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 के कार्यवृत - के सम्बन्ध में ।

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

महोदया (Madam) / महोदय (Sir),

The 9th meeting of the "National Committee on Transmission" (NCT) was held on 28th September, 2022. Minutes of the meeting is attached for kind information.

भवदीय/Yours faithfully,

01.11.2022

(ईशान शरण/Ishan Sharan)
मुख्य अभियंता / Chief Engineer

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		

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Minutes of the 9th meeting of National Committee on Transmission (NCT) held on 28.09.2022

List of participants is attached as **Annex-I.**

Chairperson, CEA, & Chairman, NCT, welcomed the participants and suggested that the meetings of NCT should be held more frequently, preferably every month. Thereafter, he requested Member Secretary, NCT, to take up the agenda points for discussion.

1 Confirmation of the minutes of the 8th meeting of National Committee on Transmission.

1.1 Member Secretary, NCT, stated that the minutes of the 8th meeting of NCT held on 25.03.2022 was issued vide CEA letter no CEA-PS-11-15(11)/1/20-PSPA-I dated 05.05.2022. 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.

1.2 The minutes of 8th meeting of NCT along with the corrigendum dated 13.06.2022 were confirmed.

2 Change in Scope of Under Bidding Schemes

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

2.1.1 Member Secretary, NCT, stated that in the revised scope of works for "Transmission scheme for Solar Energy Zone in Gadag (1500MW), Karnataka: Part A Phase-II" (approved in the 8th meeting of NCT held on 25.03.2022), provision for bus sectionalizer at 220 kV level was not included in the scope of works. However, during the preparation of RfP document for the scheme, it was observed that provision for total 12 no of bays at 220 kV level (present as well as future) had been approved at Gadag Pooling station (Phase I & Phase II). As per CEA Manual on Transmission Planning Criteria, there can be a maximum of eight (8) feeders in one section at 220 kV level. Keeping in view that 4 no of 220 kV bays are already under implementation under Gadag Phase-I scheme, it was necessary to incorporate the provision of bus sectionaliser at 220 kV level in the RfP document of Gadag Phase-II scheme

2.1.2 In line with the same, CTU vide letter no. C/CTU/S/03/NCT dated 15.06.2022 had requested for inclusion of 220 kV bus sectionalizer bay along with associated Bus Coupler (BC) & Transfer Bus Coupler (TBC) bays at Gadag PS in the scope of works for Transmission scheme for Solar Energy Zone in Gadag (1500MW), Karnataka: Part A Phase-II.

2.1.3 As the scheme was already under bidding, following revised scope of works was communicated to the BPC:

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.	400 kV line bays at Gadag PS and Koppal PS for Gadag PS-Koppal PS 400 kV D/c line	Line bays – 4 (2 each at Gadag PS & Koppal PS)

2.1.4 Members noted the above revised scope of Transmission scheme for Solar Energy Zone in Gadag (1500MW), Karnataka: Part A Phase-II. Chairperson, CEA, opined that the transmission schemes must be formulated with utmost care and modifications at later stage must be avoided.

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

2.2.1 Various transmission schemes viz. '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 schemes, CTUIL vide mail dated 08.09.2022 has intimated some modifications in the following packages on account of increase in line length and addition in future provisions:

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)	• 400 kV, 50 MVAr Switchable line reactor – 4 nos. • Switching equipment for 400 kV 50 MVAR switchable line reactor – 4 nos.	• 400 kV, 63 MVAr Switchable line reactor – 4 nos. • Switching equipment for 400 kV 63 MVAR switchable line reactor – 4 nos.

Sl. No.	Scheme	Scope	As approved in 5th NCT	Modification/ Additional provision
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)	• 400 kV, 50 MVAr Switchable line reactor – 4 nos. • Switching equipment for 400 kV 50 MVAR switchable line reactor – 4 nos.	• 400 kV, 63 MVAr Switchable line reactor – 4 nos. • Switching equipment for 400 kV 63 MVAR 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 MVA765/400kV & 2x500 MVA 400/220 kV pooling station at Ramgarh along with2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus reactor	--	*Future provision to be included:* Space provision for STATCOM (± 2x300MVAr, 4x125 MVAr MSC, 2x125 MVAr MSR) at Ramgarh S/s

2.2.2 CTU 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 Rajasthan Phase-III schemes, establishment of Ramgarh S/s was approved under Phase-III Part C1 package in the 5th NCT. However, future space provision for STATCOM (± 2x300 MVAr, 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 can be included in the future provision under Scope of works of Ramgarh S/s.

2.2.3 Dr. R. Saha, Expert Member NCT, raised the apprehension regarding very less improvement in voltage profile with upgradation of capacity of Switchable Line Reactors (SLR) from 50MVAr to 63MVAr. He stated that for substantial improvement in voltage profile, upgrading the capacity of SLR to 125 MVAr may be considered.

2.2.4 Representative of CTUIL stated that 63 MVAr is the optimum capacity chosen for upgradation as any rating above 80 MVAr would result in overcompensation of the transmission line. He further stated that modifications/additional provisions proposed in the above table have been

intimated to BPCs for incorporation in the RfP document of the respective transmission schemes.

2.2.5 Chairperson, CEA, and Chairman, NCT, stated that any change in the scope of already notified schemes must be ratified by NCT.

2.2.6 NCT noted the modifications in the scope of works of Transmission system for evacuation of power from REZ in Rajasthan (20 GW) Phase –III.

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

3.1 Member Secretary, NCT, presented the status of the transmission schemes noted/approved/recommended in the 8th meeting of NCT. The Updated status is given below:

Sr. No	Name of the Transmission Scheme	Noted/ Recommended/ Approved	Survey Agency	MoP approval	BPC	Status
1.	Inter-regional ER-WR Interconnection	Approved for implementation through TBCB	RECPDCL	Not required	RECPDCL	RFP initiated on 21.09.2022. Bid deadline 23.11.2022.
2.	Western Region Expansion Scheme-XXV (WRES-XXV)	Approved for implementation through RTM	Not applicable	Not required	CTUIL	
3.	Western Region Expansion Scheme-XXVII (WRES-XXVII)	Approved for implementation through TBCB	PFCCL	Not required	PFCCL	Issuance of RFP Notification and documents is at approval stage.
4.	Western Region Expansion Scheme-XXVIII (WRES-XXVIII)	Approved for implementation through TBCB	PFCCL	Not required	PFCCL	RFP initiated on 20.09.2022. Bid deadline 21.11.2022.
5.	Western Region Expansion Scheme-XXIX (WRES-XXIX)	Approved for implementation through TBCB	PFCCL	Not required	PFCCL	RFP initiated on 20.09.2022. Bid deadline 21.11.2022.
6.	Transmission system for evacuation of power from Luhri Stage-I HEP	Approved for implementation through TBCB	CTUIL	Not required	RECPDCL	RFP initiated on 06.09.2022. Bid deadline 09.11.2022
7.	Transmission system for evacuation of power from Kaza Solar Power Project (880 MW)	Recommended to MoP for Implementation through TBCB	PFCCL	MoP approval awaited		Discussed below at para 3.2.
8.	ISTS Network Expansion scheme in Western Region & Southern Region for export of surplus power	Recommended to MoP for Implementation through TBCB	RECPDCL	Approved and notified vide Gazette		RfP initiated on 25.07.2022. Bid deadline 10.11.2022.

Sr. No	Name of the Transmission Scheme	Noted/ Recommended/ Approved	Survey Agency	MoP approval	BPC	Status
	during high RE scenario in Southern Region			Notification dated 13.06.2022		

3.2 Regarding transmission system for evacuation of power from Kaza Solar Power Project (880 MW), Director, MoP, stated that SJVN had informed them about land identification issues and involvement of forest land for which relaxation is being sought.

CTUIL stated that NRPC has agreed for phasing of approved transmission system for Kaza solar project.

After discussions, NCT decided that the Transmission system for evacuation of power from Kaza Solar Power Project (880 MW) would be taken up once firm commitment about timeline of commissioning of Kaza solar park is received from SJVNL.

3.3 Chairperson, CEA, enquired about the reasons for delay in the issuance of RfP documents by the BPC. It was informed that after issuance of minutes of NCT, CTUIL (for schemes involving augmentation of exiting ISTS substation) obtains requisite information/inputs like sub-station layout, upstream/downstream elements etc. from the existing sub-station owner. CTUIL then prepares the project specific Technical Requirements for substations, transmission lines and communication system etc. to be incorporated in the RfP document of the scheme. After CEA vets the inputs furnished by CTUIL, BPC issues the RfP. In case intra-state sub-stations are involved, requisite information is obtained by BPC. Sometimes delay in issuance of RfP is due to delay in information provided by the existing substation owner.

3.4 Chairperson, CEA, directed Member Secretary, NCT, to take up the standardization of the procedure, formats and timelines for preparation of project specific technical inputs for RfP in consultation with BPCs and CTUIL in order to minimize the duration between approval of schemes by NCT and issuance of RfP by BPC.

3.5 CTUIL stated that the issue pertaining to the implementation timelines of the TBCB projects also needs deliberation as time and again requests are received from Industry Associations for increasing the implementation timeframe. While the preliminary information regarding any wild life/protected area along the planned transmission line route is provided by CTUIL in the agenda of NCT, however, possibility of some uncertainties like avoiding prioritized zone of the GIB potential area for Rajasthan Phase-III schemes, land acquisition and RoW issues, difficult terrain etc. in case of RE linked schemes results in change in scope and increase in estimated timelines and cost of the transmission scheme. Keeping in view short gestation period of RE generation projects,

implementation timeframe for RE linked transmission schemes had been agreed to be kept as 18 months. However, considering the recent cases of time overrun, a holistic view with respect to the implementation timeframe needs to be taken.

3.6 Member Secretary, NCT, suggested the deployment of features offered in PM-GatiShakti portal for tentative routing of planned transmission lines through forest, GIB areas, railway crossings etc. to work out the tentative route and length of the transmission line. This will in turn help to work out the project completion schedule and estimated cost. He further stated that as per MoP OM dated 01st July, 2022, assuming the role of CTUIL as BPC, under Pre-bidding activities of TBCB projects, CTUIL required to comply with the following:

- CTU shall diligently carry out the route survey of approved ISTS schemes, so that the routes are realistic and can be used by successful bidders without much deviation.
- The cost assessment for the approved ISTS shall be done accurately, so that the estimated cost closely represents the cost of developing the ISTS. For this, the cost data to be continuously compiled for various completed or awarded projects.
- CTU will initiate land acquisition for the proposed substation and initiate process for other clearances including Railway/highway crossings etc.

3.7 NCT agreed that a realistic, scheme-wise implementation timeframe is required for the planned ISTS schemes. A realistic implementation timeframe would provide the clarity to the RE generators so that they can incorporate flexibility in the implementation timeframe of their generation projects to match the SCoD of the evacuation schemes.

3.8 Chairperson asked CEA and CTUIL to formulate norms for assessing realistic timeline for completion of transmission projects considering the terrain and other factors.

3.9 Regarding the issue of how to proceed with the bid submission of the Rajasthan Phase-III projects falling in GIB areas with uncertainty in implementation timeframe, MNRE stated that they have granted 30-day extension on SCoD to RE generation projects, after the date of judgement by the Supreme Court. Possibility of similar provision for associated ISTS schemes can be explored. Chairperson, CEA, stated that the matter is under deliberation in MoP and would soon be resolved.

3.10 CTUIL also informed that the RE generation developers while seeking connectivity, ask for a tentative location of the pooling station. Finalizing the location of the pooling station based on the location of the first few connectivity applicants would result in sub-optimal location of pooling station. Accordingly, CTUIL requested MNRE to take up the matter with SECI so that SECI, while identifying RE potential areas, may also indicate the tentative location of the

pooling station and the same could be made available to generation project developers seeking connectivity to the grid.

3.11 MNRE stated that SECI would be able to provide broad coordinates for the RE potential areas, however, providing coordinates of the pooling station would not be possible.

3.12 Chairperson, CEA, advised CTUIL to separately take up the issue of identification of the location of pooling stations in coordination with SECI and MNRE.

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

4.1 Augmentation of ISTS for interconnection of HVPNL transmission schemes:

4.1.1 The scheme comprises inter-state transmission system involving inter-connections with intra-state transmission scheme of HVPNL. The scheme involves 400/220 kV ICT Augmentation at 400/220 kV Bahadurgarh (PG) S/s and 400/220 kV Jind S/s to ensure 'N-1' compliance with proposed downstream network at 220 kV level.

4.1.2 Further, the scheme also comprises of provision of 220 kV line bays at the following S/s:

(i) 4 nos. of 220kV line bays at Bahadurgarh (PG) for interconnection to 220 kV Kharkhoda pocket B (HVPN) and 220 kV METL (HVPN) S/s.

(ii) 2 nos. of 220 kV line bays at Sonepat (PG) for interconnection to 220kV Kharkhoda pocket A (HVPN) S/s.

4.1.3 The estimated cost of scheme is about Rs. 117 Crs. As the estimated cost of the scheme lies between Rs 100 to 500 Crore and works are of the nature of technical upgradation (clause 7.1(7) of Tariff Policy, 2016), NCT approved the scheme for implementation through RTM mode.

Sl. No.	Name of the scheme/est. cost	Decision of NCT	Purpose /Justification
1.	Augmentation of ISTS for interconnection of HVPNL transmission schemes Est. Cost: Rs. 117.05 Crs. Implementation timeframe: Given in detailed scope.	• Approved for implementation through RTM mode - to be given to POWERGRID (as these substations are owned by POWERGRID)	To provide 'N-1' compliant system as well as 220kV line bays for interconnection with HVPNL transmission schemes at various ISTS substations.

4.1.4 Detailed scope of the scheme alongwith implementation timeline is given below:

Augmentation of ISTS for interconnection of HVPNL transmission schemes

i. Augmentation by 1x500 MVA, 400/220 kV ICT (3rd) at 400/220 kV 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.

ii. 2 nos of 220 kV line bays at 400/220 kV Bahadurgarh (PG) S/s (for 220 kV Kharkhoda pocket B- Bahadurgarh (PG) D/c line) – **July, 24**
   - 220 kV line bays – 2 nos.

iii. 2 nos of 220 kV line bays at 400/220 kV Bahadurgarh (PG) S/s (for 220 kV METL – Bahadurgarh (PG) D/c line) – **March, 24**
   - 220 kV line bays – 2 nos.

iv. Augmentation by 1x500 MVA, 400/220 kV ICT (3rd) at 400/220 kV Jind (PG) S/s – **February, 24**
   - 400/220 kV, 500 MVA ICT – 1 no.
   - 400 kV ICT bay – 1 no.
   - 220 kV ICT bay – 1 no.

v. 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) - **July, 24**
   - 220 kV line bays – 2 nos.

4.2 <u>Scheme to relieve high loading of WR-NR Inter Regional Corridor (400 kV Bhinmal-Zerda line):</u>

4.2.1 CTU had proposed following scheme as immediate requirement (Phase-I: short term) to relieve high loading of WR-NR Inter Regional Corridor (400 kV Bhinmal-Zerda line) (tentative cost Rs. 279.5 Cr):

- Bypassing of 400 kV Kankroli - Bhinmal-Zerda line at Bhinmal to form 400 kV Kankroli – Zerda (direct) line *(with necessary arrangement for bypassing Kankroli- Zerda line at Bhinmal with suitable switching equipment inside the Bhinmal substation)*

- Reconductoring of 400 kV Jodhpur (Surpura)(RVPN) – Kankroli S/c line with twin HTLS conductor *[with minimum capacity of 1940 MVA/ckt at nominal voltage (line length is about 188 km); Upgradation of existing 400kV bay equipment's each at Jodhpur (Surpura)(RVPN) and Kankroli S/s (3150 A)]*

CTUIL stated that initially the reconductoring was proposed with capacity of 2100MVA/ckt, however, POWERGRID informed them that the 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 1400A 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.

CTU also mentioned that in the studies, line loading at 400 kV Jodhpur (Surpura) (RVPN) – Kankroli S/c (twin moose) line was about 1250 MW in Feb solar max scenario under worst case contingency. As the envisaged power flow is less than 1940MVA, the reconductoring is proposed with HTLS Conductor (Gap/Composite core) with 1400 Amps(~1940MVA).

4.2.2 Further, CTUIL proposed that on 400 kV Jodhpur (Surpura) – Kankroli line, existing earth wire to be replaced with OPGW and associated FOTE need to be replaced alongwith the reconductoring work of 400kV Jodhpur (Surpura) - Kankroli line (tentative cost Rs. 9.4 Cr).

4.2.3 Further, it was opined that the scheme is an integral part of transmission scheme for evacuation of power for various upcoming RE developers in Western Rajasthan and required urgently. In view of that Bypassing of 400 kV Kankroli - Bhinmal-Zerda lines at Bhinmal may be implemented in shorter time i.e. 12 months and implementation time of reconductoring of 400kV Jodhpur (Surpura) – Kankroli line may be kept as 18 months, however, best effort can be made for reconductoring by 15 months due to urgent requirement. Members agreed on the same.

4.2.4 As the estimated cost of the scheme lies between Rs 100 to 500 Crore and works are of the nature of technical upgradation, NCT approved the scheme for implementation through RTM mode.

S.No.	Name of the scheme/est. cost	Decision of NCT	Purpose /Justification
1.	Scheme to relieve high loading of WR-NR Inter Regional Corridor (400 kV Bhinmal-Zerda line) Est. Cost: Rs. 288.9 Crs (includes Rs 9.4 Crs for OPGW and associated FOTE)	• Approved for implementation through RTM mode- to be given to POWERGRID (as the transmission lines/bays are	To relieve overloading of Bhinmal-Zerda line under various operating conditions.

	Implementation timeframe: 12 months for bypassing at Bhinmal and 18 months for reconductoring works* from date of allocation. **Best effort to be made for reconductoring in 15 months.*	owned by POWERGRID)	

4.2.5 Detailed scope of the scheme:

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

i. Bypassing of 400 kV Kankroli - Bhinmal-Zerda line at Bhinmal to form 400 kV Kankroli – Zerda (direct) line # - 12 months from date of allocation
ii. Reconductoring of 400 kV Jodhpur (Surpura)(RVPN) – Kankroli S/c (twin moose) line with twin HTLS conductor*- 18 months** from date of allocation
iii. OPGW installation on 400 kV Jodhpur (Surpura)(RVPN) – Kankroli S/c (twin moose) line -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)*

***Best effort to be made for reconductoring in 15 months from date of allocation*

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

4.3.1 CTUIL stated that as per inputs from Odisha, large number of industries are expected in and around Joda area with cumulative demand of about 480 MW which cannot be catered with the existing 220 kV network in the area. Accordingly, OPTCL will be implementing 400/220 kV Joda new substation under intra-state scheme through LILO of existing Rourkela (POWERGRID) – Talcher (NTPC) 400kV D/c ISTS line at Joda New S/s. With the integration of Joda New 400/220 kV substation with ISTS, most of the power flows to Joda New through Jharsuguda – Rourkela – Joda New 400 kV 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 been agreed in the 7th CMETS-ER meeting held on 31.05.2022 to reconductor Jharsuguda – Rourkela 400 kV 2xD/c lines with HTLS conductor in similar timeframe of establishment of Joda New 400/220kV substation i.e. in 36 months.

Further, 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 85°C max. conductor temperature with ampacity of 1228 Amperes & 1400 Amperes

(per conductor) respectively. However, to have equitable rating for all circuits, it was proposed in the meeting that all four circuits of Rourkela-Jharsuguda may be reconductored with HTLS conductor of 1228 A rating

4.3.2 Dr. R. Saha, Expert Member, stated that different ampacity values at the same voltage level have been mentioned in the agenda items pertaining to reconductoring, which needs to be standardized. He also suggested that the details about the ambient temperature in case of reconductoring works needs to be clearly mentioned in the agenda item.

4.3.3 CTUIL clarified that in this particular instance, ampacity of 1228A with ambient temperature of 75°C have been considered as these lines have to be reconductored on the existing towers. In the new towers, ampacity of 1400A with ambient temperature of 85°C can be achieved. However, to avoid differential loading of the circuits, 1228A ampacity with ambient temperature of 75°C had been considered.

4.3.4 As the estimated cost of the scheme lies between Rs 100 to 500 Crore, and works are of the nature of technical upgradation (clause 7.1(7) of Tariff Policy, 2016), accordingly NCT approved the scheme for implementation through RTM mode.

S.No.	Name of the scheme/est. cost	Decision of NCT	Purpose /Justification
1.	Eastern Region Expansion Scheme-XXIX (ERES-XXIX) Est. Cost: Rs. 422.23 Crs Implementation timeframe: 36 months from date of allocation.	• Approved for implementation through RTM mode- to be given to POWERGRID (as these substations and transmission lines are owned by POWERGRID)	To provide power supply to Joda and improve power supply in adjoining areas of Odisha and Jharkhand.

4.3.5 Detailed scope of the scheme is as given below:

(a) Reconductoring of Jharsuguda/Sundargarh (PG) – Rourkela (PG) 400kV 2xD/c Twin Moose line with Twin HTLS conductor (with ampacity of equivalent to single HTLS as 1228 A at nominal voltage).

(b) Bay upgradation at Rourkela (PG) end for 3150 A 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.*

4.4 **Augmentation of transformation capacity at Kallam PS by 2x500 MVA, 400/220kV ICTs (3rd & 4th) along with 220 kV bays for RE interconnection**

4.4.1 CTUIL stated that Kallam PS with transformation capacity of 2x500MVA is under implementation by consortium of IndiGrid 1 Ltd. (Lead Member) and IndiGrid 2 Ltd., with target commissioning of June, 2023. Stage-II connectivity at Kallam PS has already crossed 1 GW (~1782.6 MW). Further, 3 nos. 220kV line bays are proposed for following RE projects which have been 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)

4.4.2 In the 9th CMETS-WR meeting, it was agreed that augmentation of transformation capacity at Kallam PS may be taken up considering the 1 GW additional potential at Kallam (under 181.5 GW RE Zones) as well as rapid pace of Stage-II connectivity applications being received by CTUIL at Kallam PS. Accordingly, CTUIL had proposed 'Augmentation of transformation capacity at Kallam PS by 2x500MVA, 400/220kV ICTs (3rd & 4th) along with 220 kV bays for RE interconnection with estimated cost of Rs. 156.89 Crs.

4.4.3 CMD, POSOCO, stated that even after augmentation of ICTs at Kallam by 2x500 MVA, 400/22kV ICTs, Kallam substation will not fulfill 'N-1' criteria.

4.4.4 CTUIL stated that there is provision of space for only 02 nos. additional ICTs. As such, additional augmentation is not proposed. He further stated that at present Stage-II connectivity applications totaling around 1782.6 MW have been received.

4.4.5 It was deliberated that as there is only wind generation, taking a peak factor of 0.75, generation of around 1340MW needs to be evacuated and hence the system would remain 'N-1' compliant with 4x500 MVA ICTs. Nevertheless, CTU may also take up with the TSP of Kallam PS for exploring space for 5th 400/220 kV ICT at Kallam PS.

4.4.6 As the estimated cost of the scheme lies between Rs 100 to 500 Crore, and works are of the nature of technical upgradation (clause 7.1(7) of Tariff Policy, 2016), NCT approved the scheme for implementation through RTM mode.

S.No.	Name of the scheme/est. cost	Decision of NCT	Purpose /Justification
1.	Augmentation of transformation capacity at Kallam PS by 2x500MVA, 400/220 kV ICTs (3rd & 4th)	• Approved for implementation through RTM mode- to be	Stage-II connectivity at Kallam PS has already crossed 1 GW (~1782.6 MW). Hence, scheme for

	along with 220 kV bays for RE interconnection Est. Cost: Rs. 156.89 Crs Implementation timeframe: 18 months from date of allocation.	given to consortium of IndiGrid 1 Ltd. (Lead Member) and IndiGrid 2 Ltd. (as the substation is owned by the above consortium)	augmentation of Kallam PS was agreed to be taken up considering the 1 GW additional potential under 181.5 GW as well as rapid pace of Stage-II connectivity applications being received by CTU.

4.4.7 Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Augmentation of Kallam Pooling Station by 2x500 MVA, 400/220 kV ICTs	500 MVA, 400/220kV ICT: 2 nos. 400 kV ICT bays: 2 nos. 220 kV ICT bays: 2 nos.
2.	3 nos. 220 kV line bays for RE interconnection	220 kV line bays: 3 nos.
3.	1x125 MVAr bus reactor (2nd) at Kallam PS	125 MVAr, 420 kV Bus reactor – 1 no. Bus reactor bay: 1 no.

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

4.5.1 CTU stated that out of additional RE capacity of 181.5 GW planned by the year 2030, 75 GW REZs lie in the state of Rajasthan comprising of 15 GW Wind and 60 GW Solar potential. Accordingly, a comprehensive transmission scheme was evolved for evacuation of 75 GW RE from Rajasthan, which includes transmission scheme for about 8GW (Solar) in Bikaner complex (14GW along with 6GW BESS), Bikaner-II: 4 GW (7GW Solar+ 3 GW BESS) and Bikaner-III:4 GW (7GW Solar+ 3 GW BESS). Bikaner complex being out of GIB area, more RE developers are interested in this complex.

CTU also stated that at Bikaner-II PS, St-II Connectivity for 5.575 GW RE has already been granted against the potential of 1.9 GW (revised from 2.9 GW) identified under Ph-II), therefore, evacuation for additional 3.7 GW capacity is required from Bikaner-II PS. 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 GW+4 GW) shall be required from Bikaner Complex (Bikaner-II & III).

4.5.2 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), following transmission scheme had been

agreed for evacuation of power from Rajasthan REZ Ph-IV (Part-1) [Bikaner complex: 7.7 GW] in the 8th CMETS-NR meeting.

Items	**Details**
Name of 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: 4 GW (7GW Solar+3GW BESS)
Scope of the scheme	• 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 including one spare unit) ➢ 765kV ICT bays - 6 nos. ➢ 400/220 kV, 500 MVA ICTs - 5nos ➢ 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) ➢ 220 kV ICT bays - 5 nos. ➢ 330 MVAr Bus Reactor-2 nos. (7x110 MVAr, including one spare unit) ➢ 765kV reactor bays- 2 nos. ➢ 125 MVAr, 420kV bus reactor - 2 nos. ➢ 420 kV reactor bays - 2 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** ▪ 765/400kV 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 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 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.

Items	Details
	• 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 including one spare unit) ➢ 765kV ICT bays - 4 nos. ➢ 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) ➢ 330 MVAr Bus Reactor-2 nos. (7x110 MVAr, including one spare unit) ➢ 765kV reactor bays- 2 nos. ➢ 125 MVAr, 420kV bus reactor - 2 nos. ➢ 420 kV reactor bays - 2 nos. **Future provisions at Neemrana-II S/s:** **Space for** ▪ 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 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.

Items	Details
	➢ 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. • 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.*

4.5.3 CEA stated that as per the Manual on Transmission Planning Criteria, maximum transformation capacity at a substation at 765 kV level can be 9000MVA and 6x1500 MVA ICTs have been proposed, therefore, there is no need to keep space for one number of additional 765/400 kV ICT.

4.5.4 Since the estimated cost of the scheme is very high (Rs. 13,460 Cr.), to make the scheme competitive for bidders and considering ICT augmentation at later stage, various packages were proposed. During deliberations, NCT opined that the complete scope of the substation including the augmentation may be clubbed as a single package. Accordingly, some packages proposed in the agenda of NCT were combined. Package wise details are given below:

PART-A: (Rs. 4,741 Cr.)

Sl. No.	Scope of Transmission Scheme	Capacity /km
1	Establishment of 6x1500 MVA (along with one spare unit of 500 MVA), 765/400 kV & 5x500 MVA 400/220 kV Bikaner-III Pooling Station along with 2x330 MVAr (765 kV) Bus Reactor (along with one spare unit of 110 MVAr) & 2x125 MVAr (420 kV) Bus Reactor at a suitable location near Bikaner **Future provisions: Space for** • 765 kV line bays along with switchable line reactors – 6 nos. • 765kV Bus Reactor along with bay: 1 no. • 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 Sectionalization bay: 2 sets • 220 kV line bays for connectivity of RE Applications -8 nos. • 220kV Sectionalization bay: 2 sets • STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr)	• 765/400 kV 1500 MVA ICTs: 6 nos (19x500 MVA including one spare unit) • 765 kV ICT bays – 6 nos. • 765 kV line bays- 2 nos. • 330 MVAr Bus Reactor-2 nos. (7x110 MVAr, including one spare unit) • 765kV reactor bays- 2 nos. • 400/220 kV, 500 MVA ICTs – 5 nos • 400 kV ICT bays – 11 nos. • 420 kV reactor bays - 2 nos. • 125 MVAr, 420 kV bus reactor - 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 ICT bays - 5 nos. • 220 kV line bays – 6 nos (for RE connectivity) • 220 kV BC (2 no.) and 220 kV TBC (2 no.) • 220 kV Sectionalisation bay: 1 set
2	LILO of both ckts of 400 kV 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 - 2 nos.

Sl. No.	Scope of Transmission Scheme	Capacity /km
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 Neemrana-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- 2 nos.

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-B: (Rs. 1,876 Cr.)

Sl. No.	Scope of Transmission Scheme	Capacity /km
1	Establishment of 765/400 kV, 4x1500 MVA (along with one spare unit of 500 MVA) Neemrana-II S/s along with 2x330 MVAr (765 kV) 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** • 765/400kV ICT along with bays- 2 • 765 kV line bays along with switchable line reactors – 12 • 765 kV Bus Reactor along with bay: 1 nos.	• 765/400 kV 1500 MVA ICTs – 4 nos (13x500 MVA including one spare unit) • 330 MVAr Bus Reactor-2 nos (7x110 MVAr, including one spare unit) • 765 kV reactor bays- 2 nos. • 125 MVAr, 420kV bus reactor - 2 nos. • 420 kV reactor bays - 2 nos. • 765 kV ICT bays – 4 nos. • 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)

	• 400 kV line bays along with switchable line reactor –6 • 400 kV Bus Reactor along with bays: 1 no. • 400kV Sectionalization bay: 2 sets	
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 S/s 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
4) The implementation of package shall be taken up matching with Package A

PART-C: (Rs. 3,204 Cr.)

Sl. No.	Scope of Transmission Scheme	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 Neemrana-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. Developer of Bikaner-III PS & Neemrana-II S/s to provide space for 2 nos. of 765 kV line bays alongwith space for Switchable line reactor 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. 3,271 Cr.)

Sl. No.	Scope of Transmission Scheme	Capacity /km
1	Neemrana-II- Bareilly (PG) 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 Neermana-II S/s– 2 nos. • 765 kV, 330 MVAr Switchable line reactors at Bareilly (PG) – 2 nos. • Switching equipment for 765 kV 330 MVAr switchable line reactors at Neermana-II S/s – 2 nos. • Switching equipment for 765 kV 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	765 kV 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 alongwith space for Switchable line reactor 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 alongwith space for Switchable line reactor at Bareilly (PG) S/s

PART-E: (Rs. 368 Cr.)

S.No.	Scope of Transmission Scheme	Capacity /km
1	Augmentation by 765/400 kV, 1x1500 MVA 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 by 400/220 kV, 5x500 MVA ICT at Bikaner-II PS	• 400/220 kV, 500 MVA ICT – 5 nos. • 400 kV ICT bays – 5 nos. • 220 kV ICT bays - 5 nos.

Note:

1. Though, the augmentation by 765/400 kV, 1x1500 MVA ICT (4th) at Bikaner (PG) shall be required for evacuation requirement beyond 5.5 GW (out of 7.7 GW capacity) at Bikaner-II/Bikaner-III, it was decided to take up the same earlier as it would facilitate evacuation of some power in absence of other transmission elements mentioned in Part-A to D, which may take longer time for implementation. The Implementation timeframe for Augmentation of 765/400kV, 1x1500MVA Transformer (4th) at Bikaner (PG) shall be kept 18 months from date of allocation.

2. Implementation of Augmentation by 400/220kV, 1x500MVA Transformer (3rd) at Kotputli (PG) shall be taken up matching with Package B.
3. CTU informed that recently about 4400 MW St-II Connectivity was granted at Bikaner-II PS. Earlier 2x500 MVA ICTs was approved by CTU and awarded to POWERGRID. Additionally, 2x500 MVA ICTs shall be taken up for approval by CTU as per the requirement. Subsequently, implementation of additional 400/220 kV, 5x500 MVA ICT at Bikaner-II PS shall be taken up for evacuation requirement beyond 2000 MW at 220 kV level of Bikaner-II PS.

4.5.5 On the implementation time line of the projects, it was pointed out that due to shutdown requirements of existing lines and considering the long lengths of the 765 kV lines, the implementation timeframe to be kept as 24 months from the date of SPV transfer.

4.5.6 After deliberations, NCT approved Part-E for implementation under RTM to POWERGRID and recommended Part-A to Part-D for implementation under TBCB.

S.No.	Package	Implementation time	Mode of implementation
1	Part-A	24 months	TBCB
2	Part-B		TBCB
3	Part-C		TBCB
4	Part-D		TBCB
5	Part-E	• Augmentation by 765/400 kV, 1x1500MVA ICT (4th) at Bikaner (PG) - 18 months from date of allocation. • Augmentation by 400/220 kV, 1x500 MVA ICT (3rd) at Kotputli (PG) - 18 months from date of allocation (matching with Part B). • Augmentation with 400/220 kV, 5x500 MVA ICT at Bikaner-II PS –to be taken up for evacuation requirement beyond 2000 MW at 220 kV level of Bikaner-II PS, with implementation timeframe matching with schedule of RE generation or 18 months from date of allocation, whichever is later.	RTM to POWERGRID

5 Schemes referred from previous NCT:

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

5.1.1 Member Secretary, NCT, stated that the scheme was discussed in 5th NCT meeting held on 25.08.2021 and 02.09.2021. In the meeting, the scheme was deferred and NCT recommended the scheme to be reviewed in next NCT meeting.

5.1.2 CTU stated that the Stage-II Connectivity and LTA for 2600MW has already been granted at Ramgarh PS. Further, Adani Renewable Energy Park Rajasthan Ltd. (AREPRL) are in process of developing 2GW Solar Park proposed to be connected at Ramgarh PS and they have requested to enhance the transmission system capacity of Ramgarh PS by minimum 5 GW. Implementation of HVDC shall help in evacuation of additional power from Ramgarh PS.

5.1.3 CTUIL further stated that for Bhadla-II – Sikar-II 765 kV D/c line (Phase-II Part- C) has been ratified by the GIB committee nominated by Hon'ble Supreme Court, 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. Since implementation time frame of HVDC is more than gestation period of RE, it was requested that the implementation of above HVDC scheme may be approved.

5.1.4 Representative of CTU stated that the HVDC will be implemented with overhead Dedicated Metallic Return (DMR) technology. He also stated that by default, HVDC terminals can be operated for 50% of its capacity in reverse mode (3000 MW in this case). For 100% reversal of power, i.e., from Fatehpur to Bhadla, there may be some incremental cost. Further Bus sectionalizer may be provided at 400 kV Bus between 2x1500 MW sections each at Bhadla & Fatehpur to ensure reliability of 3000 MW power during contingencies at HVDC terminals. For drawing Auxiliary supply for HVDC station at Bhadla (HVDC), 400/33 kV transformers may be provided whereas at Fatehpur, auxiliary supply may be drawn from 765/400/33 kV transformers. Members agreed for above including provision for full reversal capability.

5.1.5 Detailed scope of the scheme is as follows:

a) Establishment of 6000 MW, ± 800 kV Bhadla (HVDC) [LCC] terminal station (4x1500 MW) at a suitable location near Bhadla-3 substation
   - 400/33 kV, 2x50 MVA transformers for exclusively supplying auxiliary power to HVDC terminal.
   - 400kV bus sectionaliser -2 nos (1 Set) at Bhadla (HVDC) station.

b) Establishment of 6000 MW, ±800 kV Fatehpur (HVDC) [LCC] terminal station (4x1500 MW) at suitable location near Fatehpur (UP)

c) Bhadla-3 – Bhadla (HVDC) 400 kV 2xD/c quad moose line along with the line bays at both substations
   - Line length- 2 km
   - 400 kV line bays -8 nos

d) ±800 kV HVDC line (Hexa lapwing) between Bhadla (HVDC) & Fatehpur (HVDC) (with Dedicated Metallic Return)
   - Line length- 950 km

e) Establishment of 5x1500 MVA, 765/400 kV ICTs at Fatehpur (HVDC) along with 2x330 MVAr (765kV) bus reactor
   - 765/400kV 1500 MVA ICTs: 5 nos (16x500 MVA, including one spare unit)
   - 765 kV ICT bays – 5 nos.
   - 400 kV ICT bays – 5 nos.
   - 400 kV Bus sectionaliser-2 nos [1 Set]
   - 765 kV line bays – 4 nos.
   - 330 MVAr, 765kV Bus Reactor -2 nos. (7x110 MVAr, including one spare unit)
   - 765 kV reactor bays- 2 nos.

   Future provisions: Space for
   - 765/400 kV ICT along with bay: 1 no.
   - 765 kV line bay along with switchable line reactor: 4nos.
   - 765 kV 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.
   - 400 kV Bus Reactor along with bay: 1 no.
   - 220 kV line bays: 6 nos.

f) LILO of both ckts of 765 kV Varanasi – Kanpur (GIS) D/c line at Fatehpur - (30 km)

5.1.6 Expert Member, Shri R. Saha stated that presently, due to technological enhancement in HVDC, upto 7500 MW can be transmitted through ± 800 kV system. He suggested that this high capacity system may be considered wherever required. In this regard, it was opined that for planning the future transmission corridors, the suggested option would be considered depending upon the quantum of power to be evacuated.

5.1.7 After deliberations, the scheme mentioned at para 5.1.5 was recommended to MoP for implementation under TBCB route with following considerations:

(a) The implementation time will be 42 months from date of SPV transfer.

(b) The estimated cost of the scheme is Rs. 12,700 Cr (as per 5th NCT estimate).

(c) HVDC terminals will be implemented with 100% power reversal capability.

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

5.2.1 Member Secretary, NCT, stated that transmission system for evacuation of power from additional 20 GW REZs envisaged in Rajasthan (Phase-III), was discussed and agreed in 5th NCT meeting held on 25.08.2021 and 02.09.2021. As part of above scheme, Transmission system for evacuation of power from REZ in Rajasthan (20 GW) 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 765/400 kV Kanpur (GIS) substation was also linked with HVDC system (LILO of Varanasi-Kanpur at Fatehpur). The scope of the scheme is as follows:

- Augmentation by 1x1500 MVA ICT at 765/400kV Kanpur (GIS) substation
  - 765/400kV 1500 MVA ICT: 1 no
  - 765kV ICT bay – 1 no.
  - 400 kV ICT bay – 1 no.

5.2.2 The above scheme would be required with the Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part I, recommended at para 5.1 above, with implementation timeframe of 42 months from date of SPV transfer. However, the augmentation of ICT work at Kanpur (GIS) S/s will take about 18 months.

5.2.3 After deliberations, it was agreed that the scheme may be put on hold for time being and would be reviewed by NCT after award of Bhadla III-Fatehpur HVDC system or in case prior requirement arises as part of grid strengthening

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

5.3.1 Member Secretary, NCT, stated that this scheme comprising of establishment of a new 400 kV 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 the under construction 132 kV Pasighat to Khupi corridor in Arunachal Pradesh under comprehensive scheme through Gogamukh (ISTS) – Gerukamukh (Arunachal Pradesh) 132kV D/c line.

5.3.2 He informed that the scheme was discussed in 8th Meeting of NCT, wherein the proposal was deferred. Thereafter, the proposal was discussed in NERPC

forum on 11.07.2022 and agreed in special meeting held among CEA, NERPC and CTU.

5.3.3 The scope of the scheme with estimated cost of Rs. 289 Cr is as follows:

i. Establishment of New Gogamukh 400/220/132kV substation

- 400/220 kV, 2x500 MVA ICTs alongwith associated ICT bays at both levels
- 220/132 kV, 2x200 MVA ICTs alongwith associated ICT bays at both levels
- 400 kV 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
- 420 kV, 2x125 MVAr bus reactor along with associated bays
- 220 kV line bays
  - 2 no. for termination of Bihpuria – Gogamukh 220kV D/c line (line to be implemented by AEGCL)
- 132 kV line bays
  - 2 no. for termination of LILO of one circuit of North Lakhimpur – Dhemaji 132 kV new D/c line (LILO to be implemented by AEGCL)
  - 2 no. for termination of Gogamukh (ISTS) – Gerukamukh (Arunachal Pradesh) 132 kV D/c line

ii. Extension works at Gerukamukh (Arunachal Pradesh) 132kV S/s

- 2 no. of 132 kV line bays for termination of Gogamukh (ISTS) – Gerukamukh (Arunachal 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
    - 4 nos. of 400V line bays for termination of Dibang – Gogamukh 2xD/c lines
    - 2 nos. of 400kV line bays (along with 2x80MVAr switchable line reactor) for termination of Gogamukh – Biswanath Chariali 400kV D/c (Quad) line
    - 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-1 line is under implementation by POWERGRID and is expected to be commissioned by Dec 2022.

(b) *Arunachal Pradesh to provide space at Gerukamukh S/s for implementation of 2 no. 132kV line bays.*

5.3.4 As the estimated cost of the scheme lies between Rs 100 to 500 Crore, NCT approved the North Eastern Region Expansion Scheme-XVI (NERES-XVI) scheme for implementation through TBCB mode with implementation time frame as 30 months from transfer of SPV.

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

5.4.1 Representative of CTU stated that 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 He also stated that the above scheme was agreed in the 8th NCT meeting held on 25.03.2022 to facilitate 'N-1' compliancy of the 765/400 kV 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.

5.4.3 The scheme was awarded to CTU 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.

5.4.4 It was further informed that subsequently, POWERGRID vide letter dated 19.05.2022 has intimated that as per site conditions, space for installation of 2nd 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:

- 1st ICT in Section B: ICT to be installed in Space available for Future ICT. For connection on 765 kV 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.
- 1st ICT in Section A: ICT to be installed in Space available for Future ICT. For connection on 765 kV 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.
- 2nd 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 765 kV Bus Sectionalizer 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 400 kV 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.

5.4.5 To deliberate on DB Power line 2 shifting from existing 400kV Bay No. 433 to Future Bay 444 using additional BPIs (proposed 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.

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

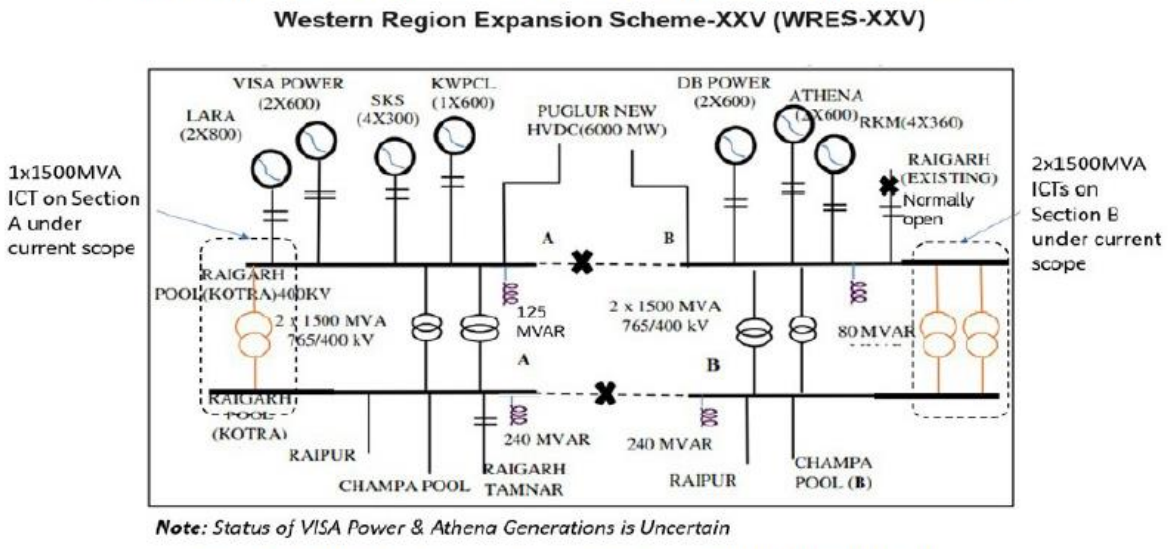

Figure 5-30 Western Region Expansion Scheme-XXV (WRES-XXV) scheme

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
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 765 kV 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):** • Due to space constraints / non-availability of required clearances in Section-B, 1 no. 400 kV 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: 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) **Sec-B: 4th ICT** • 400 kV 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]

5.4.7 Regarding present status and cost implications, representative of CTU stated 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 time and cost escalation. Hence, POWERGRID has requested approval for revised scheme with revised time-line of implementation. Further, 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.).

5.4.8 NCT approved the revised scope of work given in table above under WRES-XXV scheme with implementation timeline as 12 months on best effort basis from date of allocation of the scheme so that the modifications are completed before the start of next winter season.

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 establishment of KPS2 & KPS3 was deliberated 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 While preparation of Bidding Documents for the Khavda Phase-II Schemes (8 no.) for evacuation of 5 GW from Khavda RE park, the need was felt to prepare the layout of the pooling stations & outgoing lines from Khavda RE park based on the holistic Transmission System planned for evacuation of total 27.7 GW RE capacity from Khavda. This was mainly on account of limited availability of land and line corridors (RoW) due to restrictions (No-go zones) imposed by Local Military Authority (LMA).

5.5.3 While preparing the layout of the pooling stations KPS2 & KPS 3, keeping in view the present as well as future requirements, the following changes in the space requirement (for future expansion) at KPS2 was felt necessary:

a) 765 kV line bays (future): 10 nos. instead of 8 nos envisaged earlier.

b) 400 kV line bays (future): 12 nos. instead of 10 nos envisaged earlier.

c) Space for proposed 8000 MW HVDC System as well as BESS

5.5.4 Accordingly, 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.	Establishment of 765/400 kV, 4x1500MVA, KPS2 (GIS) with 2x330 MVAR 765 kV bus reactor and 2x125 MVAR 400 kV bus reactor.

S.No	Scope of the Transmission Scheme (Original)	Scope of the Transmission Scheme (Revised)
	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. 220 kV line bays: 4 nos.	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 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 Chairperson, CEA, enquired about the present status of the original scheme and the need to incorporate the space for future HVDC Converter station in the scope of works of the present scheme.

5.5.6 CEA & CTU stated that on account of limited land availability for Khavda Pooling Station 2, the layout of the KPS-2 S/s depicting the orientation of the HVDC, 765 kV & 400 kV switchyards have to be furnished alongwith the bidding documents. To avoid any space constraints in future, the tentative alignment of the incoming 400 kV lines of the developers and outgoing 765 KV ISTS lines from KPS-2 has also to be clearly marked in the layout. For optimum development of Khavda Pooling Station -2 (KPS-2) keeping in view present as well as future requirements, it is necessary to incorporate the space for future HVDC converter station in the scope of the scheme under bidding.

5.5.7 Chairperson, CEA, stated that as the Transmission scheme for Establishment of Khavda PS-2 has already been notified by MoP and any change in the scope of works would require amendment in the Gazette Notification done by MoP. Accordingly, the scope of works needs to be finalised in a prudent manner, so as to avoid such cases in future.

5.5.8 After detailed deliberations, NCT approved the changes in the future provision to be kept at Khavda Pooling Station-2, on account of urgency to complete the bidding process for the "Transmission Scheme for Establishment of KPS-2".

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

5.6.1 In view of the direction of MoP, for more space provisions in new ISTS substations (for evacuation of power from potential RE Zones / for meeting drawl requirements of STUs, etc), space provision at Chhatarpur PS, being established under "Transmission system for evacuation of power from Chhatarpur SEZ (1500MW)" (currently under bidding), was reviewed and revised space provision is given below:

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

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 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	(i) Establishment of 3x500MVA, 400/220 kV Pooling Station at Chhatarpur (ii) 1x125 MVAR, 420 kV bus reactor at Chhatarpur PS (iii) 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* 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**

Sl. No.	Scope of the Transmission Scheme (Original)	Scope of the Transmission Scheme (Revised)
		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.*

5.6.2 As it is not possible for NTPC to construct dedicated transmission line upto the planned Chhatarpur PS on account of the transmission line passing through Panna Tiger Reserve, it was informed that two separate pooling stations are being planned for pooling of RE power of RUMS and NTPC. Hence, additional future provisions at Chhatarpur PS may not be required.

5.6.3 CTUIL was directed to examine the requirement of future provisions in view of the above and it was decided that the matter shall be deliberated again in the next meeting.

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

5.13.1 Transmission system for evacuation of Power from RE Projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh was agreed in the 4th meeting of NCT held on 20.01.2021 & 28.01.2021 for implementation in two phases as two different Transmission packages: Phase-I (1500MW) & Phase-II (1000MW).

5.13.2 Ministry of Power, 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 and renotified the scope to be taken up under Phase-I i.e. “Transmission system for evacuation of power from RE projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh under Phase-I.”

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

5.13.4 SECI vide letter dated 23.06.2022 had requested to initiate the development of several Pooling Stations including Rajgarh Phase-II (1000 MW), irrespective of the receipt of connectivity applications. Rajgarh Phase II Scheme as per 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 (Rajgarh)	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 2100MVA/ckt at nominal voltage)	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.

5.13.5 Earlier, the Phase-II of the scheme had been agreed to be taken up only after grant of Connectivity 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.

5.13.6 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)

Sl. No.	Scope of the Transmission Scheme	Capacity/km.
		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.

5.13.7 It was informed that MPPTCL has requested to review the above scheme in view of overloading of Shujalpur 400/220kV ICTs and downstream system.

5.13.8 After deliberations, it was decided that the scheme would be reviewed in the next NCT meeting based on visibility of RE generation as well as outcome of studies to be carried out in coordination with MPPTCL.

5.14 **Resumption of bidding process of transmission schemes at Bidar and Ananthapuram**

5.14.1 SECI vide the letter dated 23.06.2022 had requested to initiate the development of Pooling Stations simultaneously at different locations including Anantapur and Bidar for integration of RE. 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.

5.14.2 A meeting was held in CEA on 01.08.2022 in which it was agreed that 1000 MVA capacity each at Bidar and 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 had informed that they have not received any connectivity applications at Anantapur and Bidar.

5.14.3 In view of above, the following needed 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.

5.14.4 After deliberations, it was decided that the scheme would be reviewed in the next NCT meeting based on visibility of RE generators.

6 Supply and Installation of OPGW on existing main lines which are to be LILOed under various transmission schemes.

6.1 CTU stated that some existing transmission lines have been agreed to be LILOed under various transmission schemes. The OPGW on the LILO portion is being implemented by the TSP implementing the LILO portion. However, the main existing lines do not have OPGW and hence the communication of the LILO stations to the respective RLDC cannot be established. Respective RPCs have given their consent for the installation of OPWG.

6.2 The transmission lines which are to be provided with OPGW alongwith necessary accessories and FOTE are mentioned as under.

Western Region

- 400kV Bachau (PG) – EPGL line (221 km) [to be LILOed at Kallam]
- 400kV Satna – Bina (1st) D/c line (276 km) [to be LILOed at Chatarpur]
- 400kV Kakrapar - Vapi D/c line (116 km) [to be LILOed at Vapi-II]

Estimated Cost Rs. 31 Crore (approx.)

Northern Region

- 765kV S/c Jaipur (Phagi) (RVPNL) – Gwalior line (312 km) (Ckt-1 is proposed) (to be LILOed at Dausa)
- 400kV D/c Agra – Jaipur (South) (PG) line (254 km) (to be LILOed at Dausa)

Estimated Cost Rs. 28.5 Crore (approx.)

6.3 After detailed deliberations, NCT approved the installation of OPGW (alonwith necessary accessories and FOTE) on the above lines which are to be LILOed under various transmission schemes, under RTM mode to owner of the lines viz. POWERGRID, matching with the timeframe of the respective LILOs.

7 Evaluation of functioning of National Grid.

Due to paucity of time, the agenda could not be discussed.

8 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.

Due to paucity of time, the agenda could not be discussed.

9 Five-year rolling plan for ISTS capacity addition.

Due to paucity of time, the agenda could not be discussed.

Meeting ended with thanks to chair.

Summary of the deliberations of the 09th NCT meeting held on 28.09.2022.

1. ISTS Transmission schemes, costing upto Rs 100 Crore, noted by NCT: No information in this regard received from CTUIL.

2. ISTS Transmission schemes, costing between Rs 100 Crore to Rs 500 Crore, approved by NCT:

2.1 The transmission schemes approved by NCT under RTM is given below:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Implementation timeframe	Allocated to	Estimated Cost (Rs. Crs)
1.	Augmentation of ISTS for interconnection of HVPNL transmission schemes	RTM	Given in detailed scope	CTUIL	117.05
2.	Scheme to relieve high loading of WR-NR Inter Regional Corridor (400 kV Bhinmal-Zerda line)	RTM	12 months for bypassing and 18 months for *reconductoring* (*Best effort to be made for completing reconductoring works in 15 months)* from date of allocation	CTUIL	288.9
3.	Eastern Region Expansion Scheme-XXIX (ERES-XXIX)	RTM	36 months from date of allocation	CTUIL	422.23
4.	Augmentation of transformation capacity at Kallam PS by 2x500 MVA, 400/220 kV ICTs (3rd & 4th) along with 220 kV bays for RE interconnection	RTM	18 months from date of allocation	CTUIL	156.89

Sl. No.	Name of Transmission Scheme	Implementation Mode	Implementation timeframe	Allocated to	Estimated Cost (Rs. Crs)
5.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex)-Part-E	RTM	As mentioned in para 4.5.6	CTUIL	368
6.	Supply and Installation of OPGW on existing main lines which are to be LILOed under various transmission schemes.	RTM	Matching with the timeframe of the respective LILOs.	CTUIL	59.5

2.2 The transmission schemes approved by NCT under TBCB is given below:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Implementation timeframe	Allocated to	Estimated Cost (Rs. Crs)	Survey Agency
1.	North Eastern Region Expansion Scheme-XVI (NERES-XVI)	TBCB	30 months	RECPDCL	289	CTUIL

3. The broad scope of above ISTS scheme, approved by NCT for implementation through TBCB route to be notified in Gazette of India is as given below:

Sl. No.	Name of Scheme & Implementation timeframe	Broad Scope	Bid Process Coordinator
1.	North Eastern Region Expansion Scheme-XVI (NERES-XVI) **Implementation Timeframe: 30 months from transfer of SPV**	i. Establishment of New Gogamukh 400/220/132 kV substation ii. Extension works at Gerukamukh (Arunachal Pradesh) 132 kV S/s iii. Gogamukh (ISTS) – Gerukamukh (Arunachal Pradesh) 132 kV 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 v. Associated bays and reactors	RECPDCL

		(Detailed scope as approved by 9th NCT and subsequent amendments thereof)	

4. ISTS Transmission schemes, costing greater than Rs 500 Crore recommended by NCT to MoP:

4.1 The ISTS transmission schemes recommended by NCT to MoP are given below:

Sl. No.	Transmission Scheme	Implementation Mode	Implementation timeframe	Survey Agency	Estimated Cost (Rs. Crs)
1.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1: Bikaner Complex)-Part-A	TBCB	24 Months	CTUIL	4741
2.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1: Bikaner Complex) Part-B	TBCB	24 Months	PFCCL	1876
3.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1: Bikaner Complex) Part-C	TBCB	24 Months	PFCCL	3204
4.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1: Bikaner Complex) Part-D	TBCB	24 Months	PFCCL	3271
5.	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III: Part I	TBCB	42 months	RECPDCL	12,700

4.2 The broad scope of ISTS schemes recommended by NCT to MoP for implementation through TBCB mode, to be notified in Gazette of India is as given below:

Sl. No.	Name of Scheme & Implementation timeframe	Broad Scope	Bid Process Coordinator
1.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex)- Part-A **Implementation Timeframe: 24 months**	(i) Establishment of 765/400/220 kV Bikaner-III Pooling Station (ii) LILO of both ckts of 400kV Bikaner (PG)-Bikaner-II D/c line (Quad) at Bikaner-III PS (iii) Bikaner-II PS – Bikaner-III PS 400 kV D/c line (Quad) (iv) Bikaner-III - Neemrana-II 765 kV D/c line (v) Associated bays and reactors **(Detailed scope as approved by 9th NCT and subsequent amendments thereof)**	To be decided by MoP
2.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex)- Part-B **Implementation Timeframe: 24 months**	1. Establishment of 765/400 kV Neemrana-II S/s 2. Neemrana-II -Kotputli 400 kV D/c line (Quad) 3. LILO of both ckts of 400 kV Gurgaon (PG) - Sohna Road (GPTL) D/c line (Quad) at Neemrana-II S/s 4. Associated bays and reactors **(Detailed scope as approved by 9th NCT and subsequent amendments thereof)**	To be decided by MoP
3.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex)- Part-C **Implementation Timeframe: 24 months**	1. Bikaner-III - Neemrana-II 765 kV D/c line (2nd) 2. Associated bays and reactors **(Detailed scope as approved by 9th NCT and subsequent amendments thereof)**	To be decided by MoP
4.	Transmission system for	1. Neemrana-II- Bareilly (PG)	To be

Sl. No.	Name of Scheme & Implementation timeframe	Broad Scope	Bid Process Coordinator
	evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex)- Part-D **Implementation Timeframe: 24 months**	765 kV D/c line 2. Associated bays and reactors **(Detailed scope as approved by 9th NCT and subsequent amendments thereof)**	decided by MoP
5.	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III: Part I **Implementation Timeframe: 42 months**	1. Establishment of 6000MW, ±800 kV Bhadla (HVDC) terminal station [LCC] (4x1500 MW) at a suitable location near Bhadla-3 substation. 2. Establishment of 6000 MW, ±800 kV Fatehpur (HVDC) terminal station [LCC] (4x1500 MW) at suitable location near Fatehpur (UP). 3. Bhadla-3 – Bhadla (HVDC) 400 kV 2xD/c line 4. ±800 kV HVDC line (Hexa lapwing) between Bhadla-3 & Fatehpur (with Dedicated Metallic Return**)** 5. Establishment of 5x1500 MVA, 765/400 kV ICTs at Fatehpur (HVDC). 6. Associated bays and reactors **(Detailed scope as approved by 9th NCT and subsequent amendments thereof)**	To be decided by MoP

5. Modification in the scope of works of Transmission Scheme awarded through RTM by 8th NCT.

5.1 The modified scope of works for Western Region Expansion Scheme-XXV (WRES-XXV) scheme on account of space constraints at Raigarh (Kotra) S/s:

Raigarh (Kotra) Section-A

Original Scope	Revised Scope
765/400kV ICT: 1x1500MVA	765/400 kV ICT (Sec-A: 3rd): 1x1500 MVA

Original Scope	Revised Scope
765kV ICT bay: 1 no.	765 kV 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.	400 kV ICT bay: 1 no.

Raigarh(Kotra) Section-B

Original Scope	Revised Scope
765/400kV ICT: 2x1500MVA	765/400kV ICTs (Sec-B: 3rd & 4th): 2x1500MVA
765kV ICT bay: 2 no.	**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.	**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) **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]

5.2 The revised cost of Western Region Expansion Scheme-XXV (WRES-XXV) scheme is Rs. 381 Crs.

6. Modification in the scope of works of Transmission Scheme presently under bidding (recommended in 5th NCT meeting).

6.1 Ministry of Power vide Gazette notification 5032(E) published on 06.12.2021 had appointed RECPDCL as BPC for implementation of the transmission scheme "Establishment of Khavda Pooling Station-2 (KPS-2) in Khavda RE Park" through TBCB route. Space for future provisions at KPS2 needs to be kept. Accordingly, the changes in scope of KPS2 are given as under:

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

Sl. 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	Establishment of 765/400 kV, 4x1500MVA, KPS2 (GIS) with 2x330 MVAR 765 kV bus reactor and 2x125 MVAR 400 kV bus

Sl. No.	Scope of the Transmission Scheme (Original)	Scope of the Transmission Scheme (Revised)
	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. 220 kV line bays: 4 nos.	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 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

6.2 'Transmission system for evacuation of power from REZ in Rajasthan (20 GW) Phase –III' were approved in the 5th NCT meeting. 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 following schemes, some modifications are necessary on account of increase in actual line length (after detailed survey) and incorporation of future provisions as detailed below:

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)	• 400 kV, 50 MVAr Switchable line reactor – 4 nos. • Switching equipment for 400 kV 50 MVAR switchable line reactor – 4 nos.	• 400 kV, 63 MVAr Switchable line reactor – 4 nos. • Switching equipment for 400 kV 63 MVAR 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)	• 400 kV, 50 MVAr Switchable line reactor – 4 nos. • Switching equipment for 400 kV 50 MVAR switchable line reactor – 4 nos.	• 400 kV, 63 MVAr Switchable line reactor – 4 nos. • Switching equipment for 400 kV 63 MVAR 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 MVA765/400kV & 2x500 MVA 400/220 kV pooling station at Ramgarh along with2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus reactor	--	*Future provision to be included:* Space provision for STATCOM (± 2x300MVAr, 4x125 MVAr MSC, 2x125 MVAr MSR) at Ramgarh S/s

Annex-I

List of participants of the 9th meeting of NCT

CEA:

1. Sh. Ghanshyam Prasad, Chairperson, CEA & Chairman, NCT
2. Sh. Ajay Talegaonkar, Member (E&C)
3. Sh. Ravinder Gupta, Chief Engineer (PSPA-II)
4. Sh. Ishan Sharan, Chief Engineer (PSPA-I)
5. Sh. B.S. Bairwa, Director (PSPA-II)
6. Smt. Manjari Chaturvedi, Director (PSPA-I)
7. Sh. Subhro Paul, Director (F&CA)
8. Sh. J. Ganeswara Rao, Deputy Director (PSPA-I)
9. Ms. Priyam Shrivastava, Deputy Director (PSPA-I)
10. Sh. Suyash Ayush Verma, Deputy Director (PSPA-II)
11. Sh. Deepanshu Rastogi, Deputy Director (PSPA-II)
12. Sh. Manish Maurya, Assistant Director (PSPA-II)

MoP:

1. Sh. Goutam Ghosh, Director (Trans.)

MNRE:

1. Sh. Dilip Nigam, Adviser

NITI Aayog:

1. Sh. Manoj Kumar Upadhyay, Deputy Adviser

CTUIL:

1. Sh. Ashok Pal, Deputy COO
2. Sh. Jasbir Singh, CGM
3. Sh. P.S. Das, Sr.GM
4. Sh. Kashish Bhambhani, GM
5. Sh. Anil Kumar Meena, Sr. DGM
6. Sh. Sandeep Kumawat, CM

POSOCO:

1. Sh. S.R. Narasimhan, CMD
2. Sh. Surajit Banerjee, CGM
3. Sh. Vivek Pandey, GM
4. Sh. Priyam Jain, Manager
5. Sh. Prabhankar Porwal, Dy Manager

Expert Member:

1. Dr. R. Saha

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