

I/5982/2019



सत्यमेव जयते

भारत सरकार
Government of India

विद्युत मंत्रालय
Ministry of Power

केन्द्रीय 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: पारेषण तंत्र पर दक्षिणी क्षेत्र स्थायी समिति (एसआरएससीटी) की द्वितीय बैठक की कार्यवृत्त।

Subject: Minutes of 2nd meeting of Southern Region Standing Committee on Transmission (SRST).

महोदय(Sir)/महोदया(Madam),

The 2nd meeting of Southern Region Standing Committee on Transmission (SRST) was held on **10 June 2019 (Monday) at Bengaluru**. A copy of minutes of the meeting is enclosed for your information and necessary action.

भवदीय/Yours faithfully,

P. Jindal
10/07/2019
(प्रदीप जिंदल/ Pardeep Jindal)

मुख्य अभियंता/ Chief Engineer

प्रति सूचनार्थ/ Copy for kind information to:

1) PPS to Member (PS), CEA

I/5982/2019

Address List:

<p>1. The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, Bangalore 560 009. FAX : 080-22259343</p>	<p>2. Chief Operating Officer, Central Transmission Utility (CTU), Power Grid Corporation of India “Saudamini” Plot No. 2, Sector-29, Gurugram-122001 Tel. No. 0124-2571816 Fax No.0124-2571932</p>
<p>3. Director (System Operations), POSOCO B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi-110016 Tel. No. 26852843 Fax No. 2626524525, 26536901</p>	<p>4. Managing Director Karnataka State Power Trans. Corp.Ltd., Cauvery Bhawan, Bangalore - 560 009. FAX : 080 -22228367</p>
<p>5. Chairman and Managing Director Transmission Corp. of Andhra Pradesh Ltd., (APTRANSCO) Gunadala, Eluru Rd, Vijayawada, Andhra Pradesh</p>	<p>6. Chairman-cum-Managing Director Transmission Corp. of Telangana Ltd., (TSTRANSCO) Vidyut Soudha, Khairatabad Hyderabad – 500 082.</p>
<p>7. Chairman-cum-Managing Director Kerala State Electricity Board, Vidyuthi Bhawanam, Pattom, Thiruvananthapuram - 695 004. FAX : 0471-2444738</p>	<p>8. Managing Director Tamil Nadu Transmission Corporation Ltd (TANTRANSCO), 6th Floor, Eastern Wing, 800 Anna Salai, Chennai - 600002. FAX : 044-28516362</p>
<p>9. The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, Puducherry – 605 001. FAX : 0413-2334277/2331556</p>	<p>10. Executive Engineer Divisional Office Lakshadweep Electricity Department Kavaratti Island UT of Lakshadweep</p>

Minutes of 2nd meeting of Southern Region Standing Committee on Transmission (SRST) held on 10th June, 2019 at Bengaluru

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

Director, KPTCL, welcomed Chairperson, CEA, and other participants. He also gave a brief presentation on the electricity scenario in Karnataka.

Chairperson, CEA, and Member (Power System), CEA welcomed the participants. He thanked KPTCL for hosting the meeting.

Chief Engineer (PSPA-II), CEA, stated that a number of proposals had been received from constituents and most of them had been discussed in the joint study meeting held on 01-02 May, 2019, at Bengaluru. On account of high penetration of RE sources in Southern Region, the region is likely to become power surplus in certain scenarios. This surplus power would have to be exported to other regions, for which system strengthening would be required in Southern Grid as well as in rest of all-India grid. He thereafter requested Director (PSPA-II), CEA, to take up the agenda items for deliberation.

1.0 Minutes of 1st Meeting of Southern Region Standing committee on Transmission (SRST)

Director (PSPA-II), CEA, stated that the Minutes of 1st Meeting of Southern Region Standing committee on Transmission (SRST) held on 07th September, 2018, at Chennai, was circulated vide letter No. CEA-PS-12-14(12)/1/2018-PSPA-II Division dated 01.11.2018. No comments have been received on the minutes.

The minutes of 1st meeting of Southern Region Standing Committee on Transmission (SRST) as circulated was confirmed.

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

2.0 Intra-State transmission projects proposed for Green Energy Corridor Ph-II in Karnataka

Director (PSPA-II), CEA, stated that intra- state transmission projects proposed for Green Energy Corridor Ph-II in Karnataka were discussed in the 42nd meeting of Standing Committee on Power System Planning for Southern Region (SCPSPSR) held on 27.04.2018 and was also discussed in the 1st meeting of Southern Region Standing Committee on Transmission (SRST) held on 07.09.2018. Details of the transmission system proposed by KPTCL are as follows:

A. Establishment of 2x500 MVA, 400/220 kV sub-station at Yalwar, Bijapur District with the associated transmission lines.

400 kV System:

I/5982/2019

- i. Narendra (New) Kudgi-Yalwar 400 kV D/C line (with Quad Moose ACSR Conductor)
- ii. Gulbarga- Yalwar 400 kV D/C line (with Quad Moose ACSR Conductor).
- iii. 2x500 MVA, 400/220 kV ICTs at Yalwar.
- iv. 2x125 MVA bus reactors.

220 kV System:

- 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 sub-station at Yalwar.
- iii. B. Bagewadi -Yalwar 220 kV D/C line.

B. Establishment of 2x500 MVA, 400/220 kV sub-station at Lokapur, Bagalkot with the associated transmission lines.**400 kV System:**

- i. LILO of both circuits of Narendra (New) –Narendra (PGCIL) 400 kV D/C line (with Quad Moose ACSR Conductor) at Lokapur
- ii. 2x500 MVA 400/220 kV ICTs.
- iii. 2x125 MVA bus reactors.

220 kV System:

- i. LILO of both circuits of existing Gadag-Bagalkot 220 kV D/C line at Lokapur.
- ii. LILO of both circuits of Mahalingpura-Soundatti 220 kV D/C line at Lokapur.
- iii. Mughalkod - Lokapur/Bagalkot 220 kV D/c Line

2.2 It was decided in the 1st meeting of SRSCCT that the above proposal would be discussed again by CEA, CTU and SR States, considering the proposals for wind/solar energy zones power evacuation.

2.3 Accordingly, the proposed transmission system was discussed in the joint study meeting held on 01-02 May, 2019, at SRPC Bengaluru. Considering the large scale capacity addition from RE sources and commissioning of generation projects based on conventional sources by 2021-22 and the likely electricity demand in the year 2021-22, the load generation balance for total Southern Region was prepared in co-ordination with the constituents, for the year 2021-22. With the high penetration/implementation of wind and solar generators in Southern Region, the

I/5982/2019

region is expected to become power surplus in certain months during the year (especially from June to September, when SR experiences generally off – peak load condition) and in certain conditions/hours (peak solar generation period). This surplus power would be of the order of 29,000 MW and would have to be exported from Southern region and absorbed in other Regions.

- 2.4** CTU representative stated that it may be possible to export 15,000-17,000 MW of surplus power from Southern Region with upgradation of existing/under implementation sub-stations from 400 kV to rated voltage level of 765 kV and charging of corresponding transmission lines to their rated voltage at 765 kV level. However, for further transfer of power within Western Region and beyond to Northern Region or Eastern Region, transmission system augmentation may be required.
- 2.5** Chief Engineer (PSPA-II), CEA, informed that a note in this regard has already been sent to Member Secretary of NRSCT and WRSCT, dealing with planning of Western & Northern grids, with a request to plan for absorption of this surplus power in Western/Northern Region of the country. Chairperson, CEA, suggested that in view of large scale integration of Renewable Energy in the system, all-India studies would need to be carried out to plan for transfer of power among regions.
- 2.6** Chief Engineer (PSPA-II), CEA, further stated that injection of power at the proposed 400/220 kV substation at Yalwar for WEZ would require system strengthening beyond Kolhapur in Western Region for export of power from Southern Region. In the joint study meeting held on 01-02 May, 2019, at Bengaluru, it was brought out that the proposed scheme for establishment of Yalwar S/s would have to be planned along with the transmission system augmentation required beyond Kolhapur.
- 2.7** Representative of KPTCL informed that about 1,043 MW of wind generation is connected to the grid in the vicinity of Bijapur and B.Bagewadi area and in addition to this, 300 MW capacity is under implementation. In order to avoid the congestion in existing 220 kV network in the vicinity of Bijapur and for reliable evacuation of power from the existing generators, KPTCL wants to build Gulbarga- Yalwar 400 kV D/C intra-state line. Narendra (New) Kudgi-Yalwar 400 kV D/C line could be taken up based on the results of the joint study with Western/Northern Region/ all-India studies.
- 2.8** Chief Engineer (PSPA-II), CEA, stated that with Gulbarga- Yalwar line and considering injection of power at Yalwar, power from Yermarus TPS will flow to south Karnataka and there will be the need of system strengthening. KPTCL informed that as per present policy, KPTCL cannot export power beyond Southern Region. In the high wind season, without Narendra (New) Kudgi-Yalwar 400 kV D/C line and without system strengthening beyond Kolhapur in Western Region for export of power from Southern Region, Karnataka will have to curtail wind generation in such case.

I/5982/2019

- 2.9** After further discussions, for the evacuation of existing 1,043 MW wind power without congestion, the proposed 400/220 kV substation at Yalwar and associated transmission lines for evacuation of wind generation in Yalwar was agreed, except the Narendra (New) Kudgi- Yalwar 400 kV D/C line. It was also agreed that no further power injection will be allowed until system strengthening beyond Kolhapur in Western Region for export of power from Sothern Region is carried out. Members agreed for the same.
- 2.10** COO, CTU advised KPTCL to use Twin HTLS conductor instead of quad moose in the Gulbarga- Yalwar 400 kV D/C line. Chairperson/ Member (Power System), CEA, advised KPTCL to carry out system studies and decide whether to use Twin HTLS or quad moose conductor.
- 2.11** Accordingly, the following system was agreed by the Standing Committee for establishment of 2x500 MVA, 400/220 kV sub-station at Yalwar, Bijapur District:

400 kV System:

- i. Gulbarga- Yalwar 400 kV D/C line (with quad moose ACSR Conductor or twin HTLS).
- ii. 2 x 500 MVA, 400/220 kV ICTs at Yalwar.
- iii. 2 x 125 MVA bus reactors.

220 kV System:

- 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 sub-station at Yalwar.
 - iii. B. Bagewadi -Yalwar 220 kV D/C line.
- 2.12** Regarding 2x500 MVA, 400/220 kV sub-station at Lokapur, KPTCL informed that there is 670 MW wind based generation project at Lokapur and its power is already being evacuated successfully through the existing 220 kV network. KPTCL further informed that RE based capacity addition is not being planned in near future at/near Lokapur. After detailed deliberations it was opined that there is no requirement of establishment of 400/220 kV S/s at Lokapur, as power is already being evacuated successfully through the existing system. Accordingly, it was recommended that the proposal for establishment of 2x500 MVA, 400/220 kV substation at Lokapur may be dropped. Members agreed for the same.

I/5982/2019

- 3.0 Providing additional feed to 3x500 MVA, 400/220 kV substation at Mylasandra, (Electronic City) Bengaluru and establishment of 2x500 MVA, 400/220 kV substation at Dommasandra in Bengaluru**
- 3.1** Director (PSPA-II), CEA, stated that the proposal for establishment of 2x500 MVA, 400/220 kV sub-station at Dommasandra and providing additional feed to 3x500 MVA, 400/220 kV substation at Mylasandra, (Electronic City) Bengaluru was discussed in 41st & 42nd SCPSPSR. The scheme was also discussed in 1st SRSCT held on 07.09.2018. In the 1st SRSCT it was decided to discuss the scheme in a separate meeting of CEA, CTU and KPTCL.
- 3.2** Accordingly, the matter was discussed in the joint study meeting held on 01-02 May, 2019, at Bengaluru. In the joint study meeting, following transmission scheme was proposed by KPTCL for connectivity of Mylasandra and Dommasandra SS:

Additional feed for Mylasandra 400/220 kV substation:

- i. 3x500 MVA, 400/220 kV ICTs
- ii. LILO of one circuit of Dharampuri – Somanhally 400 kV D/C (Quad) line at proposed 400/220 kV substation at Mylasandra.
- iii. Mylasandra – Dommasandra 400 kV S/C line (with quad Moose ACSR conductor)

Establishment of Dommasandra 400/220 kV substation

- i. 2x500 MVA, 400/220 kV ICTs
- ii. LILO of Kolar – Somanhally 400 kV S/C line at Dommasandra 400/220 kV substation

Schematic diagram is given in Fig. -1.

I/5982/2019

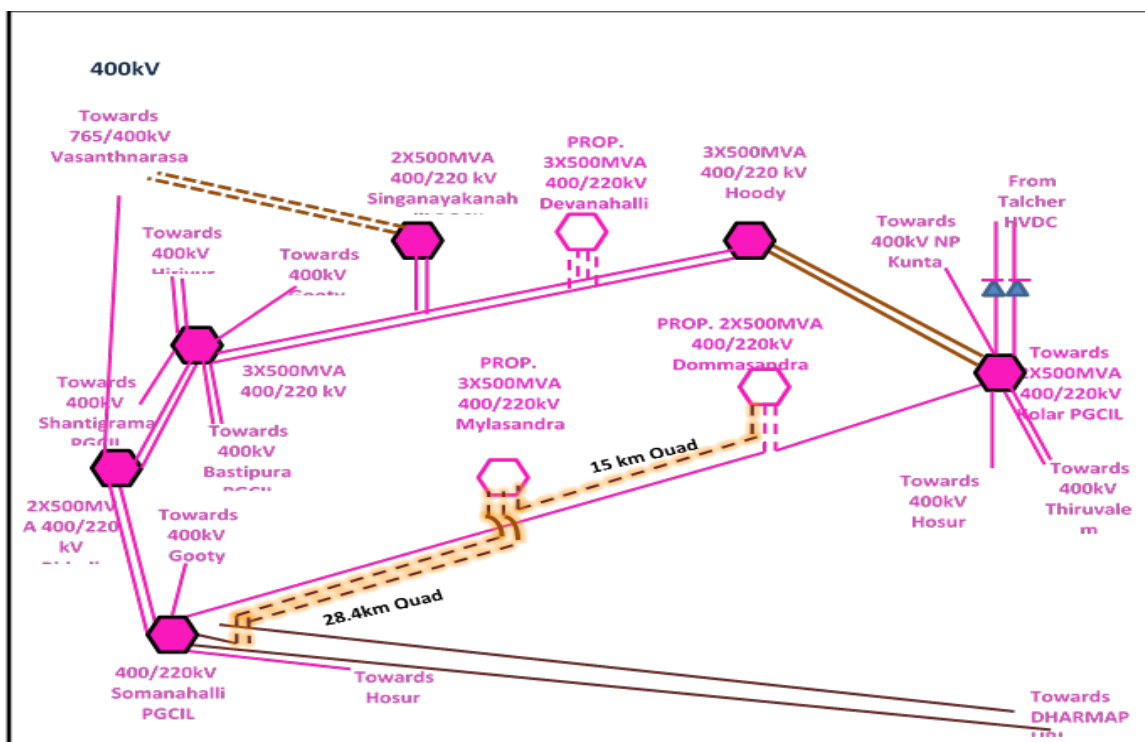


Figure 1 : Connectivity arrangement for Mylasandra & Dommasandra

- 3.3 It was informed by KPTCL that implementation of the scheme would be taken up through multi circuit towers utilizing the existing corridor of POWERGRID's Kolar – Somanahally 400 kV S/c line.
- 3.4 The transmission scheme mentioned in para 3.2 was agreed by the Standing Committee. It was decided that commercial issues, if any, towards utilization of existing corridor (RoW) of POWERGRID's Kolar – Somanahally 400 kV S/c line, would be taken up separately by KPTCL with POWERGRID.
- 4.0 **Establishment of 400/230 kV substation at Vadamadurai, Tamil Nadu, along with associated transmission lines**
- 4.1 Director (PSPA-II), CEA, stated that, the establishment of 400/230 kV substation at Vadamadurai along with associated transmission system was discussed in the 1st SRSCT meeting. The following system was proposed in 1st SRSCT:
- 2x500 MVA 400/230 kV ICT at Vadamadurai
 - 2x125 MVA, 400 kV Bus Reactors at Vadamadurai
 - LILO of Karaikudi-Pugalur 400 kV S/C line at Vadamadurai
 - LILO of Thappagundu – Anaikadavu 400 kV S/C line at Vadamadurai
- 4.2 In the 1st SRSCT meeting, it was decided that CEA, CTU and TANTRANSCO may jointly study the scheme. Accordingly, the scheme was discussed in the Joint Study meeting on 01-02 May, 2019, at SRPC Bengaluru. In the meeting, TANTRANSCO

I/5982/2019

informed that land was not available for establishment of 400/230 kV substation at Vadamadurai and requested to drop the proposal.

4.3 After further discussions, the proposal of 400/230 kV substation at Vadamadurai was dropped. Members agreed for the same.

5.0 Establishment of 400/110 kV substation at Vishwanathapuram, Tamil Nadu

5.1 Director (PSPA-II), CEA, stated that, in the 1st SRSCT meeting, the establishment of 400/110 kV substation at Vishwanathapuram along with associated transmission system was discussed for reducing the overloading of auto transformers of the existing Hosur 230 kV SS and the upcoming Uddanapally 230 kV SS and also to reduce the loading of certain 110 kV lines in that area. The following transmission system was proposed in the 1st SRSCT meeting:

- i. Establishment of Vishwanathapuram 400/110 kV S/S with 3x200 MVA 400/110 kV ICT.
- ii. LILO of Thiruvalem-Palavady 400 kV S/C line at Vishwanathapuram (with quad moose ACSR conductor).
- iii. PGCIL Hosur (Shoolagiri)- Vishwanathapuram 400 kV S/C line
- iv. 1x80 MVAR, 400 kV line reactor for Vishwanathapuram –Thiruvalem 400 kV S/C line.
- v. 1x125 MVAR, 400 kV Bus reactor

5.2 Further, it was decided in the 1st SRSCT meeting that CEA, CTU and TANTRANSCO may jointly study the scheme. It was also decided in the 1st SRSCT that TANTRANSCO may also plan for 230 kV connectivity, keeping in view the future expansion. Accordingly, the scheme was discussed in the joint study meeting on 01-02 May, 2019, at SRPC Bengaluru. During the joint study meeting, TANTRANSCO proposed establishment of 400/230/110 kV S/S at Vishwanathapuram. TANTRANSCO informed that the load drawl at proposed Vishwanathapuram S/S would be of the order of 400-500 MW.

5.3 In the joint study meeting, CEA & CTU had proposed that considering the corridor utilization, LILO of both circuits of Thiruvalem-Palavady 400 kV D/C line at Vishwanathapuram shall be considered instead of constructing 400 kV S/c line from Hosur. TANTRANSCO representative agreed for the same. It was informed by TANTRANSCO that the length of Thiruvalem-Vishwanathapuram transmission line was about 190 km. Accordingly, it was decided that 1x50 MVAR switchable line reactors on both circuits of Vishwanathapuram –Thiruvalem 400 kV D/C line at Vishwanathapuram end may be considered instead of 1x80 MVAR line reactor.

5.4 After detailed deliberations, the following transmission system was recommended for approval of SRSCT:

I/5982/2019

- 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 Thiruvalam – Palavady 400 kV Quad Moose D/C line at Vishwanathapuram.
- iii. 2x50 MVA, 400 kV switchable line reactors at Vishwanathapuram for Vishwanathapuram –Thiruvalam 400 kV D/C line.
- iv. 1x125 MVA, 400 kV bus reactor at Vishwanathapuram.

5.5 Director (PSPA-II), CEA, informed that subsequently TANTRANSCO vide letter dated 24.05.2019 had proposed the above scheme (mentioned at 5.4) along with additional connectivity at 230 kV and 110 kV level at proposed Vishwanathapuram S/s as detailed below:

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 230 kV 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.

5.6 Chief Engineer (PSPA-II), CEA, opined that consolidated proposal should be considered by the Standing Committee.

5.7 COO, CTU enquired about the short circuit rating of the 400 kV equipment. TANTRANSCO informed that short circuit rating of the 400 kV equipment was 63 kA. Representative of CTU advised that due to the system expansion, the fault level of various substations is increasing and so in future, all the new substations may be designed for 63 kA fault level.

5.8 After further deliberations, the transmission system mentioned at para 5.4 along with the 220 kV and 110 kV connectivity mentioned at para 5.5 was agreed by the Standing Committee.

6.0 Phase-II Solar & Wind Energy Zone Transmission schemes

6.1 It was informed that potential Solar Energy Zones (SEZ) and Wind Energy Zones (WEZ) in various districts of six RE rich states were identified by SECI/MNRE for 66.5 GW quantum. Subsequently, based on bidding timeline, SECI provided phasing details of prioritized SEZs (50,000 MW) and WEZs (16,500 MW) in two phases i.e.

I/5982/2019

2020 & 2021. The details of prioritized SEZs and WEZs in Southern region (totaling to 18,500 MW) are as under:

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

6.2 It was further informed that 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 in Southern Region and additional 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 Southern Region Standing Committee on Transmission (SRSCT) 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. Details are given below:

a) Tirunelveli and Tuticorin Wind Energy Zone (Tamil Nadu) (500 MW):

- (i) Addition of 1x500 MVA, 400/230kV ICTs (4th) at Tuticorin-II GIS sub-station.

***Operation of Tuticorin Pooling Station – Dharmapuri (Salem) 765kV D/C line (presently operating at 400kV) at its rated voltage. (i. e. 765kV) & 5th ICT (500 MVA) at Tuticorin-II PS would be reviewed for dispersal of more than 2000MW RE generation*

b) Karur / Tiruppur Wind Energy Zone (Tamil Nadu) (2500 MW):

- (i) Establishment of 5x500 MVA, 400/230 kV Karur Pooling Station (at a location in between Karur Wind zone and Tiruppur wind zone)
- (ii) LILO of both circuits of Pugalur – Pugalur (HVDC) 400 kV D/c line (with Quad Moose ACSR Conductor) at Karur PS

I/5982/2019

(iii) 9 nos. of 230 kV line bays for interconnection of wind projects

(iv) 2x125 MVA, 400 kV Bus reactors at Karur PS

c) Koppal Wind Energy Zone (Karnataka) (2500 MW):

(i) Establishment of 5x500 MVA, 400/220 kV pooling station near Munirabad /suitable location in Koppal distt.

(ii) Pooling station (near Munirabad /suitable location in Koppal distt.) - Munirabad 400 kV D/c Line (with Quad Moose ACSR conductor)

(Based on the request of KPTCL, it was decided to drop this line in the 2nd meeting of SRSCT. The same would be taken up in ECT/NCT.)

(iii) Pooling station (near Munirabad /suitable location in Koppal distt.) - Narendra (New) 400 kV D/c Line (with Quad Moose ACSR conductor)

(iv) 9 Nos of 220 kV line bays for interconnection of wind projects

(v) 2x125 MVA, 400 kV bus reactor at Pooling station (near Munirabad /suitable location in Koppal distt.)

(vi) Adequate space provision for future expansion

d) Kurnool Wind Energy Zone (3000 MW) /Solar Energy Zone (AP) (1500 MW):

(i) Establishment of 765/400/220 kV 3x1500 MVA, 9x500 MVA Pooling station at suitable location in Kurnool Distt. (Kurnool-III)

(ii) Kurnool-III Pooling station - Kurnool(new) 765 kV D/c Line

(iii) Kurnool –III PS-Maheshwaram(PG) 765 kV D/c Line

(iv) 220 kV line bays for interconnection of wind projects (15 nos.)

(v) 1x330 MVA (765kV) & 1x125 MVA (400 kV) bus reactor at Kurnool-III PS

(vi) 240 MVA Switchable line reactors at both ends of Kurnool-III PS – Maheshwaram (PG) 765 kV D/c Line

6.3 The above transmission system was agreed as a broad master plan to serve integration of RE generation potential assessed in Tamil Nadu, Karnataka and Andhra Pradesh for the period up to 2021-22. This broad master plan would be implemented in stages for RE integration. The transformation capacity at various sub-stations and certain elements would be reviewed based on LTA applications.

6.4 The above transmission system was discussed in 2nd meeting of National Committee on Transmission (NCT) held on 04.12.2018 and in the 3rd meeting of Empowered Committee on Transmission (ECT) held on 21.12.2018, wherein it was decided that implementation of the above schemes may be taken up only after receipt of Stage-II

I/5982/2019

connectivity applications/LTA applications from RE generators or LTA application from RIA on behalf of RE generators. CTU informed that so far, no LTA applications have been received from RE generators or SECI.

- 6.5** Further, the transmission system for evacuation of power from Phase-II Wind & Solar Energy Zone in Southern Region was discussed in the 1st Southern Region Standing Committee on Transmission held on 07.09.2018 wherein following transmission system was proposed for integration of Phase-II Solar Energy Zones in Southern Region:

Transmission scheme for Solar Energy Zone in Andhra Pradesh (3500 MW)

Ananthpuram (Anantapur)SEZ (2500 MW) and Kurnool SEZ (1000 MW)

- (i) Establishment of 765/400/220 kV, 3x1500 MVA, 7x500 MVA pooling station at suitable border location between Ananthpuram & Kurnool Distt
- (ii) LILO of Kurnool-III PS - Kurnool(New) 765 kV D/c Line at Ananthpuram PS
- (iii) Ananthpuram PS- Pavagada (PG) 400 kV D/C Line (HTLS)
- (iv) 220 kV line bays for interconnection of wind/solar projects (12 nos)
- (v) 1x330 MVAr (765kV) & 1x125 MVAr (400kV) bus reactor at Ananthpuram PS

Transmission Scheme for Solar Energy Zone in Karnataka (5000 MW)

a) Gadag SEZ (2500 MW)

- (i) Establishment of 400/220 kV, 5x500 MVA Gadag Pooling Station (with provisions to upgrade to 765 kV)
- (ii) Gadag PS - Koppal PS 400 kV D/C Line (HTLS)
- (iii) LILO of Tumkur (Vasantnarsapura) - Narendra (New) 765 kV D/C Line (Operating at 400 kV) at Gadag PS
- (iv) 220 kV line bays for interconnection of solar projects (8 nos)
- (v) 1x125MVAr (400 kV) bus reactor at Gadag PS

b) Bidar SEZ (2500 MW)

- (i) Establishment of 400/220 kV, 5x500 MVA Bidar Pooling Station
- (ii) Bidar PS - Nizamabad(PG) 400 kV D/C line (HTLS)
- (iii) Bidar PS - Gulbarga (KPTCL) 400 kV D/C line (HTLS)
- (iv) 220 kV line bays for interconnection of solar projects (8 nos)
- (v) 1x125 MVAr (400 kV) bus reactor at Gadag PS

I/5982/2019

- 6.6** In the 1st SRSCT meeting, it was decided that due to the requirement of large scale integration of renewable energy generators in Southern Region, including the proposal for ISTS connected RE generators in the state of Andhra Pradesh and Karnataka, detailed study needs to be carried out considering the proposals of renewable rich states.
- 6.7** Accordingly, the above schemes were taken up for detailed analysis in the joint study meeting of SR constituents held on 1 - 2 May, 2019, at SRPC, Bengaluru. Considering the large scale capacity addition from RE sources in Southern States and commissioning of generation projects based on conventional sources by the year 2021-22 and the likely electricity demand in the year 2021-22, the load generation balance for Southern Region was prepared for the year 2021-22 in co-ordination with the constituents. The same is given at **Annex-II**. Details are given below:

State	Installed Capacity 2021-22 (MW)	Dispatch			Morning Peak Load (MW)	Evening Peak Load (MW)	Off-Peak Load (MW)	Deficit (-) / Surplus(+)		
		Morning Peak [Solar @ 75% & Wind @10%]	Evening Peak [Solar @ 75% & 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	7981
ISTS RE (solar) SR	14050	10538	0	10538				10538	0	10538
Total	144123	72088	54680	72782	61450	61450	43015	10638	-6770	29767

Note: Electricity demand of Puducherry (460 MW) is included in Tamil Nadu.

- 6.8** Govt. of India Order No. 23/03/2016-R&R dated 14.06.2018, notified the long term growth trajectory of Renewable Purchase Obligations (RPOs) for Solar as well as Non-Solar, uniformly for all States / Union Territories upto the year 2021-22 in order to achieve the target of 1,75,000 MW of Renewable Energy capacity by March, 2022. All the States / Union Territories uniformly need to meet 21% (Solar - 10.5% + Non-Solar - 10.5%) of the total consumption of electricity in 2021-22 from Renewable Energy Resources. During 2018-19, peak electricity demand of Southern Region was 49,623 MW (339,377 MU) which is expected to grow as per the 19th EPS to 62,975 MW (4,20,753 MU) by 2021-22.
- 6.9** Considering the large scale integration of RE generators and load generation scenario of Southern Region, the dispatch of coal based generation plants would

I/5982/2019

have to be reduced to their technical minimum in certain seasons and in certain hours and dispatch of gas based generation projects would also have to be reduced to zero in certain seasons and in certain hours, considering that the States / Union Territories shall be meeting 21% of their electricity demand from RE sources by 2021-22.

- 6.10** Further as per the CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017, minimum 22% Capacity Utilization Factor (CUF) is to be considered for wind farms and 19% CUF for Solar PV project. Accordingly, the RPO obligations shall be met by States / Union Territories from RE generation including ISTS connected RE generation by 2021-22. The details of the same are given below:

State/UT	Projected electricity demand in 2021-22 (as per 19 th EPS)		RPO Obligation (21% in MU) (MU)	RPO equivalent capacity requirement in MW (Avg CUF 21%)
	(MW)	(MU)		
Andhra Pradesh	11843	78540	16493	8966
Telangana	14499	84603	17767	9658
Karnataka	14271	85932	18046	9810
Kerala	5263	31371	6588	3581
Tamil Nadu	20273	136643	28695	15598
Puducherry	583	3664	769	418
Southern Region	62975	420753	88358	48031

- 6.11** With the high penetration/implementation/potential of wind and solar generations in Southern Region, the region is expected to become power surplus in certain seasons during the year (especially from June to September, when Southern Region experiences generally off-peak load conditions) and in certain conditions/hours (peak solar generation period), the surplus may be observed to extent of 29,000 MW. This surplus power would have to be exported from Southern Region to other regions and would be required to be absorbed in other Regions.
- 6.12** Further from the load-generation balance of Southern Region as provided in para 6.7, it may be observed that during the evening peak load conditions, Southern Region may observe deficit conditions and require import of power of about 6,800 MW. Accordingly, the transmission system within Southern region and the inter-regional links between Southern Grid and rest of all-India Grid, shall have to be robust and flexible enough to facilitate import of power to meet the deficit in Southern Region during the evening peak load conditions and shall also facilitate export of surplus power of about 29,000 MW from Southern Region during high RE & off-peak demand conditions.
- 6.13** In the joint study meeting, CTU representative stated that it may be possible to export 15,000-17,000 MW of surplus power from Southern Region with upgradation of existing/under implementation substations from 400 kV to rated voltage level of 765 kV and charging of corresponding transmission lines to their rated voltage at 765 kV

I/5982/2019

level. However, for export of surplus power of the order of 29,000 MW from Southern Region, inter-regional system strengthening shall be required. For further transfer of power within Western Region and beyond to Northern Region or Eastern Region, transmission system augmentation may be required, which needs to be identified based on all-India studies.

- 6.14** Accordingly, detailed system studies were carried out for evacuation of power from Solar & Wind Energy zones in Andhra Pradesh and Karnataka in Southern Region as per the above load-generation balance for integration of Phase-II Solar Energy Zones, wherein the following transmission system was envisaged:

Transmission scheme for Solar Energy Zone in Andhra Pradesh (3500 MW)

Ananthpuram (Ananthapur) SEZ (2500 MW) and Kurnool SEZ (1000 MW)

- (i) Establishment of 765/400/220 kV, 3x1500 MVA, 7x500 MVA pooling station at suitable border location between Ananthpuram & Kurnool Distt
- (ii) Ananthpuram PS-Kurnool-III PS 765 kV D/c Line
- (iii) Ananthpuram PS-Cuddapah 765 kV D/C Line along with 1x240 MVA switchable Line Reactor on Ananthapur PS end of each circuit
- (iv) 220 kV line bays for interconnection of wind/solar projects (12 nos)
- (v) 1x240 MVA (765kV) & 1x125 MVA (400kV) bus reactor at Ananthpuram PS

Transmission Scheme for Solar Energy Zone in Karnataka (5000 MW)

a) Gadag SEZ (2500 MW)

- (i) Establishment of 400/220 kV, 5x500 MVA Gadag Pooling Station
- (ii) Gadag PS-Koppal PS 400 kV quad D/C Line
- (iii) Gadag PS-Narendra (new) PS 400 kV quad D/C Line
- (iv) 220 kV line bays for interconnection of solar projects (8 nos)
- (v) 1x125MVA (400 kV) bus reactor at Gadag PS

b) Bidar SEZ (2500 MW)

- (i) Establishment of 765/400/220 kV, 3x1500 MVA, 5x500 MVA pooling station at suitable border location near Bidar
- (ii) Bidar PS – Parli (new) (PG) 765 kV D/C line along with 1x330 MVA switchable Line Reactor on Parli (New) end of each circuit
- (iii) Bidar PS – Maheshwaram (PG) 765 kV D/C line along with 1x240 MVA switchable Line Reactor on Bidar PS end of each circuit

I/5982/2019

- (iv) 220 kV line bays for interconnection of solar projects (8 nos)
- (v) 1x240 MVA (765kV) & 1x125 MVA (400 kV) bus reactor at Bidar PS

Common Transmission System Strengthening in Southern Region for export of power from Solar & Wind Energy Zone in Southern Region

- (i) Raichur – Sholapur 765kV D/c line with 240 MVA line reactor at Raichur end.
- (ii) Narendra – Kolhapur 765kV 2nd D/c line with 330MVA line reactor at Kolhapur end
- (iii) Upgradation of Tuticorin PS to its rated voltage of 765kV level along with 2x1500 MVA transformer and 1x330 MVA Bus Reactor
- (iv) Upgradation of Dharmapuri (Salem New) to its rated voltage of 765kV level alongwith 2x1500 MVA transformer and 1x240 MVA Bus Reactor
- (v) Upgradation of Madhugiri (Tumkur) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x240 MVA Bus Reactor
- (vi) Upgradation of Narendra New to its rated voltage of 765kV level alongwith 2x1500 MVA transformer and 1x330 MVA Bus Reactor
- (vii) Upgradation/charging of Tuticorin PS - Dharmapuri (Salem New) 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVA switchable Line Reactor on both end of each circuit.
- (viii) Upgradation/charging of Dharmapuri (Salem New) - Madhugiri (Tumkur) 765 kV 2xS/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVA switchable Line Reactor on Dharmapuri (Salem New) end of one circuit and 1x330 MVA switchable Line Reactor on Dharmapuri (Salem New) end of second circuit
- (ix) Upgradation/charging of Madhugiri (Tumkur) - Narendra New 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVA switchable Line Reactor on both end of each circuit.
- (x) Conversion of 400 kV Line Reactors installed on 765 kV circuits/ lines (initially charged at 400 kV) mentioned at SI No. v, vi and vii into 400 kV bus Reactor with suitable arrangements at respective substations.

Common Transmission System Strengthening in Western Region for export of power from Solar & Wind Energy Zone in Southern Region

- (i) Upgradation of Kolhapur (PG) to its rated voltage of 765kV level along with 2x1500 MVA transformer and 1x330 MVA Bus Reactor

I/5982/2019

- (ii) Upgradation/charging of Narendra (New) - Kolhapur (PG) 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVAR switchable Line Reactor on Kolhapur (PG) end of each circuit
- (iii) Conversion of 400kV Line Reactors installed on 765 kV circuits/ lines (initially charged at 400 kV) mentioned at Si No II into 400 kV bus Reactor with suitable arrangements at respective substations.
- (iv) Kolhapur(PG) – Pune GIS 765 kV D/c Line along with 1x330 MVAR switchable Line Reactor on Kolhapur (PG) end and 1x240 MVAR Line Reactor on Pune PG end of each circuit.

6.15 CTU representative stated that from the system study results, it was observed that large surplus power from Southern Region would be required to be exported through the inter-regional links between Southern grid and Western grid, including the above proposed transmission system, keeping in view the potential of Solar & Wind Energy Zones in Southern Region.

6.16 The above transmission system shall be required for immediate connectivity to Phase-II wind and solar generation in Southern region. In addition to above transmission system requirements, the transformation capacity augmentation shall also be required at number of 765 kV and 400 kV substations which may be identified with the receipt of LTA applications, so that the same can be implemented in the matching period of RE generations.

6.17 However, for further transfer of power within Western Region and beyond to Northern Region or Eastern Region, transmission system augmentation may be required, which is to be identified. Chief Engineer (PSPA-II), CEA, stated that a note in this regard has already been sent to Member Secretary of NRSCT and WRSCT, dealing with planning of Western & Northern regional grids, with a request to plan for absorption of this surplus power in Western/Northern Region.

6.18 POSOCO representative stated that with the integration of large quantum of RE in Southern Region, power is expected to be exported towards potential load centers in Western Region, Northern Region and Eastern region. The present proposal serves as broad master plan for integration of Phase-I & Phase-II potential Solar and Wind energy zones in Southern Region and export of surplus power from Southern Region. However, due to absorption of this excess power from Southern Region, transmission constraints may occur in 400 kV or lower level network within Western, Northern and Eastern Grid, which may ultimately lead to insecure operating conditions and possible RE curtailment. Accordingly, he suggested that all-India studies may be carried out for planning the transmission system, with participation from all regions.

6.19 Chief Engineer (PSPA-II), CEA, informed that based on the outcome of regional studies, all-India studies would be carried out to identify the system strengthening

I/5982/2019

required for transfer of power from one region to another in different load- generation scenarios.

- 6.20** POSOCO representative also suggested that low RE scenario should also be studied at planning stage itself, in order to prevent multiple transmission line openings to control over voltages and reversal of power in real time operation.
- 6.21** Chief Engineer (PSPA-II), CEA, informed that studies for Southern Region had been carried out for various load-generation scenarios viz. high solar generation scenario, high wind generation scenario and low solar/wind generation scenarios.
- 6.22** TANGEDCO representative stated that the proposed transmission system should be taken-up only after firm commitment from beneficiaries and not merely based on the envisaged RE potential, as this shall further escalate their transmission charges and the DISCOMs shall be further burdened. TANGEDCO representative further enquired about the commitment of payment of transmission charges of the above proposed transmission system. Chief Engineer (PSPA-II), CEA, stated that the payment of transmission charges shall be as per the Govt. of India Policy and CERC Regulations.
- 6.23** TANGEDCO representative stated that the waiver of transmission charges should be given only to the eligible RE generators upon receipt of relevant documents regarding fulfilment of the provisions for waiver of transmission charges and losses for the use of ISTS network and not merely upon the declaration by RE generators. It was suggested that RE generators may be asked to produce certificate from entities including DISCOM(s) that the executed PPAs with the solar and wind generators are for compliance of their renewable purchase obligations. This was noted by POSOCO and CTU.

After deliberations, it was decided that henceforth RE generators shall be required to submit the certificate issued from DISCOM(s) for waiver of transmission charges and losses, for which suitable format shall be developed by CTU and advisory shall be issued in this regard on its website.

- 6.24** Member Secretary (I/C), SRPC, requested that for the RE generators which are not eligible for waiver of transmission charges & losses for the use of ISTS network, the details may be shared with SRPC. SRPC and STU representatives also requested that the information pertaining to bilateral billing to generators as part of RTA, may be provided for compliance with the CERC Regulations. CTU agreed to provide the same.
- 6.25** POSOCO representative stated that with the integration of large quantum of RE, the short circuit ratio (SCR) for assessing the strength of the system should also be assessed at the planning stage and minimum SCR may be ensured in accordance with the Central Electricity Authority (Technical Standard for Connectivity to the grid) Regulations. CTU representative stated that as per the international practice, SCR of

I/5982/2019

3 or higher implies a strong system for RE integration and operation, while a value of 1.5 is a minimally acceptable level for RE integration. The same was also recommended by the M/s Powertech Labs Inc. consultant as well.

- 6.26** Representative of KPTCL stated that with the proposed system and high amount of RE injection at Gadag and Bidar, the transmission lines in and around Munirabad area may get overloaded and accordingly suggested that injection of RE power at Munirabad should be prevented. During off-peak condition, when state's RE generation, mainly wind, which is expected to be around 8,000 MW capacity, will be at its maximum generation which may be about 65%-70% of the installed capacity as seen in recent past. Gadag being predominant wind zone, will contribute significantly to the total RE generation which may lead to congestion in the 400 kV and 220 kV network considering the proposed capacity injected to Koppal. Added to this, another 2500 MW solar generation proposed at Gadag SEZ will lead to further congestion in the downstream network. During peak load condition, with the proposed solar generation (2500 MW) along with other internal generation of the State which includes both conventional and RE generators, power will tend to flow towards load center, in this case towards Bengaluru through 400 kV Munirabad- Guttur- Hiriyur-Nelamangala line and Munirabad-RTPS-Raichur New-Gooty-FSC 1&2 towards Bengaluru, leading to loading violations of any of the 400 kV segment.
- 6.27** Accordingly, KPTCL requested that "Pooling station (near Munirabad/suitable location in Koppal distt.) - Munirabad 400 kV D/c Line (with Quad Moose ACSR conductor)" may be dropped.
- 6.28** Towards this CTU representative stated that the referred transmission line has already been agreed in the 2nd meeting of National Committee on Transmission held on 04.12.2018 and in the 3rd meeting of Empowered committee on Transmission held on 21.12.2018 and the same shall require requisite approval from NCT & ECT. After deliberations, it was agreed to drop the referred transmission line and same would be taken-up in the forthcoming meeting of NCT and ECT.
- 6.29** Based on the above, the transmission system for Phase- I (including part Ph-II) RE in Southern Region, as detailed in para 6.2 was reviewed and agreed.
- 6.30** Chief Engineer (PSPA-II), CEA, stated that optimum minimum system required for RE integration should be approved and options are to be explored for integration at 400 kV level, wherever possible. This shall also address the beneficiaries concerns towards enhancement in transmission charges. Accordingly, it was suggested that the proposed 765/400 kV substation in Andhra Pradesh for integration of 3500 MW (Ananthpuram-2500 MW solar & Kurnool-1000 MW wind) of RE potential may be downgraded to 400/220 kV substation with 7x500 MVA transformation capacity. Further, the proposed integration of the substation shall be at 400 kV via

I/5982/2019

Ananthpuram PS-Kurnool-III PS 400 kV (High capacity) D/c Line and Ananthpuram PS-Cuddapah 400 kV (High capacity) D/C Line with suitable line reactors.

6.31 After detailed deliberations, it was decided that immediate connectivity transmission system for integration of Phase-I & Phase-II of potential Solar and Wind Energy Zones may be approved as per the above discussions. However, the proposed system strengthening in the inter-regional corridors and system strengthening beyond Kolhapur in Western region shall require all-India study.

6.32 Accordingly, following transmission system was agreed by the Standing Committee for evacuation of power from Phase-II Solar Energy Zones in Andhra Pradesh and Karnataka:

Transmission scheme for Solar Energy Zone in Andhra Pradesh (3500 MW)

Ananthpuram (Ananthapur) SEZ (2500 MW) and Kurnool SEZ (Kurnool-1000 MW)

- (i) Establishment of 400/220 kV, 7x500 MVA pooling station at suitable border location between Ananthpuram & Kurnool Distt
- (ii) Ananthpuram PS-Kurnool-III PS 400 kV (High capacity equivalent to quad moose) D/c Line
- (iii) Ananthpuram PS-Cuddapah 400 kV (High capacity equivalent to quad moose) D/c Line with suitable line reactors
- (iv) 220 kV line bays for interconnection of wind/solar projects (12 nos.)
- (v) 2x125 MVA (400 kV) bus reactors at Ananthpuram PS

Transmission Scheme for Solar Energy Zone in Karnataka (5000 MW)

a) Gadag SEZ (2500 MW)

- (i) Establishment of 400/220 kV, 5x500 MVA Gadag Pooling Station.
- (ii) Gadag PS-Koppal PS 400 kV (high capacity equivalent to quad moose) D/C Line.
- (iii) Gadag PS-Narendra (New) PS 400 kV (high capacity equivalent to quad moose) D/C Line.
- (iv) 220 kV line bays for interconnection of solar projects (8 nos.)
- (v) 1x125 MVA (400 kV) bus reactor at Gadag PS.
- (vi) Upgradation of Narendra (New) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x330 MVA Bus Reactor.
- (vii) Upgradation of Kolhapur (PG) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x330 MVA Bus Reactor.

I/5982/2019

- (viii) Upgradation/charging of Narendra new - Kolhapur (PG) 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVAR switchable Line Reactor on Kolhapur (PG) end of each circuit.

b) Bidar SEZ (2500 MW)

- (i) Establishment of 765/400/220 kV, 3x1500 MVA, 5x500 MVA pooling station at suitable border location near Bidar.
- (ii) Bidar PS – Maheshwaram (PG) 765 kV D/C line along with 1x240 MVAR switchable Line Reactor on Bidar PS end of each circuit.
- (iii) 220 kV line bays for interconnection of solar projects (8 nos).
- (iv) 1x240 MVAR (765 kV) & 1x125 MVAR (400 kV) bus reactor at Bidar PS.

6.33 Following “common transmission system strengthening in Southern Region for enabling evacuation and export of power from Solar & Wind Energy Zones in Southern Region” was also agreed by the Standing Committee:

- (i) Upgradation of Tuticorin PS to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x330 MVAR Bus Reactor.
- (ii) Upgradation of Dharmapuri (Salem New) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x240 MVAR Bus Reactor.
- (iii) Upgradation of Madhugiri (Tumkur) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x240 MVAR Bus Reactor.
- (iv) Upgradation/charging of Tuticorin PS - Dharmapuri (Salem New) 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVAR switchable line reactor on both end of each circuit.
- (v) Upgradation/charging of Dharmapuri (Salem New) - Madhugiri (Tumkur) 765 kV 2xS/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVAR switchable Line Reactor on Dharmapuri (Salem New) end of each circuit.
- (vi) Upgradation/charging of Madhugiri (Tumkur) - Narendra New 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVAR switchable line reactor on both end of each circuit.
- (vii) Conversion of 400 kV line reactors installed on 765 kV circuits/ lines (initially charged at 400 kV) mentioned at sl no. iv, v and vi into 400 kV bus Reactor with suitable arrangements at respective substations.

6.34 The above transmission system is a broad master plan to serve integration of RE generation potential assessed in Tamil Nadu, Karnataka and Andhra Pradesh for period upto 2021-22. As such, it was agreed that the scheme would be implemented

I/5982/2019

as ISTS, consequent to grant of LTA by CTU. The transformation capacity at various sub-stations and certain elements may be required to be reviewed based on LTA applications. Accordingly, this broad master plan would be implemented in stages to serve RE integration.

- 6.35** It was also decided that all-India studies would be conducted with the participation of CEA, CTU, POSOCO and concerned beneficiaries /STUs for evolution of additional (over and above the above proposed scheme) transmission scheme for export of power from Southern grid to rest of all-India grid. If required, a joint meeting of the RSCTs may also be convened.

Transmission Planning proposals by Andhra Pradesh

7.0 Proposal by APTRANSCO for erection of 400/220/132 kV Chilakaluripet S/S near Kukkapalli Varipalem village in Guntur district.

- 7.1** Director (PSPA-II), CEA, stated that, APTRANSCO had proposed for erection of 400/220 kV Chilakaluripeta S/S along with associated transmission lines. The transmission system was agreed in the 39th meeting of SCPSPSR. Details are given below:

- i. 400 kV bus extension at proposed 765/400 kV Chilakaluripeta (PGCIL) S/S for erection of 400/220 kV Chilakaluripeta S/S with 2x500 MVA PTRs after construction of proposed 765/400 kV Chilakaluripeta (PGCIL) S/S.
- ii. Erection of 220/132 kV Chilakaluripeta S/S with 2x100 MVA PTRs.
- iii. 220 kV D/c line (20 km approx.) from proposed 220/132 kV Chilakaluripeta S/S to 400/220 kV Chilakaluripeta S/S.
- iv. 132 kV LILO (10.5 km approx.) of existing 132 kV Chilakaluripeta –Nallapadu line at proposed 220/132 kV Chilakaluripet SS
- v. 132 kV LILO (10.5 km approx.) of existing 132 kV Chilakaluripeta – Marripalem line at proposed 220/132 kV Chilakaluripet SS.
- vi. 1x125 MVAR Bus reactor at 400/220 kV substation at Chilakaluripeta.

- 7.2** APTRANSCO has informed that the proposed site for construction of 400/220 kV Chilakaluripeta S/S is in the vicinity of all 220 kV and 132 kV transmission lines and APTRANSCO has proposed to construct 400/220/132 kV Chilakaluripeta S/S with

I/5982/2019

220 kV & 132 kV features instead of separate 220/132 kV Chilakaluripeta S/S. The following scheme has been proposed by APTRANSCO:

- i. Erection of 400/220/132 kV Chilakaluripeta SS with 2x500 MVA ICTs and 2x100 MVA PTRs.
- ii. 400 kV QMDC line (33 km approx.) from 765/400 kV Chilakaluripeta(PGCIL) S/S to 400/220/132 kV Chilakaluripeta S/S.
- iii. Making 220 kV S/C LILO (0.7 km approx.) of existing 220 kV Sattenapalli-Parchuru DC line at proposed 400/220/132 kV Chilakaluripeta S/S.
- iv. Making 220 kV DC LILO (6 km approx.) of existing 220 kV Ongole-Guntur-2 (Prathipadu) SC line at proposed 400/220/132 kV Chilakaluripeta SS.
- v. 132 kV LILO (2.5 km approx.) of existing 132 kV Chilakaluripeta –Nallapadu at proposed 220/132 kV Chilakaluripet SS
- vi. 132 kV LILO (2.5 km approx.) of existing 132 kV Chilakaluripeta –Marripalem at proposed 220/132 kV Chilakaluripet SS.
- vii. 132 kV DC/SC LILO (2 km approx.) of existing 132 kV Chilakaluripeta – Parchuru DC/SC line at proposed 220/132 kV Chilakaluripet SS.
- viii. 1x125 MVAR Bus reactor at 400/220 kV substation at Chilakaluripeta.

The above proposal was agreed in the joint study meeting.

- 7.3** Representative of CTU stated that the 400 kV bays at the both ends will be in the scope of the APTRANSCO. APTRANSCO agreed for the same.
- 7.4** COO, CTU enquired about the distance between Chilakaluripeta 765/400kV S/S PG to Chilakaluripeta 400kV S/S AP. APTRANSCO informed that distance between the two substations is about 33 km. COO, CTU advised APTRANSCO to use twin HTLS conductors instead of quad moose for the transmission line.
- 7.5** Chief Engineer (PSPA-II), CEA, advised to consider 63 kA short circuit rating for the Chilakaluripeta 400kV S/S (AP). APTRANSCO agreed for the same.
- 7.6** After further deliberations, the above proposal of APTRANSCO was agreed by the Standing Committee.

8.0 Proposal of APTRANSCO for extension of EHT Power Supply of 582 MW for Godavari-Penna Interlink Phase-I Lift Irrigation Scheme in Guntur District.

- 8.1** Director (PSPA-II), CEA, stated that APTRANSCO has proposed dedicated transmission scheme for extension of 582 MW of power supply at 220 kV level to five number of pumping stations under Godavari-Penna Interlink Phase-I Lift Irrigation Scheme in Guntur District as detailed below:

Sl. No.	Name of LI Scheme	Load in MW
1.	Lift – 1: 220/11 kV Harischandrapuram SS	39
2.	Lift – 2: 220/11 kV Lingapuram SS	96
3.	Lift – 3: 220/11 kV Gorantla SS	120
4.	Lift – 4: 400/220/11 kV Burugubanda SS	192

I/5982/2019

5.	Lift – 5: 220/11 kV Nakarikallu SS	135
	Total	582

8.2 Accordingly, APTRANSCO has proposed the following dedicated scheme for extension of 582 MW of power supply at 220 kV and 132 kV level to the above proposed five number of pumping stations under Godavari – Penna Interlink Phase-I Lift Irrigation Scheme in Guntur district. The proposal was agreed in the joint study meeting.

- i. Erection of 400/220/11 kV Bhurugubanda S/S with 2 x 500 MVA ICTs.
- ii. Making LILO (14 km approx.) of 400 kV Twin Moose Sattenapalli – Eluru & Sattenapalli – Nunna lines at proposed 400/220/11 kV Bhurugubanda SS.
- iii. Making 220 kV DC LILO (3 km approx.) of existing 220 kV VTS- Piduguralla D/C line at proposed 400/220/11 kV Bhurugubanda SS.
- iv. Erection of 220/11 kV Harischandrapuram SS.
- v. Making 220 kV DC LILO (3 km approx.) of existing 220 kV VTS- Piduguralla DC line at proposed 220/11 kV Harischandrapuram SS.
- vi. Erection of 220/11 kV Lingapuram SS.
- vii. Making 220 kV LILO (1 km approx.) of existing 220 kV VTS – Tallapalli SC line & 220 kV VTS – Rentachintala SC line at proposed 220/11 kV Lingapuram SS.
- viii. Erection of 220/11 kV Gorantla SS.
- ix. Erection of 220 kV Twin Moose DC Line (17 km approx.) from proposed 400/220/11 kV Bhurugubanda SS to proposed 220/11 kV Gorantla SS.
- x. Making 220 kV LILO (6 km approx.) of existing 220 kV VTS – Tallapalli SC line & 220 kV VTS – Rentachintala SC line at proposed 220/11 kV Gorantla SS
- xi. Erection of 220/11 kV Nakarikallu SS.
- xii. Erection of 220 kV Twin Moose DC Line (26 km approx.) from proposed 400/220/11 kV Bhurugubanda SS to proposed 220/11 kV Nakarikallu SS.

8.3 Member Secretary (I/C), SRPC, opined that this substation should be provided with SCADA facility and operation controllability from SRLDC. The same was agreed by APTRANSCO.

8.4 After further deliberations, members agreed to the above proposal.

9.0 Proposal of APTRANSCO for erection of 400/220 kV Atchuthapuram GIS and associated transmission network in Vishakhapatnam district.

9.1 Director (PSPA-II), CEA, stated that APTRANSCO has proposed the following dedicated transmission scheme for erection of 400/220 kV Atchuthapuram GIS and connected transmission network in Vishakhapatnam district to meet the load demand in the area. The scheme was agreed in the Joint Study meeting held at Bengaluru.

I/5982/2019

- i. Up-gradation of 220 kV Atchuthapuram S/S to 400/220 kV Atchuthapuram S/S with 3 x 500 MVA PTRs.
- ii. Making LILO (4 km approx.) of existing 400 kV Kalapaka - Vemagiri TMSC & Vemagiri – Simhadri TMSC line at proposed 400/220 kV Atchuthapuram SS.
- iii. Making 220 kV LILO (12 km approx.) of existing 220 kV Pendurthi - Upper Sileru SC line at proposed 400/220 kV Atchuthapuram SS.
- iv. Making 220 kV LILO (12 km approx.) of existing 220 kV Koruprolu -Kakinada SC line & Koruprolu - Anark SC line at proposed 400/220 kV Atchuthapuram SS.
- v. Erection of 220 kV DC line (8 km approx.) from 220 kV Brandix SS to proposed 220 kV Atchuthapuram SS.

9.2 The above proposal of APTRANSCO was agreed by the Standing Committee.

10.0 Proposal by APTRANSCO for evacuation of 960 MW (12x80 MW) power from Polavaram Hydro Electric Project of APGENCO in East Godavari district and system improvement network connected to 400 kV Guddigudem SS and Inter connection of 220 kV Lines.

10.1 Director (PSPA-II), CEA, stated that the following dedicated transmission scheme for evacuation of 960 MW (12 x 80 MW) power from Polavaram Hydro Electric Project (PHEP) was agreed in 42nd meeting of SCPSPSR:

- i. KV Kota – PHEP 400kV D/C line (with quad Moose ACSR conductor) – 79 km.
- ii. 2 x 125 MVA, 400 kV bus Reactor at Polavaram Hydro Electric Project.

10.2 Subsequently, following 220 kV downstream power evacuation system from 400 kV Polavaram HEP and GVK power plant, by providing 2x 500 MVA, 400/220 kV at each location to overcome the overloading conditions in and around Ramachandrapuram area, was agreed in 1st meeting of SRSCT as an intra-state system:

- i. 2 x 500 MVA, 400/220kV ICTs at PHEP.
- ii. Polavaram- Pattiseema 220 kV D/C line (Twin Moose ACSR, 16 km approx.)
- iii. LILO of both circuits of Polavaram - Pattiseema 220 kV D/C line at Purushothapatnam S/S (1 km approx.).
- iv. LILO of the both existing circuits of the Vemagiri - Samalkot 220 kV D/C line at Jegurupadu S/S (1 km approx.)
- v. 2x500 MVA, 400/220 kV ICTs at GVK-2 Power Plant
- vi. 2x100 MVA, 220/132 kV ICTs at Ramachandrapuram SS
- vii. GVK-2 Power Plant –Ramachandrapuram 220 kV D/C line (single moose ACSR conductor (25 km approx.)
- viii. LILO of existing 132 kV RC Puram- Kakinada 132 kV D/C line at proposed at RC Puram (0.5 km approx.)

I/5982/2019

- ix. LILO of existing 132 kV RC Puram - Editha at proposed 220/132 kV S/S at RC Puram (1 km approx.)
- x. LILO of existing 132 kV RC Puram - Kothapeta at proposed 220/132 kV SS at RC Puram (6 km approx.)
- xi. Gollapalem - RC Puram 132 kV D/C line (18 km approx.).

10.3 Director (PSPA-II), CEA, further stated that APTRANSCO has informed that space was not available for establishment of 220 kV features at Polavaram HEP. Accordingly, APTRANSCO had proposed the following revised transmission evacuation scheme for 12 x 80 MW (960 MW) Polavaram Hydro Electric Project in East Godavari district:

- i. Polavaram – Guddigudem 400 kV D/c (quad) line.
- ii. LILO of both circuits of existing Pallantha – Pattiseema 220 kV D/c line at 400/220 kV Guddigudem S/s.
- iii. Purushothapuram – Guddigudem 220 kV D/c line.

(Guddigudem SS was already approved under Chintalapudi Lift Irrigation Scheme in the 41st SRST)

10.4 In the joint study meeting, CEA and CTU had opined that the proposed arrangement may result into constraints in power evacuation from Polavaram HEP and Hinduja generation projects due to overloading of Guddigudem – KV Kota section of the transmission system. After detailed discussions, following scheme was proposed for evacuation of power from Polavaram HEP.

- i. Polavaram – Guddigudem 400 kV D/c (quad) line
- ii. Guddigudem - Eluru 400 kV D/c (quad) line

Further, it was also brought out that there should be proper reactive compensation at Guddigudem and Eluru.

10.5 It was agreed to drop the following transmission system which had been approved in the 1st SRST meeting, on account of non-availability of space for establishment of 220 kV features at Polavaram HEP:

- i. 2 x 500 MVA, 400/220kV ICTs at PHEP.
- ii. Polavaram- Pattiseema 220 kV D/C line (Twin Moose ACSR, 16 km approx.)
- iii. LILO of both circuits of Polavaram - Pattiseema 220 kV D/C line at Purushothapatnam S/S (1 km approx.).

10.6 Accordingly, after further deliberations, following transmission scheme was agreed for evacuation of 960 MW power from PHEP by the Standing Committee:

- i. Polavaram – Guddigudem 400 kV D/c (quad) line
- ii. Guddigudem - Eluru 400 kV D/c (quad) line

I/5982/2019

- iii. 1x125 MVR,400kV bus reactor at Guddigudem
- iv. 1x125 MVR,400kV bus reactor at Eluru

Along with above scheme, following transmission scheme as agreed in 1st SRSCT would remain:

- i. LILO of the both existing circuits of the Vemagiri - Samalkot 220 kV D/C line at Jegurupadu S/S (1 km approx.)
- ii. 2x500 MVA, 400/220 kV ICTs at GVK-2 Power Plant
- iii. 2x100 MVA, 220/132 kV ICTs at Ramachandrapuram SS
- iv. GVK-2 Power Plant –Ramachandrapuram 220 kV D/C line (single moose ACSR conductor (25 km approx.)
- v. LILO of existing 132 kV RC Puram- Kakinada 132 kV D/C line at proposed at RC Puram (0.5 km approx.)
- vi. LILO of existing 132 kV RC Puram - Editha at proposed 220/132 kV S/S at RC Puram (1 km approx.)
- vii. LILO of existing 132 kV RC Puram - Kothapeta at proposed 220/132 kV SS at RC Puram (6 km approx.)
- viii. Gollapalem - RC Puram 132 kV D/C line (18 km approx.).

11.0 Proposal of APTRANSCO for extension of total power of 450 MVA, 210 MVA power for establishment of Petrochemical Complex by M/s GAIL (India) Ltd and 240 MVA power supply at 220 kV level in Kakinada SEZ.

11.1 Director (PSPA-II), CEA, stated that APTRANSCO has proposed the following transmission scheme for extension of total power of 450 MVA, 210 MVA power for establishment of Petrochemical Complex by M/s GAIL (India) Ltd and 240 MVA power supply at 220 kV level in Kakinada SEZ:

- i. Up-gradation of 220/132/33 kV Kakinada SEZ SS to 400/220/132/33 kV Kakinada SEZ SS with 2 x 315 MVA PTRs.
- ii. Making LILO (10 km approx.) of 400 kV TMDC line of HNPCL – KV Kota line at proposed 400/220/132/33 kV Kakinada SEZ SS.
- iii. 220 kV DC line (5 km approx.) from proposed 400/220/132/33 kV Kakinada SEZ SS to M/s GAIL (Petrochemical Complex at Kakinada SEZ).
- iv. Laying of 220kV DC line (60 km approx.) from 220 kV Samalkota SS to proposed 220/132 kV Kakinada SEZ SS.

11.2 Further, the above scheme was discussed in the Joint Study Meeting on 01-02 May, 2019. Considering the marginal difference between the cost of 315 MVA & 500 MVA ICTs, it was proposed to upgrade the Kakinada S/s with 2x500 MVA ICTs. Further, in

I/5982/2019

order to control the voltage profile, it was also proposed to install 1x125 MVAR bus reactor at Kakinada 400kV S/s.

11.3 After detailed deliberations, the following scheme was agreed in the joint study meeting and recommended for approval of the SRSCT:

- i. Up-gradation of 220/132/33 kV Kakinada SEZ SS to 400/220/132/33 kV Kakinada SEZ SS with 2x500 MVA, 400/220kV ICTs.
- ii. 1x125 MVAR, 420 kV bus reactor at Kakinada 400 kV S/s.
- iii. Making LILO (10 km) of 400 kV TMDC line of HNPCL – KV Kota line at proposed 400/220/132/33 kV Kakinada SEZ SS.
- iv. 220 kV DC line (5 km approx.) from proposed 400/220/132/33 kV Kakinada SEZ SS to M/s GAIL (Petrochemical Complex at Kakinada SEZ).
- v. Laying of 220kV DC line (60 km approx.) from 220 kV Samalkota SS to proposed 220/132 kV Kakinada SEZ SS.

11.4 After deliberations, the above scheme was agreed by the Standing Committee.

Transmission Planning proposals by Telangana

12.0 LILO of one circuit of existing 220 kV Srisailam-Dindi DC line to the proposed 220/33 kV Domalapenta SS in Telangana State by TSTRANSCO

12.1 Director (PSPA-II), CEA, stated that TSTRANSCO has informed that the work of erection of 220/33 kV sub-station at Domalapenta has been taken up by making LILO of one circuit of existing 220 kV Srisailam-Dindi DC line for facilitating the extension of power supply to the consumers in Telangana region as they are presently being fed by AP. The erection works of line and substation have been completed. The following are the particulars of line lengths:

- i. 220 kV Srisailam- Dindi DC line (Existing)- 81.5 km
- ii. 220 kV Srisailam- Domalapenta (Proposed)- 1.6 km
- iii. 220 kV Dindi - Domalapenta (Proposed)- 80 km
- iv. Length of LILO part- 160 mtrs (0.16 km)

12.2 The proposal for LILO of one circuit of the existing 220 kV Srisailam-Dindi DC line to the proposed 220/33 kV Domalpentia SS is for interstate line and TSTRANSCO had requested for approval for the same.

I/5982/2019

- 12.3 The Srisailam-Dindi DC line is deemed ISTS line and APTRANSCO has no objection to the proposal. Further, POSOCO and CTU opined that the proposal is generally in order.
- 12.4 After detailed deliberations, the proposal was agreed by the Standing Committee.

13.0 Proposal of TSTRANSCO for modification in earlier approved connectivity for Kaleshwaram Lift Irrigation Scheme.

- 13.1 Director (PSPA-II), CEA, stated that in 41st SCPSPSR, erection of 400 kV SS at Medaram, Karimnagar Dist. and erection of 400 kV QMDC line (21 km) from 400 kV Ramadugu SS to 400 kV Medaram SS was accorded approval.
- 13.2 TSTRANSCO has requested to approve and ratify modifications in connectivity which were approved in 41st SCPSPSR, as mentioned below:

Sl. No.	Approved connectivity as per minutes of meeting of 41 st SCPSPSR	Modified connectivity as per field requirement
i.	Erection of 400 kV SS at Medaram, Karimnagar Dist. (Pkg-6)	Erection of 400 kV GIS SS at Medaram, Karimnagar Dist. Pkg-6 (Commissioned on 28.08.2018)
ii.	Erection of 400 kV Quad Moose DC Line from 400 kV Ramadugu LI SS to 400 kV Medaram LI SS- 21 km	Erection of 400 kV Quad Moose DC Line from 400 kV Ramadugu LI SS to 400 kV Medaram Outdoor Switchyard- 20.35 km (Circuit-II commissioned on 20.08.2018) Circuit-I commissioned on 31.10.2018) Erection of 400 kV 2500 Sqmm Double Circuit XLPE Power Cable from 400 kV Medaram Outdoor Switchyard to 400 kV Medaram GIS SS. [Circuit-II (1.352 km for 3-Phase) commissioned on 24.08.2018 Circuit-I (1.460 km for 3-Phase) commissioned on 24.12.2018]

- 13.3 The scheme was discussed and agreed in the joint study meeting and recommended for ratification in the SRSCT. The scheme was discussed and ratified by the Standing Committee.

I/5982/2019

13.4 Chairperson/Members (PS), CEA, advised all the constituents to put up the agenda in Standing Committee meeting in advance to avoid post facto approval. Members noted the same.

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

14.1 Director (PSPA-II), CEA, stated that transmission scheme for evacuation of power from Yadadri (Damaracherla) TPP (5x800 MW) was approved in 39th SCPSR.

14.2 TSTRANSCO has proposed revised transmission scheme for evacuation of power from Yadadri (Damaracherla) TPP (5x800 MW) as per field requirement and also to provide start up power to Yadadri (Damaracherla) TPP. The proposed revised scheme is as follows:

Approved Transmission Evacuation Scheme of Yadadri (Damaracherla) TPP (5x800 MW) as per minutes of meeting of 39th SCPSR	Proposed Revised Transmission Evacuation Scheme of Yadadri (Damaracherla) TPP (5x800 MW)
1) Proposed Damaracherla Switchyard to proposed 400/220/132 kV Choutuppall SS by Quad Moose DC Line	1) Proposed Yadadri (Damaracherla) 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 (Damaracherla) 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 (Damaracherla) 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 (Damaracherla) Switchyard to 400/220kV 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 400kV Khammam – Mamidpally TMDC Line to proposed 400/220/132kV Choutuppall SS – 15 km.
6) From proposed 400/220/132 kV Dindi SS to Upcoming 220/33 kV Thimmajipet SS by Single Moose	6) 220 kV TMDC line from proposed 400/220kV Damaracherla SS to 220/132kV Miryalaguda SS – 25 km.

I/5982/2019

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

Startup power to Yadadri (Damaracherla) TPP (5x800 MW) will be facilitated at 400 kV level duly taking the 220 kV Supply from 220 kV Miryalaguda S/S and stepping up the voltage from 220 kV to 400 kV level at proposed 400/220 kV Damaracherla S/S.

- 14.3** TSTRANSCO proposed that instead of connectivity between Damaracherla switchyard to proposed 400/220 kV Maheshwaram (TSTRANSCO) SS by Quad

I/5982/2019

Moose DC Line, they want Double circuit LILO of existing 400 kV Khammam – Mamidpally TMDC Line to proposed 400/220/132 kV Choutuppal SS.

- 14.4** Chief Engineer (PSPA-II), CEA, stated that power is already being injecting towards Khammam from North Telangana, so LILO of existing 400kV Khammam – Mamidpally TMDC Line will not be beneficial. He advised that instead of the LILO, direct link from Choutuppal SS to Maheshwaram will serve the load of Hyderabad.
- 14.5** TSTRANSCO informed that there is RoW issue between the Damaracherla SS to Maheshwaram. On query about status of Damaracharla TPP, TSTRANSCO replied that first unit is of Damaracharla TPP is likely to be commissioned by the year 2021.
- 14.6** After deliberations, it was decided that the revised proposal of TSTRANSCO may be discussed in a separate meeting between CEA, CTU and TSTRANSCO. The recommendations would be discussed in next meeting of Standing Committee.

15.0 Revised proposal for Palamuru Rangareddy Lift Irrigation Scheme by TSTRANSCO.

- 15.1** Director (PSPA-II), CEA, stated that transmission scheme for Palamuru Rangareddy Lift Irrigation schemes was approved in 40th SCPSPSR.
- 15.2** TSTRANSCO has intimated that the rated input power of pump motors of various pumping stations under Palamuru Rangareddy Lift Irrigation Scheme have been revised as follows:

Name of the Pumping Station	No. of Motors including future extension	Rated input power of each motor	Rated input power of each motor with 25% overloaded	Total input power of all motors
(1)	(2)	(3)	(4)	(col.2xcol.3)
Stage-I Pumping Station, Narlapur	8+1=9	107 MW	145 MW	963 MW
Stage-II Pumping Station, Yedula	9+1=10	117 MW	145 MW	1170 MW
Stage-III Pumping Station, Vattem	9+1=10	115 MW	145 MW	1150 MW
Stage-IV Pumping Station, Uddandapur	5+1=6	113 MW	145 MW	678 MW
Stage-V Pumping Station, K.P. Laxmidevipally	3+1=4	59 MW	75 MW	236 MW
Total	39 Nos			4197 MW

I/5982/2019

15.3 Accordingly, TSTRANSCO has proposed revised connectivity for Palamuru Rangareddy Lift Irrigation Scheme as follows:

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
<ol style="list-style-type: none"> 1) 400kV Quad Moose DC line from Veltoor to proposed 400kV Yedula LI SS – 50kMs 2) 400kV Quad Moose DC line from proposed 400kV Yedula LI SS to proposed 400kV Narlapur LI SS – 30kMs 3) 400kV Quad Moose DC line from proposed 400kV Yedula LI SS to proposed 400kV Vatttem/Karvena LI SS – 60kMs 4) 400kV Quad Moose DC line from Maheshwaram TSTransco SS to proposed 400kV Yedula LI SS – 130kMs 5) LILO of both circuits of 400kV Suryapet – Manikonda (Kethireddypalli) Quad Moose DC line to proposed 400kV Uddandapur LI SS – 50 km 6) 400kV Quad Moose DC line from proposed 400kV Vatttem LI SS to proposed 400kV Uddandapur LI SS – 50 km 7) 220kV Twin Moose DC line from 220kV Parigi SS to KP Laxmidevipally LI SS – 20 km 8) 125MVAR Bus Reactor at Narlapur 400kV LI SS 9) 125MVAR Bus Reactor at Yedula 400kV LI SS 10) 125MVAR Bus Reactor at Vatttem 400kV LI SS 11) 125MVAR Bus Reactor at Uddandapur 400kV LI SS 	<ol style="list-style-type: none"> 1) 400/11kV LI SS at Narlapur with 9x160MVA and 2x25MVA 400/11 kV PTRs 2) 400/11kV LI SS at Yedula with 10x160MVA and 2x25MVA 400/11 kV PTRs 3) 400/11kV LI SS at Vatttem with 10x160MVA and 2x25MVA 400/11 kV PTRs 4) 400/11kV LI SS at Uddandapur with 6x160MVA and 2x25MVA 400/11kV PTRs 5) 220/11kV LI SS at KP Laxmidevipally with 4x80MVA and 2x25MVA 220/11 kV PTRs 6) 400kV QMDC line from 400 kV Veltoor SS to proposed 400 kV Yedula LI SS – 50 km 7) 400 kV QMDC line from proposed 400 kV Yedula LI SS to proposed 400 kV Narlapur LI SS – 30 km 8) 400kV QMDC line from proposed 400 kV Yedula LI SS to proposed 400 kV Vatttem LI SS – 60 km 9) 400 kV QMDC line from proposed 400 kV Vatttem LI SS to proposed 400 kV Uddandapur LI SS – 50 km 10) 400 kV QMDC line from 400 kV Maheshwaram (TS) SS to proposed 400 kV Uddandapur LI SS – 65 km 11) 400kV QMDC line from 400kV Dindi SS to 400kV Yedula LI SS –

I/5982/2019

Approved transmission scheme for Palamuru Rangareddy Lift Irrigation Scheme as per minutes of meeting of 40 th SCPSPSR	Revised transmission scheme for Palamuru Rangareddy Lift Irrigation Scheme
	<p>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 Vattem 400 kV LI SS</p> <p>16) 125MVAR Bus Reactor at Uddandapur 400 kV LI SS</p>

15.4 Chief Engineer (PSPA-II), CEA, stated that STUs should plan their system comprehensively. Major revisions in already approved schemes is not advisable.

15.5 TSTRANSCO informed that they want direct link between Maheshwaram (TS) SS to proposed 400 kV Uddandapur LI. CE(PSPA-II) advised that connectivity between Damaracharla- Choutuppall- Uddandapur- Maheshwaram (TS) may be planned so that power of Damarcharla can be fed to Hyderabad.

15.6 After deliberations, it was decided that CEA, CTU and TSTRANSCO may jointly study and finalise the scheme. The recommendations would be discussed in next meeting of Standing Committee.

16.0 220 kV connectivity to Bhadradari TPP, TSGENCO, Telangana

16.1 SRPC had informed that for black start condition, extension of startup power to 4x270 MW Bhadradari TPS (BTPS) is not feasible through 400 kV Julurupadu S/s due to expected high voltage at KTPS complex and Julurupadu S/s.

16.2 TS SLDC had suggested connectivity at 220 kV level to provide startup power to BTPS under black start restoration procedure and alternate system for evacuation of power from BTPS. The following scheme was proposed by TSTRANSCO, which was also agreed in the joint study meeting.

- i. 1x315 MVA, 400/220kV ICT at Bhadradi TPS switchyard
- ii. 220 kV D/c line from 220 kV Manguru SS to BTPS switchyard (22 km)

16.3 After detailed deliberations, the above proposal was agreed by the Standing Committee.

Transmission planning proposals by Karnataka

17.0 Establishing 2x500 MVA, 400/220 kV sub-station at Kadakola, Mysuru District

The Director (PSPA-II), CEA, stated that, KPTCL has planned to establish a 400/220 kV sub-station at Kadakola in Mysuru District for relieving loads on 400/220 kV Bastipura sub-station (Mysuru) and to provide alternate source of power supply to 220 kV sub-stations in and around Mysuru. The proposed transmission scheme for 400/220 kV Kadakola sub-station is as follows:

- i. LILO of both circuits of Shantigrاما (Hassan) - Bastipura 400 kV D/c Twin Moose line to the proposed 400/220 kV Kadakola sub-station.
- ii. 2x500 MVA, 400/220 kV transformers with provision for additional 500 MVA transformer in future.
- iii. 2x125 MVAr bus reactors.
- iv. 220 kV bus extension to existing 220/66 kV Kadakola sub-station with the following 220 kV lines emanating from existing 220 kV Kadakola sub-station.
 - a) 220 kV DC line towards Chamarajanagar.
 - b) 220 kV DC line from Bastipura.
 - c) 220 kV SC line Towards Hootagalli.
 - d) 220 kV SC line towards Kaniyambetta.
 - e) Proposed 220 kV DC line towards Vajamangala.

The scheme was discussed in the joint study meeting and it was brought out that in addition to the above system, additional connectivity may be required at Kadakola S/s to meet the load demand with reliability. CN Halli – Kadakola 400kV (quad) D/c line has been proposed as additional system.

In the joint study meeting, following transmission system was agreed:

- i. LILO of both circuits of Shantigrاما (Hassan) - Bastipura 400 kV D/c Twin Moose line to the proposed 400/220 kV Kadakola sub-station.
- ii. CN Halli – Kadakola 400kV (quad) D/c line
- iii. 2x500 MVA, 400/220 kV transformers with provision for additional 500 MVA transformer in future.
- iv. 2x125 MVAr bus reactors.
- v. 220 kV bus extension to existing 220/66 kV Kadakola sub-station with the following 220 kV lines emanating from existing 220 kV Kadakola S/s.
 - a) 220 kV DC line towards Chamarajanagar.

I/5982/2019

- b) 220 kV DC line from Bastipura.
- c) 220 kV SC line Towards Hootagalli.
- d) 220 kV SC line towards Kaniyambetta.
- e) Proposed 220 kV DC line towards Vajamangala.

Fİ 4 After further deliberations, Kadakola 400 kV substation with 63 kA short circuit level along with the connectivity mentioned in para 17.3 was agreed by the Standing Committee.

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

18.1 Director (PSPA-II), CEA, stated that KPTCL has informed that M/s JSW (vide their letter dated 3rd September, 2018) has requested for permanent de-linking of existing 400 kV RTPS-BTPS-JSW-Guttur Twin Moose line between BTPS and JSW generating station.

18.2 It was informed that, 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) and Edlapur (1x800 MW) Thermal Power Plant, 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.
- 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.

I/5982/2019

- 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.

18.3 It was also approved in the Joint Study Meeting held in December, 2013, that KPTCL would plan an 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 at JSW 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.

18.4 Further, in the 39th Meeting of Standing Committee on Power System Planning of Southern Region 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.

18.5 M/s JSW has requested for permanent de-linking of existing 400kV RTPS-BTPS-JSW-Guttur Twin Moose line between BTPS and JSW. In this regard, load flow study was conducted by KPTCL and it was observed that by delinking JSW from the 400 kV LILO connectivity, the entire 1,100 MW generation of JSW may not be exported in the existing network condition without completion of the associated transmission scheme of YTPS (400 kV Gulbarga and CN Halli). In the above condition, if there is outage of 400 kV DC Quad line between JSW & BPS, the 220kV JSW-Lingapura DC line is overloaded. Hence the generation at JSW needs to be restricted to the line loading capacity to 220 JSW-Lingapura DC Drake line.

18.6 The issue was discussed in the joint study meeting on 01-02 May, 2019 at Bengaluru. KPTCL informed that Bellary Pooling Station and JSW-Bellary PS 400 kV lines have already been commissioned. Total installed capacity in JSW complex is 1,460 MW (4x300 MW +2x130 MW), excluding the generators directly connected to JSW steel

I/5982/2019

plant. Part of 1,460 MW is captive capacity and part is IPP. However, information regarding captive capacity and IPP capacity of JSW generating units was not available with KPTCL.

- 18.7** During the Joint Study meeting on 01-02 May, 2019, it was recommended that KPTCL would take an undertaking from JSW about the generating units which are CPP along with their capacity and generating units which are IPP along with their capacity. The power flow studies would be carried out after obtaining data from JSW. Decision to remove LILO would be taken subsequently.
- 18.8** In the Standing Committee meeting, representative of KPTCL informed that M/s JSW has not taken LTA for injecting power in the grid and M/s JSW sells power generally in short term.
- 18.9** Chief Engineer (PSPA-II), CEA, stated that delinking the 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, had already been planned with the commissioning of following system:
- i. Bellary Pooling station -CN Halli 400 kV D/C line with Quad Moose conductor
 - ii. Yeramarus TPS-Gulbarga 400 kV D/C line with Quad Moose conductor
 - iii. BTPS-Guttur 400 kV Quad Moose DC line.
- 18.10** It was also pointed out that KPTCL has been slow in implementation of the transmission system linking CN. Halli and Gulbarga which was agreed in 2013 & 2015. JSW/ KPTCL have also not furnished the status of JSW generating units i.e. which generating units are IPP and which are captive.
- 18.11** After deliberations, it was decided that the issue would be discussed in a separate meeting with KPTCL, JSW, SRLDC and CEA. The recommendations would be discussed in next meeting of Standing Committee.
- 19.0 Power evacuation scheme by KPTCL for the proposed 2000 MW Sharavathy Pumped Storage Project**
- 19.1** Director (PSPA-II), CEA, stated that KPTCL has 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 with 4 Nos of 400 kV TBs at Talaguppa.
 - ii. Strengthening of 400 kV Talaguppa- proposed C.N.Halli D/c Twin Moose line by higher ampacity conductor (Twin Moose equivalent HTLS).

I/5982/2019

- 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.
- 19.2 KPTCL informed that Sharavathy Pumped Storage Project would provide 6 hours of electricity generation during peak hours and would operate in pumping mode for 7.5 hours.
- 19.3 Representative of SRLDC enquired about the time frame of commissioning of the 2000 MW Sharavathy Pumped Storage Project. KPTCL informed that the project would be commissioned by 2025. Chairperson/Member (Power System), CEA, advised KPTCL to seek help from CEA, if required, towards commissioning of the project as planned.
- 19.4 KPTCL further informed that the existing Sharavathy HEP has been uprated from 970 MW to 1030 MW. Chief Engineer (PSPA-II), CEA, opined that for improved reliability, 400 kV S/s is needed even for existing Sharavathy HEP. He further stated that strengthening of proposed 400 kV Talaguppa- C.N.Halli D/c Twin Moose transmission line could be agreed as of now.
- 19.5 It was opined that even if the existing corridor being used for Sharavathy HEP is used for evacuation of power from Sharavathy Pumped Storage Plant, some additional Survey would be required.
- 19.6 Representative of CTU advised that proper reactive power compensation should be provided at the Sharavathy Pumped storage plant and he proposed 2x125 MVAR, 400 kV reactors at Sharavathy Pumped storage plant.
- 19.7 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.
- 20.0 Proposal by KPTCL to relook into the decision of installation of 2x125 MVAR bus reactor at UPCL Switchyard**
- 20.1 Director (PSPA-II), CEA, stated that the proposal of providing 2x125 MVAR bus reactors at UPCL switchyard, to control prevailing system over- voltages, was approved in 39th Standing Committee meeting of Power System Planning of Southern Region held on 28th & 29th December, 2015. KPTCL has stated that installation of reactors will have significant impact on tariff and has requested to relook the decision

I/5982/2019

of 39th Standing Committee meeting by proposing lower capacity bus reactors at UPCL by conducting necessary joint study.

20.2 He further stated that the proposal was discussed in the joint study meeting and it was decided that 2x125 MVAR bus reactors would be provided at UPCL switchyard, as approved in 39th Standing Committee meeting of Power System Planning of Southern Region.

20.3 Members agreed for the same.

21.0 N-1 criteria getting violated for 400/220 kV ICTs at UPCL, Karnataka

21.1 Director (PSPA-II), CEA, stated that SRPC has informed that the flow on 2x315 MVA, 400/220 kV ICTs at UPCL was high, and on many occasions the N-1 criteria was getting violated. As a consequence, during certain load generation balance conditions, UPCL was unable to take out one ICT for maintenance since the flow on other ICT would be beyond the rated capacity. As a long term measure, possibility of third ICT could be examined.

21.2 He further informed that, the matter was discussed in the joint study meeting and it was brought out that putting up another ICT will increase the cost which will have to be borne by the beneficiaries. However, to ensure reliability, it was agreed to put 500 MVA, 400/220kV 3rd ICT.

21.3 Representative of KPTCL informed that presently entire load of Dakshina Kannada and Udupi District is being fed through 220 kV Kemar, 220 kV Kavoor, 220 kV MSEZ and 220 kV Puttur sub-stations. KPTCL had proposed 400/220 kV Arasapadavu sub-station and loads of 220 kV Kavoor, 220 kV MSEZ sub-stations would be fed from proposed 400 kV Arasapadavu sub-station which will relieve the loading of 2x315 MVA, 400/220 kV ICTs at UPCL. Establishment of Arasapadavu 400/220 kV S/s had been agreed in the 1st SRSCT.

21.4 Representative of KPTCL requested that the requirement of additional 400/220 kV ICT at UPCL needs to be relooked considering the proposed 400/220 kV Arasapadavu sub-station.

21.5 On query about status of Arasapadavu S/S, representative of KPTCL informed that land for sub-station had already been acquired. The S/s would be commissioned in 2-3 years' time. Representative of CTU informed that installation of new ICT at UPCL would also take about two years' time.

I/5982/2019

- 21.6** Chief Engineer (PSPA-II), CEA, opined that for 2 to 3 years till Arsapadavu S/s is commissioned, n-1 reliability would remain compromised at UPCL. KPTCL informed that there is constraint in existing Varahi- Kemar 220 kV line and generation at Varahi would have to be regulated. Representative of Load Dispatch Centre, Karnataka, informed that it is not always possible to regulate generation at Varahi HEP.
- 21.7** After deliberations it was decided that to address the issue of n-1 criteria violation, the work of Arsapadavu 400 kV substation must be expedited by KPTCL and the proposal of 400/220kV 3rd ICT at UPCL may be dropped.

Transmission Planning Proposal by Kerala

22.0 Udupi - Kasargod D/C line- RoW issues

- 22.1** Director (PSPA-II), CEA, stated that Udupi – Kasargode- Kozhikode 400 kV (Quad) D/C line along with 400/220 kV Substation at Kasargode was agreed in the 35th SCPSPSR held on 04.01.2013. In the 31st meeting of Empowered Committee held on 25.02.2013, it was decided that 400 kV Udupi - Kasargode D/C line along with 400/220 kV Substation at Kasargode would be implemented through TBCB subject to obtaining:
- (i) Commitment from the Kerala Government that the land compensation only for tower footing should be paid in the Right of Way (RoW).
 - (ii) Commitment from Udupi Power Corporation (UPCL) to provide two number of 400 kV bays at Mangalore (UPCL) Switchyard.
- 22.2** Director (Transmission & System Operation), KSEB vide letter No. D(T&SO)/T6/TRANSGRID/ 2018-19 dated: 05.01.2019 addressed to Member (Power System), CEA, has stated that:

Ministry of Power has issued guidelines for giving compensation vide letter No. 3/7/2015-Trans dated 15.10.2015. Discussions regarding Udupi-Kasargod line was held in 2013, well before the release of MoP guidelines for compensation. During those days only tree cutting compensation was paid. Hence, the decision regarding compensation taken during 2013 is irrelevant now.

Further about 50 km of the subject line is located in the geographical area of Karnataka state and Kerala has no obligation or commitment for the compensation of this portion of the transmission line. Accordingly, the condition for payment of compensation by Kerala State may be removed from the RfP document and RoW compensation as per MoP guidelines shall be included in the scope of the successful bidder.

I/5982/2019

- 22.3 Further to this, a meeting was held on 20.02.2019 at CEA, New Delhi, under Chairperson, CEA, in which representatives of POWERGRID, RECTPCL, KSEB and UPCL were present. In the meeting following were agreed:
- a) Inclusion of 2 no. 400 kV line bays and 400 kV Bus Extension Works at Udupi generation switchyard as a part of Transmission System for “400 kV Udupi (UPCL)- Kasargod D/c line”.
 - b) “Compensation for RoW for the transmission scheme 400 kV Udupi (UPCL)- Kasargod D/c line shall be borne by successful bidder/ TSP only” and the same shall be included in the RfP document of the scheme.
- 22.4 After deliberations, members agreed that the “Compensation for RoW for the transmission scheme 400 kV Udupi (UPCL)- Kasargod D/c line shall be borne by successful bidder/ TSP only”.

Transmission Planning Proposals by Tamil Nadu

23.0 Proposal of TANTRANSCO for enhancement of 400/110 kV ICT capacity from 2 x 200 MVA to 3 x 200 MVA at the existing Alamathy 400/230-110KV SS

- 23.1 TANTRANSCO has informed that Alamathy 400/230-110 kV substation is situated nearer to the load centres of both urban and sub-urban area in Chennai. The total interconnecting transformer capacity at Alamathy 400/230-110 kV SS is 1345 MVA with 3x315 MVA, 400/230 kV ICTs and 2x200 MVA, 400/110 kV ICTs. The observed peak ICTs load at Alamathy 400/230-110kV SS provided by TANTRANSCO are as follows:

200 MVA, 400/110 kV ICT 1	123MVA
200 MVA, 400/110 kV ICT 2	115MVA
315 MVA, 400/230 kV ICT 3	264MVA
315 MVA, 400/230 kV ICT 4	246MVA
315 MVA, 400/230 kV ICT 5	246MVA

- 23.2 In order to accommodate all the existing & future load growth, TANTRANSCO has proposed to enhance 400/110 kV ICT capacity from 2x200 MVA to 3x200 MVA at Alamathy 400/230-110 kV SS. The proposal of TANTRANSCO was agreed in the joint study meeting and recommended for approval in the SRSCT.
- 23.3 After deliberations, the above proposal was agreed by the Standing Committee.

Transmission Planning Proposals by CTU:

- 24.0 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.**

I/5982/2019

24.1. CTU informed that the proposal for grant of connectivity to NLC India Ltd for its TPS-II 2nd Expansion (2x660 MW) was deliberated in the 42nd meeting of SCPSPSR and 22nd meeting of Southern Region constituents regarding Connectivity/LTA applications held on 27.04.2108, wherein the following scheme was agreed for grant of Connectivity to NLC and to control short circuit levels in Neyveli generation complex:

Transmission System for grant of connectivity to NLC for its TPS-II 2nd Expansion (2x660 MW):

- i. Bypassing the LILO of Neyveli TS-II –Trichy 400 kV S/c line and LILO of Neyveli TS-I Expn – Trichy 400kV S/c line at Nagapattinam and utilization of LILO section to form NLC (TPS-II 2nd Expansion) – Nagapattinam 400 kV 2xD/c line along with the line bays at generation switchyard.
- ii. 1x125 MVar bus reactor at generation switchyard (NLC TPS-II 2nd Expansion)
- iii. Switchyard to be designed for fault level of 50 kA (for 1 sec)

Re-arrangement of Transmission System for control of short circuit levels in Neyveli generation complex:

- i. Connecting one ckt. of Neyveli TS-II – Salem 400kV D/c line and Neyveli TSII – NNTPS 400kV S/c line (bypassing Ney TS-II) to form NNTPS – Salem 400kV S/c line.
- ii. Modification in Neyveli(TNEB) – NNTPS 400 kV D/c line (agreed in 41st SCPSPSR) as Neyveli(TNEB) – Neyveli TS-II 400 kV D/c line with high capacity conductors (to be constructed by TANTRANSCO).
- iii. Bypassing of LILO of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400kV S/c lines at Nagapattinam.

Connectivity system for NLC TPS-II 2nd Expansion (2x660) and re-arrangement of transmission system to control the high fault level is represented in Fig. 2.

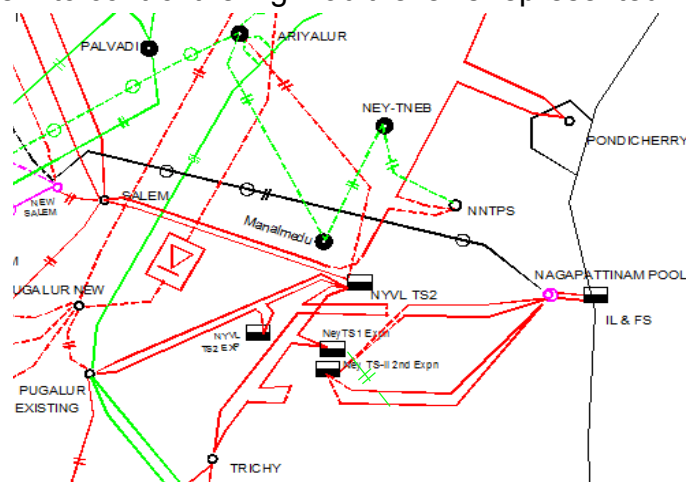


Figure 2: Connectivity arrangement for Neyveli TS-II 2nd Expn.

I/5982/2019

24.2. It was informed that the above arrangement for grant of Connectivity was again re-looked as both the generation projects of Neyveli TS-II 2nd Expn (2x660 MW) and IL&FS Nagapattinam (2x600 MW) are left with connectivity to ISTS grid through Nagapattinam – Salem 765kV D/c line (charged at 400kV) only. Under the N-1 contingency of Nagapattinam – Salem 765kV D/c line (charged at 400kV), both the generation projects are left with connectivity through one circuit only, which may lead to the oscillations in the generation machines.

24.3. In view of the same, detailed system studies were carried out and following transmission system was proposed for the joint study meeting held on 1st & 2nd May, 2019 at Bengaluru:

Transmission system for connectivity to NLC (TPS-II 2nd Expansion):

- i. Re-storing of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400kV 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 400kV 2xD/c lines along with the line bays at generation switchyard
- ii. LILO of one D/c circuit of Neyveli TPS-II 2nd Expn – Nagapattinam 400 kV 2xD/c lines at proposed Cuddalore 400/230-110 kV S/s of Tamil Nadu in place of Neyveli TS-II – Cuddalore 400 kV D/c line (Cuddalore S/s and its connectivity already agreed in the 1st meeting of SRSC held on 07.09.2018)
- iii. 2x125 MVA bus reactors at generation switchyard (NLC TPS-II 2nd Expansion)
- iv. Generation Switchyard to be designed with 50 kA short circuit level.

Re-arrangement of Transmission System for control of short circuit levels in Neyveli generation complex:

- i. Connecting one ckt. of Neyveli TS-II – Salem 400kV D/c line and Neyveli TSII – NNTPS 400kV S/c line (bypassing Ney TS-II) to form NNTPS – Salem 400kV S/c line.
- ii. LILO of one D/c circuit of Neyveli TPS-II 2nd Expn – Nagapattinam 400 kV 2xD/c at proposed Cuddalore 400/230-110 kV S/s of Tamil Nadu in place of Neyveli TS-II – Cuddalore 400 kV D/c line (Cuddalore S/s and its connectivity already agreed in the 1st meeting of SRSC held on 07.09.2018).

The proposal for Connectivity of NLC TPS-II 2nd Expansion (2x660) and re-arrangement of transmission system to control the high fault level is represented in Fig.3.

I/5982/2019

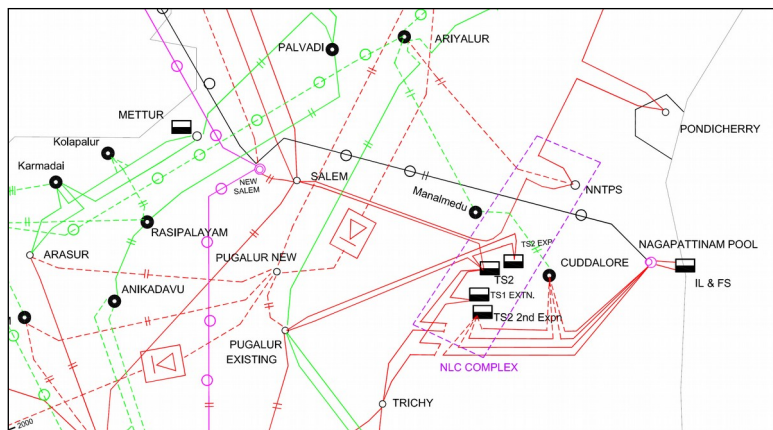


Figure 3: Proposed connectivity for Neyveli TS-II 2nd Expn.

- 24.4.** In the Joint Study meeting, TANTRANSCO informed that Cuddalore 400 kV S/s has been planned to relieve the overloading of 400/230 kV ICTs at Neyveli-TS-II. However, the proposed rearrangement, wherein the Cuddalore S/s is connected to Neyveli TS-II 2nd Expn, is further increasing the overloading of the ICTs at Neyveli TS-II and affecting the reliability of the downstream 230 kV network of TANTRANSCO. Representative of NLC informed that even under present scenario, loadings on 400/230 kV ICTs at Neyveli-TS-II are on higher side and in the past the transformers have tripped on over load conditions. The same was also observed from the study analysis carried out during the Joint Study meeting.

CEA and CTU opined that in order to control overloading of ICTs at Neyveli TS-II, rearrangement of the loads/230 kV network is required. TANTRANSCO agreed for the same and informed that they will propose re-arrangement of load / 230 kV network configuration after carrying out detailed analysis.

- 24.5.** Based on the studies and deliberations held in the joint study meeting, following two alternatives were identified for Connectivity of Neyveli TS-II 2nd Expn and control of fault levels at Neyveli generation complex.

Alternative-I:

A. Connectivity to Neyveli TS-II 2nd Expn (2x660 MW):

- i. Re-storing of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400kV 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. LILO of one of D/c circuit of Neyveli TPS-II 2nd Expn – Nagapattinam 400 Kv, 2xD/c lines at proposed Cuddalore 400/230-110 kV S/s (TANTRANSCO) in place of Neyveli TS-II – Cuddalore 400 kV D/c line (Cuddalore S/s & its connectivity was agreed in the 1st meeting of SRSCT)
- iii. 2x125 MVAR bus reactors at generation switchyard (NLC TPS-II 2nd Expansion)
- iv. Generation Switchyard to be designed with 50 kA short circuit level.

- B.** Re-arrangement of load / configuration of 230 kV networks to control overloading of ICTs /230 kV lines at Neyveli TS-II, Cuddalore 400/230-110 kV and Manalmedu 400/230 kV substations by TANTRANSCO.

I/5982/2019

Alternative-II:**A. Connectivity arrangement for Neyveli-TS-II:**

- 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. Neyveli TS-II – Cuddalore 400 kV D/c (Quad) line
- iii. Nagapattinam – Manalmedu 400kV D/c (Quad) line (in place of Cuddalore – Manalmedu 400kV D/c line – agreed in 1st SRSCCT)
- iv. 2x125 MVar bus reactors at generation switchyard (NLC TPS-II 2nd Expansion)
- v. Generation Switchyard to be designed with 50 kA short circuit level.

- B.** Re-arrangement of load / configuration of 230 kV networks to control overloading of ICTs / 230 kV lines at Neyveli TS-II, Cuddalore 400/230-110 kV and Manalmedu 400/230 kV substations by TANTRANSCO.

- 24.6.** CTU representative further stated that the fault levels at Neyveli generation complex has been assessed with the above alternatives and bypassing of one ckt. of Neyveli TS-II – Salem 400 kV D/c line and Neyveli TS-II – NNTPS 400 kV S/c line to form NNTPS – Salem 400 kV S/c line (agreed in 1st SRSCCT meeting held on 07.09.2018) and it has been found that in both the alternatives the fault levels are within limits as per planning criteria. The results of the same are given in the table below:

Table 1 : Short circuit fault level in Neyveli generation complex

Sl. No.	Substation / Generating Stn.	Alternative-1		Alternative-2	
		3-Ph SCC (~kA)	1-Ph SCC (~kA)	3-Ph SCC (~kA)	1-Ph SCC (~kA)
1	Neyveli TS – I Expn (2x210 MW)	21	17	21	17
2	Neyveli TS – II (7x210 MW)	28	24	29	24
3	Neyveli TS – II Expn (2x250 MW)	27	22	28	23
4	NNTPS (2x500 MW)	27	25	26	24
5	Neyveli TS – II 2 nd Expn (2x660 MW)	22	22	19	20
6	Nagapattinam PS	23	20	21	20
7	Cuddalore (TANTRANSCO)	24	21	21	16

- 24.7.** Representative of TANGEDCO stated that with the Alternative-I, the issue of high loading at Neyveli TS-II is not getting addressed. He further stated that Cuddalore S/s & its connectivity was agreed in the 1st meeting of SRSCCT held on 07.09.2018 with the following transmission lines:

- Neyveli TS-II – Cuddalore 400 kV D/C Line.
- Manalmedu - Cuddalore 400 kV D/C Line.

Representative of TANGEDCO proposed that Manalmedu – Cuddalore 400 kV D/C line may be extended to Neyveli TS-II 2nd expansion so as to form Manalmedu – Neyveli TS-II 2nd Expn- 400 kV D/C line in place of Nagapattinam – Manalmedu 400 kV DC (Quad) line.

I/5982/2019

24.8. On a query about commissioning of generation project, it was informed by NLC representative that the generation project would be commissioned before 2023-24. TANGEDCO representative informed that Manalmedu substation is also expected in the similar timeframe and accordingly, there shall be no constraints in evacuation of power from generation units of Neyveli TS-II 2nd Expn.

24.9. After detailed deliberations, following transmission system was agreed by the Standing Committee:

Transmission System for providing connectivity to Neyveli TS-II 2nd Expn (2x660 MW)- under the scope of NLC India Ltd.:

- 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 MVAR 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 network configuration to control overloading of ICTs / 230kV 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 SRSCT.
- ii. Manalmedu – Neyveli TPS-II 2nd Expn 400kV D/c (Quad) line (in place of Cuddalore – Manalmedu 400kV D/c line – agreed in 1st SRSCT) – under the scope of TANGEDCO

25.0 High Short Circuit Current level at 765/400 kV Thiruvalem S/s:

25.1. CTU stated that Southern Region grid has been growing with a rapid pace in terms of the generation capacity and the associated transmission system to facilitate evacuation and supply of power to the beneficiaries. With the growth of power system, the strength in terms of fault levels have also been growing consistently, which is a concern at many substations. Accordingly, to keep the fault current within the substation design limits, studies are carried out from time to time system and necessary steps are taken-up. From the system studies of 2021-22 time frame, the 3-Ph short circuit levels at 400 kV bus of Thiruvalem S/s are observed to be of the order of 64 kA, however the 400 kV substation is designed with 50 kA fault level. Single line diagram of 400 kV bus at Thiruvalem S/s is given in Fig. 4.

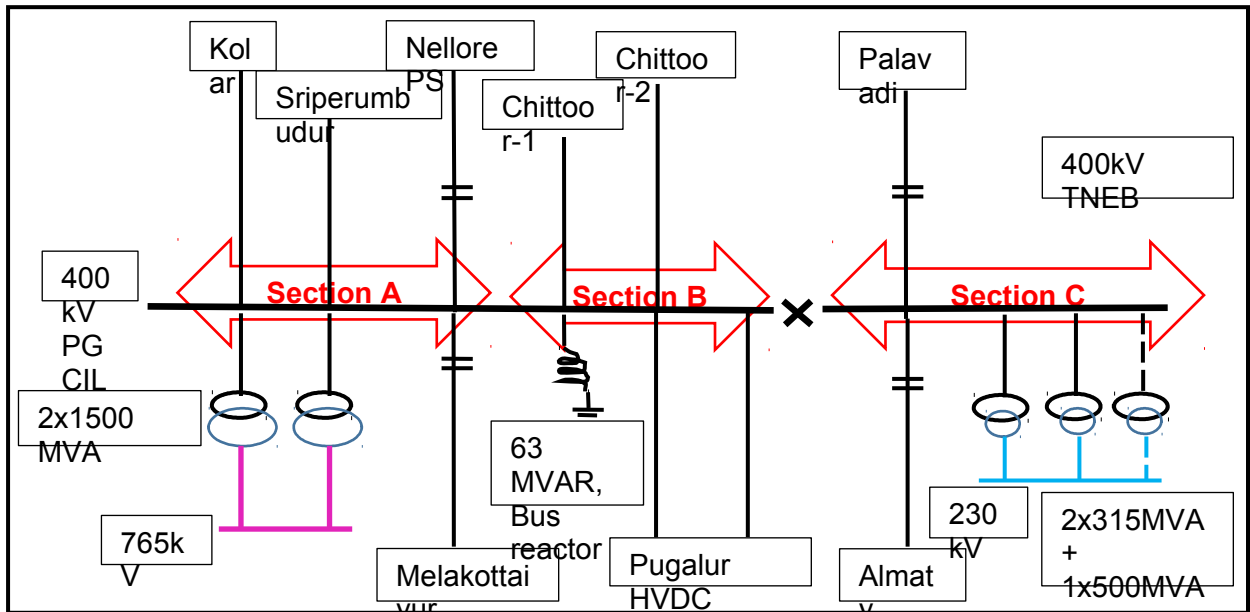


Figure 4: SLD representation of 400 kV bus at Thiruvalem S/s

25.2. Accordingly, system studies were carried out and the following alternatives were proposed:

Table 2 : Short circuit fault level at 400kV bus at Thiruvalem S/s

Alt.	Scheme	Connectivity Details	3-Ph Fault current (kA)		
			Section -A	Section -B	Section -C
1	12Ω, 420kV fault limiting bus series reactors between Bus section-A and bus section-B Bus Section-B and bus section-C	Bus section-A : Kolar S/c line; Sriperumbudur S/c line; Nellore Pool D/c (quad) line; Melakottaiyur D/c line; 2x1500MVA, 765/400kV ICTs Bus section-B : Chittoor 400kV D/c (quad) line; Pugalur HVDC 400kV D/c (quad) line; 63MVAR, 420kV bus reactor Bus section-C : Palavadi D/c line; Almaty D/c line, 2x315 +1x500 MVA, 400/230kV ICTs	49	39	30
2	12Ω,420kV fault limiting bus series reactors between Bus section-(A+B) and bus section-C 12Ω, 420kV fault limiting line series reactors in both circuit of Chittoor – Thiruvalem D/c (quad) line	Bus section-(A+B) : Kolar S/c line; Sriperumbudur S/c line; Nellore Pool D/c (quad) line; Melakottaiyur D/c line; 2x1500MVA, 765/400kV ICTs; Chittoor 400kV D/c (quad) line; Pugalur HVDC 400kV D/c (quad) line; 63MVAR, 420kV bus reactor Bus section-C : Palavadi D/c line; Almaty D/c line, 2x315 + 1x500 MVA, 400/230kV ICTs	57	-	32
3	12Ω, 420kV fault limiting bus series reactors between Bus section-A and bus section-B Bus Section-B and bus	Bus section-A : Nellore Pool D/c (quad) line; Melakottaiyur D/c line; 2x1500MVA, 765/400kV ICTs Bus section-B : Chittoor 400kV D/c (quad) line; Pugalur HVDC 400kV D/c (quad) line; 63MVAR, 420kV bus reactor	43	38	30

I/5982/2019

Alt.	Scheme	Connectivity Details	3-Ph Fault current (kA)		
			Sec tion -A	Sec tion -B	Sec tion -C
	section-C Bypass of Kolar- Thiruvalem and Thiruvalem-Sriperumbudur 400kV S/c line to form Kolar – Sriperumbudur 400kV S/c direct line.	Bus section-C : Palavadi D/c line; Alamaty D/c line, 2x315 +1x500 MVA, 400/230kV ICTs			

25.3. CTU representative informed that based on the system study results, Alternative-3 is proposed as the fault currents in all sections of the Thiruvalem 400kV bus remains well within 50 kA limit of the designed fault levels of the bus.

25.4. After detailed deliberations, following was agreed by the Standing Committee for control of fault levels of Thiruvalem 400 kV bus:

Transmission System strengthening for controlling fault level at 400 kV bus of Thiruvalem substation:

a) 12Ω, 420 kV fault limiting bus series reactors between:

- Bus section-A and bus section-B
- Bus Section-B and bus section-C

b) Opening of the one of the bus (other than on which fault limiting bus series reactors are being installed) between the above mentioned bus sections through suitable arrangement.

c) Bypass of Kolar-Thiruvalem and Thiruvalem-Sriperumbudur 400 kV S/c line to form Kolar – Sriperumbudur 400 kV S/c direct line.

26.0 High loading of Nellore – Nellore PS 400 kV (Quad) D/c line

26.1. CTU informed that in the 42nd SCPSPSR held on 27.04.2018, it was agreed to bypass Nellore PS – Nellore (PG) 400kV D/c (Quad) line and Nellore (PG) - Thiruvalem 400 kV D/c (Quad) line at Nellore (PG) for making Nellore PS - Thiruvalem 400 kV D/c (quad) line to control loading on Nellore (PG) - Nellore PS 400 kV lines and control of short circuit levels at Nellore (PG). It was also agreed that 2x50 MVAR line reactors at Nellore (PG) end on Nellore (PG) - Thiruvalem 400 kV D/c line may be utilized as switchable bus reactors by suitable arrangement. Nellore (PS) -Nellore (PG) single line diagram is given in Fig. 5.

I/5982/2019

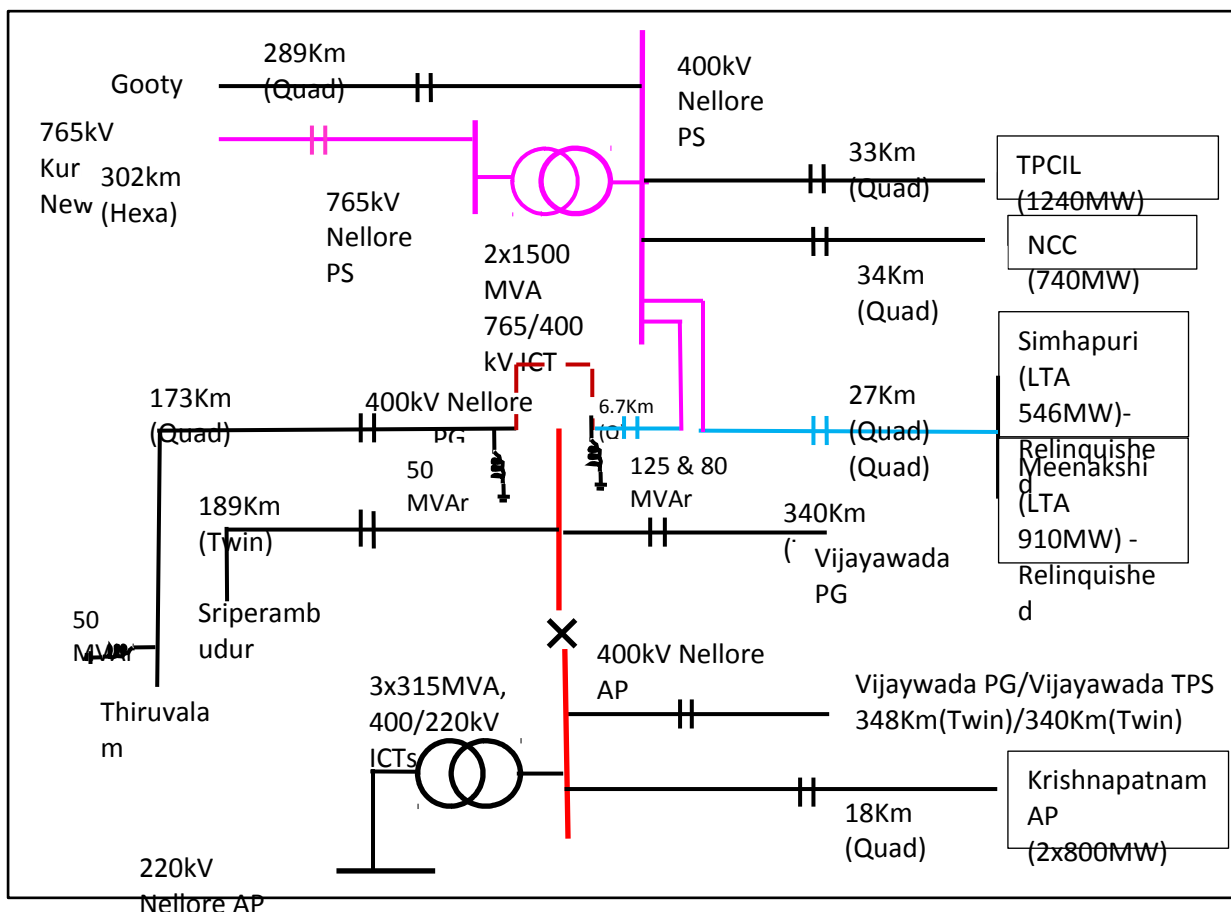


Figure 5: Nellore (PS) -Nellore (PG) SLD

26.2. Further, in the 151st Meeting of OCC held on 10.01.2019, SRLDC informed that:

“presently power flow on 400kV Nellore(PS)- Nellore (PG) D/c is at around 850-900 MW whereas earlier it was touching around 1,200MW. At present Karnataka is meeting peak demands, Gooty, Nelamangala and Hiriyur ICTs are over loaded. Injection at Gooty and Gooty-Nelamangala flow would further increase if the revised configuration is implemented presently. When loadings would come down, SRLDC will carry out further studies and the conversion would be taken up. POWERGRID (SR-I) confirmed that the modification would be carried out on SOS basis as per SRLDC instructions.”

26.3. Further, entire LTA of Simhapuri Energy Ltd. (546 MW) and Meenakshi Energy Ltd. (910 MW) has already been relinquished / revoked and at present total LTA of 1980 MW [TPCIL (1240 MW) and SGPL (740 MW)] exists in the Nellore generation complex and loadings on the ISTS network for transfer of power for the LTA quantum of 1980 MW are generally in order under normal as well as contingency conditions.

26.4. Earlier due to space constraints at Nellore(PG), the Simhapuri/Meenakshi 400 kV (Quad) D/c dedicated line was terminated at the bays of 125 MVAR and 80 MVAR bus reactors by making the bus reactors as switchable line reactors. Subsequently, the above dedicated line has been LILoed at Nellore PS (765/400kV station). With

I/5982/2019

the bypassing of Nellore PS – Nellore (PG) 400kV D/c (Quad) line and Nellore (PG) – Thiruvalam 400 kV D/c (Quad) line at Nellore (PG) through tie breaker arrangement, the 125 MVAR and 80 MVAR switchable reactors on Nellore PS-Nellore(PG) line and 1x50 MVAR line reactors, each at Nellore(PG) on Nellore (PG) – Thiruvalam 400 kV D/c (quad) line will remain as midpoint reactors. With this arrangement, one circuits of Nellore PS - Thiruvalam line (about 180 km) shall have 125+50+50 MVAR line reactors and other circuit shall have 80+50+50 MVAR line reactors. Under such scenario, transmission lines are over compensated and shall be in the range of 120 - 150 % compensation. Further, the Nellore (PG) substation shall be left without any bus reactors and may face issues in control of high voltage conditions.

26.5. Accordingly, it was proposed to shift the 125 MVAR and 80 MVAR line reactors at Nellore (PG) on Nellore PS-Nellore(PG) 400kV D/c line with suitable arrangement on Nellore(PG) – Sriperumbudur 400kV D/c line (189 km) and bypass Nellore PS – Nellore 400 kV D/c (quad) line and Nellore – Thiruvalam 400kV D/c (quad) line at Nellore (PG) for making Nellore PS – Thiruvalam 400kV D/c (quad) line. Estimated cost of shifting of line reactors is about Rs. 10-12 Crore. The proposal was also agreed in the Joint Study meeting held on 1st – 2nd May, 2019 at SRPC, Bengaluru.

26.6. After detailed deliberations, the above proposal was agreed by the members.

27.0 Utilization of 2x240 MVAR line reactors of Vemagiri – Chilakaluripeta 765kV D/c as bus reactors at Vemagiri end

27.1. It was informed that Srikakulam-Vemagiri 765 kV D/c line had been implemented as system strengthening scheme for import of power to Southern Region. Vemagiri-Chilakaluripeta 765 kV D/c line is being implemented as a part of transmission system strengthening beyond Vemagiri. For termination of Vemagiri-Chilakaluripeta 765 kV D/c line at Vemagiri, the line was to cross the existing Srikakulam-Vemagiri 765 kV D/c line at Vemagiri GIS. However due to technical constraints, the same was not possible. Accordingly as per the discussions in the 148/149th OCC meeting, 765 kV terminal bays of Chilakauripeta D/c line at Vemagiri GIS were swapped with 765 kV terminal bays of 765 kV Srikakulam D/c line. The existing 240 MVAR line reactors in swapped bays of both the circuits of Srikakulam are presently being used as Bus reactors at Vemagiri GIS for voltage control and are put into continuous service.

27.2. Considering the utilization of all four nos. of 240 MVAR reactors (existing 2 bus reactors and additional 2 line reactors being used as bus reactors) and associated bays for voltage control at Vemagiri GIS, it was proposed in joint study meeting held on 1st – 2nd May, 2019, at SRPC, Bengaluru, that DOCO of 2x240 MVAR line reactors at Vemagiri end along with associated bays may be accorded.

27.3. CTU informed that system studies were carried out wherein it has been observed that with 2x240 MVAR reactors, voltage relief of about 20 kV is observed at 765 kV

I/5982/2019

Vemagiri GIS and about 10 kV at Srikakulam substation from the prevailing voltage profiles. Further, SPRC vide letter dated 15.03.2019 has already approved the declaration of DOCO of referred bays subject to approval of SRSCT.

27.4. It was informed that the proposal for DOCO of 2x240 MVAR line reactors as bus reactors along with associated bays at Vemagiri end was discussed and agreed in the Joint Study meeting held at Bengaluru.

27.5. After detailed deliberations, members agreed to the above proposal.

28.0 Construction of 1 nos. of 220 kV bay at Palakkad 400/220 kV Substation for grant of Stage-II Connectivity to Sindphal Power Development Private Limited

28.1. CTU representative informed that Stage-II Connectivity was granted to M/s Sindphal Power Development Private Limited in the 32nd Southern Region constituents meeting regarding Connectivity/LTA applications held on 25.04.2019. Details of the stage-II Connectivity are given below:

Applicant	Location	Quantum of Stage-I Granted (MW)	Stage-II Connectivity Sought for (MW)	Start date of Stage-II Connectivity	Proposed location for Grant of Stage-II Connectivity	Dedicated Tr. System (Under the scope of applicants)
Sindphal Power Development Private Limited	Coimbatore , Tamil Nadu	400	276	15.10.2020	Palakkad (Existing)	Sindphal Power – Palakkad 220kV S/c line on double circuit tower with high capacity conductor suitable to carry 400 MW at nominal voltage

It was informed that as per the detailed Procedure for Grant of connectivity to projects based on renewable sources to ISTS, the dedicated transmission line including line bays at generation pooling station shall be under the scope of the applicant and the terminal bays at the ISTS sub-station shall be under the scope of transmission licensee owning the ISTS sub-station subject to compliance of relevant provision of tariff policy. Accordingly, one no. of 220 kV bay at Palakkad S/s was proposed to be implemented under ISTS.

28.2. Representative from KSEB stated that additional system strengthening may be required for evacuation of power generated from the subject wind farms being connected at Pallakad substation. Towards this, CTU stated that the present proposal is for providing connectivity to the applicant and further system strengthening required for evacuation of power shall be identified after receipt of LTA application.

I/5982/2019

28.3. After detailed deliberations, members agreed for 1 no. of 220 kV bay at Palakkad sub-station under ISTS.

29.0 Allocation of one 220 kV bay at Hiriya 400/220 kV (POWERGRID) substation to KPTCL for termination of 220 kV S/c line

29.1. KPTCL vide letter dated 10.07.2018 had requested for allocation of one no. 220 kV bay at Hiriya 400/220 kV (POWERGRID) substation for termination of 220 kV S/c line on D/c towers (15.1 km) from Hiriya(PG) to Hiriya(KPTCL). POWERGRID representative informed that space was available for implementation of one 220 kV bay at Hiriya 400/220 kV (POWERGRID) substation and same may be allocated to KPTCL.

Members agreed for the same.

30.0 Status of Implementation of downstream network (by State utilities) associated with ISTS substation of POWERGRID

30.1. CTU informed that augmentation of transformation capacity in various existing sub-stations as well as addition of new sub-stations 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 needs to be commissioned. The status of downstream system as informed in the meeting by respective states are as follows:

I/5982/2019

Sl. No.	Name of Substation	MVA Capacity	220 kV Bays	Expected Schedule of Substation	Remarks	Deliberations in 2 nd SRSCT
1.	Tumkur (Vasantnarsapur)	2x500 MVA	6	Commissioned	Construction of downstream T/L for 6 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> 220 kV DC line Tumkur- Antrasanahalli: commissioned 220 kV DC line Tumkur-Madhugiri: Status: 209 locations towers are erected. Stringing of 44.31 kms/44.481kms completed- Jul'19 220 kV KIADB industrial area has significant load and 2 nos of 220 kV lines from 400 kV Tumkur is planned to be connected to KIADB.
2.	Yelahanka	2x500 MVA	10	Commissioned	Construction of downstream T/L for 10 Nos (6 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	Commissioned	Construction of downstream T/L for 4 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> 220 kV DC line between Bidadi (PG)- Bidadi (KPTCL) - Commissioned 220 kV DC line Bidadi- Magadi: Status: Out of 127 locations stub concreted in 80 locations and towers erected in 70 locations. Stringing 10.8 / 64.38 ckms completed. Delay in stringing due to forest area. 220 kV Bidadi- Kumbalgod – 1200 sq mm UG cable SC line: Status: Out of 54 section of cable, 27 sections of 1200 sq.mm cable laying completed.
4.	Hiriyur	2x315 MVA	6	Commissioned	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 DC Hiriyur- Gowribidnur- Commissioned. 220kV Hiriyur (PGCIL)-Hiriyur KPTCL 220kV Hiriyur (PGCIL)-Chitradurga. <p>Status: Out of 149 locations stub concreted in 139 locns and towers erected in 101 locns. Stringing 27.79 / 78.267 ckms completed.</p>
5.	Hassan	2x315 MVA	6	Commissioned	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	LOI for the re- tendered work of “ Balance portion of construction of 220 kV DC Drake ACSR line from 400/220 kV PGCIL Shantigrama station to LILO the existing 220 kV B4 line” is issued on 10-06.2019.
6.	Kolar	2x500 MVA	6	Commissioned	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	<ul style="list-style-type: none"> 220 kV DC line Kolar (PG)- Kolar (KPTCL)- Commissioned. 220kV DC line Kolar- Chitamani- Commissioned. 220kV DC lines Kolar PGCIL- T.Gollahalli: <p>Status: Out of 161 locations, stub concreted in 134 locns and towers erected in 69 locns. Stringing 2.24 /54.5 ckms completed.</p>
7.	Hosur	2x315 MVA	6	Commissioned	Construction of downstream T/L for 1 Nos 230 kV bays to be expedited by TANTRANSCO.	1 Nos 230kV downstream T/L to Shoolagiri expected by July'19.
8.	Kozhikode	2x315 + 1x500 MVA	4	Commissioned	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) expected by Sept'19

I/5982/2019

Transmission Planning Related Issues by SRPC**31.0 Highly loaded transmission line/ corridor****31.1 400 kV Hiriyur-Nelamangala D/C lines**

Member Secretary (I/C), SRPC, informed that 400 kV Hiriyur-Nelamangala D/C lines are being heavily loaded and have touched peak of 775 MW each. There was n-1 security violation of about 7% (in Feb 19) and 10% (in Mar 19). SRPC further informed that 400 kV Hiriyur – Mysore D/C line and 400 kV Bellary Pooling station – C. N. Halli D/C line would relieve the line loading of 400 kV Hiriyur – Nelamangala D/C line.

KPTCL informed that with the commissioning of 400 kV Vasanthnarasapura-Singanayakanahalli DC line and commissioning of the associated 400 kV transmission scheme of Yeramarus, the line loading on Hiriyur-Nelamangala line may get reduced. CTU requested KPTCL to expedite the implementation of the line.

31.2 400 kV Gooty-Nelamangala and 400 kV Gooty-Somanahalli line

Representative of SRLDC informed that 400 kV Gooty-Nelamangala and 400 kV Gooty-Somanahalli lines are highly loaded and Gooty-Nelamangala line has touched thermal limit (875 MVA) on few occasions in Feb and Mar 19. There was n-1 security violation of about 15% (Mar 19) on Gooty-Nelamangala line. He further informed that implementation of bypass at Nellore to alleviate Nellore PS- Nellore D/C lines would affect the flows on these two lines.

KPTCL informed that with commissioning of 400kV Vasanthanarasapura-Singanayakanahalli DC line and commissioning of Hiriyur-Mysore 400 kV DC Quad line, loading on Gooty-Nelamangala 400kV and Gooty-Somanahalli line may get reduced. KPTCL was requested to expedite the implementation of the lines.

31.3 400 kV NP Kunta-Kolar S/C line

Representative of SRLDC 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-Nelamangala / Somanahalli lines and also results in low voltages in Bengaluru area.

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 may resolve the overloading issue.

It was decided that CEA, CTU and SRLDC may jointly study and resolve the issue.

32.0 KKNPP High Voltage issues

32.1 Representative of SRPC informed that voltage at KKNPP bus are generally high during off peak conditions. In addition to this, KKNPP U-II (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 reactor back in service needs to be ensured by KKNPP.

I/5982/2019

32.2 KKNPP units should provide sufficient reactive compensation by absorbing reactive power or else by installing additional reactors. In the meetings held with NPCIL / KKNPP, it was assured that up to 150 MVAR reactive power absorption would be ensured by each of the KKNPP units (though the capability of the generating units was much higher).

32.3 Members opined that either the failed reactor of 80 MVAR be restored without delay or 1x125 MVAR reactor be installed at KKNPP by NPCIL. After further deliberation, it was decided that this issue needs to be discussed with NPCIL/KKNPP in a separate meeting. Accordingly, CEA would take up the matter with NPCIL.

33.0 ICT loadings

SRPC informed that the following ICT's are violating N-1 security criteria. The list of substation along with remedial action discussed during the meeting are given below:

Andhra Pradesh:

- 400/220 kV Nellore SS:

APTRANSCO informed that they have already planned additional 1x500 MVA ICT (4th ICT) at Nellore S/S (Manubolu) to resolve the issue. Work is already in progress and the ICT is expected to be commissioned by September, 2019.

- 400/220 kV Mardam SS:

APTRANSCO informed that the augmentation of ICT capacity from 2 x 315 MVA to 2 x 315 MV A + 1x 500 MVA ICTs at 400/220 kV Maradam (Garividi) S/S had already been agreed in the 1st SRSCCT.

- 400/220 kV Vemagiri SS

APTRANSCO informed that there is space constraint at Vemagiri substation. 2x500 MVA,400/220 kV ICT at GVK-2 Power Plant and 2x100MVA,220/132kV ICT at Ramachandrapuram S/S will resolve the issue.

Karnataka:

- 400/220 kV Nelamangala S/S

KPTCL informed that to reduce the loading of the Nelamangala S/S following works are planned:

- a) Commissioning of 400 kV Devanahalli Hardware Park.
- b) Strengthening of 220 kV A'Halli –Nelamangala line will reduce loading of ICT's

- 400/220 kV Hoody S/S

KPTCL informed that after commissioning of 400 kV Mylasandra and 400 kV Devanahalli Hardware Park, loading on Hoody S/S may get resolved.

I/5982/2019

- 400/220 kV Hiriyur S/S

KPTCL informed that with the commissioning of 400 kV Jagalur sub-station and its associated line, loads of 220 kV Thallak would be fed from 400 kV Jagalur sub-station and the ICT issues of 2X315MVA, 400/220 kV Hiriyur S/S would be solved

- 400/220 kV Mysore S/S

KPTCL informed that commissioning of 400 kV Kadakola S/S and its associated lines will relieve the overloading of 400 kV Mysore S/S.

- 400/220 kV UPCL S/S

KPTCL informed that the proposed 400 kV Arasapadavu sub-station is intended to take loads of 220 kV MSEZ and Kavoor sub-stations, resulting in reduction of load on 2X315MVA, 400/220 kV UPCL transformers.

I/5982/2019

Operational feedback by POSOCO

34.0 Transmission Line Constraints

Sl. No.	Corridor	Description of the constraints	Discussions in the meeting
1	400 kV Nellore Pooling Station - Nellore DC line	<p>With full Generation at SGPL (2x660 MW) & SEIL (2x660 MW), the 400 kV NPS- Nellore D/C flow is high and loading is more than 2000 MW for 50% of time in March, 2019. With commissioning of units at MEPL (stage-2-2x350MW), the problem will aggravate.</p> <p>Remarks: In the 42nd SCM dated 27th April 2018, the re-arrangement to bypass 400 kV Nellore PS – Nellore D/C at Nellore (PG) for making 400 kV Nellore PS – Thiruvallam D/C had been approved. The same may be done at the earliest as it would relieve the line-loading problem. But this will increase further loading on 400 kV Gooty – Nelamangala/Somnahalli line.</p>	This issue already discussed at item no.26.
2	400 kV Udumalpet-Palakkad DC line	<p>Kerala drawl is mainly through 400 kV Udumalpet-Palakkad D/C line. Present loading on these lines is in the range of 450-550 MW. N-1 violation of around 8% has happened during March, 2019.</p> <p>Remarks: At present this is the limiting constraint for the import of Kerala. The 400 kV Tirunelveli – Cochin line will relieve this constraint to some extent. Commissioning of the same to be expedited.</p>	CTU informed that Tirunelveli – Cochin 400 kV D/c line is expected by July, 2019. Further, to relieve the constraints, 2000 MW Pugalur – North Trichur VSC based HVDC is under implementation and is expected by April, 2020.
3	400 kV Hiriya-Nelamangala DC line	<p>With less generation at UPCL and high wind and Solar generation, the flow on 400 kV Hiriya-Nelamangala D/C line is severely high and will further increase if Yeramarus TPS & BTPS generation is full.</p> <p>Remarks: 400 kV Hiriya – Mysore D/C line and 400 kV Bellary Pooling station – C. N. Halli D/C line would relieve the line loading of 400 kV Hiriya – Nelamangala D/C line. The same may be commissioned at the earliest.</p>	This issue already discussed at item no. 31.1.
4	400 kV Gooty-Nelamangala line & 400 kV Gooty-Somanahalli line	<p>During peak demand period and heavy Drawl by BESCOM area, the flow on 400 kV Gooty-Nelamangala & 400 kV Gooty-Somanahalli line are high and touched thermal limit on few occasions. This is resulting in severe low voltages in Bangaluru area.</p>	This issue already discussed at item no. 31.2.

I/5982/2019

Sl. No.	Corridor	Description of the constraints	Discussions in the meeting
		Remarks: Commissioning of downstream of 400 kV Tumkur, 400 kV Yelhanka & 400 kV Tumkur – Yelhanka D/C line to be expedited.	
5	400 kV N.P. Kunta - Kolar line	Solar power at N.P. Kunta is mostly evacuated through 400 kV N.P. Kunta-Kolar S/C line and flow is as high as 800 MW. The N-1 of this line will cause severe over-loading of 400 kV Gooty – Nelamangala/Somnahalli and also low voltages in Bengaluru area. At present the 400 kV Urvakonda – Hindupur – N P Kunta D/C section is kept open to avoid further over-loading of this line. Remarks: Strengthening of 400 kV N. P. Kunta – Kolar or additional transmission line from 400 kV N. P. Kunta say, 400 kV N. P. Kunta – Hosur D/C line may be explored.	This issue already discussed at item no. 31.3.
6	Overloading of 220 kV Shoolagiri-Hosur (TN)-Yerrandahalli-Somanahalli SC line	Somanahalli, Yerrandahalli and Hosur are industrial areas. 220 kV Yerrandahalli is split and load is partly met from Hosur (TN) and partly met from Somanahalli side. Entire load cannot be met from either side (Somanahalli or Hosur) due to high loading on upstream lines. The line flow on this line is also causing high flows on Shoolagiri-Hosur 230 kV S/C line. Remarks: The commissioning of 400 kV Dommasandra and Mylassandra alongwith 2 nd circuit of 230kV Shoolagiri-Hosur at the earliest to relieve the line-loading problem.	TANTRANSCO informed that bay at Hosur is ready and 2 nd circuit of 230 kV Shoolagiri-Hosur line will be charged by next month. 400 kV Dommasandra and Mylassandra already discussed at para 3 of the minutes of meeting.
7	Constraints in Nagjhari PH evacuation	The 220 kV Nagjhar – Ambewadi DC line, 220 kV Ambewadi – Narendra DC line, 220 kV Kaiga – Kodalally SC & 220 kV Kadra – Kodalally SC lines are severely over-loaded. In 1 st meeting of SRSCCT, committee recommended re-conductoring of the lines with HTLS conductor. KPTCL has to expedite the same.	KPTCL informed that the evacuation lines from Nagjhar generating station towards 220 kV SRS Hubli, Ambewadi, Bidnal receiving stations and 220 kV evacuation lines of Kadra and Kodalally generating stations, the proposed replacement of age old Drake conductor/ porcelain insulators by HTLS Drake conductor/ polymer insulators has been approved.
8	Overloaded 220 kV lines in Tamil Nadu	The following lines are heavily loaded in Southern Tamil Nadu- 230 kV Madurai - Sembatty S/c, 230 kV Pugalur - Mywadi S/c, 230 kV Pudanchandai-Pugalur line.	TANTRANSCO informed that they have already floated tender for the 2 nd circuit of 230 kV Madurai – Sembatty line. and for strengthening of 230 kV Pudanchandai-Pugalur line they required 2 bays at Pugalur. Representative of CTU informed that bays are not available at present as they

I/5982/2019

Sl. No.	Corridor	Description of the constraints	Discussions in the meeting
			have already been allocated to other developers. If bays become available in future, the same may be allocated to TANTRANSCO.
9	220 kV Hyderabad Metro Network	220 kV Shankarpally – Gachibowli D/C & 220 kV Ghanapur - Moulali are getting heavily loaded. TSTRANSCO is in the process of re-conductoring. TSTRANSCO may expedite the same.	TSTRANSCO informed that re-conductoring of 220 kV Shankarpally - Gachibowli line with HTLS Drake conductor (1400 A) has been completed. Circuit - I was commissioned on 20.05.2019 & Circuit - II was commissioned on 16.05.2019 TSTRANSCO has proposed to erect a 220 kV DC line (UG Cable) from 220/132/33 kV Osmania University SS to 220/132 kV Nagole SS (8 km), which will reduce the overloading on 220 kV Ghanapur - Moulali line.
10	220 kV Bangalore Metro Network	Most of the 220 kV network in Bengaluru is radialised during peak season to prevent overloading of lines. The radialisation of lines decreases the reliability of supply, thus resulting in low voltage situation during peak demand period and High Voltage during off-peak period of the day, thus making it an ideal station for STATCOM. There is no sufficient Capacitor Compensation at distribution level in BESCOM area.	KPTCL informed that the following works are planned in Bangalore Metropolitan Area to relieve existing congestion: <ul style="list-style-type: none"> • 2x150 MVA, 220/66 kV GIS sub-station at Sobha Dreams in Bengaluru East taluk, Bengaluru Urban district. Status: DPR approved, to be tendered • Construction of 220/66 kV MCMV line with AAAC Moose from 400/220 kV Peenya to 220/66/11 kV NRS sub-station. Status: DPR approved • 400/220kV Peenya: Status: DPR approved • 400/220kV Devanahalli: Status: 2 Nos of 500MVA Transformer erected. 400kV and 220kV side equipment erection under progress. • 400/220kV Mylasandra: Status: 3*500MVA Transformer and 125MVAR Reactor foundation completed.125MVAR Reactor erection completed. Earthmat formation and cable duct under progress. • 400/220kV Dommasandra:

I/5982/2019

Sl. No.	Corridor	Description of the constraints	Discussions in the meeting
			<p data-bbox="1059 259 1414 322"><u>Status:</u> As per proceedings of 2nd SRST meeting.</p> <ul style="list-style-type: none"> <li data-bbox="1015 353 1414 510">• <u>220 kV ITI:</u> <u>Status:</u>220kV side precommissioning tests completed.66kV side testing to be taken up by RT staff <li data-bbox="1015 542 1414 698">• <u>220kV Koramangala:</u> <u>Status:</u> All works completed. Koramangala associated cable work idle charged on 20-May-19 <li data-bbox="1015 730 1414 1070">• <u>220kV Kumbalagodu:</u> <u>Status:</u> <u>Station:</u> Levelling, retaining wall works under progress. 220kV GIS hall and control room work under progress. Line: 220kV Cable: 10/27 sec cable laying completed from PGCIL end, 19/27 sec cable laying completed from Bangalore university end. <li data-bbox="1015 1102 1414 1442">• <u>220 kV Brindavan:</u> <u>Status:</u> Erection of 220kV GIS modules completed, Erection of 66kV GIS Modules under progress. 220kV GIS Control Room and hall finishing work is under progress. <ul style="list-style-type: none"> <li data-bbox="1082 1321 1414 1442">• Line:All works completed. CEIG approval to be obtained. <li data-bbox="1015 1473 1414 1563">• <u>220/66kV sub-station Exora sub-station:</u> to be re tendered <li data-bbox="1015 1572 1414 1662">• <u>220/66kV HBR Layout sub-station:</u> Price evaluation under process <li data-bbox="1015 1671 1414 1760">• <u>220/66kV Sahakari Nagar sub-station:</u> Price evaluation under process <li data-bbox="1015 1769 1414 1814">• <u>220/66kV Manyata Tech Park sub-station:</u> Commissioned <li data-bbox="1015 1823 1414 1912">• <u>220/66kV Nagarabhavi sub-station:</u> DPR under preparation <li data-bbox="1015 1921 1414 1966">• <u>220/66kV Nelamangala sub-station:</u> To be tendered <li data-bbox="1015 1975 1414 2038">• <u>220 kV Peenya-NRS DC line:</u> DPR under preparation

I/5982/2019

Sl. No.	Corridor	Description of the constraints	Discussions in the meeting
			<ul style="list-style-type: none"> • 220 kV Bidadi- Kumbalagodu-Vrushabhavathi 1200 sqmm UG Cable: Tender awarded • Capacitor banks: 450 MVAR out of planned 780 MVAR capacitor banks at 11 kV voltage level commissioned in Bengaluru City.

35.0 ICT Constraints

Sl. No	ICT	Description of the constraints	Discussion in the meeting
1	400/220 kV, 3x315 MVA ICTs at Vemagiri SS	N-1 condition not satisfied on few occasions	This issue already discussed at item no. 33
2	400/220 kV, 2x315MVA ICTs at Maradam SS	N-1 condition not satisfied for 80% of time in March, 2019. N-1-1 of ICTs will overload ICTs at Gazuwaka and Kalpakka SS.	This issue already discussed at item no. 33
3	400/220kV, 3x315 MVA ICTs at Nellore SS	N-1 condition not satisfied on few occasions	This issue already discussed at item no. 33
4	400/220 kV, 3X500 MVA ICTs at Neelamangala	N-1 condition not satisfied on few occasions	This issue already discussed at item no. 33
5	400/220 kV, 3X500 MVA ICTs at Hoody	N-1 condition not satisfied on few occasions.	This issue already discussed at item no. 33
6	400/220 kV 2X315 MVA ICTs at Hiriyr	N-1 condition is violated for both the directions	Sufficient reactive compensation shall be provided by KPTCL.

I/5982/2019

SI. No	ICT	Description of the constraints	Discussion in the meeting
		due to heavy MVAR drawl.	The distribution licensee and bulk consumer should provide adequate reactive compensation to compensate reactive power requirement in their system so that they do not depend upon the grid for reactive power support.
7	400/220 kV, 2X315 + 1x500 MVA ICTs at Mysore	N-1 condition not satisfied on most of the occasions	KPTCL has proposed a new 400/220 kV Kadakola SS by LILO of Hassan – Mysore 400 kV DC line. With the commissioning of Kadakola, the matter will be addressed. Kadakola SS has been discussed at 17.0.
8	400/220 kV, 2X315 MVA ICTs at UPCL	N-1 condition not satisfied on few occasions	Already discussed at item No. 21.
9	400/230 kV, 2X315MVA ICTs at Thiruvallam	N-1 condition not satisfied on few occasions	2x200 MVA, 400/110 kV ICTs proposed by TANTRANSCO (Discussed at item no. 46).

36.0 Nodes Experiencing Low Voltage

SI. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Discussion in the meeting
1	400 kV Somnahally SS	During peak load condition	Voltages are low during peak load condition	CTU informed that inadequate transmission system in and around Bengaluru area is causing the low voltage situation. Dynamic compensation at suitable location is to be identified keeping in view the space availability. KPTCL may provide additional feeds to Bengaluru area to meet the demand. CTU informed that with the commissioning of ± 6000 MW Raigarh - Pugalur HVDC line, the low voltage issue is expected to be resolved (Nov'2019 / Feb' 2020). CTU informed that with the
2	400 kV Nelamangala SS	During peak load condition	Voltages are low during peak load condition	
3	400 kV Bidadi SS	During peak load condition	Voltages are low during peak load condition	
4	400 kV Hoody SS	During peak load condition	Voltages are low during peak load condition	
5	400 kV Mysore SS	During peak load condition	Voltages are low during peak load condition	
6	400 kV Hosur SS	During peak load condition	Voltages are low during peak load condition	
7	400 kV Arasur SS	During peak load condition & high wind period	Voltages are low during peak load condition	
8	400 kV Karamadai SS	During peak load condition	Voltages are low during peak load condition	
9	400 kV Trichur SS	During peak load condition	Voltages are low during peak load condition	

I/5982/2019

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Discussion in the meeting
10	400 kV Palakkad SS	During peak load condition	Voltages are low during peak load condition	commissioning of 2000 MW Pugalur – North Trichur VSC based HVDC by April, 2020, the low voltage issues is expected to be resolved.
11	400 kV Cochin SS	During peak load condition	Voltages are low during peak load condition	

37.0 Nodes Experiencing High Voltage

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints
1	400 kV Gooty SS	Monsoon period and off peak period	Voltages remain very high most of the time
2	400 kV Nunna SS	Whole Year	Voltages remain very high most of the time
3	400 kV Sattenapally	Whole Year	Voltages remain very high most of the time Remarks: 1x125 MVAR reactor approved in 42 nd SCPSPSR. The same may be expedited.
4	400 kV Ghani SS	Whole year	Voltages remain very high most of the time
5	400 kV Jamalamadugu SS	Whole year	Voltages remain very high most of the time. Remarks: 1x80 MVAR reactor approved in 42 nd SCPSPSR. The same may be expedited.
6	400 kV Uravakonda SS	Whole year	Voltages remain very high most of the time. Remarks: 1x125 MVAR reactor approved in 42 nd SCPSPSR may be expedited.
7	400 kV KV Kota SS	Whole Year	Voltages remain very high most of the time
8	400 kV Hinduja SS	Whole Year	Voltages remain very high most of the time
9	400 kV Kalikiri SS	Whole Year	Voltages remain very high most of the time
10	400 kV Podili SS	Whole Year	Voltages remain very high most of the time
11	400 kV Dindi SS	Whole year	Voltages remain very high most of the time Additional reactor of 125 MVAR reactor approved in 1 st SRSCCT may be expedited
12	400 kV Suryapet SS	Whole year	Voltages remain very high most of the time. Remarks: 1x125 MVAR reactor approved in 42 nd SCPSPSR and the same may be expedited
13	400 kV Malkaram SS	During off peak period	Voltages remain very high most of the time
14	400kV Mamidipally SS	Whole year	Voltages remain very high most

I/5982/2019

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints
			of the time
15	400kV Asupaka SS	Monsoon period and off peak period	Voltages remain very high most of the time. Remarks: 1x80 MVAR reactor approved in 42 nd SCPSPSR and the same may be expedited.
16	400 kV Srisailam LB SS	Whole year	Voltages remain very high most of the time. Remarks: 1x125 MVAR reactor approved in 39 th SCPSPSR may be expedited
17	400 kV Ramadagu SS	Whole Year	Voltages remain very high most of the time.
18	400 kV Jegurupadu SS	Whole Year	Voltages remain very high most of the time.
19	400 kV Nirmal SS	Whole Year	Voltages remain very high most of the time
20	400 kV Hassan SS	During off peak	Voltages remain very high most of the time
21	400 kV Narendra SS	During off peak	Voltages remain very high most of the time
22	400 kV Mysore SS	During off peak	Voltages remain very high during off-peak hours
23	400 kV Tumkur SS	During off peak	Voltages remain very high most of the time
24	400 kV Karaikudi SS	During off peak	During Low wind condition and off-peak condition Voltages are very High
25	400 kV Udumalpet SS	During off peak	During low wind condition and off-peak condition, voltages are very high
26	400 kV Anaikaduvu SS	During off peak	Voltages remain very high most of the time
27	765 kV Cuddappa SS	Whole Year	Voltages remain very high most of the time
28	765 kV Nizambad SS	Whole Year	Voltages remain very high most of the time
29	765 kV Thiruvallam SS	Whole Year	Voltages remain very high most of the time. Remarks: 2x240 MVAR approved in 42 nd SCPSPSR may be expedited

37.1 Representative of CTU informed that detailed study of reactive power compensation had been carried out and the same had been discussed in 1st meeting of SRSCT. Reactors are proposed at different locations and with the commissioning of planned/ under implementation bus reactors at various ISTS & STU substations, the issue of high voltage would be addressed. STUs were requested to provide the status of planned reactor at various state sub-stations.

I/5982/2019

In case the high voltage conditions persists with the commissioning of above planned/ under construction bus reactors, suitable comprehensive reactive studies may be carried out subsequently, considering the high RE integration in Southern Region.

38.0 Lines opened on High Voltage

38.1 SRLDC informed that number of 765 kV and 400 kV lines are tripped on over-voltage and physically opened by real-time operators to control over-voltages in the grid. SRLDC requested all the constituents to give high priority in expediting the commissioning of already approved bus reactors.

39.0 Delay in Transmission System

Delay in following transmission lines is affecting grid operation adversely:

S. No	Transmission Corridor	Proposed Commissioning Date/ Original Target date	Actual/ Likely Commissioning Date	Transmission Constraint Caused	Present status/ Discussion
1	400 kV Tirunelveli-Cochin DC line	Nov-08	RoW issues	400 kV Udumalpet-Palakkad DC line getting heavily loaded & Kerala Drawl limitation	CTU informed that line is expected by August 2019
2	400 kV Thrissur – Kozhikode DC line	---	RoW issues	Low voltages in North Kerala & 220 kV North - South corridor of Kerala	SRLDC informed that the North Kerala is fed radially from Mysore area and severe low voltages are faced in North Kerala during high demand period. Representative of KSEB informed that the line is expected by March, 2020
3	400 kV Tumkur-Yelahanka DC line	April-19	RoW issues	High loading on 400kV Gooty-Nelamangala line	POWERGRID was requested to expedite the commissioning of Tumkur-Yelahanka D/C lines. It was informed that the line would be

I/5982/2019

					commissioned by September, 2019.
4	400 kV Hiryur-Mysore DC line	July-19	RoW issues	High loading on 400kV Hiryur-Nelamangala DC line	POWERGRID informed that line is expected by August, 2019.
5	400 kV Ballary PS-Chikkanayakanah alli DC line	--	Tendering stage	High loading on 400kV Hiryur-Nelamangala DC line	SRLDC informed that 400 kV Hiryur-Nelamangala D/C line is being loaded heavily during peak wind period and during full generation from YTPS, BTPS, RTPS and Jindal in Karnataka area. KPTCL informed that the "400 kV Ballary PS-Chikkanayakanah alli DC line" is under tendering stage. SRLDC requested KPTCL to expedite the implementation of the line.

40.0 Transmission Elements under long outage

SRLDC informed that the following transmission elements have been under long outage:

Sl. No.	Transmission Elements	Affected Areas	Expected Revival date
1	220kV Upper Sileru - Balimela	Inter-regional line. ER-SR. Out since 21 st April, 2014	Line had been idle charged from 8 th January 2015 from Upper Sileru end.
2	220kV Chikkodi – Mudshingi & 220 kV Chikkodi – Talangade	Inter-regional line WR-SR.	Line had been idle charged

40.1 Regarding 220 kV Upper Sileru-Balimela line, SRLDC informed that line had been idle charged from Upper Sileru end since 8th January 2015. This line being an Inter-Regional line, the line shall be kept in healthy condition so that the line can be used whenever required.

I/5982/2019

40.2 Regarding 220 kV Chikkodi – Mudshingi & 220 kV Chikkodi – Talangade lines, SRLDC requested KPTCL to keep the lines healthy so that these lines can be used whenever required.

41.0 Sub-stations with High Fault level:

41.1 SRLDC informed that the substations where fault level exceeds 40 kA are as mentioned below:

- 400 kV Tiruvallam PG
- 400 kV Tiruvallam TN
- 400 kV Nellore PG
- 400 kV Nellore AP
- 400 kV Nellore PS
- 400 kV Chittoor
- 400 kV Raichur – PG
- 400 kV Kurnool – AP
- 400 kV Kurnool – PG
- 400 kV Raichur TPS
- 400 kV Gooty
- 400 kV Krishnapatnam
- 400 kV Maheshwram PG
- 400 kV Khammam
- 400 kV Maheswaram TS
- 400 kV Ramagundam NTPC
- 400 kV Alamathi SS

41.2 Representative of CTU stated that the issue related to Tiruvallem could be addressed by series reactor. The fault level at Nellore could be controlled with bypassing of Nellore PS-Nellore (PG) line and for other substations where fault level exceeds 40 kA, detailed study may be carried out separately. Chief Engineer (PSPA-II), CEA, stated that for these substations, study would be carried out and the observations/results of study would be discussed in the next meeting of SRSC. Members agreed for the same.

42.0 Other issues in Southern Region

42.1 The following operational issues were raised by SRLDC:

- During monsoon with less demand coupled with high RE penetration, many of the transmission lines are under-loaded, thus resulting in high voltages across the grid.

I/5982/2019

- If the fault level has crossed 32 kA, the buses may also be highlighted. DR outputs, if any, for actual event illustrating this to be attached.
 - With Full generation at MAPS & Bhavini and with interconnection, the Fault MVA touching 25 kA, the rated capacity of breaker.
- Any substation layout which affected grid operation adversely could also be highlighted.
 - It is recommended to have uniform rating of LV/400 kV for Generator Transformers connected to 400 kV grid directly then only optimization of tap position give fruitful results.
 - Substations where parallel circuits are on the same diameter are as mentioned below:
 - At 400 kV Alamatty SS, Vallur D/C, Thiruvallur D/C, SV Chatram D/C, NCTPS -1 & Manali-1 and 400/220kV ICT-1&2 400/132kV ICT-4&5 are on the same diameter.
 - At 400 kV Alundur SS, 400/220kV ICT-1&2 are on the same diameter.
 - At 400 kV Hinduja SS, 400kV KV Kota D/C and 400kV Kalpakka D/C are on the same diameter.
 - At 400 kV Kayathar SS, 400kV Karaikudi D/C and 400/230kV ICT-1&2 are on the same diameter.
 - At 400 kV Kudamkulam SS, 400kV Thirunelveli D/C are on the same diameter.
 - At Kakatiya TPS, 400kV Warangal D/C and 400kV Gajwel D/C are on the same diameter.
 - At 400 kV KTPS SS, 400kV Khammam D/C and 400/220kV, 80MVA ICT & 400/11kV, 50MVA ICT are on same diameter.
 - At Mettur-III SS, 400kV Palavadi D/C, 400kV Karamadai D/C and 400/230kV ICT-1 & 2 are on same diameter.
 - At 400 kV Udumalpet SS, 400/220kV ICT 1 & 2 is on same diameter.
 - At 400 kV Sholinganalur, 400kV Kalivendapattu – Sholinganalur D/C and 400/230kV Sholinganalur ICT 1 & 2 are on the same diameter.
 - At 400 kV Nunna SS, 400kV Vemagiri Ckt-III&IV are on the same diameter.
 - At 400 kV RTPP SS , 400kV CHitoor D/C are on the same diameter
 - At 400 kV Kanarapatti SS, 400kV Kayathar D/C, 400kV Tirunelveli D/C lines are on the same diameter.
 - At 400 kV Salem (TN) SS, 400/110kV ICT-1&2 and 400/230kV ICT-1&2 are on the same diameter.
 - At 400 kV Simhadri (AP) SS, 400 kV Kalpakka ckt-1&2 and Kalpakka ckt-3&4 are on the same diameter.
 - At 400 kV Simhadri Stg-2 SS, 400kV Vemagiri D/C and 400kV Gazuwaka D/C are on the same diameter.
 - At 400 kV SV Chatram SS, 400/110kV ICT-1&2, 400kV NCTPS D/C, 400kV Alamaty D/C and 400/230kV ICT 1&2 are on the same diameter.
 - At 400 kV VTS-IV SS, 400kV Sattenpalli D/C on same diameter.

I/5982/2019

- At 400 kV Ramagundam SS, both Chandrapur circuits are on same Dia.
- At 400 kV Gooty SS, both Nellore PS circuits are on same Dia.
- In future, it is recommended to avoid parallel circuits on the same Dia for reliability purposes.
- Many KPTCL Stations at 220 kV level are operated as single bus. Many State 220 kV stations do not have bus bar protection. These issues are being taken up at PCC meetings.
- Vallur TPS (1500 MW) and NCTPS-II (1200MW) generation is connected at 400 kV bus and no 230 kV path is available to give start up supply in case of Blackout. So there is a need to provide 230 kV path.
- The following Interregional links has to be explored for import of power by Southern Region,
 - 220 kV Upper Sileru-Balimela S/C line
- National HVDC project of Lower Sileru-Barasoor line right of way has to be used for New inter connection between SR & NEW Grids.
- Presently one line each of 765 kV Kurnool-NPS DC line and 765 kV Kurnool-Cuddapah-Thiruvalem DC line are kept open due to high voltage. Some of the 765 kV transmission lines in Southern Region are not fully compensated for Reactive power and thus resulting in high bus voltages.
- 230 kV MAPS – Bhavini line (80 MVA) is used for only startup purpose and is always kept open. 230 kV Acharapakkam – Villupuram is open to avoid overloading of 230 kV Kalpakkam – Acharapakam S/C line. 230 kV MAPS is left with only two sources i.e. 230 kV MAPS - Arni SC and 230 kV MAPS - SP Koil DC line.

42.2 The above issues were deliberated in the meeting and it was opined that the operational issues may be discussed in OCC and TCC meetings of SRPC, which would be the appropriate forum for such issues.

42.3 Regarding High Voltage across the Southern Region grid, CTU informed that sufficient reactors have been planned at various locations in the Grid and the same were approved in the previous standing committee meetings. The reactors are being implemented by various agencies are in the different stage of implementation. SRLDC requested POWERGRID and STUs to expedite the commissioning of reactors at the earliest.

42.4 Regarding sub-stations where parallel circuits are on the same diameter, SRLDC informed that at many sub stations parallel circuits (DC) are terminated in the same Dia. In case of LBB operation of Tie breaker, both the circuits would be tripped, thereby reducing the reliability of the system. In addition to this, failure of switchyard equipments in the Dia, may damage adjacent bay equipment leading to tripping of lines. These types of incidents have been observed in the recent past. Considering the above, it was recommended to avoid the termination of parallel circuits on the same Dia and same Bus for reliability purposes, in future.

I/5982/2019

- 42.5 Regarding single bus operation at 220 kV level it was informed that as per clause-42.2(a) of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010, double main and transfer bus scheme or double 220 kV bus scheme is recommended at 220 kV level. However, it is observed that many of the 220 kV substations are operated as a single bus without any bus bar protection. It was recommended to avoid the single bus operation of 220 kV substations.

Additional Agenda Points received after Joint Study Meeting held on 01-02 May, 2019

Transmission Planning Proposals by Tamil Nadu

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

TANTRANSCO informed that administrative approval was accorded by TANTRANSCO for establishing a 230/110 kV SS at Vembakkam by LILO of 230 kV MAPS – Echur line and the work is to be commenced soon. As MAPS is a central generating station, TANTRANSCO had sought approval for making LILO of 230 kV MAPS – Echur line at Vembakkam 230 kV SS.

SRLDC representative suggested that in place of LILO of MAPS-Echur line, LILO of MAPS-Arni line should be done. It was decided that TANTRANSCO would resubmit the proposal along with relevant system studies after incorporating the suggestions of SRLDC.

- 44.0 Proposal of TANTRANSCO for erecting 400 kV Bus reactors at different locations**

TANTRANSCO had proposed erection of 400 kV Bus reactors at following locations:

1	Korattur	400 kV	2x125 MVar
2	Manali	400 kV	2x125 MVar
3	Guindy	400 kV	2x125 MVar
4	Ottiampakkam	400 kV	2x125 MVar
5	Pulianthope	400 kV	1x125 MVar
6	Alamathy	400 kV	1x125 MVar
7	Vellalaviduthi	400 kV	1x63 MVar

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

- 45.0 Proposal of TANTRANSCO for establishing Alagarkoil 400/230-110 kV SS (in place of Kondagai)**

45.1 TANTRANSCO informed that Konthagai 400/230-110 kV substation proposal was

I/5982/2019

approved in the 41st and 42nd meeting of Standing Committee on Power System Planning with the following 400 kV connectivity:

- (a) LILO of one circuit of 400 kV Kayathar-Karaikudi DC line by erecting 25 Km of DC line to Konthagai 400 kV SS.
- (b) 400 KV DC Link line from the proposed Virudhunagar 765/400 kV SS to Konthagai 400 kV SS.
- (c) Provision of 2x500 MVA 400/230 kV ICT & 2x200 MVA 400/110kV capacity.

45.2 TANTRANSCO further informed that the identified land at Konthagai is only sufficient to establish a 400 kV GIS SS, and hence, as a cost effective measure, it has been decided to establish a 400 kV AIS SS in the premises of the existing Alagarkoil 230 kV SS by retaining the same 400 kV connectivity of Konthagai SS at Alagarkoil.

45.3 TANTRANSCO proposed establishment of Alagarkoil 400/230-110 kV substation in place of Kondagai 400 kV SS with the following connectivity:

400 kV connectivity:

- (a) LILO of one circuit of 400 kV Kayathar-Karaikudi DC line by erecting 25 km of DC line to Konthagai 400 kV SS.
- (b) 400 KV DC Link line from the proposed Virudhunagar 765/400 kV SS to Konthagai 400 kV SS.
- (c) Provision of 2x500 MVA 400/230 kV ICT & 2x200 MVA 400/110 kV capacity.
- (d) Provision of 1 x 125 MVAr Bus Reactor.
- (e) 230kV and 110 kV connectivity of the existing Alagarkoil 230 kV SS will be retained. Additional 230 kV connectivity to the proposed new 230 kV substations at Thirupalai and Arasanoor near Alagarkoil.

After deliberations, the scheme was agreed by the Members.

46.0 Proposal of TANTRANSCO for Thiruvalem 400/110 kV Ratio Introduction

46.1 TANTRANSCO proposed 400/110 kV ratio introduction at Thiruvalem 400/230 kV substation as it will give relief to the existing Thiruvalem 230 kV substation and will be useful for transferring the existing 110 kV loads of Thiruvalem 230/110 kV substation to the now proposed 400/110 kV bus during execution of the already sanctioned 110 kV feeders strengthening work (fed from Thiruvalem 230 kV SS) which is pending for execution due to non-feasibility of transferring of loads of existing fully loaded feeders.

46.2 TANTRANSCO proposed 400/110 kV ratio introduction at Thiruvalem 400/230 kV substation with the following connectivity.

400/110 kV ratio introduction at Thiruvalem 400/230 kV SS:

I/5982/2019

ICT: 2x200 MVA 400/110 kV ICTs.

110 kV Connectivity:

- (a) 110 kV Thiruvalam - M.V.Puram DC line.
- (b) 110 kV Thiruvalam - SIPCOT DC line.
- (c) 110kV Thiruvalam - Vaduganthangal SC line.

46.3 After deliberations, the scheme was agreed by the Members.

Transmission Planning Proposals by Andhra Pradesh

47.0 Proposal for erection of 2x80 MVAR reactor at Stage- 1 (2x800 MW) Sri Damodaram Sanjeevaiah Thermal Power Station, Krishnapatnam, Nellore district.

47.1 Representative of APTRANSCO informed that the following scheme had been approved in 26th SCPSPSR for evacuation of power from stage I (2x800 MW) of Sri Damodaram Sanjeevaiah Thermal Power Station:

- i. Manubolu - Krishnapatnam switchyard 400 kV QMDC line
- ii. Chittoor - Krishnapatnam switchyard 400 kV QMDC line

47.2 He further informed that APPDCL has proposed for erection of 2x80 MVR bus reactor at Sri Damodaram Sanjeevaiah Thermal Power Station. The above bus reactors are ready for charging.

47.3 After deliberations the same was agreed. However, Chairperson, CEA, stated that constituents must put up their proposals to the Standing Committee and seek approval from Standing Committee prior to execution of transmission system. They must not carry out the works on their own and then seek approval of Standing Committee after execution of the work.

48.0 Connectivity Transmission system agreed in earlier Connectivity/LTA meetings of SR

48.1. Representative of CTU stated that following dedicated transmission system was agreed for grant of Stage-II connectivity in various Connectivity/LTA meetings of Southern Region held after 1st meeting of SRSCT (held on 07.09.2018).

I/5982/2019

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
26th Conn/LTA meeting held on 07.09.2018							
1	120000 1607	Shapoorji Pallonji Infrastructure Capital	Tuticorin, Tamil Nadu	250	01.10.2020	Tuticorin-II GIS PS (erstwhile Tirunelveli PS)	Shapoorji Pallonji – Tuticorin-II 230kV S/c line strung on D/c towers along with terminal bays at Tuticorin-II & generation switchyard
28th Connectivity/LTA meeting held on 26.11.2018							
2	120000 1733	ReNew Power Limited	Davangere, Karnataka	300	01.04.2020	Hiriyur (Existing)	ReNew Power Limited – Hiriyur 220kV S/c line along with terminal bays at both ends
4	120000 1739	Mytrah Energy (India) Pvt. Ltd.	Pollachi, Tamil Nadu	300	30.07.2020	Palakkad (Existing)	Mytrah Energy – Palakkad 220kV D/c line along with terminal bays at both ends
5	120000 1740	Shapoorji Pallonji Infrastructure Capital Co. Pvt. Ltd.	Tuticorin, Tamil Nadu	250	15.12.2020	Tuticorin-II GIS PS (erstwhile Tirunelveli PS)	Shapoorji Pallonji – Tuticorin-II 230kV D/c line along with terminal bays at both ends
6	120000 1741	Shapoorji Pallonji Infrastructure Capital Co. Pvt. Ltd.	NP Kunta, Andhra Pradesh	250	15.12.2020	NP Kunta	Shapoorji Pallonji – NP Kunta 220kV S/c line strung on D/c tower along with terminal bays at both ends
29th Connectivity/LTA meeting held on 26.12.2018							
7	120000 1773	Ecoren Energy Private Limited	Bellary, Karnataka	175	15/08/2020	Hiriyur (Existing)	Ecoren Energy India Private Limited – Hiriyur 220kV S/c line
32nd Connectivity/LTA meeting held on 25.04.2019							
8	120000 2004	Sindphal Power Development Private Limited	Coimbatore, Tamil Nadu	276	15.10.2020	Palakkad (Existing)	Sindphal Power – Palakkad 220kV S/c line with high capacity conductor suitable to carry 400 MW at nominal voltage
9	120000 1998	SBE Renewables Ten Private Limited	Trichy, Tamil Nadu	450	01.09.2020	Trichy	SBE Renewables Ten Private Limited – Trichy 400kV S/c line

48.2. The details of LTA granted in various Connectivity/LTA meetings of Southern Region held after 1st meeting of SRSCT are as under:

Sl.	Applicant	Location	LTA	Beneficiaries	Date of
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I/5982/2019

No.			quantum (MW)	(MW)	start of LTA
25th Connectivity/LTA meeting held on 17.08.2018					
1	Betam Wind Energy Private Limited	Tirunelveli, TN	250.2	NR-100 MW + ER- 150.2 MW,	31.07.201 9
2	Sprng Renewable Energy Private Limited	Pugalur, TN	300	NR-300 MW	30.11.201 9
27th Connectivity/LTA meeting held on 24.10.2018					
3	Mytrah Energy (India) Private Limited	Palakkad, Kerala	300	NR-300 MW	29.02.202 0

Members noted the same.

Annex-I**List of participants of the 2nd meeting of Southern Region Committee on Transmission (SRSCT) held on 10th June, 2019 at Bengaluru**

Sl. No.	Name	Designation
Central Electricity Authority		
1.	P.S. Mhaske	Chairperson/ Member (PS)
2.	Pardeep Jindal	Chief Engineer
3.	Ishan Sharan	Director
4.	Kanchan Chauhan	Assistant Director
SRPC		
1.	Asit Singh	Member Secretary (I/C)
2.	Len. J.B	EE
3.	Betsy Sebastian	AEE
POSOCO, NLDC		
1.	S.R. Narasimhan	Director (System Operations)
2.	Priyam Jain	Dy. Manager
POWERGRID		
1.	Subir Sen	COO (CTU-Plg.)
2.	Mukesh Khanna	CGM (CTU-Plg.)
3.	V.G. Rao	Sr. GM
4.	Anil Kumar Meena	DGM (CTU-Plg.)
5.	Ankush Patel	Dy. Manager (CTU-Plg.)
6.	G. Venkatesh	Dy. Manager (CTU-Plg.)
7.	Himanshi	Dy. Manager (CTU-Plg.)
POSOCO/SRLDC		
1.	A. Gartia	ED
2.	S.P. Kumar	Sr. DGM
3.	G. Madhukar	Chief Manager
4.	Venkateshan. M.	Chief Manager
5.	M. Pradeep Reddy	Manager
6.	L. Sharath Chand	Dy. Manager
NLC India Ltd		
1.	D.S. Ramakrishnan	DGM/E/PSE, CO
APTRANSCO		
1.	Y.V. Ramakrishna	Dy. EE, SS

Sl. No.	Name	Designation
	KSEB	
1.	Dr. P. Rajan	Chief Engineer, Trans Grid
	TSTRANSCO	
1.	A. Sreenivasa Reddy	SE/ Power Systems
2.	M. Sheshagiri	DE/SS II
	TANGEDCO/TANTRANSCO	
1.	T. Senthivelan	Dir/Trans
2.	D. Ravichandran	SE/SS
3.	T. Sumathi	EE/ SS
4.	R. Alamelu	AEE/ SS
5.	V. Jayanthi	AEE/ SS
	KPTCL	
1.	K.V. Shivakumar	Director
2.	R. M Hiriyannaiah	SEE
3.	S. Shankar	SEE/SLDC
4.	D. Chethan	EE/PSS
5.	Nagaraja.M.C	EE
6.	B.V.Mallesappa	EE/SLDC
7.	Divya Prabha H.	AEE/PS
8.	Meetha C Jadav	AE/PSS
9.	Swathi.S.	AE/PSS
10.	Rekha. S.	AEE,SCADA

LOAD GENERATION BALANCE OF SOUTHERN REGION IN 2021-22: PEAK & OFF-PEAK CONDITIONS														
Agency	Installed Capacity (MW)			Morning Peak Despatch [Solar @ 75% & Wind @10%]	Evening Peak Despatch [Solar @ 0% & Wind @10%]	Off-Peak Despatch [Solar @ 75% & Wind @60%]	Peak Demand as per 19th EPS in SR in 2021-22 (MW)	Morning Peak Load (MW)	Evening Peak Load (MW)	Off-Peak Load (MW)	Deficit (-)/Surplus(+) (MW)			
	Existing	Addition	Total								Morning Peak	Evening Peak	Off-Peak	
Andhra Pradesh	22576	1600	24176	12244	11101	12268	11843	11250	11250	7875	994	-149	4393	
Hydro	2013	0	2013	403	1007	1007								
Thermal	6050	1600	7650	5376	6555	3450								
Gas	2793	0	2793	100	208	100								
LTA (OA) in SR	831	0	831	795	795	631								
CGS Share	2328	0	2328	1686	1859	1222								
RE	8561	0	8561	3885	678	5858								
LTA from NEW Grid														
Telangana	13726	7530	21256	14002	11388	10620	14500	13500	13500	9450	502	-2112	1170	
Hydro	2357	50	2407	481	602	1685								
Thermal	4163	6680	10843	7718	7803	3540								
Gas	0	0	0	0	0	0								
LTA (OA) in SR	839	0	839	839	839	839								
CGS Share	2336	0	2336	1715	1885	1258								
RE	4031	800	4831	3247	259	3297								
LTA from NEW Grid														
Karnataka	29266	2312	31578	14534	12092	13917	14271	14500	14500	10150	34	-2408	3767	
Hydro	3312	0	3312	1803	3127	1213								
Thermal	7680	0	7680	3754	4976	2220								
Gas	0	360	360	0	306	0								
LTA (OA) in SR	0	0	0	0	0	0								
CGS Share	3705	0	3705	2457	2658	1841								
RE	14569	1952	16521	6520	1025	8643								
LTA from NEW Grid														
Kerala	4569	179	4748	2366	3030	1652	5263	4600	4600	3220	-2234	-1570	-1568	
Hydro	1883	179	2062	1067	1541	587								
Thermal	202	0	202	0	80	80								
Gas	360	0	360	0	0	0								
LTA (OA) in SR	0	0	0	0	0	0								
CGS Share	1724	0	1724	1299	1409	985								
RE	400	0	400	0	0	0								
LTA from NEW Grid														
Tamil Nadu	25960	9055	35015	17074	15738	15808	20273	17600	17600	12320	-526	-1862	3488	
Hydro	2309	20	2329	359	359	359								
Thermal	5170	6225	11395	7382	8529	3537								
Gas	562	0	562	202	202	0								
LTA (OA) in SR	1098	0	1098	1098	1098	0								
CGS Share	6175	0	6175	4253	4580	3276								
RE	10646	2810	13456	3781	971	8636								
LTA from NEW Grid														
ISTS RE (wind) SR	950	12351	13301	1330	1330	7981					1330	1330	7980.6	
ISTS RE (solar) SR	3500	10550	14050	10538	0	10538					10538	0	10537.5	
Total	100546	43577	144123	72088	54680	72782	62975	61450	61450	43015	10638	-6770	29767	
								Likely demand as per discussion with States						

Electricity Demand of Puducherry is included in Tamil Nadu.