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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

Date: 29.06.19

To

-As per list enclosed-

विषय: पश्चिमी क्षेत्र की ट्रांसमिशन पर स्थायी समिति की 21.05.2019 को हुई दूसरी बैठक की कार्यवृत्ति

Subject: Minutes of the 2nd meeting of Western Region Standing Committee on Transmission (WRSCT) held on 21.05.2019

Sir/ Madam,

The minutes of the 2nd meeting of Western Region Standing Committee on Transmission held on 21.05.2019 at Indore is available on CEA website (www.cea.nic.in) at the following link: <http://cea.nic.in/compsplanningwr.html> i.e. Home page - Wings - Power Systems -PSP&A-1 - Standing Committee on Power System Planning Western Region

Yours faithfully,

(Goutam Roy)

Chief Engineer (PSP&A-I)

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4.	Secretary (Power), UT of Dadra & Nagar Haveli, Secretariat, Amla, Silvassa - 396230	5.	Chief Electrical Engineer, Electricity Department, Government of Goa, Vidyut Bhavan, 3rd Floor, Panaji - 403001 Fax – 0832-2222354	6.	Managing Director, GETCO, Sardar Patel Vidyut Bhawan, Race Course, Vadodara-390007 Fax - 0265-2338164
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10	COO (CTU) POWERGRID, Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001 Fax-0124-2571809				

Nominated STU Members for WRSCT:

11	Shri B B Chauhan, Managing Director, GETCO, Sardar Patel Vidyut Bhawan, Race Course, Vadodara-390007	12	Chief Engineer (Planning & Design), MPPTCL, Block no -2 ,Shakti Bhawan, rampur, Jabalpur – 482008 (M.P)	13	Er. Tripti Sinha, Managing Director, CSPTCL, Dangania, Raipur (CG)-492013
14	Shri Ravindra Chavan Director (Projects), MSETCL, Prakashganga, Plot No.C-19, E-Block, Bandra-Kurla Complex, Bandra (E), Mumbai - 400051	15	Shri Stephen Fernandes, Executive Engineer (IPM), Vidyut Bhavan, 3rd Floor, Panaji, Goa - 403001		

Minutes for 2nd Meeting of Western Region Standing Committee on Transmission

1 Confirmation of the Minutes of the 1st meeting of Western Region Standing Committee on Transmission held on 5th September 2018.

- 1.1. CEA stated that the Minutes of the 1st meeting of Western Region Standing Committee on Transmission held on 05.09.2019 were issued vide CEA letter no.CEA-PS-11-23(19)/1/2018-PSPA-I/I/2390/2018 dated 5th October, 2018.

As no comments have been received from the constituents till date, CEA requested members to confirm the minutes of the 1st meeting of WRSCT.

- 1.2. POSOCO stated that under item 2.1 at page no 5 of the minutes, there is a table indicating the tariff implications of the proposed transmission schemes with no Government grant/upfront payment from developers and with upfront payment of Rs 25 lakh/MW, 35 lakh/MW, 50 lakh/MW from RE generation developers. Just beneath the table, the description of @ symbol used in the table is given as “Generation tariff increase by 14-18 (25 lakh/MW Bid incl.), 21-25 paise/unit (35 lakh/MW Bid incl.) & 32-36 paise/unit (50 lakh/MW Bid incl.)” He stated that this @ symbol should be removed as it is giving the impression that tentative transmission tariff indicated in the table for various options of upfront payment (i.e. Rs 25 lakh/MW, 35 lakh/MW, 50 lakh/MW from RE generation developers) is incremental tariff as compared to the tariff derived in case of no government grant/upfront payment.
- 1.3. CTU clarified that the tentative transmission tariff has been derived after deducting the amount of upfront payment to be received from RE generation developers from the Total Cost of transmission schemes followed by calculation of Annual Transmission charges @18%.
- 1.4. CEA stated that the figures in the table are the tentative transmission tariff in various options (1-4).The note under the table mentions the expected generation tariff increase with inclusion of upfront payments (i.e. Rs 25 lakh/MW, 35 lakh/MW, 50 lakh/MW from RE generation developers)
- 1.5. With above clarification, minutes of the 1st meeting of WRSCT were confirmed.

2. Reviewing the progress of earlier agreed transmission schemes

- 2.1. CEA stated that till date forty-one projects have been awarded through Tariff Based Competitive Bidding out of which twenty-two projects have already been commissioned/ready for commissioning and fifteen projects are under implementation by various Transmission Service Providers. Out of balance four projects, one project has been cancelled by CERC, in one project the TSP has requested for closure and construction of two projects could not start due to litigation. Apart from this, there are three projects which are presently under bidding process costing Rs 1948.8 crores. Further, nine no. of transmission schemes, costing Rs 8708 crores, have been recommended for implementation through Tariff Based Competitive Bidding (TBCB)

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in the 3rd meeting of Empowered Committee on Transmission (ECT) held on 21.12.2018. They are also under bidding process.

- 2.2. The status of implementation of transmission projects through Tariff Based Competitive Bidding in Western Region are enclosed as **Annexure 1A**.
- 2.3. The status of transmission schemes under implementation by Powergrid in Western Region is enclosed as **Annexure 1B**.
3. **Installation of 1X315 MVA, 400/220 kV (3rd) transformer at Pithampur 400 kV substation – Agenda by MPPTCL.**
- 3.1. CEA stated that MPPTCL has proposed to install 1X315 MVA, 400/220 kV (3rd ICT) at Pithampur 400 kV substation by shifting of 1X315 MVA, 400/220 kV (4th) transformer earlier proposed to be installed at Bina (MPPTCL) 400 kV substation.

Installation of 1x315MVA, 400/220 kV (4th) transformer at Bina 400 kV substation was earlier planned as transmission system strengthening works in Madhya Pradesh under Financial assistance from Japan International Cooperation Agency (JICA). The tendering activities for installation of 1x315 MVA, 400/220 kV (4th) transformer at Bina 400 kV substation has been completed and order has been placed on 01.10.2018. JICA has already conveyed their no objection for shifting of the transformer from Bina to Pithampura.

- 3.2. MPPTCL stated that the shifting of 1X315 MVA, 400/220 kV transformer from Bina to Pithampura has been proposed in view of increased drawl requirements at Pithampur 400/220 kV S/s and reduction in drawl requirements at 400 kV Bina MPPTCL S/s in view of implementation of Guna and Sagar 400/220 kV S/s in its vicinity.

Increased Drawal requirements at Pithampur: Existing capacity of 400/220 kV transformers at Pithampur 400 kV Substation is (2x315) i.e. 630MVA and maximum load recorded during past three years is 579MVA (i.e. 92%). At present Pithampur 400 kV S/s is connected from SSTPP Stage-I Project through 400 kV D/C (Twin Moose) line and also connected to Indore (PGCIL) 765 kV S/s through 400 kV D/C line. Further in order to evacuate the power from SSTPP Stage-II (2x660MW) Project, MPPTCL has planned to construct a 400 kV DCDS (Quad) line from SSTPP Stage-II Switchyard to Pithampur 400 kV S/s and 400 kV DCDS (Quad) line from Pithampur 400 kV S/s to Badnawar 400 kV S/s. Load growth in Pithampur area in the coming years as well as increase in power flow towards Pithampur 400 kV S/s due to commissioning of SSTPP Stage-II (2x660MW) project, increases the drawl requirements at Pithampura.

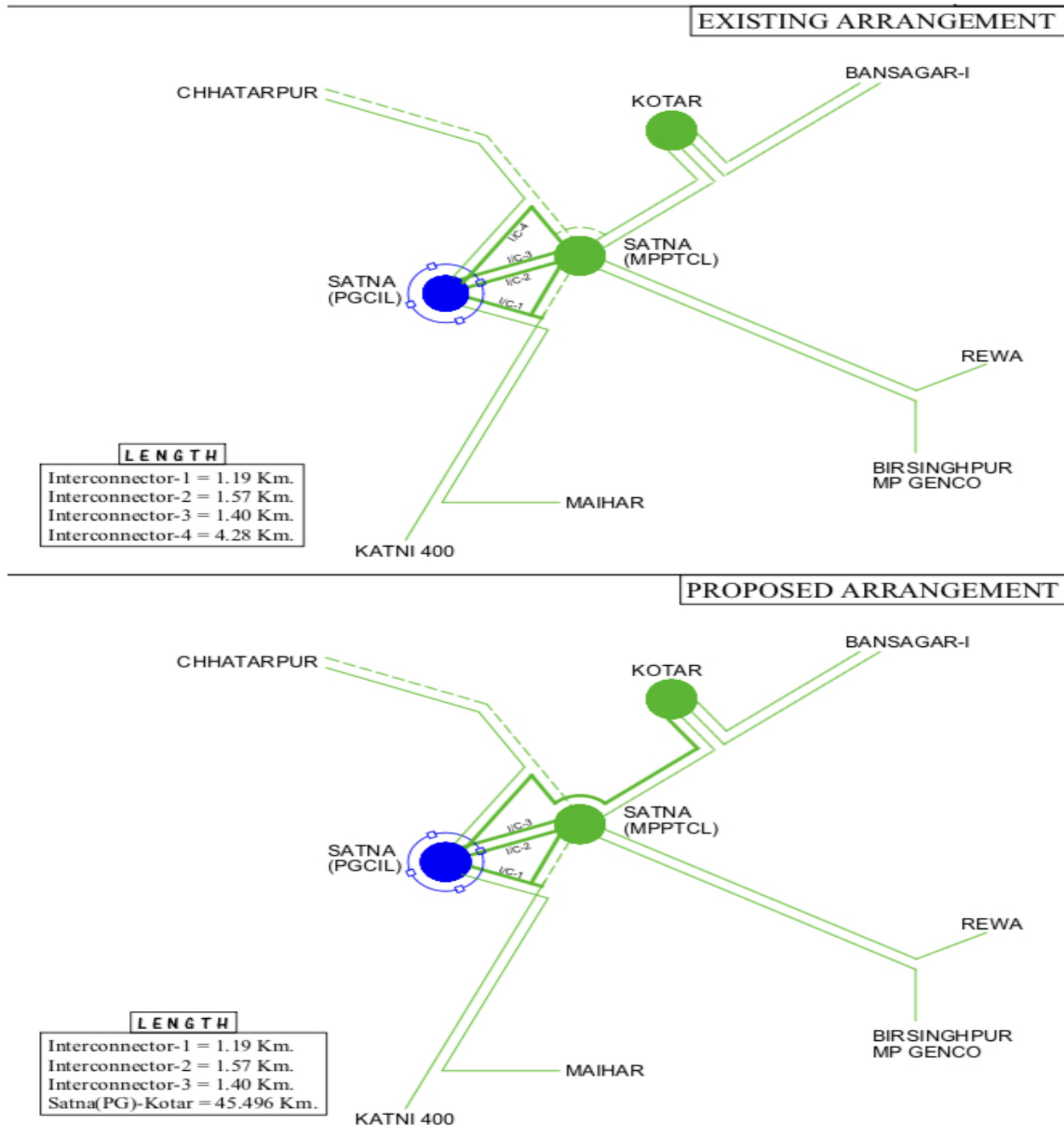
Reduction in Drawal requirements at Bina (MPPTCL): Upgradation of Sagar 220 kV S/s to 400 kV S/s with 2x315MVA, 400/220 KV ICTs under Green Energy Corridor Project-I is under construction and proposed to be completed by June-2019. Further, establishment of Guna 400 kV Substation through intra-state TBCB process is also under process by MPPTCL. Both these substations are expected to give relief to loading on the existing 3x315MVA, 400/220 kV (3 nos.) transformers installed at Bina 400 kV

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Substation and the contingent loading would be manageable with available 3x315MVA ICTs at Bina 400kV Substation.

- 3.3. Regarding the status of implementation of Guna 400/220 kV and Sagar 400/220 kV substations, MPPTCL informed that Sagar (MP) 400 kV substation is scheduled to be commissioned by end of June' 2019. Guna (MP) 400/220 kV S/stn which is being implemented through Intra-State TBCB process would be awarded by end of June'2019 with implementation timeframe of 24-30 months.
- 3.4. MPPTCL stated that the tendering activities for installation of 1x315 MVA, 400/220 kV (4th) transformer at Bina 400 kV substation has been completed and order has been placed on 01.10.2018. The same will be shifted to Pithampur 400kV Substation in a time frame of about 9-12 months.
- 3.5. POSOCO raised concern pertaining to overloading of 400/220 kV ICTs at Bina 400 kV S/stn till the commissioning of 400kV Guna S/stn. MPPTCL stated that with commissioning of 400/220 kV Morena S/stn, the loading of ICTs at Bina has reduced. Further, commissioning of 400 kV Sagar S/stn by next month will further relieve the loading of ICTs at Bina S/stn.
- 3.6. To a query from CTU regarding Bus Reactors at 400 kV Pithampur S/stn, MPPTCL confirmed that 2X50 MVAR Bus Reactors are already installed at Pithampur 400 kV S/stn. In addition, there two nos. of 400 kV D/c lines between Pithampur and SSTPP (appx. 140 km), one with quad conductor and other with Twin Moose conductor. The Pithampur- SSTPP 400 kV D/C quad line has got 50 MVAR line reactors in both the ckts at Pithampur end.
- 3.7. Members agreed to the MPPTCL proposal of installation of 1x315MVA, 400/220kV (3rd) transformer at Pithampur 400kV Substation by shifting of 1x315MVA, 400/220kV (4th) transformer planned to be installed at Bina 400 kV substation.
4. **Extension of 220 kV supply from Satna (PG) 765/400 kV substation to Kotar 220 kV S/s of MPPTCL by using existing interconnector-IV between Satna (PG) – Satna (MPPTCL) S/s**
 - 4.1. CEA stated that MPPTCL had proposed extension of 220 kV supply from Satna (PGCIL) 765/400 kV substation to Kotar (MPPTCL) 220 kV S/s, using the existing 220 kV interconnector-IV between Satna (PGCIL) - Satna (MPPTCL) S/s and sought approval of CEA for the scheme as depicted below:

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To deliberate on the issue, a meeting was held at CEA on 04.02.2019 among CEA, CTU and MPPTCL wherein the following was agreed:

- (i) MPPTCL proposal for extension of 220 kV supply from Satna (PGCIL) 765/400 kV substation to Kotar 220 kV S/s of MPPTCL, by using existing 220 kV interconnector-IV between Satna (PGCIL) - Satna (MPPTCL) S/s, was agreed in principle. The proposal would be formalized in the next meeting of Western Region Standing Committee on Transmission.
- (ii) With above proposal, the number of 220 kV interconnectors between Satna (PGCIL) 400/220 kV and Satna (MPPTCL) 220 kV would be reduced to three (from existing 4 nos.). In case of outage of any 220 kV interconnections between Satna (PGCIL) and Satna (MPPTCL), to avoid overloading of the remaining 220 kV circuit(s), MPPTCL/SLDC to take necessary operational measures. As suggested by MPPTCL, opening of Satna (MPPTCL) - Katni 400/220 kV 220 kV S/c line could be one of the options.

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CEA stated that the above proposal, which has already been agreed in principle, has been put for the concurrence of the members.

- 4.2. MPPTCL stated that Satna (MPPTCL) S/s is connected with Satna (PG) 765/400 kV S/s through 4 nos. of 220 kV interconnectors. The lengths of Interconnector I, II, III and IV are 1.19 km, 1.57 km, 1.40 km and 4.28 km respectively. Lower loading has been observed on Interconnector-IV due to comparatively higher length of 4.28 km as compared to length of other interconnectors. Further, to cater future load growth in Satna area, installation of 3rd 1X160 MVA, 220/132 kV transformer at Satna (MPPTCL) S/s and diversion of load from this substation was also planned. With the above proposal, there would be balanced loading on the remaining 3 nos. of 220 kV interconnections between Satna (PG) and Satna (MPPTCL). He further stated that tender for the scheme has already been floated.
- 4.3. POSOCO suggested that the operational measure of opening of Satna (MPPTCL) - Katni 400/220 kV (PG) 220 kV S/c line, to avoid overloading of the remaining two 220 kV circuits (in case of outage of one ckt) between Satna (PGCIL) 400/220 kV and Satna (MPPTCL) 220 kV S/stn, by MPPTCL could be done through provision of an SPS instead of doing it manually.

MPPTCL agreed to to explore the alternative of installing SPS to prevent overloading of 220 kV interconnections between Satna (PGCIL) 400/220 kV and Satna (MPPTCL) 220 kV.

- 4.4. Members concurred the MPPTCL proposal of extension of 220 kV supply from Satna (PGCIL) 765/400 kV substation to Kotar (MPPTCL) 220 kV S/s, using the existing 220 kV interconnector-IV between Satna (PGCIL) - Satna (MPPTCL) S/s.

5. Implementation of Connectivity lines by RE project developers on D/c or M/c towers.

- 5.1. CEA stated that RE project developers have been granted Stage-II Connectivity based on the deliberations held in regional meetings of Standing Committee on Transmission/ Meeting regarding LTA and Connectivity applications. To conserve scarce Right of Way (RoW) in vicinity of the pooling station, RE project developers have been advised to implement the section in vicinity of pooling stations on M/c towers. While applying for prior approval under Section 68 to CEA, the RE developers have proposed implementation of entire/major section of their connectivity line (S/c line) on D/c and/or M/c towers.

The above issue was deliberated with CTU in a meeting held in CEA under the chairmanship of Chairperson, wherein it was agreed that the proposal of various developers may be considered subject to the following condition:

- (i) Implementation of connectivity line on Double Circuit and / or on Multi Circuit towers at their own cost & risk may be considered only after receipt of such request from the developer.

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- (ii) The developer/s would not make any claim for additional bay or additional quantum of injection or overriding priority at the ISTS pooling station on basis of item. The developer/s has / have to give an undertaking to this effect.
- (iii) CTU will include the implementation details of the connectivity line on Double Circuit towers or on Multi Circuit towers or any other configuration in the connectivity intimation, if requested by applicant.
- (iv) All issues related to sharing of the Double Circuit and / or Multi Circuit towers have to be coordinated among the developers themselves under intimation to CEA / CTU before taking up implementation.

5.2. CTU stated that in line with the above decision, revised intimation letter for grant of Stage II Connectivity to the applicants (RE project developers) by including the implementation details of the connectivity line on Double Circuit towers or on Multi Circuit towers or any other configuration is being issued on the receipt of request from RE developers.

5.3. CEA stated that prior approval u/sec 68 has already been granted to the developers based on revised Stage II connectivity intimation by CTU, which includes the implementation details of the connectivity line on Double Circuit towers or on Multi Circuit towers.

Members noted the same.

6. Revised Intra-State Transmission scheme of Gujarat under Green Energy Corridor-I

6.1. CEA stated that the DPR for the Intra-State transmission schemes under Green Energy Corridor (GEC) at estimated cost of 1962.12 Crore for financial assistance from KfW/NCEF was submitted by GETCO to CEA vide their letter dated 03.7.2014. CEA concurred to the proposal on 11.07.2014. The intra state transmission schemes under GEC as submitted by Gujarat were agreed in the 36th & 37th meetings of Standing Committee on Power System Planning of Western Region held on 29.08.2013 & 5.9.2014 respectively. Further, GETCO vide their letter dated 24.5.2016 requested certain modifications in the transmission proposal with respect to that agreed in the above meetings without any change in the estimated cost. CEA vide its letter no 28/1/2015/PSP&PA-I/697 dated 27.5.2016 concurred the modified proposal.

Further, GETCO vide its letter dated 17.03.2018 has requested CEA for exclusion of feeder bays (package no.27) from Green Energy Corridor-I (GEC-I) and inclusion of Shapar 400/220 kV S/stn under GEC-I so that the overall estimated cost of transmission schemes under GEC-I for GETCO is within Rs. 1962 Crore. CEA vide its letter no CEA-PS-11-23(17)/1/2018/PSPA-I/655/2018/1 dated 25.04.2018 gave its in-principle for exclusion of feeder bays (package no. 27) and inclusion of 400/220 kV Shapar substation under GEC-I.

6.2. The intra-state transmission schemes being implemented by GETCO under GEC-I after incorporating the above modifications is enclosed as **Annexure-2**.

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Members noted the same.

7. Intra state transmission schemes for state of Gujarat for consideration under Green Energy Corridor-II

- 7.1. CEA stated that GETCO has submitted a proposal amounting Rs. 3738.99 Crores under Intra-State Transmission schemes for Gujarat State for consideration under GEC-II. The scheme includes 400/220/66 KV substations (3 Nos.- Keshod, Kalavad and Shivilakha), 220/66 KV substations (7 Nos.- Gomta, Giyavad, Talaja, Kamalapur, Khambhalia, Nichi Mandal and Dhama), 400 KV transmission lines (2160 CKM) and 220 KV transmission lines (2978 CKM). The element wise details of the scheme is enclosed as **Annexure-3**
- 7.2. GETCO stated that GERC has set the RPO target of 17% (8.25% wind + 8.0% solar + 0.75% other) by 2021-22 for Gujarat. For achieving 17% RPO target considering 20% PLF, more than 13000 MW RE capacity was required to be installed from all RE sources. About 7000 MW RE capacity is already integrated in GETCO network and around 3000 MW additional capacity would be integrated with implementation of the transmission schemes under GEC-I. The schemes proposed under GEC-II will integrate around 4000 MW of RE power from the potential RE areas of Kutch (1000 – 1200 MW), Jamnagar & Junagarh & Dwarka (1500 – 2000 MW), Morbi & Rajkot & Surendranagar (1000 – 1200 MW) and Bhavnagar (200 – 300 MW).

The planned schemes under GEC-I, GEC-II and other Intra-State schemes will be able to handle around 14000 MW RE integration in addition to 750 MW Radhanesda solar park and 500 MW Harshad solar park whose grid integration has already been planned through ISTS.

- 7.3. CEA stated that as per the Ministry of Power order dated 14.06.2018, Long term growth trajectory of RPOs for Solar as well non-solar has been fixed as 21 % (10.5% + 10.5%) by 2021-22 uniformly for all the states / union territories. The RPO shall be on total consumption of electricity by on obligated entity, excluding consumption met from hydro sources of power. If RPO of 21% is considered for Gujarat, about 16,000 MW RE capacity was required to be installed from all RE sources. Further, the RE potential identified in state of Gujarat would be implemented under intra-state scheme or inter-state schemes. It would be better if transmission schemes are evolved in a coordinated manner that would serve the evacuation needs of inter- state and intra-state schemes.
- 7.4. GETCO stated that RE potential assessment in Gujarat is already under process by a committee under chairmanship of Joint Secretary (MNRE). The committee would finalize the total RE potential in state of Gujarat.

GETCO is following the RPO targets set by GERC. With the schemes proposed under GEC-II, integration of RE power in excess of its RPO target of 17 % (about 13000 MW) by 2021-22 was possible. However, considering issues in implementation of transmission corridors, few schemes may take long time for commissioning and accordingly a conservative time-frame of 2025 has been assumed for its implementation

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The scheme has been identified based on RE potential areas and prevailing network issues and changes in the schemes may be required at later stage depending on RE growth and network behaviour.

- 7.5. GETCO further stated that the above scheme is required for meeting the RPO targets and overcoming some prevailing network constraints in Gujarat, therefore, the same may be agreed.
- 7.6. SECI stated that Long-term growth trajectory of RPOs for Solar as well non-solar has to be complied all the states uniformly. Necessary deliberations are already going on for the same.
- 7.7. POSOCO stated that the overall figure of RE installed capacity are available, but the consolidated list of RE generation capacity statewise (solar and wind), was not available and the same needs to be compiled.
- 7.8. After further deliberations, the following was agreed;
 - i) Intra-State Transmission schemes for Gujarat proposed by GETCO under GEC-II was agreed by the members. The details are enclosed as **Annexure 3**
 - ii) All State to formally submit the RPO targets for solar and non-solar along with time frame, set by their respective Regulatory Commissions.
 - iii) States to furnish the consolidated list the RE installed capacity (wind and solar) and future capacity proposed.

8. Revised Intra-State Transmission scheme of Maharashtra under Green Energy Corridor-I

- 8.1. CEA stated that MSETCL has submitted to CEA, the proposal for the Intra-State transmission schemes under Green Energy Corridor (GEC) at an estimated cost of Rs. 367 Crore. The intra-state transmission schemes for MSETCL comprised of twenty seven (27) no. of transmission elements (190 ckm of transmission line at 220 kV level, 783.36 ckm of transmission line at 132 kV level, 9 no of 220 kV bays, 48 no. of 132 kV bays and 1x25 MVAR bus shunt reactor at 220 kV Dhule S/s). Out of 27 no. of intra-state transmission elements proposed by MSETCL under GEC-I, 24 no. of elements were already agreed in the 36th meeting of Standing Committee on Power System Planning in Western Region held on 29.08.2013. Subsequently, three nos. of additional transmission elements were included under GEC-I based on proposal submitted by MSETCL vide its letter dated 07.08.2015.
- 8.2. Subsequently, MSETCL has submitted the revised list of intra- state transmission elements being implemented by it under GEC-I and the same is enclosed as **Annexure-4**.

Members noted the same.

9. Intra state transmission schemes for state of Maharashtra for consideration under Green Energy Corridor-II

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- 9.1. CEA stated that technical approval for following 13 nos. of transmission elements under GEC-II (Tranche) Part-A to MSETCL has been accorded vide CEA letters dated 21.08.2018 and 30.11.2018:
- (i) 2nd circuit stringing of Degaon – Mandrup 132 kV S/C line on D/C line
 - (ii) LILO on 132 kV Ujani – Naldurg S/C at 220/132 kV Tuljapur S/s
 - (iii) 2 x 100 MVA, 220/132 kV ICTs at 220 kV Manjarsumbha S/s
 - (iv) Manjarsumbha – Sarola 132 kV D/C line
 - (v) Establishment of 2 x 25 MVA, 132/33 kV Sarola S/s with 8 nos. of 33 kV outlets and Sarola – Kajj 132 kV S/C on D/C line
 - (vi) Renovation of 132 kV Latur – Ujani – Naldurg – Solapur(Bale) D/C line using 0.2 ACSR Panther Conductor
 - (vii) 2nd ckt. stringing of Kharda – Bhairavnath co-gen 132 kV S/C on D/C line
 - (viii) 2x100 MVA, 220/132 kV ICTs at 220 kV Patoda S/s
 - (ix) LILO on Ashti – Kharda 132 kV S/C on D/C line at 220/132 kV Patoda S/s
 - (x) Patoda – Raimoha 132 kV S/C on D/C line
 - (xi) Conversion of existing Kale(T) – Wathar 132 kV S/C line to D/C line
 - (xii) LILO of one ckt. of Jath – Mhaisal 220 kV D/C line at 400/220 kV Alkud S/s
 - (xiii) LILO of one ckt. of Vita – Mhaisal (on Miraj line) 220 kV D/C line at 400/220 kV Alkud S/s
- 9.2. Further, in the 42nd meeting of SCSPWR held on 17.11.2017, MSETCL's proposal under GEC-II Part B for funding under NCEF for evacuation of power from large quantum of existing and proposed RE generation projects in Sakri, Shivaji Nagar and Dondaicha area, was agreed. The proposal involved establishment of Balsane 400/220 kV pooling station alongwith LILO of both circuits of Dhule - Sardar Sarovar 400 kV D/C line at Balsane.
- 9.3. POSOCO enquired about the provision of line reactors in Sardar Sarovar- Balsane 400 kV D/C line (after LILO of Dhule - Sardar Sarovar 400 kV D/C line at Balsane) at Balsane end.
- 9.4. CTU requested MSETCL to ensure provision of 80 MVAR line reactor at Balsane end along with NGR for the Sardar Sarovar -Balsane 400 kV D/C line.
- 9.5. MSETCL agreed for provision of the line reactors and scope of works of the Intra-State transmission scheme for evacuation of RE power in Balsane area under GEC-II Part B is as given below:
- a) 2 x 500 MVA, 400/220 kV Pooling Sub-Station at Balsane.
 - b) LILO of both circuit of 400 kV Dhule - Sardar Sarovar D/C line at Balsane 400 kV Pooling S/s with provision of 80 MVAR line reactors alongwith NGR in both ckts at Balsane end for the Sardar Sarovar -Balsane 400 kV D/C line
 - c) 220 kV D/C line from 400 kV Pooling S/s. to 220 kV Shivajinagar S/s.
 - d) LILO of 220 kV Dhule – Dondaicha S/C line partially on M/C towers at 400 kV Balsane Pooling S/s.
 - e) 1 x 125 MVA Bus Reactor at 400 kV Pooling S/s.

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10. Establishment of 400/220 kV Intra State substation at Pimpalgaon (Nashik) by MSETCL

10.1. CEA stated that MSETCL has proposed establishment of 400/220 kV Intra State substation at Pimpalgaon (Nashik) with the following scope of works as a part of their intra-state scheme:

- (i) Establishment of 400/220 kV substation at Pimpalgaon (Nashik) with 2x500 MVA 400/220 kV ICT's.
- (ii) LILO of both circuit of 400 kV Aurangabad (PG) – Boisar (PG) Quad Moose Line at Pimpalgaon @ route length – 5 Km
- (iii) 220 kV D/C Line from proposed 400/200 kV Pimpalgaon substation to existing 220 kV Pimpalgaon substation (Inter Connection)
- (iv) Reorientation of existing 220 kV D/C Nashik (GCR) – Pimpalgaon substation at proposed 400/220 kV Pimpalgaon substation.
- (v) LILO of 132 kV Ozar – Chandwad at 132 kV Ranwad
- (vi) 2nd circuit stringing of 132 kV Pimpalgaon – Ranwad line.

MSETCL has proposed the scheme to meet the load demand of Nashik area and to reduce the loading of 220 kV transmission lines and also to have reliability in view of depleting Nashik TPS Generation. Presently, Nashik & nearby areas are fed through 220 kV Babhaleshwar – Nashik Line and 3x210 MW Generating Units of Nashik Thermal Power Station.

10.2. CTU stated that the above proposal involves LILO of Aurangabad-Boisar 400 kV D/C quad line, which is an ISTS line. Aurangabad-Boisar 400 kV D/C quad line is provided with 80 MVAR fixed line reactors in both the ckts at both ends. With LILO at Pimpalgaon , Boisar- Pimpalgaon section of the line would be about 100 km whereas the Pimpalgaon – Aurangabad section would be around 200 km. Accordingly the following additional scope of works needs to be incorporated under the scheme:

- (i) Installation of 125 MVAR bus reactor at proposed 400 kV Pimpalgaon.
- (ii) Installation of switchable line reactor of 63 MVAR at Pimpalgaon end of Pimpalgaon to Aurangabad 400 kV D/c line to help charging from Aurangabad end.
- (iii) Conversion of both 80 MVAR fixed line reactor associated with Aurangabad-Boisar 400 kV D/C quad line at Boisar (PG) end to switchable Line Reactor.

10.3. After deliberation, the following was agreed for establishment of Pimpalgaon 400/220 kV substation:

Intra-State Scheme to be implemented by MSETCL:

- (i) Establishment of 400/220 kV substation at Pimpalgaon (Nashik) with 2x500 MVA 400/220 kV ICT's alongwith 1X125 MVAR 400 kV bus reactor.
- (ii) LILO of both circuit of 400 kV Aurangabad (PG) – Boisar (PG) Quad Moose Line at Pimpalgaon @ route length – 5 Km
- (iii) Provision of 63 MVAR switchable line reactors in both ckts of Aurangabad-Pimpalgaon 400 kV D/C line at Pimpalgaon end.

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- (iv) 220 kV D/C Line from proposed 400/200 kV Pimpalgaon substation to existing 220 kV Pimpalgaon substation (Inter Connection)
- (v) Reorientation of existing 220 kV D/C Nashik (GCR) – Pimpalgaon substation at proposed 400/220 kV Pimpalgaon substation.
- (vi) LILO of 132 kV Ozar – Chandwad at 132 kV Ranwad
- (vii) 2nd circuit stringing of 132 kV Pimpalgaon – Ranwad line.

Inter-State Transmission Scheme:

- (i) Conversion of 80 MVar fixed line reactor at Boisar end of Aurangabad- Boisar 400 kV D/c line to switchable line reactor alongwith NGR bypass arrangement.

11. Connectivity of 50 MW solar park being established by South East Central (SEC) Railways for meeting its RPO obligations as a distribution licensee and change of its connectivity agreed at Raipur (Kumhari) 400/220 kV PGCIL substation from bulk consumer to Licensee

- 11.1.** CEA stated that the connectivity to Railways at Raipur (Kumhari-POWERGRID) 400/220 kV substation at 220 kV level was agreed in the 29th meeting of Standing Committee on Power System Planning of Western Region held on 10.09.2009. The connectivity line along with the two nos. of 220 kV bays at Raipur 400/220 kV substation of POWERGRID was agreed to be implemented by Railways and CTU has already granted connectivity for a quantum of 100MW to SEC Railways as a Bulk Consumer at Raipur (Kumhari-POWERGRID) vide intimation dated 29.05.2012.

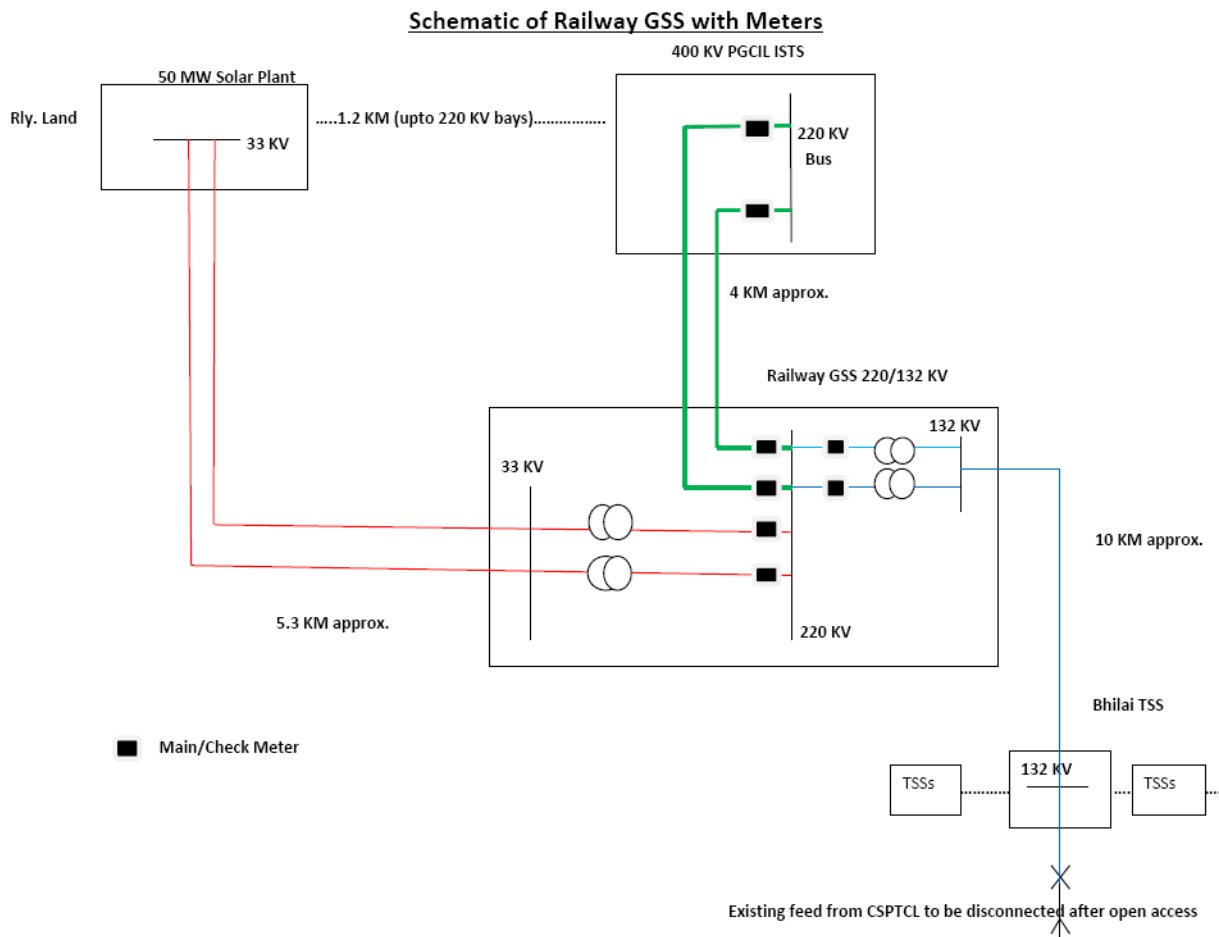
The issue of reconfirmation of connectivity of SEC Railway 220/132 kV substation at Bhilai in Chhattisgarh to Raipur (Kumhari) 400/220 kV PGCIL substation along with additional connectivity to Railways at Raigarh and Bhatpara was also deliberated in the 42nd meeting of Standing Committee on Power System Planning of Western Region held on 17.11.2017. In the meeting, Railways had confirmed that connectivity at Raipur (Kumhari) 400/220 kV PGCIL S/s was as a bulk consumer, whereas the new connectivity at Raigarh and Bhatpara, was being sought as a Licensee.

- 11.2.** Railway Board vide its letter dated 22.01.2019 has requested CEA to include, the issue of connectivity of 50 MW solar park being established by South East Central (SEC) Railways for meeting its RPO obligations as a distribution licensee and change of its connectivity agreed at Raipur (Kumhari) 400/220 kV PGCIL substation from bulk consumer to Licensee, as an agenda in the Western Region Standing Committee on Transmission. To deliberate on the issue two meetings (on 28.02.2019 and 20.03.2019) were held at CEA, New Delhi under the Chairmanship of Chief Engineer (PSPA-1), CEA wherein the following was agreed:

- i) Railways request of changing the already granted connectivity at Raipur (Kumhari) 400/220 kV PGCIL S/s as a bulk consumer to that of a Licensee would be deliberated in the next i.e. 2nd meeting of Western Regional Standing Committee on Transmission.
- ii) Technically, the connectivity of 50 MW Solar Plant with the 220/132 kV Kumhari GSS of Railway is an optimal solution. But it is neither an ISTS point nor an Intra state point.

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- iii) No separate grant of connectivity is required for the SPD, if the SPD is connected with Railways 220/132 kV Kumhari GSS, as in that case, the solar plant would be embedded in the Railways system. However, the SPD would be required to apply to CTU for availing the LTA/MTOA through ISTS
- iv) Railways to take directions from CERC regarding scheduling, dispatch and energy accounting by WRLDC, based on meters installed at Railways 220/132 kV Kumhari GSS.
- v) The connectivity proposal would also put for discussion in the 2nd meeting of WRSCT.



11.3. CEA stated that as also deliberated in the earlier meeting held at CEA, this is a unique case with no precedence where a generator meant for inter-state power flow is neither connected to ISTS directly nor to the state grid.

CTU stated that with proposed arrangement, the solar park is getting connected to ISTS network through Railways network which implies that Solar Plant would be an embedded entity of Railways in which case, no separate grant of connectivity is required for the SPD. However, the SPD would be required to apply to CTU for availing the LTA/MTOA through ISTS for power transfer across the country for “Railways Work”.

11.4. POSOCO stated that as per present regulations, the jurisdiction of POSOCO for scheduling, metering and energy accounting is restricted to ISTS sub-stations. Since the

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nature of connectivity point (Railway GSS) in the proposed case is ambiguous, it would not be possible for POSOCO to take responsibility of meters installed at Railway GSS.

11.5. After detailed discussions, the following was concluded:

- (i) Technically, the connectivity of 50 MW Solar Plant with the 220/132 kV Kumhari GSS of Railway is an optimal solution
- (ii) Railways' request of changing the already granted connectivity at Raipur (Kumhari) 400/220 kV PGCIL S/s as a bulk consumer to that of a Licensee was noted by the members.
- (iii) Railways' may approach appropriate forum for scheduling, dispatch and energy accounting for the proposed arrangement.

12. MSETCL proposal for STU connectivity of M/s GWEL generation plant situated at Warora

12.1. CEA stated that M/s GWEL, which is an ISGS with 2x300 MW of installed capacity, has total PPA of 550 MW (200 MW to MSEDCL, 200 MW to Dadra & Nagar Haveli and 150 MW to TANGEDCO). Currently, M/s GWEL is connected with ISTS network through dedicated GWEL-Bhadravati 400 kV D/c line and all the beneficiaries are drawing their share of power through ISTS network and paying the respective ISTS charges. As per PPA of Maharashtra with GWEL, Generation bus was the drawl point. Accordingly, MSEDCL has filed a petition before CERC wherein CERC has directed MSEDCL to make arrangement for drawl of their share of 200 MW from GWEL bus bar.

MSETCL (to provide the STU connectivity to M/s GWEL (ISGS generation) has proposed LILO of one circuit of GWEL – Bhadravati 400 kV D/c line at Warora(MSETCL) 400 kV substation. To discuss the connectivity proposal, a meeting was held in CEA on 19.07.2018 with participation from MSEDCL, MSETCL, M/s GWEL, CTU and POSOCO. In the meeting the following was agreed:

- (i) MSETCL to convey their views regarding the proposal for installation of 400/220, 1x315 or 500 MVA ICT at GWEL generation switchyard along with associated ICT bays for drawl of MSEDCL share from GWEL through 220 kV lines.
- (ii) M/s GWEL and MSETCL to jointly explore the availability of space for creation of 220 kV level in GWEL generation switchyard.

12.2. The issue was deliberated in the 1st meeting of WRSCT, wherein the scheme of creation of 220 kV level at M/s GWEL premises through 400/220 kV, 1 x 315 MVA ICTs and its interconnection with 220 kV Intra State Transmission Network was technically agreed and MSETCL was suggested to implement the above alternative for STU connectivity at GWEL. In the meeting MSETCL had stated that they would further deliberate on the issue and would revert back

12.3. MSETCL stated that for evacuation of MSEDCL share of power from GWEL power plant, creation of 220 kV level at M/s GWEL premises through 400/220 kV, 1X 315

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MVA ICTs and its interconnection with 220 kV Intra-State Transmission network would be implemented by them.

- 12.4. CTU suggested that MSETCL can also explore the option of implementing 500 MVA ICT instead of 315 MVA ICT as the cost implications in both case would be similar. Further with provision of only one ICT there would be no redundancy, in case of outage.
- 12.5. POSOCO stated that in case of implementation of a single ICT, in the event of an outage, MSETCL would be drawing their share of power through ISTS network and in that case ISTS charges would be applicable.
- 12.6. MSETCL stated that it is planning to put only single ICT for drawal of their share of 200 MW from GWEL busbar.
- 12.7. After deliberations, creation of 220 kV level at M/s GWEL premises through provision of 400/220 kV, 1X 315 (or 500) MVA ICT and its interconnection with 220 kV Intra-State Transmission network by MSETCL was agreed.

13. Inter-State Transmission System Strengthening in Chattarpur area in Madhya Pradesh

- 13.1. CEA Stated that in the 40th meeting of SCSPWR, the following transmission system strengthening scheme was agreed by the members:

Inter State Transmission system strengthening in Chhattarpur area in Madhya Pradesh

- (i) Establishment of 2x500 MVA, 400/220 kV substation at Bijawar*
- (ii) LILO of both circuits of Satna–Bina 400kV (1st) D/c line at Bijawar. (There are four 400kV circuits between Satna and Bina, out of which one circuit is proposed to be LILOed at Sagar (MPPTCL) substation. This LILO is on one D/c out of the above three remaining 400kV circuits between Satna and Bina).
- (iii) 1x125 MVAr, 420 kV Bus Reactor at Bijawar pooling station.
- (iv) 4 nos. 220kV line bays for termination of LILO of both ckts of Tikamgarh-Chhattarpur 220 kV D/c line at Bijawar.
- (v) Space for 4 nos. of 220kV line bays for solar park interconnections

*SPPD shall provide land contiguous to Chhattarpur solar park for establishment of 400/220kV Bijawar substation.

Intra State Transmission system strengthening in Chhattarpur area in Madhya Pradesh

- (i) Stringing of 2nd circuit of Tikamgarh – Chhattarpur 220kV S/c on D/c line.

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- (ii) LILO of both circuits of Tikamgarh-Chhattarpur 220 kV D/c line at Bijawar 400/220 kV substation (60 km)

The implementation of the Inter State Transmission system strengthening in Chhattarpur area in Madhya Pradesh was taken as a part of the transmission scheme “Connectivity System for Lanco Vidarbha Thermal Power Pvt. Ltd. (LVTPPL) and Inter State Transmission system strengthening in Chhattarpur area in Madhya Pradesh” through TBCB route with PFCCL as the Bid Process Coordinator for the scheme.

- 13.2. M/s Rewa Ultra Mega Solar Ltd. (RUMSL), the Solar Power Project Developer (SPPD) for development of solar parks in Madhya Pradesh, vide their letter dated 26.08.2017 had stated that RUMSL was unable to develop solar park at Chhattarpur and does not require associated substation in that area, but CEA may take decision on development of proposed ISTS substation at Chhattarpur.
- 13.3. Establishment of Bijawar 400/220 kV substation was agreed for the purpose of evacuation of power from Chhattarpur Solar Park and also to cater the present and future power drawl requirements in Chhattarpur area. Accordingly, CEA vide its letter dated 30.08.2017 had requested MPPTCL to intimate the implementation time frame of the intra-state strengthening scheme in Chhattarpur area (220 kV outlets from proposed Bijawar 400/220 kV substation) and the tentative location(s) of the proposed 400/220 kV substation in Chhattarpur area.

Empowered Committee in its 37th meeting held on 20.09.2017 had decided that the bidding process for the scheme may be taken up after resolution of financial issue of M/s LVTPPL and after ascertaining the progress of the project.

In the 42nd meeting of SCPSPWR held on 17.11.2017, regarding the time frame for implementation of Bijawar 400/220 kV S/s, MPPTCL had stated that it would be required beyond 2021–22. However, in case the scheme was scheduled in earlier time frame they would take up the implementation of the 220 kV outlets from Bijawar 400/220 kV substation in matching time frame.

- 13.4. In the 2nd NCT (National Committee on Transmission) meeting held on 04.12.2018, the progress of the transmission scheme “Connectivity System for Lanco Vidarbha Thermal Power Pvt. Ltd. (LVTPPL) and Inter State Transmission system strengthening in Chhattarpur area in Madhya Pradesh” was reviewed. In the meeting CEA had stated that there was no progress in resolution of financial issue by the developer of LVTPPL, therefore, the bidding of the scheme is still on hold. The scheme would be put up in the next WRSCT and based on the deliberations, the bidding process of the scheme could be resumed with the reduced scope of works.
- 13.5. CEA stated that with implementation of the above scheme, loading on Satna ICT would be relieved and requested MPPTCL to intimate the time frame of requirement of Bijawar S/stn and implementation time frame of 220 kV outlets from proposed 400/220 kV Bijawar S/stn, so that bidding process for “Inter State Transmission system strengthening in Chhattarpur area in Madhya Pradesh” with reduced can be resumed.
- 13.6. MPPTCL stated that they have already planned 220 kV interconnection between 220/132 kV Rewa (MPPTCL) and 400/220 kV Rewa (PG). The order for the scheme

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has already been placed in October 2018 with implementation time frame of 24 months. Implementation of this scheme will relieve the 400/220 kV Satna (PG) ICT. Rewa pooling station along with LILO of two circuits of Vidhyanchal TPS-Jabalpur line at Rewa PS has already been implemented under ISTS.

In view of above works, establishment of Bijawar 400/220 kV S/s to cater to drawl requirements in Chhattarpur area was not required.

13.7. After deliberations, members agreed that the transmission scheme “Inter State Transmission system strengthening in Chhattarpur area in Madhya Pradesh” may be dropped.

14. Review of Reactive compensation on account of LILO of Satna – Bina ckt#3 at Sagar(MP) substation:

14.1. 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

The length of Satna – Bina ckts 3 & 4 is 272.586km and both ends of the line have been provided with 420kV, 50MVAR fixed line reactors. With the implementation of LILO, the line lengths of the two sections namely, Satna – Sagar (MP) 400kV section and Sagar (MP) – Bina 400kV section would become 223.35 km and 97.64 km respectively. Therefore, after LILO, % compensation on Sagar (MP) – Satna 400kV line would be about 37% and on Sagar (MP) – Bina line section shall be about 85%.

Accordingly, in the 1st meeting of WRSCT held on 05.09.2018, CTU had proposed the following reactive compensation on the Bina-Sagar-Satna 400 kV line:

- (i) Installation of 50MVAR switchable line reactor at Sagar(MP) end of Satna(PG) - Sagar(MP) 400kV line – Under scope of MPPTCL
- (ii) Installation of 125MVAR bus reactor at Sagar (MP) S/s – Under scope of MPPTCL
- (iii) Conversion of 50MVAR fixed line reactor at Bina PG) end of Sagar (MP)-Bina(PG) 400kV line into switchable line reactor. – Under scope of ISTS

In the 1st meeting of WRSCT, MPPTCL had stated that 125 MVAR bus reactor at 400 kV Sagar (MP) was already under implementation, as such adequate reactive compensation would be available at Sagar, Bina and Satna S/s and there would be no requirement of 50MVAR switchable line reactor at Sagar (MP) end of Sagar (MP) – Satna(PG) 400kV line. Also, there is space constraint at Sagar S/s for installation of switchable line reactor. In the meeting, it was agreed that CTU would carry out the studies with CEA and MPPTCL and the above proposal would be reviewed as per the study results.

14.2. CTU stated that it has been observed that on account of 37% compensation on Satna – Sagar 400kV line, a total rise of 12kV (11kV line rise & 1kV source rise) was

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observed when charging the line from Satna end. With the proposed 50MVAR Line reactor, the compensation becomes about 74% and the total voltage rise of only 4kV (4kV line rise & 0 source rise) was observed while charging the line from Satna end.

Similarly, while charging the line from Sagar end, the total rise observed both without and with the line reactor at Sagar end is 9kV (SR: 5kV & LR: 4kV) and 7kV (SR: 3kV & LR: 4kV) respectively.

- 14.3. MPPTCL stated that with 9 kV rise the line (Satna-Sagar 400 kV Line) could be charged from Sagar end and in that case, line reactors would not be required. POSOCO stated with provision of line reactor at Sagar end, there would be flexibility to the charge the line from both ends.
- 14.4. After further deliberations, MPPTCL agreed to implement 50MVAR switchable line reactor at Sagar(MP) end of Satna(PG) - Sagar(MP) 400kV line.
- 15. Establishment of 132/33 kV Sironcha Substation, Tal. – Sironcha, District – Gadchiroli and interconnection with Kistampeth 132 kV substation in Telangana**

- 15.1. CEA stated that during the 1st meeting of WRSCT held on 05.09.2018, the following proposal of MSETCL was taken up for approval as it involved a 132 kV line between two states and two regions also:
- i) Establishment of 2x25 MVA, 132/33 kV substation at Sironcha.
 - ii) 132 kV SCDC line from Kistampeth (Telangana State) with end bays each at Kistampeth and Sironcha S/s – 32 km

In the meeting, MSETCL had informed that Telangana State Transmission Company Limited (TSTCL) have already given their in-principle consent to extend supply from 132 kV Kistampeth S/s to the proposed 132 kV Sironcha S/s. Accordingly, the following was agreed in the 1st meeting of Western Region Standing Committee on Transmission:

- (i) The proposed 132 kV line was a natural interstate line, which would facilitate MSETCL in providing reliable supply to Sironcha area and the line should be operated in radial mode.
 - (ii) MSETCL should not take up conversion of this to an ISTS line in future.
 - (iii) In view of the in principle consent given by TSTCL to extend supply to 132 kV Sironcha S/s from their 132 kV Kistampeth S/s, MSETCL proposal was agreed by the members with the conditions that Sironcha 132/33 kV substation would operate in radial mode from 132 kV Kistampeth S/s.
 - (iv) MSETCL needs to finalise the implementation and operational modalities with TSTCL and submit a proposal to CEA so that the same could be referred to Southern Region Standing Committee on Transmission for the approval of Southern Region constituents.
- 15.2. MSETCL stated that conversion of the proposed Kistampeth- Sironcha 132 kV S/C line to ISTS would provide them flexibility to source their power and would facilitate them in energy accounting and other related issues.

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- 15.3. CTU state that ISTS links between two states (and in this case between two regions) are always planned with high capacity transmission links.
- 15.4. MSETCL stated that 132 kV link has been proposed to feed loads in Sironcha area where future load growth would not be substantial. It is not possible to extend supply from MSETCL system, therefore link has been proposed from Telangana state which has been agreed in principle by Telangana.
- 15.5. Member Secretary, WRPC informed that similar links also exists between MP and Maharastra, Gujarat and Maharastra, which has been established by mutual agreement on bilateral basis.
- 15.6. After further deliberations, it was agreed that if MSETCL wants an ISTS scheme to feed Sironcha area, MSETCL needs to submit a detailed proposal, which needs to be studied in coordination with Telangana. The proposal needs to include existing Intra-state substations of MSETCL in vicinity of Sironcha area and difficulties in extending the supply to Sironcha area.
16. **Bhuj 400/220kV ICT bay being implemented as Hybrid/MTS on account of bay swapping with ReNew Wind Energy (AP2) Pvt. Ltd.**
- 16.1. CEA stated that during the 1st meeting of WRSCT held on 05.09.2018, an additional 1x500 MVA, 400/220 kV (9th) ICT, for injection from any additional RE project (above 4000 MW under Tranche I to IV of SECI bids) in existing Bhuj PS along with associated 400 kV GIS bay and 220 kV AIS bay was agreed. Accordingly, the following scope of works was approved in 3rd Empowered Committee Meeting held on 21.12.2018 to be implemented by POWERGRID through RTM route:

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Additional 1x500MVA 400/220kV (9 th) ICT, for injection from any additional RE project (other than 4000MW injection under SECI bids upto Tranche IV) in existing Bhuj PS with associated 400 kV GIS bay and 220kV AIS bay.	1x500MVA, 400/220kV 400kV ICT bay-1 220kV ICT bay-1	37
2.	3 nos. of 220kV line bays(hybrid/MTS) for termination of dedicated lines of RE developers with Stage-II connectivity	220kV bays -3	19.3
Total Rs (in Crore)			56.3

- 16.2. CTU stated that on account of space constraints at Bhuj PS for 220 kV ICT bay, detailed engineering was carried out and it was found prudent to allocate 220kV

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Hybrid/MTS Bay no. 235 to the 9th ICT which was earlier allocated to M/s Renew Wind Energy (AP2) Pvt. Ltd).

Accordingly, reallocation/ re-numbering of 220kV bays at Bhuj PS (which were already allocated to RE applicants viz. M/s Avikiran Solar India Private Ltd. & M/s Renew Wind Energy (AP2) Pvt. Ltd) for the purpose of installation of the 9th ICT was carried out at POWERGRID Gurgaon office on 20.12.2018, which was agreed by the RE developers.

With the above bay reallocation, the 220kV side bay type of the 9th 400/220kV ICT at Bhuj PS has been modified from AIS to Hybrid/MTS.

- 16.3.** POSOCO enquired about the nature of bay allocated to M/s Renew Wind Energy (AP2) Pvt. Ltd) after carrying out reallocation/renumbering of 220 kV Bays at Bhuj PS for the purpose of installation of 9th ICT.
- 16.4.** CTU clarified that the bay allocated to M/s Renew Wind Energy (AP2) Pvt. Ltd even after reallocation/renumbering remains Hybrid/MTS.
- 16.5.** Members concurred the change in scope of 220 kV bay associated with 9th, 1x500 MVA, 400/220 kV from AIS to Hybrid/MTS. The revised scope of works is as given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm
1.	Additional 1x500MVA 400/220kV (9 th) ICT, for injection from any additional RE project (other than 4000MW injection under SECI bids upto Tranche IV) in existing Bhuj PS with associated 400 kV GIS bay and 220kV Hybrid/MTS bay.	1x500MVA, 400/220kV 400kV ICT bay-1 220kV ICT bay-1
2.	3 nos. of 220kV line bays(hybrid/MTS) for termination of dedicated lines of RE developers with Stage-II connectivity	220kV bays -3

17. 400kV ICT bay for Installation of 1x500MVA ICT (3rd) at Itarsi 400/220kV substation

- 17.1.** CEA stated that the issue of critical loading of several ICTs in Western Region was discussed in the 42nd & 43rd SCSPWR held on 10.01.18 & 11.05.2018, in which augmentation of the following transformation capacity in Western Region was agreed to fulfill (n-1) contingency criteria in 2021–22 timeframe:

Sl. No.	Scope of the Transmission Scheme	Existing / Already planned MVA	Proposed ICT (MVA)
1	Jabalpur 400/220kV S/S	2x315	1x500

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2	Itarsi 400/220kV	1x315+1x500	1x500
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In the 2nd meeting of Empowered Committee on Transmission held on 06.08.18 the following augmentation works were agreed to be implemented under RTM by POWERGRID.

Transmission Scheme	Detailed scope of works	Estimated Cost (Rs. Crore)
Augmentation of transformation capacity in Western Region	Jabalpur 400/220 kV S/S <ul style="list-style-type: none"> 400/220kV ICT 500MVA 400kV ICT bay – 1 no. 220kV ICT bay- 1 no. 	34
	Itarsi 400/220 kV S/S <ul style="list-style-type: none"> 400/220kV 500MVA ICT - 1 no., 400kV ICT bay -1 no. 220kV ICT bay-1 no. 	34
Total Rs (in Crore)		68

17.2. POWERGRID stated that there are space constraints for implementation of the 400kV ICT bay as AIS at Itarsi S/s. With the available space, the 400 kV bay may be implemented as outdoor GIS bay (adopting 2-CB scheme).

17.3. CEA enquired about the increase in the estimated cost due to changes proposed in the scheme. POWERGRID stated that with the proposed changes there will be increase in cost of Augmentation at Itarsi S/stn from 34 Cr. To 37 Cr.

17.4. Members concurred the change in scope of 400 kV bay associated with 1x500 MVA, 400/220 kV from AIS to outdoor GIS at Itarsi. The revised scope of works is as given below:

Transmission Scheme	Detailed scope of works	Estimated Cost (Rs. Crore)
Augmentation of transformation capacity in Western Region	Jabalpur 400/220 kV S/S <ul style="list-style-type: none"> 400/220kV ICT 500MVA 400kV ICT bay – 1 no. 220kV ICT bay- 1 no. 	34
	Itarsi 400/220 kV S/S <ul style="list-style-type: none"> 400/220kV 500MVA ICT - 1 no., 400kV ICT bay -1 no. (outdoor GIS bay adopting 2 CB scheme) 220kV ICT bay-1 no. 	37
Total Rs (in Crore)		68

18. Grant of ISTS connectivity to LARA STPP Stage-II (2x800MW) of NTPC Ltd. for its Lara STPP-I generation project (2x800MW) located in Chhattisgarh:

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- 18.1. CEA stated that Lara stage-I STPP (2x800 MW) of NTPC has already been granted connectivity Lara STPP I – Raigarh (Kotra) PS 400kV D/c line. Long Term Access (LTA) for transfer of 1586.51 MW power from the Lara-I project to various beneficiaries in WR has already been granted through Lara STPP I – Champa PS 400kV D/c (quad) line (along with other transmission elements).

M/s NTPC Ltd. has applied for connectivity for its upcoming 2x800MW Lara STPP-II generation project. The details of the application are given below:

S. No	Name of the Applicant	Location of Generating Station	Seeking Connectivity (MW)	Date from which Connectivity required	Comm. Schedule
1	NTPC Ltd. (2x800MW Lara Stage-II Project)	Raigarh, Chhattisgarh WR	1600	01.02.2022	30.06.2023

The application was discussed during the 31st WR Conn/LTA Meeting held on 24.10.18 wherein the following was observed:

- (i) Connectivity of additional 1600MW at the existing switchyard of Lara STPP-I generation project, which is connected both to Raigarh (Kotra) and Champa pooling stations, leads to the issue of high fault current at Raigarh (Kotra) PS (i.e. beyond the design rating of 50kA).
- (ii) Majority of fault contribution comes from Champa PS through Champa PS – Lara STPP (Stage-I & II) – Raigarh (Kotra) 400kV D/c line.

In view of the above, it was proposed to grant connectivity to NTPC Ltd. for its Lara STPP-II generation project with following transmission system (under the scope of NTPC Ltd.):

- i) Shifting of Lara STPP I - Raigarh (Kotra) 400kV D/c line to Lara STPP-II bus so as to form Lara STPP II – Raigarh (Kotra) 400kV D/c line along with associated bays at generation end
- ii) Lara STPP II - Raigarh(Kotra) 400kV (2nd) D/c line (new) along with associated bays at both ends
- iii) Lara STPP-I & Lara STPP-II buses to be kept disconnected from each other under normal operating conditions

It was also deliberated that in place of Lara STPP II – Raigarh (Kotra) 400kV (2nd) D/c line (new), the option of re-conductoring of Lara STPP I – Raigarh (Kotra) 400kV D/c line with HTLS conductor may also be explored. However, the matter regarding de-capitalisation of old conductor and terminal bay equipment (if required to be upgraded) resulting due to re-conductoring of the line needs to be further deliberated. After deliberations, it was decided that the connectivity arrangement for Lara STPS-II shall be finalised in the next WRSCT meeting after taking into consideration views of all the WR constituents.

- 18.2. If the above arrangement is agreed then the connectivity line of Lara STPP-I generation project of NTPC shall also stand revised as Lara STPP I – Champa PS 400kV D/c (quad) line (existing).

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18.3. CTU stated that the option of reconductoring of the existing Lara STPP I – Raigarh (Kotra) 400kV D/c line with HTLS conductor instead of laying a new 400 kV D/C line is a better option, however tariff related issues will arise on account of decapitalisation of old conductor and terminal bay equipment.

18.4. GETCO stated that the execution time of reconductoring would be less as compared to laying a new 400 kV D/C line. Recently, a project of reconductoring of 220 kV line with HTLS conductor has been executed in Gujarat. The reconductoring cost of the project executed is less than of laying a new 220 kV line with lesser execution period.

As far as issue of decapitalisation of the existing conductors is concerned, its scrap value could be included in the reconductoring project.

18.5. The issue was further deliberated and connectivity to Lara Stage-II project through reconductoring of the existing Lara STPP I – Raigarh (Kotra) 400kV D/c line was agreed. CTU to take up issues arising due to decapitalisation of existing asset with CERC. The following connectivity was agreed by the members:

I. Connectivity system for NTPC Lara STPP 2x800MW stage-II generation project:

A. Under ISTS

(i) Reconductoring of Lara STPP I – Raigarh (Kotra) 400kV D/c line with HTLS conductor (Quad Moose capacity)

B. Under the scope of NTPC Ltd

(i) Shifting of Lara STPP I - Raigarh (Kotra) 400kV D/c line to Lara STPP-II bus so as to form Lara STPP II – Raigarh (Kotra) 400kV D/c line along with associated bays at generation end

(ii) Lara STPP-I & Lara STPP-II buses to be kept disconnected from each other under normal operating conditions

II. Revised connectivity system for NTPC Lara STPP 2x800MW stage-I generation project:

(i) Lara STPP I – Champa PS 400kV D/c (quad) line

19. **604 MW LTOA granted to Chattisgarh State Power Trading Company Ltd. (CSPTTrCL)**

19.1. CTU stated that LTA of 604 MW granted to CSPTTrCL from various generation projects in Chhattisgarh is as given below:

Sl. No.	Generation Project	LTA firmed up with CSPDCL	End date of firm power transfer to CSPDCL*	LTA on Target basis in WR
A. IPPs associated with HCTPC-V				
1	RKM Powergen Ltd (4X360)	0	NA	66
2	Athena Chhattisgarh Power Ltd. (2X600)	0	NA	55
3	Jindal Power Ltd. (4X600)	110	31.12.2030	0

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Sl. No.	Generation Project	LTA firmed up with CSPDCL	End date of firm power transfer to CSPDCL*	LTA on Target basis in WR
4	SKS Power Gen. (Ch.) Ltd. (4X300)	55	31.10.2030	0
5	Korba West Power Co. Ltd. (1X600)	27	31.12.2030	0
6	DB Power Ltd. (2X600)	0	NA	55
7	KSK Mahanadi Power Co. Ltd. (6X600)	82	31.12.2030	0
8	Bharat Aluminium Co. Ltd. (4X300)	55	31.12.2030	0
9	Vandana Vidyut Ltd. (2X135 + 1X270)	0	NA	25
10	Lanco Amarkantak Power Pvt. Ltd. (2X660)	0	NA	60
B. IPPs associated with HCTPC-IV & Part System of HCTPC-I				
1	Maruti Clean Coal & Power Ltd. (1x300 MW)	14	31.12.2030	0
	Total	343		261

*Based on CSPTCL NOCs dated 29.12.2017 & 10.12.2018

The TSAs/DIC status of Athena Chhattisgarh Power Ltd., Vandana Vidyut Ltd. and Lanco Amarkantak Power Pvt. Ltd. have been terminated vide their letters dated 27.11.2018, 13.02.2019 and 28.11.2018 respectively w.e.f. the effective date of LTA operationalization (i.e. 01.10.2017) on account of adverse progress as well as default in terms of CERC Regulations & Procedures, BPTA and TSA, making them ineligible to inject power into the grid through any form of open access.

19.2. The matter was taken up in the 36th meeting of WR constituents for Connectivity & LTA Applications held on 27.03.19, which was not attended by CSPTrdCL. However, CSPTrdCL vide e-mail dated 25.03.2019 had intimated that they would not be able to attend the meeting. Therefore, the matter of requirement of LTA by CSPTCL after termination of TSAs/DIC status of Athena Chhattisgarh Power Ltd., Vandana Vidyut Ltd. and Lanco Amarkantak Power Pvt. Ltd was decided to be taken up in the next meeting of Standing Committee Meeting on Power System Planning in Western Region.

19.3. CTU stated that as TSA signed with the above three IPPs have been terminated and the LTA has also been closed, therefore, it is suggested that CSPTrdCL may inform regarding requirement of LTA from the three IPPs.

19.4. CSPTCL stated that the issue would be taken up with CSPTrdCL.

19.5. Members noted the termination of TSAs/DIC status of Athena Chhattisgarh Power Ltd., Vandana Vidyut Ltd. and Lanco Amarkantak Power Pvt. Ltd by CTU and requested CSPTCL to inform CTU regarding LTA requirement of CSPTrdCL from above IPPs at the earliest.

20. STU and CTU interconnections proposed by GETCO.

20.1. CEA stated that considering future load growth and operational feedback from SLDC, GETCO has proposed establishment of new 220 kV substations at Chiloda, Sarigam

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and Khajod as a part of their intra-state network strengthening along with the following 220 kV interconnections with the CTU:

- i) Dehgam (PGCIL) – Chiloda 220 kV D/C line
- ii) LILO of Vapi (GETCO)–Tarapur (NPCIL) 220 kV S/C line at proposed Sarigam 220 kV substation
- iii) LILO of both circuits of Kawas (NTPC) – Navsari (PGCIL) 220 kV D/C line at proposed Khajod 220 kV substation

20.2. Establishment of Chiloda 220 kV substation through Dehgam (PGCIL) – Chiloda 220 kV D/C line

20.2.1. GETCO stated that 400/220 kV Dehgam (PGCIL) substation is having 400/220 kV, 2x315 MVA+1x500 MVA installed capacity along with four 220 kV outlets to GETCO s/s (220 kV D/C line each to Ranasan & Khanpur substations). The Dehgam–Khanpur 220 kV D/C line remains critically loaded with around 180-200 MW per circuit. Reconductoring of this line has already been planned and will be implemented in future.

Further, considering load growth surrounding Ahmedabad city area, upgradation of 132 kV Chiloda substation to 220 kV level along with LILO of Gandhinagar TPS – Soja / Ranasan 220 kV line at Chiloda substation has already been planned. However, to provide a strong 220 kV source, Dehgam (PGCIL) – Chiloda 220 kV D/C line has been proposed.

- 20.2.2. CEA enquired about the availability of space for provision of two nos. of 220 kV bays at Dehgam 400/220 kV substation.
- 20.2.3. CTU confirmed the availability of space for two nos. of 220 kV bays at Dehgam and enquired about the implementation time frame of Dehgam (PGCIL) – Chiloda 220 kV D/C line.
- 20.2.4. GETCO informed implementation time of 24 months for Dehgam (PGCIL) – Chiloda 220 kV D/C line.
- 20.2.5. The following scheme was agreed for establishment of Chiloda 220/132 kV substation:

Intra-state system by GETCO

- (i) Establishment of Chiloda 220/132 kV substation by upgrading of existing Chiloda 132 kV substation
- (ii) Dehgam (PGCIL) – Chiloda 220 kV D/C line.
- (iii) LILO of Gandhinagar TPS – Soja / Ranasan 220 kV line at Chiloda substation

Inter- State Transmission System

- (i) Two nos. of 220 kV bays at Dehgam 400/220 sustation.

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- (ii) Implementation time of 24 months (To be coordinated with GETCO to avoid any implementation mismatch).

20.3. Establishment of Sarigam 220 kV substation through LILO of Vapi (GETCO) – Tarapur (NPCIL) 220 kV S/C line.

- 20.3.1. GETCO stated that Umargam & Sarigam areas in South Gujarat are having huge industrial demand and are being fed through 66 kV lines from 220 kV Bhilad substation. Considering future load growth & limitation in outlets from 220 kV Bhilad substation, upgradation of 66 kV Sarigam substation to 220 kV level by constructing 220 kV D/C line from Bhilad substation has been planned as a part of intra-state system. To have additional infeed, LILO of Vapi (GETCO) – Tarapur (NPCIL) 220 kV S/c line at Sarigam substation has been proposed.
- 20.3.2. POSOCO stated that Vapi (GETCO) – Tarapur (NPCIL) 220 kV S/C line is associated with evacuation system of Tarapur nuclear generation project of NPCIL. Therefore, concurrence of NPCIL needs to be taken for the proposal.
- 20.3.3. GETCO stated that this line not a part of the islanding scheme of Tarapur, however, they would take up the proposal with NPCIL.
- 20.3.4. Members agreed to the proposal of LILO of Vapi (GETCO) – Tarapur (NPCIL) 220 kV S/C line at proposed Sarigam 220 kV substation (upgradation of existing 66 kV Sarigam substation) subject to approval by NPCIL.

20.4. Establishment of Khajod 220 kV substation through LILO of both circuits of Kawas (NTPC) – Navsari (PGCIL) 220 kV D/C line

- 20.4.1. GETCO stated that to meet future load growth surrounding Surat city area, 220 kV Khajod substation and its 220 connectivity through LILO of both circuits of Kawas (NTPC) – Navsari (PGCIL) 220 kV D/C line at Khajod substation has been planned as a part of intra-state system. Further, as an additional connectivity, LILO of Sachin (Talangpore) – Ichchhapore 220 kV S/C line at Khajod will also be taken up in future.
- 20.4.2. Members agreed with the GETCO proposal of establishment of Khajod 220 kV substation through LILO of both circuits of Kawas (NTPC) – Navsari (PGCIL) 220 kV D/C line, as a part of intra-state system. The scope of works is as given below:
- (i) Establishment of Khajod 220/66 kV substation.
- (ii) LILO of both circuits of Kawas (NTPC) – Navsari (PGCIL) 220 kV D/C line.
- (iii) LILO of Sachin (Talangpore) – Ichchhapore 220 kV S/C line at Khajod

20.5. Navsari (PG) – Bhestan/Popada (GETCO) 220 kV D/C line to be taken up as separate ISTS scheme on priority basis.

- 20.5.1. CEA stated that Navsari (PG) – Bhestan/Popada (GETCO) 220 kV D/C line was planned as a part of the transmission scheme “Transmission System associated with DGEN TPS (1200 MW) of Torrent Power Ltd.” which was awarded to M/s

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Instalaciones Inabensa through TBCB route. The implementation schedule of the scheme was 38 months i.e. May, 2018. M/s DGENTPL has not taken up the implementation of the scheme.

20.5.2. The issue of non-implementation of scheme by M/s DGENTPL has been deliberated in earlier standing committee meetings.

In the 42nd meeting of SCPSPWR held on 17.11.2017, it was agreed that the Navsari (PG) – Bhestan 220 kV D/C line is required on an urgent basis. It was decided that a separate meeting among CEA, CTU, GETCO, M/s Torrent Energy Ltd and PFCCL (BPC) would be called to deliberate upon the following:

- i) Necessary action / procedure for cancellation of the transmission scheme as per TSA.
- ii) Requirement of DGEN–Vadodara 400kV D/c line for evacuation of power from DGEN
- iii) Mode of implementation of Navsari (PG)–Bhestan 220 kV D/C line and DGEN–Vadodara 400 kV D/C line (if required).

In a meeting held on 23.01.2018 at CEA New Delhi, it was agreed that GETCO and CTU would explore scheme (apart from Navsari- Bhestan 220 kV D/C line) to reduce the overloading on the Vav-Popadiya/Sachin-Navsari (GETCO)-Navsari(PGCIL) 220 kV lines.

GETCO vide their letter dated 26.04.2019 has submitted due to space constraint at Navsari / Sachin substation, it is not possible to plan alternative scheme. Further, Navsari- Bhestan 220 kV D/C line is very important STU-CTU interconnection in the area and its implementation would relieve following congested lines in the area viz:

- (i) Navsari (PGCIL)–Navsari (GETCO) 220 kV D/C
- (ii) Vav – Bhestan 220 kV S/C
- (iii) Vav – Sachin 220 kV S/C.

20.5.3. GETCO stated that Navsari (PG) – Bhestan/Popada 220 kV D/C line may be dropped from DGEN scheme and needs to be taken-up on priority as a separate ISTS scheme.

20.5.4. CEA stated that in operational feedback by NLDC, overloading of Navsari (PG)-Navsari (GETCO) 220 kV D/c lines (loaded above 150MW/ckt most of the time and the system is not N-1 compliant, considering loading as 250MW per circuit) has been reported on consistent basis.

20.5.5. CTU stated that CERC vide its order dated 14.05.2019 has served notice to the Transmission Licensee (M/s DGENTPCL) of the transmission scheme “Transmission System associated with DGEN TPS (1200 MW) of Torrent Power Ltd.” stating that its license shall stand revoked w.e.f 15 days of the notice, if no response is received from the licensee.

20.5.6. In view of consistent overloading observed on Vav-Popadiya/Sachin-Navsari (GETCO)- Navsari (PGCIL) 220 kV lines, members agreed to delink the line from

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“Transmission System associated with DGEN TPS (1200 MW) of Torrent Power Ltd.” and take up the implementation of Navsari (PG) – Bhestan 220 kV D/C line as a separate ISTS scheme with the following scope of works:

- (i) Navsari (PG) – Bhestan 220 kV D/C line (with minimum capacity of 400MVA per circuit)
- (ii) 2 nos. of 220 kV line bays at Navsari 400/220 kV (PGCIL) substation (already implemented by PGCIL)
- (iii) 2 nos. of 220 kV bays at Bhestan/Popadiya(GETCO) 220 kV substation (already implemented by GETCO)

21. Progress of downstream network whose terminating bays are under construction by PGCIL

21.1. The 5.4. Proviso (iii) of Indian Electricity Grid Code (IEGC) (Fourth Amendment) Regulations, 2016, of CERC dated 06.04.2016 is as follows:

“Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other transmission licensee and both transmission systems are executed in a manner other than through tariff based competitive bidding, the transmission licensee shall endeavor to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate Implementation Agreement.”

The status of the 220 kV lines from various 400/220 kV substations is indicated in the table below:

Sl. No.	ISTS S/s	Voltage ratio, Trans. Cap	Unutilised bays	Status of ISTS bay	220kV lines for unutilised bays	Status of Lines
1	Mapusa (PG)	400/220kV (3x315 MVA)	2	Existing bay	Mapusa – Cuncolin 220 kV D/c line	GED has not yet furnished the updates. (No participation from Goa)
			2		Mapusa–Tuem 220 kV D/c line	The agency has been finalized for carrying out work from Mapusa to Tuem D/C line with GIS S/s at Tuem. The work will be awarded after the receipt of approval from the Govt. The completion period will be 20 months from the date of award. (No participation from Goa)
2	Pirana	400/220kV (2x315MVA)	2	Existing bay	Pirana – Barjadi 220 kV D/c line	March 20
3	Boisar	400/220kV (2x315kV+500 MVA)	1	Existing bay	Boisar – Borivali 220 kV line S/c line	Jun'19 (only one foundation left)

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4	Wardha	400/220 kV (2x315 MVA)	2	Existing bay	Wardha – Yeoavatmal 220 kV D/c line	Jun'19
5	Solapur	400/220 kV (2x315 +1x500 MVA)	2	Existing bay	Solapur – Bale (M) 220kV D/c line	Mar'20
			2		Solapur – Narangwadi 220 kV D/c line	Mar'20
6	Betul GIS	400/220 kV (2x315 MVA)	2	Existing bay	LILO of Sarni - Pandhurna 220kV line at Betul GIS (PGCIL)	Dec 19
7	Navi Mumbai	400/220 kV (2 x 315 MVA)	4	Existing bay	LILO of Apta – Taloja and Apta - Kalwa section of the Apta- Taloja/Kalwa 220 kV D/c line at Navi Mumbai (PG)	Agreed to be implemented under ISTS. Comm. Sch. - 30 months from date of transfer of SPV
8	Indore (PG)	400/220 kV (2 x 500 MVA)	2	Existing bay	Yet to plan	Yet to plan
9	Parli (PG)	400/220 kV (2x500 MVA)	2	Existing bay	LILO of Parli – Harangul 220 kV S/c line	Jun'19
10	Vadodar a GIS	400/220 kV (2 x 500 MVA)	2	Existing bay	220 kV Jhambua – Vadodara D/C Line	December 19
11	Navsari	400/220 kV (2x315MVA + 1x500 MVA)	2	Existing bay	Navsari – Bhestan 220kV D/c line	Agreed to be taken up as separate scheme.

400 kV line bays:

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S. No.	STS Substation	Proposed Bays	Commissioning Schedule	Lines emanating from Substation	Latest available status
1	Indore (PG)	2	Jul, 2018	Indore (PG) – Ujjain 400 kV D/c line	Dec, 2019
2	Vadodara(PG)	2	Sep, 2018	DGEN – Vadodara 400kV D/c line	Notice for license cancellation of Transmission Licensee (M/s DGENTPCL) of the transmission scheme "Transmission System associated with DGEN TPS (1200 MW) served by CERC. Subsequently, the license has been cancelled vide CERC order dated 11.06.19.

22. Western Region Strengthening Scheme- XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme- IX (NERSS-IX)

- 22.1. The scheme was recommended for implementation through TBCB route in the 37th meeting of erstwhile Empowered Committee held on 20.09.2017, which has been notified by MoP vide Gazette notification dated 04.05.2018. The transmission scheme includes four parts –A,B,C &D as detailed below:

Western Region Strengthening Scheme- XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme- IX (NERSS-IX)

Part A- Additional 400kV outlets from Banaskantha 765/400 kV S/s

S. No.	Name of the Transmission Element
1	LILO of second circuit of Zerda – Ranchodpura 400 kV D/c line at Banaskantha (PG) PS

Part B: Establishment of new substation at Vapi/Ambethi area and its associated transmission lines.

S. No.	Name of the Transmission Element
1.	Establishment of 2 x 500 MVA, 400/220 kV S/s near Vapi / Ambheti (Vapi – II) (GIS) ICTs : 2x500MVA, 400/220kV

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	<p><u>400kV</u></p> <ul style="list-style-type: none"> • ICT bays: 2 nos. • Line bays: 4 nos. • Space for 2x500MVA, 400/220kV ICTs (future) • Space for 400/220kV ICT bays (future): 2 nos. • Space for Line bays along with Line Reactors (future): 4 nos. <p><u>220kV</u></p> <ul style="list-style-type: none"> • ICT bays: 2 nos. • Line bays: 6 nos. (2 for Sayali (DNH) and 4 nos. for GETCO) • Space for 400/220kV ICT bays (future): 2 nos. • Space for Line bays (future): 6 nos.
2.	LILLO of KAPP – Vapi 400 kV D/c line at Vapi – II
3.	125 MVAr bus reactor at Vapi – II Substation
4.	<p>Vapi-II – Sayali D/C 220kV line</p> <ul style="list-style-type: none"> • From Vapi-II upto LILLO point of one circuit of Vapi (PG) –Khadoli 220kV D/c line at Sayali substation with ampacity equivalent to twin zebra conductor. • Interconnection with LILLO section (of LILLO of one circuit of Vapi (PG) – Khadoli 220kV D/c line at Sayali substation) so as to form Vapi-II – Sayali 220 kV D/c line and Vapi- Khadoli 220 kV D/c line. (The LILLO section is with zebra conductor)

Part C: Additional ISTS feed to Navi Mumbai 400/220 kV substation of POWERGRID

S. No.	Name of the Transmission Element
1.	Padghe (PG) – Kharghar 400 kV D/c (quad) line to be terminated into one ckt. of Kharghar – Ghatkopar 400 kV D/c (quad) line (thus forming Padghe (PG) - Kharghar 400 kV S/c (quad) line, Padghe (PG) - Ghatkopar 400 kV S/c (quad) line)
2.	LILLO of Padghe (PG) – Ghatkopar 400kV S/c line at Navi Mumbai GIS (PG) (with quad conductor)
3.	LILLO of Apta – Kalwa/Taloja 220 kV D/c line (i.e. Apta – Kalwa and Apta Taloja 220kV lines) at Navi Mumbai (PG)

Part D: North Eastern Region Strengthening Scheme – IX

S. No.	Name of the Transmission Element
1.	<p>Pare HEP (NEEPCO) (from near LILLO point)– North Lakhimpur (AEGCL) 132 kV D/c line (with ACSR Zebra conductor) along with 2 no. 132 kV line bays at North Lakhimpur end.</p> <p>Note: Two line bays at Pare HEP would be spare due to bypassing of LILLO of Ranganadi (NEEPCO) - Naharlagun / Nirjuli (POWERGRID) at Pare HEP (NEEPCO). The bays would be used for connecting with North Lakhimpur (AEGCL) S/s and this line will be constructed from LILLO portion.</p>

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2.	LILO of one circuit of Pare HEP – North Lakhimpur (AEGCL) 132kV D/c line (with ACSR Zebra) at Nirjuli (POWERGRID) substation
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22.2. Additional ISTS feed to Navi Mumbai 400/220 kV substation of POWERGRID:

The transmission scheme has been deliberated in the 35th, 38th, 40th, 41st and 42nd meeting of SCPSPWR and was agreed in 41st meeting of SCPSPWR and firmed up with modifications in the 42nd meeting of SCPSPWR. The scheme included portions to be implemented as a part of ISTS and Intra State Transmission scheme, as given below:

A. Under Inter State Transmission System (through TBCB)

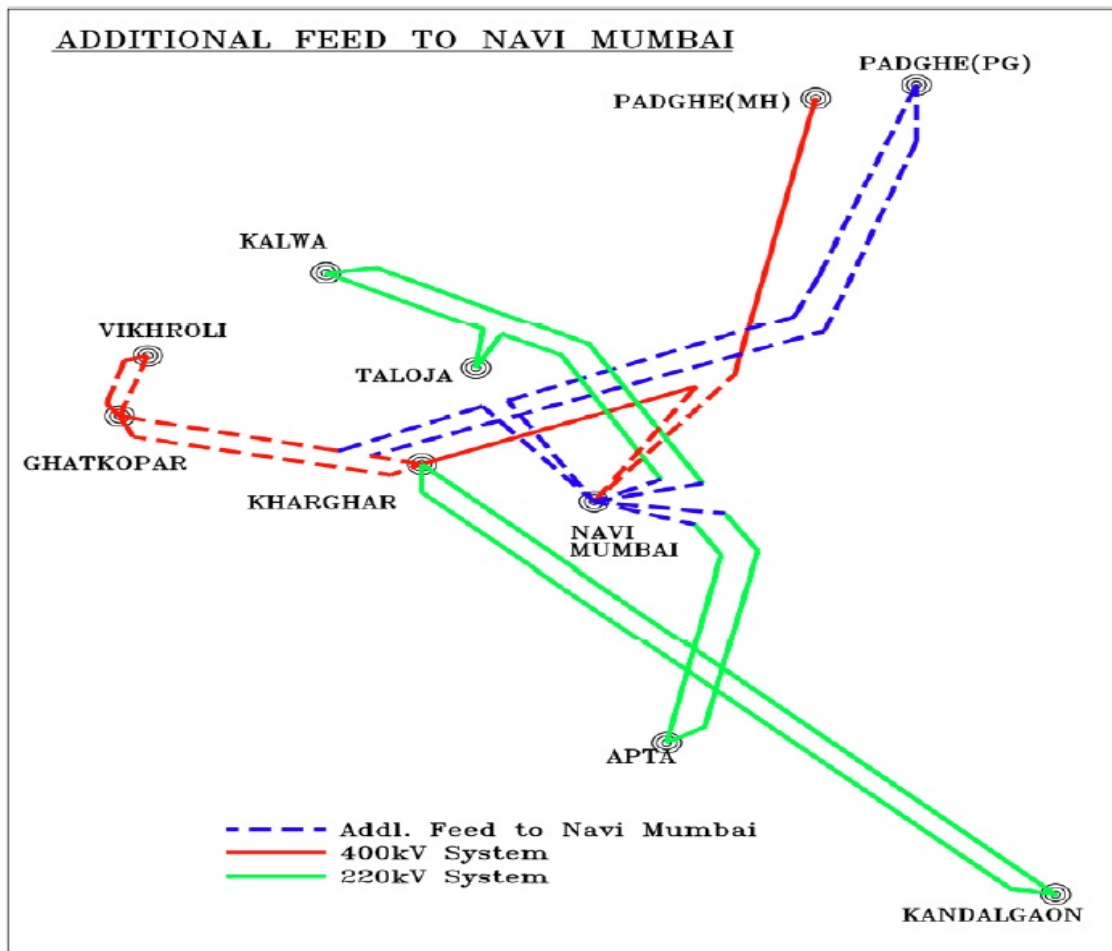
Transmission System for providing ISTS feed to Navi Mumbai and drawl of power:

- (i) Padghe (PG)–Kharghar 400 kV D/c (quad moose ampacity) line to be terminated into one ckt. of Kharghar–Ghatkopar 400 kV D/c line (thus forming Padghe (PG) – Kharghar 400 kV S/c (quad moose ampacity) line, Padghe (PG) - Ghatkopar 400 kV S/c (quad moose ampacity) line)
- (ii) LILO of Padghe (PG) – Ghatkopar 400kV S/c (quad moose ampacity) line at Navi Mumbai (PG)
- (iii) LILO of Apta–Taloja and Apta-Kalwa section of the Apta-Taloja/Kalwa 220 kV D/c line at Navi Mumbai (PG)

B. Under Intra State Transmission System (by MSETCL / Intra state Transmission Licensee)

- (i) Reconfiguration of the Kharghar – Kandalgaon 220 kV D/c line and Apta – Taloja / Kalwa 220 kV D/c at their crossing point for achieving balanced power on the 220 kV outlets from Navi Mumbai 400/220 substation.
- (ii) Implementation of the planned Kharghar–Ghatkopar 400 kV D/C line (Twin Moose conductor) as Kharghar–Ghatkopar 400 kV D/C (quad moose ampacity) line.

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In 43rd meeting of SCSPWR held on 11.05.2018, MSETCL agreed to expedite the implementation of Kharghar–Vikhroli 400 kV D/C quad line so that the same could be completed ahead of the ISTS scheme (Additional ISTS feed to Navi Mumbai 400/220 kV substation of POWERGRID). Regarding finalisation of coordinates of LILO point (for termination of 400 kV D/C quad line from 765/400 kV Padghe (GIS) into one ckt of Kharghar–Vikhroli 400 kV D/C quad line), it was agreed that the same would be deliberated in a separate meeting.

Accordingly, a meeting was held on 15.12.2018 at MSETCL office Mumbai, amongst MSETCL, CEA, CTU, BPC to deliberate on issues associated with additional ISTS feed to Navi Mumbai 400/220 kV substation of PGCIL under WRSS-XIX scheme. In the meeting, following issues were deliberated and agreed:

a) Identification of exact point of termination of Padghe (PG) – Kharghar 400 kV D/C (quad) line at Kharghar substation (MSETCL) end

The coordination of the LILO point for termination of Padghe – Kharghar D/C line at Kharghar – Ghatkopar line of MSETCL has been identified near Kharghar 400 kV S/s of MSETCL are 19^o2.34'34.5" N and 73^o3'35.43" E.

b) RoW issues along the Padghe – Kharghar line and LILO of 400 kV and 220 kV D/C lines at Navi Mumbai

For the RoW issues pertaining to transmission lines: LILO of Padghe (PG) – Ghatkopar (Vikhroli) 400kV S/c line at Navi Mumbai GIS (PG) and LILO of Apta – Kalwa/Taloja 220 kV D/C line (i.e. Apta – Kalwa and Apta – Taloja 220 kV

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lines) at Navi Mumbai (PGCIL), it was agreed that the bidders would be given option to consider suitable technological options like cable of equivalent rating, multi-circuit, GIL (gas insulated line) etc. to mitigate the RoW for the 2 km LILO (end portion at Navi Mumbai) of both 400 kV and 220 kV sections.

For RoW issues along Padghe – Kharghar line, it was agreed that in order to mitigate the RoW, the bidders may use any of the available technological options like monopole, GIL, narrow base towers etc.

22.3. Establishment of new substation at Vapi/Ambethi area and its associated transmission lines:

The scheme for establishment of new substation at Vapi/Ambethi area and its associated transmission lines was deliberated in the 39th, 40th, 41st and 42nd meeting of SCPSPWR. The scheme included portions to be implemented as a part of ISTS and Intra State Transmission scheme, as given below:

A. Under Inter State Transmission System (through TBCB)

- (i) Establishment of 2 x 500 MVA, 400/220 kV S/s near Vapi / Ambethi (Vapi – II)
- (ii) LILO of both circuits of KAPP – Vapi 400 kV D/c line at Vapi – II
- (iii) 1 x 125 MVA bus reactor at Vapi – II Substation
- (iv) Vapi-II – Sayali D/C 220kV line
 - From Vapi-II to LILO point of one circuit of Vapi (PG) –Khadoli 220kV D/C line at Sayali substation with ampacity equivalent to twin zebra conductor.
 - Interconnection with LILO section (of LILO of one circuit of Vapi (PG) – Khadoli 220 kV D/C line at Sayali substation) so as to form Vapi-II – Sayali 220 kV D/C line and Vapi- Khadoli 220 kV D/C line. The LILO section is with zebra conductor.

B. Under Intra State Transmission System (by GETCO)

220 kV outlets to be implemented by GETCO in matching time frame of the Vapi-II 400/220 kV substation:

- i) Vapi-II–Atul (GETCO) 220kV D/c line.
- ii) LILO of Chikhli (Ambetha)–Vapi (GETCO) 220 kV S/c line at Vapi-II

C. Under Intra State Transmission System (by DNH)

Reconductoring to be implemented by DNH in matching time frame of Vapi-II 400/220 kV substation:

- i) Reconductoring of the LILO section (of LILO of one circuit of Vapi(PG)–Khadoli 220kV D/C line at Sayali substation) with ampacity equivalent to twin zebra conductor in matching time-frame of the ISTS line i.e., Vapi-II – Sayali D/C 220kV line.

A meeting was held in CEA on 08.01.2019 to resolve the issues raised by the bidders in pre-bid meeting of the transmission project “Western Region System Strengthening Scheme XIX (WRSS-XIX). The following issues were deliberated and agreed upon in the meeting:

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(a) Implementation of Vapi-II/Ambethi 400kV S/s as GIS to reduce/optimize land requirement

Vapi-II 400/220 kV substation may be establishment as GIS substation to reduce the land requirement because Ambethi area is densely populated and there may be issues in getting about 40 acres contiguous land in this area.

(b) Location of Vapi-II 400kV substation

In the meeting, it was agreed that Vapi-II 400/220 kV S/s is to be established on west side of Kakrapar – Vapi 400 kV D/C line (existing line which is to be LILOed at Vapi-II 400/220 kV). The substation may be established in the region bounded by NH-48, SH- and Kakrapar – Vapi 400 kV D/C line.

22.4. CEA stated that the above modifications in the already agreed schemes have been incorporated in the RfP document of the scheme. The RfP submission (Technical and Financial bid) of the project is scheduled in last week of May 2019.

Kharghar–Ghatkopar 400 kV D/c line (under implementation by MSETCL) needs to be implemented in matching timeframe of Padghe (PG) – Kharghar 400 kV D/C (quad) line. In case of any delay in implementation of Kharghar–Ghatkopar 400 kV D/c line, MSETCL is required to expedite implementation of two nos. of 400 kV bays and 400 kV D/C line (about 300 m) up to termination point of Padghe – Kharghar D/C line.

MSETCL stated that Kharghar–Ghatkopar 400 kV D/c line would be implemented in matching time frame and in event of any delay, two nos. of 400 kV bays at Kharghar and 400 kV D/C line (about 300 m) up to termination point of Padghe – Kharghar D/C line would be implemented with priority so as to establish Padghe (PG) – Kharghar 400 kV D/C (quad) line.

22.5. UT of DNH stated that Part B of the scheme (Establishment of new substation at Vapi/Ambethi area and its associated transmission lines) includes Vapi-II – Sayali D/C 220kV line. Instead of implementation of Vapi-II – Sayali 220 kV D/c line, DNH proposed that Vapi-II – Wagchiba 220 kV D/C line may be implemented. Further, KAPP – Vapi-II 400 kV D/c line may be extended upto Kala S/s so that DNH load can become a part of islanding scheme for Kakrapar 2x 700 MW Kakrapar generation of NPCIL.

22.6. CEA stated that the proposed modification in the scheme may not possible at this stage as the bidding of this scheme is in advance stage. However, the modifications proposed by DNH would be studied and required modifications may be taken up as separate scheme in addition to the agreed scheme.

22.7. Members noted and concurred the changes done in the scheme.

23. Additional 400 kV feed to Goa and Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool by M/s Goa Tamnar Transmission Projects Limited through TBCB route.

A. Request for Early commissioning of the transmission scheme by M/s GTTPL

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B. Inclusion of LILO of both circuits Ambewadi – Ponda 220 kV D/C line at New 400/220 kV Substation of GTTPL under the scope of M/s GTTPL: proposal by Electricity Department, Goa

23.1. The transmission scheme “Additional 400 kV Feed to Goa and Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool” by M/s Goa Tamnar Transmission Projects Limited (GTTPL) is under implementation through TBCB route. The scope of works is as given below:

Additional 400 kV feed to Goa

A. Additional 400 kV feed to Goa

- a) LILO of one circuit of Narendra (existing) – Narendra (New) 400 kV D/C quad line at Xeldem
- b) Xeldem – Mapusa 400 kV D/C (quad) line
- c) Xeldem – Xeldem (existing) 220 kV HTLS D/C line (ampacity equivalent to twin moose conductor)
- d) Establishment of 400/220 kV substation at Xeldem

400 kV

- ICTs: 2x500 MVA, 400/220 kV
- ICT bays: 2 nos
- Line bays: 4 nos (2no. for Xeldem – Mapusa 400 kV D/C (quad) line & 2 nos for LILO of one ckt of Narendra (existing) – Narendra (New) 400 kV D/C quad line at Xeldem)
- Bus Reactor: 1x125 MVAR
- Bus Reactor Bay: 1 no
- Space for 2x500 MVA, 400/220 kV ICTs (future)
- Space for ICT bays (future): 2 nos
- Space for Line bays along with Line Reactors (future): 4 nos
- 1x63 MVAR switchable line reactor along with 500 Ohms NGR and its auxiliaries (for Narendra (existing) – Xeldem 400 kV line formed after LILO of one ckt of Narendra (existing) – Narendra (New) 400kV D/C quad line) at Xeldem)
- 1x80 MVAR switchable line reactor along with 500 Ohms NGR and its auxiliaries (for Narendra (New) –Xeldem 400 kV (quad) line formed after LILO of one ckt of Narendra (existing) – Narendra (New) 400 kV D/C quad line) at Xeldem

220 kV

- ICT bays: 2 nos
- Line bays: 6 nos
- Space for ICT bays (future): 2 nos
- Space for Line bays (future): 6 nos

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B. Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool

a) Dharamjaygarh Pool Section B - Raigarh (Tamnar) Pool 765 kV D/C line

Establishment of 400/220 kV substation at Xeldem under ISTS by M/s GTTPL also includes 6 nos. of 220 kV line bays. These 6 nos. of 220 kV bays are being implemented for termination of following 220 kV lines at Xeldem:

- (a) Xeldem - Xeldem (existing) 220 kV HTLS D/C line. The 220 kV line and 220 kV bays at Xeldem 400 kV S/s are under the scope of M/s GTTPL and 2 nos. of 220 kV line bays at Xeldem (existing) S/s are under the scope of GED.
- (b) LILO of 2nd circuit of Ambewadi - Ponda 220 kV D/C line at Xeldem - under the scope of GED
- (c) Xeldem - Verna 220 kV D/C line - under the scope of GED

23.2. The zero date of the project is 14.03.2018 and the project implementation timeline, as per the Transmission Service Agreement of the transmission scheme, is as indicated below:

Sl. No.	Name of the Transmission Element	Scheduled COD from Effective Date 14.03.2018	Percentage of Quoted Transmission Charges recoverable on Scheduled COD of the Element of the Project	Element(s) which are pre-required for declaring the commercial operation (COD) of the respective Element
a) Additional 400kV feed to Goa				
1	LILO of one ckt. of Narendra (existing) – Narendra (New) 400kV D/c quad line at Xeldem	44 months	33.14%	<i>COD of elements marked at Sl. 1 & 2 is linked with availability of element marked at Sl. 3. Hence, either elements 1 & 3 may be commissioned simultaneously or elements 2 & 3 may be commissioned simultaneously. Further, none of the elements can be commissioned independently as their utilisation is dependent on each other as mentioned above.</i>
2	Xeldem – Mapusa 400kV D/c (quad) line	38 months	9.73%	
3	Establishment of 2x500MVA, 400/220kV substation at Xeldem	38 months	25.96%	
b) Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool				
1	Dharamjaygarh Pool Section B – Raigarh (Tamnar) Pool 765kV D/c line	40 Months	31.17%	NIL

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23.3. Inclusion of LILO of both circuits Ambewadi – Ponda 220 kV D/C line at New 400/220 kV Substation of GTTPL under the scope of M/s GTTPL

23.3.1. CEA stated the LILO of 1st circuit of Ambewadi - Ponda 220 kV D/C line is already done at Xeldem (existing), further implementation of LILO of 2nd circuit of Ambewadi - Ponda 220 kV D/C line at Xeldem (ISTS) is under the scope of GED. However, Electricity Department of Goa has requested for inclusion of LILO of 220 kV Ambewadi - Ponda Line at Dharbhandora (Xeldem (New)) substation in the scope of works of M/s Goa Tamnar Transmission Projects Limited.

There was no representation of GED in the meeting.

CEA stated that as the scheme is already under implementation through TBCB route, inclusion of additional scope of works in the scheme being implemented by M/S GTTPL is not possible.

23.4. Request for Early commissioning of the transmission scheme by M/s GTTPL

23.4.1. CEA stated that M/s GTTPL has informed that they intend to commission following elements under the transmission scheme “Additional 400 kV Feed to Goa and Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool” by 20.06.2020:

- (i) Establishment of 2 x 500 MVA, 400/220 kV S/s at Xeldem
- (ii) Xeldem – Mapusa 400 kV D/c Quad line
- (iii) Dharamjaygarh Pool Section B – Raigarh Tamnar Pool 765 kV D/c line

M/s GTTPL has stated that early commissioning of the above elements would provide addition feed to Goa to meet their power demand with reliability. Further, Dharamjaygarh Pool Section B – Raigarh Tamnar Pool 765 kV D/c line would provide additional corridor to evacuate power from Raigarh (Tamnar).

23.4.2. NLDC in their operational feedback has reported voltage above 420kV for 35% of the time in the quarter October-December 2018. Almost every day one ckt of 400kV Kolhapur-Mapusa is kept out on high voltage which affects the N-1 security of Goa supply. Also in some occasions, high voltage has resulted in blackout of Goa system.

23.4.3. The elements (i) and (ii) under 23.4.1 would overcome operational constraints of Goa and element (iii) would provide additional corridor to evacuate power from Raigarh (Tamnar).

23.4.4. The early commissioning of the three elements proposed by M/s GTTPL was agreed. It was also agreed that the timeline could be firmed up in a separate meeting with GED and PGCIL so that associated upstream and downstream elements are also implemented in a matching time frame.

24. Operational Feedback of NLDC

The operational feedback of NLDC for the period from October’ 2018 to December’ 2018 is as follows:

Transmission Line Constraints

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S. No	Corridor Season/ Antecedent Conditions	Description of the constraints
1.	<p>400kV Kudus-Kala D/c corridor.</p> <p>Maharashtra Demand 18500-22000 MW, Nil SSP Generation, Less Gen. at TAPS</p>	<p>Constraints: 400 kV Kudus-Kala D/c lines carrying more than 500 MW each and the corridor is N-1 non-compliant. In Oct'18 & Nov'18, the corridor was N-1 non-compliant for 5% & 10% of the time respectively.</p> <p>Remedial Actions: Commissioning of 400kV Padghe (GIS) –Khargar and Padghe (GIS)-Ghatkopar would relieve Kudus-Kala D/C. 220kV outlets from Kudus would give some relief on Kudus-Kala D/C. At present 2x500MVA 400/220kV Kudus ICTs are idle charged in the absence of 220kV outlets.</p> <p>43rd SCM: 400 kV Bableshtar-Kudus D/C would be commissioned by May'19 and downstream network from Kudus would be commissioned by Mar'19.</p> <p>MSETCL has not yet furnished the updates.</p>
2	<p>Transmission system for Koradi St-II (3x660MW) and IEPL (1x270 MW)</p> <p>Koradi-II station is connected with 400 kV Koradi II-Koradi III D/C, 220 kV Koradi II-Kaulewada D/C and LILO of 400 kV Wardha-Warora one circuit (Interim arrangement).</p>	<p>Constraints: At present Koradi-II units (3 X 660 MW) are commissioned and managed with SPS. System is N-1 non-compliant and there is no generation at IEPL. Also high loading of 400kV Warora-Wardha S/C is observed resulting in restricted operation of Bhadarwati HVDC & Chandrapur-Padghe Bipole.</p> <p>Remedial Actions: The Evacuation plan for APML, Tirora (5x660 MW) Rattan India, Amravati (5x270 MW), Chandrapur st-2 (2x500 MW), IEPL (2x270MW) and Dhariwal (1x300 MW) need to be studied by the STU in order to check whether the existing plan and available network will provide secure evacuation under various n-1 contingencies. HVDC Bhadrawati is operated at maximum.</p> <p>1st WRSCT: - LILO of Chandrapur-I – Parli 400 kV S/c line at Warora (M) has been already planned as a part of Intra state transmission and is under implementation. MSETCL is yet to review the CTU/CEA proposal before finalization to decide LILO of one circuit of Warora PS –Parli (PG) D/c line at Warora (M) or Warora (M) – Warora Pool 400 kV D/c line.</p> <p>MSETCL has not yet furnished the updates.</p>
3	400 kV Bina-Shujalpur D/c	<p>Constraints: High loading above 600 MW/ckt observed on most of the time in Q3 (17-18). No constraint observed in this quarter.</p>

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S. No	Corridor Season/ Antecedent Conditions	Description of the constraints
	N-1 insecure operation of Bina -Shujalpur D/C after commissioning of Shujalpur – RAPS D/C coupled with high Demand in MP of above 12000 MW.	<p>Remedial Actions: Present Status: With the commissioning of Bipole of Champa-Kurukshetra, loading on Bina-Shujalpur D/C has reduced slightly. Commissioning of RAPS 7&8 generation would relieve the loading. 43rd SCM: CEA suggested Shujalpur 400 kV S/s may be interconnected with another source like Indore or Bhopal to address the high loadings on Bina-Shujalpur 400 kV D/C. Interconnection of Shujalpur and Bhopal (BDTCL) being proposed as a part of RE scheme</p>
4	400kV Padghe Kalwa-D/c High loading is observed in general during High demand in Mumbai system.	<p>Constraint: The corridor becomes N-1 non compliant when total loading is above 1100 MW. Many times Chandrapur-Padghe Bipole flow is restricted to control the loading on these lines. Also facilitating outage in this corridor on week days is difficult. Outages are being planned only on Saturday/Sundays with planned load shedding.</p> <p>Remedial Action: Commissioning of 400kV Ghatkopar S/S and Padghe (GIS)-Khargar, Padghe—Navi Mumbai-Ghatkopar and Khargar-Ghatkopar would give additional infeed to Mumbai and relieve loading of Padghe-Kalwa D/C. ISTS scheme is likely to be awarded in May 2019. MSETCL has not yet furnished the updates about Vikhroli S/s.</p>
5	220 kV Navsari (PG) - Navsari (GETCO) D/c Most of the time	<p>Constraints: These lines are loaded above 150MW/ckt most of the time and the system is N-1 non compliant (considering N-1 loading as 250MW). Non compliant observed for 70%, 5% & 30% of the time in month of Oct'18, Nov'18 & Dec'18 respectively.</p> <p>Remedial Actions: Commissioning of 400kV Vav (II) S/s is planned by Gujarat by making LILO of 400kV Jhanor-Navsari one ckt & Ukai-Kosamba one ckt and may relieve loading on 220kV Navsari (PG)-Navsari ckts. 220kV Navsari-Bhestan (Popada) D/C was to be implemented by DGENTPL under TBCB which is dropped at present. 43rd SCM: M/s DGENTPL has intimated that they are not developing the scheme. As agreed in a meeting held on 23.01.18 among CTU, GETCO and NLDC, CTU and GETCO may study and plan the transmission scheme to reduce the over-loading of 220kV Vav-Popadiya, Vav-Navsari, and</p>

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S. No	Corridor Season/ Antecedent Conditions	Description of the constraints
		Navsari-Navsari (PG). GETCO stated that 400 kV Vav S/s would be commissioned by August 2019
6	220kV Boisar-Boisar T/C With high demand of Mumbai and less generation at 220kV Tarapur, Trombay and Dahanu	<p>Constraint: Non compliance observed for 58%(avg) of the time during this quarter.The ckts are mostly loaded above 200MW each and managed with load trimming scheme implemented by MSETCL. With commissioning of 4th ICT at Boisar, the loading on ckts has further increased. One ckt of 400kV Aurangabad-Boisar D/C and one ICT is kept open to control the loading on 220kV Boisar-Boisar ckts.</p> <p>Remedial Actions: 43rd SCM: MSETCL stated that additional (4th) Ckt. between Boisar (PG)–Boisar (M) (LILO of Boisar–Borivali at Boisar (PG)) is scheduled for June, 2018. MSETCL has not yet furnished the updates.</p>
7	220kV Jhanor(NTPC)-Haldarwa-D/c Almost most of the time with Jhanor gen. above 300MW.	<p>Constraint: When the lines are carrying more than 150MW/ckt, the system is N-1 non compliant. 15% & 5% of the time lines were N-1 non compliant in the month of Oct'18 & Dec'18. Many reliability measures like bus split at Jhanor, and generation reduction had to be taken to facilitate the shutdown of one line.</p> <p>Remedial Actions: LILO of 220kV Haldarwa-Jagadia S/C line at Jhanor would relieve the loading. The LILO has been agreed in 36th SCM of WR.</p> <p>35th WRPC &TCC discussions: In the 35th WRPC meeting GETCO had intimated that the works associated with line have been already completed. However, the 220 kV bays at Jhanor are expected by Sept 2018, therefore the LILO of 220 kV Haldarwa–Jagadia S/C line at Jhanor S/s would be completed by Sept, 2018.</p> <p>GETCO stated that LILO of 220kV Haldarwa-Jagadia S/C line at Jhanor is ready. However, bay work are pending due to Bus-Bar protection scheme & panel drawing issues with NTPC. It would take three months after clearance from NTPC.</p>
8	220kV Amreli-Sawarkundla D/c High loading during Rabi season and when generation at Padva BECL and GPPC is	<p>Constraint: When total loading on lines is equal or above 300MW, the system becomes N-1 non compliant (N-1 loading considered as 250MW). 55% of the time, lines were N-1 non compliant during this quarter.</p> <p>Remedial Action: Gujarat STU Plan (17-18): LILO of one circuit of</p>

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S. No	Corridor Season/ Antecedent Conditions	Description of the constraints
	not available in Gujarat system.	220 KV D/C Amreli – Dhasa line at Botad. GETCO stated that LILO of one circuit of 220 KV D/C Amreli – Dhasa line at Botad has already been commissioned and around 25-30 MW load has been reduced in 220kV Amreli-Sawarkundla D/c line.
9	220kV Ukai-Mota D/c When Ukai generation is high at 220kV side.	Constraint: When total loading on these lines is equal or above 340MW, the corridor becomes N-1 non compliant. Remedial Action: Commissioning of 400kV Vav S/s planned by Gujarat by making LILO of 400kV Jhanor-Navsari one ckt & Ukai-Kosamba one ckt would help in relieving the constraint. 43rd SCM: GETCO stated that 400 kV Vav S/s would be commissioned by March, 2019. GETCO stated that 400 kV Vav S/s would be commissioned by August 2019.
10.	220kV Pune PG-Talegaon D/c All the time	Constraint: 83 %(avg) of the time lines were N-1 non compliant during the quarter with total loading of more than 250MW. Further one ICT at Pune PG is kept out to control the line loading. Remedial Action- 43rd SCM: 220kV Talegaon (PG)–Talegaon (M)–Urse–Chinchwad 220 kV D/C is planned & under implementation and this line has been completed up to Urse S/s. Thus, Pune (PG) and Talegaon(M) have 4 no. of 220 kV lines. However, 2 no. of Talegaon (PG) – Talegaon (M) are kept open to restrict the loading on 220kV Urse–Chinchwad. It was intimated that Urse–Chinchwad 220 kV D/C and Pune (PG)–Hingewadi 220 kV D/C would be completed by Dec, 2018. Present Status: Lines have not yet commissioned. MSETCL has not yet furnished the updates.
11.	220kV DSPM-Korba(E) With full generation in DSPM and less generation in Korba East and Budhipadar	Constraint: DSPM (2x250 MW) generation was planned with LILO of existing 220kV Korba West-Korba East one ckt and 220kV Suhela-Banari line. No additional lines were planned for DSPM evacuation. This has resulted in overloading of 220kV DSPM-Korba East line when the power flow is towards Budhipadar end. SLDC CSPTCL raised concerns of forced backing down at DSPM even when they were overdrawing from the grid. For more than 55% (Avg) of the time line was loaded above 200MW during the quarter. Remedial Action: Additional 220 kV lines to be planned for DSPM generation and strengthen the

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S. No	Corridor Season/ Antecedent Conditions	Description of the constraints
		<p>interconnection between K(E) and DSPM.</p> <p>43rd SCM: CSPTCL stated that LILO of 220 kV Siltara – Korba (E) S/C at DSPM is under implementation, which would be completed by Aug, 2018. However, the 2 no. of 220 kV bays at DSPM have to be provided by M/s CSPGCL, which are expected to be ready by December, 2019.</p> <p>CSPTCL has not yet furnished the updates.</p> <p>Tower erection completed. Bay works would be completed by Dec 19.</p>
12	<p>400kV Chandrapur- Chandrapur(II) D/C</p> <p>When generation at Chandrapur is less and Chandrapur(II) is high</p>	<p>Constraint: Less generation at Chandrapur is leading to critical loading on these lines. Chandrapur-Padghe HVDC flow had to be restricted to ensure N-1 security of these lines, which reduced the operational flexibility with HVDC and also caused low voltages at Parli, Lonikhand & Padghe area.</p> <p>Remedial Action</p> <p>1st WRSCT: LILO of one circuit of Chandrapur-I – Bhadravati 400 kV 2xD/c line at Chandrapur-II.</p> <p>MSETCL has not yet furnished the updates.</p>
13	<p>400kV Tarapur-Boisar D/C</p> <p>With full generation of Tarapur</p>	<p>Constraint: 400kV TAPS-Boisar D/C (20.88km each) lines are shorter lines compared to TAPS-Padghe D/c (91km each) lines and Boisar being load centre, the power flows are not uniform and higher on shorter lines. The power flow further increases with the outage of Aurangabad-Boisar one ckt. TAPS-Boisar D/C being short lines, on tripping of one ckt, 80% of total power flows on the other line. It is difficult to provide shutdown of the lines and NPCIL is always writing to WRLDC to maintain uniform flow on all lines from TAPS and also to control the flow on TAPS-Boisar lines whenever the flow is more than 500MW. HVDC Chandrapur-Padghe maximisation is restricted with constraints at SI No. 12.</p>
14	<p>220kV Gwalior PG- Mahalgaon D/c lines</p> <p>During Rabi crop season, when demand above 11000MW</p>	<p>Constraint: The lines were carrying more than 260MW for 60% of the time and were N-1 non-compliant during the quarter.</p> <p>MPPTCL updates awaited</p>
15	<p>220kV Itarsi PG-Itarsi D/c lines</p> <p>During Rabi crop season, when demand above 11000MW</p>	<p>Constraint: More than 90% of the time, the lines were carrying above 260MW (total) and was N-1 non compliant in month of Oct'18 & for more than 20% of the time during Nov'18 & Dec'18.</p> <p>MPPTCL updates awaited</p>

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S. No	Corridor Season/ Antecedent Conditions	Description of the constraints
16	400kV Parli PG-Parli MS D/c loading High demand of Maharashtra	<p>When total loading on lines is equal or above 900MW, the system becomes N-1 non compliant. More than 65%, 30% & 15% of the time, the system was N-1 non compliant in the month of Oct'18, Nov'18 & Dec'18 respectively.</p> <p>Remedial Action: 2x500MVA ICTs and bays at Parli (PG) are commissioned in July'18.</p> <p>43rd SCM: The LILO of 220 kV Parli–Harangul S/c at Parli (PG) was expected to be Commissioned by Dec, 2018. LILO of Osmanabad (M)–Parli 220 kV S/c at Parli (PG) just completed on 18.1.19 and relieved the loading on Parli-(PG)-Parli (MS) lines considerably.</p>

ICT Constraints

S. No.	ICT	Season/ Antecedent Conditions	Description of the constraints
1	2 x 315 MVA 400/220 kV Chakan ICTs	All time	<p>Constraints:</p> <p>The system is not N-1 compliant with each ICT carrying more than 220MW. MSETCL has implemented load trimming scheme to take care of overloading.</p> <p>Remedial Actions:</p> <p>43rd SCM: MSETCL intimated that LoI has been placed for additional 400/220 kV, 315 MVA ICT at Chakan S/s and the same is</p>

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S. No.	ICT	Season/ Antecedent Conditions	Description of the constraints
			<p>expected to be commissioned by March,2019.</p> <p>MSETCL has not yet furnished the updates.</p>
2	(2x315+1x 500MVA) 400/220kV Parli(MS) ICTs	Demand of Maharashtra 22000MW & Drawl of 8000MW. Low Parli generation	<p>Constraints: During the quarter, ICTs were n-1 non-compliant (N-1 of 500MVA ICT) for 13% of time in Oct'18 and 23% of the time in Nov'18. The ICT loading increases further if the generation is less at Parli. MSETCL has implemented load trimming scheme to take care of overloading under contingencies.</p> <p>Remedial Actions: 2x500MVA ICTs and bays at Parli (PG) are commissioned in July'18.</p> <p>43rd SCM: The LILO of 220 kV Parli–Harangul S/c at Parli (PG) was expected to be Commissioned by Dec, 2018 and LILO of Osmanabad (M)–Parli 220 kV S/c at Parli (PG) was expected by Sep, 2018.</p> <p>Present Status: LILO of Osmanabad (M)–Parli 220 kV S/c at Parli (PG) just completed on 18.1.19.</p> <p>MSETCL has not yet furnished the updates.</p>
3	2x315+ 1x500MVA 400/220kV Kolhapur (MS) ICTs	Demand of Maharashtra 22000MW & Drawl of 8000MW. Low Wind generation in Southern part.	<p>Constraints: The ICTs are N-1 non-compliant when wind generation is very low in Southern Maharashtra. In April 2017, two blackouts have occurred at Karad and Kolhapur S/s causing load loss of more than 1800 MW. MSETCL thereafter planned and implemented load trimming scheme.</p> <p>Remedial Actions: 43rd SCM: LILO of 220 kV Vita-Miraj S/C line at Alkud S/s by Sep'18.</p> <p>220 kV Jet–Mhaisal S/c line at Alkud S/s by Mar'19. Replacement of one 315 MVA ICT by 500 MVA at Kolhapur MS.</p> <p>Operationalization of 220kV Kolhapur-Chikkodi & 220kV Mudsungi-Chikkodi would relieve the loading on ICTs and improve reliability of supply in Kolhapur area.</p>

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S. No.	ICT	Season/ Antecedent Conditions	Description of the constraints
			<p>Present Status: Vita-Miraj LILO at Alkud completed on 1-Oct-18.</p> <p>MSETCL has not yet furnished the updates.</p>
4	2x500MVA 400/220kV Sholapur (MS) ICTs	With Demand in Maharashtra system above 22000 MW & Drawl of 8000MW.	<p>Constraints: It is observed that the ICTs are highly loaded and N-1 non-compliant.</p> <p>MSETCL has implemented load trimming scheme to take care of overloading. No constraint observed in this quarter.</p> <p>Remedial Actions: To control overloading, load has to be shifted from Lamboti ICTs to Sholapur (PG) ICTs which are underutilised. As an intrim arrangement 400kV Solapur PG-Karad S/c line is being used as 220kV Solapur PG-Jeur S/c line which relieved the loading on Solapur MS ICT's.</p> <p>43rd SCM: ICT-3(500 MVA) is proposed at Solapur (MS) & expected by Mar'19.</p> <p>Present Status: With the COD of Unit-1 at Solapur NTPC, constraints were observed in the 400kV Solapur –Kolhapur & 400kV Solapur-Alkud lines under N-1 contingency. Restoration of 400kV Solapur-Karad to be done on priority basis.</p> <p>MSETCL has not yet furnished the updates.</p>
6.	2x500MVA +1x600MVA 400/220kV Kalwa ICTs	Maharashtra system above 22000 MW (Mumbai 2900 MW) & Drawl of 8000MW.	<p>Constraints: With increased demand and low network augmentation in the area, the system is not N-1 compliant. For about 35% and 15% of the time, the ICTs were N-1 non compliant in the month of Oct'18 & Nov'18.</p> <p>Remedial Actions: The Navi Mumbai substation need to be utilized with 220 kV network augmentation. 400kV Ghatkopar S/s and 400kV Navi Mumbai to be expedited along with commissioning of 400kV Padghe GIS-Kharghar-Ghatkopar & 400kV Padghe GIS-Navi Mumbai-Ghatkopar lines.</p> <p>As per 42nd SCM: MSETCL intimated that 4th 400/220 kV 500 MVA ICT at Kalwa S/S is expected to be commissioned by June 2018.</p> <p>Present Status: Fourth ICT is not yet</p>

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S. No.	ICT	Season/ Antecedent Conditions	Description of the constraints
			commissioned. MSETCL has not yet furnished the updates.
7	315MVA+ 500MVA 400/220kV Itarsi ICTs	Madhya Pradesh Demand above 12000MW	<p>Constraint : System is not N-1 compliant for tripping of 500MVA ICT. For about 20% of the time ICTs were N-1 non compliant in month of Oct'18.</p> <p>Remedial Actions: Load trimming scheme to be planned by SLDC, MP/MPPTCL for contingency of 500 MVA ICT.</p> <p>43rd SCM: MP has planned 220kV Itarsi-Budhini D/C which would carry 100MVA load. Therefore, instead of replacing the 315MVA ICT with 500MVA ICT, 3rd 500 MVA, 400/220kV ICT at Itarsi S/s is approved in 1st WRSCT meeting.</p>
8	2x315MVA 400/220kV Kala ICTs	With commissioning of 765kV Aurangabad PG-Padghe D/c, 400kV Padghe- Kudus -Kala D/c corridor and increased load of DNH	<p>Constraint: It is observed that ICTs are loaded above 250MW and are N-1 non-compliant. One ckt of 765kV Aurangabad-Padghe is opened to control Kala ICT loading.</p> <p>Remedial Actions: 43rd SCM: 3rd ICT of 500 MVA is planned and expected in Sep'18.</p> <p>Present Status: Kala ICT-3(500 MVA) charged on 21-Nov-18. ICT loadings are relieved however constraint shifted from ICTs to 400kV Kudus-Kala D/c lines.</p>
9	2x315MVA ICTs at Raita	With Demand 4000MW & drawl & above 1300 MW in Chhattisgarh	<p>Constraint: When total loading of ICTs is above 450MW, it becomes N-1 non-compliant & for about 20% of the time ICTs were N-1 non-compliant in month of Oct'18.</p> <p>CSPTCL has not yet furnished the updates.</p>
10	2x315MVA ICTs at Akola- MS	Demand of Maharashtra above 21000MW & Drwal of 7500MW	<p>Constraint: Akola ICTs becomes N-1 non compliant when total loading is above 420MW.</p> <p>In the month of Oct'18 & Nov'18 more than 20% of the time, ICTs were N-1 non compliant.</p> <p>Remedial Action: Maharashtra has implemented load trimming scheme for ICT overloading.</p> <p>Additional ICT may be planned at Akola. MSETCL has not yet furnished the updates.</p>

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S. No.	ICT	Season/ Antecedent Conditions	Description of the constraints
11	2x315MVA ICTs at Wardha- PG	Demand of Maharashtra above 22000MW & Drwal of 8000MW	Constraiant: ICTs becomes N-1 non-compliant when total loading is above 440MW. More than 40% and 20% of the time, ICTs were N-1 non compliant in month of Oct'18 & Nov'18. Remedial Action: After implementation of scheme to control fault level at Wardha S/s, the ICT loading is expected to significantly reduce.
12	2x315MVA ICTs at Bhatapara-PG	Demand of Chhattisgarh above 4000MW with 1300MW drawl	Constraiant: ICTs becomes N-1 non compliant when total loading above 430MW. More than 40% of the time ICTs were N-1 non compliant in the month of Oct'18. CSPTCL has not yet furnished the updates.
13	2x315MVA ICTs at Raigarh PG	Demand of Chhattisgarh above 4000MW with 1300MW drawl	Constraiant: ICTs becomes N-1 non compliant when total loading is above 400MW. More than 80% of the time ICTs were N-1 non compliant in the month of Oct'18 and about 5% of the time in the month of Nov'18. CSPTCL has not yet furnished the updates
14	2x1500MVA ICTs at Ektuni	When ICTs loaded above 900MW & High generation at Tirora & Koradi(II)	Constraint: When total loading on ICTs crosses above 1800MW, ICTs becomes N-1 non compliant (N-1 loading considered as 1617MW i.e 110% of rating). For about 5% of the time ICTs were N-1 non compliant in month of Oct'18 & Nov'18. Further loading on these ICTs are sensitive to generation at APML Tirora (18%) & Koradi (II) (13%). MSETCL has not yet furnished the updates.
15	3x315MVA ICTs at Bina MPPTCL	MP demand of about 11000MW and above	Constraiant: ICTs becomes N-1 non compliant when total loading is above 750MW. For about 10% & 20% of the time ICTs were N-1 non compliant in the month of Nov'18 % Dec'18. Remedial Action: To control the loading, 220kV Bina-Shivpuri and 220kV Bina-Datia lines were opened in some of the instances by MP.
16	2x315MVA ICTs at Morena (CWRTL)	MP demand of 12000MW, Drawl of about 6500MW during Ravi	Constraiant: ICTs becomes N-1 non compliant when total loading is above 440MW. For about 10% of the time ICTs were N-1 non compliant in the month of

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S. No.	ICT	Season/ Antecedent Conditions	Description of the constraints
		Crop Season	Dec'18. 1st WRSCT: 220kV Morena-Bhind D/c planned for meeting the load of around 100MW in Bhind area that would further increase the loading of these ICTs. MPPTCL has not yet furnished the updates.
17	2x315MVA ICTs at Pitampura	MP demand 11000MW, Drawl 6500MW.	Constraint: ICTs becomes N-1 non compliant when total loading is above 440MW. For about 20%, 30% & 10% of the time ICTs were N-1 non compliant in the month of Oct'18, Nov'18 & Dec'18 respectively. 3 rd ICT at Pitahampur to be installed by MPPTCL.
18	2x315,1x500 MVA ICTs at Satna-PG	MP demand 11000MW, Drawl 6500MW.	Constraint: ICTs becomes N-1 non compliant when total loading is above 730MW. For about 30% of the time ICTs were N-1 non compliant in the month of Oct'18, Nov'18 & about 8% of the time in Dec'18. 220kV Satna PG-Maihar line was kept open to control the ICTs loading by SLDC MP. MPPTCL has not yet furnished the updates.
19	2x315 MVA ICTs at Seoni- PG	MP demand 11000MW	Constraint: ICTs becomes N-1 non compliant when total loading is above 380MW. Loading was more due to prolonged outage of ICT at Satpura from 19 th April 2018. This ICT will be disconnected from Grid as intimated by SLDC MP in 514 th OCCM of WR. Outage on Seoni ICT could not be facilitated in day time and allowed only after 2000hrs. MPPTCL has not yet furnished the updates.

25. Transmission System for evacuation of Power from potential solar and wind energy zones (10.5 GW= 3 GW Solar + 7.5 GW Wind) in Western Region under Phase-I.

25.1. CEA stated that Govt. of India had set a target for establishing 175 GW renewable capacity by 2022, which includes 100 GW Solar, 60 GW Wind generation capacity. MNRE vide its order dated 08.06.2018 had constituted a Sub-Committee to identify ISTS connectivity for renewable energy projects from potential solar energy zones (SEZs) and potential wind energy zones (WEZs) of about 50 GW and 16.5 GW respectively. SEZs and WEZs envisaged in 7 RE rich states (Tamil Nadu, Andhra

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Pradesh, Karnataka, Gujarat, Rajasthan, Maharashtra and Madhya Pradesh) were identified by SECI in association with MNRE in consultation with RE power developers.

To ease implementation of transmission infrastructure, it was proposed to bifurcate these requirements in two phases. A total of 20GW solar & 9 GW wind projects has been planned in Phase-I (up to Dec'2020) and 30 GW solar & 7.5 GW wind has been planned for Phase-II (Dec '2021). For Western Region the same translates into a requirement of 7.5GW solar and 3GW wind [10.5GW] in Phase-I (up to Dec'2020) and 12.5GW solar and 5GW wind [17.5GW] in Phase-II (Dec '2021) totalling to 28GW. The details of SEZs & WEZs in Western Region are given below:

State/District	Solar Energy Zones			Wind Energy Zones			Total (Solar + Wind)		
	Ph-1 (GW)	Ph-2 (GW)	Total	Ph-1 (GW)	Ph-2 (GW)	Total	Ph-1 (GW)	Ph-2 (GW)	Total
	2020	2021		2020	2021		2020	2021	
Gujarat									
Kutch (S: Rapar; W: Bhuj & Lakadia)	3	2	5	2	2	4	5	4	9
Banaskantha (S: Vav / Tharad)	0	2.5	2.5	0	0	0	0	2.5	2.5
Jamnagar (S: Lalpur)	1	1.5	2.5	0	0	0	1	1.5	2.5
Dwarka (W)	0	0	0	1	1	2	1	1	2
Subtotal	4	6	10	3	3	6	7	9	16
Maharashtra									
Osmanabad	0	0	0	0	2	2	0	2	2
Solapur	1	1.5	2.5	0	0	0	1	1.5	2.5
Wardha	0	2.5	2.5	0	0	0	0	2.5	2.5
Subtotal	1	4	5	0	2	2	1	6	7
Madhya Pradesh									
Rajgarh	2.5	0	2.5	0	0	0	2.5	0	2.5
Khandwa	0	2.5	2.5	0	0	0	0	2.5	2.5
Subtotal	2.5	2.5	5	0	0	0	2.5	2.5	5
Total	7.5	12.5	20	3	5	8	10.5	17.5	28

25.2. The transmission schemes for evacuation of power from potential solar and wind energy zones for **10.5 GW (7.5 GW wind + 3 GW solar)** under Phase-I were agreed in the 1st meeting of Western Region Standing Committee on Transmission (WRSC) held on 5.9.2018. The schemes were further deliberated in the 2nd NCT meeting held on 04.12.2018 & 3rd ECT meeting held on 21.12.2018. The transmission scheme associated with potential RE projects in Western Region along with recommendation of 2nd NCT and 3rd ECT regarding its implementation is as given below:

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S. No.	Name of Scheme:	Estd cost (Rs. Cr.)	ECT Recomd.	Allocated to BPC
1.	Additional 1x500MVA 400/220kV (9 th) ICT, for injection from any additional RE project (other than 4000MW injection under SECI bids upto Tranche IV) at Bhuj PS	56.3	RTM (POWERGRID)	-
2.	WRSS-21 Part-A (TBCB)- "Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS	856	TBCB	REC
3.	WRSS-21 Part-A (RTM) - Conversion of existing 2x63MVAR line reactors at Bhachau end of Bhachau – EPGL 400kV D/c line to switchable line reactors	19	RTM (POWERGRID)	
4.	WRSS-21 Part-B- Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS:	1865	TBCB	PFC
5.	Transmission system associated with RE generations at Bhuj-II, Dwarka & Lakadia	1075	TBCB	REC
6.	Transmission System for providing connectivity to RE projects at Bhuj-II (2000MW) in Gujarat	645	TBCB	PFC
7.	Jam Khambhaliya Pooling Station and Interconnection of Jam Khambhaliya Pooling Station for providing connectivity to RE projects (1500 MW) in Dwarka (Gujarat) and installation of 400/220 kV ICT along with associated bays at M/s CGPL Switchyard	435 (229+169+37)	TBCB	REC
8.	400kV line bay at Solapur PS for St-II connectivity to M/s Toramba	10	RTM (POWERGRID)	
9.	Transmission System for providing connectivity to RE projects in Gujarat [Lakadia (2000MW)]*	196	Proposed for potential basis based on the LTA applications of SECI	
10.	Transmission system associated with RE generations from potential wind energy zones in Osmanabad area of Maharashtra*	301		
11.	Transmission system associated with RE generations from potential Solar Energy Zone in Maharashtra (1000 MW under Ph-I)*	220		

* The schemes to be taken up for implementation after receipt of connectivity/LTA applications from RE generation developers / LTA applications from SECI

25.3. Transmission system associated with RE generations (10.5 GW) in Western Region, interalia, included creation of pooling stations in **Gujarat [Wind: Bhuj II (2000 MW), Lakadia (2000 MW) & Dwarka (1500 MW); Solar: Lakadia (2000 MW)] and Maharashtra [Wind: Osmanabad (2000 MW) & Solar: Solapur (1000 MW)]** and associated transmission lines as given below:

- i) Bhuj PS – Lakadia PS 765 kV D/c line
- ii) LILO of Bhachau – EPGL 400 kV D/c (triple) line at Lakadia PS
- iii) Lakadia – Vadodara 765 kV D/c line
- iv) Lakadia PS – Banaskantha PS 765 kV D/c line
- v) Reconfiguration of Bhuj PS – Lakadia PS 765kV D/c line so as to establish Bhuj II – Lakadia 765 kV D/c line as well as Bhuj – Bhuj II 765kV D/c line

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- vi) Extension of Essar – Lakadia/Bhachau 400kV D/c (triple) line up to Jam Khambhaliya PS
- vii) LILO of both circuits of Parli(PG) – Pune(GIS) 400kV D/c line at Kallam PS
- viii) Solapur pooling point – Solapur (PG) 400 kV D/c line (twin HTLS)

25.4. CTU stated that provision of spare ICT and Reactors in already agreed transmission scheme for integration of envisaged RE generation capacity in Solar & Wind Energy Zones (10.5 GW) also needs to be included. The following spare ICTs and reactors are proposed to be included in the already agreed schemes:

S.No	Approved in the 3 rd ECT meeting held on 21.12.2018	Corresponding Spare ICT / Reactors units to be additionally included
1	Establishment of 2x1500MVA, 765/400kV Lakadia PS with 765kV (1x330MVAR) & 400kV (1x125 MVAR) bus reactor (<i>under WRSS-21 Part-A- Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS</i>)	<ul style="list-style-type: none"> • 1x500 MVA, 765/400 kV, 1-ph ICT (spare unit) at Lakadia end. • 1x110 MVAR, 765 kV, 1-ph Reactor (spare unit) at Lakadia end. (for both 1x330MVA bus reactor under Part A and 1x330MVA line reactor on Lakadia – Vadodara line under Part B)
2	330MVA switchable line reactors at both ends of Lakadia–Vadodara 765kV D/c line (<i>under WRSS-21 Part-B- Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS</i>)	<ul style="list-style-type: none"> • 1x110 MVAR, 765 kV, 1-ph switchable line reactor (spare unit) at Vadodara end
3	240MVA switchable Line reactor at Lakadia PS end of Lakadia PS – Banaskantha PS 765kV D/c line (<i>under Transmission System associated with RE generations at Bhuj–II, Dwarka & Lakadia</i>)	<ul style="list-style-type: none"> • 1x80 MVAR, 765 kV, 1-ph switchable line reactor (spare unit) at Lakadia end
4	Establishment of 2x1500MVA, (765/400kV), 4x500MVA(400/220kV) Bhuj-II PS (GIS) with 765kV (1x330MVAR) and 420kV (1x125 MVAR) bus reactor (<i>under Transmission System for providing connectivity to RE projects at Bhuj-II (2000MW) in Gujarat</i>)	<ul style="list-style-type: none"> • 1x500 MVA, 765/400 kV, 1-ph ICT (spare unit) at Bhuj-II PS • 1x110 MVAR, 765 kV, 1-ph Bus Reactor (spare unit) at Bhuj-II PS

25.5. Members agreed to the above proposal for inclusion of spare ICTs and reactors in the already scheme.

25.6. CEA stated that the bidding process for the five nos. of transmission schemes in WR, recommended by 3rd ECT to be implemented through TBCB route, was started by the BPC (PFCC/RECTPCL) and the survey reports of the schemes were issued to the

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bidders. Subsequently, Govt. of Gujarat has suggested some locations for pooling stations at Lakadia, Jam Khambaliya and Bhuj-II. The BPC were requested to redo the survey based on these inputs.

A meeting was held in CEA on 10.05.19 to discuss boundary limits of the Pooling Stations at Bhuj II, Lakadia and Jam Khambaliya. In the meeting a revised location was decided for Bhuj-II pooling station. Bhuj-II pooling station is to be established by LILO of Bhuj- Lakadiya 765 kV D/C line at Bhuj-II. With the revised location it was estimated that the line length of Bhuj-II to Lakadia 765 kV D/C would be more than 150 km and there would be requirement of line reactors for the line. The original location of Bhuj-II PS indicated in the survey report was on eastern side of Bhuj PS and the length of Bhuj-II – Lakadiya PS was estimated to be less than 100km. As such line reactors were proposed with the Bhuj-II – Lakadiya PS 765 kV D/C line. In the meeting it was agreed that the requirement of line reactors in Bhuj-II to Lakadia 765 kV D/C line would be studied and the same would be included in the scope of works of the current scheme under bidding.

25.7. CTU stated that with the revised location of Bhuj-II pooling station, Bhuj-II pooling station was about 40 -50 km western side of existing Bhuj pooling station. Instead of LILO of both circuits of Bhuj – Lakadia PS 765kV D/c line at Bhuj-II, interconnection between Bhuj-II to Bhuj pooling station could be established through a single 765 kV D/C line.

25.8. CEA stated that with the above proposal, Bhuj-II pooling station would be radially connected to Bhuj pooling station. About 2 GW RE power would be pooled at Bhuj-II (with a future provision of another 2 GW) and about 4.5 GW power would be pooled at Bhuj pooling station. Therefore, at Bhuj pooling station total 6.5 GW power would be pooled which would be disbursed further through Bhuj-Lakadia and Bhuj – Banaskantha 765 kV D/C lines.

With LILO of Bhuj – Lakadia PS 765kV D/c line at Bhuj-II, Bhuj-II PS gets interconnected with existing Bhuj PS through a 765 kV D/C line and also gets interconnected with Lakadia through a 765 kV D/C line.

25.9. After further deliberations, the following additional scope of works was agreed (due to shift in location of Bhuj-II PS) to be included in the already agreed scheme:

- (i) 240MVA line reactor alongwith NGR of 400 Ohms in each circuit of Bhuj-II – Lakadia 765kV D/c line at Bhuj-II PS end
- (ii) 1x80MVA single phase spare line reactor unit at Bhuj-II PS.

25.10. MSETCL stated that they are planning Intra-State Transmission system for evacuation of about 1 GW of RE potential in Osmanabad Area and in that case Interstate transmission system associated with RE generations from potential WEZs in Osmanabad Area of Maharashtra may not be required.

25.11. CEA stated that Transmission System associated with RE generations from potential WEZs in Osmanabad Area of Maharashtra for evacuation of 2 GW wind energy potential from Osmanabad area has already been approved in 1st WRSCT. The scheme has also been recommended in the 2nd NCT and 3rd ECT for implementation through TBCB route after receipt of connectivity/LTA applications from RE generation developers / SECI.

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- 25.12. CTU requested MSETCL to share the details of the intra-state proposal for evacuation of 1000 MW and connectivity applications received in Osmanabad area. MSETCL agreed to provide the same.
- 25.13. In view of the evacuation system for 1 GW RE projects being planned by MSETCL, it was agreed that the capacity of the Kallam 400/220 kV pooling station agreed as a part of ISTS to be reduced to 1000 MW (from 2000 MW already planned) as the total potential identified in Osmanabad area was only 2 GW.
- 25.14. Incorporating the above changes, the scope of works for the Transmission system associated with RE generations (9.5 GW= 6.5 GW wind + 3 GW solar) in Western Region is as given below:

1. WRSS -21 Part-A - Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	Establishment of 2x1500 MVA, 765/400kV Lakadia PS with 765kV (1x330MVAR) & 400kV (125 MVAR) bus reactor <u>Future provisions:</u> Space for 765/400kV ICTs along with bays: 2 nos. 400/220kV ICTs along with bays : 8 nos. 765kV line bays:8 nos. 400kV line bays: 6 nos. 220kV line bays: 16 nos 765kV bus reactor along with bays : 1no 400kV bus reactor along with bays: 1no	2x1500MVA, 765/400kV 400kV ICT bay-2 765kV ICT bay-2 400kV line bay-4 765kV line bay-2 1x330MVAR, 765 kV, 1x125MVAR, 420 kV 765kV Reactor bay- 1 400kV Reactor bay -1 1x500 MVA, 765/400 kV, 1-ph ICT (spare unit) 1x110 MVAR, 765 kV, 1 ph Reactor (spare unit) <i>(for both 1x330MVAR bus reactor under Part A and 1x330MVAR line reactor on Lakadia – Vadodara line under Part B)</i>
2	LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS	10km
5	Bhuj PS – Lakadia PS 765kV D/c line	100km
6	2 nos of 765kV bays at Bhuj PS for Bhuj PS – Lakadia PS 765kV D/c line	765kV line bay-2

Note:

- a. POWERGRID to provide space for 2 nos of 765kV bays at Bhuj PS for Bhuj PS – Lakadia PS 765kV D/c line

Implementation time frame i.e. December 2020.

2. WRSS -21 Part-A (RTM)- Conversion of existing 2x63MVAR line reactors at Bhachau end of Bhachau – EPGL 400kV D/c line to switchable line reactors

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Sl. No.	Scope of the Transmission Scheme	Capacity /ckm
	Conversion of existing 2x63MVAR line reactors at Bhachau end of Bhachau – EPGL 400kV D/c line to switchable line reactors	400kV Reactor bay -2

POWERGRID to provide space for Conversion of existing 2x63MVAR line reactors at Bhachau end of Bhachau – EPGL 400kV D/c line to switchable line reactors

Implementation time frame is December 2020

3. WRSS -21 Part-B- Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Lakadia – Vadodara 765kV D/c line	350km
2.	330MVAR switchable line reactors at both ends of Lakadia – Vadodara 765kV D/c line	330 MVAR line reactor -4 no. 765kV Reactor bay -4 no. 1x110 MVAR, 765 kV, 1 ph. switchable line Reactor (spare unit) At Vadodara end
3	2 nos of 765kV bays at both Vadodara and Lakadia S/Ss for Lakadia – Vadodara 765kV D/c line	765kV line bays- 4

Note:

- POWERGRID to provide space for 2 nos of 765kV bays and space for 2 nos. of 330MVAR switchable line reactors at Vadodara for Lakadia – Vadodara 765kV D/c line*
- Developer of Lakadia S/s to provide space for 2 nos of 765kV bays and space for 2 nos. of 330MVAR switchable line reactors at Lakadia for Lakadia – Vadodara 765kV D/c line*

Implementation time frame is December 2020.

4. Transmission system associated with RE generations at Bhuj –II, Dwarka & Lakadia:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Lakadia PS – Banaskantha PS 765kV D/c line	200km
2.	765kV Bays at Lakadia and Banaskantha for Lakadia PS – Banaskantha PS 765kV D/c line	4 nos. 765kV Bays
3.	240MVAR switchable Line reactor at Lakadia PS end of Lakadia PS – Banaskantha PS 765kV D/c line	2x240 MVAR 765kV reactor Bays -2 1x80 MVAR, 765 kV, 1 ph

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	switchable line Reactor (spare unit) At Lakadia end
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Note:

- POWERGRID to provide space for 2 nos of 765kV bays at Banaskantha S/s for Lakadia – Banaskantha 765kV D/c line*
- Developer of Lakadia S/s to provide space for 2 nos of 765kV bays and space for 2 nos. of 240MVAR switchable line reactors at Lakadia for Lakadia – Banaskantha 765kV D/c line*

Implementation time frame is June 2021 or as per the progress of connectivity/LTA applications of RE projects from WEZ in Gujarat.

5. Transmission System for providing connectivity to RE projects at Bhuj-II (2000MW) in Gujarat:

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm
1	Establishment of 2x1500MVA (765/400kV), 4x500MVA(400/220kV) Bhuj-II PS (GIS) with 765kV (1x330MVAR) and 400kV (125 MVAR) bus reactor <u>Future provisions:</u> Space for 765/400kV ICTs along with bays: 2 nos. 400/220kV ICTs along with bays: 5 nos. 765kV line bays: 4 nos. 400kV line bays: 6 nos. 220kV line bays: 9 nos 765kV bus reactor along with bays: 1no 400kV bus reactor along with bays: 1no	2x1500MVA, 765/400kV, 4x500MVA (400/220kV) 400kV ICT bay-6 765kV ICT bay-2 220kV ICT bay- 4 765kV line bay-4 220kV line bays -7 1x330MVAR, 765kV, 1x125MVAR, 420kV 765kV reactor Bays -1 400kV reactor Bays -1 1x500 MVA, 765/400 kV, 1-ph ICT (spare unit) 1x110 MVAR, 765 kV, 1 ph Reactor (spare unit)
2	Reconfiguration of Bhuj PS – Lakadia PS 765kV D/c line so as to establish Bhuj-II –Lakadia 765 kV D/C line as well as Bhuj-Bhuj-II 765kV D/C line	20 km
3	1X240MVAR switchable Line reactor for each circuit at Bhuj II PS end of Bhuj-II – Lakadia 765 kV D/c line	2x240 MVAR, 765 kV with 400 ohm NGR 765 kV Reactor Bays-2no. 1x80 MVAR, 765 kV, 1 ph switchable line Reactor (spare unit) at Bhuj II end

Implementation time frame is December 2020 or as per the progress of connectivity/LTA applications of RE projects at Bhuj-II

6. Jam Khambaliya Pooling Station and Interconnection of Jam Khambaliya Pooling Station for providing connectivity to RE projects (1500 MW) in Dwarka

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(Gujarat) & Installation of 400/220 kV ICT along with associated bays at M/s CGPL Switchyard

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm
Jam Khambaliya Pooling Station		
1.	Establishment of 4x500MVA, 400/220kV Jam Khambhaliya PS (GIS) alongwith 1x125MVA, 420kV Bus reactor <u>Future provisions:</u> Space for 400/220kV ICTs along with bays: 4 nos. 400kV line bays: 8 nos. 220kV line bays: 9 nos 400kV bus reactor along with bays: 1no	4x500MVA, 400/220kV 400kV ICT bay-4 220kV ICT bay- 4 400kV line bay-1 220kV line bay-7
2.	1 no 400kV line bay for M/s Vaayu 1 no of 220kV bay for M/s Air power 6 nos of 220kV bay for future developers	
3.	1x125MVA, 420kV Bus reactor at Jam Khambhaliya PS (GIS) along with reactor bay	1x125MVA, 420kV 400kV reactor Bays -1
Interconnection of Jam Khambaliya Pooling Station for providing connectivity to RE projects (1500 MW) in Dwarka (Gujarat)		
4.	Extension of Essar-Lakadia/Bhachau 400kV D/c (triple) line up to Jam Khambhaliya PS	40km
5.	63MVA switchable Line Reactor at both ends of Lakadia/Bhachau - Jam Khambhaliya 400kV D/c line	4x 63 MVA 400kV reactor Bays -4
6.	2 no. 400 kV line bays at Jam Khambhaliya PS for termination of Lakadia/Bhachau - Jam Khambhaliya 400kV D/c line	400kV line bay-2
Installation of 400/220 kV ICT along with associated bays at M/s CGPL Switchyard		
7.	1x500 MVA, 400/220 ICT at CGPL Mundra switchyard.	1x500 MVA, 400/220 kV 400 kV ICT bay-1 220 kV ICT bay-1

Note:

- M/s CGPL to provide space for ICT and creation of 220kV level at CGPL Mundra UMPP switchyard.
- 1x500 MVA, 400/220 kV ICT at CGPL Mundra would be charged from 400 kV side and kept isolated from 220 kV side.

Implementation time frame is June 2020.**7. Name of Scheme: 400kV line bay at Solapur PS for St-II connectivity to M/s Toramba**

Sl. No.	Scope of the Transmission Scheme	Capacity /km
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1.	1 nos. of 400kV bay at Solapur (PG) for St-II connectivity to M/s Toramba	400kV line bay -1
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Transmission schemes for providing connectivity to RE projects in potential wind energy and solar energy zones in WR [Lakadia (2000MW), Osmanabad (1000MW) & Solapur (1000 MW)]:

8. Name of Scheme: Transmission System for providing connectivity to RE projects in Gujarat [Lakadia (2000MW)]:

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm
1.	Establishment of 4x500MVA, 400/220kV ICTs at Lakadia PS (GIS)	4x500MVA, 400/220kV 400kV ICT bay-4 220kV ICT bay- 4 220kV line bays -7

9. Name of Scheme: Transmission system associated with RE generations from potential wind energy zones in Osmanabad area of Maharashtra (1 GW)

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm
1.	Establishment of 2x500MVA, 400/220kV near Kallam PS	2x500MVA, 400/220kV 400kV ICT bay-2 220kV ICT bay-2 400kV line bay-4 220kV line bay- 4
2.	1x125MVA bus reactor at Kallam PS	1x125 MVA 400kV reactor bay -1
3.	LILO of both circuits of Parli(PG) – Pune(GIS) 400kV D/c line at Kallam PS	10km
4.	Conversion of 50MVA fixed Line Reactors on each ckt of Parli (PG) – Pune (GIS) 400kV D/c line at Parli (PG) end into switchable.	400kV Reactor bays -2
5.	Provision of new 50MVA switchable line reactor at Kallam PS end of Kallam – Pune(GIS) 400kV D/c line	2x50 MVA 400kV Reactor bays -2

Note:

- The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.
- Powergrid to provide space at Parli (PG) for Conversion of 50MVA fixed Line Reactors on each ckt of Parli (PG) – Pune (GIS) 400kV D/c line at Parli (PG) end into switchable.

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10. Name of Scheme: Transmission system associated with RE generations from potential Solar Energy Zone in Maharashtra (1000 MW under Ph-I)

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 400/220 kV, 2x500 MVA at Solapur PP (near Mohol) Space for 8 nos. of 220 kV line bays for interconnection of wind & solar projects	500MVA, 400/220kV ICT -2 400kV ICT bay -2 220kV ICT bay -2 400kV line bay -2
2.	Solapur pooling point - Solapur (PG) 400 kV D/c line (twin HTLS)	50km
3.	2 nos. of 400kV bays at Solapur PS for Solapur pooling point - Solapur (PG) 400 kV D/c line	400kV line bay -2
4.	1x125 MVAR, 420 kV Bus Reactor at Solapur PP	1x125 MVAR, 420kV bus reactor 420kV reactor bay

26. Transmission System for evacuation of Power from potential solar and wind energy zones (17.5 GW=12.5 GW Solar + 5 GW Wind) in Western Region under Phase-II.

26.1. CEA stated that out of total 28 GW REZ [20 GW Solar + 8 GW Wind], transmission system for 10.5 GW REZ [3 GW Solar + 7.5 GW Wind] has already been planned under Ph-I. For the balance 17.5 GW [12.5 GW Solar + 5.0 GW Wind], joint study meetings amongst CEA, CTU and POSOCO were held on 24.04.2019 and 25.04.2019 in order to identify the broad transmission schemes to cater to the balance REZs in WR.

In the Phase-II of implementation of Transmission infrastructure for evacuation of power from remaining 17.5 GW identified RE potential in Western Region, the studies have been carried out considering following quantum RE potential from solar energy zones and Wind energy zones:

SEZ's

- (i) Gujarat [Rapar (3GW), Banaskantha (2.5GW), Jamnagar (2.5 GW)];
- (ii) Maharashtra [Solapur (1.5GW). Wardha (2.5 GW)] and
- (iii) Madhya Pradesh [Khandwa (2.5 GW) and Rajgarh (2.5 GW)]

WEZ's

- (iv) Gujarat [Jamkhambhaliya (0.5 GW)]

Study assumptions:

- i) **Time-frame:** Studies were carried out for the 2021-22 time frame

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- ii) **Demand:** All India demand is considered as per the 19th EPS of CEA (2021-22). Based on the discussions & past trends, for solar maximized scenario, demand has been considered as about 90% of the peak demand of 19th EPS for various regions except for Northern region where it is considered as about 95% of the peak demand. In view of the above, demand of 61.5 GW has been considered in Western Region.
- iii) **Study considerations:** In the studies, all India transmission network up to 220 kV level has been simulated. This includes, existing and well as under construction transmission network incl. high capacity transmission corridors and Green Energy Corridors. The transmission planning criteria was generally followed for transmission design considerations. Considering envisaged RE (wind & solar) capacity addition and to achieve Load-generation balance, Thermal generation dispatch is reduced upto 55%, wherever required. At some of the locations, thermal generations are even needed to be backed down.
- iv) **Scenarios:** 70% Wind and 80% Solar has been considered on All India basis except in Rajasthan where wind dispatch is considered as 30%. Two scenarios have been studied for WR REZs:
- 80% Solar dispatch (Enclosed as Annexure-I)
 - 100% Solar dispatch (Enclosed as Annexure-II)

26.2. Details of the transmission system identified based on the studies:

A. Gujarat REZs [8GW Solar + 0.5GW Wind]

- (a) **Kutch (Rapar) SEZ 5000 MW (3000MW near Rapar and 2000MW near Lakadia (S/s augmentation at Lakadia already planned in the 1st WRSCT)) & Banskantha SEZ 2500 MW**

Alternative-1

Estimated cost: ~Rs. 5700Cr.

- i) Establishment of 400/220 kV, 6x500MVA Kutch (Rapar) SEZ Pooling Point
- ii) Augmentation of Transformation capacity at Lakadia PS by 1x1500MVA, 765/400kV. Augmentation of 400/220 kV transformation capacity by 4x500MVA, 400/220kV ICTs in case injection from RE projects are at 200 kV level.
- iii) Establishment of 400/220 kV, 5X500 MVA Banaskantha SEZ Pooling Point
- iv) Establishment of 400 kV switching station at Patan
- v) Establishment of 765/400 kV, 2x1500 MVA at suitable location near Ahmedabad (towards eastern side of Ahmedabad)
- vi) Kutch (Rapar) SEZ PP- Lakadia 400 KV D/c line (Twin HTLS)
- vii) Kutch (Rapar) SEZ PP- Patan 400 kV 2xD/c line (Twin HTLS-multi circuit)
- viii) Banaskantha SEZ PP - Patan 400 kV D/c line (Twin HTLS)
- ix) Banaskantha SEZ PP - Sankhari 400 kV D/c line (Twin HTLS)
- x) Patan - Sami 400 kV D/c line (Twin HTLS)
- xi) Patan - Ahmedabad 400 kV 2xD/c line (Twin HTLS- multi circuit)

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- xii) LILO of Pirana(T) – Pirana(PG) 400kV D/c line at Ahmedabad with twin HTLS along with reconductoring of Pirana – Pirana(T) line with twin HTLS conductor
- xiii) Ahmedabad – Indore 765 kV D/c line
- xiv) Ahmedabad – Vadodara 400 kV D/c line (Twin HTLS)
- xv) 220 kV line bays for interconnection of solar projects(25 nos)
- xvi) Associated Reactive Compensation (Line + Bus)
- xvii) Spare reactors and transformers

Alternative-2**Estimated cost: ~Rs. 5250Cr.**

- i) Establishment of 765/400 kV, 3x1500 MVA & 400/220kV, 6x500MVA Kutch(Rapar) SEZ Pooling Point
- ii) Augmentation of transformation capacity at Lakadia PS by 1x1500MVA, 765/400kV and 4x500MVA, 400/220kV ICTs for interconnection with SEZ
- iii) Augmentation of transformation capacity at Radhanesda PS by 5X500 MVA, 400/220kV ICTs for interconnection with SEZ
- iv) Establishment of 765/400kV, 2X1500 MVA at suitable location near Ahmedabad (towards eastern side of Ahmedabad)
- v) Radhanesda PS - Sankhari 400 kV D/c line (Twin HTLS)
Or
Radhanesda PS – Banaskantha – Sankhari 400kV D/c corridor (Twin HTLS)
- vi) Kutch (Rapar) SEZ PP - Ahmedabad 765kV D/c line
- vii) LILO of Lakadia – Banaskantha 765kV D/c line at Kutch (Rapar) SEZ PP
- viii) LILO of Pirana(T) – Pirana(PG) 400kV D/c line at Ahmedabad with twin HTLS along with reconductoring of Pirana – Pirana(T) line with twin HTLS conductor
- ix) Ahmedabad – Indore 765 kV D/c line
- x) 220 kV line bays for interconnection of solar projects(25 nos)
- xi) Associated Reactive Compensation (Line + Bus)
- xii) Spare reactors and transformers

(b) Jamnagar SEZ 2500 MW**Alternative-1****Estimated cost: ~Rs. 1900Cr.**

- i) Establishment of 400/220 kV, 5X500 MVA at Lalpur (Jamnagar) SEZ PP
- ii) Establishment of 400kV switching station at Jasdan
- iii) Lalpur (Jamnagar) SEZ PP - Jasdan 400 kV D/c line (Twin HTLS)
- iv) Lalpur (Jamnagar) SEZ PP – Kalavad (GETCO) 400 kV D/c line (Twin HTLS)
- v) Lalpur (Jamnagar) SEZ PP – Jam Khambhaliya PS 400 kV D/c line (Twin HTLS)
- vi) Jasdan- Hadala (GETCO) 400kV D/c (Twin HTLS)
- vii) Jasdan – Vadodara 400 kV D/c line (Twin HTLS)
- viii) 220 kV line bays for interconnection of solar projects (8 nos)
- ix) Associated Reactive Compensation (Line + Bus)

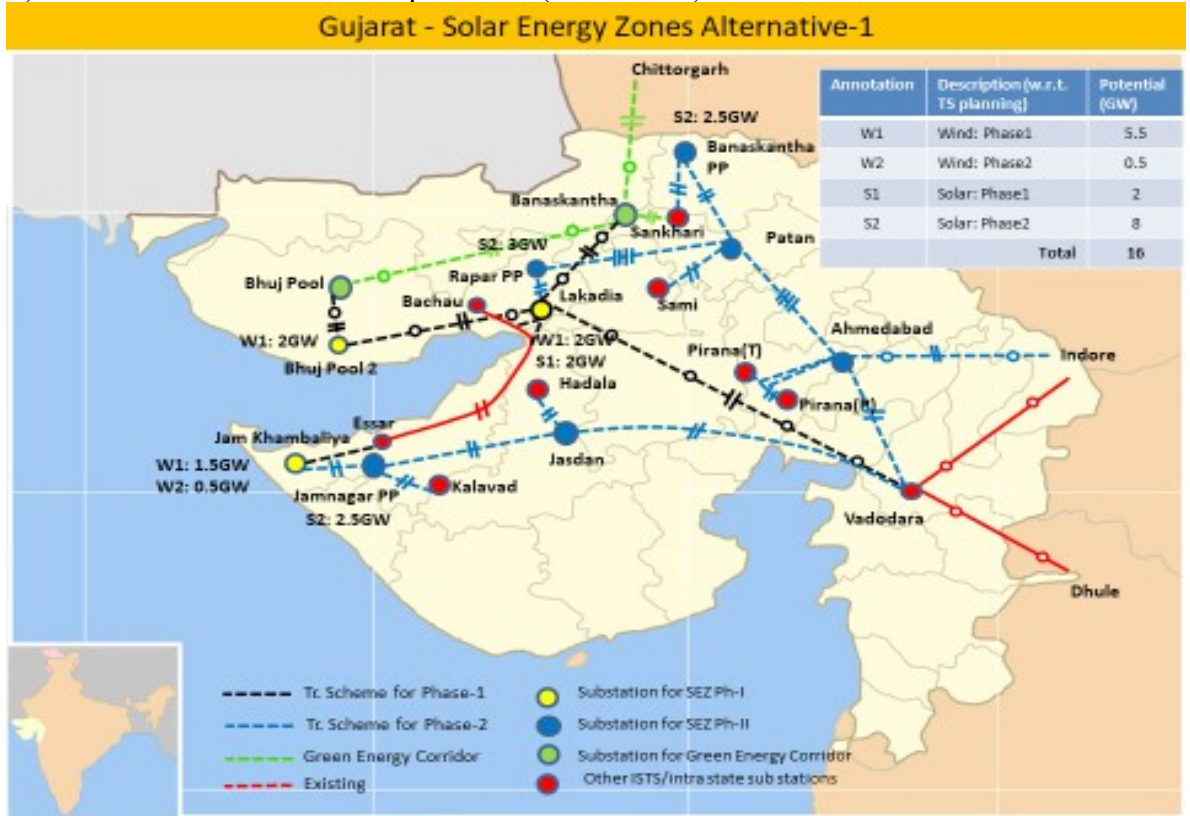
Alternative-2**Estimated cost: ~Rs. 1300Cr.**

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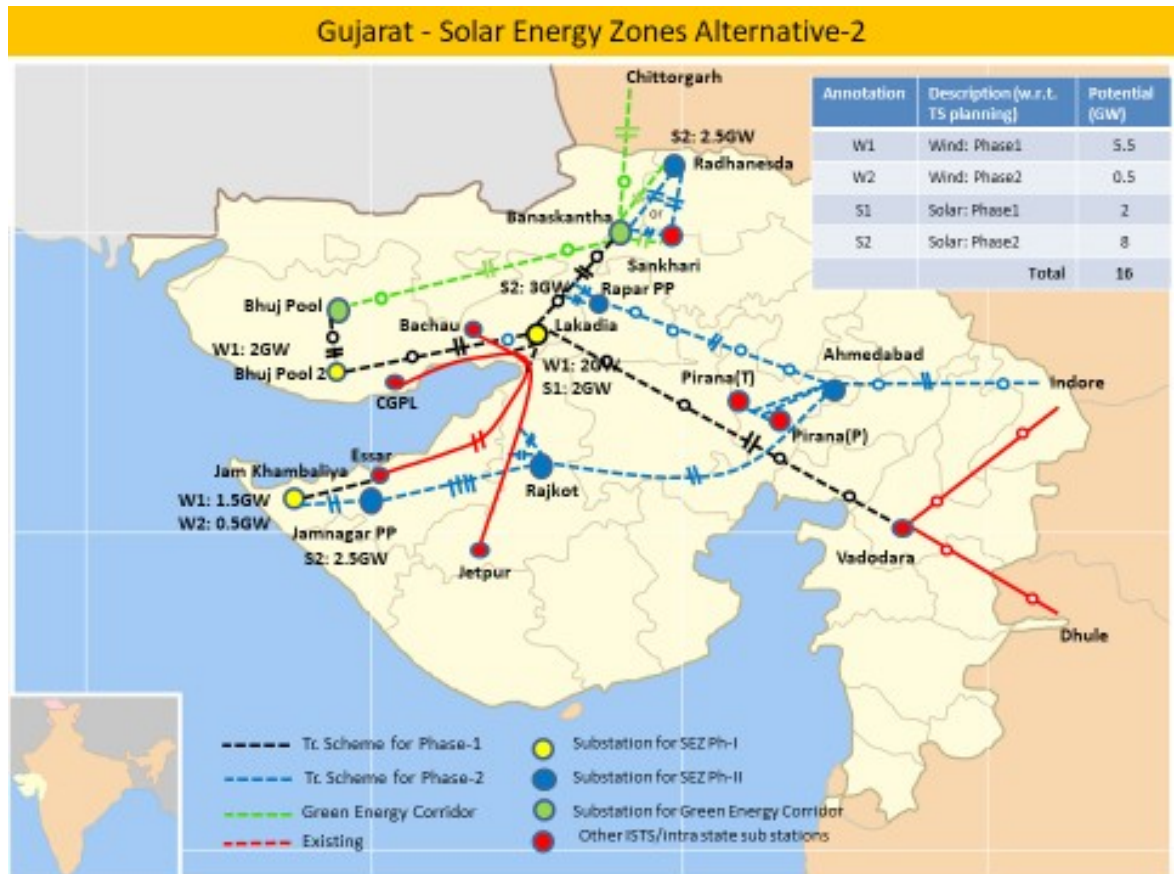
- i) Establishment of 400/220 kV, 5X500 MVA at Lalpur (Jamnagar) SEZ PP
- ii) Establishment of 400kV switching station at Rajkot
- iii) Lalpur (Jamnagar) SEZ PP - Rajkot 400 kV 2xD/c line (Twin HTLS)
- iv) Lalpur (Jamnagar) SEZ PP – Jam Khamabliya PS 400 kV D/c line (Twin HTLS)

Or

- LILO of Jam Khambhaliya – Lakadia 400kV D/c line at Lalpur (Jamnagar) SEZ PP along with Lalpur (Jamnagar) SEZ PP – Jam Khamabliya PS 400 kV 2nd D/c (triple) line
- v) LILO of CGPL- Jetpur 400 kV D/C(triple) at Rajkot
- vi) Rajkot – Ahmedabad 400 kV D/c line (Twin HTLS)
- vii) 220 kV line bays for interconnection of solar projects (8 nos)
- viii) Associated Reactive Compensation (Line + Bus)



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B. Maharashtra SEZs [4GW Solar]

(a) Solapur SEZ 2500 MW (Phase-I (1000MW) + Phase-II (1500MW) under ISTS)

Estimated cost: ~Rs. 400Cr.

Phase-I (1000MW)

- i) Toramba – Solapur (PG) 400kV S/c line (dedicated line, of M/s TREPL with St-I connectivity of 900MW & St-II connectivity of 300MW)

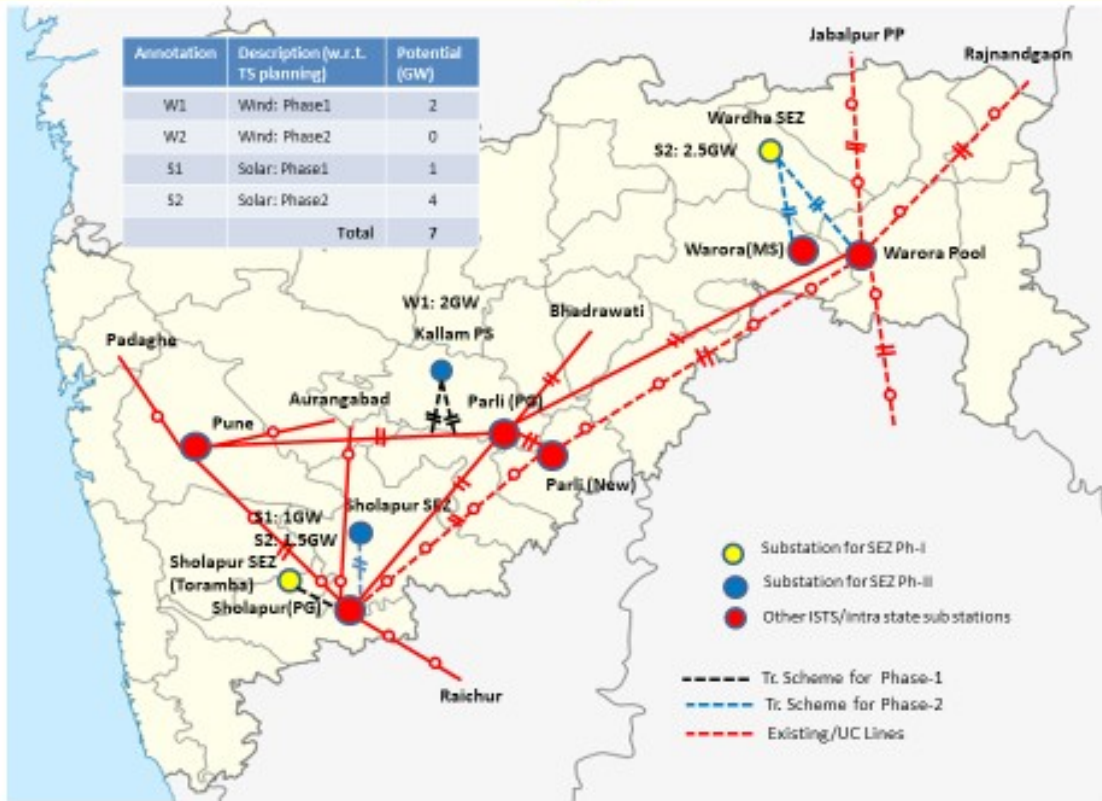
Phase-II (1500MW) (under ISTS)

- i) Establishment of 400/220 kV, 2X500 MVA at Solapur PP*
- ii) Augmentation of 400/220 kV, Solapur PP with 1x500MVA, 400/220kV transformer
- iii) Solapur PP – Solapur(PG) 400 kV D/c line (Twin HTLS)*
- iv) 220 kV line bays for interconnection of solar projects(8 nos)
- v) 1x125 MVAR, 420 kV Bus Reactor at Solapur PP*

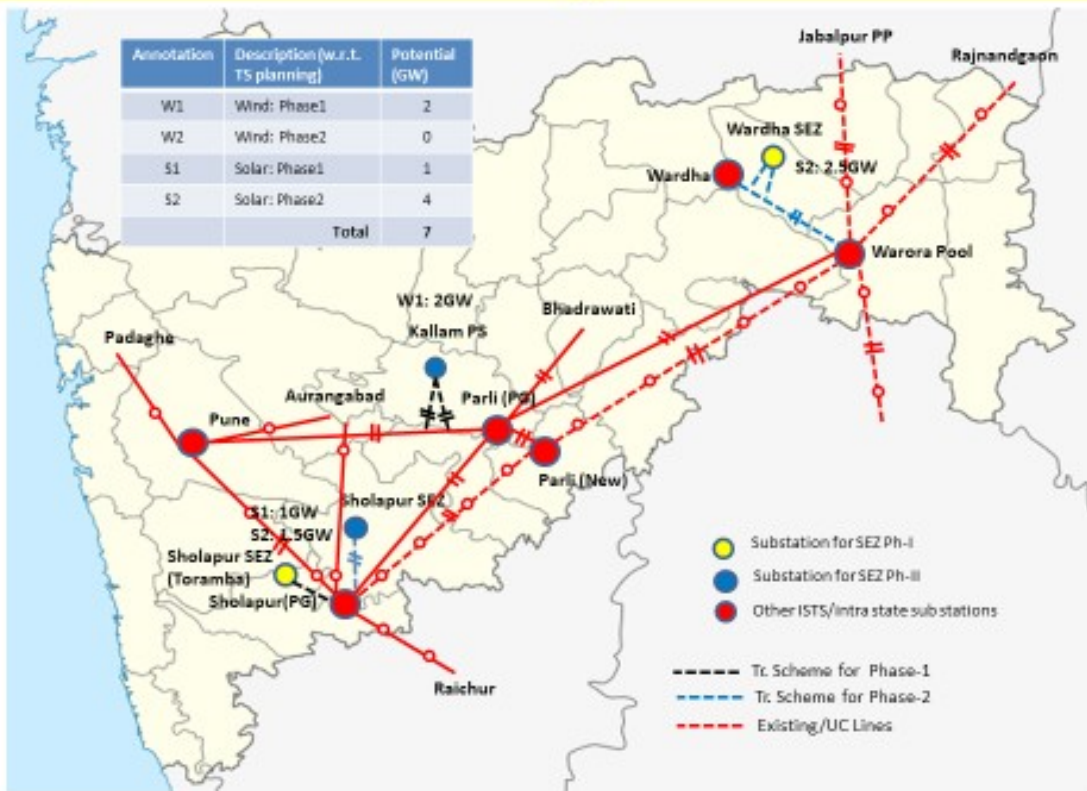
*Already agreed in the 1st WRSCT

Parli(PG) - Parli(MSETCL) 400kV D/c line is observed to be overloaded under N-1 condition. Line reconductoring may be considered.

Maharashtra – Solar Energy Zones Alternative-1



Maharashtra – Solar Energy Zones Alternative-2



(b) Wardha SEZ 2500 MW
Alternative-1

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Estimated cost: ~Rs. 700Cr.

- i) Establishment of 400/220 kV, 5X500 MVA at Wardha SEZ PP
- ii) Wardha SEZ PP - Warora Pool 400 kV D/c line (Twin HTLS)
- iii) Wardha SEZ PP - Warora (MSETCL) 400 kV D/c line (Twin HTLS)
- iv) 220 kV line bays for interconnection of Solar projects (8 nos)
- v) 1x125MVAR bus reactor at Wardha SEZ PP

Alternative-2**Estimated cost: ~Rs. 500Cr.**

- i) Establishment of 400/220 kV, 5X500 MVA at Wardha SEZ PP
- ii) LILO of Wardha - Warora Pool 400 kV D/c (Quad) line at Wardha SEZ PP
- iii) 220 kV line bays for interconnection of Solar projects (8 nos)
- iv) 1x125MVAR bus reactor at Wardha SEZ PP

C. Madhya Pradesh SEZs [5GW Solar]**(a) Rajgarh 2500 MW****Estimated cost: ~Rs. 800Cr.**

- i) Establishment of 400/220 kV, 5X500 MVA at Rajgarh SEZ PP
- ii) Rajgarh SEZ PP -Bhopal (Sterlite) 400 kV D/c line (HTLS)
- iii) Rajgarh SEZ PP – Shujalpur 400 kV D/c line (HTLS)
- iv) 220 kV line bays for interconnection of solar & wind projects (8 nos)
- v) 1X125 MVAR, 420 kV Bus Reactor at Rajgarh SEZ PP

** Shujalpur(PG) - Shujalpur(MPPTCL) 220kV D/c line is observed to be overloaded under N-1 condition. The same may be reviewed.*

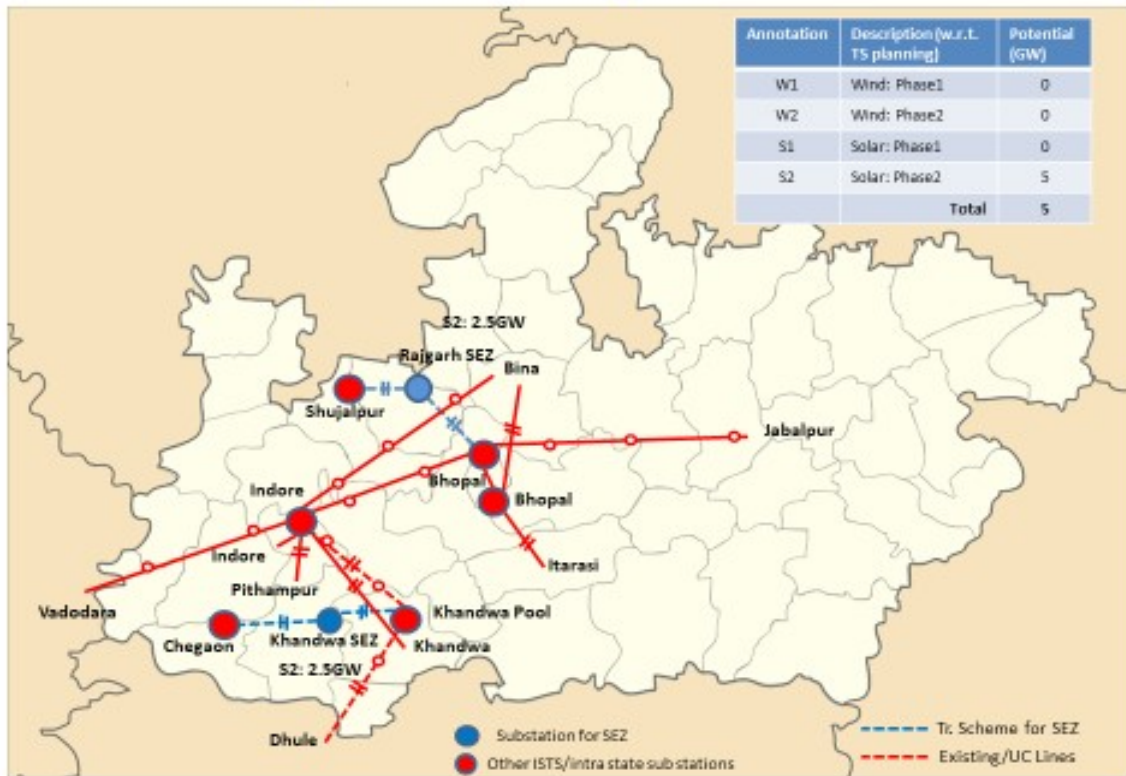
(b) Khandwa SEZ: 2500 MW**Alternative-1****Estimated cost: ~Rs. 700Cr.**

- i) Establishment of 400/220 kV, 5X500 MVA at Khandawa SEZ PP
- ii) Khandwa SEZ PP - Khandwa Pool D/c line (Twin HTLS)
- iii) Khandwa SEZ PP - Chegaon (MPPTCL) D/c line (Twin HTLS)
- iv) 220 kV line bays for interconnection of solar projects (8 nos)
- v) Associated Reactive Compensation

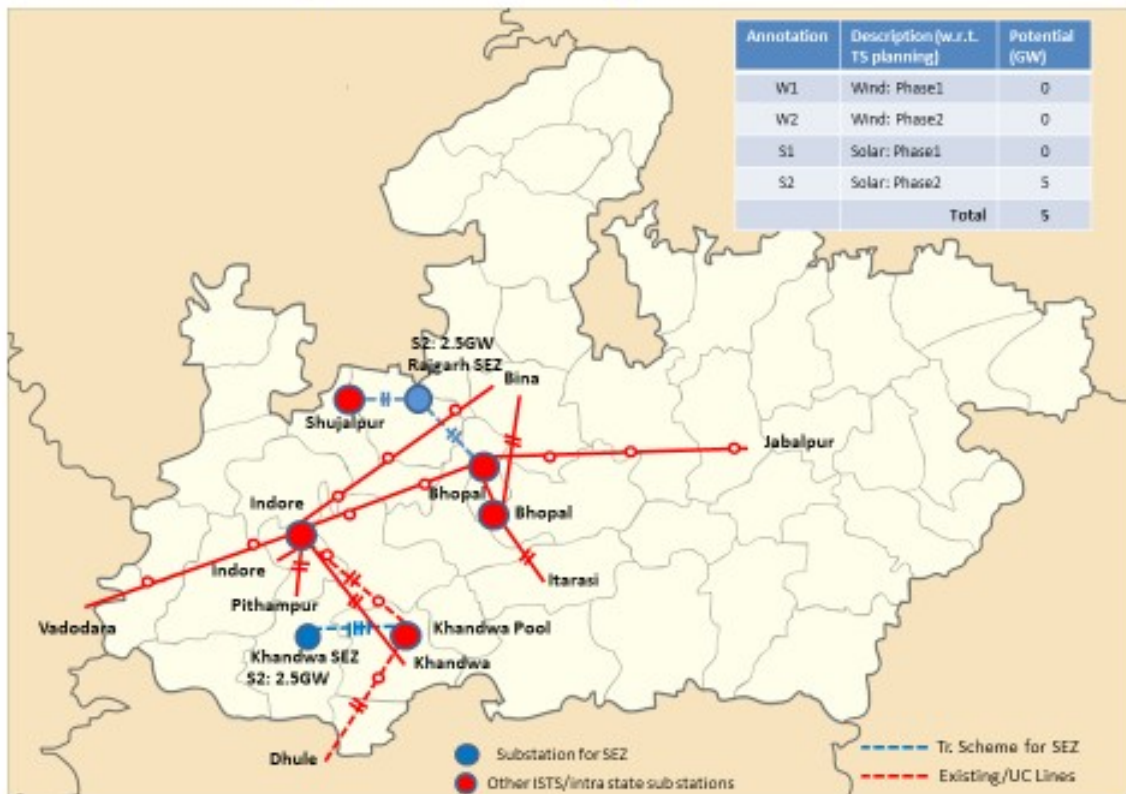
Alternative-2**Estimated cost: ~Rs. 700Cr.**

- i) Establishment of 400/220 kV, 5X500 MVA at Khandwa SEZ PP
- ii) Khandwa SEZ PP - Khandwa Pool 2XD/c line (Twin HTLS)
- iii) Augmentation of 1X1500 MVA, 765/400kV ICT at Khandwa Pool (Sterlite)
- iv) 220 kV line bays for interconnection of solar projects (8 nos)
- v) Associated Reactive Compensation

Madhya Pradesh – Solar Energy Zones Alternative-1



Madhya Pradesh – Solar Energy Zones Alternative-2



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- 26.3. CEA stated that load flow study file of the above proposed system has been shared with the members states. STUs were requested to give their comments w.r.t their intra-state transmission system represented in the studies as well the new proposed scheme for RE projects. To deliberate on the observations of the constituents a separate joint studies meeting would be held. Any additional system required, based on the detailed study would be taken up as an ISTS scheme.
- 26.4. CTU stated that at existing Solapur, space for only 3 nos. of 400 kV bays are available. Out of this, one no of bay has already been allocated to M/s Toramba for their Stage –II Connectivity of 300 MW (Stage-I Connectivity of 900 MW). Therefore, out of 2.5 GW potential, only 1.5 GW potential needs to be integrated.
- 26.5. It was opined that if 1.5 GW can be integrated with MSETCL intra-state system then in that case, the scheme under ISTS may not be required.
- 26.6. MSETCL stated that there are no margins in their Solapur 400/220 kV S/stn. Therefore, scheme may be envisaged as ISTS system only. MSETCL raised the issue regarding overloading of Parli (P) - Parli (MSETCL) 400 kV D/c line.
- CEA stated that the same could be studied in the proposed joint study meeting.
- 26.7. POSOCO enquired about the availability of space at Khandwa Pooling Station (for pooling of power from Khandwa SEZ) as the scheme is being implemented through TBCB route.
- 26.8. CEA stated that Khandwa 765/400 kV Pooling Stn was initially envisaged to pool 2640 MW of generation (1320 MW Khargone of NTPC and 1320 MW Dwarakadheesh IPP). Out of this only Khargone project has come up and there is no visibility of other generation project. Therefore, space for future provisions is already there in 765/400 kV Khandwa pooling station.
- 26.9. On MPPTCL query regarding issue of overloading of Shujalpur(PG) - Shujalpur(MPPTCL) 220kV D/c line observed under N-1 condition, it was stated that the same could be studied in the proposed joint study meeting. Additional requirement, if any, could be included in the ISTS scheme.
- 26.10. CEA further stated that, joint study meetings amongst CEA, CTU and POSOCO were held on 24.04.2019 and 25.04.2019 in order to identify the broad transmission schemes to cater to the various REZs in WR wherein the above options were studied.
- 26.11. SECI stated that MNRE vide its letter dated 04.05.2018 had given “in-principle” approval of 5000 MW Dholera UMSPP to be implemented by Gujarat Power Corporation Limited. In the meeting held on 08.05.2019 under the Chairmanship of Secretary, MNRE at New Delhi, the Dholera UMSPP has been split into two different projects:
- Dholera UMSPP (Phase -I):** 1000 MW Solar Power Park would be developed by Gujarat Power Corporation Limited (GPCL) under Mode - I of Guideline of Development of Solar Park in India issued by MNRE, wherein necessary CFA would be availed by GPCL. The scheme of power evacuation would be carried out by

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GETCO. GETCO will avail the necessary CFA as per the provision under MNRE Guidelines.

Dholera UMSP (Phase - II): 4000 MW would be developed by Solar Energy Corporation of India(SECI) under Mode-7 for which the land would be provided on long term lease basis by GPCL/ DholeraSIRDA and appropriate agreement would be executed between SECI and GPCL/DholeraSIRDA.

- 26.12.** SECI further stated that under Mode 7, SECI would act as SPPD and get the external power evacuation infrastructure of the solar park developed by External Transmission Development Agency like CTU or STU as the case may be. The total cost of the evacuation system from a land parcel would be divided by the total RE capacity planned on the parcel of land and utilizing the evacuation system to arrive at per MW cost of the evacuation system. 40% of the cost of the transmission system would be borne by RE developers. CFA of Rs. 20 lakh per MW or 30% of project cost, whichever is less, for setting up external power evacuation infrastructure and the balance cost, if any shall be socialised.

SECI requested to finalise the evacuation system for Dholera UMSP so that implementation time of evacuation system could be estimated and other activities for implementation of the solar park could be initiated to align it with time frame of evacuation system.

SECI further clarified that 4 GW capacity would be in addition to 66.5 GW RE capacity (50 solar + 16.5 GW wind).

- 26.13.** CEA stated 5000 MW solar park in the vicinity of Dholera in District of Ahmedabad, Gujarat had earlier come up for discussion in the 43rd WR SCM held on 11.05.2018 wherein GPCL had informed that Govt. Gujarat has committed for consumption of 20 % of the installed capacity of the project i.e. 1000 MW. Hence, the transmission system for balance 4000MW needs to be injected into the ISTS Grid. In the meeting it was decided that M/s GPCL shall apply for both connectivity and LTA for its Dholera Ultra Mega Solar Park at the earliest in view of anticipated commissioning schedule of December 2019, December 2020 and December 2021 for Phase I (1000 MW), Phase II (2000 MW) and Phase III (2000 MW) of the project respectively. Further, the transmission system for Dholera UMSP would be evolved in a separate meeting among CEA, CTU and GETCO.
- 26.14.** CTU stated that the immediate connectivity system for Dholera UMSP could be discussed and broadly agreed in the meeting. Detailed studies for the evacuation system could be carried out after receipt of LTA application and system strengthening, if required, would be taken up
- 26.15.** The tentative transmission system for providing immediate connectivity to Dholera UMSP was discussed and the following system was agreed broadly:
- (i) Power injection from the Solar Park may be at 400kV level.
 - (ii) Establishment of 765/400kV Dholera Pooling station
 - (iii) LILO of Lakadia – Vadodara 765 kV D/c line at Dholera UMSP
 - (iv) Dholera UMSP – Ahmedabad 765kV D/c line

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It was also decided that evacuation system for Dholera UMSP would be further studied in the joint study meeting. SECI was requested to indicate the likely beneficiaries of Dholera UMSP.

26.16. The members deliberated on the technical and commercial aspects of the scheme. Restricting the deliberations to technical aspects, members broadly agreed with the transmission system for 17.5 GW RE projects in WR under Phase-II and immediate connectivity to Dholera UMSP. The details of the transmission scheme technically agreed by the members is as given below:

A. Gujarat REZs [8GW Solar + 0.5GW Wind]

(a) Kutch (Rapar) SEZ 5000 MW (3000MW near Rapar and 2000MW near Lakadia (S/s augmentation at Lakadia already planned in the 1st WRSCT)) & Banskantha SEZ 2500 MW

Estimated cost: ~Rs. 5250Cr.

- i) Establishment of 765/400 kV, 3x1500 MVA & 400/220kV, 6x500MVA Kutch(Rapar) SEZ Pooling Point
- ii) Augmentation of transformation capacity at Lakadia PS by 1x1500MVA, 765/400kV and 4x500MVA, 400/220kV ICTs for interconnection with SEZ
- iii) Augmentation of transformation capacity at Radhanesda PS by 5X500 MVA, 400/220kV ICTs for interconnection with SEZ
- iv) Establishment of 765/400kV, 2X1500 MVA at suitable location near Ahmedabad (towards eastern side of Ahmedabad)
- v) Radhanesda PS - Sankhari 400 kV D/c line (Twin HTLS)
- vi) Kutch (Rapar) SEZ PP - Ahmedabad 765kV D/c line
- vii) LILO of Lakadia – Banaskantha 765kV D/c line at Kutch (Rapar) SEZ PP
- viii) LILO of Pirana(T) – Pirana(PG) 400kV D/c line at Ahmedabad with twin HTLS along with reconductoring of Pirana – Pirana(T) line with twin HTLS conductor
- ix) Ahmedabad – Indore 765 kV D/c line
- x) 220 kV line bays for interconnection of solar projects(25 nos)
- xi) Associated Reactive Compensation (Line + Bus)
- xii) Spare reactors and transformers

(b) Jamnagar SEZ 2500 MW

Estimated cost: ~Rs. 1300Cr.

- i) Establishment of 400/220 kV, 5X500 MVA at Lalpur (Jamnagar) SEZ PP
- ii) Establishment of 400kV switching station at Rajkot
- iii) Lalpur (Jamnagar) SEZ PP - Rajkot 400 kV 2xD/c line (Twin HTLS)
- iv) Lalpur (Jamnagar) SEZ PP – Jam Khamabliya PS 400 kV D/c line (Twin HTLS)
- v) LILO of CGPL- Jetpur 400 kV D/C(triple) at Rajkot
- vi) Rajkot – Ahmedabad 400 kV D/c line (Twin HTLS)
- vii) 220 kV line bays for interconnection of solar projects (8 nos)
- viii) Associated Reactive Compensation (Line + Bus)

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B. Maharashtra SEZs [4GW Solar]**(a) Solapur SEZ 2500 MW (Phase-I (1000MW) + Phase-II (1500MW) under ISTS)****Estimated cost: ~Rs. 400Cr.****Phase-I (1000MW)**

- i) Toramba – Solapur (PG) 400kV S/c line (dedicated line, of M/s TREPL with St-I connectivity of 900MW & St-II connectivity of 300MW)

Phase-II (1500MW) (under ISTS)

- i) Establishment of 400/220 kV, 2X500 MVA at Solapur PP*
 - ii) Augmentation of 400/220 kV, Solapur PP with 1x500MVA, 400/220kV transformer
 - iii) Solapur PP – Solapur(PG) 400 kV D/c line (Twin HTLS)*
 - iv) 220 kV line bays for interconnection of solar projects(8 nos)
 - v) 1x125 MVAR, 420 kV Bus Reactor at Solapur PP*
- *Already agreed in the 1st WRSCT

Parli(PG) - Parli(MSETCL) 400kV D/c line is observed to be overloaded under N-1 condition. Line reconductoring may be considered.

(b) Wardha SEZ 2500 MW**Estimated cost: ~Rs. 500Cr.**

- i) Establishment of 400/220 kV, 5X500 MVA at Wardha SEZ PP
- ii) LILO of Wardha - Warora Pool 400 kV D/c (Quad) line at Wardha SEZ PP
- iii) 220 kV line bays for interconnection of Solar projects (8 nos)
- iv) 1x125MVA bus reactor at Wardha SEZ PP

C. Madhya Pradesh SEZs [5GW Solar]**(a) Rajgarh 2500 MW****Estimated cost: ~Rs. 800Cr.**

- vi) Establishment of 400/220 kV, 5X500 MVA at Rajgarh SEZ PP
- vii) Rajgarh SEZ PP -Bhopal (Sterlite) 400 kV D/c line (HTLS)
- viii) Rajgarh SEZ PP – Shujalpur 400 kV D/c line (HTLS)
- ix) 220 kV line bays for interconnection of solar & wind projects (8 nos)
- x) 1X125 MVAR, 420 kV Bus Reactor at Rajgarh SEZ PP

** Shujalpur(PG) - Shujalpur(MPPTCL) 220kV D/c line is observed to be overloaded under N-1 condition.Line reconductoring or 2nd 220 kV DC line may be considered.*

(b) Khandwa SEZ: 2500 MW**Estimated cost: ~Rs. 700Cr.**

- i) Establishment of 400/220 kV, 5X500 MVA at Khandwa SEZ PP
- ii) Khandwa SEZ PP - Khandwa Pool 2XD/c line (Twin HTLS)
- iii) Augmentation of 1X1500 MVA, 765/400kV ICT at Khandwa Pool (Sterlite)

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- iv) 220 kV line bays for interconnection of solar projects (8 nos)
- v) Associated Reactive Compensation

D. Dholera UMSP : The transmission system for providing immediate connectivity to Dholera UMSP broadly agreed:

- (i) Power injection from the Solar Park may be at 400kV level.
- (ii) Establishment of 765/400kV Dholera Pooling station
- (iii) LILO of Lakadia – Vadodara 765 kV D/c line at Dholera UMSP
- (iv) Dholera UMSP – Ahmedabad 765kV D/c line

27. 763MW LTOA granted to Karnataka Power Corporation Limited (2x800 MW) – agenda by CTU

27.1. CTU stated that KPCL has been granted LTOA vide intimation (revised) dated Aug, 2011 for 763 MW transfer of power from its 2x800 MW generation project in Janjgir-Champa, Chhattisgarh to Southern Region. As per the LTOA intimation (i) target beneficiaries were Southern Region for entire 763 MW (ii) the commissioning schedule for generation units was Sept, 2015 and March, 2016. In the time frame of 2015-16, Southern Region was projected to be surplus on account of large number of proposed generation projects in SR having target beneficiaries in WR & NR. Therefore, the power transfer to SR from the project was planned through displacement. Accordingly, the transmission system associated with the grant of above LTOA included upgradation of ± 800 kV 3000 MW HVDC bipole link to 6000MW along with downstream network in NR.

CTU further stated that during the 20th SR Conn/LTA meeting held on 13.07.2016, it was observed that the generation project was yet to receive environmental clearance and its implementation time-frame was uncertain. Accordingly, considering the present load generation scenario and the progress of the generation project, it was decided to delink the LTOA of project from Champa-Kurukshetra HVDC link. It was also decided to modify the LTA intimation of the project and associate it with under construction transmission lines between NEW-SR Grid, after the commissioning schedule of the generation project attains certainty. No specific associated transmission system was identified with LTA.

27.2. CTU informed that the progress of the generation project are being reviewed continuously in the JCC (Joint Coordination Committee) meetings of WR and the status of the generation project of M/s KPCL is still uncertain as MoEF clearance is still awaited for want of coal linkage. CTU proposed to cancel the grant of 763 MW LTOA to M/s KPCL and encash the bank guarantee as there has been no progress in the implementation of this project for the past three years.

27.3. Representative of M/s KPCL stated that all statutory clearances for the project has been received except for clearance from MoEF, which is pending for want of allocation of coal block for the project. Govt. of Karnataka and KPCL has made several efforts at all levels with Government of India and Ministry of Coal to get allocation of coal for the

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project. Already substantial amount has been spent towards land, water and other preliminary works associated with the project. M/s KPCL have made all efforts to start the project, however, due to change in policy of allocation of coal by MoC, GoI, delays are happening in coal allocation for the project. M/s KPCL requested that as the delay in progress of project is due to non-availability of coal from MoC, this may be considered as force majeure and LTA granted to the project need not be cancelled.

- 27.4. On query from CTU regarding the expected time of commencement of the project, KPCL stated that, they are hopeful that their project would start within one year.
- 27.5. CTU stated that KPCL may relinquish the LTOA of 763 MW and may apply again for LTA after getting MoEF clearance and firming up the implementation schedule of the project.
- 27.6. CEA enquired CTU the reason for not issuing the revised intimation of LTA to M/s KPCL. CTU stated that M/s KPCL was not able to firm the implementation schedule of their generation project for want of MoEF clearance, therefore, revised intimation has not been issued.
- 27.7. CEA suggested that the revised LTA intimation may be issued to KPCL. With commissioning of the identified transmission system for grant of LTA to M/s KPCL generation project, billing would start and KPCL would be liable to pay the applicable PoC charges.
- 27.8. M/s KPCL representative stated that already substantial amount has been spent on the project and are hopeful for early commencement of implementation activities of the generation project, therefore, it would be difficult for them to relinquish the LTA granted. They are pursuing the issue of coal block allocation at highest level. Accordingly, atleast six months' time may kindly be given to them.
- 27.9. After further deliberation it was agreed that CTU may issue the revised LTA intimation to M/s KPCL for the LTA of 763 MW. M/s KPCL have the option to either pay the applicable PoC charges after commencement of LTA or relinquish the LTA granted and apply afresh for LTA as and when it gains clarity on the implementation schedule of the generation project.

28. Requirement of Transformer Augmentation in Western Region – agenda by CTU

- 28.1. CEA stated that as per the operational feedback report of NLDC (January 2019), several 400/220kV ICTs in WR are getting critically loaded in current time frame. In case of tripping of one ICT in that S/s, the situation becomes critical as the parallel ICT gets overloaded as per the details given below:
- i) **2x315MVA, 400/220kV ICTs at Bhatapara:** ICTs becomes N-1 non-compliant when total loading goes above 430MW. Matter was taken up in the 37th WRPC meeting and it was decided to take it up in the next WRSCT.
 - ii) **2x315MVA, 400/220kV ICTs at Raigarh:** ICTs becomes N-1 non-compliant when total loading is above 400MW.
 - iii) **2x315MVA, 400/220kV ICTs at Morena:** ICTs becomes N-1 non-compliant when total loading is above 440MW.
 - iv) **2x315 +1x500 MVA ICTs at Satna:** ICTs becomes N-1 non-compliant when total loading is above 730MW

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- v) **2x315MVA, 400/220kV ICTs at Seoni:** ICTs becomes N-1 non-compliant when total loading is above 380MW.

28.2. CTU stated that they have carried out system studies in 2022-23 time frame considering all existing and planned systems. The loadings observed on the above transformers are given below:

Sl. / TRANSFORMER			EXISTING /PLANNED TRANSFORMERS (MVA)	CURRENT TIME FRAME	2022-23 TIME FRAME	
				PEAK LOADING (MW)	PEAK LOADING (MW)	N-1 Outage loading (MW)
1	Bhatapara	400/220kV	2x315	2x215	2x200	1x290
2	Raigarh*	400/220kV	2x315	2x200	2x208	1x322
3	Morena	400/220kV	2x315	2x220	2x240	1x346
4	Seoni	400/220kV	2x315	2x190	2x220	1x345
5	Satna	765/400/220 kV	2x315+1x500	2x200+1x320	2x203+1x322#	2x315 (500MVA ICT out)#
6	Padghe(GIS)	765/400kV	2x1500	2x550	2x1050	1565

**Additional outlets from Raigarh (PG) substation need to be planned by CSPTCL in addition to Raigarh(PG) – Raigarh(CSPTCL) 220kV D/c line in order to avoid overloading on this line in future*

28.3. CEA stated that provision of additional ICTs at the existing 400/220 kV substation needs to be planned along with the 220 kV outlets by the concerned STU and implementation of both, additional 400/220 kV ICT and additional 220 kV outlets, needs to be done in matching time frame. Otherwise, in case of delay in implementation of the 220 kV outlets, additional 400/220 kV ICT would remain unutilised.

28.4. CTU stated that there may be some case where overloading of existing 400/220 kV ICTs is observed during outage of one ICT. Therefore, additional ICTs are required for fulfilment of n-1 criteria and there may not be any need of additional 220 kV outlets.

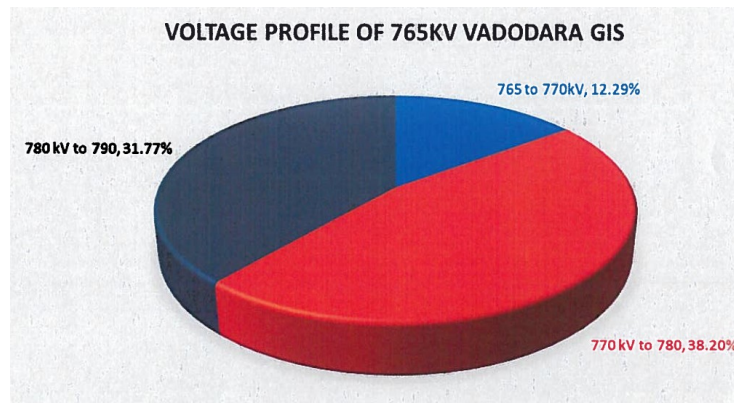
28.5. MPPTCL stated that loadings on Satna 400/220 kV ICTs would get reduced after implementation of the Rewa pooling station – Rewa 220 kV D/C line.

28.6. It was observed that overloading on the ICTs listed above in table are marginal (in case of N-1 outage condition). Members agreed that the issue of provision of additional ICT may be deliberated in a separate meeting among CEA, CTU, POSOCO and STUs for finalisation of additional ICTs at existing 400/220 kV substations with high loadings, wherein STU needs to intimate their future plans regarding additional 220 kV outlets associated with the additional ICT. STU also needs to intimate the schemes proposed in vicinity of the 400/220 kV substation where high loadings are observed.

29. Requirement of additional 765kV Bus Reactors at Vadodara GIS & Raipur Pool Substations – agenda by CTU

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- 29.1. CTU stated that the 765kV bus voltage at Vadodara GIS S/s generally remains high and the Vadodara – Dhule 765kV S/c line is often taken out of service by WRLDC for voltage control during night hours. As per the operational feedback report of Jan'19, the line was opened 36 times during the Q3 of 2018-19. The voltage profile was analyzed from Jan'18 to Aug'18 and following voltage pattern was observed:



Further, the issue of high voltage at Raipur Pool (Durg) 765kV S/S was deliberated in the 498th OCC meeting of WRPC held on 22.08.2017, wherein, it was decided that the issue be referred to the standing committee on Power System Planning. As per the operational feedback report of Jan'19, the Raipur Pool – Wardha 765kV D/c line (ckt. 2) was opened 8 times during the Q3 of 2018-19 to control the over voltages. The matter was deliberated in the 42nd WR SCM held on 17.11.2017 wherein it was observed that the requirement of bus reactor at Raipur PS shall be further reviewed.

- 29.2. CTU informed that as per the studies carried out for 2022-23 off-peak time-frame, the voltages observed at Vadodara and Raipur PS 765kV buses with and without 240MVar bus reactor is as given below:

Sl.	Substation	Existing BR (MVar)	Voltage level (kV)	Voltage without addl 240MVar Bus reactor (kV)	Voltage with addl 240MVar Bus reactor (kV)	Sensitivity (kV)
1	Vadodara	1x240	765	795	786	9
2	Raipur PS	1x240	765	788	785	3

- 29.3. It was agreed that the proposal would be studied along with POSOCO proposal of conversion of line reactors as bus reactors.

30. Commissioning of Solar Farms without Power Plant Controllers (PPC)- agenda by POSOCO

- 30.1. POSOCO stated that Solar Park of 750MW by RUMSL (Rewa Ultra Mega Solar Limited) at Rewa, Madhya Pradesh is under commissioning phase and part capacity has been commissioned. This Solar park is having three SPDs (Solar park developers) namely ACME, Arinsun & Mahendra with capacity of 250MW each. Recently as per

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discussion with Mahindra (the SPD) regarding the dynamic VAR compensation by solar park, it was understood that the plant cannot provide the dynamic VAR compensation as PPC (Power Plant Controller) is not available and was not envisaged during the planning phase. However solar park can provide the reactive power support as per system requirement whenever required, but it would be manual.

The CEA (Technical Standards for Connectivity to the Grid) (Amendment) Regulations 2012 has following provision:

“B2. For generating station getting connected on or after completion of 6 months from date of publication of these Regulations in the Official Gazette.

(1) The generating station shall be capable of supplying dynamically varying reactive power support so as to maintain power factor within the limits of 0.95 lagging to 0.95 leading.”

- 30.2.** POSOCO stated that conditions for providing dynamic VAR compensation needs to be specified while granting connectivity to solar RE developers.
- 30.3.** CTU stated that the Connectivity intimation granted by CTU specifically mentions that the applicant has to abide by CEA (Technical Standards for Connectivity to the Grid) Regulations.
- 30.4.** Members raised the issue of non-compliance of Technical standards/Regulations by the RE project developers and emphasized that a monitoring mechanism for checking the compliance of various Regulations and Standards by the Developers needs to be created.
- 30.5.** After deliberations, CTU agreed that clause The generating station shall be capable of supplying dynamically varying reactive power support so as to maintain power factor within the limits of 0.95 lagging to 0.95 leading would specifically mentioned in the connectivity intimation that would be issued in future to RE developers. Regarding the issue of non-compliance of Technical standards/Regulations by the RE project developers, it was agreed that the issue would be deliberated in a separate meeting.

31. High Voltages in the WR System- agenda by POSOCO

- 31.1.** POSOCO stated that in the Western region grid, the peak to off-peak demand variation is around 10000MW to 15000MW. During the off peak hours, very high voltages are observed in the grid resulting into opening of many EHV lines (400kV & 765kV) to control high voltage in the Grid. To arrest the voltage rise in the system, various actions are being taken by system operator on a daily basis vis-a vis:
- a) Taking all Bus Reactors into service,
 - b) Instruction to SLDCs for Switching off capacitor banks at lower voltage level,
 - c) Instructing generating stations to absorb VAR as per their capability curve.

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If high voltages still prevails after the above actions, as a last resort lightly loaded/less important EHV lines are being opened. Number of transmission lines opened on High voltage on daily basis during the fourth quarter of 2018-19 is given in figure-1.

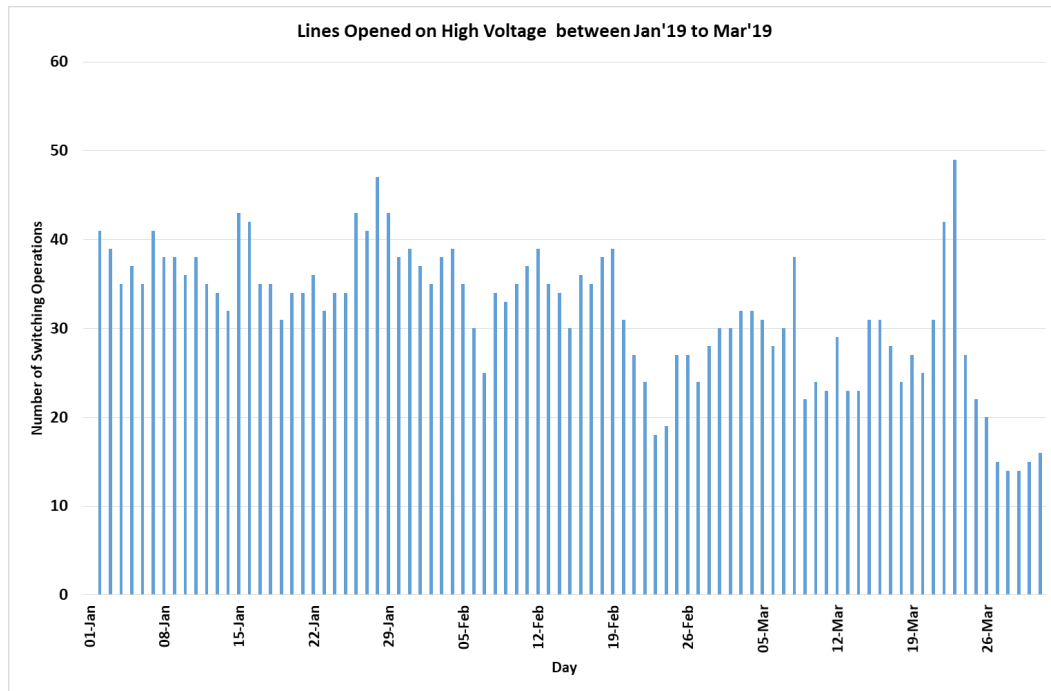


Figure 1 Lines kept opened on high voltage on Daily Basis in Western Region

Further, wherever possible the switchable line reactors are utilized as Bus reactor after opening these lines. Some of the lines having line reactors, which are being opened regularly to control the high voltages in the system are given below:-

S. No	Voltage (kV)	Transmission Line Name	No of Ckts Kept out to control HV	LR as BR provision not available as intimated by utility	Un-utilized MVAR Capacity as per system requirement
1	765	Aurangabad-Wardha Ckt-1,2,3,4	one, sometimes two	Aurangabad PG end	240
2	765	Warora PS-New Parli Ckt-1,2	one	New Parli end	330
3	765	Raipur PS(Durg)-Wardha Ckt-1,2,3,4	two	Wardha PG end	660
4	765	Raigarh PS(Kotra)-Raipur PS(Durg) Ckt-1,2	one	Raipur PS(Durg) end	240
5	765	Vadodara(PG)-Dhule(BDTCL)-S/C	-	Vadodara PS end	240
6	765	Aurangabad (PG) - Padghe (PG) Ckt-1,2	one	Padghe GIS end	240
7	400	Kosamaba-Chorania	one	Both ends	113
8	400	Aurangabad PG-Boisar Ckt-1,2	one	Boisar PG end	80

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S. No	Voltage (kV)	Transmission Line Name	No of Ckts Kept out to control HV	LR as BR provision not available as intimated by utility	Un-utilized MVAR Capacity as per system requirement
9	400	Chandrapur(II)-Nanded Ckt-1,2	one	Chandrapur(II) end	50
10	400	Chandrapur-Parli Ckt-3	-	Both ends	100
11	400	Sugen-Pirana	-	Pirana end	50
Sub Total (MVAR un utilized)					2343

31.2. POSOCO suggested that provision for taking these line reactors as bus reactors would further help the system operator to control the high voltages in the grid.

31.3. The issue of conversion of existing Line reactors to be used as Bus reactor was deliberated and it was agreed that proposal would be studied by CEA, CTU and STU. The same would be put up as agenda in the next WRSCT meeting.

32. Commissioning of Switchable Line reactors with NGR Bypass & CSD- agenda by POSOCO

32.1. POSOCO stated that recently Rajnandgaon-Warora PS 765 kV D/c line (Hexa Zebra) has been commissioned with Switchable Line Reactors (SLR) at both ends. This line has been implemented, through TBCB route, by M/s Raipur–Rajnandgaon–Warora Transmission Limited, as a part of the transmission scheme Additional System Strengthening scheme for Chhattisgarh IPPs (Part – B).

POSOCO informed that during real time grid operation, one circuit of Rajnandgaon-Warora 765 kV D/C was opened to control the voltage profile of the system and the transmission licensee (RRWTL/WKTL) was instructed to operate the line reactor as Bus reactor. The transmission licensee had informed that these line reactors could not be operated as Bus reactor as NGR bypass and CSD (control switching device) are not available/commissioned for these switchable line reactors.

32.2. POSOCO suggested that wherever switchable line reactors are being planned with EHV lines, there shall be provision of NGR bypassing along with CSD, so that these switchable line reactors can be utilized as Bus reactors as and when required by the system.

32.3. CEA informed that the RfP documents of the transmission schemes which are currently under bidding it has been specified that The scheme for Rector shall be designed in such a way that it is possible to use the line reactors as bus reactors to control bus voltage.

32.4. Members noted the same.

33. Early commissioning of bus splitting works at Raigarh (Kotra) and Dharamjaygarh substations of POWERGRID:

33.1. CTU stated that bus-splitting arrangement to address the issue of high fault level (observed in the studies for **2018-19 time frame**) at Dharamjaygarh, Raigarh (Kotra) and Champa

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pooling stations of POWERGRID was agreed in the 39th Meeting of Standing Committee on Power System planning in Western Region, held on 30th November 2015.

The bus-splitting scheme is under implementation by POWERGRID as Western Region Strengthening Scheme – XVIII with commissioning schedule of 36 months (SCOD is 09.02.2020). The scope of works under WRSS-XVIII involves the following:

1. Splitting of following substation along with necessary switching arrangement.

- a. Dharamjaygarh Pool 765kV BUS
- b. Raigarh Pool (Kotra) 400kV & 765kV BUS
- c. Champa Pool 400 kV & 765kV BUS

2. Installation of Reactors:

- a. 1X125 MVAR BUS Reactor at 400kV BUS of Dharamjaygarh Pool.
- b. 1X125 MVAR BUS Reactor at 400kV BUS Section A of Raigarh Pool (Kotra).
- c. 1X240 MVAR BUS Reactor at 765kV BUS Section A of Raigarh Pool (Kotra).
- d. 1X240 MVAR BUS Reactor at 765kV BUS Section A of Champa Pool.
- e. 1X330 MVAR BUS Reactor at 765kV BUS Section B of Dharamjaygarh Pool.

33.2. CTU stated that the system studies in the current time-frame indicate that the fault level at Dharamjaygarh and Raigarh (Kotra) 765/400kV Pooling stations is already crossing the design limits and the bus splitting scheme needs to be implemented at these substations on priority.

Following fault levels at the above substations:

Sl.	Substation	Fault Level (400kV) (in kA)		Fault Level (765kV) (in kA)	
		Design	Observed	Design	Observed
1	Dharamjaygarh PS	50	30	50	57
2	Raigarh (Kotra) PS	50	51	50	36
3	Champa PS	50	39	50	46

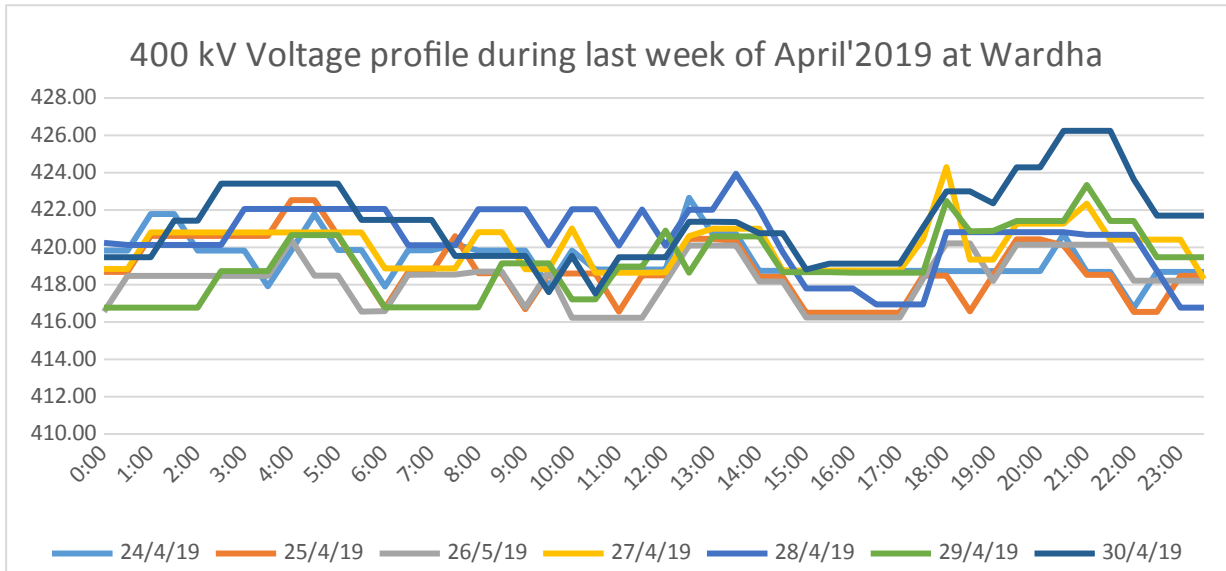
CTU proposed the early commissioning of bus splitting works along with installation of reactive compensation at Dharamjaygarh and Raigarh (Kotra) by June 2019 itself as compared to its SCOD of Feb 2020.

33.3. The members agreed early commissioning (by June 2019) of bus splitting along with bus reactors at the Dharamjaygarh and Raigarh (Kotra) substations.

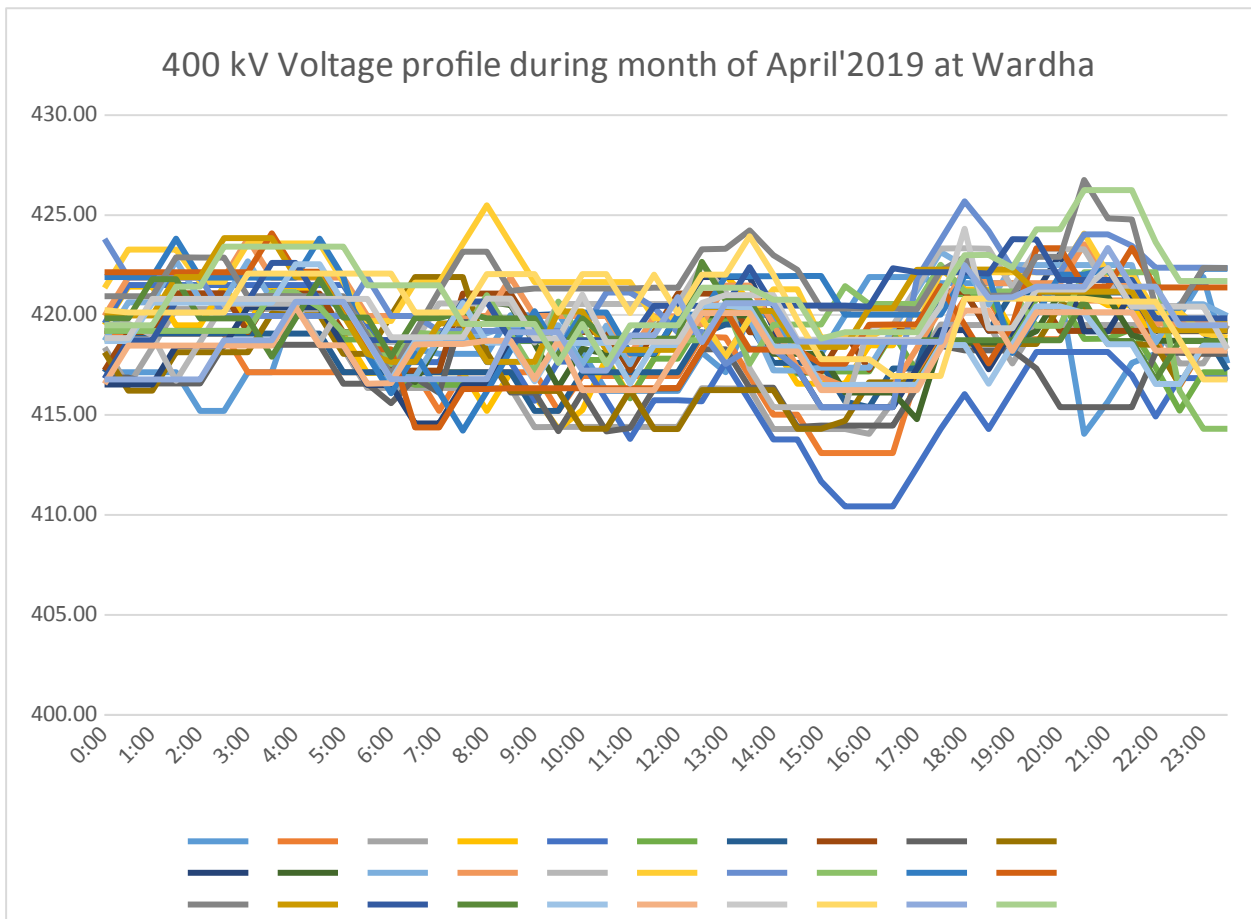
34. Charging of 400 kV Wardha – Aurangabad (1200 kV Wardha – Aurangabad) Line Reactor as Bus reactor

34.1. CTU stated that the voltage at Wardha substation remains persistently high throughout the year. The 400 kV Voltage profile of Wardha substation during last week of April 2019 is as follows:

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The voltage observed at Wardha substation during the month of April, 2019 is as given below:



34.2. CEA stated that provision 1x330MVAr 765kV bus reactor at Wardha substation has already been agreed in the 42nd meeting of SCPSPWR held on 17.11.2017 as part of reactive power compensation to control high voltages in WR in the time frame of 2021 – 22. The scheme Provision of Bus Reactors at High Voltage Nodes in Western Region was recommended to be implemented under RTM in the 2nd ECT meeting held on 06.08.2018.

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- 34.3. CTU stated that scheme is under implementation by POWERGRID as WRSS-20 scheme and the SCOD of the scheme is 25 months from IA (investment approval). The IA of the scheme is expected in June/July 2019. Commissioning of bus reactor at Wardha would take time. However, 80MVAR line Reactors on each ckt of Wardha - Aurangabad 400kV D/c line (Wardha – Aurangabad 1200 kV S/C line charged at 400 kV level) at Wardha end are ready for commissioning and the same may be used as bus reactors for voltage control at Wardha S/s.
- 34.4. CEA enquired about the commissioning of Wardha - Aurangabad 400kV D/c line (Wardha – Aurangabad 1200 kV S/C line charged at 400 kV level). CTU stated that line is expected to be commissioned by December 2019.
- 34.5. Members agreed for utilisation of the 80MVAR line Reactors on each ckt of Wardha - Aurangabad 400kV D/c line (Wardha – Aurangabad 1200 kV S/C line charged at 400 kV level) at Wardha end as bus reactors till the commissioning of the line (expected by Dec'19).

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Annexure-I

List of Participants of the 2nd meeting of Western Region Standing Committee on Transmission held on 21st May'2019 at Indore

S.No	Name (Smt/Shri)	Designation	Mb. No.	Email
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21	Shashank Shekhar	Asst. Mgr. (CTU-		shashankshekhar

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		Operation)		
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Status of TBCB Transmission Projects - Western Region

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
1	<p>System Strengthening in NR for import of power from North Karanpura and other projects outside NR and System Strengthening in WR for import of power from North Karanpura and other projects outside Western Region and also for projects within Western Region.</p> <p>Estimated Cost Rs. 2700 Cr</p>	<p>REC</p> <p>NKTCL (Reliance Power Transmission Company Ltd)</p> <p>Milestones:</p> <p>(i) SPV acquired by Reliance on 20-05-2010</p> <p>(ii) Approval u/s 164 received on 12.08.2013.</p>	<p>(i) Sipat/Korba (Pooling) - Seoni 400 kV D/C line</p> <p>(ii) Lucknow - Bareilly 765 kV D/C line</p> <p>(iii) Bareilly - Meerut 765 kV D/C line</p> <p>(iv) Agra - Gurgaon (ITP) 400 kV D/C line</p> <p>(v) Gurgaon (ITP) - Gurgaon (PG) 400 kV D/C line</p> <p>(vi) Gurgaon (ITP) 400/220 kV GIS Substation</p>	<p>Matter was in CERC for revision of tariff and extension of date of commissioning.</p> <p>NKTCL filed an appeal in appellate tribunal challenging CERC order of 9.5.2013. Appellate Tribunal has given final judgment on 2.12.13 setting aside CERC order and allowing the appeal. NKTCL is initiating steps for implementing of order. The judgment of Appellate Tribunal accepts delay in clearance under section-164 as force majeure. According NKTCL have requested MoP to extend the validity of section 68 clearance vide their letter dated 14.1.2014.</p> <p>Beneficiaries have appealed SC.</p> <p>SC on 12th August has disposed of the appeal and directed ATE to decide on the appeal.</p> <p>APTEL in its hearing dated 01st Feb 19 disposed off the case directing to go back to CERC for a fresh treatment - including (but not limited</p>

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
				to) the aspect of the very necessity of NK and TT transmission system. A petition has been filed with a stay application in CERC for redressal of grievances. Hearing was expected in April'19. Work Yet to start.
2	Transmission System Associated with Krishnapattnam UMPP-Synchronous interconnection between SR and WR (Part-B) Estimated Cost Rs. 440 Cr	REC RSTCL (Consortium of Patel-Simplex- BS Transcomm) Milestones: (i) LoI placed on 16.12.2010 (ii) SPV acquired on 07.01.2011 (iii) Trans. license received on 24.08.2011 (iv) Approval u/s 164 received on 29.08.2011 (v) Tariff adoption on 12.8.2011	(i) Raichur - Sholapur 765 kV S/C line-1 (208 ckm)	Commissioned in 06/2014
3	System strengthening common for WR and NR	PFC	(i) Dhramjaygarh - Jabalpur 765 kV D/C (ii) Jabalpur - Bina 765 kV S/C line	Line commissioned in 09/2015 Line commissioned in 06/2015

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
	Estimated Cost Rs. 1720 Cr	Jabalpur Transmission Company Limited (Sterlite Grid) Milestones: (i) LOI placed on 31.01.2011 (ii) Special Purpose Vehicle acquired on 31.03.2011 (iii) Scheduled Completion Date is 31.03.2014. (iv) Transmission License granted on 12.10.2011. (v) Tariff adoption approval on 28.10.2011 (vi) Clearance under Section 164 : received on 12.07.13		
4	System strengthening for WR Estimated Cost Rs. 2900 Cr	PFC BDTCL(Sterlite Grid) Milestones: (i) LoI placed on 19.1.2011 (ii) SPV acquired on 31.3.2011 (iii) Trans. license received on 12.10.2011	(i) Jabalpur-Bhopal 765 kV S/C line (ii) Bhopal-Indore 765 kV S/C line (iii) 2x1500 MVA 765/400 kV substation at Bhopal (iv) Bhopal-Bhopal (MPPTCL) 400 kV D/c quad line.	Line commissioned in 06/2015 Line commissioned in 10/2014 Commissioned in 07/2014 Line Commissioned in 07/2014

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
		(iv) Approval u/s 164 received on 29.01.2013 (v) Tariff adoption on 28.10.2011 (vi) Original COD : Mar2014	(v) Aurangabad-Dhule 765 kV S/C line (vi) Dhule-Vadodara 765 kV S/C line (vii) 2x1500 MVA, 765/400 kV substation at Dhule (viii) Dhule-Dhule (Msetcl) 400 kV D/C Line	Line commissioned in 10/2014 Line commissioned in 10/2015 Commissioned in 11/2014 Line Commissioned in 11/2014
5	Transmission System associated with DGEN TPS (1200 MW) of Torrent Power Ltd. Estimated Cost Rs. 275 Cr	PFC M/s Instalaciones Inabensa, S.A. Spain Milestones: (i) LoI issued on 19.05.2014 (ii) Approval under section 68 on 30.01.2014. (iii) Approval under Sec 164 of EA,2003 on 24.04.2016	(i) DGEN TPS – Vadodara 400 kV D/C, Twin Moose line. (ii) Navsari – Bhestan 220 kV D/C line	Project authority had not started construction activity as per execution plan. Matter was taken up with the project authority and notice served in August/Sept 2016 but project authority did not respond. Member (PS), CEA took a meeting on 26.04.2017 to review the progress of Tr. project wherein project authority informed to close the project due to financial constraints in parent company. CEA vide letter dated 14.06.2017 informed CERC to take appropriate action. Completion Target was May 2018

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
6	<p>Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-A)</p> <p>Estimated Cost Rs. 256 Cr</p>	<p>REC Powergrid Warora Transmisson Limited (A subsidiary of PGCIL)</p> <p>Milestones: (i) LoI issued on 11.03.2015 (ii) Approval under section 68 on 26.11.2014 (iii) Approval under Sec 164 of EA,2003 on 24.04.2017</p>	<p>(i) Gadarwara STPS - Jabalpur Pool 765kV D/C line (ii) Gadarwara STPS - Warora P.S. (New) 765 kV D/C line (iii) LILO of both Ckts. Of Wardha-Parli 400 kV D/C at Warora P.S. (2xD/C) (iv) Warora 765/400 kV Pooling Station (2x1500 MVA).</p>	<p>Commissioned in July, 2018</p>
7	<p>Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-B).</p> <p>Estimated Cost Rs. 275 Cr</p>	<p>REC Powergrid Parli Transmisson Limited (A subsidiary of PGCIL)</p> <p>Milestones: (i) LoI issued on 11.03.2015 (ii) Approval under section 68 on 10.12.2014 (iii) Approval under Sec 164 of EA,2003 on 28.06.2017</p>	<p>(i) Warora P.S.- Parli (New) 765 kV D/C line (ii) Parli (New) - Solapur 765 kV D/c line (iii) Parli (New) - Parli (PG) 400 kV D/C (Quad) line (iv) 765/400 kV Parli (New) Sub-station (2x1500 MVA)</p>	<p>Commissioned in June, 2018</p>

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
8	<p>Transmission System Strengthening associated with Vindhyachal- V</p> <p>Estimated Cost</p> <p>Rs. 211 Cr</p>	<p>REC</p> <p>Powergrid Jabalpur Transmisson Limited (A subsidiary of PGCIL)</p> <p>Milestones:</p> <p>(i) LoI issued on 10.02.2015</p> <p>(ii) SPV has been acquired by the successful bidder on 26.02.2015</p> <p>(iii) Approval u/s 164 of EA,2003 on 19.09.2016</p>	<p>(i) Vindhyachal P. S- Jabalpur P. S. 765 kV D/C line.</p>	<p>Commissioned in December, 2018</p>
9	<p>System strengthening for IPPs in Chhattisgarh and other generation projects in Western Region</p> <p>Estimated Cost</p> <p>Rs. 823 Cr</p>	<p>PFC</p> <p>Chhattisgarh - WR Transmission Ltd. (A subsidiary of Adani Power Limited)</p> <p>Milestones:</p> <p>(i) LoI issued on 28.07.2015</p> <p>(ii) SPV acquisition on 23.11.2015</p> <p>(iii) Approval u/s 68 of EA,2003 on 24.04.2015</p> <p>(iv) Approval u/s 164 of EA,2003 on 20.10.2016</p>	<p>(i) Gwalior 765/400 kV – Morena 400 kV D/C line 400 kV D/C Length- 50 km</p> <p>(ii) Establishment of 400/220 kV S/s at Morena, 2X315 MVA</p> <p>(iii) Vindhyachal-IV & V– Vindhyachal Pool 400 kV D/C (Quad) line Length-15 km</p> <p>(iv) Sasan UMPP – Vindhyachal Pooling station 765 kV S/C (Q) line 7 Length-8 km</p>	<p>Commissioned in May, 2018</p> <p>Commissioned in May, 2018</p> <p>Commissioned in March, 2018</p> <p>Commissioned in April, 2018</p>

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
			(v) LILO of one circuit of Aurangabad – Padghe 765 kV D/C line at Pune Length-50 km (vi) Raigarh (Kotra) – Champa (Pool) 765kV S/C (Q) line (vii) Champa (Pool) – Dharamjaygarh 765kV S/C (Q) line	Anticipated Date of Completion: March, 2019 (Severe RoW issues) Commissioned in August, 2018 Commissioned in July, 2018
10	Additional System Strengthening for Sipat STPS Estimated Cost Rs. 867 Cr	PFC Sipat Transmission Ltd (A subsidiary of Adani Power Limited) Milestones: (i) SPV acquisition on 23.11.2015 (ii) LoI issued on 28.07.2015 (iii) Approval u/s 164 of EA,2003 on 05.08.2016	(i) Sipat – Bilaspur Pooling Station 765 kV S/C line Length-25 km (ii) Bilaspur PS – Rajnandgaon 765 kV D/C line Length-180 km	Commissioned in August, 2018 Connection agreement signed on 28.06.2018. Project is ready for commissioning
11	Additional System Strengthening Scheme for Chhattisgarh IPPs – Part B	PFC Raipur - Rajnandgaon - Warora Transmission Ltd (A subsidiary of Adani Power Limited)	(i) Raipur (Pool) – Rajnandgaon 765 kV D/C line Length - 60 KM	Commissioned in Mar'19 Commissioned in Mar'19.

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
	<p>Estimated Cost</p> <p>Rs. 823 Cr</p>	<p>Milestones:</p> <p>(i) SPV acquisition on 23.11.2015</p> <p>(ii) LoI issued on 28.07.2015</p> <p>(iii) Approval u/s 164 of EA,2003 on 15.06.2016</p>	<p>(ii) Rajnandgaon – New Pooling station near Warora 765 kV D/C line Length - 270 KM</p> <p>(iii) Establishment of new 765/400 kV substation near Rajnandgaon 2x1500 MVA</p>	<p>Commissioned in Mar'19.</p>
12	<p>Additional inter-Regional AC link for import into Southern Region i.e. Warora – Warangal and Chilakaluripeta - Hyderabad - Kurnool 765 kV link</p> <p>Estimated Cost</p> <p>Rs. 4805 Cr</p>	<p>PFC</p> <p>Warora Kurnool Transmission Ltd (A subsidiary of Essel Infraprojects Limited)</p> <p>Milestones:</p> <p>(i) LoI issued on 29.02.2016</p> <p>(ii) SPV acquisition on 06.07.2016</p> <p>(iii) Approval u/s 164 of EA,2003 on 27.06.2017</p>	<p>(i) Establishment of 765/400 kV S/s at Warangal (New) with 2x1500 MVA ICTs and 2x240 MVAR bus reactors</p> <p>(ii) Warora Pool – Warangal (New) 765kV D/c line with 240 MVAR switchable line reactor at both ends Length - 350 KM</p> <p>(iii) Warangal (New) – Hyderabad 765 kV D/c line with 330 MVAR switchable line reactor at Warangal end Length- 160 KM</p> <p>(iv) Warangal (New) – Warangal (existing) 400 kV (quad) D/c line Length-10 KM</p> <p>(v) Hyderabad – Kurnool 765 kV D/c line with 240 MVAR switchable line reactor at Kurnool end</p>	<p>Scheduled Date of Completion : November 2019</p>

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
			<p>Length- 170 KM</p> <p>(vi) Warangal (New) – Chilakaluripeta 765kV D/c line with 240 MVAR switchable line reactor at both ends Length – 250 KM</p> <p>(vii) Cuddapah – Hoodi 400kV (quad) D/c line with 63 MVAR switchable line reactor at both ends Length-200 KM</p>	
13	<p>Common Transmission System for Phase-II Generation Projects in Odisha and Immediate Evacuation System for OPGC (1320 MW) Project in Odisha</p> <p>Estimated Cost Rs. 2736 Cr</p>	<p>PFC</p> <p>Orissa Generation Phase-II Transmission Limited (A subsidiary of Sterlite Grid Limited)</p> <p>Milestones: (i) LoI issued on 06.01.2016 (ii) SPV acquisition on 08.04.2016 (iii) Approval u/s 164 of EA,2003 on 07.03.2017</p>	<p>(i) OPGC (IB TPS) – Jharsuguda (Sundargarh) 400 kV D/C line with Triple Snowbird Conductor Length - 50 KM</p> <p>(ii) Jharsuguda (Sundargarh) – Raipur Pool 765 kV D/C line Length - 350 KM</p>	<p>Commissioned in December 2017</p> <p>Scheduled Date of Completion: August 2019</p> <p>Line is ready for charging.</p>

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
14.	<p>Transmission System Strengthening in WR associated with Khargone TPP (1320 MW)</p> <p>Estimated Cost Rs. 2137 Cr</p>	<p>REC</p> <p>Khargone Transmission Limited (Sterlite Grid Ltd.)</p> <p>Milestones:</p> <p>(i) LoI issued on 26.05.2016</p> <p>(ii) SPV acquisition on 22.08.2016</p> <p>(iii) Approval u/s 164 of EA,2003 on 05.07.2017</p>	<p>A. Connectivity system for Khargone TPP</p> <p>(i) LILO of one ckt of Rajgarh - Khandwa 400 kV D/C line at Khargone TPP</p> <p>(ii) Khargone TPP Switchyard – Khandwa pool 400 kV D/C (Quad) line</p> <p>B. System strengthening in WR in time frame of Khargone TPP</p> <p>(i) Khandwa Pool – Indore 765 kV D/C line.</p> <p>(ii) Khandwa Pool – Dhule 765 kV D/C line.</p> <p>(iii) Establishment of 765/400 kV, 2x1500 MVA pooling station at Khandwa pool</p>	<p>Line Commissioned in Feb, 2018.</p> <p>Scheduled Date of Completion: July 2019</p>
15.	<p>New WR- NR 765 kV Inter-regional corridor</p> <p>Estimated Cost Rs. 916 Cr</p>	<p>REC</p> <p>Powergrid Varanasi Transmission System Limited (POWERGRID)</p> <p>Milestones:</p> <p>(i) LoI issued on 01.03.2018</p> <p>(ii) SPV acquisition on 27.03.2018</p> <p>(iii) Approval u/s 164 of EA,2003 on 15.03.2019</p>	<p>(i) Vindhyanchal Pooling Station- Varanasi 765 kV D/C line</p>	<p>Scheduled Date of Completion: July 2021</p>

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
16.	<p>A. Additional 400 kV feed to Goa</p> <p>B. Additional System for Power Evacuation from Generation projects pooled at Raigarh (Tamnar) Pool</p> <p>Estimated Cost Rs. 863 Cr</p>	<p>PFC</p> <p>Milestones:</p> <p>(i) LoI issued on 30.11.2017</p> <p>(ii) SPV acquisition on 14.03.2018</p> <p>(iii) Approval u/s 164 of EA,2003 on 29.11.2018</p>	<p>A. Additional 400kV feed to Goa</p> <p>(i) LILO of one ckt. of Narendra (existing) – Narendra (New) 400 kV D/c quad line at Xeldem</p> <p>(ii) Xeldem – Mapusa 400 kV D/c (Q) line</p> <p>(iii) Establishment of 2x500MVA, 400/220kV substation at Xeldem</p> <p>B. Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool</p> <p>(i) Dharamjaygarh Pool section B - Raigarh (Tamnar) Pool 765 kV D/c line</p>	<p>Scheduled Date of Completion: November 2021</p> <p>Anticipated Date of Completion : June 2020</p>
17.	<p>A. Connectivity System for Lanco Vidarbha Thermal Power Ltd. (LVTPL)</p> <p>B. Inter State Transmission system strengthening in Chhatarpur area in Madhya Pradesh</p>	<p>PFC</p> <p>Milestones:</p> <p>(i) MoP vide Gazette Notification dated 28.10.2016 appointed PFCCL as BPC</p>	<p>A. Connectivity System for Lanco Vidarbha Thermal Power Ltd. (LVTPL)</p> <p>(i) LVTPL TPS switchyard – Warora Pool 765kV D/c line</p> <p>B. Inter State Transmission system strengthening in Chhatarpur area in Madhya Pradesh</p>	<p>Bidding process kept in abeyance.</p>

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
			(i) LILO of both circuits of Satna – Bina 400kV (1st) D/c line at Bijawar. (ii) Establishment of 2x500MVA, 400/220kV substation at Bijawar	
18.	WRSS -21 Part-A (TBCB) - Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS	REC Milestones: (i) RfQ stage concluded (ii) REC has applied for approval u/section 68	(i) Establishment of 2x1500 MVA, 765/400kV Lakadia PS with 765kV (1x330MVAR) & 400kV (125 MVAR) bus reactor along with future provisions. (ii) LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS (iii) Bhuj PS – Lakadia PS 765kV D/c line (iv) 2 nos of 765kV bays at Bhuj PS for Bhuj PS – Lakadia PS 765kV D/c line	
19.	WRSS -21 Part-B- Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS	PFC Milestones: (i) RfQ stage concluded	(i) Lakadia – Vadodara 765 kV D/c line (ii) 330MVAr switchable line reactors at both ends of Lakadia – Vadodara 765 kV D/c line (iii) 2 nos of 765 kV bays at	

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
		(ii) PFC has applied for approval u/section 68	both Vadodara and Lakadia S/Ss for Lakadia – Vadodara 765 kV D/c line	
20.	Transmission system associated with RE generations at Bhuj –II, Dwarka & Lakadia	<p>REC</p> <p>Milestones:</p> <p>(i) RfQ stage concluded</p> <p>(ii) REC has applied for approval u/section 68</p>	<p>(i) Lakadia PS – Banaskantha PS 765 kV D/c line</p> <p>(ii) 765kV Bays at Lakadia and Banaskantha for Lakadia PS – Banaskantha PS 765 kV D/c line</p> <p>(iii) 240MVAR switchable Line reactor at Lakadia PS end of Lakadia PS – Banaskantha PS 765 kV D/c line</p>	
21.	Transmission System for providing connectivity to RE projects at Bhuj-II (2000MW) in Gujarat	<p>PFC</p> <p>Milestones:</p> <p>(i) RfQ stage concluded</p>	<p>(i) Establishment of 2x1500MVA (765/400kV), 4x500MVA(400/220kV) Bhuj-II PS (GIS) with 765kV (1x330MVAR) and 400kV (125 MVAR) bus reactor along with future provisions</p> <p>(ii) Reconfiguration of Bhuj PS – Lakadia PS 765kV D/c line so as to establish Bhuj-II –Lakadia 765 kV</p>	

S.No.	Name of the Project	BPC /Implementing Agency / Milestones	Scope of works	Current Status
			D/C line as well as Bhuj-Bhuj-II 765kV D/C line	
22.	Jam Khambaliya Pooling Station and Interconnection of Jam Khambaliya Pooling Station for providing connectivity to RE projects (1500 MW) in Dwarka (Gujarat) & Installation of 400/220 kV ICT along with associated bays at M/s CGPL Switchyard	REC Milestones: (i) RfQ stage concluded	(i) Establishment of 4x500MVA, 400/220kV Jam Khambhaliya PS (GIS) alongwith 1x125MVA, 420kV Bus reactor along with future provisions (ii) 1x125MVA, 420kV Bus reactor at Jam Khambhaliya PS (GIS) along with reactor bay (iii) Extension of Essar-Lakadia/Bhachau 400kV D/c (triple) line up to Jam Khambhaliya PS (iv) 63MVA switchable Line Reactor at both ends of Lakadia/Bhachau - Jam Khambhaliya 400kV D/c line (v) 2 no. 400 kV line bays at Jam Khambhaliya PS for termination of Lakadia/Bhachau - Jam Khambhaliya 400kV D/c line (vi) 1x500 MVA, 400/220 ICT at CGPL Mundra switchyard.	

STATUS OF TRANSMISSION SCHEMES COMMISSIONED BY POWERGRID IN WESTERN REGION (as on 24.04.2019)

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
1	Western Region System Strengthening Scheme -II	5222	20 th (23.01.04)	July'06		
	Set-A: For absorbing import in eastern and central part of WR Grid (POWERGRID)	1700			Commissioned	
	Set-B: For regional strengthening in Southern Maharashtra (100 % private)	1050			Commissioned	
	Set-C: For regional strengthening in Gujarat (100 % private)	600			---	Implementation by Reliance
	a) Rajgarh – Karamsad 400kV D/c				commissioned	
	b) Limdi(Chorania) – Ranchodpura 400kV D/c				commissioned	
	c) Ranchodpura – Zerda(Kansari) 400kV D/c				commissioned	
	Set-D: For regional Strengthening in Northern Madhya Pradesh (POWERGRID)	1050			commissioned	
2	Transmission system associated with Krishnapatnam (5x800 MW) (WR Portion)- now delinked from Krishnapatnam UMPP	1928	27 th (30.07.07)			
	a) Raichur – Solapur (PG) 765 kV S/c				Commissioned	

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	b) Solapur(PG) – Pune 765 kV S/c				Commissioned	
	c) LILO of 400kV Aurangabad I (Waluj) - Pune (PG) D/c & Parli (PG) - Pune (PG) D/c lines at Pune(GIS)				Commissioned	
	d) Establishment of new 765/400 kV substations at Pune (GIS) with 2x1500 MVA transformation capacity				Commissioned	
3	Associated transmission system of VSTPP-IV and Rihand-III	4673	29th (10.09.09)	Mar'10		
	a) Rihand III- Vindhyachal Pool 765 kV D/c (initially to be op. at 400kV)				Commissioned	
	b) Vindhyachal IV - Vindhyachal Pool 400kV D/c(Quad)				Commissioned	
	c) Vindhyachal Pool - Satna 765 kV 2xS/c				Commissioned	
	d) Satna -Gwalior 765 kV 2xS/c				Commissioned	
	e) Gwalior – Jaipur(South) 765 kV S/c				Commissioned	
	f) Vindhyachal Pool-Sasan 765 kV S/c				Commissioned	
	g) Vindhyachal Pool-Sasan 400 kV D/c				Commissioned	
	h) Establishment of 765/400kV, 2x1500 MVA substation at Vindhyachal Pool				Commissioned	
4	Solapur STPP(2x660MW) transmission system	63.32	30th (08.07.10)	Oct'13		
	a) Solapur STPP – Solapur (PG) 400kV D/c (Quad)				Commissioned	Line completed in Apr'15
	b) Augmentation of 400/220kV ICT by 1x500MVA transformer (3 rd) at Solapur (PG)				Commissioned	

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
5	Solapur STPP (2x660MW) transmission system (Part-A)	50.52	36th (29.08.13)	Mar'15		Award placed in May'15
	a) Solapur STPP – Solapur (PG) 400kV 2nd D/c (Quad)				Commissioned	
6	Transmission system for evacuation of Kakrapar Atomic Power Project unit 3 &4 (2x700 MW)	378.71	31 st (27.12.10)	Feb'14		
	a) Kakrapar NPP – Navsari 400kV D/c – 38 km				Commissioned	Stringing commenced from Mar'16
	b) Kakrapar NPP – Vapi 400kV D/c - 104 km				Commissioned	
7	Transmission System associated with Mauda Stage-II (2x660 MW)	1575.3	32 nd (13.05.11)	Sep'13		
	a) Mauda II – Betul 400KV D/c (Quad)-210 km				Commissioned	
	b) Betul– Khandwa 400KV D/c (Quad)-180 km				Commissioned	
	c) Khandwa – Indore(PG) 400kV D/c -215 km				Commissioned	
	d) Establishment of 400/220kV 2x315MVA substation at Betul				Commissioned	
8	Provision of 1x315MVA ICT & Spare Converter Trf for reliable auxilliary power supply at HVDC back to back station at Bhadravati	143	33 rd (21.10.11)	-	Commissioned	ICT commissioned in Mar'15. Balance work under progress.
9	Establishment of Pooling Station at Champa and Raigarh (Near Tamnar) for IPP Generation Projects in Chhattisagrh	2066.85	29th (10.09.09)	May'11		

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	a) Champa Pooling Station - Raipur Pooling Station 765kV D/c				Commissioned	
	b) Raigarh Pooling Station (near Kotra) - Raigarh pooling (near Tamnar) 765kV D/c				Commissioned	
	c) Champa Pooling Station - Dharamjaygarh Pooling Station 765kv S/c				Commissioned	
	d) Raigarh Pooling Station (near Kotra) - Champa pooling 765kV S/c				Commissioned	
	e) Establishment of 765/400kV 6x1500MVA Champa Pooling Station				Commissioned	
	f) Establishment of 765/400kV 3x1500MVA Raigarh Pooling Station (near Tamnar)				Commissioned	
10	Transmission system strengthening in Western Part of WR for IPP generation projects in Chhattisgarh	2127.51	29th (10.09.09)	Nov'11		
	a) Aurangabad(PG) – Boisar 400kV D/c (Quad)				Commissioned	
	b) Wardha - Aurangabad (PG) 765kV D/c				Commissioned	
	c) Establishment of 765/400kv 2x1500MVA auraganbad (PG) S/s				Commissioned	
	d) Augmentation of transformation capacity at Boisar by 400/220kV, 1x500MVA				Commissioned	
11	System strengthening in North/West part of WR for IPP Projects in Chhattisgarh	2073.26	29th (10.09.09)	Dec'11		
	a) Aurangabad (PG) – Padghe(PG) 765kV D/c				Commisisoned	

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	b) Vadodara – Asoj 400kV D/c(Quad)				Commissioned	
	c) Padghe – Kudus 400kV D/c (Quad)				Commissioned	
12	System Strengthening in Raipur-Wardha Corridor for IPP projects in Chhattisgarh (DPR-6)	1422.85	29th (10.09.09)	Jan'12		
	a) Raipur Pooling station - Wardha 765kV 2nd D/c				Commissioned	
13	WR-NR HVDC interconnector for IPP Projects in Chhattisgarh	9569.76	29th (10.09.09)/30th (08.07.10)	Mar'12	Commissioned	
	a) A ± 800kV, 3000MW HVDC bipole between Champa Pooling Station-Kurukshetra (NR) (provision to upgrade to 6000MW at a latter date)				Commissioned	
	b) Kurukshetra(NR) - Jalandhar 400kV D/c(Quad) one ckt. via 400/220kV Nakodar				Commissioned	
	c) LILO of Abdullapur – Sonepat 400kV D/c(triple) at Kurukshetra				Commissioned	
	d) Establishment of 3000MW 800KV HVDC bipole terminal each at Champa Pooling station and Kurukshetra(NR) respectively: to be upgraded to 6000MW.				Commissioned	
	e) Establishment of 400/220kV 2x500 MVA S/s at Kurukshetra (GIS) 2x500MVA				Commissioned	400kV bays ready for commissioning in Dec'15. ICT-II under progress.

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
14	Inter-regional system strengthening scheme for WR and NR-Part A	1315.9	36 th (29.08.13)	Oct'13		Completed
	a) Solapur - Aurangabad 765kV D/c				Commissioned	
15	Transmission System Associated with Lara STPS-I (2x800MW)	400.47	17 th LTA (03.01.13)	Jun'14		
	a) Lara STPS-I – Raigarh (Kotra) Pooling Station 400 kV D/c line – 18km				Commissioned	
	b) Lara STPS-I – Champa Pooling Station 400 kV D/c (quad) line.-112km				Commissioned	Tower erection commenced in Oct'15
16	Inter-regional system strengthening scheme for WR and NR-Part B	6517.36		Dec'14	Apr'18	PROJECT COMPLETED
	(a) 765KV D/C Jabalpur Pooling Station - Orai line				Commissioned	
	(b) 765KV D/C Orai - Aligarh line				Commissioned	01 ckt commissioned in Mar'18 & balance commissioned in Apr'18.
	(c) 400KV D/C Orai - Orai line (Q)				Commissioned	
	(d) LILO of one ckt of Satna-Gwalior 765KV 2x S/C line at Orai				Commissioned	
	(e) LILO of Agra - Meerut 765KV S/C at Aligarh				Commissioned	
	(f) LILO of Kanpur - Jhatikara 765KV S/C at Aligarh				Commissioned	
17	Wardha - Hyderabad 765kV Links	3662.02		Jan'15		

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	(a) 765KV D/C Wardha - Hyderabad line				Commissioned	
	(b) 400KV D/C Nizamabad - Dichpali line				Commissioned	
18	GREEN ENERGY CORRIDORS:- Inter State Transmission Scheme (ISTS) - Part B	3705.61	36 / 37 th (29.08.13/05.09.14)	Apr'15	Commissioned	Project completed.
	(a) 765KV D/C Banaskanta - Chittorgarh (New) line				Commissioned	Commissioned in Feb'19.
	(b) 765KV D/C Chittorgarh (New) - Ajmer (New) line				Commissioned	
	(c) 400KV D/C Banaskanta - Sankhari line				Commissioned	Commissioned in Feb'19.
	(d) Establishment of 765/400/220kV (765/400kV - 2x1500 MVA & 400/220kV - 2x500MVA) substation at Banaskanta				Commissioned	Commissioned in Feb'19.
19	GREEN ENERGY CORRIDORS:- Inter State Transmission Scheme (ISTS) - Part C	2247.37	36 / 37 th (29.08.13/05.09.14)	July'15	Commissioned	PROJECT COMPLETED.
	(a) 765KV D/C Bhuj Pool - Banaskanta line				Commissioned	Line completed in Feb'19.
	(d) Establishment of 765/400/220kV (765/400kV - 2x1500 MVA & 400/220kV - 2x500MVA) pooling station at Bhuj				Commissioned	Completed in Feb'19.
20	Transmission System Strengthening Associated with Vindhyachal V - Part A		34 th (09.05.12)	Feb'15	Commissioned	PROJECT COMPLETED.
	(a) 1x1500MVA, 765/400kV ICT at Vindhyachal Pooling Station				Commissioned	

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
21	Transmission System Strengthening Associated with Vindhyachal V - Part B		34th (09.05.12)		Commissioned	PROJECT COMPLETED.
	(a) 2 nos of 765kV Line bays alongwith 2x330MVAR Line Reactor at Vindhyachal Pooling Station				Commissioned	Commissioned in Dec'18.
	(a) 2 nos of 765kV Line bays alongwith 2x330MVAR Line Reactor at Jabalpur Pooling Station				Commissioned	Commissioned in Dec'18.
22	STATCOMs in Western Region		36th (29.08.13)	Mar'15	Commissioned	PROJECT COMPLETED.
	(a) Aurangabad				Commissioned	Commissioned in Mar'18.
	(b) Gwalior				Commissioned	Commissioned in Dec'18.
	(c) Solapur				Commissioned	Commissioned in Apr'18.
	(d) Satna				Commissioned	Commissioned in Mar'18.
23	Western Region System Strengthening Scheme XIV	93.96	37th (05.09.14)	Jan'16	Commissioned	PROJECT COMPLETED.
	(a) 2x500MVA, 400/220kV transformer alongwith six nos of 220kV bays at Indore (PG) 765/400kV Substation				Commissioned	Both ICT's and 220KV line bays charged in Sep'18. However down stream system of MPPTCL yet to be commissioned. Matter critical.
	(b) 1x500MVA, 400/220kV transformer alongwith two nos of 220kV bays at Itarsi (PG) 400/220kV S/s				Commissioned	

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
24	Powergrid works associated with Part-A of Transmission system for Gadawara STPS of NTPC		36/37th (29.08.13 / 05.09.14)	Apr'16	Commissioned	PROJECT COMPLETED.
	(a) 2 nos. 765 kV line bays at 765/400kV Jabalpur Pooling Station of POWERGRID {for Gadawara STPS (NTPC) - Jabalpur PS 765 kV D/c}				Commissioned in May'17	
25	Powergrid works associated with Part-B of Transmission system for Gadawara STPS of NTPC i.e. WRSS XV		36/37th (29.08.13 / 05.09.14)	Apr'16	Commissioned	PROJECT COMPLETED
	(a) 2 nos. 765 kV line bays at 765/400kV Solapur sub-station of POWERGRID {for Parli New (TBCB) - Solapur (PG) 765 kV D/c}				Commissioned	
	(b) 2 nos 400kV line bays at existing 400kV Parli (PG) Switching Station of POWERGRID {for Parli New (TBCB) - Parli (PG) 400kV D/c (quad)}				Commissioned	
26	Powergrid works associated with System Strengthening for IPPs in Chhattisgarh and other generation projects in Western Region		36th (29.08.13)	Jul'16	commissioned	Commisisioning progressively matching with TBCB lines.
	(a) 1 no. 765 kV line bay at 765/400kV Vindhyachal Pooling Station of POWERGRID {for Sasan UMPP - Vindhyachal PS (PG) 765 kV 2nd S/c}				Commissioned	

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	(b) 2 no. 400 kV line bays at 765/400kV Vindhaychal Pooling Station of POWERGRID {for Vindhaychal (IV/V) STPP switchyard (NTPC) - Vindhaychal PS (PG) 400 kV 2nd D/c (quad)}				commissioned	
	(c) 2 no. 400 kV line bays at Gwalior Substation {for Gwalior - Morena 400 kV D/c (quad)}				commissioned	Commissioned in May'18.
	(d) 2 nos. 765 kV line bays at 765/400kV Pune (GIS) sub-station of POWERGRID {for LILO of one circuit of Aurangabad(PG) – Padghe(PG)765 kV D/c at Pune (GIS) (PG)}				Mar'19	Completed.
	(e) 2 nos. 765 kV line bays at 765/400kV Champa Pooling Station of POWERGRID {1for Champa PS(PG) - Raigarh (Kotra) PS(PG) 765 kV 2nd S/c, 1 for Champa PS(PG) – Dharamjaigarh(PG) 765 kV 2nd S/c}				commissioned	
	(f) 1 no. 765 kV line bay at 765/400kV Raigarh (Kotra) Pooling Station of POWERGRID {for Champa PS(PG) - Raigarh (Kotra) PS(PG) 765 kV 2nd S/c}				commissioned	
	(g) 1 no. 765 kV line bay at 765/400kV Dharamjaigarh Pooling Station of POWERGRID {for Champa PS(PG) – Dharamjaigarh(PG)765 kV 2nd S/c}				commissioned	
27	Powergrid works associated with Additional System Strengthening Scheme Chhattisagrh IPPs Part-B		36/37th (29.08.13 / 05.09.14)	Jul'16	commissioned	

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	(a) 2 nos. 765 kV line bay at 765/400kV Raipur Pooling Station of POWERGRID {for Raipur PS(PG) – Rajnandgaon (TBCB) 765 kV D/c}				commissioned	
28	Powergrid works associated with Additional System Strengthening for Sipat STPS		36/37th (29.08.13 / 05.09.14)	Jul'16	commissioned	PROJECT COMPLETED.
	(a) 3 nos. 765 kV line bays at 765/400kV Bilaspur Pooling Station of POWERGRID (1 no. for Sipat STPS(NTPC) - Bilapur PS(PG) 3rd 765kV S/c, 2 nos. for Bilaspur PS(PG)-Rajnandgaon(TBCB) 765 kV D/c)				commissioned	765KV Sipat bay at Bilaspur commissioned in Aug'18. Balance commissioned in Mar'19.
	(b) 2 nos. 240 MVAR, 765 kV switchable line reactors at 765/400kV Bilaspur PS end for Bilaspur PS(PG) - Rajnandgaon(TBCB) 765 kV D/c				commissioned	Commissioned in Mar'19
29	Transmission System Strengthening associated with Mundra UMPP- Part A	266.19	36th (29.08.13)	Jul'16		
	(a) LILO of both circuits of Mundra UMPP-Limbdi 400kV D/c (triple snowbird) line at Bachau				commissioned	
30	Transmission System Strengthening associated with Mundra UMPP- Part B		36/38th (29.08.13/1 7.07.2015)		commissioned	Project Completed.
	(a) Mundra UMPP - Bhuj Pool 400kV D/c line (triple snowbird)				commissioned	

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
31	Bays for Transmission System Associated with DGEN Torrent Energy Ltd (1200MW)		13/14th LTA (27.12.10/13.05.2011)	Jul'16		Execution of TBCB scheme critical
	(a) 2nos 400kV Bays at Vadodara (GIS)				Aug'18	Bay charged in Aug'18. Commissioning matching with TBCB line.
	(b) 2nos 220kV Bays at Navsari (GIS)				May'18	Bay charged in May'18. Commissioning matching with TBCB line.
32	Western Region System Strengthening -16		38th (17.07.15)	Jul'16	Jan'19	PROJECT COMPLETED.
	(a) Installation of 2x500MVA, 400/220kV ICTs with associated bays at Parli (PG) switching station along with provision of six nos. of 220 kV bays				Ready for commissioning	ICT's ready for commissioning in Jul'18. Availability of down stream network by MSETCL. Critical
	(b) Provision of two nos. of 220kV bays at Mapusa (Colvale) 400/220 kV substation				Ready for commissioning	Ready for commissioning in Jul'18. Availability of down stream network by GED.
	(c) Installation of 500MVA, 400/220kV (3rd) ICT with associated bays at Satna (PG) S/s with provision of two nos. 220kV line bays				commissioned	

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	(d) Provision of two nos. of 400 kV bays at 765/400kV Indore(PG) substation				Ready for commissioning	Charged in Jan'19. Availability of down stream network by MPPTCL. Critical.
33	Western Region System Strengthening -17		39th (30.11.15)	Feb'17	Mar'19	Compln Sch. : 31 month from IA.
	1. Provision of 1x240 MVAR switchable line reactor at Pune GIS S/s end {for Aurangabad (PG) – Pune GIS 765kV S/C line, formed after LILO of one ckt of Aurangabad (PG) – Padghe (PG) 765kV D/C line at Pune GIS}.				commissioned	
	2. Conversion of followings Fixed Line Reactor into Switchable Line Reactors / BUS Reactor.					
	a. Bina (PG) – Shujalpur 400kV D/C line: 420kV 50 MVAR fixed line reactor at Shujalpur end is to be converted into switchable line reactor. The 420kV 63 MVAR line reactor installed at Bina (PG) end is already switchable.				commissioned	
	b. 1x63 MVAR BUS Reactor at Bhadravati S/s: 420kV				commissioned	
	3. Installation of ICTs along with associated bays at following substations of POWERGRID:					
	a. Khandwa 400/220kV Substation: 1x500 MVA, 400/220kV 3rd ICT.				commissioned	ICT commissioned in May'18 except 02 nos. of bays. Bay commissioned in Oct'18
	b. Boisar 400/220kV Substation: 1x500 MVA, 400/220kV 4th ICT.				commissioned	Commissioned in May'18.

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	c. Kala 400/220kV Substation: 1x500 MVA, 400/220kV 3rd ICT.				commissioned	Commissioned in Nov'18.
	d. Dehgam 400/220kV Substation: 1x500 MVA, 400/220kV 3rd ICT.				commissioned	Commissioned in Jun'18.
34	Transmission System for Ultra mega Solar Park in Rewa District, Madhya Pradesh .		38th (17.07.2015)	Jan'16 / Mar'17	commissioned	Project Completed
	Establishment of 3x500MVA, 400/220kV substation at Rewa Pooling Station				commissioned	Sub station alongwith ICT I & II completed & charged in Mar'18. 3rd ICT charged in Feb'19
	LILO of Vindhyachal - Jabalpur 40kV D/c (both circuits) at Rewa Pooling Station				commissioned	Line completed & charged in Mar'18.
	6 nos. 220kV line bays at Rewa Pooling Station				commissioned	Sub station alongwith ICT I & II completed & charged in Mar'18. balance work under progress.

STATUS OF TRANSMISSION SCHEMES UNDER IMPLEMENTATION BY POWERGRID IN WESTERN REGION (as on 24.04.2019)

Sl. No	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
1	Western Region System Strengthening -V	722	25 th (30.09.06)	Dec'07	Apr'19	Matching with line.
	a) 400 kV Vapi- Kala - Kudus D/c				Commissioned Dec' 17	Contingency arrangement to connect Vapi-Navi Mumbai with Navsari-Boisar line by passing ROW area, to from Vapi - Navsari line (24 Ckm) commissioned in Mar'13. 400KV D/C Vapi-Kala portion commissioned in Mar'14 (61 Ckm). Balance portion commissioned in Dec'17.
	b) LILO of 400 kV Lonikhand - Kalwa line at Navi Mumbai				Apr'19	Cable work in progress (2km.) Critical ROW issues
	c) Establishment of 400/220 kV, 2 x 315 MVA new S/s (GIS) at Navi Mumbai				Apr'19	Testing is under progress. State down tream system at Navi Mumbai to be implemented through TBCB. Matter critical. Balance portion (02 Kms) of line executed using under ground cable. Work affected due to water logging. Severe ROW problem encountered at Navi Mumbai end, miscreants have burnt and damaged part of laid cable.
	d) 220 kV Vapi- Khadoli D/c.				Commissioned	
2	Tr. System of Mundra Ultra Mega Power Project (4000 MW)	4824	26 th (23.02.07)	Oct'08	Dec'19	
	a) Mundra – Bachchau - Ranchodpura 400 kV (Triple) D/c				Commissioned	

Sl. No	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	b) Mundra – Jetpur 400 kV (Triple) D/c				Commissioned	
	c) Mundra – Limbdi 400 kV (Triple) D/c				Commissioned	
	d) Gandhar-Navsari 400 kV D/c				Commissioned	
	e) Navsari - Boisar 400 kV D/c				Commissioned	Severe ROW & Forest issue.
	f) LILO of both circuits of Kawas-Navsari 220 kV D/c at Navsari (PG)				Commissioned	
	g) Wardha-Aurangabad 400 kV(Quad) D/c (with provision to upgrade at 1200 kV at later date)				Dec'19	Contract terminated 01 out of 02 packages due to unsatisfactory performance and fresh tender taken up. The new package bifurcated into two part. Ist part awarded in Dec'14 and second part in Feb'15. Severe ROW being encountered. Due to thunderstrom and cyclone in Jun'18, about 6 fdn, 11 tower erection & approx. 9 ckm stringing damaged.
	g) Aurangabad (PG) -Aurangabad I (Waluj) 400 kV(Quad)				Commissioned	
	Substations					
	a) 40% Fixed Series Compensation each on Wardha - Aurangabad 400 kV D/c at Wardha end				Dec'19	Work under progress. Completion matching with Wardha-Aurangabad line.
	b) Establishment of new 400/220 kV, 2x315 MVA substation at Navsari & Bachchau				Commissioned	

Sl. No	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	c) Establishment of new 765/400 kV, 3x1500 MVA, substation at Wardha for charging of Seoni - Wardha 2xS/c lines at 765 kV level				Commissioned	
3	Transmission System Strengthening in WR-NR Transmission Corridor for IPPs in Chattisgarh	5151.37	35 th (03.01.13)	Jun'14	Dec'19	Associated with Champa -Kurukshehra Bipole-II (upgradation) ant. by Dec'19.
	a) Up-gradation of + 800kV, 3000MW HVDC bipole between Champa Pooling Station – Kurukshehra (NR) to 6000MW				Dec'19	Associated with Champa -Kurukshehra Bipole-II (upgradation) ant. by Dec'19.
	b) Kurukshehra (NR) – Jind 400kV D/c (Quad)				Commissioned	
4	Bays for Transmission System Associated with DGEN Torrent Energy Ltd (1200MW)		13/14th LTA (27.12.10/1 3.05.2011)	Jul'16		Execution of TBCB scheme critical
	(a) 2nos 400kV Bays at Vadodara (GIS)				Aug'18	Bay charged in Aug'18. Commissioning matching with TBCB line.
	(b) 2nos 220kV Bays at Navsari (GIS)				May'18	Bay charged in May'18. Commissioning matching with TBCB line.
5	Western Region System Strengthening -16		38th (17.07.15)	Jul'16	Jan'19	PROJECT COMPLETED.

Sl. No	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	(a) Installation of 2x500MVA, 400/220kV ICTs with associated bays at Parli (PG) switching station along with provision of six nos. of 220 kV bays				Ready for commissioning	ICT's ready for commissioning in Jul'18. Availability of down stream network by MSETCL. Critical
	(b) Provision of two nos. of 220kV bays at Mapusa (Colvale) 400/220 kV substation				Ready for commissioning	Ready for commissioning in Jul'18. Availability of down stream network by GED.
	(c) Installation of 500MVA, 400/220kV (3rd) ICT with associated bays at Satna (PG) S/s with provision of two nos. 220kV line bays				Commissioned	
	(d) Provision of two nos. of 400 kV bays at 765/400kV Indore(PG) substation				Ready for commissioning	Charged in Jan'19. Availability of down stream network by MPPTCL. Critical.
6	Western Region System Strengthening -18		39th (30.11.15)	Feb'17	Feb'20	Compln Sch. : 36 month from IA.
	1. Splitting of following substation along with necessary switching arrangement.					
	a. Dharamjaygarh Pool 765kV BUS				Feb'20	Award placed in Mar'17. Engg., supply, civil work & erection under progress.
	b. Raigarh Pool (Kotra) 400kV & 765kV BUS				Feb'20	Award placed in Mar'17. Engg., supply & civil work under progress.

Sl. No	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	c. Champa Pool 400 kV & 765kV BUS				Feb'20	Award placed in Mar'17. Engg., supply & civil work under progress.
	2. Installation of Reactors:					
	a. 1X125 MVAR BUS Reactor at 400kV BUS Section A of Dharamjaygarh Pool.				Feb'20	
	b. 1X125 MVAR BUS Reactor at 400kV BUS Section A of Raigarh Pool (Kotra).				Feb'20	
	c. 1X240 MVAR BUS Reactor at 765kV BUS Section A of Raigarh Pool (Kotra).				Feb'20	
	d. 1X240 MVAR BUS Reactor at 765kV BUS Section A of Champa Pool.				Feb'20	
	e. 1X330 MVAR BUS Reactor at 765kV BUS Section B of Dharamjaygarh Pool.				Feb'20	
7	PG Works associated with Transmission System for Khargone TPP		38th & 39th (17.07.15 & 30.11.15)	Feb'17	Jul'19	Compln Sch. : Feb'18 to Jul'19 matching with TBCB lines.

Sl. No	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	1. 63 MVAR switchable line reactor along with 500Ω NGR at Rajgarh(PG) end of Khargone TPS – Rajgarh (PG) 400kV line <i>{formed after LILO of one circuit of Khandwa - Rajgarh 400 kV D/C line at Khargone TPS, being implemented under TBCB}</i>				Jul'19	Award placed in Mar'17. Engg., supply, civil work & erection under progress.
	2. 2 nos. of 765 kV line bays at 765/400kV Indore Substation of POWERGRID <i>{for termination of Khandwa PS – Indore 765 kV D/C line, being implemented under TBCB}</i>				Feb'18	Ready for commissioning. Commisisoning matching with TBCB line.
	3. 240 MVAR Switchable Line Reactors along with 700Ω NGR at Indore (765/400kV S/s) end of each circuit of Khandwa Pool – Indore 765kV D/c line (Line being implemented under TBCB)				July'19	
8	POWERGRID Works associated with New WR - NR 765kV Inter-regional corridor		40th (01.06.2016)		May'21	
	a. 2 nos. of 765kV Line Bays at Vindhychal 765/400 kV Pooling Station;				May'21	Awarded in Sep'18. Engg. & civil work under progress.
	b. 2 nos. of 765kV Line Bays along with 765kV, 1x330 MVAR line reactor in each bay at Varanasi 765/400 kV GIS sub-station				May'21	Awarded in Feb'19.

Sl. No	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
9	POWERGRID Works associated with Additional 400kV feed to Goa		40th (01.06.2016) 41st (21.12.2016)		Sep'21	Compln Sch. : 30-36 months from IA.
	2 nos of 400kV line bays at Mapusa s/s for termination of Xeldem – Mapusa 400kV D/c (quad) line & 1x80MVA LR at Narendra (New) S/s for Narendra(New) - Xeldam 400kV line				Mar'21	Awarded in Sep'18. Engg. under progress.
10	POWERGRID Works associated with Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool		40th (01.06.2016)		May'21	
	2 nos. of 765kV Line Bays each at Dharamjaygarh Pool and Raigarh (Tamnar) Pool				May'21	Awarded in Sep'18. Engg. & civil works under progress.
11	Transmission system for Ultra Mega Solar Power Park (700MW) at Banaskantha (Radhanesda), Gujarat	118	40th (01.06.2016)	May'17	Sep'19	Compln Sch. : 16 months from IA.
	400KV D/C Banaskantha PS - Banaskantha (PG) line				Sep'19	Completion matching with Banaskantha (Radhanesda) S/stn.
	765/400kV Banaskantha (PG) 2 nos line bays				Sep'19	Work under progress. Completion matching with Banaskantha (Radhanesda) S/stn.
12	Supplementary Transmission system for Ultra Mega Solar Power Park (700MW) at Banaskantha (Radhanesda), Gujarat		41st (21.12.2016)		Sep'19	Compln Sch. : 18 months from IA.

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	Establishment of 2x500MVA, 400/220kV pooling station at Banaskantha (Radhanesda) [GIS] along with 1x125MVAr bus reactor				Sep'19	Award placed in Dec'17. Work under progress.
	4 nos. 220kV line bays at 400/220kV at Banaskantha (Radhanesda) pooling station for Solar Park Interconnection.				Sep'19	

Intra-state transmission schemes being implemented by GETCO under GEC-I

Package No.	Package Details
(A)	Projects under KfW
1	220 KV Babara substation (Dist. Amreli)
	(1) 220/132 KV, 2 X 150 MVA,
	(2) 220/66 KV, 3 X 160 MVA,
	(3) 6 Nos. 220 KV, 4 Nos. of 132 KV & 6 Nos. 66 KV feeder bays.
2	220 kV Kalavad GIS substation (Dis. Jamnagar)
	(1) 220/66 kV, 3x160 MVA
	(2) 10 Nos. of 220 kV & 10 Nos. of 66 kV feeder bays
3	220 KV Moti Gop substation (Dist. Jamnagar)
	(1) 220/66 KV, 3 X 160 MVA
	(2) 8 Nos. of 220 KV & 6 Nos. of 66 KV feeder bays
4	Up-gradation of 132 KV Wankaner substation to 220 KV level (Dist. Rajkot) - Hybrid / GIS technology
	(1) 220/66 KV, 3 X 160 MVA, 220/132 KV 2X150 MVA
	(2) 4 Nos. of 220 KV & 6 Nos. of 66 KV feeder bays
5	400 KV Bhachunda GIS substation (Dist. Kutch) (220/66 KV scheme is already approved)
	(1) 400/220 KV, 3 X 500 MVA
	(2) 4 Nos. of 400 KV feeder bays
	(3) 400 KV, 1 x 125 MVAR Reactor with bay
6	400/220/66 KV Bhogat GIS substation (Dist. Jamnagar)
	(1) 400/220 KV, 2 X 500 MVA
	(2) 220/66 KV, 2 X 160 MVA
	(3) 2 Nos. of 400 KV feeder bays
	(4) 400 KV, 1 x 125 MVAR Reactor with bay
	(5) 6 Nos. of 220 KV & 6 Nos. of 66 KV feeder bays
7	400 KV D/C Shapar – Pachham (Fedra) line (Twin AL-59)
8	220 kV D/C Amreli-Babara line (AL-59)
9	220 kV D/C Shapar-Babara line (AL-59)
10	220 KV, 1 x 50 / 1 x 25 MVAR Bus Reactors each at 220 KV Moti Paneli, Bhatia, Nakhatrana, Bhachau & Deodar substations
(B)	Projects under NCEF
11	220 KV Bhachunda GIS substation (Dis. Kutch)
	(1) 220/66 KV, 2 X 160 MVA
	(2) 6 Nos. of 220 KV & 6 Nos. of 66 KV feeder bays
12	400 KV D/C Bhogat – Kalavad line (Twin AL-59)
13	400 KV Hadala – Shapar line (Twin AL-59)
14	LILO of both circuits of 220 KV D/C Jamanvada – Varsana line at 220 KV Bhachunda (AL-59) M/C line

Package No.	Package Details
15	LILO of one circuit of 220 KV D/C Akrimota – Nakhatrana line at Bhachunda
16	220 KV D/C Bhatia - Bhogat line (AL-59)
17	220 KV D/C Bhogat - Ranavav line (AL-59)
18	LILO of one circuit of 220 KV D/C Gandhinagar TPS – Chhatral line at Vadavi (AL-59)
19	220 KV D/C Chorania – Salejada line (AL-59)
20	220 KV D/C Radhanpur – Sankhari line (AL-59)
21	LILO of one Circuit of 220 KV D/C Hadala - Sartanpar at 220 KV Wankaner (AL-59)
22	LILO on 220 KV S/C Lalpar - Sartanpar line at 220 KV Wankaner (M/C tower by replacement of existing 132KV towers) (AL-59)
23	220 KV D/C Bhogat – Moti Gop line (AL-59)
24	LILO of both circuits of 220 KV D/C Tebhda – Nyara line at Moti Gop substation (M/C line : AL-59)
25	400 kV D/C Bhachunda – Varsana line (Twin AL-59)
26	LILO of both circuits of 132 KV D/C Sitac WF - Jasdan line at Babara (M/C line)
27	400 kV Shapar GIS substation (Dist. Surendranagar)
	(1) 400/220 kV, 3x500 MVA Transformer with bay
	(2) 220/66 kV, 3x160 MVA Transformer wwith bay
	(3) 10 Nos. of 400 kV feeder bays
	(4) 10 Nos. of 220 kV line bays
	(5) 400 kV, 1x125 MVAR reactor bay
	12 nos. of 66 kV Bays
28	1 No. of 220 KV Reactor bay each at MotiPaneli, Bhatia, Nakhatrana, Bhachau and Deodar substations
29	Transformer Package (All the substation and reactor bay packages are without transformer and Reactor)

Schemes under Intra-State Transmission schemes for Gujarat State under GEC-II**(A) Substations:**

Sr. No.	Name of Element	Quantum	Unit Rate in Rs. Lacs	Amount in Rs. Lacs
1	400/220/66 KV Keshod GIS substation (Dist. Junagadh)	2 x 500 MVA + 2 x 160 MVA	21085	21085
	(1) 400/220 KV, 2 X 500 MVA			
	(2) 220/66 KV, 2 X 160 MVA			
	(3) 6 Nos. of 400 KV feeder bays			
	(4) 400 KV, 1 x 125 MVAR Reactor with bay			
(5) 8 Nos. of 220 KV & 8 Nos. of 66 KV feeder bays				
2	400/220/66 KV Kalavad GIS substation (Dist. Jamnagar)	2 x 500 MVA	14163	14163
	(1) 400/220 KV, 2 X 500 MVA			
	(2) 8 Nos. of 400 KV feeder bays			
(3) 400 KV, 1 x 125 MVAR Reactor with bay				
3	400/220/66 KV Shivilakha GIS substation (Dist. Kutch)	2 x 500 MVA + 2 x 160 MVA	21085	21085
	(1) 400/220 KV, 2 X 500 MVA			
	(2) 220/66 KV, 2 X 160 MVA			
	(3) 6 Nos. of 400 KV feeder bays			
	(4) 400 KV, 1 x 125 MVAR Reactor with bay			
(5) 8 Nos. of 220 KV & 8 Nos. of 66 KV feeder bays				
4	220 KV Dhama substation (Dist. Surendranagar)	2 x 160 MVA	4480	4480
	(1) 220/66 KV, 2 X 160 MVA, (2) 8 Nos. 220 KV, 6 Nos. 66 KV feeder bays.			
5	220 KV Nichi Mandal (Vankda) / Shapar (Dist. Morbi)		4164	4164

	(1) 220/66 KV, 2 X 160 MVA, (2) 6 Nos. 220 KV, 6 Nos. 66 KV feeder bays.	2 x 160 MVA		
6	220 KV Khambhalia substation (Dist. Jamnagar) (1) 220/66 KV, 2 X 160 MVA, (2) 6 Nos. 220 KV, 6 Nos. 66 KV feeder bays.	2 x 160 MVA	4164	4164
7	220 KV Kamlapur substation (Dist. Rajkot) (1) 220/66 KV, 2 X 160 MVA, (2) 8 Nos. 220 KV, 6 Nos. 66 KV feeder bays.	2 x 160 MVA	4480	4480
8	220 KV Talaja substation (Dist. Bhavnagar) (1) 220/66 KV, 2 X 160 MVA, (2) 6 Nos. 220 KV, 6 Nos. 66 KV feeder bays.	2 x 160 MVA	4164	4164
9	220 KV Giyavad substation (Dist. Morbi) (1) 220/66 KV, 2 X 160 MVA, (2) 8 Nos. 220 KV, 6 Nos. 66 KV feeder bays.	2 x 160 MVA	4480	4480
10	220 KV Gomta substation (Dist. Rajkot) (1) 220/66 KV, 2 X 160 MVA, (2) 6 Nos. 220 KV, 6 Nos. 66 KV feeder bays.	2 x 160 MVA	4164	4164
Total (A)...			86429	86429
(B)	Transmission Lines:			
Sr. No.	Name of Element	Quantum (RKM)	Unit Rate in Rs. Lacs	Amount in Rs. Lacs
1	400 KV D/C Kalvad - Keshod line (Twin AL-59)	120	165	19800
2	400 KV D/C Keshod - Shapar line (Twin AL-59)	190	165	31350
3	400 KV D/C Shapar – Chharodi line (Twin AL-59)	90	165	14850
4	400 KV D/C Bhachunda – Shivilakha line (Twin AL-59)	210	165	34650
5	400 KV D/C Shivilakha - Veloda (Sankhari) line (Twin AL-59)	245	165	40425
6	400 KV D/C Veloda (Sankhari) - Prantij line (Twin AL-59)	150	165	24750

7	LILO of one circuit of 400 KV D/C Soja – Zerda line at Veloda (Sankhari) substation	50	165	8250
8	LILO of 400 KV S/C Chorania - Asoj line at 400 KV Pachham (Fedra) substation	25	165	4125
9	LILO of both circuit of 220 KV D/C Visavadar - Timbdi at 400 KV Keshod substation	12	160	1920
10	220 KV D/C (400KV) Keshod - Keshod line	25	70	1750
11	220 KV D/C Mansar (Halvad) - Dhama line (AL-59)	110	70	7700
12	220 KV D/C Dhama - Bechraji line (AL-59)	45	70	3150
13	220 KV D/C Dhama - Chharodi line (AL-59)	100	70	7000
14	LILO of 220 KV S/C Bala (SSNNL) - Dhanki (SSNNL) at 220 KV Sarla (GETCO) substation (AL-59)	45	70	3150
15	LILO of both circuits of 220 KV D/C Bhimasar - Charadava line at 220 KV Nichimandal (Vankda) substation (M/C tower AL-59)	10	160	1600
16	220 KV D/C Nichimandal – Shapar (400 KV S/S) line (AL-59)	85	70	5950
17	220 KV D/C Tappar - Radhanpur line (AL-59)	170	70	11900
18	LILO of both circuit of 220 KV D/C Tappar – Shivilakha line at Shivilakha (400 KV) substation (M/C tower AL-59)	25	160	4000
19	LILO of both circuit of 220 KV D/C Bhatia – Kalavad line at Khambhalia substation (M/C tower AL-59)	20	160	3200
20	LILO of both circuits of 220 KV D/C Shapar - Babara line at 220 KV Kamlapur substation (AL-59)	15	70	1050
21	220 KV D/C Kamlapur - Bagodara line (AL-59)	110	70	7700
22	220 KV D/C Bagodara - Mogar line (AL-59)	110	70	7700
23	220 KV D/C Moti Gop - Gomta line (AL-59)	125	70	8750
24	220 KV D/C Gomta - Kamlapur line (AL-59)	75	70	5250
25	220 KV D/C Ghiyavad - Shapar (400 KV s/s) line (AL-59)	50	70	3500
26	LILO of one circuit of 220 KV D/C Hadala - Sartanpur line at 220 KV Ghiyavad substation (AL-59)	10	70	700

27	LILO of both circuit of 220 KV D/C Otha – Sagapara line at Talaja substation (M/C tower AL-59)	20	160	3200
28	220 KV D/C Talaja - Maglana line (AL-59)	60	70	4200
29	LILO of both circuits of 220 KV D/C Jambuva - Karamsad line at Dhuvaran CCPP (by using existing LILO portions and through 220 KV D/C Pachham - Kasor line)	40	160	6400
30	220 KV D/C Maglana - Pachchham line (AL-59)	100	70	7000
			Total (B)...	284970
(C) Reactive Power Compensation:				
Sr. No.	Name of Element	Quantum	Unit Rate in Rs. Lacs	Amount in Rs. Lacs
1	400 KV, 50 MVAR line Reactor for 400 KV D/C Bhachunda - Shivilakha & Shivilakha - Veloda lines : 50 MVAR line rector for each circuits at both the ends	8 Nos.	500	2500
			Total (C)...	2500
400 KV (14 Nos.) & 220 KV (30 Nos.) line bays at far end GETCO substations will be executed through inhouse sources, for smooth execution under loose packages.				
			Grand Total....Total(A)+Total(B)+Total(C).....	373899