

I/9079/2020



भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केंद्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-II

Power System Planning & Appraisal Division-II

सेवा मे / To,

संलग्न सूची के अनुसार

As per list enclosed

विषय : दक्षिण क्षेत्र विद्युत समिति (परेक्षण योजना) की पहली बैठक का कार्यवृत्त ।

Subject: 1st meeting of Southern Regional Power Committee (Transmission Planning) (SRPCTP)- Minutes.

महोदय(Sir)/महोदया(Madam),

दक्षिण क्षेत्र विद्युत समिति (परेक्षण योजना) की पहली बैठक 16 दिसम्बर, 2019 को हैदराबाद, में आयोजित की गई थी। इस बैठक के कार्यवृत्त की प्रति आपकी सूचना एवं आवश्यक कार्यवाही हेतु संलग्न है।।

The 1st meeting of Southern Regional Power Committee (Transmission Planning) [SRPC(TP)] was held on 16th December, 2019 at Hyderabad.

A copy of minutes of the meeting is enclosed for your information and necessary action.

भवदीय/Yours faithfully,

(प्रदीप जिंदल/ Pardeep Jindal)

मुख्य अभियंता/ Chief Engineer

Copy for kind information to:

1) PPS to Member PS, CEA

List of addressee:

1. The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, Bangalore 560 009. FAX : 080-22259343	2. Chief Operating Officer (CTU-Plg), Central Transmission Utility, Power Grid Corporation of India “Saudamini” Plot No. 2, Sector-29, Gurugram-122001 Tel. No. 0124-2571816 Fax No.0124-2571932
3. Director (System Operations), POSOCO B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi-110016 Tel. No. 26852843 Fax No. 2626524525, 26536901	4. Managing Director Karnataka Power Transmission Corp. Ltd., Cauvery Bhawan, Bengaluru - 560 009. FAX : 080 -22228367
5. Chairman and Managing Director Transmission Corp. of Andhra Pradesh Ltd., (APTRANSCO) Gunadala, Eluru Road, Vijayawada, Andhra Pradesh	6. Chairman-cum-Managing Director Transmission Corp. of Telangana Ltd., (TSTRANSCO) Vidyut Soudha, Khairatabad Hyderabad – 500 082.
7. Chairman-cum-Managing Director Kerala State Electricity Board, Vidyuthi Bhawanam, Pattom, Thiruvananthapuram - 695 004. Fax : 0471-2444738	8. Managing Director Tamil Nadu Transmission Corporation Ltd (TANTRANSCO), 6 th Floor, Eastern Wing, 800 Anna Salai, Chennai - 600002. FAX : 044-28516362
9. The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, Puducherry – 605 001. Fax : 0413-2334277/2331556	10. Executive Engineer, Divisional Office, Lakshadweep Electricity Department, Kavaratti Island, UT of Lakshadweep
11. Chairman & Managing Director, NTPC Limited, NTPC Bhawan, SCOPE Complex, Institutional Area, Lodhi Road, New Delhi - 110003	12. Chairman & Managing Director, NHPC Limited, N.H.P.C. Office Complex, Sector-33, Faridabad - 121003 (Haryana)
13. Chairman, Solar Energy Corporation of India Limited, 1 st Floor, D-3, A Wing, Prius Platinum Building, District Centre, Saket, New Delhi - 110017	

Minutes of 1st meeting of Southern Regional Power Committee (Transmission Planning) held on 16.12.2019 at Hyderabad.

List of participants is at **Annex-I**.

Chairperson [additional charge of Member (Power System)], CEA, welcomed the participants. He informed that Ministry of Power vide letter dated 04.11.2019 has revised the existing Regional Standing Committees on Transmission (RSCTs) by replacing the same with "Regional Power Committees (Transmission Planning) [RPC(TPs)]". Accordingly, this is the 1st meeting of Southern Regional Power Committee (Transmission Planning) [SRPC(TP)].

- 1.0 Chief Engineer (PSPA-II), CEA, stated that Southern Regional Power Committee (Transmission Planning) [SRPC(TP)] has been constituted by MoP with the following composition:

1.	Member (Power System) , Central Electricity Authority	Chairperson
2.	Chief Operating Officer, Central Transmission Utility POWERGRID	Member
3.	Director (System Operation), Power System Operation Corporation Ltd.	Member
4.	Heads of State Transmission Utilities (STUs) of Telangana, Andhra Pradesh , Karnataka, Kerala, Tamil Nadu, UT of Puducherry, UT of Lakshadweep#	Member
5.	Member Secretary of Southern Region Power Committee	Member
6.	CMD/ MD/ Chairman of NTPC, NHPC and SECI	Members
7.	Chief Engineer (from Power System Wing), Central Electricity Authority	Member Secretary

#STUs to coordinate with their respective Distribution Companies (Discoms)

Terms of Reference (TOR) of the SRPC(TP) are as follows:

- i. Carry out a quarterly review of the Transmission System in the region; assess the growth in generation capacity and the demand in various parts of the region; and draw up proposals for strengthening inter- Regional transmission system. The transmission planning is required to keep in mind the areas where the generation is likely to grow and areas where load demand will grow so that the transmission system at any point of time is capable to meet the demand in every corner of the country and comply with the mandate under the Tariff Policy of developing transmission system ahead of the generation for ensuring smooth operation of the grid.
- ii. Assess the transmission system requirements in the near, medium and long term and draw up transmission schemes to meet these requirements. While doing this a perspective plan for the next 15-20 years may also be kept in mind and accordingly the requisite allowance/margin may be factored in the system during planning process.

- iii. Examine applications for connectivity and access and ensure that these are granted speedily, provided that the requisite fees/charges are paid.
 - iv. Review the upstream and downstream network associated with transmission schemes.
 - v. Examine and evaluate the intra-state transmission proposals.
 - vi. Review and facilitate the construction of the inter-regional grid strengthening schemes.
- The RPC(TPs) shall take steps to ensure that the transmission capacity is capable of wheeling the electricity to different parts of the region and outside the region as per the demands of the market. They shall carry out the quarterly reviews and make recommendation for system strengthening and expansion keeping in mind the guidelines laid down by the Tariff Policy.
 - The RPC(TPs) will forward their review of the transmission systems and their recommendation for system expansion/strengthening to the National Committee on Transmission (NCT) at the end of every quarter- by 15th July; 15th October; 15th January and 15th April. The NCT will examine the proposals and forward them to Government with their recommendations.
 - As per MoP order regarding constitution of RPC(TPs), STUs have to coordinate with their respective Distribution Companies (DISCOMs). Even in the RSCT order, it was specifically mentioned that STUs have to coordinate with their respective Distribution Companies (Discoms).

1.1 Terms of Reference of NCT (re-constituted vide MoP letter No 15/3/2017-Trans dated: 04.11.2019), pertaining to RPC(TP) were also discussed. ToR of NCT inter-alia includes “*identify the constraints, if any, in the inter-State, inter-region transfer system.....*”. Members opined that identifying the constraints in inter-state transmission system should be in the ToR of RPC(TP) and not in the ToR of NCT.

1.2 Members were of the view that some portion of ToR of RPC(TPs) and NCT are not clear as to which committee will perform which task. For example, planning of inter-regional lines is mentioned as a function of both RPC(TP) & NCT. In the order for constitution of NCT, it is mentioned that “*the views of RPCTPs will be relevant for transmission issues within the region, but for transmission issues across regions, the views of RPCTPs would be inadequate because they will not have a national perspective*”. However, the ToR of RPC(TPs) inter-alia mentions the following:

- *to draw up proposals for strengthening inter- regional transmission system.*
- *The RPCTPs shall take steps to ensure that the transmission capacity is capable of wheeling the electricity to different parts of the region and outside the region as per the demands of the market.*

- 1.3 Members were of the view that it would be difficult to assess the transmission system requirement for the next 15-20 years and prepare the perspective plan for the next 15-20 years, as suggested in the ToR of RPC(TPs). The perspective plan may be prepared for the next 10-15 years.
- 1.4 ToR of NCT inter-alia mentions that “...since the NCT will be looking at the National Transmission System i.e. transmission across regions and across states, therefore, prior concurrence of Regional Power Committees (Transmission Planning) will not be relevant. The views of RPC(TPs) will be relevant for transmission issues within the region, but for transmission issues across regions, the views of RPCTPs will be inadequate...”. Members opined that in our country ‘One Nation One Grid’ concept has been implemented. Hence, the views/inputs of the RPC(TPs) will be relevant for issues with regard to transmission within and across regions and states. It will be useful if the views/inputs are collectively shared and discussed. While designing any national transmission system, the techno-commercial impact on individual states/ regions are to be essentially considered. The perspectives of the constituent states will not be different from that of the national perspective. To effectively participate in the national development and understanding the necessity, the details need to be shared with transparency among the RPCTPs/STUs concerned. Since, the cost of the transmission infrastructure is already being socialized, the role of RPC(TPs)/concerned STUs is vital and prior concurrence and deliberation will be much essential in formulating the intended national agenda.
- 1.5 As per ToR of NCT, the role given to CTU to make a comprehensive presentation before NCT every quarter for ensuring development of an efficient, coordinated and economical inter-state transmission system for smooth flow of electricity, is overlapping with the ToR of RPC(TPs) wherein RPC(TPs) have been mandated to carry out review of the transmission system in the region, assess the transmission system requirement in the near, medium and long term and draw up transmission scheme to meet the requirements. Similarly, the role given to NCT and RPC(TPs) to prepare a perspective plan keeping 10-15 years’ time horizon in mind, is overlapping with the role given to CEA under Section 3 and Section 73 of the Electricity Act, 2003.
- 1.6 It was agreed that CEA may take up the matter with MoP for removing the difficulties/overlapping in ToR of the two committees.

2.0 Confirmation of minutes of 2nd meeting of Southern Region Standing Committee on Transmission (SRSCT)

- 2.1 Director (PSPA-II), CEA, informed that minutes of 2nd meeting of Southern Region Standing Committee on Transmission (SRSCT) held on 10.06.2019 at Bengaluru, was circulated vide letter No. CEA-PS-12-14(12)/1/2018-PSPA –II/I/5982/2019 dated: 10.07.2019.
- 2.2 Based on observations of NLC India Ltd., CTU and TANTRANSCO, corrigendum was issued vide CEA’s letter no CEA-PS-12-14(12)/1/2018-PSPA-II Division/I/6865/2019 dated 17.09.2019.
- 2.3 Minutes of 2nd meeting of SRSCT along with corrigendum was confirmed by the members.

Follow up issues of previous meetings of Standing Committee on Power System Planning for SR (SCPSPSR)/ Southern Region Standing Committee on Transmission (SRSCT)

3.0 Revised proposal by TSTRANSCO for earlier approved transmission scheme of Yadadri (Damaracherla) TPP (5x800 MW)

3.1 Director (PSPA-II), CEA, stated that transmission system for evacuation of power from Yadadri (Damaracherla) TPP (5x800 MW) was approved in 39th meeting of SCPSPSR held on 28-29 December, 2015. In the 2nd SRSCT meeting held on 10.06.2019, TSTRANSCO had proposed the following revised transmission scheme for evacuation of power from Yadadri TPP (5x800 MW) and also to provide start up power to Yadadri TPP. TSTRANSCO had proposed the revised scheme due to problem in land acquisition in some sections of the earlier approved scheme. The proposed scheme is as follows:

Approved Transmission Evacuation Scheme of Yadadri (Damaracherla) TPP (5x800 MW) as per minutes of meeting of 39th SCPSPSR	Proposed Transmission Scheme for Yadadri TPP (5x800 MW)
1) Proposed Damaracherla Switchyard to proposed 400/220/132 kV Choutuppall SS by Quad Moose DC Line	1) Proposed Yadadri Switchyard to proposed 400/220/132 kV Choutuppall SS by Quad Moose DC Line – 150 km.
2) Proposed Damaracherla Switchyard to proposed 400/220 kV Dindi SS by Quad Moose DC Line	2) Proposed Yadadri Switchyard to 400/220 kV Dindi SS by Quad Moose DC Line – 140 km.
3) Proposed Damaracherla Switchyard to proposed 400/220 kV Maheshwaram (TSTRANSCO) SS by Quad Moose DC Line	3) Proposed Yadadri Switchyard to proposed 400/220 kV Damaracherla SS by Quad Moose DC Line – 5 km.
4) Proposed Damaracherla Switchyard to proposed 400/220 kV Jangaon SS (Jangaon SS is included in the Manuguru and KTPS VII Evacuation Scheme) by Quad Moose DC Line	4) Proposed Yadadri Switchyard to 400/220 kV Jangaon SS by Quad Moose DC Line – 155 km.
5) From Proposed 400/220/132 kV Choutuppall SS to Upcoming 220/33 kV Hayathnagar SS by Single Moose DC Line	5) Double circuit LILO of existing 400 kV Khammam – Mamidpally TMDC Line to proposed 400/220/132 kV Choutuppall SS – 15 km. 6) 220 kV TMDC line from proposed 400/220kV Damaracherla SS to 220/132 kV Miryalaguda SS – 25 km.

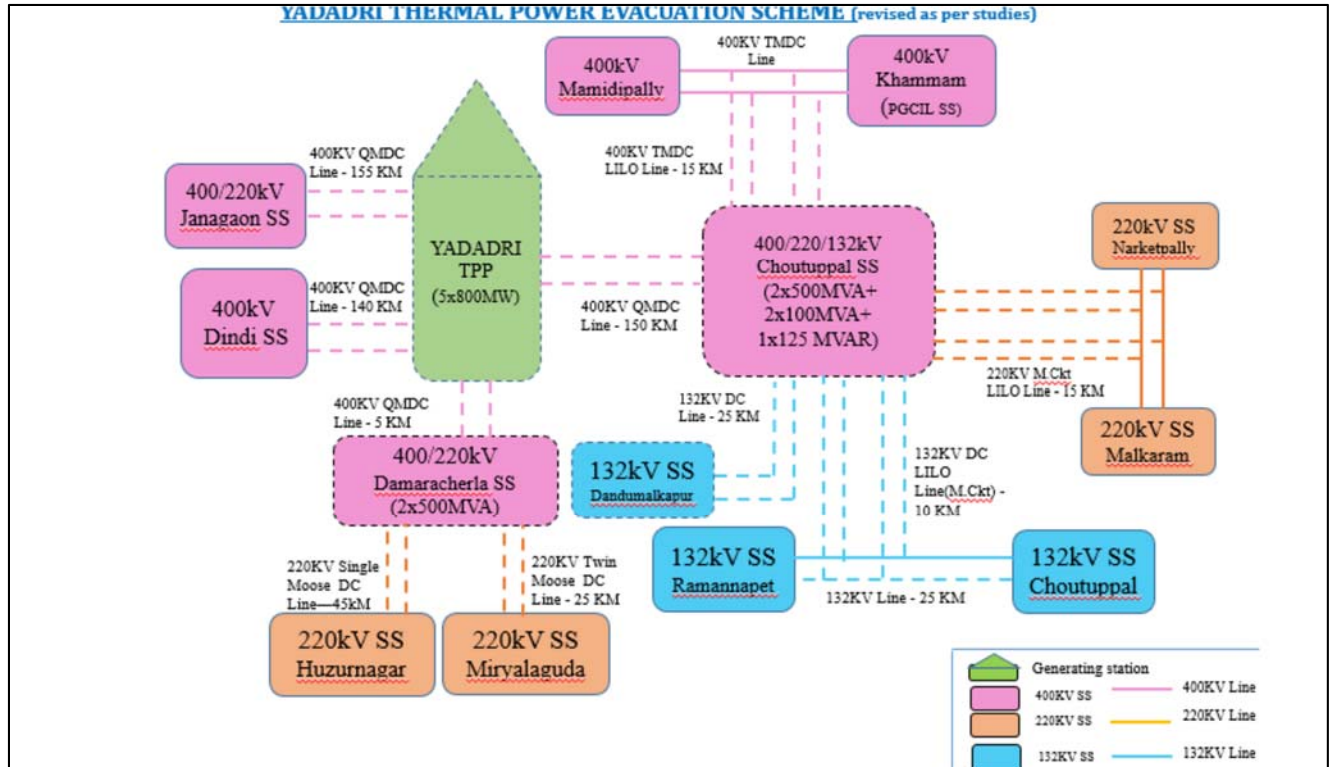
Approved Transmission Evacuation Scheme of Yadadri (Damaracherla) TPP (5x800 MW) as per minutes of meeting of 39th SCPSPSR	Proposed Transmission Scheme for Yadadri TPP (5x800 MW)
6) From proposed 400/220/132 kV Dindi SS to Upcoming 220/33 kV Thimmajipet SS by Single Moose DC line	7) 220 kV SMDC line from proposed 400/220kV Damaracherla SS to 220/132 kV Huzurnagar SS – 45 km
7) From proposed 400/220/132 kV Dindi SS to proposed 220/132 kV Nagarkurnool SS by Single Moose DC line	8) Double Circuit LILO of existing 220 kV Narketpally – Malkaram DC line to proposed 400/220/132 kV Choutuppall SS on multi circuit towers – 15 km
8) From proposed 400/220/132 kV Dindi SS to Existing 220/33 kV KM Pally SS by Single Moose DC line	9) 2 nd circuit stringing on existing 132 kV Ramannapet-Choutuppall DC/SC line – 25 km
9) 400/220 kV Dindi SS with 3x500 MVA ICT	10) LILO of both circuits of 132 kV Ramannapet – Choutuppall DC line to proposed 400/220/132kV Choutuppall SS on multi circuit towers – 10 km.
10) 400/220/132 kV Choutuppall SS with 3x500MVA+2x100 MVA ICT	11) 132 kV DC line from proposed 400/220/132 kV Choutuppall SS to Upcoming 132/33kV Dandumalkapur SS – 25 km.
11) 220/132 kV Nagarkurnool SS with 2x100 MVA ICT	12) 400/220 kV Damaracherla SS with 3x500 MVA ICT.
12) 2x125 MVAR Bus Reactor at Damaracherla switchyard	13) 400/220/132 kV Choutuppall SS with 2x500 MVA+2x100 MVA ICT.
	14) 2x125 MVAR Bus Reactor at Yadadri (Damaracherla) Switchyard.
	15) 1x125 MVAR bus reactor at proposed 400/220/132 kV Choutuppall SS (approved in 1 st SRSCT meeting).

3.2 In the 2nd meeting of SRSCT, Chief Engineer (PSPA-II), CEA, had stated that power is already being injecting towards Khammam from North Telangana, so LILO of existing 400 kV Khammam – Mamidipally D/c line may not facilitate in evacuation of power from Yadadri TPP and he advised that instead of the LILO, a direct link from Choutuppall SS to Maheshwaram shall facilitate in

evacuation of power from Yadadri TPP and to supply the loads in Hyderabad. TSTRANSCO representative stated that based on field survey, there are RoW issues and direct transmission line from Choutuppal SS to Maheshwaram SS cannot be implemented. Further, first unit of 800 MW at Yadadri TPP is scheduled for commissioning by the year 2021.

- 3.3 In the 2nd SRSCT meeting, it was decided that the revised proposal of TSTRANSCO may be discussed in a separate meeting between CEA, CTU and TSTRANSCO.
- 3.4 Accordingly, the proposed transmission system was discussed in the joint study meeting held on 21-22 November, 2019. In the meeting, the following transmission system was agreed for evacuation & supply of power from Yadadri TPP (5x800 MW).

Revised Transmission Scheme for Yadadri TPP (5x800 MW)
1) 400 kV Quad Moose DC Line from proposed Yadadri TPP Switchyard to proposed 400/220/132 kV Choutuppal S/S – 150 km
2) 400 kV Quad Moose DC Line from proposed Yadadri TPP Switchyard to 400/220 kV Dindi S/S– 140 km
3) 400 kV Quad Moose DC Line from proposed Yadadri TPP Switchyard to 400/220 kV Jangaon S/S – 155 km.
4) 400/220/132 kV Choutuppal SS with 2x500 MVA + 2x100 MVA ICTs.
5) 2x125 MVAR Bus Reactors at Yadadri TPP Switchyard.
6) 400 kV Quad Moose DC Line from proposed Yadadri TPP Switchyard to proposed 400/220 kV Damaracherla S/S – 5 km.
7) 400/220 kV Damaracherla SS with 2x500 MVA ICT.
8) Double Circuit LILO of existing 400 kV Khammam – Mamidpally TMDC line to proposed 400/220/132 kV Choutuppal SS – 15 km.
9) 220 kV TMDC line from proposed 400/220 kV Damaracherla S/S to 220/132 kV Miryalaguda S/S – 25 km.
10) 220 kV SMDC line from proposed 400/220 kV Damaracherla S/S to 220/132 kV Huzurnagar S/S – 45 km.
11) Double Circuit LILO of existing 220 kV Narketpally – Malkaram DC line to proposed 400/220/132 kV Choutuppal S/S – 15 km.
12) 2 nd circuit stringing on existing 132 kV Ramannapet-Choutuppal SC line – 25 km.
13) LILO of both circuits of 132 kV Ramannapet – Choutuppal DC line to proposed 400/220/132 kV Choutuppal S/S on multi circuit towers – 10 km
14) 132 kV DC line from proposed 400/220/132 kV Choutuppal S/S to upcoming 132/33 kV Dandumalkapur S/S – 25 km.
15) 1x125 MVAR Bus Reactor at proposed 400/220/132 kV Choutuppal S/S



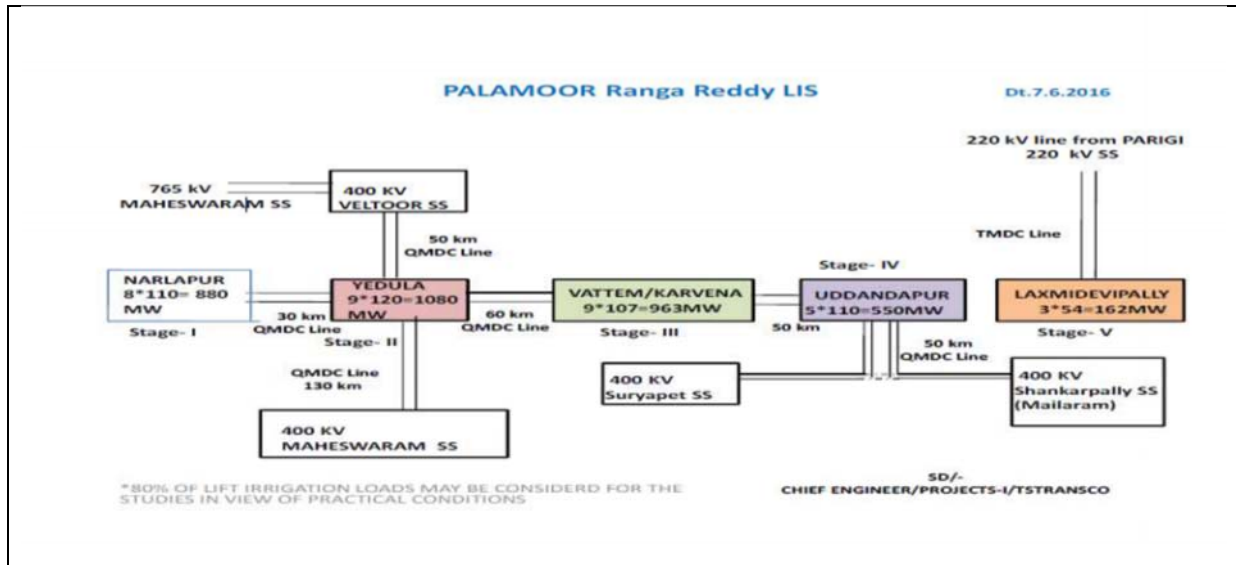
3.5 Director (SO), POSOCO, opined that as Southern Region is experiencing high voltages, it would be prudent to commission the associated bus reactors along with the first line. Also, for short lines like Damaracherla to Yadadri TPP (length 5 km), Line Differential Protection could be decided in the planning stage itself. He also suggested that the agenda should include the commissioning time frame of assets under planning and the PSSE study files should include all the elements planned to be commissioned within the time frame of study.

3.6 TSTRANSCO representative informed that they would try to commission the associated bus reactors along with the first line. TSTRANSCO representative also informed that they have requested for startup power from October, 2020, and Yadadri TPP is likely to be commissioned by June, 2021. TSTRANSCO agreed to match the transmission scheme with the commissioning of generating units of Yadadri TPP.

3.7 After deliberations, the revised transmission scheme mentioned in para 3.4 for Yadadri TPP (5x800 MW) was agreed.

4.0 Revised transmission scheme by TSTRANSCO for Palamuru Rangareddy Lift Irrigation Scheme.

4.1 Director (PSPA-II), CEA, stated that transmission scheme for Palamuru Rangareddy Lift Irrigation scheme was approved in 40th SCPSR meeting held on 19.11.2016.



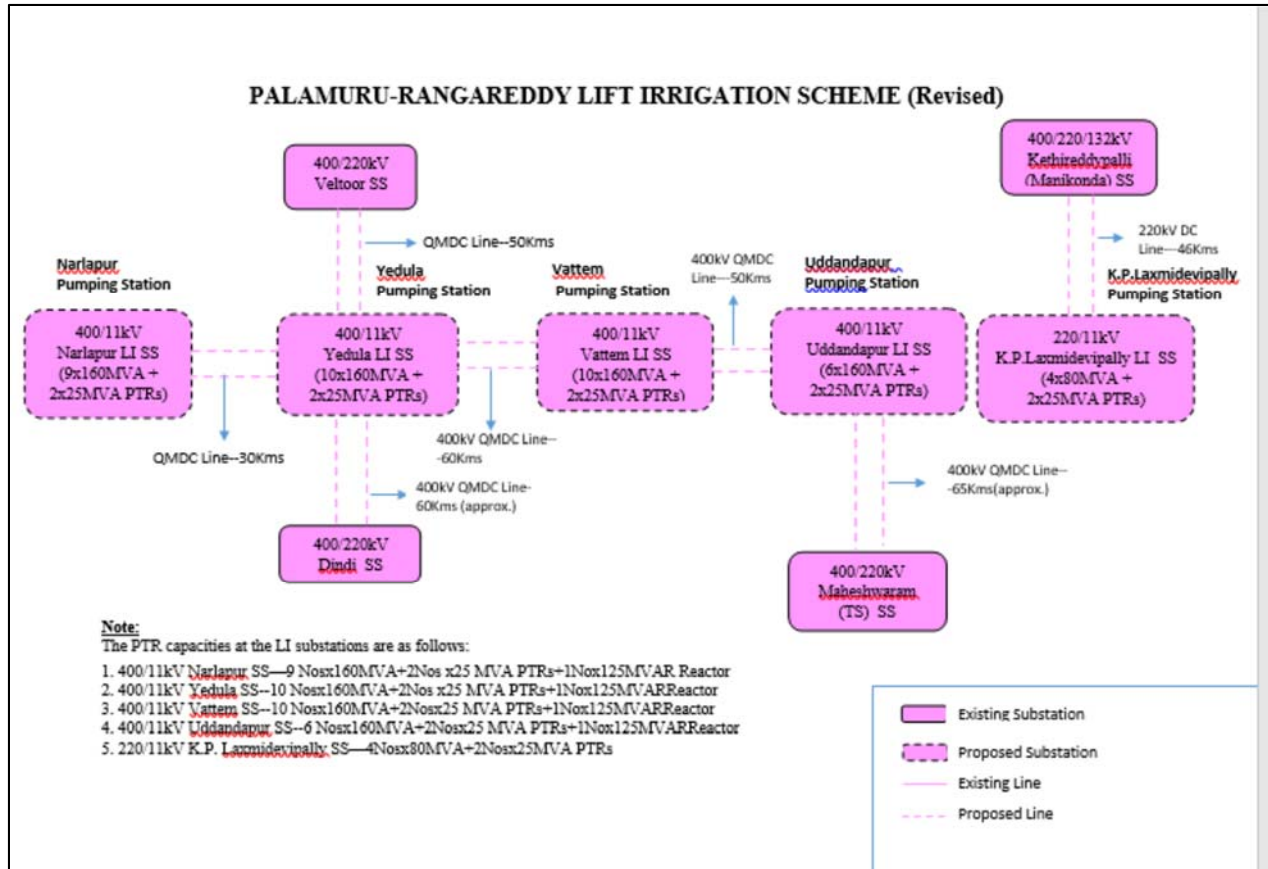
4.2 In the 2nd SRSCT meeting held on 10.06.2019, TSTRANSCO had proposed revised connectivity (due to RoW issues in certain sections of already approved scheme) for Palamuru Rangareddy Lift Irrigation Scheme as follows:

Approved transmission scheme for Palamuru Rangareddy Lift Irrigation Scheme as per minutes of meeting of 40 th SCPSR	Revised transmission scheme for Palamuru Rangareddy Lift Irrigation Scheme
1) 400kV Quad Moose DC line from Veltoor to proposed 400kV Yedula LI SS – 50kMs	1) 400/11kV LI SS at Narlapur with 9x160MVA and 2x25MVA 400/11 kV PTRs
2) 400kV Quad Moose DC line from proposed 400kV Yedula LI SS to proposed 400kV Narlapur LI SS – 30kMs	2) 400/11kV LI SS at Yedula with 10x160MVA and 2x25MVA 400/11 kV PTRs
3) 400kV Quad Moose DC line from proposed 400kV Yedula LI SS to proposed 400kV Vatttem/Karvena LI SS – 60 km	3) 400/11kV LI SS at Vatttem with 10x160MVA and 2x25MVA 400/11 kV PTRs
4) 400kV Quad Moose DC line from Maheshwaram TStranSCO SS to proposed 400kV Yedula LI SS – 130kMs	4) 400/11kV LI SS at Uddandapur with 6x160MVA and 2x25MVA 400/11kV PTRs
5) LILO of both circuits of 400kV Suryapet – Manikonda (Kethireddypalli) Quad Moose DC	5) 220/11kV LI SS at KP Laxmidevipally with 4x80MVA and 2x25MVA 220/11 kV PTRs

Approved transmission scheme for Palamuru Rangareddy Lift Irrigation Scheme as per minutes of meeting of 40th SCPSPSR	Revised transmission scheme for Palamuru Rangareddy Lift Irrigation Scheme
<p>line to proposed 400kV Uddandapur LI SS – 50 km</p> <p>6) 400kV Quad Moose DC line from proposed 400kV Vatttem LI SS to proposed 400kV Uddandapur LI SS – 50 km</p> <p>7) 220kV Twin Moose DC line from 220kV Parigi SS to KP Laxmidevipally LI SS – 20 km</p> <p>8) 125MVAR Bus Reactor at Narlapur 400kV LI SS</p> <p>9) 125MVAR Bus Reactor at Yedula 400kV LI SS</p> <p>10) 125MVAR Bus Reactor at Vatttem 400kV LI SS</p> <p>11) 125MVAR Bus Reactor at Uddandapur 400kV LI SS</p>	<p>6) 400kV QMDC line from 400 kV Veltoor SS to proposed 400 kV Yedula LI SS – 50 km</p> <p>7) 400 kV QMDC line from proposed 400 kV Yedula LI SS to proposed 400 kV Narlapur LI SS – 30 km</p> <p>8) 400kV QMDC line from proposed 400 kV Yedula LI SS to proposed 400 kV Vatttem LI SS – 60 km</p> <p>9) 400 kV QMDC line from proposed 400 kV Vatttem LI SS to proposed 400 kV Uddandapur LI SS – 50 km</p> <p>10) 400 kV QMDC line from 400 kV Maheshwaram (TS) SS to proposed 400 kV Uddandapur LI SS – 65 km</p> <p>11) 400kV QMDC line from 400kV Dindi SS to 400kV Yedula LI SS – 60 km</p> <p>12) 220kV DC line from 400/220/132 kV Kethireddypalli (Manikonda) SS to proposed 220kV KP Laxmidevipally LI SS – 46 km</p> <p>13) 125 MVAR Bus Reactor at Narlapur 400 kV LI SS</p> <p>14) 125 MVAR Bus Reactor at Yedula 400 kV LI SS</p> <p>15) 125MVAR Bus Reactor at Vatttem 400 kV LI SS</p> <p>16) 125MVAR Bus Reactor at Uddandapur 400 kV LI SS</p>

- 4.3 It was decided in the 2nd SRSCT meeting that CEA, CTU and TSTRANSCO may jointly study and finalize the transmission scheme for Palamuru Rangareddy Lift Irrigation. The recommendations would be discussed in next meeting of Standing Committee.
- 4.4 Accordingly, the proposal was discussed in the Joint Study Meeting on 21-22 November, 2019, and based on load flow studies, the following transmission scheme was agreed for Palamuru Rangareddy Lift Irrigation Scheme:

Revised transmission scheme for Palamuru Rangareddy Lift Irrigation Scheme
1) 400 kV QMDC line from 400 kV Veltoor SS to proposed 400 kV Yedula LI SS – 50 km
2) 400 kV QMDC line from proposed 400 kV Yedula LI SS to proposed 400 kV Narlapur LI SS – 30 km
3) 400 kV QMDC line from proposed 400 kV Yedula LI SS to proposed 400 kV Vattem LI SS – 60 km.
4) 400 kV QMDC line from proposed 400 kV Vattem LI SS to proposed 400 kV Uddandapur LI SS – 50 km
5) 125 MVAR Bus Reactor at Narlapur 400 kV LI SS
6) 125 MVAR Bus Reactor at Yedula 400 kV LI SS
7) 125 MVAR Bus Reactor at Vattem 400 kV LI SS
8) 125 MVAR Bus Reactor at Uddandapur 400 kV LI SS
9) 400/11 kV LI SS at Narlapur with 9x160 MVA and 2x25 MVA, 400/11 kV PTRs
10) 400/11 kV LI SS at Yedula with 10x160 MVA and 2x25 MVA 400/11 kV PTRs
11) 400/11 kV LI SS at Vattem with 10x160 MVA and 2x25 MVA, 400/11 kV PTRs
12) 400/11 kV LI SS at Uddandapur with 6x160 MVA and 2x25 MVA, 400/11 kV PTRs
13) 220/11 kV LI SS at KP Laxmidevipally with 4x80 MVA and 2x25 MVA, 220/11 kV PTRs
14) 400 kV QMDC line from 400 kV Maheshwaram (TS) SS to proposed 400 kV Uddandapur LI SS – 65 km
15) 400 kV QMDC line from 400 kV Dindi SS to 400 kV Yedula LI SS – 60 km
16) 220 kV DC line from 400/220/132 kV Kethireddypalli (Manikonda) SS to proposed 220 kV KP Laxmidevipally LI SS – 46 km



4.5 As per TSTRANSCO, the pump house and associated transmission system is likely to be commissioned by 2020-21.

4.6 Chief Engineer (PSPA-II), CEA, requested TSTRANSCO representatives to plan their transmission system after carrying out detailed field survey. Major and frequent revisions in already approved transmission schemes is not advisable.

4.7 After deliberations, the revised transmission scheme mentioned in para 4.4 for Palamuru Rangareddy Lift Irrigation Scheme was agreed.

5.0 Permanent de-linking of existing 400 kV RTPS-BTPS-JSW-GUTTUR Twin Moose line between BTPS and JSW

5.1 In the joint meeting of Standing Committee on Power System Planning of SR and WR held on 26th December 2013, transmission system of KPTCL for evacuation of power from Yeramarus (2x800 MW) TPP and Edlapur (1x800 MW) TPP was discussed and the following transmission scheme was approved:

- i. Bellary 400 kV Pooling station near BTPS.
- ii. Gulbarga 400/220 kV sub-station with 7x167 MVA (single phase) or 2x500 MVA ICT.

- iii. Yeramarus TPS-Gulbarga 400 kV D/C line with Quad Moose conductor.
- iv. Establish 400 kV switching station at Chikkanayakanahalli (CN Halli) near Loop in Loop out (LILO) point of 400 kV Nelamangala-Talaguppa lines to Hassan.
- v. LILO of both the Nelamangala-Talaguppa 400 kV lines to the proposed pooling station near CN Halli.
- vi. Terminate 400 kV D/C line feeding 400/220 kV Hassan sub-station from Nelamangala-Talaguppa line at CN Halli 400 kV pooling station.
- vii. Yeramarus TPS-BPS 400 kV D/C line with Quad Moose conductor.
- viii. Bellary Pooling station -CN Halli 400 kV D/C line with Quad Moose conductor.
- ix. Bellary Pooling station -New Madhugiri (Near Tumkur) 400 kV D/C line with quad moose conductor.
- x. Bellary TPS-Bellary Pooling station 400 kV D/C line with Quad Moose conductor.
- xi. De-link 400 kV S/C line running between RTPS-BTPS-JSW-Guttur with BTPS and JSW bus so as to retain direct connectivity between RTPS and Guttur.
- xii. JSW TPS-BPS 400 kV D/C line with Quad Moose conductor.

5.2 It was also approved in the Joint Study Meeting held in December, 2013, that KPTCL would plan additional 400 kV DC transmission line from JSW TPS or would configure the JSW-Bellary link in such a way that in case of contingency, the LILO of RTPS-Guttur line at JSW generating station would be re-established. If there is any constraint/congestion in the system beyond Bellary Pooling Station or New Madhugiri S/S, then JSW or other generators connected to Bellary PS may have to be backed down.

5.3 Further, in the 39th meeting of SCPSPSR held on 28th & 29th December 2015, the following changes were agreed:

- i. BTPS-Guttur 400 kV Quad Moose DC line.
- ii. Retain the LILO to BTPS only, from the existing 400 kV SC line running between 'RTPS-BTPS-JSW-Guttur'.
- iii. BPS to BTPS 400 kV DC Quad Moose link may be dropped.
- iv. JSW would be connected with Bellari Pooling station by additional two nos. 400 kV Quad DC line.
- v. Switching station at 'Chikkanayakanahalli' (CN Halli) will be converted into a step down station with 2x500 MVA, 400/220 kV ICT's.

- 5.4 M/s JSW had requested for permanent de-linking of LILO portion of existing 400 kV “RTPS-BTPS-JSW-Guttur” Twin Moose line at JSW generating station.
- 5.5 The issue of de-linking of 400 kV LILO portion of 400 kV “RTPS-BTPS-JSW-GUTTUR” Twin Moose line at JSW generating station was discussed in the 2nd SRSC meeting held on 10.06.2019. It was decided in the meeting that the issue would be discussed in a separate meeting of KPTCL, JSW, SRLDC and CEA. The recommendations would be discussed in next meeting of SRSC.
- 5.6 Accordingly, the matter was discussed in the joint study meeting on 21-22 November, 2019, wherein load flow studies were carried out for different scenarios. Based on studies, no constraints were observed in de-linking the LILO at JSW generating station, provided JSW does not inject any power in the grid. The RTPS-BTPS-Guttur (Davangere) S/C line is LILOed at JSW. After bypassing the LILO, if BTPS- Guttur S/C line is under maintenance and one circuit of BTPS – Hiriyur lies goes out, evacuation of power from RTPS, BTPS and JSW would have to be curtailed.
- 5.7 The matter was subsequently discussed in a meeting on 22nd November 2019, chaired by Chairperson/Member (Power System), CEA, with representatives from KPTCL, SRLDC, JSW, CEA and CTU [minutes of meeting was part of agenda of 1st SRPC(TP) meeting]. Brief of discussions in the meeting are as follows:

- Representative of M/s JSW requested for de-linking of LILO portion of existing 400 kV “RTPS-BTPS-JSW-Guttur” Twin Moose line at JSW Generating station. He informed that M/s JSW is expanding its Steel plant (power plant and steel plant are at the same location), resulting in increase in electricity demand locally. So power may not be injected by JSW generating station in the grid. He further informed that M/s JSW is not having LTA for injecting power in the grid. At present, M/s JSW is selling 300 MW power to Telangana under SToA. The PPA with Telangana is till March, 2020. He also informed that the total installed capacity of JSW generating station is 1,690 MW (1x100 + 3x130 + 4x300 MW). Out of this, 860 MW is IPP and 830 MW is CPP. Details of installed capacity and bifurcation of the capacity into IPP and CPP capacity is given below:

	Total capacity	IPP Capacity	CPP Capacity
Generating units connected below 220 kV voltage level	1x100 MW+1x130 MW		1x100 MW+1x130 MW
Generating units connected to 220 kV voltage level	2x130 MW (Unit 1,2)	2x130 MW (Unit 1,2)	
Generating units connected to 400 kV voltage level	4x300 MW (Unit 3,4,5,6)	2x300 MW (Unit 3,4)	2x300 MW (Unit 5,6)
	1690 MW	860 MW	830 MW

- KPTCL representative also informed that M/s JSW has not taken LTA for injecting power in the grid and is injecting power in short term.
- SRPC representative opined that the LILO may be opened after 1st June, 2020, i.e. after the annual peak demand period of Southern Region.

5.8 After deliberations, it was agreed by the members that KPTCL may open the LILO subject to the following:

- i. The LILO may be opened only after 1st June, 2020, i.e. after the annual peak demand period of Southern Region.
- ii. KPTCL shall ensure that there would not be any constraints / congestion in the STU grid and conditions stipulated in the manual on transmission planning criteria are met, while giving NoC for injection of power (quantum in MW) to M/s JSW.
- iii. KPTCL should expedite the works of upgradation of BTPS - Guttur 400 kV S/C line to 400 kV Quad D/C line. This was agreed in the 39th SCSPSR meeting held on 28-29 December, 2015. However, the work has been delayed and KPTCL must expedite the same.
- iv. The issue of NoC to the declared IPPs or CPP of JSW, as the case may be, would be in accordance with KERC regulations/orders.

6.0 Modifications in 220 kV transmission system proposed by KPTCL at Yalwar (associated transmission lines of 400/220 kV Yalwar Substation.)

6.1 Director (PSPA-II), CEA, stated that KPTCL had requested for the following modifications in the associated 220 kV transmission system of 400/220 kV Yalwar S/S:

220 kV System (as per minutes of 2nd meeting of SRSCT):

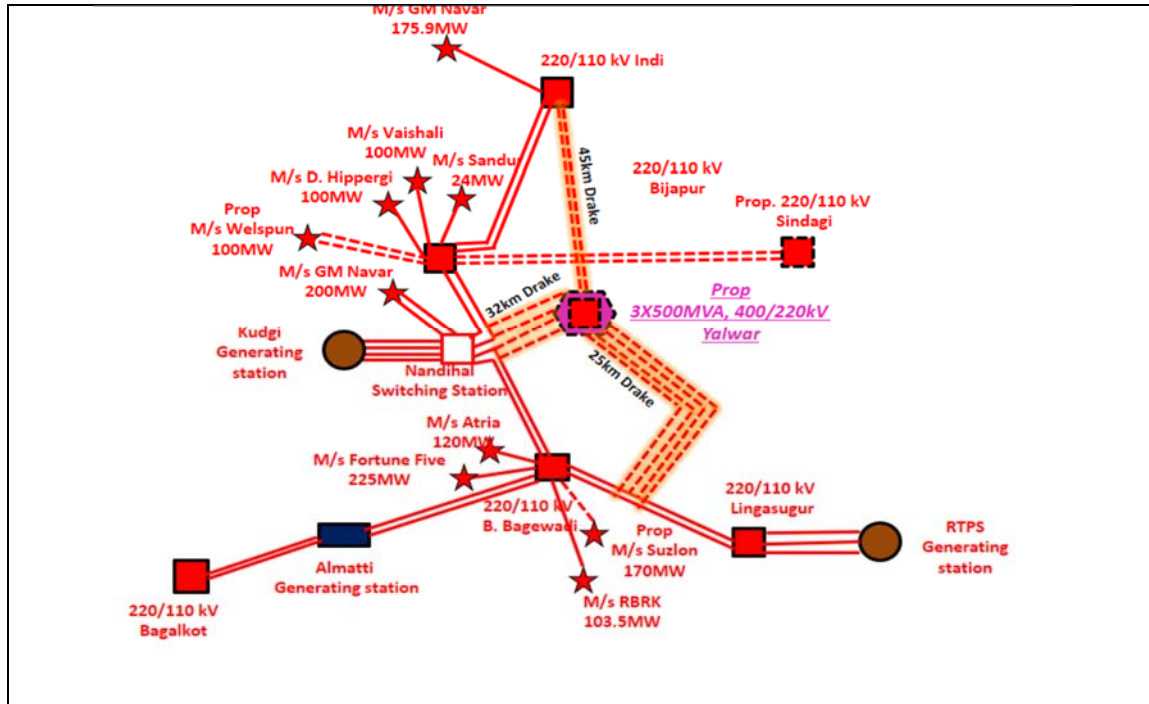
- i. LILO of both circuits of existing B. Bagewadi – Lingasugur 220 kV D/C line at Yalwar.
- ii. LILO of both circuits of Bijapur- Sindagi 220 kV D/C line at Yalwar sub-station.
- iii. B. Bagewadi -Yalwar 220 kV D/C line.

Modifications in 220 kV transmission system proposed by KPTCL (vide letter dated 09.08.2019):

- i. DC LILO of existing B.Bagewadi – Lingasugur 220 kV DC line to the proposed 400/220 kV Yalwar sub-station.
- ii. 220 kV DC line from proposed 400/220 kV Yalwar (Shivanagi) sub-station to 220 kV Indi substation.

- iii. 220 kV multi-circuit line to the LILO point of 220 kV DC Basavana Bagewadi-Vijayapur line near 220 kV Nandihal switching station.

The transmission line at Sl. No. (i) was already agreed in the 2nd SRSCT meeting.



6.2 The issue was discussed in the joint study meeting. In the meeting, Chief Engineer (PSPA-II), CEA, stated that with the proposed connectivity, there would be unequal loading between B. Bagewadi – Yalwar. As such KPTCL agreed to study alternate connectivity to solve this issue and send a detailed proposal to CEA in a weeks’ time. It was decided that the proposal would be discussed in the SRPC(TP) meeting.

6.3 In the 1st SRPC(TP) meeting, KPTCL representative informed that they were planning to use series capacitors for matching the impedance of transmission lines between B. Bagewadi – Yalwar. This would solve the unequal loading problem.

6.4 CTU representative opined that Kudgi generating station being nearby, use of series capacitors in the transmission line may cause the problem of sub- synchronous resonance.

6.5 It was decided that KPTCL will carry out detailed study with the planned series capacitors and submit the study results to CEA. The matter would be discussed in the next meeting of SRPC(TP).

7.0 Power evacuation scheme by KPTCL for the proposed 2000 MW Sharavathy Pumped Storage Project

7.1 In the 2nd SRSCT meeting, KPTCL had proposed following transmission scheme (for evacuation of power from 2000 MW Sharavathy pumped storage project).

- i. Construction of 400 kV MC line with Quad Moose conductor from proposed Sharavathy Pumped Storage Station to 400/220 kV Talaguppa sub-station by utilizing the existing 220 kV S 1, S2 or S3, S4 corridor.
- ii. Strengthening of 400 kV Talaguppa- proposed C.N. Halli D/c Twin Moose line by higher ampacity conductor (Twin Moose equivalent HTLS).
- iii. Augmentation of existing 1x315 MVA (out of 3X315) transformers by 1x500 MVA, 400/220 kV transformers at Talaguppa.
- iv. Strengthening of 220 kV Talaguppa- Sharavathy D/c line by higher ampacity conductor (Drake equivalent HTLS).
- v. By utilizing the existing corridor of S1-S2 or S3-S4, replacing the S1-S2 & S3-S4 D/c lines with Drake conductor by 220 kV MC line between Sharavathy-Shimoga (S1, S2, S3, S4) with AAAC Moose conductor.

7.2 In the 2nd SRSCT meeting, it was decided that the transmission scheme proposed above would be discussed and finalized at a later stage, based on the status of commissioning of Sharavathy Pumped Storage Plant.

7.3 In the Joint Study meeting on 21-22 November, 2019, Chief Engineer (PSPA-II), CEA, enquired about the commissioning schedule of the generation project. Towards this, KPTCL informed that they have not received the exact commissioning schedule of the project and requested to defer the proposal.

7.4 Accordingly, in the SRPC(TP) meeting it was agreed to defer the proposal and it was decided that the proposal would be taken-up for discussion upon receipt of firm commissioning schedule of the generation project.

8.0 Proposal for grant of connectivity to NLC India Ltd for TPS-II 2nd Expansion (2x660 MW) in Cuddalore, Tamil Nadu, and to control high short circuit fault level in Neyveli Generation complex.

8.1 In the 2nd SRSCT meeting held on 10.06.2019, following transmission system was agreed for grant of connectivity to NLC India Ltd for TPS-II 2nd Expansion (2x660 MW) in Cuddalore, Tamil Nadu, and to control high short circuit fault level in Neyveli Generation complex:

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

- i. Re-storing of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400 kV D/c line through suitable arrangement of bypassing the LILOs at Nagapattinam and utilization of LILO sections for making Neyveli TPS-II 2nd Expn – Nagapattinam 400 kV, 2xD/c lines along with the line bays at generation switchyard
- ii. 2x125 MVA bus reactors at generation switchyard (NLC TPS-II 2nd Expn)
- iii. Generation Switchyard to be designed with 50 kA short circuit level.

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

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

8.2 Regarding implementation, the following was agreed in the 2nd SRST meeting:

- i. Re-storing of Neyveli TS-II/Neyveli TS-I Expn - Trichy 400 kV D/c lines through suitable arrangement of bypassing the LILOs at Nagapattinam, would be **implemented under ISTS**.
- ii. Utilization of LILO sections for making Neyveli TPS-II 2nd Expn – Nagapattinam 400 kV, 2xD/c lines along with the line bays at generation switchyard would be **implemented by NLC India Ltd.**

iii. 2x125 MVA bus reactors at generation switchyard (NLC TPS-II 2nd Expn)- **NLC India Ltd.**

8.3 Director (PSPA-II), CEA, stated that NLC has requested that the transmission scheme - “Utilization of LILO sections for making Neyveli TPS-II 2nd Expn – Nagapattinam 400 kV, 2xD/c lines” may also be executed under ISTS for ease of O&M activities of the lines, since the existing LILO portions to Nagapattinam is owned by PGCIL.

8.4 CTU representative stated that Manalmedu – Neyveli TPS-II 2nd Expn. 400 kV D/c (Quad) line had been agreed in the 2nd SRST meeting. In case of delay in implementation of 400 kV Manalmedu S/s and associated transmission lines, for the intervening period there will be only Nagapattinam – Dharampuri 765 kV D/c line (charged at 400 kV) beyond Nagapattinam PS for entire generation of 2x600 MW (IL&FS) and 2x660 MW (Neyveli TPS-II 2nd Expn) and there may be constraints in power evacuation. Accordingly, TANTRANSCO was requested to match the implementation of Manalmedu S/s and associated transmission lines with the time frame of Neyveli TPS-II 2nd Expn (2x660 MW) generation project.

8.5 CTU further informed that as per connectivity application received from NLC, connectivity for TPS-II 2nd Expansion (2x660 MW) is required by April, 2021. TANTRANSCO informed that Manalmedu S/s will be commissioned by December, 2021.

8.6 CTU representative suggested that LILOs may be bypassed in phased manner in case of delay in implementation of Manalmedu S/s and associated transmission lines. Initially restoring of only one circuit of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400 kV D/c line through suitable

arrangement of bypassing the LILO at Nagapattinam may be carried out and shall be utilized for connectivity of Neyveli TPS-II 2nd Expn through Neyveli TPS-II 2nd Expn – Nagapattinam 400kV D/c line. The second LILO section of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400 kV D/c line, shall be restored through suitable arrangement of bypassing the LILO at Nagapattinam after commissioning of Manalmedu S/S, Neyveli TPS-II 2nd Expn – Manalmedu 400 kV D/c (Quad) line and Manalmedu – Ariyalur 400 kV D/c line.

- 8.7 After detailed deliberations, following was agreed. (The transmission scheme remains the same as agreed in the 2nd SRSC meeting held on 10.06.2019. The only change is that the implementation of “Utilization of LILO sections for making Neyveli TPS-II 2nd Expn – Nagapattinam 400 kV, 2xD/c lines” would be carried out under ISTS).

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

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

Additional System Strengthening for control of short circuit levels in Neyveli generation complex and re-arrangement of network configuration to control overloading of ICTs / 230 kV lines from Neyveli generation complex:

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

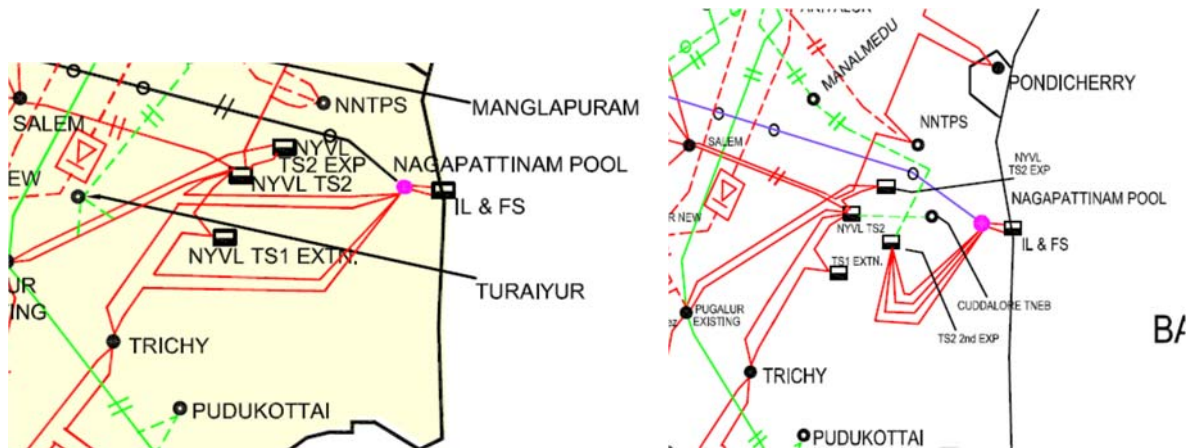


Fig: Proposed connectivity for Neyveli TPS-II 2nd Expn (2x660 MW)

9.0 Overloading of 400 kV NP Kunta-Kolar S/C line

9.1 In the 2nd SRST meeting, representative of SRLDC had informed that due to Solar power evacuation at NP Kunta, there is very high flow (of the order of 800 MW) on NP Kunta – Kolar S/C line, and the 400 kV Urvakonda-Hindupur-NP Kunta D/C lines have to be kept open to mitigate the flow on NP Kunta – Kolar lines. Outage of this line increases the flow on 400 kV Gooty-Neelamangala / Somanahalli lines and also results in low voltages in Bengaluru area. In the meeting, representative of CTU stated that strengthening of 400 kV NP Kunta – Kolar line or additional NP Kunta – Hosur 400 kV D/C line may be explored. CTU further suggested that bypassing the LILO of Cuddapah – Kolar line at NP Kunta, may resolve the overloading issue. In the 2nd SRST meeting, it was decided that CEA, CTU and SRLDC may jointly study and resolve the issue.

9.2 The matter was discussed in the Joint Study meeting on 21-22 November, 2019. Brief of discussions in the meeting are as follows:

- Representative of SRLDC informed that overloading of 400 kV NP Kunta-Kolar S/C line is observed during the high import scenario in Southern region during the months of February to April. During this time, Southern Region is importing power up to 9,700 MW. CTU informed that presently the ATC of NEW Grid – SR Grid is 9,500 MW and about 7,800 MW of LTA & MToA have been granted for import to SR beneficiaries.
- Chief Engineer (PSPA-II), CEA, advised that SRLDC may take into consideration all such constraints observed in the transmission system, if any, in Southern Region and may accordingly declare margins for SToA.
- System studies were carried out with LILO at NP Kunta, wherein no constraints were observed while keeping the import to Southern Region within the limits of ATC. Studies also

indicated that with commissioning of Vemagiri- C. Peta 765 kV D/C line, the loading on Kolar –N. P. Kunta – Cuddapah line is further eased. Accordingly, it was decided that transmission strengthening/bypassing of the LILO is not required.

- 9.3 In the 1st SRPC(TP) meeting, representative of POSOCO informed that the NP Kunta-Kolar line was severely loaded in the months of February to May. This happened even when import of power in Southern Region from NEW Grid was as low as 4,000 MW. Hence, it was requested that the 400 kV Cuddapah – NP Kunta – Kolar line may be by-passed at NP Kunta and restored as 400 kV Cuddapah- Kolar line or other alternative strengthening including re-conductoring may be explored.
- 9.4 POSOCO also informed that the severe loading also constrained the operator from reducing the import at Kolar or whenever there was outage of a pole at Kolar HVDC terminal. Chief Engineer (PSPA-II), CEA, requested POSOCO to share the relevant data for the heavy loading condition.
- 9.5 After deliberations, it was decided that CEA, CTU and SRLDC/POSOCO may jointly study the issue considering the inputs provided by SRLDC. Thereafter, the same would be discussed in the next meeting of SRPC(TP).

10.0 Kudankulam Nuclear Power Plant (KKNPP)- High Voltage issues

- 10.1 In the 2nd SRSCT meeting, SRPC representative had informed that voltage at KKNPP bus are generally high during off-peak conditions. In addition to this, KKNPP U-2 (1000 MW) is generating reactive power as high as 380 MVAR, resulting in further increase in voltage. One 80 MVAR bus reactor at 400 kV KKNPP is out of service since 14.12.2016. The present committed date of December 2019 (though postponed few times) of putting the bus reactor back in service needs to be ensured by KKNPP/NPCIL. In the 2nd SRSCT meeting it had been decided that this issue needs to be discussed with NPCIL/KKNPP in a separate meeting.
- 10.2 Accordingly, a meeting was held on 22.11.2019 under chairmanship of Chairperson, CEA, with representatives from CEA, NPCIL, SRPC, SRLDC, CTU and TANGEDCO [minutes of meeting was part of agenda of 1st SRPC(TP) meeting]. Brief of discussions in the meeting are as follows:
- i. NPCIL representative informed that bushing of one of the bus reactor (80 MVAR) at Kudankulam had failed and the same was being imported from Russia, as it was originally supplied by Russia. The bus reactor is likely to be put back into service by March, 2020.
 - ii. It was brought out that in the absence of sufficient bus reactors at Kudankulam Nuclear Power Plant and also due to proposed shut down of one generating unit at Kudankulam from 2nd week of December, 2019, the outgoing 400 kV lines would be lightly loaded and may result in high MVAR injection into the grid.
 - iii. NPCIL representative informed that each generating unit at Kudankulam can absorb upto 150 MVAR. Therefore, it was proposed that SRPC/SRLDC would carry out necessary

simulation for the period of only one unit operational at Kudankulam and accordingly, Kudankulam Nuclear Power Plant may have to absorb more MVAR. To limit MVAR injection from lightly loaded transmission lines during the period of maintenance of one unit at Kudankulam, SRPC/SRLDC may also consider opening 1-2 outgoing circuits, after considering reliability aspects, and in consultation with NPCIL and other Stakeholders.

- 10.3 In the 1st SRPC(TP) meeting, SRLDC informed that two outgoing circuits from Kudankulam NPP have already been opened to control the high voltage.
- 10.4 After deliberations, it was decided that this is an operational issue and it should be resolved at SRPC level.

11.0 Proposal of TANTRANSCO for establishing a 230/110 kV SS at Vembakkam by LILO of 230 kV MAPS – Echur line

- 11.1 Director (PSPA-II), CEA, stated that in the 2nd SRSCT meeting, TANTRANSCO had requested for establishing 230/110 kV SS at Vembakkam by making LILO of 230 kV MAPS – Echur line. SRLDC representative opined that in place of LILO of MAPS-Arni line, LILO of Bhavini-Arni line may be considered. It was decided in the 2nd SRSCT meeting that TANTRANSCO would resubmit the proposal along with relevant system studies, after incorporating the suggestion of SRLDC.
- 11.2 In joint study meeting held on 21-22 November, 2019, TANTRANSCO requested to drop the proposal. Accordingly, the proposal was dropped on the request of TANTRANSCO.
- 11.3 Members noted the same.

Transmission Planning proposals by Andhra Pradesh

12.0 Augmentation of 4th 500 MVA ICT at existing 400/220 kV substation at Manubolu (Nellore)

- 12.1 In the 2nd SRSCT meeting, SRLDC representative had informed that ‘n-1’ condition was not satisfied on few occasions at 400/220 kV, 3x315 MVA ICT at Nellore S/S. APTRANSCO informed that they have planned 4th 500 MVA ICT at existing 400/220 kV substation at Manubolu (Nellore) to satisfy the ‘n-1’ condition and work is already in progress and the ICT is likely to be commissioned by May, 2020.
- 12.2 APTRANSCO has requested for ratification of 4th 500 MVA ICT at existing 400/220 kV substation at Manubolu (Nellore).
- 12.3 The proposal was agreed in the joint study meeting and recommended for ratification in the SRPC(TP) meeting.
- 12.4 Members agreed for the same.

13.0 Augmentation of 4th 500 MVA ICT at existing 400/220 kV substation at Kalpaka, Visakhapatnam District.

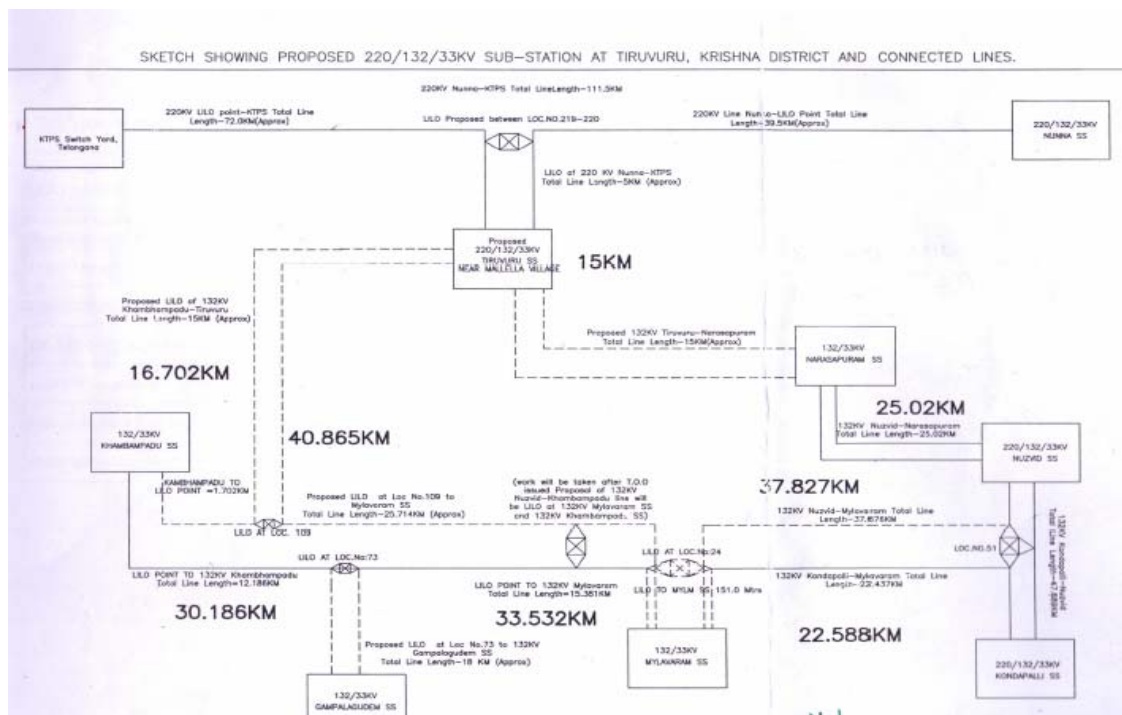
- 13.1 Director (PSPA-II), CEA, stated that APTRANSCO had informed that they have planned augmenting of ICT capacity from 3x315 MVA to 3x315MVA+1x500 MVA at the existing 400/220 kV Kalpaka substation to overcome the ICT constraints and to satisfy 'n-1' condition. APTRANSCO has requested for the approval of augmentation of 4th 500 MVA ICT at existing 400/220 kV substation at Kalpaka.
- 13.2 This proposal was discussed in the joint study meeting on 21-22 November, 2019, and after detailed deliberations, it was recommended that 4th ICT at Kalpaka would be approved subject to the condition that adequate downstream network is ensured by APTRANSCO, matching with augmentation of transformation capacity at 400/220 kV level. Accordingly, additional 220 kV lines may be planned for meeting load requirements, if not planned already. The matter would be discussed in the meeting of SRPC(TP).
- 13.3 In the 1st SRPC(TP) meeting, APTRANSCO representative informed that they have planned to replace the existing conductors of following transmission lines with HTLS conductors: (i) Kalpaka-VSS (PGCIL SS) 220 kV D/C line (length 3.40 km) and (ii) (PGCIL SS) –Gajuwaka SS 220 kV S/C line (length 12 km). APTRANSCO further informed that the 4th ICT is likely to be commissioned by May, 2020.
- 13.4 After deliberations, the proposal of APTRANSCO was agreed.

14.0 Proposal by APTRANSCO for erection of 220/132/33 kV Tiruvuru SS, 132/33 kV Mylavaram SS & 132/33 kV Gampalagudem SS and associated 220 kV & 132 kV transmission lines in Krishna district.

- 14.1 Director (PSPA-II), CEA, stated that APTRANSCO has proposed the following dedicated Transmission Scheme for erection of 220/132/33 kV Tiruvuru S/S, 132/33 kV Mylavaram S/S & 132/33 kV Gampalagudem S/S and associated 220 kV & 132 kV transmission lines in Krishna district:
- i. Erection of 220/132/33 kV Tiruvuru S/S with 2x100 MVA and 2x31.5 MVA transformers.
 - ii. Making 220 kV SC LILO (5 km approx.) of existing 220 kV KTPS- Nunna S/C line at proposed 220/132/33 kV Tiruvuru S/S.
 - iii. Erection of 132 kV DC line (15 km approx.) from existing 132 kV Narasapuram to proposed 220/ 132/33 kV Tiruvuru S/S.
 - iv. Making 132 kV LILO (15 km approx.) of proposed 132 kV Kambhampadu-Nuzvidu line at proposed 220/132/33 kV Tiruvuru S/S.
 - v. Erection of 132/33 kV Mylavaram S/S with 2x31.5 MVA transformers.

- vi. Making 132 kV LILO (0.151 km approx.) of 132 kV proposed Nuzvidu- Kambhampadu S/C line and 132 kV Kambhampadu- Kondapalli SC line at proposed 132/33 kV Mylavaram SS.
- vii. Erection of 132/33 kV Gampalagudem SS with 2x31.5 MVA transformers.
- viii. Making 132 kV SC LILO (18 km approx.) of existing 132 kV Kambhampadu - Kondapalli SC line at proposed 132/33 kV Gampalagudem SS.

14.2 APTRANSCO informed that 220/132/33 kV Tiruvuru SS and associated transmission system is likely to be commissioned by December, 2020.



14.3 Director (PSPA-II), CEA, stated that the proposal involves making LILO of 220 kV KTPS-Nunna line, which is an inter-state line between Telangana and Andhra Pradesh. The proposal was discussed and agreed in the joint study meeting, subject to approval of TSTRANSCO and SRLDC, and recommended to SRPC(TP) for deliberations.

14.4 Subsequently, TSTRANSCO informed that no constraints are observed in the TSTRANSCO network with the proposed LILO of 220 kV KTPS-Nunna line. SRLDC informed that average flow on the line in October 2019, was 55 MW and maximum flow was 126 MW. LILO of 220 kV KTPS-Nunna S/C line at 220/132/33 kV Tiruvuru S/S may not be an issue regarding line loading.

14.5 After detailed deliberations, members agreed for the transmission scheme.

Transmission planning proposals by Telangana

15.0 Modifications in earlier approved Kaleshwaram Lift Irrigation scheme

- 15.1 Director (PSPA-II), CEA, informed that the transmission system of Kaleshwaram Lift Irrigation scheme was approved in 40th SCPSPSR meeting held on 19.11.2016 and subsequently in 41st SCPSPSR meeting held on 22.09.2017. The scheme included establishment of 400 kV SS at Chandlapur, Medak District. As per minutes of 40th SCPSPSR, the capacity of motors to be installed at Chandlapur, Medak District, was 5x88.5 MW. TSTRANSCO vide letter dated 05.08.2019, has informed that the capacity of motors at Chandlapur, Siddipet District (new district formation due to re organization of districts), have been changed from 5x88.5 MW to 4x134.8 MW. Construction of 400 kV Chandlapur SS and associated lines have been completed and commissioned on 06.05.2019, duly considering the revised motor/pump capacity. TSTRANSCO has requested for ratification of the same.
- 15.2 The proposal was agreed in the joint study meeting and it was decided to put up the same for ratification in the meeting of SRPC(TP).
- 15.3 After deliberations, the proposal was agreed by the members.

16.0 Sita Rama Lift Irrigation Scheme - Proposal for LILO of 220 kV KTPS (TS) - Lower Sileru (AP)- I line at 220/11 kV V.K. Ramavaram LI SS and also at 400/220 kV Asupaka SS for providing additional source

- 16.1 Director (PSPA-II), CEA, informed that the transmission system for Sita Rama Lift Irrigation scheme was approved in 41st SCPSPSR meeting (held on 22.09.2017) with the following connectivity:
- i. 220 kV SS at Pump House - 1 (6x25 MW) at B.G: Kothur(V) Ashwapuram (M) in Bhadradi Kothagudem District
 - ii. 220/11 kV SS at Pump House - 2 (6x40 MW) at V.K. Ramavaram (V) Mulakalapally (M) in Bhadradi, Kothagudem District
 - iii. 400/220/11 kV SS (3x315 MVA) at Pump House 3 (5x40 MW+2x30 MW) Kamalapuram(V) Chandrugonda(M) in Bhadradi, Kothagudem District
 - iv. LILO of one circuit of KTPS - Manuguru 220 kV D/C Line to proposed Pump House -1 at B.G. Kothur (about 1 km).
 - v. LILO of KTPS V - Lower Sileru II 220 kV S/C Line to proposed Pump House -1 at B.G. Kothur (about length of 20 km).
 - vi. Julurupadu (400/220 kV S/S) - Pump House -3 (at Kamalapuram) 400 kV D/C line for a length of 50 km.

vii. Pump House -3 (at Kamalapuram) -Pump House -2 (at V.K. Ramavaram), 220 kV D/C line (with Single Moose) for length of about 25 km.

16.2 TSTRANSCO vide letter dated 29.06.2019, has proposed the following additional connectivities/modifications in the transmission scheme of Sita Rama Lift Irrigation Scheme, to provide alternate source to 220/11 kV V.K. Ramavaram SS and 400/220/11 kV Kamalapuram SS.

- i. 220 kV Twin Moose DC line from 400/220/11 kV Kamalapuram LI SS to 220/11 kV V.K. Ramavaram LI SS – 25 km (instead of earlier approved 220 kV Single Moose DC line from 400/220/11 kV Kamalapuram LI SS to 220/11 kV V.K. Ramavaram LI SS – 25 km)
- ii. LILO of 220 kV KTPS (TS) - Lower Sileru (AP)- I ISTS line at 220 kV V.K. Ramavaram LI SS and also at 400/220 kV Asupaka SS

16.3 The proposal involves making LILO of 220 kV KTPS (TS) - Lower Sileru (AP)- I ISTS line. The proposal was agreed in the Joint Study meeting, subject to approval of APTRANSCO, SRLDC and SRPC.

16.4 APTRANSCO vide letter dated 13.12.2019, has agreed to the proposal of TSTRANSCO for making LILO of 220 kV KTPS (TS) - Lower Sileru (AP)- I line at 220/11 kV V.K. Ramavaram LI SS and also at 400/220 kV Asupaka SS.

16.5 After deliberations, the proposal was agreed by the members.

Transmission planning proposals by Karnataka

17.0 Bus reactor at 400/220 kV Jagalur substation

17.1 Director (PSPA-II), CEA, informed that establishing 2x500 MVA, 400/220 kV GIS sub-station at Jagalur was approved in the 39th meeting of SCPSPSR. In the minutes of the meeting, the provision for bus reactor at 400/220 kV Jagalur SS was not mentioned. In-house study had been carried out by KPTCL to check the necessity of providing bus reactors at 400 kV Jagalur substation. Based on the study results and also considering the “Manual on Transmission Planning criteria” by CEA, provision for 2x80 MVAR bus reactors at 400 kV Jagalur SS was incorporated in the scheme by KPTCL. The work of establishing 2x500 MVA, 400/220 kV GIS Substation at Jagalur along with 2x80 MVAR bus reactors was awarded by KPTCL on 29.07.2016.

17.2 Subsequently, in the 42nd SCPSPSR meeting held on 27th April, 2018, CTU had suggested to install 2x125 MVAR bus reactor at Jagalur to control over-voltage. Representative of KPTCL had informed that 2x80 MVAR bus reactors were already under installation at Jagalur and the proposed 2x125 MVAR reactors may be dropped.

17.3 This issue was discussed in the Joint study meeting on 21-22 November, 2019, and in the meeting, KPTCL informed that the work of establishing 400/220 kV GIS Sub-station at Jagalur along with

2x80 MVAR bus reactors has been completed and the reactors are sufficient to maintain good voltage profile in the system. KPTCL representative stated that in the reactive compensation studies carried out by CTU, 2x80 MVAR bus reactors at Jagalur had not been considered, and in the prevailing scenario, providing reactive power compensation at 400 kV Jagalur SS with 2x80 MVAR bus reactors may be sufficient to maintain good voltage profile and the proposed 2x125 MVAR bus reactors may be dropped.

17.4 It had been decided in the Joint Study meeting that since 2x80 MVAR bus reactors have already been installed, the 2x125 MVAR bus reactors proposed in 42nd SCSPSR meeting may be dropped as of now. Further, it was decided that additional bus reactor, if any, may be planned based on the future requirements.

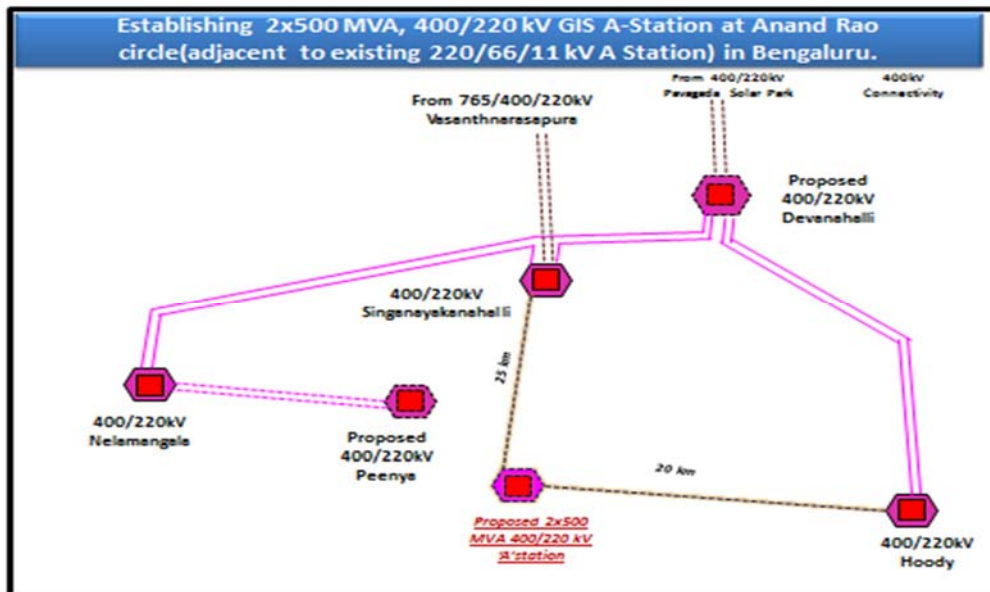
17.5 Members agreed for the above.

18.0 Establishing 2x500 MVA, 400/220 kV GIS A-Station at Anand Rao circle (adjacent to existing 220/66/11 kV A Station) in Bengaluru

18.1 Director(PSPA-II), CEA, stated that KPTCL vide letter dated 19.10.2019 had proposed the establishment of 2x500 MVA, 400/220 kV GIS A-Station at Anand Rao circle (adjacent to existing 220/66/11 kV A Station) in Bengaluru with following connectivity:

400 kV Connectivity:

- i. 400 kV S/C connectivity from 400/220 kV Singanayakanahalli PGCIL substation which is at a distance of 25 km from the proposed substation.
- ii. 400 kV S/C connectivity from 400/220 kV Hoody substation which is at a distance of about 20 km from the proposed substation.



220 kV connectivity:

- i. The existing 220 kV 'A' station will be connected to the 220 kV bus of proposed 400 kV 'A' station.
- ii. The existing 220 kV UG cable between NRS and “A” station and existing 220 kV UG cable between EDC and “A” station will be terminated to 220 kV bus of 400 kV substation proposed at 'A' station.
- iii. The proposed 220 kV UG cable between Peenya and “A” station (proposed in 400kV Peenya scheme) will be terminated to 220 kV bus of 400 kV substation proposed at 'A' station.

18.2 This proposal was discussed in the joint study meeting. In the meeting, KPTCL had informed that looking into the severe ROW issues involved in the Bengaluru area, underground AC transmission cables of 400 kV and 220 kV levels shall be used for connectivity of the proposed substation. It was also informed that presently at 400 kV level, about 19 km long UG AC cable is in operation in Saudi Arabia only. Representative of CTU opined that 25 km long AC cable at 400 kV level shall generate huge amount of reactive power and losses/temperature rise of the cable would also be very high. This may pose huge challenge in operation of the cable. KPTCL was requested to present operational experience of such long cable at 400 kV level along with suitable reactive compensation scheme for the cable in the forthcoming meeting of SRPC(TP).

18.3 In the 1st SRPC(TP) meeting, KPTCL informed that proposal is being firmed up and KPTCL would be submitting the same to CEA, once the proposal is finalized. KPTCL is planning to establish the substation by 2024-25.

18.4 Member Secretary (SRPC), suggested that KPTCL may explore the possibility of underground GIS substation or establish 220 kV substation at the nearest possible location close to the city and then use cable, so that the cable length is reduced. Possibility of GIL may also be explored.

18.5 It was also pointed by CTU representative that as per operational experience with even smaller length of cable than the one suggested by KPTCL, there have been incidences of frequent failure of cable joints due to huge charging current and resulting heat generation in the 400 kV cable.

18.6 After detailed deliberations, it was decided that KPTCL shall submit the detailed technical feasibility report of the proposal and the same would be discussed in the next meeting of SRPC(TP).

19.0 Additional works proposed by KPTCL under Intra-state transmission schemes under Green Energy Corridor Phase-2.

Director (PSPA-II), CEA, stated that KPTCL vide letter dated 19.10.2019, has proposed the following intra-state transmission schemes under Green Energy Corridor Phase-2.

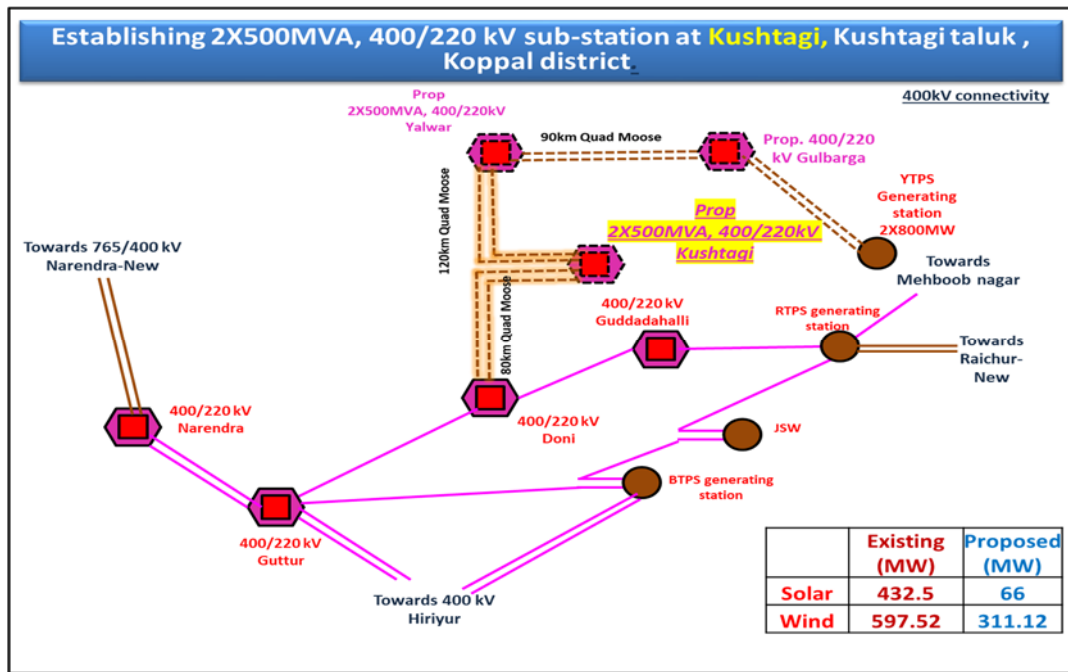
A. Establishing 2x500 MVA 400/220 kV sub-station in Kushtagi Taluk, Koppal district
400 kV connectivity:

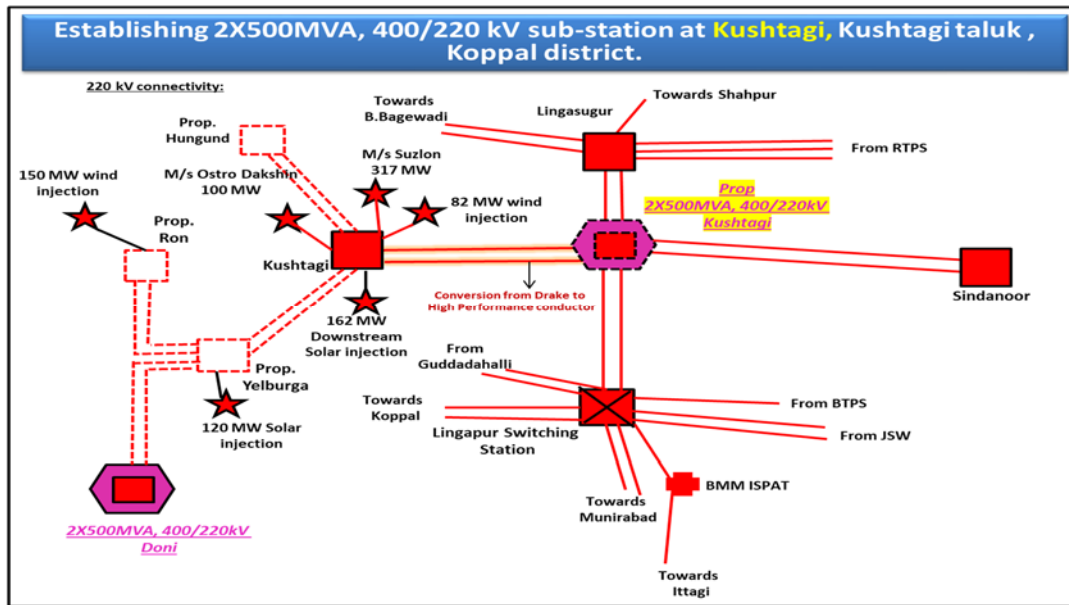
- i. Kushtagi(proposed) –Yalwar (proposed) 400 kV D/C line with Quad Moose conductor (120 km).
- ii. Kushtagi (proposed) -Doni 400 kV D/C line with Quad Moose conductor (80 km).
- iii. Conversion of Guttur-Doni 400 kV line from SC to DC with Quad Moose conductor.
- iv. 2x500 MVA, 400/220 kV power transformers at Kushtagi.
- v. 2x125 MVAr bus reactors at Kushtagi.

220 kV connectivity:

- i. LILO of 220 kV Lingasugur-Kushtagi SC line and 220 kV Lingasugur-Sindanur SC line to proposed 400 kV Kushtagi sub-station.
- ii. LILO of 220 kV Lingapura-Kushtagi SC line and 220 kV Lingapura-Sindanur SC line to proposed 400 kV Kushtagi sub-station.
- iii. Strengthening of proposed 220 kV connectivity between proposed 400/220 kV Kushtagi and existing 220 kV Kushtagi sub-station by replacing drake conductor by high performance conductor.

With the above 220 kV connectivity there will be 220 kV DC line with Drake conductor from proposed 400 kV Kushtagi sub-station each towards, existing Lingasugur, Sindanur and Lingapura stations and 220 kV DC line with high performance conductor between proposed 400 kV Kushtagi and existing 220 kV Kushtagi sub-station.





- 19.1 CTU informed that on basis of assessment of RE potential, MNRE has planned development of 2.5 GW potential of Wind Energy Zone(WEZ) in Koppal, Karnataka. Accordingly, CEA and CTU in consultation with stakeholders have planned establishment of 5x500MVA, 400/220 kV S/s at Koppal, Karnataka. MoP has selected PFC as BPC for selection of successful bidder for establishment of Koppal S/s. Further, in a meeting for prioritization of REZ on basis of development, transmission system for Koppal is to be developed by December, 2021. Towards this CTU has provided RfP inputs to PFC as BPC. As implementation of Koppal S/s under TBCB route for evacuation of power from potential Renewable Energy Zone (REZ) is in advance stage for selection of successful bidder, therefore there is no requirement of establishment of a new 400 kV S/s in Koppal for the same REZ potential.
- 19.2 KPTCL representative informed that the REZ potential assessed by Karnataka in Koppal is in addition to REZ potential assessed by MNRE/SECI. TANTRANSCO representative was of the view that identified potential by MNRE in any area includes both the potential being developed under ISTS and Intra-State.
- 19.3 SECI representative clarified that the potential identified for development under ISTS is in addition to the potential identified by respective states for development under intra-state system. Potential for development under ISTS has been identified in consultation with respective authorities from states. In case of Koppal, potential has been identified by SECI in consultation with KREDL. Representative of SECI further stated that 2.5 GW capacity was identified as ultra-mega RE Park in Koppal area for which the ISTS system has been planned. NTPC representative advised to create a task force to resolve this kind of issues in future.
- 19.4 Chief Engineer (PSPA-II), CEA, suggested that SRPC may monitor the capacity of RE projects being implementation under intra-state system in Southern Region. SRPC agreed to monitor RE potential already developed and the balance potential which could be developed (connected to ISTS/State Grid) in different states of Southern Region and would inform the same to SRPC(TP).

- 19.5 KPTCL representative clarified that there is 432.5 MW existing solar generation and 66 MW proposed solar generation and 597.52 MW existing wind generation and 311.12 MW proposed wind generation in the Kushtagi (Koppal) area, which are different from the RE potential planned to be connected to ISTS. The 2x500 MVA, 400/220 kV sub-station at Kushtagi is proposed to evacuate this RE capacity. KPTCL further informed that the substation and associated transmission system is likely to be commissioned by 2023-24.
- 19.6 After deliberations, the proposal of KPTCL regarding establishing 2x500 MVA, 400/220 kV sub-station in Kushtagi Taluk, Koppal District, along with associated transmission lines was agreed.

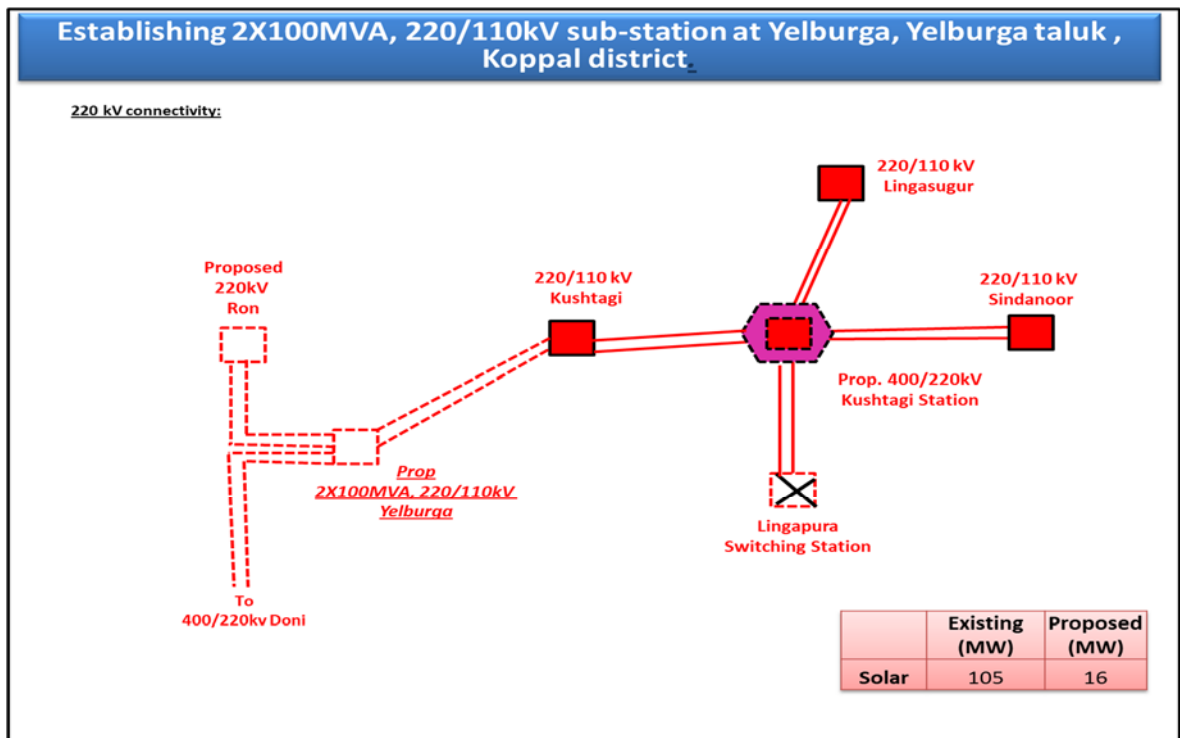
B. Establishing 2x100 MVA 220/110 kV substation at Yelburga, Koppal district

220 kV Connectivity

- i. 220 kV DC line from 220/110 kV Kushtagi sub-station to proposed 220 kV Yelburga sub-station.
- ii. Double circuit LILO of proposed 220 kV Doni - Ron DC line to proposed 220/110 kV Yelburga sub-station.
- iii. 2x100 MVA, 220/110 kV transformers.

110 kV connectivity

- i. 110 kV DC line from proposed 220 kV Yelburga substation to existing 110 kV Yelburga substation.
- ii. 110 kV DC line from proposed 220 kV Yelburga substation to existing 110 kV Bevoor substation.



19.7 KPTCL informed that 105 MW solar capacity is already connected to the existing system and Karnataka has planned additional 16 MW of Solar capacity. Regarding requirement of establishment of 220/110 kV S/s at Yelburga, Koppal, for additional 16 MW capacity, while power from 106 MW capacity is already being evacuated, KPTCL informed that the existing system is overloaded and the proposed system is required to relieve the overloading of the existing system. KPTCL further informed that the substation and associated transmission system is likely to be commissioned by 2023-24.

19.8 After deliberations, the proposal of KPTCL for establishing 2x100 MVA, 220/110 kV substation at Yelburga, Koppal district, along with the associated transmission lines was agreed.

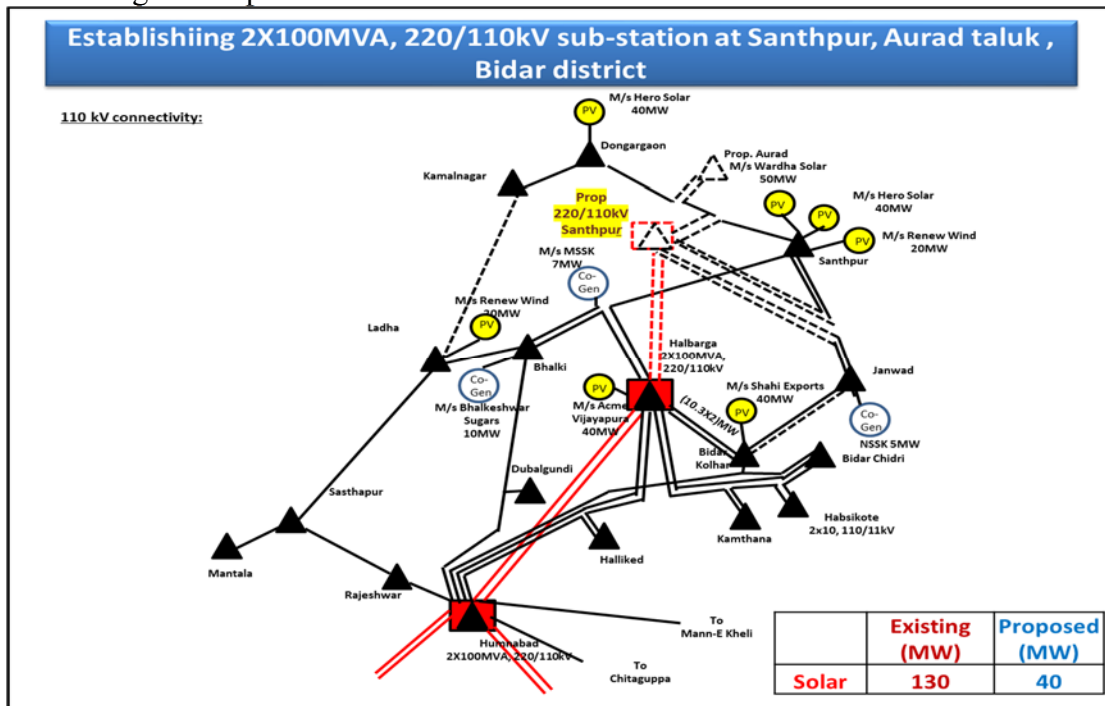
C. Establishing 2x100 MVA, 220/110 kV substation at Santhpur, Bidar district

220 kV connectivity

- i. 220 kV DC line from 220/110 kV Halbarga sub-station to proposed 220 kV Santhpur sub-station.
- ii. 2x100 MVA, 220/66 kV transformers.

110 kV connectivity

- i. 110 kV line from proposed 220/110 kV Santhpur substation to LILO existing 110 kV Santhpur -Janwad DC line.
- ii. 110 kV line from proposed 220/110 kV Santhpur substation to LILO existing 110 kV Santhpur-Dongargaon line.
- iii. 110 kV line from proposed 220/110 kV Santhpur substation to LILO existing 110 kV Halabarga-Santhpur line.



- 19.9 KPTCL representative informed that at present, 130 MW of solar generation around Halbarga area is being evacuated at 110 kV voltage level and additional 40 MW solar generation has been planned in the area. The generated power, after meeting the load, is pumped to 220 kV voltage level at 220/110 kV Halbarga sub-station. During any exigency at Halbarga, the said generations may get bottled up, resulting in problem of power evacuation.
- 19.10 Hence, in order to provide alternate path for evacuating green energy in the vicinity and to overcome the constraints in the 110 kV network, 2x100 MVA, 220/110 kV sub-station at Santhpur in Aurad taluk, Bidar district, is proposed. KPTCL informed that the substation and associated transmission system is likely to be commissioned by 2023-24.
- 19.11 After deliberations, the proposal of KPTCL for establishing 2x100 MVA 220/110 kV substation at Santhpur in Aurad taluk, Bidar district, along with associated transmission lines was agreed.

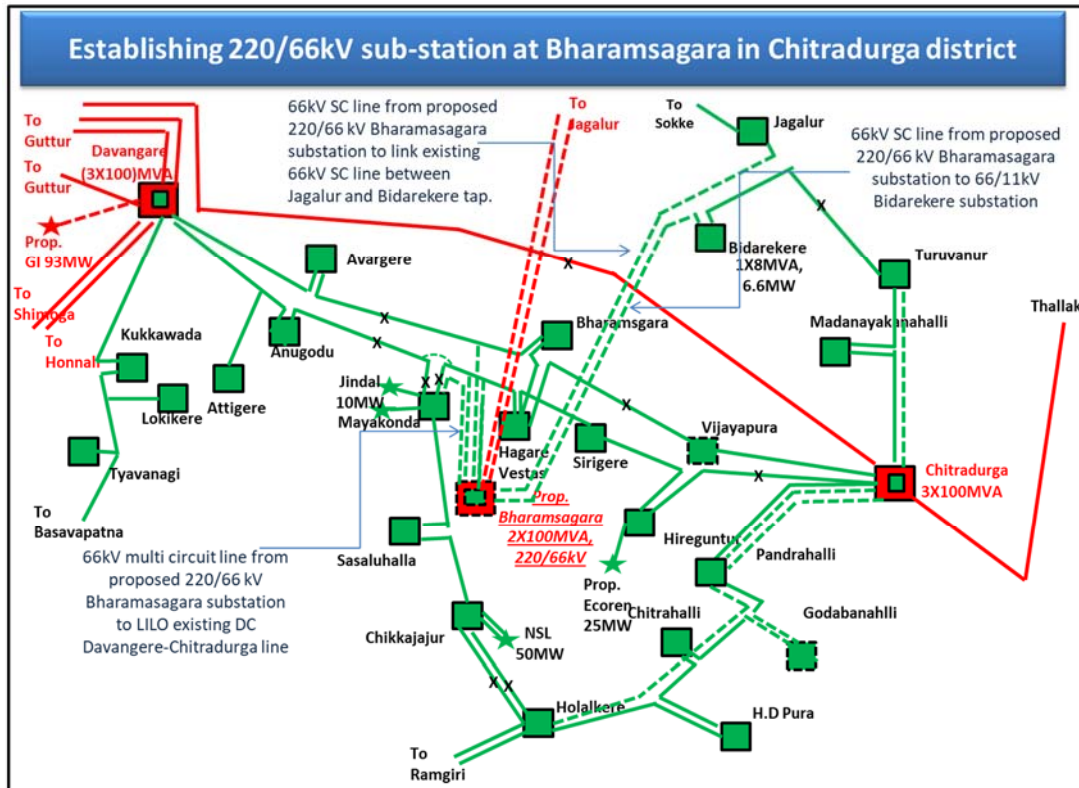
D. Establishing 2x100 MVA, 220/66 kV substation at Bharamsagara in Chitradurga district

220 kV Connectivity

- i. 220 kV DC line from proposed 400/220 kV Jagalur to proposed 220/66 kV Bharamsagara sub-station subject to availability of space at Jagalur
 - ii. 2x100 MVA, 220/66 kV transformers.
- 19.12 KPTCL informed that there is 20 MW existing Solar generation and 115.3 MW existing wind generation and 25.6 MW proposed wind generation in Bharamasagara area. The proposed 220 kV sub-station would serve as a reliable network for evacuation of power from RE generators in the vicinity and also as an alternate source of power supply to the downstream 66 kV sub-stations. KPTCL informed that the substation and associated transmission system is likely to be commissioned by 2023-24.
- 19.13 After deliberations, the proposal of KPTCL for establishing 2x100 MVA, 220/66 kV substation (as mentioned above) at Bharamsagara in Chitradurga district was agreed.
- 19.14 In addition, KPTCL proposed the following 66 kV connectivity at Bharamsagara in Chitradurga district

66 kV connectivity at Bharamsagara

- i. 66 kV multi circuit line from proposed 220/66 kV Bharamasagara substation to LILO existing DC Davangere-Chitradurga line.
- ii. *66kV SC line from proposed 220/66 kV Bharamasagara substation to link existing 66kV SC line between Jagalur and Bidarekere tap.
- iii. *66kV SC line from proposed 220/66 kV Bharamasagara substation to 66/11kV Bidarekere substation.
(*The 66 kV Jagalur-Chitradurga SC line is made LILO to proposed 220 kV Bharamsagara sub-station.)



19.15 Regarding the 66 kV connectivity at Bharamsasagara, it was advised that while planning the 66 kV connectivity, KPTCL should keep in mind the provisions of para 44(6) of Central Electricity Authority Regulations for Measures relating to Safety and Electric Supply, 2010, viz. “There should be no tapping of another transmission line from the main line for 66 kV and above class of line”.

E. Providing additional 100 MVA, 220/110 kV transformer at 220/110 kV Lingasugur sub-station in Raichur District.

19.16 KPTCL representative informed that the following RE capacity is existing/planned in Lingasugur area:

	Existing (MW)	Proposed (MW)
Solar		20
Wind	120	
MHS	145.65	15

19.17 The proposed augmentation work would serve as a reliable network for evacuation of power from existing and proposed RE generators in the area. KPTCL informed that the transformer is likely to be commissioned by 2023-24.

19.18 After deliberations, the proposal of KPTCL for establishing 1x100 MVA, 220/110 kV transformer at 220/110 kV Lingasugur sub-station in Raichur District, was agreed.

F. Providing Additional 100 MVA 220/66 kV transformer at 220/66 kV Thallak sub-station in Chitradurga District.

19.19 KPTCL representative informed that the following RE capacity is existing in Thallak area:

	Existing (MW)
Solar	378
Wind	30

19.20 The existing 2x100 MVA transformers get overloaded in high RE generation scenario, resulting in curtailment of RE generation. To overcome the overloading problem, KPTCL has proposed additional 1x100 MVA transformer at 220/66 kV Thallak sub-station. KPTCL informed that the transformer is likely to be commissioned by 2021-22.

19.21 After deliberations, the proposal of KPTCL for establishing 1x100 MVA, 220/66 kV transformer at Thallak substation in Chitradurga district was agreed.

G. Strengthening of 220 kV D/C line between Gadag to Lingapura switching station by replacing existing Drake by equivalent HTLS conductor.

19.22 KPTCL representative informed that the following RE capacity is existing/planned in Gadag area:

	Existing (MW)	Proposed (MW)
Solar	155	55
Wind	608.5	86.34

19.23 KPTCL representative further informed that the 220 kV D/C Gadag –Lingapura transmission line gets overloaded in high RE injection scenario. Hence, KPTCL has planned to replace the existing Drake conductors with HTLS conductors and the work is likely to be completed by 2023-24.

19.24 Chief Engineer (PSPA-II), CEA, advised that before the re conductoring work, KPTCL should study whether the existing towers can withstand the weight and loading of new conductors. KPTCL agreed for the same.

19.25 After deliberations, the proposal of KPTCL was agreed.

20.0 Dynamic reactive support by utilizing STATCOMs at Hoody and Neelamangala

20.1 Director(PSPA-II), CEA, stated that KPTCL vide letter dated 19.10.2019 had informed that the issue of low voltage in Karnataka sub-stations was discussed in the 36th SRPC meeting, wherein it was decided that in order to provide steady state as well as dynamic reactive support at the sub-stations experiencing low voltages, installation of STATCOMs at one or two stations viz. Hoody, Somanahalli, Yelahanka, Mysore etc. may be explored.

- 20.2 In the Joint study meeting, it had been decided to explore feasibility of both use of Solar Inverter and STATCOM for containing voltage within limits in the SR grid.
- 20.3 POSOCO representative opined that the reactive support to be provided by RE generating stations using inverters should be as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019.
- 20.4 Members noted the same.
- 21.0 Providing alternate source to the proposed 220/66 kV Pavagada sub-station (feeding from 220/66 kV Madhugiri S/S) by constructing new 220 kV DC line on DC tower with Drake conductor, from existing 400/220 kV Kyathaganacherlu (PGCIL) station to proposed 220/66 kV Pavagada substation for a distance of 32 km in the new corridor.**
- 21.1 Director(PSPA-II), CEA, stated that KPTCL has proposed to have 2nd source of power supply to the proposed 220 kV Pavagada sub-station, by constructing new 220 kV D/C line from existing 400/220 kV Kyathaganacherlu (PGCIL-Pavagada Solar park) station to 220/66 kV Pavagada (KPTCL) sub-station for a distance of 32 km with new two (2 nos.) 220 kV terminal bays at each Pavagada (KPTCL) and Kyathaganacherlu (PGCIL- Pavagada Solar park).
- 21.2 In the Joint study meeting, CTU had informed that two (2 nos.) 220 kV bays at Pavagada (POWERGRID) can be allocated to KPTCL. However, KPTCL shall ensure that it does not inject power into the Pavagada (POWERGRID) substation for evacuation of power from the STU network.
- 21.3 In the 1st SRPC(TP) meeting, Member Secretary, SRPC, opined that to ensure that KPTCL does not inject power into the Pavagada (POWERGRID) substation, reverse power flow relays may be installed in the transmission line. KPTCL agreed that they would not inject any power into Pavagada (POWERGRID) substation.
- 21.4 Representative of CTU stated that the 220 kV bays at 400/220 kV Pavagada (POWERGRID) will be under the scope of KPTCL. KPTCL agreed for the same and they informed that work would be completed by 2023-24.
- 21.5 After deliberations, it was decided that two (2 nos.) 220 kV bays at Pavagada (POWERGRID) may be allocated to KPTCL, however KPTCL shall not inject any power into Pavagada (POWERGRID) substation and to avoid injection of power into ISTS system, Reverse Power Relay would be installed by KPTCL.

Transmission planning proposals by Tamil Nadu

22.0 Provision of additional 400/110 kV ICT (3rd unit of 200 MVA) at the existing 400/230-110 kV Kayathar substation and 400/230 kV & 400/110 kV ICTs provision for the ongoing 400/230-110 kV Thennampatty S/S

- 22.1 Director(PSPA-II), CEA, stated that TANTRANSCO vide letter dated 03.07.2019, had proposed additional 200 MVA, 400/110 kV ICT (3rd unit of 200 MVA) at the existing 400/230-110 kV Kayathar substation to meet the 'n-1' contingency criterion. This issue had been discussed in the joint study meeting. In the meeting, TANTRANSCO informed that in order to meet the "n-1" contingency condition, it is essential to enhance 400/110 kV ICT capacity from 2x200 MVA to 3x200 MVA at Kayathar 400/230-110 kV SS. The space for erection of 400/110 kV, 200 MVA ICT is available at Kayathar 400/230-110 kV SS. As per TANTRANSCO, the ICT is likely to be commissioned by 2020-21.
- 22.2 On a query about wind generation capacity at Kayathar, TANTRANSCO representative informed that the installed capacity of wind generation at Kayathar is 367 MW and the existing/planned wind generation at Kanarpatty is 1180 MW.
- 22.3 CTU representative opined that Kayathar is a high wind zone and with additional ICT at Kayathar, injection from Kayathar into the ISTS grid will increase. CTU representative stated that additional ICT at Kayathar may be agreed provided TANTRANSCO will not give additional RE connectivity at Kayathar and the proposed additional ICT is only for satisfying 'n-1' contingency condition.
- 22.4 After deliberations, the additional ICT proposed at Kayathar was agreed by the members, provided no additional RE injection shall be allowed by TANTRANSCO at Kayathar.
- 22.5 Regarding Thennampatty SS, Director (PSPA-II), CEA, stated that establishment of Thennampatty 400/230-110 kV S/S was approved in the 34th meeting of SCPSPSR. However, capacity of 400/230 kV and 400/110 kV ICTs was not mentioned. TANTRANSCO vide letter dated 03.07.2019 had informed that 2x315 MVA, 400/230 kV ICT and 2x200 MVA, 400/110 kV ICTs were under installation and likely to be commissioned shortly.
- 22.6 In the 1st SRPC(TP) meeting, TANTRANSCO informed that the ICTs at Thennampatty have been commissioned. Members noted the same.

23.0 Enhancement of ICT capacity by 1x500 MVA, 400/230 kV ICT along with the existing 2x315 MVA, 400/230 kV ICTs at Sunguvarchatram 400/230-110 kV SS.

- 23.1 Director(PSPA-II), CEA, stated that TANTRANSCO vide letter dated 18.10.2019 had informed that Sunguvarchatram 400/230-110 substation has total transformation capacity of 1030 MVA with two (2 nos.) 400/230kV, 315 MVA ICT and two (2 nos.) 400/110 kV, 200 MVA ICTs.

Presently, sustained peak load of the two 315 MVA ICTs is 64% of its full load capacity. M/s. Rack Bank Data Centers Pvt. Ltd. had proposed to establish their company at SIPCOT Sriperumbudur Industrial Park with 192 MW (213 MVA) load in Phase-1 and 288 MW (320 MVA) load in Phase -2.

23.2 In the joint study meeting on 21-22 November, 2019, TANTRANSCO had requested to approve additional 1x500 MVA ICT at Sunguvarchatram 400/230-110 kV S/S, in order to accommodate all existing and future loads. Based on study results, the additional 1x500 MVA ICT at Sunguvarchatram 400/230-110 kV S/S had been agreed in the Joint Study meeting. As per TANTRANSCO, the ICT is likely to be commissioned by 2021-22.

23.3 After deliberations, the proposal was agreed by the members.

24.0 Re-Contracting of existing 110 kV D/C Theni-Sembatty feeder I & II and Theni-Periyar feeder I& II.

24.1 Director(PSPA-II), CEA, stated that TANTRANSCO had informed that the existing 110 kV D/C Theni-Sembatty feeder I & II and Theni-Periyar feeder I & II are having wolf and Lynx conductor respectively and are very old. Due to load growth in this area, new 110 kV substations are introduced in these feeders. In order to mitigate the existing overloading conditions, the re-conductoring work needs to be expedited. TANTRANSCO has planned to replace the Wolf/Lynx conductor by HTLS conductors. In the joint study meeting, TANTRANSCO had been advised to upgrade terminal equipments and the proposal had been agreed.

24.2 In the SRPC(TP) meeting, TANTRANSCO representative informed that they want to avail grant from PSDF for the proposed re-conductoring work and requested the approval of SRPC(TP) for the re-conductoring work. The work is likely to be completed by 2021-22.

24.3 Chief Engineer (PSPA-II), CEA, advised that before the re conductoring work, TANTRANSCO should study whether the existing towers can withstand the weight and loading of new conductors. TANTRANSCO agreed for the same.

24.4 After deliberations, the proposal of TANTRANSCO was agreed.

25.0 Proposal by TANTRANSCO for construction of additional evacuation lines from Kudankulam U 3&4 (2x1000 MW) to the nearby TANTRANSCO's 400 kV substations (also proposed by SRPC).

25.1 Director(PSPA-II), CEA, stated that TANTRANSCO had requested for construction of additional evacuation lines from Kudankulam U 3&4 (2x1000 MW) to the nearby TANTRANSCO's 400 kV substations. The matter had been discussed in the joint study meeting and based on study results, it was decided that additional transmission system beyond the six circuits (towards Tuticorin –PS and Tirunelveli) planned for evacuation of power from Kudankulam NPP, are not needed.

However, if required, the evacuation system (including as proposed by TANTRANSCO) can be reviewed with the LTA application from NPCIL.

- 25.2 After deliberations, it was agreed that the need for additional evacuation lines would be assessed with the LTA application from NPCIL.

Transmission planning proposals by CTU

26.0 System studies for identification of transmission system for grant of connectivity and LTA to NPCIL for Kaiga APP expansion Unit 5&6 (2x700 MW)

- 26.1 CTU representative informed that NPCIL has submitted connectivity and LTA applications in the month of June, 2019, for proposed expansion of Kaiga APP (U- 5&6) by 1400 MW (2x700 MW) in Karwar, Karnataka.
- 26.2 Kaiga APP-U 1&2 (2x220 MW) is connected through 220 kV lines to Kadra & Kodalalli hydro generating stations and through 400/220 kV, 2x500 MVA ICTs to 400 kV switchyard of Kaiga APP – U 3&4 (2x220 MW). Further, Kaiga generation complex is connected at 400 kV level through Kaiga – Narendra 400 kV D/c line (108 km) and Kaiga – Guttur (Davangere) 400 kV D/c line (163 km). Further, these two 400 kV D/c lines had been planned for evacuation of 6x220 MW (1320 MW) total capacity of Kaiga Atomic Power Plant.
- 26.3 CTU informed that while implementing the above transmission system for evacuation of power from Kaiga complex, forest clearance was obtained after assurance to environmentalists and Forest Department for not seeking additional forest clearance in future for laying new transmission lines. However, NPCIL has now enhanced the planned capacity of Unit-5 & 6 from 2x220 MW to 2x700 MW, thereby increasing the total capacity of Kaiga complex to 2280 MW. The existing 220 kV and 400 kV transmission lines are not adequate for evacuation of total capacity of 2280 MW of the Kaiga generation complex.
- 26.4 The connectivity application was discussed in the 35th meeting (by CTU) of Southern Region constituents regarding Connectivity/LTA applications in SR held on 29.08.2019, wherein it was decided that joint studies shall be carried out in consultation with CEA, POSOCO and STUs for identification of transmission system for grant of connectivity and LTA to NPCIL for Kaiga APP-U 5,6 (2x700 MW).
- 26.5 In the 35th meeting (by CTU) of SR constituents regarding Connectivity/LTA applications held on 29.08.2019, KPTCL had informed that during ‘n-1’ contingency of any one of 400 kV lines emanating from Kaiga, the 220 kV Kaiga – Kadra and Kadra – Nagjari lines are loaded beyond the permissible limits. It was also informed that replacement of existing Drake conductor with HTLS Drake conductor of 220 kV evacuation lines from Nagjari generating station towards 220

kV SRS Hubli, Ambewadi, Bidnal receiving stations and 220 kV lines of Kadra and Kodalalli generating stations was agreed earlier and upon completion of upgradation works there shall be no constraint in evacuation of power from Kaiga APP U-5&6 (2x700 MW).

26.6 The matter regarding connectivity and LTA for Kaiga APP U-5&6 (2x700 MW) was discussed in the joint study meeting (held on 21-22 November, 2019). Brief of discussions in the meeting are given below:

- Chief Engineer (PSPA-II), CEA, stated that looking into the implementation issues in the forest area in the region, options may be explored for re-conductoring of existing transmission lines. Towards this, it was informed that re-conductoring of existing transmission lines shall require shut-down of each 400 kV D/c corridor at a time and in certain cases NPCIL may have to back down the existing generation at Kaiga complex as well. It was also brought out that the existing 400 kV generation switchyard may not be capable of handling the current carrying capacity along with Unit-5&6 and in such case entire 400 kV generation switchyard would have to be upgraded with 3150 A ratings and under such situation the existing generation may have to be backed down / shut down for a longer time period.
- CTU further informed that Sirsi-Davangere section of Kaiga-Davangere 400 kV D/c line belongs to KPTCL and accordingly shall have to be implemented by KPTCL. Towards this, KPTCL representative informed that in case the line is upgraded, they may require to upgrade the Davangere substation switchyard also as it very old and may not be capable of handling the increased current. KPTCL prime-facie was agreeable to the proposal of re-conductoring of the transmission line. KPTCL informed that they shall intimate their final decision in the forthcoming SRPC(TP) meeting, after discussion with the management.
- NPCIL representative stated that they were very serious about development of Kaiga Unit-5&6 and shall update on the back down/shut down of the existing generating units as per the requirements. Further, NPCIL representative ensured that they would obtain necessary clearances from Forest Department for carrying out the work of re-conductoring of the transmission lines for enabling evacuation of power from Kaiga APP U - 5&6 (2x700 MW), as the establishment of Kaiga U 5&6 (2x700 MW) would not be possible without re-conductoring of the transmission lines.

26.7 In the 1st SRPC(TP) meeting, it was decided that NPCIL shall obtain necessary clearances from Forest Department for carrying out the work of re-conductoring of transmission lines for enabling evacuation of power from Kaiga APP U 5&6 (2x700 MW), as the establishment of Kaiga U - 5&6 (2x700 MW) would not be possible without re-conductoring of the transmission lines.

- 26.8 KPTCL representative stated that as no additional transmission lines are being laid in the forest area and it is only re-conductoring of the existing transmission lines, the matter may be taken up with MoP for obtaining necessary forest clearance at the earliest.
- 26.9 After detailed deliberations, following transmission system was agreed for grant of connectivity and LTA to NPCIL for expansion of Kaiga APP Unit 5&6 (2x700 MW). However, implementation of the transmission system by respective entities shall be taken up only after NPCIL obtains necessary clearances from Forest Department for carrying out the work of re-conductoring of the transmission lines.

Transmission System for Grant of Connectivity:

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

Transmission System for Grant of LTA:

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

27.0 System studies for identification of transmission system for grant of connectivity to NPCIL for Kudankulam NPP Unit 3&4 (2x1000 MW)

- 27.1 CTU informed that NPCIL had submitted connectivity application for Kudankulam NPP Unit-3&4 (2x1000 MW) in Tamil Nadu in the month of January, 2011. Kudankulam Unit-1&2 (2x1000 MW) are connected with ISTS network through Kudankulam – Tirunelveli 400 kV 2xD/c (quad) lines. The connectivity to Kudankulam expansion Unit-3&4 (2x1000 MW) was proposed through bus extension of Kudankulam Unit-1&2 generation switchyard in the 12th meeting (by CTU) of SR constituents regarding Connectivity/LTA Applications held on 08.06.2011. However, looking into the progress made by the generation developer, the proposal for connectivity was deferred.
- 27.2 The proposal for grant of connectivity to Kudankulam Unit-3&4 was again discussed in subsequent meetings wherein NPCIL representative informed that Kudankulam Unit-1&2 generation switchyard bus had been designed with 2000 A ratings and cannot handle continuous

current from all the four generating units and therefore, Kudankulam Unit-3&4 generation switchyard shall be kept independent from Kudankulam Unit-1&2 switchyard. Accordingly, the proposal was revised, which was discussed in the 15th meeting (by CTU) of Southern Region Constituents regarding LTA and Connectivity applications, held on 04.01.2013, wherein it was decided that the connectivity may be granted to Kudankulam Unit-3&4 through Kudankulam-II – Tuticorin pooling station 400 kV D/c (Quad) line with suitable re-arrangements at generation switchyards as per the schematic given below:

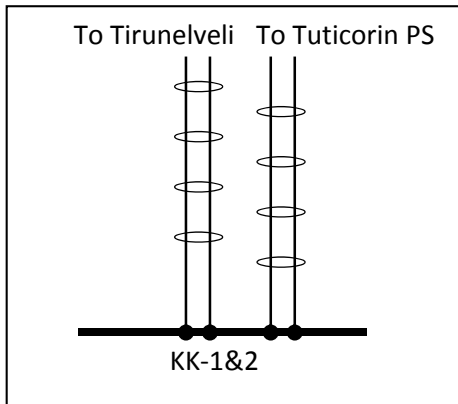


Fig: Connectivity arrangement at KKNPP for Unit-1&2

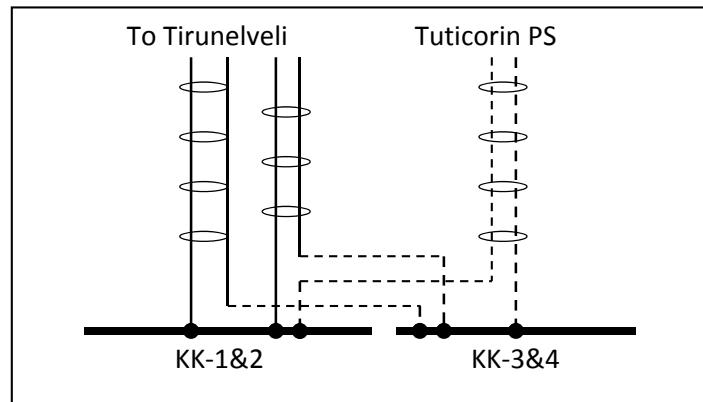


Fig: Proposed Connectivity arrangement at KKNPP generation complex with proposed U-3&4

- 27.3 Subsequently, in consideration of evacuation of power with reliability from nuclear power plant, the proposal of connectivity to Kudankulam Unit-3&4 was discussed again in 36th meeting of SCPSPSR held on 04.09.2013, wherein it was decided that Tirunelveli - Tuticorin PS section of Kudankulam - Tuticorin PS 400 kV Quad D/c line may be constructed ahead of Kudankulam Unit - 3 & 4 and one of the existing Kudankulam – Tirunelveli 400 kV Quad D/c line may be connected to the same, making Kudankulam – Tuticorin PS 400 kV Quad D/c line as an interim-arrangement for providing two termination points viz. Tirunelveli & Tuticorin PS, for evacuation of power from Kudankulam Unit -1&2.
- 27.4 The proposal for grant of connectivity to Kudankulam Unit -3&4 was again discussed in the 37th SCPSPSR meeting held on 31.07.2014, wherein NPCIL opined that under outage of two towers of each circuit of Kudankulam – Tirunelveli D/c line, only one line shall be available for evacuation of entire power from Kudankulam Unit-3&4. Therefore, NPCIL requested to review the proposal of connectivity and provide additional transmission lines for safe evacuation of power from Kudankulam generation complex. After discussions, it was agreed that detailed studies shall be carried out for requirement of additional evacuation lines for Kudankulam Unit-3&4 based on the progress and timeframe of commissioning of generating units.

- 27.5 Due to uncertain timeframe of the generation project, the proposal for additional transmission lines for Kudankulam U-3&4 was deferred. Therefore, connectivity could not be granted.
- 27.6 The transmission system for Kudankulam Unit - 3&4 was discussed in the 40th SCPSR meeting held on 19.11.2016, wherein TANTRANSCO had requested that additional evacuation lines towards TANTRANSCO substation be planned from Kudankulam Unit - 3 & 4. It was decided that additional transmission system, if required, shall be planned after detailed studies, upon receipt of LTA application for Kudankulam Unit - 3 & 4.
- 27.7 CTU further informed that NPCIL vide letter dated 21.08.2019 and email dated 04.09.2019 and 06.09.2019 has conveyed the commissioning schedule of Kudankulam Unit-3&4 as October 2023 and April 2024 respectively. NPCIL is seeking connectivity for Kudankulam Unit-3&4 from March, 2023.
- 27.8 The application for grant of connectivity to NPCIL for Kudankulam U 3&4 was discussed in the 36th Southern Region constituents meeting (by CTU) regarding Connectivity/LTA Applications in SR held on 24.09.2019, wherein it was decided that Joint Studies shall be carried out in consultation with CEA, POSOCO and STUs, for identification of transmission system for grant of connectivity to NPCIL for Kudankulam Unit – 3&4 (2x1000 MW).
- 27.9 Accordingly, the matter was discussed in the joint study meeting held on 21-22 November, 2019. Brief of discussions in the meeting are as follows:
- SRLDC representative informed that unbalanced loading is observed in the Kudankulam NPP – Tirunelveli 400 kV D/c (Quad) line and Kudankulam NPP – Tuticorin PS 400 kV D/c (Quad) lines. Under the outage of one circuit of Kudankulam – Tirunelveli 400 kV D/c line, loading on the other circuit crosses 1140 MW and the temperature of connector reaches more than 100°C within 2 to 3 hrs. In accordance with the operating instructions, the transmission line shall be taken out of service in case the conductor temperature reaches more than 100°C. Under such circumstances it becomes difficult to obtain shut down for maintenance of the transmission lines.
 - NPCIL representative stated that so far 4 out of 12 connectors in the Kudankulam switchyard have been replaced with new aluminum connectors. Remaining 8 connectors are to be replaced in a phased manner. Further, the planned outage of one unit of Kudankulam NPP is being scheduled in the month of December, 2019, and the same time period shall be utilized for completing the balance works. It was also stated that POWERGID should also utilise the referred time frame for requisite equipment upgradation/maintenance of the transmission line, if required.
 - With reference to aspect of unbalanced loading of transmission lines, CTU stated that the power flow on the transmission line is dynamic in nature and depends on different load

generation scenarios which shall vary from case-to-case basis, depending on prevailing grid conditions.

- In joint study meeting, load flow studies were carried out with the above proposed transmission system for 2025-26 time frame, wherein no constraints were observed in evacuation of power from Kudankulam Unit-3&4 with the proposed transmission system. However, NPCIL requested that additional transmission lines may also be planned for providing reliability for evacuation of power from Kudankulam Unit-3&4 (2x1000 MW) in case of outage of entire Tirunelveli 400 kV substation. Towards this, CTU representative stated that even in case of such contingency, two (2 nos.) Quad transmission lines to Tuticorin PS shall be sufficient for evacuation of power from Kudankulam NPP and prima-facie, additional transmission system beyond these six circuits is not needed. However, the requirement of additional evacuation system can be assessed with the LTA application from NPCIL.
- The joint study meeting recommended that the transmission system for connectivity to Kudankulam NPP Unit-3&4 (2x100 MW) shall be discussed in the 1st SRPC(TP) meeting.

27.10 In 1st SRPC(TP) meeting, CTU representative informed that as per the decision in the joint study meeting, short circuit study has been conducted for entire Southern Region substations for 2023-24 timeframe and the results have been including as part of additional agenda of the 1st SRPC(TP) meeting. Further, short circuit study has also been conducted (for the year 2025-26) with and without consideration of Kudankulam Unit -3&4, wherein it is observed that estimated short circuit level of 400 kV Tirunelveli S/S is reaching upto 49 kA and 45 kA respectively. CTU also informed that the comprehensive analysis for fault levels in entire Southern Region including Tirunelveli substation shall be presented in next SRPC(TP) meeting along with possible solutions.

27.11 TANTRANSCO representative again requested for additional 400 kV D/c connectivity from Kudankulam NPP to Virudhnagar 765/400 kV S/s. CEA and CTU opined that present connectivity is sufficient to evacuate the power, however the same may be discussed as and when LTA application for Kudankulam Unit-3&4 is received.

27.12 It was also stated that the connectivity proposal requires extension/restoration of existing transmission lines and re-arrangement at generation switchyard as well as outside generation switchyard, therefore, it is proposed that implementation of transmission system for connectivity may be considered under ISTS and generation switchyard related works under scope of NPCIL.

27.13 After deliberations, following transmission system was agreed for providing connectivity to Kudankulam NPP Unit –3&4 (2x1000 MW):

- a) Restoration of Kudankulam – Tirunelveli 400 kV D/c (Quad) line by terminating it at Tirunelveli substation [presently this line is connected to Tirunelveli – Tuticorin PS 400 kV

D/c (Quad) line and thus connected as Kudankulam (Unit-1&2) – Tuticorin PS 400kV D/c (Quad) line]– **Under ISTS**

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

28.0 Short circuit and overvoltage/under voltage studies for Southern Region

- 28.1 **Over/Under Voltages:** CTU informed that as per operational feedback provided by POSOCO, over/under voltages have been observed in different part(s) of the southern grid under certain scenarios. In this regard, detailed system studies for analysis of High Voltage conditions in Southern Region was carried out for the off-peak conditions and the same was discussed in the 42nd SCPSPSR meeting on 27.04.2018 and 1st SRSCT meeting held on 07.09.2018, wherein 27 nos. of bus reactors were finalized at different substations in Southern Region and the same are under implementation.
- 28.2 It was decided in the meeting that states may expedite the implementation of bus reactors and may update the status.
- 28.3 **Short Circuit Level:** CTU informed that POSOCO has also mentioned about the rising fault levels at different substations. Transmission schemes for controlling the short circuit level at Nellore, Neyveli complex and Thiruvalem sub-stations have already been discussed and agreed in 2nd SRSCT meeting held on 10.06.2019.
- 28.4 Further, studies were carried out for 2023-24 time-frame, wherein high short circuit levels at the following substations have been observed:

Sl. No.	Substation	Voltage level (kv)	3-Ph SC (kA)	1-Ph SC (kA)	Ownership	Switchyard rating (kA)
1.	MAHESHWARAM-TS	400	63.7	45.5	TSTRANSCO	
2.	MAHESHWARAM	400	63.5	45.6	POWERGRID	63
3.	UDUMALPET	400	51.8	37.1	POWERGRID	40
4.	YADADRI	400	49.3	49.9	TSTRANSCO	

Sl. No.	Substation	Voltage level (kv)	3-Ph SC (kA)	1-Ph SC (kA)	Ownership	Switchyard rating (kA)
5.	CHITTOR	400	47.4	33.5	APTRANSCO	
6.	DINDI	400	46.9	33.2	TSTRANSCO	
7.	EDAYARPALAYAM	400	46.7	33.3	TANTRANSCO	
8.	TIRUNELVELI	400	45.7	35.0	POWERGRID	40
9.	HYDERABAD-TS	400	45.5	31.0	TSTRANSCO	
10.	KURNOOL	400	45.1	33.3	APTRANSCO	
11.	KURNOOL	765	40.5	27.5	POWERGRID	40

28.5 It was decided that states may also carry out detailed studies for identification of locations where fault levels are crossing the design limits and come up with necessary measures for control of fault levels in the next SRPC(TP) meeting.

29.0 Augmentation of transformer capacity in Southern Region

29.1 CTU informed that the present peak electricity demand of southern region is about 49,000 MW (March, 2019), which is likely to increase to about 70,000 MW by 2023-24 (as per 19th EPS). To meet the power demand and to facilitate the constituents to draw power from the 765 kV and 400 kV substations, adequate transformation capacity needs to be provided. Further, POSOCO in the operational feedback has stated that the requirement of transformer augmentation may be identified for 765 kV and 400 kV substations under ISTS as well as Intra-STS substations. Based on the inputs from constituents, loading profile and expected growth in electricity demand, augmentation of transformation capacity required at various substations is identified from time-to-time.

29.2 Accordingly, system studies have been carried out for 2023-24 time-frame, wherein ICT loadings at the following substations have been observed to exceed more than 80% of the transformer ratings.

Sl. No.	Substation	ICT voltage level	Ownership	ICT flow	ICT ratings	% loading
1.	KURNOOL	400/220	AP	284.1	315	90.2
2.	NELLORE	400/220	AP	273	315	86.7
3.	DEVANHALLI	400/220	Karnataka	505.8	500	101.2
4.	KOTTAYAM	400/220	Kerala	262.7	315	83.4
5.	MADAKATHRA	400/220	Kerala	256.3	315	81.4
6.	KASARGODE	400/220	Kerala	258.2	315	82
7.	SPBUDR	400/110	TN	166.8	200	83.4
8.	THERVOI	400/110	TN	175.3	200	87.6
9.	EDAYARPALAYAM	400/110	TN	163.3	200	81.7
10.	OTTAPIDARAM	400/110	TN	88.5	100	88.5
11.	SALEM	400/230	TN	296.7	315	94.2

12.	MANALMEDU	400/230	TN	449.7	500	89.9
13.	HOSUR	400/220	POWERGRID	249	315	80

29.3 It was decided that states may go through the proposal and review the requirement of augmentation of transformers at respective locations. The proposal from respective states for augmentation of transformation capacity shall be discussed in the next SRPC(TP) meeting.

30.0 Allocation of two 230 kV bays at 400/230 kV Pugalur (PGCIL-existing) to TANTRANSCO

30.1 CTU informed that TANTRANSCO vide letter dated 05.09.2019, has requested for allocation of two 220 kV bays at 400/230 kV Pugalur (existing) substation of POWERGRID. TANTRANSCO stated that the bays shall be utilized for termination of 230 kV lines.

30.2 CTU informed that that upon revocation of connectivity to M/s Renew Power Ventures Private Limited, two (2 nos.) 230 kV bays at Pugalur (existing) are available and the same bays are reserved for allocation to TANTRANSCO, subject to ratification in the 1st SRPC(TP).

30.3 TANTRANSCO informed that two 230 kV bays are required for strengthening of downstream network at 400/230 kV Pugalur (existing) substation. Out of the two 230 kV bays, one 230 kV bay shall be utilized for termination of Pugalur(PG) – Valayapatty (existing) 230 kV S/c line and one 230 kV bay shall be utilized for termination of 230 kV S/c line from Pugalur (PG) to proposed Nallur 230 kV S/s substation. The work is likely to be completed by 2021-22.

30.4 It was opined that these lines shall be used for drawl of power and TANTRANSCO shall not inject any power into the Pugalur (PGCIL-existing) substation. TANTRANSCO agreed for the same.

30.5 After deliberations, it was decided that two 230 kV bays at Pugalur (PGCIL-existing) substation may be allocated to TANTRANSCO which shall be under the scope of TANTRANSCO and they shall not inject any power into Pugalur (PGCIL-existing).

31.0 Development of common facilities at Tuticorin-II GIS for RE Integration

31.1 In joint study meeting held on 21-22 November, 2019, CTU informed that the Tuticorin-II GIS substation had been established with 2x500 MVA, 400/230 kV transformers with initial provision for five (5 nos.) 230 kV line bays for termination of 230 kV dedicated transmission lines from the RE generation projects in the vicinity. These five 230 kV bays have already been commissioned and the power from RE generation projects is being evacuated utilizing the ISTS network.

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

facilitating evacuation and transfer of RE power beyond Tuticorin-II GIS substation and is being integrated with the existing GIS bus.

- 31.3 Presently, 1,500 MW of connectivity and 1,200 MW of LTA has been granted at Tuticorin-II GIS S/s. The details of the RE generation developers which have been granted Connectivity and LTA are given below:

Sl. No.	RE generation developer	Connectivity granted	LTA granted	Bay No.	Present Status
1	M/s Mytra Energy (India) Pvt. Ltd.	300	250	222 & 223	Commissioned & LTA under operation
2	M/s Green Infra Renewable Energy Ltd.	249.9	249.9	205	
3	M/s Orange Sironj Wind Power Pvt. Ltd.	200	200	221	
4	M/s Betam Wind Energy Pvt. Ltd.	250.2	250.2	220	To be commissioned & LTA is effective from 31.07.2019
5	M/s Shapoorji Pallonji Infrastructure Capital Company Pvt. Ltd.	500	250	210 & 211 (Hybrid bays)	Yet to be connected. Start date of LTA : 25.10.2020
	Total	1500.1	1200.1		

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

- 31.4 The development of 230 kV substation switchyard was to be taken up in parts and the investment in development of second part was deferred which was to be implemented with matching RE generation projects. RE generation developers faced lot of difficulties in interface of GIS module for connection with the existing 230 kV GIS bus. Looking into the difficulties, extension of 230 kV switchyard (extension beyond 05 nos. of GIS line bays and 03 nos. of ICT bays) has been transformed into outdoor hybrid switchyard (Bus bar AIS and line bay equipment GIS) so that the future bay extensions can be carried out smoothly through the outdoor hybrid GIS module(s).
- 31.5 Accordingly, for evacuation of power from RE generators connected at 230 kV Hybrid switchyard, extension of indoor GIS bus upto the outdoor AIS bus bar of Hybrid switchyard using GIB arrangement and necessary associated common infrastructure is required at Tuticorin-II GIS S/s. In joint study meeting it was decided to discuss the matter in forthcoming 1st SRPC(TP) meeting.
- 31.6 The matter was deliberated at length in the 1st SRPC(TP) meeting and it was agreed that the extension of indoor GIS bus upto the gantry before bay no. 210 (figure at Annex II) to the outdoor AIS bus bar of 230 kV Hybrid switchyard using GIB arrangement and necessary associated

common infrastructure works may be implemented under ISTS as part of associated works with augmentation of ICT-3. The work is likely to be completed by October, 2020.

Further extension shall be taken-up upon allocation of bays to the RE applicants under the scope of RE developers or under ISTS as per the provisions of CERC Connectivity Regulations, 2009 / Detailed procedure for “Grant of connectivity to projects based on renewable sources to inter-state transmission system”.

Transmission planning proposals by SRPC

32.0 Additional connectivity at 400 kV or 230 kV at NTPL, Tuticorin, to enhance the reliability in power evacuation during contingent conditions

32.1 Director(PSPA-II), CEA, stated that SRPC vide letter dated 03.09.2019, had requested to examine additional connectivity at 400 kV or 230 kV at NTPL to enhance the reliability in evacuation of power during contingent conditions. This connectivity may be required to draw auxiliary power/evacuation of power (upto the extent possible) during outage of both the 400 kV D/C lines. Upon examination of the minutes of the 24th meeting of SCPSPSR, it was found that following transmission system had been agreed as the evacuation system for Tuticorin TPS JV (2x500 MW) (NTPL):

- i) Tuticorin JV TPS – Madurai 400 kV D/c quad line
- ii) 2x315 MVA 400/220 kV ICT at Tuticorin TPS JV
- iii) LILO of 2 nos. of 230 kV circuits at Tuticorin TPS JV

Accordingly, the referred 2 nos. of 230 kV circuits at Tuticorin TPS JV is a part of ATS.

32.2 TANTRANSCO vide letter dated 10.10.2019 had referred the minutes of the 38th SCPSPSR meeting held on 07.05.2015 and stated that the 230 kV connectivity from TANTRANSCO side was not part of ATS for NTPL power evacuation.

32.3 In the joint study meeting, TANTRANSCO had stated that the referred 230 kV lines cannot be utilized for the evacuation of power from Tuticorin JV (2x500 MW) as the same leads to congestion in the downstream network. Towards this, it had been decided that the referred 230 kV lines may be by-passed through suitable arrangement under normal operation to avoid congestion in downstream networks and the same may be utilized for drawl of start-up power/evacuation of power to the extent possible, whenever required.

32.4 In the 1st SRPC(TP) meeting, TANTRANSCO again stated that the referred 230 kV lines cannot be utilized for evacuation of power from Tuticorin JV (2x500 MW) (NTPL) as the same leads to congestion in the downstream network and some of the state’s generation may have to be backed down.

- 32.5 Chief Engineer (PSPA-II), CEA, proposed that the 230 kV lines may be by-passed through suitable arrangement under normal operation to avoid congestion in downstream networks and the same may be utilized to draw startup-power/evacuation of power (upto the extent possible) during outage of both the 400 kV D/C lines.
- 32.6 Representative of SRLDC stated that the 230 kV line can be by-passed through suitable arrangement under normal operation at NTPL switchyard and SRLDC can assist TANTRANSCO/NTPL on a case to case basis when the line is required to be closed.
- 32.7 After deliberations, it was agreed that the 230 kV NTPL-TTP Auto & 230 kV NTPL-TTPS lines will be restored and normally kept bypassed with suitable switching arrangement at NTPL switchyard. However, whenever requirement arises, these lines would be closed on the instruction of SRLDC after taking into account the concern of TANTRANSCO.
- 33.0 Delay in installation of 2x125 MVAR bus reactors at Kaiga Atomic Power Plant by NPCIL**
- 33.1 Director(PSPA-II), CEA, stated that Chairperson, SRPC, vide letter dated 30.07.2019 had informed that high voltage was being experienced due to delay in installation of bus reactors at Kaiga Atomic Power Plant by NPCIL. 2x125 MVAR bus reactors at Kaiga Atomic Power Plant were approved in the 37th meeting of Standing Committee on Power System Planning of Southern Region held on 31.07.2014. However, the reactors were yet to be installed by NPCIL, resulting in high voltage issues. Despite the issue being followed up in various forums of SRPC and assurance of NPCIL Management on expediting the commissioning of the reactors, it was noted with concern that the reactors were still in tendering stage.
- 33.2 To discuss the matter, a meeting with representatives from CEA, SRPC, NPCIL, SRLDC, CTU and KPTCL was held under the chairmanship of Chairperson, CEA, on 22.11.2019 [minutes of meeting was part of agenda of 1st SRPC(TP) meeting]. In this meeting, NPCIL representative informed that tender for the installation of bus reactors had been floated. Bids have been received and are under evaluation. As per NPCIL representative, the work was likely to be awarded by March, 2020.
- 33.3 Members noted with concern the delay in installation of bus reactors by NPCIL.

Additional agenda

34.0 Evacuation of power from Telangana Ph-I (2x800 MW) Power Project of NTPC –provision of adequate margin in transmission system for evacuation of 15% unallocated quota. (transmission system already agreed in 41st SCPSR as intra-state system)

- 34.1 Director(PSPA-II), CEA, stated that CTU vide letter dated 04.09.2019 had informed that NTPC had requested CTU to keep margins in the ISTS Grid for evacuation and supply of 15% unallocated quota power from Telangana Ph-I TPS (2x800 MW). CTU had informed that the generation project is a State embedded generation and its transmission system is being implemented by TSTRANSCO. In the joint study meeting, TSTRANSCO had informed that they were in discussions with NTPC for allocation of 100% power from the generation project and requested to drop the agenda.
- 34.2 In the SRPC(TP) meeting, TSTRANSCO informed that they were still under discussions with NTPC for allocation of 100 % power from the project and would inform about the outcome to CEA.
- 34.3 Chief Engineer (PSPA-II), CEA, opined that additional transmission system may not be required for exporting the 15 % unallocated power, as this power would be consumed locally in Telangana and drawal of Telangana from Southern Grid would reduce by an equivalent amount.
- 34.4 Representative of NTPC informed that the evacuation arrangement for 15% unallocated quota power from Telangana Ph-I (2x800 MW) would be as per the prevailing arrangement for evacuation of unallocated power from other NTPC stations.
- 34.5 After deliberations, it was decided that the matter can be further discussed in the next meeting of SRPC(TP) upon receipt of clarification from TSTRANSCO regarding allocation of 100 % power from the generation project to Telangana.

35.0 Proposal for erection of 80 MVAR bus reactor at Podili 400 kV S/s by APTRANSCO.

- 35.1 Director(PSPA-II), CEA, stated that APTRANSCO vide letter dated 19.11.2019 had proposed for erection of 80 MVAR bus reactor at 400/200kV Podili S/S. The proposal was discussed in the joint study meeting. In the meeting, CTU had opined that considering increasing short circuit strength of all substations in SR, 125 MVAR reactors need to be installed in all upcoming substations, in place of 63/80 MVAR bus reactors. Reactor of 63/80 MVAR rating were inefficient in controlling the system voltages efficiently. APTRANSCO representative had stated that they were installing 125 MVAR reactor at Hindupur instead of earlier agreed 80 MVAR reactor. The 80 MVAR reactor procured for Hindupur, therefore was being shifted to Podili. Towards this, CTU representative had stated that in the 1st SRSCT meeting held on 07.09.2018, 125 MVAR bus reactor, in addition

to the 80 MVAR bus reactor, was agreed to be installed at Hindupur substation to control the high voltage.

35.2 In the SRPC(TP) meeting, APTRANSCO representative stated that as agreed in the 1st SRSCT meeting, they are installing 125 MVAR bus reactor at Hindupur in addition to the 80 MVAR reactor at Hindupur. They were installing another 80 MVAR reactor at Podili. The reactor is likely to be installed by May, 2020.

35.3 After detailed deliberations, the proposal of APTRANSCO was agreed.

36.0 Proposal for erection of 132/33 kV S/S at T. Narasapuram by APTRANSCO

36.1 Director(PSPA-II), CEA, stated that APTRANSCO vide letter dated 19.11.2019 had proposed erection of 132/33 kV T. Narsapuram S/s with following connectivity:

- i. Erection of 132/33kV T. Narsapuram S/S with 2x31.5 MVA PTRs.
- ii. Making LILO of KV Kota (230/132kV) -Ashwaropet 132 kV S/C line at T. Narsapuram
- iii. Making LILO of KV Kota (132/33 kV) -Ashwaropet 132 kV S/C line at T. Narsapuram

KV Kota-Ashwaropet line is an inter-state line between A.P and Telangana.

36.2 In the joint study meeting, it was decided that the proposal would be discussed in the forthcoming SRPC(TP) meeting after approval of the same by TSTRANSCO, SRLDC and SRPC.

36.3 TSTRANSCO vide letter dated 13.12.2019 had conveyed that with the proposed LILO, no constraints are observed in the network.

36.4 APTRANSCO further informed that the 132/33 kV S/S at T. Narasapuram is likely to be commissioned by March, 2021.

36.5 After deliberations, the proposal was agreed by the members.

37.0 Requirement of power at 400 kV level for MRPL (Mangalore Refinery & Petrochemicals Limited)

37.1 Director(PSPA-II), CEA, stated that establishment of 400/220 kV S/S by KPTCL at Asarpadavu along with associated transmission system for extending power supply to M/S MRPL was agreed in the 1st SRSCT meeting held on 07.09.2018. M/s MRPL vide letter dated 11.11.2019 had requested to expedite the works. In the joint study meeting, KPTCL had informed that land acquisition was in progress and the implementation of substation at Arasapaduvu will be expedited.

37.2 In the 1st SRPC(TP) meeting, KPTCL informed that the Arasapaduvu SS along with associated transmission system for supply of power to MRPL, would be ready by December, 2021.

37.3 Members noted the same.

38.0 Implementation of bays at Edayarpalayam 400/230/110 kV S/s of TANTRANSCO

- 38.1 Director(PSPA-II), CEA, stated that CTU vide letter dated 14.08.2019 had intimated that the progress of Edayarpalayam S/S is quite slow, whereas the Pugalur- Edayarpalayam and Udumalpet- Edayarpalayam 400 kV lines are scheduled for commissioning by February/March 2020. In the joint study meeting, it was agreed to by-pass the Pugalur- Edayarpalayam 400 kV D/c lines and Udumalpet- Edayarpalayam 400 kV D/c lines outside Edayarpalayam substation so as to form Pugalur- Udumalpet 400 kV D/c lines, in case of non-availability of bays at Edayarpalayam 400/230/110 kV S/s of TANTRANSCO. Further, TANTRANSCO was requested to expedite the implementation of bays at Edayarpalayam 400/230/110 kV S/S.
- 38.2 In the SRPC(TP) meeting, TANTRANSCO informed that the work of Edayarpalayam S/S has been recently awarded and will take about 18 months' time for completion. Hence, the Edayarpalayam S/S may be bypassed at present.
- 38.3 Members noted the same.

39.0 Establishment of 400/230-110kV S/S at Ulagam instead of at Vishwanathapuram by TANTRANSCO

- 39.1 Director(PSPA-II), CEA, stated that establishment of 440/230-110 kV S/s at Vishwanathapuram was discussed and approved in 2nd SRSCT meeting held on 10.06.2019, with following connectivity:
- i. Establishment of Vishwanathapuram 400/230/110 kV S/S with 2x500 MVA, 400/230 kV ICTs and 3x200 MVA, 400/110 kV ICTs.
 - ii. LILO of both circuits of Thiruvalem – Palavady 400 kV Quad Moose D/C line at Vishwanathapuram.
 - iii. 2x50 MVA, 400 kV switchable line reactors at Vishwanathapuram for Vishwanathapuram –Thiruvalem 400 kV D/C line.
 - iv. 1x125 MVA, 400 kV bus reactor at Vishwanathapuram.

230 kV connectivity:

- i. 230 kV S/C line to the existing Hosur 230 kV SS.
- ii. 230 kV D/C line to the proposed 230kV SS near Bagalur.
- iii. 230 kV S/C line to the proposed Kalukondapally 230 kV SS.

110 kV connectivity:

- i. 110 kV D/C line to Shoolagiri 110kV SS.
- ii. 110 kV S/C line to Uddanapally 230kV SS
- iii. 110 kV S/C line to proposed Alur 110kV SS.
- iv. 110 kV D/C line to proposed Hosur SEZ 110kV SS.
- v. 110 kV S/C line to proposed Vishwanathapuram 110kV SS.

39.2 TANTRANSCO vide letter dated 16.11.2019 had informed that there may be some practical difficulties in erecting the 230 kV and 110 kV lines on the already identified land. Hence, alternate land was chosen at Ulagam village near Hosur so that the proposed 440/230-110 kV S/s can be connected with the 230 kV and 110 kV network as proposed. There is no change in 400 kV connectivity of 400/230-110 kV SS at Ulagam (LILO distance of Palavady-Thiruvallam 400 kV DC line getting reduced) but there would be some modifications in the downstream network based on the field feasibility study, as detailed below:

Establishment of 400/230-110 kV SS at Ulagam:

ICTs/Reactors:

- i. 2x500 MVA, 400/230 kV ICTs
- ii. 3x200 MVA, 400/110 kV ICTs
- iii. Provision of 1x125 MVAr Bus Reactor at Ulagam.
- iv. Provision of 2x50 MVAr 400 kV switchable line reactors at Ulagam SS for Ulagam – Thiruvallam line.

400 kV connectivity:

- i. LILO of 400 kV Thiruvallam – Palavady Quad Moose D/C line at the proposed Ulagam 400/230-110 kV SS.

230 kV connectivity:

- i. 230 kV S/C line to the existing Gurubarapally 230 kV SS in Hosur taluk.
- ii. 230 kV D/C line to the proposed 230kV SS at Nandhimangalam village near
- iii. 230 kV D/C line to the proposed Kalukondapally 230 kV SS.

110 kV connectivity:

- i. 110 kV D/C line to the existing Nariganapuram 110 kV SS.
- ii. 110 kV D/C line to the existing Bagalur 110 kV SS.
- iii. 110 kV D/C line to the proposed Hosur SEZ 110 kV SS.

The proposal of TANTRANSCO was agreed in the Joint Study meeting and recommended for deliberations in SRPC(TP). As per TANTRANSCO, the substation at Ulagam and associated transmission system is likely to be commissioned by 2022-23.

39.3 After discussions, the transmission scheme mentioned in para 39.2 was agreed.

40.0 Phase-II Solar & Wind Energy Zone Transmission Schemes

40.1 Director (PSPA-II), CEA, stated that SECI/MNRE had identified potential Solar Energy Zones (SEZ) and Wind Energy Zones (WEZ) in various districts of RE rich states for 66.5 GW quantum on all-India basis. Subsequently, based on bidding timeline, SECI had provided phasing details of prioritized SEZs (50,000 MW) and WEZs (16,500 MW) in two phases i.e. 2020 & 2021. Out of

the above 66.5 GW RE generation potential, 18.5 GW RE generation potential is planned to be implemented in Southern Region as detailed below:

State/District	Solar		Wind		Total (GW)
	Ph-1 (GW)	Ph-2 (GW)	Ph-1 (GW)	Ph-2 (GW)	
	2020	2021	2020	2021	
Andhra Pradesh					
Kurnool	2.5		2	1	5.5
Ananthpuram		2.5			2.5
Karnataka					
Koppal			2.5		2.5
Gadag		2.5			2.5
Bidar		2.5			2.5
Tamil Nadu					
Karur			1.5	1	2.5
Tirunelveli				0.5	0.5
Total	2.5	7.5	6	2.5	18.5

- 40.2 Out of the 18.5 GW of identified SEZs and WEZs in Southern Region, transmission system for evacuation of 8.5 GW of power from Phase-I and Phase-II Wind Energy Zone and 1.5 GW of Phase-I of Solar Energy Zone (in Kurnool area), totaling to Renewable Energy Zone power of 10 GW, was agreed in 1st SRSCT meeting held on 07.09.2018 and it was decided that the schemes would be taken-up for implementation as ISTS, consequent to grant of LTA by CTU.
- 40.3 Transmission system for immediate connectivity for balance 8.5 GW of RE potential in Southern Region and integration of 18.5 GW of Solar and Wind Energy Zones in Southern Region was discussed and agreed in the 2nd SRSCT meeting held on 10.06.19. It was decided that the schemes would be taken-up for implementation as ISTS, consequent to grant of LTA by CTU. It was also decided in the 2nd SRSCT meeting that all-India studies would be carried out with the participation of CEA, CTU, POSOCO and concerned beneficiaries /STUs for evolution of additional (over and above the above proposed transmission scheme) transmission scheme for export of power from Southern grid to rest of all-India grid.
- 40.4 The scheme as discussed and agreed in the 2nd SRSCT meeting was also published on CTU website seeking comments/observations from stakeholders as per the provisions of the CERC Planning Regulation. Further, the transmission system was also discussed in the 36th SRPC meeting held on

12.07.2019, wherein the SR constituents had requested for carrying out all-India studies with participation from CEA, CTU, STUs and POSOCO.

40.5 For prioritization of the already identified transmission system for the 66.5 GW potential RE capacity, a meeting was held in CEA with representatives from MNRE/SECI and CTU on 30.08.2019. Based on discussions in the meeting, the RE capacity addition was prioritized into three phases i.e. RE generation projects scheduled for commissioning by Dec, 2020 (Phase-I); Dec, 2021 (Phase-II) and beyond 2021 (Phase-III). Out of the above 66.5 GW RE generation potential, 18.5 GW RE generation potential is planned to be implemented in Southern Region. Further, SECI vide letter dated 13.12.2019 has intimated that the Phase-III generation projects are scheduled for commissioning beyond Dec, 2021 and by Oct, 2022. The details of the same as per location and phases are given below:

Potential location in SR	Capacity (GW) by Dec, 2021		Capacity (GW) beyond Dec, 2021 and by Oct'2022		Total (GW)
	Wind	Solar	Wind	Solar	
Tiruneveli (TN)	0.5				0.5
Koppal (Karnataka)	2.5				2.5
Karur (TN)			2.5		2.5
Gadad (Karnataka)		2.5			2.5
Bidar (Karnataka)		2.5			2.5
Kurnool (AP)	2.5		0.5	2.5	5.5
Ananthapuram (AP)				2.5	2.5
Total	5.5	5.0	3.0	5.0	18.5

40.6 As discussed in the 2nd SRSCT meeting regarding carrying out all-India studies, Load-Generation balance was prepared by CEA and CTU to carry out system studies for integration of 175 GW RE by 2022 and the load generation balance along with PSSE files had been circulated to SR constituents and POSOCO on 19.11.2019. The same was also discussed with the SR constituents and POSOCO in the joint study meeting on 21-22 November, 2019, at New Delhi/Gurugram. The SR constituents had been requested to furnish their comments on the load generation balance and PSSE files in a weeks' time. However, till 16.12.2019, comments were received only from POSOCO. The STUs have not yet submitted their comments/observations.

40.7 In the 1st SRPC(TP) meeting, representative of TANGEDCO stated that they whole heartedly support the GoI initiate of 175 GW RE by 2022. However, they have some concerns which need

to be addressed. TANGEDCO made a PowerPoint presentation (copy enclosed at Annex-III) on the proposed transmission corridor for evacuation of power from the proposed RE capacity addition of 18.5 GW. The following issues were deliberated:

- (i) TANGEDCO highlighted the glimpses of CTU's Renewable Energy Corridor report evolved for Renewable capacity addition of 42 GW in 12th plan period and published during 2012. It was stated that the proposal was a comprehensive one, covering all the aspects of power system planning. The report gave emphasis to RE Potential Reassessment, Intra-State transmission strengthening, Inter-State transmission strengthening, provision of dynamic reactive compensation, provision of Energy Storage technology, financial plan outlay and funding mechanism for both Inter-State and Intra-State transmission system strengthening. Further, the report had identified twelve critical areas for mitigation of RE intermittency and variability and seamless integration of RE into grid. The action plan for implementation of the critical activities had been proposed. The Capex requirement for Intra-State system strengthening and Inter-State system strengthening and the funding mechanism to reduce the tariff burden had been detailed. The crux of the report was that the planning studies were carried out on all-India basis comprehensively and the planning criteria and guidelines were scrupulously followed.
- (ii) The present transmission proposal of CTU for the proposed RE capacity addition of 18.5 GW does not exhibit any such detailed approach. There are major flaws in the study report. The transmission plan has been evolved solely on the basis of information received from SECI on assessed RE potential. The assessed potential cannot be the basis for conducting the power system planning studies as potential that can be extracted / developable from the RE rich pockets largely depends on availability of land, type of land, topography etc. TANGEDCO has been insisting to consider such developable potential in each State after due consultation with the State Nodal Agencies (SNA) for energy development. Further, it had been reiterated in many forums that the report on RE developable potential in all RE rich States by any authorized agency like NIWE should be shared among the stakeholders. But, neither SECI (Bid Process Coordinator) nor the CTU has shared any such reports.
- (iii) The second important issue is that a case study to assess the adequacy of the existing transmission system with immediate connectivity to the proposed RE generators has not been carried out by CTU. As this adequacy assessment is the basis for any augmentation

study, this needs to be carried out. Since the transmission plan is being evolved based on assessed RE potential in RE rich states and proposed to transfer to non RE rich / deficit states, it is essential to conduct a comprehensive study on all-India basis for different probabilistic scenarios duly considering the realistic LGB of target regions /states so as to estimate the realistic system augmentation requirements.

- (iv) Another inevitable issue is assessment of impact on downstream Intra-state network contiguous to ISTS due to integration of RE generators into ISTS, and Intra-State system strengthening requirements. Since this proposal does not contain any details about the downstream system strengthening requirements, the proposal should be revised duly incorporating the Intra-State system strengthening plans. TANGEDCO further stated that the feasibility of embedding RE generators at Intra-State level to utilise the available margin should be explored.
- (v) CTU has declared vide their affidavit in petition No. 92/MP/2015 that out of 40,607.95 MW envisaged capacity in 9 HCPTCs, LTA quantum of 17,556.3 MW is effective and the balance capacity of 23,051.65 MW (56.8%) is redundant due to relinquishment / abandonment of the generation project. Due to the redundancy in the Indian national grid, over voltage problem is prevailing on pan India basis, which was highlighted by POSOCO in the SRPC forums. Further, the Tuticorin-Salem-Madhugiri-Narendra 765 kV transmission line has already been constructed and is being operated at 400 kV. The time required for up-gradation of this corridor is very less when compared to the gestation period of RE generators in the present scenario of poor response to bidding. Hence, considering these factors, it is essential to design an optimal transmission system factoring the available capacity margin in each corridor.
- (vi) TANGEDCO insisted on a tangible plan to bring the Raigarh-Pugalur-Trissur HVDC corridor in to beneficial use so as to avoid the up-gradation of the existing ISTS corridors.
- (vii) TANGEDCO further highlighted the observations and adverse comments of POSOCO on network data base manipulation, study approach and assumptions.
- (viii) TANGEDCO concluded the deliberations with the following request:
- *Developable potential assessment report to be furnished by SECI/NIWE in coordination with SNA*
 - *All India data base to be prudently checked and vetted by all constituents*

- *Base case study, adequacy study with immediate connectivity, probabilistic scenario studies with augmentation to be carried out*
- *Comprehensive plan for seamless integration of RE addition*
- *Funding mechanism for Intra State System strengthening.*

- 40.8 Regarding consideration of developable RE potential in RE rich States and sharing of report among the stakeholders by any authorized agency like SECI/NIWE etc., CTU stated that CEA/CTU have considered the RE potential as per the information provided by MNRE/SECI in consultation with the SNA/STU/NIWE through various meetings with participation of representatives of Southern States, including Tamil Nadu. However, detailed report regarding developable potential as required by STUs, may be obtained from MNRE/SECI. Accordingly, SECI was requested to provide the report for circulation to Southern States.
- 40.9 Chief Engineer (PSPA-II), CEA, stated that the earlier programme of 100 GW of solar capacity by 2022 comprised of 40 GW solar roof-top, 40 GW distributed generation and 20 GW solar plant/park based capacity. Later about 34 GW solar capacity was expected to be connected at transmission level for which transmission planning had already been carried out as part of National Electricity Plan (NEP) 2017-2022. However, now more solar capacity is being planned to be developed as solar plant/park based generation capacity to be connected at transmission level. This has resulted in requirement of additional transmission system to serve the 100 GW solar capacity by 2022. He requested SECI representative to finalise the bidding of remaining solar park/plants required upto 2022 as early as possible, so that the associated transmission system could be made available in time and be optimized.
- 40.10 It was informed that the transmission system had been evolved based on the identified RE potential (18.5 GW) and TANGEDCO had not objected to the potential until now. However, such an objection was being raised at a very later stage, when the transmission scheme has already been planned and approved for providing immediate connectivity and integration of RE with SR ISTS grid.
- 40.11 Regarding observations/comments of TANTRANSOCO for not carrying out case study to assess the adequacy of the existing transmission system for immediate evacuation and integration of proposed RE generators to SR grid, CTU informed that after detailed analysis, system studies had been carried out during joint study meetings held on 10th and 11th May, 2018 and 1st and 2nd May,

2019, at SRPC, Bengaluru, and representatives of TANGEDCO/ TANTRANSCO had participated in these meetings. CTU further stated that with respect to the issues raised by TANGEDCO regarding utilization of margins in the existing/under implementation transmission system as part of HCPTCs, it is pertinent to mention that transmission system has been planned and implemented in phased manner as per the requirements, matching with the identified generation projects. Further, while carrying out transmission system planning, the existing/under implementation transmission system are re-configured for economic and optimal utilization of the same. Also while doing so, the margins in the existing/under implementation systems are first considered for allocation of the same to the generators (including RE generators) and only thereafter new transmission elements are identified/planned.

40.12 CTU further informed that a number of IPPs have relinquished their LTA as per the rights provided to them under the CERC Connectivity Regulations, 2009, subject to payment of relinquishment charges and CTU has no control on relinquishment of LTAs. CTU had calculated the relinquishment charges as payable by the various generators as per the methodology prescribed by CERC in Petition no. 92/MP/2015 and the same are available on CTU's website. Further, in the referred case, the dispatches from IPPs generators have been adjusted by the amount of relinquished LTA quantum and accordingly the above concern raised by TANGEDCO has already been addressed.

It may also be noted that the transmission system identified and under discussion is required in the timeframe by the year 2022, matching with implementation of the identified RE potential in Southern Region. It may also be kept in mind that Southern Region's peak demand is expected to grow to about 63,000 MW in 2021-22 and to 66,700 MW in 2022-23 (as per 19th EPS). Further the referred margins in the existing transmission corridors has already been utilized by a number of RE developers granted connectivity and LTA. In specific case of Tuticorin Area, LTA of 1200 MW has already been granted out of which 950 MW capacity has already been commissioned.

40.13 Regarding development of downstream network, it was informed by CEA/CTU that the STUs were part of detailed joint studies carried out at SRPC, Bengaluru, on 1st & 2nd May, 2019, and no observation/ comments were provided by STUs in that respect and till date CTU has not received any comment regarding overloading of downstream network due to transmission system identified for immediate evacuation of power from potential REZ. However, upon receipt of specific

observations from states, the same shall be analyzed and if required, further system strengthening shall be proposed in downstream network.

- 40.14 Chief Engineer (PSPA-II), CEA, stated that the issues raised by TANGEDCO regarding non-disclosure of system studies data, study approach and assumptions, are not correct. As per the decision in the 2nd SRSCT meeting held on 10.06.2019 and 36th SRPC meeting held on 12.07.2019, a meeting was held on 18th November, 2019, in CEA for discussions on Load-Generation balance (LGB) to carry out all-India Studies for integration of 175 GW RE capacity by 2022. Load-generation scenario had been developed for August 2021-22 (afternoon peak) timeframe. System studies were carried for the above load generation scenario. The PSSE study files, load-generation scenario and assumptions considered in the studies and study results were circulated to all the constituents in the Southern Region and POSOCO for their observations/comments/ suggestions vide email dated 19.11.2019.
- 40.15 The circulated LGB and system studies were also discussed in the joint study meeting held on 21-22 November, 2019, wherein POSOCO representative and SR constituents requested for some more time to forward their comments/observations on the all-India load-generation scenario for RE integration and the associated PSSE study file. In the meeting, CTU informed that they were open to carry out number of scenario studies on all-India basis as per the suggestions / observations of the constituents. However, it was requested that views/suggestions may be forwarded within a week, so that the analysis and studies could be carried out for discussions in the forthcoming 1st SRPC(TP) meeting.
- 40.16 CTU enquired TANGEDCO about the receipt of email dated 19.11.2019 wherein it was confirmed by TANGEDCO that they have received the email and the PSSE files and study results, however, they still need some time to analyze the same and submit their comments/observations on the same. CTU also informed that a reminder was also sent to all the SR constituents vide email dated 12.12.2019 in this regard, however no comments have been received yet.
- 40.17 Chief Engineer (PSPA-II), CEA stated that in response to the above circulated system studies, comments were received only from POSOCO vide letter dated 29.11.2019 and the same were discussed in a meeting with POSOCO & CTU at CEA on 10.12.2019, wherein detailed deliberations were held on the observations of POSOCO. In the meeting it was decided to prepare total nine scenarios for the month of June, 2021, August, 2021 and February, 2022, for afternoon

peak, evening peak and night off-peak scenarios (three scenarios for each month viz. June, August and February). It was further decided that the scenarios prepared as per the deliberations shall be circulated to SR constituents for their comments / observations / suggestions and the same shall be discussed / deliberated with the Southern Region constituents.

- 40.18 CTU requested STU representatives to submit their comments/observations on the system studies circulated by CTU. Further SR constituents may also suggest/recommend any other additional cases/scenarios for carrying out all-India studies to address their concerns. Requirement of additional transmission system for facilitating export of surplus power from RE generation in Southern Region to other regions shall be analyzed and presented in the next SRPC(TP) meeting based on the observations/comments from SR constituents on the all-India studies.
- 40.19 POSOCO representative opined that in addition to the scenarios discussed in the meeting held at CEA on 10.12.2019, three more scenarios for afternoon peak, evening peak and night off-peak scenario may be developed for the month of October also so as to cover all the likely scenarios in a year on quarterly basis. Chief Engineer (PSPA-II), CEA, opined that the RE pattern observed in February is the same as that in October and hence carrying out separate studies for October may not be required.
- 40.20 POSOCO representative opined that as the load generation balance has been developed on all-India basis, the same must also be circulated to constituents of other regions (NR/WR/ER/NER) for their comments/observations. Chief Engineer (PSPA-II), CEA, informed that the load generation balance would be finalized on receiving the comments of SR constituents. Once, the comments of SR constituents are incorporated, the load generation balance files would be circulated for comments of stakeholders of other regions, as well.
- 40.21 SECI was requested to apprise the forum about the status of land acquisition and bidding of the identified potential RE zones in Southern Region, towards which SECI representative stated that they are progressing towards identification of land and a number of biddings are under various stages of finalization. SECI further stated that they have also submitted an affidavit before CERC in Petition no. 200/MP/2019 regarding details of the status pertaining to identification of land and status of RE bidding, schedule of commissioning of the RE generation projects corresponding to 18.5 GW of solar and wind generation potential envisaged in the Southern Region. It was further

informed that the requisite information has also been submitted to CTU vide letter dated 13.12.2019 for onward submission to CERC.

40.22 CTU stated that TANGEDGO had enquired about the status of receipt of LTA applications in Petition no. 200/MP/2019 regarding Grant of Regulatory approval for taking up implementation of identified transmission system for 18.5 GW of REZ in Southern Region as per the decision in the 2nd SRSCT meeting and has stated that the transmission system for integration of 18.5 GW of identified RE potential in Southern Region may be taken-up only after grant of LTA by CTU. In this regard, CTU informed that till date no LTA application has been received either from RE generators or from SECI on behalf of RE generators.

40.23 TANGEDGO stated that SECI has been enabled as an applicant under the category of Renewable Energy Implementing Agency (REIA) to apply for Connectivity/LTA as per the Seventh amendment dated 09.01.2019 to the CERC Connectivity Regulations, 2009. However, SECI has not submitted any Connectivity/LTA application to CTU in this regard. And thus, if these transmission lines/system are implemented, the whole burden of payment of associated charges would be on SR Discoms.

Representative of SECI stated that they do not have any plans to apply for Connectivity/LTA, as it would not be possible to furnish Application fee, Connectivity Bank Guarantee etc. as per the CERC Connectivity Regulations. The Connectivity/LTA applications shall be submitted by respective successful bidders upon issuance of LoA on completion of bidding process. SECI was requested to expedite the bidding process for the remaining RE capacity.

40.24 TANTRANSCO stated that time for commissioning of RE projects is about 24 months and upgradation of 765 kV lines (initially @ 400 kV) to its rated voltage of 765 kV shall take comparatively less time. So the upgradation works of these transmission lines may be taken-up later on the basis of success of SECI biddings and firm commitment of RE projects. In this regard, it was informed that as per timelines specified by SECI in bidding documents, generators are required to commission the projects within 18 months from the date of issue of LOA. Further upgradation/ charging of 765 kV lines initially charged at 400 kV to its rated voltage of 765 kV, required establishment of 765 kV switchyard & switchgears and shall require about 24 months from the date of transfer of SPV or nomination from Govt. of India under Regulated Tariff Mechanism.

40.25 Regarding observation made by TANTRANSCO for requirement of upgradation 765 kV D/c line initially charged at 400 kV for evacuation of power upto 2000 MW from RE generators pooled at Tuticorin-II GIS (erstwhile Tirunelveli PS) from Tirunelveli / Tuticorin areas, CTU informed that Tuticorin-II GIS (erstwhile Tirunelveli PS) S/s was planned as part of Green Energy Corridor -1 (Part-A) for evacuation of potential Renewable Wind Energy in Tirunelveli / Tuticorin areas. In a meeting held on 01.05.2018 at MNRE (minutes of meeting at Annex-IV), in which TANGEDCO was also a participant, it was decided that development of ISTS infrastructure may be carried out for Koppal (2500 MW), Kurnool (3000 MW), Karur (2500 MW) and Tirunelveli/Tuticorin (2500 MW) for Southern Region as prioritized wind energy zones. As high capacity transmission corridor already exists for Tirunelveli/ Tuticorin (Tamil Nadu), accordingly augmentation of transformation capacity is to be taken up. SECI/MNRE has estimated additional 0.5 GW wind potential for development under 66.5 GW potential REZ to be developed by 2022 in Tirunelveli/Tuticorin areas. In joint study meeting held on 10th and 11th May 2018, at SRPC Bengaluru, it was agreed by TANTRANSCO that dispatch of Coastal Energy, Tuticorin JV and Tuticorin TPS had been considered such as to evacuate 2000 MW of power from RE generators pooled at Tuticorin –II GIS, without any overloading, even under outage of Kudankulam – Tirunelveli 400 kV D/c (Quad) line. Further, it was agreed that for dispersal of more than 2000 MW of power from RE generations being pooled at Tuticorin-II GIS substation, Tuticorin PS - Dharampuri (Salem) 765 kV D/c line (presently operating at 400 kV) needs to be operated at its rated voltage i.e. 765 kV. Accordingly, upgradation of 400 kV corridor to 765 kV shall be required for evacuation of a total of 3.0 GW of RE power (existing/under implementation/potential) from Tuticorin/Tirunelveli areas. CTU informed that presently Stage-II connectivity for 1650 MW and LTA for 1200 MW capacity have already been granted at Tuticorin-II GIS.

40.26 After detailed deliberations, the following was decided:

- i. SECI would share the RE potential assessment study/report for 18.5 GW of envisaged RE potential in states of Andhra Pradesh, Karnataka and Tamil Nadu with CEA/CTU/SRPC and with STU's of SR.
- ii. SRPC would co-ordinate with States to find out the RE potential already developed and the balance RE potential which could be developed in different locations (connected to

ISTS as well as intra-state network), based on availability of land and other infrastructure within two months and forward their findings to CEA.

- iii. SECI/MNRE to confirm whether the assessed RE potential at different locations in Southern Region includes the potential being developed in intra-state system or excludes the same. For example, whether the RE potential (2.5 GW) at Koppal, Karnataka, is the total potential of Koppal area and includes the RE potential (of about 1 GW) being developed by KPTCL in Koppal or is over and above the potential being developed by KPTCL.
- iv. SECI was requested to expedite the bidding process of planned RE capacity in Southern region so as to avoid mismatch between commissioning of RE capacity and associated transmission system.
- v. Accordingly, CEA/CTU may review the transmission plans/schemes based on the above.

41.0 Status of implementation of downstream network (by State utilities) associated with ISTS substation of POWERGRID

41.1 Augmentation of transformation capacity in various existing substations as well as addition of new substations along with line bays for downstream network are under implementation at various locations in Southern Region. For utilization of these transformation capacities, implementation of downstream 220 kV system is needed. The status of implementation of downstream system as informed by respective states in the 1st SRPC(TP) meeting is as follows:

Sl. No.	Name of existing Substation	Capacity (MVA)	Total 220 kV Bays	Total un-utilized bays	Remarks	Deliberations in 1 st SRPC(TP)
1.	Tumkur (Vasantnarsapur)	3×500 MVA	6	2	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> • 220 kV D/c line Tumkur-Antrasanahalli - Commissioned. • 220 kV DC line Tumkur-Madhugiri – Commissioned. • 2 Nos 220 kV circuits to Vasanthanarsapur industrial area of KIADB – March, 2022

Sl. No.	Name of existing Substation	Capacity (MVA)	Total 220 kV Bays	Total un-utilized bays	Remarks	Deliberations in 1 st SRPC(TP)
2.	Yelahanka	2x500 MVA	10	8 (4 under ISTS)	Construction of downstream T/L for 8 Nos (4 bays under ISTS) 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> • 220 kV Yelahanka – DG Plant 2000 sq mm UG cable 2 runs – Commissioned • Proposal for strengthening of Bengaluru transmission network to utilize the remaining bays at Yelahanka is under planning.
3.	Bidadi	2x500 MVA	6	4	Construction of downstream T/L for 4 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> • 220 kV D/c line between Bidadi (PG)- Bidadi (KPTCL) – Commissioned • 220 kV D/c line Bidadi – Magadi – March, 2020 • 220 kV Bidadi – Kumbalagod – 1200 sq mm UG cable S/c line – March, 2020 • 220 kV S/c line identified to Kampagada layout
4.	Hiriyur	2x315 MVA	6	2	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> • 220 kV Hiriyur – Chitradurga via Thallak to Hiriyur – Commissioned. • 220 kV D/c Hiriyur – Gowribidnur- Commissioned. • 220 kV Hiriyur (PGCIL) – Hiriyur (KPTCL) – March, 2020 • 220 kV Hiriyur (PGCIL) – Chitradurga. – March, 2020
5.	Hassan	2x315 MVA	6	2	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> • LILO of B4 circuit of Shimoga – Bangalore 220kV at Hassan – March, 2020
6.	Kolar	2x500 MVA	6	2	Construction of downstream T/L for 2 nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> • 220 kV D/c line Kolar(PG) – Kolar (KPTCL) Commissioned. • 220 kV D/c line Kolar – Chintamani – Commissioned. • 2 Nos 220 kV downstream T/L to Gollahalli – March, 2020.

Sl. No.	Name of existing Substation	Capacity (MVA)	Total 220 kV Bays	Total un-utilized bays	Remarks	Deliberations in 1 st SRPC(TP)
7.	Hosur	2x315 MVA	6	0	Construction of downstream T/L for 1 Nos 230 kV bays to be expedited by TANTRANSCO	• 1 Nos 230 kV downstream T/L to Shoolagiri – Commissioned.
8.	Kozhikode	2x315 + 1x500 MVA	4	1	Construction of downstream T/L for 1 Nos 220 kV bay to be expedited by KSEB.	• 1 Nos 220 kV downstream T/L to Kozhikode(KSEB) – Award by March, 2020.

42.0 Connectivity transmission system agreed in earlier Connectivity/LTA meetings of Southern Region

42.1 CTU representative informed that following dedicated transmission system was agreed for grant of Stage-II connectivity in various Connectivity/LTA meetings of Southern Region held after 2nd SRSCT meeting held on 10.06.2019.

Sl. No.	Application No.	Applicant	Location	Stage-II Connectivity (MW)	Start Date of Stage-II connectivity	Proposed location for grant of Stage-II Connectivity	Dedicated Transmission System
35th Conn/LTA meeting held on 26.08.2019							
1	1200002220	Zenataris Renewable Energy Pvt. Ltd. (ZREPL)	Bellary, Karnataka	125	01-Jan-21	Hiriyur	Sharing dedicated line of Ecoren i.e. Ecoren - Hiriyur 220kV S/c line
38th Conn/LTA meeting held on 26.11.2019							
2	1200002293	GRT Jewellers (India) Pvt. Ltd.	Thoothukud, TamilNadu	150	31-May-21	Tuticorin-II	GRT Jewellers (India) Private Limited - Tuticorin-II GIS 230kV S/c

42.2 Further, following connectivity application of NTPC for proposed solar plants at Simhadri & Ramagundam within premises of the existing generators were agreed for grant in 38th Connectivity/LTA meeting held on 26.11.2019:

Sl. No.	Application No.	Applicant	Location	Connectivity Sought (MW)	Date of connectivity application	Nature of applicant	Transmission System
1	1200002271	NTPC Ltd	Ramagundam, Telangana	100	21-Oct-19	Solar Generator (At NTPC Ramagundam generation switchyard)	Through 5 feeders from Solar Plant to 33kV bus of NTPC switchyard

2	1200002272	NTPC Ltd	Simhadri, AP	25	21-Oct-19	Solar Generator (At NTPC Simhadri generation switchyard)	Through 3 feeders from Solar Plant to 33kV bus of NTPC switchyard
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42.3 Following LTA applications agreed for grant in various Connectivity/LTA meetings of Southern Region held after 2nd SRSCCT meeting held on 10.06.2019.

Sl. No.	Applicant	Location	LTA quantum (MW)	Beneficiaries (MW)	Date of start of LTA
33rd Conn/LTA meeting held on 26.06.2019					
1	200002127	Shapoorji Pallonji Infrastructure Company Pvt. Ltd.	250	(ER target)	25-Oct-20
34th Conn/LTA meeting held on 29.07.2019					
2	200002164	Karnataka Solar Power Development Corporation Ltd.	200	UP	30-Dec-19
37th Conn/LTA meeting held on 24.10.2019					
3	200002258	Sembcorp Energy India Limited	250	Bahrapur (for supply to Bangladesh through Bahrapur interconnection)	01-Apr-20

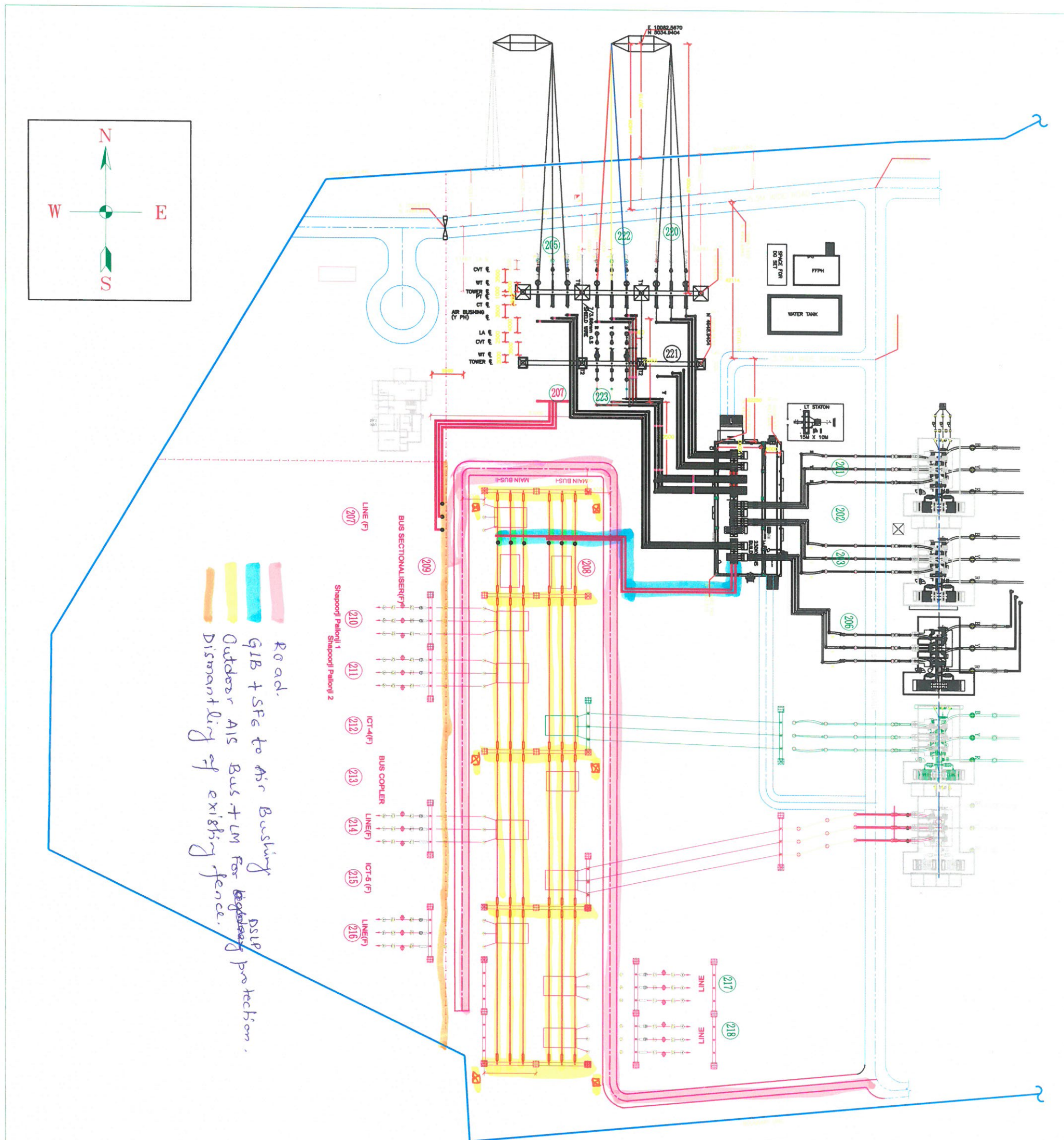
42.4 Members noted the same.

Meeting ended with vote of thanks.

Annex-I**List of participants of 1st SRPC(TP) meeting held on 16.12.2019 at Hyderabad**

Sl. No.	Name	Designation
Central Electricity Authority		
1.	P. S. Mhaske	Chairperson/Member (Power System)
2.	Pardeep Jindal	Chief Engineer (PSPA-II)
3.	Ishan Sharan	Director (PSPA-II)
4.	Kanchan Chauhan	Assistant Director (PSPA-II)
SRPC		
1.	A. Balan	Member Secretary
2.	Rangarajan R.M.	SE
3.	Len J.B.	EE
CTU		
1.	Dr. Subir Sen	COO (CTU-Plg)
2.	Ajay Dahiya	Manager (CTU-Plg)
3.	Ankush Patel	Dy.Manager (CTU-Plg)
4.	Venkatesh Gorli	Dy Manager (CTU-Plg)
POSOCO, NLDC		
1.	S. R. Narasimhan	Director (SO)
POSOCO, SRLDC		
1.	S. P. Kumar	SGM
2.	Madhukar G.	Chief Manager
NTPC		
1.	S. S. Mishra	GM
NHPC		
1.	J.C. Sarkar	GM (T&RE)
SECI		
1.	R. K. Agarwal	Consultant
KPTCL		
1.	Dr. Manjula N.	MD
2.	K. Siddaraju	Director (Transmission)
3.	D. Chethan	EE, PSS
4.	Divya Prabha H.	AEE, PSS
TANTRANSCO		
1.	T. Senthilvelan	Director

Sl. No.	Name	Designation
	TANGEDCO	
1.	M. A. Helen	Director
2.	D. Ravi Chandran	ACE/System Studies
3.	M. Sudarsan	EE/System Studies
4.	G. Ramesh Kumar	AEE/System Studies
5.	Dr. R. Kathiravan	AEE/CERC
	APTRANSCO	
1.	K. Bindu	EE (SS<SS)
2.	K. Kesava Reddy	Dy-EE
3.	Y.V. Ramakrishna	Dy-EE
	TSTRANSCO	
1.	D. Latha Vinod	CE/400 kV
2.	P.Chandra Shekar	CE/PS I/C
3.	Balaiah	SE/PS
4.	M. Sheshagiri	Divisional Engineer
5.	J. Ajay Kumar	DE/TSTRANSCO
6.	P. Srinivasu	ADE/TSTRANSCO
	KSEBL	
1.	Dr. P. Rajan	Chief Engineer



FOR TENDER PURPOSE ONLY

POWER GRID CORPORATION OF INDIA LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)

PROJECT:						SUBSTATION:			EXTN. OF 230kV TIRUNELVELI GIS SUBSTATION	
TITLE:						GENERAL ARRANGEMENT DRAWING				
DATE		SCALE		DRG.NO.		DATE		SCALE		REV
JAN 2019		NTS		C/ENGG/SR/CONSULTANCY/TIRU-EXT./GA		2019		0		0
CDE (ENGG-S/S)	Sr. GM (ENGG-S/S)	Sr. DGM (ENGG-Civil)	GM (CIVIL)	GM (ENGG-S/S)	GM (ENGG-TL)	ED (ENGG-S/S & TL)				
PREPARED	CHECKED BY		CLEARED BY			APPROVED BY				

Glimpses of CTU's Report on RE Corridor-2012

- CTU's proposal of Renewable capacity addition of 42 GW in 12th plan period:
- Study Approach: RE Potential Reassessment, Intra-State Transmission strengthening, Inter -State Transmission strengthening, Provision of Dynamic Reactive Compensation, Provision of Energy Storage technology
- 12 Critical areas identified and action plan defined
- Financial plan outlay and funding mechanism

Issues in the present Study Report on 18.5 GW RE CAPACITY ADDITION

- Potential Assessment Report from nodal agency ie. NIWE or SECI or any other agency not available - Associated issues.
- Adequacy of the existing system was not assessed - Planning Regulation 6(2) and other provisions.
- All India Base Case study and Issues in the All India Data Base.
- Land availability has not been discussed with documentary evidence.
- LGB of Target regions/States , Details of assumptions made, Transmission capability corridor wise not available, Different scenario studies with and without upgradation of the corridors operated at 400 kV (with immediate connectivity).
- Impact assessment on the downstream Intra State network and strengthening requirement.
- No LTA application either from generator or SECI available.
- As per PGCIL's affidavit during 2017 in 92/MP/2015 that out of 40607.95 MW envisaged capacity in 9 HCPTCs, LTA quantum of 17556.3 MW is effective and the balance capacity of 23051.65 MW is redundant due relinquishment. (56.8% redundant)
- Over voltage problem: POSOCO had highlighted that 23 lines were opened for voltage regulation at least 26 times with total no of hrs outage more than 500 hours(36th SRPC).
- Raigarh-Pugalur HVDC corridor – Effective Utilisation.

POSOCO's OBSERVATIONS ON STUDY REPORT:

- LGB data is different for different regions
- **Network topology is also different for different regional studies**
- The swing bus generation in the case of CGPL Mundra is **-9283** MW. The capacity of the plant is 4500 MW. Even if 55% is considered at CGPL Mundra, a change of around 12000 MW has to be made in the LGBR which will drastically affect the flow in the WR-SR.
- Data base inconsistency – 85 elements of SR case study not found in NR case study and 43 elements of NR case study not found in SR case study.
- **Lines not planned and not approved to be executed in future included in Network data**
- Out of the **13 STATCOMS**, only 5 have been modelled. Further, 26 additional STATCOMS have been considered in base case, most of them acting as filters.

Basic input data for the study

State	Installed Capacity 2021-22 (MW)	Despatch			Morning Peak Load (MW)	Evening Peak Load (MW)	Off-Peak Load (MW)	Deficit (-) / Surplus(+) (MW)		
		Morning Peak [Solar @ 75% & Wind @10%]	Evening Peak [Solar @ 0% & Wind @10%]	Off-Peak [Solar @ 75% & Wind @60%]				Morning Peak	Evening Peak	Off-Peak
Andhra Pradesh	24176	12244	11101	12268	11250	11250	7875	994	-149	4393
Telangana	21256	14002	11388	10620	13500	13500	9450	502	-2112	1170
Karnataka	31578	14534	12092	13917	14500	14500	10150	34	-2408	3767
Kerala	4748	2366	3030	1652	4600	4600	3220	-2234	-1570	-1568
Tamil Nadu	35015	17074	15738	15808	17600	17600	12320	-526	-1862	3488
ISTS RE (wind) SR	13301	1330	1330	7981				1330	1330	7980.6
ISTS RE (solar) SR	14050	10538	0	10538				10538	0	10537.5
Total	144123	72088	54680	72782	61450	61450	43015	10638	-6770	29767

No.238/56/2017-Wind

भारत सरकार/Government of India

नवीन एवं नवीकरणीय ऊर्जा मंत्रालय/Ministry of New & Renewable Energy

CGO Complex, Block No.14, Lodhi Road, New Delhi – 110003


(Wind Power Division)

Dated 14th May, 2018

OFFICE MEMORANDUM

Subject: Minutes of the meeting for planning of long term evacuation and transmission infrastructure for wind power –regarding.

I am directed to forward herewith a copy of the minutes of the meeting for planning of long term evacuation and transmission infrastructure for wind power held on 1st May, 2018 at MNRE, New Delhi for your kind information.


(A. Hari Bhaskaran)
Scientist 'C'

To,

SNAs & STUs (Tamil Nadu, Karnataka, Gujarat, Andhra Pradesh, Telangana, Maharashtra, Madhya Pradesh and Rajasthan)

Copy to

1. Chairman, CEA, New Delhi
2. CMD, PGCIL, Gurgaon
3. Managing Director, Solar Energy Corporation of India Ltd.
4. DG, NIWE
5. Secretary General, Indian Wind Turbine Manufacturers Association, New Delhi
6. Chairman, Indian Wind Energy Association, New Delhi
7. President, Wind Independent Power Producers Association (WIPPA), New Delhi
8. Chairman, Indian Wind Power Association, Chennai.

Copy for information to:

1. PPS to Secretary, MNRE
2. PPS to JS (BPY)
3. Scientist 'F' (GU), MNRE.

Minutes of the meeting held on 01.05.18 at MNRE, New Delhi for planning of long term evacuation and transmission infrastructure for wind power

A meeting was held under Chairmanship of Sh. Bhanu Pratap Yadav, Joint Secretary, MNRE on 1st May, 2018 in MNRE, New Delhi for planning of long term evacuation and transmission infrastructure for wind power. The meeting was attended by officials of MNRE, CEA, NIWE, SNA, STUs of wind resource rich states, PGCIL, wind developers/IPP/association, etc. The list of participants is attached at **Annexure-1**.

2. Joint Secretary welcomed the participants and stated that meeting was convened to plan long term infrastructure for evacuation of wind energy in the country. He then requested POWERGRID to make a presentation on this issue. POWERGRID presented that as per earlier discussions held in Dec'17 & Jan'18 with MNRE, National Institute of Wind Energy (NIWE), STUs, State Nodal Agency of wind potential rich states, POWERGRID & wind developers/IPP as well as data provided by all above stakeholders, selection of prioritized wind energy zones (WEZs) along with its envisaged potential which could be developed upto 2022, were carried out. Based on inputs received during these meetings, transmission plan for identified Wind energy zones was worked out and a comprehensive report was submitted to MNRE, MOP, CEA and other stake holders for their comments/ observations.

3. PGCIL mentioned that the draft report comprised of transmission plan for following five prioritized Wind energy zones (12,000 MW):

- a. Koppal (2500MW) in Karnatak
- b. Kurnool (3000MW) in AP
- c. Dwarka (2000MW) in Gujarat
- d. Karur (2500MW) in Tamil Nadu
- e. Osmanabad (2000MW) in Maharashtra

It was also stated that two additional zones viz. Bhuj WEZ (3000 MW) in Gujarat and Tirunelveli /Tuticorin WEZ (2500 MW) in Tamil Nadu for which transmission scheme is already identified and under implementation as part of Green energy Corridors-ISTS scheme.

4. PGCIL further indicated that in earlier meetings, it was deliberated that as per the NIWE estimates for wind energy, total potential of 45 GW exist in Kutch distt. Further, CTU also received wind connectivity applications for 13,000MW. Wind Developers/IPP have also indicated about 8000MW of potential in Kutch complex (Bhuj/Bachau) due to high WPD/CUF. In Kutch complex, Bhuj pooling station is already under implementation under GEC-ISTS scheme, which will be fully utilized after SECI ISTS connected wind bids. SECI has indicated total 3900 MW transfer requirement from SECI RFS-I to IV from Bhuj PS. In

order to accommodate power transfer requirement through 220kV & 400kV level injection at Bhuj PS, augmentation of 400/220kV & 765/400kV ICTs is envisaged.

5. Considering above developments as well as potential in Kutch distt, Bhuj & Bachau (Lakadia) complex were added to above identified five (5) WEZs and transmission plan was evolved for additional 5000 MW capacity (Bhuj-II -3000 MW, Bachau/Lakadia-2000 MW).
6. In Tirunelveli / Tuticorin complex, Tirunelveli pooling station is already under implementation under GEC-ISTS scheme. SECI has indicated total 950 MW transfer requirement from SECI RFS-I to IV from Tirunelveli PS for which augmentation of 400/220kV ICTs are envisaged. Therefore, above augmentation plan was also included in transmission plan for WEZ.
7. POWERGRID presented the transmission plan for identified WEZs for total of 22,500 MW including Bhuj-II & Bachau/Lakadia (total : 5000 MW) complex.
8. CEA opined that some of the RE rich states states i.e. Andhra Pradesh, Karnataka, Gujarat are planning/ already planned Sub Stations in wind rich pockets for wind evacuation of 2000 to 3000MW each as part of Intra state transmission system under Green Energy Corridors, which needs to be optimally utilised to avoid duplicity of transmission infrastructure. However, wind developers responded that in view of the Intra state transmission charges issue, majority of wind IPPs/developers will seek connectivity in ISTS only.
9. It was emphasized that feasibility of connections of wind projects at Intra state transmission system may be explored. However, RE developers need to apply for LTA in ISTS in that case to facilitate power transfer across the state.
10. In the end following decisions were taken.
 - Considering short gestation period of wind generation vis-a-vis development of transmission system, scheme may be posed for discussion in respective standing committee meeting(s) for finalization. Further, implementation modalities need to be finalized at the earliest.
 - It was agreed that in view of availability of land/quality resource, etc., following prioritized wind energy zones are in order. However, it was requested that substation location for common pooling station in above WEZs may be selected in such a way so as to minimize connectivity infrastructure requirement to the extent possible.

- To identify possible locations for additional wind projects within the existing evacuation capacity considering that RE projects do not require these capacities all the time, a committee may be formed who may also look at the technical aspects of the same.
- It was recommended that development of ISTS infrastructure may be carried out for following prioritized wind energy zones:

S.No	State	WEZ Complex	WEZ Quantum(MW)
1	Karnataka	Koppal	2500
2	Andhra Pradesh	Kurnool	3000
3	Gujarat	Dwarka	2000
		Kutch (Bhuj)**	3000
		Kutch (Bhuj-II)	3000
		Kutch (Lakadia /Bachau)	2000
4	Tamil Nadu	Karur	2500
		Tirunelveli/Tuticorin**	2500
5	Maharashtra	Osmanabad	2000
Total (MW)			22500

*** high capacity transmission corridor already exist /being implemented viz. Bhuj in Kutch distt (Gujarat) & Tirunelveli/Tuticorin distt (Tamil Nadu), augmentation of transformation capacity to be taken up*

Meeting ended with a vote of thank to the chair.

Annexure

The list of participants for the meeting on planning for long term evacuation and transmission infrastructure for wind power held on 1st May, 2018 at MNRE, New Delhi

Sl.No.	Name & Designation	Organization
1.	Shri Bhanu Pratap Yadav, Joint Secretary	MNRE
2.	Shri J.N. Swain, Managing Director	SECI
3.	Shri G. Upadhyay, Director	MNRE
4.	Shri Hari Bhaskaran, Scientist 'C'	MNRE
5.	Shri Sunil Jain, President	WIPPA
6.	Shri O.P. Taneja, Associate Director	IWTMA
7.	Shri Rakesh Garg	Renew Power
8.	Shri Subir Sen, General Manager	POWERGRID
9.	Shri Kashish bhambhani, Sr. Manager	POWERGRID
10.	Shri Sandeep Kumawat	POWERGRID
11.	Shri Bellarmih John Raj, CE/CIVIL	TRANSCO
12.	Shri K. Manmohan, SE, Solar	TANGEDCO
13.	Shri T. Sumathi, EE	TANGEDCO
14.	Shri R. Kumaran, Manager	GE Renewable
15.	Ms. Anjana Agrawal, XEN(Plan)	RVPN
16.	Shri S.C. Sharma, SE (P&P)	RVPN
17.	Shri Surendra Vashistha, Project Manager	RREC
18.	Shri Srinivas, CR	IWPA
19.	Shri K.R. Nair, President	IWPA
20.	Shri Sharad Sawja	Sterling Agro
21.	Shri Anil Kumar Asthana	SUZLON
22.	Dr. K. Balaraman, DG	NIWE
23.	Shri Ravinder Gupta, Chief Engineer	CEA
24.	Shri B.S. Bairwa, Director	CEA
25.	Shri J.K. Mishra, Director (PS)	SECI
26.	Shri D. Nagaraj, Managing Director	KREDL
27.	Shri M.K. Jaiswal, Chief Engineer (Planning)	MPPTCL
28.	Dr. Sanjay S. Kulkarni, ED(System)	MSETCL
29.	Ms. Prajeeta V. Tayde, Manager	GEDA
30.	Shri T. Srinivasulu, Project Director (Wind)	TSREDCO/Telangana
31.	Shri A. Sreenivasa Reddy, Superintending Engineer/Power Systems	TSTRANSCO, Hyderabad

32.	Shri Raj Kumar	TSREDCO, Hyderabad
33.	Ms. Kiran V., General Manager (PRSS)	Mytrah Energy
34.	Shri Dharmendra Gupta	Mytrah Energy
35.	Shri N.P. Jadav, ACE(R&C)	GETCO
36.	Shri Dipak H. Patel, Dy. Engineer (STU)	GETCO
37.	Shri Rakesh Rathore	SEMBCORP
38.	Shri Shanmagarajeshwaran	Siemens Gamesa
39.	Ms. Swatti S., Asst. Engineer	KPTCL
40.	Shri V.S. Raghavendra, SEE Planning	KPTCL
41.	Shri M. Krishna Kumar, Senior Advisor	Vish Wind Info Skyline
42.	Shri Monil Mathur, Corporate	VW Infra, Mumabi
43.	Shri Ashish Shukla,	Siemens Gamesa
44.	Shri Ravinder, Ex. Chairperson	CEA

WIND DIVISION
R.N. 238/56/2017-WIND

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List for long term evacuation and transmission infrastructure for wind power

1.	Chairman Central Electricity Authority, Sewa Bhawan, R. K. Puram, Sector-1 New Delhi - 110 066	2	Chairman and Managing Director Power Grid Corporation of India Saudamini, Plot No. 2, Sector 29, Near IFFCO Chowk Gurugram – 122 001 (Haryana)
3	Managing Director Solar Energy Corporation of India 1 st Floor, D-3, A Wind, Religare Building District Centre, Saket New Delhi – 110 017	4	Director General National Institute of Wind Energy Survey No.6.57/1A2, Pallikaranal, Velachery - Tambaram High Road, Chennai – 600100
5	Secretary General Indian Wind Turbine Manufacturers Association Transit House: C-1, 2nd Floor, Soami Nagar, New Delhi - 110 017.	6	President Wind Independent Power Producers Association (WIPPA) Tower No. 2, 2 nd Floor, NBCC Plaza Pushp Vihar, Saket New Delhi 110 017
7	Chairman Indian Wind Energy Association Second Floor AIFD Building 12-13 Special Institutional Area New Delhi – 110 067	8	Chairman Indian Wind Power Association Door No. E, 6 th Floor Tower-I, Shakthi Towers No. 766, Anna Salai Chennai – 600 002

SNAs

9	Vice Chairman & Managing Director New & Renewable Energy Development Corporation of Andhra Pradesh Ltd. (NREDCAP) 5-8-207/2 Pishah Complex, Nampally, Hyderabad – 500 001	10	Director, Gujarat Energy Development Agency, 4th floor, Block No.11 &12 Udyog Bhavan, Sector – 11 Gandhinagar - 382 017 Gujarat, India
11	Managing Director Karnataka Renewable Energy Development Agency Ltd. 39, "Shanti Gruha" Bharath Scouts & Guides Place Road Bangalore – 5600001	12	Managing Director, MP Urja Vikas Nigam Ltd., Urja Bhawan, Main Road NO.2 Shivaji Nagar, Bhopal –462016

13	Director General, Maharashtra Energy Development Agency (MEDA), S.No. 191/A, Phase1, 2nd Floor, MHADA Commercial Complex Opp. Tridal Nagar, Yerawada Pune – 411 006.	14	Managing Director, Rajasthan Renewable Energy Corporation Limited E-166, Yudhister Marg, 'C'Scheme Jaipur – 302 001
15	Chairman & Managing Director Tamil Nadu Energy Development Agency (TEDA), EVK Sampath Maaligai, 5th Floor, College Road, Chennai – 600 006	16	Vice Chairman & Managing Director Telengana New & Renewable Energy Development Corpn. Ltd. 5-8-207/2, Pigsaw Complex Nampally Hyderabad-1

STUs

17	Chairman & Managing Director, Transmission Corporation of Andhra Pradesh Limited, Vidyut Soudha,48-12-4/1, Eluru Rd, Gunadala, Vijayawada, Andhra Pradesh 520008	18	Chairman, Gujarat Energy Transmission Corporation Limited (GETCO), Sardar Patel, Vidyut Bhavan, Race Course, Vadodara -390007, Gujarat (INDIA)
19	Chairman & Managing Director, Maharashtra State Electricity Transmission Co. Ltd. Prakashganga, Plot No.C-19, E-Block, Bandra-Kurla Complex, Bandra(E), Mumbai - 400051	20	Chairman & Managing Director, Rajasthan Rajya Vidyut Prasaran Nigam Limited (RVPN), Vidyut Bhawan, Janpath, Jaipur - 302 005, Rajasthan.
21	Chairman, TAMILNADU TRANSMISSION CORPORATION LIMITED, NPKRR Maligai, (TNEB Office), 144, Anna Salai, Chennai, 600002, Tamil Nadu	22	Managing Director, Karnataka Power Transmission Corporation Ltd., HRD Centre, Bangalore - 560048, Karnataka
23	Chairman & Managing Director, MP Power Transmission Company Limited., Block No.2, Shakti Bhawan, Rampur, Jabalpur 482 008 (M.P.)	24	Chairman & Managing Director, Transmission Corporation of Telangana Limited, Vidyut Soudha, Khairatabad, Hyderabad-500082

CR. MARB

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SHIV DARGAL
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