भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

सेवा में / To,

उ.क्षे.वि.स. एवं टीसीसी के सभी सदस्य एवं विशेष आमंत्रित (संलग्न सूचीनुसार)
Members of NRPC & TCC & Special Invitees (As per List)

विषय: 51 वीं तकनीकी समन्वय समिति (टीसीसी) और 76 वीं उत्तरी क्षेत्रीय विद्युत समिति (एनआरपीसी) बैठक की कार्यसूची।
Subject: Agenda for 51st Technical Co-ordination Committee (TCC) & 76th Northern Regional Power Committee (NRPC) -reg.

महोदय / महोदया,

एनआरपीसी की तकनीकी समन्वय समिति (टीसीसी) की **51 वीं** बैठक और उत्तर क्षेत्रीय विद्युत समिति की **76 वीं** बैठक दिनांक **25.10.2024 (11:00 AM)** को वीडियो कॉन्फ्रेंसिंग के माध्यम से आयोजित की जाएगी। बैठक की कार्यसूची संलग्न है।

कृपया बैठक में भाग लेना सुविधा जनक बनाएं या अपनी ओर से उपयुक्त **प्रतिनिधि(कार्यकारी निदेशक/ मुख्य महाप्रबंधक /मुख्य अभियंता से कम नहीं**) नियुक्त करें। मीटिंग लिंक अलग से साझा किया जाएगा ।

The **51st** meeting of Technical Co-ordination Committee (TCC) of NRPC and **76th** meeting of Northern Regional Power Committee (NRPC) will be held on **25.10.2024 (11:00 AM)** via video-conferencing. Agenda for the same is attached.

Kindly make it convenient to attend the same or depute suitable representative (**not lower than Executive Director/ Chief General Manager/ Chief Engineer**) to attend meeting on your behalf. Meeting link shall be shared separately.

भवदीय
Yours faithfully

Signed by Vijay Kumar Singh
Date: 21-10-2024 14:34:02

(वी.के. सिंह)
(V.K. Singh)
सदस्य सचिव
Member Secretary

प्रतिलिपि: राजीव सूद, अध्यक्ष, एनआरपीसी एवं एमडी, एचपीपीटीसीएल (md.tcl@hpmail.in)

सत्यमेव जयते

उत्तर क्षेत्रीय विद्युत समिति

NORTHERN REGIONAL POWER COMMITTEE

Agenda of

51st meeting of

Technical Coordination Committee

&

76th meeting of

Northern Regional Power Committee

Date: 25th October 2024

Time: 11:00 AM

Via: Video Conferencing

Contents

Agenda for TCC & NRPC

A.1 Approval of MoM of the 75th NRPC meeting

A.1.1 The minutes of the 75th NRPC meeting (held on 28.08.2024) were issued vide letter dt. 18.09.2024. No comment has been received as of now.

Decision required from Forum:

Forum may consider to approve the issued MoM.

A.2 Status of action taken on decisions of 75th NRPC meeting (agenda NRPC Secretariat)

A.2.1 Status on decisions of 75th NRPC meeting is attached as **Annexure-I.**

Decision required from Forum:

Status of action taken may be discussed in meeting.

A.3 Redundant communication for Salal (NHPC) Station (agenda by CTUIL)

A.3.1 In 25th TeST Meeting of NRPC, Grid-India provided feedback that Salal Generating Station (NHPC) presently connected in radial path from Salal-Kishenpur and there is no redundant communication path available for this station. Any issues of communication in this path may lead to outage of Salal data and difficulty in computation of drawl of J&K. CTU stated in the meeting that they shall examine and plan redundant communication for Salal (NHPC) Station.

A.3.2 Redundant communication for Salal (NHPC) is discussed in 7th CPM of NR (minutes are attached at **Annexure-II**). In the meeting, POWERGRID informed that one additional line is available between 220kV Salal (NHPC) & Jammu (Gladini) (JKPTCL) (2x S/c lines) which belongs to POWERGRID. OPGW can be installed on one single circuit of this line to achieve redundant communication for Salal Station. POWERGRID also informed that ULDC FOTE is available at Jammu (JKPTCL) (Gladini) and at Salal (NHPC) therefore no additional FOTE shall be required.

A.3.3 CTU proposed that OPGW can be installed on 220kV Salal (NHPC) – Jammu (JKPTCL) S/c line **(62 kms.)** to provide redundant communication to Salal (NHPC) station. The same was agreed in the meeting.

A.3.4 Based on the above details, a scheme has been prepared by CTU which is attached at **Annexure-III**. After review of NRPC, same shall be put up in upcoming NCT meeting by CTU for approval.

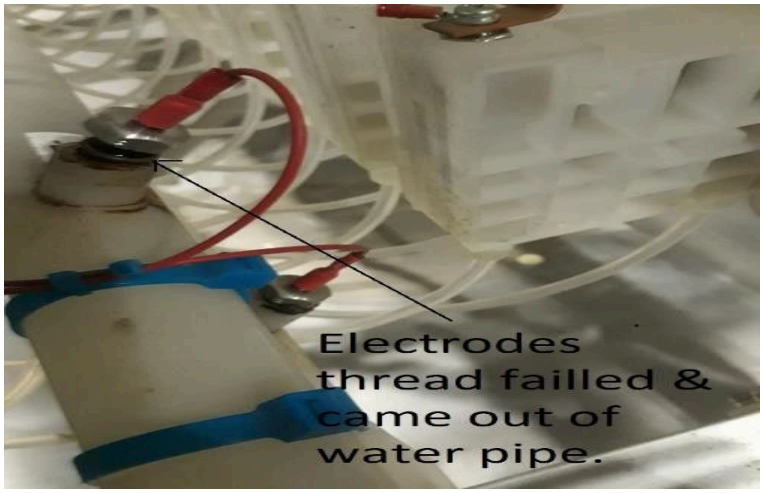
Decision required from Forum:

Forum may deliberate on the above proposal and recommend for approval.

A.4 Installation of Co2 injection (seeding) system in HVDC Mundra and Mahendragarh Terminal system (agenda by ATIL)

A.4.1 ±500 kV HVDC Mundra-Mahendragarh Transmission system is a critical interconnection between the Western Region and the Northern Region. The system is in service since the last 12 years. Every year, the system is taken into outage for 6-8 days mainly to check the valve cooling system with checks of deposition of the electrode cooling tubes. The reason of deposition is during circulation of DM water for cooling of thyristor, it meets aluminum alloy heat sinks of the thyristor. Very slow chemical process happens which releases aluminum in DM water while circulation within thyristor heat sink. Released aluminum particles in microns circulate inside water tubes of valve hall. Siemens has provided electrodes on colling tubes of valve hall. Aluminum particles with other impurities deposit on electrodes provided on colling tubes of valve hall. It is very critical to check these electrodes every year so that electrodes with high deposition can be replaced.

A.4.2 Some images of the deposition formed are:



	Location	2019	2020	2021	2022	2023	Grand Total

REPLACEMENT OF GRADING ELECTRODE	Mundra	15	20	32	44	47	158
	Mahendragarh	7	9	18	25	28	87

A.4.3 While this electrode deposition and replacement activity had been carried out once a year, ATIL has observed increased deposition in electrodes in the past 5 years. Below is the trend of deposition observed:

A.4.4 Moreover, ATIL has had 5 nos. of emergency outages availed in the past 2 years due to deposition and water leakage in the valve hall. The problem is aggravating and it is required that ATIL would have to check the deposition on electrodes on 6 monthly basis i.e. 16 days outage of HVDC system.

A.4.5 ATIL had approached OEM (M/S Siemens) to provide a solution for such deposition. M/S Siemens has proposed installation of Co2 dosing (injection) system. The purpose of the CO2-dosing system is to inject gaseous CO2 in the cooling system in order to modify the conditions of the cooling water. According to the CO2 amount the pH-value of the cooling water and the conductivity changes. Through the conductivity value the injected CO2 amount is controlled. The CO2-dosing system is needed to reduce/stop the formation of aluminum coating on the grading electrodes used inside the converter. Thus, the injection system maintains the pH of DM water to 7 which prevents such scaling.

A.4.6 ATIL has submitted that the above-mentioned solution is proven and globally recommended. Enclosed (**Annexure-IV)** is a technical paper published by “Internal Journal of electrochemical science” on the subject with Siemens’ experience on the same. In India, Power grid has installed the same in its Talcher and Kolar HVDC terminals and the results are very good. Co2 injection system has reduced impurity deposition which has resulted in long maintenance and emergency outages.

A.4.7 The estimate cost of supply and installation is Rs 10 crore/pole/terminal (total Rs 40 crore for both Mundra and Mahendragarh). The installation would require an outage of 6-8 days outage/pole.

A.4.8 ATIL seeks approval of the forum to install the Co2 injection system as an additional capitalization for technical upgradation project and requests approval of the outage duration for installation of the same as deemed available to ATIL.

Decision required from Forum:

Forum may deliberate and may take decision of above proposal of ATIL.

A.5 Implementation of Automatic Demand Management Scheme (ADMS) by DISCOMs in NCT of Delhi as mandated by IEGC Regulations (agenda by DTL)

A.5.1 DTL has mentioned that IEGC 2023 Clause 36, Demand and Load Management states that

(1) The demand and load shall be managed for ensuring grid security.

(2) SLDC, in coordination with STU and Distribution Licensee(s), shall develop Automatic Demand Management scheme with emergency controls at SLDC.

(3) Whenever the power system is in an alert state or emergency state as assessed by SLDC or advised by RLDC.

- The respective distribution licensee or bulk consumer under the regional control area/ state control area shall abide by the directions of the RLDC/SLDC to secure the system, and extreme measures like load shedding may be carried out as a last resort.
- Provided that load shedding shall be resorted to after the demand response option has been exhausted.
- The load disconnected, if any, shall be restored as soon as possible on clearance from SLDC, in coordination with RLDC if required, after the system has been normalized.

A.5.2 Therefore, implementation of Automatic Demand Management scheme (ADMS) has been on the agenda of NRPC. In the 64th NRPC meeting held on dt. 24.03.2023, it was stressed by NRPC that ADMS should be fully automatic for which it was suggested by NRLDC representative that a logic be added that could sense the overall drawl of Delhi before its operation to ensure certainty of action.

A.5.3 Subsequently, a separate meeting was called by NRPC on 07.08.2023 along with Delhi SLDC, Delhi DISCOMs, and NRLDC in order to resolve issues regarding implementation of ADMS. Delhi SLDC and Delhi DISCOMS re-iterated the difficulties in implementation of ADMS. At this, NRLDC suggested that logic for ADMS may be

developed at State periphery and Logic of ADMS may have a combination of frequency condition, overdrawal and overdrawal limit along with time duration limit for continuous overdrawal. Thereafter, it was decided that Delhi SLDC will co-ordinate with the Delhi DISCOMs and finalize the logic for ADMS operation in Delhi and intimate the same to the NRPC Secretariat. The matter was also deliberated in various Delhi state OCC meetings.

A.5.4 Further, as per directions given by NRPC in a meeting held with Delhi SLDC and Delhi DISCOMs on 04.01.2024, a committee with the members from all DISCOMs and DTL was constituted under the chairmanship of GM(T)SLDC to formulate the logic for implementation of ADMS in NCT of Delhi. In this meeting, NRPC stated that MES may be exempted from load shedding since the load of MES is less than one percent of the overall load of Delhi.

A.5.5 DTL has submitted that numerous meetings of this ADMS committee were held. The committee agreed with the observation of NRPC regarding the exemption of MES for load shedding. The committee finalized the logic / Standard Operating Procedure (SOP) for implementation of ADMS in Delhi and the same was shared with NRPC and NRLDC on 05.06.2024 and 15.07.2024 respectively for perusal/ approval. In response, NRLDC provided some suggestions in the proposed SOP of ADMS.

A.5.6 The suggestions provided by NRLDC were incorporated and the committee finalized the logic / Standard Operating Procedure (SOP) for implementation of ADMS in NCT of Delhi.

A.5.7 The copies of MOMs referred herein and communication made with NRLDC & NRPC are attached as **Annexure-V**.

A.5.8 The final SOP is attached as **Annexure- VI.** The finalized SOP was submitted to NRPC vide letter dt. 16.08.2024 for their approval. NRPC has obtained the consent of NRLDC on the above SOP and the same is acceptable to them.

A.5.9 Now, the Standard Operating Procedure (SOP) of Automatic Demand Management Scheme (ADMS) by the DISCOMs in NCT of Delhi is put before NRPC for approval. Thereafter, the process of implementation of ADMS shall be initiated by the Delhi DISCOMs with the due information to Delhi Electricity Regulatory Commission.

Decision required from Forum:

Forum may deliberate and approve the proposed Standard Operating Procedure (SOP) of Automatic Demand Management Scheme (ADMS) of DTL.

A.6 Restoration of damaged tower No.4 (C-Type) of double circuit line connecting Noida Sector-62 and Sahibabad to DTL 220kV Gazipur S/Stn. [Delhi-UP Corridor] (agenda by DTL)

A.6.1 DTL has submitted that double circuit line owned by UPPTCL emanating from 220kV DTL Gazipur S/Stn. to 220kV UPPTCL Noida Sector-62 and Sahibabad S/Stn. is passing through Gazipur dumping site. This transmission line is used in case of any emergency for evacuation and supply between Delhi and UP.

A.6.2 Further, DTL has mentioned that off late, XEN, Electricity Transmission Division-I, Ghaziabad had informed DTL that narrow base Tower No.4 has got tilted due to nearby pressure of MCD Delhi, waste and hence, the conductor of the referred section of transmission line had been dismantled. UPPTCL has approached to MCD for reimbursement of cost of repair of this tower. At the same time, DTL has also been requested to follow up this matter with MCD for reimbursement of cost of repair.

A.6.3 Accordingly, the matter has taken up many a times with MCD for compensation of amount to be incurred in repairing of the tower line as asked by UPPTCL. However, no response has been received so far. Superintending Engineer, Electricity Transmission Circle-Ghaziabad(UPPTCL) vide letter dt.20.03.2024 has been requested for early restoration of these lines by incurring the expenditure of repair in R&M head of UPPTCL in view of overall interest of the power system of Northern region due to the fact that the expenditure is of the order of lacs of rupees. However, no response from UPPTCL site has been received so far and the transmission lines are still under breakdown since 2022.

A.6.4 As the matter has been rigorously followed up by DTL with MCD as well as the owner of the line i.e. UPPTCL, but no outcome/response have been received so far and hence in view of best interest of the Northern Region Power System, DTL has proposed that this matter may be discussed for further direction to UPPTCL for taking necessary action in this regard. It is prudent to mention that these transmission lines are utilized to exchange power in case of emergency between Delhi and UP.

A.6.5 Moreover, DTL has shared the previous OCC reference related to the matter as under-

This matter was brought out to the notice of NRPC vide agenda item no. A.19 of the 220th OCC Meeting for further deliberation and decision. As per the decision of the OCC as per A.19, DTL was directed to take up the matter with higher officials of MCD for reimbursement of repair of this tower. Accordingly, this matter was taken up with higher officers of MCD vide letter no.-31 dated 02.08.2024. However, no response has been received so far in this matter.

A.6.6 Further, DTL has submitted that during the site visit held on 12.08.2024, it has been noticed that the tilted tower has been removed/ dismantled by UPPTCL and de-stringing of conductors has been done. It is also submitted that neither UPPTCL nor MCD has given any response so far in the matter.

A.6.7 It is prudent to mention that UPPTCL is the owner of the said assets and this petty expenditure to be incurred in the requisite repair etc. may be carried out by UPPTCL. Further, if UPPTCL does not require these lines in future at all, then further action in regard to dismantling of this link on permanent basis may be considered and approved by the Forum so that spared bays may be used by DTL somewhere else.

Decision required from Forum:

Members may kindly discuss and approve the permanent dismantling of the double circuit line connecting Noida Sector-62 and Sahibabad to DTL 220kV Gazipur S/Stn. The concerned may be directed accordingly to complete the work at the earliest in order to extend the use of the associated spread bays at somewhere by DTL.

A.7 Actions for resource adequacy exercise at SLDC level (agenda by NRLDC)

A.7.1 Hon’ble CERC In the matter of Planning for safe, secure, and reliable integrated operation of the power system during critical periods arising on account of seasonal variations wherein the electricity demand increases rapidly by undertaking specific measures to mitigate the risks on the power system, under clause (h) of sub-section (1) of Section 79 of the Electricity Act, 2003 and the Regulation 31 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 has issued suo-motto order 9/SM/2024 dated 07.10.2024. Order is attached as **Annexure-VII.**

A.7.2 Commission has issued the following directions to NLDC, RLDCs, and SLDCs in connection with the implementation of Regulations 31 and 33 of the Grid Code to address the anticipated surge in demand of electricity during October 2024 on account of seasonal variations:

a) All the State Load Despatch Centres and RLDCs shall furnish the details of operational planning undertaken by them in terms of Regulation 31(4) (a) of the Grid Code especially for October 2024. RLDC shall validate the adequacy of resources in terms of Regulation 31(4)(b) of the Grid Code.

b) All State Load Despatch Centres and Regional Load Despatch Centres shall prepare the worst-case scenario due to possible surge in demand during the period 1.10.2024 to 31.10.2024 in their respective control area and submit within seven days to the Commission with a copy to National Load Despatch Centre.

c) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, should assess their demand-generation scenario in the upcoming months, ensure the optimum generation, avoid undesirable planned outages, and advise the generating company to offer their availability. The State Load Despatch Centre or Regional Load Despatch Centre shall ensure the optimum scheduling during the shortage period and surplus power to get despatched during the deficit period.

d) The Distribution Companies, in case of a shortage scenario, can procure the power from surplus or requisitioned capacity of other states so that optimum despatch can be ensured for safe and reliable power system operations. The State Load Despatch Centre shall monitor the generation-demand deficit of the respective distribution companies.

e) The generating companies operating their plant with capacity less than its installed capacity due to technical issues, i.e., capacity under partial outage or forced outage, are advised to fix the issues to ensure the maximum generation capacity on-bar.

f) The draw schedule of the respective control area needs to adhere to prevent the reduction of system frequency. The State Load Despatch Centre or Regional Load Despatch Centre, as the case may be, shall monitor the deviation of the key system parameters.

g) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, shall issue the system alerts to their respective grid-connected entities for the possible deficit during the likely surge in demand

h) The Regional Load Despatch Centres and State Load Despatch Centres shall submit the report on the implementation of the above measures, a load-generation scenario in their respective control areas, and any other measures taken to address the deficit of power supply during the period 1.10.2024 to 31.10.2024.

A.7.3 NLDC, RLDCs, and SLDCs have been directed to submit their responses to the measures contained in para 9 of this order by 16.10.2024.

A.7.4 Accordingly, NRLDC vide email dated 09.10.2024 has requested all SLDCs to furnish the details of operational planning carried out at SLDC level so that operational planning studies can be done at regional level using input from states. Further, the figures submitted by SLDCs and discussions held in 223 OCC meeting for anticipated energy and demand data has been shared and it has been requested to review these figures and provide inputs on the worst case scenario as mentioned in CERC order for further compilation of worst-case scenario at regional level.

A.7.5 It is being noticed that although demand data is being shared by NR states on day-ahead basis, weekly and monthly demand data is still not being received. Same was also discussed in 223 OCC meeting. Extract of OCC meeting MoM is mentioned below:

Quote

Demand forecasting related

NRLDC representative mentioned that with reference to the Clause 31(2) of Central Electricity Regulatory Commission-IEGC Regulations, 2023 and the Operating Procedure of NRLDC prepared in accordance with the same, each SLDC has to furnish the demand estimation for day ahead, week ahead, month ahead (with time block wise granularity) and demand estimation for year ahead (with hour granularity). The sub-clause 31(2) (h) of IEGC-2023 states the following timeline for the submission of demand estimate data to RLDC.

Type of Demand Estimation	*Timeline*
Daily	*10:00 hours of previous day*
Weekly	*First working day of previous week*
Monthly	*Fifth day of previous month*
Yearly	*30th September of previous year*

The following is the status regarding forecast data submission.

Region	State	Demand Estimation							
		Daily*		Weekly		Monthly		Yearly	
		Estimation (Y/N)	Data submission (Y/N)	Estimation (Y/N)	Data submission (Y/N)	Estimation (Y/N)	Data submission (Y/N)	Estimation (Y/N)	Data submission (Y/N)
NR	Punjab	Y	Y	N	N	N	N	N	N
	Haryana	Y	Y	N	N	N	N	N	N
	Rajasthan	Y	Y	N	N	N	N	N	N
	Delhi	Y	Y	N	N	N	N	Y*	Y*
	UP	Y	Y	N	N	N	N	Y*	Y*
	Uttarakhand	Y	Y	N	N	N	N	N	N
	HP	N	N	N	N	N	N	Y*	Y*
	J&K	Y	Y	N	N	N	N	N	N
	Chandigarh	Y	Y	N	N	N	N	N	N
	Railways_NR	N	N	N	N	N	N	N	N

**Submitted for FY-24-25. Data is awaited for FY 25-26*

In accordance with above, NRLDC representative requested all SLDCs to furnish the demand estimation data as per the formats available at https://drive.google.com/drive/folders/1KWY4G9gTBLV5wTJkhGEIeRptKP-QbhjL?usp=drive_link to NRLDC through mail (nrldcmis@grid-india.in) and FTP as per above timeline.

HP SLDC representative stated that they are submitting the daily demand data to NRLDC through FTP, however, on few occasions it was missed to email the data. HP SLDC is now emailing the forecast data to NRLDC on daily basis. NRLDC representative noted the same.

All states agreed to furnish the demand estimation data with NRLDC as per timelines specified in IEGC 2023.

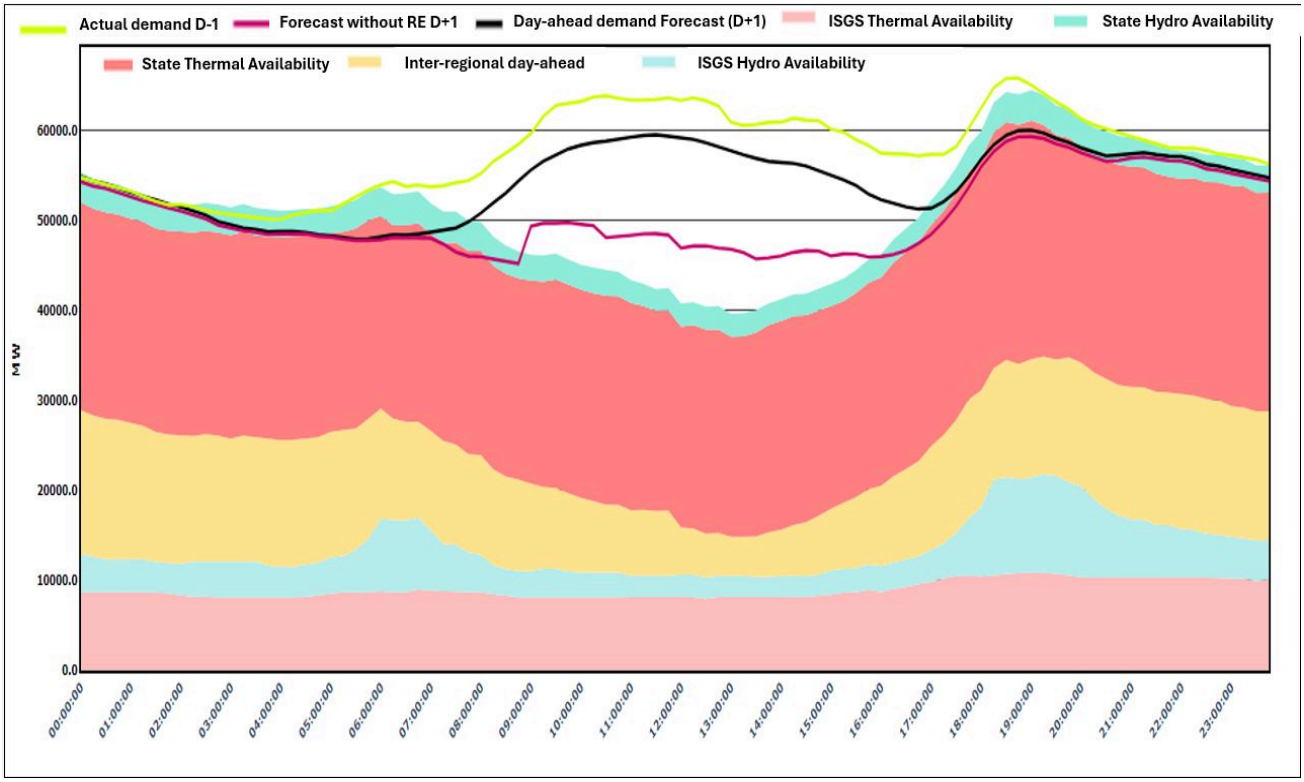
Unquote

A.7.6 In addition to demand forecast, generation adequacy related data is also to be submitted from states. Only a monthly maximum demand figure is being discussed in monthly OCC meetings on day ahead basis.

A.7.7 However, NRLDC is carrying out day-ahead resource adequacy assessment after 15:00 hrs. of D-1 based on generation stacking method with Day ahead demand forecast and generation using the following inputs:

- Day-ahead Demand forecast
- Day-ahead RE forecast (From REMC for ISTS and inputs from internal forecasting tool for intra-state)
- Generation availability

A.7.8 One such sample snapshot of assessment on day-ahead basis is shown below:



A.7.9 SLDCs are requested to share actions being taken at their end for resource adequacy in line with the actions required as per IEGC 2023 and CERC order 9/SM/2024 dated 07.10.2024.

Decision required from Forum:

Members may please deliberate

A.8 Winter preparedness 2024-25 (agenda by NRLDC)

A.8.1 During 223 and 224 OCC meetings held recently, the challenges expected during grid operation for upcoming winter months were discussed. Moreover, there is possibility for severe winter during this season due to the impact of LA-NINA. IMD in their press release dated 05.09.2024, Extended range Forecast for next two weeks (5- 18 Sept, 2024) mentioned that “The latest MMCFS forecast indicates higher likelihood of La Niña conditions are likely to develop during end of monsoon season”. Accordingly, number of measures were discussed and implemented for better grid operation during winter months:

A.8.2 Based on the detailed discussion held in last OCC meeting, following actions were suggested:

- Transmission utilities have been asked to prepare plan for measures to be taken by them for carrying out pre-winter maintenance activities. It was agreed that same may be shared by utilities via mail with NRPC/NRLDC before next OCC meeting. Same is yet to be received.
- To carry out tap change exercise at 220kV and below voltage level. NRLDC will also be studying voltage profile of 400/220kV substations in NR for the month of Oct 2024. Accordingly, tap changes at following 400/220kV substations will be proposed in next OCC meeting.
- With low temperature across Northern region and with high humidity in the air, fog starts to appear across the Northern region. This problem is generally most severe from 15Dec- 15Feb period & more prominent in areas having high pollution. During this time, additional care need to be taken by system operator as many multiple element tripping events have been reported in the past especially in Punjab, Rajasthan, Haryana and Eastern UP. Such tripping are more severe if the lines are tripping from generation complex. Events of outage of nuclear generation outage at RAPP were also reported due to tripping of lines from RAPP during night hours.

A.8.3 List of line that reported tripping on 4 or more instances last year during Dec-Jan months during fog-prone time of 21:00-10:00hrs along with their insulator status is shown below:

S. No.	Line Name	Tripping instances	Owner	Insulator status

1	220 KV RAPS_A(NP)-Sakatpura(RS) Ckt-2	12	RRVPNL	N/A
2	220 KV RAPS_B(NP)-Sakatpura(RS) Ckt-1	10	RRVPNL	N/A
3	220 KV RAPS_A(NP)-Sakatpura(RS) Ckt-1	9	RRVPNL	N/A
4	400 KV Agra-Unnao Ckt-1	8	UPPTCL	Partial polymer (25%)
5	220 KV Debari(RS)-RAPS_A(NP) Ckt-1	6	RRVPNL	N/A
6	220 KV Nara(UP)-Roorkee(UK) Ckt-1	5	UPPTCL	N/A
7	220 KV Ratangarh(RS)-Sikar(PG) Ckt-1	5	POWERGRID	N/A
8	220 KV Panipat(BB)-Chajpur(HV) Ckt-2	5	HVPNL	N/A
9	400 KV Muktsar-Makhu Ckt-2	5	PSTCL	Porcelain
10	400 KV Suratgarh(RVUN)-Ratangarh(RS) Ckt-1	4	RRVPNL	Porcelain
11	220 KV Shahjahanpur(PG)-Lakhimpur(Gola) Ckt-2	4	UPPTCL	N/A
12	220 KV Ratangarh(RS)-Sikar(PG) Ckt-2	4	POWERGRID	N/A
13	400 KV Shree Cement(SCL)-Kota(PG) Ckt-1	4	POWERGRID	Polymer
14	400 KV Muradnagar_2-Mathura Ckt-1	4	UPPTCL	N/A

A.8.4 It is requested to priorities pre-winter maintenance activities for these lines including insulator replacement work that may have been planned. Further, it is requested to furnish details of progress on cleaning and replacement of porcelain insulator with polymer insulator of other lines not shown above also. NRLDC has already requested vide email dated 26.09.2024 all transmission utilities to furnish the utility-wise latest status of the replacement of porcelain insulators with polymer insulators so that crucial lines for which such works are pending may be identified & prioritized. List is also attached as **Annexure-VIII**.

A.8.5 To ensure that all over flux setting of transformers and overvoltage settings of transmission lines are as per approved protection philosophy of NRPC.

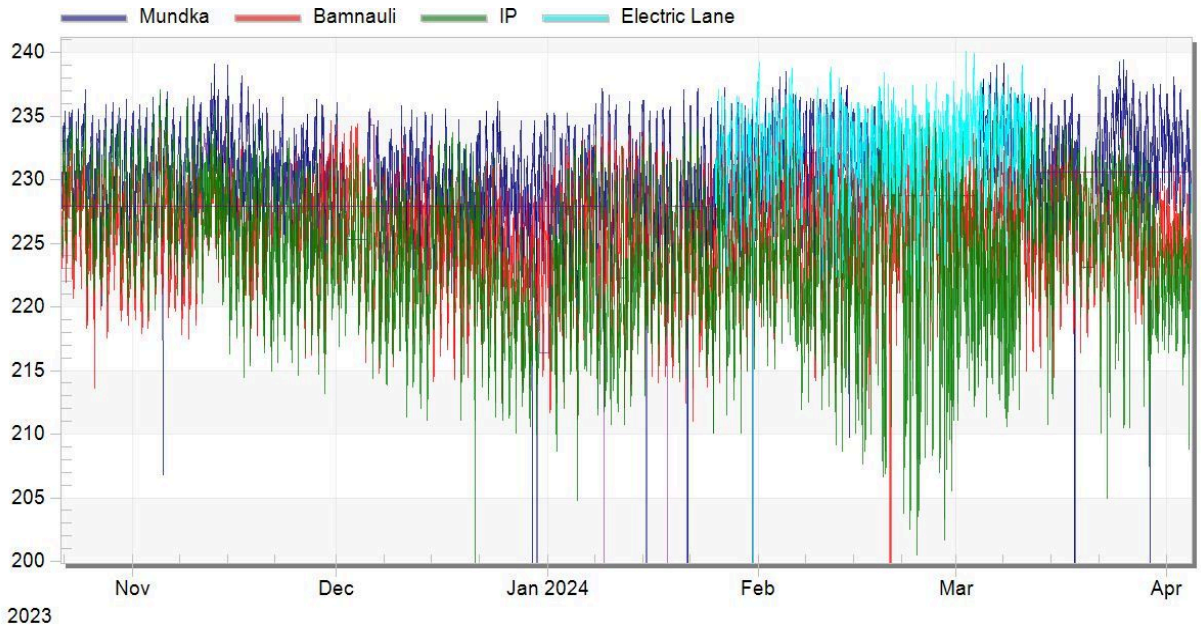
A.8.6 On number of occasions, it is seen that utilities are correcting their protection settings after tripping events. It is important all the protection settings are as approved by NRPC. Utilities are requested to confirm the same from field and ensure that protection settings are only as approved by NRPC.

A.8.7 OCC had expressed concern on the lack of progress of DTL reactors and asked them to expedite their works. Status of reactors under commissioning in Delhi control area in Northern region as per discussion in 223 OCC MoM is shown below:

Substation	Reactor	Status as per 223 OCC MoM
Mundka	1x125 MVAr at 400 kV &	Bay work completed on 25.03.2023. Reactor

	1x25 MVAr at 220 kV	part tender is dropped and at present same is under revision.
Bamnauli	2x25 MVAr at 220 kV	Bay work completed on 25.03.2023. Reactor part tender is dropped and at present same is under revision.
Electric Lane	1x50 MVAr at 220 kV	Under Re-tendering due to Single Bid
Indraprastha	2x25 MVAr at 220 kV	Bay work completed on 07.11.2023. Reactor part tender is dropped and at present same is under revision.

A.8.8 Voltage profile of these substations for 220kV level is shown below:



A.8.9 From the above voltage profile, it can be seen that there is urgent requirement of these reactors.

A.8.10 In a special meeting convened on 23.12.2019 to discuss high voltage issues in Delhi system following information was shared by Delhi SLDC:

(i) Tender for reactors (125MVAR & 2×25MVAR at Maharanibagh, 1×50MVAR at Peeragarhi, 1×125MVAR & 1×25MVAR at Mundka, 2×50MVAR at Harsh Vihar, 1×50MVAR at Electric Lane, 2×25MVAR at Bamnauli and 2×25MVAR at Indraprastha) is going to be floated and the tender is likely to be finalized by 3 months with delivery schedule of 6 months and commissioning time of 3 months. These reactors are likely to be in service by next winter.

A.8.11 It may be noted that these reactors were approved in 40th Meeting of Standing Committee on Power System Planning of Northern Region held on 22nd June, 2018. However, the same has not yet been commissioned. DTL is requested to expedite the commissioning of these long pending reactors.

A.8.12 Utilities to ensure maximum availability of bus reactors and line reactors including provision of using line reactors as bus reactors in case of opening of lines on high voltage. Latest status of reactors under long outage was also discussed in recent 224 OCC meeting.

A.8.13 The reactive power absorption by generators becomes an important resource that helps in managing high voltages in the grid. However, even after continuous follow up in OCC meetings, it is seen that MVAR data telemetry is poor/ inaccurate from some of the generating stations. For some of the generators it is seen that there is inadequate reactive power absorption based on their capability curve especially during night hours.

A.8.14 Since with IEGC 2023 implementation, reactive energy performance also has financial impact, it is desirable that all generating stations continue to support grid voltages by having reactive power performance as per their capability curve and grid requirement.

A.8.15 All generating stations are requested to resolve any issues related to telemetry and make sure that MVAr absorption is as per grid requirement and capability curve of machine. Generators may also set their Vsch (voltage set point) such that units are absorbing MVAR as per their capability and grid requirement with intimation to RLDC/SLDC.

A.8.16 Reactive power support from generators would help to control high voltages in the grid and minimise frequent opening of lines to control high voltages in the grid.

A.8.17 NRLDC would be presenting the reactive power performance of generators in the monthly OCC meetings.

A.8.18 Utilities are requested to prepare plan for measures to be taken by them for carrying out pre-winter maintenance activities. Same may be shared by utilities via mail with NRPC/NRLDC.

Decision required from Forum:

Members may please discuss.

A.9 Communication System Outage Planning Portal (Agenda by POWERGRID)

A.9.1 In the 50th TCC & 74th NRPC Meeting held on 28th and 29th June 2024, it was decided that CTUIL may confirm about development of web-based Communication System Outage Planning Portal in UNMS based on Standard Operating Procedure (SOP) finalised in 14th NPC meeting held on 03rd February 2024. It was also highlighted that communication outage portal should be the same for all regions as outage procedure is same for all regions. In view of the above, CTUIL may refer the specification of WRPC and SRPC. It was emphasized that cyber security issues arising while mapping/ transferring the information available on isolated UNMS system to web-based outage planning portal may also be addressed.

A.9.2 Subsequently, CTUIL vide email dated 02.07.24, communicated to POWERGRID for development of Communication System Outage Planning Portal in existing UNMS system.

A.9.3 As NR-UNMS, NER-UNMS and ER-UNMS system have already been commissioned, and the system is under AMC, therefore, new development in NR-UNMS, NER-UNMS and ER-UNMS is not possible as scope of work under the Project has already been completed. However, WR-UNMS and SR-UNMS is under implementation stages.

A.9.4 WR-UNMS is being awarded to M/s Sterlite Technologies Limited. The work of NR-UNMS and NER-UNMS Project was also awarded to M/s Sterlite Technologies Limited. SR-UNMS is awarded to M/s NMS Works, and ER-UNMS was also awarded to M/s NMS Works. Moreover, Communication System Outage Planning Portal involves usage of existing inventory data of the region which is available in existing regional UNMS system.

A.9.5 There is requirement of integration of inventory data from existing Regional UNMS system to the Regional Communication System Outage Planning Portal, so it is decided to develop Communication System Outage Planning Portal for NR-UNMS, NER-UNMS and WR-UNMS from M/s Sterlite Technologies Limited under the WR-UNMS project. Similarly, the Communication System Outage Planning Portal for SR-UNMS and ER-UNMS shall be developed from M/s NMS Works under SR-UNMS project.

A.9.6 The Regional Communication System Outage planning portal shall be accessed by users such as RLDC, CTU, RPC, maintenance contractor for O&M, for fault reporting and rectification.

A.9.7 As per CEA Cyber security guideline, 2020

"Article 1. Cyber Security Policy.

a. Cardinal Principles: The Responsible entity will strictly adhere to following

cardinal principles while framing cyber security policy:

i. There is hard isolation of their OT Systems from any internet facing IT system.

"

A.9.8 In compliance to CEA Cyber Security guidelines for maintaining hard isolation between UNMS system and Internet facing system, it is decided to host Communication System Outage Planning Portal on Cloud. The ticketing and outage portal shall be hosted as SaaS (Software as a service) on the cloud, and it shall be isolated from the existing UNMS system. The synchronization of inventory data between regional Communication System Outage Planning Portal and Regional UNMS system shall be offline based.

A.9.9 Estimated cost for development of Cloud based Communication System Outage Planning Portal for seven years for NR-UNMS, NER-UNMS and WR-UNMS shall be Rs. 2.64 crores (attached at **Annexure-IX**). Cost shall be booked under ISTS portion of WR-UNMS for NR-UNMS, NER-UNMS and WR-UNMS. Estimated cost for development of Cloud based Communication System Outage Planning Portal for seven years for SR-UNMS and ER-UNMS shall be Rs. 2.99 crores (attached at **Annexure-X**). Cost shall be booked under ISTS portion of SR-UNMS for ER-UNMS and SR-UNMS.

Decision required from Forum:

Members may please deliberate and approve.

A.10 Procurement of cold spare transformers and reactor for Northern Region (Agenda by POWERGRID)

A.10.1 Hon'ble CERC had set up a committee on dated 15.03.2018 consisting of representatives from CERC, NLDC, CEA & POWERGRID under the Chairmanship of the Chief (Engineering) of the CERC to assess the requirement of regional spares including bus reactors, line reactors, ICTs, etc. This would ensure reliability of the grid and reduce downtime in case of any failure/outage.

A.10.2 As per CERC Committee recommendation, the following spares transformers & reactors are required to be kept as spare for Northern Region as per POWERGRID assets base:

i) Transformer:

MVA Rating of Transformers	Voltage Rating	Total Installed unit in POWERGRID	Spare Required as per CERC report	RPC Approved Spares	Qty Proposed for procurement	Location of spare requirement
3Ø-500MVA	400/220/33kV	87	7	6	1	Uttrakhand
3Ø-315MVA	400/220/33kV	84	10	6	4	Delhi, Haryana, Uttrakhand, J&K
3Ø-200MVA	400/132/33kV	1	1	0	1	Uttar Pradesh
3Ø-160MVA	220/66kV	2	1	0	1	Chandigarh
				TOTAL:	**7**	

ii) Reactors:

MVAR Rating of Reactors	Voltage Rating	Total Installed unit	Spare Required as per CERC report	RPC Approved Spares	Qty Proposed for procurement	Spare requirement
3Ø-125MVAR	420kV	59	9	0	8	Delhi, Haryana, Uttarakhand, J&K, Uttar Pradesh, Punjab, HP, Rajasthan
3Ø-80MVAR	420kV	39	7	0	7	Haryana, Uttarakhand, J&K, Uttar Pradesh,

						Punjab, HP, Rajasthan
3Ø-63MVAR*	420kV	109	13	0	7	Haryana, Uttarakhand, J&K, Uttar Pradesh, Punjab, HP, Rajasthan
3Ø-25MVAR	245kV	11	6	0	6	Haryana, J&K, Ladakh, Punjab, UP, Uttarakhand
				TOTAL:	**28**	

* - Quantity considered for both 50MVAR & 63MVAR reactors. In case of failure of existing 50MVAR reactor, 63MVAR shall be replaced.

A.10.3 Apart from the above, special types of transformers and reactors for GIS stations are also required to be procured as per committee report and to meet out any contingency as per details given below:

i) <u>Transformer:</u>

MVA Rating of Transformers	Voltage Rating	Location of spare requirement	Remarks
3Ø-500MVA	400/220/33kV	GIS Maharani Bagh	**HV bushings**: Oil to GIS **IV Bushings**: Oil to Oil
3Ø-500MVA	400/220/33kV	GIS Baghpat	

ii) <u>Reactor:</u>

MVAR Rating of Reactors	Voltage Rating	Location of spare requirement	Remarks
3Ø-125MVAR	420kV	GIS Manesar	**HV bushings**: Oil to GIS
3Ø-125MVAR	420kV	GIS Baghpat	

A.10.4 In view of the above, it is requested for approval for procurement of cold spare transformers & reactors of various ratings as per CERC committee recommendation as mentioned above. The Tariff for the investment made is to be shared by constituents as per CERC notification.

Decision required from Forum:

Members may please deliberate and approve.

Agenda for NRPC

B.1 Outstanding Contribution for FY 2024-25 (agenda by NRPC Secretariat)

B.1.1 Demand Letter for contribution towards NRPC fund for the year 2024-25 was sent on 10.04.2024 to all the constituent members. It was also mentioned that beyond 30th June, 1 % simple interest shall be levied. Accordingly, NRPC Secretariat has received contributions from all organisations except UT of Ladakh.

B.1.2 It is mentioned that payment has been received from 43 constituent members.

a) UT of Ladakh has not paid the contribution amount of Rs 12,00,000 for FY 2024-25. It is mentioned that Reminder letter for payment was sent on 8th July,2024. DO Letter from MS, NRPC was also sent on 12.08.2024 (enclosed as **Annexure-XI**). However, payment has not been received till date.

b) It is mentioned that Talwandi Sabo Power Ltd. and UT of Chandigarh paid the contribution amount, but have not paid the interest amount.

c) Interest amount of Rs 24,000 and Rs 12,000 is pending from TSPL and UT of Chandigarh respectively.

B.1.3 Details of total outstanding contribution is mentioned below:

S. No.	Name of Constituent	Period (FY)	Contribution amount (Rs)	Interest Amount (upto 31st Oct,24) (Rs)	Total Outstanding amount (Rs)
1	UT of Ladakh	2024-25	12,00,000	48,000	12,48,000
2	Talwandi Sabo Power Ltd.	2024-25	0	24,000	24,000
3	UT of Chandigarh	2024-25	0	12,000	12,000
	Total				Rs 12,84,000

B.1.4 Above Member Utilities are requested to kindly pay the contribution amount and the interest amount at the earliest to avoid further levying of penalty charges.

Decision required from Forum:

Members may please deliberate and suggest necessary action.

B.2 Pending contribution from RE generators having more than 1000 MW installed capacity (agenda by NRPC Secretariat)

B.2.1 It is mentioned that in the 75th NRPC meeting, Forum approved inclusion of following RE generators having more than 1000 MW installed capacity as permanent members of NRPC:

1. Adani Green Energy Limited
2. ReNew Power Private Limited
3. Azure Power India Pvt. Limited
4. Avaada Energy Private Limited
5. NTPC Green Energy Limited

B.2.2 It was also agreed that as permanent members of NRPC, these members shall contribute annual contribution amount of Rs 12,00,000 for FY 2024-25. Accordingly, demand letter dated 30.09.2024 seeking contribution amount has been sent to these organizations requesting for payment within 02 months.

B.2.3 So far, payment from M/s Adani Green Energy Limited has been received in NRPC Fund. It is requested that remaining 04 members as above may deposit the contribution amount within two months i.e. by 30.11.2024 as mentioned in the demand letter.

B.2.4 Above newly added members are requested to submit the nominations of members for NRPC and various Sub-Committee meetings and also join the meetings regularly.

Decision required from Forum:

Submitted for information of members.

B.3 Status of Expenditure incurred during Quarter-2 (as on 30.09.2024) of FY 2024-25 from NRPC Fund (Agenda by NRPC Secretariat)

B.3.1 As per the Standard Operating Procedure (SOP) for budgeting and expenditure of RPCs in pursuance to the MoP letter dated 23.02.2006, NRPC has finalized its annual Internal Budget for FY 2024-25 and got it approved by Forum in 72nd NRPC

meeting held on 30.03.2024. In line with the budget finalized, status of actual expenditure incurred (INR 1,81,91,118) during Quarter-1 of FY 2024-25 was apprised in 75th NRPC meeting held on 28.08.2024.

B.3.2 Further, Status of actual expenditure incurred during Quarter-2 of FY 2024-25 (All figures in Rs.) is as follows:

Account Head	**Budget Estimate for FY 2024-25**	**Remarks/ Booking of Expenditure during Q1/FY 2024-25**	**Total Expenditure during Q2/FY 2024 25**
Salary	2,00,00,000	Salary bills	69,41,686
Rewards	1,00,000	Bonus for Group-C Employees	
Allowances	1,53,00,000	HRA, DA etc	
LTC	5,00,000	LTC	
Medical Treatment	5,00,000	Cost of Medical Treatments	6,88,554
Training	5,00,000	Training Expenses of NRPC Officials	94,220
DTE	15,00,000	Domestic tour expense	5,22,115
OE	1,00,00,000	Office expenditure- Recurring expenses of salary of contractual staff, AMC and other bills.	43,08,413
RRT	4,00,000	Rent rate and Taxes- One time expense of property tax.	0
Digital Equipment	5,00,000	Digital equipment (cartridges, Hard Disks, pen drive etc.)	6,26,332
Repair and Maintenance	1,50,00,000	ARMO, Civil & Electrical works in NRPC Complex through CPWD, AMC of IT Maintenance.	3,92,127
Other	7,00,000	Hospitality and other similar bills (Mobile, Newspaper	1,16,841

Revenue Exp.		Bills etc)	
Machinery and Equipment	15,00,000	Machinery and equipment like lift etc.	17,12,783
IT & Computer Applications etc	3,00,000	Cyber Security and Hybrid VC projects and other related works.	0
Furniture and fixtures	15,00,000		0
Total	**6,83,00,000**		**1,54,03,071**

B.3.3 Total Expenditure incurred up to quarter 2 of FY 2024-25 is Rs.3,35,94,189.

Decision required from Forum:

Submitted for information of NRPC members.

B.4 Opening of new dedicated bank account in name of 'NRPC Guest House Charges' and acceptance of UPI payment (agenda by NRPC Secretariat)

B.4.1 NRPC building has a functional guest house where officers from NRPC members/other organizations are staying as per their requirements. The charges are collected as per rate approved by NRPC Forum. Then, collected money is deposited to Government Exchequer on the monthly basis.

B.4.2 Presently maintenance of Guest House viz civil, electrical maintenance and expenditures towards day-to-day consumables items served to the guests during their stay etc, is entirely being met from NRPC Fund collected from the members. At the same time 100 % amount collected from the members towards room rent is deposited in the Government Exchequer. The present practice may invite audit objections as NRPC Fund amount is being used for maintenance of guest house/consumable items provided to the guests.

B.4.3 Further, as of now money is taken in cash from guests and many a times guest insists for payment via ptm/other online mode as they don't keep enough cash. To

avoid, any possibility for mismanagement of cash, it is proposed to open a new bank account in name of **'NRPC Guest House Charges'** and guests may be facilitated with UPI payments for guest charges. The same procedure has been approved by ERPC forum in its 52nd meeting (held on 06.09.2024).

B.4.4 Since the construction of building has been done long back with funds provided by Central Government, ideally the room rent should be deposited in the account of Central Govt (CFI). However, expenditures towards minor maintenance and consumable items etc should be met from the amounts collected from the guest.

B.4.5 In view of above, it is proposed that 50% Guest House Charges collected from the guests shall be deposited in the Central Govt Fund (CFI) and 50% funds shall be utilized for the minor maintenance of guest house/consumable items etc.

B.4.6 After collection of charges (both cash/online), monthly re-conciliation may be done and 50% of charges may be deposited to Government Exchequer and remaining 50% may be kept retained in bank account of 'NRPC Guest House Charges'.

Decision required from Forum:

Submitted for deliberation and approval. If approved, the proposal shall be effective from 01.11.2024.

B.5 Amendment in Conduct of Business Rules (COBR) of NRPC to include State RE Generators of capacity 250 MW & above as members in RE Sub-Committee (agenda by NRPC Secretariat)

B.5.1 Conduct of Business Rules (COBR) of NRPC was amended as discussed in 75th NRPC Meeting (held on 28 August 2024) to include MNRE, SECI and Associations of RE generators as a member in RE-Sub-Committee of NRPC. As per existing CoBR, composition of RE Sub-Committee is as below:

> *"RE Sub-Committee shall be represented by all ISTS connected RE generators, state RE generators having capacity 100 MW & above, MNRE, SECI, Association of RE Generators, NLDC, NRLDC, CTU, Powergrid, STU and SLDC of RE rich states where REMC is operated. "*

B.5.2 However, as per decision of RPC Review meeting (MoM vide letter dated 02.09.2024 attached as **Annexure-XII**):

"All RPCs shall form a sub-committee to discuss the issues of RE generators and the sub- committee which shall meet at least once in a quarter. SECI, Solar and Wind Association, State RE Generators of capacity 250 MW & above and regional RE generators shall be made member of the sub-committee."

B.5.3 Therefore, there is need to amend CoBR, to include State RE Generators of capacity 250 MW & above in place of *existing 100 MW & above.*

B.5.4 Draft of amended CoBR is attached as **Annexure-XIII.**

Decision required from Forum:

Submitted for deliberation and approval.

B.6 Development of new website of NRPC through NICSI (agenda by NRPC Secretariat)

Need for a new website:

B.6.1 The existing website, built on obsolete HTML technology, poses significant challenges in disseminating timely and accurate information to member organizations and the public.

B.6.2 The need for a new website stem from several critical issues. The current platform's outdated technology severely limits its functionality and user experience. A major concern is the website's inability to refresh content automatically, resulting in users often seeing outdated information due to caching and cookie-related issues. This technical limitation is particularly problematic for NRPC that needs to regularly publish time-sensitive information such as meeting agenda, minutes, and various energy accounts. Furthermore, the content management process is cumbersome and inefficient. Administrators, who are not programming experts, must update background programs in real-time to upload new documents, a process that is both time-consuming and prone to errors. These limitations significantly hinder NRPC's ability to provide up-to-date, crucial information to its member organizations in a timely manner. Website lacks latest security features and it has been flagged by NIC as venerable and non-compliant to cyber security.

Features of new website:

B.6.3 To address these challenges, NRPC secretariat aims to develop a modern, user-friendly website with enhanced features and robust security, providing a unified and effective platform for all stakeholders in the power sector.

B.6.4 The new platform will be designed and developed bilingually (in Hindi and English) with a responsive interface compatible across various devices. It will incorporate a user-friendly Content Management System (CMS) for easy updates, a secure user portal for data submission and management, and advanced technical features including browser compatibility, Progressive Web Application (PWA) support, and cloud hosting on a MeitY empaneled service provider.

B.6.5 The proposed website will utilize modern web technologies such as React.js or Angular.js for the frontend, with a robust backend system built on .NET or an equivalent CMS. Security will be a top priority, with implementation of SSL/TLS, regular security audits, and compliance with government standards like GIGW, CERT-IN, and STQC. The new platform will feature dynamic sections for all Meetings, Operation, Commercial, Protection, System Study and regulatory information, along with improved document management and search capabilities.

B.6.6 This comprehensive upgrade will not only address the current limitations but also significantly enhance user experience, improve information dissemination, and ensure the security and reliability of NRPC's online presence.

B.6.7 NICSI was requested to take-up development works of website and provide an estimate of works vide NRPC letter no. CEA-GO-17-12(24)/3/2024-NRPC dated 12.09.2024 (copy enclosed as **Annexure-XIV**).

B.6.8 Subsequently, NISCI vide email dated 16.10.2024 (copy enclosed **Annexure-XV)** submitted proposal for development of website with a one-year warranty and a five-year Annual Maintenance Contract (AMC) an estimated cost of **₹ 37,91,695.63** including development, AMC and hosting cost and exclusive of NICSI service charges.

Proposal:

1) The website will be developed with a one-year warranty and a five-year Annual Maintenance Contract (AMC) at an estimated cost of **₹ 37,91,695.63** including development, AMC and hosting cost and exclusive of NICSI service charges. Actual cost shall be known only after finalization of tender by NIC.

2) Scope of works and technical specifications furnished to NICSI for this purpose are enclosed at **Annexure**- **XIV.**
3) Additional Scope of works is attached at **Annexure-XIV-a.**
4) *There is no need for additional contribution from members for above works as sufficient fund is available in NRPC Fund to meet above expenditure.*

Decision required from Forum:

Members may deliberate and approve the above proposal of NRPC Secretariate.

*****

NRPC Members for FY 2024-25

S. No.	NRPC Member	Category	Nominated/ Notified/Delegated Member	E-mail
1	Member (GO&D), CEA	Member (Grid Operation & Distribution), Central Electricity Authority (CEA)	Member (GO&D), CEA	member.god@cea.nic.in
2	Member (PS), CEA	Nodal Agency appointed by the Government of India for coordinating cross-border power transactions	Member (PS), CEA	memberpscea@nic.in
3	CTUIL	Central Transmission Utility	Chief Operating Officer	pcgarg@powergrid.in
4	PGCIL	Central Government owned Transmission Company	Director (Operations)	tyagir@powergrid.in
5	NLDC	National Load Despatch Centre	Director (System Operation)	rk.porwal@grid-india.in
6	NRLDC	Northern Regional Load Despatch Centre	Executive Director	nroy@grid-india.in
7	NTPC	Central Generating Company	Director (Finance)	jaikumar@ntpc.co.in
8	BBMB		Chairman	cman@bbmb.nic.in
9	THDC		CGM (EM-Design)	rrsemwal@thdc.co.in
10	SJVN		CMD	sectt.cmd@sjvn.nic.in
11	NHPC		Director (Technical)	rajkumar0610.rkc@gmail.com
12	NPCIL		Director (Finance)	df@npcil.co.in
13	Delhi SLDC	State Load Despatch Centre	General Manager	gmsldc@delhisldc.org
14	Haryana SLDC		Chief Engineer (SO&C)	cesocomml@hvpn.org.in
15	Rajasthan SLDC		Chief Engineer (LD)	ce.ld@rvpn.co.in
16	Uttar Pradesh SLDC		Director	directorsldc@upsldc.org
17	Uttarakhand SLDC		Chief Engineer	anupam_singh@ptcul.org
18	Punjab SLDC		Chief Engineer	ce-sldc@punjabsldc.org
19	Himachal Pradesh SLDC		Managing Director	mdhpsldc@gmail.com
20	DTL	State Transmission Utility	CMD	cmd@dtl.gov.in
21	HVPNL		Managing Director	md@hvpn.org.in
22	RRVPNL		CMD	cmd.rvpn@rvpn.co.in
23	UPPTCL		Managing Director	md@upptcl.org
24	PTCUL		Managing Director	md@ptcul.org
25	PSTCL		CMD	cmd@pstcl.org
26	HPPTCL		Managing Director	md.tcl@hpmail.in
27	IPGCL	State Generating Company	Managing Director	md.ipgpp@nic.in
28	HPGCL		Managing Director	md@hpgcl.org.in
29	RRVUNL		CMD	cmd@rrvun.com
30	UPRVUNL		Director (Technical)	director.technical@uprvunl.org
31	UJVNL		Managing Director	mdujvnl@ujvnl.com
32	HPPCL		Managing Director	md@hppcl.in
33	PSPCL	State Generating Company & State owned Distribution Company	CMD	cmd-pspcl@pspcl.in
34	UHBVN	State owned Distribution Company (alphabetical rotaional basis/nominated by state govt.)	Managing Director	md@uhbvn.org.in
35	Jodhpur Vidyut Vitran Nigam Ltd.		Managing Director	md.jdvvnl@rajasthan.gov.in
36	Paschimanchal Vidyut Vitaran Nigam Ltd.		Managing Director	md@pvvnl.org
37	UPCL		Managing Director	md@upcl.org
38	HPSEB		Managing Director	md@hpseb.in
39	Prayagraj Power Generation Co. Ltd.	IPP having more than 1000 MW installed capacity	Head (Commercial & Regulatory)	sanjay.bhargava@tatapower.com
40	Aravali Power Company Pvt. Ltd		CEO	brahmajig@ntpc.co.in
41	Apraava Energy Private Limited		CEO	niraj.gupta@apraava.com
42	Talwandi Sabo Power Ltd.		COO	Vibhav.Agarwal@vedanta.co.in
43	Nabha Power Limited		CEO	sk.narang@larsentoubro.com
44	MEIL Anpara Energy Ltd		COO & WTD, Executive Director	anandkumar.singh@meilanparapower.com arun.tholia@meilanparapower.com
45	Rosa Power Supply Company Ltd		Station Director	Hirday.tomar@relianceada.com
46	Lalitpur Power Generation Company Ltd		Managing Director	vksbankoti@bajajenergy.com
47	MEJA Urja Nigam Ltd.		CEO	hopmeja@ntpc.co.in
48	Adani Power Rajasthan Limited		COO, Thermal, O&M	jayadeb.nanda@adani.com
49	JSW Energy Ltd. (KWHEP)		Head Regulatory & Power Sales	jyotiprakash.panda@jsw.in
50	TATA POWER RENEWABLE	IPP having less than 1000 MW installed capacity (alphabetical rotaional basis)	Zonal Head	dhmahabale@tatapower.com
51	UT of J&K	From each of the Union Territories in the region, a representative nominated by the administration of the Union Territory concerned out of the entities engaged in generation/ transmission/ distribution of electricity in the Union Territory.	Chief Engineer, JKSPDCL/JKPDD	cejkpcl2@gmail.com/sojpdd@gmail.com
52	UT of Ladakh		Chief Engineer, LPDD	cepdladakh@gmail.com
53	UT of Chandigarh		Executive Engineer, EWEDC	elop2-chd@nic.in
54	NPCL	Private Distribution Company in region (alphabetical rotaional basis)	Head-Commercial	ssrivastava@noidapower.com
55	Fatehgarh Bhadla Transmission Limited	Private transmission licensee (nominated by cetral govt.)	AVP-O&M	nitesh.ranjan@adani.com
56	NTPC Vidyut Vyapar Nigam Ltd.	Electricity Trader (nominated by central govt.)	CEO	ceonvvn@ntpc.co.in
57	ReNew Power Private Limited	RE Generating Company having more than 1000 MW installed capacity	CEO	sumant@renew.com
58	NTPC Green Energy Limited		CEO	rajivgupta@ntpc.co.in
59	Azure Power India Pvt. Limited		CEO	sunil.gupta@azurepower.com
60	Avaada Energy Private Limited		CEO	kishor.nair@avaada.com
61	Adani Green Energy Limited		COO	chaitanya.sahoo@adani.com

List of addressee (via mail)

TCC Members for FY 2024-25

S. No.	TCC Member	Category	Nominated/ Notified/Delegated Member	E-mail
1	Director (Operation), HPSEBL	Chairperson, TCC		manojupretisolan@gmail.com
2	Member (GO&D), CEA	Member (Grid Operation & Distribution), Central Electricity Authority (CEA)	Chief engineer(GM Division)	cegm-cea@gov.in
3	Member (PS), CEA	Nodal Agency appointed by the Government of India for coordinating cross-border power transactions	Chief Engineer, PSPA-I Division	i.sharan@nic.in
4	CTUIL	Central Transmission Utility	Dy Chief Operating Officer	ashok@powergrid.in
5	PGCIL	Central Government owned Transmission Company	ED, NR-I	akmishra2@powergrid.in
6	NLDC	National Load Despatch Centre	Head of NLDC	susha@grid-india.in
7	NRLDC	Northern Regional Load Despatch Centre	Executive Director	nroy@grid-india.in
8	NTPC	Central Generating Company	Regional ED, NR	rednr@ntpc.co.in
9	BBMB		Member (Power)	mp@bbmb.nic.in
10	THDC		GM (EMD)	neerajverma@thdc.co.in
11	SJVN		Director (Projects)	de.sectt@sjvn.nic.in
12	NHPC		ED (O&M)	hod-om-co@nhpc.nic.in
13	NPCIL		Outstanding Scientist & ED (commercial)	nrchoudhary@npcil.co.in
14	Delhi SLDC	State Load Despatch Centre		nomination awaited
15	Haryana SLDC		Chief Engineer/SO & Comml.	cesocomml@hvpn.org.in
16	Rajasthan SLDC			nomination awaited
17	Uttar Pradesh SLDC		Chief Engineer (PSO)/Chief Engineer (C&S)	cepso@upsldc.org
18	Uttarakhand SLDC			nomination awaited
19	Punjab SLDC		Chief Engineer	ce-sldc@pstcl.org
20	Himachal Pradesh SLDC			nomination awaited
21	DTL	State Transmission Utility	Director (Operation)	dir.opr@dtl.gov.in
22	HVPNL		Chief Engineer/SO & Comml.	cesocomml@hvpn.org.in
23	RRVPNL		Chief Engineer (PP&D)	ce.ppm@rvpn.co.in
24	UPPTCL		Director (Planning & Commercial)	director_comm@upptcl.org
25	PTCUL		Chief Engineer	ce_oandmk@ptcul.org
26	PSTCL		Director / Technical	dir-tech@pstcl.org
27	HPPTCL		GM (C&D)	gmcd.tcl@hpmail.in
28	IPGCL	State Generating Company	Director(Tech.)	corporate.ppcl@gmail.com
29	HPGCL		Director/Technical	dirtech@hpgcl.org.in
30	RRVUNL		Dy. Chief Engineer	dyce.elect.katpp@rrvun.com
31	UPRVUNL		Director (Technical)	director.technical@uprvunl.org
32	UJVNL		General Manager	kkjaiswal99@gmail.com
33	HPPCL		Director (Electrical) General Manager(Electrical)	dir_elect@hppcl.in gm_elect@hppcl.in
34	PSPCL	State Generating Company & State owned Distribution Company		nomination awaited
35	UHBVN	State owned Distribution Company (alphabetical rotaional basis/nominated by state govt.)		nomination awaited
36	Jodhpur Vidyut Vitran Nigam Ltd.			nomination awaited
37	Paschimanchal Vidyut Vitaran Nigam Ltd.			nomination awaited
38	UPCL		Director (P)	dpupcl29@gmail.com
39	HPSEB			nomination awaited
40	Prayagraj Power Generation Co. Ltd.	IPP having more than 1000 MW installed capacity	Head – Commercial & Regulatory	Sanjay.bhargava@tatapower.com
41	Aravali Power Company Pvt. Ltd		CEO	brahmajig@ntpc.co.in
42	Apraava Energy Private Limited			nomination awaited
43	Talwandi Sabo Power Ltd.		Dy. Head O&M	ravinder.thakur@vedanta.co.in
44	Nabha Power Limited			nomination awaited
45	MEIL Anpara Energy Ltd		COO & WTD, Executive Director	anandkumar.singh@meilanparapower.com arun.tholia@meilanparapower.com
46	Rosa Power Supply Company Ltd		VP-Technical Services	Niranjan.Jena@relianceada.com
47	Lalitpur Power Generation Company Ltd		GM Electrical	aupadhyay.ltp@lpgcl.com
48	MEJA Urja Nigam Ltd.		GM (O&M)	piyushkumar@ntpc.co.in
49	Adani Power Rajasthan Limited		AVP	Manoj.taunk@adani.com
50	JSW Energy Ltd. (KWHEP)		Head of Plant	kaushik.maulik@jsw.in
51	TATA POWER RENEWABLE	IPP having less than 1000 MW installed capacity (alphabetical rotaional basis)		nomination awaited
52	UT of J&K	From each of the Union Territories in the region, a representative nominated by the administration of the Union Territory concerned out of the entities engaged in generation/ transmission/ distribution of electricity in the Union Territory.		nomination awaited
53	UT of Ladakh			nomination awaited
54	UT of Chandigarh			nomination awaited
55	NPCL	Private Distribution Company in region (alphabetical rotaional basis)		nomination awaited
56	Fatehgarh Transmission Limited	Private transmission licensee (nominated by cetral govt.)		nomination awaited
57	NTPC Vidyut Vyapar Nigam Ltd.	Electricity Trader (nominated by central govt.)		nomination awaited
58	ReNew Power Private Limited	RE Generating Company having more than 1000 MW installed capacity		nomination awaited
59	NTPC Green Energy Limited			nomination awaited
60	Azure Power India Pvt. Limited			nomination awaited
61	Avaada Energy Private Limited			nomination awaited
62	Adani Green Energy Limited			nomination awaited

Special Invitees:

1. Smt. Nandita Gorlosa, Chairman, NERPC & Hon'ble Power Minister, Govt. of Assam, Block D, Ground Floor, Janata Bhawan, Dispur, Assam, 781006 [Email: nanditagorlosa77@gmail.com], Telephone no: (0361) – 2237032(O)
2. Shri Gaurav Gupta, Chairperson, SRPC & Managing Director, Karnataka Power Corporation Limited & ACS Energy Department GoK, 240, 2nd floor Vikasa Soudha, Bengaluru, Karnataka 560001. [Email: prs.energy@gmail.com ; acs@karnataka.gov.in] Tel -08022252373
3. Shri Vishal Kumar Dev, IAS, Chairman, ERPC, Principal Secretary to Govt., Department of Energy, Govt. of Odisha, Bhubaneswar. [Email-chairman@gridco.co.in] Tel -06742540098
4. Shri P. Dayanand Chairman CSPTCL & Chairman, WRPC, Office of Chairman, Vidyut Seva Bhavan, Danganiya, Raipur 492 013 (C.G.) [Email: chairmancspc@gmail.com] Tel. 0771 2574000
5. Smt. Rishika Saran, Member Secretary, NPC, Sewa Bhawan, R. K. Puram, New Delhi-66 [Email-cenpc-cea@gov.in]
6. Shri Deepak Kumar, Member Secretary, WRPC, Plot No- F-3, MIDC Area, Marol, Opp. SEEPZ, Central Road, Andheri (East), Mumbai-40093. [email: ms-wrpc@nic.in] Tel - 02228221636
7. Shri Asit Singh, Member Secretary, SRPC, No.29, Race Course Cross Road, Bengaluru-560009. [Email: mssrpc-ka@nic.in] Tel -08022287205/9449047107
8. Shri N.S. Mondal, Member Secretary, ERPC,14,Golf Club Road, ERPC Building, Tollygunje,Kolkata-700033. [Email: mserpc-power@nic.in]- Tel 03324239651/9958389967
9. Shri K B Jagtap, Member Secretary, NERPC, NERPC Complex, Dong Parmaw, Lapalang, Shillong-793006. [Email: ms-nerpc@gov.in] Tel -03642534077/ 8652776033
10. Shri Brieflee Lyngkhoi, Chief Engineer, GM Division, CEA, Sewa Bhawan, R. K. Puram, New Delhi-66 [Email: cegm-cea@gov.in]

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Status of action taken on decision 75th NRPC meeting

S.N.	Agenda	Decision of 75th NRPC	Status of action taken
A.7	Continuous high frequency operation of grid on 03.08.2024, 04.08.2024 & 11.08.2024 (agenda by NRLDC)	A letter may be sent from MS NRPC side to states for backing down their technical minimum at least to 55% of their MCR as per CEA standards.	Letters have been sent to Punjab, Rajasthan, Haryana, RPSCL, MEIL Anpara Energy Limited, JSW Barmer Limited.
A.9	Recommendations of the committee to analyse the grid event happened at 13:53 hrs on 17th June 2024 due to tripping of HVDC Champa-Kurukshetra (agenda by NRPC Secretariat)	An agenda may be listed in the Protection Sub-Committee meeting to review the over-voltage grading.	Agenda has been taken in the 52nd PSC meeting and nominations have been asked to constitute the committee under the chairmanship of SE (O), NRPC.
A.13	Inclusion of RE generators having more than 1000 MW installed capacity as permanent members of NRPC (agenda by NRPC Secretariat)	(i) Inclusion of RE generating companies having more than 1000 MW installed capacity in the region as permanent members of NRPC. (ii) A demand letter regarding membership contribution (Rs. 12 lakh per member) for the year 2024-25 shall be sent to following companies: 1. Adani Green Energy Limited	(i) These companies have been added as permanent members of NRPC. (ii) Demand letters dated dated 30.09.2024 seeking contribution amount have been sent to these organisations.

		2. ReNew Power Private Limited 3. Azure Power India Pvt. Limited 4. Avaada Energy Private Limited 5. NTPC Green Energy Limited	

Annexure-II

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कारपोरेशन ऑफ इण्डिया 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)

Ref: CC/CTU/Comm/CPM/NR **Date:** 03/09/2024

Subject: Minutes of 7th Northern Region ISTS Communication Planning Meeting (NR-CPM) held in virtual mode (MS-Teams) on 21st August 2024

Dear Sir/Madam,

Please find enclosed the Minutes of the 7th Northern Region ISTS Communication Planning Meeting (NR-CPM) held on 21st August 2024 through virtual mode.

Thanking you,

Yours faithfully,

(H S Kaushal)
Sr. GM (CTUIL)

Minutes for 7th Meeting for Planning of Communication system for Inter-State Transmission system (ISTS) of Northern Region (NR-CPM) held in virtual mode (MS- Teams) on 21.08.24

The 7th meeting of NR-CPM was held on 21.08.2024 through virtual mode (MS-Teams). The list of participants is attached at ***Annexure-I***.

DGM (CTU) welcomed all the participants at the meeting and proceeded with the agenda items.

Agenda wise deliberation is as under:

Agenda 1: Dual redundancy for Salal (NHPC)

Grid-India has provided feedback in 25th TeST Meeting of NRPC that presently Salal Generating Station (NHPC) is connected in radial path from Salal-Kishenpur and no redundant communication path is available. Any issues of communication in this path may lead to outage of Salal data.

Non-availability of data leads to non-visibility of Salal Generation and difficulty in computation of drawl of J&K.

In this regard Grid-India requested that CTUIL to plan redundant communication for Salal Generating Station.

CTU has examined and found that there is another transmission line 220kV Salal (NHPC) – Jammu (JKPTCL) (62 kms.) is available. OPGW can be installed on this line to provide redundant communication to the Salal Station.

Deliberations:

Presently Salal (NHPC) is connected via a single path to Kishenpur, there is no alternate path available for redundancy. CTU stated that Salal is also connected with Jammu (J&K) station via 220kV line, by installing OPGW on this line alternate path can be created. POWERGRID informed that this line belongs to POWERGRID. Grid-India enquired about the availability of FOTE at Salal (NHPC) and Jammu (J&K). POWERGRID informed that ULDC FOTE is available at Jammu (J&K) (Gladini) and no additional FOTE required at Salal (NHPC).

CTU asked POWERGRID to share cost and BoQ for this work within one week, thereafter the scheme shall be prepared by CTU and put up in NRPC Forum for their views, POWERGRID agreed for same.

Above proposal is agreed by Forum.

Agenda 2: Replacement of Fiberhome make Communication Equipment

In the 25th TeST Meeting of NRPC, POWERGRID has informed that under Microwave Replacement Project Fibrehome make communication equipment were installed during 2012 to 2014. Annual maintenance of Fiberhome make Communication Equipment has been carried out from 2014 to 2021 in line with contractual provisions of 1+6 years AMC and then Annual Maintenance Contract has been extended for 2+1 year (up to 15.04.2025) through separate AMC contract.

These Fibrehome devices had STM-1/STM-4 capacities and several technical limitations, such as supporting only two optical directions and using optical cards instead of an SFP solution. They also had a limitation of four Ethernet ports.

In the present scenario, maintenance cost of these equipment is very high, and availability of spares is also challenging.

In the 25th TeST Meeting CTU was requested to deliberate this agenda in the CPM meetings so that replacement plan can be prepared for these Fiberhome make Communication Equipment as AMC of these equipment is going to expire by April 2025.

Deliberations:

CTU elaborated the agenda and asked POWERGRID to provide details regarding the same. POWERGRID stated that around 250 to 260 equipment of Fiberhome make including SDH and PDH needs to be replaced. Further communication of STU nodes also depended on the Fiberhome make FOTE at Central Sector, therefore replacement of these FOTE requires phased manner implementation in coordination with STUs FOTE replacement schemes.

RVPNL stated they have 9 locations to be replaced. RVPNL also mentioned that they will carry out this replacement as part of ULDC scheme and will inform the critical locations to be replaced first.

UPPTCL informed that 49 locations need to be replaced, and same matter has been put up for management approval. UPPTCL stated that they will revert back with details of locations and criticality through email once approved by management.

PSTCL stated that replacement of all their FOTE will be done in their own project in phased manner.

POWERGRID also informed that 3 nos. of FOTE also needs to be replaced at PTCUL which are installed by POWERGRID and same shall be replaced by POWERGRID.

NRLDC stated that based on the feedback received from states it is felt that there might be need of AMC extension beyond April 2025 as many states are yet to start for replacement of Fibre homes equipment and requested that AMC shall be closed in phased manner as equipment are phased out.

Further, NRLDC stated that these states are replacing equipment on their own, any new scheme may not be required by CTUIL as these are intra-state nodes and at ISTS nodes other FOTE equipment are already available and central sector data is not dependent on Fibrehome equipment.

POWERGRID stated that AMC is provided by COMTEL, a system integrator. POWERGRID shall examine and coordinate with STUs for replacement of these FOTE in a phased manner. A separate meeting can also be planned with STU, CTUIL and POWERGRID to discuss the replacement procedure in a phased manner.

Agenda 3: Latest Power maps and Fiber Optic maps of STU network

For ISTS communication planning purpose, all the STUs of Northern Region are requested to provide their latest power map and fiber optic map to the CTU.

Deliberations:

CTU requested all the STU to submit their latest FO map so that the same can be used in communication planning of ISTS networks.

GRID-INDIA requested CTU to share ISTS FO map, CTU agreed for the same.

Agenda 4: Status of schemes approved in various NCT

Following schemes were agreed in NRPC meetings and approved in the NCT, POWERGRID is requested to provide present status of these schemes.

S. No.	Name of Scheme	FOTE (No.)	OPGW (Km.)	Cost (Cr.)	Status
	Schemes approved in 20th NCT				
1	Redundant Communication system for Dulhasti (NHPC) & Kishtwar (Sterlite) stations	2	120	7.2	
2	Supply and installation of 24 Fibre OPGW on PKTCL lines for providing redundant communication for Parbati Pooling (Banala) (PG) S/s, Parbati-II (NHPC) & Parbati-III (NHPC) stations.(NR)	4	0.783	1.24	
3	Redundant Communication for Chamera-III (NHPC) & Budhil (GreenCo) using 3 pairs of fibers sharing from HPPTCL network. (NR)	1	0	0.3	
	Schemes approved in 19th NCT				
4	OPGW installation on existing 400 kV Kota – Merta line which is LILOed at ShriCement & proposed to be LILOed at 765/400 kV Beawar (ISTS) S/s	3	311	18.5	
5	Supply and Installation of 12 nos. FOTE and additional ethernet (125 nos.) cards for existing FOTE in view of resource disjoint and critical locations.	12	0	5.2	
6	Supply and Installation of 11 nos. FOTE Equipment at Backup SLDCs in NR & Backup NRLDC.	11	0	3.3	
7	OPGW installation on 765kV Agra (PG) -Fatehpur (PG)D/c line may be consisdered as a separate scheme in matching timeframe of Ph-IV (Part-4:3.5GW) scheme.	2	335	16.5	
	Schemes Modified/approved in 16th NCT				
8	Supply and Installation of OPGW on 400kV Kishenpur-Wagoora line.	2	183	9.15	
9	Supply and Installation of OPGW on 400kV Agra- ballabhgarh line.	2	181	9.05	
	Schemes approved in 11th NCT				
10	OPGW installation on existing 400 kV	2	229	10.3	

	Jallandhar (PG) – Kurukshetra (PG) line which is to be LILOed at 400 kV Dhanansu (PSTCL)				
11	Redundant communication System for Bhinmal (PG) and Kankroli (PG) ISTS stations	8	5	2.55	
12	OPGW installation on 220 kV Anta (NTPC) - Bhilwara Line	2	187	9.35	
	Schemes approved in 9th NCT				
13	Transmission lines which are to be provided with OPGW alongwith necessary accessories and FOTE are mentioned as under · 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)		312 254	28.5	

Deliberation:

CTU requested POWERGRID to provide status of schemes approved in various NCT.

POWERGRID stated that most of the schemes are under retendering/ re-tendering stage. CTU asked POWERGRID to provide the status of the above schemes within one week to CTU, as CTU needs to update the status in various forums.

POWERGRID agreed for the same, they shall provide complete details and status of the above schemes to CTU within one week.

5. **Any other agenda points**

A. NRLDC enquired about the status of the following schemes.

a. Status of VOIP Scheme

CTU informed VOIP scheme agenda is presented in 52nd SRPC meeting held on 03.08.24 and Special WRPC meeting held on 29.07.24. In both meetings the VOIP agenda has been technically approved with some comments. CTU shall submit the agenda in the upcoming 75th NRPC meeting to be on 28.08.2024. Further VoIP scheme has been put for deliberation in the upcoming 52nd ERPC meeting to be held on 05.09.24. For the NERPC a special meeting can be requested for this agenda.

Further as AMC of existing VOIP system is going to expire on July'25, NRLDC requested that alternative arrangement shall be made by POWERGRID for contingency till the time new system is commissioned, POWERGRID agreed for the same.

b. Communication system for new building of NLDC

CTU informed that agenda is put in upcoming 22nd NCT meeting and after approval award letter shall be issued to the POWERGRID.

c. Update on 2+2 SAS upgradation

CTU stated that a meeting has been held with POWERGRID Engineering and AM department to discuss the same. POWERGRID should provide the details so that the scheme can be prepared.

B. POWERGRID requested the status of OPGW installation schemes as discussed in the 6th CPM. CTU stated that a similar type of agenda was also discussed in the 48th and 49th COM SR meetings held on dtd. 29.07.24 and 23.08.24 respectively and it was decided that a audit shall be done before replacement and these requirements to be dealt with case-to-case basis. Further methodology also needs to be finalized for such replacement, for this CTU has presented one agenda in the 25th NRPC TeST meeting where forum decided that one SOP is under finalization for audit of communication system. After SOP these cases may be deliberated in the CPM/ TeST meeting and further in NRPC forum.

Annexure-I

List of Participants:

S.No	**Name**	**Organization**
1.	Priyanka Patel, Manager	NRPC
2.	T. P. Verma, DGM	CTUIL
3.	Prakhar Pathak, Engineer	CTUIL
4.	Abhay Kumar, Engineer Trainee	CTUIL
5.	Ankur Gulati, DGM	NRLDC
6.	Paritosh Pathak, Manager	NRLDC
7.	Narendra Kumar Meena, DGM (ULDC)	POWERGRID
8.	Sanjeet Kumar Singh, Manager (GA&C)	POWERGRID
9.	Deepak Gupta, AE	UPPTCL
10.	Jitendra Sharma, DM(T)	DTL
11.	Manish Athaiya, SE(SSDA-SLDC)	RVPNL
12.	Surbjeet Singh, ASE	PSTCL
13.	Pushpender,EE	PSTCL
14.	Varun Kukna	HVPNL

S. No.	Items	Details
1.	Name of Scheme	Redundant Communication for Salal (NHPC)
2.	Scope of the scheme	OPGW installation on existing 220kV Salal (NHPC)-Jammu (Gladini) (JKPTCL) S/c line (62 Km.)
3.	Objective / Justification	At present Salal Generating Station (NHPC) is connected with radial path from Salal-Kishenpur and no redundant communication path is available, same was highlighted by NRLDC during 25th TeST Meeting of NRPC. Any issues of communication in this path may lead to outage of Salal data. Non-availability of data leads to non-visibility of Salal Generation and difficulty in computation of drawl of J&K. CTU has deliberated this requirement in the 7th CPM meeting of NR where it was agreed that to provide redundant communication to Salal (NHPC) station, OPGW can be installed over 220kV Salal (NHPC) – Jammu (JKPTCL) S/c **(62 kms.)** line, further POWERGRID confirmed in the meeting that there is no need of additional FOTE at Salal & Jammu (Gladini) as existing FOTE can be utilised for this link requirement also.
4.	Estimated Cost	**Rs. 3.72 crore (approx.) (excluding taxes and duties)**
5.	Implementation timeframe	**18 months from the date of allocation**
6.	Implementation Agency and mode	**POWERGRID**
7.	Implementation mode	**RTM mode**
8.	Deliberations in different meetings	Deliberated in 25th TeST meeting of NRPC & 7th CPM (Communication Planning Meeting) of NR.

Analysis of corrosion and scaling in high-voltage direct-current valve cooling water system

X W Li[1] and D Ding[2,*], L Wang[2] and L W Sun[2]

[1] State Grid Shaanxi Electric Power Company, Xi'an, China.
[2] State Grid Shaanxi Electric Power Research Institute, Xi'an, China.

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Abstract. In this paper, the problems of corrosion and scaling in the converter valve tower cooling water system based on the ± 500kV Baode HVDC transmission project with Siemens light-triggered thyristor HVDC transmission technology are analyzed in detail. The corrosion and scaling phenomenon can cause the closure or emergency shutdown of converter valves and bring potential dangers to the safe and stable operation of power grid. So far, there is no fundamental solution to this problem. Based on the investigation of scaling phenomenon of grading electrode and corrosion of thyristor aluminum alloy heat sinks, the scaling law of the grading electrode is proposed and the cause of scaling is put forward and analyzed. Some suggestions are given.

1. Introduction

Converter valve is the core equipment of a high-voltage, direct current (HVDC) electric power transmission system. Considering the valve loss, which inevitably exists, the heat generated by valve loss could largely harm the performance of converter valve. Thus, the internal water cooling system, which effectively helps dissipating the heat out of valve, is of great significance to ensure the normal operation of the converter valve [1]. Unfortunately, operating experiences show that the problem of corrosion and scaling is very common in inner cooling water system of converter valves [2-12]. Despite the use of mixed ion exchange resin for desalination and purification of the internal cooling water of the converter valve, corrosion and scaling still exist in the internal cooling water system of the converter valve, leading to an unsatisfied performance of the heat dissipation and insulation of the converter valve. Accordingly, the safe and stable operation of the thyristor, reactor, damper capacitor and water pipe of the converter valve could be negatively affected.

In this paper, the scaling problem of bipolar grading electrodes in the ±500 kV Baode HVDC power transmission project is taken as the research object and the corrosion and scaling issues of the internal cooling water system of the converter valve are analyzed and the relevant recommendations and solutions are proposed.

2. Valve cooling water path and grading electrode

2.1. HVDC transmission system

The HVDC transmission technology is one of the most advanced and energy-saving power transmission and transformation technologies in the world, and it is also the key developing technology in Chinese technical equipment field. It has the advantages of asynchronous operation between two AC systems,

fast response, precise adjustment, convenient operation, stable voltage distribution along the line and low operation loss. Moreover, the investment and operation cost of HVDC transmission line are less than that of AC transmission system [13]. HVDC transmission system usually consists of rectifier station, inverter station and HVDC transmission line. Its wiring principle is shown in figure 1.

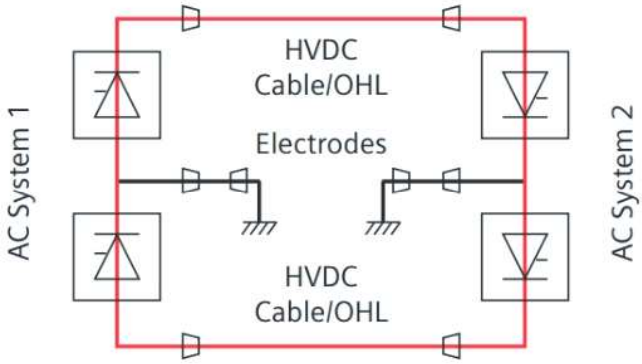

Figure 1. HVDC transmission system

2.2. Valve cooling water system

Converter valve is one of the most important equipment in HVDC transmission system. Under normal operation, the thyristor generates high heat with high current flowing, which causes the temperature of the thyristor to rise sharply. The thyristor must be cooled effectively, or it will be burnt out. The temperature of the thyristor of the converter valve is generally less than 90°C. The heat dissipation of thyristor is realized by the aluminum alloy heat sinks which is closely contacted with thyristor by internal cooling water cooling. The system flow chart is shown in figure 2.

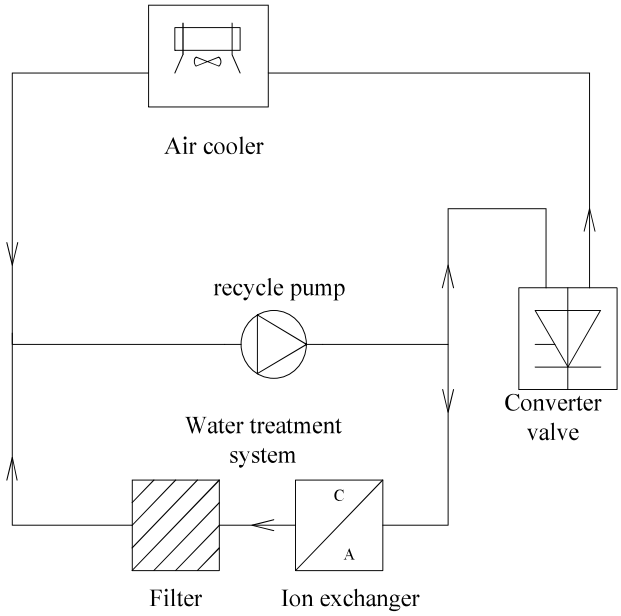

Figure 2. Air cooling water system

2.3. Valve assembly waterway

The valve hall of the converter valve is divided into three phases, namely A, B and C. Each phase is subdivided into left (L) and right (R) sides, each side being split into six layers. Each valve assembly is composed of series thyristors. The thyristors are separated by aluminum alloy heat sinks. The heat sinks are connected by waterways, and the heat of the heat sinks is derived by cooling water.

The connection modes of cooling water pipeline of valve assembly could be segmented to series type, parallel type and series-parallel type. The series type of connection mode is mainly based on ABB technology route. The flow rate in series type is large, but the temperature difference between the head and the tail is huge too. The parallel type is mainly based on SIEMENS technology route. The series-parallel type, mainly based on Zhonglian Puri technology route, combines the advantages of ABB and SIEMENS given water route arrangement of flow and temperature.

SIEMENS technology route was adopted in ±500 kV converter station. Its valve assembly waterway was parallel, A is thyristor, B is heat sinks, C is connecting water pipe. The schematic diagram is shown in figure 3, and the valve assembly is shown in figure 4.

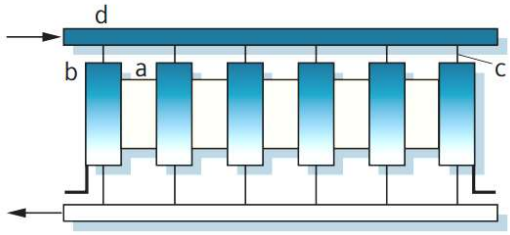

Figure 3. Parallel connection water line

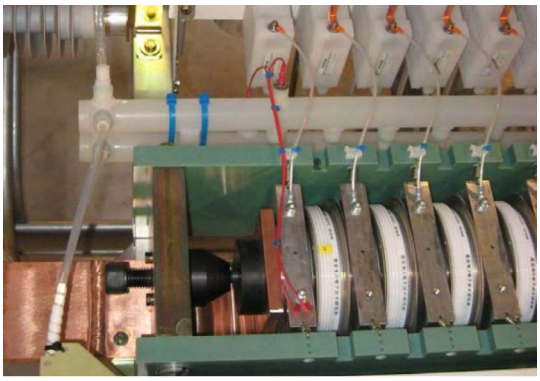

Figure 4. SIEMENS Valve assembly

2.4. Grading electrode position

In order to avoid discharging unevenly on the inner and outer wall of cooling water pipeline in the converter valve due to uneven voltage distribution, and leakage current caused by the contact between metal equipment and water pipeline in the valve assembly, grading electrodes were installed on the main cooling water pipe of the valve tower and the water distribution and catchment pipes in the valve assembly. The appearance of the grading electrodes is shown in Figure 5. For the grading electrode, the effective part presented is platinum, of 23.8 mm in length and 2 mm in diameter; the remaining part is stainless steel. The installation of grading electrodes could help realizing even voltage distribution on the inner and outer wall of the main water cooling pipeline and help releasing leakage current, which now transfer from thyristor aluminum alloy heat sinks to inert platinum electrode. By doing this, the corrosion phenomenon of electrical equipment could be avoided [14].

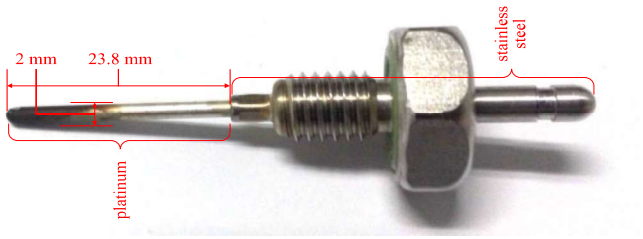

Figure 5. Grading electrodes

There were 432 grading electrodes installed in the single pole of Baoji Converter Station, including 24 zero potential electrodes. The number of grading electrodes installed on the T-type connection part of valve assemblies and main water pipe was 144, the number of grading electrodes installed on the anode side of thyristor valve assemblies was 288 and the number of grading electrodes installed on the cathode side was 288. The rest were electrode valve tower interlayer electrodes. The installation positions of grading electrodes could be divided into the following categories, as shown in table 1, L: left side, R: right side, L1: on the left and level 1, R1: on the right and level 1, R2\L3\L4\R4\R5\L6 and so on.

Table 1. Grading electrode positions in the valve tower

Valve tower electrode location (A phase, B phase, C phase)		Number of electrodes
Top part tube	L sides	2
	R sides	2
S-shape tube	L1 and R1 upper part	4
	R2 upper part	2
	L3 upper part	2
	L4 and R4 upper part	4
	R5 upper part	2
	L6 upper part	2
T-type tube	L and R sides	12
Water distribution pipe and confluence pipe	Cathode sides.	24
	Anode sides	24
Bottom part tube	L and R side	2

3. Scaling on Grading Electrodes

Based on the investigation of several HVDC transmission projects in China, it is found that the scaling phenomenon of grading electrodes exists in different degrees. Figure 6 (a) and (b) illustrate the difference in scaling for grading electrodes of ABB technical route and grading electrode of Siemens technical route, respectively. In addition, figure 6(c) shows a third type of grading electrode of Zhonglian Puri technical route with some scaling presented.

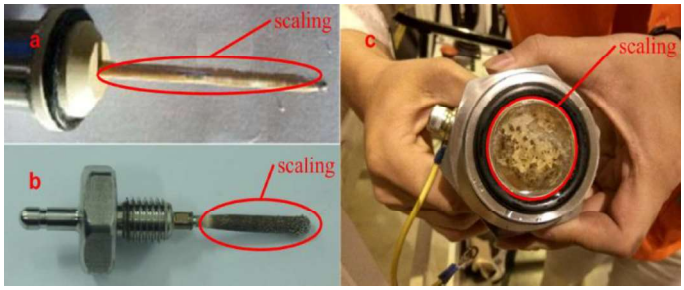

Figure 6. Three types of electrode scaling

3.1. Scaling phenomenon in Inverter station

The scaling phenomena in Baoji Converter Station were as following: the scaling of the grading electrodes on the anode side of thyristor on the valve assembly was slight and loose; the scaling of the grading electrodes on the cathode side was serious and firm; the zero potential point of the main water pipe of the valve tower was not scaling. The scaling of the grading electrode at the T-type connection between the water distributing pipe of the valve assembly and the main water pipe was moderate, but scaling was very firm.

The scaling on the anode side was slight. The thickness of the scaling of electrode could be calculated as the following: the diameter of the electrode with scaling minus the diameter of the electrode without scaling, and then divide the result by 2. The average thickness of scaling was 0.1-0.2 mm. The scaling distributed evenly, the scaling was crisp and easy to fall off. The scaling on the upstream side was slightly thicker than that on the back side. Only the root part was not covered by scaling, as shown in figure 7.

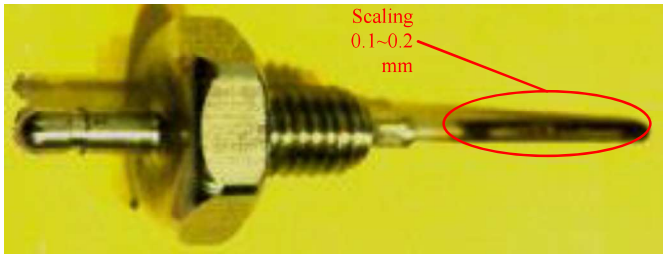

Figure 7. Deposit on grading electrodes at anode side of valve assembly of Invert station

The scaling of the grading electrodes on the cathode side is serious. Generally, the scaling thickness is 0.6-0.8 mm, the end is thick, the tail is thin, the scaling is firm, and it is not easy to fall off. There is no difference between the scaling on the front and back surfaces. Only the root is not covered by scaling, as illustrated in figure 8.

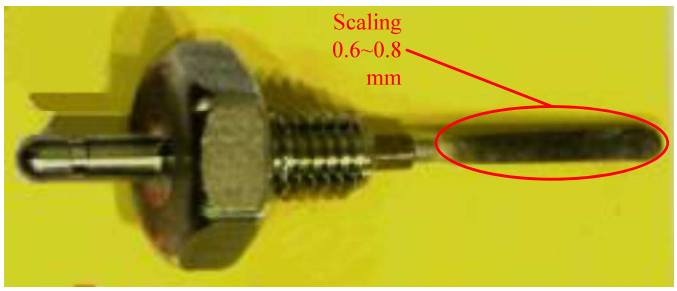

Figure 8. Deposition of grading electrodes at cathode side of valve assembly of Invert station

Observing the grading electrode at the T-type connection of valve assembly distributing pipeline and main water pipe, general scale thickness is 0.6-0.8 mm, scaling distributed evenly, scaling is very firm, firmly attached to the electrode surface. The scaling is no difference between water front side and back side. Only half of length of the platinum electrode part is covered by scaling, as seen in figure 9.

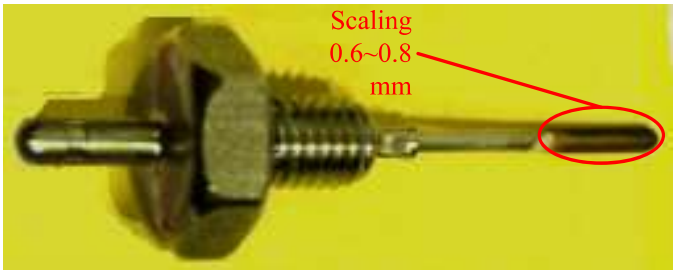

Figure 9. Deposition of grading electrodes at T-junction of the valve assembly and the main water pipe of Invert station

3.2. Scaling phenomenon in Rectifier station

Deyang converter station basically operates as a rectifier, and the scaling of anode side grading electrodes on valve assembly was serious, as shown in Figure 10, which was basically consistent with the scaling of cathode side of valve assembly in rectifier station. The scaling of grading electrodes on cathode side was slight, as shown in figure 11, which was basically consistent with the scaling of anode side of valve assembly in rectifier station; the zero potential point of main water pipe in valve tower was not scaling. The scaling degree of grading electrodes installed on T-type connection of water distributing pipe and main water pipe was at intermediate level, as seen in figure 12.

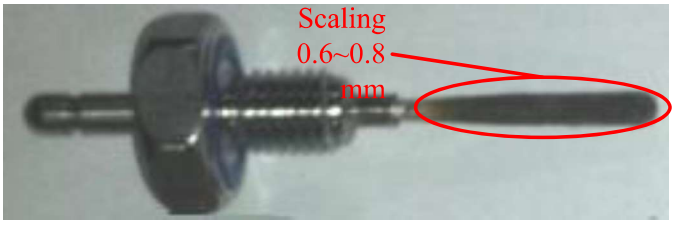

Figure 10. Deposit on grading electrodes at anode side of valve assembly of rectifier station

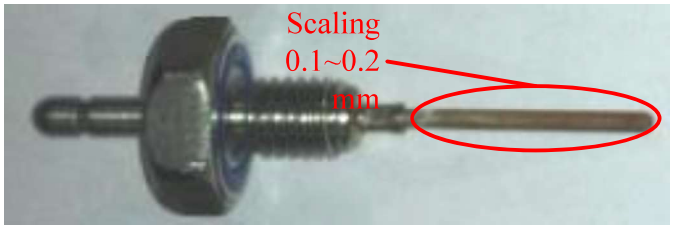

Figure 11. Deposit on grading electrodes at cathode side of valve assembly of rectifier station

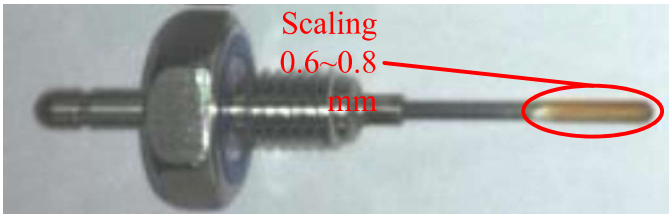

Figure 12. Deposit on grading electrodes at T-junction of the valve assembly and the main water pipe of rectifier station

4. Scale distribution principle

4.1. Distribution characteristics of scaling

According to the electrode scaling thickness, that is, the diameter of the electrode after scaling minus the diameter of the electrode without scaling, and then divided by 2, and position of grading electrodes scaling, the 864 branch electrodes of bipolar at the BAOJI converter station were all sampled for detection. The electrodes scaling were divided into 6 classes: valve assembly cathode side with serious scaling; anode side with slight scaling; valve assembly T-type tube electrodes with scaling in the middle; S-shape tube electrodes, top part electrodes, pole II bottom screen electrodes with scaling situation in agreement with those at anode side; and pole I bottom screen electrode with scaling situation in agreement with those at cathode side, as seen in tables 2 and 3, the diameter of the electrode after scaling is listed. note: The pole I converter valve has been operating for 44 months, the bottom voltage of the valve tower is -500 kV, the pole II has been operating for 39 months, and the bottom voltage of the valve tower is +500 kV. CL:CL represents the left side of the valve tower of the C phase converter valve, CR\BL\BR\AL\AR and so on.

Table 2. Pole I grading electrode with deposits' data analysis (unit: mm)

Average value	CL	CR	BL	BR	AL	AR
Top part	2.04	2.04	2.02	2.02	2.03	2.05
Mid-upper part	2.11	2.02	2.00	2.01	2.01	2.02
S-type tube	2.05	2.04	2.07	2.05	2.03	2.03
Cathode side	2.63	2.94	2.96	2.95	2.94	2.94
Anode side	2.13	2.23	2.23	2.23	2.23	2.23
T-shape tube	2.04	2.16	2.13	2.08	2.12	2.09
Bottom part	2.88	2.72	2.73	2.65	2.68	2.83

Table 3. Pole II grading electrode with deposits' data analysis (unit: mm)

Average value	CL	CR	BL	BR	AL	AR
Top part	2.04	2.05	2.04	2.04	2.04	2.04
Mid-upper part	2.45	2.52	2.49	2.72	2.62	2.02
S-shape tube	2.06	2.04	2.06	2.06	2.05	2.08
Cathode side	2.34	2.28	2.30	2.28	2.31	2.29
Anode side	2.99	2.93	3.09	2.89	2.95	3.05
T-type tube	2.24	2.10	2.23	2.14	2.19	2.07
Bottom part	2.01	2.01	2.02	2.01	2.02	2.03

4.2. Distribution and treatment of scaling

Baoji converter station functions as an inverter station, therefore, the scale distribution of 432 grading

electrodes of pole I and pole II were basically identical. Thus, the scaling regularity of grading electrodes of Inverter station could be obtained: scaling on the cathode side of thyristor is serious and sturdy, the scaling on the anode side is slight and loose, while scaling degree at the T-type connection is moderate and very firmly attached.

As a rectifier station, the scale distribution of 432 grading electrodes of pole I and pole II in Deyang converter station were the same, but it was different from that in Baoji converter station. Therefore, the scaling regularity of grading electrodes could be concluded that: scaling on the anode side of thyristor is serious, scaling on the cathode side is slight and scaling on the T-type connection is moderate.

Therefore, according to the scaling distribution law of grading electrodes, scaling removal could be carried out purposefully. Inverter station could aim at removing scaling on the cathode side of thyristor of valve assembly, while rectifier station could only focus on scaling on the anode side of thyristor of valve assembly [15].

5. Related detection analysis and treatment recommendations

5.1. Scale analysis

The scales of all grading electrodes were broken and dissolved in hot dilute sulfuric acid with 35% mass concentration. By doing this, the content of metal elements was detected by ICP emission spectrometer. Aluminum elements accounted for 90-96%, iron elements 5-8%, calcium elements 0.1-0.5%, magnesium elements 0.1-0.5%, sodium elements 0.05-0.1%.Detecting the resistance values of the extreme and tail parts of the grading electrode after scaling ,the resistance values were found to be 280-350 kΩ.This indicates that the main harm of the scaling of the electrode lies in the gradual loss of the original function of grading voltage and transferring leakage current.

5.2. Water quality inspection

The main metal element found in scaling was aluminum. Analyzing the mass concentration of metal elements in inner cooling water and makeup water of pole I and pole II, seen in Table 4. It was found that the mass concentration of aluminum was very low, only 1.1-1.3 ug/L. This indicates that the medium aluminum in scaling of grading electrode may come from the makeup water of valve tower. Therefore, the concentration of Mg^{2+} and Ca^{2+} and the mass concentration of aluminum in the makeup water should be reduced.

Table 4. Water sample analysis of data on cation ion contents (μg/L)

Sample name	Na^{+}	NH^{4+}	K^{+}	Mg^{2+}	Ca^{2+}	Al
Pole I de-gas jar	2.6	0.2	1.5	0.3	5.9	1.3
Pole II de-gas jar	1.1	0.2	0.8	0.2	3.6	1.1
makeup water	1105.8	0.2	389.5	10.3	75.8	1.5

5.3. Structure of aluminum alloy heat sinks

The aluminum alloy material directly contacting the internal cooling water system is only the aluminum alloy heat sinks of the thyristor. Unfolding a piece of aluminum alloy heat sinks running for 3 years, it could be found that there were many black corrosion points in the water inlet and outlet. As shown in figure 13, the water inlet channel (the so-called “double mosquito perfume water path” section) was bright and clean, while the outlet channel had black corrosion spots, as shown in figure 14. The results show that the corrosion products of aluminum alloy may come from the scaling of the grading electrodes, and the corrosion effect exerts no obvious harm to the aluminum alloy heat sinks.

Figure 13. Inlet and outlet section of the heat sink

Figure 14. "Double mosquito perfume water path" section inside of the heat sink

5.4. Waterway voltage analysis

Since grading electrodes connect with heat sink, grading electrodes potentiality varies with the heat sink potentiality, the voltage difference among the grading electrodes is the sum of several heat sink voltage difference, the results listed in table 5.

Table 5. Voltage in the water circuit

Title	Voltage at two ends(V)	Valve condition	Current direction
Two electrodes	26	turn-on	Anode to Cathode
Neighboring heat sinks	2	turn-on	Anode to Cathode
Head-tail heat sinks	26	turn-on	Anode to Cathode
Two electrodes	41665	turn-off	Cathode to Anode
Neighboring heat sinks	3205	turn-off	Cathode to Anode
Head-tail heat sinks	41665	turn-off	Cathode to Anode

5.5. Electrolytic corrosion and scaling analysis

Based on the aluminum-hydroelectric potential-pH chart [16], the following patterns are possible. If the potential exceeds 1.35V above zone with oxygen reaction, the electrolytic water product is oxygen, see Eg.(1). If the potential is below 0.12V zone with the hydrogen reaction, see Equation (2). If the potential

is between 0.12-1.35V, the absorption oxygen corrosion will take place, see Equation (3). If the potential is over -1.676V, aluminum loses electrons and is electrolyzed, see Equation (4).

$$4OH^- - 4e^- \rightarrow 2H_2O + O_2\uparrow \quad (1)$$

$$2H^+ + 2e \rightarrow H_2 \quad (2)$$

$$O_2 + 2H_2O + 4e^- \rightarrow 4OH^- \quad (3)$$

$$Al \rightarrow Al^{3+} + 3e \quad (4)$$

Through the calculation of $Al(OH)_3$ pks=32.89 and H_3AlO_3 pK1=11.2, at 18~25℃, the pH value is 5.6~5.8, the oxide film of alumina has the minimum solubility, that is, the aluminum alloy protective film is the best. When the pH value is less than 4.6 or more than 8.3, the protective film begins to dissolve, see Equations (5) and (6):

$$Al(OH)_3 \leftrightarrow Al(OH)^{2+} + 2OH^- \quad (5)$$

$$Al(OH)_3 \leftrightarrow H_3AlO_3 \leftrightarrow H_2AlO_3^- + H^+ \quad (6)$$

Therefore, the aluminum alloy heat sink is subject to electrolytic corrosion. The production of hydrogen or oxygen will generate $Al(OH)_4^-$. So, in the cooling water system, when the valve is turned on, the aluminum hydroxide is absorbed by the electrode surface of valve anode side. When the valve is turned off, the aluminum hydroxide is absorded by the electrode surface of valve cathode side. In addition, the electrode at the positive potential can produce oxygen, with its volume being about 50% of that at the negative potential, and the electrolysis gas can remove the scaling. Therefore, both rectifier and invert stations have more severe scaling in the electrode at the positive potential than at the negative one.

6. Conclusions

Corrosion in HVDC valves cooling water system was analyzed. The chemical composition of the scaling on the electrodes revealed a large amount of aluminum. Further investigation showed that the aluminum detected was a corrosion product coming from the makeup water of internal cooling water and aluminum alloy heat sinks. It could be found that the surface conductive resistance of the grading electrode increased significantly and the function of grading voltage and transferring leakage current were lost after scaling. Observing the internal of the heat sinks of aluminum alloy, corrosion spots were found. But they are not enough to harm its safe operation. The experiments illustrated that the scaling at the positive potential was higher than that at the negative potential. The scaling principle was different in the rectifier and inverter stations. In the rectifier station, the scaling of grading electrodes at the anode side of valve is serious, while the scaling of grading electrodes at the cathode side is more severe in the inverter station. Based on these regularities of the distribution of the scaling on grading electrodes, targeted scale removal measurements could be carried out. On account of the corrosion of aluminum alloy heat sinks caused by leakage current electrolysis, the conductivity of the internal cooling water system should be lowered as far as possible, and the pH value should be adjusted to a reasonable range.

References

[1] Liu Z Y 2013 UHV AC/DC Power Grid (Beijing: China Power Press) pp 479-80
[2] Arinde S Dhaliwal and Fu Y 2008 Special Report for Group B4 (Cigre. Question 1.1-1.5) p 110
[3] Tian X W, Yang J M and Zhang W P 2010 *Modern Science* **8** pp 68-70
[4] Wang Y Y, Hao Z J and Lin R 2006 *Southern Power System Technology* **32** pp 80-3
[5] Li Y 2009 *Journal of Guizhou Electric Power Technology* **115** pp 5-6
[6] Zhang P D, Hao Z J and Liu H T 2008 *Journal of Electrical Engineering Technology* **12** pp 1-2
[7] Qian Y H, Zhou Y Y and Xu C W 2012 *Advanced Materials Research* **354-355** pp 1157-60
[8] Deng B F, Sun H M and Cao J F 2008 *Southern Power System Technology* **2** pp 73-6
[9] Wang C, Liu X, Wang X, Liu N and Jiao X Y 2015 *Electrical Insulation Conf. (EIC) (Seattle*

Washington USA) pp 7-10
[10] Neubert and Holweg 2007 *Siemens Investigation Report of Scaling Phenomenon on Grading Electrodes in Thyristor Valve Cooling Cirguit* (Erlangen, Simens Technical Note) p 7
[11] Lips H P 2002 *IEEE Transactions on Power Delivery* **9** (4) pp 1830-1837
[12] Jackson P O, Abrahamsson B, Gustavsson D and Igetoft L 1997 *IEEE Transactions on Power Delivery* **12** (2) pp1049-1052
[13] Zhao W J 2011 *HVDC Transmission Engineering* (Second edition) (Beijing: China Power Press) pp 26-27
[14] Zhang J W, Wang M H, Deng W B, Luo B and Zhu J 2012 *High Voltage Apparatus* **51**(32) pp 22-25
[15] Fu J H, Li Q Y, Gu Y G, Sun H T, Jiao Y F and Zuo K 2014 *Shaanxi Electric Power* **42**(10) pp 72-75
[16] Yang Z H, Xu N and Qiu Z X 2000 *Journal of Northeast University (Natural Science Edition)* **21**(4) pp 401-3

Int. J. Electrochem. Sci., 14 **(2019)** 3465 – 3476, doi: 10.20964/2019.04.47

International Journal of ELECTROCHEMICAL SCIENCE
www.electrochemsci.org

Short Communication

Corrosion Behavior of Aluminum in Carbon Dioxide Aqueous Solution at 50 ºC

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Received: 15 January 2019 / *Accepted:* 14 February 2019 / *Published:* 10 March 2019

In this work, the corrosion behavior of aluminum in carbon dioxide solutions with different concentrations at high temperature (50 ºC) was studied. The corrosion of aluminum in the carbon dioxide solutions was inhibited to a certain extent compared to the corrosion in deionized water. It was found that an aluminum electrode in 0.84 μmol L^{-1} carbon dioxide solution with pH 4.35 had the lowest corrosion rate as observed from its lowest corrosion current, the most positive corrosion potential, and the maximum charge transfer impedance. The mechanism for aluminum corrosion inhibition was that HCO_3^- generated by carbon dioxide ionization developed an ordered charge field on the aluminum surface, shielding the diffusion of aluminum ions and inhibiting the dissolution of the oxide film on the aluminum surface. SEM, EDS and XRD confirmed that the corrosion products covering the surface of the aluminum electrode were $Al(OH)_3$ and/or Al_2O_3. Based on the above, it was elucidated that the Pt grading electrodes of the high voltage direct current (HVDC) valve cooling system lower the scaling rate in solutions with a certain concentration of carbon dioxide, and it was shown that the concentration of aluminum ions in the inner cooling water is a crucial factor affecting the scaling of grading electrodes. Therefore, reducing the concentration of aluminum ions in the inner cooling water, in other words, inhibiting the corrosion of aluminum, is the fundamental means for solving the scaling problem of the grading electrode. This paper will contribute to the research on production improvement techniques used for HVDC valve cooling systems.

Keywords: Aluminum, Corrosion, Carbon dioxide solution, Bicarbonate radical, Radiator, Thyristor, High voltage direct current

1. INTRODUCTION

High voltage direct current (HVDC) transmission systems have become the preferred resource allocation and long distance power transportation method due to their narrow transmission corridor, high transmission efficiency, and low power consumption [1, 2]. Unfortunately, the scaling of grading electrodes in deionized water cooling circuits of HVDC power transmission modules is a long-known and unsolved problem that has a great impact on the safe operation of the HVDC transmission system. Deionized water is used as the cooling water circulating in the in-valve cooling system, and its working temperature is in the range of 48-52 ^{o}C. Grading electrodes are cylindrical bright platinum electrodes with deposition of mixed aluminum oxides and hydroxides (alumina) [3, 4]. The aluminum element in the deposition is derived from corrosion of the aluminum radiator and is precipitated on the surface of the grading electrodes under appropriate conditions. To solve the scaling problem of the grading electrode, it is necessary to suppress the corrosion behavior of the aluminum radiator in the in-valve cooling water system [5]. Previous reports have focused on the corrosion characteristics of aluminum in weak acid media (hydrochloric acid, sulfuric acid) [6, 7], aqueous alkaline solutions [8, 9] and neutral dilute salt solutions (for instance, halide media [10, 11] and sodium sulfate solution [12]).

According to the studies by Weber [13] and Siemen [14], the introduction of a certain concentration of carbon dioxide in the deionized water at 25 ^{o}C lowered the scaling rate of grading electrodes. However, they did not identify the origin for the lowering of the grading electrode scaling rate. The scaling on the surface of the grading electrode is due to aluminum deposition, indicating that the corrosion behavior of the aluminum radiator in the inner cooling water system was suppressed when the scaling rate was lowered. This paper discusses the electrochemical corrosion behavior of aluminum in different concentrations of carbon dioxide aqueous solution at 50 ^{o}C in order to elucidate the corrosion mechanisms, providing guidance for solving the scaling problem of the grading electrode in the HVDC valve cooling system.

2. EXPERIMENTAL SECTION

2.1. Electrochemical system

An electrochemical system for testing consisted of a working electrode, a reference electrode, a counter electrode and an electrolyte. Platinum black electrodes were used as the counter electrodes, and saturated calomel electrodes (SCE) were used as the reference electrodes. The SCE potential at 50 ^{o}C is 0.228 V (relative to the standard hydrogen electrode (SHE)). The working electrodes were cut from the aluminum radiator with a 1 cm × 1 cm working surface. The model 3003 aluminum electrode was used [15] that was composed of Si (0.57 wt%), Fe (0.63 wt%), Cu (0.14 wt%), Mn (1.27 wt%), Zn (0.09 wt%), Li (0.03 wt%) and Al (97.31wt%). All of the surfaces other than the 1 cm^2 working surface were coated with epoxy resin. Prior to testing, the working electrodes were polished with diamond paper and nano-alumina powder, cleaned with deionized water and absolute ethanol, and dried and immersed in the testing electrolytes for 24 h.

Different concentrations of carbon dioxide electrolyte were prepared by the aeration method, and the concentration was controlled by different ventilation times. First, N_2 was injected into deionized water (100 mL) for 5 min (excluding the dissolved air in deionized water), and then CO_2 was injected into deionized water for 0, 10, 20, 30, 40, 50 and 60 min. Finally, all electrolytes were closed and left standing for 12 h. The concentrations of the carbon dioxide solutions were tested according to the ISO 925-1997 standard [16]. An S470 pH meter was used to test the pH of the electrolytes.

2.2. Electrochemical Test

Steady state polarization curves and electrochemical impedance spectroscopy (EIS) spectra were obtained using a CHI660D electrochemical workstation. The potential scan rate was 1 mV s^{-1}, and the potential range was 0.8 V (ranging from the potential 0.4 V lower than the stable potential to the potential 0.4 V higher than the stable potential). The corrosion potential and corrosion current density were obtained from the polarization curves.

The corrosion characteristics of the aluminum surface were determined from the results of EIS analysis that was performed over a frequency range from 1 Hz to 10^5 Hz with an amplitude of 5 mV. The electrolyte temperatures for all tests were between 48 and 52 ^oC. During the testing, the electrochemical systems were kept in a shielding box.

2.3. Characterization

All of the SEM, EDS, and XRD test samples underwent accelerated corrosion by potentiostatic anodic oxidation for a more clear observation and analysis of the corrosion surface and corrosion products of aluminum. The anodization process used a two-electrode system with platinum as the cathode and an aluminum electrode after pre-treatment (polished, washed) as the anode. The stable potential (open circuit potential) at various concentrations was tested prior to the anodization. Based on the stable potential, the oxidation overpotential of 30 mV was increased to conduct accelerated corrosion experiments. The compositions of corrosion products were determined using a D8-Focus X-ray powder diffraction instrument with a Cu target. The scanning angle range was from 5 to 80 degrees, and the scan rate was 8° min^{-1}. SEM was performed using an SU8010 ultrahigh resolution field emission scanning electron microscope equipped with high performance X-ray energy dispersive spectroscopy (EDS).

3. RESULTS AND DISCUSSION

3.1. Different concentrations and pH of carbon dioxide solutions

The concentrations and pH of the carbon dioxide solution at different ventilation times are shown in Table 1. For 0-30 min, as the ventilation time increased, the concentration of the carbon dioxide solution gradually increased and the pH gradually decreased. Until the ventilation time of 40 min, the concentration and pH of the carbon dioxide solution tended to be stable, indicating that the prepared

carbon dioxide solution was near saturation. The concentration of HCO_3^- in the carbon dioxide solution was calculated according to formula (3), and the concentration of HCO_3 showed the same trend as the concentration of the carbon dioxide solution.

$$CO_2 + H_2O = H_2CO_3 \quad (1)$$

$$H_2CO_3 = H^+ + HCO_3^- \quad (2)$$

$$C(H^+) = C(HCO_3^{2-}) = \sqrt{C(CO_2)K_{a1}} \quad (3)$$

$$HCO_3^- = H^+ + CO_3^{2-} \quad (4)$$

Table 1. Concentration and pH of the carbon dioxide solution at different ventilation times

Ventilation time of carbon dioxide solution (min)	Concentration of carbon dioxide solution (μmol L^{-1})	pH	Calculated concentration of HCO_3^- in electrolytes (μmol L^{-1})
0	0	6.12	0.76
10	345	5.76	1.74
20	535	5.37	4.27
30	750	4.67	21.38
40	850	4.36	43.65
50	886	4.35	44.67
60	876	4.35	44.67

According to the ionization reactions (1), (2) and (4) of carbon dioxide in water, CO_2, H_2CO_3 molecules, and HCO_3^- and CO_3^{2-} ions are present in the carbon dioxide solution. For the study of the corrosion mechanisms of aluminum in the carbon dioxide solution, the CO_2 and H_2CO_3 molecules and the HCO_3^- and CO_3^{2-} ions in the carbon dioxide solution should be analyzed. Examination of the equilibrium ionization constants shows that the second-order ionization constant ($Ka_2 = 4.7 \times 10^{-11}$) of carbonic acid is far weaker than the first-order ionization constant ($Ka_1 = 4.7 \times 10^{-7}$). Thus, there are more HCO_3^- ions in the solution. Therefore, it is speculated that HCO_3^- ions play a major role in inhibiting aluminum corrosion in the carbon dioxide solution.

3.2. Polarization curves

The polarization curves of the aluminum electrodes are shown in Fig. 1. It is well known that the more positive the corrosion potential and the lower the corrosion current, the lower the aluminum corrosion rate [17, 18]. As the concentration of the carbon dioxide solution increased to 850 μmol L^{-1}, the corrosion potential of aluminum was gradually positively shifted, indicating that the corrosion of aluminum in the carbon dioxide solution was inhibited.

The data for the corrosion potential and the corrosion current density of the aluminum electrodes in the electrolytes are shown in Table 2. The corrosion current of aluminum in the carbon dioxide solution was lower than that in deionized water, indicating that the corrosion resistance of aluminum in the carbon dioxide solution was better than that in deionized water. The lowest corrosion current density and the

most positive corrosion potential of aluminum were measured in the 850 μmol L^{-1} carbon dioxide solution, indicating that the lowest corrosion rate of aluminum was obtained in the 850 μmol L^{-1} carbon dioxide solution. Thus, injection of CO_2 into deionized water can reduce the corrosion of aluminum.

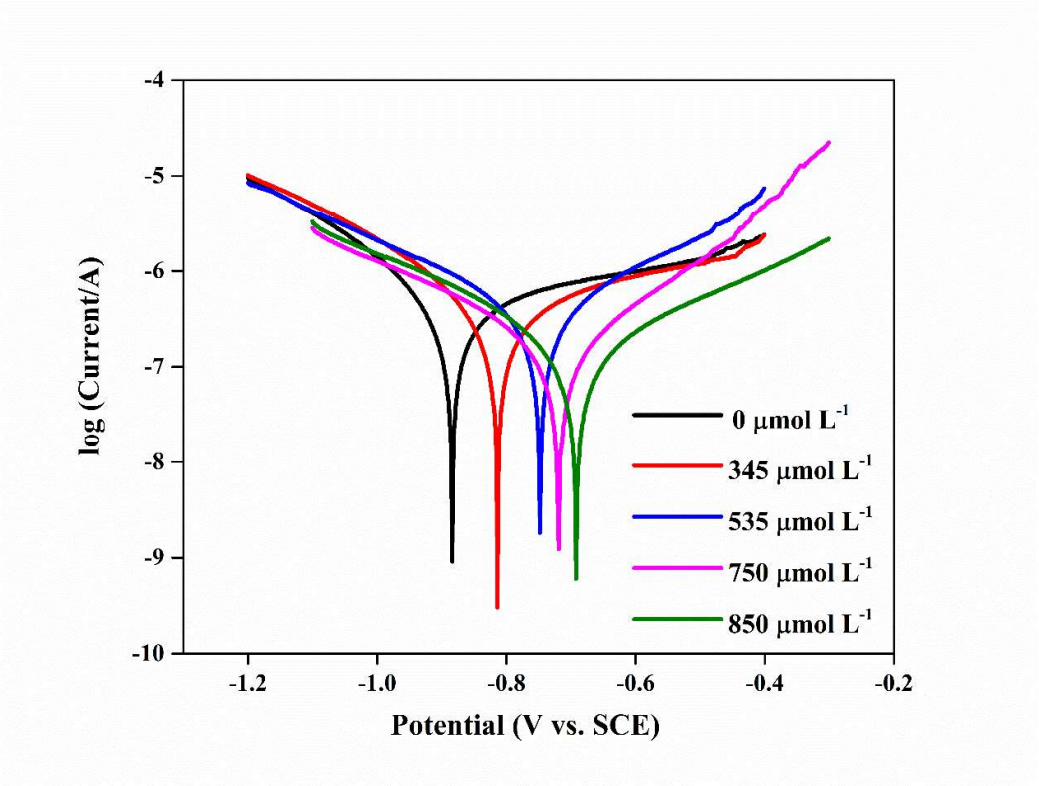

Figure 1. Polarization curves of aluminum in the carbon dioxide solution.

Table 2. Corrosion potential and current densities of aluminum in carbon dioxide solution at 50 °C.

Concentration of carbon dioxide solution (μmol L^{-1})	Corrosion potential (V)	Corrosion current density (nA cm^{-2})	Anodic Tafel slope (V dec^{-1})	Cathodic Tafel slope (V dec^{-1})
0	-0.884	248.9	0.209	-0.124
345	-0.814	237.4	0.214	-0.145
535	-0.748	219.9	0.217	-0.221
750	-0.719	167.1	0.220	-0.272
850	-0.692	122.6	0.226	-0.195

3.3. EIS curves

According to the analysis of the surface state of the aluminum electrode, contributions from charge transfer impedance due to the oxidation of aluminum, diffusion impedance of ions in the electrolyte, impedance of the electric double layer capacitor, and impedance of the cladding layer should be present. The EIS curves of the aluminum electrode in carbon dioxide solutions with different concentrations are shown in Fig. 2a. The Nyquist diagrams of aluminum corrosion in carbon dioxide solutions with different concentrations show similar plots consisting of a semicircle and a straight line.

The physical meaning of the semicircle diameter in the high-frequency region is the charge transfer impedance (Rct) during the etching process, and the charge transfer impedance reflects the corrosion resistance of the aluminum in the solution. The lower the charge transfer impedance, the lower the aluminum corrosion resistance [19-21]. The equivalent circuit diagram of the electrochemical impedance spectrum is shown in Fig. 2c.

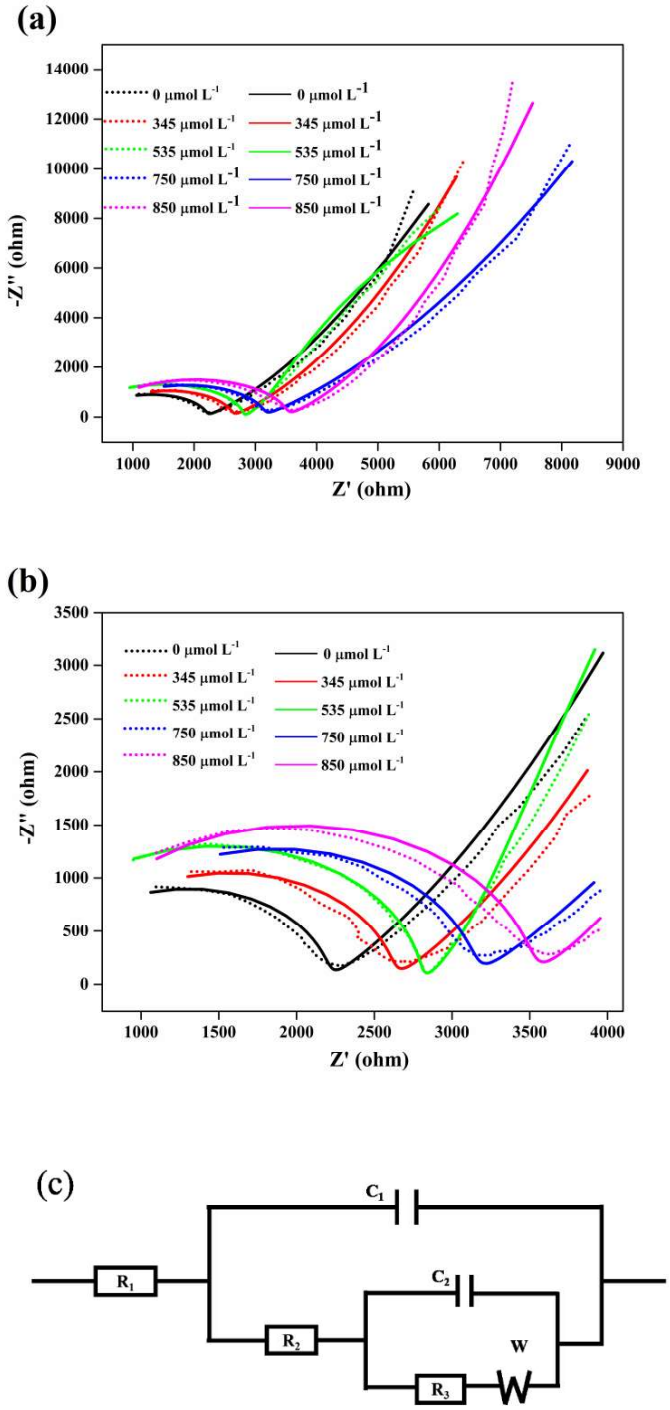

Figure 2. EIS curves (a), partially enlarged view of the curves (b), and their equivalent circuit model (c) for the aluminum electrodes in the carbon dioxide solutions at stable potential. The original data curves and the fitting curves are indicated by dotted and solid lines, respectively.

R_1 represents the resistance of the solution between the aluminum electrode and the reference electrode, R_2 represents the impedance of the electrolyte through the deposition layer, R_3 represents the charge transfer impedance for aluminum oxidation, C_1 represents the capacitance of the cladding layer, C_2 represents the capacitance of the double layer, and W represents the diffusion impedance of the ions in the electrolyte [22, 23].

Table 3. EIS parameters obtained by fitting the data to equivalent circuit model.

Concentration (μmol L^{-1})	R_1 (Ω)	R_2 (Ω)	R_3 (10^{-6}Ω)	C_1 (10^{-9}F)	C_2 (10^{-6}F)
0	753.0	1773	25.82	1.709	4.346
345	706.5	2064	30.26	1.464	4.865
535	639.9	2615	33.83	1.233	9.418
750	552.2	2825	38.79	1.168	2.249
850	273.3	3068	39.93	1.449	5.173

The data for the corresponding numerical simulations of the equivalent circuit are shown in Table 3. As the concentration of the carbon dioxide solution increased to 850 μmol L^{-1}, the charge transfer resistance gradually increases, indicating that the corrosion resistance of aluminum gradually increases and that the corrosion resistance of aluminum in the carbon dioxide solution was better than that in the deionized water. The highest charge transfer impedance was observed for the oxidation of aluminum in the 850 μmol L^{-1} carbon dioxide solution. This result was consistent with the results of the polarization curves shown in Fig. 1.

3.4. SEM and EDS

The surface morphologies of the aluminum electrode after corrosion in carbon dioxide solutions with different concentrations are shown in Fig. 3. Fig. 3b shows the presence of significant corrosion on the aluminum electrode surface in deionized water, with gullies, pores, and corrosion products observed. However, the corrosion of aluminum in the carbon dioxide solutions was relatively mild. Fig. 3c and 3d show that only small corrosion holes appeared on the electrode surface for the carbon dioxide solutions at the lower concentrations (345, 535 μmol L^{-1}). In Fig. 3e, and 3f, it is observed that the electrode surfaces were very smooth in the carbon dioxide solutions with higher concentrations (750, 850 μmol L^{-1}), and no obvious corrosion occurred.

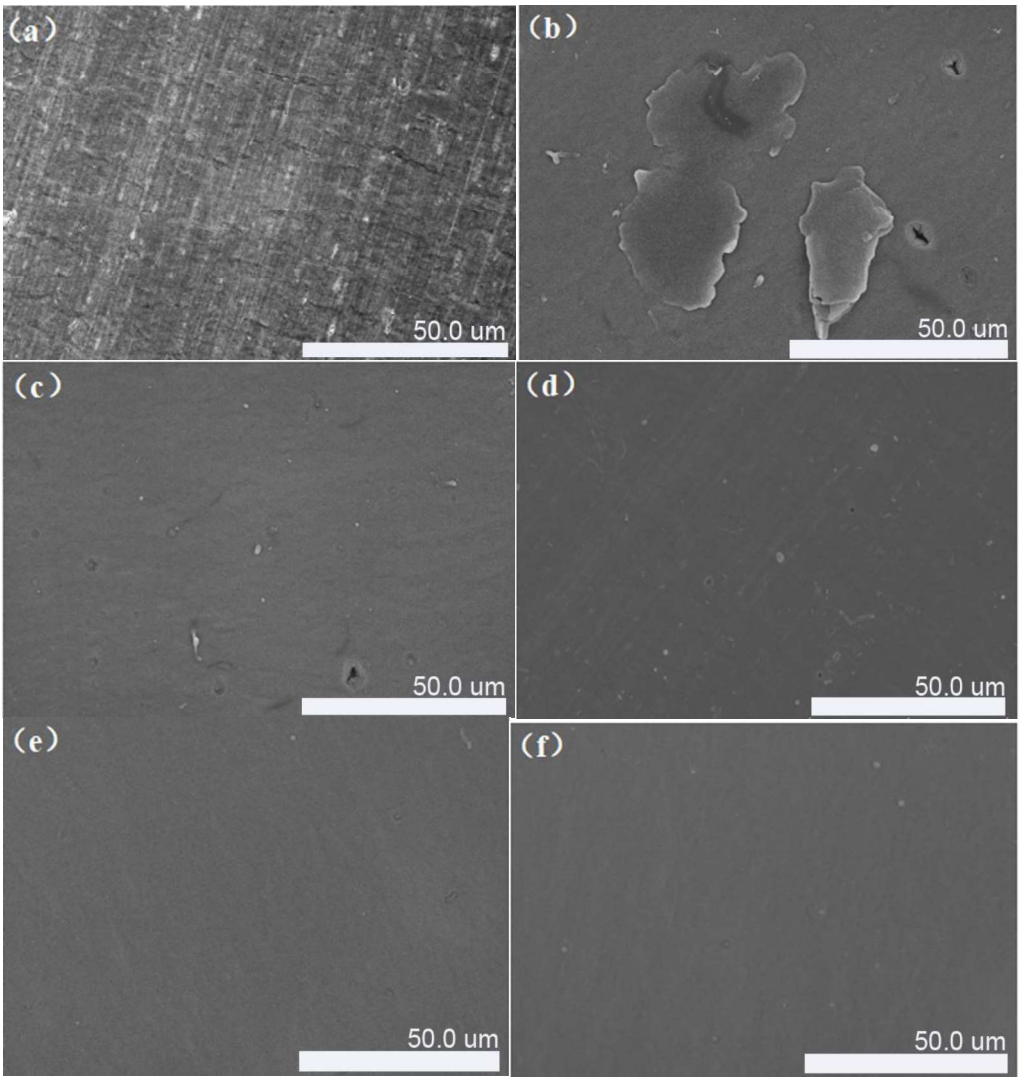

Figure 3. SEM images of the original aluminum (a) and the aluminum electrode surface in 0 μmol L^{-1} (b), 345 μmol L^{-1} (c), 535μmol L^{-1} (d), 750 μmol L^{-1} (e) , and 850 μmol L^{-1} (f) carbon dioxide solution.

The SEM and EDS of the corrosion products of the aluminum electrode in deionized water and in the 850 μmol L^{-1} carbon dioxide solution are shown in Fig. 4. It is observed from Figs. 4a and 4e that the corrosion of aluminum in deionized water was more severe and that more holes appeared. According to the EDS elemental diagram, the distributions of elements for the corrosion products in deionized water and in the 850 μmol L^{-1} carbon dioxide solution were similar. Aluminum was uniformly distributed on the electrode surface, while oxygen was mainly concentrated in the corrosion products. The elemental contents of the corrosion products of the aluminum electrode in deionized water and in the 850 μmol L^{-1} carbon dioxide solution are shown in Table 4. It was found that the corrosion products consisted mainly of aluminum and oxygen. The corrosion products of the aluminum electrode in deionized water and in the carbon dioxide solution should be consistent. The corrosion product of the aluminum electrode in the carbon dioxide solution did not develop either aluminum carbonate or aluminum hydrogen carbonate.

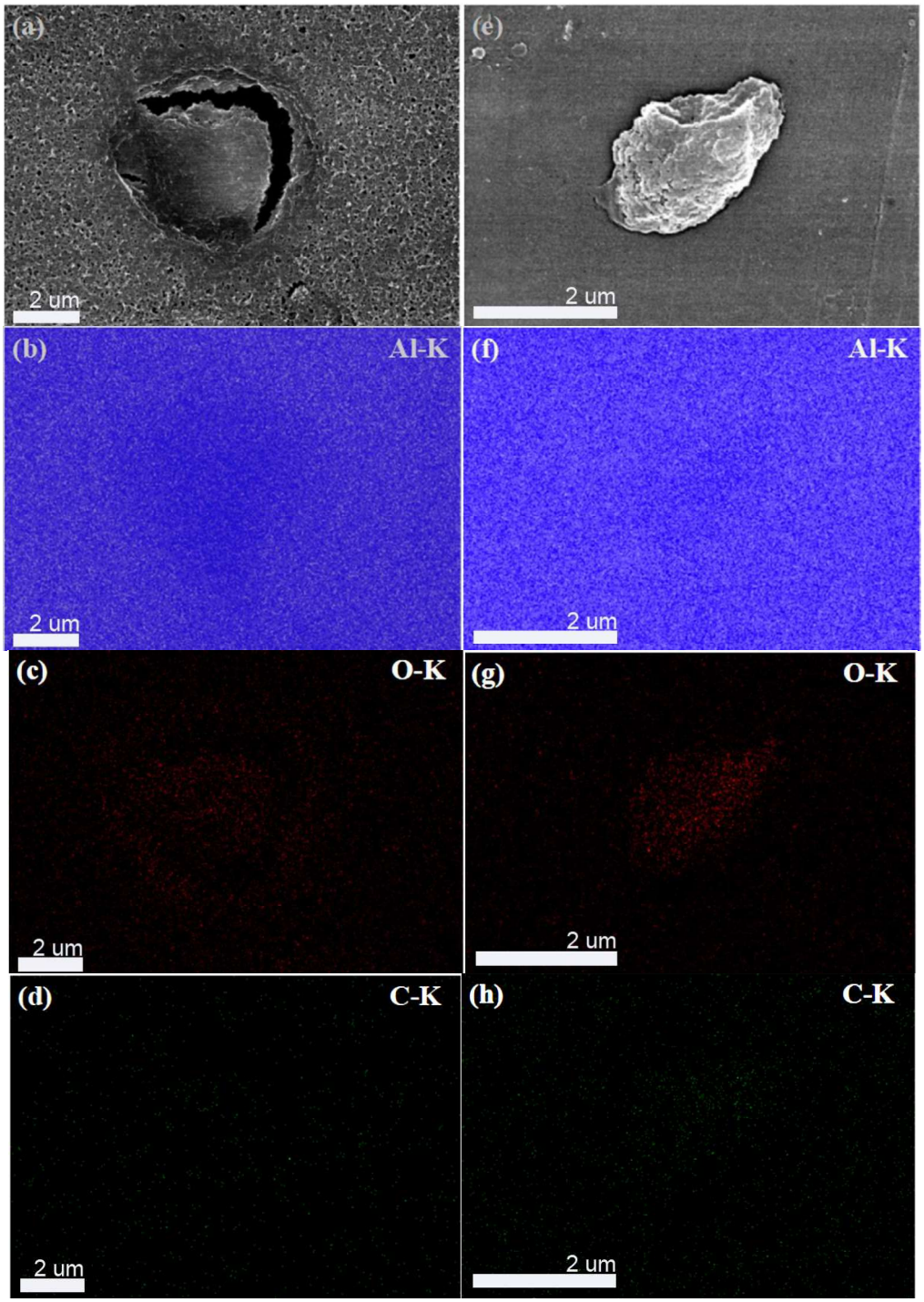

Figure 4. SEM images (a) and Al (b), O (c) and C (d) of EDS elemental analysis for corrosion products of aluminum in 0 μmol L^{-1} carbon dioxide solution, and SEM images (e) and Al (f), O (g) and C (h) of EDS elemental analysis for the corrosion products of aluminum in the 850 μmol L^{-1} carbon dioxide solution.

Table 4. Elemental contents obtained from the EDS analysis results presented in Figure 4.

Concentration of carbon dioxide solution (μmol L^{-1})	Al-K		O-K		C-K	
	Wt %	*At%*	*Wt %*	*At%*	*Wt %*	*At%*
0	84.51	75.35	12.63	18.90	2.86	5.72
850	86.36	77.10	11.53	18.31	2.11	4.59

3.5. XRD

The XRD spectra of the corrosion products of the aluminum electrodes in carbon dioxide solutions with different concentrations are shown in Fig. 5. For all of the samples, four strong peaks are observed at 39°, 45°, 65°, and 78° that match well to Al (PDF#040-708). Two strong peaks observed at 25° and 63° also correspond well to $Al(OH)_3$(PDF#26-0025) and Al_2O_3 (PDF#33-0018), respectively. This indicates that the corrosion products of aluminum electrodes in the carbon dioxide solutions and the deionized water contained $Al(OH)_3$ and Al_2O_3. This was consistent with the corrosion products of aluminum in moist air [24, 25]. As the concentration of the carbon dioxide solution increased, the peaks of the $Al(OH)_3$ and Al_2O_3 corrosion products at 25° and 63° gradually weakened. The peak of the corrosion product in the 850 μmol L^{-1} carbon dioxide solution almost disappeared. This indicated that the corrosion resistance of aluminum in the carbon dioxide solution was better than that in deionized water and that the lowest corrosion rate of aluminum was obtained in the 850 μmol L^{-1} carbon dioxide solution.

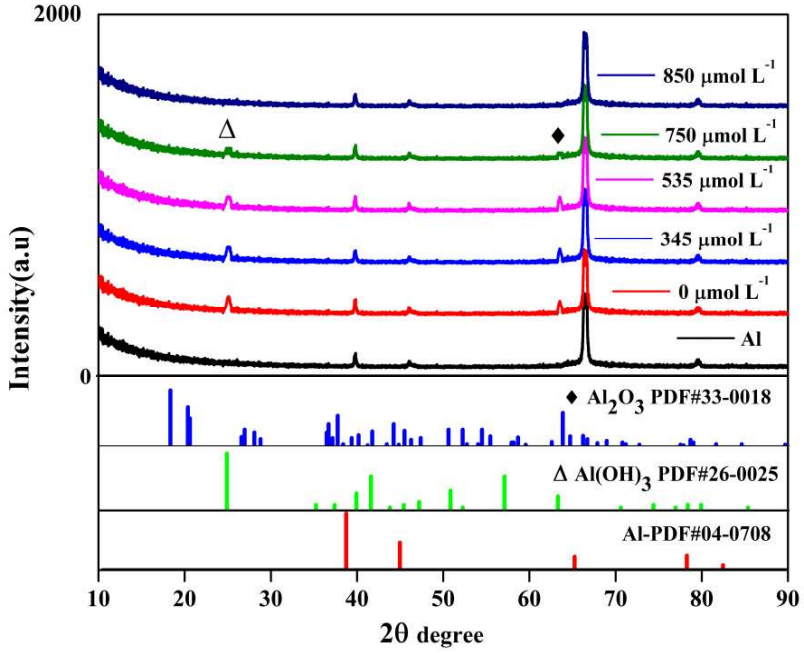

Figure 5. XRD spectrum of the corrosion products on the aluminum surface in the carbon dioxide solution.

3.6. Corrosion mechanism

It is speculated that HCO_3^- ions play a major role in inhibiting aluminum corrosion in carbon dioxide solutions. This paper mainly explores the origin for the inhibition of aluminum corrosion by HCO_3^- ions.

According to the work of Lashgari [26], the following processes are involved in the aluminum corrosion phenomena: damage of oxide/passive film (hydroxylation process) [27, 28], anodic metallic dissolution, and proton reduction. The oxide films are often chemically unstable in aqueous media and dissolve gradually through the interaction with water molecules, corresponding to the so-called hydroxylation process. At the interface region, some particular anions such as Cl^- [29, 30] can facilitate the hydroxylation process at the high energy surface active sites. However, HCO_3^- anion is relatively large and is adsorbed at a long distance and brings fewer water molecules onto the surface-active sites. Therefore, HCO_3^- ions inhibit aluminum corrosion based on suppressing the dissolution of the oxide film on the aluminum surface.

In the carbon dioxide electrolyte, HCO_3^- generated by carbon dioxide ionization adsorbed on the aluminum surface, eliminating the electric field on the original Al surface. The layer of bicarbonate HCO_3^- becomes electrostatically repulsive, reversing the charge in the oxide film layer for OH^-, which will suppress the deposition of aluminum on the surface. HCO_3^- continuously gathers on the surface of the electrode to form a shielding layer, shielding the diffusion of aluminum ions in solution. The Al^{3+} of the Helmholtz layer and the aluminum electrodes reach equilibrium of dissolution-precipitation. Because the continuous dissolution of aluminum is suppressed, aluminum corrosion is also suppressed.

4. CONCLUSIONS

The corrosion behavior of aluminum in weakly acidic carbon dioxide solution was studied. The electrolyte was simulated according to the working conditions of HVDC. The corrosion environment of aluminium was also special, such as high temperature, low conductivity and so on. Aluminum corrosion under these specific conditions was rarely reported. The results showed that compared to deionized water, the corrosion of aluminum in the carbon dioxide solution was suppressed. It was found that an aluminum electrode in the 0.84 μmol L^{-1} carbon dioxide solution with pH 4.35 had the lowest corrosion rate as observed from its lowest corrosion current, the most positive corrosion potential, and the maximum charge transfer impedance. It was confirmed that HCO_3^- plays a major role in inhibiting aluminum corrosion in carbon dioxide solutions. HCO_3^- inhibited aluminum corrosion by inhibiting the dissolution of the oxide film on the aluminum surface and by electrostatic repulsion of OH^- in solution.

This report focused on the primary reason for the grading electrodes scaling in HVDC valve cooling systems. It was elucidated that reducing the concentration of aluminum ions in the inner cooling water, in other words, inhibiting the corrosion of aluminum, is the fundamental means for solving the scaling problem of the grading electrode. This paper will provide guidance for the future application of aluminum in HCDC systems.

ACKNOWLEDGMENTS
This work was supported by the Programs of the China Southern Power Grid (CGYKJXM20180394, CGYKJXM20160094).

References

1. A. Kalair, N. Abas and N. Khan, *Renew. Sust. Energ. Rev.*, 59 (2016) 1653.
2. B.V. Eeckhout, D.V. Hertem and M.Reza, *Int. T. Electr. Energ.,* 20 (2010) 661.
3. H.Y. Qian, Y.Y. Zhou and W.C. Xu, *Adv. Mater. Res.*, 354 (2012) 1157.
4. Y. Wang, Z. Hao and R. Lin, *High. Voltage. Eng.*, 32 (2006) 80.
5. D.Y. Li, Y.X. Shi, H.P. Xu, Y. Chen, P. Zhou, X.W. Li, W.X. Feng and S.P. Wang, *Int. J. Electrochem. Sci.*, 13 (2018) 9346.
6. J.P. Dasquet, D. Caillard and E. Conforto, *Thin Solid Films*, 371 (2000) 183.
7. I.V. Aoki ,M.C. Bernard and C.D. Torresi, *Electrochim. Acta*, 46 (2002) 1871.
8. J. Zhang, M. Klasky and B.C. Letellier, *J. Nucl. Mater.*, 384 (2009) 175.
9. M. Lashgari and A.M. Malek, *Electrochim. Acta*, 55 (2010) 5253.
10. Z. Bo, L. Ying and F. Wang, *Corros. Sci.*, 51 (2009) 268.
11. E. Mccafferty, *Corros. Sci.*, 45 (2003) 1421.
12. S.G. Wang, H.J. Huang, M. Sun,K. Long and Z.D. Zhang, *J. Phy. Chem. C*, 119 (2015).
13. I. Weber, B. Mallick, M. Schild, S. Kareth, R. Puchta and E.R. Van, *Chem. Eur. J.*, 20 (2015) 12091.
14. P.O. Jackson, B. Abrahamsson and D. Gustavsson, *IEEE. T. Power. Deli.*, 12 (1997) 1049.
15. C.Y. Kong, R.C. Soar and P.M. Dickens, *J. Mater. Process. Technol.*, 146 (2004) 181.
16. Solid mineral fuels determination of carbonate carbon content gravimetric method, *ISO 925-1997*.
17. S.M. Moon and S.I. Pyun, *Corros. Sci*, 39 (1997) 399.
18. M.A. Amin, S.S. Abd El Rehim and A.S. El Lithy, *Corros. Sci.*, 52 (2010) 3099.
19. S.I. Pyun and S.M. Moon, *J. Solid. State. Electrochem.*, 4 (2000) 267.
20. N.D. Nam, W.C. Kim and J.G. Kim, *Mater. Corros.*, 63 (2012) 1004.
21. B. Zhang, Y. Li and F.H. Wang, *Corros. Sci.*, 49 (2007) 2071.
22. M. Trueba, S.P. Trasatti and D.O. Flamini, *Corros. Sci.*, 63 (2012) 59.
23. J. Wysocka, S. Krakowiak and J. Ryl, *J. Electroanal. Chem.*, 778 (2016) 126.
24. G.S. Frankel, *J. Electrochem. Soc*., 29 (1998) 2186.
25. T.H. Nguyen and R.T. Foley, *J. Electrochem. Soc.*, 129 (1982) 27.
26. M. Lashgari, E. Kianpour and E. Mohammadi, *J. Mater. Eng. Perform*, 22 (2013) 3620.
27. P.J. Eng, T.P. Trainor, G.E. Brown, G.A. Waychunas, M. Newville, S.R. Sutton and M.L. Rivers, *Science*, 288 (2000) 1029.
28. E.J. Lee and S.I. Pyun, *Corros. Sci.*, 37 (1995) 157.
29. M. Lashgari, *Electrochim. Acta*, 56 (2011) 3322.
30. W.M. Carroll, M. Murphy and C.B. Berslin, *Corros. Sci.*, 34 (1993) 1495.

Annexure-V

सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

सं. उक्षेविस/ वाणिज्यिक/ 209/ आर पी सी (64वीं)/2023/3933-3980 दिनाँक: 12, April, 2023

सेवा में / To,

उ.क्षे.वि.स. के सभी सदस्य (संलग्न सूचीनुसार)
Members of NRPC (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 64वीं बैठक का कार्यवृत ।
Subject: 64th meeting of Northern Regional Power Committee – MoM

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 64वीं बैठक दिनांक 24.03.2023 को धर्मशाला, हिमाचल प्रदेश में आयोजित की गयी थी । बैठक का कार्यवृत संलग्न है। यह उ.क्षे.वि.स. की वेबसाइट (http://164.100.60.165/) पर भी उपलब्ध है।

The 64th meeting of Northern Regional Power Committee (NRPC) was held on 24.03.2023 at Dharamshala, Himanchal Pradesh. MoM of the same is attached herewith. The same is also available on NRPC Sectt. website (http://164.100.60.165/).

भवदीय
Yours faithfully,

Naresh

(नरेश भंडारी) 12/4/23
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

18-ए, शहीद जीत सिंह मार्ग, कटवारिया सराय, नई दिल्ली- 110016 फोन:011-26513265 ई-मेल: ms -nrpc@nic.in वेबसाईट: www.nrpc.gov.in
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016 Phone: 011-26513265 e- mail: ms-nrpc@nic.in Website: www.nrpc.gov.in

A.14.32 UP representative explained that Anpara Unit 4 had undergone capital overhauling after continuous operation for 13 years, during which time it was discovered that the LP turbine blade was damaged and required major repair, causing a delay. The turbine, which was of Toshiba make, was sent to Toshiba Chennai facility for repair and has since been delivered to the UP site. UP representative assured the forum that Anpara Unit 4 would be synchronized by April 15th and that Anpara Unit 3 would also be synchronized by the same date, as its rotor had been dispatched from Haridwar on March 24th 2023 after repair.

A.14.33 MS NRPC inquired about the revival status of Obra Unit 10, to which the UP representative replied that it was currently under inspection and an exact time for its revival was yet to be confirmed. NRLDC representative raised concerns about the critical coal position at Anpara C thermal power plant, which was around 2.9 days.

A.14.34 UP representative informed the forum that they typically maintain a 3-day coal supply at Anpara A, B, and C plants and that the coal is sourced from NCL, with both trucks and merry go round trains used for transportation.

Delhi

A.14.35 NRLDC representative reported that the 400kV Bawana bus was split due to high fault level, rendering the 2 ICT section n-1 non-compliant.

A.14.36 DTL representative provided an update that they would be implementing an SPS *at* Bawana within a week as agreed upon during the 205th OCC meeting. Additionally, the SPS at Mundka had already been implemented, but only two 315MVA ICTs were currently operational, making it still n-1 non-compliant. To address this issue, DTL had received board approval for purchasing 7 no's of 500 MVA ICTs, with two being procured urgently and the remaining five on a regular basis. They have also planned for re-conductoring of 220kV lines from Bamnauli and Mundka to HTLS conductor by the summer of 2024, which would enable more load that can be shifted on Bamnauli and Mundka Stations.

A.14.37 NRLDC representative inquired about the operation of ADMS in their state and why some manual intervention was needed. DTL representative explained that in the case where Delhi as a whole was underdrawing and one DISCOM was overdrawing, a fully automatic ADMS would shed the load of that DISCOM, leading Delhi as a whole to underdraw more from the grid. Due to this, ADMS of respective DISCOMS is operated only after confirmation from Delhi SLDC.

A.14.38 However, MS NRPC stressed that ADMS should be fully automatic, and the NRLDC representative suggested adding a logic to the ADMS that could sense the overall drawl of Delhi before its operation to ensure certainty of action.

A.14.39 TPDDL representative reported that ADMS was fully implemented at their end but faced challenges due to poor communication infrastructure during outages. They were unable to revive 100% of the load shed through ADMS when system conditions improved, leading to manual intervention, commercial losses, and marking the outage as under breakdown. NRLDC representative and MS NRPC urged them to find a solution to improve ADMS and make it automatic.

Uttarakhand

A.14.40 NRLDC representative brought up the issue of no bidders for a new 400/220kV ICT at Kashipur. Uttrakhand representative stated that they were not finding any new bidders due to multiple factors, such as ABB's waiting time of over three years, inspection by a third-party clause etc.

A.14.41 CTU informed the group that they and other TSPs were able to award transformers without such hindrances and urged Uttrakhand to explore the possibility of merging the single Kashipur ICT requirement with the Landhora substation package to make it more appealing to bidders.

A.14.42 NRLDC representative also highlighted the heavy loading of 220kV CB Ganj-Pantnagar and 220kV Roorkee-Roorkee lines, which were regularly loaded above 200 MW. They also inquired about the status of the upcoming 400/220kV substation Landhora from Uttrakhand.

A.14.43 Uttrakhand representative stated that a new 400kV substation (Khurpia Farm) was currently in the planning stage with connectivity through LILO of 400kV Kashipur-Bareilly D/C. They also noted that the 220kV CB Ganj-Pantnagar would be LILOed at this substation to relieve its loading. Furthermore, a new 132kV D/C from Sitargangj(UK) to Khurpia Farm was also proposed. Regarding the Landhora substation, Uttrakhand apprised the forum that a tender was about to be floated and that 400kV Kashipur-Roorkee one circuit would be LILOed at Landhora.Uttrakhand representative informed the group that they had obtained UERC approval for running Sharavanti and Gamma gas plants with a price of 9 Rs/unit from 1.4.23 to 30.06.23.

Himachal Pradesh

A.14.44 NRLDC representative provided an update on the high loading of the 400/220kV Nallagarh ICTs, which have been drawing around 900MW power during peak demand. CTU informed the forum that a new transformer is planned to be installed at Nallagarh.

A.14.45 Punjab representative informed that a 400kV Ropar Substation is planned that will help to relieve the load on Nallagarh ICTs by shifting some load to Ropar. Additionally, the

I/29646/2023

सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

दिनाँक: 14.08.2023

विषय: Punching rights for Delhi DISCOMs in PUShP Portal and ADMS implementation in Delhi - MoM

Please find attached minutes of the meeting held on 07.08.2023 at NRPC, New Delhi to deliberate Operational rights for Delhi DISCOMs in PUShP Portal and ADMS implementation in Delhi.

संलग्नक:यथोपरि

Signed by Anzum Parwej
Date: 14-08-2023 13:31:25
Reason: Approved

(अंजुम परवेज)
अधीक्षण अभियंता

To

1. CE, NPC, CEA, New Delhi - 66
2. GM(Operational Planning), NRLDC, Grid-India - 16
3. GM, Delhi SLDC, DTL (gm.dsldc@gmail.com)
4. HoD (Power Purchase Cell), BRPL, BYPL, TPPDL, NDMC

*****

Minutes of the Meeting held on 07.08.2023 to
deliberate Operational rights for Delhi DISCOMs in PUShP Portal
and ADMS implementation in Delhi

1. Member Secretary, NRPC welcomed participants from NRLDC, Delhi SLDC, BRPL, BYPL and TPDDL. List of participants is attached as **Annexure**.
   a. He apprised members that in the workshop of PuShP portal conducted by NRPC Sectt. on 23.05.2023, NPC asked NRPC Sectt. to take up the matter of punching rights of Delhi DISCOMs and make recommendations to NPC.
   b. The matter was also raised by BYPL in 67th NRPC meeting wherein BYPL representative stated that as per existing modalities of PUShP Portal, SLDC is nodal agency for Delhi State and has been entrusted to facilitate overall available power capacity in Delhi, if any. Presently, Delhi DISCOMs have been provided with 'View only' login rights of PUShP portal; whereas Delhi SLDC being the Nodal Agency, has access to punching rights i.e. Operational rights, PSM status and Accounting. The forum agreed in the meeting to take up the request of BYPL for Operational/ punching rights on PUShP portal in a separate meeting.
   c. He requested Delhi SLDC to apprise regarding the issue.
2. Representative of Delhi SLDC expressed its inability to represent 05 different DISCOMs in Delhi, both Private and Govt. on the portal and requested that operational rights on the portal may be given directly to DISCOMs because rights of sale/ purchase of power are with DISCOMs only. Further, there is not a single Power Purchase Cell (PPC) in Delhi unlike other states.
   a. He further apprised that, presently, share allocation bifurcation is being carried out by DERC. In the PuShP portal, requests will be processed on first come first serve basis of power allocation. However, it will be difficult to distribute power among DISCOMs if all DISCOMs requested power at the same time as it will be infeasible to maintain this first come first serve basis.
   b. He also stated that DISCOMs can purchase power in different plants wherein allocation has not been decided by DERC. In case, more than one DISCOMs submit requisition to avail power from a particular station in a particular block and the total requisition power is more than the surrendered power, Delhi SLDC will not be in a position to bifurcate the allocated power.
3. EE(C) stated that since Delhi SLDC is expressing its inability to represent multiple Delhi DISCOMs on the portal, a methodology can be devised for Delhi DISCOMs to represent themselves on the portal as follows:
   a. Delhi may be bifurcated into 5 sections on the portal- one for each DISCOM- and each section may operate independently, as a sub-set of Delhi, in terms of relinquishment of their own share or procurement of surrendered power.

b. WBES would get net schedule of Delhi.

c. Thus, each DISCOM of Delhi may be given separate operational rights on the portal for relinquishment of their own share or procurement of surrendered power.

d. The PSM may be ensured by DISCOMs as these are end-users.

e. Inter-DISCOM relinquishment/ procurement may not be allowed.

f. SLDC may punch, one time, DISCOM-wise firm share from various stations on the portal wherein allocation has been done by DERC and update the same from time to time as and when firm share of DISCOMs is changed by DERC.

g. Contract note generated by portal may be suitably changed to mention the specific DISCOM in case of Delhi only for accounting purposes.

4. NRLDC agreed that individual operating rights can be given to Delhi DISCOMs for punching. However, responsibility for checking state transmission corridor and other DERC compliances would be with Delhi SLDC.

5. TPDDL, BYPL and BRPL also submitted that Delhi SLDC may co-ordinate for all DISCOMs transactions on the portal as well.

6. TPDDL added that Delhi SLDC is also nodal for compliance of Inter DISCOM Transfer of power (IDT) rules of DERC. Compliance of IDT may also be ensured by Delhi SLDC for transactions on the portal as well.

7. Accordingly, it was agreed to recommend the following to NPC Division, CEA:

   a. Each Delhi DISCOMs may be given operating rights and Delhi DISCOMs will operate on the PUShP portal **as a sub-set of Delhi**.

   b. The PSM will be ensured by DISCOMs.

   c. The transactions on the PUShP portal will be approved by Delhi SLDC after Transmission corridor check and other necessary checks as per DERC.

   d. Delhi SLDC will also share DERC approved DISCOM wise firm power allocation for one-time implementation in portal and update the same from time to time as and when firm share of DISCOMs is changed by DERC.

8. EE(O), NRPC informed that in the meeting taken by Member Secretary, NRPC on 13.06.2023 to discuss the status of Automatic Demand Management Scheme (ADMS) implementation in Northern Region, representative from Delhi SLDC apprised that manual intervention is there in the operation of ADMS for Delhi. Delhi SLDC mentioned that their DISCOMs have reservation that in case where Delhi as a whole is under-drawing and one DISCOM is over-drawing, a fully automatic ADMS would shed the load of that DISCOM, leading Delhi as a whole to under-draw more from the grid. As discussed in 64th NRPC meeting held on 24.03.2023, to overcome above issue, it was suggested to add a logic to the ADMS that could sense the overall drawl of Delhi before its operation to ensure certainty of action.

9. In the meeting, Delhi SLDC informed that Fully automatic ADMS is not operational in Delhi. The Load shedding is done by individual DISCOMs manually. He further mentioned that there is not much scope of load shedding in Delhi.
10. BYPL informed that there is no automatic application for ADMS operation in BYPL however, there is a provision for manual load shedding through a single push button from their SCADA control center. Further, he mentioned that if load is very narrow and there are fluctuations in the load due to demand diversity, in that case there is very less scope of load shedding. However, load shedding is done as per the instructions of Delhi SLDC.
11. BRPL and TPDDL mentioned that they also have provision for manual load shedding through a single push button from there their SCADA control center. TPDDL also mentioned that load fluctuates every minute especially due to DMRC load.
12. NRLDC mentioned that logic for ADMS operation may be developed at state periphery. Logic for ADMS may have a combination of frequency condition, overdrawl condition and overdrawl limit along with the time duration limit for continuous overdrawl.
13. MS, NRPC stated that ADMS is necessary for Grid Security and as per IEGC, it is mandatory for all states. He requested Delhi SLDC to co-ordinate with the Delhi DISCOMs and finalize the logic for ADMS operation in Delhi.
14. In view of the above, following were decided in the meeting:
    a. NPC Division, CEA would be recommended the decision of forum as mentioned on point no. 7.
    b. Delhi SLDC will co-ordinate with the Delhi discoms and finalize the logic for ADMS operation in Delhi at the earliest and intimate the same to NRPC sectt.

Meeting ended with vote of thanks to the Chair.

*****

Annexure

List of Participants

NRPC Sectt.

1. Sh. V. K. Singh, MS
2. Sh. Anzum Parwej, SE
3. Sh. Praveen Jangra, EE
4. Sh. Omkishor, EE
5. Sh. Kaushik Panditrao, AEE
6. Sh. Omprakash Rajput, AE

NRLDC Grid-India

7. Sh. Alok Kumar, GM
8. Smt. Kavita Parihar, Sr. DGM
9. Sh. Bikas Kumar Jha, DGM
10. Sh. P. Karthik, CM
11. Sh. Gaurav Singh, Manager

Delhi SLDC

12. Sh. S. K. Sinha, AGM
13. Sh. Naveen Kumar, उ. प्र. (त)

BRPL

14. Sh. Sahil Saxena, VP
15. Sh. Bhuwanesh Dwivedi, Add VP
16. Sh. A.K. Geva, Add VP
17. Sh. Aashman Gadia, DGM

BYPL

18. Sh. Haridas Maity, AS VP
19. Sh. Ravindra Gupta, DGM
20. Sh. Som Dutt, GM
21. Sh. N. Aravindh Babu, Asst VP
22. Sh. Anil Vaishy, Addl VP

TPDDL

23. Sh. Yogesh Gupta, Addl. GM
24. Sh. Md. Shadab Ahmad, AGM
25. Sh. Deepak Mehra, Mgr

I/33401/2024

सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेतरीय विद्युत समिति
Northern Regional Power Committee

विषय: Minutes of the meeting to discuss the status of Automatic Demand Management Scheme (ADMS) implementation in Delhi-reg.

Kindly find attached minutes of the meeting held on **04.01.2024 (10:30 AM)** to discuss the status of Automatic Demand Management Scheme (ADMS) implementation in Delhi.

(डी.के. मीना)
अधीक्षण अभियंता (प्रचालन)

सेवा में,

As per list of participants (Copy attached)

Minutes of the meeting held on 04.01.2024 (10:30 AM) to discuss the status of Automatic Demand Management Scheme (ADMS) implementation in Delhi

MS, NRPC welcomed all the participants in the meeting. List of participants is attached at **Annexure-I**.

1. MS, NRPC informed that this meeting has been convened to deliberate on the concerns raised by Discoms of Delhi regarding implementation of Automatic Demand Management System (ADMS) in Delhi in the Meeting held by SLDC, Delhi on 07.11.2023 to decide on practical and workable solution for implementation of ADMS in Delhi. He stated that as per as per the Indian Electricity Grid Code (IEGC), 2023, every SLDC, in coordination with STU and Distribution Licensee (s), shall develop Automatic Demand Management Scheme with emergency controls at SLDC to ensure network security.

2. EE(O), NRPC stated that in the aforementioned meeting held by SLDC, Delhi, Discoms have highlighted their apprehension about the aspect of load shedding which may happen whenever ADMS actuates, as Discoms have to adhere to the norms/ advisories issued by DPCC, CAM/GRAP to avoid load shedding. Other concerns raised by the Discoms includes load fluctuation due to Metro and Railway operations, sudden overdrawl due to tripping/ non-availability of scheduled generation, disparity between real time loads in SLDC SCADA and Discom SCADA etc.

3. MS, NRPC stated that load shedding in general is not desirable. However, considering grid security ADMS implementation is mandatory for all states as per IEGC, 2023.

4. Representative of TPDDL stated that
   - At present they can disconnect multiple 11 kV feeders with single click.
   - As per the regulation emergency control of ADMS should be with SLDC.
   - As per the IEGC, ADMS is one of the mechanisms to bring Area Control Error (ACE) to zero. Other mechanisms like deploying reserve and rescheduling should also be focused.
   - If Delhi as a whole is over drawing and one particular Discom is not overdrawing, then it may be clarified whether that Discom also need to do load shedding.
   - There is disparity in the real time loads in the SLDC SCADA and Discom SCADA. Therefore, it may be decided which data is to be considered for taking decision in ADMS.
   - There are load fluctuation for short duration due to Metro operation. Therefore, suitable time delay needs to be incorporated in the ADMS logic.
   - On an average 3000 consumers are connected on every 11kV feeder in TPDDL and limited number of 11kV feeders are available for load shedding. Therefore, large no. of consumers will be affected due to frequent switching.
   - TPDDL agrees that AMDS needs to be implemented for grid security. But at the same time above stated concerns also need to be addressed.

5. Representative of BRPL stated that they have similar concerns as stated by TPDDL and they also agree that ADMS needs to be implemented for grid security. He mentioned that there is disparity between ABT meter data and SCADA data and ABT data is not available real time. He suggested that for accurate flow of information, communication between SLDC and Discoms needs to be strengthened. BRPL representative further stated that implementation of demand response program may also be considered for load control at Discoms level. BRPL has done some pilots on demand response and submitted the report to the DERC. Further, increase in the generation through Pumped Storage Projects and internal generation of Delhi may also be taken into consideration to avoid overdrawl from the grid.

6. Representative of BYPL stated that they also agree that ADMS needs to be implemented for grid security. He informed that BYPL and BRPL can also disconnect multiple 11 kV feeders with single click. He mentioned that most of their concerns are similar to the concerns stated by TPDDL and BYPL. Further, he stated that data source for ADMS should be aggregated at SLDC level.

7. Representative of NRLDC stated that as per the regulation ACE is to be calculated at the SLDC level and therefore logic of ADMS has to be at the SLDC level. He mentioned that ADMS may have more than one stages wherein certain amount of load shedding may be done in every stage and frequency at which ADMS will operate may also be incorporated in the ADMS logic. Further, ADMS logic may also be such as to actuate ADMS whenever ACE goes beyond a particular limit so as to reduce the ACE.

8. Representative of NRLDC mentioned that interventions suggested by Discoms i.e. rescheduling, increasing internal generation and increase in generation through PSP are all manual intervention which can be implemented so that ADMS does not operate. However, ADMS which is an automatic intervention and it is mandatory as per the regulation. Further, as suggested by BRPL, Discom may implement demand response for load control provided that it is operated in automatic mode without manual intervention. He also informed that reserves are deployed as per the requirements. Further, ADMS is also required to provide additional relief.

9. Regarding Discoms apprehension about load shedding which may happen when ADMS operates, as they have to follow the norms of DPCC/ CAM-GRAP to avoid load shedding, representative of NRLDC stated that if Discoms maintain the grid discipline than ADMS may not actuate and condition of load shedding may not arise. Further, he suggested that ADMS logic can be devised so that load shedding happens only in that Discom which is having overdrawl so that if a particular Discom is not overdrawing than that Discom may not be required to do load shedding.

10. Representative of NRLDC informed that all state in the eastern region have implemented ADMS. Further, different states have implemented ADMS differently as per their requirement. He also shared with the participants the

Logics for ADMS operation incorporated by the various states in the Eastern region. Copy of the presentation is attached as **Annexure-II**.

11. Representative of NRLDC clarified that as per regulations ACE is to be calculated based on telemetry values. Therefore, ABT meter data is not required for ADMS implementation and SCADA data may be used to implement ADMS.

12. Representative of Delhi SLDC stated that at present load of Delhi as a whole is being calculated at 400KV level using data of ISTS points. Therefore, margin of error is very less in this data. He further stated that since Discoms, are apprehensive about the Discom-wise bifurcation available in SCADA of SLDC Delhi, SCADA data of Discoms may be used in the implementation of ADMS.

13. Representative of TPDDL stated that SCADA data of NDMC and MES may also be considered in the ADMS. Further, he requested SLDC Delhi to improve the accuracy of SLDC SCADA data.

14. Representative of SLDC Delhi stated that SCADA is not available in NDMC therefore SLDC SCADA data may be considered for NDMC.

15. Representative of MES stated that SCADA is available in MES. Further, avg. load of MES is around 25 MW and peak load is around 40 MW.

16. MS, NRPC stated that load of MES may be considered in the logic of ADMS. However, MES may be exempted from load shedding since load of MES is less than one percent of the overall load of Delhi.

17. Representative of TPDDL stated that ADMS may be implemented at 11kV and/or 33kV level, to which SLDC Delhi replied that Discoms may decide which the feeders on which ADMS would be implemented at the Discoms level.

18. Representative of NRLDC stated that a committee may be formed under the chairmanship of GM, SLDC Delhi with representatives from all Discoms and DTL to formulate the logic for implementation of ADMS in Delhi.

19. Representative of Discoms mentioned that at present facility of automatic reconnection is not available in Discoms.

20. NRLDC representative stated that automatic reconnection is essential for ADMS operation therefore Discoms may take necessary action to enable automatic reconnection of feeders.

21. MS, NRPC stated that implementation of ADMS mandatory as per the regulation and there is no provision of exemption for implementation of ADMS. Further, at the same time concerns of Discoms also need to be addressed. He mentioned that ADMS is for the purpose of grid security and it may also happen in the future that ADMS would never be operated. He further stated that Discoms may implement load shedding either at 11 KV or 33 kV as per their convenience. He requested Delhi SLDC/ and DTL to improve accuracy of SLDC SCADA data.

22. After detailed deliberations following decisions were taken in the meeting:

- ADMS logic may be devised so as only Discom having overdrawl would do the load shedding.
- SCADA data would be used for ADMS. ABT meter data is not required for ADMS.
- SCADA data of Discoms would be used to decide which DICCOM is having overdrawl. For this purpose, Discoms SCADA data may be shared with SLDC Delhi. However, for SLDC SCADA data may be used for NDMC.
- A committee would be formed under the chairmanship of GM, SLDC Delhi with representatives from all Discoms and DTL. The committee shall submit the report within one month to Member Secretary, NRPC. Terms of Reference (ToR) of the committee are as under:

  a. To formulate the logic for implementation of ADMS in Delhi with suitable time delay and adequate quantum of ACE for actuation of ADMS.

  b. To decide the frequency at which load would be reconnected automatically.

Meeting ended with vote of thanks to the Chair.

*****

List of participants

NRPC Sectt.

1. Sh. V.K. Singh, Member Secretary
2. Sh. D.K. Meena, Superintending Engineer (O)
3. Sh. Omkishor, Executive Engineer (O)
4. Sh. Vipul Kumar, Assistant Executive Engineer (O)

NRLDC

5. Sh. Alok Kumar, General Manager
6. Sh. Gaurav Singh, Manager

SLDC

7. Sh. S.K. Sinha, Assistant General Manager (T)
8. Naveen Kumar, Deputy Manager (T)

DTL

9. Sh. B.L. Gujar, Assistant General Manager

BRPL

10. Sh. M. Kishore Babu, Assistant Vice President
11. Sh. Avinash Kumar, Assistant Vice President
12. Sh. Anil Bohara, Assistant Vice President (Head. Sys-OP)
13. Sh. Bhuwanesh Dwivedi, Assistant Vice President (SCADA)
14. Sh. Pramod Kumar Mishra, Assistant Vice President
15. Sh. T. Murthi, Assistant Vice President
16. Sh. A.V.V. Surendra, Sr. Manager

BYPL

17. Sh. Anil Vashy, Vice President
18. Sh. Som Dutt Sharma, General Manager
19. Sh. Prashant Agrawal, General Manager

TPDDL

20. Sh. Kapil Kumar, Head of Department
21. Sh. Ankit Malik, Assistant General Manager

MES

22. Sh. Raghav Pandey, SCADA Engineer

DELHI TRANSCO LIMITED

(A Govt. of NCT of Delhi Undertaking)

STATE LOAD DESPATCH CENTRE (DELHI)

website: www.delhisldc.org

F.DTL/207/2024-25/GM(T)SLDC/F.3/17 Date 5.6.2024

Member Secretary
Northern Regional Power Committee
18-A, Qutab Institutional Area
Shaheed Jeet Sigh Marg
Katwaria Sarai
New Delhi – 110016.

Sub:- Minutes of Meeting held in office of GM(T)SLDC, DTL for implementation of ADMS in NCT of Delhi – Reg.

Sir,

As per the directions of Northern Regional Power Committee (NRPC), issued vide MoM of the meeting held on 04th Jan., 2024, an ADMS Committee was constituted comprising of SLDC , DISCOMs, NDMC, and MES in the meeting held on 8th Feb., 2024.

Subsequently, ADMS Committee held meetings on 23rd Feb., 2024 and 18th March 2024 to decide the logic for implementation of ADMS in NCT of Delhi. Copies of MoM of all these meetings have already been shared with SE(O), NRPC. Based on the logic decided, a Standard Operating Procedure (SOP) is finalized by ADMS Committee in its final and concluding meeting held on 03rd June 2024 along with the timeline for implementation of ADMS in NCT of Delhi by all the DISCOMs. Copy of Minutes of final meeting is enclosed herewith for perusal and deliberation of NRPC.

The SOP may kindly be deliberated upon and approved by NRPC before implementation of ADMS in NCT of Delhi by the DISCOMs.

(Anish Garg)
GM(T)SLDC

Copy to:
AGM(T) to Director(Operations) : for information please

DELHI TRANSCO LIMITED

(A Govt. of NCT of Delhi Undertaking)

STATE LOAD DESPATCH CENTRE (DELHI)

website: www.delhisldc.org

No. F.DTL/207/2024-25/GM(T)SLDC/F.3/16 Dated: 03-6-2024

Minutes of Meeting

A final meeting of ADMS Committee was called vide our meeting notice no. F.DTL/207/2024-25/GM(T)SLDC/F.03/15 dated 31.05.2024 on 03rd June 2024 in Chamber of GM(T)SLDC, Chairperson of Committee, to finalize the Standard Operating Procedure (SOP) for implementation and working of Automatic Demand Management System (ADMS) by DISCOMs in NCT of Delhi. The draft SOP was circulated on 03rd April 2024 among the Committee members for their perusal and comments.

At the outset, Sh. Anish Garg, General Manager(Tech.)SLDC welcomed all the participants and emphasized on finalization of SOP for implementation and working of Automatic Demand Management System in NCT of Delhi in the line with the broad logic finalized in earlier meetings.

In the meeting, the draft SOP was discussed and after detailed deliberations the Committee agreed with the draft SOP in totality.

The Standard Operating Procedure, as finalized by ADMS Committee, is as under:-

"***Standard Operating Procedure (SOP) for implementing ADMS scheme in NCT of Delhi***

On the basis of broad logic, for implementation of ADMS, as decided by ADMS Committee in its meeting held on 18th March 2024 in the office of GM(T)SLDC, the Standard Operating Procedure for implementation and working of ADMS in NCT of Delhi is as under:

1. *Delhi DISCOMs shall implement the ADMS at their end. For this purpose, Delhi SLDC will share Over-drawl (OD)/ Under-drawl (UD) data of Delhi and Northern Region (NR) frequency on real time basis with all DISCOMs.*

2. *DISCOMs shall develop an automated system to monitor above both data continuously at their end.*

3. *For the purpose of decision making, each DISCOM shall use its own SCADA data of OD occurring in their area of operation and Delhi SLDC SCADA data of OD occurring in NCT of Delhi and Northern Region frequency data.*

4. *As per decision of ADMS Committee, 03 minutes time lag was given before actuation of ADMS. However, considering the average time delay of 30 seconds in data transfer from Delhi SLDC to DISCOMs through ICCP, a total time lag of 3 minutes and 30 seconds shall be considered before actuation of ADMS.*

5. *Each DISCOM shall develop the logic, at their end, for actuation of ADMS in following sequence:-*

    a. *First the frequency should be checked. As soon as it gets below 49.7 Hz, the ADMS logic should initiate and the countdown of time lag of 03 minutes 30 seconds will start. If during this duration frequency gets restored to 49.7 Hz or above then the timer will reset and ADMS will start monitoring frequency afresh.*
    b. *At the end of 3 minutes 30 seconds, the ADMS of each DISCOM will simultaneously check if Delhi as a whole is overdrawing and if that DISCOM is overdrawing.*
    c. *If after 03 minutes 30 seconds all the conditions are met i.e. frequency remained below 49.7 Hz for all this duration and at the end of 3 minutes 30 seconds both Delhi as a whole and the particular DISCOM are overdrawing then ADMS of that particular DISCOM(s) will operate instantaneously to disconnect load of their respective area automatically.*
    d. *The ADMS will disconnect load in 04 stages each having time gap of 01 minute. The quantum of load to be disconnected in each stage shall be as per below:*

S. No.	Name of DISCOM	Quantum of over-drawl to be disconnected in each stage of 01 minute.
1.	TPDDL	To the extent of over-drawl or 29 MW, whichever is lower.
2.	BRPL	To the extent of over-drawl or 41 MW, whichever is lower.
3.	BYPL	To the extent of over-drawl or 21 MW, whichever is lower.
4.	NDMC	To the extent of over-drawl or 10% of Schedule or 05 MW, whichever is lowest.
5.	MES	No Load shedding to be done, as per decision taken in NRPC meeting held on 04th Jan., 2024.

The limits shall get revised automatically whenever, DERC revises the Over-drawl limit.

e. *Feeders tripped due to actuation of ADMS shall get reconnected automatically after 02 minutes of restoration of frequency at or above 49.7 Hz.*

6. *In first week of every month, Delhi SLDC and DISCOMs shall check the correctness of Delhi OD/UD data and NR frequency being shared through ICCP. However, at any time, if there is any mis-match of data being shared by Delhi SLDC with DISCOMs, the concerned DISCOM shall check the same at its end and if the problem is on part of Delhi SLDC then that DISCOM shall inform the Delhi SLDC in time for its rectification.*

7. *Whenever, DERC revises the over-drawl limit of any of the DISCOM, the same should be intimated to Delhi SLDC by the concerned DISCOM and necessary changes be made in the ADMS system under intimation to Delhi SLDC.*

8. *Each DISCOM shall assign a nodal officer for the ADMS and its contact details shall be made available to System Operation, Delhi SLDC.*

9. *All DISCOMs shall share the report of every ADMS operation with Delhi SLDC on very next day for record purpose in the format that will be prepared by System Operation, Delhi SLDC.*

10. *If any hindrance/ difficulty arises after implementation of ADMS, the SOP can be revised accordingly after discussing with*

all stakeholders. Any modification required in the SOP, in later date, it shall be done only with the consent of GM(T)SLDC and under intimation to NRPC."

All stakeholders agreed to implement the ADMS, as per the finalized SOP, subject to the approval of NRPC.

Further, concerns raised by DISCOMs and decision on timeline to implement the ADMS were discussed and deliberated as under:-

1. NDMC requested that it may be exempted from the scope of implementation of ADMS in NCT of Delhi as they are serving load of VVIP areas of Delhi including Rashtrapati Bhawan, Parliament House, PM House, important Government Buildings, and Diplomatic area/ Embassy area and also their quantum of load is quite less in comparison to the overall load of Delhi. Moreover, they submitted that their main source of supply is Pragati Power generation plant. Even if a unit of any generating plant gets tripped then a shortfall of directly 30 MW will occur which will be difficult for them to meet.

   As the exemption from implementation of ADMS is not in the purview of this Committee, the Chair asked NDMC to approach NRPC for the same.

2. BYPL put forth their concern that in case as per SLDC SCADA data if any DISCOM is over-drawing but as per SCADA of concerned DISCOM it is not over-drawing and vice-versa then this scenario can create issues in future.

   The Chair emphasized on the going ahead with the implementation of ADMS as per agreed logic. Point no. 10 is kept in SOP to take care of any such difficulty encountered in future.

3. The Chair asked the DISCOMs for providing the timeline for implementation of ADMS in NCT of Delhi for apprising the NRPC.

   BRPL and BYPL submitted that the Purchase Order for upgradation of their SCADA system has been placed. So, subsequent to upgradation of their SCADA system only they will be able to implement the ADMS

because at present no changes can be made in existing SCADA system. It was informed by the BRPL and BYPL that their existing SCADA system will be upgraded before 31st March 2025.

TPDDL stated that there is no hindrance on their part in implementation of ADMS but emphasized that the ADMS implementation should be made applicable simultaneously by all the DISCOMs.

NDMC submitted that the tender for installation of SCADA in NDMC has been floated and it is due to open on 18th June 2024. It may take more than 01 year in its installation.

The Chair observed that since NRPC has allowed that for NDMC, Delhi SLDC SCADA data be used for implementation of ADMS, so delay in SCADA installation by NDMC will not hamper ADMS implementation in NCT of Delhi.

Therefore, after detailed deliberations and taking into account the concerns of all DISCOMs, it was unanimously decided to implement the ADMS in NCT of Delhi on **28th February 2025, subject to the approval of SOP by NRPC**.

The Minutes are issued with the approval of the Chair.

3/6/2024

AM (T) to GM (T)SLDC

Encl: List of participants (Annexure-I)

Copy to all participants

Copy for kind information to:-

1. GM(T) SLDC
2. SE (O), NRPC
3. AGM (T) to Dir (O)

Annexure-I

List of Participants:-

1. Sh. S. K. Sinha, AGM(T)System Operation, SLDC (sinha.surendra123@gmail.com).
2. Sh. V. K. Jaiswal, AGM(T)SCADA, SLDC (vinay.jaiswal@dtl.gov.in).
3. Sh. Sameer, AM(T) to GM(T)SLDC (gm.dsldc@gmail.com)
4. Sh. Akhil Agrawal, Dy. Manager(T) SCADA-Software, SLDC (akhil@dtl.gov.in).
5. Sh. Ankit Malik, AGM, TPDDL (ankit.m@tatapower-ddl.com).
6. Sh. Anil Bohara, HoD(SO & SCADA), BRPL (anil.bohara@relianceada.com)
7. Sh. M. Kishore, AsVP, BRPL (miriyala.babu@relianceada.com).
8. Sh. Anil Vaishy, VP, BYPL (anil.vashy@relianceada.com)
9. Sh. Prashant Agrawal, GM(PMG), BYPL (prashant.agarwal@relianceada.com).
10. Sh. N. Aravindh Babu, AsVP (PCC) BYPL (aravindh.babu@relianceada.com).
11. Sh. Surendranath Amalakanti, AEE, NDMC (surendranath316322@ndmc.gov.in).
12. Sh. Madan Pal, Advisor (RE), NDMC (madanpalndmc@rediffmail.com)

Gmail DGMSO DELHISLDC <dgmsodelhisldc@gmail.com>

Fwd: Minutes of Meeting

GM Delhi SLDC <gm.dsldc@gmail.com> Thu, Oct 10, 2024 at 11:29 AM
To: dgmsodelhisldc@gmail.com

---------- Forwarded message ---------
From: **NRLDC SO 2** <nrldcso2@grid-india.in>
Date: Tue, Aug 13, 2024 at 11:18 AM
Subject: Re: Minutes of Meeting
To: GM Delhi SLDC <gm.dsldc@gmail.com>
Cc: Anish Garg <garganish@gmail.com>, Somara Lakra (सोमारा लाकरा) <somara.lakra@grid-india.in>, Bikas Kumar Jha (बिकास कुमार झा) <bikaskjha@grid-india.in>, Sunil Kumar Aharwal (सुनील कुमार अहरवाल) <skaharwal@grid-india.in>, Gaurav Malviya (गौरव मालवीय) <gauravmalviya@grid-india.in>, seo-nrpc <seo-nrpc@nic.in>, NARESH BHANDARI <ms-nrpc@nic.in>, Gaurav Singh (गौरव सिंह) <gauravsingh@grid-india.in>

Sir,

Please refer to the following extract from Minutes of the meeting to discuss the status of Automatic Demand Management Scheme (ADMS) implementation in Delhi-reg of NRPC held on 04.01.2024 :

- A committee would be formed under the chairmanship of GM, SLDC Delhi with representatives from all Discoms and DTL. The committee shall submit the report within one month to Member Secretary, NRPC. Terms of Reference (ToR) of the committee are as under:

  a. To formulate the logic for implementation of ADMS in Delhi with suitable time delay and adequate quantum of ACE for actuation of ADMS.

  b. To decide the frequency at which load would be reconnected automatically.

As can be seen it was decided that the logic for the implementation of ADMS in Delhi, including the suitable time delay and the adequate quantum of ACE for the actuation of ADMS, will be determined by the committee formed under the chairmanship of GM, SLDC Delhi.

As input from NRLDC, the following adjustment in the scheme may be considered:

Currently, the proposed ADMS will operated in four stages with a 1-minute interval between them when the frequency falls below 49.7 Hz combined with Delhi's overall overdraw and the respective DISCOM's overdraw.

However, if the frequency continues to decline and drops below 49.6 Hz, it may be more effective for the entire ADMS quantum (all four stages) to trip simultaneously without any further time delay.

This adjustment would improve the system's responsiveness in critical situations.

सादर धन्यवाद/ Thanks & Regards
प्रणाली संचालन-II/ System Operation-II
उ॰क्षे॰भा॰प्रे॰के॰/ NRLDC
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड/ Grid Controller of India Limited
Formerly known as
पोसोको / POSOCO

From: GM Delhi SLDC <gm.dsldc@gmail.com>
Sent: Monday, July 15, 2024 4:00:35 PM
To: NRLDC SO 2; Somara Lakra (सोमारा लाकरा)
Cc: Anish Garg
Subject: Fwd: Minutes of Meeting

Sir,

Please find attached in trailing mail the logic/SoP, finalised on 03.06.2024 by Delhi SLDC along with all stakeholders, for implementation of ADMS in Delhi.

The same was already shared with NRPC for their kind perusal and approval for initiating its implementation process. Approval of NRPC is still awaited.

Regards

AM(T) to GM(T)SLDC

---------- Forwarded message ---------
From: **GM Delhi SLDC** <gm.dsldc@gmail.com>
Date: Mon, Jun 3, 2024 at 5:40 PM
Subject: Minutes of Meeting
To: surendra kumar sinha <sinha.surendra123@gmail.com>, <Vinayjaiswaldtl@gmail.com>, <anil.bohara@relianceada.com>, <anil.vashy@relianceada.com>, <ankit.m@tatapower-ddl.com>, <surendranath.316322@ndmc.gov.in>, <madanpalndmc@rediffmail.com>, <miriyala.babu@relianceada.com>, <prashant.agarwal@relianceada.com>, akhil agrawal <akhilagrawal09@gmail.com>, <aravindh.babu@relianceada.com>
Cc: Anish Garg <garganish@gmail.com>, <seo-nrpc@nic.in>, AGMT <agmtoperation.dtl@gmail.com>

Sirs,

Please find attached the Minutes of Meeting held on 03.06.2024 for finalization of SOP for implementation of ADMS in NCT of Delhi.

Regards

Sameer
AM(T) to GM(T)SLDC
Follow Grid-India on:

Gmail DGMSO DELHISLDC <dgmsodelhisldc@gmail.com>

Final Standard Operating Procedure for implementation of ADMS in Delhi after incorporating suggestion of NRLDC.

Dharmendra Kumar Meena <dharmendra.cea@gov.in> Thu, Sep 26, 2024 at 10:26 AM
To: ashokkumar3 <ashok.kumar3@dtl.gov.in>, dgmsodelhisldc <dgmsodelhisldc@gmail.com>

महोदय / महोदया,

forwarding the NRLDC regarding reviewed the modified proposal scheme of the Delhi ADMS for necessary action please.

भवदीय,

डी.के. मीना

अधीक्षण अभियंता (प्रचालन एवं संरक्षण),

उत्तर क्षेत्रीय विद्युत समिति

विद्युत् मंत्रालय

१८-शहीद जीत सिंह मार्ग, कटवरिया सराय

नई दिल्ली - १६

From: "Gaurav Singh (गौरव सिंह)" <gauravsingh@grid-india.in>
To: "Vipul Kumar" <vipul.cea@gov.in>
Cc: bikaskjha@grid-india.in, skaharwal@grid-india.in, "somara lakra" <somara.lakra@grid-india.in>, gauravmalviya@grid-india.in, akashtomar@grid-india.in, asif@grid-india.in, rahulnegi@grid-india.in, "Sh V K Singh" <ms-nrpc@nic.in>, "Santosh Kumar" <seo-nrpc@nic.in>
Sent: Friday, September 20, 2024 10:13:19 AM
Subject: Fw: Final Standard Operating Procedure for implementation of ADMS in Delhi after incorporating suggestion of NRLDC.

Sir,

We have reviewed the modified proposal scheme of the Delhi ADMS and it seems acceptable. Kindly note that NRLDC has no further comments on the scheme.

Regards,

Gaurav Singh / गौरव सिंह

Chief Manager/मुख्य प्रबंधक

System Operation/ प्रणाली संचालन

NRLDC,GRID-INDIA / उत्तरी क्षेत्रीय भार प्रेषण केंद्र, ग्रिड-इंडिया

From: NRLDC SO 2
Sent: Friday, September 13, 2024 11:47 AM
To: Gaurav Singh (गौरव सिंह)

Subject: Fw: Final Standard Operating Procedure for implementation of ADMS in Delhi after incorporating suggestion of NRLDC.

Please see if the proposal is in order.

सादर धन्यवाद/ Thanks & Regards

प्रणाली संचालन-II/ System Operation-II

उ॰क्षे॰भा॰प्रे॰के॰/ NRLDC
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड/ Grid Controller of India Limited
Formerly known as
पोसोको / POSOCO

From: Vipul Kumar <vipul.cea@gov.in>
Sent: Wednesday, August 28, 2024 3:43 PM
To: NRLDC SO 2; Bikas Kumar Jha (बिकास कुमार झा); Sunil Kumar Aharwal (सुनील कुमार अहरवाल)
Cc: Sh V K Singh; Santosh Kumar; Omkishor
Subject: Fwd: Final Standard Operating Procedure for implementation of ADMS in Delhi after incorporating suggestion of NRLDC.

महोदय/महोदया,

Reference is invited to trailing mail from Delhi SLDC on the cited subject matter, wherein it has circulated Final Standard Operating Procedure for implementation of ADMS in Delhi after incorporating suggestion of NRLDC.

Therefore, in this regard if NRLDC has any comments on the attached document same may kindly be communicated before next OCC meeting of NRPC.

सादर

विपुल कुमार
सहायक कार्यपालक अभियंता
उत्तर क्षेत्रीय विद्युत् समिति
नई दिल्ली

[Quoted text hidden]

Follow Grid-India on:

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Letter to NRPC for SOP approval - 16.08.2024.pdf
4413K

Annexure-VI

DELHI TRANSCO LIMITED

(A Govt. of NCT of Delhi Undertaking)

STATE LOAD DESPATCH CENTRE (DELHI)

website: www.delhisldc.org

F.DTL/207/2024-25/GM(T)SLDC/F.9/36 Date 16/8/2024

Member Secretary
Northern Regional Power Committee
18-A, Qutab Institutional Area
Shaheed Jeet Sigh Marg
Katwaria Sarai
New Delhi – 110016.

Sub:- Final Standard Operation Procedure (SOP) for implementation of ADMS in NCT of Delhi after incorporating NRLDC suggestion – Reg.

Ref: 1. Our letter no. F.DTL/207/2024-25/GM(T)SLDC/F. 3/17 dated 05.06.2024
2. NRLDC e-mail dated 13.08.2024

Sir,

Delhi SLDC had submitted SOP for implementation of ADMS in NCT of Delhi along with final Minutes of Meeting to Northern Region Power Committee (NRPC) vide above referred letter dated 05th June 2024 (copy attached) for their consideration and approval. In response to the aforesaid letter, Northern Region Load Despatch Centre (NRLDC) had suggested an adjustment in the SOP vide their e-mail dated 13th August 2024 (copy attached).

After informing all the stakeholders, the suggested point has been incorporated in SOP at point no. 2(e). The final SOP is attached herewith for consideration of NRPC.

Accordingly, the SOP may kindly be approved by NRPC. Subsequently, after approval, the same will be communicated to the DISCOMs for implementation of ADMS in Delhi.

(Anish Garg)
GM(T)SLDC

Encl: As above.

Copy to:

AGM(T) to Director(Operations), DTL	: for information please
System Operation - 2, NRLDC (via e-mail)	: for information please
All ADMS Committee Members (via e-mail)	: for information please

OFFICE OF THE GENERAL MANAGER (T) SLDC
SLDC Building, Minto Road, Tagore Lane, New Delhi – 110 002
Ph: 23221091

Standard Operating Procedure (SOP) for implementing ADMS scheme in NCT of Delhi

1. For the purpose of decision making, each DISCOM shall use its own SCADA data of OD occurring in their area of operation and Delhi SLDC SCADA data of OD occurring in NCT of Delhi and Northern Region frequency data.

2. Each DISCOM shall develop the logic, at their end, for actuation of ADMS in following sequence:-

    a. First the frequency should be checked. As soon as it gets below 49.7 Hz, the ADMS logic should initiate and the countdown of time lag of 03 minutes 30 seconds will start. If during this duration frequency gets restored to 49.7 Hz or above then the timer will reset and ADMS will start monitoring frequency afresh.
    b. At the end of 3 minutes 30 seconds, the ADMS of each DISCOM will simultaneously check if Delhi as a whole is overdrawing and if that DISCOM is overdrawing.
    c. If after 03 minutes 30 seconds all the conditions are met i.e. frequency remained below 49.7 Hz for all this duration and at the end of 3 minutes 30 seconds both Delhi as a whole and the particular DISCOM are overdrawing then ADMS of that particular DISCOM(s) will operate instantaneously to disconnect load of their respective area automatically.
    d. The ADMS will disconnect load in 04 stages each having time gap of 01 minute. The quantum of load to be disconnected in each stage shall be as per below:

S. No.	Name of DISCOM	Quantum of over-drawl to be disconnected in each stage of 01 minute.
1.	TPDDL	To the extent of over-drawl or 29 MW, whichever is lower.
2.	BRPL	To the extent of over-drawl or 41 MW, whichever is lower.
3.	BYPL	To the extent of over-drawl or 21 MW, whichever is lower.
4.	NDMC	To the extent of over-drawl or 10% of Schedule or 05 MW, whichever is lowest.
5.	MES	No Load shedding to be done, as per decision taken in NRPC meeting held on 04th Jan., 2024.

The limits shall get revised automatically whenever, DERC revises the Over-drawl limit.

e. However, if the frequency continues to decline and drops below 49.6 Hz, the entire ADMS quantum (all four stages) shall trip simultaneously without any further time delay for the overdrawing DISCOM(s).

f. Feeders tripped due to actuation of ADMS shall get reconnected automatically after 02 minutes of restoration of frequency at or above 49.7 Hz.

CENTRAL ELECTRICITY REGULATORY COMMISSION
(NEW DELHI)

Suo-Motu Petition No. 9/SM/2024

Coram:
Shri Jishnu Barua, Chairperson
Shri Ramesh Babu V., Member
Shri Harish Dudani, Member

Date of Order : 7th October, 2024

In the matter of :

Planning for safe, secure, and reliable integrated operation of the power system during critical periods arising on account of seasonal variations wherein the electricity demand increases rapidly by undertaking specific measures to mitigate the risks on the power system, under clause (h) of sub-section (1) of Section 79 of the Electricity Act, 2003 and the Regulation 31 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023.

And in the matter of :

1. National Load Despatch Centre,
   Grid Controller of India Ltd. (CIN U40105DL2009GOI188682)
   B-9 (1st Floor), Qutab Institutional Area, Katwaria Sarai,
   New Delhi -110016

2. Northern Regional Load Despatch Centre,
   Grid Controller of India Ltd.
   18-A, Shaheed Jeet Singh Sansanwal Marg,
   Katwaria Sarai, New Delhi -110016

3. Western Regional Load Despatch Centre, Mumbai
   Grid Controller of India Ltd.
   F-3, M.I.D.C. Area, Marol Andheri (East),
   Mumbai -400093

4. Southern Regional Load Despatch Centre
   29, Race Course Cross Road,
   Bangalore -560009

5. Eastern Regional Load Despatch Centre, Kolkata
   Grid Controller of India Ltd. 14, Golf Club Road, Tollygunge, Kolkata -700 03

6. North Eastern Load Despatch Centre, Shillong
   Grid Controller of India Ltd.
   Lower, Nongrah, Lapalang, Shillong,
   Meghalaya 793006

7. The Chief Engineer,
   State Load Dispatch Centre,
   SLDC Complex. PSTCL,
   Near 220 kV G/Stn,
   Ablowal, Patiala- 147001

8. The Chief Engineer (LD),
   Electricity Department,
   UT Secretariat,
   Sector - 9D, UT of Chandigarh-160009

9. The Managing Director,
   Himachal Pradesh Power Transmission Corporation Limited,
   Barowalias House,
   Khalini,Shimla-171002

10. The Executive Director,
    State Load Despatch Centre,
    Delhi Transco Ltd, 33kV Substation Building,
    Minto Road, New Delhi, 110002

11. The Superintending Engineer
    State Load Dispatch Centre.
    Rajasthan Rajya Vidua Prasaran Nigam Limited.
    Ajmer Road, Heerapur. Jaipur – 302004

12. The Managing Director,
    Slate Load Despatch Centre,
    Haryana,
    Behind BBMB Power house,
    Sewah, Panipat, Haryana 132103

13. The Chief Engineer
    State Load Despatch Center,
    SLDC Complex TOTU,
    Shimla, Himachal Pradesh-17 10 1 1

14. The Director,
    State Load Despatch Centre,

Uttar Pradesh Power Transmission Corporation Limited (UPPTCL),
Phase II, Vibhuti Khand, Lucknow- 226001

15. The Chief Engineer,
State Load Dispatch Centre,
Vidyut Bhawan, Saharanpur Road Majra,
Near ISBT Dehradun-248001
Uttarakhand

16. The Chief Engineer,
Maharashtra State Load Dispatch Centre,
Thane-Belapur Road. Airoli
Navi Mumbai-400 708

17. The Chief Engineer,
State Load Despatch Centre,
Gujrat Energy Transmission Corporation Limited (GETCO),
GSSC Compound Near TB Hospital,
Gotri Road, Gotri, Vadodara - 390 021

18. The Chief Engineer (LD),
State Load Despatch Centre (SLDC),
Chhattisgarh State Power Transmission Co. Ltd.
Danganiya, Raipur, Chhattisgarh- 492013

19. The Chief Engineer,
State 3 Despatch Centre,
MP Power Transmission Co. Ltd
Nayagaon, Rampur, Jabalpur-482008

20. The Chief Engineer (Electrical),
State Load Despatch Centre (SLDC),
Race Course Cross Road, A. R. Circle, Bengaluru-560009

21. The Chief Engineer,
State Load Despatch Centre (SLDC),
Transmission corporation of Andhra Pradesh Limited (APTRANSCO),
Vidvut Soudha, Gunadala,
Eluru Road Vijayawada, Andhra Pradesh 520004

22. The Chief Engineer/Operation,
State Load Dispatch Centre,
Tamil Nadu Transmission Corporation Limited (TANTRANSCO),
144 Anna Salai, Chennai- 600002

23. The Chief Engineer,

State Load Despatch Centre (SLDC), Transmission Corporation of Telangana Ltd. (TSTRANSCO),
Vidvut Soudha, Khairatabad. Hyderabad- 500 082

24. The Chief Engineer (Transmission- System Operation),
State Load Despatch Centre (SLDC)
Vaidyuthi Bhavanam, Pottam, Trivandrum- 695 009 Kerala

25. The Chief Engineer (TRANS., O&M),
State Load Despatch Center (SLDC),
Bihar State Power Transmission Company Limited (BSPTCL),
4th Floor, Vidyut Bhawan, Bailey Road, Patna-1

26. The Chief Load Despatcher,
State Load Despatch Centre (SLDC),
SLDC Building. GR1DCO Colony,
P.O. Mancheswar Railway Colony,
Bhubaneswar- 751017

27. The Chief Engineer,
State Load Despatch
Center, Jharkhand Urja Sancharan Nigam Limited,
Engineering Building, H.E.C.,
Dhurwa. Ranchi – 834004

28. The Chief Engineer,
West Bengal State Load Despatch Centre WBSLDC),
Danesh Seikh Lane,
Andul Road, Howrah-711109

29. The Additional Chief Engineer,
State Load Despatch Centre (SLDC),
Power Department, Govt. of Sikkim, Gangtok-737201

30. The Chief Engineer,
State Load Despatch Centre (SLDC), Damodar
Valley Corporation (DVC), Danesh Saikh Lane,
Andul Road, Howarh 711109

31. The Executive Engineer (SLDC),
Department of Power,
Government of Arunachal Pradesh,
National Highway 52A,Vidyut Bhawan, Itanagar-791111

32. The Asst. General Manager,
SLDC Division,
Assam Electricity Grid Corporation Ltd.,

ASEB Colony, Power House Kahilipara,
Guwahati-781 019

33. The Superintending Engineer,
P&E Office Complex, North Block (III Floor)
Electric Veng, Aizawl- 796001, Mizoram.

34. The Superintending Engineer,
Load Despatch Centre
Meghalaya Power Transmission Corporation Limited,
Short Round Road,
Lum Jingshai, Meghalaya, Shillong 793022.

35. The Chief Engineer,
Department of Power Govt. of Nagaland, Kohima-797 001

36. The General Manager, State Load Despatch Centre
Manipur State Power Company Ltd (MSPCL)
Electricity Complex, Keisumphat Junction,
Imphal-795001, Manipur.

37. The Director (Tech.),
Tripura State Electricity Corporation Ltd (TSECL),
Banamalipur, Agartala -799 001

38. Northern Regional Power Committee, New Delhi
Shaheed Jeet Singh Marg,
Qutab Institutional Area,
New Delhi -110016

39. Western Regional Power Committee, Mumbai
M.I.D.C. Central Road,
Krantiveer Lakhuji Salve Marg, Seepz,
Andheri East, Mumbai, Maharashtra-400093

40. Southern Regional Power Committee,
29, Race Course Rd, Nehru Nagar,
Gandhi Nagar, Bengaluru,
Karnataka 560009

41. Eastern Regional Power Committee, Kolkata
14, Golf Club Rd, Golf Gardens,
Tollygunge, Kolkata,
West Bengal- 70003316

42. North Eastern Regional Power Committee,
Jowai Rd, Umpling, Shillong,

Meghalaya-793006

43. Central Electricity Authority,
Sewa Bhawan, R. K. Puram, Sector-1,
New Delhi ....**Respondents**

ORDER

This Commission, in the exercise of the powers conferred under Section 178 read with Section 79(1)(h) of the Electricity Act, 2003 (hereinafter referred to as "the Act"), has specified CERC (Indian Electricity Grid Code), Regulations 2023 (hereinafter referred as "the Grid Code") on 29.05.2023 effective from 1.10.2023. Section 28(2) of the Act provides that the Regional Load Despatch Centre shall comply with such principles, guidelines and methodologies in respect of wheeling and optimum scheduling and despatch of electricity as the Central Commission may specify in the Grid Code. Section 29(1) of the Act provides that the Regional Load Despatch Centre shall issue such directions and exercise such supervision and control as may be required for ensuring the stability of the grid operation and for achieving the maximum economy and efficiency in the operation of the power system in the region under its control. Section 33(3) of the Act provides that the State Load Despatch Centre shall comply with the directions of the Regional Load Despatch Centre ("RLDC"). Section 29(4) of the Act provides that the Regional Power Committee in the region may, from time to time, agree on matters concerning the stability and smooth operation of the integrated grid and the economy and efficiency of the power system within the region. Therefore, the Act envisages and assigns responsibilities to the

Regional Load Despatch Centres and State Load Despatch Centres as apex bodies at the regional level and state level, respectively, to ensure safe, secure, stable, and integrated operation of the power system in the respective region or the state, as the case may be, and to the Regional Power Committees to coordinate among the constituents in their respective regions to achieve agreement with regard to stability and smooth operation of the integrated grid.

2. Regulation 31 of the Grid Code provides for the time horizon for operational planning, demand estimation, generation estimation, and adequacy of resources for the purpose of operational planning in the following manner: -

(a) For operational planning, National Load Despatch Centre, Regional Load Despatch Centres, and State Load Despatch Centres have been assigned the responsibility to carry out operational planning within their respective control areas on Intra-day, Day Ahead, and Weekly time horizons.

(b) For demand estimation, the State Load Despatch Centres are mandated to carry out demand estimation as part of operational planning for both active power and reactive power incidents on the transmission systems based on the details collected from distribution licensees, grid-connected distributed generation resources, captive power plants and other bulk consumers embedded within the State and to estimate the peak and off-peak demand on a weekly and monthly basis for load - generation balance planning as well as for operational planning. Based on the demand estimate furnished by SLDCs and other entities directly connected to the ISTS, RLDCs shall prepare regional

demand estimates based on which NLDC shall prepare national demand estimates.

(c) For generation estimation, RLDCs have been mandated to forecast generation from wind, solar, ESS, and renewable energy hybrid generating stations, which are regional entities, and SLDCs have been mandated to forecast generation from such resources which are intra-State entities for different time horizons, for the purpose of operational planning.

(d) SLDCs are required to estimate and ensure adequacy of resources, identify generation, demand response capacity, and generation flexibility requirements, and furnish time block-wise information for the following day in respect of all intra-State entities to the concerned RLDCs who shall validate the adequacy of resources with due regard to the aggregated demand forecast for the control area, renewable energy generation forecast for the control area, injection schedule of intra-State entity generating stations, requisition from regional entity generating stations, secondary and planned procurement through tertiary reserve requirements, and planned procurement through bilateral or collective transactions.

3. Regulation 33 provides that based on the operational planning analysis data, NLDC, RLDCs, and SLDCs shall carry out operational planning studies in real time, intra-day, day-ahead, and weekly basis, and RPCs shall carry out operational planning studies on monthly/yearly basis. This Regulation further provides that operational studies shall be carried out to assess whether the planned operations would result in

deviations from any of the operational limits defined under the Grid Code and applicable standards issued by the Central Electricity Authority. Regulation 33 further enjoins upon Regional Power Committees to monitor significant deviations for early resolution. NLDCs, RLDCs, RPCs, and SLDCs are required to develop operating plans to address potential deviation from system operational limits identified as a result of the operational planning study and communicate the same to the users in advance for taking corrective measures. The detailed reasons and explanations given by the users shall be discussed in the monthly operation sub-committee of the respective regions, and quarterly reports shall be submitted by RPCs to the Commission and CEA.

4. An extract of Regulations 31 and 33 of the Grid Code is enclosed in this order for the convenience of reference.

5. The Commission sought details of the load-generation scenario for the months of September and October 2024 from NLDC, followed by meetings of the Commission with the officers of NLDC. NLDC has submitted forecast scenarios for the months of September 24 and October 2024. The NLDC has also conducted the meeting of the Forum of Load Despatchers to ensure the proper projection of demand by the State Load Despatch Centre. We have considered the peak demand forecast for the month of October 2024. A summary of these scenarios is as under:-

Table 1: Peak demand forecast and load generation balance during Oct-24

(in GW)

	Oct-24
Demand Forecast	
Peak Demand forecast	230
Peak Demand (including ISTS losses) forecast	232.2
Available generation (other than thermal generation)	59.4
Ex-bus Thermal Requirement (without reserve)	172.8
Gross Thermal Requirement (without reserve)	187.9
Estimated Thermal Generation	
Net available thermal capacity	182.20
Availability of generation required	
Additional generation required	5.7
Additional generation required (with reserve 3% of peak demand)	12.60

It is observed from the above table that the projected load generation balance based on peak demand during October 2024 indicates the requirement for additional generation. The rise in demand during solar generation hours can be met from renewable generation provided the solar generation is as per the past trends. However, during non-solar hours (including evening and morning peaks), there is a requirement of additional requirement of Generation resources of about 12.60 GW with a reserve requirement of 3% to meet contingency.

6. The Grid Code enjoins the responsibility upon all concerned stakeholders to ensure stable and economic operation of power system and resolve the issues of significant deviations, if any. The Commission, taking cognizance of the previous year's record, intends to impress upon all the stakeholders that there is an imperative need for prudent planning of load generation balance and issue of alerts to all the grid-connected user entities of the concerned control areas to make them aware about the

anticipated challenges in the operation of the power system and for undertaking the preventive measures as may be required to maintain load generation balance.

7. The Commission is of the view that there is a need to sensitize all the stakeholders, monitor their actions, and bring about behavioural changes through specific and proactive regulatory interventions The Commission believes that it is advisable to take preventive *ex-ante* measures instead of the ex-post reactive measures of finding instances of violation of the Grid Code, initiating penal proceedings for violation, and imposing penalty under the provisions of the Act. This proactive approach would also help to encourage collective efforts on the part of the National Load Despatch Centre, Regional Load Despatch Centres, State Load Despatch Centres, and the grid connected entities to make concerted efforts to ensure stable and economic operation of the grid.

8. The projected requirement of generation is significantly higher than the annual growth of the electricity demand and the addition of generation capacity. The projected requirement of thermal generation during October, 2024 needs proper operational planning and adequacy of resources in terms of Regulation 31(4) of the Grid Code. Any uncertain variation in the electricity demand arising on account of seasonal variations leading to a rapid increase in demand causes undesirable stress in the power system. The steep rise in electricity demand without adequate generation sources may put the power system operation at risk. It is the statutory responsibility of the RLDCs and SLDCs to carry out the operational planning for the increase in demand due to seasonal variations while discharging their functions under Sections 28

and 32 of the Act, respectively, read with the provisions of Regulations 31 and 33 of the Grid Code. 12. In light of the above, the Commission feels that there is a need to prepare the system operators and the stakeholders to meet the situation arising out of the abrupt increase in demand due to seasonal variations, especially during October 2024. Regulation 60 of the Grid Code empowers the Commission to issue practice directions through suo-moto proceedings with regard to implementation of the provisions of the said Regulations. Regulation 60 of the Grid Code is extracted as under:-

> *"60. Issue of Suo Motu Orders and Directions*
>
> *The Commission may from time to time issue suo motu orders and practice directions with regard to implementation of these regulations and matters incidental or ancillary thereto, as the case may be."*

9. In exercise of the powers vested under Regulation 60, read with all relevant provisions of the Grid Code, the Commission issues the following directions to NLDC, RLDCs, and SLDCs in connection with the implementation of Regulations 31 and 33 of the Grid Code to address the anticipated surge in demand of electricity during October 2024 on account of seasonal variations:

a) All the State Load Despatch Centres and RLDCs shall furnish the details of operational planning undertaken by them in terms of Regulation 31(4) (a) of the Grid Code especially for October 2024. RLDC shall validate the adequacy of resources in terms of Regulation 31(4)(b) of the Grid Code.
b) All State Load Despatch Centres and Regional Load Despatch Centres shall prepare the worst-case scenario due to possible surge in demand during the

period 1.10.2024 to 31.10.2024 in their respective control area and submit within seven days to the Commission with a copy to National Load Despatch Centre.

c) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, should assess their demand-generation scenario in the upcoming months, ensure the optimum generation, avoid undesirable planned outages, and advise the generating company to offer their availability. The State Load Despatch Centre or Regional Load Despatch Centre shall ensure the optimum scheduling during the shortage period and surplus power to get despatched during the deficit period.

d) The Distribution Companies, in case of a shortage scenario, can procure the power from surplus or requisitioned capacity of other states so that optimum despatch can be ensured for safe and reliable power system operations. The State Load Despatch Centre shall monitor the generation-demand deficit of the respective distribution companies.

e) The generating companies operating their plant with capacity less than its installed capacity due to technical issues, i.e., capacity under partial outage or forced outage, are advised to fix the issues to ensure the maximum generation capacity on-bar.

f) The draw schedule of the respective control area needs to adhere to prevent the reduction of system frequency. The State Load Despatch Centre or Regional Load Despatch Centre, as the case may be, shall monitor the deviation of the key system parameters.

g) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, shall issue the system alerts to their respective grid-connected entities for the possible deficit during the likely surge in demand.

10. The Regional Load Despatch Centres and State Load Despatch Centres shall submit the report on the implementation of the above measures, a load-generation scenario in their respective control areas, and any other measures taken to address the deficit of power supply during the period 1.10.2024 to 31.10.2024.

11. The objective of the present proceedings is to prepare the system operators and other stakeholders to meet the challenges and threats to the power system that may arise due to the abrupt increase in demand. The responses of the SLDCs, RLDCs, and NLDC with regard to the implementation of the measures detailed in para 9 of this order shall, in the first instance, be examined in detail by a Single-Member Bench comprising a Member of the Commission. Accordingly, in the exercise of powers under Section 97 of the Electricity Act,2003, the Commission nominates Shri Ramesh Babu V., Member, to conduct the proceedings for this purpose. The Single Member Bench shall provide due opportunity to the parties to make their submissions. The Single Member Bench shall have the authority to direct the parties to submit such further information and to take such remedial measures as may be considered necessary. The Single Member Bench shall submit a report to the Commission with regard to the preparedness of the System Operators and other stakeholders to meet the challenges arising on account of the sudden surge in demand for power and his recommendations with regard to the remedial measures to be taken for the future. The

Commission, after consideration of the report of the Single Member Bench shall issue appropriate directions as may be considered appropriate.

12. NLDC, RLDCs, and SLDCs are directed to submit their responses to the measures contained in para 9 of this order by 16.10.2024.

Sd./-	**Sd./-**	**Sd./-**
(Shri Harish Dudani)	**(Shri Ramesh Babu V)**	**(Shri Jishnu Barua)**
Member	**Member**	**Chairperson**

Extract of Regulation 31 and 33 of the Grid Code

31. OPERATIONAL PLANNING

(1) Time Horizon

(a) Operational planning shall be carried out in advance by NLDC, RLDCs and SLDCs within their respective control areas with Monthly and Yearly time horizons in co-ordination with CTU, RPCs or STUs, as applicable.

(b) Operational planning shall be carried out in advance by NLDC, RLDCs and SLDCs within their respective control areas on Intra-day, Day Ahead, Weekly time horizons.

(c) RLDCs in consultation with NLDC shall issue procedures and formats for data collection to carry out:

(i) Operational planning analysis,

(ii) Real-time monitoring,

(iii) Real-time assessments.

(d) SLDC may also issue procedures and formats for data collection for the above purposes.

(2) Demand Estimation

(a) Each SLDC shall carry out demand estimation as part of operational planning after duly factoring in the demand estimation done by STU as part of resource adequacy planning referred to in Chapter 2 of these regulations. Demand estimation by SLDC shall be for both active power and reactive power incidents on the transmission system based on the details collected from distribution licensees, grid-connected distributed generation resources, captive power plants and other bulk consumers embedded within the State.

(b) Each SLDC shall develop methodology for daily, weekly, monthly, yearly demand estimation in MW and MWh for operational analysis as well as resource adequacy purposes. Each SLDC, while estimating demand may utilize state of the art tools, weather data, historical data and any other data. For this purpose, all distribution licensees shall maintain a historical database of demand.

(c) The demand estimation by each SLDC shall be done on day ahead basis with time block wise granularity for the daily operation and scheduling. In case SLDC observes a major change in demand in real time for the day, it shall immediately submit the revised demand estimate to the concerned RLDC for demand estimate correction.

(d) Each SLDC shall submit node-wise morning peak, evening peak, day shoulder and night off-peak estimated demand in MW and MVA on a monthly and quarterly basis for the nodes 110 kV and above for the preparation of scenarios for computation of TTC and ATC by the concerned RLDC and NLDC.

(e) SLDC shall also estimate peak and off-peak demand (active as well as reactive power) on a weekly and monthly basis for load - generation balance planning as well as for operational planning analysis, which shall be a part of the operational planning data. The demand estimates mentioned above shall have granularity of a time block. The estimate shall cover the load incident on the grid as well as the net load incident taking into account embedded generation in the form of roof-top solar and other distributed generation.

(f) The entities such as bulk consumers or distribution licensees that are directly connected to ISTS shall estimate and furnish such a demand estimate to the concerned RLDC.

(g) Based on the demand estimate furnished by the SLDCs and other entities directly connected to ISTS, each RLDC shall prepare the regional demand estimate and submit it to the NLDC. NLDC, based on regional demand estimates furnished by RLDCs, shall prepare national demand estimate.

(h) Timeline for submission of demand estimate data by SLDCs or other entities directly connected to ISTS, as applicable, to the respective RLDC and RPC shall be as follows:

(i) SLDCs, RLDCs and NLDC shall compute forecasting error for intra-day, dayahead, weekly, monthly and yearly forecasts and analyse the same in order to reduce forecasting error in the future. The computed forecasting errors shall be made available by SLDCs, RLDCs and NLDC on their respective websites.

(3) Generation Estimation

(a) The modalities of generation estimation by entities shall be as per the Procedure referred to in sub-clause (c) of clause (1) of Regulation 31 of these regulations.

(b) RLDC shall forecast generation from wind, solar, ESS and Renewable Energy hybrid generating stations that are regional entities and SLDC shall forecast generation from such sources that are intra-state entities, for different time horizons as referred to in clause (1) of Regulation 31 of these regulations for the purpose of operational planning.

(4) Adequacy of Resources

(a) SLDCs shall estimate and ensure the adequacy of resources, identify generation reserves, demand response capacity and generation flexibility requirements with due regard to the resource adequacy framework as specified under Chapter 2 of these regulations.

(b) SLDCs shall furnish time block-wise information for the following day in respect of all intra-state entities to the concerned RLDC who shall validate the adequacy of resources with due regard to the following:

(i) Demand forecast aggregated for the control area;

(ii) Renewable energy generation forecast for the control area;

(iii) Injection schedule for intra-State entity generating station;

(iv) Requisition from regional entity generating stations;

(v) Secondary and planned procurement through Tertiary reserve requirement;

(vi) Planned procurement of power through other bilateral or collective transactions, if any.

33. OPERATIONAL PLANNING STUDY

(1) Based on the operational planning analysis data, operational planning study shall be carried out by various agencies for time horizons as under:

(2) SLDCs, RLDCs and NLDC shall utilize network estimation tool integrated in their EMS and SCADA systems for the real time operational planning study. All users shall make available at all times real time error free operational data for the successful execution of network analysis using EMS/SCADA. Failure to make available such data shall be immediately reported to the concerned SLDC, the concerned RLDC and NLDC along with a firm timeline for restoration. The performance of online network estimation tools at SLDC and RLDC shall be reviewed in the monthly operational meeting of RPC. Any telemetry related issues impacting the online network estimation tool shall be monitored by RPC for their early resolution.

(3) SLDCs shall perform day-ahead, weekly, monthly and yearly operational studies for the concerned State for:

(a) assessment and declaration of total transfer capability (TTC) and available transfer capability (ATC) for the import or export of electricity by the State. TTC and ATC shall be revised from time to time based on the commissioning of new elements and other grid conditions and shall be published on SLDC website with all the assumptions and limiting constraints;

(b) planned outage assessment;

(c) special scenario assessment;

(d) system protection scheme assessment;

(e) natural disaster assessment; and

(f) any other study relevant in operational scenario.

(4) RLDCs and NLDC shall perform day-ahead, weekly, monthly and yearly operational studies for:

(a) assessment of TTC and ATC at inter-regional, intra-regional, and inter-state levels;

(b) planned outage assessment;

(c) special scenario assessment;

(d) system protection scheme assessment;

(e) natural disaster assessment; and

(f) any other study relevant to operational scenarios

(5) RLDC shall assess intra-regional and inter-state level TTC and ATC and submit them to NLDC. NLDC shall declare TTC and ATC for import or export of electricity between regions including simultaneous import or export capability for a region, and crossborder interconnections 11 (Eleven) months in advance for each month on a rolling basis. TTC and ATC shall be revised from time to time based on the commissioning of new elements and other grid conditions and shall be published on the websites of the NLDC and respective RLDCs with all the assumptions and limiting constraints

(6) Operational planning study shall be done to assess whether the planned operations shall result in deviations from any of the system operational limits defined under these regulations and applicable CEA Standards. The deviations, if

any, shall be reviewed in the monthly operational meeting of RPC and significant deviations shall be monitored by RPC for early resolution.

(7) NLDC, RLDCs, RPCs and SLDCs shall maintain records of the completed operational planning study, including date specific power flow study results, the operational plan and minutes of meetings on operational study.

(8) NLDC, RLDCs, RPCs and SLDCs shall have operating plans to address potential deviations from system operational limit identified as a result of the operational planning study. These operating plans shall be communicated to users in advance so that they can take corrective measures. In case any user is unable to adhere to such an operating plan, it shall inform the respective SLDC, RLDC and NLDC in advance with detailed reasons and explanations for the non-adherence. These detailed reasons and explanations shall be discussed in the monthly operation sub-committee of the respective region and a quarterly report shall be submitted by the respective RPC to the Commission and CEA.

(9) Each SLDC shall undertake a study on the impact of new elements to be commissioned in the intra-state system in the next six (6) months on the TTC and ATC for the State and share the results of the studies with RLDC.

(10) Each RLDC shall undertake a study on the impact of new elements to be commissioned in the next six (6) months in (a) the ISTS of the region and (b) the intrastate system on the inter-state system and share the results of the studies with NLDC

(11) NLDC shall undertake study on the impact of new elements to be commissioned in the next six (6) months in (a) inter-regional system, (b) cross-border link and (c) intraregional system on the inter-regional system.

(12) NLDC, RLDCs and SLDCs shall compare the results of the studies of the impact of new elements on the system and transfer capability addition with those of the interconnection and planning studies by CTU and STUs, and any significant

variations observed shall be communicated to CEA, RPCs, CTU and STUs for immediate and long-term mitigation measures.

(13) Defense mechanisms like system protection scheme, load-rejection scheme, generation run-back, islanding scheme or any other scheme for system security shall be proposed by the concerned user or SLDC or RLDC or NLDC and shall be deployed as finalized by the respective RPC.

S.No.	Voltage Level	Name of Line	Circuit ID	Tower Configura	Line Length	O&M by	Agency at		Type of conductor	Remarks	Replaced with Polymer Insulator (As a % of Total Line	Remarks
							End-I	End-II				
1. HVDC lines												
ISTS LINES												
A. POWERGRID												
1	± 800kV	Agra-Bishwanath Chariali Pole-I	1	Bi-pole	1728	POWERGRID	POWERGRID	POWERGRID	Hexagon Lapwing	HVDC capcacity 6000 MW, only two physical lines	Partial (11%)	
2	± 800kV	Agra-Bishwanath Chariali Pole-II	2	Bi-pole	1728	POWERGRID	POWERGRID	POWERGRID	Hexagon Lapwing		Partial (11%)	
3	± 800kV	Agra-Alipurduar Pole-I	1	Bi-pole	1296*	POWERGRID	POWERGRID	POWERGRID	Hexagon Lapwing		Partial (11%)	
4	± 800kV	Agra-Alipurduar Pole-II	2	Bi-pole	1296*	POWERGRID	POWERGRID	POWERGRID	Hexagon Lapwing		Partial (11%)	
5	± 800kV	Kurukshetra-Champa Pole-I	1	Bi-pole	1305	POWERGRID	POWERGRID	POWERGRID	Hexagon Lapwing	HVDC capcacity 6000 MW, only two physical lines	Partial (11%)	
6	± 800kV	Kurukshetra-Champa Pole-II	2	Bi-pole	1305	POWERGRID	POWERGRID	POWERGRID	Hexagon Lapwing		Partial (11%)	
7	± 800kV	Kurukshetra-Champa Pole-III	3	Bi-pole	1305	POWERGRID	POWERGRID	POWERGRID	Hexagon Lapwing		Partial (11%)	
8	± 800kV	Kurukshetra-Champa Pole-IV	4	Bi-pole	1305	POWERGRID	POWERGRID	POWERGRID	Hexagon Lapwing		Partial (11%)	
9	± 500kV	Balia-Bhiwadi Pole-I	1	Bi-pole	790	POWERGRID	POWERGRID	POWERGRID	ACSR Quad Bersimis	HVDC capacity 2500 MW	Partial (15%)	
10	± 500kV	Balia-Bhiwadi Pole-II	2	Bi-pole	790	POWERGRID	POWERGRID	POWERGRID			Partial (15%)	
11	± 500kV	Rihand-Dadri Pole-I	1	Bi-pole	815	POWERGRID	POWERGRID	POWERGRID	ACSR Quad Bersimis	HVDC capacity 1500 MW	Partial (62%)	
12	± 500kV	Rihand-Dadri Pole-II	2	Bi-pole	815	POWERGRID	POWERGRID	POWERGRID			Partial (43%)	
B. Adani Power Ltd (Adani Transmission India Ltd.)												
1	± 500kV	Adani Mundra - Mahindergarh Pole-I	1	Bi-pole	990	ATIL	APL Mundra	ATIL	ACSR Quad Bersimis	HVDC capacity 2500 MW	Partial (43%)	
2	± 500kV	Adani Mundra - Mahindergarh Pole-II	2	Bi-pole	990	ATIL	APL Mundra	ATIL			Partial (43%)	
2. 765kV Transmission Line												
ISTS LINES												
A. POWERGRID												
1	765kV	Agra-Aligarh	1	D/C	123	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis	LILO of Agra-Gr. Noida at Aligarh (LILO portion	Polymer Insulator	
2	765kV	Aligarh-Gr.Noida	1	D/C	51	POWERGRID	POWERGRID	WUPPTCL	Quad Bersimis		Polymer Insulator	
3	765kV	Agra-Fatehpur	1	S/C	335	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Conventional	
4	765kV	Agra-Fatehpur	2	S/C	334	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Conventional	
5	765kV	Agra-Jhatikara	1	S/C	252	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Polymer Insulator	
6	765kV	Ajmer-Chittorgarh	1	D/C	211	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
7	765kV	Ajmer-Chittorgarh	2	D/C	211	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
8	765kV	Ajmer-Bhadla II	1	D/C	326	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra	LILO of 765kV D/C Ajmer-Bikaner-1 at Bhadla II(PG)	Not Available	
9	765kV	Ajmer-Bhadla II	2	D/C	326	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra	LILO of 765kV D/C Ajmer-Bikaner-2 at Bhadla II(PG)	Not Available	
10	765kV	Balia - Lucknow765 (N)	1	S/C	319	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Conventional	
11	765kV	Bikaner - Bhadla	1	D/C	167	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
12	765kV	Bikaner - Bhadla	2	D/C	167	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
13	765kV	Bikaner- Moga	1	D/C	367	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
14	765kV	Bikaner- Moga	2	D/C	367	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
15	765kV	Bikaner-Bhadla II	1	D/C	197	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra	LILO of 765kV D/C Ajmer-Bikaner-1 at Bhadla II(PG)	Not Available	
16	765kV	Bikaner-Bhadla II	2	D/C	197	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra	LILO of 765kV D/C Ajmer-Bikaner-2 at Bhadla II(PG)	Not Available	
17	765kV	Kanpur(GIS)-Aligarh	1	D/C	322	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis	LILO of Kanpur-Jhatikara at Aligarh	Polymer Insulator	
18	765kV	Aligarh-Jhatikara	1	D/C	158	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Polymer Insulator	
19	765kV	Jhatikara-Bhiwani (PG)	1	S/C	85	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Polymer Insulator	
20	765kV	Koteshwar(PG)-Meerut	1	S/C	176	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis	Earlier charged at 400kV	Not Available	
21	765kV	Koteshwar(PG)-Meerut	2	S/C	176	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Not Available	
22	765kV	Lucknow-Bareilly	1	S/C	252	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Conventional	
23	765kV	Meerut-Bhiwani(PG)	1	S/C	174	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Partial (99%)	

24	765kV	Meerut-Gr.Noida	1	S/C	119	POWERGRID	POWERGRID	WUPPTCL	Quad Bersimis	Agra-Meerut LILOed at G. Noida by UPPTCL	Polymer Insulator	
25	765kV	Moga- Bhiwani (PG)	1	S/C	273	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Partial (96%)	
26	765kV	Moga-Meerut	1	S/C	338	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Polymer Insulator	
27	765kV	Orai-Aligarh	1	D/C	331	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
28	765kV	Orai-Aligarh	2	D/C	331	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
29	765kV	Phagi-Bhiwani(PG)	1	S/C	272	POWERGRID	RRVPNL	POWERGRID	Quad Bersimis		Partial (18%)	
30	765kV	Phagi-Bhiwani(PG)	2	S/C	277	POWERGRID	RRVPNL	POWERGRID	Quad Bersimis		Partial (16%)	
31	765kV	Varanasi-Balia	1	S/C	166	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Conventional	
32	765kV	Varanasi-Fatehpur	1	S/C	223	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis	LILO of Gaya (ER)-Fatehpur at Varanasi	Conventional	
33	765kV	Varanasi-Kanpur(GIS)	1	S/C	326	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Polymer Insulator	
34	765kV	Varanasi-Kanpur(GIS)	2	S/C	326	POWERGRID	POWERGRID	POWERGRID	Hexa Zebra		Polymer Insulator	
B. PKTSL												
1	765kV	Khetri-Jhatikara	1	D/C	146	PKTSL	PKTSL	POWERGRID	Hexa Zebra		Not Available	
2	765kV	Khetri-Jhatikara	2	D/C	146	PKTSL	PKTSL	POWERGRID	Hexa Zebra		Not Available	
C. PFTL												
1	765kV	Fatehgarh II-Bhadla II	1	D/C	186	PFTL	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
2	765kV	Fatehgarh II-Bhadla II	2	D/C	186	PFTL	POWERGRID	POWERGRID	Hexa Zebra		Not Available	
D. FBTL												
1	765kV	Fatehgarh II-Bhadla	1	D/C	175	FBTL	POWERGRID	POWERGRID	Hexa Zebra	Loop in of 400kV Fatehgarh (FBTL)-	Polymer Insulator	
2	765kV	Fatehgarh II-Bhadla	2	D/C	175	FBTL	POWERGRID	POWERGRID	Hexa Zebra		Polymer Insulator	
E. BKTL												
1	765kV	Bikaner-Khetri	1	D/C	241	BKTL	POWERGRID	PKTSL	Hexa Zebra		Polymer Insulator	
2	765kV	Bikaner-Khetri	2	D/C	241	BKTL	POWERGRID	PKTSL	Hexa Zebra		Polymer Insulator	
F. PAPTL												
1	765kV	Ajmer-Phagi	1	D/C	134	PAPTL	POWERGRID	RRVPNL	Hexa Zebra		Not Available	
2	765kV	Ajmer-Phagi	2	D/C	134	PAPTL	POWERGRID	RRVPNL	Hexa Zebra		Not Available	
G. PASTL												
1	765kV	Aligarh(PG)-SIKAR_2	1	D/C	265	PASTL	PSTL	POWERGRID	Hexa Zebra	Anti theft charged from Aligarh(PG) Upto	Not Available	
2	765kV	Aligarh(PG)-SIKAR_2	2	D/C	265	PASTL	PSTL	POWERGRID	Hexa Zebra		Not Available	
STATE LINES												
A. UPPTCL												
1	765kV	Agra Fatehabad-Ghatampur	1	S/C	229	UPPTCL	UPPTCL	UPPTCL	Quad Bersimis		Not Available	
2	765kV	Agra Fatehabad-Gr. Noida	1	S/C	159	UPPTCL	UPPTCL	UPPTCL	ACSR Quad Bersimis		Not Available	
3	765kV	Agra(Fatehbad)-Lalitpur	1	S/C	337	UPPTCL	UPPTCL	LPGCL	Quad Bersimis		Not Available	
4	765kV	Agra(Fatehbad)-Lalitpur	2	S/C	335	UPPTCL	UPPTCL	LPGCL	Quad Bersimis		Not Available	
5	765kV	AnparaC-AnparaD	1	S/C	3	UPPTCL	LANCO	UPRVUNL	Quad Bersimis		Not Available	
6	765kV	AnparaC-Unnao	1	S/C	409	UPPTCL	LANCO	UPPTCL	Quad Bersimis		Conventional	AnparaB-Unnao shifted to AnparaC and charged at 765kV
7	765kV	AnparaD-Obra_C	1	D/C	53	UPPTCL	UPRVUNL	UPPTCL	Quad Bersimis	After LILO of 765 KV ANPARA D-UNNAO LINE	Not Available	
8	765kV	Obra_C-Unnao	1	D/C	390	UPPTCL	UPRVUNL	UPPTCL	Quad Bersimis		Not Available	
9	765kV	Bara-Mainpuri	1	S/C	377	UPPTCL	UPPTCL	UPPTCL	Quad Bersimis		Not Available	
10	765kV	Gr. Noida-Meerut_PMSTL	1	S/C	100	UPPTCL	UPPTCL	UPPTCL	Quad Bersimis	After LILO of 765 KV GREATER NOIDA	Not Available	
11	765kV	Meerut_PMSTL-Hapur	1	S/C	37	UPPTCL	UPPTCL	UPPTCL	Quad Bersimis		Not Available	
12	765kV	Gr. Noida-Jawaharpur	1	D/C	162	UPPTCL	UPPTCL	UPPTCL	Quad Bersimis	After LILO of 765 KV MAINPURI(SEUPPTCL)-	Not Available	
13	765kV	Jawaharpur-Mainpuri	1	D/C	40	UPPTCL	UPPTCL	UPPTCL	Quad Bersimis		Not Available	
14	765kV	Hapur(UP)-Rampur_PRSTL (UP)	1	S/C	230	UPPTCL	UPPTCL	UPPTCL	Quad Bersimis	LILO of 765kV Hapur-Ghatampur at Rampur. LILO portion is on D/C tower 2.5km 5towers	Not Available	

15	765kV	Mainpuri(UP)-Hapur(UP)	1	S/C	217	UPPTCL	UPPTCL	UPPTCL	Quad Bersimis		Not Available	
B. RRVPNL												
1	765kV	Anta-Phagi	1	S/C	214	RRVPNL	RRVPNL	RRVPNL	Quad Bersimis		Not Available	
2	765kV	Anta-Phagi	2	S/C	212	RRVPNL	RRVPNL	RRVPNL	Quad Bersimis		Not Available	
3. 765kV Transmission Line charged at 400kV												
ISTS LINES												
A. POWERGRID												
1	765kV charged at 400kV	Kishenpur-Moga	1	S/C	275	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Partial (1%)	
2		Kishenpur-Moga	2	S/C	287	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis		Partial (1%)	
3		Tehri-Koteshwar(PG)	1	S/C	15	POWERGRID	THDC	POWERGRID	Quad Bersimis		Conventional	
4		Tehri-Koteshwar(PG)	2	S/C	17	POWERGRID	THDC	POWERGRID	Quad Bersimis		Conventional	
5		Rihand-Vindhyachal Pool	1	S/C	31	POWERGRID	NTPC	POWERGRID	Quad Bersimis		Not Available	
6		Rihand-Vindhyachal Pool	2	S/C	31	POWERGRID	NTPC	POWERGRID	Quad Bersimis		Not Available	
4. 400kV HVAC Transmission Line												
ISTS LINES												
A. POWERGRID												
1	400kV	Abdullapur- Bawana	1	D/C	167	POWERGRID	POWERGRID	DTL	Triple Snowbird		Partial (99%)	
2	400kV	Abdullapur- Deepalpur	1	D/C	141	POWERGRID	POWERGRID	KT Jhajjar	Triple Snowbird	LILO of Abdullapur-Bawana one ckt at Deepalpur by Jhajjar KT	Partial (99%)	LILO of Abdullapur-Bawana one ckt at Deepalpur
3	400kV	Abdullapur-Kurukshetra	1	D/C	52	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird+Twin HTLS for LILO	LILO of Abdullapur-Sonipat line at Kurukshetra	Polymer Insulator	LILO of Abdullapur-Sonepat ckts at Kurukshetra
4	400kV	Abdullapur-Kurukshetra	2	D/C	52	POWERGRID	POWERGRID	POWERGRID		LILO of Abdullapur-Sonipat line at Kurukshetra	Polymer Insulator	
5	400kV	Agra-Agra(Fatehbad)	1	S/C	45	POWERGRID	POWERGRID	UPPTCL	Twin Moose	LILO of Agra(PG)-Agra(UP) ckt-2 at Fatehabad (765kV Agra UP)	Polymer Insulator	
6	400kV	Agra(UP)-Agra(Fatehbad)	1	S/C	56	POWERGRID	UPPTCL	UPPTCL	Twin Moose		Polymer Insulator	
7	400kV	Agra-Agra(UP)	1	D/C	30	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Polymer Insulator	
8	400kV	Agra-Ballabgarh	1	S/C	181	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
9	400kV	Agra-Bassi	1	S/C	211	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	Planned for insulator replacement in 321nos towers under NR3
10	400kV	Agra-Bhiwadi	1	D/C	209	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
11	400kV	Agra-Bhiwadi	2	D/C	209	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
12	400kV	Agra-Jaipur South	1	D/C	254	POWERGRID	POWERGRID	POWERGRID	Twin Moose	LILO of Agra-Bassi D/C at Jaipur South	Partial (4%)	LILO of Agra-Bassi D/C at Jaipur South
13	400kV	Agra-Jaipur South	2	D/C	254	POWERGRID	POWERGRID	POWERGRID	Twin Moose	LILO of Agra-Bassi D/C at Jaipur South	Partial (4%)	
14	400kV	Agra-Sikar	1	D/C	386	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (3%)	
15	400kV	Agra-Sikar	2	D/C	386	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (3%)	
16	400kV	Ajmer-Ajmer(PG)	1	D/C	66	POWERGRID	RRVPNL	POWERGRID	Quad Moose		Not Available	
17	400kV	Ajmer-Ajmer(PG)	2	D/C	66	POWERGRID	RRVPNL	POWERGRID	Quad Moose		Not Available	
18	400kV	Allahabad-Fatehpur	3	S/C	154	POWERGRID	POWERGRID	POWERGRID	Twin Moose	LILO of Allahabad-Kanpur one ckt at Fatehpur	Polymer Insulator	
19	400kV	Allahabad-Fatehpur	1	D/C	140	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Lilo of Allahabad-Mainpuri (PG) D/C at Fatehpur	Conventional	
20	400kV	Allahabad-Fatehpur	2	D/C	140	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Lilo of Allahabad-Mainpuri (PG) D/C at Fatehpur	Conventional	
21	400kV	Allahabad-Varanasi	1	D/C	99	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Allahabad-Sarnath shifted from Sarnath to varanasi	Conventional	
22	400kV	Allahabad-Kanpur	1	S/C	225	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
23	400kV	Allahabad-Kanpur(New 765)	1	D/C	240	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Not Available	
24	400kV	Allahabad-Kanpur(New 765)	2	D/C	240	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Not Available	
25	400kV	Allahabad-Meja(NTPC)	1	D/C	28	POWERGRID	POWERGRID	MUNPL	Twin Moose		Polymer Insulator	MUNPL is joint venture between NTPC and UPRVUN
26	400kV	Allahabad-Meja(NTPC)	2	D/C	28	POWERGRID	POWERGRID	MUNPL	Twin Moose		Polymer Insulator	

27	400kV	Amritsar-Jalandhar	1	S/C	60	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
28	400kV	Amritsar-Jalandhar	2	D/C	71	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	LILO of 400kV Amritsar-Hamirpur at Jalandhar
29	400kV	Amritsar-ParbatiPooling (Banala)	1	D/C	251	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (49%)	
30	400kV	Auraiya-Agra	1	D/C	166	POWERGRID	NTPC	POWERGRID	Twin Moose		Partial (86%)	
31	400kV	Auraiya-Agra	2	D/C	166	POWERGRID	NTPC	POWERGRID	Twin Moose		Partial (90%)	
32	400kV	Baglihar II-Kishenpur	1	S/C	130	POWERGRID	JKSPDCL	POWERGRID	Twin Moose	LILO of 400kV Kishenpur-New Wanpoh ckt-2 at Baglihar. LILO portion is of JK PDD	Conventional	
33	400kV	Baghlihar II-New Wanpoh	1	S/C	130	POWERGRID	JKSPDCL	POWERGRID	Twin Moose		Not Available	
34	400kV	Bagpat-Kaithal	1	D/C	154	POWERGRID	POWERGRID	POWERGRID	Quad Moose	LILO of Meerut-Kaithal DC at Baghpat	Polymer Insulator	
35	400kV	Bagpat-Kaithal	2	D/C	154	POWERGRID	POWERGRID	POWERGRID	Quad Moose	LILO of Meerut-Kaithal DC at Baghpat	Polymer Insulator	
36	400kV	Bagpat-Saharanpur	1	D/C	121	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Partial (41%)	
37	400kV	Bagpat-Dehradun	1	D/C	165	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Partial (40%)	
38	400kV	Bahadurgarh-Kabulpur	1	S/C	42	POWERGRID	POWERGRID	HVPNL	Twin Moose		Polymer Insulator	LILO of Bahadurgarh-Bhiwani at Kabulpur
39	400kV	Bahadurgarh-Sonepat	1	D/C	53	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird		Polymer Insulator	
40	400kV	Bahadurgarh-Sonepat	2	D/C	53	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird		Polymer Insulator	
41	400kV	Balia-Mau	1	D/C	9	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Conventional	
42	400kV	Balia-Sohawal	1	D/C	229	POWERGRID	POWERGRID	POWERGRID	Twin Moose	LILO of Balia-LUCKNOW D/C at Sohawal	Conventional	LILO of Balia-Lucknow (316 KM) D/C at Sohawal
43	400kV	Balia-Sohawal	2	D/C	229	POWERGRID	POWERGRID	POWERGRID	Twin Moose	LILO of Balia-LUCKNOW D/C at Sohawal	Conventional	LILO of Balia-Lucknow (316 KM) D/C at Sohawal
44	400kV	Ballabgarh-Tughlakabad	1	M/C	40	DTL	POWERGRID	POWERGRID	HTLS INVAR (LILO portion) & Bersimis (before LILO)	Tower is quad circuit tower	Polymer	
45	400kV	Ballabgarh-Tughlakabad	2	M/C	40	DTL	POWERGRID	POWERGRID		Tower is quad circuit tower	Polymer	
46	400kV	Ballabhgarh-Gurgaon	1	S/C	43	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
47	400kV	Ballabhgarh-Maharanibagh	1	D/C	61	POWERGRID	POWERGRID	POWERGRID	Quad Bersimis	Bypassed at Maharanibagh to form Dadri-Ballabgarh	Polymer Insulator	
48	400kV	Ballabhgarh-Nawada	1	D/C	13	POWERGRID	POWERGRID	HVPNL	Quad Bersimis		Polymer Insulator	Ballabhgarh-Gnoida LILOed at Nawada (Faridabad,Haryana)
49	400kV	Bareilly PG-Moradabad	1	D/C	93	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Partial (3%)	
50	400kV	Bareilly PG-Rampur_PRSTL	1	S/C	40	POWERGRID	POWERGRID	UPPTCL	Twin Moose	After LILO of 400 KV BAREILLY(PG)-MORADABAD(UPPTCL) CIRCUIT-II at RAMPUR(PRSTL)	Not Available	
51	400kV	Rampur_PRSTL-Moradabad	1	S/C	57	POWERGRID	UPPTCL	UPPTCL	Twin Moose	After LILO of 400 KV BAREILLY(PG)-MORADABAD(UPPTCL) CIRCUIT-II at RAMPUR(PRSTL)	Not Available	
52	400kV	Bareilly PG-Bareilly (765kV)	1	D/C	2	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Conventional	
53	400kV	Bareilly PG-Bareilly (765kV)	2	D/C	2	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Conventional	

54	400kV	Bareilly PG(765kV)-Kashipur	1	D/C	101	POWERGRID	POWERGRID	PTCUL	Quad Moose		Partial (90%)	
55	400kV	Bareilly PG(765kV)-Kashipur	2	D/C	101	POWERGRID	POWERGRID	PTCUL	Quad Moose		Partial (90%)	
56	400kV	Bassi-Bhiwadi	2	S/C	220	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
57	400kV	Bassi-Heerapura	1	D/C	48	POWERGRID	POWERGRID	RRVPNL	Twin Moose		Polymer Insulator	
58	400kV	Bassi-Heerapura	2	D/C	49	POWERGRID	POWERGRID	RRVPNL	Twin Moose		Polymer Insulator	
59	400kV	Bassi-Kotputli	1	S/C	106	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
60	400kV	Bassi-Phagi	1	D/C	48	POWERGRID	POWERGRID	RRVPNL	Quad Moose		Partial (26%)	
61	400kV	Bassi-Phagi	2	D/C	48	POWERGRID	POWERGRID	RRVPNL	Quad Moose		Partial (26%)	
62	400kV	Bassi-Sikar	1	D/C	170	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (16%)	
63	400kV	Bassi-Sikar	2	D/C	170	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (17%)	
64	400kV	Bawana(CCGT)-Bahadurgarh	1	D/C	49	POWERGRID	DTL/Pragati CCGT	POWERGRID	Twin Moose		Polymer Insulator	
65	400kV	Bhadla-Bhadla(PG)	1	D/C	27	POWERGRID	RRVPNL	POWERGRID	Quad Moose		Not Available	
66	400kV	Bhadla-Bhadla(PG)	2	D/C	27	POWERGRID	RRVPNL	POWERGRID	Quad Moose		Not Available	
67	400kV	Bhadla-Bhadla II	1	D/C	52	POWERGRID	POWERGRID	POWERGRID	Twin HTLS+Hexa Zebra	48.309KM Twin HTLS conductor of POWERGRID and 3.73 KM HEXA Zebra of FBTL	Not Available	
68	400kV	Bhadla-Bhadla II	2	D/C	52	POWERGRID	POWERGRID	POWERGRID	Twin HTLS+Hexa Zebra		Not Available	
69	400kV	Bhinmal-Kankroli	1	D/C	202	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Bypassed at Bhinmal to form 400kV Kankroli Zerda ckt-2	Polymer Insulator	
70	400kV	Bhiwadi-Gurgaon	1	S/C	83	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
71	400kV	Bhiwadi-Hissar	1	S/C	212	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
72	400kV	Bhiwadi-Hissar	2	D/C	144	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	LILO of Bhiwadi-Moga both ckts at Hisar
73	400kV	Bhiwadi-Hissar	3	D/C	144	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
74	400kV	Bhiwadi-NeemranaPG	1	D/C	48	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
75	400kV	Bhiwadi-NeemranaPG	2	D/C	48	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
76	400kV	Bhiwani BBMB - Hissar	1	S/C	35	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Bypassed at Hissar to form Bhiwani BBMB-Fatehabad	Polymer Insulator	
77	400kV	Bhiwani (PG) - Hissar	1	S/C	64	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Bypassed at Hissar to form Moga-Bhiwani(PG)	Polymer Insulator	LILO of Bawana-Hisar (132KM) at Bhiwani PG
78	400kV	Bhiwani (PG) - Hissar	2	D/C	57	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Bypassed at Bhiwani(PG) to form Mahindergarh(ATIL)	Polymer Insulator	
79	400kV	Bhiwani (PG) - Hissar	3	D/C	57	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
80	400kV	Bhiwani PG - Jind	1	D/C	82	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
81	400kV	Bhiwani PG - Jind	2	D/C	82	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
82	400kV	Bhiwani PG- BawanaCCGT	1	D/C	97	POWERGRID	POWERGRID	DTL/ CCGT	Twin Moose		Polymer Insulator	LILO of Bawana-Hisar (132KM) at Bhiwani PG
83	400kV	Bhiwani PG- Bhiwani BBMB	1	S/C	34	POWERGRID	POWERGRID	BBMB	Twin Moose		Polymer Insulator	LILO of Bhiwani (BBMB)- Bahadurgarh (84km) at Bhiwani (PG)
84	400kV	Bhiwani PG-Kabulpur	1	S/C	48	POWERGRID	POWERGRID	HVPNL	Twin Moose		Polymer Insulator	LILO of Bahadurgarh-Bhiwani at Kabulpur
85	400kV	Bikaner_2 (PBTSL)-Bikaner(PG)	1	D/C	43	POWERGRID	PBTSL	POWERGRID	Quad Moose		Not Available	
86	400kV	Bikaner_2 (PBTSL)-Bikaner(PG)	2	D/C	43	POWERGRID	PBTSL	POWERGRID	Quad Moose		Not Available	
87	400kV	Chamba pool - Jalandhar	1	D/C	162	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (48%)	
88	400kV	Chamba pool - Jalandhar	2	D/C	162	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (48%)	
89	400kV	Chamera-II - Chamba Pool	1	S/C	0.38	POWERGRID	NHPC	POWERGRID	Twin Moose		Conventional	Two tower is S/C and one tower is D/C
90	400kV	Chamera-II-Chamera-I	1	S/C	36	POWERGRID	NHPC	NHPC	Twin Moose		Conventional	
91	400kV	Chamera-II-Kishenpur	1	S/C	135	POWERGRID	NHPC	POWERGRID	Twin Moose		Conventional	

92	400kV	Chamera-I-Jalandhar	1	D/C	152	POWERGRID	NHPC	POWERGRID	Twin ACAR		Partial (43%)	
93	400kV	Chamera-I-Jalandhar	2	D/C	152	POWERGRID	NHPC	POWERGRID	Twin ACAR		Partial (43%)	
94	400kV	Chittorgarh-Chittorgarh(PG)	1	D/C	49	POWERGRID	RRVPNL	POWERGRID	Quad Moose		Not Available	
95	400kV	Chittorgarh-Chittorgarh(PG)	2	D/C	49	POWERGRID	RRVPNL	POWERGRID	Quad Moose		Not Available	
96	400kV	Chittorgarh-Kankroli	1	D/C	71	POWERGRID	RRVPNL	POWERGRID	Twin Moose		Polymer Insulator	LILO of 400 kV Rapp C-Kankroli at Chhitorgarh
97	400kV	Dadri NCTPP-G. Noida	1	D/C	13	POWERGRID	NTPC	UPPCL	Quad Bersimis		Polymer Insulator	
98	400kV	Dadri NCTPP-Maharanibagh	1	D/C	54	POWERGRID	NTPC	POWERGRID	Quad Bersimis	Bypassed at Maharanibagh to form Dadri-Ballabgarh	Polymer Insulator	
99	400kV	Dadri NCTPP-Kaithal	1	S/C	213	POWERGRID	NTPC	POWERGRID	Twin Moose	LILO of Dadri-Malerkotla at Kaithal	Polymer Insulator	
100	400kV	Dadri NCTPP-Mandola	1	D/C	46	POWERGRID	NTPC	POWERGRID	Quad Bersimis		Polymer Insulator	
101	400kV	Dadri NCTPP-Mandola	2	D/C	46	POWERGRID	NTPC	POWERGRID	Quad Bersimis		Polymer Insulator	
102	400kV	Dadri NCTPP-Muradnagar New	1	S/C	33	POWERGRID	NTPC	UPPTCL	Twin Moose		Polymer Insulator	Line shifted from Muradnagar to Muradnagar New (UPPTCL)
103	400kV	Dadri NCTPP-Panipat	1	S/C	112	POWERGRID	NTPC	BBMB	Twin Moose		Polymer Insulator	
104	400kV	Dadri NCTPP-Panipat	2	S/C	117	POWERGRID	NTPC	BBMB	Twin Moose		Polymer Insulator	
105	400kV	Deepalpur-Bawana	1	D/C	26	POWERGRID	KT-Jhajjar	DTL	Triple Snowbird	LILO of 400kV Bawana-Abdullapur one circuit at Deepalpur by Jhajjar KT	Polymer Insulator	
106	400kV	Dehradun-Abdullapur	1	D/C	89	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Not Available	
107	400kV	Dehradun-Abdullapur	2	D/C	89	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Not Available	
108	400kV	Dulhasti-Kishenpur	1	S/C	120	POWERGRID	NHPC	POWERGRID	Quad Moose		Conventional	
109	400kV	Dulhasti-Kishenpur	2	S/C	120	POWERGRID	NHPC	POWERGRID	Quad Moose		Conventional	
110	400kV	Dwarka-Jhatikara	1	S/C	18	POWERGRID	POWERGRID	POWERGRID	Twin HTLS	After LILO of 400kV Jhatikara-Bamnoli-I at Dwarka(PG)	Not Available	
111	400kV	Dwarka-Bamnauli	1	S/C	10	POWERGRID	POWERGRID	DTL	Twin HTLS		Not Available	
112	400kV	Fatehbad PG-Hissar	1	D/C	89	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Bypassed at Hissar to form Bhiwani BBMB-Fatehabad	Polymer Insulator	
113	400kV	Fatehpur-Kanpur	1	S/C	100	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Bypassed at Kanpur to form Fatehpur-Panki	Polymer Insulator	LILO of Singrauli-Kanpur at Fatehpur
114	400kV	Fatehpur-Kanpur	2	S/C	107	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (64%)	LILO of Allahabad-Kanpur one ckt at Fatehpur
115	400kV	Kanpur-Panki	1	S/C	6	POWERGRID	POWERGRID	UPPTCL	Twin Moose	Bypassed at Kanpur to form Fatehpur-Panki	Polymer Insulator	
116	400kV	Kanpur-Panki	2	S/C	6	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Polymer Insulator	
117	400kV	Fatehpur-Mainpuri	1	D/C	260	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	LILO of Allahabad-Mainpuri (363 KM) D/C at Fatehpur Series compensated line (Degree of comp. - 40%)
118	400kV	Fatehpur-Mainpuri	2	D/C	260	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
119	400kV	G.Noida-Nawada	1	D/C	30	POWERGRID	UPPTCL	HVPNL	Quad Bersimis	Lilo of Ballabgarh-G.Noida at Nawada	Polymer Insulator	Ballabhgarh-Gnoida LILOed at Nawada (Faridabad,Haryana)
120	400kV	Gorakhpur PG-Gorakhpur UP	1	D/C	46	POWERGRID	POWERGRID	UPPCL	Twin Moose		Polymer Insulator	Partial Planning has been completed
121	400kV	Gorakhpur PG-Gorakhpur UP	2	D/C	46	POWERGRID	POWERGRID	UPPCL	Twin Moose		Polymer Insulator	Partial Planning has been completed

122	400kV	Gorakhpur PG-Lucknow PG	1	D/C	264	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (3%)	At crossing
123	400kV	Gorakhpur PG-Lucknow PG	2	D/C	264	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (3%)	At crossing
124	400kV	Gorakhpur PG-Basti (UP)	1	D/C	117	POWERGRID	POWERGRID	UPPTCL	Twin Moose	LILO of 400kV Gorakhpur PG-Lucknow PG ckt-4 at Basti (UP). LILO portion is of UP	Not Available	
125	400kV	Gorakhpur PG-Basti (UP)	2	D/C	108	POWERGRID	POWERGRID	UPPTCL	Twin Moose	LILO of 400kV Lucknow-Gorakhpur-3 at Basti. LILO portion is of UP	Not Available	
126	400kV	Basti (UP)-Lucknow PG	1	D/C	204	POWERGRID	UPPTCL	POWERGRID	Twin Moose		Not Available	
127	400kV	Gurgaon-Sohna Road	1	D/C	7	POWERGRID	POWERGRID	GPTL	Quad Moose	LILO of 400kV Gurgaon-Manesar D/C at Sohna Road by GPTL	Not Available	
128	400kV	Gurgaon-Sohna Road	2	D/C	7	POWERGRID	POWERGRID	GPTL	Quad Moose		Not Available	
129	400kV	Hamirpur-ParbatiPooling (Banala)	1	D/C	77	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	LILO of Amritsar-Banala-1 at Hamirpur
130	400kV	Jaipur South-Bassi	1	D/C	37	POWERGRID	POWERGRID	POWERGRID	Twin Moose	LILO of Agra-Bassi D/C at Jaipur South	Polymer Insulator	LILO of Agra-Bassi D/C at Jaipur South
131	400kV	Jaipur South-Bassi	2	D/C	37	POWERGRID	POWERGRID	POWERGRID	Twin Moose	LILO of Agra-Bassi D/C at Jaipur South	Polymer Insulator	
132	400kV	Jaipur South-Kota	1	D/C	180	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Not Available	
133	400kV	Jaipur South-RAPP D	1	D/C	228	POWERGRID	POWERGRID	NPCIL	Twin Moose		Not Available	
134	400kV	Jalandhar-Nakodar	1	D/C	42	POWERGRID	POWERGRID	PSTCL	Quad Moose		Polymer Insulator	
135	400kV	Jalandhar-Hamirpur	1	D/C	135	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (43%)	LILO of 400kV Amritsar-Hamirpur at Jalandhar
136	400kV	Kaithal-Hissar	1	D/C	113	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird		LILO of Patiala-Hissar at Kaithal	
137	400kV	Kaithal-Hissar	2	D/C	113	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird		LILO of Patiala-Hissar at Kaithal	
138	400kV	Kaithal-Malerkotla	1	S/C	135	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
139	400kV	Kankroli-Jodhpur	1	S/C	188	POWERGRID	POWERGRID	RRVPNL	Twin HTLS		Conventional	
140	400kV	Kanpur-Agra	1	S/C	240	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
141	400kV	Kanpur-Auraiya	1	D/C	73	POWERGRID	POWERGRID	NTPC	Twin Moose		Conventional	
142	400kV	Kanpur-Auraiya	2	D/C	73	POWERGRID	POWERGRID	NTPC	Twin Moose		Conventional	
143	400kV	Kanpur-Ballabgarh	1	S/C	386	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	*Series Compensated,Ckt 1-35%, Ckt-2 & 3-40%
144	400kV	Kanpur-Ballabgarh	2	D/C	371	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	*Series Compensated,Ckt 1-35%, Ckt-2 & 3-40%
145	400kV	Kanpur-Ballabgarh	3	D/C	371	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	*Series Compensated,Ckt 1-35%, Ckt-2 & 3-40%
146	400kV	Kanpur-Kanpur(GIS)	1	D/C	21	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Polymer Insulator	
147	400kV	Kanpur-Kanpur(GIS)	2	D/C	21	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Polymer Insulator	
148	400kV	Kanpur(GIS)-Lucknow(765)	1	D/C	160	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Not Available	
149	400kV	Kanpur(GIS)-Lucknow(765)	2	D/C	160	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Not Available	
150	400kV	Kishenpur-NewWanpoh	1	D/C	130	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
151	400kV	Kishenpur-NewWanpoh	3	D/C	135	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
152	400kV	Kishenpur-NewWanpoh	4	D/C	135	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Not Available	
153	400kV	Kishenpur-Samba	1	D/C	35	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Not Available	
154	400kV	Kishenpur-Samba	2	D/C	35	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
155	400kV	Kota-Merta	1	D/C	256	POWERGRID	POWERGRID	RRVPNL	Twin Moose		Conventional	

156	400kV	Kotputli-Bhiwadi	1	S/C	132	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	LILO of Bassi-Bhiwadi-2 at Kotputli
157	400kV	Kurukshetra-Jind	1	D/C	103	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Not Available	
158	400kV	Kurukshetra-Jind	2	D/C	103	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Not Available	
159	400kV	Kurukshetra-Sonipat	1	D/C	125	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird (Twin HTLS for LILOportion)	LILO of Abdullapur-Sonipat line at Kurukshetra	Partial (99%)	LILO of Abdullapr-Sonipat ckts at
160	400kV	Kurukshetra-Sonipat	2	D/C	125	POWERGRID	POWERGRID	POWERGRID			Partial (99%)	
161	400kV	Kurukshetra(PG)-Dhanansu(PS)	1	D/C	165	POWERGRID	POWERGRID	PSTCL	Quad Moose	LILO of 400kv Kurukshetra-Jalandhar (LILO portion is of	Polymer Insulator	LILO portion to be checked
162	400kV	Dhanansu(PS)-Jalandhar(PG)	1	D/C	106	POWERGRID	PSTCL	POWERGRID	Quad Moose		Polymer Insulator	
163	400kV	Kurukshetra-Nakodar	1	D/C	234	POWERGRID	POWERGRID	PSTCL	Quad Moose		Polymer Insulator	
164	400kV	Lucknow-Basti	1	D/C	203	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Not Available	
165	400kV	Lucknow-Basti	2	D/C	203	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Not Available	
166	400kV	Lucknow PG-Lucknow UP	1	S/C	63	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Conventional	
167	400kV	Lucknow PG-Unnao	1	D/C	74	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Conventional	
168	400kV	Lucknow PG-Unnao	2	D/C	74	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Conventional	
169	400kV	Lucknow UP-Bareilly PG	1	S/C	279	POWERGRID	UPPTCL	POWERGRID	Twin Moose		Conventional	
170	400kV	765 Lucknow (PG) - Lucknow (PG)	1	D/C	3	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Polymer Insulator	
171	400kV	765 Lucknow (PG) - Lucknow (PG)	2	D/C	3	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Polymer Insulator	
172	400kV	LucknowPG-Sohawal	1	D/C	98	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	LILO of Balia-Lucknow (316 KM) D/C at Sohawal
173	400kV	LucknowPG-Sohawal	2	D/C	98	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
174	400kV	Lucknow PG-Shahjahanpur	1	D/C	170	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (10%)	
175	400kV	Lucknow PG-Shahjahanpur	2	D/C	170	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Partial (10%)	
176	400kV	Lucknow-Jehta	1	D/C	32	POWERGRID	POWERGRID	UPPTCL	Twin Moose	LILO of 400kV Lucknow-Unnao DC at Jehta (UP). LILO portion is of	Not Available	
177	400kV	Lucknow-Jehta	2	D/C	32	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Not Available	
178	400kV	Ludhiana-Jalandhar	1	S/C	85	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
179	400kV	Ludhiana-Malerkotla	1	S/C	36	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
180	400kV	Ludhiana-Patiala	1	D/C	76	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
181	400kV	Ludhiana-Patiala	2	D/C	76	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
182	400kV	Mainpuri-Ballabgarh	1	D/C	236	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
183	400kV	Mainpuri-Ballabgarh	2	D/C	236	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
184	400kV	Malerkotla-Patiala	1	S/C	62	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
185	400kV	Manesar- Sohna Road	1	D/C	17	POWERGRID	POWERGRID	GPTL	Quad Moose	LILO of 400kV Gurgaon-Manesar D/C at Sohna Road by GPTL	Not Available	
186	400kV	Manesar- Sohna Road	2	D/C	17	POWERGRID	POWERGRID	GPTL	Quad Moose		Not Available	
187	400kV	Mandola-Maharanibagh	1	D/C (LILO towers are M/C)	29	POWERGRID	POWERGRID	POWERGRID	Twin HTLS	After LILO of 400KV Mandola-Bawana D/C Lines at 400KV Maharanibagh(PG)	Not Available	
188	400kV	Mandola-Maharanibagh	2	D/C (LILO towers are M/C)	29	POWERGRID	POWERGRID	POWERGRID	Twin HTLS		Not Available	
189	400kV	Maharanibagh-Bawana	1	D/C	29	POWERGRID	POWERGRID	DTL	Twin HTLS		Not Available	
190	400kV	Maharanibagh-Bawana	2	D/C	29	POWERGRID	POWERGRID	DTL	Twin HTLS		Not Available	
191	400kV	Meerut-Bagpat	1	D/C	71	POWERGRID	POWERGRID	POWERGRID	Twin Moose	LILO of Meerut-Kaithal DC at Baghpat	Polymer Insulator	
192	400kV	Meerut-Bagpat	2	D/C	71	POWERGRID	POWERGRID	POWERGRID	Twin Moose	LILO of Meerut-Kaithal DC at Baghpat	Polymer Insulator	
193	400kV	Meerut-Mandola	1	D/C	60	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
194	400kV	Meerut-Mandola	2	D/C	60	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
195	400kV	Meerut-Muzzafarnagar	1	S/C	37	POWERGRID	POWERGRID	UPPTCL	Twin Moose		Polymer Insulator	
196	400kV	Moga-Fatehabad	1	D/C	179	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
197	400kV	Moga-Hissar	1	D/C	209	POWERGRID	POWERGRID	POWERGRID	Twin Moose	Bypassed at Hissar to form Moga-Bhiwani(PG)	Polymer Insulator	

198	400kV	Moga-Hissar	2	D/C	206	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	LILO of Bhiwadi-Moga both ckts at Hisar
199	400kV	Moga-Hissar	3	D/C	206	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
200	400kV	Moga-Jalandhar	1	D/C	85	POWERGRID	POWERGRID	POWERGRID	Twin ACAR		Polymer Insulator	
201	400kV	Moga-Jalandhar	2	D/C	85	POWERGRID	POWERGRID	POWERGRID	Twin ACAR		Polymer Insulator	
202	400kV	Muradnagar-Hapur	1	S/C	28	POWERGRID	UPPTCL	UPPTCL	Twin Moose	Moradabad-Muradnagar LILOed at Hapur; LILO portion of	Not Available	
203	400kV	Moradabad-Hapur	2	S/C	109	POWERGRID	UPPTCL	UPPTCL	Twin Moose		Not Available	
204	400kV	Nallagarh-Koldam	1	D/C	46	POWERGRID	POWERGRID	NTPC	Quad Moose		Conventional	Koldam to Parbati pool section is of
205	400kV	Nallagarh-Patiala	1	D/C	94	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird		Polymer Insulator	
206	400kV	Nallagarh-Patiala	2	D/C	94	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird		Polymer Insulator	
207	400kV	Nathpa Jhakri-Gumma	1	D/C	55	POWERGRID	SJVNL	HPPTCL	Triple Snowbird	LILO of DC Jhakri-Panchkula line at Gumma	Not Available	
208	400kV	Nathpa Jhakri-Gumma	2	D/C	55	POWERGRID	SJVNL	HPPTCL	Triple Snowbird		Not Available	
209	400kV	Gumma-Panchkula	1	D/C	112	POWERGRID	HPPTCL	POWERGRID	Triple Snowbird		Not Available	
210	400kV	Gumma-Panchkula	2	D/C	112	POWERGRID	HPPTCL	POWERGRID	Triple Snowbird		Not Available	
211	400kV	Nathpa Jhakri-RampurHEP	1	D/C	21	POWERGRID	SJVNL	SJVNL	Triple Snowbird	Nathpa Jhakri-Nallagarh LILOed at Rampur HEP	Conventional	LILO of Jhakri-Nalagarh-1 at RampurHEP
212	400kV	Nathpa Jhakri-RampurHEP	2	D/C	21	POWERGRID	SJVNL	SJVNL	Triple Snowbird		Conventional	
213	400kV	NeemranaPG-Manesar	1	D/C	67	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
214	400kV	NeemranaPG-Manesar	2	D/C	67	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
215	400kV	NeemranaPG-Babai	1	D/C	85	POWERGRID	POWERGRID	RRVPNL	Twin Moose	LILO PORTION IF OF NRSS36(B), LILO of 400kV Neemrana-Sikar-1 at Babai	Not Available	LILO of 400kV Neemrana-Sikar at Babai by NRSSXXXVI (Essel group): Earlier 29% of Neemrana-Sikar PG
216	400kV	NeemranaPG-Sikar	2	D/C	176	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Not Available	
217	400kV	NewWanpoh-Wagoora	1	D/C	57	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
218	400kV	NewWanpoh-Wagoora	2	D/C	57	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
219	400kV	Orai(PG)-Orai	1	D/C	42	POWERGRID	POWERGRID	UPPTCL	Quad Moose		Not Available	
220	400kV	Orai(PG)-Orai	2	D/C	42	POWERGRID	POWERGRID	UPPTCL	Quad Moose		Not Available	
221	400kV	Panchkula -Abdullapur	1	D/C	63	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird		Polymer Insulator	LILO of Jhakri-Abdullapur at Panchkula
222	400kV	Panchkula -Abdullapur	2	D/C	63	POWERGRID	POWERGRID	POWERGRID	Triple Snowbird		Polymer Insulator	LILO of Jhakri-Abdullapur at
223	400kV	Patiala-Panchkula	1	D/C	65	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
224	400kV	Patiala-Panchkula	2	D/C	65	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Polymer Insulator	
225	400kV	Patiala-Patran	1	D/C	79	POWERGRID	POWERGRID	PTCL	Triple Snowbird	LILO of 400kV D/C Patiala – Kaithal Line at Patran SS under the ownership of PTCL.	Polymer Insulator	LILO of 400 kV Kaithal-
226	400kV	Patiala-Patran	2	D/C	79	POWERGRID	POWERGRID	PTCL	Triple Snowbird		Polymer Insulator	
227	400kV	Patran-Kaithal	1	D/C	47	POWERGRID	PTCL	POWERGRID	Triple Snowbird		Polymer Insulator	
228	400kV	Patran-Kaithal	2	D/C	47	POWERGRID	PTCL	POWERGRID	Triple Snowbird		Polymer Insulator	
229	400kV	RampurHEP-Nallagarh	1	D/C	128	POWERGRID	SJVNL	POWERGRID	Triple Snowbird	Nathpa Jhakri-Nallagarh LILOed at Rampur HEP	Conventional	LILO of Jhakri-Nalagarh-1 at RampurHEP
230	400kV	RampurHEP-Nallagarh	2	D/C	128	POWERGRID	SJVNL	POWERGRID	Triple Snowbird		Conventional	
231	400kV	RAPS-C-Chittorgarh	1	D/C	155	POWERGRID	NPCIL	RRVPNL	Twin Moose		Partial (38%)	LILO of 400 kV Rapp C-Kankroli at Chhitorgarh
232	400kV	RAPS-C-Kankroli	1	D/C	199	POWERGRID	NPCIL	POWERGRID	Twin Moose		Partial (51%)	

233	400kV	RAPS-C-Kota	1	S/C	51	POWERGRID	NPCIL	POWERGRID	Twin Moose		Partial (55%)	400kV RAPS-Jaipur line whose work was completed till Kota section is connected with 400kV Raps-Kota#2 (for antitheft purpose) and hence 400kV RapsC-Kota #2 is now two twin moose lines connected in parallel paths
234	400kV	RAPS-C-Kota	2	D/C	55	POWERGRID	NPCIL	POWERGRID	Twin Moose	D/C with 400kV Jaipur-RAPP D line	Not Available	
235	400kV	Rasra-Balia	1	S/C	46	POWERGRID	UPPTCL	POWERGRID	Twin Moose	LILO of 400kV Balia-Mau-II at Rasara. LILO portion is of UP	Not Available	
236	400kV	Rasra-Mau	1	S/C	38	POWERGRID	UPPTCL	UPPTCL	Twin Moose		Not Available	
237	400kV	Rihand-Allahabad	1	D/C	279	POWERGRID	NTPC	POWERGRID	Twin Moose		Conventional	
238	400kV	Rihand-Allahabad	2	D/C	279	POWERGRID	NTPC	POWERGRID	Twin Moose		Conventional	
239	400kV	Roorkee-Kashipur	1	D/C	151	POWERGRID	POWERGRID	PTCUL	Quad Moose		Partial (72%)	
240	400kV	Roorkee-Kashipur	2	D/C	151	POWERGRID	POWERGRID	PTCUL	Quad Moose		Partial (72%)	
241	400kV	Roorkee-Saharanpur	1	D/C	36	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Polymer Insulator	
242	400kV	Roorkee-Dehradun	1	D/C	80	POWERGRID	POWERGRID	POWERGRID	Quad Moose		Partial (50%)	
243	400kV	Sarnath-Varanasi	1	D/C	70	POWERGRID	UPPTCL	POWERGRID	Quad Moose		Partial (52%)	LILO of Sarnath-Allahabad (144 KM) at 765/400kV Varanasi
244	400kV	Sarnath-Varanasi	2	D/C	107	POWERGRID	UPPTCL	POWERGRID	Quad Moose		Partial (52%)	
245	400kV	Shahjahanpur-Bareilly PG	1	D/C	116	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
246	400kV	Shahjahanpur-Bareilly PG	2	D/C	116	POWERGRID	POWERGRID	POWERGRID	Twin Moose		Conventional	
247	400kV	Shahjahanpur-Rosa	1	D/C	8	POWERGRID	POWERGRID	UPPCL	Twin Moose		Not Available	
248	400kV	Shahjahanpur-Rosa	2	D/C	8	POWERGRID	POWERGRID	UPPCL	Twin Moose		Not Available	
249	400kV	Shree Cement-Kota	1	D/C	208	POWERGRID	Sh. Cement	POWERGRID	Twin Moose		Polymer Insulator	
250	400kV	Shree Cement-Merta	2	D/C	103	POWERGRID	Sh. Cement	RRVPNL	Twin Moose		Polymer Insulator	
251	400kV	Sikar-Babai	1	D/C	95	POWERGRID	POWERGRID	RRVPNL	Twin Moose	LILO PORTION IF OF NRSS36(B), LILO of 400kV Neemrana-Sikar 1 at Babai	Not Available	
252	400kV	Sikar-Ratangarh	1	D/C	76	POWERGRID	POWERGRID	RRVPNL	Twin Moose		Conventional	
253	400kV	Sikar-Ratangarh	2	D/C	76	POWERGRID	POWERGRID	RRVPNL	Twin Moose		Conventional	
254	400kV	Singrauli-Allahabad	1	S/C	224	POWERGRID	NTPC	POWERGRID	Twin Moose		Conventional	
255	400kV	Singrauli-Allahabad	2	S/C	202	POWERGRID	NTPC	POWERGRID	Twin Moose		Conventional	
256	400kV	Singrauli-Allahabad	3	S/C	215	POWERGRID	NTPC	POWERGRID	Twin Moose		Not Available	
257	400kV	Singrauli-Anpara	1	S/C	25	POWERGRID	NTPC	UPPTCL	Twin Moose		Partial (91%)	
258	400kV	Singrauli-Fatehpur	1	S/C	331	POWERGRID	NTPC	POWERGRID	Twin Moose		Conventional	LILO of Singrauli-Kanpur at Fatehpur
259	400kV	Singrauli-LucknowUP	1	S/C	409	POWERGRID	NTPC	UPPTCL	Twin Moose		Conventional	
260	400kV	Singrauli-Rihand	1	S/C	42	POWERGRID	NTPC	NTPC	Twin Moose		Conventional	
261	400kV	Singrauli-Rihand	2	S/C	44	POWERGRID	NTPC	NTPC	Twin Moose		Conventional	
262	400kV	Singrauli-Vindhyachal	1	S/C	3	POWERGRID	NTPC	POWERGRID	Twin Moose		Conventional	
263	400kV	Singrauli-Vindhyachal	2	S/C	5	POWERGRID	NTPC	POWERGRID	Twin Moose		Conventional	
264	400kV	Koteswar(PG)-Koteswar(THDC)	1	D/C	3	POWERGRID	POWERGRID	THDC	Twin Moose		Conventional	
265	400kV	Koteswar(PG)-Koteswar(THDC)	2	D/C	3	POWERGRID	POWERGRID	THDC	Twin Moose		Conventional	
266	400kV	Tehri-Koteshwar(PG)	3	S/C	14	POWERGRID	THDC	POWERGRID	Quad Moose		Not Available	

267	400kV	Unnao-Jehta	1	D/C	70	POWERGRID	UPPTCL	UPPTCL	Twin Moose	LILO of 400kV Lucknow-Unnao DC at Jehta (UP). LILO portion is of UP	Not Available	
268	400kV	Unnao-Jehta	2	D/C	70	POWERGRID	UPPTCL	UPPTCL	Twin Moose	LILO of 400kV Lucknow-Unnao DC at Jehta (UP). LILO portion is of UP	Not Available	
269	400kV	Uri-II - Uri-I	1	S/C	10	POWERGRID	NHPC	NHPC	Twin Moose		Conventional	LILO of 400kV Uri-I - Wagoora D/C at Amargarh
270	400kV	Uri-II - Wagoora	1	S/C	105	POWERGRID	NHPC	POWERGRID	Twin Moose		Conventional	
271	400kV	Jauljivi-Bareilly_2	1	D/C	205	POWERGRID	POWERGRID	POWERGRID	Twin Moose	After LILO of 400kV Dhauliganga - Bareilly(UP) Double circuit line(Initially LILOed at Pithoragarh and charged at 220kV level) at Jauljivi(PG)	Not Available	
272	400kV	Jauljivi-Bareilly_2	2	D/C	205	POWERGRID	POWERGRID	POWERGRID	Twin Moose	After LILO of 400kV Dhauliganga - Bareilly(UP) Double circuit line(Initially LILOed at Pithoragarh and charged at 220kV level) at Jauljivi(PG)	Not Available	
B. POWERLINK Transmission Ltd												
1	400kV	Bareilly PG-Meerut	1	D/C	250	POWERLINK	POWERGRID	POWERGRID	Twin Moose		Conventional	LILO of Bareilly PG-Mandola-1 (241 Km) at
2	400kV	Bareilly PG-Meerut	2	D/C	250	POWERLINK	POWERGRID	POWERGRID	Twin Moose		Conventional	
3	400kV	Bareilly UP-Bareilly PG	1	D/C	14	POWERLINK	UPPTCL	POWERGRID	Twin Moose		Polymer Insulator	
4	400kV	Bareilly UP-Bareilly PG	2	D/C	14	POWERLINK	UPPTCL	POWERGRID	Twin Moose		Polymer Insulator	
5	400kV	Gorakhpur PG-Lucknow PG	1	D/C	246	POWERLINK	POWERGRID	POWERGRID	Twin Moose		Conventional	*Series compensated line
6	400kV	Gorakhpur PG-Lucknow PG	2	D/C	246	POWERLINK	POWERGRID	POWERGRID	Twin Moose		Conventional	
7	400kV	Meerut-Mandola	3	D/C	102	POWERLINK	POWERGRID	POWERGRID	Twin Moose		Conventional	LILO of Bareilly PG-Mandola-1&2 (241 Km)
8	400kV	Meerut-Mandola	4	D/C	102	POWERLINK	POWERGRID	POWERGRID	Twin Moose		Conventional	
C. PKTSL												
1	400kV	Khetri-Sikar	1	D/C	78	PKTSL	PKTSL	POWERGRID	Twin HTLS		Not Available	
2	400kV	Khetri-Sikar	2	D/C	78	PKTSL	PKTSL	POWERGRID	Twin HTLS		Not Available	
D. Adani Transmission India Ltd.												
1	400kV	Mahindergarh (APL)-Bhiwani PG	1	D/C	50	ATIL	APL	POWERGRID	Twin Moose		Conventional	
2	400kV	Mahindergarh (APL)-Bhiwani PG	2	D/C	50	ATIL	APL	POWERGRID	Twin Moose		Conventional	
3	400kV	Mahindergarh (APL)-Bhiwani PG	3	D/C	56	ATIL	APL	POWERGRID	Twin Moose	Bypassed at 400kV Bhiwani to form 400kV Bypassed at Dhanonda to form	Not Available	
4	400kV	Mahindergarh (APL)-Bhiwani PG	4	D/C	56	ATIL	APL	POWERGRID	Twin Moose		Not Available	
5	400kV	MahindergarhHVDC-Dhanonda	1	D/C	5	ATIL	APL	HVPNL	Quad Moose		Conventional	
6	400kV	MahindergarhHVDC-Dhanonda	2	D/C	5	ATIL	APL	HVPNL	Quad Moose		Conventional	
E. APCPL (Aravali Power Corporation Pvt Ltd.)												
1	400kV	Jhajjar (IGSTPS)-Mundka	1	D/C	66	APCPL	APCPL	DTL	Twin Moose		Polymer	
2	400kV	Jhajjar (IGSTPS)-Mundka	2	D/C	66	APCPL	APCPL	DTL	Twin Moose		Polymer	
F. PHTL (Powergrid Himachal Transmission Limited)												
1	400kV	Abdullapur-Kala Amb	1	D/C	39	PHTL	POWERGRID	PKATL	Quad Moose		Conventional	
2	400kV	Abdullapur-Kala Amb	2	D/C	39	PHTL	POWERGRID	PKATL	Quad Moose		Conventional	
3	400kV	Kala Amb- Wangtoo (HP)	1	D/C	174	PHTL	PKATL	HPPTCL	Quad Moose	Karcham-Kala Amb LILOed at Wangtoo (HP)	Not Available	
4	400kV	Karcham Wangtoo - Wangtoo (HP)	1	D/C	1	PHTL	JSW	HPPTCL	Quad Moose		Not Available	
5	400kV	Karcham Wangtoo - Wangtoo (HP)	2	D/C	1	PHTL	JSW	HPPTCL	Quad Moose		Not Available	
6	400kV	Baspa-Karcham Wangtoo	1	D/C	22	PHTL	JPVL	JSW	Triple snowbird		Conventional	
7	400kV	Baspa-Karcham Wangtoo	2	D/C	22	PHTL	JPVL	JSW	Triple snowbird		Conventional	
8	400kV	Karcham Wangtoo-NJPC	1	D/C	34	PHTL	JSW	SJVNL	Triple snowbird		Conventional	

9	400kV	Karcham Wangtoo-NJPC	2	D/C	34	PHTL	JSW	SJVNL	Triple snowbird		Conventional	
10	400kV	Sorang-Wangtoo	1	D/C	21	PHTL	SORANG	HPPTCL	Quad Moose		Not Available	
11	400kV	Sorang-Kala Amb	1	D/C	160	PHTL	SORANG	PKATL	Quad Moose		Not Available	
G. PKTCL (Parbati-Koldam Transmission)												
1	400kV	Koldam-Ludhiana	1	D/C	151	PKTCL	NTPC	POWERGRID	Triple Snowbird		27% Polymer & 73% porcelain	
2	400kV	Koldam-Ludhiana	2	D/C	151	PKTCL	NTPC	POWERGRID	Triple Snowbird		27% Polymer & 73% porcelain	
3	400kV	Koldam-Banala	1	D/C	67	PKTCL	NTPC	POWERGRID	Quad Moose		100% porcelain	
4	400kV	Nallagarh-Banala	1	D/C	62	PKTCL	POWERGRID	POWERGRID	Quad Moose		100% porcelain	Powergrid owned 46.38km
5	400kV	Parbati-II- ParbatiPooling (Banala)	1	S/C	13	PKTCL	NHPC	POWERGRID	Quad Moose		100% porcelain	Some portion is of Powergrid
6	400kV	Parbati-III- ParbatiPooling (Banala)	1	S/C	4	PKTCL	NHPC	POWERGRID	Quad Moose		100% porcelain	
7	400kV	Parbati II- Sainj	1	S/C	1	PKTCL	NHPC	HPPCL	Quad Moose		100% porcelain	LILO of 400kV Parbati II-Parbati III at Sainj
8	400kV	Parbati III- Sainj	1	S/C	9	PKTCL	NHPC	HPPCL	Quad Moose		100% porcelain	
H. INDIGRID:NRSS-29 Transmission Company Limited												
1	400kV	Jalandhar-Samba	1	D/C	135	NRSS-29	POWERGRID	POWERGRID	Twin Moose		Polymer	
2	400kV	Jalandhar-Samba	2	D/C	135	NRSS-29	POWERGRID	POWERGRID	Twin Moose		Polymer	
3	400kV	Amargarh-Samba	1	D/C	286	NRSS-29	NRSS-29	POWERGRID	Twin Moose		Polymer	
4	400kV	Amargarh-Samba	2	D/C	286	NRSS-29	NRSS-29	POWERGRID	Twin Moose		Polymer	
5	400kV	Uri-I - Amargarh	1	D/C	62	NRSS-29	NHPC	NRSS-29	Twin Moose	LILO of 400kV D/C Uri-I – Wagoora Line at Amargarh SS under the ownership of NRSS-XXIX.	Polymer	
6	400kV	Uri-I - Amargarh	2	D/C	62	NRSS-29	NHPC	NRSS-29	Twin Moose		Polymer	
7	400kV	Amargarh - Wagoora	1	D/C	36	NRSS-29	NRSS-29	POWERGRID	Twin Moose		Polymer	
8	400kV	Amargarh - Wagoora	2	D/C	36	NRSS-29	NRSS-29	POWERGRID	Twin Moose		Polymer	
I. Powergrid Unchahar Transmission Ltd.												
1	400kV	Fatehpur-Unchahar	1	D/C	54	PUTL	POWERGRID	NBPPL	Twin Moose		Not Available	
2	400kV	Fatehpur-Unchahar	2	D/C	54	PUTL	POWERGRID	NBPPL	Twin Moose		Not Available	
J. NRSSXXXI(B) (Sekura Energy)												
1	400kV	Amritsar-Malerkotla	1	D/C	149	NRSSXXXI(B)	POWERGRID	POWERGRID	Twin Moose		Polymer	
2	400kV	Amritsar-Malerkotla	2	D/C	149	NRSSXXXI(B)	POWERGRID	POWERGRID	Twin Moose		Polymer	
3	400kV	Kurukshetra-Malerkotla	1	D/C	139	NRSSXXXI(B)	POWERGRID	POWERGRID	Twin Moose		Polymer	
4	400kV	Kurukshetra-Malerkotla	2	D/C	139	NRSSXXXI(B)	POWERGRID	POWERGRID	Twin Moose		Polymer	
K. Gurgaon Palwal Transmission Ltd.												
1	400kV	Dhanoda-Neemrana	1	D/C	47	GPTL	HVPNL	POWERGRID	Twin HTLS	Bypassed at Dhanonda to form	Polymer	
2	400kV	Dhanoda-Neemrana	2	D/C	47	GPTL	HVPNL	POWERGRID	Twin HTLS		Polymer	
3	400kV	Prithala-Kadarpur	1	D/C	29	GPTL	GPTL	GPTL	Twin HTLS		Polymer	
4	400kV	Prithala-Kadarpur	2	D/C	29	GPTL	GPTL	GPTL	Twin HTLS		Polymer	
5	400kV	Prithala(GPTL)-Aligarh(PG)	1	D/C	49	GPTL	GPTL	POWERGRID	Twin HTLS		Polymer	
6	400kV	Prithala(GPTL)-Aligarh(PG)	2	D/C	49	GPTL	GPTL	POWERGRID	Twin HTLS		Polymer	
7	400kV	Kadarpur-Sohna Road	1	D/C	10	GPTL	GPTL	GPTL	Twin HTLS		Polymer	
8	400kV	Kadarpur-Sohna Road	2	D/C	10	GPTL	GPTL	GPTL	Twin HTLS		Polymer	
L. FBTL												
1	400kV	AREPRL-Fatehgarh Pooling	1	D/C	1	FBTL	FBTL	FBTL	Quad moose		Not Available	
2	400kV	AREPRL-Fatehgarh Pooling	2	D/C	1	FBTL	FBTL	FBTL	Quad moose		Not Available	
3	400kV	Fatehgarh II-Fatehgarh Pooling	1	D/C	45	FBTL	POWERGRID	FBTL	Hexa Zebra+ Twin HTLS	LILO of 400kV Fatehgarh I-Bhadla-1 at Fatehgarh II. LILO Portion is of Powergrid	Not Available	
4	400kV	Fatehgarh II-Fatehgarh Pooling	2	D/C	45	FBTL	POWERGRID	FBTL	Hexa Zebra+ Twin HTLS		Not Available	
M. PBTSL												
1	400kV	Bikaner_2 (PBTSL)-Khetri (PKTSL)	1	D/C (some towers M/C)	275	PBTSL	PBTSL	PKTSL	Twin HTLS		Not Available	

2	400kV	Bikaner_2 (PBTSL)-Khetri (PKTSL)	2	D/C (some towers M/C)	275	PBTSL	PBTSL	PKTSL	Twin HTLS		Not Available
3	400kV	Bikaner_2 (PBTSL)-Khetri (PKTSL)	3	D/C (some towers M/C)	275	PBTSL	PBTSL	PKTSL	Twin HTLS		Not Available
4	400kV	Bikaner_2 (PBTSL)-Khetri (PKTSL)	4	D/C (some towers M/C)	275	PBTSL	PBTSL	PKTSL	Twin HTLS		Not Available
5	400kV	Khetri (PKTSL)-Bhiwadi(PG)	1	D/C	126	PBTSL	PKTSL	POWERGRID	Twin HTLS		Not Available
6	400kV	Khetri (PKTSL)-Bhiwadi(PG)	2	D/C	126	PBTSL	PKTSL	POWERGRID	Twin HTLS		Not Available
N. PRTL											
1	400kV	Jaisalmer(RS)-Fatehgarh_III(PG)	1	D/C	50	PRTL	RAJASTHAN	PRTL	Twin HTLS		Not Available
2	400kV	Jaisalmer(RS)-Fatehgarh_III(PG)	2	D/C	50	PRTL	RAJASTHAN	PRTL	Twin HTLS		Not Available
3	400kV	Fatehgarh_III(PG)- Fatehgarh_II(PG)	1	D/C	44	PRTL	PRTL	POWERGRID	Twin HTLS		Not Available
4	400kV	Fatehgarh_III(PG)- Fatehgarh_II(PG)	2	D/C	44	PRTL	PRTL	POWERGRID	Twin HTLS		Not Available
O. NRSS-36											
1	400kV	Babai(RS)-Bhiwani(PG)	1	D/C	111	NRSS-36	NRSS-36	POWERGRID	Twin Moose		Not Available
2	400kV	Babai(RS)-Bhiwani(PG)	2	D/C	111	NRSS-36	NRSS-36	POWERGRID	Twin Moose		Not Available
RE Connected at ISTS Dedicated Lines											
A. RENEW											
1	400kV	Bikaner(PG) - Bikaner (Renew)	1	S/C	5	RENEW	POWERGRID	RENEW	Twin Moose		Not Available
B. Avaada											
1	400kV	Bikaner(PG)-Avaada	1	S/C	14	AEPL	POWERGRID	AEPL	Twin Moose		Not Available
C. ARPOPL											
1	400kV	Bikaner(PG)-Ayana	1	S/C	12	ARPOPL	PGCIL	Ayana	ACSR Twin Moose+AL 59		Not Available
D. Azure											
1	400kV	Bikaner(PG)-Azure 43 PSS	1	S/C	9	Azure	POWERGRID	Azure 43 PSS	Twin Moose		Not Available
2	400kV	Azure43(RSS)-Azure 43 PSS	1	S/C	3	Azure	Azure 43 PSS	Azure 43 RSS	Twin Moose		Not Available
E. RSRPL											
1	400kV	Bikaner(RENEW) - Renew Surya Ravi	1	S/C	13	RSRPL	RENEW	RSRPL	Twin Moose		Not Available
F. NTPC											
1	400kV	Bhadla II - Kolayat	1	D/C	29	NTPC	POWERGRID	NTPC	Quad Moose		Not Available
2	400kV	Kolayat - Kolayat_2	1	D/C	2	NTPC	NTPC	NTPC	Quad Moose		Not Available
STATE LINES											
A. DTL											
1	400kV	Bamnauli-Tughlakabad	1	M/C	68	DTL	DTL	POWERGRID		Tower is quad circuit tower	Polymer Insulator
2	400kV	Bamnauli-Tughlakabad	2	M/C	68	DTL	DTL	POWERGRID		Tower is quad circuit tower	Polymer Insulator
3	400kV	Bamnoli-Jhatikara	1	D/C	12	DTL	DTL	POWERGRID	Quad bersimis		Polymer Insulator
4	400kV	Bamnoli-Jhatikara	2	D/C	12	DTL	DTL	POWERGRID	Quad bersimis		Polymer Insulator
5	400kV	Bawana-Mundka	1	D/C	18	DTL	DTL	DTL	Quad bersimis		Polymer Insulator
6	400kV	Bawana-Mundka	2	D/C	18	DTL	DTL	DTL	Quad bersimis		Polymer Insulator
7	400kV	Jhatikara-Mundka	1	D/C	17	DTL	POWERGRID	DTL	Quad bersimis		Polymer Insulator
8	400kV	Jhatikara-Mundka	2	D/C	17	DTL	POWERGRID	DTL	Quad bersimis		Polymer Insulator
B. HVPNL											
1	400kV	CLP Jhajjar -Dhanonda	1	D/C	20	HVPNL	CLP Jhajjar	HVPNL	Twin Moose		Conventional
2	400kV	CLP Jhajjar -Dhanonda	2	D/C	20	HVPNL	CLP Jhajjar	HVPNL	Twin Moose		Conventional
3	400kV	CLP Jhajjar- Kabulpur	1	D/C	35	JKTPL	CLP Jhajjar	HVPNL	Quad Moose		Already had Anti fog
4	400kV	CLP Jhajjar- Kabulpur	2	D/C	35	JKTPL	CLP Jhajjar	HVPNL	Quad Moose		Polymer Insulator
5	400kV	Deepalpur-Kabulpur	1	D/C	67	JKTPL	KT Jhajjar	HVPNL	Quad Moose		Installed on every
6	400kV	Deepalpur-Kabulpur	2	D/C	67	JKTPL	KT Jhajjar	HVPNL	Quad Moose		towers

7	400kV	Dhanoda-Daultabad	1	D/C	73	HVPNL	HVPNL	HVPNL	Quad Moose		Already had Polymer Insulator	
8	400kV	Dhanoda-Daultabad	2	D/C	73	HVPNL	HVPNL	HVPNL	Quad Moose			
9	400kV	Gurgaon-Daultabad	1	D/C	21	HVPNL	POWERGRID	HVPNL	Quad Moose			Six towers multi-circuit with Bamnauli-
10	400kV	Gurgaon-Daultabad	2	D/C	21	HVPNL	POWERGRID	HVPNL	Quad Moose			
11	400kV	Jhajjar-Daulatabad	1	D/C	64	HVPNL	APCPL	HVPNL	Twin Moose		Polymer Insulator	Partial (84%),
12	400kV	Jhajjar-Daulatabad	2	D/C	64	HVPNL	APCPL	HVPNL	Twin Moose		Polymer Insulator	Remaining pending
13	400kV	Khedar-Fatehabad	1	D/C	40	HVPNL	HPGCL	POWERGRID	Twin Moose		Conventional	Presently there is no planning of replacment of Convention disc Insulator with Polymer Insulators
14	400kV	Jind-Kirori	1	D/C	51	HVPNL	POWERGRID	HVPNL	Twin Moose		Polymer Insulator	
15	400kV	Jind-Kirori	2	D/C	51	HVPNL	POWERGRID	HVPNL	Twin Moose		Polymer Insulator	
16	400kV	Khedar-Kirori	1	D/C	6.2	HVPNL	HPGCL	HVPNL	Twin Moose		Conventional	Presently there is no planning of replacment
17	400kV	Khedar-Kirori	2	D/C	6	HVPNL	HPGCL	HVPNL	Twin Moose			
18	400kV	Khedar-Nuhiawali	1	D/C	114	HVPNL	HPGCL	HVPNL	Twin Moose		Conventional	Existing disc insulator
19	400kV	Nuhiawali-Fatehabad	1	D/C	78	HVPNL	HVPNL	POWERGRID	Twin Moose		Conventional	are of Porcelain
C. PDD (Jammu & Kashmir)												
1	400kV	Baglihar(stage 1)-Kishenpur	1	D/C	68	JK PDD	JKSPDCL	POWERGRID	Twin Moose		Conventional	
2	400kV	Baglihar(stage 1)-Kishenpur	2	D/C	68	JK PDD	JKSPDCL	POWERGRID	Twin Moose		Not Available	
D. PSTCL												
1	400kV	Behman Jassa- HMEL	1	D/C	17	PSTCL	PSTCL	PSTCL	Twin Moose		Not Available	
2	400kV	Behman Jassa- HMEL	2	D/C	17	PSTCL	PSTCL	PSTCL	Twin Moose		Not Available	
3	400kV	Behman Jassa- Moga	1	S/C	113	PSTCL	PSTCL	PSTCL	Twin Moose	After LILO of 400 KV TSPL to 400 KV Moga at 400 KV Behman Jassa Singh	Not Available	
4	400kV	Makhu-Amritsar	1	D/C	64	PSTCL	PSTCL	PSTCL	Twin Moose		Partial (10%)	
5	400kV	Makhu-Amritsar	2	D/C	64	PSTCL	PSTCL	PSTCL	Twin Moose		Partial (10%)	
6	400kV	Muktsar-Makhu	1	D/C	96	PSTCL	PSTCL	PSTCL	Twin Moose		Conventional	
7	400kV	Muktsar-Makhu	2	D/C	96	PSTCL	PSTCL	PSTCL	Twin Moose		Conventional	
8	400kV	Nakodar-Makhu	1	D/C	52	PSTCL	PSTCL	PSTCL	Twin Moose		Conventional	
9	400kV	Nakodar-Makhu	2	D/C	52	PSTCL	PSTCL	PSTCL	Twin Moose		Conventional	
10	400kV	Nakodar-Moga	1	S/C	78	PSTCL	PSPCL	POWERGRID	Twin Moose		Not Available	LILO of 400kV Talwandi sabo-Nakodar at Moga
11	400kV	Rajpura-Dhuri	1	D/C	86	PSTCL	PSTCL	PSTCL	Twin Moose		Conventional	Lilo of Rajpura th-Dhuri
12	400kV	Rajpura TPS- Rajpura	1	D/C	9	PSTCL	PSPCL	PSTCL	Twin Moose		Conventional	1 at 400kV Rajpura
13	400kV	Rajpura-Dhuri	2	D/C	86	PSTCL	PSTCL	PSTCL	Twin Moose		Conventional	Lilo of Rajpura th-Dhuri
14	400kV	Rajpura TPS- Rajpura	2	D/C	9	PSTCL	PSPCL	PSTCL	Twin Moose		Not Available	2 at 400kV Rajpura
15	400kV	Rajpura TPS-Nakodar	1	D/C	139	PSTCL	PSPCL	PSTCL	Twin Moose		Conventional	
16	400kV	Rajpura TPS-Nakodar	2	D/C	139	PSTCL	PSPCL	PSTCL	Twin Moose		Conventional	
17	400kV	Talwandi Saboo- Dhuri	1	D/C	175	PSTCL	PSPCL	PSTCL	Twin Moose		Partial (22%)	
18	400kV	Talwandi Saboo- Dhuri	2	D/C	175	PSTCL	PSPCL	PSTCL	Twin Moose		Partial (22%)	
19	400kV	Talwandi Saboo- Behman Jassa	1	D/C	20	PSTCL	PSPCL	PSTCL	Twin Moose	After LILO of 400 KV TSPL to 400 KV Moga at 400 KV Behman Jassa Singh	Not Available	
20	400kV	Talwandi Saboo- Nakodar	1	D/C	180	PSTCL	PSPCL	PSTCL	Twin Moose		Conventional	
21	400kV	Talwandi Saboo- Muktsar	1	D/C	100	PSTCL	PSPCL	PSTCL	Twin Moose		Conventional	
22	400kV	Talwandi Saboo- Muktsar	2	D/C	100	PSTCL	PSPCL	PSTCL	Twin Moose		Conventional	
E. PTCUL												
1	400kV	Alaknanda(GVK)-Srinagar(PTCUL)	1	D/C	14	PTCUL	GVKPIL	PTCUL	Twin Moose		Conventional	
2	400kV	Alaknanda(GVK)-Srinagar(PTCUL)	2	D/C	14	PTCUL	GVKPIL	PTCUL	Twin Moose		Conventional	
3	400kV	Muradabad-Kashipur	1	S/C	108	PTCUL	UPPTCL	PTCUL	Twin Moose		Conventional	
4	400kV	Rishikesh-Nehtaur	1	D/C	124	PTCUL	PTCUL	UPPTCL	Twin Moose		Not Available	LILO of 400kV

5	400kV	Nehtaur-Kashipur	2	D/C	80	PTCUL	UPPTCL	PTCUL	Twin Moose		Not Available	Rishikesh-Kashipur
6	400kV	Roorkee-Rishikesh	1	S/C	50	PTCUL	POWERGRID	PTCUL	Twin Moose	LILO portion is of POWERGRID	Not Available	
7	400kV	Roorkee-Muzaffarnagar	1	S/C	71	PTCUL	POWERGRID	UPPTCL	Twin Moose		Not Available	
F. RRVPNL												
1	400kV	Ajmer-Bhilwara	1	D/C	160	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
2	400kV	Ajmer-Bhilwara	2	D/C	160	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
3	400kV	Akal-Barmer	1	S/C	124	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Conventional	
4	400kV	Akal-Jodhpur	1	S/C	225	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Conventional	
5	400kV	Akal-Ramgarh	1	D/C	99	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
6	400kV	Akal-Ramgarh	2	D/C	99	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
7	400kV	Anta-Chhabra	1	S/C	90	RRVPNL	RRVPNL	RVUNL	Quad Moose	Bypassed at Anta to form Chhabra-Kota(PG)	Not Available	
8	400kV	Anta-Chhabra SC	1	D/C	89	RRVPNL	RRVPNL	RVUNL	Quad Moose		Not Available	
9	400kV	Anta-Chhabra SC	2	D/C	89	RRVPNL	RRVPNL	RVUNL	Quad Moose		Not Available	
10	400kV	Anta-Kalisindh	1	D/C	80	RRVPNL	RRVPNL	RVUNL	Quad Moose		Not Available	
11	400kV	Anta-Kalisindh	2	D/C	80	RRVPNL	RRVPNL	RVUNL	Quad Moose		Not Available	
12	400kV	Anta-Kawai	1	D/C	50	RRVPNL	RRVPNL	Kawai(Adani)	Quad Moose		Not Available	
13	400kV	Anta-Kawai	2	D/C	50	RRVPNL	RRVPNL	Kawai(Adani)	Quad Moose		Not Available	
14	400kV	Anta-Kota (PG)	1	S/C	91	RRVPNL	RRVPNL	POWERGRID	Twin Moose	Bypassed at Anta to form Chhabra-Kota(PG)	Not Available	
15	400kV	Barmer-Bhinmal	1	D/C	144	RRVPNL	RRVPNL	POWERGRID	Twin Moose		Not Available	
16	400kV	Barmer-Bhinmal	2	D/C	144	RRVPNL	RRVPNL	POWERGRID	Twin Moose		Not Available	
17	400kV	Barmer-Jaisalmer-II (Bhaesada)	1	D/C	117	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
18	400kV	Barmer-Jaisalmer-II (Bhaesada)	2	D/C	117	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
19	400kV	Barmer-Rajwest	1	D/C	15	RRVPNL	RRVPNL	RAJWEST	Twin Moose		Conventional	
20	400kV	Bhadla-Jodhpur	1	D/C	106	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
21	400kV	Bhilwara-Chhabra	1	S/C	303	RRVPNL	RRVPNL	RVUNL	Twin Moose		Conventional	
22	400kV	Bhilwara-Chittorgarh(RRVPNL)	1	D/C	49	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
23	400kV	Bhilwara-Chittorgarh(RRVPNL)	2	D/C	49	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
24	400kV	Bikaner-Bhadla	1	D/C	189	RRVPNL	RRVPNL	RRVPNL	Quad Moose		Not Available	
25	400kV	Bikaner-Bhadla	2	D/C	189	RRVPNL	RRVPNL	RRVPNL	Quad Moose		Not Available	
26	400kV	Bikaner-Merta	1	S/C	172	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
27	400kV	Bikaner-Sikar(PG)	1	D/C	171	RRVPNL	RRVPNL	POWERGRID	Twin Moose		Not Available	
28	400kV	Bikaner-Sikar(PG)	2	D/C	171	RRVPNL	RRVPNL	POWERGRID	Twin Moose		Not Available	
29	400kV	Chhabra - Kawai SCTPS	1	S/C	45	RRVPNL	RVUNL	APRL	Twin Moose		Conventional	
30	400kV	Chhabra-Chhabra SC	1	D/C	2	RRVPNL	RRVPNL	RVUNL	Quad Moose		Not Available	
31	400kV	Chhabra-Chhabra SC	2	D/C	2	RRVPNL	RRVPNL	RVUNL	Quad Moose		Not Available	
32	400kV	Heerapura-Hindaun	1	S/C	192	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Conventional	
33	400kV	Hindaun-Chhabra	1	S/C	305	RRVPNL	RRVPNL	RVUNL	Twin Moose		Conventional	
34	400kV	Kakani (Jodhpur New)-Jodhpur	2	S/C	102	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
35	400kV	Kankani (Jodhpur New)-Akal	1	D/C	223	RRVPNL	RRVPNL	RRVPNL	Quad Moose		Not Available	
36	400kV	Kankani(Jodhpur New)-Jaisalmer-II(Bhainsra)	1	D/C	177	RRVPNL	RRVPNL	RRVPNL	Quad Moose	LILO of 400kV Kankani(Jodhpur New)-Akal ckt-2	Not Available	
37	400kV	Jaisalmer-II(Bhainsra)-Akal	1	D/C	61	RRVPNL	RRVPNL	RRVPNL	Quad Moose		Not Available	
38	400kV	Kankani (Jodhpur New)-Jodhpur	1	S/C	67	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
39	400kV	Kankani (Jodhpur New)-Merta	1	S/C	140	RRVPNL	RRVPNL	RRVPNL	Twin Moose	LILO of 400kV Jodhpur-Merta-1 at Kakani	Not Available	
40	400kV	Merta-Bhadla	1	D/C	175	RRVPNL	RRVPNL	RRVPNL	Twin Moose	LILO of 400kV Jodhpur-Merta-2 at Bhadla	Not Available	
41	400kV	Merta-Heerapura	1	S/C	175	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Conventional	
42	400kV	Merta-Ratangarh	1	S/C	173	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Conventional	

43	400kV	Phagi-Ajmer(RRVPNL)	1	D/C	109	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
44	400kV	Phagi-Ajmer(RRVPNL)	2	D/C	109	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
45	400kV	Phagi-Heerapura	1	D/C	52	RRVPNL	RRVPNL	RRVPNL	Quad Moose		Not Available	
46	400kV	Phagi-Heerapura	2	D/C	52	RRVPNL	RRVPNL	RRVPNL	Quad Moose		Not Available	
47	400kV	Rajwest - Kankani (Jodhpur New)	1	S/C	209	RRVPNL	RRVPNL	RRVPNL	Twin Moose	LILO of 400kV Jodhpur-Rajwest-I at Kakani	Not Available	
48	400kV	Rajwest-Jodhpur	1	D/C	209	RRVPNL	RWPL	RRVPNL	Twin Moose		Conventional	
49	400kV	Ramgarh-Bhadla	1	D/C	160	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
50	400kV	Ramgarh-Bhadla	2	D/C	160	RRVPNL	RRVPNL	RRVPNL	Twin Moose		Not Available	
51	400kV	Suratgarh-Bikaner	1	S/C	146	RRVPNL	RVUNL	RRVPNL	Twin Moose		Conventional	
52	400kV	Suratgarh-Ratangarh	1	S/C	144	RRVPNL	RVUNL	RRVPNL	Twin Moose		Conventional	
53	400kV	Suratgarh-Ratangarh	2	S/C	144	RRVPNL	RVUNL	RRVPNL	Twin Moose		Conventional	
54	400kV	Suratgarh-Suratgarh SC	1	S/C	2	RRVPNL	RVUNL	RVUNL	Quad Moose		Not Available	
55	400kV	Suratgarh SC-Bikaner	1	D/C	140	RRVPNL	RVUNL	RRVPNL	Twin Moose		Not Available	
56	400kV	Suratgarh SC-Bikaner	2	D/C	140	RRVPNL	RVUNL	RRVPNL	Twin Moose		Not Available	
G. UPPTCL												
1	400kV	Agra (Fatehbad)-Agra South	1	D/C	70	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
2	400kV	Agra (UP)-Agra(Fatehbad)	1	S/C	104	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	LILO of 400 kV Agra(UP)-Muradnagar(N) at Fatehabad(UP)
3	400kV	Agra UP-Unnao	1	S/C	279	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Partial (25%)	
4	400kV	Agra(Fatehbad)-Mathura	1	S/C	142	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
5	400kV	Agra(Fatehbad)-Mathura	2	D/C	151	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura
6	400kV	Alakhnanda-Vishnuprayag	1	D/C	109	UPPTCL	GVKPIL	JPVL	Twin Moose		Not Available	
7	400kV	Aligarh-Mainpuri	1	D/C	93	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
8	400kV	Aligarh-Mainpuri	2	D/C	93	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
9	400kV	Aligarh-Muradnagar	1	S/C	177	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	*Series Compensated line (40%). It would be shifted
10	400kV	Aligarh-Sikandrabad	1	D/C	95	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
11	400kV	Aligarh-Harduaganj	1	S/C	40	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
12	400kV	AnparaB-AnparaC	1	D/C	0.05	UPPTCL	UPRVUNL	LANCO	Quad Moose		Conventional	
13	400kV	AnparaB-AnparaC	2	D/C	0.05	UPPTCL	UPRVUNL	LANCO	Quad Moose		Conventional	
14	400kV	AnparaB-AnparaD	1	D/C	5	UPPTCL	UPRVUNL	UPPTCL	Twin Moose		Not Available	
15	400kV	AnparaB-AnparaD	2	D/C	5	UPPTCL	UPRVUNL	UPPTCL	Twin Moose		Not Available	
16	400kV	AnparaB-Mau	1	S/C	262	UPPTCL	UPRVUNL	UPPTCL	Twin Moose		Partial (13%)	
17	400kV	AnparaB-Obra B	1	S/C	40	UPPTCL	UPRVUNL	UPPTCL	Twin Moose		Partial	
18	400kV	AnparaB-Sarnath	1	D/C	158	UPPTCL	UPRVUNL	UPPTCL	Twin Moose		Partial	
19	400kV	AnparaB-Sarnath	2	D/C	158	UPPTCL	UPRVUNL	UPPTCL	Twin Moose		Conventional	
20	400kV	Ataur-Hapur	1	D/C	52	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
21	400kV	Ataur-Hapur	2	D/C	52	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
22	400kV	Ataur-Indirapuram	1	D/C	15	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
23	400kV	Ataur(UP)-Noida Sec 123(UP)	1	D/C	19	UPPTCL	UPPTCL	UPPTCL	Quad Moose (LILO portion Twin HTLS)	LILO of 400 KV ATAUR-INDIRAPURAM CKT-II at 400 KV NOIDA SECTOR 123	Not Available	
24	400kV	Indirapuram(UP)-Noida Sec 123(UP)	1	D/C	17	UPPTCL	UPPTCL	UPPTCL	Quad Moose (LILO portion Twin HTLS)		Not Available	
25	400kV	Azamgarh-Mau	1	S/C	48	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Partial (79%)	
26	400kV	Azamgarh-Tanda	1	D/C	153	UPPTCL	UPPTCL	NTPC	Twin Moose		Not Available	
27	400kV	Badaun-Sambhal	1	D/C	77	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
28	400kV	Badaun-Sambhal	2	D/C	77	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
29	400kV	Banda-Orai	1	D/C	108	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	

30	400kV	Banda-Orai	2	D/C	108	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
31	400kV	Banda-Rewa road	1	D/C	177	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
32	400kV	Banda-Rewa road	2	D/C	177	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
33	400kV	Bara-Meja	1	D/C	32	UPPTCL	UPPTCL	MUNPL	Quad Moose		LILO of 400kV Bara-Rewa road D/C at Meja	
34	400kV	Bara-Meja	2	D/C	32	UPPTCL	UPPTCL	MUNPL	Quad Moose			
35	400kV	Bareilly UP-Unnao	1	D/C	271	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Partial (15%)	*Series Compensated line (45%)
36	400kV	Bareilly UP-Unnao	2	D/C	271	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Partial (15%)	*Series Compensated line (45%)
37	400kV	Gorakhpur UP-Azamgarh	1	S/C	90	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Partial (76%)	
38	400kV	Gr. Noida(765)-Sector 148	1	D/C	47	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
39	400kV	Gr. Noida(765)-Sector 148	2	D/C	47	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
40	400kV	Gr. Noida-Gr. Noida (765)	1	D/C	45	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
41	400kV	Gr. Noida-Gr. Noida (765)	2	D/C	45	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
42	400kV	Gr.Noida-Sikandrabad	1	D/C	17	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
43	400kV	Gr.Noida-Sikandrabad	2	D/C	17	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
44	400kV	Hapur-Dasna	1	D/C	14	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
45	400kV	Hapur-Dasna	2	D/C	14	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
46	400kV	Hapur-Moradabad	1	S/C	109	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
47	400kV	Hapur-Muradnagar	1	S/C	28	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
48	400kV	Harudaganj-Sikandarabad	1	S/C	115	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
49	400kV	Mainpuri(UP)-Mainpuri(PG)	1	D/C	25	UPPTCL	UPPTCL	POWERGRID	Twin Moose		Not Available	LILO of 400kV Orai-Mainpuri(PG) at Mainpuri(UP)
50	400kV	Mainpuri(UP)-Mainpuri(PG)	2	D/C	26	UPPTCL	UPPTCL	POWERGRID	Twin Moose		Not Available	
51	400kV	Meja-Musauli	1	D/C	65	UPPTCL	MUNPL	UPPTCL	Quad Moose		Not Available	
52	400kV	Meja-Rewa road	1	D/C	45	UPPTCL	MUNPL	UPPTCL	Quad Moose		Not Available	
53	400kV	Muradnagar New- Mathura	1	D/C	246	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura
54	400kV	Muradnagar-Ataur	2	D/C	18	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
55	400kV	Musauli-Rewa road	1	D/C	34	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
56	400kV	Muzaffarnagar-Alakhnanda	1	D/C	189	UPPTCL	UPPTCL	GVKPIL	Twin Moose		Not Available	
57	400kV	Muzaffarnagar-Ataur	1	D/C	121	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
58	400kV	Muzaffarnagar-Vishnuprayag	1	D/C	280	UPPTCL	UPPTCL	JPVL	Twin Moose		Conventional	
59	400kV	Noida Sec 148 - Noida Sec 123	1	D/C	20	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
60	400kV	Noida Sec 148 - Noida Sec 123	2	D/C	20	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
61	400kV	Noida Sec 148-Noida Sec 123	1	D/C	20	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
62	400kV	Noida Sec 148-Noida Sec 123	2	D/C	20	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
63	400kV	Obra-Rewa road	1	S/C	179	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
64	400kV	Obra-Sultanpur	1	S/C	230	UPPTCL	UPRVUNL	UPPTCL	Twin Moose		Conventional	
65	400kV	Obra B - Obra C	1	S/C	1	UPPTCL	UPRVUNL	UPRVUNL	Twin Moose		Not Available	
66	400kV	Orai-Mainpuri(UP)	1	D/C	176	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
67	400kV	Orai-Mainpuri(UP)	2	D/C	176	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
68	400kV	Orai-Paricha	1	D/C	111	UPPTCL	UPPTCL	UPRVUNL	Twin Moose		Not Available	
69	400kV	Orai-Paricha	2	D/C	111	UPPTCL	UPPTCL	UPRVUNL	Twin Moose		Not Available	

70	400kV	Panki-Aligarh	1	S/C	285	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Partial (24%)	
71	400kV	Rewa road -Panki	1	S/C	210	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	LILO of Bara-Panki at 400kV Rewa Road
72	400kV	Rosa-Badaun	1	D/C	85	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
73	400kV	Rosa-Badaun	2	D/C	85	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
74	400kV	Sarnath-Azamgarh	1	S/C	97	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
75	400kV	Lucknow_1(PG)-Mohanlalganj (PGYTL)	1	S/C	58	UPPTCL	POWERGRID	UPPTCL	Twin Moose	LILO of 400kV LUCKNOW(PG)-	Conventional	
76	400kV	Sultanpur(UP)-Mohanlalganj (PGYTL)	1	S/C	133	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Conventional	
77	400kV	Sultanpur-Tanda	1	D/C	103	UPPTCL	UPPTCL	NTPC	Twin Moose		Not Available	
78	400kV	Tanda-Basti	1	D/C	44	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
79	400kV	Tanda-Basti	2	D/C	44	UPPTCL	UPPTCL	UPPTCL	Quad Moose		Not Available	
80	400kV	Mohanlalganj (PGYTL)-Unnao(UP)	1	S/C	104	UPPTCL	UPPTCL	UPPTCL	Twin Moose	LILO of 400 KV SAROJANI	Partial (13%)	Status after LILO?
81	400kV	Lucknow(UP)-Mohanlalganj (PGYTL)	1	S/C	89	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Partial (13%)	
82	400kV	Unnao-Panki	1	S/C	49	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Partial (41%)	
83	400kV	Varanasi-Jaunpur	1	D/C	73	UPPTCL	POWERGRID	UPPTCL	Twin Moose		Not Available	
84	400kV	Varanasi-Jaunpur	2	D/C	73	UPPTCL	POWERGRID	UPPTCL	Twin Moose		Not Available	
85	400kV	Jaunpur (UP)-Obra_B(UP)	1	D/C	177	UPPTCL	UPPTCL	UPPTCL	Twin Moose	After LILO of 400 KV OBRA B- OBRA-C CKT-	Not Available	
86	400kV	Obra_C_TPS(UP)-Jaunpur (UP)	1	D/C	176	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
87	400kV	Sambhal-Rampur	1	D/C	74	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
88	400kV	Sambhal-Rampur	2	D/C	74	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
89	400kV	Simbholi-Meerut_PMSTL	1	D/C	29	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
90	400kV	Simbholi-Meerut_PMSTL	2	D/C	29	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
91	400kV	Simbholi_PMSTL (UP)-Muradnagar_2(UP)	1	D/C	71	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
92	400kV	Simbholi_PMSTL (UP)-Muradnagar_2(UP)	2	D/C	71	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
93	400kV	Panki-Panki_TPS	1	S/C	1	UPPTCL	UPPTCL	UPPTCL	Twin Moose		Not Available	
H. PJFTL												
1	400kV	Firozabad-Jawaharpur	1	D/C	40	PJFTL	PJFTL	UPRVUNL	Quad Moose	Anti-theft charging from Firozabad(PJFTL)	Not Available	
2	400kV	Firozabad-Jawaharpur	2	D/C	40	PJFTL	PJFTL	UPRVUNL	Quad Moose		Not Available	
3	400kV	Agra South-Firozabad PJFTL	1	D/C	79	PJFTL	UPPTCL	PJFTL	Twin Moose	LILO of 400kV Agra South-Agra Fatehabad ckt-2 at Firozabad PJFTL	Not Available	
4	400kV	Agra(Fatehabad)-Firozabad PJFT	1	D/C	79	PJFTL	UPPTCL	PJFTL	Twin Moose		Not Available	
I. GTL												
1	400kV	Kanpur(PG)-Ghatampur_TPS(UP)	1	D/C	49	GTL	POWERGRID	UPPTCL	Twin Moose	Antitheft charging from Kanpur(PG) Upto DEAD	Not Available	
2	400kV	Kanpur(PG)-Ghatampur_TPS(UP)	2	D/C	49	GTL	POWERGRID	UPPTCL	Twin Moose		Not Available	
J. HPPTCL												
1	400kV	Lahal-Chamba	1	D/C	35	HPPTCL	HPPTCL	POWERGRID	Twin Moose		Not Available	
2	400kV	Lahal-Chamba	2	D/C	35	HPPTCL	HPPTCL	POWERGRID	Twin Moose		Not Available	
K. NTPC JV												
1	400kV	Dadri-Loni (Harsh Vihar)	1	D/C	54	NTPC	NTPC	DTL	Twin Moose		Polymer	
2	400kV	Dadri-Loni (Harsh Vihar)	2	D/C	54	NTPC	NTPC	DTL	Twin Moose		Polymer	
L. MTSCL												
1	400kV	Ajmer-Deedwana	1	S/C	110	MTSCL	RRVPNL	MTSCL	Twin Moose		Not Available	
2	400kV	Bikaner-Deedwana	1	S/C	129	MTSCL	RRVPNL	MTSCL	Twin Moose		Conventional	
M. Aravali Transmission Service Company Ltd (ATSCL)												
1	400kV	Alwar-Hindaun	1	S/C	96	ATSCL	ATSL	RRVPNL	Twin Moose		Not Available	Partly owned by Aravali Transmission Services lLtd.
N. BBMB												
1	400kV	Dehar-Rajpura	1	S/C	129	BBMB	BBMB	PSTCL	Twin Morkulla+ LILO portion is of twin moose	Dehar-Bhiwani LILOed at Rajpura	Antifog	LILO of Dehar-Bhiwani at Rajpura
2	400kV	Bhiwani(BBMB)-Rajpura	1	S/C	213	BBMB	BBMB	PSTCL		Dehar-Bhiwani LILOed at Rajpura	Antifog	

3	400kV	Dehar-Panchkula	1	S/C	125	BBMB	BBMB	POWERGRID	Twin Morkulla+ LILO portion is of twin moose	POWERGRID owned LILO portion of 9.034Km	Antifog	LILO of Dehar-Panipat at Panchkula
4	400kV	Panchkula-Panipat	1	S/C	155	BBMB	POWERGRID	BBMB			Antifog	
OTHER DEDICATED LINES												
A. THDC												
1	400kV	Aligarh-Khurja	1	D/C	35	THDC	POWERGRID	THDC	Twin Moose		Not Available	
2	400kV	Aligarh-Khurja	2	D/C	35	THDC	POWERGRID	THDC	Twin Moose		Not Available	
5. 400kV Transmission Line charged at 220kV												
STATE LINES												
A. RRVPNL												
1	400kV charged at 220kV	Dholpur-Hindaun	1	S/C	100	RRVPNL	RRVUNL	RRVPNL	Twin Moose		Conventional	
2	400kV charged at 220kV	Kota-KTPS	1	D/C	7	RRVPNL	POWERGRID	RRVUNL	Twin Moose		Conventional	
3	400kV charged at 220kV	Kota-KTPS	2	D/C	7	RRVPNL	POWERGRID	RRVUNL	Twin Moose		Conventional	

* - Fixed series capacitor (FSC) is owned by POWERGRID

Annexure-IX

PR No.	Intem No	Quantity For NR-UNMS	Quantity For NER-UNMS	Quantity For WR-UNMS	Supply Price (	F&I Price (Rs	Services (Rs.)	Total (Rs.)	Total price for NR-UNMS (Rs.)	Total price for NER-UNMS (Rs.)	Total price for WR-UNMS (Rs.)	Total Price inclusind NR-UNMS, NER-UNMS and WR-UNMS
NEW ITEM	Cloud Based tickecting Solution and outage portal For Seven years	Combined For NR-UNMS, NER-UNMS and WR-UNMS										18887600
7000025231	STATE END (MINIMUM 4X10 GBPS FIBREOPTIC PORTS AND 4X1 GBPS	2	2	2	1468712	0	102449	1571161	3142321	3142321	3142321	6284642
7000025198	WORKSTATION CONSOLE WITH ONE TFT WITH OSAND LICENSE	1	1	1	189181	0	4098	193279	193279	193279	193279	386558
7000025211	Workstation Desk	1	1	1	385726	0	3415	389141	389141	389141	389141	778281
7000025212	Furnitures- Chairs	1	1	1	51391	0	3415	54806	54806	54806	54806	109612
									3779547	3779547	3779547	7559094
											Price of Existing Items	7559094
											Price of NEW Items	18887600
											Total price estimate inculding New Items	26446694
											Percent variation With reste to LOA Price	**2.85 %**

Gaurav Awal {गौरव आवल}

From: Vaibhav Misra <vaibhav.misra@stl.tech>
Sent: Wednesday, September 4, 2024 2:15 PM
To: Anjan Kumar Das {अंजन कुमार दास}; Gaurav Awal {गौरव आवल}
Cc: Vijayanand Choudhury
Subject: Re: Budgetary Proposal for Cloud Based Ticketing Platform Services for PGCIL UNMS Project (NR, NER, ER)
Attachments: 1659_001.pdf

Dear Sir,

With reference to the on going opportunity,
We would like to retender the revised proposal for the additional requirement of Cloud Based Ticketing Platform Services for PGCIL UNMS Project (NR, NER, WR)

Pl ignore the previous shared proposal & PFA the attached revised competitive proposal
Kindly consider this as no-regret price from our side,

Hope you will find it in line with your requirements & competitive as well. Look forward for taking this next level of closure,

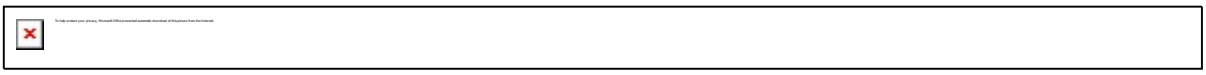
<PS:pl ignore any typo of region mentioned as ER instead of WR>

Rgds,
Vaibhav

On Wed, Aug 21, 2024 at 6:18 PM Vaibhav Misra <vaibhav.misra@stl.tech> wrote:

> Dear Sir,
>
> Greetings !!
>
> We thank you for considering us to share the budgetary proposal for the additional requirement of Cloud Based Ticketing Platform Services for PGCIL UNMS Project (NR, NER, ER)
>
> PFA the attached proposal for the same.
>
> Hope you will find it in line with your requirements & competitive as well. Look forward for taking this next level of closure,
>
> --
>
> **Vaibhav Misra**
> Sales Lead-PSU & Govt Enterprises
>
> Sterlite Technologies Limited

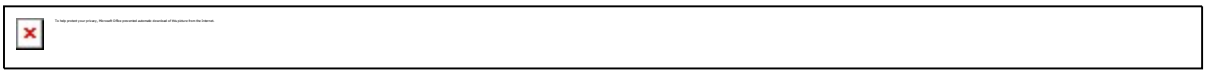
M:+91-96508-72266Capital Cyberscape, 15th & 16th Floor, Sector 59, Gurugram, Haryana – 122102,Delhi - 122001 India



--

Vaibhav Misra
Sales Lead-PSU & Govt Enterprises

Sterlite Technologies Limited
M:+91-96508-72266Capital Cyberscape, 15th & 16th Floor, Sector 59, Gurugram, Haryana – 122102,Delhi - 122001 India



www.stl.tech

To,

Shri Anjan Das

General Manager, GA&C

Power Grid Corporation India Ltd

Dt: 04-09-2024

Sub: Budgetary Proposal for Cloud Based Ticketing Platform Services for PGCIL UNMS Project (NR, NER, WR)

Dear Sir,

We thank you for considering us to share the budgetary proposal for the additional requirement of Cloud Based Ticketing Platform Services for PGCIL UNMS Project (NR, NER, WR)

Summary :

Sr. No.	Item Description	UoM	Quantity	Remarks
1	**Software (Cloud based - SaaS)**			
1.1	Number of ITSM Technicians	Users	15	5 Users / Region
1.2	Number of ITSM User/Requesters	Users	600	200 Users / Region
1.3	Number of Nodes (Interfaces shall get multiplied as per RFP)	Nodes	18,000	6000 Nodes / Region
1.4	EMAIL Notifications (1000/Day - 3 x 300/Day per Region)	Transactions	18,48,000	22 Days/Month * 7 Years
1.5	SMS Notifications (1000/Day - 3 x 300/Day per Region)	Transactions	18,48,000	22 Days/Month * 7 Years
2	**Data Retention (Cloud based - SaaS)**			
2.1	Storage - Data/Log Retention (1 Year)	Set	1	
2.2	Storage - Data/Log Retention (7 Year)	Set	1	
3	**Services ()**			
3.1	One-time implementation, Test & Demonstration in NR, NER & ER	Lumpsum	1	
	Total Value (In numbers)			***1,88,87,600.00***
	Total Value (In words) : *Rupees One Crore Eighty Eight Lakh, Eighty seven thousand six hundred Only.*			

Sterlite Technologies Limited
Capital Cyberspace,15th & 16th Floor, Sectro 59, Gurugram Haryana-122102 | Phone: +91 124 4561850
Registered office: 4th Floor, Godrej Millennium, Koregaon Road 9, STS 12/1, Pune, Maharashtra, India- 411001 India. CIN : L31900PN2000PLC202408

Terms & Conditions: -

-8*5 Support, IST timings

- Unless otherwise agreed in writing by the supplier all invoices are payable within thirty (30) days of the date of invoice, in the currency of the invoice, drawn on a bank based in India or by such other method as is agreed in advance by the Supplier.

- All prices are not inclusive of GST which shall be payable in addition by the Customer at the applicable rate.

- Payment Terms: 100% Advance

- This proposal is under NDA and non-Binding offer

-Any other HW or details other than present scope will attract separate commercials and timelines of delivery

Salient Features

1	SaaS based solution hosted on public Cloud.
2	Incident Management
3	Email to Incident Management
4	Service Asset Management/ CI Management
5	Service Level Management
6	EMAIL Notification
7	Cloud Based Solution

Note: SMS rest API, SMTP Details, Connectivity and HW (if any) will be in customer scope

Hope you will find it in line with your requirements & competitive as well.

For M/S Sterlite Technology Ltd.

STERLITE TECHNOLOGIES LTD

Vaibhav Misra

Sales Lead-PSU & Govt Enterprises

Annexure-X

PR No.	Intem No	Quantity For SR-UNMS	Quantity For ER-UNMS	Supply Price (Rs.)	F&I Price (Rs.)	Services (Rs.)	Total (Rs.)	Total price for SR-UNMS (Rs.)	Total price for ER-UNMS (Rs.)	Total Price inclusind ER-UNMS and SR-UNMS (rs.)
NEW ITEM	Cloud Based tickecting Solution and outage portal For Seven years	Combined For ER-UNMS and ER-UNMS		Estimated Price			19400000	19400000		19400000
7000023882	INTERNAL FIREWALL WITH IDPS FOR STATE END (MINIMUM 4X10 GBPS FIBREOPTIC	2	2	2400000	33600	72000	2505600	5011200	5011200	10022400
7000023880	WORKSTATION CONSOLE WITH ONE TFT WITH OSAND LICENSE	1	1	122654	1717	3680	128051	128051	128051	256102
7000023866	Workstation Desk	1	1	83596	1170	2508	87274	87274	87274	174548
7000023865	Furnitures- Chairs	1	1	9229	129	277	9635	9635	9635	19270
									Price of Existing Items	10472320
									total price estimate of New and existing Items	29872320
									Percent variation with respect to awarded price	3.23 %

Gaurav Awal {गौरव आवल}

From: P.Zainul Abideen <zain@nmsworks.co.in>
Sent: Friday, September 27, 2024 3:46 PM
To: Gaurav Awal {गौरव आवल}
Cc: A.Manickavasagam; Cherian Thomas; Udaya Kumar P; Prakash B Khawas
Subject: PGCIL UNMS: TT - UPDATED price - 27 Sept 2024
Attachments: TT Pricing revised - NMSWorks - 26 Sept 2024 - F.xlsx

Dear Gaurav sir

Please find the pricing for TT and cloud infra including SMS, Email in sheet 1
In Sheet 2 – Infra, cloud, SMS, Email spec is provided
Looking forward to your valuable PO.

Thank you
With Warm Regards
P.ZAINUL ABIDEEN
BUSINESS DEVELOPMENT HEAD – OSS/BSS
+91 98841 96373
NMSWorks Software Pvt. Ltd.
INDIA
www.nmsworks.co.in

27-Sep-24

TROUBLE TICKETING - WEB PORTAL REQUIREMENT											
SL	**SR Contract Schedules**	**Heading**	**Activity Description**	**HSN / SAC Code**	**Applicable HSN / SAC Code**	**Rate of GST**	**Item Description**	**Unit**	**Qty**	**Unit Price - Ex-works - Excluding GST**	**Total Price - Ex-works - Excluding GST**
1	Schdele 1	Plant and Equiment	Supply-Software	85176930	997331	18%	TROUBLE TICKETING SYSTEM (WEB PORTAL), Reporting & Dashboard	EA	1	11,000,000	11,000,000
2	Schdele 2	Transportation, Insurance	Service-Software	NA	NA	18%	Delivery	EA	1	-	-
3	Schdele 3	Installation Charges	Service-Software	998734	998734	18%	Implementation	EA	1	-	-
4	Schdele 4a	Training	Training	998399	998399	18%	Training	EA	1	-	-
5	Schdele 4b	Maintenance	AMC	998716	998313	18%	Software + Cloud Infra - for Year 1	EA	1	1,200,000	1,200,000
6	Schdele 4b	Maintenance	AMC	998716	998313	18%	Software + Cloud Infra - for 6 Years	EA	6	1,200,000	7,200,000
											19,400,000

NMSWorks Software - HW Dimensioning for CygNet Software Modules - Main											
S.No.		Applications	Resource			Storage(GB)			VM	NUMBER OF INSTANCES	
		OSS Modules	Core	VCPUs	RAM	Data Storage	Backup Storage	OS Storage		Main - Active	Total
1	Server 1	CygNet Trouble Ticketing System	4	8	16	100	0	60	VM	1	1
2	Server 2	DB VM with Mariadb	2	4	16	1000	200	60	VM	1	1

S.No	Item
1	Amazon EC2
2	Amazon with EC2 for MariaDB
3	Amazon Virtual Private Cloud
4	Elastic Load Balancing

1	SMS Gateway - 600 SMS per day is assumed for 200 tickets / day
2	SMTP Gateway - 600 mails per day is assumed for 200 tickets / day

Terms

1) Compute Infra on Cloud with SMS, Email feature for handling 200 tickets per day is provided
2) Price changes due to increase in load, if any, will be to the account of PGCIL for AWS, SMS, EMAIL
3) Domain name and SSL certificate shall be taken care and maintained by PGCIL for subdomain of *.unms.in
4) SMS:Message has to be maximum of 160 characters
5) EMAIL: 100KB per Mail

Annexure-XI

सत्यमेव जयते

विजय कुमार सिंह
सदस्य सचिव

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय समिति
Northern Regional Power Committee

अर्ध शासकीय पत्र सं.
D.O. No.
NRPC/SER/310/2024-25/393-395

दिनांक :
Date : 12th August, 2024

Dear Shri Malik Ji,

As you are aware that the Northern Regional Power Committee (NRPC) was constituted vide Government of India's Resolution dated 25.05.2005 and subsequent Amendments dated 29.11.2005 and 09.05.2008. Further, as per Government of India, Ministry of Power's letter dated 23.02.2006, the activities of RPCs are to be fully financed by the constituent members (copy enclosed). For this purpose, NRPC constituent members are required to pay annual contribution as decided in NRPC meetings from time to time.

2. In 72nd NRPC meeting held on 30.03.2024 at Lucknow, NRPC members agreed to contribute a sum of Rs.12 lakhs per member as annual contribution towards NRPC Secretariat for FY 2024-25. It was also decided that if the payment is delayed beyond 30.06.2024, simple interest @ 1% per month has to be levied on late payment.

3. In this regard, I would like to refer a Demand Letter CEA-GO-17-16(68)/7/2024-NRPC dated 10.04.2024 (copy enclosed) sent by NRPC office through which contribution amount of Rs.12 lakhs for FY 2024-25 was sought from UT of Ladakh. Subsequently, a reminder vide letter No.NRPC/AS/NRPC Fund/2024-25/333 dated 05.07.2024 was also sent from NRPC Secretariat (copy enclosed). But contribution amount has not been received in NRPC fund till date. Due to delay in payment, the contribution amount has been revised to Rs.12,24,000/- (including late payment charges up to August, 2024) for FY 2024-25. To avoid further levy of penalty charges, the process of clearance of contribution amount has to be expedite. The payment could be made through Demand Draft drawn in favour of "NRPC Fund" or through RTGS in the Bank account named "NRPC Fund" (A/c No. 3083000105096078 RTGS/NEFT Code: PUNB0308300).

4. I request you to please look into the matter and issue directions to the concerned officers to take necessary action to expedite the payment of aforementioned contribution amount at the earliest for smooth functioning of NRPC Secretariat.

Yours sincerely,

12/08/2024

(Vijay Kumar Singh)

Shri Vikram Singh Malik, IAS
Administrative Secretary, PDD
Civil Secretariat Leh,
UT of Ladakh

Copy to: 1. Chief Engineer (R&R), Ministry of Power, New Delhi
2. Chief Engineer, PDD, Choglamsar, Leh, UT of Ladakh

Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi-110001
Telephone No. 23715507; FAX NO. 23717519

Date: February 23, 2006

To
The Chairperson
Central Electricity Authority,
Sewa Bhawan, R.K.Puram,
New Delhi.

(Attention: Shri Ajit Singh, Under Secretary)

Subject: **Establishment of Regional Power Committees under the provisions of the Electricity Act, 2003 - matter regarding.**

Sir,

I am directed to refer to your letter No. 1/2/2005-PP (CEA), dated 13.07.2005 on the subject mentioned above and to say that consequent on setting up of Regional Power Committees (RPCs) under the aegis of the Electricity Act,2003 in place of the erstwhile Regional Electricity Boards, the matter relating to administrative and financial set up of the RPCs has been considered by the Ministry in consultation with the Central Electricity Authority and the Internal Finance Wing of the Ministry.

2. The President is pleased to declare the Member Secretaries of the Regional Power Committees (RPCs) as 'Head of Department' under SR 2(10) of the Fundamental & Supplementary Rules. They shall exercise all the powers of Heads of Department under General Financial Rules,1963, subject to the observance of instructions and restrictions contained in the Delegation of Financial Power Rules, 1978 and such other Rules and Orders issued by the Central Government from time to time applicable to 'Head of Departments'.

3. Further, with the approval of the Competent Authority in the Ministry of Power, it has been decided that, henceforth, the functioning of the RPCs shall be regulated as per the following arrangement

(a) Member Secretaries of the Regional Power Committees (RPCs) will be under the administrative and financial control of the Chairman of the respective Regional Power Committee (RPCs) for all matters including sanction of leave, tour etc. of the Member Secretary.

(b) The Annual confidential Report of the Member Secretaries of the Regional Power Committees (RPCs) shall be initiated by the respective Chairman of the Regional Power Committee (RPCs) and shall be reviewed by the Chairperson, Central Electricity Authority.

(c) The activities of the Regional Power Committees (RPCs) will be fully financed by the constituent Members with effect from 01.04.2006 and the Central Electricity Authority will take immediate steps in this regard.

(d) The manpower for the Secretariat of the Regional Power Committees (RPCs) shall continue to be provided by the Central Electricity Authority.

4. This issues with the concurrence of the Internal Finance Wing vide their diary No. 7657/JSFA06, dated 16.02.2006.

Yours faithfully,
Sd/-
(R.C.Arora)
Under Secretary to the Government of India
Tel No. 2371-9637

Copy to:

1. Member Secretary of All Regional Power Committees
2. Controller of Accounts, Ministry of Power.
3. Secretary, CEA/US(Vig),CEA
4. Director (R & R)/ US(Trans),Ministry of Power.
5. Finance/Budget/ V & S Desk, Ministry of Power.

Sd/-
(R.C.Arora)
Under Secretary to the Government of India
Tel No. 2371-9637

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

DEMAND LETTER

No. NRPC /AS/NRPC Fund/2024-25 Date: 10.04.2024

To,
Chief Engineer,
Office of Chief Engineer,
PDD, Choglamsar, Leh
UT of Ladakh

Subject: Contribution towards NRPC Fund for the year 2024-25 by the Constituents-regarding.

Sir,

As you are aware that activities of RPCs are financed by their constituent members in compliance with MoP direction vide letter no. A-60016/59/2005 Adm-I dtd. 23.02.2006.

Kind reference is invited to decisions of the 72nd meeting of NRPC held on 30.03.2024 at Lucknow, wherein NRPC members agreed to contribute a sum of Rs.12 Lakh per member as contribution towards annual expenditure of NRPC secretariat for F.Y. 2024-25. It was also decided that the amount shall be deposited in NRPC fund by 30.06.2024. It was agreed that late payment i.e payment after due date of 30.06.2024 would attract simple interest @ 1% per month (payment made during month would also invite 1% interest).

Accordingly, being member of NRPC forum for FY 2024-25, you are requested to make above payment of Rs.12 lakh before 30.06.2024 positively.

Payment can be made via Demand Draft in favour of "NRPC Fund". The contribution can also be deposited in any CBS branch of Punjab National Bank or through RTGS in the account named "NRPC Fund" (A/c No. 3083000105096078) under intimation to us. The IFS Code is PUNB0308300.

It is requested to kindly make above payment and send confirmation mail at ms-nrpc@nic.in after making due payment along with receipt at the earliest.

This issues with approval of Member Secretary, NRPC.

Priyanka 10/04/2024

(प्रियंका पटेल)
(Priyanka Patel)
नोडल ऑफिसर-एन आर पी सी फण्ड
Nodal Officer NRPC Fund

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

REMINDER-I

DEMAND LETTER

No. NRPC /AS/NRPC Fund/2024-25/333 Date: 5.07.2024

To,
Chief Engineer,
Office of Chief Engineer,
PDD, Choglamsar, Leh
UT of Ladakh

Subject: Contribution towards NRPC Fund for the year 2024-25 by the Constituents- regarding.

Sir,

This has reference to NRPC letter Ref. CEA-GO-17-16(68)/7/2024-NRPC dated 10.04.2024 wherein contribution of sum of Rs, 12 lakh was sought for meeting annual expenditure of NRPC secretariate for FY 2024-25. It was also mentioned that beyond 30th June, 1 % simple interest shall be levied on the contribution amount.

In this regard, it is informed that contribution amount has not been received from your organisation till date. In view of late payment, the contribution amount of Rs 12 lakh for has been revised to Rs 12.12 lakhs (Rupees Twelve Lakhs Twelve Thousand Only). To avoid further levy of penalty charges, it is requested to expedite the process for clearance of aforementioned contribution amount.

Payment can be made via Demand Draft in favour of "NRPC Fund". The contribution can also be deposited in any CBS branch of Punjab National Bank or through RTGS in the account named "NRPC Fund" (A/c No. 3083000105096078) under intimation to us. The IFS Code is PUNB0308300.

It is requested to kindly make above payment and send confirmation mail at ms-nrpc@nic.in after making due payment along with receipt at the earliest.

This issues with approval of Member Secretary, NRPC.

Priyanka 5/07/24
(प्रियंका पटेल)
(Priyanka Patel)
नोडल ऑफिसर-एन आर पी सी फण्ड
Nodal Officer NRPC Fund

Annexure-XII

सत्यमेव जयते

भारत सरकार/Government of India
विद्युत मंत्रालय/Ministry of Power
केन्द्रीय विद्युत प्राधिकरण/Central Electricity Authority
एन.पी.सी. प्रभाग/National Power Committee Division
Ist Floor, Wing-5 ,West Block-II, RK Puram, New Delhi-66

No. CEA-GO-15-14/1/2021-NPC Division/256 Date: 02.09.2024

To
(As per distribution list)

विषय: दिनांक 07.08.2024 को अध्यक्ष, सीईए द्वारा आयोजित आरपीसी की समीक्षा बैठक के कार्यवृत्त के संबंध में।
Subject: Minutes of Review meeting of RPCs by Chairperson, CEA held on 07.08.2024-reg.

कृपया, दिनांक 07.08.2024 को अध्यक्ष, सीईए द्वारा आयोजित आरपीसी की समीक्षा बैठक का कार्यवृत्त आपकी जानकारी और आवश्यक कार्रवाई के लिए संलग्न है।

The Minutes of the Review meeting of RPCs by Chairperson, CEA held on 07.08.2024 is enclosed herewith for your kind information and necessary action, please.

भवदीय/Yours faithfully

Encl: As above

02/09/2024.

(ऋषिका शरण/Rishika Sharan)
मुख्य अभियन्ता एवं सदस्य सचिव,रा.वि.स /
Chief Engineer & Member Secretary, NPC

Distribution List:-

1. Shri V.K.Singh, Member Secretary, NRPC, 18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110066.[Email: ms-nrpc@nic.in]
2. Shri N.S. Mondal, Member Secretary, ERPC,14,Golf Club Road, ERPC Building, Tollygunje,Kolkata-700033. [Email: mserpc-power@nic.in]
3. Shri Asit Singh, Member Secretary, SRPC, No.29, Race Course Cross Road, Bengaluru-560009. [Email: mssrpc-ka@nic.in]
4. Shri Deepak Kumar, Member Secretary, WRPC, Plot No- F-3, MIDC Area, Marol, Opp. SEEPZ, Central Road, Andheri (East), Mumbai-40093.[email: ms-wrpc@nic.in]
5. Shri K B Jagtap, Member Secretary, NERPC, NERPC Complex, Dong Parmaw, Lapalang, Shillong-793006. [Email: ms-nerpc@gov.in]

Copy for kind information to:-

1. SA to Chairperson, CEA, New Delhi
2. SA to Member(Go&D).CEA, New Delhi
3. Chief Engineer, PCD Division, CEA
4. Chief Engineer , IRP Division, CEA
5. Chief Engineer , GM Division, CEA
6. Secretary, CEA
7. Director (Admin), CEA

******

Minutes of Review Meeting of RPCs/NPC taken by Chairperson, CEA on 07.08.2024

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

Chairperson, CEA welcome all the participants to the Review Meeting of RPCs/NPC. Member Secretary, NRPC presented the Agenda items and the deliberations held thereon are outlined hereunder.

1. **Unified Accounting Software for RPCs:**

The implementation of software was last deliberated in 14th NPC meeting held on 3rd February 2024 wherein it was decided that EPRC will be the nodal RPC for implementation of the Unified Accounting Software (UAS) for RPCs with NTPC and some States to be included in the sub-committee for the purpose.

Following deliberations were held:

(a) MS, NRPC apprised that due to transfer of concerned executives from ERPC, the progress of work for UAS is slow and requested that NPC or any other RPC may be made nodal RPC for timely implementation of this project.

Accordingly, he suggested that NRPC is willing to take lead and finalise Unified Accounting Software for RPCs in a timely manner.

(b) MS, SRPC opined that current stage of project does not warrant for additional members from States/NTPC/Grid India as decided in the NPC meeting.

MS, NPC agreed to the views of SRPC that for timely implementation of Unified Accounting Software for RPCs, joint-committee of UAS may be concise.

Decision taken:

a. NPRC shall be nodal RPC for implementation of the UAS.
b. DPR, NIT and other documents related to tendering shall be prepared in-house by the Joint Committee.
c. The structure of Joint Committee shall be kept concise and the Joint Committee shall be reconstituted accordingly.

[Action: NRPC/NPC]

2. **Integration of RE Entities and challenges:**

The number of Renewable Energy (RE) entities is increasing, leading to a corresponding rise in challenges. These challenges include operational, commercial, protection, and communication issues. Since these entities are not members of RPCs, ensuring compliance with Regulations and Rules has become increasingly difficult such as:

i. Adequate reactive power compensation

ii. Compliance of HVRT/LVRT.
iii. Protection performances indices reporting
iv. Approval of protection settings
v. Action in case of non-compliance

Following deliberations were held:

(a) MS, NRPC informed that they have formed a separate sub-group for RE generators after getting approval in NRPC forum. He further informed that the 1st meeting has been held successfully and quarterly meeting is being scheduled.
(b) MS, SRPC informed about holding special meetings with RE Developers, RE Parks & SRLDC to get the issues resolved and to ensure compliance. He further informed that fund is required for holding separate sub-committee meetings for RE generators.
(c) Chairperson, CEA suggested that due to high penetration of RE in the Grid, their issues may also be discussed and resolved at RPC level. SECI, Solar and Wind Association, State RE Generators of capacity 250 MW & above and all regional RE generators may also be member of the sub-committee.

Decision taken:

a. RE generators having more than 1000 MW cumulative capacity shall be taken as permanent member of RPCs as per MoP's Resolution dated 3rd Dec 2021. These RE generators shall pay membership fee and attend all meetings for resolution of their issues in RPC forum.

[Action: All RPCs]

b. All RPCs shall form a sub-committee to discuss the issues of RE generators and the sub-committee which shall meet at least once in a quarter. SECI, Solar and Wind Association, State RE Generators of capacity 250 MW & above and regional RE generators shall be made member of the sub-committee. This shall be communicated by NPC Division through formal letter to all RPCs.

[Action: All RPCs/NPC]

c. The fees/contribution amount for non-RPC member participants of the RE subcommittee may be decided by the respective RPC forum.

[Action: All RPCs]

3. **Issues Related to Sharing of OPGW by Transmission Utilities**

A Committee was constituted to formulate 'Comprehensive Guidelines for Usage and Sharing of Optical Ground Wire (OPGW) of Power System Application' under

Chairmanship of Member (PS), CEA. The Terms of Reference of the Committee covers 'Sharing of OPGW laid on the ISTS lines as well as Intra-State lines'.

Various issues have been observed in sharing of OPGW fibers on ISTS as well as non-ISTS lines among utilities across all regions. CEA was requested to expedite the finalisation of guidelines at the earliest.

Decision taken:

Chairperson, CEA, directed that the Committee meeting be held at the earliest and the guidelines be finalized.

[Action: PCD Division, CEA]

4. **Implementation of Single Administrative Unit in RPCs**

Following deliberations were held:

(a) ERPC:

A meeting was held between ERPC, RIO (E) & RPSO (E), to discuss the modalities for implementation of the proposed scheme of single administrative unit at ERPC. The following issues were identified, which needs to be addressed at CEA HQ level for smooth implementation of the scheme:

i. Approval from Competent authority is required for shifting of DDO of RPSO & RIO to DDO of ERPC so that a common DDO will function for all three offices. **Necessary direction from CEA to PAO is required for shifting/merging of DDOs of RPSO & RIO with DDO of ERPC.**
ii. At present the individual office has its own PD (Program Division). Role of PD in PFMS has not been defined in the scheme proposed by CEA. The same may be defined.
iii. ERPC, RIO & RPSO are having their own maker and DDO login credentials for PFMS. To implement the scheme, the maker and DDO of three offices need to be unified in PFMS and shall be under DDO of ERPC.
iv. Till the matter of PFMS workflow gets confirmed, verification and processing of the bills in physical form would be carried out by Single Administrative Unit of ERPC w.e.f. 01.08.2024. The scheme will be fully implemented once the PFMS related issues are resolved.

(b) NERPC

i. No designated account processing officer in NERPC (e.g., accountant).
ii. Inadequate strength of Upper Division Clerks (UDC) and Lower Division Clerks (LDC) in NERPC.
iii. However, NERPC will form single administrative unit with existing DDO and administrative staff of NERPC/RIO (NE).

(c) NRPC:

As decided in previous meeting, single administrative unit is not useful in case of NRPC as the other sub-ordinate offices are functioning in Sewa Bhawan.

(d) SRPC:

As decided in previous meeting, single administrative unit is not useful in case of SRPC as sub-ordinate offices in Southern Region are at scattered locations.

(e) WRPC:

Implementation is under process.

Decision taken:

i. ERPC shall start implementation through existing login-IDs of sub-ordinate offices. Same person may use all login-IDs of DDOs/PD of all sub-ordinate offices in ER.
ii. NRPC is not required to implement Single Administrative Unit.
iii. SRPC will implement the Single Administrative Unit once all the sub-ordinate offices are functional at single location.
iv. Manpower issue shall be taken up separately.

[Action: All RPCs]

5. **Certification of Availability for Non-ISTS lines carrying ISTS power**

In this regard, a meeting was chaired by Chairperson, CEA on 31.07.2024 and following was decided:

i. NPC Division to take lead for formation of procedure for certification.
ii. Standing Committee shall be formed for Certification of cases.

NPC Division apprised that draft guidelines have been circulated for comments of RPCs.

Decision taken:

NPC Secretariat may expedite the finalization of guidelines and constitution of Standing Committee.

[Action: NPC Secretariat]

6. **Need for Demand Forecasting Software**

MS, NERPC appraised that Demand Forecasting Software in RPCs shall be useful for following:

i. Accurate Demand Projections: Ensures precise forecasting of power demand to meet future requirements.

ii. Resource Adequacy: Facilitates planning to ensure sufficient generation resources are available to meet projected demand.
iii. Operational Planning: Assists in preparing Short-term Distribution Resource Adequacy Plans (ST-DRAP) for efficient operational planning at the state level.
iv. Avoiding Shortfalls: Helps in identifying potential shortfalls in resource availability, enabling timely procurement and generation adjustments.
v. Aggregation and Reporting: Enables SLDCs and RLDCs to aggregate and submit demand forecasts at state, regional, and national levels, facilitating coordinated planning and resource optimization.
vi. Forecasting Errors Analysis: Assists in calculating and publishing forecasting errors, enhancing the accuracy of future demand estimations.

Decision taken:
Demand forecasting and Resource Adequacy is being taken up by IRP Division, CEA. Officers of IRP Division may be stationed in all RPCs once software procurement is completed.

[Action: IRP Division and CEA Admin.]

7. **Manpower requirements in RPCs:**

Manpower shortage was highlighted by all RPCs. It was apprised that due to various new tasks assigned under CEA & CERC regulations, 7 verticals (5 Technical & 2 Administration) are minimum requirement.

Technical Vertical:

i. Operation
ii. Commercial
iii. Protection
iv. Communication & Cyber Security
v. Renewable

Administration Vertical:

i. General Administration & Services
ii. Finance

Vacancy Position (as on 07.08.2024) at DD/AD level was highlighted as below:

SN	RPC	DD			AD-I/II (Combined)		
		Sanctioned	Filled	Vacant	Sanctioned	Filled	Vacant
1	NRPC	6	4	2	8	4	4
2	ERPC	6	4*	2	8	5	3**
3	WRPC	6	4	2	8	4	4
4	SRPC	6	5	1	8	5	3

5	NERPC	4	2	2***	6	4	2@

*Out of existing 4 officers:

- Sh. Manjunatha M is out of office since Feb-24. Initially, he was on leave till April-24 and thereafter he has not reported for duty till date.
- Sh Pratham Kumar was relieved from CEA on 10.05.24 and joined ERPC on 22.07.24. Now he is on leave.
- Sh Anup Das has been included in the list of second batch of hands-on-exposure/field training on deputation basis which would be starting from 02nd Sep' 2024.

** Ms Swati, AD has been posted recently by CEA but has not joined yet. After her joining, vacancy shall remain 2.

***One Deputy Director excluded who is on study leave from 01.08.2024 to 31.07.2026.

- @One AD Shri D K Singh has been included in the list of second batch of hands-on-exposure/field training on deputation basis which would be starting from 02nd Sep' 2024.

ERPC submitted that the manpower requirement of various RPCs may differ depending on the volume of work. However in respect of ERPC, the optimum numbers of various officers would be as follows: Director: 3, Deputy Director: 8 (50 % of the DDs shall be having more than 3 years of experience as DD), AD-I/AD-II: 14

Decision taken:

ADs of upcoming new batch shall first be posted in RPCs. The post of DDs shall also be filled on priority basis.

[Action: CEA Admin]

8. **CAG audit para for License fee of NRPC Quarters occupied by CEA employees**

CAG audit has suggested for deposition of licensee fee and water charges in NRPC Fund as maintenance is done by RPC Fund.

A letter dated 09.01.2024 was sent to CEA on this issue and matter was discussed with DD (Budget). Accordingly, from August 2024, CEA will deposit licensee fee and water charges in NRPC Fund through PFMS.
However, action for previous amount which has been credited to GPRA pool may be taken.

Decision taken:

CEA shall deposit licensee fee and water charges in NRPC Fund regularly.

[Action: CEA Admin]

9. **Reclassification of quarters at ERPC Residential Complex as per plinth area specified for different categories of Govt employee**

Issues in ERPC:

i. The plinth area of existing quarters is way less than the existing criteria prescribed by CPWD:

SL No	Type of Quarter	Plinth area of existing quarters (in sq.m.)	Plinth area as per latest CPWD norm (in sq.m.)
1	B	35.04	49.5(Type-I)
2	C	41.70	75(Type-II)
3	D	79.37	110Type-IV)
4	E	127.14	161.50(Type-V)

ii. As per present norms, the type B quarters are not eligible for allotment. Also Type-III are not available in the existing quarters.

iii. Some of the officials staying in ERPC Residential Complex have submitted application for allotment of quarters as per the plinth area specified by MoH & UA.

Proposal:

i. Reclassification of the existing staff quarters in line with the prescribed norms as per the OM dated 23.01.2024 of Ministry of Housing & Urban Affairs by amalgamation of existing quarters. No major structural modification is required. Amalgamation of quarter is possible with minor modifications.

Decision taken:

ERPC may do such changes with the approval of ERPC Forum and any other relevant Government bodies like CPWD, if required.

[Action: ERPC]

10. **Need of amendment in quarter allotment rules of NRPC**

MS, NRPC appraised that NRPC Quarter allotment rules were formulated in 1990. It is proposed to amend the quarter allotment rules to align it with GPRA rules.

Decision taken:

NRPC may propose amendment in rules and send the same to CEA for approval.

[Action: NRPC]

11. **Office Redevelopment Plan of WRPC**

MS, WRPC apprised the status of redevelopment Plan of WRPC.

i. Transit office:

- Tender has been floated by CPWD (Estimated Cost: 2.75 Cr, Schedule: Six months)

ii. New Building

- Soil testing done by CPWD in June 2024.
- Survey work for evaluating residual value of the building material is going on.

Decision taken:

WRPC is advised to complete the project in time.

[Action: WRPC]

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Annexure-I

List of Participants in the Review Meeting of RPCs/NPC held on 07.08.2024

CEA:

1. Sh. Ghanshyam Prasad, Chairperson
2. Smt. Rishika Sharan, CE, NPC Division/ MS, NPC
3. Sh. B. Lee Lyngkhoi, CE, GM Division
4. Sh. Satyendra Kumar Dotan, Director, NPC Division
5. Sh. Sandeep Kumar, DD, GM Division
6. Sh. Ravi Shankar, DD, NPC Division
7. Sh. Shishir Pradhan, DD, NPC Division

NRPC:

1. Sh. V K Singh, MS
2. Sh. D K Meena, SE (P)
3. Sh. Reeturaj Pandey, AS
4. Sh. Praveen Jangra, EE (C)

ERPC:

1. Sh. N S Mondal, MS
2. Sh. Pranay Piyush Jena, AS

WRPC:

1. Sh. Deepak Kumar, MS

SRPC:

1. Sh. Asit Singh, MS

NERPC:

1. Sh. Kishore Jagtap, MS

****

NORTHERN REGIONAL POWER COMMITTEE
KATWARIA SARAI, NEW DELHI

CONDUCT OF BUSINESS
Rules, 2024

~~August~~ October 2024

Contents

CHAPTER-I: GENERAL

1. Short title and commencement

1.1 Government of India, under the provision of Section 2, Subsection 55 of the Electricity Act 2003 vide resolution F.No. 23/21/2021-R&R dated 3rd December 2021 (copy enclosed) published in the Gazette of India has established the Northern Regional Power Committee herein after referred to as NRPC comprising of states of Delhi, Haryana, Himachal Pradesh, Punjab, Rajasthan, Uttaranchal and Uttar Pradesh and the Union Territories of Chandigarh, Jammu & Kashmir and Ladakh.

1.2 As per the clause-9 of the aforesaid resolution dated 3rd December 2021, the NRPC hereby makes the following rules which may be called "The Northern Regional Power Committee (Conduct of Business) Rules, 2024".

1.3 These rules shall come into force from the date of its approval by the NRPC and shall remain in force unless otherwise modified.

2. Definitions

2.1. In these Rules unless the context otherwise requires:

(a) 'Act' means the Electricity Act, 2003.

(b) 'Agenda' means the list of business proposed to be transacted at a meeting of the Committee or Sub-Committee.

(c) 'Authority' means Central Electricity Authority.

(d) 'Commercial Sub-Committee (CSC)' means a sub-committee constituted by the Committee to consider commercial related issues.

(e) 'Commission' means Central Electricity Regulatory Commission.

(f) 'Committee' means the Northern Regional Power Committee constituted by the Central Government under Sub-Section (55) of Section 2 of the Electricity Act, 2003.

(g) 'Government Resolution' means resolution No. 23/21/2021-R&R dated 3rd December 2021, notified by Government of India and amendment(s) thereon.

(h) 'IEGC' means the Indian Electricity Grid Code, specified by Central Electricity Regulatory Commission.

(i) LGBR Sub-Committee means a sub-committee constituted by the committee to -

i. finalise annual outage plan of generating stations

ii. prepare anticipated power supply position for next fiscal and

iii. for periodic review of (i) & (ii).

(j) ‘Meeting’ means a meeting of the committee / sub-committee convened by the Member Secretary, NRPC Secretariat or any member authorized to convene a meeting in the absence of the head of Secretariat.

(k) ‘Member’ means the member of the as per Resolution of the Government of India on establishment of NRPC dated 3rd December 2021 and as amended from time to time.

(l) ‘NLDC’ means National Load Despatch Centre.

(m) ‘NRLDC’ means Northern Regional Load Despatch Centre

(n) ‘Operational Coordination Sub-Committee (OCC)’ means a sub-committee constituted by the NRPC to consider all issues related to operation of the regional grid.

(o) ‘Protection Sub-Committee (PSC)’ means a sub-committee constituted by the Committee to consider all power system protection related issues.

(p) ‘Renewable Energy Sub-Committee (REC)’ means a sub-committee constituted by the Committee to consider all Renewable Energy related issues.

(q) ‘Rule’ means Northern Regional Power Committee (Conduct of Business) Rules as amended.

(r) ‘SLDC’ means State Load Despatch Centre.

(s) ‘Sub-Committee’ means the Sub-Committees constituted by NRPC to guide and assist it in conducting the functions assigned to it.

(t) ‘System study Sub-Committee’ means a sub-committee constituted by NRPC to carry out the Power System studies.

(u) ‘Technical Coordination Sub-Committee (TCC)’ means a sub-committee constituted by the NRPC to assist the NRPC on all technical, commercial and other matters.

(v) ‘TeST Sub-Committee’ means a sub-committee constituted by the NRPC to assist the NRPC on all Telecommunication, SCADA & Telemetry related issues.

(w) ‘Year’ means Financial Year.

2.2. The words and expressions used and not defined in these Rules shall be construed as having the same meaning as defined in the Act.

2.3. Reference to any Acts, Rules and Regulations shall include amendments or consolidation or re-enactment thereof.

3. Functions of NRPC

3.1. The committee shall carry out following functions:

3.1.1 To undertake Regional Level operation analysis for improving grid performance.

3.1.2 To facilitate inter-state/inter-regional transfer of power.

3.1.3 To facilitate all functions of planning relating to inter-state/ intra-state transmission system with CTU/STU.

3.1.4 To provide views on the inter-state transmission system planned by CTU within 45 days of receipt of the proposal by the concerned NRPC. The views of NRPC will be considered by National Committee on Transmission for sending their recommendation to Ministry of Power for approval of new inter-state transmission system.

3.1.5 To coordinate planning & maintenance of generating machines of various generating companies of the region including those of inter-state generating companies supplying electricity to the Region on an annual basis and also to undertake review of maintenance programme on a monthly basis.

3.1.6 To undertake planning of outage of transmission system on a monthly basis.

3.1.7 To undertake operational planning studies including protection studies for stable operation of the grid.

3.1.8 To undertake planning for maintaining proper voltages through review of reactive compensation requirement through system study committee and monitoring of installed capacitors.

3.1.9 To evolve consensus on all issues relating to economy and efficiency in the operation of power system in the region.

4. Secretariat of NRPC

4.1. Secretariat, NRPC shall perform the following duties namely;

4.1.1. Keep custody of records of proceedings of the Committee, sub-committees, task force and working groups of the NRPC.

4.1.2. Prepare agenda for the Committee and Sub-Committee meetings.

4.1.3. Prepare minutes of Committee and Sub-Committee meetings.

4.1.4. Take follow-up action on the decision taken in the Committee & Sub-Committee meetings.

4.1.5. Maintain archive of data and information pertaining to commercial accounts, operating parameters, protection system and communication system of the regional power system.

4.1.6. Collect from constituent members or other offices, companies, firms or any other party as may be considered useful for the efficient discharge of functions of NRPC under the Resolution and place the information before the Committee and its sub-committees.

4.1.7. Certification of open cycle generation carried out by central sector gas-based stations.

4.2. The duties and responsibility envisaged under Indian Electricity Grid Code (IEGC) Regulations made by CERC, NRPC Resolution and NRPC from time to time shall be carried out by the NRPC Secretariat.

4.3. In line with the provisions of IEGC the details of functions are given below:

4.3.1. The Member Secretary, NRPC shall investigate and endeavour to resolve the grievance regarding unfair practices, delays, discrimination, lack of information, supply of wrong information or any other matter related to open access in inter-state transmission system.

4.3.2. The Member Secretary, NRPC shall, for the purpose of payment of transmission charges/ capacity charges and incentives, certify:

(i) Availability of Regional AC system and outage hours of HVDC transmission system.

(ii) Availability and Plant Load Factor for ISGS.

4.3.3. Member Secretary, NRPC, shall verify and take up the matter regarding persistent non-compliance of IEGC with the defaulting agency for expeditious termination of the non-compliance. NRPC Secretariat shall maintain appropriate records of such violation.

4.3.4. NRPC Secretariat is to carry out periodic inspection of Under Frequency Relays installed by the constituents and investigate cases of non-operation of such relays at set frequency in actual system operation.

4.3.5. The NRPC Secretariat shall review on monthly basis the Annual outage plan prepared by CEA in consultation with all parties concerned.

4.3.6. The NRPC Secretariat shall be responsible for analyzing the outage schedule given by all Regional Constituents, preparing a draft annual outage schedule and finalization of the annual outage plan for the following financial year by 31st December of each year.

4.3.7. Any other responsibilities assigned by CERC/ CEA Regulations/ NRPC Resolution shall also be carried out by secretariat.

4.4. **Human Resources**

4.4.1. Officers and staff to man the Secretariat shall be provided by CEA. As and when CEA is unable to provide requisite number of Group “C” or “D” officials, the vacant posts shall be got outsourced through competitive bidding route for a period up to two (2) years or until CEA provides the manpower. Their remuneration shall be within the ambit of “Minimum Wages Act, 1948”.

4.4.2. Member Secretary is also empowered to appoint personnel in case of shortage of staff at other levels on secondment basis.

4.4.3. For discharging the functions other than those assigned by the Resolution, NRPC may hire adequate number of persons, experts or consultants.

4.4.4. For the purpose of handling NRPC fund, Member Secretary shall appoint one nodal officer from the constituents of NRPC on secondment basis. In the absence of nodal officer from NRPC constituent, MS, NRPC can temporarily appoint one officer of NRPC Secretariat to handle NRPC fund.

4.5. **Contribution towards NRPC Fund**

4.5.1. An NRPC fund shall be maintained from contributions from members of NRPC for a particular year. A nodal officer shall be appointed as per clause 4.4.4. for the purpose of handling this fund.

4.5.2. The constituents shall deposit their contributions towards NRPC fund, based on the figures approved in the first NRPC meeting held in that financial year. The fund shall be utilized for reimbursement of budgetary allocation from Government of India, expenditure for conducting various meetings/training programs, expenditure for maintenance of NRPC Secretariat, hiring of additional staff/consultants, or any other expenditure as approved by the NRPC forum. Any surplus/ deficits of a particular year shall be adjusted in the subsequent financial year.

4.5.3. All the member constituents of NRPC except CEA, NLDC, NRLDC and CTU shall equally share the expenditure of NRPC Secretariat.

4.5.4. Audit shall be done as per SOP issued by Central Electricity Authority and reports for the same shall be placed before NRPC forum.

5. Furnishing of data / information to Secretariat of RPC

5.1. NRLDC and the constituents of the region shall make available all data / information required by the Secretariat to discharge its functions or to carry out any other responsibility / function assigned to it by the Authority / Commission / Committee. It shall also be responsibility of the constituents to ensure that any data though not specifically asked for by the Secretariat, but which may be required for the specific responsibility / function assigned to the Secretariat is also made available to the secretariat.

5.2. NRLDC shall provide to Member Secretary, NRPC a computer terminal to have a view of all the parameters in real time frame of Northern Regional grid system.

6. Chairperson of NRPC

The Chairperson of NRPC would be appointed as per ‘Government Resolution’.

7. Website of NRPC

The NRPC shall have its own website which shall be maintained by NRPC Secretariat.

CHAPTER-II: PROCEDURE FOR CONDUCTING NRPC MEETINGS

8. Place and date of NRPC Meeting

8.1. The place and date of the meeting will be decided by Member Secretary, NRPC in consultation with Chairperson, NRPC. The meeting will generally be held within the region.

8.2. Meeting will be hosted by the member organizations as per the roster prepared by Member Secretary, NRPC in consultation with the members of the NRPC.

8.3. In case the situations are not conducive for physical meetings, the meetings will be conducted through Video Conferencing.

9. Periodicity of meetings

9.1. The Committee members shall **meet at least once in a month**, as per para-11 of "Resolution". However, the Committee may meet to discuss any issue as and when required in consultation with Chairperson, RPC.

10. Notice for the Committee meetings and Agenda

10.1. Notice for the Committee meetings shall be issued by Member Secretary, NRPC at least 3 weeks in advance in consultation with Chairperson, NRPC. In case of exigency or meeting through video conferencing, meetings required to be conducted to carry out urgent business, notice of one week is to be given.

10.2. The agenda points for the meeting shall be sent to the Member Secretary by the members at least 2 weeks in advance of the meeting. The member Secretary, NRPC shall finalize the agenda and circulate the same to all its members at least 1 week in advance and also be posted on the website.

10.3. Normally, NRPC shall meet to discuss the agenda related to transmission planning submitted by CTU on monthly basis. Discussions other than those related to transmission planning shall generally be put up after discussions in Technical Co-ordination Sub-Committee (TCC) which will be held as and when required.

10.4. Member Secretary, NRPC may also put any agenda involving urgent matters / policy issue directly before NRPC in consultation with Chairperson, NRPC.

10.5. Member Secretary, NRPC may convene a meeting on short notice on any urgent matter in consultation with Chairperson of the committee.

10.6. On receipt of specific request from a member too, Member Secretary, NRPC may convene a meeting in accordance with clause 10.5 above.

11. Effect of Non-receipt of Notice of Meeting by a Member

11.1. The non-receipt of notice by any member of NRPC or sub-committee shall not invalidate the proceeding of the meeting or any decision taken in the meeting.

12. Cancellation / re-scheduling of Meeting

12.1. If a meeting is required to be cancelled or rescheduled the same shall be intimated to the members at the earliest by e-mail and also posted in NRPC website immediately.

13. Quorum of NRPC Meeting

13.1. The Quorum of the meeting shall be at least 50% of its members.

13.2. All decision in the NRPC shall be taken by consensus.

13.3. The decisions / ratifications made by the Committee during the meeting with the above quorum shall be treated as final.

13.4. The decision of the NRPC arrived at for Operation of the Regional Grid and Scheduling and dispatch of electricity shall be followed by Northern Regional Load Despatch Centre (NRLDC) subject to the directions or regulations of the Commission.

13.5. Only members of NRPC and not more than two representatives of his organization shall participate in the Committee meeting. Other persons may attend the meeting by invitation / permission only. However, voting rights will be available only to the Members of NRPC.

14. Presiding Authority

14.1. The Chairperson, NRPC shall preside over the meeting of NRPC and conduct business. The Member Secretary, NRPC shall assist the Chairperson of NRPC in conducting the meeting. If the Chairperson is unable to be present at the meeting for any reason, the senior member of NRPC from the State utilities present in the meeting shall be requested by Member Secretary to preside over the meeting.

14.2. In the absence of Member Secretary, NRPC the next senior most officer of the NRPC Secretariat shall convene the meeting.

15. Recording of the minutes

15.1 The minutes of the meeting shall be finalized and circulated to all its members by the Members Secretary, NRPC within 15 working days from the date of the Committee Meeting. The minutes shall also be posted on the website of NRPC.

15.2 The discussions during the meeting shall be Audio recorded and the record shall be kept at the secretariat of NRPC till the confirmation of the minutes. The member organization hosting the meeting shall extend all facilities for audio recording of the proceedings of the meeting.

16. Confirmation of the Minutes

16.1 Minutes of the NRPC meeting shall be placed in the next meeting for confirmation. However, in case of urgency the minutes may be confirmed by circulation.

CHAPTER-III: SUB-COMMITTEES OF NRPC

17. Constitution of Sub-Committees of NRPC

17.1. Following Sub-Committees will be constituted by NRPC to guide and assist it in conducting the functions assigned to it:

(a) Technical Co-Ordination Sub-Committee (TCC)

(b) Operation Co-Ordination Sub-Committee (OCC)

(c) Commercial Sub-Committee (CSC)

(d) Protection Sub-Committee (PSC)

(e) System Study Sub-Committee (SSC)

(f) LGBR Sub-Committee

(g) Telecommunication, SCADA & Telemetry (TeST) Sub-Committee

(h) Renewable Energy Sub-Committee (REC)

17.2. NRPC or Member Secretary, NRPC or any Sub-Committee may constitute task force, core group for specific purpose from among the members and external experts to advice on any specific issue.

18. Technical Co-Ordination Sub-Committee (TCC)

18.1. **Functions**:

18.1.1. Technical Co-ordination Sub-Committee, shall consider all issues referred by the Operation Co-Ordination Sub-Committee, Commercial Sub-Committee, Protection Sub-Committee, System Study Sub-Committee, LGBR Sub-Committee and TeST Sub-Committee concerning operation of regional grid, commercial aspects, inter-state/ inter-regional transfer of power, grid stability etc. leading to economy and efficiency in the operation of power system in the region.

18.1.2. TCC shall implement the decisions of the NRPC and also provide guidance and assist NRPC in discharge of its functions and formulation of policy matters on regional grid operation, grid security, and commercial matters.

18.2. **Composition of Technical Co-ordination Sub-Committee:**

18.2.1. TCC shall be represented by the Technical Members of the NRPC constituents dealing with the Generation / transmission / Distribution and representative from Central Electricity Authority. The representation shall be at the level of Technical Heads in State Utilities, Executive Directors / Chief General Managers or equivalent in PSUs / Technical Heads of Distribution company / Traders / IPPs and Chief Engineer in CEA.

18.2.2. Chairperson, NRPC from their concerned State shall appoint the Chairperson of TCC. Chairperson, TCC shall be rotated every year from among the States in the same order as Chairperson of NRPC.

18.3. **Meetings:**

18.3.1. TCC shall meet as and when required, and put up its recommendations to the NRPC.

18.3.2. TCC shall meet separately also as and when needed to address urgent issues or specific issues, if any, concerning the operation of regional grid, security of the grid, commercial matters and other issues.

18.3.3. The Chairperson of the TCC shall preside over the meeting. In case Chairperson is unable to be present, Member Secretary, NRPC shall request a person among TCC members to preside over the meeting.

18.3.4. Member Secretary, NRPC shall assist Chairperson, TCC in conducting TCC Meeting.

19. Operation Co-Ordination Sub-Committee (OCC)

19.1. **Functions:**

Operation Co-ordination Committee(OCC) shall discuss all issues related to operation of the regional grid viz. estimating availability of power and energy from each power station and demand of each State for the current and next month; drawing up coordinated maintenance schedule for generating units and major transmission lines; reviewing operational discipline and its norms to be observed by constituents; reviewing the operation of Automatic Under-Frequency Relays; discussing system occurrences, if any, during the previous month and reviewing the status of implementation of the recommendations of the Inquiry Committees; monitoring / reviewing violation of provisions of IEGC related to grid operation; discussing / reviewing measures for ensuring economic grid operation including optimisation of energy transfer with other regions; examining possibility of optimising intra-regional energy exchanges; discussing optimisation of energy transfer with other regions; and any other matter referred by the TCC/NRPC.

19.2. **Composition of Operation Co-Ordination Committee:**

19.2.1. OCC shall be represented by the representatives of the constituent members of NRPC. The nominated representative shall be at the level of Chief Engineers in State Utilities/ General Manager in CPSEs or equivalent level conversant with operational issues.

19.2.2. Member Secretary, NRPC shall be Chairperson of the OCC and preside over the meetings. Superintending Engineer of secretariat shall be convener of the OCC.

19.3. **Meetings:**

The meeting will be held every month generally before 20th day of that month.

20. Commercial Sub-Committee (CSC):

20.1. Functions:

Commercial Sub-Committee(CSC) shall discuss all commercial related issues viz. energy accounting, schemes required for inclusion in the Bulk Power Supply Agreements, requirement of power from the new projects, installation of special energy meters and its cost sharing, etc., metering aspects, reviewing of the payments towards Regulatory accounts, issues related to transmission charges, commercial issues in inter-state and inter-regional exchange of power, issues concerning settlement of payments among constituents, if any, etc. and any other matter referred by the TCC/NRPC. Commercial Committee shall audit the Regional Energy Accounts and DSM, Reactive Energy and other Pool Accounts.

20.2. Composition of Commercial Sub-Committee (CSC):

20.2.1. Commercial sub-committee shall be represented by the representatives of the constituent members of RPC.

20.2.2. The nominated representative shall be at the level of Chief Engineers in State Utilities/ General Manager in CPSEs or equivalent level conversant with commercial issues.

20.2.3. Member Secretary, NRPC shall be Chairperson of the CSC and preside over the meetings. Superintending Engineer of secretariat shall be convener of the CSC.

20.3. Meetings:

The meeting will be held quarterly or as and when required to address the issues of urgent nature.

21. Protection Sub-Committee (PSC)

21.1. Functions:

Protection Sub-Committee (PSC) shall discuss all power system protection related issues viz. analysis of system disturbances in the region, review of protective relaying schemes, relay co-ordination islanding schemes, automatic under frequency load shedding schemes, review of the implementation of recommendations made by the Inquiry Committee of the grid disturbance in the region concerning the above matters, etc. and any other matter referred by the TCC/NRPC.

21.2. Composition of Protection Sub-Committee:

21.2.1. Protection Sub-Committee shall be represented by constituent members of NRPC.

21.2.2. The nominated representative shall be at the level of Chief Engineers in State Utilities/ General Manager in CPSEs or equivalent level and concerns with power system protection / testing in the region.

21.2.3. Member Secretary, NRPC shall be Chairperson of the PC and preside over the meetings. Superintending Engineer of secretariat shall be convener of the PC.

21.3. **Meetings:**

The meeting will be held quarterly or as and when required to address the issues of urgent nature.

22. System Study Sub-Committee (SSC):

22.1. **Functions:**

System Study Sub-Committee shall carry out following system studies:

i. Studies for assessment of the quantum of capacitors required in the region taking into account the expected additions in the generation and transmission systems and the low voltage conditions in the system.

ii. Studies for review of reactive compensation requirement.

iii. Operational load flow studies, as and when required, for peak conditions off peak conditions etc.

iv. Short-circuit studies as and when required.

v. Transient stability studies for major events like grid disturbances or other issues periodically or as and when requested by the constituent(s).

vi. System studies related to transmission constraints.

vii. Studies specific to high / low voltage conditions with specific reference to reactors or capacitors operation / requirement.

viii. Identification of requirement of reactors as and when required

ix. Co-relation of protection related issues from Studies as and when required.

x. Any other technical study referred by the NRPC/TCC.

22.2. **Composition Of System Study Sub-Committee:**

22.2.1. System Study Sub-Committee shall be represented by constituent members of NRPC.

22.2.2. The nominated representative shall be at the level of Executive Engineers in State Utilities / Deputy General Manager in CPSEs or equivalent level and conversant with issues related to system studies in the region.

22.2.3. Member Secretary, NRPC shall be Chairperson of the SSC and preside over the meetings Superintending Engineer of secretariat shall be convener of this Sub-Committee.

22.3. **Meetings:**

As and when required, as decided by the convener.

23. LGBR Sub-Committee

23.1. **Functions:**

LGBR Sub-Committee shall carry out the following functions in accordance with the provisions of Indian Electricity Grid Code:

i. Finalise annual outage plan of generating stations.

ii. Prepare anticipated power supply position for the next fiscal year.

iii. Periodic review of annual outage plan of generating stations and anticipated power supply position.

23.2. **Composition of LGBR sub-committee:**

23.2.1. LGBR Sub-Committee shall be represented by constituent members of NRPC.

23.2.2. The nominated representative shall be at the level of Chief Engineers in State Utilities/ General Manager in CPSEs or equivalent level and conversant with issues related to system studies in the region.

23.2.3. Member Secretary, NRPC shall be the Chairperson of the LGBR Sub-Committee and preside over the meetings. Superintending Engineer of secretariat shall be convener of the LGBR Sub-Committee.

23.3. **Meetings:**

Meetings will be held as and when required to be decided by the convener.

24. Telecommunication, Scada & Telemetry (TeST) Sub-Committee

24.1. **Functions:**

TeST Sub-Committee shall meet to deliberate upon Telecommunication, SCADA and Telemetry schemes of NR and issues thereon in accordance with the provisions of Indian Electricity Grid Code.

24.2. **Composition of TeST Sub-Committee:**

24.2.1. TeST Sub-Committee shall be represented by constituent members of NRPC.

24.2.2. The nominated representative shall be at the level of Chief Engineers of State Utilities/General Manager of CPSEs or equivalent level and conversant with Telecommunication, SCADA & Telemetry in the region.

24.2.3. Member Secretary, NRPC shall be Chairperson of the TeST Sub-Committee and preside over the meetings. Superintending Engineer of secretariat shall be convener of the TeST Sub-Committee.

24.3. **Meetings:**

The meeting will be held as and when required to be decided by the convenor.

25. Renewable Energy Sub-Committee (REC)

25.1 Functions:

RE Sub-Committee shall meet to deliberate upon issues related to Renewable Energy resources, its integration in grid, evacuation and other related issues.

25.2 Composition of RE Sub-Committee:

25.2.1 RE Sub-Committee shall be represented by all ISTS connected RE generators, state RE generators having capacity ~~100~~ 250 MW & above, MNRE, SECI, Association of RE Generators, NLDC, NRLDC, CTU, Powergrid, STU and SLDC of RE rich states where REMC is operated.

25.2.2 The nominated representative shall be at the level of Chief Engineers of State Utilities/General Manager of CPSEs or equivalent level and conversant with Renewable Energy domain in the region.

25.2.3 Member Secretary, NRPC shall be Chairperson of the RE Sub-Committee and preside over the meetings. Superintending Engineer of secretariat shall be convener of the RE Sub-Committee.

25.3 Meetings:

25.3.1 The meeting will be held quarterly & as and when required to address the issues of urgent nature.

CHAPTER-IV: PROCEDURE FOR CONDUCTING SUB-COMMITTEE MEETINGS OF NRPC

26. Conducting of Sub-Committee Meetings, issue of Notice, Agenda & its Minutes

26.1 The notice for the above sub-committee meeting shall be issued at least 15 days before the date of meeting and agenda points one week before the meeting by the NRPC Secretariat. However, when the meeting is to be held through video conferencing, this period may be reduced to 10 days and 3 days respectively. The minutes of the meeting shall be finalized by Member Secretary and issued by NRPC Secretariat within 15 working days of the meeting.

26.2 The decision of the Committee arrived at for Operation of the Regional Grid and other above functions shall be implemented by the Constituents. In case the Sub-committee recommends the matter to the TCC / NRPC, for further deliberation or decision, the same shall be referred by NRPC secretariat to TCC/ NRPC.

26.3 The meetings will be conducted at the place and venue preferably located in the Region to be decided by Member Secretary, NRPC. In case the situations are not conducive for physical meetings, the meetings will be conducted through Video Conferencing.

26.4 Meeting may be hosted by the member organizations as decided by Member Secretary, NRPC in consultation with the members of the sub-committee. All the arrangements required for conducting the meeting shall be made by the host member organisation.

CHAPTER-V: Operation of "NRPC-Fund"

27. NAME:

The name of the fund shall be "NRPC-Fund". The fund is accumulated amount of contribution fee collected from constituent members of NRPC.

28. PURPOSE:

i) The fund shall be utilized for meeting the reimbursement of the actual expenditure incurred (from budget provided by Central Electricity Authority) by the office of the NRPC Secretariat to the consolidated fund of Govt. of India/CEA through DDO, NRPC;

ii) The fund shall be utilized for meeting the expenditure in the conduct of NRPC meetings, workshops, seminars etc.;

iii) The fund shall be utilized to meet any other office expenditure considered necessary by Member Secretary, for efficient working of NRPC Sectt., with the approval of Chairman, NRPC;

iv) The fund shall be used for meeting expenditure of NRPC Secretariat as per SOP issued by CEA.

29. CONTRIBUTION:

All the Members and rotational members except the following shall contribute equally on annual basis, which shall be decided every year in NRPC meeting based on review of actual expenditure of the previous year and estimated expenditure in current/next year:

i) NLDC/NRLDC/SLDCs

ii) Member (Go&D), CEA

iii) MS, NRPC

iv) Exempted by MoP

30. OPERATION:

The fund will be maintained with any Nationalized bank in the name of Northern Regional Power Committee (NRPC) and operate jointly by the nodal officer from the Constituent member along with two more signatory to be nominated with the approval of Member Secretary, NRPC on behalf of NRPC Members. The operation of account will be done under the administrative control / supervision of Member Secretary. All transaction from this account shall be through Cheque/NEFT/RTGS only.

31. MAINTENANCE OF ACCOUNTS:

The account of all the expenditure/receipts shall be maintained by the nodal officer (as per para 29 above) on behalf of NRPC Member. Such officer shall also maintain a cash book etc., where in details of all receipts and expenditure shall be recorded.

32. VERIFICATION OF ACCOUNTS:

The “NRPC – Fund” account for each financial year shall be audited as per SOP issued by CEA.

CHAPTER-VI: REPORTS

33. REPORTS BY NRPC

33.1 The following reports shall be prepared and furnished by NRPC secretariat**:**

S. No.	Name of the report	Periodicity
1	Monthly Progress Report Northern Regional Grid / Operational Data	Monthly
2	Annual Report of NRPC	Annual

CHAPTER-VII: MISCELLANEOUS

34. Saving of inherent Power of the NRPC

34.1 Nothing in these Rules shall bar the NRPC from adopting in conformity with the Act a procedure that is at variance with provisions of these Rules, if the NRPC in view of the special circumstances of a matter or class of matters deem it necessary or expedient to deal with such a matter or class of matters.

34.2 Nothing in these Rules shall expressly or by implication, bar the NRPC to deal with any mater or exercise any power under the Act for which no Rules have been framed and NRPC may deal with such matters, and functions in a manner it thinks fit.

*****

Annexure-XIV

सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

To,

Sh. Ram Krishan
Sr. General Manager,
National Informatics Centre Services Inc.,
6th Floor (Hall No. 2 & 3), Bhikaji Cama Place,
New Delhi-110066
Email: ramkrishan@nic.in

विषय: Re-development of NRPC website-reg.

Sir,

The Northern Regional Power Committee (NRPC) is a committee established by Ministry of Power vide its Gazette notification dated 21.12.2021. The committee has its headquarter and Secretariat at 18-A, Qutab Institutional Area, New Delhi-110016. NRPC is in process of complete re-development of its website www.nrpc.gov.in to serve as a unified platform for disseminating information, regulatory updates, meeting details, and other relevant activities. The website will cater to various stakeholders, including various government organizations/ PSU/ companies engaged in power sector, regulatory bodies, and the general public.

2. In view of this, NICSI is hereby requested to take-up development works of website and provide to this office, the estimate for the works for administrative and financial approval by competent authority. NICSI is also requested to share the bid document, LoA and other related documents with NRPC after award of works.

संलग्नक:यथोपरि

Signed by Anzum Parwej
Date: 12-09-2024 17:47:38

(अंजुम परवेज)
अधीक्षण अभियंता (सेवाएं)

1. Introduction

The Northern Regional Power Committee (NRPC) is a committee established by Ministry of Power vide its Gazette notification dated 21.12.2021. The committee has its headquarter and Secretariat at 18-A, Qutab Institutional Area, New Delhi-110016.

NRPC is in process of complete re-development of its website www.nrpc.gov.in to serve as a unified platform for disseminating information, regulatory updates, meeting details, and other relevant activities. The website will cater to various stakeholders, including various government organizations/ PSU/ companies engaged in power sector, regulatory bodies, and the general public. It aims to enhance transparency, provide updates, and streamline the process of information submission and record-keeping in an efficient and hassle-free manner.

2. Scope of the project

i. **Design and Development**: Design and development of NRPC's website in both Hindi and English. Detailed Project requirement of website is given at **Annexure-I.**

ii. **User-login Portal:**

- Implement a user-login portal with basic security features like CAPTCHA.
- The portal will allow users to submit data through predefined UI forms or spreadsheets.
- Admin users will have the capability to download the submitted data either in batches or individually as spreadsheets.

iii. **User base:** Initial user capacity is estimated at 250-300 concurrent users, with a projected increase of 30% over the next 5 years. Approximately 100 users will be provided login credentials for the portal.

iv. **Warranty and AMC**: Provide a one-year warranty followed by a five-year Annual Maintenance Contract (AMC), covering both major and minor changes.

- Define major and minor changes separately to provide clarity.
- Provision for major changes outside AMC, while minor changes should be covered in AMC.

v. **Content Migration**: Migrate all content from the old NRPC website (http://164.100.60.165) to the new site.

vi. **User Acceptance Testing**: Define and demonstrate a reasonable set of user acceptance tests (UAT).

vii. **Security Audit**: Resolve all vulnerabilities identified during the security audit before the website goes live.

viii. **Website Hosting:** Host the website using a MeitY-empanelled Cloud Service Provider (CSP) with 99.9% uptime and implement SSL for security. The bidder shall be responsible for estimating technical specifications cloud service for hosting of website till completion of AMC period and hiring of CSP services for same. Cloud Service Provider should not normally be changed after during period of contract, i.e. till completion of 5-years AMC.

ix. **Performance Optimization:** Optimize the website periodically for better performance, both during the warranty and AMC periods.

x. **Other Essential Requirements:** Any additional work essential for operations, development, design, testing, hosting, or maintenance must be covered by the successful bidder.

xi. **Bidder Responsibilities:**

- Submit a detailed project plan, system requirement specifications (SRS), design documents, training plans, and manuals.
- Provide regular reports, security audit certificates, and compliance documents.
- Ensure the project complies with government standards (e.g., GIGW, CERT-IN, STQC).

3. Prescribed Technical Requirements:

i. **Browser Compatibility**: The website should work across all major browsers (Chrome, Firefox, Safari, IE) and devices (desktop, mobile, tablet).

ii. **Progressive Web Application (PWA)**: Include support for push notifications.

iii. **User Interface (UI)**:

- Simple, easy-to-use UI for creating pages, uploading documents, and managing content in bilingual formats.
- The website should also have the capability for custom dashboards to support data visualization, allowing administrators and users to display data in a graphical format for enhanced analysis.

iv. **Search Engine Optimization (SEO)**: Ensure the website is optimized for search engines.

v. **Technology Stack**:

- Frontend: HTML, CSS, JavaScript, React.js or Angular.js.
- Backend: .NET or any other CMS.
- Database: MySQL or MongoDB.
- Authentication: OAuth 2.0 or JWT for secure user login.
- Hosting: AWS, IBM, Azure, or any other MeitY empanelled cloud service.

vi. **Responsiveness**: Ensure the website is fully responsive across all devices and screen sizes.

vii. **Accessibility**: Implement accessibility standards to make the website usable for people with disabilities.

viii. **Security**: Implement strong security measures like SSL/TLS, regular security audits, and data protection protocols.

ix. **Multilingual Support**: Real-time multilingual interface delivery.

x. **Testing & QA**: Perform unit, integration, and user acceptance testing (UAT).

xi. **Compliance**: Ensure compliance with GIGW, CERT-IN, and STQC standards.

xii. **Centralized Information Hub**: Provide a unified platform for stakeholders to access information related to NRPC.

xiii. **Deployment & Maintenance**: Define deployment strategies, post-deployment support, and maintenance plans.

4. Prescribed Qualifying Requirements (QR)

Qualification criteria should be but not limited to following:

i. Bidder shall be NICSI 'Tier-3' empaneled vendor for development of website or similar works.
ii. Bidder shall have functional office in Delhi & NCR to provide the services envisaged under the contract from local resources i.e. Delhi & NCR.
iii. The bidder shall be ISO 9001:2008 and ISO 27001:2013 or above certified.
iv. The bidder or any of its associates / subsidiaries / parent entity shall not have been debarred or blacklisted by Central Government / State Government / PSU / Govt. Undertaking / Local / Private in India on the date of original bid opening.
v. Joint Venture or Consortium of any form is NOT permitted under the tender. The financial and technical criteria should be considered only for the Bidder and not for any associates / subsidiaries of the Bidder.
vi. Any other Qualifying Requirements decided by NICSI.

5. General Guidelines

i. **Service Level Agreements (SLA):** Define and demonstrate reasonable SLAs at Go-Live.
ii. **Dedicated Project Manager:** Vendor must provide a dedicated project manager for the contract duration.
iii. **Security & Performance Monitoring:** Ensure protection against electronic threats using firewalls, security software, and passwords.
iv. **Security Audits & STQC**:
    a. Conduct security audits and resolve any vulnerabilities.
    b. Perform STQC audit as per government compliance and obtain a quality certification.
v. **Accommodating Changes**: The vendor should be prepared to accommodate new requirements that arise during project execution.
vi. **Scalability**: Ensure the system is scalable and robust.
vii. **Auto-Backup**: Provide auto-backup of all website content and submit quarterly backup reports to NRPC.
viii. **Content Management System (CMS)**: Provide a CMS for easy website management.
ix. **Compliance with MeitY Guidelines**: Ensure adherence to guidelines for development, deployment, and cloud services.

6. **Rates**: Firm and Fixed during the entire duration of the contract without any price variation on any account whatsoever.

7. **Payment Terms**

i. **Payment terms for Development of website:** The 100% payment should be released after declaration of Go-Live by NICSI and NRPC.

ii. **Payment terms for AMC of website:** The AMC payment will be on Quarterly basis after submission of quarterly reports by vendor w.r.t. defined SLA and all the work completed during the previous quarter for which the invoice was raised.

Aggregate charges for AMC of 5 years should not be less than 30% of total development charges (excluding charges for hosting of website on production environment of Cloud Service Provider). An illustrative Price Schedule is attached at **Annexure-II.**

iii. The tax shall be deducted at source as per the statutory laws.

iv. The Value of the contract shall cover all costs of design, development, deployment, operations &maintenance, training, and handover.

v. During the entire period of contract, if bidder fails to perform the services as per the defined scope of work under technical specification, suitable penalty provisions should be defined in contract. All, the levied penalty shall be deducted from the bill raised by the Bidder / Seller.

vi. All payments by NRPC till Go-Live are proposed to be made to NICSI through electronic payment mechanism.

vii. All AMC payments by NRPC are proposed to be made directly to vendor through electronic payment mechanism.

viii. All charges for cloud hosting should be raised separately on quarterly or annual basis preferably within 2 weeks of bills raised CSP to bidder.

8. **Prescribed Project Schedule:**

i. **Requirement Gathering by successful bidder/ Vendor (10 Days)**

a. Based on the technical specification vendor team should prepare the project requirement document.
b. Requirement gathering should capture the processes, information and interactions that NRPC wants to build and include defining how the system and its environment interact.
c. Requirements should include operational and technical aspects as well, like encryption, security, disaster recovery, hosting and business continuity.
d. The process of requirement gathering may include open-ended questions, pinpointing details, rephrasing, sharing the questionnaire etc.

e. Requirement gathering team should analyze the existing system for suggesting improvement and establishing new requirement.
f. Requirement document has to be deliberated with NRPC before proceeding for the development phase.

ii. Development of NRPC website should be completed within 10 weeks after Gathering the requirement.

iii. Training- (5 Days)

a. Provision for at least two days training should be kept for providing training to administrators of the Website and to users for uploading data to websites directly.
b. Reference training and user manual should also be provided for future reference.

iv. Testing (15 Days)

a. VAPT by CERT-IN empanelled agency and compliance of the findings by vendor.
b. Testing of applications and website developed to be conducted on NLDC test server including Beta Testing.
c. Final Application should be hosted on production environment of any of MeitY empanelled Cloud Service Provider.

The system will be declared Go-Live after the completion of above four step. The Total Days for development and system Go-Live should not be more than 120 days from zero date.

9. Premature Termination of Contract

During the entire period of the contract, if at any point of time, Bidder fails to deliver the services as per the scope of work, due to any lapse / reason, suitable provision should be kept in the contract to give the right to NRPC to terminate the contract in full/partial by giving one (01) month advance notice for restoration of service/fault to the bidder and after one-month.

Annexure-I

Scope of Works- Detailed Project requirement

Indicative functionalities:

1. **Visitor Section**

- **Home Page**
    - Introduction to NRPC: Brief overview of NRPC's purpose and functions.
    - Latest News and Updates: Dynamic section for recent announcements.
    - Quick Links: Navigation shortcuts to important sections.
- **About Us**:
    - Constitution: Detailed background on NRPC's establishment and purpose.
    - Function: Role and responsibilities under NRPC's Conduct of Business Rules 2024.
    - NRPC Members: List of committee members.
    - Contact Us: Contact details and office address, including Google Maps integration.
- **Meetings**:
    - Subcommittees and Groups (NRPC/TCC, OCC, CSC, etc.)
    - **Note**: Meetings section should display the meeting name, date, agenda, minutes, and other documents with filters and search options for easy access.
- **Commercial**:
    - Power Allocation, Energy Accounts, Transmission Accounts, Deviation Settlement, Ancillary Services, and more.
    - **Note**: Current financial year data should be displayed, with an option to access archived information.
- **Operation**:
    - Load Generation Balance Report, Overhaul Plans, Approved Transmission Outages, and more.
    - **Note**: Provide both current FY information and archive access.

- **Protection**:
    - Islanding Schemes, Special Protection Schemes, Third Party Audits, Studies, and more.
- **Acts and Rules**:
    - Links to Electricity Acts and power sector rules with search and filter functionalities.
- **Regulations and Orders**:
    - Hyperlinks to CERC and CEA regulations and orders.
- **Language Options**:
    - Bilingual support (Hindi/English) with toggle for easy language switching.
- **General Instructions**:
    - Guidelines and downloadable documents for stakeholders.
- **Tenders**:
    - Active and closed tenders with submission guidelines.
- **Photo Gallery**:
    - Categorized albums showcasing NRPC events and activities.
- **Important Links**:
    - Curated and categorized external resources.
- **User Login for Information Uploads**:
    - Secure login for authorized users to submit reports and access archives.

2. Administrator Section (Organized by Functionality)

- **Secure Login**:
    - Admin section access through encrypted login with MD5 or salted password encryption.
    - Password reset after five wrong attempts, with email notifications.
- **User Management**:
    - Role-based user creation and management (Master Admin, General Operation Admin, Departmental Users).

    - Module-based access rights (view, add, delete, edit, publish, etc.).
    - Audit logs for user actions stored for 30 days.
- **Menu Management**:
    - Global, primary, secondary, and sub-menu creation (up to four levels).
    - Edit, delete, publish, and manage highlighted menus.
- **Content Management**:
    - Create, edit, archive, and publish information under defined menu sections.
    - Rich content editor supporting images, videos, tables, graphs, buttons, etc.
    - Upload multiple content types (PDF, DOC, XML, MP4, etc.).
- **Links Management**:
    - Add/delete links (file, URL, or content) in Hindi/English.
    - Set expiration dates for links, ownership, and metadata.

Annexure-II

Bill of Quantity- Illustrative

S. No.	Description	Amount (exclusive of GST) (₹)
Development of NRPC website		
1.1.	Development of NRPC Websites including all necessary certifications and licences charges till	
1.2.	Hosting charges for website till completion of warranty period	
1.3.	Hosting charges for website during 1st year of AMC	
1.4.	Hosting charges for website during 2nd year of AMC	
1.5.	Hosting charges for website during 3rd year of AMC	
1.6.	Hosting charges for website during 4th year of AMC	
1.7.	Hosting charges for website during 5th year of AMC	
AMC of NRPC website after completion of 01-year warranty period		
2.1	AMC charges for 1st year	
2.2	AMC charges for 2nd year (To be quoted at least 1.08 x Sl. No. 2.1 above)	
2.3	AMC charges for 3rd year (To be quoted at least 1.08 x Sl. No. 2.2 above)	
2.4	AMC charges for 4th year (To be quoted at least 1.08 x Sl. No. 2.3 above)	
2.5	AMC charges for 5th year (To be quoted at least 1.08 x Sl. No. 2.4 above)	
	GST @ _____	
	Total Incl. GST	

Total cost quoted for AMC period (i.e. Sl. No. 2.1 to 2.5 of Price Schedule) shall be minimum 30% of total quoted price for mandatory items (i.e. Sl. No. 1.1 of Price Schedule).

Addendum to Instructions to bidders for NRPC Website

1. **Pre-Bid meeting:** A Pre-Bid meeting should be held at least one week before last data of final submission of technical/ financial bid by bidders at NRPC office- 18A, Qutab Institutional Area, Opposite Katwaria Sarai, New Delhi- 110016. Date of Pre-Bid meeting to be finalised by NICSI in consultation with NRPC.

   Pre-Bid meeting may be attended by NISCI official(s) or any other authorised representative.

Addendum to Scope of Works for NRPC Website

1. High Availability Requirements

The successful bidder must implement a high availability solution for the NRPC website to ensure reliable dissemination of critical information, including:

- Minimum 99.9% uptime per month

- Automatic scaling to handle increased load

- Comprehensive monitoring and alerting system

- Page load times within 3 seconds for 95% of users

2. Annual Maintenance Contract (AMC)

The website developer shall perform the following tasks during AMC:

2.1 Routine Maintenance and Bug Fixing

- Apply patches within 3 days of release

- Fix critical bugs within 3 hours, non-critical within 48 hours

- Perform weekly system health checks and optimization

2.2 Cyber Security Compliance

- Conduct quarterly vulnerability assessments

- Implement security updates within 24 hours

- Ensure the project complies with government standards and guidelines (e.g., GIGW, CERT-IN, STQC).

2.3 User Interface Maintenance

- Implement cosmetic changes within 48 hours

- Ensure responsiveness across devices

2.4 Content and Feature Management

- Make minor changes (up to 3 man-days) within 1 week

- Provide project plans for major changes within 48 hours

- Respond to urgent content change requests within 4 hours

2.5 Performance Optimization

- Conduct monthly performance audits

- Maintain page load times under 3 seconds

- Scale resources to maintain 99.9% uptime

2.7 Support and Training

- Provide 24/7 technical support with 2-hour response for critical issues

- Conduct bi-annual online/ offline training sessions for NRPC staff in case of any changes in features.

- Maintain up-to-date system documentation

2.8 Reporting and Communication

- Submit quarterly maintenance, performance, and security reports.

- Submit last quarter end full backup file.

- Maintain an updated issue tracker accessible to NRPC

2.9 Cloud Infrastructure Management

- Monitor and optimize cloud resource usage

- Provide quarterly reports on resource utilization and costs

- Full backup and incremental automated backups.

3. Service Level Agreement (SLA) and Penalties

3.1 Website Uptime

- Target: 99.9% uptime per month

- Penalty: 0.5% of monthly AMC fee for every 0.1% drop below target

3.2 Page Load Time

- Target: 3 seconds or less for 95% of page loads

3.3 Issue Resolution Time

- High Priority: Within 4 business hours (0.5% penalty per hour delay, max 10%)

- Medium Priority: Within 2 business days

3.4 Data Accuracy and Timeliness

- Target: 99.9% accuracy, updated within agreed timeframes

- Penalty: 0.1% of monthly AMC fee per instance (max 3%)

3.5 Security Incident Response

- Target: Notification within 1 hour, mitigation plan within 4 hours

3.6 Backup and Recovery

- Target: Daily backups, 4-hour recovery time objective (RTO)

- Penalty: 1% per missed backup, 0.5% per hour exceeding RTO

3.7 Performance Under Load

- Target: Maintain performance under 2x average daily traffic

- Penalty: 0.5% per hour of degraded performance

Note:

1. Maximum total penalty cap: 15% of monthly AMC fee.
2. This addendum should be read in conjunction with the original scope of works document. All other terms and conditions remain unchanged.

Fwd: NRPC_ Budgetary Estimation

ME Me <ravikant.cea@gov.in>
Wed, 16 Oct 2024 5:27:38 PM +0530 •

To "Rajat Dixit" <dixit.rajat@gov.in>

Cc "Anzum Parwej" <anjum.parwej@nic.in>, "Praveen Jangra" <praveen.cea@gov.in>

1 Attachment(s) • Download as Zip

NRPC_BoQ.pdf
359.5 KB •

Sir,

Pl. refer to trailing mail & attachment for kind information and necessary action.

सादर / with regards,

रवि कांत / Ravi Kant
कार्यपालक अभियंता / Executive Engineer
उत्तर क्षेत्रीय विद्युत् समिति सचिवालय / Northern Regional Power Committee Secretariat (NRPC)
नई दिल्ली / New Delhi -110016

========== Forwarded message ==========
From: PO MONITORING CELL <pomocell-nicsi@nic.in>
To: "Anzum Parwej"<anjum.parwej@nic.in>, "Ravi Kant"<ravikant.cea@gov.in>, "Praveen Jangra" <praveen.cea@gov.in>
Date: Wed, 16 Oct 2024 17:03:04 +0530
Subject: NRPC_ Budgetary Estimation
========== Forwarded message ==========

•••

Dear Sir,
Please find the attached NRPC Budgetary Estimation for your review and further initiation.

सादर धन्यवाद || Thanks & Regards
" कागज़ के 3000 पन्नों के लिए एक पेड़ को काटा जाता है.. पेड़ों का संरक्षण करें... हरियाली लाएँ.. इस मेल का या इसकी किसी फाइल का प्रिंट तब तक न लें जब तक सचमुच ज़रूरत न हो" !!!!
गंगा सिंह, कार्यालय सहायक, O/o श्री ज्ञान प्रकाश सिंह || Ganga Singh Office Assistant to Sh. Gyan Prakash Singh
महाप्रबंधक || General Manager
एन.आई.सी.एस.आई.-मुख्यालय नई दिल्ली || NICSI-HQ New Delhi-110066
IP No.69044

OASYS
Drive for innovative solution

Oasys Tech Solutions Pvt. Ltd.
Block-B, Ground Floor, Fortune Tower,Near XIMB,
Bhubaneswar, Odisha 751013
www.oasystspl.com info@oasystspl.com
0674-2300178 +91-7377-373770

Dear Sir,

We are submitted below The Northern Regional Power Committee (NRPC) financial quotation for your further course of action.

Annexure-II

Bill of Quantity- Illustrative		
Sl No	**Description**	**Amount (exclusive of GST) INR**
Development of NRPC Website		
1.1	Development of NRPC Websites including all necessary certifications and licenses charges till	17,83,750.00
1.2	Hosting charges for website till completion of warranty period	1,10,000.00
1.3	Hosting charges for website during 1st year of AMC	1,10,000.00
1.4	Hosting charges for website during 2nd year of AMC	1,10,000.00
1.5	Hosting charges for website during 3rd year of AMC	1,10,000.00
1.6	Hosting charges for website during 4th year of AMC	1,10,000.00
1.7	Hosting charges for website during 5th year of AMC	1,10,000.00
AMC of NRPC website after completion of 01-year warranty period		
2.1	AMC charges for 1st year	1,31,175.00
2.2	AMC charges for 2nd year (To be quoted at least 1.08 x SI. No. 2.1 above)	1,41,669.00
2.3	AMC charges for 3rd year (To be quoted at least 1.08 x SI. No. 2.2 above)	1,53,002.52
2.4	AMC charges for 4th year (To be quoted at least 1.08 x SI. No. 2.3 above)	1,65,242.72
2.5	AMC charges for 5th year (To be quoted at least I .08 x SI. No. 2.4 above)	1,78,462.14
	Sub Total	32,13,301.38
	GST@18%	5,78,394.25
	Total Incl. GST	**37,91,695.63**

1. *Total cost quoted for AMC period (i.e. SI. No. 2. I to 2.5 of Price Schedule) shall be minimum*
2. *30% of total quoted price for mandatory items (i.e. SI. No. I. I of Price Schedule).*
3. *Above cost is exclusive of NICSI service charges*

Authorized Signatory