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

सेवा में/To

As per list of Addresses

विषय : ट्रांसमिशन पर राष्ट्रीय समिति (एनसीटी) की नवी बैठक की कार्यसूची – के सम्बन्ध में ।

Subject : Agenda for the 9th Meeting of National Committee on Transmission (NCT) – regarding.

महोदया (Madam) / महोदय (Sir),

The 9th meeting of the "National Committee on Transmission" (NCT) is scheduled on 28th September, 2022 at 3.00 pm. Details of the meeting are given below:

Venue : Chintan, 2nd Floor, CEA, Sewa Bhawan, R.K. Puram Sector-1, New Delhi

Date : 28th September, 2022

Time : 1500 Hrs.

The agenda for the meeting is enclosed herewith.

Kindly make it convenient to attend the meeting.

भवदीय/Yours faithfully,

रवीन्द्र गुप्ता

(रवीन्द्र गुप्ता / Ravinder Gupta)
मुख्य अभियंता एवं सदस्य सचिव (एनसीटी)
/Chief Engineer & Member Secretary (NCT)

प्रतिलिपि / Copy to:

संयुक्त सचिव (पारेषण), विद्युत मंत्रालय, नई दिल्ली /
Joint Secretary (Trans), Ministry of Power, New Delhi

List of Addresses:

1.	Chairperson, Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	2.	Member (Power System), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.
3.	Member (Economic & Commercial), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	4.	Director (Trans), Ministry of Power Shram Shakti Bhawan, New Delhi-110001.
5.	Sh. Dilip Nigam, Scientist 'G', MNRE, Block no. 14, CGO Complex, Lodhi Road, New Delhi – 110003	6.	Chief Operating Officer, CTUIL, Saudamini, Plot No. 2, Sector-29, Gurgaon – 122 001.
7.	Sh. Rajnath Ram, Adviser (Energy), NITI Aayog, Parliament Street, New Delhi – 110 001.	8.	CMD, POSOCO, B-9, Qutub, Institutional Area, Katwaria Sarai, New Delhi – 110010
9.	Dr. Radheshyam Saha, Ex. Chief Engineer, Central Electricity Authority	10.	Shri Sushanta Kumar Ray Mohapatra, Ex. Chief Engineer, Central Electricity Authority

Table of Agenda

Agenda for the 9th meeting of National Committee on Transmission

1 Confirmation of the minutes of the 08th meeting of National Committee on Transmission.

1.1 The minutes of the 8th meeting of NCT held on 25/03/2022 were issued vide CEA letter no CEA-PS-11-15(11)/1/20-PSPA-I dated 05/05/2022.

1.2 Further, corrigendum to the minutes was issued vide CEA letter no.CEA-PS-11-15(11)/1/2020-PSPA-I Division/258 dated 13.06.2022.

1.3 Members may confirm the minutes and corrigendum to the 08th meeting of NCT.

2 Transmission scheme for Solar Energy Zone in Gadag (1500MW), Karnataka: Part A Phase-II.

2.1 CTU vide letter no. C/CTU/S/03/NCT dated 15.06.2022 has requested to amend the scope of work for Transmission scheme for Solar Energy Zone in Gadag (1500MW), Karnataka: Part A Phase-II.

2.2 *Considering that the total number of 220 kV bays to be implemented in Phase I & Phase II of the scheme would be more than 8, at Gadag PS, 220kV bus sectionalizer bay along with associated Bus Coupler (BC) & Transfer Bus Coupler (TBC) bays are also required as per CEA planning criteria. Accordingly, the revised scope of works is as follows:*

Sl. No.	Scope of the Transmission Scheme	Capacity / line length km
1.	400/220 kV, 3x500 MVA ICT Augmentation at Gadag Pooling Station	400/220 kV, 500 MVA ICT – 3 400 kV ICT bays – 3 220 kV ICT bays – 3 220 kV line bays – 4 **220kV sectionalization bay: 1 set** **220kV Bus Coupler (BC) bay: 1** **220kV Transfer Bus Coupler (TBC) bay - 1**
2.	Gadag PS-Koppal PS 400 kV (high capacity equivalent to quad moose) D/c line	Length – 60
3.	2 nos. of 400 kV line bays at each end of Gadag PS-Koppal PS 400 kV D/c line	Line bays – 4

2.3 The Scheme with revised scope is already under bidding. Members may note.

3 Status of the transmission schemes noted/approved/recommended to MoP in the meetings of NCT:

3.1 The status of the transmission schemes noted/approved/recommended in the 8th meeting of NCT is tabulated below

Sr. No	Name of the Transmission Scheme	Noted/ Recommended/ Approved	Survey Agency	MoP approval	BPC	Remarks
	8th NCT					
1.	Inter-regional ER-WR Interconnection	Approved for implementation through TBCB	RECPDCL	Not required	RECPDCL	Bid documents under preparation
2.	Western Region Expansion Scheme-XXV (WRES-XXV)	Approved for implementation through RTM route	Not applicable	Not required		
3.	Western Region Expansion Scheme-XXVII (WRES-XXVII)	Approved for implementation through TBCB	PFCCL	Not required	PFCCL	Bid documents under preparation
4.	Western Region Expansion Scheme-XXVIII (WRES-XXVIII)	Approved for implementation through TBCB	PFCCL	Not required	PFCCL	
5.	Western Region Expansion Scheme-XXIX (WRES-XXIX)	Approved for implementation through TBCB	PFCCL	Not required	PFCCL	
6.	Transmission system for evacuation of power from Luhri Stage-I HEP	Approved for implementation through TBCB	CTUIL	Not required	RECPDCL	
7.	Transmission system for evacuation of power from Kaza Solar Power Project (880 MW)	Recommended to MoP Implementation through TBCB mode	PFCCL	MoP approval awaited		Discussed in the meeting by MoP on 14.07.2022 Scheme to be redeliberated at NRPC forum based on capacity and firm timelines of commissioning of solar parks furnished by SJVNL.
8.	ISTS Network Expansion scheme in Western Region & Southern Region for export of surplus power during high RE scenario in Southern	Recommended to MoP Implementation through TBCB mode	RECPDCL	Approved and notified vide Gazette Notification dated		

Sr. No	Name of the Transmission Scheme	Noted/ Recommended/ Approved	Survey Agency	MoP approval	BPC	Remarks
	Region			13.06.2022		

* As per the MoP order dated 28.10.2021, ISTS schemes costing between Rs. 100 Crore to Rs. 500 Crore are to be approved by NCT while ISTS schemes costing more than Rs. 500 Crore to be recommended by NCT to MoP for approval.

4 New Transmission Schemes submitted by CTUIL for consideration of 9th NCT:

4.1 *HVPNL proposal of transmission schemes involving Interconnection with ISTS elements:*

S. No.	Items	Details
1.	**Name of Scheme**	HVPNL proposal of transmission schemes involving Interconnection with ISTS elements
2.	**Scope of the scheme**	➢ Augmentation with 1x500MVA, 400/220kV transformer (3rd) at 400/220kV Bahadurgarh (PG) S/s -**July, 24.** ▪ 400/220 kV, 500 MVA ICT – 1 no. ▪ 400 kV ICT bay – 1 no. ▪ 220 kV ICT bay – 1 no. ➢ 2 nos of 220 kV line bays at 400/220 kV Bahadurgarh (PG) S/s (for 220 kV D/c line from Kharkhoda pocket B) – **July, 24** ▪ 220 kV line bays – 2 nos. ➢ 2 nos of 220 kV line bays at 400/220 kV Bahadurgarh (PG) S/s (for 220kV METL – Bahadurgarh (PG) D/c line) – **March, 24** ▪ 220 kV line bays – 2 nos. ➢ Augmentation with 1x500MVA, 400/220kV transformer (3rd) at 400/220kV Jind (PG) S/s – **December, 23** ▪ 400/220 kV, 500 MVA ICT – 1 no. ▪ 400 kV ICT bay – 1 no. ▪ 220 kV ICT bay – 1 no. ➢ 2 nos of 220 kV line bays at 400/220 kV Sonepat (PG) S/s (for 220 kV D/c line from Kharkhoda pocket A) - **Jul'24** ▪ 220 kV line bays – 2 nos.
3.	**Depiction of the scheme on Transmission Grid Map**	Refer Figure 4 -1**, Figure 4 -2** and **Figure 4 -3** (As per MOM of 24.11.21 meeting)
4.	**Upstream/downstream system associated with the scheme**	Upstream: nil (existing) Downstream: • Bahadurgarh (PG) - Kharkhoda pocket B 220 kV D/c line • Bahadurgarh (PG) - METL 220 kV D/c line • At Jind 400/220 kV (PG) – 220 kV network existing • Sonepat (PG) - Kharkhoda pocket A 220 kV D/c line
5.	**Objective / Justification**	• A meeting was held on 24/11/2021 among CEA, CTU, HVPNL, BBMB, POWERGRID and POSOCO to discuss HVPNL transmission scheme proposal involving interconnection with ISTS elements. In the meeting, Inter-state transmission scheme involving inter-connections with transmission scheme proposal of HVPNL agreed for implementation under ISTS • Subsequently, HVPNL vide their letter dated 27/01/2022 provided the time schedule for transmission works to be implemented under ISTS.

S. No.	Items	Details
		• HVPNL vide email dated 15/02/2022 confirmed that network for unutilised/ under implementation bays at 400/220 kV Bahadurgarh (PG) & 400/220 kV Sonepat (PG) Substations are already planned. Therefore, the approval of 220kV line bays requested in the above scheme (S. No 2) are additional and agreed for implementation of the proposed scheme. • The matter was also discussed and agreed in 4th Consultation meeting for evolving Transmission Schemes in NR held on 28/02/2022.
6.	**Estimated Cost**	**117.05 Cr.**
7.	**Impact on the total Annual Transmission charges in % along with the existing ATC**	A. ATC (considering Levelized Tariff @15% of estimated cost): Rs 17.56 Crore B. Present ATC: Rs. 41,292.01 Crore* C. A/B (%): 0.042 %
8.	**Need of phasing, if any**	Not Applicable
9.	**Implementation timeframe**	The element wise timeline as provided by HVPN are mentioned in Scope of the scheme (Sl. No. 2).
10.	**Inclusion of any wild life/protected area along the transmission line route**	Not Applicable
11.	**Deliberations with RPC along with their comments**	The estimated cost of the scheme is less than Rs 500 Crs. Accordingly, the same is not required to be sent to NRPC for deliberation in line with MoP office order no. 15/3/2018-Trans-Pt(5) dated 28-10-2021 regarding reconstitution of NCT.
12.	**System Study for evolution of the proposal**	• In the joint meeting held on 24.11.2021, HVPN informed that load flow studies carried out by HVPNL, after connecting all the downstream network at 220 kV level, ICTs at 400/220 kV Bahadurgarh (PG) will become 'N-1' non-compliant. CEA and POSOCO also agreed the same. Therefore, ICT augmentation is required at Bahadurgarh (PG). • In the joint meeting held on 24.11.2021, Director (PSPA-I), CEA, stated that as per system studies, loading on 2x500 MVA 400/220 kV ICTs at Jind (PG) would increase and ICTs may become 'N-1' non-compliant with the commissioning of Nain and Lodhar (HVPN) substations. Therefore, ICT augmentation would be required at Jind (PG). • 4 nos. of 220kV line bays at Bahadurgarh (PG) agreed for interconnection to 220kV Kharkhoda pocket B (HVPN) and 220kV METL (HVPN) S/s as proposed by HVPNL • 2 nos. of 220kV line bays at Sonepat (PG) agreed for interconnection to 220kV Kharkhoda pocket A (HVPN) S/s as proposed by HVPNL

**Total YTC allowed for Nov'21, as per Notification of Transmission Charges payable by DICs for Billing Month of January, 2022 dated 25.12.2021 posted on NLDC website*

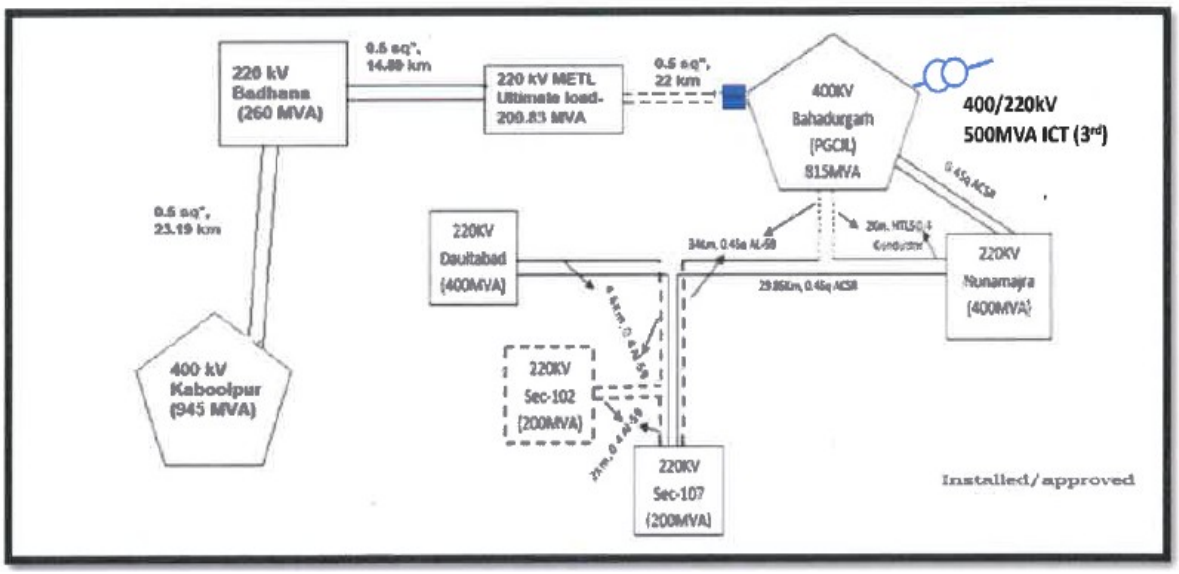


Figure 4-1 HVPNL proposal of transmission schemes involving Interconnection with ISTS elements (fig-1)

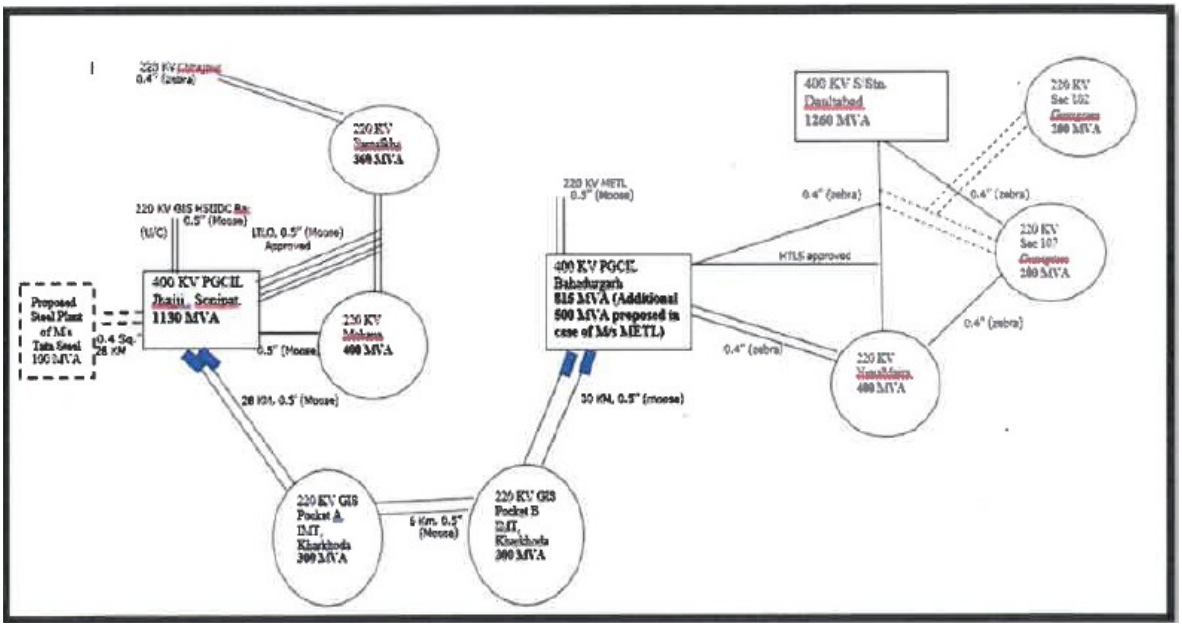


Figure 4-2HVPNL proposal of transmission schemes involving Interconnection with ISTS elements (fig-2)

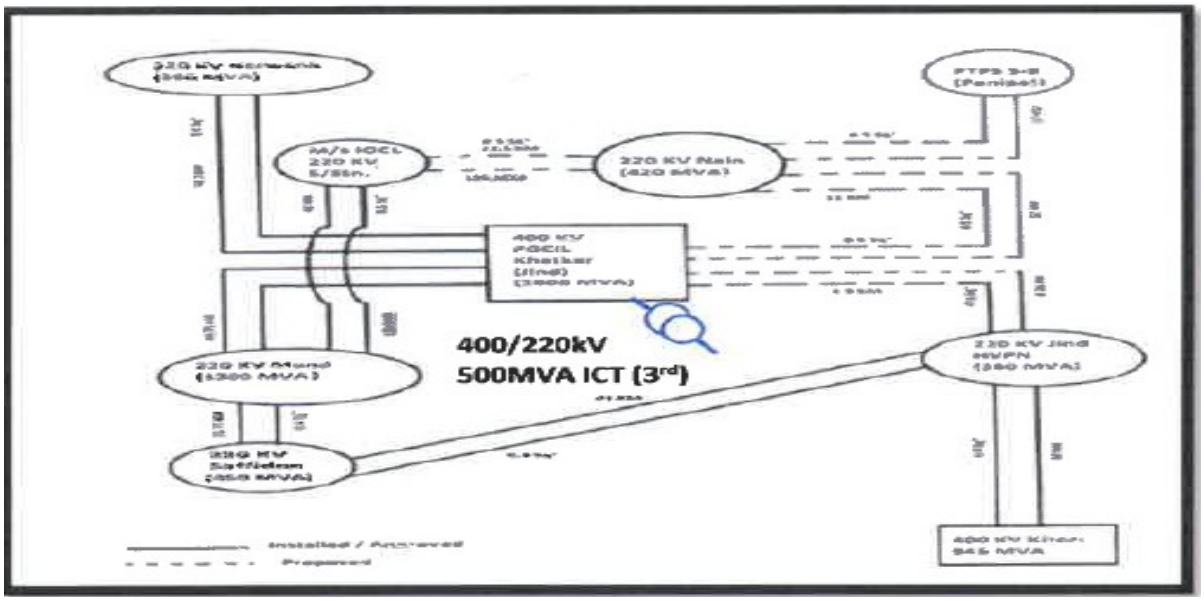


Figure 4-3 HVPNL proposal of transmission schemes involving Interconnection with ISTS elements (fig-3)

4.2 *Scheme to relieve high loading of WR-NR Inter Regional Corridor (400 kV Bhinmal-Zerda line)*

S. No.	Items	Details
	Name of Scheme	Scheme to relieve high loading of WR-NR Inter Regional Corridor (400 kV Bhinmal-Zerda line)
2.	**Scope of the scheme**	➢ Bypassing of 400 kV Kankroli - Bhinmal-Zerda line at Bhinmal to form 400 kV Kankroli – Zerda (direct) line # ➢ Reconductoring of 400 kV Jodhpur (Surpura)(RVPN) – Kankroli S/c (twin moose) line with twin HTLS conductor*-188 km *# with necessary arrangement for bypassing Kankroli- Zerda line at Bhinmal with suitable switching equipment inside the Bhinmal substation* **with minimum capacity of* 1940MVA*/ckt at nominal voltage; Upgradation of existing 400kV bay equipment's each at Jodhpur (Surpura)(RVPN) and Kankroli S/s(3150 A)*
3.	**Depiction of the scheme on Transmission Grid Map**	Refer Figure 4 -4
4.	**Upstream/downstream system associated with the scheme**	Not Applicable
5.	**Objective / Justification**	The objective of transmission scheme is to relieve overloading of Bhinmal-Zerda line under various operating conditions The Joint Study Meeting on Transmission Planning for Northern Region & Western Region was held on 21.03.2022, 28.03.22 & 29.03.22 over VC amongst CEA, CTU, POSOCO, WR, and NR constituents to deliberate NR-WR Inter-regional transmission system requirement to relieve overloading of Bhinmal-Zerda line under various operating conditions.

S. No.	Items	Details
		In the Joint Study meeting, the following scheme was proposed by CTU as per the immediate requirement (Phase-I: short term) to relieve 400kV WR-NR IR corridor loadings: • Bypassing of 400 kV Kankroli - Bhinmal-Zerda lines at Bhinmal to form 400 kV Kankroli – Zerda (direct) line # • Reconductoring of 400 kV Jodhpur(Surpura)(RVPN) – Kankroli S/c line with twin HTLS conductor*-188 km *# with necessary arrangement for bypassing Kankroli- Zerda line at Bhinmal with suitable switching equipment inside the Bhinmal substation.* **with minimum capacity of 2100 MVA/ckt at nominal voltage; Upgradation of existing 400kV bay equipment's each at Jodhpur (Surpura)(RVPN) and Kankroli S/s (3150 A)* After deliberations in the meeting, it was decided that Ph-1 (short term) scheme may be implemented as inter regional system strengthening scheme (ISTS) on urgent basis. The matter was also discussed and agreed in the 5th CMETS NR held on 30.03.2022. Subsequently, POWERGRID vide mail 20.05.22 provided inputs stating that with recent experience of Re-conductoring of various old lines based on HTLS conductor design principles for 400KV Lines designed with ACSR Moose conductor for 85 Deg C, ampacity of around 1400 Amperes may be possible with GAP & Composite Core type HTLS Conductor. For higher ampacity corresponding to 2100MVA capacity, GAP type HTLS Conductor may not be suitable and Composite Core type HTLS conductor may be the only option. It was also mentioned that the Composite Core type HTLS conductors is very costly (around 3 times to that of equivalent ACSR), whereas, GAP is economical (around 1.5 times to that of equivalent ACSR). With ampacity requirement of 1400A, possibility of GAP & Composite core type HTLS conductor may facilitate larger vendor base leading to better competition & fair price discovery. In case of higher ampacity, limited vendors of Composite core conductor may lead to reduced competition With 1400 Ampacity, 400kV line can be designed for about 1940 MVA. In the studies, it is observed from studies that line loading at 400 kV Jodhpur (Surpura) (RVPN) – Kankroli S/c (twin moose) line is about 1250 MW in Feb solar max scenario under worst case contingency. As the envisaged power flow is less than 1940MVA, therefore it is proposed that HTLS Conductor (Gap/Composite core) with 1400Amps(~1940MVA) may be utilized for reconductoring of 400kV Jodhpur (Surpura)(RVPN) – Kankroli S/c (twin moose) line Based on above inputs, proposal was again deliberated in the 7th CMETS NR meeting held on 31.05.22. In the meeting, proposal for Reconductoring of 400 kV Jodhpur(Surpura) (RVPN) – Kankroli S/c line with twin HTLS conductor having minimum capacity of 1940MVA/ckt at nominal voltage was agreed
6.	**Estimated Cost**	**Rs 279.5 Cr.**
7.	**Impact on the total Annual**	A. ATC (considering Levelized Tariff @15% of

S. No.	Items	Details
	Transmission charges in % along with the existing ATC	estimated cost): Rs 41.93 Crore B. Present ATC: Rs. 41,292.01 Crore* C. A/B (%): 0.102 %
8.	**Need of phasing, if any**	Not Applicable
9.	**Implementation timeframe**	18 Months from date of allocation of project
10.	**Inclusion of any wild life/protected area along the transmission line route**	Not Applicable
11.	**Deliberations with RPC along with their comments**	The estimated cost of the scheme is less than Rs 500 Crs. Accordingly, the same is not required to be sent to NRPC for deliberation in line with MoP office order no. 15/3/2018-Trans-Pt(5) dated 28-10-2021 regarding reconstitution of NCT.
12.	**System Study for evolution of the proposal**	Refer Figure 4 -5**, Figure 4 -6, Figure 4 -7, Figure 4 -8** and **Figure 4 -9.**

**Total YTC allowed for Nov'21, as per Notification of Transmission Charges payable by DICs for Billing Month of January, 2022 dated 25.12.2021 posted on NLDC website*

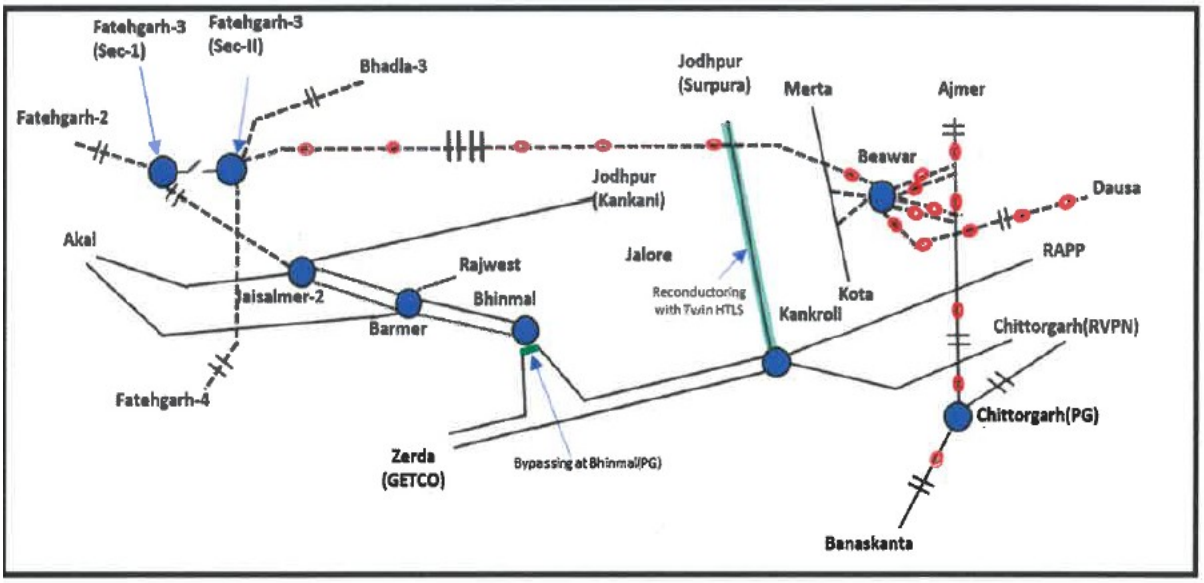


Figure 4-4 Scheme to relieve high loading of WR-NR Inter Regional Corridor (400 kV Bhinmal-Zerda line)

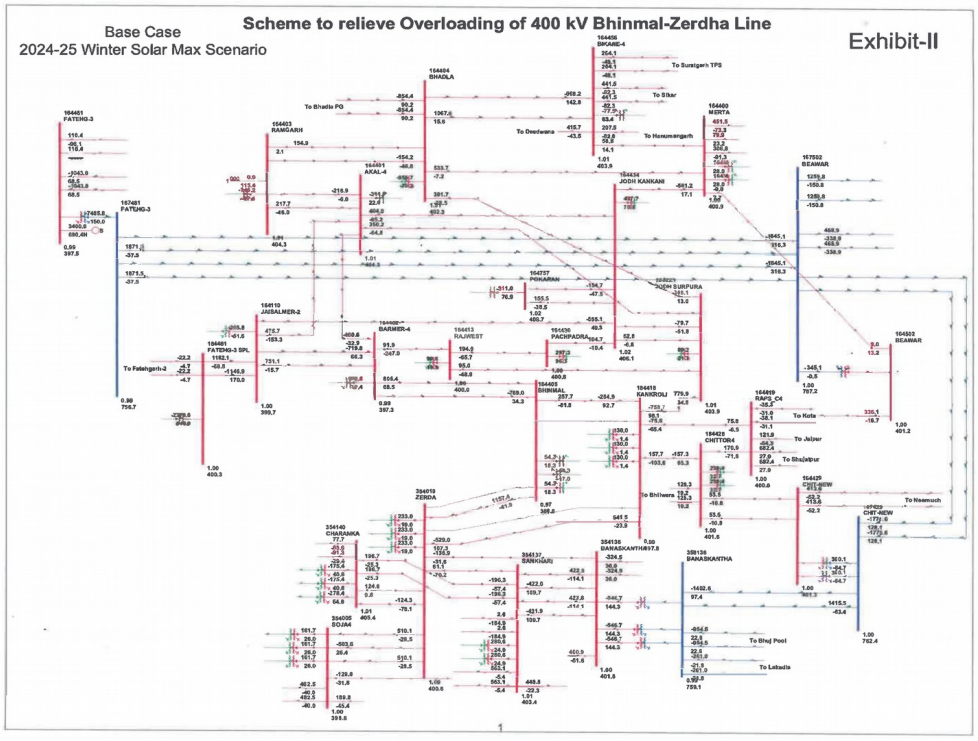


Figure 4-5 Scheme to relieve overloading of 400kV Bhinmal - Zerda Line (fig-1)

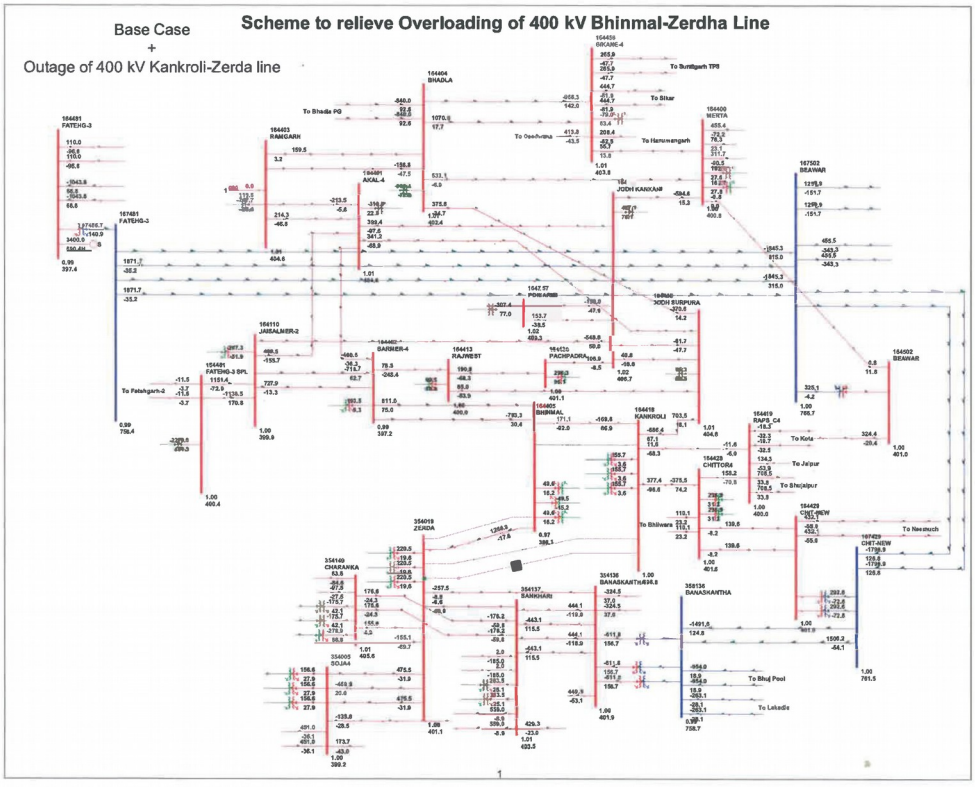


Figure 4-6 Scheme to relieve overloading of 400kV Bhinmal - Zerda Line (fig-2)

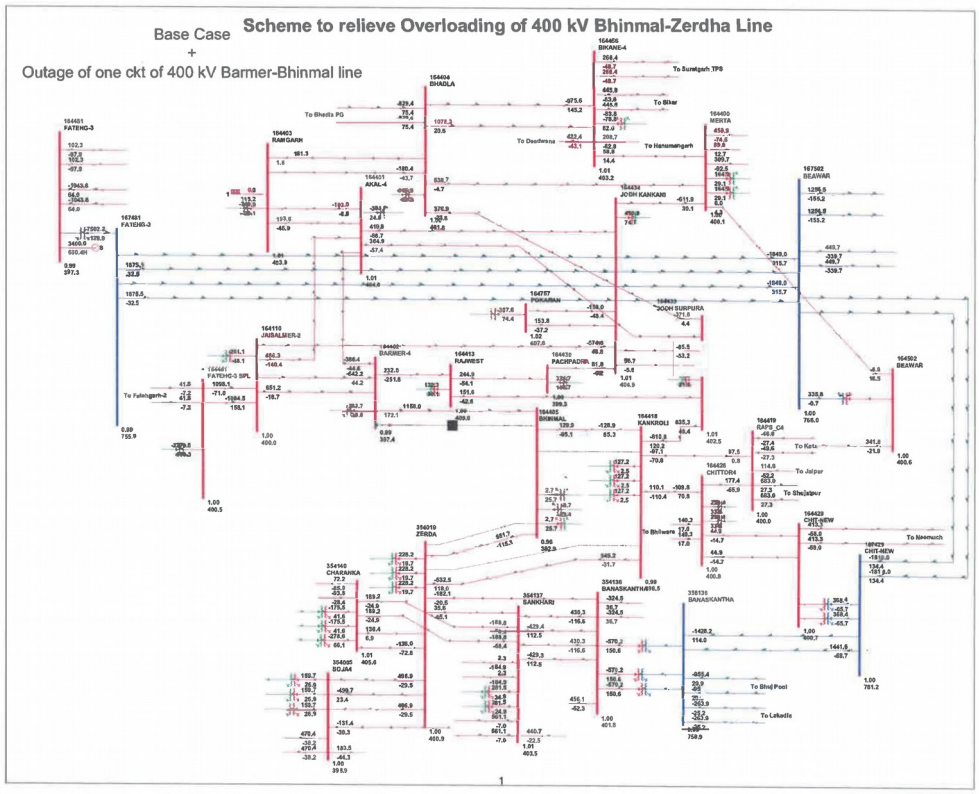


Figure 4-7 Scheme to relieve overloading of 400kV Bhinmal - Zerda Line (fig-3)

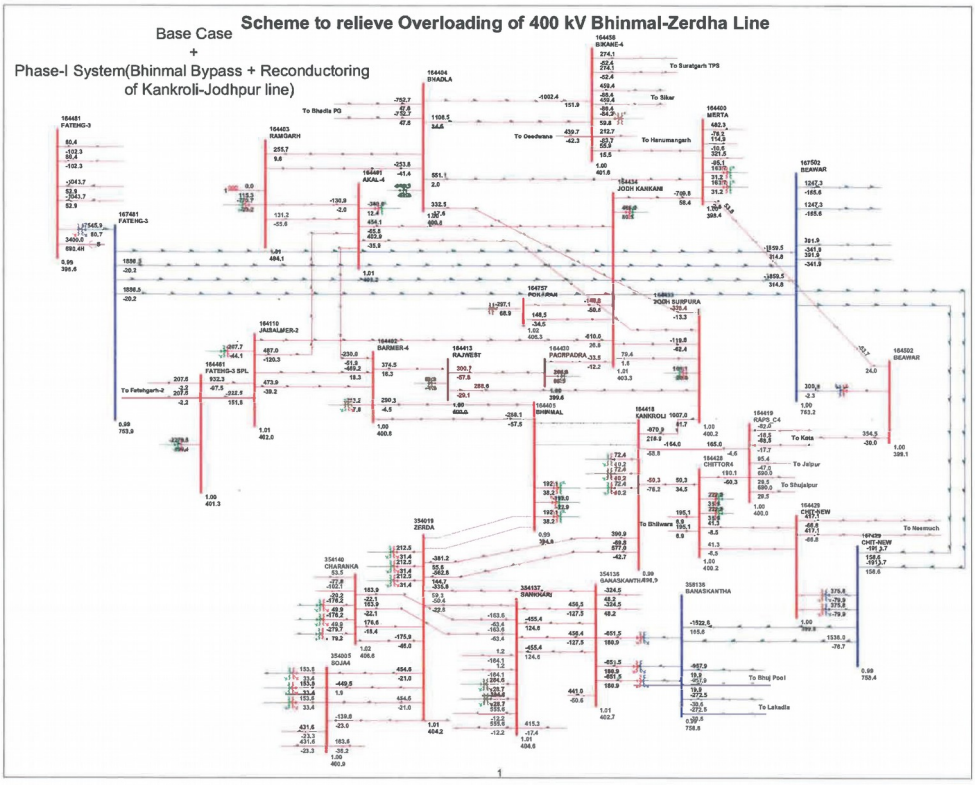


Figure 4-8 Scheme to relieve overloading of 400kV Bhinmal - Zerda Line (fig-4)

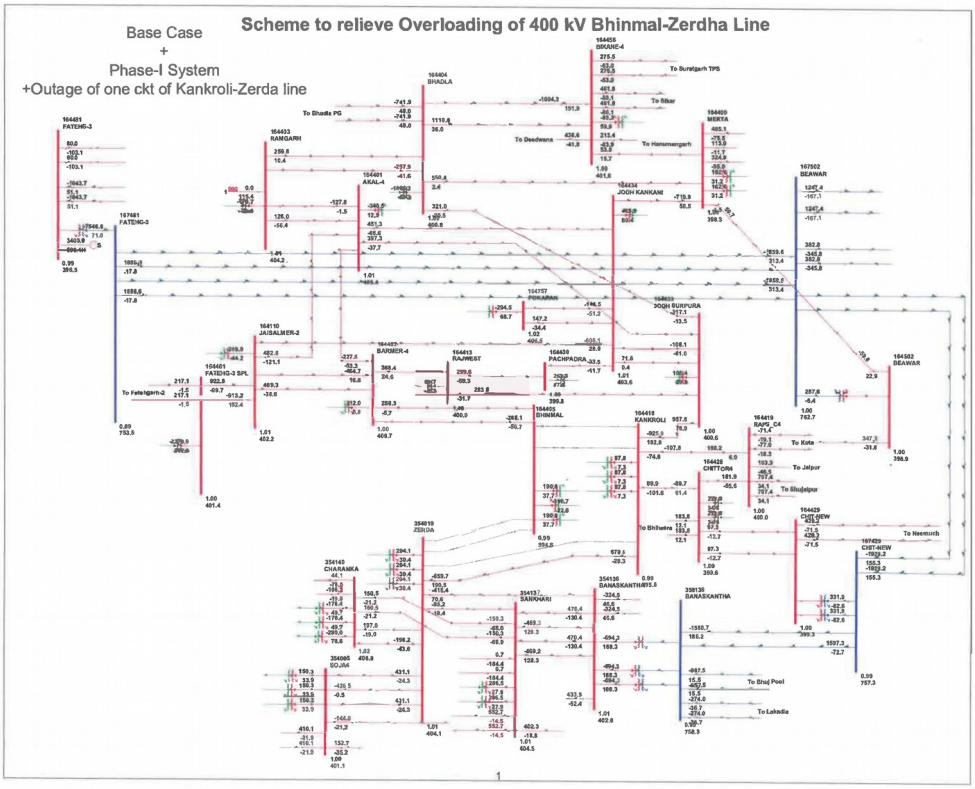


Figure 4-9 Scheme to relieve overloading of 400kV Bhinmal - Zerda Line (fig-5)

4.3 *Eastern Region Expansion Scheme-XXIX (ERES-XXIX)*

Sl. No.	Items	Details
1.	**Name of scheme**	Eastern Region Expansion Scheme-XXIX (ERES-XXIX)
2.	**Scope of the scheme**	(a) Reconductoring of Jharsuguda/Sundargarh (POWERGRID) – Rourkela (POWERGRID) 400kV 2xD/c Twin Moose line with Twin HTLS conductor (with ampacity Single HTLS as 1228 A at nominal voltage). (b) Bay upgradation at Rourkela (POWERGRID) end for 3150A rating – 04 nos. diameters in one and half breaker scheme (except 09 nos. existing circuit breakers which are of minimum 3150 A rating). ***Note:*** *No upgradation in line bays is envisaged at Jharsuguda/Sundargarh (POWERGRID) S/s as the existing line bays are rated for 3150 A.*
3.	**Depiction of the scheme on Transmission Grid Map**	Refer Figure 4 -10**.**
4.	**Upstream/downstream system associated with the scheme**	Nil
5.	**Objective / Justification**	As per inputs from Odisha, large numbers of industries are expected in and around Joda area with cumulative demand of about 480MW, which cannot be catered with existing 220kV network in the area. Accordingly, need for establishment of a new 400kV substation in Joda was felt to meet the power demand of the area. In this regard, providing power supply to Joda from nearby strong ISTS substation(s) was explored. Considering the same, it has

Sl. No.	Items	Details
		been decided in the 6th CMETS-ER held on 29th Apr 2022 that new 400/220kV Joda substation may be implemented by OPTCL under intra-state scheme through LILO of existing Rourkela (POWERGRID) – Talcher (NTPC) 400kV D/c ISTS line at Joda New. With the integration of Joda New 400/220kV substation with ISTS, most of the power flows to Joda from Jharsuguda – Rourkela – Joda 400kV corridor. Further, Rourkela substation also acts as a source of power to Jharkhand through Rourkela – Chaibasa and Rourkela – Ranchi 400kV D/c lines. Accordingly, it has also been agreed in the 7th CMETS-ER held on 31-05-2022 to reconductor Jharsuguda – Rourkela 400kV 2xD/c lines with HTLS conductor in similar timeframe of establishment of Joda New 400/220kV substation i.e. in 36 months. Circuit I & III of Rourkela-Jharsuguda 400kV D/c line are designed for 75°C max. conductor temperature and Circuit II & IV are designed for and 85°C max. conductor temperature (schematic at Figure 4 -11). For 400kV transmission lines designed for 75°C & 85°C max. conductor temperature, ampacity of 1228 Amperes & 1400 Amperes (per conductor) respectively may be possible for re-conductoring purpose considering techno-commercial solution. It is observed that one circuit (ckt-1) of Rourkela-Jharsuguda on Section-A is designed for 75°C max. conductor temperature and other circuit (ckt-2) is designed for 85°C max. conductor temperature. Similar is the case for Section-B i.e. ckt-3 is designed for 75°C max. conductor temperature and ckt-4 is designed for 85°C max. conductor temperature. Accordingly, to have equitable rating for all circuits on Section-A and Section-B it was proposed in the meeting that all four circuits of Rourkela-Jharsuguda may be reconductored with HTLS of 1228A rating
6.	**Estimated Cost**	INR 422.23 Cr. ***Note:*** *NCT may rework the estimated cost of the scheme at the time of finalisation/approval of the scheme considering scrap value of dismantled conductor at that point of time.*
7.	**Impact on the total Annual Transmission Charges in % along with the existing ATC**	A. ATC (considering levelized tariff @15% of estimated cost): about ₹63.33 Cr. B. Present ATC: ₹ 42259.4Cr.* C. A/B: about 0.15%
8.	**Need of phasing, if any**	No phasing required.
9.	**Implementation timeframe**	36 months from date of allocation
10.	**Inclusion of any wild life/ protected area along the transmission line route**	No major National Park, Wild Life Sanctuary, other protected areas exist.
11.	**Deliberations with RPC along with their comments**	Estimated cost of the ISTS scheme is less than INR 500 Cr. Accordingly, the same is not required to be sent to NERPC for deliberation in line with MoP office order no. 15/3/2018-Trans-Pt(5) dated 28-10-2021 regarding reconstitution of NCT.
12.	**System study for evolution of the proposal**	Refer **Figure 4 -12, Figure 4 -13 and Figure 4 -14.**

**Total YTC allowed for June 2022, as per notification of transmission charges payable by DICs for billing month of August 2022 dated 25-07-2022 published on NLDC website.*

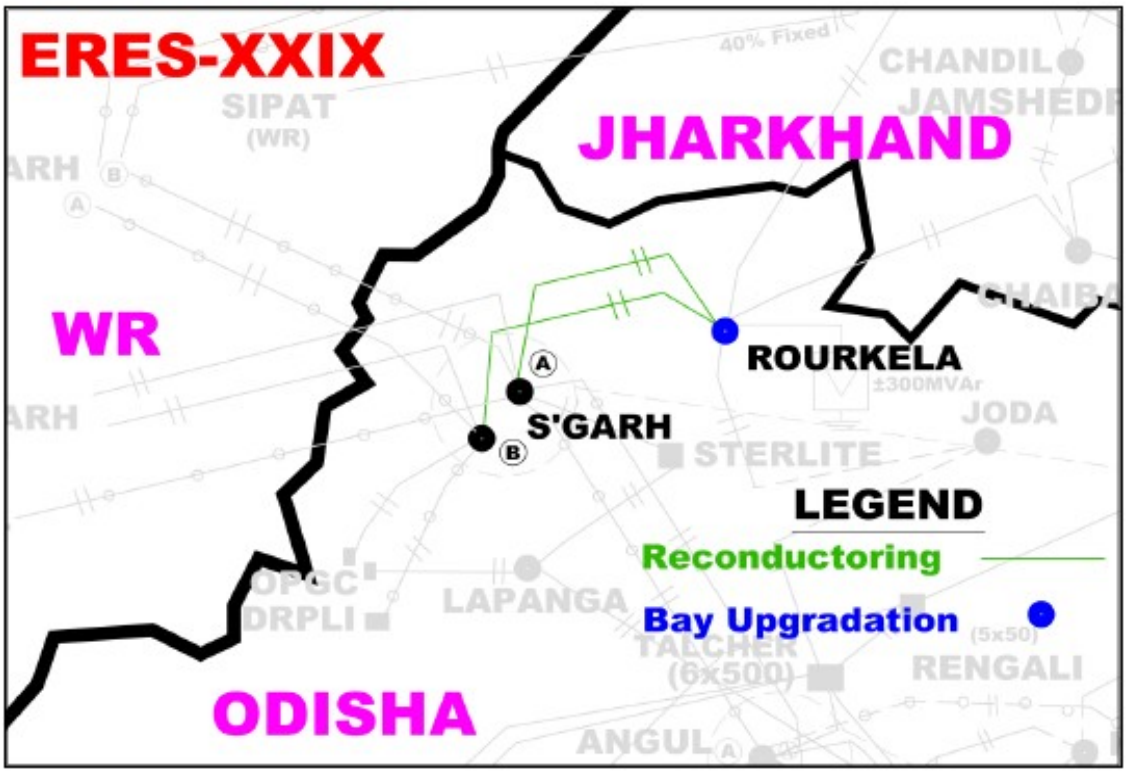


Figure 4-10 Eastern Region Expansion Scheme-XXIX (fig-1)

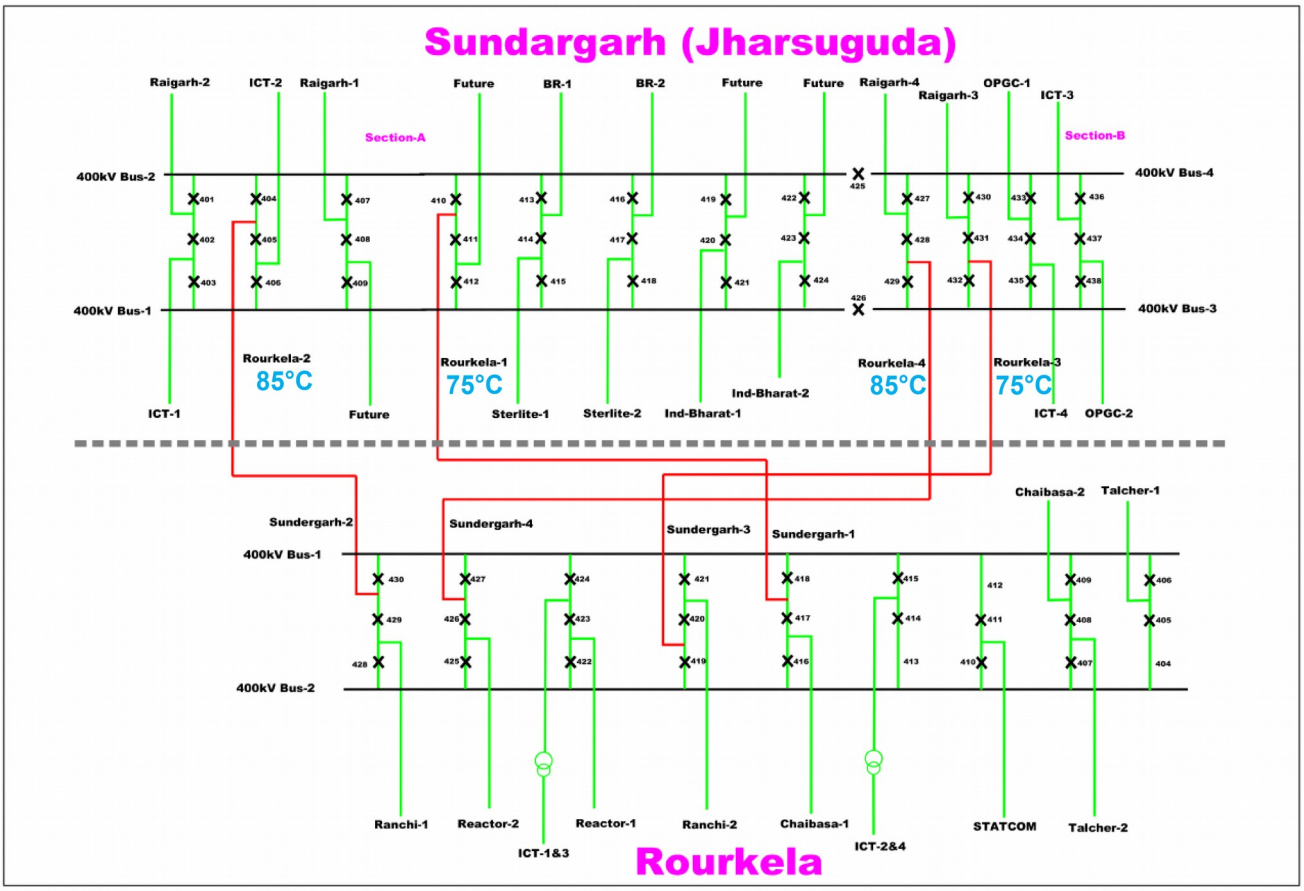


Figure 4-11 Eastern Region Expansion Scheme-XXIX (fig-2)

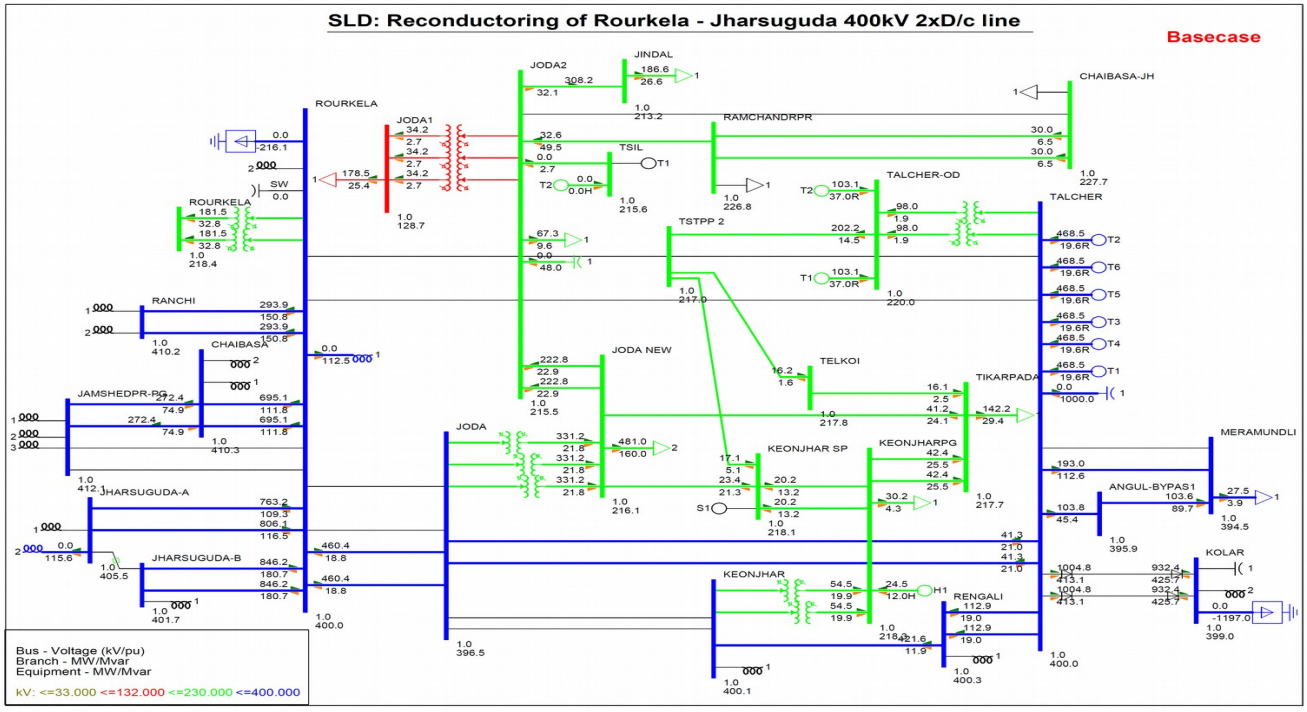


Figure 4-12 Eastern Region Expansion Scheme-XXIX (fig-3)

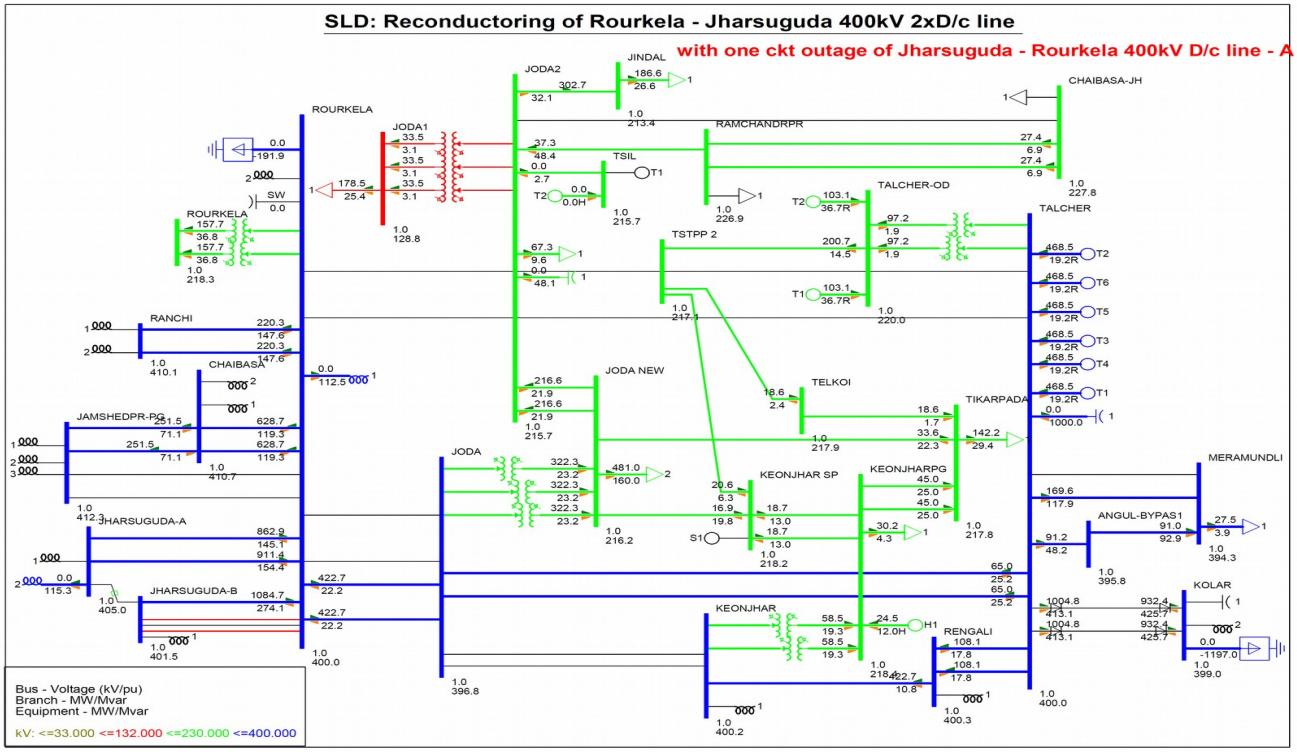


Figure 4-13 Eastern Region Expansion Scheme-XXIX (fig-4)

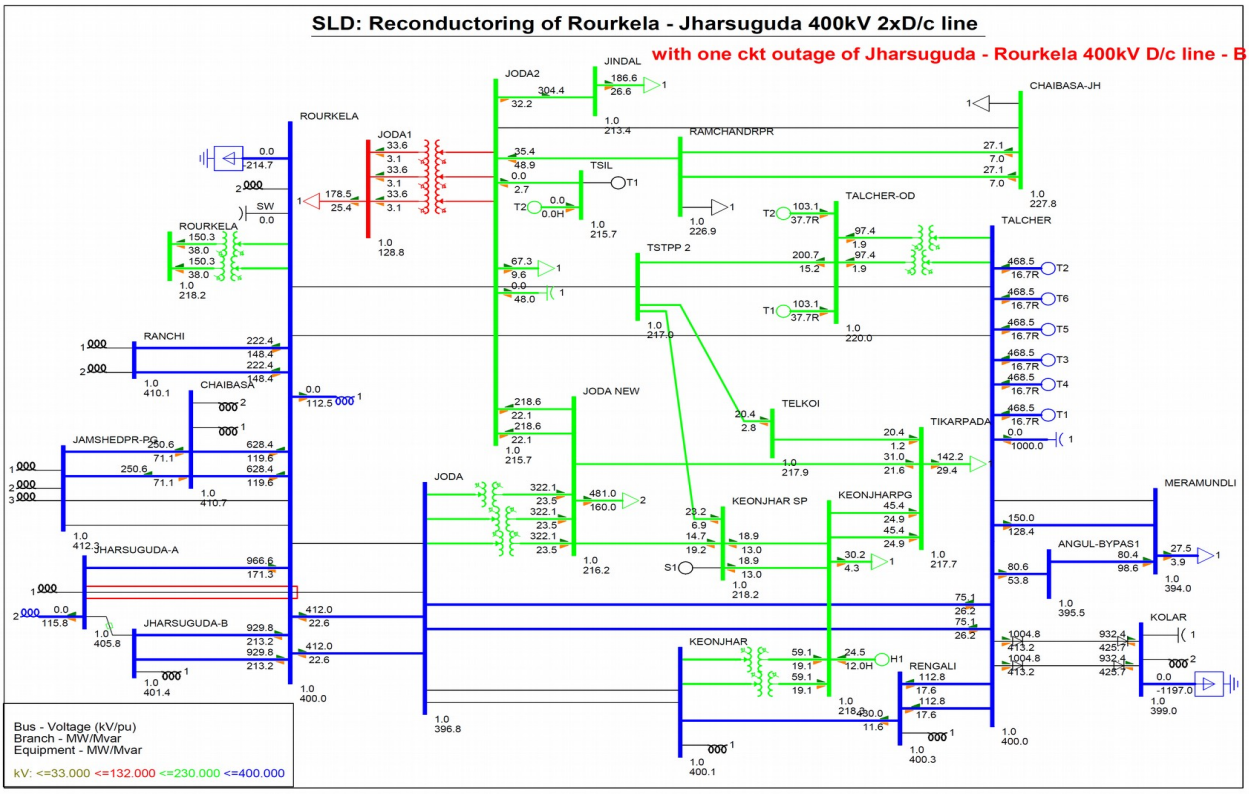


Figure 4-14 Eastern Region Expansion Scheme-XXIX (fig-5)

4.4 *Augmentation of transformation capacity at Kallam PS by 2x500MVA, 400/220kV ICTs (3rd & 4th) along with 220kV bays for RE interconnection*

<table>
<tr><th>S. No.</th><th>Items</th><th colspan="3">Details</th></tr>
<tr><td>1.</td><td>Name of Scheme</td><td colspan="3">Augmentation of transformation capacity at Kallam PS by 2x500MVA, 400/220kV ICTs (3rd & 4th) along with 220kV bays for RE interconnection</td></tr>
<tr><td>2.</td><td>Scope of the scheme</td><td>Sl.</td><td>Scope of the Transmission Scheme</td><td>Capacity /km</td></tr>
<tr><td></td><td></td><td>1.</td><td>Augmentation of Kallam Pooling Station by 2x500 MVA, 400/220kV ICTs</td><td>500MVA, 400/220kV ICT: 2 nos.
400kV ICT bays: 2 nos.
220kV ICT bays: 2 nos.</td></tr>
<tr><td></td><td></td><td>2.</td><td>3 nos. 220kV line bays for RE interconnection</td><td>220kV line bays: 3 nos.</td></tr>
<tr><td></td><td></td><td>3.</td><td>1x125 MVAr bus reactor (2nd) at Kallam PS</td><td>125 MVAr, 420 kV Bus reactor – 1 no.
Bus reactor bay: 1 no.</td></tr>
<tr><td>3.</td><td>Depiction of the scheme on Transmission Grid Map</td><td colspan="3">Refer Figure 4 -15</td></tr>
<tr><td>4.</td><td>Upstream/ downstream system associated with the scheme</td><td colspan="3">Upstream: Following RE projects are granted/proposed to be granted Stage-II connectivity at Kallam PS:
M/s Veh Aarush (201MW: Granted)
M/s JSW Neo (300MW: Under Process)
M/s Serentica Renewables (210MW: Under Process)</td></tr>
<tr><td>5.</td><td>Objective / Justification</td><td colspan="3">In order to achieve the commitment made in terms of Nationally Determined Contributions (NDCs), as one of the significant steps, India has pledged to increase the non-fossil fuel energy capacity to 500 GW by 2030. MNRE vide letter No. 367-13/1/2021-GEC dated 15.02.2022 addressed to Joint Secretary (Trans), MoP, had forwarded the Renewable Energy Zones (REZs) identified by MNRE/SECI with a total capacity of 181.5 GW for likely benefits by the year 2030. Out of the same, 1GW (Wind + Solar) potential has been identified in Kallam area, which is in addition to 1GW REZ potential identified at Kallam under 66.5GW REZ. (i.e. total 2GW).
Further, out of 181.5GW REZ, SECI vide letter dated 23.06.2022 has informed that as a first step to provide RTC Power (with wind, solar & storage components), they have identified certain locations with high solar & wind potential where work on RE evacuation system may be taken up immediately. Kallam is one such location which has been prioritised by SECI for development of transmission system.
The matter was deliberated in the 9th CMETS-WR meeting held on 28.07.2022 wherein it was deliberated that the Stage-II connectivity at Kallam PS has already crossed 1GW (~1272MW). Hence, scheme for integration of Kallam REZ (1GW) may be taken up considering the 1GW addl. potential under 181.5GW as well as rapid pace of Stage-II connectivity applications being received by CTU.
Further, 3 nos. 220kV line bays are also proposed under the subject scheme for following RE projects which are granted/proposed to be granted Stage-II connectivity at Kallam PS:
M/s Veh Aarush (201MW: Granted)
M/s JSW Neo (300MW: Under Process)
M/s Serentica Renewables (210MW: Under Process)</td></tr>
<tr><td>6.</td><td>Estimated Cost</td><td colspan="3">Rs. 156.89 Crore</td></tr>
</table>

<table>
<tr><th>S. No.</th><th>Items</th><th colspan="3">Details</th></tr>
<tr><td>7.</td><td>Impact on the total Annual Transmission charges in % along with the existing ATC</td><td colspan="3">A. ATC (considering Levelized Tariff @15% of estimated cost): INR 23.53 Crore
B. Present ATC: INR 42391.16 Crore*
C. A/B (%): Less than 0.055%</td></tr>
<tr><td>8.</td><td>Need of phasing, if any</td><td colspan="3">Not Applicable</td></tr>
<tr><td>9.</td><td>Implementation timeframe</td><td>Sl.</td><td>Scope of the Transmission Scheme</td><td>Time-frame</td></tr>
<tr><td></td><td></td><td>1.</td><td>Augmentation of Kallam Pooling Station by 2x500 MVA, 400/220kV ICTs</td><td>18 months from date of allocation to implementing agency</td></tr>
<tr><td></td><td></td><td>2.</td><td>3 nos. 220kV line bays for RE interconnection</td><td>M/s Serentica Renewables (210MW): 01.07.2024
M/s JSW Neo (300MW): 01.08.2024
M/s Veh Aarush (201MW): 31.12.2024</td></tr>
<tr><td></td><td></td><td>3.</td><td>1x125 MVAr bus reactor (2nd) at Kallam PS</td><td>18 months from date of allocation to implementing agency</td></tr>
<tr><td>10.</td><td>Inclusion of any wild life/protected area along the transmission line route</td><td colspan="3">None envisaged</td></tr>
<tr><td>11.</td><td>Deliberations with RPC along with their comments</td><td colspan="3">The estimated cost of the scheme is less than INR 500 Cr. Accordingly, the same is not required to be sent to WRPC for deliberation in line with MoP office order no. 15/3/2018-Trans-Pt(5) dated 28-10-2021 regarding reconstitution of NCT</td></tr>
<tr><td>12.</td><td>System Study for evolution of the proposal</td><td colspan="3">Studies were carried out by Committee on Transmission Planning for Integration of 181.5 GW RE Capacity by 2030, which includes 1GW REZ potential at Kallam PS.

The same was discussed and agreed in 9th Consultation Meeting for Evolving Transmission Schemes in Western Region (CMETS-WR) held on 28.07.2022

Load flow results are at Figure 4 -16.</td></tr>
</table>

** Total YTC allowed for July 2022, as per notification of transmission charges payable by DICs for billing month of Sep 2022 dated 25-08-2022 published on NLDC website (available @ https://posoco.in/transmission-pricing/notification-of-transmission-charges-for-the-dics/.)*

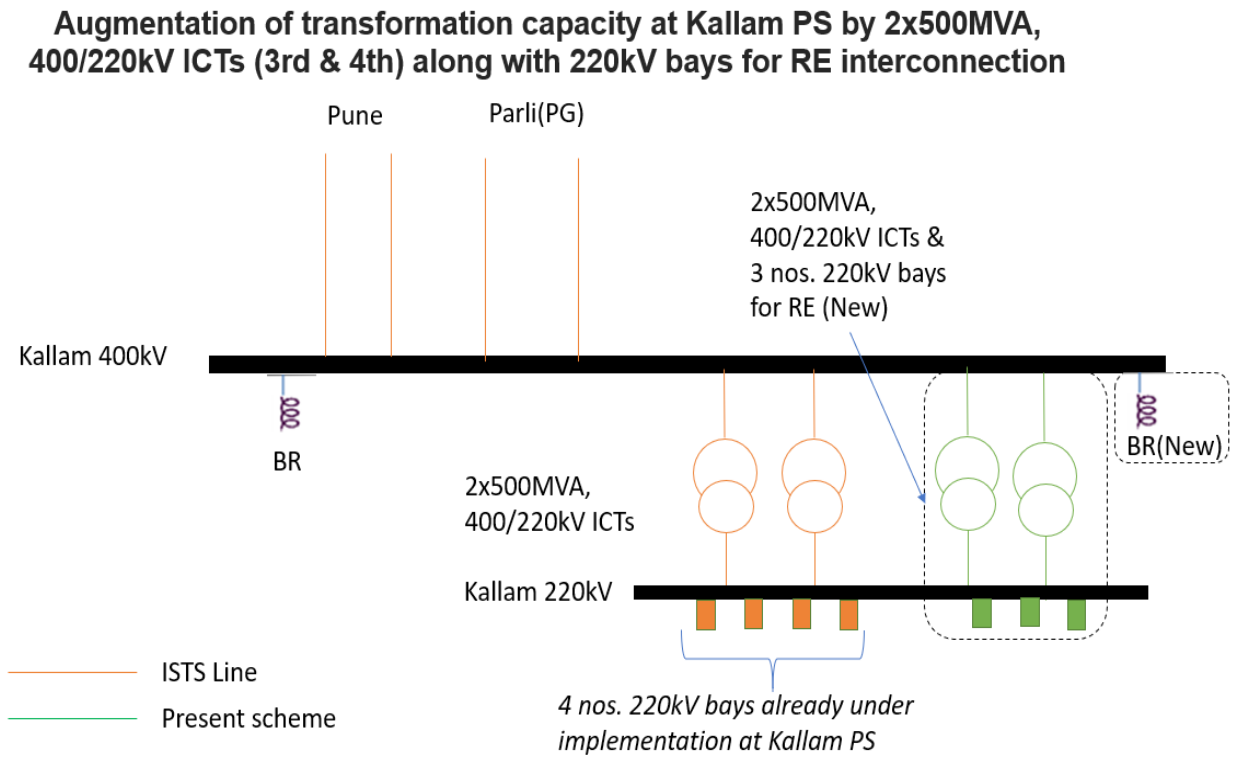


Figure 4-15 Augmentation of transformation capacity at Kallam PS by 2x500MVA, 400/220kV ICTs (3rd & 4th) along with 220kV bays for RE interconnection (fig-1)

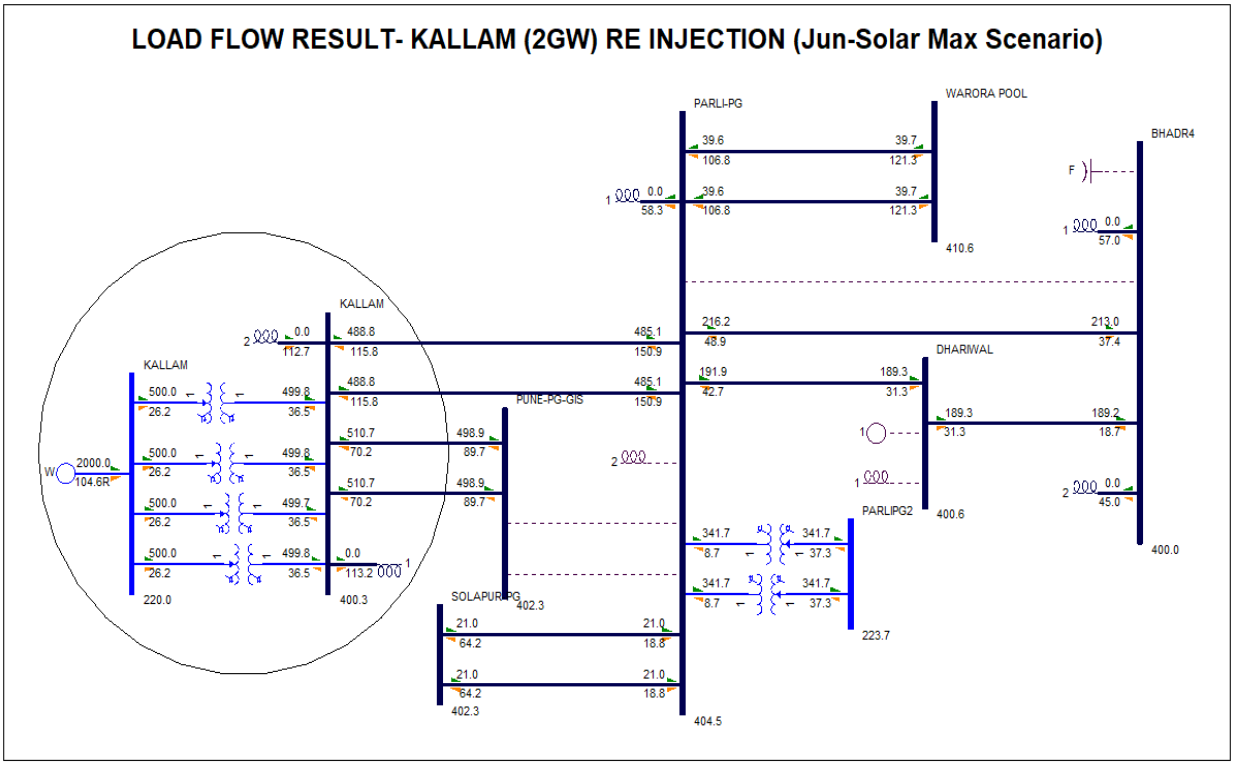


Figure 4-16 Augmentation of transformation capacity at Kallam PS by 2x500MVA, 400/220kV ICTs (3rd & 4th) along with 220kV bays for RE interconnection (fig-2)

4.5 *Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex: 7.7GW)*

S. No.	Items	Details
1.	Name of Scheme	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex : 7.7GW)
2.	Scope of the scheme	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) **(Bikaner Complex: 7.7GW) (Bikaner-II : 3.7GW (Solar) + Bikaner-III : 4GW (7GW Solar+3GW BESS)** • Establishment of 6x1500 MVA, 765/400kV & 5x500 MVA^ 400/220kV Bikaner-III Pooling Station along with 2x330 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor at a suitable location near Bikaner ➢ 765/400kV 1500 MVA ICTs: 6 nos (19x500 MVA 1Φ unit including one spare) ➢ 765kV bays: 10 nos. ➢ 765kV ICT bays - 6 nos. ➢ 765kV reactor bays- 2 nos. ➢ 330 MVAr Bus Reactor-2 nos. (7x110 MVAr, including one spare unit) ➢ 400 kV bays: 21 nos. ➢ 400 kV ICT bays – 11 nos. ➢ 400 kV line bays - 6 nos.(4 nos. for LILO of Bikaner-Bikaner-II D/c line & 2 nos. for Bikaner-II D/c line) ➢ 420 kV reactor bays - 2 nos. ➢ 125 MVAr, 420kV bus reactor - 2 nos. ➢ 220 kV bays: 12 nos. ➢ 220 kV ICT bays - 5 nos. ➢ 220 kV line bays – 6 nos* (for RE connectivity) ➢ 220kV Sectionalization bay: 1 set ➢ BC and TBC : 2 nos. (each) **Future provisions at Bikaner-III PS*:** **Space for** ▪ 765 kV bays: 6 nos. ▪ 765/400kV ICT along with bay- 1 no. ▪ 765 kV line bays along with switchable line reactors – 4 nos. ▪ 765kV Bus Reactor along with bay: 1 no. ▪ 400 kV bays: 16 nos. ▪ 400 kV line bays along with switchable line reactor –4 nos. ▪ 400 kV line bays–4 nos. ▪ 400/220kV ICT along with bays -5 nos. ▪ 400 kV Bus Reactor along with bay: 1 no. ▪ 400kV Sectionalisation bay: 2 sets ▪ 220 kV bays: 8 nos. ▪ 220 kV line bays for connectivity of RE Applications - 6 nos.* ▪ 220kV Sectionalization bay: 2 sets ▪ STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr) • LILO of both ckts of 400kV Bikaner (PG)-Bikaner-II D/c line at Bikaner-III PS (~20 km) • Bikaner-II PS – Bikaner-III PS 400 kV D/c line (Quad) (~30 km) ➢ 400 kV line bays at Bikaner-II – 2 nos. • Establishment of 765/400 kV, 4x1500 MVA Neemrana-II S/s along with 2x330 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor at a suitable location near Neemrana ➢ 765/400kV 1500 MVA ICTs: 4 nos (13x500 MVA 1Φ units including one spare) ➢ 765 kV bays: 8

S. No.	Items	Details
		➢ 765kV ICT bays - 4 nos. ➢ 330 MVAr Bus Reactor-2 nos. (7x110 MVAr, including one spare unit) ➢ 765kV reactor bays- 2 nos. ➢ 400 kV bays: 14 ➢ 400 kV ICT bays – 4 nos. ➢ 400 kV line bays - 6 nos (4 nos. for LILO of Gurgaon - Sohna Road D/c line & 2 nos. for Kotputli D/c line) ➢ 125 MVAr, 420kV bus reactor - 2 nos. ➢ 420 kV reactor bays - 2 nos. **Future provisions at Neemrana-II S/s:** **Space for** ▪ 765 kV bays: 9 nos. ▪ 765/400kV ICT along with bays- 2 nos. ▪ 765 kV line bays along with switchable line reactors – 6 nos. ▪ 765kV Bus Reactor along with bay: 1 no. ▪ 400 kV bays: 9 nos. ▪ 400 kV line bays along with switchable line reactor –6 nos. ▪ 400 kV Bus Reactor along with bays: 1 no. ▪ 400kV Sectionalization bay: 2 sets • LILO of both ckts of 400 kV Sohna Road(GPTL)-Gurgaon(PG) D/c line at Neemrana-II S/s (~85 km) • Neemrana-II -Kotputli 400 kV D/c line (Quad) (~70 km) ➢ 400 kV line bays at Kotputli- 2 nos. • Bikaner-III – Neemrana-II 765 kV 2xD/c line (~350 km) along with 330 MVAr switchable line reactor for each circuit at each end ➢ 765kV line bays at Bikaner-III PS – 4 nos ➢ 765kV line bays at Neemrana-II – 4 nos. ➢ 765 kV, 330 MVAr Switchable line reactors at Bikaner-III PS – 4 nos. ➢ 765 kV, 330 MVAr Switchable line reactors at Neermana-II – 4 nos. ➢ Switching equipment for 765kV 330 MVAr switchable line reactors at Bikaner-III PS – 4 nos. ➢ Switching equipment for 765kV 330 MVAr switchable line reactors at Neemrana-II – 4 nos. • Neemrana-II- Bareilly(PG) 765 kV D/c line (~350 km) along with 330 MVAr switchable line reactor for each circuit at each end ➢ 765 kV line bays at Neemrana-II – 2 nos. ➢ 765 kV line bays at Bareilly(PG) – 2 nos. ➢ 765 kV, 330 MVAr Switchable line reactors at Neemrana-II – 2 nos. ➢ 765 kV, 330 MVAr Switchable line reactors at Bareilly(PG) – 2 nos. ➢ Switching equipment for 765kV 330 MVAR switchable line reactors at Neemrana-II – 2 nos. ➢ Switching equipment for 765kV 330 MVAR switchable line reactors at Bareilly(PG) – 2 nos. • Augmentation with 400/220 kV, 5x500 MVA^ ICT at Bikaner-II PS along with associated bays ➢ 400/220 kV, 500 MVA ICTs – 5 nos ➢ 400 kV ICT bays – 5 nos. ➢ 220 kV ICT bays - 5 nos. • Augmentation with 765/400 kV, 1x1500MVA ICT (4th) at Bikaner (PG) ➢ 765/400 kV, 1500 MVA ICT – 1 no. ➢ 765 kV ICT bay – 1 no. ➢ 400 kV ICT bay – 1 no.

<table>
<tr><th>S. No.</th><th>Items</th><th>Details</th></tr>
<tr><td></td><td></td><td>• Augmentation by 400/220 kV, 1x500 MVA (3rd) ICT at Kotputli (PG)
➢ 400/220 kV, 500 MVA ICT – 1 no
➢ 400 kV ICT bay – 1 no
➢ 220 kV ICT bay - 1 no

^incl 1x500MVA ICT to fulfill ‘N-1’ requirement
* Recently, 220kV bays (3 nos. under ISTS scope+1 no. under developer scope) at Bikaner-III PS under ISTS were agreed in CMETS-NR meetings commensurate to Stage-II connectivity applications granted at Bikaner-III PS. Considering additional envisaged applications as well as agreed bays (3 nos) under ISTS, 220 kV line bays at Bikaner-III PS for RE Connectivity (6 nos.) is considered in the scheme. The corresponding no. of 220 kV bays may be considered reduced from future scope of Bikaner-III PS.</td></tr>
<tr><td>3.</td><td>Depiction of the scheme on Transmission Grid Map</td><td>Refer Figure 4 -17</td></tr>
<tr><td>4.</td><td>Upstream/ downstream system associated with the scheme</td><td>Connectivity of under implementation 400/220kV Bikaner-II S/s includes 400kV D/c interconnection with Khetri (2xD/c) and Bikaner (PG). 765/400/220kV existing Bikaner (PG) S/s is interconnected to 765/400kV Khetri, 765/400/220kV Bhadla (PG) and 765/400kV Moga S/s through 765kV D/c lines. 765/400kV existing Bareilly(PG) S/s is interconnected to 765/400kV Lucknow S/s through 765kV D/c line & 400kV Bareilly (PG) and Kashipur S/s through 400kV D/c lines.</td></tr>
<tr><td>5.</td><td>Objective / Justification</td><td>1. MNRE vide letter No. 367-13/1/2021-GEC dated 15.02.2022 addressed to Joint Secretary (Trans), MoP, had forwarded the Renewable Energy Zones (REZs) identified by MNRE/SECI with a total capacity of 181.5 GW for likely benefits by the year 2030. Transmission plan was to be prepared for the identified RE zones. These REZ’s are located in eight states, out of which 75 GW REZs includes in the state of Rajasthan comprising of 15 GW Wind and 60 GW Solar potential.

2. Accordingly, a Comprehensive transmission scheme was evolved for evacuation of 75GW RE from Rajasthan. Out of above comprehensive scheme, transmission scheme is evolved for about 8GW (Solar) in Bikaner complex with potential (14GW along with 6GW BESS) as below:
• Bikaner-II: 4 GW (7GW Solar+ 3 GW BESS)
• Bikaner-III:4 GW (7GW Solar+ 3 GW BESS)

3. At Bikaner-II PS, St-II Connectivity for 5.575 GW RE is already granted against the potential of 1.9 GW (revised from 2.9GW) identified under Ph-II), therefore, evacuation for additional 3.7 GW capacity is required from Bikaner-II PS.

4. For additional solar potential of 7GW with 3GW BESS at Bikaner-III, evacuation system (4 GW) shall also be required. Therefore, total evacuation system requirement for 7.7GW (3.7+4 GW) shall be required from Bikaner Complex (Bikaner-II & III).
<table>
<tr><th>S.No</th><th>Pooling Station</th><th colspan="2">Total RE potential (GW)</th><th>Net RE generation</th></tr>
<tr><td></td><td></td><td>Solar</td><td>BESS</td><td></td></tr>
<tr><td>1</td><td>Bikaner-II</td><td>3.7*</td><td>-</td><td>3.7</td></tr>
<tr><td>2</td><td>Bikaner-III</td><td>7</td><td>3</td><td>4</td></tr>
<tr><td></td><td></td><td>10.7</td><td>3</td><td>7.7</td></tr>
</table>
</td></tr>
</table>

S. No.	Items	Details
		1.9GW Solar potential is already considered in Ph-II at Bikaner-II. Total potential considered at Bikaner-II : 5.6GW (1.9+3.7) 5. Evacuation system planned earlier in Ph-I, II, III from Bikaner complex was adequate for evacuation of about 4.8 GW RE potential from Bikaner complex. however, recently due to restrictions in GIB area, CTU has received more no. of connectivity applications in Bikaner complex. Stage-II connectivity received at Bikaner (PG) & Bikaner-II PS has already exceeded the envisaged potential in Bikaner complex as part of Ph-I (2.9 GW) and Ph-II (1.9 GW) potential. 6. Upon grant of about 5.575 GW St-II Connectivity, in the 5th & 6th CMETS in NR, no further grant for St-II connectivity at 400/220kV Bikaner-II was decided. However, to effect LTA of entire Stage-II grant at Bikaner-II, additional corridors shall need to be planned from Bikaner-II PS. Further, as Bikaner PS and Bikaner-II PS are interconnected, power flow on interconnection is influenced by RE generation dispatched at each Pooling station. Considering space limitation of 400kV bays for additional corridors as well as 765/400kV ICTs at Bikaner PS, there is limitation on evacuation of power from Bikaner PS. 7. The agenda for evacuation of power from Bikaner-II & Bikaner-III PS along with studies was discussed in 8th CMETS-NR meeting wherein observations on agenda/studies by Stakeholder incl. HVPN and POSOCO were deliberated. HVPN vide letter 28.06.22 and POSOCO mail dated 01.07.22 also sent their observations on agenda/studies. 8. Based on observations from Stakeholders, revised study files shared to all constituents on 01.07.22. Subsequently, HVPN vide letter 05.07.22 concurred with the proposal 9. Based on POSOCO input, CTU also carried out P-V and Q-V stability analysis in line with the discussion held in meeting and enclosed as part of minutes of 8th CMETS-NR meeting 10. Considering grant of connectivity to new RE generators in Bikaner complex (incl. Bikaner-III) as well as for evacuation of power beyond Bikaner complex (Bikaner/Bikaner-II/Bikaner-III PS), transmission scheme was agreed for evacuation of power from Rajasthan REZ Ph-IV (Part-1) [**Bikaner complex :7.7GW**] in the 8th CMETS-NR meeting with scope at S. No. 2
6.	Estimated Cost	**Total: Rs 13460 Cr.**
7.	Impact on the total Annual Transmission charges in % along with the existing ATC	A. ATC (considering Levelized Tariff @15% of estimated cost): Rs 2,019 Cr. B. Present ATC: Rs. **42259.4 Cr**.* C. A/B (%): 4.78 %
8.	Need of phasing, if any	Not Applicable
9.	Implementation timeframe	24 months from allocation of project.

S. No.	Items	Details
10.	Inclusion of any wild life/protected area along the transmission line route	No major National park, Wild life sanctuary, other protected areas observed. However, for details of forest/protected areas survey is required to be done.
11.	Deliberations with RPC along with their comments	The above scheme was deliberated and agreed in 56th NRPC held on 29.07.2022. (MoM Awaited)
12.	System Study for evolution of the proposal	Studies discussed and agreed in following meeting: • 8th & 9th CMETS-NR meeting held on 30.06.2022 & 28.07.2022 respectively. • 56th NRPC meeting held on 29.07.2022 (MoM Awaited) Load flow results are shown at Figure 4 -18 to **Figure 4 -26**

4.5.1. Packaging for Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex: 7.7GW) (Bikaner-II : 3.7GW (Solar) + Bikaner-III : 4GW (7GW Solar+3GW BESS)

PART-A1: (Rs. 4424 Cr.)

S.No.	Transmission Elements	Capacity /km

1	Establishment of 4x1500 MVA (along with one spare unit of 500 MVA), 765/400 kV & 3x500 MVA 400/220 kV Bikaner-III Pooling Station along with 2x330 MVAr (765kV) Bus Reactor (along with one spare unit of 110 MVAr) & 2x125 MVAr (420kV) Bus Reactor at a suitable location near Bikaner
	
	Future provisions: Space for
	• 765 kV bays: 10 nos.
	  • 765/400kV ICT along with bays- 3 no.
	  • 765 kV line bays along with switchable line reactors – 6 nos.
	  • 765kV Bus Reactor along with bay: 1 no.
	• 400 kV bays: 18 nos.
	  • 400 kV line bays along with switchable line reactor –4 nos.
	  • 400 kV line bays–4 nos.
	  • 400/220kV ICT along with bays -7 nos.
	  • 400 kV Bus Reactor along with bay: 1 no.
	  • 400kV Sectionalization bay: 2 sets
	• 220 kV bays: 11 nos.
	  • 220 kV line bays for connectivity of RE Applications -8 nos.
	  • 220kV Sectionalization bay: 3 sets
		• 765/400kV 1500 MVA ICTs: 4 nos (13x500 MVA including one spare unit)
		• 765 kV bays: 10 nos.
		  • 765kV ICT bays - 4 nos.
		  • 765kV line bays- 2 nos.
		  • 330 MVAr Bus Reactor-2 nos. (7x110 MVAr, including one spare unit)
		  • 765kV reactor bays- 2 nos.
		• 400 kV bays: 18 nos.
		  • 400/220 kV, 500 MVA ICTs – 3 nos
		  • 400 kV ICT bays – 7 nos.
		  • 420 kV reactor bays - 2 nos.
		  • 400 kV line bays - 6 nos.(4 nos. for LILO of Bikaner-Bikaner-II D/c line & 2 nos. for Bikaner-II D/c line)
		• 220 kV bays: 9 nos.
		  • 220 kV ICT bays - 3 nos.
		  • 125 MVAr, 420kV bus reactor - 2 nos.
		  • 220 kV line bays – 4 nos (for RE connectivity)
		• BC and TBC: 1 no. (each)

	• STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr)	
2	LILO of both ckts of 400kV Bikaner (PG)-Bikaner-II D/c line(Quad) at Bikaner-III PS	Length: 20 km
3	Bikaner-II PS – Bikaner-III PS 400 kV D/c line (Quad)	Length: 30 km
4	2 no. of 400 kV line bays at Bikaner-II	400 kV line bays at Bikaner-II PS - 2 nos.
5	Bikaner-III - Neemrana-II 765 kV D/c line along with 330 MVAr switchable line reactor for each circuit at each end	Length: 350 km • 765 kV, 330 MVAr switchable line reactors at Bikaner-III PS – 2 nos. • 765 kV, 330 MVAr Switchable line reactors at Neermana-II S/s – 2 nos. • Switching equipment for 765kV 330 MVAr switchable line reactors at Bikaner-III PS – 2 nos. • Switching equipment for 765kV 330 MVAr switchable line reactors at Neemrana-II S/s – 2 nos.
6	2 no. of 765 kV line bays at Neemrana-II S/s	• 765kV line bays at Neemrana-II S/s- 2nos.

Note :

1) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey
2) Powergrid to provide space for 2 nos. of 400 kV line bays at Bikaner-II PS
3) Developer of Neemrana-II S/s to provide space for 2 nos. of 765 kV line bays at Neemrana-II S/s for termination of Bikaner-III - Neemrana-II 765 kV D/c line
4) Provision of suitable sectionalization shall be kept at Bikaner-III PS at 400kV & 220kV level to limit short circuit level

PART-A2: (Rs. 118 Cr.)

S.No.	Transmission Elements	Capacity /km
1	Augmentation with 400/220 kV, 2x500 MVA^ ICT at Bikaner-III PS	• 400/220 kV, 500 MVA ICTs – 2 nos. • 400 kV ICT bays – 2 nos. • 220 kV ICT bays - 2 nos.
2	220 kV Line bays for RE connectivity	• 220 kV line bays – 2 nos • 220kV Sectionalization bay: 1 set • BC and TBC: 1 no. (each)

^ incl 1x500MVA ICT to fulfill 'N-1' requirement

Note :

1) The implementation of package comprising number of 220kV bays and transformers. The 220kV bays to be taken based on receipt of Stage-II connectivity and the implementation of 400/220kV transformer to be taken up based on evaluation requirement beyond 1500MW at 220kV level of Bikaner-III PS

PART-A3: (Rs. 199 Cr.)

S.No.	Transmission Elements	Capacity /km
1	Augmentation with 765/400 kV, 2x1500 MVA ICT at Bikaner-III PS	• 765/400kV 1500 MVA ICTs: 2 nos. (6x500 MVA 1-phase units) • 765 kV ICT bays – 2 nos. • 400 kV ICT bays - 2 nos.

Note :

1) The implementation of package to be taken up with evaluation requirement beyond 3000MW (out of 7.7GW) at Bikaner-II/ Bikaner-III PS

PART-B1: (Rs. 1776 Cr.)

S.No.	Transmission Elements	Capacity /km

1	Establishment of 765/400 kV, 3x1500 MVA (along with one spare unit of 500MVA) Neemrana-II S/s along with 2x330 MVAr (765kV) Bus Reactor (along with one spare unit of 110 MVAr) & 2x125 MVAr (420kV) Bus Reactor at a suitable location near Neemrana
	
	Future provisions: Space for
	• 765 kV bays: 16 nos.
	  • 765/400kV ICT along with bays- 3
	  • 765 kV line bays along with switchable line reactors – 12
	  • 765kV Bus Reactor along with bay: 1 nos.
	• 400 kV bays: 9 nos.
	  • 400 kV line bays along with switchable line reactor –6
	  • 400 kV Bus Reactor along with bays: 1 no.
	  • 400kV Sectionalization bay: 2 sets
		• 765 kV bays: 10 nos.
		  • 765/400kV 1500 MVA ICTs – 3 nos (10x500 MVA including one spare unit)
		  • 765kV ICT bays – 3 nos.
		  • 330 MVAr Bus Reactor-2 nos.(7x110 MVAr, including one spare unit)
		  • 765kV reactor bays- 2 nos.
		
		• 400 kV bays: 13 nos.
		  • 400 kV ICT bays – 3 nos.
		  • 400 kV line bays - 6 nos (4 nos. for LILO of Gurgaon -Sohna Road D/c line & 2 nos. for Kotputli D/c line)
		  • 125 MVAr, 420kV bus reactor - 2 nos.
		  • 420 kV reactor bays - 2 nos.

2	Neemrana-II -Kotputli 400 kV D/c line (Quad)	Length: 70 km
3	2 no. of 400 kV line bays at Kotputli	400 kV line bays at Kotputli - 2 nos.
4	LILO of both ckts of 400 kV Gurgaon (PG) - Sohna Road (GPTL) D/c line (Quad) at Neemrana-II S/s	Length: 85 km

Note :

1) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey
2) Provision of suitable sectionalization shall be kept at Neemrana-II at 400kV level to limit short circuit level
3) Powergrid to provide space for 2 nos. of 400 kV line bays at Kotputli S/s

PART-B2: (Rs. 100 Cr.)

S.No.	Transmission Elements	Capacity /km
1	Augmentation with 765/400kV, 1x1500 MVA (4th) at Neemrana-II S/s	• 765/400kV 1500 MVA ICT: 1 no. • 765 kV ICT bay – 1 no. • 400 kV ICT bay – 1 no.

Note :

1) The implementation of package to be taken up with evaluation requirement beyond 2300MW at Bikaner-II/ Bikaner-III PS (Out of 7.7GW)

PART-C: (Rs. 3204 Cr.)

S.No.	Transmission Elements	Capacity /km
1	Bikaner-III - Neemrana-II 765 kV D/c line (2nd) along with 330 MVAr switchable line reactor for each circuit at each end	Length: 350 km • 765 kV, 330 MVAr Switchable line reactors at Bikaner-III PS – 2 nos. • 765 kV, 330 MVAr Switchable line reactors at Neermana-II – 2 nos. • Switching equipment for 765kV 330 MVAr switchable line reactors at Bikaner-III PS – 2 nos. • Switching equipment for 765kV 330 MVAr switchable line reactors at Neemrana-II S/s – 2 nos.
2	2 no. of 765 kV line bays each at Bikaner-III PS & Neemrana-II S/s	765kV line bays - 4 nos (2 nos. each at Bikaner-III PS & Neemrana-II S/s)

Note :

1) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey
2) The implementation of package to be taken up with evaluation requirement beyond 3800MW at Bikaner-II/ Bikaner-III PS (Out of 7.7GW)
3) Developer of Bikaner-III PS & Neemrana-II S/s to provide space for 2 nos. of 765 kV line bays each at Bikaner-III PS & Neemrana-II S/s for termination of Bikaner-III - Neemrana-II 765 kV D/c line (2nd)

PART-D: (Rs. 3271 Cr.)

S.No.	Transmission Elements	Capacity /km
1	Neemrana-II- Bareilly (PG) 765 kV D/c line (~350 km) along with 330 MVAr switchable line reactor for each circuit at each end	Length: 350 km • 765 kV, 330 MVAr switchable line reactors at Neermana-II S/s– 2 nos. • 765 kV, 330 MVAr Switchable line reactors at Bareilly(PG) – 2 nos.

		• Switching equipment for 765kV 330 MVAr switchable line reactors at Neermana-II S/s – 2 nos. • Switching equipment for 765kV 330 MVAr switchable line reactors at Bareilly(PG) S/s – 2 nos.
2	2 no. of 765 kV line bays each at Neemrana-II & Bareilly (PG) S/s	765kV line bays - 4 nos (2 nos. each at Neemrana-II & Bareilly (PG) S/s)

Note :

1) The implementation of package shall be taken up matching with Package C
2) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey
3) Developer of Neemrana-II S/s to provide space for 2 nos. of 765 kV line bays at Neemrana-II S/s for termination of Neemrana-II- Bareilly (PG) 765 kV D/c line
4) Powergrid to provide space for 2 nos. of 765 kV line bays at Bareilly (PG) S/s

PART-E: (Rs. 368 Cr.)

S.No.	Transmission Elements	Capacity /km
1	Augmentation by 765/400 kV, 1x1500MVA ICT (4th) at Bikaner (PG)	• 765/400 kV, 1500 MVA ICT – 1 no. • 765 kV ICT bay – 1 nos. • 400 kV ICT bay - 1 nos.
2	Augmentation by 400/220 kV, 1x500 MVA ICT (3rd) at Kotputli (PG)	• 400/220 kV, 500 MVA ICT – 1 nos. • 400 kV ICT bay – 1 nos. • 220 kV ICT bay - 1 nos.
3	Augmentation with 400/220 kV, 5x500 MVA^ ICT at Bikaner-II PS	• 400/220 kV, 500 MVA ICTs – 5 nos. • 400 kV ICT bays – 5 nos. • 220 kV ICT bays - 5 nos.

^ incl 1x500MVA ICT to fulfill 'N-1' requirement

Note :

1) Implementation of Augmentation by 765/400kV, 1x1500MVA Transformer (4th) at Bikaner (PG) shall be taken up after evacuation requirement beyond 5500MW (Out of 7.7GW) at Bikaner-II/Bikaner-III
2) Implementation of Augmentation by 400/220kV, 1x500MVA Transformer (3rd) at Kotputli (PG) shall be taken up matching with Package B1
3) Implementation of Augmentation by 400/220kV, 5x500MVA Transformer at Bikaner-II PS shall be taken up after evacuation requirement beyond 1000MW at 220kV level of Bikaner-II PS (2x500MVA ICTs is under implementation)

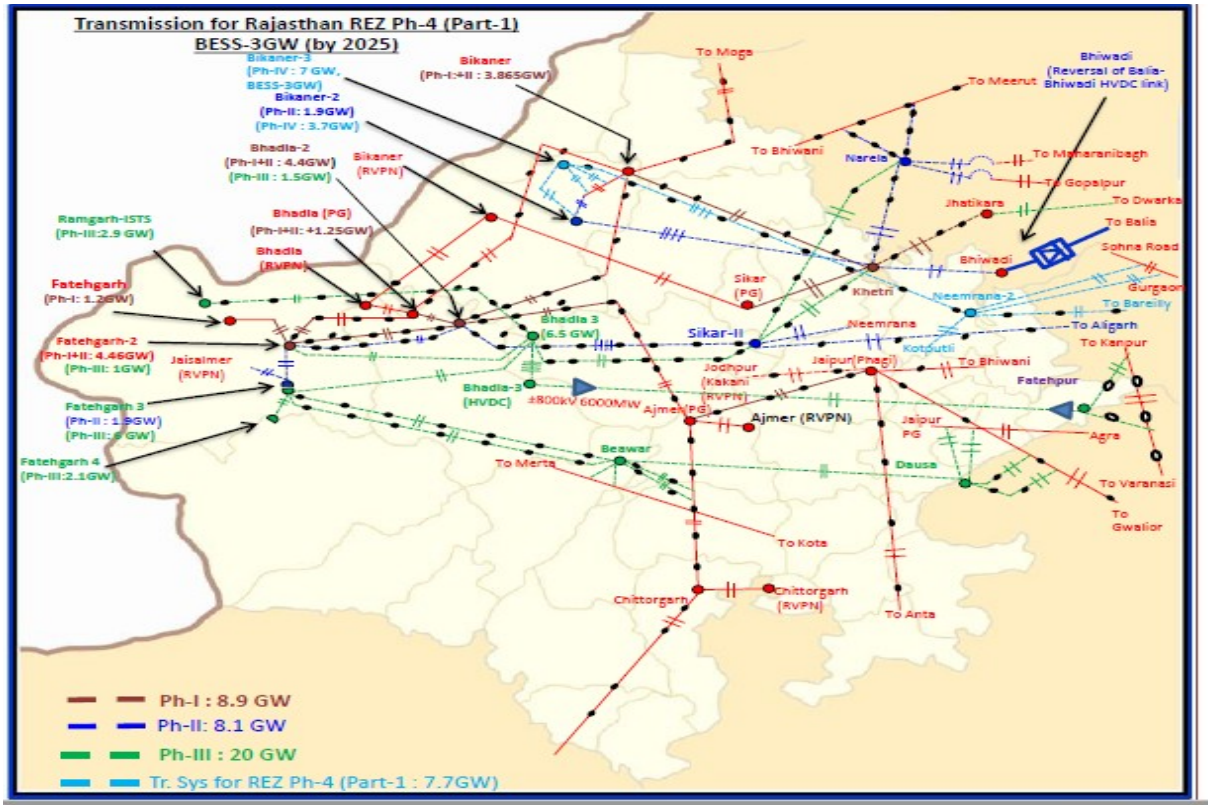


Figure 4-17 Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex : 7.7GW)

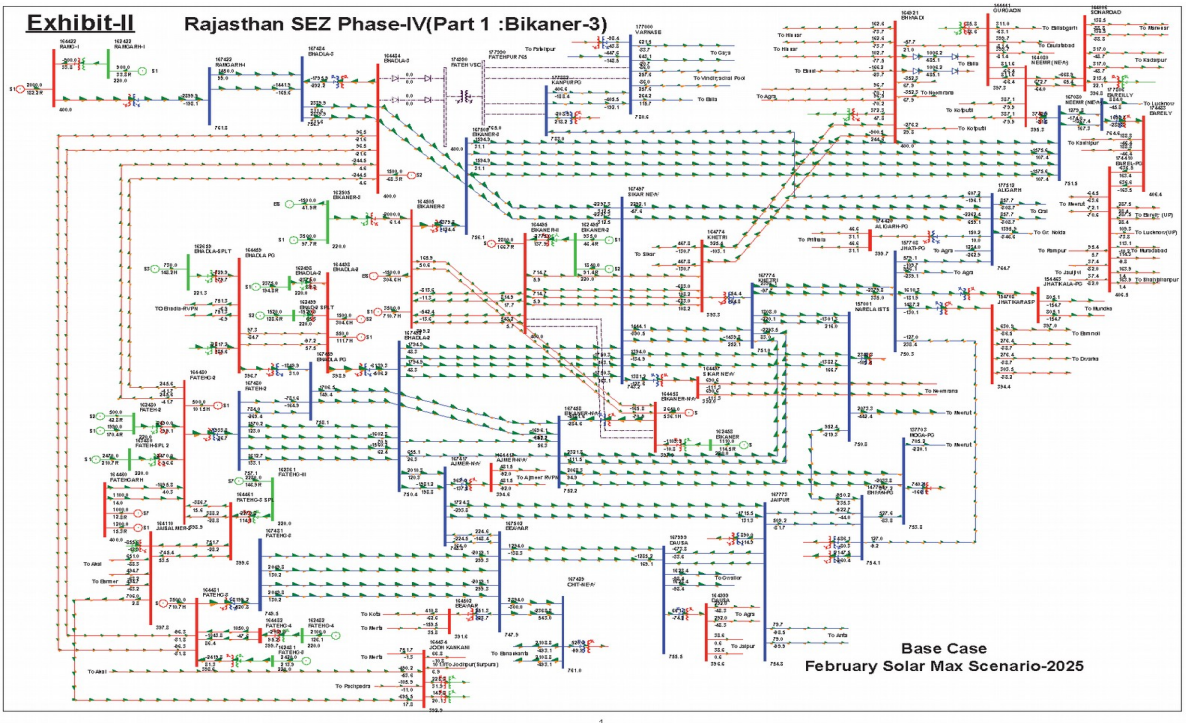


Figure 4-18 Load flow results of Bikaner-3 (fig-1)

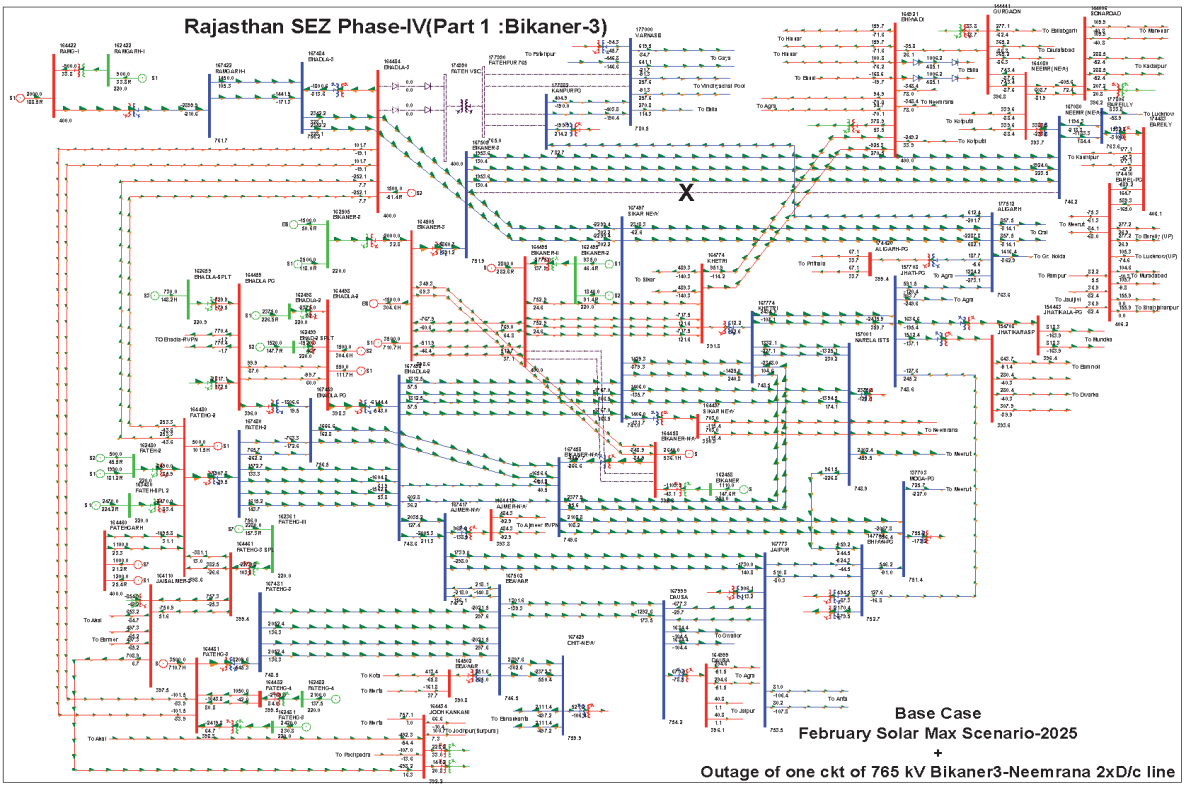


Figure 4-19 Load flow results of Bikaner-3 (fig-2)

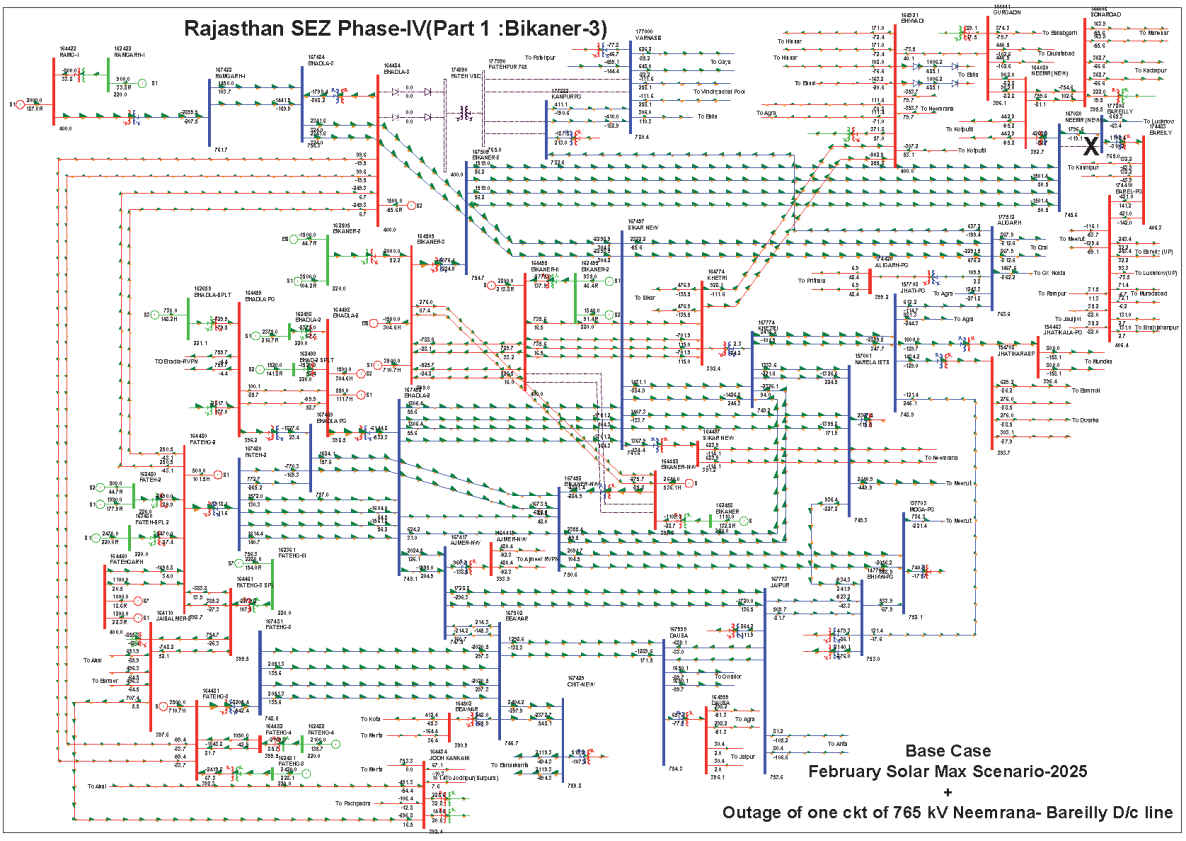


Figure 4-20 Load flow results of Bikaner-3 (fig-3)

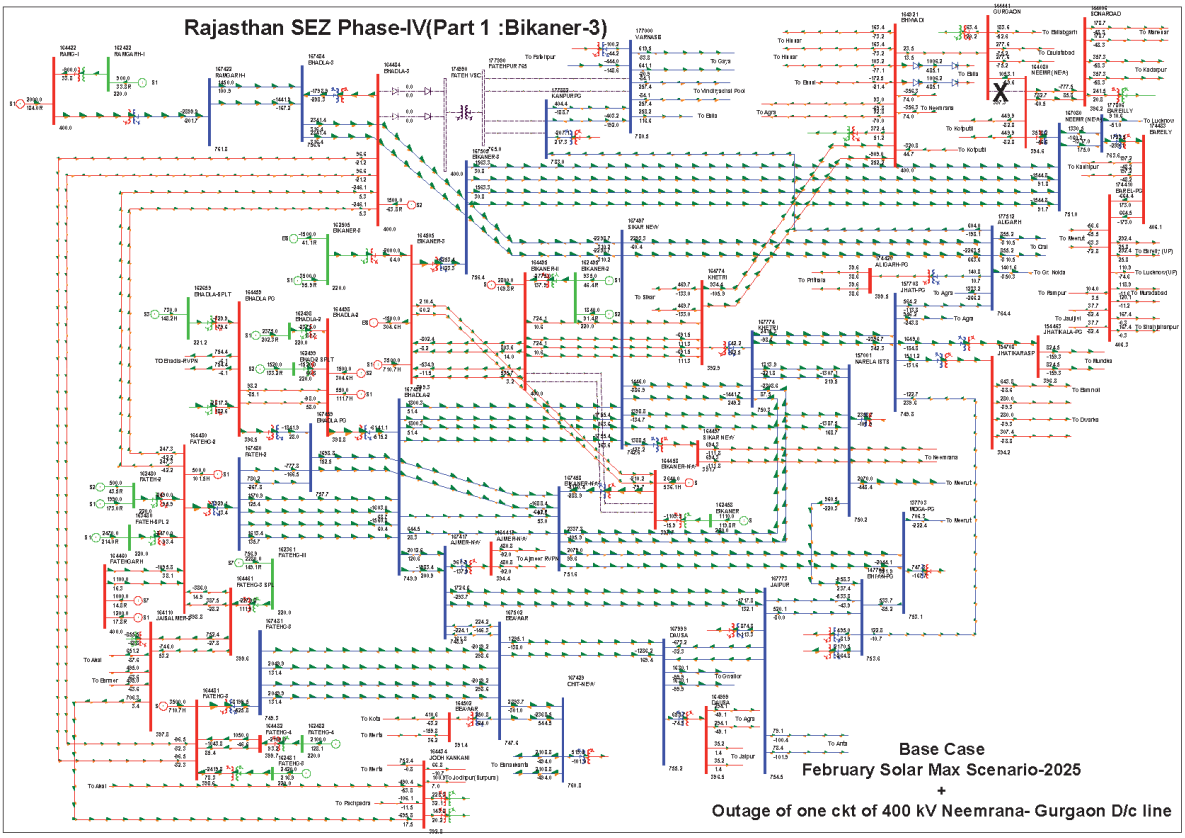


Figure 4-21 Load flow results of Bikaner-3 (fig-4)

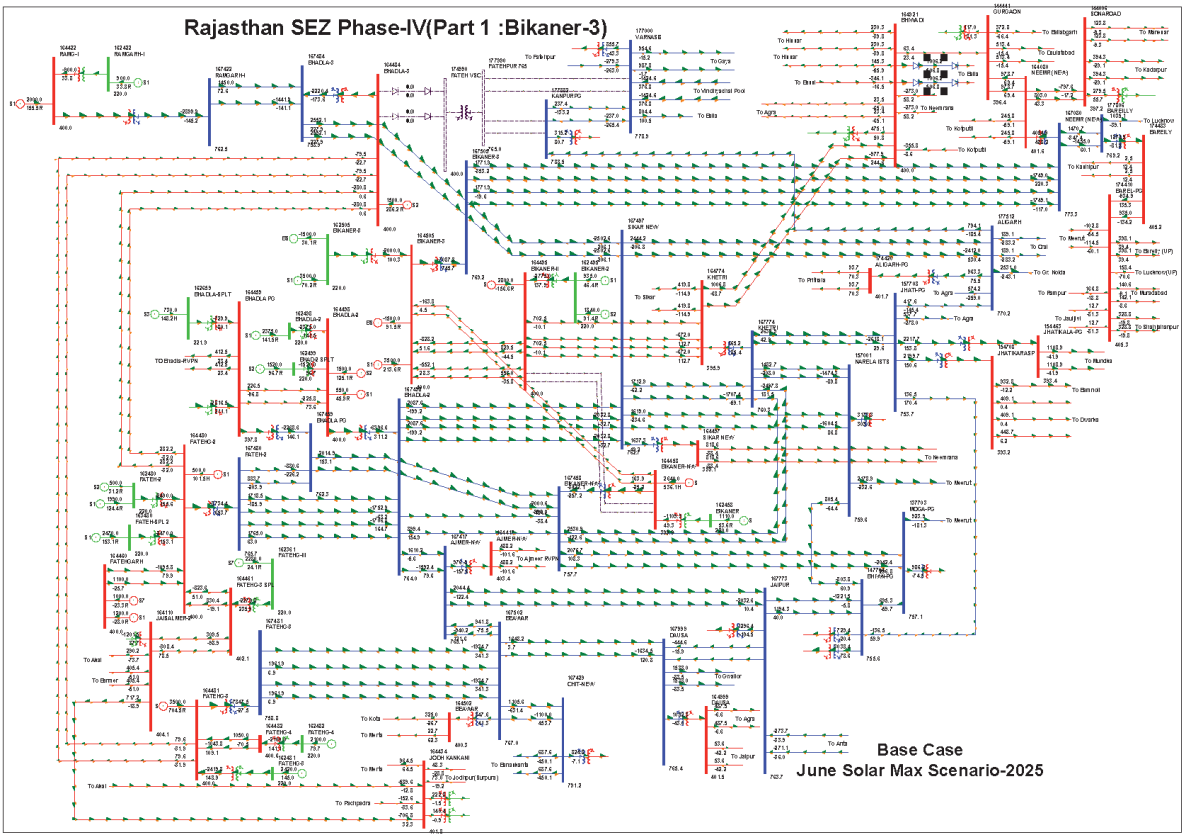


Figure 4-22 Load flow results of Bikaner-3 (fig-5)

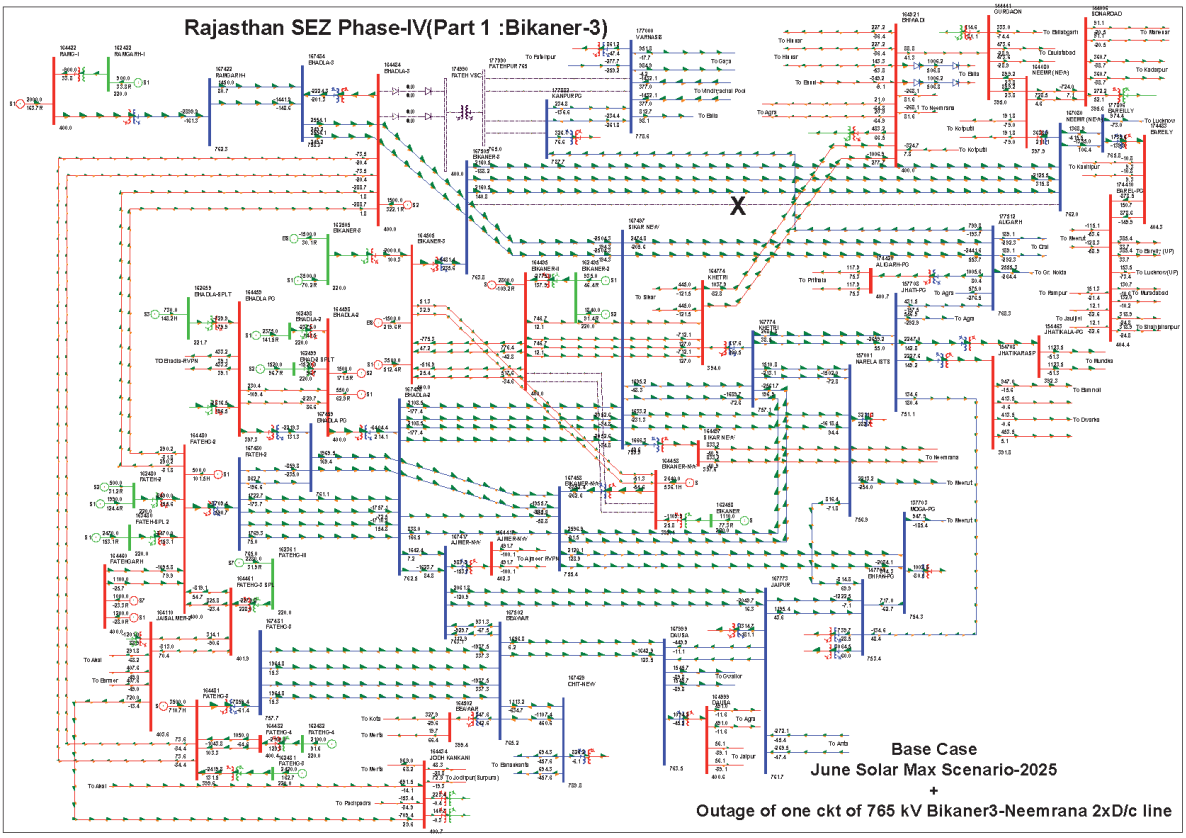


Figure 4-23 Load flow results of Bikaner-3 (fig-6)

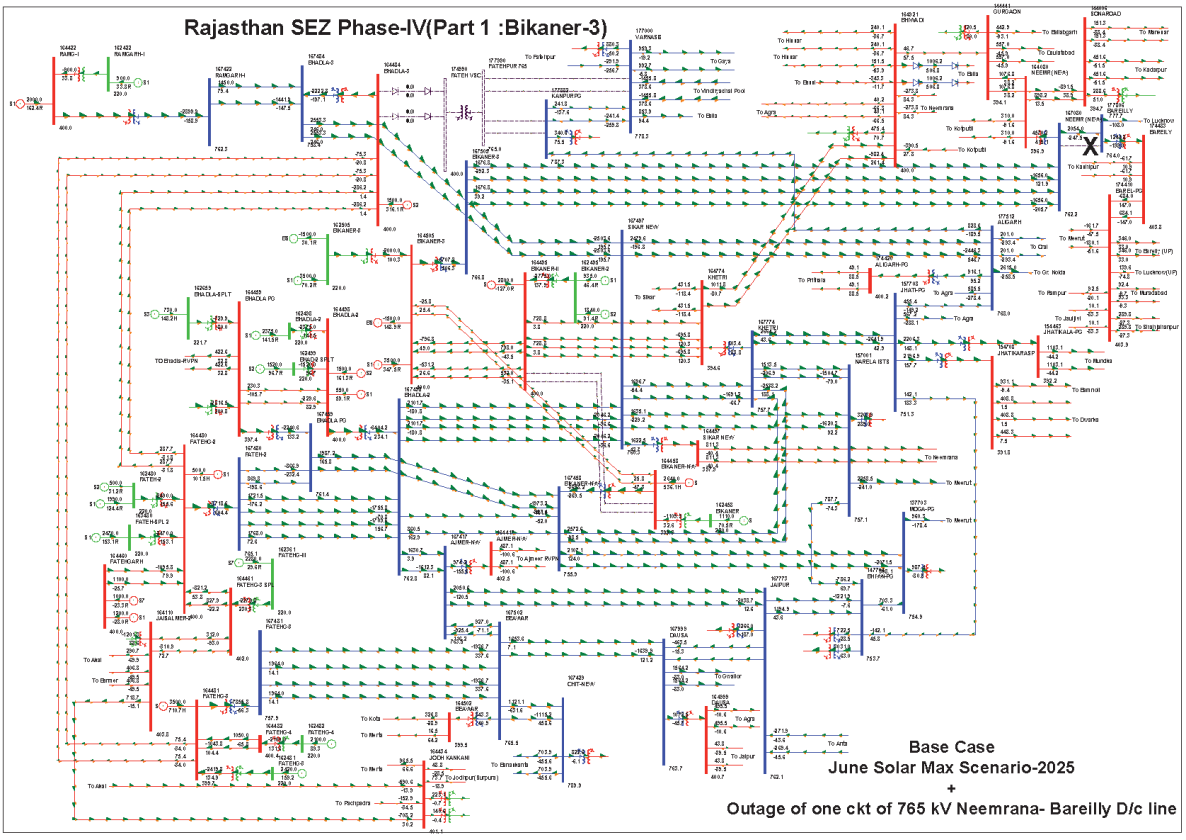


Figure 4-24 Load flow results of Bikaner-3 (fig-7)

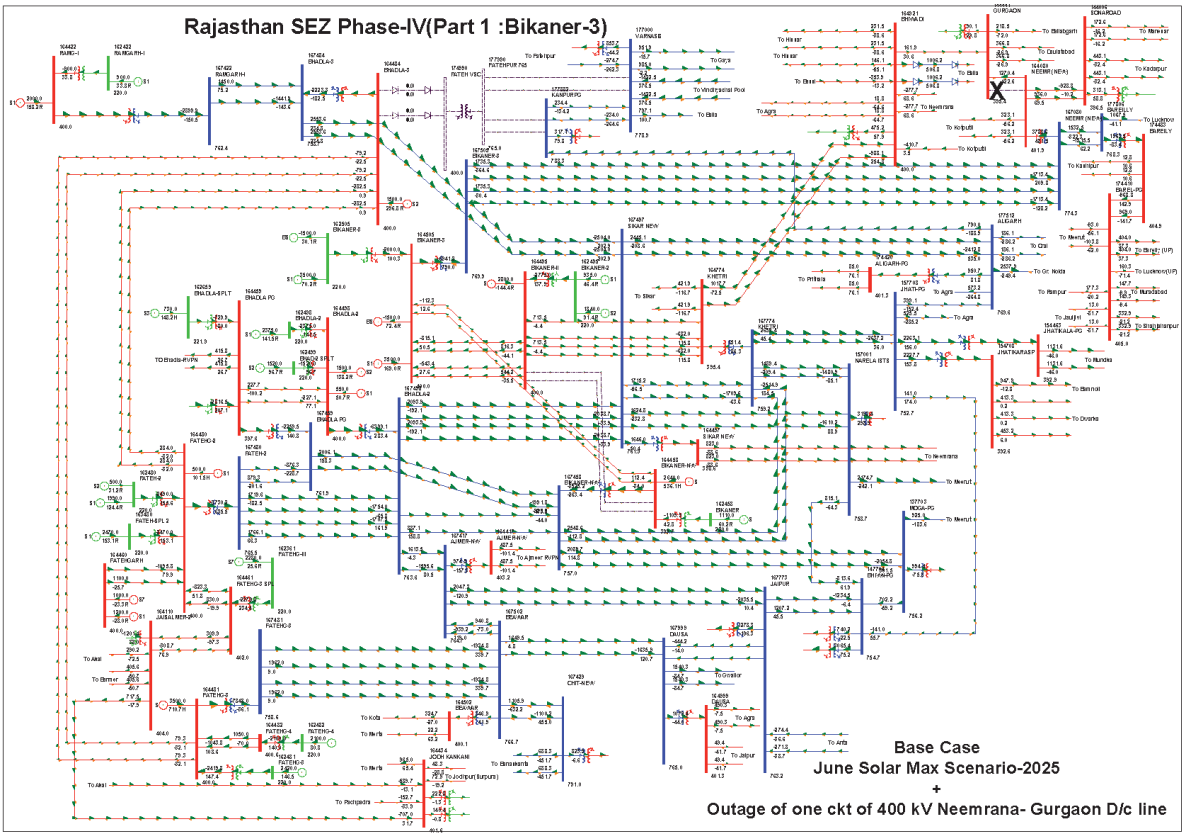


Figure 4-25 Load flow results of Bikaner-3 (fig-8)

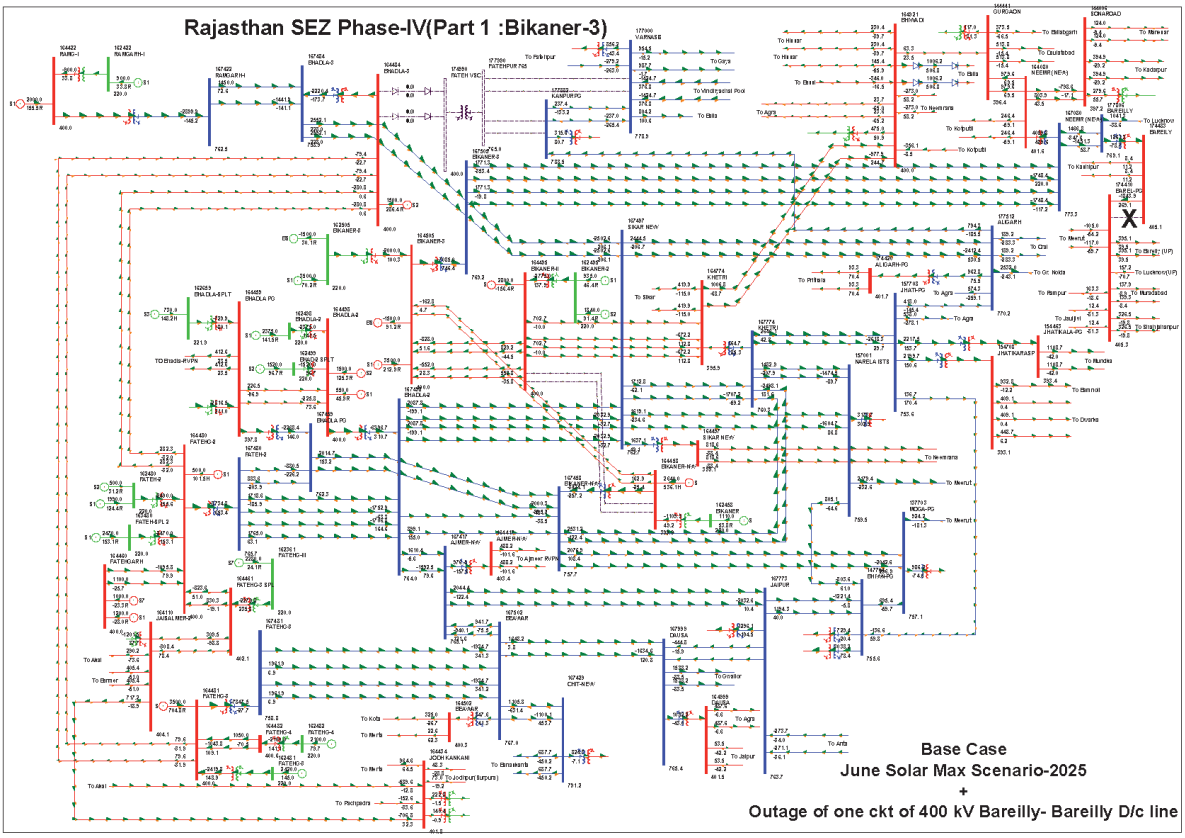


Figure 4-26 Load flow results of Bikaner-3 (fig-9)

5 Schemes referred from previous NCT:

5.1 Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part I

S. No.	Items	Details
1.	Name of Scheme	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part I
2.	Scope of the scheme	• Establishment of 6000MW, ±800KV Bhadla(HVDC) terminal station at a suitable location near Bhadla-3 substation. • Establishment of 6000MW, ±800KV Fatehpur (HVDC) terminal station at suitable location near Fatehpur (UP). • Bhadla-3 - Bhadla(HVDC) 400kV 2xD/c quad moose line along with the line bays at both substations ➢ Line length- 2km ➢ 400kV line bays -8 nos • ±800KV HVDC line (Hexa lapwing) (4x1500 MW) between Bhadla-3 & Fatehpur ➢ Line length- 950 km • Establishment of 5x1500MVA, 765/400KV ICTs at Fatehpur (HVDC) along with 2x330MVAr (765kV) bus reactor ➢ 765/400kV 1500 MVA ICTs : 5 nos (16x500 MVA, including one spare unit) ➢ 765kV ICT bays – 5 nos. ➢ 400 kV ICT bays – 5 nos. ➢ 765 kV line bays – 4 nos. ➢ 330 MVAr, 765kV Bus Reactor -2 nos. (7x110 MVAr, including one spare unit) ➢ 765kV reactor bays- 2 nos. ***Future provisions: Space for*** ➢ 765/400kV ICT along with bay: 1 no. ➢ 765kV line bay along with switchable line reactor: 4nos. ➢ 765kV Bus Reactor along with bays: 2 nos. ➢ 400/220 kV ICTs along with bays: 4nos. ➢ 400 kV line bays along with switchable line reactor: 4 nos. ➢ 400kV Bus Reactor along with bay: 1 no. ➢ 220 kV line bays: 6nos. • LILO of both ckts of 765kV Varanasi – Kanpur (GIS) D/c at Fatehpur - (30km)
3.	Depiction of the scheme on Transmission Grid Map	Refer **Figure 5 -27**
4.	Upstream/ downstream system associated with the scheme	Not Applicable
5.	Objective / Justification	➢ Transmission system for evacuation of power from additional 20GW REZs envisaged in Rajasthan, was

S. No.	Items	Details
		discussed and agreed in 5th NCT meeting held on 25.08.2021 and 02.09.2021 respectively. As part of above scheme, Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part I i.e. 6000MW HVDC corridor towards Fatehpur for further dispersal of RE power from Ramgarh PS/Bhadla-3 PS was also discussed. Augmentation of 1x1500MVA ICT at 765/400kV Kanpur (GIS) substation was also linked with HVDC system (LILO of Varanasi-Kanpur at Fatehpur) ➢ During the above NCT meeting, it emerged that option of Battery Storage System could be explored which could reduce the requirement of HVDC lines. Accordingly, after detailed deliberations, NCT recommended that Transmission scheme "Transmission system for evacuation of power from REZ in Rajasthan (20 GW) under phase III – Part I" may be deferred and to be reviewed in next NCT meeting. 1x1500MVA ICT at 765/400kV Kanpur (GIS) (which is part of Phase-III Part J) was also deferred. ➢ Subsequently, SECI submitted a proposal that 12GW generation capacity including Battery Energy Storage System may be planned so that net injection at Bhadla-III PS remains 6GW. Matter was discussed in 12th meeting of sub-committee on cross cutting issues for setting up transmission lines in RE rich areas held under chairmanship of JS(Trans.) on 27.04.2022. During the meeting, it was informed that Stage-II Connectivity application of 550MW has been received at Bhadla-III PS. Further, it was also informed that Stage-I Connectivity for plain vanilla solar generators has been received in substantial quantum at Bhadla-III PS. SECI suggested to reserve 6GW capacity at Bhadla-III PS for RE Projects with CUF more than 50%. On this, it was informed that as per present Regulations, connectivity cannot be denied to any applicant. ➢ After detailed deliberation, it transpired that implementation time schedule of HVDC is about 3.5 years, while generators are seeking connectivity under plain vanilla mode before year 2025. It was advised to indicate the specific conditions in the approval for avoiding hoarding of Stage-II Connectivity in a particular location. ➢ It is also to inform that Stage-II Connectivity and LTA for 2600MW has already been granted at Ramgarh PS. Further, Adani Renewable Energy Park Rajasthan Ltd. (AREPRL) vide its letter addressed to Director (PS), SECI dated 12.05.2022 informed that they are in process of developing 2GW Solar Park proposed to be connected at Ramgarh PS. They have requested to enhance the transmission system capacity of Ramgarh PS by minimum 5GW. Implementation of HVDC shall help in evacuation of additional power from Ramgarh PS

S. No.	Items	Details
		➢ It is further to inform that for Bhadla-II – Sikar-II 765kV D/c line (Ph-II Part- C) is ratified by SC constituted GIB committee based on which CERC has accorded grant of transmission license both for Part-C and its onward interconnector i.e. Sikar-II – Aligarh 765kV D/c line (Phase-II Part-D) which is out of GIB area. ➢ Recently, committee has also ratified Phase-II Part-A as well as Phase-II Part B schemes (with rerouting of lines) ➢ Keeping above in view and since implementation time frame of HVDC is more than gestation period of RE, implementation of above HVDC scheme may be again discussed in ensuing NCT meeting.
6.	Estimated Cost	**Total: Rs 12700 Cr. (As per 5th NCT estimate)**
7.	Impact on the total Annual Transmission charges in % along with the existing ATC	D. ATC (considering Levelized Tariff @15% of estimated cost): Rs 1,905 Crore E. Present ATC: Rs. **42259.4Cr.*** F. A/B (%): 4.51 %
8.	Need of phasing, if any	Not Applicable
9.	Implementation timeframe	36 months from the date of allocation of project
10.	Inclusion of any wild life/protected area along the transmission line route	Identified Bhadla-3 PS location (under 3 km boundary) is falling in GIB potential area. Likewise Bhadla(HVDC) S/s shall also be located in the potential GIB area in Rajasthan. Therefore, the lines emanating from above stations shall pass through the potential GIB area in Rajasthan. The Bhadla-3 - Fatehpur HVDC line may also pass through Jamwa ramgarh, Nahargarh, bandh baratha & ramsagar WLS or its buffer zone in the state of Rajasthan & National chambal WLS or its buffer zone in the state of UP & MP. However, for details of forest/protected areas survey is required to be done.
11.	Deliberations with RPC along with their comments	Transmission system for additional 20 GW REZ in Northern Region (Phase-III) was discussed and agreed in the 49th NRPC meeting held on 27.09.2021 It may be noted that in the scheme approved in NRTC (TP) & NRPC, the scope of Bhadla(HVDC) was combined with Bhalda-3 S/s. However, in the 5th NCT packaging, the scope of Bhadla-3 & Bhadla(HVDC) was segregated by adding 400 kV 2xD/c line(Quad) between Bhalda-3 S/s & Bhadla(HVDC) (~ 2km)
12.	System Study for evolution of the proposal	Studies were discussed and agreed in following meeting: • 3rd NRPC(TP) on 19.02.2022 • 49th NRPC meeting held on 27.09.2021

**Total YTC allowed for June 2022, as per notification of transmission charges payable by DICs for billing month of August 2022 dated 25-07-2022 published on NLDC website*

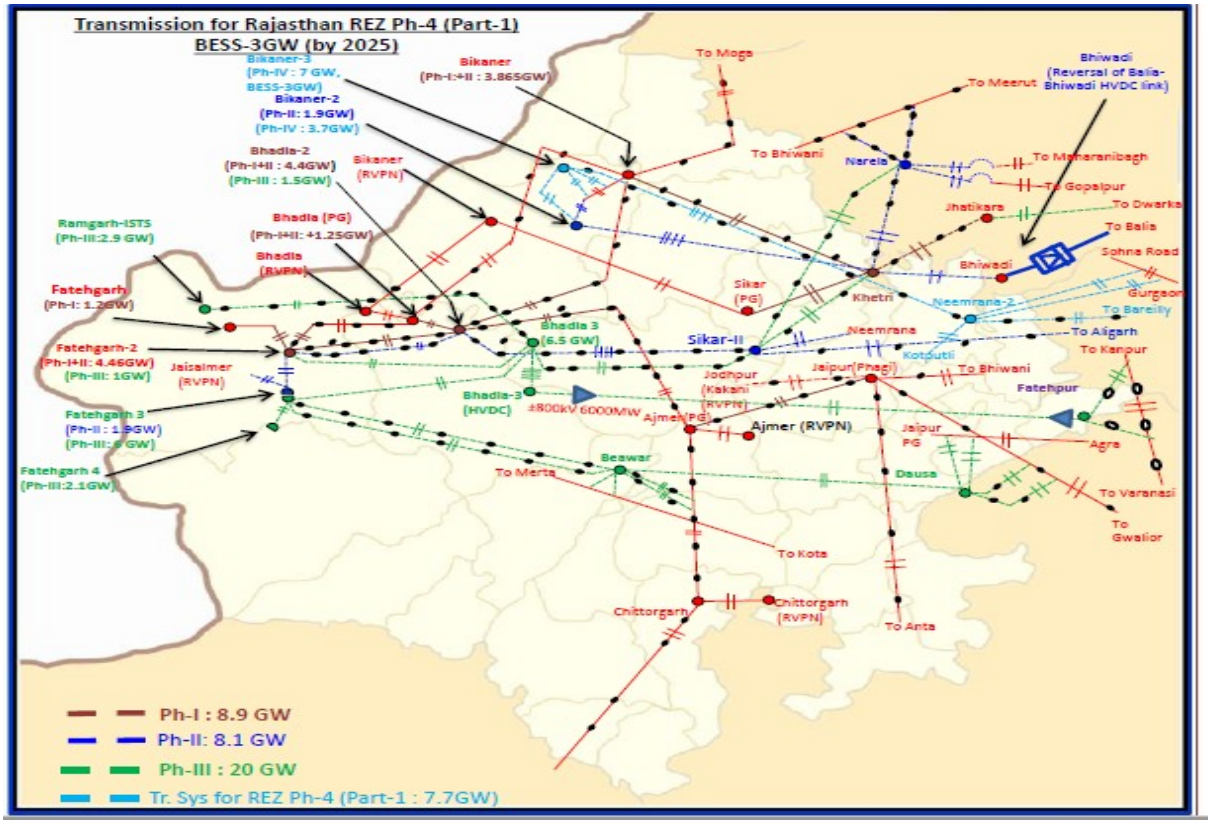


Figure 5-27 Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part I

5.2 *Augmentation of 1x1500MVA ICT at 765/400kV Kanpur (GIS) substation (Part of Transformer augmentation at various substations for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part J)*

S. No.	Items	Details
1.	Name of Scheme	Augmentation of 1x1500MVA ICT (3rd ICT) at 765/400kV Kanpur (GIS) substation (Part of Transformer augmentation at various substations for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part J)
2.	Scope of the scheme	• Augmentation of 1x1500MVA ICT at 765/400kV Kanpur(GIS) substation ➢ 765/400kV 1500 MVA ICT: 1 no ➢ 765kV ICT bay – 1no. ➢ 400 kV ICT bay – 1 no.
3.	Depiction of the scheme on Transmission Grid Map	Refer Figure 5 -28

S. No.	Items	Details
4.	Upstream/ downstream system associated with the scheme	765 kV level Kanpur (GIS) S/s is presently connected with existing 765/400 kV Aligarh S/s through a S/c line and 765/400 kV Varanasi S/s though 2 x S/c lines. At 400 kV level, Kanpur (GIS) is connected with 400/220 kV Kanpur (AIS), 765/400 kV Lucknow, 400/220 kV Allahabad S/s though D/c lines each.
5.	Objective / Justification	➢ Transmission system for evacuation of power from additional 20GW REZs envisaged in Rajasthan, was discussed and agreed in 5th NCT meeting held on 25.08.2021 and 02.09.2021 respectively. As part of above scheme, Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part I i.e. 6000MW HVDC corridor towards Fatehpur for further dispersal of RE power from Ramgarh PS/Bhadla-3 PS was also discussed. Augmentation of 1x1500MVA ICT at 765/400kV Kanpur (GIS) substation was also linked with HVDC system (LILO of Varanasi-Kanpur at Fatehpur). ➢ After deliberations, it was decided that since the timeframe of HVDC has now been delayed, therefore, augmentation of 1x1500MVA ICT at 765/400kV Kanpur (GIS) substation could also be taken up later. ➢ Since the Bhadla-3 -Fatehpur HVDC scheme is being taken up in the ensuing NCT meeting, implementation of above scheme may also be discussed in the present meeting. Implementation may be taken up matching with the Bhadla-3 – Fatehpur HVDC Scheme (Phase-III Part-I)
6.	Estimated Cost	**Total: Rs 88 Cr. (As per 5th NCT cost estimate)**
7.	Impact on the total Annual Transmission charges in % along with the existing ATC	A. ATC (considering Levelized Tariff @15% of estimated cost): Rs 13.2 Crore B. Present ATC: Rs. 42259.4Cr.* C. A/B (%): 0.031 %
8.	Need of phasing, if any	Not Applicable
9.	Implementation timeframe	Matching with Bhadla-3 – Fatehpur HVDC scheme(Phase-III Part-I)
10.	Inclusion of any wild life/protected area along the transmission line route	Not Applicable
11.	Deliberations with RPC along with their comments	Transmission system for additional 20 GW REZ in Northern Region (Phase-III) was discussed and agreed in the 49th NRPC meeting held on 27.09.2021.
12.	System Study for evolution of the proposal	Studies were discussed and agreed in following meeting: • 3rd NRPC(TP) on 19.02.2022 • 49th NRPC meeting held on 27.09.2021

**Total YTC allowed for June 2022, as per notification of transmission charges payable by DICs for billing month of August 2022 dated 25-07-2022 published on NLDC website*

5.3 North Eastern Region Expansion Scheme-XVI (NERES-XVI)

5.3.1 This scheme comprising of establishment of a new 400kV substation at Gogamukh has been proposed by CTU for feeding power to upper Assam above Brahamputra river. The proposed substation is also planned to be utilised for providing additional feed and strength to under construction 132 kV Pasighat to Khupi corridor in Arunachal Pradesh through Gogamukh (ISTS) – Gerukamukh (Arunachal Pradesh) 132kV D/c line.

5.3.2 In the 8th Meeting of National Committee on Transmission (NCT) held on 25-03-2022, the following was agreed:
"*In view of commissioning timeframe of May'2029 for Dibang HEP (2880 MW) and proposal of Assam for intra-state system strengthening in the area where Gogamukh substation has been proposed, NCT deferred the proposal for further deliberation and review, if required*."

5.3.3 CTU vide letter dated 04th July, 2022 requested to take up approval of the NERES-XVI scheme in the NCT at the earliest.

5.3.4 Details of the scheme is given as under:

Sl. No.	Items	Details
1.	Name of scheme	North Eastern Region Expansion Scheme-XVI (NERES-XVI)
2.	Scope of the scheme	i. Establishment of New Gogamukh 400/220/132kV substation • 400/220kV, 2x500MVA ICTs alongwith associated ICT bays at both levels • 220/132kV, 2x200MVA ICTs alongwith associated ICT bays at both levels • 400kV line bays - 4 no. for termination of LILO of one D/c line (ckt-1 & ckt-2 of line-1) of Lower Subansiri – Biswanath Chariali 400kV (Twin Lapwing) 2xD/c lines • 420kV, 2x125MVAr bus reactor along with associated bays • 220kV line bays - 2 no. for termination of Bihpuria – Gogamukh 220kV D/c line (line to be implemented by AEGCL) • 132kV line bays - 2 no. for termination of LILO of one circuit of North Lakhimpur – Dhemaji 132kV new D/c line (LILO to be implemented by AEGCL) - 2 no. for termination of Gogamukh (ISTS) – Gerukamukh (Arunachal Pradesh) 132kV D/c line ii. Extension works at Gerukamukh (Arunachal Pradesh) 132kV S/s - 2 no. of 132kV line bays for termination of Gogamukh (ISTS) – Gerukamukh (Arunachal

Sl. No.	Items	Details
		Pradesh) 132kV D/c line iii. Gogamukh (ISTS) – Gerukamukh (Arunachal Pradesh) 132kV D/c (**Zebra#**) line iv. LILO of one D/c (ckt-1 & ckt-2 of line-1) of Lower Subansiri – Biswanath Chariali 400kV (Twin Lapwing) 2xD/c lines at Gogamukh S/s • Additional space for future expansion: - 400/220kV, 1x500MVA ICT - 1 no. (along with associated bays at both levels) - 420kV, 1x125MVAr bus reactor along with associated bays - 12 nos. of 400kV line bays for future lines o 4 nos. of 400V line bays for termination of Dibang – Gogamukh 2xD/c lines o 2 nos. of 400kV line bays (along with 2x80MVAr switchable line reactor) for termination of Gogamukh – Biswanath Chariali 400kV D/c (Quad) line o 6 nos. of 400kV line bays (along with switchable line reactor) for future lines - 220/132kV, 1x200MVA ICT - 1 no. (along with associated bays at both levels) - 6 nos. of 220kV line bays for future lines - 6 nos. of 132kV line bays for future lines ***Note:*** *(a) Lower Subansiri – Biswanath Chariali 400kV (Twin Lapwing) D/c line is under implementation by POWERGRID and is expected to be commissioned by Aug 2022.* *(b) Arunachal Pradesh to provide space at Gerukamukh S/s for implementation of 2 no. 132kV line bays.*
3.	Depiction of the scheme on Transmission Grid Map	Refer Figure 5 -28**.**
4.	Upstream/downstream system associated with the scheme	<u>Upstream network to be implemented under ISTS:</u> i. Lower Subansiri – Biswanath Chariali 400kV (Twin Lapwing) 2xD/c lines <u>Downstream system to be implemented by AEGCL, Assam:</u> i. Bihpuria – Gogamukh 220kV D/c line ii. Construction of North Lakhimpur – Dhemaji 132kV new D/c line along with LILO of one circuit at Gogamukh (ISTS)
5.	Objective / Justification	There is no source (EHV substation or generation) in upper Assam or in eastern part of Arunachal Pradesh. Accordingly, a new 400kV substation is planned to be established at Gogamukh for feeding power to upper Assam above Brahamputra river. Further, the same substation is also planned to be utilised for providing additional feed and strength to

Sl. No.	Items	Details
		under construction long 132kV Pasighat to Khupi corridor in Arunachal Pradesh through Gogamukh (ISTS) – Gerukamukh (Arunachal Pradesh) 132kV D/c line. Further, Gogamukh 400/220/132kV substation would also serve the purpose of acting as a pooling point for upcoming large HEPs in Arunachal Pradesh. One such project is Dibang HEP (2880MW, 12x240MW) of M/s NHPC Ltd. in Arunachal Pradesh. The same is planned to be pooled through Dibang – Gogamukh 400kV 2xD/c (Quad) line and for onward power transfer to other parts of Indian grid, Biswanath Chariyali – Gogamukh 400kV D/c (Quad) line has been planned.
6.	Estimated Cost	INR 289 Cr.
7.	Impact on the total Annual Transmission Charges in % along with the existing ATC	A. ATC (considering levelized tariff @15% of estimated cost): ₹43.35 Cr. B. Present ATC: ₹41292.01 Cr.* C. A/B: 0.105%
8.	Need of phasing, if any	No phasing required.
9.	Implementation timeframe	Mar 2025
10.	Inclusion of any wild life/ protected area along the transmission line route	No major National park, Wild life sanctuary, other protected areas observed. However, for details of forest/protected areas survey is required to be done.
11.	Deliberations with RPC along with their comments	Estimated cost of the scheme is less than INR 500 Cr. Accordingly, the same is not required to be sent to NERPC for deliberation in line with MoP office order no. 15/3/2018-Trans-Pt(5) dated 28-10-2021 regarding reconstitution of NCT.
12.	System study for evolution of the proposal	Refer Figure 5 -29

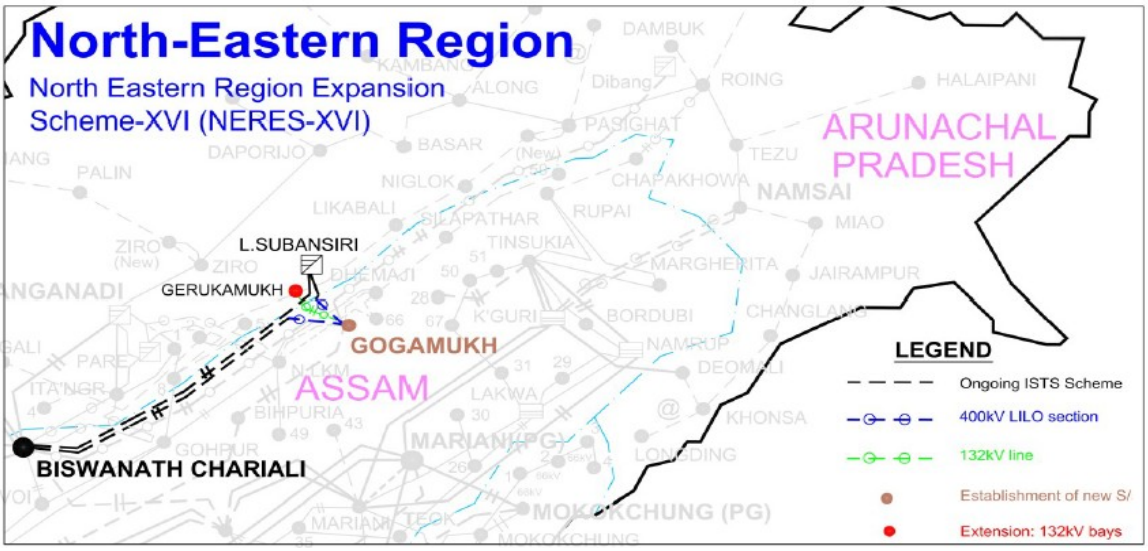


Figure 5-28 Augmentation of 1x1500MVA ICT (3rd ICT) at 765/400kV Kanpur (GIS) substation (Part of Transformer augmentation at various substations for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part J) (fig-1)

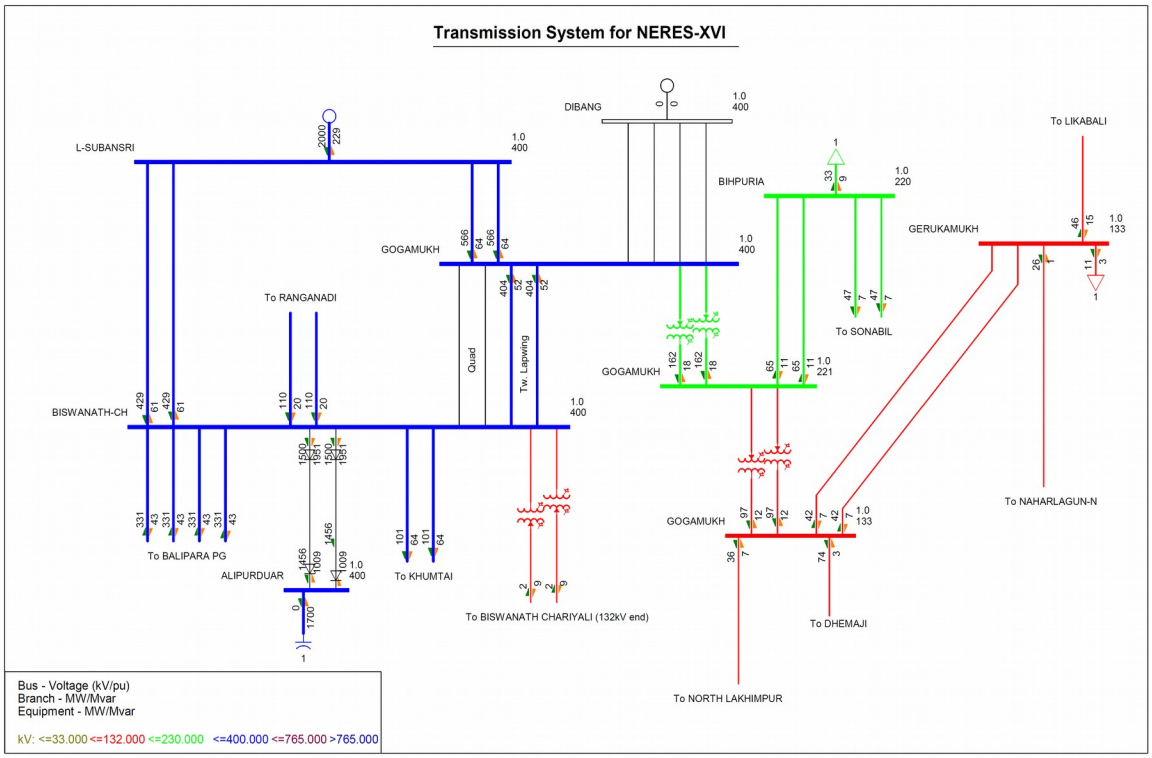


Figure 5-29 Augmentation of 1x1500MVA ICT (3rd ICT) at 765/400kV Kanpur (GIS) substation (Part of Transformer augmentation at various substations for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part J) (fig-2)

5.3.5 Members may deliberate.

5.4 Modification of scope under Western Region Expansion Scheme-XXV (WRES-XXV) scheme on account of space constraints at Raigarh (Kotra) S/s

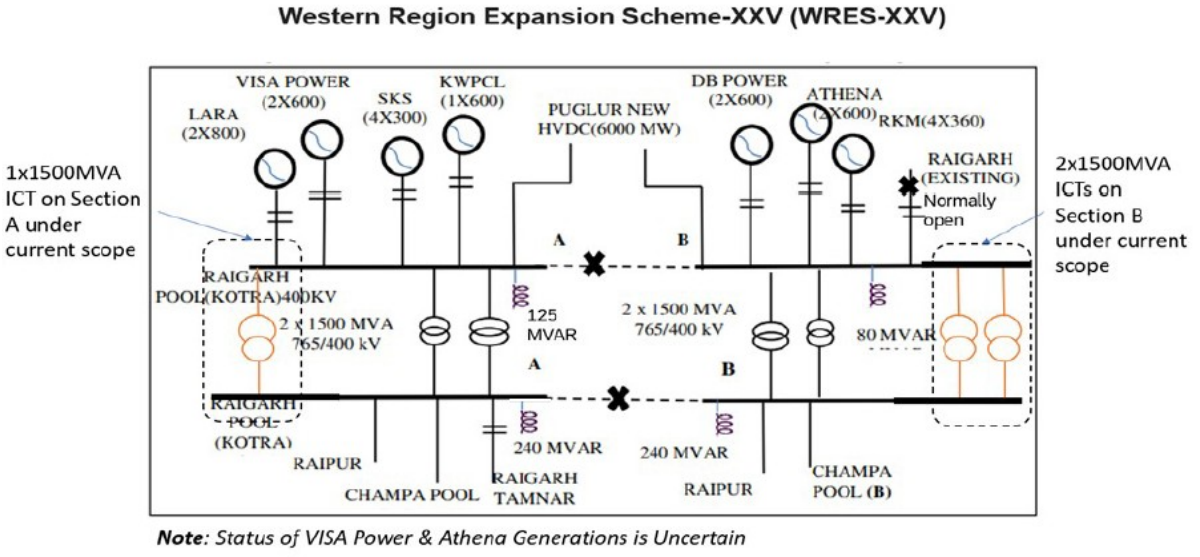


Figure 5-30 Western Region Expansion Scheme-XXV (WRES-XXV) scheme

5.4.1 The Western Region Expansion Scheme-XXV (WRES-XXV) involved augmentation of transformation capacity at Raigarh (Kotra) by 1x1500MVA,

765/400kV ICT at Section-A (3rd ICT on Section A) and by 2x1500MVA, 765/400kV ICTs at Section-B (3rd & 4th ICTs on Section B) along with associated ICT bays as elaborated below:

Raigarh(Kotra) Section-A

- 765/400kV ICT: 1x1500MVA
- 765kV ICT bay: 1 no.
- 400kV ICT bay: 1 no.
-

Raigarh(Kotra) Section-B

- 765/400kV ICT: 2x1500MVA
- 765kV ICT bay: 2 nos.
- 400kV ICT bay: 2 nos.

5.4.2 The above scheme was agreed in the 8th NCT meeting held on 25.03.2022 to facilitate N-1 compliancy of the 765/400kV ICTs at Raigarh (Kotra) S/s under following 2 conditions (after bus split arrangement):

- With Raigarh – Pugalur HVDC line operating under blocked mode or reverse mode (SR to WR) during high renewable generation in southern region and high generation at Raigarh (Kotra) PS
- With Raigarh – Pugalur HVDC line operating under forward mode (WR to SR) and under low generation at either of the bus section at Raigarh PS

The scheme was awarded to CTUIL for implementation under RTM mode to be implemented by POWERGRID vide NCT letter dated 10.05.2022 with schedule of 15 months from date of allocation.

5.4.3 Subsequently, POWERGRID vide letter dated 19.05.2022 that as per site conditions, space for installation of 4th 765/400kV ICT on Section-B is not feasible. Further, modification of bay orientation may be required for installation of ICT on Section-A. The matter was discussed with POWERGRID and it was decided that a committee comprising of members from CTUIL & POWERGRID shall visit the site and explore options to implement the scheme. The committee visited the site on 31.05.2022 & 01.06.2022 and submitted its site visit report and made the following recommendations:

a) 3rd ICT in Section B: ICT to be installed in Space available for Future ICT. For connection on 765kV side, Future Bay No. 726 to be constructed in existing Half Dia. For connection in 400kV side, 400kV DB Power 2 Line (along with Line side equipment) to be shifted from existing 400kV Bay No. 433 to Future Bay 444 using additional BPIs. The vacated 400kV Bay no. 433 shall be used

to terminate this ICT in AIS. This arrangement requires sufficient outage of DB POWER 2 Line for shifting in new Dia.

b) 3rd ICT in Section A: ICT to be installed in Space available for Future ICT. For connection on 765kV side the Dia consisting of Bays 710,711 & 712 to be constructed in AIS (Presently this space has been used to terminate the Champa-I Line in Bay 715).

765kV Champa-1 Line shall be shifted from Bay 715 to Bay 710. For connection of ICT on 765kV side, Bay No. 712 shall be used. For connection of ICT in 400kV side, Future Bay 421 shall be constructed in existing Half Dia.

c) 4th ICT in Section B: ICT to be installed in Space available in the area earmarked for Future ICT in Section A. For connection on 765kV side, 1 no. 765kV GIS Bay (consisting of 2 nos. CBs) shall be constructed (Double Bus Double Breaker Scheme) in Bus Section-B in the space available near 765k Bus Sectionaliser Area and using GIB (Gas Insulated Bus Duct), the ICT shall be physically located in the area of Section A and connected to Bus in Section B.

Likewise, for connection on 400kV side also, 1 no 400kV GIS Bay (consisting of 2 nos. CBs) shall be constructed (Double Bus Double Breaker Scheme) in the space available near 400kV Bus Sectionaliser Area and using GIB (Gas Insulated Bus Duct), the ICT shall be physically located in the area of Section A and connected to Bus in Section B.

5.4.4 To deliberate on DB Power line 2 shifting from existing 400kV Bay No. 433 to Future Bay 444 using additional BPIs (proposed under Sl.(a) above), a meeting was held amongst CEA, CTUIL, POSOCO, POWERGRID and DB Power on 20/07/22 wherein DB power expressed their apprehensions in shifting of their bay and subsequently DB Power vide e-mail dated 26.07.2022 informed that the above shifting is not acceptable to them.

5.4.5 In view of above, committee explored alternate arrangement for termination of ICT bay in section-B using partly 400kV GIB duct and balance by BPI arrangement. In view of the same, the revised scope of the scheme is given below:

Raigarh (Kotra) Section-A

Original Scope	Site Visit Committee Recommendation	Revised Scope
765/400kV ICT: 1x1500MVA	Space available	765/400kV ICT (Sec-A: 3rd): 1x1500MVA

Original Scope	Site Visit Committee Recommendation	Revised Scope
765kV ICT bay: 1 no.	• New Diameter with bay nos. 710, 711 & 712 to be constructed (AIS) in the space used for termination of Champa-I 765kV line in Bay No. 715 (existing). • Champa-I 765kV line to be shifted from bay no. 715 to 710 (new) • Equipment of Existing Main bay (715) of Champa-I line shall be shifted to New ICT Bay (ICT 3rd bay no. 712) • ICT to be terminated into bay no. 712	765kV bay: 1 no. for change in termination of Champa-I line from existing bay to new bay & Equipment of Existing Main bay of Champa-I line shall be shifted to New ICT Bay (ICT 3rd bay) for utilization.
400kV ICT bay: 1 no.	Space available (Bay No. 421)	400kV ICT bay: 1 no.

Raigarh(Kotra) Section-B

Original Scope	Site Visit Report Recommendation	Revised Scope
765/400kV ICT: 2x1500MVA	**ICT-I (3rd):** • Space Available **ICT-II (4th):** • Space Available in area earmarked for future ICT in the other section (Section-A)	765/400kV ICTs (Sec-B: 3rd & 4th): 2x1500MVA
765kV ICT bay: 2 no.	**ICT-I (3rd):** • Space Available (Bay No. 726) **ICT-II (4th):** • Due to space constraints / non availability of required clearances in Section-B, 1 no. 765kV GIS bay (consisting of 2 breakers) to be constructed (Double bus double breaker scheme) in space near 765kV bus sectionalizer area and the ICT (physically located in section-A) to be connected with the above bay through GIB Duct	**Sec-B: 3rd ICT** • 765kV ICT bay (AIS): 1 no. **Sec-B: 4th ICT** • 765kV ICT bay (GIS): 1 no. consisting of 2 breakers [with Double bus double breaker scheme and the ICT (4th) (physically located in the space available near section-A) to be connected with the above bay through GIB Duct]
400kV ICT bay: 2 no.	**ICT-I (3rd):** • Space Available (Bay No. 444) • Due to constraints w.r.t. available clearances on 400kV side, ICT shall be terminated into above bay in section-B using partly 400kV GIB duct and balance by BPI arrangement **ICT-II (4th):**	**Sec-B: 3rd ICT** • 400kV ICT bay (AIS): 1 no. (ICT shall be terminated into above bay using partly 400kV GIB duct and balance by BPI arrangement)

Original Scope	Site Visit Report Recommendation	Revised Scope
	• Due to space constraints / non availability of required clearances in Section-B, 1 no. 400kV GIS bay (consisting of 2 breakers) to be constructed (Double bus double breaker scheme) in space near 400kV bus sectionalizer area and the ICT (physically located in the space available near section-A) to be connected with the above bay through GIB Duct	**Sec-B: 4th ICT** • 400kV ICT bay (GIS): 1 no. consisting of 2 breakers [with Double bus double breaker scheme and the ICT (4th) (physically located in the space available near section-A) to be connected with the above bay through GIB Duct]

5.4.6 The cost of scheme was earlier mentioned as Rs. 210Cr. in the 8th NCT meeting held on 25.03.2022 and the same was arrived at considering Mar'20 price level. However, considering **Mar'22 level**, the cost of scheme shall be about Rs. 274 Cr. Now, with above changes in the scope of work, the revised cost of the scheme has been worked out as Rs. 381 Cr. (i.e. increment by Rs. 107 Cr.).

5.4.7 POWERGRID vide letter dated 14.07.2022 has informed that although the scheme was to be implemented by POWERGRID as per CTU OM dated 11.05.2022 in time-frame of 15 months (i.e. Aug'23), the same is undergoing changes as per the site visit held on 31.05.2022 & 01.06.2022 leading to cost and time escalation. Hence, POWERGRID has requested approval for revised scheme with revised time-line of implementation.

Matter may be deliberated.

5.5 Modification of future space provision in "Establishment of Khavda Pooling Station-2 (KPS2) in Khavda RE Park" scheme

5.5.1 Transmission system for KPS2 & KPS3 establishment was deliberated and approved in the 3rd WRPC (TP) meeting held on 14.06.2021 and in the 5th NCT meeting held on 25.08.2021 and 02.09.2021. Ministry of Power vide Gazette notification 5032(E) published on 06.12.2021 has appointed RECPDCL as BPC for implementation of the subject transmission schemes through TBCB route.

5.5.2 Subsequently, RECPDCL vide letter dated 10.05.2022 informed that as per discussions amongst CEA, RECPDCL & GPCL on 26.04.2022 & between CEA & RECPDCL on 04.05.2022 & 09.05.2022, the following space requirement (for future expansion) at KPS2 was felt:

- 765kV line bays (future): 10 nos. instead of 8 nos.
- 400kV line bays (future): 12 nos. instead of 10 nos.

- Space for proposed 8000MW HVDC System as well as BESS

5.5.3 Accordingly, a meeting was held on 24.05.2022 amongst CEA, CTU, RECPDCL, GPCL & RE developers to discuss the above issues and the revised land requirement for KPS2 & KPS3 as well as transmission line corridor requirements in Khavda RE park were firmed up and communicated to GPCL by REC vide letter dated 17.06.2022 (copy of requirement attached at Flag-II).

5.5.4 In view of the above changes in space for future provisions at KPS2, the changes in scope of KPS2 are given as under:

Establishment of Khavda Pooling Station-2 (KPS2) in Khavda RE Park:

S.No	Scope of the Transmission Scheme (Original)	Scope of the Transmission Scheme (Revised)
1.	Establishment of 765/400 kV, 4x1500MVA, KPS2 (GIS) with 2x330 MVAR 765 kV bus reactor and 2x125 MVAR 400 kV bus reactor. Adequate space for future expansion of 5x1500 MVA 765/400 kV ICT's *Bus sectionalizer at 765kV & 400kV.* *On each bus section, there shall be 2x1500MVA 765/400kV ICTs, 1x330MVAr, 765 kV & 1x125MVAr 420kV bus reactor with space for future expansion.* *Bus sectionalizer at 765 kV level shall normally be closed and bus sectionalizer at 400 kV level shall normally be open* Future provisions: Space for 765/400 kV ICTs along with bays: 5 nos. **765kV line bay with switchable line reactor: 8 nos.** **400kV line bay with switchable line reactor: 10 nos.** To take care of any drawal needs of area in future: 400/220 kV ICT: 2 nos.	Establishment of 765/400 kV, 4x1500MVA, KPS2 (GIS) with 2x330 MVAR 765 kV bus reactor and 2x125 MVAR 400 kV bus reactor. Adequate space for future expansion of 5x1500 MVA 765/400 kV ICT's *Bus sectionalizer at 765kV & 400kV.* *On each bus section, there shall be 2x1500MVA 765/400kV ICTs, 1x330MVAr, 765 kV & 1x125MVAr 420kV bus reactor with space for future expansion.* *Bus sectionalizer at 765 kV level shall normally be closed and bus sectionalizer at 400 kV level shall normally be open* Future provisions: Space for 765/400 kV ICTs along with bays: 5 nos. **765kV line bay with switchable line reactor: 10 nos.** **400kV line bay with switchable line reactor: 12 nos.** **8000MW, ±800kV HVDC Converter station (LCC)** To take care of any drawal needs of area in

S.No	Scope of the Transmission Scheme (Original)	Scope of the Transmission Scheme (Revised)
	220 kV line bays: 4 nos.	future: 400/220 kV ICT: 2 nos. 220 kV line bays: 4 nos.
2.	LILO of one ckt. of KPS1- Bhuj PS 765 kV D/c line at KPS2	LILO of one ckt. of KPS1- Bhuj PS 765 kV D/c line at KPS2

5.5.5 Subsequently, series of deliberations have been held between CEA, CTUIL, RECPDCL & GPCL to resolve the issues related to land requirement for Khavda PS - 2 and RoW for associated transmission lines. In a meeting convened by CEA on 30.08.2022 under the chairmanship of Member (Power System), the land requirement for KPS-2 has been firmed up. It had been agreed that the 247 acres of land being provided by GPCL for setting up Khavda Pooling Station-2 (KPS-2) would be sufficient and additional land may not be required. GPCL would take up with LMA (Local Military Authority) for the requirement of 700 metres corridor width with a margin of 50- 100 m beyond 700 m for the transmission line corridor from KPS-1 to KPS-2 and requirement of 370 m corridor (available RoW is 300 m) with some margin from KPS-2 to KPS-3.

5.5.6 **Space for Battery Energy Storage System (BESS) in Khavda RE Park:**

As per discussions amongst CEA, CTU and RECPDCL in a meeting held under chairmanship of Member(PS), CEA on 08.08.2022, it was preliminarily decided that space for 5GW (for 4 hours) BESS may be reserved & distributed for interconnection with KPS1, KPS2 & KPS3. For this purpose, space may be reserved by GPCL outside the premises of KPS1 (under implementation), and KPS2/KPS3 (under bidding). The above land requirement shall not be under scope of future provisions of TSP implementing the above substations.

Members may deliberate.

5.6 Modification of future space provision in Transmission system for evacuation of power from Chhatarpur SEZ (1500MW) scheme

5.6.1 MoP vide letter dated 13.06.2022 regarding location of new ISTS projects planned under TBCB route has decided that where a proposed line is to connect to an existing station, the transformers at terminal end must be located in the existing station itself. A new substation will only be created if there is no space in the existing substation after working out cost-benefit analysis of modernizing/reconfiguring existing station vis-à-vis acquiring land and building new substation.

5.6.2 In view of above direction of MoP, it is proposed that new ISTS substations (for evacuation of power from potential RE Zones / for meeting drawl requirements of STUs, etc) may be planned with more space provisions on account of following reasons:

- To be able to cater to significant enhancement of injection/drawl requirements in the area in future, Substations may be established with a minimum transformation capacity of 4000-5000MVA.
- Outage of any single ICT unit should not overload the remaining ICT(s) or the underlying system (i.e n-1 criterion to be followed)
- Where possible, space provision for Battery Energy Storage Systems (BESS) may also be kept in vicinity of REZ Pooling Stations (esp. considering appreciable space requirement of such systems). As a thumb rule, space provision for BESS capacity of about 20% of REZ potential identified by SECI/ MNRE (for 4 hrs.) may be kept.

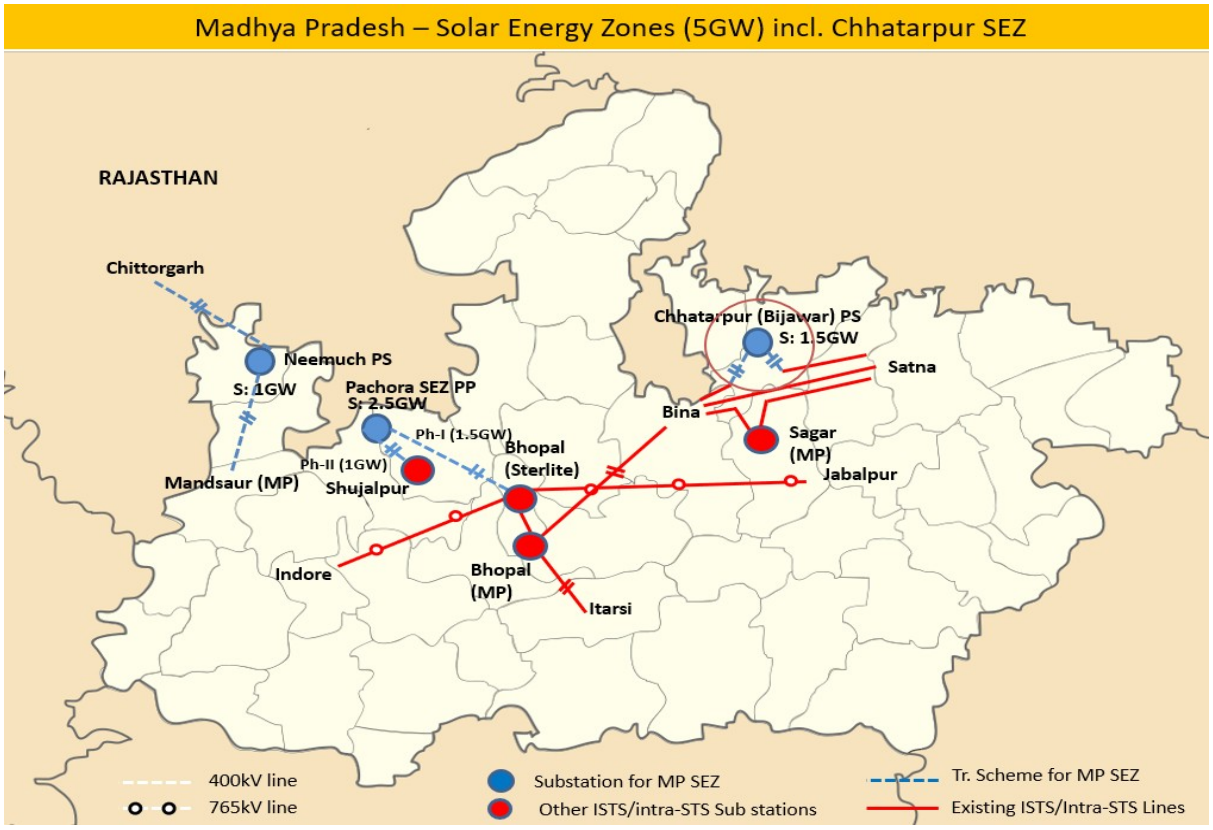
5.6.3 In view of the above, space provision at Chhatarpur PS being established under Transmission system for evacuation of power from Chhatarpur SEZ (1500MW) scheme (currently under tendering process) was reviewed and revised space provision is given below:

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

Sl. No.	Scope of the Transmission Scheme (Original)	Scope of the Transmission Scheme (Revised)
1.	(i) Establishment of 3x500MVA, 400/220 kV Pooling Station at Chhatarpur (ii) 1x125 MVAR, 420 kV bus reactor at Chhatarpur PS (iii) 5 nos. 220kV line bays for solar park interconnection **out of Satna – Bina 2xD/c lines, one circuit of 2nd D/c line has been LILOed at Sagar (MPPTCL) substation. The proposed LILO is to be made on the other (1st) D/c line*	Establishment of 3x500MVA, 400/220 kV Pooling Station at Chhatarpur 1x125 MVAR, 420 kV bus reactor at Chhatarpur PS 5 nos. 220kV line bays for solar park interconnection **out of Satna – Bina 2xD/c lines, one circuit of 2nd D/c line has been LILOed at Sagar (MPPTCL) substation. The proposed LILO is to be made on the other (1st) D/c line between Satna & Bina*

Sl. No.	Scope of the Transmission Scheme (Original)	Scope of the Transmission Scheme (Revised)
	between Satna & Bina Future provisions: Space to accommodate: • 400/220 kV, 500 MVA ICT along with associated bays -1 • 4 nos. of 220kV line bays • Sectionaliser arrangement	Future provisions: Space to accommodate: • 400/220 kV, 500 MVA ICT along with associated bays -**5** • **400 kV line bays: 6 nos**. • **3x125MVAr Bus Reactor with bay** • **13 nos**. of 220kV line bays • Sectionaliser arrangement **at 220kV (2 Sets) & 400kV (1 Set) levels**
2.	LILO of Satna – Bina 400kV (1st) D/c line at Chhatarpur PS	LILO of Satna – Bina 400kV (1st) D/c line at Chhatarpur PS

***Note**: As per the MoP Gazette, scheme implementation is to be taken only after grant of LTA. In this respect, it may be noted that Generation Projects are yet to be identified at Chhatarpur PS.*



5.6.4 The 400kV & 220kV buses may be sectionalized in future as per space given above so that they may be operated in normally open / normally closed mode as per requirement.

5.6.5 Further, space for 300MW (for 4 hours) BESS (i.e. 20% of 1500MW REZ Potential) may be reserved outside the premises of Chhatarpur PS. The above land requirement shall not be under scope of future provisions of TSP implementing the above substation.

5.6.6 The matter was discussed and in-principally agreed in the 9th CMETS-WR meeting held on 28.07.2022. In the meeting, M/s RUMSL was requested to intimate regarding adequate space availability for the above revised scope as well as for installation of BESS in vicinity of Chhatarpur PS.

Members may deliberate.

5.7 Transmission System for Evacuation of Power from RE Projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh

5.7.1 The transmission scheme was agreed in the 2nd WRSCT and 2nd WRPC(TP) meetings held on 21.05.2019 and 04.09.2020 respectively for evacuation of Power from RE Projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh in two phases: Ph-I (1500MW) & Ph-II (1000MW). The transmission system was discussed and agreed on in the 4th NCT (re-constituted vide MOP office order 13.04.2018) meeting held on 31.07.2019 & 4th NCT (re-constituted vide MOP office order 04.11.2019) meeting held on 20.01.2021 & 28.01.2021.

5.7.2 Ministry of Power, GOI vide Gazette notification dated 24.01.2020 had appointed REC as the Bid Process Coordinator (BPC) for selection of Bidder as Transmission Service Provider (TSP) to establish the subject transmission scheme through Tariff Based Competitive Bidding (TBCB) process. Subsequently, MoP vide gazette notification dated 19.07.2021 had modified the scope of the subject transmission scheme after examining the recommendations of the 4th NCT meeting (held on 20.01.2020 & 28.01.2020) and CEA such that the scope covered only the Transmission system for evacuation of power from RE projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh under Phase-I.

5.7.3 Phase-I of the scheme is under implementation by M/s GR Infraprojects Ltd. with SCOD of 30.11.2023.

5.7.4 Now, SECI vide letter dated 23.06.2022 (refer Flag-III) has requested to initiate the development of Pooling Stations simultaneously at various locations specified in the letter, irrespective of the receipt of connectivity applications including Rajgarh Phase-II (1000MW). The Phase-II of the scheme as agreed in the 4th NCT meeting is given below:

Sl. No.	**Scope of the Transmission Scheme**	**Capacity/km.**
1.	Augmentation of 400/220 kV, 2x500 MVA ICT (4th & 5th) at Pachora PS	400/220 kV, 500 MVA ICT – 2 400 kV ICT bays – 2 220 kV ICT bays – 2 400 kV line bays – 2 220 kV line bays – 4 (to be taken up as per Connectivity/LTA applications received)
2.	Pachora – Shujalpur 400kV D/c line (Quad/HTLS) (with minimum capacity of 2100MVA/ckt at nominal voltage)	Length – 80 km
3.	2 no. of 400 kV line bays at Shujalpur for Pachora – Shujalpur 400kV D/c line (Quad/HTLS) (with minimum capacity of	400kV line bays – 2

Sl. No.	Scope of the Transmission Scheme	Capacity/km.
	2100MVA/ckt at nominal voltage)	

Note:

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

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

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

5.7.5 Earlier, the Phase-II of the scheme was to be taken up only after grant of Connectivity/LTA applications beyond 1500 MW at Pachora PS. However, based on request of SECI to expedite the Phase-II of the scheme irrespective of connectivity applications, the matter needs to be deliberated.

5.7.6 Further, to provide clarity regarding the conductor configuration of Pachora – Shujalpur 400kV D/c line as well as bus sectionalization which shall be required at 220kV level, the revised scope is given below (changes marked in bold):

Sl. No.	Scope of the Transmission Scheme	Capacity/km.
1.	400/220 kV, 2x500 MVA ICT augmentation at Pachora PS	400/220 kV, 500 MVA ICT – 2 400 kV ICT bays – 2 220 kV ICT bays – 2 400 kV line bays – 2 220 kV line bays – 4 (to be taken up as per Connectivity/LTA applications received) **220kV Bus Sectionaliser – 1 set** **220kV TBC bay – 1 no.** **220kV BC bay – 1 no.**
2.	Pachora – Shujalpur 400kV D/c line (**Quad ACSR/AAAC/AL59 Moose equivalent**)	Length – 80 km
3.	2 no. of 400 kV line bays at Shujalpur for Pachora – Shujalpur 400kV D/c line (**Quad ACSR/AAAC/ AL59 Moose equivalent**)	400kV line bays – 2

Note:

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

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

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

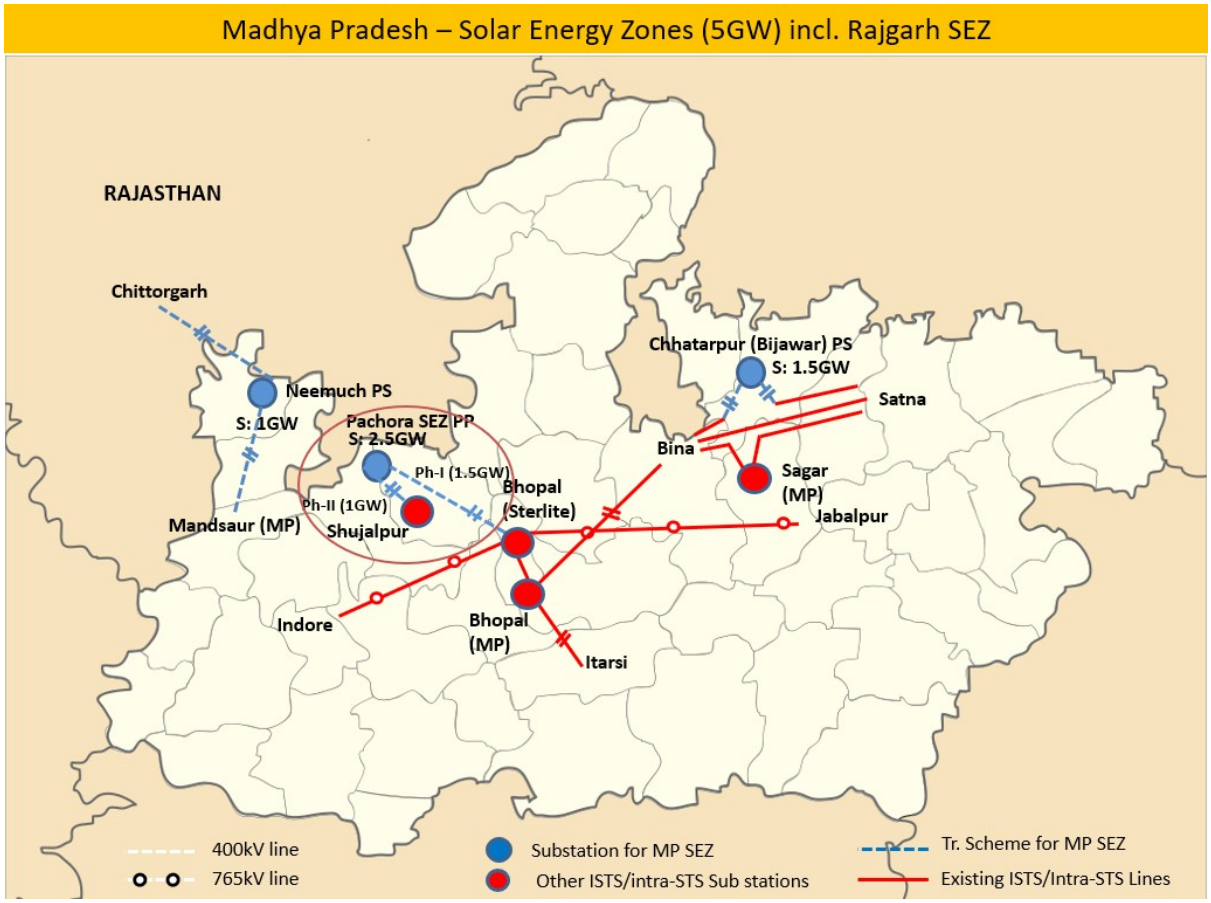


Figure 5-31 Madhya Pradesh - Solar Energy Zone

Members may deliberate.

5.8 <u>Resumption of bidding process of transmission schemes as Bidar and Ananthapuram</u>

5.8.1 SECI vide the letter dated 23.06.2022 had informed that Delhi, Punjab and Madhya Pradesh have approached SECI for RTC power with Renewable Energy. Since sufficient pooling stations are not available in the identified potential RE generation locations in Southern Region such as Bidar, Ananthpur and Kurnool, SECI had requested CTUIL to initiate the development of Pooling Stations simultaneously at different locations including Anantapur and Bidar. The transmission system at Ananthpur and Bidar was to be implemented through TBCB route for which bidding had been initiated but were subsequently put on hold because of uncertainty in development of RE generation projects.

5.8.2 A meeting was held in CEA on 01.08.2022 in which it was agreed that 1000 MVA capacity each at Bidar, Ananthpur could be taken up in first phase and further capacity would be taken up based on the visibility of RE generators. In the meeting, CTUIL informed that they have not received any connectivity applications at Anantapur and Bidar.

5.8.3 In view of above, the following needs to be deliberated:

- Taking up the transmission schemes without any connectivity applications
- Phasing of the schemes i.e. (i) whether bidding for Phase I & phase II of each scheme would be done simultaneously with time gap in CoD of the phases or (ii) taking up bidding of Phase I & phase II of each scheme in different time frames needs to be deliberated.

5.8.4 Transmission Scheme for Solar Energy Zone in Bidar (2500 MW), Karnataka

5.8.4.1 Detailed Scope of Work

S. No.	Scope of the Transmission Scheme
1.	Establishment of 3x1500MVA (765/400kV), 5x500MVA (400/220kV) station at suitable border location near Bidar with 765kV (1x240 MVAR) and 400kV (1x125 MVAR) Bus Reactor **A. 765kV** i) ICT: 10x500MVA, 765/400/33 kV (with 1x500 MVA, 765/400/33 kV Transformer unit as common spare for three banks) ii) ICT bay: 3 nos. iii) Line bay: 2 nos. iv) Bus Reactor: 3x80 MVAR (one bank of 240 MVAR) v) Line Reactor: 6x80 MVAR (two banks of 240 MVAR each) vi) Spare Reactor: 1x80 MVAR (common spare unit for banks of Bus Reactor & Line Reactor) vii) Bus Reactor bay: 1 no. viii) Switchable Line Reactor bay: 2 nos. ix) Space for future line bay: 6 nos.

	x) Space for future 765/400/33 kV ICT along with associated bay: 1 no. xi) Space for future 765kV Bus Reactor along with associated bay: 1 no. **B. 400kV** i) ICT: 5x500MVA, 400/220kV ii) ICT bay: 8 nos. (3 nos. for 765/400/33kV and 5 nos. for 400/220/33kV) iii) Bus Reactor: 1x125 MVAR, 420kV iv) Bus Reactor bay: 1 no. v) Space for future line bay: 8 nos. vi) Space for future 765/400/33kV ICT bay: 1 no. vii) Space for future 400/220/33kV ICT along with associated bay: 2 nos. **C. 220kV** i) ICT bay: 5 nos. (4 nos. on Bus section-A and 1 no. on Bus section-B) ii) Line bay: 8 nos. (6 nos. on Bus section-A and 2 no. on Bus section-B) iii) Bus sectionalizer bay: 2 nos. (one no. for each Main Bus) iv) Bus coupler bay: 2 nos. (one no. for each Bus section) v) Transfer Bus coupler bay: 2 nos. (one no. for each bus section) vi) Space for future 400/220kV ICT bay: 2 nos. (2 nos. on Bus section-B) vii) Space for future line bay: 4 nos. (2 nos. each on Bus section-A & Bus section-B)
2.	Bidar PS – Maheshwaram (PG) 765 kV D/C line
3.	2 nos. of 765 kV Line bays at Maheshwaram (PG) GIS substation for termination of Bidar PS – Maheshwaram (PG) GIS 765 kV D/C line
4.	765kV, 1x240 MVAR Switchable Line Reactor for each circuit at Bidar PS end of Bidar PS- Maheshwaram (PG) GIS 765 kV D/C line [as per A. v), vi) & viii) above]

Note:

1. POWERGRID to provide space for 2 no. of 765 kV line bays at Maheshwaram (PG) substation for termination of Bidar PS – Maheshwaram (PG) 765 kV D/c line

Phasing of Transmission scheme based on the Minutes of the meeting on “ISTS network expansion scheme for integration of additional RE potential in SR for providing RE power on RTC basis/load following basis and wind generation in windy states” held on 01.08.2022.

5.8.4.2 Transmission Scheme for Solar Energy Zone in Bidar (2500 MW), Karnataka **under Phase-I**

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 2x500MVA 400/220kV station at suitable border location near	• 400/220 kV, 500 MVA ICT – 2 nos. • 400 kV ICT bays – 2 nos.

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	Bidar with 1x125 MVAR, 400kV bus reactor with provision to upgrade to 765kV level **Future provisions: (including space for Phase-II)** **A. <u>765kV</u>** i) Space for 500 MVA, 765/400/33 kV ICTs: 13 nos. (12x500 MVA + 1x500 MVA, 765/400/33 kV Transformer unit as common spare for three banks) ii) Space for 765/400/33 kV ICT bays – 4 nos. iii) Space for Line bay with SLR: 8 nos. iv) Space for future 765kV Bus Reactor along with associated bay: 2 nos. v) Space for Spare Reactor **B. <u>400kV</u>** i) Space for 765/400/33 kV ICT bays – 4 nos. ii) Space for 400/220kV ICTs : 5 nos. iii) Space for 400/220kV ICT bays : 5 nos. iv) Space for future line bay with SLR: 8 nos. **C. <u>220kV</u>** i) Space for ICT bay: 5 nos. ii) Space for Line bay: 8 nos. iii) Bus Sectionalizer: 1 set iv) Bus coupler bay: 1 no. v) Transfer Bus coupler bay: 1 no.	• 220 kV ICT bays – 2 nos. • 400 kV line bays – 2 nos. (for termination of Bidar PS – Maheshwaram (PG) 765 kV D/c (initially charged at 400kV)) • 420kV Bus Reactors – 1x125 MVAR • 400kV Bus Reactor bays – 1 no. • 220 kV line bays – 4 nos. • 220 kV Bus Coupler (BC) Bay -1 nos. • 220 kV Transfer Bus Coupler (TBC) Bay - 1 nos.
2.	Bidar PS – Maheshwaram (PG) 765 kV D/ c (initially charged at 400kV)	160 Km
3.	400 kV line bays at Maheshwaram(PG) for termination of Bidar PS – Maheshwaram (PG) 765 kV D/c line (initially charged at 400kV)	400 kV GIS line bays – 2 nos.

Note: 1. *POWERGRID to provide space for 2 no. of 400 kV GIS line bays at Maheshwaram (PG) substation for termination of Bidar PS – Maheshwaram (PG) 765 kV D/c line (initially charged at 400kV)*

5.8.4.3 Transmission Scheme for Solar Energy Zone in Bidar (2500 MW), Karnataka **under Phase-II**

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Upgradation of Bidar PS with 3x1500 MVA (765/400kV), 3x500MVA (400/220kV) ICTs along with 1x240 MVAR, 765kV bus reactor	• 765/400/33 kV, 1500 MVA ICTs – 3 nos. (10x500MVA, 765/400/33 kV Transformer unit including one common spare for three banks) • 400/220 kV, 500 MVA ICT – 3 nos.

Sl. No.	Scope of the Transmission Scheme	Capacity /km
		• 765kV ICT bays – 3 nos. • 400 kV ICT bays – 6 nos. • 220 kV ICT bays – 3 nos. • 765kV Bus Reactors – 1x240 MVAR • 765kV Bus Reactor bays – 1 no. • 765 kV line bays – 2 nos. (for termination of Bidar PS – Maheshwaram (PG) 765 kV D/c line) • 220 kV line bays – 4 nos. • 220kV Bus Sectionalizer: 1set • 220 kV Bus Coupler (BC) Bay -1 no. • 220 kV Transfer Bus Coupler (TBC) Bay - 1 no.
2.	Upgradation of Bidar PS – Maheshwaram (PG) 765 kV D/c line(initially charged at 400kV) to its rated voltage level	160 km
3.	765 kV line bays at Maheshwaram(PG) for termination of Bidar PS – Maheshwaram (PG) 765 kV D/c line	765 kV GIS line bays – 2 nos.
4.	765kV, 1x240MVAr switchable line reactor for each circuit at Bidar PS end of Bidar PS – Maheshwaram (PG) 765 kV D/c line	765 kV, 240 MVAr SLR – 2 nos. (7 x 80 MVAr incl. 1 switchable spare unit common for both bus reactor and line reactor) at Bidar PS

Note:

1. *POWERGRID to provide space for 2 no. of 765 kV GIS line bays at Maheshwaram (PG) substation for termination of Bidar PS – Maheshwaram (PG) 765 kV D/c line*

5.8.5 Transmission scheme for Solar Energy Zone in Ananthpuram (Ananthapur) (2500 MW) and Kurnool (1000 MW), Andhra Pradesh

5.8.5.1 Detailed Scope of Work

S. No.	Scope of the Transmission Scheme
1.	Establishment of 400/220 kV, 7x500 MVA pooling station at suitable border location between Ananthpuram & Kurnool Distt with 400kV (2x125 MVAR) bus reactor **A. <u>400 kV</u>** i. ICT: 7x500MVA, 400/220kV ii. ICT bay: 7 nos. iii. Line bay: 4 nos. iv. Bus Reactor: 2×125 MVAR, 420kV v. Bus Reactor bay: 2 nos. vi. Line Reactor: 2x80 MVAR, 420kV vii. Switchable line reactor bay: 2 Nos viii. Space for future line bay along with switchable line reactor: 6 nos. ix. Space for future 400/220kV ICT along with associated bay: 1 nos.

	B. <u>220 kV</u> i. ICT bay: 7 nos. (4 nos. on Bus section-A and 3 nos. on Bus section-B) ii. Line bay: 12 nos. (6 nos. on Bus section-A and 6 nos. on Bus section-B) iii. Bus sectionalizer bay: 2 nos. (one no. for each Main Bus) iv. Bus coupler bay: 2 nos. (one no. for each Bus section) v. Transfer Bus coupler bay: 2 nos. (one no. for each Bus section) vi. Space for future 400/220kV ICT bay: 1 nos. (1 no. on Bus section-B) vii. Space for future line bay: 4 nos. (2 nos. on Bus section-A and 2 nos. on Bus section-B)
2.	Ananthpuram PS-Kurnool-III PS 400 kV (High capacity equivalent to quad moose) D/c Line
3.	2 Nos 400 kV line bays at Kurnool-III PS for Ananthpuram PS-Kurnool-III PS 400 kV D/c line
4.	Ananthpuram PS-Cuddapah 400 kV (High capacity equivalent to quad moose) D/c Line
5.	2 Nos 400 kV line bays Cuddapah PS for Ananthpuram PS-Cuddapah 400 kV
6.	80 MVAr, 420 KV switchable line reactor for Ananthpuram PS-Cuddapah 400 kV D/c line [As per A.vi) & vii) above]

Note:

1. POWERGRID to provide space for 2 nos. 400kV GIS line bays at Cuddapah PS.
2. Developer of Kurnool-III PS to provide space for 2 nos. 400kV line bays at Kurnool-III PS.

Phasing of Transmission scheme based on the Minutes of the meeting on “ISTS network expansion scheme for integration of additional RE potential in SR for providing RE power on RTC basis/load following basis and wind generation in windy states” held on 01.08.2022.

5.8.5.2 Transmission scheme for Solar Energy Zone in Ananthpuram (Ananthapur) (2500 MW) and Kurnool (1000 MW), Andhra Pradesh under Phase-I

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 400/220 kV, 2x500 MVA pooling station at suitable border location between Ananthpuram & Kurnool Distt with 400kV (2x125 MVAR) bus reactor **Future provisions: (including space for Phase-II)** <u>400kV</u> • Space for 400kV Line bay with switchable line reactor: 8 nos.	• 400/220 kV, 500 MVA ICT – 2 nos. • 400 kV ICT bays – 2 nos. • 220 kV ICT bays – 2 nos. • 400 kV line bays – 2 nos. (for termination of Ananthapuram PS - Cuddapah 400 kV (quad) D/c Line) • 420kV Bus Reactors – 2x125 MVAR

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	• Space for future 400/220kV ICT along with associated bays: 6 nos. <u>220 kV</u> • Space for ICT bay: 6 nos. • Space for Line bay: 12 nos. • 220 kV Bus Sectionalizer: 2 sets • 220 kV Bus Coupler (BC) Bay - 2 nos. • 220 kV Transfer Bus Coupler (TBC) Bay - 2 nos.	• 400kV Bus Reactor bays – 2 nos. • 220 kV line bays – 4 nos. • 220 kV Bus Coupler (BC) Bay -1 nos. • 220 kV Transfer Bus Coupler (TBC) Bay - 1 nos.
2.	Ananthpuram PS-Cuddapah 400 kV (High capacity equivalent to quad moose) D/c Line	150 km
3.	2 Nos 400 kV line bays at Cuddapah PS for Ananthpuram PS-Cuddapah 400 kV D/c line	400 kV GIS line bays – 2 nos.
4.	80 MVAr, 420 kV switchable line reactor at Ananthpuram PS for Ananthpuram PS-Cuddapah 400 kV D/c line	420 kV, 80 MVAr line reactor – 2 nos. Switching equipments for line reactor – 2 nos.

Note:

1. POWERGRID to provide space for 2 nos. 400kV GIS line bays at Cuddapah.

5.8.5.3 Transmission scheme for Solar Energy Zone in Ananthpuram (Ananthapur) (2500 MW) and Kurnool (1000 MW), Andhra Pradesh under Phase-II

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	400/220 kV, 5x500 MVA ICT Augmentation at Ananthapuram PS	• 400/220 kV, 500 MVA ICT – 5 nos. • 400 kV ICT bays – 5 nos. • 220 kV ICT bays – 5 nos. • 400 kV line bays – 2 nos. (for termination of Ananthapuram PS – Kurnool-III 400 kV (quad) D/c Line) • 220 kV line bays – 8 nos. • 220 kV bus sectionalizer: 2 sets • 220 kV Bus Coupler (BC) Bay - 2 nos. • 220 kV Transfer Bus Coupler (TBC) Bay - 2 nos.
2.	Ananthpuram PS-Kurnool-III PS 400	100 km

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	kV (High capacity equivalent to quad moose) D/c Line	
3.	2 Nos 400 kV line bays at Kurnool-III PS for Ananthpuram PS- Kurnool-III PS 400 kV D/c line	400 kV line bays – 2 nos.

Note:

1. Developer of Kurnool-III PS to provide space for 2 nos. 400kV line bays at Kurnool-III PS for termination of Ananthpuram PS-Kurnool-III PS 400 kV (High capacity equivalent to quad moose) D/c Line.

5.9 Modification in the "Transmission system for evacuation of power from REZ in Rajasthan (20GW) Phase –III"

5.9.1 Various transmission scheme for 'Transmission system for evacuation of power from REZ in Rajasthan (20GW) Phase –III' were approved in the 5th NCT meeting held on 25.08.2021 and 02.09.2021. The same was notified by MoP for implementation vide Gazette notification dated 06.12.2021. The transmission schemes are presently under bidding. In regard to the above approved scheme, CTUIL vide its mail dated 08.09.2022 has intimated some modifications in the following packages on account of increase in line length and addition in future provision:

Sl. No.	Scheme	Scope	As approved in 5th NCT	Modification/ Additional provision
1.	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part A3	Fatehgarh-III PS – Bhadla-III PS 400kV D/c line (Quad)	50 MVAr-4 Nos. (Switchable) Sw. equipment for 50MVAr Sw. line reactor - 4 Nos	63 MVAr-4 Nos. (Switchable) Switching equipment for 63MVAr Switchable line reactor - 4 Nos.
2.	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part B1	Fatehgarh-II PS – Bhadla-III PS 400kV D/c line (Quad)	50 MVAr-4 Nos. (Switchable) Sw. equipment for 50MVAr Sw. line reactor - 4 Nos	63 MVAr-4 Nos. (Switchable) Switching equipment for 63MVAr Switchable line reactor - 4 Nos.
3.	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part C1	Establishment of 2x1500 MVA 765/400kV & 2x500 MVA 400/220 kV pooling station at Ramgarh along with 2x240 MVAr (765kV) Bus Reactor &	--	*Future provision to be included:* Space provision for STATCOM (± 2x300MVAr, 4x125 MVAr MSC, 2x125 MVAr MSR) at Ramgarh S/s

Sl. No.	Scheme	Scope	As approved in 5th NCT	Modification/ Additional provision
		2x125 MVAr (420kV) Bus reactor		

5.9.2 CTUIL informed that in the survey report shared by BPC, with the identified Bhadla-III PS location there is significant increase in the length of Fatehgarh-III PS - Bhadla-III PS 400 kV D/c line and Fatehgarh-II PS - Bhadla-III PS 400 kV D/c line from the tentative length approved in the 5th NCT meeting (i.e. 200 km to around 274 km and 243 km respectively). Therefore, the line reactive compensation agreed with the earlier line lengths also need to be revised. Further, as part of Phase-III scheme, establishment of Ramgarh S/s was approved under Phase-III Part C1 package in 5th NCT. However, future space provision for STATCOM (± 2x300MVAr, 4x125 MVAr MSC, 2x125 MVAr MSR) at Ramgarh S/s was inadvertently missed in the above package. Since the Package Phase-III Part C1 is under bidding, the same is to be included in the future provision of Ramgarh S/s.

5.9.3 The Modification/Additional provisions proposed in the above table have been intimated to BPCs for incorporation in the respective transmission schemes.

5.9.4 Members may please note.

6 Evaluation of functioning of National Grid.

POSOCO may make the requisite presentation apprising NCT of the performance of national Grid.

7 Comprehensive presentation by CTU apprising NCT of measures taken for ensuring development of an efficient, co-ordinated and economical ISTS for smooth flow of electricity.

CTU may present

8 Five-year rolling plan for ISTS capacity addition.

- As per the amended ToR of the NCT, CTU shall prepare a five-year rolling plan for ISTS capacity addition every year. The Annual Plan shall be put up to the NCT six months in advance.
- CTU may present
- Members may deliberate

9 Any other issues, with permission of chair