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भारत सरकार
Government of India

विद्युत मंत्रालय
Ministry of Power

केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन - I प्रभाग
Power System Planning & Appraisal - I Division

सेवा में / To

-As per enclosed list-

विषय: "ट्रांसमिशन पर राष्ट्रीय समिति" (एनसीटी) की तीसरी बैठक - बैठक के कार्यवृत्त

Subject: 3rd meeting of "National Committee on Transmission" (NCT) – Minutes of Meeting

Sir/Madam,

The 3rd meeting of the "National Committee on Transmission" (NCT) was held through Video Conferencing on 26th and 28th May, 2020 under the Chairmanship of Shri P. S. Mhaske, Chairperson, CEA. The Minutes of the meeting are enclosed herewith.

Yours faithfully,

(Goutam Roy)

Chief Engineer (PSPA-I) & Member Secretary (NCT)

Copy to:

- (i) Joint Secretary (Trans), Ministry of Power, Shram Shakti Bhawan, New Delhi-110001
- (i) Chief Engineer (PSPA-II), CEA
- (ii) CMD (POSOCO), B-9, Qutub, Institutional Area, Katwaria Sarai, New Delhi - 110010
- (iii) CEO, RECTPCL, ECE House, 3rd Floor, Annexe - II, [28A, KG Marg, New Delhi - 110001](#)
- (iv) VP, PFC Consulting Ltd, First Floor, "Urjanidhi", 1, Barakhmba Lane, Connaught Place, New Delhi-110001

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List of addressees:

| | | | |
|----|--|----|--|
| 1. | Chairperson, Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066. | 2. | Member (Power System), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066. |
| 3. | Member (Economic & Commercial), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066. | 4. | Director (Trans) Ministry of Power Shram Shakti Bhawan, New Delhi-110001. |
| 5. | Sh. Dilip Nigam, Scientist 'G', Block no. 14, CGO Complex, Lodhi Road, New Delhi – 110003 | 6. | Chief Operating Officer, Central Transmission Utility POWERGRID, Saudamini, Plot No. 2, Sector-29, Gurgaon – 122 001. |
| 7. | Sh. Rajnath Ram, Adviser (Energy), NITI Aayog, Parliament Street, New Delhi – 110 001. | 8. | Sh. P. K. Pahwa, Ex. Member (GO&D), CEA 428 C, Pocket -2, Mayur Vihar, Phase -1, Delhi – 110091. |
| 9. | Shri Prabhakar Singh, Ex. Director (Projects), POWERGRID D 904, Tulip Ivory, Sector-70, Gurgaon – 122 001. | | |

Minutes of the 3rd meeting of National Committee on Transmission (NCT) held on 26th and 28th May, 2020

List of Participants is attached as **Annexure-I**

Chairman, NCT welcomed the participants to the 3rd meeting of Reconstituted NCT and requested Chief Engineer (PSPA-I) to take up the agenda for discussion.

A. Review of the earlier meetings of NCT:

1. Confirmation of the minutes of 2nd meeting of National Committee on Transmission (NCT)

The minutes of 2nd meeting of National Committee on Transmission held on 22.01.2020 were issued vide CEA letter No. File No.CEA-PS-11-15(11)/1/20-PSPA-I/9013/2020 dated 06.02.2020.

1.1. CEA representative stated that no comments / observations have been received on the minutes of the meeting. Accordingly, the minutes of 2nd meeting of NCT may be confirmed.

1.2. NCT confirmed the minutes of 2nd meeting of NCT.

2. Status of transmission schemes under bidding process - briefing by BPCs

PFCCCL and RECTPCL presented in brief, the status of transmission projects awarded through TBCB route by them. The status furnished by the BPCs are attached as **Annexure-II**.

2.1. NCT noted the status of transmission projects presented by the BPCs.

3. Notification of transmission schemes approved in 4th, 5th and 6th meetings of erstwhile National Committee on Transmission and 1st and 2nd meeting of Reconstituted NCT :

The details of the transmission schemes are given at **Annexure III**.

3.1. NCT noted the status of bidding/award of the transmission schemes approved in the last three meetings of erstwhile NCT.

B. Evaluation of the functioning of National Grid in previous quarter:

POSOCO made a presentation apprising NCT of the functioning of National Grid in previous quarter (4th quarter of 2019-20). The presentation made by POSOCO is attached as **Annexure-IV**. The presentation included overview of Grid Operation during last Quarter, major elements commissioned during the quarter, enhancement in Transfer Capability Limits during the quarter, congestion in Power Exchanges during the quarter, constraints faced during Grid Operation, important Grid Elements under long outage, important elements under construction and important Aspects for future Transmission Planning.

Member (E&C) pointed out that presentation has highlighted many constraints in the grid operation. He requested CE(PSPA-1) to present an action taken report on the same in the next NCT meeting. CE(PSPA-1) stated that the same forms a part of the agenda note.

C. Schemes agreed in Regional Power Committees (Transmission Planning)

4. Change in location in the earlier agreed transmission schemes:

4.1. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II –Part A:

4.1.1. CE (PSPA-1), CEA stated that the transmission scheme “Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II –Part A” was discussed in the 6th meeting of NCT. The scheme is being implemented through TBCB route and MoP vide Gazette notification dated 24.01.2020 has appointed RECTPCL as BPC for the project. The transmission scheme is currently under bidding. The scope of works under this scheme inter alia includes Establishment of Ramgarh-2 PS along with Ramgarh-2 PS – Fatehgarh-2 PS 400kV D/c line (150 km) and Ramgarh-2 PS – Jaisalmer-2 (RVPN) 400 kV D/c line (60 km). However, with the proposed location of Ramgarh-2 PS, transmission lines from this substation would have to pass through GIB area (habitat of Great Indian Bustard bird). In order to avoid GIB zone, Ramgarh-2 PS – Fatehgarh-2 PS 400kV D/c line have to circumvent the GIB area resulting in increase of line length to more than 450 km.

4.1.2. Three meetings were held on 08.04.2020, 20.04.2020 and 01.05.2020 in which considering the GIB area en-route the transmission lines, discussions were held regarding shifting of Ramgarh-2 PS to appropriate new location. In the meeting held on 01.05.2020, the pooling station which was planned in Ramgarh/Kuchheri potential SEZ has been agreed to be shifted to Fatehgarh area to avoid the GIB areas and the following was agreed:

- i. The new location for establishment of Ramgarh-2 PS under the transmission scheme ‘Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II - Part A’ agreed as

Fatehgarh-3 (Ramgarh-2 PS): at Village Neemba, Tehsil Fatehgarh, District Jaisalmer (26°20'08"N and 71°04'48"E)

- ii. Since the substation is now shifted in Fatehgarh area, there should be futuristic land provision for evacuation of around 8-9 GW RE power instead of 1.9 GW as planned in Ramgarh-2 PS.
- iii. Adequate provision of space for 765kV level at Ramgarh-II (Fatehgarh-III) PS may be kept for future expansion

4.1.3. Subsequently, in the meeting held on 15.05.2020 amongst CEA and CTU, the future space requirement of Ramgarh-II (Fatehgarh-III) 400/220kV PS has also been revised/finalized. The proposed scope of work under the transmission scheme 'Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II - Part A' is given below:

| Sl.No. | Scope of the Transmission Scheme | Capacity /km |
|--------|---|---|
| 1. | Establishment of 400/220 kV, 4x500 MVA at Ramgarh-II (Fatehgarh-III) PS with 420kV (2x125 MVAR) bus reactor <i>Future provisions: Space for 765/400kV ICTs along with bays: 8 nos. 765kV line bay alongwith switchable line reactor: 8 nos. 765kV Bus Reactor along with bays: 3 nos. 400/220 kV ICTs along with bays: 8 nos. 400 kV line bays along with switchable line reactor: 10 nos. 400kV Bus Reactor along with bays: 2 nos. 400kV Sectionalizer bay: 2 nos. 220 kV line bays: 15 nos. 220kV sectionalizer bay: 2 nos.</i> | 400/220 kV, 500 MVA ICT - 4 nos. 400 kV ICT bays - 4 nos. 220 kV ICT bays - 4 nos. 400 kV line bays - 4 nos. 220 kV line bays - 7 nos. 125 MVAR, 420kV bus reactor - 2 nos. 420 kV reactor bay - 2 nos. |
| 2. | Ramgarh-II (Fatehgarh-III) PS – Fatehgarh-II PS 400kV D/c line (Twin HTLS*) | Length - 46 |
| 3. | 2 nos. of 400 kV line bays at Fatehgarh-II for Ramgarh-II (Fatehgarh-III) PS –Fatehgarh-II PS 400kV D/c line | 400 kV line bays - 2 nos. |
| 4. | Ramgarh-II (Fatehgarh-III) PS – Jaisalmer-II (RVPN) 400kV D/c line (Twin HTLS*) | Length - 50 |
| 5. | 2 nos. of 400 kV line bays at Jaisalmer-II (RVPN) for Ramgarh-II (Fatehgarh-III) PS – Jaisalmer-II (RVPN) 400kV D/c line | 400 kV line bays - 2 nos. |
| | | Total |

** with minimum capacity of 2100 MVA on each circuit at nominal voltage*

Note:

- (i) Powergrid to provide space for 2 nos. of 400 kV bays at Fatehgarh-II*
- (ii) M/s RVPNL to provide space for 2 nos. of 400 kV bays at Jaisalmer-II*
- (iii) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey*

4.1.4. On the query from Chairperson, CEA regarding the 1.9 GW envisaged potential at Ramgarh, CTU stated that the 1.9 GW potential at Ramgarh is part of the 20 GW potential (17 GW ISTS and 3 GW under intra-state) that was envisaged for evacuation from Rajasthan under Phase I & II and the Regulatory Approval for the same has been obtained from CERC. However, due to involvement of GIB area, it was agreed to shift the Ramgarh-2 PS in the Fatehgarh area with the same connectivity. However, looking at the high potential of Fatehgarh area, space provision has been suggested for extension of capacity of Fatehgarh –III S/S.

4.1.5. On query from Member (E&C), CEA regarding the evacuation of RE power from the area on the western side of GIB area near the border, it was informed that Power evacuation system from Ramgarh (1 GW) forms a part of the planning for evacuation system for 20 GW of additional power from border area indicated by MNRE. The transmission planning for evacuation of RE power from that area has been taken up separately and a separate connectivity system is being planned. A preliminary study for which has been done considering the evacuation towards Bhadla avoiding GIB areas.

4.1.6. On query from expert members regarding the additional 20 GW potential in Rajasthan, CEA informed that MNRE has intimated about the 20 GW additional RE potential that has been envisaged at the following areas in Rajasthan: Fatehgarh (11 GW), Bhadla (6 GW), Bikaner (2 GW) and Ramgarh (1 GW).

4.1.7. On query from Expert Member (NCT) regarding the status of upcoming/under implementation RE projects in Ramgarh area, CEA informed that, two nos. of RE developers namely Adani and Azure have taken Stage-2 Connectivity at Ramgarh-2 PS for 500 MW each. CEA informed that M/s Azure has agreed for shifting of their connectivity to new location (Fatehgarh) and M/s Adani has intimated that they would also shift their present connectivity to new location (Fatehgarh). However, in future, they would also be developing RE project in Ramgarh area with the timeframe of April'2023. CEA added that the transmission planning for evacuation of the same would be done separately along with planning forevacuation of RE power from Ramgarh area/ western side of GIB area.

4.1.8. NCT Members agreed and noted the same.

4.2. Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh:

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4.2.1. CE (PSPA-1), CEA stated that the transmission scheme was discussed and recommended for implementation through TBCB in the 3rd meeting of NCT. M/s RECTPCL has been appointed as BPC for the scheme by MoP vide Gazette notification dated 24.01.2020. The transmission scheme is currently under bidding. The scope of works of the aforesaid scheme, broadly comprises of the following elements:

- i. Establishment of 400/220 kV, 5X500 MVA at Rajgarh SEZ
- ii. Rajgarh SEZ PP -Bhopal (Sterlite) 400 kV D/c line
- iii. Rajgarh SEZ PP – Shujalpur 400 kV D/c line

4.2.2. Subsequently, two meetings were held on 28.02.2020 and 30.03.2020 with participation from CEA, CTU, MNRE, SECI, MPNRED, MPPTCL and MPUVND to discuss the request of MPNRED regarding change of location of Rajgarh ISTS pooling station to Agar/Shajapur area. MPNRED informed that at the identified location at Rajgarh, there are issues of land availability. As such, it would not be possible to implement P.S for evacuation of 2.5 GW in that location. Also, they intimated that 550 MW Solar Park in Agar and 450 MW Solar Park in Shajapur districts are being developed under Ultra Mega Renewable Energy Power Projects (UMREPP) scheme of MNRE and the RfP for setting up of these solar projects had already been floated in January, 2020. Accordingly, MPNRED proposed to shift the location of Rajgarh ISTS Pooling station to village Pachora, tehsil Agar, district Agar (coordinates 23.7177N 76.12333E) where land is available for the pooling station. In view of above, it was decided location of Rajgarh P.S. would be shifted to Pachora, Agar and the transmission system for evacuation of power from RE projects in Agar/Shajapur/Rajgarh (2.5 GW) SEZ in Madhya Pradesh would be implemented in two Phases i.e. under Phase-I (timeframe July, 2022) the transmission system for evacuation of 1 GW from Agar/Shajapur district. Under Phase-II (timeframe December, 2022) the Transmission system for evacuation of the balance 1.5 GW from Rajgarh. It was also decided that the transmission elements required under each phase should be matched with the timeframe of each phase of generation development.

4.2.3. Accordingly, after a meeting with CTU on 01.05.2020, the following transmission elements required under Ph-I (1000 MW) and Ph-II (1500 MW) were evolved:

Phase-I

| Sl. No. | Scope of the Transmission Scheme | Capacity /km |
|---------|--|---|
| 1 | Establishment of 400/220 kV, 2X500 MVA at Pachora SEZ PP with 420kV (125 MVAR) bus reactor <u>Future provisions:</u> Space for 400/220kV ICTs along with bays: 6 | 400/220 kV, 500 MVA ICT – 2 400 kV ICT bays – 2 220 kV ICT bays – 2 400 kV line bays – 2 220 kV line bays – 4 (for Agar & Shajapur solar park interconnection) |

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| | | |
|---|--|--|
| | 400kV line bays: 8 nos. 220kV line bays: 11 nos 420kV bus reactor along with bays: 1 no 220kV Bus sectionalizer bay: 2 nos. (One no. bay for each Main Bus) | 125 MVAR, 420 kV reactor 420 kV reactor bay – 1 |
| 2 | Pachora SEZ PP -Bhopal (Sterlite) 400 kV D/c line (Quad/HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage) along with 80MVAR switchable line reactors on each circuit at Pachora end | Length – 160 Switchable line Reactors (at Pachora end) – 420kV, 2x80MVAR Line reactor bays (at Pachora) – 2 nos. |
| 3 | 2 no. of 400 kV line bays at Bhopal (Sterlite) for Pachora SEZ PP - Bhopal (Sterlite) 400 kV D/c line (Quad/HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage) | 400 kV line bays – 2 |

Note: (i) M/s BDTL (Bhopal Dhule Transmission Company Limited) to provide space for 2 no. of 400 kV line bays at Bhopal (Sterlite) for termination of Pachora SEZ PP -Bhopal (Sterlite) 400 kV D/c line.

(ii) Space for future provisions for 400 kV line bays to be kept including the space for switchable line reactors.

The completion schedule for the scheme is July’ 2022 (the completion schedule to be reviewed before submission of RfP bids considering visibility of RE generators and sufficient implementation time for the TSP)

Phase- II:

Transmission elements required to cater to evacuation requirement of 1500 MW RE from Rajgarh REZ under Phase-II, which would be required in the implementation timeframe of December’ 2022 would comprise of the following:

- 1) Augmentation of Pachora S/s by 3X500 MVA, 400/220 kV ICTs

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- 2) Pachora-Shujalpur (PG) 400 kV D/c line or any other better alternative in view of re-distribution of RE potential zones by MPNRED*

In case of any change in the scheme under Phase-II, the same would be discussed and formalized in the upcoming meeting of Western Region Power Committee (Transmission Planning).

**Requires augmentation of Shujalpur(PG) by 1x500MVA, 400/220kV ICTs and reconductoring of Shujalpur(PG)-Shujalpur(MP) 220kV D/c line (conductor with ampacity equivalent to ACSR twin moose at nominal voltage)*

4.2.4. Chairman, NCT stated that the elements for the scheme have already been approved by the erstwhile NCT. The only changes that are being intimated are with respect to location of Rajgarh pooling station and the phasing of the scheme. Since, the packaging of the scheme is not within the ambit of ToR of the reconstituted NCT, therefore NCT would not give its observations/decision on the packages formulated for each phase.

4.2.5. Accordingly, NCT noted the changes being proposed w.r.t change in location and phasing of the “ Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh”

4.3. Transmission Scheme for Evacuation of power from RE sources in Koppal Wind Energy Zone (Karnataka) (2500 MW):

4.3.1. CE (PSPA-1), CEA stated that the transmission scheme for evacuation of power from RE sources in Koppal Wind Energy Zone (Karnataka) (2500 MW) was discussed in the 2nd meeting of NCT and M/s PFCCL has been appointed as BPC for the scheme by MoP vide Gazette notification dated 09.10.2019. The location of the proposed Koppal PS was initially finalized in Kushtagi Taluk of District Koppal and the co-ordinates of the same were conveyed to M/s PFCCL based on the meeting held at CEA on 15.01.2020 amongst CEA, CTU, MNRE, SECI and BPCs.

4.3.2. Subsequently, M/s PFCCL vide its letter dated 24.04.2020 requested to revisit the location of Koppal PS based on the communication received from SECI informing that Koppal P.S. is to be located near the proposed Solar Park at Talakal Village, as communicated by Govt. of Karnataka, which is about 40 Kms. from the Kushtagi site. Accordingly, in an e-meeting held on 01.05.2020, it was agreed that, Koppal pooling station shall be located with the boundary limitation of Koppal as given below:

| S.No. | Pooling Station | Boundary Limitations agreed | | | Remarks |
|-------|---|---|---------------|---------------|---|
| 1 | 400/220 KV Koppal Pooling Station Taluk: District: Koppal | 5 Km radius of following plot within jurisdiction boundary Taluka- Yelbarga , District-Koppal and to be located on left side of NH 67 (From Koppal to Gadag) | | | <i>The coordinates of Koppal PS is tentative in nature and subject to</i> |
| | | Option 1 | Latitude | Longitude | |
| | | Corner-1 | 15°22'24.04"N | 76° 0'49.19"E | |

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| | | | | | |
|--|--|----------|---------------|---------------|--|
| | | | | | <i>change as per the availability of land within boundary limits</i> |
| | | Corner-2 | 15°22'13.81"N | 76° 0'55.41"E | |
| | | Corner-3 | 15°22'7.90"N | 76° 0'36.71"E | |
| | | Corner-4 | 15°22'18.80"N | 76° 0'30.85"E | |

4.3.3. The transmission scheme presently under bidding was envisaged for evacuation of power from Koppal WEZ (2500 MW) and the Regulatory Approval is awaited for the same. However, now with the relocation of the ISTS P.S. near the proposed Koppal Solar Park, it is understood that the scheme would be utilized for evacuation of Solar power instead of Wind power as earlier envisaged.

4.3.4. NCT members stated that since there is no change in scope of works of the scheme, they have no comments to offer. NCT noted the change in location of Koppal P.S.

5. New / Modified Inter-State Transmission Schemes in Northern Region:

5.1. Name of the Scheme: ICT augmentation at 400/220 kV Patran S/s of M/s Patran Transmission Company Limited (a subsidiary of Techno Electric and Engineering Company Limited) associated with LTA to Nuclear Power Plant (4X700 MW) of M/s NPCIL in Haryana

5.1.1. CE (PSP&A-1), CEA stated that in the 1st meeting of NRPCTP held on 24.01.2020, the following system was agreed to provide the connectivity/LTA to Nuclear Power Plant (4X700 MW) of NPCIL in Haryana:

Transmission system for connectivity:

- i. Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP) - Fatehabad (PG) 400 kV (Quad) D/c line along with 400 kV bays at both ends – under the scope of applicant.
- ii. Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP) – Patran (TBCB) 400 kV (Quad) D/c line along with 400 kV bays at both ends – under the scope of applicant.
- iii. 2x125 MVAR, 420 kV Bus Reactor at Generation switchyard of NPCIL (under scope of NPCIL)

The above system would be constructed by NPCIL (applicant). However, the following system would only be implemented as a part of ISTS:

Transmission system for LTA:

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- i. 400/220 kV, 1x500 MVA ICT along with associated bays at Patran 400/220 kV (TBCB) substation – to be implemented under ISTS (due to overloading observed at Patran)

5.1.2. On query from Chairman, NCT regarding the power system studies scenario for the project, CTU informed that the transmission scheme has been finalized after carrying out the system studies for the 2024-25 timeframe. CTU added that the two nos. of connectivity lines were agreed and further no additional system was required as power would be evacuated through existing system. However, under ISTS system, an ICT has been proposed at Patran substation due to the overloading issues observed at Patran S/s.

5.1.3. On query from Expert Member (NCT) regarding the timeframe and LTA agreement, CTU informed that the project has the time frame of 2026-27. CTU added that the LTA to Nuclear Power Plant of NPCIL for (4X700 MW) has already been granted, however, the LTA Agreement has not been signed yet.

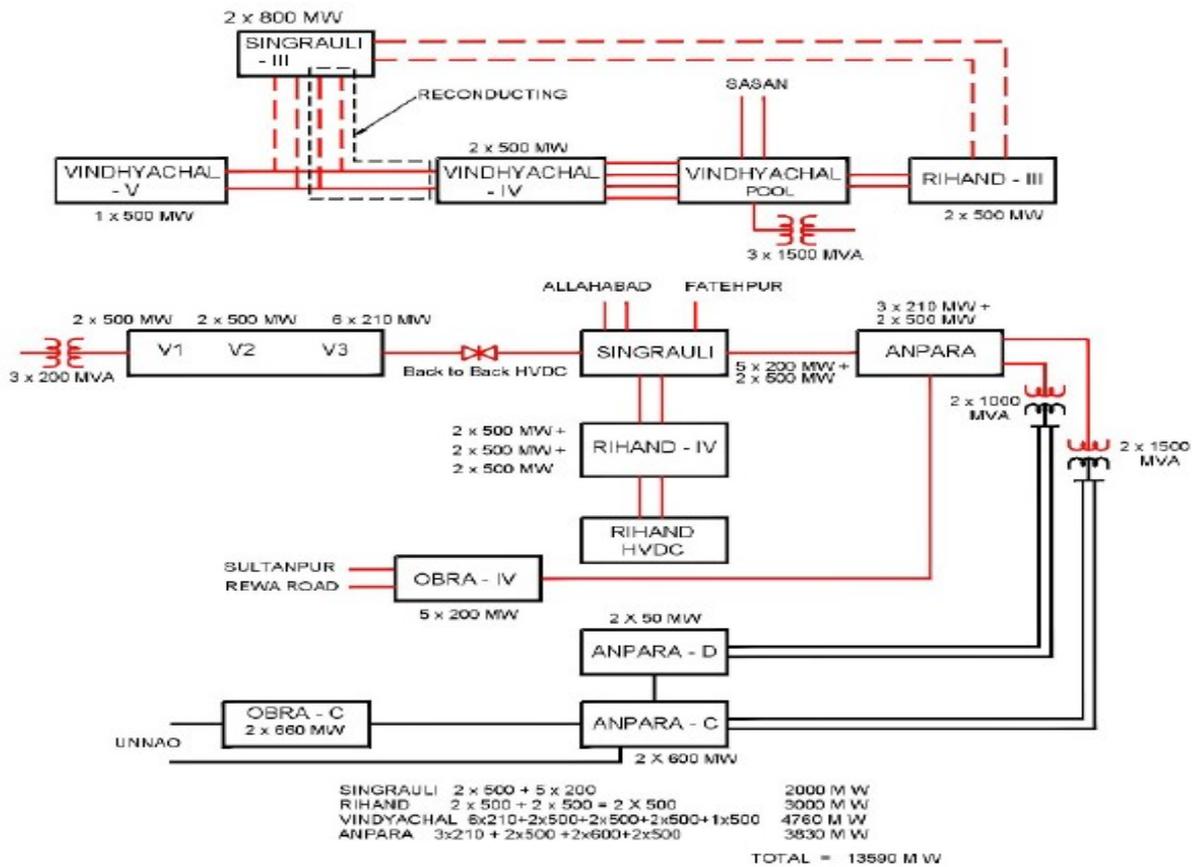
5.1.4. After deliberations, NCT members opined that as the scheme involves implementation of only one ICT along with associated bays that too in timeframe of 2026-27, the scheme may be deferred and may be taken up in future in matching timeframe. The system may be put up to NCT for approval accordingly.

5.2. Name of Scheme: Evacuation system for Singrauli STPP Stage III (2x800 MW) of M/s NTPC

5.2.1. CE (PSPA-1), CEA stated that NTPC is implementing Singrauli STPP Stage III (2x800 MW) generation within the existing Singrauli TPS complex and UP has committed for purchase of 85% of power from Singrauli STPP Stage III. Following transmission system was agreed in the 1st NRPCTP meeting held on 24.01.2020 for evacuation of power from Singrauli STPP Stage III:

- i. LILO of both circuits of Tie line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage-III - under the scope of NTPC.
- ii. Re-conductoring of Singrauli Stage-III - Vindhyachal Stage-IV 400 kV D/C TM line (formed after above proposed LILO) with HTLS conductor - under the scope of NTPC
- iii. Singrauli Stage-III – Rihand-III 400kV D/c line - under ISTS scope
- iv. 2x125 MVAR. 420 kV Bus Reactor at Singrauli Stage-III generation switchyard - under scope of NTPC

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5.2.2. On query from Chairman, NCT regarding the timeframe of Singrauli Stage-III, CEA representative informed that the time frame of the project is Dec 2024.

5.2.3. CTU informed that no Connectivity or LTA application has been received yet from NTPC. CTU added that evacuation system of Singrauli Stage III would be connected to Western Region and the scheme has not yet been deliberated in the WRPC (TP).

5.2.4. Member (E&C), CEA stated that as the transmission system has been agreed in the NRPC(TP) meeting and not yet discussed in the WRPC(TP), the scheme may be given in-principle approval.

5.2.5. Expert member, NCT stated that the transmission system may be agreed in-principle for implementation under ISTS.

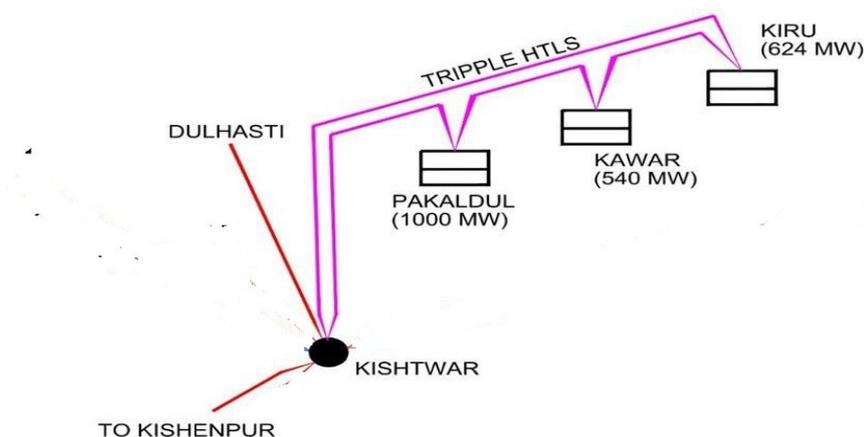
5.2.6. Although members were in agreement for in-principle approval of the scheme, it was agreed that the scheme may be deferred and may be put up to NCT after deliberations in WRPC(TP) and grant of connectivity/LTA to Singrauli stage-III TPS.

5.3. Name of Scheme: Establishment of 400 kV switching station at Kishtwar (GIS) under ISTS

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5.3.1.CE (PSPA-1), CEA stated that CVPPL is implementing three major HEPs viz Pakaldul (1000MW), Kiru (624 MW) and Kwar (540 MW) HEP in J&K. In the 1st NRPCTP meeting held on 24.01.2020, following Connectivity system was agreed for evacuation of power from Pakaldul (1000MW), Kiru (624 MW) and Kwar (540 MW) HEPs of CVPPL :

- i. Implementation of Kiru-Kwar-Pakaldul - Kishtwar 400 kV D/C Triple HTLS connectivity line to be implemented by M/s CVPPL. M/s CVPPL to phase the implementation of the dedicated line as per the implementation timelines of the three HEPs ie. Kiru, Kwar & Pakaldul.
- ii. One and a half breaker switching scheme at 400kV Generation switchyard.
- iii. 2 bays at each end of Kishtwar and Pakaldul - under the scope of generator.
- iv. 420 kV, 125 MVAR Bus Reactor at Pakaldul HEP - under scope of generation developer
- v. 420 kV, 125 MVAR Bus Reactor at Kishtwar Switching Station - under ISTS.
- vi. Establishment of 400 kV switching station at Kishtwar (GIS) by LILO of one circuit of Kishenpur – Dulhasti 400kV D/c (Quad) line (Single Circuit Strung) – under ISTS.



5.3.2.System at (i),(ii),(iii) and (iv) above are in the scope of generation developers and the location of Kishtwar pooling Station (GIS) is yet to be finalized.

5.3.3.CTU informed that Connectivity and LTA for Pakaldul HEP has already been granted. LTA has been granted alongwith stringing of 2nd circuit of Kishenpur – Dulhasti 400kV D/c (Quad) line .But the LTA grant is yet to be deliberated in the NRPC-TP meeting. Further no Connectivity/LTA has been received for Kiru and Kwar HEPs. CTU added that it was agreed that CVPPL would first connect Pakaldul to Kishtwar PS and subsequently extend the same transmission line to Kiru and Kwar HEP as per matching time frame.

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5.3.4. NCT Members agreed and approved the following system to be implemented as ISTS under Transmission system for evacuation power from Pakaldul HEP in Chenab Valley HEPs:

- i) Establishment of 400 kV switching station at Kishtwar (GIS) along with 420 kV, 125 MVAR Bus Reactor at Kishtwar Switching Station by LILO of one circuit of Kishenpur – Dulhasti 400kV D/c (Quad) line (Single Circuit Strung)-Connectivity system
- ii) 2nd circuit of Kishenpur – Dulhasti 400kV D/c (Quad) line (NRPC-TP to ratify in its next meeting) – LTA system

5.4. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II-Part B1 and Part G1

5.4.1. CE (PSPA-1), CEA stated that the transmission scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) was agreed in the 6th meeting of NCT and is being taken up in various parts. Ministry of Power vide OM dated 23/01/2020 has allocated Part B1 and G1 of the overall scheme to POWERGRID for implementation under RTM.

Part B1

5.4.2. He stated that Part B1 of the scheme inter alia includes \pm 600 MVAR STATCOM along with 4x125 MVAR MSC & 2x125 MVAR MSR each at Fatehgarh-II & Bhadla-II S/s. CTU had requested to split the total STATCOM capacity into two equal set of STATCOM (\pm 300MVAR STATCOM; 2x125MVAR MSC; 1x125MVAR MSR) one on each side of 400kV Bus Section for both Fatehgarh-II & Bhadla-II S/S and was agreed in the 1st NRPC (Transmission Planning) meeting held on 24.01.2020.

Part G1

5.4.3. He further stated that Part G1 of the scheme includes Removal of LILO of Bawana – Mandola 400kV D/c (Quad) line at Maharani Bagh (LILO of Maharani Bagh- Bawana section at Gopalpur S/s has also been agreed) and Extension of above LILO section upto Narela S/s so as to form Maharani Bagh – Narela 400kV D/c (Quad) and Maharani Bagh-Gopalpur-Narela 400kV D/c (Quad) lines.

5.4.4. CE (PSPA-I), CEA stated that in the 1st NRPC (Transmission Planning) meeting held on 24.01.2020, CTU has intimated that LILO of Bawana-Mandola 400kV D/c (Quad) at Maharani Bagh is under implementation using Twin HTLS conductor on Multicircuit tower. Considering that LILO is already being constructed with twin HTLS conductor, it was agreed during the 1st NRPC (Transmission Planning) to construct extension of LILO section with Twin HTLS conductor instead of Quad conductor. Further, considering RoW issues in Delhi area, it was also agreed to construct extension of LILO section too on multi-circuit towers.

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5.4.5. NCT Members noted the same.

5.5. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II-Part D

5.5.1. CE (PSPA-1), CEA stated that the transmission scheme ‘Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II-Part D’ was agreed in the 6th meeting of NCT. The scheme broadly includes:

- Sikar-II – Aligarh 765kV D/c line
- 2 no. of 765 kV line bays each at Sikar-II and Aligarh for Sikar-II – Aligarh 765kV D/c line (Total 4 no.)
- 765 kV, 1x330 MVAR switchable line reactor for each circuit at each end of Sikar-II – Aligarh 765 kV D/c line with 110 MVAR spare unit

5.5.2. CEA stated that, in the above scheme, for the provision of spare reactor unit, the word “at Aligarh” was inadvertently missed out. The same needs to be corrected.

5.5.3. CTU informed that 2 nos. of 765kV GIS line bay modules are already available at Aligarh S/s (POWERGRID). The 765 kV GIS line bay module are existing up to SF6 Air bushing outside GIS hall. The existing GIS line bay modules available at Aligarh S/s may be utilized for termination of Sikar-II – Aligarh 765kV D/c line at Aligarh S/s. However, to make it suitable for termination of 765 kV line with switchable line reactor, switchable line reactor bays and outdoor equipment needs to be implemented. Therefore, two nos. of 765 kV GIS line bays at Aligarh substation can be deleted from the scope of works.

5.5.4. The proposed scope of work under the transmission scheme ‘Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II - Part D’ is given below:

| Sl. No. | Scope of the Transmission Scheme | Capacity / km |
|---------|---|---|
| 1. | Sikar-II – Aligarh(GIS) 765kV D/c line | Length – 330 km |
| 2. | 2 no. of 765 kV line bays at Sikar-II for Sikar-II – Aligarh(GIS) 765kV D/c line | 765 kV line bays – 2*(Sikar-II S/s) – (Revised to 2 no. from earlier 4} |
| 3. | 1x330 MVAR switchable line reactor for each circuit at each end of Sikar-II – Aligarh(GIS) 765kV D/c line | 330MVAR, 765 kV reactor- 4 (2 reactors each at Sikar-II and Aligarh) Switching equipment for 765 kV reactor - 4 (2 Switching equipment each at Sikar-II and Aligarh) 110 MVAR, 765 kV, 1 ph Reactor (spare unit) at Aligarh -1 |

Note:

- (i) Developer of Sikar-II S/s to provide space for 2 no of 765 kV bays and space for 2 no of switchable line reactors at Sikar-II substation
- (ii) * 2 nos. of 765kV GIS line bay modules (up to SF6 to Air bushing outside GIS hall) are already available at Aligarh(GIS) S/s. TSP shall utilize the same for termination of Sikar-II – Aligarh(GIS) 765kV D/c line at Aligarh.
- (iii) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey

5.5.5. NCT Members noted the same.

5.6. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part G

5.6.1.CE (PSPA-1), CEA stated that the transmission scheme “Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part G” was agreed in the 6th meeting of NCT. The scheme includes following elements:

- Establishment of 3x1500MVA,765/400kV Narela substation
- Khetri – Narela 765kV D/c line
- LILO of Meerut – Bhiwani 765kV S/c line at Narela
- 1x330MVAr switchable line reactor for each circuit of Khetri – Narela 765kV D/c line at Narela end

5.6.2.He stated that, in the minutes of 6th meeting of NCT, it was mentioned that 1x110 MVAr spare reactor at Khetri end would be used as spare for Khetri – Narela 765 kV D/c line. However, it may be noted that no line reactor is envisaged for this line at Khetri end and spare reactor is required at Narela end for which no provision has been made. Accordingly, 1x110MVAr spare reactor at Khetri may be read as 1x110MVAr spare reactor at Narela(GIS) end. The same is summarized below:

| <u>As per 6th NCT MOM</u> | <u>Revision</u> |
|--|--|
| 1x110 MVAr spare reactor at Khetri to be used as spare for Khetri – Narela 765 kV D/c line | 1x110 MVAr spare reactor at Narela(GIS) to be used as spare for Khetri – Narela (GIS) 765 kV D/c line |

5.6.3. NCT Members noted the same.

5.7. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part F

CE(PSPA-1),CEA stated that the Transmission scheme “Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part G” was agreed in the 6th meeting of erstwhile NCT. The

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scheme as agreed in the 5th meeting of NRSCT held on 13.09.2017, which inter-alia includes 1x80MVA_r switchable Line reactor on each circuit at each end of Bikaner-II – Khetri 400 kV 2xD/c line. However, in the minutes of 6th meeting of NCT, in the package wise description of the scheme, this element got inadvertently mentioned as 1x80 MVA_r Switchable line reactor for each circuit at each end of Bikaner-II – Khetri 400kV 2xD/c line. Accordingly, following corrections are made in the scope of the scheme:

| Scope of the Transmission Scheme | Capacity /km |
|---|---|
| 1x80MVA _r switchable Line reactor on each circuit at each end of Bikaner-II – Khetri 400 kV 2xD/c Line | 400 kV, 80MVA _r reactor – 8nos. Switching equipment for 400 kV switchable line reactor –8 |

NCT Members noted the same.

6. New / Modified Inter-State Transmission Schemes in Western Region:

6.1. Transmission system for evacuation of 10 GW RE power from potential RE zones in Khavda region

6.1.1. Out of the total 28 GW (20 GW Solar + 8 GW Wind) potential REZs identified in Western Region, 16 GW potential RE zones have been identified specifically in Gujarat. This included transmission scheme associated with 5.5 GW RE potential under Phase-I and 10.5 GW RE potential under Phase-II. Phase-I part of WR transmission system was agreed in the 1st meeting of WRSCT held on 05.09.2018 and was recommended by erstwhile National Committee on Transmission (NCT) in its 2nd and 3rd meeting held on 04.12.2018 and 01.03.2019 respectively. The transmission system planned under Phase-I is under implementation except for Transmission Scheme for providing connectivity to RE project in Gujarat [Lakadia (2000 MW) wind] which is under hold. The transmission system under Phase-II RE in WR was agreed in 2nd meeting of WRSCT held on 21.05.2019 and was recommended in the 4th meeting of NCT held on 31.07.2019. The implementation of Phase II system is yet to be taken up. The Phase-II system initially planned included establishment of pooling stations at Jamnagar (2.5 GW), Radhanesda (2.5 GW), Lakadia (2 GW) and Rapar (3 GW) and Dwarka (0.5 GW).

6.1.2. Subsequently, with Govt. of Gujarat decision to allocate land to RE projects beyond SECI IV wind ISTS bids in Khavda area, the transmission system for evacuation of 10 GW solar capacity under Ph-II was reviewed and new scheme was evolved with pooling station in Khavda Region.

6.1.3. The revised transmission system for 10 GW solar RE projects in Gujarat under Phase-II (excluding 0.5 GW Dwarka) and immediate connectivity to Dholera UMSP was agreed in the 1st meeting of WRPCTP held on 11.01.2020 at Ahmedabad. The following

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transmission system for evacuation of 10 GW RE power from potential RE zones in Khavda region and from Dholera UMSP was approved:

A. Transmission system for evacuation of 10 GW RE power from potential RE zones in Khavda region

Phase-I, 4.5 GW (2 GW at Khavda, 2 GW at Bhuj-II & 0.5 GW at Bhuj PS):

- (i) 500 MW at Bhuj pooling station (400/220 kV, 500 MVA 9th ICT): 500 MW capacity injection at 220 kV Bhuj pooling station through dedicated transmission lines of RE developers in Khavda.
- (ii) 2000 MW at Bhuj-II pooling station (765/400/220 kV): Bhuj-II pooling station with 2x1500 MVA, 765/400 kV, 4X500 MVA, 400/220 kV capacity is currently under implementation. Bhuj-II pooling station has future provisions for another 2x1500 MVA, 765/400 kV and 4x500 MVA, 400/220 kV transformation capacity. 2000 MW capacity injection at 220/440 kV level at Bhuj-II pooling station through dedicated transmission lines of RE developers in Khavda. For LTA beyond 1500 MW at Bhuj-II pooling station, implementation of 1X1500, 765/400 kV ICT Augmentation at Bhuj-II pooling station under ISTS to be taken up.
- (iii) 2000 MW at Khavda pooling station
 - a) Establishment of Khavda 765/400, 3x1500MVA, 400/220kV, 4x500MVA* PS (GIS) with 1X330 MVAR 765 kV bus reactor and 1X125 MVAR 400 kV bus reactor (765/400/220 kV Khavda pooling station to be created with future provisions for pooling total 7.5 GW RE capacity. Two bus sections with bus sectionalizer to be created at 765kV & 400kV level with 4x1500MVA, 765/400kV ICTs in each section. Bus sectionalizer at 765kV level shall normally be closed and bus sectionalizer at 400kV level shall normally be open. Each 400 kV section to have RE capacity of maximum 4000 MW. The RE capacity can be directly connected at 400 kV level or at 220 kV level through 400/220 kV transformer. Two bus sections with bus sectionalizer are to be created at 220 kV level for each 400 kV Bus section with maximum RE capacity of 2000 MW in each 220 kV section. 220 kV bus sectionalizers to be normally kept open).

* (400/220kV, 4x500MVA substation to be taken up after the grant of connectivity/LTA at 220kV level. Not required if connectivity is granted at 400 kV level)
 - b) Khavda PS(GIS) – Bhuj PS 765 kV D/c line

Phase-II, 5.5 GW RE injection at Khavda

- i) Augmentation of Khavda PS(GIS) by 5x1500MVA, 765/400kV ICTs and 12X500 MVA, 400/220 kV ICTs (400/220 kV ICTs augmentation to be taken up as per the LTA/connectivity granted at 220 kV level). Provision of 1X125 MVAR 400 kV bus reactor on second bus.
- ii) Khavda PS (GIS) – Lakadia PS 765kV D/c line with 330 MVAR line reactors at Khavda end

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- iii) Lakadia PS – Ahmedabad 765kV D/c line with 240 MVAR line reactors on both ends
- iv) Establishment of Ahmedabad 765/400kV, 2X1500 MVA S/s (towards eastern side of Ahmedabad) along with associated 400kV interconnections (LILO of Pirana (PG) – Pirana (T) 400kV D/c line at Ahmedabad S/s with twin HTLS along with reconductoring of Pirana (PG) – Pirana(T) line with twin HTLS conductor)
- v) Ahmedabad – Indore 765kV D/c line with 330 MVAR line reactors on both ends
- vi) Ahmedabad – Vadodara 765kV D/c line
- vii) 220 kV line bays for interconnection of solar projects (25 nos) implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level.
- viii) Spare reactors and transformers

B. Proposed Transmission system for DHOLERA UMSP:

The revised transmission system for evacuation of power from Dholera UMSP (Phase I – 2GW is as given below:

- i) Establishment of 400kV Dholera Pooling station (Injection of power from the Solar Park at 400kV level) along with 400kV, 1x125MVAR bus reactor
- ii) LILO of both circuits of Vadodara- Pirana (PG) 400 kV DC line at Dholera pooling station.

6.1.4. Director SECI, special invitee to the meeting, stated that 2 GW RE capacity injection at Bhuj-II P.S. through dedicated transmission lines of RE developers in Khavda approved by WRPC (TP) under Phase-I of the scheme is not feasible from developer's point of view. The distance between Khavda and Bhuj-II is appx. 90 km. Already, owing to geographical conditions of Khavda, the tariff of the RE developers would be on higher side and none of the developers would be interested in implementing the dedicated transmission line from Khavda as it would result in further increase in their generation tariff. He requested to review this arrangement for evacuation of 2 GW out of 4.5 GW RE potential of Khavda planned under Phase-I. The alternative could be Establishment of a second 400/220 kV pooling station at Khavda along with 400 kV D/c line upto Bhuj-II P.S.

6.1.5. Director, PSPA-1, CEA stated that earlier, as per the requirement furnished by SECI, Bhuj-II P.S. was planned for evacuation of 2000 MW wind capacity from Bhuj area. Its scope of works includes establishment of 2x1500 MVA, 765/400 kV and 4X500 MVA, 400/220 kV Bhuj-II pooling station which is under implementation through TBCB route. Further, future space provisions for another 2x1500 MVA, 765/400 kV and 4x500 MVA, 400/220 kV transformation capacity has also been kept. As of now, LTA of only 650 MW has been granted at Bhuj-II and in view of Govt of Gujarat decision to only allocate land in Khavda region, chances of receiving more LTA applications at Bhuj-II is bleak. Therefore, to utilize the asset already under implementation, WRPC (TP) in its 1st meeting had agreed that 2000 MW capacity needs to be injected at 400 kV level of Bhuj-II through dedicated transmission line of RE developers in Khavda.

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- 6.1.6.** Member (E&C) stated that if there is uncertainty regarding utilization of Bhuj-II PS, then the implementation of the same can be stopped if considerable progress has not been made and the option of shifting this P.S. from Bhuj area to Khavda can be explored.
- 6.1.7.** SECI stated that Government of Gujarat would not be allocating any Revenue land in areas other than Khavda. However, RE developers who have acquired private land in Bhuj area would only be able to implement their projects.
- 6.1.8.** CTU stated that since LTA application of 650 MW is available at Bhuj-II PS and also because the transmission scheme for evacuation of power through Bhuj-II PS is being implemented through TBCB route, it would not be possible to either stop its implementation or shift its location. Also, Stage-II Connectivity application of 1280 MW has also been granted at Bhuj-II PS. Therefore, there are chances that balance capacity of Bhuj-II P.S could be utilized in future.
- 6.1.9.** Member (E&C) opined that if the connectivity and LTAs have already been granted by CTU at Bhuj-II P.S., then it would get utilized with commissioning of the RE projects. Accordingly, the planned system for evacuation of 2000 MW capacity of Khavda area from Bhuj-II P.S through dedicated transmission line by developers may be dropped.
- 6.1.10.** Chairman, NCT agreeing with the opinion of Member (E&C) suggested that committee may deliberate and finalise the planned evacuation system from Khavda except for the 2 GW injection planned at Bhuj-II. He requested the committee to deliberate on the provision of 400/220 kV transformation capacity along with 220 kV bays at Khavda P.S. in view of expected connectivity at 400 kV level at Khavda PS by RE developers in Khavda region.
- 6.1.11.** MNRE stated that as per the information provided by SECI, land in Khavda region is being allotted in the chunks of 5-6 GW to implementing agencies like SECI, NTPC, Reliance, Adani etc. Accordingly, it is anticipated that RE projects with large capacity would be coming in this area and they would be seeking connectivity mainly at 400 kV level.
- 6.1.12.** CTU stated that so far, they have received Stage-I and Stage-II connectivity application of Adani for 2500 MW and 500 MW respectively, at Khavda P.S. Stage-II connectivity for 500 MW has been granted at 400 kV voltage level. CTU further stated that 330 MVAR, 765 kV bus reactor on second 765 kV bus has been missed out in the final scheme and it needs to be included. The 125 MVAR, 400 kV bus reactor on second 400 kV bus has already been included in the scheme.
- 6.1.13.** CEA stated that in WRPC (TP) meeting, it was agreed that implementation of 400/220 kV transformers at Khavda P.S. to be taken up only after the grant of connectivity/LTA at 220kV level. They would not be required if connectivity is granted at 400 kV level. Accordingly, if SECI confirms that developers would be seeking connectivity at 400 kV

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level, the 400/220 kV transformation capacity at Khavda P.S. can be dropped or their capacity/numbers can be reduced.

6.1.14. SECI confirmed that if the injection is being planned at 400 kV level, the clause of seeking connectivity at 400 kV level would be incorporated in the tender for Khavda area.

6.1.15. After detailed deliberations, the committee agreed for provision 4X500 MVA, 400/220 kV transformation capacity at Khavda pooling station instead of 16X500 MVA 400/220 kV transformation capacity planned by WRPC(TP). With this configuration at Khavda pooling station, 2 GW RE could be injected at 220 kV level and balance 5.5 GW RE injection would be at 400 kV level. NCT approved the following phase-wise Transmission Scheme for evacuation of 8 GW RE power from potential RE zones in Khavda region :

- A. 500 MW injection at Bhuj pooling station through dedicated transmission lines of RE developers in Khavda region.
- B. Establishment of Khavda pooling station and associated transmission lines for evacuation of 7.5 GW in two phases

Phase-I, 3.0 GW RE injection at Khavda pooling station

- (i) Establishment of Khavda 765/400, 3x1500MVA, 400/220kV, 2x500MVA PS (GIS) with 1X330 MVAR 765 kV bus reactor and 1X125 MVAR 400 kV bus reactor (765/400/220 kV Khavda pooling station to be created with future space provisions for pooling total 4.5 GW RE capacity under phase-II. Provision for two bus sections with bus sectionalizer to be created at 765kV & 400kV level with 4x1500MVA, 765/400kV ICTs in each section. Bus sectionalizer at 765kV level shall normally be closed and bus sectionalizer at 400kV level shall normally be open. Each 400 kV section to have RE capacity of maximum 4000 MW. Under Phase-I only one bus section at 765 kV and 400 kV is to be implemented.)
- (ii) Khavda PS(GIS) – Bhuj PS 765 kV D/c line
- (iii) 220 kV line bays (4 nos.) for interconnection of solar projects, implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level.
- (iv) Spare reactors and transformers
 - 1x500MVA, 765/400kV (single phase) Spare transformer at Khavda PS
 - 110MVA, 765kV switchable single phase reactor (spare unit for bus/line reactor) at Khavda PS

Phase-II, 4.5 GW RE injection at Khavda

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- i) Augmentation of Khavda PS(GIS) by 4x1500MVA, 765/400kV ICTs and 2X500 MVA, 400/220 kV ICTs (400/220 kV ICTs augmentation to be taken up as per the LTA/connectivity granted at 220 kV level). Provision of 1X330 MVAR 765 kV bus reactor and 1X125 MVAR 400 kV bus reactor on second 765 kV and 400 kV bus respectively.
- ii) Khavda PS (GIS) – Lakadia PS 765kV D/c line with 330 MVAR switchable line reactors at Khavda end
- iii) Lakadia PS – Ahmedabad 765kV D/c line with 240 MVAR switchable line reactors on both ends
- iv) Establishment of Ahmedabad 765/400kV,2X1500 MVA S/s with provision of 1X125 MVAR 400 kV & 1x330MVAR 765kV bus reactor (towards eastern side of Ahmedabad) along with associated 400kV interconnections (LILO of Pirana (PG) – Pirana (T) 400kV D/c line at Ahmedabad S/s with twin HTLS along with reconductoring of Pirana (PG) – Pirana(T) line with twin HTLS conductor with minimum capacity of 2100 MVA per circuit at nominal voltage)
- v) Ahmedabad – Indore 765kV D/c line with 330 MVAR switchable line reactors on both ends
- vi) Ahmedabad – Vadodara 765kV D/c line
- vii) 220 kV line bays(4 nos.) for interconnection of solar projects, implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level.
- viii) Spare reactors and transformers
 - 1x500MVA, 765/400kV (single phase) Spare transformer at Ahmedabad S/s
 - 80MVAr 765kV single phase switchable line reactors (spare units) each at Lakadia & Ahmedabad S/s
 - 110MVAr 765kV single phase switchable reactor (spare unit for bus/line reactor) at Ahmedabad S/s
 - 110MVAr 765kV single phase switchable line reactor (spare unit) at Indore S/s

6.1.16. NCT approved the following Transmission system for evacuation of power from Dholera UMSP (Phase I – 2GW)

- i) Establishment of 400kV Dholera Pooling station (Injection of power from the Solar Park at 400kV level) along with 400kV, 1x125MVAr bus reactor
- ii) LILO of both circuits of Vadodara- Pirana (PG) 400 kV DC line at Dholera pooling station.

6.2. Name of the scheme: Augmentation of ICTs at Western Region (WR) (operational feedback report of NLDC)

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6.2.1. In the 1st meeting of WRPC(TP) held on 11.01.2020 , the implementation of following transformation capacity augmentations under ISTS was agreed based on the operational feedback report of NLDC (January, 2019) for WR and the inputs furnished by STUs regarding their intra-state plans:

- (i) Augmentation of 1x500 MVA, 400/220 kV ICT (3rd) at Morena 400/220 kV S/s
- (ii) Augmentation of 1x500 MVA, 400/220 kV ICT (3rd) at Wardha 400/220 kV S/s
- (iii) Augmentation of 1x500 MVA, 400/220 kV ICT (3rd) at Seoni 400/220 kV S/s

6.2.2. NCT noted and approved the same.

6.3. Name of the Scheme: Conversion of 50MVA fixed line reactor at Bina (PG) end of Sagar (MP)- Bina(PG) 400kV line into switchable line reactor

6.3.1. Director (PSPA-1) , CEA stated that Phase-I of the intrastate transmission scheme planned by MPPTCL for absorption of power from renewable energy sources in Madhya Pradesh under Green Energy Corridor (Intra-state) inter-alia includes the following elements:

- (i) Establishment of 2x315MVA, 400/220kV Sagar S/s (Upgradation)
- (ii) LILO of one circuit of Satna(PG) – Bina(PG) 400kV line at Sagar(MP) 400kV S/s – 35km LILO length

6.3.2. The requirement of Reactive compensation on account of LILO of Satna – Bina ckt#3 at Sagar(MP) substation have been deliberated in the 1st and 2nd meeting of WRSCT held on 05.09.2018 and 21.05.2019 respectively and the following has been approved :

- (i) 50MVA fixed line reactor at Sagar(MP) end of Satna(PG) - Sagar(MP) 400kV line – under intra-state by MPPTCL.
- (ii) Conversion of 50MVA fixed line reactor at Bina (PG) end of Sagar (MP)- Bina(PG) 400kV line into switchable line reactor – under ISTS.

6.3.3. NCT noted and approved the same

7. New / Modified Inter-State Transmission Schemes in Southern Region:

7.1. Name of the Scheme: Transmission system for connectivity to NLC India Ltd for TPS-II 2nd Expansion (2x660 MW) in Cuddalore, Tamil Nadu and to control high short circuit fault level in Neyveli Generation complex

7.1.1. Director (PSP&A-II), CEA stated that in the 1st meeting of SRPC(TP) held on 16.12.2019, the following transmission system was agreed for grant of connectivity to NLC India Ltd for TPS-II 2nd Expansion (2x660 MW) in Cuddalore, Tamil Nadu:

Transmission System for providing connectivity to Neyveli TS-II 2nd Expn (2x660 MW):

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- i. Re-storing of Neyveli TS-II/Neyveli TS-I Expn - Trichy 400 kV D/c lines through suitable arrangement of bypassing the LILOs at Nagapattinam - to be implemented under ISTS.
- ii. Utilization of LILO sections for making Neyveli TPS-II 2nd Expn – Nagapattinam 400 kV, 2xD/c lines upto Neyveli TPS-II 2nd Expn switchyard - to be implemented under ISTS.
- iii. LILO of 2nd circuit of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400 kV D/c line at Nagapattinam shall be restored only after commissioning of Manalmedu S/s, Neyveli TPSII 2nd Expn – Manalmedu 400 kV D/c (Quad) line and Manalmedu – Ariyalur 400 kV D/c line by TANTRANSCO.
- iv. 2x125 MVAR bus reactors at generation switchyard (Neyveli TPS-II 2nd Expn) – by NLC India Ltd.
- v. The line bays at generation switchyard would be implemented by NLC India Ltd.
- vi. Generation Switchyard to be designed with 50 kA short circuit level

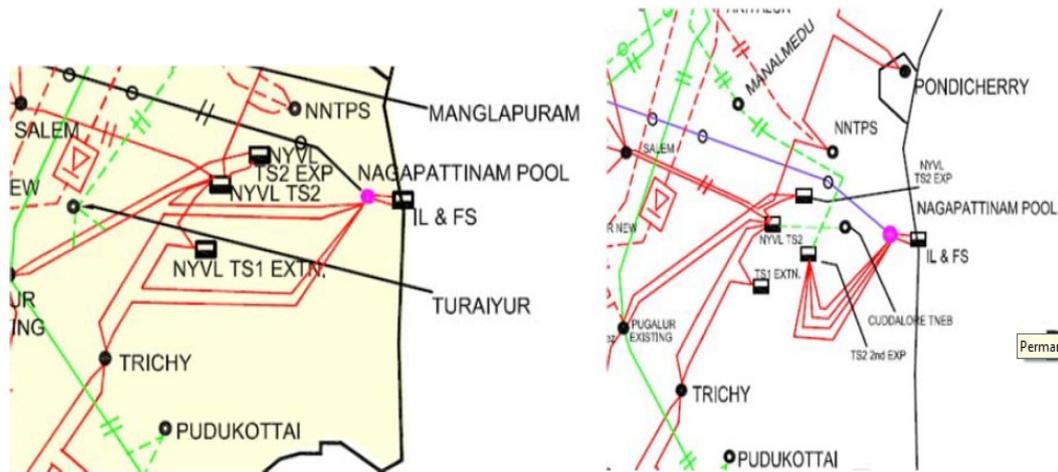


Fig: Proposed connectivity for Neyveli TPS-II 2nd Expn (2x660 MW)

7.1.2. This entire scheme comprises of the following transmission elements which have to be implemented under ISTS after grant of connectivity/LTA by CTU.:

- i. Re-storing of Neyveli TS-II/Neyveli TS-I Expn - Trichy 400 kV D/c lines through suitable arrangement of bypassing the LILOs at Nagapattinam - to be implemented under ISTS.
- ii. Utilization of LILO sections for making Neyveli TPS-II 2nd Expn – Nagapattinam 400 kV, 2xD/c lines upto Neyveli TPS-II 2nd Expn switchyard - to be implemented under ISTS.

7.1.3. Shri P K Pahwa, Expert member enquired about the reason for taking up the implementation of connectivity transmission system under ISTS.

7.1.4. CTU stated that the elements to be taken up under ISTS are the ones involving rearrangement in existing ISTS Transmission System and form part of total ATS for NLC TPS-II 2nd Expansion project. They further stated that earlier, as per the connectivity application received from NLC India Ltd. , connectivity for TPS-II 2nd Expn was required

by April' 2021. However, recently, they have revised the commissioning schedule of TPS-II 2nd Expn generation to 2024-25. So , the scheme would again be taken up in the next SRPC(TP) and can be deferred for now.

7.1.5. After deliberations, NCT deferred the scheme.

7.2. Name of the Scheme: Additional system strengthening for control of short circuit levels in Neyveli generation complex and re-arrangement of network configuration to control overloading of ICTs /230 kV lines from Neyveli generation complex

7.2.1. In the 1st meeting of SRPC(TP) held on 16.12.2019, the following Additional system strengthening for control of short circuit levels in Neyveli generation complex and re-arrangement of network configuration to control overloading of ICTs /230 kV lines from Neyveli generation complex was agreed alongwith Transmission System for providing connectivity to Neyveli TS-II 2nd Expn (2x660 MW) :

- i. Neyveli TS-II – Cuddalore 400 kV D/c (Quad) line – under the scope of TANGEDCO as agreed in 1st SRSCT.
- ii. Manalmedu – Neyveli TPS-II 2nd Expn 400 kV D/c (Quad) line (in place of Cuddalore – Manalmedu 400 kV D/c line agreed in 1st SRSCT – under the scope of TANGEDCO.
- iii. Bypassing of one ckt. of Neyveli TS-II- Salem 400 kV D/c line of PGCIL and Neyveli TSII-NNTPS 400 kV S/c line of PGCIL, to form NNTPS-Salem 400 kV S/c line (agreed in 42nd SCSPSR)- as ISTS line.

7.2.2. CEA Representative informed that out of the above elements, the one requiring realignment of existing system was decided to be implemented under ISTS i.e Bypassing of one ckt. of Neyveli TS-II- Salem 400 kV D/c line of PGCIL and Neyveli TSII-NNTPS 400 kV S/c line of PGCIL, to form NNTPS-Salem 400 kV S/c line.

7.2.3. CTU stated that on account of postponement of the commissioning schedule of TPS-II 2nd Expn generation, this strengthening would also be taken up again in next SRPC(TP) meeting and can be deferred for the time being.

7.2.4. NCT agreed to defer the scheme

7.3. Name of the Scheme: Transmission system for grant of connectivity and LTA to NPCIL for Kaiga APP expansion Unit 5&6 (2x700 MW)

7.3.1. NPCIL has submitted connectivity and LTA applications in the month of June, 2019, for proposed expansion of Kaiga APP (U- 5&6) by 1400 MW (2x700 MW) in Karwar, Karnataka. Currently, Kaiga APP-U 1&2 (2x220 MW) is connected through 220 kV lines to Kadra & Kodasalli hydro generating stations and through 400/220 kV, 2x500 MVA ICTs to 400 kV switchyard of Kaiga APP – U 3&4 (2x220 MW). Further, Kaiga generation complex is connected at 400 kV level through Kaiga – Narendra 400 kV D/c line (108 km) and Kaiga – Guttur (Davangere) 400 kV D/c line (163 km). Further, these

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two 400 kV D/c lines had been planned for evacuation of 6x220 MW (1320 MW) total capacity of Kaiga Atomic Power Plant. However, NPCIL has now enhanced the planned capacity of Unit-5 & 6 from 2x220 MW to 2x700 MW, thereby increasing the total capacity of Kaiga complex to 2280 MW. The existing 220 kV and 400 kV transmission lines are not adequate for evacuation of total capacity of 2280 MW of the Kaiga generation complex. Accordingly in the 1st meeting of SRPC(TP) held on 16.12.2019, following transmission system was agreed for grant of connectivity and LTA to NPCIL for expansion of Kaiga APP Unit 5&6 (2x700 MW).

Transmission System for Grant of Connectivity:

- a) Bus extension of existing Kaiga 400 kV generation switchyard – by NPCIL
- b) Upgradation of Kaiga generation switchyard with 3150 A rating – by NPCIL
- c) 2x125 MVAR, 420 kV bus reactors at Kaiga Unit-5&6 generation switchyard – by NPCIL

Transmission System for Grant of LTA:

- a) Re-Conductoring of Kaiga – Narendra 400 kV D/c line with Twin HTLS conductor – under ISTS
- b) Re-Conductoring of Kaiga – Guttur (Davangere) 400 kV D/c line with Twin HTLS conductor
 - Kaiga – Sirsi section of Kaiga – Davangere 400 kV D/c line – under ISTS
 - Sirsi – Davangere section of Kaiga – Davangere 400 kV D/c line – by KPTCL
- c) Upgradation of bay equipment at Narendra S/s - under ISTS
- d) Upgradation of bay equipment at Davangere S/s – by KPTCL
- e) Replacement of existing Drake conductor by HTLS Drake conductor of 220 kV transmission lines from Nagjari generating station towards 220 kV SRS Hubli, Ambewadi, Bidnal receiving stations and 220 kV lines of Kadra and Kodalali generating stations – by KPTCL

7.3.2. CEA representative informed that in the 1st meeting of SRPC(TP), it was agreed that the implementation of the above transmission system by respective entities shall be taken up only after NPCIL obtains necessary clearances from Forest Department for carrying out the work of re-conductoring of the transmission lines. The elements of the above scheme to be implemented under ISTS are as follows:

- (i) Re-Conductoring of Kaiga – Narendra 400 kV D/c line with Twin HTLS conductor – under ISTS
- (ii) Re-Conductoring of Kaiga – Sirsi section of Kaiga – Davangere 400 kV D/c line
- (iii) Upgradation of bay equipment at Narendra S/s

7.3.3. Shri P K Pahwa, expert member enquired about the context behind imposing the condition on NPCIL to obtain Forest Clearance as a pre-requisite for the TSP to perform re-conductoring.

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7.3.4. CTU stated that while implementing the existing 220 kV and 400 kV transmission lines for evacuation of power from Kaiga Complex, forest clearance was obtained after assurance to environmentalists and Forest Department for not seeking additional forest clearance in future for laying new transmission lines. Since NPCIL has now enhanced the planned capacity of Unit-5 & 6 from 2x220 MW to 2x700 MW, therefore the requirement of re-conductoring of existing lines has arisen. Therefore, looking into the implementation issues associated with forest region in Western Ghats, it was decided that NPCIL would obtain necessary clearances from Forest Department for carrying out the work of re-conductoring of the transmission lines.

7.3.5. Accordingly, it was decided that the scheme may be deferred and would be re-discussed once NPCIL obtains necessary clearances from Forest Department for carrying out the re-conductoring work, and intimates the same to CEA/CTU.

7.3.6. After deliberation, NCT deferred the scheme.

7.4. Name of Scheme: Transmission system for grant of connectivity to NPCIL for Kudankulam NPP Unit 3&4 (2x1000 MW)

7.4.1. In the 1st meeting of SRPC(TP) held on 16.12.2019, the following transmission system was agreed for providing connectivity to Kudankulam NPP Unit – 3&4 (2x1000 MW):

- a) Restoration of Kudankulam – Tirunelveli 400 kV D/c (Quad) line by terminating it at Tirunelveli substation [presently this line is connected to Tirunelveli – Tuticorin PS 400 kV D/c (Quad) line and thus connected as Kudankulam (Unit-1&2) – Tuticorin PS 400kV D/c (Quad) line]– Under ISTS
- b) Kudankulam NPP (Unit-3&4) - Tuticorin PS 400 kV D/c (Quad) line [by implementing Kudankulam-Tirunelveli section and extending this upto Tuticorin PS, using the Tirunelveli-Tuticorin PS –400 kV D/c (Quad) existing line as mentioned in (a) above]– Under ISTS
- c) Termination of one circuit of each of Kudankulam Unit-1&2 – Tirunelveli 400 kV 2xD/c (Quad) line at Kudankulam Unit-3&4 and one circuit of Kudankulam Unit-3&4 - Tuticorin PS 400 kV D/c (Quad) line at Kudankulam Unit-1&2. This arrangement shall result into 3 nos. of 400 kV quad circuits from Kudankulam Unit-1&2 and Kudankulam Unit-3&4 generating stations – transmission line works under ISTS and re-arrangement works alongwith 400 kV bays at generation switchyard by NPCIL.
- d) 2x125 MVAR, 420 kV bus reactors at Kudankulam Unit-3&4 – by NPCIL

7.4.2. CEA representative informed that since connectivity proposal requires extension/restoration of existing transmission lines and re-arrangement at generation switchyard as well as outside generation switchyard, therefore, in the 1st SRPC(TP) meeting, implementation of transmission system for connectivity was agreed to be considered under ISTS and generation switchyard related works under scope of NPCIL.

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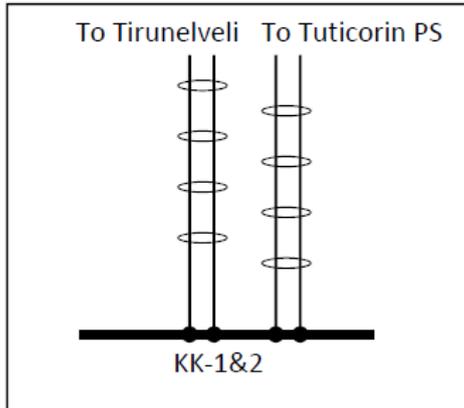


Fig: Connectivity arrangement at KKNPP for Unit-1&2

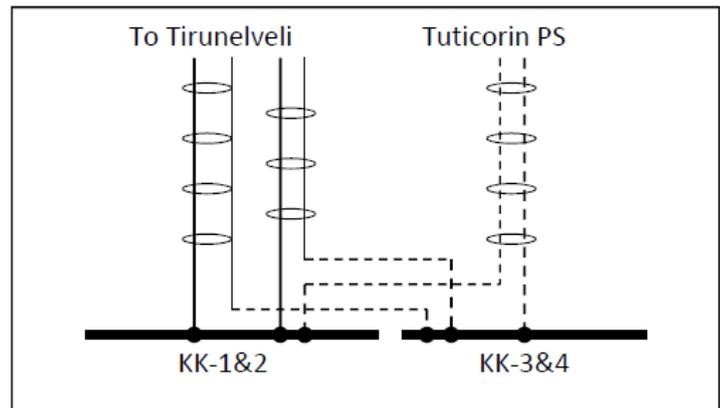


Fig: Proposed Connectivity arrangement at KKNPP generation complex with proposed U-3&4

7.4.3. CTU representative stated that the implementation of the above scheme is to be taken up after grant of connectivity/LTA by CTU. CTU has not yet received LTA application for Kudankulam NPP Unit3&4 (2x1000 MW). Further, NPCIL has intimated that their commissioning schedule would be revised. Accordingly the connectivity application would also be revised. This proposal for grant of connectivity to Kudankulam Unit-3&4 would again be discussed in the next SRPC(TP) meeting.

7.4.4. Members noted the information provided by CTU, and NCT deferred the scheme.

7.5. Name of Scheme: Development of common facilities at Tuticorin-II GIS for RE Integration

7.5.1. Tuticorin-II GIS substation had been established with 2x500 MVA, 400/230 kV transformers with initial provision for five (5 nos.) 230 kV line bays for termination of 230 kV dedicated transmission lines from the RE generation projects in the vicinity. These five 230 kV bays have already been commissioned and the power from RE generation projects is being evacuated utilizing the ISTS network.

7.5.2. Further, the 3rd 500 MVA, 400/230 kV ICT, for facilitating evacuation and transfer of RE power beyond Tuticorin-II GIS substation was agreed in 42nd SCSPSR held on 27.04.2018 and 34th SRPC meeting held on 11.08.2018. The 3rd ICT is under advanced stage of implementation for facilitating evacuation and transfer of RE power beyond Tuticorin-II GIS substation and is being integrated with the existing GIS bus.

7.5.3. Presently, 1500 MW of connectivity and 1200 MW of LTA has been granted at Tuticorin-II GIS S/s. The details of the RE generation developers which have been granted Connectivity and LTA are given below:

| S.no | RE developer | Generation | Connectivity granted | LTA granted | Bay no | Present status |
|------|--------------|------------|----------------------|-------------|--------|----------------|
| | | | | | | |

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| | | | | | |
|---|---|--------|--------|-------------------------|---|
| 1 | M/s Mytra Energy (India) Pvt. Ltd. | 300 | 250 | 222 & 223 | Commissioned & LTA under operation |
| 2 | M/s Green Infra Renewable Energy Ltd | 249.9 | 249.9 | 205 | |
| 3 | M/s Orange Sironj Wind Power Pvt. Ltd | 200 | 200 | 221 | |
| 4 | M/s Betam Wind Energy Pvt. Ltd. | 250.2 | 250.2 | 220 | To be commissioned & LTA is effective from 31.07.2019 |
| 5 | M/s Shapoorji Pallonji Infrastructure Capital Company Pvt. Ltd. | 500 | 250 | 210 & 211 (Hybrid bays) | Yet to be connected. Start date of LTA : 25.10.2020 |
| | Total | 1500.1 | 1200.1 | | |

Further Stage-I/II Connectivity applications for 150 MW alongwith LOA issued by SECI has been received from M/s GRT Jewellers in the month of October, 2019, and the same would be granted shortly.

7.5.4. CEA representative informed that the development of 230 kV substation switchyard was to be taken up in parts and the investment in development of second part was deferred which was to be implemented with matching RE generation projects. RE generation developers faced lot of difficulties in interface of GIS module for connection with the existing 230 kV GIS bus. Looking into the difficulties, extension of 230 kV switchyard (extension beyond 05 nos. of GIS line bays and 03 nos. of ICT bays) has been transformed into outdoor hybrid switchyard (Bus bar AIS and line bay equipment GIS) so that the future bay extensions can be carried out smoothly through the outdoor hybrid GIS module(s).

7.5.5. Accordingly, for evacuation of power from RE generators connected at 230 kV Hybrid switchyard, extension of indoor GIS bus upto the outdoor AIS bus bar of Hybrid switchyard using GIB arrangement and necessary associated common infrastructure is required at Tuticorin-II GIS S/s. The matter was deliberated at length in the 1st SRPC (TP) meeting and it was agreed that the extension of indoor GIS bus upto the gantry before bay no. 210 (figure at Annex V) to the outdoor AIS bus bar of 230 kV Hybrid switchyard using GIB arrangement and necessary associated common infrastructure works may be implemented under ISTS as part of associated works with augmentation of ICT-3.

7.5.6. Members noted and approved the extension works to be implemented under ISTS.

8. New / Modified Inter-State Transmission Schemes in Eastern Region:**8.1. Name of the scheme: Transmission system for power evacuation from Arun-3 (900MW) HEP, Nepal of M/s SAPDC – Indian Portion:**

- 8.1.1.** SJVN Arun-3 Power Development Company Pvt. Ltd. (SAPDC) is establishing a 900MW HEP in Nepal. The power from the hydro project was initially proposed to be evacuated through Arun-3 – Dhalkebar (Nepal) – Muzaffarpur (POWERGRID) 400kV D/c (Quad) line. In the 4th meeting of JSC/JWG held on 13th-14th Feb 2017, it was decided that Nepali portion of the transmission system would be implemented by M/s SAPDC as per PDA and the Indian portion of the cross-border line may be built by an Indian entity.
- 8.1.2.** In the 2nd meeting of ECT held on 06.08.2018, the scheme was deferred for further deliberation with the stakeholders. In the 2nd meeting of erstwhile NCT held on 04.12.2018, it was informed that this link is being further discussed in JTT meeting of India- Nepal and therefore would be put up to the NCT in its next meeting.
- 8.1.3.** In the 3rd meeting of erstwhile NCT held on 01.03.2019, it was decided that Indian portion of Arun-III-Muzaffarpur 400 kV D/c line would be implemented through RTM. Before implementation of this transmission line, Arun III HEP in Nepal would sign requisite agreements including TSA/BPTA etc..
- 8.1.4.** Subsequently, In 2nd meeting of Eastern Region Standing Committee on Transmission (ERSCT) held on 05.07.2019, members agreed for construction of Indian portion of Dhalkebar (Nepal) – Muzaffarpur (POWERGRID) 400kV D/c (Quad) line along with 2 no. 400kV line bays at Muzaffarpur (POWERGRID). Members noted that the charges for the said scope would be completely borne by M/s SAPDC.
- 8.1.5.** In the 6th meeting of erstwhile NCT held 30-09-2019, implementation of Indian portion of Dhalkebar (Nepal) – Muzaffarpur (POWERGRID) 400kV D/c (Quad) line along with 2 no. 400kV line bays at Muzaffarpur (POWERGRID) S/s was recommended to be implemented through RTM route.
- 8.1.6.** However, in the 7th JWG/JSC meeting between India and Nepal held on 14th-15th Oct 2019, it was proposed to terminate the line on Indian side at under-construction Sitamarhi 400kV substation keeping the border crossing point as same due to Right of Way (RoW) constraints in transmission line corridor for termination of Dhalkebar – Muzaffarpur line (associated with Arun-III HEP) near Muzaffarpur end.
- 8.1.7.** The matter was again discussed in the 1st meeting ERPC-TP held on 14-02-2020, wherein termination of said cross-border line at Sitamarhi instead of Muzaffarpur has been agreed with following scope of works:
- i. Sitamarhi (POWERGRID) – Dhalkebar (Nepal) 400kV D/c (Quad) line (Indian portion - tentatively about 40km)

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- ii. Extension at Sitamarhi (POWERGRID) S/s: 2 no. of 400kV line bays for termination of Sitamarhi (POWERGRID) – Dhalkebar (Nepal) 400kV D/c (Quad) line

- 8.1.8.** The implementation modalities of the Indian portion of Sitamarhi (POWERGRID) – Dhalkebar (Nepal) 400kV D/c (Quad Moose) line (along with 2 no. 400kV line bays at Sitamarhi (POWERGRID) S/s) associated with Arun-3 HEP may be deliberated in the NCT
- 8.1.9.** Shri P K Pahwa, Expert Member enquired about who would be implementing the Indian portion of Dhalkebar (Nepal) – Sitamarhi (POWERGRID) D/c (Quad Moose) line (along with 2 no. 400kV line bays at Sitamarhi (POWERGRID) S/s) and implication on cost of the scheme after shifting the pooling point to Sitamarhi (POWERGRID) S/s.
- 8.1.10.** CTU stated that both Sitamarhi S/s and Muzaffarpur S/s are ISTS points. Injection point in Nepal remains the same. As length of Dhalkebar (Nepal) – Sitamarhi (POWERGRID) D/c (Quad Moose) line would be lesser vis a vis Dhalkebar (Nepal) – Muzaffarpur (POWERGRID) 400kV D/c (Quad) line, therefore the overall cost of the scheme would be on lesser side. Regarding implementing agency for the Indian portion of the scheme, the same would be notified by Ministry of Power.
- 8.1.11.** Member (E&C) enquired about the beneficiaries of the scheme and the impact on transmission charges.
- 8.1.12.** It was informed that the cost of the Indian portion of the link would be borne by M/s SJVN Arun-3 Power Development Company (Pvt.) Ltd. (SAPDC, subsidiary of M/s SJVN Ltd).
- 8.1.13.** After detailed deliberations, NCT agreed with the proposed scope of works.

8.2. Modification in Transmission schemes of Eastern Region agreed in 6th meeting of erstwhile NCT held on 30.09.2019

- 8.2.1.** Representative of CTU (POWERGRID) stated that in the 6th meeting of erstwhile NCT held on 30-09-2019, following schemes were decided for implementation under RTM route. Subsequently, Ministry of Power vide office memorandum dated 15-01-2020 assigned implementation of said schemes in Eastern Region (ER) to POWERGRID under Regulated Tariff Mechanism (RTM). The schemes with the following elements are being implemented as a part of ERSS-XXIII:

(a) Additional 400kV connectivity at 400/220/132kV Saharsa (new) 400/220/132kV S/s:

- i. LILO of Kishanganj (POWERGRID) – Darbhanga (DMTCL) 400kV D/c (Quad) line at Saharsa (New) S/s
- ii. 4 no. of 400kV line bays at Saharsa (New) S/s for termination of above LILO line

(b) Bypassing of 400kV lines to limit fault current level at Farakka (NTPC)

- i. Bypassing of Farakka – Kahalgaon (ckt-3 & ckt-4) and Farakka – Durgapur 400kV D/c lines of POWERGRID so as to form Kahalgaon – Durgapur 400kV D/c line

8.2.2. With regard to item no. (a) above, it is to mention that the length for LILO was considered as 20km in the 6th meeting of erstwhile NCT. However, now during DPR preparation stage it has been observed that about 41km of 400kV D/c (Quad) line would be required for planned LILO. This has necessitated update in the estimated cost of the scheme.

8.2.3. With regard to item no. (b) above, it is to mention that during implementation following additional requirements/upgrades have been envisaged in the scheme:

- (a) OPGW exists in the Farakka – Durgapur line section, however the same is not available in the Farakka – Kahalgaon section. To have seamless OPGW connectivity in Durgapur – Kahalgaon section (formed after bypassing of lines), about 90km of additional OPGW shall be required in the existing Kahalgaon – Farakka line (D/c with Ckt 3 & Ckt 4) and around 50km of OPGW is required for repeater connectivity as Kahalgaon – Durgapur line length shall exceed 250km.
- (b) Due to increase in line length, certain augmentations in bay equipment like installation of Circuit Breaker with Pre Insertion Resistor (PIR), PLCC, DPC, Wave Trap shifting etc. is required at Kahalgaon and Durgapur ends of Kahalgaon – Durgapur line section formed after bypassing.

The above additional scope was noted in the scheme in the 1st meeting of ERPC-TP held on 14-02-2020 (minutes awaited). This has necessitated modification in the scope and corresponding update in the estimated cost of the project.

8.2.4. In view of the above, following modifications and corresponding update in the estimated cost in already approved scheme under RTM is proposed:

| As per 6 th meeting of erstwhile NCT held on 30-09-2019 | | | New proposal | | |
|---|--------------|--------------------------|--------------|--------------|--------------------------|
| Scope | Capacity/ km | Estimated Cost (Rs. Cr.) | Scope | Capacity/ km | Estimated Cost (Rs. Cr.) |
| A. Additional 400kV connectivity at 400/220/132kV Saharsa (New) 400/220/132kV substation | | | | | |
| LILO of Kishanganj (POWERGRID) – Darbhanga (DMTCL) 400kV D/c (Quad) line at Saharsa (New) S/s | 20km | 52 | No change | 41km | 150 |
| 4 no. of 400kV line bays at Saharsa (New) S/s | 4 | 36 | No change | 4 | 38 |

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| | | | | | |
|--|---|----|--|---|----|
| for termination of above LILO line | | | | | |
| B. Bypassing of 400kV lines to limit fault current level at Farakka (NTPC) | | | | | |
| Bypassing of Farakka – Kahalgaon (ckt-3 & ckt-4) and Farakka – Durgapur 400kV D/c lines of POWERGRID so as to form Kahalgaon – Durgapur 400kV D/c line | - | 10 | Bypassing of Farakka – Kahalgaon (ckt-3 & ckt-4) and Farakka – Durgapur 400kV D/c lines of POWERGRID so as to form Kahalgaon – Durgapur 400kV D/c line along with bay upgradation at Kahalgaon & Durgapur ends and additional OPGW. | - | 22 |

- 8.2.5.** Shri P K Pahwa, Expert member stated that modification in the length of the transmission lines in the earlier approved schemes as well as upgrades required can be noted down by NCT. However, since Evaluation of Cost of the scheme is no more part of Terms of Reference of Reconstituted NCT therefore, the Committee cannot go in detail with respect to Cost of the modified scheme.
- 8.2.6.** Director (PSPA-I), CEA stated that earlier “Evaluation of Cost of the Schemes” and “Formation of Bid Evaluation Committee for a TBCB project” was inter-alia part of the ToR of the erstwhile NCT. Now, these functions are not included in the ToR of the Reconstituted NCT. This has led to ambiguity with respect to the existence of the sub-committee (Cost Committee) which was constituted by erstwhile NCT . Further, who would be performing the function of constituting Bid Evaluation Committee for the schemes whose bidding has been initiated by BPCs is also not clear.
- 8.2.7.** Member (E&C). CEA stated that as far as evaluating the Cost of the transmission schemes is concerned, the same has been removed from the ToR of the Reconstituted NCT. However, it is possible that the Reconstituted NCT may frame its Conduct of Business Rules and include the evaluation of Cost of the Schemes within it. As part of its Conduct of Business Rules, NCT may constitute a sub-committee for evaluation of Cost Committee in line with the Cost Committee constituted by the erstwhile NCT. However, this would require further deliberation and can be taken up in the next NCT meeting.
- 8.2.8.** After detailed deliberation, NCT approved the following:

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- (i) Increase in length of LILO of Kishanganj (POWERGRID) – Darbhanga (DMTCL) 400kV D/c (Quad) line at Saharsa (New) S/s from earlier approved 20 km to 41km.
- (ii) Bypassing of Farakka – Kahalgaon (ckt-3 & ckt-4) and Farakka – Durgapur 400kV D/c lines of POWERGRID so as to form Kahalgaon – Durgapur 400kV D/c line along with bay upgradation at Kahalgaon & Durgapur ends and additional OPGW.

8.3. Shifting of 400/220kV ICT from section A to section B at Durgapur (POWERGRID) S/s:

8.3.1. Representative of CTU informed that with the operationalization of split bus arrangement at Durgapur (POWERGRID), the power flow on 400/220kV ICTs on either side of the split bus arrangement at Durgapur (POWERGRID) is observed to be uneven. In order to balance the power flow on ICTs, it was proposed to shift the 315MVA ICT-1 from Durgapur-A section to Durgapur-B section so that all the 3x315MVA ICTs would remain in Durgapur-B section. The scheme was agreed in the 1st meeting of ERPC (TP) held on 14-02-2020.

- a) The scope of works is given below:

| Sl. No. | Scope of the Transmission Scheme |
|---------|--|
| 1. | Shifting of 400kV side of 400/220kV, 315MVA ICT-1 from Durgapur-A section to Durgapur-B section without physical shifting of ICT such that all three ICTs are on same 400kV bus section (if required, GIS bus duct could be used). |

8.3.2. NCT approved the above scheme.

9. New / Modified Inter-State Transmission Schemes in North Eastern Region:

9.1. Name of Scheme: Establishment of new 220/132kV substation at Nangalbibra:

9.1.1. In the 1st meeting of NERSCT held on 08.11.2019, it was discussed that load in 220kV substation at Agia has increased due to additional loading on Agia (Assam) - Mendipather (Meghalaya) 132kV line and AEGCL has no tariff benefit due to PoC mechanism. Further, AEGCL proposed that for reducing loading on lines connected with Agia (Assam) substation and enhancing the reliability of power supply in the western parts of Meghalaya, a 220kV substation either in West Garo Hills district or in the East Garo Hills district of Meghalaya is required. Accordingly, the following scope of works were agreed 1st meeting of NERSCT to be implemented under ISTS:

- a) Establishment of new 220/132kV, 2x160MVA substation at Nangalbibra

220kV:

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- ICTs: 220/132kV, 2x160MVA
- ICT bays: 2 no.
- Line bays: 2 no. [for termination of Bongaigaon (POWERGRID) –Nangalbibra 400kV D/c line (initially operated at 220kV) – under this scheme]
- Bus reactor: 2x31.5MVA
- Bus reactor bays: 2 no.
- Space for future line bays: 6 no. [2 no. for termination of Mawngap (Meghalaya) - Nangalbibra (Meghalaya) 220kV D/c line of MePTCL and 4 no. for future lines]

132kV:

- ICT bays: 2 no.
- Line bays: 2 no. [for termination of Nangalbibra – existing Nangalbibra (MePTCL) 132kV D/c (Single Moose) line of MePTCL]
- Space for future line bays: 6 no. (for future lines)

Additional space for future expansion:

Space for future ICTs:

- 220/132kV, 1x200MVA (along with associated bays at both levels)
- 400/220kV, 3x500MVA (along with associated bays at both levels)

Space for 400kV upgradation:

- Line bays along with space for switchable line reactor: 8 no. [2 no. for 400kV operation of Bongaigaon (POWERGRID) – Nangalbibra 400kV D/c line (initially operated at 220kV) and 6 no. for other lines]
- Bus reactor: 420kV, 3x125MVA

- b) Extension at Bongaigaon (POWERGRID) S/s: 2 no. of line bays for termination of Bongaigaon (POWERGRID) – Nangalbibra 400kV D/c line (initiated operated at 220kV)
- c) Extension at Hatsinghmari (Assam) S/s: 2 no. of 132kV line bays for termination of Hatsinghmari (Assam) – Ampati (Meghalaya) 132kV D/c line.
- d) Extension at Ampati (Meghalaya) S/s: 2 no. of 132kV line bays for termination of Hatsinghmari (Assam) – Ampati (Meghalaya) 132kV D/c line.
- e) Bongaigaon (POWERGRID) – Nangalbibra 400kV D/c line (initially operated at 220kV)
- f) Hatsinghmari (Assam) – Ampati (Meghalaya) 132kV D/c line

9.1.2. Representative of CTU stated that the following works needs to be implemented by MePTCL, Meghalaya under intra-state scheme in matching timeframe of the above mentioned ISTS scheme:

- (i) *Mawngap (Meghalaya) – Nangalbibra (Meghalaya) 220kV D/c line alongwith 220kV line bays at both ends*

(ii) Nangalbibra (ISTS) – existing Nangalbibra (MePTCL) 132kV D/c (Single Moose) line (2 no. 132kV line bays at Nangalbibra (MePTCL) is to be implemented by MePTCL, however, 2 no. 132kV line bays at Nangalbibra (ISTS) is under the scope of this ISTS scheme.

9.1.3. NCT noted and approved the scope of works to be implemented under ISTS.

9.2. Installation of line reactor at Imphal (POWERGRID) S/s

9.2.1. In the 2nd meeting of NERSCT held on 08.11.2019, the requirement of additional Reactive Compensation at Imphal end of Silchar-Imphal 400 kV D/c line (170 km) was deliberated under the Agenda Item involving Strengthening of Southern part of NER Grid. It was observed that Silchar-Imphal 400 kV D/c line is a longline and there is only 80 MVAR Bus Reactor at Imphal and no line reactors at Imphal end. Without line reactor, rise of about 21-22 kV is observed during line charging. The aforesaid requirement of Reactive Compensation at Imphal end was deliberated along with requirement of bypassing of Silchar (PG)- PK Bari (ISTS) 400 kV D/c line and Silchar(PG)- Imphal(PG) 400 kV D/c line. However, the latter was decided to be reviewed in future and the following scope of works was agreed for implementation under ISTS:

(i) Installation of 400kV, 2x63MVA switchable line reactors, one in each circuit of Silchar (POWERGRID) – Imphal (POWERGRID) 400kV D/c line at Imphal end

9.2.2. NCT approved with the above scope of works approved by NERSCT.

9.3. Augmentation of transformation capacity at Salakati (POWERGRID) S/s

9.3.1. In the 2nd meeting of NERSCT held on 08.11.2019, POSOCO raised the issue of non compliance of (n-1) contingency at 220/132 kV, 2x50 MVA ICTs at Salakati (PG)vS/stn. Accordingly, the following augmentation was agreed by the members:

(i) Installation of 3rd ICT of 220/132kV, 1x100MVA at Salakati alongwith associated bays at both levels

9.3.2. NCT approved with the above transformation capacity augmentation.

9.4. Reconductoring of ISTS lines of Powergrid:

9.4.1. Reconductoring of the following POWERGRID lines was agreed in the 1st meeting of NERPC(TP):

| Sl. No. | Scope of the Transmission Scheme | Capacity / line length km |
|---------|---|---------------------------|
| 1. | Reconductoring of Siliguri – Bongaigaon 400kV D/c line with Twin HTLS conductor (<i>ampacity of single HTLS shall be 1596A, which is equivalent to Twin ACSR Moose</i>) | 218km |

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| | | |
|-----|---|---|
| | <i>conductor for 45°C ambient and 85°C maximum conductor temperature)</i> along with requisite modifications in the line bay equipment at both ends. | |
| 2. | Upgradation of 400 kV bay equipments at Siliguri and Bongaigaon S/s | Upgradation of 400 kV bay equipments – 4 nos. |
| 3. | Reconductoring of Alipurduar – Salakati (Bongaigaon) 220kV D/c line with single HTLS conductor (<i>ampacity of single HTLS shall be 1596A, which is equivalent to Twin ACSR Moose conductor for 45°C ambient and 85°C maximum conductor temperature)</i> along with requisite modifications in the line bay equipment at both ends. | 101km |
| 4. | Upgradation of 220 kV bay equipments at Alipurduar and Salakati (Bongaigaon) S/s | Upgradation of 220 kV bay equipments – 4 nos. |
| 5. | Reconductoring of BTPS – Salakati 220kV D/c line with single HTLS conductor (<i>ampacity of single HTLS shall be 1596A, which is equivalent to Twin ACSR Moose conductor for 45°C ambient and 85°C maximum conductor temperature)</i> along with requisite modification in bay equipment at both ends. | 3km |
| 6. | Upgradation of 220 kV bay equipments at BTPS and Salakati S/s | Upgradation of 220 kV bay equipments – 4 nos. |
| 7. | Re-conductoring of Dimapur – Imphal 132kV S/c line with single HTLS conductor (<i>ampacity of single HTLS shall be 798A, which is equivalent to Single ACSR Moose conductor for 45°C ambient and 85°C maximum conductor temperature)</i> along with upgradation of terminal equipment and strengthening of tower, wherever required. | 169km |
| 8. | Upgradation of 132 kV bay equipments at Dimapur and Imphal S/s | Upgradation of 132 kV bay equipments – 2 nos. |
| 9. | Re-conductoring of Loktak – Jiribam 132kV S/c line with single HTLS conductor (<i>ampacity of single HTLS shall be 798A, which is equivalent to Single ACSR Moose conductor for 45°C ambient and 85°C maximum conductor temperature)</i> along with upgradation of terminal equipment and strengthening of tower, wherever required. | 83km |
| 10. | Upgradation of 132 kV bay equipments at Loktak and Jiribam S/s | Upgradation of 132 kV bay equipments – 2 nos. |

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9.4.2. NCT approved the proposed reconductoring works.

9.5. Upgradation of switching scheme at POWERGRID substations at Nirjuli and Imphal:

9.5.1. CEA representative stated that for increased reliability, the conversion of following S/s from Single Main Transfer Scheme to Double Main Transfer Scheme on completion of 25 years was agreed in the 1st meeting of NERPC(TP) held on 08.11.2019:

(i) Conversion of 132kV level of 132/33kV Nirjuli S/s to Double Main Transfer Bus Scheme preferably with Bus Sectionalisation on AIS depending on layout or alternatively on GIS/ Hybrid GIS if layout does not permit AIS Bus sectionalisation

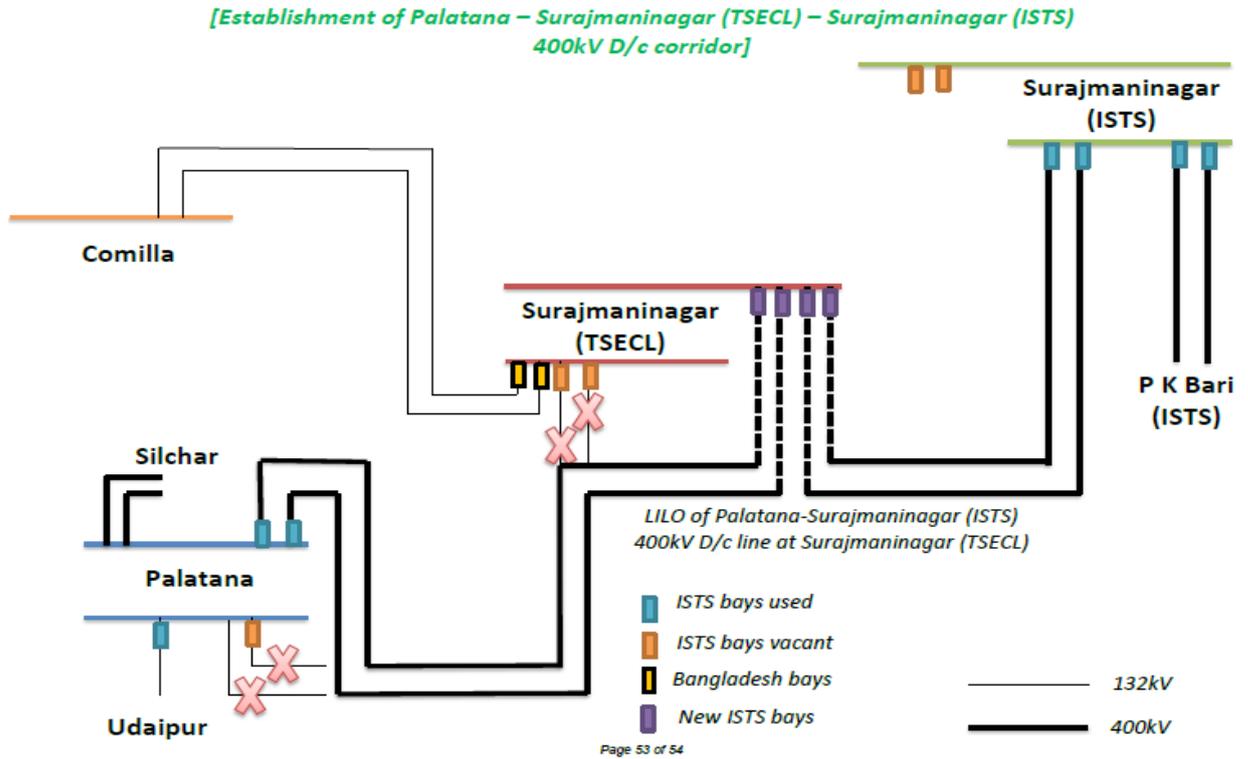
(ii) Conversion of 132kV level of 400/132kV Imphal S/s to Double Main Transfer Bus Scheme preferably with Bus Sectionalisation on AIS depending on layout or alternatively on GIS/ Hybrid GIS if layout does not permit AIS Bus sectionalisation

9.5.2. NCT approved the above conversions/upgradation in existing substations.

9.6. 400kV connectivity to Surajmaninagar (TSECL) 400/132kV S/s:

9.6.1. Representative of CTU stated that Shifting of Palatana – Surajmaninagar (TSECL) 400kV D/c line (operated at 132kV) to the 400/132kV ISTS S/s at Surajmaninagar (ISTS) is already under implementation by POWERGRID. Also, TSECL is implementing upgradation of existing 132kV substation at Surajamaninagar (TSECL) to 400/132kV considering load growth projection of Tripura. In the 1st meeting of NERPC(TP), it was agreed that Upon 400kV upgradation of Surajmaninagar (TSECL) S/s, the Palatana – Surajmaninagar (ISTS) 400kV D/c link may be LILOed at Surajmaninagar (TSECL) S/s alongwith 4 nos. 400kV line bays at Surajmaninagar (TSECL) S/s under a separate ISTS scheme.

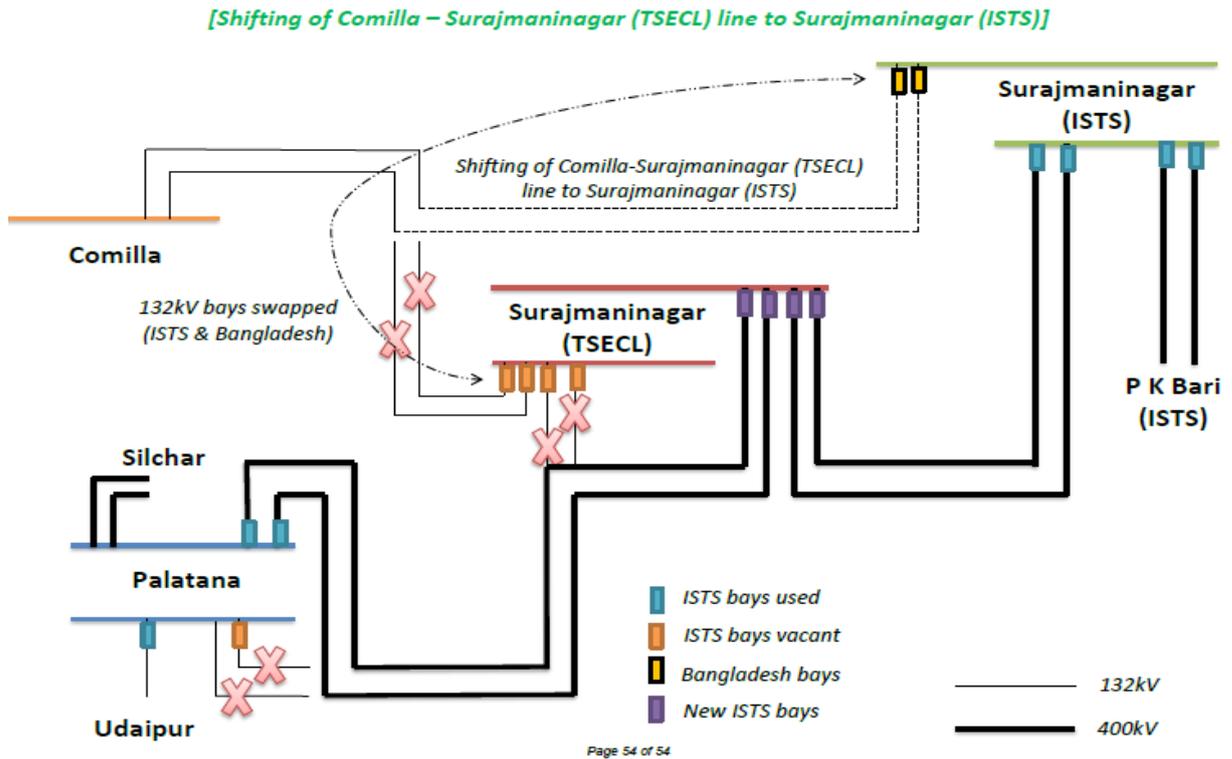
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9.6.2. Accordingly, the following scheme to be taken up under ISTS is being put up for approval of NCT:

- (i) LILO of Palatana – Surajmaninagar (ISTS) 400kV D/c line at 400/132kV Surajmaninagar (TSECL) S/s along with associated 4 no. 400kV line bays – *In matching timeframe of upgradation of 400/132kV Surajmaninagar (TSECL) substation*

9.6.3. It was also informed that in the 1st meeting of NERPC (TP) held on 08.11.2019, the proposal of shifting of the cross border Comilla (Bangladesh)-Surajmaninagar (TSECL) 400kV D/c line (operated at 132kV) Cross Border link to ISTS station at 400/132kV was also discussed as this shall provide opportunity to all constituents to sell power to Bangladesh with equal terms. The proposal was agreeable to all the NER constituents except TSECL which has an ongoing contract for sale of power to Bangladesh upto March 2021.



9.6.4. Accordingly, the following proposal is being put up before NCT with the conditions that the works involved in the proposal would be scheduled for completion in April 2021 i.e. after expiry of existing contract of Tripura for sale of power to Bangladesh :

- (ii) Shifting of Comilla (Bangladesh) – Surajmaninagar (TSECL) 400kV D/c line (operated at 132kV) to Surajmaninagar (ISTS) along with 2 no. 132kV line bays at Surajmaninagar (ISTS) – *Completion in Apr 2021.*

9.6.5. NCT approved the scheme (i) and re-deliberation of scheme (ii) in RPC-TP.

D. CTU inputs/presentation for development of an efficient, co-ordinated and economical inter – State transmission system for smooth flow of electricity:

1.1. COO (CTU-Plg), POWERGRID made a comprehensive presentation before the NCT on development of ISTS for smooth flow of electricity. It was informed that after re-constitution of the NCT and Regional Standing Committee on Power System planning in Nov'19 by Ministry of Power, GoI, five meetings of Regional Power Committee (Transmission Planning) were held where various transmission schemes were identified to facilitate meeting the anticipated power demand by 2022. The scheme also includes augmentation of transformation capacity in various substations, installation of reactors, series reactors to control fault current, re-conductoring of existing transmission lines etc. to address feedback from system operators. It was also presented that transmission plan for integration of potential Renewable Energy Zones(REZ) viz. Solar and wind of 66.5GW by

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2022 in various renewable resource rich States as envisaged by MNRE/SECI has been evolved and take up its implementation in a phased manner. It was highlighted that during 2019-20, connectivity for about 42800MW(131 applications), LTA of about 9600MW and MTOA of about 1795 MW was granted in line with CERC Connectivity Regulations, 2009 and its amendment thereof. It was depicted that to enhance cross-border power transfer capacity, three cross-border links each between India – Nepal, India – Bangladesh and India-Sri Lanka were planned.

- 1.2. The presentation also included future power supply scenario by 2025 considering demand growth as per 19th EPS and capacity addition programme as per data available from CEA website. The requirement for additional 65.5GW potential REZ upto 2025 as provided by SECI and its broad contour for transmission system was also presented. Copy of the presentation is enclosed.

- 1.3. Chairperson, CEA stated that the present peak demand of the country is about 183GW. However, the 19th EPS demand corresponding to 2019-20 is about 200GW. Therefore, it is most likely that expected demand of 2021-22 or 2025 scenario may not match with the projected demand in the 19th EPS. Accordingly, the load projection, capacity addition programme as well as the requirement of transmission expansion/strengthening may be reviewed keeping in view the present trend of load growth. This exercise may be carried out by CTU in association with CEA and same may be presented in the next NCT meeting.

The presentation made by CTU is attached as **Annexure-VI**.

Annexure-I

List of participants of 3rd meeting of NCT held on 26th and 28th may, 2020 through VC

| S.No | Name (S/Shri) | Designation | Mb. No. | Email |
|-----------------------------|------------------------|--|------------|--|
| I CEA | | | | |
| 1 | P.S.Mhaske | Chairperson- in chair | | |
| 2 | Sandesh Kr. Sharma | Member (E&C) | | |
| 3 | Goutam Roy | Chief Engineer (PSPA-I) & Member Secretary | 8376817933 | goutamroy.715@gmail.com |
| 4 | Awdhesh Kumar Yadav | Director | 9868664087 | awd.cea@gmail.com |
| 5 | Manjari Chaturvedi | Director | | |
| 6 | Ishan Sharan | Director | | i.sharan@nic.in |
| 7 | Sh. Deepanshu Rastogi | Asst. Director | | |
| 8 | Sh. Suyash Ayush Verma | Asst. Director | | |
| II MoP | | | | |
| 9 | Goutam Ghosh | Director (Trans) | | goutam.ghosh@nic.in |
| III MNRE | | | | |
| 10 | Girish Kumar | Director | 9717493267 | gkumar.mnre@nic.in |
| IV Technical Experts | | | | |
| 10 | Prabhakar Singh | Technical Expert | 9873174448 | prabhakar.s@rediffmail.com |
| 11 | P.K.Pahwa | Technical Expert | 9818243524 | pkpahwa2000@yahoo.com |
| V NITI Ayog | | | | |
| 12 | Rajnath Ram | Adviser (E) | 9899425318 | rajnath-pc@nic.in |
| VI POWERGRID | | | | |
| 13 | Subir Sen | COO (CTU-Plg) | 9650293185 | subir@powergridindia.com |
| 14 | Ashok Pal | CGM (CTU-Plg) | 9910378105 | ashok@powergridindia.com |

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| | | | | |
|------------|-----------------|------------------------|--|----------------------------|
| 15 | Mukesh Khanna | CGM (CTU-Plg) | | mkhanna@powergridindia.com |
| VII | POSOCO | | | |
| 16 | N Nallarasam | HoD SO | | |
| 17 | Rajiv Porwal | Sr. GM (SO) | | rk.porwal@posoco.in |
| VII | SECI | | | |
| I | | | | |
| 18 | S K Mishra | Director(Power system) | | |
| IX | PFCL | | | |
| 19 | Sanjay Nayak | VP | | sanjaynayak@pfcindia.com |
| X | RECTPCL | | | |
| 20 | Bhupinder Gupta | Add CEO | | bhupender.g@gmail.com |
| 21 | Kuldeep Rai | Add CEO | | kuldeep.rairecl.in |

Annex-II

Status of Transmission Schemes under bidding by PFCCCL through TBCB route

| Sl. no. | Transmission Scheme | Status |
|---------|--|--|
| 1. | Western Region Strengthening Scheme- XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme- IX (NERSS-IX) | <ol style="list-style-type: none"> 1. Bid process completed and LoI was issued to successful bidder on 02.03.2020. 2. SPV could not be transferred due to non-signing of TSA by DNHPDCL and Daman & Diu. 3. MoP vide letter dated 16.04.2020 CEA vide letter dated 14.05.2020 advised DNHPDCL and Daman & Diu to sign the TSA. DNHPDCL has agreed to sign the TSA. 4. On confirmation of signing of TSA by DNHPDCL & Daman & Diu, SPV is expected to be transferred by 31.05.2020. |
| 2. | Evacuation of power from RE sources in Koppal Wind Energy Zone (Karnataka) (2500 MW) | <ol style="list-style-type: none"> 1. RfQ bid process was completed, RfP documents issued on 19.12.2019 with the last date of submission scheduled on 20.02.2020. 2. The RfP bid submission has been extended from time to time and now extended up to 11.06.2020 due to non-availability of LTTCs of the scheme. 3. On the advise of SECI, the location of Koppal Pooling station has been shifted near to proposed solar park at Talakal Village. The revised location was communicated to the bidders on 15.05.2020. 4. CEA and CTU has been requested to provide List of Long Term Transmission Customers (LTTCs) for signing of TSA, the same is awaited. 5. Regulatory approval is awaited. |
| 3. | Evacuation of Power from RE Sources in Karur/ Tiruppur Wind Energy Zone (Tamil Nadu) (2500 MW) | <ol style="list-style-type: none"> 1. RfQ process completed and RfP documents issued to the short listed bidders on 20.02.2020 with the last date of submission scheduled on 23.04.2020. 2. The RfP bid submission has been extended from time to time and now extended up to 26.06.2020 due to non-availability of LTTCs of the scheme. 3. CEA and CTU has been requested to provide |

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| Sl. no. | Transmission Scheme | Status |
|---------|--|--|
| | | <p>List of Long Term Transmission Customers (LTTCS) for signing of TSA, the same is awaited.</p> <p>4. Regulatory approval is awaited.</p> <p>5. CEA/SECI has advised that the bid process can be wait till the approval of Regulator as the <i>Land availability in Karur WEZ is limited and not corresponding to the 2500 MW of envisaged potential and needs to be re-assessed.</i></p> |
| 4. | Transmission scheme for Solar Energy Zone in Ananthapur (Ananthapur) (2500 MW) and Kurnool (1000 MW), Andhra Pradesh | <p>1. The bid process was initiated on 06.03.2020 with single stage two envelope (RfQ and RfP combined) with last date of submission of RfP bids on 08.05.2020.</p> <p>2. Pre-bid Meeting held on 07.05.2020;</p> <p>3. The RfP bid submission has been extended up to 22.06.2020;</p> <p>4. CEA and CTU has been requested to provide List of Long Term Transmission Customers (LTTCS) for signing of TSA, the same is awaited.</p> <p>5. SECI has advised that the bid process can be put on hold as there is an issue on land allotment by AP Govt.</p> |
| 5. | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part-D | <p>1. The bid process was initiated on 06.03.2020 with single stage two envelope (RfQ and RfP combined) with last date of submission of RfP bids on 08.05.2020.</p> <p>2. Pre-bid Meeting held on 07.05.2020;</p> <p>3. The RfP bid submission has been extended up to 22.06.2020;</p> <p>4. CEA and CTU has been requested to provide List of Long Term Transmission Customers (LTTCS) for signing of TSA, the same is awaited.</p> |
| 6. | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part-E | <p>1. The bid process was initiated on 06.03.2020 with single stage two envelope (RfQ and RfP combined) with last date of submission of RfP bids on 08.05.2020.</p> <p>2. Pre-bid Meeting held on 07.05.2020;</p> <p>3. The RfP bid submission has been extended up</p> |

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| Sl. no. | Transmission Scheme | Status |
|---------|--|--|
| | | <p>to 22.06.2020;</p> <p>4. CEA and CTU has been requested to provide List of Long Term Transmission Customers (LTTCs) for signing of TSA, the same is awaited.</p> |
| 7. | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part-F | <p>1. The bid process was initiated on 06.03.2020 with single stage two envelope (RfQ and RfP combined) with last date of submission of RfP bids on 08.05.2020.</p> <p>2. Pre-bid Meeting held on 07.05.2020;</p> <p>3. The RfP bid submission has been extended up to 22.06.2020;</p> <p>4. CEA and CTU has been requested to provide List of Long Term Transmission Customers (LTTCs) for signing of TSA, the same is awaited.</p> |
| 8. | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part-G | <p>1. The bid process was initiated on 06.03.2020 with single stage two envelope (RfQ and RfP combined) with last date of submission of RfP bids on 08.05.2020.</p> <p>2. Pre-bid Meeting held on 07.05.2020;</p> <p>3. The RfP bid submission has been extended up to 22.06.2020;</p> <p>4. CEA and CTU has been requested to provide List of Long Term Transmission Customers (LTTCs) for signing of TSA, the same is awaited.</p> |

Status of Transmission Schemes under bidding by RECTPCL through TBCB route

| S. No. | Transmission Scheme and Brief Scope | Status |
|--------|--|--|
| 1. | <p>Transmission system for evacuation of power from RE projects in Osmanabad area (1 GW) in Maharashtra</p> <ol style="list-style-type: none"> 1. Establishment of 2x500MVA, 400/220kV near Kallam PS 2. 1x125MVAR bus reactor at Kallam PS 400 kV Reactor bay -1 3. LILO of both circuits of Parli(PG) – Pune(GIS) 400kV D/c line at Kallam PS 4. Provision of new 50MVAR switchable line reactor at Kallam PS end of Kallam – Pune(GIS) 400kV D/c line | <ol style="list-style-type: none"> 1. The bid process was initiated on 05.03.2020 with single stage two envelope (RfQ and RfP combined) 2. Last date of submission has been extended to 22.06.2020 from 11.05.2020. However, the bid deadline has to be further extended (refer note 1 below) 3. List of LTTCs for signing of TSA awaited 4. Boundary limit for construction of S/s finalized, MoM awaited 5. Regulatory approval awaited 6. Confirmation on revised RFP inputs awaited from CEA |
| 2. | <p>Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh</p> <ol style="list-style-type: none"> 1. Establishment of 400/220 kV, 5X500 MVA at Rajgarh SEZ PP with 420kV (1X125 MVAR) bus reactor 2. Rajgarh SEZ PP –Bhopal (Sterlite) 400 kV D/c line (HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage) 3. 2 no. of 400 kV line bays at Bhopal (Sterlite) for Rajgarh SEZ PP –Bhopal (Sterlite) 400 kV D/c line (HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage) 4. Rajgarh SEZ PP – Shujalpur 400 kV D/c line (HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage) 5. 2 no. of 400 kV line bays at Shujalpur for Rajgarh SEZ PP – Shujalpur 400 kV D/c line (HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage) | <ol style="list-style-type: none"> 1. The bid process was initiated on 05.03.2020 with single stage two envelope (RfQ and RfP combined) 2. Last date of bid submission has been extended to 22.06.2020 from 11.05.2020; 3. Due to change in S/s location & phasing of transmission system, it is understood that the bidding process has to be reinitiated. Necessary direction awaited. Upon receipt of necessary direction, bid process shall be re-initiated. 4. List of LTTCs for signing of TSA awaited 5. Regulatory approval awaited |
| 3. | <p>Transmission Scheme for Solar Energy Zone in Gadag (2500 MW), Karnataka - Part – A</p> | <ol style="list-style-type: none"> 1. The bid process was initiated on 05.03.2020 with single stage two envelope (RfQ and |

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| S. No. | Transmission Scheme and Brief Scope | Status |
|--------|--|--|
| | <ol style="list-style-type: none"> 1. Establishment of 400/220 kV, 5x500 MVA Gadag Pooling Station with 400 kV (1X125 MVAR) bus reactor 2. Gadag PS-Koppal PS 400 kV (high capacity equivalent to quad moose) D/c line 3. 400kV GIS Line bay at Koppal PS: 2 nos. for Gadag PS-Koppal PS 400 kV (high capacity equivalent to quad moose) D/c Line 4. Gadag PS-Narendra (New) PS 400 kV (high capacity equivalent to quad moose) D/c line 5. 400kV GIS Line bay at Narendra (New): 2 nos. for Gadag PS-Narendra (New) 400 kV (high capacity equivalent to quad moose) D/c Line | <ol style="list-style-type: none"> RfP combined) 2. Last date of submission has been extended to 22.06.2020 from 08.05.2020. However, the bid deadline has to be further extended (refer note 1 below) 3. List of LTTCs for signing of TSA awaited 4. Boundary limit for construction of S/s to be finalized, preliminary discussion held 5. Regulatory approval awaited 6. Confirmation on revised RFP inputs awaited from CEA |
| 4. | <p>Transmission Scheme for Solar Energy Zone in Bidar (2500 MW), Karnataka</p> <ol style="list-style-type: none"> 1. Establishment of 3x1500MVA (765/400kV) and 5x500MVA (400/220kV) Station at suitable border location near Bidar with 765kV (1x240MVAR) and 400kV(1X125MVAR) bus reactor. 2. Bidar PS –Maheshwaram (PG) 765kV D/c line 3. 2 nos of 765 kV line bays at Maheshwaram (PG) GIS substation for termination of Bidar PS – Maheshwaram (PG) GIS 765kV D/c line 4. 765 kV, 1x240MVAR switchable line reactor for each circuit at Bidar PS end of Bidar PS– Maheshwaram (PG) 765kV D/c line | <ol style="list-style-type: none"> 1. The bid process was initiated on 05.03.2020 with single stage two envelope (RfQ and RfP combined) 2. Last date of submission has been extended to 22.06.2020 from 08.05.2020. However, the bid deadline has to be further extended (refer note 1 below) 3. List of LTTCs for signing of TSA awaited 4. Boundary limit for construction of S/s to be finalized, preliminary discussion held 5. Regulatory approval awaited 6. Confirmation on revised RFP inputs awaited from CEA |
| 5. | <p>Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II - Part A</p> <ol style="list-style-type: none"> 1. Establishment of 400/220 kV, 4x500 MVA at Ramgarh – II PS with 420kV (2x125 MVAR) bus reactor 2. Ramgarh-II PS – Fatehgarh- II PS 400kV D/c line (Twin HTLS*) 3. 2 no. of 400 kV line bays at Fatehgarh- II for Ramgarh – II PS– Fatehgarh-II PS 400kV D/c | <ol style="list-style-type: none"> 1. The bid process with single stage two envelope (RfQ and RfP combined) initiated on 05.03.2020 was annulled due to change in transmission line length and in turn qualification requirement. 2. Bidding process has been re-initiated on 11.05.2020 3. Last date of submission is 13.07.2020 |

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| S. No. | Transmission Scheme and Brief Scope | Status |
|--------|---|---|
| | <p>line</p> <p>4. Ramgarh –II PS– Jaisalmer-II (RVPN) 400 kV D/c line (Twin HTLS*)</p> <p>5. HTLS*)</p> <p>6. 2 no. of 400 kV line bays each at Jaisalmer- II for Ramgarh – II - Jaisalmer-II 400kV D/c line</p> | <p>4. List of LTTCs for signing of TSA awaited</p> <p>5. Regulatory approval awaited</p> |
| 6. | <p>Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II - Part B</p> <p>1. Fatehgarh-II PS – Bhadla-II PS 765kV D/c line (2nd)</p> <p>2. 2 no. of 765 kV line bays each at Fatehgarh-II and Bhadla-II for Fatehgarh-II PS – Bhadla- II PS 765kV D/c line (2nd)</p> <p>3. 1x240 MVAR Switchable line reactor for each circuit at each end of Fatehgarh-II – Bhadla- II 765kV D/c line (2nd)</p> | <p>1. The bid process was initiated on 05.03.2020 with single stage two envelope (RfQ and RfP combined)</p> <p>2. Last date of submission has been extended to 22.06.2020 from 08.05.2020. However, the bid deadline has to be further extended (refer note 1 below)</p> <p>3. List of LTTCs for signing of TSA awaited</p> <p>4. Regulatory approval awaited</p> |
| 7. | <p>Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II - Part C</p> <p>1. Establishment of 765/400 kV, 2x1500 MVA at Sikar – II with 400kV (1x125 MVAR) and 765 kV (2x330 MVAR) bus reactor.</p> <p>2. Bhadla-II PS – Sikar-II 765kV D/c line</p> <p>3. 2 no. of 765 kV line bays at Bhadla- II for Bhadla-II PS – Sikar-II 765kV D/c line</p> <p>4. 1x330 MVAR switchable line reactor for each circuit at Sikar-II end of Bhadla-II PS – Sikar-II 765kV D/c line.</p> <p>5. 1x240MVAR switchable line reactor for each circuit at Bhadla-II end of Bhadla-II PS – Sikar-II 765kV D/c line</p> <p>6. Sikar-II – Neemrana 400kV D/c line (Twin HTLS*)</p> <p>7. 2 no. of 400 kV line bays at Neemrana for Sikar-II – Neemrana 400kV D/c line (Twin HTLS*)</p> | <p>1. The bid process was initiated on 05.03.2020 with single stage two envelope (RfQ and RfP combined)</p> <p>2. Last date of submission has been extended to 22.06.2020 from 11.05.2020. However, the bid deadline has to be further extended (refer note 1 below)</p> <p>3. Boundary limit for construction of S/s finalized, MoM awaited</p> <p>4. List of LTTCs for signing of TSA awaited</p> <p>5. Regulatory approval awaited</p> |

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Annexure III

| S. No. | Name of Scheme | Estimated Cost as per NCT (in Crore) | Mode of Implementation | Agreed in NCT | MoP OM / Gazette Notification | Remarks |
|--------|---|--------------------------------------|------------------------|---|-------------------------------|----------|
| 1) | Transmission System for evacuation of power from RE projects in Rapar (3000 MW) and Lakadia (2000 MW) SEZ – Part A | 932 | TBCB | 4 th (erstwhile NCT) | | Reviewed |
| 2) | Transmission System for evacuation of power from RE projects in Rapar (3000 MW) and Lakadia (2000 MW) SEZ– Part B | 1373 | TBCB | 4 th (erstwhile NCT) | | Reviewed |
| 3) | Transmission System for evacuation of power from RE projects in Rapar (3000 MW) and Lakadia (2000 MW) SEZ – Part C | 2168 | TBCB | 4 th (erstwhile NCT) | | Reviewed |
| 4) | Transmission System for evacuation of power from RE projects in Rapar (3000 MW) and Lakadia (2000 MW) SEZ – Part C (Ahmedabad 400 kV interconnection) | 117.35 | RTM | 4 th (erstwhile NCT) | | Reviewed |
| 5) | Transmission System for providing connectivity to RE projects in Gujarat [Lakadia (2000 MW)] | 196 | RTM | 2 nd & 4 th (erstwhile NCT) | | Reviewed |
| 6) | Augmentation of transformation capacity at Lakadia PS for providing connectivity to RE projects (2000 MW) SEZ | 247 | RTM | 4 th (erstwhile NCT) | | Reviewed |
| 7) | Transmission System for evacuation of power from RE projects in Banaskantha (2500 MW) REZ-Part A (Augmentation of transformation capacity at Radhanesda PS) | 193 | RTM | 4 th (erstwhile NCT) | | Reviewed |
| 8) | Transmission System for evacuation of power from | 308 | TBCB | 4 th (erstwhile | | Reviewed |

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| | | | | | | |
|-----|---|-------|------|---------------------------------|---|--|
| | RE projects in Banaskantha (2500 MW) REZ-Part B | | | NCT) | | |
| 9) | Transmission System for evacuation of power from RE projects in at Jamnagar (2500 MW) REZ | 1347 | TBCB | 4 th (erstwhile NCT) | | Reviewed |
| 10) | Transmission system for evacuation of power from RE projects in Sholapur (1000 MW under Ph-I+ 500 MW under Ph-II) SEZ | 253 | TBCB | 4 th (erstwhile NCT) | | Sholapur SEZ has been deferred due to land issues as per meeting at MOP dated 10.12.2019 |
| 11) | Transmission system for evacuation of power from RE projects in wind energy zones in Osmanabad area of Maharashtra (1 GW) | 282 | TBCB | 4 th (erstwhile NCT) | 15/3/2018 -Trans-Pt(1) dated 23.01.2020 | |
| 12) | Transmission system for evacuation of power from RE projects in wind energy zones in Osmanabad area of Maharashtra (1 GW) - Conversion of 50MVA fixed Line Reactors on each ckt of Parli (PG) – Pune (GIS) 400kV D/c line at Parli (PG) end into switchable line reactors | 19 | RTM | 4 th (erstwhile NCT) | 15/3/2018 -Trans-Pt(1) dated 23.01.2020 | |
| 13) | Transmission system for evacuation of power from RE projects in Wardha (2500 MW) SEZ in Maharastra | 467 | TBCB | 4 th (erstwhile NCT) | | Deferred in view of uncertainty in RE project (MoP mtg dated 10.12.2019) |
| 14) | Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh | 640 | TBCB | 4 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | |
| 15) | Transmission system for evacuation of power from RE projects in Khandwa (2500 MW) in Madhya Pradesh | 453 | TBCB | 4 th (erstwhile NCT) | | Deferred in view of uncertainty in RE project (MoP mtg dated 10.12.2019) |
| 16) | Transmission system for | 72.79 | RTM | 4 th | | Deferred due |

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| | | | | | | |
|-----|---|------------------------|----------|---------------------------------|---|--|
| | evacuation of power from RE projects in Khandwa (2500 MW) in Madhya Pradesh – ICT augmentation at Khandwa Pool | | | (erstwhile NCT) | | to land issues as per meeting at MOP dated 10.12.2019 |
| 17) | Transmission System for providing immediate connectivity to Dholera UMSP (4000 MW) | 1416 | TBCB | 4 th (erstwhile NCT) | | Reviewed |
| 18) | Transmission scheme for Solar Energy Zone in Ananthpuram (Ananthapur) (2500 MW) and Kurnool (1000 MW) , Andhra Pradesh | 823 | TBCB | 4 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | SECI has suggested to put on hold due to land issues |
| 19) | Transmission Scheme for Solar Energy Zone in Gadag (2500 MW), Karnataka - Part A | 551 | TBCB | 4 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | |
| 20) | Transmission Scheme for Solar Energy Zone in Gadag (2500 MW), Karnataka - Part B | 554 | RTM | 4 th (erstwhile NCT) | 15/3/2018 -Trans-Pt(1) dated 23.01.2020 | |
| 21) | Scheme for Solar Energy Zone in Bidar (2500 MW), Karnataka | 1367.52 | TBCB | 4 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | |
| 22) | Common transmission system strengthening in Southern Region for enabling evacuation and export of power from Solar & Wind Energy Zones in Southern Region | 1202 | RTM | 4 th (erstwhile NCT) | 15/3/2018 -Trans-Pt(1) dated 23.01.2020 | |
| 23) | Transmission Scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under phase II | TBCB – 16357 RTM - 726 | TBCB/RTM | 5 th (erstwhile NCT) | | The scheme was reviewed and the fresh scheme was re-evolved in the 6 th meeting of erstwhile NCT. |

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| | | | | | | |
|-----|---|------|------|---------------------------------|---|--|
| 24) | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II -Part A | 618 | TBCB | 6 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | |
| 25) | Transmission system strengthening for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II -Part A1 (765/400kV ICT augmentation at Fatehgarh-II) | 72 | RTM | 6 th (erstwhile NCT) | 15/3/2018 -Trans-Pt(1) dated 23.01.2020 | |
| 26) | Transmission system strengthening for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II -Part B | 1116 | TBCB | 6 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | |
| 27) | Transmission system strengthening Scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II -Part B1 (765/400/220 ICT augmentation at Fatehgarh-II and Bhadla-II) | 932 | RTM | 6 th (erstwhile NCT) | 15/3/2018 -Trans-Pt(1) dated 23.01.2020 | |
| 28) | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under phase-II- Part C | 2182 | TBCB | 6 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | |
| 29) | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part D | 1741 | TBCB | 6 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | |
| 30) | Transmission system | 1644 | TBCB | 6 th | Gazette | |

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| | | | | | | |
|-----|---|------|------|---------------------------------|---|--|
| | strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part E | | | (erstwhile NCT) | notification dated 24.01.2020 | |
| 31) | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part F | 2098 | TBCB | 6 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | |
| 32) | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part F1 | 83 | RTM | 6 th (erstwhile NCT) | 15/3/2018 -Trans-Pt(1) dated 23.01.2020 | |
| 33) | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part G | 1618 | TBCB | 6 th (erstwhile NCT) | Gazette notification dated 24.01.2020 | |
| 34) | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Part G1 (Maharanibagh/Gopalpur- Narela 765/400 kV substation 400 kV interconnection) | 72 | RTM | 6 th (erstwhile NCT) | 15/3/2018 -Trans-Pt(1) dated 23.01.2020 | |
| 35) | Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II- Power reversal in Balia-Bhiwadi HVDC line | 15 | RTM | 6 th (erstwhile NCT) | 15/3/2018 -Trans-Pt(1) dated 23.01.2020 | |

Annex V



3rd Meeting of National Committee on Transmission Grid Performance – 4th Quarter (2019-20)

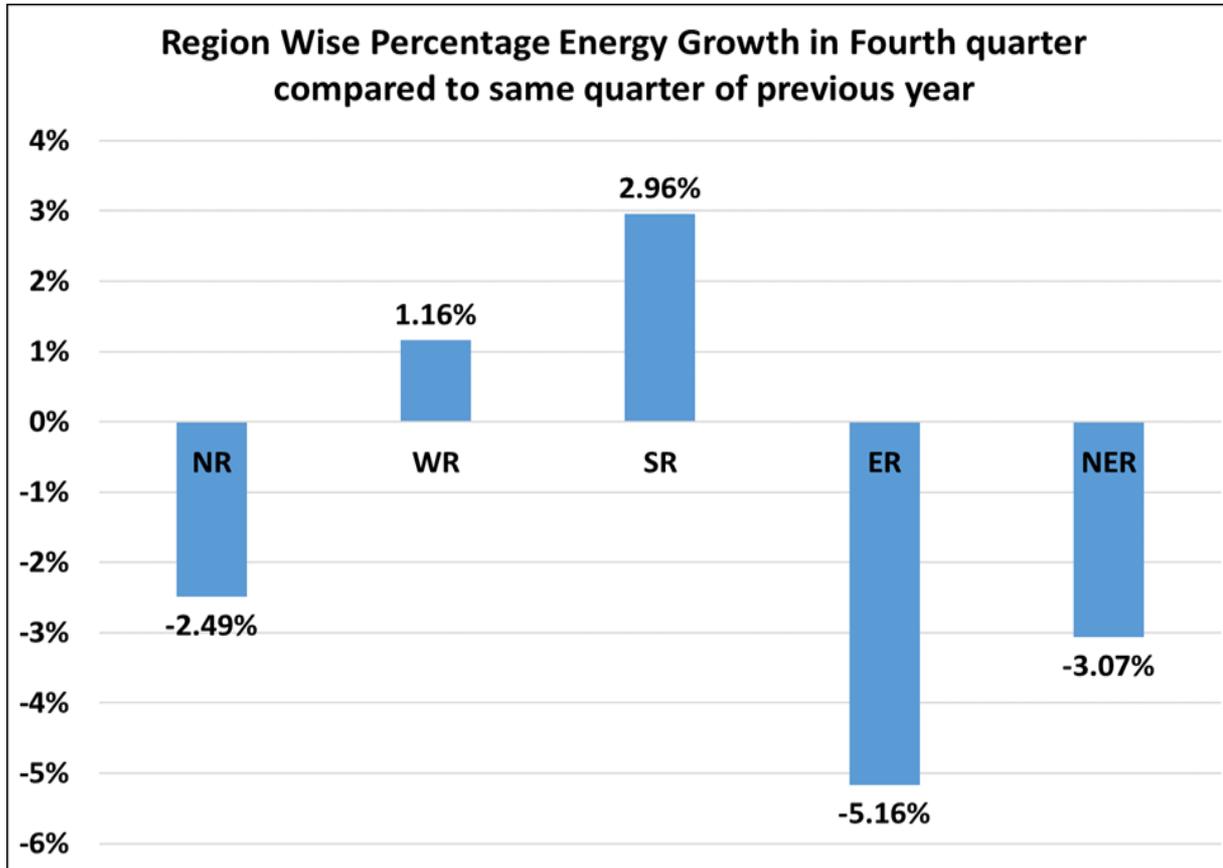


Power System Operation Corporation Limited
National Load Despatch Center

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 - Uncertainty in Energy Met (2019-20)
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- **Important Grid Elements under long Outage**
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- **Important Aspects for future Transmission Planning**

Energy Growth compared to Previous Year



Western Region recorded its all time high demand of **59385 MW** on 21st Feb 2020.

Southern Region recorded its all time high demand as well as energy of **53465 MW & 1157 MUs** respectively on 18th March 2020.

25th March 2020 onwards, demand has reduced significantly due to containment measures on account of COVID-19.

Details available at https://posoco.in/download/nldc-operational-feedback_april_2020/?wpdmdl=29081

Uncertainty in Energy Met (2019-20)

| S. No. | Region | Energy Met* | 19 th EPS Projection (A) | 19 th EPS Projection – Econometric Method [^] (B) | % Uncertainty w.r.t. (A) | % Uncertainty w.r.t. (B) |
|--------|---------------|-------------|-------------------------------------|---|--------------------------|--------------------------|
| 1 | Northern | 389285 | 420047 | 417321 | -7.32% | -6.72% |
| 2 | Western | 388836 | 429217 | 384703 | -9.41% | 1.07% |
| 3 | Southern | 344436 | 376376 | 346540 | -8.49% | -0.61% |
| 4 | Eastern | 145902 | 153363 | 166302 | -4.86% | -12.27% |
| 5 | North Eastern | 15984 | 20437 | 17124 | -21.79% | -6.66% |
| 6 | All India | 1284443 | 1399440 | 1331990 | -8.22% | -3.57% |

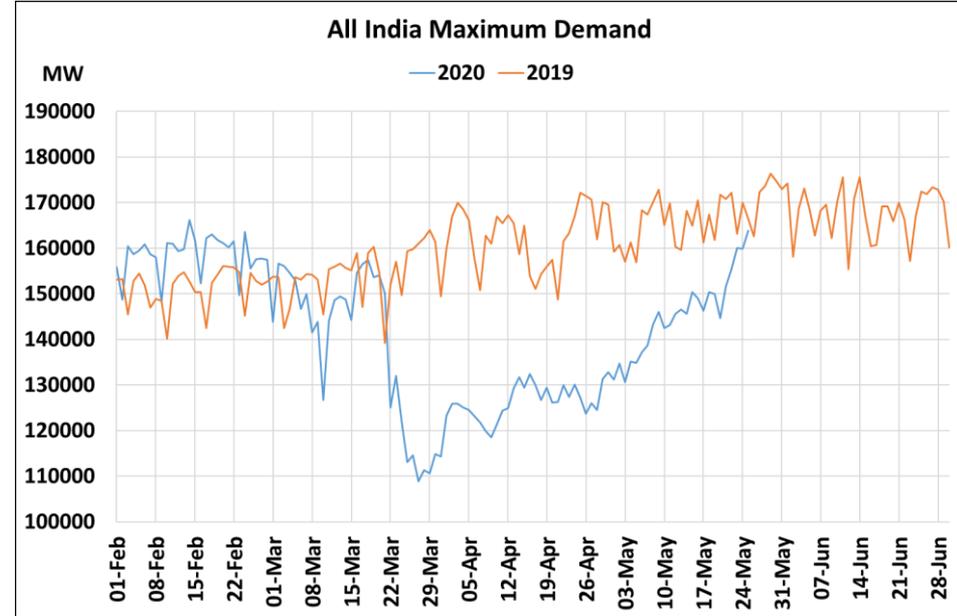
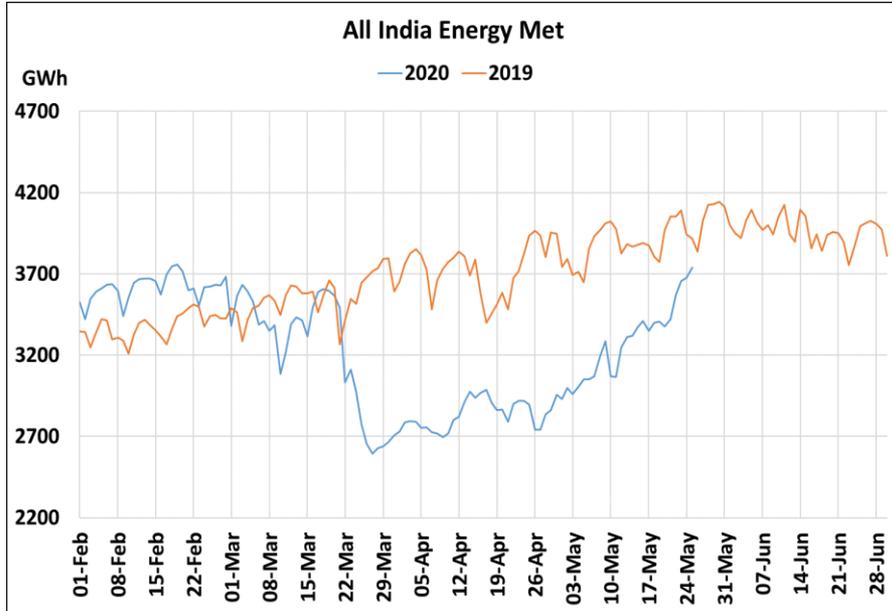
Figures are in MUs

*Source: CEA Power Supply Position Report

[^] PAM (Partial Adjustment Model) Baseline Scenario Data

Projection Data is excluding Andaman & Nicobar and Lakshadweep data

Impact of COVID-19 on all India Demand



- India energy met during the lock down period was less by 20-30 % in comparison to normal day energy consumption.
- The percentage reduction in energy met was highest for Northern region followed by Western and Southern regions.
- After relaxation in lockdown, all India demand has started picking up and is approaching last year trend.

22nd March 2020: Janta Curfew, **25th March – 14th April 2020:** All-India containment measures vide MHA order no. 40-3/2020-DM-I(A)
5th April 2020: Lights switch off event at 21:00 hrs for 9 minutes, **14th April – 31st May 2020:** Extension of all-India containment measures

Number of Grid Incidents/Disturbances

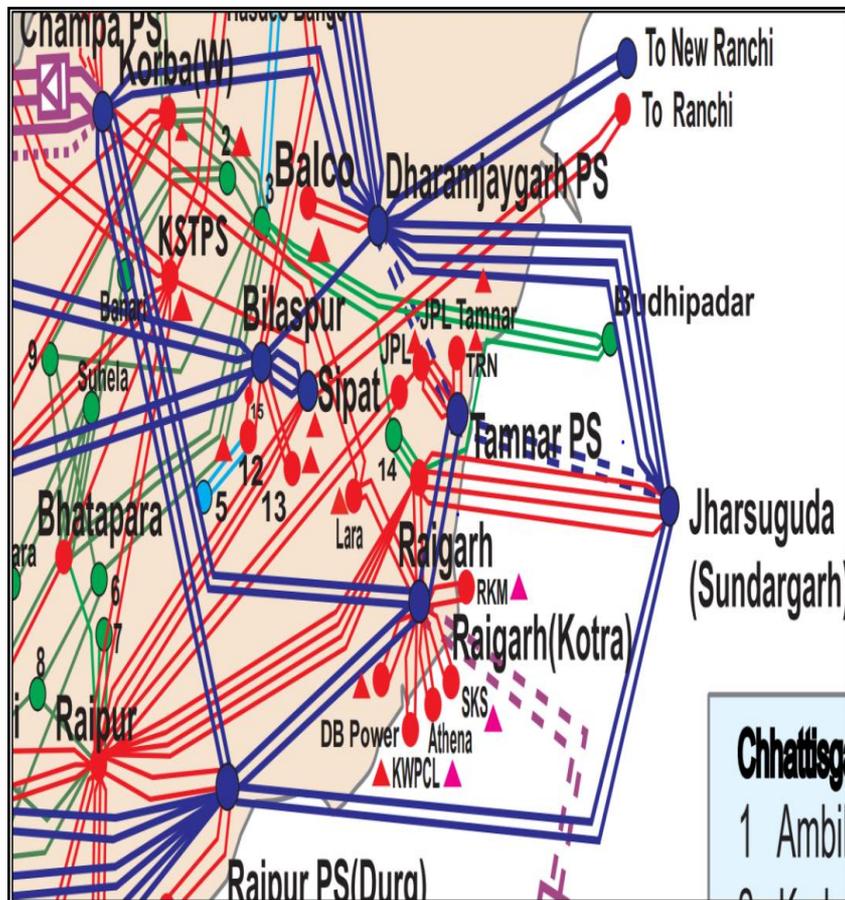
4th Quarter (FY 2019-20)

| Region | Grid Incidents | | Grid Disturbances | | | | | Total |
|----------------------|----------------|------|-------------------|------|------|------|------|-------|
| | GI-1 | GI-2 | GD-1 | GD-2 | GD-3 | GD-4 | GD-5 | |
| Northern | 0 | 16 | 22 | 0 | 0 | 0 | 0 | 38 |
| Western | 7 | 10 | 7 | 0 | 0 | 0 | 0 | 24 |
| Southern | 3 | 1 | 11 | 0 | 0 | 0 | 0 | 15 |
| Eastern | 3 | 2 | 14 | 0 | 0 | 0 | 0 | 19 |
| North-Eastern | 1 | 19 | 27 | 0 | 0 | 0 | 0 | 47 |
| All India | 14 | 48 | 81 | 0 | 0 | 0 | 0 | 143 |

Details available at https://posoco.in/download/nldc-operational-feedback_april_2020/?wpdmdl=29081

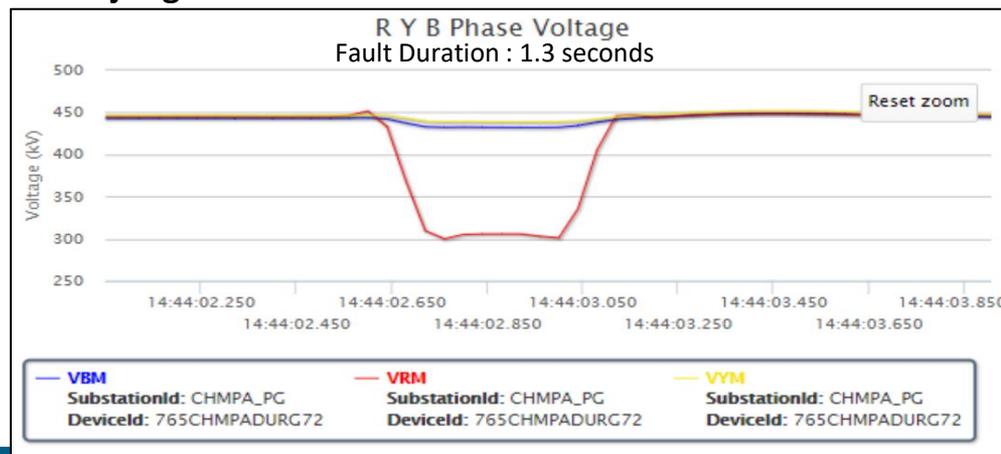
NEAR MISS INCIDENT: Complete Outage Of Tamnar S/s

Details available at point 1.4 (iii) of NLDC Operational Feedback for Jan-Mar'20 Quarter



Remarks to utilities:

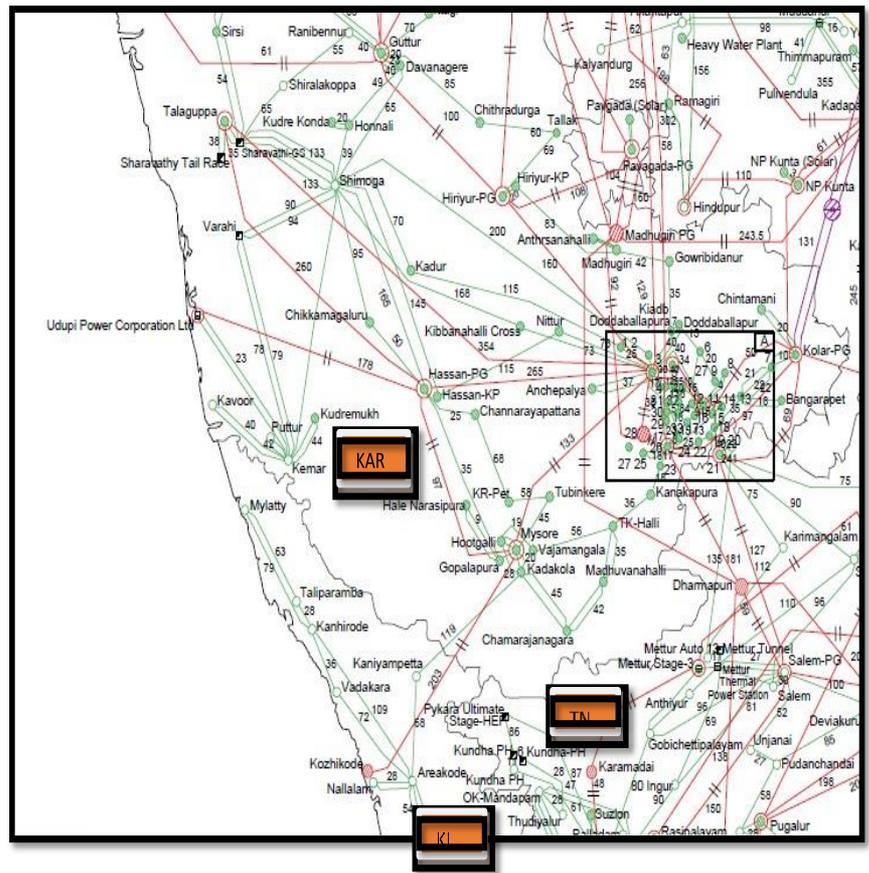
- Four no. of stations at 400 kV and above went dark, 765/400 kV Tamnar, 400 kV JPL Stage-1, 400 kV JPL Stage-2 and 400 kV TRN
- A total of 1330 MW of generation loss took place and fault clearing time was approx.. 1.3 secs which is violation of CEA Grid Standards Regulations
- Any further escalation of tripping could have been serious as major 765 kV stations are nearby Tamnar station
- The Raigarh Pooling station is directly connected with Tamnar and any further tripping had the potential to cause major generation loss



NEAR MISS INCIDENT: Partial GD in Karnataka and North Kerala

Date:- 01-03-2020 at 13:57 Hrs

Details available at point 1.4 (ii) of NLDC Operational Feedback



- 400kV Talaguppa Neelamangala
 - 400kV Hassan Neelamangala
 - 220kV Shimoga A'Halli
- ← 3 no. of 400kV and 220kV trunk lines were only in service during antecedent
- 400kV Mysore Neelamangala line-1 and 2
 - 220kV Sirsi Hubli line-1 and 2
 - 220kV Kanakapura TKHalli
 - 220kV Shiralakoppa Ranibennur
 - 220kV Shimoga Honnali
 - 220kV Shimoga Davangere
 - 220kV Neelamangala KB Cross
 - 220kV Nittur Arasikere
 - 220kV Kadur Dabuspet
 - 220kV Kanakapura TKHalli
- ← 2 no. of 400kV and 10 no. of 220kV trunk lines were out during antecedent
- Note: Bus Split operation at 220kV Areakode SS

| Kar Load loss | Generation loss | Kerala Load loss |
|----------------|-----------------|------------------|
| 2000 MW | 1754 MW | 380 MW |

About 2400 MW of load of Southern Region got affected

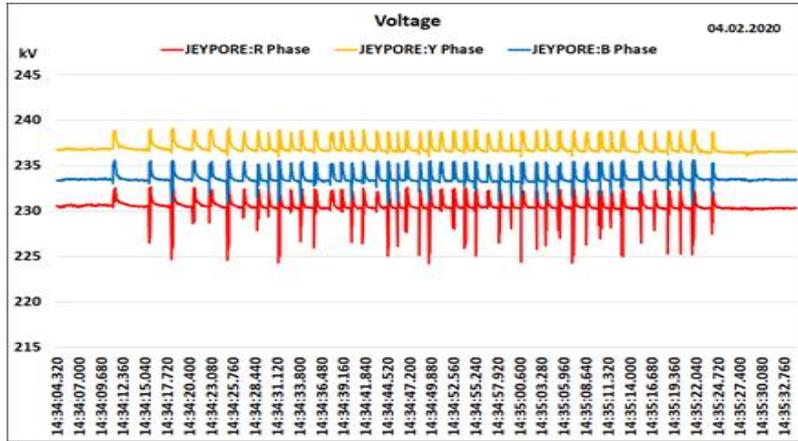
The loads in two states were affected and large generation was also lost in the event

The large restoration time owing to the outage of large part of network caused high unserved energy.

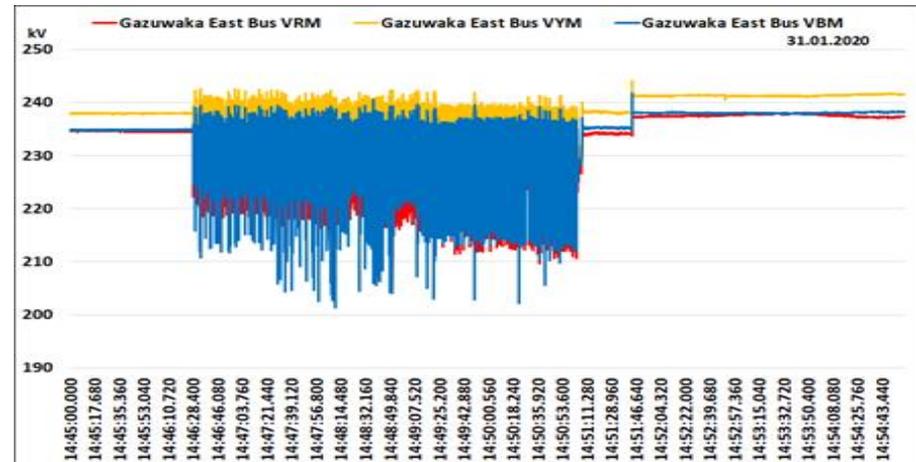
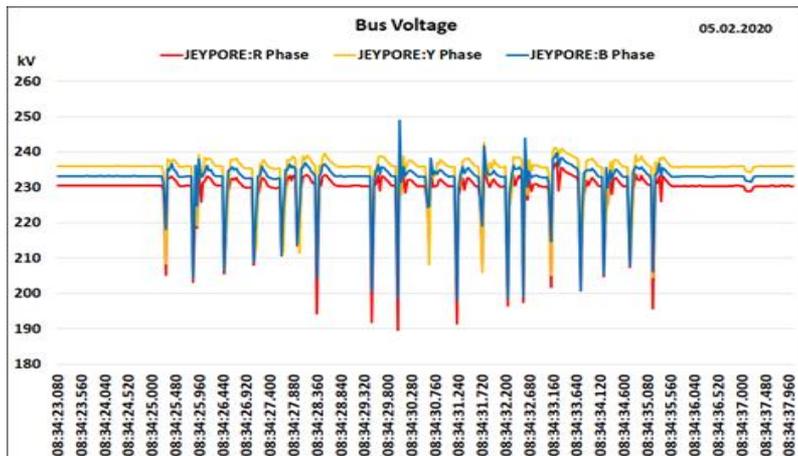
220 kV SS Affected- (Total:37) [KPTCL-28, KPCL-3, KSEB-6]

Severe Fluctuation in Voltage near Gazuwaka HVDC

Details available at point 1.4 (iii) of NLDC Operational Feedback for Jan-Mar'20 Quarter



- The timing of the incidents is given below: 14:46 hrs to 14:51 hrs on 31-01-2020, 14:34 hrs to 14:36 hrs on 04-02-2020 and 08:34 hrs to 08:38 hrs on 05-02-2020
- The event shared with all the neighbouring constituents and POWERGRID.
- The PMU data shared with POWERGRID to help in analysing the event



Major Elements Commissioned during the Quarter

| S. No. | Element | First time Charging / Synchronization Date | Remarks |
|--------|--|--|---|
| 1 | 765kV Chilakularipeta-Vemagiri D/C | Ckt-I - 15.01.20 Ckt-II - 16.01.20 | Commissioning of lines resulted in the enhancement of SR-Import Capability. |
| 2 | 400 kV Alipurduar-Binaguri D/C | Ckt-III & IV - 16.01.20 | Commissioning of lines strengthened the NER-ER corridor and will facilitate the evacuation of hydro generation from NER & Bhutan. |
| 3 | LILO of 220 kV Delina-Zainakote at 400/220kV Amargarh substation | 30.01.20 | Commissioning of lines improved the power supply of J&K (UT) as well as evacuation from Kishanganga (NHPC) Hydro Electric Plant. |
| 4 | 765 kV Khandwa (PG) Substation and 765 kV Khandwa – Indore D/C | Ckt- I -26.02.20 Ckt- II – 12.03.20 | Station and lines will facilitate the power evacuation from Khargone STPS. |
| 5 | 765 kV Bikaner – Moga D/C | 09.03.20 | Commissioning of lines facilitate the evacuation of Solar power from Rajasthan |

- **Darlipalli Unit -1 (800 MW) and Khargone Unit -2 (660 MW) were also commissioned during the quarter.**

Enhancement in Transfer Capability Limits

| S. No. | Corridor | Previous Transfer Capability (A) | Enhanced Transfer Capability in last quarter (B) | Present Transfer Capability (C) | Delta (A to B) | Reason for Enhanced Transfer Capability in last quarter (A to B) |
|--------|--------------|----------------------------------|--|---------------------------------|----------------|--|
| 1 | WR-NR | 14900 | 16150 | 17200 | 1250 | Commissioning/COD of following elements: - a) HVDC Champa – Kurukshetra Pole -3 b) 765 kV Bikaner – Moga D/C |
| | ER-NR | 5250 | 5250 | 5250 | 0 | |
| | Import of NR | 20150 | 21400 | 22450 | 1250 | |
| 2 | ER-SR | 4950 | 5950 | 5950 | 1000 | Commissioning/COD of following elements: - a) 765 kV Vemagiri – Chilkuripeta D/C |
| | WR-SR | 5550 | 6950 | 6950 | 1400 | |
| | Import of SR | 10500 | 12900 | 12900 | 2400 | |

Figures are in MW

Congestion In Power Exchanges

| S. No. | Month | Unconstrained Cleared Volume (MUs) | Actual Cleared Volume (MUs) | Volume of electricity not cleared due to congestion (MUs) | % of volume not cleared due to congestion | % of time congestion occurred |
|--------|---------------|------------------------------------|-----------------------------|---|---|-------------------------------|
| 1 | January 2020 | 4815.33 | 4970.79 | 23.34 | 0.51% | 5.58% |
| 2 | February 2020 | 4291.18 | 4289.15 | 2.03 | 0.05% | 0.22% |
| 3 | March 2020 | 3971.24 | 3971.24 | - | - | - |

**Source: CERC Monthly Market Monitoring Reports*

Transmission Line and ICT Constraints



| S. No | Region | Element | Description of the constraints |
|-------|----------|--|---|
| 1 | Northern | 400 kV Dadri-Greater Noida | Switchgear upgradation at Dadri and Nawada needs to be carried out so that any undue event/disturbance due to high line loadings especially during high demand season may be avoided. |
| 2 | | 400 kV Anpara-Sarnath D/C | Under N-1 of 400 kV Anpara-Sarnath line, loading on other circuit is high. Similarly, under N-1 of 765 kV Anpara C –Unnao line, loading of 400 kV lines from Anpara increases significantly. Remarks: Commissioning of 765 kV Anpara D-Unnao to be expedited. |
| 3 | | 765 kV Anpara C-Unnao | |
| 4 | | 400 kV Anta-Kota line | Loading of this line remains close to thermal limits under high generation in Chhabra, Kawai, Kalisindh complex. Under N-1 contingency of 765kV Anta-Phagi D/C line or 765/400kV Phagi ICTs, loading on 400kV Anta-Kota would cross thermal limits. |
| 5 | | 3x500 MVA, 400/220 kV ICTs at Bhadla (Raj) and Bhadla (PG) | During high solar generation, loading of ICTs are N-1 non-compliant for considerable duration. |
| 6 | | 2x1500 MVA , 765/400 kV ICTs at Phagi | Remarks: 3rd planned ICT of 1500 MVA capacity at Phagi should be expedited. |
| 7 | | 2X315 MVA, 400/220kV ICTs at Dipalpur, Merta, Bhinmal and Chhittorgarh (Raj) | ICTs have been N-1 non-compliant for significant period during last quarter. |

Details available at point 2.1.1 & 2.1.2 of NLDC Operational Feedback for Jan-Mar'20 Quarter

Transmission Line and ICT Constraints

| S. No | Region | Element | Description of the constraints |
|-------|---------|--|--|
| 1 | Western | 400kV Kudus-Kala D/C | Remarks: Commissioning of 400kV Padghe (GIS) –Kharghar and Padghe (GIS)-Ghatkopar would relieve Kudus-Kala D/C. |
| 2 | | 400kV Padghe- Kalwa D/C | Remarks: Commissioning of 400kV Ghatkopar S/S and Padghe (GIS)-Kharghar, Padghe-Navi Mumbai-Ghatkopar and Kharghar-Ghatkopar would give additional infeed to Mumbai and relieve loading of Padghe-Kalwa D/C |
| 3 | | 400kV Chandrapur-Chandrapur (II) D/C | Lines have been N-1 non-compliant for 21% for the time during last quarter |
| 4 | | 2x315 MVA, 400/220 kV ICTs at Astha MPPTCL ICTs, Raigarh PG and Akola MSETCL | ICTs have been N-1 non-compliant for significant period during last quarter. |
| 5 | | 2x315MVA+ 1x500MVA 400/220 kV Dhule MSETCL ICTs | ICTs have been N-1 non-compliant for around 60% of the time during last quarter |
| 6 | | 2x1500 MVA ICTs at Ektuni | ICTs have been N-1 non-compliant for around 35% of the time during last quarter |

Details available at point 4.1.1 & 4.1.2 of NLDC Operational Feedback for Jan-Mar'20 Quarter

Transmission Line and ICT Constraints



| S. No | Region | Element | Description of the constraints |
|-------|----------|--|--|
| 1 | Southern | 400 kV Mysore-Nelamangala D/C | Remarks: Commissioning of 400 kV Hiriyr Mysore will relieve the loading and needs to be expedited. |
| 2 | | 220 kV Bangalore Metro Network | Low voltage situation during peak period and high Voltage during off-Peak period of the day. STATCOM at 400 kV Somanahalli/Nelamangala/Hoody may be planned. |
| 3 | | Andhra Pradesh 220 kV Network | Constraint: Several 220 kV lines from Maradam, Upper Sileru, Lower Sileru, Sattenpalli etc. are overloaded. Details available in NLDC operational feedback. |
| 4 | | 400/220 kV 2x315MVA ICTs at Maradam and Vemagiri, Kaiga, Kochi, Guttur, Hoody, Nelamangla and Thiruvalem | Severe N-1 problem observed at Maradam, Kaiga, Hoody and Nelamangla during last quarter |
| 5 | | 400/220 kV 2X500 MVA ICTs at Kolar | ICTs have been N-1 non-compliant for around 22% of the time during last quarter |
| 1 | Eastern | 220 kV Gaya- (PG) - Bodhgaya D/C | These lines are not N-1 compliant. Planning required for taking care of the N-1 contingency of these circuits. |

Details available at point 5.1.1 & 5.1.2 of NLDC Operational Feedback for Jan-Mar'20 Quarter

High Voltage Nodes

| S. No | Region | Areas |
|-------|---------------|--|
| 1 | Northern | Voltages at most of substations of Northern region especially those lying in Punjab, Haryana, Delhi, parts of Uttar Pradesh (near Agra) continue to be above 420 kV for more than 60-70% of time. Voltages during night hours at these stations are in the range of 430-435 kV. |
| 2 | Western | Kalwa, Chandrapur, Dhule, Seoni, Raita, Ukai, Raigarh, Khaparkheda, Bhatapara, Kurud, Akola, New Koyna, |
| 3 | Southern | Gooty, Kurnool, Sattenapally, Chilakaluripeta, Jamalamadugu, Uravakonda, Kalikiri, Podili, Dindi, Tukkapur, Veltoor, Suryapet, Malkaram, Mamidipally, Chandalapur, Asupaka, Srisailam LB, Ramadagu, Julurupadu, Tippapur, Medaram, Narsapur, Jangaon, Tumkur, Karaikudi, Khammam, Anaikaduvu, Kamudi, NP Kunta, Dharmapuri, Narendra, Tirunelveli, Chittor, Nellore, Pavagada, Talarichervu, Pugalur, Thapagundu, Shankarpally, KV Kota, Nunna, Tallapalli, Chilakaluripeta, Cuddapah, Nizamabad, Srikakulam, Vemagiri |
| 4 | Eastern | Jharsuguda, Koderma, Maithaon B, New Dubri, Patna, Barh, Binaguri, New Purnea, Teesta |
| 5 | North-Eastern | Ranganadi, Balipara, Misa, BNC, Palatana, Silchar, Bongaigaon, Byrnihat |

Details available at https://posoco.in/download/nldc-operational-feedback_april_2020/?wpdmdl=29081

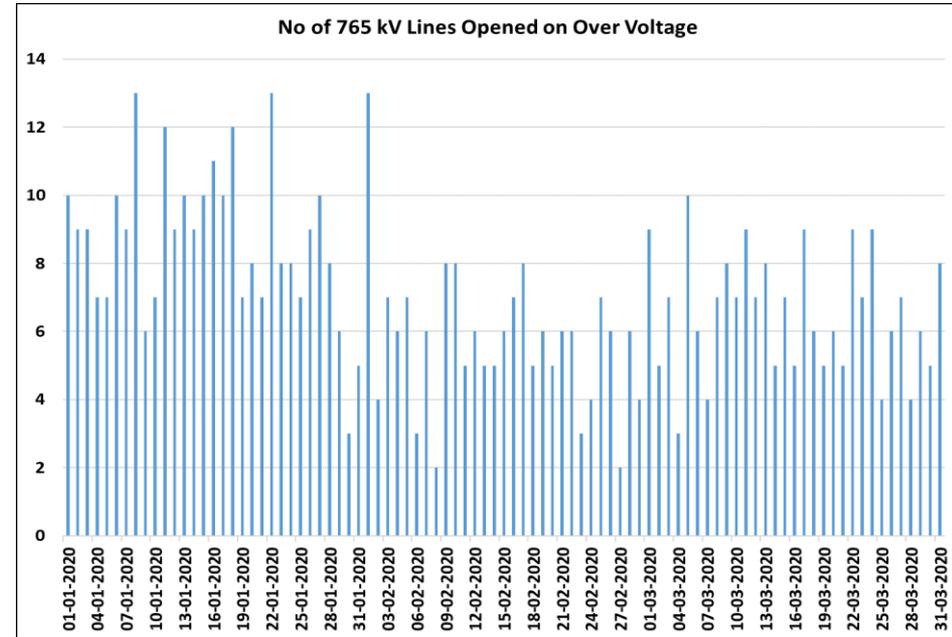
Low Voltage Nodes

| S. No | Region | Areas |
|-------|---------------|--|
| 1 | Northern | Hindaun, Sikar |
| 2 | Western | Padghe |
| 3 | Southern | Trichur, Kozhikode, Arasur, Karamadai, Salem, Kalivendapattu, Sholinganallur, Guttur, Hoody, Vemagiri, Somanahalli, Trichy |
| 4 | Eastern | Arambag |
| 5 | North-Eastern | - |

Details available at https://posoco.in/download/nldc-operational-feedback_april_2020/?wpdmdl=29081

Lines Opened on High Voltage

- **Frequently opened 765 kV lines for voltage control**
 - 765 kV Kanpur – Aligarh – I (69 outages)
 - 765 kV Moga – Meerut line (62 outages)
 - 765 kV Phagi – Bhiwani – I (35 outages)
 - 765 kV Agra – Fatehpur – I (32 outages)
 - 765 kV Cuddpah – Tiruvalem – I (30 outages)
- **Line opening considered as last resort for voltage control**



Details available at https://posoco.in/download/nldc-operational-feedback_april_2020/?wpdmdl=29081

Lines Opened on High Voltage

- 400 kV Lines opened more than 4236* times during the quarter for voltage control

| S. No. | Region | No. of times 400 kV Lines opened* | Lines opened per day on average in last quarter | Total 400 kV lines in the region | Frequently Opened Lines |
|--------|---------------|-----------------------------------|---|----------------------------------|--|
| 1. | Northern | 3355 | 37 | 493 | 400 kV Bhadla – Jodhpur-I 400 kV Dehar – Rajpura –I |
| 2. | Western | 360 | 4 | 468 | 400 kV Aurangabad – Bhusawal – I 400 kV Kosamba – Chorania - I |
| 3. | Southern | 283 | 3 | 392 | 400 kV Pavagada – Tumkur-II 400 kV KTPS – Khammam-II |
| 4. | Eastern | 131 | 1 | 199 | 400 kV New PPSP – Arambagh – II 400 kV New Chanditala – Kharagpur - I |
| 5. | North-Eastern | 107 | 1 | 30 | 400 kV Bongaigaon – Balipara Ckt – 1,2,3 & 4 400 kV Ranganadi – BNC D/C |
| 6. | All India | 4236 | 47 | 1582 + (33-IR) | |

Details available at https://posoco.in/download/nldc-operational-feedback_april_2020/?wpdmdl=29081

*Considering lines opened 03 times or more during the quarter

^ Data till Dec'19

Elements Opened to Control Overloading

- Total 23 transmission elements have been opened in last quarter to control overloading of associated elements

| S. No. | Region | Line/ICT Opened at 400 kV level and above | Reason |
|--------|----------|---|--|
| 1. | Northern | 400 KV Ajmer(RS)-Deedwana (MTS) (RS) line | To control loading of 765/400 kV Phagi ICTs |
| 2. | | 400 KV Bassi (PG)-Phagi(RS) (PG) line | |
| 3. | | 400 KV Phagi-Heerapura (RS) line | |
| 4. | | 400 KV Bassi-Sikar (PG) line | |
| 5. | | 400 KV Jaipur South-Kota (PG) line | To control loading of 400 kV Anta-Kota line |
| 6. | | 400 KV Kota(PG)-Merta(rs) (pg) line | |
| 7. | | 765 KV Kanpur_GIS-Aligarh (PG) Ckt-1 | To control loading of 765 kV Aligarh- G.Noida line |
| 8. | | 400/220 kV 315 MVA ICT 1 at Wangto_GIS (HP) | To control over loading in 220 kV network. |

Elements Opened to Control Overloading

| S. No. | Region | Line/ICT Opened at 400 kV level and above | Reason |
|--------|----------|---|---|
| 9. | Western | 400/220 kV Pune (PG) one ICT | To control loading in 220 kV Pune (PG) –Talegaon D/C lines |
| 10. | | 400/220 kV one ICT at Boisar PG | To control loading on 220kV Boisar-Boisar T/C lines |
| 11. | | 400 kV Asoj-Kosamba line | To control loading of 400kV SSP-Asoj line |
| 12. | Southern | 400 kV Talaguppa Nelamangala S/C | To control loading of 220 kV Sharavathi - Talaguppa circuits during high generation at Sharavathy |
| 13. | | 400 kV Hindupur Uravakonda D/C | To control the loading of 400 kV NP Kunta Kolar S/C |

Important Grid Elements under Long Outage



| S.No. | Line | Voltage (in kV) | Owner | Outage Date | Revival Date | Impact on Grid and System Operation during 4 th Quarter of 2019-20 |
|-------|--|-----------------|-------------|----------------------|--------------|---|
| 1 | Kishanganj-Patna D/C | 400 | POWERGRID | 01-09-18 | 22-01-20 | Non-availability of line affects the generation evacuation from hydro plants in Sikkim and Bhutan. Presently, the line is restored with ERS tower. |
| 2 | Barh-Motihari D/C and Motihari – Gorakhpur D/C | 400 | DMTCL | 04-09-19 | Still out | 400 kV Barh-Motihari D/C and Barh-Gorakhpur D/C were bypassed at LILO Point near Motihari and charged as 400 kV Barh-Gorakhpur D/C on 05.02.2020 and 31-01-20 using ERS. High voltage issues in charging of lines due to high long length (approx. 360 Kms) Currently, only 400 kV Barh – Motihari – II is in service being the only 400 KV source of power at Motihari. |
| 3 | Jaisalmer_2-Barmer Ckt-1 & 2 | 400 | RRVPL | 11-05-19 | Still out | 02 towers collapsed on 11.05.2019 and 04 towers collapsed on 16.05.2019 |
| 4 | Anpara_C -Unnao | 765 | UPPTCL | 12-03-20 | 31-03-20 | Tower collapsed at location no. 218 in line |
| 5 | SINGHAJI-PITAMPUR-I & II | 400 | MPPTCL | 02-06-19 26-02-20 | Still out | Affects reliability of Singhaji Stage-1,2 generation |
| 6 | 400KV-SSP-DHULE-MS-1 & 2 | 400 | Maharashtra | 13-02-20 | 24-02-20 | Affected reliability of SSP Generation |

Important Grid Elements under Construction

| S. No. | Name of element | Agency | Remarks |
|--------|---|-----------|---|
| 1 | 765kV Anpara D- Unnao | UPPTCL | Scheduled Commissioning: Jan 2012. Would reduce loading of 400 kV Anpara-Sarnath D/C, Anpara-Mau, and Anpara-Obra lines. |
| 2 | 765kV Bara -Mainpuri ckt-1 and 2 nd 765/400 kV ICT at Mainpuri | SEUPPTCL | Scheduled Commissioning: Jun 2017. Would strengthen the evacuation of Bara TPS generation in case of N-1 contingency of 765kV Bara-Mainpuri ckt-2. |
| 3 | 400kV Mahindergarh-Bhiwani # 3 & 4 | POWERGRID | Scheduled Commissioning: Aug 2018. N-1-1 contingency of 400kV Mahindergarh-Dhanonda D/C would overload the existing 400kV Mahindergarh-Bhiwani D/C beyond their thermal limit (during high power order on HVDC Mundra-Mahindergarh). This may result in less import from WR via Mundra-Mahendragarh HVDC bipole. |
| 4 | 400/220 kV 500MVA ICT-3 at Rajpura | PSTCL | Would address the N-1 non-compliance at Rajpura ICTs during paddy season. |
| 5 | Addition of a 3 rd 500 MVA ICT at Maithon | POWERGRID | Would ensure reliable supply to Kalyaneswari, Dhanbad etc. |
| 6 | 400 kV Rajarhat-Purnea with one ckt LILO at Farakka and other at Gokarno | POWERGRID | Timely commissioning of with LILO at Farakka and Gokarno would improve the fault level/voltage stiffness at Jeerat / Subhashgram, as well as relieve the loading of 400 kV Malda-N. Purnea D/C line during the lean hydro period. |

Important Grid Elements under Construction

| S. No. | Name of Element | Agency | Remarks |
|--------|--|--------------------------|---|
| 7 | 3rd 315 MVA 400/132 kV ICT at Motihari | POWERGRID | Commissioning would address N-1 of existing 2X200 MVA ICTs at Motihari |
| 8 | 400kV Lonikhand-Karad LILO at Jejuri & commissioning of Hinjewadi | MSETCL | Immediate actions are required to strengthen the infeed to Jejuri. Commissioning of these on priority basis would help in improving the voltage profile of Jejuri, Lonikhand and Pune area. |
| 9 | 765kV Tamnar-Dharamjaygarh D/C | GTTPL | Would improve the reliability of power evacuation from JPL Stg-2 (4x600MW) & TRN (2x300MW) generation (Total 3000 MW generation). Presently being managed with SPS. |
| 10 | 400kV Padghe PG-Kharghar, 400kV Padghe PG-Ghatkopar line along with Ghatkopar S/s | Through TCB route/MSETCL | Commissioning of this network would relieve the constraints in Mumbai system. |
| 11 | 400/220kV Xeldem Substation, 400kV Mapusa-Xeldem D/c line & 400kV Narendra-Narendra one ckt LILO at Xeldem along with downstream network at Xeldem | GTTPL | Required for reliable supply to Goa system. Presently infeed from Karnataka system (Ambewadi-Xeldem & Ambewadi-Ponda) is out since Jun'19. |
| 12 | 315 MVA, 400/220 kV Chakan 3 rd ICT at Chakan | MSETCL | To address N-1 of 2 X 315 MVA 400/220 kV Chakan ICTs |

Important Grid Elements under Construction

| S. No. | Name of Element | Agency | Remarks |
|--------|--|-----------|--|
| 13 | 3rd 500 MVA, 400/220kV ICT at Morena | CWRTL | To address N-1 of 2x315 MVA Morena CWRTL ICTs |
| 14 | 3rd 500 MVA, 400/220kV ICT at Wardha-PG, Jabalpur-PG | POWERGRID | To address N-1 of 2x315MVA ICTs at Wardha-PG and Jabalpur-PG |
| 15 | 3rd 500 MVA, 400/220kV ICT at Itarsi S/s | MPPTCL | To address N-1 of 315MVA+ 500MVA 400/220kV Itarsi ICTs |
| 16 | 3rd 500 MVA, 400/220 kV ICT at Maradam | AP | To address N-1 of 2x315 MVA Maradam ICTs |
| 17 | 4th 500 MVA, 400/220 kV ICT at Nellore | AP | To address N-1 of 3x315 MVA Nellore ICTs |
| 18 | 400/220 kV Kadakola S/s | KPTCL | To address N-1 of 2X315+1X500 MVA ICTs at Mysore |
| 19 | 400/200 kV Arasapadavu S/s | KPTCL | To address N-1 of 2X315+1X500 MVA ICTs at UPCL |

Important Grid Elements under Construction

| S. No. | Name of Element | Agency | Remarks |
|--------|--|---------------|--|
| 20 | 400 kV Kozhikode Trichur D/C | KSEB | Scheduled Commissioning: Mar-2020. Would enhance import of S3 |
| 21 | 400 kV Ariyalur-NNTPP D/C line | TANTRANSOCO | Scheduled Commissioning: Feb 2020. Would relieve constraint in evacuation of NNTPP Generation |
| 22 | New 132 kV Loktak- Ningthoukhong D/C | MSPCL | Would enhance transfer capability of Manipur Power System |
| 23 | 132 kV AGTCCPP - P. K. Bari D/C | Sterlite Grid | Would enhance reliability of Tripura Power System |
| 24 | 132 kV Monarchak – Surjamaninagar D/C | TSECL | Would enhance reliable evacuation of Monarchak Power Station |
| 25 | 400 kV Silchar – Misa D/C | Sterlite Grid | Would enhance reliability and transfer capability of NER power system |
| 26 | 132 kV Imphal (PG) – Imphal IV lines | MSPCL | Would enhance transfer capability of Manipur Power System |
| 27 | 400 kV Surajmaninagar – P. K. Bari D/C | Sterlite Grid | Would enhance transfer capability of Tripura Power System |

Important Aspects for Future Transmission Planning

- All India Studies considering different scenarios for Renewable Generation evacuation planning
- Planning for Reactive Power Management on all India level
- Planning Synchronous Condensers near RE pooling stations (utilization of decommissioned plants as synchronous condensers)
- Adequate Short Circuit Ratio at RE Interconnection point to be ensured
- N-1 of ICTs at RE pooling stations



Thank You !!

Inputs on development of ISTS for smooth flow of electricity

1. Transmission Plan by 2022
2. Outlook by 2025
3. Connectivity / LTA

After the reconstitution of NCT vide MoP order no 15/3/2017-Trans dated 04-11-19, total 5 nos. meetings of Regional Power Committees – Transmission Planning (RPCTP) held in various regions

| Sl. No | Region | Meetings | Date |
|--------|--------------|-------------------------|------------|
| 1 | NER | 1 st NERPCTP | 08-11-2019 |
| 2 | SR | 1 st SRPCTP | 16-12-2019 |
| 3 | WR | 1 st WRPCTP | 11-01-2020 |
| 4 | NR | 1 st NRPCTP | 24-01-2020 |
| 5 | ER | 1 st ERPCTP | 14-02-2020 |
| | Total | 5 nos. | |

Demand Peak till date vs EPS 2021-22

The regionwise distribution of present peak demand and projected demand of 2021-22 as per 19th EPS is as below:

| | Peak Demand (GW) | |
|-----------|-------------------|------------------------------|
| | Present Till date | 19 th EPS 2021-22 |
| NR | 66.6 | 73.4 |
| WR | 59.4 | 71.0 |
| SR | 53.8 | 63.0 |
| ER | 23.4 | 28.0 |
| NER | 3.0 | 4.5 |
| All India | 183.8 | 225.8 |

Installed Capacity and Peak demand: 2021-22

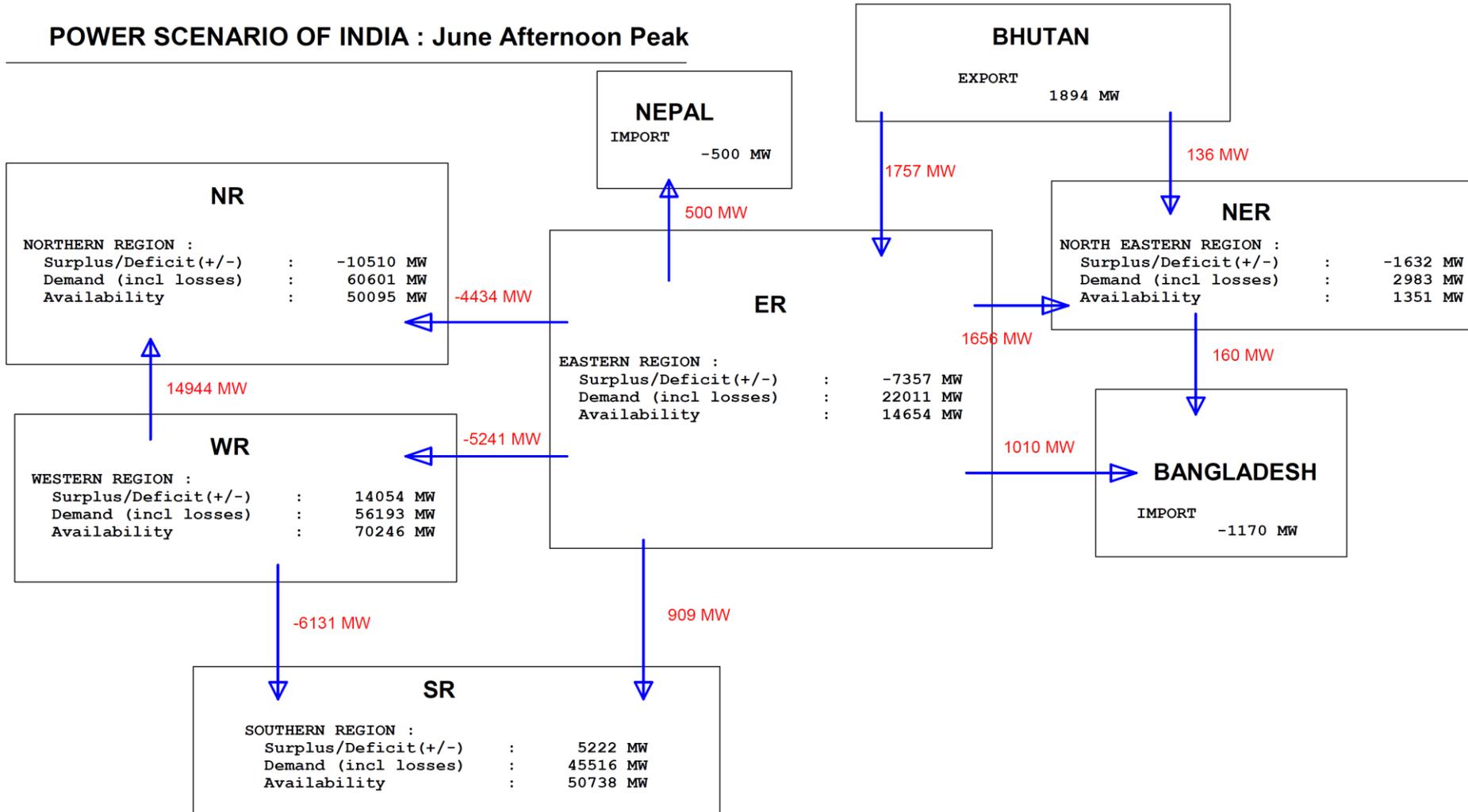
All figures are in MW

| Installed Capacity | | | | | | | Peak Demand |
|--------------------|---------------|--------------|--------------|---------------|---------------|---------------|---------------|
| Regions | Thermal | Hydro | Nuclear | Total Conv | Renewable | Total | |
| Northern | 54241 | 22955 | 3020 | 80216 | 45166 | 125382 | 73770 |
| Western | 97484 | 7392 | 3240 | 108116 | 54329 | 162445 | 71020 |
| Southern | 50232 | 12769 | 3820 | 66821 | 60708 | 127529 | 62975 |
| Eastern | 39326 | 6133 | 0 | 45459 | 12582 | 58041 | 28046 |
| North Eastern | 2593 | 2052 | 0 | 4645 | 1565 | 6210 | 4499 |
| ALL INDIA | 243876 | 51301 | 10080 | 305257 | 174350 | 479607 | 225751 |

Source: NEP Vol. II Trans, Jan 2019

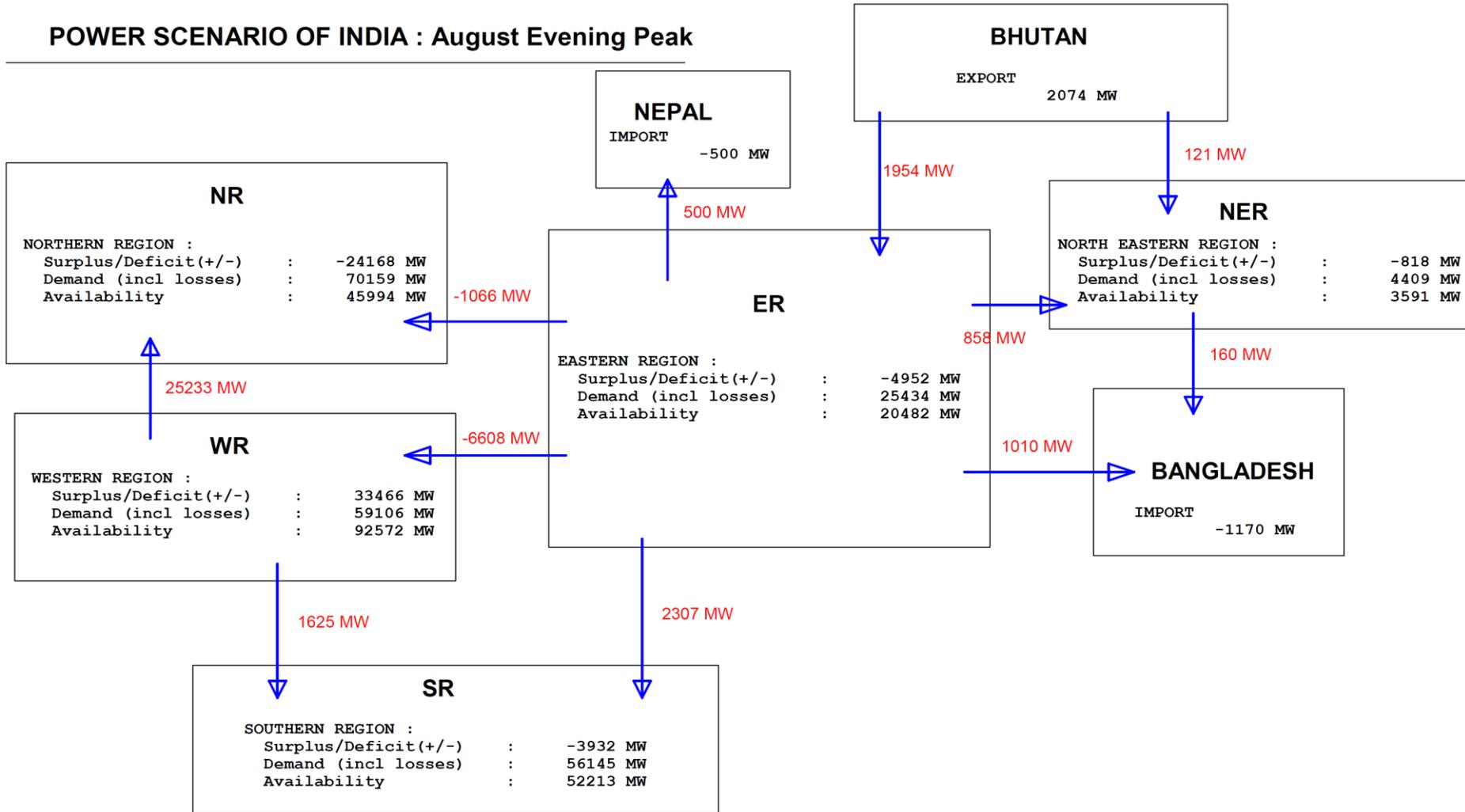
Inter Regional Power Flow: Jun'22 Afternoon Peak

POWER SCENARIO OF INDIA : June Afternoon Peak



Inter Regional Power Flow: Aug'22 Evening Peak

POWER SCENARIO OF INDIA : August Evening Peak



All India Inter Regional Capacity

| | | |
|---|---|----------------------|
| IR Capacity by the end of FY 2018-19 | | 94850 MW |
| IR links Addition in 2019-20 | | |
| Sl. No | Name of the link | Capacity (MW) |
| 1 | Jharsuguda - Raipur PS 765kV D/c line - Apr'19 | 4200 |
| 2 | Champa Kurukshetra HVDC Pole III (1500MW)-Oct'19 | 1500 |
| 3 | Champa Kurukshetra HVDC Pole IV (1500MW)-Mar'20 | 1500 |
| Total addition | | 7200 |
| IR Capacity by the end of 31.03.2020 | | 102050 MW |
| IR links Addition in 2020-22 | | |
| Sl. No | Name of the link | Capacity (MW) |
| 1 | Vindhyachal - Varanasi 765kV D/c | 4200 |
| 2 | Warora Pool - Warangal (New) 765kV D/c | 4200 |
| 3 | Raigarh - Pugulur \pm 800kV HVDC Bipole | 6000 |
| 4 | LILO of Narendra - Narendra (New) 400kV (Quad) line at Xeldam (Goa) | 1600 |
| Total addition | | 16000 |
| IR Capacity by the end of 2021-22 | | 118050 MW |

Available Transfer Capability (ATC) Of WR-NR Corridor



Present → 19500MW

6 No. high Capacity corridors

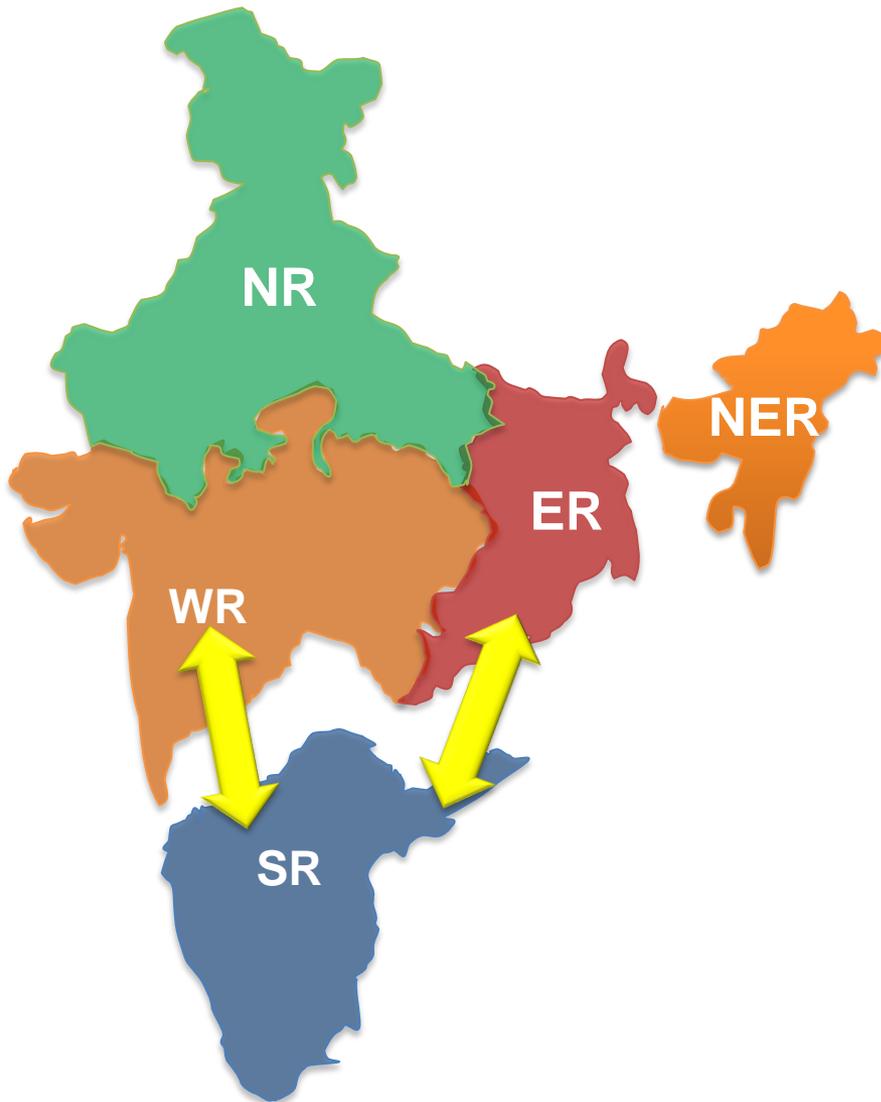
- 6000MW, \pm 800kV, Champa – Kurukshetra HVDC Bipole
- Gwalior-Agra 765kV 2xS/c
- Gwalior-Jaipur 765kV 2xS/c
- Jabalpur-Orai 765kV D/c
- 2500MW, \pm 500kV Mundra – Mahendergarh HVDC
- Banaskantha-Chittorgarh 765kV D/c

By 2022 → 22000MW

Addition of 1 corridor

- Vindhyachal-Varanasi 765kV D/c

Available Transfer Capability (ATC) Of NEW-SR Corridor



Present → 11500MW

7 No. high Capacity corridors

- 2500MW, ± 500 kV Talcher-Kolar HVDC
- Raichur-Sholapur 765kV 2xS/c
- Narendra-Kolhapur 765kV D/c (operated at 400kV)
- Wardha-Nizamabad 765kV D/c
- Angul-Srikakulam 765kV D/c
- 1000MW Jeypore Back to back HVDC
- 1000MW Chandrapur Back to back HVDC

By 2022 → 20700MW

Addition of 2 corridors

- Warora Pool-Warangal 765kV D/c
- 6000MW, ± 800 kV, Raigarh-Pugulur HVDC Bipole

Transmission System for 66.5 GW RE Zones (REZ)

- ❖ Comprehensive transmission scheme evolved - Est. cost of Rs. 41,688 Cr.

| Region (State)/ Phase wise Planned Capacity | Phase-I (12.4 GW) (NR & WR) | Phase-II (26.1 GW) (NR, WR & SR) | Phase-III (28 GW) (WR&SR) | Total (66.5 GW) |
|--|-----------------------------------|--|---------------------------------|-----------------------|
| WR (Gujarat, Maharashtra, Madhya Pradesh) | 3.5 | 4.5 | 20 [@] | 28.0 |
| NR (Rajasthan) | 8.9 | 11.1* | - | 20.0 |
| SR (Tamil Nadu, Andhra Pradesh, Karnataka) | - | 10.5 | 8 | 18.5 |
| Phasewise Cost Estimate (in Rs cr.) | 10,907 | 18,367 | 12,414 | 41,688 |
| Expected Commissioning Schedule | Dec'20/ Mar'21 | Dec'21 | Oct'22/ Dec'22 | |

* Out of 11.1 GW, transmission for 3 GW is under the scope of RVPNL

@ Out of 20 GW, transmission for 1 GW is under the scope of MSETCL

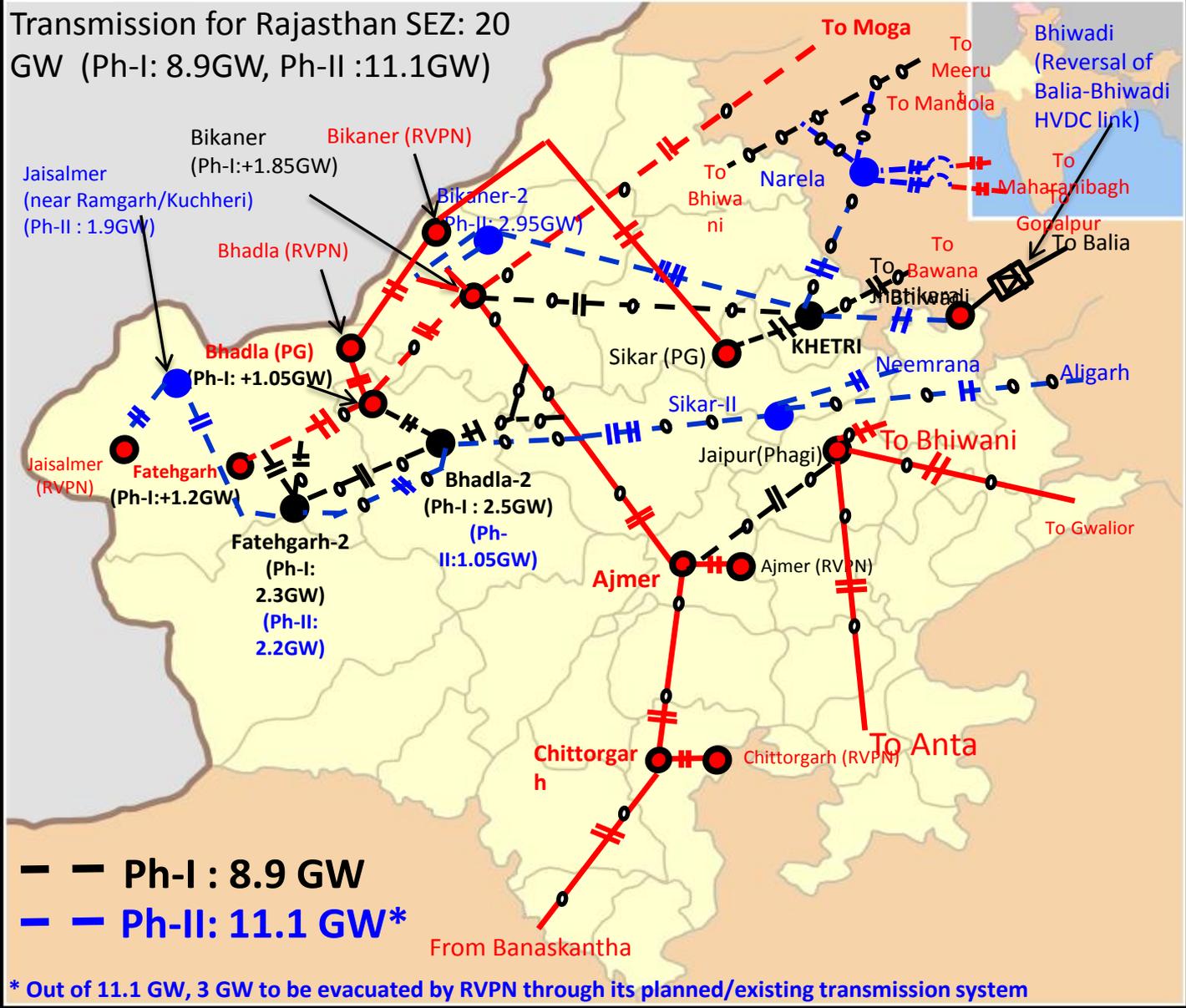
Composition of 66.5 GW RE Zones (REZ)

| State | Phase-I | | Phase-II | | Phase-III | | Total | |
|----------------|-------------|------------|-------------|-------------|----------------|-------------|-------------|-----------|
| | Wind | Solar | Wind | Solar | Wind | Solar | Wind | Solar |
| Gujarat | 3.5 | | 2 | | 0.5 | 10 | 6 | 10 |
| Maharashtra | | | | | 2 [#] | 5 | 2 | 5 |
| Madhya Pradesh | | | | 2.5 | | 2.5 | | 5 |
| WR | 3.5 | | 2 | 2.5 | 2.5 | 17.5 | 8 | 20 |
| Rajasthan | | 8.9 | | 11.1* | | | | 20 |
| NR | | 8.9 | | 11.1 | | | | 20 |
| Karnataka | | | 2.5 | 5 | | | 2.5 | 5 |
| Andhra Pradesh | | | 2.5 | | 0.5 | 5 | 3 | 5 |
| Tamil Nadu | | | 0.5 | | 2.5 | | 3 | |
| SR | | | 5.5 | 5 | 3 | 5 | 8.5 | 10 |
| Total | 3.5 | 8.9 | 7.5 | 18.6 | 5.5 | 22.5 | 16.5 | 50 |
| | 12.4 | | 26.1 | | 28 | | 66.5 | |

* Out of 11.1 GW, transmission for 3 GW is under the scope of RVPNL

Out of 20 GW, transmission for 1 GW is under the scope of MSETCL

RAJASTHAN – RENEWABLE ENERGY ZONES



GUJARAT- RENEWABLE ENERGY ZONES



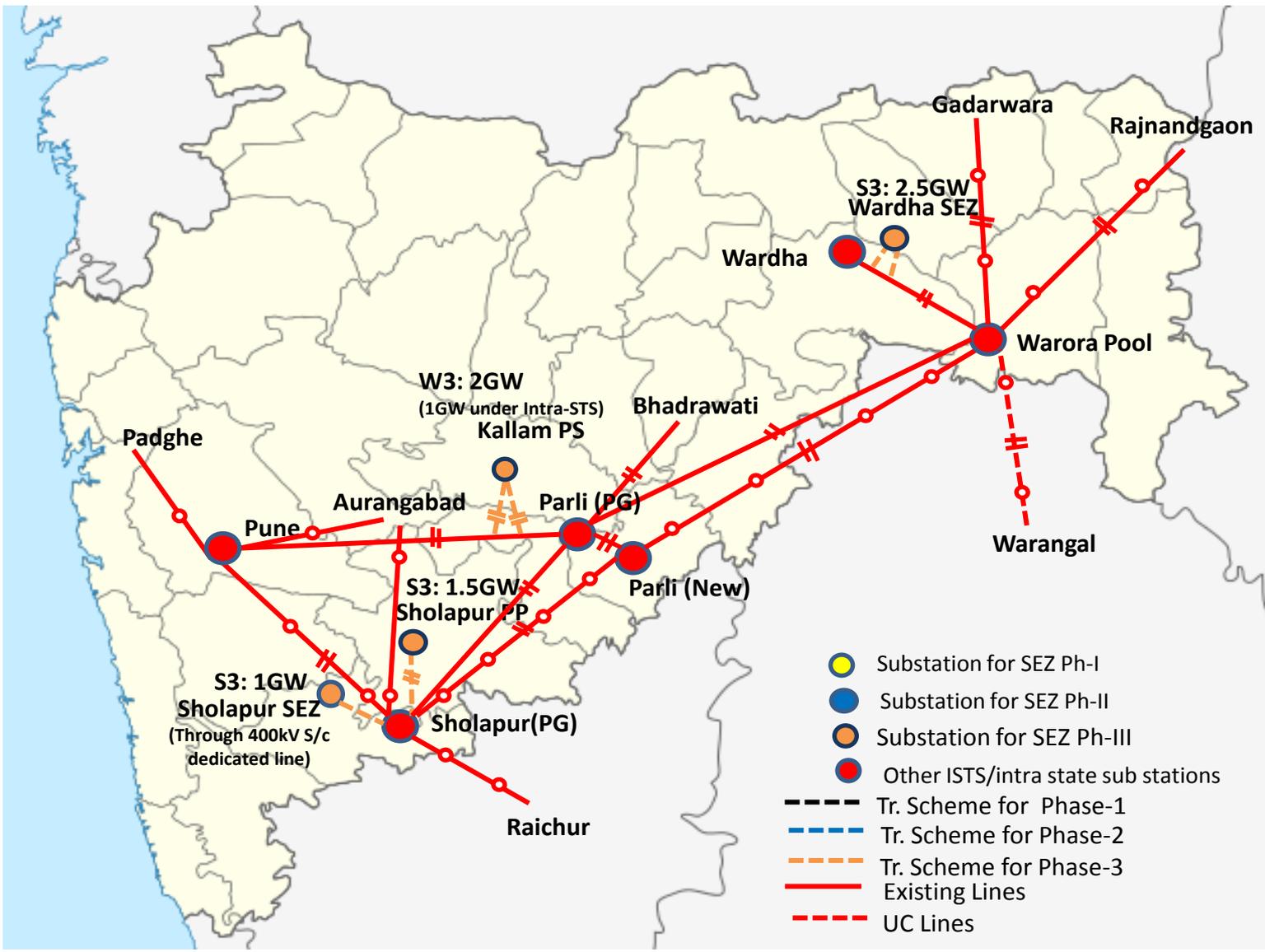
--- 400kV line
 ○-○ 765kV line

- Tr. Scheme for Khavda Phase-1
- Tr. Scheme for Khavda Phase-2
- Tr. Scheme for Dholera UMSP
- REZ Tr. Scheme Under Implementation
- Green Energy Corridor
- Existing/Other ISTS/Intra-ISTS
- UC System (Other)

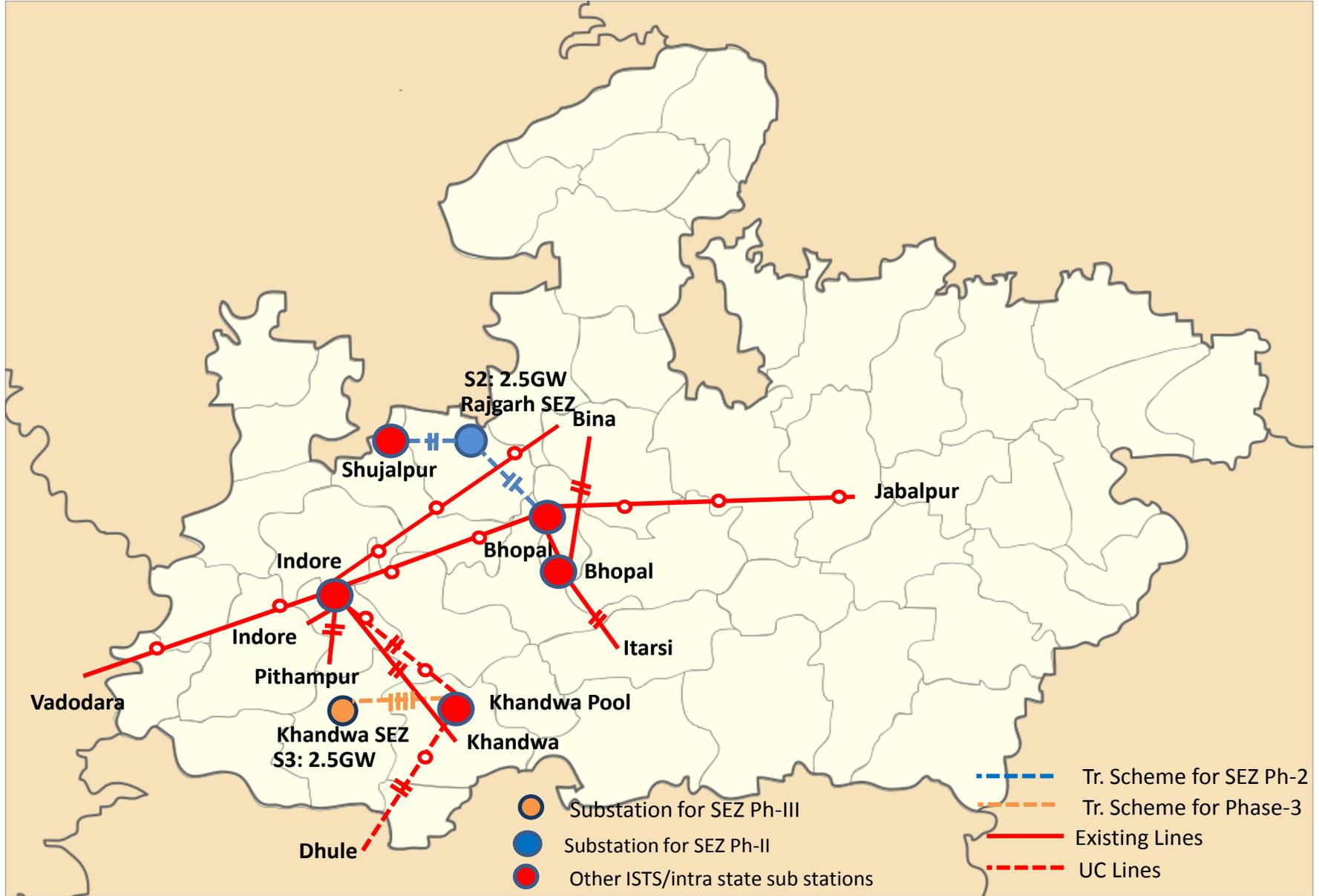
- Proposed Substation for Khavda SEZ (Ph-I/Ph-II)
- Pooling Station for Dholera UMSP
- Substation for REZ Under Implementation
- Substation for Green Energy Corridor
- Other ISTS/intra state sub stations



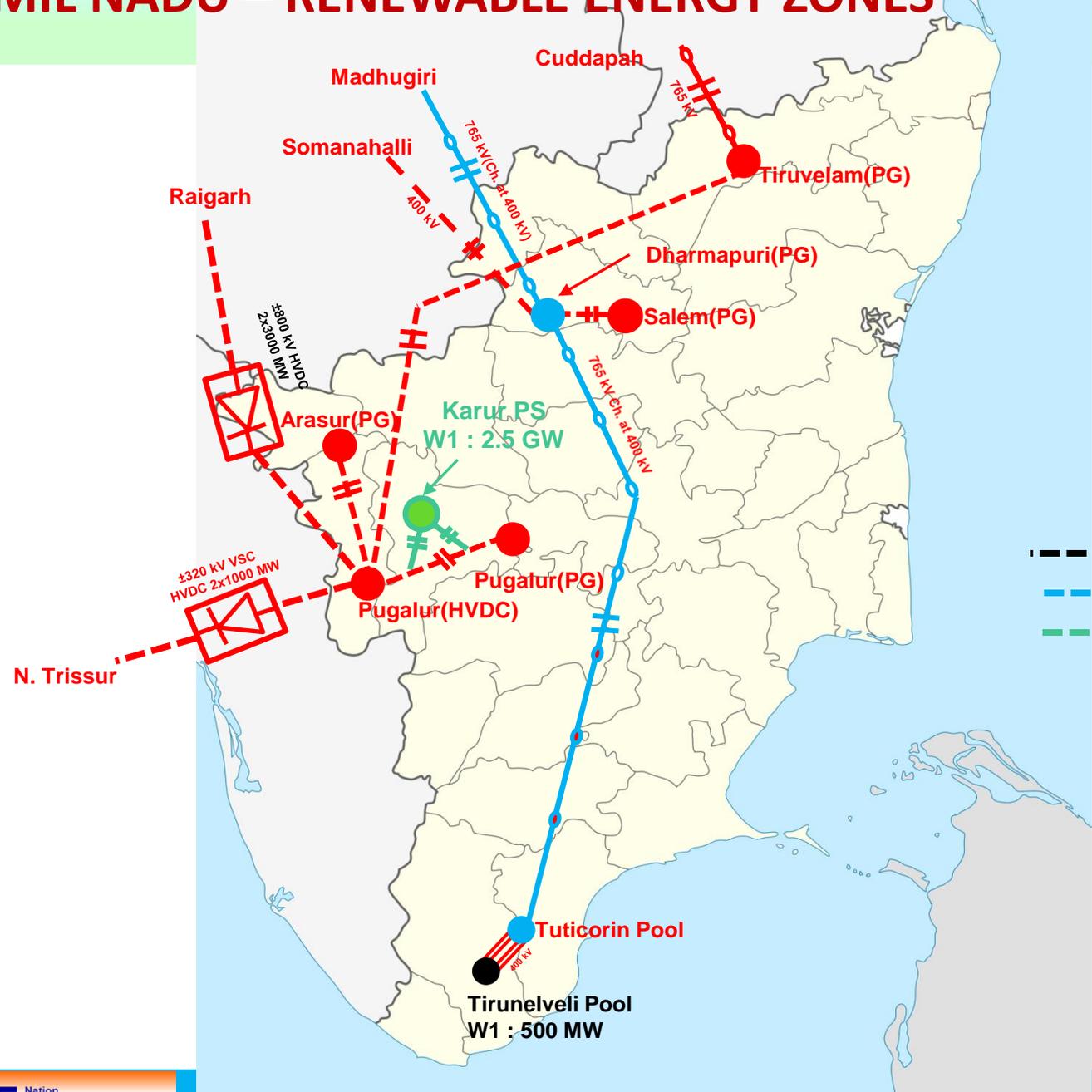
MAHARASHTRA – RENEWABLE ENERGY ZONES



MADHYA PRADESH – RENEWABLE ENERGY ZONES

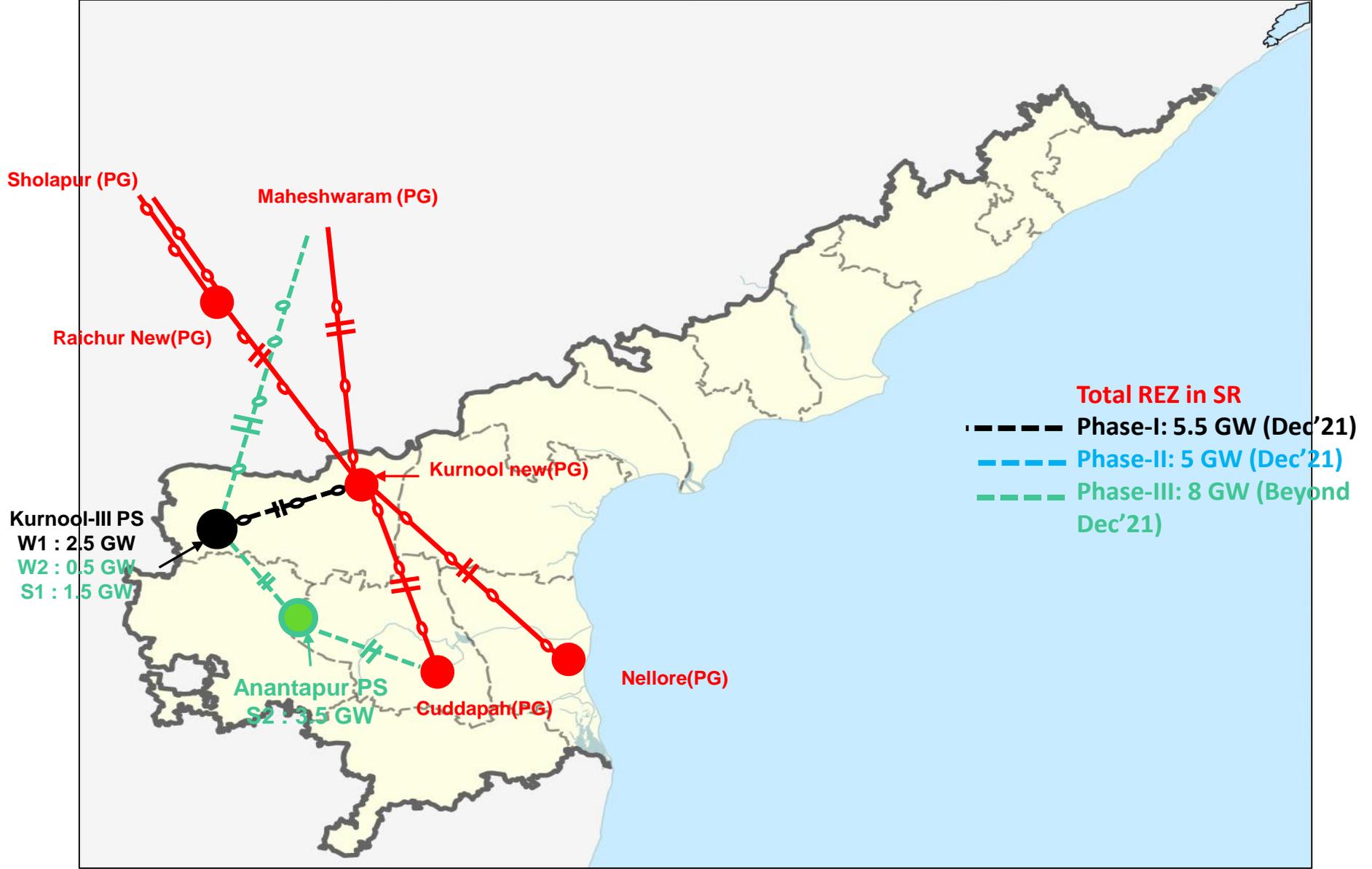


TAMIL NADU – RENEWABLE ENERGY ZONES

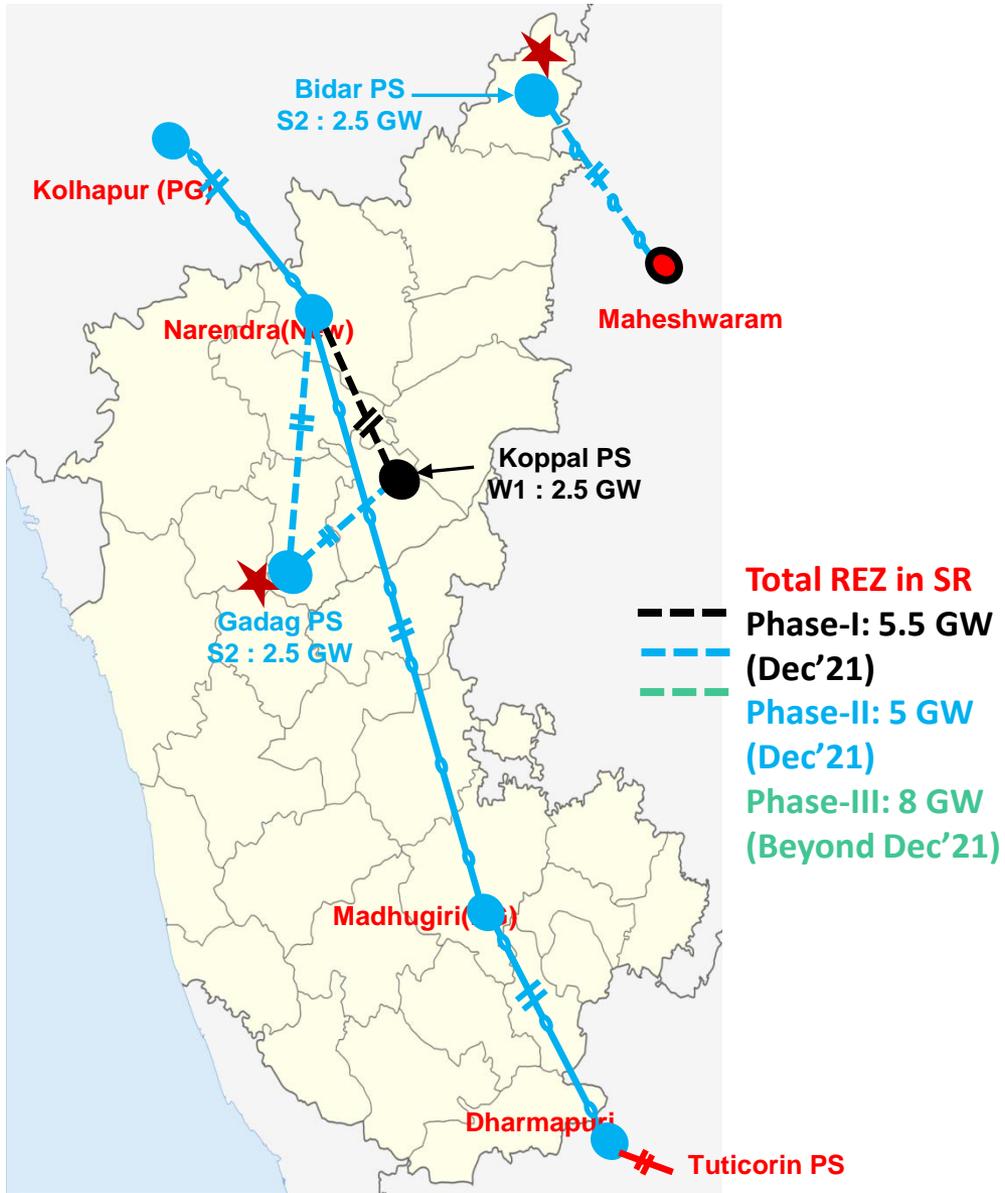


- Total REZ in SR**
- - - Phase-I: 5.5 GW (Dec'21)
 - - - Phase-II: 5 GW (Dec'21)
 - - - Phase-III: 8 GW (Beyond Dec'21)

ANDHRA PRADESH – RENEWABLE ENERGY ZONES



KARNATAKA – RENEWABLE ENERGY ZONES



Implementation status for TS for 66.5 GW RE Zones (REZ)

| Project Status | Phase-I (12.4 GW) (NR & WR) | Phase-II (26.1 GW) (NR, WR&SR) | Phase-III (28 GW) (WR&SR) |
|------------------------------|-----------------------------------|--|--|
| NCT Approval | Approved | Approved | Approval for revised system for Khavda REZ (10GW) system pending* |
| MoP Order | Approved | Approved | Approved except Gujarat REZ (10GW) shifted to Khavda area* and REZs in Wardha (2.5), Solapur(1.5) & Khandwa(2.5)^ |
| Regulatory Approval | Obtained | Awaited for SR | Awaited for SR. For WR, RPC to be held. After that, Submission of revised petition for Khavda REZ |
| Implementation Status | Under implementation | WR under implementation/tendering (except Lakadia^) SR & NR-Under tendering | Under tendering (except Gujarat REZ (10GW) shifted to Khavda area* and REZs in Wardha (2.5), Solapur(1.5) & Khandwa(2.5)^) |

^Deferred due to land issues as per decision in meeting held on 10.12.2019 chaired by Secretary, MoP

* MNRE vide letter dtd. 20/12/19, informed that no land is being given by Gujarat govt. for projects beyond SECI Tranche-IV in area other than Khavda; hence 10GW out of 10.5GW REZs in Gujarat under Phase-III have been shifted to Khavda area and revised system has been planned and approved in 1st WRPC (TP) meeting held on 11.01.2020

Addressing Operational Issues

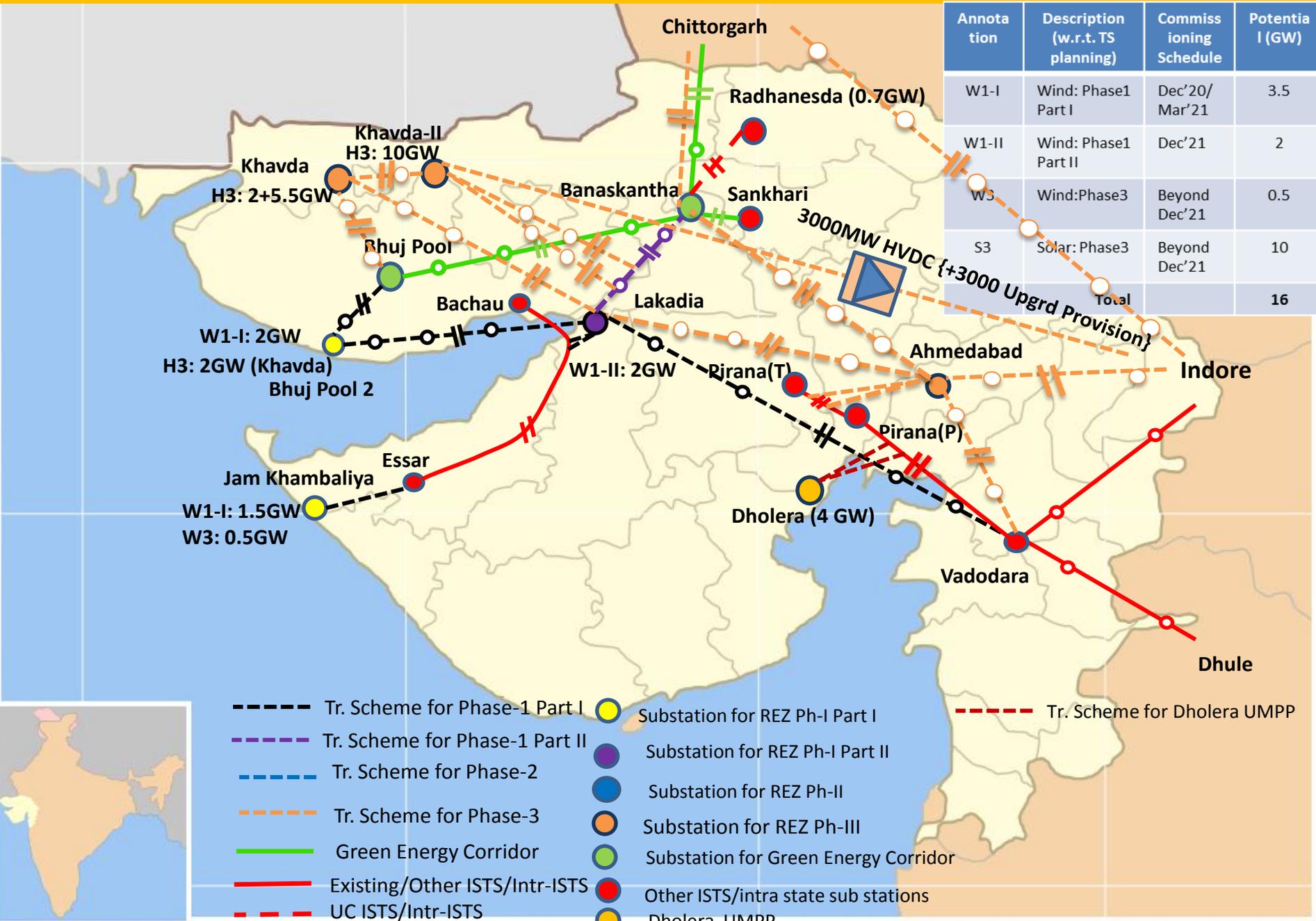
| | NR | WR | SR | ER/NER |
|---|---|--|---|---|
| ICT / Bay Augmentation | <ul style="list-style-type: none"> - 500 MVA, 400/220 kV (4th) ICT at Amritsar - 2 Nos. 220 kV line bays at Saharanpur - 2 Nos. 400 kV Hybrid/GIS Line bays at Varanasi - 1 no. 220kV bay at Shahjahanpur | <ul style="list-style-type: none"> -500MVA 400/220kV ICT each at Morena, Wardha, Seoni | | <ul style="list-style-type: none"> -500MVA 400/220kV 4th ICT at Muzaffarpur -100MVA, 220/132kV at Salakati - Conversion of Nirjuli and Imphal S/s from AIS to GIS |
| Reactor | | <ul style="list-style-type: none"> -Conversion of 80 MVAR fixed line reactor to switchable at Boisar -Conversion of 50MVAR fixed line reactor to switchable at Bina (PG) | <ul style="list-style-type: none"> -Shifting of 125 MVAR and 80 MVAR line reactors at Nellore (PG) | <ul style="list-style-type: none"> -2 no 63 MVAR switchable line reactor at Imphal |
| Reconducting with terminal bay upgradation | | <ul style="list-style-type: none"> -Pirana (PG) – Pirana (T) 400kV D/c line – 12ckm | | <ul style="list-style-type: none"> -Siliguri - Bongaigaon 400kV D/c line- 436ckm -Alipurduar - Salakati 220kV D/c line-202ckm -BTPS - Salakati line 220kV D/c line- 6ckm -Dimapur - Imphal 132kV S/c line- 169ckm -Loktak - Jiribam 132kV S/c line-82ckm |
| Series bus reactor | | | <ul style="list-style-type: none"> 2 nos. 12Ω, 420 kV fault limiting bus series reactors at Thiruvalem | |
| Bypassing Arrangement | <ul style="list-style-type: none"> -Rearrangement of feeders at Moga (PG) | | <ul style="list-style-type: none"> - Bypassing of feeders at Nellore (PG) & Thiruvalem | <ul style="list-style-type: none"> - Bypassing of feeders outside Farakka switchyard alongwith bay upgradation |
| Estimated Cost (Rs) | 119 Cr | 173 Cr | 92 Cr | 882 Cr |
| Completion Schedule | Progressively by Dec '21 | Progressively by Dec '22 | Progressively by Apr '21 | Progressively by Mar'23 |

Renewable Potential from 2022 to 2025

| State | District | Taluk/Tehsil/Village | Additional Capacity by 2024 (in GW) | Tentative Cost (in Rs Cr) |
|----------------|----------------------------|--|-------------------------------------|---------------------------|
| NR | | | 27.5 | 33000 |
| Rajasthan | Jaisalmer | Jaisalmer | 5 | 4700 |
| | | Fatehgarh | 5 | 4350 |
| | Bikaner | Kolayat/Poogal/Khajuwala | 10 | 8950 |
| Ladakh | | Areas identified in SECI tender for 7.5GW solar only | 7.5 | 15000 |
| WR | | | 23 | 25280 |
| Gujarat | Kutchh | Khavda | 20 | 25130 |
| Chhattisgarh | Rajnandgaon | Dondargarh/Khairagarh | 1 | 50 |
| | Durg | Patan | 2 | 100 |
| SR | | | 12 | 5143 |
| Andhra Pradesh | Anantpur | Ramagiri | 5 | 1553 |
| | Kurnool | Owk | 5 | 2778 |
| Telangana | Nalgonda | Mella Cheruvu | 2 | 812 |
| ER | | | 3 | 620 |
| Jharkhand | Palamu | Bishrampur | 2 | 600 |
| Odisha | Baleshwar (Salt Pan Lands) | | 1 | 20 |
| Total | | | 65.5 | 64043 |

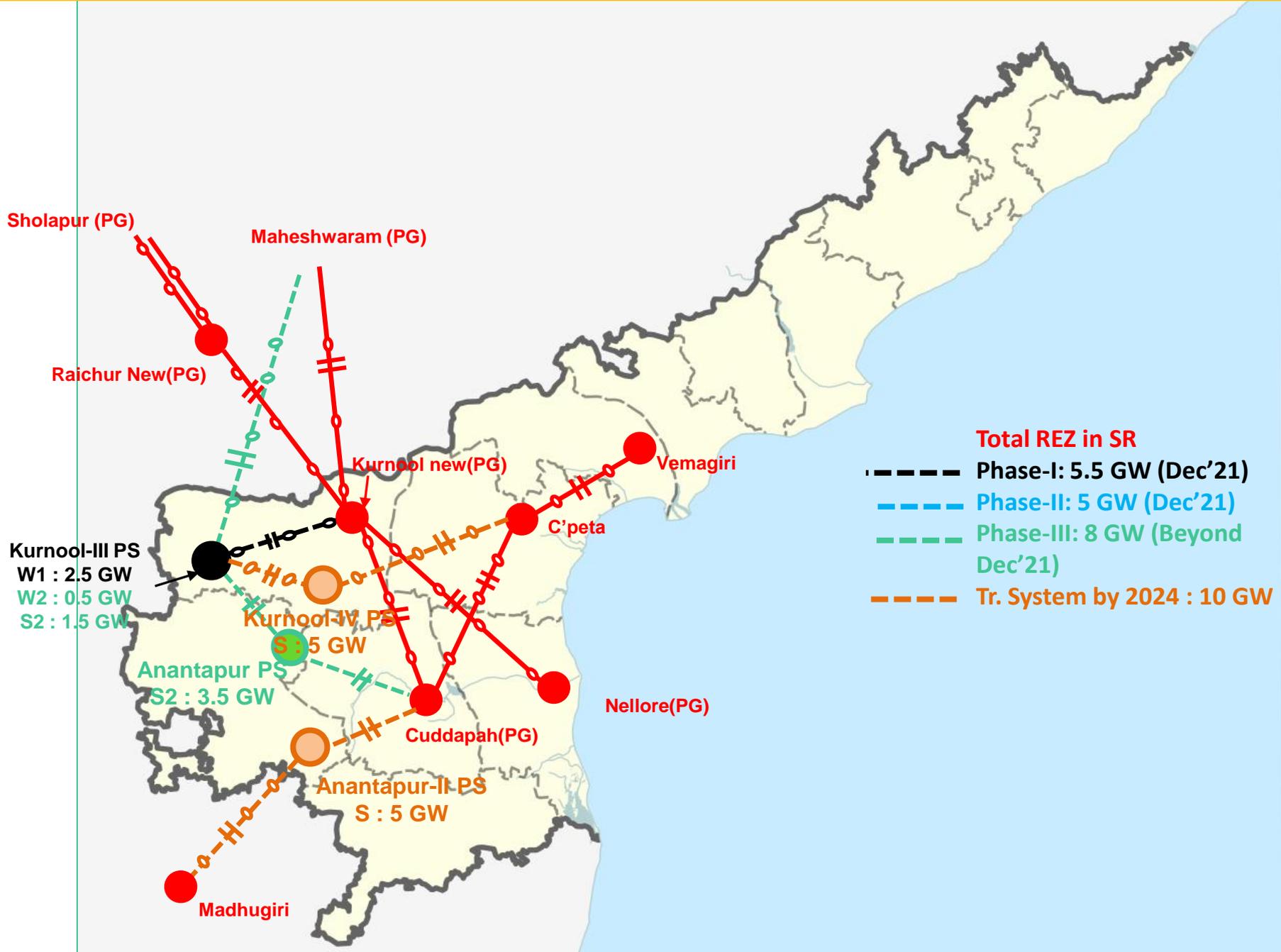
Gujarat - Renewable Energy Zones (2025) – 20GW

| Annotation | Description (w.r.t. TS planning) | Commissioning Schedule | Potential (GW) |
|------------|----------------------------------|------------------------|----------------|
| W1-I | Wind: Phase1 Part I | Dec'20/ Mar'21 | 3.5 |
| W1-II | Wind: Phase1 Part II | Dec'21 | 2 |
| W3 | Wind: Phase3 | Beyond Dec'21 | 0.5 |
| S3 | Solar: Phase3 | Beyond Dec'21 | 10 |
| | Total | | 16 |



- Tr. Scheme for Phase-1 Part I
- Tr. Scheme for Phase-1 Part II
- Tr. Scheme for Phase-2
- Tr. Scheme for Phase-3
- Green Energy Corridor
- Existing/Other ISTS/Intr-ISTS
- UC ISTS/Intr-ISTS
- Substation for REZ Ph-I Part I
- Substation for REZ Ph-I Part II
- Substation for REZ Ph-II
- Substation for REZ Ph-III
- Substation for Green Energy Corridor
- Other ISTS/intra state sub stations
- Dholera UMPP
- Tr. Scheme for Dholera UMPP

Andhra Pradesh - Renewable Energy Zones (2025) – 10GW



Telangana - Renewable Energy Zones (2025) – 2GW



- Total REZ in SR**
- Phase-I: 5.5 GW (Dec'21)
 - Phase-II: 5 GW (Dec'21)
 - Phase-III: 8 GW (Beyond Dec'21)
 - Tr. System by 2024 : 2 GW

Installed Capacity and Peak Demand: 2025

All figures are in MW

| Type | By 2021-22 | Addition during 2022-25 | By 2025 |
|--------------|---------------|-------------------------|---------------|
| Thermal | 243876 | 47337 | 291213 |
| Hydro | 51301 | 7371 | 58672 |
| Nuclear | 10080 | 2900 | 12980 |
| Renewable | 174350 | 65650 | 240000 |
| Total | 479607 | 123258 | 602865 |

| Region | Installed Capacity | | | | | Peak Demand (19 th EPS) |
|--------------|--------------------|--------------|--------------|---------------|---------------|------------------------------------|
| | Thermal | Hydro | Nuclear | Renewable | Total | |
| NR | 70751 | 27466 | 3020 | 72666 | 173903 | 86776 |
| WR | 98626 | 8102 | 3240 | 77329 | 187297 | 84502 |
| SR | 72130 | 13335 | 6720 | 72708 | 164893 | 74666 |
| ER | 47125 | 5892 | 0 | 15582 | 68599 | 32319 |
| NER | 2581 | 3877 | 0 | 1715 | 8173 | 5790 |
| Total | 291213 | 58672 | 12980 | 240000 | 602865 | 266844 |

Anticipated Load Generation Scenario: 2025

All India peak demand August evening peak

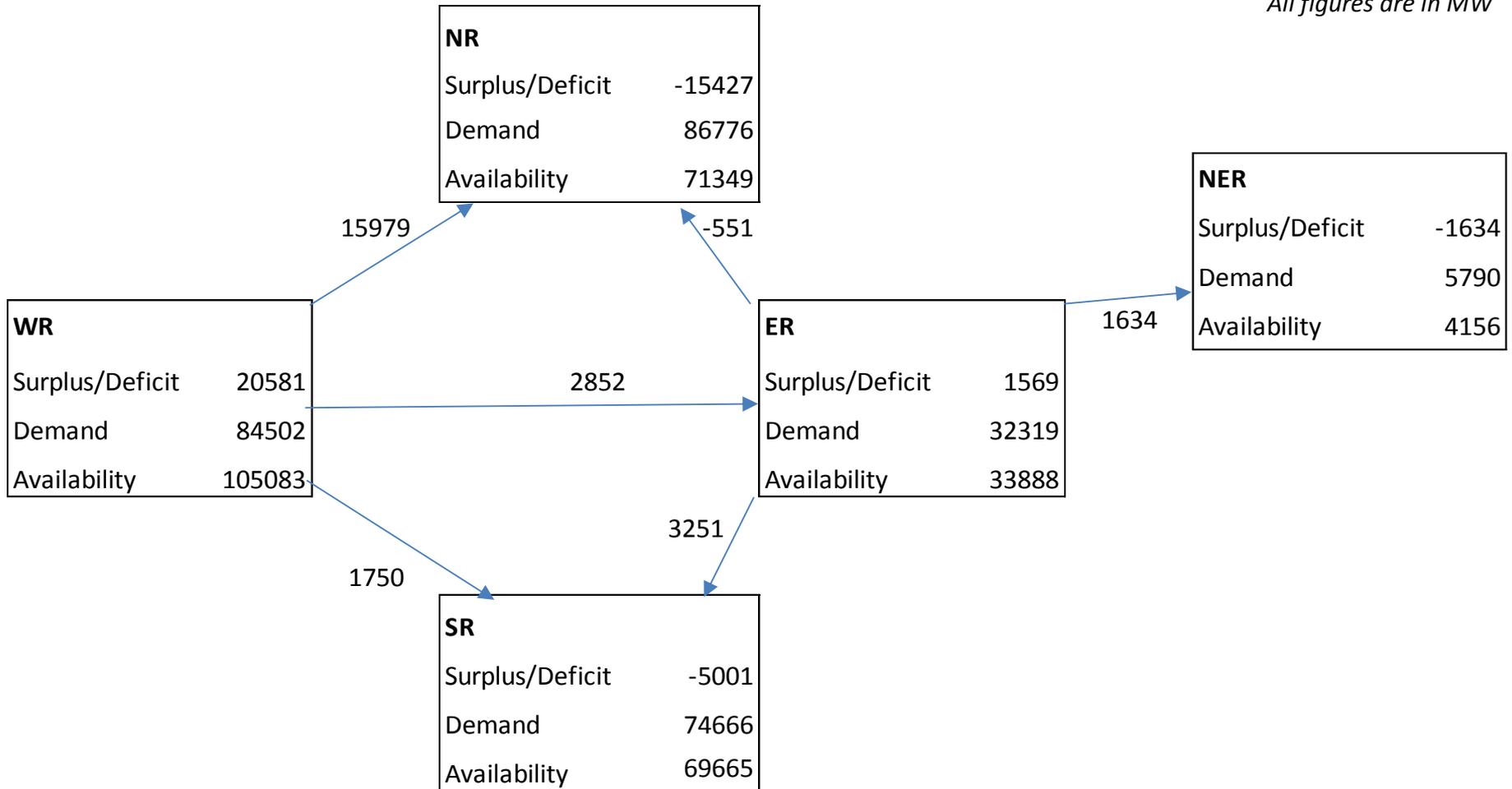
- Despatch from Nuclear generation ~85%; wind generation ~70-75%, hydro generation 70%-95%
- Balance is met through thermal generation in merit order despatch

All figures are in MW

| Availability | Thermal | Hydro | Nuclear | Wind | Total Availability | Demand | Surplus /Deficit |
|--------------|---------------|--------------|--------------|--------------|--------------------|---------------|------------------|
| NR | 35423 | 26092 | 2567 | 7267 | 71349 | 86776 | -15427 |
| WR | 73459 | 5671 | 2754 | 23199 | 105083 | 84502 | 20581 |
| SR | 32806 | 9335 | 5712 | 21812 | 69665 | 74666 | -5001 |
| ER | 27027 | 5303 | 0 | 1558 | 33888 | 32319 | 1569 |
| NER | 495 | 3489 | 0 | 172 | 4156 | 5790 | -1634 |
| Total | 169209 | 49890 | 11033 | 54007 | 284140 | 266844 | 87 |

Inter Regional Power Flow: Aug 2025 Evening Peak

All figures are in MW



Cross Border Interconnections

Cross-Border Interconnections
(400kV and above)



Map not to scale. For representation only.

| Existing interconnections | Present Capacity (MW) | Future Capacity (MW) |
|---------------------------|-----------------------|----------------------|
| India – Bhutan | 2070 | 4290 |
| India – Bangladesh | 1160 | 1160 |
| India – Nepal | 600 | 1000 |
| India – Myanmar | 3 | 3 |
| Total (approx.) | 3830 | 6450 |

Cross border link planned during 2019-20

- Gorakhpur – New Butwal 400kV D/c (Q) line
- Madurai (New) – New Habarana HVDC line with 2x500MW HVDC terminal in two phases
- Katihar - Parbotipur - Bornagar 765kV D/c line

Connectivity/LTA/MTOA granted during 2019-20

| Sl. No. | Applications | Mar'19 | | Addition during 2019-20 | | Mar'20 | |
|---------|---|--------|---------|-------------------------|-----------------------|--------|---------|
| | | No | Quantum | No | Quantum | No | Quantum |
| 1 | LTA granted | 237 | 105123 | 38 (RE-21) | 9614 (RE-6065.5) | 275 | 114737 |
| 2 | MTOA granted | 138 | 14517 | 13 (RE-10) | 1795 (RE-1376.11) | 151 | 16312 |
| 3 | Connectivity granted (including Stage - I & II) | 449 | 186598 | 131 (RE-87) | 42796 (RE-35111.2) | 580 | 229394 |

Thank You !!!