AGENDA
FOR
206TH OCC MEETING

Date: 31.08.2023

Eastern Regional Power Committee

14, Golf Club Road, Tollygunge

Kolkata: 700033

AGENDA FOR 206TH OCC MEETING TO BE HELD ON 31.08.2023 (THURSDAY) AT 10:30 HRS

PART – A

ITEM NO. A.1: Confirmation of Minutes of 205th OCC Meeting held on 27th July 2023 physically at ERPC, Kolkata.

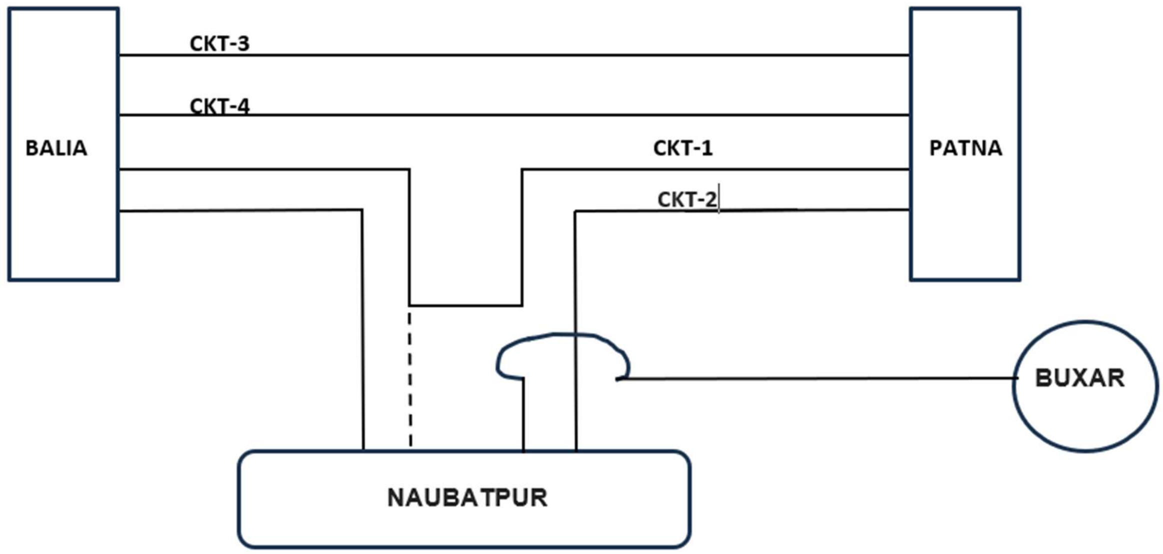
The minutes of 205th Operation Coordination sub-Committee meeting held on 27.07.2023 was circulated vide letter dated 23.08.2023.

Members may confirm the minutes of 205th OCC meeting.

PART B: ITEMS FOR DISCUSSION

ITEM NO. B.1: Temporary arrangement at Naubatpur GIS to provide start up power to 2x660 MW Buxar Thermal Power Project, Chausa, Buxar at 400 KV level – BSPTCL.

- In the special online meeting held on 02.08.2023 under the chairmanship of Member Secretary ERPC, PGCIL ER-I has suggested another alternate arrangement for providing the start-up power to 2x660 MW Buxar Thermal Power Plant.
- In this alternate arrangement, LILO of 400 kV Patna (PG)-Balia ckt 1 at Naubatpur will be bypassed and another direct connectivity between Balia & Patna (PG) will be made.
- During the outage of 400 kV Patna-Naubatpur S/C, Balia will cater the load of Buxar & Naubatpur.
- For checking the feasibility of aforesaid arrangement officials of BSPTCL, BGCL & PGCIL has visited the Naubatpur site on 03.08.2023. (MOM is placed at **Annexure-B.1**).
- For establishing another 01 no 400 kV direct circuit connectivity between Patna to Balia, shorting of 400 kV Patna-Naubatpur- I (Quad Moose) & 400 kV Naubatpur-Balia-I (Quad Moose) outside Naubatpur Sub-station have been explored through shorting at normal tower locations Loop In(/O-DD+O-LI3) and Loop Out (I/O-DD+25-LOI) owned by BGCL through twin moose or equivalent HTLS conductor .
- After the above bypass arrangement Bay no-409(existing bay of Balia-1) and Bay no- 406(existing main bay of Patna-I feeder) along with associated tie bay shall become spare for connectivity with 400 kV SJVNL Buxar Thermal ckt 1for start -up power.



- One ckt of 400 kV SJVNL Buxar-Naubatpur transmission line can be terminated at Naubatpur Sub-station into bays of 400 kV Balia-1 feeder by shorting arrangement between Multi-circuit Tower MC 2 and MC 1of 400 kV SJVNL(Buxar)-Naubatpur D/C line and Multi Ckt tower MC2 and MCl of 400 kV Patna-Naubatpur D/C and 400 kV Naubatpur-Balia D/C line in top tier.
- After termination, 400 kV Balia-1 bay (Bay no 409 & tie) at Naubatpur GIS will be utilized for extending the start-up to Buxar thermal and 400 kV Patna-I bay (Bay no 406 & tie) at Naubatpur shall remain spare and can only be utilized for completion of diameter of opposite element ie 500 MVA 400/220/33 kV ICT-01 at Naubatpur.
- PLCC equipment (ABB make :model ETL600) of 40 kV Balia-I line needs to be shifted from Naubatpur to Patna to match remote end equipment.
- One set of PLCC/DTPC with SDH will be required for one ckt of 400 kV SJVNL(Buxar)-Naubatpur line at both ends.
- CRP related work such as dismantling of PLCC panels and rewiring of the control and protection wire of the aforesaid line at Naubatpur and Patna, end to end PLCC testing etc is also involved.
- ERPC may grant approval of this arrangement to facilitate start-up power to SJVNL till availability of start up power through 220 kV system as mutually agreed earlier or commissioning of 400 kV bays (To be constructed by BSPTCL) at 400 kV Naubatpur GIS, whichever is applicable.

BSPTCL may update. Members may discuss.

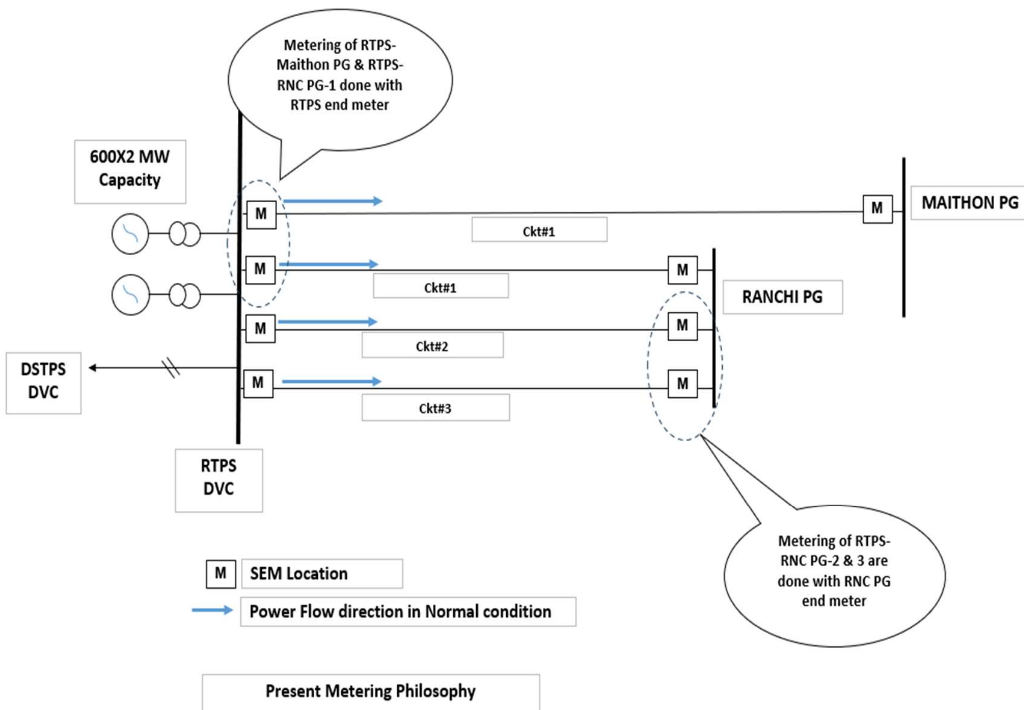
ITEM NO. B.2:	**Proposal of carrying out Metering of 400kV RTPS_Ranchi PG Ckt # 2 & 3 with RTPS end meter data for the purpose of Deviation Settlement and Reactive Energy Accounting – DVC.**

Presently, Metering of 400kV Raghunathpur-Ranchi PG Ckt#2 & 3 (L#407 & 408), is being carried out with the Meter-data of Ranchi PG end for the purpose of Deviation Settlement as well as for Reactive Energy Accounting. These lines are owned and maintained by DVC.

As the flow through the above-mentioned lines is towards Ranchi PG end normally and not being utilized for DVC State's drawl only, these lines have been given the status of '**non-ISTS lines Carrying ISTS Power', ref. 35th ERPC/TCC Meeting & Letter of ERPC Dtd. 24-08-2017 & CERC order Dtd. 28-02-2022 against Petition No.: 466/TT/2020**. Accordingly, the annual availability certification for these lines is carried out by ERPC and the transmission tariff of these lines is recovered by CTU on basis of the Sharing Regulations from all the Drawee DICs as per usage.

While carrying out metering from the Ranchi PG end data makes DVC liable to bear the loss for these lines solely. Since, the transmission charges for these lines are being shared among the DICs on national level, the transmission losses also should be distributed nationally treating it at par with other ISTS lines.

Therefore, it is being proposed to incorporate the metering of 400kV RTPS - Ranchi PG Ckt # 2 & 3 taking RTPS end meter-data instead of Ranchi PG end data for the purpose of Deviation Settlement and Reactive Energy Accounting.



DVC may update. Members may discuss.

ITEM NO. B.3:	**STU connectivity of M/s NLC-Talabira-Lapanga 400 kV D/C (Quad) Line – OPTCL.**

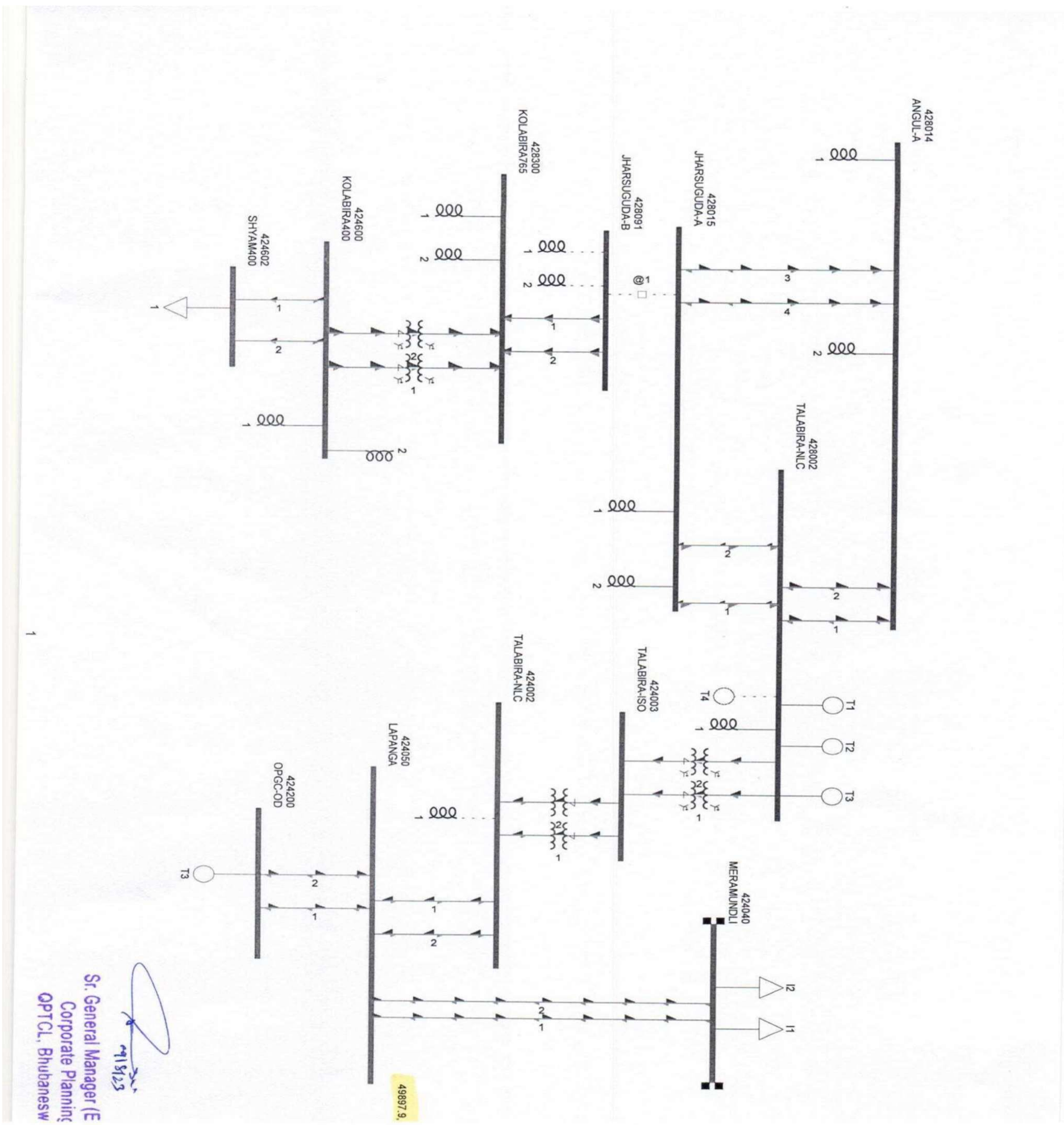
In the 20th CMETS meeting the evacuation of NLC (3 X 800 MW) was deliberated and following modalities for connectivity had been finalized:

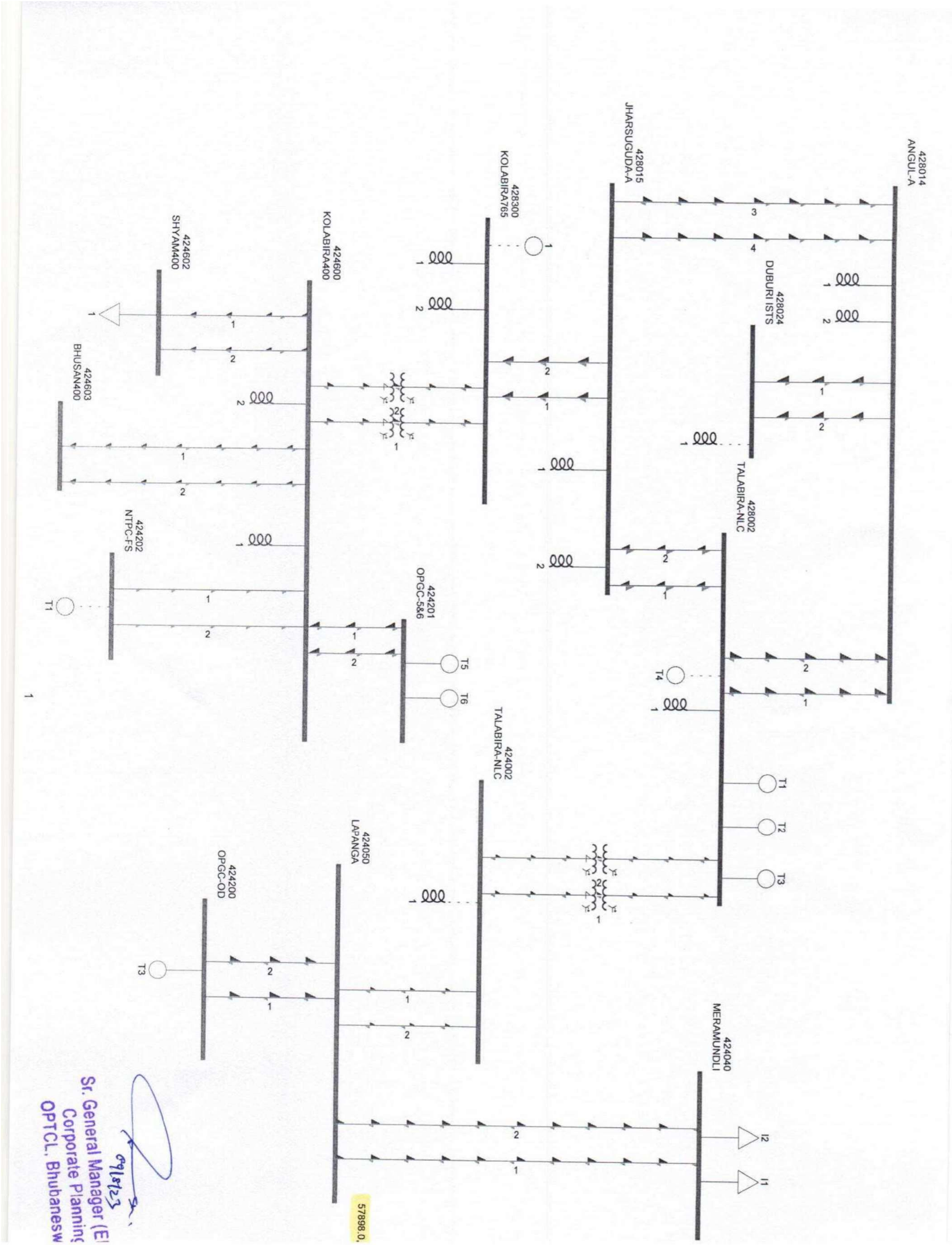
(i)LILO of both circuits of Sundargarh-A-- Angul 765 kV 2 X S/c lines as ISTS connectivity.
(ii)Lapanga- NLC 400 kV D/C (Quad) line as Intra state line for evacuation of 400 MW state share.

It was observed that fault level at Lapanga touches 58 kA against the designed limit of 63 kA after connectivity of NLC where as in base case without NLC connectivity the fault level is 43 kA.
With an aim of controlling fault level at Lapanga, which would have two major sources by 2027-28 timeframe i.e. OPGC and Talabira, ERLDC suggested OPTCL in the meeting for planning suitable bus splitting arrangement.

In this regard, OPTCL proposes connection of isolation transformer in the circuit from NLC to Lapanga to limit the fault current. System study for the same has been conducted and the report in base case as well as with isolation transformer is attached below.

However, M/s ERPC may advise other suitable devices to be adopted by OPTCL for limiting fault current.
It is also requested to convene a separate meeting with OPTCL and NLC to finalize the scheme.





OPTCL may update. Members may discuss.

ITEM NO. B.4:	**Presentation on benefits of Synchronous Condensers by USAID's South Asia Regional Energy Partnership - (SAREP).**

USAID's ongoing energy program, South Asia Regional Energy Partnership (SAREP) builds on successful legacy of USAID's energy sector projects over five decades through bilateral initiatives with the Ministry of Power (MOP) and the Ministry of New & Renewable Energy (MNRE) and complements ongoing activities in South Asia. This five-year initiative aims to provide expert technical assistance and capacity development related to the modernization of utilities, advanced energy solutions (for technologies such as renewables, energy efficiency, electric vehicles, and grid integration), private sector engagement and transparent procurement process to improve access to affordable, secure, reliable, and sustainable energy.

Since India, has set itself an ambitious target of 500 GW of non-fossil generation by the year 2030. It is evident that going forward the renewable energy share in generation mix will increase significantly in comparison to that of conventional generators. Due to ongoing evolution of grid, there is an urgent need to monitor the system inertia and provide inertia to the system at strategic locations. We are pleased to reach out to you to engage on this important topic.

USAID's SAREP program conducted a workshop with key stakeholders to deliberate on Synchronous Condensers (Syncons) as a possible solution to the challenges of increased renewable energy in the power system on May 26, 2023, at the Northern Regional Power Committee (NRPC) in New Delhi.

To further engage and take forward this important initiative, SAREP would like to present the benefits of Syncons as a power system element and its multi-fold benefits in providing dynamic reactive power and short circuit power support while strengthening the system from an inertia perspective. the document with the workshop proceedings in which the discussions and key suggestions have been summarized is attached at **Annexure B.4**.

SAREP may give a brief presentation.

ITEM NO. B.5:	**Declaration of High and Low Demand Season in compliance with CERC (Terms and Conditions of tariff) Regulations,2019-ERLDC.**

As per the Tariff Regulations 2019-24, ERLDC has been mandated to declare the high demand season (3 nos, months in a FY) and low demand season (remaining 9 nos. months in a FY) for FY 2024-25 at least 6 months in advance i.e. by 30th September 2023.

ERLDC has worked out the same by considering month-wise cumulative energy consumed by the region minus the cumulative monthly energy generated by the regional hydro generations. The month-wise data for FY 2022-23, FY 2021-22 and average month-wise data for last 5 FY are compared. The top 3 months in which the data is maximum in two out of the three data sets are considered to be high demand season and the rest 9 months are considered as low demand season.

Month	Monthly Energy consumption less Hydro Gen(in MU) in FY 2022-23	Monthly Energy consumption less Hydro Gen(in MU) in FY 2021-22	Monthly Average Energy consumption less Hydro Gen(in MU) in last five years
APR	14060	13564	11802
MAY	13767	11013	11430
JUN	12995	10190	11142
JUL	13367	11253	11199
AUG	12618	10895	11029
SEP	11994	10351	10507
OCT	11674	10580	10785
NOV	10791	9851	9900
DEC	11464	10742	10537
JAN	12440	11629	11327
FEB	11870	10751	10633
MAR	13766	13369	12437

As observed from the aforementioned table, the maximum average energy consumption less average hydro generation is found to be during the months of April-24, May-24 and March-25. Thus the proposed High & Low Demand Season for FY 2024- 25 is as follows:

- **High demand season:** April 2024, May 2024 and March 2025
- **Low demand season:** June 2024, July 2024, August 2024, September 2024, October 2024, November 2024, December 2024, January 2025 and February 2025

ERLDC may update. Members may discuss.

ITEM NO. B.6: Shutdown proposal of generating units for the month of September 2023. – ERPC.

Maintenance Schedule of Thermal Generating Units of ER during 2023-24 in the month of September'2023							
System	Station	Unit No.	Capacity (MW)	Period (as per LGBR 2021-22)		No. of Days	Reason
				From	To		
TVNL	Tenughat TPS	1	210	01.07.2023	15.08.2023	46	AOH
DVC	Koderma TPS	1	500	01.09.2023	25.09.2023	25	BOH
WBPDCL	Bakreshwar TPS	1	210	30.08.2023	03.10.2023	35	BOH/Turbine Overhauling
OPGC	IBTPS	3	660	01.09.2023	30.09.2023	30	
OPGC	IBTPS	1	210				AOH
NTPC	KBUNL	3	195	21.08.2023	04.10.2023	45	COH
NTPC	FSTPP	4	500				Generator OH

DPL	DPL TPS	7	300	01.08.2023	30.09.2023	61	Boiler +LPT O/H+Generator rotor thread out and checking + NOX work
DPL	DPL TPS	8	250				AOH
GMRKEL	GMR	2	350	25.09.2023	09.10.2023	15	AOH
GMRKEL	GMR	3	350	15.08.2023	17.09.2023	34	AOH

Members may update.

ITEM NO. B.7: Prolonged shutdown of Farakka unit-4 – WBSEDCL.

FSTPP U#4 tripped on 16.07.2023 due to GT Y- phase oil leakage and low hydrogen pressure and has been out of bus since then. Upon telephonic enquiry from ERLDC in the last week of July'2023 it was come to the knowledge that the said machine has been taken shutdown for overhauling work. It is to be recorded that no prior formal information regarding the said preapproved shutdown was received by WBSEDCL as a beneficiary neither from FSTPP end nor from ERLDC end. For such surprise shutdown, WBSEDCL has been losing around 4MU availability per day & replenishing the same through procurement from Exchange Market at the average rate of around Rs.6.72/- against the plant variable cost of Rs.3.25/- per unit. It may be recalled that in the last year also U5 of Farakka tripped on 17.03.2022 with Bottom Ash Problem & was out of bus till 27.05.2022. The Energy Exchange Market price during those periods was around Rs.8.39/- per unit.

Hence, such surprise shutdown has a significant commercial implication in power purchase portfolio of beneficiaries & required to be monitored assiduously from appropriate level. It is also to be recorded that WBSEDCL is still in dark regarding the date of restoration of the said shutdown.

WBSEDCL may update. Members may discuss.

ITEM NO. B.8: Prolonged Mismatch between ISGS Entitlement & Schedule in respect of beneficiary, due to differential treatment of Ramp function during scheduling of upward revision of entitlement under zero back down condition. – WBSEDCL.

In several blocks it has been noticed that there is some quantum mismatch between beneficiary's Entitlement & schedule in respect of NTPC stations & the same differential quantum is displayed as URS available i.e. back down from the concerned beneficiary. Upon case study it has been revealed that during those blocks no back down was imposed by the beneficiary & such mismatch is generated due to differential treatment of ramp function during scheduling implementation against the request of upward revision of Station DC from generator end. The Ramp function as stipulated was not followed during upward revision of Station DC but the same was followed strictly in the corresponding upward revision of SG & such gap quantum thus generated was dispatched in real time for RTM transaction, SCED, URS allotment & Ancillary service purpose, depriving the original beneficiary. Some case study in this regard is attached at **Annexure B.8** for reference.

WBSEDCL may update. Members may discuss.

ITEM NO. B.9:	**Prolonged Mismatch between beneficiary's Actual entitlement as per GOI allocation & Real time allocated entitlement from NTPC Stations. – WBSEDCL.**

For NTPC Plants, in several blocks, it has been noticed that beneficiary's entitlement quantum is less than the corresponding proportionate share (as per GOI % allocation) of the DC placed by concerned generator. Upon case study it has been revealed that in those blocks GOI allocation % was violated & the gap quantum was sold by the generators in Day Ahead Market depriving the beneficiaries. Some case study in this regard is attached at **Annexure B.9** for reference.

WBSEDCL may update. Members may discuss.

ITEM NO. B.10:	**Requirement of cold spares for ICTs in Eastern Region to meet any exigency-ERLDC.**

Utilities wise 400/220 kV ICTs Installed capacity vis-à-vis present spare capacity is as follows:

Sl No	Name of Utility	Installed Capacity (Nos)		Cold Capacity (Nos)	Spare	Remarks
		500 MVA ICT	315 MVA ICT	500 MVA ICT	315 MVA ICT	
1	PGCIL	27	47	3	4	One 315 MVA under procurement
2	Other ISTS (NKTL, PMJTL, PMTL, DMTCL)	8				
3	NTPC/NPGC/BRBCL		4			
4	WBSETCL/WBPDCL/CESC		23			
5	OPTCL/SEL		12			One 500 MVA under procurement
6	DVC		10			One 315 MVA spare will be available as per approved plan
7	BGCL	4				

It can be noted that at present West Bengal, Odisha and DVC, which have significantly large number of 400/220 kV ICTs don't have any cold spare capacity, although Odisha and DVC have plan to have spare capacity in future. However, West Bengal has not yet shared its plan for maintaining cold spare capacity.

Powergrid installed capacity vs cold spare capacity, may be used as a benchmark for maintaining cold spare by different utilities. Considering this the cold spare capacity that needs to be maintained at different utilities having significantly large numbers of ICTs comes out to be as follows:

Sl No	Name of Utility	Total Number of 400 /220 kV ICTs (315 MVA)	Proposed Cold Spare to be maintained
1	WBSETCL/WBPDCL/CESC	23	2
2	OPTCL/SEL	12	1
3	DVC	10	1

Members may update.

ITEM NO. B.11:	Non operationalization of HOT line between Teesta III - Rangpo – Teesta-III.

Teesta III HEP vide mail dated 28.08.2023 has confirmed that HOT line is not working between Teesta III-Rangpo. Communication has been checked between Teesta III and Rangpo, which was found to be in healthy condition but problem seems to exist at Rangpo S/S that needs to be identified and rectified thereafter**.**

Teesta-III may update. Members may discuss.

ITEM NO. B.12:	Availability of Generation data during non-solar hours. –ERLDC.

All India power demand has exceeded All India power demand has exceeded 234GW with states of ER not also lagging behind and touching all-time highs recently. Considering this high demand period, it is extremely crucial to maintain adequate generation resources, especially maximisation of thermal and hydro generation during non-solar hours. As per advice from ministry, Grid-India / ERDLC is reconciling generation margin available on running units between 1900hrs to 2400hrs every day for the previous day. The report requires data from all generators (ISGS, IPP, SGS etc.) corresponding to max Gen, min Gen, reason for not attaining full generation etc between the said period. Presently ERLDC is mostly relying on SCADA to generate the report. But to bring more authenticity, ISGS or IPP or SLDCs in collaboration with their embedded Genco may need to provide required real time or offline data to ERLDC.

Already it has been observed that a margin to the tune of say 1.5 GW in Eastern region while 15 GW on all India bases are available on running units during evening peak while states are compelled to shed load due to power crisis. So, all stake holders of our region specially Genco & SLDCs may come forward to facilitate dispatch of idle spinning capacities.

All SLDCs and GENCO may provide the desired generation data for the plants along with the reason of less generation last day by 3:00 Hrs daily for submission to NLDC. The format of data is as per **Annexure-12.1**. RLDCs/NLDC is in the process of implementation of real-time margin calculation and assistance from all stakeholders are require in coming days also. Some plants of ER having margin during non-solar hours on regular basis and detail is in **Annexure-B.12.2.**

ERLDC may update. All SLDCs and Gencos may respond.

ITEM NO. B.13:	Request to furnish the data for preparation of LGBR 2024-25 of Eastern region – ERPC.

As per the IEGC Clause **32.3**(**a**) & (**b**) issued by CERC on 29.05.2023, "RPCs shall prepare and finalize the annual outage plan for the next financial year in respect of grid elements of their respective regional grid*", "RPCs shall prepare Load Generation Balance Report (LGBR) for the respective region based on the LGBR submitted by SLDCs for their respective states and the data submitted by the regional entity generating stations, inter-State transmission licensees and other entities directly connected to ISTS in such format as may be stipulated by the RPCs and shall prepare annual outage plan for generating units and transmission elements in their respective region* *after carrying out necessary system studies in order to ensure system security and resource adequacy."*

In this regard, Load Generation Balance Report (LGBR) for the year 2024-25 in respect of Eastern Region is to be finalized by September, 2023 (as advised by CEA vide mail dated. 14.08.2023). The approved programme of planned maintenance in respect of Thermal and Hydro stations in the region, along with the estimated monthly generation programme, the estimated monthly energy requirement (MU) and estimated monthly peak/off-peak demand (MW) for the year 2024-25 of each state / utility shall be the input for preparation of LGBR of Eastern Region for 2024-25.

To prepare the LGBR of Eastern Region, the following data/ information for the financial year 2024-25(April'2024 to March'2025) in respect of the constituents/ generators of Eastern Region is required:

<u>State and Central Sector Generators/IPPs/CPPs/SLDCs/Utilities</u>

i) The Unit-wise and Station-wise monthly energy generation proposed from existing units during 2024-25 (thermal, hydro and RES).
ii) Annual maintenance programme for each of the generating units (thermal, hydro and RES)
iii) Generating units under R&M/ long outage indicating date of outage and reasons of outage and expected date of return (thermal and hydro both).
iv) Partial and forced outage figures (in %) of generating units and auxiliary power consumption for the last 3 years.
v) Month-wise peak/off-peak demand (MW) – restricted and unrestricted.
vi) Month-wise energy requirement (in MU) – restricted and unrestricted.
vii) Month-wise and source-wise power purchase and sale plan (both MU & MW).
viii) Schedule of commissioning of new generating units during 2024-25 and unit-wise monthly generation programme (in MU) upon COD.
ix) Allocation of power from new generating units.

<u>ISTS/STU/Transmission licenses in the states and Central Sector</u>

i) Monthly and annual planned outage of transmission system (Transmission lines 220kV and above / ICTs / Reactors/ other elements (TCSC, SC etc.)).

It is therefore requested to provide the above information (as applicable), at earliest, for compilation of data and preparation of draft **LGBR of ER for the year 2024-25.**

ERPC may update. Members may discuss.

ITEM NO. B.14:	Anticipated Power Supply Position during the month of September 2023. – ERPC.

The abstract of peak demand (MW) vis-à-vis availability and energy requirement vis-à-vis availability (MU) for the month of September 2023 were prepared by ERPC Secretariat (**Annexure B.14**) on the basis of LGBR for 2023-24 and feedback of constituents, keeping in view that the units are available for generation and expected load growth etc.

Members may update.

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OBSERVATIONS OF SITE VISIT BY COMMITTEE FOR ARRANGEMENT FOR START UP POWER TO UPCOMING SJVNL POWER PLANT AT CHAUSA IN BUXAR DISTRICT (BIHAR).

Members present:

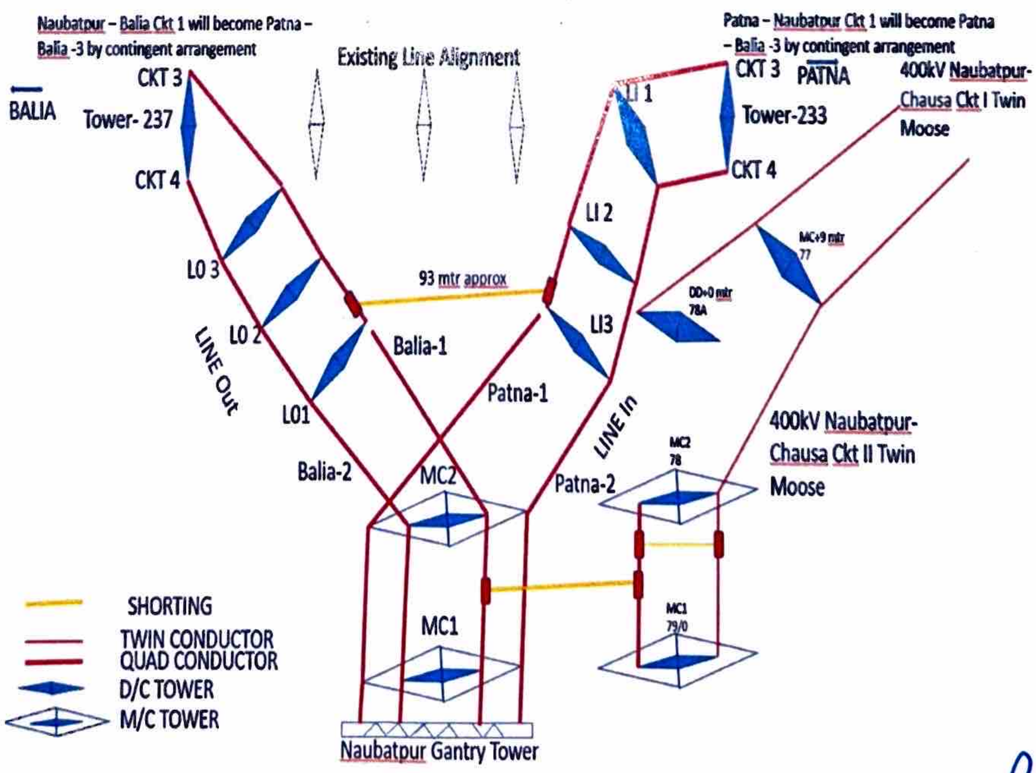
PGCIL	BGCL	BSPTCL
Shri Ankur Kumar, DGM (AM)	Shri Rajesh Sr. GM (O&M/Proj/ Comml)	Shri Tanmay Pathak, ESE (P-1)
		Shri Arun Kumar Rai, ESE, TC, Patna West
		Shri Surya Mani Kumar, EEE (P-1)

A special online meeting was convened by ERPC on dated 02.08.2023 regarding feasibility of providing start-up Power to SJVNL, Chausa (Buxar) Power plant from 400/220/132 kV Naubatpur Sub-station (GIS) of BGCL. Accordingly, site visit of committee members from Power Grid, BGCL and BSPTCL at Naubatpur SS has been organized on 03.08.2023. The detailed observations of the committee are as follows:

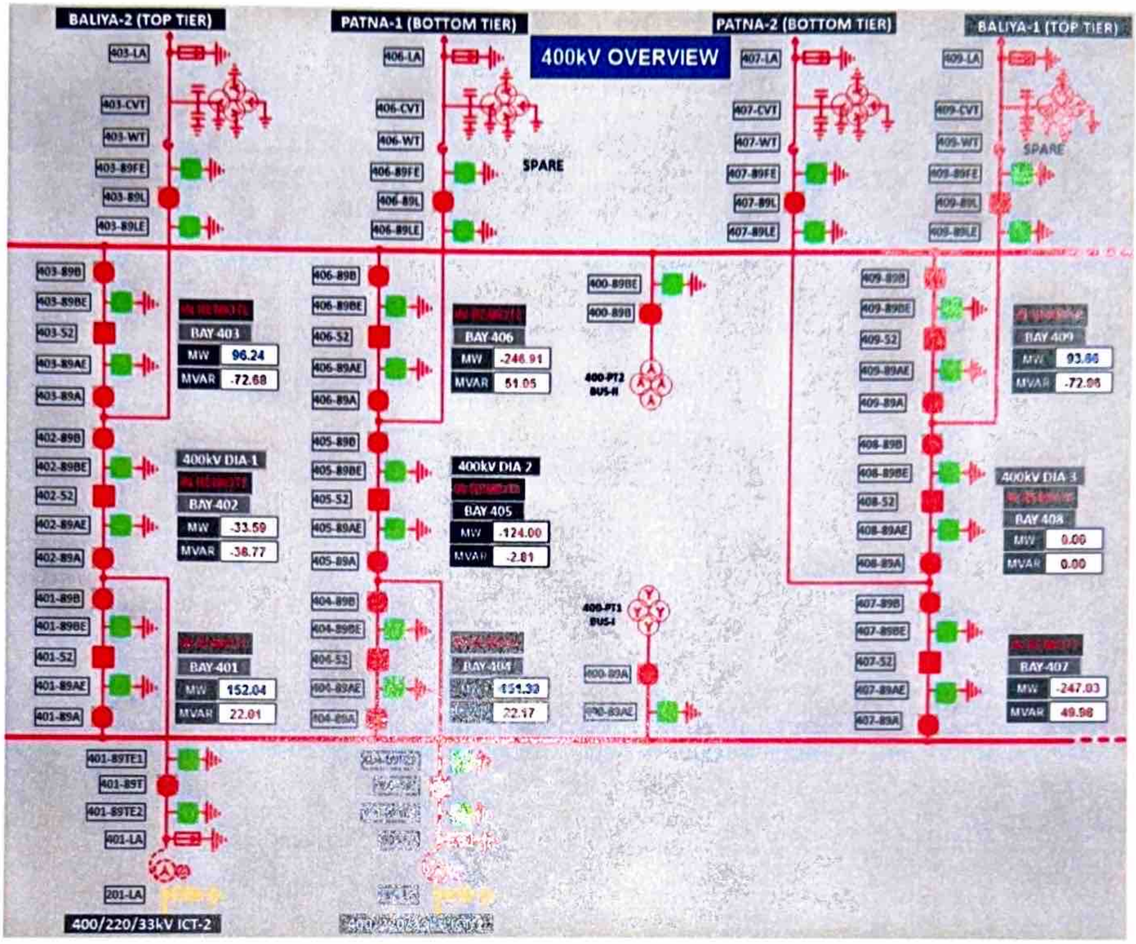
1. For establishing 01 no. 400 kV circuit direct connectivity between Patna to Balia, shorting of 400 kV Patna-Naubatpur-1 (Quad Moose) and 400 kV Naubatpur-Balia-1 (Quad Moose) outside Naubatpur Sub-station have been explored through shorting at normal tower locations Loop In (1/0-DD+0-LI3) and Loop Out (1/0-DD+25-LO1) owned by BGCL through twin moose or equivalent HTLS conductor.

   The sketch for the above said arrangement is attached for reference. However, suitability and feasibility required clearance need to be verified at site.

Arrangement for startup power of upcoming Chausa Thermal Power Plant



2. Owing to above bypass arrangement, presently in service bays pertaining above feeders at Naubatpur i.e. Bay no-409 (existing main bay of Balia-1 feeder) and Bay no. 406 (existing main bay of Patna-1 feeder) along with associated tie bays shall become spare for connectivity with 400 kV Chausa (Buxar)-Naubatpur (under construction by BSPTCL) for start up power purpose.



3. For termination of the 400 kV Chausa (Buxar)-Naubatpur line into Naubatpur GIS, all the possibility has been explored. It has been observed that 01 circuit of said line can be terminated into Naubatpur Sub-station into bays of 400 kV Naubatpur Balia -I feeder by shorting arrangement between Multi-circuit Tower MC 2 and MC1 of 400 kV Chausa (Buxar)-Naubatpur D/C line and Multi-circuit Tower MC2 and MC1 of 400 kV Patna Naubatpur D/C and 400 kV Naubatpur Balia D/C line in top tier. The sketch related to para 1 is attached for reference.
4. Subsequently, the bays pertaining 400 kV Balia-1 line (Bay No.-409 and tie) at Naubatpur will be utilized for extending start up power. However, the bays pertaining 400 kV Patna-1 line (Bay no. 406 and tie) at Naubatpur shall remain spare and can only be utilized for completion of diameter of opposite element i.e. 500 MVA 400/220/33 kV ICT-1 at Naubatpur.

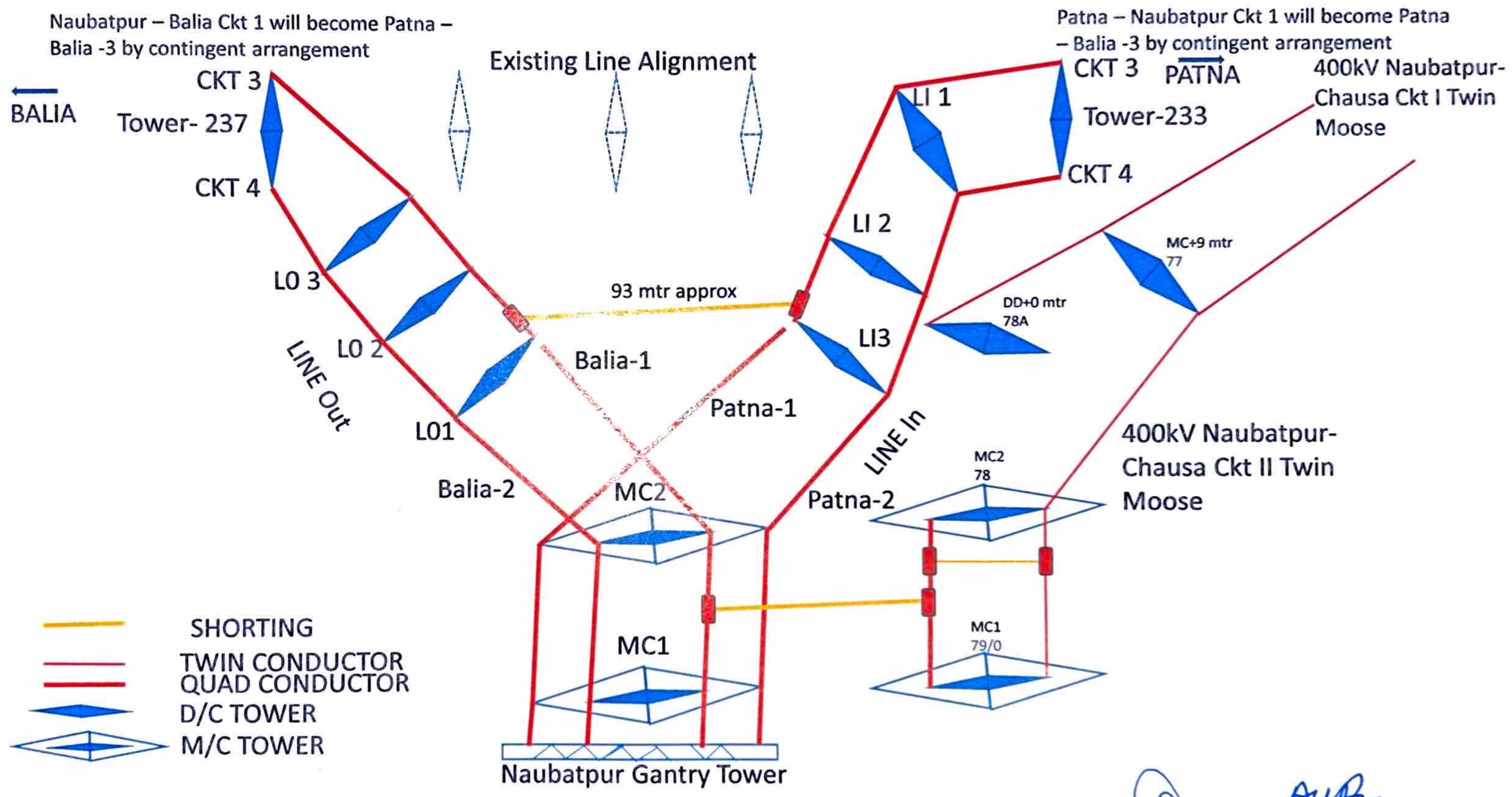
5. **Further, Protection and SCADA issues involved in above arrangements:**

a) PLCC equipment (ABB make: model ETL600) of 400 kV Balia-1 line needs to be shifted from Naubatpur to Patna to match remote end equipment.
b) One PLCC/DTPC with SDH will be required for one circuit of 400 kV Chausa (Buxar)-Naubatpur line at both the ends.
c) CRP related work such as dismantling of PLCC panels and rewiring of the control and protection wire of above associated line at Naubatpur and Patna, end to end PLCC testing etc is also involved. PLCC Engineer will be required for the same.
d) Resetting of Relays, SCADA name change and data validation etc. at Patna, Balia and Naubatpur is required at SLDC/ERLDC/NRLDC.
e) Proper Energy accounting to be ensured.

Above activities are involved in extension of start-up power to Chausa, Buxar Thermal Power station along with maintaining the ER-NR corridor capacity.

For PGCIL	For BGCL	For BSPTCL
Ankur Kumar		
Shri Ankur Kumar, DGM (AM)	Shri Rajesh Sr. GM (O&M/Proj/ Comml)	Shri Tanmay Pathak, ESE (Project-1)
		AKRay
		Shri Arun Kumar Rai, ESE, TC, Patna West
		Shri Surya Mani Kumar, EEE (Project-1)

Arrangement for startup power of upcoming Chausa Thermal Power Plant



Annexure B.4

USAID
FROM THE AMERICAN PEOPLE

GOVERNMENT OF INDIA
MINISTRY OF POWER

Workshop on
DEPLOYMENT OF SYNCHRONOUS CONDENSERS IN INDIA

Proceedings of the workshop

May 26, 2023

Disclaimer: The data, information, and assumptions (hereinafter 'data-set') used in this document are in good faith and from the source to the best of SAREP (the program) knowledge. The program does not represent or warrant that any data-set used will be error-free or provide specific results. The results and the findings are delivered on "as-is" and "as-available" data-set. All data-set provided are subject to change without notice and vary the outcomes, recommendations, and results. The program disclaims any responsibility for the accuracy or correctness of the data-set. The burden of fitness of the data-set lies completely with the user. In using the data-set data source, timelines, the users, and the readers of the report further agree to indemnify, defend, and hold harmless the program and the entities involved for all liability of any nature

CONTENTS

1. BACKGROUND

Globally, countries are increasingly relying on energy generation from renewable sources for lowering greenhouse emissions and minimizing their dependence on fossil fuels. India, too, has set itself an ambitious target of 500 GW of non-fossil based installed electricity generation capacity by the year 2030. It is evident that going forward the renewable energy share in generation mix will increase significantly in comparison to that of conventional generators.

This transition is expected to significantly reduce the system inertia since the renewable generators are connected to the grid using power electronic converters and are thus unable to provide the required inertial response during major grid disturbances. Due to ongoing evolution of grid, there is an urgent need to monitor the system inertia and provide inertia to the system at strategic locations.

While planning for renewable energy rich network with addition of static solutions like Static synchronous Compensator (STATCOM) and Static VAR(Volt-amperes reactive) Compensator (SVC), the focus needs be drawn to the need of improving the Short Circuit Ratio (SCR) and Inertia at different nodes in Renewable Energy (RE) rich regions. The same can be done by mapping SCR and inertia in different regions. The SCR for a voltage event has similar character as inertia for a frequency event and thus both play an equally important role. The SCR helps during a voltage transient event due to a fault and inertia helps during a frequency transient event (large generation loss).

In order to ensure stable, reliable, and quality power, it is of utmost importance to understand the various needs of power system emerging due to transition of power generation technologies as well as understanding the behavior of different technologies available in the market.

USAID's previous bilateral initiative with the Ministry of Power (MoP), Government of India called Greening the Grid (GTG) -Renewable Integration and Sustainable Energy (RISE) program supported large-scale integration of renewable energy and enhanced grid reliability and security. Building on this initiative, USAID's ongoing energy program, South Asia Regional Energy Partnership (SAREP) is supporting in the large-scale integration of renewable energy with technical assistance to power sector stakeholders. USAID through SAREP held a full day workshop in hybrid-mode to discuss and deliberate on "Deployment of Synchronous Condensers (Syncons) in India" at the Northern Regional Power Committee (NRPC) office in New Delhi on May 26, 2023.

This workshop received overwhelming participation of 117 members with 55 physically present at the workshop – including representatives from NRPC, GRID-INDIA, Central Electricity Authority (CEA), Central Electricity Regulatory Authority (CERC), National Thermal Power Corporation (NTPC), PowerGrid, Regional Load Dispatch Centers (RLDCs), State Transmission Utilities (STUs) of Haryana, Tamil Nadu, Madhya Pradesh; West Bengal State Electricity Distribution Company Ltd. (WBSETCL - PSP) and other public and private stakeholders.

Participants at the National workshop on Synchronous Condensers in NRPC

2. SESSION I: INAUGURAL SESSION

Mr. V K Singh (Member Secretary, NRPC) opened the forum with his welcome address followed by Remarks by Ms. Monali Zeya-Hazra, Senior Clean Energy Specialist from USAID/India who provided a brief overview of USAID's engagement with the Ministry of Power, Government of India and USAID's clean energy program, South Asia Regional Energy Partnership.

The welcome remarks were followed by remarks of Mr. S R Narasimhan (Chairperson and Managing Director (CMD), GRID-India) who set the context for the event. Finally, the chief guest of the event, Mr. Ghanshyam Prasad (Chairperson, CEA) delivered his Special Remarks.

2.1 CONTEXT SETTING BY CMD, GRID-INDIA

Mr. S R Narasimhan, CMD – GRID-India expressed his delight in attending a workshop on a topic of high importance to all sector stakeholders. He reflected on the landmark developments in the Indian power sector. He appreciated India's efforts in RE capacity addition of around 110 GW in last three-four years. As a system operator, GRID-India is observing the energy transition in India and internationally. While the most advanced economies are struggling to manage the interconnection queues for Solar, Wind and Battery Energy Storage System (BESS) projects, India has been very efficient in managing queues through deployment of pooling stations, development of appropriate regulatory mechanisms and technical standards.

With larger deployment of Inverter-based Resources (IBRs), reactive power, inertia and system strength are of key importance to the system operator. He emphasized on the need to look back at the old warhorse of the power system – synchronous condenser, a few of which were in service in India during the 1970s at Rana Pratap Sagar Dam, Jaipur, and Rourkela. In the past, all rotating machines were assumed to pe a part of the generation system, and hence, operation and cost recovery was dictated by the regulations and guidelines of the generation sector. However, it is possible to deploy synchronous condenser as a transmission element under Tariff Based Competitive Bidding (TBCB) mode. He sought the opinion of all stakeholders on what would be the requirement and how best can synchronous condensers be deployed practically.

Special Address by Mr. Ghanshyam Prasad, Chairperson CEA and Context setting by Mr Narasimhan, CMD, GRID-India

2.2 SPECIAL ADDRESS BY CHAIRPERSON, CEA

Building on the context set by GRID-India, Mr. Ghanshyam Prasad, Chairperson, CEA elaborated on India's efforts and ambitions to achieve 500 GW of non-fossil capacity, which is expected to contribute roughly 40% to the energy mix by 2030. Owing to the size of the Indian grid, predominantly run-on conventional generation, system inertia was never a constraint and hence, it was not necessary to deploy synchronous condensers. However, India has deployed syncons in the past and due consideration is given to reactive power compensation devices even today during transmission planning.

Inertia, however, is a separate issue and requires a detailed study in the Indian context to assess the requirement of syncons today and in the future. The end goal should be to deliver reliable and quality power to all. At this stage, a pre-study is required to understand the best combination of available solution(s) is to achieve the end goals. CEA and Central Transmission Utility (CTU) are the two statutory bodies who undertake studies at national level. Once again, both CEA and CTU must join hands and work together to undertake the pre-study. He suggested documenting the history of syncons in the country even while the country explores its deployment for RE integration support. He further suggested organizing regional workshops on Syncons with Regional Power Committee or Regional Load Despatch Centres to create more awareness and discussion around Syncons. He finally thanked USAID and all participants for joining the workshop.

2.3 SAREP'S TECHNICAL PRESENTATION ON SYNCON

SAREP through a presentation elaborated on Syncons as a power system element and its three-fold benefits in providing dynamic reactive power and short circuit power support while strengthening the system from an inertia perspective. The presentation also apprised all sector stakeholders on syncon deployment at international stage and the relevant use cases for such deployments. SAREP also presented a performance comparison of Syncon with other similar technologies like STATCOMs, SVCs, etc.

Technical Presentation by Mr. D K Chaturvedi, Technical Expert SAREP

The presentation apprised delegates on the contribution of Syncon during a major fault (a voltage transient event) is to the tune of 400-500% of its rating as compared to contribution limited to 120-130% of its rating in case of STATCOMs. The inertial support is very important to help during a frequency event (to limit Rate of Change of Frequency (RoCoF)) is only available from Syncon amongst all Flexible AC Transmission System (FACTS) devices.

SAREP highlighted the need to consider Syncon as an option while planning grid-scale assets, as it emerges as an effective solution world over to manage the grid transient conditions during a fault or a large generation loss. The low upfront capital investment requirement, small footprint, technological maturity, and an asset life of forty years makes Syncon an attractive alternative to be considered for grid services. While new syncons allow the flexibility to provide the requisite reactive power, short circuit power, and inertia services at nodes of interest, retrofitting of existing, old, or retired generating units is also an option. However, there may be a lot of challenges in retrofitting due to ownership, operation, and cost recovery issues.

Mr. S K Soonee, former CMD of the erstwhile Power System Operation Corporation of India (POSOCO), and Senior Technical Adviser, SAREP, provided historical context of power systems in India. Mr. Soonee said that syncons have been around in the 70s-80s as well, and hence the current focus is not a new development but a kind of renaissance for the technology. He also cited some recent instances of disruption in power supply, where syncons could have helped stabilize the situation.

Following the technical presentation and expert inputs, various participants such as Mr. A K Rajput, Member (Power System), CEA, and Mr. Awadhesh Kumar Yadav, Chief (Engineering), CERC expressed their thoughts, concerns, and exchanged ideas.

Participants listening to the Chief Guest, Mr. Ghanshyam Prasad, Chairperson, CEA

3. SESSION II: TECHNICAL PRESENTATIONS

The session was chaired by Mr. A K Rajput, Member (Power Systems) CEA followed by technical presentations delivered by GRID-India, and Original Equipment Manufacturers (OEMs).

Session 2: Technical Presentations chaired by Mr. A K Rajput

3.1 TECHNICAL PRESENTATION BY GRID-INDIA

GRID-India apprised all stakeholders of the uniqueness of the Indian power sector, both in terms of opportunity and challenges, due to its fast-paced, large-scale RE integration into the grid. The percentage of synchronous capacity on the grid is likely to change from current levels of 77% to 50% by 2030. However, the Indian system operator is already experiencing massive operational challenges with RE power parks. The following incidents reported by GRID-India, demonstrate the operational challenges with large RE integration into the grid:

1. In January 2022, several Extra High Voltage (EHV) lines tripped on account of High Voltage Ride Through (HVRT) trigger and resulted in a generation loss of 2000 MW from RE power park.
2. In February 2023, the system operator experienced 8 'grid events' within a time span of 45 minutes. The grid events led to sustained forced oscillations, outage of 7 EHV lines and complete outage of a 765 kV substation in Rajasthan.
3. In May 2023, inadequate fault ride through capability resulted in a frequency dip of 0.58 Hz and a loss of 7000 MW of RE generation.

The system was secure during all such incidents but with the accelerated development of RE projects, the grid operators are faced with the following major operational bottlenecks:

1. Multi-GW scale RE generation outages leading to voltage dips and voltage swells at pooling stations, in a matter of milliseconds
2. Low frequency oscillations
3. Frequent change of High Voltage Direct Current (HVDC) polarity due to changing power flow pattern

In view of the current system operation challenges, GRID-India emphasized the requirement of reactive power reserves and resource margin, dynamic reactive power support, system inertia monitoring and shortfall mitigation. As a short-term measure, power sector stakeholders may explore the possibility of using hydro-electric generators in synchronous condenser mode. However, the absence of compensation mechanism for reactive power, voltage support and inertia contribution may discourage hydro plant owners from operating their plant in syncon mode.

GRID-India Presentation by Mr. Vivek Pandey

To strengthen the grid capacity for handling higher contribution of RE, it is important to rethink the power system planning philosophy from a reactive power and inertia perspective. The planning agencies may evaluate the placement of STATCOMs and syncons in Indian grid and explore repurposing of thermal power plants as an alternative.

Grid India opined that it is also necessary to seek the regulator's views on cost recovery mechanism, metering, and role of reactive power markets for deployment of syncons in India.

3.2 TECHNICAL PRESENTATION BY ORIGINAL EQUIPMENT MANUFACTURERS (OEMS)

Prominent manufacturers in the field such as Siemens and General Electric (GE) also presented an overview of their syncon product catalogue with case studies on international deployments and associated use cases. Europe, Australia, and USA are centers for syncon deployment. A delivery timeline of 2 years is reasonable for new syncon deployment. The manufacturers highlighted that technology is not a concern but enabling regulations need to be developed in India.

Technical Presentations by OEMs

4. SESSION III: EXPERIENCE SHARING BY INTERNATIONAL EXPERTS

4.1 EXPERIENCE SHARING BY DR. LUIS ROCCO, INSTITUTO DE INVESTIGACIÓN TECNOLÓGICA (IIT) COMILLAS

The technical expert from Spain, Dr. Luis Rocco also shared his experiences on Syncon. In Spain, synchronous condensers are deployed with a strong and clear regulatory framework in place. The interconnection of non-synchronous generation is planned based on grid access capacity at the point of interconnection. The regulatory framework considers the short circuit capacity, static security, dynamic security, and weighted short circuit ratio of power park modules as the governing criteria for assessing the grid access capacity for RE integration. In case of inadequate SCR, static or dynamic security, syncon deployment is considered at park/Point of Connection (PoC) level to enhance the grid access capacity for reliable and secure evacuation of RE from the power plant/park.

4.2 EXPERIENCE SHARING BY MR. FABIAN SPESCHA, EX- AUSTRALIAN ENERGY MARKET OPERATOR (AEMO)

The syncon expert from Australia, who was previously a part of AEMO informed the stakeholders of the inertia studies undertaken by the market operator. AEMO has developed guidelines for monitoring and maintaining the minimum system strength at certain nodes in the power system. The system strength charge for installation at key points is determined as a sum of system strength unit price (fixed charge), system strength locational factor (electrical distance from the nodes of interest), system strength quantum (based on SCR of new generating system and its rates MW output).

Experience sharing by International Experts

The regulatory framework requires generators to assess the impact of proposed RE plant on the grid. For interconnection, the generators carry out detailed system studies considering the capacity addition targeted at the node. If the planned capacity addition at concerned node is infeasible, the RE developer may opt for any of the following:

- Reduce capacity of plant
- Modify control systems
- Expand transmission network
- Install grid forming equipment
- Constrained operation

5. SESSION IV: OPEN DISCUSSION WITH STAKEHOLDERS

The workshop was concluded with an open discussion on stakeholder's perspective of challenges, potential solutions, feasibility, and mode of deployment as well as any enabling policy and regulatory measures required for syncon deployment. This section summarizes the key takeaways from open discussion with stakeholders.

Open Discussion session chaired by Mr. S K Soonee

Based on the consultation with stakeholders, the following key challenges were identified:

- Lack of a consolidated database of past syncon deployments and operational experience
- Inadequate utilization of hydro power plants as synchronous condensers due to technical and financial constraints
- Limited focus on reactive power adequacy as part of resource adequacy studies
- Lack of a detailed national level study to identify the current inertia and the long-term inertia (2050 horizon) and short circuit power requirements at different nodes of Indian power system
- Lack of technical guidelines for sizing and siting of synchronous condensers
- Absence of adequate regulatory mechanism for cost recovery/incentivization of inertia, short-circuit support as grid services
- Lack of pilots that demonstrate the benefits of syncon

To address the identified challenges, the following solutions were discussed by stakeholders:

- Creation of a national level data repository of past syncon installations
- Carry out feasibility studies to operate existing hydro power plants and planned pumped storage plants in syncon mode
- A reactive power adequacy study may be taken up at national-level jointly by CEA and CTU
- A detailed national-level study for long-term inertia estimation and short circuit power of power system can be carried out
- Syncon pilot implementation (early deployments) may be taken up with following key considerations:
    - Stakeholder consultation

        - Plan regional level workshops to further advance the discussion on needs and deployment methods
    - Site selection for deployment
        - Substations with Short Circuit Ratio (SCR) below 3 and near RE complex may be the immediate targets.
        - Sites identified based on detailed dynamic studies may also be considered.
        - Any other site of strategic importance may be considered in consultation with system planners, operators, and regulators.
    - Bidding, installation, and operation
        - May be deployed under Tariff Based Competitive Bidding (TBCB) mechanism.
        - Greenfield syncons are likely to be the most suitable solution.
        - Cost of operation (power supplied for syncon operation) may be pooled under regional losses.
    - Cost recovery
        - Option 1 - As fixed tariffs similar to transmission assets
        - Option 2 - A market-based cost recovery with reactive power market

        Initially option 1 can be adopted on similar lines as deployment of STATCOMs, later option 2 can be looked into after sufficient experience is gained

    - Performance monitoring and impact assessment
        - Monitoring of syncon output, especially during imbalances and disturbances is essential to establish to identify the impact of syncon on grid stability.

6. WAY FORWARD

1. Plan regional workshops with RLDCs, Regional Powe Committees (RPCs), STUs, State Load Dispatch Centers (SLDCs) and other stakeholders to
    a. Deliberate on operational challenges and potential locations for syncon installation
    b. Collect data for creation of national level data repository for syncons
2. Inertia estimation study with following objectives
    a. Establish the minimum threshold and secure operation levels of inertia for stability and reliability
    b. Analyze the different inertia estimation and monitoring methods and provide recommendations on inertia monitoring tool design
    c. Simulate the inertia requirement for different time horizons under business – as – usual and projected high RE penetration scenarios.
    d. Conduct knowledge dissemination sessions on long-term inertia estimation studies for Indian grid
3. Consult with stakeholders on their interest in deploying syncons
4. Develop project proposal with anchor stakeholder (proposal to outline size, location, budgetary estimates, implementation timeline and success indicators)
5. Submit proposal for Regional Power Committee’s review and approval
6. Upon approval, engage with stakeholders for implementation

ANNEXURE I – WORKSHOP AGENDA

Date : May 26, 2023
Venue : Northern Regional Power Committee (NRPC), Katwaria Sarai, New Delhi-110 016

Name of Session	Speaker
Inaugural Session	
Welcome Remarks	Mr. V K Singh, Member Secretary, NRPC
Introduction to SAREP	Ms. Monali Zeya Hazra, Senior Clean Energy Specialist, USAID/India
Context Setting	Mr. S R Narasimhan, CMD, GRID-INDIA
Special Address	Mr. Ghanshyam Prasad, Chairperson CEA
Presentation by SAREP Synchronous condensers benefits, comparative analysis, and approach for implementation in India	Mr. DK Chaturvedi, Technical Expert – SAREP (Ex NTPC) Mr. Ajay Rawat, Lead-Utility Modernization, SAREP
Technical Presentations	
Presentation and Discussion RE induced operational challenges for GRID-INDIA	Mr. Sameer Saxena/Mr. Vivek Pandey, GRID-INDIA
Presentation by Siemens Synchronous condenser technology and solutions available in market	Mr. Moritz Ackermann, Head – Special Electric Machines, Siemens Energy, Germany
Presentation by General Electric Synchronous condenser technology and solutions available in market	Mr. Sushil Trivedi, Generator Expert, General Electric
Experience Sharing	
Expert's View How Synchronous Condenser could be beneficial to Renewable Rich Network?	Dr Luis Rouco (through weblink) Professor, Electric Power Systems, IIT Comillas, Spain
Presentation and Experience sharing from the perspective of System Operator - Australia	Mr. Fabian Spescha (through weblink) Grid Connection Manager, Total Eren Ex- AEMO
Open Discussion	
Views of key stakeholders on deployment of Synchronous Condensers in India and next steps	Moderated by Mr. S K Soonee, Technical Expert, SAREP (Ex-CMD, POSOCO)
Summary of deliberation and key take aways	

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Annexure B.8

<u>Case Study - Mismatch between ISGS Entitlement & Schedule in respect of beneficiary, due to differential treatment of Ramp function during scheduling of upward revision of entitlement under zero backdown condition</u>

GENERATING STATION	DATE	BLOCK	ENTITLEMENT OF WBSEDCL (AS PER GOI)	SCHEDULE OF WBSEDCL	SHARE FOREGO/URS AVAILABLE (ACTUALLY NOT IMPOSED BY WBSEDCL)	PERTICIPATING SEGMENT **RTM**	SIMILAR INCIDENCES	
							DATE	BLOCK NOS
FSTPP STG III	11-08-2023	50	147	135	12	34	01-07-2023	84,85
							04-07-2023	58
							21-07-2023	71,72,77
							11-08-2023	51,52
							04-08-2023	74-76 & 79-82

GENERATING STATION	DATE	BLOCK	ENTITLEMENT OF WBSEDCL (AS PER GOI)	SCHEDULE OF WBSEDCL	SHARE FOREGO/URS AVAILABLE (ACTUALLY NOT IMPOSED BY WBSEDCL)	PERTICIPATING SEGMENT **SCED**	SIMILAR INCIDENCES	
							DATE	BLOCK NOS
TSTPP STG I	03-02-2023	38	64	63	2	18	03-02-2023	39-40 & 45-46
FSTPP STG III	04-08-2023	71	18	9	9	25	04-08-2023	72-73
							23-06-2023	39,45,&51
							30-07-2023	91-96
							31-07-2023	3-7,11 & 17-19
FSTPP STG I & II	09-06-2023	71	328	307	21	64	09-06-2023	72-75
							19-06-2023	63-64,67 & 73

GENERATING STATION	DATE	BLOCK	ENTITLEMENT OF WBSEDCL (AS PER GOI)	SCHEDULE OF WBSEDCL	SHARE FOREGO/URS AVAILABLE (ACTUALLY NOT IMPOSED BY WBSEDCL)	PERTICIPATING SEGMENT **URS**	SIMILAR INCIDENCES	
							DATE	BLOCK NOS
FSTPP STG I & II	09-06-2023	75	393	392	1	0.23	19-06-2023	63-64 , 67&73

GENERATING STATION	DATE	BLOCK	ENTITLEMENT OF WBSEDCL (AS PER GOI)	SCHEDULE OF WBSEDCL	SHARE FOREGO/URS AVAILABLE (ACTUALLY NOT IMPOSED BY WBSEDCL)	PERTICIPATING SEGMENT **ANCILLARY SERVICES**	SIMILAR INCIDENCES	
							DATE	BLOCK NOS
TSTPP STG I	03-02-2023	34	46	44	2	18	03-02-2023	35-37
FSTPP STG III	30-07-2023	91	74	9	65	150	30-07-2023	92-95

NOTE : DATA SOURCE ERLDC WEB BASED SCHEDULE.

Annexure B.9

Case study regarding mismatch between beneficiary's Actual entitlement as per GOI allocation & Real time allocated Entitlement from NTPC Stations

GENERATING STATION	DATE	BLOCK	DECLARED CAPACITY	% ENTITLED SHARE OF WBSEDCL	ENTITLED SHARE OF WBSEDCL IN MW	ENTITLEMENT ALLOCATED IN REAL TIME IN MW	DIFFERENCE BETWEEN ENTITLED SHARE & ENTITLEMENT GIVEN	DAM MARKET CLEARD SELL VOLUME OF CONCERNED GENERATOR
			DC	S	ES= DC*S%	EA	δ=ES -EA	
FSTPP I & II	22-08-2023	1	660	32.77	216.25	170.74	45.51	138.90
FSTPP I & II	22-08-2023	2	660	32.77	216.25	206.29	9.96	30.40
KHSTPP-I	18-08-2023	1	450	6.83	30.74	25.97	4.77	69.80
BARH I	18-08-2023	1	920	1.02	9.39	7.62	1.77	173.20
KHSTPP-I	19-08-2023	1	400	6.83	27.32	26.57	0.76	86.50
KHSTPP-I	22-08-2023	1	530	6.83	36.20	35.57	0.63	12.30
BARH I	18-08-2023	2	920	1.02	9.39	8.94	0.45	44.00
KHSTPP-I	18-08-2023	2	450	6.83	30.74	30.39	0.35	5.10
KHSTPP-I	19-08-2023	2	400	6.83	27.32	26.98	0.34	42.80
KHSTPP-I	24-08-2023	1	510	6.83	34.84	34.66	0.17	5.90
BARH I	22-08-2023	1	600	1.02	6.12	5.99	0.14	13.40
FSTPP I & II	18-08-2023	1	1025	32.77	335.98	335.95	0.04	3.90

NOTE : DATA SOURCE ERLDC WEB BASED SCHEDULE.

Annexure-B.12.1

Station/Constituents	Installed Capacity (A)	Running Capacity (B=A-E)	Max generation between 1900 to 2400 (C)		Range of generation between 1900hrs to 2400hrs (Max(MW)&Min(MW))	Margin remained available on running units (Actual margin or D=B*0.93-C (Th) =B*0.99-C(Hy))	Outage Capacity (E)	Reason for not attaining full generation
	(MW)	(MW)	(MW)	Hrs		(MW)	(MW)	
Thermal Generations								
BIHAR								
JHARKHAND								
DVC								
ODISHA								
WEST BENGAL								
CESC & DPL								
ISGS								
IPP								
Hydro Generations								
BIHAR								
JHARKHAND								
DVC								
ODISHA								
WEST BENGAL								
CESC & DPL								
ISGS								
IPP								

Annexure-B.12.2

	16-08-2023	17-08-2023	18-08-2023	19-08-2023	20-08-2023	21-08-2023	22-08-2023	23-08-2023	24-08-2023
TENUGHAT (2 * 210)	44	38	38	35	31	40	45	38	33
CHANDRAPURA TPS (2*250)	6	7	6	28	5	52	41	41	31
DURGAPUR STPS(2 * 500)	-45	15	41	25	2	26	0	0	21
KODERMA (2 * 500)	124	0	0	0	0	0	224	0	103
MEJIA TPS(2 * 250 + 4*210)	118	164	135	118	167	121	96	0	112
MEJIA TPS II (2 * 500)	20	0	0	0	93	151	133	0	0
RTPS(2 * 600)	261	292	273	206	145	230	377	283	239
IB.TPS (2 * 210)	89	112	109	102	74	0	0	0	0
OPGC(2 * 660)	99	56	39	48	97	95	53	39	170
STERLITE(1*600)	246	273	253	58	158	133	133	58	278
BAKRESHWAR(5 * 210)	0	15	81	31	40	42	31	118	128
BANDEL TPS (1 * 60 + 1 * 215)	57	6	7	0	53	10	0	0	0
KOLAGHAT(6 * 210)	70	75	95	87	82	94	0	0	96
SAGARDIGHI(2 * 300 + 2 * 500)	2	27	17	336	336	377	234	368	348
DPL(1 * 250 + 1 * 300)	39	41	55	58	0	0	0	54	54
BARH ST-II(2 * 660)	291	292	19	29	0	0	0	0	13
BARH ST.-I (2*660)	177	338	18	2	86	0	114	55	113
FSTPP ST-I & II(2 * 500 + 3*200)	-23	14	14	0	47	0	0	0	8
FSTPP ST-III(1 * 500)	-8	0	0	0	0	0	0	0	0
KBUNL(2 * 195)	16	14	0	0	9	0	10	10	10
KHSTPP ST-I(4 * 210)	66	129	111	171	54	32	59	78	60
NABINAGAR(4 * 250)	13	12	1	4	0	0	6	11	240
TALCHER STPS – I (2 * 500)	229	134	156	56	54	37	0	0	7
Total Thermal (MW)	**1892**	**2053**	**1466**	**1392**	**1532**	**1439**	**1555**	**1152**	**2063**
SUBARNREKHA HPS (2 * 65)	19	19	129	88	129	17	129	100	85
PANCHET HPS (2 * 40)	1	1	59	47	54	46	54	46	54
U.KOLAB (4 * 80)	170	215	159	91	167	171	79	140	173
RENGALI HPS (5 * 50)	23	24	21	22	18	17	19	15	2
BURLA HPS/HIRAKUD I (2 * 32 + 2 * 49.5 + 1*37.5 + 2*43.65)	36	36	39	42	36	30	22	38	39
BALIMELA HPS (2 * 75 + 6 * 60)	18	18	18	22	21	29	80	13	0
JALDHAKA HPS(2 * 4 + 3 * 9)	10	10	17	0	0	10	10	10	8
RAMAM(4 * 12.75)	19	19	21	22	21	23	24	25	17
TEESTA CANAL(9 * 7.5)	43	43	42	42	43	45	42	43	39
RONGNICHU(2 * 56.5)	7	7	7	7	7	7	6	7	0
Total Hydro (MW)	**345**	**390**	**511**	**382**	**495**	**394**	**464**	**436**	**416**
Total ER Reserve (MW)	**2238**	**2443**	**1977**	**1774**	**2027**	**1833**	**2019**	**1588**	**2479**

Annex-B.14

Updated Anticipated Peak Demand (in MW) of ER & its constituents for September 2023

1	**BIHAR**	**Demand (MW)**	**Energy Requirement (MU)**
	NET MAX DEMAND	7521	4553
	NET POWER AVAILABILITY- Own Sources	554	303
	Central Sector+Bi-Lateral	6552	4006
	SURPLUS(+)/DEFICIT(-)	-414	-245
2	**JHARKHAND**		
	NET MAXIMUM DEMAND	1900	1094
	NET POWER AVAILABILITY- Own Source	480	198
	Central Sector+Bi-Lateral+IPP	925	681
	SURPLUS(+)/DEFICIT(-)	-715	-215
3	**DVC**		
	NET MAXIMUM DEMAND	3331	2181
	NET POWER AVAILABILITY- Own Source	5709	3368
	Central Sector+MPL	455	342
	Bi- lateral export by DVC	2194	1412
	SURPLUS(+)/DEFICIT(-) AFTER EXPORT	639	118
4	**ODISHA**		
	NET MAXIMUM DEMAND (OWN)	5800	4070
	NET MAXIMUM DEMAND (In Case of CPP Drawal)	6759	3182
	NET POWER AVAILABILITY- Own Source	3662	2129
	Central Sector	1953	1315
	SURPLUS(+)/DEFICIT(-) (OWN)	-185	-626
	SURPLUS(+)/DEFICIT(-) (In Case, 600 MW CPP Drawal)	-1144	262
5	**WEST BENGAL**		
	WBSEDCL		
5.1	NET MAXIMUM DEMAND	8611	4711
	NET MAXIMUM DEMAND (Incl. Sikkim)	8621	4718
	NET POWER AVAILABILITY- Own Source (Incl. DPL)	5327	2580
	Central Sector+Bi-lateral+IPP&CPP+TLDP	2760	1952
	EXPORT (To SIKKIM)	10	7
	SURPLUS(+)/DEFICIT(-) AFTER EXPORT	-535	-186
5.2	**CESC**		
	NET MAXIMUM DEMAND	1960	1046
	NET POWER AVAILABILITY- Own Source	830	512
	IMPORT FROM HEL	540	363
	TOTAL AVAILABILITY OF CESC	1370	875
	DEFICIT(-) for Import	-590	-171
	WEST BENGAL (WBSEDCL+CESC+IPCL)		
	(excluding DVC's supply to WBSEDCL's command area)		
	NET MAXIMUM DEMAND	10571	5757
	NET POWER AVAILABILITY- Own Source	6157	3092
	CS SHARE+BILATERAL+IPP/CPP+TLDP+HEL	3300	2315
	SURPLUS(+)/DEFICIT(-) BEFORE WBSEDCL'S EXPORT	-1115	-350
	SURPLUS(+)/DEFICIT(-) AFTER WBSEDCL'S EXPORT	-1125	-357
6	**SIKKIM**		
	NET MAXIMUM DEMAND	105	49
	NET POWER AVAILABILITY- Own Source	8	3
	Central Sector	81	66
	SURPLUS(+)/DEFICIT(-)	-16	20
	EASTERN REGION		
	NET MAXIMUM DEMAND	28655	17704
	NET MAXIMUM DEMAND (In Case of CPP Drawal of Odisha)	29595	16816
	BILATERAL EXPORT BY DVC (Incl. Bangladesh)	2194	1412
	EXPORT BY WBSEDCL TO SIKKIM	10	7
	EXPORT TO B'DESH & NEPAL OTHER THAN DVC	642	462
	NET TOTAL POWER AVAILABILITY OF ER	27643	16406
	(INCLUDING CS ALLOCATION +BILATERAL+IPP/CPP+HEL)		
	SURPLUS(+)/DEFICIT(-)	-1022	-1305
	SURPLUS(+)/DEFICIT(-) (In Case, 600 MW CPP Drawal of Odisha)	-1962	-417