सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड

(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)

(भारत सरकार का उद्यम)

CENTRAL TRANSMISSION UTILITY OF INDIA LTD.

(A wholly owned subsidiary of Power Grid Corporation of India Limited)

(A Government of India Enterprise)

संदर्भ/Ref: CTU/E/00/13th CMETS-ER

दिनांक/Date: 24-11-2022

वितरण सूची के अनुसार/ As per distribution list

विषय/Subject: पूर्वी क्षेत्र में पारेषण योजनाओं के विकास के लिए 13वीं परामर्श बैठक की कार्यावली (सीएमईटीएस-ईआर) / Agenda for 13th Consultation Meeting for Evolving Transmission Schemes in Eastern Region (CMETS-ER)

महोदय /महोदया /Sir /Ma'am.

आईएसटीएस योजना और ओपन एक्सेस आवेदन प्रसंस्करण के लिए पूर्वी क्षेत्र में पारेषण योजनाओं के विकास के लिए **13वीं** परामर्श बैठक (सीएमईटीएस-ईआर) **29th नवंबर, 2022 (मंगलवार)** को वीडियो कॉन्फ्रेंसिंग के माध्यम से नीचे दिए गए विवरण के अनुसार आयोजित होने वाली है:

The **13th** Consultation Meeting for Evolving Transmission Schemes in Eastern Region (CMETS-ER) for ISTS planning and open access applications processing is scheduled to be held on **29th November, 2022 (Tuesday)** through video conferencing as per details below:

विषय/Topic	:	13th CMETS-ER
दिनांक/Date & समय/Time	:	29th November 2022 at 10:30 AM
बैठक लिंक/ Meeting Link	:	MS-Teams (in email)

इस संबंध में बैठक की कार्यावली अलग से प्रसारित की जाएगी, जो सीटीयू वेबसाइट (*www.ctuil.in >> ISTS Planning and Coordination >> Consultation Meetings for ISTS >> ER*) पर भी उपलब्ध होगी। कृपया उपरोक्त लिंक के माध्यम से बैठक में शामिल होने और रिटर्न मेल के माध्यम से इस संबंध में भागीदार होने की पुष्टि करे।

In this regard, the agenda of the meeting shall be circulated separately and the same will also be available on CTU website (*www.ctuil.in >> ISTS Planning and Coordination >> Consultation Meetings for ISTS >> ER*). It is requested to join the meeting through the above link and send confirmation of participation in this regard through return mail.

धन्यवाद/Thanking you,

भवदीय / Yours faithfully,

राजेश कुमार

24/11/2022

(राजेश कुमार) / (Rajesh Kumar)

महाप्रबंधक/ General Manager

A. वितरण सूची के अनुसार/ **Distribution List:**

1. **Chief Engineer (PSP&A-II)** Central Electricity Authority Sewa Bhawan, R.K.Puram New Delhi-110066	2. **Member Secretary** Eastern Regional Power Committee 14, Golf Club Road, Tollygunge Kolkata-700033
3. **Director (SO)** Power System Operation Corporation Ltd. (POSOCO) 9th Floor, IFCI Towers, 61, Nehru Place, New Delhi-110016	4. **Executive Director** Eastern Regional Load Despatch Centre 14, Golf Club Road, Jubilee Park, Golf Gardens, Tollygunge, Kolkata, West Bengal - 700095
5. **CMD** Damodar Valley Corporation DVC Towers, VIP Road Kolkata-700054	6. **CMD** Odisha Power Transmission Corporation Ltd. (OPTCL) Bhoinagar Post Office, Jan path Bhubaneshwar-751022
7. **CMD** Bihar State Power Transmission Company Ltd. (BSPTCL) Vidyut Bhavan, 4th floor, Bailey Road Patna-800021	8. **CMD** Jharkhand Urja Sancharan Nigam Limited (JUSNL) Engineering Building, HEC, Dhurwa Ranchi -834004
9. **Principal Chief Engineer cum Secretary** Power Department Government of Sikkim Gangtok, Sikkim	10. **Managing Director** West Bengal State Electricity Transmission Company Ltd. (WBSETCL) Vidyut Bhavan, 8th Floor, A-Block Salt Lake City, Kolkata-700091

B. विशेष आमंत्रित /**Special invitee:**

1. **Director (Projects)** Power Grid Corporation of India Ltd. "Saudamini", Plot No. 2, Sec-29, Gurugram Haryana-122001	2. **Managing Director** Haldia Energy Limited (HEL) 2A, Lord Sinha Road, First Floor, Kolkata, West Bengal - 700071, Email: rabi.chowdhury@rpsg.in; kakali@rpsg.in;
3. **Chairman** CESC Limited CESC House, Chowringhee Square Kolkata – 700001 Email: kakali@rpsg.in; rabi.chowdhury@rpsg.in	

Agenda for 13th Consultation Meeting for Evolving Transmission Schemes in Eastern Region (CMETS-ER)

1. Confirmation of minutes of the previous meeting

The minutes of the 12th CMETS-ER held on 28-10-2022 were issued vide letter dated 10-11-2022. As no comments have been received, the minutes may be confirmed.

WBSETCL vide email dated 17-11-2022 has provided updated status, which has been included in the agenda.

A. Application related matters in Eastern Region (ER)

No new open access Application with connectivity/drawl/injection in Eastern Region is proposed to be deliberated in the meeting.

B. ISTS expansion schemes in Eastern Region

2. Revised connectivity for Laxmikantpur 400/132kV S/s and split bus arrangement at Laxmikantpur S/s

2.1. In the 12th CMETS-ER held on 28-10-2022, following was deliberated:

"It was decided that WBSETCL and HEL would meet and jointly finalise requirement of the additional data and carry out necessary system studies at the earliest. It was also decided that a separate meeting may be convened at ERPC level of all concerned for deliberation and early resolution of the issue. WBSETCL also mentioned that if the matter is not resolved by the next CMETS-ER, they would come up with alternate proposal for establishment of New Laxmikantpur S/s".

2.2. However, no decision/views have been received from either WBSETCL or HEL on the subject matter.

2.3. WBSETCL is requested to update on the matter including the decision regarding whether alternate proposal for establishment of New Laxmikantpur S/s is to be taken up. Further, they may also update regarding the deliberations held at various meetings including NERPC.

3. Replacement of 50MVAr (old), (3x16.67MVAr), 420kV Bus Reactor-I at Durgapur substation under ADDCAP (2019-24) of FSTPS – Agenda by ERPC

3.1. ERPC vide email dated 26-10-2022 has informed that proposal from POWERGRID for replacement of old 50 MVAr, (3x16.67 MVAr) Bus Reactor-I at Durgapur S/s under ADDCAP (2019-24) of FSTPS was discussed in the 195th OCC meeting wherein it was decided that the agenda may be forwarded to CTU for approval. ERPC has inter alia mentioned following in the agenda:

- The subject 420kV, 50MVAr bus reactor-I (make-CGL) was commissioned in 1991 and is in service for more than 30 years. In the recent times, it is observed that this reactor is continuously giving problem like leakages, high moisture content and high temperature gradient when compared with similar capacity units.
- For further assessment of the health with all aspects, matter was referred to CPRI/Bangalore for Residual Life Assessment. After reviewing all parameters, CPRI has opined for replacement of the subject Reactor as deterioration is observed in Solid Insulation of the Reactor also.
- In addition to presence of moisture in solid insulation, CO_2/CO ratio is also high which also indicates cellular insulation deterioration.
- After receipt of report of CPRI (copy attached at **Annexure-IV**), further analysis was done internally by POWERGRID and measures like arresting leakages, oil top-up etc. were done but still the DGA values didn't improve, which indicates permanent defects.
- Accordingly, POWERGRID has mentioned that the subject bus reactor has already experienced designed electrical life and started to deteriorate and require replacement as individual component change will not solve the issue. Further spare/supports are very difficult of such ageing population from OEM.

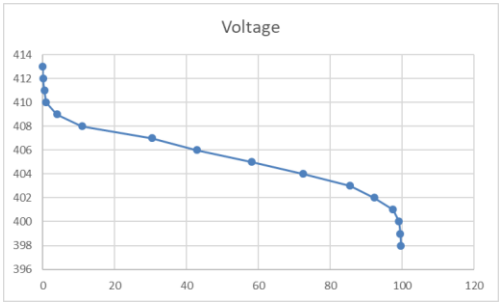
3.2. Studies for requirement of Bus reactor at Durgapur S/s has been carried out and following is submitted:

a) Bus split arrangement is present at 400kV level at Durgapur S/s. SLD at **Annexure-V**.

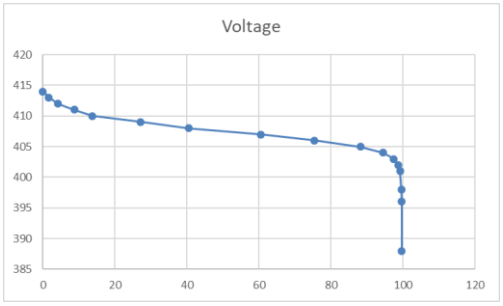
b) In one section (Durgapur-B), 2x125MVAr, 420MVAr bus reactors are in service and in other section (Durgapur-A) 1x125MVAr, 420kV bus reactor in parallel to 1x50MVAr (old), 420kV is in service (which is proposed to be replaced). With the decommissioning of the 50MVAr bus reactor, the Durgapur-A section would have only one bus reactor.

c) The present voltage profile of Durgapur S/s was obtained from POWERGRID and it has been observed that most of the time the voltage is above 400kV on majority of time.

Bus-1



Bus-2



d) Studies have been carried out for 2027-28 timeframe for the two critical scenarios viz. February Solar Max (Sc-7) and February Night off peak (Sc-9). Further, split bus arrangement at 400kV bus of Durgapur S/s alongwith all 3x315MVA, 400/220kV ICTs at Durgapur-B section after shifting of 1x315MVA, 400/220kV ICT from Durgapur-A section have been considered. Studies results are given below:

Bus Name	Voltage (in kV)		
	Without 50 MVAR	With 50 MVAR	With 125 MVAR
Scenario-7			
Durgapur-A	408.0	406.9	405.3
Durgapur-B	403.5	403.4	403.2
Scenario-9			
Durgapur-A	412.1	410.7	408.7
Durgapur-B	408.7	408.5	408.2

3.3. From the above, it can be observed that with switching of 50MVAr bus reactor, voltage changes by about 1.2kV in both scenarios. However, with 125MVAr bus reactor, the voltage change is observed to be about 2.8kV and 3.5kV in scenario 7 and 9 respectively. Accordingly, it is prudent that 125MVAr bus reactor may be installed in the Durgapur-A to control the high voltage condition in Durgapur S/s.

3.4. POWERGRID vide email dated 04-11-2022 has confirmed that space is available for installation of a new 420kV, 1x125MVAr bus reactor along with associated bay in Durgapur-A 400kV bus section.

3.5. In view of the above, following scope of works is proposed to be implemented as part of ISTS scheme namely Eastern Region Expansion Scheme-XXXII (ERES-XXXII) with implementation time-frame of 18 months from date of allocation:

a) Installation of new 420kV, 1x125MVAr bus reactor at Durgapur S/s in split bus section-A (which is not having ICTs)

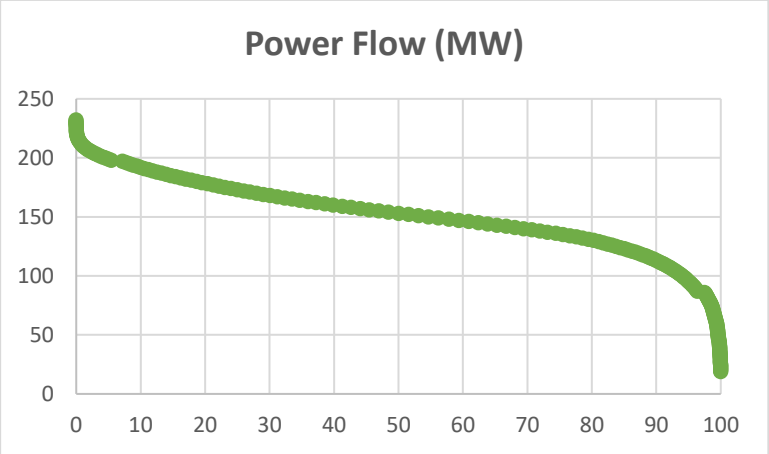
Note: *The existing 50MVAr (3x16.67MVAr) bus reactor at Durgapur S/s in bus section-A may be decommissioned prior to installation of new 420kV, 1x125MVAr bus reactor as indicated above.*

3.6. Matter may be deliberated.

4. Augmentation of transformation capacity at Ara (POWERGRID) 220/132kV S/s – Agenda by ERPC

4.1. ERPC vide email dated 26-10-2022 has requested to augmentation of transformation capacity at existing Ara (POWERGRID) 220/132kV S/s. Inter alia following details have been provided:

- Presently, 220/132kV Ara S/s is having the transformation capacity of 360MVA (2 x 100MVA + 1 x 160MVA).
- The load duration curve of Ara ICTs from April to Sep 2022 is shown below:



4.2. The N-1 capacity at Ara can be considered at 200MVA (considering largest ICT under outage). From the above drawal pattern at Ara S/s, it could be observed that the power flow through all the transformers exceeds 200MW during peak hours for about 5% of time. Further, this load demand might increase further in future. Thus, the reliability criteria of N-1 is not being fulfilled at Ara S/s.

4.3. It is understood that Buxar TPS (2x660MW) is under implementation and would be supply power to Bihar grid in Buxar, Dumraon, and Ara areas among others. Keeping in view the same and reliability aspects, BSPTCL may provide their view on augmentation of transformation capacity at Ara S/s.

4.4. Nevertheless, inputs have been obtained from POWERGRID regarding feasibility of augmentation of transformation capacity at Ara S/s. POWERGRID vide email dated 10-11-2022 has informed that there is adequate space for installation of 4th 220/132kV, 1x200MVA ICT at Ara. SLD of Ara S/s is at **Annexure-VI**.

4.5. As per confirmation from BSPTCL, following scope of works is proposed to be implemented as part of ISTS scheme namely Eastern Region Expansion Scheme-XXXII (ERES-XXXII) with implementation time-frame of 18 months from date of allocation:

a) Installation of new 220/132kV, 1x200MVA (4th) ICT at Ara (POWERGRID) S/s with associated bays in AIS (220kV bay no. 203 & 132kV bay no. 6).

b) Interconnection between 132kV side of 4th ICT and 132kV ICT bay (no. 6) may be with GIB or XLPE cables as per site conditions.

4.6. Matter may be deliberated.

5. Status of downstream 220kV or 132kV network by STUs from the various commissioned and under-construction ISTS substations in ER

5.1. Numbers of ISTS sub-stations have been commissioned and some are under construction for which the downstream system is being implemented by the STUs. Based on the information provided by the states, updated information on planned/under-construction downstream system is given at **Annexure-I**.

5.2. STUs may update the status of downstream system given at **Annexure-I** prior to the meeting for further deliberations in the meeting, if any.

6. Status of 400kV substations being implemented by STUs/entities in ER to be connected through ISTS

6.1. Various 400kV substations have been approved in the intra-state strengthening schemes in ER having interconnection with ISTS grid involving LILO of ISTS lines or direct connection to ISTS substations. Status of such intra-sate substations as per available information is given at **Annexure-II**.

6.2. STUs may update the status of the transmission system given at **Annexure-II** prior to the meeting for further deliberations in the meeting, if any.

7. Status of space allocated at various ISTS substations to STUs for implementation of line bays under intra state system) for their intra state lines

7.1. Space at various ISTS substations have been allocated to STUs for creation of line bays for termination of their new intra-state. List of such ISTS substations as per available information is given at **Annexure-III**.

7.2. STUs may update the status of the bays given at **Annexure-III** prior to the meeting for further deliberations in the meeting, if any.

Annexure-I

Status of Downstream Transmission Network in ER

Sl. No.	ISTS S/s	State	Voltage ratio, Trans. Cap	Downstream Voltage level (kV)	Unuti-lised bays	Status of ISTS bay	STU lines for unutilised bays	Status of Lines	
								Date of Award	Completion schedule
1.	Chaibasa	Jharkhand	400/220kV, 2x315MVA	220	2	Existing bay	Chaibasa (POWERGRID) – Jadugoda (JUSNL) 220kV D/c		Will be taken up in future. No firm plan as of now.
2.	Daltonganj	Jharkhand	400/220/132kV, 2x315MVA+ 2x160MVA	132	2	Existing bay	Daltonganj (POWERGRID) – Chatarpur 132kV D/c	22-10-2019	Expected by 31-12-2023.
3.	Dhanbad	Jharkhand	400/220kV	220	4	Existing bay	LILO of 1st circuit of 220kV Dumka – Govindpur D/c line at Dhanbad (23km)	Bid evaluation is in progress. Price bid opened. Additional funds are required, proposal sent to state govt. for approval	Expected by Dec 2023.
							LILO of 2nd circuit of 220kV Dumka – Govindpur D/c line at Dhanbad	Preparation of DPR under process.	
4.	Keonjhar	Odisha	400/220kV, 2x315MVA	220	2	Existing bay	Keonjhar (POWERGRID) – Turumunga (OPTCL) 220kV D/c		Expected by Mar 2023.
5.	Subashgram	West Bengal	400/220kV, 2x315MVA+ 1x500MVA	220	2	Existing bay	Subashgram (POWERGRID) – Baraipur 220kV D/c line		220kV Baruipur substation charged. 132kV downstream delayed due to RoW. Expected by Jan 2023.
6.	Rajarhat	West Bengal	400/220kV, 2x500MVA	220	2	Existing bay	Rajarhat (POWERGRID) – New Town AA2C 220kV D/c Cable		Line charged on 26-09-2022 from Rajarhat S/s.

Sl. No.	ISTS S/s	State	Voltage ratio, Trans. Cap	Downstream Voltage level (kV)	Unuti-lised bays	Status of ISTS bay	STU lines for unutilised bays	Status of Lines	
								Date of Award	Completion schedule
									Substation is expected by Dec 2022.
7.	Sitamarhi (New)	Bihar	400/220/132kV, 2x500MVA + 2x200MVA	132	2	Existing bay	LILO of Benipatti - Pupri 132kV S/c at Sitamarhi (New)		Expected by Mar 2023
8.	Saharsa (New)	Bihar	400/220/132kV, 2x500MVA + 2x200MVA	132	2-ISTS (addln.4 by state)	Existing bay	Saharsa (New) - Saharsa 132kV D/c line formed by LILO of Saharsa - Banmankhi and Saharsa - Uda Kishanganj 132kV S/c line		04 nos. of bays are under construction by BSPTCL at Saharsa (New). These bays are expected in Dec 2022.
9.	Banka	Bihar	400/220/132kV, 2x500MVA + 2x200 & 1x315MVA	220	2	Oct 2024	Banka (POWERGRID) – Goradih (Sabour New) 220kV D/c line	Award expected in Dec 2022	18 months from date of award

Annexure-II

Status of 400kV & 220kV substations being implemented by STUs/entities in ER to be connected to ISTS

Sl. No.	Substation/Location	Transformation Capacity/ Element	Date of Award	Completion Schedule
A	**Bihar (to be implemented by BSPTCL)**			
I	**Bakhtiyarpur GIS**	400/220/132kV, 2x500MVA + 2x160MVA	26.11.2019	Progressively from Jan'22 to Feb'22.
a)	LILO of both circuits of Barh – Patna (PG) 400kV D/c (Quad) line-1 at Bakhtiyarpur 400 kV 2xD/c line	400kV 2xD/c	26.11.2019	Line ready to be charged matching with Bakhtiyarpur S/s.
II	**Chappra (New)**	400/220/132kV, 2x500MVA + 2x200MVA	Cabinet approval under process	24 months from date of award
a)	LILO of 400 kV Barh (NTPC) - Motihari (DMTCL) D/C (Quad) transmission line at Chappra	400kV 2xD/c	Cabinet approval under process	24 months from date of award.
B	**Odisha (to be implemented by OPTCL)**			
I	**Digapahandi**	400/220kV, 2x500MVA	Tendering activity to be taken up shortly along with Pandiabili-Digapahandi 400kV D/c line	2025-26
a)	Digapahandi – Therubali – Jeypore 400kV D/c line	400kV D/c	To be taken after tending of Digapahandi S/s	2025-26
II	**Therubali**	400kV switching station along with 420kV, 1x125MVAr bus reactor	Survey completed. Land schedule is under preparation	2026-27
III	**Bhadrak**	400/220kV, 2x500MVA	Tendering is in hold	2025-26
a)	LILO of Baripada – Duburi and Baripada – Pandiabili 400kV line sections at Bhadrak	400kV D/c	Tendering in progress	2025-26
IV	**Paradeep***	400/220kV, 2x500MVA		24 months
a)	Paradeep – Duburi 400kV D/c line	400kV D/c	Line package awarded May'22 and substation	24 months

Sl. No.	Substation/Location	Transformation Capacity/ Element	Date of Award	Completion Schedule
			package send to government for approval	
V	**Paradeep***	765/400kV, 2x1500MVA	Survey completed. Land schedule is under preparation	2026-27
a)	Angul (POWERGRID) – Paradeep (OPTCL) 765kV D/c line	765kV D/c	Survey completed. Land schedule is under preparation	2026-27
VI	**Joda New**	400/220kV, 3x500MVA		
a)	LILO of Rourkela (POWERGRID) – Talcher (NTPC) 400kV D/c line at Joda New	400kV		
C	**Jharkhand (to be implemented by JUSNL)**			
I	**Chandil (New)**	400/220kV, 2x500MVA	Bid price very high. It will send to Jharkhand cabinet for approval	24 months
a)	PVUNL – Chandil 400kV D/c (Quad) line	400kV D/c (Quad)		
b)	Chandil – Chaibasa (POWERGRID) 400kV D/c (Quad) line	400kV D/c (Quad)		
c)	Chandil – Dhanbad 400kV D/c (Quad) line	400kV D/c (Quad)		
II	**Koderma**	400/220/132/33kV, 2x500MVA + 2x200MVA + 2x80MVA		
a)	PVUNL – Koderma 400kV D/c (Quad) line	400kV D/c (Quad)		
III	**Latehar**			
a)	Patratu – Latehar 400kV D/c line	400kV D/c	Forest Stage-I clearance is awaited.	Apr 2023
b)	Latehar – Chandwa (POWERGRID) 400kV D/c line	400kV D/c	All clearances have been obtained. Works for 20km is pending due to theft of line.	Apr 2023
IV	**Jasidih**	400/220kV, 2x500MVA	-	No firm plan now. To be
a)	Koderma (JUSNL) – Jasidih 400kV D/c (Quad) line	400kV D/c (Quad)	-	

Sl. No.	Substation/Location	Transformation Capacity/ Element	Date of Award	Completion Schedule
b)	Jasidih – Dumka 400kV D/c (Quad) line	400kV D/c (Quad)	-	taken up in future.
V	**Mander**	400/220kV, 2x500MVA	-	
a)	LILO of Patratu – Ranchi (New) 400kV D/c line at Mander	400kV 2xD/c	-	
VI	**Dumka (New)**	400/220kV, 2x500MVA	-	
a)	Dumka (New) – Dhanbad (ISTS) 400kV D/c (Quad) line	400kV D/c (Quad)	-	
D	**West Bengal**			
(to be implemented by WBSETCL)				
I	**Laxmikantpur GIS#**	400/132kV, 2x315MVA	Land identified. In process of acquisition. Expected by Dec 2024	
a)	LILO of Haldia – Subhasgram 400kV D/c line at Laxmikantpur	400kV D/c	-	Expected by Dec 2024
II	**Falakata**	220/132kV, 2x160MVA	Initial civil works have been started	Mar 2024
a)	LILO of Birpara – Alipurduar 220kV D/c line at Falakata substation	220kV 2xD/c		Mar 2024
(to be implemented by CESC)				
III	**Subhasgram (POWERGRID)**	400/220kV, 1x500MVA (6th ICT)		
	Installation of new 400/220kV, 500MVA (6th) ICT at Subhasgram (POWERGRID) S/s along with associated ICT bays and OLTC by CESC at its own cost	400/220kV, 1x500MVA (6th ICT)		

* ***As per inputs from OPTCL:*** *Paradeep 765/400kV S/s shall be established at a different location from the already under-construction Paradeep 400/220kV S/s, accordingly, 400kV 2xD/c line shall be established between two substations.*

 # The 400kV infeed to New Laxmikantpur 400/132kV S/s is under discussion in the item no 2. Based on the deliberations, the lines would be updated, if required.

Annexure-III

Space allocated at various ISTS substations to STUs for implementation of line bays under intra state system for their intra state lines

Sl. No.	Substation/ Location	Space for	Date of award of line and bays	Completion Schedule	Agreed in CMETS-ER
1.	Angul (POWERGRID)	2 nos. 765kV lines bays for termination of Angul (POWERGRID) – Paradeep 765kV D/c line (including suitable switchable line reactors)		Survey is going on. Expected by 2025-26	1st
2.	Rourkela (POWERGRID)	2 No. 220kV lines bays for termination of Rourkela (POWERGRID) – Tarkera 220kV D/c (HTLS) line		Would be taken up after reconductoring of 1st D/c line.	1st & 7th
3.	Keonjhar (POWERGRID)	2 No. 220kV lines bays for termination of Keonjhar (POWERGRID) – Tikarpada 220kV D/c line	NIT yet to be taken up	Expected by 2024-25	1st
4.	Maithon (POWERGRID)	2 No. 220kV lines bays for implementation of Maithon (POWERGRID) – Asansol 220kV D/c line	Line expected to be floated by Dec, 2022, bays by POWERGRID under deposit works	Expected by 2024-25.	7th

Annexure-IV

CENTRAL POWER RESEARCH INSTITUTE
CABLES & DIAGNOSTICS DIVISION
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PROF. SIR. C. V. RAMAN ROAD, BANGALORE - 560 080. INDIA.
Tel: +91 80-22072333/2332

CPRI

FINAL REPORT

Sub: Consultancy Assignment for Analysis and Submitting the Report on Transformers and Reactors (89 Nos.) of POWERGRID by CPRI, Bangalore

Ref: No. SRTS-II/C&M/WC-2183/LOA-2051/2019/3212 dated 20.03.2019

Date: 20.01.2020

Condition Assessment of Durgapur Bus Reactor-I R Phase

Make: CGL, Equipment Sl. No. 24893, Rating: 400kV, 16.67 MVAR, Phase: Single Phase
Year of Manufacturing: 1990 (**30 Years old**)

The diagnostic test data provided by POWERGRID have been analysed in detail and following are our observations:

1. IR and PI values lie in the normal permissible range. Tan delta values of windings are in normal range.
2. Core insulation resistance values are normal.
3. Tan delta values of the HV bushings are in normal range.
4. Estimated moisture content in the solid insulation is 2.4% exceeding the maximum permissible range.
5. The oil test results are satisfactory. However it is observed that water content increases and BDV decreases after every filtration.
6. D.G.A results indicate high CO2/CO ratio (CO2/CO>10). However due to frequent topping up and filtration the DGA test results are fluctuating.
7. Furan analysis shows high furan content (1911 ppb-October 2017) indicating high deterioration of solid insulation. Fluctuations in furan results are observed due to frequent dry out and topping up of oil.
8. Review of maintenance and equipment history indicates that the reactor is subjected to frequent oil filtration, oil top up and online dry out due to oil leakages from several points of the reactor.

Recommendations:

From the Furan test data, it can be inferred that the solid insulation is deteriorating. FDS data indicates high moisture content in the solid insulation. In view of high power system reliability, the unit is recommended for replacement.

R. Arunjothi

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CPRI

FINAL REPORT

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Date: 20.01.2020

Condition Assessment of Durgapur Bus Reactor-I Y Phase

Make: CGL, Equipment Sl. No. 24894, Rating: 400kV, 17 MVAR, Phase: Single Phase
Year of Manufacturing: 1990 (**30 Years old**)

The diagnostic test data provided by POWERGRID have been analysed in detail and following are our observations:

1. IR and PI values lie in the normal permissible range. Tan delta values of windings are in normal range.
2. Core insulation resistance values are normal.
3. Tan delta values of the HV bushings are in normal range.
4. Estimated moisture content in the solid insulation (1.3%) lies in the normal permissible range.
5. The oil test results are satisfactory.
6. D.G.A results indicate high CO2/CO ratio (CO2/CO>10). However due to frequent topping up and filtration the DGA test results are fluctuating.
7. Furan analysis shows high furan content (1607 ppb-October 2017) indicating high deterioration of solid insulation. Fluctuations in furan results are observed due to frequent dry out and topping up of oil.
8. Review of maintenance and equipment history indicates that the reactor is subjected to frequent oil filtration, oil top up and online dry out due to oil leakages from several points of the reactor.

Recommendations:

From the Furan test data, it can be inferred that the solid insulation is deteriorating. In view of high power system reliability, the unit is recommended for replacement.

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FINAL REPORT

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Date: 20.01.2020

Condition Assessment of Durgapur Bus Reactor-I B Phase

Make: CGLL, Equipment Sl. No. 24895, Rating: 400kV, 17 MVAR, Phase: Single Phase
Year of Manufacturing: 1990 (**30 Years old**)

The diagnostic test data provided by POWERGRID have been analysed in detail and following are our observations:

1. IR and PI values lie in the normal permissible range. Tan delta values of windings are in normal range.
2. Core insulation resistance values are normal.
3. Tan delta values of the HV bushings are in normal range.
4. Estimated moisture content in the solid insulation (1.0%) lies in the normal permissible range.
5. The oil test results are satisfactory.
6. D.G.A results indicate high CO2/CO ratio (CO2/CO>10). However due to frequent topping up and filtration the DGA test results are fluctuating.
7. Furan analysis shows moderate furan content (733 ppb-October 2017) indicating moderate deterioration of solid insulation. Fluctuations in furan results are observed due to frequent dry out and topping up of oil.
8. Review of maintenance and equipment history indicates that the reactor is subjected to frequent oil filtration, oil top up and online dry out due to oil leakages from several points of the reactor.

Recommendations:

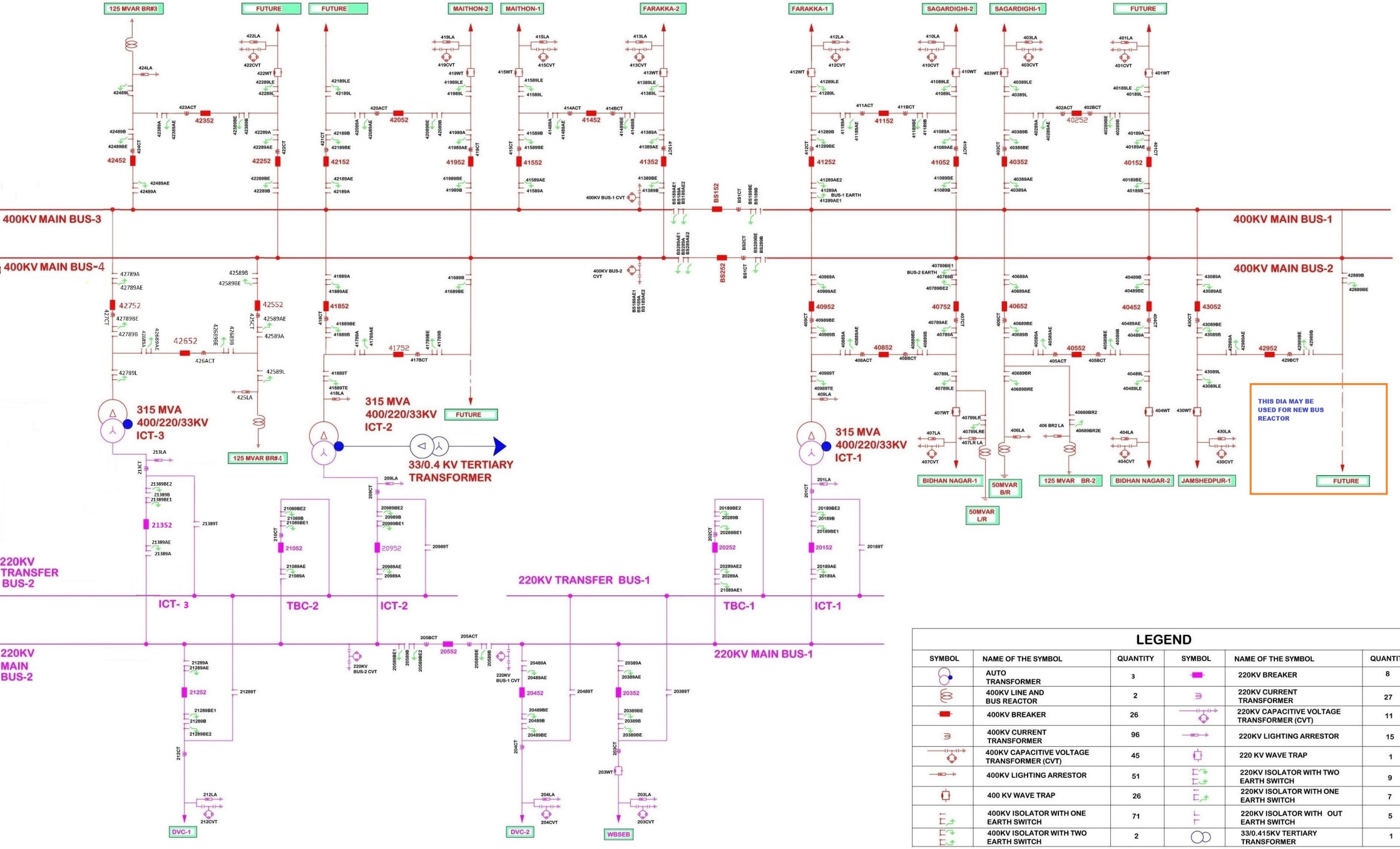
From the Furan test data, it can be inferred that the solid insulation is deteriorating moderately but considering the condition of other two sister units and to maintain high power system reliability, the unit is recommended for replacement.

R. Arunjothi

(R. ARUNJOTHI)
JOINT DIRECTOR (CDD)

SLD of Durgapur (POWERGRID) S/s

Annexure-V



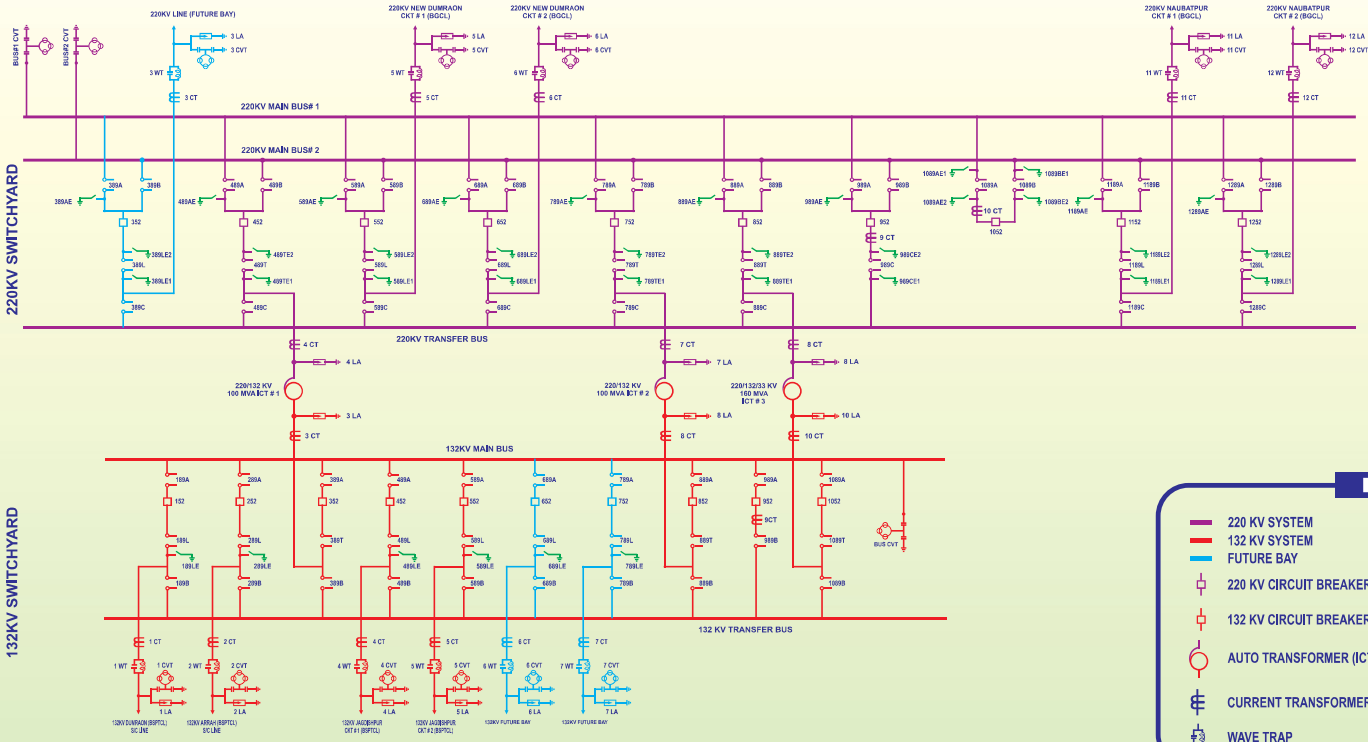
LEGEND

SYMBOL	NAME OF THE SYMBOL	QUANTITY	SYMBOL	NAME OF THE SYMBOL	QUANTITY
	AUTO TRANSFORMER	3		220KV BREAKER	8
	400KV LINE AND BUS REACTOR	2		220KV CURRENT TRANSFORMER	27
	400KV BREAKER	26		220KV CAPACITIVE VOLTAGE TRANSFORMER (CVT)	11
	400KV CURRENT TRANSFORMER	96		220KV LIGHTING ARRESTOR	15
	400KV CAPACITIVE VOLTAGE TRANSFORMER (CVT)	45		220 KV WAVE TRAP	1
	400KV LIGHTING ARRESTOR	51		220KV ISOLATOR WITH TWO EARTH SWITCH	9
	400 KV WAVE TRAP	26		220KV ISOLATOR WITH ONE EARTH SWITCH	7
	400KV ISOLATOR WITH ONE EARTH SWITCH	71		220KV ISOLATOR WITH OUT EARTH SWITCH	5
	400KV ISOLATOR WITH TWO EARTH SWITCH	2		33/0.415KV TERTIARY TRANSFORMER	1

POWERGRID CORPORATION OF INDIA LIMITED

EASTERN REGION-I, ARA SUB-STATION

SINGLE LINE DIAGRAM



EQUIPMENT DETAILS

SL.No.	DESCRIPTION OF EQUIPMENTS	UNIT	QTY.
	245 KV EQUIPMENTS (1600A)		
1,0	CIRCUIT BREAKER	Nos.	08
2,0	ISOLATORS WITH 2 E/S	Nos.	08
3,0	ISOLATORS WITH 1 E/S	Nos.	08
4,0	ISOLATORS WITHOUT E/S (TANDEM)	Nos.	15
5,0	CURRENT TRANSFORMER	Nos.	24
6,0	CAPACITIVE VOLTAGE TRANSFORMER	Nos.	18
7,0	SURGE ARRESTOR	Nos.	21
	245 KV EQUIPMENTS (2500A)		
1,0	CIRCUIT BREAKER	Nos.	01
2,0	ISOLATORS WITH 2 E/S	Nos.	02
3,0	CURRENT TRANSFORMER	Nos.	03
	145 KV EQUIPMENTS (1250A)		
1,0	CIRCUIT BREAKER	Nos.	08
2,0	ISOLATORS WITH 1 E/S	Nos.	04
3,0	ISOLATORS WITHOUT E/S	Nos.	19
4,0	CURRENT TRANSFORMER	Nos.	24
5,0	CAPACITIVE VOLTAGE TRANSFORMER	Nos.	15
6,0	SURGE ARRESTOR	Nos.	21
	TRANSFORMERS		
1,0	100 MVA 220/132 KV 3 PHASE ICT	Nos.	02
2,0	160 MVA 220/132/33 KV 3 PHASE ICT	Nos.	01

LEGEND

- 220 KV SYSTEM
- 132 KV SYSTEM
- FUTURE BAY
- 220 KV CIRCUIT BREAKER
- 132 KV CIRCUIT BREAKER
- AUTO TRANSFORMER (ICT)
- CURRENT TRANSFORMER
- WAVE TRAP
- CAPACITIVE VOLTAGE TRANSFORMER
- SURGE ARRESTER
- EARTH SWITCH
- ISOLATOR WITH ONE EARTH SWITCH
- ISOLATOR WITH TWO EARTH SWITCH
- ISOLATOR WITHOUT EARTH SWITCH