Agenda Note for 37th Meeting of Standing Committee on Power System Planning in Western Region

1.0 Confirmation of the minutes of 36th meeting of the Standing Committee on Power System Planning in Western Region (SCPSPWR) held on 29.08.2013 at NRPC, Katwaria Sarai, New Delhi.

1.1 The minutes of the 36th SCPSPWR were issued vide CEA letter No.26/10/2013-SP&PA/559 - 572 dated 26th September 2013. No comments have been received from any constituent of WR. The minutes of the 36th SCPSPWR may be confirmed.

2.0 Review of Progress on Earlier Agreed Transmission Schemes.

2.1 The status of implementation of transmission projects under tariff based competitive bidding are enclosed at Annexure-1. PGCIL may furnish the status of implementation of transmission schemes under their scope.

3.0 In principle approvals granted to POWERGRID.

3.1 In order to control overvoltage condition prevailing in the grid following proposals of POWERGRID regarding commissioning of line reactors as bus reactors till the availability of the associated line were agreed in principle by CEA:

(i) Commissioning of 765 kV, 1X240 MVAR line reactors of 765 kV Satna – Gwalior S/C line at both ends as bus reactor at Satna and Gwalior 765 kV substations.
(ii) Commissioning of 1X240 MVAR line reactor associated with 765 kV Bina – Gwalior S/C line at both ends as bus reactor at Bina and Gwalior 765 kV substations.
(iii) Commissioning of 1X240 MVAR line reactor associated with 765 kV Indore – Vadodara S/C line as bus reactor at Indore 765 kV substations.
(iv) Commissioning of 2X50 MVAR line reactors associated with 400 kV MB Power TPS – Jabalpur pool D/C line as bus reactors at Jabalpur substation.
(v) Commissioning of 400 kV, 2X80 MVAR line reactors associated with Wardha – Aurangabad 400 kV D/c line as bus reactors at Aurangabad substation.
(vi) Commissioning of 1X240 MVAR line reactor associated with 765 kV Satna – Gwalior S/C (2nd) line as bus reactor at both Satna & Gwalior substations.
(vii) Commissioning of 765 kV, 1X240 MVAR line reactor of Gwalior – Jaipur 765 kV S/C line at Gwalior substation.
(viii) Commissioning of 765 kV, 2X330 MVAR line reactors of Wardha – Raipur Pool 765 kV D/C line at Wardha substation.
(ix) Commissioning of 765 kV, 2X240 MVAR line reactors of Wardha – Aurangabad 765 kV D/C line at Aurangabad substation.
(x) Commissioning of 765 kV, 2X240 MVAR line reactors of Aurangabad- Padghe 765 kV D/C line at Aurangabad substation.
(xi) Commissioning of 765 kV, 2X240 MVAR line reactor of Jabalpur pool – Dharamjaigarh 765 kV D/C line at Jabalpur pool substation.
(xii) Commissioning of 765 kV, 2X240 MVAR line reactors of Raipur pool – Champa 765 kV D/C line at Raipur pool end.
(xiii) Commissioning of 765 kV, 2X330 MVAR line reactors of Wardha – Aurangabad 765 kV D/C line at Wardha sub-station.
(xiv) Commissioning of 765 kV, 2X240 MVAR line reactors of Raipur Pool– Wardha 765 kV D/C line at Raipur Pool sub-station.

3.2 These line reactors commissioned as bus reactors were to be restored as line reactors with commissioning of the associated lines. POWERGRID may kindly intimate the present status of the line reactors commissioned as bus reactors and the associated lines.

S.No.	Line Reactors (MVAR)	Substation	Associated Transmission Line	Date / schedule of	
				Comm. of Line reactor as Bus Reactor	Restoration of Bus Reactor as Line Reactor
(i)	1X240	Satna 765 kV S/s	Satna – Gwalior 765 kV S/C line		
	1X240	Gwalior 765 kV S/s	Satna – Gwalior 765 kV S/C line		
(ii)	1X240	Bina 765 kV S/s	Bina – Gwalior 765 kV S/C line		
	1X240	Gwalior 765 kV S/s	Bina – Gwalior 765 kV S/C line		
(iii)	1X240	Indore 765 kV S/s	Indore – Vadodara 765 kV S/C line		
(iv)	2X50	Jabalpur 400 kV S/s	MB Power TPS – Jabalpur pool 400 kV D/C line		
(v)	2X80	Aurangabad 400 kV S/s	Wardha – Aurangabad 400 kV D/c line		
(vi)	1X240	Satna 765 kV S/s	Satna – Gwalior 765 kV S/C line (2nd line)		
	1X240	Gwalior 765 kV S/s	Satna – Gwalior 765 kV S/C line (2nd line)		
(vii)	1X240	Gwalior 765 kV S/s	Gwalior – Jaipur 765 kV S/C line		
(viii)	2X330	Wardha 765 kV S/s	Wardha – Raipur Pool 765 kV D/C line		
(ix)	2X240	Aurangabad 765 kV S/s	Wardha – Aurangabad 765 kV D/C line		
(x)	2X240	Aurangabad 765 kV S/s	Aurangabad-Padghe 765 kV D/C line		
(xi)	2X240	Jabalpur 765 kV S/s	Jabalpur pool – Dharamjaigarh 765 kV D/C line		
(xii)	2X240	Raipur pool 765 kV S/S	Raipur pool – Champa 765 kV D/C line		
(xiii)	2x330	Wardha 765 kV S/s	Wardha-Aurangabad 765 kV D/C line		
(xiv)	2x240	Raipur Pool 765 kV S/s	Raipur Pool– Wardha 765 kV D/C		

			line		

3.3 Members may please note.

4.0 Procurement of one no. 333 MVA, 765/400 kV and two nos. of 500 MVA, 765/400 kV ICTs for Western Region – POWERGRID proposal.

4.1 POWERGRID has informed that at present seventy two (72) units of 500 MVA, 765/400 kV single phase ICTs and twelve (12) units of 333 MVA 765/400 kV single phase ICTs are under operation at various 765/400 kV substations in Western Region as shown below:

S.No	Name of Substation	Capacity(MVA)	No.of ICT of 500 MVA	No.of ICT of 333 MVA
1	Bilaspur	4500	9	0
2	Wardha	4500	9	0
3	Seoni	4500	9	0
4	Satna	2000		6
5	Indore	3000	6	0
6	Jabalpur	3000	6	0
7	Sholapur	3000	6	0
8	Gwalior	3000	6	0
9	Tamnar	4500	9	0
10	Kotra	4500	9	0
11	Durg	1500	3	0
12	Bina	2000		6
		TOTAL	**72**	**12**

4.2 Further POWERGRID has stated that these transformers were manufactured at off-shore works of ABB, Hyundai, BTW and Hyosung. If any of these units fails, it has to be transported to off shore works of manufacturer for the repair, which is a time consuming process. During the repair period, failure of second unit may lead to overloading of the other units operating in parallel and may cause transmission constraint at 765 kV level specially in view of ensuing commissioning of various power projects in the Region.

4.3 POWERGRID has proposed to procure two (2) nos. single phase 500 MVA capacity and one (1) no. single phase 333 MVA capacity 765/400 kV ICT as spare for Western Regional Grid.

4.4 Earlier in the 35th meeting of Standing Committee on Power System Planning in WR, POWERGRID has made a similar proposal of procurement of spare 765/400 kV ICTs in WR which was not agreed by the WR constituents and POWERGRID was requested to give priority to periodic maintenance and monitoring of these ICTs.

4.5 Members may deliberate.

5.0 Procurement of spare 765 kV reactors for Western Region – POWERGRID proposal.

5.1 POWERGRID has informed that at present six (6) units of 765 kV, 110 MVAR single phase reactors and one hundred two (102) units of 765 kV, 80 MVAR single phase reactors are under operation at their substations in Western Region. The voltage at 765 kV buses in WR is generally high and failure of any one unit of the reactor may lead to overvoltage in the system.

5.2 POWERGRID has proposed procurement of one unit of 765 kV, 110 MVAR single phase reactors and two units of 765 kV, 80 MVAR single phase reactors as spare reactors for Western Regional Grid.

5.3 Members may discuss.

6.0 Procurement of spare 125 MVAR, 400 kV reactors for Western Region – POWERGRID proposal.

6.1 POWERGRID has informed that at present ten (10) units of 400 kV, 125 MVAR reactors are under operation and fifteen (15) units of 400 kV, 125 MVAR reactors are under various stages of commissioning at their substations in Western Region. The voltage at 400 kV buses in WR is generally high and failure of any one unit of the reactor may lead to overvoltage in the system.

6.2 POWERGRID has proposed procurement of two unit of 400 kV, 125 MVAR reactors as spare reactors for Western Regional Grid.

6.3 Members may discuss.

7.0 Provision of 400/220 kV, 2X500 MVA ICTs at Parli (POWERGRID) 400 kV and LILO of 220 kV MSETCL lines at Parli (PG).

7.1 The 400kV Parli(PG) switching Station is connected to following lines:

(i) Parli(PG)- Parli(MSETCL) 400kV D/c
(ii) Parli(PG)-Wardha 400kV D/c
(iii) Parli(PG)-Bhadrawati 400kV D/c
(iv) Parli(PG)-Pune 400kV D/c
(v) Parli(PG)-Solapur 400kV D/c

7.2 POWERGRID has informed that the existing 2X315 MVA 400/220 kV ICTs at Parli (MSETCL) gets loaded above 280 MW per ICT and the 500 MVA ICT gets loaded beyond 490 MW. Generally, several 220 kV outgoing lines from Parli (MSETCL) Substation are loaded beyond 150 MW. In particular, the 220kV Parli-Murud line is frequently loaded beyond 200 MW and 220kV Parli-Parbhani line also is loaded above 200 MW. Outage of any one or more line would lead to overloading of other lines and eventual cascade tripping.

7.3 To avoid overloading of the ICTs / 220 kV lines, POWERGRID has proposed that installation of 2x500MVA, 400/220kV ICTs at Parli(PG) Station. Provision of ICTs at Parli (PG) substation would require 220kV lines for dispersal of power.

7.4 Members/ MSETCL may deliberate. MSETCL may propose the 220 kV outlets for dispersal of power from Parli (PG) 400/220 kV substation.

8.0 Contingency arrangement for transmission lines emanating from Champa 765/400 kV pooling station- Agenda by POWERGRID.

8.1 The evacuation system of IPP generation projects totaling to about 21000 MW of installed capacity consists of establishment of 765/400 kV pooling stations at Raigarh (Kotra), Raigarh (Tamnar), Champa, interconnection of pooling stations, Champa/ Raigarh – Raipur – Wardha – Aurangabad 765 kV corridor and Champa-Dharamjaigarh 765 kV corridor.

8.2 At Champa 765/400 kV pooling station power from IPP generation projects KSK Mahanadi (3600 MW), Lanco Amarkantak (1320 MW) and NTPC Lara (1600 MW) generation project will be pooled. The 765 kV transmission lines planned from Champa 765/400 kV pooling stations, interalia, includes Champa – Raipur pool 765 kV D/C line, Champa – Dharamjaigarh 765 kV S/C line, Champa – Raigarh (Kotra) 765 kV S/C line. POWERGRID has informed that these lines shall be progressively commissioned during the period March 2014 to May 2014 whereas there is delay in commissioning of the 765/400 kV Champa pooling station due to delay in land acquisition.

8.3 POWERGRID has informed that at present the power from the IPP generation projects in Chhattisgarh is mainly being wheeled through Raipur- Wardha 400 kV D/c line. To provide another path for IPP generation projects in Chhattisgarh, the following contingency arrangement has been proposed by POWERGRID:

Contingency arrangement at Champa 765/400 kV pooling station

Phase-I

- Interconnection of Raipur Pool- Champa pool 765 kV D/C (by bunching ckt-I & ckt-II) with Champa pool- Dharamjaigarh 765 kV S/C line bypassing Champa pooling station so as to form Raipur pool – Dharamjaigarh 765 kV S/C line. Schematic shown in exhibit-I.

Phase – II

- Interconnection of Raipur Pool- Champa pool 765 kV D/C (ckt-I) with Champa pool - Dharamjaigarh 765 kV S/C line bypassing Champa pooling station so as to form Raipur pool – Dharamjaigarh 765 kV S/C line.

- Interconnection of Raigarh Pool (Kotra) - Champa pool 765 kV S/C line with Raipur pool – Champa pool 765 kV (ckt-II) bypassing Champa pooling station so as to form Raigarh (Kotra) – Raipur pool 765 kV S/C line.

  Schematic shown in exhibit-II.

Exhibit-I

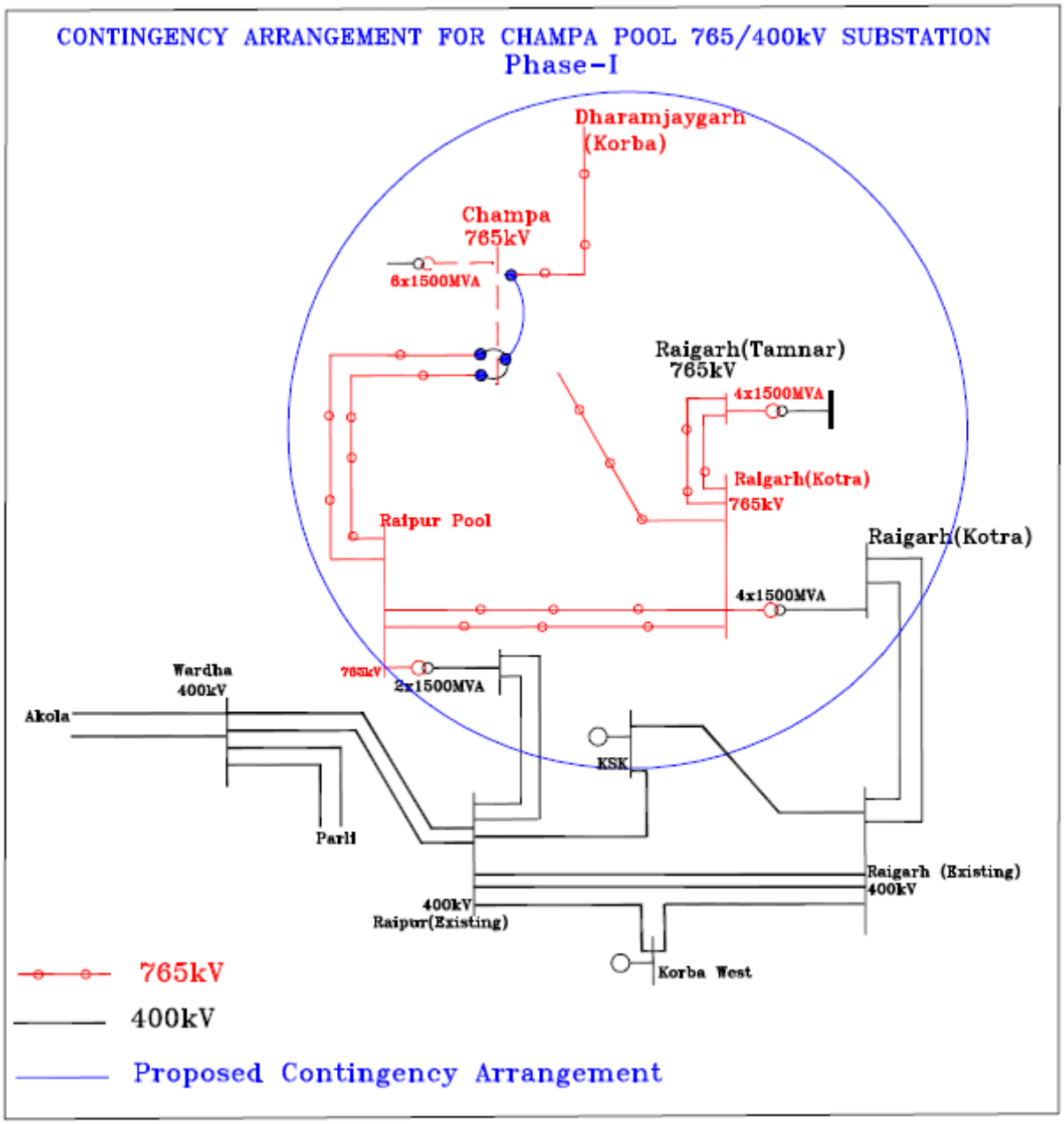
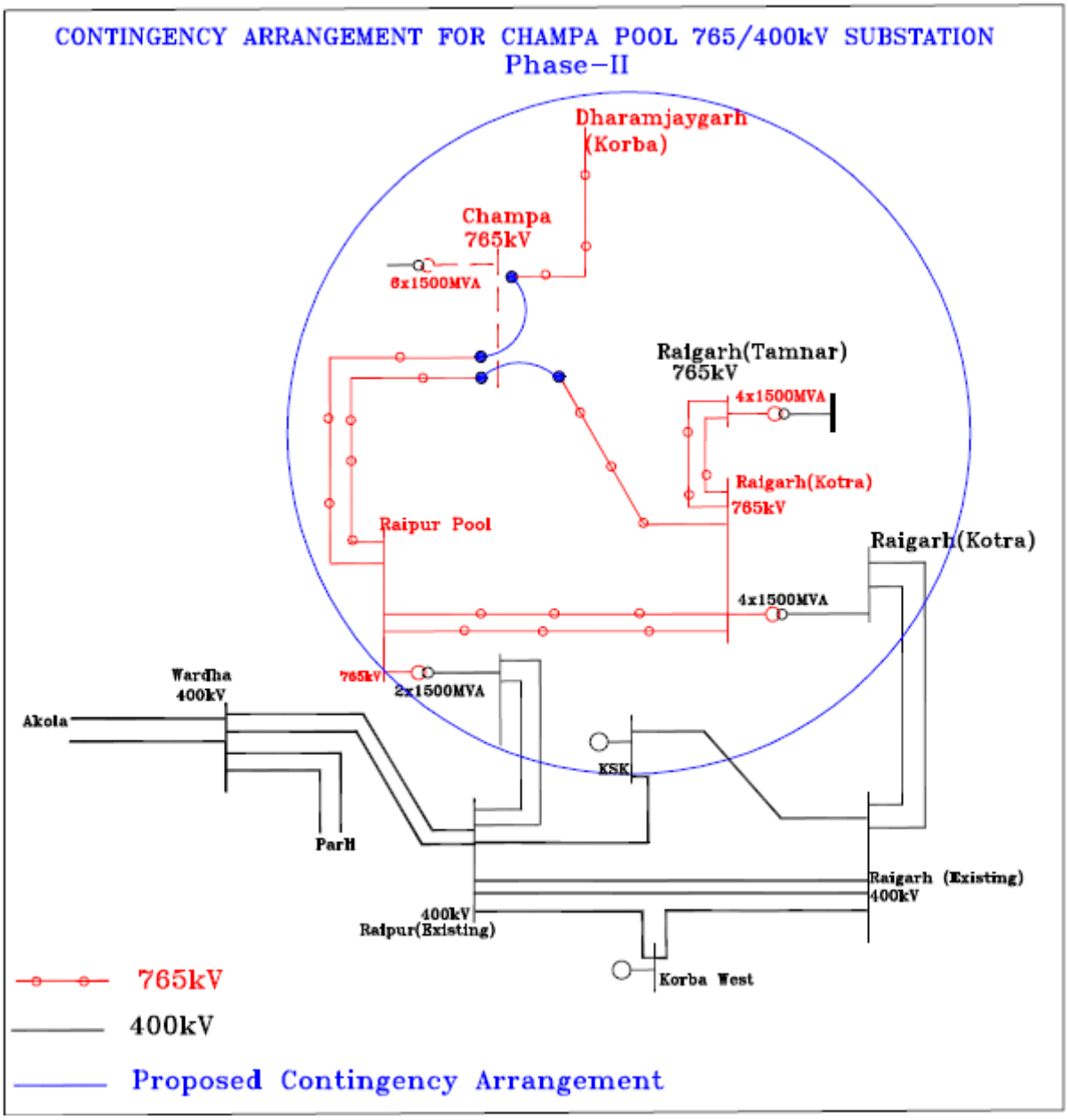

CONTINGENCY ARRANGEMENT FOR CHAMPA POOL 765/400kV SUBSTATION
Phase-I
Dharamjaygarh
(Korba)
Champa
765kV
6x1500MVA
Raigarh(Tamnar)
765kV
4x1500MVA
Raigarh(Kotra)
765kV
Raipur Pool
Raigarh(Kotra)
4x1500MVA
765kV
2x1500MVA
Wardha
400kV
Akola
Parli
KSK
Raigarh (Existing)
400kV
400kV
Raipur(Existing)
Korba West
765kV
400kV
Proposed Contingency Arrangement

Exhibit-II



8.4 The load flow studies carried out by POWERGRID with the above contingency arrangement is enclosed as **Annexure- 2** It is observed that about 780 MW of power can be evacuated through this arrangement provided that the Dharamjaigarh – Jabalpur 765 kV D/C under implementation by M/s Sterlite Grid Ltd (scheduled for commissioning by March 2014) is available. Without Dharamjaigarh – Jabalpur 765 kV D/C line an additional 350 – 400 MW power can only be evacuated through the contingency arrangement.

8.5 In view of the delay in implementation of some elements of the planned evacuation system due delay in land acquisition and RoW issues, the proposal of POWERGRID was agreed in principle as it provided an additional outlet for the IPPs in Chhattisgarh which are getting commissioned.

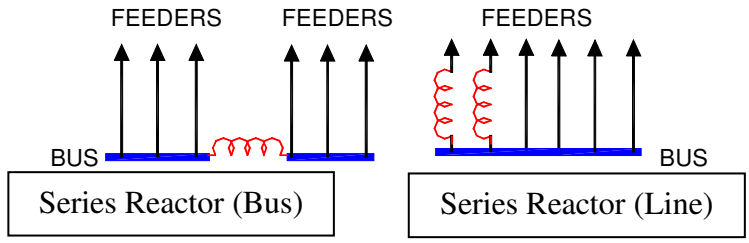
8.6 POWERGRID may intimate the status of the contingency arrangement and progress of Champa pooling station and associated transmission lines and also the status of Dharamjaigarh – Jabalpur 765 kV D/C line.

8.7 Members may concur with the above proposal.

9.0 Proposal of Series Reactors in Western Region- Agenda by POWERGRID

9.1 The demand of Western Region (WR) is growing exponentially. To meet this increasing demand, many generation projects are under implementation and some of the projects are in the advanced stage of commissioning. Due to availability of natural resources in select pockets, huge generation addition is expected in certain pockets of Chhattisgarh and Wardha area of Maharashtra. With the increased generation capacity in above areas, it has been observed that for 2016-17 condition the short circuit level of Wardha and Champa Pooling Station in WR are exceeding their design limits of 40 kA/ 50 kA.

9.2 **Series Reactors:** Series reactor can be provided in two ways for controlling fault current i.e (i) Series Reactor on Bus Sectionalizer and (ii) Series Reactor on the transmission lines. The characteristic of both are as follows:



(i) **Series Reactor (Bus)**

- The effectiveness of the series reactor on bus sectionaliser would vary depending upon where, it is located. When properly located, due to current infeed effect, even a small value is very effective in controlling the short circuit.

- The effect of the series reactor on bus sectionaliser is very prominent at small values and its effect diminishes as the impedance value increases. **Table-1** shows the effect of bus reactor which has equal feed on both sides.

Table-1: Effect of series bus reactor on Short Circuit.

X(ohm)	SC Current (kA)	Change in SC (kA)

X(ohm)	SC Current (kA)	Change in SC (kA)
0	65.0343	-
2	57.3708	7.6635
4	52.8414	4.5294
6	49.8504	2.991
8	47.7278	2.1226
10	46.1433	1.5845
12	44.9155	1.2278
14	43.9360	0.9795
16	43.1365	0.7995
18	42.4715	0.665
20	41.9097	0.5618

- Effect of series reactor (bus) on adjacent buses is less.

- If the feed for injection and drawl are not equally distributed then high current may flow through the series bus reactor causing a voltage drop.

- Very difficult to install on existing bus where provision has not been kept.

(ii) **Series Reactor (Line)**

- Series reactor on transmission line is very effective when numbers of feeders contributing towards maximum short circuit current are less.

- Series reactor on transmission line would be effective in reducing the short circuit level of both From bus and To bus between the line is connected.

- High fault feed is usually combined effect of small line and connected to a strong bus. Hence Series Reactor on such lines may be even higher than the line impedance.

Addition of Series Reactor may affect the load flow on the line under steady state condition. In such conditions compensating devices like capacitor may be required.

9.3 A base case for 2017-18 conditions for Load Flow & Short Circuit Study has been established. At Wardha 400kV, it is observed that the short circuit level is beyond the designed limits of 40 kA. The short circuit level at Wardha 400 kV bus is mainly contributed from 3 nos. 765/400 kV, 1500 MVA transformers, Mauda 400 kV D/c line and Warora Pool 400 kV D/c line (LILO of Wardha – Parli 400 kV D/c (quad) line at Warora Pool is approved in the 36th Standing Committee Meeting in Western Region under Chattisgarh Supplementary Scheme). Whereas on the Wardha 765 kV side, the short circuit level is beyond the designed limits of 40 kA and major contribution is from the transformers and Seoni 765 kV D/c line.

At 400kV Champa also, the short circuit level is coming out to be beyond the designed limits of 50 kA. The major contribution at 400kV Champa is from 765kV

ICT. Similarly on 765kV Champa, the short circuit level is beyond the designed limits of 50 kA and major contribution is from Dharamjaygarh Pool 765kV 2xS/c line, Raigarh Pool (Kotra) 2xS/c line, Raipur Pool 765kV D/c line.

The Load Flow & short circuit results of 765/400kV Wardha & Champa Pool substations are given below at Figure-1(a), 1(b), 1(c) and 1(d) respectively.

Figure-1(a): Wardha 400 kV (Load Flow Results)

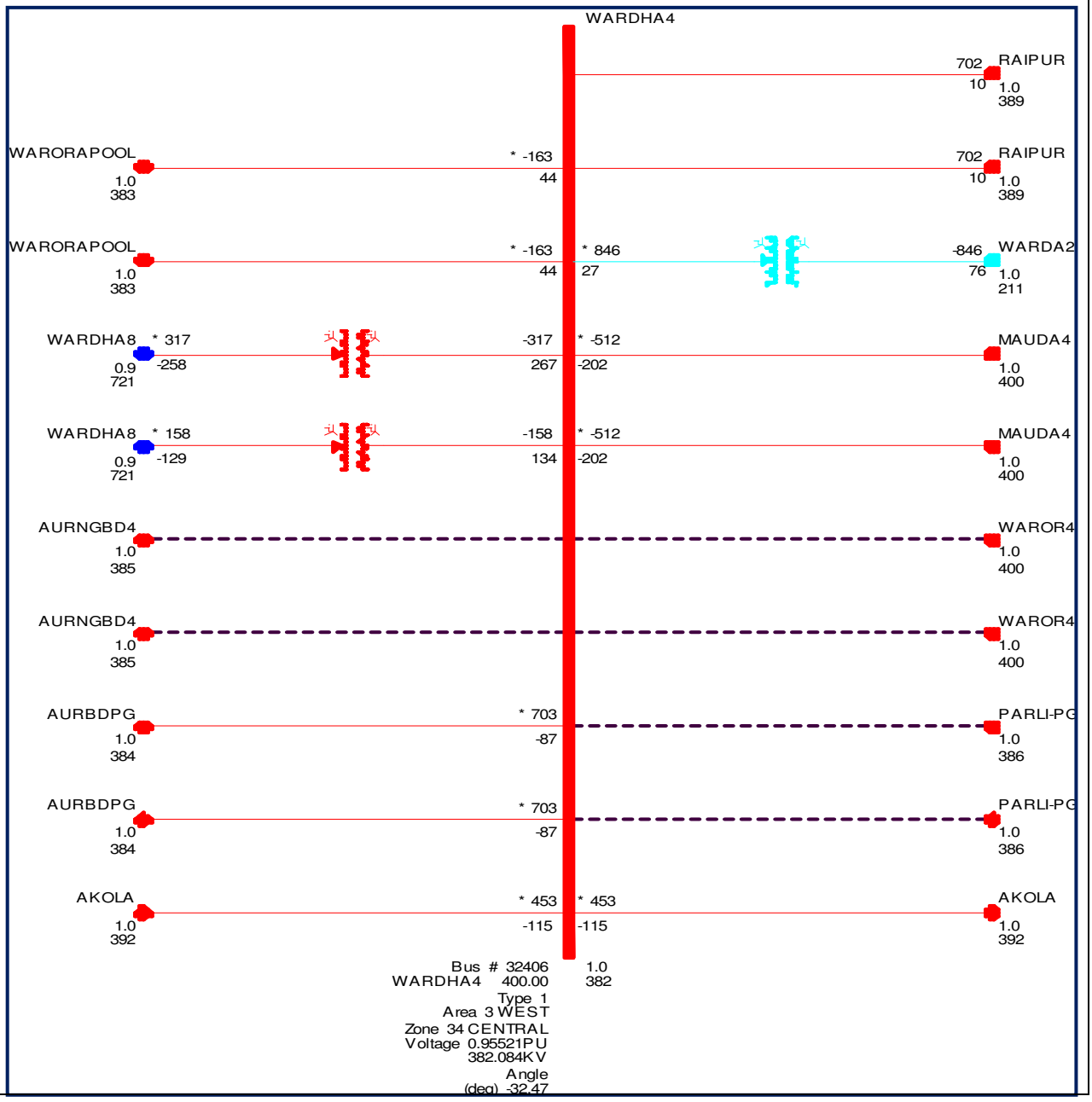


Figure-1(a): Wardha 765 kV (Load Flow Results)

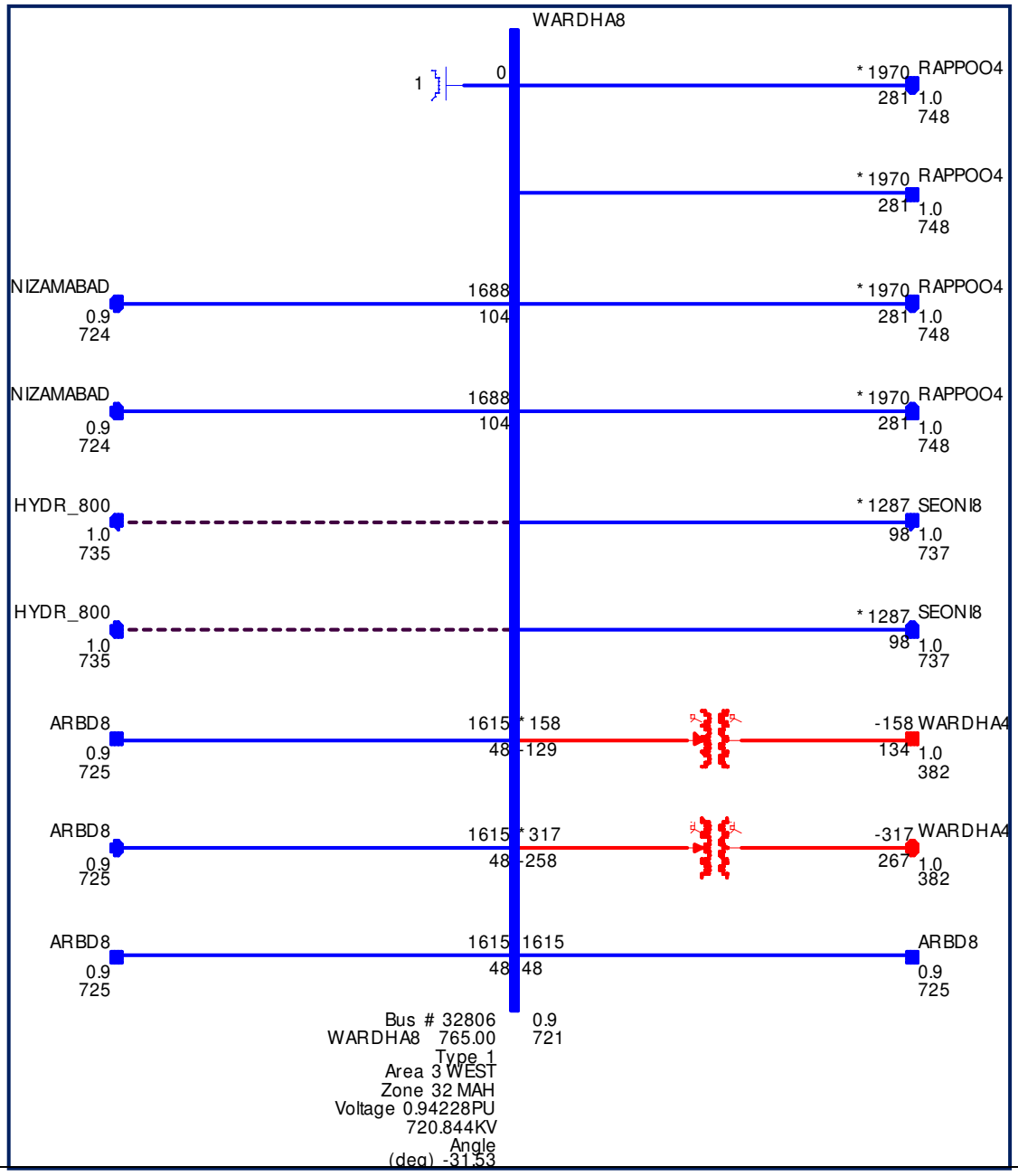


Figure-1(b): Wardha 400 kV (Short Circuit Results)

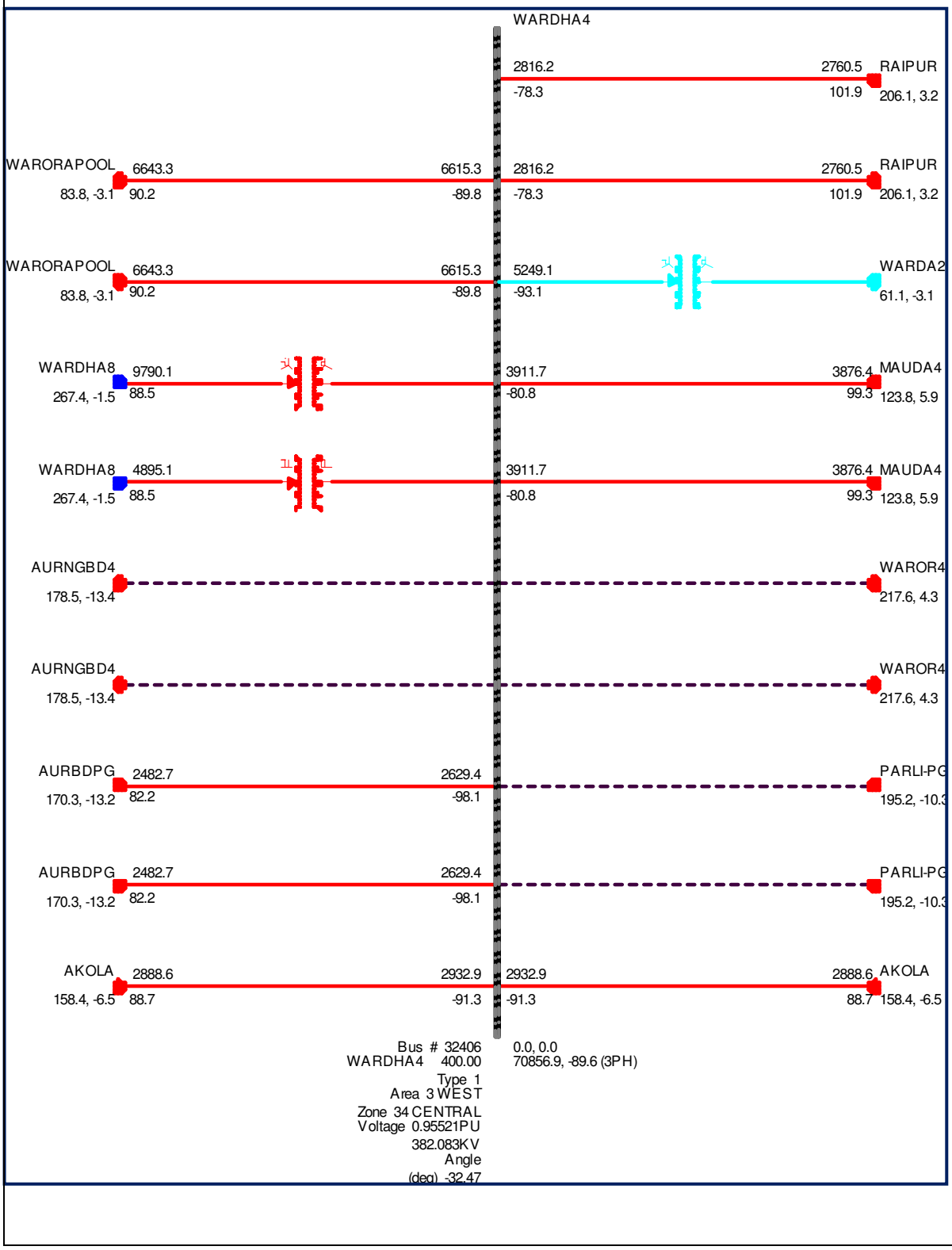


Figure-1(b): Wardha 765 kV (Short Circuit Results)

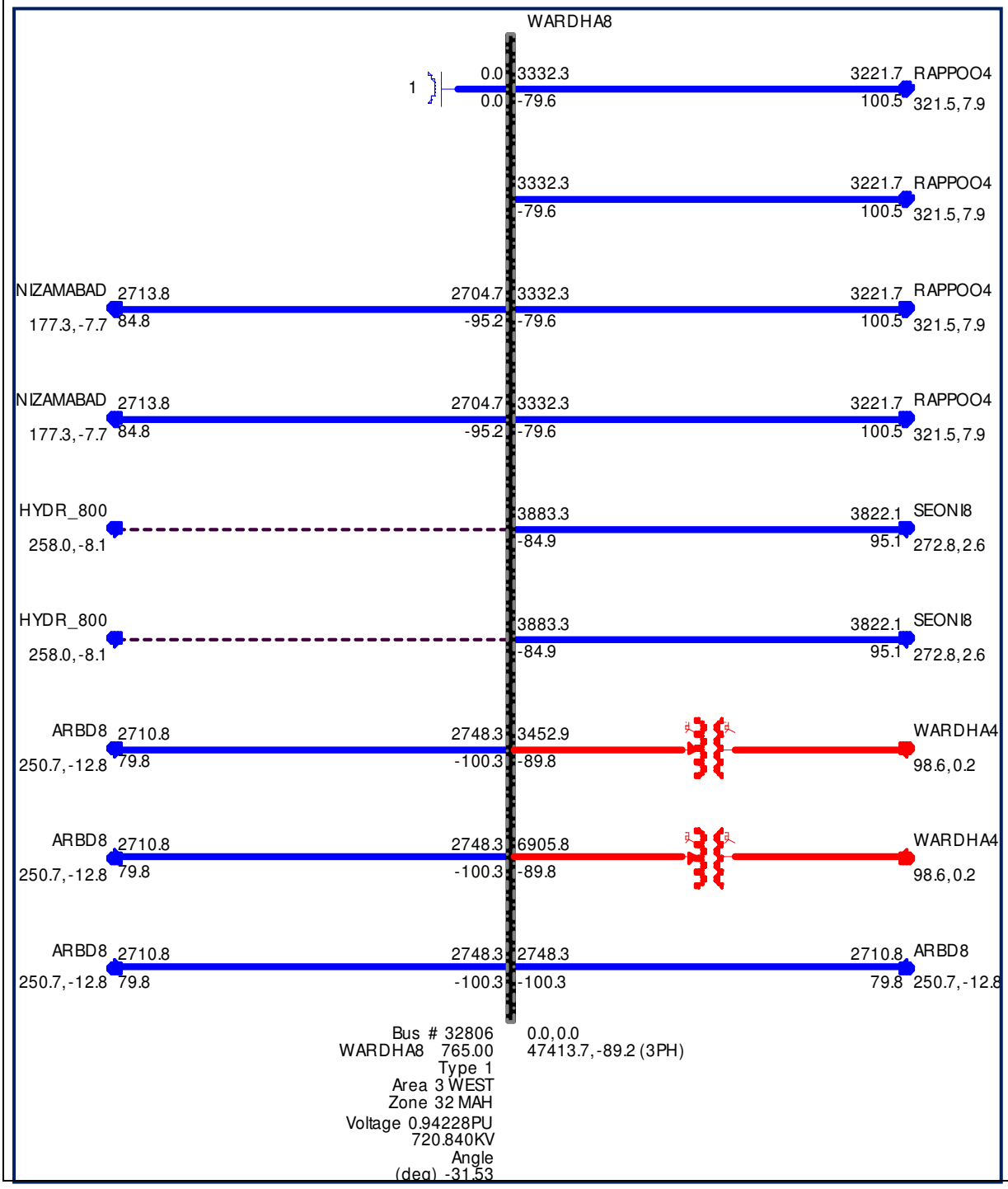


Figure-1(c): Champa Pool 400 kV (Load Flow Results)

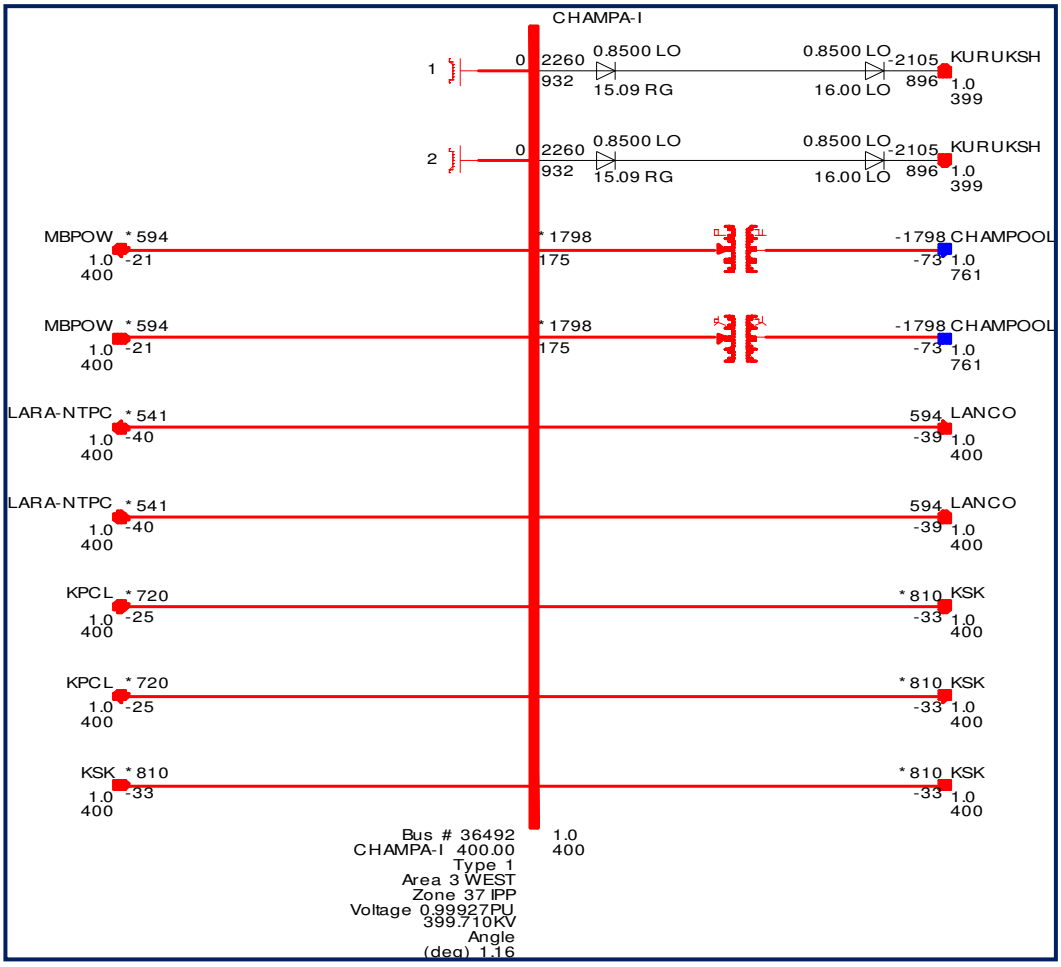


Figure-1(c): Champa Pool 765 kV kV (Load Flow Results)

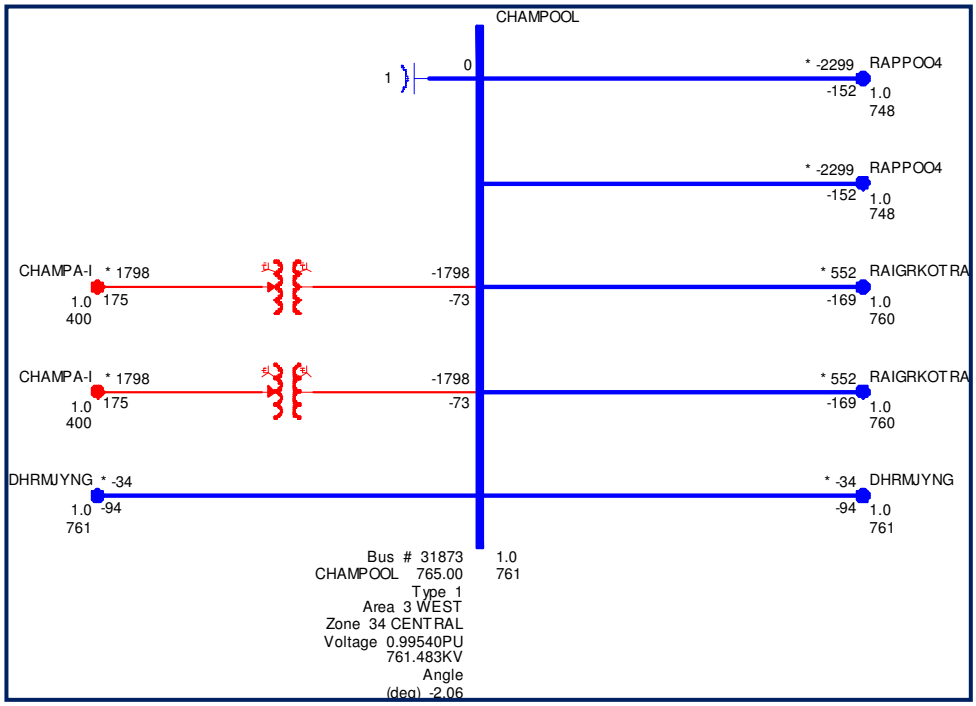


Figure-1(d): Champa Pool 400 kV (Short Circuit Results)

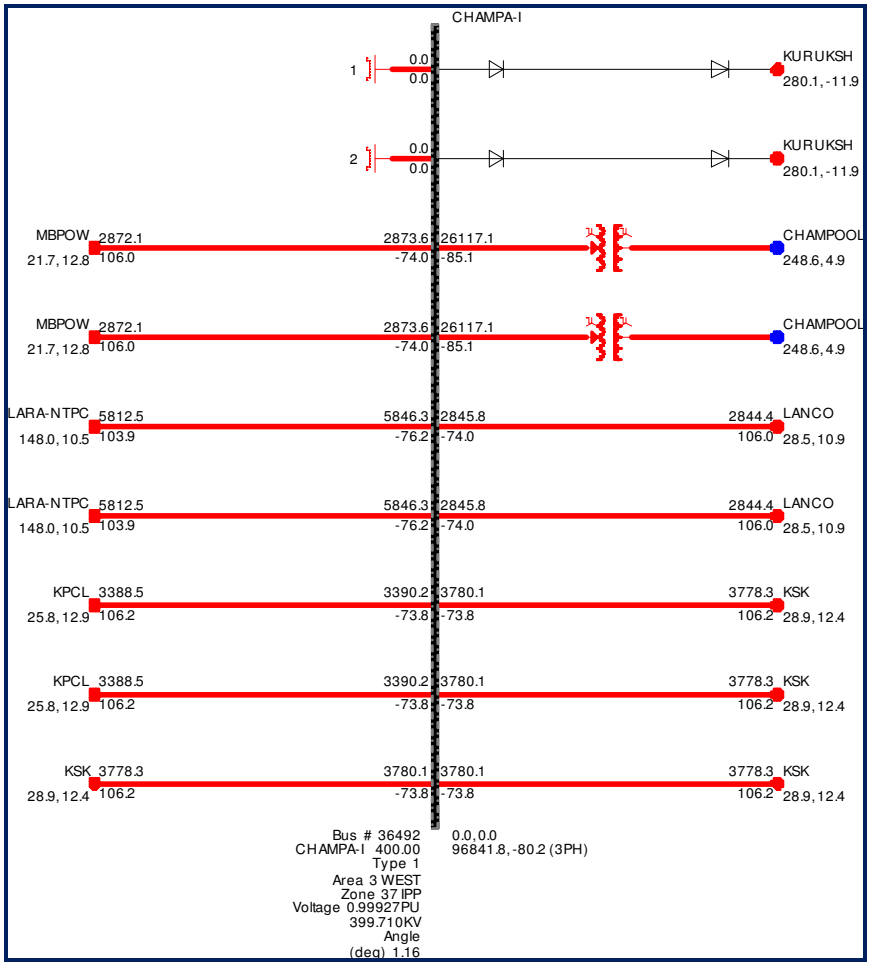
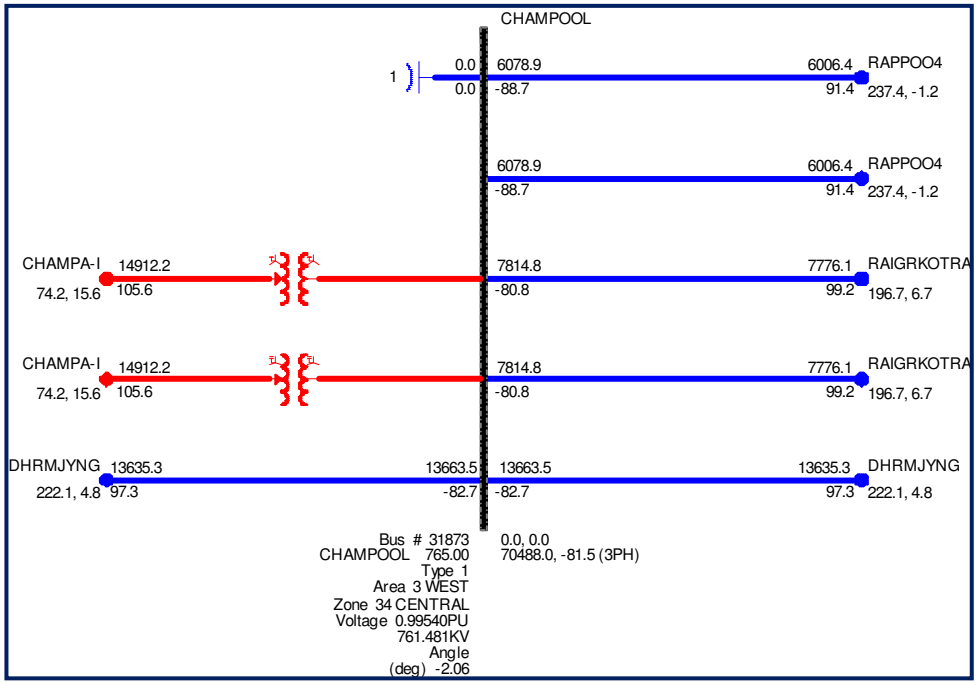


Figure-1(d): Champa Pool 765 kV (Short Circuit Results)



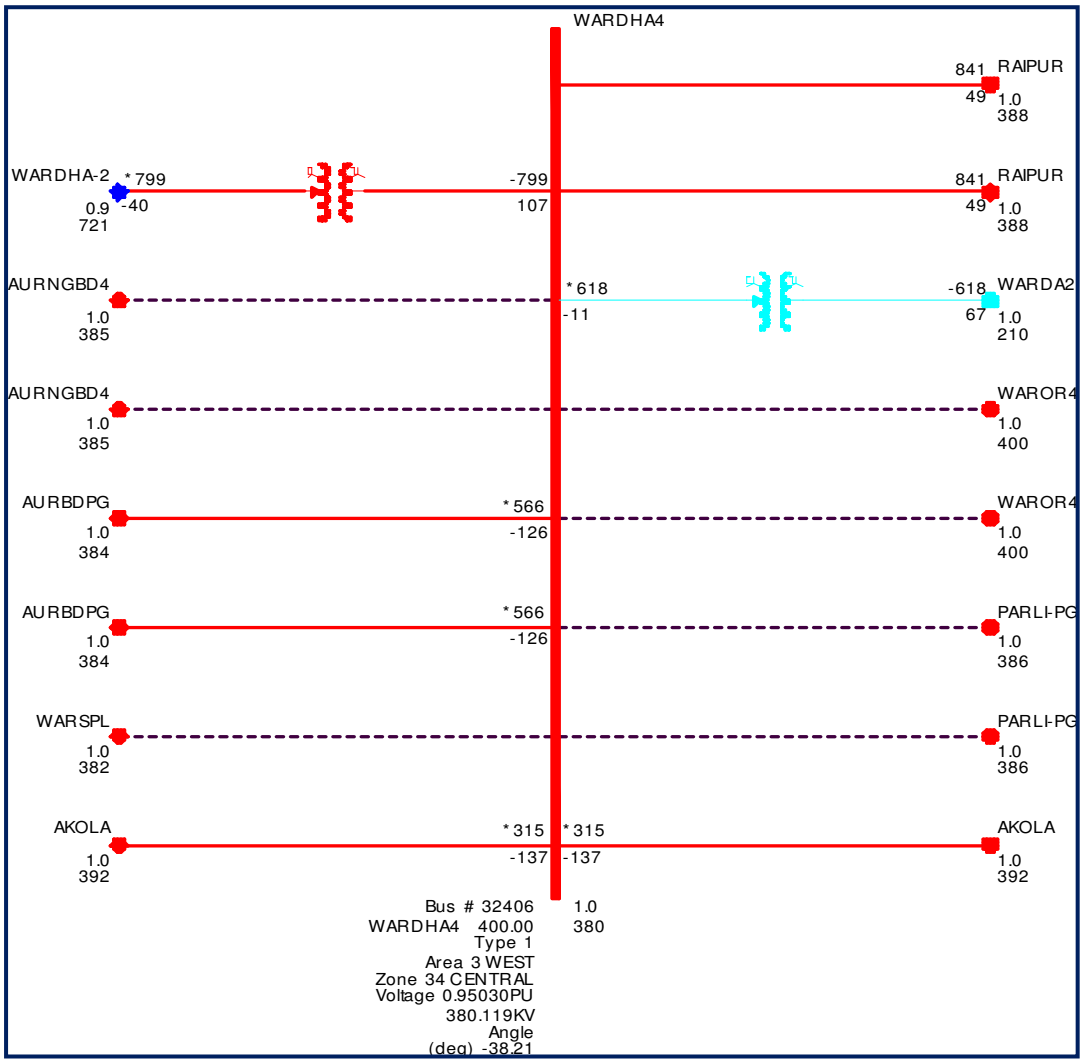
(i) **Mitigating the Short Circuit levels at Wardha & Champa**

To mitigate the short circuit levels at Wardha & Champa Pooling station, detailed studies were carried out. Based on the results, the proposal given at Para 9.4 and 9.5 was carried and short circuit current was observed within their limits.

At Wardha 400 kV bus, the short circuit values are **37.98 kA & 39.96 kA** (designed for 40 kA) on split buses and on the 765 kV bus, the short circuit value is about **38.71 kA & 38.45 kA** (designed for 40 kA) on split buses. Similarly, the short circuit level at Champa Pooling Station 400 kV bus is about **49.46 kA & 48.88 kA** (designed for 50 kA) on split buses and on 765 kV bus, short circuit value is about **40.0 kA & 31.1 kA** (designed for 50 kA) on split buses.

The Load Flow & short circuit results of 765/400kV Wardha & Champa Pool substations are given below at **Figure-2(a), 2(b), 2(c) and 2(d)** respectively.

Figure-2(a): Wardha 400 kV (Load Flow Results)



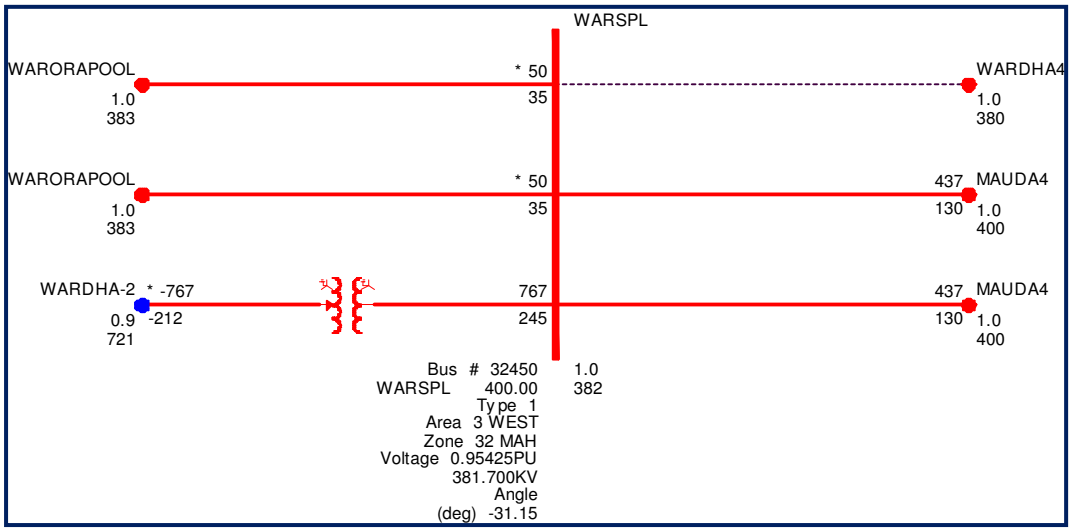
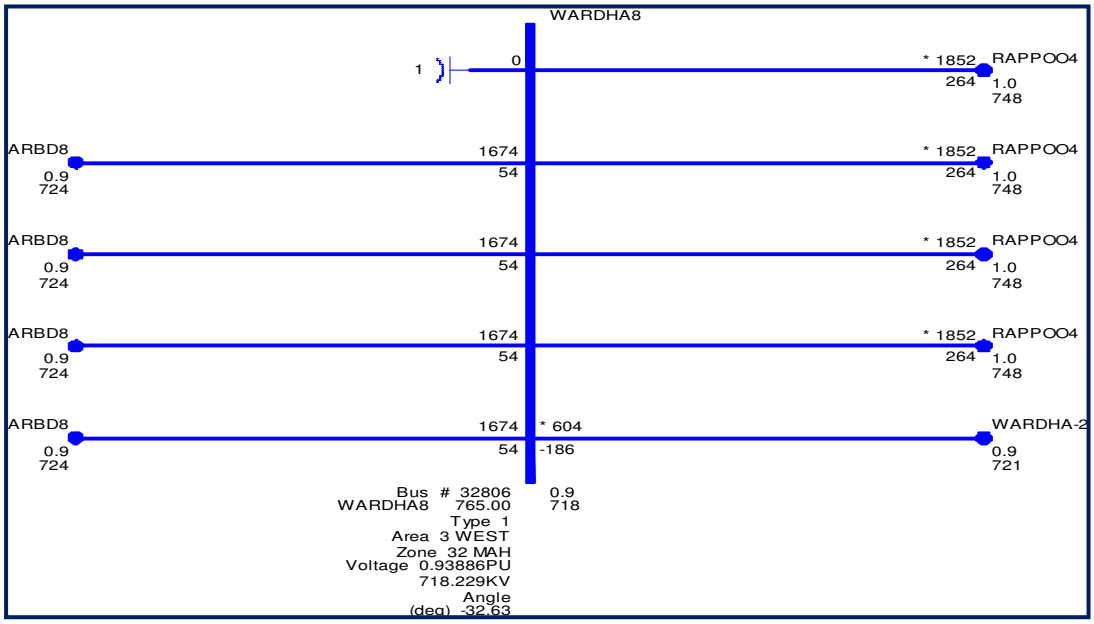


Figure-2(a): Wardha 765 kV (Load Flow Results)



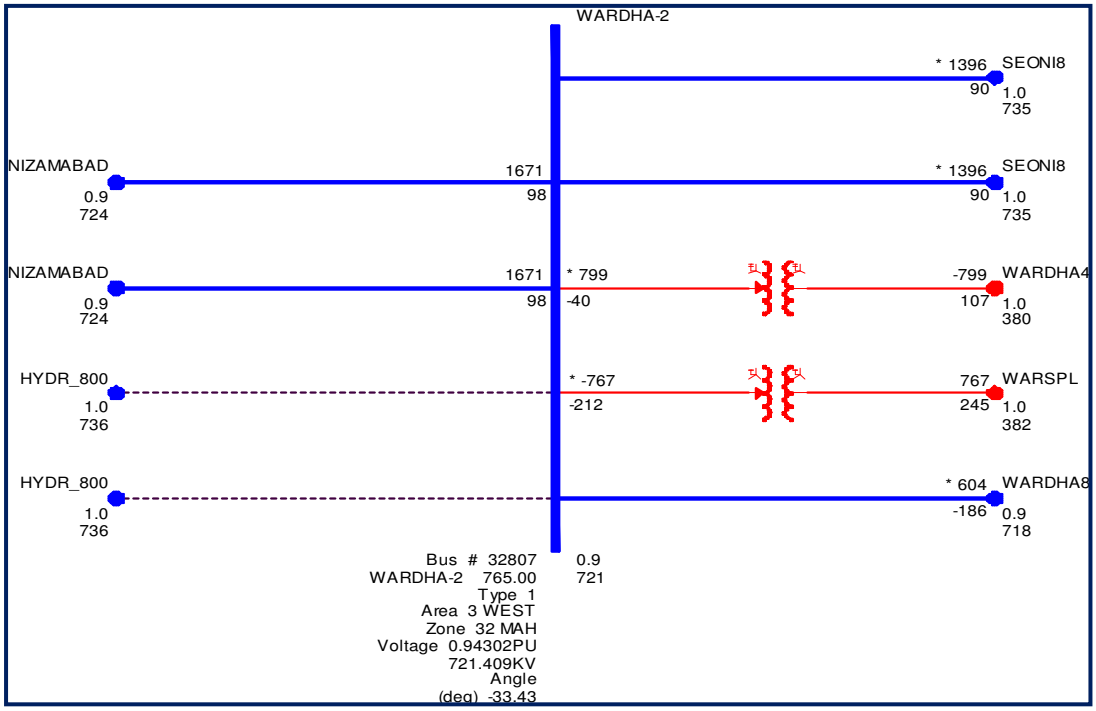
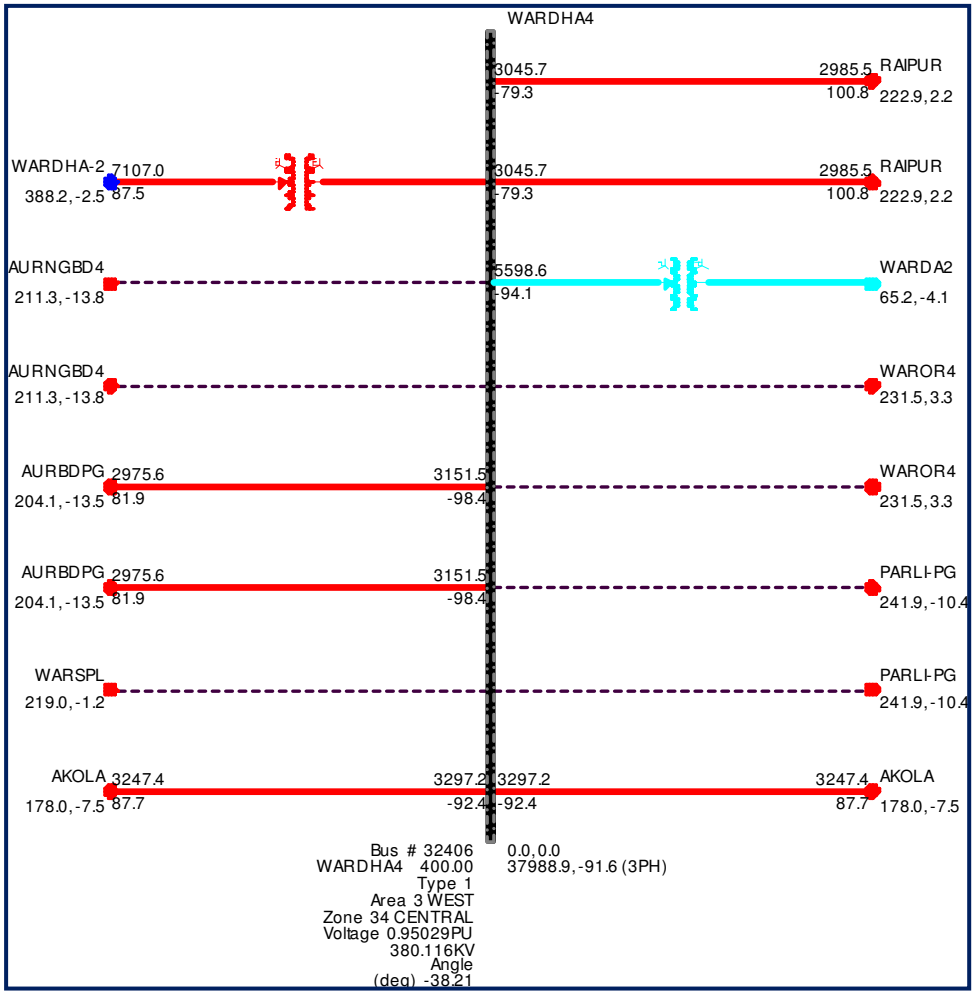


Figure-2(b): Wardha 400 kV (Short Circuit Results)



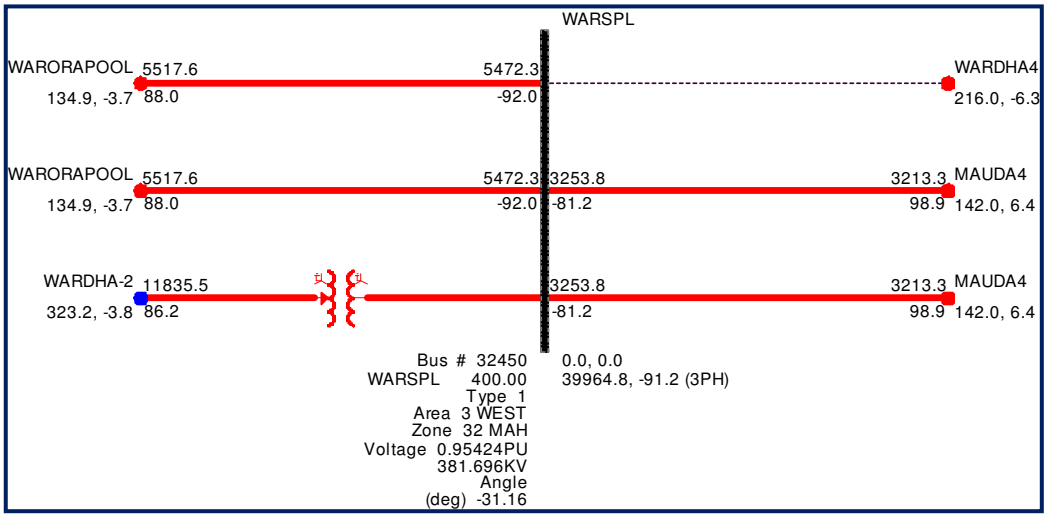
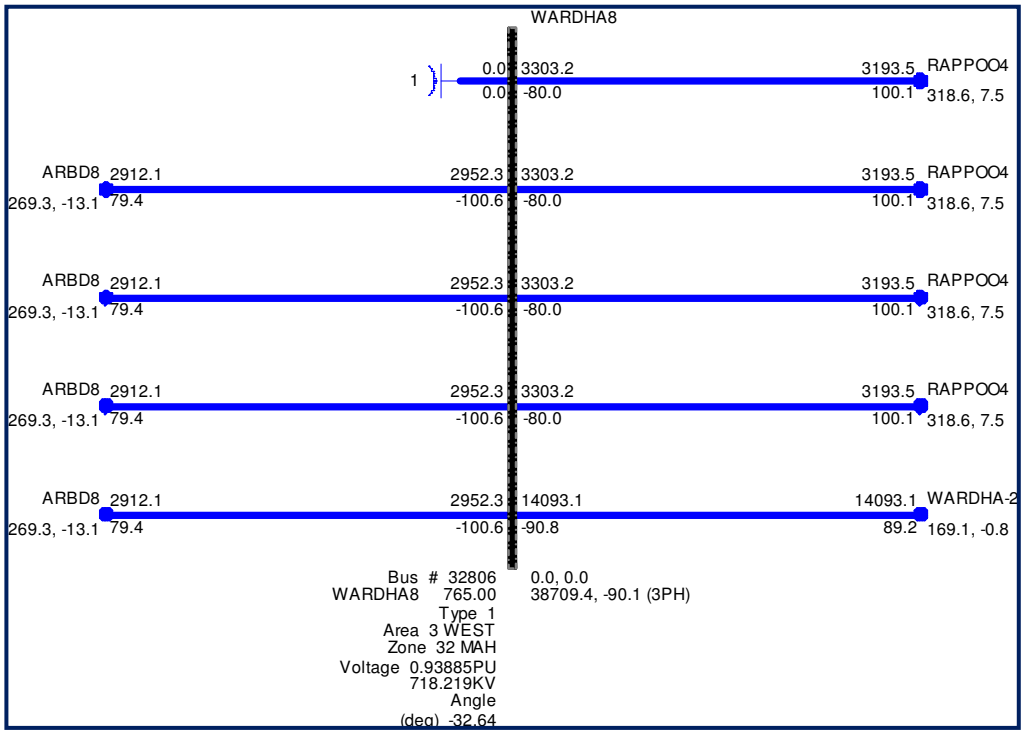


Figure-2(b): Wardha 765 kV (Short Circuit Results)



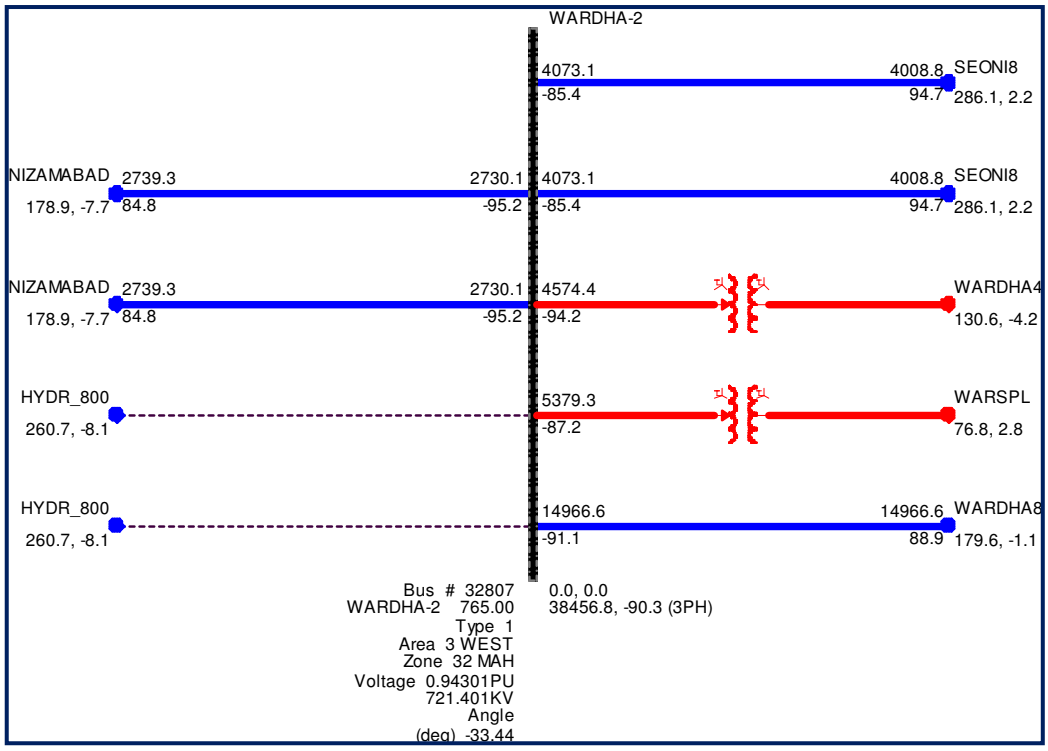
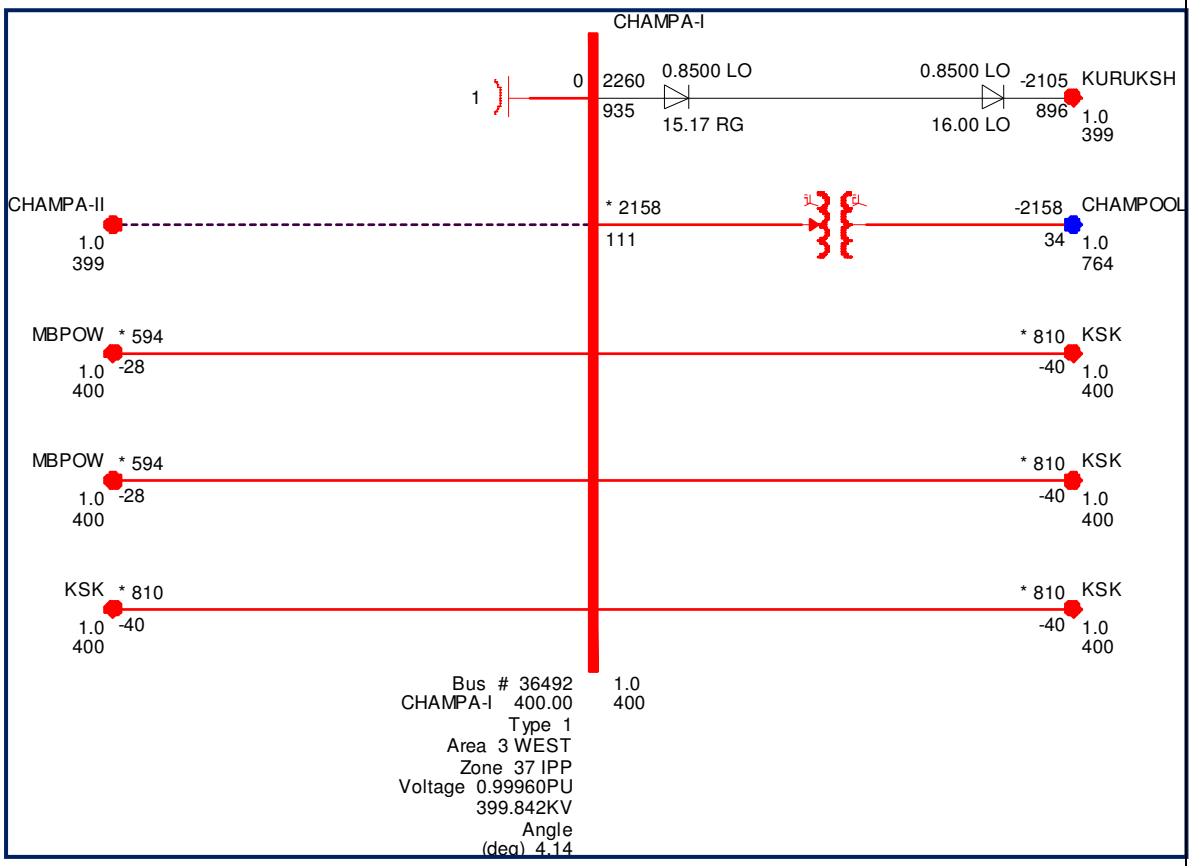


Figure-2(c): Champa Pool 400 kV (Load Flow Results)



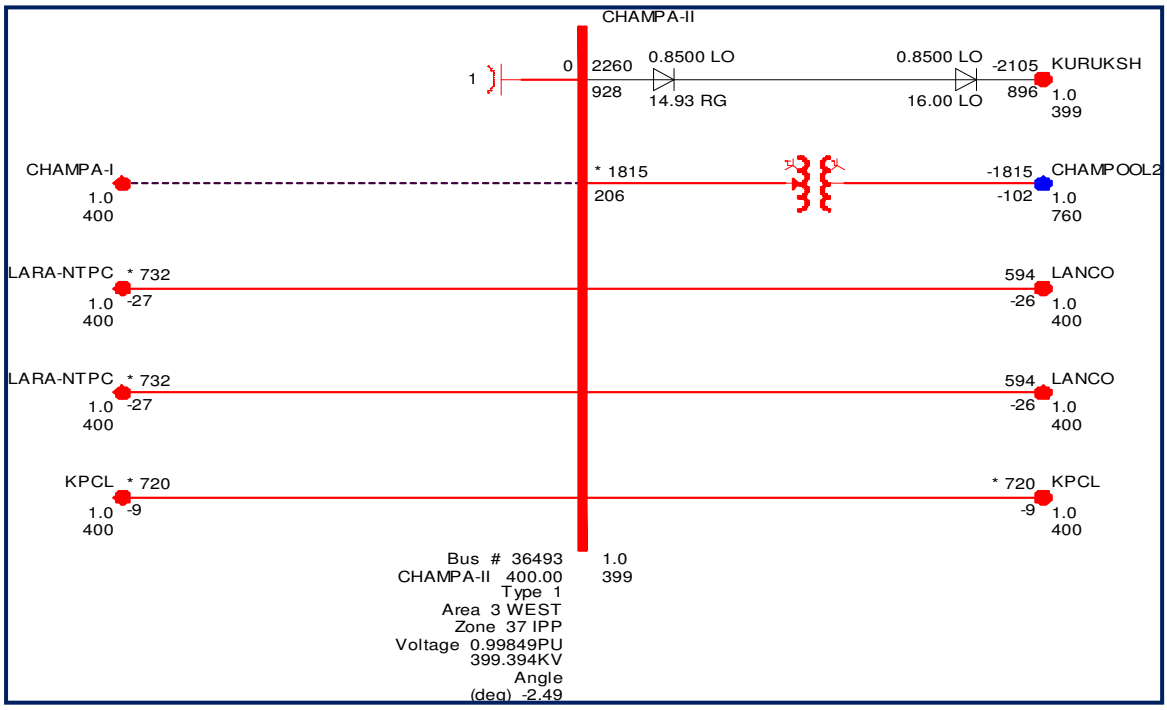


Figure-2(c): Champa Pool 765 kV (Load Flow Results)

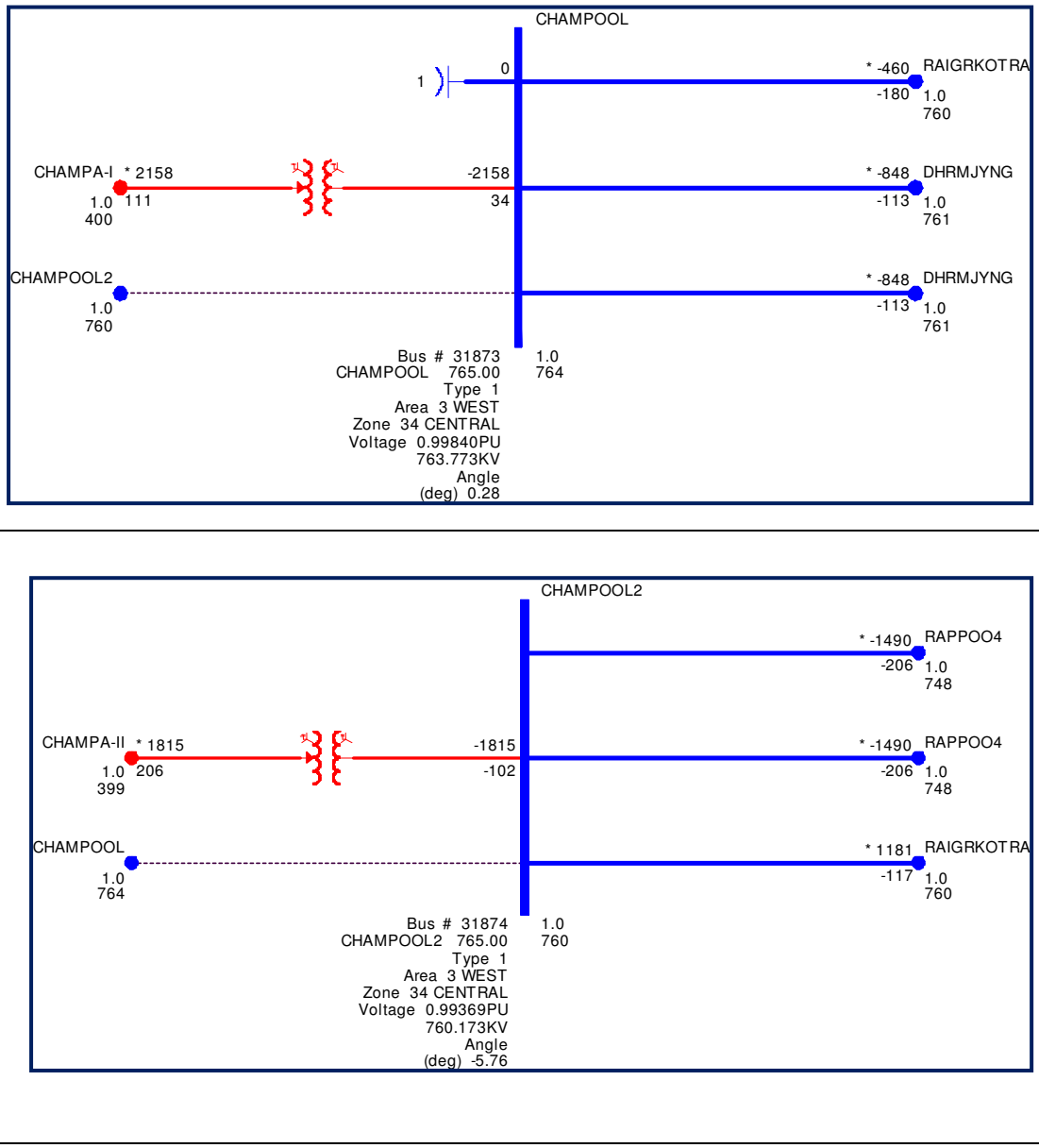
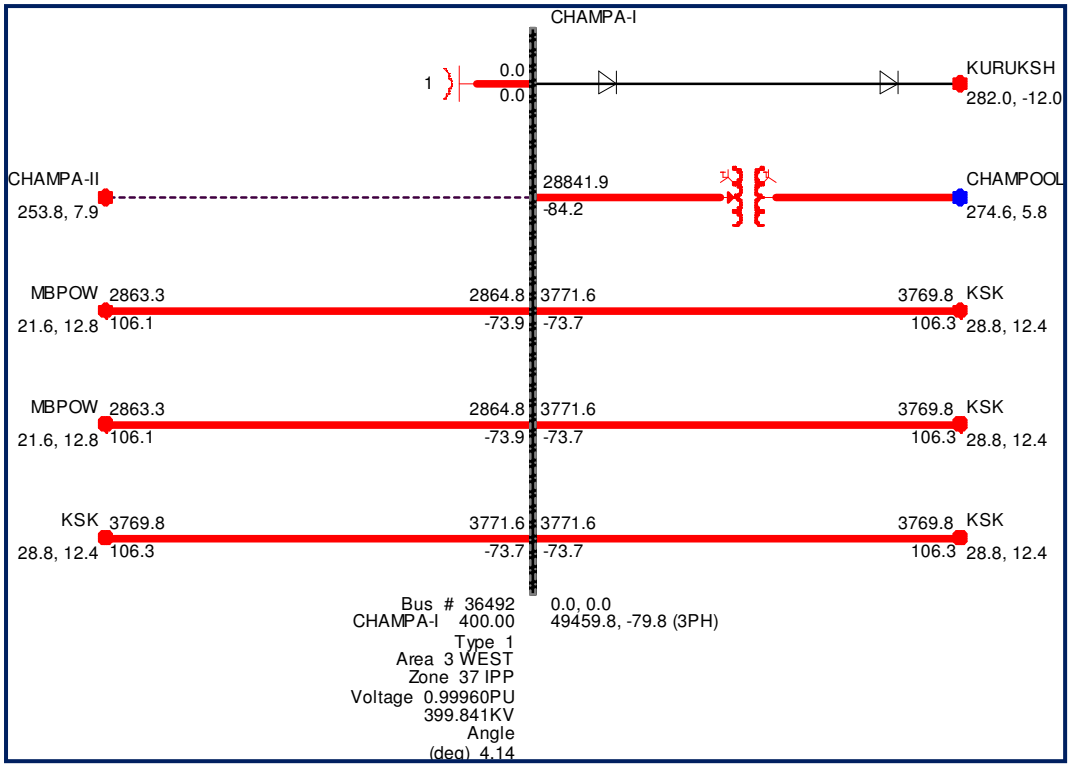


Figure-2(d): Champa Pool 400 kV (Short Circuit Results)



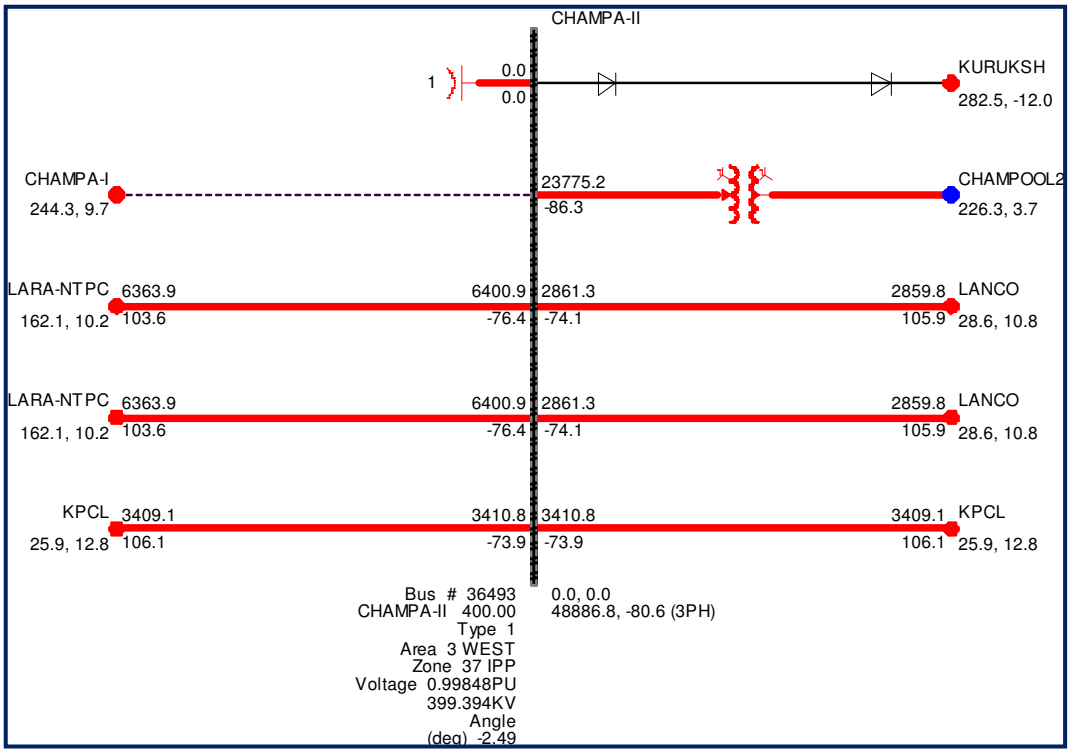
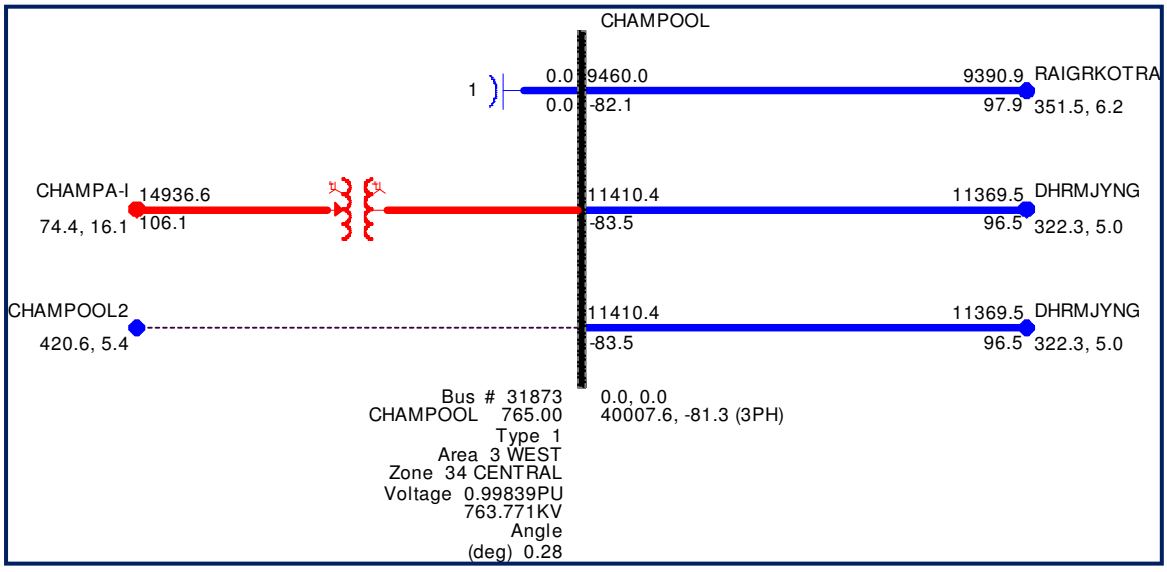
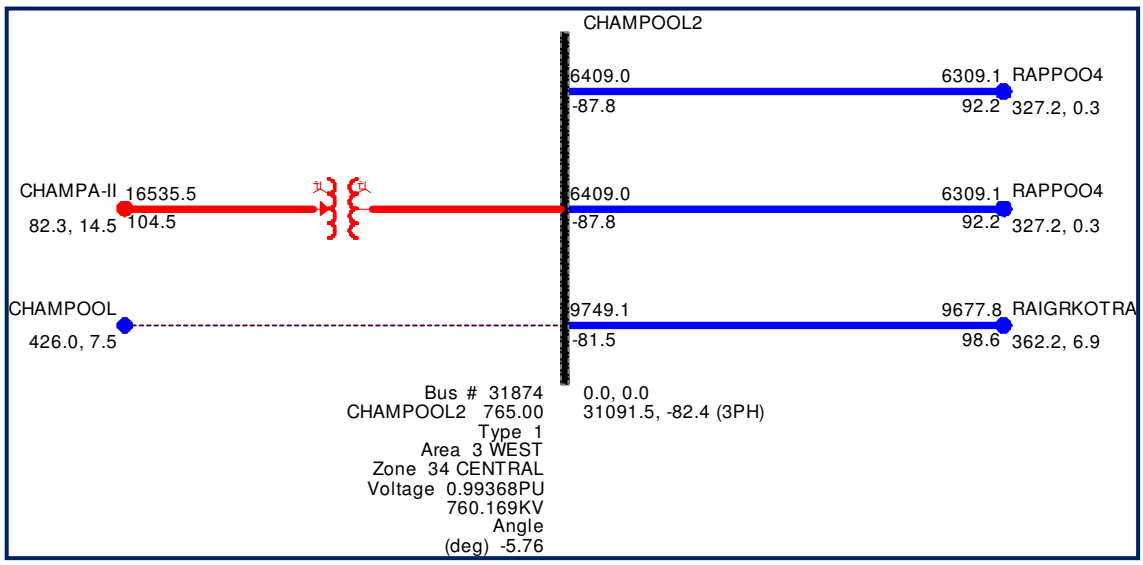


Figure-2(d): Champa Pool 765 kV (Short Circuit Results)





9.4 At Wardha Pooling Station to control the short circuit level of Wardha, following Series reactors are proposed:

Series Reactor (Line):

- 12 ohm on both circuits of Wardha – Mauda 400 kV D/c line
- 12 ohm on both circuits of Wardha – Warora Pool/Parli 400 kV D/c line

Series Reactor (Bus) :

- 12 ohm on Wardha 765 kV Bus Sectionalizer

The 400 kV bus at Wardha shall be split into two sections with following feeders on each side and the bus section will be kept open:

400 kV Split Bus A

- Wardha – Raipur 400 kV D/c line
- Wardha – Akola 400kV D/c line
- Wardha – Aurangabad (PG) 400kV D/c line
- 400kV side of 1no. 1500 MVA, 765/400kV ICT
- 400kV side of 3nos. 315MVA, 400/220kV ICT
- 400kV, 50MVAR Bus Reactor

400 kV Split Bus B

- Wardha – Mauda 400 kV D/c line
- Wardha – Warora Pool/Parli 400kV D/c line
- 400kV side of 2nos. 1500 MVA, 765/400kV ICT

The 765 kV bus at Wardha shall be split two sections with following feeders on each side and the bus section will be kept close with 12 Ohm Series Reactor (Bus) in Sectionaliser:

765 kV Split Bus A

- Wardha – Seoni 765 kV 2xS/c line
- Wardha – Nizamabad 765kV D/c line
- 765kV side of 3nos. 1500 MVA, 765/400kV ICT
- 765kV, 3x110MVAR Bus Reactor
- 765kV, 3x80MVAR Bus Reactor

765 kV Split Bus B

- Wardha – Raipur Pool 765 kV 2xD/c line
- Wardha – Aurangabad 765 kV 2xD/c line

9.5 At Champa Pooling Station to control the short circuit level of Champa Pooling Station following Series Reactors are proposed:

Series Reactor (Line):

- 12 ohm on both circuits of Champa Pool – Raipur Pool 765 kV D/c line
- 12 ohm on both circuits of Champa Pool – Raigarh Pool (Kotra) 765 kV 2xS/c line
- 12 ohm on both circuits of Champa Pool – Dharamjaigarh 765 kV 2xS/c line

The 400 kV bus at Champa Pooling Station shall be split two sections with following feeders on each side and the bus section will be kept open:

400 kV Split Bus A

- Champa Pool – Lanco TPP 400 D/c line
- Champa Pool – Lara STPP 400 D/c line
- Champa Pool – Karnataka PCL 400kV D/c line
- 400kV side of 3nos. 1500 MVA, 765/400kV ICT
- 400kV, 80MVAR Bus Reactor

400 kV Split Bus B

- Champa Pool – KSK Mahanadi PCL 400 2xD/c line
- Champa Pool – MB TPP 400 D/c line
- 400kV Side of 3nos. 1500 MVA, 765/400kV ICT

The 765 kV bus at Champa Pooling Station shall be split two sections with following feeders on each side and the bus section will be kept open:

765 kV Split Bus A

- Champa Pool – Raipur Pool 765kV D/c line
- Champa Pool – Raigarh Pool (Kotra) 765kV S/c line 1
- 765kV side of 3nos. 1500 MVA, 765/400kV ICT
- 765kV, 3x80MVAR Bus Reactor

765 kV Split Bus B

- Champa Pool – Dharamjaigarh Pool 765kV 2xS/c line
- Champa Pool – Raigarh Pool (Kotra) 765kV S/c line 2
- 765kV side of 3nos. 1500 MVA, 765/400kV ICT

Members may deliberate.

10.0 Bus Splitting of Kahalgaon STPS Stage I and Stage II – Agenda by WRPC

10.1 The Kahalgaon STPS generation project of NTPC with an installed capacity of 2340 MW (Stage – I: 4X210 MW, Stage – II: 3X500 MW) is located in Eastern Region. In Stage-I (840 MW) of the Kahalgaon STPS, constituents of ER, NR and SR have got the power allocation and in Stage-II (1500 MW), constituents of ER, NR and WR have got the power allocation.

10.2 The bus splitting of Kahalgaon STPS Stage-I and Stage-II to contain fault level was agreed in the Standing Committee on Power System Planning of ER(Eastern Region) held on 20.09.2010. The scheme was approved by ERPC in its 24th meeting held on 27.04.2013. The scheme has also been approved by NR in their 29th NRPC meeting and 26th TCC meeting held on 13.09.2013 and 12.09.2013 respectively.

10.3 The scheme was taken up for discussion in the 24th WRPC/TCC meeting held on 2013 wherein it was suggested that scheme needs to be taken up first in the Standing Committee meeting of WR.

10.4 The estimated cost of the scheme to be implemented by NTPC is about 98.94 crores. NTPC may present the details of the scheme.

10.5 Members may deliberate.

11.0 Applications for Connectivity and Long Term (Open) Access for Phase-II Generation Projects in Orissa as per CERC Regulations, 2009

11.1 In the Connectivity/Long-Term Access Meeting of Eastern Regions constituents regarding Connecting/LTA applications of generation projects in ER held on 5th January, 2013, following projects were considered as phase-II generation projects in Orissa and transmission system for the same was discussed and finalized-

Sl No	Applicant	Installed Capacity (MW)	LTA Quantum (MW)	Comm. Schedule	Target Beneficiary Regions			
					WR	SR	NR	ER
1.	Sterlite Energy Ltd.	Included under Phase-I (2400 MW)	1000	Commissioned	400	-	400	200
2.	GMR Kamalanga Energy Ltd	350 (1x350)	220	Sep, 2017	220	-	-	-
3.	OPGC	1320 (2x660)	600	July, 2017	200	200	200	-
4.	Darlipalli	1600 (2x800)	793.25	Oct 2016	-	-	-	793.25
	Sub-Total	**3270**	**2613.25**		**820**	**200**	**600**	**993.25**
5.	Srikakulam	1320 (2x660)	1240	Jun'15		1240		
	Total	**6990**	**3853.25**		**820**	**1440**	**600**	**993.25**

11.2 POWERGRID has carried out studies (enclosed at Annexure-3) to evolve the transmission system for evacuation and transfer of power from above mentioned generation projects. In this regard, it to mention that a comprehensive transmission system comprising of high capacity 765 kV transmission corridor from Odisha to NR via WR for evacuation of power from phase-I IPPs (Installed Capacity: 10090 MW & LTA Quantum: 6080 MW) in Odisha is already under implementation which includes, 765/400 kV sub-stations at Angul and Jharsuguda along with 2 circuits of 765 kV from Angul to Jharsuguda and Jharsuguda to Dharamjaigarh. In addition another 765 kV D/c line in Angul-Jharsuguda-Dharamjaigarh corridor has been planned for evacuation of power from generation projects in Srikakulam area in Southern Region (Installed Capacity: 1320 MW, LTA Quantum: 1240 MW).

11.3 Studies indicate that the 2 nos. 765 kV D/c lines already planned between Angul and Jharsuguda would be adequate to evacuate the power being pooled at Angul. However, the 2 nos. 765 kV D/c lines already planned between Jharsuguda and Dharamjaigarh may not be adequate for the transfer of power beyond Jharsuguda. Accordingly, additional corridor with 765 kV D/c line from Jharsuguda to Raipur Pool in Western region has been planned. This corridor would provide additional path for transfer of power beyond Jharsuguda utilizing the 765kV transmission network planned in WR associated with generation projects in Chhattisgarh.

11.4 Further, it is to mention that LILO of one Rourkela – Raigarh 400 kV D/c line at Jharsuguda is under implementation as part of phase-I transmission system. In order to strengthen the 400kV interconnection, it is proposed to LILO the 2nd Rourkela – Raigarh 400 kV D/c line at Jharsuguda.

11.5 Accordingly, following common transmission system has been agreed in the Standing Committee meeting and Long-Term Access Meeting of Eastern Regions constituents:

A. Transmission System for Immediate Evacuation of Generation Projects

(i) **GMR Kamalanga Energy Ltd (350 MW)**: Through Ph-I System i.e. GMR-Angul 400kV D/c line.

(ii) **Sterlite Energy Ltd. (2400 MW)** : Sterlite – Jharsuguda 400 kV D/c line

(iii) **OPGC (1320 MW)** : OPGC – Jharsuguda 400 kV D/c (triple snowbird) line

(iv) **Darlipalli (1600 MW)** : Darlipalli – Jharsuguda 765 kV D/c line

(v) **Srikakulam (1320 MW)** : Srikakulam – Srikakulam Pool 400 kV D/c line

B. Common transmission system

B1 Being Implemented by POWERGRID

- Angul – Jharsuguda (Sundargarh) – Dharamjaigarh 765 kV D/c line.

This line is being implemented by POWERGRID as a part of evacuation system from generation projects in Srikakulam area of Andhra Pradesh in Southern region. The same would also be utilized for evacuation of power phase-II generation projects in Odisha.

B2 To be implemented through Tariff based Competitive Bidding Route

Transmission Scheme	**Estimated Line Length (km)**
i) Jharsuguda (Sundargarh) – Raipur Pool 765 kV D/c line	350
ii) LILO of both circuits of Rourkela - Raigarh 400 kV D/c (2nd line) at Jharsuguda (Sundargarh)	2x400 kV D/c line : each about 30 km

Note :

- CTU to provide 2x240 MW switchable line reactor at Jharsuguda (Sundargarh) end on Jharsuguda (Sundargarh) – Raipur Pool 765 kV D/c line.
- CTU to provide 2x240 MW switchable line reactor at Raipur Pool end on Jharsuguda (Sundargarh) – Raipur Pool 765 kV D/c line.
- CTU to provide 2 no. of 765kV line bays each at Jharsuguda (Sundargarh) and Raipur Pool for termination of Jharsuguda (Sundargarh) – Raipur Pool 765 kV D/c line.

- CTU to provide 4 nos. of 400kV line bays at Jharsuguda (Sundargarh) for termination of LILO of both circuits of Rourkela - Raigarh 400 kV D/c (2nd line).

B3 To be implemented by POWERGRID

- Addition of 2x1500MVA, 765/400kV ICT at Jharsuguda (Sundargarh).
- Addition of 2x1500MVA, 765/400kV ICT at Angul
- Split bus arrangement at 400kV and 765kV bus in both Angul and Jharsuguda (Sundargarh) substations.

– .

11.6 The scheme was approved by the constituents of Eastern Region in the connectivity and LTA meeting on 05-01-2013 and also in the 24th TCC/ERPC meeting on 26-27 April, 2013. The above common system includes Jharsuguda – Raipur pool 765 kV D/c line and LILO of Rourkela - Raigarh 400 kV D/c (2nd line) at Jharsuguda which are inter-regional lines.

11.7 Members may deliberate and concur with the proposal.

12.0 Contingency arrangement for Kala 400/220 kV substation of POWERGRID

12.1 The establishment of 400/220 kV 2x315 MVA Kala S/S (GIS) in UT of DNH by LILO of both circuits of 400 kV Vapi-Kudus D/C line and establishment of 400/220 kV 2x315 MVA Magarwada S/S (GIS) in UT of DD by LILO of both circuits of 400 kV Navsari-Boisar D/C line is being implemented by POWERGRID as regional system strengthening scheme.

12.2 POWERGRID has informed that severe RoW issues are being faced in implementing the Magarwada-Boisar section and Kala- Kudus section of the Navsari- Boisar 400 kV D/C line and Vapi- Kudus 400 kV D/C line respectively. The 2x315 MVA, 400/220 kV Magarwada S/S and 2x315 MVA, 400/220 kV Kala S/S are ready for commissioning. Also the Navsari-Magarwda portion of Navsari-Boisar 400 kV D/C line and Vapi-Kala portion of Vapi-Kudus 400 kV D/C line would be ready shortly. The Kala-Khadoli 220 kV D/C line for drawal of power from Kala S/S by DNH would be ready shortly but associated 220 kV bays at Khadoli S/S are getting delayed.

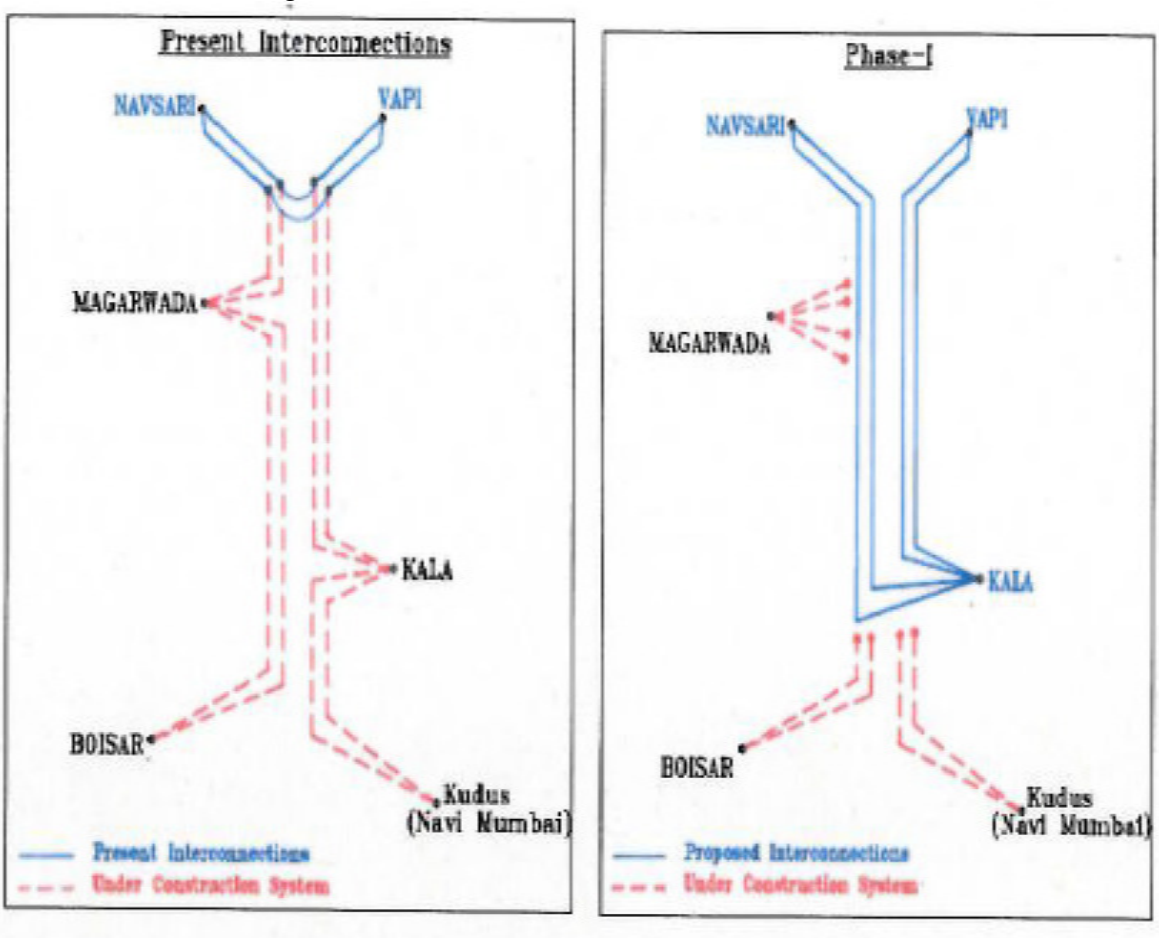
12.3 In order to supply power to DNH from Kala ISTS sub-station and relieve over loading of existing transformers at Vapi 400/220 kV substation of POWERGRID and 220/66 kV Bhilad sub-station of GETCO, POWERGRID has proposed the following contingency arrangement:

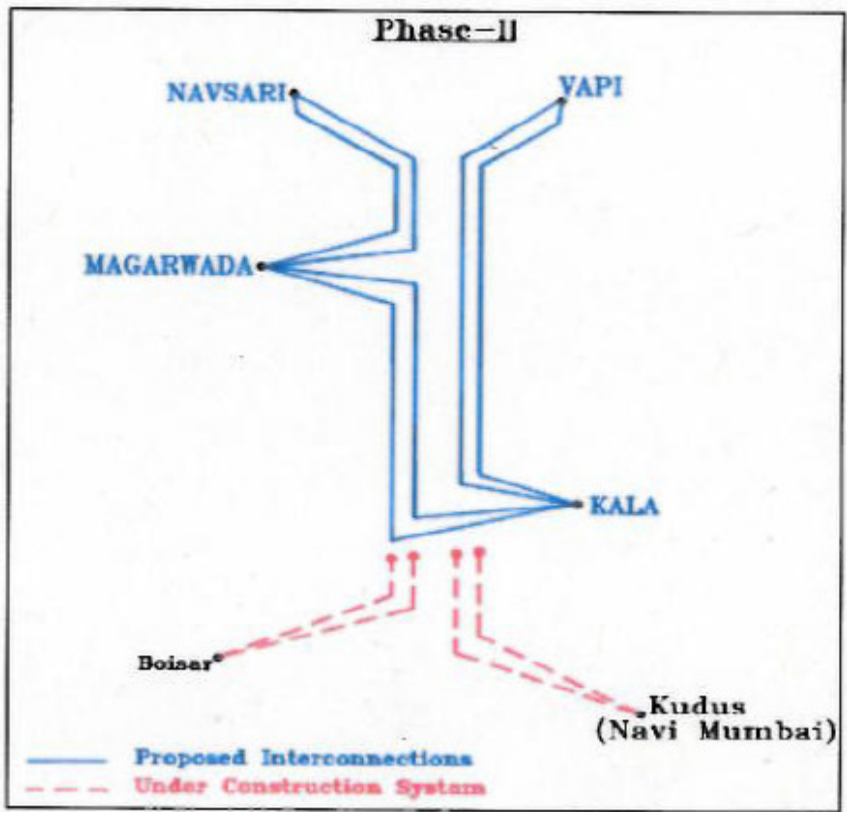
a) **Phase-I :** Opening of interconnection of Navsari-Vapi 400 kV D/C lines at the start of multi-circuit point and connecting it in a manner so as to form Vapi-Kala 400 kV D/c line and Kala-Navsari 400 kV D/C line.

b) Opening of one circuit of Vapi-Khadoli 220 kV D/C (existing) line near Khadoli and connecting it with Kala-Khadoli 220 kV D/C line, so as to form Vapi-Khadoli 220 kV S/C, Kala-Vapi 220 kV S/C and Kala-Khadoli 220 kV S/C

c) **Phase II :** LILO of Kala- Navsari 400 kV D/C line at 400/220 kV Magarwada substation thereby making the following

- Vapi- Kala 400 kV D/C line.
- Kala – Magarwada 400 kV D/C line.
- Maragwada – Navsari 400 kv D/C line.





12.4 The interconnection of Navsari 400 kV (GIS) and Vapi 400 kV substation was agreed in 34th SCM of WR held on 09-05-2012 as an interim arrangement to provide an additional feed to Vapi. This was to be implemented through interconnection of Navsari–Boisar and Vapi-Navi Mumbai (Kudus) 400 kV D/C lines at a point where multi circuit portion of these lines starts. With readiness of the sections of the Navsari–Boisar and Vapi-Navi Mumbai (Kudus) 400 kV D/C lines between the starting point of multi circuit and Kala substation, the above interim arrangement has been proposed by POWERGRID.

12.5 In principle approval of CEA for the (Phase-I) of the contingency arrangement proposed by POWERGRID, as given below, was granted:

a) **Phase-I :** Opening of interconnection of Navsari-Vapi 400 kV D/C lines at the start of multi-circuit point and connecting it in a manner so as to form Vapi-Kala 400 kV D/c line and Kala-Navsari 400 kV D/C line.

b) Opening of one circuit of Vapi-Khadoli 220 kV D/C (existing) line near Khadoli and connecting it with Kala-Khadoli 220 kV D/C line, so as to form

- Vapi-Khadoli 220 kV S/C
- Kala-Vapi 220 kV S/C
- Kala-Khadoli 220 kV S/C

The interim arrangement would be restored to original configuration after the completion of remaining portions of the above lines i.e Kala-Kudus and Magarwada-Boisar 400 kV D/C lines and completion of 220 kV bays at Khadoli.

12.6 POWERGRID may kindly furnish the status of implementation of the interim arrangement.

13.0 Creation of 6th 220 kV bay at Omkareshwar HEP switchyard.

13.1 Omkareshwar HEP (8 X65 MW) 520 MW of NHDC LTD. (Narmada Hydroelectric Development Corporation Limited- a joint venture of NHPC Ltd. and Govt. of Madhya Pradesh) is located in Khandwa district of Madhya Pradesh. At present the power from Omkareshwar HEP is evacuated through the following five nos. of 220 kV lines:

(i) Omkareshwar HEP – Khandwa 220 kV S/C line
(ii) Omkareshwar HEP – Chhegaon 220 kV S/C line.
(iii) Omkareshwar HEP – Barwaha 220 kV S/C line.
(iv) Omkareshwar HEP – Julwaniya 220 kV S/C line.
(v) Omkareshwar HEP – Nimrani 220 kV S/C line (this line is tapped at tower location no. 320 for Barwaha).

13.2 MPPTCL has implemented six nos. of 220 kV line for evacuation of power from Omkareshwar HEP. At there are only five nos. of 220 kV line bays at generation switchyard, the sixth line was being utilised by making tapping arrangement in the Omkareshwar HEP – Nimrani 220 kV S/C line for Barwaha. MPPTCL has made a request for provision of 6th bay at Omkareshwar generation switchyard.

13.3 At Omkareshwar generation switchyard space was available for creation of a 220 kV bay, which NHDC intends to utilise for provision of a bus reactor to control over voltage in view of high voltage conditions prevailing at Omkareshwar HEP.

13.4 A meeting was held in CEA on 10.06.2014 with MPPTCL and NHDC Ltd. wherein it was decided that the space available for one 220 kV bay Omkareshwar generation switchyard would be utilised for provision of sixth 220 kV line bay. With creation of additional 220 kV line bay and reconfiguration of 220 kV lines, the evacuation system of Omkareshwar HEP would be as given below:

(i) Omkareshwar HEP – Khandwa 220 kV S/C line
(ii) Omkareshwar HEP – Chhegaon 220 kV S/C line.
(iii) Omkareshwar HEP – Barwaha 220 kV D/C line.
(iv) Omkareshwar HEP – Julwaniya 220 kV S/C line.
(v) Omkareshwar HEP – Nimrani 220 kV S/C line.

13.5 This is for kind information of the members.

14.0 FSC on Mundra – Zerda 400 kV D/C line – GETCO proposal

14.1 GETCO has requested CEA to carry out the system studies to provide compensation on Mundra – Zerda 400 kV D/C line-2. The reasons for provision of compensation on 400 KV Mundra – Zerda line-2 are:

- To increase power transfer capacity of the line,
- To improve stability of network for evacuation of 2640 MW power from APL Mundra
- To load the line up to its thermal capacity i.e. 850 MW on each circuit without compromising with voltage stability,
- Considering long line length of 331 Km

14.2 Studies carried out to check the feasibility of provision of about 40% FSC on the Adani- Zerda 400 kV D/C line-2. The studies considers about 4250 MW dispatch from Adani Mundra TPS , about 3850 dispatch from the CGPL generation project,

EPGL Salaya 100 MW and power order of 1500 MW on Mundra – Mohindergarh HVDC bipole line. The studies has been carried out for two scenarios i.e., the present scenario and the scenario in 2016-17.At present there are two nos. of 400 kV D/C lines under implementation between Mundra and Zerda. Therefore, in order to avoid uneven loading on these lines, provision of FSC needs to be considered on both 400 kV D/c lines. However, studies have been carried out considering various alternatives which include FSC on line-2 and on both the lines.

14.3 The summary of the power flow on the 400 kV lines emanating from the Adani Mundra generation switchyard is shown in the Table1 for present condition and in Table 2 for 2016-17 conditions. Dispatch considered from Mundra Adani TPS- 4250 MW, Flow on Mundra – Mohindergarh HVDC bipole line 1500 MW.

Table 1 (Present Condition)

S.No	Transmission line	Adani-Zerda D/C line-1	Adani-Zerda D/C line-2	Adani – Sami-Dehgam D/C line	Adani – Versana line	Adani – Hadala line	Flow at 220 kV	Exhibit No.
1	Without Adani – Zerda 400 kV D/C lines – Base case			1504	401	248	592	I
2	Base case + Adani Zerda 400 kV D/C line-2		1118	1010	134	76	406	II
3	Base Case + Adani Zerda 400 kV D/C line-2 with 40% FSC		1468	854	51	23	348	III
4	Base case + Adani Zerda 400 kV D/C line-2+40% FSC with outage of one ckt of Adani-Zerda line-2		997	1064	163	95	428	IV
5	Base case + Adani Zerda 400 kV D/C line-2+40% FSC + Adani-Dehgam D/C out		1902	0	233	141.00	468	V
6	Base case + Adani Zerda 400 kV D/C line-1 and line-2	800	800	796	20	4	326	VI
7	Base case + Adani Zerda 400 kV D/C line-1 and line-2 + 40% FSC on line-2	670	1114	712	-25	-25	296	VII
8	Base case + Adani Zerda 400 kV D/C line-1 and line-2 + 40% FSC on both lines	960	960	652	-56	-46	274	VIII

14.4 In the present configuration of the transmission system around M/s APL, a loading of about 750 MW per ckt. is observed on the Adani- Sami-Dehgam 400 kV D/C lines. With addition of Adani – Zerda 400 kV D/C line, about 550 MW per ckt. flow is observed in this line and whereas the flow in Adani – Dehgam line reduces to 505 MW per ckt from 750 MW per ckt. If Adani-Zerda line-2 is 40% series compensated, then it is seen power flow on this line increases to the tune 740 MW per circuit and on Adani-Dehgam power flow reduces to 425 MW per circuit. Further the outage of Adani-Dehgam 400 kV D/C line (n-1-1) causes loading of Adani-Zerda line-2 to the tune of 950 MW per circuit. The present condition is further analysed with the addition of Adani-Zerda 400 kV D/C line-1. Addition of the line-1 causes even distribution of power flow on Adani-Zerda lines and Adani-Dehgam line to the tune of 400 MW per circuit. Thus, it is seen that the addition of Adani-Zerda 400 kV lines to the present configuration relieves the high loading being observed on the Adani-Dehgam 400 kV lines. Highly uneven loading on line-1 and line-2 is observed in case 40 % series compensation on Adani-Zerda line-2 only.

14.5 The GETCO's proposal of providing series compensation on Adani-Zerda line-2 was further studied in time frame of 2016-17. In this scenario, interalia, following additional transmission elements has been considered:

(i) Establishment of Halvad 400 kV substation and LILO of Adani-Hadala 400 kV S/C line at Halvad.
(ii) Halvad – Versana 400 kV D/C line.
(iii) Bachau- Versana 400 kV D/C line
(iv) LILO of Ranchodpura- Zerda 400 kV line at Sankhari 400 kV substation.
(v) Sankhari- Banaskantha 400 kV D/C line.
(vi) Mundra UMPP – Bhuj pool 400 kV D/C line (triple snowbird).
(vii) Bhuj pool – Banaskantha – Chitorgarh 765 kV line along with 765/400 kV substation at Bhuj pool , Banaskantha and Chitorgarh
(viii) LILO of both ckts of Mundra UMPP - Limbdi at Bachau (Triple snowbird)
(ix) Saurastra pool 765/ 400 kV substation and Saurastra pool – Vadodara 765 kV D/C line.

14.6 The summary of the power flow on the 400 kV lines emanating from the Adani Mundra generation switchyard considering the above transmission elements is shown in the tables given below.

Table 2

S. No	Transmission line	Adani-Zerda D/C line-1	Adani-Zerda D/C line-2	Adani-Sami-Dehgam D/C line	Adani – Versana line	Adani – Halvad line	Flow at 220 kV	Exhibit no.
1	Base case (with Adani-Zerda line-1 and Line-2)	586	586	606	228	184	506	IX
2	Outage of Adani-Zerda 400 kV D/C line-1 (n-1-1)		796	700	383	254	564	X
3	Base case + 40% FSC on Line-2	508	844	560	155	151	478	XI
4	Base case + 40% FSC on Line-2+outage of Adani-	606	1006	-	318	227	540	XII

	Dehgam 400 kV D/C line (n-1-1)							
5	Base case + 40% FSC on Line-1 and line-2	722	722	534	117	134	466	XIII
6	Base case + 40% FSC on Line-1 and line-2 +outage of Adani-Dehgam 400 kV D/C line (n-1-1)	869	869	-	249	196	504	XIV

14.7 In the base case, even loading on Adani-Zerda line-1, Line-2 and Adani-Dehgam 400 kV D/C lines to the tune of 300 MW per circuit is observed. In the event of outage of Adani-Zerda 400 kV D/C line-1 (n-1-1), normal loadings are observed on other lines from Adani generation project. Provision of 40% series compensation on Adani-Zerda D/C line-2 causes uneven loading on Adani-Zerda lines with 254 MW per ckt. on line-1 and 422 MW per ckt. on line-2. With outage of Adani- Sami-Dehgam 400 kV D/C line uneven loading on Adani-Zerda lines with 303 MW per ckt. on line-1 and 503 MW per ckt. on line-2 is observed. With provision of 40 % series compensation on both Adani – Zerda line-1 and line-2 power flow of 360 MW per ckt on these lines are observed and it increases to 435 MW per ckt on outage of Adani-Dehgam 400 kV D/Cline.

14.8 By end of 12th plan with addition of the proposed transmission system and with addition of one Adani – Zerda 400 kV D/C line-1 and line-2, power flow of about 300 MW per ckt. is observed on 4 nos. of 400 kV lines to Zerda and 2 nos. of lines to Dehgam. With provision of 40% series compensation on both line-1 and line-2 in this line the flow increases to 361 MW per ckt only.

14.9 GETCO have given another proposal to make LILO of both circuits of one of the 400 KV D/C Mundra - Zerda line at 400 KV Charanka Solar Park substation and FSC on the other 400 KV D/C Mundra - Zerda line. With these changes, network configurations will be as under:

(i) 400 KV D/C Mundra - Zerda line (Twin Moose - 331 RKM & 63 MVAR line reactors for each circuit at both end)
(ii) 400 KV D/C Mundra - Charanka line (Twin Moose - 220 RKM & 63 MVAR line reactors for each circuit at Mundra end)
(iii) 400 KV D/C Charanka - Zerda line (Twin Moose - 115 RKM)
(iv) 400 KV D/C Charanka - Sankhari line (Twin Moose - 100 RKM, associated with Charanka Solar Park scheme)

14.10 The summary of the power flow on the transmission lines emanating from Adani Mundra TPS is summarized in the Table 3. An injection of 500 MW at 220 kV level has been assumed at Charanka Solar park.

Table 3

S. No	Transmission line	Adani-Zerda D/C 400	Adani-Zerda D/C 400	Adani-Sami-Dehgam	Adani – Versana 400	Adani – Halvad 400 kv	Flow at 220 kV	Exhibit no.

		kv line-1	kv line-2	D/C 400 kv line	kv line	line		
1	Base case (with Adani-Zerda line-1 and Line-2 plus Charanka 500 MW gen.)	566	566	612	245	195	512	XV
2	Base case + LILO of Adani-Zerda line-1 at Charanka	A-C:590 C-Z:568	561	606	245	195	512	XVI
3	Base case + LILO of Adani-Zerda line-1 at Charanka + 40% FSC on Adani-Zerda line-2	A-C:500 C-Z:500	796	570	168	174	490	XVII

14.11 With the proposed changes in the network by GETCO, there is only redistribution of power flow on the lines emanating from Adani Mundra TPS. There is no substantial change in power flow pattern in case of LILO of Adani-Zerda 400 kV D/C line-1 at Charanka as compared to the case when no LILO is done at Charanka. Therefore, GETCO may make LILO of Adani-Zerda 400 kV D/C line-1 at Charanka for providing additional outlets for charanka solar park. But provision of FSC on the other Adani-Zerda 400 kV D/C line is not justified based on the load low studies. The exhibilts mentioned in Table 1,2 & 3 are enclosed as Annexure- 4.

14.12 Thus it is seen from above that with the proposed transmission addition/modifications in Gujarat, provision of FSC on Adani- Zerda 400 kV lines does not have substantial impact in increasing the power flow on Adani-Zerda 400 kV lines. The Adani-Zerda 400 kV D/C line would be directly connected to the generation switchyard of M/s Adani Power, therefore, SSR issues also needs to be taken into consideration.

15.0 Aurangabad (PG) 400/220 KV, 2 x 315 MVA ICTs along with its associated bays, commercial burden on Maharastra- Agenda by MSETCL.

15.1 MSETCL vide their letter dated 17.04.2014 has stated that establishment of 400/220 kV, 2x315 MVA ICTs at Aurangabad (PG) was made a part of the minutes of the 28th Standing Committee meeting on Power System Planning of WR held on 6th December, 2008 without any discussion and further no discussions were held on the issue till 36th SCM of WR. With the commissioning of the above asset, POWERGRID has claimed the monthly transmission from 1.02.2014, which is not justified as the scheme is burdening the consumers of Maharastra.

15.2 The 400/220 kV, 2x315 MVA Aurangabad (PG) substation has been planned as a part of the Mundra UMPP evacuation scheme. The matter of establishment of 400/220 kV 2x315 MVA ICTs at Aurangabad (PG) has been duly deliberated and

accordingly included in the minutes of the Standing Committee of WR. A brief details of the discussions held is given below:

(i) In the 27th SCM of WR held on 30.07.2007 at Indore, the issue of allocation of 2 no's of 400 kV bays at Aurangabad substations of MSETCL for termination of Wardha – Aurangabad 400 kV D/C line, planned as a part of Mundra UMPP evacuation system was discussed. Due to non-availability of space for two numbers of bays at existing Aurangabad (MSETCL) 400 kV substation, new 400 kV substation at Aurangabad was proposed. In the meeting, it was decided that the proposal of creation of new 400 kV substation would be reviewed after MSETCL furnishes their plan with respect to Aurangabad.

(ii) The transmission system associated with Mundra UMPP and Sasan UMPP, even though was approved by the WR constituents, some constituents were not signing the BPTA with PGCIL due to commercial implications in sharing of transmission charges.

(iii) The issue was discussed in a meeting taken by Chairperson CEA with WR constituents on 10.12.2007 at Pune, wherein it was agreed that the total transmission system of Sasan and Mundra UMPP would be divided into two components.
- Generation specific scheme – Transmission elements, the charges to be shared only by the beneficiaries of the UMPP.
- Common transmission system strengthening scheme – Transmission charges to be pooled with regional charges of the existing systems.

(iv) In the joint meeting of Standing Committees on Power System Planning of NR and WR held on 10.6.2008 at New Delhi, transmission elements were identified based on the above principle, which also included creation of a new 400/220 kV 2x315 MVA substation Aurangabad. The same was also concurred by the WR constituents in the 8th meeting of WRPC held on 12.09.2008. Subsequently, the scheme was included as a part of annexure of the minutes of the 28th Standing Committee Meeting of WR held on 6.12.2008.

(v) The agenda for the 30th Standing Committee meeting of WR at item no.2.1 I (b) included - Inter Connection at 220 kV level of the state grid with proposed ISTS stations. Under this item constituents were requested to inform the present status of implementation of 220 kV inter connections from the ISTS substations including Aurangabad.

15.3 The 400/220 kV, 2x315 MVA ICTs at Aurangabad (PG) substation has already been commissioned and MSETCL has not yet planned the 220 kV outlets from this substation.

15.4 MSETCL is requested to plan and expedite the implementation of 220 kV outlets from this substation.

15.5 Members may deliberate.

16.0 220 kV outlets from Aurangabad (PG) 765/400/220 kV substation.

16.1 Establishment of 2x315 MVA, 400/220 kV Aurangabad (PG) was agreed as a part of the regional system strengthening scheme in WR for Mundra UMPP generation

project. Subsequently, establishment of 765/400kV 2x1500MVA Aurangabad (PG) S/s was also agreed as a part of the Transmission system associated with IPPs in Chhattisgarh. 765/400/220kV Aurangabad(PG) is a sub-station under construction with following lines under various stages of implementation:

(i) Aurangabad(PG) - Wardha 765kV 2xD/c
(ii) Aurangabad(PG) - Solapur 765kV D/c
(iii) Aurangabad(PG)- Padghe 765 kV D/c
(iv) Aurangabad(PG)- Boisar 400kV D/c
(v) Aurangabad(PG)- Aurangabad 400kV D/c

16.2 POWERGRID has informed that presently, 2X1500 MVA, 765/400kV ICTs and 2x315MVA, 400/220kV ICTs along with 6 nos. 220 kV bays are under commissioning at Aurangabad (PG) Substation. There are no 220 kV outlets from this sub-station as yet.

16.3 MSETCL is requested to plan and expedite the implementation of 220 kV outlets from this substation.

17.0 Installation of additional 1x315MVA, 400/220kV Transformer at Itarsi (PGCIL) 400kV Substation and 2x500MVA, 400/220kV Transformer at Indore (PGCIL) 765kV Substation – Agenda by MPPTCL

17.1 **Installation of additional 1x315MVA, 400/220kV Transformer at Itarsi (PGCIL) 400kV Substation**: MPPTCL has informed that the 220kV substations around Itarsi and Betul area viz. Sarni, Betul, Handia 220kV S/s, Hoshangabad, Itarsi and Pipariya are dependent on 220kV supply available from Satpura TPS and Itarsi 400/220kV S/s (PGCIL). At present there is only one no. 315MVA, 400/220kV ICT installed at Itarsi (PGCIL) 400kV S/s. The 500MVA (3X167), 400/220kV ICT at Satpura TPS have already rendered useful life of 35 years and frequent problems is experienced. There is no spare transformer available; therefore the reliability of the 500MVA, 400kV ICT at Satpura is uncertain. The 62.5 MW units at Satpura TPS supplying power on 220kV are being abandoned in a phased manner by MPPGCL, therefore loading and dependency on 315MVA, 400/220kV ICT at Itarsi is increasing.

17.1.1 MPPTCL has further informed that on partial outage of generation at 220 kV level at Satpura TPS, about 300MW load has been recorded on the single transformer at Itarsi (PGCIL) 400kV S/s.

17.1.2 MPPTCL has proposed an additional 1x315MVA, 400/220kV transformer at Itarsi (PGCIL) 400kV S/s to ensure the reliability of supply to 220kV substations around Itarsi and Betul area during normal as well as system distress conditions.

17.2 **Installation of additional 2x500MVA, 400/220kV Transformer at Indore (PGCIL) 765kV Substation.** MPPTCL has informed that the demand of West Discom of MP has touched 4100 MW during 2013-14 and is expected to further increase this year. The 4x315MVA, 400/220kV ICTs installed at 400kV S/s Indore (MPPTCL) are carrying more than 930 MW of power and Indore is getting feed of about 175MW from Barwaha 220 kV S/s.

17.2.1 MPPTCL has further informed that out of the 4 nos. 315MVA transformers, two sets of 400/220/33kV, 105MVA transformers installed at Indore (MPPTCL) 400kV S/s

have already competed 30 years of useful service. The studies carried out by NLDC for management of loads during Rabi Season of 2013-14 also indicates that there would be over loading of 400/220kV transformers at Indore in case of contingency conditions.

17.2.2 In order to provide additional source of power at 400 kV level at Indore, MPPTCL has proposed installation of 2x500MVA, 400/220kV transformers at 765kV S/s Indore (PGCIL). The studies carried out by MPPTCL are enclosed as Annexure-5

17.3 Members may deliberate.

18.0 400 kV 125 MVAR Bus reactor at Navi Mumbai (2 no.) - Agenda by POWERGRID

18.1 POWERGRID has informed that Vikroli - Navi Mumbai 400 kV S/C line is an STU line to be implemented by Tata Power. Out of the total length of 35 kms, about 12 kms shall be implemented by laying underground cable.

18.2 POWERGRID has proposed installation of two nos. 400 kV, 125 MVAR bus reactors at Navi Mumbai substation. The two nos. of 400 kV bays at Navi Mumbai constructed for termination of Vapi – Navi Mumbai 400 kV D/C line (which now is being terminated at Kudus due to severe RoW issues) shall be utilized for installation of the bus reactors.

18.3 Members may deliberate.

19.0 Laying of cable in DGEN- Vadodara 400 kV D/C line at DGEN end- Agenda by POWERGRID

19.1 There is severe RoW constraint in Dahej SEZ/GIDC area for implementing the DGEN – Vadodara 400 kV D/C line. To discuss issues related to RoW problem a meeting was held in CEA on 30.10.2013 wherein, a committee comprising of members from GIDC, POWERGRID, Torrent Energy Limited and Dahej SEZ was formed to explore the alternatives for laying DGEN – Vadodara 400 kV D/C line in the RoW constraint area.

19.2 The report submitted by the committee was discussed in the meeting held on 16.12.2013 in CEA, wherein, it was decided that cable laying for about 3 km length would be required to overcome the RoW constraint in Dahej SEZ / GIDC area for the DGEN – Vadodara 400 kV D/C line.

19.3 POWERGRID has proposed installation of a 400 kV, 1X125 MVAR Bus reactor at Vadodara to compensate the additional reactive power generated by the 3 km cable of the DGEN – Vadodara 400 kV D/C line.

19.4 Members may deliberate.

20.0 Reconfiguration / utilisation of the Essar – Bachau 400 kV D/C line.

20.1 M/s Essar Power Gujarat Limited (EPGL) has been granted connectivity for 2440 MW and LTA for 250 MW by CTU and Essar – Bachau 400 kV D/C line is under implementation by POWERGRID for providing connectivity with the ISTS to M/s EPGL. Essar Salaya Ph-I (2X600 MW) has already been commissioned, whereas Essar Salaya Ph-II (2X660 MW), as informed by EGPL, was delayed as MOEF

clearance and forest clearance of coal/water corridor for the project was still pending. The MOEF clearance was linked to forest clearance of coal/water corridor. Due to delay in the project, the implementation of 2 nos. of 400 kV bays for termination of the Essar- Bachau 400 kV D/C line at Essar switchyard is yet to be taken up by M/s EGPL.

20.2 The Essar – Bachau 400 kV D/C line is under implementation by POWERGRID. Out of total 568 nos. of tower locations for ESSAR-Bachau 400 kV D/C line, 435 foundations has been completed , 332 towers has already been erected and 125 ckm stringing of the line has been done.

20.3 Gujarat has PPA of 1000 MW in Essar Salaya Ph-I (2X600 MW) and two nos. 400 kV D/C lines were planned for evacuation of the power towards their load centres. Out of which Essar- Hadala 400 kV D/C line has already been commissioned and the Essar – Amreli 400 kV D/C line is partly completed towards the Amreli end. The balance portion of the Essar-Amreli 400 kV D/C line is likely to be completed by April 2015. At Essar generation switchyard all the four nos. bays has been commissioned by M/s EGPL.

20.4 Based on the request of M/s EGPL, a meeting was held in CEA on 06.05.2014 with POWERGRID, GETCO and EGPL wherein, the following was agreed:

- Essar- Bachau 400 kV D/C line could be terminated in Essar Salaya Ph-I generation switchyard.

- M/s EPGL to implement two nos. of 400 kV bays along with provision of 125 MVAR bus reactor by March 2015.

- As an interim arrangement the two nos. 400 kV Amreli bays could be utilised for terminating the Essar – Bachau 400 kV D/C line at Essar Ph-I switchyard till the implementation of two no. of 400 kV bays by M/s EPGL or completion of Essar-Amreli 400 kV D/C line, whichever is earlier.

- Necessary arrangements for facilitating the above would be made by M/s Essar.

- POWERGRID / CTU and EPGL to coordinate regarding the implementation of the interim arrangement.

- CTU to carry out studies for possible reconfiguration of Essar-Bachau 400 kV D/C line at Bachau end for relieving evacuation constraints of Mundra CGPL power.

- In case of any abnormal power flow beyond 400 KV Hadala / 400 KV Bhachau (PG), anticipated till commissioning of 400 KV D/C EPGL – Amreli line, 400 KV D/C EPGL – Bhachau (PG) line will be opened.

20.5 The above decisions taken in the meeting held on 06.05.2014 were made on technical considerations, without having any implications on the existing commercial arrangement between the parties involved, to facilitate utilisation of the Essar – Bachau 400 kV D/C line under implementation by POWERGRID, which otherwise would have remained idle, for the want of 400 kV bays at Essar switchyard, which

has not been implemented by M/s EPGL due to uncertainties in Ph-II of their generation plant.

20.6 Members may discuss and concur.

21.0 Evacuation of Renewable Energy generations located in WR and NR to Northern Region states

21.1 In the 36th SCM of WR the following transmission system was agreed for evacuation of renewable energy generations located in WR and NR:

Western Region (Gujarat):

i. Bhuj Pool–Banaskantha 765 kV D/c
ii. Banaskantha -Chittorgarh 765 kV D/c
iii. Banaskantha-Sankhari 400 kV D/c
iv. 765/400/220kV (765/400 kV-2x1500 MVA & 400/220kV-2x500MVA) sub-station each at Bhuj Pool and Banaskantha.
v. Associated reactive compensation (Bus reactors & line reactors)

Northern Region (Rajasthan):

i. Chittorgarh-Ajmer (New) 765 kV D/c
ii. Ajmer (New)-Suratgarh (New) 765 kV D/c
iii. Suratgarh (New)-Moga (PG) 765 kV D/c
iv. Chittorgarh-Chittorgarh (RVPN) 400 kV D/c (Quad)
v. Ajmer (New)- Ajmer (RVPN) 400 kV D/c (Quad)
vi. Suratgarh (New)- Suratgarh 400 kV D/c (Quad)
vii. 2x1500 MVA, 765/400 kV sub-station each at Chittorgarh, Ajmer (New) and Suratgarh (New)
viii. Associated reactive compensation (Bus reactors & line reactors).

21.2 It was also agreed that the renewable generations would be allowed to inject in the ISTS at Bhuj, Banaskantha, Chittorgarh, Ajmer etc., if they apply for LTA quantum which is at least 25% of their installed capacity.

21.3 Ministry of Power vide its letter no.11/43/2012-PG dated 07.02.2014 has approved the implementation of the ISTS portion of the Green Energy Corridor to be included in the KfW / GIZ funding proposal, under compressed time schedule by POWERGRID.

21.4 According to KFW funding availability in three tranches i.e. tranche-I, II & III, the transmission scheme to be implemented by POWERGRID has been phased out, as given below:

(a) Green Energy Corridors-ISTS-Part-A (Tranche-I)

Rajasthan (Northern region)

- Ajmer (New)- Ajmer (RVPN) 400kV D/c (Quad) – 57km
- Chittorgarh (New)- Chittorgarh (RVPN) 400kV D/c (Quad)-25km
- Establishment of 2x1500 MVA, 765/400kV S/s at Chittorgarh
- Establishment of 2x1500 MVA, 765/400kV S/s at Ajmer (New)

Tamil Nadu (Southern region)

- Tirunelveli Pooling Station - Tuticorin Pooling Station 400 kV 2xD/c (Quad) -1st ckt 57km/2nd ckt – 55km
- Establishment of 2x500 MVA, 400/230kV S/s at Tirunelveli Pooling Station

(b) Green Energy Corridors-ISTS-Part-B (Tranche-II)

Gujarat (Western Region)

- Establishment of 765/400/220 kV (765/400 kV - 2x1500 MVA & 400/220 kV- 2x500MVA) sub-station at Banaskantha
- Banaskantha – Chittorgarh 765kV D/C -285 km
- Banaskantha-Sankhari 400 kV D/C-26 km

Rajasthan (Northern region)

- Chittorgarh – Ajmer(New) 765kV D/C -200km

(c) Green Energy Corridors-ISTS-Part-C (Tranche-III)

Gujarat (Western Region)

- Establishment of 765/400/220 kV (765/400 kV-2x1500 MVA & 400/220 kV- 2x500 MVA) sub-station at Bhuj Pool
- Bhuj Pool – Banaskanta 765kV D/c -315km

21.5 POWERGRID has carried out the studies to assess the associated reactive compensation (Bus reactors and line reactors). The studies are enclosed at Annexure - 6.The following bus and line reactors has been proposed by POWERGRID:

BUS REACTORS:

S.No.	Substation	Rating
1	Chittorgarh S/s - 2x1500 MVA, 765/400kV	1x240 MVAR,765kV 1x125 MVAR,420kV
2	Ajmer S/s - 2x1500 MVA, 765/400kV	1x240 MVAR,765kV 1x125 MVAR,420kV
3	Banaskantha sub-station 765/400/220 kV (765/400 kV - 2x1500 MVA & 400/220 kV- 2x500MVA)	1x330 MVAR,765kV 1x125 MVAR,420kV
4	Bhuj Pool sub-station 765/400/220 kV (765/400 kV - 2x1500 MVA & 400/220 kV- 2x500MVA)	1x330 MVAR,765kV 1x125 MVAR,420kV

LINE REACTORS:

S.No.	Line	From end	To end
1	Banaskantha – Chittorgarh 765 kV D/c line	1x330 MVAR,765kV in each circuit	1x240 MVAR,765kV in each circuit
2	Banaskantha – Bhuj Pool line 765 kV D/C line.	1x330 MVAR,765kV in each circuit	1x330 MVAR,765kV in each circuit

3	Chittorgarh – Ajmer 765 kV D/c line	1x240 MVAR,765kV in each circuit	1x240 MVAR,765kV in each circuit

21.6 Members may deliberate and concur the above proposal of reactors.

22.0 System for increasing capacity of Inter-State Transmission system for import of power into SR up to 2018-19.

22.1 Presently, Southern Region is facing power deficit which is of the order of 3400 MW (as per CEAs monthly report on power supply position for April 2014). This situation has arisen mainly due to – (i) delay/deferment of anticipated generation projects, for example, Krishnapattam UMPP (4000 MW), Cheyyur UMPP(4000 MW), Udangudi TPS(2120-MW), IPP projects in Nagapatanam/ Cuddalore area (3000 to 4000 MW), Kundankulam APP (2000 MW), Kalpakkam PFPR (500 MW), East cost project in Srikakulam (1320 MW), Gas based projects in Vemagiri (about 3000 MW) etc. and (ii) also due to non-availability of gas for existing gas projects in Southern Region.

22.2 Looking at the generation projects which are in pipe line or under planning stage and may be materialized by 2018-19, a total of about 30,000 MW of installed capacity may be added in Southern Region. Still Southern Region would be in a deficit situation by the end of 2018-19. The quantum of this deficit would range between 10000 to 16000 MW. It is felt that at this stage, sufficient transmission system to import power of the order of 16000 MW into Southern Region needs to be planned.

Analysis of surplus/deficit in Southern Region considering above addition programme and scenario is given in the following table:

	MW		
Peak Demand Met	36985	A	
Peak import from NEW Grid	3950	B	
Peak Availability of Generation in SR	33035	C=A-B	
Projected Peak Demand as per 18th EPS Report including Loss	66111	E	
Projected Peak Demand excluding loss	64128	F=E*0.97	
	Scenario-I (Optimistic)	**Scenario-II**	**Scenario-III (Pessimistic)**
Projected Hydro Generation Addition (G)	930	930	930
Projected Thermal Generation Addition (H)	28520	24810	21130
Projected Total Generation Addition * (Installed Capacity) (I=G+H)	**29450**	**25740**	**22060**
Projected Generation Addition (Availability)	23281	20313	17369

(J=G*0.5+H*0.8)			
Total Import Requirement (MW) (K=E-C-J)	**9795**	**12763**	**15707**
* Wind Generation, Renewables, Gas Generation of Future addition are not considered.			

22.3 Following is a list of existing and planned/under-construction inter-regional transmission links:

The existing inter-regional links of SR with NEW grid are:

(i) ±500kV, 2000 MW Talcher – Kolar HVDC bipole
(ii) 1000 MW Chandrapur HVDC back-to-back
(iii) 1000 MW Gazuwaka HVDC back-to-back
(iv) Raichur – Sholapur 765 kV 2xS/c lines

Further, following additional inter-regional links are under construction

(v) Narendra – Kolhapur 765 kV D/c (initially charged at 400 kV)
(vi) Angul – Srikakulam – Vemagiri 765kV D/c line
(vii) Wardha – Nizamabad - Hyderabad 765kV D/c line

22.4 The above existing/planned system can facilitate import of about 9000- 10000 MW into Southern Region. To achieve the import objective of 16000 MW additional inter-regional transmission links would be needed along with strengthening within the Southern grid. Accordingly, following three schemes are proposed:

(i) Additional inter-Regional AC link for import into Southern Region i.e. Warora-Warangal - Hyderabad- Kurnool 765kV link
(ii) HVDC Bipole link between Western region (Chhattisgarh) and Southern Region (Pugalur)
(iii) Strengthening of transmission system beyond Vemagiri

Details of elements covered under these schemes are given below:

22.5 **Scheme-I: Additional inter-Regional AC link for import into Southern Region i.e. Warora-Warangal - Hyderabad- Kurnool 765kV link**

(i) Establishment of 765/400kV substations at Warangal (New) with 2x1500 MVA transformer and 2x240 MVAR bus reactors.
(ii) **Warora Pool -Warangal (New) 765 kV D/c line with 240 MVAR switchable line reactor at both ends**.
(iii) Warangal (New) –Hyderabad765 kV D/c line with 330 MVAR switchable line reactor at Warangal end.
(iv) Warangal (New) – Warangal (existing) 400 kV (quad) D/c line.
(v) Hyderabad– Kurnool 765 kV D/c line with 240 MVAR switchable line reactor at Kurnool end.
(vi) Warangal (New) – Chilakaluripeta 765kV D/c line with 240 MVAR switchable line reactor at both ends.
(vii) LILO of Kurnool-Thiruvelam 765 kV D/c at Cuddapah
(viii) Cuddapah- Hoodi 400kV (quad) D/c line with 63 MVAR switchable line reactor at both ends.

22.6 **<u>Scheme-II</u>: HVDC Bipole link between Western region (Chhattisgarh) and Southern region (Tamil Nadu)**

(i) **Raigarh (HVDC Stn) – Pugalur (HVDC Stn) 6000 MW HVDC bipole**
(ii) **Establishment of Raigarh HVDC Stn and Pugalur HVDC Stn with 6000 MW HVDC terminals (with alternate of having 3000 MW in first phase)**
(iii) **Raigarh HVDC Station – Raigarh (Existing) 400kV (quad) 2xD/c lines (or with bay extension)**
(iv) Pugalur HVDC Station – Pugalur (Existing) 400kV (quad) D/c line.
(v) Pugalur HVDC Station – Arasur 400kV (quad) D/c line with 80 MVAR switchable line reactor at Arasur end.
(vi) Pugalur HVDC Station – Thiruvalam 400kV (quad) D/c line with 80 MVAR switchable line reactor at both ends.
(vii) Pugalur HVDC Station – Edayarpalayam 400 kV (quad) D/c line with 63 MVAR switchable line reactor at Edayarpalayam end.
(viii) Edayarpalayam – Udumulpeta 400 kV (quad) D/c line.
(ix) Establishment of 400/220kV substation with 2x500 MVA transformers at Edayarpalayam and 2x125 MVAR bus reactors.

22.7 **<u>Scheme-III</u>: Strengthening of transmission system beyond Vemagiri**

(i) Vemagiri-II – Chilakaluripeta 765kV D/c line with 240 MVAR switchable line reactor at both ends.
(ii) Chilakaluripeta – Cuddapah 765kV D/c line with 240 MVAR switchable line reactor at both ends.
(iii) Chilakaluripeta – Podli 400kV (quad) D/c line
(iv) Chilakaluripeta – Narsaraopeta 400kV (quad) D/c line
(v) Cuddapah – Madhugiri 400kV (quad) D/c line with 80 MVAR switchable line reactor at both ends.
(vi) Cuddapah-Hindupur 400kV (quad) D/c line with 80 MVAR switchable line reactor at Hindupur end.
(vii) Srikaukulam Pooling Station – Garividi 400 kV (Quad) D/c line with 80 MVAR switchable line reactor at Garividi end.
(viii) Establishment of 765/400kV substations at Chilakaluripeta and Cuddapah with 2x1500 MVA transformers and 2x240 MVAR bus reactors each.
(ix) Establishment of 400/220kV substations at Podli with 2x315 MVA transformers and 2x125 MVAR bus reactors.

22.8 The above schemes have been evolved through number of cases i.e base cases and contingency cases under various load generation scenarios. A list of cases for 16000 MW deficit scenarios as a justification for the proposed transmission schemes is given below:

Sl.No.	**Case**	**Exhibit no.**
1	Pessimistic Scenario Raigarh-Pugalur 3000 MW	1.0
2	Pessimistic Scenario Raigarh- Pugalur 4000 MW	2.1
3	Pessimistic Scenario Raigarh- Pugalur 2000 MW	2.2
4	Pessimistic Scenario Raigarh- Pugalur 0 MW	2.3
5	Pessimistic Scenario Raigarh- Pugalur 6000 MW	2.4
6	Pessimistic Scenario Warangal-Kurnool path HVDC-3000 MW	3.1
7	Pessimistic Scenario Warora-Warangal N-1	3.2

8	Pessimistic Scenario Warora-Warangal both ckt out	3.3
9	Pessimistic Scenario Angul - Srikakulam N-1	4.1
10	Pessimistic Scenario Angul-Srikakulam both ckt out	4.2
11	Pessimistic Scenario Srikakulam-Vemagiri N-1	4.3
12	Pessimistic Scenario Vemagiri-CPeta N-1	4.4
13	Pessimistic Scenario CPeta-Cudappah	4.5
14	Case with only TN gen reduction	5.1
15	Case with only TN gen reduction-Warangal-Kurnool path	5.2
16	Optimistic case with TN full gen	6.1
17	Optimistic case with TN full gen-Warangal-Kurnool path	6.2
18	Optimistic case with TN full gen Kilpenathur-Coimbatore N-1	6.3
19	Optimistic case with TN full gen Kilpenathur-N.Chennai pool N-1	6.4
20	Case with PST 20 Deg	PST 20 deg
21	Case with PST 15 Deg	PST 15 deg
22	Case with PST 10 Deg	PST 10 deg
23	Case with PST 5 Deg	PST 5 deg
24	Case with PST 0 Deg	Without PST

The above exhibits are enclosed as Annexure-7.

22.9 **Phase shifting transformer:**
It has been observed that the flow on the Raichur-Solapur line is only 565 MW without Phase shifting transformer (Exhibit- Without PST).

To overcome this situation and to achieve some control of power on the AC network Phase Shifting Transformer (PST) at Sholapur is proposed. This PST would be of 3000 MVA (2x1500 MVA). The loading on Raichur-Solapur line improves considerably with the provision of PST.

The studies with 0 deg, 5 deg, 10 deg, 15 deg, 20 deg phase shifting transformer are shown in Exhibits.

22.10 The above schemes have been discussed and agreed in the 37th SCM of SR held on 31.07.2014.

Members may deliberate

23.0 New transmission schemes in lieu of transmission schemes under tendering process/ execution which were a part of the intra-state transmission system identified for RES generations in GUJARAT.

23.1 In the 36th SCM of WR held on 29.08.2013, the intra-state transmission system required for integration of RES generation in the states of Gujarat was agreed. Subsequently, during the meeting held on 19.02.2014 in CEA, it was deliberated that the transmission schemes which have already been awarded for implementation or was planned to be awarded during the next 5-6 months would not be considered for financial assistance under KfW funding. GETCO, vide letter dated 27.05.2014 has proposed the following transmission schemes in place of the approved schemes which are already awarded/ tenderized for financial assistance by MNRE:

S.No.	Name of Transmission Element
(a) Transmission lines (400/220 kV):	
1	400 kV D/C Bhogat-Kalavad line (Quad).
2	220KV D/C Bhogat- Moti Gop line.
3	LILO of one circuit of 220 D/C Hadala – Sartanpar at Wankaner 220 kV substation (with AL-59).
4	LILO of 220 S/C Lalpar – Sartanpar at Wankaner 220 kV substation (with AL-59) (M/C tower by replacement of existing 132 kV towers)
5	LILO of both circuits of 220KV D/C Tebhda – Nyara line at Moti Gop substation (M/C line)
(b) 400/220 kV Sub-Stations:	
1	Upgradation of 132 kV Wankaner substation to 220 kV level
(c) Transmission lines feeder bays	
1	400 KV Feeder Bays : 2 no. at Bhogat, 2 no. at Kalavad
2	220 KV Feeder Bays : 2 no. at Bhogat

23.2 Members may please note.

24.0 19th Open Access meeting on Connectivity and Long Term Open Access (LTOA) applications in Western Region.

24.1 The Open Access meeting would be held after the Standing Committee meeting. The agenda regarding Connectivity and Long Term Open Access (LTOA) applications in Western Region would be circulated by POWERGRID.

25.0 Any other item with the permission of the chair.