



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 कार्यसूची।

Subject: Agenda for 2nd meeting of Southern Region Standing Committee on Transmission (SRSTC).

महोदय(Sir)/महोदया(Madam),

The 2nd meeting of Southern Region Standing Committee on Transmission (SRSTC) will held on **10 June 2019 (Monday) at Bengaluru**. Agenda for the meeting is enclosed.

Kindly make it convenient to attend the meeting.

भवदीय/Yours faithfully,

(प्रदीप जिंदल/ Pardeep Jindal)

मुख्य अभियंता/ Chief Engineer

प्रति सूचनार्थ/ Copy for kind information to:

1) PPS to Member (PS), CEA

Address List:

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

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

Date: 10.06.2019

Time: 10:30 A.M.

Venue: Hotel Renaissance, Race Course Road, Bengaluru

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

- 1.1 Minutes of 1st Meeting of Southern Region Standing committee on Transmission (SRST) held on 07th September, 2018 at Chennai, were 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.

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

- 2.1 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 (SCPSP) for Southern Region held on 27.04.2018 and also discussed in the 1st meeting of Southern Region Standing Committee on Transmission (SRST) held on 07.09.2018. Details of the proposed transmission system 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. 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. 2 x 500 MVA, 400/220 kV ICTs at Yalwar.
- iv. 2 x 125 MVar 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. 2 x 500 MVA 400/220 kV ICTs.
- iii. 2 x 125 Mvar 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 in detailed study with 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 completion of generation projects from 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 by the constituents for the year 2021-22. With the high penetration/implementation of wind and solar generators in Southern Region, the 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), the surplus power may be observed to extent of 29,000 MW. This surplus power would have to be absorbed in other Regions, particularly Western and Northern Region.

CTU representative stated that 15,000-17,000 MW of surplus power can be exported from Southern Region with upgradation of existing/under implementation substation 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, transmission system augmentation is required for absorption and transfer of power in and beyond Western Region. The matter

will have to be deliberated in Western Region Standing Committee on Transmission. A note in this regard has been sent to Chief Engineer (PSP&A-I) CEA, 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.

- 2.4 The injection of power at the proposed 400/220 KV substation at Yalwar for WEZ requires system strengthening beyond Kolhapur in WR for export of power from Sothern Region. After detailed deliberations, it was recommended that the proposed scheme for establishment of Yalwar S/s may be discussed along with the transmission system augmentation required beyond Kolhapur.
- 2.5 KPTCL informed that there is 670 MW wind power plant at Lokapur and its power is already being evacuated successfully through 220 kV network. KPTCL further informed that no RE addition is 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 400/220 kV Lokapur S/s may be dropped at present.

Members may please deliberate.

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 sub-station at Dommasandra in Bengaluru

- 3.1 The proposal for establishment of 2x 500 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.
- 3.2 In the 1st SRSCT it was decided to discuss the scheme in a separate meeting of CEA, CTU and KPTCL.
- 3.3 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
- iii. Mylasandra – Dommasandra 400 kV S/C line (with quad Moose ACSR conductor)

3.4 KPTCL informed that the line length of Dommasandra - Mylasandra section is about 14.52 km and line length of Somanhalli - Mylasandra section is about 5.81 km and implementation of the scheme would be taken up through multi circuit towers utilizing the existing corridor of POWERGRID's Kolar – Somanhally 400kV S/c line.

3.5 It was decided that the commercial issues, if any, towards utilization of existing corridor (RoW) of POWERGRID's Kolar – Somanhally 400 kV S/c line, would be taken up separately by KPTCL with POWERGRID.

3.6 After detailed deliberations, the transmission scheme was technically agreed in the Joint Study meeting. The study results are given at **Exhibit I (a)**.

Members may please discuss.

4.0 Establishment of 400/230 kV substation at Vadamadurai, Tamil Nadu, along with associated transmission lines

4.1 The establishment of 400/230 kV substation at Vadamadurai along with associated transmission system was discussed in the 1st SRSC meeting. The following system was proposed in 1st SRSC:

- i. 2x500 MVA 400/230 kV ICT at Vadamadurai
- ii. 2x125 MVA, 400 kV Bus Reactors at Vadamadurai
- iii. LILO of Karaikudi-Pugalur 400 kV S/C line at Vadamadurai
- iv. LILO of Thappagundu – Anaikadavu 400 kV S/C line at Vadamadurai

4.2 In the 1st SRSC 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 informed that land was not available for establishment of 400/230 kV substation at Vadamadurai and requested to drop the proposal. The same was agreed.

Members may please discuss.

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

5.1 In the 1st SRSC 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 SRSC 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 MVA, 400 kV line reactor for Vishwanathapuram –Thiruvalem 400 kV S/C line.
- v. 1x125 MVA, 400 kV Bus reactor

5.2 It was decided in the 1st SRSC meeting that CEA, CTU and TANTRANSCO may jointly study the scheme. It was also decided in the 1st SRSC 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 shall be of the order of 400-500 MW.

5.3 CEA & CTU 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 400kV S/c line from Hosur. TANTRANSCO representative agreed for the same. It was informed by TANTRANSCO that Thiruvalem-Vishwanathapuram transmission line is about 190 km in length. Accordingly, it was decided that 1x50 MVAR switchable line reactors on the Vishwanathapuram –Thiruvalem 400 kV D/C line at Vishwanathapuram end on both circuits may be considered instead of 1x80 MVAR line reactors.

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

- i. Establishment of Vishwanathapuram 400/230/110 kV S/S with 2x500 MVA, 400/230 kV ICTs and 3x200 MVA 400/110 kV ICTs.
- ii. LILO of both circuits of Thiruvalem – Palavady 400 kV Quad Moose D/C line at Vishwanathapuram.

- iii. 2x50 MVAR, 400 kV switchable line reactor at Vishwanathapuram for Vishwanathapuram –Thiruvalam 400 kV D/C line.
- iv. 1x125 MVAR, 400 kV Bus reactor.

The study results are given at **Exhibit I (b)**.

Members may please discuss.

5.5 Subsequently TANTRANSOCO vide letter dated 24.05.2019 (copy enclosed as **Annex- 1**) has proposed the above scheme (mentioned at 5.3) 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.

Members may please discuss.

6.0 Phase-II Solar & Wind Energy Zone Transmission Schemes

6.1 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, the information was finalized by SECI provided phasing details of prioritized SEZs (50,000 MW) and WEZs (16,500 MW) in two phases i.e. 2020 & 2021. The details of prioritized SEZs and WEZs in Southern region are as under:

State/District	Solar		Wind		Total
	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

State/District	Solar		Wind		Total
	Ph-1 (GW)	Ph-2 (GW)	Ph-1 (GW)	Ph-2 (GW)	
	2020	2021	2020	2021	
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 Out of 18.5 GW of identified prioritized SEZs and WEZs, 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 held on 07.09.2018 and 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) (500MW):

- (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) (2500MW):

- (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
- (iii) 9 Nos. of 230kV line bays for interconnection of wind projects
- (iv) 2x125 MVA, 400kV Bus reactors at Karur PS

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

- (i) Establishment of 5x500 MVA, 400/220kV 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)
- (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 220kV line bays for interconnection of wind projects

- (v) 2x125 MVA, 400kV bus reactor at Pooling station (near Munirabad /suitable location in Koppal distt.)
- (vi) Adequate space provision for future expansion

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

- (i) Establishment of 765/400/220kV 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) 220kV line bays for interconnection of wind projects (15 nos)
- (v) 1x330 MVA (765kV) & 1x125MVA (400kV) 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 transformation capacity at various stations and certain elements would be reviewed based on LTA applications. 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 period up to 2021-22. This broad master plan would be implemented in stages for RE integration.

6.4 The above transmission system was also discussed in 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 wherein it was decided that implementation of the above schemes may be taken up only after receipt of Stage-II connectivity/LTA applications from RE generators or LTA application from RIA on behalf of RE generators. As no LTA applications have been received from RE generators or SECI, so far the agreed transmission scheme have not been taken-up for implementation.

6.5 Further the transmission system for evacuation of power from Phase-II 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 & Wind Energy Zones in Southern Region:

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

- a) Ananthapur and Kurnool SEZ (3500 MW: Ananthapur - 2500 MW & Kurnool-1000 MW)**

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

6.6 During the 1st SRSC meeting, it was decided that due to the requirement of large scale integration of renewable energy generations in Southern Region including the proposal for ISTS connected RE sources 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 mentioned at para 6.5 were taken up for detailed deliberations & studies in the joint study meeting of SR constituents held on 1– 2 May, 2019 at SRPC, Bengaluru. During the meeting, considering the large scale capacity additions from RE sources in Southern States and completion of generation projects from conventional sources by 2021-22 and the likely electricity demand in the year 2021-22, the load generation balance for Southern Region was prepared by the constituents for the year 2021-22. Details are given in table below:

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

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 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 need to meet 21% (Solar - 10.5% + Non-Solar - 10.5%) of the total consumption of electricity 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 (420753 MU) by 2021-22.
- 6.9 Considering the large RE Generation capacity additions and Load Generation Scenario of Southern Region, dispatch of coal based generation plants would have to be reduced to technical minimum level during off-peak period to facilitate must-run renewable energy generation. It is also expected that some of coal based generation projects would have to be shut down and some ISGS allocations would also be surrendered by Southern states to balance their load generation scenarios.
- 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 generations including ISTS connected RE generations by 2021-22. The details of the same are given below for Southern Region:

State/UT	Demand by 2021-22 (as per 19 th EPS)		RPO Obligation 21% in 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 limited seasons during the year (especially from June to September, when Southern Region experiences generally off-peak load conditions) and in certain conditions/hours (peak sun time period), the surplus may be of the order of 29,000 MW. This surplus power would have to be absorbed in other Regions, particularly Western & Northern Region.
- 6.12 Further from the Load-Generation balance, it may be observed that during the evening peak load conditions the Southern region may require import of power from NEW Grid of about 6800 MW. Accordingly, the transmission system within Southern region and the inter-regional links between SR Grid and NEW Grid shall have to be robust and flexible enough to facilitate import of power to meet the deficit during the evening peak conditions and shall also facilitate export of surplus power of about 29000 MW during high RE & off-peak conditions.
- 6.13 During the meeting, CTU representative stated that after meeting the RPO obligations, 15,000-17,000 MW of surplus power can be exported from Southern Region with upgradation of existing/under implementation substation 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 export of surplus power of 29,000 MW from Southern Region, Inter-Regional system strengthening shall also be required between SR Grid and NEW Grid.
- 6.14 It was brought out in the joint study meeting that transmission system augmentation would be required in and beyond Western Region for absorption and transfer of surplus power from Southern Region. The matter will have to be deliberated in Western Region/Northern Region Standing Committee on Transmission.

6.15 Phase-II Solar & Wind Energy Zone Transmission Schemes would be discussed and finalized after the outcome of deliberations in the WRSCT/NRSCT. All India studies would have to be carried out.

Members may please discuss.

Transmission Planning proposals by Andhra Pradesh

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

7.1 APTRANSCO had proposed for erection of 400/220 kV Chilakaluripeta SS along with associated transmission lines. The transmission system was agreed in the 39th meeting of SCPSPSR held on 28-29 December, 2015. Details are given below:

- i. 400 kV bus extension at proposed 765/400 kV Chilakaluripeta (PGCIL) SS for erection of 400/220 kV Chilakaluripeta SS with 2x500 MVA PTRs after construction of proposed 765/400 kV Chilakaluripeta (PGCIL) SS.
- ii. Erection of 220/132 kV Chilakaluripeta SS with 2x100 MVA PTRs.
- iii. 220 kV DC line (20 km approx.) from proposed 220/132 kV Chilakaluripeta SS to 400/220 kV Chilakaluripeta SS.
- 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 vide letter dated 17.01.2019 (copy enclosed as **Annex-2**) has informed that the proposed site for construction of 400/220 kV Chilakaluripeta SS is in the vicinity of all 220 kV and 132 kV transmission lines and proposed to construct 400/220/132 kV Chilakaluripeta SS with 220 kV & 132 kV features instead of separate 220/132 kV Chilakaluripeta SS. The following scheme has now 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) SS to 400/220/132 kV Chilakaluripeta SS.
- iii. Making 220 kV SC LILO (0.7 km approx.) of existing 220 kV Sattenapalli-Parchuru DC line at proposed 400/220/132 kV Chilakaluripeta SS.

- 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.

7.3 After detailed deliberations the above proposal was agreed in the joint study meeting and recommended for ratification of the SRSCT.

Members may please discuss.

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 APTRANSCO vide letter dated 17.01.2019 (copy enclosed at **Annex- 3**) has proposed dedicated 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
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:

- i. Erection of 400/220/11 kV Bhurugubanda SS with 2 x 500 MVA ICTs.
- ii. Making LILO (14 km approx.) of 400 kV Twin Moose Sattanapalli – 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 DC 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 After detailed deliberations, the scheme was agreed in the Joint Study meeting and recommended for approval of the SRSCT.

The study results are given at **Exhibit I (c)**.
Members may please discuss.

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

9.1 APTRANSCO has proposed the following dedicated Transmission Scheme for erection of 400/220 kV Atchuthapuram GIS and connected Transmission Network (copy enclosed as **Annex-4**) in Visakhapatanam district to meet the load demand in the area:

- i. Up-gradation of 220 kV Atchuthapuram SS to 400/220 kV Atchuthapuram SS 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 After detailed deliberations, the scheme was agreed in the Joint Study meeting and recommended for approval of the SRSCT.

The study results are given at **Exhibit I (d)**.

Members may please discuss.

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 Following dedicated transmission scheme for evacuation of 960 MW (12 x 80 MW) power from Polavaram Hydro Electric Project (PHEP) of APGENCO in East Godavari district 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 Yemagiri - 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.)
- 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 APTRANSCO vide letter dated 02.11.2018 (copy enclosed as **Annex- 5**) has informed that space was not available for establishment of 220 kV features at Polavaram HEP. Accordingly, APTRANSCO 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 Standing Committee Meeting)

10.4 CEA and CTU 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 deliberation following scheme was proposed for evacuation of Polavaram HEP and APTRANSCO was required to submit the detailed study analysis of the proposed scheme in the forthcoming SRSCCT.

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

The study results are given at **Exhibit I (e)**.

Members may please discuss.

11.0 Proposal of APTRANSCO for extension of total power of 450 MVA, including 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 APTRANSCO vide letter dated 29.03.2019 (copy enclosed as **Annex- 6**) has proposed the following transmission scheme for extension of total power of 450 MVA, including 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 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 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 during 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 2 x 500 MVA, 400/220kV ICTs.
- ii. 1x125 MVAR, 420kV bus reactor at Kakinada 400kV 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.

The study results are given at **Exhibit I (f)**.

Members may please discuss.

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 TSTRANSCO vide letter dated 27.02.2019 (copy enclosed as **Annex 7**) 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 Domalpenta SS is for interstate line and TSTRANSCO has requested for approval for the same.

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. After detailed deliberations the above proposal was agreed in the joint study meeting and recommended for approval of SRSCT.

Members may please deliberate.

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

13.1 TSTRANSCO vide letter dated 10.01.2019 (copy enclosed as **Annex 8**) has informed 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 41st 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 agreed in the joint study meeting and recommended for ratification in the SRSCT.

Members may please concur.

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

14.1 Transmission scheme for evacuation of power from Yadadri (Damaracherla) TPP (5x800 MW) was approved in 39th SCPSR.

14.2 TSTRANSCO vide letter dated 17.04.2019 (copy enclosed as **Annex 9**) 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 Choutuppal SS by Quad Moose DC Line	1) Proposed Yadadri (Damaracherla) Switchyard to proposed 400/220/132 kV Choutuppal 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	3) Proposed Yadadri (Damaracherla) Switchyard to proposed 400/220 kV

<p>(TSTRANSCO) SS by Quad Moose DC Line</p> <p>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</p> <p>5) From Proposed 400/220/132 kV Choutuppall SS to Upcoming 220/33 kV Hayathnagar SS by Single Moose DC Line</p> <p>6) From proposed 400/220/132 kV Dindi SS to Upcoming 220/33 kV Thimmajipet SS by Single Moose 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>Damaracherla SS by Quad Moose DC Line – 5 km.</p> <p>4) Proposed Yadadri (Damaracherla) Switchyard to 400/220kV Jangaon SS by Quad Moose DC Line – 155 km.</p> <p>5) Double circuit LILO of existing 400kV Khammam – Mamidpally TMDC Line to proposed 400/220/132kV Choutuppall SS – 15 km.</p> <p>6) 220 kV TMDC line from proposed 400/220kV Damaracherla SS to 220/132kV Miryalaguda SS – 25 km.</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>
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	<p>12) 400/220 kV Damaracherla SS with 3x500MVA</p> <p>13) 400/220/132 kV Choutuppal 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 Choutuppal SS (approved in 1st SRSCT meeting)</p>
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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 SS and stepping up the voltage from 220 kV to 400 kV level at proposed 400/220 kV Damaracherla SS.

The study results are given at **Exhibit I (g)**.

TSTRANSCO may present their proposal/ studies.

Members may please discuss.

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

15.1 Transmission scheme for Palamuru Rangareddy Lift Irrigation schemes was approved in 40th SCPSR.

15.2 TSTRANSCO vide letter dated 17.04.2019 (copy enclosed as **Annex 10**) 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. Laxmidevally	3+1=4	59 MW	75 MW	236 MW
Total	39 Nos			4197 MW

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

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

<p>6) 400kV Quad Moose DC line from proposed 400kV Vatterm LI SS to proposed 400kV Uddandapur LI SS – 50kMs</p> <p>7) 220kV Twin Moose DC line from 220kV Parigi SS to KP Laxmidevipally LI SS – 20 kMs</p> <p>8) 125MVAR Bus Reactor at Narlapur 400kV LI SS</p> <p>9) 125MVAR Bus Reactor at Yedula 400kV LI SS</p> <p>10)125MVAR Bus Reactor at Vatterm 400kV LI SS</p> <p>11)125MVAR Bus Reactor at Uddandapur 400kV LI SS</p>	<p>7) 400 kV QMDC line from proposed 400 kV Yedula LI SS to proposed 400 kV Narlapur LI SS – 30 km</p> <p>8) 400kV QMDC line from proposed 400 kV Yedula LI SS to proposed 400 kV Vatterm LI SS – 60 km</p> <p>9) 400 kV QMDC line from proposed 400 kV Vatterm LI SS to proposed 400 kV Uddandapur LI SS – 50 km</p> <p>10) 400 kV QMDC line from 400 kV Maheshwaram (TS) SS to proposed 400 kV Uddandapur LI SS – 65 km</p> <p>11)400kV QMDC line from 400kV Dindi SS to 400kV Yedula LI SS – 60 km</p> <p>12)220kV DC line from 400/220/132 kV Kethireddypalli (Manikonda) SS to proposed 220kV KP Laxmidevipally LI SS – 46 km</p> <p>13)125 MVAR Bus Reactor at Narlapur 400 kV LI SS</p> <p>14)125 MVAR Bus Reactor at Yedula 400 kV LI SS</p> <p>15)125MVAR Bus Reactor at Vatterm 400 kV LI SS</p> <p>16)125MVAR Bus Reactor at Uddandapur 400 kV LI SS</p>
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TSTRANSCO may present their proposal/ studies.

Members may please discuss.

16.0 220 kV connectivity to Bhadradari TPP, TSGENCO, Telangana

- 16.1 SRPC vide letter no SRPC/SE-II/2019/1571 dated 22.03.2019 (copy enclosed as **Annex-11**) has informed that for black start condition, extension of startup power to 4x270 MW Bhadradari TPS (BTPS) is not feasible through 400 kV Julurupadu due to expected high voltage at KTPS complex and Julurupadu.
- 16.2 TS SLDC had suggested connectivity at 220 kV level to provide startup power to BTPS under black start restoration procedure and alternate evacuation of power from BTPS. The following scheme was proposed by TSTRANSCO.
- i. 1x315 MVA, 400/220kV ICT at Bhadradari 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 in the joint study meeting and recommended for approval of SRSCT. TSTRANSCO vide letter dated 24.05.2019 has also sent a proposal along with study results for above scheme (copy at **Annex- 12**).

Members may please discuss.

Transmission planning proposals by Karnataka

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

- 17.1 KPTCL vide letter dated 26.02.2019 (copy at **Annex- 13**) 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 Shantigram(Hassan) - Bastipura 400 kV D/c Twin Moose line to the proposed 400/220 kV Kadakola sub-station.
 - ii. 2 x 500 MVA, 400/220 kV transformers with provision for additional 500 MVA transformer in future.
 - iii. 2 x125 MVA 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.
 - 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.

17.2 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 - Mysuru 400kV (quad) D/c line has been proposed as additional system.

17.3 After detailed deliberations, the following transmission system was agreed:

- i. LILO of both circuits of Shantigrama (Hassan) - Bastipura 400 kV D/c Twin Moose line to the proposed 400/220 kV Kadakola sub-station.
- ii. CN Halli – Mysuru 400kV (quad) D/c line
- iii. 2 x 500 MVA, 400/220 kV transformers with provision for additional 500 MVA transformer in future.
- iv. 2 x125 MVA 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.
 - 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 study results are given at **Exhibit I (h)**.

Members may please discuss.

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

18.1 KPTCL vide letter dated 26.02.2019 (copy enclosed as **Annex- 14**) has informed that M/s JSW (vide their letter dated 3rd September, 2018) has requested for permanent de-linking of existing 400kV RTPS-BTPS-JSW-Guttur Twin Moose line between BTPS and JSW Generating station.

18.2 In the Joint meeting of Standing Committee of 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 or 2x500 MVA.
- iii. Yeramarus TPS-Gulbarga 400 kV D/C line with Quad Moose conductor.
- iv. Establish 400 kV switching station near 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
- 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 Bellary 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 (vide their letter dated 3rd September, 2018) has requested for permanent delinking 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+2x130), excluding the generators directly connected to JSW steel 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.

Members may please discuss.

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

19.1 KPTCL vide letter dated 15.03.2019, has proposed following transmission scheme (copy enclosed as **Annex-15**) 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 400kV 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).
- 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 The power evacuation scheme was discussed in the joint study meeting.

KPTCL may present their proposal/ studies.

Members may please discuss.

20.0 Proposal by KPTCL to relook into the decision of installation of 2x125 MVAR bus reactor at UPCL Switchyard

20.1 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.

20.2 KPTCL vide letter No. CEE (P&C)/SEE(PLG)/EE(PSS)/KCO-97/100329/18-19 dated: 14.01.2019 (copy enclosed as **Annex-16**) has stated that installation of reactors will have significant impact on tariff and has requested to relook the decision of 39th Standing Committee meeting by proposing lower capacity bus reactors at UPCL by conducting necessary joint study.

20.3 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.

Members may please concur.

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

21.1 SRPC vide letter no SRPC/SE-II/2019/1571 dated 22.03.2019 (copy enclosed as **Annex-17**) 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 capacity. As a long term measure, possibility of third ICT could be examined.

21.2 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.

Members may please discuss.

Transmission Planning Proposal by Kerala

22.0 Udupi - Kasargod D/C line- RoW issues

22.1 Udupi – Kasargode- Kozhikode 400 kV (Quad) D/C link 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.

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.

Members may please concur.

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 vide letter dated 29.04.2019 (copy at **Annex- 18**) 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 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 demands, TANTRANSCO has proposed to enhance 400/110 kV ICT capacity from 2 X 200 MVA to 3 X 200 MVA at Alamathy 400/230-110 kV SS.

23.3 After deliberations, the proposal of TANTRANSCO was agreed in the joint study meeting and recommended for approval in the SRSCT.

Members may please discuss.

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.

24.1 The proposal for grant of connectivity to NLC India Ltd for its TPS-II 2nd Expansion (2x660 MW) was circulated vide letter dated 21.12.2017 for comments / observations of the Southern Region constituents. Considering the feedback, the proposal was further deliberated in the 42nd SCPSPSR and in the 22nd meeting of Southern Region constituents regarding Connectivity/LTA applications. After deliberations during the meeting following was agreed for grant of Connectivity to NLC Ltd. and control of 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 400kV 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 MVA 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 400 kV D/c line and Neyveli TS II - NNTPS 400 kV S/c line (bypassing Neyveli TS II) to form NNTPS – Salem 400 kV 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 400 kV 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.1

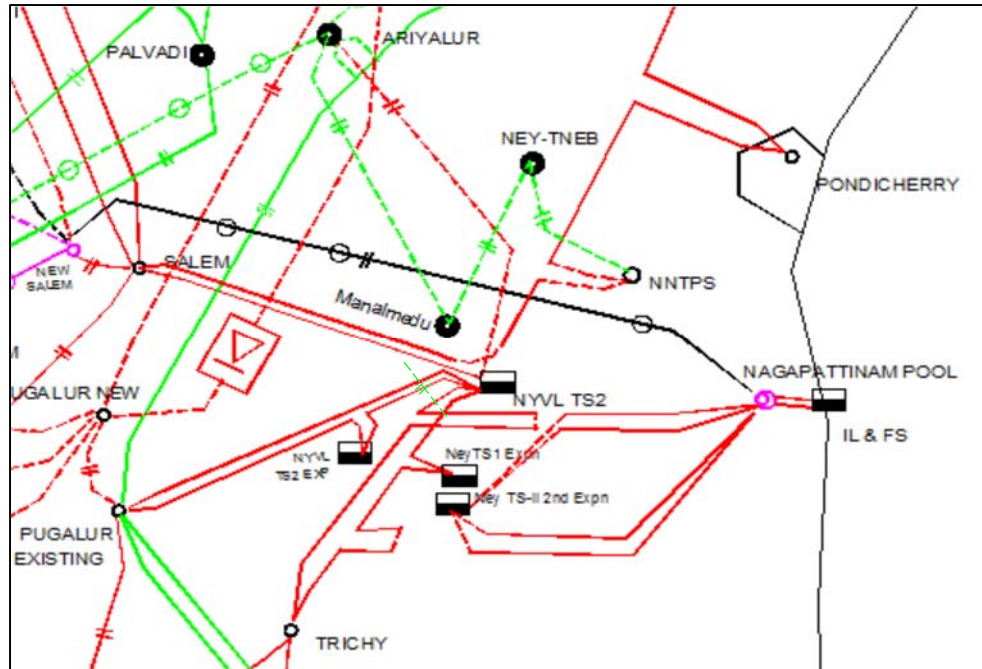


Figure 1 : Connectivity arrangement for Neyveli TS-II 2nd Expn.

24.2 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 765 kV D/c line (charged at 400 kV) only. Under the N-1 contingency of Nagapattinam - Salem 765 kV D/c line (charged at 400 kV), both the generation projects are left with connectivity through one circuit only, which may lead to the oscillations in the generating machines.

24.3 In view of the same, detailed system studies were carried out and following was proposed in the joint study meeting:

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

- 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. 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 was already agreed in the 1st SCT 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 400 kV D/c line and Neyveli TS II – NNTPS 400 kV S/c line (bypassing Neyveli TS II) to form NNTPS – Salem 400 kV 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 was already agreed in the 1st SRSCT 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.2.

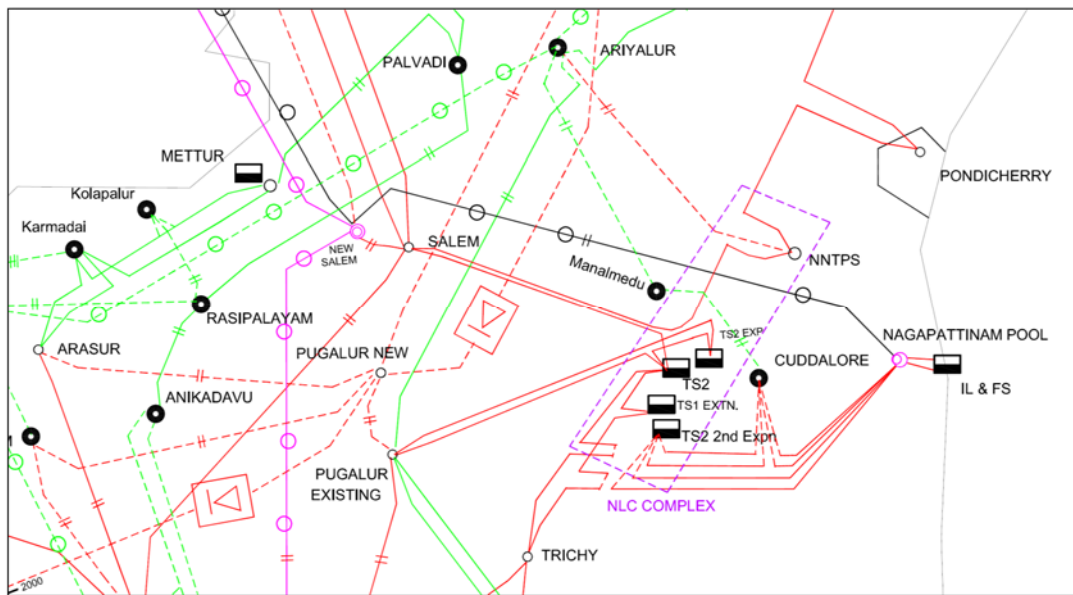


Figure 2 : Proposed connectivity for Neyveli TS-II 2nd Expn.

24.3 In the Joint Study meeting on 01-02 May, 2019 at Bengaluru, TANTRANSCO stated 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 from 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 India Ltd. 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 under over- load conditions. The same was even observed from the study analysis carried out during the Joint Study meeting.

24.4 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 After detailed deliberations, following two alternatives were studied for connectivity of Neyveli TS II 2nd Expn and control of fault levels at Neyveli generation complex. The System Study results for both Alternatives are enclosed at **Annex- 19**.

Alternative-I:

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

- i. Re-storing of Neyveli TS II / Neyveli TS I Expn. - Trichy 400 kV D/c line through suitable arrangement of bypassing the LILOs at Nagapattinam and utilization of LILO sections for making Neyveli TPS II 2nd Expn - Nagapattinam 400 kV 2xD/c lines along with the line bays at generation switchyard.
 - ii. 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 SCT held on 07.09.2018)
 - 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 / 230kV lines at Neyveli TS-II, Cuddalore 400/230-110kV and Manalmedu 400/230kV substations by TANTRANSCO.**

Alternative-II:

A. Connectivity arrangement for Neyveli TS II 2nd Expn (2x660 MW):

- i. Re-storing of Neyveli TS II / Neyveli TS I Expn – Trichy 400 kV D/c line through suitable arrangement of bypassing the LILOs at Nagapattinam and utilization of LILO sections for making Neyveli TPS II 2nd Expn – Nagapattinam 400 kV 2xD/c lines along with the line bays at generation switchyard.
 - ii. Neyveli TS II - Cuddalore 400 kV D/c (Quad) line.
 - iii. Nagapattinam – Manalmedu 400 kV D/c (Quad) line (in place of Cuddalore – Manalmedu 400 kV D/c line – agreed in 1st SRSCT)
 - 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 / 230kV lines at Neyveli TS-II, Cuddalore 400/230-110 kV and Manalmedu 400/230 kV substations by TANTRANSCO.**

24.6 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 SCT held on 07.09.2018). 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-I		Alternative-II	
		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 Based on the study results, Alternative-II for connectivity of Neyveli TS II 2nd Expn and control of fault levels at Neyveli generation complex was agreed in the joint study meeting and recommended for approval of the SRSC. However, TANTRANSCO may like to update the re-arrangement of loads to control loadings on Transformers at Neyveli TS II generating station.

Members may please discuss.

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

25.1 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 in the power system, fault levels have also growing consistently, which is a concern at many substations. To keep the fault current within the substation design limits, studies are carried out from time to time system and necessary steps are taken to limit the fault current.

25.2 From the system studies of 2021-22 time frame, the 3-Phase 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.

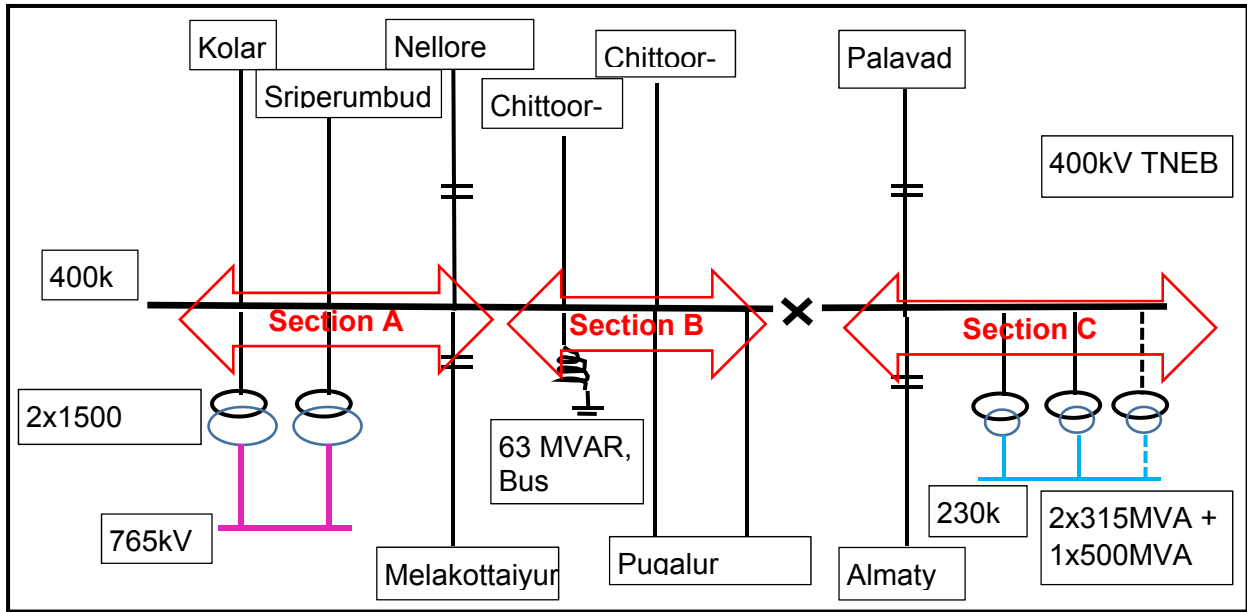


Figure 3 : SLD representation of 400kV bus at Thiruvalem S/s

25.3 In order to control the fault current levels at 400 kV Thiruvalem bus, the 400 kV bus has been segregated into three sections (Section A, B, C) and series reactors were introduced in the sections to control the fault levels along-with bypassing of some of the transmission lines as well. The alternatives and the results are provided in the table below. From the study results it is observed that in case of Alternative-3, the fault currents in all sections of the Thiruvalem 400 kV bus remain well within 50 kA limit of the designed fault levels of the bus.

Table 2 : Short circuit fault level at 400 kV 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 <ul style="list-style-type: none"> Bus section-A and bus section-B 	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	49	39	30

Alt.	Scheme	Connectivity Details	3-Ph Fault current (kA)		
			Section -A	Section -B	Section -C
	<ul style="list-style-type: none"> Bus Section-B and bus section-C 	<p>Bus section-B: Chittor 400kV D/c (quad) line; Pugalur HVDC 400kV D/c (quad) line; 63MVAR, 420kV bus reactor</p> <p>Bus section-C: Palavadi D/c line; Alamaty D/c line, 2x315 +1x500 MVA, 400/230kV ICTs</p>			
2	<p>12Ω, 420kV fault limiting bus series reactors between Bus section- (A+B) and bus section-C</p> <p>12Ω, 420kV fault limiting line series reactors in both circuit of Chittoor – Thiruvalam D/c (quad) line</p>	<p>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; Chittor 400kV D/c (quad) line; Pugalur HVDC 400kV D/c (quad) line; 63MVAR, 420kV bus reactor</p> <p>Bus section-C: Palavadi D/c line; Alamaty D/c line, 2x315 + 1x500 MVA, 400/230kV ICTs</p>	57	-	32
3	<p>12Ω, 420kV fault limiting bus series reactors between</p> <ul style="list-style-type: none"> Bus section-A and bus section-B Bus Section-B and bus section-C <p>Bypass of Kolar-Thiruvalam and Thiruvalam-Sriperumbudur 400kV S/c line to form Kolar – Sriperumbudur 400 kV S/c direct line.</p>	<p>Bus section-A: Nellore Pool D/c (quad) line; Melakottaiyur D/c line; 2x1500MVA, 765/400kV ICTs</p> <p>Bus section-B: Chittor 400kV D/c (quad) line; Pugalur HVDC 400kV D/c (quad) line; 63MVAR, 420kV bus reactor</p> <p>Bus section-C: Palavadi D/c line; Alamaty D/c line, 2x315 +1x500 MVA, 400/230kV ICTs</p>	43	38	30

25.4 The proposal was discussed in the Joint Study meeting held on 1-2 May, 2019, wherein it was agreed that Alternative-3 is suitable for control of fault levels of Thiruvallam bus and following proposal may be put up before SRST for deliberations and approval.

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

- (i) 12Ω, 420 kV fault limiting bus series reactors between –
 - Bus section-A and bus Section-B
 - Bus Section-B and bus Section-C
- (ii) 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.
- (iii) Bypass of Kolar-Thiruvallam and Thiruvallam-Sriperumbudur 400 kV S/c line to form Kolar – Sriperumbudur 400 kV S/c direct line.

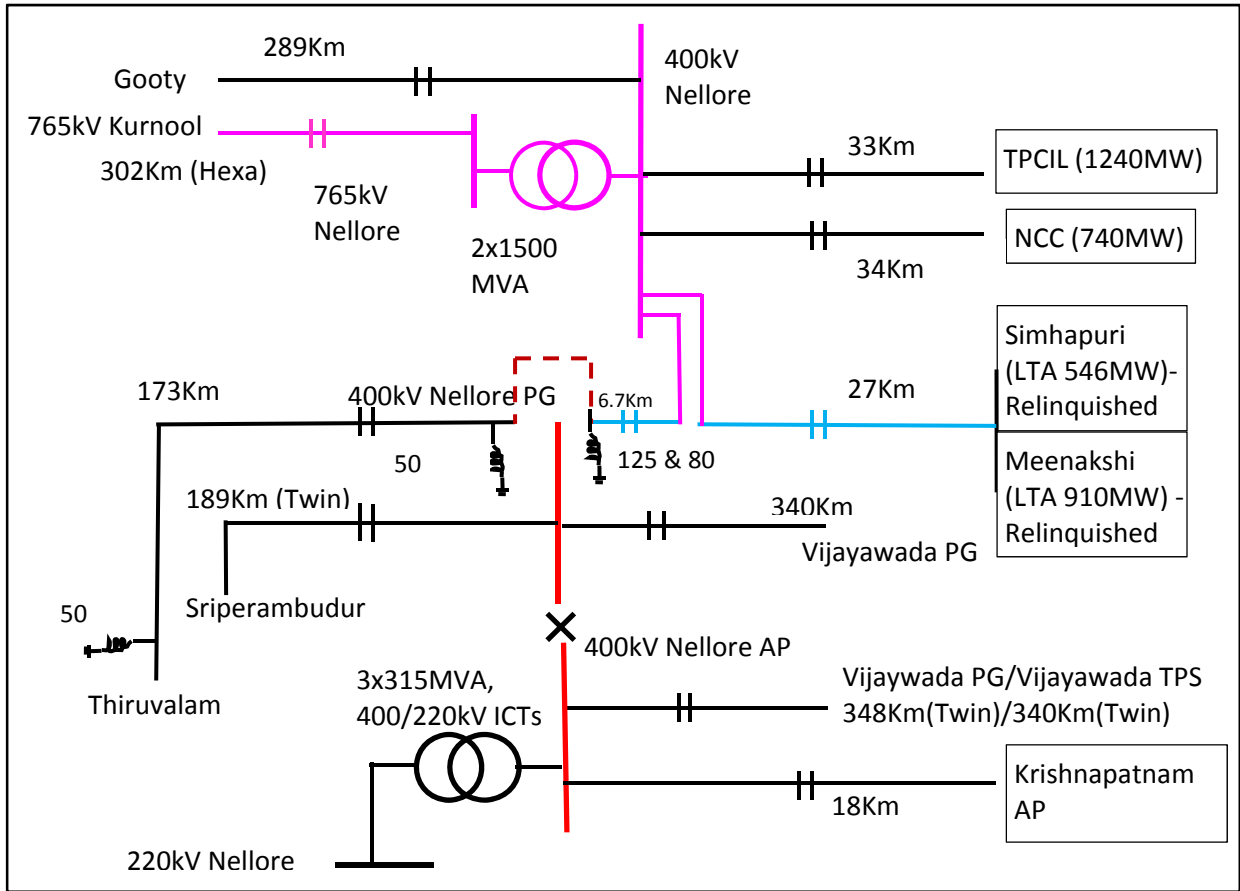
Members may please deliberate.

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

26.1 In the 42nd SCPSPSR held on 27.04.2018, it was agreed to bypass Nellore PS - Nellore (PG) 400 kV D/c (Quad) line and Nellore (PG) - Thiruvallam 400 kV D/c (Quad) line at Nellore (PG) for making Nellore PS - Thiruvallam 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) - Thiruvallam 400 kV D/c line may be utilized as switchable bus reactors by suitable arrangement.

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

“presently power flow on 400 kV Nellore(PS)- Nellore (PG) D/c is at around 850-900 MW whereas earlier it was around 1,200 MW. At present Karnataka is meeting peak demand, 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 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 (740MW)] exists in the Nellore generation complex and loadings on the ISTS network for transfer of power for the LTA quantum of 1,980 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 LILLOed at Nellore PS (765/400 kV station). With the bypassing of Nellore PS - Nellore (PG) 400 kV D/c (Quad) line and Nellore (PG) - Thiruvallam 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) - Thiruvallam 400 kV D/c (Quad) line will remain as midpoint reactors. Further, with this arrangement one circuit of Nellore PS - Thiruvallam 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) 400 kV D/c line with suitable arrangement on Nellore(PG) - Sriperumbudur 400 kV D/c line (189km) and bypass Nellore PS - Nellore 400 kV D/c (Quad) line and Nellore - Thiruvalem 400 kV D/c (Quad) line at Nellore (PG) for making Nellore PS - Thiruvalem 400 kV D/c (Quad) line. Estimated cost of shifting of line reactors is about Rs. 10-12 Cr.

26.6 The proposal was also discussed and agreed in the Joint Study meeting held on 1st – 2nd May, 2019 at SRPC, Bangalore.

Members may please deliberate.

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

27.1 Srikakulam-Vemagiri 765 kV D/c line had been implemented as system strengthening scheme for import of power in 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 has to cross the existing Srikakulam-Vemagiri 765 kV D/c line at Vemagiri GIS. However, due to technical constraints, the same is not possible.

27.2 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.

27.3 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, Bangalore that DOCO of 2x240 MVAR line reactors at Vemagiri end along with associated bays may be accorded.

27.4 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 Vemagiri GIS and about 10 kV at Srikakulam substation from the prevailing voltage profiles. Details are enclosed at **Annex-20**. Further, SPRC vide letter dated 15.03.2019 has already approved the declaration of DOCO of referred bays subject to approval of Standing Committee on Transmission.

27.5 The matter was discussed and agreed in the Joint Study meeting for DOCO of 2x240 MVAR line reactors as bus reactors along with associated bays at Vemagiri end.

Members may please deliberate.

28.0 Construction of 1 no. of 220 kV bay at Palakkad 400/220 kV Substation for grant of Stage-II Connectivity to Sindphal Power Development Private Limited

28.1 In the 32nd Southern Region constituents meeting regarding Connectivity/LTA applications held on 25.04.2019, grant of Stage-II Connectivity to M/s Sindphal Power Development Private Limited was agreed as per the following details.

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 220 kV S/c line on double circuit tower with high capacity conductor suitable to carry 400 MW at nominal voltage

28.2 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.

28.3 Accordingly, 1 nos. of 220 kV bay at Palakkad S/s shall be implemented under ISTS.

Members may please discuss.

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 addressed to CTU has requested for allocation of one no. 220 kV bay at Hiriya 400/220 kV (POWERGRID) substation for termination of 220kV S/c line on D/c towers (15.1 km) from Hiriya (PG) to Hiriya (KPTCL).

29.2 Space is available for implementation of one 220kV bay at Hiriya 400/220kV (POWERGRID) substation and same may be allocated to KPTCL.

Members may please deliberate.

30.0 Status of implementation of downstream network by State utilities associated with ISTS substation of POWERGRID

30.1 Augmentation of transformation capacity in various existing substations as well as addition of new substations along with line bays for downstream network are under implementation at various locations in Southern Region. For utilization of these transformation capacities, implementation of downstream 220kV system needs to be commissioned. The status of downstream system as informed by respective states in the 1st SRSC is as follows:

Sl. No.	Name of Substation	MVA Capacity	220 kV Bays	Expected Schedule of Substation	Remarks	Deliberations in 1 st SRSC
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"> • 4 Nos 220 kV downstream T/L i.e. 2 to Anthranasahalli & 2 to Madhugiri-II expected by Sep/Oct'18. • Balance 2 Nos downstream T/L yet to be taken up
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"> • 2 Nos 220 kV downstream T/L cable to Yelahanka DG plant expected by Sep/Oct'18. • Balance 4 Nos downstream T/L yet to be planned
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"> • 2 Nos 220 kV downstream T/L to Magadi expected by Mar'19. • 2 Nos 220 kV downstream T/L to Kumbalgodu expected by Mar'20.
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"> • 2 Nos 220 kV downstream T/L i.e. 1 to Hiriyur(KPTCL) & 1 to Chitradurga expected by Mar'19.
5.	Hassan	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"> • 2 Nos 220 kV downstream T/L i.e. LILO of Hassan(KPTCL) – Nittur S/c expected by Mar'19.

6.	Kolar	2x500 MVA	6	Commissioned	Construction of downstream T/L for 2 Nos 220 kV bays to be expedited by KPTCL.	• 2 Nos 220 kV downstream T/L to Gollahalli expected by Mar'19.
7.	Hosur	2x315 MVA	6	Commissioned	Construction of downstream T/L for 1 Nos 230 kV bays to be expedited by TANTRANSOCO.	• 1 Nos 230 kV downstream T/L to Shoolagiri expected by Jun'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 Mar'19.

Members may update the status.

Transmission Planning Related Issues by SRPC

SRPC vide letter dated 24.05.2019 (copy enclosed as **Annex 21**) has mentioned the following transmission planning issues:

31.0 Highly loaded transmission line/ corridor

31.1 400 kV Hiriya-Nelamangala D/C lines

- i. Touched peak of 775 MW each
- ii. N-1 security violation of about 7% (Feb 19) and 10% (Mar 19)
- iii. Commissioning of 400 kV Hiriya-Mysore D/C line and 400 kV Bellary PS - CN Halli D/C line

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

- i. Highly loaded, Gooty-Nelamangala touched thermal limit (875 MVA) on few occasions in Feb and Mar 19
- ii. N-1 security violation of about 15% (Mar 19) on Gooty-Nelamangala
- iii. Implementation of bypass at Nellore to alleviate Nellore PS- Nellore D/C lines would affect the flows on these two lines
- iv. Commissioning of Tumkur-Yelahanka D/C lines needs to be expedited

31.3 400 kV NP Kunta-Kolar S/C line

- i. Flow as high as 800 MW due to Solar power evacuation at NP Kunta
- ii. 400 kV Urvakonda-Hindupur-NP Kunta D/C lines kept open to mitigate the

flow on NP Kunta-Kolar lines

- iii. Outage of this line increases the flow on 400 kV Gooty-Nelamangala / Somanahalli lines and also results in low voltages in Bengaluru area.

Members may please discuss.

32.0 KKNPP High Voltage issues

32.1 KKNPP voltages 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) needs to be ensured by KKNPP.

32.2 KKNPP units to provide sufficient reactive compensation by absorbing reactive power or else by installing additional reactors.

32.3 In the meetings held with NPCIL / KKNPP, it was assured that upto 150 MVAR reactive power absorption would be ensured by each of the KKNPP units (though the capability was much higher).

Members may please discuss.

33.0 ICT loadings

The following ICT's are violating N-1 security criteria

- Andhra Pradesh: 400/220 kV Nellore SS, 400/220 kV Mardam SS, 400/220 kV Vemagiri SS
- Karnataka: 400/220 kV Nelamangala SS, 400/220 kV Hoody SS, 400/220 kV Hiriyur SS, 400/220 kV Kaiga SS, 400/220 kV Mysore SS and 400/220 kV UPCL SS

Members may please discuss.

Operational feedback by POSOCO

Details are at Annex 22.

34.0 Transmission Line Constraints

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?	Remedial Actions (CTU Remarks)
1	400 kV Nellore Pooling Station - Nellore DC line	Whole Year	<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>	Yes	Matter has been already addressed. POWERGRID (SR-I) has already confirmed that 400 kV Nellore PS – Nellore D/C may be bypassed at Nellore (PG) on SOS basis as per SRLDC instructions.”
2	400 kV Udumalpet-Palakkad DC line	Whole year	<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>	Yes	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.

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?	Remedial Actions (CTU Remarks)
3	400kV Hiriya-Nelamangala DC line	Whole year	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. Remarks: 400 kV Hiriya – Mysore D/C line and 400 kV Bellary Pooking station – C. N. Halli D/C line would relieve the line loading of 400 kV Hiriya – Nelamangala D/C line. The same maybe commissioned at the earliest.	Yes	400 kV Hiriya – Mysore D/c line is expected by Sept, 2019. 400 kV Bellary Pooling station – C. N. Halli D/C line is to be implemented by KPTCL. However, construction of C. N. Halli S/s is yet to taken-up by KPTCL. KPTCL may expedite.
4	400 kV Gooty-Nelamangala line & 400 kV Gooty-Somanahalli line	Whole Year	During peak demand period and heavy Drawl by BESCO 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. Remarks: Commissioning of downstream of 400 kV Tumkur, 400 kV Yelhanka & 400 kV Tumkur – Yelhanka D/C line to be expedited.	Yes	Tumkur – Yelahanka 400 kV D/c line is expected by Sept, 2019. Construction of downstream network is to be expedited by KPTCL. Tumkur: <ul style="list-style-type: none"> • 4 Nos 220 kV downstream T/L i.e. 2 to Anthranasahalli & 2 to Madhugiri-II. • Balance 2 Nos downstream T/L yet to be taken up Yelahanka: <ul style="list-style-type: none"> • 2 Nos 220 kV downstream T/L cable to Yelahanka DG plant. Balance 4 Nos. downstream T/L yet to be planned
5	400 kV N.P. Kunta - Kolar line	During Solar Peak period	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	No	In the Joint Study meeting, system studies were carried out for 2021-22 time frame, wherein with the commissioning of under construction

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?	Remedial Actions (CTU Remarks)
			<p>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.</p> <p>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.</p>		transmission lines, over loading was not observed.
6	Overloading of 220 kV Shoolagiri-Hosur (TN)-Yerrandahalli-Somanahalli SC line	Whole Year	<p>Somanahalli, Yerrandahalli and Hosur are Industrial areas. 220 kV Yerrandahalli is split and load is partly fed 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.</p> <p>Remarks: The commissioning of 400 kV Dommasandra and Mylassandra alongwith 2nd circuit of 230kV Soolagiri-Hosur at the earliest to relieve the line-loading problem.</p>	Yes	
7	Constraints in Nagjhari PH evacuation	Whole Year	<p>The 220 kV Nagjheri – Ambewadi DC line, 220 kV Ambewadi – Narendra DC, 220 kV Kaiga – Kodalally SC & 220 kV Kadra – Kodalally SC lines are severely over-loaded. In 1st meeting of Standing Committee on Transmission, committee recommended for re-conductoring of the lines with HTLS conductor. KPTCL has to expedite the same.</p>	Yes	

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?	Remedial Actions (CTU Remarks)
8	Overloaded 220 kV lines in Tamil Nadu	Whole Year	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.	Yes	
9	220 kV Hyderabad Metro Network	Whole Year	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.	Yes	
10	220 kV Bangalore Metro Network	Whole Year	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 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.	Yes	

Members may please discuss.

35.0 ICT Constraints

Sl. No	ICT	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter? Details.	Remedial Actions (CTU Remarks)
1	400/220 kV, 3x315 MVA ICTs at Vemagiri SS	Whole Year	N-1 condition not satisfied on few occasions	Yes	Present ATC between NEW & SR Grid is 9500 MW. However, 7500 MW has already been granted under LTA

Sl. No	ICT	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter? Details.	Remedial Actions (CTU Remarks)
					& MTOA. With this quantum, no constraint is envisaged at Vemagiri ICT. Loading of Vemagiri ICTs will further relieve after commissioning of beyond Vemagiri transmission system that is expected by July, 19.
2	400/220 kV, 2x315MVA ICTs at Maradam SS	Whole Year	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.	Yes	
3	400/220kV, 3x315 MVA ICTs at Nellore SS	Whole Year	N-1 condition not satisfied on few occasions	Yes	
4	400/220 kV, 3X500 MVA ICTs at Neelamangala	Whole Year	N-1 condition not satisfied on few occasions	Yes	
5	400/220 kV, 3X500 MVA ICTs at Hoody	Whole Year	N-1 condition not satisfied on few occasions.	Yes	
6	400/220 kV 2X315 MVA ICTs at Hiriyyur	Whole Year	N-1 condition is violated for both the directions due to heavy MVAR drawl.	Yes	Sufficient reactive compensation shall be provided by KPTCL.
7	400/220 kV, 2X500 MVA ICTs at Kaiga	Whole Year	N-1 condition not satisfied on few occasions	Yes	
8	400/220 kV, 2X315 + 1x500 MVA ICTs at Mysore	Whole Year	N-1 condition not satisfied on most of the occasions	No	KPTCL has proposed a new 400/220 kV Kadakola substation by LILO of Hassan – Mysore 400 kV DC line.

Sl. No	ICT	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter? Details.	Remedial Actions (CTU Remarks)
					With the commissioning of Kadakola, the matter will be addressed.
9	400/220 kV, 2X315 MVA ICTs at UPCL	Whole Year	N-1 condition not satisfied on few occasions	Yes	
10	400/230kV, 2X315MVA ICTs at Thiruvallam	Whole Year	N-1 condition not satisfied on few occasions	Yes	

Members may please discuss.

36.0 Nodes Experiencing Low Voltage

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?	Remedial Actions (CTU Comments)
1	400 kV Somnahally SS	During peak load condition	Voltages are low during peak load condition	Yes	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.
2	400 kV Nelamangala SS	During peak load condition	Voltages are low during peak load condition	Yes	
3	400 kV Bidadi SS	During peak load condition	Voltages are low during peak load condition	No	
4	400 kV Hoody SS	During peak load condition	Voltages are low during peak load condition	No	
5	400 kV Mysore SS	During peak load condition	Voltages are low during peak load condition	No	
6	400 kV Hosur SS	During peak load condition	Voltages are low during peak load condition	No	With the commissioning of \pm 6000MW Raigarh - Pugalur HVDC line, the low voltage issue is expected to be resolved (Nov'2019 / Feb'2020).
7	400 kV Arasur SS	During peak load condition & high wind period	Voltages are low during peak load condition	Yes	
8	400 kV Karamadai SS	During peak load condition	Voltages are low during peak load condition	Yes	

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?	Remedial Actions (CTU Comments)
9	400 kV Trichur SS	During peak load condition	Voltages are low during peak load condition	Yes	With the commissioning of 2000 MW Pugalur – North Trichur VSC based HVDC by April, 2020, the low voltage issues is expected to be resolved.
10	400 kV Palakkad SS	During peak load condition	Voltages are low during peak load condition	Yes	
11	400 kV Cochin SS	During peak load condition	Voltages are low during peak load condition	Yes	

Members may please discuss.

37.0 Nodes Experiencing High Voltage

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
1	400 kV Gooty SS	Monsoon period and off peak period	Voltages remain very high most of the time	Yes
2	400 kV Nunna SS	Whole Year	Voltages remain very high most of the time	Yes
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.	Yes
4	400 kV Ghani SS	Whole year	Voltages remain very high most of the time	Yes
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.	Yes
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.	Yes
7	400 kV KV Kota SS	Whole Year	Voltages remain very high most of the time	Yes
8	400 kV Hinduja SS	Whole Year	Voltages remain very high most of the time	No

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
9	400 kV Kalikiri SS	Whole Year	Voltages remain very high most of the time	No
10	400 kV Podili SS	Whole Year	Voltages remain very high most of the time	No
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 SRSCT may be expedited	Yes
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	Yes
13	400 kV Malkaram SS	During off peak period	Voltages remain very high most of the time	Yes
14	400kV Mamidipally SS	Whole year	Voltages remain very high most of the time	Yes
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.	No
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	Yes
17	400 kV Ramadagu SS	Whole Year	Voltages remain very high most of the time.	No
18	400 kV Jegurupadu SS	Whole Year	Voltages remain very high most of the time.	No
19	400 kV Nirmal SS	Whole Year	Voltages remain very high most of the time	No
20	400 kV Hassan SS	During off peak	Voltages remain very high most of the time	Yes
21	400 kV Narendra SS	During off peak	Voltages remain very high most of the time	Yes
22	400 kV Mysore SS	During off peak	Voltages remain very high during off-peak hours	No

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
23	400 kV Tumkur SS	During off peak	Voltages remain very high most of the time	Yes
24	400 kV Karaikudi SS	During off peak	During Low wind condition and off-peak condition Voltages are very High	Yes
25	400 kV Udumalpet SS	During off peak	During low wind condition and off-peak condition, voltages are very high	Yes
26	400 kV Anaikaduvu SS	During off peak	Voltages remain very high most of the time	Yes
27	765 kV Cuddappa SS	Whole Year	Voltages remain very high most of the time	Yes
28	765 kV Nizambad SS	Whole Year	Voltages remain very high most of the time	Yes
29	765 kV Thiruvallam SS	Whole Year	Voltages remain very high most of the time. Remarks: 2x240 MVar approved in 42 nd SCPSR may be expedited	Yes

37.1 As per CTU, with the commissioning of planned/ under implementation bus reactors at various ISTS & STU substations, the issue of high voltage is expected to be addressed. List of Bus/Line reactors to be commissioned in SR is enclosed at **Annex-23**. However, 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.

Members may please discuss.

38.0 Lines opened on High Voltage

A number of 765 kV and 400 kV lines were tripped on over-voltage and physically opened by real-time operators to control over-voltages in the grid. Details of transmission lines tripped on over-voltage are given at **Annex- 24**.

Members may please discuss.

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
1	400 kV Tirunelveli-Cochin DC line	Nov-08	RoW issues	400 kV Udumalpet-Palakkad DC line getting heavily loaded & Kerala Drawl limitation
2	400 kV Thrissur – Kozhikode DC line	---	RoW issues	Low voltages in North Kerala & 220kV North - South corridor of Kerala
3	400 kV Tumkur-Yelahanka DC line	April-19	RoW issues	High loading on 400kV Gooty-Nelamangala line
4	400 kV Hiriyur-Mysore DC line	July-19	RoW issues	High loading on 400kV Hiriyur-Nelamangala DC line
5	400 kV Ballery PS-Chikkanayakanahalli DC line	--	Tendering stage	High loading on 400kV Hiriyur-Nelamangala DC line

Members may please discuss

40.0 Transmission Elements under long outage

The following transmission elements have been under long outage:

SI 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

Members may please discuss.

41.0 Sub-stations with High Fault level:

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 Alamatty SS

Members may please discuss.

42.0 Other Issues in Southern Region

- During Monsoon with less demand coupled with High RE penetration, many of the transmission lines are under-loaded and thus resulting in high voltages across the grid.
- 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 & Bhavni 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, 400kV 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.
 - 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 400kV Bus and No 230kV 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 and 765 kV Kurnool-Cudapah-Thiruvalem DC are kept open due to high voltage. Some of the 765kV 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 is always kept open. 230kV Acharapakkam – Villupuram is open to avoid over-loading of 230kV Kalpakkam – Acharapakam S/C line. 230kV MAPS is left with only two sources i.e. 230kV MAPS - Arni SC & 230kV MAPS - SP Koil DC.

Members may please discuss.

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 vide letter dated 24.05.2019 (copy at **Annex- 25**) has 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 has sought approval for making LILO of 230 kV MAPS – Echur line at Vembakkam 230 kV SS.

Members may please discuss.

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

TANTRANSCO vide letter dated 24.05.2019 (copy at **Annex- 26**) has 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

Members may please discuss.

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

45.1 TANTRANSCO vide letter dated 24.05.2019 (copy at **Annex- 27**) has informed that Konthagai 400/230-110 kV substation proposal was 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 have 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 has 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 400/110kV 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.

Members may please discuss.

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

46.1 TANTRANSCO vide letter dated 24.05.2019 (copy at **Annex- 28**) has 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 230KV SS) which is pending for execution due to non-feasibility of transferring of loads of existing fully loaded feeders.

46.2 TANTRANSCO has 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:

ICT: 2x200 MVA 400/110kV ICTs.

110 kV Connectivity:

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

Members may please discuss.