

I/11500/2020



भारत सरकार

**Government of India**

विद्युत मंत्रालय

**Ministry of Power**

केंद्रीय विद्युत प्राधिकरण

**Central Electricity Authority**

विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-I

**Power System Planning & Appraisal Division-I**

सेवा मे / To,

संलग्न सूची के अनुसार

As per list enclosed

**विषय : दक्षिण क्षेत्र विद्युत समिति (परेक्षण योजना) की 2<sup>nd</sup> बैठक की कार्यसूची ।****Subject: Agenda for 2<sup>nd</sup> meeting of Southern Regional Power Committee (Transmission Planning) [SRPC(TP)].**

महोदय(Sir)/महोदया(Madam),

दक्षिण क्षेत्र विद्युत् समिति (परेक्षण योजना) की बैठक 01.10.2020 को 11.00 AM, में आयोजित की जाएगी। बैठक का कार्यसूची संलग्न है।

The 2<sup>nd</sup> meeting of Southern Regional Power Committee (Transmission Planning) [SRPC(TP)] is scheduled to be held on 01.10.2020 (Thursday) at 11.00 AM (via VC). Agenda of the meeting is enclosed. Link for joining the meeting would be sent in due course.

You are requested to participate in the meeting.

भवदीय/Yours faithfully,

(ईशान शरण/ Ishan Sharan)

निदेशक/ Director

Copy for kind information to:

- 1) PPS to Member PS, CEA

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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**List of addressee:**

1. The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, Bangalore 560 009. FAX : 080-22259343	2. Chief Operating Officer (CTU-Plg), Central Transmission Utility, Power Grid Corporation of India “Saudamini” Plot No. 2, Sector-29, Gurugram-122001 Tel. No. 0124-2571816
3. Director (System Operations), POSOCO B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi-110016 Tel. No. 26852843 Fax No. 2626524525, 26536901	4. Managing Director Karnataka Power Transmission Corp. Ltd., Cauvery Bhawan, Bengaluru - 560 009. FAX : 080 -22228367
5. Chairman and Managing Director, Transmission Corp. of Andhra Pradesh Ltd., (APTRANSCO) Gunadala, Eluru Road, Vijayawada, Andhra Pradesh	6. Chairman-cum-Managing Director Transmission Corp. of Telangana Ltd., (TSTRANSCO) Vidyut Soudha, Khairatabad Hyderabad – 500 082.
7. Chairman-cum-Managing Director, Kerala State Electricity Board, Vidyuthi Bhawanam, Pattom, Thiruvananthapuram - 695 004. Fax : 0471-2444738	8. Managing Director, Tamil Nadu Transmission Corporation Ltd (TANTRANSCO), 6 <sup>th</sup> Floor, Eastern Wing, 800 Anna Salai, Chennai - 600002. Fax : 044-28516362
9. The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, Puducherry – 605 001. Fax: 0413-2334277/2331556	10. Executive Engineer, Divisional Office, Lakshadweep Electricity Department, Kavaratti Island, UT of Lakshadweep
11. Chairman & Managing Director, NTPC Limited, NTPC Bhawan, SCOPE Complex, Institutional Area, Lodhi Road, New Delhi – 110003	12. Chairman & Managing Director, NHPC Limited, N.H.P.C. Office Complex, Sector-33, Faridabad - 121003 (Haryana)
13. Chairman, Solar Energy Corporation of India Limited, 1 <sup>st</sup> Floor, D-3, A Wing, Primus Platinum Building, District Centre, Saket, New Delhi – 110017	

**Other invitees:**

Director (Operations), NPCIL, Mumbai dschoudhary@npcil.co.in	Director (Power), NLC India Limited Neyveli, Tamil Nadu dir.power@nlcindia.in	Director (Planning & Projects) NLC India Limited Neyveli, Tamil Nadu dpp.co@nlcindia.in
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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**Agenda for 2<sup>nd</sup> meeting of Southern Regional Power Committee (Transmission Planning)****Date: 01.10.2020****Time: 11:00 A.M****1.0 Minutes of 1<sup>st</sup> Meeting of Southern Regional Power Committee (Transmission Planning) [SRPC(TP)]**

- 1.1 Minutes of Meeting of 1<sup>st</sup> Southern Regional Power Committee (Transmission Planning) [SRPC (TP)] held on 16.12.2019 at Hyderabad, was circulated vide letter No. CEA-PS-12-14(12)/1/2018-PSPA –II/I/9079/2020 dated: 12.02.2020. Any comments/observations on the minutes have not been received.

Hence, the minutes of meeting of 1<sup>st</sup> Southern Regional Power Committee (Transmission Planning) as circulated, may please be confirmed.

**Follow up issues of previous meetings of Southern Region Standing Committee on Transmission (SRSTC)/ Southern Regional Power Committee (Transmission Planning) [SRPC(TP)]****2.0 Modifications in 220 kV transmission system proposed by KPTCL at Yalwar (associated transmission lines of 400/220 kV Yalwar Substation.)**

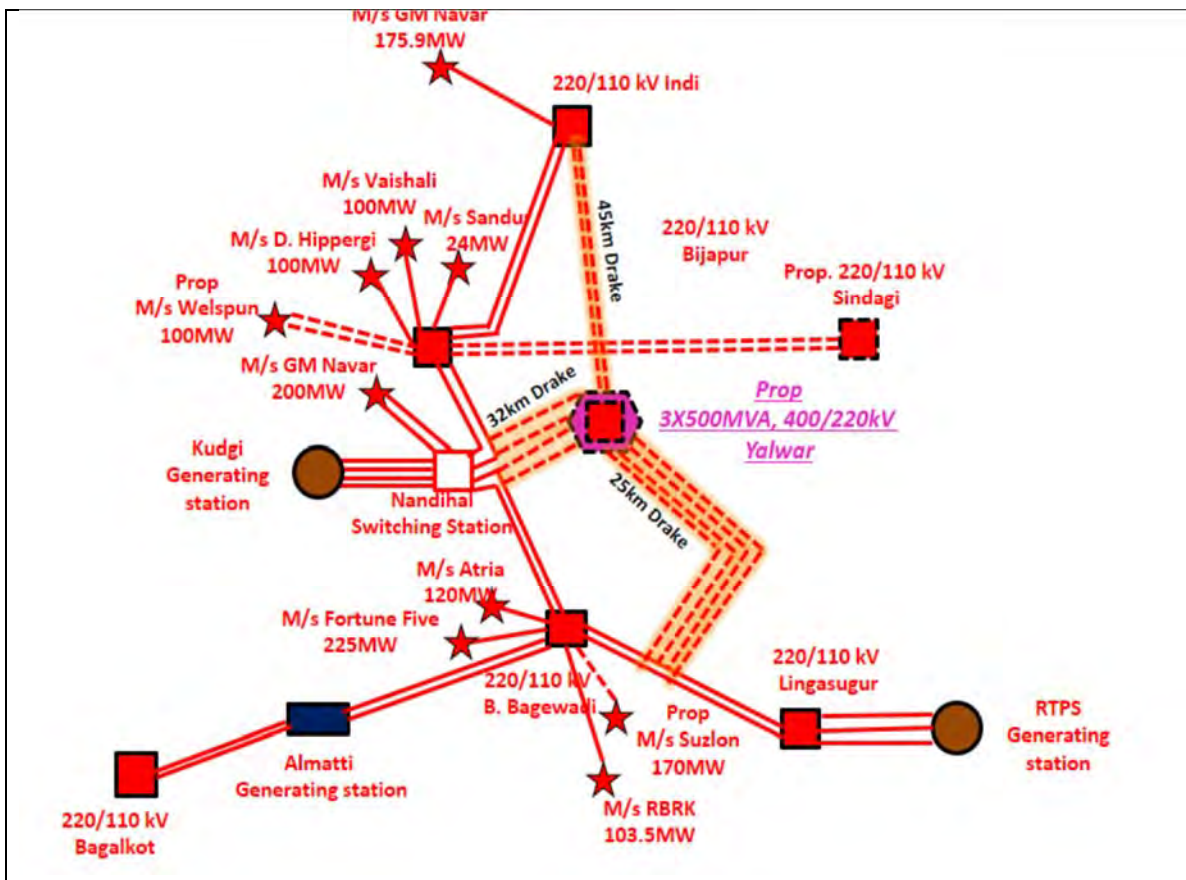
- 2.1 KPTCL has requested modifications in the associated 220 kV transmission system of 400/220 kV Yalwar S/S. This system, as agreed in the 2<sup>nd</sup> meeting of SRSTC held on 10.06.2019 is given below:

- i. LILO of both circuits of existing B. Bagewadi – Lingasugur 220 kV D/C line at Yalwar.
- ii. LILO of both circuits of Bijapur- Sindagi 220 kV D/C line at Yalwar sub-station.
- iii. B. Bagewadi -Yalwar 220 kV D/C line.

- 2.2 Modifications in 220 kV transmission system proposed by KPTCL, as given below was discussed in the 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019.

- i. DC LILO of existing B.Bagewadi – Lingasugur 220 kV DC line to the proposed 400/220 kV Yalwar sub-station.
- ii. 220 kV DC line from proposed 400/220 kV Yalwar (Shivanagi) sub-station to 220 kV Indi substation.
- iii. 220 kV multi-circuit line to the LILO point of 220 kV DC Basavana Bagewadi-Vijayapur line near 220 kV Nandihal switching station.

The transmission line at Sl. No. (i) was already agreed in the 2<sup>nd</sup> SRSTC meeting. Changes have been suggested in Sl. No. (ii) and (iii).



- 2.3 In the 1<sup>st</sup> SRPC(TP) meeting, Chief Engineer (PSPA-II), CEA, had stated that with the proposed connectivity, there would be unequal loading between B. Bagewadi –Yalwar. KPTCL representative had informed that in order to solve the problem of unequal loading, they were planning to use series capacitors for matching the impedance of transmission lines between B. Bagewadi –Yalwar. COO(CTU) had opined that Kudgi generating station being nearby, use of series capacitors in the transmission line may cause the problem of sub-synchronous resonance.
- 2.4 As such, it was decided in the 1<sup>st</sup> SRPC(TP) meeting that KPTCL will carry out detailed study with the planned series capacitors and submit the study results to CEA. The matter would be discussed in the next meeting of SRPC(TP).
- 2.5 KPTCL has informed vide e mail (copy at Annex 2.1) that detailed survey is being carried out to finalize the route length of the proposed LILO line (4 nos. of 220 kV circuits) from proposed 400/220 kV Yalwar sub-station to LILO the existing 220 kV B.Bagewadi - Lingasugur DC line.
- 2.6 As detailed study from KPTCL is awaited, the proposal would be discussed in the next SRPC(TP) meeting upon receipt of complete inputs from KPTCL.

Members may please note.



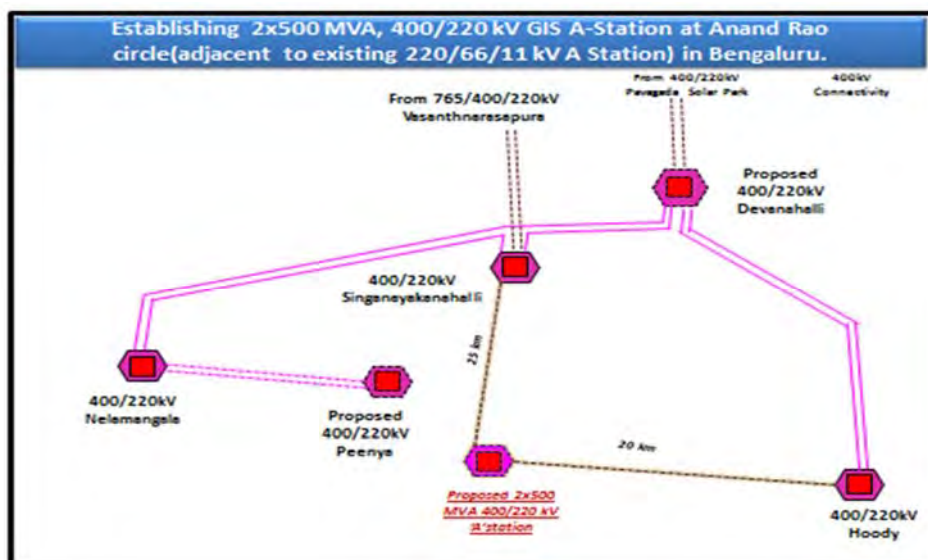
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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**3.0 Establishing 2x500 MVA, 400/220 kV GIS A-Station at Anand Rao circle (adjacent to existing 220/66/11 kV A Station) in Bengaluru**

3.1 KPTCL has proposed the establishment of 2x500 MVA, 400/220 kV GIS A-Station at Anand Rao circle (adjacent to existing 220/66/11 kV A Station) in Bengaluru with following connectivity:

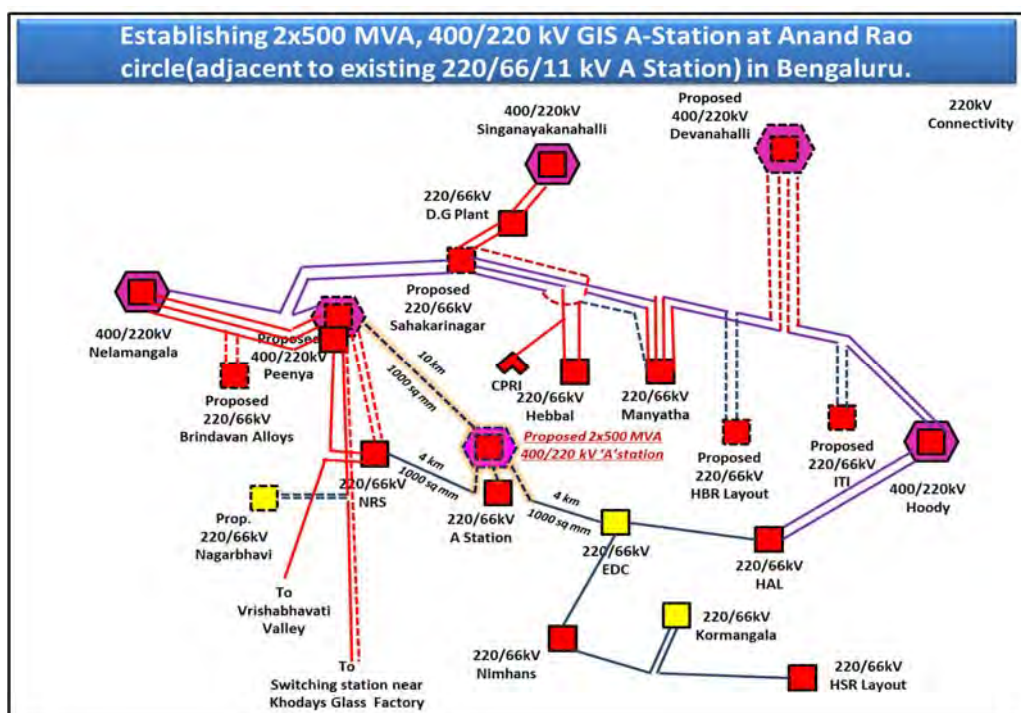
400 kV Connectivity:

- i. 400 kV connectivity from 400/220 kV Singanayakanahalli PGCIL substation which is at a distance of 25 km from the proposed substation.
- ii. 400 kV connectivity from 400/220 kV Hoody substation which is at a distance of about 20 km from the proposed substation.

220 kV connectivity:

- i. The existing 220 kV 'A' station will be connected to the 220 kV bus of proposed 400 kV 'A' station.
- ii. The existing 220 kV UG cable between NRS and "A" station and existing 220 kV UG cable between EDC and "A" station will be terminated to 220 kV bus of 400 kV substation proposed at 'A' station.
- iii. The proposed 220 kV UG cable between Peenya and "A" station (proposed in 400 kV Peenya scheme) will be terminated to 220 kV bus of 400 kV substation proposed at 'A' station.

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- 3.2 The proposal was discussed in the 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019. KPTCL is planning to establish the substation by 2024-25. In the meeting, KPTCL had informed that looking into the severe RoW issues involved in the Bengaluru area, underground AC transmission cables of 400 kV and 220 kV levels shall be used for connectivity of the proposed substation. It was also informed by KPTCL that presently at 400 kV level, about 19 km long UG AC cable is in operation in Saudi Arabia only. Representative of CTU had opined that 25 km long AC cable at 400 kV level shall generate huge amount of reactive power and losses/temperature rise of the cable would also be very high. This may pose problem in operation of the cable. KPTCL was requested to present operational experience of such long cable at 400 kV level along with suitable reactive compensation scheme for the cable.
- 3.3 Accordingly, it was decided that KPTCL shall submit the detailed technical feasibility report of the proposal and the same would be discussed in the next meeting of SRPC(TP).
- 3.4 KPTCL has informed vide e-mail (copy at Annex 2.1) that they have obtained budgetary offer for consultancy services for techno-economical study to analyze the feasibility of the transmission scheme of proposed 400/220 kV 'A' station by construction of 400 kV lines from 400 kV Singanayakanahalli and 400 kV Hoody sub-station using 400 kV UG Cable. Further, it has been decided by KPTCL to call for short term open tender for the said consultancy service and preparation of bid document is under process.
- 3.5 As detailed report from KPTCL is awaited, the proposal would be discussed in the next SRPC(TP) meeting upon receipt of complete inputs from KPTCL.

Members may please note.

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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**4.0 Proposal for grant of connectivity to NLC India Ltd for TPS-II 2<sup>nd</sup> Expansion (2x660 MW) in Cuddalore, Tamil Nadu, and to control high short circuit fault level in Neyveli Generation complex.**

4.1 Proposal for grant of Connectivity to M/s NLC India Ltd for Neyveli TPS-II 2<sup>nd</sup> Expansion thermal power plant was discussed and agreed in the 2<sup>nd</sup> SRSCT meeting held on 10.06.2019 and subsequently in the 1<sup>st</sup> meeting of Southern Regional Power Committee (Transmission Planning) held on 16.12.2019. In view of the connectivity requirements of Neyveli TPS-II 2<sup>nd</sup> expansion from April, 2021, and commissioning of Manalmedu (TANTRANSCO) substation by December, 2021, it was agreed in 1<sup>st</sup> SRPC(TP) meeting that LILO of 2<sup>nd</sup> circuit of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400 kV D/c line at Nagapattinam, shall be restored only after commissioning of Manalmedu S/s, Neyveli TPSII 2<sup>nd</sup> Expn – Manalmedu 400 kV D/c (Quad) line and Manalmedu – Ariyalur 400 kV D/c line by TANTRANSCO.

4.2 Accordingly, following was agreed in the 2<sup>nd</sup> SRSCT/1<sup>st</sup> SRPC(TP) meeting(s):

**Transmission System for providing connectivity to Neyveli TS-II 2<sup>nd</sup> Expn (2x660 MW):**

- i. Re-storation of Neyveli TS-II/Neyveli TS-I Expn - Trichy 400 kV D/c lines through suitable arrangement of bypassing the LILOs at Nagapattinam– **to be implemented under ISTS.**
- ii. Utilization of LILO sections for making Neyveli TPS-II 2<sup>nd</sup> Expn – Nagapattinam 400 kV, 2xD/c lines upto Neyveli TPS-II 2<sup>nd</sup> Expn switchyard - to be implemented under ISTS.
- iii. LILO of 2<sup>nd</sup> circuit of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400 kV D/c line at Nagapattinam shall be restored only after commissioning of Manalmedu S/s, Neyveli TPSII 2<sup>nd</sup> Expn – Manalmedu 400 kV D/c (Quad) line and Manalmedu – Ariyalur 400 kV D/c line by TANTRANSCO.
- iv. 2x125 MVAR bus reactors at generation switchyard (Neyveli TPS-II 2<sup>nd</sup> Expn) – by NLC India Ltd.
- v. The line bays at generation switchyard would be implemented by NLC India Ltd.
- vi. Generation Switchyard to be designed with 50 kA short circuit level.

**Additional System Strengthening for control of short circuit levels in Neyveli generation complex and re-arrangement of network configuration to control overloading of ICTs / 230 kV lines from Neyveli generation complex:**

- i. Neyveli TS-II – Cuddalore 400 kV D/c (Quad) line – under the scope of TANGEDCO as agreed in 1<sup>st</sup> SRSCT.
- ii. Manalmedu – Neyveli TPS-II 2<sup>nd</sup> Expn 400 kV D/c (Quad) line (in place of Cuddalore – Manalmedu 400 kV D/c line agreed in 1<sup>st</sup> SRSCT) – under the scope of TANGEDCO.
- iii. Bypassing of one ckt. of Neyveli TS-II- Salem 400 kV D/c line of PGCIL and Neyveli TSII- NNTPS 400 kV S/c line of PGCIL, to form NNTPS-Salem 400 kV S/c line (agreed in 42<sup>nd</sup> SCPSPSR)- **to be implemented under ISTS.**

4.3 Subsequently, CTU vide email dated 12.03.2020 sought confirmation of start date of connectivity and expected commissioning schedule of both the units of Neyveli TPS-II 2<sup>nd</sup>

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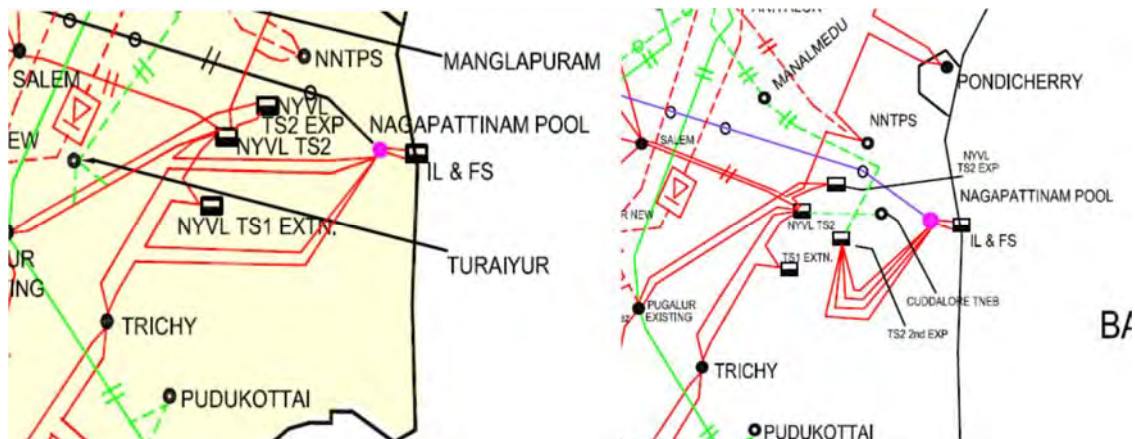
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Expansion. In reply to the email, M/s NLC India Ltd. has furnished the following information towards start date of connectivity and expected commissioning schedule:

- Date from which connectivity is required : Year 2024-25 (Tentative)
- Date of commissioning of Unit 1 : Year 2025-26 (Tentative)
- Date of commissioning of Unit 2 : Year 2025-26 (Tentative)

4.4 M/s NLC India Ltd. has revised the start date of connectivity from April, 2021, to the year 2024-25 (tentative). In view of the delayed schedule of commissioning of Neyveli TPS-II 2<sup>nd</sup> Expansion, implementation of the associated transmission scheme may be required to be phased by Tamil Nadu. Further, as per the revised schedule of commissioning of the generating units, Manalmedu S/S shall be connected radially to Ariyalur till the implementation of Manalmedu – Neyveli TPS-II 2<sup>nd</sup> Expn 400 kV D/c (Quad) line, which shall be implemented matching with schedule of commissioning of generating units of Neyveli TPS-II 2<sup>nd</sup> Expansion. Further LILO of 2<sup>nd</sup> circuit of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400 kV D/c line at Nagapattinam, shall be restored only after commissioning of Manalmedu S/s, Neyveli TPS II 2<sup>nd</sup> Expn – Manalmedu 400 kV D/c (Quad) line and Manalmedu - Ariyalur 400 kV D/c line by TANTRANSCO as agreed in the 1<sup>st</sup> SRPC(TP) meeting.

4.5 For transmission system augmentation and re-arrangement of network configuration, as mentioned in para 4.2, firm commissioning schedule of Neyveli TS-II 2<sup>nd</sup> Expn (2x660 MW) is required. As such, the augmentation/re-arrangement work would be taken up upon receipt of firm commissioning schedule of Neyveli TS-II 2<sup>nd</sup> Expn (2x660 MW) from NLC.



**Fig: Proposed connectivity for Neyveli TPS-II 2<sup>nd</sup> Expn (2x660 MW)**

Members may please discuss.

## 5.0 Overloading of 400 kV NP Kunta-Kolar S/C line

5.1 Overloading of N.P. Kunta-Kolar 400 kV S/c line was discussed in the 2<sup>nd</sup> SRSCT meeting and subsequently in the 1<sup>st</sup> SRPC(TP) meeting. In the 1<sup>st</sup> SRPC(TP) meeting, representative of POSOCO informed that the NP Kunta-Kolar line was severely loaded in the months of

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February to May. This happened even when import of power in Southern Region from NEW Grid was as low as 4,000 MW. Hence, it was requested that the 400 kV Cuddapah – NP Kunta – Kolar line may be by-passed at NP Kunta and restored as 400 kV Cuddapah- Kolar line. Other alternative like strengthening, including re-conductoring may also be explored. POSOCO also informed that the severe loading also constrained the operator from reducing the import at Kolar or whenever there was outage of a pole at Kolar HVDC terminal. Chief Engineer (PSPA-II), CEA, requested POSOCO to share the relevant data for the heavy loading condition.

- 5.2 It had been decided in the 1<sup>st</sup> SRPC(TP) meeting that CEA, CTU and SRLDC/POSOCO may jointly study the issue. Thereafter, the same would be discussed in the next meeting of SRPC(TP).
- 5.3 Accordingly, study has been carried out on basis of inputs from NLDC/RTAMC. Study results are tabulated as below.

Sl. No.	Power flow on important Connectivity Elements	Case 1: Base Case (as per present status)	Case 2 : Case 1 + injection at NP Kunta @1500 MW	Case 3 : Case 2 + Outage of one pole of Talcher-Kolar HVDC line & other pole @150 MW at Kolar*	Case 4: Case 3 + bypass of Cuddapah – Kolar lines at NP Kunta
1.	NP Kunta - Cuddapah 400 kV S/c + D/c lines	96+ 2x113	261+2x308	192+2x227	2x706
2.	NP Kunta - Kolar 400 kV S/c line	508	610	943	-
3.	Cuddapah – Kolar 400kV S/c line	-	-	-	685
4.	Gooty – Somanhally 400kV S/c line	378	367	462	480
5.	Kolar –Somanhally 400kV S/c line	237	253	38	1
6.	Kolar – Hossur 400kV D/c line	600	625	268	200
7.	Kolar – Hoody 400kV D/c line	1252	1300	740	636

\* Due to HVDC electrode earthing issue, with outage of one pole of Talcher-Kolar HVDC line, other pole can be operated at 150 MW only.

- 5.4 From analysis of study results, it is observed that high loading on N P Kunta – Kolar 400 kV S/c line gets reduced with by- passing of Cuddapah – N P Kunta and N P Kunta – Kolar 400 kV S/c line at N P Kunta S/s to form Cuddapah – Kolar 400 kV line.



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- 5.5 Accordingly, it is proposed to bypass the LILO of 400 kV Cuddapah – Kolar line at N P Kunta to form Cuddapah – Kolar 400 kV line. Bypass arrangement may be carried out in such a way, if possible, that both 400 kV circuits may be reconnected at N P Kunta S/s, as and when required for grid operation. This arrangement will provide flexibility to grid operator.

Members may please discuss.

**6.0 Short Circuit studies and Over/Under Voltage studies for Southern Region**

- 6.1 **Over/Under Voltages:** System studies for analysis of high voltage conditions in Southern Region had been carried out by CTU for the off-peak conditions and the same was discussed in the 42<sup>nd</sup> SCPSPSR meeting on 27.04.2018 and in the 1<sup>st</sup> SRSCT meeting held on 07.09.2018, wherein 27 nos. of bus reactors were finalized at different substations in Southern Region and the same are under implementation. It was decided in the 1<sup>st</sup> SRPC(TP) meeting that states may expedite the implementation of bus reactors and may update the status.

- 6.2 **Short Circuit Level:** In the 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019, CTU had informed about the likely locations where high short circuit level could be observed for 2023-24-time frame. In the meeting, it was decided that STUs may also carry out detailed studies for identification of locations where fault levels are crossing the design limits and come up with necessary measures for control of fault level, in the next SRPC(TP) meeting.

- 6.2.1 **Scheme to control fault level at Udumalpet S/s:** The present proposal involves scheme to control fault level at Udumalpet S/s, whereas, mitigation schemes for high fault levels in other ISTS substations in Southern Region will be presented in subsequent SRPC(TP) meetings. From the system studies for 2023-24-time frame, the 3-phase short circuit levels at 400 kV bus of Udumalpet S/s are observed to be of the order of about 49 kA, whereas the substation has been designed for 40 kA fault level. SLD of Udumalpet S/s is depicted below.

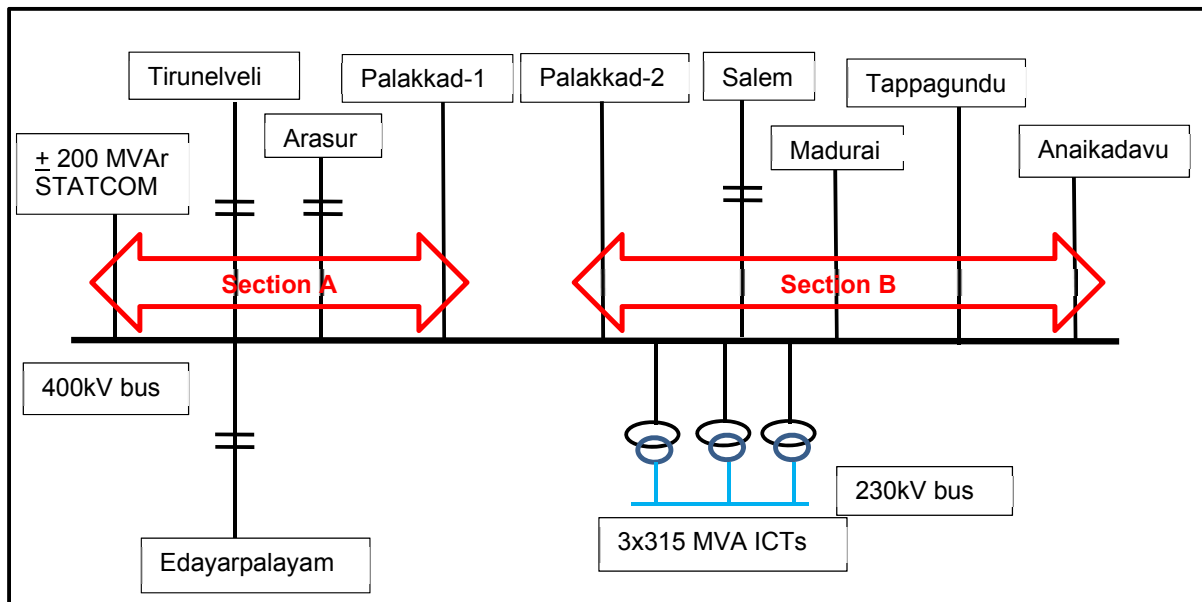


Fig: Schematic for Transmission system for controlling high Short Circuit Current level at Udumalpet 400/230kV substation

6.2.2 In order to control the fault current levels at 400 kV Udumalpet bus, the 400 kV bus has been segregated into two sections (Section A & B) and series reactors have been introduced in the sections to control the fault levels along with bypassing of some of the transmission lines as well. The alternatives and the results are provided in the table below. From the study results it is observed that in case of Alternative-3, the fault currents in both sections of the Udumalpet 400 kV bus remains well within 40 kA limit, the designed fault levels of the bus.

Table 1: Short circuit fault level at 400 kV Udumalpet bus

Alternative	Scheme	Connectivity Details	3-Ph Fault current (kA)	
			Section-A	Section-B
	Base case	Palakkad D/c line, Arasur D/c line, Edayarpalayam(quad) D/c line, Tirunelveli D/c line, Salem D/c line, Madurai S/c line, Tappagundu S/c line, Anaikadevu S/c line and 3x315 MVA, 400/230kV ICTs	49.1	-
1	12Ω, 420kV fault limiting bus series reactors between Bus Section-A and Bus Section-B	<p><b>Bus section-A:</b> One ckt. of Palakkad D/c line, Arasur D/c line, Edayarpalayam (quad) D/c line, Tirunelveli D/c line, ± 200 MVar Statcom</p> <p><b>Bus section-B:</b></p>	38.2	38.3



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Alternative	Scheme	Connectivity Details	3-Ph Fault current (kA)	
			Section-A	Section-B
		2 <sup>nd</sup> ckt. of Palakkad D/c line, Salem D/c line, Madurai S/c line, Tappagundu S/c line, Anaikadevu S/c line and 3x315 MVA, 400/230 kV ICTs		
2	12Ω, 420kV fault limiting bus series reactors between Bus Section-A and Bus Section-B  12Ω, 420 kV fault limiting series line reactor in Udumalpet – Anaikadevu 400kV S/c line at Udumalpet	<b>Bus section-A:</b> One ckt. of Palakkad D/c line, Arasur D/c line, Edayarpalayam (quad) D/c line, Tirunelveli D/c line, ± 200 MVAr Statcom  <b>Bus Section-B:</b> 2 <sup>nd</sup> ckt. of Palakkad D/c line, Salem D/c line, Madurai S/c line, Tappagundu S/c line, Anaikadevu S/c line and 3x315 MVA, 400/230 kV ICTs.	38.2	36.2
3	12Ω, 420 kV fault limiting bus series reactors between Bus Section-A and Bus Section-B.  Bypass of one ckt of Udumalpet – Arasur and Udumalpet – Anikadevu at Udumalpet to form Anikadevu – Arasur 400kV S/c line.	<b>Bus section-A:</b> One ckt. of Palakkad D/c line, Arasur S/c line, Edayarpalayam (quad) D/c line, Tirunelveli D/c line, ± 200 MVAr Statcom  <b>Bus Section-B:</b> 2 <sup>nd</sup> ckt. of Palakkad D/c line, Salem D/c line, Madurai S/c line, Tappagundu S/c line and 3x315 MVA, 400/230kV ICTs.	35.7	32.5

6.2.3 From the above table it is observed that Alternative-3 is suitable for control of fault level at Udumalpet S/s. Accordingly, following transmission system strengthening scheme is proposed for controlling fault level at 400 kV bus of Udumalpet substation:

- a) 12Ω, 420 kV fault limiting bus series reactors between Bus section-A and bus Section-B
- b) Bypassing one ckt of Udumalpet – Arasur line and Udumalpet – Anikadevu line at Udumalpet to form Anikadevu – Arasur 400kV S/c line.

6.3 States to present the measures taken/to be taken to control the fault level in their respective substations.

Members may please discuss.

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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**7.0 Augmentation of transformer capacity in Southern Region (including augmentation of transformation capacity with 1x500 MVA, 400/220 kV ICT each at Kochi and Hiriya 400 kV substations)**

7.1 In the 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019, CTU had informed that the present peak demand of the Southern Region is about 49,000 MW (March, 2019), which is likely to increase to about 70,000 MW by 2023-24 (as per 19<sup>th</sup> EPS). To meet the power demand and to facilitate the constituents to draw their allocated power from the ISTS network, adequate transformation capacity needs to be provided. Further, POSOCO in the operational feedback has stated that the requirement of transformer augmentation may be identified for 765 kV and 400 kV substations under ISTS as well as Intra-STS substations.

7.2 Based on the inputs from constituents, loading profile and expected growth in electricity demand, augmentation of transformation capacity required at various substations is identified from time-to time. System studies were carried out for 2023-24 time-frame, wherein ICT loadings at the following substations were observed to exceed more than 80% of the transformer ratings.

Sl. No.	Substation	ICT voltage level	Ownership	Flow per ICT (MVA)	ICT rating (MVA)	% loading
1.	KURNOOL	400/220	AP	284.1	315	90.2
2.	NELLORE	400/220	AP	273	315	86.7
3.	DEVANHALLI	400/220	Karnataka	505.8	500	101.2
4.	KOTTAYAM	400/220	Kerala	262.7	315	83.4
5.	MADAKATHRA	400/220	Kerala	256.3	315	81.4
6.	KASARGODE	400/220	Kerala	258.2	315	82
7.	SPBUDR	400/110	TN	166.8	200	83.4
8.	THERVOI	400/110	TN	175.3	200	87.6
9.	EDAYARPALAYAM	400/110	TN	163.3	200	81.7
10.	OTTAPIDARAM	400/110	TN	88.5	100	88.5
11.	SALEM	400/230	TN	296.7	315	94.2
12.	MANALMEDU	400/230	TN	449.7	500	89.9
13.	HOSUR	400/220	POWERGRID	249	315	80

7.3 In the 1<sup>st</sup> SRPC(TP) meeting, it was decided that states may go through the proposal and review the requirement of augmentation of transformers at respective locations. The proposal from respective states for augmentation of transformation capacity shall be discussed in the next SRPC(TP) meeting.

7.4 In view of the observations received during the meeting and modifications/updation received from SR constituents on circulated all-India system study file, the network was updated and the studies were revised, wherein ICT loadings at the following substations is likely to exceed 80% of the ICT rating:

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Sl. No.	Substation	ICT voltage level	Ownership	Flow per ICT (MVA)	ICT ratings (MVA)	% loading
1.	Kurnool	400/220	AP	264	3x 315	84
2.	Edayarpalayam	400/110	TN	244	2 x 200	122
3.	Ottapidaram	400/110	TN	83	2 x 100	83
4.	Salem	400/230	TN	262	2 x 315	83
5.	Salem	400/110	TN	222	2 x 200	112
6.	Manalmedu	400/110	TN	182	2 x 200	90

- 7.5 Further, the matter of non-compliance of N-1 criteria (as per CEA manual on transmission planning criteria) of 2x315 MVA, 400/220 kV ICTs at Hiriyur S/S was discussed in 1<sup>st</sup> SRSCT meeting held on 07.09.2018, 2<sup>nd</sup> SRSCT meeting held on 10.06.2019 and 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019. In the 1<sup>st</sup> SRPC (TP) meeting, KPTCL requested to consider augmentation of transformation capacity at Hiriyur substation. In addition, POSOCO in the operational feedback has also mentioned the issue of overloading of 2x315 MVA, 400/220 kV ICTs at Hiriyur.
- 7.6 Similarly, at Kochi substation, with commissioning of Tirunelveli – Kochi 400 kV D/c line, loading on 2x315MVA, 400/220 kV ICTs at Kochi S/s has increased significantly. Presently both ICTs are loaded to about 80-90 % of transformation capacity and are not complying N-1 criteria. Details of loading observed on each 315 MVA, 400/220 kV ICT at Kochi S/s after commissioning of Tirunelveli - Kochi 400 kV D/c line are given at Annex 7.1.
- 7.7 Accordingly, CTU vide letter dated 20.02.2020 (copy at Annex 7.2) has proposed for augmentation of transformation capacity with 1x500 MVA, 400/220 kV ICT each at Kochi and Hiriyur 400 kV substations.

Members may please discuss.

**8.0 Evacuation of power from Telangana Ph-I (2x800 MW) Power Project of NTPC – provision of adequate margin in transmission system for evacuation of 15% unallocated quota. (transmission system already agreed in 41<sup>st</sup> SCPSR meeting as intra-state system)**

- 8.1 In the 1<sup>st</sup> SRPC(TP) meeting, CTU informed that NTPC vide letter dated 04.09.2019 had requested CTU to keep the margins in the ISTS Grid for evacuation and supply of 15% unallocated quota power from Telangana Ph-I TPS. CTU had stated that the generation project is a State embedded generation and its transmission system is being implemented by TSTRANSCO. Therefore, to keep the margin for 15% unallocated quota from the generation project in ISTS Grid, NTPC may apply for LTA under the Connectivity Regulations, 2009. TSTRANSCO stated that they were in discussions with NTPC for allocation of 100% power from the generation project
- 8.2 In the 1<sup>st</sup> SRPC(TP) meeting, representative of NTPC informed that the evacuation arrangement for 15% unallocated quota power from Telangana Ph-I (2x800 MW) would be as

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per the prevailing arrangement for evacuation of unallocated power from other NTPC stations. It was decided that the matter could be further discussed in the next meeting of SRPC(TP) upon receipt of clarification from TSTRANSCO regarding allocation of 100% power from the generation project to Telangana.

- 8.3 Subsequently, TSTRANSCO vide letter dated 20.06.2020 (copy at Annex 8.1) has informed that they have requested MoP for allocation of 100% power from Stage –I (2x800 MW) of 4000 MW Telangana STPP of NTPC. Reply from MoP is awaited.

Members may please note.

Transmission Planning proposals by Andhra Pradesh**9.0 Provision of 4<sup>th</sup> ICT of 500 MVA capacity at existing 400/220 kV substation at Vemagiri**

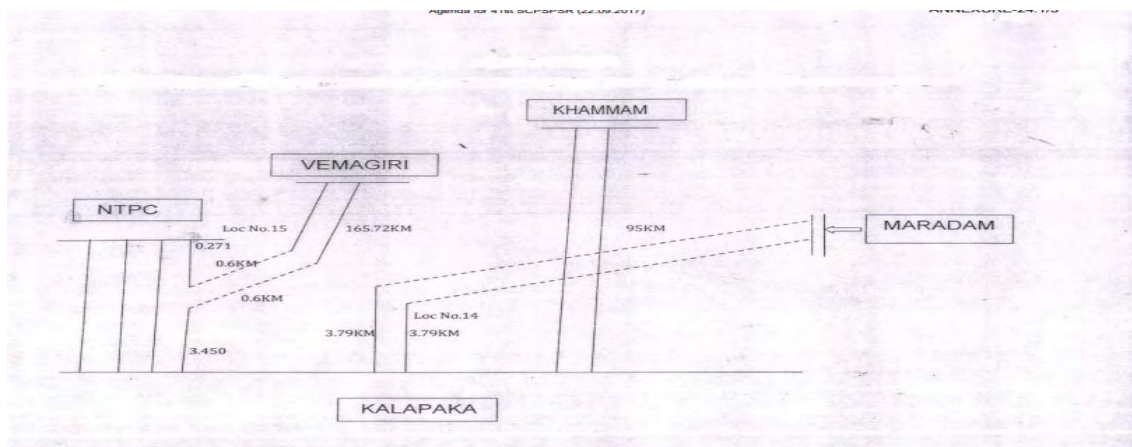
- 9.1 APTRANSCO vide letter dated 08.01.2020 (copy at Annex 9.1) has requested for augmentation ICT capacity from 3x315 MVA to 3x315 + 1x500 MVA at existing 400/220 kV Vemagiri substation in order to overcome the ICT constraints, satisfy N-1 condition and for reliable power supply in the area.

- 9.2 POSOCO in its operational feedback for January-March, 2020, has also brought out that for the 400/220 kV, 3x315 MVA ICTs at Vemagiri, N-1 condition was not satisfied for 12% of the time in the month of March, 2020.

Member may please discuss.

**10.0 Erection of 400 kV Quad Moose DC line from 400 kV Kalpaka SS to 400 kV Garividi (Mardam) SS- replacement of existing Twin Moose Conductor with Twin Moose Invar conductor from location No. 1 to location No. 14.**

- 10.1 Re-arrangement of Kalpaka-Garividi (Mardam) 400 kV Quad Moose D/C line was discussed in the 41<sup>st</sup> Meeting of Standing Committee on Power System Planning for Southern Region (SCPSPSR) held on 22<sup>nd</sup> September, 2017 at Chennai.



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- 10.2 APTRANSCO vide letter dated 20.02.2020 (copy at Annex 10.1) has mentioned that APTRANSCO proposed to take up the 400 kV Quad Moose line from 400 kV Kalpaka SS to the proposed 400 kV Garividi (Mardam) SS by replacing the existing Twin Moose conductor with Twin Moose equivalent Invar conductor from location No. 1 to location No. 14 of 400 kV Kalpaka-Garividi (Mardam) D/C line. However, the same has not been mentioned in the minutes of the meeting of 41<sup>st</sup> SCPSPSR and APTRANSCO has requested to issue necessary clarification/approval in this regard.
- 10.3 CEA vide letter dated 08.05.2020 (copy at Annex 10.2) has conveyed 'in-principle' approval for the following and recommended that modification would be formalized in the next meeting of SRPC(TP) and accordingly scope of the scheme that was agreed in the 41<sup>st</sup> SCPSPSR (para 24.4 of the minutes) would get partly modified.

The Kalpaka-Garividi (Mardam) 400 kV Quad Moose D/C line may be implemented as:

- (i) The portion of line from Kalpaka SS end (location No. 1) to location No. 14, which comprises of Twin Moose conductor (existing Kalpaka-Vemagiri line), would be reconducted with HTLS conductor equivalent to Quad Moose capacity, so as to match the capacity of the remaining portion of Kalpaka-Garividi (Mardam) Quad Moose line.
- (ii) The transmission line from location No. 14 (of Kalpaka-Vemagiri line) to Garividi (Mardam) would be Quad Moose D/C line.

Members may please note.

**11.0 Evacuation of 6000 MW (AC) of Solar Power proposed by Andhra Pradesh Green (APGECL) from various Pooling Stations under Phase-I out of 10000 MW (AC) of Solar power**

- 11.1 APTRANSCO vide their letter dated 26.06.2020 (copy at Annex 11.1) informed that Andhra Pradesh Green Energy Corporation Limited (APGECL), has proposed 4,550 MW (AC) of solar power to be set by them under Phase-I in Prakasam, YSR Kadapa and Ananthapur districts of Andhra Pradesh.
- 11.2 APTRANSCO vide email dated 17.07.2020 (copy at Annex 11.2) has further informed that APGECL has furnished revised proposals for 6000 MW (AC) of Solar Power under Phase-I in Prakasam, YSR Kadapa and Ananthapur districts of Andhra Pradesh, instead of 4,550 MW planned earlier. The locations of Solar Power Parks along with capacities are tabulated below. As per APTRANSCO, power generated from the solar parks would be used for meeting the electricity demand of agricultural consumers in the State.

Sl. No.	Location of Solar Park	Capacity Proposed in MW under Phase-I
1	C.S. Puram, Prakasam Dist.	600MW
2	Kotcherlakota (Rudrasamudram), Prakasam	1,000MW

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3	Pendlimarri, YSR Kadapa Dist.	500MW
4	M. Kambaladinne, YSR Kadapa Dist.	500MW
5	Urichintala, Ananthapur Dist.	700MW
6	Mudigubba, Ananthapur Dist.	500MW
7	Chakrayapeta, YSR Kadapa Dist.	500MW
8	Thonduru, YSR Kadapa Dist.	400MW
9	Pampanuruthanda, Ananthapur Dist.	1,300MW
	<b>Total capacity</b>	<b>6,000MW</b>

- 11.3 Transmission scheme for solar generation project (Kadapa Ultra Mega Solar Park: 1000 MW) at 400 kV Mylavaram SS (in addition to the 6,000 MW proposed solar capacity) had been approved in 40<sup>th</sup> SCPSPSR held on 19<sup>th</sup> November, 2016. As against 1,000MW of Solar Power at Mylavaram, 250 MW has already been commissioned and connected to 400 kV Jammalamadugu SS on temporary basis. APTRANSCO has proposed to drop the Mylavaram SS and has proposed changes in some of the already approved transmission schemes, to cater to the evacuation of power from some of the proposed solar capacity of 6000 MW. The already approved scheme and changes proposed are given below:

Sl. No.	Schemes approved earlier	Now Proposals/Remarks
1	400 kV Jammalamadugu - Ghani QMDC line as per 38 <sup>th</sup> SCPSPSR.	400 kV Jammalamadugu-Ghani QMDC Line as per 38 <sup>th</sup> SCPSPSR.
2	400 kV SS Uravakonda: 3x500 MVA ICT as per 42 <sup>nd</sup> Standing Committee Meeting.	Proposed 4x500 MVA ICT to meet the n-1 contingency.
3	400 kV Jammalamadugu SS (Kondapuram): 3x315 MVA ICT as per 40 <sup>th</sup> SCPSPSR.	Proposed 4x500 MVA ICT and connected bay extension works at Jammalamadugu SS.
4	400 kV Talaricheruvu SS: 3x315 MVA ICT as per 40 <sup>th</sup> SCPSPSR.	Proposed 3x315+1x500 MVA ICTs and connected bay extension works at Talaricheruvu SS.
5	400/220 kV SS at Mylavaram with 3*315 MVA ICTs and 1*125 MVAR bus reactor and 400 kV QMDC line from 400 kV Jammalamadugu-MyLavaram SS (2 km) for evacuation of 1000 MW of Solar Power at Mylavaram (1000MW Solar Power of Kadapa Ultra Mega Solar Park of APSPCL) as per 40 <sup>th</sup> Standing Committee Meeting.	Dropped.  Power will be evacuated at 400 kV SS Jammalamadugu instead of at Mylavaram.

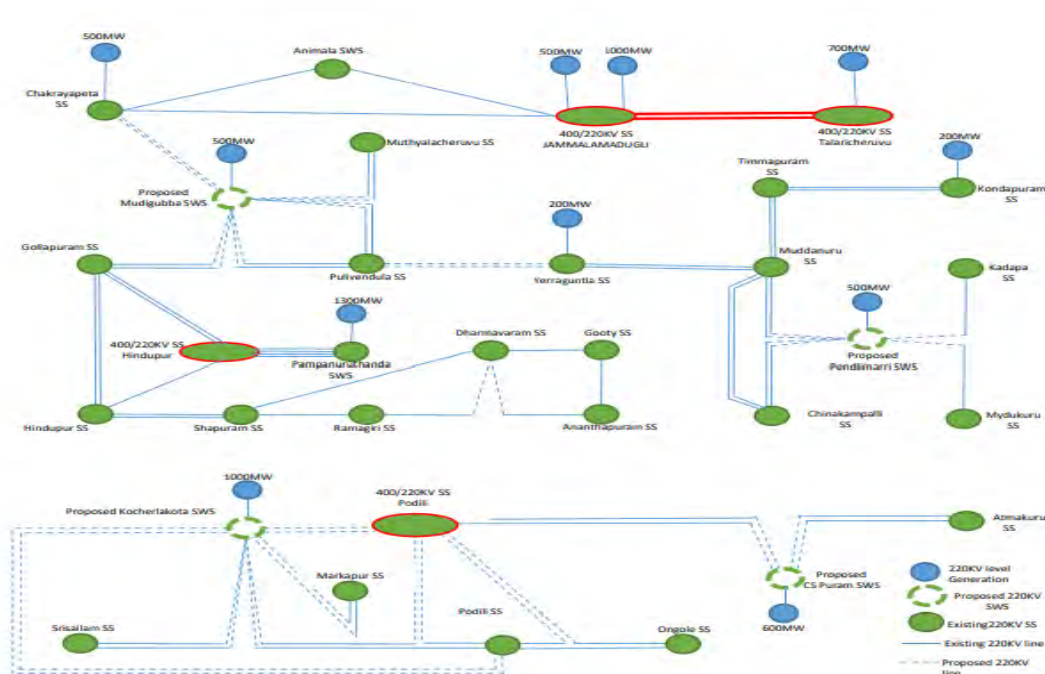
- 11.4 Studies have been carried out by APTRANSCO (copy at Annex 11.3) duly dropping the 400/220 kV SS at Mylavaram and 400 kV QMDC line from 400 kV Jammalamadugu-MyLavaram SS (2 km) (approved in 40<sup>th</sup> SCPSPSR) and connecting the 1000 MW Solar Power of Kadapa Ultra Mega Solar Park at 400 kV Jammalamadugu SS instead at Mylavaram SS.



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The following transmission system has been proposed by APTRANSCO for evacuation of power:

Sl. No.	Description	Solar Power Capacity	Lines proposed
1	Pooling Stations-1, 2,3 & 4 to 400 kV SS Jammalamadugu (YSR Kadapa District)	1,000 MW	<u>Pooling Station to 400 kV Jammalamadugu Substation:</u> a) PS-1 to Jammalamadugu Substation: 220 kV TMDC/SC line: 12.5 km b) PS-2 to Jammalamadugu Substation: 220 kV TMDC/SC line: 10.0 km c) PS-3 to Jammalamadugu Substation: 220 kV SMDC line: 8.0 km d) PS-4 to Jammalamadugu Substation: 220 kV SMDC Line: 9.8 km <b>(Already commissioned)</b>



11.5 APTRANSCO has carried out system studies for the following scenarios considering an annual peak electricity demand of 14,611 MW by the year 2022-23. A maximum capacity factor of 75% has been taken for wind and solar power as per Transmission Planning Criteria.

- Scenario 1: Full Solar Full Wind (75% Solar, 75% wind)
- Scenario 2: Full Solar Full Wind (75% Solar, 75% wind, RTPP NIL)
- Scenario 3: Full Solar Less wind (75% Solar, 40% wind)
- Scenario 4: Full Solar, No wind (75% Solar, 0% wind)
- Scenario 5: Less Solar, Full wind (40% Solar, 75% wind)
- Scenario 6: No Solar, Full wind (0% Solar, 75% wind)
- Scenario 7: Less Solar, Less wind (40% Solar, 40% wind)
- Scenario 8: No Solar, No wind (0% Solar, 0% wind)

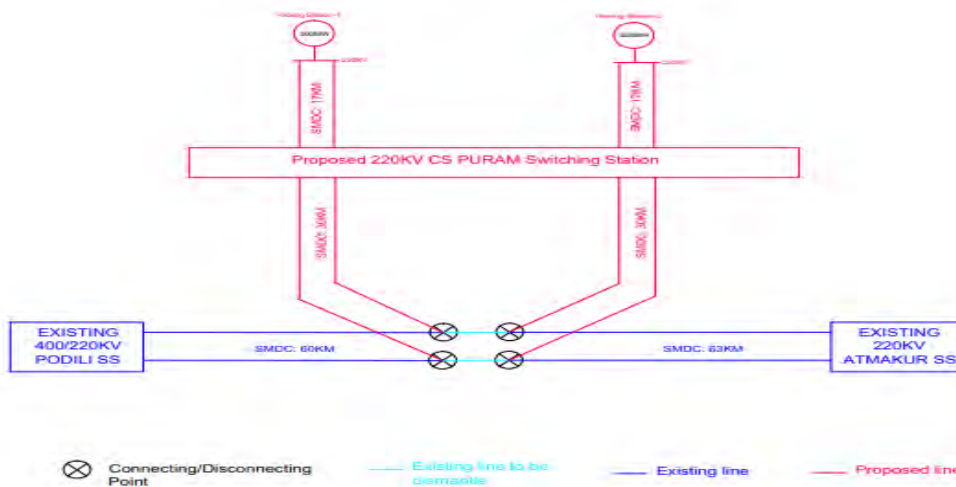


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11.6 Based on the system studies for the 6,000 MW Solar Power, the following evacuation lines are proposed for evacuation of 6,000 MW of Solar Power in Prakasam, YSR Kadapa & Ananthapur Districts under Phase-1.

Sl. No.	Description	Solar Power Capacity	Lines proposed
1	Pooling Stations-1 & 2 to C.S. Puram Switching Station. (Prakasam Dist.)	600 MW	1) <u>Pooling Stations to Switching Station:</u> a) PS-1 to Sw. Station: 220 kV SMDC line: 17 km b) PS-2 to Sw. Station: 220 kV SMDC line: 12 km  2) <u>Evacuation lines from Sw. Station:</u> By making double LILO of 220 kV SMDC line from 400 kV Podili SS to 220 kV Atmakur SS at the proposed 220 kV switching station at C.S.Puram: 30 km

**1. 600MW solar Power at Proposed 220KV CS PURAM SWS**

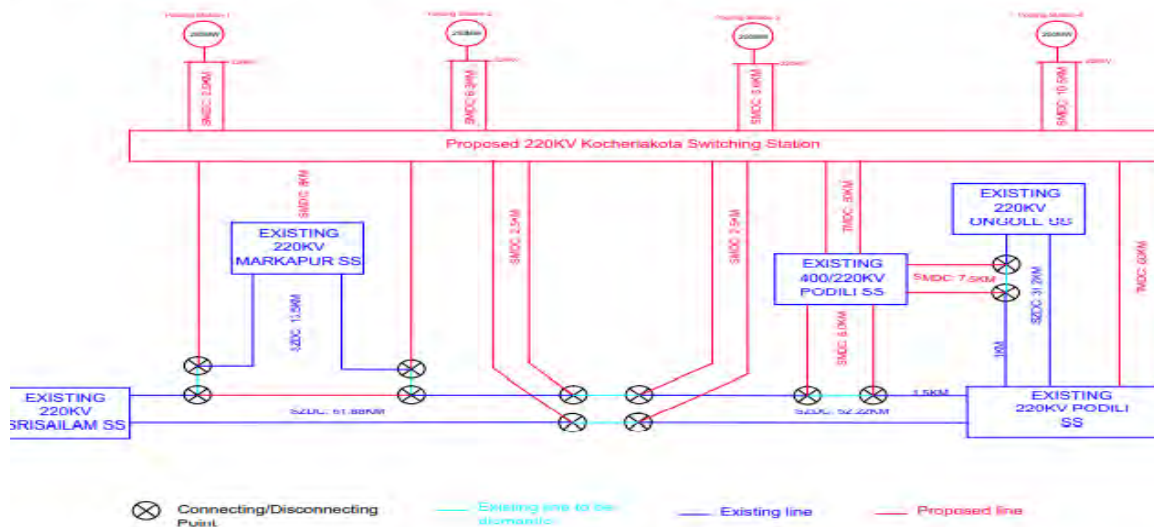


Sl. No.	Description	Solar Power Capacity	Lines proposed
2	Pooling Stations-1, 2, 3 & 4 to Kotcherlakota Switching Station (Prakasam Dist.)	1,000 MW	1) <u>Pooling Stations to Switching Station:</u> a) PS-1 to Sw. Station: 220 kV SMDC line: 2.5 km b) PS-2 to Sw. Station: 220 kV SMDC line: 6.3 km c) PS-3 to Sw. Station: 220 kV SMDC line: 3.6 km d) PS-4 to Sw. Station: 220 kV SMDC line: 10.5 km  2) <u>Evacuation lines from Sw. Station:</u> a) Directing the existing single LILO arrangements of 220 kV Srisailam-Podili SMDC line to 220 kV Markapur SS. b) 220 kV SMDC line from the proposed 220 kV Kotcherlakota Sw. Station to 220 kV Markapur SS.

**Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**

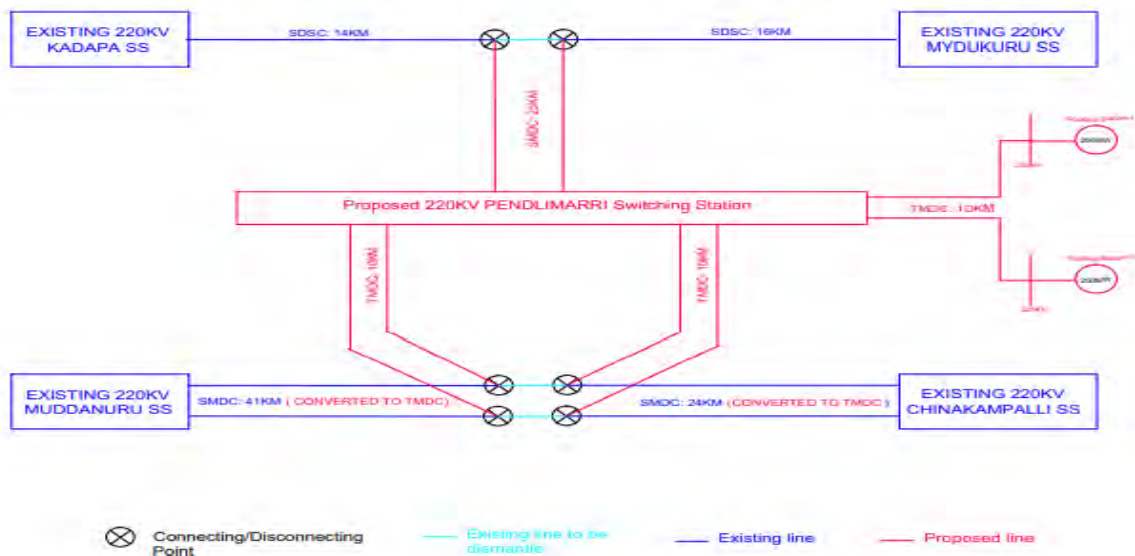
			<p>c) Making double LILO arrangement of 220 kV Srisailam-Podili SMDC line to the proposed Kotcherlakota Sw. Station.</p> <p>d) 220 kV TMDC line is proposed from the proposed Kotcherlakota Sw. Station to 400 kV Podili SS.</p> <p>e) 220 kV TMDC line is proposed from the proposed Kotcherlakota Sw. Station to 220 kV Podili SS.</p>
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**2. 1000MW solar Power at Proposed 220KV Kocherlakota SWS**



Sl. No.	Description	Solar Power Capacity	Lines proposed
3	Pooling Stations-1 & 2 to Pendlmari Switching Station (YSR Kadapa Dist.)	500 MW	<p>1) <u>Pooling Stations to Sw. Station:</u></p> <p>a) 220 kV DC/SC line from PS-1 to common point (TMSC) to Sw. Station (TMDC): 10 km.</p> <p>b) 220 kV DC/SC Line from PS-2 to common point (TMSC) to Sw. Station (TMDC): 10 km.</p> <p>2) <u>Evacuation lines from Sw. Station:</u></p> <p>a) By making LILO arrangements of 220 kV Kadapa-Mydukur SC line: 25 km.</p> <p>b) By making double LILO arrangements of 220 kV RTPP-Chinakampalli DC line duly converting it from SMDC to TMDC: 10 km.</p>

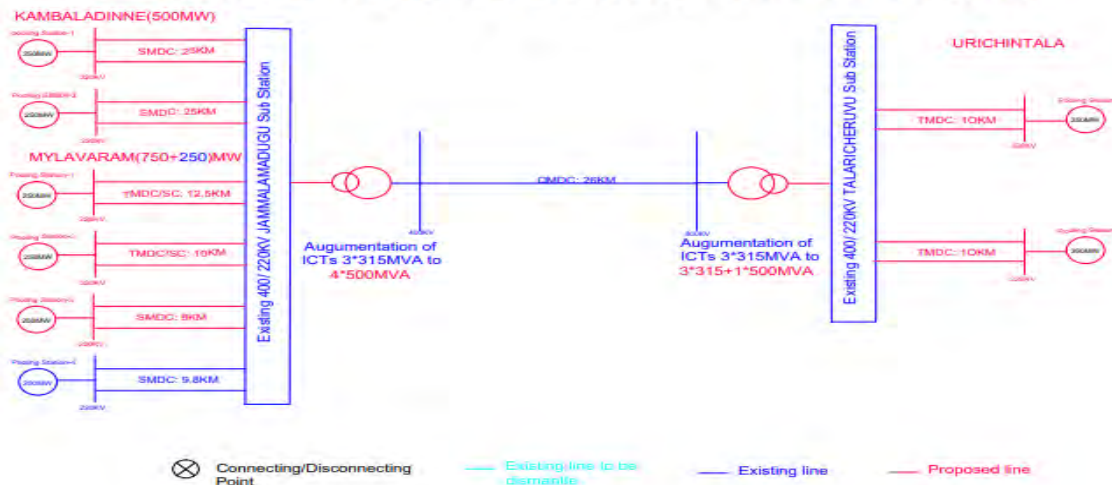
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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**3. 500MW solar Power at Proposed 220KV PENDLIMARRI SWS**

Sl. No.	Description	Solar Power Capacity	Lines proposed
4	Kambaldinne Pooling Stations- 1 & 2 to Jammalamadugu (YSR Kadapa Dist.)	500 MW	1. 220 kV SMDC line from Pooling Station-1 to 400 kV Jammalamadugu SS: 25 km. 2. 220 kV SMDC line from Pooling Station-2 to 400 kV Jammalamadugu SS: 25 km.
5	Urichinthala Pooling Stations – 1 & 2 to Talaricheruvu SS (Anantapur Dist.)	700 MW	1) <u>Pooling Stations to Sw. Station:</u> a) 220 kV TMDC line from PS-1 to 400 kV Talaricheruvu SS: 10 km. b) 220 kV TMDC line from PS-2 to 400 kV Talaricheruvu SS: 10 km.

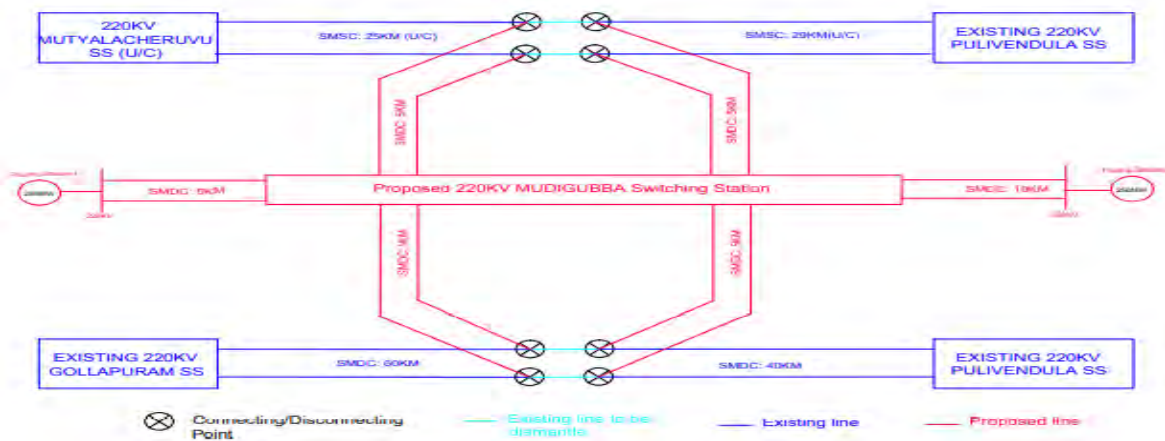
**Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**

**4. 700MW solar Power at 400/220KV TALARICHERUVU SS  
5A. 500MW solar Power at 400/220KV JAMMALAMADU SS  
5B. 1000MW solar Power at 400/220KV JAMMALAMADU SS**



Sl. No.	Description	Solar Power Capacity	Lines proposed
6	Pooling Stations-1 & 2 to Mudhigubba Switching Station (Anantapur Dist.)	500 MW	1) <u>Pooling Stations to Sw. Station:</u> a) PS-1 to Sw. Station: 220 kV SMDC line: 5 km. b) PS-2 to Sw. Station: 220 kV SMDC line: 10 km.  2) <u>Evacuation Lines from Sw. Station:</u> a) Making double LILO arrangements for 220 kV Pulivendula-Gollapuram SMDC line: 5 km. b) Making double LILO arrangement for the proposed 220 kV Pulivendula-Mutyalacheruvu SMDC Line:5 km.

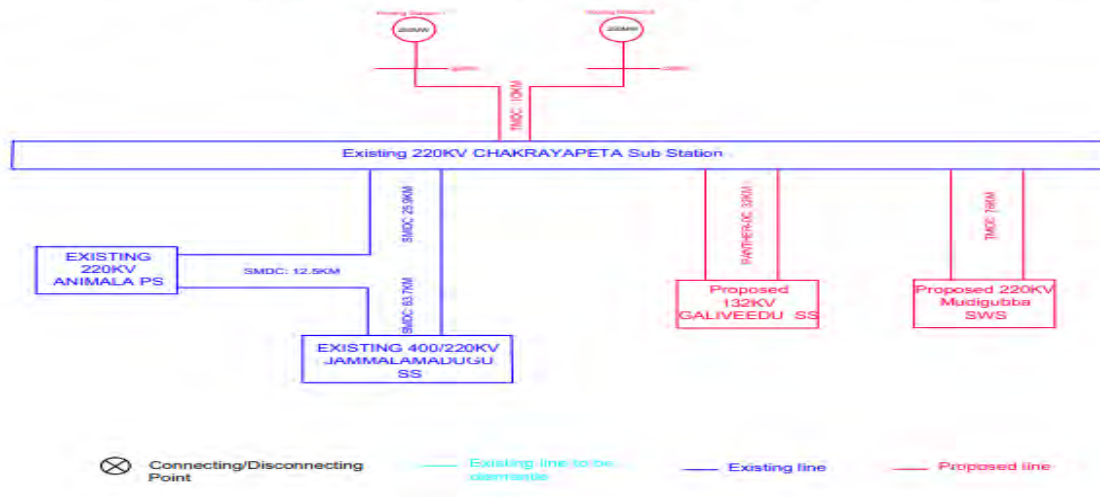
**6. 500MW solar Power at Proposed 220KV MUDIGUBBA SWS**



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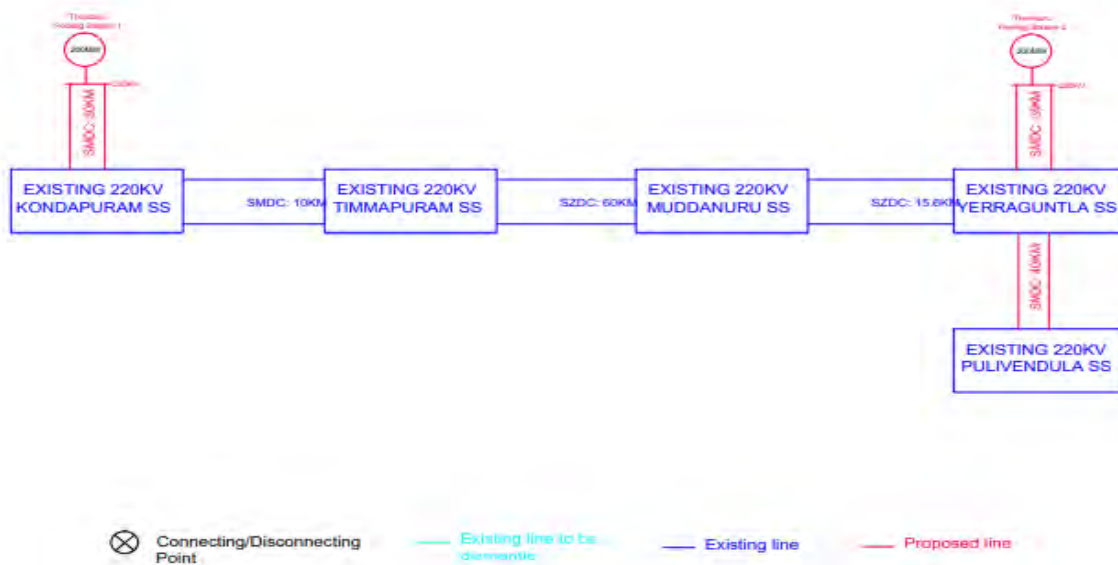
Sl. No.	Description	Solar Power Capacity	Lines proposed
7	Pooling Stations – 1 & 2 to 220 kV SS Chakrayapet (YSR Kadapa Dist.)	500 MW	<p>1) <u>Pooling Stations to Sw. Station:</u></p> <p>a) 220 kV TMSC line from PS-1 to common point &amp; TMDC line from common point to Sw. Station: 10 km.</p> <p>b) 220 kV TMSC line from PS-2 to common point &amp; TMDC line from common point to Sw. Station: 10 km.</p> <p>2) <u>Evacuation lines from Chakrayapet Substation:</u></p> <p>a) 220 kV TMDC line from 220 kV Chakrayapet SS to the proposed switching station at Mudhigubba: 76 km.</p> <p>b) 132 kV DC line from 220 kV Chakrayapet SS to the proposed 132 kV SS at Galiveedu: 32 km.</p>

**7. 500MW solar Power at 220KV CHAKRAYAPETA SUB STATION**

Sl. No.	Description	Solar Power Capacity	Lines proposed
8	Thondur PS-1 to Kondapuram SS & PS-2 to Yerraguntla (YSR Kadapa Dist.)	400 MW	<p>1) <u>Pooling stations to substations:</u></p> <p>a) 220 kV SMDC line from Thondur PS-1 to 220 kV Kondapuram SS: 30 km.</p> <p>b) 220 kV SMDC line from Thondur PS-2 to 220 kV Yerraguntla SS: 35 km.</p> <p>c) 220 kV SMDC Line from 220 kV Pulivendula SS to 220 kV Yerraguntla SS: 40 km.</p>

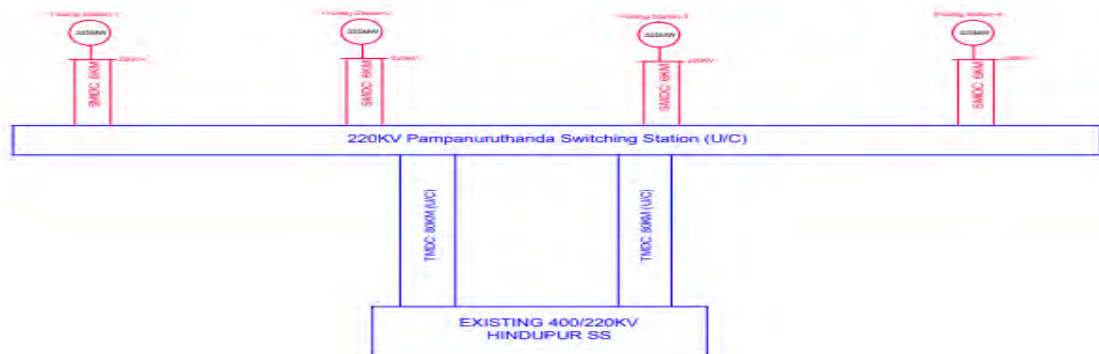


**8. 400MW (Thonduru)solar Power at 220KV KONDAPURAM/ YERRAGUNTLA SUB STATION**



Sl. No.	Description	Solar Power Capacity	Lines proposed
9	Pooling Stations – 1, 2, 3 & 4 to Pampanur Tanda Switching Station (Anantapur Dist.)	1300 MW	<p>1) <u>Pooling Stations to Sw. Station:</u></p> <p>a) 220 kV SMDC line from PS-1 to Sw. Station: 6 km                      b) 220 kV SMDC line from PS-2 to Sw. Station: 6 km                      c) 220 kV SMDC line from PS-3 to Sw. Station: 6 km                      d) 220 kV SMDC line from PS-4 to Sw. Station: 6 km</p> <p>2) <u>Evacuation Lines from Sw. Station:</u></p> <p>2x TMDC 220 kV line from Pampanur Tanda Switching Station to 400/220 kV Hindupur SS: 80 km</p> <p>(Note: 220 kV Single Moose DC line from 400/220 kV Hindupur SS to 220 kV Pampanur Tanda SS was agreed in 40<sup>th</sup> meeting of SCPSPSR held on 19.12.2016)</p>

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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**9. 1300MW solar Power at 220KV Pampanuruthanda SWS**

In addition, the following system strengthening works have been proposed for evacuation of power from the proposed solar generation projects. Some of the schemes are already approved schemes.

1	Proposal for extension of Power Supply for a CMD of 400 MVA to the proposed Industrial Park at Guttapadu by APIIC: i. laying 220 kV TMDC Line from 400 kV Ghani SS to the proposed Switching Station at Guttapadu,(14 km length) and ii. Making Double LILO of the 220 kV Narnur-Somayajulu Palli DC line at the proposed Switching Station at Guttapadu (7 km)
2	Proposed 220 kV SMDC Line from 400 kV Talaricheruvu SS to 220 kV Tadipatri SS not considered in order to avoid overloading of 220 kV Gooty-Boyareddypalli-Tadipatri DC/SC Line.
3	Proposal for LILO of 220 kV Ramagiri - Anantapur SC line to the proposed 220 kV Dharmavaram SS in order to avoid over loading of 220 kV Anantapur-Gooty SC line (LILO line length: 1.6 km)
4	Proposal for LILO of 220 kV Chinakampalli-Renigunta SC Line at the 220 kV Rajampet SS in order to avoid over loading of 220 kV Chinakampalli-Rajampet SC Line (LILO Line Length: 3.0 km)
5	Proposal for replacement of existing ACSR Zebra Conductor with ACSS Conductor on 220 kV Chinakampalli-Timmapuram-Kalikiri SC line to avoid over loading (Length of the lines: 71.5 km & 10.0 km respectively)
6	Proposal for conversion of 220 kV RTPP-Chinakampalli DC Lines from SMDC to TMDC and double LILO at the Pendlimarri Sw. Station in order to avoid over loading of SMDC lines. Towers are suitable for conversion to TMDC
7	From 220 kV Pampanurthanda-Hindupur: 1 No. TMDC Line with ACSR Conductor and 1 No. SMDC Line with ACSS Conductor was proposed earlier. However, during studies, it is observed that load sharing is uneven between TMDC Lines with ACSR and SMDC Lines with ACSS Conductor. During N-1 contingency also, TMDC Line will get over loaded. Hence, TMDC Lines with ACSR Conductors may only be considered for the above 2 nos. double circuits.



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8	Under N-1 contingency, the ICTs 2x315 + 2x500 MVA at 400 kV Uravakonda SS will get overloaded. Previously, 220 kV DC line from 220 kV Vajrarakur SS to 220 kV Ananthapur SS was proposed and same did not materialise as there is no provision for 220 kV bays at 220 kV Ananthapur SS. Later, Single LILO of 220 kV Anantapur-Kalyandurg DC Line to 220 kV Vajrarakur SS was proposed. But, it is also not meeting the N-1 Contingency at 400 kV SS/Uravakonda. Hence, to meet the N-1 contingency, augmentation of ICTs at Uravakonda SS from 2x315+2x500 MVA to 4x500 MVA is proposed. CEA approval is available for 3*500MVA ICTs as per 42 <sup>nd</sup> Standing Committee Meeting. Approval is to be obtained for the balance 500MVA ICT
9	LILO arrangement of 2 <sup>nd</sup> circuit of 220 kV Podili-Ongole DC line at 400 kV Podili SS which is already approved.
10	LILO arrangement of 2 <sup>nd</sup> circuit of 220 kV Podili-Markapur line (Now, it is called 220KV Podili-Srisailam DC Line as LILO at Markapur is proposed to be disconnected) to 400 kV Podili SS which is already approved.
11	Proposal for stringing of 2 <sup>nd</sup> circuit on 220 kV Dhone-Krishnagiri DC/SC line is required for converting temporary connectivity to permanent connectivity for wind power evacuation at 220 kV Krishnagiri SS.
12	Proposal for stringing of 2 <sup>nd</sup> circuit on 220 kV Dhone-Kambalapadu-Lakkasagaram-Nansurala DC/SC lines is required for converting temporary connectivity to permanent connectivity for wind power evacuation at 220 kV Nansurala SS.

11.7 APTRANSCO informed that tentative commissioning date of proposed transmission system would be 12 to 15 months from the date of approval by SRPC(TP).

11.8 APTRANSCO may please present.

Members may please discuss.

**Transmission Planning proposals by Telangana****12.0 Proposal for new 220 kV substation at Chandanvally along with modification in earlier approved 220 kV D/C line from 400/220/132 kV Kethireddypalli (Manikonda) SS to proposed 220 kV KP Laxmidevipally LI SS.**

12.1 In the 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019, 220 kV D/c line from 400/220/132 kV Kethireddypalli (Manikonda) SS to proposed 220 kV KP Laxmidevipally LI SS had been agreed as a part of transmission scheme for Palamuru Rangareddy Lift Irrigation Scheme.

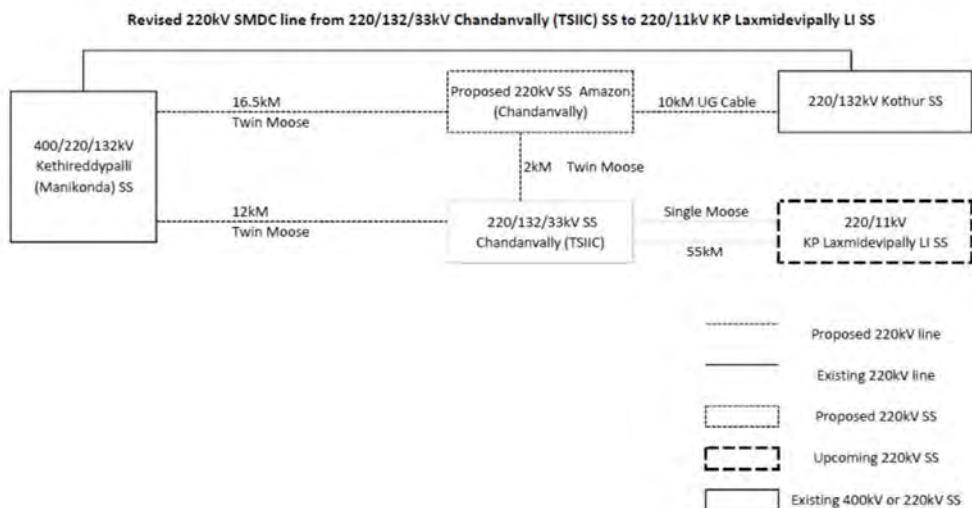
12.2 TSTRANSCO vide letter dated 28.05.2020 (copy at Annex 12.1) has proposed the following transmission system for establishing 220 kV substation at Chandanvally:

- i. Proposed 220/132/33 kV Chandanvally (TSIIC) SS with 2x100 MVA PTR capacity (70 MW load).
- ii. Proposed 220 kV SS for M/s. Amazon Data Services India Private Limited, Chandanvally (100 MW load).
- iii. Proposed 220 kV Twin Moose DC/SC line from 400/220/132 kV Kethireddypalli SS to proposed 220 kV Amazon (Chandanvally) SS - 16.5 km.
- iv. Proposed 220 kV Twin Moose DC/SC line from 400/220/132 kV Kethireddypalli SS to proposed 220 kV Chandanvally (TSIIC) SS – 12 km

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- v. Proposed 220 kV Twin Moose SC line from 220 kV Chandanvally (TSIIC) SS to 220 kV Amazon (Chandanvally) SS - 2 km
- vi. Proposed 220 kV SC line (1200 sq.mm. UG Cable) from 220/132 kV Kothur SS to proposed 220 kV Amazon (Chandanvally) SS - 10 km
- vii. Proposed 220 kV Single Moose DC line from 220/132/33 kV Chandanvally (TSIIC) SS to proposed 220 kV KP Laxmidevipally LI SS (236 MW load) – 55 km [instead of 220 kV DC line from 400/220/132 kV Kethireddypalli (Manikonda) SS to proposed 220 kV KP Laxmidevipally LI SS as agreed in 1<sup>st</sup> SRPC(TP) meeting].



Members may please discuss.

### 13.0 Proposal for extending power supply to meet the load requirement for lifting additional 1 TMC of water from Godavari Basin in Link-I, Link-II & Link-IV of Kaleshwaram Lift Irrigation Scheme

- 13.1 TSTRANSCO vide letter dated 10.06.2020 (copy at Annex 13.1) has informed that Irrigation & CAD (I&CAD) Department of Telangana has requested to extend power supply for lifting the additional 1 TMC water from Godavari Basin in Link-I, Link-II & Link-IV of Kaleshwaram Lift Irrigation Scheme. The required load for lifting of additional 1 TMC water is as follows:

LINK	Sl.No.	PUMP House/ Load Centre	Existing Loads (MW)	New/ Additional Loads (MW)	Total Load (MW)
LINK-I	1	Medigadda	11x40MW=440 MW	6x40MW=240 MW	680
	2	Annaram	8x40 MW=320 MW	4x40 MW=160 MW	480
	3	Sundilla	9x40 MW=360 MW	5x40 MW=200 MW	560
	<b>TOTAL</b>		<b>1120</b>	<b>600</b>	<b>1720</b>
LINK-II	1	Medaram	7x124.4 MW=870.8 MW	0	870.80
	2	Ramadugu	7x139 MW=973 MW	0	973
	3	Velgatoor Reach-I	0	5x135 MW=675 MW	675
	4	Pegadapally (Namapur) Reach-II	0	4x135 MW=540 MW	540
	<b>TOTAL</b>		<b>1843.8</b>	<b>1215</b>	<b>3058.80</b>

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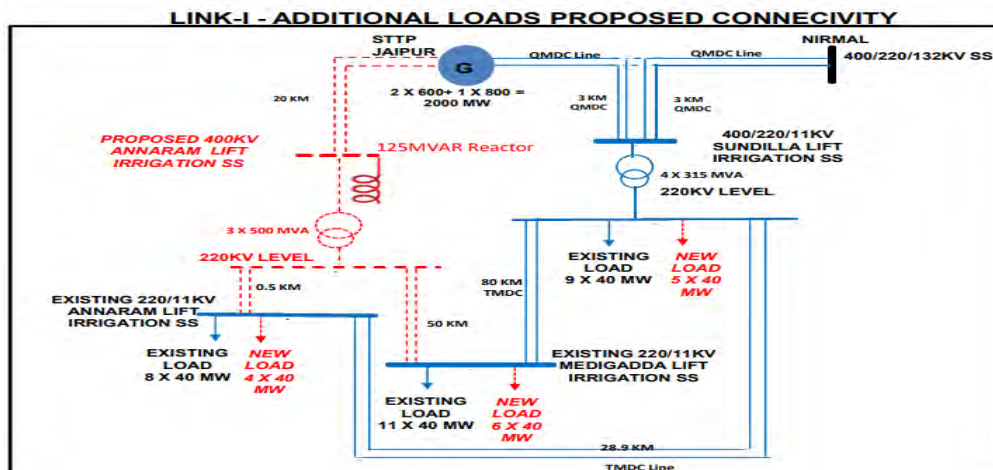
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LINK-IV	1	Near Tippapur (Reach-I) (Veljipur (V))	4x106 MW=424 MW	4x125 MW=500 MW	924
	2	Near Chandulapur (Reach-II) Chinagundavelli(V)	4x134.8 MW=539.2 MW	6x125 MW=750 MW	1289.2
	3	Near Tukkapur (Reach-III)	8x43 MW=344 MW	4x90 MW=360 MW	704
		<b>TOTAL</b>	<b>1307.2</b>	<b>1610</b>	<b>2917.2</b>

13.2 TSTRANSCO has proposed the following transmission system to meet the load requirement for lifting additional 1 TMC of water from Godavari Basin in Link-I, Link-II & Link-IV of Kaleshwaram Lift Irrigation Scheme:

**(I) Link – I for additional load of 600 MW at Medigadda, Annaram and Sundilla pumping stations**

- Proposed 400/220 kV Annaram SS with 3x500 MVA Transformers.
- Proposed 400 kV QMDC line from STPP Jaipur (Singareni STPP) to proposed 400/220 kV Annaram SS - 20 km.
- Proposed 220 kV TMDC line from 400/220 kV Annaram SS to existing 220/11 kV Annaram SS – 0.5 km.
- Proposed 220 kV TMDC Line from 400/220 kV Annaram SS to existing 220/11 kV Medigadda SS – 50 km.
- 1x125 MVAR reactor at the proposed 400/220 kV Annaram SS.



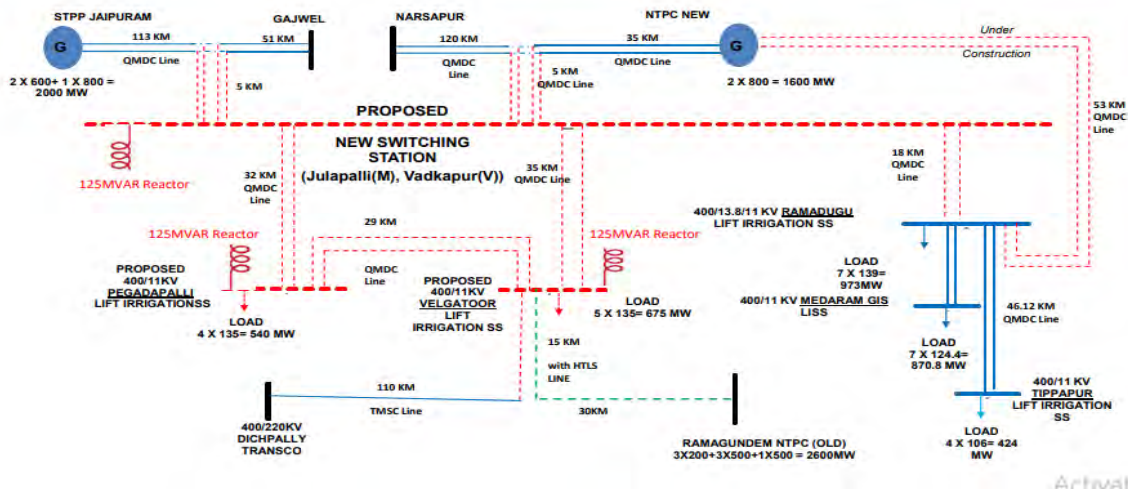
**(II) Link-II for additional load of 1,215 MW at Vegaltoor (Reach-I of Load 675 MW) and Namapur/Pegadapally (Reach-II of Load 540 MW)**

- Proposed 400 kV Vadkapur switching station.
- Proposed 400/11 kV Pegadapally SS.
- Proposed 400/11 kV Velgatoor SS.
- LILO of 400 kV QMDC line from STPP Jaipur (Singareni STPP) – Gajwel 400/220/132 kV SS to proposed 400 kV Vadkapur Switching station – 5 km LILO

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length instead of already existing LILO of 400 kV QMDC line from STPP Jaipur – Gajwel 400/220/132 kV SS at 400/220 kV Ramadugu SS.

- e) LILO of 400 kV QMDC line from Telangana STPP (2x800 MW) - 400/220/32 kV Narsapur SS to proposed 400 kV Vadkapur Switching station – 5 km LILO length.
- f) Proposed 400 kV QMDC Line from 400 kV Vadkapur Switching Station to 400/220 kV Ramadugu SS – 18 km.
- g) Proposed 400 kV QMDC line from 400 kV Vadkapur switching station to 400/11 kV Velgatoor SS – 35 km.
- h) Proposed 400 kV QMDC line from 400 kV Vadkapur switching station to 400/11kV Pegadapally SS in - 32 km.
- i) Proposed 400 kV QMDC line from 400/11 kV Pegadapally SS to 400/11 kV Velgatoor SS – 29 km.
- j) LILO of 400 kV NTPC-Dichpally TMSO to proposed 400/11 kV Velgatoor SS - 15 km LILO length.
- k) Re-conductoring of proposed 400 kV NTPC - Velgatoor single circuit line with higher current carrying capacity conductor (i.e. 400 kV NTPC - Velgatoor portion pertaining to LILO of 400 kV NTPC - Dichpally to Velgatoor SS)
- l) 1x125 MVAR Reactor at proposed 400 kV Vadkapur SWS.
- m) 1x125 MVAR Reactor at proposed 400/11 kV Pegadapally SS.
- n) 1x125 MVAR Reactor at proposed 400/11 kV Velgatoor SS.

**LINK-II - ADDITIONAL LOADS PROPOSED CONNECTIVITY**

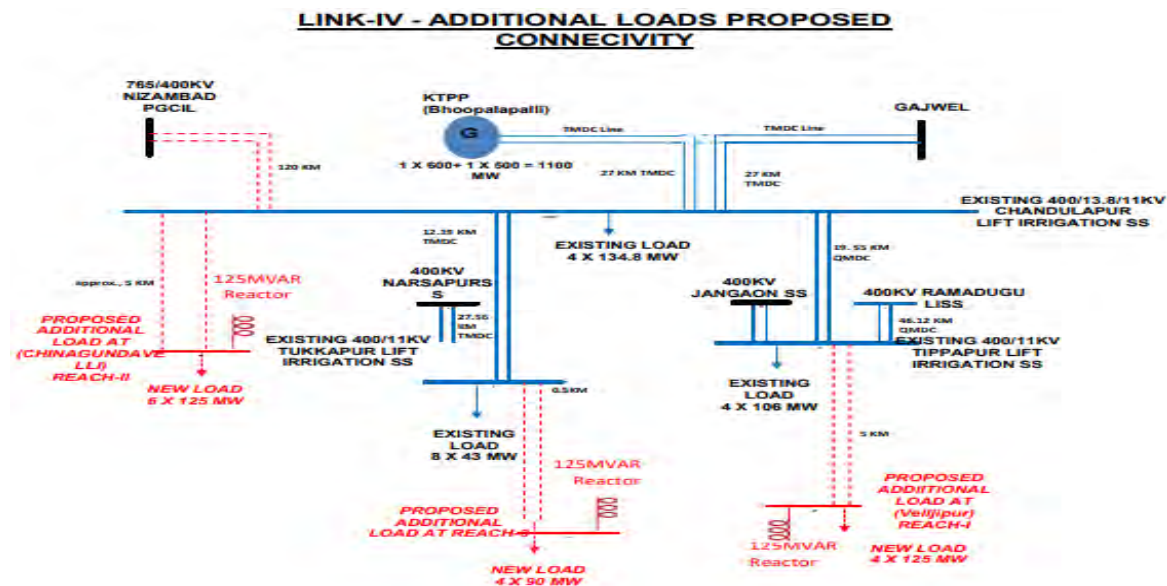
**(III) Link-IV of Kaleshwaram Scheme for additional load of 1,610 MW at Reach – I (near Tippapur: 500 MW), Reach - II (near Chandlapur: 750 MW) and Reach – III (Tukkapur: 360 MW) Pumping Stations**

- a) Proposed 400 kV QMDC Line from 765/400 kV Nizamabad substation (PGCIL) to existing 400/13.8/11 kV Chandlapur substation – 120 km.
- b) Proposed 400 kV switchyard (Reach-I) at Veljipur (V).

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- c) Proposed 400 kV QMDC line from existing 400/11 kV Tippapur SS to proposed additional load (4x125 MW=500 MW) Pumping Station (Reach-I) at Veljipur (V)- 5 km.
- d) Proposed 400 kV Switchyard (Reach-II) at Chinagundavelli (V).
- e) Proposed 400 kV QMDC line from existing 400/13.8/11 kV Chandlapur substation to proposed additional load (6x125 MW = 750 MW) pumping station (Reach-II) at Chinagundavelli (V) – 5 km.
- f) Proposed 400 kV switchyard (Reach-III)
- g) Proposed 400 kV TMDC line from existing 400/11 kV Tukkapur SS to proposed additional load (4x90 MW = 360 MW) Pumping Station (Reach-III) - 0.5 km
- h) 1x125 MVAR reactor at proposed 400 kV Reach-I Switchyard Veljipur (V)
- i) 1x125 MVAR reactor at proposed 400 kV Reach-II Switchyard Chinagundavelli (V)
- j) 1x125 MVAR reactor at proposed 400 kV Reach-III Switchyard.



13.3 The above schemes were discussed in a meeting (through VC) between CEA, CTU and TSTRANSCO on 20.08.2020. In the meeting, the requirement of LILO of Dichpally-Ramagundem 400 kV line to the proposed 400/11 kV Velgatoor Lift Irrigation substation (as part of Link-II for meeting additional load of 1,215 MW at Velgatoor) was also discussed. TSTRANSCO representative informed that in case of fault at 400 kV Vadkapur switching station, alternate source of power would be required for running the pumps and for this, LILO of Dichpally-Ramagundem 400 kV line to the proposed 400/11 kV Velgatoor Lift Irrigation substation had been planned. It was suggested by CTU representative that the bus at Vadkapur 400 kV switching station may be split into two parts with circuit breaker. In case of fault in one section, entire load could be met from another section and by this arrangement LILO of Dichpally-Ramagundem line could be avoided.



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- 13.4 TSTRANSCO vide letter dated 28.08.2020 (copy at Annex 13.2) has informed that in view of bulk loads at 400/11 kV Velgatoor LISS and 400/11 kV Pegadapally LISS, 400 kV Vadkapur switching station, and LILO of 400 kV NTPC Ramagundem - Dichpally TMSC line to 400/11 kV Velgatoor SS has been proposed. TSTRANSCO has also intimated that as per the studies carried out by TSTRANSCO, the total Telangana state system losses will be reduced by 15 MW with the proposed LILO of 400 kV NTPC (Ramagundem) - Dichpally TMSC line to 400/11 kV Velgatoor SS as the proposed Velgatoor SS is near to the NTPC Ramagundam (45 km) and proposed LILO length is about 15 km.
- 13.5 It was also brought out in the meeting on 20.08.2020 that Telangana State would be in deficit situation during the months in which the Lift Irrigation schemes would operate and hence Telangana should tie up power for meeting its electricity demand. TSTRANSCO vide letter dated 28.08.2020 (copy at Annex 13.2) has informed that agreements for purchase of solar power for a total capacity of 1,723 MW have been concluded by TSDiscoms. The solar power from these projects is expected from the year 2022-23. Deficit, if any, would be met through short term power purchase and power purchase through power exchange.

Members may please discuss.

Transmission Planning proposals by TANTRANSCO**14.0 Establishment of S. P. Koil 400/230-110 kV SS by upgrading the existing S. P. Koil 230 kV SS**

- 14.1 TANTRANSCO vide letter dated 18.07.2020 (copy at Annex 14.1) had informed that considering the future load growth in and around Chennai South area, the establishment of S.P. Koil 400/230-110 kV S/S has been envisaged by upgrading the existing S.P. Koil 230 kV SS, with the following connectivity.

400 kV transmission lines:

Erection of 400 kV DC line on DC Tower for making LILO of one of the circuit of Thiruvalam - Kalivanthapattu 400 kV DC quad line.

ICTs:

- 2x500 MVA 400/230 KV ICT
- 2x200 MVA 400/110 kV ICT

Bus Reactor:

- 400 kV - 1x125 MVAr

230 kV Transmission Lines:

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- i. The existing 230 kV transmission lines at S.P.Koil 230/110 kV SS are retained and in addition to this, new proposal of 230 kV line to Kadapperi 230 kV SS from the proposed S.P.Koil 400/230-110 kV SS.
- ii. Replacement of existing S.P.Koil - Veerapuram 230 kV feeder conductor by equivalent HTLS conductor.

**110 kV Transmission Lines:**

Existing 110 kV transmission lines at S.P. Koil 230/110 kV SS have been retained.

- 14.2 The proposal was discussed in a meeting (through VC) between CEA, CTU and TANTRANSCO on 20.08.2020. In the meeting, CTU representative informed that the Thiruvallam - Kalivanthapattu 400 kV line is Twin Moose and not Quad Moose and accordingly TANTRANSCO was requested to modify the proposal.
- 14.3 TANTRANSCO vide email dated 26.08.2020 (copy at Annex 14.2) has submitted the revised proposal for establishment of S.P. Koil 400/230-110 kV S/S by upgrading the existing S.P. Koil 230/110 kV SS, with the following transmission scheme.

**400 kV transmission lines:**

Erection of 400 kV DC line on DC tower for making LILO of one circuit of Thiruvallam - Kalivanthapattu 400 kV DC Twin Moose line at S.P. Koil 400/230 kV SS.

**ICTs:**

- 2x500 MVA, 400/230 kV ICT

**Bus Reactor:**

- 1x125 MVAR, 400 kV

**230 kV transmission lines:**

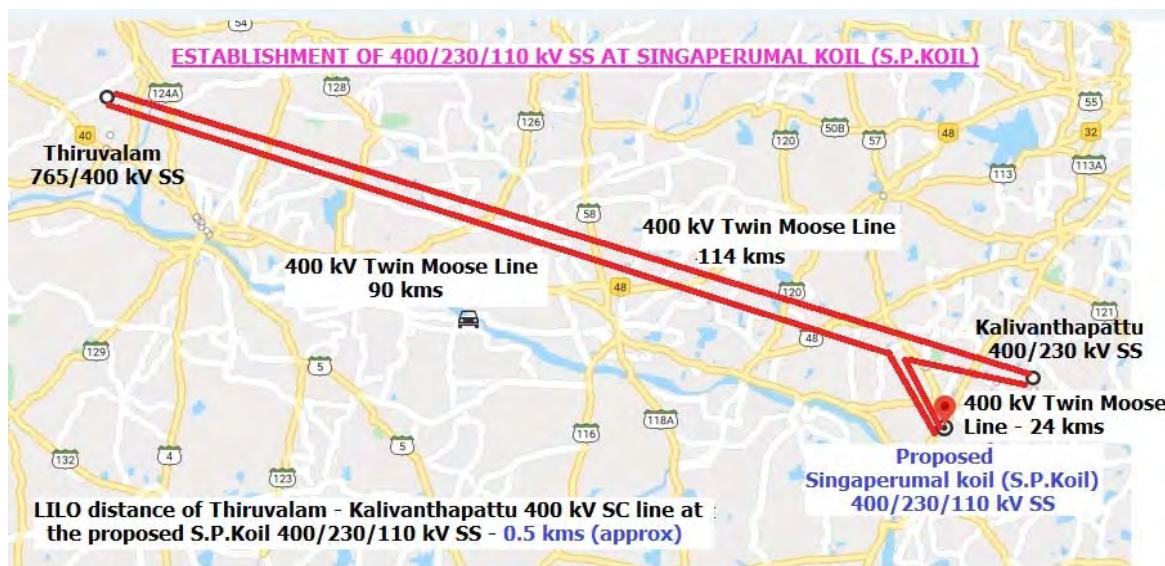
- i. The existing 230 kV transmission lines at S.P. Koil, 230/110 kV SS, would be retained and in addition to this 230 kV S/C line is planned to Kadapperi 230 kV SS from the S.P. Koil 400/230-110 kV SS.
- ii. Replacement of existing S.P. Koil - Veerapuram 230 kV S/C feeder conductor by equivalent HTLS conductor.

**110 kV transmission lines:**

Existing 110 kV transmission lines at S.P. Koil 230/110 kV SS would be retained.



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Member may please discuss.

### 15.0 Revised ATS for Mangalapuram 400/230 kV S/S

15.1 Establishment of Mangalapuram 400/230 kV SS was approved in the 37<sup>th</sup> meeting of the Standing Committee on Power System Planning for Southern Region held on 31.07.2014 with the following transmission system:

#### 400 kV transmission lines:

LILO of both circuits of Pugalur-Ariyalur 400 kV D/C quad line.

#### 230 kV transmission lines:

- i. LILO of Salem –Singapuram 230 kV feeder.
- ii. LILO of Deviyakurichi - Valayapatty 230 kV feeder.
- iii. 230 kV SC line to the proposed Thammampatty 230 kV SS.
- iv. 230 kV SC line to the proposed Udayapatty 230 kV SS.

#### ICT:

2 x 315 MVA, 400/230 kV ICT.

15.2 TANTRANSCO vide letter dated 18.07.2020 (copy at Annex 14.1) has proposed revised ATS with increase in the ICT capacity for Mangalapuram 400/230 kV substation as given below:

#### 400 kV transmission lines:

LILO of one of the circuit of Pugalur-Kalivanthapattu 400 kV Quad line.

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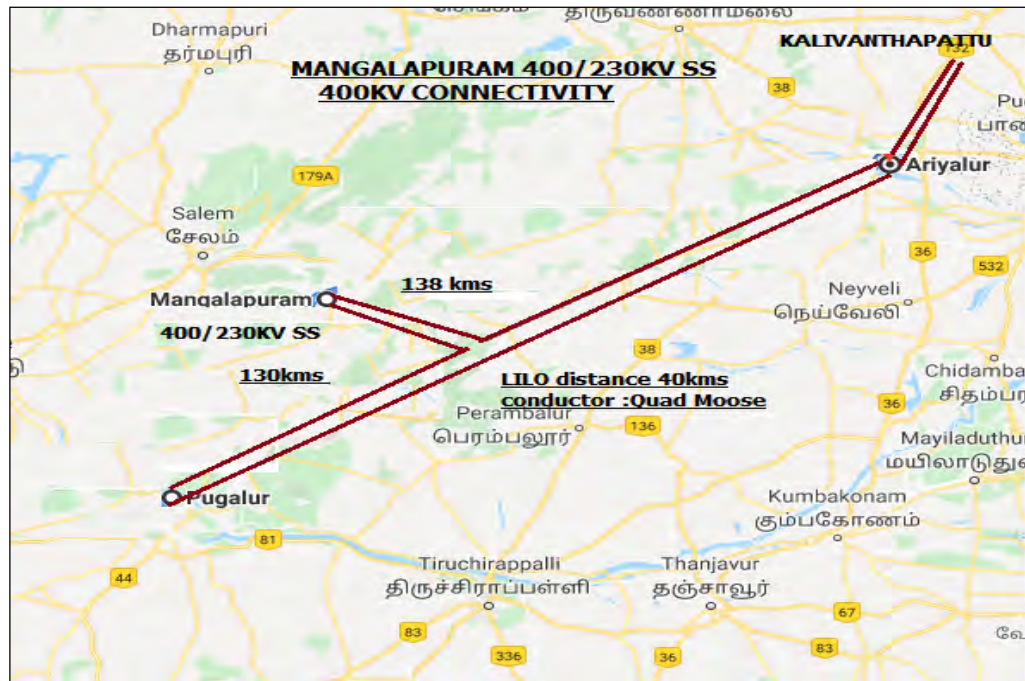
- i. LILO of Salem –Singapuram 230 kV feeder.
- ii. LILO of Deviyakurichi - Valayapatty 230kV feeder.
- iii. Erection of a new 230 kV feeder by stringing on the existing free arm from Pudhanchandai to Deviyakurichy 230 kV substations and making LILO at the proposed Mangalapuram 400/230 kV SS.
- iv. 230 kV DC line to the proposed Udayapatty 230 kV SS.

**ICT:**

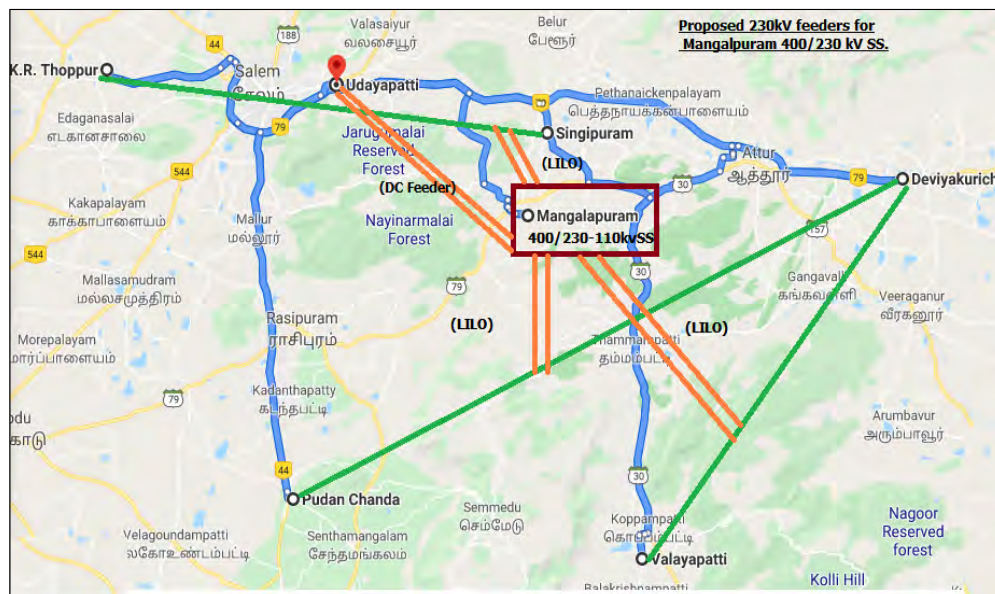
2 x 500 MVA, 400/230 kV ICT.

**Bus Reactors:**

400 kV, 2 x125 MVAr bus reactors.



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Members may please discuss.

### 16.0 Establishment of Kalvadagam 400/110 kV substation

16.1 TANTRANSOCO vide letter dated 18.07.2020 (copy at Annex 14.1) has proposed to establish 400/230-110 kV substation at Kalvadagam, Erode Region, instead of Kolapalur 400 kV SS approved in 37<sup>th</sup> meeting of SCPSPSR held on 31.07.2020, due to land availability issue at Kolapalur.

16.2 Transmission system for Kolapalur 400/230-110 kV substation as approved in 37<sup>th</sup> meeting of SCPSPSR is given below:

#### 400 kV transmission lines:

- Single circuit LILO of 400 kV MTPS Stage III - Karamadai D/c line at Kalvadagam
- 400 kV D/C line from Rasipalayam 400 kV Substation.

#### ICT

2x 315MVA, 400/230kV ICTs and 2x200 MVA, 400/110 kV ICTs

#### 230 kV transmission lines:

- 230 kV S/C line to Thingalur 230 kV SS
- 230 kV S/C line to Anthiyur 230kV SS
- 230 kV S/C line to Shenbagapudur 230 kV SS
- LILO of Gobi – Pallakapalayam 230kV feeder



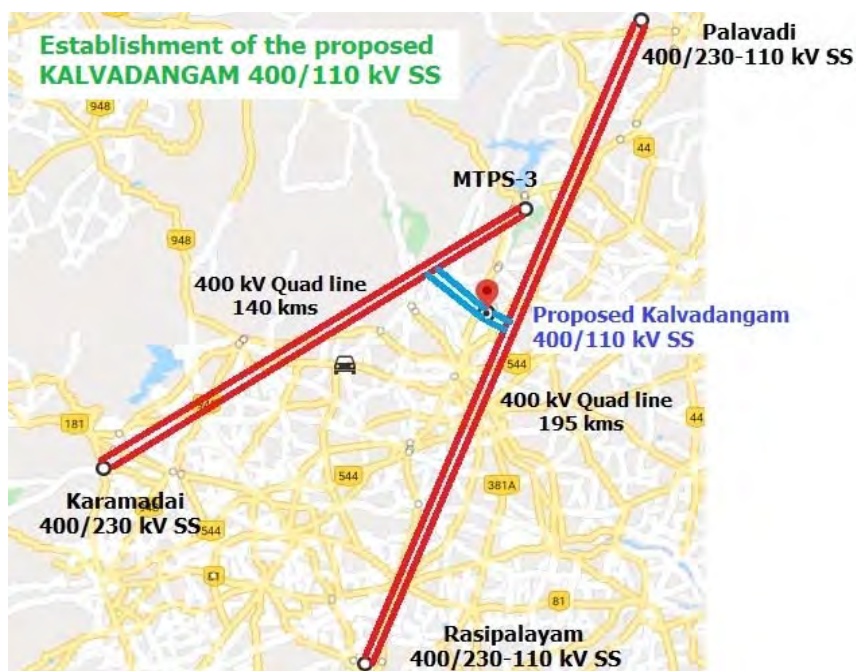
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- v. LILO of Karamadai – Ingur 230kV line
- 16.3 The proposal was discussed in a meeting (through VC) between CEA, CTU and TANTRANSCO on 20.08.2020. TANTRANSCO vide email dated 05.09.2020 (copy at Annex 16.1) has submitted the revised proposal
- 16.4 Transmission system for 400/110 kV substation at Kalvadagam, Erode Region, as proposed by TANTRANSCO (instead of substation at Kolapalur) is given below:

**400 kV transmission lines:**

- LILO of one circuit of Rasipalayam - Palavadi 400 kV D/C quad line at Kalvadagam.
- LILO of one circuit of MTPS III - Karamadai 400 kV D/C quad line at Kalvadagam.

**LILO Details:**

LILO distance of 400 kV Rasipalayam - Dharmapuri Quad SC line - 7 kms.

LILO distance of 400 kV MTPS (Mettur) - Karamadai Quad SC line - 10 kms.

**Distance between Substations:**

- |                               |            |
|-------------------------------|------------|
| 1. Rasipalayam - Kalvadagam   | - 107 kms. |
| 2. Palavadi - Kalvadagam      | - 102 kms. |
| 3. MTPS (Mettur) - Kalvadagam | - 35 kms.  |
| 4. Karamadai - Kalvadagam     | - 120 kms. |

**ICT**

3x200 MVA, 400/110 kV ICT

**Bus Reactor:**

400 kV, 1x125 MVAr Bus reactor

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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**110 kV transmission lines:**

- i. LILO of Pallipalyam - Barrage II 110 kV feeder.
- ii. LILO of Barrage III - Anthiyur 110 kV feeder (in between Barrage-III & Chennampatty 110 kV SS).
- iii. LILO of K.R.Thoppur-Vembadithalam- IVELI 110 kV feeder (in between Vembadithalam & IVELI 110 kV SS).
- iv. DC feeder to Edapadi 110 kV SS.

Members may please discuss.

**17.0 Neyveli TS-II to Neyveli (TANTRANSCO) 230 kV substation-230 kV line 1 & 2 - Ratification for the usage of Twin Moose conductor instead of the approved HTLS conductor:**

- 17.1 TANTRANSCO vide letter dated 18.07.2020 (copy at Annex 14.1) has informed that in the 36<sup>th</sup> SCSPSR meeting held on 4<sup>th</sup> September, 2013, the proposal of Neyveli TS-II - Neyveli (TANTRANSCO 230 kV substation), 230 kV DC line with HTLS conductor was approved for the additional transmission system for evacuation of power from 2x500 MW Neyveli Lignite Corporation Ltd. TS-I (Replacement), NNTPS.
- 17.2 During the execution of work, the 230 kV D/C line between Neyveli TS-II - Neyveli (TANTRANSCO 230 kV substation) was erected with 230 kV twin moose conductor instead of the already approved HTLS conductor. The line has been subsequently commissioned on 26.12.2019.
- 17.3 Accordingly, TANTRANSCO has requested that the necessary ratification may be issued for the change in the type of 230 kV conductor from HTLS to twin moose between Neyveli TS-II and Neyveli (TANTRANSCO 230 kV substation).

Members may please discuss.

**18.0 Proposal to drop the 230 kV connectivity to NTPL for power evacuation during contingent conditions**

- 18.1 As per the minutes of the 24<sup>th</sup> meeting of SCSPSR held on 18.06.2007, following transmission system had been agreed as the evacuation system for Tuticorin TPS JV (2x500 MW) (NTPL):
  - i) Tuticorin JV TPS – Madurai 400 kV D/c quad line
  - ii) 2x315 MVA 400/220 kV ICT at Tuticorin TPS JV
  - iii) LILO of 2 nos. of 230 kV circuits at Tuticorin TPS JV

- 18.2 In the 1<sup>st</sup> SRPC(TP) meeting, TANTRANSCO had stated that the 230 kV lines should not be utilized for the evacuation of power from Tuticorin JV (2x500 MW) TPP as the same leads to

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congestion in the downstream network and some of the state's generation may have to be backed down.

- 18.3 The matter had been discussed in the 1<sup>st</sup> SRPC(TP) meeting and it had been agreed that the 230 kV NTPL-TTP Auto & 230 kV NTPL-TTPS lines will be restored and normally kept bypassed with suitable switching arrangement at NTPL switchyard. However, whenever requirement arises, these lines would be closed on the instruction of SRLDC after taking into account the concern of TANTRANSCO.
- 18.4 TANTRANSCO vide letter dated 18.07.2020 (copy at Annex 14.1) has again requested to drop the 230 kV connectivity of NTPL power plant (LILO of TTPS – Tuticorin 230 kV), since evacuation of NTPL power through this 230 kV feeder results in overloading of the 230 kV feeder due to which the TTPS generation has to be backed down. Hence, TANTRANSCO has requested to drop the proposal of utilizing TTPS –TTN Auto 230 kV S/C line connectivity for power evacuation from NTPL station.

Members may please deliberate.

**19.0 Manalmedu 400/230-110 kV substation**

- 19.1 Establishment of Manalmedu 400/230/110 kV substation was approved in the 41<sup>st</sup> meeting of SCPSPSR (held on 22.09.2017) with the following transmission schemes:

**400 kV transmission lines:**

- i. Ariyalur (proposed 765/400kV SS) - Manalmedu 400 kV D/C link
- ii. Neyveli (TNEB)-Manalmedu 400 kV D/C link.

**230 kV transmission lines:**

- i. LILO of Neyveli TS-II - Kadalangudi 230 kV SC line at Manalmedu.
- ii. Kumbakonam- Manalmedu 230 kV S/C line
- iii. Narimanam- Manalmedu 230 kV S/C line.

**ICTs:**

- i. 2x500MVA, 400/230 kV ICT
- ii. 2x200MVA, 400/110 kV ICT

**Bus reactor:**

2x80 MVAr Bus reactors.

- 19.2 Due to constraints in land acquisition for the establishment of 400 kV SS at Neyveli, upgradation of the existing Cuddalore 230/110 kV substation into 400/230-110 kV SS instead of the already approved Neyveli 400/230 kV substation had been approved in the 1<sup>st</sup> SRSCT meeting held on 07.09.2018 with the following connectivity:

- (i) Neyveli TS II - Cuddalore 400 kV D/C line.
- (ii) Manalmedu - Cuddalore 400 kV D/C line.
- (iii) 2x500 MVA, 400/230 kV ICTs
- (iv) 2x200 MVA, 400/110 kV ICTs



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- (v) 2x125 MVA, 400 kV bus Reactors

Thus the 400 kV connectivity for Manalmedu SS was modified as given below:

- (i) Ariyalur 765/400 kV SS - Manalmedu 400 kV DC line.
- (ii) Cuddalore - Manalmedu 400 kV D/C line.

19.3 Further, in the 2<sup>nd</sup> SRST meeting held on 10.06.2019, as an additional system strengthening scheme for control of short circuit levels in Neyveli generation complex and rearrangement of network configuration to control overloading of ICTs/230 kV lines from Neyveli generation complex, transmission schemes of the already proposed Manalmedu & Cuddalore 400 kV substations were modified as follows:

- (i) Neyveli TS II - Cuddalore 400 kV D/c (Quad) line - under the scope of TANGEDCO as agreed in 1<sup>st</sup> SRST meeting.
- (ii) Manalmedu - Neyveli TPS II 2<sup>nd</sup> Expansion 400 kV D/c (Quad) line (in place of Cuddalore – Manalmedu 400kV D/c line as agreed in 1<sup>st</sup> SRST) – under the scope of TANGEDCO

19.4 TANTRANSCO vide letter dated 18.07.2020 (copy at Annex 14.1) has proposed to revise the transmission scheme for the establishment of 400/230-110 kV Manalmedu substation as given below:

**Manalmedu 400/230-110 kV SS – proposed revised connectivity:****400 kV transmission lines:**

- i. Erection of 400 kV DC line from Ariyalur 765/400 kV SS to Manalmedu 400 kV SS.
- ii. Erection of 400 kV DC line from the proposed Neyveli TS II 2<sup>nd</sup> Expansion TPP to Manalmedu 400 kV SS.

**ICT**

- i. 2x500 MVA, 400/230 kV ICTs
- ii. 3x200 MVA, 400/110 kV ICTs

**Bus reactor**

2x125 MVA Bus Reactors

**230 kV transmission lines:**

- i. Erection of DC line to make LILO of Neyveli TS-II to Kadalangudi 230 kV feeder at Manalmedu 400 kV SS.
- ii. Erection of SC line to Kumbakonam 230 kV SS from Manalmedu 400 kV SS
- iii. Erection of SC line to Poyyur 230 kV SS from Manalmedu 400 kV SS.
- iv. Erection of DC line to the proposed Chidambaram 230 kV SS from Manalmedu 400 kV SS.

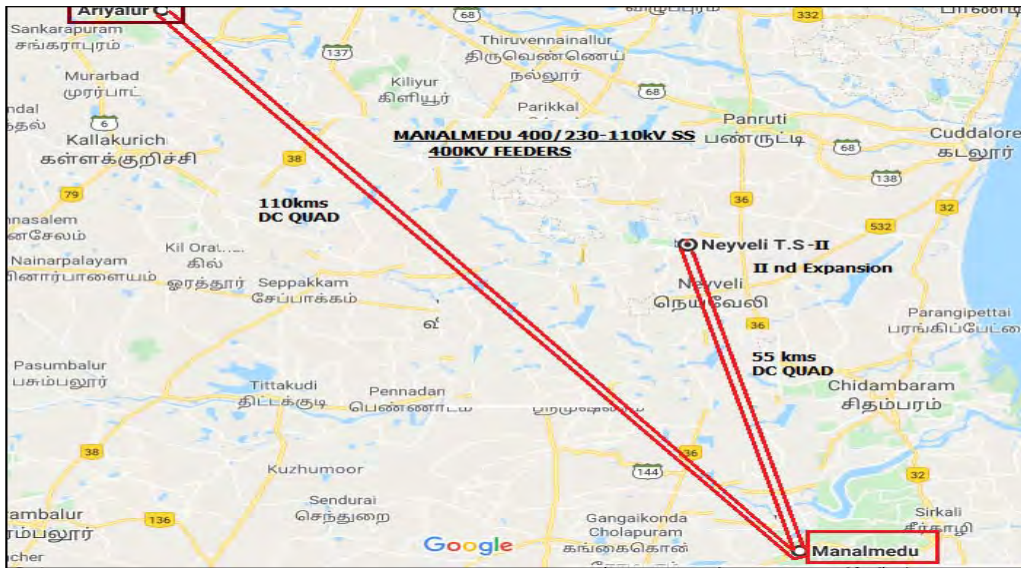
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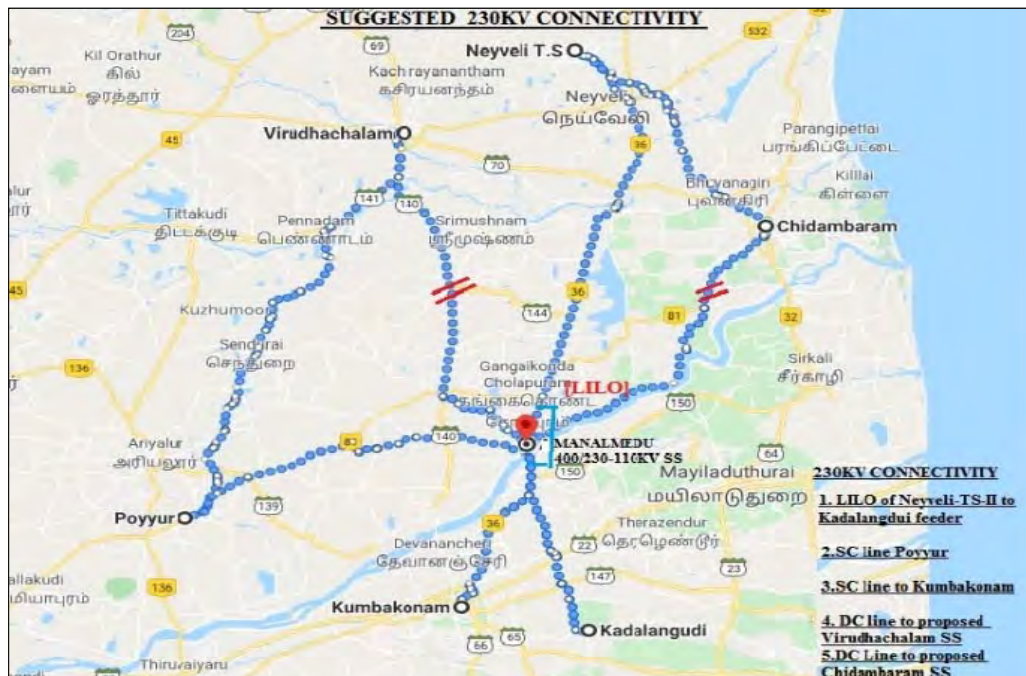
- v. Erection of DC line to the proposed Virudhachalam 230 kV SS from Manalmedu 400 kV SS.

**110 kV transmission lines**

- i. LILO of existing Kadalangudy-LTPCL-Manalmedu 110 kV feeder between LTPCL and Manalmedu substation.
- ii. SC line to Kattumannar Koil 110 kV SS.
- iii. SC line to Sethiyathoppu 110 kV SS.
- iv. DC line to Pappakudi 110 kV SS.
- v. SC line to the sanctioned Naduvalur 110 kV SS.



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Members may please discuss.

### Transmission Planning proposals by KSEB

#### **20.0 Green Corridor Projects (GC) in Kerala**

20.1 KSEB vide letter dated 17.07.2020 (copy at Annex 20.1) has informed that in the 40<sup>th</sup> meeting of SCSPSR held on 19.11.2016, the following intra-State Green Power Corridor schemes had been agreed:

##### **20.1.1 Wayanad – Kasargode Green Power Corridor Project**

- Construction of a 400 kV Substation at Wayanad (Kattikulam)
- Construction of a 2x500MVA 400/220kV, 2 x 200MVA 220/110kV, substation at Kasargode (Cheemeni)
- Interconnectivity of 400 kV Switching Station Wayanad (Kattikulam) to 400 kV Kasargode (Cheemeni) substation.
- 220 kV connectivity to existing 220 kV substations at Kanhirode, Thaliparamba, Ambalathara and Mylatty.

##### **20.1.2 Attapaddy Green Power Corridor Project**

- 33/220 kV step up substation at Kottathara.
- Construction of 220 /110 kV Substation at Vettathur by LILO of 220 kV Madakathara – Areakode.

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- iii. 220/110 kV Multi circuit / Multi Voltage line on Multi circuit towers from the proposed 220 kV Vettathur Substation up to the existing 110 kV Mannarkkad Substation and then extending the 220 kV D/c line to 220 kV Substation Kottathara. (The 110 kV D/c line will be between the proposed 220 kV Vettathur Substation and existing 110 kV Mannarkkad Substation)

**20.1.3 220 kV Ramakkalmedu Green Power Corridor**

- i. Construction of a 2x50 MVA, 33/110 kV step up substation at Anakkaramettu.
- ii. Construction of 110kV D/c line from Anakkaramettu (near Ramakkalmedu) to 110 kV Substation Nedumkandam.
- iii. Construction of 2 nos 110 kV feeder bays at 110 kV Nedumkandam Substation.
- iv. Construction of 110 kV D/c line from Kattappana to Kuyilimala along the right of way of existing 66 kV S/c line.
- v. Construction of a 220/110 kV substation with 2nos 220/110 kV, 50 MVA transformers and 2 nos 220 kV feeder bays at Kuyilimala. LILO of 220 kV Udumalpet – Idukki S/c feeder at 220 kV Kuyilimala Substation.

20.2 However subsequently these schemes underwent some modifications consequent to change in the project elements, change in locations, reconfiguration of the scheme owing to introduction of additional renewable resources etc. Accordingly, KSEB has requested for revision in the transmission schemes. The proposed revised schemes are as follows:

<b>WAYANAD KASARAGODE GREEN POWER CORRIDOR PROJECT</b>	
<b>Scheme as agreed in the 40<sup>th</sup> meeting of SCPSPSR</b>	<b>Revised Scheme</b>
Construction of 400 kV Substation at Wayanad (Kattikulam)	Construction of 400/220 kV <b>GIS</b> Substation at Wayanad (Payyampally). (Note: the switching station at Wayanad would be connected to Mysore-Areacode 400 kV D/C line by LILO of both the circuits)
Construction of a 2x500 MVA 400/220kV, 2x200 MVA 220/11 kV Substation at Kasaragode (Cheemeni)	Deleted (as the scheme is being developed as ISTS scheme through TBCB route)
Interconnectivity of 400 kV Switching Station Wayand (Kattikulam) to 400 kV Substation Kasaragode (Cheemeni)	400 kV DC line from Wayanad (Payyampalli) S/S to Kasaragode (Cheemeni) 400/220 kV substation.
220 kV connectivity to existing 220 kV substation at Kanhirode, Thaliparamba, Ambalathara and Mylatty.	LILO of 220 kV Kadakola (Mysore)-Kaniyampetta S/C line to 400/220 kV Wayanad (Payyampally) Substation (LILO length 5.25 km)

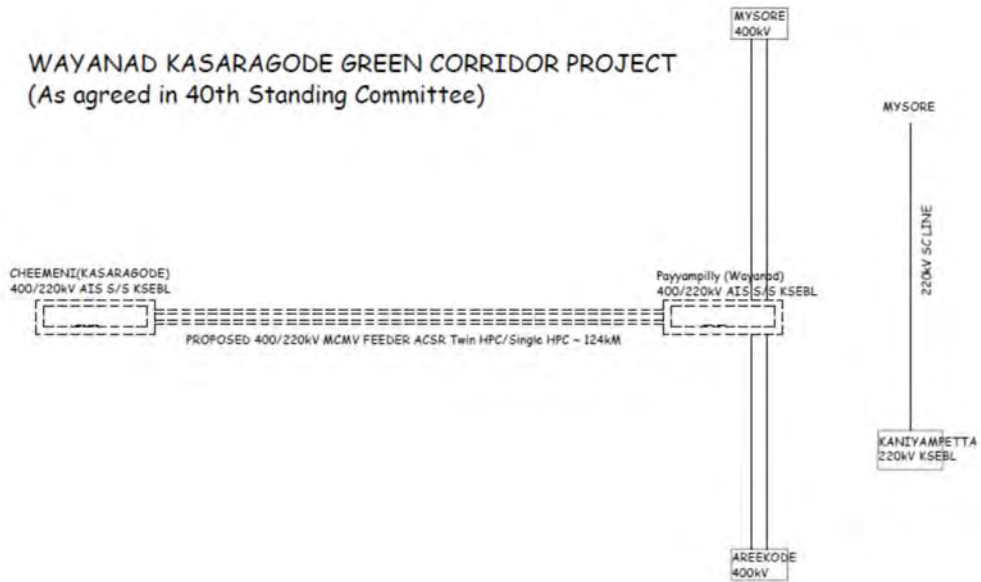
<b>ATTAPADDY GREEN POWER CORRIDOR PROJECT</b>	
<b>Scheme as agreed in the 40<sup>th</sup> meeting of SCPSR</b>	<b>Revised Scheme</b>
33/220 kV step up substation at Kottathara	Construction of 33/220 kV Kottathara AIS substation
Construction of 220/110 kV substation at Vettathur by LILO of 220 kV Madakkathara- Areekode line	Construction of 220/110 kV Mannarkad GIS substation. (Note: location has been changed to the land available with KSEB near to existing Mannarkad 110 kV S/S)
220/110 kV Multi Circuit/Multi Voltage line on Multi circuit towers from the proposed 220 kV substation Vettathur upto the the existing 110 kV Substation Mannarkkad and then extending the 220kV D/c line to 220kV Substation Kottathara. (The 110kV line will be between the proposed 220kV Vettathur Substation and existing 110 kV Substation Mannarkkad)	220 kV DC line from Vettathur tap (location) to Mannarkad. (Note: As the substation site has been changed to Mannarkkad, only 220 kV DC line needs to be constructed by LILO of Madakkathara Areekode 220 kV feeder. The connectivity at 110 kV level to the existing 110 kV Mannarkkad Substation is included in this part)
<b>220 kV RAMAKKALMEDU GREEN POWER CORRIDOR</b>	
<b>Scheme as agreed in the 40<sup>th</sup> meeting of SCPSR</b>	<b>Revised Scheme</b>
Construction of 2x50 MVA, 33/110 kV step up substation at Anakkaramedu	Construction of 2x60 MVA, 33/110 kV step up substation at Anakkaramedu. (Note: the transformer capacity has been enhanced to 2x60 MVA due to increased wind generation proposed in the area)
Construction of 110 kV D/c line from Anakkaramedu (near Ramakkalmedu) to 110 kV substation Nedunkandam	Construction of 110 kV D/c line from Anakkaramedu (near Ramakkalmedu) to 110 kV Nedunkandam substation.
Construction of 2 nos 110 kV feeder bays at Nedunkandam Substation	Construction of 2 nos. 110 kV feeder bays at Nedunkandam Substation.
Construction of 110 kV D/c line from Kattappana to Kuyilimala along the right of way of existing 66 kV S/c line	Construction of 20 km 220/110 kV MCMV Line from Nirmala City (Near Kattappana) to Kuyilimala (location) and 5 km 110 kV DC line from Nirmala city to Kattappana along ROW of existing 66 kV SC line.
Construction of a 220/110 kV substation with 2 nos 220/110 kV 50 MVA transformers and 2 nos 220 kV feeder bays at Kuyilimala.  LILO of 220 kV Udumalpet I Idikki S/c feeder at 220 kV Substation, Kuyilimala	Construction of 220/110 kV GIS substation with 1 no. 100 MVA transformer and 4 nos. 220 kV feeder bays and 6 no. 110 kV feeders at Nirmala City (Near Kattappana) (Note: Substation site has been changed to Nirmala City where land is available)



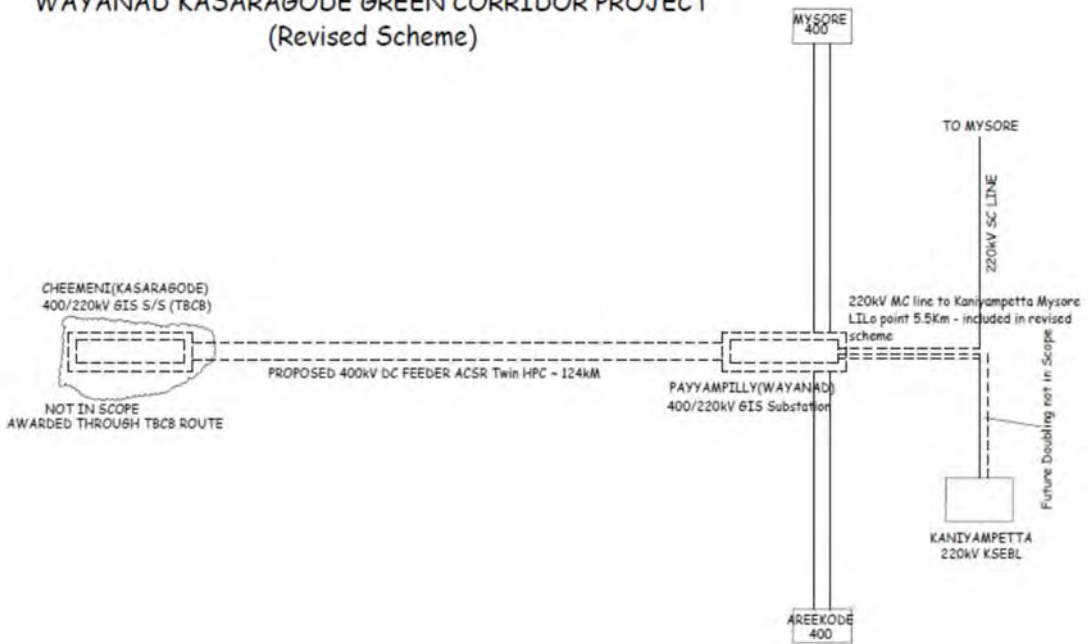
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Construction of 2 nos 110 kV feeder bays at Vazhathope Substation.  
 (Note: The pooling station for 50 MW of floating solar power, out of total capacity of 300 MW, is proposed near Vazhathope. The evacuation is proposed at 110 kV level to the nearby Vazhathope SS. Hence additional two nos feeder bays is required at Vazhathope SS).

WAYANAD KASARAGODE GREEN CORRIDOR PROJECT  
 (As agreed in 40th Standing Committee)



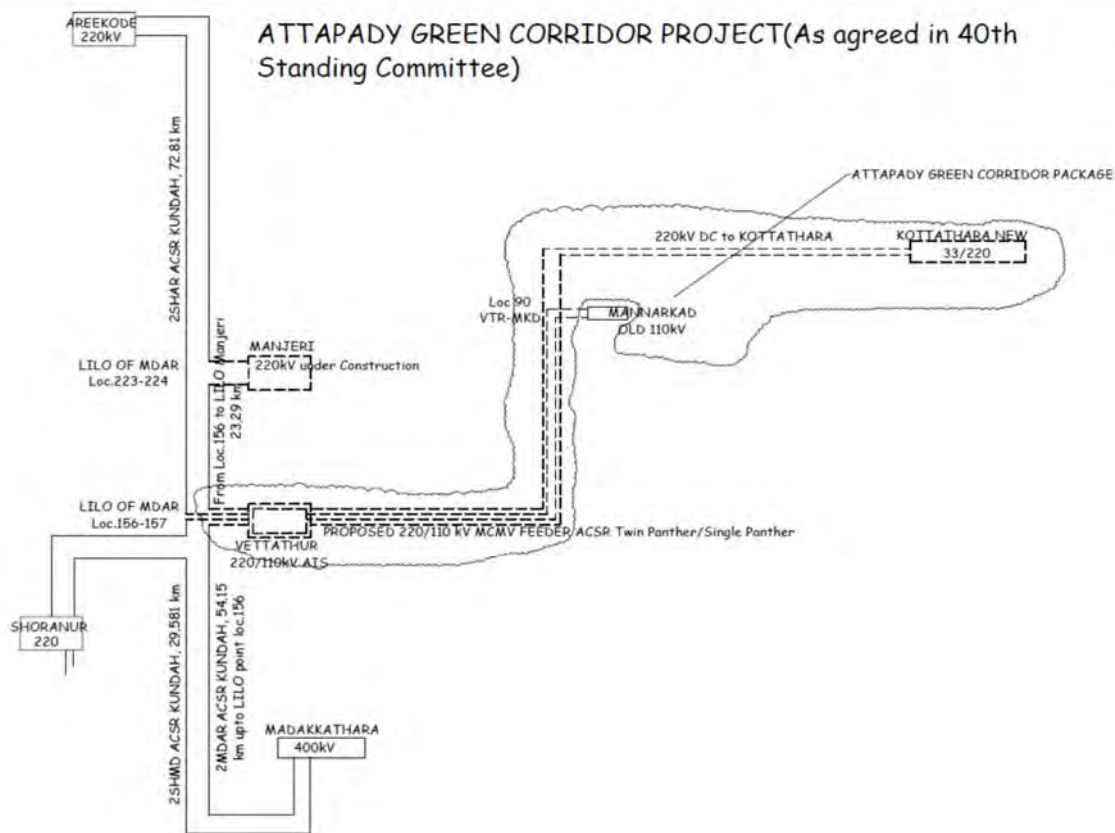
WAYANAD KASARAGODE GREEN CORRIDOR PROJECT  
 (Revised Scheme)



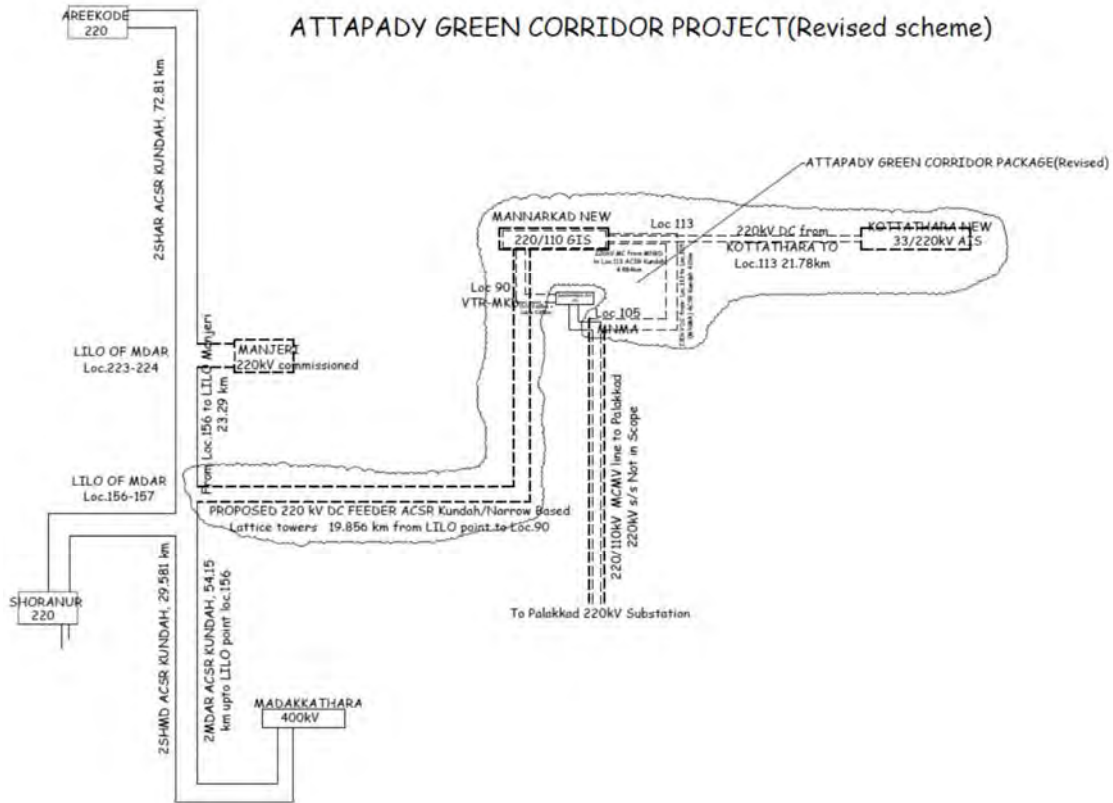


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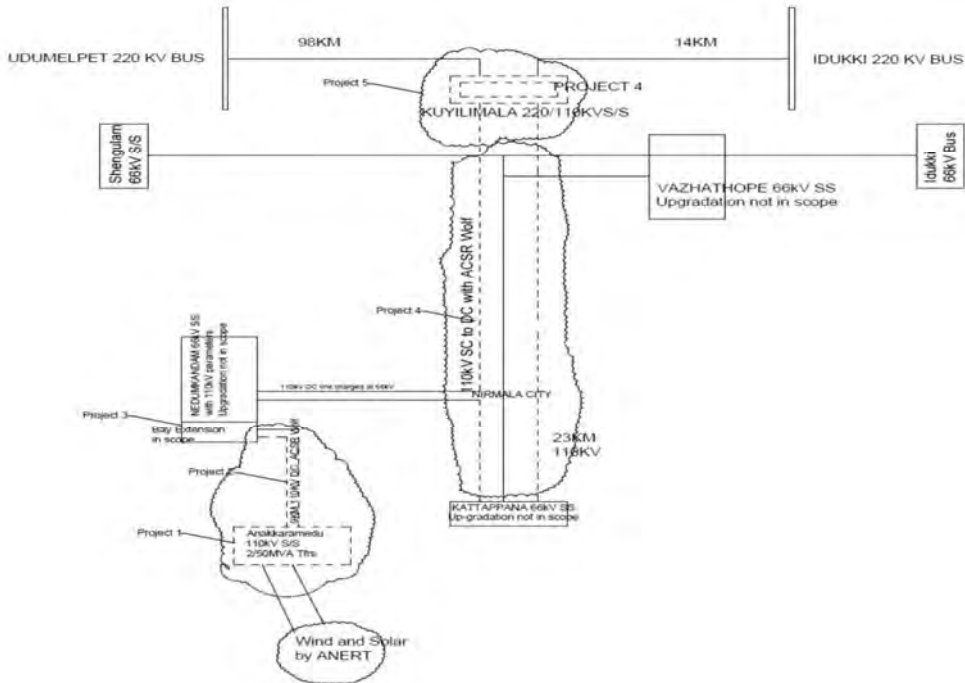
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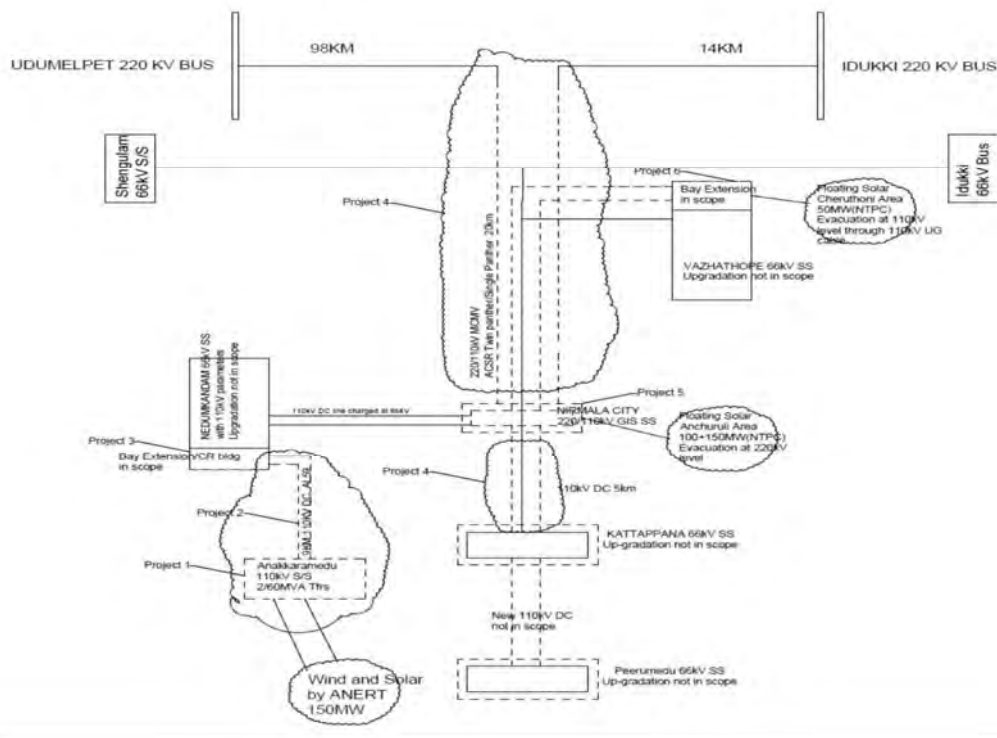
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### RAMAKKALMEDU GREEN POWER CORRIDOR PROJECT (Agreed as per 40th Standing Committee)



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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**RAMAKKALMEDU GREEN POWER CORRIDOR PROJECT  
(Revised Scheme)**

- 20.4 In the revised proposal for Wayanad - Kasargod Green Power Corridor, transformer MVA had not been provided. The matter was discussed with KSEB, and it was informed by KSEB that 4x167 MVA transformers are proposed at Wayanad.
- 20.5 The 4x167 MVA transformers as proposed by KSEB at Wayanad would not satisfy N-1 criteria as in the event of fault in any one transformer, there will be complete outage at the substation for replacing the faulty transformer with the spare transformer. Clarification was sought from KSEB in this regard.
- 20.6 KSEB vide e-mail dated 31.08.2020 (copy at Annex 20.2) has informed that in the event of outage of one transformer in the 4x167 MVA transformer configuration, the maximum outage time expected for the substation would be limited to the time required for changing over to the standby unit (which is configured like a hot standby) through the operation of the isolator and pipe bus arrangement provided in the sub-station. Further, this will not result in supply outage to 220 kV Kaniampetta substation since it will be having connectivity to 220 kV Areekode Substation. However, KSEB may review its proposal and provide 2x315 MVA, 400/220 kV transformers at 400 kV Wayanad substation.
- 20.7 KSEB may present. Members may please discuss.

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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)**21.0 Installation of Shunt Reactor at the proposed 400 kV Kottayam substation**

21.1 400 kV substation at Kottayam was agreed in the 39<sup>th</sup> SCPSPSR held on 28-29 December, 2015 with the following connectivity:

- 400 kV substation at Kottayam with 2x315 MVA, 400/220 kV interconnection transformers by LILO of 400 kV Thirunelveli- Kochin East PGCIL DC line.
- 220 kV connectivity (as per 41<sup>st</sup> meeting of SCPSPSR held on 22<sup>nd</sup> September, 2017)
  - Ettumanoor – Kottayam 220 kV D/c line.
  - Thuravoor (Eramalloor) – Kottayam 220 kV D/c line.
  - 220 kV connectivity to existing 220 kV substations at Poovanthuruthu and Ambalamughal by LILO of existing 220 kV Pallom - Ambalamughal feeder to 400 kV Kottayam substation.

21.2 KSEB vide letter dated 17.07.2020 (copy at Annex 20.1) has proposed installation of one 125 MVAR shunt reactor in the 400 kV bus at Kottayam to control voltage during lightly loaded conditions.

Members may please discuss.

**22.0 Modification in 400 kV Edamon substation**

22.1 400 kV substation at Edamon was agreed at 39<sup>th</sup> SCPSPSR held on 28-29 December, 2015. The following scheme was agreed upon:

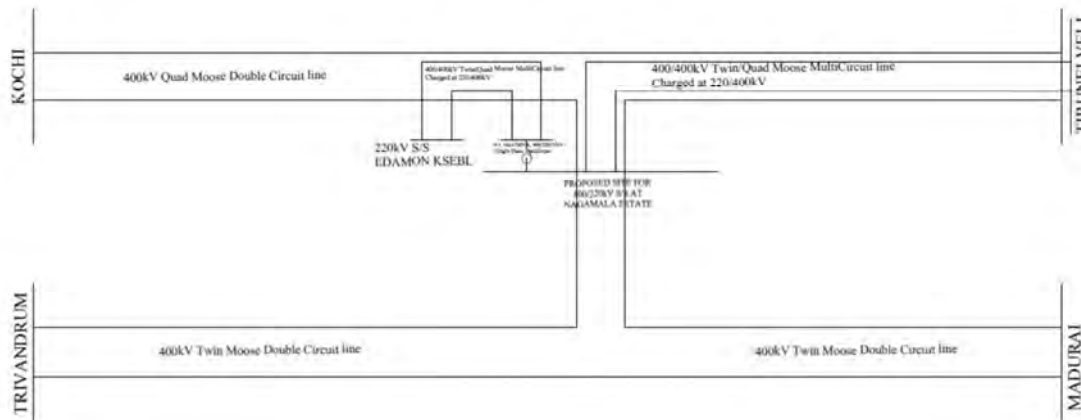
- Six 400 kV line bays
- Four spare 400 kV line bays
- Two transformer bays with 2x315 MVA 400/220 kV ICT's.
- The 400 kV connectivity would be established by charging existing 220 kV Tirunelveli – Edamon Twin Moose D/c feeder, constructed in 400 kV parameters, at 400 kV, and by LILO-ing both circuits of under construction 400 kV Tirunelveli – Cochin East Quad Moose D/c feeder.
- Additional connectivity to 400 kV substation, Trivandrum North is planned later by LILO of existing 400 kV Tirunelveli – Trivandrum (North) Twin Moose D/c feeder.
- Downstream 220kV connectivity: -
  - a. 220 kV connectivity will be directly to existing 220 kV switchyard of Edamon and further to following stations
  - b. 220 kV D/c feeder to Pothencode
  - c. 220 kV D/c and 220 kV S/c feeders to Sabarigiri
  - d. 220 kV feeders to Kundara and Edappon.

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- 22.2 KSEB vide letter dated 17.07.2020 (copy at Annex 20.1) has informed that at the identified location for 400/220 kV substation, Tirunelveli - Edamon I & II Twin Moose feeders, Tirunelveli - Cochin East I & II Quad Moose feeders and Tirunelveli - Trivandrum I & II Quad Moose feeders are crossing so that the 400 kV lines can be directly terminated.
- 22.3 As per studies carried out by KSEB, only six circuits need to be connected to the new 400/220 kV substation at Edamon, Nagamala Estate. The following revised transmission scheme has been proposed by KSEB:
- i. Tirunelveli - Edamon I & II Twin Moose feeders constructed in 400 kV parameters and now charged at 220 kV level will be terminated at 400 kV Edamon substation.
  - ii. One of the 400 kV Quad Moose Tirunelveli- Cochin East I & II feeders will be LILO'ed at 400 kV Edamon substation.
  - iii. One of the 400 kV Twin Moose Tirunelveli - Trivandrum I & II feeders will be LILO'ed at 400 kV Edamon substation.
  - iv. The 220 kV connectivity to 220 kV Edamon (KSEBL) existing substation will be established by using the balance portion of Twin Moose feeder to Edamon (KSEB) substation.
  - v. 3 Nos. + 1 No.(spare) 166.67 MVA, 400/220/33 kV single phase auto transformer banks at 400 kV Edamon substation.
- 22.4 The 4x167 MVA transformers as proposed by KSEB at Edamon would not satisfy N-1 criteria as in the event of fault in any one transformer, there will be complete outage at the substation for replacing the faulty transformer with the spare transformer. Clarification was sought from KSEB in this regard. KSEB vide e-mail dated 31.08.2020 (copy at Annex 20.2) has informed that in place of 4x167 MVA transformers at Edamon, they would be providing 2x315 MVA, 400/220 kV transformers.
- 22.5 Further, KSEB vide e-mail dated 31.08.2020 (copy at Annex 20.2) has proposed the following downstream connectivity at Edamon (Nagamala Estate):
- 220 kV connectivity to existing 220 kV switchyard of Edamon
  - 220 kV D/c feeder to Pothencode
  - 220 kV D/c feeder to Sabarigiri
  - 220 kV feeder to Pathanamthitta
  - 220 kV feeders to Kundara and Edappon.

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Agenda for 2nd meeting of Southern Regional Power Committee (Transmission Planning)400/220kV SUBSTATION EDAMON (NAGAMALA ESTATE)  
NETWORK DIAGRAM

22.6 As this scheme differs from the scheme approved in the 39<sup>th</sup> SCPSPSR meeting, KSEB has requested for approval of the revised scheme.

22.7 KSEB may present.

Members may please discuss.

### 23.0 Change in location of 220 kV Eramallur substation

23.1 Establishment of 220 kV Eramallur sub station was approved in the 39<sup>th</sup> SCPSPSR held on 28-29 December 2015.

23.2 KSEB vide letter dated 04.09.2020 (copy at Annex 23.1) has proposed change in location of 220 kV Eramallur substation to Thuravoor (due to land availability issue) with the following connectivity:

#### 220 kV connectivity

Connectivity to 220 kV Thuravoor S/S has been planned through Kottayam – Thuravoor 220 kV D/c line from 400/220 kV Kottayam S/s

(The same connectivity had been agreed for Eramallur 220 kV substation in 41<sup>st</sup> SCPSPSR meeting held on 06.12.2017).

#### 110 kV connectivity at Thuravoor Substation

- 110 kV D/c feeder to 110 kV Thykattussery S/s.
- 110 kV feeder to 110 kV Cherthala S/s
- 110 kV feeder to 110 kV Mattancherry S/s
- 110 kV feeder to 110 kV Eramalloor S/s
- 110 kV D/c feeder to 110 kV SL Puram S/s
- 110 kV feeder to 110 kV Aroor S/s



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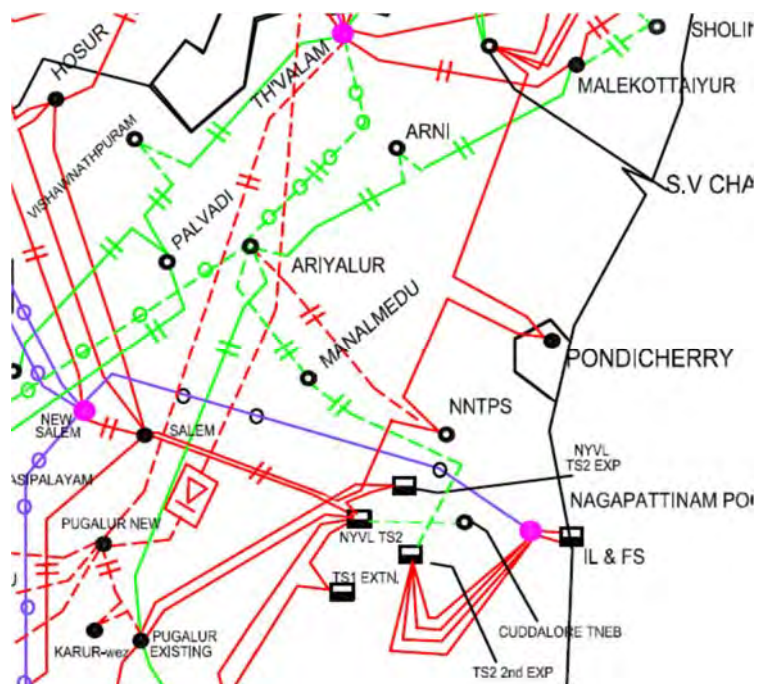
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- 110 kV feeder to 110 kV Vaikkom S/s
- 110 kV feeder to 110 kV Thykattussery S/s

Members may please discuss.

Transmission planning proposals by CTU**24.0 Alternate arrangement of transmission system for evacuation of power from 2<sup>nd</sup> Unit of NNTPS (2x500 MW) in Tamil Nadu**

24.1 CTU vide letter dated 02.03.2020 (copy at Annex 24.1) informed that the Ariyalur sub-station (being executed by TANTRANSCO and originally planned to be commissioned in 2017-18) is delayed and as informed by TANTRANSCO, the sub-station is likely to be commissioned by June, 2020 (under best effort scenario). The 2<sup>nd</sup> Unit of NNTPS (being implemented by NLC), and the NNPTS – Ariyalur 400 kV D/c line being implemented by POWERGRID is likely to be commissioned by March, 2020. Hence, as an interim arrangement, the NNTPS – Ariyalur line may be connected with one circuit of LILO section of Pugalur – Kalivandapattu 400 kV D/c line at Ariyalur, to form NNTPS - Pugalur 400 kV circuit and NNTPS - Kalivandapattu 400 kV circuit.



24.2 To discuss the issue, a meeting was held on 09.03.2020 at CEA, New Delhi. Minutes of meeting is at Annex 24.2. In the meeting, it was agreed that from system study point of view, the NNTPS - Ariyalur 400 kV D/c line can be connected with one circuit of LILO section of Pugalur - Kalivandapattu 400 kV D/c line at Ariyalur, to form NNTPS - Pugalur 400 kV circuit and NNTPS – Kalivandapattu 400 kV circuit, as an interim arrangement. This interim

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arrangement would help in evacuation of power from NNTPS. TANTRASCO was advised to commission the Ariyalur S/S by June 2020.

- 24.3 Accordingly, in-principle approval was conveyed vide CEA letter dated 18.03.2020 for the interim arrangement (copy at Annex 24.3).

Members may please discuss.

**25.0 Restoring of one circuit of Kudankulam – Tuticorin PS 400 kV (quad) D/c line at Tirunelveli to control loadings/un-balancing on Kudankulam – Tirunelveli 400 kV (quad) lines**

- 25.1 In the 41<sup>st</sup> Southern Region constituents meeting regarding Connectivity/LTA applications held on 13.04.2020, SRLDC informed that in real time operation with full generation of Coastal Energen, Tuticorin JV and existing wind generation at Tuticorin-II GIS, the tendency of power flow is from Tuticorin PS to Kudankulam in place of Kudankulam to Tuticorin PS. Due to this, entire power of Kudankulam Unit 1&2 and power coming from Tuticorin PS is flowing through Kudankulam – Tirunelveli 400 kV (quad) D/c line and results in high loading in case of outage of one circuit of Kudankulam – Tirunelveli 400 kV (quad) D/c line.

- 25.2 However, as per the feedback of SRLDC, with the increase in RE generation at Tuticorin-II, the un-balancing of loading on the quad lines may further enhance. To address the high loading issue, re-arrangement of circuits at Tirunelveli substation may be carried out. It was opined that restoration of one circuit of Kudankulam – Tuticorin PS 400 kV D/c line at Tirunelveli substation would provide one additional 400 kV quad circuit and shall address the high loading issues. With this re-arrangement, there will be three 400 kV (quad) circuits from Kudankulam to Tirunelveli, one 400 kV (quad) circuit from Kudankulam to Tuticorin PS and one 400 kV (quad) circuit from Tirunelveli to Tuticorin PS. System studies have been carried out for the proposed arrangement for March, 2020, time frame and the results of the load flow studies are given at Annex 25.1. From the study results, it is observed that the issue under N-1 contingency also gets addressed and no constraints are observed.

- 25.3 Accordingly, following interim re-arrangement is proposed for termination of one circuit of Kudankulam – Tuticorin PS 400 kV D/c line at Tirunelveli substation:

- i. Three 400 kV (quad) circuits from Kudankulam to Tirunelveli
- ii. One 400 kV (quad) circuit from Kudankulam to Tuticorin PS
- iii. One 400 kV (quad) circuit from Tirunelveli to Tuticorin PS

The diagram of the proposed re-arrangement is given below:

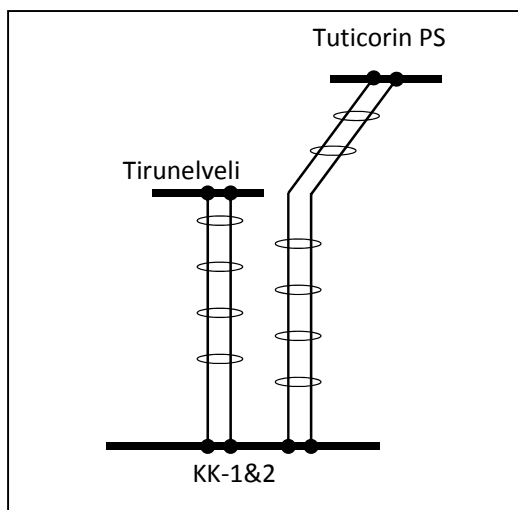


Fig: Existing arrangement

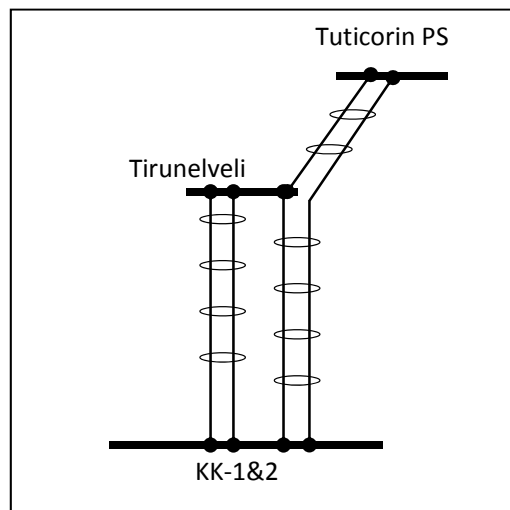


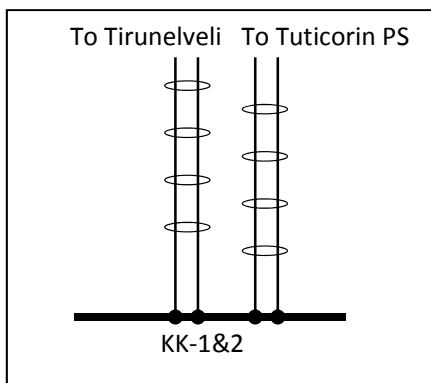
Fig: Proposed re – arrangement

Members may please discuss.

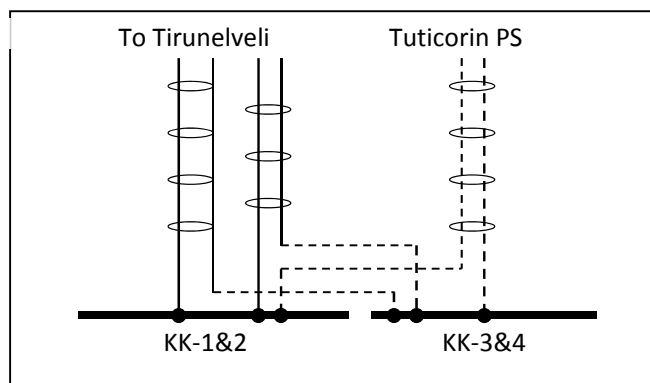
## 26.0 Transmission system for grant of Connectivity to NPCIL for expansion of Kudankulam NPP Unit 3&4 (2x1000 MW)

26.1 In the 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019, following transmission system was agreed for grant of connectivity to NPCIL for expansion of Kudankulam NPP Unit 3&4 (2x1000 MW):

- i. Restoration of Kudankulam – Tirunelveli 400 kV D/c (Quad) line by terminating it at Tirunelveli substation [presently this line is connected to Tirunelveli – Tuticorin PS 400 kV D/c (Quad) line and thus connected as Kudankulam (Unit-1&2) – Tuticorin PS 400 kV D/c(Quad) line]– **Under ISTS**
- ii. Kudankulam NPP (Unit-3&4) - Tuticorin PS 400 kV D/c (Quad) line [by implementing Kudankulam-Tirunelveli section and extending this upto Tuticorin PS, using the Tirunelveli-Tuticorin PS –400 kV D/c (Quad) existing line as mentioned in (a) above]– **Under ISTS**
- iii. Termination of one circuit of each of Kudankulam Unit-1&2 – Tirunelveli 400 kV 2xD/c (Quad) line at Kudankulam Unit-3&4 and one circuit of Kudankulam Unit-3&4 - Tuticorin PS 400 kV D/c (Quad) line at Kudankulam Unit-1&2. This arrangement shall result into 3 nos. of 400 kV quad circuits from Kudankulam Unit-1&2 and Kudankulam Unit-3&4 generating stations – transmission line works under ISTS and re-arrangement works alongwith 400 kV bays at generation switchyard – **by NPCIL**.
- iv. 2x125 MVAR, 420 kV bus reactor at Kudankulam (Unit-3&4) – **by NPCIL**



**Fig : Connectivity arrangement at KKNPP for Unit-1&2**



**Fig : Proposed Connectivity arrangement at KKNPP generation complex with proposed U-3&4**

- 26.2 NPCIL vide letter dated 21.08.2019 and email dated 04.09.2019 & 06.09.2019 had conveyed the commissioning schedule of Kudankulam Unit - 3&4 as October 2023 & April 2024 respectively. NPCIL is seeking connectivity for Unit-3&4 from March, 2023.
- 26.3 The construction of transmission system for grant of connectivity would take about two years' time. Nuclear power projects have a long gestation period. So it is proposed to take up the transmission line works matching with the commissioning of Kudankulam NPP Unit-3&4, so that the transmission system is not stranded for a long time. Further, NPCIL is yet to submit Long Term Access (LTA) application for Kudankulam NPP Unit-3&4 as per CERC Connectivity Regulations, 2009.
- 26.4 In view of the above, CTU has proposed that the connectivity for Kudankulam NPP Unit-3&4 may be provided through bus extension of Kudankulam NPP Unit-1&2 generation switchyard with suitable bus sectionalise arrangement. Further it is also proposed that the Kudankulam NPP (Unit-3&4) - Tuticorin PS 400 kV D/c (Quad) line and other re-arrangement at Kudankulam generation switchyard, as approved in the 1<sup>st</sup> SRPC(TP) meeting, may be included in the transmission system required for LTA and may be implemented accordingly.
- Members may please discuss.

## 27.0 Assessment of online Dynamic Line Rating

- 27.1 Overhead transmission lines are designed considering the worst case scenarios like no wind, high ambient temperature and maximum solar radiation etc. Capacity of transmission lines (ampacity) is vastly affected by local weather conditions (wind speed, ambient temperature, solar radiation etc.). Due to lack of availability of local weather conditions in real time, it is not possible to get actual margin available in transmission system and system operators generally use static thermal rating as the controlling limit of overhead lines.
- 27.2 By assessing the real time parameters and sag calculation, real time capacity of the overhead lines, known as **Dynamic Line Rating (DLR)**, can be assessed and available margins can be utilized for additional power transfer, if required.

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- 27.3 For real time Dynamic Line Rating calculation, sensors are mounted on the transmission lines (on the conductor closest to the ground) and the actual sag in real time is measured as also the actual wind speed at the conductor level – for precise forecasting of the power transmission capacity.
- 27.4 It helps in optimum utilization of the available transmission system and further may help in taking decision regarding postponement of implementation of new transmission system, if existing transmission system have sufficient dynamic line rating margin.
- 27.5 In past similar projects has been installed worldwide, viz. France utility, RTE, is using DLR package since 2009 on 09 nos. of transmission lines having voltage level between 63 to 400 kV (400 kV : 1 no; 225 kV : 2 nos and 63 kV : 6 nos.); Belgian utility, Elia, is also using DLR package since 2008 on more than 30 transmission lines having voltage level between 70 kV and 380 kV (380 kV : 18 nos.; 220 kV : 2 nos.) and presently operating satisfactorily (copy of relevant information is at Annex 27.1 and 27.2. Pilot projects have also been implemented in Gujarat and Maharashtra.
- 27.6 CERC in it order dated 05.08.2015 in Petition No. 009/SM/2015 (CAC Sub Committee on Congestion in Transmission) asked for implementation of Dynamic Line Rating within one month.
- 27.7 The matter pertaining to implementation of assessment of Dynamic Line Loadings in real time/ day ahead for optimal utilization of transmission lines was discussed in 37<sup>th</sup> SRPC and 167<sup>th</sup> OCC meetings held on 01.02.2020 and 13.03.2020 respectively. In the OCC meeting it was decided that SRPC may take up the matter with POSOCO/CTU to have a pilot project on any critical line in Southern Region. MS, SRPC, vide letter dated 16.03.2020 (copy at Annex 27.3) addressed to CTU/POSOCO, has requested to have a pilot project on any critical line in SR. KSEB vide letter dated 29.02.2020 (copy at Annex 27.3) has proposed installation of the system for dynamic loadings on Udumalpet–Palakad 400 kV D/c line.
- 27.8 In view of above, Udumalpet – Palakad 400 kV D/c line (line length 95 km.), Tuticorin PS – Madurai 400 kV D/c (quad) line (line length 95 km.), N. P. Kunta – Kolar 400 kV S/c line (line length 130 km.) or any other transmission line may also be considered as potential candidate for the pilot project.

Member may please discuss.

**28.0 Requirement of 765 kV spare (1-Ph) Reactors units:**

- 28.1 765 kV transmission system forms backbone of the power transmission network. Outage of single 765/400 kV ICT or 765 kV line reactor / bus reactor impacts the grid much more than that the outage of single unit of ICT and line reactor/bus reactor of 400 kV systems. Hence, reliability of the 765kV transmission system is of utmost importance.

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- 28.2 765 kV ICTs and reactors are high MVA/MVAR rating equipments and are large in size. Transportation of 765 kV equipments takes much more time than 400 kV units. Therefore, 765 kV S/s are generally planned with one spare unit (1-Ph) of 765/400 kV ICT and 240 MVAR/330 MVAR bus reactors and line reactors so that reliability of 765 kV grid can be maintained.
- 28.3 It has been noticed that one spare unit (1-Ph) of 80 MVAR reactors has not been considered for 765 kV Warangal New and Chilkaluripeta TBCB substations. Therefore, it is proposed to provide one spare unit (1-Ph) of 80 MVAR reactor at each 765 kV Warangal New and Chilkaluripeta TBCB substations along with necessary arrangement to take spare reactor units into service as per requirement.

Members may please discuss.

### 29.0 Connectivity transmission system agreed in connectivity/LTA meetings of Southern Region

Grant of connectivity and LTA to following applicants was agreed in various connectivity/LTA meetings of Southern Region held after 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019.

#### 29.1 Connectivity and LTA agreed in 40<sup>th</sup> connectivity/LTA meeting held on 28.02.2020

##### Connectivity application:

Sl. No.	Application No.	Applicant	Location	Stage-II Connectivity (MW)	Start Date of Stage-II connectivity	Proposed location for grant of Stage-II Connectivity	Dedicated Transmission System
1	1200002448	Renew Power Pvt. Ltd. (RPPL)	Davangere, Karnataka	300	15-March, 2021	Hiriyur	Renew Power Pvt Ltd – Hiriyur 220kV S/c line strung on D/c tower along with bays at both ends*
*RPPL has been granted connectivity with the same bay subsequent to withdrawal of earlier granted Connectivity at Hiriyur							

##### LTA application:

Sl. No.	Application No.	Applicant	Location	LTA quantum (MW)	Beneficiaries (MW)	Start date of LTA	Remarks
1	1200002343	Renew Power Pvt. Ltd. (RPPL)	Davangere, Karnataka	300	ER (target)	15-Mar-21	LTA has been agreed with the availability of 3 <sup>rd</sup> 400/220 kV ICT at Hiriyur.



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Sl. No.	Application No.	Applicant	Location	Stage-II Connectivity (MW)	Start Date of Stage-II connectivity	Proposed location for grant of Stage-II Connectivity	Dedicated System	Tr.
1	1200002503	NTPC Ltd.	Tuticorin, Tamil Nadu	230	01-Sept-21	Tuticorin-II GIS	NTPC Limited (Tuticorin) – Tuticorin-II 230 kV S/c line (high capacity conductor enabling at least 380 MW power transfer at nominal voltage) along with bay at NTPC end.	

As per the Detailed Procedure for “Grant of Connectivity to projects based on Renewable Sources to Inter-State Transmission System” under para 5.3.1 provides that “For the connectivity transmission system, the dedicated transmission line including line bays at generation pooling station shall be under the scope of the applicant and the terminal bays at the ISTS sub-station shall be under the scope of transmission licensee owning the ISTS sub-station subject to compliance of relevant provision of tariff policy.”

Accordingly, under above provisions of the detailed procedure, NTPC has requested that the implementation of 230 kV bay at ISTS substation may kept under the scope of ISTS licensee. In view of the above, it is proposed that 1 no. of 230 kV bay at Tuticorin-II GIS PS may be implemented under ISTS for termination of Dedicated/Connectivity transmission line from NTPC Ltd. for its Tuticorin Solar generation project.

29.3 Connectivity agreed in 42<sup>nd</sup> Connectivity/LTA meeting held on 06.05.2020

Sl. No.	Application No.	Applicant	Location	Stage-II Connectivity (MW)	Start Date of Stage-II connectivity	Proposed location for grant of Stage-II Connectivity	Dedicated System	Tr.
1	1200002536	ReNew Surya Ojas Private Limited	Koppal, Karnataka	300	15.01.2022 or availability of Koppal PS & associated transmission system, whichever is later	Koppal PS	ReNew Surya Ojas Private Limited Koppal generation switchyard – Koppal 220 kV S/c line on D/C towers	

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Sl. No.	Application No.	Applicant	Location	Stage-II Connectivity (MW)	Start date of Stage-II connectivity	Proposed location for grant of Stage-II connectivity	Dedicated Transmission System
1	1200002562	Boreas Renewable Energy Pvt Ltd	Bellary, Karnataka	175	15-Aug-20	Hiriyur	Boreas Renewable Energy Pvt Ltd – Hiriyur 220kV S/c line along with bays at both ends

**LTA application:**

Sl. No.	Application No.	Applicant	Location	LTA quantum (MW)	Beneficiaries (MW)	Start date of LTA	Remarks
1	1200002585	Boreas Renewable Energy Pvt Ltd	Bellary, Karnataka	175	ER (target)	15-Aug-20	LTA has been agreed with the availability of 3 <sup>rd</sup> 400/220 kV ICT at Hiriyur

Members may please note.

**30.0 Status of Implementation of downstream network by State utilities associated with ISTS substation of POWERGRID**

30.1 CTU has informed that augmentation of transformation capacity in various existing substations as well as addition of new substations along with line bays for downstream network are under implementation at various locations in Southern Region. For utilization of these transformation capacities, implementation of downstream 220kV system needs to be commissioned. The status of downstream system as informed by respective states in the 1<sup>st</sup> SRPC(TP) meeting, is as follows:

Sl. No.	Name of Existing Substation	MVA Capacity	Total 220 kV Bays	Total Un-utilized bays (under ISTS)	Remarks	Deliberations in 1 <sup>st</sup> SRPC(TP) meeting
1.	Tumkur (Vasantnarsapur)	3×500 MVA	6	2	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> <li>• 220kV D/c line Tumkur-Antrasanahalli – <b>Commissioned.</b></li> <li>• 220kV DC line Tumkur-Madhugiri – <b>Commissioned.</b></li> </ul>

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						<ul style="list-style-type: none"> <li>• 2 Nos 220kV circuits to Vasanthanarsapur industrial area of KIADB – <b>Mar’22</b></li> </ul>
2.	Yelahanka	2x500 MVA	10	4	Construction of downstream T/L for 8 Nos (4 bays under ISTS) 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> <li>• 220kV Yelahanka – DG Plant 2000sq mm UG cable 2 runs – <b>Commissioned</b></li> <li>• Proposal for strengthening of Bengaluru transmission network to utilize the remaining bays at Yelahanka is under planning.</li> </ul>
3.	Bidadi	2x500 MVA	6	4	Construction of downstream T/L for 4 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> <li>• 220kV D/c line between Bidadi (PG)- Bidadi (KPTCL) – <b>Commissioned</b></li> <li>• 220kV D/c line Bidadi – Magadi – <b>Mar’20</b></li> <li>• 220kV Bidadi – Kumbalgod – 1200 sq mm UG cable S/c line – <b>Mar’20</b></li> <li>• 220kV S/c line identified to Kampagada layout</li> </ul>
4.	Hiriyur	2x315 MVA	6	2	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> <li>• 220kV Hiriyur – Chitradurga via Thallak to Hiriyur – <b>Commissioned.</b></li> <li>• 220kV D/c Hiriyur – Gowribidnur- <b>Commissioned.</b></li> <li>• 220kV Hiriyur (PGCIL) – Hiriyur (KPTCL) – <b>Mar’20</b></li> <li>• 220kV Hiriyur (PGCIL) – Chitradurga – <b>Mar’20</b></li> </ul>
5.	Hassan	2x315 MVA	6	2	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> <li>• LILO of B4 circuit of Shimoga – Bangalore 220kV at Hassan – <b>Mar’20</b></li> </ul>
6.	Kolar	2x500 MVA	6	2	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> <li>• 220kV D/c line Kolar(PG) – Kolar(KPTCL) <b>Commissioned.</b></li> <li>• 220kV D/c line Kolar – Chintamani – <b>Commissioned.</b></li> <li>• 2 Nos 220kV downstream T/L to Gollahalli – <b>Mar’20</b></li> </ul>
7.	Kozhikode	2x315 + 1x500 MVA	4	1	Construction of downstream T/L for 1 Nos 220 kV bay to be expedited by KSEB.	<ul style="list-style-type: none"> <li>• 1 Nos 220kV downstream T/L to Kozhikode(KSEB) – <b>Award by March, 20.</b></li> </ul>

States may please update the status.

### 31.0 Phase-I & Phase-II Solar & Wind Energy Zone Transmission Schemes

31.1 SECI/MNRE have identified Potential Solar Energy Zones (SEZ) and Wind Energy Zones (WEZ) in various districts of six RE rich states for 66.5 GW quantum. Subsequently, based on bidding timeline, SECI provided phasing details of prioritized SEZs (50,000 MW) and WEZs

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(16,500 MW) in two phases i.e. 2020 & 2021. The details of prioritized SEZs and WEZs in Southern region (totaling to 18,500 MW) are as under:

State/District	Solar		Wind		Total (GW)
	Ph-1 (GW)	Ph-2 (GW)	Ph-1 (GW)	Ph-2 (GW)	
	2020	2021	2020	2021	
<b>Andhra Pradesh</b>					
Kurnool	2.5		2	1	5.5
Ananthpuram		2.5			2.5
<b>Karnataka</b>					
Koppal			2.5		2.5
Gadag		2.5			2.5
Bidar		2.5			2.5
<b>Tamil Nadu</b>					
Karur			1.5	1	2.5
Tirunelveli				0.5	0.5
<b>Total</b>	<b>2.5</b>	<b>7.5</b>	<b>6</b>	<b>2.5</b>	<b>18.5</b>

31.2 Out of the 18.5 GW of identified SEZs and WEZs in Southern Region, transmission system for evacuation of 8.5 GW of power from Phase-I and Phase-II Wind Energy Zone and 1.5 GW of Phase-I Solar Energy Zone (in Kurnool area), totaling to Renewable Energy Zone power of 10 GW, was agreed in 1<sup>st</sup> SRSC meeting held on 07.09.2018, and it was decided that the schemes would be taken up for implementation as ISTS, consequent to grant of LTA by CTU. The transmission system discussed and agreed in 1<sup>st</sup> SRSC is given below:

**a) Tirunelveli and Tuticorin Wind Energy Zone (Tamil Nadu) (500 MW):**

(i) Addition of 1x500 MVA, 400/230kV ICTs (4<sup>th</sup>) at Tuticorin-II GIS sub-station.

*\*\*Operation of Tuticorin Pooling Station – Dharmapuri (Salem) 765kV D/C line (presently operating at 400kV) at its rated voltage. (i. e. 765kV) & 5th ICT (500 MVA) at Tuticorin-II PS would be reviewed for dispersal of more than 2000MW RE generation*

**b) Karur / Tiruppur Wind Energy Zone (Tamil Nadu) (2500 MW):**

(i) Establishment of 5x500 MVA, 400/230 kV Karur Pooling Station (at a location in between Karur Wind zone and Tiruppur wind zone)

(ii) LILO of both circuits of Pugalur – Pugalur (HVDC) 400 kV D/c line (with Quad Moose ACSR Conductor) at Karur PS

(iii) 9 nos. of 230 kV line bays for interconnection of wind projects

(iv) 2x125 MVA, 400 kV Bus reactors at Karur PS

**c) Koppal Wind Energy Zone (Karnataka) (2500 MW):**

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- (i) Establishment of 5x500 MVA, 400/220 kV pooling station near Munirabad /suitable location in Koppal distt.
- (ii) Pooling station (near Munirabad /suitable location in Koppal distt.) - Narendra (New) 400 kV D/c Line (with Quad Moose ACSR conductor)
- (iii) 9 Nos of 220 kV line bays for interconnection of wind projects
- (iv) 2x125 MVA, 400 kV bus reactor at Pooling station (near Munirabad /suitable location in Koppal Distt.)
- (v) Adequate space provision for future expansion

[Note: Pooling station (near Munirabad /suitable location in Koppal distt.) - Munirabad 400 kV D/c Line (with Quad Moose ACSR conductor), agreed in the 1<sup>st</sup> SRST was dropped as per the request of KPTCL in 2<sup>nd</sup> SRST meeting.]

**d) Kurnool Wind Energy Zone (3000 MW) /Solar Energy Zone (AP) (1500 MW):**

- (i) Establishment of 765/400/220 kV 3x1500 MVA, 9x500 MVA Pooling station at suitable location in Kurnool Distt. (Kurnool-III)
- (ii) Kurnool-III Pooling station - Kurnool(new) 765 kV D/c Line
- (iii) Kurnool –III PS-Maheshwaram(PG) 765 kV D/c Line
- (iv) 220 kV line bays for interconnection of wind projects (15 nos.)
- (v) 1x330 MVA (765kV) & 1x125 MVA (400 kV) bus reactor at Kurnool-III PS
- (vi) 240 MVA Switchable line reactors at both ends of Kurnool-III PS – Maheshwaram (PG) 765 kV D/c Line

It was agreed in the 1<sup>st</sup> SRST meeting that the transmission schemes would be implemented as ISTS, consequent to grant of LTA by the CTU. The transformation capacity at various stations and certain elements could be required to be reviewed based on LTA applications. Accordingly, this broad master plan would be implemented in stages to serve RE integration.

31.3 Transmission system for immediate connectivity for balance 8.5 GW of RE potential in Southern Region and integration of 18.5 GW of Solar and Wind Energy Zones in Southern Region was discussed and agreed in the 2<sup>nd</sup> SRST meeting held on 10.06.2019. The transmission schemes discussed and agreed in 2<sup>nd</sup> SRST for Phase-I and Phase-II RE zones in Southern Region are given below:

**a) Ananthpuram (Ananthapur) SEZ (AP) (2500 MW) and Kurnool SEZ (AP) (Kurnool-1000 MW)**

- (i) Establishment of 400/220 kV, 7x500 MVA pooling station at suitable border location between Ananthpuram & Kurnool Distt.



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- (ii) Ananthpuram PS-Kurnool-III PS 400 kV (High capacity equivalent to quad moose) D/c Line
  - (iii) Ananthpuram PS-Cuddapah 400 kV (High capacity equivalent to quad moose) D/c Line with suitable line reactors
  - (iv) 220 kV line bays for interconnection of wind/solar projects (12 nos.)
  - (v) 2x125 MVAr (400 kV) bus reactors at Ananthpuram PS
- b) Gadag SEZ (Karnataka) (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 MVAr (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 MVAr Bus Reactor.
  - (vii) Upgradation of Kolhapur (PG) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x330 MVAr 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 MVAr switchable Line Reactor on Kolhapur (PG) end of each circuit.
- c) Bidar SEZ (Karnataka) (2500 MW)**
- (i) Establishment of 765/400/220 kV, 3x1500 MVA, 5x500 MVA pooling station at suitable border location near Bidar.
  - (ii) Bidar PS – Maheshwaram (PG) 765 kV D/C line along with 1x240 MVAr switchable Line Reactor on Bidar PS end of each circuit.
  - (iii) 220 kV line bays for interconnection of solar projects (8 nos).
  - (iv) 1x240 MVAr (765 kV) & 1x125 MVAr (400 kV) bus reactor at Bidar PS.
- d) Common transmission system strengthening in Southern Region for enabling evacuation and export of power from Solar & Wind Energy Zones in Southern Region**
- (i) Upgradation of Tuticorin PS to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x330 MVAr Bus Reactor.

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- (ii) Upgradation of Dharmapuri (Salem New) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x240 MVAr Bus Reactor.
  - (iii) Upgradation of Madhugiri (Tumkur) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x240 MVAr Bus Reactor.
  - (iv) Upgradation/charging of Tuticorin PS - Dharmapuri (Salem New) 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVAr switchable line reactor on both end of each circuit.
  - (v) Upgradation/charging of Dharmapuri (Salem New) - Madhugiri (Tumkur) 765 kV 2xS/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVAr switchable Line Reactor on Dharmapuri (Salem New) end of each circuit.
  - (vi) Upgradation/charging of Madhugiri (Tumkur) - Narendra New 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVAr switchable line reactor on both end of each circuit.
  - (vii) Conversion of 400 kV line reactors installed on 765 kV circuits/ lines (initially charged at 400 kV) mentioned at sl no. iv, v and vi into 400 kV bus Reactor with suitable arrangements at respective substations.
- As per discussions in 2<sup>nd</sup> SRSC meeting, the above transmission system is a broad master plan to serve integration of RE generation potential assessed in Tamil Nadu, Karnataka and Andhra Pradesh for period upto 2021-22. As such, it was agreed that the scheme would be implemented as ISTS, consequent to grant of LTA by CTU. The transformation capacity at various sub-stations and certain elements may be required to be reviewed based on LTA applications. Accordingly, this broad master plan would be implemented in stages to serve RE integration.

31.4 As per information furnished by SECI, status of land availability for setting up of RE generation projects (18.5 GW) in Southern Region is detailed below:

- Land is available in Gadag (2500 MW SEZ) and Koppal (2500 MW WEZ) and Government of Karnataka has already identified the land. However, Koppal was originally envisaged as Wind Energy Zone but SECI has now proposed to develop Koppal as a SEZ.
- Regarding Bidar (2500 MW SEZ), Karnataka, land location is yet to be firmed up.
- Land is available in Ananthpuram (2,500 MW SEZ) and Kurnool (2,500 MW SEZ, 3,000 MW WEZ) Andhra Pradesh.
- Regarding Karur WEZ (2,500 MW), Tamil Nadu Government has raised specific concerns about the availability of land for the identified potential of 2500 MW. Regarding Tirunelveli WEZ (500 MW), Tamil Nadu Government has not confirmed the availability of land.

Members may please note.

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31.5 Further, the following were also decided in the 1<sup>st</sup> SRPC(TP):

- i. SECI would share the RE potential assessment study/report for 18.5 GW of envisaged RE potential in states of Andhra Pradesh, Karnataka and Tamil Nadu with CEA/CTU/SRPC and with STU's of SR
- ii. SRPC would co-ordinate with states to find out the RE potential already developed and the balance RE potential which could be developed in different locations (connected to ISTS as well as intra-state network), based on availability of land and other infrastructure within two months and forward their findings to CEA.
- iii. SECI/MNRE to confirm whether the assessed RE potential at different locations in Southern Region includes the potential being developed in intra-state system or excludes the same. For example, whether the RE potential (2.5 GW) at Koppal, Karnataka, is the total potential of Koppal area and includes the RE potential (of about 1 GW) being developed by KPTCL in Koppal or is over and above the potential being developed by KPTCL.
- iv. SECI was requested to expedite the bidding process of planned RE capacity in Southern region so as to avoid mismatch between commissioning of RE capacity and associated transmission system.
- v. Accordingly, CEA/CTU may review the transmission plans/schemes based on the above.

31.6 SECI has informed that SECI along with NIWE, made a presentation on assessment of 18.5 GW RE Potential in states of Andhra Pradesh, Karnataka and Tamil Nadu, at TNEB Headquarters Chennai on 11<sup>th</sup> February 2020. The meeting was attended by SR constituents.

31.7 SRPC to present for 31.5 (ii) and SECI to present for 31.5 (i), (iii) & (iv).

Members may please discuss.

### **32.0 Upgradation of Narendra New to its rated voltage of 765kV level under the scheme Gadag Solar Energy Zone, Karnataka (2500MW) Part – B**

32.1 Upgradation of Narendra New to its rated voltage of 765kV level alongwith 2x1500 MVA, 765/400kV ICTs and 1x330 MVAr Bus Reactor under the scheme Gadag Solar Energy Zone, Karnataka (2500MW) was agreed in the 2<sup>nd</sup> SRSCT meeting held on 10.06.2019.

32.2 Presently Narendra New GIS substation is operating at 400kV level and proposed upgradation to 765kV is envisaged to be GIS. However, after detailed survey at site, it has been found that land adjacent to 400kV GIS switchyard is available and acquirable for establishment of 765kV AIS switchyard instead of 765kV GIS. Further, there have been certain incidents of failure in GIS equipments in the past which is affecting the availability of system. The

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restoration/rectification time required for GIS is comparatively high due to requirement of OEM representatives at the site.

- 32.3 Accordingly, considering the reliability & techno economic aspects, it is proposed that the upgradation may be carried out as 765kV AIS instead of 765kV GIS. With the proposed change of configuration from GIS to AIS, additional land required is about 350x530 Sqm approx. However, the overall cost of upgradation to 765kV AIS is lesser than that of 765kV GIS.

Members may please discuss.

**33.0 All-India studies for evolution of additional transmission scheme for export of power from Southern grid to rest of all-India grid**

- 33.1 It was decided in the 2<sup>nd</sup> SRSCT meeting that all-India studies would be carried out with the participation of CEA, CTU, POSOCO and concerned beneficiaries/STUs for evolution of additional (over and above the above proposed transmission scheme) transmission scheme for export of power from Southern grid to rest of all-India grid.
- 33.2 Accordingly, Load-Generation balance was prepared by CEA and CTU to carry out system studies for integration of 175 GW RE by the year 2022 and the load generation balance along with PSSE file for one scenario (August 2021-22 Afternoon Peak) had been circulated to SR constituents and POSOCO on 19.11.2019. The same was also discussed with the SR constituents and POSOCO in the joint study meeting on 21-22 November, 2019, at New Delhi and subsequently in the 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019 at Hyderabad.
- 33.3 In the 1<sup>st</sup> SRPC(TP) meeting, it was decided to prepare total nine scenarios for the month of June, 2021, August, 2021 and February, 2022, for afternoon peak, evening peak and night off-peak scenarios (three scenarios for each month viz. June, August and February). It was further decided that the same shall be circulated to SR constituents for their comments / observations / suggestions. Further, SR Constituents were again requested to forward their comments/observations on the already circulated Load-Generation balance and PSSE file, so that the nine number of scenarios could be formulated.
- 33.4 In view of the above, LGB for 9 nos. of scenarios and system studies file for one scenario (June 2021-22 Afternoon Peak) was prepared. Load generation scenarios, results of the system studies, study assumptions & inputs considered were uploaded on CTU website and were also circulated to all the regional constituents for their comments/observations vide emails dated 20.05.2020 (SR), 08.06.2020 (WR) and 11.06.2020 (NR, ER & NER).
- 33.5 Comments were received from POSOCO vide letter dated 25.06.2020. Further, observations pertaining to certain transmission network data updation of STU network and generation dispatches were also received from TANTRANSCO vide email dated 02.06.2020 and KPTCL vide email dated 08.06.2020. KPTCL has stated that the 9 nos. of load generation balance scenarios and assumptions considered for study pertaining to Karnataka is in line with the

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historical pattern. No comments were received from any other constituents. Accordingly, the system studies file was updated incorporating the above observations of the constituents and system studies were carried out for all the 9 nos. of scenarios. The system studies along with observations received from POSOCO/constituents were also discussed with CEA and POSOCO in meeting held on 23.07.2020.

- 33.6 The Load generation scenarios, study assumptions & inputs considered, system studies and the detailed study analysis was uploaded on CTU website on 03.08.2020 and the same was also circulated to constituents for their comments and observations. Detailed System studies are enclosed at Annex-33.1.

Members may please discuss.

### **34.0 Establishing of 3x500 MVA, 400/220kV Devanahalli substation in Bengaluru**

- 34.1 KPTCL vide letter dated 14.09.2020 (Annex-34.1) has informed that the proposal of establishing 400/220 kV Devanahalli substation was approved in the 39<sup>th</sup> meeting of SCPSPSR under “Transmission scheme for 2000MW Tumkur (Pavagada) Ultra Mega Solar Park” with the following Inter-State transmission system.

#### **Phase-I (1000 MW)**

- i. LILO of 400 kV Gooty - Tumkur (Vasanthnarasapura) D/C at Tumkur (Pavagada) Pooling station.
- ii. Tumkur (Pavagada) Pooling station - Hiriya 400 kV D/C (as part of Tumkur (Pavagada) Pooling station - Mysore D/C line.
- iii. LILO of 400 kV Bellary Pool - Tumkur (Vasanthnarasapura) D/C (Quad) (both Circuits) [KPTCL line] at Tumkur (Pavagada) Pooling station\*.
- iv. Establishment of 3x500 MVA, 400/220 kV Pooling station at Tumkur.
- v. 1x125 MVAR bus reactor at 400/220 kV Pooling station at Tumkur.
- vi. 8 nos. 220 kV bays at 400/220 kV Tumkur (Pavagada) Pooling station for interconnection with solar project.

\*KPTCL would complete Bellary Pooling Station -Tumkur (Vasanthnarasapura) D/C (Quad) by December-2016.

#### **Phase-II (1000 MW)**

- i. Hiriya-Mysore 400 kV D/C line\*
- ii. Tumkur (Pavagada) Pooling station – Devanahalli (KPTCL) 400 kV D/C (Quad)\*\*
- iii. Augmentation of 2x500 MVA, 400/220 kV transformer at Tumkur (Pavagada) Pooling station.
- iv. 1x125 MVAR bus reactor at Tumkur (Pavagada) Pooling station.
- v. Third 400/220 kV, 1x500 MVA transformer at Tumkur (Vasanthnarasapura).



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- vi. 1x80 MVAR switchable line reactor at Mysore end of Hiriur-Mysore DC for each circuit.
- vii. 8 nos. 220 kV line bays at 400/220 kV Tumkur Pooling Station for Solar Interconnection.
- \*With the completion of this line, it would be connected with Tumkur (Pavagada) Pooling station - Hiriur 400 kV DC line to form Tumkur (Pavagada) - Mysore DC line.
- \*\*KPTCL would complete establishment of 400/220 kV sub-station at Devanahalli including inter-linking 400 kV and 220 kV line before Phase-II at Ultra Mega Solar Power Park.
- 34.2 However, there is no mention of the 400 kV transmission scheme explicitly under the scope of KPTCL (LILO of 400 kV Nelamangala -Hoody Twin Moose line to Devanahalli) in the minutes of the 39<sup>th</sup> Standing Committee meeting.
- 34.3 Further, in the agenda of 40<sup>th</sup> meeting of SCPSPSR, it is mentioned that (para 10.1):
- “During 39<sup>th</sup> SCPSPSR, Tumkur (Pavagada) Pooling Station - Devanahalli (KPTCL) 400 kV D/C Quad line was agreed as a part of transmission system for Tumkur (Pavagada) Ultra Mega Solar Park (2000 MW) Phase II. LILO of Nelamangala-Hoody line at 400 kV Devanahalli was also agreed.”*
- 34.4 In this context, KPTCL has informed that, the work of 400/220 kV Devanahalli substation has been completed and needs to be charged. KPTCL has requested for ratification of the following:
- LILO of 400 kV Yelahanka (Singanayakanhalli) - Hoody and LILO of 400 kV Nelamanagala- Hoody line at 400/220 kV Devanahalli Sub-Station
  - 3 x 500 MVA, 400/220 kV transformers
  - 1 x 125 MVAR bus reactor
- 34.5 To discuss the matter, a meeting was held on 17.09.2020 (through VC), with representatives from CTU, SRLDC and KPTCL. Minutes of meeting are at Annex 34.2. In the meeting, it was agreed that since the 2x500 MVA, 400/220 kV transformers and 1x125 MVAR reactor at Devanahalli substation have already been installed and are ready for charging, in-principle approval may be accorded for the following:
- LILO of 400 kV Yelahanka (Singanayakanhalli) - Hoody and LILO of 400 kV Nelamanagala- Hoody line at 400/220 kV Devanahalli Sub-Station
  - 3 x 500 MVA, 400/220 kV transformers
  - 1 x 125 MVAR bus reactor

It was also decided in the meeting that the matter would be put up in the forthcoming SRPC(TP) meeting for ratification.

Members may please discuss.

**35.0 Operational feedback from POSOCO (Quarter 3: Oct'19 to Dec'19)****35.1 Transmission Line Constraints**

Sl. No.	Corridor	Description of the constraints	CTU comments
1	400 kV Hiriya-Nelamangala D/c line	<p>With less generation at UPCL and high wind and solar generation, the flow on 400 kV Hiriya-Nelamangala D/c line is severely high and flow will further increase if Yeramarus TPS &amp; BTPS generation is full.</p> <p><b>Remarks:</b> 400 kV Hiriya – Mysore D/C line and 400 kV Bellary Pooling station – Jagalur - C N Halli D/C line would relieve the line loading of 400 kV Hiriya – Nelamangala D/c line. The same may be commissioned at the earliest.</p>	<p>With the commissioning of Hiriya – Mysore 400 kV D/c line (one circuit bypassed at Hiriya forming Pavagada – Mysore 400 kV S/c line), the loading on Hiriya–Nelamangala line has been reduced.</p> <p>In the 2<sup>nd</sup> SRSCT meeting, KPTCL informed that with the commissioning of 400 kV Vasanthnarasapura – Singanayakanahalli D/c line and commissioning of the associated 400 kV transmission scheme of Yeramarus, the line loading on Hiriya – Nelamangala line may get reduced.</p> <p>KPTCL to expedite the implementation of the line.</p>
2	Constraints in Nagjheri PH evacuation	<p>The 220 kV Nagjheri – Ambewadi DC line, 220 kV Ambewadi – Narendra DC line, 220 kV Kodalalli – Nagjheri D/C line, 220 kV Kaiga – Kodalalli SC &amp; 220 kV Kadra – Kodalalli SC lines are severely over-loaded.</p> <p>In 1<sup>st</sup> meeting of SRSCT, committee recommended for re-conductoring of the lines with HTLS conductor. KPTCL has to expedite the same.</p>	<p>KPTCL has to expedite the re-conductoring work.</p>
3	Tamil Nadu 230 kV System	<p>The following lines are heavily loaded:</p> <ul style="list-style-type: none"> <li>• 230 kV NLCTS2 – Kadalangudi S/C line</li> <li>• 230 kV Kalivandapattu – Tharamani S/C line</li> <li>• 230 kV Anaikaduvu - Othakalmandapam D/C line (during wind season)</li> <li>• 230 kV Othakalmandapam-Coimbatore S/C line</li> <li>• 230kV Othakalmandapam – Thudialur S/C line</li> </ul>	<p>TANTRANSCO may update</p>

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		<ul style="list-style-type: none"> <li>• 230 kV Madurai - Sembatty S/c line</li> <li>• 230 kV Pugalur - Mywadi S/c line</li> <li>• 230kV Pudanchandai-Pugalur line</li> <li>• 230kV TTPS-TSIPCOT S/c</li> <li>• 230kV Pugalur – Karukathi S/c</li> </ul>	
4	220 kV Bangalore Metro Network	<p>Most of the 220 kV network in Bengaluru is radialised during peak season to prevent overloading of lines. The radialisation of lines decreases the reliability of supply, thus resulting in low voltage situation during peak period and high voltage during off-peak period of the day, thus making it an ideal station for STATCOM.</p> <p>There is no sufficient Capacitor Compensation at distribution level in BESCOM area.</p>	KPTCL may update

**35.2 ICT Constraints**

Sl. No.	ICT	Description of the constraints	CTU comments
1	400/220 kV 2x315 MVA ICTs at Maradam SS	N-1 condition not satisfied for considerable time. N-1 of this ICTs will overload ICTs at Gazuwaka and Kalpakka SS.	<p>Augmentation of ICT capacity from 2 x 315 MVA to 2 x 315 MVA + 1x 500 MVA ICTs at 400/220 kV Maradam (Garividi) S/S had already been agreed in the 1<sup>st</sup> SRST.</p> <p>APTRANSCO may expedite the implementation of 3<sup>rd</sup> ICT at Maradam.</p>
2	400/220 kV 3X500 MVA ICTs at Somanhalli	N-1 condition not satisfied for 10 % of time in Dec 2019.	
3	400/220 kV 2x315 MVA ICTs at Kochi	N-1 condition not satisfied for 23 % of time in Dec 2019.	<p>Loading on 2x315 MVA ICTs at Kochi has been increased with the commissioning of Tirunelveli – Cochin 400kV (Quad) D/c line.</p> <p>With the commissioning of 2000 MW Pugalur – North Trichur VSC based HVDC, the loadings are expected to reduce.</p>

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			1x500 MVA ICT has been planned by CTU at Kochi, subject to approval of SRPC(TP).
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**35.3 Nodes Experiencing High Voltage / Low Voltage**

During the 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019, it was informed that detailed study of reactive power compensation had been carried out and the same had been discussed in 1<sup>st</sup> meeting of SRSCCT, wherein 27 nos. of 125 MVAR bus reactors were agreed to be installed at different locations and with the commissioning of planned/ under implementation bus reactors at various ISTS & STU substations, the issue of high voltage would be addressed. It was decided in the meeting that states may expedite the implementation of bus reactors and may update the status.

In case the high voltage conditions persists with the commissioning of above planned / under implementation bus reactors, comprehensive reactive compensation studies may be carried out subsequently, considering the high RE integration in Southern Region.

States may please update.

**35.4 Delay in transmission lines affecting grid operation adversely**

Sl. No.	Transmission Corridor	Proposed Commissioning Date/ Original Target date	Actual/ Likely Commissioning Date	Transmission Constraint Caused	CTU comments
1.	400 kV Thrissur - Kozhikode DC line	---	RoW issues	Low voltages in North Kerala & 220 kV North - South corridor of Kerala	KSEB may update
2.	400 kV Hiriyur-Mysore DC line	July-19	RoW issues	High loading on 400 kV Hiriyur-Neelamangala DC line	Line commissioned and date of Commercial operation 01.05.2020.
3.	400 kV Bellary PS - Chikkanayakanahalli DC line	--	Tendering stage	High loading on 400 kV Hiriyur-Neelamangala DC line	KPTCL may update

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## 36.0 Operational feedback from POSOCO (Quarter 4: January 20 to March 20)

## 36.1 Transmission Line Constraints

Sl. No.	Corridor	Description of the constraints	CTU comments
1	400 kV Hiriya-Nelamangala D/c line	<p>With less generation at UPCL and high wind and solar generation, the flow on 400 kV Hiriya-Nelamangala D/c line is severely high and flow will further increase if Yeramarus TPS &amp; BTPS generation is full.</p> <p><b>Remarks:</b> 400 kV Hiriya – Mysore D/C line and 400 kV Bellary Pooling Station – Jagalur - C N Halli D/C line would relieve the line loading of 400 kV Hiriya – Nelamangala D/c line. The same may be commissioned at the earliest.</p>	<p>With commissioning of Hiriya – Mysore 400 kV D/c line (one circuit bypassed at Hiriya forming Pavagada – Mysore 400kV S/c line), the loading on Hiriya – Nelamangala line has been reduced.</p> <p>In the 2<sup>nd</sup> SRST meeting, KPTCL informed that with the commissioning of 400 kV Vasanthnarsapura – Singanayakanahalli D/c line and commissioning of the associated 400 kV transmission scheme of Yeramarus, the line loading on Hiriya – Nelamangala line may get reduced. KPTCL to expedite the implementation of the line.</p>
2	400 kV NLC TS2-NNTPS line	This line loading is high when there is no generation at NNTPS and wind generation is high in Tamil Nadu area.	With the commissioning of NNTPS – Ariyalur line, the line loading is expected to be reduced.
3	400 kV Kanarpatty-Tirunelveli S/C line	<p>With solar generation in Kamuthi area and high wind generation Karaikudi &amp; Kayathar area, the line loading is high.</p> <p><b>Remarks:</b> Commissioning of 400 kV Kanarpatty-Tirunelveli second circuit will relieve the loading.</p>	<p>TANTRANSCO may update.</p> <p>The 2<sup>nd</sup> circuit of Kanarpatty – Tirunelveli was agreed for reliability purpose only and not for regular injection of power.</p>
4	Constraints in Nagjheri PH evacuation	The 220 kV Nagjheri – Ambewadi DC line, 220 kV Ambewadi – Narendra DC line, 220 kV Kodalalli – Nagjheri D/C line, 220 kV Kaiga – Kodalalli SC & 220 kV Kadra – Kodalalli SC lines are severely over-loaded. In 1 <sup>st</sup> meeting of SRST, committee recommended for re-conductoring of the lines with HTLS conductor. KPTCL has to expedite the same.	KPTCL may update
5	Tamil Nadu 230kV System	<p>The following lines are heavily loaded</p> <ul style="list-style-type: none"> <li>• 230 kV NLCTS2 – Kadalangudi S/C line</li> <li>• 230 kV Kalivendapattu – Tharamani S/C line</li> </ul>	TANTRANSCO may update



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		<ul style="list-style-type: none"> <li>• 230 kV Anaikaduvu-Othakalmandapam D/C line (during wind season)</li> <li>• 230 kV Othakalmandapam-Coimbatore S/C line</li> <li>• 230kV Othakalmandapam – Thudialur S/C</li> <li>• 230 kV Madurai - Sembatty S/c line</li> <li>• 230 kV Pugalur - Mywadi S/c line</li> <li>• 230 kV Pudanchandai-Pugalur line</li> <li>• 230 kV TTPS-TSIPCOT S/c line</li> <li>• 230 kV Pugalur – Karukathi S/c line</li> </ul>	
6	220 kV Bangalore Metro Network	Most of the 220 kV network in Bengaluru is radialised during peak season to prevent overloading of lines. The radialisation of lines decreases the reliability of supply & thus resulting in low voltage situation during peak period and high voltage during off-peak period of the day, thus making it an ideal station for STATCOM. There is no sufficient Capacitor Compensation at distribution level in BESCOM area.	KPTCL may update
7	Andhra Pradesh 220 kV Network	<p>The following lines are heavily loaded</p> <ul style="list-style-type: none"> <li>• 220 kV Lower Sileru – Bommuru S/C line</li> <li>• 220 kV Maradam-Garividi D/C line</li> <li>• 220 kV Maradam-Bobbili D/C line</li> <li>• 220 kV Kalpaka-Brandix D/C line</li> <li>• 220 kV UpperSileru-Pendurthi S/C line</li> <li>• 220 kV Lower Sileru-KTSV S/C line</li> <li>• 220 kV Gazuwaka-Parwada line</li> <li>• 220 kV Vemagiri-Bommuru D/C line</li> <li>• 220 kV Gudivada-Nunna D/C line</li> <li>• 220 kV Gunadala-Nunna S/C line</li> <li>• 220 kV VTPS-Tadikonda D/C line</li> <li>• 220 kV Sattenpalli-Narasaraopeta D/C line</li> <li>• 220 kV Sattenpalli-Parchuru D/C line</li> <li>• 220 kV Chinakampalli-Rajampet S/C line</li> <li>• 220 kV Ghani-Somayajulapalli D/C line</li> </ul>	APTRANSCO may update

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## 36.2 ICT Constraints

Sl. No.	ICT	Description of the constraints	CTU comments
1.	400/220 kV 2x315 MVA ICTs at Maradam SS	N-1 condition not satisfied for considerable time. N-1 of these ICTs will overload ICTs at Gazuwaka and Kalpakka SS.	Augmentation of ICT capacity from 2 x 315 MVA to 2 x 315 MVA + 1x 500 MVA ICTs at 400/220 kV Maradam (Garividi) S/S had already been agreed in the 1 <sup>st</sup> SRSCT.  APTRANSCO may expedite the implementation of 3 <sup>rd</sup> ICT at Maradam.
2.	400/220 kV, 3x315 MVA ICTs at Vemagiri	N-1 not satisfied for 12% of the time in March	APTRANSCO may update. Proposal has been received from APTRANSCO for additional 1x500 MVA ICT at Vemagiri 400/220 kV substation.
3.	400/220 kV 3X315 MVA ICTs at Nellore	N-1 not satisfied for few instants	1x500 MVA, 4 <sup>th</sup> ICT at Nellore S/s (Manubolu) had already been agreed in 1 <sup>st</sup> SRPC(TP) meeting.  APTRANSCO may update.
4.	400/220 kV 2x500 MVA ICTs at Kolar	N-1 not satisfied for 25 % of the time in February and March	
5.	400/220 kV 2x315 MVA ICTs at Kaiga	N-1 not satisfied for 23 % of the time	KPTCL may update
6.	400/220 kV 2x315 MVA ICTs at UPCL	N-1 not satisfied 17 % of the time in March	KPTCL may update
7.	400/220 kV 2x315 MVA ICTs at Guttur	N-1 not satisfied for few instants	KPTCL may update
8.	400/220 kV 2x315 MVA ICTs at Kochi	N-1 not satisfied for few instants	Loading on 2x315 MVA ICTs at Kochi has been increased with the commissioning of Tirunelveli – Cochin 400 kV (Quad) D/c line.  With the commissioning of 2000 MW Pugalur – North Trichur VSC based HVDC, the loadings are expected to reduce.

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Sl. No.	ICT	Description of the constraints	CTU comments
			1x500 MVA ICT has been planned by CTU at Kochi, subject to approval of SRPC(TP).
9.	400/230 kV 2x315 MVA ICTs at Thiruvallam	N-1 not satisfied for few instants	1x500 MVA 3 <sup>rd</sup> ICT has been planned by TANTRANSCO. TANTRANSCO may update
10.	400/220 kV 2x315 +1x500 MVA ICTs at Mysore	N-1 not satisfied for 40 % of the time in February and March	With the commissioning of 400 kV Kadakola S/S and its associated lines, the ICT loadings are expected to reduce.
11.	400/220 kV 3x500 MVA ICTs at Nelamangala	N-1 not satisfied for 30 % of the time in February.	KPTCL may update
12.	400/220 kV 3x500 MVA ICTs at Hoody	N-1 not satisfied for 25 % of the time	KPTCL may update

**36.3 Node Experiencing High Voltage / Low Voltage**

During the 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019, it was informed that detailed study of reactive power compensation had been carried out and the same had been discussed in 1<sup>st</sup> meeting of SRSCT, wherein 27 nos. of 125 MVAR bus reactors were agreed to be installed at different locations and with the commissioning of planned/ under implementation bus reactors at various ISTS & STU substations, the issue of high voltage would be addressed. It was decided in the meeting that states may expedite the implementation of bus reactors and may update the status.

In case the high voltage conditions persists with the commissioning of above planned / under implementation bus reactors, comprehensive reactive compensation studies may be carried out subsequently, considering the high RE integration in Southern Region.

States may please update.

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## 36.4 Delay in transmission lines affecting grid operation adversely

Sl. No.	Transmission Corridor	Proposed Commissioning Date/ Original Target date	Actual/Likely Commissioning Date	Transmission constraint	CTU comments
1.	400 kV Thrissur – Kozhikode DC line	---	RoW issues	Low voltages in North Kerala & 220 kV North - South corridor of Kerala	KSEB may update
2.	400 kV Bellary PS - Chikkanayakanahalli DC line	--	Tendering stage	High loading on 400 kV Hiriya-Nelamangala DC line	KPTCL may update
3.	400 kV Ariyalur-NNTPS D/C line	Feb-2020	RoW issues	Constraint in evacuation of NNTPS generation	NNTPS – Ariyalur line expected by June, 2020.  In view of delay in readiness of Ariyalur S/s (TANTRANSCO), interim arrangement done to connect this line to one ckt of LILO section of Pugalur-Kalivandapattu 400 kV D/c line to evacuate power from NNTPS.

**37.0 Presentation on Composite Insulated Cross Arm solution for the Transmission Line Towers by Shemar Power Engineering (India) Pvt. Ltd.**

Presentation for 15 minutes followed by Question & answers for 5 minutes.

Annex 2.1Issues pertaining to KPTCL

- **Modifications in 220 kV transmission system proposed by KPTCL at Yalwar (associated transmission lines of 400/220 kV Yalwar Substation.)**

*“6.5 It was decided during 1st SRPC (TP) meeting that KPTCL will carry out detailed study with the planned series capacitors and submit the study results to CEA. The matter would be discussed in the next meeting of SRPC (TP)”.*

Detailed line survey is being carried out by KPTCL to finalise the route length of the proposed LILO line (4 nos. of 220 kV circuits) from proposed 400 kV Yalwar sub-station to LILO the existing 220 kV B.Bagewadi-Lingasugur DC line.

- **Establishing 2x500 MVA, 400/220 kV GIS A-Station at Anand Rao circle (adjacent to existing 220/66/11 kV A Station) in Bengaluru:**

*“18.5 It was also pointed by CTU representative that as per operational experience with even smaller length of cable than the one suggested by KPTCL, there have been incidences of frequent failure of cable joints due to huge charging current and resulting heat generation in the 400 kV cable.*

*18.6 After detailed deliberations, it was decided that KPTCL shall submit the detailed technical feasibility report of the proposal and the same would be discussed in the next meeting of SRPC(TP).”*

KPTCL has obtained budgetary offer from the firm for Consultancy services for Techno-economical study to analyze the feasibility of the transmission scheme of proposed 400/220kV 'A' station by construction of 400kV lines from 400kV Singanayakanahalli and 400kV Hoody sub-station using 400kV UG Cable. Further, it was decided to call for short term open tender for the said consultancy service and preparation of bid document is under process.



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Annex-7.1

Date	Loading on each ICT at Kochi
01/01/20	237.90
02/01/20	233.31
03/01/20	256.20
04/01/20	268.75
05/01/20	218.66
06/01/20	186.32
07/01/20	207.20
08/01/20	212.28
09/01/20	199.49
10/01/20	208.06
11/01/20	208.96
12/01/20	191.01
13/01/20	176.77
14/01/20	195.83
15/01/20	211.40
16/01/20	202.56
17/01/20	206.87
18/01/20	218.06
19/01/20	201.90
20/01/20	226.57
21/01/20	241.10
22/01/20	228.00
23/01/20	203.06
24/01/20	209.61
25/01/20	220.20
26/01/20	189.00
27/01/20	206.70
28/01/20	196.74
29/01/20	195.48
30/01/20	200.06
31/01/20	165.16

Date	Loading on each ICT at Kochi
01/02/20	240.01
02/02/20	211.04
03/02/20	224.22
04/02/20	209.24
05/02/20	188.52
06/02/20	204.41
07/02/20	211.34
08/02/20	202.36
09/02/20	200.30
10/02/20	229.22
11/02/20	235.05
12/02/20	212.01
13/02/20	205.16
14/02/20	219.08
15/02/20	207.87
16/02/20	208.87
17/02/20	212.01
18/02/20	228.22
19/02/20	227.37
20/02/20	217.15

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पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड  
(भारत सरकार का उद्यम)  
POWER GRID CORPORATION OF INDIA LIMITED  
(A Government of India Enterprise)

Annex-7.2

Ref. No. :C/CTU/S/00/03/ICT-Kochi-Hiriyur

Date: 20.02.2020

Shri Pardeep Jindal  
Chief Engineer(PSP&A-II)  
Central Electricity Authority,  
Sewa Bhawan, R K Puram,  
New Delhi – 110066

**Subject : Augmentation of ICT at Hiriyur and Kochin substations – Reg.**

Dear Sir,

The matter of non-compliance of N-1 criteria (as per CEA manual on transmission planning criteria) of 2x315MVA, 400/220 kV ICTs at Hiriyur S/s was discussed in 1<sup>st</sup> SRSCT meeting held on 07.09.2018, 2<sup>nd</sup> SRSCT meeting held on 10.06.2019 and 1<sup>st</sup> SRPC(TP) meeting held on 16.12.2019. During the 1<sup>st</sup> SRPC(TP) meeting KPTCL requested to consider augmentation of transformation capacity at Hiriyur substation. In addition, POSOCO in there operational feedback has also mentioned the issue of overloading of 2x315MVA, 400/220 ICTs at Hiriyur.

Similarly, at Kochi substation, with commissioning of Tirunelveli – Kochi 400kV D/c line, loading on 2x315MVA, 400/220kV ICTs at Kochi S/s has increased significantly. Presently both ICTs are loaded about 80-90 % of transformation capacity and not complying to N-1 criteria. Details of loading observed on each 315MVA, 400/220kV ICT at Kochi S/s after commissioning of Tirunelveli – Kochi 400kV D/c line are attached at Annexure-1.

In view of the above, it is proposed to augment the transformation capacity with 1x500, 400/220 kV ICT at Kochi and Hiriyur substations and same may be taken up in forthcoming SRPC(TP) meeting.

Thanking You

Yours faithfully

(Mukesh Khanna)  
Chief General Manager(CTU-PIg)

केन्द्रीय कार्यालय: "सौदामिनी", प्लॉट नंबर 2, सेक्टर -29, गुरुग्राम -122001, (हरियाणा) दूरभाष: 0124-2571700-719

Corporate Office: "Saudamini", Plot No. 2, Sector-29, Gurugram-122001, (Haryana) Tel.: 0124-2571700-719

पंजीकृत कार्यालय: बी -9, कुतब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली -110 016. दूरभाष: 011-26560112, 26560121, 26564812, 26564892, CIN: L40101DL1989GOI038121

Registered Office: B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110 016. Tel: 011-26560112, 26560121, 26564812, 26564892, CIN : L40101DL1989GOI038121

Website: www.powergridindia.com



I/11500/2020

## Annexure-1

Date	Loading on each ICT at Kochi
01/01/20	237.90
02/01/20	233.31
03/01/20	256.20
04/01/20	268.75
05/01/20	218.66
06/01/20	186.32
07/01/20	207.20
08/01/20	212.28
09/01/20	199.49
10/01/20	208.06
11/01/20	208.96
12/01/20	191.01
13/01/20	176.77
14/01/20	195.83
15/01/20	211.40
16/01/20	202.56
17/01/20	206.87
18/01/20	218.06
19/01/20	201.90
20/01/20	226.57
21/01/20	241.10
22/01/20	228.00
23/01/20	203.06
24/01/20	209.61
25/01/20	220.20
26/01/20	189.00
27/01/20	206.70
28/01/20	196.74
29/01/20	195.48
30/01/20	200.06
31/01/20	165.16

Date	Loading on each ICT at Kochi
01/02/20	240.01
02/02/20	211.04
03/02/20	224.22
04/02/20	209.24
05/02/20	188.52
06/02/20	204.41
07/02/20	211.34
08/02/20	202.36
09/02/20	200.30
10/02/20	229.22
11/02/20	235.05
12/02/20	212.01
13/02/20	205.16
14/02/20	219.08
15/02/20	207.87
16/02/20	208.87
17/02/20	212.01
18/02/20	228.22
19/02/20	227.37
20/02/20	217.15

I/11500/2020

Annex-8.1

**TRANSMISSION CORPORATION OF TELANGANA LIMITED**

From  
Chief Engineer/ Power Systems,  
TSTRANSCO,  
Vidyut Soudha,  
Hyderabad, Telangana - 500082.

To  
The Chief Engineer/ PS P&A-II,  
Central Electricity Authority (CEA),  
RK Puram, Sewa Bhavan,  
New Delhi-110066.

Lr. No. CE(PS)/SE(PS)/DE(SS II)/ADE/AE/F. TSTPP(2x800MW) /D.No. 16 /20,  
Dt. 20/06/2020

Sir,

Sub: Follow up action of 1<sup>st</sup> SRPC(TP) held on 16.12.2019 - Status regarding allocation of 15% unallocated power to Telangana State from Telangana PH-I TPP (2x800 MW) of NTPC - Communiacted - Regarding.

Ref: CEA mail dated: 10.06.2020.

\*\*\*\*\*

With reference to your mail dated: 10.06.2020 regarding the status in respect of allocation of 15% unallocated power to Telangana State from Telangana PH-I TPP (2x800 MW) of NTPC, it is to inform that "a letter was addressed to Ministry of Power from Spl. Chief Secretary, Energy Department, GoTS for arranging necessary order on 100% power allocation to Telangana State from Stage-I (2x800 MW) of 4000 MW NTPC Telangana STPP. The reply from MoP, Govt. of India is awaited". This is for favor of information and further necessary action.

Yours faithfully

*K. Lakshmi*  
20/06/2020  
Chief Engineer/ Power Systems  
TSTRANSCO/Telangana  
2/4

Copy to:

1. Executive Director/Commercial & TSPCC/TSTRANSCO/VS/ Hyderabad
2. AE(T) to Director/ Grid Operations/ TSTRANSCO/ VS/ Hyderabad

*CS (PS P&A-II)*  
*[Signature]*

*PSPA-II - No. 337*  
*8/7/20*



From:  
Chief Engineer/IPC & Power Systems  
APTRANSCO,  
Vidyut Soudha, Gunadala,  
Vijayawada - 520008

To  
The Chief Engineer (PSP & A-II),  
Central Electricity Authority,  
Seva Bhavan, R.K.Puram,  
NEW DELHI - 110 066

**Lr. No. CE(IPC&PS)/SE(PS)/EE(SS&LTSS)/DEE-3/F.Vemagiri 4<sup>th</sup> ICT /D. No.129/2020,**

**dt.8.01.2020.**

Sir,

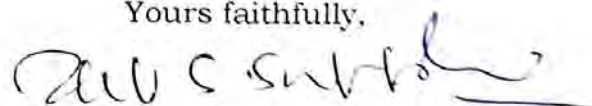
Sub:- APTRANSCO - Proposal for Augmentation of 4<sup>th</sup> 500 MVA ICT at the existing 400/220 kV substation at Vemagiri, East Godavari district - Inclusion of this proposal as item in the Agenda for discussion in the forthcoming 2<sup>nd</sup> Meeting of Southern Region Power Committee (Transmission Planning) SRPC(TP) - Requested - Reg.

\* \* \*

It is to inform that APTRANSCO has accorded approval for augmentation of ICT capacity from 3 x 315 MVA to 3 x 315 MVA + 1 x 500 MVA at the existing 400/220 kV substation at Vemagiri, East Godavari District to overcome the ICT constraints and to satisfy N-1 condition and also to meet the load demand and reliable power supply in the scheme area.

Hence, it is requested to arrange to include the above proposal as agenda item for discussion in the forthcoming 2<sup>nd</sup> Meeting of Southern Region Power Committee (Transmission Planning) SRPC(TP) and arrange for approval of the same at the earliest. A copy of this letter is being sent through e-mail also.

Yours faithfully,



**Chief Engineer (IPC & Power Systems)**

V. S. Subha Rao  
mob: 9440811114

Copy to:

Dr. Subir Sen, COO  
PGCIL, 'Saudamini', Plot NO.2, Sector-29,  
GURGAON - 122001, Haryana.

I/11500/2020

Annex-10.1

**TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED**

From:  
Chief Engineer/IPC & Power Systems  
APTRANSCO,  
Vidyut Soudha, Gunadala,  
Vijayawada – 520008

To  
The Chief Engineer (PSP & A-II),  
Central Electricity Authority,  
Seva Bhavan, R.K.Puram,  
NEW DELHI – 110 066

**Lr. No. CE(IPC&PS)/SE(PS)/EE(SS&LTSS)/DEE-3/F. Kalpaka – Garividi(Maradam)/**  
**D.No. 137/2020, dt: 20.02.2020**

Sir,

**Sub:** Erection of 400 kV Quad Moose DC line from 400 kV Kalpaka SS to 400 kV Garividi (Maradam) SS – Replacement of the existing Twin Moose Conductor with Twin Moose equivalent Invar Conductor from location no. 1 to location no.14 – Reg.,

**Ref:** 1. Lr. No. CE(IPC&PS)/SE(PS)/DE(SS&LTSS)/ADE-2/F. Garividi/  
D. No. 222/2017, dt:19.01.2017  
2. Lr. No. Dir (Proj)/CE/400kVConst/SE/PM/400kV/DIA(S)/F.KLP-  
GRD/D. No. 50/2017,Dt. 31.01.2017.  
3. Lr. No. CEA/PSPA-II/2017/53/8/371-372-2 , dt. 11.05.2017.

\* \* \*

APTRANSCO initially proposed 400 kV Quad Moose DC line from 400 kV Kalpaka SS to 400 kV Garividi (Maradam) SS. Due to severe Right of Way problem at Kalpaka, APTRANSCO has revised and approved the following re-arrangement for construction of 400 kV Kalpaka SS to 400 kV Garividi (Maradam) SS.

- i. The proposed 400 kV QMDC line from 400 kV Garividi (Maradam) SS will be connected to the existing 400 kV Kalpaka – Vemagiri Twin Moose DC line at Loc No. 14, by disconnecting the 400 kV Kalpaka – Vemagiri DC line between Location Nos. 14 & 15.
- ii. The Loc No. 15 of 400 kV Kalpaka – Vemagiri Twin Moose DC line will be connected to Loc No. 2 of 400 kV Kalpaka – Simhadri Circuit – I.

From the above rearrangement the lines will be as follows:

- i. 400 kV Kalpaka – Garividi (Maradam)DC line
- ii. 400 kV Vemagiri – Simhadri-I SC line
- iii. 400 kV Kalpaka – Vemagiri SC line
- iv. 400 kV Kalpaka – Simhadri-I lines (3 circuits)

The above proposal was submitted vide this office letters dated: 19.01.2017 and 31.01.2017. In the letter dated: 31.01.2017 cited vide reference (2), it was mentioned that APTRANSCO proposed to take up the 400 kV QMDC line from 400 kV Kalpaka SS to the proposed 400 kV Garividi (Maradam) SS by replacing the existing Twin Moose



I/11500/2020

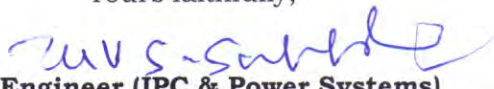
conductor with Twin Moose equivalent Invar Conductor from location no. 1 to location no.14 of 400 kV Kalpaka – Garividi (Maradam) SS line.

The in-principle approval was received from CEA vide reference (3) cited for the proposed rearrangement of 400 kV Kalpaka SS – Garividi (Maradam) SS DC line vide reference cited (2) cited and in the 41<sup>st</sup> Standing Committee meeting held on 22.09.2017 at Chennai. With this arrangement, part of the 400 kV Kalpaka – Garividi (Maradam) DC line will be Twin Moose from 400 kV Kalpaka SS end to location no. 14 and Quad Moose from Location no. 14 to 400 kV Garividi (Maradam)SS. The Twin Moose DC line from 400 kV Kalpaka SS to Location no. 14 was proposed for replacement with Invar Twin Moose conductor.

However the proposed the replacement of the existing Twin Moose conductor with Twin Moose equivalent Invar Conductor between location no 1 to location no. 14 was not indicated either in the in-principle or standing committee approvals.

**Therefore, it is requested to issue necessary clarification/approval for the replacement of existing Twin Moose conductor with Twin Moose equivalent Invar Conductor between location no. 1 to location no. 14 of 400 kV Kalpaka – Garividi (Maradam) DC line.**

Yours faithfully,

  
**Chief Engineer (IPC & Power Systems)**  
**(CH.V.S.Subba Rao)**  
Mob: 94408 11114

Copy to:

Dr. Subir Sen, COO  
PGCIL, 'Saudamini', Plot NO.2, Sector-29,  
GURGAON - 122001, Haryana.

D:\DyEE3\400 kV\Garividi 400kV SS\Letter\_CEA\_11022020.doc

I/11500/2020

Annex-10.2

626

File No.CEA-PS-12-14(12)/1/2018-PSPA-II Division

I/9722/2020



भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

**Central Electricity Authority**

विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग – II

Power System Planning &amp; Appraisal Division -II

सेवा मे / To

Chief Engineer (IPC & Power Systems),  
APTRANSCO,  
Vidyut Soudha, Gunadala,  
Vijayawada-520008

विषय/Subject: Erection of 400 kV Quad Moose DC line from 400 kV Kalpaka SS to 400 kV Garividi (Mardam) SS- Replacement of existing Twin Moose Conductor with Twin Moose Invar Conductor from location No. 1 to location No. 14- regarding.

संदर्भ/Reference: Letter No. CE(IPC&PS)/SE(PS)/EE(SS&LTSS)/DEE-3/ F.Kalpaka-Garividi(Mardam)/D.No./37/2020 dated 20.02.2020 (received vide e-mail dated: 28.04.2020)

महोदय/Sir,

1. Re-arrangement of Kalpaka-Garividi (Mardam) 400 kV Quad Moose D/C line was discussed in the 41<sup>st</sup> Meeting of Standing Committee on Power System Planning for Southern Region (SCPSPSR) held on 22<sup>nd</sup> September, 2017 at Chennai. APTRANSCO vide the letter under reference has mentioned that APTRANSCO proposed to take up the 400 kV Quad Moose line from 400 kV Kalpaka SS to the proposed 400 kV Garividi (Mardam) SS by replacing the existing Twin Moose conductor with Twin Moose equivalent Invar conductor from location No. 1 to location No. 14 of 400 kV Kalpaka-Garividi (Mardam) D/C line. However, the same has not been mentioned in the minutes of the meeting and APTRANSCO has requested to issue necessary clarification/approval in this regard.
2. Considering the above, 'in-principle' approval is conveyed for the following:  
The Kalpaka-Garividi (Mardam) 400 kV Quad Moose D/C line may be implemented as:
  - (i) The portion of line from Kalpaka SS end (location No. 1) to location No. 14, which comprises of Twin Moose conductor (existing Kalpaka-Vemagiri line), would be reconducted with HTLS conductor equivalent to Quad Moose capacity, so as to

I/11500/2020

File No.CEA-PS-12-14(12)/1/2018-PSPA-II Division

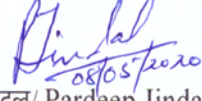
627

I/9722/2020

match the capacity of the remaining portion of Kalpaka-Garividi (Mardam) Quad Moose line.

- (ii) The transmission line from location No. 14 (of Kalpaka-Vemagiri line) to Garividi (Mardam) would be Quad Moose D/C line.
3. This issues with the approval of Member (Power System), CEA. The above modification would be formalised in the next meeting of SRPC(TP) and accordingly scope of the scheme that was agreed in the 41<sup>st</sup> SCPSPSR (para 24.4 of the minutes) would get partly modified.

भवदीय/Yours faithfully



(प्रदीप जिंदल/ Pardeep Jindal)

मुख्य अभियंता/ Chief Engineer



I/11500/2020

Annex-11.1

Transmission Corporation of Andhra Pradesh Ltd.

From  
The Chief Engineer(Plg,PS&Comml)  
APTRANSCO,  
Vidyut Soudha,  
Vijayawada- 520004

To  
The Chief Engineer (PS & PA-II)  
CEA ,Sewa Bhavan  
RK Puram ,Sector I  
New Delhi-110066

Lr.No. CE (Plg,PS&Comml)/DE(SS-I)/F.Solar/D.No.166/20 dtd24/06/20

Sir,

Sub: APTransco- Evacuation of 4550 MW (AC) of solar power under Phase-I out of 10000 MW (AC) Solar power initiative of government of AP - agenda item for discussion in the upcoming SRPCTP - Reg.

Ref: (1) Minutes of 1<sup>st</sup> meeting of SRPC(TP) held on 16.12.19-Reg. 4021689

(2) CEA-PS-12-14(12)/1/2018-PSPA-II Division 1/9790/2020

\* \* \*

Please refer to the letter under ref(2) wherein it was requested to furnish the RE potential developed and the balance RE potential which could be developed in different locations(connected to ISTS as well as intra-state network), based on availability of land and other infrastructure.

APGECL(Andhra Pradesh Green Energy Corporation Limited), a state government company has proposed 4550 MW (AC) of solar power to be set by them under Phase-I in Prakasam, YSR Kadapa and Ananthapur districts of Andhra Pradesh and requested Aptransco to carry out the System Studies for evacuation of the same duly furnishing the field feasibility as under.

S.No.	Location of solar park ,District	Proposed capacity under Phase-I in MW
1	Urichintala, Ananthapuram (Talaricheruvu)	800
2	Mudigubba, Ananthapuram	500
3	Pendlimarri, Kadapa	500
4	M.Kambaladinne, Kadapa (Jammalmadugu)	500
5	Kadapa ultra mega, Kadapa (Jammalmadugu)	750
6	Chandrasekharapuram, Prakasam	500
7	Rudrasamudram, Prakasam	1000
	<b>Total capacity</b>	<b>4550</b>

With reference to the above proposal received, system studies have been carried out duly considering the field feasibility. The scheme for evacuation of 4550 MW

I/11500/2020

pertainining to 400 KV network which is approved by the APTransco board is as follows.

- i) Augmentation of ICTs capacity from 3 x 315 MVA to 4 x 500MVA and connected bay extension works at Jammalamadugu SS.
- ii) 400/220 KV SS at Mylavaram , 400 KV QMDC line from 400 KV Jammalamadugu –Mylavaram SS (2 km) were dropped.
- iii) Augmentation of ICTs from (3X315 MVA to 3X315 MVA +1X500 MVA) at 400 KV Talaricheruvu SS.

The study results for the above transmission scheme are herewith enclosed.

It is requested to conduct studies for the above scheme and include it as an agenda item in the forthcoming Southern Regional Power Committee (Transmission Planning) Meeting .

*Sanku*  
*26/06/20* (FAC)  
Chief Engineer  
(Planning & Power Systems & Comml.)

Copy to:

The Director (SP&PA),  
Central Electricity Authority,  
Seva Bhavan, R.K.Puram,  
NEW DELHI – 110 066

## Annex 11.2

## TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED

**Sub:** Evacuation of 6000 MW (AC) of Solar Power proposed by APGECL from various Pooling Stations under Phase-I out of 10000 MW (AC) of Solar power- Revised System Studies Report -Submitted- Reg.

\*\*\*

1. system studies report for evacuation of 4550MW of Solar Power proposed by APGECL (Andhra Pradesh Green Energy Corporation Limited) under Phase-I out of 10000 MW of solar power was approved. The study report was submitted to CEA on 26-06-2020 for approval.
2. APGECL has furnished revised proposals for evacuation of 6000 MW (AC) of Solar Power under Phase-I in Prakasam, YSR Kadapa and Ananthapur Districts of Andhra Pradesh instead of 4550 MW(AC) as approved above. Hence, System Studies conducted for evacuation of 6000 MW of Solar Power.
3. The locations of Solar Power Parks along with Capacities are tabulated below.

Sl. No.	Location of Solar Park	Capacity Proposed in MW under Phase-I
1	C.S. Puram, Prakasam Dist.	600MW
2	Kotcherlakota (Rudrasamudram), Prakasam Dist.	1,000MW
3	Pendlimarri, YSR Kadapa Dist.	500MW
4	M. Kambaladinne, YSR Kadapa Dist.	500MW
5	Urichintala, Ananthapur Dist.	700MW
6	Mudigubba, Ananthapur Dist.	500MW
7	Chakrayapeta, YSR Kadapa Dist.	500MW
8	Thonduru, YSR Kadapa Dist.	400MW
9	Pampanuruthanda, Ananthapur Dist.	1,300MW
	<b>Total capacity</b>	<b>6,000MW</b>

- a) As against 1,000MW of Solar Power at Mylavaram, 250MW was already commissioned and connected to 400KV SS/Jammalamadugu on temporary basis. Studies were carried out duly dropping the 400/220 kV SS at Mylavaram and 400 kV QMDC line from 400 kV Jammalamadugu–Mylavaram SS (2 km) and connecting this 1000MW Solar Power of Kadapa Ultra Mega Solar Park of APSPCL to 400KV SS/ Jammalamadugu.

- b) System strengthening works proposed/already approved as tabulated below.

1	Proposal for extension of Power Supply for a CMD of 4,00MVA to the proposed Industrial Park at Guttapadu by APIIC by 1) laying 220KV TMDC Line from 400KV Ghani SS to the proposed Switching Station at Guttapadu,(14KM) and 2) Making Double LILO of the 220KV Narnur-Somayajulu Palli DC Line at the proposed Switching Station at Guttapadu (7KM)
2	Proposed 220KV SMDC Line from 400KV Talaricheruvu SS to 220KV Tadipatri SS not considered in order to avoid overloading of 220KV Gooty-Boyareddypalli-Tadipatri DC/SC Line.
3	Proposal for LILO of 220KV Ramagiri-Anantapur SC Line to the proposed 220KV Dharmavaram SS in order to avoid over loading of 220KV Anantapur-Gooty SC Line (LILO Line Length: 1.6KM)



I/11500/2020

4	Proposal for LILO of 220KV Chinakampalli-Renigunta SC Line at the 220KV Rajampet SS in order to avoid over loading of 220KV Chinakampalli-Rajampet SC Line (LILO Line Length: 3.0KM)
5	Proposal for replacement of existing ACSR Zebra Conductor with ACSS Conductor on 220KV Chinakampalli-Timmapuram-Kalikiri SC Line to avoid over loading (Length of the Lines: 71.5 KM & 10.0 KM respectively)
6	Proposal for conversion of 220KV RTPP-Chinakampalli DC Lines from SMDC to TMDC and double LILO at the Pendlimarri Sw. Station in order to avoid over loading of SMDC Lines. Towers are suitable for conversion to TMDC
7	From 220 KV Pampanurthanda-Hindupur: 1 No. TMDC Line with ACSR Conductor and 1 No. SMDC Line with ACSS Conductor was proposed earlier. However, during studies, it is observed that load sharing is uneven between TMDC Lines with ACSR and SMDC Lines with ACSS Conductor. During N-1 contingency also, TMDC Line will get over loaded. Hence, TMDC Lines with ACSR Conductors may only be considered for the above 2 Nos. Double Circuits.
8	Under N-1 contingency, the ICTs 2*315 + 2*500 MVA at 400KV SS Uravakonda will get overloaded. Previously, 220KV DC Line from 220KV Vajrarakur SS to 220KV Ananthapur SS was proposed and same did not materialise as there is no provision for 220KV Bays at 220KV Ananthapur SS. Later, Single LILO of 220KV Anantapur-Kalyandurg DC Line to 220KV Vajrarakur SS was proposed. But, it is also not meeting the N-1 Contingency at 400KV SS/Uravakonda. Hence, to meet the N-1 contingency, augmentation of ICTs at Uravakonda SS from 2*315+2*500MVA to 4*500MVA is proposed. CEA approval is available for 3*500MVA ICTs as per 42 <sup>nd</sup> Standing Committee Meeting. Approval is to be obtained for the balance 500MVA ICT
9	LILO arrangement of 2 <sup>nd</sup> Circuit of 220KV Podili-Ongole DC Line at 400KV Podili SS which was already approved.
10	LILO arrangement of 2 <sup>nd</sup> Circuit of 220KV Podili-Markapur Line (Now, it is called 220KV Podili-Srisailam DC Line as LILO at Markapur is proposed to be disconnected) to 400KV SS Podili which was already approved.
11	Proposal for stringing of 2nd circuit on 220KV Dhone-Krishnagiri DC/SC Line is required for converting temporary connectivity to permanent connectivity for wind power evacuation at 220KV Krishnagiri SS.
12	Proposal for stringing of 2nd circuit on 220KV Dhone-Kambalapadu-Lakkasagaram-Nansurala DC/SC Lines is required for converting temporary connectivity to permanent connectivity for wind power evacuation at 220KV Nansurala SS.

- c) The following various scenarios are considered at an annual peak load of 14,611 MW by the FY 2022-23. A maximum capacity factor of 75% is taken for Wind and Solar power as per Transmission Planning Criteria.

Scenario 1: Full Solar Full Wind (75% Solar, 75% wind)

Scenario 2: Full Solar Full Wind (75% Solar, 75% wind , RTPP NIL)

Scenario 3: Full Solar Less wind (75% Solar, 40% wind)

Scenario 4: Full Solar, No wind (75% Solar, 0% wind)

Scenario 5: Less Solar, Full wind (40% Solar, 75% wind)

Scenario 6: No Solar, Full wind (0% Solar, 75% wind)

Scenario 7: Less Solar, Less wind (40% Solar, 40% wind)

Scenario 8: No Solar, No wind (0% Solar, 0% wind)

4. a) Revised Studies were carried out for the 1000MW Kadapa Ultra Mega Solar Power Park of APSPL duly dropping its connectivity at 400KV SS/Mylavaram and considering its connectivity at 400KV SS/Jammalamadugu and the details are as follows.

Sl. No.	Description	Solar Power Capacity	Lines proposed
---------	-------------	----------------------	----------------

I/11500/2020

1	Pooling Stations-1, 2,3 & 4 to 400KV SS Jammalamadugu (YSR Kadapa District)	1,000 MW	<u>Pooling Stations to 400KV Jammalamadugu Substation:</u> a) PS-1 to Jammalamadugu Substation: 220KV TMDC/SC Line: 12.5KM b) PS-2 to Jammalamadugu Substation:220KV TMDC/SC Line: 10.0KM c) PS-3 to Jammalamadugu Substation: 220KV SMDC Line: 8.0KM d) PS-4 to Jammalamadugu Substation: 220KV SMDC Line: 9.8KM <b>(Already commissioned)</b>
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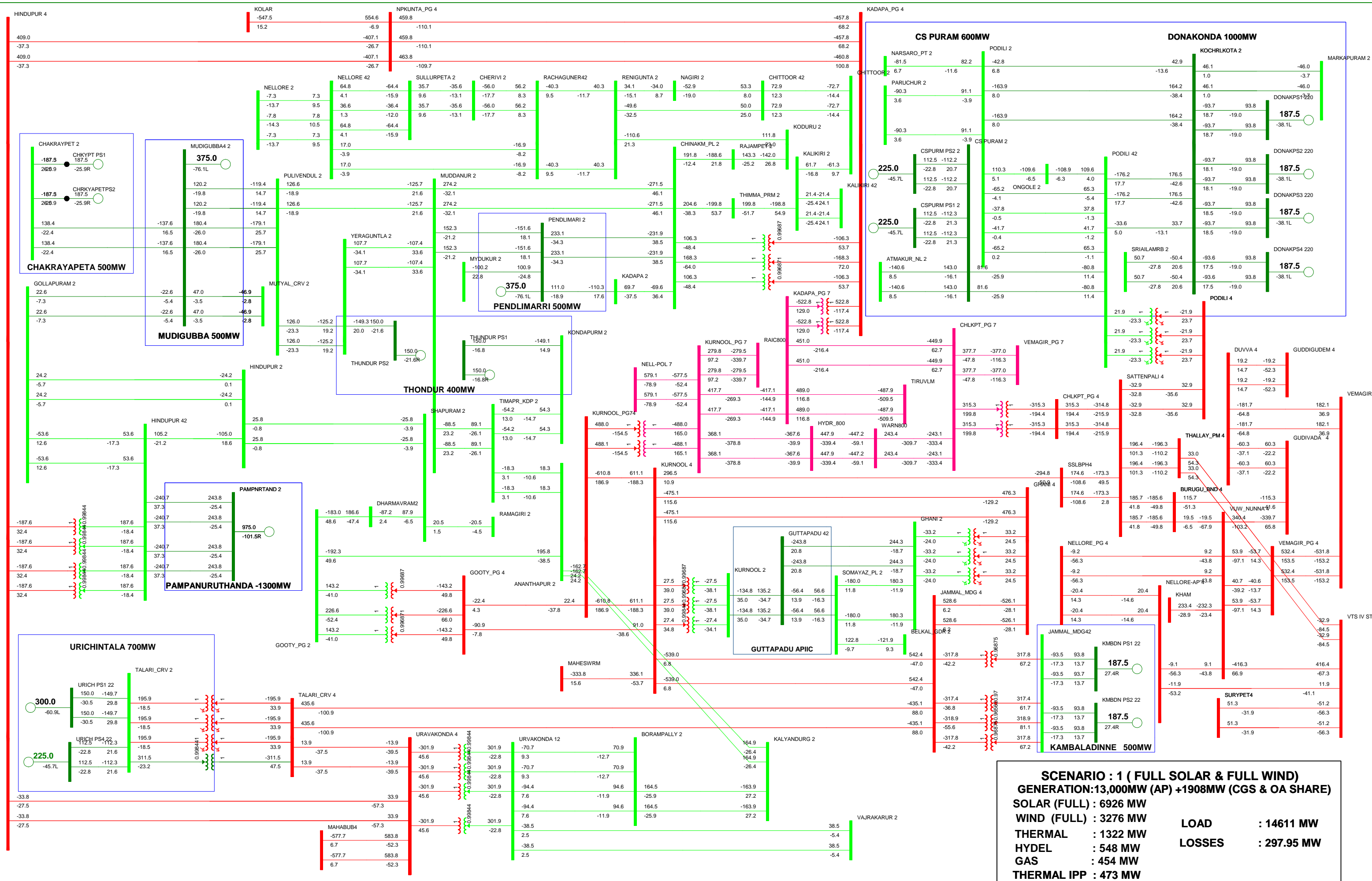
b) Based on the system studies for the 6,000MW Solar Power, the following evacuation lines are proposed for evacuation of 6,000 MW of Solar Power in Prakasam, YSR Kadapa & Ananthapur Districts under Phase-1.

Sl. No.	Description	Solar Power Capacity	Lines proposed
1	Pooling Stations-1 & 2 to C.S. Puram Sw. Station. (Prakasam Dist.)	600 MW	1) <u>Pooling Stations to Switching Station:</u> a) PS-1 to Sw. Station: 220KV SMDC Line: 17KM b) PS-2 to Sw. Station: 220KV SMDC Line: 12KM  2) <u>Evacuation Lines from Sw. Station:</u> By making Double LILO of 220KV SMDC Line from 400KV SS/Podili to 220KV SS/Atmakur at the proposed 220KV Switching Station at C.S.Puram: 30KM
2	Pooling Stations-1, 2, 3 & 4 to Kotcherlakota Sw. Station (Prakasam Dist.)	1,000 MW	1) <u>Pooling Stations to Sw. Station:</u> a) PS-1 to Sw. Station: 220KV SMDC Line: 2.5KM b) PS-2 to Sw. Station: 220KV SMDC Line: 6.3KM c) PS-3 to Sw. Station: 220KV SMDC Line: 3.6KM d) PS-4 to Sw. Station: 220KV SMDC Line: 10.5KM  2) <u>Evacuation Lines from Sw. Station:</u> a) Directing the existing single LILO arrangements of 220KV Srisailam-Podili SMDC Line to 220KV SS/Markapur b) 220KV SMDC Line from the proposed 220KV Kotcherlakota Sw. Station to 220KV SS/Markapur c) Making Double LILO arrangements of 220KV Srisailam-Podili SMDC Line to the proposed Kotcherlakota Sw. Station d) 220KV TMDC Line is proposed from the proposed Kotcherlakota Sw. Station to 400KV SS/Podili e) 220KV TMDC Line is proposed from the proposed Kotcherlakota Sw. Station to 220KV SS/Podili
3	Pooling Stations-1 & 2 to Pendimmarri Sw. Station (YSR Kadapa Dist.)	500 MW	1) <u>Pooling Stations to Sw. Station:</u> a) 220KV DC/SC Line from PS-1 to common point (TMSC) to Sw. Station (TMDC): 10KM b) 220KV DC/SC Line from PS-2 to common point (TMSC) to Sw. Station (TMDC): 10KM  2) <u>Evacuation Lines from Sw. Station:</u> a) By making LILO arrangements of 220KV Kadapa-Mydukur SC Line: 25KM b) By making Double LILO arrangements of 220KV RTPP-Chinakampalli DC Line duly converting it from SMDC to TMDC: 10KM
4	Kambaldinne Pooling Stations –	500 MW	1) 220KV SMDC Line from Pooling Station-1 to 400KV SS/Jammalamadugu: 25KM

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	1 & 2 to Jammalamadugu (YSR Kadapa Dist.)		b) 220KV SMDC Line from Pooling Station-2 to 400KV SS/Jammalamadugu:25KM
5	Urichinthala Pooling Stations – 1 & 2 to Talaricheruvu SS (Anantapur Dist.)	700 MW	1) <u>Pooling Stations to Sw. Station:</u> a) 220KV TMDC Line from PS-1 to 400KV SS Talaricheruvu: 10KM b) 220KV TMDC Line from PS-2 to 400KV SS Talaricheruvu: 10KM
6	Pooling Stations-1 & 2 to Mudhigubba Sw. Station (Anantapur Dist.)	500 MW	1) <u>Pooling Stations to Sw. Station:</u> a) PS-1 to Sw. Station: 220KV SMDC Line: 5KM b) PS-2 to Sw. Station: 220KV SMDC Line: 10KM  2) <u>Evacuation Lines from Sw. Station:</u> a) Making Double LILO arrangements for 220KV Pulivendula-Gollapuram SMDC Line: 5KM b) Making Double LILO arrangements for the proposed 220KV Pulivendula-Mutyalacheruvu SMDC Line: 5KM
7	Pooling Stations – 1 & 2 to 220KV SS Chakrayapet (YSR Kadapa Dist.)	500 MW	1) <u>Pooling Stations to Sw. Station:</u> a) 220KV TMDC Line from PS-1 to common point & TMDC Line from common point to Sw. Station: 10KM b) 220KV TMDC Line from PS-2 to common point & TMDC Line from common point to Sw. Station: 10KM  2) <u>Evacuation Lines from Chakrayapet Substation:</u> a) 220KV TMDC Line from 220KV SS Chakrayapet to the proposed Switching Station at Mudhigubba: 76KM b) 132KV DC Line from 220KV SS Chakrayapet to the proposed 132KV SS at Galiveedu: 32KM
8	Thondur PS-1 to Kondapuram SS & PS-2 to Yerraguntla (YSR Kadapa Dist.)	400 MW	1) <u>Pooling Stations to Substations:</u> a) 220KV SMDC Line from Thondur PS-1 to 220KV SS Kondapuram: 30KM b) 220KV SMDC Line is proposed from Thondur PS-2 to 220KV SS Yerraguntla: 35KM c) 220KV SMDC Line from 220KV SS Pulivendula to 220KV SS Yerraguntla: 40KM
9	Pooling Stations – 1, 2, 3 & 4 to Pampanur Tanda Sw. Station (Anantapur Dist.)	1300 MW	1) <u>Pooling Stations to Sw. Station:</u> a) 220KV SMDC Line from PS-1 to Sw. Station: 6KM b) 220KV SMDC Line from PS-2 to Sw. Station: 6KM c) 220KV SMDC Line from PS-3 to Sw. Station: 6KM d) 220KV SMDC Line from PS-4 to Sw. Station: 6KM  2) <u>Evacuation Lines from Sw. Station:</u> a) 220KV TMDC Line from Pampanur Tanda Sw. Station to 400KV SS Hindupur: 80KM b) <b>220KV TMDC Line with ACSR shall be considered from Pampanur Tanda Sw. Station to 400KV SS Hindupur instead of SMDC Line with ACSS Conductor: 80KM</b>
Total Solar Power		6000MW	

EVACUATION OF 6000MW SOLAR POWER PHASE-1 OF 10000MW SOLAR SCHEME

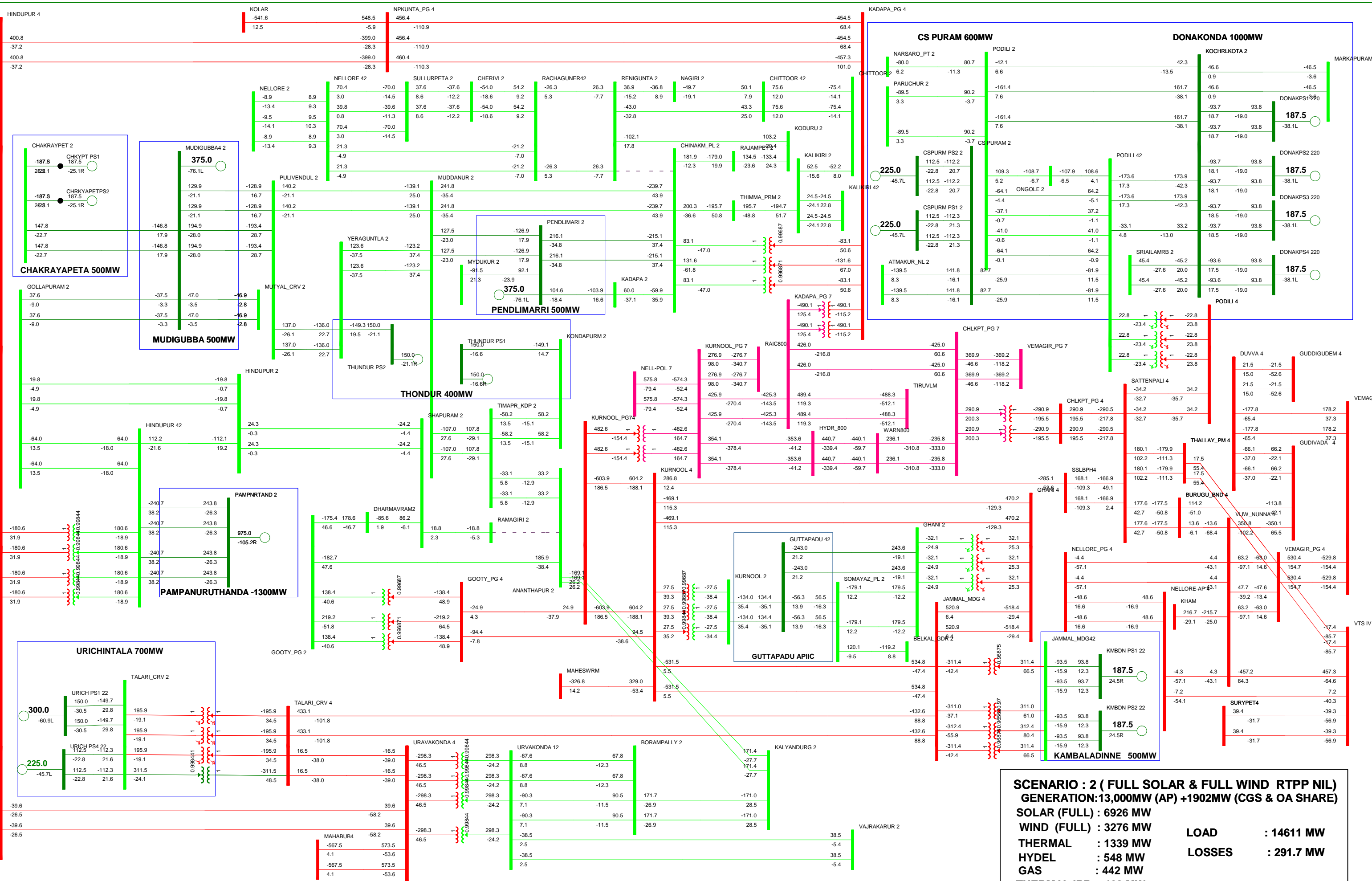


**SCENARIO : 1 ( FULL SOLAR & FULL WIND)**  
**GENERATION:13,000MW (AP) +1908MW (CGS & OA SHARE)**  
**SOLAR (FULL) : 6926 MW**  
**WIND (FULL) : 3276 MW**  
**THERMAL : 1322 MW**  
**HYDEL : 548 MW**  
**GAS : 454 MW**  
**THERMAL IPP : 473 MW**

**LOAD : 14611 MW**  
**LOSSES : 297.95 MW**

# EVACUATION OF 6000MW SOLAR POWER PHASE-1 OF 10000MW SOLAR SCHEME

SCENARIO : 2 ( FULL SOLAR & FULL WIND RTPP NIL)

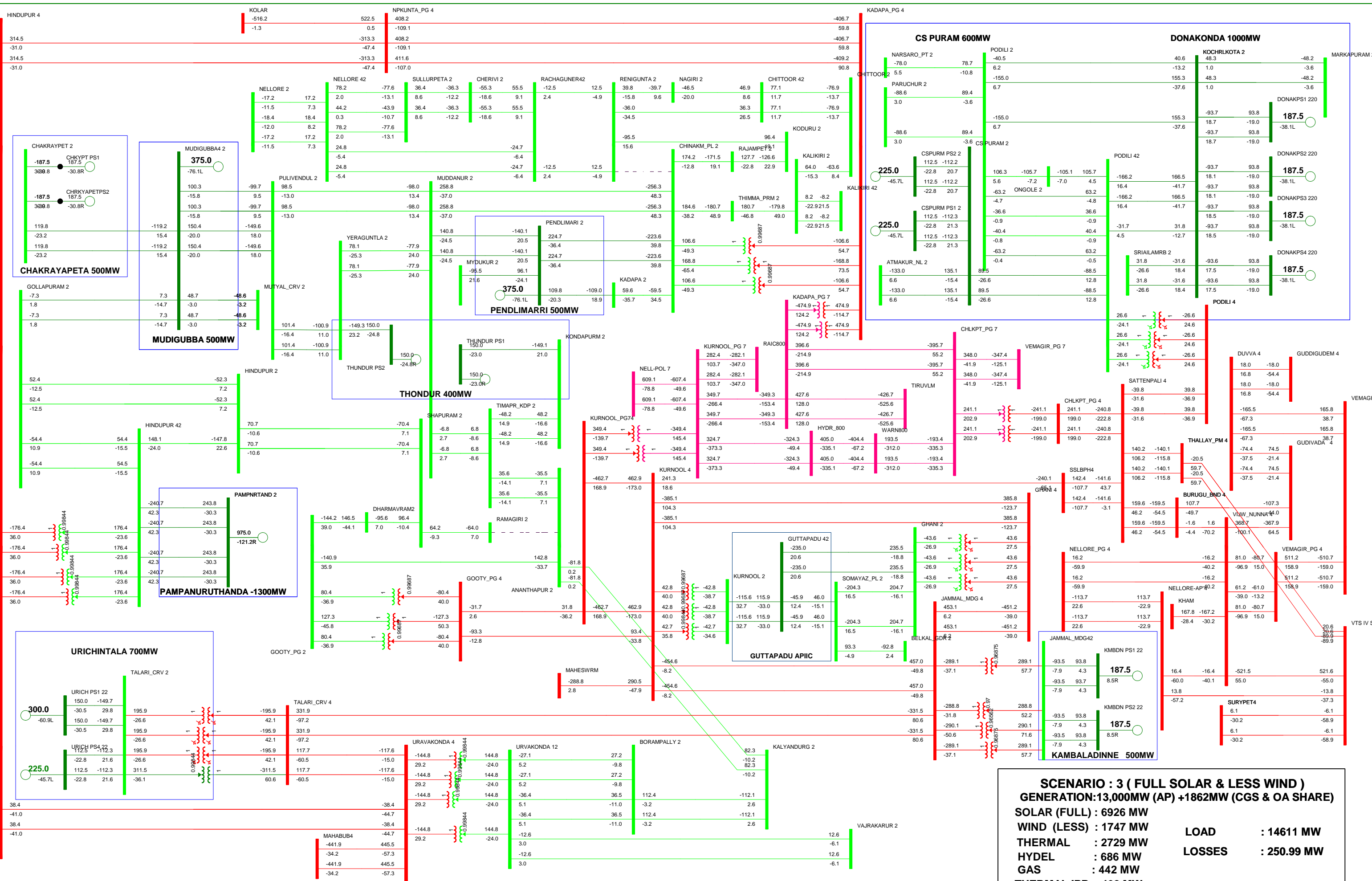


**SCENARIO : 2 ( FULL SOLAR & FULL WIND RTPP NIL)**  
**GENERATION:13,000MW (AP) +1902MW (CGS & OA SHARE)**  
**SOLAR (FULL) : 6926 MW**  
**WIND (FULL) : 3276 MW**  
**THERMAL : 1339 MW**  
**HYDEL : 548 MW**  
**GAS : 442 MW**  
**THERMAL IPP : 468 MW**

**LOAD : 14611 MW**  
**LOSSES : 291.7 MW**

# EVACUATION OF 6000MW SOLAR POWER PHASE-1 OF 10000MW SOLAR SCHEME

SCENARIO : 3 ( FULL SOLAR & LESS WIND )



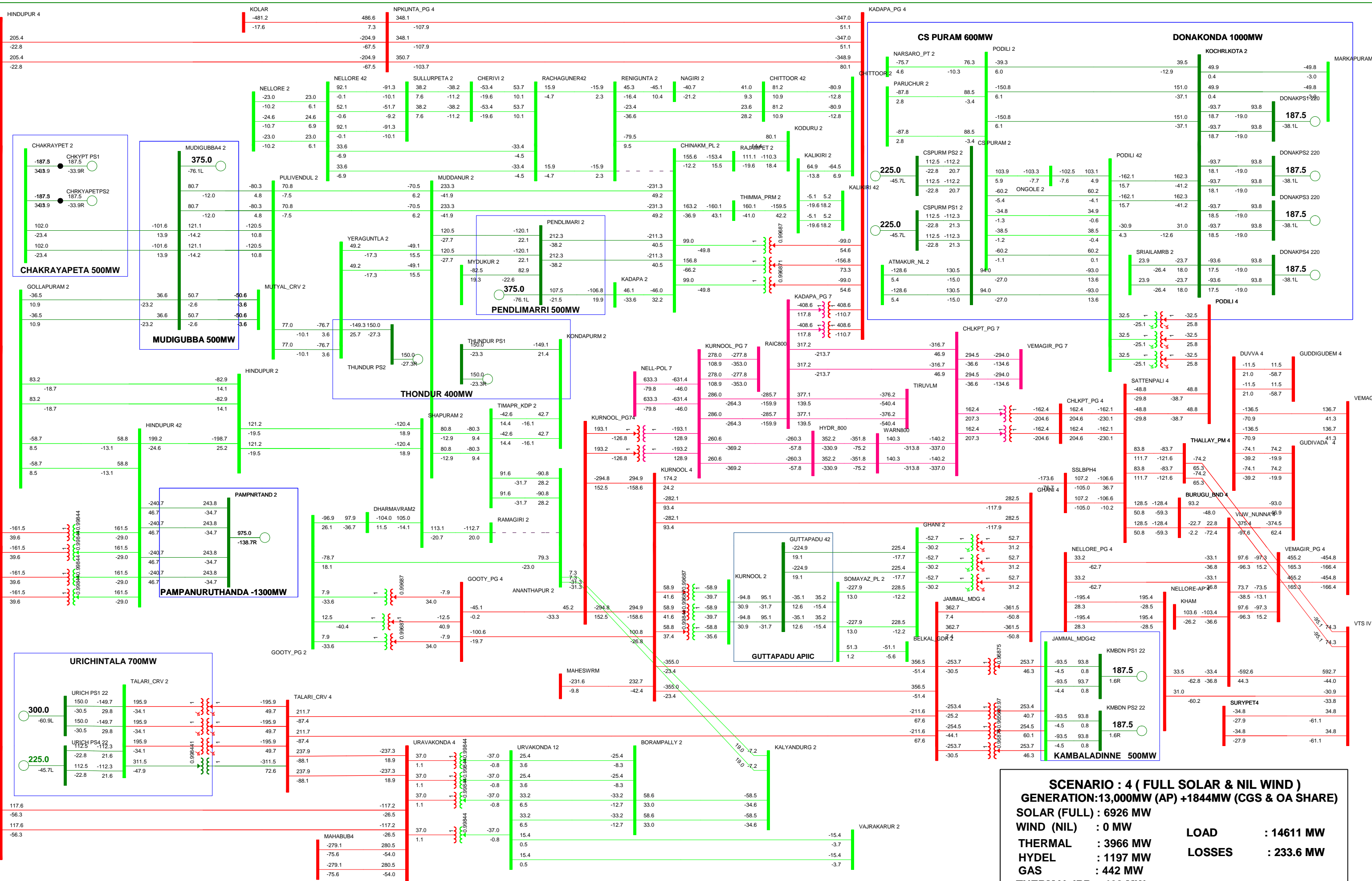
**SCENARIO : 3 ( FULL SOLAR & LESS WIND )**  
**GENERATION:13,000MW (AP) +1862MW (CGS & OA SHARE)**  
**SOLAR (FULL) : 6926 MW**  
**WIND (LESS) : 1747 MW**  
**THERMAL : 2729 MW**  
**HYDEL : 686 MW**  
**GAS : 442 MW**  
**THERMAL IPP : 468 MW**

**LOAD : 14611 MW**  
**LOSSES : 250.99 MW**



# EVACUATION OF 6000MW SOLAR POWER PHASE-1 OF 10000MW SOLAR SCHEME

SCENARIO : 4 ( FULL SOLAR & NIL WIND )

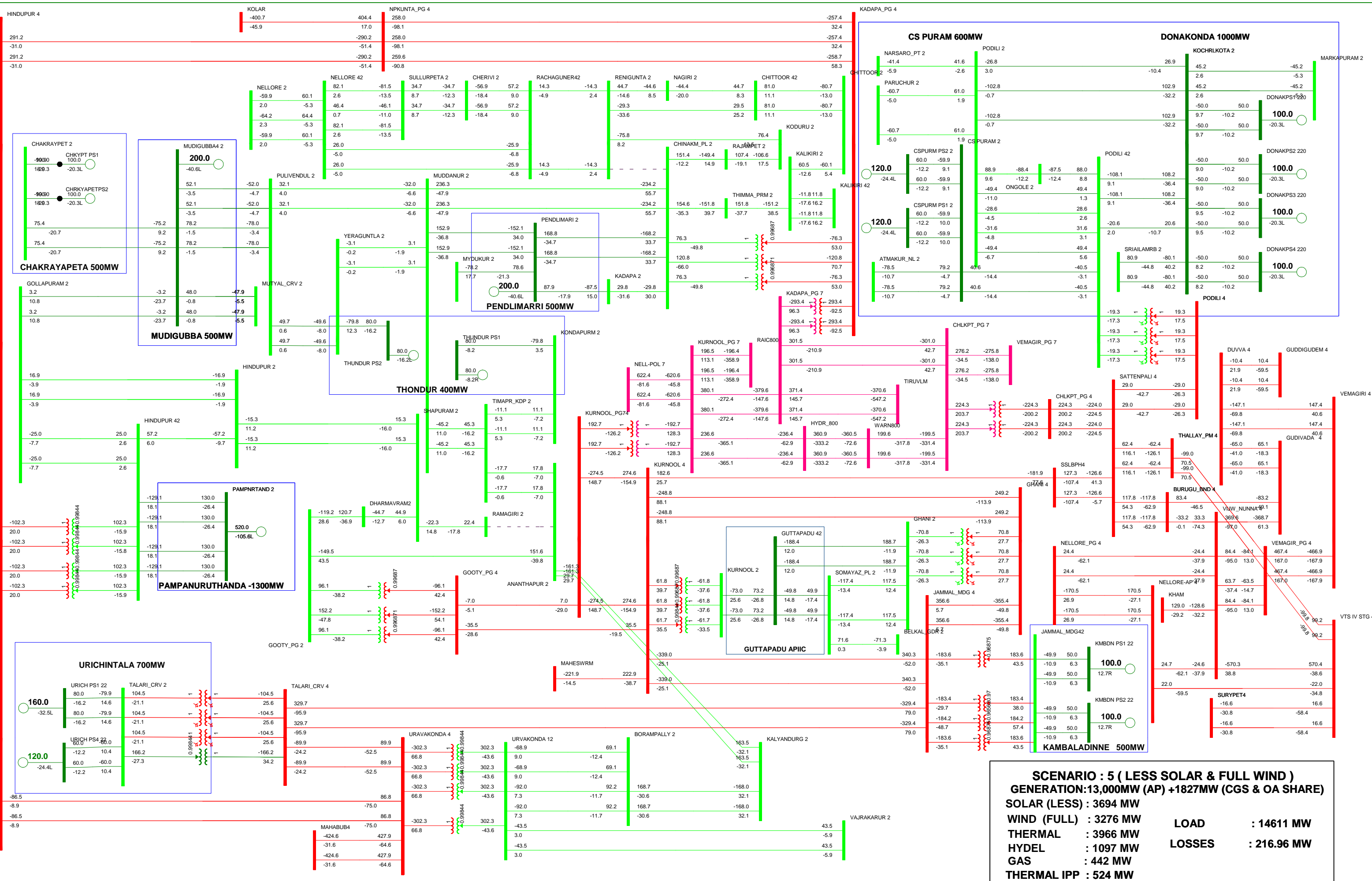


**SCENARIO : 4 ( FULL SOLAR & NIL WIND )**  
**GENERATION:13,000MW (AP) +1844MW (CGS & OA SHARE)**  
**SOLAR (FULL) : 6926 MW**  
**WIND (NIL) : 0 MW**  
**THERMAL : 3966 MW**  
**HYDEL : 1197 MW**  
**GAS : 442 MW**  
**THERMAL IPP : 468 MW**

**LOAD : 14611 MW**  
**LOSSES : 233.6 MW**

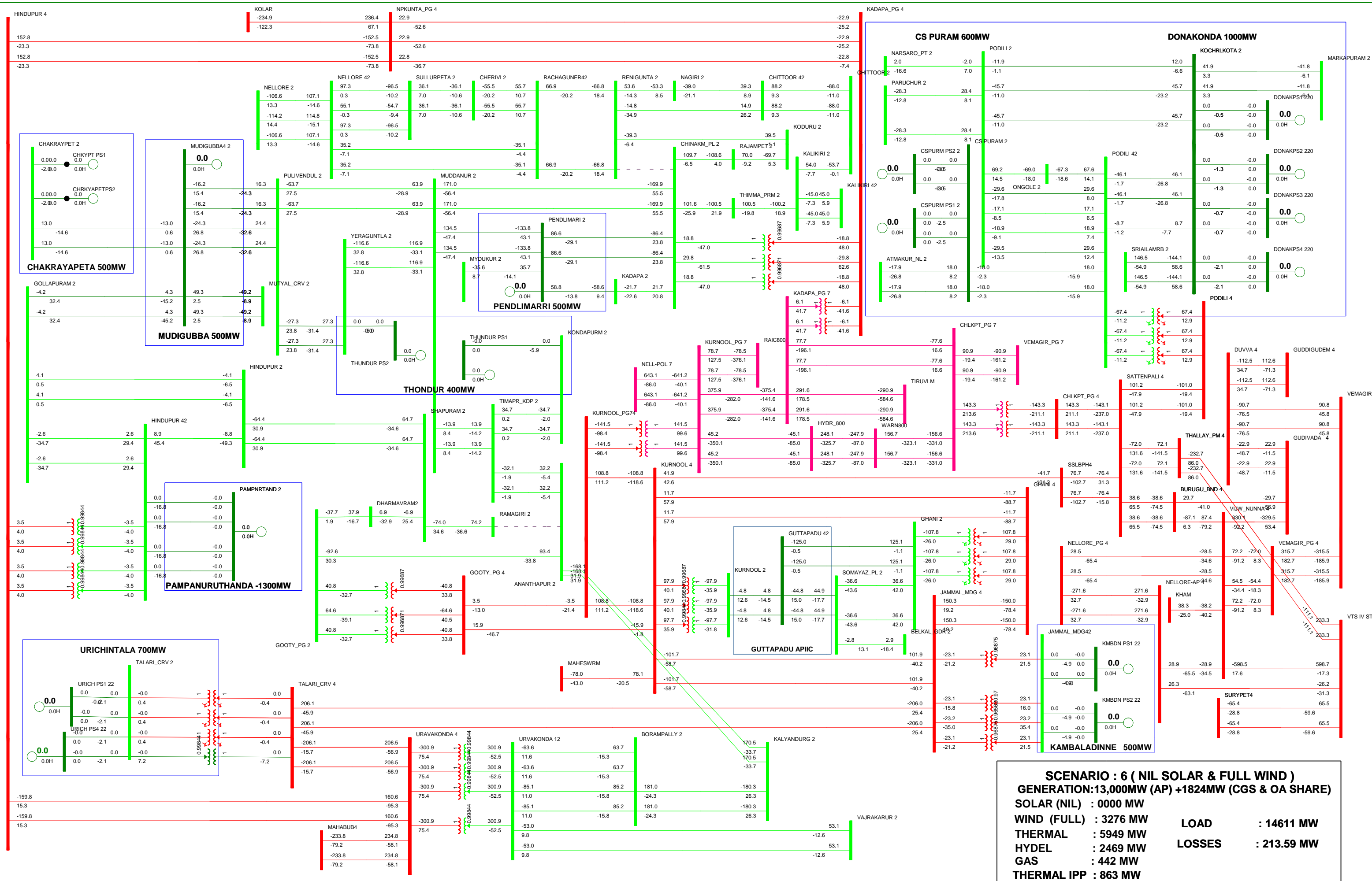
# EVACUATION OF 6000MW SOLAR POWER PHASE-1 OF 10000MW SOLAR SCHEME

SCENARIO : 5 ( LESS SOLAR & FULL WIND )



# EVACUATION OF 6000MW SOLAR POWER PHASE-1 OF 10000MW SOLAR SCHEME

SCENARIO : 6 ( NIL SOLAR & FULL WIND )

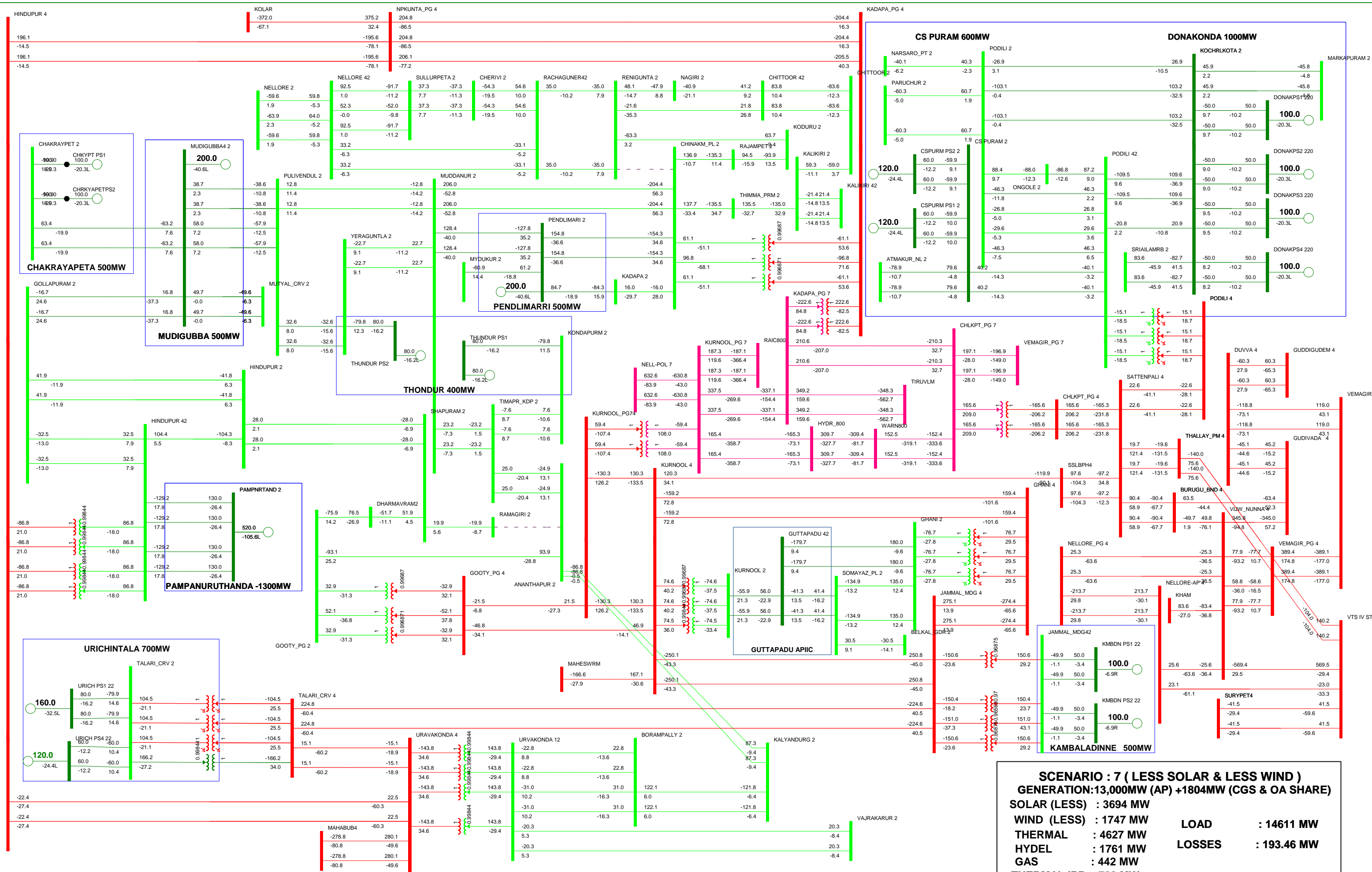


**SCENARIO : 6 ( NIL SOLAR & FULL WIND )**  
**GENERATION:13,000MW (AP) +1824MW (CGS & OA SHARE)**  
**SOLAR (NIL) : 0000 MW**  
**WIND (FULL) : 3276 MW**  
**THERMAL : 5949 MW**  
**HYDEL : 2469 MW**  
**GAS : 442 MW**  
**THERMAL IPP : 863 MW**

**LOAD : 14611 MW**  
**LOSSES : 213.59 MW**

# EVACUATION OF 6000MW SOLAR POWER PHASE-1 OF 10000MW SOLAR SCHEME

SCENARIO : 7 ( LESS SOLAR & LESS WIND )



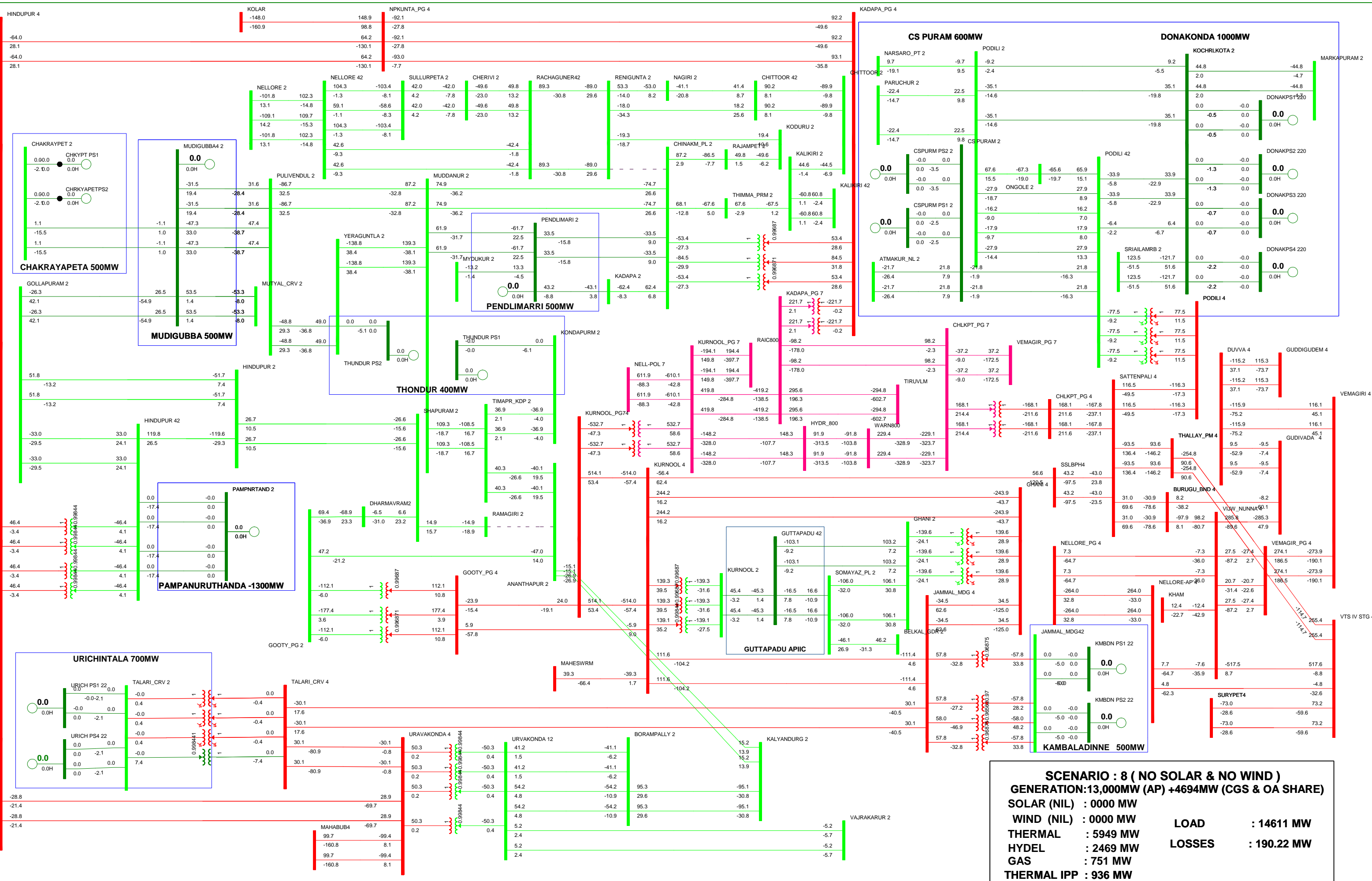
**SCENARIO : 7 ( LESS SOLAR & LESS WIND )**  
**GENERATION:13,000MW (AP) +1804MW (CGS & OA SHARE)**  
**SOLAR (LESS) : 3694 MW**  
**WIND (LESS) : 1747 MW**  
**THERMAL : 4627 MW**  
**HYDEL : 1761 MW**  
**GAS : 442 MW**  
**THERMAL IPP : 728 MW**

**LOAD : 14611 MW**  
**LOSSES : 193.46 MW**



# EVACUATION OF 6000MW SOLAR POWER PHASE-1 OF 10000MW SOLAR SCHEME

SCENARIO : 8 ( NO SOLAR & NO WIND )



**SCENARIO : 8 ( NO SOLAR & NO WIND )**  
**GENERATION:13,000MW (AP) +4694MW (CGS & OA SHARE)**  
**SOLAR (NIL) : 0000 MW**  
**WIND (NIL) : 0000 MW**  
**THERMAL : 5949 MW**  
**HYDEL : 2469 MW**  
**GAS : 751 MW**  
**THERMAL IPP : 936 MW**

**LOAD : 14611 MW**  
**LOSSES : 190.22 MW**

**TRANSMISSION CORPORATION OF TELANGANA LIMITED**

From  
Chief Engineer/ Power Systems,  
TSTRANSCO,  
Vidyut Soudha,  
Hyderabad, Telangana - 500082.

To  
~~The~~ Chief Engineer/ PS P&A-II,  
Central Electricity Authority (CEA),  
RK Puram, Sewa Bhavan,  
New Delhi-110066.

Lr. No. CE(PS)/SE(PS)/DE(SS II)/ADE/AE/F.PRLIS /D.No. 07/20,Dt.28 /05/2020

Sir,

Sub: TSTRANSCO - 1<sup>st</sup> meeting of SRPC(TP) - 220kV DC line from 400/220/132kV Kethireddypalli (Manikonda) SS to proposed 220kV KP Laxmidevipally LI SS - Modification - requested - Regarding.

Ref: CEA File No.CEA-PS-12-14(12)/1/2018-PSPA-II Division 512 I/9079/2020, dated: 12.02.2020.

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In the minutes of 1<sup>st</sup> meeting of Southern Regional Power Committee (Transmission Planning) [SRPC(TP)] held on 16<sup>th</sup> December, 2019 at Hyderabad, erection of 220kV DC line from 400/220/132kV Kethireddypalli (Manikonda) SS to proposed 220kV KP Laxmidevipally LI SS was approved vide para 4.4(16).

Now, TSTRANSCO has proposed the following:

- i. Proposed 220/132/33kV Chandanvally (TSIIC) SS with 2x100 MVA PTR Capacity (70 MW load)
- ii. Proposed 220kV SS for M/s. Amazon Data Services India Private Limited, Chandanvally - 100 MW load
- iii. Proposed 220kV Twin Moose DC/SC line from 400/220/132kV Kethireddypalli SS to proposed 220kV Amazon (Chandanvally) SS - 16.5 kM
- iv. Proposed 220kV Twin Moose DC/SC line from 400/220/132kV Kethireddypalli SS to proposed 220kV Chandanvally (TSIIC) SS - 12 kM
- v. Proposed 220kV Twin Moose SC line from 220kV Chandanvally (TSIIC) SS to 220kV Amazon (Chandanvally) SS - 2kM



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- vi. Proposed 220kV SC line (1200 Sq.mm: UG Cable) from 220/132kV Kothur SS to proposed 220kV Amazon (Chandanvally) SS - 10 kM
- vii. Proposed 220 kV Single Moose DC line from 220/132/33kV Chandanvally (TSIIC) SS to proposed 220 kV KP Laxmidevipally LI SS (236MW load) - 55 km (instead of earlier approved 220kV DC line from 400/220/132kV Kethireddypalli (Manikonda) SS to proposed 220kV KP Laxmidevipally LI SS (approved in the 1st Meeting of Southern Regional Power Committee (Transmission Planning))

In view of the above, it is requested to ratify the above changes. The load flow studies duly incorporating the above proposals along with study results are herewith furnished.

- Encl: 1. PSSE converged case through email  
2. Study Results

  
Chief Engineer/ Power Systems

Copy to:

1. Chief Engineer/ 400kV/TSTRANSCO/VS/ Hyderabad
2. Chief Engineer/ Construction/ TSTRANSCO/ VS/ Hyderabad
3. SE(T) to Chairman and Managing Director/ TSTRANSCO/VS/Hyderabad
4. DE(T) to Director/ Projects/ TSTRANSCO/ VS/ Hyderabad
5. DE(T) to Director/ Transmission/ TSTRANSCO/ VS/ Hyderabad
6. ADE(T) to Director/ Lift Irrigation Schemes/ TSTRANSCO/ VS/ Hyderabad
7. AE(T) to Director/ Grid Operations/ TSTRANSCO/ VS/ Hyderabad

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**TRANSMISSION CORPORATION OF TELANGANA LIMITED**

From  
Chief Engineer/Power Systems,  
TSTRANSCO,  
Vidyut Soudha,  
Hyderabad, Telangana - 500082.

To  
✓ The Chief Engineer/PS P&A-II,  
Central Electricity Authority (CEA),  
RK Puram, Sewa Bhavan,  
New Delhi-110066.

Lr. No. CE(PS)/SE(PS)/DE(SS II)/ADE/AE/F. /D.No. 09/20, Dt. 10/06/2020

Sir,

Sub: TSTRANSCO - Proposal for extending power supply to meet the load requirement for lifting additional 1 TMC of water from Godavari Basin in Link-I, Link-II & Link-IV of Kaleshwaram Lift Irrigation Scheme - Approval requested - Regarding.

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It is to submit that the Executive Director/ Lift Irrigation Schemes has informed that the I&CAD dept. of Telangana vide letter dated 08.11.2019 has requested to extend power supply for lifting the additional 1 TMC water from Godavari Basin in Link-I, Link-II & Link-IV of Kaleshwaram Lift Irrigation Scheme. The required load for lifting of additional 1 TMC water is as follows:

LINK	S.No.	PUMP House/ Load Centre	Existing Loads (in MW)	New/ Additional Loads (in MW)	Total Load (in MW)
LINK-I	1	Medigadda	11x40MW=440MW	6x40MW=240MW	680
	2	Annaram	8x40MW=320MW	4x40MW=160MW	480
	3	Sundilla	9x40MW=360MW	5x40MW=200MW	560
	<b>TOTAL</b>		<b>1120</b>	<b>600</b>	<b>1720</b>
LINK-II	1	Medaram	7x124.4MW=870.8MW	0	870.80
	2	Ramadugu	7x139MW=973MW	0	973
	3	Velgatoor Reach-I	0	5x135MW=675MW	675
	4	Pegadapally (Namapur) Reach-II	0	4x135MW=540MW	540
	<b>TOTAL</b>		<b>1843.8</b>	<b>1215</b>	<b>3058.80</b>
LINK-IV	1	Near Tippapur (Reach-I) (Veljipur (V))	4x106MW=424MW	4x125MW=500MW	924
	2	Near Chandulapur (Reach-II) Chinagundavelli(V)	4x134.8MW=539.2MW	6x125MW=750MW	1289.2
	3	Near Tukkapur (Reach-III)	8x43MW=344MW	4x90MW=360MW	704
	<b>TOTAL</b>		<b>1307.2</b>	<b>1610</b>	<b>2917.2</b>

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In this connection, it is to bring to your notice that TSTRANSCO has proposed following connectivities to meet the load requirement for lifting additional 1 TMC of water from Godavari Basin in Link-I, Link-II & Link-IV of Kaleshwaram Lift Irrigation Scheme. The proposed scheme is as follows:

**(I) Link - I for Additional Load of 600 MW at Medigadda, Annaram and Sundilla pumping stations:**

- a) Proposed 400/220kV Annaram SS with 3x500 MVA Transformers
- b) Proposed 400kV QMDC line from STPP Jaipur to proposed New 400/220kV Annaram SS - 20 Km
- c) Proposed 220kV TMDC line from 400/220kV Annaram SS to Existing 220/11kV Annaram SS - 0.5Km
- d) Proposed 220kV TMDC Line from 400/220kV Annaram SS to Existing 220/11kV Medigadda SS - 50Km
- e) 1x125MVAR Reactor at proposed 400/220kV Annaram SS

**(II) Link-II for Additional Load of 1215 MW at Vegaltoor (Reach-I of Load 675 MW) and Namapur/Pegadapally (Reach-II of Load 540 MW)**

- a) Proposed 400kV Vadkapur switching station
- b) Proposed 400/11kV Pegadapally SS
- c) Proposed 400/11kV Velgatoor SS
- d) LILO of 400kV QMDC line from STPP Jaipur - Gajwel 400/220/132kV SS to proposed 400kV Vadkapur Switching station - 5Km LILO length **instead of already existing LILO of 400kV QMDC line from STPP Jaipur - Gajwel 400/220/132kV SS at 400/220kV Ramadugu SS**
- e) LILO of 400KV QMDC line from Telangana STPP(2x800 MW) - 400/220/32kV Narsapur SS to proposed 400kV Vadkapur Switching station - 5Km LILO length
- f) Proposed 400kV QMDC Line from 400kV Vadkapur Switching Station to 400/220kV Ramadugu SS - 18Km
- g) Proposed 400kV QMDC line from 400kV Vadkapur switching station to 400/11kV Velgatoor SS - 35Km
- h) Proposed 400kV QMDC line from 400kV Vadkapur switching station to 400/11kV Pegadapally SS in - 32 Km
- i) Proposed 400kV QMDC line from 400/11kV Pegadapally SS to 400/11kV Velgatoor SS - 29Km
- j) LILO of 400kV NTPC-Dichpally TMSC to proposed 400/11 kV Velgatoor SS - 15 kM LILO Length

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- k) Reconductoring of proposed 400kV NTPC - Velgatoor single circuit line with higher current carrying capacity conductor (i.e., 400kV NTPC - Velgatoor portion pertaining to LILO of 400kV NTPC - Dichpally to Velgatoor SS)
- l) 1x125MVAR Reactor at proposed 400kV Vadkapur SWS
- m) 1x125MVAR Reactor at proposed 400/11kV Pegadapally SS
- n) 1x125MVAR Reactor at proposed 400/11kV Velgatoor SS

**(III) Link-IV of Kaleshwaram Scheme for Additional Load of 1610 MW at Reach - I (near Tippapur: 500 MW), Reach - II (near Chandlapur: 750 MW) and Reach - III (Tukkapur: 360 MW) Pumping Stations.**

- a) Proposed 400kV QMDC Line from 765/400kV Nizamabad Substation (PGCIL) to existing 400/13.8/11 kV Chandlapur Substation - 120Km
- b) Proposed 400kV Switchyard (Reach-I) at Veljipur (V)
- c) Proposed 400kV QMDC Line from existing 400/11kV Tippapur SS to proposed Additional Load (4x125 MW=500 MW) Pumping Station (Reach-I) at Veljipur (V)- 5kM
- d) Proposed 400kV Switchyard (Reach-II) at Chinagundavelli (V)
- e) Proposed 400kV QMDC Line from existing 400/13.8/11kV Chandlapur Substation to proposed Additional Load (6x125 MW = 750 MW) Pumping Station (Reach-II) at Chinagundavelli (V) - 5kM.
- f) Proposed 400kV Switchyard (Reach-III)
- g) Proposed 400kV TMDC Line from existing 400/11kV Tukkapur SS to proposed Additional Load (4x90 MW = 360 MW) Pumping Station (Reach-III) - 0.5kM
- h) 1x125MVAR Reactor at proposed 400kV Reach-I Switchyard Veljipur (V)
- i) 1x125MVAR Reactor at proposed 400kV Reach-II Switchyard Chinagundavelli (V)
- j) 1x125MVAR Reactor at proposed 400kV Reach-III Switchyard

In this regard, the load flow studies are carried out duly incorporating the above proposal. Study results are herewith enclosed.

In view of the above, it is requested to accord approval for the above proposals.

Encl: 1. PSSE converged case through email  
2. Study Results

Yours faithfully

  
Chief Engineer/ Power Systems  
TSTRANSCO/Telangana 2/10

Page 3 of 4

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Copy to:

1. Dr. Subir Sen/ COO/CTU, Smart Grid, PGCIL Corporate Office, Saudamini, Plot No. 2, Sector 29, Near IFFCO Chowk, Gurgaon (Haryana) - 122001, INDIA
2. The General Manager/ SRLDC, 29, Race Course Cross Road, Bengaluru - 560009
3. Executive Director/LIS/TSTRANSCO
4. SE(T) to Chairman and Managing Director/ TSTRANSCO
5. DE(T) to Director/ Projects
6. DE(T) to Director/ Transmission
7. ADE(T) to Director/ Lift Irrigation Schemes
8. AE(T) to Director/ Grid Operation



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# TRANSMISSION CORPORATION OF TELANGANA LTD.

(Govt. of Telangana State Undertaking)

Vidyut Soudha, Khairtabad, Hyderabad - 500 082. PABX:23396000  
(CIN No: U40102TG2014SGC094248) www.transco.telangana.gov.in

From  
Director/Grid Operations,  
TSTRANSCO,  
Vidyut Soudha,  
Hyderabad, Telangana - 500082.

To  
~~The~~ Chief Engineer/PS P&A-I,  
Central Electricity Authority (CEA),  
RK Puram, Sewa Bhavan,  
New Delhi-110066.

Lr. No. DIR(GO)/CE(PS)/SE(PS)/DE(SS II)/ADE/AE/F. /D.No. 35 /20, Dt. 28 /08/2020

Sir,

Sub: TSTRANSCO - Proposal for extending power supply to meet the load requirement for lifting additional 1 TMC of water from Godavari Basin in Link-I, Link-II & Link-IV of Kaleshwaram Lift Irrigation Scheme - Regarding.

- Ref: i. Lr. No. CE(PS)/SE(PS)/DE(SS II)/ADE/AE/F. /D.No.09/20,  
Dt.10/06/2020  
ii. Lr. No. CE(PS)/SE(PS)/DE(SS II)/ADE/AE/F. /D.No.17/20,  
Dt.02/07/2020  
iii. CEA mail dated: 21.08.2020

\*\*\*\*\*

The proposal for extending power supply to meet the load requirement for lifting additional 1 TMC of water from Godavari Basin in Link-I, Link-II & Link-IV of Kaleshwaram Lift Irrigation Scheme was communicated vide reference (i) cited above and requested to accord approval.

Further the generation particulars pertaining to the State and ISTS particulars were communicated vide reference (ii) cited above.

In the reference (iii) cited above, it is requested to furnish the comments/ observations on the following points:

- i. Link-II: Bus at Vadkapur 400kV switching station may be split into two parts with circuit breaker. By this arrangement LILO of Dichpally-Ramagundem line can be avoided.
- ii. Load generation balance of Telangana shows that Telangana would have deficit of about 5,500 MW by 2023-24. It was informed by TSTRANSCO representative that Telangana would procure power in Short Term or through power exchange to meet this shortfall of 5500MW.

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In this regard, the following remarks are herewith furnished:


- i. The Kaleshwaram lift irrigation scheme is major and crucial project in Telangana State.
- ii. In view of bulk quantum of loads at 400/11kV Velgatoor SS and 400/11kV Pegadapally LI SS, 400kV Vadkapur switching station and LILO of 400kV NTPC (Ramagundem) - Dichpally TMSC line to 400/11kV Velgatoor SS are proposed.
- iii. As per the studies, the total Telangana state system losses will be reduced by 15MW with proposed LILO of 400kV NTPC (Ramagundem) - Dichpally TMSC line to 400/11kV Velgatoor SS as the proposed Velgatoor SS is near to the NTPC Ramagundem (45kM) and proposed LILO length is 15kM only.
- iv. In the studies, thermal plants are assumed to operate with 85% PLF. However, many of the thermal plants are operating with PLF above 95%.
- v. Also, the Hydel plants are operating with PLF above 50%.
- vi. Agreements for purchase of Solar power for a total capacity of 1723 MW have been concluded by TSDISCOMS. The Solar power from these projects is expected from FY 2022-23.
- vii. Taking into consideration of the above, the deficit MW, if any, can be met through Short term power purchases and Power exchange (DAM, TAM & RTM).

The load flow study results are here with enclosed.

In view of the above, it is requested to communicate the approval in-principle for the scheme as communicated vide reference (i) cited above.

Encl: 1. PSSE converged case through email  
2. Study Results

Yours faithfully

  
28/8/2020  
Director/ Grid Operations  
TSTRANSCO/Telangana

I/11500/2020

Copy to:

1. Dr. Subir Sen/ COO/CTU, Smart Grid, PGCIL Corporate Office, Saudamini, Plot No. 2, Sector 29, Near IFFCO Chowk, Gurgaon (Haryana) - 122001, INDIA
2. Chief Engineer/LIS/TSTRANSCO
3. SE(T) to Chairman and Managing Director/ TSTRANSCO
4. DE(T) to Director/ Projects
5. DE(T) to Director/ Transmission
6. ADE(T) to Director/ Lift Irrigation Schemes

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With LILO of 400kV NTPC-Dichpally to Velgatoor

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E THU, AUG 27 2020 11:19

ZONE TOTALS  
IN MW/MVAR

X-- ZONE --X	FROM -----AT ZONE BUSES-----			TO				-NET INTERCHANGE-			
	GENE- RATION	FROM IND GENERATN	TO IND MOTORS	TO LOAD	TO BUS SHUNT	GNE BUS DEVICES	TO LINE SHUNT	FROM CHARGING	TO LOSSES	TO TIE LINES	TO TIES + LOADS
51	12893.7	0.0	0.0	22783.0	0.0	0.0	0.0	0.0	234.8	-10124.1	-10124.1
TELANGANA	-984.8	0.0	0.0	3745.3	3652.7	0.0	3080.2	13711.4	3349.9	-1101.4	-1101.4
COLUMN	12893.7	0.0	0.0	22783.0	0.0	0.0	0.0	0.0	234.8	-10124.1	-10124.1
TOTALS	-984.8	0.0	0.0	3745.3	3652.7	0.0	3080.2	13711.4	3349.9	-1101.4	-1101.4

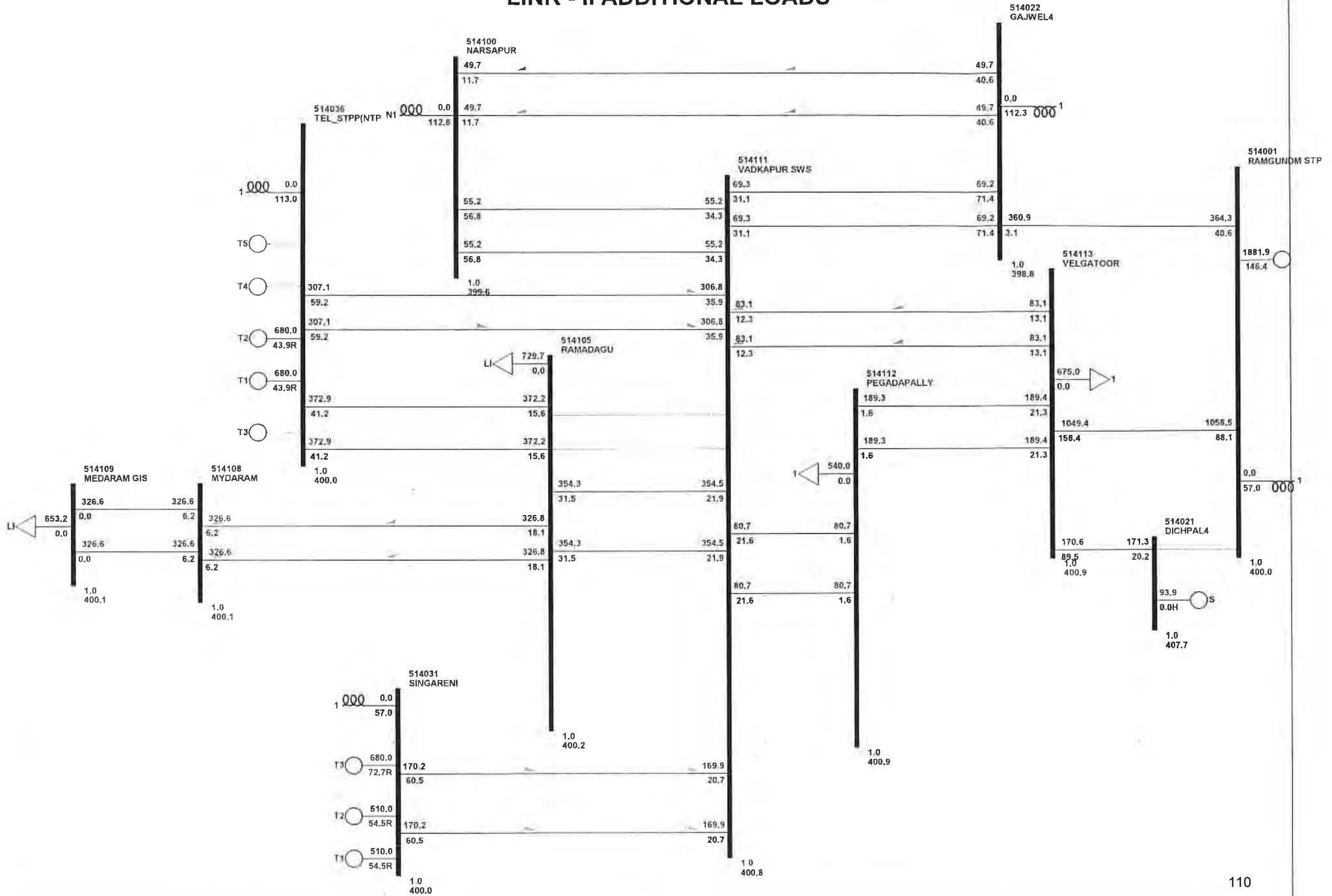
Without LILO of 400kV NTPC-Dichpally to Velgatoor

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E THU, AUG 27 2020 11:20

ZONE TOTALS  
IN MW/MVAR

X-- ZONE --X	FROM -----AT ZONE BUSES-----			TO				-NET INTERCHANGE-			
	GENE- RATION	FROM IND GENERATN	TO IND MOTORS	TO LOAD	TO BUS SHUNT	GNE BUS DEVICES	TO LINE SHUNT	FROM CHARGING	TO LOSSES	TO TIE LINES	TO TIES + LOADS
51	12893.7	0.0	0.0	22783.0	0.0	0.0	0.0	0.0	249.8	-10139.1	-10139.1
TELANGANA	-839.9	0.0	0.0	3745.3	3593.4	0.0	3077.6	13679.6	3538.6	-1115.2	-1115.2
COLUMN	12893.7	0.0	0.0	22783.0	0.0	0.0	0.0	0.0	249.8	-10139.1	-10139.1
TOTALS	-839.9	0.0	0.0	3745.3	3593.4	0.0	3077.6	13679.6	3538.6	-1115.2	-1115.2

### KALESHWARAM ADDITIONAL 1TMC PROPOSALS LINK - II ADDITIONAL LOADS







TAMILNADU TRANSMISSION CORPORATION LTD.  
(Subsidiary of TNEB Ltd.)

From

Er.T.Senthilvelan, B.E.,  
Director/Transmission Projects,  
TANTRANSCO,  
144, Anna Salai,  
Chennai -2.

To

The Member (Power System),  
Central Electricity Authority,  
Sewa Bhavan, R.K.Puram,  
New Delhi 110 066.

Lr.No.CE/Plg.&R.C/SE/SS/EE-I/AEE2/F.2<sup>nd</sup> SRPC(TP) Agenda/D. /20 dt. .07.20

Dear Sir,

Sub: TANTRANSCO- Agenda points to be included in the forthcoming 2<sup>nd</sup> meeting of Southern Regional Power Committee (Transmission Planning) proposed to be conducted by CEA – furnished - reg.

\*\*\*\*\*

The following proposals for the establishment of 400 kV Substations and its Associated Transmission schemes evolved by TANTRANSCO are to be included as agenda point for the forthcoming 2<sup>nd</sup> meeting of the Southern Regional Power Committee (Transmission Planning).

**1. S.P.Koil 400/230-110 kV SS:**

Considering the future load growth in and around Chennai South area, the establishment of S.P.Koil 400/230-110 kV SS by upgrading the existing S.P.Koil 230 kV SS has been envisaged with the following transmission scheme.

**400 kV Transmission Lines :**

Erection of 400 kV DC line on DC Tower for making LILO of one of the circuit of Thiruvalem - Kalivanthapattu 400 kV DC quad line.

**ICTs:**

2x500 MVA 400/230 KV ICT

2x200 MVA 400/110 kV ICT

**Bus Reactor:**

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400 kV - 1x125 MVA

**230 kV Transmission Lines :**

- i. The existing 230 kV transmission lines at S.P.Koil 230/110 kV SS are retained and in addition to this new proposal of 230 kV line to Kadapperi 230 kV SS from the proposed S.P.Koil 400/230-110 kV SS.
- ii. Replacement of existing S.P.Koil - Veerapuram 230 kV feeder conductor into equivalent HTLS conductor.

**110 kV Transmission Lines :**

Existing 110 kV transmission lines at S.P.Koil 230/110 kV SS are retained.

**2. Mangalapuram 400/230kV substation:**

The proposed establishment of Mangalapuram 400/230kV SS was approved in the 37<sup>th</sup> meeting of the Standing Committee on Power System Planning for Southern region with the following transmission schemes.

**400 kV Transmission Lines :**

LILO of both Pugalur-Kalivanthapattu 400kV D/C quad line.

**230 kV Transmission Lines:**

- i. LILO of Salem –Singapuram 230kV feeder.
- ii. LILO of Deviyakurichi - Valayapatty 230kV feeder.
- iii. 230 kV SC line to the proposed Thammampatty 230kV SS.
- iv. 230 kV SC line to the proposed Udayapatty 230kV SS.

**ICT:**

2x315 MVA, 400/230 kV ICT.

**Revised ATS for Mangalapuram 400/230kV SS :**

Since, the approval was accorded during the year 2014, the revised ATS with increase in the ICT capacity has been proposed for Mangalapuram 400/230kV substation.

**400 kV Transmission Lines :**

LILO of one of the circuit of Pugalur-Kalivanthapattu 400kV quad line.

**230 kV Transmission Lines:**

- i. LILO of Salem –Singapuram 230kV feeder.



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- ii. LILO of Deviyakurichi - Valayapatty 230kV feeder.
- iii. Erection of a new 230 kV feeder by stringing on the existing free arm from Pudhanchandai to Deviyakurichy 230 kV substations and making LILO at the proposed Mangalapuram 400/230 kV SS.
- iv. 230 kV DC line to the proposed Udayapatty 230kV SS.

**ICT:**

2 X 500 MVA, 400/230kV ICT.

**Bus Reactors:**

400 kV – 2 x125 MVar bus reactors.

**3. Kalvadagam 400/230-110kV Substation:**

It has been proposed to establish a 400/230-110 kV Substation at Kalvadagam at Erode Region instead of Kolapalur 400 kV SS with the following Transmission Schemes.

**400 kV Transmission Lines :**

LILO of Rasipalayam - Palavadi 400kV SC quad line.

LILO of MTPS - Karamadai 400kV SC quad line.

**230 kV Transmission Lines:**

- i. LILO of Gobi-MTPS-II 230 KV feeder.
- ii. LILO of MTPS II to Thingalur 230 KV feeder.
- iii. LILO of MTPS-I to Ingur 230 KV feeder.
- iv. LILO of Ingur - Thingalur 230KV feeder.
- v. DC feeder to existing Pallakapalayam 230 KV feeder.
- vi. DC feeder to Andhiyur 230 kV SS.

**110 kV Transmission Lines:**

- i. LILO of Pallipalayam - Barrage IV 110 kV feeder.
- ii. LILO of Barrage II- K.R.Thoppur 110 kV feeder.
- iii. LILO of Barrage III to Anthiyur 110 kV feeder.
- iv. LILO of K.R.Thoppur- Vembadithalam- IVELI 110 kV feeder.
- v. DC feeder to Edapadi 110 KV SS.
- vi. DC feeder to Pallakapalayam 230 KV SS through Thevur 110 KV SS.

**ICT:**

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2x500 MVA, 400/230kV ICT

2x200 MVA, 400/110kV ICT

**Bus Reactor:**

400 kV- 1x125 MVar Bus reactor

**4. Neyveli TS-II to Neyveli (TANTRANSCO) 230kV substation-230kV line 1 & 2 -Ratification for the usage of Twin Moose conductor instead of the approved HTLS conductor:**

In the 36<sup>th</sup> Standing Committee meeting on Power System Planning of Southern Region, the proposal of Neyveli TS-II to Neyveli (TANTRANSCO) 230kV substation-230kV DC line with HTLS conductor was approved for the additional transmission system for evacuation of power from 2x500 MW Neyveli Lignite Corporation Ltd. TS-I (Replacement) NNTPS.

During the execution of work, the 230kV DC line between Neyveli TS-II to Neyveli (TANTRANSCO) 230kV substation was erected with the standard 230kV twin moose conductor instead of the already approved HTLS conductor. The above lines were commissioned on 26.12.2019.

Hence, it is requested that the necessary ratification may be issued for the change in the type of 230kV conductor (twin moose) between Neyveli TS-II and Neyveli (TANTRANSCO) 230kV substation.

**5. Proposal to drop the 230kV connectivity to NTPL for power evacuation during contingent conditions:**

In the 22<sup>nd</sup> Standing Committee meeting on Power System Planning the following evacuation system was agreed for Tuticorin TPS JV (2 X 500 MW)

- i) Tuticorin JV TPS - Madurai 400 kV D/C Quad
- ii) 2x315 MVA 400/220 kV ICT at Tuticorin TPS JV.
- iii) LILO of 2 nos. of 220 kV circuits at Tuticorin TPS JV.

In the 166<sup>th</sup> OCC meeting, CE/Grid Operation/TANTRANSCO has requested to drop the 230 kV connectivity of NTPL power plant (LILO of TTPS – Tuticorin 230 kV), since during contingent condition at NTPL power plant, the evacuation



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through this 230 kV feeder results in overloading of the 230 kV feeder with reduction in generation at TTPS.

Hence, Operation wing has requested that the above issue may be discussed in the forthcoming standing committee meeting for cancelling the 230kV TTPS –TTN Auto S/C line connectivity for power evacuation from NTPL station.

In view of the above, it is inferred that evacuation of the NTPL generation through the TANTRANSCO 230kV network during contingency condition without backing down the TTPS generation is not feasible. Hence, it is requested to drop the above proposal of utilizing TTPS –TTN Auto 230kV S/C line connectivity for power evacuation from NTPL station.

#### **6. Manalmedu 400/230/110kV substation.**

Manalmedu 400kV substation has been envisaged as a system strengthening measure at 400 kV level in Thiruvarur-Nagapattinam-Perambalur area.

Establishment of Manalmedu 400/230/110kV substation was approved by CEA in the 41<sup>st</sup> meeting of SCSPSR with the following transmission schemes:

##### 400 kV transmission Lines:

- i) Ariyalur 765/400kV SS to Manalmedu 400kV DC link
- ii) Neyveli (TNEB)-Manalmedu 400kV DC link.

##### 230kV transmission Lines:

- i) LILO of Neyveli TS-II to Kadalangudi 230kV SC line at Manalmedu.
- ii) Kumbakonam- Manalmedu and
- iii) Narimanam to Manalmedu.

##### ICTs:

2x500MVA, 400/230kV ICT  
2X200MVA, 400/110kV ICT

##### Bus reactor:

400kV- 2x80MVAr Bus reactors.

Citing the constraints in land acquisition for the establishment of 400kV SS at Neyveli, upgradation of the existing Cuddalore 230 /110 kV substation into 400kV SS instead of the already approved Neyveli 400/230 kV substation has

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been approved in the 1st Meeting of SRSCT held on 07.09.2018 with the following connectivity:

- i. Neyveli TS-II – Cuddalore 400 kV D/C Line.
- ii. Manalmedu - Cuddalore 400 kV D/C Line.
- iii. 2 x500 MVA, 400/230 kV ICTs
- iv. 2x200 MVA, 400/110 kV ICTs
- v. 2 X 125 MVA, 400kV bus Reactors

Thus the 400kV connectivity for Manalmedu SS has been modified as below:

- i. Ariyalur 765/400kV SS to Manalmedu 400kV DC link line
- ii. Manalmedu - Cuddalore 400 kV D/C Line.

Further, in the 2<sup>nd</sup> SRSCT meeting held on 10.06.2019, as an additional system strengthening for control of short circuit levels in Neyveli generation complex and rearrangement network configuration to control overloading of ICTs/230 kV lines from Neyveli generation complex, transmission schemes of the already proposed Manalmedu & Cuddalore 400kV substations are modified as follows:

- i. Neyveli TS-II – Cuddalore 400 kV D/c (Quad) line – under the scope of TANGEDCO as agreed in 1st SRSCT.
- ii. Manalmedu – Neyveli TPS-II 2nd Expansion 400kV D/c (Quad) line (in place of Cuddalore – Manalmedu 400kV D/c line – agreed in 1st SRSCT) – under the scope of TANGEDCO

By this arrangement, Cuddalore 400kV SS is approved only with 400kV DC line from NLCTS-II.

The proposal is evolved mainly to avoid low voltage and to maintain stable supply in the delta districts. The load growth is more than 10% in this delta area.

The transmission scheme for the establishment of 400/230-110 kV Manalmedu substation is revised as given below:

**Manalmedu 400/230 kV SS – revised connectivity:**

Establishment of Manalmedu 400/230kV SS with

- i. 2x500 MVA 400/230 kV ICTs
- ii. 3x200 MVA 400/110 kV ICTs
- iii. 2x125 MVA Bus Reactors



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**400 kV transmission lines:**

- i. Erection of 400 kV DC line from Ariyalur 765/400 kV SS to Manalmedu 400 kV SS.
- ii. Erection of 400 kV DC line from the proposed Neyveli TS -II 2<sup>nd</sup> Expansion to Manalmedu 400 kV SS.

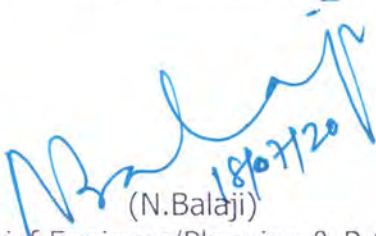
**230 kV transmission lines:**

- i. Erection of DC line to make LILO of Neyveli TS-II to Kadalangudi 230 kV feeder at Manalmedu 400 kV SS.
- ii. Erection of SC line to Kumbakonam 230 kV SS from Manalmedu 400 kV SS
- iii. Erection of SC line to Poyyur 230 kV SS from Manalmedu 400 kV SS.
- iv. Erection of DC line to the proposed Chidambaram 230 kV SS from Manalmedu 400 kV SS.
- v. Erection of DC line to the proposed Virudhachalam 230 kV SS from Manalmedu 400 kV SS.

**110 kV connectivity**

- i LILO of existing Kadalangudy-LTPCL-Manalmedu 110 kV feeder between LTPCL and Manalmedu substation.
- ii SC line to Kattumannar koil 110kV SS.
- iii SC line to Sethiyathoppu 110kV SS.
- iv DC line to Pappakudi 110kV SS.
- v SC line to the sanctioned Naduvalur 110kV SS.

It is requested to include the above proposals as agenda points for the forthcoming 2<sup>nd</sup> meeting of Southern Regional Power Committee (Transmission Planning).

  
(N. Balaji)  
Chief Engineer/Planning & R.C  
For Director/Transmission Projects

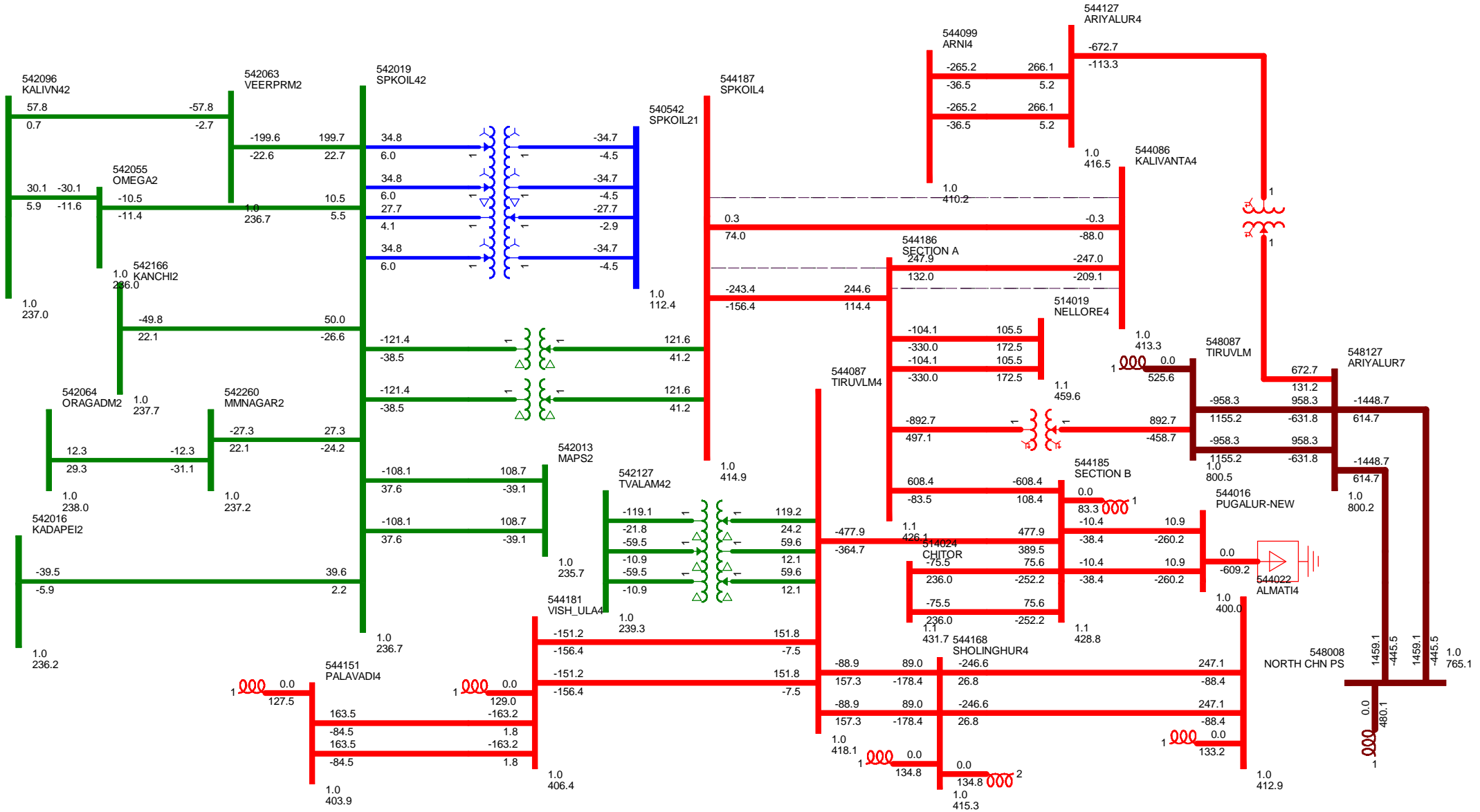
2/2

<p>Already Proposed Connectivity for the establishment of S.P.Koil 400/230-110 kV SS by upgrading the existing S.P.Koil 230/110 kV SS (as per our email dated 20.07.2020)</p>	<p>Revised Connectivity now proposed for the establishment of S.P.Koil 400/230 kV SS by upgrading the existing S.P.Koil 230/110 kV SS after Joint Study of TANGEDCO with CEA and CTU on 20.08.2020 through Video conference.</p>
<p><b><u>400 kV Transmission Lines :</u></b></p> <p>Erection of 400 kV DC line on DC Tower for making LILO of one of the circuit of Thiruvalam - Kalivanthapattu 400 kV DC quad line.</p> <p><b><u>ICTs:</u></b></p> <p>2x500 MVA 400/230 KV ICT 2x200 MVA 400/110 KV ICT</p> <p><b><u>Bus Reactor:</u></b></p> <p>400 kV - 1x125 MVar</p> <p><b><u>230 kV Transmission Lines :</u></b></p> <p>i. The existing 230 kV transmission lines at S.P.Koil 230/110 kV SS are retained and in addition to this new proposal of 230 kV line to Kadapperi 230 kV SS from the proposed S.P.Koil 400/230-110 kV SS.</p> <p>ii. Replacement of existing S.P.Koil - Veerapuram 230 kV feeder conductor into equivalent HTLS conductor.</p> <p><b><u>110 kV Transmission Lines :</u></b></p> <p>Existing 110 kV transmission lines at S.P.Koil 230/110 kV SS are retained.</p>	<p><b><u>400 kV Transmission Lines :</u></b></p> <p>Erection of 400 kV DC line on DC Tower for making LILO of one of the circuit of Thiruvalam - Kalivanthapattu 400 kV DC Twin Moose line.</p> <p><b><u>ICTs:</u></b></p> <p>2x500 MVA 400/230 KV ICT 2x200 MVA 400/110 KV ICT dropped and Existing 230/110 kV ratio will be retained</p> <p><b><u>Bus Reactor:</u></b></p> <p>400 kV - 1x125 MVar</p> <p><b><u>230 kV Transmission Lines :</u></b></p> <p>i. The existing 230 kV transmission lines at S.P.Koil 230/110 kV SS are retained and in addition to this new proposal of 230 kV line to Kadapperi 230 kV SS from the proposed S.P.Koil 400/230-110 kV SS.</p> <p>ii. Replacement of existing S.P.Koil - Veerapuram 230 kV feeder conductor into equivalent HTLS conductor.</p> <p><b><u>110 kV Transmission Lines :</u></b></p> <p>Existing 110 kV transmission lines at S.P.Koil 230/110 kV SS are retained.</p>

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CASE1 : BASECASE + WITH THE PROPOSED SP KOIL 400/230/110KV SS

BY MAKING LILO OF ONE CIRCUIT OF THE TIRUVALAM-KALIVANTHAPATTU 400KV DC LINE (W/O 110KV ICTs)





**Kalvadangam 400/110 kV Substation**

It has been proposed to establish a 400/110 kV Substation at Kalvadangam at Erode Region instead of Kolapalur 400/230-110 kV SS with the following Transmission Schemes.

**400 kV Transmission Lines:**

- i. 400 kV Quad 2 X DC line from Rasipalayam 400 KV SS to Palavady 400 KV SS (one DC line via Dharmapuri 765/400 KV Substation) has been sanctioned in 37<sup>th</sup> Standing Committee on Power System Planning of Southern Region. Now, Kalvadangam is proposed to be LILOed in one circuit of Rasipalayam - Palavady 400 KV DC quad line.
- ii. LILO of one circuit of MTPS - Karamadai 400kV DC quad line.

**110 kV Transmission Lines:**

- i. LILO of Pallipalyam - Barrage II 110 kV feeder.
- ii. LILO of Barrage III to Anthiyur 110 kV feeder  
(in between Barrage-III & Chennampatty 110 kV SS).
- iii. LILO of K.R.Thoppur- Vembadithalam- IVELI 110 kV feeder  
(in between Vembadithalam & IVELI 110 kV SS).
- v. DC feeder to Edapadi 110 KV SS.

**ICT:**

3x200 MVA, 400/110kV ICT

**Bus Reactor:**

400 kV- 1x125 MVAr Bus reactor

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<p>Connectivity already proposed for the establishment of Kalvadagam 400/230-110 kV SS</p>	<p>Revised Connectivity now proposed for the establishment of <b>Kalvadangam 400/110 kV SS</b></p>
<p><b><u>400 kV Transmission Lines :</u></b></p> <p>i. 400 kV Quad 2 X DC line from Rasipalayam 400 KV SS to Palavady 400 KV SS (one DC line via Dharmapuri 765/400 KV Substation) has been sanctioned in 37<sup>th</sup> Standing Committee on Power System Planning of Southern Region. Now, Kalvadagam is proposed to be LILoed in one circuit of Rasipalayam - Dharmapuri 400 KV DC quad line.</p> <p>ii. LILO of one circuit of MTPS - Karamadai 400kV DC quad line.</p> <p><b><u>ICTs:</u></b></p> <p>2x500 MVA, 400/230kV ICT 2x200 MVA, 400/110kV ICT</p> <p><b><u>Bus Reactor:</u></b></p> <p>400 kV - 1x125 MVAr</p> <p><b><u>230 kV Transmission Lines:</u></b></p> <p>i. LILO of Gobi-MTPS-II 230 KV SC feeder. ii. LILO of MTPS II to Thingalur 230 KV SC feeder. iii. LILO of MTPS-I to Ingur 230 KV SC feeder. iv. LILO of Ingur - Thingalur 230KV SC feeder.</p>	<p><b><u>400 kV Transmission Lines :</u></b></p> <p>i. 400 kV Quad 2 X DC line from Rasipalayam 400 KV SS to Palavady 400 KV SS (one DC line via Dharmapuri 765/400 KV Substation) has been sanctioned in 37<sup>th</sup> Standing Committee on Power System Planning of Southern Region. Now, Kalvadangam is proposed to be LILoed in one circuit of <b>existing Rasipalayam - Palavady</b> 400 KV DC quad line.</p> <p>ii. LILO of one circuit of MTPS - Karamadai 400kV DC quad line.</p> <p><b><u>ICTs:</u></b></p> <p><b>2x500 MVA 400/230 KV ICT dropped</b> <b>3x200 MVA 400/110 kV ICT</b></p> <p><b><u>Bus Reactor:</u></b></p> <p>400 kV - 1x125 MVAr</p> <p><b><u>230 kV ATS Proposal has been dropped</u></b></p> <p><b><u>110 kV Transmission Lines :</u></b></p> <p>i. LILO of Pallipalyam - Barrage II 110 kV feeder. ii. LILO of Barrage III to Anthiyur 110 kV feeder (in between Barrage-III &amp; Chennampatty 110 kV SS).</p>

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<p>v. DC feeder to existing Pallakapalayam 230 KV feeder.</p> <p>vi. DC feeder to Andhiyur 230 kV SS.</p>	<p>iii. LILO of K.R.Thoppur- Vembadithalam- IVELI 110 kV feeder (in between Vembadithalam &amp; Iveli 110 kV SS).</p> <p>iv. DC feeder to Edapadi 110 KV SS.</p>
<p><b><u>110 kV Transmission Lines :</u></b></p>	
<p>i. LILO of Pallipalyam - Barrage II 110 kV feeder.</p>	
<p>ii. LILO of Barrage III to Anthiyur 110 kV feeder (in between Barrage-III &amp; Chennampatty 110 kV SS).</p>	
<p>iii. LILO of K.R.Thoppur- Vembadithalam- IVELI 110 kV feeder (in between Vembadithalam &amp; IVELI 110 kV SS).</p>	
<p>iv. DC feeder to Edapadi 110 KV SS.</p>	

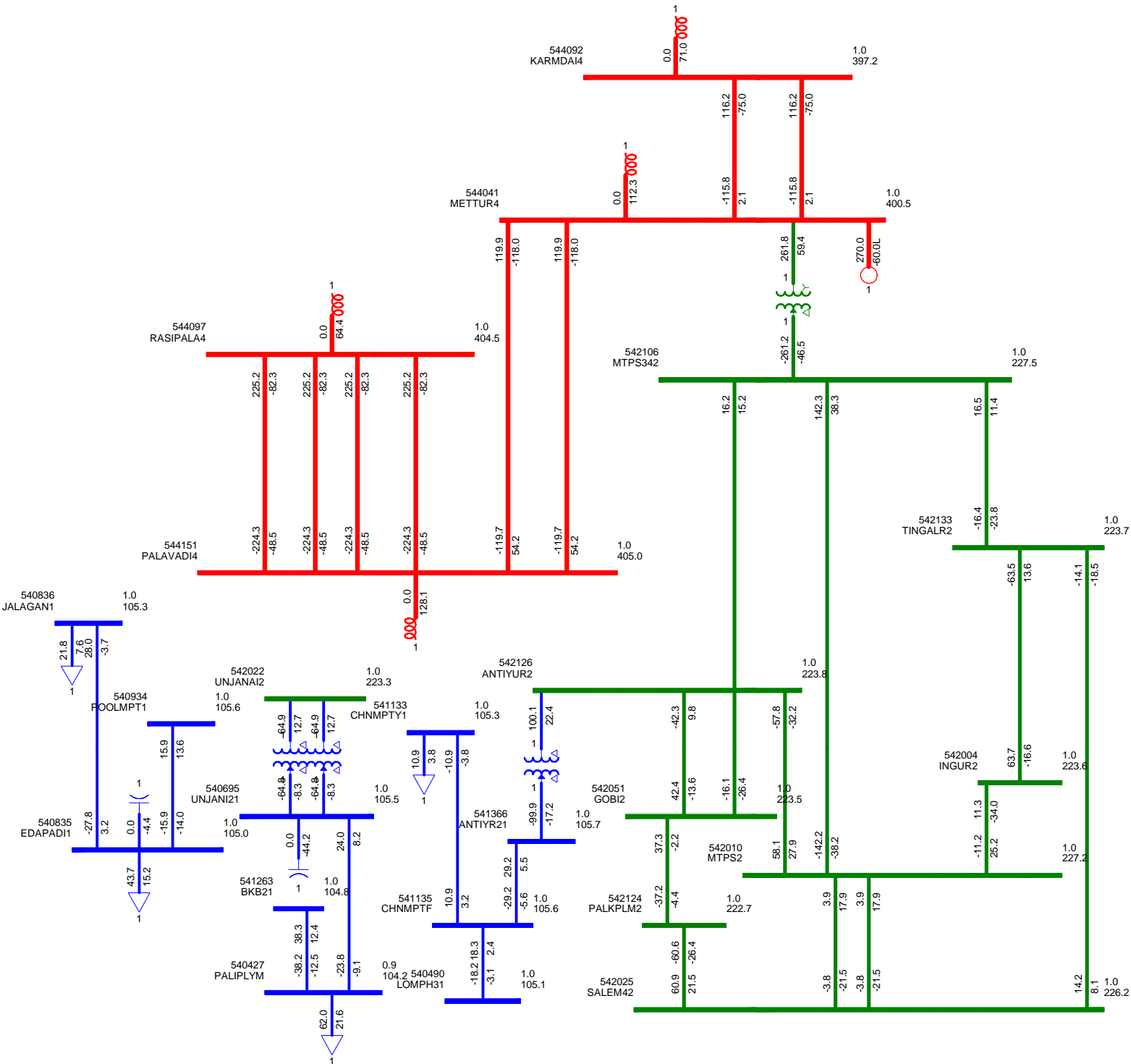
I/11500/2020

ESTABLISHMENT OF THE PROPOSED KALVADANGAM 400/110 KV SS

BASECASE : WITHOUT THE PROPOSED KALVADANGAM 400/110 KV SS

CONDITION : FULL WIND FULL SOLAR

YEAR 2022-23



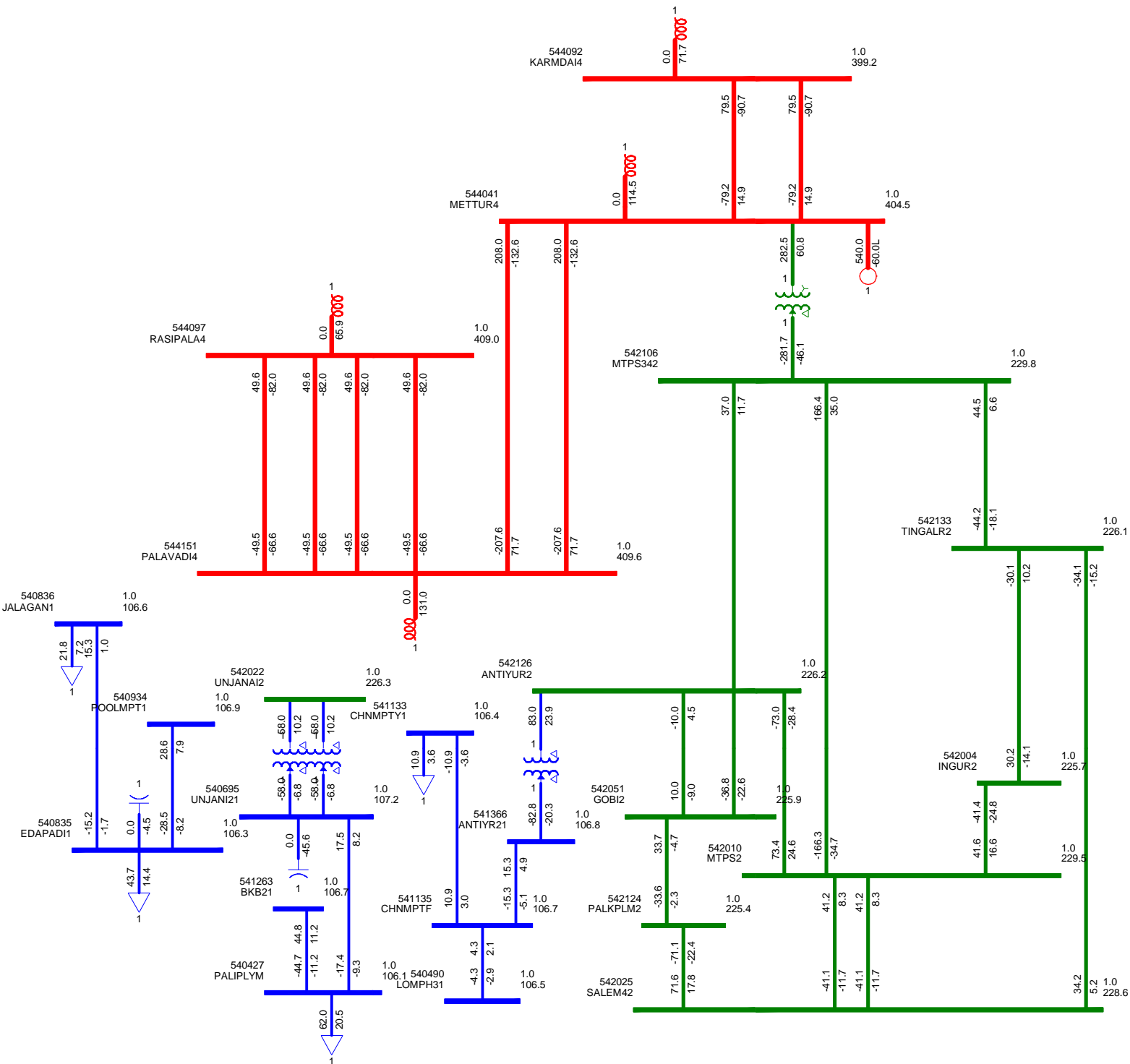
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ESTABLISHMENT OF THE PROPOSED KALVADANGAM 400/110 KV SS

BASECASE : WITHOUT THE PROPOSED KALVADANGAM 400/110 KV SS

CONDITION : NIL WIND NIL SOLAR

YEAR 2022-23



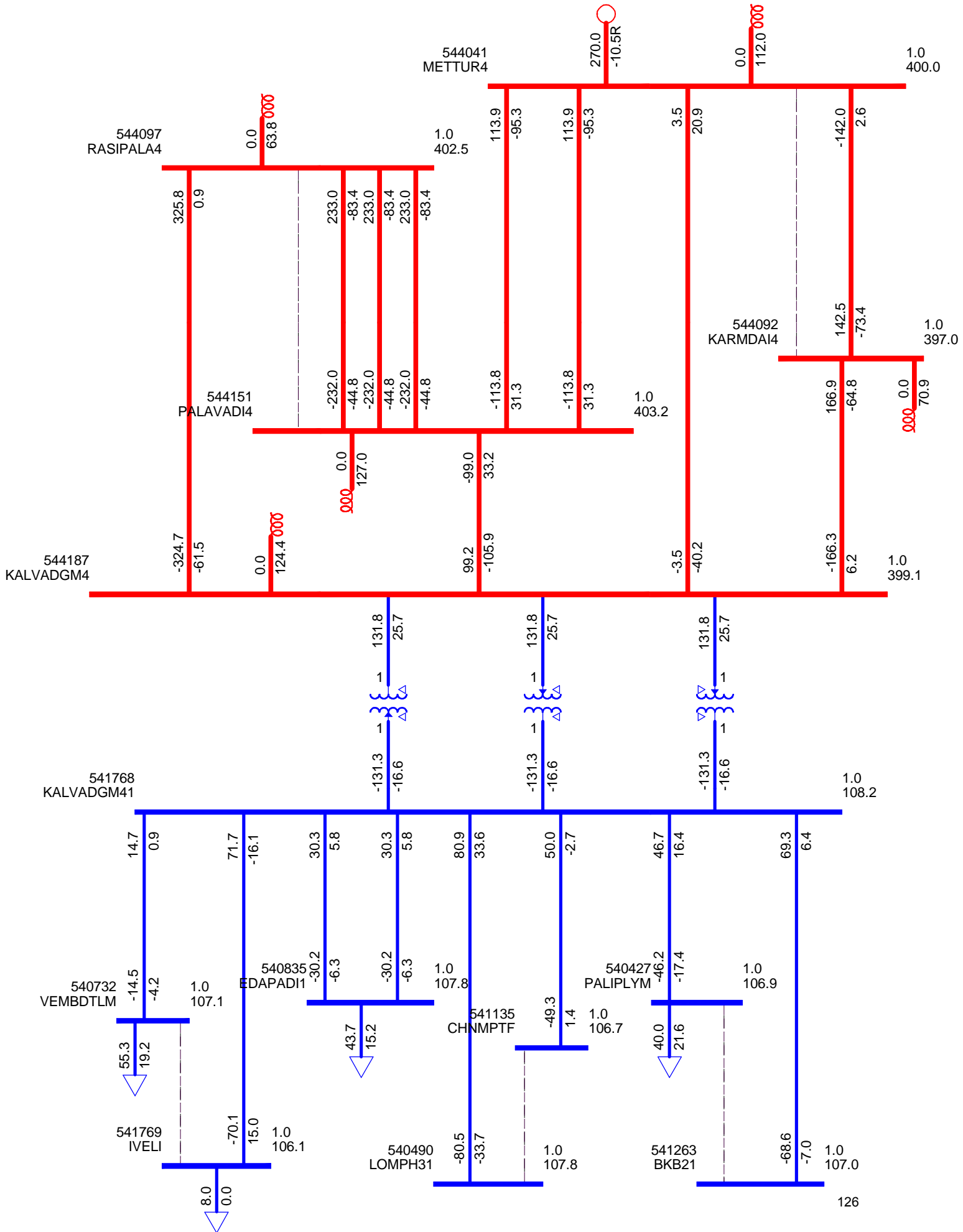


I/11500/2020

CASE1 : BASECASE + WITH THE PROPOSED KALVADANGAM 400/110 KV SS (W/O 230 KV ICTs)

CONDITION : FULL WIND FULL SOLAR

YEAR 2022-23

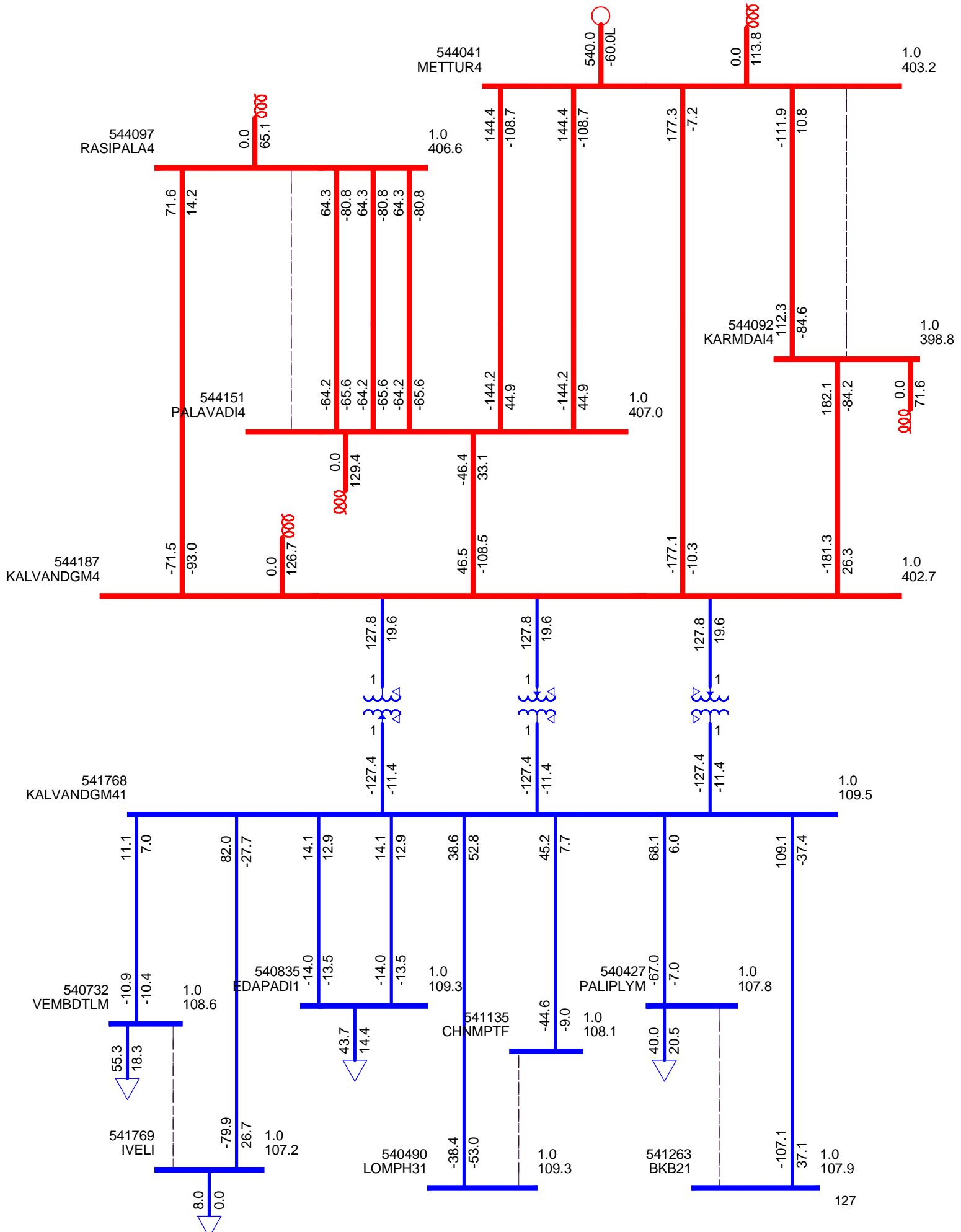


I/11500/2020

CASE1 : BASECASE + WITH THE PROPOSED KALVADANGAM 400/110 KV SS (W/O 230 KV ICTs)

CONDITION : NIL WIND NIL SOLAR

YEAR 2022-23



I/11500/2020

**KERALA STATE ELECTRICITY BOARD LIMITED***(Incorporated under the Companies Act, 1956)*

Office of the Director (Transmission, System Operation & REES)  
 Reg. Office: Vydyuthi Bhavanam, Pattom, Thiruvananthapuram – 695 004, Kerala  
 Phone: +91 471 2514528, E-mail: pse@kseb.in, dtkseb@kseb.in  
 Website: www.kseb.in.CIN :U40100KL2011SGC027424

No. D(T&amp;SO)/PSE/SRPC/Tr.Plng/2020-21/ 49

Date: 17.07.2020

To

**The Chief Engineer (SP&PA-1)**  
**Power System Planning & Appraisal-I**  
**Central Electricity Authority**

Sub: 2<sup>nd</sup> meeting of Southern Regional Power Committee (Transmission Planning)-SRPCTP  
 –Agenda points to be included – reg.

Ref: 1. Meeting notice-Email dtd. 13.07.2020 from the CEA.

2. Minutes of the meeting of the 39<sup>th</sup> meeting of the Standing Committee on Power System Planning of Southern Region held in Dec.2015.
3. Minutes of the meeting of the 40<sup>th</sup> meeting of the Standing Committee on Power System Planning of Southern Region held in Nov.2016.

Sir,

Agenda items pertaining to KSEBL to be included in the 2<sup>nd</sup> meeting of Southern Regional Power Committee (Transmission Planning) requested vide e-mail cited vide ref.1 is furnished below.

**I. Green Corridor Projects (GC)**

In the 40<sup>th</sup> meeting of the standing committee on Power System Planning on Southern Region KSEBL proposed an intra-State Green Power Corridor scheme in Kerala to evacuate Wind and Solar Power and the same was agreed by the Standing Committee. This system will be implemented by KSEBL as State projects vide Sl.no.33.1.(1),(2),(3) of ref.3 (40<sup>th</sup> meeting) as follows.

1. Wayanad – Kasargode Green Power Corridor Project (by KSEBL)
  - i) Construction of a 400kV Substation at Wayanad (Kattikulam)
  - ii) Construction of a 2x500MVA 400/220kV, 2 x 200MVA 220/110kV, Substation at Kasargode (Cheemeni)
  - iii) Interconnectivity of 400kV Switching Station Wayanad (Kattikulam) to 400kV Substation Kasargode (Cheemeni).
  - iv) 220kV connectivity to existing 220kV substations at Kanhirode, Thaliparamba,

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Ambalathara and Mylatty.

2. Attapaddy Green Power Corridor Project.

- i) 33/220 kV step up substation at Kottathara.
- ii) Construction of 220 /110 kV Substation at Vettathur by LILO of 220 kV Madakathara – Areakode.
- iii) 220/110kV Multi circuit / Multi Voltage line on Multi circuit towers from the proposed 220 kV Substation, Vettathur up to the existing 110 kV Substation Mannarkkad and then extending the 220kV D/c line to 220kV Substation Kottathara. (The 110 kV D/c line will be between the proposed 220 kV Vettathur Substation and existing 110 kV Substation Mannarkkad)

3. 220kV Ramakkalmedu Green Power Corridor

- i) Construction of a 2x50 MVA, 33/110 kV step up substation at Anakkaramettu.
- ii) Construction of 110kV D/c line from Anakkaramettu (near Ramakkalmedu) to 110kV Substation Nedumkandam.
- iii) Construction of 2 nos 110kV feeder bays at 110kV Nedumkandam Substation.
- iv) Construction of 110 kV D/c line from Kattappana to Kuyilimala along the right of way of existing 66 kV S/c line.
- v) Construction of a 220/110 kV substation with 2nos 220/110kV 50 MVA Transformers and 2 nos 220 kV feeder bays at Kuyilimala. LILO of 220kV Udumalpet – Idukki S/c feeder at 220kV Substation Kuyilimala

However subsequently these schemes underwent some modifications consequent to change in the project elements, change in locations, reconfiguration of the scheme owing to introduction of additional renewable resources etc. Accordingly the following revised schemes are submitted herewith for the approval of SRPCTP.

1. NORTH GREEN POWER CORRIDOR PROJECT –

This project envisages establishing a green power corridor between Wayanad and Kasargod Districts interconnecting the renewable energy source from Kasargode area to Mysore –Areakode link. The corridor will act as a power highway connecting Kasargode, Kannur, Wayanad and then to Mysore/Kozhikode/ Thrissur through the existing 400kV line, which will provide access to South Kerala for the evacuation of Green power generated. The total project consists of the following components.

- Construction of a 400kV GIS Substation at Payyampalli in Wayanad
- Construction of 5.25 km of 220 kV MC LILO line of Kaniyampetta-Mysore line

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to the 400 kV Wayanad Substation

- Construction of 124 kM of Double Circuit 400kV Twin HPC-ACSS line (Quad Moose equivalent line) from 400kV Substation at Payyampalli in Wayanad to 400kV Substation at Cheemeni in Kasaragode.

## 2. ATTAPPADY GREEN POWER CORRIDOR PROJECT

This project envisages the construction of a reliable power transmission corridor capable of transporting up to 200 MW of green power from the Attapady region to the existing KSEB power grid. The project consists of the following components.

- Construction of 33/ 220kV Step up Substation at Kottathara, Agali.
- Construction of 220kV DC feeder from 220kV New Mannarkkad GIS to the Kottathara Substation.
- Construction of 220/110kV GIS Substation at Mannarkad
- Construction of 220kV Double Circuit line from Vettathur Tap point to New Mannarkkad GIS Substation.
- Supply and installation of 1MW Solar Plant in the Substation premises of Kottathara Substation.

## 3. RAMAKKALMEDU GREEN POWER CORRIDOR PROJECT

This project aims at constructing a reliable power transmission corridor capable of transferring up to 100MW wind power from the Ramakkalmedu area and 300MW of solar power from Kattappana / Vazhathope area to Kuyilimala (LILO location of 220kV Udumalpet – Idukki Single Circuit feeder) in Idukki District with minimum loss. The project consists of the following components

- Construction of 33/110 kV Step up Substation at Anakkamedu (Near Ramakkalmedu)
- Construction of 9km, 110kV DC line from Anakkamedu (Near Ramakkalmedu) to Nedumkandom Substation.
- Construction of 2 nos 110kV feeder bays at Nedumkandom and Vazhathope Substations.
- Construction of 20km 220/110kV MCMV line (up gradation) from Nirmala City (Near Kattappana) to Kuyilimala LILO point and 5km 110kV DC line with ACSR Kundah Conductor from Nirmala city to Kattappana along the right of way of the existing 66kV SC line.
- Construction of a 220/110kV GIS Substation at Nirmala City (Near Kattappana).



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**II. Installation of Shunt Reactor at the proposed 400kV Substation, Kottayam.**

A 400kV substation at Kottayam was agreed at 39<sup>th</sup> Standing Committee of Southern Region vide Sl.no.29.1.(i) of ref.2. The following scheme was agreed upon:

- A 400kV substation with two 400/220kV, 315MVA Interconnection Transformers by Line in Line out arrangement of 400kV Thirunelveli- Kochin East PGCIL DC line. It is also a power highway for Koodamkulam power evacuation.
- 4 Numbers of 220kV transmission line are proposed for downstream evacuation of power from this substation bus.

One no. of 125 MVAR shunt reactor is proposed in the 400kV Bus to control voltage during lightly loaded conditions. The same may be approved.

**III. 400kV Substation Edamon- change in the scheme**

A 400kV substation at Edamon was agreed at 39<sup>th</sup> Standing Committee of Southern Region vide Sl.no.29.1.(iii) of ref.2. The following scheme was agreed upon:

- Six 400kV Line bays
- Four spare 400kV Line Bays
- Two transformer bays with 2x315MVA 400/220kV ICT's.
- The 400kV connectivity will be established by charging existing 220kV Tirunelveli – Edamon Twin Moose D/c feeder, constructed in 400kV parameters, at 400kV and by LILO-ing both circuits of under construction 400kV Tirunelveli – Cochin East Quad Moose D/c feeder.
- Additional connectivity to 400kV Substation, Trivandrum North is planned later by LILO of existing 400kV Tirunelveli – Trivandrum (North) Twin Moose D/c feeder.
- Downstream 220kV connectivity: -
  - a. 220kV connectivity will be directly to existing 220kV switchyard of Edamon and further to following stations
  - b. 220kV D/c feeder to Pothencode
  - c. 220kV D/c and 220kV S/c feeders to Sabarigiri
  - d. 220kV feeders to Kundara and Edappon.

At the identified location for 400/220kV substation, Tirunelveli - Edamon I & II Twin Moose feeders, Tirunelveli - Cochin East I & II Quad Moose feeders and Tirunelveli - Trivandrum I & II Quad Moose feeders are crossing so that the 400kV lines can be directly terminated.

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Detailed LFS study has been conducted and it is inferred that only six circuits need to be connected to the new 400/220kV substation at Nagamala Estate.

Based on LFS the following revised arrangement is proposed:

1. Tirunelveli Edamon I & II Twin Moose feeders constructed in 400kV parameters and now charged at 220kV level will be terminated at 400kV Edamon Substation.
2. Only one of the 400kV Quad Moose Tirunelveli Cochin East I & II feeders will be LILO'ed at 400kV Edamon Substation.
3. Only one of the 400kV Quad Moose Tirunelveli Trivandrum I & II feeders will be LILO'ed at 400kV Edamon Substation.
4. The 220kV Connectivity to 220kV Edamon(KSEBL) existing substation will be established by using the balance portion of Twin Moose feeder to Edamon(KSEBL) substation.
5. 3Nos. + 1No.(Spare) 166.67MVA, 400/220/33kV Single Phase Auto transformer banks are proposed at 400kV Substation Edamon.

The tentative schematic drawing of the Edamon scheme is attached along with this for reference.

As the proposed scheme differs from the originally agreed scheme in 39<sup>th</sup> Standing Committee meeting for Southern Region, fresh approval may be issued.

**IV. 220 kV Substation Irinjalakuda, 220 kV Substation Sasthamkotta and 220 kV Substation Thuravur**

In the 39<sup>th</sup> meeting of the standing committee on Power System Planning on Southern Region held at New Delhi on December 2015, KSEBL proposed a 220kV intra-State transmission system strengthening scheme in Kerala and the same was agreed by the Standing Committee. This system will be implemented by KSEBL as state projects vide Sl.no. 29.2.2 under the head 'projects planned under intra-State system Strengthening scheme'. But following changes in locations of the proposed Substations are made during the DPR stage due to the issues of flexibility, Reliability and Land availability etc.

Sl. No.29.2.2(xiii) of ref.2 - 220kV S/S North Paravur - Changed to 220kV S/S Irinjalakuda

Sl. No. 29.2.2 (xviii) of ref.2 - 220kV S/S, Eramallur - Changed to 220kV S/S, Thuravur

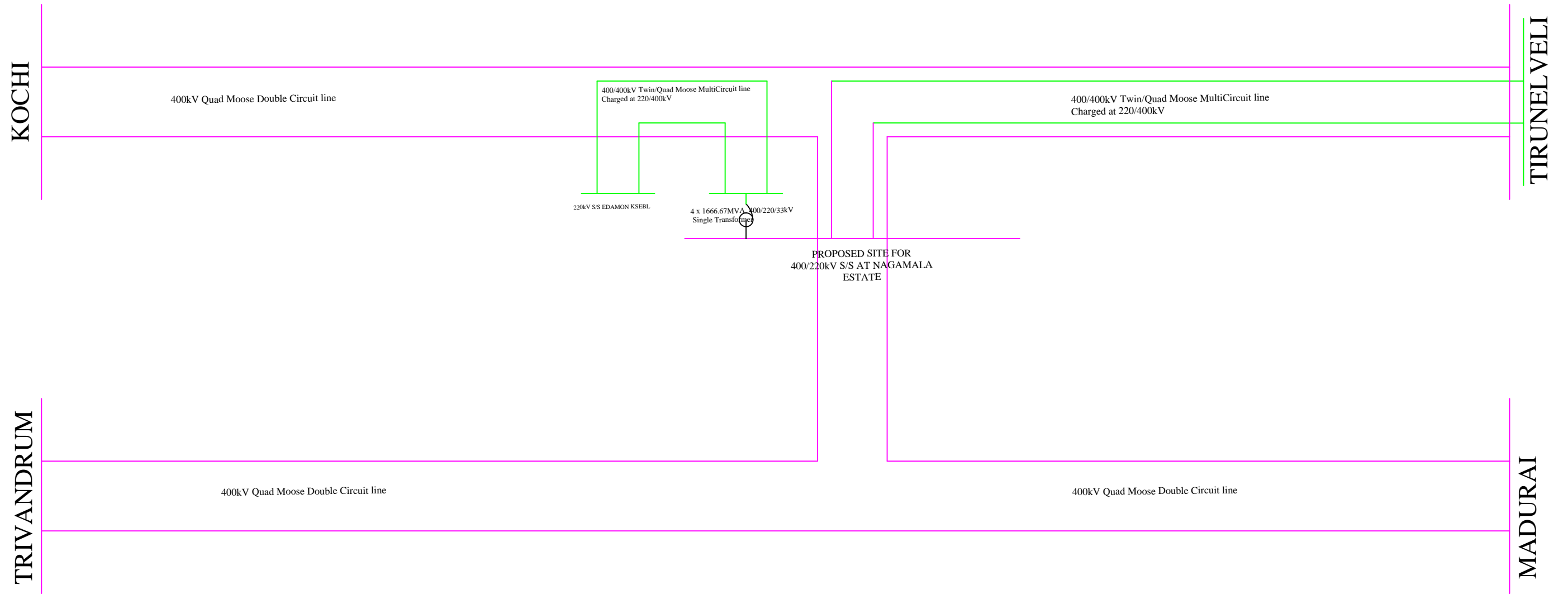
Sl. No. 29.2.2 (xxi) of ref.2- 220kV S/S, Parippally - Changed to 220kV S/S, Sasthamkotta

Yours faithfully,

  
Director (Transmission, System Operation & REES)

Acc: The tentative schematic drawing of Edamon scheme. 16/7

### 400/220kV SUBSTATION EDAMON (NAGAMALA ESTATE) NETWORK DIAGRAM



I/1500/2020

Fwd: 2nd meeting of SRPC(TP) - clarification on Agenda points from KSEBL

From: Kanchan Chauhan (kanchanchauhan.cea@gmail.com)

To: sharan\_ishan@yahoo.com

Date: Monday, August 31, 2020, 02:10 PM GMT+5:30

Thanks and Regards

Kanchan Chauhan

Assistant Director (PSPA-2),

Central Electricity Authority.

Ministry of Power (Govt. of India)

New Delhi-110066

----- Forwarded message -----

From: **Biju S.S** <[ssbiju@gmail.com](mailto:ssbiju@gmail.com)>

Date: Mon, Aug 31, 2020 at 2:03 PM

Subject: Re: 2nd meeting of SRPC(TP) - clarification on Agenda points from KSEBL

To: Kanchan Chauhan <[kanchanchauhan.cea@gmail.com](mailto:kanchanchauhan.cea@gmail.com)>Cc: <[dtkseb@kseb.in](mailto:dtkseb@kseb.in)>

Ma'am,

Please find furnished below point wise clarification (in **Blue**) for the queries raised from your end:

1. In the proposal of Wayanad-Kasargode Green Energy project, transformer capacity at Wayanad S/S has not been mentioned. From the DPR of North Green Corridor, it has brought out that 4x167 MVA Transformer capacity has been proposed at Wayanad. This transformation capacity will not satisfy N-1 Criteria at Wayanad. If there is any fault in one transformer, there will be a complete outage at the Substation for replacing it with the spare transformer.

4x167 MVA was proposed at Wayanad, since the loading expected on the transformer was comparatively low owing to its single downstream 220kV connectivity to 220kV Substation Kaniampetta. This connectivity was proposed to provide a stable and secure power source to the 220kV Substation Kaniampetta, which at present is solely dependent on its 220kV S/c connectivity to 220kV Substation Areekode and 220kV Substation Kadakola. The loading towards Kadakola is experiencing constraints at present due to the inherent network issues. In this context it may also be noted that in the event of outage of one unit in the 4x167 MVA transformer configuration, the maximum outage time expected for the substation is limited to the time required for changing over to the standby unit (which is configured like a hot standby) through the operation of the isolator and pipebus arrangement provided in the Station. Further this will not result in supply outage to 220kV Substation Kaniampetta since it will be having connectivity to 220kV Substation Areekode.

However, considering your viewpoints and if required, after reviewing our proposal on the basis of the clarification provided as above, we can provide 2x315MVA 400/220kV Transformers at 400kV Substation Wayanad.

2 (A) In the revised transmission scheme of Edamon, 4x167 transformation capacity has been proposed at Edamon. This transformation capacity will not satisfy N-1 Criteria at Edamon.

Agreed. We will be providing 2x315MVA 400/220kV Transformers at 400kV Substation Edamon

2(B) In the Edamon scheme, it is mentioned in the connectivity that one circuit of 400kV quad moose tirunelveli -Trivandrum will be LILO at Edamon, as per CTU, it is twin moose line and not quad moose line.

At 400kV Substation Edamon, it is proposed to LILO **one circuit each of 400kV Tirunelveli - Cochin East D/c (Quad Moose) and 400kV Tirunelveli - Trivandrum D/c (Twin Moose) feeders**. In addition to the above configuration, it is also proposed for LILO-ing of both circuits of existing 400kV Tirunelveli - Edamon D/c (Twin Moose - presently charged at 220kV level) feeder and charging the same at 400kV level.

Downstream 220kV connectivity: -

- 220kV connectivity will be directly to existing 220kV switchyard of Edamon and further to following stations
- 220kV D/c feeder to Pothencode
- 220kV D/c feeder to Sabarigiri
- 220kV feeder to Pathanamthitta
- 220kV feeders to Kundara and Edappon.

3. Location of North Paravur, Ermallur and Paripally has been changed to Irinjalakuda, Thuravur, Sasthmkotta respectively. Any change in approved associated connectivities of these substations has not been mentioned in the proposal.

Please note that the proposal for the upgradation of existing 110kV Substations at North Parur and Parippally to 220kV has been in third phase of the transmission plan considering the present day loading of the concerned stations. However the location of the proposed 220kV Substation at Eramalloor has been shifted to Thuravoor. Further considering the revised outlook on the loading of various stations it is now proposed to construct additional 220kV Substations at Irinjalakuda and Sasthamkotta. The 220kV level connectivity to 220kV Substation Irinjalakuda is proposed to be established by the construction of 220kV D/c feeder from 220kV Substation Aluva and that for 220kV Substation Sasthamkotta is proposed by LILO of 220kV Kundara - Kayamkulam Twin Moose feeder at the location near East Kallada. Request sanction for the same.

The downstream connectivity to the above 220kV Substations is furnished below:

220kV Substation Thuravoor -

- (1) 110kV D/c feeder to 110kV Substation Thykattussery
- (2) 110kV feeder to 110kV Substation Cherthala
- (3) 110kV feeder to 110kV Substation Mattancherry
- (4) 110kV feeder to 110kV Substation Eramalloor
- (5) 110kV D/c feeder to 110kV Substation SL Puram
- (6) 110kV feeder to 110kV Substation Aroor
- (7) 110kV feeder to 110kV Substation Vaikom
- (8) 110kV feeder to 110kV Substation Thykattussery

220kV Substation Irinjalakuda -

- (1) 110kV D/c feeder to existing 110kV Substation Irinjalakuda
- (2) 110kV feeder to 110kV Substation Kattoor
- (3) 110kV feeder to 110kV Substation Cherpu
- (4) 110kV feeder to 110kV Substation Kodungallur
- (5) 110kV feeder to 110kV Substation North Parur

220kV Substation Sasthamkotta -

- (1) 110kV D/c feeder to 220kV Substation Edappon
- (2) 110kV feeder to 110kV Substation Chavara,
- (3) 110kV feeder to 220kV Substation Kundara
- (4) 110kV feeder to 110kV Substation Karunagappally
- (5) 110kV feeder to 110kV Substation Kattanam

BR /

Biju .S.S

Executive Engineer / KSEBL

On Thu, Aug 27, 2020 at 2:46 AM Kanchan Chauhan <[kanchanchauhan.cea@gmail.com](mailto:kanchanchauhan.cea@gmail.com)> wrote:

Sir,

This is in reference to the the agenda point received from KSEBL, in this regard we have following observations:

1. In the proposal of Wayanad-Kasargode Green Energy project, transformer capacity at Wayanad S/S has not been mentioned. From the DPR of North Green Corridor, it has brought out that 4x167 MVA Transformer capacity has been proposed at Wayanad. This transformation capacity will not satisfy N-1 Criteria at Wayanad .If there is any fault in one transformer , there will be a complete outage at the Substation for replacing it with the spare transformer.

2 (A) In the revised transmission scheme of Edamon, 4x167 transformation capacity has been proposed at Edamon . This transformation capacity will not satisfy N-1 Criteria at Edamon.

2(B) In the Edamon scheme, it is mentioned in the connectivity that one circuit of 400kV quad moose tirunelveli -Trivandrum will be LILO at Edamon , as per CTU, it is twin moose line and not quad moose line.

3. Location of North Paravur,Ermallur and Parippally has been changed to Irinjalakuda,Thuravur,Sasthmkotta respectively. Any change in approved associated connectivities of these substations has not been mentioned in the proposal.

You are requested to clarify/revise the proposal as well as studies and submit it at the earliest.



Thanks and Regards  
~~I/11500/2020~~ uhan  
Assistant Director (PSPA-2),  
Central Electricity Authority,  
Ministry of Power (Govt. of India)  
New Delhi-110066

I/11500/2020

**KERALA STATE ELECTRICITY BOARD LIMITED**

(Incorporated under the Companies Act, 1956)



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**No. D(T&SO)/PSE/SRPC/Tr.Plng/2020-21/ 70****Date: 04.09.2020****To**

**The Chief Engineer (SP&PA-1)  
 Power System Planning & Appraisal-I  
 Central Electricity Authority**

Sub: 2<sup>nd</sup> meeting of Southern Regional Power Committee (Transmission Planning)-SRPCTP  
 – Agenda points to be included – additions / revisions in agenda - reg.

Ref: 1. Meeting notice-Email dtd. 13.07.2020 from the CEA.

2. Minutes of the meeting of the 39<sup>th</sup> meeting of the Standing Committee on Power System Planning of Southern Region held in Dec.2015.
3. Minutes of the meeting of the 40<sup>th</sup> meeting of the Standing Committee on Power System Planning of Southern Region held in Nov.2016.
4. Letter No D(T&SO)/PSE/SRPC/Tr.Plng/2020-21/49 dated 17.07.2020 from KSEBL

Sir,

Agenda items pertaining to KSEBL to be included in the 2<sup>nd</sup> meeting of Southern Regional Power Committee (Transmission Planning) was forwarded vide ref. (4) cited above. Clarifications were sought by CEA on certain points in the agenda items forwarded as above. The required clarifications along with additional items pertaining to changes in the schemes sanctioned in the 39<sup>th</sup> meeting of SCPSPSR are furnished below for your kind consideration.

**I. Observations by CEA and clarifications against the same:**

Observation No (3):

*Location of North Paravur, Ermallur and Paripally has been changed to Irinjalakuda, Thuravur, Sasthmkotta respectively. Any change in approved associated connectivities of these substations has not been mentioned in the proposal.*

KSEBL Clarification:

The proposal for the upgradation of existing 110kV Substations at North Parur and Parippally to 220kV has been shifted to the third phase of the transmission plan considering the present day loading of the concerned stations. However the location of the proposed 220kV Substation at Eramalloor, proposed and sanctioned in the 39<sup>th</sup> meeting of SCPSPSR with 220kV connectivity proposed by construction of a 220kV D/c feeder from Brahmapuram, has been shifted to Thuravoor to address the issues of flexibility, reliability

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and land availability etc. Consequent to this shifting the connectivity has been changed to the following:

**220kV Connectivity:**

- Construction of a 220kV D/c feeder from 400kV Substation Kottayam to Thuravoor.

**110kV downstream connectivity:**

- 110kV D/c feeder to 110kV Substation Thykattussery
- 110kV feeder to 110kV Substation Cherthala
- 110kV feeder to 110kV Substation Mattancherry
- 110kV feeder to 110kV Substation Eramalloor
- 110kV D/c feeder to 110kV Substation SL Puram
- 110kV feeder to 110kV Substation Aroor
- 110kV feeder to 110kV Substation Vaikom
- 110kV feeder to 110kV Substation Thykattussery

Further considering the revised outlook on the loading of various stations it is now proposed to construct additional 220kV Substations at Irinjalakuda and Sasthamkotta.

At present the whole of Thrissur district is depended on 400kV Substation Madakathara to full-fill its power supply needs. An outage of 220kV Bus in this substation will be catastrophic for the supply security of the area. Further growing load in the areas served by the 110kV sub-transmission network from this station increases the future risk of the transmission system being unable to withstand the loss of any one of the elements. Even under the present scenario constraints are often experienced in the sub transmission network catering to the South-western part of the Thrissur district. Studies carried out to analyze the capabilities of the existing transmission network for meeting the expected demand during various time frames indicate the incapability of the system to meet the reliability and performance criteria specified in various statutory planning and operational guidelines. Against this back drop, it has been proposed to provide an additional 220kV source to cater load of south western part of Thrissur district by upgradation of existing 110kV substation Irinjalakkuda to 220kV with 2x100MVA 220/110kV transformer. Following connectivity is proposed for the above substation:

**220kV Connectivity:**

- 220kV D/c feeder from the proposed 220kV Substation Aluva to Irinjalakkuda.

**110kV Connectivity:**

- 110kV D/c feeder to existing 110kV Substation Irinjalakuda
- 110kV feeder to 110kV Substation Kattoor
- 110kV feeder to 110kV Substation Cherpu

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- 110kV feeder to 110kV Substation Kodungallur
- 110kV feeder to 110kV Substation North Parur

At present major part of Kollam district is depended on 220kV Substation Kundara to full-fill its power supply needs. An outage of this substation or its 110kV Bus will be catastrophic for the supply security of the area. Studies carried out to analyze the capabilities of the existing transmission network for meeting the expected demand during various time frames indicate the incapability of the system to meet the reliability and performance criteria specified in various statutory planning and operational guidelines. Against this back drop, it has been proposed to provide an additional 220kV source to act as a backup support for 220kV Substation Kundara by upgradation of existing 110kV substation Sasthamkotta to 220kV with 2x100MVA 220/110kV transformer. Following connectivity is proposed for the above substation:

**220kV Connectivity:**

- LILO of 220kV Kundara - Kayamkulam Twin Moose feeder at the location near East Kallada.

**110kV Connectivity:**

- 110kV D/c feeder to 220kV Substation Edappon
- 110kV feeder to 110kV Substation Chavara,
- 110kV feeder to 220kV Substation Kundara
- 110kV feeder to 110kV Substation Karunagappally
- 110kV feeder to 110kV Substation Kattanam

It is requested that sanction may kindly be accorded for the above proposed schemes.

**II. Additional revisions / deletions required in the schemes approved in the 39<sup>th</sup> SCPS**

In the 39<sup>th</sup> meeting of the standing committee on Power System Planning on Southern Region held at New Delhi on December 2015, KSEBL proposed an intra-State transmission system strengthening scheme in Kerala and the same was agreed by the Standing Committee vide Sl.no. 29.0 of the MoM. However consequent to the finalization and fine tuning of the project components of the long term transmission plan following revisions / deletions in the schemes agreed in 39<sup>th</sup> SCPSR is requested:

**Sl. No.29.1.(i) - 400kV Substation Kottayam**

The 220kV downstream connectivity for the above may be modified as following:

- 220kV connectivity to existing Substations at Pallom and Ambalamughal by LILO of existing 220kV Pallom – Ambalamughal line
- 220kV D/c feeder to proposed 220kV Substation Ettumanoor
- 220kV D/c feeder to proposed 220kV Substation Thuravoor

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**Sl. No.29.1.(v) - 400kV Substation Ettumanoor**

The proposed scheme is not required since 400kV Substation Kottayam is already sanctioned by LILO of both circuits of 400kV Tirunelveli – Coschin East line vide Sl. No 29.1.(i) and hence may be deleted.

**Sl. No. 29.2.2 (i) - 220kV Substation at Neeleswaram, Kasaragod Dt**

Considering the present network loading in the Kasaragod district and to ensure supply security in the Northern most parts of the district it is proposed to construct a new 220kV Substation in the area by upgrading the existing 110kV Substation Vidyanagar (Kasaragod) to 220kV with 2x100MVA 220/110kV Transformers. Accordingly it was decided to drop the proposal for 220kV Substation Neeleswaram agreed in the 39<sup>th</sup> SCPSP meeting and hence may be deleted from the sanctioned scheme. The newly proposed 220kV substation Vidyanagar is also envisaged to provide reliable power evacuation facility for 80MW Solar Power generation proposed in the area. Following connectivity is proposed for this substation:

**220kV Connectivity:**

- 220kV feeder from 220kV Substation Thalassery to Vidyanagar.
- 220kV feeder from 220kV Substation Mylatty to Vidyanagar.

**110kV Connectivity:**

- 110kV D/c feeder to 220kV Substation Mylatty
- 110kV D/c feeder to 110kV Substation Mulleria,
- 110kV feeder to 110kV Substation Kubanur
- 110kV feeder to 110kV Substation Manjeswaram

It is requested that sanction may kindly be accorded for the above proposed scheme.

**Sl. No. 29.2.2 (ii) - 220kV Substation at Thalassery, Kannur Dt**

The transformer capacity of the proposed station may be revised to 2x100MVA from 2x160MVA proposed in the original sanctioned scheme. Further the 220kV connectivity for the station is now proposed from 220kV Substation Kanhirode and 220kV Substation Mylatty via the proposed 220kV Substation Vidyanagar by upgradation of existing 110kV corridor to 220/110kV MCMV corridor. Request that the changes may kindly be approved.

**Sl. No. 29.2.2 (v) - 220kV Substation at Kunnamangalam, Kozhikode Dt**

The 220kV connectivity is proposed by LILO of existing 220kV Areeekode – Kaniampetta S/c feeder in lieu of the earlier proposed LILO of existing 220kV Areeekode – Kanhirode feeder.

Request that the change may kindly be approved.



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**Sl. No. 29.2.2 (vii) - 220kV Substation at Kunnankulam, Thrissur Dt**

The 220kV connectivity in the sanctioned scheme was mentioned as LILO of proposed 220kV Madakathara – Nallalam feeder. However in the 40<sup>th</sup> SCPSPSR it was agreed to take the 220kV D/c outlets from HVDC station in lieu of taking from Madakathara. Hence the proposed connectivity to 220kV Substation Kunnankulam may be revised as LILO of proposed 220kV HVDC – Nallalam feeder.

**Sl. No. 29.2.2 (viii) - 220kV Substation at Edappal, Malappuram Dt**

The location of 220kV Substation Edappal has been shifted to Vengaloor to address the issues of flexibility, reliability and land availability etc. Consequent to this shifting the 220kV connectivity for the proposed 220kV Substation Vengaloor has been changed to the following:

- 220kV feeder from the proposed 220kV Substation Kunnankulam
- 220kV feeder from the proposed 220kV Substation Irinjalakkuda

The 220kV connectivity was mentioned as LILO of proposed 220kV Madakathara – Malaparamba feeder in the sanctioned scheme. There will be no change in the 110kV downstream connectivity. Request that the changes may kindly be approved.

**Sl. No. 29.2.2 (xvii) - 220kV Substation at Ettumanoor, Kottayam Dt**

In the scheme sanctioned in 39<sup>th</sup> SCPSPSR, the 220kV connectivity for the station was proposed by LILO of existing 220kV Pallom – Ambalamughal and Sabarigiri – Ambalamughal feeders. However considering the field feasibility it is now proposed to provide 220kV connectivity by construction of a 220kV D/c feeder from the proposed 400kV Substation Kottayam. There will be no change in the 110kV connectivity. Request that the change may kindly be approved.

**III. New Proposal for consideration in the 2<sup>nd</sup> meeting of SRPC(TP)****Interconnection of 220kV Substation Pothencode and 220kV Substation Kundra**

220kV Substation Pothencode is the major source of power to the capital city of Trivandrum. This station is connected to 400kV Substation Trivandrum (Pallipuram) through four 220kV circuits and to 220kV Substation Edamon through a 220kV D/c feeder. The drawal of 400kV Substation Trivandrum with an installed capacity of 3x315MVA 400/220kV Transformers is solely depended on the demand of Trivandrum district. 220kV Substation Kundara is the major source of power for Kollam district. This station is served mainly from 220kV Substation Edamon for meeting its demand.

The interconnection of 220kV Substation Pothencode and Kundra will improve the utilization of the 400kV substation Trivandrum to a large extent. This scheme is also expected to

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provide adequate supply security to both Trivandrum and Kollam since this interconnection will create a 220kV ring comprising of Edamon – Pothencode – Kundra – Edamon.

Accordingly it is proposed to construct a 220kV D/c corridor between 220kV Substation Pothencode and 220kV Substation Kundra by LILO of one circuit of 220kV Trivandrum (Pallippuram) 2xD/c feeders. This configuration will also provide a direct 220kV support to 220kV Substation Kundra from 400kV Substation Trivandrum.

It is requested that the above scheme may be sanctioned for execution.

Yours faithfully,

**Director (Transmission, System Operation & REES)**

Acc: (1) Updated schematic drawing of 400kV Edamon project.

(2) Updated schematic drawing of Attapady and Ramakkalmedu GEC projects.

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पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड

(भारत सरकार का उद्यम)

POWER GRID CORPORATION OF INDIA LIMITED

(A Government of India Enterprise)

Ref No. : C/CTU/S/03/07/NNTPS

Date : 02.03.2020

Shri Pardeep Jindal  
Chief Engineer (PSP&A – II)  
3<sup>rd</sup> Floor, Central Electricity Authority,  
Sewa Bhawan, R.K. Puram,  
New Delhi – 110066

**Subject : Alternate arrangement of transmission system for evacuation of power from 2<sup>nd</sup> unit of NNTPS.**

Sir,

This is with reference to transmission system for evacuation of power from 2x500MW NNTPS power plant of M/s NLC India Ltd. NNTPS switchyard – Ariyalur 400kV D/c line was agreed as transmission system for evacuation of power from NNTPS. The 400kV line is under implementation by POWERGRID and is expected by March 2020. Vide letter dated 20.02.2020, M/s NLC India Ltd. informed that the expected CoD of 2<sup>nd</sup> unit of NNTPS is March 2020 and requested to operationalize the full quantum of LTA.

In this regard, it is to inform that NLC India Ltd was granted LTA of 314.79 MW and out of which 157MW, corresponding to unit -1, has already been operationalized. The matter regarding commissioning of transmission system for enabling evacuation of power by March' 2020 from 2<sup>nd</sup> unit of NNTPS was discussed in 36<sup>th</sup> TCC / 37<sup>th</sup> SRPC meeting, wherein TANTRANSCO informed that the expected commissioning schedule of Ariyalur S/s, with best efforts, as June 2020. In meeting it was deliberated that pending commissioning of scheduled Ariyalur S/s, NNTPS - Ariyalur 400kV D/c line may be connected with LILO section of Pugalur – Kalivandapattu 400kV D/c line at Ariyalur, to form NNTPS – Pugalur 400kV circuit and NNTPS – Kalivandapattu 400kV circuit as interim arrangement.

In view of above, it is requested to convene a meeting with participation from CEA, CTU, POSOCO, TANTRANSCO and NLC to resolve the matter.

Thanking You

Yours faithfully

Mukesh Khanna  
Chief General Manager(CTU-Plg)

केन्द्रीय कार्यालय: "सौदामिनी", प्लॉट नंबर 2, सेक्टर -29, गुरुग्राम -122001, (हरियाणा) दूरभाष: 0124-2571700-719

Corporate Office: "Saudamini", Plot No. 2, Sector-29, Gurugram-122001, (Haryana) Tel.: 0124-2571700-719

पंजीकृत कार्यालय: बी -9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली -110 016. दूरभाष: 011-26560112, 26560121, 26564812, 26564892, CIN:L40101DL1989GOI038121

Registered Office: B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110 016. Tel: 011-26560112, 26560121, 26564812, 26564892, CIN : L40101DL1989GOI038121

Website: www.powergridindia.com

File No.CEA-PS-12-14(12)/1/2018-PSPA-II Division

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Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-II

Power System Planning &amp; Appraisal Division-II

सेवा में / To,

संलग्न सूची के अनुसार

As per list enclosed

**विषय/Subject: Minutes of the meeting regarding Alternate arrangement of transmission system for evacuation of power from 2<sup>nd</sup> unit of NNTPS.**

महोदय(Sir)/महोदया (Madam),

A meeting was held on 09.03.2020 at CEA, to discuss the matter of Alternate arrangement of transmission system for evacuation of power from 2<sup>nd</sup> unit of NNTPS.

Minutes of the meeting is enclosed.

भवदीय/Yours faithfully,

ईशान शरण / Ishan Sharan

निदेशक/ Director

**List of addressee:**

1. COO, CTU Power Grid Corp. of India Ltd. "Saudamini", Plot No.2, Sector-29, Gurugram 122 001, Haryana. FAX : 95124-2571932	2. Director (System Operation), POSOCO, B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi-110016
3. Director (Transmission), TANTRANSCO, 144, Anna Salai, Chennai - 600002. FAX: 044-28516362	4. Director (Power) NLC India Limited, Block-1, Neyveli-607801, Cuddalore District, Tamil Nadu

List of the participants is enclosed at **Annex-I**.

1. Chief Engineer (PSP&A-II), CEA, welcomed the participants and informed that the meeting has been called for discussing possible alternate arrangement for evacuation of power from 2<sup>nd</sup> Unit of New Neyveli Thermal Power Plant (replacement)(NNTPS) (2x500 MW) of NLC in Tamil Nadu, due to delay in commissioning of Ariyalur substation. The Ariyalur Substation (765/400 kV) is being implemented by TANTRANSKO.
2. CTU representative informed that the Ariyalur sub-station was planned to be commissioned in 2017-18. However, as informed by TANTRANSKO, the sub-station is likely to be commissioned by June, 2020 (under best effort scenario). The 2<sup>nd</sup> Unit of NNTPS (being implemented by NLC), and the NNPTS – Ariyalur 400 kV D/c line, being implemented by POWERGRID, is likely to be commissioned by March, 2020. Hence, as an interim arrangement, the NNTPS – Ariyalur line may be connected with one circuit of LILO section of Pugalur – Kalivandapattu 400 kV D/c line at Ariyalur, to form NNTPS – Pugalur 400 kV circuit and NNTPS – Kalivandapattu 400 kV circuit.
3. Director (PSP&A-II), CEA, informed that the following transmission system was approved under ISTS in the 35<sup>th</sup> meeting of SCPSPSR held on 04.01.2013, for grant of LTA to NNTPS (2x500 MW):
  - NNTPS switchyard – Ariyalur (Villupuram) 400 kV D/c line along with termination bays at Ariyalur substation
  - Ariyalur (Villupuram) 400 kV, 2x500 MVA S/S.

In the 37<sup>th</sup> meeting of SCPSPSR held on 31.07.2014, it was decided that Ariyalur 765/400 kV substation would be implement by TANTRANSKO.

4. CTU informed that LTA had been granted to NLC for 334 MW capacity, which was subsequently reduced to 314.79 MW on account of auxiliary consumption. Out of the total installed capacity of 1000 MW at NNTPS, 600 MW is allocated to Tamil Nadu and 66 MW is allocated to NLC for mining load.
5. NLC representative informed that the first unit of NNTPS has been declared under commercial operation w.e.f. 28.12.2019 and COD of 2<sup>nd</sup> unit is expected by 27<sup>th</sup> March, 2020. He requested for timely approval and implementation of alternate arrangement for evacuation of power from 2<sup>nd</sup> Unit of NNTPS, in the absence of availability of Ariyalur substation of Tamil Nadu.
6. CTU representative informed that on the request of NLC vide email dated 19.12.2019, LTA of 156.56 has been operationalized w.e.f. 22.12.2019 upon commissioning of first Unit (500 MW) of NNTPS, through LILO of Neyveli-Puducherry line at NNTPS and margins available in the existing transmission system.



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CTU representative further informed that the transmission system for LTA under the scope of POWERGRID, viz., NNTPS switchyard – Ariyalur (Villupuram) 400 kV D/c line is under advanced stage of completion and only 6-7 km of stringing is left to be done. The transmission line is expected to be ready for commissioning by 26<sup>th</sup> March 2020.

8. TANGEDCO/TANTRANSCO representative stated that 400 kV connectivity to Ariyalur substation is to be established through LILO of both circuits of Pagalur – Kalivandaattu 400 kV (quad) D/c lines and this LILO section of the line has already been completed by them. Further, with respect to the 765/400 kV Ariyalur substation, the works are being carried out by BHEL and the same are expected to be completed within 3 months, i.e. by June 2020. Upon enquiry of the present status of the substation, it was informed that 2x1500 MVA, 765/400 kV ICTs (6 nos. of 500 MVA single phase units) have already been installed and associated bays are under advanced stage of completion. Further, laying of control cables is being done and thereafter testing would be carried out.
9. CTU/TANTRANSCO informed that the matter regarding commissioning of transmission system for evacuation of power from 2<sup>nd</sup> Unit of NNTPS was also discussed in 36<sup>th</sup> TCC / 37<sup>th</sup> SRPC meeting, wherein TANTRANSCO had informed that the expected commissioning schedule of Ariyalur S/s, with best efforts, was June, 2020. During the meeting, it was deliberated that pending commissioning of Ariyalur S/s, NNTPS – Ariyalur 400 kV D/c line may be connected with LILO section of Pugalur – Kalivandapattu 400 kV D/c line at Ariyalur, to form NNTPS – Pugalur 400 kV circuit and NNTPS – Kalivandapattu 400 kV circuit, as interim arrangement.

In view of the above, CTU informed that system studies were carried-out for evacuation of entire power from 2x500 MW units of NNTPS, wherein it was observed that with the existing transmission system, there might be some constraints in evacuation of power from NNTPS under certain conditions, specially in case when the NLC generations connected at 230 kV level are not running to their full capacity. Under such conditions, NLC may have to back down its generation. Accordingly, the alternate arrangement has been proposed. System study results carried out by CTU are enclosed at **Exhibit-I**.

10. POSOCO representative stated that in case the generators connected at 230 kV level in NLC complex do not generate to their full capacity, the 2x250 MVA ICTs at Neyveli TS-II may get overloaded. Further, under such situations, N-1 criteria at NNTPS ICTs also gets violated. In this regard, it was informed that the issue of overloading of ICTs shall get resolved with implementation of 765/400 kV Ariyalur substation. Further, TANGEDCO is implementing Manalmedu and Cuddalore 400/230 kV substations for distribution and configuration of loads which shall further address the ICT overloading issues.
11. POSOCO representative further informed that if 2<sup>nd</sup> Unit (500 MW) of NNTPS is synchronized without the proposed interim arrangement, then the 2x500 MVA ICTs at NNTPS and 2x250 MVA ICTs at NLC-II will be heavily loaded (with full generation of other generators in Neyveli complex). The loading in these ICTs will further increase

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in case of reduction in generation at NLC-I or at NLC-II Stage-I (Unit-1, 2 &3 connected at 230 kV). The contingency of 400 kV NLC-II – Pugalur line will also result in increase in loading of ICTs at NNTPS and NLC-II.

12. POSOCO represented also informed that with proposed interim arrangement, the loading of ICTs at NNTPS and NLC-II will reduce marginally. Also, as there will be two evacuating lines to Pugalur (one from NNTPS and NLC-II each), the 'N-1' of these lines will not increase the loading of ICTs at NNTPS and NLC-II significantly. However, with the interim arrangement also, the generation reduction at NLC-I and NLC-II Stage-I (Unit-1,2&3) will cause overloading and 'N-1' non-compliance of ICTs at NNTPS and NLC-II.

The tripping of both ICTs at NNTPS may result in:

- Tripping of both 250 MVA, 400/230 kV ICTs at NLC-II
- Overloading of 230 kV Pundy – Vilianur and 230 kV Pundy – Bahoor lines.

In order to maintain the loading of ICTs at NNTPS and NLC-II within permissible limits, either sufficient generation at NLC-I and NLC-II Stage-I (Unit-1,2&3) may be ensured or proper rearrangement of feeders may be carried out by TANTRANSCO. The option for implementation of suitable SPS (in case of overloading of ICTs, reduction in generation/tripping of units at NNTPS/NLC-II Stage-II) may also be explored for 'N-1' compliance of ICTs at NNTPS and NLC-II. System study results provided by POSOCO is at **Exhibit-II**.

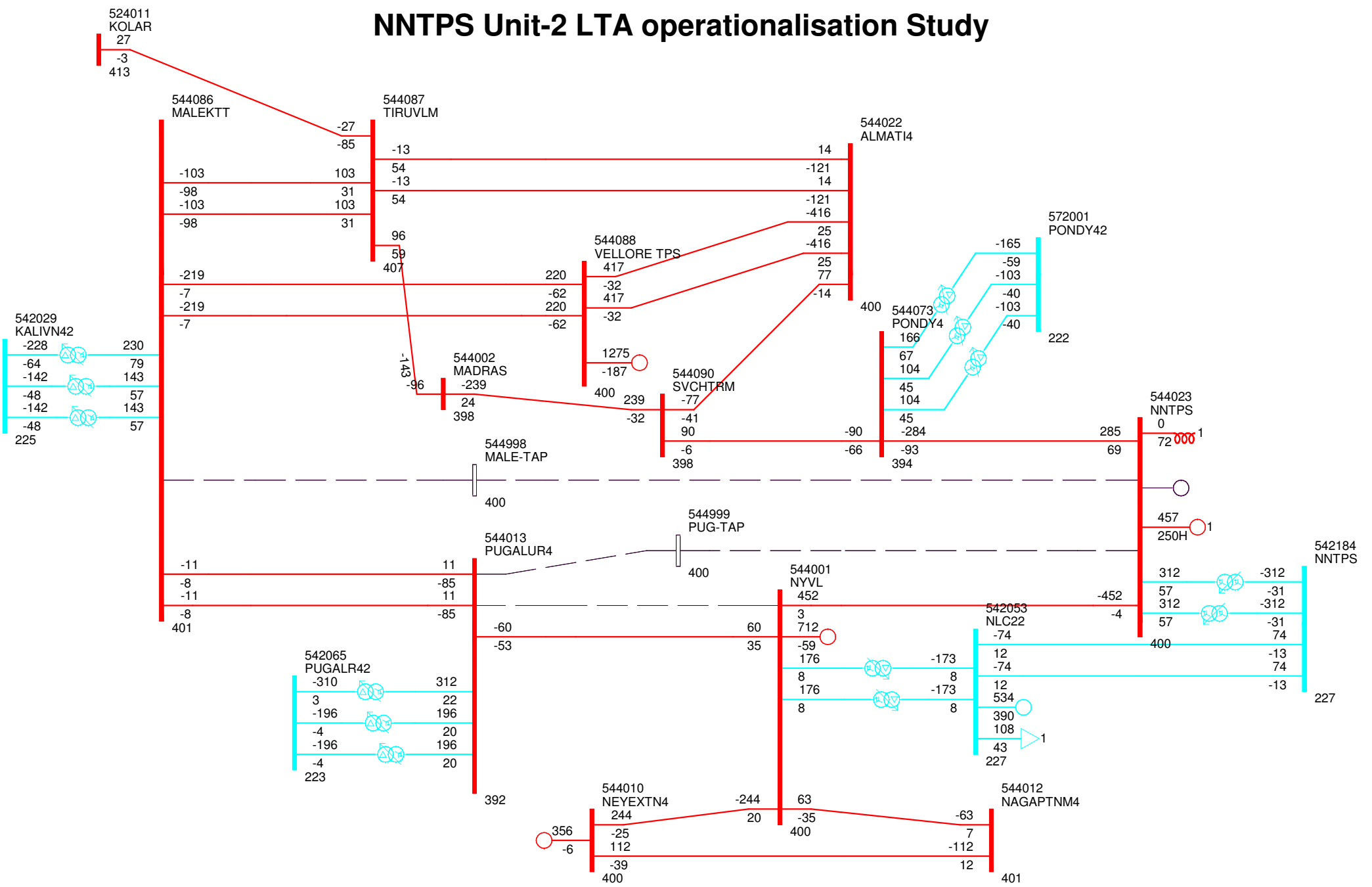
13. After detailed deliberations, it was agreed from system study point of view that the NNTPS - Ariyalur 400 kV D/c line can be connected with one circuit of LILO section of Pugalur – Kalivandapattu 400 kV D/c line at Ariyalur, to form NNTPS – Pugalur 400 kV circuit and NNTPS – Kalivandapattu 400 kV circuit, as an interim arrangement. This interim arrangement would help in evacuation of power from NNTPS. TANTRASCO was advised to commission the Ariyalur S/S by June 2020.
14. Chief Engineer (PSP&A-II), CEA, stated that this matter would be submitted to Member (Power System), CEA, for in-principle approval. The same would then be put up in the forthcoming meeting of SRPC(TP).

----- X X X X ----- X X X X -----

**List of participants of the meeting held in CEA on 09.02.2020 to discuss alternate transmission system for NNTPS (2x500 MW)**

Sl. No.	Name	Designation	Organization
1.	Pardeep Jindal	Chief Engineer (PSPA-II)	CEA
2.	Ishan Sharan	Director (PSPA-II)	CEA
3.	Ramakrishnan C.	GM/E&I	NLCIL
4.	J. Dhanasekaran	GM/Commercial	NLCIL
5.	M. Sudarshan	EE/System Studies	TANGEDCO
6.	S. Devaraju	SE	TANTRANSCO
7.	N. Nallarasana	CGM	NLDC, POSOCO
8.	Priyam Jain	Dy. Manager	NLDC, POSOCO
9.	Anil Kumar Meena	Dy. GM	CTU-Plg, POWERGRID
10.	Ankush Patel	Dy. Manager	CTU-Plg, POWERGRID

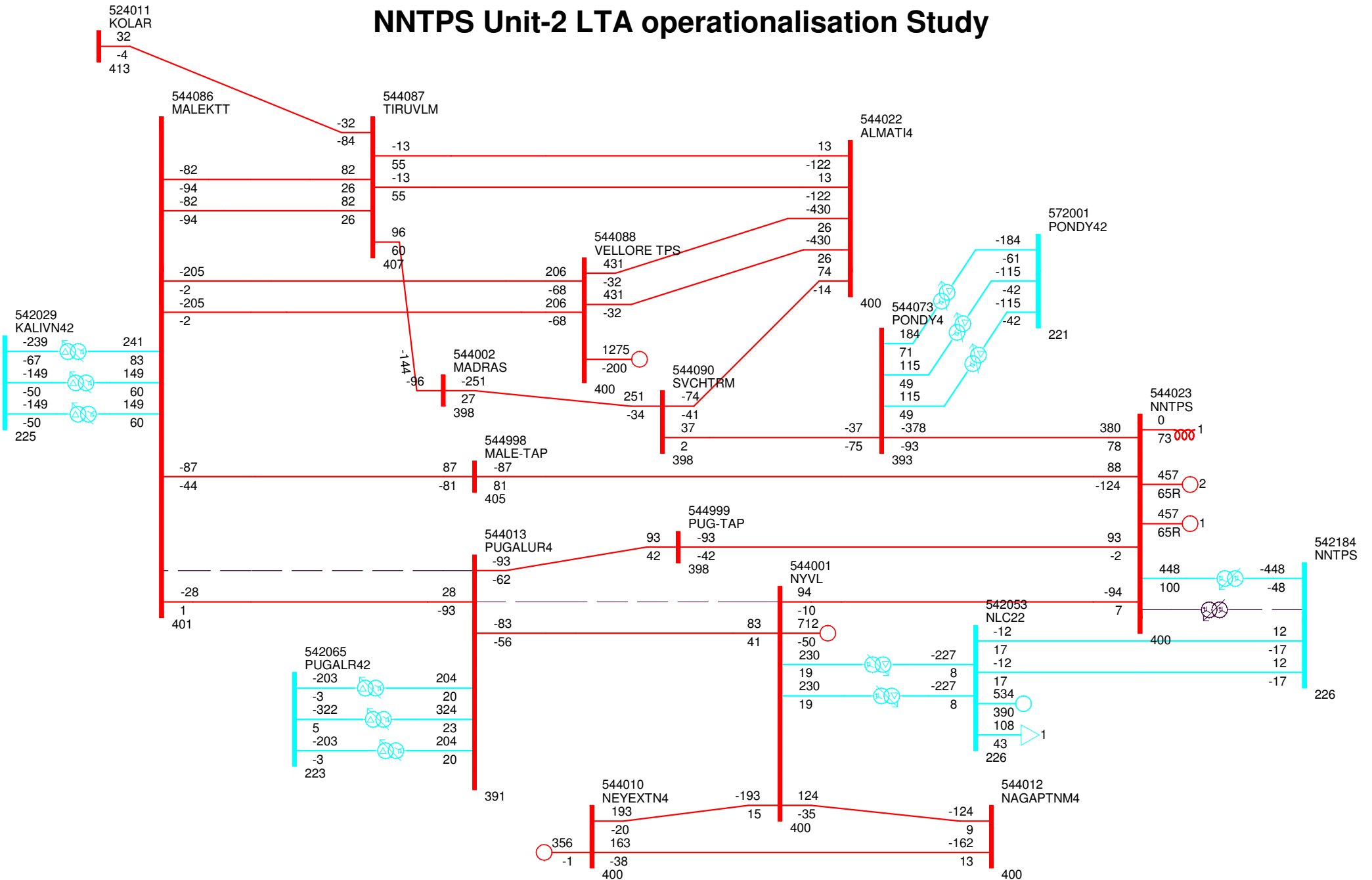
# NNTPS Unit-2 LTA operationalisation Study







# NNTPS Unit-2 LTA operationalisation Study



Study Results - Alternate Arrangement for evacuation of power from 2nd unit of NNTPS						
S. No.	Element	Base Case - NNTPS - 01 unit (MW)	Current Arrangement - NNTPS - 02 units (MW)	Proposed Interim Arrangement - NNTPS- 02 units (MW)	Current Arrangement + N-1 of NLC-II - Pugalur line (MW)	Proposed Interim Arrangement - + N-1 of NLC-II - Pugalur line (MW)
1	400 kV K'pattu - Pugalur - I (362 Kms)	114.5	92	X	112	X
2	400 kV K'pattu - Pugalur - II (362 Kms)	114.5	92	98	112	116
3	400 kV NNTPS - K'pattu (345 Kms)	X	X	40	X	49
4	400 kV NNTPS - Pugalur (205 Kms)	X	X	242	X	290
5	400 kV NNTPS - NLC - II	-388.5	-64	-267	-117	-352
6	400 kV NNTPS - Pondy	195	276	235	301	248
7	2x500 MVA, 400/230 kV NNTPS ICTs	2x332	2x365	2x347	2x379	2x354
8	2x250 MVA, 400/230 kV NLC-II ICTs	2x183	2x190.4	2x187	2x199	2x193
9	400 kV NLC - II - Pugalur	247	283	242	X	X
10	400 kV NLC- II - Salem D/C	2x193	2x250	2x225	2x278	2x244
11	400 kV NLC-II - NLC-II Exp.	-207	-172	-212	-103	-163
12	400 kV NLC-II Exp. - Pugalur	247	282	242	351	290

**Note:-**

a) All India May 2020 Peak case has been taken for study purpose.

b) Ex-bus generation considered at nearby plants is as under:-

NLC- I -  $3 \times 60 + 3 \times 35.3 = 295$  MW

NLC - II -  $3 \times 175.4 + 4 \times 178.4 = 1240$  MW

NLC - I Exp. -  $2 \times 193.7 = 387$  MW

NLC - II Exp. -  $2 \times 226.8 = 453.6$  MW

ILFS -  $2 \times 550 = 1100$  MW

c) Sensitivities:-

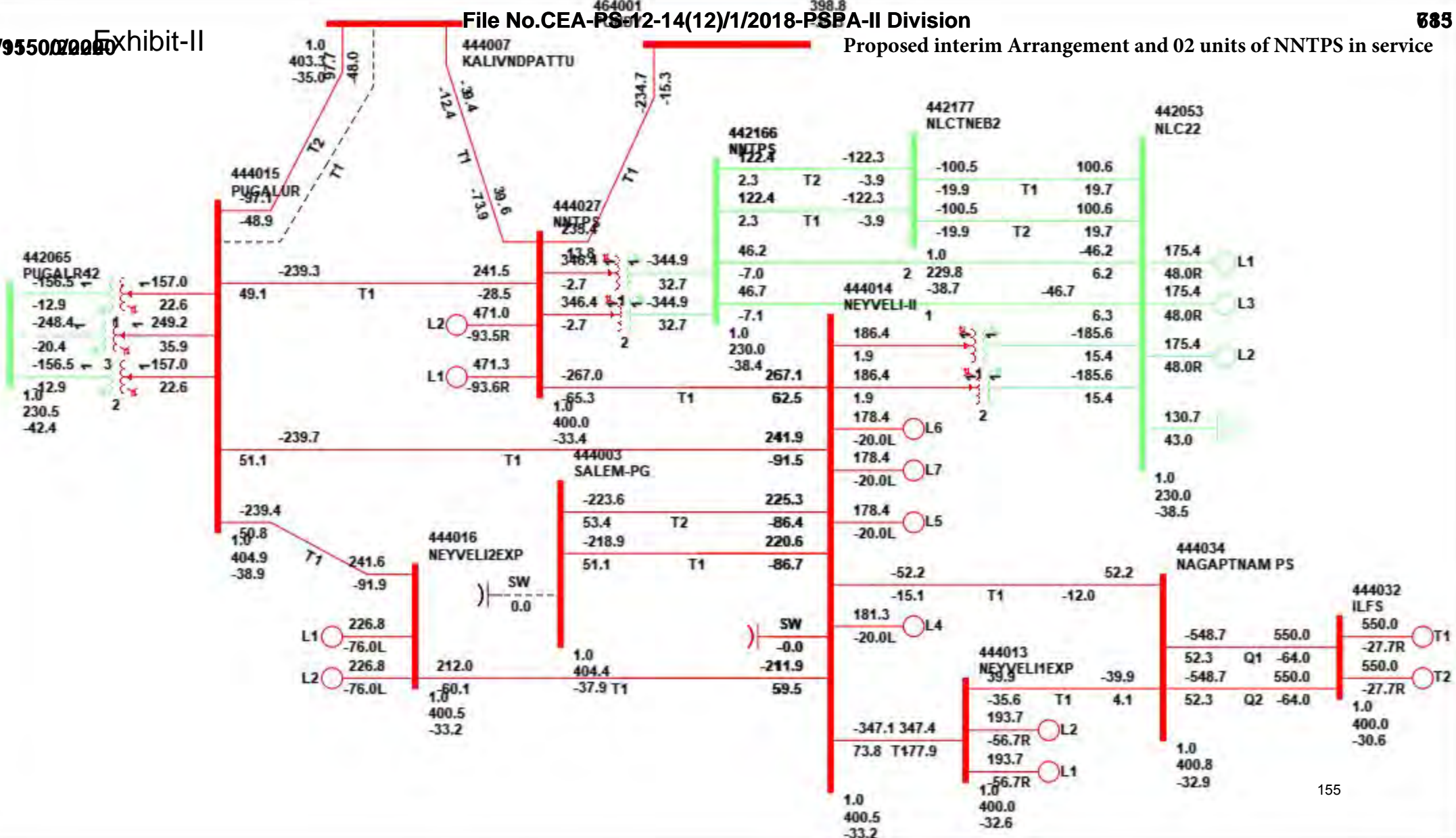
2x500 MVA ICTs at NNTPS - ~35%

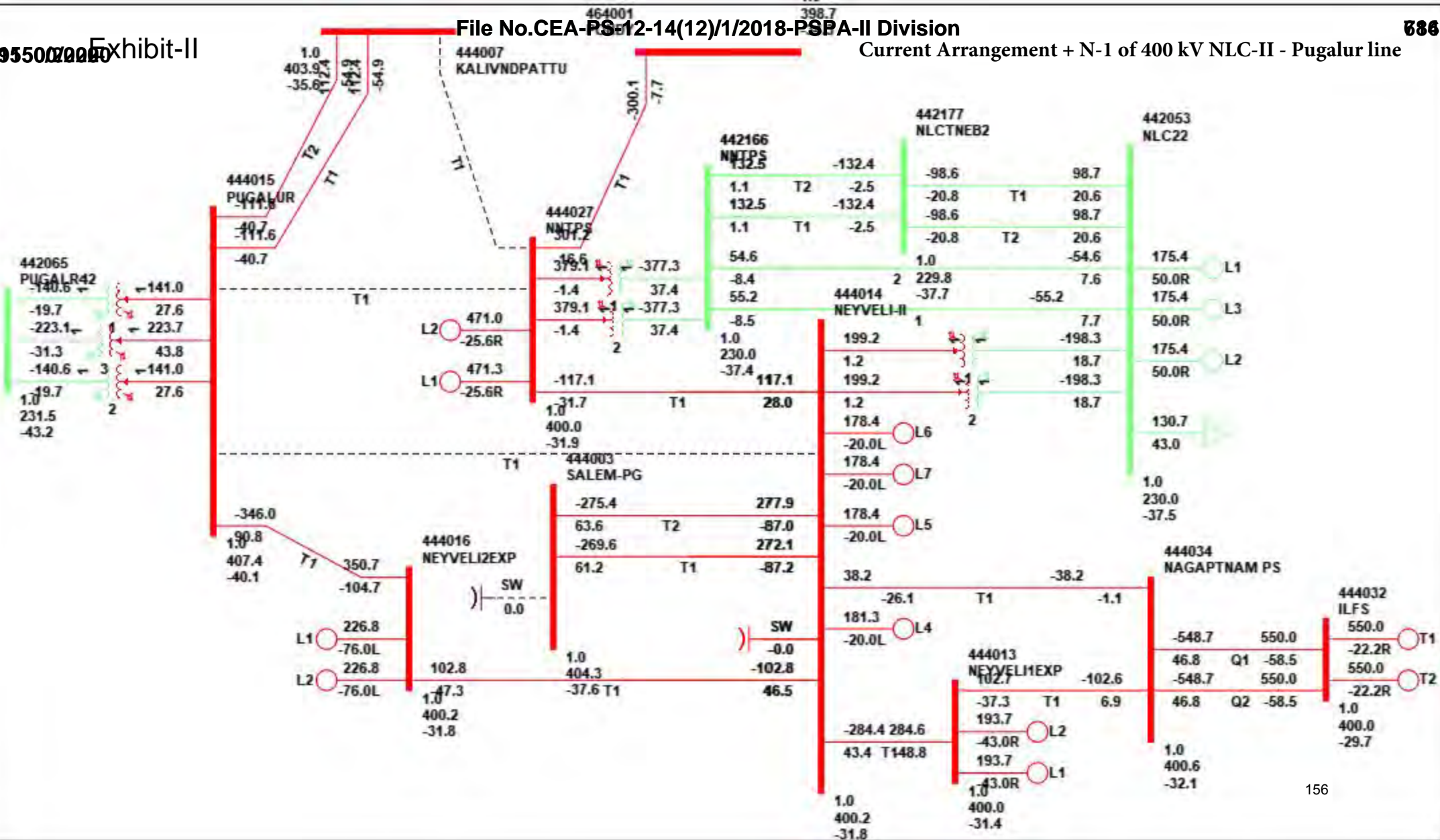
2X250 MVA ICTs at NLC-II - ~16%





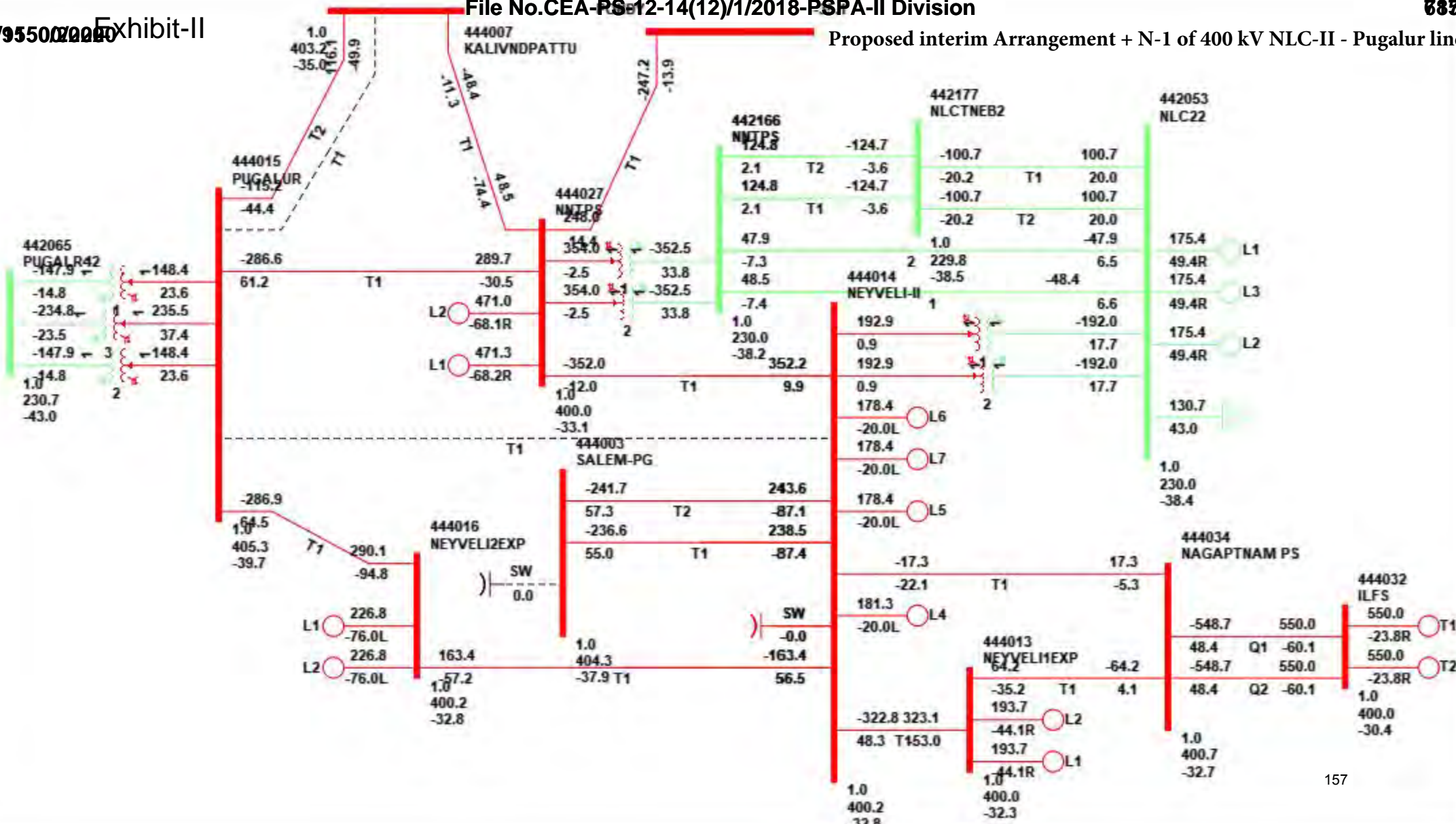








Proposed interim Arrangement + N-1 of 400 kV NLC-II - Pugalur line



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Annex-24.3

File No.CEA-PS-12-14(12)/1/2018-PSPA-II Division

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Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग -II

Power System Planning &amp; Appraisal Division-II

सेवा में / To,

संलग्न सूची के अनुसार

As per list enclosed

विषय/Subject: Alternate arrangement of transmission system for evacuation of power from 2<sup>nd</sup> unit of NNTPS

महोदय(Sir)/महोदया (Madam),

Please refer the minutes (copy enclosed) of the meeting held in CEA on 09.03.2020, to discuss the matter of alternate arrangement of transmission system for evacuation of power from 2<sup>nd</sup> unit of NNTPS.

In the meeting, it was agreed from system study point of view that the NNTPS - Ariyalur 400 kV D/c line can be connected with one circuit of LILo section of Pugalur - Kalivandapattu 400 kV D/c line at Ariyalur, to form NNTPS - Pugalur 400 kV circuit and NNTPS - Kalivandapattu 400 kV circuit, as an interim arrangement. This interim arrangement would help in evacuation of power from NNTPS.

As the expected CoD of 2<sup>nd</sup> Unit of NNTPS is March 2020, in -principle approval is being conveyed for the interim arrangement, considering the urgency of the matter.

Thanking You.

भवदीय/Yours faithfully,

(प्रदीप जिंदल/Pardeep Jindal)

मुख्य अभियंता /Chief Engineer

I/11500/2020

File No.CEA-PS-12-14(12)/1/2018-PSPA-II Division

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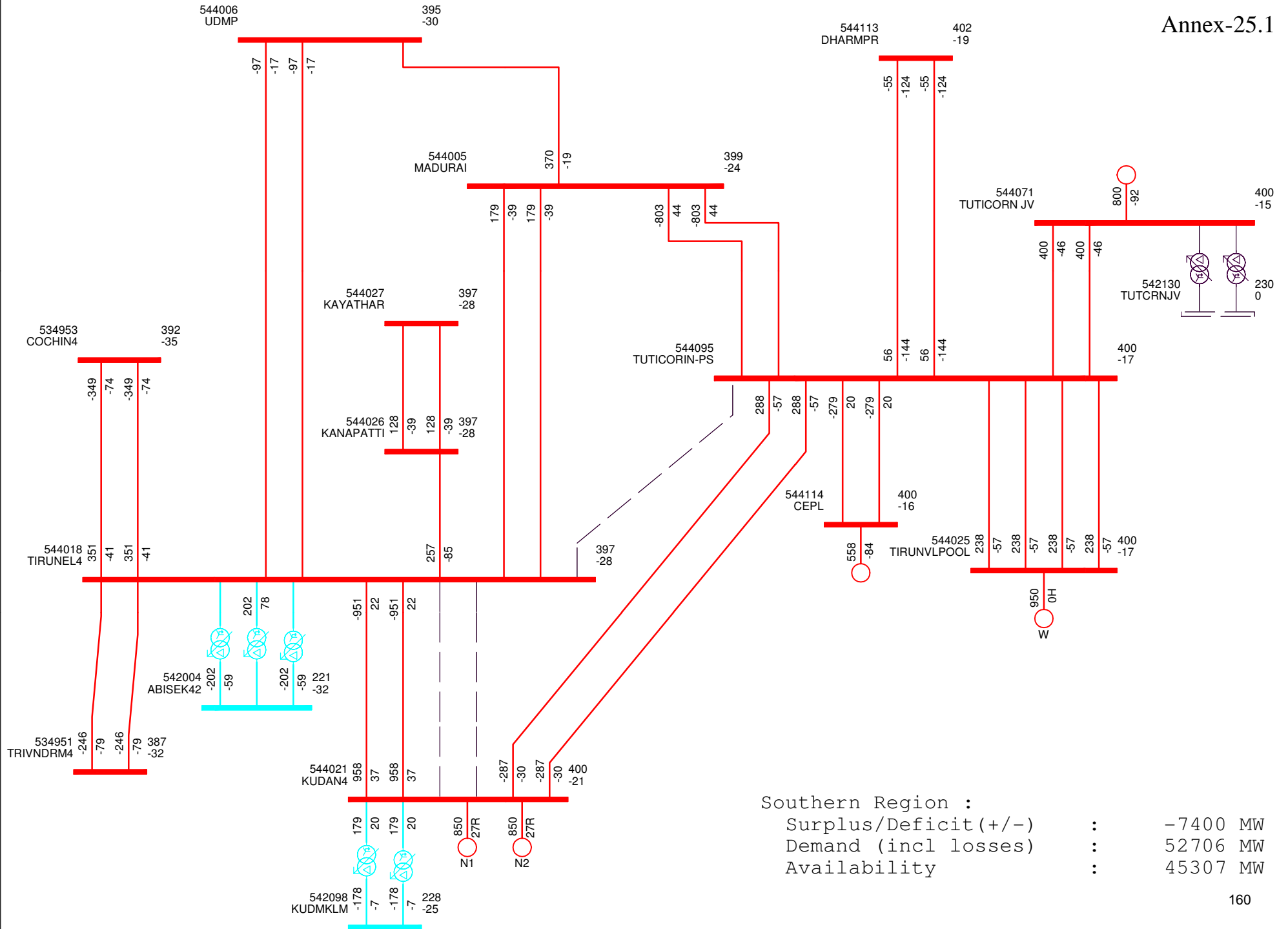
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**List of addressee:**

<p>1. COO, CTU Power Grid Corp. of India Ltd. "Saudamini", Plot No.2, Sector-29, Gurugram 122 001, Haryana. FAX : 95124-2571932</p>	<p>2. Director (System Operation), POSOCO, B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi-110016</p>
<p>3. Director (Transmission), TANTRANSCO, 144, Anna Salai, Chennai - 600002. FAX: 044-28516362</p>	<p>4. Director (Power) NLC India Limited, Block-1, Neyveli-607801, Cuddalore District, Tamil Nadu</p>

# Re-arrangement of Transmission system at Tirunelveli for Kudankulam 1 & 2 (2000 MW)

Annex-25.1

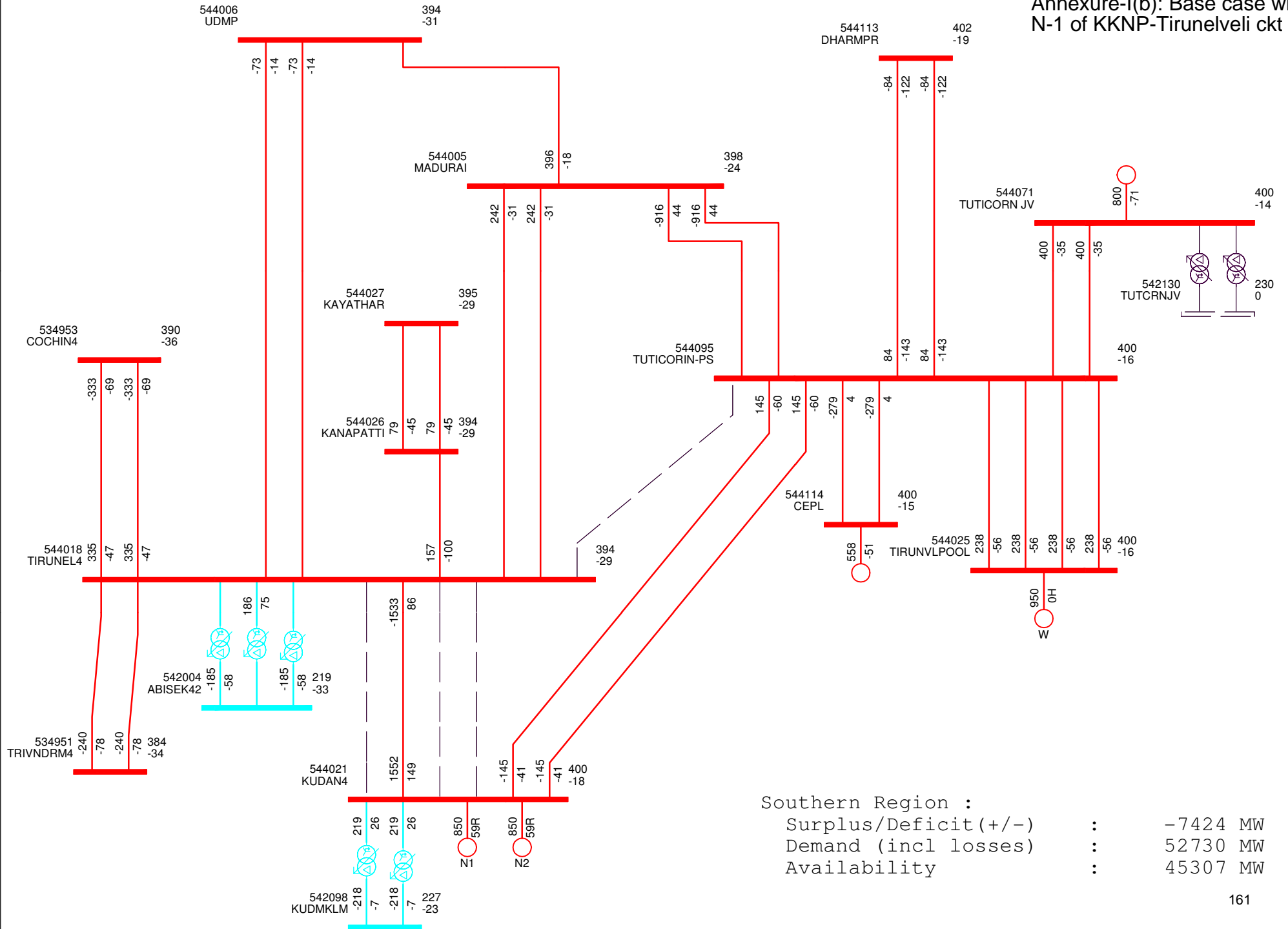


Southern Region :

Surplus/Deficit(+/-)	:	-7400 MW
Demand (incl losses)	:	52706 MW
Availability	:	45307 MW

# Re-arrangement of Transmission system at Tirunelveli for Kudankulam 1 & 2 (2000 MW)

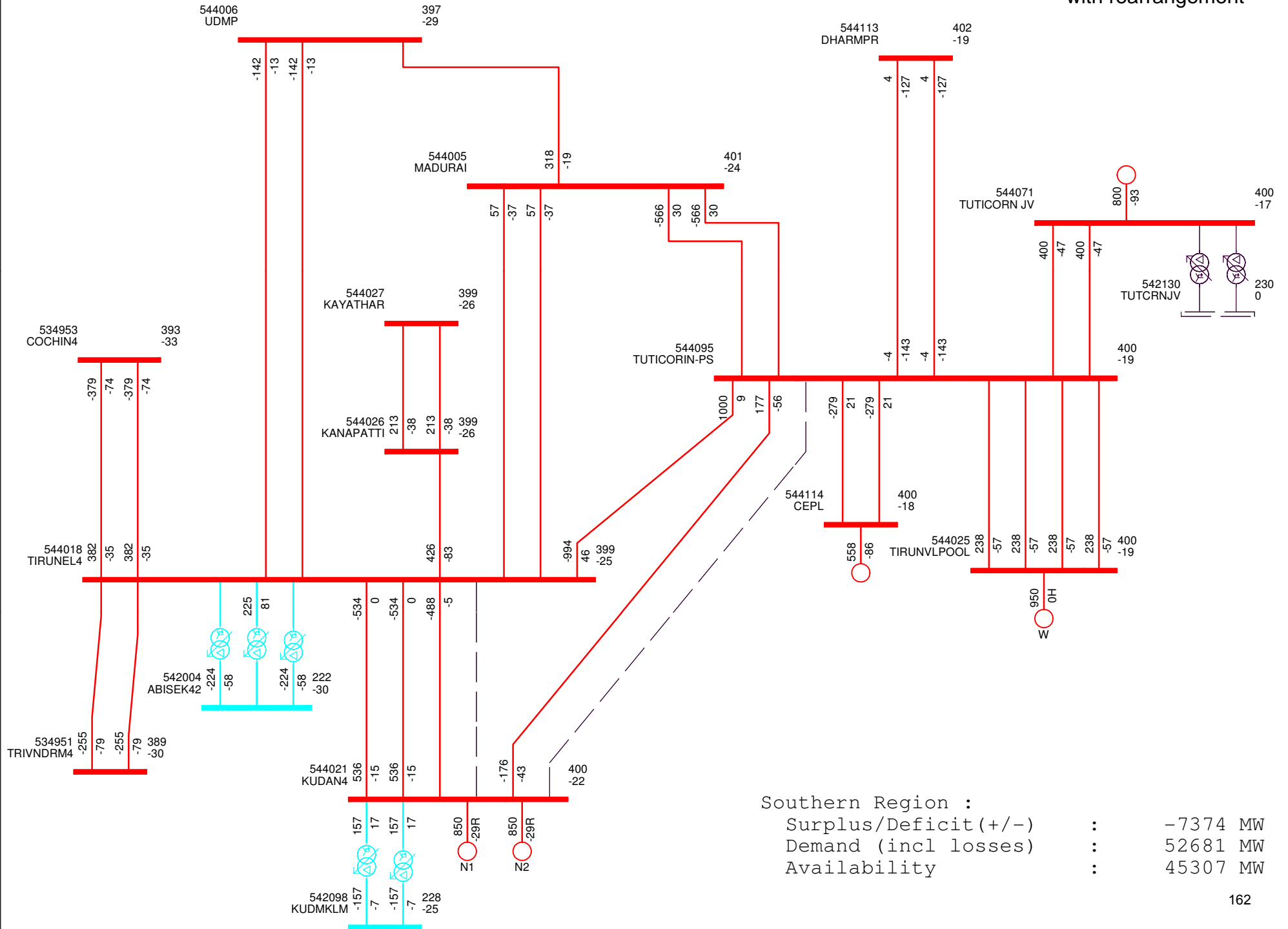
Annexure-I(b): Base case with N-1 of KKNP-Tirunelveli ckt





# Re-arrangement of Transmission system at Tirunelveli for Kudankulam 1 & 2 (2000 MW)

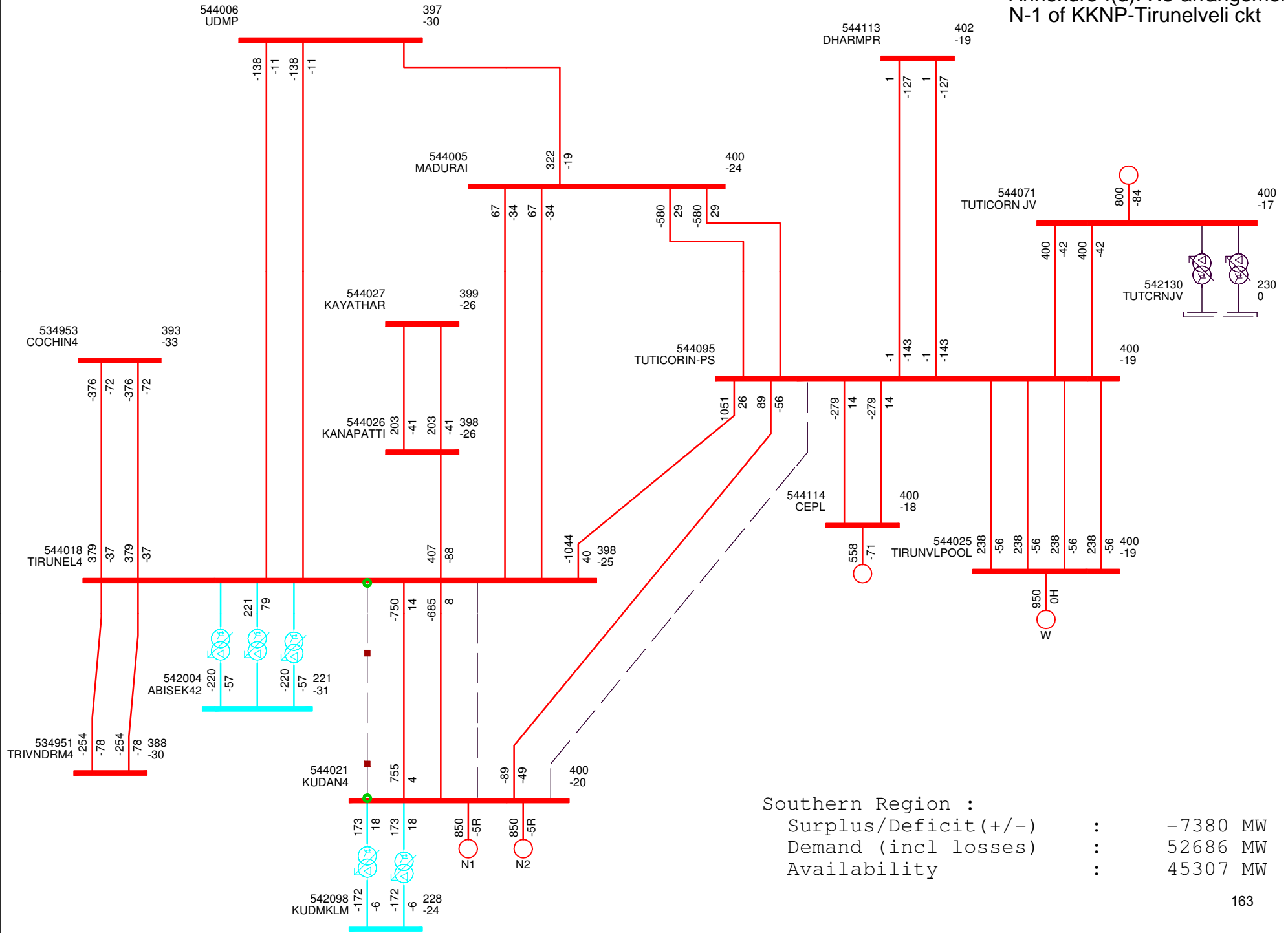
Annexure-I(c): Base case with rearrangement



Southern Region :

Surplus/Deficit(+/-)	:	-7374 MW
Demand (incl losses)	:	52681 MW
Availability	:	45307 MW

# Re-arrangement of Transmission system at Tirunelveli for Kudankulam 1 & 2 (2000 MW)



I/11500/2020



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[www.elia.be](http://www.elia.be)

Brussels, May 21<sup>st</sup>, 2019

TO WHOM IT MAY CONCERN

Elia has been using Ampacimon systems (hardware, software and services) since 2008 on the Belgian transmission and sub-transmission electricity grid. Deployment and operation of these systems have been successful and satisfactory.

These systems consist mainly of ADR SENSE monitoring devices, ADR OPERATE real-time ampacity software, ADR TREND and ADR HORIZON ampacity forecast software. They have been used to alleviate constraints on the Belgian grid, in order to maximise its utilization by securely increasing the thermal limits of overhead lines, while maintaining safety and operational security. To date more than 150 devices have been installed on more than 30 lines from 70 kV to 380 kV, including interconnectors, and deployment is pursued according to Elia's needs.

A complete integration into the SCADA/EMS at the Belgian National Control Centre has been made in such a way that ampacity computations are used continuously by Elia dispatch engineers.

Ampacimon's forecasting tools effectiveness allows Elia to increase exchange capacities on the day-ahead electricity market without increasing its exposure to redispatching costs.

Our expectations have been fully met thanks to the Ampacimon team and the quality of Ampacimon solutions and services, which is greatly helping Elia in meeting the challenges on its grid.

For reference, the list of lines currently equipped and monitored with Ampacimon solutions is attached, with circuit reference, voltage level, number of sensors, year of commissioning.

./...

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Bruselas, el 21 de mayo del 2019

**A QUIEN CORRESPONDA**

Elia ha estado utilizando los sistemas Ampacimon (hardware, software y servicios) desde el año 2008 en la red eléctrica de transmisión y subtransmisión belga. El despliegue y la operación de estos sistemas han sido exitosos y satisfactorios.

Estos sistemas consisten principalmente en dispositivos de monitoreo ADR SENSE, software de ampacidad en tiempo real ADR OPERATE, y software de pronóstico de ampacidad ADR TREND y ADR HORIZON. Se han utilizado para aliviar las restricciones en la red belga a fin de maximizar su utilización al aumentar de forma segura los límites térmicos de las líneas aéreas, mientras se mantiene la seguridad física y la seguridad operativa. Hasta el día de hoy, más de 150 dispositivos han sido instalados en más de 30 líneas desde 70 kV hasta 380 kV, incluidos interconectores, y el desarrollo se lleva de acuerdo con las necesidades de Elia.

Se ha realizado una integración completa en el SCADA / EMS en el Centro de Control Nacional de Bélgica de tal manera que los ingenieros de explotación de Elia utilizan continuamente los cálculos de ampacidad.

La eficacia de las herramientas de pronóstico de Ampacimon le permite a Elia aumentar las capacidades de intercambio en el mercado diario de electricidad sin aumentar su exposición a los costos de redispatching.

Nuestras expectativas se han cumplido plenamente gracias al equipo de Ampacimon y la calidad de las soluciones y servicios de la empresa, lo cual ha ayudado muchísimo a Elia para enfrentarse a los desafíos de su red.

Para su referencia, se adjunta la lista de líneas actualmente equipadas y monitoreadas con las soluciones de Ampacimon, con referencia de circuito, nivel de voltaje, número de sensores y año de puesta en servicio.

A handwritten signature in blue ink, appearing to read "Patrick De Leener".

Patrick De Leener,

Chief Officer Customers, Market & System

I/11500/2020



Country	Utility	Circuit ref	Voltage (kV)	Year commissioned	No of sensors
Belgium	ELIA	380.73	380	2017	8
Belgium	ELIA	380.74.H	380	2017	3
Belgium	ELIA	380.74.M	380	2017	5
Belgium	ELIA	380.102	380	2017	3
Belgium	ELIA	380.91	380	2017	10
Belgium	ELIA	380.11	380	2017	10
Belgium	ELIA	380.12	380	2017	13
Belgium	ELIA	380.31	380	2017	11
Belgium	ELIA	70.49.M	70	2017	2
Belgium	ELIA	70.49.T	70	2017	4
Belgium	ELIA	380.29	380	2016	2
Belgium	ELIA	380.30	380	2016	2
Belgium	ELIA	220.513	220	2016	3
Belgium	ELIA	220.514	220	2016	3
Belgium	ELIA	150.313	150	2015	4
Belgium	ELIA	150.314	150	2015	4
Belgium	ELIA	380.19	380	2014	7
Belgium	ELIA	380.80	380	2014	4
Belgium	ELIA	380.79	380	2014	4
Belgium	ELIA	380.25	380	2014	4
Belgium	ELIA	380.31	380	2013	1
Belgium	ELIA	380.23	380	2014	10
Belgium	ELIA	380.27	380	2014	2
Belgium	ELIA	380.28	380	2014	2
Belgium	ELIA	150.5	150	2014	6
Belgium	ELIA	150.6	150	2014	6
Belgium	ELIA	150.7	150	2014	2
Belgium	ELIA	150.8	150	2014	2
Belgium	ELIA	150.15	150	2010	5
Belgium	ELIA	150.16	150	2010	5





INTERLOCUTEUR Mathieu Fontaine  
TÉLÉPHONE +33 (0)1 79 24 89 71  
E-MAIL Mathieu.fontaine@rte-france.com

OBJET RTE Satisfaction letter PARIS, 24/05/2019

RTE has been using Ampacimon systems (hardware, software and services) since 2009 on the French transmission electricity grid. These systems (ADR SENSE sensors, ADR OPERATE real-time ampacity software, ADR TREND ampacity forecast software) have been deployed in various regions and have operated successfully.

They have been used to relieve constraints on the RTE grid, in order to maximise its use by safely increasing thermal limits of overhead lines, while maintaining full safety and security of operations. To date more than 30 Ampacimon sensors have been installed on 9 lines from 63 kV to 400 kV for the deployments of our DLR projects "Ampacité" and "Ampacité 2". Ampacimon has been selected for the large-scale industrial phase due to start in 2019.

Data exchange between the Ampacimon server and RTE control centres has been successfully implemented according to TASE2 exchange protocol, allowing RTE dispatch engineers to use ampacity data, including forecasts, in operation conditions.

The Ampacimon systems and quality of service have fully met our expectations and have helped greatly in meeting the challenges RTE faces on its grid.

For reference, the list of lines currently equipped and monitored with Ampacimon solutions is attached, with circuit reference, voltage level, number of sensors, year of commissioning.

I/11500/2020



RTE ha estado utilizando los sistemas Ampacimon (hardware, software y servicios) desde el año 2009 en la red eléctrica de transmisión francesa. Estos sistemas (sensores ADR SENSE, software de ampacidad en tiempo real ADR OPERATE, software de pronóstico de ampacidad ADR TREND) se han implementado en varias regiones y han funcionado con éxito.

Se han utilizado para aliviar las restricciones en la red RTE a fin de maximizar su uso al aumentar de forma segura los límites térmicos de las líneas aéreas y a la vez mantener una total protección y unas operaciones seguras. A día de hoy, más de 30 sensores Ampacimon han sido instalados en 9 líneas de 63 kV a 400 kV para el desarrollo de nuestros proyectos DLR "Ampacité" y "Ampacité 2". Ampacimon ha sido seleccionado para la fase industrial del DLR a gran escala que comenzará en 2019.

El intercambio de datos entre el servidor Ampacimon y los centros de control de RTE se ha implementado con éxito de acuerdo con el protocolo de intercambio TASE2, lo que permite a los ingenieros de explotación de RTE de utilizar datos de ampacidad, incluidos pronósticos, en condiciones de operación.

Los sistemas y la calidad del servicio de Ampacimon han cumplido con todas nuestras expectativas, ayudando muchísimo a RTE a enfrentarse a los desafíos de su red.

Para su referencia, se adjunta la lista de líneas actualmente equipadas y monitoreadas con las soluciones de Ampacimon, con referencia de circuito, nivel de voltaje, número de sensores, año de puesta en servicio.

I/11500/2020



Country	Utility	Line name <i>(obfuscated for confidentiality reasons)</i> <i>(ofuscado por razones de confidencialidad)</i>	Voltage (kV)	Year of commissioning	No of sensors
France	RTE	Bacalan-Marquis	225	2018	1
France	RTE	Marmagne-Mehun	90	2018	4
France	RTE	Realtor – Tavel Circuit 2	400	2017	13
France	RTE	Prauthoy Rolampont	63	2017	5
France	RTE	Bissy-Grande Ile	225	2015	1
France	RTE	Châteauneuf du Rhone - Montjoyer	63	2015	4
France	RTE	Fugerolle - Montjoyer	63	2015	3
France	RTE	Fugerolle – Montmartel	63	2015	3
France	RTE	Arly-Marlens-Thônes	63	2012	4

**Olivier ARP**

Project Manager Ampacité 2

A handwritten signature in black ink, appearing to be "Olivier ARP", written over a light blue horizontal line.


**Mathieu FONTAINE**

Project Manager on DLR at RTE

A handwritten signature in black ink, appearing to be "Mathieu FONTAINE", written over a light blue horizontal line.

I/11500/2020

फैक्स/स्पीड पोस्ट /FAX/SPEEDPOST

भारत सरकार केंद्रीय विद्युत प्राधिकरण दक्षिण क्षेत्रीय विद्युत समिति बेंगलूरु - 560 009				Government of India Central Electricity Authority Southern Regional Power Committee Bengaluru - 560 009	
Web site: www.srpc.kar.nic.in		e-mail: <a href="mailto:mssrpc-ka@nic.in">mssrpc-ka@nic.in</a>		Ph: 080- 22287205	Fax: 080- 22259343
सं/No.	SRPC/SE(O)/2019-20 / 178 3 - 87	दिनांक / Date	16.03.2020		

1. COO, CTU, Gurugram
2. Director (O), POSOCO, New Delhi

**Sub: Pilot project in SR on dynamic line ratings -reg.**

Sir,

As you are kindly aware the issue of dynamic line ratings is under deliberation in SRPC forum. Dynamic line ratings were to be implemented within one month as per CERC Order dated 05.08.2015 in Petition No 009/SM/2015 (CAC Sub Committee on Congestion in Transmission). As noted in the 36<sup>th</sup> SRPC meeting, the issue of implementation of dynamic line ratings was taken up with Chairperson, CEA by Chairperson, SRPC vide letter dated 13.09.2019 (**Annexure-I**). The issue was further deliberated in the 36<sup>th</sup> TCC / 37<sup>th</sup> SRPC meeting held on 31.01.2020 and 01.02.2020.

KSEBL vide letter dated 27.02.2020 (**Annexure-II**) has suggested that Kerala pose to be most appropriate case for piloting this technology.

The issue was discussed in the 167<sup>th</sup> OCC meeting held on 13.03.2020 wherein after deliberation, OCC had opined that MS, SRPC on behalf of the OCC forum may take up the issue with POSOCO / CTU to have a Pilot Project on any critical line in SR which could be funded through PSDF or through R & D fund of PGCIL.

It is requested that Pilot Project on dynamic line ratings could be considered in SR as per the deliberations in SRPC forum and to ensure the compliance of CERC Order. A positive reply would be highly appreciated.

धन्यवाद /Thanking you,

संलग्न : यथोपरि / Encl: As above

भवदीय / Yours faithfully



(ए बालन/ A BALAN)

सदस्य सचिव/Member Secretary

Copy to:

1. Chief Engineer, PSPA-II, CEA, New Delhi
2. Chief (Engg), CERC, New Delhi
3. Executive Director, SRLDC, Bengaluru

I/11500/2020

ಡಾ|| ಎನ್. ಮಂಜುಳ, ಭಾಷಣೀ,  
ವ್ಯವಸ್ಥಾಪಕ ನಿರ್ದೇಶಕರು

**Dr. N. MANJULA, IAS.,**  
Managing Director  
& Chairperson, SRPC



(Page 1 of 2 )  
ಕರ್ನಾಟಕ ವಿದ್ಯುತ್ ಪ್ರಸಾರಣ ನಿಗಮ ನಿಯಮಿತ  
**Karnataka Power Transmission  
Corporation Limited**  
Kaveri Bhavan, K.G. Road,  
Bengaluru - 560 009.  
CIN : U40109KA1999SGCO25521  
Office : 080-22244556 / 22214342  
e-mail : md@kptcl.com

13<sup>th</sup> September 2019

The Chairperson,  
Central Electricity Authority,  
New Delhi-110066.

Sir,

In the 36<sup>th</sup> meeting of SRPC held on 12.07.2019, electrical infrastructure (transmission towers etc) getting affected due to local tunneling and localized high speed winds due to convection etc. becoming predominant was reported by PGCIL, APTRANSCO and other transmission licensees. Most of these events are not captured by IMD reportedly due to lack of infrastructure. The Committee had concluded that the matter may be referred to CEA and a specific study may be conducted under aegis of CEA.

Further in the meeting, the optimum utilization of the transmission corridor was also discussed. Entities had suggested that POSOCO may use dynamic line rating (solutions are in place in foreign countries) in day ahead and in real time to have optimized TTC/ATC on dynamic line ratings. There may be additional current carrying capacity & sag adjustments and with that there could be additional margin of 15-20% on the existing infrastructure. It was noted that by using dynamic line rating on few contingent lines ATC of the corridor/ control area could be increased significantly.



I/11500/2020

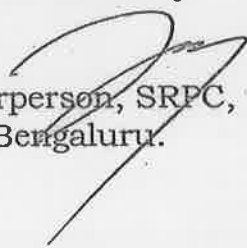
Annexure- VII  
(Page 2 of 2 )

Further Operational Guidelines for determination of TTC, ATC, and TRM for the Short-Term Horizon (0-3 Months) had been notified by NRCE. These guidelines are being used in Southern Region on seasonal basis but are yet to be implemented by POSOCO for inter-regional corridors towards SR. In the CERC Order dated 05.08.2015, the Commission had accepted the recommendation of CAC Sub Committee on Congestion and Transmission which stated '*POSOCO to commence use of dynamic line rating within one month, after taking confirmation from equipment owner regarding the facility ratings*'.

Keeping into consideration the concerns of SR constituents, it is requested that the following may kindly be arranged to be examined:

- Specific study on local tunneling and localized high speed winds due to convection etc and its impact on electrical infrastructure (transmission towers etc).
- POSOCO may be suggested to implement the operational guidelines for inter-regional corridor for import to SR on seasonal basis at the earliest.
- Implementation of dynamic line loadings on real time / day ahead for optimal utilization of existing corridors. The same may be included in the Operational Guidelines for determination of TTC/ATC/TRM for it to be implemented by POSOCO in real time/day ahead.

Yours faithfully,

  
Chairperson, SRPC,  
Bengaluru.

V/11500/2020

(1/2)

**KERALA STATE ELECTRICITY BOARD LTD.***(Incorporated under the Indian Companies Act, 1956)*

Office of the Chief Engineer(Transmission System Operation)

LD Centre, H.M.T.Colony P.O., Kalamassery - 683 503.

Phone: 0484 2555965,2543850,9496019100 Fax: 0484 2555950

Email : [cesoklsy@gmail.com](mailto:cesoklsy@gmail.com), [ceso@kseb.in](mailto:ceso@kseb.in)Website: [www.kseb.in](http://www.kseb.in), CIN:U40100KL2011SGC027424

No.CESO/ EELD1/AEEMO/ATC-TTC/19-20/ 3122.

Dated:26.02.2020

To

The Member Secretary,  
SRPC, Bengaluru

Sir,

( Sub: Implementation of dynamic line loading on real time/  
day ahead for optimal utilisation transmission corridors –  
37<sup>th</sup> SRPC agenda item - further actions – request from  
Kerala side – reg. )

- Ref: 1) Letter dt:13.09.2019 of Chairperson, SRPC addressed  
to the Chairperson, CEA.  
2) Deliberations in various OCC/ TCC meetings.  
3) Discussions in 37<sup>th</sup> SRPC, Hyderabad dt: 01.02.2020.  
4) Report of expert group – Review of Indian Electricity Grid  
Code - January 2020.

( Please refer to the subject matter. Kerala has been requesting  
adoption of "Dynamic Line Loading Technology" for real time visibility and  
monitoring of transmission capacity which can enable better and effective  
utilization of transmission corridors. Adoption of such technology is learned  
to benefit in day ahead /real time assessment of TTC/ ATC/ TRM to a better  
level than current practice of locking the capacities to seasonal limitations.

This is more relevant for a state like Kerala where we are  
importing 70% or more of its power from other part of the country and  
in many situations, corridor constraints deprive the state in making use of  
the low cost power available in day ahead/ intra day market.

More over, the state and the region has been paying additional  
charges for power due to market splits consequent to congested corridors  
whereas the actual corridor capacity can be substantially higher if such real  
time visibility is brought in with the support of dynamic line loading  
features.

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The situation becomes more grave and concerning when the inter state feeders are under outage due to permit works and forced outages.

Many times state/region face curtailment of its allocations in such cases.

It is pertinent to note that the state like Tamil Nadu, Karnataka and Andhra Pradesh where we have huge capacity of RE power are constrained to curtail in real time such RE power due to difficulties in absorption for the reason of capacity constraints of the system in some cases.

Kerala being a strategically placed geographical region, with Tamil Nadu and Karnataka on its boundaries, can absorb and utilise, this RE power that is being curtailed, provided corridor capacity can be made available in existing systems. The matter of adoption of dynamic line loading technology was discussed in the recent SRPC meetings at Hyderabad on 1<sup>st</sup> February 2020 and it is gathered that POSOCO in consultation with CTU are working on this for implementing this technology in critical corridors.

So required decisions from the side of CTU/ POSOCO is expected soon.

Detailed procedure and operational guidelines in this regard are also to be prepared and released.

For the reasons and circumstances stated above, the inter state transmission lines of Kerala pose to be the most the appropriate case for piloting this technology and we request the appropriate authorities for taking decisions for implementation preferably in the route from Udumalpet to Kerala, as the same can give immediate relief to the State in situations of contingencies. )

Yours faithfully,

  
Chief Engineer (Trans.System Operation)

- Copy to: 1) The Member, CERC, New Delhi  
2) The Chairperson, SRPC, Bengaluru  
3) The Chairman, CEA, New Delhi  
4) The Director (Operations), POSOCO, New Delhi  
5) The Executive Director, SRLDC, Bengaluru  
6) The Chief Engineer (Commercial & Planning), KSEBL  
7) The TA to Director (TSO & S), KSEBL.

## **All-India Studies for integration of power from identified Renewable Energy Zones in 2021-22**

1<sup>st</sup> meeting of Southern Region Power Committee (Transmission Planning) (SRPC(TP)) meeting was held on 16.12.2019 wherein various issues related to All-India studies for integration of power from identified Renewable Energy zones were discussed with the constituents. During the meeting, it was decided that comments / observations / suggestions may be submitted by the SR constituents on the All-India system studies already circulated vide email dated 19.11.2019 and based on observations received from constituents and deliberations held with POSOCO/CEA during the meeting held on 10.12.2019 on the referred circulated LGB/system studies circulated vide email dated 19.11.2019, 9 nos. of scenarios shall be prepared and circulated to the constituents.

In view of the above, LGB for 9 nos. of scenarios and system studies file for Scenario-4, June 2021-22 Afternoon Peak was prepared. Load generation scenarios, results of the system studies, study assumptions & inputs considered were uploaded on CTU website and were also circulated to all the regional constituents for their comments/observations vide emails dated 20.05.2020 (SR), 08.06.2020 (WR) and 11.06.2020 (NR, ER & NER).

Comments were received from POSOCO vide letter dated 25.06.2020. Further, observations pertaining to certain transmission network data updation of STU network and generation dispatches were also received from TANTRANSCO vide email dated 02.06.2020 and KPTCL vide email dated 08.06.2020. KPTCL has stated that the 9 nos. of load generation balance scenarios and assumptions considered for study pertaining to Karnataka is in line with the historical pattern. No comments were received from any other constituents. Accordingly, the system studies file was updated incorporating the above observations of the constituents and system studies were carried out for all the 9 nos. of scenarios. The system studies along with observations received from POSOCO/constituents were also discussed with CEA and POSOCO in meeting held on 23.07.2020.

Load generation scenarios, study assumptions & inputs considered, system studies and study analysis are attached for comments/observations. Comments/observations on the referred system studies may be forwarded to following email ids :

[anilsehra@powergridindia.com](mailto:anilsehra@powergridindia.com); [ankush.patel@powergridindia.com](mailto:ankush.patel@powergridindia.com).

I/11500/2020

**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 (SR – 62975 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.



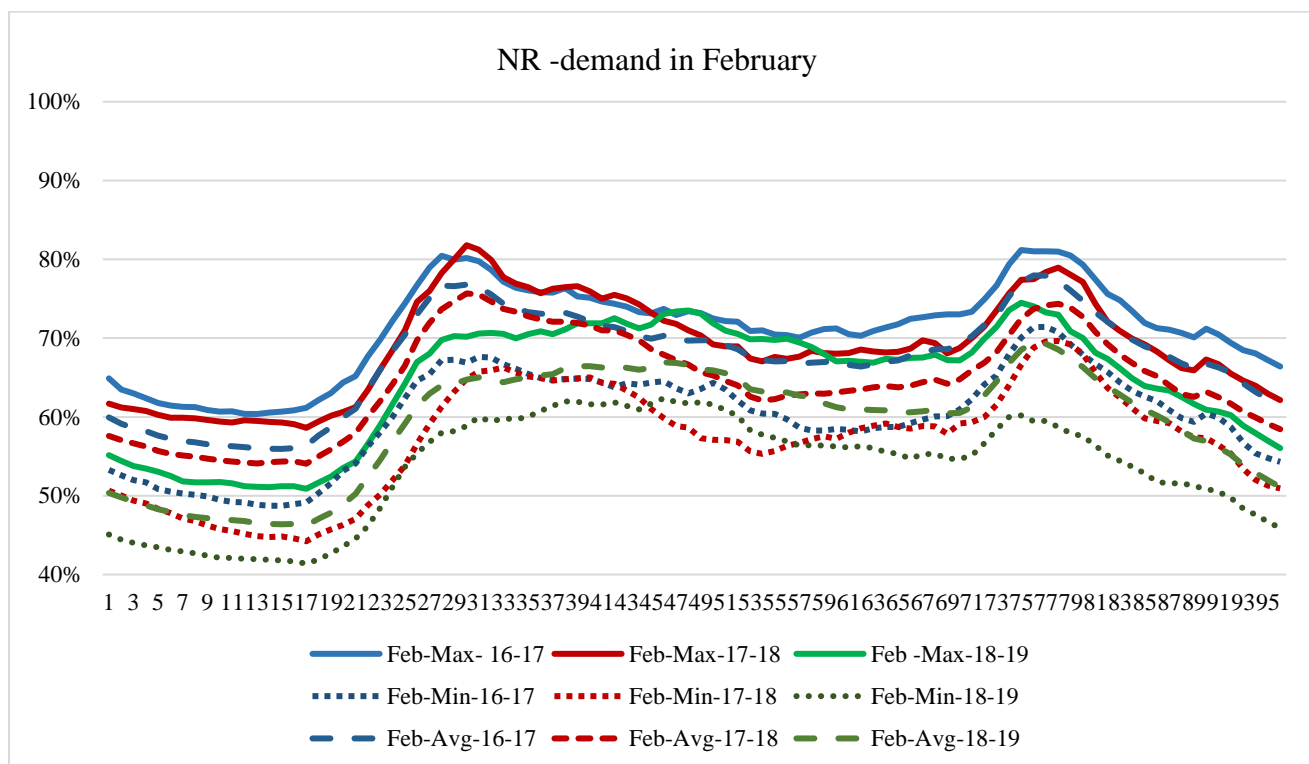
**CEA report dated 30.01.2020 for Consideration of demand factor for carrying out Transmission Planning studies**

1.1 Load-generation balance scenarios for carrying out all –India studies for integration of 175GW RE capacity by the year 2022 had been prepared for the following representative scenarios:

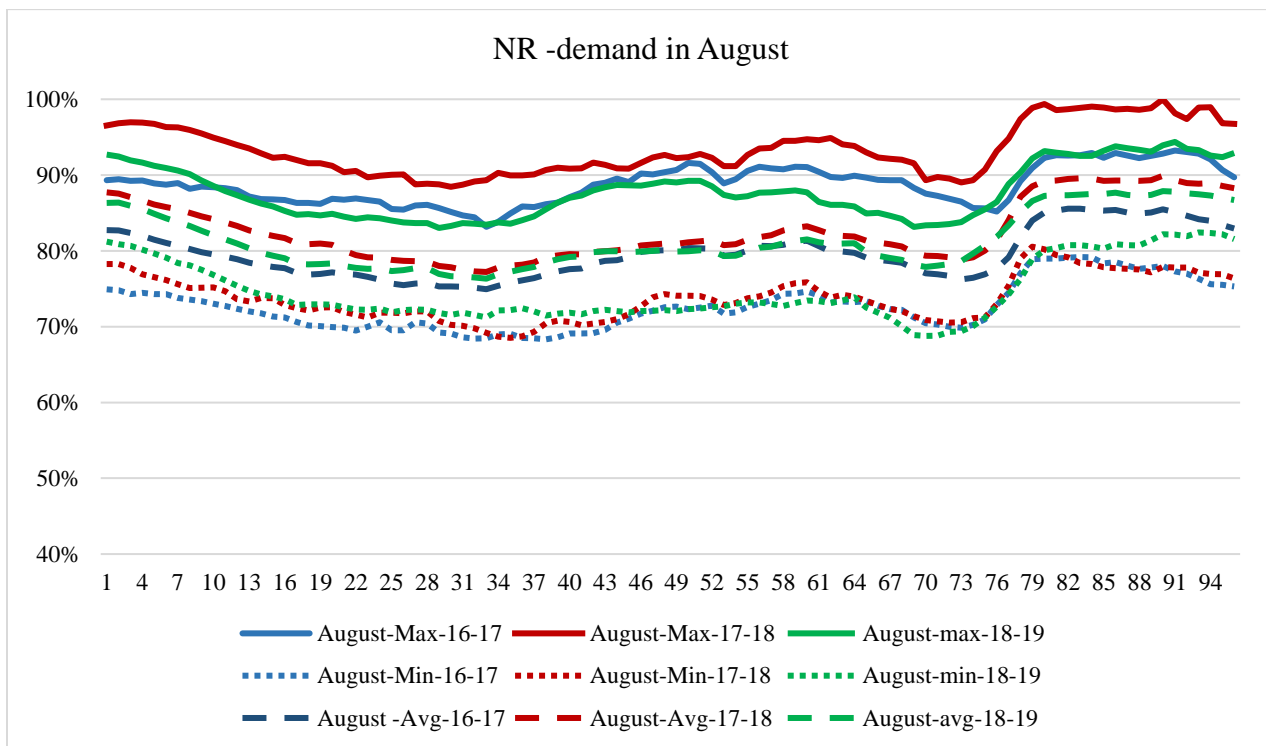
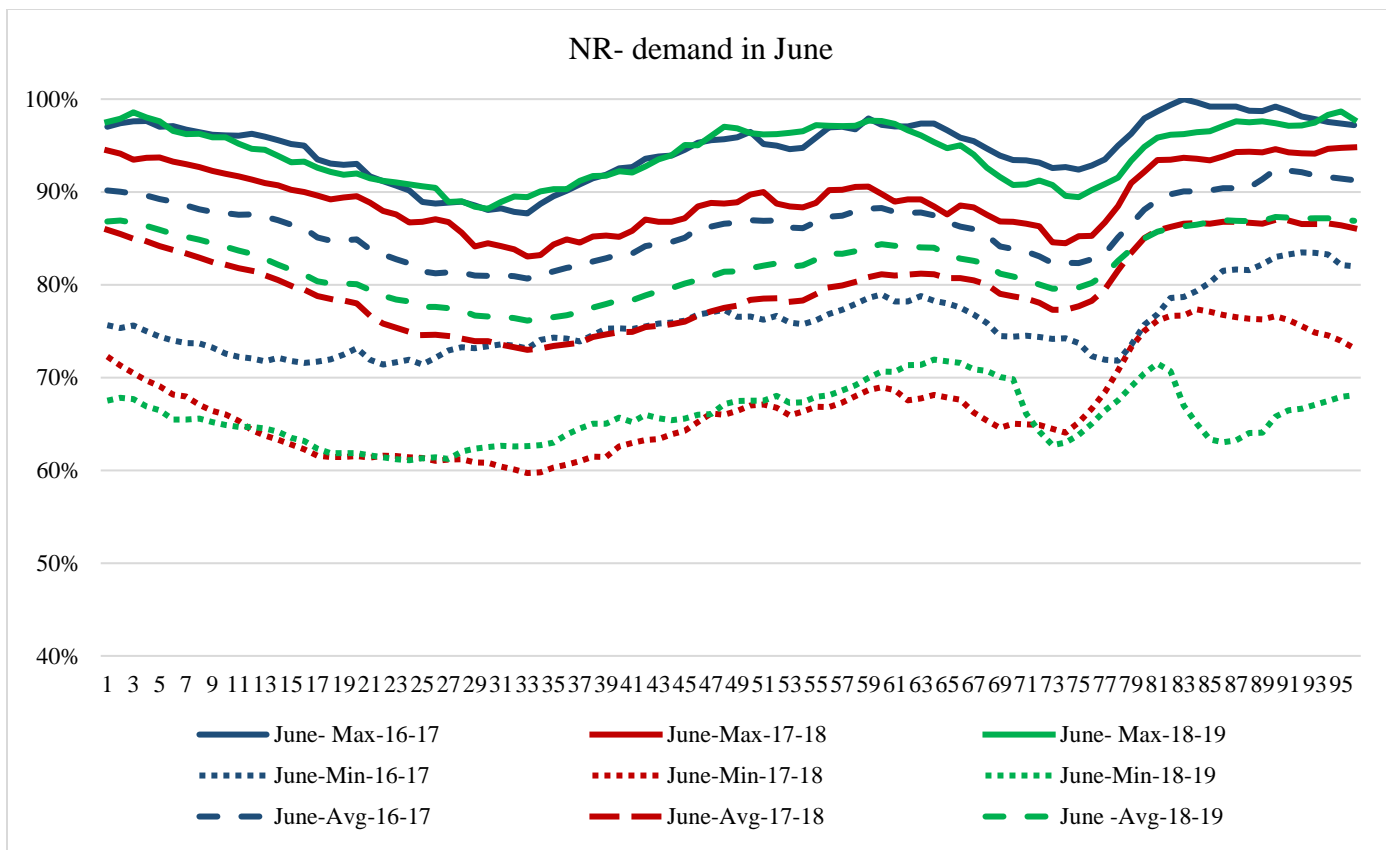
- i. June 2021 (for afternoon peak, evening peak, night off peak)
- ii. August 2021 (for afternoon peak, evening peak, night off peak)
- iii. February 2022 (for afternoon peak, evening peak, night off peak)

For calculation of the demand factor for the above representative scenarios, demand data (15 minutes interval) for the years 2016-17, 2017-18 and 2018-19, as obtained from POSOCO has been analyzed. The graph showing region wise variation of maximum, minimum and average demand in a month as a percentage of peak demand in the region during the year, for the representative scenarios as given below.

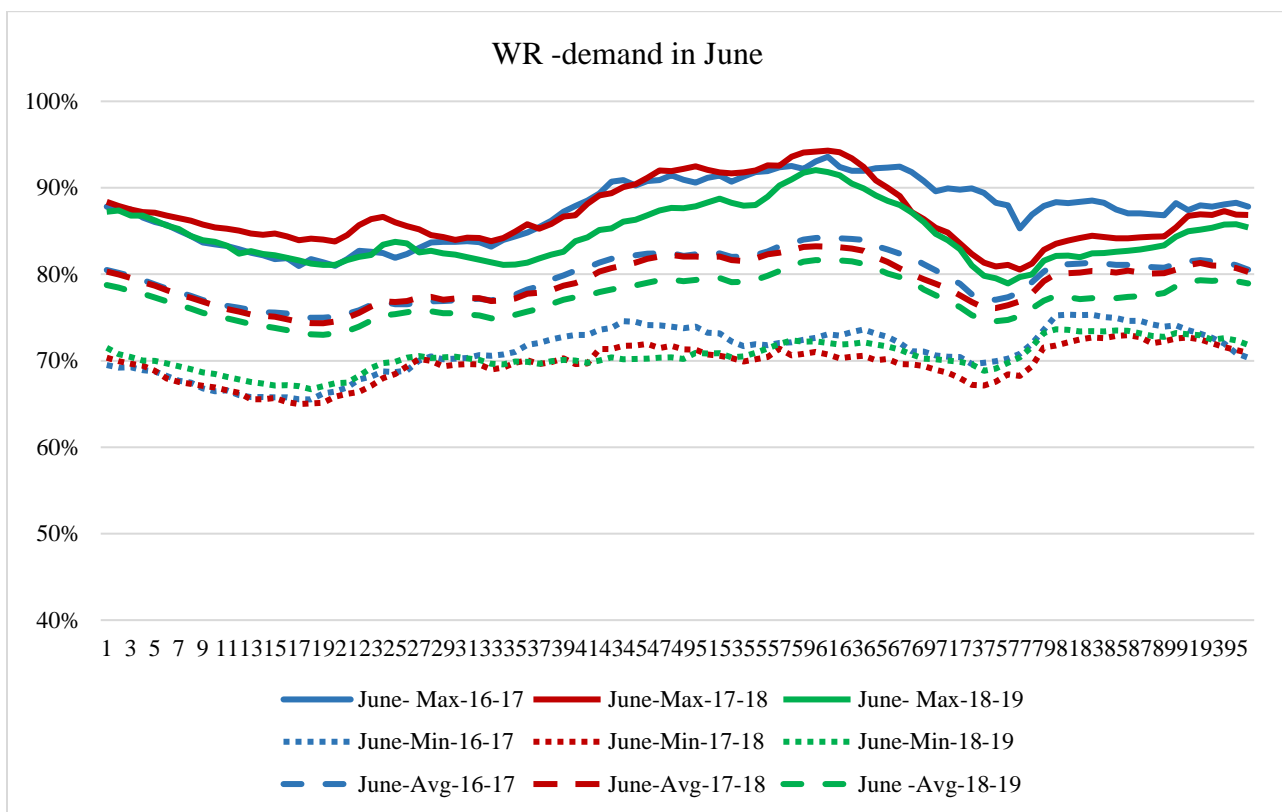
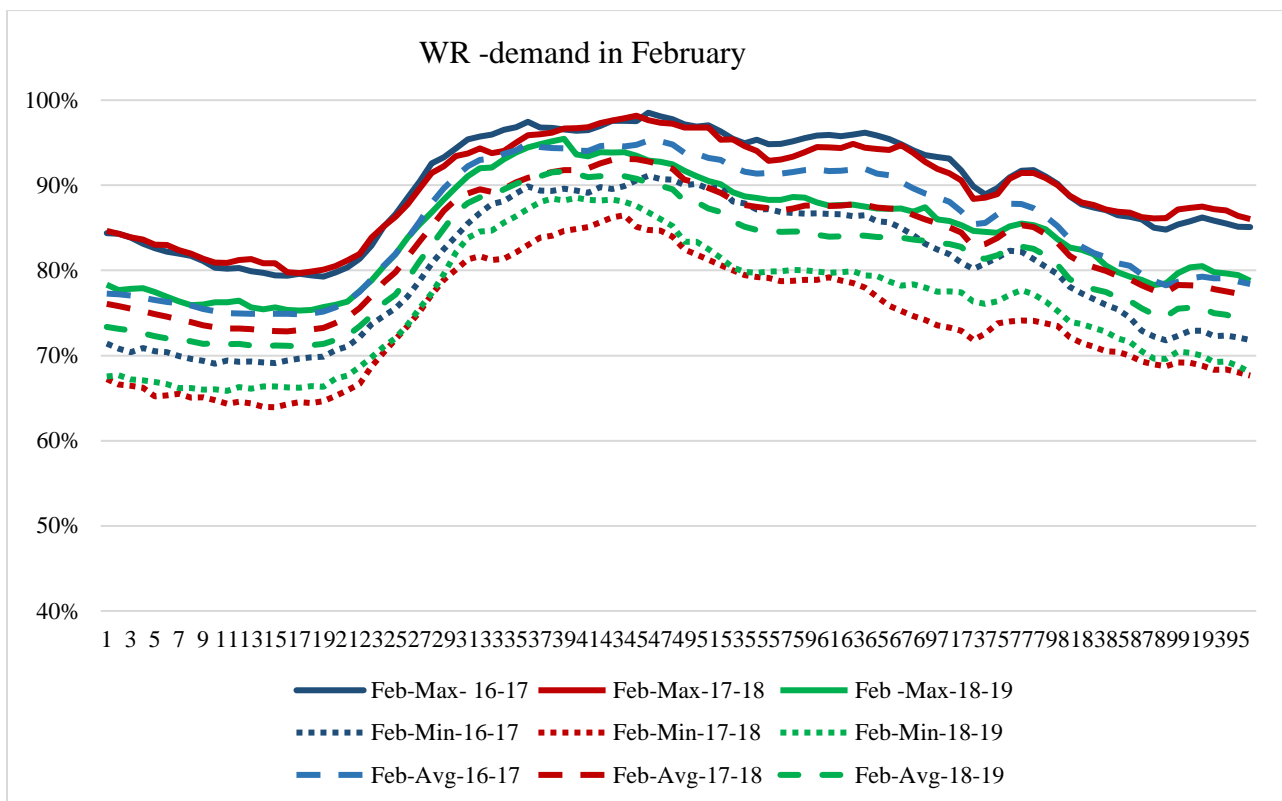
**1.2 Northern Region Demand**



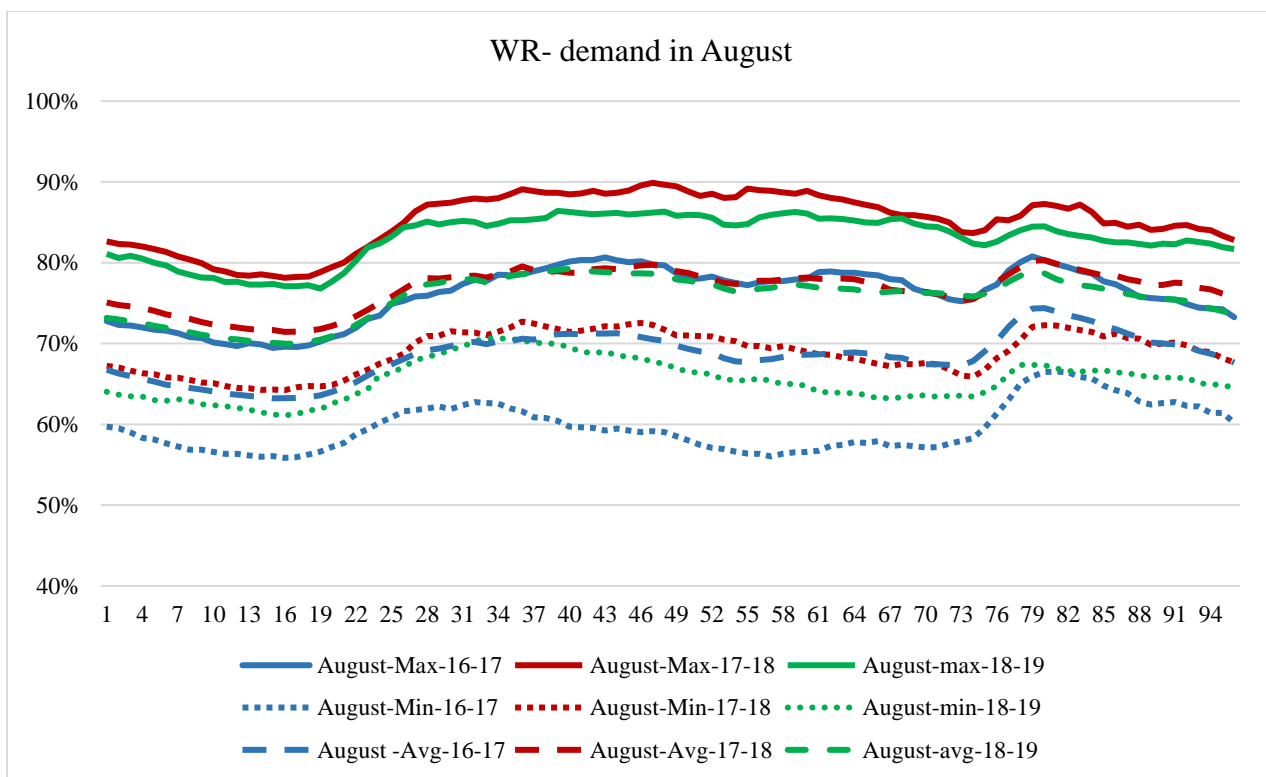
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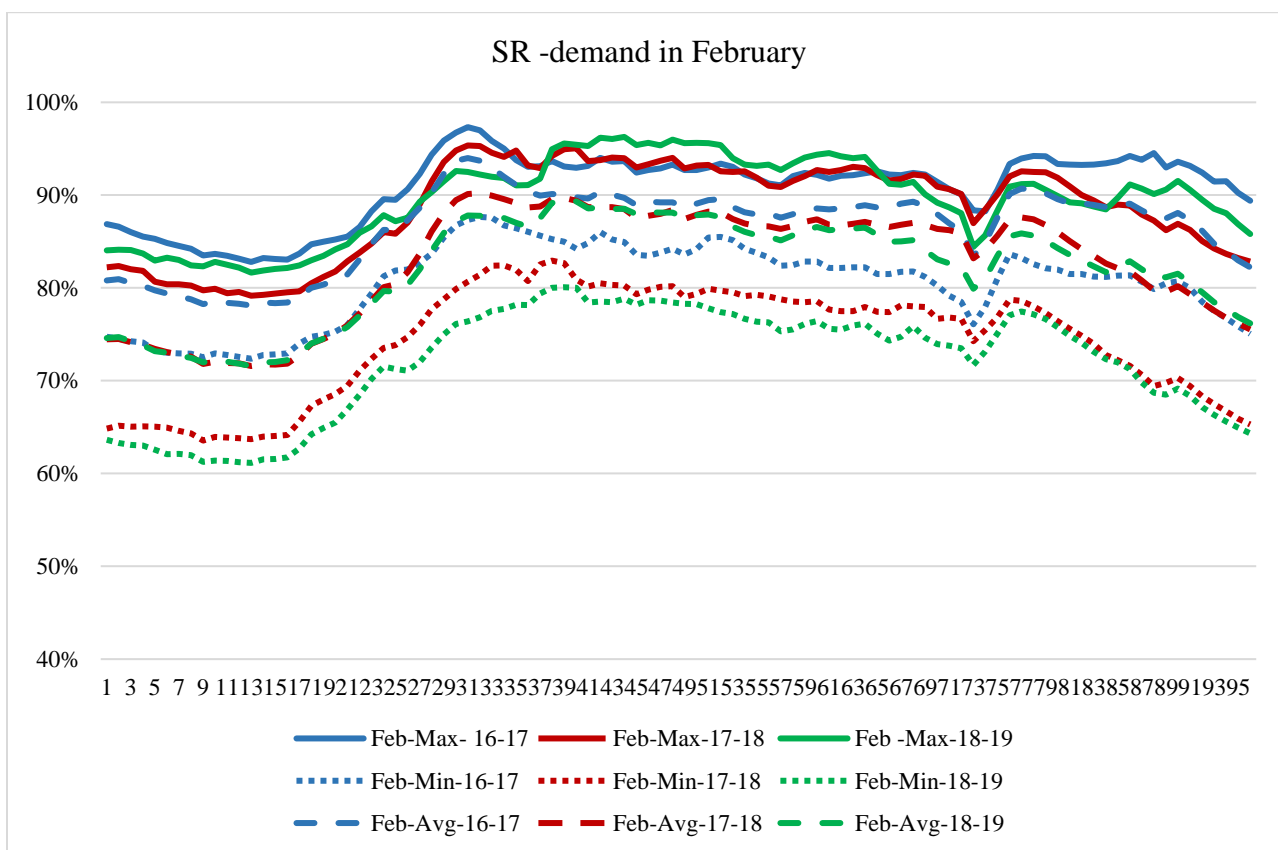
1.3 Western Region Demand



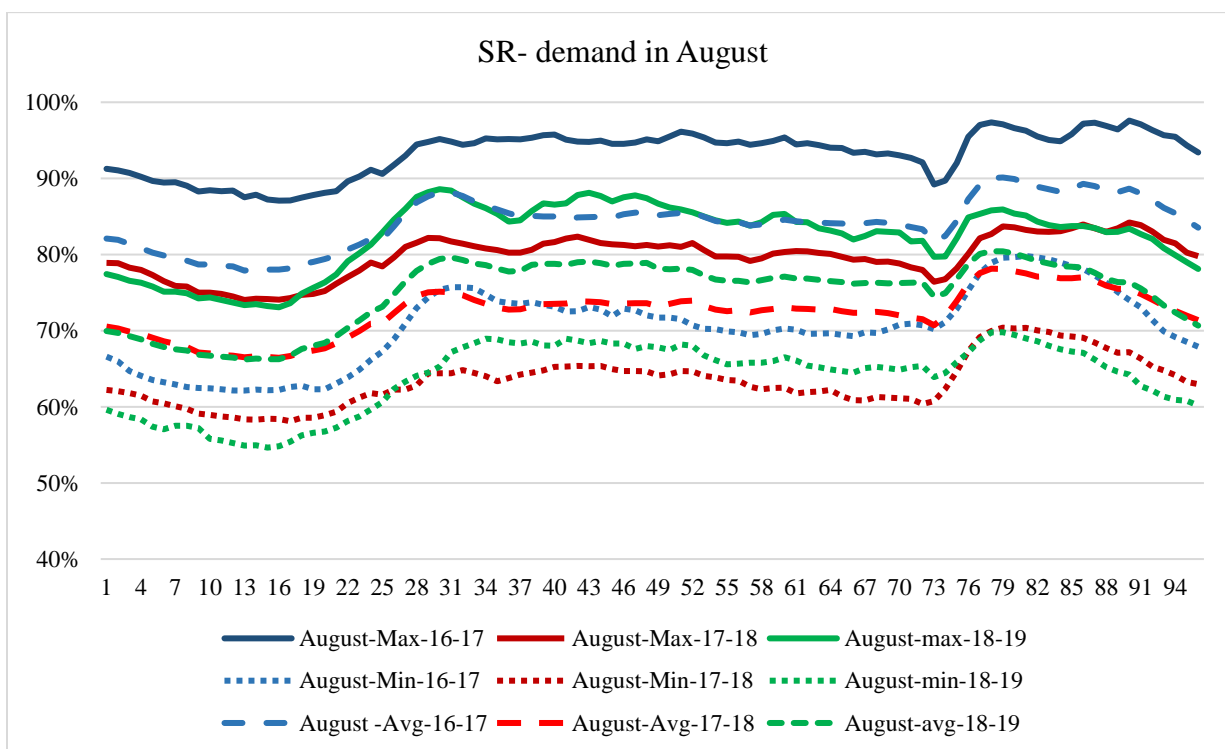
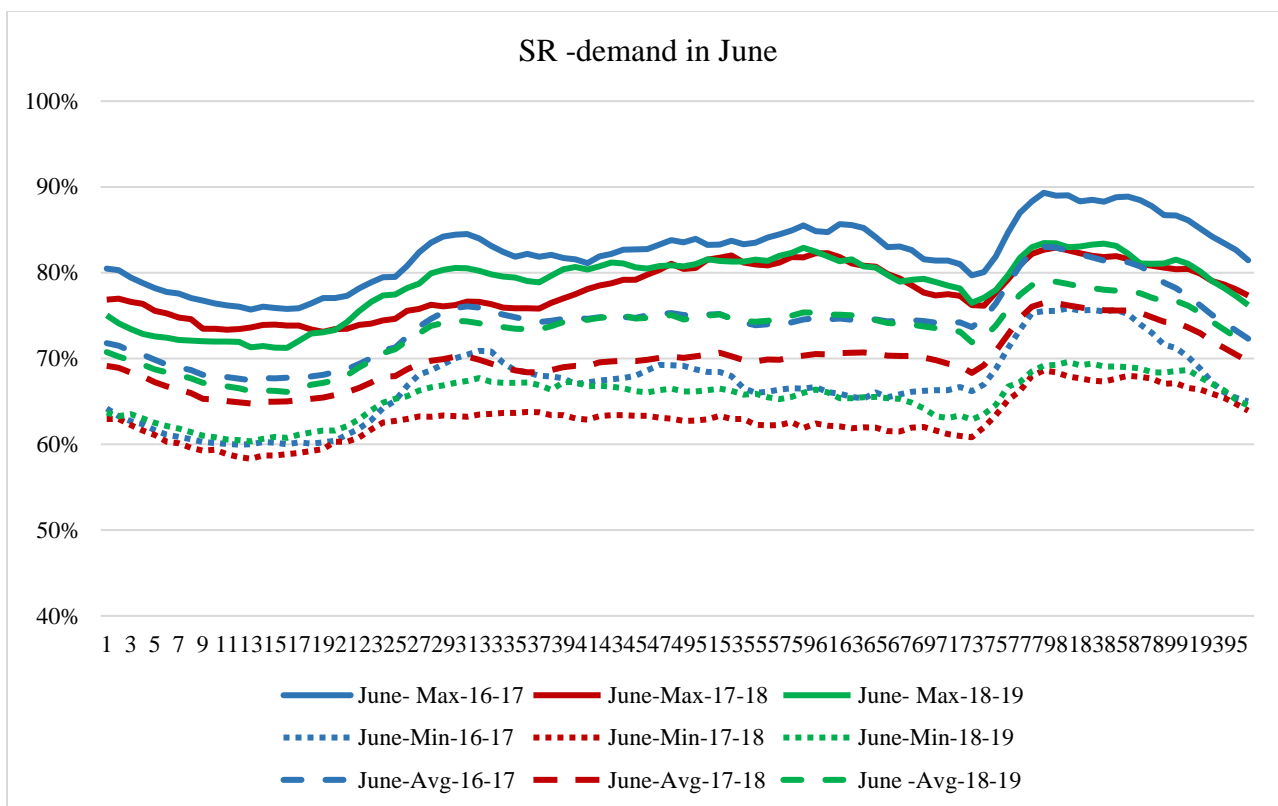
I/11500/2020



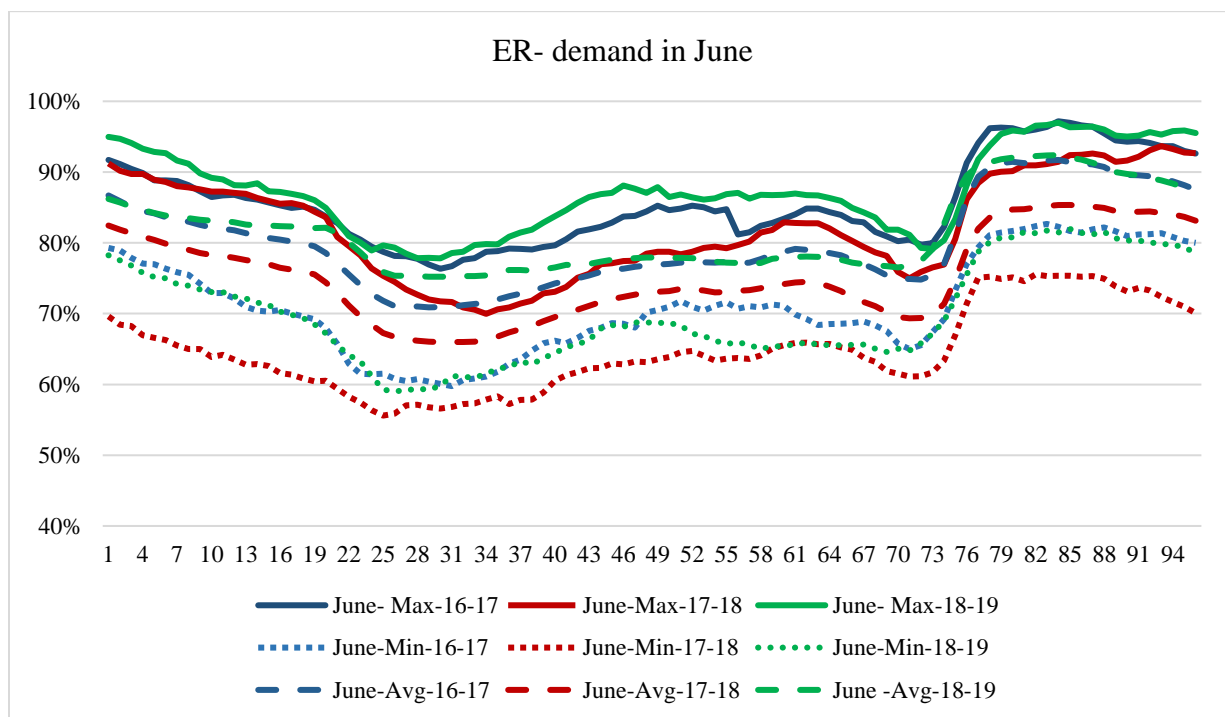
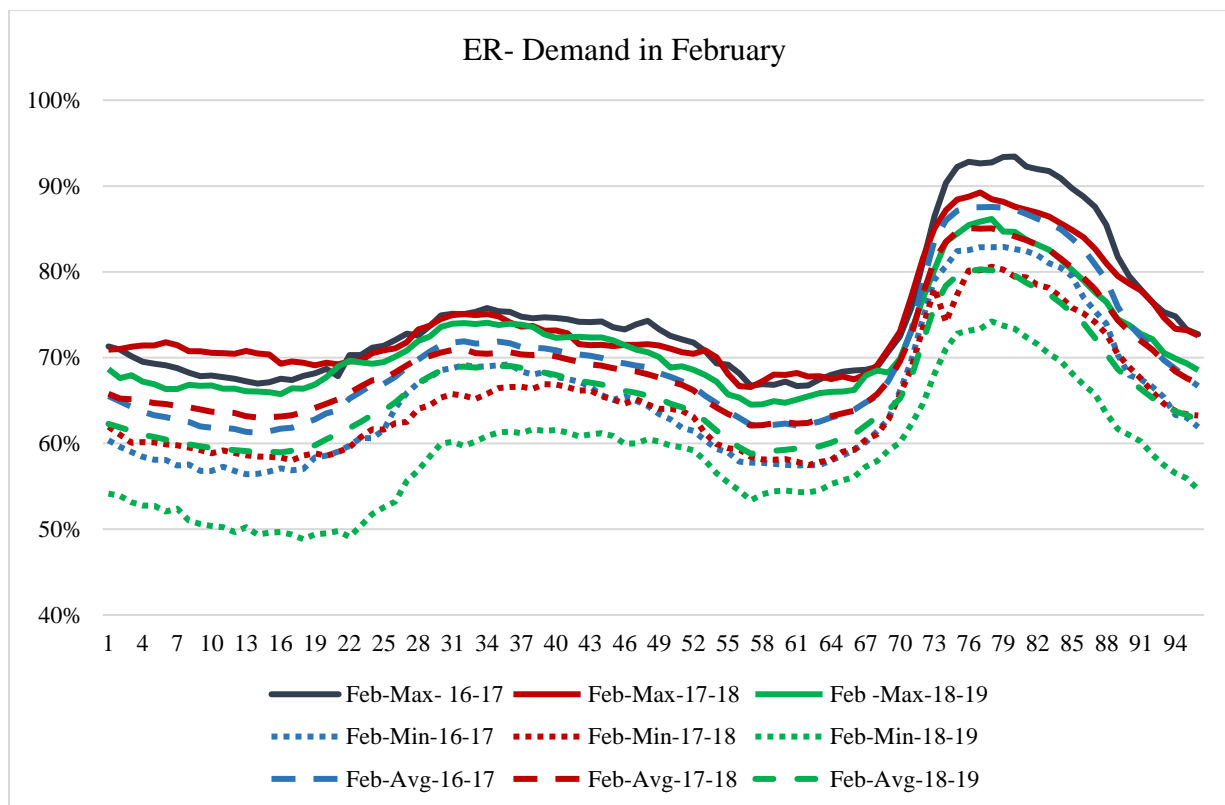
### 1.4 Southern Region Demand



I/11500/2020

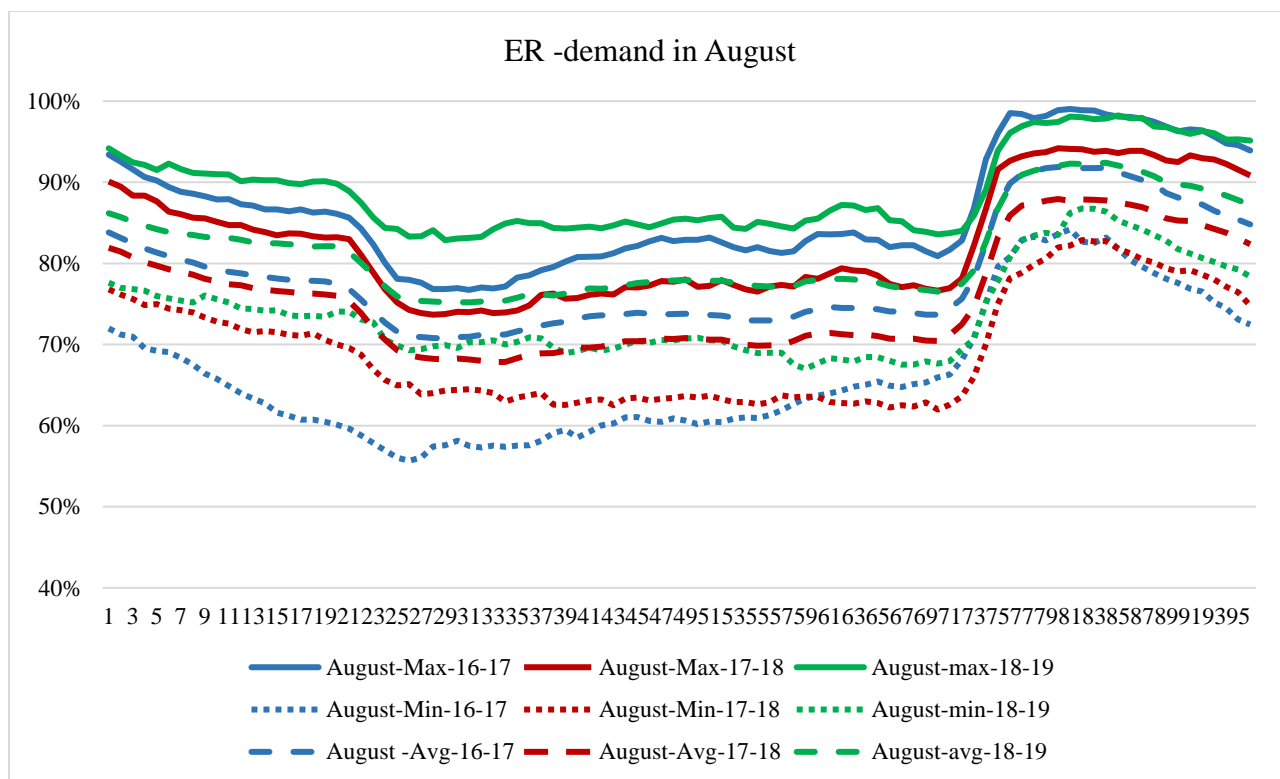


1.5 Eastern Region Demand

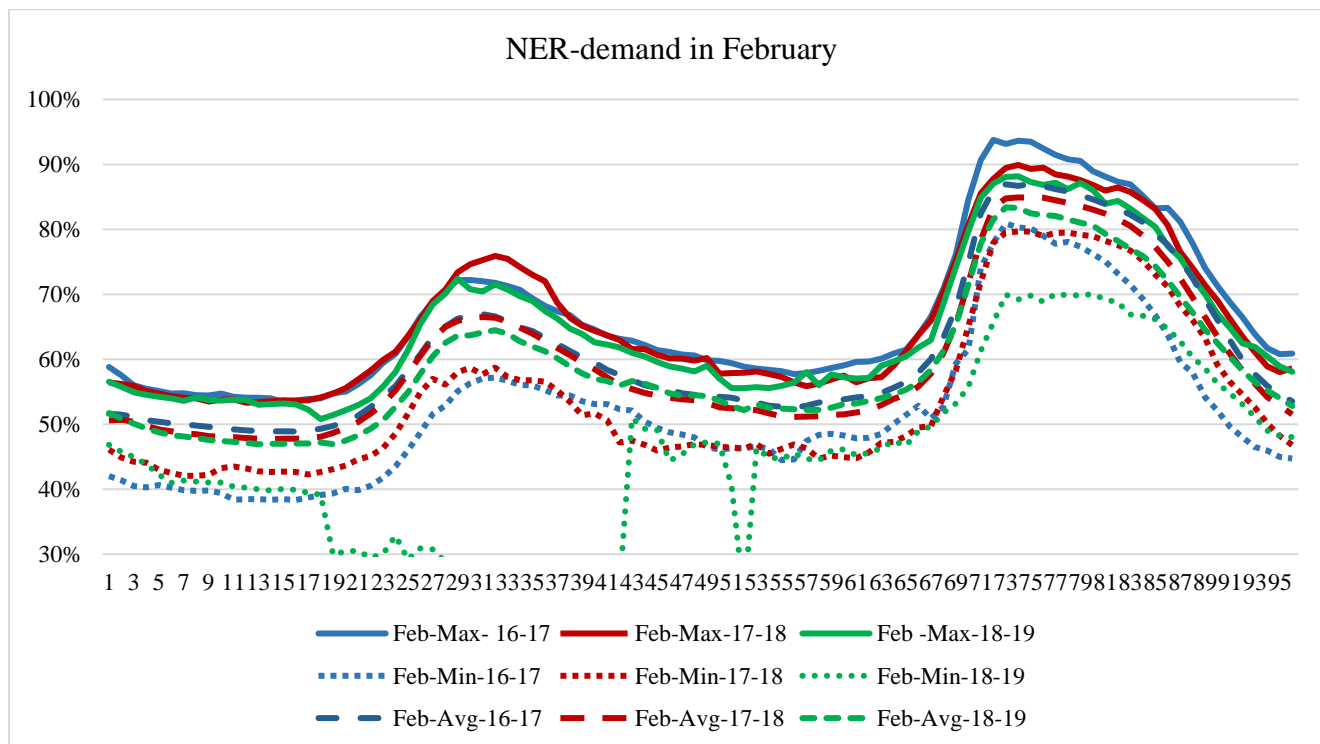




I/11500/2020

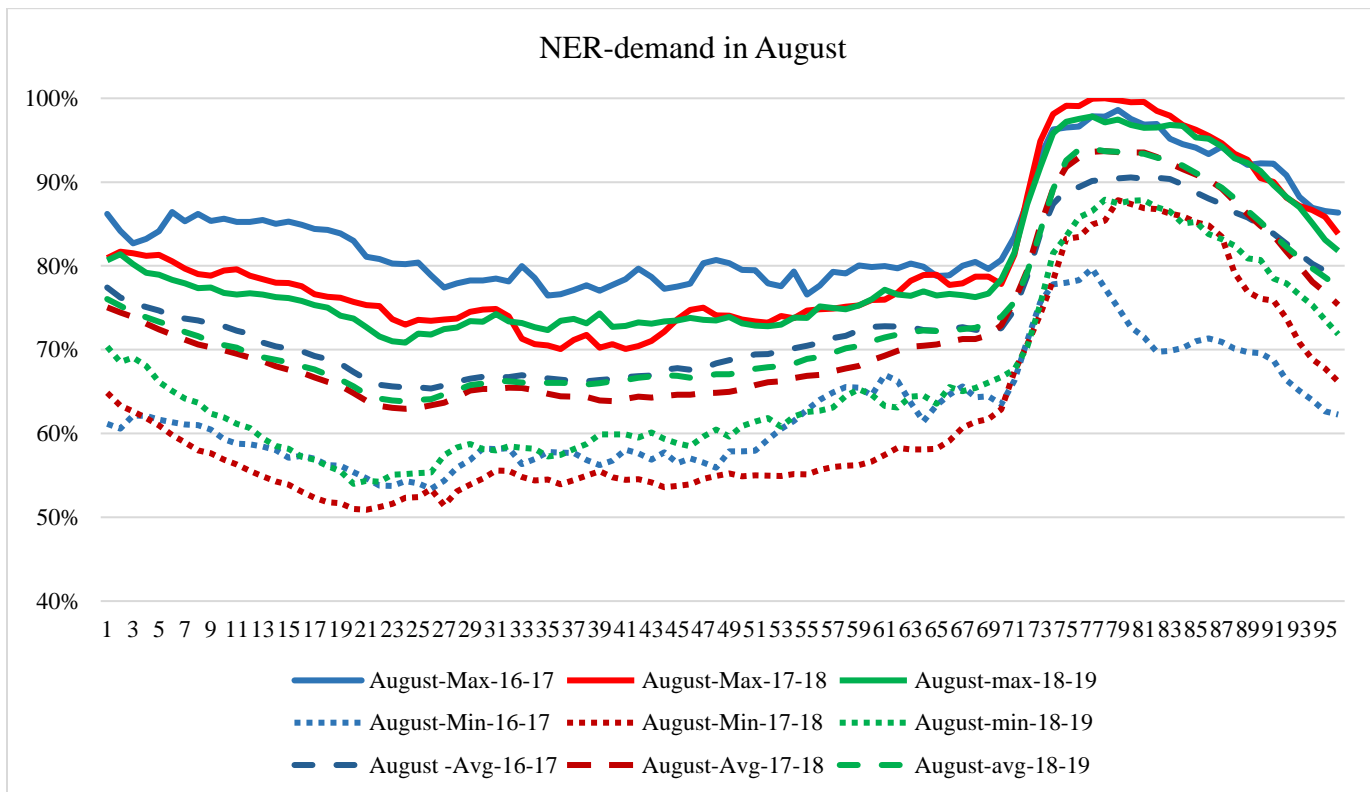
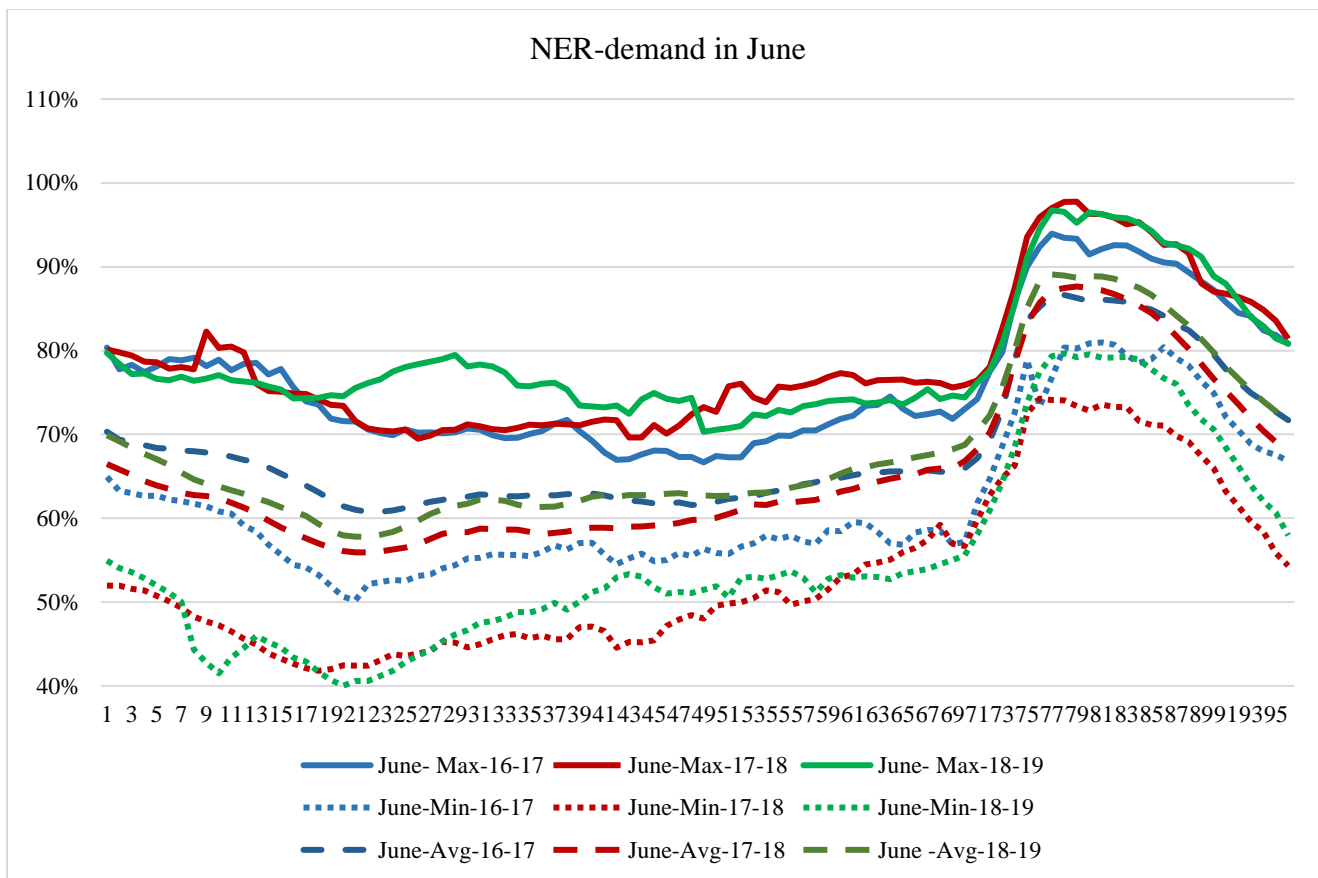


**1.6 North Eastern Region Demand**



Note: There appears to be some discrepancy in the NER demand data.

I/11500/2020



I/11500/2020

1.7 These daily variation curves have been obtained by taking maximum/average/minimum demand of the day in a month for each time block. The maximum daily curve has been used for determining the demand factor of Evening Peak (between 72-85 time block). The average daily curve has been used for the afternoon peak (45-55 time block) and minimum daily curve has been used for night off peak period (10-20 time block).

1.8 Based on analysis of previous years (2016-17, 2017-18, 2018-19) electricity demand, following factors have been calculated which will be used for calculating the future electricity demand for carrying out transmission planning studies.

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

### All India Revised LGB 2021-22

Region	Installed Capacity			Hydro	Nuclear	Solar	Solar Rooftop	Wind	Other Renewabl	Diesel	Gas	Total	EPS Peak Demand	App. Peak Demand	
	Thermal Central	Thermal State	Thermal Private												
NR	11880	35345	0	21640	3020	27741	4500	4299	1360	0	2519	112304	73770	69301	
WR	19000	36975	37075	8168	3240	26880	4500	25860	0	0	10659	172357	71020	66717	
SR	12890	35748	6640	11922	3320	30618	4500	31302	2863.7	1185	4075	145062	62975	59160	
ER	24650	10585	4850	8182	0	250	400	0	0	0	0	48917	28046	26347	
NER	750	133	0	2220	0	100	100	0	0	0	1821	5124	4499	4226	
	69170	118786	48565	52131	9580	85589	14000	61461	4224	1185	19073	483764	225751	225751	
	236521			165273						240310					

Availability factor	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	National DF	Regional DF
NR	30%	31%				70%	80%	50%	50%	40%	0%	0%		
WR	44%	28%	53%		40%	80%	50%	50%	50%	0%	0%	0%	76%	75%
SR	4%	26%	11%		40%	80%	50%	50%	50%	0%	0%	0%	82%	80%
ER	25%	25%	43%		70%	80%	50%	50%	0%	0%	0%	0%	76%	75%
NER	0%	0%			70%	80%	50%	50%	0%	0%	0%	0%	71%	70%
	28%										85%	191888		

Availability	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	Total availability	Demand Factor	Surplus/Deficit	Net Availability	Net Demand
NR	3614	10922	0		15148	2416	13871	2250	1720	0	0	0	49940	61638	-11698	47690	59388
WR	8448	10459	19731		3267	2592	13440	2250	12930	0	0	0	73117	54274	18843	70867	52024
SR	506	9162	726		4769	2656	15309	2250	15651	0	0	0	51029	51335	-306	48779	49085
ER	6182	2605	2090		5727	0	125	200	0	0	0	0	16930	21433	-4503	16730	21233
NER	0	0	0		1554	0	50	50	0	0	0	0	1654	3209	-1555	1604	3159
Total	18750	33149	22547		30465	7664	42794	7000	30301	0	0	0	192670	191888	781	185670	184888
	74446			31%	80095						188320						
	45% StateTh			33149	ISGS Th	40515											

Availability factor	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	National DF	Regional DF
NR	46%	38%				95%	85%	0%	0%	70%	0%	0%		
WR	68%	35%	81%		70%	85%	0%	0%	75%	0%	0%	85%	83%	84%
SR	6%	32%	16%		70%	85%	0%	0%	75%	0%	0%	85%	89%	90%
ER	36%	31%	67%		90%	85%	0%	0%	0%	0%	0%	85%	96%	97%
NER	0%	0%			90%	85%	0%	0%	0%	0%	0%	85%	98%	99%
	35%										96%	216721		

Availability	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	Total availability	Demand Factor	Surplus/Deficit	Net Availability	Net Demand
NR	5519	13580	0		20558	2567	0	0	3009	0	0	2141	47373	70142	-22769	47373	70142
WR	12976	12841	29907		5717	2754	0	0	19395	0	0	9060	92651	59087	33564	92651	59087
SR	711	11327	1056		8345	2822	0	0	23477	0	0	3464	51201	56136	-4935	51201	56136
ER	8827	3253	3230		7364	0	0	0	0	0	0	0	22674	26945	-4271	22674	26945
NER	0	0	0		1998	0	0	0	0	0	0	1548	3546	4411	-866	3546	4411
Total	28033	41001	34193		43982	8143	0	0	45881	0	0	16212	217445	216721	724	217445	216721
	103227			44%	45881						218812						
	40% StateTh			41001	ISGS Th	61502											

Availability factor	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	National DF	Regional DF
NR	46%	39%				70%	80%	0%	0%	25%	0%	0%		
WR	68%	35%	81%		40%	80%	0%	0%	30%	0%	0%	65%	66%	60%
SR	6%	32%	16%		40%	80%	0%	0%	30%	0%	0%	65%	66%	60%
ER	36%	31%	67%		70%	80%	0%	0%	0%	0%	0%	65%	77%	70%
NER	0%	0%			70%	80%	0%	0%	0%	0%	0%	65%	62%	56%
	35%										76%	171571		

Availability	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	Total availability	Demand Factor	Surplus/Deficit	Net Availability	Net Demand
NR	5519	13622	0		15148	2416	0	0	1075	0	0	1637	39416	58542	-19126	39416	58542
WR	12976	12880	29907		3267	2592	0	0	7758	0	0	6928	76309	46967	29342	76309	46967
SR	736	11362	1056		4769	2656	0	0	9391	0	0	2649	32618	41646	-9028	32618	41646
ER	8992	3263	3230		5727	0	0	0	0	0	0	0	21213	21638	-426	21213	21638
NER	0	0	0		1554	0	0	0	0	0	0	1183	2737	2777	-40	2737	2777
Total	28223	41128	34193		30465	7664	0	0	18223	0	0	12398	172294	171571	723	172294	171571
	103544			44%	18223						155663						
	40% StateTh			41128	ISGS Th	61692											

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Region	Installed Capacity			Hydro	Nuclear	Solar	Solar Rooftop	Wind	Other Renewabl	Diesel	Gas	Total	EPS Peak Demand	App. Peak Demand	
	Thermal Central	Thermal State	Thermal Private												
NR	11880	35345	0	21640	3020	27741	4500	4299	1360	0	2519	112304	73770	69301	
WR	19000	36975	37075	8168	3240	26880	4500	25860	0	0	10659	172357	71020	66717	
SR	12890	35748	6640	11922	3320	30618	4500	31302	2863.7	1185	4075	145062	62975	59160	
ER	24650	10585	4850	8182	0	250	400	0	0	0	0	48917	28046	26347	
NER	750	133	0	2220	0	100	100	0	0	0	1821	5124	4499	4226	
<b>Total</b>	<b>69170</b>	<b>118786</b>	<b>48565</b>	<b>52131</b>	<b>9580</b>	<b>85589</b>	<b>14000</b>	<b>61461</b>	<b>4224</b>	<b>1185</b>	<b>19073</b>	<b>483764</b>	<b>225751</b>	<b>225751</b>	
	236521			165273						240310					

Availability factor	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	National DF	Regional DF
NR	30%	31%				60%	80%	70%	60%	30%	0%	0%		
WR	44%	28%	53%		30%	80%	60%	60%	40%	0%	0%	0%	83%	82%
SR	4%	26%	11%		40%	80%	60%	60%	40%	0%	0%	0%	75%	74%
ER	25%	25%	43%		60%	80%	60%	60%	0%	0%	0%	0%	79%	78%
NER	0%	0%			60%	80%	60%	60%	0%	0%	0%	0%	66%	65%
<b>Total</b>	28%										86%	194146		

Availability	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	Total availability	Demand Factor	Surplus/Deficit	Net Availability	Net Demand
NR	3614	10875	0		12984	2416	19419	2700	1290	0	0	0	53297	63292	-9996	50597	60592
WR	8448	10418	19731		2450	2592	16128	2700	10344	0	0	0	72811	58782	14029	70111	56082
SR	506	9124	726		4769	2656	18371	2700	12521	0	0	0	51372	47038	4334	48672	44338
ER	6182	2593	2090		4909	0	150	240	0	0	0	0	16165	22081	-5916	15925	21841
NER	0	0	0		1332	0	60	60	0	0	0	0	1452	2952	-1500	1392	2892
<b>Total</b>	<b>18750</b>	<b>33010</b>	<b>22547</b>	<b>31%</b>	<b>26444</b>	<b>7664</b>	<b>54127</b>	<b>8400</b>	<b>24155</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>195097</b>	<b>194146</b>	<b>951</b>	<b>186697</b>	<b>185746</b>
	74307				86682						192343						
	45% StateTh				33010 ISGS Th			40346									

Availability factor	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	National DF	Regional DF
NR	46%	39%				90%	80%	0%	0%	70%	0%	0%		
WR	68%	35%	81%		60%	80%	0%	0%	75%	0%	0%	85%	84%	85%
SR	6%	32%	16%		70%	80%	0%	0%	75%	0%	0%	85%	84%	85%
ER	36%	31%	67%		85%	80%	0%	0%	0%	0%	0%	85%	94%	95%
NER	0%	0%			85%	80%	0%	0%	0%	0%	0%	85%	96%	97%
<b>Total</b>	35%										95%	214463		

Availability	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	Total availability	Demand Factor	Surplus/Deficit	Net Availability	Net Demand
NR	5519	13665	0		19476	2416	0	0	3009	0	0	2141	46225	70897	-24671	46225	70897
WR	12976	12920	29907		4901	2592	0	0	19395	0	0	9060	91751	59810	31941	91751	59810
SR	711	11398	1056		8345	2656	0	0	23477	0	0	3464	51107	53035	-1928	51107	53035
ER	8827	3274	3230		6955	0	0	0	0	0	0	0	22286	26398	-4112	22286	26398
NER	0	0	0		1887	0	0	0	0	0	0	1548	3435	4324	-889	3435	4324
<b>Total</b>	<b>28033</b>	<b>41257</b>	<b>34193</b>	<b>44%</b>	<b>41563</b>	<b>7664</b>	<b>0</b>	<b>0</b>	<b>45881</b>	<b>0</b>	<b>0</b>	<b>16212</b>	<b>214803</b>	<b>214463</b>	<b>340</b>	<b>214803</b>	<b>214463</b>
	103483				45881						216460						
	40% StateTh				41257 ISGS Th			61886									

Availability factor	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	National DF	Regional DF
NR	46%	39%				70%	80%	0%	0%	20%	0%	0%		
WR	68%	35%	81%		40%	80%	0%	0%	25%	0%	0%	60%	72%	66%
SR	6%	32%	16%		50%	80%	0%	0%	25%	0%	0%	60%	66%	60%
ER	36%	31%	67%		70%	80%	0%	0%	0%	0%	0%	60%	72%	66%
NER	0%	0%			70%	80%	0%	0%	0%	0%	0%	60%	55%	50%
<b>Total</b>	35%										75%	169313		

Availability	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	Total availability	Demand Factor	Surplus/Deficit	Net Availability	Net Demand
NR	5519	13698	0		15148	2416	0	0	860	0	0	1511	39152	54044	-14893	39152	54044
WR	12976	12951	29907		3267	2592	0	0	6465	0	0	6395	74554	51253	23301	74554	51253
SR	711	11427	1056		5961	2656	0	0	7826	0	0	2445	32081	41316	-9235	32081	41316
ER	8827	3282	3230		5727	0	0	0	0	0	0	0	21067	20240	827	21067	20240
NER	0	0	0		1554	0	0	0	0	0	0	1092	2646	2460	187	2646	2460
<b>Total</b>	<b>28033</b>	<b>41359</b>	<b>34193</b>	<b>44%</b>	<b>31657</b>	<b>7664</b>	<b>0</b>	<b>0</b>	<b>15150</b>	<b>0</b>	<b>0</b>	<b>11444</b>	<b>169500</b>	<b>169313</b>	<b>187</b>	<b>169500</b>	<b>169313</b>
	103585				15150						154844						
	40% StateTh				41359 ISGS Th			62039									

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Installed Capacity

Region	Thermal Central	Thermal State	Thermal Private		Hydro	Nuclear	Solar	Solar Rooftop	Wind	Other Renewabl	Diesel	Gas	Total	EPS Peak Demand	App. Peak Demand
NR	11880	35345	0		21640	3020	27741	4500	4299	1360	0	2519	112304	73770	69301
WR	19000	36975	37075		8168	3240	26880	4500	25860	0	0	10659	172357	71020	66717
SR	12890	35748	6640		11922	3320	30618	4500	31302	2863.7	1185	4075	145062	62975	59160
ER	24650	10585	4850		8182	0	250	400	0	0	0	0	48917	28046	26347
NER	750	133	0		2220	0	100	100	0	0	0	1821	5124	4499	4226
	69170	118786	48565		52131	9580	85589	14000	61461	4224	1185	19073	483764	225751	225751
	236521				165273						240310				

Scenario 7 : Afternoon peak Feb 2022

Availabili ty factor	Thermal Central	Thermal State	Thermal Private		Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas		National DF	Regional DF		
NR	34%	45%			30%	80%	80%	60%	10%	0%	0%	0%		71%	70%		
WR	51%	40%	55%		20%	80%	70%	60%	0%	0%	0%	0%		95%	93%		
SR	38%	36%	45%		20%	80%	70%	60%	0%	0%	0%	0%		90%	88%		
ER	55%	38%	55%		30%	80%	70%	60%	0%	0%	0%	0%		69%	68%		
NER	55%	0%			30%	80%	70%	60%	0%	0%	0%	0%		54%	53%		
	40%										88% 198661						
Availabili ty	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	Total availability	Demand Factor	Surplus/Deficit	Net Availability	Net Demand
NR	4085	15823	0		6492	2416	22193	2700	430	0	0	0	54139	52727	1412	51439	50027
WR	9719	14958	20389		1634	2592	18816	2700	0	0	0	0	70808	67440	3368	68108	64740
SR	4927	12854	2984		2384	2656	21432	2700	0	0	0	0	49938	56586	-6648	47238	53886
ER	13524	3997	2665		2455	0	175	240	0	0	0	0	23056	19473	3583	22816	19233
NER	411	0	0		666	0	70	60	0	0	0	0	1207	2435	-1228	1147	2375
Total	32667	47632	26038		13630	7664	62686	8400	430	0	0	0	199148	198661	487	190748	190261
	106337			45%	71516						194561						
	45% StateTh				47633 ISGS Th			58218									

Scenario 8 : Evening peak Feb 2022

Availabili ty factor	Thermal Central	Thermal State	Thermal Private		Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas		National DF	Regional DF		
NR	53%	48%			70%	80%	0%	0%	35%	0%	0%	85%		79%	78%		
WR	79%	43%	85%		70%	80%	0%	0%	20%	0%	0%	85%		94%	92%		
SR	59%	39%	70%		70%	80%	0%	0%	20%	0%	0%	85%		95%	93%		
ER	85%	41%	85%		70%	80%	0%	0%	0%	0%	0%	85%		92%	90%		
NER	85%	0%			70%	80%	0%	0%	0%	0%	0%	85%		93%	91%		
	43%										95% 214463						
Availabili ty	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	Total availability	Demand Factor	Surplus/Deficit	Net Availability	Net Demand
NR	6316	16986	0		15148	2416	0	0	1505	0	0	2141	44511	58546	-14034	44511	58546
WR	15028	16022	31514		5717	2592	0	0	5172	0	0	9060	85105	66480	18625	85105	66480
SR	7642	13794	4624		8345	2656	0	0	6260	0	0	3464	46784	59590	-12806	46784	59590
ER	20953	4297	4123		5727	0	0	0	0	0	0	0	35100	25682	9417	35100	25682
NER	638	0	0		1554	0	0	0	0	0	0	1548	3739	4166	-427	3739	4166
Total	50575	51099	40260		36492	7664	0	0	12937	0	0	16212	215240	214463	776	215240	214463
	141934			60%	12937						210781						
	36% StateTh				51099 ISGS Th			90059									

Scenario 9 : Night off peak Feb 2022

Availabili ty factor	Thermal Central	Thermal State	Thermal Private		Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas		National DF	Regional DF		
NR	41%	47%			30%	80%	0%	0%	10%	0%	0%	30%		50%	48%		
WR	60%	43%	65%		20%	80%	0%	0%	0%	0%	0%	30%		69%	67%		
SR	45%	38%	53%		20%	80%	0%	0%	0%	0%	0%	30%		68%	66%		
ER	65%	40%	65%		30%	80%	0%	0%	0%	0%	0%	30%		57%	55%		
NER	65%	0%			30%	80%	0%	0%	0%	0%	0%	30%		41%	40%		
	42%										65% 146738						
Availabili ty	Thermal Central	Thermal State	Thermal Private	% of I.C.	Hydro	Nuclear	Solar	Solar rooftop	Wind	Other Renewabl	Diesel	Gas	Total availability	Demand Factor	Surplus/Deficit	Net Availability	Net Demand
NR	4830	16736	0		6492	2416	0	0	430	0	0	756	31660	36648	-4988	31660	36648
WR	11492	15783	24099		1634	2592	0	0	0	0	0	3198	58797	49247	9550	58797	49247
SR	5844	13585	3536		2384	2656	0	0	0	0	0	1222	29227	43017	-13789	29227	43017
ER	16023	4237	3153		2455	0	0	0	0	0	0	0	25866	15965	9902	25866	15965
NER	488	0	0		666	0	0	0	0	0	0	546	1700	1863	-163	1700	1863
Total	38675	50341	30787		13630	7664	0	0	430	0	0	5722	147250	146738	511	147250	146738
	119803			51%	430						141781						
	42% StateTh				50341 ISGS Th			68951									



REGION	STATE	PROJECT NAME	UNIT	CAPACITY (MW)	Status (Existing/UC)	Despatch Scenario 1	Despatch Scenario 2	Despatch Scenario 3	Despatch Scenario 4	Despatch Scenario 5	Despatch Scenario 6	Despatch Scenario 7	Despatch Scenario 8	Despatch Scenario 9
						Dispatch considered	Dispatch considered	Dispatch considered	Dispatch considered	Dispatch considered	Dispatch considered	Dispatch considered	Dispatch considered	
WR	Chhatisgarh	JP Nigri	2x660	1320	Existing	726	1122	1122	726	1122	1122	726	1122	858
WR	Chhatisgarh	ACBIL,IPP	2x135+2*30	330	Existing	181.5	280.5	280.5	181.5	280.5	280.5	181.5	280.5	214.5
NR	Rajasthan	Barsingsar	2x125	250	Existing	137.5	212.5	212.5	137.5	212.5	212.5	137.5	212.5	162.5
WR	MP	*SASAN (Unit 1-6)	**6x660 (37.5%)	3960	Existing	2178	3366	3366	2178	3366	3366	2178	3366	2574
WR	Chhatisgarh	Korba West Power Corp.Ltd. (IPP)	1x600	600	Existing	330	510	510	330	510	510	330	510	390
NR	UP	Rihand TPS	2x500 +2x500+2x500	3000	Existing	1650	2550	2550	1650	2550	2550	1650	2550	1950
NR	UP	Singrauli STPS	5x200+2x500	2000	Existing	1100	1700	1700	1100	1700	1700	1100	1700	1300
WR	Chhatisgarh	JPL Stage II,IPP	4x600	2400	Existing	1320	2040	2040	1320	2040	2040	1320	2040	1560
WR	Chhatisgarh	KSTPS	3x200+3x500+1 x 500	2600	Existing	1430	2210	2210	1430	2210	2210	1430	2210	1690
WR	Chhatisgarh	Sipat STPS	2X500+3X660	2980	Existing	1639	2533	2533	1639	2533	2533	1639	2533	1937
ER	Odisha	GKEL	(2x350)	700	Existing	385	595	595	385	595	595	385	595	455
WR	Chhatisgarh	SKS	2x300+2X300	1200	Existing	660	1020	1020	660	1020	1020	660	1020	780
WR	MP	VSTPS	6x210+2x500+2 x 500+3x500	4760	Existing	2618	4046	4046	2618	4046	4046	2618	4046	3094
ER	Jharkhand	ADHUNIK	(2x270)	540	Existing	297	459	459	297	459	459	297	459	351
WR	Gujarat	*CGPL	**3x830 +1x830+ 1x830	4150	Existing	2282.5	3527.5	3527.5	2282.5	3527.5	3527.5	2282.5	3527.5	2697.5
WR	Chhatisgarh	JINDAL Stage I,	4x250	1000	Existing	550	850	850	550	850	850	550	850	650
WR	Chhatisgarh	JINDAL(JSPL TPP)unit3 DCP(IPP)	4x135	540	Existing	297	459	459	297	459	459	297	459	351
WR	Chhatisgarh	Spectrum Coal Private Ltd.	2x50	100	Existing	55	85	85	55	85	85	55	85	65
WR	Chhatisgarh	ESSAR Mahan	2x600	1200	Existing	660	1020	1020	660	1020	1020	660	1020	780
WR	Chhatisgarh	GMR-Chhatisgarh Energy Ltd	2x685	1370	Existing	753.5	1164.5	1164.5	753.5	1164.5	1164.5	753.5	1164.5	890.5
WR	Chhatisgarh	KPCL	2x600	1200	UC	660	1020	1020	660	1020	1020	660	1020	780
WR	Chhatisgarh	Vandana Vidyut,IPP	1x135	135	Existing	74.25	114.75	114.75	74.25	114.75	114.75	74.25	114.75	87.75
WR	Chhatisgarh	TRN Energy	2x300	600	Existing	330	510	510	330	510	510	330	510	390
WR	Chhatisgarh	NSPCL Bhilai TPP(*)	2x250	500	Existing	275	425	425	275	425	425	275	425	325
ER	Odisha	JITPL	(2x600)	1200	Existing	660	1020	1020	660	1020	1020	660	1020	780
ER	Odisha	IBEUL U-1	(2x350)	350	Existing	192.5	297.5	297.5	192.5	297.5	297.5	192.5	297.5	227.5
ER	Odisha	IBEUL U-2	(2x350)	350	UC	192.5	297.5	297.5	192.5	297.5	297.5	192.5	297.5	227.5
ER	Odisha	OPGC U-2	2x660	660	UC	363	561	561	363	561	561	363	561	429
WR	Chhatisgarh	Maruti Clean Coal Power Ltd	1x300	300	Existing	165	255	255	165	255	255	165	255	195
WR	MP	Jaypee Bina	2x250 (70%)	500	Existing	275	425	425	275	425	425	275	425	325
WR	MP	Gadarwara STPS	1*800+1*800	1600	UC	880	1360	1360	880	1360	1360	880	1360	1040
WR	MP	Khargone TPP	2*660	1320	UC	726	1122	1122	726	1122	1122	726	1122	858
WR	Chhatisgarh	DB Power,IPP	2x600	1200	Existing	660	1020	1020	660	1020	1020	660	1020	780

WR	Chhatisgarh	RKM Powergrn Ltd	4x360	1440	Existing	792	1224	1224	792	1224	1224	792	1224	936
WR	Chhatisgarh	LANCO-Amarkantak	2x300	600	Existing	330	510	510	330	510	510	330	510	390
ER	Odisha	Talcher	(2x500)	1000	Existing	550	800	800	550	800	800	550	850	650
ER	Odisha	Darlipalli	2x800	1600	UC	880	1280	1280	880	1280	1280	880	1360	1040
WR	MP	Jhabua Power ( Avanta)	1x600	600	Existing	330	480	480	330	480	480	330	510	390
ER	West Bengal	ANDAL	(2x500)	1000	Existing	550	800	800	550	800	800	550	850	650
ER	Odisha	Talcher	(4x500)	2000	Existing	1100	1600	1600	1100	1600	1600	1100	1700	1300
SR	Andhra Pradesh	Thermal Powertech.	2x660	1320	Existing	726	1056	1056	726	1056	1056	726	1122	858
ER	Bihar	KhSTPP-II	(3x500)	1500	Existing	825	1200	1200	825	1200	1200	825	1275	975
WR	MAHARASHTRA	GMR Warora	2x300	600	Existing	330	480	480	330	480	480	330	510	390
WR	MAHARASHTRA	Dhariwal-I& II (STU)	1x300	300	Existing	165	240	240	165	240	240	165	255	195
WR	Chhatisgarh	Lara	1*800+1*800	1600	Existing	880	1280	1280	880	1280	1280	880	1360	1040
WR	Chhatisgarh	BALCO	4x300+4*67.5+ 4*1 35	2010	Existing	1105.5	1608	1608	1105.5	1608	1608	1105.5	1708.5	1306.5
ER	Bihar	KhSTPP-I	(4x210)	840	Existing	462	672	672	462	672	672	462	714	546
SR	Tamil Nadu	NLC TPS-I Exp.		420	Existing	231	336	336	231	336	336	231	357	273
NR	UP	Tanda TPS Extension	2x660	1320	UC	726	1056	1056	726	1056	1056	726	1122	858
WR	Chhatisgarh	KSK Mahanadi.IPP(Unit 1,2 and Unit 4)	3x600	1800	Existing	990	1440	1440	990	1440	1440	990	1530	1170
WR	Chhatisgarh	KSK Mahanadi.IPP(Unit 3,5 and Unit 6)	3x600	1800	UC	990	1440	1440	990	1440	1440	990	1530	1170
WR	Gujarat	*Mundra(APL)	**4*330 +2*660+3*660	4620	Existing	2541	3696	3696	2541	3696	3696	2541	3927	3003
SR	Tamil Nadu	NLC TPS-II Exp. Units 1 & 2		500	Existing	275	375	400	275	375	375	274	425	325
ER	Bihar	BARH	(2x660)	1320	Existing	726	990	1056	726	990	990	723.36	1122	858
ER	Bihar	Barh-1	3x660	1980	UC	1089	1485	1584	1089	1485	1485	1085.04	1683	1287
ER	West Bengal	FSTPP-III	(1x500)	500	Existing	0	0	0	0	0	0	274	425	325
ER	West Bengal	RTPS	(2x600)	1200	Existing	0	0	0	0	0	0	657.6	1020	780
ER	Bihar	NABINAGAR-I	(4x250)	1000	Existing	0	0	0	0	0	0	548	850	650
ER	Bihar	Nabinagar-2	3x660	1980	UC	0	0	0	0	0	0	1085.04	1683	1287
ER	Jharkhand	North Karanpura	3x660	1980	UC	0	0	0	0	0	0	1085.04	1683	1287
ER	Jharkhand	BOKARO'B'	(1x210)	210	Existing	0	0	0	0	0	0	115.08	178.5	136.5
ER	Jharkhand	CHANDRAPURA	(2x250)	500	Existing	0	0	0	0	0	0	274	425	325
ER	West Bengal	WARIA	(1x210)	210	Existing	0	0	0	0	0	0	115.08	178.5	136.5
ER	Jharkhand	Bokaro-A'	(1x500)	500	Existing	0	0	0	0	0	0	274	425	325
SR	Tamil Nadu	NNTPS (Replacement)		1000	Existing	0	0	0	0	0	0	548	850	650
SR	Andhra Pradesh	NCC	2x660	1320	Existing	0	0	0	0	0	0	723.36	1122	858
SR	Andhra Pradesh	Simhapuri	4x150	600	Existing	0	0	0	0	0	0	328.8	510	390
SR	Andhra Pradesh	Meenakshi	2x150+2x350	1000	Existing	0	0	0	0	0	0	548	850	650
WR	MP	Moserbaer(Annupur TPP)	2x600	1200	Existing	0	0	0	0	0	0	657.6	1020	780
SR	Telangana	RSTPS St.III (U-7)		500	Existing	0	0	0	0	0	0	274	425	325
ER	West Bengal	FSTPP-I & II	(3x200+2x500)	1600	Existing	0	0	0	0	0	0	876.8	1360	1040
SR	Tamil Nadu	NLC TS-II Stg1		630	Existing	0	0	0	0	0	0	345.24	535.5	409.5
SR	Tamil Nadu	NLC TS-II Stg.2		840	Existing	0	0	0	0	0	0	460.32	714	546
ER	Jharkhand	KODERMA	(2x500)	1000	Existing	0	0	0	0	0	0	548	850	650
SR	Telangana	RSTPS St.I & II (U-1 to U-6)		2100	Existing	0	0	0	0	0	0	1150.8	1785	1365
ER	Bihar	KBUNL	(2x195)	390	Existing	0	0	0	0	0	0	213.72	331.5	253.5
ER	Jharkhand	MPL	(2x525)	1050	Existing	0	0	0	0	0	0	575.4	892.5	682.5
SR	Tamil Nadu	IL&FS Tamil Nadu	2x600	1200	Existing	0	0	0	0	0	0	657.6	1020	780

ER	West Bengal	MEJIA	(4x210+250x2)	1340	Existing	0	0	0	0	0	0	734.32	1139	871
ER	West Bengal	MEJIA-II	(2x500)	1000	Existing	0	0	0	0	0	0	548	850	650
NER	Assam	BTPS		750	Existing	0	0	0	0	0	0	411	637.5	487.5
NR	UP	Tanda TPS	4x110	440	Existing	0	0	0	0	0	0	241.12	374	286
SR	Tamil Nadu	NTPL - Tuticorin JV		1000	Existing	0	0	0	0	0	0	548	850	650
WR	MAHARASHTRA	Mauda	2x500+2x660	2320	Existing	0	0	0	0	0	0	1271.36	1972	1508
SR	Andhra Pradesh	Simhadri stg II		1000	Existing	0	0	0	0	0	0	548	850	650
NR	UP	Unchahar -I TPS	2x210	420	Existing	0	0	0	0	0	0	230.16	357	273
SR	Andhra Pradesh	Simhadri stg I		1000	Existing	0	0	0	0	0	0	548	850	650
NR	UP	Unchahar -III TPS	1x210	210	Existing	0	0	0	0	0	0	0	0	0
NR	UP	Unchahar -II TPS	2x210	420	Existing	0	0	0	0	0	0	0	0	0
WR	MAHARASHTRA	Solapur	2*660	1320	Existing	0	0	0	0	0	0	0	0	0
SR	Tamil Nadu	Coastal Energen	2x600	1200	Existing	0	0	0	0	0	0	0	0	0
NR	Haryana	ISTPS Jhajjar	3x500	1500	Existing	0	0	0	0	0	0	0	0	0
NR	UP	Unchahar -IV TPS	1x500	500	Existing	0	0	0	0	0	0	0	0	0
NR	UP	Dadri NCPS Stage-II	2x490	980	Existing	0	0	0	0	0	0	0	0	0
SR	Tamil Nadu	NTECL Vallur TPS		1500	Existing	0	0	0	0	0	0	0	0	0
SR	Karnataka	Kudgi TPS		2400	Existing	0	0	0	0	0	0	0	0	0
NR	UP	Dadri NCTPS	4x210	840	Existing	0	0	0	0	0	0	0	0	0
<b>117735</b>						<b>41297</b>	<b>62226</b>	<b>62416</b>	<b>41297</b>	<b>62226</b>	<b>62226</b>	<b>58705</b>	<b>90835</b>	<b>69462</b>

## State Thermal generations considering various scenarios

S.No	REGION	STATE	PROJECT NAME	UNIT	CAPACITY (MW)	Status (Existing/UC)	Scenario 1			Scenario 2			Scenario 3			Scenario 4			Scenario 5			Scenario 6			Scenario 7			Scenario 8			Scenario 9			
							No of units in operation	Despatch per unit	Total plant dispatch	No of units in operation	Despatch per unit	Total plant dispatch	No of units in operation	Despatch per unit	Total plant dispatch	No of units in operation	Despatch per unit	Total plant dispatch	No of units in operation	Despatch per unit	Total plant dispatch	No of units in operation	Despatch per unit	Total plant dispatch	No of units in operation	Despatch per unit	Total plant dispatch	No of units in operation	Despatch per unit	Total plant dispatch	No of units in operation	Despatch per unit	Total plant dispatch	
1	WR	MP	AMARKANTAK	2X120	240	Existing	1	83	83	1	102	102	1	103	103	1	83	83	1	103	103	1	103	103	1	97	97	1	104	104	1	103	103	
1	WR	MP	AMARKANTAK	1X210	210	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	WR	MP	SATPURA-II	1x200	200	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	WR	MP	SATPURA-II	1x210	210	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	WR	MP	SATPURA-III & IV	2x210	420	Existing	1	146	146	1	179	179	1	179	179	1	145	145	1	180	180	1	180	180	1	170	170	1	182	182	1	180	180	
3	WR	MP	SATPURA-III & IV	2x250	500	Existing	1	174	174	1	213	213	1	214	214	1	173	173	1	214	214	1	215	215	1	202	202	1	217	217	1	214	214	
4	WR	MP	S GANDHI TPS I & II	4x210	840	Existing	2	146	292	2	179	358	2	179	359	2	145	291	2	180	360	2	180	361	2	170	339	2	177	354	2	174	347	
5	WR	MP	S GANDHI TPS III	1x500	500	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9	WR	MP	SSTP(Shri Singhaji Thermal Power	2x600	1200	Existing	1	417	417	1	511	511	1	513	513	1	415	415	1	514	514	1	515	515	1	485	485	1	521	521	1	514	514	
9	WR	MP	SSTP(Shri Singhaji Thermal Power	2x600	1200	Existing	1	417	417	1	511	511	1	513	513	1	415	415	1	514	514	1	515	515	1	485	485	1	521	521	1	514	514	
10	WR	MP	BLA POWER	1x45(35% )	45	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29	WR	Chhatisgarh	KORBA (E)	4x50	200	Existing	2	35	69	2	43	85	2	43	85	2	35	69	2	43	86	2	43	86	2	40	81	2	42	84	2	41	83	
29	WR	Chhatisgarh	KORBA (E)	2x120	240	Existing	1	83	83	1	102	102	1	103	103	1	83	83	1	103	103	1	103	103	1	97	97	1	104	104	1	103	103	
30	WR	Chhatisgarh	KORBA (W)	4x210	840	Existing	2	146	292	2	179	358	2	179	359	2	145	291	2	180	360	2	180	361	2	170	339	2	177	354	2	174	347	
30	WR	Chhatisgarh	KORBA (W)	1x500	500	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	WR	Chhatisgarh	KORBA (E) ext-I	2x250	500	Existing	1	174	174	1	213	213	1	214	214	1	173	173	1	214	214	1	215	215	1	202	202	1	217	217	1	214	214	
36	WR	Chhatisgarh	SVPL TPP	1x63	63	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
49	WR	Chhatisgarh	Marwa TPS	2x500	1000	Existing	1	347	347	1	426	426	1	427	427	1	346	346	1	429	429	1	430	430	1	404	404	1	434	434	1	428	428	
58	WR	MAHARASHTRA	CHANDRAPUR	2x210	420	Existing	1	146	146	1	179	179	1	179	179	1	145	145	1	180	180	1	180	180	1	170	170	1	182	182	1	180	180	
58	WR	MAHARASHTRA	CHANDRAPUR	3x500	1500	Existing	1	347	347	1	426	426	1	427	427	1	346	346	1	429	429	1	430	430	2	404	808	2	434	868	2	428	856	
59	WR	MAHARASHTRA	CHANDRAPUR Extension	2x500	1000	Existing	1	347	347	1	426	426	1	427	427	1	346	346	1	429	429	1	430	430	1	404	404	1	434	434	1	428	428	
60	WR	MAHARASHTRA	TROMBAY	2x500	1000	Existing	1	347	347	1	426	426	1	427	427	1	346	346	1	429	429	1	430	430	1	404	404	1	434	434	1	428	428	
60	WR	MAHARASHTRA	TROMBAY	1X250	250	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	WR	MAHARASHTRA	KORADI	2x210	420	Existing	1	146	146	1	179	179	1	179	179	1	145	145	1	180	180	1	180	180	1	170	170	1	182	182	1	180	180	
62	WR	MAHARASHTRA	KORADI	3x660	1980	Existing	1	458	458	1	562	562	1	564	564	1	457	457	1	566	566	1	567	567	2	533	1066	2	573	1146	2	565	1130	
63	WR	MAHARASHTRA	NASIK	3x210	630	Existing	1	146	146	1	179	179	1	179	179	1	145	145	1	180	180	1	180	180	2	170	339	2	182	365	2	180	360	
64	WR	MAHARASHTRA	KHAPERKHEDE	4x210	840	Existing	2	146	292	2	179	358	2	179	359	2	145	291	2	180	360	2	180	361	2	170	339	2	177	354	2	174	347	
64	WR	MAHARASHTRA	KHAPERKHEDE	1x500	500	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	WR	MAHARASHTRA	PARLI	2x210	420	Existing	1	146	146	1	179	179	1	179	179	1	145	145	1	180	180	1	180	180	1	170	170	1	182	182	1	180	180	
65	WR	MAHARASHTRA	PARLI	3x250	750	Existing	1	174	174	1	213	213	1	214	214	1	173	173	1	214	214	1	215	215	2	202	404	2	217	434	2	214	428	
66	WR	MAHARASHTRA	BHUSAWAL	2x210	420	Existing	1	146	146	1	179	179	1	179	179	1	145	145	1	180	180	1	180	180	1	170	170	1	182	182	1	180	180	
66	WR	MAHARASHTRA	BHUSAWAL	2x500	1000	Existing	1	347	347	1	426	426	1	427	427	1	346	346	1	429	429	1	430	430	1	404	404	1	434	434	1	428	428	
67	WR	MAHARASHTRA	REL DAHANU	2x250	500	Existing	1	174	174	1	213	213	1	214	214	1	173	173	1	214	214	1	215	215	1	202	202	1	217	217	1	214	214	
68	WR	MAHARASHTRA	PARAS	2x250	500	Existing	1	174	174	1	213	213	1	214	214	1	173	173	1	214	214	1	215	215	1	202	202	1	217	217	1	214	214	
69	WR	MAHARASHTRA	JSW Ratnagiri(Jaigad)	4x300	1200	Existing	2	208	417	2	256	511	2	256	513	2	208	415	2	257	514	2	258	515	2	242	485	2	253	506	2	248	496	
70	WR	MAHARASHTRA	Mihan TPP(Abhijit)	4x61.5	246	Existing	2	43	85	2	52	105	2	53	105	2	43	85	2	53	105	2	53	106	2	50	99	2	52	104	2	51	102	
71	WR	MAHARASHTRA	Wardha Warora Power Co Ltd.	4x135	540	Existing	2	94	188	2	115	230	2	115	231	2	93	187	2	116	231	2	116	232	2	109	218	2	114	228	2	112	223	
72	WR	MAHARASHTRA	Vidharba Industry, Butibori	2x300	600	Existing	1	208	208	1	256	256	1	256	256	1	208	208	1	257	257	1	258	258	1	242	242	1	260	260	1	257	257	
73	WR	MAHARASHTRA	APML,Tiroda-Ph-I(400 kV)	3x660	1980	Existing	1	458	458	1	562	562	1	564	564	1	457	457	1	566	566	1	567	567	2	533	1066	2	573	1146	2	565	1130	
74	WR	MAHARASHTRA	APML,Tiroda-Ph-II( 765 kV)	2x660	1320	Existing	1	458	458	1	562	562	1	564	564	1	457	457	1	566	566	1	567	567	1	533	533	1	573	573	1	565	565	
75	WR	MAHARASHTRA	IEPL (Ideal Energy Power Ltd.	1x270	270	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
76	WR	MAHARASHTRA	IBL (India Bulls Limited, Amravati) Ratan India	5x270	1350	Existing	2	188	375	2	225	450	2	226	452	2	187	374	2	227	454	2	228	455	4	216	865	4	234	935	4	230	920	
78	WR	MAHARASHTRA	Indrajeet	1x77	77	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
79	WR	MAHARASHTRA	Indorama	1x49	49	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
80	WR	MAHARASHTRA	Finolex, Ratnagiri	1x43	43	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
81	WR	MAHARASHTRA	JSW Boisar, Vashi Circle	1x37.6	37.6	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
82	WR	MAHARASHTRA	Uttam Galwa	1x60	60	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
83	WR	MAHARASHTRA	Gupta Energy Ltd	2x60	120	Existing	1	42	42	1	51	51	1	51	51	1	42	42	1															

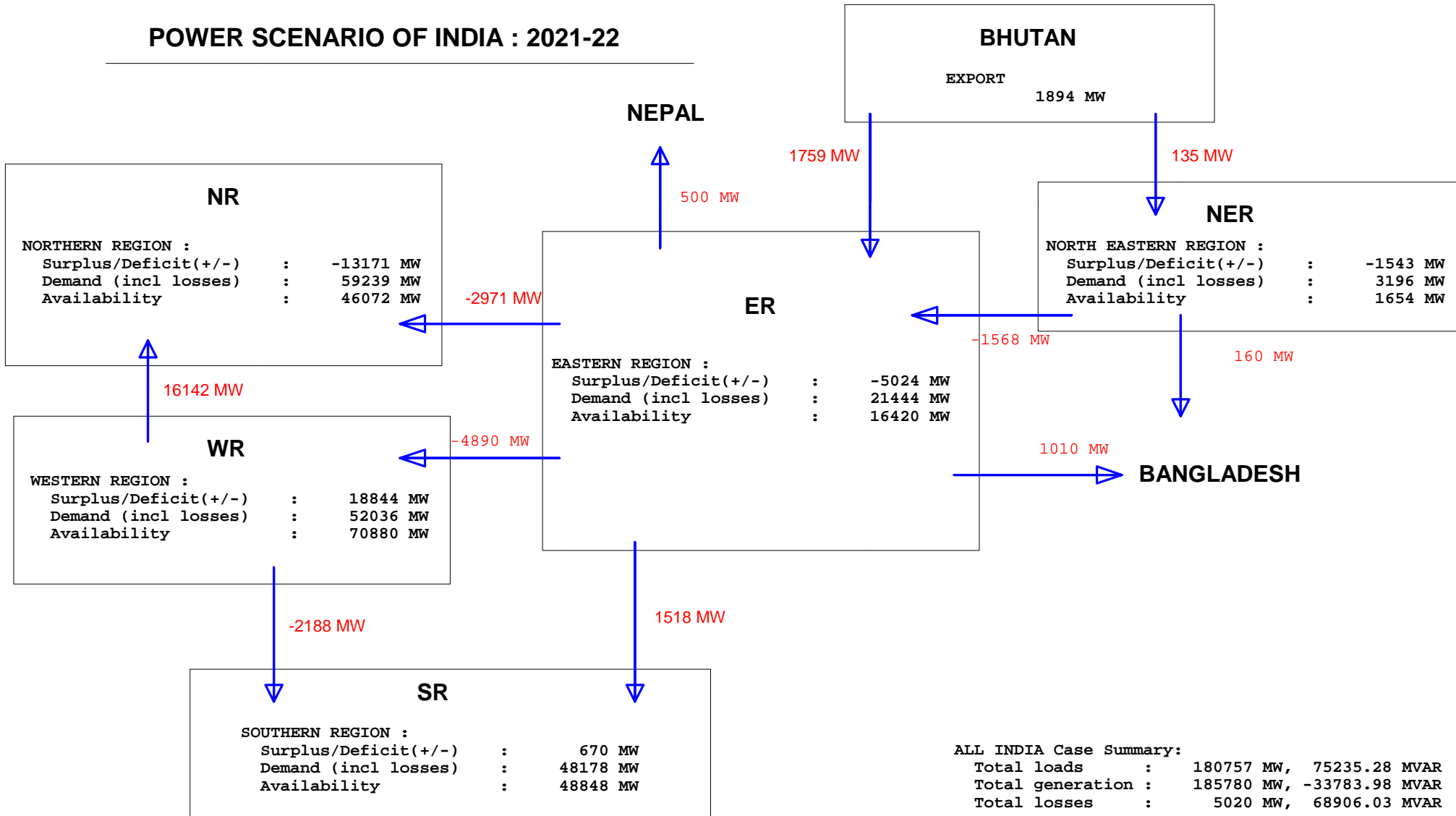




631	NR	Punjab	Lehra Mohabbat TPS	2x250	500	Existing	1	174	174	1	213	213	1	214	214	1	173	173	1	214	214	1	215	215	1	202	202	1	217	217	1	214	214
632	NR	Punjab	Rajpura	2x700	1400	Existing	1	486	486	1	596	596	1	598	598	1	484	484	1	600	600	1	601	601	1	565	565	1	608	608	1	600	600
633	NR	Punjab	Talwandi Saboc	3x660	1980	Existing	1	458	458	1	562	562	1	564	564	1	457	457	1	566	566	1	567	567	2	533	1066	2	573	1146	2	565	1130
634	NR	Punjab	GOINDWAL (GVK)	2x270	540	Existing	1	188	188	1	230	230	1	231	231	1	187	187	1	231	231	1	232	232	1	218	218	1	234	234	1	231	231
641	NR	Rajasthan	Kota TPS	2x110	220	Existing	1	76	76	1	94	94	1	94	94	1	76	76	1	94	94	1	95	95	1	89	89	1	96	96	1	94	94
641	NR	Rajasthan	Kota TPS	3x210	630	Existing	1	146	146	1	179	179	1	179	179	1	145	145	1	180	180	1	180	180	2	170	339	2	182	365	2	180	360
641	NR	Rajasthan	Kota TPS	2x195	390	Existing	1	135	135	1	166	166	1	167	167	1	135	135	1	167	167	1	168	168	1	158	158	1	169	169	1	167	167
642	NR	Rajasthan	Suratgarh TPS	6x250	1500	Existing	4	157	627	4	212	847	4	212	850	4	155	622	4	213	853	4	214	855	5	200	998	5	215	1077	5	212	1058
643	NR	Rajasthan	RAMGARH GT EX1	1x35.5	35.5	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
643	NR	Rajasthan	RAMGARH GT EX1	2x37.5	75	Existing	1	26	26	1	32	32	1	32	32	1	26	26	1	32	32	1	32	32	1	30	30	1	33	33	1	32	32
643	NR	Rajasthan	RAMGARH GT EX1	1X110	110	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
643	NR	Rajasthan	RAMGARH GT EX1	1x50	50	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
644	NR	Rajasthan	Giral LTPS	2x125	250	Existing	1	87	87	1	107	107	1	107	107	1	87	87	1	107	107	1	107	107	1	101	101	1	109	109	1	107	107
645	NR	Rajasthan	Dholpur CCPI	3x110	330	Existing	1	76	76	1	94	94	1	94	94	1	76	76	1	94	94	1	95	95	2	89	178	2	96	191	2	94	188
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646	NR	Rajasthan	Chhbra TPS	2x660	1320	Existing	1	458	458	1	562	562	1	564	564	1	457	457	1	566	566	1	567	567	1	533	533	1	573	573	1	565	565
647	NR	Rajasthan	RajWest	8x135	1080	Existing	5	87	433	5	113	565	5	114	568	5	86	430	5	114	570	5	114	572	6	109	653	6	116	694	6	114	681
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649	NR	Rajasthan	Kalisindi	2X600	1200	Existing	1	417	417	1	511	511	1	513	513	1	415	415	1	514	514	1	515	515	1	485	485	1	521	521	1	514	514
650	NR	Rajasthan	Kawai	2X660	1320	Existing	1	458	458	1	562	562	1	564	564	1	457	457	1	566	566	1	567	567	1	533	533	1	573	573	1	565	565
651	NR	Rajasthan	Suratgarh TPS Extension	2x660	1320	UC	1	458	458	1	562	562	1	564	564	1	457	457	1	566	566	1	567	567	1	533	533	1	573	573	1	565	565
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660	NR	UP	Obra A	1X94	94	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
661	NR	UP	Obra E	5X200	1000	Existing	2	139	278	2	167	333	2	167	334	2	138	277	2	168	336	2	169	337	4	160	641	4	173	693	4	170	681
662	NR	UP	Harduaganj - f	1x60	60	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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663	NR	UP	Harduaganj - c	2x250	500	Existing	1	174	174	1	213	213	1	214	214	1	173	173	1	214	214	1	215	215	1	202	202	1	217	217	1	214	214
664	NR	UP	Paricha - A,B,C	2x110	220	Existing	1	76	76	1	94	94	1	94	94	1	76	76	1	94	94	1	95	95	1	89	89	1	96	96	1	94	94
664	NR	UP	Paricha - A,B,C	2x210	420	Existing	1	146	146	1	179	179	1	179	179	1	145	145	1	180	180	1	180	180	1	170	170	1	182	182	1	180	180
664	NR	UP	Paricha - A,B,C	2x250	500	Existing	1	174	174	1	213	213	1	214	214	1	173	173	1	214	214	1	215	215	1	202	202	1	217	217	1	214	214
665	NR	UP	Anpara - j	3x210	630	Existing	1	146	146	1	179	179	1	179	179	1	145	145	1	180	180	1	180	180	2	170	339	2	182	365	2	180	360
666	NR	UP	Anpara - f	2x500	1000	Existing	1	347	347	1	426	426	1	427	427	1	346	346	1	429	429	1	430	430	1	404	404	1	434	434	1	428	428
667	NR	UP	Anpara - C(IPP)	2x600	1200	Existing	1	417	417	1	511	511	1	513	513	1	415	415	1	514	514	1	515	515	1	485	485	1	521	521	1	514	514
668	NR	UP	Rosa (IPP)	4x300	1200	Existing	2	208	417	2	256	511	2	256	513	2	208	415	2	257	514	2	258	515	2	242	485	2	253	506	2	248	496
669	NR	UP	Bajaj Energy Pvt. Ltd(IPP)	10x45	450	Existing	6	29	176	6	38	228	6	38	228	6	29	175	6	38	229	6	38	230	8	36	288	8	39	312	8	38	307
671	NR	UP	Anpara - D	2x500	1000	Existing	1	347	347	1	426	426	1	427	427	1	346	346	1	429	429	1	430	430	1	404	404	1	434	434	1	428	428
672	NR	UP	Lalitpur	3x660	1980	Existing	1	458	458	1	562	562	1	564	564	1	457	457	1	566	566	1	567	567	2	533	1066	2	573	1146	2	565	1130
673	NR	UP	Bara	3x660	1980	Existing	1	458	458	1	562	562	1	564	564	1	457	457	1	566	566	1	567	567	2	533	1066	2	573	1146	2	565	1130
674	NR	UP	Meja	1x660	660	Existing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
675	NR	UP	JP Churk	3x60	180	Existing	1	42	42	1	51	51	1	51	51	1	42	42	1	51	51	1	52	52	2	48	97	2	52	104	2	51	103
676	NR	UP	Meja Extensior	1x660	660	UC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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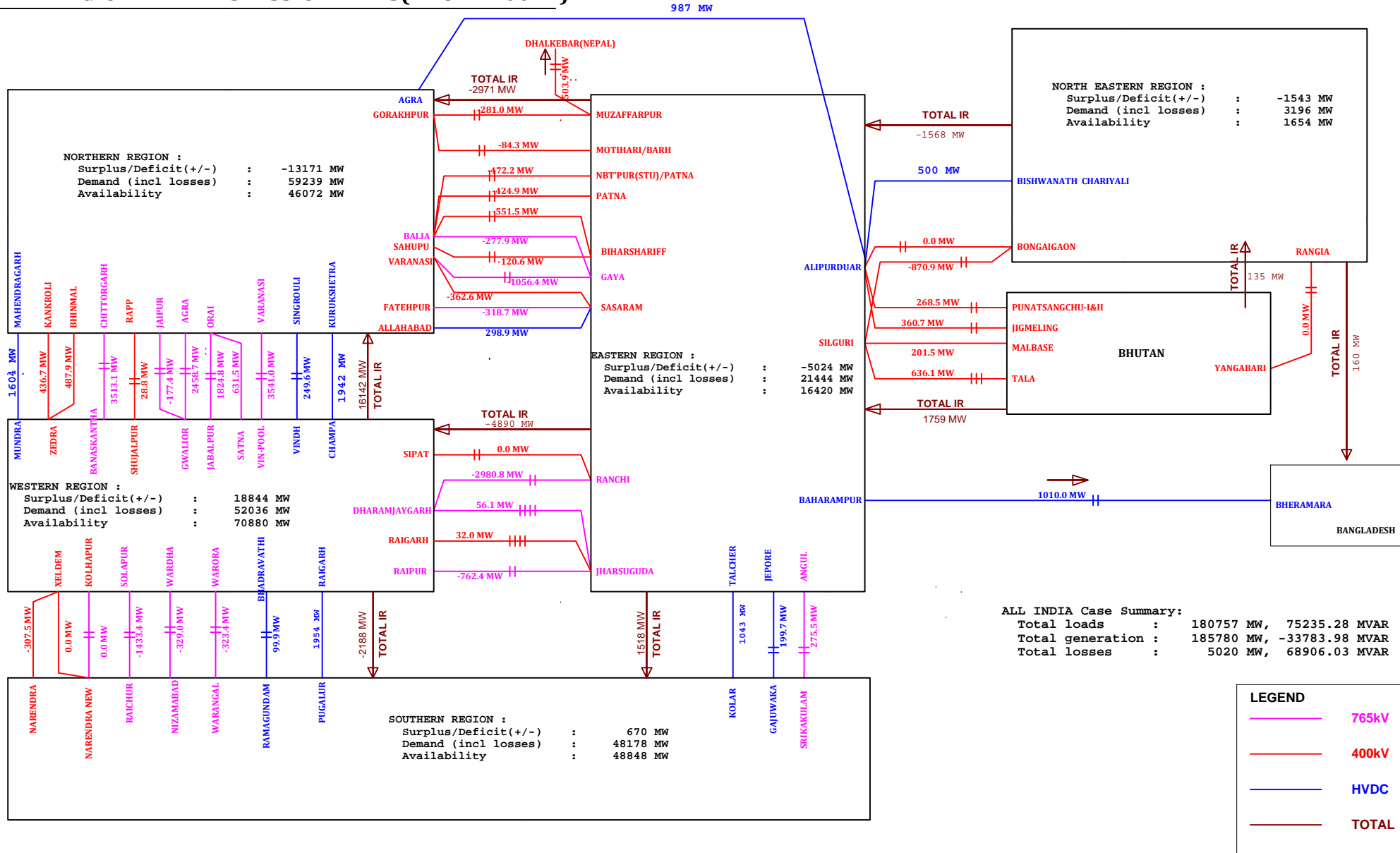
**POWER SCENARIO OF INDIA : 2021-22**



**ALL INDIA Case Summary:**

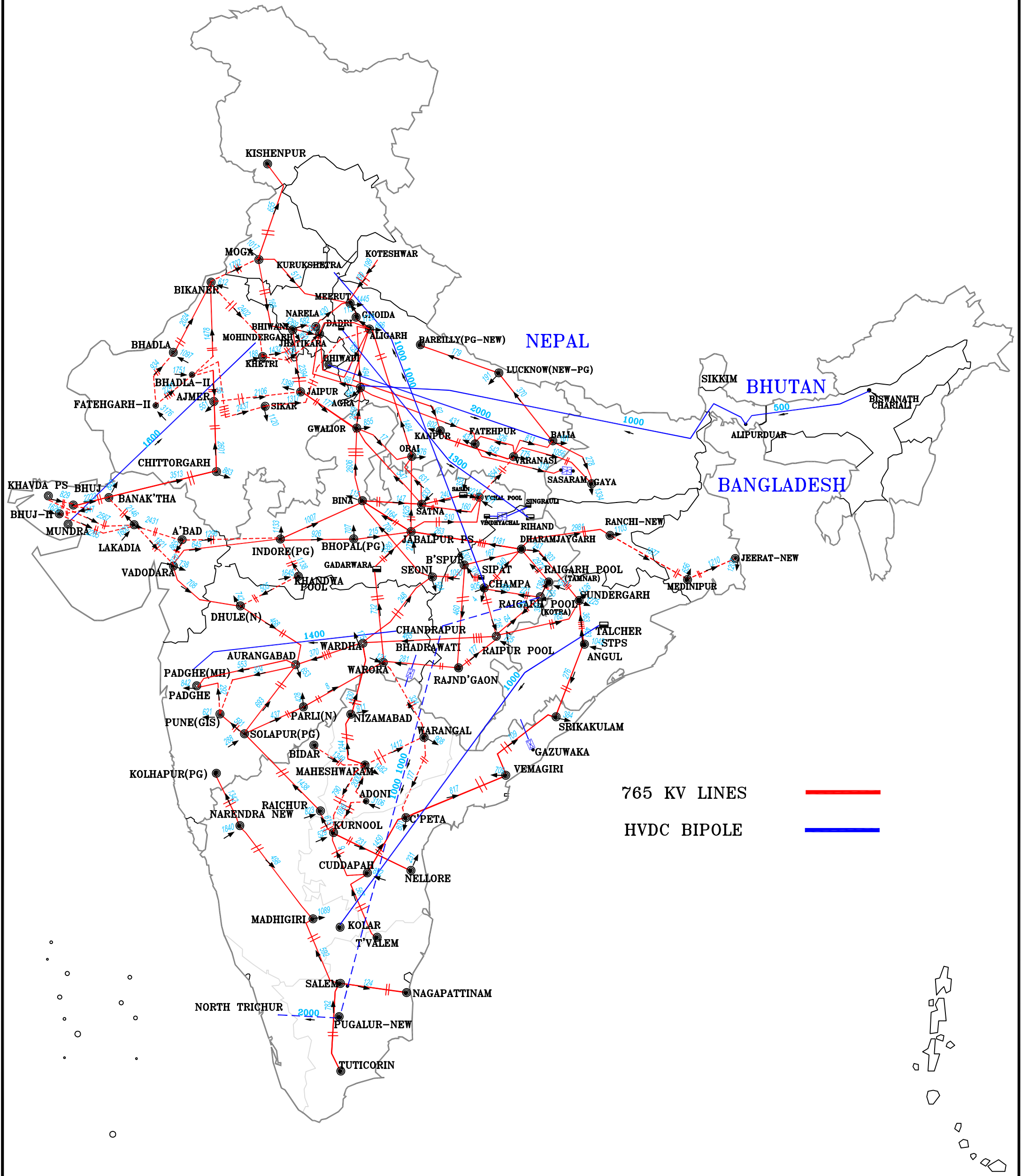
Total loads	:	180757 MW,	75235.28 MVAR
Total generation	:	185780 MW,	-33783.98 MVAR
Total losses	:	5020 MW,	68906.03 MVAR

**INTER REGIONAL TRANSMISSION LINES(ABOVE 400kV)**

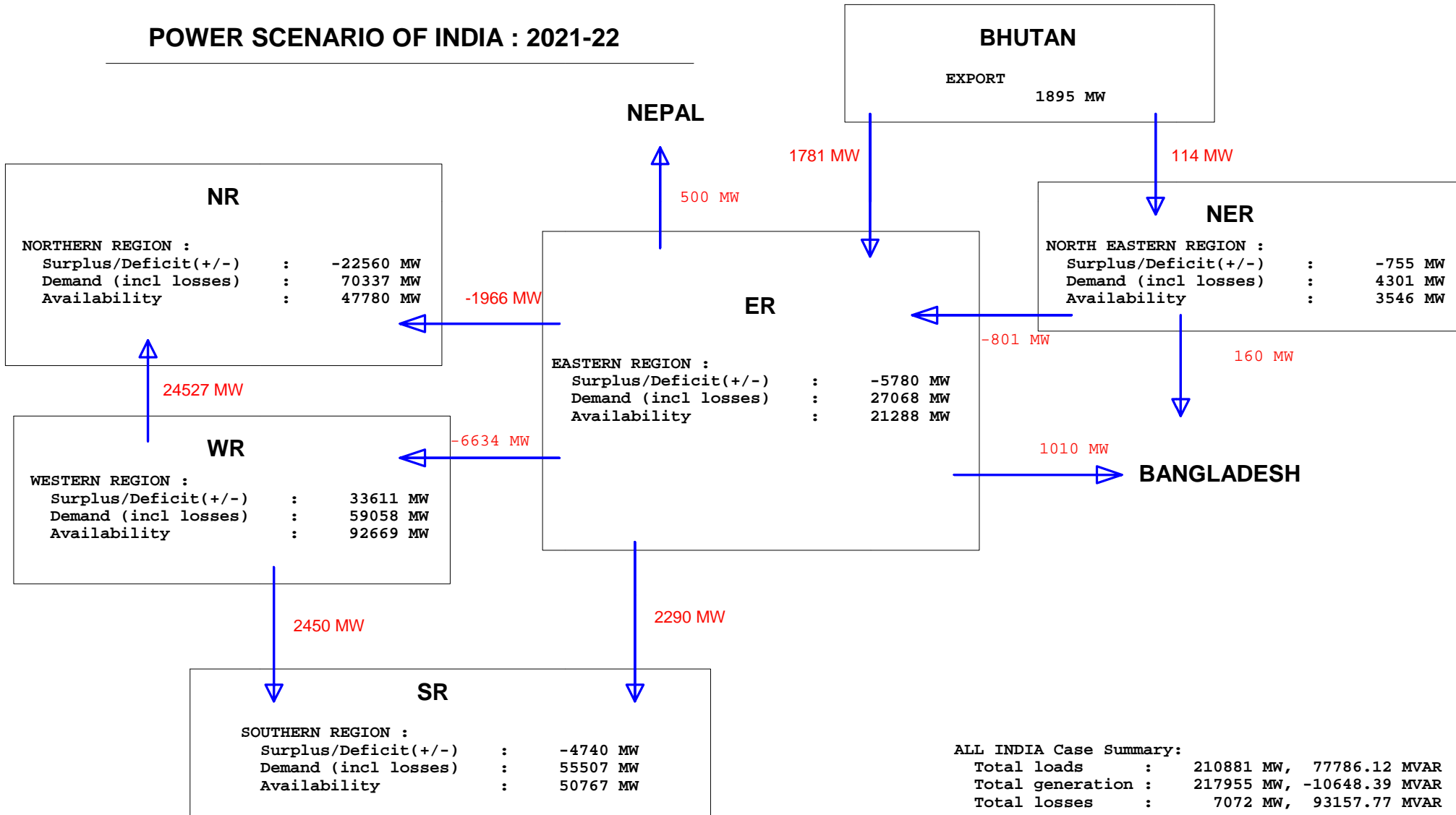


# All-India Studies for 2021-22

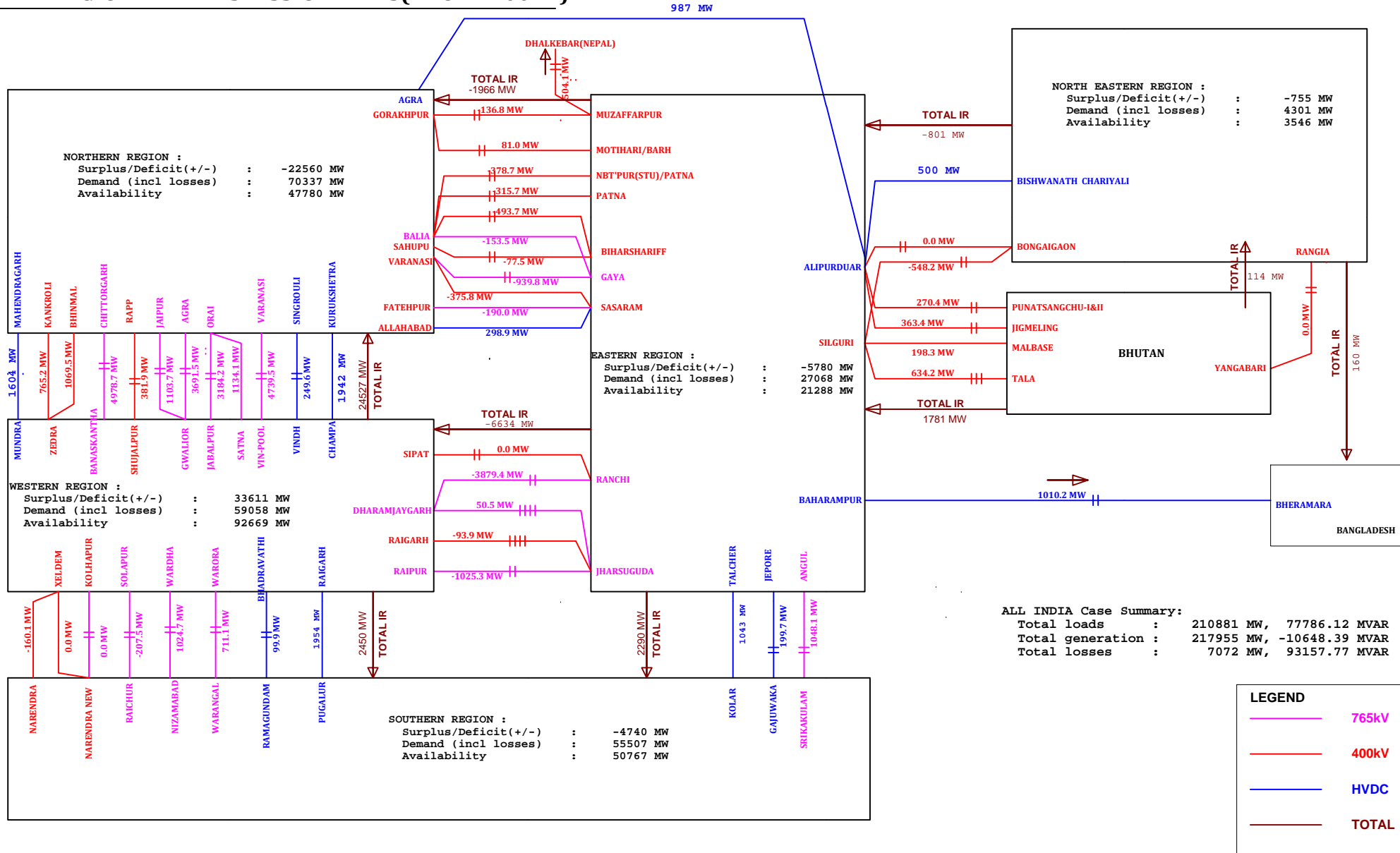
## 765kV ISTS lines and HVDC links



**POWER SCENARIO OF INDIA : 2021-22**

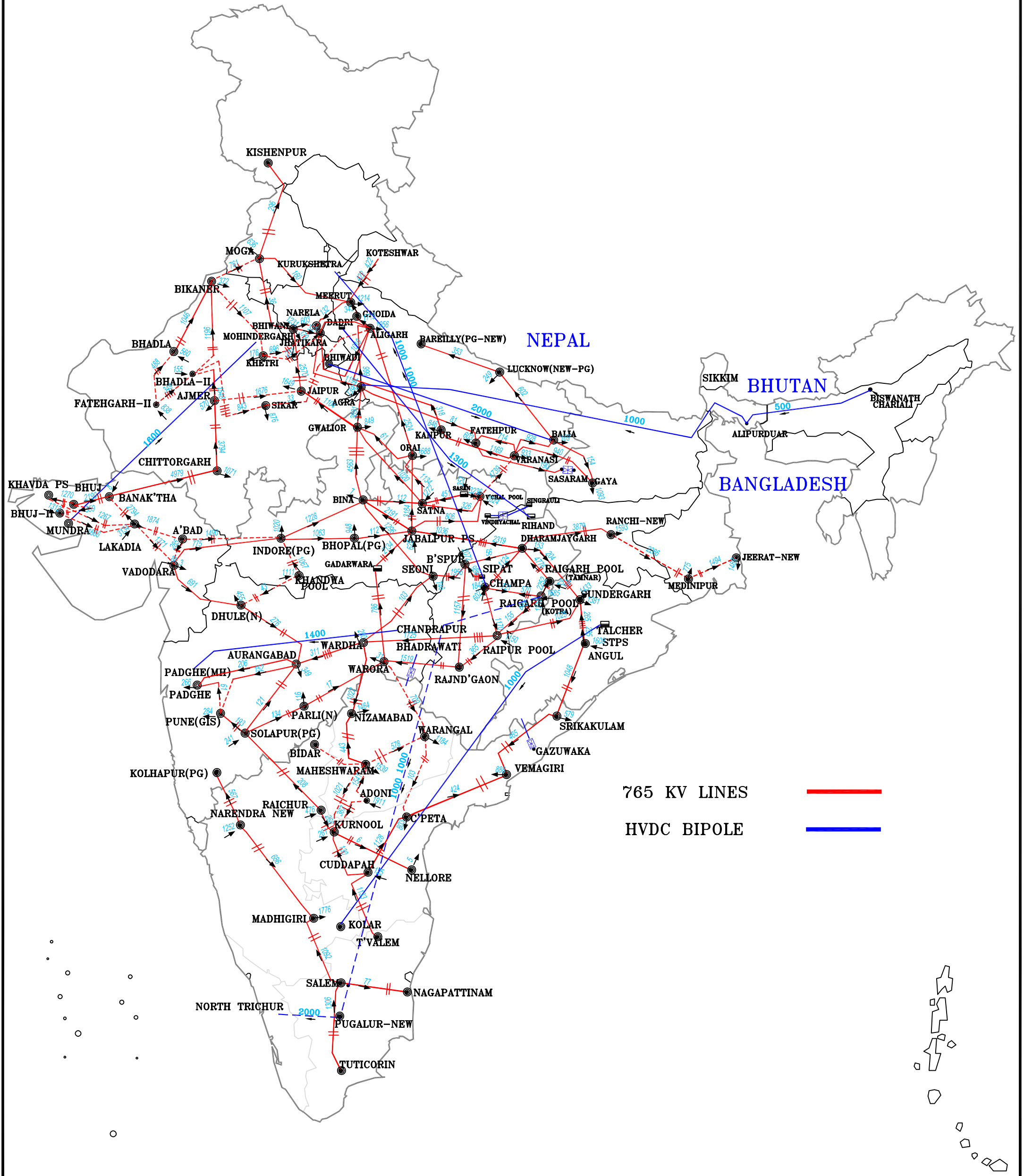


**INTER REGIONAL TRANSMISSION LINES(ABOVE 400kV)**



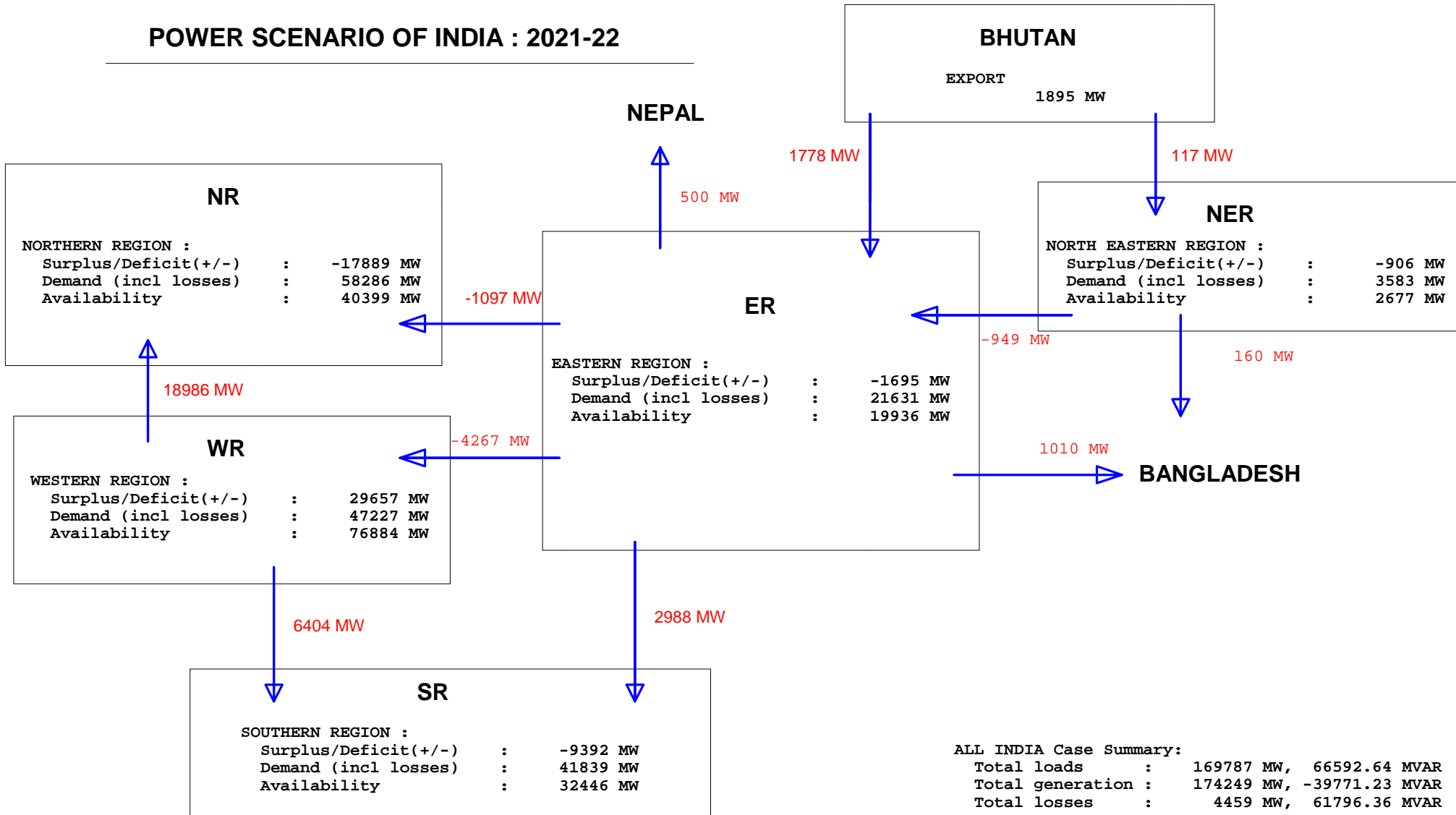
# All-India Studies for 2021-22

## 765kV ISTS lines and HVDC links

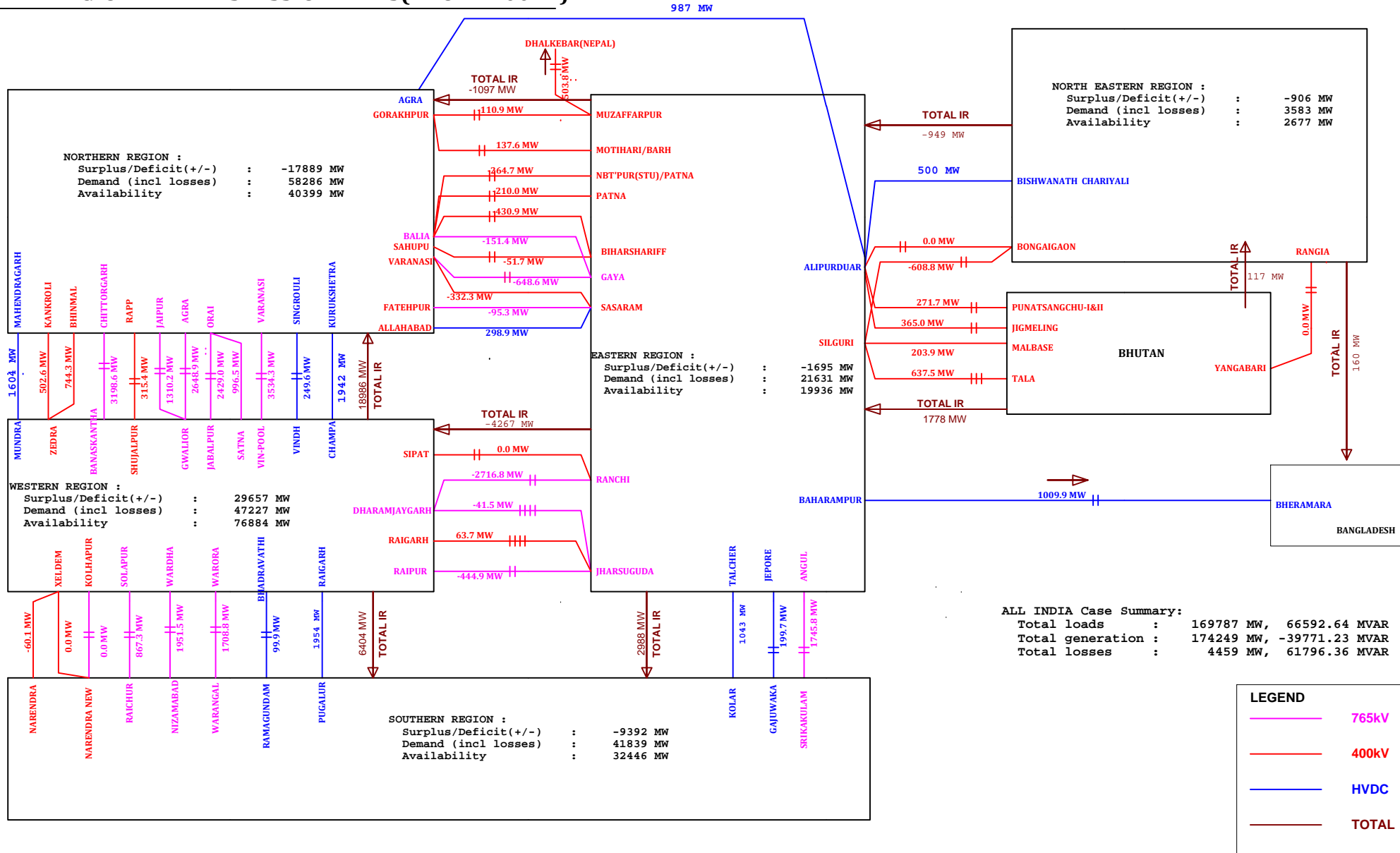




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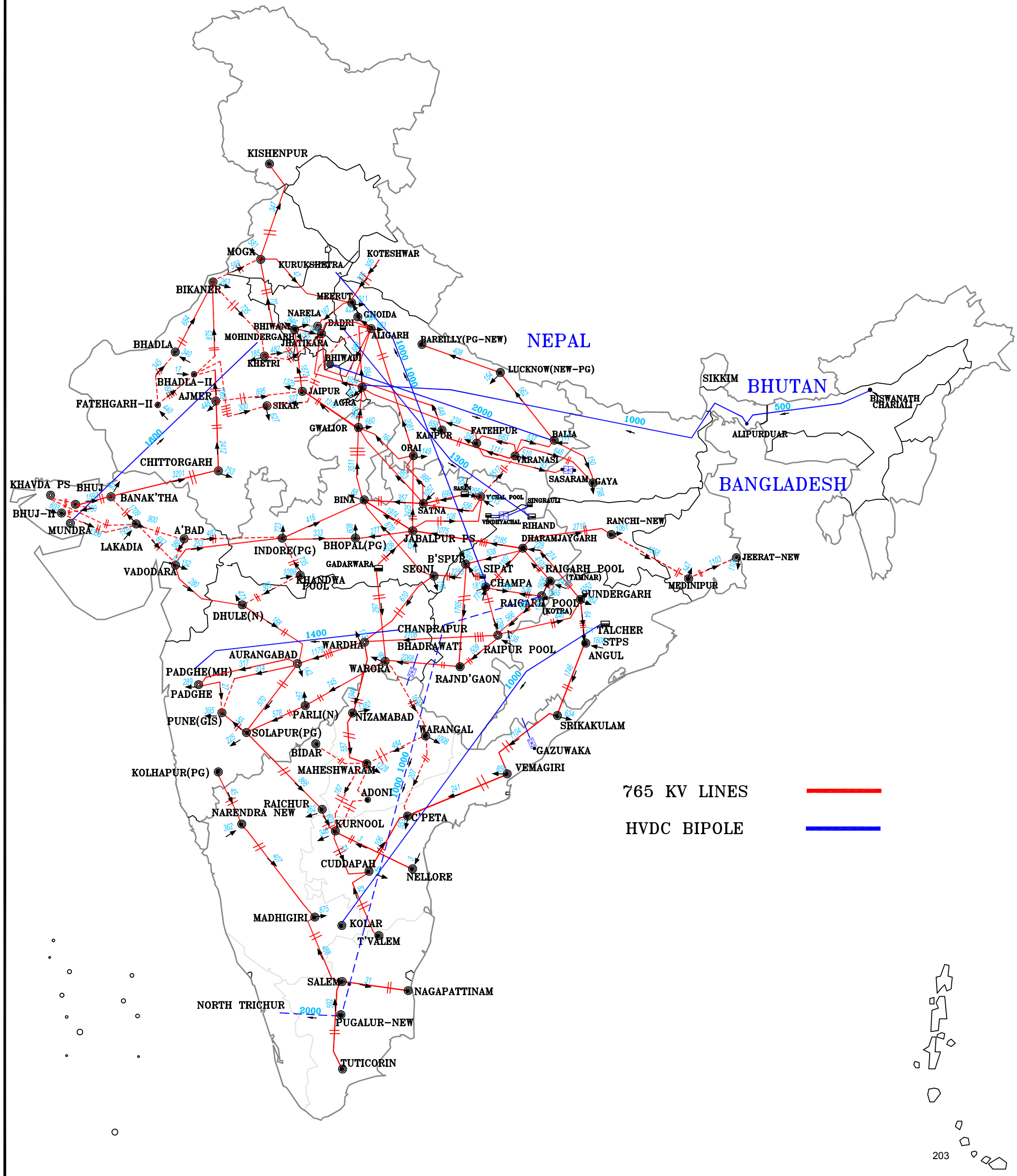


**INTER REGIONAL TRANSMISSION LINES(ABOVE 400kV)**

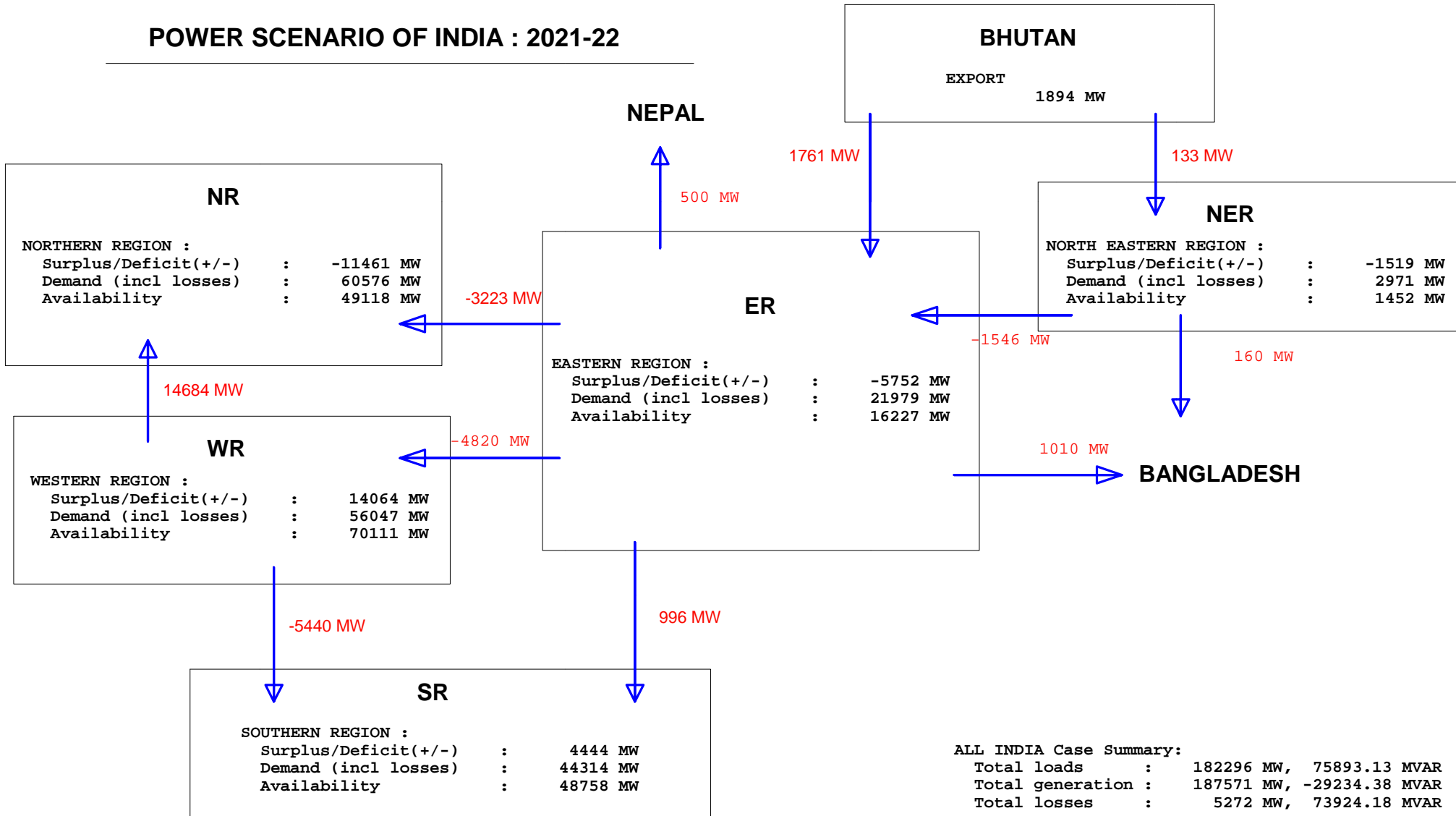


# All-India Studies for 2021-22

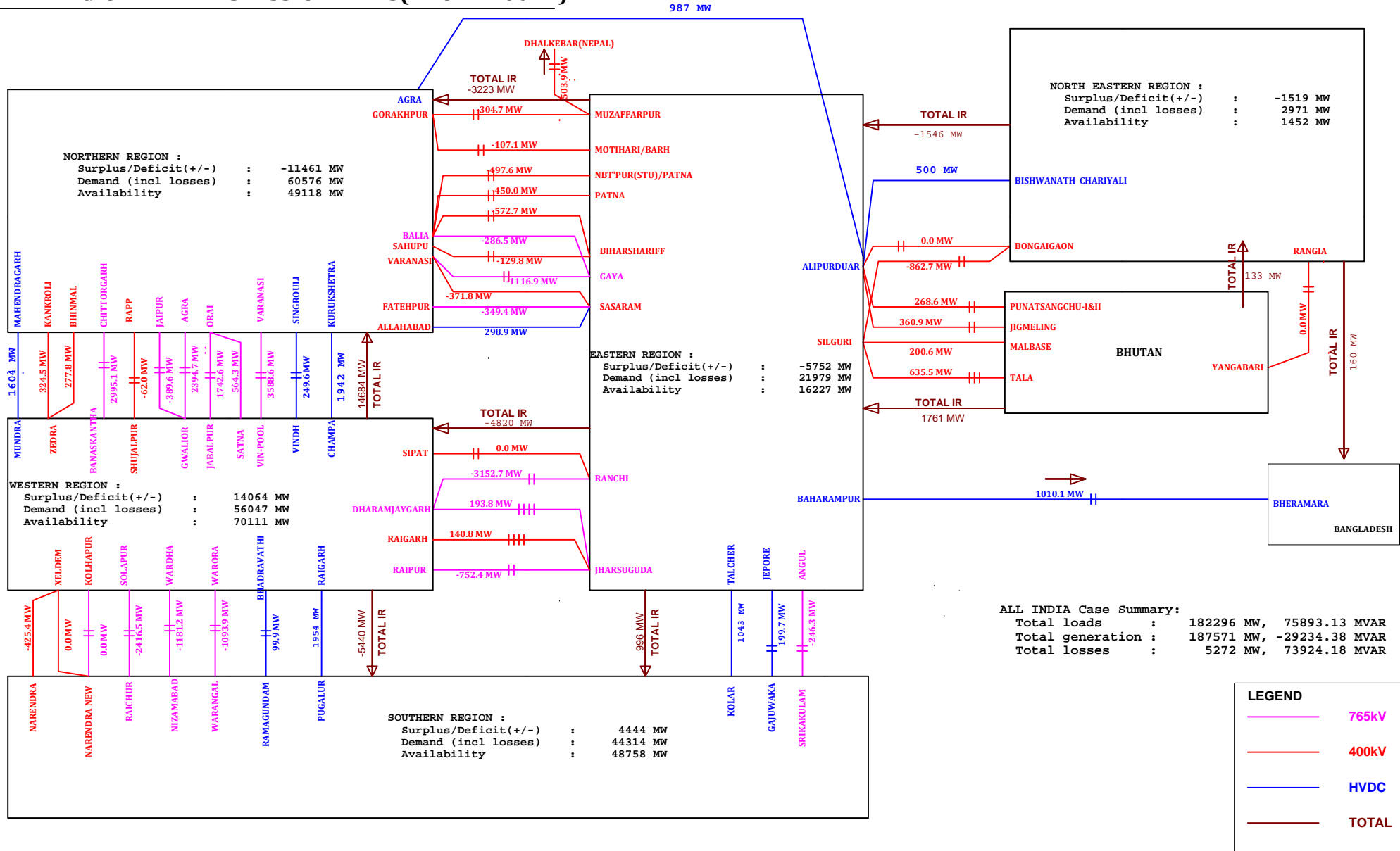
## 765kV ISTS lines and HVDC links



**POWER SCENARIO OF INDIA : 2021-22**

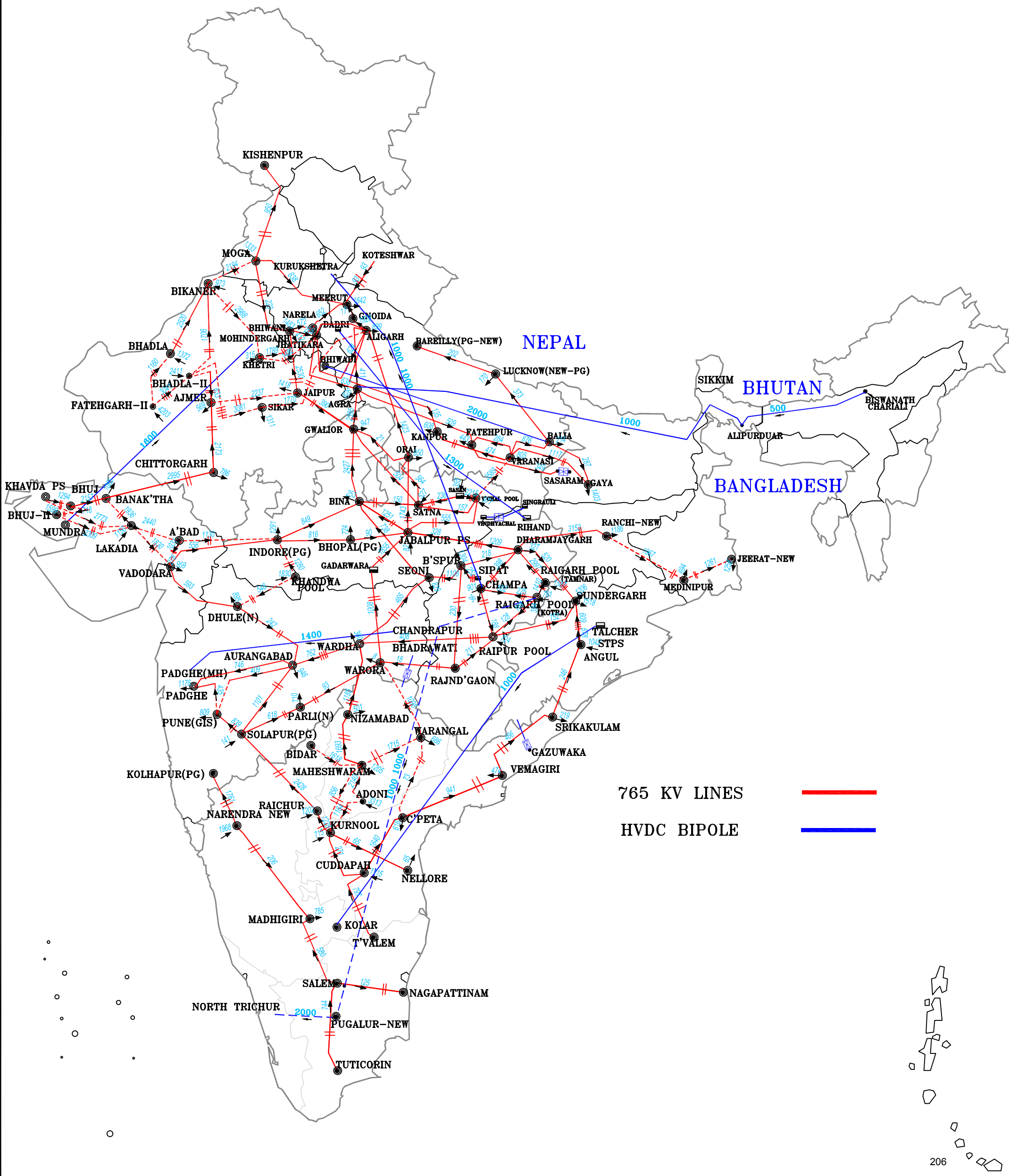


**INTER REGIONAL TRANSMISSION LINES(ABOVE 400kV)**



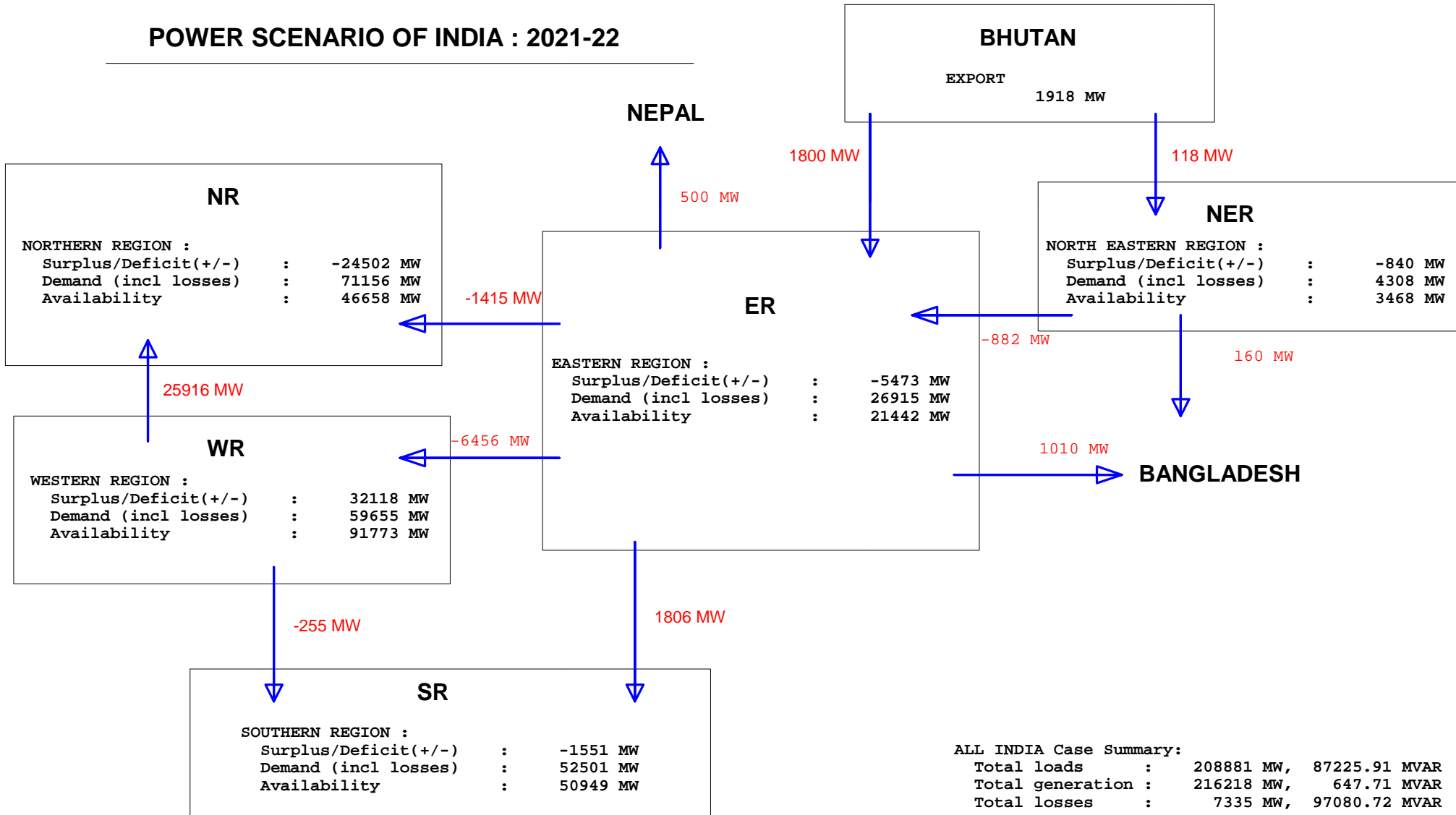
# All-India Studies for 2021-22

## 765kV ISTS lines and HVDC links

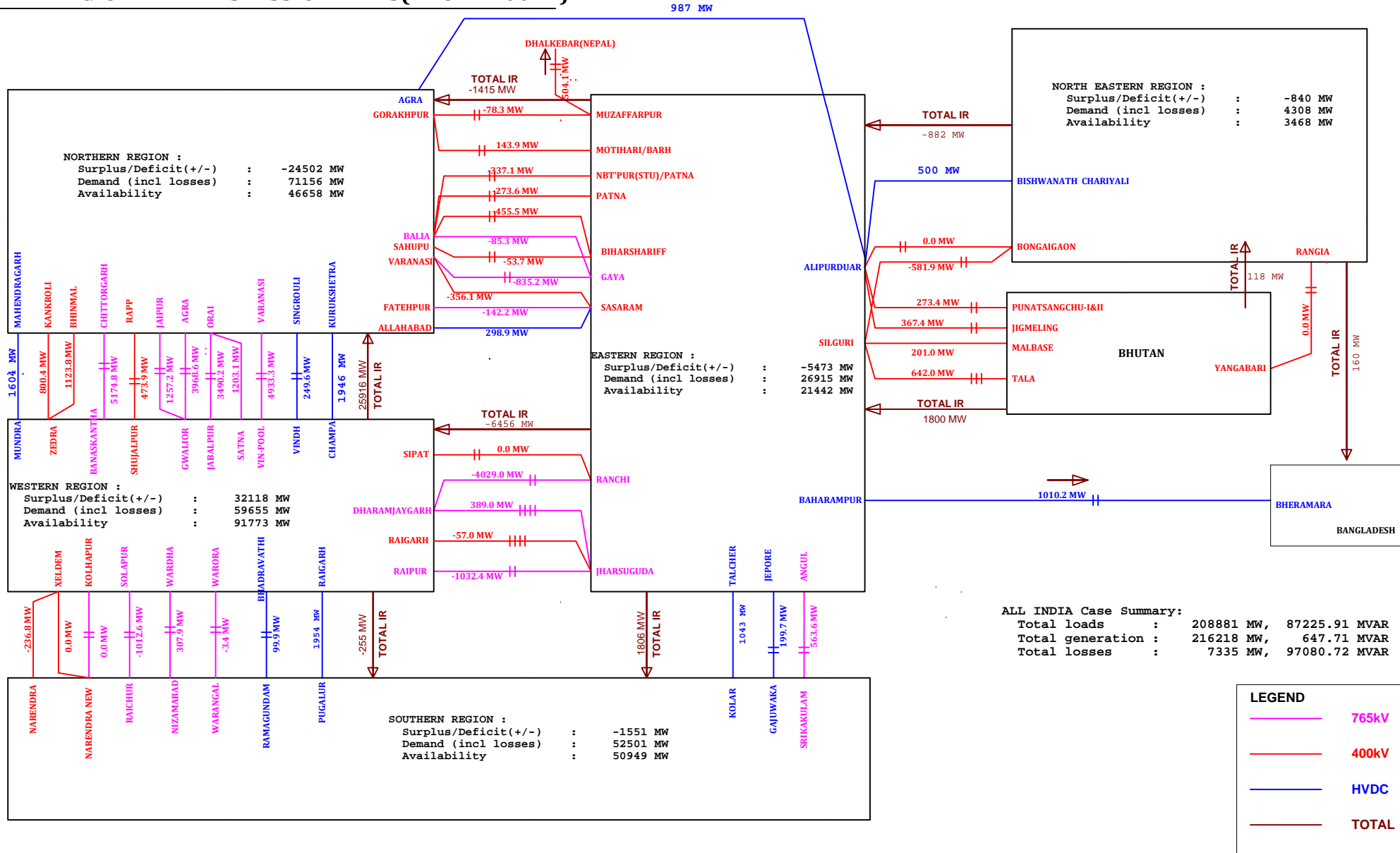




**POWER SCENARIO OF INDIA : 2021-22**

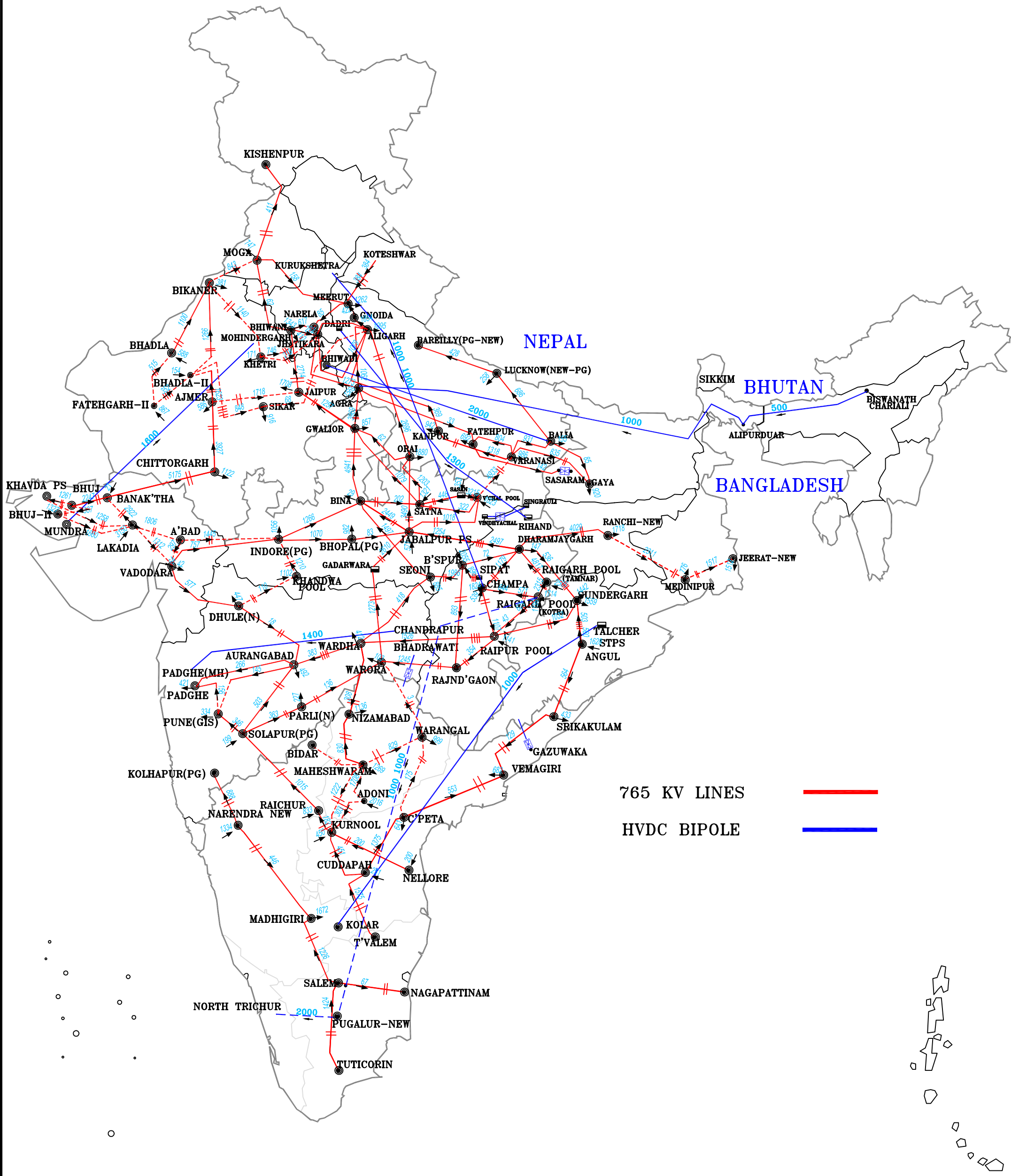


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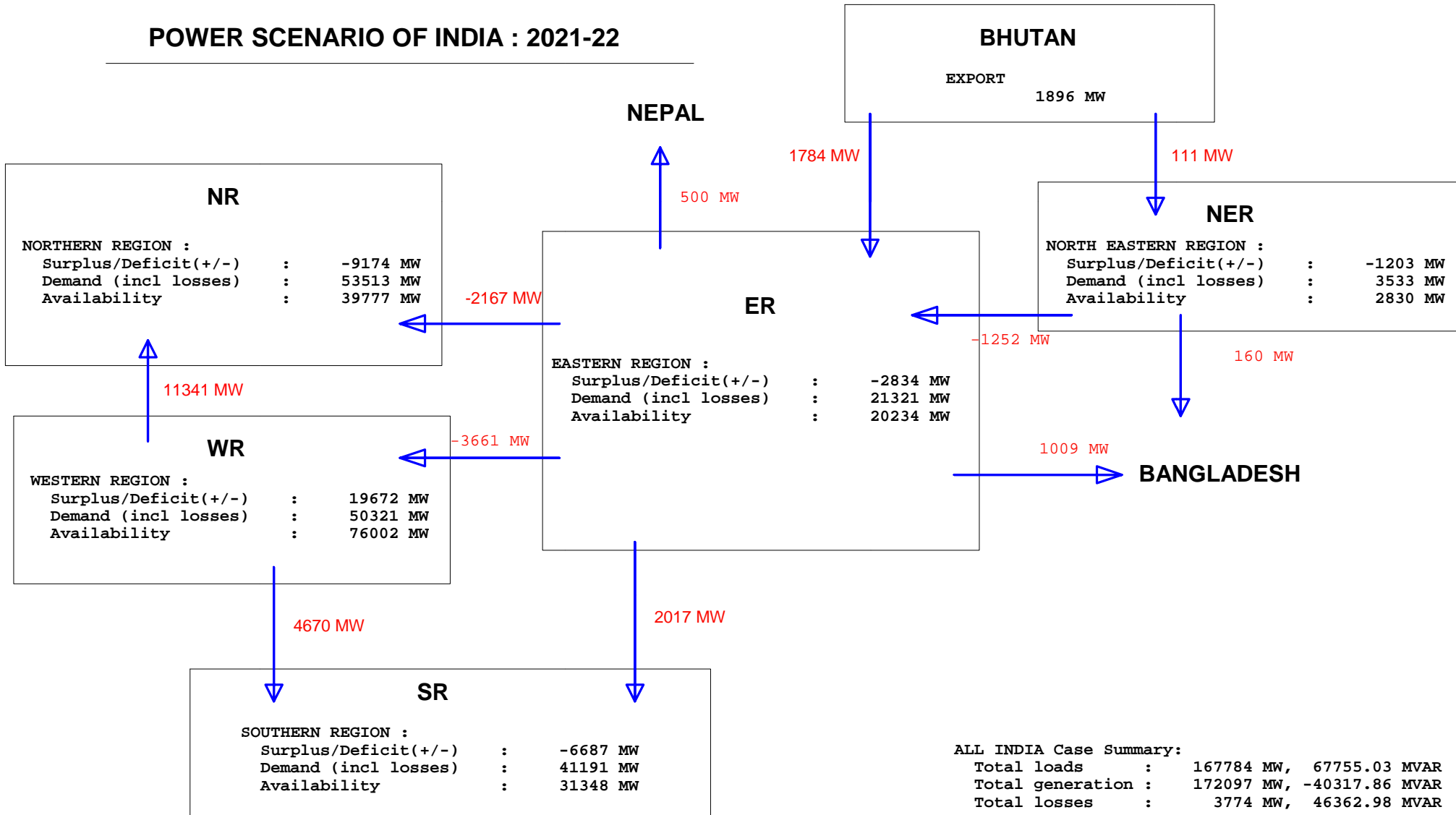


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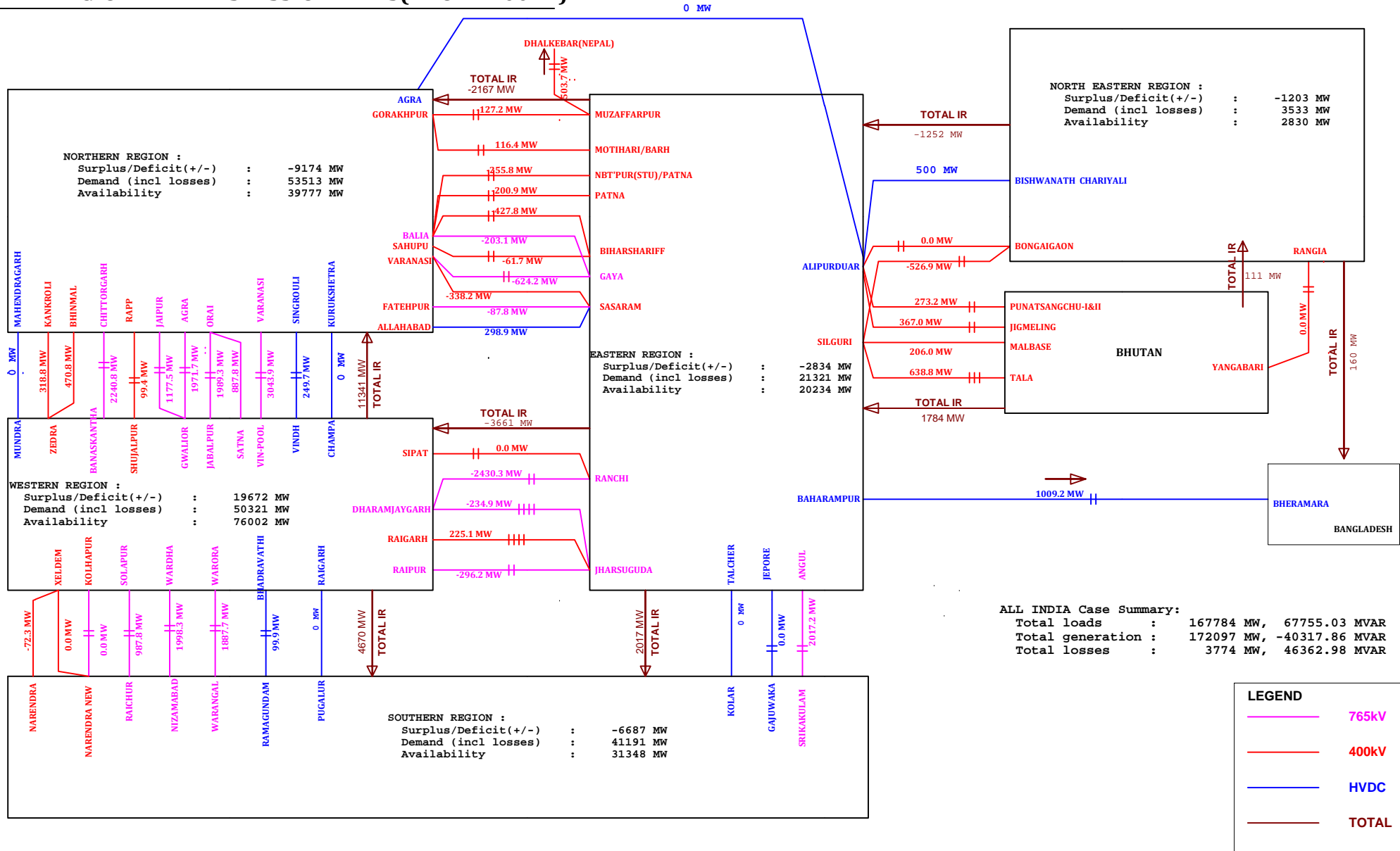
## 765kV ISTS lines and HVDC links



**POWER SCENARIO OF INDIA : 2021-22**

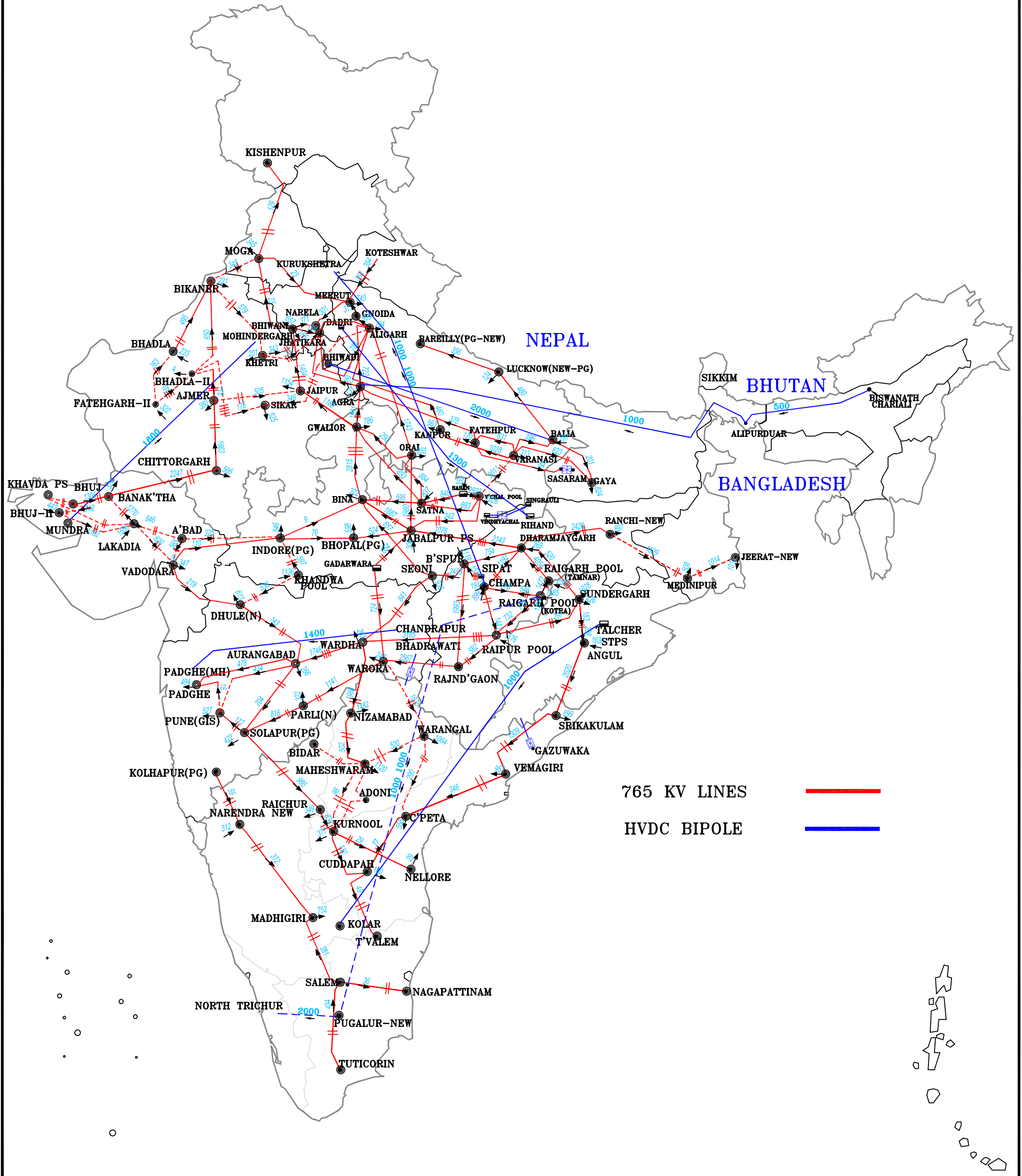


**INTER REGIONAL TRANSMISSION LINES(ABOVE 400kV)**



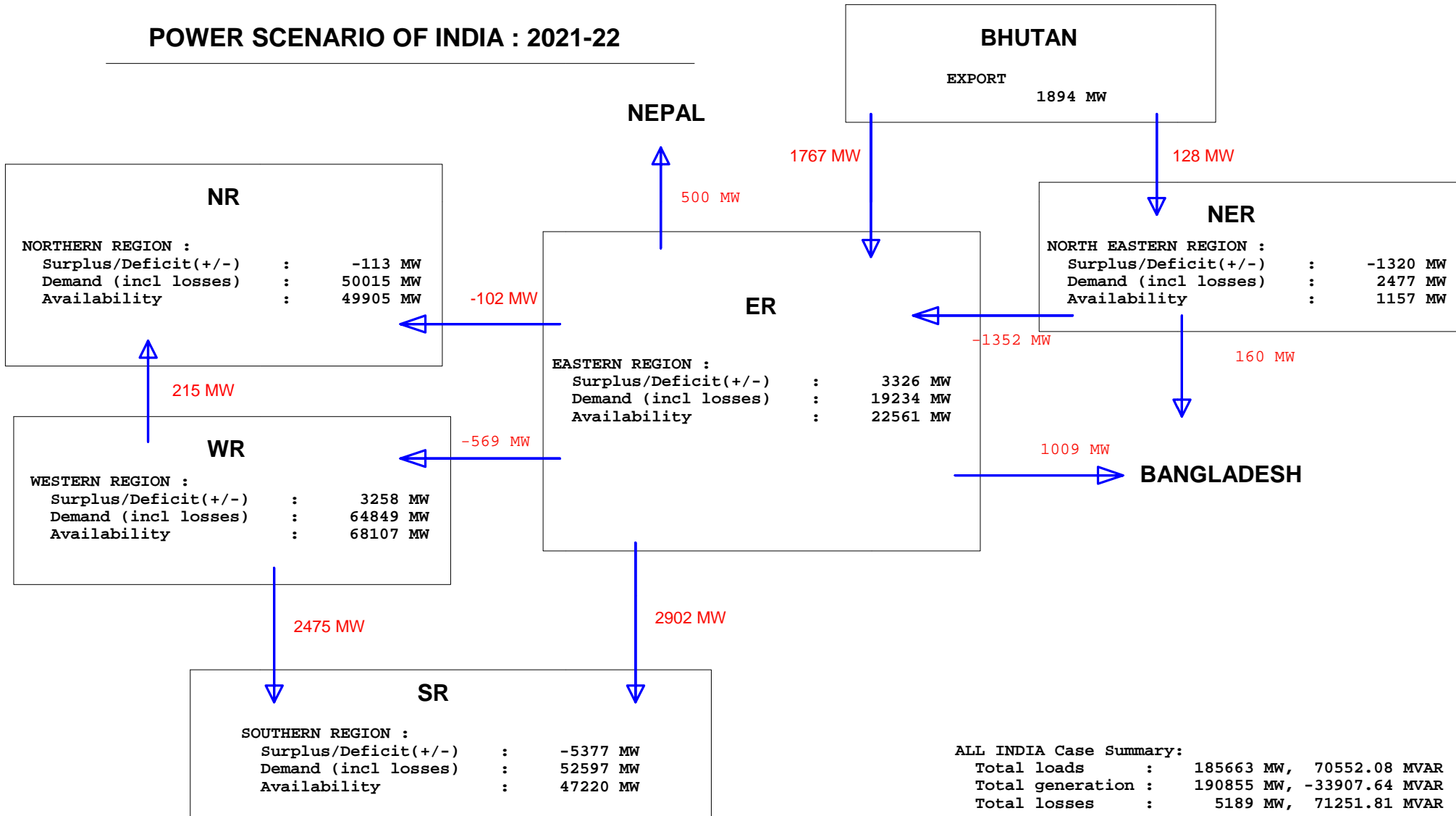
# All-India Studies for 2021-22

## 765kV ISTS lines and HVDC links

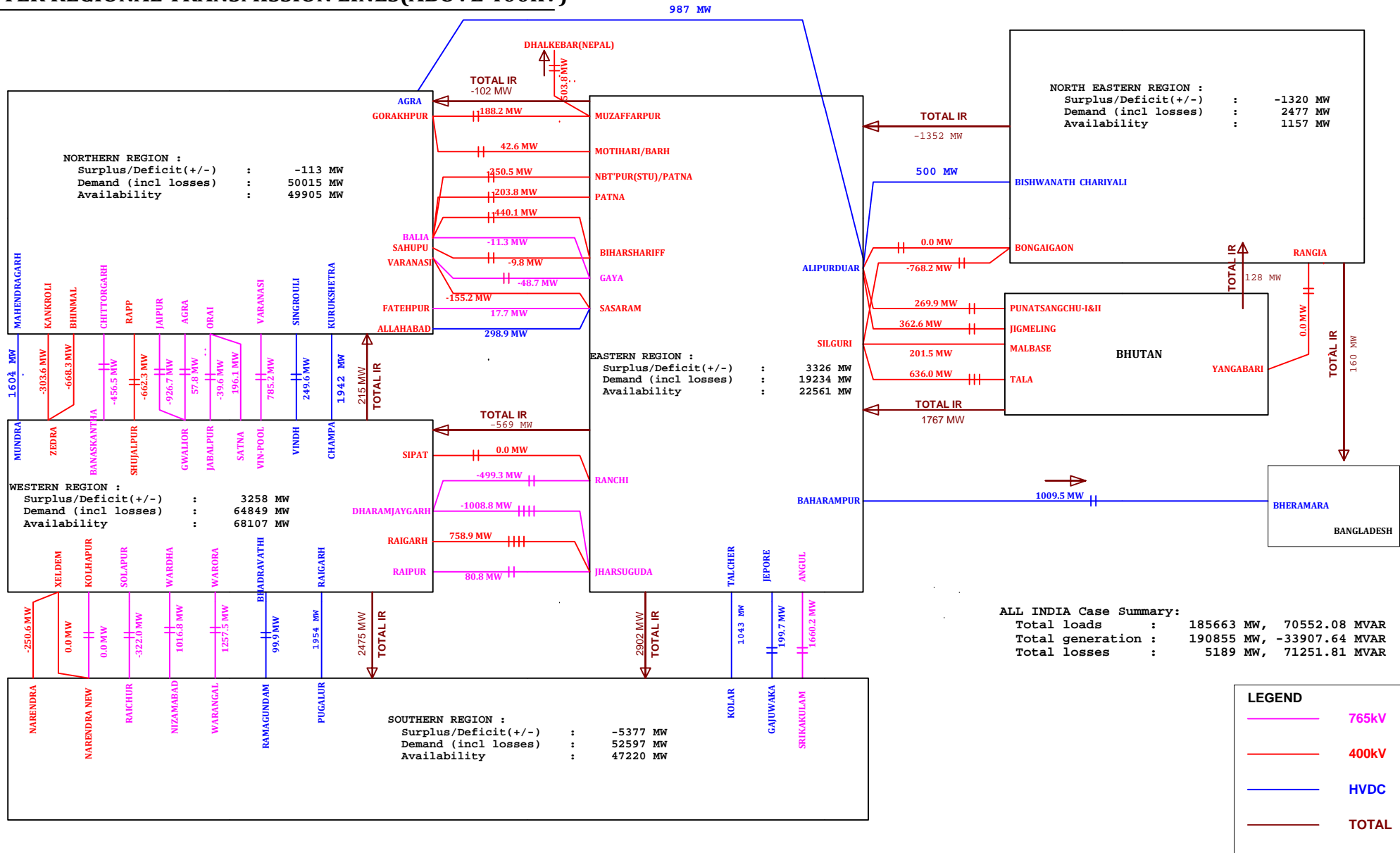




**POWER SCENARIO OF INDIA : 2021-22**

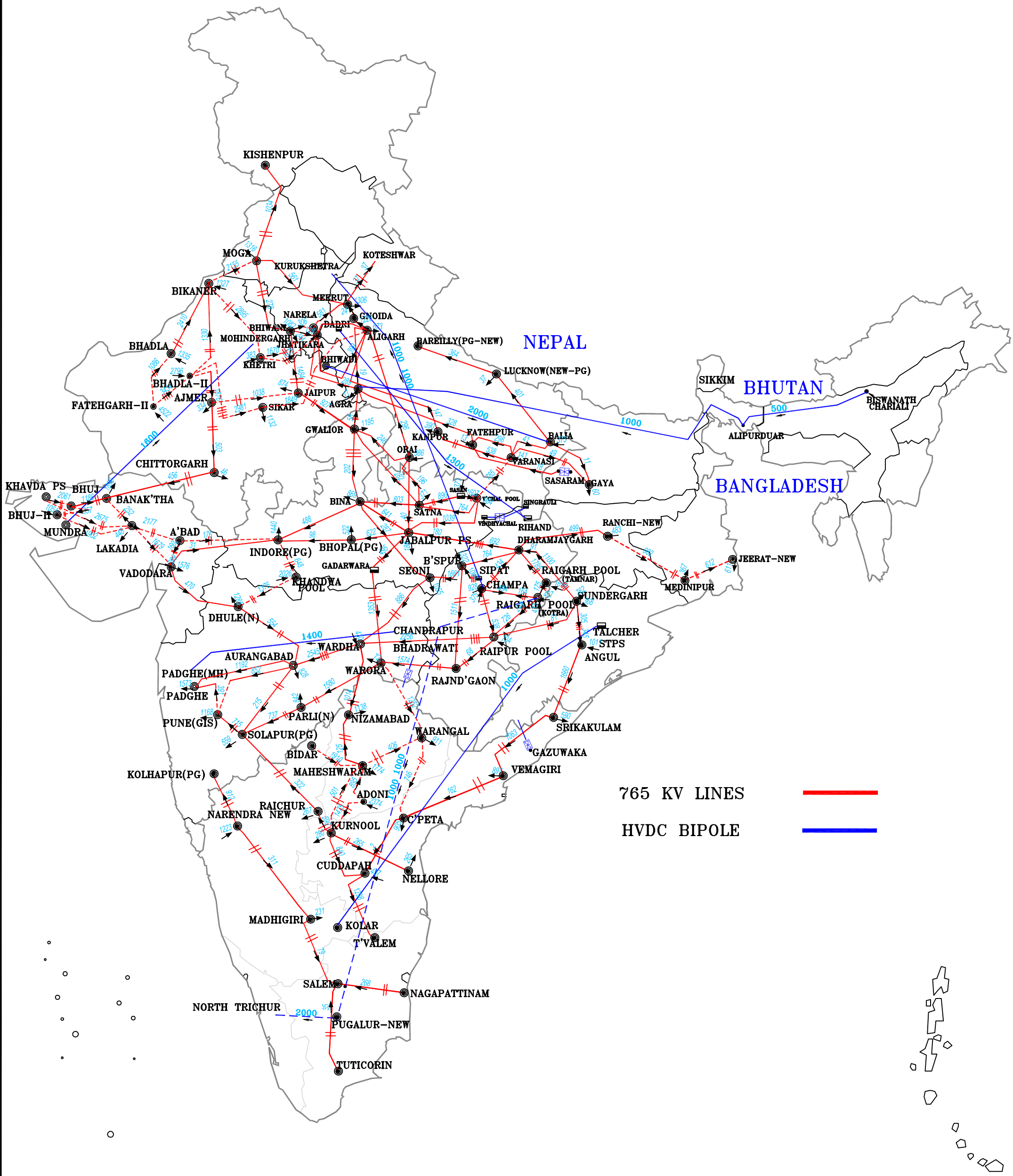


**INTER REGIONAL TRANSMISSION LINES(ABOVE 400kV)**



# All-India Studies for 2021-22

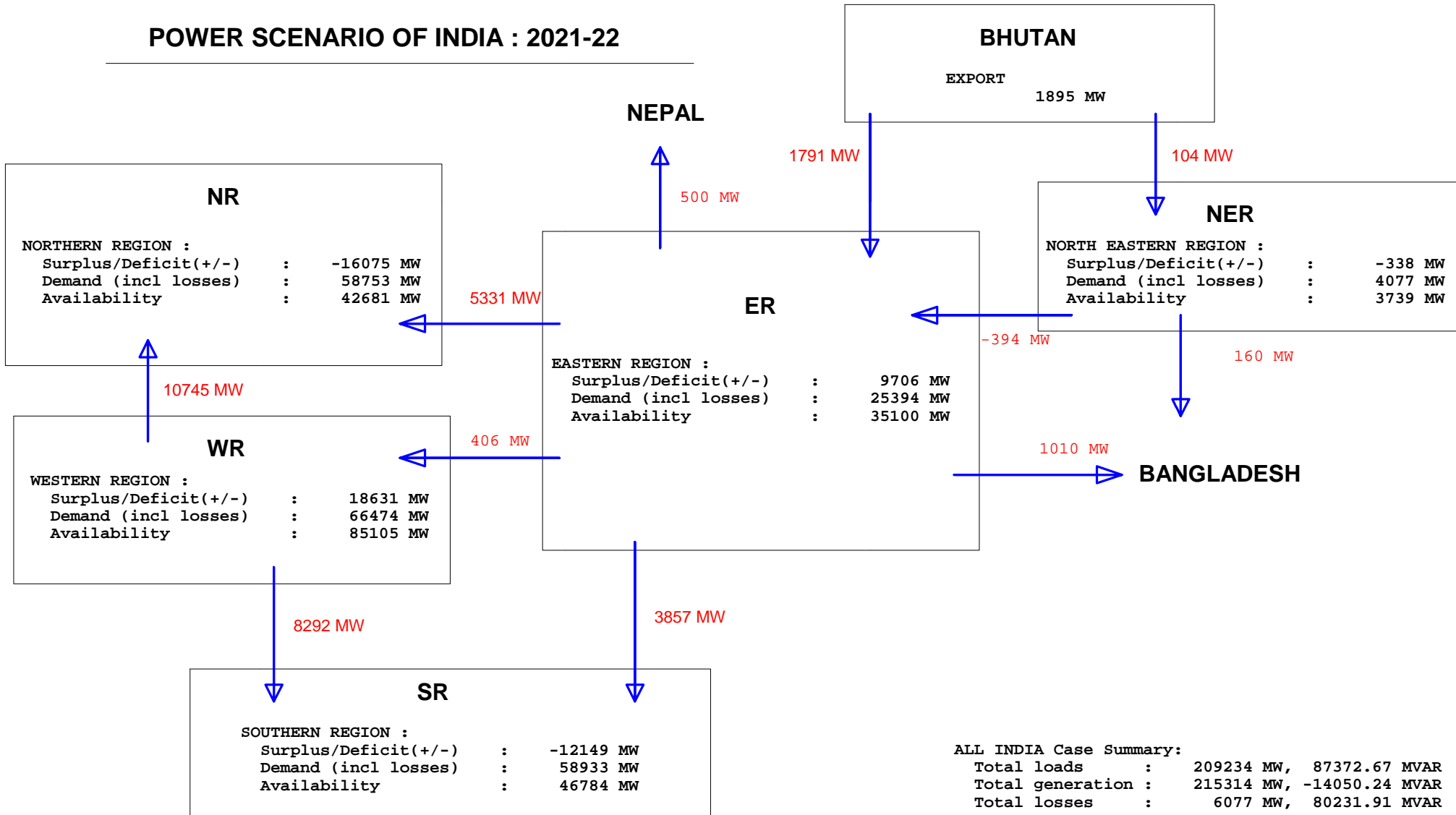
## 765kV ISTS lines and HVDC links



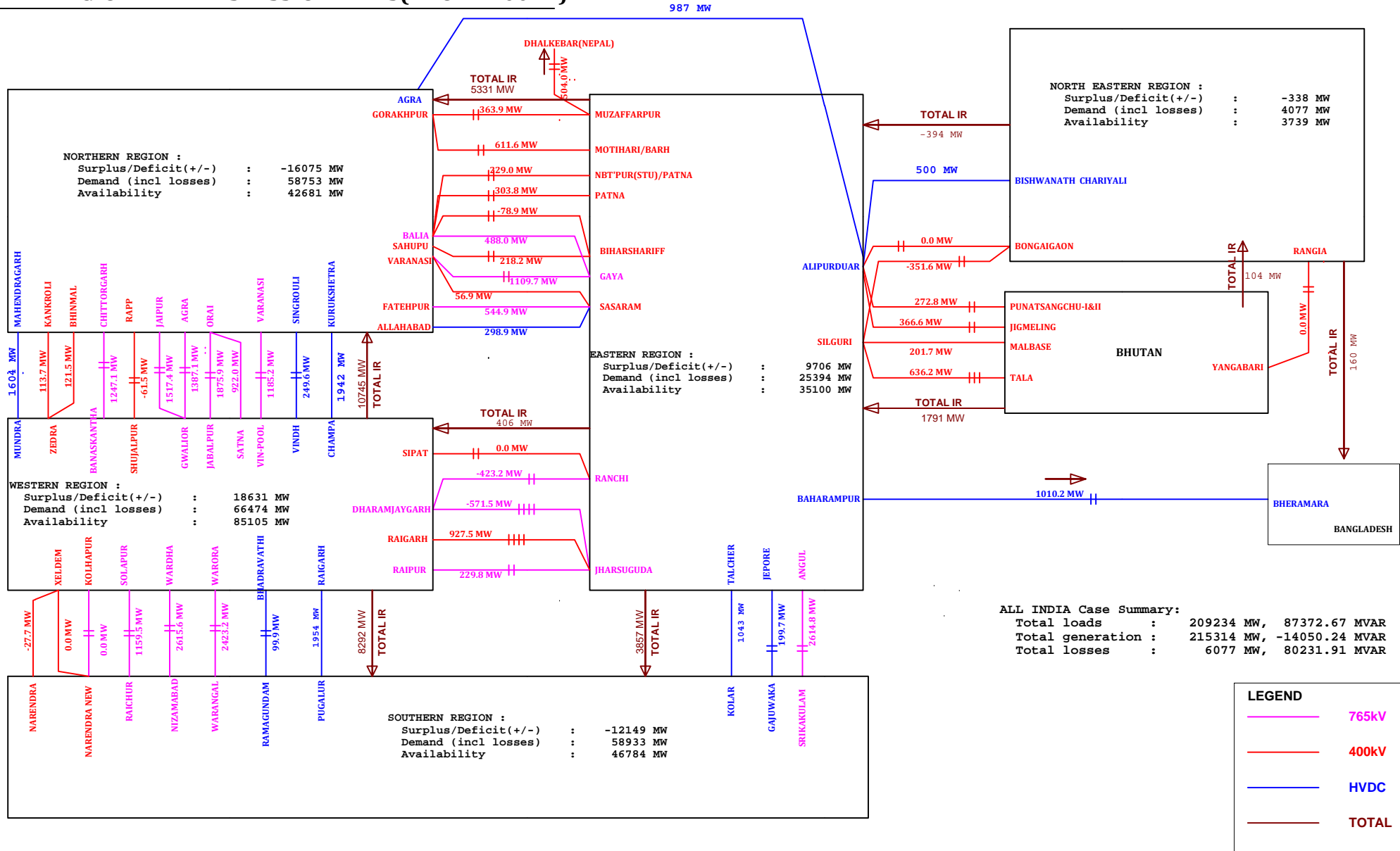
765 KV LINES —

HVDC BIPOLE —

**POWER SCENARIO OF INDIA : 2021-22**



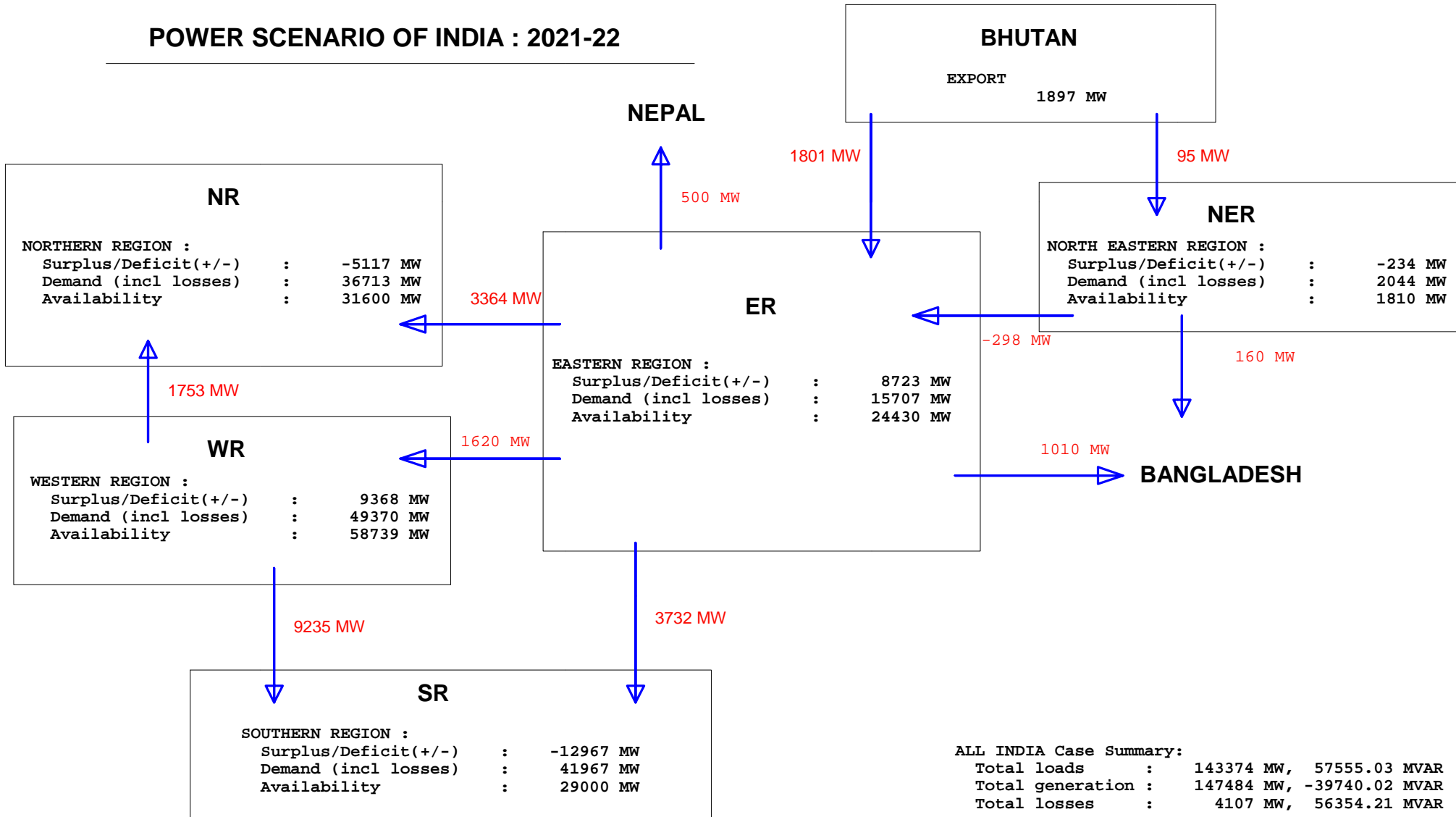
**INTER REGIONAL TRANSMISSION LINES(ABOVE 400kV)**



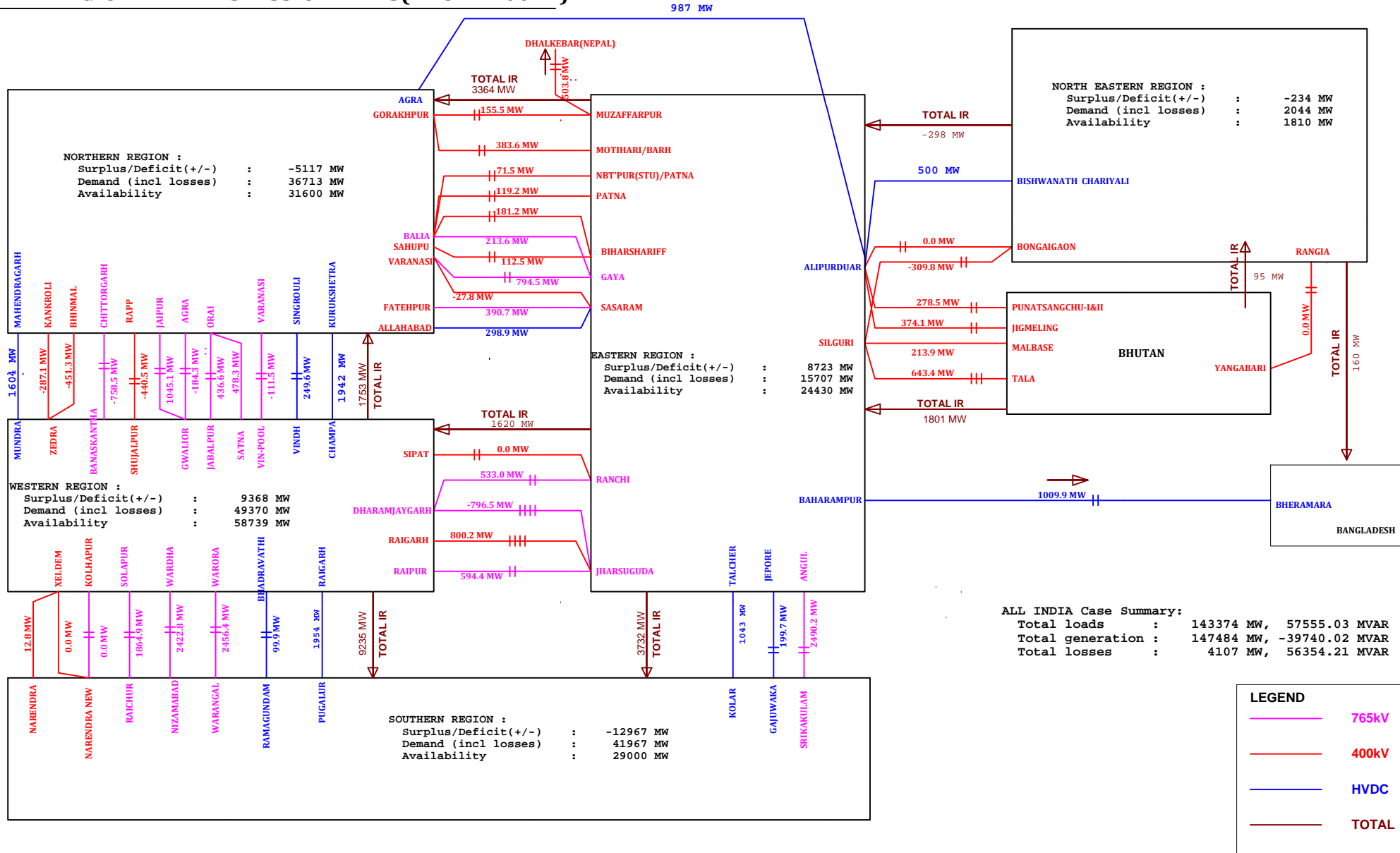




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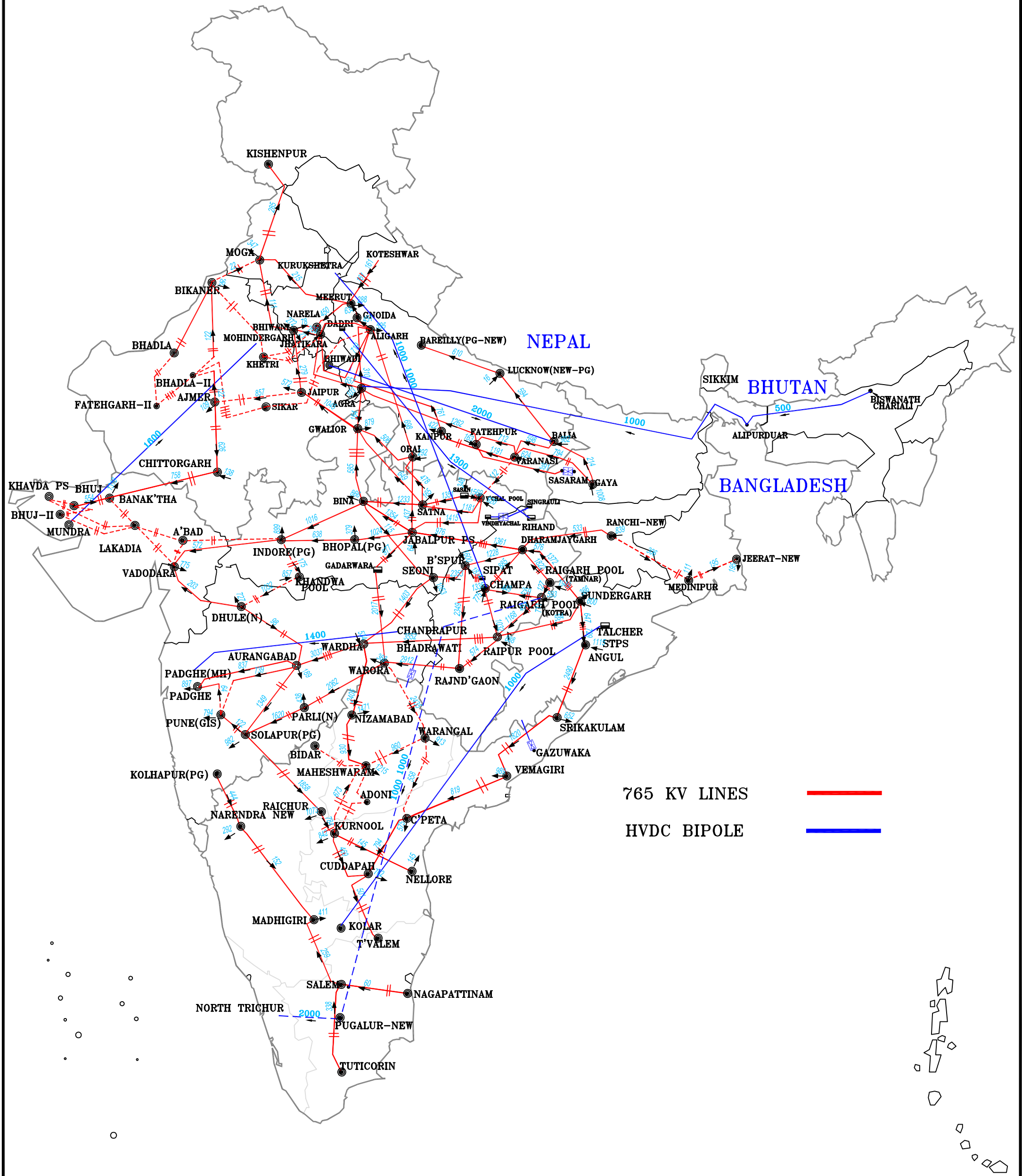


**INTER REGIONAL TRANSMISSION LINES(ABOVE 400kV)**



# All-India Studies for 2021-22

## 765kV ISTS lines and HVDC links



## Study analysis of system conditions for RE integration in 2021-22

Based on the load-generation scenarios developed in consultation with CEA, POSOCO, CTU and regional constituents, system studies have been carried-out for identification of power flow patterns across various regions as per the generation available to meet the load in the identified scenarios. Identification of adequacy of Inter-regional transmission capacity available by 2021-22 timeframe to cater to the required power flows, identification of likely bottlenecks in the transfer of power in such scenarios both for import as well as export in each region has been evaluated through referred studies. Constraints likely to be observed in Intra-State/ISTS network within the region are also highlighted. Apart from the above, issues related to sufficiency of spinning reserve available to cater to increase in peak load in the evening together with the non-availability of solar generation and issues related to voltage conditions in various scenarios has been discussed.

### 1. Adequacy of Inter-regional (IR) links for facilitating power transfer

From the study results, it has been observed that there shall be huge impact of RE integration on the inter-regional flows ranging from import in a particular scenario to export in the other. IR links need to have sufficient capacity to facilitate both the above system conditions. IR links between various regions were planned based on the existing system conditions and the likely load-generation scenario at the time of planning. Though the same are sufficient both for facilitating import and export in most of the corridors, however in certain corridors, it has been observed that the IR links can cater only to either import or export. For example, the IR links between WR-SR and ER-SR were planned in order to facilitate the import of power from generation surplus WR & ER to power deficit SR. However, upon integration of RE generation in the RE rich states of Andhra Pradesh, Karnataka & Tamil Nadu, the power flow pattern shall reverse in high RE scenario and southern region shall export the surplus power to other regions. Accordingly, the existing/planned transmission system has been studied for re-alignment with the referred changes scenario and for sufficiency of the same.

Maximum export/import of various regions as per the LGB are tabulated below:

Region	Max Export	Scenario	Max Import	Scenario
NR	1412	Scenario 7 : Afternoon peak Feb 2022	-24671	Scenario 5 : Evening peak Jun 2021
WR	33564	Scenario 2 : Evening peak Aug 2021	None	Scenario 7 : Afternoon peak Feb 2022
SR	4334	Scenario 4 : Afternoon peak Jun 2021	-13789	Scenario 9: Night off peak Feb 2022
ER	9902	Scenario 9: Night off peak Feb 2022	-5916	Scenario 4 : Afternoon peak Jun 2021
NER	9368	Scenario 1 : Afternoon peak Aug 2021	-1500	Scenario 4 : Afternoon peak Jun 2021

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Maximum import/export capability of a particular region shall depend not only on the adequacy of the number of inter-regional links between the participating region and the adjacent region but also on the power-flow pattern through various IR gates which in-turn shall depend on the generation and load considered in the participating and adjacent region and their distribution.

Power flow on IR links for facilitating maximum import/export was studied for all the scenarios. As per the system studies, maximum power transfer observed through IR links between two regions amongst all the scenarios are tabulated below :

Corridor (From-To)	Max Power flow	Scenario	Max power flow	Scenario
ER-NR	5331	Scenario 8 : Evening peak Feb 2022	-3223	Scenario 4 : Afternoon peak Jun 2021
WR-NR	25916	Scenario 5 : Evening peak Jun 2021/ Scenario 2 Evening peak Aug 2021	None	Scenario 7 : Afternoon peak Feb 2022
ER-WR	1620	Scenario 9: Night off peak Feb 2022	-6634	Scenario 2 : Evening peak Aug 2021
WR-SR	9235	Scenario 9: Night off peak Feb 2022	-5440	Scenario 4 : Afternoon peak Jun 2021
ER-SR	3857	Scenario 8 : Evening peak Feb 2022	None	Scenario 4 : Afternoon peak Jun 2021
NER-ER	-298	Scenario 9: Night off peak Feb 2022	-1568	Scenario 1 : Afternoon peak Aug 2021

From the above and adequacy of existing/planned IR links in various Inter-regional corridors, constraints were likely to be faced in the following cases :

- Export of power from SR to WR in Scenario 4 : Afternoon peak Jun 2021
- Import of power from WR by ER in Scenario 5 : Evening peak Jun 2021& Scenario 2 Evening peak Aug 2021

#### **A. Export of power from SR to WR in Scenario 4 : Afternoon peak Jun 2021**

System studies indicate that the following transmission elements become N-1 insecure in the referred scenario:

- 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

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

- Alternative-I (Kolhapur (PG) - Pune (GIS) 765kV D/c line) - With proposed strengthening loadings of the critical lines are generally found to be in order.

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- ii. Alternative-II (Kolhapur (PG) - Solapur (PG) 765kV D/c line) - With proposed strengthening loadings of critical lines are generally found to be in order. However, more power tends to flow through 400kV network.
- iii. Alternative-III (LILO of Solapur(PG) - Pune(GIS) 765kV S/c line at Kolhapur (PG)) - 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, reconductering 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.

In view of the above, the following transmission system shall be required in order to enable export of surplus power from SR to WR:

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

System studies for the proposed transmission system are attached at **Annexure-I**

#### **B. Import of power by NR from WR in Scenario 5 : Evening peak Jun 2021 & Scenario 2 Evening peak Aug 2021**

System studies indicate that the following transmission elements are overloaded in the referred scenario:

- Bhinmal-Zerda 400 kV S/c line
- Kankroli-Zerda 400 kV S/c line

Accordingly, option for reconductering is to be explored for the above referred transmission lines.

## **2. Adequacy of ISTS/Intra-state network within regions**

From the study results, it is observed that loading of most of the transmission lines are within permissible limits in most of the scenarios and no major loading violations are seen. However, constraints are observed in certain transmission



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lines in certain scenarios of high RE. List of all such transmission lines which are likely to get overloaded along with possible mitigation measures are tabulated below:

Transmission line	Scenario	Remarks
Kolhapur-Kolhapur PG 400 kV	1,4	Resolved with proposed system strengthening beyond Kolhapur
Greater Noida- Grater Noida (UP) 400 kV	2,5,8	To be discussed with STU
Meramundli- Khuntuni 400kV	2,5	Intra-state strengthening already planned

Further, considering the increase in generation and load demand, constraints are observed in certain ICTs at ISTS and State substations for which system strengthening, if required, shall be taken-up in a phased manner in consultation with the constituent.

### 3. Adequacy of spinning reserve for change in generation from morning peak to evening peak

From the LGB, it is observed there a huge and sudden deficit of power created due to non-availability of solar generation in the evening to meet the peak load demand in the evening. This deficit is required to be met by the already running thermal generation machines of the afternoon peak and switching-on of other generations like gas etc. In order to utilize the maximum reserve capacity of the available generation, maximum number of possible thermal machines in each region are kept running at technical minimum in the afternoon scenario. This reserve capacity is first utilized for meeting the deficit caused in the evening. Balance deficit shall have to be met by ramping other available generation including switching-on of gas machines.

Deficit caused in evening scenario and required ramping by various generation is tabulated as follows:

(In MW)	Reduction in Solar	Increase in demand	Required net increase in gen	Contribution			
				Thermal	Hydro	Gas	Wind
August 2021	49	24	73	29	13	16	15
June 2021	62	20	82	29	15	16	20
Feb 2022	71	15	86	35	23	16	12

(In % contribution)	Reduction in Solar	Increase in demand	Required net increase in gen	Contribution			
				Thermal	Hydro	Gas	Wind
August 2021	49	24	73	40%	18%	22%	21%
June 2021	62	20	82	35%	18%	20%	24%
Feb 2022	71	15	86	41%	27%	19%	14%

Change in dispatch	Max ramping in terms of % dispatch			
	Thermal	Hydro	Gas	Wind
August 2021	55 - 85	40-70	0-85	40-70
June 2021	55 - 85	60-90	0-85	30-70
Feb 2022	55 - 85	30-70	0-85	10-35

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From the above, it is seen that huge operational flexibility shall be required in the spinning reserve in order to meet the deficit caused in various scenarios from afternoon peak to evening peak. Various options and challenges associated with them needs to be assessed in this regard related to lowering of technical minimum of thermal generating machines from 55%, utilization of quick start generation like hydro generation with storage/gas machines, utilization of storage facility in renewable generation....etc.

#### **4. Voltage conditions in transmission system and other related issues**

With the injection of high amount of RE into the Indian Grid and subsequent switching-off of thermal generation, additional reactive support is required at various locations. Though adequate reactive compensation is planned in the form of switchable line reactors, bus reactors, STATCOMs, SVCs at the time of inception of transmission projects, however in certain cases wherein the load is low and adequate thermal generation is not available, it has been found that a number of nodes experience high voltages. In such case of off-peak conditions, certain lightly loaded lines may be required to be taken out-of-service in order to avoid high voltage situations.

---X-X-X---

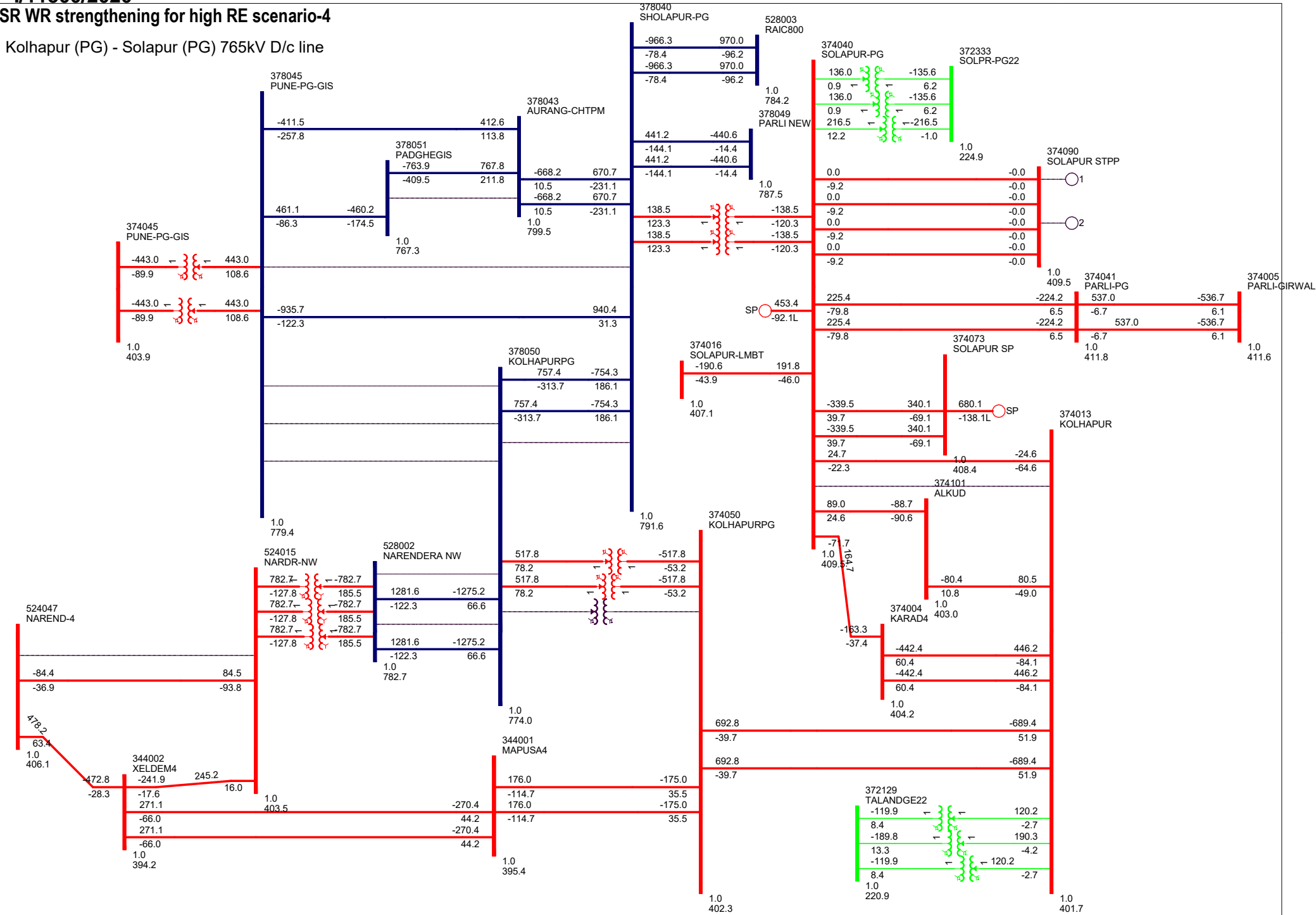




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SR WR strengthening for high RE scenario-4

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







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Annex-34.1

**KARNATAKA POWER TRANSMISSION CORPORATION LIMITED**

Telephone: 080-22210416  
Fax : 080-22292204



Office of the  
Chief Engineer Electy.,  
Planning & Co-ordination,  
Kaveri Bhavan, Bangalore-9

**No. CEE (P&C)/SEE(Plg)/EE(PSS-S)/KCO-97/19245/2020-21**

Date: 14 SEP 2020

The Member (Power Systems),  
Central Electricity Authority,  
Sewa Bhavan, R.K.Puram,  
New Delhi-110 066.

7666-70

Sir,

**Sub:- Establishing of 3X500MVA, 400/220kV Devanahalli substation  
in Bengaluru - reg.**

\*\*\*\*\*

The proposal of establishing 400/220kV Devanahalli substation was approved in the 39th Meeting of Standing Committee of Power System Planning of Southern Region held on 28th and 29th December, 2015 at New Delhi under Transmission scheme for 2000MW Tumkur (Pavagada) Ultra Mega Solar Park with the following Inter-state Transmission system.

**Phase-1(1000 MW)**

- i. LILO of 400 kV Gooty - Tumkur (Vasanthnarasapura) DC at Tumkur (Pavagada) Pooling station.
- ii. Tumkur (Pavagada) Pooling station - Hiriya 400 kV DC (as part of Tumkur(Pavagada) Pooling station - Mysore DC line.
- iii. LILO of 400 kV Bellary Pool - Tumkur (Vasanthnarasapura) DC (Quad) (both Circuits) [KPTCL line] at Tumkur (Pavagada) Pooling station\*.
- iv. Establishment of 3x500 MVA, 400/220 kV Pooling station at Tumkur.
- v. 1x125 MVAR bus reactor at 400/220 kV Pooling station at Tumkur.
- vi. 8 nos. 220 kV bays at 400/220 kV Tumkur (Pavagada) Pooling station for interconnection with solar project.

\*KPTCL would complete Bellary Pooling Station - Tumkur (Vasanthnarasapura) DC (Quad) by December-2016.

**Phase-II (1000 MW)**

- i. Hiriya-Mysore 400 kV DC line\*
- ii. Tumkur (Pavagada) Pooling station - Devanahally(KPTCL) 400 kV DC (Quad)\*\*
- iii. Augmentation of 2x500 MVA, 400/220 kV transformer at Tumkur (Pavagada) Pooling station.
- iv. 1x125 MVAR bus reactor at Tumkur (Pavagada) Pooling station.

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- v. Third 400/220 kV, 1X 500 MVA transformer at Tumkur (Vasanthnarasapura).
- vi. 1x80 MVAR switchable line reactor at Mysore end of Hiriyur-Mysore DC for each circuit.
- vii. 8 nos. 220 kV line bays at 400/220 kV Tumkur Pooling Station for Solar Interconnection.
- \*With the completion of this line, it would be connected with Tumkur (Pavagada) Pooling station – Hiriyur 400 kV DC line to form Tumkur (Pavagada) – Mysore DC line.
- \*\*KPTCL would complete establishment of 400/220 kV sub-station at Devanahalli including inter-linking 400 kV and 220 kV line before Phase-II at Ultra Mega Solar Power Park.

It may be noted that the above transmission scheme was evolved through joint study by CEA, CTU and KPTCL wherein 3X500 MVA, 400/220kV Devanahalli was considered with 400kV DC Quad Moose line from 2000MW Pavagada Solar Park along with 400kV interlinking of Hoody-Nelamangala Twin Moose line by LILO arrangement.

However, there is no mention of the 400kV transmission scheme explicitly under the scope of KPTCL (LILO of 400kV Nelamangala –Hoody Twin Moose line to Devanahalli) in the proceedings of the 39<sup>th</sup> Standing Committee meeting.

Further, as per the agenda of 40<sup>th</sup> Meeting of Standing Committee of Power System Planning of Southern Region dated 7.11.2016, it is mentioned that during the 39<sup>TH</sup> SCSPSR Tumkur (Pavagada) Pooling Station-Devanahalli (KPTCL) 400kV DC Quad line was agreed as a part of transmission system for Tumkur (Pavagada) Ultra Mega Solar Park 2000MW-Phase II. LILO of Nelamangala-Hoody line at 400kV Devanahalli was also agreed.

In this context, it is informed that, the work of 400/220kV Devanahalli substation along with LILO of 400kV Hoody-Nelamangala DC line is completed and needs to be synchronized for which regarding 3X500 MVA, 400/220kV Devanahalli and 400kV interlinking of Hoody-Nelamangala DC Twin Moose line by LILO arrangement to 400kV Devanahalli is required.

Hence approval is hereby requested for the following with ratification in the ensuing meeting if SRPC(TP).

- DC LILO of existing 400 kV Hoody-Nelamangala Twin Moose line to proposed 400 kV Devanahalli sub-station.
- 3x500 MVA, 400/220 kV transformers at Devanahalli.
- 1X125 MVAR bus reactor.

Yours faithfully

  
Chief Engineer Electy.,  
(Planning & Co-ordination)



भारत सरकार  
Government of India  
विद्युत मंत्रालय  
Ministry of Power  
केन्द्रीय विद्युत प्राधिकरण  
Central Electricity Authority  
विद्युत प्रणाली योजना एवं मूल्यांकन-1 प्रभाग  
Power System Planning & Appraisal-I Division

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सेवा / To

संलग्न सूची के अनुसार  
As per list enclosed

**विषय /Subject:** Minutes of Meeting to deliberate on the proposal of KPTCL regarding establishment of 3x500 MVA, 400/220 kV Devanahalli sub-station in Bengaluru

महोदया/महोदय/Madam / Sir,

To discuss the proposal of KPTCL regarding establishment of 3x500 MVA, 400/220 kV Devanahalli sub-station in Bengaluru, a meeting was held on 17.09.2020 (through VC). Minutes of the meeting is enclosed for kind perusal.

भवदीय/ Yours faithfully,

(ईशान शरण/ Ishan Sharan)  
निदेशक/ Director

I/11590/2020

**List of addressee:**

1. The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, Bengaluru 560 009. Fax: 080-22259343	2. Chief Operating Officer (CTU-Plg), Central Transmission Utility, Power Grid Corporation of India “Saudamini” Plot No. 2, Sector-29, Gurugram-122001 Tel. No. 0124-2571816
3. ED, SRLDC, Bengaluru	4. Managing Director Karnataka Power Transmission Corp. Ltd., Cauvery Bhawan, Bengaluru - 560 009. Fax: 080 -22228367

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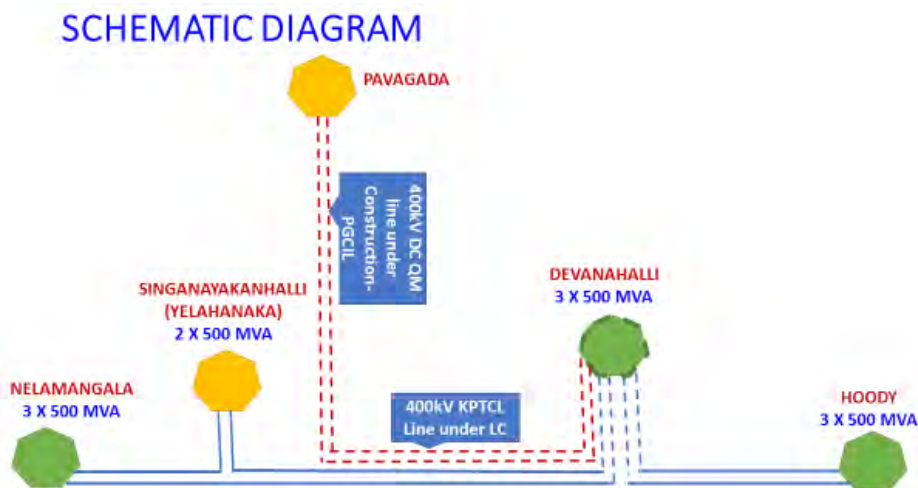
**Minutes of meeting held on 17.09.2020 through VC to discuss the proposal of KPTCL regarding establishment of 3x500 MVA, 400/220 kV Devanahalli sub-station in Bengaluru**

List of participants is enclosed at **Annex-I**.

1. Chief Engineer (PSP&A-I), CEA, welcomed the participants and informed that the meeting had been convened to deliberate on the proposal of KPTCL for part commissioning of 400/220 kV Devanahalli substation.
2. KPTCL further informed that the transmission system of Pavagada Ultra Mega Solar Park (2000 MW) was discussed in 39<sup>th</sup> SCPSR meeting held on 28-29 December, 2015. Tumkur (Pavagada) Pooling station - Devanahalli (KPTCL) 400 kV quad D/c line had been agreed in the meeting. As per minutes of the meeting,

*“KPTCL would complete establishment of 400/220 kV substation at Devanahalli including inter-linking 400 kV and 220 kV lines before Phase-II at Pavagada Ultra Mega Solar Power Park”*

3. KPTCL intimated the as per the decision of the 39<sup>th</sup> & 40<sup>th</sup> SCPSR they have established the 400/220 kV substation at Devanahalli. The 2x500 MVA, 400/220 kV transformers and 1x125 MVAR reactor at Devanahalli substation have already been installed and are ready for charging. Work of third 1x500 MVA transformer is to be taken up. The S/S is to be charged by LILO of 400 kV Nelamanagala /Yelahanka (Singanayakanhalli) - Hoody D/C line. However, as the MoM of 39<sup>th</sup> and 40<sup>th</sup> SCPSR is not clear so SRLDC is asked for ratification of the SRPCTP for giving the charging code. Considering the urgency for charging the line they requested CEA for immediate resolution in this matter. KPTCL further gave a brief presentation on the scheme. Copy of presentation is at **Annex-II**.



4. Presently, the 400/220 kV Devanahalli substation is planned for charging from Hoody end only as some portion of line from Devanahalli to Nelamangala /Yelahanka (Singanayakanhalli) is being replaced with multi circuit towers to accommodate the 400 kV Pavagada – Devanahalli D/C of Powergrid line due to acute ROW constraint in that area and the same is in advanced stage of implementation.

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Accordingly, KPTCL requested for in-principle approval for the 400/220 kV Devanahalli sub-station with the following elements and ratification of the same in ensuing meeting of SRPC(TP):

- a) LILO of 400 kV Yelahanka (Singanayakanhalli) - Hoody and LILO of 400 kV Nelamanagala- Hoody line at 400/220 kV Devanahalli Sub-Station
- b) 3 x 500 MVA, 400/220 kV transformers
- c) 1 x 125 MVAR Bus reactor

As indicated, KPTCL is planning to charge the 400/220 kV Devanahalli substation from Hoody end, as some portion of line from Devanahalli to Nelamangala /Yelahanka is in advanced stage of implementation and will take some more time. Further, out of the planned 3x500 MVA transformers at Devanahalli, 2x500 MVA transformers would be charged initially.

5. CGM, SRLDC, informed that charging of Devanahalli substation would help in meeting the load in Devanahalli area and the 125 MVAR reactor would help in maintaining voltage in the area, as the area experiences high voltage.
6. CGM, CTU, informed that the system would help in meeting the load in Devanahalli area and there are no issues in charging the sub-station. It was also stated that the Tumkur (Pavagada) Pooling station - Devanahalli (KPTCL) 400 kV quad D/c line is expected by October, 2020 including the multi-circuit portion of the line.
7. Member Secretary, SRPC, stated that the proposal is in order, however, it needs to be taken up in the forthcoming SRPC(TP) meeting for ratification.
8. After detailed deliberations, it was decided that in-principle approval may be agreed for the following:
  - a) LILO of 400 kV Yelahanka (Singanayakanhalli) - Hoody and LILO of 400 kV Nelamanagala- Hoody line at 400/220 kV Devanahalli Sub-Station
  - b) 3 x 500 MVA, 400/220 kV transformers
  - c) 1 x 125 MVAR bus reactor

KPTCL would initially charge the 400/220 kV Devanahalli substation from Hoody end with 2x500 MVA transformers at 400/220 kV Devanahalli substation. SRLDC was also requested to give the charging clearance to KPTCL for the above works. It was also decided that the matter would be put up in the forthcoming SRPC(TP) meeting for ratification.

Meeting ended with vote of thanks.



I/11590/2020

Sl. No.	Name	Designation
<b>Central Electricity Authority</b>		
1	Goutam Roy	Chief Engineer (PSPA-I)
2	Ishan Sharan	Director (PSPA-I)
3	Kanchan Chauhan	Assistant Director (PSPA-I)
4	Mayank Wadhwa	Assistant Director (PSPA-I)
<b>Southern Region Power Committee (SRPC)</b>		
5	A. Balan	Member Secretary
6	Asit Singh	Superintending Engineer
7	R. M. Rangarajan	Superintending Engineer
<b>CTU</b>		
8	Mukesh Khanna	CGM (CTU-Plg)
9	Anil Kumar Meena	DGM (CTU-Plg)
<b>SRLDC</b>		
10	Abhimanyu Gartia	ED
11	S. P. Kumar	CGM (SO)
12	Madhukar G.	Chief Manager
<b>KPTCL</b>		
13	K. Siddaraju	Director (Transmission)
14	D. Chethan	Executive Engineer (Elec)

**Annex-1**

**List of participants of the meeting held on 17.09.2020 through VC regarding establishment of 3x500 MVA, 400/220 kV Devanahalli sub-station in Bengaluru**