भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
पूर्वी क्षेत्रीय विद्युत समिति
Eastern Regional Power Committee
14, गोल्फ क्लब रोड, टालीगंज, कोलकाता-700033
14 Golf Club Road, Tollygunj, Kolkata-700033

सत्यमेव जयते

वसुधैव कुटुम्बकम्
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Tel. No.: 033-24239651,24239658 FAX No.:033-24239652, 24239653 Web: **www.erpc.gov.in**

NO. ERPC/EE/OPERATION/2023/ 825 **DATE: 13.09.2023**

To

As per list enclosed.

Sub: Minutes of 206th OCC Meeting held on 31.08.2023 (Thursday) virtually through Microsoft teams Online platform - reg.
31.08.2023 (गुरुवार) को वस्तुतः माइक्रोसॉफ्ट टीमों के ऑनलाइन प्लेटफॉर्म के माध्यम से आयोजित 206वीं ओसीसी बैठक का कार्यवृत्त - संबंध में।

Sir,

Please find enclosed minutes of 206th OCC Meeting held on 31.08.2023 (Thursday) virtually through Microsoft teams Online platform at 11:00 hrs for your kind information and necessary action. The same is also available at ERPC website (www.erpc.gov.in).
कृपया अपनी जानकारी और आवश्यक कार्रवाई के लिए 31.08.2023 (गुरुवार) को 11:00 बजे माइक्रोसॉफ्ट टीमों के ऑनलाइन प्लेटफॉर्म के माध्यम से आयोजित 206वीं ओसीसी बैठक के संलग्न कार्यवृत्त देखें। यह ईआरपीसी वेबसाइट (www.erpc.gov.in) पर भी उपलब्ध है।

Observations, if any, may please be forwarded to this office at the earliest.
टिप्पणियाँ, यदि कोई हों, कृपया यथाशीघ्र इस कार्यालय को अग्रेषित करें।

This issues with the approval of Member Secretary.
इसे सदस्य सचिव के अनुमोदन से जारी किया जाता है।

Regards/ सम्मान,

Yours faithfully/ आपका विश्वासी,

अलीक 13.IX.23

(A. De)
EE(Opération)
ईई(ऑपरेशन)

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CC:

Chief Engineer, OPM, CEA	Chief Engineer, NPC, CEA	ASSISTANT SECRETARY,ERPC

MINUTES
OF
206TH OCC MEETING

Date: 31.08.2023
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 206TH OCC MEETING HELD ON 31.08.2023 (THURSDAY) AT 10:30 HRS

Member Secretary ,ERPC chaired the 206th OCC meeting. On welcoming all the participants he outlined the performance of ER grid during July and highlighted the following points:

- *In July-2023, energy consumption of ER was 18676.96 MU which is 6.60 % more than July-2022.*
- *In July-2023, Peak demand met of ER was 29,633 MW which is 11.36 % more than July-2022..*
- *During July-2023, 67.84 % of the time, grid frequency was in IEGC band(49.90 Hz-50.05Hz)*
- *Thermal PLF of ER during June-2023 was 71.0 %.*
- *Generating stations whose PLF is more than 90% during July-2023:*

Utility	***Generating station***	***PLF(%)***
DVC	*Chandrapura TPS*	*93.5*
TATA POWER	*Jojobera TPS*	*94.2*
CESC	*Budge Budge TPS*	*93.2*
HEL	*Haldia TPP*	*94.4*

- *During the month of July 2023, no new transmission line (132 kV and above) has been commissioned:*

- *As far as coal stock is concerned, stock position is optimum in most generating units except WBPDCL (specially Kolaghat TPS) along with Mejia TPS (DVC) need to focus on building their actual coal stock as per their normative requirement.*

He also shared a brief presentation elaborating performance details of NTPC generating units in last Financial year w.r.t their respective merit order based despatch against actual schedule considering seasonal variation in total unit cost.

ED,ERLDC shared a comprehensive presentation comprising drawl profile of all the beneficiaries during July'2023 and complimented adherence of most beneficiaries to respective drawl schedule except Jharkhand(overdrawl of 150MW) and especially West Bengal with significant quantum of overdrawl(500 MW). He also shared with the forum the incident of drop in grid frequency to as low as 49.5 Hz on instances of such considerable overdrawl by some beneficiaries.

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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.

Deliberation in meeting

Members confirmed the minutes of 203rd OCC Meeting with the following change:

Item Number B2:

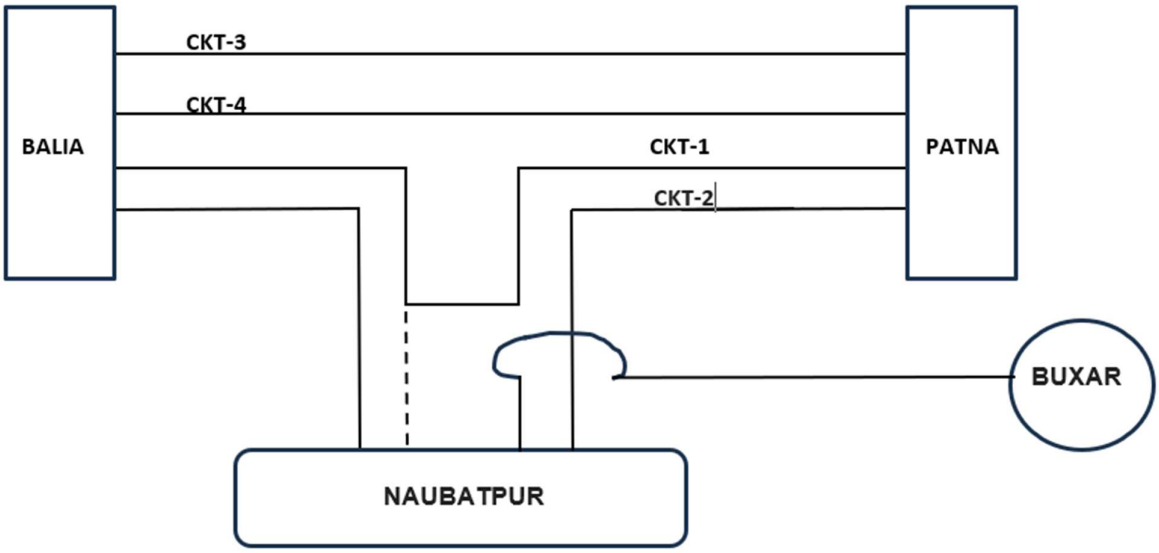
Deliberation:

Representative of CESC submitted that assessment study for system augmentation of 220kV Subhasgram-EMSS circuits is under progress. Bilateral discussions with West Bengal STU are being carried out in parallel.

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.

Deliberation in meeting

ERPC representative informed that as decided in a special online meeting held on 02.08.2023 among ERPC, ERLDC, CTU, NLDC, NRLDC, POWERGRID ER-I, BSPTCL,SJVNL under the chairmanship of Member Secretary ERPC temporary arrangement is permitted only for drawl of Start-up power while no injection would be allowed.

BSPTCL representative submitted that the entire work including shifting of PLCC equipment shall be carried out by them while SJVNL has consented to bear all costs to be incurred in the process.

ERLDC representative pointed out that the matter needs to be referred to CMETS as connectivity plan has been changed from that discussed in special meeting convened on 02.08.2023

In response, BSPTCL representatives submitted that some minor changes have been made to make circuit-III of Patna Balia line available.

OCC granted consent to the proposed connectivity scheme and it was also agreed that intimation of the same would be given to CTU.

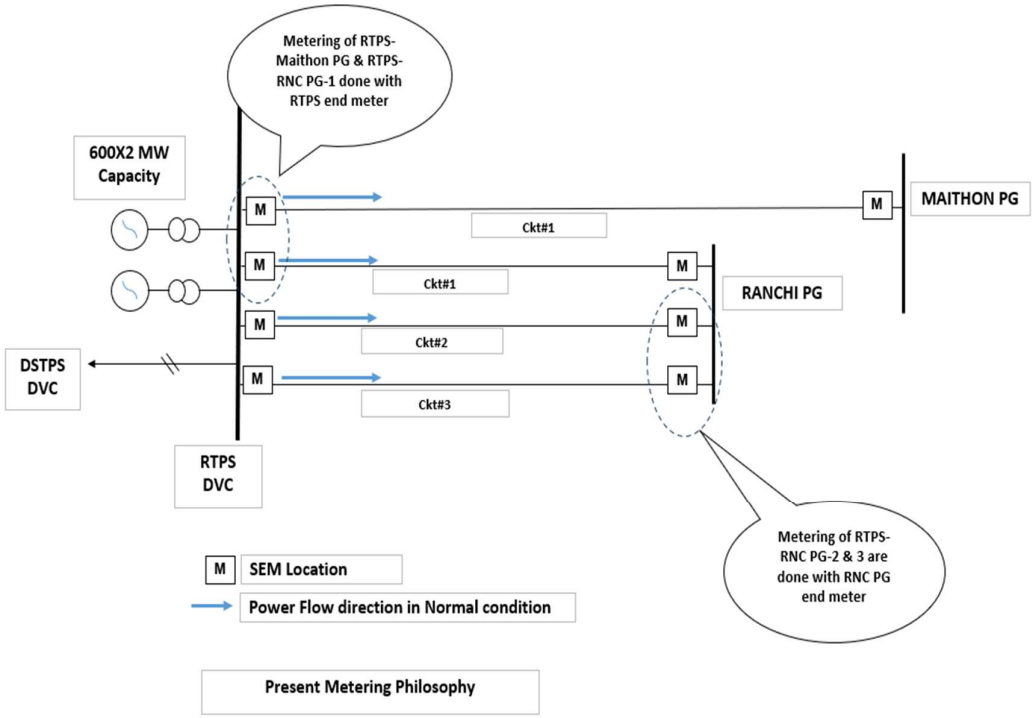
ITEM NO. B.2:	**Proposal of carrying out Metering of 400kV RTPS_Ranchi PG Ckt # 2 & 3 with RTPS end meter data for the purpose of Deviation Settlement and Reactive Energy Accounting – DVC.**

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.

Deliberation in meeting

Representative of ERPC submitted that DVC has proposed to carry out metering of 400kV Raghunathpur-Ranchi PG Ckt#2 & 3 (L#407 & 408) at RTPS end rather than Ranchi PG end to ensure uniform sharing of transmission losses among all DICs similar to sharing of transmission charges for any other ISTS line. As these lines have been given status of "Non-ISTS lines carrying ISTS Power".

Upon detailed deliberation, the followings were decided:

1. *The metering arrangement, as proposed by DVC, would be made effective from 04.09.2023.*
2. *This metering arrangement will be valid up to 31.03.2024 in line with CERC petition number 466/TT/2020 dated 28.02.2022. After that period, depending upon the status of the line, as decided by the Competent Authority, metering arrangement shall be further reviewed.*

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:

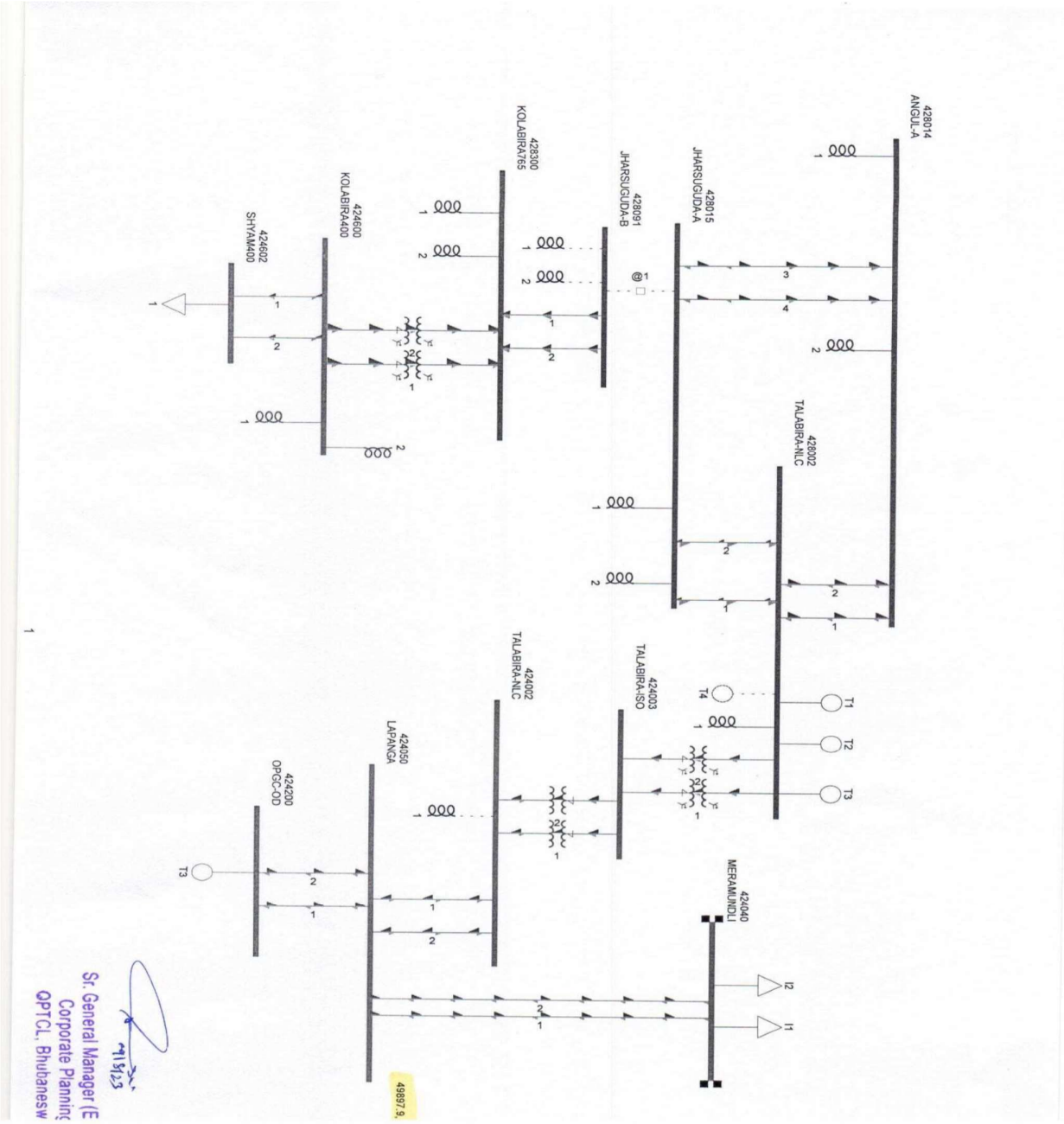
(i)LILO of both circuits of Sundargarh-A-- Angul 765 kV 2 X S/c lines as ISTS connectivity.
(ii)Lapanga- NLC 400 kV D/C (Quad) line as Intra state line for evacuation of 400 MW state share.

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.



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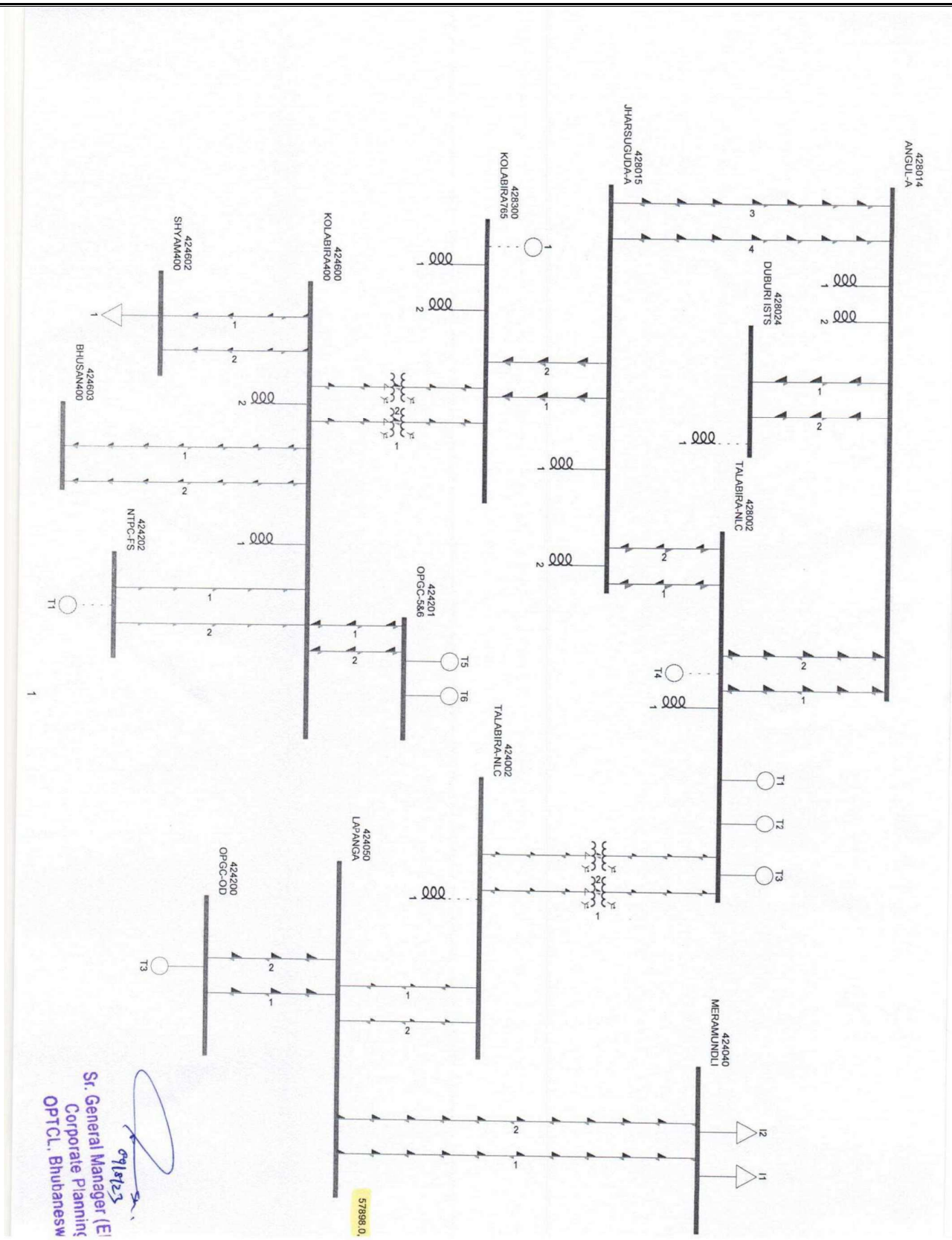
Corporate Plannin
OPTCL, Bhubanesw



OPTCL may update. Members may discuss.

Deliberation in meeting

OPTCL representative submitted that it is planned to install 12 ohms series reactor in Lapanga- NLC 400 kV D/C (Quad) line for limiting fault level to designed value and also apprised that OERC has directed OPTCL to finalize the issue with NLC at earliest.

While ERLDC representative opined that generally series reactor is deployed in bus splitting and may result marginal drop in MW transferred, OPTCL representative reaffirmed that similar scheme has been successfully adopted both in Northern as well as southern regions.

*Regarding connectivity issue, OCC intimated OPTCL that CTU is authorized to grant only ISTS connectivity but not for permitting STU connectivity and thus in this regard OPTCL needs to approach CEA where separate committee has been constituted to deal STU connectivity matters (**CEA Letter attached at Annexure B.3**)*

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.

Deliberation in meeting

*South Asia Regional Energy Partnership (SAREP) representative delivered an exhaustive presentation (***Annexure B.4***.) illustrating the unique capability of synchronous condensers in*

improving system inertia by instantaneously impeding the rapid rate of change of frequency amidst high uncertainty and variability of renewable energy injection into grid.

Upon clarification sought from OCC, he further explicated that how newly installed synchronous condensers can enhance system resilience at minimum operating cost (1%) and how existing generators can also be deployed effectively for the same purpose but with reduced short circuit power at point of connection. He also updated that no new installation of this technology exists in India as on date.

OCC requested SAREP to share detailed study report as well as to organize a physical workshop on this innovative system stability solution for ready reference to all Eastern region constituents.

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.

Deliberation in meeting

ERLDC representative briefly spelled out the backdrop process of trend analysis in declaration of High and low demand season in compliance with CERC (Terms and Conditions of tariff) Regulations,2019.

SLDC Odisha representative shared that Odisha faces peak demand period mostly in April, May and June.

SLDC West Bengal representative submitted that apart from the summer peak, peak demand is also experienced in their control area in August and September or October, thereby strongly pleaded for declaring six months as peak demand period in place of three months by highlighting the issue to CERC.

OCC was of the view that peak demand period declaration for the Eastern region should be independent of variation in peak demand period of individual states. At the same time OCC opined that shutdown schedule of all generating units need to be finalized keeping in account of peak demand period of concerned beneficiaries and urged all generating units to deliver optimum capacity throughout the year without any partial loading except in planned shutdown period.

ERLDC representative intimated that the declaration of high and low demand season has to be made by 30th September,2023 as per CERC mandate.

After detailed deliberation, OCC thus finally consented to declare April-24, May-24 and June-24 as High demand season for FY 2024-25 for Eastern Region.

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.

Deliberation in meeting

TVNL representative submitted that the boiler along with all auxiliaries, after undergoing successful hydraulic test,is ready for restoration to service, while ongoing bearing works of turbine may take another 3-4 days for completion and firmly assured bringing the unit to service by 07.09.2023.

DVC representative submitted that planned shutdown of Koderma TPS for Flue Gas desulfurization works shall be deferred, instead appealed for permitting shutdown of Mejia TPS(Unit#8) owing to high mechanical stresses and vibration in turbine shaft. Upon enquiry from OCC , he assured putting unit#3 of Mejia TPS back to service by 01.09.2023 before availing shutdown of unit#8 .Subsequent to confirmation that ER constituents don't hold any share allocation in Mejia TPS (unit#8) , OCC agreed to allowing emergency shutdown of Mejia TPS (unit#8) for minimum 35 days subject to due intimation to as well as seeking prior consent from its major stakeholders in northern region as per PPA obligations. OCC also emphasized carrying out predictive maintenance by DVC to reduce breakdown maintenance.

WBPDCL representative apprised that Bakreshwar TPS unit-01,under shutdown since 22.08.2023 shall return to service by 26.09.2023 after 35 days while Sagardighi(unit#01) shall be operational by 03.09.2023 and also assured restoration of kolaghat TPS(Unit#5) on resolving coal availability issues. OCC advised WBPDCL to adopt concrete measures for replenishment of depleted coal stock in all generating stations whose detailed action plan was sought for submission within one week.

In absence of OPGC representative, SLDC Odisha representative assured restoration of IB TPS unit-01 by 18.09.2023 and requested shutdown of unit-03 for one month. Acceding to request from GRIDCO representative for granting shutdown to IB TPS unit-03 only after restoration of unit-01 and GMR unit-02, OCC approved Shutdown of IB TPS unit-03 from 20.09.2023 to 19.10.2023 for 30 days.

NTPC representative informed deferment of KBUNL unit-03 upto November'2023.

OCC consented to shutdown of GMR unit-03 from 14.08.2023 to 19.09.2023 but advised postponement of shutdown of unit-02 that was originally scheduled from 25.09.2023 as per LGBR 2023-24.

The approved shutdown schedule for month of September 2023 is provided at ***Annexure B.6.***

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

Deliberation in meeting

WBSEDCL representative apprised the forum of severe inconvenience being faced in ensuring reliable power supply to consumers owing to unexpected forced outage of Farakka unit-4.He mentioned that no intimation had been received by WBSEDCL from NTPC or ERLDC after such unanticipated shutdown despite being a bonafide beneficiary of NTPC and consequently WBSEDCL being compelled to purchase power via power exchange at a very high price compared to Farakka unit cost, thus incurring huge losses. He further enquired NTPC of reason for not availing shutdown of the Farakka U-4 during last winter and requested for availing planned shutdown only in winter period.

NTPC representative submitted that sudden outage of Farakka unit-4 due to low hydrogen pressure was not fully under their control and beneficiaries are generally intimated from their end in case of planned shutdown of units. While in case of forced shutdown, they intimate ERLDC only. He further stated that in future they'd intimate the beneficiaries too in such cases. He also shared that last overhauling of Farakka U-4 had been done in Aug '21 and the unit-4 under shutdown shall be synchronized by 05.09.2023.

OCC urged NTPC to rigorously perform predictive maintenance of all generating units in order to scale down incidences of such forced shutdown that have repeatedly occurred over last five years, whose details were also asked to be shared.

SLDC, West Bengal representative expressed serious concern on losses being faced by DISCOMs on such unanticipated outage of generating units while abiding by fixed consumer tariff and these losses indirectly get passed on to generating units as well in a closed loop.

ERLDC representative submitted that Farakka unit- 4 outage was duly intimated to all SLDCs and proposed that WBSEDCL may share relevant mail Ids for information sharing in future.

West Bengal SLDC requested OCC forum to postpone routine monthly shutdown of Teesta-III and Teesta-V till Farakka unit- 4 is restored to service from forced outage to ensure better energy

availability.

OCC consented to the request made by West Bengal SLDC and deferred routine shutdown of Teesta-III and Teesta-V HEPs as proposed by WBSEDCL.

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.

Deliberation in meeting

In response to the issue raised by WBSEDCL representative, ERLDC representative shared a concise presentation elucidating the mismatch or disintegration among ERLDC scheduling software and SCED or Ancillary services as the plausible reason behind beneficiary's ISGS entitlement and Schedule.

NTPC representative submitted that there had been a technical glitch at their end too in this regard.

ERLDC representative apprised that the issue has been summarily resolved thereby nullifying the possibility of recurrence of such mismatch in future.

OCC opined that a Working Group comprising representatives from ERPC, ERLDC, NTPC and concerned utilities maybe formed to assess the possible causes of mismatch and also to regularly monitor and prevent occurrence of such mismatch.

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.

Deliberation in meeting

OCC opined that a Working Group comprising representatives from ERPC, ERLDC, NTPC and concerned utilities maybe formed to assess the possible causes of mismatch and also to regularly monitor and prevent occurrence of such mismatch.

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 Spare Capacity (Nos)		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.

Deliberation in meeting

ERPC representative informed that spares for ICTs must be maintained by all utilities in line with CEA standards and updated that DVC along with OPTCL have planned for such spares while no plan has been made by West Bengal in this regard.

WBSETCL representative submitted that commissioning of 4th 315 MVA ICT at 400/220 kV Jeerat S/S is under process which would tentatively take 30 days after issuance of LOA. He further enquired of the process of spare ICT requisition from Eastern Regional pool to explore the possibility of shifting 315 MVA spare ICT available at Malda to Jeerat.

OCC apprised M/s WBSETCL that regional spare pool being maintained by M/s Powergrid, all techno-commercial and administrative modalities for availing spare ICT need to be finalized with M/s Powergrid. In order to expedite ICT commissioning, OCC advised M/s WBSETCL to convene special meeting with M/s Powergrid in this regard.

OPTCL representative submitted that LOA has been issued on 22.05.2023 for a 500 MVA ICT at New Duburi which is expected to be installed by next 12 months.

OCC advised OPTCL to maintain 315 MVA spare ICT besides 500 MVA ICT.

As lack of proper spare ICTs may compromise system reliability violating N-1 criteria, OCC urged ERLDC to issue letters to all utilities regarding maintenance of spare ICTs, highlighting the issue to concerned topmost management.

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.

Deliberation in meeting

Teesta III representative informed that owing to non-functional HOT line between Teesta III-Rangpo, severe inconvenience is encountered in day-to day operations. He also briefly intimated that no technical fault has been noticed neither at their end nor in communication link after checking all relevant parameters and thus technical problem is likely to persist at PG Rangpo S/S but deliberation with Powergrid on this has yielded no result.

In response to assistance sought by Teesta III, OCC opined that ERPC Secretariat may take up this matter with ERLDC and concerned utilities and resolve the issue at the earliest.

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.

Deliberation in meeting

ERLDC representative informed the following:
(i)Format for sharing generation data for estimation of real time margin has been shared with all SLDC heads, Gencos and IPPs.
(ii) The sought data along with reason for less generation (if any) from all SLDCs, Gencos or IPPs must be received by 3:00 hrs daily for onward submission to NLDC.
(ii) SLDC DVC, Bihar and Jharkhand are regularly sharing desired data on time while data from SLDC west Bengal is received at around 8:00 hrs.

ERLDC also suggested DVC to sell excess power available as margin in RTM.

OCC advised all SLDCs, Gencos and IPPs to strictly adhere to timelines of sharing data necessary in computation of real time margin of all generating units for their optimum utilization so as to ensure reliable power availability.

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 2**9**.0**5**.20**23**, *"*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:

State and Central Sector Generators/IPPs/CPPs/SLDCs/Utilities

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.

ISTS/STU/Transmission licenses in the states and Central Sector

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.

Deliberation in meeting

ERPC representative apprised the forum regarding submission of Load Generation Balance Report for the year 2024-25 to CEA by 20.09.2023 and only MPL has shared annual maintenance schedule till date while receipt of details from other constituents is still pending.

Regarding transmission data, he intimated that Transmission Licensees also need to submit annual plan of major outage at the earliest.

OCC thus urged all constituents to furnish the necessary data to ERPC latest by 08.09.2023.

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.

Deliberation in meeting

The updated anticipated power supply position for September 2023 is provided at ***Annexure B.14.***

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भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केंद्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-II
Power System Planning & Appraisal Division-II

सेवा में / To,

संलग्न सूची अनुसार / As per attached list

विषय / Subject: Constitution of Standing Committee for ensuring coordinated planning and development of Inter-State and intra-state transmission network.

महोदया/ महोदय /Madam/Sir,

1. Section 73 of Electricity Act, 2003, provides that CEA shall formulate short-term and perspective plans for development of the electricity system and co- ordinate the activities of the planning agencies for the optimal utilization of resources to subserve the interests of the national economy and to provide reliable and affordable electricity for all consumers.

2. The Electricity (Transmission System Planning, Development and Recovery of Inter-State Transmission Charges) Rules, 2021, notified by Ministry of Power on 1st October 2021, inter-alia provides that;

"3(1) The Central Electricity Authority shall draw up short term plan every year on rolling basis for upto next five years and perspective plan every alternate year on rolling basis for next ten years for development of the electricity system and co-ordinate the activities of the planning agencies for the optimal utilization of resources to subserve the interests of the national economy and to provide reliable and affordable electricity in accordance with section 73 of the Act.

3(2) The Central Electricity Authority shall also draw up the perspective plan for development of transmission system after consultation with all the relevant stakeholders such as, Central Transmission Utility, State Transmission Utilities, System Operators, generating and distribution companies, industry associations and the State Governments, etc., and after assessing the rate of growth in demand as well as the growth of generation in different areas of country.

3. For preparation of short term and perspective plan and for coordinating the activities of planning agencies, five number of regional standing committees namely "**Standing Committee on Short Term & Perspective Power System Planning (SCSTPPSP)**", one for each region is being constituted.

4. Constitution and Terms of Reference (ToR) of the Standing Committee on Short Term & Perspective Power System Planning are as under.

A. Standing Committee on Short Term & Perspective Power System Planning – Northern Region (SCSTPPSP-NR)

1.	Member(Power System), Central Electricity Authority (CEA)	Chairperson
2.	Chief Operating Officer, CTUIL	Member
3.	Director(System Operation), POSOCO	Member
4.	Heads of State Transmission Utilities (STUs)/Electricity Departments of UT of Jammu & Kashmir, UT of Ladakh, Himachal Pradesh, Punjab, Haryana, Rajasthan, Delhi, Uttar Pradesh, Uttarakhand, UT of Chandigarh	Member
5.	Member Secretary of Northern Regional Power Committee	Member
6.	CMD/ MD/ Chairman of NTPC, NHPC, SECI, SJVNL, NPCIL, NLC, BBMB	Member
7.	Chief Engineer(PSPA-I/PSPA-II), Central Electricity Authority	Member & Convenor

B. Standing Committee on Short Term & Perspective Power System Planning-Western Region (SCSTPPSP-WR)

1.	Member(Power System), Central Electricity Authority (CEA)	Chairperson
2.	Chief Operating Officer, CTUIL	Member
3.	Director(System Operation), POSOCO	Member
4.	Heads of State Transmission Utilities (STUs)/Electricity Departments of Gujarat, Madhya Pradesh, Chhattisgarh, Maharashtra, Goa, UT of Daman & Diu, UT of Dadra & Nagar Haveli	Member
5.	Member Secretary of Western Regional Power Committee	Member
6.	CMD/ MD/ Chairman of NTPC, SECI, NPCIL, NLC	Member
7.	Chief Engineer(PSPA-I/PSPA-II), Central Electricity Authority	Member & Convenor

C. Standing Committee on Short Term & Perspective Power System Planning – Southern Region (SCSTPPSP-SR)

1.	Member(Power System), Central Electricity Authority (CEA)	Chairperson
2.	Chief Operating Officer, CTUIL	Member
3.	Director(System Operation), POSOCO	Member
4.	Heads of State Transmission Utilities (STUs) of Telangana, Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, UT of Puducherry, UT of Lakshadweep	Member
5.	Member Secretary of Southern Regional Power Committee	Member
6.	CMD/ MD/ Chairman of NTPC, SECI, NPCIL, NLC	Member
7.	Chief Engineer(PSPA-I/PSPA-II), Central Electricity Authority	Member & Convenor

D. Standing Committee on Short Term & Perspective Power System Planning – Eastern Region (SCSTPPSP-ER)

1.	Member(Power System), Central Electricity Authority (CEA)	Chairperson

2.	Chief Operating Officer, CTUIL	Member
3.	Director(System Operation), POSOCO	Member
4.	Heads of State Transmission Utilities (STUs) of Bihar, Jharkhand, West Bengal, Odisha, Sikkim, UT of Andaman & Nicobar Islands	Member
5.	Member Secretary of Eastern Regional Power Committee	Member
6.	CMD/ MD/ Chairman of NTPC, NHPC, SECI, DVC	Member
7.	Chief Engineer(PSPA-I/PSPA-II), Central Electricity Authority	Member & Convenor

E. Standing Committee on Short Term & Perspective Power System Planning-North Eastern Region (SCSTPPSP-NER)

1.	Member(Power System), Central Electricity Authority (CEA)	Chairperson
2.	Chief Operating Officer, CTUIL	Member
3.	Director(System Operation), POSOCO	Member
4.	Heads of State Transmission Utilities (STUs)/Electricity Departments of Assam, Meghalaya, Nagaland, Arunachal Pradesh, Tripura, Manipur, Mizoram	Member
5.	Member Secretary of North Eastern Regional Power Committee	Member
6.	CMD/ MD/ Chairman of NTPC, NHPC, SECI	Member
7.	Chief Engineer(PSPA-I/PSPA-II), Central Electricity Authority	Member & Convenor

5. ToR of the above committees:

(i) Review the existing and under implementation intra-state and inter-state transmission system in the region.
(ii) Review the operational constraints faced by the system operators in the region.
(iii) Examination of import/export requirement of each State, UT and Region through the ISTS network for the next 5-10 years.
(iv) Examination of new ISTS proposals and proposals from STUs/Electricity Departments for augmentation of intra-state network; assess the transmission system requirement in the near, medium & long term (up to 10 years or more) for each state, UT and region and draw up the transmission schemes to meet these requirements.
(v) Examine the associated transmission system for generating stations.
(vi) Review the status of Connectivity/LTA/GNA granted by CTUIL.

6. The Committees may meet at least once in six months, or as per requirement. Joint meeting of Regional committees may be called, if required.

7. Based on deliberations in the meetings of the committees, CEA shall prepare the short term and perspective transmission plan on rolling basis.

भवदीय/Yours faithfully,

25.10.2022

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

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25.	Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, Puducherry – 605 001.	se1ped.pon@nic.in
26.	Executive Engineer, Divisional Office, Lakshadweep Electricity Department, Kavaratti Island, UT of Lakshadweep	lk-ktelect@nic.in
27.	Member Secretary, Eastern Regional Power Committee, 14, Golf Club Road, Tollygunge, Kolkata-700033.	mserpc-power@nic.in
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32.	Managing Director, West Bengal State Electricity Transmission Company Ltd, Vidyut Bhavan (8th Floor), A-block, Salt Lake City, Kolkata-700091	md@wbsetcl.in; cpd.wbsetcl@gmail.com; cped@cd3.vsnl.net.in; ce.corporate@wbsetcl.in
33.	Superintending Engineer, Electricity Department C/O Secretary (GA) Andaman and Nicobar Administration, Secretariat, Port Blair (AN)	seed@and.nic.in ; asga123.and@nic.in; commr.andaman@gmail.com
34.	Member Secretary, North Eastern Regional Power Committee(NERPC), Meghalaya State Housing Finance Co-Operative Society Ltd. Building Nongrim Hills, Shillong (Meghalaya) – 793003	ms-nerpc@gov.in
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37.	Chairman-cum-Managing Director, Meghalaya Energy Corporation Limited, Lumjingshai, Short Round Road, Shillong (Meghalaya) – 793001.	cetranzemeptcl@gmail.com
38.	Managing Director, Manipur State Power Company Ltd. (MSPCL), Electricity Complex, Patta No. 1293 under 87(2), Khwai Bazar, Keishampat, District – Imphal West, Manipur – 795001	md.mspcl@gmail.com; ed.tech.mspcl@gmail.com;
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41.	Engineer-in-Chief Power & Electricity Department, Kawlphetha Building, New Secretariat Complex, Khatla, Aizawl Mizoram-796001	eincplanning@gmail.com; mizoplan@gmail.com
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46.	Managing Director (SECI), 1st Floor, D-3, A Wing, Prius Platinum Building District Centre, Saket, New Delhi – 110017	md@seci.co.in
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50.	Chairman, BBMB, Chandigarh	secy@bbmb.nic.in
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Annexure B.4

USAID
FROM THE AMERICAN PEOPLE

GOVERNMENT OF INDIA
MINISTRY OF POWER

Deployment of Synchronous Condensers in India

Aug 31, 2023

Eastern Regional Power Committee (ERPC)
Operation and Coordination Committee Meeting

South Asia Regional Energy Partnership (SAREP)

AGENDA

1. Introduction to SAREP
2. Synchronous Condenser, its applications and benefits

About SAREP

South Asia Regional Energy Partnership (SAREP)

is designed to support U.S. India Clean Energy Cooperation

A five-year initiative supporting Indo-US collaboration with following objectives:

1. Developing high performing modern utilities
2. Increase deployment of advanced energy solutions and systems
3. Enhance private investments, markets and transparent, best value procurement
4. Regional energy cooperation and integration of markets

Program Period: 2021 – 2026

Key Bilateral Partners: Ministry of Power (MOP), Ministry of New & Renewable Energy (MNRE)

Key Central Sector Stakeholders

FOR, PFC, NTPC-REL, IREDA, EESL, SECI, SGKC, NPTI, SCGJ, PSSC, CEA, CTU, GRID-INDIA

Key State Sector Stakeholders

Energy Department, Transmission and Distribution utilities, SLDCs, SERCs, SNAs, SDAs

Key Regional Stakeholders

NEA, DHPS, BPDB, URA, CEB, MoEWRI, SREDA, DRE, SLSEA, AEPC, MoECCT

FOR: Forum of Regulators; PFC: Power Finance Corporation Ltd.; NTPC-REL: NTPC Renewable Energy Ltd.; IREDA: Indian Renewable Energy Development Agency Ltd.; Energy EESL: Energy Efficiency Services Ltd.; SECI: Solar Energy Corporation of India Ltd.; SGKC: Smart Grid Knowledge Center; NPTI: National Power Training Institute; SCGJ: Skill Council for Green Jobs; PSSC: Power Sector Skill Council; SERC: State Electricity Regulatory Commission; SNA: State Nodal Agency ; SDA: State Designated Agency; SLDCs: State Load Dispatch Centers

SAREP's Program Strategy

1. Technical assistance and capacity development
2. Enable partnerships and alliances
3. Develop new business models, improve access to financing and accelerate private sector investments
4. Grants for innovative solutions under Strategic Partnership Fund through competitive procurement
5. Enhance cross learning and outreach

SAREP is supporting India's clean energy transition

GOVERNMENT OF INDIA
MINISTRY OF NEW AND RENEWABLE ENERGY

- Repowering of wind projects
- Green Hydrogen
- Solar Rooftop Vendor Rating

GOVERNMENT OF INDIA
MINISTRY OF POWER

- Grid flexibility, resilience
- Pumped Hydro Energy Storage
- Power market

NITI Aayog

- Enablers for EV financing – innovative business models & instruments
- Building partnerships
- Planning electricity network infrastructure

- Implementing Net Zero 2030 strategies
- Renewable procurement
- Energy efficiency programs
- Green bonds

पी एफ सी PFC

- Smart metering and RDSS
- Distribution Utilities Network
- Advanced technologies for distribution sector
- Capacity building

इरेडा IREDA

- Alternate Investment Fund
- Green bonds
- Solar Rooftop

एन टी पी सी नवीकरणीय NTPC RENEWABLES

- Green hydrogen and derivates
- Clean financing

विनियामक मंच FORUM OF REGULATORS

- Resource adequacy
- Ancillary services and Reserves
- Energy storage, EV and other technologies

EESL

- Energy efficient chillers
- Enabling super ESCO model
- Rooftop solar

Expert –
Mr. DK Chaturvedi,
Advisor, SAREP (Ex NTPC)

He is first Asian Fellow &
Honorary Member of CIGRE Paris
Convener of CIGRE TB 885 Guide
on the Assessment, Specification
and Design of Syncons for
Low/Zero inertia generators

Synchronous Condenser for

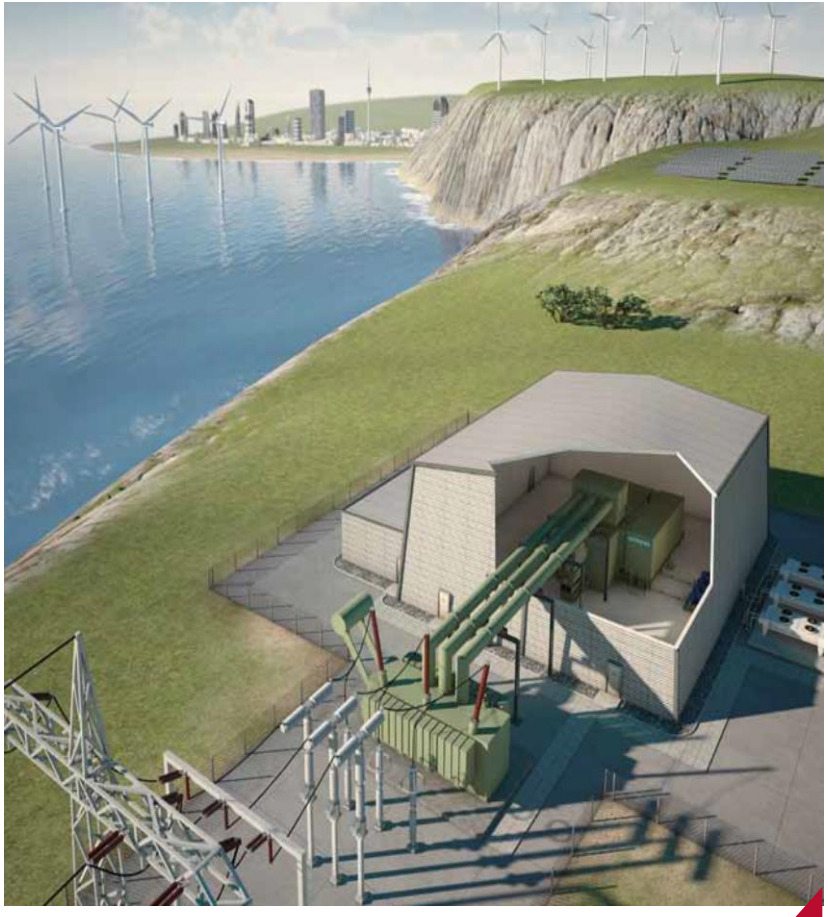
Short Circuit Power, Overload capacity, Dynamic Reactive Power and Inertia Support

Transition towards solar and wind power generation

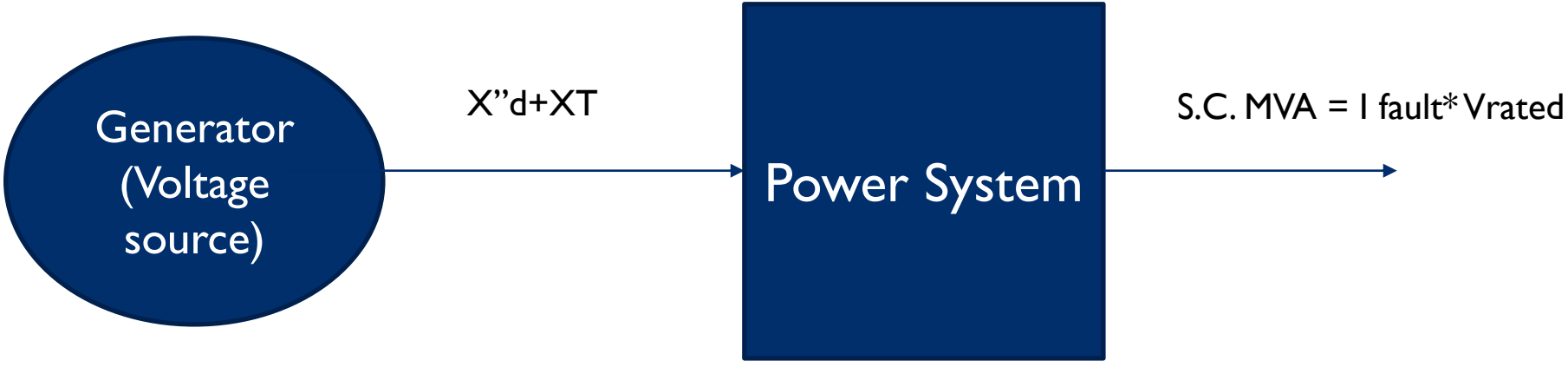
- A power generation technology transition is being taking place world over.
- This change from machine based power generation to inverter based power generation, involve use of Inverters to feed power from solar park or wind farm to grid, which earlier used to be from turbo-generator (a machine).
- This change has severely affected the Power System transient stability as we will see in following slides.
- In order to meet this short fall, a machine based solution is being implemented globally , which is called Synchronous Condenser.

Synchronous Condenser

- It neither converts electrical energy into mechanical like a motor or mechanical energy of turbine into electrical energy like a generator. Synchronous Condensers are the same generators as were used in past for power generation (not coupled to turbine).
- The Synchronous condensers operate at zero power factor and run using Static frequency converters or VFD driven motor.
- Besides fault level increase and limiting RoCoF, Synchronous Condenser also provide dynamic reactive support.
- The Synchronous Condenser inertia can be increased to 8-10 times by adding a flywheel to the machine shaft.



Short Circuit Power Support



Machine contribution MVAsc = Machine MVA / (X"d+XT)

HIGHER MVA means STRONGER SYSTEM

Synchronous Condenser - Short Circuit Power Support

Short Circuit MVA Calculations						
Generator rating	Gen. impedance	Transf. Impedance	Gen. X_d"impedance with +tol.	Transf. Impedance with +tol.	Total Impedance	Fault rating
960	18.5	16	21.27	17.2	38.47	2500
776	24	15	27.6	16.12	43.7	1775
588	17.2	13.5	19.78	14.5	34.3	1700
294	16	13.5	18.4	14.5	32.9	900

OVERLOAD : 1.5 P.U. FOR 30 SECONDS, 2.0 P.U. FOR 10 SECONDS

Improving System Stability Using SynCon

A Fault event -Transient Voltage Stability:

- SC can give instantaneously short circuit power equivalent to 4 -4.5 times of its rating, at point of connection. Whereas STATIC devices can contribute limited to their rating.
- **Timeline**: Instantaneous from Machine as well as static devices

Transient Frequency Stability:

- SC with flywheel (inertia constant 8-10) can give high inertia immediately after an event to limit the RoCoF. Whereas STATCOM alone can't give inertia being static device. BESS can give synthetic inertia, which happen to be lower as compared to machine inertia and also a time lapse in its response is involved. Thus BESS do not contribute in limiting the RoCoF in initial few cycles.
- **Timeline:** Machine response is instantaneous, but BESS response is not available in 200mS and may not be of help in saving system.

System Dynamic Stability:

- SynCon can deliver or absorb reactive power (MVAr) continuously as per system requirements, within its capability. STATCOM is excellent to manage dynamic stability **BESS helps in frequency regulation and energy balancing services that SC cannot provide.**

Synchronous Condenser with Flywheel at Terna

Ref: CIGRE 2020 e session paper A1-304

Synchronous Condenser application in HVDC

- The reactive power of HVDC system is supplied by SVC during normal operation. The capacity of SVC is sufficient, when the system is in normal operation or has small disturbances. The basic reactive power requirement can be met by switching on and off capacitor filter banks.
- SC serves as reactive backup and helps by providing dynamic reactive support as well as Short Circuit Power Support during a fault, which can be 4-5 times of its rated output at point of connection.
- Thus Synchronous Condenser helps in avoiding continuous commutation failure and system collapse.
- SC can give instantaneously short circuit power equivalent to 4 -4.5 times of its rating, at point of connection. Whereas STATIC devices can contribute limited to their rating.

Short Circuit Power Support

Technical parameters of the new designed 300MVAR condenser		
Steady state reactance /%	X_d	150.5~15
Transient reactance /%	X_d'	14~16.5
Sub-transient reactance/%	X_d''	11.1~11.3
Force excitation factor	K_M	3.5
Rotor overload capacity	-	2.5 I_{fn} for 15s
Stator overload capacity	-	3.5 I_n for 15 sec
Leading phase operation ability in MVar	-	150-165
Power loss	-	1.07-1.15%

General comparison of SynCon and STATCOM

Solution	Dynamic VAR Support	Overload	Short Circuit Power during a fault	S.C. Power - Time of support	Inertia support during generation loss	Inertia- Time of support
STATCOM	Yes 100%	Limited to margin, say 125%	125% of rating available	Instantaneous	No	No
Synchronous Condensers	Yes 100%	Yes 200% for 15 seconds	800% and at POC 400%	Instantaneous	Yes 8-12 times with flywheel	Instantaneous

SynCon support during fault is almost three times that of the STATCOM
Inertia support is not there with STATCOM

Good Average Poor

Comparison of BESS vs Synchronous Condensers

30MW (60MW Peak) BESS & 250 MVAR SynCon with Flywheel

Performance comparison- 30mw bess in australia with 250mw syncon with flywheel at terna italy

Technical performance	Synchronous Condenser	SC with Flywheel	BESS with Grid Forming Control
Response time for frequency support	Instantaneous (rotating Inertia)	No Freq. support	Very fast
Response time for voltage regulation	Fast (Sub-transient behaviour of Generator)	Fast (use of fast power electronics components)	Fast (use of fast power electronics components)
Full load losses	1.5%	1%	>1%
Availability	Medium due to rotating parts	High (only static parts)	High (only static parts)
Capex (for frequency support)	Low	No	Very high
Capex (for voltage regulation)	Medium	Medium	High
Opex	Low	Low	High

Good Average Poor

Performance comparison of 30 MW BESS in Australia with 250 MW syncon (with flywheel) at Terna Italy

		SC with Flywheel	BESS with Grid Forming Control
General Features	Rated Apparent Power	250 MVAR	30 MVAR
	Voltage at Point of Connection	400 kV	33 kV
	Total stored Energy	0.49 MWh (kinetic energy)	8 MWh (electrochemical energy)
	Total price	23.5 M€, including 10 years maintenance contract for ~3 M€.	19 M€ (30 M Australian $), including 12 years maintenance.
Inertial service	Inertia constant H	7s (~2 s generator contribution and ~5 s flywheel contribution)	Not inherent characteristic, adjustable in the control loop. H = 6.66 s (in this application)
	Inertial response for 0.1 Hz/s	7 MW	0.7 MW (with this H setting)
	Inertial response for 0.5 Hz/s	35 MW	3.3 MW (with this H setting)
	Inertial response for 1 Hz/s	70 MW	6.7 MW (with this H setting)
	Inertial response for 2 Hz/s	140 MW	13.3 MW (with this H setting)
Other grid services	Voltage regulation capacity in steady state	-150 MVAR / +250 MVAR	- 30 MVAR / +30 MVAR
	Short-circuit capacity at Connecting Point	1200 MVA(fault current is 4.8 p.u. at POC)	60 MVA (fault current is limited to 2 p.u. at POC)
	Frequency regulation	None	Fast and primary frequency response
Other considerations	Footprint	~4500 m²	~3000 m²
	Losses	~1% of Rated Apparent Power	~1% of Rated Apparent Power
	Lifetime	not available	not available

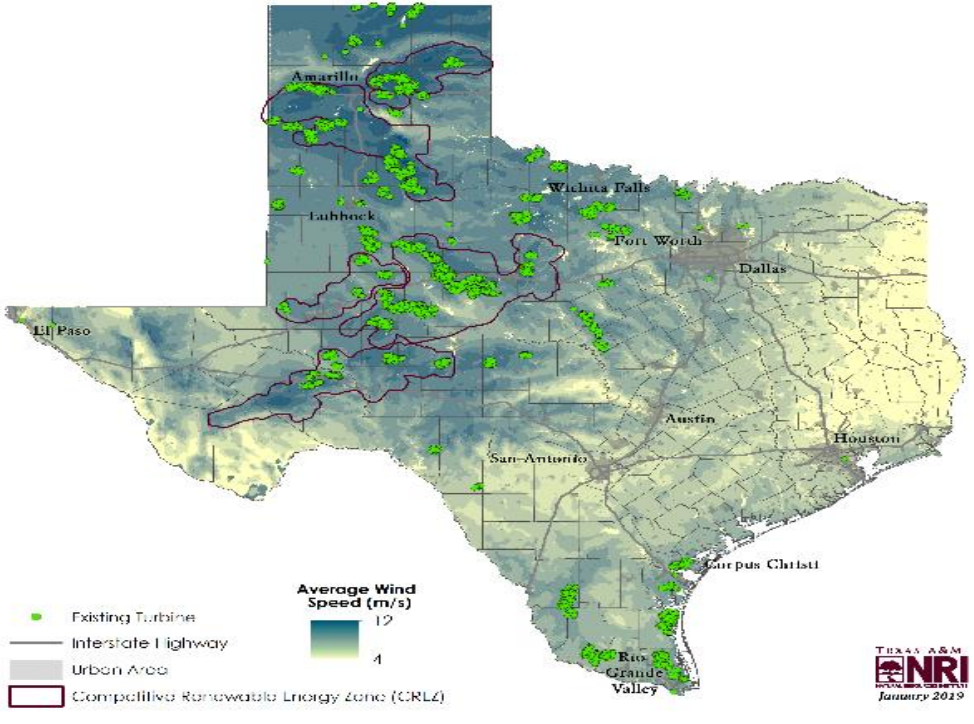
Comparison between BESS and SC

- BESS is an emerging and promising technology to ensure the future grid stability. A comparison has been done in CIGRE Session 2020 paper A1-102 based on two recent industrial applications. The analysis concludes that
- Both technologies can supply inertial response, but with existing BESS technology and prices, **SC inertial response appears much cheaper than that of BESS**.
- SC provide **voltage regulation services and short-circuit power in a much more cost-effective manner**.
- The advantage of **BESS is their capability to provide frequency regulation and energy balancing services that SC cannot provide.** The 30 MW BESS stores much more usable energy for the grid than the 250 MVAR SC with its flywheel (in this comparison in next slide, with a factor 140).
- Addition of flywheel, makes it possible to significantly increase the inertia of SynCon for a very marginal additional cost. Thus, depending on its power, the inertia of a generator can be in some cases multiplied by up to 8 to 10 approximately, increasing its constant of inertia up to 12s.
- The synthetic inertia of BESS is limited by the overload capacity of the BESS to deliver active power for short duration.
- When comparing both voltage regulation capacity (MVARs) and short-circuit power, SC performance are much superior to those of BESS with a factor of respectively 8 and 20. **Therefore, SC clearly stands as the candidate of choice for these grid services.**

Two greenfield Synchronous Condenser Installations in the Panhandle Area of Texas, USA

Synchronous condensers is provided **primarily to increase fault current levels** and improving system strength.

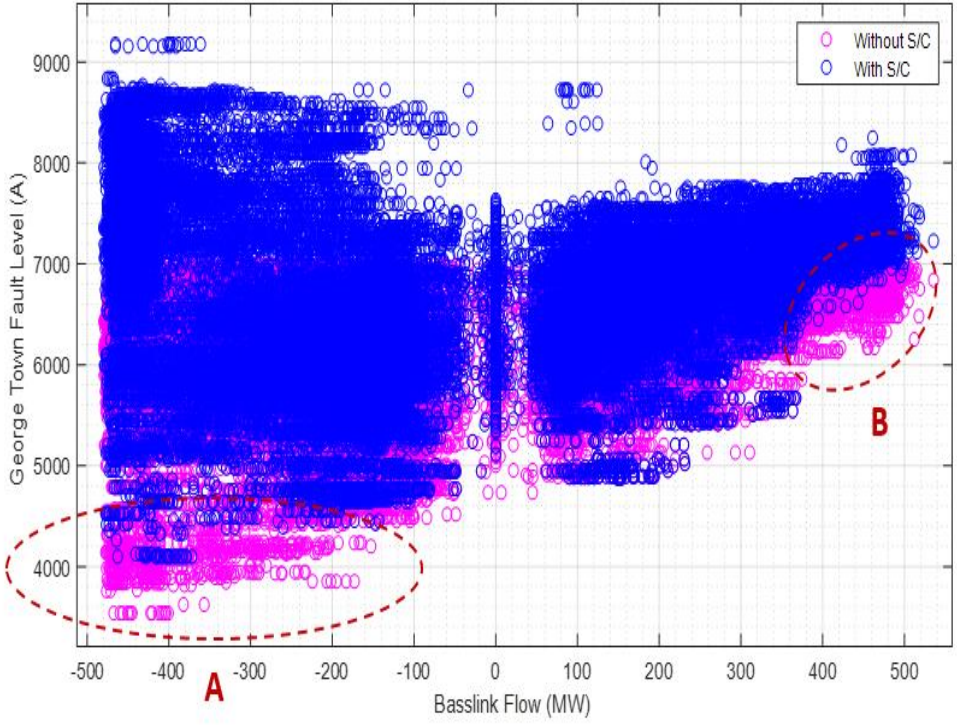
The installation of two Siemens synchronous machines of +175/-125MVAr have been successfully commissioned in 2018.



PANHANDLE WIND FARM

George Town Australia

Synchronous Condensers have been provided to **ensure that sufficient fault level** is maintained in George Town 220kV bus, where the HVDC converter station is located in Tasmania.



Several Synchronous Condenser Installations with Flywheel in Terna, Italy

INERTIA CASE:

The Sardinian island power supply is by several HVDC connections as well as large number of windfarm and PV.

Being an island system, **faults or HVDC commutation failures could lead to extremely high rate of change of frequency (ROCOF).**

To cope with this problem, Terna recently decided to equip its **future SCs with additional flywheels.**

Synchronous Condenser in Denmark

In Denmark, 250MVAr synchronous condenser solution has been provided with a **short circuit power of more than 800 MVA in addition to reactive power control**.

The installation of this standalone synchronous condenser solution will enable the transmission system operator Energinet.dk to operate the transmission network **without the need for a large thermal power plant.**

This enabling the infeed of large amounts of renewable energy into the transmission network.

Manitoba Hydro Nelson River BPIII project

Due to the large capacity of the HVDC systems and the lack of generation in the receiving ac system, Manitoba hydro system is a weak ac system both in terms of its inertia as well as the short circuit capacity.

To meet required inertia and short circuit capacity, four 250 MVAR Synchronous condensers are provided.

One of the four 250 MVAR synchronous condensers

SYNCHRONOUS CONDENSER INSTALLATION

List of Synchronous Condenser Installation

Country	Location/Project name	Inertia constant MWs/MVA	Kinetic Energy in MWs	Type of Machine Cylindrical/salient pole (r.p.m.)	Rating		
					MVAR delivery	MVAR absorption	S.C. Support
Ireland	Moneypoint		4000	cylindrical	245	-111	830
Estonia	Kiisa		1750	cylindrical	50	-50	900
Estonia	Viru		1750	cylindrical	50	-50	900
Estonia	Püssi		1750	cylindrical	50	-50	900
United Kingdom	Grain		2 x 1700	cylindrical	2 x 115	-90	570
United Kingdom	Scottish Power				70		
Italy	Rosara		1780	cylindrical	250	-125	1100
Germany	Hoheneck		610	cylindrical	430	-260	1200
Germany	Ampirion GmbH				330		
Germany	Tenne TSO				250		
Germany	Oberottmarshausen		610	cylindrical	300	-200	1200
United Kingdom	Rassau		1100	cylindrical	60	-60	420
United Kingdom	STATKRAFT				67		
Italy	Fano		1780	cylindrical	250	-125	1100
Australia	Robertstown		1100	cylindrical	125	-70	580
Australia	KIAMAL Solar Farm		340	cylindrical	190	-70	730
Australia	Davenport				2*129		
Australia	Darlington point solar farm				42		
Australia	Silverton wind farm				40		
Australia	Haughton solar farm Pacific Hydro				65		
Australia	South Australia	8.53	2 x 1100	Cylindrical / 3000	2 x 129	2 x -77	2 x 642
USA	Blackwater		470	cylindrical	158	-114	960
USA	Alibates		470	cylindrical	160	-70	950

USA	Tule Canyon		470	cylindrical	160	-70	950
USA	Songs Mesa		470	cylindrical	225	-120	970
USA	Miguel		2x470	cylindrical	450	- 225	970
USA	San Luis Rey		470	cylindrical	225	-120	970
USA	Talega		470	cylindrical	225	-120	970
USA	Fieldale				2*100		
USA	Eversource Stony Hill				25		
USA	Santiago Southern California Edison				3*81		
USA	Eversource Saco Valley				2*25		
USA	Blue sky West Bingham				60		
USA	Standpipe Pacific Corp				65		
USA	Oakfield Blue Sky East				60		
USA	Vermont	1.73	4 x 43	Salient Pole / 1800	4 x 25	4 x -12.5	4 x 131
USA	Midwest				560	-310	
USA	Finlay Solar Park				60		
USA	Panhandle Texas				2*175	-125	
USA	Maine – 1	1.95	117	Salient Pole / 1800	60	-27	350
USA	Maine – 2	1.95	117	Salient Pole / 1800	60	-27	350
USA	Wyoming	1.84	120	Salient Pole / 1200	65	-40	310
USA	California	1.46	3 x 118	Salient Pole / 1200	3 x 81	3 x -35	3 x 324
USA	New Hampshire – 1	1.49	2 x 37	Salient Pole / 1800	2 x 25	2 x -12.5	2 x 97
USA	Connecticut	1.49	37	Salient Pole /1800	25	-12.5	98
USA	New Hampshire – 2	1.49	2 x 37	Salient Pole / 1800	2 x 25	2 x -12.5	2 x 97
USA	Virginia – 1	1.39	2 x 139	Salient Pole / 1200	2 x 100	2 x -50	2 x 342
USA	Virginia – 2	1.39	2 x 139	Salient Pole / 1200	2 x 100	2 x -50	2 x 342
USA	Maine – 1	1.95	117	Salient Pole / 1800	60	-27	350
Korea	Jeju Island	1.93	2 x 97	Salient Pole / 1800	2 x 50	2 x -25	2 x 224
Norway	Feda		340	cylindrical	170	-90	740
Denmark	Herslev		450	cylindrical	200	-120	1000
Denmark	Fraugde		450	cylindrical	200	-120	1000
Denmark	Bjaeverskov		450	cylindrical	270	-140	900
Georgia	Black Sea		80	cylindrical	60	-39	250

Italy	ICS Matera	7.08	1770	Cylindrical	250	-125	1198
Italy	ICS Matera	7.08	1770	Cylindrical	250	-125	1198
Italy	ICS Codrongianos	1.69	423	Cylindrical	250	-125	1277
Italy	ICS Codrongianos	1.69	423	Cylindrical	250	-125	1277
Italy	ICS Codrongianos	7.08	1770	Cylindrical	250	-125	1198
Italy	ICS Foggia	7.08	1770	Cylindrical	250	-125	1198
Italy	ICS Garigliano	7.08	1770	Cylindrical	250	-125	1198
Italy	ICS Villanova	7.08	1770	Cylindrical	250	-125	1198
Italy	ICS Candia	7.08	1770	Cylindrical	250	-125	1198
Italy	Maida				2*250		
Italy	Salargius				2*250		
Italy	Brindisi				2*250		
Italy	Brindisi Nord	7.08	1770	Cylindrical	250	-125	Retrofit
Italy	Brindisi Nord	7.08	1770	Cylindrical	250	-125	Retrofit
Italy	Partinico				170		
Italy	Favara				170		
Canada	Winnipeg, Dorsey Inverter station of BPI HVDC Bipole	1.41	226.4	Salient Pole	160	-80	0.653 (SCR)
Canada	Winnipeg, Dorsey Inverter station of BPI HVDC Bipole	1.99	318.09	Salient Pole	160	-80	0.653 (SCR)
Canada	Winnipeg, Dorsey Inverter station of BPII HVDC Bipole	2.2	660.0	Salient Pole	300	-165	0.653 (SCR)
Canada	Winnipeg, Riel Inverter station of BPIII HVDC Bipole	2.5	625.0	Salient Pole	4*250	-125	0.653 (SCR)
Canada	Hydro Quebec Copper Mountain				25		
Canada	Hydro Quebec Cadillac				25		
Canada	Rainbow Lake				50		
China	Zhalute 2				27*300	-150	
China	Jiuquan 2					-150	
China	Xuming Substation (5 SynCons)					-150	
China	Huaian 2					-150	
China	Ziangtan 2					-150	
China	Ximeng 2					-150	
China	Taizhou 2					-150	

China	Guquan 2					-150	
UK	Rassau		750	Salient Pole	60	-60	-
UK	Keith		450	Salient Pole	2*65	-57	-
UK	Lister Drive		450	Salient Pole	2*65	-57	-
Australia	Tasmania	4.1	656	Salient Pole (273)	70	-72	
Australia	Tasmania	3.57	571	Salient Pole (273)	70	-61	
Australia	Tasmania	3.65	496	Salient Pole (167)	72	-74	
Australia	Tasmania	3.15	356	Salient Pole (200)	49	-44	
Australia	Tasmania	3.72	350	Salient Pole (167)	50	-42	
Australia	Tasmania	3.7	348	Salient Pole (167)	40	46	
Australia	Tasmania	4.2	282	Salient Pole (600)	40	20	
Australia	Tasmania	3.1	149	Salient Pole (500)	21	17	
Australia	Tasmania				14		
Netherlands	Rotterdam/Maasvlakte MPP2	10.5	500/625	Cylindrical	280*	-280	

Thank You!

ANNEXURE B6

Approved 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 2023-24)		No. of Days	Approved Period/shutdown availed		No. of Days	Reason	Whether as per LGBR or not	Remarks
				From	To		From	To				
TVNL	Tenughat TPS	1	210	01.07.2023	15.08.2023	46	14.07.2023	03.09.2023	52	AOH	NO	
DVC	Koderma TPS	1	500	01.09.2023	25.09.2023	25	23.08.2023	29.08.2023	7	BOH	NO	Not availing
WBPDCL	Bakreshwar TPS	1	210	30.08.2023	03.10.2023	35	22.08.2023	26.09.2023	35	BOH/Turbine Overhauling	YES	
OPGC	IBTPS	3	660	01.09.2023	30.09.2023	30	20.09.2023	19.10.2023	30		NO	S/D to be taken after revival of unit-3 of GMR and unit-1 of IBTPS
OPGC	IBTPS	1	210				30.08.2023	18.09.2023	29	AOH	NO	
NTPC	KBUNL	3	195	21.08.2023	04.10.2023	45				COH	NO	Not being availed
NTPC	FSTPP	4	500	01.09.2023	15.10.2023	45	16.07.2023	05.09.2023	52	Generator OH	NO	S/D already availed
DPL	DPL TPS	7	250	01.08.2023	30.09.2023	61				Boiler +LPT O/H+Generator rotor thread out and checking + NOX work	NO	Not being availed
DPL	DPL TPS	8	250				11.07.2023	13.09.2023	64	AOH	NO	S/D already availed,Unit under shutdown since 14.07.2023
GMRKEL	GMR	2	350	25.09.2023	09.10.2023	15	25.09.2023	09.10.2023	15	AOH	YES	
GMRKEL	GMR	3	350	15.08.2023	17.09.2023	34	14.08.2023	19.09.2023	37	AOH	YES	Unit under shutdown

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	556	303
	Central Sector+Bi-Lateral	6439	4006
	SURPLUS(+)/DEFICIT(-)	-526	-245
2	**JHARKHAND**		
	NET MAXIMUM DEMAND	1820	1094
	NET POWER AVAILABILITY- Own Source	430	198
	Central Sector+Bi-Lateral+IPP	1182	681
	SURPLUS(+)/DEFICIT(-)	-208	-215
3	**DVC**		
	NET MAXIMUM DEMAND	3300	2181
	NET POWER AVAILABILITY- Own Source	5300	3368
	Central Sector+MPL	330	342
	Bi- lateral export by DVC	2300	1412
	SURPLUS(+)/DEFICIT(-) AFTER EXPORT	30	118
4	**ODISHA**		
	NET MAXIMUM DEMAND (OWN)	5600	4070
	NET MAXIMUM DEMAND (In Case of CPP Drawal)	6759	3182
	NET POWER AVAILABILITY- Own Source	3750	2129
	Central Sector	1950	1315
	SURPLUS(+)/DEFICIT(-) (OWN)	100	-626
	SURPLUS(+)/DEFICIT(-) (In Case, 600 MW CPP Drawal)	-1059	262
5	**WEST BENGAL**		
	WBSEDCL		
5.1	NET MAXIMUM DEMAND	8900	4711
	NET MAXIMUM DEMAND (Incl. Sikkim)	8910	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	-833	-186
5.2	**CESC**		
	NET MAXIMUM DEMAND	2050	1046
	NET POWER AVAILABILITY- Own Source	830	512
	IMPORT FROM HEL	680	363
	TOTAL AVAILABILITY OF CESC	1370	875
	DEFICIT(-) for Import	-540	-171
	WEST BENGAL (WBSEDCL+CESC+IPCL)		
	(excluding DVC's supply to WBSEDCL's command area)		
	NET MAXIMUM DEMAND	10950	5757
	NET POWER AVAILABILITY- Own Source	6157	3092
	CS SHARE+BILATERAL+IPP/CPP+TLDP+HEL	3440	2315
	SURPLUS(+)/DEFICIT(-) BEFORE WBSEDCL'S EXPORT	-1353	-350
	SURPLUS(+)/DEFICIT(-) AFTER WBSEDCL'S EXPORT	-1363	-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