सत्यमेव जयते

**भारत सरकार**

**Government of India**

**विद्युत् मंत्रालय**

**Ministry of Power**

**पूर्वी क्षेत्रीय विद्युत् समिति**

**Eastern Regional Power Committee**

NO. ERPC/OPERATION/2024/1595 **DATE: 13.02.2024**

To

As per list enclosed.

**Sub: MoM of the special meeting held on 05.02.2024 at 11:00 hrs via physical mode under the chairmanship of Member Secretary, ERPC/** विषय: ईआरपीसी के सदस्य सचिव की अध्यक्षता में **05.02.2024** को **11:00** बजे भौतिक रूप से आयोजित **विशेष बैठक** का कार्यवृत **(MoM)**

Sir/Madam,

Please find enclosed minutes of special meeting held on 05.02.2024 at 11:00 hrs via physical mode under the chairmanship of Member Secretary, ERPC for your kind information and necessary action. The same is also available at ERPC website (www.erpc.gov.in).

कृपया दिनांक 05.02.2024 को 11:00 बजे पूर्वाह्न में भौतिक रूप से ईआरपीसी के सदस्य सचिव की अध्यक्षता में आयोजित विशेष बैठक का संलग्न कार्यवृत्त देखें। यह ईआरपीसी की वेबसाइट (www.erpc.gov.in) पर भी उपलब्ध है। कृपया इस पर आवश्यक कार्रवाई करें।

Observations, if any, may please be forwarded to this office at the earliest.

यदि कोई अवलोकन हों, तो कृपया उन्हें इस कार्यालय को जल्द से जल्द भेजें।

This issues with the approval of Member Secretary.

यह सदस्य सचिव के अनुमोदन के साथ जारी किया गया है।

Regards,

Yours faithfully,

13/02/2024

**(S. Kejriwal)**

**Director (Operation)/निदेशक (संचालन)**

Annexure-A

## Participants in Special Meeting

Venue: ERPC Conference Hall, Kolkata

Date: 05.02.2024(Monday)

| SL No | Name | Designation | Organization |
|---|---|---|---|
| 1 | N. S. Mondal | Member Secretary | ERPC |
| 2 | S. Kejriwal | Director | ERPC |
| 3 | S. Konar | Sr. GM | ERLDC |
| 4 | A. De | Dy. Director | ERPC |
| 5 | P. K. Mallik | Ch. Manager | Powergrid |
| 6 | P. Ghosh | DGM | Powergrid |
| 7 | S. Ghosh | Manager | ERLDC |
| 8 | R. Das | ACE | WBSETCL |
| 9 | S. K. Sahay | Ch. Manager | ERLDC |
| 10 | S. Mondal | Sr. DGM | ERLDC |
| 11 | P. Banerjee | ACE | WBSEDCL |
| 12 | S. Banerjee | ACE | SLDC/WBSETCL |
| 13 | A. Chatterjee | Asst. Director | ERPC |
| 14 | B. Achari | Ch. Manager | ERLDC |

**ERPC:: KOLKATA**

**MoM OF THE SPECIAL MEETING HELD ON 05.02.2024 AT 11:00 HRS VIA PHYSICAL MODE UNDER THE CHAIRMANSHIP OF MEMBER SECRETARY, ERPC**

List of participants is attached at **Annexure-A**

1. **Approval for re-conductoring in 220kV Lines (more than 35 years in service) commissioned under CTS**

**Background:**

The transmission network build under CTS scheme was commissioned in mid of 1980's. List of lines are tabulated below:

| Sl. No. | Name of TL | Total Length of Line (in KM) | Route Length of Line (in KM) under POWERGRID | Name of conductor | Year of commissioning | Remarks |
|---|---|---|---|---|---|---|
| 1 | 220kV D/C Birpara-Chukha TL | 70 | 36 | Zebra | 1986 | |
| 2 | 220kV D/C Birpara-Alipurduar TL | 57.5 | 57.5 | Zebra | 1987 | |
| 3 | 220kV D/C Siliguri-Kishanganj TL | 108.26 | 108.26 | Zebra | 1986 | |
| 4 | 220kV D/C Dalkhola-Kishangnaj TL | 30.96 | 30.96 | Zebra | 1986 | |
| 5 | 220kV D/C Malda-Gazole TL | 18.41 | 16.49 | Zebra | 1986 | |
| 6 | 220kV D/C Dalkhola-Gazole TL | 99.24 | 97.52 | Zebra | 1986 | |
| 7 | 220kV D/C Birpara-Binaguri TL | 80 | 80 | Zebra | 1986 | |
| 8 | 220kV D/C Siliguri-Binaguri TL | 6 | 6 | Zebra | 1986 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | 220kV S/C Birpara-Malbase TL | 41 | 38 | Zebra | 1988 | |
| | **Total** | | **470.73** | | | |
| 10 | 220kV D/C Alipurduar-Salakati TL | 101 | 101 | Zebra | 1987 | Re-conductoring work is in progress under NERSS-XII |

In most of the above-mentioned lines, the conductor damage from VD, MSCJ and repair sleeve, jumper, dead ends etc. have been noticed at several places. The damage might be occurring due to ageing of the conductors & earth-wire due to natural wear & tear. Also, conductor and earth wire getting snapped during seasonal temperature changes. Some snaps of sections of lines where breakage has been reported are enclosed.

The line tripping due to conductor & earth-wire snapping is gradually increasing. (2 Nos. conductor snapping incident occurred in 220kV Birpara-Binaguri Ckt-2 in the month of October-23 itself) In addition to the line outages which is severely deteriorating the transmission availability, it creates potential risk of any severe accident/hazard in the nearby area due to snapping of Conductor/Earth-wire. Further, any incident of conductor/earth-wire snapping at major crossings (Railway, NH X-Ings) may lead to undesired safety hazard as well as damage to public/national property. List of tripping in said lines due to conductor & earth-wire breakage is enclosed.

All the above-mentioned lines are more than 35 years in service so have completed useful life as per CERC regulation. Considering the increase in conductor & earth-wire snapping incidents, the issue was taken up during 209th OCC Meeting. Upon detail discussion during the 209th OCC Meeting, OCC forum advised POWERGRID to submit a detailed survey report along with health assessment report of conductor installed in old 220kV Lines commissioned under CTS.

Accordingly, vide mail dated 12.12.2023, Powergrid ER-II has shared detail test report of old 220kV Line conductor carried out by NSIC Howrah along with detail survey report. From the test report, it can be observed that the conductor sample has failed in mostly all technical parameters as tabulated below.

It is proposed that to consider the re-conductoring & earth-wire replacement of 220kV Lines commissioned under CTS under the ADDCAP 2024-2029 tariff block of Chukha Transmission System. A tentative cost for carrying out the re-conductoring work with HTLS conductor & Earth-wire replacement in above mentioned 9(Nine) lines 470.73 KM route length is approx. Rs. 281 Crores.

In 50th CCM meeting, Representative of ERPC highlighted the seriousness of re-conductoring & earth-wire replacement of 220kV Lines commissioned under Chukha Transmission System in view of the continuous increase in flow of power through these lines. Injection from Phunatsangchhu is also likely to be started shortly. Considering the facts reliability of the said lines of CTS is very important.

Representative of Powergrid submitted that the cost mentioned above is tentative and the final cost would be approved in CCM forum before further submission to CERC under ADDCAP 2024-2029 block.

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| Sl No. | Tests performed | Observation/Findings | Remarks |
|---|---|---|---|
| 1 | Freedom from defects (Visual Inspection) | Conductor found blackened & surface not smooth | Condition Poor |
| 2 | Surface Condition Test | Upon applying 50% of UTS Load, the diameter of the conductor measured at 4 places are more than the sum of minm. Specified diameter of the individual Al & Steel strands | Failed |
| 3 | Ultimate Breaking Load (Whole conductor & individual Aluminium Strands also) | Conductor strength found (114.25kN) way below the minm. UTS requirement of 130.32kN | Failed |
| 4 | DC Resistance test | Average value of resistance observed (0.12846 ohm/ KM ) is way above the Max. allowable DC resistance (0.06868 ohm/ KM) of conductor as per TS. | Failed |

Upon enquiring about the timelines for completion of project, representative of Powergrid submitted that nearly 24 months would be required from the date of approval and till commissioning of the lines. CCM approved the re-conductoring work with HTLS conductor & Earth-wire replacement in above mentioned 9(Nine) lines 470.73 KM route length with approx. cost of Rs. 281 Crores. and further advised Powergrid to carry out the healthiness checkup work of tower members along with the re-conductoring work.
CCM referred the issue to the 51st TCC/ERPC meeting for further concurrence.

In 51st TCC Meeting, TCC agreed with the proposal for the re-conductoring work, including the replacement of Earth-wire (with OPGW), for the nine specified transmission lines, totalling 470.73 kms with an estimated cost of approximately Rs. 281 Crores and referred the agenda to 51st ERPC for further approval.
However, representative of CTU informed that the issue should be referred to CMETS along with CEA first for further study and ascertain the requirement of re-conductoring works and other necessary activities, if required.
In 51st ERPC Meeting, Powergrid was instructed to segregate the lines based on their criticality and to consider load patterns when deciding on HTLS conversions. Only the critical lines should undergo HTLS conversion in a phased manner. Powergrid was advised to submit a revised cost estimate accordingly, in the next TCC/ERPC meeting.

In 211th OCC Meeting:

- OCC urged Powergrid ER-II to reassess the reconductoring proposal by sequentially prioritizing the lines with proper justification based on strategic importance, load pattern, vulnerability to failure, frequency of conductor snapping, physical deformation of conductors and field survey so that the reconductoring job can be carried out in phased manner. Powergrid ER-II was further advised to submit an exhaustive report on the same.
- ERLDC was advised to put forth a comprehensive and holistic view with analysis of loading pattern of the proposed lines based on operational study. ERLDC representative affirmed of sharing detailed analysis of the proposed lines taking N-1 contingency and other network conditions into consideration.
- OCC suggested prioritizing the finalization of technical requirements for reconductoring, before determining the source of funding for it.

- OCC also opined to convene a special meeting at ERPC secretariat in physical mode comprising the concerned utilities to further deliberate and evolve a consensus on the issue.
- Powergrid ER-II and ERLDC were advised to share the necessary details with all concerned prior to the special meeting.

**Deliberation in the meeting:**

***Powergrid ER-II Submission:***

- *Conductor ageing beyond 37 years, physical deformation of conductors and vulnerability to failure resulting in frequent tripping of the proposed lines was reiterated.*
- *Stressed the need for increasing the number of ICTs at 400 kV Malbase S/S to cater increased load after reconductoring of 220 kV Birpara-Chukha and 220 kV Birpara-Malbase lines.*
- *Acceded to submission by WB SLDC regarding conductor upgradation to HTLS and reconductoring with ACSR in specified lines but at the same time the need for upgrading 220 kV D/C Dalkhola-Kishanganj line to HTLS was also underlined.*
- *Need for relevant study by CEA and CTU on reconductoring proposal was also reaffirmed.*

***ERLDC Submission:***

- *A comprehensive presentation was delivered highlighting network configuration and loading pattern of the proposed lines for reconductoring (Attached at **Annexure**).*
- *High perennial loading of 220 kV D/C Malda-Gazole and high loading in 220 kV D/C Binaguri-Siliguri along with 220 kV D/C Siliguri-Kishanganj lines during monsoon period ( with high hydel generation) were highlighted.*
- *It also emerged that a portion of 220 kV Alipurduar-Birpara D/C line(PG) has been LILOed by WBSETCL at Falakata. Reconductoring of the LILO portions of the said line shall also be considered.*

***West Bengal SLDC, WBSETCL & WBSEDCL Submission:***

- *Agreed with the HTLS reconductoring of 220 kV D/C Malda-Gazole line during winter by opening 220 kV D/C Gazole-Dalkhola line.*
- *Agreed with the reconductoring of 220 kV D/C Binaguri-Siliguri , 220 kV D/C Siliguri-Kishanganj ,220 kV D/C Binaguri-Birpara and 220 kV D/C Alipurduar-Birpara lines with HTLS.*
- *Based on loading pattern and considering the condition of the conductors as shown by Powergrid, consented to reconductoring of 220 kV D/C Dalkhola-Gazole and 220 kV D/C Dalkhola-Kishanganj lines with ACSR conductors but not HTLS.*
- *Underscored the significant difference in cost between ACSR and HTLS conductors and thus reconductoring should be executed with necessary techno-commercial prudence.*
- *Emphasized the need of study assessing merit of the proposal by CTU, being the nodal agency for long-term planning in power sector. This may substantiate the study done by ERLDC based on operational feedback.*
- *Stressed the importance of formal consent from Bhutan prior to commencing reconductoring works in 220 kV Birpara-Malbase and 220 kV Birpara-Chukha lines with significant portions in Bhutan territory.*
- *Exploring possibility of seeking grant from PSDF for reconductoring was also proposed.*

***Decision:***

- *Agreed for HTLS reconductoring of the following lines:*
  - *220 kV D/C Malda-Gazole TL*
  - *220 kV D/C Binaguri-Siliguri TL*
  - *220 kV D/C Siliguri-Kishanganj TL*
  - *220 kV D/C Binaguri-Birpara TL*
  - *220 kV D/C Alipurduar-Birpara TL*
- *Agreed for reconductoring of the following lines with ACSR:*
  - *220 kV D/C Dalkhola-Gazole TL*
  - *220 kV D/C Dalkhola-Kishanganj TL*
- *Reconductoring works of 220 kV Birpara-Malbase and 220 kV Birpara-Chukha lines shall be commenced after due coordination with Govt. of Bhutan so that reconductoring in both India and Bhutan portions of the above lines can be carried out in synchronized manner.*
- *Powergrid was advised to approach CTU with this proposal along with the record of discussions.*

**2. Proposal for procurement of Reactor spares (cold spares) for Eastern Region**

**Deliberation in meeting**

**Background:**

In Eastern Region, following Reactors are in service at present as POWERGRID asset:

| STATE | VOLTAGE LEVEL | CAPACITY | IN SERVICE (In No) | Number of Spares available (In No) |
|---|---|---|---|---|
| WEST BENGAL | 400 KV | 125 MVAR | 13 | NIL |
| | | 80 MVAR | 07 | NIL |
| | | 63 MVAR | 05 | NIL |
| | | 50 MVAR | 08 | 01 at Maithon |
| Odisha | 400 KV | 125 MVAR | 15 | 01 at Angul |
| | | 80 MVAR | 08 | 01 at Rourkela |
| | | 63 MVAR | 07 | NIL |
| | | 50 MVAR | 06 | 01 at Rourkela |
| SIKKIM | 400 KV | 80 MVAR | 02 | NIL |
| | 220 KV | 31.5 MVAR | 02 | NIL |
| BIHAR | 400 KV | 125 MVAR | 16 | NIL |
| | | 80 MVAR | 12 | NIL |
| | | 63 MVAR | 11 | NIL |
| | | 50 MVAR | 10 | 01 at Biharsharif |
| JHARKHAND | 400 KV | 125 MVAR | 8 | NIL |
| | | 80 MVAR | 3 | NIL |
| | | 63 MVAR | 2 | 01 at Daltonganj |
| | | 50 MVAR | 8 | 01 at Jamshedpur |

However, apart from 400 KV, 50 MVAR Reactor at Maithon SS, no other spare Reactor are available till date. As per CEA spare norms (circulated in July-2020, refer page-18/19), for maintaining spares under GST regime, each state should be provisioned with respective sized Reactor. Accordingly, as per available sizing following Reactors are required at following locations:

| STATE | VOLTAGE | SIZE | STORAGE PLACE |
|---|---|---|---|
| WEST BENGAL | 400 KV | 125 MVAR | DURGAPUR SS |
| | | 80 MVAR | BINAGURI SS |
| | | 63 MVAR | BINAGURI SS |
| SIKKIM | 400 KV | 80 MVAR | RANGPO SS |
| | 220 KV | 31.5 MVAR | NEW MELLI SS |
| BIHAR | 400 KV | 125 MVAR | BIHARSARIFF SS |
| | | 80 MVAR | PATNA SS |
| | | 63 MVAR | MUZAFFARPUR SS |
| JHARKHAND | 400 KV | 125 MVAR | NEW RANCHI SS |
| | | 80 MVAR | RANCHI SS |
| ODISHA | 400 KV | 63 MVAR | ROURKELA SS |

All above Reactors will be kept as regional spare and based upon urgency the same shall be utilised in ISTS system and as per CEA spare norms in state level.

Members may discuss and approve the technical requirements for further submission of cost data to subsequent meetings. As per decision taken vide agenda point-B11 of 202nd OCC, forum agreed of the proposal for procurement of spare Reactor in ER as per CEA guideline. Further in minutes it is stated to update the detail cost implications in 49th CCM meeting, for deliberations.

Accordingly, details work out for tentative cost implications done and total value comes as, **Rs. 111,52,97,192/-** (RS. ONE HUNDRED AND ELEVEN CRORES FIFTY-TWO LACS NINETY-SEVEN THOUSAND ONE HUNDRED NINETY-TWO ONLY). Details cost break up given for reference purpose.

In the 49th CCM Meeting, West Bengal representative informed that the cost of keeping spare reactor for eastern Region is very high and procurement plan should be implemented in phase wise, so that financial burden on beneficiaries should be less. After detailed deliberation, CCM opined that the required number of spare reactors may be again deliberated in the OCC.

In 50th CCM meeting, Representative of ERPC submitted that the availability of spare reactors as per above-mentioned table is as per the CEA guidelines.

After detailed deliberations CCM advised for procurement of 125 MVA reactor for West Bengal, Bihar and Jharkhand and explore the possibilities for procurement of 63 MVAR Reactor in lieu of 50/80 MVAR Reactor for more redundancy.

CCM further advised Powergrid to submit the cost estimate in the upcoming TCC/ERPC meeting. The issue was referred to the 51st TCC/ERPC Meeting.

TCC referred the issue back to OCC meeting for further deliberation.

In the 211th OCC Meeting, Powergrid ER-II representative underlined CEA spares guidelines as the driving force behind putting up this agenda. It was submitted that CEA guidelines have been framed already taking into account failure rate and reliability of equipment. Non-feasibility of early restoration in event of outage amid non-availability of adequate spare reactors was also highlighted.

West Bengal SLDC representative submitted that CEA spare guidelines not being a regulatory mandate can't be mandatorily imposed on the constituents. He emphasized the burden imposed on end consumers due to overcompensation with reactors and over-redundancy with provision of spare reactors and thus requested considering the issue from techno-commercial perspective. He further pointed out the lack of any concrete study factoring in impact on voltage profile with reactors of various ratings in line with threshold limits as prescribed in CEA planning criteria. It was also submitted that

operating procedure being different in different regions generalized guidelines can't be uniformly enforced across all regions.

He put forth the following justifications against provision of reactor spares:

1) Switching off lightly loaded lines can reduce bus voltage similar to using a 125/80/50 MVAR reactor, without causing system hazards. This makes excessive reactor installations and spare purchases unnecessary and costly for consumers.
2) In EHT sub-stations with more than one reactor, using a reactor from a station with higher voltage to replace a failed one will not affect the system. This allows flexibility until a new reactor is procured and installed.
3) Reactors maintained by the state have a low failure rate, with no permanent outages in over five years, suggesting that investing heavily in spares is not cost-effective.
4) In emergencies, a bus reactor can substitute for a line reactor failure. Our system has multiple 50/80 MVAR reactors available for such situations.
5) Dynamic studies are needed to check if TOV (Temporary Over Voltage) and switching over voltages stay within safe limits, both with and without line reactors of different capacities (50/63/80 MVAR).
6) Reactor maintenance is manageable, especially in winter. Opening one or two lightly loaded lines can handle reactor outages, making it easier than maintaining ICTs.
7) Regulatory guidelines vary by region, reflecting different grid challenges and consumer tariffs. Decisions should be based on financial and technical factors, including downtime management and the extent of VAR control measures, rather than a one-size-fits-all approach.

In this regard, WBSEDCL representative expressed serious concern on loading of most lines below SIL in winter, thereby imposing huge VAR charge on the consumers.

ERLDC representative, pointing out requirement of reactors at Alipurduar in absence of nearby generators for providing VAR support, also outlined the distinction between present requirement of reactors and provision of spare reactors.

**OCC decisions:**

- OCC suggested to explore feasibility of deploying 63 MVAR reactors in place of 50 MVAR capacity for optimization in spare requirement.
- OCC advised ERLDC to carry out detailed node-wise operational requirement study highlighting impact of modification in reactor rating.
- OCC also opined to convene a special meeting at ERPC secretariat in physical mode comprising the concerned utilities for further deliberation and consensus on the issue.

**Deliberation in the meeting:**

***Powergrid ER-II Submission:***

- *Underscored the need of spares to ensure optimal availability as well as commercial realization besides operational flexibility.*
- *Appeal for implementing provision of RPC spares in line with extant practices followed in other regions of the country so that reactors may be kept as cold spares without imposing financial burden on constituents.*

***ERLDC Submission:***

- *Presented a comparative study of voltage profile in different pockets of Eastern region for the month of December'2023 w.r.t preceding year outlining the need of reactors to keep bus voltages within IEGC band (+/- 5% of rated value) (Attached at **Annexure**).*
- *Around 15 lines (line length: short) were highlighted that are overcompensated with reactors of total around 1000 MVAR capacity.*

***West Bengal SLDC, WBSETCL & WBSEDCL Submission:***

- *Proposal of reactor spares was not agreed to on technical grounds as follows:*
  - *Based on O&M feedback, failure rate of reactors is minimal rather its associated breaker is more prone to failure.*
  - *In case of reactor outage, overvoltage menace may be mitigated by opening lightly loaded lines with due consideration of N-1 contingency and further, reactor may also be shifted from any nearby S/S to see through two consecutive winters till procurement of new reactor.*
  - *Addition of redundant reactors renders the system to be over-compensated*
  - *Nowadays a bus reactor can be also be deployed as a line reactor in exigency.*
  - *Maintenance of reactors is relatively convenient since its shutdown may be availed easily except in winter months.*

***Decision:***

- *ERLDC was advised to evaluate the necessity of reactors on lines identified as overcompensated in coordination with CTU. If the reactors are not required, the suggestion was to repurpose these reactors as spares, strategically placing them at suitable locations for enhanced grid stability and efficiency.*
- *Procurement of new 31.5 MVAR reactor for 220 kV New Meli S/S was also acceded to.*

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