



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: दक्षिणी क्षेत्र के लिए विद्युत प्रणाली योजना पर स्थायी समिति की 42 वीं बैठक का कार्यवृत्त।

Subject: Minutes of 42nd meeting of Standing Committee on Power System Planning for Southern Region.

महोदय(Sir)/महोदया(Madam),

दक्षिणी क्षेत्र के लिए विद्युत प्रणाली योजना पर स्थायी समिति की 42 वीं बैठक 27 अप्रैल, 2018 को एरनाकुलम (केरल) में आयोजित की गई थी। इस बैठक के कार्यवृत्त की प्रति आपकी सूचना एवं आवश्यक कार्यवाही हेतु संलग्न है।

The 42nd meeting of the Standing Committee on Power System Planning of Southern Region was held on 27th April, 2018 at Ernakulam (Kerala). A copy of minutes of the meeting is enclosed for your information and necessary action.

भवदीय/Yours faithfully,

(बी.एस. बैरवा/B.S. Bairwa)

निदेशक/Director

Address List:

1.The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, Bangalore 560 009. FAX : 080-22259343	2.The Director (Projects), Power Grid Corp. of India Ltd. “Saudamini”, Plot No.2, Sector-29, Gurgaon 122 001, Haryana. FAX : 95124-2571932
3. CEO, POSOCO, B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi-110016	4. The Director (Transmission), Karnataka State Power Trans. Corp.Ltd., Cauvery Bhawan, Bangalore - 560 009. FAX : 080 -22228367
5.The Director (Transmission), Transmission Corp. of Andhra Pradesh Ltd., (APTRANSCO) Vidyut Soudha, Hyderabad – 500 082. FAX : 040-66665137	6. The Director (GridTransmission and Management), Transmission Corp. of Telangana Ltd., (TSTRANSCO) Vidyut Soudha, Khairatabad Hyderabad – 500 082. FAX : 040-23321751
7.The Director (Trans. & System Op.), Kerala State Electricity Board, Vidyuthi Bhawanam, Pattom, Thiruvananthapuram - 695 004. FAX : 0471-2444738	8. Member (Distribution), Tamil Nadu electricity Board (TNEB), 6 th Floor, Eastern Wing, 800 Anna Salai, Chennai - 600002. FAX : 044-28516362
9.The Director (Power), Corporate Office, Block – I, Neyveli Lignite Corp. Ltd., Neyveli, Tamil Nadu – 607 801. FAX : 04142-252650	10. The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, Puducherry – 605 001. FAX : 0413-2334277/2331556
11. Director (Projects), National Thermal Power Corp. Ltd. (NTPC), NTPC Bhawan, Core-7, Scope Complex, Lodhi Road, New Delhi-110003. FAX-011-24360912	12. Director (Operations), NPCIL, 12 th Floor, Vikram Sarabhai Bhawan, Anushakti Nagar, Mumbai – 400 094. FAX : 022- 25991258

Copy to:

1.	COO(CTU-Plg), Power Grid Corp. of India Ltd. “Saudamini”, Plot No.2, Sector-29, Gurgaon 122 001, Haryana. FAX : 95124-2571932	2. ED, SRLDC 29, Race Course Cross Road, Bangalore 560 009 FAX – 080-22268725
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Minutes of 42nd Meeting of the Standing Committee on Power System Planning in Southern Region (SCPSPSR) held on 27 April, 2018(Friday) at Ernakulam, Kerala.

Member (PS), CEA welcomed the participants. He requested the committee members to have positive deliberations so that consensus could be reached on critical issues. He thanked KSEBL for hosting the meeting in short notice. Chief Engineer (PSPA-II), CEA stated that the agenda for the meeting includes some critical issues relating to integration of renewable energy, requirement of reactive compensation at various node and augmentation of no. of substations. After a brief introduction of participants, he requested Director (PSPA-II), CEA to take up the agenda items for deliberation.

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

1.0 Confirmation of the minutes of 41st meeting of the Standing Committee

1.1 Director(PSPA-II), CEA stated that the minutes of 41st meeting of the Standing Committee on Power System Planning of Southern Region held on 22nd September 2017, were issued vide CEA's letter No. 51/4/ (41st)/PSPA-1112017/1569-82 dated 06thDecember, 2017.

1.2 He informed that requests for following amendments in the Minutes of Meeting have been received:

- a) TANTRANSCO had suggested for following modifications in para 10.8 (iv) of item 10 (Transmission scheme modification of Manali & Korattur 400/230-110kV substation in Chennai Region)

Existing Para

(iv) "Korattur – Manali 400 kV S/C line (on the D/C tower) with HTLS conductor"

Suggested para

(iv) "Korattur –Manali 400 kV S/C line on D/C tower"

Members agreed with the suggested modification.

- b) Item no. 12 (Establishment of Konthagai 400/230 kV substation in Madurai region), TANTRANSCO had requested for introduction of 110 kV level in the Konthagai 400/230 kV substation along with 2 X 200 MVA, 400/110 kV ICT.

Director (PSPA-II), CEA stated that in the 41st meeting of SCPSPSR, the introduction of 110 kV level of Konthagai S/S was neither an agenda nor it was discussed. He suggested TANTRANSCO to include the proposal as an agenda item for discussion in this meeting.

Members agreed to take for the requested modification.

- c) NLC India Limited suggested amendment in Para 13.2 of Item 13 (NLCIL-NNTTP (2x500 MW) – Startup Power Requirement) :

Existing para:

“Representative of NLC stated that they had started availing startup power from STU and LILO of 230kV Tie Lines I &II (connecting NLC TPS –II and TPS-I) was not required. Accordingly, Members decided to drop this proposal”.

Suggested para

“NLCIL requested to drop the agenda points of drawl of Startup Power to NNTPP since approval had already been obtained in the Commercial Sub Committee meeting of SRPC for availing startup power through Deviation Settlement Mechanism (DSM) as per CERC regulation through NLCIL s own 230 kV TIE Lines LILO at NNTPP”.

Members didn't agree for the modifications.

- d) TANTRANSCO suggested amendment in Para 14.2 of Item 14 (Power evacuation Scheme of 500MW Kadaladi Ultra Mega Solar PV Power Project at Narippaiyur of Kadaladi Taluk in Ramnad district under state sector) as under

Existing Para

“Director, PSPA-II stated that LILO of Kamuthi- Thappagundu 400 kV D/C line and Kamuthi- Thappagundu 400 kV D/C line at Virudhnagar S/S had already been approved under evacuation system for Uppur TPS (2x800MW)”.

Suggested para

“Director, PSPA-II stated that “Kamuthi – Thappagundu 400 kV D/C line and LILO of Kamuthi – Thappagundu 400 kV D/C line at Virudhunagar S/S had already been approved under the establishment of Virudhunagar 765/400 kV SS”.

Members agreed for the suggested modifications.

- e) NLC India Limited suggested following amendment in para.22.1 (B) of Item 22 (Establishment of Neyveli 400/230 kV Substation - By Upgradation of the Neyveli (TNEB) 230 KV SS)::

Existing Para

“B. 400 KV CONNECTIVITY:

- i) New Neyveli Thermal power station- Neyveli (TNEB) 400 kV D/C Link.
- ii) Manalmedu- Neyveli (TNEB) 400 kV D/C Link”.

Suggested para for addition

“NLCIL informed that there are no spare bays available for connecting NNTPP with TANTRANSCO, for proposed 400 kV SS through 400 kV D/C lines. Further it was informed that joint inspection can be had for the same by NLCIL & TANTRANSCO.”

Members were of the opinion that the recording in the minutes are in line with the discussion held in the meeting. Accordingly, suggested amendment was not agreed.

- 1.3 With the above amendments, the minutes of 41st meeting of the Standing Committee on Power System Planning of Southern Region were confirmed.

Follow up issues of previous meetings of SCPSPSR

2.0 Reactive power compensation for Uppur TPS (2X 800 MW) :

- 2.1 Director(PSPA-II) CEA, informed that in the 41st SCPSPSR the following system was agreed for evacuation of 2x 800 MW Generation from Uppur TPS and renewable generation.

A. ATS for UPPUR (2X800MW) project:

- i) Uppur- Virudhnagar 765kV D/C line
- ii) 2X240MVAR, 765kV bus reactors at the Uppur 765kV switchyard.

B. Establishment of 765/400kV S/S at Virudhnagar (For evacuation of power from Uppur and Pooling of Renewable Generation):

- i) 765/400 kV, 2X1500MVA ICTs
- ii) 765kV Connectivity:
 - a) Virudhnagar- Coimbatore 765kV D/C line
- iii) 400kV Connectivity:
 - a) Virudhnagar- Kayathar 400kV D/C line (Quad Moose ACSR Conductor).
 - b) Virudhnagar -Kamuthi 400kV D/C line (Quad Moose ACSR Conductor).
 - c) Virudhnagar -Thappagundu 400kV D/C line (Quad Moose ACSR Conductor).

- 2.2 Further, in 41st meeting of SCPSPSR, it was decided that requirement of reactive compensation at both ends of Coimbatore-Virudhnagar 765kV D/C line would be jointly studied by CTU, TANTRANSCO & CEA.

- 2.3 Director(PSPA-II) CEA, informed that a joint study meeting was held on 19.04.2018 at CEA. In the meeting, it was decided that 2 x 330 MVAR bus reactor at Virudhnagar and 240 MVAR switchable line reactors at both ends of each circuit of Virudhnagar-Coimbatore 765kV D/C would be required for reactive power compensation. Further, 1 x 125 MVAR bus reactors would be required at 400kV buses of Kayathar, Kamuthi, Thappagundu substations.

- 2.4 Representative of CTU stated that considering spare requirement and interchangeability, it is advisable to keep identical rating of equipments in one

substation. He suggested that 330 MVAR switchable line reactor (in place of 240 MVAR) may be provided on each circuit at Virudhnagar substation..

- 2.5 After deliberations, following scheme was agreed for reactive power compensation:
- i. 2 X 330MVA_r, 765kV bus reactors at the Virudhnagar 765kV Substation
 - ii. 330 MVA_r, switchable line reactor in each circuit at Virudhnagar.
 - iii. 240MVA_r switchable line reactor in each circuit at Coimbatore
 - iv. 1 x 125 MVA_r, 400kV bus reactor each at Kayathar, Kamuthi, Thappagundu.

3.0 Kadaladi Ultra Mega Solar PV Power Project (500 MW)

- 3.1 Director (PSPA-II) CEA stated that, in the 41st SCPSPSR meeting, implementation of Kadaladi – Kamuthi 400kV D/C line by TANTRANSCO was agreed. Further, it was decided that requirement of reactive compensation would be finalized by joint system study by CEA, CTU and TANTRANSCO.
- 3.2 Director (PSPA-II) CEA informed that in the joint study meeting held on 19.04.2018, requirement of 1x125MVA_r bus reactor at Kadaladi was finalized to cater the reactive power compensation.
- 3.3 Members agreed for 1x125 MVAR bus reactor at Kadaladi.

4.0 Power evacuation scheme for the proposed Kundah PSHEP (4 X 125 MW) & Sillahalla Pumped storage HEP Stage –I (4 X 250 MW) project.

- 4.1 Director (PSPA-II) CEA informed that in the 41st meeting of SCPSPSR, following scheme was proposed by TANTRANSCO for power evacuation of Kundah Pumped Storage Hydro Electric Project (KPSHEP) – 4X125MW and Sillahalla Pumped Storage HEP Stage I – 4X250MW.

A. For Power evacuation of KPSHEP (4x125 MW):

- a) Establishment of 400/230 kV Substation with 3X315 MVA or 2X500 MVA ICTs at Parali (near existing Kundah PH III) with the following 400 kV and 230 kV connectivity.

400 kV connectivity:

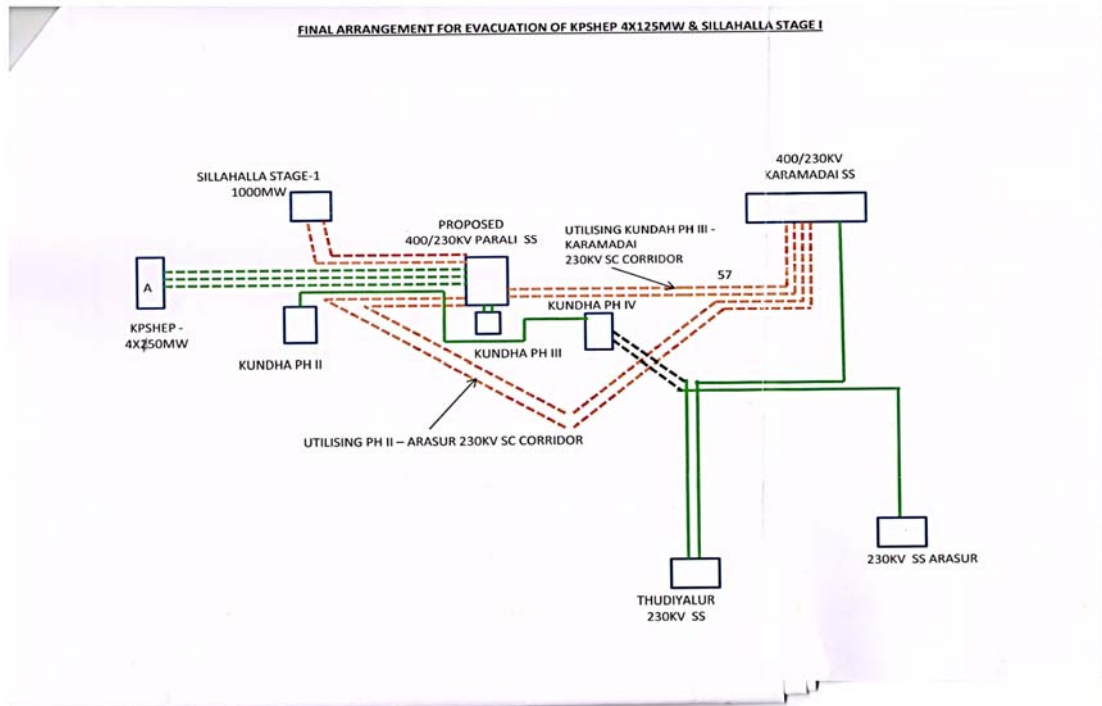
- i) Parali – Karamadai 400 kV D/C line is to run on D/C tower up to location no. 57 (Hilly terrain area) and subsequently on 400 kV M/C tower (with four circuits) upto Karamadai 400/230 kV S/S (in Plains area), which will also accommodate existing Parali – Karamadai 400 kV D/C line utilizing the corridor of existing Kundah PH II – Arasur 230 kV S/C line. The lines will have HTLS conductor.

230 kV connectivity

- i) KPSHEP -Parali 230kV 3 S/C lines on multi circuit towers (4 ckts) [sharing the 4th circuit for in addition to the existing Kundah PH II to Kundah PH III 230 kV S/C line utilizing that 230 kV corridor.
- ii) The existing KPSHEP - Kundah PH III, 230 kV D/C line to Parali 400/230 kV SS. And utilizing the existing 230Kv corridor upto Parli.

B. For power evacuation of Sillahalla Pumped Storage – Stage I HEP – 4x250MW:

- i) Silahalla PSHEP (Stage I) -Parali 400kV D/C line .
- ii) Parali - Karamadai 400 kV D/C line is to run on D/C towers up to location no. 57 (Hilly terrain) utilising Kundah PH II – Arasur 230 kV S/C line corridor. Subsequently, the line will be erected on 400 kV M/C tower (with four circuits) upto Karamadai 400/230 kV S/S (in Plains area) The multicircuit tower will also accommodate existing Parali – Karamadai 400 kV D/C line utilizing the corridor of existing Kundah PH III – Karamadai 230 kV S/C line. (INCLUDE THE DIAGRAM)



- 4.2 In the 41st meeting of SCPSPSR, it was decided that CEA, CTU & TANTRANSCO will carry out joint studies before further discussion.
- 4.3 Director (PSPA-II) CEA informed that in a joint study meeting held on 19.04.2018, it was observed that power from Kundah PSHEP (4 X 125 MW), Sillahalla Pumped storage HEP Stage – I (4 X 250 MW) alongwith generation from renewable sources flows to other states via ISTS . It was opined that such scenario would require comprehensive study involving all constituents of Southern Region.
- 4.4 Representative of TANTRANSCO stated that Kundah PSHEP (4 X 125 MW) is to be commissioned by 2020-21. Further, the transmission lines associated with above

Pumped Storage Scheme (PSS) are to pass through reserve forest area which needs clearance from forest department. TANTRANSCO requested for approval of transmission scheme for evacuation of power from above PSS so that transmission system is constructed in matching time frame of Kundah PSHEP. He further informed that the time frame for Sillahalla PSP is 2023 onwards.

- 4.5 Representative of CTU stated that with commissioning of Uppur, Kadaladi, Kundah and wind generation projects, Tamilnadu will be power surplus state by 2020-21. In this Scenario Tamilnadu need to manage their generation such that there is no or minimum injection into ISTS.
- 4.6 Members opined that pumped storage plants would be helpful in managing the grid with large scale integration of variable renewable generation. Further, it was suggested that the transmission system for evacuation of power of Kundah PSP may be agreed with adequate reactive power compensation.
- 4.7 Member (PS), CEA suggested that to take care of future load growth, transformers of 500 MVA capacity may be considered in place of 315MVA.
- 4.8 After deliberations, the following scheme was agreed for evacuation of power from Kundah Pumped Storage Hydro Electric Project (KPSHEP) (4X125MW):
 - i. Establishment of 400/230 kV Substation with 2X500 MVA ICTs at Parali (near existing Kundah PH III)
 - ii. KPSHEP - Parali 3x230kV circuits on Multi Circuit tower (4 ckts) with AL 59 or moose conductor utilizing corridor of existing Kundah PH-II - Kundah PH-III 230 kV S/C line. The existing Kundah PH-II - Kundah PH-III 230 kV S/C line would be accommodated as 4th circuit on the M/C tower.
 - iii. Parali – Karamadai 400 kV D/C line on D/C tower up to location no. 57 (Hilly terrain) and subsequently on 400 kV M/C tower (four circuits) upto Karamadai 400/230 kV S/S (in Plains area), the line would be constructed with HTLS conductor.
 - iv. 2x25 MVA_r, 230kV bus reactor at Kundah PSHP
 - v. 1x125 MVA_r, 400kV bus reactor at Parali.
- 4.9 Further, it was agreed that transmission system for evacuation of power from Sillahalla Pumped Storage plant and associated system strengthening would be taken up at later stage by TANTRANSCO.
- 5.0 Provision of exclusive 220kV feeder to CPRI, Hyderabad for their online 350 MVA short circuit test facility**
- 5.1 Director (PSPA-II) CEA informed that in 41st meeting of Standing Committee on Power System Planning in Southern Region (SCPSPSR) held on 22.09.2017, the proposal of CPRI to establish 350 MVA short circuit test facility at their existing UHVRL (Uppal, Hyderabad) for testing of distribution class transformers(33kV&11kV) was discussed. Wherein, it was decided that CPRI would

carry out the dynamics stability studies and submit the report to CEA. The report would be discussed in the joint meeting of CEA, CTU and POSOCO. In case, the dynamic stability study results are agreed in the joint meeting, CPRI would go ahead with implementation of the test facility.

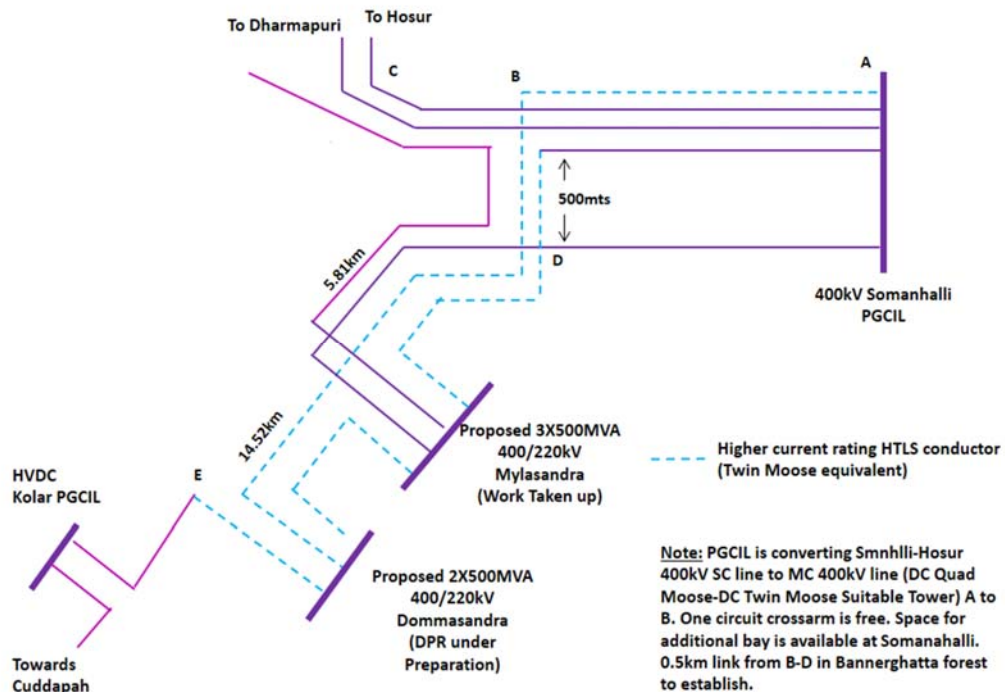
- 5.2 He further informed that, CPRI had submitted the report of the dynamics stability studies. Thereafter, a meeting was held in CEA on 25.10.17. In the meeting it was decided that CPRI may connect their online 350 MVA short circuit test facility with the grid through LILO of Ghanapur-Hayathnagar 220kV line at Uppal taking into account considering the suggestions given by CTU and POSOCO. Further, CPRI was advised to formulate operating procedure in consultation with SRPC for getting connected with grid while carrying out short circuit testing of transformer.
- 5.3 Members noted the same.

6.0 Proposal of erection of 125 MVAR Bus Reactor at other end instead of 400 kV GIS Srisailam Left Bank Hydro Electric Station (SLBHES)

- 6.1 Director (PSPA-II) CEA informed that installation of the 400kV, 1x125MVAR, Bus reactor in 400 kV GIS Sub Station of Srisailam Left Bank Hydro Electric Station(SLBHES) 400kV GIS substation was approved in the 39th Standing committee meeting. Wherein, representative of TSTRANSCO stated that erection of Bus reactor was not feasible due to space constraint at SLBHES and requested for exploring the option for installation of Bus reactors at other end of line(s) from SLBHES.
- 6.2 In the 41st meeting of SCPSPSR, it was agreed that TSTRANSCO will submit requisite data for system study to CTU. The CTU, after carrying out studies, will forward the results to CEA and TSTRANSCO. The requirement of Bus reactors at other end of the substations connecting SLBHES GIS substation would be discussed and finalized in joint meeting.
- 6.3 He further informed that, in the meeting held in CEA on 06.02.2018, it was observed that the effect of one 400kV, 125MVAR bus reactor planned at Dindi substation is not adequate to bring down the overvoltage within limit at SLBHES bus. However, the voltage is observed to be within limit by installation of additional bus reactors of 125 MVAR (400kV) capacity at Dindi i.e. installation of 400kV, 2x125MVAR bus reactor (including one reactor already planned at Dindi substation). Accordingly, it was decided that a team comprising officers from CEA, CTU and TSTRANSCO would visit SLBHES switchyard to explore the feasibility to accommodate the reactor (125 MVAR). However, the team is yet to visit the SLBHES switchyard
- 6.4 After deliberations, it was decided that the issue would be discussed in next standing committee meeting after the visit of the team.

7.0 Establishing 400/220 kV sub-station, (3 x 500 MVA) at Mylasandra (Electronic City) in Bangalore

- 7.1 Director (PSPA-II) CEA informed that, establishment of 400/220 kV sub-station (3 x 500 MVA) at Mylasandra (Electronic City) in Bangalore was approved in 27th meeting of SCSPSR with LILO of Somanahalli-Kolar 400 kV S/C line at (Twin Moose) Mylasandra. In the 41st meeting of SCSPSR, the issue of strengthening of upstream lines to Mylasandra sub-station by converting 400 kV Somanahalli-Kolar S/C (with Twin Moose ACSR conductor) line along with LILO portion to D/C quad moose conductor was discussed. In the meeting, representative of POSOCO stated that long shut down of Somanahalli-Kolar 400kV line is not possible and reconstruction would be very difficult due to RoW Constraint. Thereafter, it was decided that CEA, CTU, POSOCO and KPTCL may carry out System Studies jointly and explore various alternate options.
- 7.2 He further informed that a follow up meeting was held on 6th February 2018 at CEA, New Delhi to discuss various issues in the 41st Standing Committee Meeting. Wherein, it was suggested to explore possibility LILO of the existing Somanahalli-Hosur 400kV S/C (with Twin Moose ACSR conductor) line or Mylasandra-Hosur 400 kV D/C line.
- 7.3 In the meeting, representative of KPTCL had proposed LILO of one circuit of Dharmapuri – Somanahalli 400kV D/C line of POWERGRID at 400/220kV Mylsandra substation utilizing RoW of Kolar – Somanhalli 400 kV line for about 5.8 km. One section of 500 meters would require new RoW. Schematic diagram of the proposed scheme is given below:



- 7.4 Representative of POWERGRID informed that entire Dharmapuri-Somanahalli 400kV D/C not being constructed using M/C towers. POWERGRID is using M/C towers in selected stretch due to forest area.
- 7.5 On the apprehension of reduction of ATC of S1-S2 corridor with LILO of Dharmapuri-Somanahalli 400kV D/C line at Mylasandra, CTU stated that the issue will get resolved with commissioning of Salem-Madhugiri 765 kV S/c line.
- 7.6 Chief Engineer (PSPA-II), CEA stated that KPTCL had also proposed a new 400kV substation at Dommasandra (agenda item no. 8) by LILO of Mylasandra – Kolar 400kV S/C line. Member were of view that both proposals of KPTCL need to be studied together.
- 7.7 After deliberations, it was decided that the strengthening of upstream lines to Mylasandra sub-station and the proposal of LILO of Dharmapuri-Somanahalli 400kV D/C line at Mylasandra will be studied in detail along with proposal of establishment of a 400kV substation at Dommasandra after joint study of system carried by CEA, CTU, POSOCO and KPTCL. The proposal would be discussed in next meeting of Standing Committee.
- 7.8 Further, KPTCL was advised to expedite the work related to 230kV connectivity.

New Transmission planning proposals by Karnataka

- 8.0 **Establishing 2x500 MVA, 400/220 kV sub-station at Dommasandra in Bengaluru city**
- 8.1 Representative of KPTCL informed that in order to relieve loads of 400kV Kolar & 400 kV Mylasandra sub-station, to reduce the loading of 220 kV lines and to meet the future load growth in the vicinity. Establishment of 400/220 kV sub-station at Dommasandra (400/230kV, 2x500MVA ICTs) in Bengaluru city has been proposed with following connectivity:
 - i. 2 X 500 MVA, 400/220 kV Transformers.
 - ii. LILO of Kolar – Somanahalli S/C 400 kV line (with Twin Moose ACSR conductor) at Dommasandra.
 - iii. LILO of Somanahalli - Malur 220 kV D/C line between proposed 220kV EXORA and Malur sub-station (With this line arrangement, there will be 220 kV DC connectivity between Dommasandra & EXORA, 220 kV SC connectivity from Dommasandra, each to Sarjapura and Malur).
 - iv. 220 kV, 1000sqmm UG cable link between 220 kV VT Park substation and 220 kV EXORA sub-station (proposed).
- 8.2 Representative of SRLDC stated that after LILO of Kolar – Somanahalli S/C 400kV at Dommasandra, the Kolar – Dommasandra 400 kV line will get overloaded. Since, there

is already low voltage issue at Somanahalli, additional connectivity to Dommasandra may be explored.

- 8.3 Since, the issue was related with strengthening of 400kV Mylasandra sub-station, it was decided that detail study would be carried out jointly by CEA, CTU, POSOCO & KPTCL. Further, the proposal with study results would be discussed in next meeting of Standing Committee.

9.0 Intra-state transmission projects proposed for Green Energy Corridor Ph-II:

- 9.1 Representative of KPTCL informed that total installed generation capacity of Karnataka is 26672 MW (as on 31.03.2018), out of which 10526 MW of generation is from Renewable sources, (wind +solar + MHS+ Biomass). Further 6024 MW of additional Capacity from RE sources have been allotted by GoK For evacuation of additional generation, following ten (10 nos). Intra-State transmission projects have been planned for evacuation of large scale RE generation:

i. Establishment of 2x500 MVA, 400/220 kV sub-station at Yalwar, Bijapur District with following elements:

400 kV Transmission scheme:

- a. Narendra (New) Kudgi-Yalwar 400 kV D/C line (with Quad Moose ACSR Conductor)
- b. Gulbarga- Yalwar 400 kV D/C line (with Quad Moose ACSR Conductor).
- c. 2 X 500 MVA, 400/220 kV ICTs at Yalwar.
- d. 2 X 125 Mvar bus reactors.

220 kV Transmission scheme:

- a. LILO of both circuits of existing B.Bagewadi – Lingasugur 220 kV D/C line.
- b. LILO of both circuits of Bijapur- Sindagi 220 kV D/C line sub-station.
- c. B.Bagewadi -Yalwar 220 kV D/C line.

ii. Establishment of 2x500 MVA, 400/220 kV sub-station at Lokapur, Bagalkot

400 kV Transmission scheme:

- a. LILO of both circuits of Narendra New –Narendra (PGCIL) 400 kV D/C line (with Quad Moose ACSR Conductor) at
- b. 2 X 500 MVA 400/220 kV ICTs.
- c. 2 X 125 Mvar bus reactors.

220 kV Transmission scheme:

- a. LILO of both circuits of existing Gadag-Bagalkot 220 kV D/C line at Lokapur.

- b. LILO of both circuits of Mahalingpura-Soundatti 220 kV D/C line at Lokapur.
- c. Mughalkod.- Lokapur/Bagalkot 220 kV D/c Line.

iii. Providing additional feed to 400/220 kV Dhoni sub-station by LILO of existing Narendra – Davanagere 400 kV Twin Moose D/C line at Dhoni.

iv. Establishment of 2x100 MVA, 220/110 kV sub-station at Ron, Gadag District

220 kV Transmission scheme:

- a. Doni- Ron 220kV D/C line .
- b. 2 X 100 MVA, 220/110 kV ICTs.

110 kV Transmission scheme:

- a. LILO of both circuits of existing Ron-Gajendragad 110 kV D/C line at Ron.
- b. 110 kV LILO of DC line between Gadag and 110 kV Ron to proposed 220 kV Ron. (Existing SC line via Naregal and proposed ongoing 2nd circuit directly to 110 kV Ron).

v. Establishment of 2x100 MVA, 220/110 kV sub-station at Savalgi, Bagalkot District

220 kV Transmission scheme:

- a. LILO of both circuits of 220 kV Kudgi-Vajramatti 220 kV D/C line at Savalgi .
- b. 2x100 MVA, 220/110 kV transformers.

110 kV Transmission scheme:

- a. LILO of existing Todalbagi-Mamadapura 110 kV S/C line at Savalgi.
- b. LILO of existing Bableshtar-Mamadapura 110 kV S/C line at Savalgi.

vi. Establishment of 2x100 MVA, 220/66 kV sub-station at Hanagal, Chitradurga District

220 kV Transmission scheme:

- a. Jagalur - Hanagal 220 kV D/C line.
- b. 2 X 100 MVA, 220/66 kV ICT's.

66 kV Transmission scheme:

- a. LILO of existing Gudikote-Hangal 66 kV S/C line at Hangal.
- b. LILO of both circuits of Hangal -Rampura 66 kV D/C line at Hangal.
- c. Hangal - Konasagara 66 kV S/C line..

vii. Establishment of 2x100 MVA, 220/66 kV sub-station at PD Kote, Chitradurga District

220 kV Transmission scheme:

- a. LILO of both circuits of Hiriur-Gowribidanur 220 kV D/C line at P.D.Kote .
- b. 2 X 100 MVA, 220/66 kV ICT's.

66 kV Transmission scheme:

- a. LILO of both circuits of Hariyabbe-P.Kote 66 kV D/C line at P. D Kote.
- b. LILO of Hiriur-Kalmaranahalli 66 kV S/C line at P. D Kote.

viii. LILO of 2nd circuit of the existing Mahalingpura - Kudachi 220 kV D/C line at Athani.

ix. Conversion of existing Bidnal-Saundatti 220 kV S/C line and Saundatti - Mahalingpura 220kV S/C to 220 kV D/C line

x. Strengthening of Lingapura-Ittagi 220kV S/C line, Ittagi –Neelagunda 220kV S/C, Neelagunda –Guttur 220kV S/C line by replacing line with 220 kV D/C line (Twin Drake conductor).

- 9.2 Representative of CTU stated that with large quantum of renewable generation addition envisaged by Karnataka in their system by 2021-22, Karnataka will become energy surplus state. He enquired, whether Karnataka had carried out any comprehensive study for exporting surplus power outside the state. It was further stated that in the surplus scenario, developer of renewable generation may apply for LTA to CTU for Inter State transfer of power so that ISTS can be planned accordingly.
- 9.3 Representative of KPTCL informed that developers had already applied for connectivity at STU network.
- 9.4 After deliberations, it was decided that due to large scale integration of renewable generation in SR, detailed study considering the proposals of renewable rich states of SR and CTU need to be carried out. The results of the study would be discussed in joint study meeting.

Transmission planning proposals by Tamil Nadu

10.0 Establishment of Arni 400/230-110kV substation in Villupuram region by upgrading the existing 230 kV Arni SS.

- 10.1 Representative of TANTRANSCO stated that to increase reliability of Arni and nearby 220 kV substations, they had proposed establishment of 400 /230/110 kV SS with following scheme by upgradation of the existing 230/110 kV Arni SS to 400 kV level in the same premises retaining the existing 230 kV & 110 kV connectivity
- i. 3x315 MVA, 400/230 kV ICT

- ii. LILO of one circuit of Ariyalur - Kalivanthapattu 400 kV D/C line at Arni (Quad moose ACSR conductor).
 - iii. Arni – Thiruvalem 400 kV S/C line on D/C tower (Quad Moose ACSR Conductor)
 - iv. 2x80 MVA, 400 kV Bus Reactors
- 10.2 Director(PSPA-II) CEA informed that in a joint study meeting held on 19.04.2018, it was observed that short Circuit level at Thiruvalem being very high, Arni – Thiruvalem 400 kV S/C line is not advisable.
- 10.3 CE(PSPA-II), CEA suggested for LILO of both circuits of Ariyalur - Kalivanthapattu 400 kV D/C line at Arni (quad moose conductor) instead of constructing Arni – Thiruvalem 400 kV line.
- 10.4 TANTRANSCO further informed that existing 4 x 80 MVA, 230/110 kV transformer at Arni will be replaced by 2 x 200 MVA, 400/110 kV transformer for 110kV connectivity.
- 10.5 Representative of TANTRANSCO stated that after the LILO arrangement Ariyalur – Arni 400 kV line would be about 145km and Arni – Kalivanthapattu 400 kV line would be about 180km.
- 10.6 Representative of CTU stated that 63 MVAR, 400 kV line reactors are already present in both circuit at Kalivanthapattu end. It was suggested that 63 MVAR line reactors may be provided for Ariyalur – Arni line at Arni end.
- 10.7 After deliberations, the following scheme was agreed
- i. Establishment of 400/230-110 kV Substation with 2x500 MVA, 400/230 kV ICTs & 2x200 MVA, 400/110kV ICTs
 - ii. LILO of both circuit of Ariyalur – Kalivanthapattu 400 kV D/C line at Arni (Quad moose ACSR conductor).
 - iii. 2 x 125, 400kV bus reactor at Arni
- 11.0 Enhancement of 400/230 kV transformation capacity by erecting additional 1 X 500 MVA ICT at Thiruvalem 400/230 kV SS.**
- 11.1 Representative of TANTRANSCO informed that loading on existing ICT (400/230kV, 2x315 MVA) at Thiruvalem 400/230 kV SS has reached its maximum capacity. TANTRANSCO requested for provision of additional 1 x 500 MVA, 400/230 kV ICT at Thiruvalem 400/230 kV SS.
- 11.2 After deliberations, the proposal of TANTRANCO was agreed.
- 12.0 Introduction of 230 kV level at Ariyalur 765/400 kV substation.**
- 12.1 Representative of TANTRANSCO stated that 230kV lines feeding to Sankarapuram, Thiruvannamalai and Villupuram substations are getting overloaded. To relieve loading

on these 230 kV lines, introduction of 230 kV level at the Ariyalur 765KV substation has been proposed with following scheme:

ICT

- i) 400/230 kV, 2x500 MVA ICT at 765/400 kV Ariyalur Substation.

230 kV links

- i) Ariyalur- Sankarapuram 230 kV D/C line
- ii) Ariyalur- Thiruvannamalai 230 kV S/C line on D/C tower.
- iii) Ariyalur-Villupuram 230 kV S/C line on D/C tower

12.2 Director(PSPA-II) CEA informed that in a joint study meeting held on 19.04.2018, proposal was studied and was also agreed.

12.3 After deliberations, members agreed to the proposal of TANTRANSCO.

13.0 Introduction of 230 kV level at Virudhanagar 765/400 kV substation

13.1 Representative of TANTRANSCO proposed the following scheme to introduce 230kV level at Virudhanagar:

ICT

- i. 400/230 kV, 2x500 MVA ICT at 765/400 kV Virudhanagar substation.

230 kV links

- i. Virudhanagar -Savaspuram 230 kV S/C line on D/C tower
- ii. Virudhanagar -Kinnimangalam 230 kV S/C line on D/C tower
- iii. Virudhanagar -Thummakundu 230 kV S/C line on D/C tower
- iv. Virudhanagar -Srivilliputtur 230 kV S/C line on D/C tower

13.2 Director (PSPA-II), CEA informed that from load flow studies do not justify the need of above proposed 230 kV lines considering the load demand in 2021-22 time frame. The loads of above 230kV substations is being met easily from other substations satisfying contingency criteria.

13.3 Accordingly, the proposal of TANTRANSCO was not agreed.

14.0 2nd circuit with 230kV UG cable between Kalivanthapattu 400 kV SS (PGCIL) and Tharamani 230 kV substation of TANTRANSCO

14.1 Representative of TANTRANSCO stated that Taramani substation is near sea shore area. To avoid the delay in normalisation of supply during natural calamities at Tharamani 230/110 kV substation (which is mainly feeding the southern part of Chennai), 2nd circuit with UG cable from Kalivanthapattu 400 kV substation of POWERGRID has been proposed to ensure reliability of supply.

- 14.2 Director (PSPA-II), CEA stated that other circuits feeding Tharamani 230/110 kV substation are generally lightly loaded. The power flow on the existing lines will be reduced further with the proposed circuit.
- 14.3 On query of CE (PSPA-II) CEA regarding the length of the cable, TANTRANSCO informed that the length of cable would be about 37km.
- 14.4 CE (PSPA-II) CEA stated that there would be number of joints in 37km length of cable, which will reduce the reliability and objective of TANTRANSCO would not be fulfilled. Further, reactive power compensation and cooling arrangement needs to be studied for this proposed cable.
- 14.5 After deliberations, the proposal for underground cable connectivity of 230 kV substation at Taramani with 400 kV substation of POWERGRID at Kalivanthapattu was not agreed.
- 15.0 Modification for the already approved Transmission System associated with NCTPS Stage –III (1x800MW) and ETPS Replacement (1x660 MW)**
- 15.1 Representative of TANTRANSCO informed that the following Transmission System associated with NCTPS Stage –III (1x800MW) and ETPS Replacement (1x660 MW), was agreed in agreed in the 41st meeting of Standing Committee on Power System Planning of Southern Region:
- i) NCTPS (Stage III switchyard) -North Chennai Pooling station 765kV S/C line
 - ii) ETPS (Replacement switchyard) -North Chennai Pooling station 765kV S/C line
 - iii) North Chennai (Stage III) - Ennore (Replacement) with 765 kV S/C lines.
- 15.2 TANTRANSCO stated that NCTPS Stage-III project will be ready by the end of 2019 and ETPS Replacement project is expected by 2022-23. Accordingly, following modifications in the agreed scheme is proposed:
- i) NCTPS (Stage III) Switchyard – North Chennai Pooling station 765kV D/C line for power evacuation and reliability.
 - ii) LILO of one circuit of NCTPS (Stage III) Switchyard- North Chennai Pooling Station 765 kV D/C at ETPS (Replacement) switchyard later to restore the approved connectivity as stated in para 15.1.
- 15.3 After deliberations, members agreed to the proposal of TANTRANSCO.

Transmission planning proposals by Andhra Pradesh

- 16.0 Proposal for evacuation of 12 x 80 MW (960 MW) power from Polavaram Hydro Electric Project (HEP) of APGENCO in East Godavari district**
- 16.1 Representative of APTRANSCO stated that APGENCO is setting up Polavaram Hydro Electric Project (12x80 MW) in East Godavari district which is likely to be

commissioned by 2021. For evacuation of power from this HEP, APTRANSCO had proposed following transmission scheme:

- i) KV Kota – Polavaram HEP 400 kV D/C line (with Quad Moose ACSR conductor).
- 16.2 Representative of CTU stated that KV Kota being high voltage area, suitable reactive power compensation would be required at Polavaram HEP.
- 16.3 After deliberations, following scheme for evacuation of power from Polavaram HEP (12 x 80 MW) was agreed:
- i. KV Kota – Polavaram HEP 400 kV D/C line (with Quad Moose ACSR conductor)
 - ii. 2 x 125 MVAR, 400kV bus reactor at Polavaram HEP

17.0 Proposal for reconfiguration at 400/220kV Uravakonda SS with isolation of 220kV Bus arrangements instead of approved 400/220kV Uravakonda -2 SS

- 17.1 Representative of APTRANSCO stated that the following transmission scheme was approved in the 40th Standing Committee Meeting of SR for wind power projects at 400/220kV Uravakonda-2 substation:
- i. 400/220kV Substation at Uravakonda -2 with 400/220kV, 4x315 MVA ICTs.
 - ii. Uravakonda – Uravakonda - 2 400kV D/C line (25kM with Quad Moose ACSR conductor)
 - iii. 1x125 MVAR, 400kV Bus reactor at 400/220kV Uravakonda-2 SS.

Later, CEA recommended for 400/220KV, 3 x 500 MVA transformers (in place of 400/220kV, 4 x 315 MVA transformers) at Uravakonda -2 (Kanekal) substation.

- 17.2 APTRANSCO further stated that it has become difficult to construct 400/220kV Uravakonda-2 Sub Station. Accordingly, APTRANSCO requested for reconfiguration at 400/220kV Uravakonda SS with isolation of 220kV Bus arrangements instead of construction of approved 400/220kV Uravakonda-2 SS.
- 17.3 CE (PSPA-II), CEA stated that with clubbing of Uravakonda-2, 400/220 kV Substation at proposed Uravakonda SS would result in handling of 3000 MW of power at Uravakonda SS. He advised to consider upgradation of Uravakonda S/S to 765 kV level.
- 17.4 Representative of APTRANSCO stated that this is an interim arrangement to accommodate the power from renewable sources and their final plan is for upgradation of this substation to 765 kV.
- 17.5 Representative of POSOCO stated that there is issue of persistent high voltage at Uravakonda and need to plan a reactor.
- 17.6 After deliberations, following was agreed:
- (i) Addition of 400/220KV, 3 x 500 MVA transformers and 1x125 MVAR, 400kV Bus reactor at Uravakonda S/S with isolation of 220 kV bus from existing bus.

- (ii) Dropping the already agreed Uravakonda-2 (Kanekal) 400/220 kV Substation with Uravakonda – Uravakonda - 2 400kV D/C line.

Transmission planning proposals in Kerala

18.0 Requirement of additional 400 kV bays at Kozhikode 400 kV substation

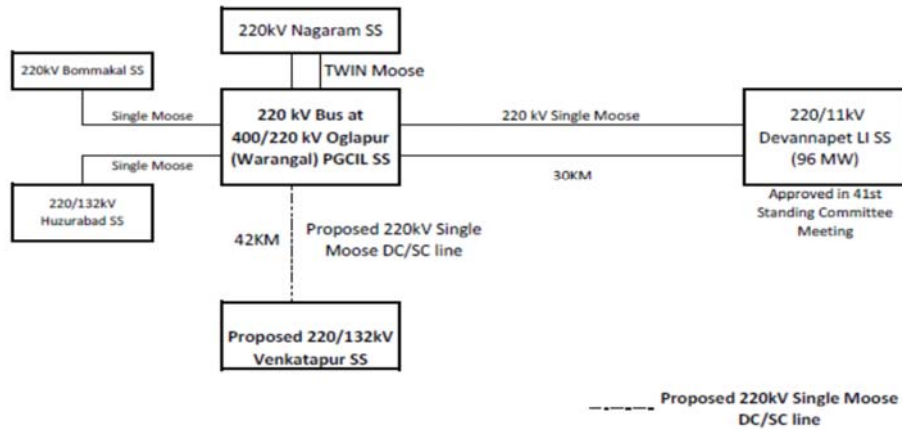
- 18.1 Representative of KSEB stated that North Trissur (Madakkathara)-Kozhikode (Areakode) 400kV D/C line (with Quad Moose ACSR conductor) was approved in the 30th meeting of Standing Committee on Power System Planning of Southern Region as ISTS. In the 39th meeting of SCPSPSR, it was decided that the line will be implemented by KSEBL.
- 18.2 Representative of KSEBL further stated that the Madakathara- Kozhikode 400kV D/C line is under execution and is expected to be commissioned by October 2019. She requested that 2 nos. 400 kV bays may be constructed at Kozhikode 400 kV substation of POWERGRID in the matching time frame for termination of the said line.
- 18.3 It was informed that in 39th meeting of SCPSPSR the proposal of KSEBL for construction of Madakathara – Kozhikode (Areakode PG) D/c 400kV utilising the existing RoW of STU owned 220kV Madakathara – Malaparamba – Areakode S/c feeder was agreed for implementation as State Transmission schemes. The proposal of KSEBL to provide two nos 400kV bays at 400kV Substation Kozhikode (Areakode PG) by CTU as part of the Regional System strengthening scheme under in line with the original sanctioned scheme was also agreed.
- 18.4 Accordingly, it was decided that for termination of North Trissur (Madakkathara)-Kozhikode (Areakode) 400kV D/C line, 2 nos. of 400kV bays at Kozhikode (Areakode) substation will be implemented under ISTS.

Transmission planning proposals in Telangana

19.0 Proposal for erection of 220kV S/C line on D/C tower (with ACSR Single Moose) from 400/220kV Oglapur (PGCIL) SS to proposed 220/ 132kV Venkatapur SS (42 KM) in Jayashanker Bhupalapally District

- 19.1 Representative of TSTRANSCO had proposed the erection of 220kV S/C line on D/C tower (ACSR Single Moose) from 400/220kV Oglapur (POWERGRID) Substation to proposed 220/ 132kV Venkatapur SS (42 KM) in Jayashanker Bhupalapally. Schematic diagram of proposed system is as under:

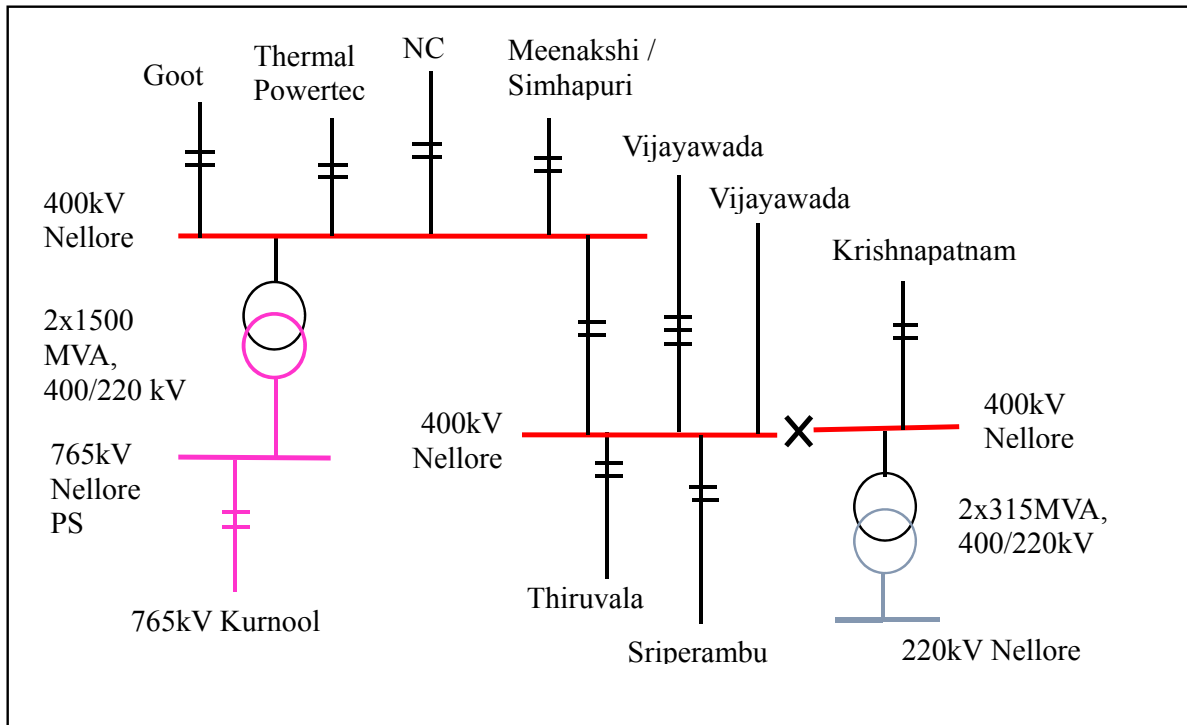
Proposal for erection of 220kV DC/SC line (ACSR Single Moose) from 400/220kV Oglapur (PGCIL) SS to proposed 220/132kV Venkatapur SS (42KM)



- 19.2 TSTRANSCO requested for one 220kV bay at 400/220kV Oglapur (Warangal) (POWERGRID) Substation.
- 19.3 Representative of CTU informed that prima-facie space is available for construction one 220 kV bay at 400/220kV Oglapur (Warangal) (POWERGRID) Substation.
- 19.4 After deliberation the proposal of TSTRANSCO was agreed. Further, it was agreed that the one 220kV bay in 400/220kV substation at Warangal of POWERGRID would be implemented by TSTRANSCO.

20.0 High loading of Nellore-Nellore PS 400 kV (Quad) D/c line

- 20.1 Representative of CTU stated that in the quarterly operational feedback reports of POSOCO, the issue of high loading on Nellore – Nellore PS 400kV (Quad) D/c line on the healthy circuit on outage of one circuit was raised. The matter was discussed in the 41st Standing Committee meeting held on 22.09.2017 and 33rd SRPC meeting held on 16.02.2018. During the SRPC meeting it was decided that to take up the matter for discussion in the Standing Committee meeting. Further POSOCO in the operational feedback report for Q3 of 2017-18 has stated that high short circuit fault level is observed at Nellore (PG) & Nellore (AP) 400kV substation.
- 20.2 Connectivity arrangement at Nellore 765/400kV PS, Nellore (PG) 400kV and Nellore (AP) 400kV substations is as given below:



20.3 CTU further stated that system studies were carried out and following alternatives can address the issue of high loading and the high short circuit levels:

Alternative 1: Opening of Nellore (PG) – Nellore PS 400kV (Quad) D/c line

Alternative 2: Bypassing the Nellore (PG) through interconnection of Nellore PS - Nellore (PG) 400kV D/c (Quad) line (6Km) and Nellore (PG) – Thiruvalam 400kV D/c (Quad) line (175Km) at Nellore (PG).

20.4 Representative of POSOCO stated that alternative-1 is a temporary measure and with the opening of Nellore (PG) – Nellore PS 400kV (Quad) D/c line, evacuation of full LTA approved by CTU may not be adhered.

20.5 It was stated that following Common transmission system was discussed and agreed by SR constituents for granting LTA to Simhapuri (540 MW), Meenakshi (491+273 MW), Krishnapatnam (Navayugaa)(1860MW), Krishnapatnam APPDCL(1600 MW) and Thermal Powertech (1320MW) in 26th Standing Committee Meeting of SR held on 13th June, 2008 & 11th Long Term Access/31st Standing Committee Meeting of SR held on 16th November, 2010 and 8th & 15th SRPC meeting held on 19th December, 2008 & 27th November, 2010 respectively:

Dedicated Transmission system:

- (i) SEPL/MEPL Generation Switchyard - Nellore (existing POWERGRID substation) 400 kV D/c line (Quad ACSR conductor) with associated line bays.
- (ii) TPCIL Generation switchyard – Nellore Pooling Station 400 kV D/c line (Quad ACSR conductor) with associated line bays

- (iii) Krishnapatnam (Navayugaa)– Nellore 765kV 2xS/C line
- (iv) Krishnapatnam APPDCL – Nellore 400kV D/C line (Quad ACSR conductor)
and
- (v) Krishnapatnam APPDCL – Chittoor 400kV D/C line (Quad ACSR conductor)

Common Transmission System Associated with ISGS Projects in Krishnapatnam Area of Andhra Pradesh

- i) Establishment of 765/400kV, 2x1500 MVA pooling station at Nellore by LILO of both circuits of Simhapuri-Nellore 400kV D/c line (Quad moose conductor) at Nellore.
- ii) Nellore Pooling station – Kurnool 765kV D/c line
- iii) Kurnool – Raichur 2nd 765kV S/c line (1st line covered under Krishnapatnam UMPP)
- iv) Associated 765kV & 400kV bays at Nellore Pooling station, Kurnool and Raichur stations.

At the time of planning of common system, it was indicated that if all the generations envisaged in this area materialize, then the common transmission system identified would require strengthening. This strengthening is to be worked out based on the success of materialisation of generation capacity addition in the area.

- 20.6 Representative of CTU informed presently there is no constraint in evacuation of LTA granted at Nellore. Further, as much of the generation could not materialize, there will be no constraints in evacuation of power from generation projects in Krishnapatnam area with the proposed re-arrangement.
- 20.7 Regarding Alternative -2, CTU stated that in the 34th meeting of SCSPSR held on 16.04.12, it was agreed that interconnection between Nellore PS & Nellore (PG) may be bypassed with the increase in the short circuit levels. As the Nellore – Nellore PS 400kV D/c (Quad) lines and Nellore – Thiruvelam 400kV D/c (Quad) lines are terminating in the same diameters, it can be easily bypassed at Nellore (PG).
- 20.8 It was opined that 2x50 MVAR line reactors at Nellore (PG) end on Nellore (PG) – Thiruvalam 400kV D/c line may be made switchable bus reactors by suitable arrangement utilizing the bay made available after bypassing the Nellore (PG).
- 20.9 After detailed deliberations, it was agreed to bypass Nellore PS – Nellore 400kV D/c (Quad) line and Nellore – Thiruvalam 400kV D/c (Quad) line at Nellore (PG) for making Nellore PS – Thiruvalam 400kV D/c (Quad) line to control loading on Nellore – Nellore PS 400kV lines and control of short circuit levels. It was also agreed that 2x50 MVAR line reactors at Nellore (PG) end on Nellore (PG) – Thiruvalam 400kV D/c line may be utilized as switchable bus reactors by suitable arrangement.
- 21.0 Proposal for Grant of Connectivity to NLC India Limited (TPS-II 2nd Expn – 2x660 MW) in Cuddalore, Tamil Nadu and to control high short circuit fault level in Neyveli Generation complex**
- 21.1 Representative of CTU stated that NLC India Ltd. had applied for connectivity of their Neyveli TPS-II 2nd Expn (2x660 MW) generation project in Cuddalore, Tamil Nadu

in the month of March, 2017 seeking connectivity for 1320 MW w.e.f. 01.04.2021. The proposal for grant of connectivity to NLC India Ltd (TPS –II 2nd Expn - 2x660 MW) at Neyveli TS-I exp. was circulated vide letter dated 21.12.2017, for comments / observations from Southern Region constituents wherein constituents have raised concern over high short circuit fault current at existing Neyveli generation complex, constraints in bay availability, system reliability etc. In view of the above, proposal for connectivity to NLC India Ltd (TPS-II 2nd Expn. - 2x660 MW) has now been proposed at Nagapattinam 765/400kV Pooling station.

21.2 It was informed that for Common Transmission System for projects located in Nagapattinam/Cuddalore area following arrangement was agreed in Nagapattinam area:

- i) New 765/400 kV pooling station at Nagapattinam (GIS) (initially to be charged at 400kV)
- ii) LILO of one circuit of Neyveli – Trichy 400kV D/C line at Nagapattinam pooling station (which shall be bypassed at later date)

Since, there was delay in completion of associated transmission lines, following contingency arrangement was agreed for evacuation of power from generating stations of IL&FS

- i) LILO of 2nd circuit of Neyveli – Trichy 400kV D/C line at Nagapattinam pooling station.
- ii) Strengthening of Neyveli TS-II to Neyveli TS-I expansion 400kV link with higher capacity conductor as contingency plan

21.3 Accordingly, these LILOs are to be bypassed / restored and both LILO sections may be extended to 400kV switchyard of Neyveli TPS-II 2nd Expn to form Ney TPS-II 2nd Expn – Nagapattinam 400kV 2XD/c line as part of connectivity transmission system. This arrangement shall also facilitate in controlling high short circuit levels at existing Neyveli generation complex. With this arrangement, the transmission system for connectivity was proposed as follows:

- 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 Expn) – Nagapattinam 400 kV 2xD/c line along with the line bays at generation switchyard.
- ii) 1x125 MVAR bus reactor at generation switchyard (NLC TPS-II 2nd Expansion)
- iii) Switchyard to be designed for fault level of 63 kA (for 1 sec).

21.4 Further to control the Short circuit current levels at Neyveli Generation complex, following is proposed:

Alternative-1

- i) Neyveli TS-II – Pondicherry 400kV S/c line (removal of LILO of Neyveli TS-II – Pondicherry 400kV S/c line at NNTPS)

- ii) NNTPS – Neyveli (TNEB) 400kV D/c line (through extension of LILOed portion to Neyveli (TNEB))

Alternative-2

- i) Connecting one ckt. of Neyveli TS-II – Salem 400kV D/c line and Ney TS-II – NNTPS 400kV S/c line (bypassing Ney TS-II) to form NNTPS – Salem 400kV S/C line.
 - ii) Modification in Neyveli(TNEB) – NNTPS 400 kV D/C line (agreed in 41st SCSPSR) as Neyveli(TNEB) – Neyveli TS-II 400 kV D/C line.
- 21.5 Representative of NLC stated that the design of switchyard may be considered with fault level of 50 KA rating (for 1 sec) as they have already floated tenders accordingly.
- 21.6 It was informed that with the proposed transmission system in Alternative-2 and re-arrangement, the short circuit level has been found to be well within limits. Further, it was agreed that switchyard may be designed for fault level of 50 kA (for 1 sec) and Neyveli (TNEB) – Neyveli TS-II 400 kV D/c line may be implemented with high capacity conductor.
- 21.7 After detailed deliberations, the following transmission system was agreed for grant of connectivity to NLC (TPS-II 2nd Expn)
- 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 Expn) – Nagapattinam 400 kV 2xD/c line along with the line bays at generation switchyard.
 - ii. 1x125 MVA r bus reactor at generation switchyard. (NLC TPS-II 2nd Expansion)
 - iii. Switchyard to be designed after fault level of 50 kA (for 1 sec).

It was also agreed that implementation of connectivity transmission system shall be done by NLC India Ltd. as per the sixth amendment to CERC connectivity Regulations.

- 21.8 Further, following re-arrangement in existing transmission system to control high short circuit current in Neyveli generation complex was agreed
- i) Connecting one ckt. of Neyveli TS-II – Salem 400kV D/c line and Neyveli TS-II – NNTPS 400kV S/c line (bypassing Ney TS-II) to form NNTPS – Salem 400kV S/C line.
 - ii) Modification in Neyveli(TNEB) – NNTPS 400 kV D/C line (agreed in 41st SCSPSR) as Neyveli(TNEB) – Neyveli TS-II 400 kV D/C line with high capacity conductors (to be constructed by TANTRANSCO)
 - iii) Bypassing of LILO of Neyveli TS-II / Neyveli TS-I Expn – Trichy 400kV S/C lines at Nagapattinam.

It was also agreed that the above re-arrangement in existing transmission system shall be executed as ISTS.

22.0 Conversion of fixed line reactors to switchable line reactors in SR

22.1 Representative of CTU stated that conversion of fixed line reactors into switchable line reactors for following lines along with few other lines was agreed in 39th meeting of SCPSPSR, held on 29.12.2015.

Sl. No	Transmission line	Length	Reactor		Agreed Proposal
			Sending end	Receiving end	
1	Gazwel – Hyderabad-II	62.5	-	50	Line Reactor at Hyderabad end to be made switchable
2	Malakaram – Hyderabad-II	28	-	50	Line Reactor at Hyderabad to be made switchable
3	Trichy – Nagapattinal I	159	50	-	Line Reactor at Trichy to be made switchable
4	Trichy – Nagapattinal II	159	63	-	Line Reactor at Trichy to be made switchable

22.2 It was further stated that adequate electrical clearance is not available for putting 400kV circuit breaker to convert the fixed line reactor into switchable line reactor for Hyderabad – Malkaram 400kV line and accordingly CTU requested that reactor at Hyderabad end for Hyderabad – Malkaram 400kV line may be retained as fixed line reactor.

22.3 CTU informed that for Hyderabad – Gajwel 400kV line, line reactor at Hyderabad can be made switchable after inclusion of standard gantry towers and 1 no. of standard beam.

22.4 Representative of CTU informed that as per the nomenclature adopted by RLDC and site, line reactors on Trichy-Nagapattinam lines may be referred as 50 MVAR line reactor on ckt-II and 63 MVAR line reactor on ckt-I respectively at Trichy end.

22.5 Members agreed for retaining line reactor of Hyderabad – Malkaram 400kV line as non-switchable/fixed type and noted the other information.

23.0 Establishment of Tirunelveli GIS Pooling Station under the scheme “Green Energy Corridors ISTS – Part-A”– name/location change to Tuticorin-II GIS.

23.1 Representative of CTU informed that Tirunelveli 400/230kV GIS Pooling Station was agreed under “Green Energy Corridors ISTS – Part-A” in the 36th meeting of SCPSPSR held on 04/09/2013. However, the required land for establishing of pooling station could not be acquired in Tirunelveli district due to high cost of land and the land was acquired in Kovilpatti Taluk which is situated in adjacent Tuticorin District.

23.2 Accordingly, it was proposed that the name of the Tirunelveli 400/230kV GIS Pooling Station may be changed to Tuticorin-II 400/230kV GIS Pooling station.

23.3 Members agreed for the same.

24.0 Transmission scheme for NP Kunta Ultra Mega Solar Power park (1500 MW) in Andhra Pradesh

- 24.1 Representative of CTU stated that following transmission scheme for NP Kunta solar power park is under implementation as per the approval in the 38th standing committee meeting of SR held on 07.03.15 matching with the generation (Ph-I: 250MW by Dec'15, Ph-II: 750MW by Sep'16 & Ph-III: 500MW by Dec'16).

Phase-I (250 MW)

- Establishment of 3x500 MVA, 400/220KV Substation at NP Kunta Pooling station
- LILO of 400KV Kadapa (Cuddapah) - Kolar S/c line at NP Kunta Pooling station
- 2 nos. 220kV line bays at NP Kunta Pooling Station
- 1x125 MVAR Bus Reactor at NP Kunta Pooling station
- ±100 MVAR STATCOM at 400kV NP Kunta Pooling station

Phase-II (750 MW)

- LILO of both circuit of Hindupur- Kadapa(Cuddapah) 400kV D/c line (Quad moose ACSR conductor) at NP Kunta Pooling station
- 6 nos. 220kV line bays at NP Kunta Pooling Station

Phase-III (500 MW)

- Augmentation of transformation capacity at NP Kunta station with 4th, 1x500 MVA, 400/220kV transformer
- 4 nos. 220kV line bays at NP Kunta Pooling Station

- 24.2 CTU informed that transmission scheme for NP Kunta Ph-I generation is already commissioned in Apr'16 matching with generation schedule. Subsequently, APSPCL postponed schedule of NP Kunta Ph-II (750 MW) & Ph-III (500 MW) Generation to Aug'19 & April'18 respectively. As envisaged earlier, NP Kunta Ph-II generation (750 MW) was expected to commission before NP Kunta Phase-III (500 MW) generation. However due to delay in award of Ph-II generation, NP Kunta Phase-III generation is commissioning before NP Kunta Ph-II generation and transmission element associated with NP Kunta Ph-II scheme i.e. LILO of 400kV Cuddapah -Hindupur D/c line (Quad) at NP Kunta PS is required with the Phase-III generation for evacuation of power with reliability and security.

- 24.3 After deliberations, it was agreed that LILO of both circuit of existing Hindupur-Kadapa(Cuddapah) 400kV D/c (quad) line at NP Kunta PS, transmission element of NP Kunta Phase-II scheme, may be considered as part of NP Kunta Phase-III generation.

Operational feedback from POSOCO:

25.0 Continuous high loading of 400kV Nellore-Nellore PS DC line and urgent need for future planning to relieve the corridor

25.1 This issue was discussed under agenda item 20.0

26.0 High flow on 400kV KKNPP-Tirunelveli D/C line after Commissioning of 400kV KKNPP-Tuticorin PS D/C line:

26.1 Representative of POSOCO informed that as per the 36th Standing Committee meeting on Power system planning in SR held on 04.09.2013, the following was approved.

"Tuticorin Pooling station - Tirunelveli section of the agreed Tuticorin Pooling station - Kudankulam 400 kV Quad D/c line may be constructed ahead of Kudankulam - 3 & 4 and one of the existing Kudankulam - Tirunelveli 400 kV Quad D/c may be connected to the same making Kudankulam - Tuticorin Pooling station 400 kV Quad D/c line.

This arrangement shall also facilitate two termination points viz. Tirunelveli & Tuticorin Pooling station for evacuation of power from Kudankulam - 1 & 2 and shall avoid operational difficulties in case of any bus fault at either Tirunelveli or Tuticorin pooling stations".

26.2 POSOCO further informed that POWERGRID had commissioned above transmission system in 1st week of March 2018. But, with the commissioning of 400kV Kudankulam-Tuticorin PS D/c line (144 Km), more than 80% of power generated from KKNPP (with Both units in service) is flowing 400kV Kudankulam-Tirunelveli D/c section (72.5 km). It was further added that with more generation at Coastal Energen and NTPL, there would be further uneven distribution of flow on 400kV KKNPP-Tirunelveli and 400kV KKNPP- Tuticorin PS sections. Additionally by commissioning of the new 400 kV lines connecting Tirunelveli wind station to Tuticorin PS will further aggravate the situation. POSOCO stated that there is a need to review the evacuation transmission system from KKNPP.

26.3 After deliberations, the issue was referred for joint system study by CEA, CTU, POSOCO and constituents of Southern Region. The proposal along with study results would be discussed in next meeting of Standing Committee.

27.0 Continuous high voltage at 400kV Uravakonda SS, 400kV Jammalamadugu SS:

27.1 The issue of high voltage at Uravakonda 400 kV substation was discussed under item no. 17. Regarding Jammalamadugu 400 kV substation, it was informed that installation of reactor is in progress.

28.0 SR Import Limiting constraint on 765/400kV Vemagiri PG ICTs:

28.1 Representative of POSOCO stated that presently limiting constraint for SR import capability is linked to no. of ICTs at 765/400kV Vemagiri(PG) Substation not meeting

N-1 criteria. It was requested that construction of following transmission system may be expedited:

- i. Vemagiri-PG- Chilakaluripeta 765 kV D/C line
- ii. Chilakaluripeta - Cuddapah 765 kV D/C line
- iii. Chilakaluripeta- Narsaraopeta(Sattenapalli) 400 kV D/C line (with Quad moose conductor)
- iv. Cuddapah - Madhugiri 400 kV D/C line

28.2 Director (PSPA-II) CEA stated that early commissioning of the above transmission elements has already been agreed by CEA.

29.0 High Voltage Nodes

29.1 Representative of POSOCO stated that following sub-stations are facing high voltages most of the time during off peak period

S.No.	Sub-Station	Reactors Approved/Commissioned
1	765kV Nizamabad SS	1x240 MVAR in-service
2	765kV Kurnool SS	2x240 MVAR approved
3	765kV Raichur SS	2x240 MVAR approved
4	765kV Thiruvallam SS	2x240 MVAR approved
5	765kV Srikakulam SS	1x330 MVAR in service
6	400kV Dindi SS	No reactor available
7	400kV Suryapet SS	No reactor available
8	400 kV Jammalamadugu SS	1x8MVAr Approved
9	400kV KV Kota SS	No reactor available
10	400kV Gooty SS	1x125MVAr+ 1x63MVAr in service

S.No.	Sub-Station	Reactors Approved/Commissioned
11	400kV Nunna SS	2X63 +2X125 MVAR in-service
12	400kV Sattenapally	1x125 MVAR Approved
13	400kV Kurnool SS(AP)	1x125 MVAR +1x63 MVAR in service
14	400kV Ghani SS	1x125 MVAR in service
15	400kV Urvakonda SS	1x80 MVAR approved, 1x125MVAR in service
16	400 kV Malkaram SS	1x125MVAR in service
17	400kV Veltoor	1x125MVAR in service
18	400kV Mamidipally SS	1x125MVAR inservice
19	400kV Hyderabad SS	1x63 MVAR in service
20	400kV Srisailam LB SS	1x125 MVAR in service
21	400 kV Kaiga SS	2x125 MVAR Approved
22	400kV Hassan SS	1x125 MVAR + 1x80 MVAR in service
23	400kV Talaguppa SS	1x125 MVAR Approved
24	400kV Karaikudi SS	1x80 MVAR in service
25	400kV Thiruvallam SS	1x63 MVAR in service
26	400 kV Udumalpet SS	No reactor available
27	400kV Pavagada SS	2x125 MVAR Approved

S.No.	Sub-Station	Reactors Approved/Commissioned
28	400kV UPCL SS	2x125 MVAr Approved
29	400kV Davanagere SS	1x125 MVAr Approved
30	400kV Asupaka SS	1x80 MVAr Approved
31	400kV Kamuthi SS	2x80 MVAr Approved
32	400kV Kayathar	1x125 MVAr Approved
33	400kV Yelhanka	2x63 MVAR in 40 th Standing Committee.

29.2 Constituent were requested to expedite the commissioning of already approved bus reactors. Further, proposal of new reactors was discussed under item no. 34

30.0 Overloading of Nelamangala-Mysore D/c line:

30.1 Representative of POSOCO stated that with the increased drawls at 400kV Kozhikode SS & 400kV Mysore SS and less generation in UPCL area, Nelamangala-Mysore 400 kV D/C line getting heavily loaded. This high loading would reduce the import capability of Kerala also. It was added that to relieve the congestion, the planned Hiriyyur-Mysore 400 kV D/c line and Lines under construction in Kerala regions to be expedited.

30.2 KPTCL and KSEBL were requested to expedite construction of Associated Transmission elements.

31.0 ATS of Yeramarus TPS:

31.1 Representative of POSOCO stated that due to non-commissioning of Yeramarus TPS Associated Transmission System, Hiriyyur-Nelamangala 400kV D/C line is getting heavily loaded during high wind generation in Karnataka.

31.2 KPTCL was requested to expedite the Yeramarus TPS Associated Transmission System.

32.0 Interim arrangement for availing quality & stable auxiliary supply for testing at Pugalur HVDC Station.

32.1 Representative of CTU stated that transmission system comprising of Raigarh-Pugalur ±800kV, 6000MW HVDC system and Pugalur-North Trichur 2000 MW VSC based HVDC link and associated AC interconnecting lines are under implementation as

separate schemes as per the approval in Joint meeting of Standing committee on Power System planning of Southern region and Western region held on 20.04.15.

- 32.2 It was informed that the schemes are being implemented in different time frames and all the elements are not expected to be commissioned simultaneously. Further, the terminal equipments of Pole-I of Raigarh-Pugalur 6000 MW HVDC link is expected by April, 2019 and the testing & pre-commissioning activities of various equipments including HVDC systems will be commenced from Sep/Oct, 2018 which requires a reliable, stable and quality auxiliary power supply.
- 32.3 The auxiliary supply was proposed to be availed through one of 200MVA, 400/110/33 kV, ICT along with 400kV GIS bays and corresponding MV and LV which are expected by September 2018. But, at least one of the following 400kV evacuation lines from Pugalur HVDC would be required for charging the above transformer and GIS bays.
- i) Pugalur HVDC Station – Pugalur (Karur) 400kV D/C line (58km) (with Quad Moose ACSR conductor)
 - ii) Pugalur HVDC Station – Arasur 400kV D/C line (60km) (with Quad Moose ACSR conductor)
 - iii) Pugalur HVDC Station – Thiruvalem 400kV D/C line (with Quad Moose ACSR conductor)
 - iv) Pugalur HVDC Station – Edayarpalayam 400kV D/C line (57km) (with Quad Moose ACSR conductor)
- 32.4 POWERGRID informed that due to severe RoW issues, the above transmission lines may not be commissioned by Sept 18. Therefore, a contingency plan was required for providing stable and quality auxiliary power supply.
- 32.5 CTU stated that Pugalur HVDC – Arasur 400kV D/C line will be crossing the existing Udumalpet – Salem 400kV S/C line at a distance of ~3.6KM from Pugalur HVDC station. It was proposed that the Pugalur HVDC – Arasur 400kV D/C line can be constructed upto the crossing point and make LILO of Udumalpet – Salem 400kV S/C line at Pugalur HVDC Station. After commissioning of one of the D/C line, LILO of Udumalpet – Salem 400kV line will be bypassed and LILO section will be utilised for implementation of Pugalur HVDC Station – Arasur 400kV D/C line.
- 32.6 Member Secretary, SRPC stated that MoP has not yet issued allocation order for auxiliary consumption of Pugalur HVDC Station. POWERGRID was advised to get the allocation order issued before drawing power from the grid.
- 32.7 Representative of POSOCO stated that there was about 300MW flow on each circuit of Udumalpet – Salem 400kV line, therefore, this LILO cannot be used for evacuation of HVDC power. In such a case with the commissioning of stage wise transmission capacity of the HVDC poles, sufficient 400 kV evacuation lines should be available.
- 32.8 After deliberations, LILO of Udumalpet – Salem 400kV line at Pugalur HVDC Station utilising section of Pugalur – Arasur 400kV D/C line was agreed as an interim

arrangement only for reliable, stable and quality auxiliary power supply to Pugalur HVDC Station. The adequate number of 400kV circuits shall be commissioned for evacuation of power from each block of Raigarh-Pugalur +/-800kV 6000 MW HVDC.

33.0 Upgradation of transmission system for evacuation of power in Southern Region

33.1 This issue was discussed with item no. 37

34.0 High voltage system studies and proposal for reactive compensation in SR

34.1 Representative of CTU informed that NLDC under its operational feedback on Transmission constraints for Quarter 1, 2 & 3 of 2017-18 has mentioned that persistent high voltage situation is being experienced 20-70% of time in the off-peak period at number of 765/400 kV substations in the Southern Regional grid and to control voltages within acceptable limits, tripping of parallel circuits of high voltage 765kV & 400kV lines were resorted to. Further despite opening of the lightly loaded lines, high voltage is observed at nos of substations for substantial period of time.

34.2 CTU informed that detailed reactive compensation studies were carried out with the present time frame and future scenario and a report of the same was circulated enclosed with the agenda. As per report, following bus reactor at the substations are required to keep the bus voltages under control under off-peak conditions.

Sl. No.	Bus Name	Voltage (in kV)	ISTS / STATE	Existing / UC BUS Reactor (MVar)	Bus Reactor proposed (MVar)
1	HOSUR	400	ISTS	63	125
2	MADHUGI	400	ISTS	63	125
3	DHARAMPURI	400	ISTS	-	125
4	HIRIYUR	400	ISTS	-	125
5	PUGALUR	400	ISTS	-	125
6	PUGALUR HVDC STN	400	ISTS	-	2x125
7	RACHAGUNNERI	400	AP	-	125
8	SURYPET	400	TEL	-	125
9	RAIDURG	400	TEL	-	2x125
10	KAMALAPURAM	400	TEL	-	125
11	NARSAPUR	400	TEL	-	125
12	MAHESHWARAM-TS	400	TEL	-	125
13	TIPPAPUR	400	TEL	-	125
14	MANIKONDA	400	TEL	-	125
15	JANAGAON	400	TEL	-	125
16	CHOUTTUPPAL	400	TEL	-	125
17	YELLAMPALLI	400	TEL	-	125
18	YERAMARUS	400	KAR	-	125
19	BELLARY PS	400	KAR	-	2x125
20	HINDPUR	400	AP	80	125
21	CNHALLI	400	KAR	-	2x125
22	JAGALUR	400	KAR	-	2x125

Sl. No.	Bus Name	Voltage (in kV)	ISTS / STATE	Existing / UC BUS Reactor (MVA)	Bus Reactor proposed (MVA)
23	WAYANAD	400	KER	-	125
24	VELALIVIDU	400	TN	-	125

- 34.3 Representative of KPTCL stated that the proposed bus reactors at Bellary PS and Jagalur were already installed. Accordingly, the same may be dropped from the above list.
- 34.4 Representative of TSTRANSCO stated that they will check the requirement of the reactors in their control area. They have requested for sharing of system study files. CTU stated that respective files of present time frame and future time frame shall be shared with them.
- 34.5 CTU further stated that the problem of high voltage in Southern region has been consistently highlighted in POSOCO operational feedback a number of times and the situation is likely to aggravate in the future. Further the installation of reactors shall require 2-3 years' time and accordingly proposal of installation of reactors may be agreed at the earliest.
- 34.6 POSOCO stated that the reactors to control the voltages are required urgently and the proposal may be agreed upon by the constituents.
- 34.7 After detailed deliberations, reactors at 6 nos. of ISTS sub-station to control high voltage were agreed. For state sub-stations, the requirement of bus reactors was agreed in principle. Further, TSTRANSCO and KPTCL stated that they will send their consent within 15 days of the meeting. Further the owner of respective substations is to assess availability of space for installation of the reactors.
- 35.0 Establishing 2x100 MVA,220/66 kV substation at Hosadurga- Revision in 220kV scheme to be included under GEC Phase 1**
- 35.1 Representative of KPTCL informed that establishment of 2x100 MVA, 220/66 kV sub-station at Hosadurga, Chitradurga District was agreed in 38th Meeting of Standing Committee of Power System Planning of Southern Region held on 28th-29th December, 2015 with 220 kV incoming line from proposed 400/220 kV CN Halli sub-station. The scheme was included under Green corridor transmission Phase-I projects.
- 35.2 He further informed that the land acquisition for the proposed 400/220kV Chikkanayakanahalli is still under process. The work of CN Halli – Hosadurga 220kV S D/C line will be taken up at later stage. Representative of KPTCL proposed to include Hosadurga-Benikere 220kV D/C line in the package.
- 35.3 Members were of the opinion that the proposals of KPTCL for inclusion of Hosadurga-Benikere 220kV D/C line in the package is considered as a financial restructuring and decision in this regard be taken by KPTCL. It does not come under purview of standing committee on power system planning.
- 36.0 Transmission System proposed for extending the Power supply to CRDA area**

- 36.1 Representative of APTRANSCO informed that CRDA scheme includes a 400 kV ring in and around capital city and proposed 400 kV substations at Thullur/Inavolu, Gudiwada and Chilakaluripet along with associated 3 Nos. 220 kV Substations & 8 Nos. 132 kV Substations and lines in a phased manner. This scheme was discussed and approved in the 39th Standing Committee Meeting held on 28th & 29th December 2015.
- 36.2 Further, it was informed that APCRDA estimated the power demand to the tune of 2718.619 MW by 2050. System studies have been carried out keeping the Transmission requirement works for the year 2020-21. APTRANSCO proposed following system for extending the Power supply to CRDA area

Zone - 1

- i. Erection of 400/220 kV Borupalem SS with 3 x 500 MVA ICTs.
- ii. Making LILO 400 kV TMSC line of Eluru – Sattenapalli & 400 kV TMSC line of Sattenapalli – Nunna line to proposed 400/220 kV Borupalem SS.
- iii. Erection of 220/33 kV Sakhamuru SS with 3 x 80 MVA PTRs.
- iv. Erection of 220 kV XLPE DC line from proposed 400/220 kV Borupalem SS to proposed 220/33 kV Sakhamuru SS.
- v. Erection of 220/33 kV Nekkallu SS with 3 x 80 MVA PTRs.
- vi. Erection of 220 kV XLPE DC line from proposed 400/220 kV Borupalem SS to proposed 220/33 kV Nekkallu SS.
- vii. Erection of 220/33 kV Ananthavaram SS with 3 x 80 MVA PTRs.
- viii. Erection of 220 kV XLPE DC line from proposed 400/220 kV Borupalem SS to proposed 220/33 kV Ananthavaram SS.
- ix. Erection of 220/33 kV Thulluru SS with 3 x 80 MVA PTRs.
- x. Erection of 220 kV XLPE DC line from proposed 400/220 kV Borupalem SS to proposed 220/33 kV Thulluru SS.
- xi. Erection of 220/33 kV Abbarajupalem SS with 3 x 80 MVA PTRs.
- xii. Erection of 220 kV XLPE DC line from proposed 400/220 kV Borupalem SS to proposed 220/33 kV Abbarajupalem SS.
- xiii. Erection of 220/33 kV Rayapudi AGC-1 SS with 3 x 80 MVA PTRs.
- xiv. Erection of 220 kV XLPE DC line from proposed 400/220 kV Borupalem SS to proposed 220/33 kV Rayapudi AGC-1SS.
- xv. Erection of 220/33 kV Nelapadu AGC-1 SS with 3 x 80 MVA PTRs.

- xvi. Erection of 220 kV XLPE DC line from proposed 400/220 kV Borupalem SS to proposed 220/33 kV Nelapadu AGC-1 SS.

Zone -2

- xvii. Erection of 400/220 kV Tallayapalem SS with 3 x 500 MVA ICTs.
- xviii. Making LILO 400 kV HTLS DC line of VTS-IV – Sattenapalli to proposed 400/220 kV Tallayapalem SS.
- xix. Erection of 220/33 kV Lingayapalem SS with 3 x 80 MVA PTRs.
- xx. Making 220 kV LILO of existing 220 kV SC VTS – Narasaraopet & 220 kV SC VTS – Podili to proposed 220/33 kV Lingayapalem SS.
- xxi. Erection of 220/33 kV Uddandrayunipalem SS with 3 x 80 MVA PTRs.
- xxii. Erection of 220 kV XLPE DC line from proposed 220 kV Lingayapalem SS to proposed 220/33 kV Uddandrayunipalem SS.
- xxiii. Erection of 220/33 kV Tallayapalem SS with 3 x 80 MVA PTRs.
- xxiv. Erection of 220 kV XLPE DC line from proposed 400/220 kV Tallayapalem SS to proposed 220/33 kV Tallayapalem SS.
- xxv. Erection of 220/33 kV Velagapudi SS with 3 x 80 MVA PTRs.
- xxvi. Erection of 220 kV XLPE DC line from proposed 400/220 kV Tallayapalem SS to proposed 220/33 kV Velagapudi SS.
- xxvii. Erection of 220/33 kV Malkapuram SS with 3 x 80 MVA PTRs.
- xxviii. Erection of 220 kV XLPE DC line from proposed 400/220 kV Tallayapalem SS to proposed 220/33 kV Malkapuram SS.
- xxix. Erection of 220/33 kV Krishnayapalem SS with 3 x 80 MVA PTRs.
- xxx. Erection of 220 kV XLPE DC line from proposed 400/220 kV Tallayapalem SS to proposed 220/33 kV Krishnayapalem SS.
- xxxi. Erection of 220/33 kV Venkatapalem SS with 3 x 80 MVA PTRs.
- xxxii. Erection of 220 kV XLPE DC line from proposed 400/220 kV Tallayapalem SS to proposed 220/33 kV Venkatapalem SS.

Zone-3

- xxxiii. Erection of 400/220 kV Nidamaru SS with 3 x 500 MVA ICTs.

- xxxiv. Making LILO one circuit of 400 kV QMDC line of Gudivada – Chilakaluripet to proposed 400/220 kV Nidamaru SS.
- xxxv. Erection of 220/33 kV Nidamaru SS with 3 x 80 MVA PTRs.
- xxxvi. Erection of 220 kV XLPE DC line from proposed 400/220 kV Nidamaru SS to proposed 220/33 kV Nidamaru SS.
- xxxvii. Erection of 220/33 kV Bethapudi SS with 3 x 80 MVA PTRs.
- xxxviii. Erection of 220 kV XLPE DC line from proposed 400/220 kV Nidamaru SS to proposed 220/33 kV Bethapudi SS.
- xxxix. Erection of 220/33 kV Yerrabalem SS with 3 x 80 MVA PTRs.
 - xl. Erection of 220 kV XLPE DC line from proposed 400/220 kV Nidamaru SS to proposed 220/33 kV Yerrabalem SS.
 - xli. Erection of 220/33 kV Kuragallu SS with 3 x 80 MVA PTRs.
 - xlii. Erection of 220 kV XLPE DC line from proposed 400/220 kV Nidamaru SS to proposed 220/33 kV Kuragallu SS.
 - xlili. Erection of 220/33 kV Inavolu SS with 3 x 80 MVA PTRs.
 - xliv. Erection of 220 kV XLPE DC line from proposed 400/220 kV Nidamaru SS to proposed 220/33 kV Inavolu SS.
 - xlv. Erection of 220 kV XLPE DC line from proposed 220 kV Malkapuram SS to proposed 220/33 kV Sakhamuru SS.
 - xlvi. Erection of 220 kV XLPE DC line from proposed 220 kV Malkapuram SS to proposed 220/33 kV Inavolu SS.
 - xlvii. Erection of 220 kV XLPE DC line from proposed 220 kV Malkapuram SS to proposed 220/33 kV Krishnayapalem SS.
- 36.3 It was opined that the transmission elements required by 2021-22 may be deliberated.
- 36.4 After deliberations members agreed for the following transmission elements in 2021-22-time frame:
 - i) Erection of 400/220 kV Tallaypalem S/S with 3x500 MVA ICT
 - ii) LILO of both circuit of VTS-IV-Sattenapalli 400kV D/C line at proposed Tallaypalem S/S
 - iii) Erection of Lingayapalem 220/33kV S/S with 3x80 MVA ICT
 - iv) LILO of existing VTS- Narasaraopet S/C 220kV line at Lingayapalem
 - v) LILO of existing VTS- Podili S/C 220kV line at Lingayapalem
 - vi) Erection of Nelapadu 220/33kV S/S with 3x80 MVA ICT
 - vii) Tallaypalem-Nelapadu 220kV XLPE cable D/C line
- 36.5 It was further agreed that other transmission schemes envisaged beyond 2021-22 may be deliberated in subsequent standing committee meetings.

37.0 Evacuation of power from Renewable Energy sources in Southern Region

- 37.1 Representative of CTU stated that the transmission system comprising of establishment of 2x500 MVA, 400/230kV GIS Pooling Station at Tuticorin-II (Tirunelveli PS) along with its interconnection with Tuticorin Pooling Station through 2 nos. of 400kV D/c (quad) lines was envisaged to facilitate interconnection of wind generation in Tirunelveli/Tutiroin area with rest of the Grid. The transmission scheme is under advanced stage of commissioning as part of “Green Energy corridor”.
- 37.2 It was further informed that CTU had received 28 applications for Connectivity (7934MW) & 8 applications for LTA (1250MW) at the Tuticorin-II GIS (Tirunelveli PS). Out of 28 applications, 11 applicants have been granted connectivity (3530MW). Further, among the 11 applicants, LTA has been granted to 4 applicants (total 300MW) and proposed to grant LTA to remaining 7 applicants. Thereafter, total quantum of LTA at Tuticorin-II GIS (Tirunelveli PS) will be 965MW.
- 37.3 The LTA application at the Tuticorin-II GIS (Tirunelveli PS) includes the PPA for 750 MW signed by the wind developers under competitive bidding conducted by SECI under Tranche-I, II & III. In addition, under recent bid held by SECI for 2000 MW under Tranche-IV, additional 200 MW envisaged in Tirunelveli Area. Details are as below:

Sl. No.	Application	SECI tranche	Bid won for	LTA quantum applied/granted	Status of LTA
1.	Mytrah Energy (India) Pvt. Ltd.	I	250	300	LTA granted for 75 MW, 225 MW proposed to be granted
2.	Green Infra Renewable Pvt. Ltd.	I	250	250	LTA applied
3.	Orange Sironj Wind Power Pvt. Ltd. (Kurukkusalai Wind Farm)	II	200	200	Proposed for grant of LTA
4.	Betam Wind Energy Pvt. Ltd.	III	50		LTA not yet applied
5.	Betam Wind Energy Pvt. Ltd.	IV	200		LTA not yet applied
	Total		950	750	

- 37.4 CTU further informed that SECI/MNRE had indicated wind potential of about 2500 MW in Tirunelveli area. In view of above, following transmission scheme was proposed for implementation in phased manner:

37.4.1 Phase-I (immediate requirement): With the existing/under-construction transmission system for evacuation of power from Tirunelveli area including 558 MW LTA of CEPL and Tuticorin JV (2x500 MW), it has been observed that wind power of 950 MW (LTA uantum) can be evacuated from Tuticorin-

II GIS (Tirunelveli PS). However, 2x500MVA ICTs which are under implementation at Tuticorin-II GIS (Tirunelveli PS); 'N-1' contingency criteria would not be fulfilled and require additional ICT of 500MVA. Accordingly, augmentation of 1x500 MVA transformer (3rd) at Tuticorin-II GIS (Tirunelveli PS) was proposed for evacuation of 950 MW generation at Tuticorin-II GIS (Tirunelveli PS).

- 37.4.2 Phase-II (future requirement): Considering the wind potential of 2500MW by SECI/MNRE in Tirunelveli area, it was observed that evacuation from present scheme (considering 765kV lines charged at 400kV level) will not be sufficient. Accordingly, it was proposed that transmission corridor of Tuticorin PS – Salem (Dharmapuri) – Vasanthansapur (Madhugiri) which is presently charged at 400 kV to be upgraded to its rated voltage of 765kV. Further, for fulfilling 'N-1' contingency criteria augmentation of transformation capacity with additional 3x500 MVA, 400/230kV ICTs at Tuticorin-II GIS (Tirunelveli PS) will be required.
- 37.5 Representative of TANGEDCO stated that a number of projects based on RE are coming up in the state seeking connectivity at ISTS and are not having firm beneficiaries. In such cases, the burden of state with respect to sharing of transmission charges as per the existing POC mechanism shall be aggravated. Further a number of generation projects are relinquishing their LTA for which corridors were planned and in such cases also the sharing of transmission charges are being passed on to the beneficiaries for which various representation have been made by TANGEDCO in CERC/APTEL. Further the cost implications on account of failure of RE generators to identify firm beneficiaries needs to be deliberated.
- 37.6 It was clarified that issues raised by TANGEDCO are pertaining to regulatory framework and are commercial in nature and these issues are not in the purview of this forum.
- 37.7 TANTRANSCO further raised their concerns regarding utilization of transmission system already planned for evacuation of power from IPPS in Tamil Nadu area and informed that the optimal utilization of the Tuticorin PS - Salem (Dharmapuri)-Vasanthansapur (Madhugiri) corridor may be seen without upgrading to 765kV. Further the feasibility of connecting the RE generators to the STU network so as to disperse at local loads instead of transferring to target regions as per displacement method may be examined.
- 37.8 Since a large potential of RE is envisaged in the States of Andhra Pradesh, Karnataka and Tamil Nadu and considering ISTS and States proposals for integration of RE into the Southern Grid, Member (PS), CEA suggested that a comprehensive study should be carried out for accessing the transmission system requirement for Southern region as a whole.
- 37.9 After detailed deliberations the following proposals were agreed:

- i. Augmentation of 1x500 MVA transformer (3rd) at Tuticorin-II GIS (Tirunelveli PS) for evacuation of 1000 MW generation at Tuticorin-II GIS (Tirunelveli PS) under ISTS
- ii. Joint study meeting with the Southern Region constituents to discuss the requirement of additional transmission system for evacuation of Renewable generation in SR.

38.0 Transmission scheme for Wind Energy Zones (WEZs) in Southern Region

- 38.1 Representative of POWERGRID stated that Govt of India has set an ambitious target for 175GW renewable capacity by 2022, out of which 60 GW is envisaged to be set up through wind power projects. In view of the wind capacity expansion plan as well as connectivity applications received in ISTS for wind capacity & SECI bids, it is expected that wind capacity may cross the milestone of 60 GW in next 3-4 years. SECI has already bid 6050 MW ISTS connected wind bids (awarded-4050 MW) and planning to bid 10,000 MW in FY18-19. Therefore, there is a requirement of development of ISTS infrastructure in wind rich pockets.
- 38.2 POWERGRID added that to identify actual developable wind potential by 2022, several round of discussions were held with MNRE & other stakeholders. Further, wind energy zones along with projected capacity in each WEZ were identified, which may come up by 2022 in wind resource rich states were prioritized.
- 38.3 Accordingly, five WEZs viz. Koppal (2500 MW) in Karnataka, Kurnool (3000 MW) in Andhra Pradesh, Karur (2500 MW) in Tamil Nadu, Dwarka (2000 MW) in Gujarat and Osmanabad (2000 MW) in Maharashtra were identified for which ISTS substation/infrastructure was decided to be developed/made available.
- 38.4 Based on the land availability, wind power density, applications received by CTU and inputs from SNA/STU following transmission system was proposed by CTU :
- 38.4.1 WEZ in Andhra Pradesh (Kurnool : 3000MW)
- (a) Establishment of 765/400/220kV 3x1500 MVA, 7x500 MVA Pooling station at suitable location in Kurnool Distt (e.g. near Adoni)
 - (b) Pooling station (near Adoni PS/suitable location in Kurnool distt.) - Kurnool(new) 765 kV D/c Lin
 - (c) 220kV line bays for interconnection of wind projects (10 nos)
 - (d) 1x240 MVA (765kV) & 1x125MVA (400kV) bus reactor at Pooling station in Kurnool Distt.
- 38.4.2 Proposed transmission scheme for WEZ in Karnataka (Koppal : 2500MW)
- i) Establishment of 6x500 MVA pooling Substation near Munirabad /suitable location in Koppal distt.

- ii) Pooling station (near Munirabad /suitable location in Koppal distt.) - Munirabad 400 kV D/c (Quad) Line
- iii) Pooling station (near Munirabad /suitable location in Koppal distt.) - Narendra (New) 400 kV D/C (Quad) Line
- iv) 220kV line bays for interconnection of wind projects (9 nos)
- v) 2x125 MVA bus reactor at Pooling station (near Munirabad /suitable location in Koppal distt.)

38.4.3 Proposed transmission scheme for Tamil Nadu (Karur : 2500MW)

Alternative-1:

- (i) Establishment of 6x500 MVA, 400/230 kV Karur Pooling Station
- (ii) LILO of both circuits of Pugalur - Pugalur(HVDC) 400 kV D/c (Quad) line at Karur PS
- (iii) 220kV line bays for interconnection of wind projects (9 nos)
- (iv) 2x125 MVA Bus reactor at Karur PS

Alternative-2:

- i) Establishment of 6x500 MVA, 400/230 kV Karur Pooling Station
- ii) LILO of both circuits of Arasur - Pugalur(HVDC) 400 kV D/c (Quad) line at Karur PS
- iii) 220kV line bays for interconnection of wind projects (9 nos)
- iv) 2x125 MVA Bus reactor at Karur PS

38.5 After deliberations, it was decided that a separate meeting will be called for joint studies by CEA, CTU and STUs of southern region states for finalisation of transmission scheme including for WEZs in southern region. The findings of the joint study will be presented in next standing committee meeting.

39.0 Status of Implementation of downstream network by State utilities associated with ISTS substation of POWERGRID

39.1 Representative of POWERGRID informed that augmentation of transformation capacity in various existing substations as well as addition of new substations along with line bays for downstream network are implemented/being implemented at various locations in Southern Region. However, downstream 220kV/230kV system is being implemented by respective STUs. For utilization of these transformation capacities, implementation of downstream 220kV system needs to be commissioned in matching time frame.

39.2 The downstream system as informed by respective states is as follows:

Sl. No.	Name of Substation	MVA Capacity	220kV Bays	Expected Schedule of Substation	Remarks	Deliberations in 42 nd SCSPSR
1.	Tumkur (Vasantnarsapur)	2×500 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 220kV downstream links i.e. Tumkur-Anthranasahalli 220kV D/C line & Tumkur-Madhugiri-II 220kV D/C line expected by Sep'18. Balance 2 Nos 220 kV downstream links yet to be taken up
2.	Yelahanka	2×500 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 220kV downstream T/L cable to Yelahanka DG plant expected by Jun'18. Balance 4 Nos 220kV downstream links yet to be planned
3.	Bidadi	2×500 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 220kV downstream links i.e Bidadi – Magadi 220kV D/C line expected by Mar'19. 2 Nos 220kV downstream Link Bidadi-Kumbalgodu expected by Mar'20.
4.	Hiriyur	2×315 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 220kV downstream links i.e. Hiriyur-Hiriyur(KPTCL) 220kV S/C line & for Hiriyur-Chitradurga 220kV S/C line expected by Mar'19.
5.	Hassan	2×315 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 220kV downstream T/L i.e. LILO of Hassan(KPTCL) – Nittur S/c expected by Mar'19.
6.	Kolar	2×500 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 220kV downstream links Kolar-Gollahalli 220kV D/C line expected by Mar'19.
7.	Karaikudi	2×315 MVA	4	Commissioned	Construction of downstream T/L for 1 Nos 230 kV bay to be expedited by TANTRANSCO	<ul style="list-style-type: none"> 1 Nos 230kV downstream T/L Karaikudi -Sembatty 220kV S/c line expected by May'18.

8.	Hosur	3×315 MVA	6	Commissioned	Construction of downstream T/L for 2 Nos 230 kV bays to be expedited by TANTRANSCO .	• 2 Nos 230kV downstream T/L Hosur -Shoolagiri 220kV D/C line expected by Jul'18.
9.	Kozhikode	2×315 + 1×500 MVA	4	Commissioned	Construction of downstream T/L for 1 Nos 220 kV bay to be expedited by KSEB.	• 1 Nos 220kV downstream T/L to Kozhikode(KSEB) expected by Mar'19.

39.3 Members noted the same.

40.0 1x330 MVAR bus reactor at Srikakulam and 2x240 MVAR switchable line reactors each at Srikakulam and Angul for Angul - Srikakulam 765kV D/c line

40.1 Representative of POWERGRID informed that the transmission system comprising of Angul-Srikakulam 765 kV D/c lines was agreed in 30th Standing Committee meeting of SR held on 13.04.2010 and 12th Standing Committee meeting of ER held on 28.12.2010.

40.2 POWERGRID further informed that as per the earlier practice only main elements of transmission scheme lines and substation were discussed and agreed in the Standing committee meetings. Generally, the reactive compensation was finalized by POWERGRID at the DPR stage when correct line lengths become available. Accordingly, keeping in view the line length and voltage profile, 1x330 MVAR bus reactor at Srikakulam and 2x240 MVAR switchable line reactors at Srikakulam and Angul end for both circuits of Angul-Srikakulam 765 kV D/c line was incorporated in the DPR. CERC in various petitions has directed that proposal of line reactors need to be approved in Standing Committee and RPC. Accordingly, it was proposed that constituent's approval for these reactors may be accorded.

40.3 Members agreed for the same.

Annex-I

List of participants in the 42nd meeting of Standing Committee on Power System Planning of Southern Region held on 27th April, 2017 at Hyderabad

Sl. No.	Name	Designation
Central Electricity Authority		
1.	P.S. Mhaske	Member (PS) - In chair
2.	S K Ray Mohapatra	CE(PSPA-II)
3.	B.S. Bairwa	Director (PSPA-II)
4.	Kanchan Chauhan	Assistant Director
SRPC		
1.	S R Bhatt	Member Secretary
2.	Anil Thomas	Executive Engineer
POSO, NLDC		
1.	N. Nallarasana,	DGM
POWERGRID		
1.	Subir Sen	COO(CTU-Planning)
2.	Mukesh Khanna	GM (CTU-Plg.), PGCIL
3.	P. Jayachandran	GM(RPT-P) POWERGRID
4.	C A Mathew	AGM
5.	Anil Kr Meena	CM(CTU-Plg.)
6.	Kashish Bhambani	CM(SG) PGCIL
7.	M. Dhayalan	CM/POWERGRID
8.	Venkatesh Gorli	Sr. Engr(CTU-Plg) ,POWERGRID
9.	Ankush Patel	Sr. Engr(GM)
POSO/SRLDC		
1.	G. Anubhasan	GM/HoR
2	Abraham Varghese	DGM
3	Madhukar G	Manager
NLC India Ltd		
1	J Dhamasekasan	DGM/Comm
2.	D.S. Ramakrishnan	ADGM

Sl. No.	Name	Designation
APTRANSCO		
1.	S. Subramanyam	Director (Proj.)
2	Y Adam	Dir
3.	G Rajababu	CE, PS
4	Y.V. Ramakrishna	ADE, SS
5	K Ramesh	ADE/PS
KSEB		
1.	Vijya Kumari P.	Director (Trans)
2	N.N.Shaji	Chief Engineer
3.	Anand S.R.	Dy CE(Grid)/KSEBL
4.	Bijju SS	AEE,PSE
TSTRANSCO		
1.	N. Bhaskar	CE/SLDC/TSTRANSCO
2.	M. Sheshagiri	DE/SSII/ TSTRANSCO
TANTRANSCO/TANGEDCO		
1.	T. Senthilvelan	Director (Trans.)
2.	M. A. Helen,	Director, Projects
3	R.S Usha	CE,Planning
4	C Veeramani	CR/reg
5	D. Ravichandran	SE, System studies
6	M. Sudarsan	EE, System studies
7	R.Kathiravan	AEE
8	G. Ramesh Kumar	AEE, System Studies
KPTCL		
1.	A P Shiva Kumar	Director(Trans.)/KPTLC
2.	Dilip Kumar	CEE(P&C)/KPTCL
3	D Chethan	EE,PSS/KPTCK
4.	Divya Prabha H	AEE/PSS/KPTCL