

Central Electricity Authority
Power System Planning & Appraisal-II Division
Sewa Bhawan, R.K. Puram, New Delhi – 110066

No. 51/4/(40th)/PSPA-II-2017/ -42-103

Date: 16-FEB -2017

Sub: 40th meeting of the Standing Committee on Power System Planning of Southern Region - **Minutes of the meeting**


Sir,

The **40th meeting** of the Standing Committee on Power System Planning of Southern Region was held on 19th November, 2016 (Saturday) at Hyderabad.

The Minutes of the meeting are enclosed.

The Minutes are available at CEA's website (www.cea.nic.in).

Yours faithfully,


16/02/2017

(प्रदीप जिंदल /Pardeep Jindal)
Chief Engineer(PSPA-II Division)

To

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

**Central Electricity Authority
Power System Planning & Appraisal-II Division
Sewa Bhawan, R.K. Puram, New Delhi – 110066**

No. 51/4/(40th)/PSPA-II-2017/

Date: 16-FEB -2017

Sub: 40th meeting of the Standing Committee on Power System Planning of Southern Region - **Minutes of the meeting**

Sir,

The **40th meeting** of the Standing Committee on Power System Planning of Southern Region was held on 19th November, 2016 (Saturday) at Hyderabad.

The Minutes of the meeting are enclosed.

The Minutes are available at CEA's website (www.cea.nic.in).

Yours faithfully,

(प्रदीप जिंदल /Pardeep Jindal)
Chief Engineer(PSPA-II Division)

To

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 (Grid Transmission 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 Ltd, Vidyuthi Bhawanam, Pattom, P.B. No. 1028, Thiruvananthapuram - 695 004. FAX : 0471-2444738	8. Member (Distribution), Tamil Nadu electricity Board (TNEB), 6th 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.	The Director (Projects), Power Grid Corp. of India Ltd. “Saudamini”, Plot No.2, Sector-29, Gurgaon 122 001, Haryana. FAX : 95124-2571932
2.	GM, SRLDC, 29, Race Course Cross Road, Bangalore 560 009 FAX – 080-22268725

MINUTES OF MEETING

Minutes of 40th Meeting of the Standing Committee on Power System Planning in Southern Region (SCPSPSR) held on 19th November, 2016 (Saturday) at Hyderabad

1. Introduction

- 1.1 Member(PS), CEA welcomed the participants and requested the committee members to have positive deliberations so that consensus could be reached on issues. He asked Chief Engineer (PSPA-II) to initiate the discussions on the agenda points.
- 1.2 List of participants is given at **Annex-I**.
- 1.3 **These Minutes may be read along with the Agenda circulated for this meeting.**

2.0 Confirmation of the minutes of 38th meeting of the Standing Committee

- 2.1 Dy Director(PSPA-II) CEA stated that minutes of the 39th meeting of the Standing Committee on Power System Planning of Southern Region were issued vide CEA's letter No. 51/4/(39th)/PSPA-II 2016/ 115-128 dated 18th, February 2016.

Based on observations of TSTRANSCO, the corrigendum was issued vide CEA's letter no 51/4/(40th)/PSPA-2-2016/473-487 dated 4-7-2016.

- 2.2 Director(KSEBL) enquired about the corrections in the minutes of the 39th SCPSPSR which they have requested vide their letter dated 2.11.2016. Chief Engineer(PSPA-II) said that comments on the last meeting should be given within six months, for inclusion in corrigendum. As the meeting of 39th SCPSPSR was held on 28-29th December, 2015 and the comments on the minutes from KSEBL, were received almost after a year, therefore, KSEBL comments were not included.
- 2.3 Accordingly, the minutes of 39th Standing Committee of Power System Planning of Southern Region along with the Corrigendum, as circulated were confirmed.

Issues discussed in previous meetings of SCPSPSR

3.0 Transformer augmentation

- 3.1 Dy Director(PSPA-II) CEA stated that during the 39th meeting of SCPSPSR, Director(Projects), KPTCL informed that there is need to augment transformers at Yelahanka instead of Muniranbad as was suggested in the 38th meeting of SCPSPSR.

3.2 CTU informed that presently 2x500MVA 400/220kV ICT is available at Yelahanka S/s. As there is uncertainty in commissioning of substation, due to severe RoW issues it was proposed to take up the augmentation once the station is commissioned based on the load demand. CTU further stated that as per available information 3 nos 220kV circuits have been planned from Yelankha, a 220kV D/c to Yelahanka s/s of KPTCL and 220kV S/c to Bial and as such 2x500 MVA ICTs should be adequate to meet the load demand. CTU suggested that the requirement of 3rd ICT may be reviewed after commissioning of the substation based on the load demand. Regarding 3rd ICT at Munirabad, CTU stated that as per KPTCL, the 3rd ICT at Munirabad is not required and hence the same may be reviewed based on the load growth in future.

3.3 After further discussions, it was decided that the augmentation at Yelahanka would be taken up after the request from KPTCL and load growth in future.

4.0 Reconductoring of 400kV transmission lines from Maheshwaram and Dichipally 765/400kV S/S of PGCIL

4.1 Dy Director(PSPA-II) CEA stated that during 39th meeting of SCPSPSR (para 12.3 of MoM) , 400kV Maheshwaram 765kV PGCIL SS- Maheshwaram 400kV TS SS were agreed to be reconducted. However, with regard to Nizamabad(Dichipally) 765kV PGCIL SS- Dichipally 400kV TSTRANSCO, it was stated that the line is already under implementation and prima facie modifications are not possible at this stage. However, PGCIL stated to revert on this issue.

4.2 AGM(CTU-P1g), POWERGRID informed that the re-conductoring on the said line will be done using HTLS conductor.

4.3 Members noted the same.

5.0 Transmission system for evacuation of power from 4000 MW power plant at Pudimadaka and 4000 MW power plant of APGENCO at Polaki

5.1 Dy Director(PSPA-II) CEA stated that during the last meeting, it was decided that the system for 4000 MW Pudimadaka would be decided after APTRANSCO confirm that whether this would be an ISTS project or State project and accordingly, the studies would be revised. And if APTRANSCO wanted it to be an ISTS, then NTPC would need to apply to CTU for connectivity and LTA under CERC regulations. Subsequently, APTRANSCO vide letter no CE(IPC&PS) /SE(PS) /DE(SS<SS) /ADE-2/F.Pudimadaka/D.No.15/2016 dated 25.01.2016 informed that the execution of

Pudimadaka 4000 MW NTPC Power Plant evacuation scheme may be entrusted to ISTS. Thus it was minuted that NTPC should now apply for LTA to CTU.

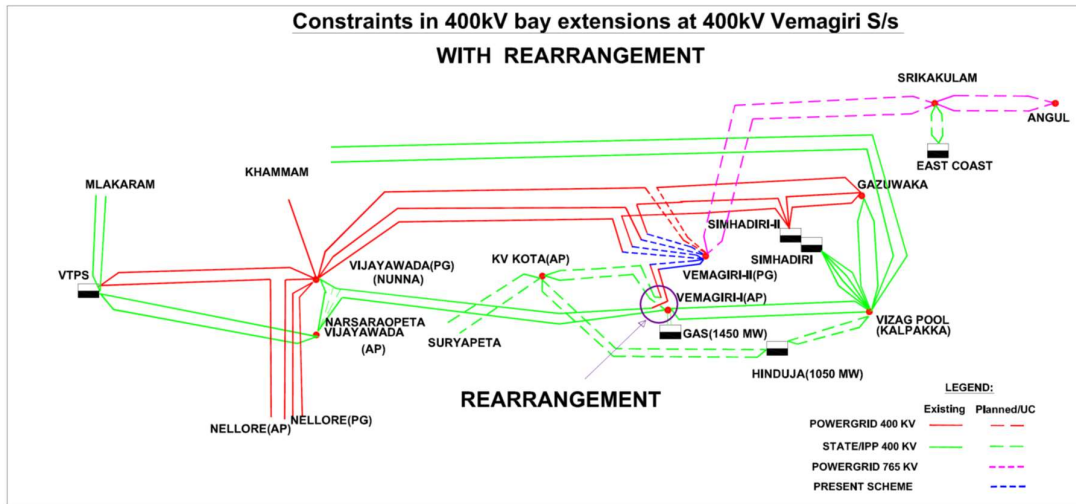
- 5.2 CTU informed that till date no Connectivity/LTA application for Pudimadaka power plant has been received from NTPC. DGM, NTPC replied that coal allocation is an issue at Pudimadaka so they have not applied to CTU. He said that Pudimadaka is not likely to come up by 13th plan.
- 5.3 Chief Engineer (PSPA-II), CEA inquired about status of the Polaki project, to which APTRANSCO replied that they have no information regarding Polaki, at present.
- 5.4 After further discussions, both the projects were dropped from planning for the time being.

6.0 Cuddapah 765/400kV substation under System Strengthening –XXIV in Southern Region

- 6.1 Dy Director(PSPA-II) CEA said that during the 39th meeting of SCPSPSR, it was discussed that PGCIL would carry out studies to ascertain requirement of series reactor at Cuddapah or/and at other S/S in SR.
- 6.2 CTU informed that earlier, fault level at Cuddapah with the planned system was coming to about 47kA and hence series reactor was envisaged. However, with the dropping of Cuddapah – Hoody 400kV Quad D/c line during 39th SCM, the short circuit level of Cuddapah shall be about 40kA. Accordingly, series reactor at Cuddapah,if required would be planned at a later date. The same was agreed.

7.0 Temporary Rearrangement of 400 kV Vemagiri-I(AP)-Vemagiri-II(PG) D/C transmission line till the commissioning of “Strengthening of transmission system beyond Vemagiri” Scheme

- 7.1 POWERGRID informed that during the last SCPSPSR, it was observed that in the absence of the scheme - “Strengthening of transmission system beyond Vemagiri” and with generation at East Coast, 400 kV Vemagiri-I(AP)-Vemagiri-II(PG) D/C line will be ‘Limiting Constraint’ and Total Transfer Capacity(TTC) for import of power to Southern Region gets adversely affected.
- 7.2 In order to relieve overloading of Vemagiri-I(AP)-Vemagiri-II(PG), different options were studied. It was proposed that one circuit of Vemagiri(PG)-Vemagiri(AP) may be connected with KV Kota and other circuit may be connected to Vijayawada (PG). The issue was also discussed in the Joint Meeting of Southern Region held in Bangalore during 14-17 March, 2016.



7.3 CTU further informed that the issue was also discussed in the 30th SRPC meeting held on 27.08.2016 and it was agreed that a joint Meeting between AP and PGCIL would be held Hyderabad to discuss this proposed rearrangement. Accordingly, CTU had visited APTRANSCO office at Hyderabad on 14th October, 2016 and joint studies were carried out and load flow data files were shared with APTRANSCO.

“Removal of Constraints in 400kV bay extensions at Vemagiri” and Wardha – Maheshwaram 765 D/c link alongwith associated transmission system Total Transfer Capacity (TTC) to Southern Region(SR) shall be limited to 7950 MW due to over loading of Vemagiri-I(AP) – Vemagiri-II(PG). In order to relieve overloading of Vemagiri-I(AP)-Vemagiri-II(PG), temporary rearrangement was proposed i.e one circuit of Vemagiri(PG)-Vemagiri(AP) may be connected with KV Kota and other circuit may be connected to Vijayawada (PG). With this rearrangement, it is observed that TTC will increase to 11500 MW.

7.4 APTRANSCO stated that with the proposed rearrangement they would lose their transmission capacity at Vemagiri and would face problems in evacuation of power from Hinduja and Gas generation at Vemagiri under present circumstances. They also informed that they were planning evacuation system for Polavaram HEP and this rearrangement may hamper the evacuation constraints.

7.5 CTU further informed that the proposed rearrangement is an interim arrangement required for about one and half years and will be restored with the commissioning of “Strengthening of transmission system beyond Vemagiri”.

7.6 Member(PS), CEA informed that though Polavaram has been awarded National priority status, but electromechanical part by APGENCO will take another 4 years. As such the

evacuation system for Polavaram HEP which was under planning stage may not be linked with this rearrangement

- 7.7 Chief Engineer(PSPA-II), CEA clarified that the CPETA S/S will come before Polavaram and when CPETA comes this temporary arrangement will be restored. He further suggested that studies will be conducted considering the scenarios suggested by APTRASNCO (Polavaram HEP and 1500 MW gas generation).
- 7.8 After detailed deliberations it was discussed and agreed that a joint study may be carried out at SRPC and based on the outcome of joint study, decision on proposed rearrangement may be taken.

8.0 Utilization of Salem – Dharmapuri 400kV quad DC line along with Dharmapuri (Salem New) Pooling Station

- 8.1 Dy Director(PSPA-II) CEA stated that during the 39th meeting of SCPSPSR, the members requested PGCIL to complete (i) 765/400V Dharmapuri (Salem) Pooling Station, (ii) Salem- Dharmapuri 400kV quad line and iii) Dharmapuri - Somanhalli 400kV D/c line at the earliest.
- 8.2 CTU informed that the 765/400kV Dharmapuri (Salem) Pooling Station & the Salem-Dharmapuri 400kV quad line have been commissioned. Regarding, Dharmapuri - Somanhalli 400kV D/c line they informed that the same would be completed by March, 2017.

9.0 Transmission planning proposals in Karnataka

9.0 Evacuation of proposed additional 2x800 MW generation of M/s Udupi Power Corporation Ltd. (Subsidiary of Adani Power Ltd)

- 9.1 Dy Director(PSPA-II) CEA informed that KPTCL have requested for evacuation of power from additional 2x800 MW generation units of M/s UPCL. This issue was discussed in the Joint Study Meeting of Southern Region held on Bangalore during 14-17 March, 2016. During the meeting, it was suggested to consider a new 400kV substation with 400kV connectivity from Hassan in view of relieving the loading on Hassan- Mysore line.

KPTCL revised its proposal vide letter dated 28.04.2016 and has proposed the following evacuation system:

- i. Establishment of 400/220kV SS near Shivasamudram.

- ii. LILO of 400kV Neelamangla- Mysore DC line at 400/220kV SS Shivasamudram.
- iii. 400kV DC connectivity from Hassan to 400/220kV SS Shivasamudram.

9.2 Chief Engineer (PSPA-II), CEA suggested that if the power is to be absorbed by Karnataka, evacuation system for these two units may be planned under state transmission system.

9.3 Since there was no representative from KPTCL, not much discussion happened on the issue, however, KSEB suggested to conduct studies considering the impact of newly suggested Kerala schemes. The same was agreed.

10.0 10.0 Connectivity and Long term access for Tumkur (Pavagada) Ultra Mega Solar Power Park in Karnataka

10.1 PGCIL submitted that in the 39th meeting of Standing committee of southern region held on 28th-29th December 2015, following transmission scheme was agreed in two phases for evacuation of power from proposed Tumkur (Pavagada) UMSPP(2000MW).

Phase-I (1000MW)

- (i) LILO of 400kV Gooty – Tumkur (Vasantnarsapur) D/c at Tumkur (Pavagada) Pooling station
- (ii) Tumkur (Pavagada) Pooling station - Hiriyur 400 kV D/c(as part of Tumkur (Pavagada) Pooling station - Mysore line)
- (iii)LILO of 400kV Bellary Pool – Tumkur (Vasantnarsapur) D/c (Quad)(both circuits)[KPTCL line] at Tumkur (Pavagada) Pooling station*
- (iv)3x500 MVA, 400/220KV Pooling station at Tumkur(Pavagada).
- (v) 1x125MVAR bus reactor at 400/220KV Tumkur (Pavagada) Pooling station.
- (vi)220kV Bays(8 Nos) at Tumkur (Pavagada) PS for interconnection with solar project.

**KPTCL would complete Bellary pooling station – Tumkur (Vasantnarsapur) line D/c (Quad) by December- 2016*

Phase-II(1000MW)

- (i) Hiriyur – Mysore 400 kV D/c line\$
- (ii) Tumkur (Pavagada) Pooling station- Devanahally (KPTCL) 400kV D/c (Quad)^^

- (iii) Augmentation of 2x500 MVA, 400/220KV transformer at Tumkur (Pavagada) Pooling station.
- (iv) 1x125MVAR bus reactor (2nd) at Tumkur (Pavagada) Pooling Station
- (v) Third 400/220 kV, 1x500 MVA transformer at Tumkur (Vasantnarsapur)
- (vi) 1x80 MVAR switchable Line reactor at Mysore end of Hiriya- Mysore D/c for each circuit.
- (vii) 8 nos. 220kV line Bays at 400/220kV Tumkur (Pavagada) PS for Solar Interconnection

§ with the completion of this line, it would be connected with Tumkur (Pavagada) Pooling station - Hiriya 400 kV D/c line to form Tumkur(Pavagada) -Mysore D/c line.

^^ KPTCL would complete establishment of 400/220 kV substation at Devanahally including inter-linking 400 kV and 220 kV lines before Phase-II at Ultra Mega Solar Power Park.

10.2 PGCIL proposed that, the above transmission system may be implemented for the purpose of connectivity & LTA under following categories:

Transmission System for connectivity

- (i) LILO of 400kV Gooty – Tumkur (Vasantnarsapur) D/c at Tumkur (Pavagada) Pooling station.
- (ii) 2x500 MVA, 400/220KV Pooling station at Tumkur(Pavagada).
- (iii) 220kV Bays(8 Nos) at Tumkur (Pavagada) PS for interconnection with solar project.

Transmission System for LTA

Phase-I (1000MW)

- (i) Tumkur (Pavagada) Pooling station - Hiriya 400 kV D/c(as part of Tumkur (Pavagada) Pooling station - Mysore line)
- (ii) LILO of 400kV Bellary Pool – Tumkur (Vasantnarsapur) D/c (Quad)(both circuits)[KPTCL line] at Tumkur (Pavagada) Pooling station.
- (iii) Augmentation of 1x500 MVA, 400/220KV Pooling station at Tumkur(Pavagada) Pooling station.

(iv) 1x125MVAR bus reactor at 400/220KV Tumkur (Pavagada) Pooling station.

Phase-II(1000MW)

(i) Hiriyur – Mysore 400 kV D/c line.

(ii) Tumkur (Pavagada) Pooling station- Devanahally (KPTCL) 400kV D/c (Quad)

(iii) Augmentation of 2x500 MVA, 400/220KV transformer at Tumkur (Pavagada) Pooling station

(iv) 1x125MVAR bus reactor (2nd) at Tumkur (Pavagada) Pooling Station

(v) Third 400/220 kV, 1x500 MVA transformer at Tumkur (Vasantnarsapur)

(vi) 1x80 MVAR switchable Line reactor at Mysore end of Hiriyur- Mysore D/c for each circuit.

10.3 Chief Engineer(PSPA-II), CEA stated that in the above proposal of PGCIL, there are following minor changes in the scope w.r.t the earlier agreed system:

- a) Number of 220kV bays have been reduced to 8 from 16.
- b) Item no (i) and (vi) has been taken out of Phase-I and included under system for Connectivity.
- c) Two no of ICTs from Phase-I has been taken to connectivity.

COO (CTU-Plg & SG) informed that transmission scheme for Tumkur UMSPP (2000MW) is under various stages of implementation by POWERGRID. However, M/s KSPDCL subsequently requested for provision of only 8 nos. of 220kV line bays at 400/220kV Tumkur (Pavagada) PS for terminating 8 nos. of 220kV transmission lines from their 220/66kV substations instead of earlier agreed 16 nos. bays.

It was discussed that since transmission planning criteria stipulates that N-1 criteria may not be applied to the immediate connectivity of wind/solar farms, above revisions for reduction of numbers of 220kV bays to 8 nos at 400/220kV Tumkur (Pavagada) PS may be agreed.

10.4 Chief Engineer(PSPA-II), CEA stated that, PGCIL needs to clarify on connectivity for Phase-II, to which PGCIL replied that this is the connectivity for both Phase I and II.

10.5 POSOCO suggested to include 1x125MVAR bus reactor at 400/220KV Tumkur (Pavagada) Pooling station in transmission system for connectivity. The same was agreed.

10.6 Considering high loading level of 400kV Hiriya-Neelmangala line and likely load generation scenario in Karnataka, it was suggested that one circuit of Tumkur- Mysore line may be routed via Hiriya substation whereas second circuit may be bypassed at Hiriya. Studies were also discussed with above configuration (Annex-2). It was observed that Hiriya- Mysore line will provide a parallel path to 400kV Hiriya – Neelmangala D/c line and shall relieve its high loading. Accordingly, it was agreed that one ckt of Hiriya-Mysore line shall be routed via Hiriya (making 400kV Tumkur-Hiriya-Mysore one ckt) whereas second circuit shall be bypassed at Hiriya and connected with Tumkur –Hiriya another ckt (making 400KV Tumkur-Mysore direct line).

10.7 Chief Engineer(PSPA-II), CEA said that Section 68 for the above scheme was given as per the system agreed in 39th meeting of SCPSPSR, since there are changes suggested by PGCIL in the agreed system, therefore, PGCIL need to take section 68 for the modified scheme, which was agreed.

10.8 After further deliberations following was agreed:

- 8 Nos. 220kV Line bays at Tumkur (Pavagada) for Interconnection with solar project instead of earlier 16 nos.220kV line bays.
- Hiriya – Mysore 400 kV D/c line – one ckt routed via Hiriya (*to make Tumkur-Hiriya-Mysore one ckt*) and another ckt bypassed at Hiriya & connect it with Tumkur –Hiriya one ckt to make Tumkur-Mysore direct line (one ckt).

10.9 POWERGRID informed that during 39th meeting of SCPSPSR, Tumkur (Pavagada) Pooling station- Devanahally (KPTCL) 400kV D/c (Quad) line was agreed as a part of Transmission System for Tumkur (Pavagada) Ultra Mega Solar Park (2000MW) Phase-II. KPTCL vide their letter no KPTCL/Dr/ps/2016-17/53-55 dated 15 June 2016) has suggested that a switching station can be constructed by PGCIL between Davanahalli and Nelamangala near Bettenahalli and replace twin moose line between Bettenahalli and Devanahalli by HTLS conductor. A meeting was held in CEA on 5th July, 2016 to resolve the issue. In the meeting, it was decided that POWERGRID will carry out a joint survey for 400kV Tumkur (Pavagada) – Devanahalli D/c (Quad) line with above Multi circuit option to check its feasibility as well as approach airport authority regarding aviation clearance issue for multi circuit tower.

POWERGRID informed that after site survey, length of 400kV Tumkur (Pavagada) – Devanahalli D/c (Quad) line found to be increased to about 153km including approx 13 kms multi circuit portion. Considering importance of this line, it was agreed to establish 400kV Tumkur (Pavagada) – Devanahalli D/c (Quad) line with multi circuit in part portion.

Accordingly, following two alternatives were also discussed:

- i) Reconductoring of 400kV Tumkur (Pavagada)PS- Tumkur (vasantnarsapura) D/c line (shall be developed through LILO of Gooty - Tumkur (vasantnarsapura) line at Tumkur (Pavagada))
- ii) Provide fixed series capacitor (40%) on 400kV Tumkur (Pavagada) - Tumkur (vasantnarsapura) D/c line (Quad) at Tumkur (Pavagada) PS end (formed after LILO of 400kV Bellary Pool - Tumkur (vasantnarsapura) line (Quad) [KPTCL line] at Tumkur (Pavagada) end).

10.10 After discussions on above topic, following was agreed:

- i) In view of RoW issue and uncertainty in timely implementation 400kV Tumkur (Pavagada) – Devanhalli D/c (Quad) line, this line may be implemented as additional transmission strengthening scheme for Tumkur (Pavagada) solar park.
- ii) In addition, fixed series capacitor (40%) on 400kV Tumkur (Pavagada) - Tumkur (Vasantnarsapura) D/c (Quad) line may be included in Ph-II transmission scope of Tumkur UMSPP.

10.11 Thus the following system was agreed:

A) Transmission System for connectivity

- (i) LILO of 400kV Gooty – Tumkur (Vasantnarsapur) D/c at Tumkur (Pavagada) Pooling station.
- (ii) 1x500 MVA, 400/220KV Pooling station at Tumkur(Pavagada)
- (iii) 220kV Bays (8 Nos) at Tumkur (Pavagada) PS for interconnection with solar project
- (iv) 1x125MVAR bus reactor at 400/220KV Tumkur (Pavagada) Pooling station.

B) Transmission System for LTA -Phase-I (1000MW)

- (i) Tumkur (Pavagada) Pooling station - Hiriyur 400 kV D/c(as part of Tumkur (Pavagada) Pooling station - Mysore line)
- (ii) LILO of 400kV Bellary Pool – Tumkur (Vasantnarsapur) D/c (Quad)(both circuits)[KPTCL line] at Tumkur (Pavagada) Pooling station*
- (iii)Augmentation of 2x500 MVA, 400/220KV Pooling station at Tumkur(Pavagada) Pooling station.

**KPTCL would complete Bellary pooling station – Tumkur (Vasantnarsapur) line D/c (Quad) by December- 2016*

C) Transmission System for LTA -Phase-II (1000MW)

- (i) Hiriyur – Mysore 400 kV D/c line (after completion of this line, one circuit of this line would be connected with one ckt of Tumkur –Hiriyur line so as to make Tumkur-Mysore direct line)
- (ii) Fixed series capacitor (40%) on 400kV Tumkur (Pavagada) - Tumkur (Vasantnarsapura) D/c (Quad) line at Tumkur(Pavagada) PS end
- (iii) Augmentation of 2x500 MVA, 400/220KV transformer at Tumkur (Pavagada) Pooling station
- (iv) 1x125MVAR bus reactor (2nd) at Tumkur (Pavagada) Pooling Station
- (v) Third 400/220 kV, 1x500 MVA transformer at Tumkur (Vasantnarsapur)
- (vi) 1x80 MVAR switchable Line reactor at Mysore end of Hiriyur- Mysore D/c for each circuit.

D) Additional ATS for Tumkur(Pavagada)

400kV Tumkur (Pavagada) – Devanhalli D/c (Quad) line with some portion on multi circuit towers

10.12 The above system needs to be implemented as per following schedule:

- | | |
|---|-----------|
| A) Transmission System for connectivity | Sept 2017 |
| B) Transmission System for LTA -Phase-I (1000MW) | Sept 2017 |
| C) Transmission System for LTA -Phase-II(1000MW) | Sept 2018 |
| D) Additional ATS for Tumkur(Pavagada), to match with the commissioning of Devanhalli SS of KPTCL | |

11.0 Temporary arrangement at Bidadi GIS for connecting one circuit of 400kV DC Tumkur (Vasanthanarsapura)- Bidadi Quad line with one circuit of 400kV DC Bidadi- Nelamangala line.

11.1 PGCIL proposed the following arrangement for Bidadi GIS:

- a) For termination at Bidadi GIS, it is proposed to interconnect one circuit of Tumkur (Vasanthanarsapura)- Bidadi Quad line with one circuit of 400kV DC Bidadi- Nelamangala line and the remaining circuit from Tumkur (Vasanthanarsapura) will be terminated at Bidadi GIS utilizing the vacated bay.

- b) For termination at Tumkur (Vasanthanarsapura) SS, available bays 400kV DC Tumkur (Vasanthanarsapura)- Yelahanka line(as this line is stuck up in RoW issue) can be utilized for Tumkur (Vasanthanarsapura)- Bidadi Quad DC line.

11.2 In this regard, a meeting was held in CEA on 2nd August 2016, to resolve the issue. In the meeting POSOCO opined that the Gooty- Tumkur- Bidadi 400kV DC line provides parallel path to the 400kV Gooty- Nelamangala and Gooty-Somanhally 400 kV S/c lines. There is reduction in flow on 400kV Gooty- Nelamangala and Gooty-Somanhally and Hiriyyur – Nelamangala lines with the above proposed arrangement. After discussions in the said meeting, the rearrangement was agreed.

11.3 The same was agreed in the SCPSPSR. Further, it was said that, POWERGRID will restore the final configuration by Nov 2016 i.e: Tumkur(Vasanthanarasapura) – Bidadi 400kV Quad D/c and Bidadi – Nelamangala 400kV DC line.

GM(SR-II), POWERGRID informed that bays at Tumkur (Vasanthanarsapura) and Bidadi for Tumkur (Vasanthanarsapura) – Bidadi 400kV Quad D/c line would be ready by March, 2017 and this temporary arrangement would be restored after completion of the bays.

12.0 Additional 400kV feed to Goa – Reactive Compensation

12.1 PGCIL informed that the scheme, Additional 400 kV feed to Goa along with required reactive compensation was agreed in 40th SCM of WR held on 01/06/2016. The scheme was discussed and agreed in 39th meeting of SCPSPSR however reactive compensation was not discussed. The scheme comprises of:

- a) LILO of one ckt. of Narendra (existing) – Narendra (New) 400kV D/c quad line at Xeldem
- b) Xeldem – Mapusa 400kV D/c (quad) line
- c) Establishment of 2x500MVA, 400/220kV substation at Xeldem

12.2 The scheme also includes 1X80 MVAR, 420 kV switchable line reactor for Narendra (New) – Xeldem 400 kV line at POWERGRID’s Narendra (New) S/s in addition to reactive compensation at Xeldem.

12.3 The scheme is to be implemented under Tariff Based Competitive Bidding, however 400 kV reactors at Narendra (New) are to be implemented by POWERGRID. It has been informed by site that due to space constraint and GIS nature of the bays, it is not feasible to install the Line Reactor as switchable. Accordingly, 1x80 MVAR, 420 kV

Switchable Line Reactor at Narendra (New) S/s is proposed to be approved as Fixed Line Reactor. The same shall also be taken up in the forthcoming SCSPWR.

12.4 The same was agreed.

13.0 Implementation of 2x63 MVar, 420 kV bus reactors at Yelahanka under the Scheme Southern Region System Strengthening -XXIII

13.1 PGCIL informed that, installation of 2x63 MVar, 420 kV bus reactors at Yelahanka 400/220kV substation was agreed under the scheme Southern Region System Strengthening – XXIII. Yelahanka 400/220kV substation along with LILO of Neelamangala – Hoodi 400kV S/c line at Yelahanka is being implemented under the scheme SRSS-XII. However, considering the uncertainty in commissioning of Yelahanka 400/220kV S/s, due to severe RoW issues POWERGRID had deferred the procurement of 2x63 MVar, 420 kV bus reactors. Keeping above in view, it is proposed that the procurement of 2x63 MVar bus reactors at Yelahanka substation may be taken up after resolution of ROW issues and if required diversion of reactors (based on the availability) from other projects shall be explored.

13.2 The same was agreed.

Transmission planning proposals in Tamil Nadu

14.0 Evacuation of Solar Power through Kamuthi-Karaikudi line of TNEB

14.1 TNEB informed that Kamuthi- Karaikudi line which was agreed in 37th meeting of SCSPSR held on 31st July, 2015, is nearing completion, however, the bays at Karaikudi which are to be built by PGCIL under Deposit work basis on behalf of TNEB, are not ready. So, there are constraints in evacuation of Solar power from Kamuthi.

14.2 In this regard, a meeting was held in CEA on 20th June, 2016 regarding evacuation of power from solar projects in Kamuthi in which following was agreed:

- i. TNEB/TANTRANSCO may implement the LILO of one circuit of Kayathar-Karaikudi 400kV DC line at Kamuthi using the Kamuthi- Karaikudi 400kV DC line. TNEB may also shift PLCC for these lines.
- ii. TNEB/TANTRANSCO may expedite the implementation of reactors at Kamuthi.
- iii. PGCIL may expedite the implementation of bays at Karaikudi.

- iv. Under high wind conditions, the Kamuthi- Kayathar line may be charged from Kayathar end when voltages are less than 390 kV.
- v. During low/no Wind condition, Kamuthi- Kayathar line may be charged from Kamuthi end.
- vi. During normal operation, if the voltage at Kamuthi is more than 410kV, the Kayathar- Kamuthi line may be kept open.
- vii. TNEB may have to back down the solar generation at Kamuthi, in case of overloading under N-1 contingency on any one of the three sections i.e: Kayathar-Karaikudi, or Kayathar- Kamuthi, or Kamuthi-Karaikudi line.

14.3 TNEB informed that the arrangement has been energized on 8th September, 2016 and no constraints have been observed. However, POSOCO opined that since Kayathar-Kamuthi line is a long line, therefore there are issues in closing this line. They emphasized on implementation of reactors at Kamuthi. TNEB informed that the reactors at Kamuthi, will be ready by June,2017.

14.4 CTU informed that bays at Karaikudi for Kamuthi – Karaikudi 400kV D/c line are being implemented by POWERGRID on deposit work basis. The payment for the same from TANTRANSCO was received in April, 2016 and award for implementation of bays has been placed in November, 2016 with a schedule of 24 months from date of receipt of payment which comes out to be April, 2018. TANTRANSCO requested for expedition of bay works at Karaikudi. CTU informed that same shall be explored, PGCIL informed that the bays at Karaikudi will be ready by April, 2018.

14.5 The above was noted by the members.

15.0 Utilization of Tirunelveli - Edamon portion of Tirunelveli - Cochin 400kV Quad D/C line

15.1 CEA stated that during 39th SCPSPSR, it was proposed to utilize the completed Tirunelveli-Edamon portion of Tirunelveli- Cochin 400kV quad D/C line by charging the line at 220kV level in Tirunelveli-Edamon portion for catering power requirement of Kerala. Director(Trans), TANTRANSCO said that this proposal may cause congestion in their 230KV network. He said that they would conduct Load flow study to check for any congestion in Tirunelveli (Abisekapatty) 230kV network during high wind and send their response to CEA & PGCIL.

15.2 TANTRANSCO suggested that the completed Tirunelveli – Edamon portion of Tirunelveli – Cochin 400kV Quad DC line may be utilised by terminating the above feeder at Edamon 230kV SS and may be charged at 230kV level as an interim arrangement, subject to the following conditions:

“The power flow in Edamon – Tirunelveli line during wind season has to be maintained by Kerala in such a way that the 230kV feeders of TANTRANSCO should not get over loaded, by providing necessary Special Protection Scheme (SPS) to limit the load drawn by Kerala”

15.3 TANTRANSCO informed that during high wind condition Kayathar, Veeranam and Udayathur 230kV feeders to Tirunelveli 230kV SS are in fully loaded condition and SPS is necessary to limit the drawl of Kerala.

15.4 Chief Engineer, CEA enquired KSEB about the present loading on existing Tirunelveli – Edamon 400kV D/c line (charged at 220kV). KSEB informed that max loading observed till date is in the range of 250-260 MW per ckt and no constraint is observed.

15.5 POSOCO suggested that Reverse Power Relay could also be used instead of SPS to control power flow on this line.

15.6 Chief Engineer(PSPA-II), CEA suggested that based on the studies of SRPC, Kerala and Tamil Nadu the flow on this line could be restricted between 600-650 MW.

15.7 After discussions it was agreed that power flow on the line may be contained within the range of 600-650 MW with proposed arrangement by providing necessary SPS at Edamon end.

16.0 Edayarpalayam 400/230-110kV S/s under the scope of TANTRANSCO:

16.1 CEA stated that in 38th SCPSR it was decided that establishment of Edayarpalayam 400/230-110 kV substation with 2x500MVA transformer at Edayarpalyam and 2x125 MVA bus reactors will be in the scope of TANTRANSCO while Edayarpalayam – Myvady 400 kV DC quad line will be in the scope of PGCIL.

16.2 Further TSTRANSCO vide their letter dated 13.06.2016 has requested that “ Edayarpalayam- Myvady 400 kV DC quad line in the scope of PGCIL may be dropped and instead of that Edayarpalayam – Anikadavu 400 kV DC quad line shall

be taken up by TANTRANSCO”. In this way, the wind power injected in the Edayarpalayam 400kV SS will be transmitted to the wind corridor of Thoppakundu- Anikadavu- Rasipalayam 400kV SS.

- 16.3** PGCIL raised apprehensions regarding injection at Edayarpalayam from wind corridor of Thoppakundu- Anikadavu- Rasipalayam. Chief Engineer(PSPA-II), CEA suggested that with so much of injection in southern part of SR including from RE and lesser load growth as compare to 18th EPS, planning of Raigarh- Pugalur HVDC link may be reviewed at least from the point of target date of commissioning, so as to avoid this HVDC line becoming stranded/underutilized asset.

It was suggested that both the lines can be considered i.e. Edayarpalayam- Myvady 400 kV DC quad line and Edayarpalayam – Anikadavu 400 kV DC quad line but after proper load flow studies.

- 16.4** CE, CEA stated that a joint study may be carried out to examine the scheme proposed by TANTRANSCO. Based on the outcome of study, the scheme may be approved.

17.0 Transmission system for evacuation of power from Uppur TPS (2x800 MW) of TNEB in Tamil Nadu.

- 17.1** CEA stated that during the joint study meeting held on 14-17 March, 2016 at SRPC office, Bangalore “Transmission system for evacuation of power from Uppur TPS (2x800 MW) of TNEB in Tamil Nadu” was discussed. Accordingly, TRANTRANSCO vide their letter dated 05.05.2016 has sent the proposal of ATS of the Uppur 2x800MW Thermal Power Project in Ramanathapuram and load flow studies.

ATS for UPPUR – 2X800MW project:

- a. 765kV DC line from Uppur switchyard to Virudhunagar 765/400kV substation.
- b. 2X240MVAR, 765kV bus reactors at the Uppur 765kV switchyard.

Establishment of 765/400kV SS in Virudhunagar (For Uppur ATS and Renewable Generation Pooling):

- i. 2X1500MVA, 765/400kV ICTs with the following 765kV and 400kV connectivity
- ii. **765kV Connectivity:**

- a. 765kV DC connectivity to the Coimbatore 765/400kV SS with 240MVAR, 765kV switchable line reactors at each line at both ends.
- b. 765kV DC connectivity to the Ariyalur 765/400kV SS with 240MVAR, 765kV switchable line reactors at each line at both ends. This line work will be taken up with the proposal of Udangudi Thermal power projects Stage II & III (each 2X660MW).

iii. **400kV Connectivity:**

- a. 400kV DC Quad line from Kayathar 400kV SS.
- b. 400kV DC Quad line from Kamuthi 400kV SS.
- c. 400kV DC twin moose line from Thappagundu 400kV SS.

17.2 CTU said that in the preliminary studies carried out March 2016, it has been observed that there is lot of injection from state generation to the ISTS network. Therefore, detailed studies with proper LGBR for Tamil nadu and SR as a whole may be needed.

17.3 It was decided to carry out the joint studies by TNEB, CEA and CTU.

18.0 Observations on earlier SCPSPSRs

18.1 Evacuation scheme for SEPC-1X525 MW

CEA stated that during the 38th meeting of SCPSPSR, evacuation scheme of SEPC was discussed and it was decided that the earlier agreed system for Udangudi Stage I and II may be sufficient to evacuate power from Udangudi 2X660MW and SEPC 1X525 MW, however TANGEDCO will furnish fresh studies.

CE, CEA stated that a joint study may be carried out to examine the schemes proposed by TANTRANSCO. Based on the outcome of study, the schemes may be approved.

18.2 Startup power requirement for ETPS SEZ-2X600MW and Udangudi Projects(2x660MW)

- (i) CEA stated that the transmission scheme for the evacuation of ETPS SEZ-2X660MW has been approved in the meeting of 37th SCPSPSR. TANTRANSCO vide their letter dated 27.02.2016, has written that the startup power for ETPS SEZ has been decided by making LILO of one of the existing NCTPS-II- SVChatram 400kV DC line by forming a separate new 400kV Start up bus.

After further discussion, it was agreed.

- (ii) TANTRANSCO informed that for the Udangudi Stage-I project 2x660MW, the 400kV DC evacuation line planned to Kayathar, may be used for startup power requirements.

The same was agreed.

18.3 Ariyalur-Thiruvalem 765kV line reactor

TANTRANSCO informed that as the Ariyalur-Thiruvalem 765kV Dc line is less than 170km, the line reactor at Ariyalur end may not be required for charging the said line. Hence erection of 2x240MVAR line reactor in Ariyalur-Thiruvalem 765kV DC at Ariyalur end, may be dropped.

After discussions it was decided that as the length of the line is 175km the line reactors should not be dropped. The same was agreed.

19.0 Kudankulam Units 3&4 (2x1000MW)-Additional Evacuation lines required by NPCIL

- 19.1** TANTRANSCO stated that during 36th SCPSR, for the evacuation of power from Kudankulam Units 3&4 , the following ATS has been evolved:

400kV DC Quad line from Tuticorin Pooling station from units 3&4 switchyard and suitable rearrangement at Kudankulam units 1 &2 Generation switchyard.

With the final rearrangement, there will be three numbers of 400kV lines (2 nos to Tirunelveli and 1 no to Tuticorin) that will emanate from both the plants i.e: KKNPP-1&2 and KKNPP-3&4.

Also during the 37th SCPSR, NPCIL opined that under the outage of two towers of each circuit of Kudankulam- Tirunelveli DC line, only one line shall be available for evacuation of power from units 1,2&3,4. It was decided that studies shall be carried out for requirement of additional evacuation lines for units 3&4.

- 19.2** TANTRANSCO requested that the additional lines which are yet to be planned from Kudankulam units may be terminated in some of the under execution/ planned substation of TANTRANSCO i.e: Kayathar (existing) 400/ 230-110kV SS, Kanarpatty (under construction) 400/230-110kV SS, Pavoorchatram(Thennampatty) (under construction)) 400/230-110kV SS, Ottapidaram (planned) 400/230-110kV SS.

- 19.3** PGCIL informed that the present system is adequate to evacuate power from Kudankulam as they have not received any LTA application from Kudankulam -3&4.

Once the LTA application for Kudankulam 3& 4 is received then further system will be planned after proper studies and the same was agreed.

20.0 Charging the LILO section of 230kV MAPS-Arni line at Echur Substation.

20.1 TANTRANSCO informed that they have commissioned the Echur 230/110kV substation by making LILO of 230kV MAPS-Arni TANTRANSCO SC line.

20.2 TANTRANSCO further informed that in the 123rd OCC meeting, SRLDC has pointed out that since MAPS being an ISGS station, prior intimation is required to be given to SRLDC about the network reconfiguration and permission for charging the new section, for ensuring the grid security and avoiding any untoward grid incident.

20.3 TANTRANSCO agreed to inform CEA/ Standing Committee in advance for such issues in future. The LILO of 230kV MAPS –Arni line at Echur was accepted by standing committee.

21.0 Common Transmission System Associated with ISGS projects in Nagapattinam/Cuddalore area of Tamil Nadu – Part A1b.: Regarding 400 kV Termination at Nagapattinam Pooling Station for Nagapattinam Pooling Station – Dharmapuri(Salem New) 765kV D/c line

21.1 PGCIL informed that, Nagapattinam Pooling Station – Dharmapuri(Salem New) 765kV D/c line has been implemented through Tariff Based Competitive Bidding route. The bay works and line reactors associated with the above scheme have been implemented by POWERGRID through regulated tariff mechanism. As this line was to be initially charged at 400kV, termination arrangement between 765 kV area to 400 kV area was made by POWERGRID for charging of this line at 400 kV.

21.2 Members noted the same.

22.0 Installation of 3rd ICTs at Madurai and Trichy 400/230kV substations

22.1 PGCIL informed that, installation of 3rd ICTs at Trichy and Madurai is being implemented by POWERGRID under the schemes SRSS-XX and SRSS-XXIII. During the 39th Meeting of Standing Committee held on 28.12.2015, Director(Trans), TANTRANSCO made a request for early commissioning of ICT at Madurai. ICT at Madurai S/s is ready for charging and ICT at Trichy would be ready by January, 2017. However, the extensions of 230kV Main and Transfer Buses in TANTRANSCO

Switchyard at Trichy and Madurai substations are not yet ready. PGCIL informed that this issue was also discussed in the 30th SRPC meeting held on 27.08.2016 wherein TNEB assured necessary action at their end. Accordingly, TANTRANSCO may be requested to expedite the 230kV connection arrangement at both Trichy and Madurai substations.

- 22.2** TANTRANSCO informed that 230kV connection arrangement at both Trichy and Madurai substations would be ready by June'17.

Transmission planning proposals in Telangana

23.0 Transmission evacuation scheme of Kaleshwaram Lift Irrigation Project (Dr. BR Ambedkar Pranihita – Chevella Sujala Sravanthi) & Palamuru – Rangareddy Lift Irrigation Schemes, proposed generation evacuation of 2x800MW Telangana

Dy Director(SP&PA-II) CEA informed that they, vide letter dated 14.06.2016 have given in-principle approval to Telangana for the transmission evacuation schemes of Kaleshwaram Lift Irrigation Project (Dr. BR Ambedkar Pranihita – Chevella Sujala Sravanthi) & Palamuru – Rangareddy Lift Irrigation Schemes and proposed generation evacuation of 2x800MW Telangana STPP to facilitate the construction of transmission lines and substations.

23.1 Kaleshwaram Lift Irrigation Project (DR.B.R. Ambedkar Pranahitha Chevella Lift Irrigation Project

- (a) TSTRANSCO has given the following load/motor for Kaleshwaram Lift Irrigation Project :

SI	Name of LI substation	Capacity, MW	Simultaneous load, MW
1	Ramadugu	7x139=973	834
2	Medaram	7x124.4=871	746
3	Tippapur	4x106=424	318
4	Chandlapur	5x88.5=443	354
5	Tukkapur	8x43=344	258
6	400kV Yellampalli	---	---
7	Kaleshwaram	11x40=440	360
8	Sundila	8x40=320	240
9	Yellampalli	9x40=360	280
10	Malakpet(132kV)	2x30=60	60

SI	Name of LI substation	Capacity, MW	Simultaneous load, MW
	Total	4235	3450

- (b) TSTRASNCO said that earlier in the 37th meeting of SCPSPSR, transmission system for LI was agreed. But now they have planned to enhance capacities of LI to 4235 MW. Accordingly, they have approached CEA and the revised proposal of TSTRASNCO is given below:

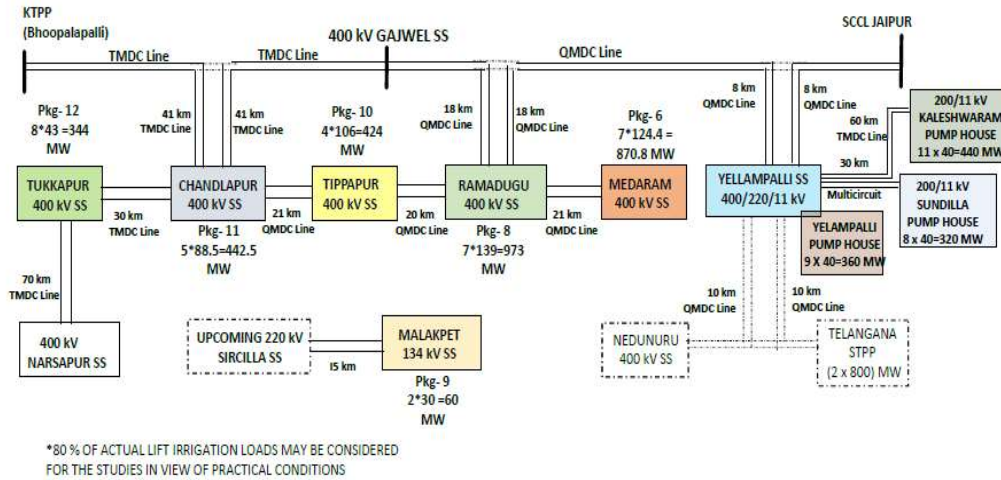
Sl. No.	Substations and Lines as approved in the 37 th Standing Committee		Revised Proposal of TSTRASNCO
1	Erection of 400 KV SS at Ramadugu, Karimnagar Dist Pkg-8 (Load 670 MW)	1	Erection of 400 KV SS at Ramadugu, Karimnagar Dist Pkg-8
2	Erection of 400 KV SS at Choppadandi, Karimnagar Dist Pkg-7 (Load 123 MW) with 2x315 MVA ICTs		-
3	Erection of 400 KV SS at Myadarm, Karimnagar Dist Pkg-6 (Load 750 MW)	2	Erection of 400 KV SS at Medaram, Karimnagar Dist Pkg-6
4	Erection of 400 KV SS at Tippapur, Karimnagar Dist Pkg-10 (Load 336 MW)		Erection of 400 KV SS at Tippapur, Karimnagar Dist Pkg-10
5	Erection of 132 KV SS at Malakpet, Karimnagar Dist Pkg-9 (Load 30 MW)		-
		3	Erection of 400 KV SS at Tukkapur, Medak Dist Pkg-12
		4	Erection of 400 KV SS at Chandlapur, Medak Dist Pkg-11
		5	Erection of 400/220 KV SS at Yellampalli, Karimnagar Dist
		6	Erection of 220 KV SS at Yellampalli Pump House, Karimnagar Dist
		7	Erection of 220 KV SS at Sundilla Pump House, Karimnagar Dist
		8	Erection of 220 KV SS at Kaleshwaram Pump House, Karimnagar Dist
		9	Erection of 132 KV SS at Malakpet, Karimnagar Dist Pkg-9

Sl. No.	Substations and Lines as approved in the 37th Standing Committee		Revised Proposal of TSTRANSCO
6	Erection of 400 KV Quad Moose DC line for making LILO of both the circuits of 400 KV SCCL - Gajwel Quad Moose DC line at the proposed 400 KV Ramadugu SS (total 50 KM for two LILO DC lines).	10	Erection of LILO of both circuits of 400 KV Quad Moose DC line from SCCL Jaipur - Gajwel at proposed Ramadugu SS - 18 KM (LILO length)
7	Erection of 90 KM 400 KV Twin Moose DC line from 400 KV Dichpally SS to the proposed 400 KV Ramadugu SS.		-
8	Erection of 25 KM 400 KV Quad Moose DC line from 400 KV Ramadugu SS to 400 KV to 400 KV Myadaram SS	11	Erection of 400 KV Quad Moose DC line from 400 KV Ramadugu LI SS to 400 KV Medaram LI SS - 21 KM.
9	Erection of 25 KM 400 KV Quad Moose DC line from 400 KV Ramadugu SS to 400 KV Choppadandi SS		-
10	Erection of 40 KM 400 KV Twin Moose DC line from 400 KV Choppadandi SS to 400 KV Tippapur SS		
11	Erection of 400 KV Twin Moose DC line for making LILO of both the circuits of 400 KV KTRPP-Gajwel Twin Moose DC line at the proposed 400 KV Tippapur SS (total 80 KM for two LILO DC lines)		-
12	Erection of 60 KM 400 KV Twin Moose DC line from 400 KV Dichpally SS to the upcoming 400 KV Nirmal SS		-
13	Erection of 30 KM 132 KV DC line from 220 KV Jagityal SS to the proposed 132 KV Malakpet SS.		-
		12	Erection of 400 KV Quad Moose DC line from 400 KV Ramadugu LI SS to 400 KV Tippapur LI SS - 20 KM.
		13	Erection of 400 KV Quad Moose DC line from 400 KV Tippapur LI SS to 400 KV Chandlapur LI SS - 21 KM
		14	Erection of LILO of both circuits of 400 KV Twin Moose DC line from KTRPP - Gajwel at Chandlapur LI SS - 41 KM(LILO length)
		15	400 KV Twin Moose DC line from 400 KV Chandlapur LI SS to 400 KV Tukkapur LI SS - 30 KM

Sl. No.	Substations and Lines as approved in the 37th Standing Committee		Revised Proposal of TSTRANSCO
		16	400 KV Twin Moose DC line from 400 KV Tukkapur LI SS to 400 KV Narasapur SS - 70 KM
		17	Erection of LILO of both circuitis of 400 KV Quad Moose DC line from SCCL Jaipur - Ramadugu at proposed Yellampalli SS - 8 KM (LILO length)
		18	Erection of LILO of both circuitis of 400 KV Quad Moose DC line from Telangana STPP- Neddurunu SS at Yellampalli SS - 10 KM (LILO length)
		19	Erection of 220 KV DC line from 400/ 220 KV Yellampalli SS to 220/11 KV Sundilla pump house - 30 KM
		20	Erection of 220 KV Twin Moose DC line from 400/220 KV Yellampalli LI SS to 220/11 KV Kaleshwaram pump house - 60 KM
		21	Erection of 132 KV DC line from upcoming 220 KV Sircilla SS to the proposed 132 KV Malakpet SS - 15 kM

(c) The schematic diagram of above scope in transmission system is shown below:

PROPOSED 400 kV EHT NETWORK FOR EXTENDING SUPPLY TO KALESHWARAM PROJECT



23.2 Palamur Ranga Reddy Lift Irrigation Scheme (3635 MW):

(a) TSTRANSCO has given the following load/motor for Palamur Ranga Reddy Lift Irrigation Scheme:

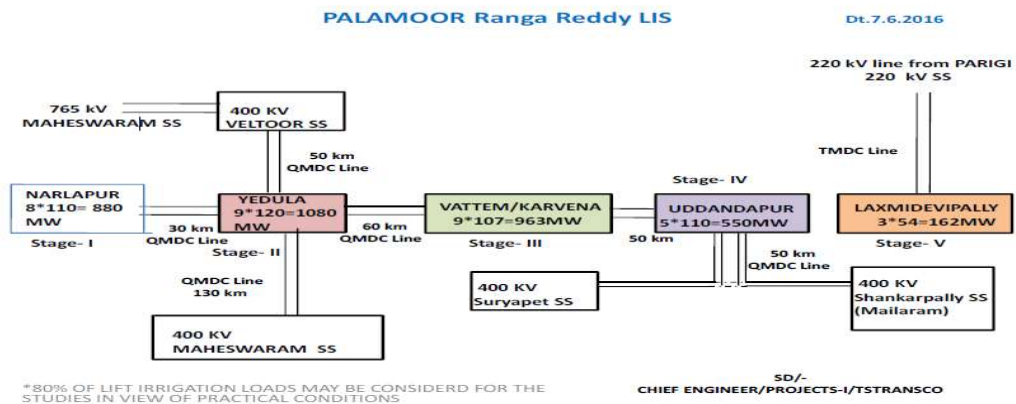
SI	Name of LI substation	Capacity, MW	Simultaneous load, MW
1	400 KV Narlapur	8x110=880	660
2	400 KV Yedula	9x120=1080	840
3	400 KV Vattem/ Karvena	9x107=963	749
4	400 KV Uddandapur	5x110=550	440
5	220 KV KP Laxmidevipally	3x54=162	108
	Total	3635	2797

(b) TSTRANSCO furnished the following transmission system:

- i) 400 KV Quad Moose DC line from Veltoor to proposed 400 KV Yedula LISS -50 KM.

- ii) 400 KV Quad Moose DC line from proposed 400 KV Yedula LISS to proposed 400 KV Narlapur LISS -30 KM.
- iii) 400 KV Quad Moose DC line from proposed 400 KV Yedula LISS to proposed 400 KV Vattem /Karvena LISS -60 KM.
- iv) 400 KV Quad Moose DC line from Maheshwaram TSTransco SS to proposed 400 KV Yedula LISS -130 KM.
- v) LILO of both circuits of 400 KV Suryapet – Manikonda (Kethireddypalli) Quad Moose DC line to proposed 400 KV Uddandapur LISS – 50 KM.
- vi) 400 KV Quad Moose DC line from proposed 400 KV Vattem LISS to proposed 400 KV Uddandapur LISS -50 KM.
- vii) 220 KV Twin Moose DC line from 220kV Pargi SS to KP Laxmidevipally LISS – 20 KM.

(c) The schematic diagram of above scope in transmission system is shown below:



23.3 Proposed Telangana STPP 2X800 MW Generation Evacuation Scheme (To be established by NTPC) at Ramagundam

The above scheme was discussed in 39th meeting of SCPSPSR held on 28th and 29th December, 2015. The following revised proposal has been sent by TSTRANSCO:

Associated transmission system

- i) 400 kV Quad Moose DC line from proposed Telangana STPP 2X800 MW to proposed 400/220/132 kV Nedunuru SS - 60 KM.
- ii) LILO of both circuits of 400kV Jangoan – 400 kV Tippapur LI SS Quad Moose DC line to proposed 400 kV Nedunuru SS – 30 KM.

- iii) 400 kV Quad Moose DC line from proposed Telangana STPP 2X800 MW to upcoming 400 kV Narsapur SS (Substation approved in 35th Standing Committee Meeting) - 170 KM.
- iv) 400 kV Quad Moose DC line from upcoming 400 kV Narsapur SS to proposed 400 kV RCPuram SS in Rangareddy District – 60 KM.
- v) LILO of 220 kV Durshed – Siddipet DC line to the proposed 400/220/132 kV Nedunuru SS – 10 KM.
- vi) 220 kV UG Cable from proposed 400 kV RCPuram to existing 220 kV Gachibowli SS – 10 KM
- vii) 220 kV UG Cable from proposed 400 kV RCPuram to upcoming 220 kV Raidurg SS – 20 KM
- viii) 220 kV Single Moose DC line from upcoming 400 kV Narsapur to proposed 220 kV Borampet SS – 43 KM
- ix) 220 kV Single Moose DC line from proposed 220 kV Borampet SS to existing 220 KV Miyapur SS– 35 KM
220 kV Single Moose DC line from proposed 220 kV Borampet SS to existing 220 KV Shapurnagar SS– 35 KM.

23.4 CEA informed that studies were carried out for the Palamuru Ranga Reddy Lift Irrigation Scheme, Kaleshwaram Lift Irrigation Project and Telangana STPP 2x800 MW generation evacuation scheme and are provided with the agenda. Further TSTRANSCO vide their Dt 03/09/2016 has also requested for approval of the following bus reactors to prevent high voltages during non-operation of lift irrigation loads:

- a) Chadulapur LI SS (under Kaleshwaram LI Scheme)-125 MVAR
- b) Narlapur LI SS (under Palamuru Rangareddy LI scheme)-125 MVAR
- c) Yedula LI SS (under Palamuru Rangareddy LI scheme)-125 MVAR
- d) Vattam LI SS (under Palamuru Rangareddy LI scheme)-125 MVAR
- e) Uddandapur LI SS (under Palamuru Rangareddy LI scheme)-125 MVAR
- f) Upcoming Telangana STPP (2x800 MW), Ramagundam-125 MVAR

23.5 After discussion following system for the TSTRANSCO schemes was agreed:

(A) Kaleshwaram Lift Irrigation Project:

- (i) Erection of 400 KV SS at Ramadugu, Karimnagar Dist Pkg-8
- (ii) Erection of 400 KV SS at Medaram, Karimnagar Dist Pkg-6
- (iii) Erection of 400 KV SS at Tippapur, Karimnagar Dist Pkg-10
- (iv) Erection of 400 KV SS at Tukkapur, Medak Dist Pkg-12
- (v) Erection of 400 KV SS at Chandlapur, Medak Dist Pkg-11
- (vi) Erection of 400/220 KV SS at Yellampalli, Karimnagar Dist
- (vii) Erection of 220 KV SS at Yellampalli Pump House, Karimnagar Dist
- (viii) Erection of 220 KV SS at Sundilla Pump House, Karimnagar Dist

- (ix) Erection of 220 KV SS at Kaleshwaram Pump House, Karimnagar Dist
- (x) Erection of 132 KV SS at Malakpet, Karimnagar Dist Pkg-9
- (xi) Erection of LILO of both circuitis of 400 KV Quad Moose DC line from SCCL Jaipur - Gajwel at proposed Ramadugu SS
- (xii) Erection of 400 KV Quad Moose DC line from 400 KV Ramadugu LI SS to 400 KV Medaram LI SS
- (xiii) Erection of 400 KV Quad Moose DC line from 400 KV Ramadugu LI SS to 400 KV Tippapur LI SS
- (xiv) Erection of 400 KV Quad Moose DC line from 400 KV Tippapur LI SS to 400 KV Chandlapur LI SS
- (xv) Erection of LILO of both circuits of 400 KV Twin Moose DC line from KTPP - Gajwel at Chandlapur LI SS
- (xvi) 400 KV Twin Moose DC line from 400 KV Chandlapur LI SS to 400 KV Tukkapur LI SS
- (xvii) 400 KV Twin Moose DC line from 400 KV Tukkapur LI SS to 400 KV Narasapur SS
- (xviii) Erection of LILO of both circuitis of 400 KV Quad Moose DC line from SCCL Jaipur - Ramadugu at proposed Yellampalli SS
- (xix) Erection of LILO of both circuitis of 400 KV Quad Moose DC line from Telangana STPP- Neddurunu SS at Yellampalli SS
- (xx) Erection of 220 KV DC line from 400/ 220 KV Yellampalli SS to 220/11 KV Sundilla pump house
- (xxi) Erection of 220 KV Twin Moose DC line from 400/220 KV Yellampalli LI SS to 220/11 KV Kaleshwaram pump house
- (xxii) Erection of 132 KV DC line from upcoming 220 KV Sircilla SS to the proposed 132 KV Malakpet SS.
- (xxiii) 125 MVAR bus reactor at Chadulapur 400kV LI SS

(B) Palamur Ranga Reddy Lift Irrigation Scheme

- (i) 400 KV Quad Moose DC line from Veltoor to proposed 400 KV Yedula LISS -50 KM.
- (ii) 400 KV Quad Moose DC line from proposed 400 KV Yedula LISS to proposed 400 KV Narlapur LISS -30 KM.
- (iii) 400 KV Quad Moose DC line from proposed 400 KV Yedula LISS to proposed 400 KV Vattam /Karvena LISS -60 KM.
- (iv) 400 KV Quad Moose DC line from Maheshwaram TSTransco SS to proposed 400 KV Yedula LISS -130 KM.
- (v) LILO of both circuits of 400 KV Suryapet – Manikonda (Kethireddypalli) Quad Moose DC line to proposed 400 KV Uddandapur LISS – 50 KM.
- (vi) 400 KV Quad Moose DC line from proposed 400 KV Vattam LISS to proposed 400 KV Uddandapur LISS -50 KM.
- (vii) 220 KV Twin Moose DC line from 220kV Pargi SS to KP Laxmidevipally LISS – 20 KM.
- (viii) 125 MVAR bus reactor at Narlapur 400kV LI SS

- (ix) 125 MVAR bus reactor at Yedula 400kV LI SS
- (x) 125 MVAR bus reactor at Vатtem 400kV LI SS
- (xi) 125 MVAR bus reactor at Uddandapur 400kV LI SS

(C) Telangana STPP 2X800 MW

- (i) 400 kV Quad Moose DC line from proposed Telangana STPP 2X800 MW to proposed 400/220/132 kV Nedunuru SS.
- (ii) LILO of both circuits of 400kV Jangoan – 400 kV Tippapur LI SS Quad Moose DC line to proposed 400 kV Nedunuru SS.
- (iii) 400 kV Quad Moose DC line from proposed Telangana STPP 2X800 MW to upcoming 400 kV Narsapur SS (Substation approved in 35th Standing Committee Meeting).
- (iv) 400 kV Quad Moose DC line from upcoming 400 kV Narsapur SS to proposed 400 kV RCPuram SS in Rangareddy District.
- (v) LILO of 220 kV Durshed – Siddipet DC line to the proposed 400/220/132 kV Nedunuru SS.
- (vi) 220 kV UG Cable from proposed 400 kV RCPuram to existing 220 kV Gachibowli SS
- (vii) 220 kV UG Cable from proposed 400 kV RCPuram to upcoming 220 kV Raidurg SS
- (viii) 220 kV Single Moose DC line from upcoming 400 kV Narsapur to proposed 220 kV Borampet SS
- (ix) 220 kV Single Moose DC line from proposed 220 kV Borampet SS to existing 220 KV Miyapur SS
- (x) 220 kV Single Moose DC line from proposed 220 kV Borampet SS to existing 220 KV Shapurnagar SS.
- (xi) 125 MVAR bus reactor at Telangana STPP (2x800 MW), Ramagundam

23.6 Further, AGM NTPC (PE-E) informed that inline with discussion of 39th meeting of CPSPSR, 400kV DC tie line between existing 400kV switchyard of Ramagundam and Telangana STPP along with associated bays has been envisaged for meeting Startup power and project commissioning requirements. It was discussed and agreed that Telangana STPP shall be permitted to draw start up power from Ramgundam (ISTS node) at 400 kV from allocated share of power of Telangana, and accordingly interface meters shall be provided by SRLDC as interface between ISTS and Telangana grid.

23.7 While agreeing on above scheme/system, following was also observed/suggested :

- a. There is requirement of more outlets from SCCL Generation Project.

- b. As informed by TSTRANSCO, these machines would be synchronous motors with capability to run at least at 0.95 power factor Lag/Lead.
- c. It is observed that Telangana will have to procure additional generation capacity of the order of 4000-5000 MW for the period 2019-20 to meet their load demand as considered in these studies i.e. 18000 MW (including 6000 MW for Lift Irrigation).

24.0 Proposal of augmentation of Power Transformers at 400kV Gajwel SS with one no additional 315 MVA

- 24.1 TSTRANSCO said that at present they have 3x 315 MVA transformer at Gajwel. TSTRANSCO requested to arrange approval for the augmentation of Power Transformers at 400kV Gajwel SS with one no additional 315 MVA Power Transformer. They stated that in view of the commissioning of SCCL Units and increasing load demand in Hyderabad area, they are proposing to augment power transformer capacity at 400/220kV Gajwel SS by adding fourth 1x315 MVA ICT.
- 24.2 PGCIL suggested that instead of augmentation of 315 MVA, they may adopt 500 MVA ICT, and the same was agreed.

25.0 LILO of 400kV NagarajunaSagar -Kurnool line to the upcoming 400kV SS at Dindi.

- 25.1 TSTRANSCO requested to LILO the 400kV NagarajunaSagar -Kurnool line at the upcoming 400kV SS at Dindi.
- 25.2 During the 39th SCPSR, TSTRANSCO's request to LILO 400kV Nagarajuna Sagar-Kurnool ISTS line at the proposed Dindi 400/220kV SS was not agreed as PGCIL said that as per the joint studies carried out the said LILO is not effective, as such it may be considered at a later date.
- 25.3 This issue was discussed and it was decided that requirement of LILO of 400kV NagarajunaSagar -Kurnool line to the upcoming 400kV SS at Dindi would be reviewed after/while commissioning of the following transmission system of TSTRANSCO which was agreed in the meeting of 39th SCPSR held on 28-29th December, 2015:
 - A) Manuguru(4x270 MW) TPS:
 - i) Manuguru TSGENCO plant switchyard to proposed 400/220kV Bommanapalli SS with Quad Moose 400 kV DC line.
 - ii) 1x125 MVAR Bus reactor at Manuguru switchyard
 - B) Kothagudem VII(1x800MW) TPS:
 - i) KTPS Stage VII switchyard to proposed 400/220kV Bommanapalli SS with Quad Moose 400kVDC line.
 - ii) 1x125 MVAR Bus reactor at KTPS Stage VII switchyard

- C) Common transmission system for Manuguru(4x270 MW) TPS and Kothagudem VII(1x800MW) TPS:
- i) From proposed 400/220kV Bommanapalli SS to upcoming Suryapet 400/220/132kV SS by Quad Moose 400kV DC line –about 125 km
 - ii) From proposed 400/220kV Bommanapalli SS to proposed 400/220kV Jangaon SS by Quad Moose 400kV DC line –about 120 km
 - iii) From proposed 400/220kV Jangaon SS to proposed 400kV Tippapur LI SS by Quad Moose 400kV DC line –about 70 km
 - iv) From proposed 400/220kV Bommanapalli SS to proposed 220/132kV Kallur SS by Single Moose 220kV DC line-about 70 km
 - v) From proposed 400/220kV Bommanapalli SS to proposed 220/132kV Pedagopathi SS by Single Moose 220kV DC line-about 110 km
 - vi) From proposed 400/220kV Bommanapalli SS to proposed 220/132kV Bommanapalli SS by Single Moose 220kV DC line.
 - vii) From Proposed 400/220 kV Jangaon SS to Upcoming 220/132 kV Jangaon SS by Single Moose 220kV DC Line – about 15 km
 - viii) From Proposed 400/220 kV Jangaon SS to Existing 220/132 kV Husnabad SS by Single Moose 220kV DC Line – about 60 km
 - ix) From Proposed 400/220 kV Jangaon SS to Existing 220/132 kV Bhongiri SS by Single Moose 220kV DC Line – about 70 km
 - x) 400/220 kV Bommanapalli SS with 2 x 315 MVA
 - xi) 400/220 kV Jangaon SS with 3 x500 MVA
 - xii) 220/132 kV Kallur SS with 3 x50 MVA
 - xiii) 220/132 kV Husnabad SS with 2 x 80 MVA.
 - xiv) LILO of both circuits of Malkaram- Vijaywada 400kV DC line at Suryapeta 400kV S/S instead of LILO of only one circuit
- D) Dindi 400/220kV SS
- (i) LILO of both circuits of 400 kV Srisailam –Mamdipally DC line at Dindi 400/220kV S/S.

25.4 TSTRANSCO would provide the status of implementation of above generating station and associated transmission system to CEA.

26.0 Integration of Solar Power Project in Telangana

26.1 TSTRANSCO proposed following transmission system to evacuate power from 500 MW Solar Park at Gattu:

- i) Gattu Solar Park to 400/220kV Veltloor SS by 220kV DC line of TSTRANSCO
- ii) Gattu Solar Park to upcoming Thimmajipet Switching station by 220kV DC line of TSTRANSCO.

26.2 The above proposal was agreed.

27.0 TSTRANSCO-KTPS-VII (1x800 MW)-Start up power

27.1 TSTRANSCO requested for startup power of about 50MVA from Feb' 2017, for KTPS Stage-VII unit which is expected to be commissioned by the end of 2017, by making LILO of one circuit of existing 400kV KTPS-Budidampadu(PGCIL)(Khammam) TMDC line.

27.2 The proposal was agreed.

28.0 Provision of exclusive 220kV feeder to CPRI, Hyderabad for their online 350 MVA short circuit test facility

28.1 TSTRANSCO informed that CPRI, Hyderabad wanted to establish a 350 MVA short circuit test facility at their existing UHVRL, CPRI, Hyderabad and has requested to carry out the technical feasibility study to provide 220kV power supply from nearest 220kV TSTRANSCO substation to their existing laboratory at CPRI, Uppal.

28.2 TSTRANSCO addressed the issue to PGCIL, as the proposed loading of CPRI has direct bearing on 400/220kV Ghanapur(PGCIL) and requested to communicate the acceptance for extending the supply to CPRI. In response to TSTRANSCO, PGCIL stated that the proposed connectivity is different from the conventional connectivity and the matter may be referred to CEA with a request to convene a meeting of CTU, CPRI, SRLDC, TSTRANSCO and SRPC.

28.3 After further discussions, the proposal was in principally agreed subject to joint studies by CEA,SRPC,CTU,SRLDC and TSTRANSCO. CPRI was agreed to provide all the data required for studies to CEA.

Transmission planning proposals in Andhra Pradesh

29.0 Wind Power evacuation

29.1 Dy Director(PSPA-II) CEA informed that during the 35th SCPSPSR, wind projects of about 3150 MW coming up in Uravakonda area (1361 MW), Kondapuram area(1109MW), and Hindupur area(680MW) was agreed. Also, during 38th meeting of SCPSPSR evacuation of power from Ghani/Panyam Solar Power Project (1000 MW) and Aspiri (1000 MW) Wind project was agreed.

29.2 APTRANSCO requested approval of another 3595 MW of wind and 1500 MW of Solar. APTRANSCO informed that the Aspiri 1000 MW of wind project that was agreed in 38th SCPSPSR is now Uravakonda-2 whose capacity is enhanced to 1400 MW. Details of wind and solar Projects (proposed and existing) are:

Wind Power Projects				
S.N.	Name of 400kV Substation	Name of the Substation	Proposed Wind Power Generation Installed Capacity(MW)	Project Status
1	400kV Uravakonda SS,Ananthapur (2x315+2X500 MVA)	LV Bus of 400kV SS	1035	Under construction
		220kV Borampalli SS(2x160 MVA)	800	
		220kV Vajrakarur SS(2x160 MVA)	260	
2	400/220/132kV Kondapuram SS,Kadapa (3X315+2X160MVA)	220kV Tirumalayapalli SS(2x160 MVA)	250	Under construction
		220kV Bethamchrela SS(2x160 MVA)	250	
		220kV Chakrayapeta SS(2x160 MVA)	200	
		220kV Porumamilla SS(2x160 MVA)	250	
3	400kV Hindupur SS,Ananthapur (4X315 MVA)	220kV Penukonda SS (2X160)	300	Under construction
		220kV Pampanur SS (2x160 MVA)	1000	
4	400kV Uravakonda-2 SS(4X315MVA)*	LV Bus of 400kV SS	1400	Proposed
5	400kV Aspiri SS#	LV Bus of 400kV SS	1000	Proposed
Total			6745	

* This substation, as mention above is the Aspiri substation as agreed earlier with enhanced RE injection of 1400MW instead of 1000MW earlier.

This is New Aspiri.

Solar Power Projects				
S.N.	Name of 400kV Substation	Name of the Substation	Proposed Wind Power Generation Installed Capacity(MW)	Project Status

1	400kV Talaricheruvu SS, Ananthapur (3X315 MVA)	LV Bus of 400kV SS	500	Proposed
2	400kV Mylavaram SS, Kadapa (2x315+2X500 MVA)	LV Bus of 400kV SS	1000	Proposed
Total			1500	

29.3 APTRANSCO proposed 3 nos of 400kV new substations i.e. 400kV Talaricheruvu (3x315 MVA), 400kV Mylavaram (3x315 MVA) and 400kV Aspiri(New) (4x315MVA) and associated 220kV pooling station. Thus now there would be total 7 no. of 400kV pooling station and 9 no. of 220kV pooling station with transfer capacity as given below:

SI No	Name of the SS	PTR Capacity (MVA)
1.	400kV Uravakonda	2 x315+ 2 x500
2.	400kV Kondapuram	3 X 315
3.	400kV Uravakonda -2	4 X 315
4.	400kV Hindupur	4 x 315
5.	400kV Talaricheruvu	3 X 315
6.	400kV Aspiri	3 x 315
7.	400kV Mylavaram	3 X 315
8.	220kV Borampalli	2 x 160
9.	220kV Vajrarakur	2 x 160
10.	220kV Thirumalayapalli	2 x 160
11.	220kV Bethamcherla	2 x 160
12.	220kV Porumamilla	2 x 160
13.	220kV Chakrayapet	2 x 160
14.	220kV Jammalamadugu	2 x 160
15.	220kV Penukonda	2 x 160
16.	220kV PanpanurTanda	2 x 160

29.4 It was also noted that in addition to the above proposals following RE injection and there pooling station are also coming up in Andhra Pradesh as agreed in Previous standing committee meetings

Thus there would be 6745MW of wind and 4000MW Solar in Andhra Pradesh i.e.10745MW of RE.

29.5 After discussion following transmission system of APTRANSCO was agreed:

1) Transmission schemes for wind projects at Uravakonda SS , Ananthapur (2x315+2X500 MVA)

i) 400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV Mahbubnagar SS

	Name	Location	Type	Installed Capacity (MW)	Developer	Transmission System
1	NP. Kunta	Anantapur	Solar	1000	NTPC	ISTS
2.	Ghani/Panayam	Kurnool	Solar	1000	NVVNL	ISTS
3.	Galiveedu	Cuddapah	Solar	500	APSPCL	State
4	Talaricheruvu	Anantapur	Solar	500	APGENCO	State
5	Mylavaram	Kadapa	Solar	1000	APSPCL	State

ii) 400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV Kondapuram SS

iii) 400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV Hindupur SS

iv) 220kV Twin Moose DC line from 400/220kV Uravakonda SS to 220kV Vajrakarur SS

v) 220kV Twin Moose DC line from 400/220kV Uravakonda SS to 220kV Borampalli SS

vi) 220kV Single Moose DC line from 400/220kV Uravakonda SS to 220kV Borampalli SS

vii) Already approved 220kV Single Moose DC line from 220kV Borampalli SS to 220kV Kalyandurg SS to be modified as 220kV Twin Moose DC line from 220kV Borampalli SS to 220kV Kalyandurg SS.

viii) 220kV Twin Moose DC line from 220kV Vajrakarur SS to 220kV Anantpur SS

ix) 1x 80 MVAR Bus reactor at 400/220kV Uravakonda SS

2) Transmission schemes for wind projects at Kondapuram SS,Kadapa (3X315+2X160MVA)

- i) 400kV Quad Moose DC line from 400kV Kondapuram SS to 400kV Kurnool SS
- ii) 400kV Quad Moose DC line from 400kV Kadapa SS to 400kV NPKunta SS
- iii) 220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Thirumalayapalli SS
- iv) 220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Bethamcherla SS
- v) 220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Chakrayapet SS
- vi) 220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Porumamilla SS
- vii) 220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Tadipatri SS
- viii) 220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Jammalamadugu SS.
- ix) 132kV DC line from 220/132kV Jammalamadugu to 132kV Jammalamadugu.
- x) 132kV DC line from 220/132kV Porumamilla to 132kV Porumamilla
- xi) 1x 80 MVAR Bus reactor at 400/220kV Kondapuram SS.

3) Transmission schemes for wind projects at 400kV Hindupur SS,Ananthapur (4X315 MVA)

- i) 400kV Quad Moose DC line from 400kV Hindupur SS to 400kV NPKunta SS
- ii) 220kV Single Moose DC line from 400/220kV Hindupur SS to 220kV Penukonda SS
- iii) Already approved 220kV Single Moose DC line from 400/220kV Hindupur SS to 220kV Hindupur/Gollapuram SS to be modified as 220kV Twin Moose DC line from 400/220kV Hindupur SS to 220kV Hindupur/Gollapuram SS
- iv) 220kV Single Moose DC line from 400/220kV Hindupur SS to 220kV Pampanur Tanda SS
- v) 1x 80 MVAR Bus reactor at 400/220kV Hindupur SS
- vi) 132kV DC line from 220/132kV penukonda to 132kV Penukonda

4) Transmission schemes for wind projects at 400kV Uravakonda-2 SS(4X315MVA)

- i) 400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV Uravakonda-2 SS.
 - ii) 1x125 MVAR Bus reactor at 400/220kV Uravakonda-2 SS
- 5) Transmission schemes for wind projects at 400kV Aspiri SS**
- i) 400kV Quad Moose DC line from 400kV Aspiri SS to 400kV Kurnool SS
 - ii) 1x125 MVAR Bus reactor at 400/220kV Aspiri SS
- 6) Transmission schemes for Solar projects at 400kV Talaricheruvu SS, Ananthapur (3X315 MVA)**
- i) Making LILO of both circuits of 400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV Kondapuram SS at proposed 400kV Talaricheruvu SS
 - ii) 1x125 MVAR Bus reactor at 400/220kV Talaricheruvu SS
- 7) Transmission schemes for Solar projects at 400kV Mylavaram SS, Kadapa (2x315+2X500 MVA)**
- i) 400kV Quad Moose DC line from 400kV Kondapuram SS to 400kV Mylavaram SS
 - ii) 1x125 MVAR Bus reactor at 400/220kV Mylavaram SS

29.6 While implementing the above system APTRANSCO would ensure following:

- a. The wind and solar generator machines should be LVRT compliant.
- b. Transmission system should match with the corresponding generation.
- c. As suggested by POSOCO, APTRANSCO should installed necessary PMUs in the system.
- d. APTRANSCO would submit the schedule of commissioning of above wind and solar generation capacity along with associated 220kV pooling station and 400kV pooling station to CEA.

30.0 Temporary Charging of Srikakulam-Vemagiri(PG) 765kV D/c line at 400kV by joining it with LILO of Gazuwaka-Vijaywada 400kV S/c at Vemagiri(PG)

30.1 CTU informed that due to delay in receipt of GIS equipment at Vemagiri(PG) 765/400kV substation, temporary Charging of Srikakulam-Vemagiri(PG) 765kV D/c line at 400kV by joining it with LILO of Gazuwaka-Vijaywada 400kV S/c at Vemagiri(PG) was proposed. However, the GIS equipment has been received at Vemagiri(PG) and Angul - Srikakulam-Vemagiri(PG) 765kV D/c line along with LILO of Gazuwaka-Vijaywada 400kV S/c line at Vemagiri(PG) would be ready by the end of December, 2016 and considering the small time gap, temporary charging arrangement may not be considered.

30.2 As such the proposal of temporary charging of Srikakulam-Vemagiri (PG) 765kV D/c line at 400kV, was dropped.

31.0 Enhancing Loading on Raichur-Sholapur Line to increase TTC for SR

31.1 COO (CTU-Planning), PGCIL stated that many new transmission elements have been commissioned in Southern Region and there have been several changes in load – generation pattern in WR & SR. He said that after gaining operational experience, Agra (NR) – Gwalior (WR) 765kV 2xS/c lines are now being operated with N-1 loading limit of 2750MW. Accordingly, considering the importance of power transfer to SR and adequate operational experience has been obtained for Raichur – Solapur 765kV 2xS/c lines, the TTC of SR can be enhanced by increasing the loading limit on Raichur – Solapur 765kV 2xS/c lines from 2500 MW to 2750 MW (under N-1 condition).

31.2 POSOCO said that SPS setting need some modification as both SR and WR regions are involved, therefore the issue needs to be discussed at WRPC and SRPC level. After detailed deliberations it was agreed that CEA would formally take up the matter with SRPC & WRPC secretariat.

32.0 Evacuation of 231 MW power from M/s Thermal Powertech Corporation India Ltd.

32.1 APTRANSCO proposed following state transmission link for drawl of 231 MW power from M/s Thermal Powertech Corporation India Ltd. in Nellore District.

- a) 220 kV Twin Moose DC line (40 KM) from M/s TPCIL to 400/220 kV Manubolu SS.

b) 2 x 315 MVA 400/220 kV ICT at M/s TPCIL

32.2 CTU said that, as the transmission system for evacuation of power from TPCIL generation project has already been planned and implemented, there is no requirement of separate link by APTRANSCO. CEA said that APTRANSCO can draw their share through the ISTS interface with the state grid.

32.3 Accordingly, the scheme of APTRANSCO was not agreed.

Transmission planning proposals in Kerala

33.0 Green Power Corridor to evacuate wind and Solar power through National Grid

33.1 KSEB informed that considering the availability of land and the proposals for about 200MW Solar Park in Kasargode, the new 400kV Substation is proposed to be set up at Cheemeni instead of establishing the same as an extension of the existing 220kV Substation at Mylatty as originally proposed. Accordingly, KSEB proposed the following transmission system:

1) Wayanad – Kasargode Green Power Corridor Project (by KSEBL)

i) Construction of a 400kV Substation at Wayanad (Kattikulam)

This station is presently proposed as a switching station for linking the existing 400kV Mysore – Areekode (Kozhikode) D/c feeder by LILO of both circuits for establishing onward connectivity with the proposed 400kV Substation at Kasargode.

ii) Construction of a 400kV Substation at Kasargode (Cheemeni)

This station is proposed with four 400kV Line bays and two transformer bays with 2x500MVA 400/220kV ICT's. Additional 220/110kV, 2 x 200MVA transformers is provided for sub-transmission level connectivity along with four 110kV Line bays.

Downstream 220kV connectivity: -

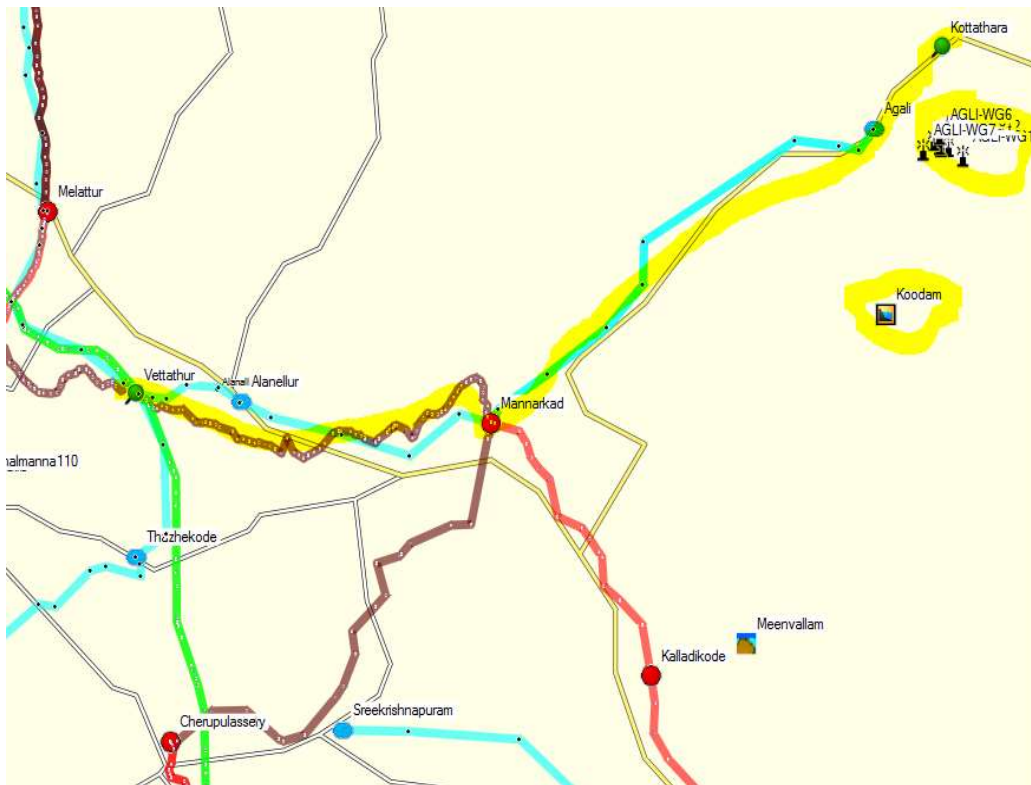
- To Existing 220kV substations at Kanhirode, Thaliparamba, Ambalathara and Mylatty

iii) Interconnectivity of 400kV Switching Station Wayanad (Kattikulam) to 400kV Substation Kasargode (Cheemeni)

Construction of a 400kV Quad Moose / Twin HTLS (ACSS Curlew) D/c feeder from 400kV Switching Station Wayanad (Kattikulam) to 400kV Substation Kasargode (Cheemeni).

- iii) 220/110kV Multi circuit / Multi Voltage line on Multi circuit towers from the proposed 220 kV Substation, Vettathur up to the existing 110 kV Substation Mannarkkad and then extending the 220kV D/c line to 220kV Substation Kottathara. (The 110 kV D/c line will be between the proposed 220 kV Vettathur Substation and existing 110 kV Substation Mannarkkad).

Scheme Area for Attappaddy Green Power Corridor Project



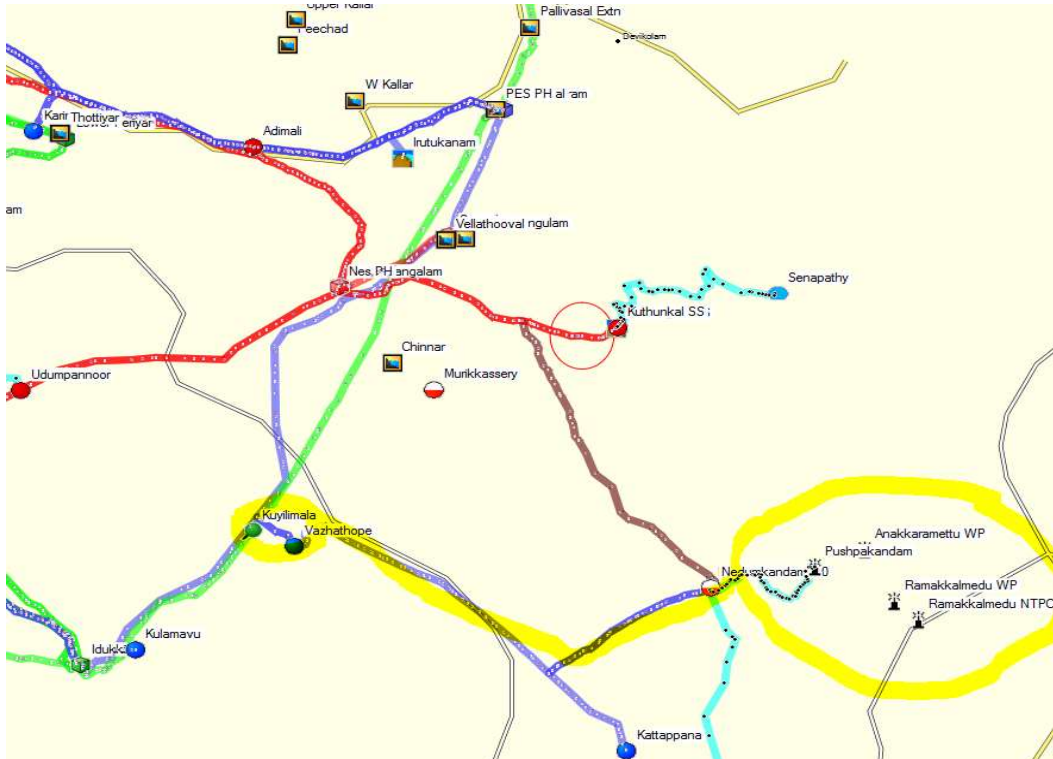
3) 220kV Ramakkalmedu Green Power Corridor

The Ramakkalmedu area is estimated to have a tappable wind potential of around 100 MW and solar potential of about 50 MW. KSEB proposed the following 220kV system for evacuating the renewable power:

- i) Construction of a 2x50 MVA, 33/110 kV step up substation at Anakkaramettu (Near Ramakkalmedu) for pooling and picking up power generated from wind and solar generators in the Ramakkalmedu area.
- ii) Construction of 110kV D/c line from Anakkaramettu (near Ramakkalmedu) to 110kV Substation Nedumkandam.
- iii) Construction of 2 nos 110kV feeder bays at 110kV Nedumkandam Substation.

- iv) Construction of 110 kV D/c line from Kattappana to Kuyilimala along the right of way of existing 66 kV S/c line.
- v) Construction of a 220/110 kV substation with 2nos 220/110kV 50 MVA Transformers and 2 nos 220 kV feeder bays at Kuyilimala. LILO of 220kV Udumalpet – Idukki S/c feeder at 220kV Substation Kuyilimala.

Scheme Area for Ramakkalmedu Green Power Corridor



33.2 After further discussions, the following system of KSEB was agreed:

- 1) **Wayanad – Kasargode Green Power Corridor Project (by KSEBL)**
 - i) Construction of a 400kV Substation at Wayanad (Kattikulam)
 - ii) Construction of a 2x500MVA 400/220kV, 2 x 200MVA 220/110kV, Substation at Kasargode (Cheemeni)
 - iii) Interconnectivity of 400kV Switching Station Wayanad (Kattikulam) to 400kV Substation Kasargode (Cheemeni).
 - iv) 220kV connectivity to existing 220kV substations at Kanhirode, Thaliparamba, Ambalathara and Mylatty.
- 2) **Attapaddy Green Power Corridor Project**
 - i) 33/220 kV step up substation at Kottathara.
 - ii) Construction of 220 /110 kV Substation at Vettathur by LILO of 220 kV Madakathara – Areekode.

iii) 220/110kV Multi circuit / Multi Voltage line on Multi circuit towers from the proposed 220 kV Substation, Vettathur up to the existing 110 kV Substation Mannarkkad and then extending the 220kV D/c line to 220kV Substation Kottathara. (The 110 kV D/c line will be between the proposed 220 kV Vettathur Substation and existing 110 kV Substation Mannarkkad)

3) 220kV Ramakkalmedu Green Power Corridor

- i) Construction of a 2x50 MVA, 33/110 kV step up substation at Anakaramettu.
- ii) Construction of 110kV D/c line from Anakaramettu (near Ramakkalmedu) to 110kV Substation Nedumkandam.
- iii) Construction of 2 nos 110kV feeder bays at 110kV Nedumkandam Substation.
- iv) Construction of 110 kV D/c line from Kattappana to Kuyilimala along the right of way of existing 66 kV S/c line.
- v) Construction of a 220/110 kV substation with 2nos 220/110kV 50 MVA Transformers and 2 nos 220 kV feeder bays at Kuyilimala. LILO of 220kV Udumalpet – Idukki S/c feeder at 220kV Substation Kuyilimala

34.0 Implementation of 220kV Madakkathara-Malaparamba-Nallalam feeder

34.1 KSEB requested that following system may be taken up at proposed Madakathara SS:

- 1) Installation of 2x315 MVA, 400/220kV transformer in the proposed HVDC station at Madakathara..
- 2) Provision of two additional 220kV bays at Madakathara for implementation of KSEB 220kV Madakkathara–Malaparamba–Nallalam feeder.

34.2 CTU informed that as per the space available at the proposed Madakathara HVDC station, establishment of 2x315 MVA, 400/220kV ICT with two 220kV Bays is possible with 220kV GIS bays.

34.3 After further deliberation, the above proposal of KSEB was agreed.

35.0 Additional ICT at 400kV Substation, Kozhikode temporarily by using a spare 315MVA ICT till 500MVA ICT is available.

35.1 KSEB informed that, during discussions in the 39th Standing Committee Meeting on Power System Planning (SCPSP-SR) held on 28th December 2015, transformation capacity enhancement at 400kV Substation Areekode by addition of 1x500MVA transformer was agreed.

- 35.2** KSEBL requested PGCIL to take necessary steps to provide the additional ICT at 400kV Substation, Kozhikode temporarily by using a spare 315MVA ICT till 500MVA ICT is available. The matter was taken up in the 29th SRPC meeting held on 4th and 5th March 2016 wherein TANTRANSCO had informed that they would be returning back the spare ICT of PGCIL being utilized at 400kV Substation Sriperumbudur. ED, SR-II PGCIL had indicated that the ICT being released could be utilized at Areekode (Kozhikode).
- 35.3** The ICT would be connected parallel to existing ICT No 2 and using the 400 and 220kV circuit breakers for both ICT No. 2 and temporary ICT. As the proposal for connecting the third transformer is not standard and conventional and KSEBL has requested clearance for the same.
- 35.4** Members agreed for the same.

36.0 Operational constraints-POSOCO

36.1 POSOCO Quarterly observations on grid constraints.

Following issues stated by POSOCO/SRLDC were discussed:

Transmission Line Constraints

S. No.	Corridor (Season/ Antecedent Conditions)	Description of the constraints	Present Status/Discussion
1	400kV Nellore Pooling Station - Nellore DC line (Whole Year)	With Full Generation at SEPL (600 MW), MEPL (300 MW) & TPCIL (2x660 MW) , the 400kV NPS-Nellore D/C flow is usually more than 1500 MW and it has reached up to 1900 MW. With further commissioning of Units at NCC(2x660MW) & MEPL(stage-2-2x350MW) , the problem will aggravate	Constraint is still there, reactor at Kurnool end needed.(CEA/CTU to review Reactor planning)
2	*400kV Gooty-Nelamangala line & 400kV Gooty-Somanahalli line (Whole Year)	With increase of SR Import to 5900 MW (ATC) and increase of Drawl by Karnataka & due to non-commissioning of 400kV Tumkur-Yelahanka DC line, the flow on 400kV Gooty-Nelamangala & 400kV Gooty-Somanahalli line are loading heavily without N-1 security. *Loading on these lines have been partially relieved after 400kV Tumkur-Bidadi-Neelamangala rearrangement.	No constraint now
3	400kV Udumalpet-Palakkad DC line (Whole year)	Kerala drawl is mainly through 400kV Udumalpet-Palakkad D/C line. 400kV Mysore-Kozhikode DC line commissioned but the flow is limited by the ICT capacity at Kozhikode. Present loading on these lines is in the range of 450-500 MW.	After 400kV Mysore- Kozhikode DC line, constraint has come down, but if schedule of Kerala increases then

S. No.	Corridor (Season/ Antecedent Conditions)	Description of the constraints	Present Status/Discussion
			problem.
4	400kV Hiriya-Nelamangala DC line (Whole year)	With Full generation at Jindal TPS, Bellary TPS, Low generation at UPCL and high wind generation, the flow on 400kV Hiriya-Nelamangala D/C line is continuously above 550MW. The commissioning of YTPS generators will further aggravate the situation. Non-commissioning of 400kV Tumkur-Yelahanka D/C line and its associated downstream 220kV network also is creating further increase in the line flow.	No constraints now.
5	220 kV Bangalore Metro Network (Whole Year)	220 kV Metro networks (Bangalore Urban area) are now radialised to prevent overloading of lines. The radialisation decreases the reliability of supply.	Noted
6	Overloading of 220 kV Shoolagiri-Hosur(TN)-Yerrandahalli-Somanahalli SC line (Whole Year)	Somanahalli, Yerrandahalli and Hosur are Industrial areas. 220kV Yerrandahalli is connected with Hosur(TN) and Somanahalli. Normally, 220kV Yerrandahalli is split and part of its load is fed from Hosur (TN) as the Entire load cannot be met from either side (Somanahalli or Hosur). The line flow on this line is also causing high flows on Shoolagiri-Hosur 230 kV S/C line.	Noted
7	220 kV Sharavathy-Shimoga lines (3 nos) and 220 kV Sharavathy-Talaguppa line(3Nos.) (During Sharavathi generation is full)	With full generation at Sharavathy HEP (>900 MW) there is no N-1 reliability on 220 kV Sharavathy-Shimoga lines and With re-arrangement of circuits at Sharavathi, now there are 3 circuits to Talaguppa. With this the constraint relieved some extent.	Noted
8	Constraints for Rayalaseema TPS Generation Evacuation (Whole Year)	The Southern AP loads have increased and with increased generation at Rayalaseema TPP (5 units on bar at present , 220 MW each and 5th unit has been added without augmenting the evacuation system which was designed for 2 units of 220 MW) the line loadings on the following 220 kV lines are of concern, 220kV Chinakampalli-Renigunta S/C, 220kV Chinakampalli-Rajampeta S/C, 220kV Chinakampalli-Kalikiri S/C line, 220kV RYTPP-Chinakampalli D/C line and 220kV Tadikonda-Parchur - Ongole S/C line	Noted

S. No.	Corridor (Season/ Antecedent Conditions)	Description of the constraints	Present Status/Discussion
9	Transformation Capacity at 400/220kV Kozhikode SS (Whole Year)	400kV Mysore-Kozhikode DC line is commissioned without enough Transformation capacity at 400/220kV Kozhikode, which became bottle neck for import of power in North Kerala.	Noted
10	Constraints in Chennai 230kV System (Whole Year)	230kV Alamatty-Manali DC line, 230kV Manali-koratur, 230kV Kalavindapattu-S.PKoil, 230kV Kalavindapattu-Siruseri, 230kV NCTPS-ETPS line are severely loaded.	TNEB to take action
11	Overloaded 220kV Lines in Tamil Nadu (Whole Year)	The following lines are heavily loaded in Southern Tamil Nadu 230kV Madurai - Sembatty S/c, 230kV Madurai - Theni S/c , 230kV Pugalur - Mywadi S/c, 230kV Pudanchandai-Pugalur line	TNEB to take action
12	Constraints in 230kV Evacuation lines of MTPS and Kundah complex (Whole year)	230kV Kundah PH4-Thudialur line, 230kV MTPS-MTPS-III-Gobi line, 230kV MTPS-Ingur line and 230kV Pugalur4-Mywadi line, 230kV Arasur-Arasur Dc line	No constraints after Karamadai line.
13	Constraint in Evacuation of Coastal Energen (Whole year)	NTPL (2x 500 MW) and Coastal (2x660 MW) generation commissioned. NTPL switchgear Current Carrying Capacity of 2000 MW. Presently, the generation is evacuating with SPS implementation.	Noted
14	Constraints in wind Evacuation (During wind season)	230kV Veerannam-Abhishekpatti line, 230kV Karaikudi-Pudukottai line are loaded heavily during Wind season	After Kanarpatti no problem.

ICT Constraints:

S. No	ICT (Season/ Antecedent Conditions)	Description of the constraints	Has the constraint occurred in earlier quarter? Details.
1	400/220kV 2x315MVA ICTs at Gazuwaka SS (Whole Year)	N-1 condition not satisfied in few occasions	Noted
2	400/220kV 2x315MVA ICTs at Vemagiri SS (Whole Year)	N-1 condition not satisfied in few occasions	Noted
3	*400/220k 3X500 MVA ICTs at Nelamangala (Whole Year)	N-1 condition not satisfied in few occasions. * Due to the constraint at Hoody N-1 is not satisfied in few occasions.	Noted

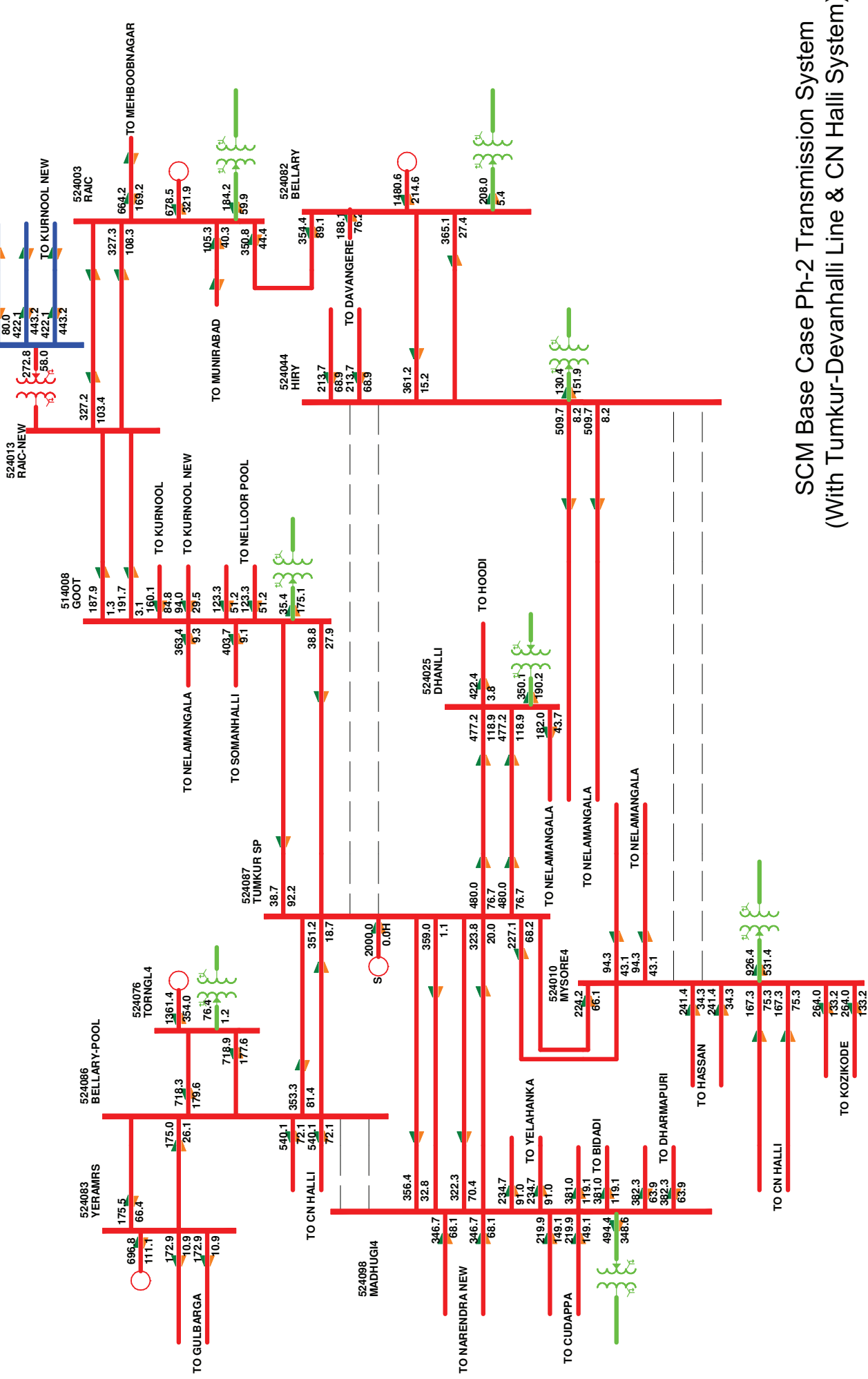
S. No	ICT (Season/ Antecedent Conditions)	Description of the constraints	Has the constraint occurred in earlier quarter? Details.
4	400/220kV 3X500 MVA ICTs at Somanahalli (Whole Year)	N-1 condition not satisfied in few occasions	Noted
5	400/220kV 3X500 MVA ICTs at Hoody (Whole Year)	N-1 condition not satisfied in few occasions. One ICT at Hoody is under outage due to bushing flashover since June 2016.	Noted
6	*400/220kV 2X315MVA ICTs at Mysore (Whole Year)	N-1 condition not satisfied in few occasions. *After commissioning of 500MVA 3 rd ICT at Mysore this constrained is not there.	No problem
7	400/230kV 2X315MVA ICTs at Pugalur (Whole Year)	N-1 condition not satisfied in few occasions	Noted
8	400/230kV 2X315MVA ICTs at Trichy (Whole Year)	N-1 condition not satisfied in few occasions	Noted

Annex-I**List of participants of the 40th meeting of Standing Committee on Power System Planning of Southern Region held on 19th November, 2016 at Hyderabad**

Sl. No.	Name	Designation
	Central Electricity Authority	
1.	S.D. Dubey	Member (PS)
2.	Pardeep Jindal	Chief Engineer
3.	Shivani Sharma	Deputy Director
4.	Kanchan Chauhan	Assistant Director
	SRPC	
1.	S R Bhatt	Member Secretary
2.	Anil	Executive Engineer
	POSOCO/ NLDC	
1.	N. Nallarasana,	DGM
	POWERGRID	
1	Subir Sen	COO(CTU-Planning)
2	V. Shekhar	ED(SRTS)
3	M.A. Ravinder	GM
4	S. Ravindar Kumar	GM(Proj.)
5	A Naga Raju	AGM
6	Mukesh Khanna	AGM (CTU-Plg.), PGCIL
7	Dilip Rozekar	AGM (CTU-Plg.), PGCIL
8	V. Thiagarajan	DGM (CTU-Plg.), PGCIL
9	Kashish Bhambhani	Ch Mgr
10	G. Venkatesh	Engineer (CTU-Plg.)
	POSOCO/SRLDC	
1.	Madhukar G	Dy. Manager
2	S.P.Kumar	DGM
	NTPC	
1.	Subhash Thakur	AGM
2	V. K. Jain	DGM

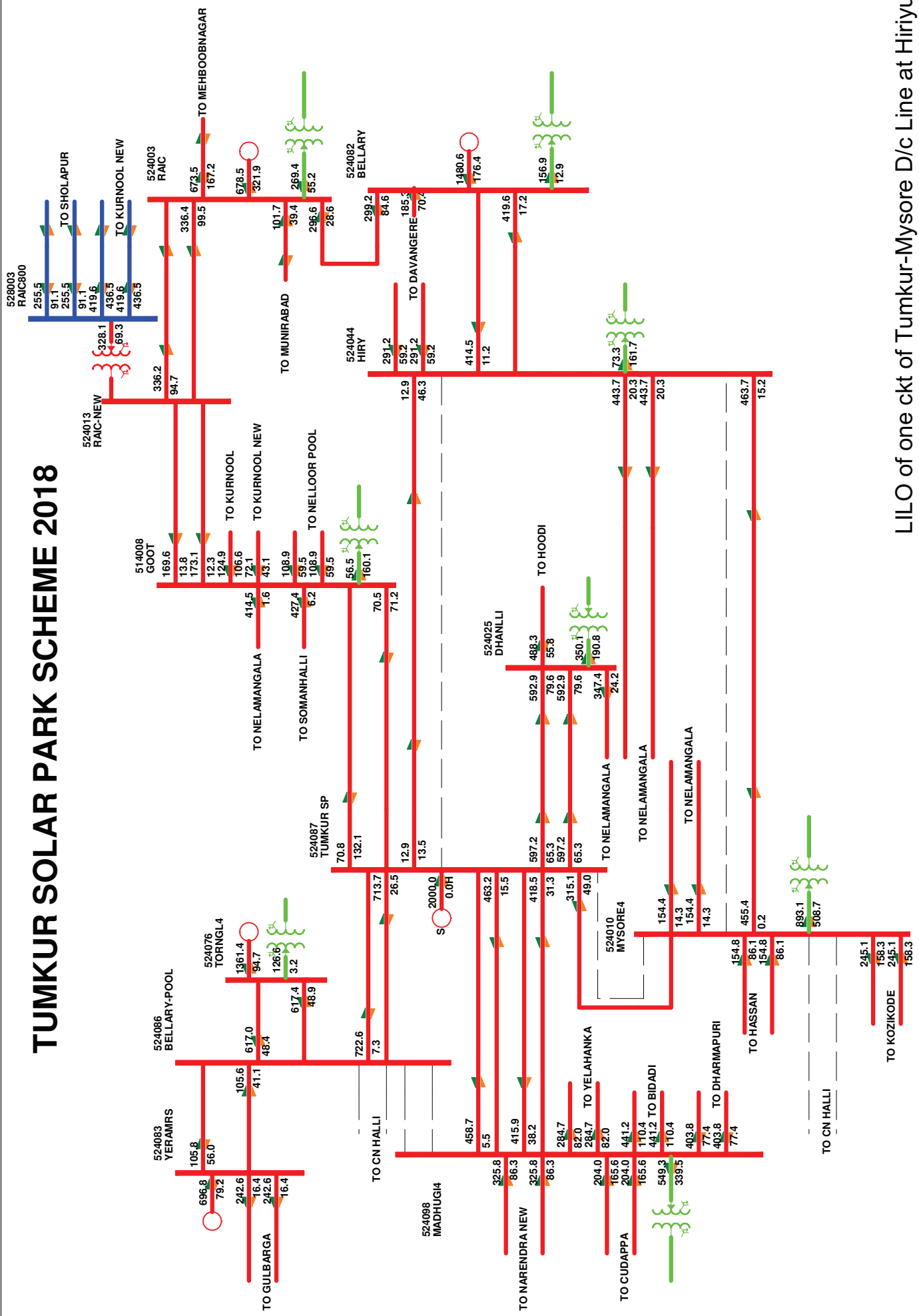
	NLC India Ltd	
1	D.S. Ramakrishnan	ADGM
	APTRANSCO	
1.	R. Nagaraja Swamy	Director (Grid & Trans.)
2.	S. Subramanyam	Director (Proj.)
3.	M. Balasubhramanyam	SE, PS
4	A.K.V. Bhaskar	SE, PS
5.	K. Nirmala	DE, SS
6	Y.V. Ramakrishna	ADE, SS
7	K. Ramesh	ADE, SS
	KSEB	
1.	Vijya Kumari P.	Director (Trans)
2.	Biju SS	AEE,PSE
	TSTRANSCO	
1.	J. Suryaprakash	Director (Proj.)
2	T. Jagatt Reddy	Director (Trans.)
3	P.V. Prashaklro	CE (Proj.)
4	D.R.Vishwanth Rao	CE (SLDC)
5	D.Latha Vinod	CE(Proj)
	TNEB	
1.	T. Senthilvelan	Director (Trans.)
2.	M. A. Helen,	Director, Projects
3	R.S Usha	CE,Planning
4.	D. Ravichandran	SE, System studies
5.	M. Sudarsan	EE, System studies
6.	G. Ramesh Kumar	AEE, System Studies

TUMKUR SOLAR PARK SCHEME 2018



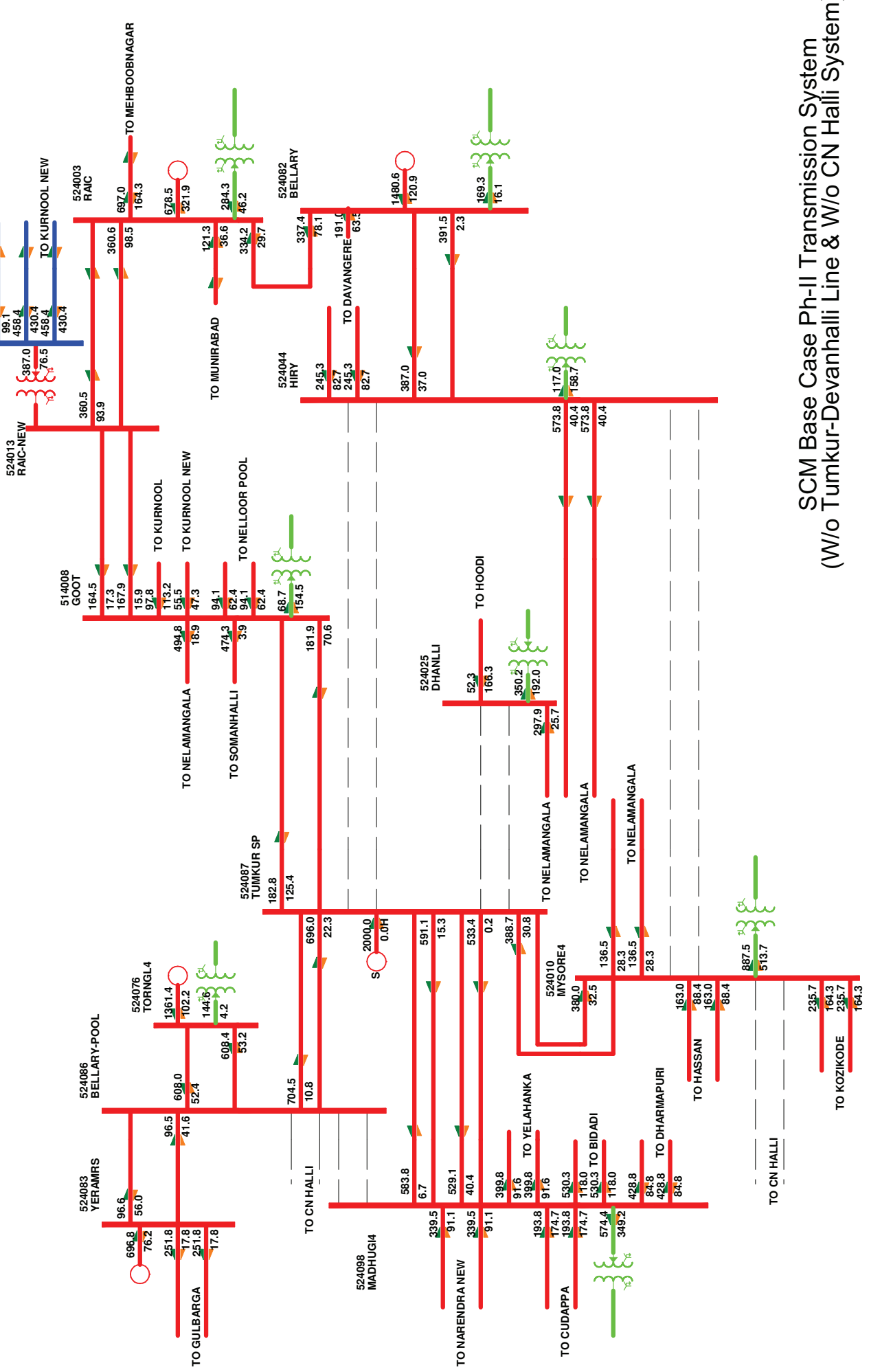
SCM Base Case Ph-2 Transmission System
(With Tumkur-Devanhalli Line & CN Halli System)

TUMKUR SOLAR PARK SCHEME 2018



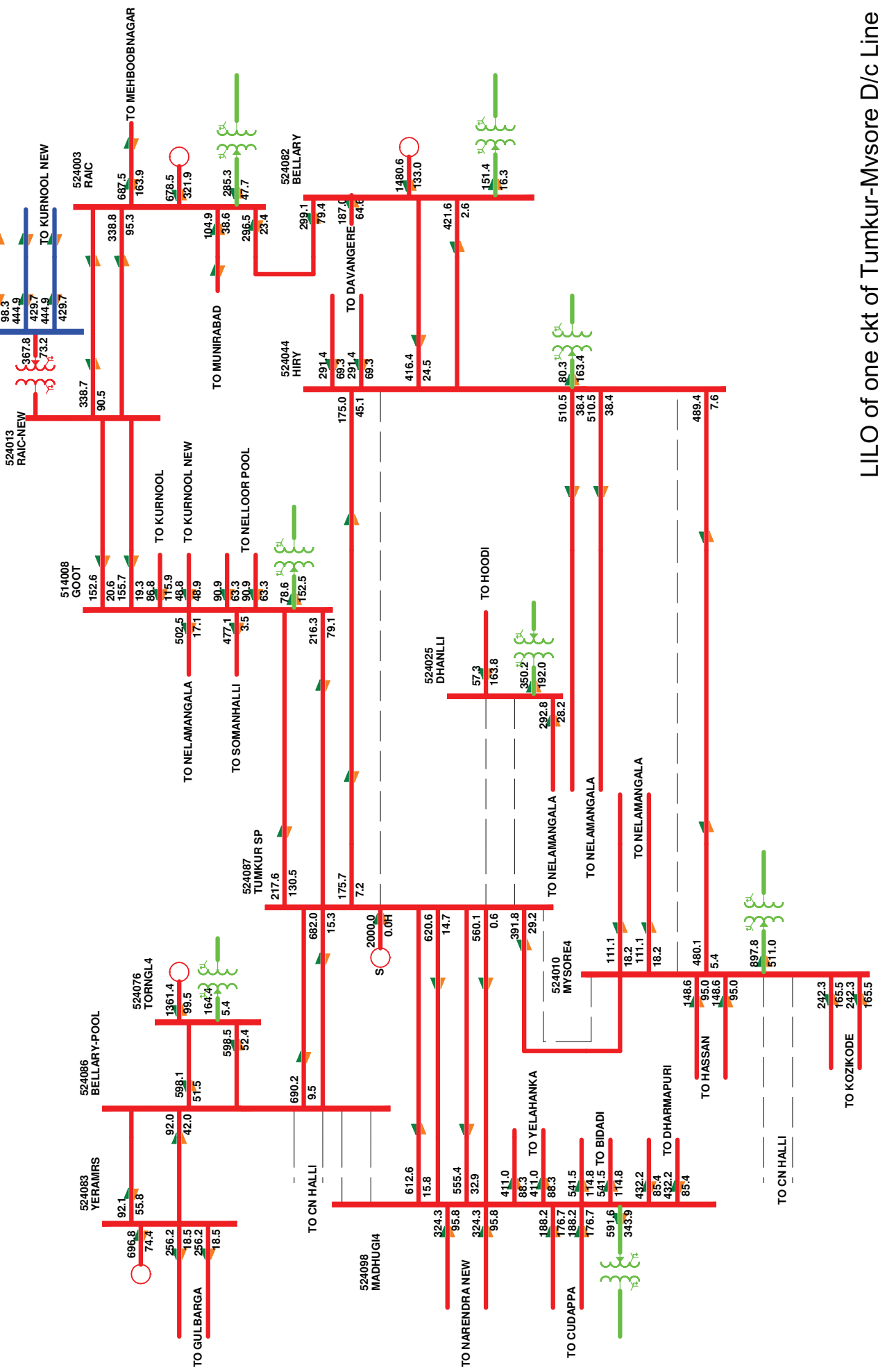
LILO of one ckt of Tumkur-Mysore D/c Line at Hiriyur

TUMKUR SOLAR PARK SCHEME 2018



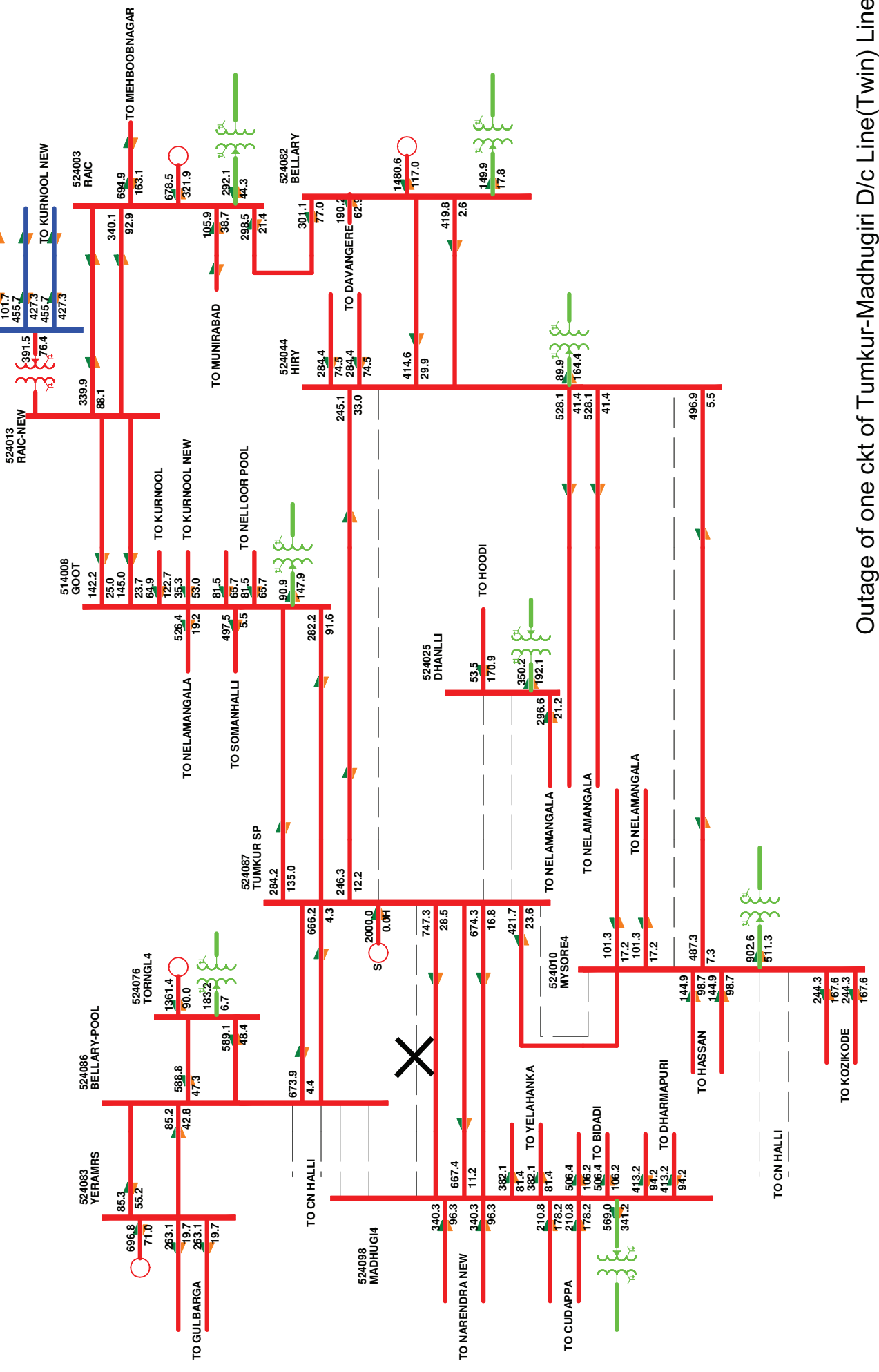
SCM Base Case Ph-II Transmission System
(W/o Tumkur-Devanhalli Line & W/o CN Halli System)

TUMKUR SOLAR PARK SCHEME 2018



LILO of one ckt of Tumkur-Mysore D/c Line

TUMKUR SOLAR PARK SCHEME 2018



Outage of one ckt of Tumkur-Madhugiri D/c Line(Twin) Line

