

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

No. 51/4/(40th)/PSPA-II-2016/ - 386 - 397

Date: 07-11-2016

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

Sir,

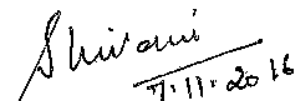
The 40th meeting of the Standing Committee on Power System Planning of Southern Region is to be held on 19th November, 2016 (Saturday) at Hyderabad. The meeting will commence at 10.00 AM.

Exact venue of the meeting will be informed shortly.

The agenda is available at CEA's website (www.cea.nic.in).

Kindly make it convenient to attend the meeting.

Yours faithfully,


7.11.2016

(Shivani Sharma)
Deputy Director (PSPA-II)
(Telephone: 011 26732394)

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
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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, 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.	GM, SRLDC, 29, Race Course Cross Road, Bangalore 560 009 FAX – 080-22268725

Agenda Note for 40th Meeting of Standing Committee on Power System Planning in Southern Region (SCPSPSR)

Date: 19th November, 2016 (Saturday)

Time: 10.00 AM

Venue: Hyderabad.

1.0 Confirmation of the minutes of meeting of the Standing Committee

1.1 Confirmation of the minutes of 39th meeting of the Standing Committee on Power System Planning of Southern Region.

The Minutes of 39th meeting of the Standing Committee on Power System Planning of Southern Region held on 28th-29th December, 2015, 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 (**Annex-Agenda-1.0**).

The minutes of 39th Meeting as circulated, along with corrigendum, may be confirmed.

Issues discussed in previous meetings of SCPSPSR

2.0 Transformer augmentation

2.1 As discussed in the 38th meeting of SCPSPSR, decision on transformer augmentation at Munirabad was to be taken in the 39th SCPSPSR.

2.2 During the meeting of 39th SCPSPSR, Director(Projects), KPTCL informed that there is need to augment transformers at Yelahanka instead of Muniranbad. PGCIL said that there are two transformers at Munirabad, and Karnataka may not be able to meet its load in the area under the outage of one of the transformers. The transformer augmentation takes at least three years to materialize. For the Yelahanka ICT, PGCIL stated that matter may be discussed after the commissioning of the Yelahanka S/S as difficulties are being faced in completion of lines both by PGCIL and KPTCL. Finally, it was decided that augmentation of ICT at Yelahanka/or Munirabad would be taken up in the next SCPSPSR (para 5.7 of MoM).

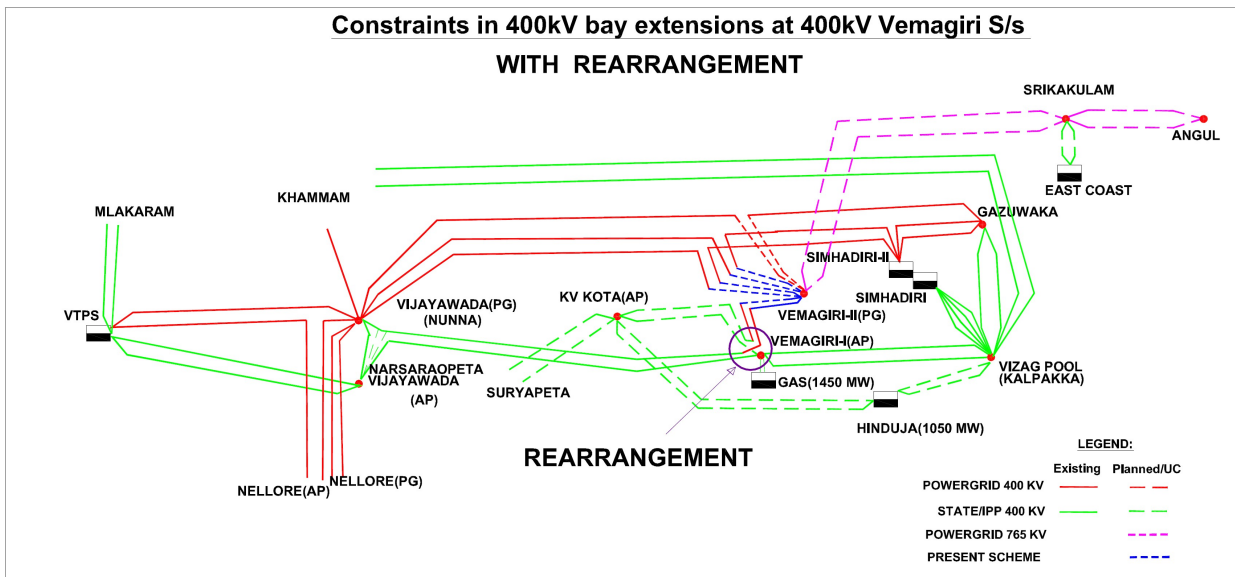
- 2.2 PGCIL may update status of Yelahanka S/S. Members may discuss.
- 3.0 **Reconductoring of 400kV transmission lines from Maheshwaram and Dichipally 765/400kV S/S of PGCIL**
- 3.1 During 39th meeting of SCPSPSR (para 12.3 of MoM), 400kV Maheshwaram 765kV PGCIL SS- Maheshwaram 400kV TS SS were agreed 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.
- 3.2 PGCIL may present. Members may discuss.
- 4.0 **Transmission system for evacuation of power from 4000 MW power plant at Pudimadaka and 4000 MW power plant of APGENCO at Polaki**
- 4.1 During the last meeting, (para 15.5 of MoM) 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.
- 4.2 NTPC/ PGCIL may give status of generation project and the LTA/Connectivity application.
- 5.0 **Cuddapah 765/400kV substation under System Strengthening –XXIV in Southern Region**
- 5.1 It was decided during the 39th SCPSPSR (para 15.36 of MoM) that PGCIL would carry out studies to ascertain requirement of series reactor at Cuddapah or/and at other S/S in SR.

5.2 PGCIL may present. Members may discuss

6.0 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

6.1 During the last SCPSR, 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.

6.2 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).



6.3 The issue was also discussed in the Joint Meeting of Southern Region held in Bangalore during 14-17 March, 2016 (**Annex-Agenda 6.0**).

6.4 APTRANSCO requested POWERGRID to send draft proposal for consideration and approval of their boards. POWERGRID had sent draft proposal

6.5 APTRANSCO/PGCIL may inform/present. Members may discuss.

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

7.1 During the 39th SCPSPSR (para 30.4 of MoM), 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.

7.2 PGCIL may give update.

Transmission planning proposals in Karnataka

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

8.1 KPTCL vide their letter no CEE(P&C)/SEE(PIg)/EE(PSS)KCO-97/34319/2015-16 dated 02 March 2016 (**Annex-Agenda 8.1**), has 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(**Annex-Agenda 8.2**). KPTCL 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

8.2 CEA requested KPTCL to inform about the beneficiaries of the project. KPTCL enquired M/s Udipi Power Corporation Ltd regarding beneficiaries (**Annex-Agenda 8.3**)

8.3 The response of ADANI is still awaited. However, it is understood that the whole power from 2x800 MW would be taken by KPTCL.

8.4 If the power is to be absorbed by Karnataka, evacuation system for these two units may

be planned under state transmission system.

8.5 KPTCL may present, Members may discuss.

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

9.1 In the 39th Standing committee meeting of southern region held on 28th-29th December 2015, transmission scheme was agreed in 2 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 - Hiriya 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) Hiriya – 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.

9.2 PGCIL has informed that following Separate transmission system shall be considered for connectivity & LTA.

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) Hiriya – 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 Hiriyr- Mysore D/c for each circuit.

9.3 From the agreed ATS following changes are suggested by PGCIL

- 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 to connectivity.
- c) 2 no of ICTs from Phase-I has been taken to connectivity.

9.4 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. Also, PGCIL needs to clarify on connectivity for Phase-II.

9.5 PGCIL may present. Members may discuss.

10.0 Transmission System for Ultra Mega Solar Park at Tumkur(Phase-II), Part B

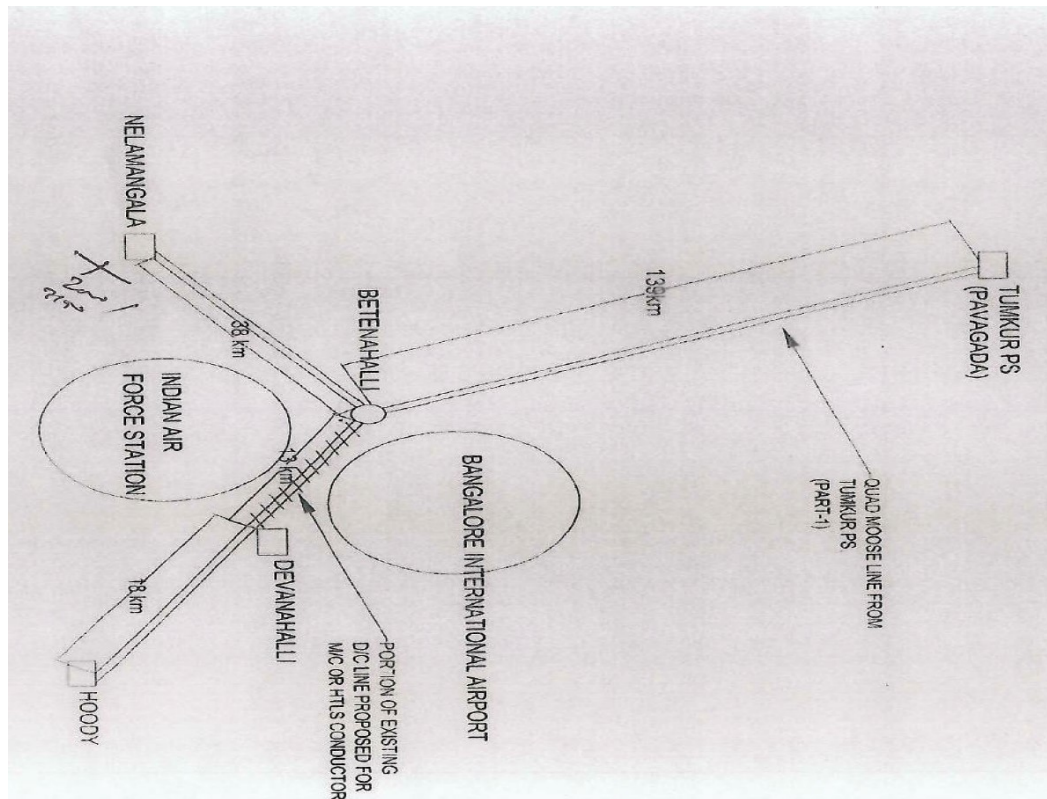
10.1 During 39th SCPSPSR, Tumkur (Pavagada) Pooling station- Devanahally (KPTCL) 400kV D/c (Quad) line was agreed as a part of Transmission System for Tumkur (Pavagada) Ultra Mega Solar Park (2000MW) Phase-II. LILO of Nelamangala- Hoody line at Devanahalli was also agreed. KPTCL vide their letter no KPTCL/Dr/ps/2016-17/53-55 dated 15 June 2016(**Annex-Agenda 10.1**) has suggested that a switching station can be constructed by PGCIL between Davanahalli and Nelamangala near Bettenahalli and replace twin moose line between Bettanahalli and Devanahalli by HTLS conductor.

10.2 PGCIL vide their letter no C/SG/00/TUMKUR dated 28th June 2016 (**Annex-Agenda 10.2**), informed that they are intending to proceed ahead with above arrangement of re-conductoring of line between Bettanahalli and Devanahalli SS by HTLS conductor. They have suggested that 400kV switching station at Bettenahalli may be developed by KPTCL under the STU scope. Also, PGCIL has requested that for the termination of 400kV Tumkur(Pavagada)-Bettenahalli DC line, associated bay extension work at Bettenahalli

station may be taken up by KPTCL on deposit work basis on behalf of PGCIL.

10.3 A meeting was held in CEA on 5th July, 2016(**Annex-Agenda 10.3**) to resolve the issue. PGCIL informed that to address ROW issue, following two options were explored:

- i. Conversion of part of existing 400kV Neelmangala-Hoody KPTCL line, which is passing through proposed Devanhalli S/s, with a multicircuit line. For this, replacement of some of the existing D/c multicircuit towers (with approx. 75-85 m height) would be needed. In this option, clearance of airport authority is required as Bangalore airport is on one side whereas IAF airport is on other side
 - ii. A Switching station near Bettanhalli may be established from where a high capacity (HTLS) line may be drawn upto Devanhalli S/s (about 13kms) by replacing existing twin moose conductors of Neelmangala- Hoody line
- 10.3 PGCIL and KPTCL may respond.



10.4 During the meeting Director, KPTCL expressed their apprehension regarding implementation of first alternative in view of the fully developed area near those locations and suggested to explore second option. KPTCL further suggested that Bettanhalli Sw Stn and Bettanhalli – Devnahalli HTLS line may be taken up as an ISTS by POWERGRID.

KPTCL also said that they would extend support in implementation of this system including shut down of their line when required and also in facilitating Govt land for establishment of proposed 400kV Bettanhalli Sw Stn.through Govt of Karnataka.

10.5 POWERGRID was advised to carry out a joint survey for 400 kV Tumkur- Devanhalli D/c (Quad) line with above options to check its feasibility as well as approach airport authority regarding aviation clearance issues for multi circuit tower. Upon survey and discussion with airport authority, CEA may be apprised so that matter may be taken up further.

10.6 PGCIL may present. Members may discuss

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 vide their letter no C/CTU/S/PLG dated 2nd June, 2016(**Annex-Agenda 11.1**), has informed that 400kV DC Tumkur (Vasanthanarsapura)- Bidadi Quad line associated with NTPC Kudgi project is expected to be completed by June'16. Bays for termination of the lines are under implementation by PGCIL and are expected by Sept, 2016. Therefore, PGCIL has proposed the following:

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 PGCIL has also stated that the proposed arrangement will provide alternate path and relieve loading on critical lines such as 400Kv SC Gooty- Somanhally, 400Kv SC Gooty- Nelamangala, 400kV DC Hoody-Nelamangala and 400kV DC Kolar- Hoody lines.

11.3 A meeting was held in CEA on 2nd August 2016, (**Annex-Agenda 11.2**) to resolve the issue. PGCIL informed that the above arrangement will result in following configuration:

- i. 400 kV S/c Tumkur-Nelamangala Line- Length 129 km
- ii. 400 kV S/c Tumkur-Bidadi Line- Length 93 km

iii. 400 kV S/c Bidadi – Nelamangala line – Length : 37 km

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 Hiriyur – Nelamangala lines with the above proposed arrangement.

He said that allowing this rearrangement may be having advantage compared to current scenario, however bay construction at 400kV Bidadi, for restoring to intended final configuration of lines, may be accelerated.

11.4 After discussions in the said meeting, the rearrangement was agreed. POWERGRID will restore the final configuration by Nov 2016 i.e: Tumkur(Vasanthanarasapura) – Bidadi 400kV Quad D/c and Bidadi – Nelamangala 400kV DC line.

11.5 PGCIL may update. Members may note.

Transmission planning proposals in Tamil Nadu

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

12.1 TNEB vide their letter CE/PIg. &R.C/SE/SS/EE1/AEE3/F.Adani/D84 dated 26.02.16 (**Annex-Agenda 12.1**) has informed that Kamuthi- Karaikudi line which was agreed in 37th meeting of SCPSPSR 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. This issue was also discussed in the Joint Study meeting during March 14-17, 2016 at Bangalore. Accordingly, TNEB vide their letter dated 04.06.2016 (**Annex Agenda 12.2**) has proposed that one circuit of Kayathar- Karaikudi 400kV DC line can be LILoed at Kamuthi using Kamuthi- Karaikudi line on temporary basis. They have also informed that during wind season, the Kamuthi 400kV bus will be charged from Kayathar 400kV SS end by closing Kayathar- Kamuthi 400kV line of 300 km. During the wind season, the

Kayathar voltage is less than 390kV and while charging the Kayathar- Kamuthi 400kV SC line from Kayathar end, the rise in voltage would be around 22kV.

12.2 TNEB has further informed that during nil wind season, Kayathar bus voltage will be more and so, the Kamuthi SS may be charged from Karaikudi 400kV SS end or by through 400/230kV or 400/110kV ICT. The Kamuthi- Kayathar 400kV line will be charged from Kamuthi end with 1x63 MVAR line reactor at Kayathar end.

12.3 A meeting was held in CEA on 20th June, 2016 (**Annex-Agenda12.3**), regarding evacuation of power from solar projects in Kamuthi. After the discussions 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.

12.4 TNEB may update. Members may notice.

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

13.1 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.

13.2 TANTRANSCO vide their letter no CE/Plg.&R.C/SE/SS/EE1/AEE1/F.39th Stg. Committee/D-55 dated 08.02.2016 (**Annex-Agenda 13.1**) had sent revised load flow studies with following observations:

- i. By doing the suggested interim arrangements, it is observed that during wind season, the Kayathar, Veeranam and Udayathur 230kV feeders to Tirunelveli 230kV SS are in fully loaded condition.
- ii. During nil wind season, the Kayathar – Tirunelveli 230kV feeder is in fully loaded condition.
- iii. The Tirunelveli 400/230kV ICT loading is within limit.

Hence, they have 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”

13.3 PGCIL/TNEB may present. Members may discuss.

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

14.1 In 38th SCPSPSR, TANGEDCO has stated that the land for the establishment of Edayarpalayam 400/230-110Kv SS has been purchased and the tendering work is under progress and the establishment of Edayarpalayam 400/230-110Kv substation will be under scope of TANTRANSCO. It was decided in the meeting that establishment of

Edayarpalayam 400/230-110 kV substation with 2x500MVA transformer at Edayarpalayam and 2x125 MVAR bus reactors will be in the scope of TANTRANSCO while Edayarpalayam – Myvady 400 kV DC quad line will be in the scope of PGCIL.

- 14.2** Further TSTRANSCO vide their letter no CE/Plg.&R.C/SE/SS /EE1/AEE1/F.Edayarpalayam /D-210 dated 13.06.2016 (**Annex-Agenda 14.1**) 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.
- 14.3** TANTRANSCO may present. Members may discuss.
- 15.0** **Transmission system for evacuation of power from Uppur TPS (2x800 MW) of TNEB in Tamil Nadu.**
- 15.1** 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. TANTRANSCO vide their letter no CE/Plg&R.C/SE/SS /EE1/AEE1/F.Uppur ATS /D-169/2016 dated 05.05.2016 (**Annex-Agenda 15.1**) has sent the proposal of ATS of the Uppur 2x800MW Thermal Power Project in Ramanathapuram and load flow studies.
- 15.2** TANTRANSCO has informed that in the Ramnad district due to high solar penetration, substantial solar power injection is available and further injection of solar power is expected in this district in the near future. Further this area is not a load centre. Hence considering all of the above, it has been decided to evacuate the power from Uppur – 2X800MW power project at 765kV level.
- 15.3** It has been proposed to establish a 765/400kV substation in Virudhunagar with pooling of power from Uppur Thermal power station apart from renewable generation of wind & solar projects in Southern part of TN with 765kV DC connectivity to Coimbatore and Ariyalur 765kV substations.
- 15.4** TANTRANSCO has informed that the Load Flow study has been conducted for the time period of 2020-2021-year condition. The ongoing ETPS Expansion 1X660MW, ETPS

SEZ – 2X660MW, NCTPS Stage III – 1X800MW projects along with the Ennore Replacement - 1X660MW and Udangudi Stage I 2X660MW, SEPC – 1X525MW projects have been considered in the study. The Pugalur HVDC station along with Raigarh – Pugalur 800kV, 6000MW HVDC line, Pugalur – North Trichur 320kV, 2000MW, HVDC line and its associated 400kV lines from Pugalur are also considered in this study. However, 1500MW schedule is considered for Kerala alone from Raigarh HVDC station for this study. During wind season, 6200MW of wind power and 1500MW of solar power has been considered in the study.

Base Case: with Uppur 2 X 800 MW with 765kV DC Connectivity to Virudhunagar 765 kV SS.

Case 1: Base case + LILO of Udangudi - Ottapidaram 400kV DC quad line at Virudhunagar 765 / 400 KV SS + 400 KV DC quad line from Kamuthi 400kV SS to Virudhunagar 765/400kV SS + 400 KV DC twin moose line from Thappagundu 400 kV SS to Virudhunagar 765 / 400 KV SS

Case 2: Base case + LILO of Ottapidaram - Kamuthi 400 KV DC quad line at Virudhunagar 765/400 KV SS + 400 KV DC twin moose line from Thappagundu 400kV SS to Virudhunagar 765 / 400 KV SS + 400 kV DC Quad line from Kayathar 400 KV SS to Virudhunagar 765/400 kV SS.

Case 3: Base case + 400 kV DC quad line from Kayathar 400 KV SS to Virudhunagar 765/400 kV SS + 400 kV DC quad line from Kamuthi 400 KV SS to Virudhunagar 765/400 kV SS + 400 kV DC line from Thappagundu 400 KV SS to Virudhunagar 765/400 kV SS.

15.5 From the study results, the following have been observed.

- i. The power from Udangudi 2X660MW, SEPC -1X525MW and wind & solar power generation are injected to Karaikudi 400/230kV substation via., Kayathar Ottapidaram and Kamuthi 400kV substations and to Tirunelveli (Abisekapatty) 400/230kV substation via., Kayathar & Kanarpatty 400kV substations for load dispersal.
- ii. Hence, in the base case, even after considering the Tirunelveli – Cochin 400kV DC line, the Checkanurani - Myvady 400kV SC line is found to be in over loaded condition. Even during present network condition also, in the full wind season, the Checkanurani - Myvady 400kV SC line is over loaded. The Kanarpatty – Tirunelveli 400kV DC line is also found to be in fully loaded condition.

- iii. In the 39th Standing committee meeting, it was agreed that the 2nd circuit from Kanarpatty to Tirunelveli 400kV line would be mainly for reliability purpose and not for injection of power into ISTS Grid.
- iv. Hence, various options have been explored to avoid the above over loading and it is observed that in case 2 & 3 , the power flow is found to be normal in all the 400kV and 765kV lines.
- v. Considering the techno economical condition, case 3 is found to be a better option i.e., with Kayathar – Virudhunagar 400kV DC quad line, Kamuthi – Virudhunagar 400kV DC quad line and Thappagundu – Virudhunagar 400kV DC twin moose line.

15.6 Based on the above, the following scheme has been evolved.

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:**
 - i. 400kV DC Quad line from Kayathar 400kV SS.
 - ii. 400kV DC Quad line from Kamuthi 400kV SS.
 - iii. 400kV DC twin moose line from Thappagundu 400kV SS.

15.7 TANTRASNCO may present. Members may discuss.

16.0 Observations on earlier SCPSPSRs

16.1 Evacuation scheme for SEPC-1X525 MW

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 2X6660MW and SEPC 1X525 MW, however TANGEDCO will furnish fresh studies.

PGCIL may present.

16.2 Startup power requirement for ETPS SEZ-2X660MW and Udangudi Projects(2x660MW)

- (i) The transmission scheme for the evacuation of ETPS SEZ-2X660MW has been approved in the meeting of 37th SCPSPSR. TANTRANSCO vide their letter no CE/Plg.&R.C/SE/SS/EE1/AEE!/F.39th StgComm Modification/D.85 dated 27.02.2016 (**Annex-Agenda 16.1**), 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.

Members may discuss.

- (ii) Also, TANTRANSCO vide their letter dated 28.07.2016](**Annex-Agenda 16.2**) has informed that for the Udangudi Stage-I project2x660MW, the 400kV DC evacuation line planned to Kayathar, may be used for startup power requirements.

Members may discuss.

16.3 Ariyalur-Thiruvalam 765kV line reactor

TANTRANSCO vide their letter dated 28.07.2016 has informed that as the Ariyalur-Thiruvalam 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-Thiruvalam 765kV DC at Ariyalur end, may be dropped.

Members may discuss.

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

17.1 TANTRANSCO vide their letter no CE/Plg.&R.C/SE/SS/EE1/AEE1/Kudankulam/D.321/2016 dated 06.09.16 (**Annex-Agenda 17.1**) has stated that during 36th SCPSPSR, 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 SCPSPSR, 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.

17.2 NPCIL has 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.

17.3 TANTRANSCO may present, Members may discuss.

Transmission planning proposals in Telangana

18.0 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

CEA, vide their letter 51/4/SP&PA-2015/405-407 dated 14.06.2016 (**Annex-Agenda 18.1**) has 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

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

TSTRANSCO, vide their letter dated 04.05.2016(**Annex-Agenda 18.2**) requested CEA to give in-principle approval for the above scheme. This scheme was discussed and agreed in 37th meeting of SCPSPSR held on 31-07-2014. However, Telangana vide their email dated 24.05.2016 (**Annex-Agenda 18.3**) revised the above scheme. Following load/motor capacity was furnished by TSTRANSCO:

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
	Total	4235	3450

The difference of earlier approved scheme and the proposed scheme are as given below:

Sl. No.	Substations and Lines as approved 37 th Standing Committee		Revised Proposal of TSTRANSCO
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

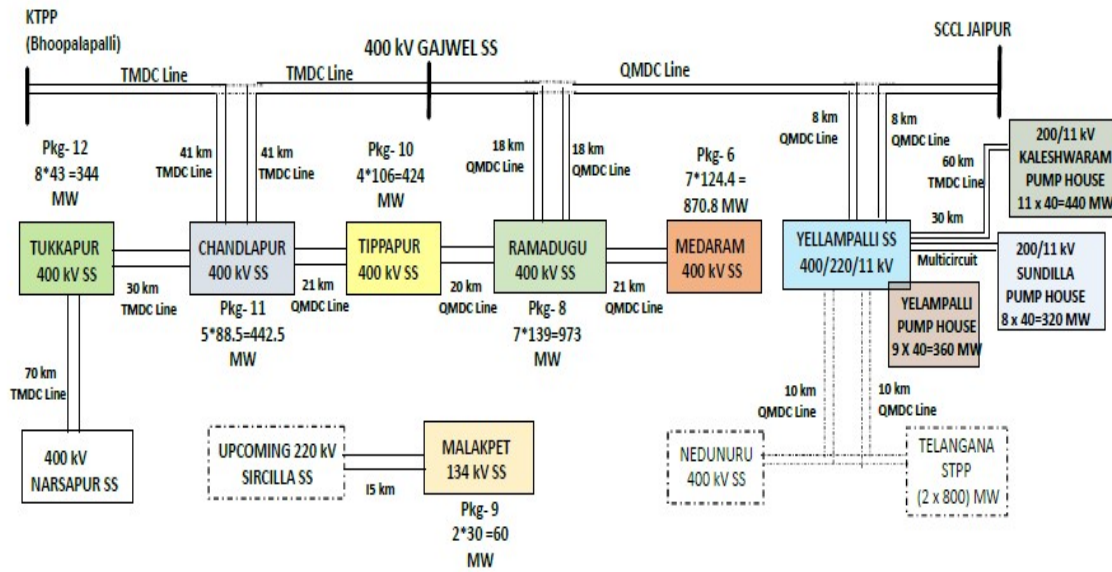
		4	Erection of 400 KV SS at Chandlapur, Medak Dist Pkg-11
		5	Erection of 400/220 KV SS at Yellampalli, Karimnagar Dist
		6	Erection of 220 KV SS at Yellampalli Pump House, Karimnagar Dist
		7	Erection of 220 KV SS at Sundilla Pump House, Karimnagar Dist
		8	Erection of 220 KV SS at Kaleshwaram Pump House, Karimnagar Dist
		9	Erection of 132 KV SS at Malakpet, Karimnagar Dist Pkg-9
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 KTPP-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 KTPP - 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
		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 circuits 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 circuits of 400 KV Quad Moose DC line from Telangana STPP- Nedduru 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
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07-06-2016

PROPOSED 400 kV EHT NETWORK FOR EXTENDING SUPPLY TO KALESHWARAM PROJECT



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

The transmission system for this scheme was discussed in 39th meeting of SCPSPSR held on 28th and 29th December, 2015. In the meeting TSTRANSCO informed that the locations of the proposed new LI SS, has been changed. So, it was decided that TSTRANSCO will furnish new proposal and the issue will be re-discussed in the next SCPSPSR. TSTRANSCO has now revised capacity of LI Substations and the associated transmission system, which are given below:

Following load/motor capacity was furnished by TSTRANSCO:

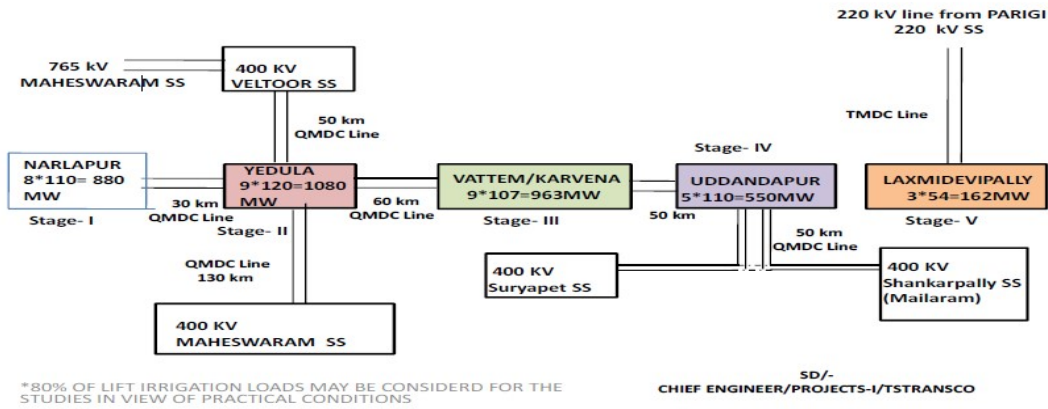
Sl	Name of LI substation	Capacity, MW	Simultaneous load, MW
1	400 KV Narlapur	8x110=880	660
2	400 KV Yedula	9x120=1080	840
3	400 KV Vатtem/ Karvena	9x107=963	749
4	400 KV Uddandapur	5x110=550	440
5	220 KV KP Laxmidevipally	3x54=162	108
	Total	3635	2797

Associated transmission system

- i) 400 KV Quad Moose DC line from Veltloor 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 Vатtem /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 Vатtem 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.

PALAMOOR Ranga Reddy LIS

Dt.7.6.2016



18.3 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.

18.4 Earlier, Joint Studies were carried out with SR constituents and PGCIL in Bangalore on 14-17 March, 2016. Further, the studies were carried out in CEA on 13th and 14th June, 2016 for evolving the transmission system for above LI schemes of Telangana and the Telangana STPP.

For these studies, the total peak load of Telangana was assumed as 12000 MW by 2019-20 additional LI load of 6000 MW. The studies were carried out for three load generation scenarios:

1. 12000 Telangana Load and 6000 LI load.
2. 11000 Telangana Load and 6000 LI load
3. 11000 Telangana Load and 0 LI load.

18.5 CEA vide its letter dated 14th June, 2016 conveyed its in-principle approval and mentioned the following:

- a. There is requirement of more outlets from SCCL Generation Project.
- b. Provision of reactors to prevent high voltages in non-operational season. This requirement would be worked out by TSTRANSCO and submitted to CEA for taking up in next meeting of SCPSPSR.
- c. As informed by TSTRANSCO, these machines would be synchronous motors with capability to run at least at 0.95 power factor Lag/Lead.
- d. 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).

18.6 In this regard a meeting was held in the office of Chief Engineer(PSPA-II) regarding “re-routing of Existing 400kV lines for Telangana STPP” (**MoM at Annex-Agenda 18.4**)

18.7 Members may discuss.

19.0 Provision of reactors-Kaleshwaram Lift Irrigation project, Palamuru Rangareddy Lift irrigation schemes, Telangana STPP

19.1 TSTRANSCO vide their letter no Dir(Proj)/ CE(SLDC)/ SE(PS)DE(SS) /ADE(SS)/F.ReactorLI/D.No428/16, Dt 03/09/2016 (**Annex-Agenda 19.1**) has requested approval for 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) Vатtem 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

19.2 Members may discuss.

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

20.1 TSTRANSCO vide their letter no Dir(Proj)/SE(PS)/DE(SS)/ADE-3/F.39th SCM/D.No.350/16 dated 28.05.2016 (**Annex-Agenda 20.1**) has requested to arrange approval for the augmentation of Power Transformers at 400kV Gajwel SS with one no additional 315 MVA Power Transformer. This is essential in view of the COD of SCCL Unit 1 (1x600 MW).

20.2 TSTRANSCO may present. Members may discuss.

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

21.1 TSTRANSCO vide their letter no Dir(Proj)/SE(PS)/DE(SS)/ADE-3/F.39th SCM/D.No.350/16 dated 28.05.2016 (**Annex-Agenda 21.1**) has requested to LILO of 400kV NagarajunaSagar -Kurnool line to the upcoming 400Kv SS at Dindi.

21.2 During the 39th SCPSPSR, TSTRANSCO's request to LILO 400kV Nagarjuna Sagar-Kurnool ISTS line at the proposed Dindi 400/220kV SS was not agreed as PGCIL said

that as per the studies carried out the said LILO is not effective, as such it may be considered later.

21.3 TSTRANSCO may present. Members may discuss.

22.0 Integration of Solar Power Project in Telangana

22.1 A meeting was held in CEA on 22nd January, 2016 to discuss issues regarding integration of 500MW solar park at Gattu in Mehboobnagar district of Telangana and to plan transmission system for evacuation of their power into the grid. It was discussed with TSTRANSCO that two number of 220kV D/C lines possibly to two different locations out of these four locations 1) Wanaparthi, 2) Bhootpur, 3) Veltur, 4)Themajipet, can be planned.

22.2 TSTRANSCO vide their letter dated 08.03.2016 (**Annex-Agenda 22.1**) has informed that it is convenient to evacuate solar power at Gattu as follows

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

22.3 TSTRANSCO may present. Members may discuss

Transmission planning proposals in Andhra Pradesh

23.0 Wind Power evacuation

23.1 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.

23.2 APTRANSCO vide their letter no CE(IPC&PS) /SE(PS) /DE(SS<SS)/ F.SCM /D.No.125/16dt.14-07-2016 (**Annex-Agenda 23.1**) has requested approval of another 3595 MW of wind and 1500 MW of Solar. APTRANSCO has 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 as given below:

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	

Solar Power Projects					
S.N.	Name of 400kV Substation	Name of the Substation	Proposed Wind Power Generation Installed Capacity(MW)	Project Status	
1	400kV Talaracheruvu 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		

23.3 APTRANSCO have proposed 3 nos of 400kV new substations: 400kV Talaricheruvu (3x315 MVA), 400kV Mylavaram (3x315 MVA) and 400kV Aspiri(New) (4x315MVA) and capacities as evolved after the joint studies with CEA, PGCIL and APTRASCO on 25th and 26th of May, 2016 are 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 Vajrakarur	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

	Name	Location	Type	I/c	Developer
1	NP. Kunta	Anantapur	Solar	1000	NTPC
2.	Galiveedu	Cuddapah	Solar	500	APSPCL
3.	Panayam	Kurnool	Solar	1000	NVVNL
4	Talaricheruvu	Anantapur	Solar	500	APGENCO
5	Mylavaram	Kadapa	Solar	1000	APSPCL
	Sub-total		Solar	4000	
6	Uravakonda	Anantapur	Wind	2095	Pvt developers
7.	Kondapur	Cuddapah	Wind	950	Pvt developers
8	Hindupur	Anantapur	Wind	1300	Pvt developers
9	Uravakonda - 2	Anantapur	Wind	1400	Pvt developers
10	Aspiri(New)	Kurnool	Wind	1000	Pvt developers
	Sub-total		Wind	6745	
	Total			10745	

Though the requirement from 400kV Mylavaram to 400kV Kondapuram was of Twin Moose only, however due to RoW constraints, APTRANSCO is taken up Quad Moose connectivity keeping in view future grid connectivity needs. Same is the case for extending connectivity to 400kV Aspiri(New). The details of the agreed and proposed scheme are given below (all these lines and substations will be erected by APTRANSCO)

Connectivity Approved			
SI No	Name of the Element	Length in KM	Status
1	400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV MahaboobNagar SS	190	Under construction
2	400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV Kondapuram SS	128	Commissioned
3	400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV Hindupur SS	130	Under construction
4	400kV Quad Moose DC line from 400kV Kondapuram SS to 400kV Kurnool SS	120	Commissioned
5	400kV Quad Moose DC line from 400kV Hindupur SS to 400kV NPKunta SS	110	to be executed by PGCIL
6	400kV Quad Moose DC line from 400kV Kadapa SS to 400kV NPKunta SS	60	to be executed by PGCIL
7	220kV Twin Moose DC line from 400/220kV Uravakonda SS to 220kV Vajrakarur SS	13	Under construction
8	220kV Twin Moose DC line from 400/220kV Uravakonda SS to 220kV Borampalli SS	55	Under construction
9	220kV Single Moose DC line from 400/220kV Uravakonda SS to 220kV Borampalli SS	55	Under construction
10	220kV Single Moose DC line from 220kV Borampalli SS to 220kV Kalyandurg SS	15	Under construction
11	220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Thirumalayapalli SS	17	Under construction
12	220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Bethamcherla SS	68	Under process
13	220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV	70	Under construction

	Chakrayapet SS		
14	220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Porumamilla SS	75	Under construction
15	220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Tadipatri SS	40	Under process
16	220kV Single Moose DC line from 400/220kV Kondapuram SS to 220kV Jammalamadugu SS	10	Under construction
17	220kV Single Moose DC line from 400/220kV Hindupur SS to 220kV Penukonda SS	50	Under process
18	220kV Single Moose DC line from 400/220kV Hindupur SS to 220kV Hindupur/Gollapuram SS	20	Under process
19	1x 80 MVAR Bus reactor at 400/220kV Uravakonda SS		Under construction
20	1x 80 MVAR Bus reactor at 400/220kV Kondapuram SS		Under construction
21	1x 80 MVAR Bus reactor at 400/220kV Hindupur SS		Under process
22	132kV DC line from 220/132kV Jammalamadugu to 132kV Jammalamadugu	10	Under construction
23	132kV DC line from 220/132kV Porumamilla to 132kV Porumamilla	10	Under construction
24	132kV DC line from 220/132kV penukonda to 132kV Penukonda	10	Under construction
	Connectivity to be approved		
1	Making LILO of both circuits of 400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV Kondapuram SS at proposed 400kV Talaricheruvu SS	2	
2	400kV Quad Moose DC line from 400kV Kondapuram SS to 400kV Mylavaram SS	10	
3	400kV Quad Moose DC line from 400kV Aspiri SS to 400kV Kurnool SS	80	
4	400kV Quad Moose DC line from 400kV Uravakonda SS to 400kV Uravakonda-2 SS	25	
6	220kV Single Moose DC line from 400/220kV Hindupur SS to 220kV Pampanur Tanda SS	70	

7	220kV Twin Moose DC line from 220kV Vajrakarur SS to 220kV Anantapur SS	60	
8	1x125 MVAR Bus reactor at 400/220kV Uravakonda-2 SS		
9	1x125 MVAR Bus reactor at 400/220kV Talaricheruvu SS		
10	1x125 MVAR Bus reactor at 400/220kV Mylavaram SS		
11	1x125 MVAR Bus reactor at 400/220kV Aspiri SS		
	Modification		
1	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	20	
2	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	15	

23.4 APTRANSCO may present, Members may discuss.

24.0 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)

24.1 PGCIL vide letter C\CTU-Plg\Angul-Srikakulam dated 10.10.2016 (**Annex-Agenda 24.1**) has proposed temporary arrangement for charging of Srikakulam-Vijayawada and Srikakulam-Gazuwaka transmission circuits.

24.2 Prior to this proposal from PGCIL, CEA had discussed the matter with CTU-planning group of PGCIL on 28-Sept-2016 (**Annex-Agenda-24.2**). As may be seen from the discussions, there is a need to assess loading limit of the temporary inter-connection between Srikakulam-Vijayawada due to Zone-3 setting, or may be to alter Zone-3 settings to accommodate more flow on this line. PGCIL was requested to carry out the studies considering impact of zone-3 setting and include in their proposal.

24.4 PGCIL may present. Members may discuss.

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

25.1 APTRANSCO proposed the following dedicated scheme for evacuation of 231 MW power from M/s Thermal Powertech Corporation India Ltd. at 220 kV level 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

25.2 Members may discuss.

Transmission planning proposals in Kerala

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

KSEB vide their letter no No. D (T&SO)/PSE/SCPSP/2016-17 dated 02.11.2016 (**Annex-Agenda 26.1**) has submitted the following:

26.1 400kV Kasargode (Cheemeni) – Areekode (Kozhikode) D/c Corridor via Wayanad.

400kV Uduppi – Mylatty (Kasargode) – Areekode (Kozhikode) D/c feeder with Quad Moose conductor is an already sanctioned scheme. The above scheme requires two more 400kV line bays at 400kV Substation Areekode (Kozhikode) in addition to the two line bays required for terminating the already sanctioned 400kV Madakathara (Trichur) – Areekode (Kozhikode) D/c feeder and a transformer bay for accommodating the 500MVA transformer, which can be a constraint under the present arrangement in the station. Accordingly it is proposed to interconnect 400kV Kasargode and Kozhikode Substations by utilizing the LILO of 400kV Mysore – Kozhikode (Areekode) D/c feeder as detailed below.

Considering the availability of land and the proposals for establishing a 1320MW thermal station and a 200MW Solar Park at Cheemeni 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. The 200MW Solar power from Ambalathara Substation will also get pooled at this 400kV Substation. Further it is also proposed that KSEBL may be allowed to carry out the execution of the 400kV Substation at Kasargode along with the 400kV D/c corridor from Kasargode to Areekode as detailed below. The 400kV corridor from Uduppi to Kasargode can be executed as per the original scheme sanctioned previously.

Considering the above factors, the sanctioned 400kV Uduppi – Kasargode (Mylatty) – Kozhikode scheme may be redesigned as follows:

Part A: Wayanad – Kasargode Green Power Corridor Project (by KSEBL)

I. Construction of a 400kV Substation at Wayanad (Kattikulam)

This station is intended as a Switching station for dropping 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. The substation is proposed with six 400kV line bays ie. 2+2 for LILO of both circuits of 400kV Mysore – Areekode D/c feeder and two bays for connectivity with 400kV Mylatty Substation through 400kV D/c feeder.

II. Construction of a 400kV Substation at Kasargode (Cheemeni)

This station is intended 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

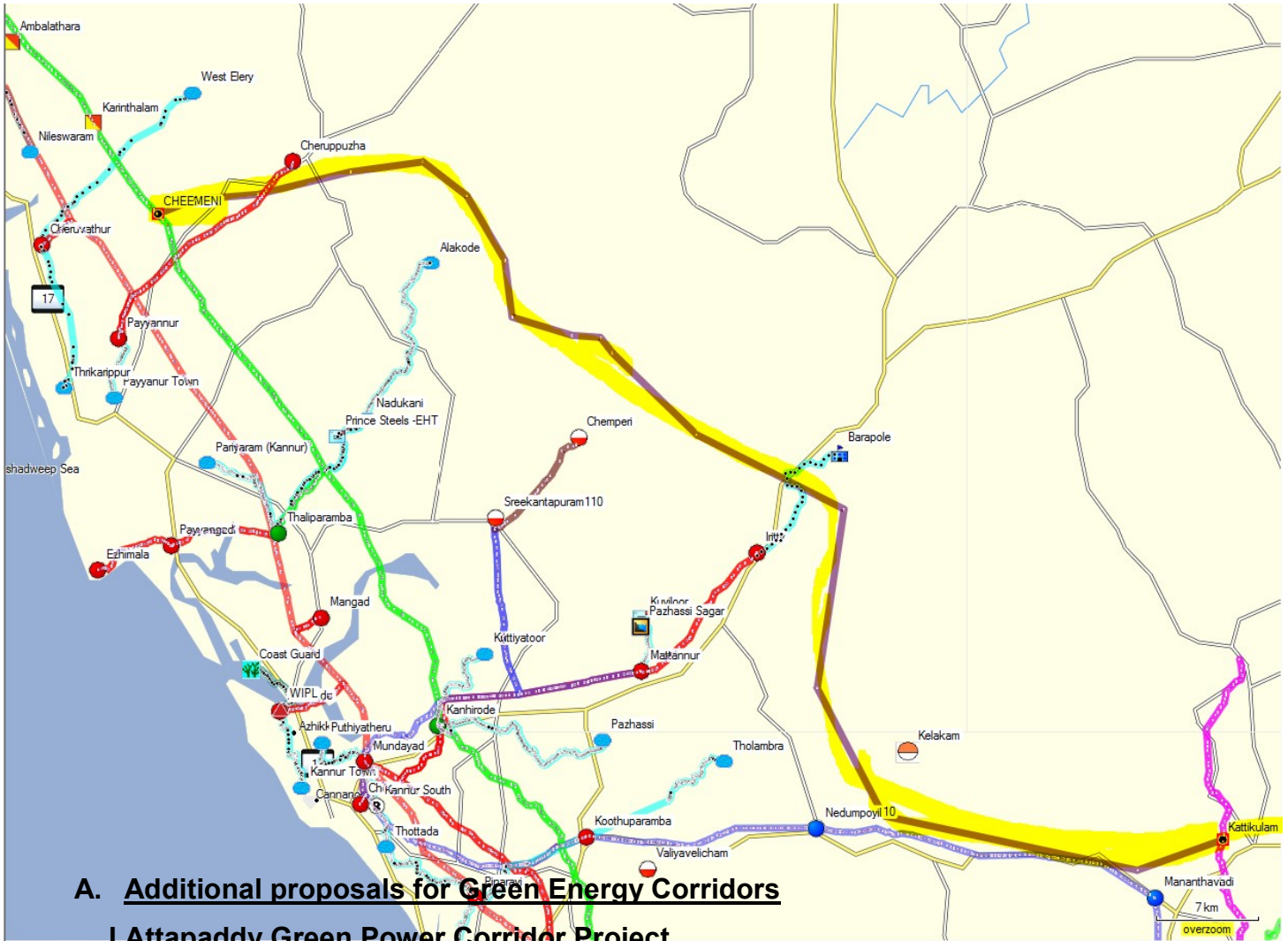
c. Construction of a 400kV Quad Moose / Twin HTLS (ACSS Curlew) D/c feeder from 400kV Switching Station Wayanad (Kattikulam) to 400kV Substation Kasargode (Cheemeni).

Part B: ISTS Scheme already sanctioned

d. 400kV Quad D/c feeder from Uduppi to Kasargode

As per the original sanctioned scheme.

Scheme Area for Part A: Wayanad – Kasargode Green Power Corridor Project



A. Additional proposals for Green Energy Corridors

I. Attappady Green Power Corridor Project

Attappady area of Palakkad district in Kerala state is energy rich and has an untapped green power potential of about 600 MW (200 MW Wind power potential, 400 MW Solar power potential and numerous small hydro resources). This makes the area ideal for hybrid generation (inter cropping), ensuring power output uniformly throughout the year. Many IPPs such as the Central government owned NHPC are ready to immediately invest in wind and solar generation in this region. M/s NHPC have already executed an MoU with the Government of Kerala for setting up a 83 MW wind project in this region and have even micro

sited many wind mill sites. However, at present, this available potential could not be tapped to the full extent due to the absence of a power transmission line for evacuation.

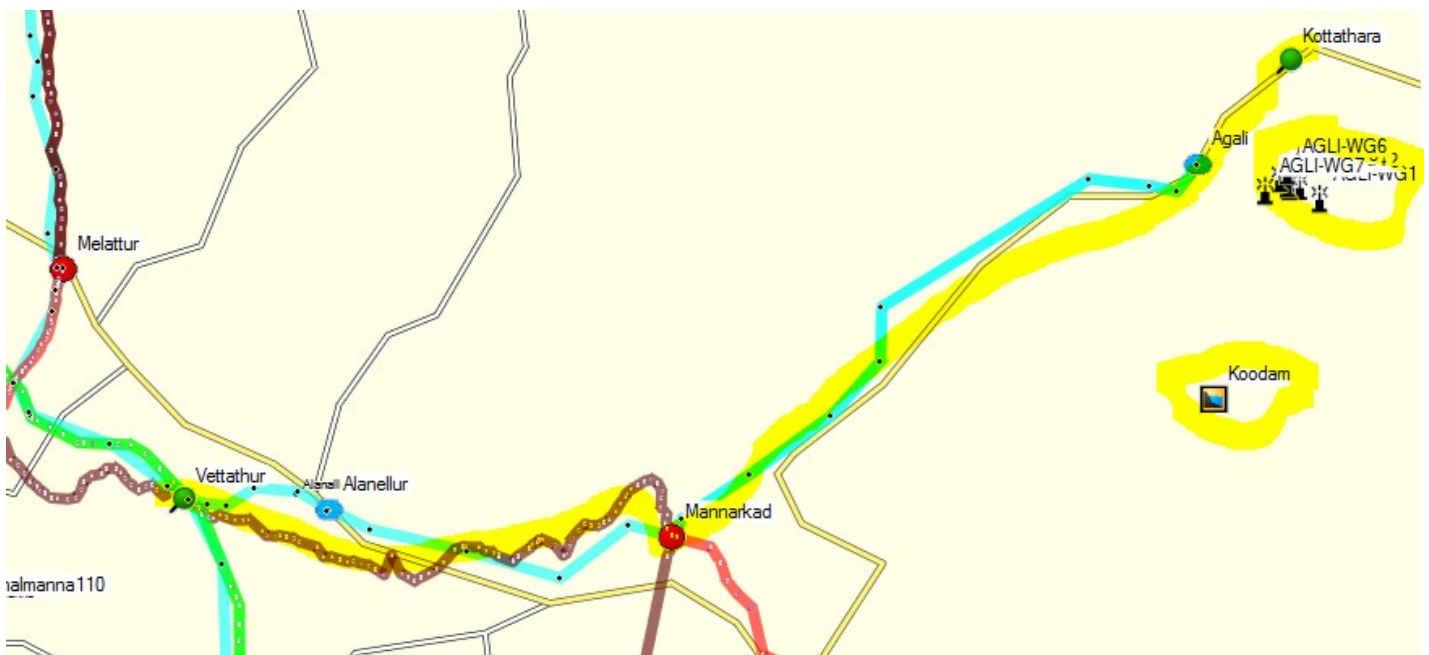
Considering the above, following 220kV corridor is proposed in the area for evacuating the renewable power as above.

Part A- Construction of a 33/220 kV step up substation at Kottathara in Attappady for pooling and picking up power generated from wind, solar and hydel generators in the Attappady region.

Part B- Construction of 220 /110 kV Substation at Vettathur inserted in LILO arrangement in the existing 220 kV Madakathara – Areekode 220kV feeder (linking two ISTS stations at Madakathara (Trichur North) and Kozhikode (Areekode)) where the power picked up from Attappady will be evacuated into the Kerala grid.

Part C- 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 Attappady Green Power Corridor Project



II.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. Out of the projected wind potential, presently only less than 15 % is utilised through IPPs and the remaining 85% is lying untapped. Also, the Ramakkalmedu area has unpopulated large barren stretches of land without any tree cover receiving sunlight almost throughout the year, making it an ideal site for solar power generation. This makes the area ideal for hybrid generation (Inter cropping), ensuring power output uniformly throughout the year. However the available potential is not tapped due to absence of a power corridor for evacuating the power generated.

Hence KSEBL proposes this project which aims at constructing a reliable power transmission corridor capable of transferring up to 100MW power from the Ramakkalmedu area to Kuyilimala in Idukki district with minimum loss. From Kuyilimala the power is proposed to be evacuated through the 220kV Udumalpet – Idukki Inter-State feeder by LILO of the same at 220kV Substation Kuyilimala.

This project includes

- Part A** - 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.
- Part B** - Construction of 110kV D/c line from Anakkaramettu (near Ramakkalmedu) to 110kV Substation Nedumkandam.
- Part C** - Construction of 2 nos 110kV feeder bays at 110kV Nedumkandam Substation.
- Part D** - Construction of 110 kV D/c line from Kattappana to Kuyilimala along the right of way of existing 66 kV S/c line.
- Part E** - 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



27.0 Implementation of 220kV Madakkathara- Malaparamba-Nallalam feeder

27.1 KSEB vide their letter no D(T&SO)/PSE/SCPSP/2016-17/413 date 01.09.2016 (**Annex-Agenda 27.1**) has requested to accord sanction for the following:

- a- Providing two additional 220kV bays by CTU in the upcoming 2000 MW HVDC station at Madakathara for implementation of 220kV Madakkathara- Malaparamba-Nallalam feeder.
- b- Installation of 2x315 MVA, 400/220kV transformer in the proposed HVDC station.

28.0 CTU's LTA Agenda

28.1 CTU may present the transmission addition requirement as part of giving connectivity and LTA for SR constituents.

28.2 Members may discuss.

29.0 Operational constraints-POSOCO

POSOCO Quarterly observations on grid constraints.

- 29.1** NLDC vide their letter dated 21st October, 2016 have submitted Operational Feedback of the National Grid for the quarter July-September 2015. POSOCO have stated present/likely transmission constraints in Southern Region under the following categories:
- i) Transmission Lines Constraints
 - ii) ICT Constraints
 - iii) Nodes experiencing low Voltage
 - iv) Nodes experiencing high Voltage.
 - v) Lines opened on high voltage.
 - vi) Delay in Generation affecting grid Operation adversely
 - vii) Delay in Transmission Lines affecting grid Operation adversely

Transmission Line Constraints

S. No.	Corridor	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
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	Yes
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.	Yes
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	Yes

S. No.	Corridor	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
			lines is in the range of 450-500 MW.	
4	400kV Hiriyur-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 Hiriyur-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.	Yes
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.	Yes

S. No.	Corridor	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
6	Overloading of 220 kV Shoolagiri-Hosur(TN)-Yerrandahalli-Somanahalli SC line	Whole Year	Somanahalli, Yerrandahalli and Hosur are Industrial areas. 220kV Yerandahalli is connected with Hosur(TN) and Somanahalli. Normally, 220kV Yerandahalli 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.	Yes
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 Sharawathi, now there are 3 circuits to Talaguppa. With this the constraint relieved some extent.	Yes
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	Yes

S. No.	Corridor	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
			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	
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.	Yes
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.	Yes
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	Yes

S. No.	Corridor	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
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	Yes
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.	Yes
14	Constraints in wind Evacuation	During wind season	230kV Veerannam-Abhishekpatti line, 230kV Karaikudi-Pudukottai line are loaded heavily during Wind season	Yes

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	Yes

2	400/220kV 2x315MVA ICTs at Vemagiri SS	Whole Year	N-1 condition not satisfied in few occasions	Yes
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.	Yes
4	400/220kV 3X500 MVA ICTs at Somanahalli	Whole Year	N-1 condition not satisfied in few occasions	Yes
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.	Yes
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.	Yes

7	400/230kV 2X315MVA ICTs at Pugalur	Whole Year	N-1 condition not satisfied in few occasions	Yes
8	400/230kV 2X315MVA ICTs at Trichy	Whole Year	N-1 condition not satisfied in few occasions	Yes

Nodes Experiencing Low Voltage

S. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
1	400kV Somnahally SS	During peak load condition	Voltages are low during the peak load condition	Yes
2	400kV Nelamangala SS	During peak load condition	Voltages are low during the peak load condition	Yes
3	400kV Hoody SS	During peak load condition	Voltages are low during the peak load condition	Yes
4	400kV Bidadi SS	During peak load condition	Voltages are low during the peak load condition	Yes
5	400kV Udumalpet SS	During peak load condition & high wind	Voltages are low during the	Yes

S. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
		period	peak load condition	
6	400kV Salem SS	During peak load condition & high wind period	Voltages are low during the peak load condition	Yes
7	400kV Arasur SS	During peak load condition & high wind period	Voltages are low during the peak load condition	Yes
8	400kV Trichur SS	During peak load condition	Voltages are low during the peak load condition	Yes
9	400kV Palakkad SS	During peak load condition	Voltages are low during the peak load condition	Yes
10	400kV Cochin SS	During peak load condition	Voltages are low during the peak load condition	Yes
11	400kV Trivendrum SS	During peak load condition	Voltages are low during the peak load condition	Yes

Nodes Experiencing High Voltage

S. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
1	400kV Vijayawada SS	Whole Year	Voltages remain very high most of the time	Yes
2	400kV Vemagiri SS	Whole Year	Voltages remain very high most of the time	Yes
3	400kV Gooty SS	Monsoon period and off peak period	Voltages remain very high most of the time	Yes
4	400kV Kurnool SS	Monsoon period and off peak period	Voltages remain very high most of the time	Yes
5	400kV Nellore Pooling Station SS	Whole Year	Voltages remain very high most of the time	Yes
6	400kV Sattenapally	Whole Year	Voltages remain very high most of the time	Yes
7	400kV VTPS Stage IV	Whole Year	Voltages remain very high most of the time	Yes
8	400kV Hyderabad	Monsoon	Voltages	Yes

S. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
	SS	period and off peak period	remain very high most of the time	
9	400kV Mamidipally SS	During off peak	Voltages remain very high most of the time	Yes
10	400kV Srisailam LB SS	During off peak	Voltages remain very high most of the time	Yes
11	400kV Malkaram SS	During off peak	Voltages remain very high most of the time	Yes
12	400kV Narendra SS	Whole Year	During Low generation period and off-peak period 400kV Narendra Voltage are High.	Yes
13	400kV Karaikudi SS	During off peak	During Low wind condition and off-peak condition Voltages are very High	Yes

S. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Has the constraint occurred in earlier quarter?
14	400kV Pugalur SS	During off peak	During Low wind condition and off-peak condition Voltages are very High	Yes
15	400kV Sriperumbudur SS	Whole Year	Voltages remain very high most of the time	Yes
16	765kV Raichur SS	Whole Year	Voltages remain very high most of the time	Yes
17	765kV Kurnool SS	Whole Year	Voltages remain very high most of the time	Yes
18	765kV Nellore PS	Whole Year	Voltages remain very high most of the time	Yes

Lines opened on high voltage

Sl. No.	Name	Total	Corresponding Nodes experiencing High Voltages
1	400 kV VEMAGIRI - GVK (JPD) 2	163	Vijaywada, Vemagiri , Sattennapalli, VTS IV, Gooty , Kurnool , Nellore Pooling Station, Mamidipally , Srisailam , Warangal, Malkaram , Kaiga, Guttur, Narendra, Tirunelveli , Madurai, Kudankulam , Thiruvalam, Pugalur, Nelamangala, Talaguppa, Hassan, Kudgi
2	400 kV HYDERABAD - N'SAGAR	121	
3	400 Kv SATTENAPALLI - SRISAILAM 2	119	
4	400 kV VEMAGIRI - GOUTHAMI CCCP 1	96	
5	400 Kv KUDGI-NARENDRA 1	87	
6	400 kV TALAGUPPA - NEELAMANGALA	83	
7	400 kV GUTTUR - NARENDRA 1	72	
8	765 KV RAICHUR - KURNOOL - 2	70	
9	400 Kv SRISAILAM-SHANKARPALLY	66	
10	400 Kv SURYAPET - MALKARAM	64	
11	400 Kv GAJWEL - SINGARENI-2	63	
12	765 KV KURNOOL - THIRUVALLM 2	57	
13	400 kV KARAIKUDY - MADURAI	54	
14	765 KV KURNOOL - NPS 1	54	
15	400 kV KHAMMAM - N'SAGAR 3	53	
16	400 Kv KUDGI-NARENDRA 2	51	
17	400 Kv VTPS - MALKARAM	50	
18	765 KV KURNOOL - NPS 2	49	
19	400 Kv PUGALUR - KARAIKUDI 1	46	
20	400 kV MYSORE - HASAN -1	42	
21	400 Kv HASSAN - UPCL 2	39	
22	400 Kv PUGALUR - KARAIKUDI 2	38	
23	400 Kv KAYATHAR - KARAIKUDI 1	30	
24	400 Kv GOOTY - TUMKUR- 1	28	
25	400 kV GUTTUR - NARENDRA 2	24	
26	400 kV MYSORE - HASAN 1	21	
27	400 kV MYSORE - HASAN 2	20	
28	400 Kv HASSAN - UPCL 1	19	
29	400 Kv GOOTY - NPS 1	18	
30	400 Kv KAIGA - NARENDRA -1	18	
31	400 kV N'SAGAR - CUDDAPPA 1	18	
32	400 Kv SATTENAPALLI - SRISAILAM 1	18	
33	400 kV KAIGA - NARENDRA 1	15	
34	400 kV KHAMMAM - N'SAGAR 2	15	
35	400 kV VEMAGIRI - GVK (JPD) -1	15	

Sl. No.	Name	Total	Corresponding Nodes experiencing High Voltages
36	400 kV RAMAGUNDAM - N'SAGAR 1	14	
37	400 kV CUDDAPPA - CHITTOOR	13	
38	400 Kv HASSAN - UPCL- 2	12	
39	400 kV N'SAGAR - MAHABOOB NAGAR	12	
40	400 Kv RAICHUR PG - GOOTY 2	12	
41	400 kV VEMAGIRI - GOUTHAMI CCCP 2	10	
42	400 kV VEMAGIRI - GVK (JPD) 1	10	
43	400 kV WARANGAL - BOOPALPALLI -1	9	
44	400 kV RAMAGUNDAM - MALKARAM	8	
45	400 Kv GAJWEL - BHOOPALAPALLY 1	7	
Sl.No.	Name	Total	
46	400 Kv GAJWEL - SHANKARPALLY 1	7	
47	400 Kv GAJWEL - SHANKARPALLY - 1	7	
48	400 Kv GAJWEL - SHANKARPALLY 2	7	
49	400 Kv HASSAN - UPCL -1	7	
50	400 kV TALAGUPPA - HASSAN	7	
51	400 kV KAIGA - GUTTUR 1	6	
52	400 kV SRISAILAM-MAMIDIPALLI	6	
53	400 kV KHAMMAM - MAMIDIPALLY 2	5	
54	400 kV KURNOOL - SRISAILAM	5	
55	400 kV VIJAYAWADA - KHAMMAM	5	
56	400 kV HASSAN - NEELAMANGALA	4	
57	400 kV HYDERABAD - KURNOOL	4	
58	400 kV KHAMMAM - KALPAKKA 2	4	
59	400 kV KHAMMAM - MAMIDIPALLY 1	4	
60	400 kV RAMAGUNDAM - HYDERABAD- 4	4	
61	765 KV KURNOOL - THIRUVALLM 1	4	
62	400 Kv GAJWEL - BHOOPALAPALLY 2	3	
63	400 Kv GOOTY - TUMKUR - 2	3	
64	400 kV RAMAGUNDAM - GAJWEL	3	

Sl. No.	Name	Total	Corresponding Nodes experiencing High Voltages
65	400 kV RAMAGUNDAM - HYDERABAD -3	3	
66	400 kV SALEM - UDUMALPET -1	3	
67	400 kV WARANGAL - KHAMMAM	3	
68	GOOTY-NELAMANGALA AT GOOTY	3	
69	400 Kv JAMMALAMADUGU - KURNOOL (AP)-2	2	
70	400 kV GHANAPUR - MAMIDIPALLY	2	
71	400 Kv KUDGI- KOLHAPUR-2	2	
72	400 kV MUNIRABAD - GUTTUR	2	
73	400 Kv NELLORE - THIRUVALLAM 1	2	
74	400 Kv N'SAGAR - KURNOOL(PG)	2	
75	400 kV RAMAGUNDAM - HYDERABAD 4	2	
76	400 kV RAMAGUNDAM - N'SAGAR -2	2	
77	400 Kv URAVAKONDA - JAMMALAMADUGU-2	2	
78	400 Kv VTPS STG IV - MALKARAM	2	
79	400 kV DICHIPALLY - RAMAGUNDAM	1	
80	400 Kv KAYATHAR - KARAIKUDI - 2	1	
81	400 kV KHAMMAM - KTPS 2	1	
82	400 Kv KUDGI- KOLHAPUR-1	1	
83	400 Kv KUDGI-KUDGI NTPC 1	1	
84	400 kV MAHABOOB NAGAR - RAICHUR	1	
85	400 kV MALKARAM - HYDERABAD	1	
86	400 Kv RAICHUR PG - GOOTY 1	1	
87	400 kV RAMAGUNDAM - N'SAGAR -1	1	
88	400 Kv TRICHUR - KOCHI -2	1	
89	400 kV VEMAGIRI - GOUTHAMI CCCP-1	1	
90	400/220 Kv ICT-3 AT MALKARAM	1	
91	N'SAGAR - CUDDAPAH FSC-II AT CUDDAPAH	1	
Grand Total		2043	

Delay in Generation affecting grid operation adversely

S. No	Generating Unit	Area/ State	Proposed Commissioning Date	Actual/ Likely Commissioning Date	Transmission Constraint Caused
1	Kudankulam Unit-2	Tamilnadu	Dec-08	Unit-1 CoD in December 2014, Unit-2 Synchronised in Aug 2016. Expected CoD in December 2016.	Transmission congestion on North-South corridor.

Delay in transmission lines affecting grid operation adversely

S. No.	Transmission Corridor	Proposed Commissioning Date/ Original Target date	Actual/ Likely Commissioning Date	Transmission Constraint Caused
1	400kV Edamon-Cochin DC line	Nov-08	Dec-16	220kV North - South corridor of Kerala
2	Stage-1 Wind evacuation system of TNEB: 400kv Kanarapatty SS, 400kV Kanarapatty-Kayathar DC line	-	-	Congestion on 400/230kV Tirunelveli ICTs, 230kV Kayathar-Tirunelveli, 230kV Udayathur-Tirunelveli, 230kV Veerannam-Tirunelveli etc.
3	400kV Tumkur-Yelhanka DC line	Jun-14	RoW issues	Constraints on Import from New grid to SR through 765kV Raichur-Sholapur DC line.
4	400kV Somnahally-Dharmapuri PS-Salem DC line	Sep-14	RoW issues	Congestion on S1-S2 Corridor
5	765kV Tuticorin PS-Dharmapuri PS DC line	Sep-14	Dec-16	Bottling of Generation at Coastal Generation
6	765kV Dharmapuri PS – Tumkur DC line	Sep-14	Dec-16	Congestion on S1-S2 Corridor