



भारत सरकार/ Government of India
विद्युत मंत्रालय / Ministry of Power
केंद्रीय विद्युत प्राधिकरण/ Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन 2 – प्रभाग
Power System Planning & Appraisal - II Division
सेवा भवन, आर.के. पुरम, नई दिल्ली 110066-
Sewa Bhawan, R.K. Puram, New Delhi – 110066



[ISO : 9001 : 2008]

No. 51/4/(39th)/PSPA-II 2016/115-128

Date: 18-FEB -2016

To
(As per Address list)

Sub: 39th meeting of the Standing Committee on Power System Planning of Southern Region - Minutes of the meeting

Sir/Madam,

The **39th meeting** of the Standing Committee on Power System Planning of Southern Region was held on 28th -29th December, 2015 in NRPC Committee room, Katwaria Sarai, New Delhi.

The Minutes of the meeting are being issued.

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

It is requested that your observations, if any, may be sent to us within 15 days. (The observations may also be emailed at shivani0004@gmail.com)

Yours faithfully,

(पदीप जिंदल /Pardeep Jindal)

मुख्य अभियंता (वि प्र यो मू२ -)/ Chief Engineer (PSPA-II)

Address list

1. The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, Bangalore 560 009. FAX : 080-22259343	2. The Director (Projects), Power Grid Corp. of India Ltd. "Saudamini", Plot No.2, Sector-29, Gurgaon 122 001, Haryana. FAX : 95124-2571932
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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 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.	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

MINUTES OF MEETING

Minutes of 39th Meeting of the Standing Committee on Power System Planning in Southern Region (SCPSPSR) held on 28th December and 29th December, 2015 at NRPC, Katwaria Sarai, New Delhi.

1. Introduction

- 1.1 Member(PS), CEA welcomed the participants and requested the gathering to have positive deliberations so that consensus could be reached on listed issues. He informed the constituents that due to flood situation in Chennai, this meeting of 39th SCPSPSR which was scheduled for 7th and 8th of December, 2015 was postponed till today.
- 1.2 With these views he requested Director, CEA to take up agenda items.
- 1.3 List of participants is given at **Annex-I**.
- 1.4 **These Minutes may be read along with the Agenda circulated for this meeting.**

2.0 Confirmation of the minutes of meetings

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

Director, CEA stated that minutes of the 38th meeting of the Standing Committee on Power System Planning of Southern Region were issued vide CEA's letter No. 51/4/(38th)/ SP&PA-2015/ 731-744 dated 23rd March, 2015. TANTRANSOCO vide their letter No CE/Plg.&.R.C/SE/EE1/AEE1/F.38th Stg Comm Modification/D.172 dated 5.05.2015 gave their observations on para 2.4(ii) regarding reactor at Udangudi Stage I project, and on para 8.3 regarding installation of reactor at Thiruvalem end of the Thiruvalem-MTPS Stge II line instead of MTPS stage II end. Accordingly, corrigendum#1 was issued vide CEA letter no 51/4/(38th)/SP&PA-2015/1318-32 dated 9th June, 2015.

- 2.2 The minutes of 38th Standing Committee of Power System Planning of Southern Region along with the Corrigendum, as circulated, were confirmed.

2.3 Confirmation of the minutes of Joint meeting of the Standing Committee on Power System Planning of Southern Region and Western Region

Director, CEA stated that the minutes of **Joint Meeting** of the Standing Committee on Power System Planning of Southern and Western Regions held on 20.04.2015 were issued vide our letter No. 51/4/SR-WR/SP&PA-2015/845-867 dated 28th May, 2015. CTU vide their letter no C/CTU/S/PLG dated 3rd

June, 2015 gave their observations on para 5.2 regarding AC system strengthening at Pugalur end. Accordingly, a corrigendum to the **Joint Meeting** of the Standing Committee on Power System Planning of Southern Region was issued vide CEA letter no 52/6/SP&PA-2015/1342-64 dated 10th June, 2015.

- 2.4 The Minutes of the Joint meeting of the Standing Committees on Power System Planning of Southern Region and Western Region along with the Corrigendum, as circulated, were confirmed.

3.0 Connectivity and LTOA for Cheyyur UMPP in Tamil Nadu

- 3.1 Director, CEA informed that in 38th meeting of SCPSPSR it was decided to get the latest status of generation project from M/s Coastal Tamil Nadu Pvt Ltd.
- 3.2 COO(CTU-Plg),PGCIL informed that MoP, GoI has listed Cheyyur UMPP under Plug and Play and has proposed to bid out in the FY 2015-16. She said that we may keep the transmission planning in abeyance for the time being. The transmission that we plan now may have to be revised when the bidding resumes again.
- 3.3 After further deliberations it was decided to re-plan the transmission system as and when the re-bidding of generation project is taken up.

4.0 Studies for converting Fixed line reactor into switchable line reactors

- 4.1 Director, CEA stated that due to reduction in line lengths generally after LILO, some lines become overcompensated with the existing fixed Reactors. Therefore, during 38th SCPSPSR it was proposed that fixed Line Reactors installed in these lines be converted to switchable Line Reactors so that they may be utilised as Bus Reactors, as and when needed.
- 4.2 AGM (CTU-Plg), PGCIL informed that, as discussed in the 38th meeting of SCPSPSR, Dynamic over Voltage (DoV) studies were carried out considering load throw off at line reactor end which is proposed to be made switchable. He proposed that all the line reactors be made switchable except for the Gooty – Bangalore 400kV line as its DoV is close to design value.
- 4.3 Director(Trans), KPTCL opined that line reactors at both ends of Bangalore – Gooty line shall also be made switchable or at least line reactor at Bangalore end may be made switchable.

COO(CTU-Plg) informed that the line reactors on Bangalore – Gooty line cannot be made switchable as the Dynamic over voltage is close to design value.

- 4.4** AGM, POSOCO suggested to retain one of the reactor at Kochi- Tirunelveli I& II as fixed. Director, CEA opined that the Dynamic over voltage for Kochi – Tirunelveli line is also close to design value and line reactors at one end may be retained as fixed line reactor.
- 4.5** After further discussions it was decided to retain reactor at Tirunelveli end of Kochi- Tirunelveli line as fixed, and the line reactors at both ends of Gooty – Bangalore 400kV line as fixed.

After deliberations the following proposal was agreed:

S. No	Transmission line	Length	Reactor		Agreed Proposal
			Sending end	Receiving end	
1	Gazwel-Hyderabad II	62.5	-	50	Line Reactor at Hyderabad end to be made switchable
2	Nellore-Tiruvellam I & II	173	50	50	Line Reactor at both ends to be made switchable
3	Sriperumbdur-Chittoor	105.7	50		Line Reactor at Sriperumbadur end to be made switchable
4	Thiruvananthapuram-Tirunelveli	160	63		Line Reactor at Thriuvananthapuram end to be made switchable (PGCIL informed that there is space constraint at Thriuvananthapuram, therefore another alternative or use of GIS would be explored)
5	Trichur-Palakkad - I & II	84	50		Already being taken up under SRSS-XX.
6	Udumalpet-Salem II	137	63		Line Reactor at Udumalpet end to be made switchable
7	Madurai-Karaikudi	130	63		Line Reactor at Madurai end to be made switchable
8	Sriperumbadur-SV Chatram	18	50		Line Reactor at Srperumbadur to be made switchable
9	Bangalore-Gooty	302	63	63	Line reactor may be retained as fix reactors

S. No	Transmission line	Length	Reactor		Agreed Proposal
			Sending end	Receiving end	
10	Kochi-Tirunelveli-I & II	231	63	63	Line Reactor at Kochi end to be made switchable. Line Reactor at Tirunelveli end to be retained as fixed line reactor.
11	Madurai-Trichy	130	50		Line Reactor at Madurai end to be made switchable
12	Trichy-Nagapattinam I	159	50		Line Reactor at Trichy end may be made switchable
13	Trichy-Nagapattinam -II	159	63		Line Reactor at Trichy end to be made switchable
14	Salem- Hosur II	125	50		Reactor at Salem end to be made switchable
15	Malakaram-Hyderabad-II(Upto LILO point)	28		50	Reactor at Hyderabad to be made switchable
16	Kurnool-Gooty	113		50	Reactor at Gooty to be made switchable

5.0 Transformer augmentation

5.1 Director, CEA stated that in the 38th meeting of SCPSPSR, out of transformer augmentations at eight nos of 400 kV substations that were proposed and discussed, augmentation at (i) Arasur, (ii) Karaikudi, (iii) Tirunelveli and (iv) Pondicherry were agreed. For the rest of the four locations i.e: (i) Munirabad, (ii) Madhugiri, (iii) Kochi, (iv) Palakkad, it was decided that it will be re-discussed in the next Standing Committee meeting based on input to be provided by KSEB and KPTCL.

5.2 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 S/S as difficulties are being faced in completion of lines both by PGCIL and KPTCL..

- 5.3** After deliberations it was decided that the call on augmentation of transformers at Yelahanka and Muniranbad will be taken in the next Standing Committee meeting.
- 5.4** CE, KSEB said that there is no load growth at Palakkad, so transformer augmentation is not required there, while the newly planned 400kV substation at Kottayam will take care of requirements at Kochi. However, he proposed an additional 1x315 MVA ICT at Kozikode. PGCIL suggested to install 1x500MVA ICT at Kozikode which was agreed.
- 5.5** Director(Trans), TANTRANSOCO made a request for early commissioning of 3rd ICT at Melakottaiyur (Kalivantapattu) and also at Madurai 400kV PGCIL SS to meet out the 2016 summer demand in Chennai.
- 5.6** Director, CEA informed that TSTRANSOCO had proposed to erect 1 no of additional 315 MVA, 400/220kV power transformers at 400/220kV Dichpally SS and 400/220kV Veltoor SS each under the proposed 9 hours agricultural power supply scheme to be operational from April 2016. The same was agreed.
- 5.7** Based on above following was agreed:
- a. After discussions following augmentation was agreed for implementation
 1. 400/220 kV, 1X500 MVA ICT at Arasur -under ISTS
 2. 400/220 kV, 1X500 MVA ICT at Karaikudi -under ISTS
 3. 400/220 kV, 1X500 MVA ICT at Tirunelveli -under ISTS
 4. 400/220 kV, 1X500 MVA ICT at Pondicherry -under ISTS
 5. 400/220 kV, 1X500 MVA ICT at Kozhikode -under ISTS
 6. 400/220kV, 1X315 MVA ICT at Dichpally SS(by TSTRANSOCO)
 7. 400/220kV, 1X315 MVA ICT at Veltoor SS(by TSTRANSOCO)
 - b. PGCIL would expedite the implementation of transformers at Melakottaiyur and Madurai.
 - c. Augmentation of transformers at Yelahanka and Muniranbad will be taken in the next Standing Committee meeting.
 - d. The ICT at Madhugir/Tumkur(Vasantnarsapura) would be covered under ATS for Solar Park at Tumkur(Pavagada)
- 6.0** **Change in scope of the schemes (i) “Strengthening of transmission system beyond Vemagiri”, and (ii) “Additional inter-regional AC links for import of power into Southern Region”, being implemented under TBCB**
- 6.1** Director, CEA informed that CEA has given in-principle approval for the change in scope of these two schemes which are being implemented under TBCB:
- (i) **Strengthening of transmission system beyond Vemagiri,**
 - (ii) **Additional inter-regional AC links for import of power into Southern**

Region

- 6.2** He said that the changes in scope of these two schemes was required mainly because i) rating (MVA_r) of some of the line reactors at various locations was changed, ii) there was difficulty in obtaining Right of Way at existing Hoody 400kV S/S and iii) there was a suggestion to keep the line bays and switchable line reactors, at Chilakaluripeta end of Warangal – Chilakaluripeta 765 kV D/c line, in the scope of (i) scheme in place of in the scheme(ii), due to ease of implementation and O&M.
- 6.3** The modified scope of the “**Strengthening of transmission system beyond Vemagiri**” (RECTPCL as BPC) scheme, as agreed by members, is:

Scope as per Gazette Notification	Modified Scope
(i) Vemagiri-II – Chilakaluripeta 765kV D/C line with 240 MVA _r switchable line reactors at both ends.	(i) Vemagiri-II – Chilakaluripeta 765kV D/C line with 240 MVA _r switchable line reactors at both ends of each circuit. (The line bays and line reactors at Chilakaluripeta to be in the scope of TSP and those at Vemagiri end in the scope of CTU).
(ii) Chilakaluripeta – Cuddapah 765kV D/C line with 240 MVA _r switchable line reactors at both ends.	(ii) Chilakaluripeta – Cuddapah 765kV D/C line with 240 MVA _r switchable line reactors at both ends of each circuit. (The line bays and line reactors at Chilakaluripeta to be in the scope of TSP and those at Cuddapah end in the scope of CTU).
(iii) Chilakaluripeta – Narsaraopeta 400kV (quad) D/C line	(iii) Chilakaluripeta – Narsaraopeta (Sattenapalli) 400kV (quad) D/C line (The line bays at both ends to be in the scope of TSP)
(iv) Cuddapah – Madhugiri 400kV (quad) D/C line with 80 MVA_r switchable line reactors at both ends.	(iv) Cuddapah – Madhugiri 400kV (quad) D/C line with 50 MVA_r switchable line reactors at both ends of each circuit. (The line bays and reactors at both ends to be in the scope of CTU)

Scope as per Gazette Notification	Modified Scope
(v) Cuddapah – Hindupur 400kV (quad) D/C line with 80 MVA switchable line reactors at Hindupur end.	
(vi) Srikakulam Pooling Station – Garividi 400 kV (Quad) D/C line with 80 MVA switchable line reactor at Garividi end.	(v) Srikakulam Pooling Station – Garividi 400 kV (Quad) D/C line (The line bays at Garividi end to be in the scope of TSP and those at Srikakulam Pooling Station end in the scope of CTU).
(vii) Establishment of 765/400 kV substation at Chilakaluripeta with 2x1500 MVA transformers and 2x240 MVA bus reactors each. Transformers: 765/400 kV, 7 x 500 MVA (One unit spare)	(vi) Establishment of 765/400 kV substation at Chilakaluripeta with 2x1500 MVA transformers and 2x240 MVA bus reactors each. Transformers: 765/400 kV, 7x500 MVA (Single-Phase units with one spare)
<p><u>765 & 400 kV Bay Requirements</u></p> <p>(i) 765 kV line bays at Chilakaluripeta: 4 no.</p> <p>(ii) 765/400 kV Transformer bays at Chilakaluripeta: 2 no.</p> <p>(iii) 400 kV line bays Chilakaluripeta : 2 no.</p> <p>(iv) Space for future 765 kV line bays at Chilakaluripeta: 6 no.</p> <p>(v) Space for future 400 kV line bays at Chilakaluripeta: 8 no.</p>	<p><u>765 kV Bays (at Chilakaluripeta)</u></p> <p>ICT bays : 2 nos.</p> <p>Line bays : 4 nos.</p> <p>765 kV Bus Reactor Bays : 2 nos.</p> <p>Spare bays (Space) : 6 nos.</p> <p><u>400 kV Bays</u></p> <p>ICT bays : 2 nos.</p> <p>Line bays : 2 nos.</p> <p>Spare bays (Space) : 8 nos.</p>
<p>Note:</p> <p>CTU to provide two nos. 765 kV bays at Vemagiri-II Pooling station for Vemagiri-II – Chilakaluripeta 765 kV D/C line</p> <p>CTU to provide requisite no. of 765 kV and 400 kV bays and line reactors for termination of</p>	<p>(vii) <u>Note about provision of line reactors and bays:</u></p> <p>a) CTU to provide 2 nos. 765kV line bays along with 240 MVA switchable line reactors at Vemagiri-II Pooling station for termination of Vemagiri-II – Chilakaluripeta 765kV D/c line.</p> <p>b) CTU to provide 2 nos. 765kV line bays along with 240 MVA</p>

Scope as per Gazette Notification	Modified Scope
<p>transmission lines at Cuddapah</p> <p>CTU to provide two nos. 400kV bays & line reactors at Madhugiri 400 kV substation for Cuddapah – Madhugiri 400kV (quad) D/C line</p> <p>CTU to provide two nos. 400 kV bays at Srikakulam 400kV substation for Srikaukulam Pooling Station – Garividi 400 kV (Quad) D/C line</p>	<p>switchable line reactors at Cuddapah 765/400kV substation for termination of Chilakaluripeta – Cuddapah 765kV D/c line.</p> <p>c) CTU to provide 2 nos. 400kV line bays along with 50 MVAR switchable line reactors at Cuddapah 765/400kV substation for termination of Cuddapah – Madhugiri 400kV (quad) D/c line.</p> <p>d) CTU to provide 2 nos of 400kV line bays along with 50 MVAR switchable line reactors at Madhugiri 400kV substation for termination of Cuddapah – Madhugiri 400kV (quad) D/c line.</p> <p>e) CTU to provide 2 nos. 400kV line bays at Srikakulam 400kV substation for termination of Srikakulam Pooling Station – Garividi 400 kV (Quad) D/c line.</p> <p>f) APTRANSCO to provide space for 2 no 400 kV line bays at Narsaraopeta (Sattenapalli) 400kV sub- station</p> <p>g) APTRANSCO to provide space for 2 no 400 kV line bays at Garividi 400kV sub-station</p>

Note-1:

- CTU: Central Transmission Utility
- APTRANSCO: AP Transmission Company Limited
- TSP: Transmission Service Provider

Note - 2: The “Cuddapah – Hindupur 400kV (quad) D/C line with 80 MVAR switchable line reactors at Hindupur end” has been given to CTU for implementation under compressed time schedule in the SSSR-XXIV scheme.

6.4 The modified scope of the “**Additional inter-regional AC links for import of power into Southern Region**” (PFCCCL as BPC) scheme, as agreed by members, is:

Transmission Scheme as per Gazette Notification	Modified Scope
<p>1. Establishment of 765/400kV substations at Warangal (New) with 2x1500 MVA transformers and 2x240 MVAr bus reactors</p> <p>Transformers: 765/400 kV, 7x500 MVA (One unit Spare)</p> <p><u>765 & 400 kV Bay Requirements</u></p> <p>(i) 765 kV line bays : 6 no.</p> <p>(ii) 765/400 kV Transformer bays : 2 no.</p> <p>(iii) 400 kV line bays : 2 no.</p> <p>(iv) Space for future 765 kV line bays : 6 no.</p> <p>(v) Space for future 400 kV line bays : 8 no</p>	<p>1. Establishment of 765/400kV substations at Warangal (New) with 2x1500 MVA transformers and 2x240 MVAr bus reactors.</p> <p>Transformers: 765/400 kV, 7x500 MVA (Single-Phase units with one spare)</p> <p><u>765 kV & 400 kV Bay Requirements (in Warangal)</u></p> <p>(i) 765 kV line bays : 6 nos.</p> <p>(ii) 765 kV Transformer bays : 2 no.</p> <p>(iii) 400kV Transformer bays : 2 no.</p> <p>(iv) 400 kV line bays : 2 no.</p> <p>(v) Space for future 765 kV line bays : 6 no.</p> <p>(vi) Space for future 400 kV line bays : 8 no</p>
<p>2. Warora Pool – Warangal (New) 765kV D/c line with 240 MVAr switchable line reactor at both ends</p>	<p>2. Warora Pool – Warangal (New) 765kV D/c line with 240 MVAr switchable line Reactor at both ends of each circuit</p> <p>(The line bays and reactors at both ends to be in the scope of TSP)</p>
<p>3. Warangal (New) –Hyderabad 765 kV D/c line with 330 MVAr switchable line reactor at Warangal end</p>	<p>3. Warangal (New) –Hyderabad 765 kV D/c line with 240 MVAr switchable line reactor at Warangal end of each circuit.</p> <p>(The line bays and reactors at Warangal end to be in the scope of TSP and the line bays at Hyderabad end in the scope of CTU)</p>

Transmission Scheme as per Gazette Notification	Modified Scope
4. Warangal (New) – Warangal (existing) 400 kV (quad) D/c line	4. Warangal (New) – Warangal (Existing) 400 kV (quad) D/c line (The line bays at Warangal (New) end to be in the scope of TSP and the line bays at Warangal (Existing) end in the scope of CTU)
5. Hyderabad – Kurnool 765 kV D/c line with 240 MVAR switchable line reactor at Kurnool end	5. Hyderabad – Kurnool 765 kV D/c line with 240 MVAR switchable line reactor at Kurnool end of each circuit (The line bays and reactors in the scope of CTU)
6. Warangal (New) – Chilakaluripeta 765kV D/c line with 240 MVAR switchable line reactor at both ends	6. Warangal (New) – Chilakaluripeta 765kV D/c line with 240 MVAR switchable line reactor at both ends of each circuit. (The line bays and reactors at both ends to be in the scope of TSP)
7. Cuddapah – Hoodi 400kV (quad) D/c line with 63 MVAR switchable line reactor at both ends	
<p>Note :</p> <ul style="list-style-type: none"> i) Warora Pool developer to provide space for two nos. 765 kV line bays at Warora Pool for termination of Warora Pool – Warangal (New) 765kV D/c line alongwith 240 MVAR switchable line reactor ii) CTU to provide two nos. 765 kV bays at Hyderabad for termination of Warangal (New) –Hyderabad 765 kV D/c line iii) CTU to provide two nos. 765 kV bays at Hyderabad for termination of Hyderabad – Kurnool 765 kV D/c line iv) CTU to provide two nos. 765 kV line bays at Kurnool for 	<p>7. <u>Note about provision of line reactors and bays</u></p> <ul style="list-style-type: none"> i) Warora Pool developer to provide space for 2 nos. 765 kV line bays at Warora Pool for termination of Warora Pool – Warangal (New) 765kV D/c line with 240 MVAR switchable line reactor ii) CTU to provide 2 nos. 765 kV bays at Hyderabad for termination of Warangal (New) –Hyderabad 765 kV D/c line iii) CTU to provide 2 nos. 765 kV bays at Hyderabad for termination of Hyderabad – Kurnool 765 kV D/c line iv) CTU to provide 2 nos. 765 kV line bays along with 240 MVAR

Transmission Scheme as per Gazette Notification	Modified Scope
<p>Hyderabad – Kurnool 765 kV D/c line with 240 MVA_r switchable line reactor at Kurnool end</p> <p>v) CTU to provide four nos. 400 kV bays at Warangal (existing) for Warangal (New) – Warangal (existing) 400 kV (quad) D/c line</p> <p>vi) M/s KPTCL to provide two nos. 400 kV bays at Hoodi for termination of Cuddapah – Hoodi 400kV (quad) D/c line along with 63 MVA_r switchable line reactors</p>	<p>switchable line reactor at Kurnool end for Hyderabad – Kurnool 765 kV D/c line.</p> <p>v) CTU to provide 2 nos. 400 kV bays at Warangal (existing) for Warangal (New) – Warangal (existing) 400 kV (quad) D/c line</p>

Note-1:

- CTU: Central Transmission Utility
- APTRANSCO: AP Transmission Company Limited
- TSP: Transmission Service Provider

Note - 2: The “Cuddapah – Hoodi 400kV (quad) D/c line with 63 MVA_r switchable line reactors at both end” would be reviewed at later stage, therefore the same is now deleted from the scope of this scheme.

6.6 KPTCL suggested to terminate Cuddapah-Hoodi 400kV (quad) D/c line at Davanhalli. After deliberations it was decided that termination of this line at Davanhalli, can be decided later.

6.7 Members noted.

7.0 Transmission evacuation schemes of Manuguru TPP(4x270 MW), Kothagudam TPS Stage- VII (1x800MW).

7.1 Director, CEA stated that TSTRANSCO had requested to get approval of the Standing Committee meeting on Power system Planning of Southern Region for their proposed evacuation schemes of **Manuguru TPP, Kothagudem TPS STg-VII and Damercharela TPP(2x600+4x800 MW).**

7.2 He said that TSTRANSCO has also proposed to convert 220kV Dindi switching station into 400/220kV conventional SS by April, 2016, to draw about 500 MW to meet the state programme of providing 9 hrs day time agricultural supply. Creation of Dindi 400/220 kV substation and its connectivity line was part of transmission system for Damercharela(2x600+4x800 MW). He explained that

as Damarcharela Generation cannot be expected by 2019, TSTRANSCO has proposed to either LILO one circuit of 400kV Srisailam- Mamidipalli line or LILO of 400kV Nagarjuna Sagar-Kurnool ISTS line at the proposed Dindi 400/220kV SS.

- 7.3** Director(Projects), TSTRANSCO said that based on the Joint studies carried out with PGCIL and CEA on 26.06.2015, 'in-principle' approval was given by CEA for (i) Transmission system for Manuguru(4x270 MW) TPS, (ii) Transmission system for Kothagudem VII (1x800MW) TPS, (iii) Common transmission system for Manuguru(4x270 MW) TPS and (iv) Transmission system for Dindi 400/220kV SS.
- 7.4** The TSTRANSCO proposal was discussed and it was also decided to include 1x125 MVAR bus reactor at Manuguru and Kothagudem. TSTRANSCO also requested to LILO 400kV Nagarjuna Sagar-Kurnool ISTS line at the proposed Dindi 400/220kV SS. PGCIL said that as per the studies carried out the LILO of 400kV Nagarjuna Sagar-Kurnool at Dindi is not effective, as such it may be considered later, the same was agreed.
- 7.5** COO(CTU) stated that the Bommanpally-Khammam 400kV DC line is required only for reliability purpose and not for evacuation of power. Director, CEA also endorsed the same. Accordingly, it was decided that Bommanpally-Khammam 400kV DC line by TSTRANSCO would be considered in the SCPSPSR after Bommanpally -Jangaon, Bommanpally - Suryapeta lines become available.
- 7.6** After discussions following was agreed to be implemented by TSTRANSCO as state transmission projects:
- 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 Pedagogathi 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.

8. Transmission evacuation schemes of Damercharela TPP

8.1 Director, CEA informed that TSTRANSCO requested to arrange approval in the Standing Committee for the evacuation schemes of Damercharela TPP.

8.2 Director(Projects), TSTRANSCO informed that the configuration of the Project has now been revised to 5x800 MW instead of earlier planned 2x600 + 4x800 MW. They informed that the land for the project has been acquired and the first unit is expected to come in the year 2018. The Financial Closure of the Damaracherla(Yadadri) TPP has been completed and the works awarded to BHEL. PGCIL said that Damercherla should have sufficient MVAR as bus reactor. It was agreed to have 2x125MVAR bus reactor at Damercherla and the new 400kV SS may be designed for 50 kA fault level and should have provision for bus sectionalizer and series reactor for future.

8.3 After further discussions the following scheme for Damaracherla was agreed to be implemented by TSTRANSCO matching with the generation project:

- a) Proposed Damaracherla Switchyard to Proposed 400/220/132 kV Choutuppal SS by Quad Moose Dc Line
- b) Proposed Damaracherla Switchyard to Proposed 400/220kV DindiSS by Quad Moose Dc Line
- c) Proposed Damaracherla Switchyard to Proposed 400/220 kV Maheswaram(TSTRANSCO) SS by Quad Moose Dc Line
- d) Proposed Damaracherla Switchyard to Proposed 400/220kV Jangaon SS (Jangaon SS is included in the Manuguru and KTPS VII Evacuation Scheme) by Quad Moose Dc Line
- e) From Proposed 400/220/132 kV Choutuppal SS to Upcoming 220/33 kV Hayatnagar SS by Single Moose DC Line
- f) From Proposed 400/220/132 kV Dindi SS to Upcoming 220/33 kV Thimmajipet SS by Single Moose DC Line
- g) From Proposed 400/220/132 kV Dindi SS to proposed 220/132 kV Nagarkurnool SS by Single Moose DC Line
- h) From Proposed 400/220/132 kV Dindi SS to Existing 220/33 kV KM Pally SS by Single Moose DC Line
- i) 400/220 kV Dindi SS with 3 x 500 MVA
- j) 400/220/132 kV Choutuppal SS with 3 x500 MVA+2 x 100 MVA
- k) 220/132 kV Nagarkurnool SS with 2x100 MVA
- l) 2X125 MVAR Bus reactor at Damercherla switchyard

9.0 Palamur-Rangareddy Lift Irrigation Scheme with 2548 MW Load.

9.1 Director, CEA stated that TSTRANSCO has requested to arrange approval in the Standing Committee meeting for the evacuation schemes of Palamaru-Ranga Reddy Lift Irrigation scheme

400kV Transmission lines

- i) Proposed 400/220kV Maheswaram (TSTRANSCO) SS to Existing 400/220kV Veltoor SS by Quad Moose Dc Line – about 137 kms.
- ii) Proposed 400/220kV Maheswaram (TSTRANSCO) SS to Proposed 400 Parigi LI SS by Quad Moose Dc Line – about 120 kms.
- iii) Existing 400/220 kV Veltoor SS to Proposed 400 kV Madaram LI SS by Quad Moose Dc Line – about 78 kms.
- iv) Proposed 400 kV Madaram (Dhanwada Mandal) LI SS to Proposed 400 kV Nancharlakota LI SS by Quad Moose Dc Line – about 54 kms.
- v) Proposed 400 kV Nancharlakota LI SS to Proposed 400 kV Parigi LI SS by Quad Moose Dc Line – about 42 kms.

The proposed new substations:

- i) 400 kV Madaram LI SS.

- ii) 400 kV Nancharlakota LI SS
- iii) 400 kV Parigi SS

9.2 Director(Projects), TSTRANSCO informed that the locations of the proposed new LI SS, has been changed and one more LI SS at Kollapur has been planned.

9.3 It was decided that TSTRANSCO will furnish new proposal and the issue will be re-discussed in the next SCPSPSR.

10.0 Power Evacuation scheme for Telangana STPP Phase-I (2X 800 MW)

10.1 Director, CEA said that NTPC has proposed to establish Telangana STPP Phase-I (2X 800 MW) in the available land near Ramagundam STPP (RSTPP). He further said that NTPC has also informed that Telangana TRANSCO is intending to execute the ATS of the project.

10.2 AGM, NTPC informed that a 400kV GIS switchyard is envisaged with provision of 4 nos of 400kV line bays in generation switchyard of Telangana STPP Phase-I. For start up power and project commissioning requirements, interconnection with existing 400kV switchyard of RSTPP is proposed.

10.3 AGM, NTPC informed that there is 100% allocation of power to TSTRANSCO from Telangana STPP Phase-I. He stated that tendering for various packages for the project has been completed and since Telangana STPP Phase-I is in the vicinity of RSTPP, the transmission line corridor may be planned, in association with PGCIL, keeping in view the existing nearby lines.

10.4 Director, CEA informed that ATS for Telangana STPP Phase-I (2X 800 MW) is yet to be received from TSTRANSCO.

10.5 After deliberations it was decided that ATS of the project would be finalized after receiving proposal from TSTRANSCO. The issue will be re-discussed in the next SCPSPSR, accordingly.

11.0 Provision of 315 MVA, 400/220kV transformer in place of 200MVA, 400/132kV failed Power Transformer at NTPC Ramagundam

11.1 Director, CEA stated that TSTRANSCO proposed restoration of 200 MVA,400/132kV failed Power transformer with 315 MVA,400/220kV power transformer at NTPC Ramagundam.

- 11.2** Director(Projects), TSTRANSCO said that they would spare one 315 MVA, 400/220kV transformer, modify the 132kV bay by providing required equipment and also modify 132kV lines.
- 11.3** He further proposed to divert the 132 kV loads of Manthani and Durshed existing on 400/132 kV of Ramagundam NTPC on the new 220 kV substations i.e., Manthani and Huzurabad which are in advanced stage of completion.
- 11.4** After discussions, the proposal was accepted.

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

- 12.1** Director, CEA explained that TSTRANSCO has proposed that the Twin Moose line between Maheshwaram 765kV PGCIL SS- Maheshwaram 400kV TS SS and Dichipally 765kV PGCIL SS- Dichipally 400kV TS SS needs to be enhanced to Quad Moose lines.
- 12.2** After discussions it was agreed that reconductoring of Twin Moose line between Maheshwaram 765kV PGCIL SS- Maheshwaram 400kV TS SS to Quad Moose will be done by TSTRANSCO. With regard to Maheshwaram 765kV PGCIL SS- Maheshwaram 400kV TS SS PGCIL informed that rating of bay equipment at Maheshwaram 765kV PGCIL SS shall be considered as per TSTRANSCO request.
- 12.3** However, with regard to Nizamabad(Dichipally) 765kV PGCIL SS- Dichipally 400kV TS, the line is already under implementation and prima facie modifications are not possible at this stage. However, PGCIL stated that they shall revert back on this issue.

13.0 Grant of LTA to Telangana State Southern Power Distribution Company Ltd. (TSSPDCL) for 2000 MW from Chhattisgarh to Telangana State DISCOMs

- 13.1** Director, CEA informed that Telangana State Southern Power Distribution Company Ltd. (TSSPDCL) has applied for LTA of 2000 MW in the month of February, 2015 for evacuation of 1000 MW power from Marwa Thermal power Station (Marwa TPS) and another 1000 MW power from other generating stations in Chhattisgarh i.e. total 2000 MW to the DISCOMs of Telangana namely Southern Power Distribution Company of Telangana Ltd. (TSSPDCL) & Northern Power Distribution Company of Telangana Limited (TSNPDCCL) .

- 13.2 COO(CTU-Plg), PGCIL stated that for grant of this LTA no additional transmission system is envisaged. The same may be granted on the existing/under construction and already planned transmission system.
- 13.3 After discussions it was decided that, as no additional system is envisaged, the matter will be discussed in the LTA meeting.

14.0 Transmission system for i) evacuation of power from 1 x 800 MW VTS Extnplant of APGENCO at Vijayawada ii) 400kV ring main around the proposed capital city of Andhra Pradesh

- 14.1 Director, CEA informed that APTRANSCO has proposed transmission system for 1 x 800 MW power plant of APGENCO at Vijayawada and transmission system for 400kV ring around the proposed capital city at Vijayawada. A joint study was conducted with CEA, PGCIL and APGENCO for evolving transmission system for power evacuation from 400 kV ring around capital city and proposed 400 kV substation at Thullur/Inavolu. The system evolved for 400 kV ring around the capital city is given in the agenda note for 39th SCPSPSR.
- 14.2 Director(Projects), APTRANSCO requested to include the following LILOs under the system evolved for “Elluru 400/220 kV substation, 2x315 MVA”
- a. LILO of Vemagiri-Nunna 220kV DC line at 220/132kV Elluru.
 - b. LILO of Elluru(existing)-Pedavegi 132kV at proposed 220/132kV Elluru SS.

And following LILOs under the system evolved for “400/220kV substation at CPeta by APTRANSCO – as a new substation close to 765/400kV CPeta (under ISTS) or as 400kV bus extension at proposed 765/400kV CPeta (ISTS) for erecting CPeta 400/220 kV, 2x500 MVA transformer”

- a. 132 kV LILO (10.5 KM approx.) of existing 132 kV Chilakaluripeta – Nallapadu at proposed 220/132 kV Chilakaluripet SS
 - b. 132 kV LILO (10.5 KM approx.) of existing 132 kV Chilakaluripeta – Marripalem at proposed 220/132 kV Chilakaluripet SS
- 14.3 PGCIL raised its apprehensions regarding bays at CPeta and whether 400kV bus extension can be allowed at proposed 765/400kV CPeta (ISTS) which is implemented under TBCB.
- 14.4 It was agreed that would provide 125MVAr bus reactors would be provided at the VTPS Extn generating stations to absorb reactive power under light load condition for more stable operation of the generating units.

14.5 It was also decided that all the 400kV S/s shall have 125MVAR bus reactors. The new 400kV S/s may be designed for 50 KA fault level strength.

14.6 Based on the discussions, following was agreed for evacuation of power from VTPS(1x800MW)

- a) 400kV VTS- Sattenpalli Quad Moose DC line.
- b) 1x125MVAR Bus reactor at VTPS Extn.

14.7 The following system was agreed for 400 kV ring around the capital city. These system would be implemented by APTRANSCO.

I) Elluru 400/220 kV substation, 2x315 MVA (To be upgraded to 765 kV with Pudimadaka) :

- i) Keep provision for 400/220 kV transformer with 2x500 MVA rating for future use.
- ii) Existing 132 kV Elluru to be upgraded to 220kV and will be connected with Elluru 400/220kV S/S.
- iii) Provision of D/C 220kV outlet from Elluru 220kV S/S.
- iv) LILO of Vemagiri-I Sattenpalli 400 kV DC twin lines at Elluru 400 kV substation.
- v) LILO of Vemagiri-Nunna 220kV DC line at 220/132kV Elluru.
- vi) LILO of Elluru(existing)-Pedavegi 132kV at proposed 220/132kV Elluru SS.
- vii) 1x125MVAR Bus reactor at Elluru 400/220 kV substation

II) Gudivada 400/220/132 kV, 2x500 MVA substation.

- i) LILO of existing Nunna- Guduwada 220kVDC line at Guduwada 400/220/132kV.
- ii) LILO of 220kV Guduwada- Guduwada 400/220/132kV DC line at Gannavaram.
- iii) Guduwada 400/220/132kV- Machhlipatnam 220kV DC line.
- iv) Elluru - Gudivada 400 kV DC Quad line.
- v) Gudivada – C Peta 400 kV DC Quad line.
- vi) 1x125MVAR Bus reactor at Gudivada 400/220/132 kV substation

III) Sattenpalli 400/220kV S/S

- i) 2 x 315 existing transformer to be augmented by 2 x 500 MVA substation.
- ii) Sattenpalli- Guntur 220kV DC line.
- iii) 1x125MVAR Bus reactor at Sattenpalli 400/220kV S/S

IV) 400/220kV substation at CPeta by APTRANSCO – as a new substation close to 765/400kV CPeta (under ISTS) or as 400kV bus extension at proposed 765/400kV CPeta (ISTS) for erecting CPeta 400/220 kV, 2x500 MVA transformer

- i) CPeta 220/132kV, 2x100 MVA S/S.
- ii) 220kV DC line from CPeta 220/132kV to CPeta 400/220 kV.
- iii) 2 nos of 220kV DC line for future from CPeta 400/220 kV
- iv) LILO of Sattenpalli - VTS 400 kV DC line at Inavolu
- v) 132 kV LILO (10.5 KM approx.) of existing 132 kV Chilakaluripeta – Nallapadu at proposed 220/132 kV Chilakaluripet SS
- vi) 132 kV LILO (10.5 KM approx.) of existing 132 kV Chilakaluripeta – Marrisalem at proposed 220/132 kV Chilakaluripet SS.
- vii) 1x125MVAR Bus reactor at 400/220kV substation at CPeta

V) Inavolu 400/220 kV, 2x500 MVA substation.

- i) Existing 132/33kV Tadepalli to be upgraded to 220/132/33 kV Tadepalli and further 220kV DC line to Inavolu.
- ii) 220kV DC line to Malkapuram.
- iii) 220kV DC line to Amravati.
- iv) Erection of 220/132/33 kV Amaravathi SS with 2 x 160 MVA PTRs.
- v) 220 kV DC line (14 KM) from proposed 400/220 kV Inavolu SS to proposed 220/132/33 kV Amaravathi SS.
- vi) 220 kV LILO (4 KM) of existing 3rd circuit of VTS – Tallapalli line at proposed 220/132/33 kV Amaravathi SS.
- vii) Erection of 220/132/33 kV Malkapuram SS with 2 x 100 MVA PTRs.
- viii) 220 kV DC line (6 KM) from proposed 400/220 kV Inavolu SS to proposed 220/132/33 kV Malkapuram SS.
- ix) 220 kV DC line (12 KM) from proposed 220/132/33 kV Tadepalli SS to proposed 220/132/33 kV Malkapuram SS.

- x) 220 kV DC LILO (5 KM) of existing VTS – Podili line at proposed 220/132/33 kV Malkapuram SS.
- xi) Up-gradation of 132/33 kV Repalle SS to 220/132/33 kV Repalle SS with 2 x 100 MVA PTRs.
- xii) 220 kV DC line (60 KM) from proposed 220/132 kV Guntur-2 SS to proposed 220/132/33 kV Repalle SS.
- xiii) Erection of 132/33 kV Amaravathi SS with 2 x 50 MVA PTRs.
- xiv) 132 kV DC line (5 KM) from proposed 220/132/33 kV Amaravathi SS to proposed 132/33 kV Amaravathi SS.
- xv) Erection of 132/33 kV Achampeta SS with 2 x 50 MVA PTRs.
- xvi) 132 kV DC line (32 KM) from proposed 220/132/33 kV Amaravathi SS to proposed 132/33 kV Achampeta SS.
- xvii) Erection of 132/33 kV Dondapadu SS with 2 x 50 MVA PTRs.
- xviii) 132 kV DC/SC line (15 KM) from proposed 220/132/33 kV Amaravathi SS to proposed 132/33 kV Dondapadu SS.
- xix) 132 kV DC/SC line (11 KM) from proposed 220/132/33 kV Malkapuram SS to proposed 132/33 kV Dondapadu SS.
- xx) Erection of 132/33 kV Peddaparimi SS with 2 x 50 MVA PTRs.
- xxi) 132 kV DC/SC line (19 KM) from proposed 220/132/33 kV Amaravathi SS to proposed 132/33 kV Peddaparimi SS.
- xxii) Erection of 132/33 kV Navuluru SS with 2 x 50 MVA PTRs.
- xxiii) 132 kV DC/SC line (12 KM) from proposed 220/132/33 kV Malkapuram SS to proposed 132/33 kV Navuluru SS.
- xxiv) 132 kV DC/SC line (16 KM) from proposed 132/33 kV Peddaparimi SS to proposed 132/33 kV Navuluru SS.
- xxv) Erection of 132/33 kV Uddandrayanipalem SS with 2 x 50 MVA PTRs.
- xxvi) 132 kV DC/SC line (3 KM) from proposed 220/132/33 kV Malkapuram SS to proposed 132/33 kV Uddandrayanipalem SS.
- xxvii) 132 kV DC/SC line (7 KM) from proposed 132/33 kV Dondapadu SS to proposed 132/33 kV Uddandrayanipalem SS.
- xxviii) Erection of 132/33 kV Krishnayanipalem SS with 2 x 50 MVA PTRs.
- xxix) 132 kV DC/SC line (6 KM) from proposed 220/132/33 kV Malkapuram SS to proposed 132/33 kV Krishnayanipalem SS.

xxx) 132 kV DC/C line (3 KM) from proposed 132/33 kV Navuluru SS to proposed 132/33 kV Krishnayanipalem SS.

xxxi) 1x125MVAR Bus reactor at Inavolu 400/220 kV S/s

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

15.1 Director, CEA informed that APTRANSCO had submitted following transmission system for the proposed 4x1000MW super critical TPS of NTPC at Pudimadaka and 4000MW TPP at Polaki

- i) 765 kV Hexa zebra S/c line from Polaki 765 SS to Srikakulam 765/400KV SS of PGCIL
- ii) 765 kV Hexa zebra DC line from Polaki 765 SS to Pudimadaka 765/400KV SS.
- iii) 400KV Quad moose D/c line from Polaki 765 KVSS to Tekkali 400/220 KV SS.
- iv) 400 KV Quad moose D/c line from Polaki 765 KVSS to Garividi 400/220 KV SS.
- v) 400 KV Twin moose D/c line from Palasa 765 KVSS to Tekkali 400/220 KV SS.
- vi) 765/400 KV substation at Pudimadaka ,Visakhapatnam Dt.
- vii) 400/220 K SS at Koruprolu/Pudimadaka Vizag.
- viii) Laying of 400 KV Quad moose D/c line from Pudimadaka 765 KVSS to Koruprolu/Pudimadaka 400/220 KV SS.
- ix) 765/400 KV substation at Eluru ,West Godavari Dt .
- x) 765 kV Hexa zebra DC line from Pudimadaka 765 SS to Eluru 765/400KV SS.
- xi) 765 kV Hexa zebra DC line from Eluru 765 SS to Nellore 765/400KV SS of PGCIL.
- xii) 765 kV Hexa zebra D/C line from Eluru 765 SS to Chilakaluripeta 765/400KV SS of PGCIL.
- xiii) 400KV Quad moose D/c line from Eluru 765 KVSS to KV Kota 400/220 KV SS.
- xiv) 400KV Quad moose D/c line from Eluru 765 KVSS to Gudivada 400/220 KV SS

15.2 He informed that a joint study was conducted with CEA, PGCIL and APTRANSCO for evolving transmission system for power evacuation from proposed 4000 MW power plant by NTPC at Pudimadaka. Accordingly, the elements from no.(vi) to (xiv) were considered in studies for Pudimadaka. The

4000MW power plant of APGENCO at Polaki was not considered as it is expected to come after 13th Plan.

- 15.3 PGCIL stated that the Pudimadaka generating station needs to provide 2x240 MVAR bus reactors for 4000MW capacity to absorb reactive power under light load condition for more stable operation of the generating units
- 15.4 AGM-Engg, NTPC said that land for 4000MW power plant at Pudimadaka is yet to be acquired, however it would come by 2019.
- 15.5 APTRANSCO said that they would revert back soon on the issue, whether Pudimadaka system would be built by APTRANSCO or would go in ISTS.
- 15.6 AGM-Engg, NTPC informed that due to space constraints both 400kV and 765kV levels cannot be accommodated at Pudimadaka switchyard and therefore, the evacuation system should have either 400kV or 765kV level.
- 15.7 Director(Projects), APTRANSCO suggested connection of Pudimadaka 765kV to Vemagiri765kV. PGCIL said that there is huge inflow of power at Vemagiri because of Srikakulam –Vemagiri 765kV connectivity.
- 15.8 Based on discussions it was decided that the system for 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 (copy enclosed) has informed that the execution of Pudimadaka 4000 MW NTPC Power Plant evacuation scheme may be entrusted to ISTS.) Thus NTPC should now apply for LTA to CTU.

16.0 Issues regarding power supply under VCIC (Vizag Chennai Industrial Corridor) scheme

16.1 For Sricity SEZ :

Director, CEA informed that APTRANSCO has approved dedicated transmission scheme for providing power supply to M/s Sricity SEZ under VCIC scheme and also to meet the up-coming loads in and around Chittoor district:

- i) Up-gradation of 220/132KV Rachagunneri SS to 400/220/132KV SS Rachagunneri with 2 x 315 MVA.

- ii) 400KV QMDC LILO of (45KM) 400KV SS Chittoor – 400KV APGENCO Krishnapatnam.
- iii) Up-gradation of 132/33KV Cherivi SS to 220/132/33KV Chervi SS with 2 x 160 MVA.
- iv) Erection of 220 KV DC line (50KM) from 400KV SS Rachagunneri to 220KV SS at Chervi in Chittoor district.
- v) Erection of 220KV DC line (30KM) from 220KV SS Sulluripet to 220KV SS Chervi in Chittoor District.
- vi) Erection of 132/33KV SS at Yerpedu with 2 x 80MVA.
- vii) Erection of 132KV DC line (5KM) from 400/220/132KV SS at Rachagunneri SS to proposed 132KV Yerpedu SS.

16.2 APTRANSCO informed that this scheme is to meet load of 500MW by 2018.

16.3 The above scheme of APTRANSCO was agreed.

16.4 Load demand by APIIC SEZ :

Director, CEA informed that APTRANSCO has proposed dedicated Transmission Scheme to meet the load demand of 200MW proposed by M/s APIIC at Menakur/Naidupet area under VCIC scheme and also to meet the up-coming loads in and around Chittoor district.

- i. Up-gradation of existing 132/33 kV Menakuru SS to 220/132/33 kV Menakuru SS with 2 x 100 MVA PTRs.
- ii. 220 kV DC line (40 KM) from proposed 400/220/132 kV Rachagunneri SS to proposed 220/132/33 kV Menakuru SS.
- iii. 132 kV LILO (15 KM) of existing 132 kV Naidupet – Gudur line to proposed 220/132/33 kV Menakuru SS.

16.5 The above scheme of APTRANSCO was agreed.

17.0 Evacuation of Power from N. P. Kunta Solar Park(Part-B):

17.1 Director, CEA said that POWERGRID has proposed that part of Cuddapah – Hindupur 400kV D/c line from Cuddapah end to LILO point be planned for completion matching with N. P. Kunta Solar Park Part-B by Dec 2016 and this shall be joined with the LILO portion of the planned evacuation system of power from N. P. Kunta Solar Park(Part-B). The balance line portion of Cuddapah – Hindupur line shall be completed later in about 28 months of time frame. PGCIL also proposed to prepone the associated 2 nos. of 400kV bays at 400kV GIS S/s at Cuddapah in Dec 2016.

- 17.2** COO(CTU-Plg), PGCIL said that the above proposal is regarding taking up some portion of the two schemes on priority and implementing the remaining portion subsequently, as such, it does not result in any change in the final network topology. In view of this, CEA has given 'no objection' for PGCIL to take up the above proposal i.e. implementing a part of Cuddapah – Hindupur line (i.e. from Cuddapah to LILO point for N.P.Kunta) and a part of LILO of both circuits of Cuddapah –Hindupur at N.P.Kunta (i.e. only one D/C out of the 2xD/c lines required for LILO at N. P. Kunta) initially, and the remaining parts of the two schemes as per their compressed time schedules.
- 17.3** She further said that construction of Cuddapah – Hindupur line shall take about 28 months (October 2017), whereas LILO of the same line is to be completed by Dec 2016.
- 17.4** AGM (CTU-Plg), PGCIL informed that NP Kunta Part A is expected in December 2016, Part B would be coming in April 2017 and Part C in Sept 2017.
- 17.5** Members agreed to the above.

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

- 18.1** Director, CEA said that CEA has given in-principle clearance for adoption of GIS at Cuddapah for proposed 400kV expansion.
- 18.2** AGM (CTU-Plg),PGCIL explained that the Cuddapah 765/400kV substation under the scheme "System Strengthening –XXIV in Southern Region" was agreed in the 37th Standing Committee Meeting on Power System Planning of Southern Region held on 31st July, 2014 at NRPC, New Delhi except for the GIS type S/S at Cuddapah instead of AIS type as earlier agreed. The issue of GIS at 765/400kV substation at Cuddapah was discussed in the 38th meeting of SCPSPSR held on 7 March, 2015 and it was agreed to implement the 765kV part as GIS and the augmentation of 400kV part as AIS for the Cuddapah 765/400kV S/s.
- 18.3** He further informed that considering the high fault level at Cuddapah and requirement of series reactor in future, it would not be possible to accommodate 400kV substation as AIS. The land available at Cuddapah substation is suitable and sufficient for establishing new 765kV and 400kV as GIS
- 18.4** Director, CEA stated that the project is to be taken up under compressed time schedule and the proposed change is only a minor modification to already

approved scheme. CEA have conveyed 'in-principle' approval for adoption of GIS at Cuddapah for proposed 400kV expansion.

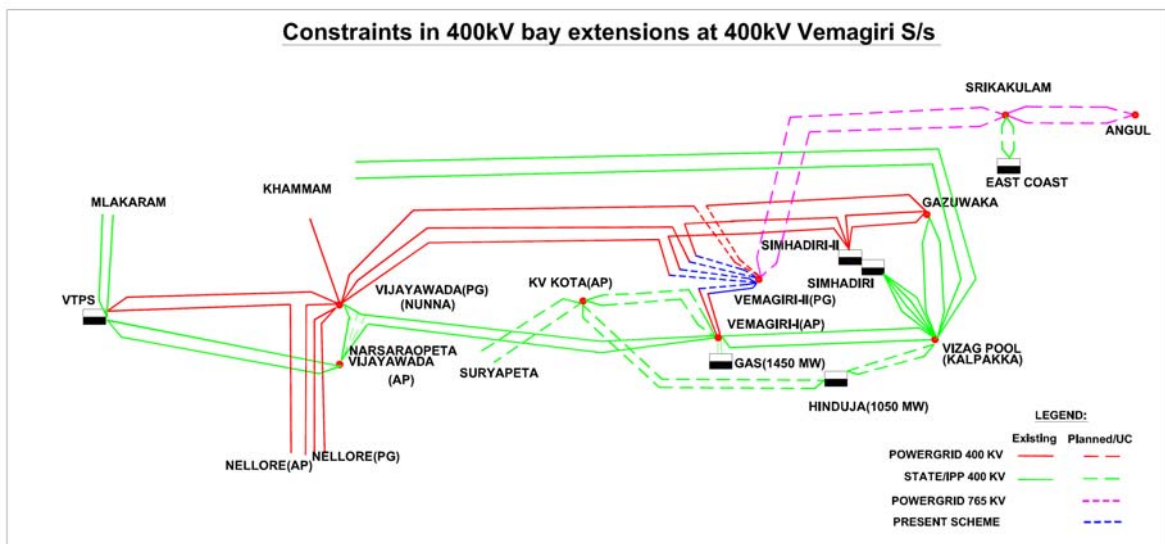
18.5 Members agreed for the above.

18.6 It was also decided that PGCIL would carry out studies to ascertain requirement of series reactor at Cuddapah or/and at other S/S in SR, which would be taken up in the next meeting of SCPSPSR.

19.0 **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.**

19.1 AGM (CTU-Plg), PGCIL said that both circuits of Simhadri- Vijayawada 400 kV D/c line were LILoed at Vemagiri-I(AP) by PGCIL. Now, the scheme "Constraints in 400 kV bay extensions at 400 kV Vemagiri S/S", is under implementation by PGCIL.

- a) Both circuits of one LILO D/C portion of Simhadri- Vijayawada 400kV line at Vemagiri-I(AP) shall be LILoed at Vemagiri-II(PG) – 15 km (1.8 km on D/c portion and 13.2 km on multi-circuit portion).
- b) Both circuits of Second LILO D/C portion of Simhadri-Vijayawada 400kV line at Vemagiri-I(AP) shall be Looped in at Vemagiri-II(PG) – 15 km. There shall be No Loop out. The open section of 400kV D/c line from Vemagiri-I(AP) shall be used for termination of KV Kota line.



19.2 He further said that aforesaid transmission scheme was planned considering "Strengthening of transmission system beyond Vemagiri" & It would be in place in the similar time frame. However, as per the present scenario, it appears that

there may be a time gap of about 1-1.5 years in both the schemes. During studies, it was observed that in the absence of “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 Available Transfer Capacity(ATC) for import of power to southern region gets adversely affected.

19.3 He further said that in order to relieve overloading of Vemagiri-I(AP)-Vemagiri-II(PG), different options were studied.

Beyond Vemagiri (AP) there are four circuits, two circuits each towards KV Kota and Vijayawada(AP)/ Vijayawada(PG). He proposed that one circuit of Vemagiri(PG)-Vemagiri(AP) may be connected with KV Kota and other circuit may be connected to Vijayawada (PG). This will result in following configuration:

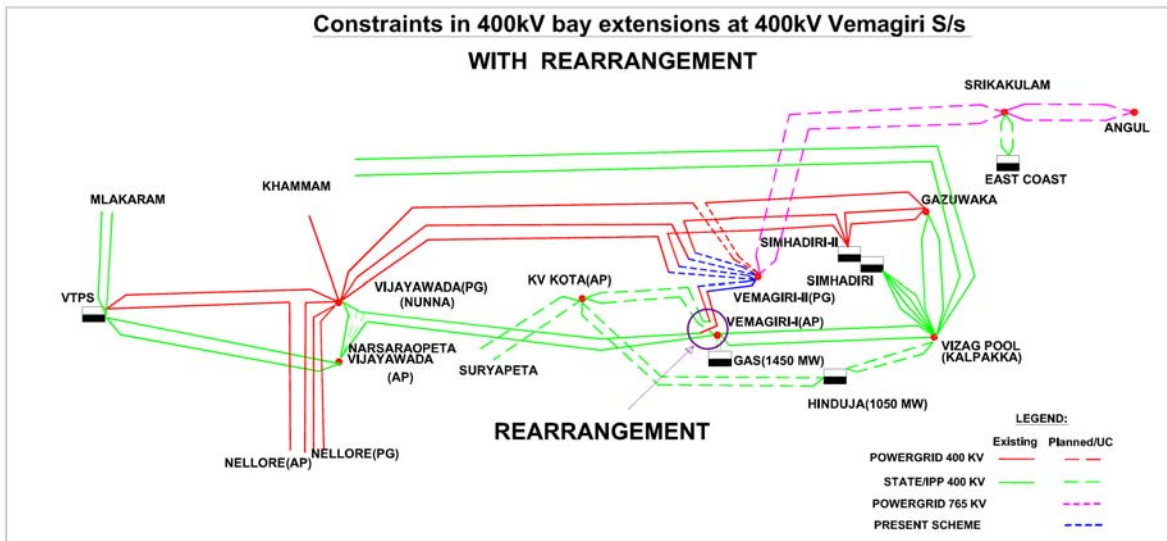
At Vemagiri-I(AP)

1. 400 kV Vemagiri-I(AP) – KV Kota - One Circuit
2. 400 kV Vemagiri-I(AP) – Vijayawada(AP) - One Circuit
3. 400 kV Vemagiri-I(AP) – Vizag Pool – Two Circuits

At Vemagiri-II(PG)

1. 400 kV Vemagiri-II(PG) – Vijayawada(PG) - Four Circuits
2. 400 kV Vemagiri-II(PG) – KV Kota - One Circuit
3. 400 kV Vemagiri-II(PG) – Simhadri - Two Circuits
4. 400 kV Vemagiri-II(PG) – Gazuwaka - One Circuit
5. 765 kV Vemagiri-II(PG)- Srikakulam – Two Circuits

The schematic for re-arrangement



- 19.4** PGCIL further said that this arrangement is temporary and 400 kV D/C Vemagiri(AP)-Vemagiri(PG) will be restored upon commissioning of “Strengthening of transmission system beyond Vemagiri”.
- 19.5** APTRANSCO said that PGCIL proposal of connecting one circuit of Vemagiri(PG)-Vemagiri(AP) with KV Kota and other circuit to Vijayawada (PG) was not accepted to them. He further requested that load flow studies duly considering the proposed evacuation of 4000 MW power from Pudimadaka plant, should be carried out to examine the aforesaid PGCIL proposal.
- 19.6** Accordingly, it was decided that PGCIL would carry out joint studies along with CEA, SRPC, SRLDC and APTRANSCO to examine issues/constraints in evacuation of given project of AP in Vemagiri area.
- 20.0 M/s Andhra Cements Ltd-Durga Cement Works- 30MW Captive power plant at Gamalapadu (V), Dachepalli (M), Guntur Dist.**
- 20.1** Director(Projects), APTRANSCO informed that M/s Andhra Cements Ltd has proposed to construct 30MW Captive power plant at Durgapuram, Dachepalli (M), Guntur Dist and wanted to connect to APTRANSCO grid.
- 20.2** Director(Projects), APTRANSCO informed that they have advised M/s Andhra Cements Ltd to construct 132kV switching station by making double LILO of circuits of 132kV Wadapalli(Telangana)- Tangeda (Andhra Pradesh)lines and 132kV Wadapalli- Piduguralla lines at M/s Andhra Cements Ltd. He informed that the 132kV Wadapalli- Tangeda lines and the 132kV Wadapalli- Piduguralla lines are ISTS lines between the states of Andhra Pradesh and Telangana.
- 20.3** AGM, POSOCO suggested that Substation where these lines would be LILOed will be an ISTS point. Thus metering would be shifted to switching station of M/s Andhra Cements Ltd.
- 20.4** APTRANSCO informed that one of the 132kV Wadapalli- Piduguralla DC lines was LILOed at Tangeda. Director, CEA suggested to connect M/s Andhra Cements Ltd to Tangeda i.e within the state’s transmission network and the same was agreed.
- 21.0 LILO of 400kV Vemagiri- Nunna DC at 400kV Sattenapally**
- 21.1** APTRANSCO informed that due to non adequate loads at 400kV Sattenpally, only one circuit of 400kV Vemagiri- Nunna DC line was LILOed at 400kV Sattenpally, instead of the earlier agreed LILO of both circuits. Accordingly, 400kV Vemagiri- Sattenpally was charged on 12.10.2015. He said that SRLDC is not permitting AP to charge Nunna- Sattenpally 400kV line.

21.2 SRLDC said that they were not permitting AP to charge Nunna- Sattenpally 400kV line as they do not have changes contemplated in this scheme. SCPSPSR notification is required in this case.

21.3 Members agreed for permitting AP to charge Nunna- Sattenpally 400kV line.

22.0 Modification in scope of transmission schemes of KPTCL for renewable energy generation projects to be taken up for KfW funding

22.1 Director, CEA said during 36th Standing Committee Meeting on Power System Planning of Southern Region, the System for RE projects in Karnataka was agreed. From the proposal submitted by KPTCL, it was worked out that a total of 4070 MW of RE Generation would be available by 2018-19.

22.2 He further said that KPTCL had informed that few proposals that were earlier approved under Green Energy Corridor scheme are revised. During the meeting held in CEA on 15-May-2015, KPTCL said that considering the progress of renewable energy generation projects and the transmission schemes, they would like to award some of the schemes by December 2015, others by June 2016 and one scheme by June 2017.

22.3 He informed that the proposed transmission schemes were divided in three groups and was agreed in- principle

Sl. No.	Transmission Scheme	To be awarded by date
	<u>Group – I</u>	
1.	Establishing 2 x 500 MVA, 400/ 220 kV Sub station at Gadag(Doni) in Mundaragi Taluk, Gadag District. (i) Establishing 2 x 500 MVA, 400/ 220 kV Sub station at Gadag(Doni) in Mundaragi Taluk, Gadag District. (ii) Construction of 400 kV LILO line with Twin Moose ACSR conductor from 400 kV Guttur-Guddadahalli SC line to Proposed 400/220 kV S/S at Gadag(Doni) for a distance of 26.798 kms in Gadag District. (iii) Construction of 220 kV DC LILO line from 220 kV Gadag-Lingapur DC line to proposed 400/220 kV Gadag(Doni) S/S for a distance of 2.775 Kms in Mundaragi Taluk, Gadag District	To be awarded by Dec 2015

Sl. No.	Transmission Scheme	To be awarded by date
2.	<p>Construction of 220 kV SC line from 400kV Hiriya (PGCIL) sub station to 220/66/11kV Hiriya sub station and Construction of 220kV DC line from 220/66/11kV Chitradurga sub station to 220/66/11kV Hiriya sub station in existing corridor in Chitradurga District.</p> <p>(i) Construction of 220 kV SC line on DC towers from existing 400kV PGCIL station Beeranahalli to existing 220/66/11kV SRS at Hiriya in Chitradurga Dist in existing corridor of 220kV SC line from Hoysalakatte to 220/66/11 kV sub station Hiriya (partly in new corridor i.e from PGCIL point to link 220 kV S/C line from Hoysalakatte to 220/66/11kV SRS at Hiriya).</p> <p>(ii) Construction of 220 kV DC line on DC towers from existing 220/66 kV Sub-Station Chitradurga to existing 220/66 kV Sub-Station Hiriya in Chitradurga Dist in existing corridor (partly in new corridor from LILLO point to 220 kV sub station Chitradurga) for a distance of 37.461Kms.</p> <p>(iii) Construction of Two Nos of 220 kV Terminal bays at 220/66/11 kV Chitradurga Sub-Station in Chitradurga Taluk and District.</p> <p>(iv) Construction of Two Nos of 220 kV Terminal bays at 220/66/11 kV Hiriya Sub-Station in Hiriya Taluk and Chitradurga District.</p> <p>(v) Releasing of towers in Existing 220kV Hoysalakatte SC line for stringing of proposed 220 kV SC line from 400/220kV Beeranahalli to 220/66/11kV Hiriya in Chitradurga Dist.</p> <p>(vi) Dismantling of 220 kV SC line from Location No 247 i.e at Doddasiddavvanahally limits near 220/66/11kV Chitradurga sub station to 220/66 kV sub station Hiriya in Chitradurga Dist.</p>	To be awarded by Dec 2015
3.	<p>Establishing 2 x 500 MVA, 400/220 kV Sub station at Jagalur in Jagalur Taluk, Davanagere District.</p> <p>(i) Establishing 2 x 500 MVA, 400/220 kV GIS Sub station at Jagalur in Jagalur Taluk, Davanagere District.</p>	To be awarded by Dec 2015

Sl. No.	Transmission Scheme	To be awarded by date
	<p>(ii) Construction of 400kV Multi circuit Quad Moose ACSR line for a length of 40kms from proposed 400/220kV Jagalur substation to LILO the proposed BTPS-CNHalli DC line at the rate of Rs.350.00Lakhs per km.</p> <p>(iii) Construction of 220kV Drake ACSR line for a length of 40kms from proposed 400/220kV Jagalur substation to 220/66kV Thallak substation at the cost of Rs.60.00Lakhs per km.</p> <p>(iv) Construction of 220kV Drake ACSR line for a length of 50kms from proposed 400/220kV Jagalur substation to proposed 220/66/11kV Kudligi substation at the cost of Rs.60.00Lakhs per km.</p> <p>(v) Construction of 4Nos of 220kV line terminal bays(2 Nos each at 220/66kV Thallak and prop 220/66/11kV Kudligi substations) at the cost of Rs:150.00 Lakhs per TB.</p> <p>(vi) Construction of 220kV DC line for a route length of 50kms from Jagalur to Chitradurga at the cost of Rs.60.00 Lakhs per km</p>	
4.	Construction of 220kV DC line for a length of 26kms from 220kV Bidnal substation to LILO one of the circuits of 220kV Narendra-Haveri DC line, in Haveri and Dharwad districts.	To be awarded by Dec 2015
	<u>Group – II</u>	
5.	<p>Establishing 2x100MVA 220/66 kV and 1x8MVA 66/11kV sub station at Shivanasamudra, Malavalli taluk, Mandya district.</p> <p>(i) Construction of 220kV DC line for a distance of 1.5kms to link to 220kV line connecting 220kV T.K.halli substation at the cost of Rs.60.00Lakhs per km.</p> <p>(ii) Construction of 220kV DC line for a distance of 1.5kms to link to 220kV line connecting 220kV Madhuvanahalli substation at the cost of Rs.60.00Lakhs per km.</p> <p>(iii) Construction of 220kV DC Drake ACSR line for a length of 76kms in the existing 220kV Hootagally-Vajamangala-T.K.Halli SC line corridor including LILO to 220/66/11kV</p>	To be awarded by June 2016

Sl. No.	Transmission Scheme	To be awarded by date
	<p>Vajamangala substation at the cost of Rs.60.00 Lakhs per km.</p> <p>(iv) Construction of 220kV line terminal bays-4Nos (one each at 220kV Hootagally and T.K.halli and two nos at Vajamangala) at the cost of Rs.150.00 Lakhs per TB.</p> <p>(v) Construction of 5kms of 66kV DC coyote ACSR lines to link M2 line, T.K.halli line, SFC line, Kollegala line, Madhuvanahalli lines to proposed 220/66/11kV Shivanasamudram substation near existing SFC substation at the cost of Rs.30.00Lakhs per kms.</p> <p>(vi) Establishing 2x100MVA 220/66 kV and 1x8MVA 66/11kV sub station at Shivanasamudra, Malavalli taluk, Mandya district</p>	
6.	<p>Establishing 2 x 100 MVA, 220/110 KV & 1x10 MVA, 110/11 KV Sub station at Mughalkod in Raibag Taluk, Belgaum District.</p> <p>(i) Establishing 2 x 100 MVA, 220/110 KV & 1x10 MVA, 110/11 KV Sub station at Mughalkod in Raibag Taluk, Belgaum District.</p> <p>(ii) Construction of 110kV DC for a length of 5kms to link 220/110/11kV Mughalkod to 110/11kV ltnal substation at the rate of Rs.40 Lakhs per km.</p> <p>(iii) Construction of 110kV DC for a length of 10kms to link 220/110/11kV Mughalkod to link to lines connecting Hidkal and Sultanpur substations at the rate of Rs.40 Lakhs per km.</p> <p>(iv) Construction of 110kV DC for a length of 15kms to link 220/110/11kV Mughalkod to lines connecting Mudalagi and Hunsyal substations at the rate of Rs.40 Lakhs per km.</p> <p>(v) Construction of 110kV DC for a length of 15kms to link 220/110/11kV Mughalkod to lines connecting Kuligod and Saidapur substations at the rate of Rs.40 Lakhs per km.</p> <p>(vi) Construction of 220kV DC line LILO Ghataprabha-Chikkodi for a route length of 40kms at a cost of</p>	To be awarded by June 2016

Sl. No.	Transmission Scheme	To be awarded by date
	Rs.60.00Lakhs per km	
	<u>Group – III</u>	
7-	<p>Establishing 2x100MVA 220/66 kV and 1x12.5MVA 66/11kV sub station at Hosadurga, Hosadurga taluk, Chitradurga district.</p> <ul style="list-style-type: none"> (i) Construction of 220kV DC line for a length of 45kms from proposed 220/66/11kV Hosadurga substation to 400/220kV CN Halli substation at the cost of Rs.60.00Lakhs per km. (ii) Construction of 220kV line terminal bays-2Nos at 400/220kV CN Halli substation at the cost of Rs.150.00 Lakhs per TB (iii) Construction of 66kV DC line for a length of 2kms from proposed 220/66/11kV Hosadurga substation to LILO 66kV SC Bagur-Ramagiri SC line at the cost of Rs.30.00Lakhs per km. (iv) Construction of 66kV DC line for a length of 10kms from proposed 220/66/11kV Hosadurga substation to 66/11kV Hosadurga substation in existing corridor at the cost of Rs.30.00Lakhs per km. (v) Construction of 66kV DC line for a length of 15kms from proposed 220/66/11kV Hosadurga substation to 66/11kV Halurameshwara substation in existing corridor at the cost of Rs.30.00Lakhs per km. (vi) Establishing 2x100MVA 220/66 kV and 1x12.5MVA 66/11kV sub station at Hosadurga, Hosadurga taluk, Chitradurga district. (vii) Construction of 2 Nos 66kV TBs at 66/11kV Halurameshwara(2 Nos) at the cost of Rs.35Lakhs per TB. 	To be awarded by June 2017

22.4 Members agreed.

23.0 Review of schemes for 'YTPS', 'ETPS', '3rd unit of BTPS' and for 'JSW Energy Ltd'.

23.1 Director, CEA stated that KPTCL had intimated that M/s. JSW Energy Ltd., had come up with a proposal for evacuating additional 660 MW generation recently (to be connected at 400 kV voltage level) together with the existing capacity of 4x300 MW (connected at 400 kV voltage level) and 2x130 MW (connected at 220 kV voltage level).

23.2 Director(Projects), KPTCL informed that they had carried out detailed study for 2017-18 time frame. With the additional 660 MW generation of M/s. JSW Energy Ltd., and with outage of 400 kV DC Quad Moose line between 'Bellari Pooling Station' and 'Madhugiri new' (under N-1-1 contingency), the existing 400 kV DC twin Moose line between 'BTPS' and 'Hiriyur' gets loaded beyond its thermal limits. Also, the fault level at 'BTPS' is nearing 40 KA due to ingress of additional 660 MW by M/s. JSW Energy Ltd., in to the Grid.

23.3 He further informed that KPTCL had proposed **1)** to retain the LILO to 'BTPS' only, from the existing 400 KV SC line running between 'RTPS-BTPS-JSW-Guttur' (total line length-300 KM). This will help in cutting the existing line in to two equal halves in terms of line length thus reducing the reactive flow and also would provide additional evacuation facility to the 'BTPS' plant in terms of contingency requirement and **2)** the 400 KV DC quad line link (approximately 8 KM in length) between 'Ballari Pooling station' and 'BTPS' may be dropped as this link is of hardly any help as power flow on this link is very meagre (in terms of few hundred MW only during normal condition) and also will contribute for increased fault level at 'BTPS'.

23.4 KPTCL proposal was studied jointly with PGCIL and it was seen that if BTPS-Bellari PS is dropped and the LILO is retained, there would be a need of another corridor towards Guttur (Davangiri) or Hiriyur to take care of reliability criterion.

23.5 COO(CTU-Plg), PGCIL suggested to construct either one more DC line between Hiriyur- BTPS 400kV Quad DC line **or** one 400kV DC line between BTPS to Guttur. KPTCL said that there is bay issue at Hiriyur. Members agreed for BTPS to Guttur connectivity.

- 23.6** Director(Projects), KPTCL proposed to convert the proposed switching station at 'Chikkanayakanahalli' (CN Halli) into a step down station with 2x315 MVA, 400/220 kV ICT's in order to connect 220 KV network to this particular station, which was agreed. PGCIL suggested that looking into the load growth the ICT capacity may be taken as 2x500MVA at CN Halli.
- 23.7** Based on the above following changes were made for Yermarus and Bellari TPS in the earlier agreed scheme (as agreed in the minutes of Joint Standing Committee meetings of Southern Region and Western Region held on 26th December, 2014, issued vide letter dated 51/4/SP&PA-2014/150-171 dated 21st January, 2014):
- i) BTPS- Guttur 400kV Quad DC line.
 - ii) Retain the LILO to 'BTPS' only, from the existing 400 KV SC line running between 'RTPS-BTPS-JSW-Guttur.
 - iii) 'Bellari Pooling station- BTPS 400 KV DC quad line link may be dropped.
 - iv) JSW would be connected with Bellari Pooling station by additional two nos 400kV Quad DC line.
 - v) Switching station at 'Chikkanayakanahalli' (CN Halli) will be converted into a step down station with 2x500 MVA, 400/220 kV ICT's.
- 23.8** It was further discussed and agreed that the transmission system for Edlapur TPS shall be reviewed and discussed in the next meeting of SCPSPSR.
- 24.0 Establishment of 400kV Madhugiri substation under SRS-XIII – name/location change to Tumkur (Vasantnarsapur).**
- 24.1** AGM (CTU-Plg), PGCIL informed that 400kV Madhugiri substation under SRSS-XIII was agreed in the 28th SCPSPSR. For establishing the substation, the land identified by M/s. KPTCL in Madhugiri was not accepted as it was very undulating with wide level differences. Subsequently, KPTCL suggested a land near Tumkur Taluk(which was already acquired by KIDAB (Karnataka Industrial Area Development Board)) which was being developed as industrial area and also their 220kV bays are planned at the same place. As the land was suitable for establishing substation and was also along the route of Gooty – Madhugiri – Yelahanka line, same was selected for establishing substation. Accordingly, the location of the substation has been changed from Madhugiri to Tumkur (Vasantnarsapur) in Tumkur Taluk.
- 24.2** Based on above the name of Madhugiri 765/400kV substation inter alia under the scope of SRSS-XII was agreed to be changed to Tumkur (Vasantnarsapur)

765/400kV substation in Tumkur taluk.

25.0 Transmission System for Tumkur (Pavagada) Ultra Mega Solar Park (2000MW)

25.1 PGCIL informed that an ultra-mega solar Power park of 2000 MW capacity is being developed by M/s Karnataka Solar Power Development Corporation Ltd.(KSPDCL) (JVC of SECI & KREDL) in Pavagada, Tumkur distt, Karnataka. M/s KSPDCL has also submitted connectivity & LTA application for transfer of power (2000 MW) from above Tumkur (Pavagada) UMSP. As per the application, the project is envisaged to be developed in two (2) phases with 1000MW generation capacity in each phase. The first 1000MW is proposed to be commissioned by Sep 2017 and Second phase of generation (1000MW) is targeted to be commissioned by Sep 2018. Out of 2000MW capacity, 1600 MW power shall be consumed by Karnataka DISCOMS and balance 400 MW by SR beneficiaries.

25.2 PGCIL further informed that in this regard meetings were held under the chairmanship of Chief Engineer (PSP&A-II) on 13 &14th Oct 2015 with KPTCL, CEA and PGCIL. Subsequently meeting was also held under the chairmanship of Member(PS) on 16th Dec 2015 with KPTCL, POSOCO, SRPC, CEA & PGCIL to discuss & finalize the transmission scheme for evacuation of power from Tumkur (Pavagada) Ultra Mega Solar Power Park. Keeping in view short gestation period of solar generation project and time required for development of evacuation system, it was decided that the transmission scheme may be implemented in two phases commensurate to the power transfer requirement from above ultra mega solar park.

25.3 Director, CEA informed that in-principle approval for the Phase-I transmission scheme of Tumkur(Pavagada) UMSP is already given by CEA based on above discussions. POWERGRID informed that as intimated by M/s KSPDCL, Solar Power Park shall be developed in 250 MW blocks, which would be connected to their 8 nos. 66/220kV sub-pooling stations and through 220kV line(s) to the ISTS point, being established within the park by M/s KSPDCL.

- 25.4** ED(Smart Grid) said that Government has assigned implementation of this Pooling Station as ISTS project to CTU under compressed time schedule. As the gestation period of solar power park is less, towards expeditious implementation of the pooling station, line bays for terminating the lines from sub pooling stations is covered under the scope of the above pooling station. He also said that Central financial assistance is also being provided by the government for the development of transmission system for evacuation from Tumkur (Pavagada) Solar Park. It emerged that if the SPPD is asked to build these bays in the ISTS switchyard as per PGCIL's specifications, it may affect commissioning of total solar power project
- 25.5** PGCIL said that the proposed LILO of both 400kV Gooty – Tumkur (Vasantnarsapur) D/c and 400kV Bellary Pool – Tumkur (Vasantnarsapur) D/c (Quad) lines may have to be implemented on multicircuit towers. The same was agreed.
- 25.6** Director (KPTCL) informed that KSPDCL intimated about revising their commissioning schedule for Phase-I & Phase-II generation of Tumkur (Pavagada) solar park. The first phase (1000MW) of the project is proposed to be commissioned by Apr 2017 and Second phase (1000MW) is proposed to be commissioned by Sep 2017. Director, CEA opined that transmission development takes time and M/s KSPDCL may be asked to review & submit their revised generation commissioning in a week's time.
- 25.7** Director, CEA informed that upon completion of Hiriyyur - Mysore D/c section, Tumkur (Pavagada) PS-Hiriyyur-Mysore line shall be delinked at Hiriyyur to make it direct Tumkur (Pavagada) PS-Mysore line.
- 25.8** COO(CTU-Plg), PGCIL stated that in case of delinking of Tumkur (Pavagada) PS-Hiriyyur-Mysore line from Hiriyyur to make it direct Tumkur(Pavagada) - Mysore line, 2 nos. of 400kV line bays at Hiriyyur S/s would be vacated and shall remain unutilized. CEA opined that in such case Tumkur(Pavagada) - Hiriyyur 400kV D/c line may be bunched at Hiriyyur end so that it is connected at one 400kV line bay at Hiriyyur. Bunching at 400kV Hiriyyur shall be opened upon completion of 400kV Hiriyyur-Mysore line section and be connected to Tumkur (Pavagada) PS -Hiriyyur section so as to form Tumkur(Pavagada) - Mysore D/c direct line. Upon disconnection of Tumkur (Pavagada) PS-Hiriyyur

at Hiriyyur, vacated 400kV bay at Hiriyyur may be utilized for bus reactor in future.

- 25.9** POSOCO suggested about evacuation of power from solar parks through 220 kV network direct to load centres. However, PGCIL informed that in case of evacuation through 220 kV network, power will directly rush to 220kV network and the 400 kV lines will be underutilized. KPTCL also stated that nearby 220kV substation are the major load centers, therefore with any direct interlinking, power will rush to the load centers causing overloading of nearby system considering the total capacity (2000MW) of the generation project . .
- 25.10** KPTCL indicated that they shall complete 400kV Bellary Pooling – Tumkur (Vasantnarsapur) D/c (Quad) line by Dec'16. PGCIL indicated that LILO of Bellary Pool – Tumkur (Vasantnarsapur) line at Tumkur (Pavagada) PS as proposed in Phase-I transmission scheme shall be effected only after completion of entire line section of Bellary Pool- Tumkur (Vasantnarsapur)D/c line for which KPTCL should make expeditious efforts considering ROW issues. It was also requested that KPTCL should ensure completion of 220kV outlets from 400/220kV Tumkur (Vasantnarsapur) and Yehlanka S/s on or before commissioning of Tumkur (Pavagada) Phase-I transmission scheme.
- 25.11** Director, CEA stated that Low Voltage Ride through (LVRT) compliance requirement should be ensured by the solar power park developer. Further, solar power park developer should also ensure availability of real time generation data to respective RLDC/SLDC as per the provisions of the grid code/regulations.
- 25.12** Based on the discussions, following Inter-State Transmission System was agreed for Tumkur (Pavagada) ultra mega solar power park (2000 MW) to be implemented by PGCIL:

Phase-I (1000MW)

- (i) LILO of 400kV Gooty – Tumkur (Vasantnarsapur) D/c at Tumkur (Pavagada) Pooling station
- (ii) Tumkur (Pavagada) Pooling station - Hiriyyur 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)
- (vii) 1x80 MVAR switchable Line reactor at Mysore end of Hiriya- Mysore D/c for each circuit.
- (viii) 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.

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

26.1 Director, CEA said that PGCIL has informed that Tirunelveli- Cochin 400kV quad D/C line (routed via Edamon on multi circuit towers upto Edamon) under

the scheme “Transmission System associated with Kudankulam APP” is held up due to severe RoW issues in Edamon –Cochin section and would take some more time for completion. Considering severe power crisis in Kerala POWERGRID 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.

- 26.2** COO(CTU-Plg), PGCIL explained that the above proposal would provide additional feeds to Kerala, and would relieve the overloading on Palakkad – Udumalpet 400kV D/c line. This would also lead to utilization of stranded assets which are left out idle from a long time.
- 26.3** AGM (CTU-Plg), PGCIL said that terminal equipments need to be changed by KSEB/PGCIL if Tirunelveli-Edamon portion of the Tirunelveli- Cochin 400kV line is to be charged at 220kV level. PGCIL further said that with this setup, as per the results of the studies, high wind scenario can be easily accommodated.
- 26.4** 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.

27.0 Implementation of Uddupi –Kasargode 400kV transmission link.

- 27.1** CE, KSEB proposed the construction of Udupi – Kasrgode 400kV DC line may be taken up by PGCIL on account of emergency nature under compressed time schedule through regulated tariff mechanism.
- 27.2** CEA said that this will be implemented as per tariff policy of Government of India. However, the process of implementation of this line in TBCB or regulated tariff under compressed time schedule, will be initiated as applicable.

28.0 Implementation of Kasargode- Kozhikode- Madakkathara 400 kV transmission link.

- 28.1** CE, KSEB proposed that the construction of Madakkathara –Areakode (Kozikode) and Areakode (Kozikode) – Kasargode 400kV DC using the RoW of existing 220/110kV feeders as 400/220kV multi-voltage multi circuit feeders be taken up by KSEB Ltd. 400kV Madakathara – Kozhikode (Areekode PG) D/c feeder with twin Moose conductor is already sanctioned scheme under ISTS vide 30th SCPSP for SR and 13th SRPC meetings. But considering that acquisition of a new RoW for the 400kV corridor will be extremely difficult in the

area, it is proposed to take up the scheme using the RoW of 220kV Madakathara – Malaparamba – Areekode S/c feeder. Since the corridor is planned to be constructed using MCMV towers utilising the existing STU owned RoW and the fact that the early availability of this asset is very critical for the supply reliability of North Kerala, it is proposed that the construction of this scheme may be allowed to be taken up as a part of the planned State Transmission schemes. But it is requested that two nos 400kV bays may be provided at 400kV Substation Kozhikode (Areekode PG) by CTU as part of the Regional System strengthening scheme in line with the original sanctioned scheme. In this context it may be noted that this corridor will become a part of the meshed network carrying both Intra-State and Inter-State power once the under execution /sanctioned ISTS projects for the State like 400kV Tirunelveli – Cochin East or 320kV Pugalur – Madakathara HVDC or 400kV Uduppi – Mylatty corridors gets commissioned. Under that circumstance, after analyzing the network configuration and incidental flows, this line may be accorded deemed ISTS status under the Sharing Regulations.

The scheme is designed with the following elements:

- a. Construction of two additional 400kV bays at existing 400kV Substation, Madakathara
- b. Construction of additional 220kV bays at Madakathara, Malaparamba and Nallalam.
- c. Construction of a 220kV Switching Station at Mavoor (Ambalaparamba) with ten line bays for providing a pooling point by LILO of following 220kV feeders:
 - Areekode – Nallalam D/c
 - Areekode – Kaniampetta S/c and
 - Madakathara – Areekode D/c

The above switching station is required since the existing approach to the 220kV substation Areekode through multi-circuit towers is presenting constraint in connecting the planned 220kV D/c feeder from Madakathara to Areekode

- 28.2** Director, CEA said that there is merit in the KSEBL proposal to implement the Madakkathara –Areekode (Kozikode)- Kasargode 400kv D/c link as state transmission project as RoW belongs to them. Also, considering the commercial issues regarding sharing of RoW and assets of existing 220kV lines between ISTS and states, it is prudent that the same may be taken up by KSEBL. Under the outage of existing network, the system could be easily maintained by KSEBL on their own. The same was agreed.

29.0 2000 MW HVDC corridor to the State of Kerala – assessing evacuation capability and transformer augmentation needs

29.1 CE, KSEBL proposed the following 400kV transmission System in Kerala and the same was agreed by the Standing Committee. These system will be implemented by KSEBL as state projects.

(i) 400kV Substations at Kottayam

Construction of a **400kV Substation at Kottayam** with four 400kV Line bays, six 220kV line bays and two transformer bays with 2x315MVA 400/220kV ICT's. The 400kV connectivity will be established by LILo-ing both circuits of 400kV Tirunelveli – Cochin East Quad Moose D/c feeder. Land for the 400kV substation is identified very near to the route of 400kV D/c line.

Downstream 220kV connectivity: -

- a) 220kV connectivity is planned to be established to existing Substations at Poovanthuruth, Sabarigiri and proposed 220kV substation at Ettumanoor.
- b) Additional connectivity by LILo of 220kV Idukki – New Pallom feeder also being explored.

(ii) 400kV Substations at Kollam

Construction of a **400kV Substation at Kollam** with four 400kV Line bays, six 220kV line bays and two transformer bays with 2x315MVA 400/220kV ICT's. The 400kV connectivity will be established by LILo-ing one circuit of 400kV Tirunelveli – Edamon – Cochin East Quad Moose D/c feeder.

Downstream 220kV connectivity: -

- a) 220kV connectivity is planned to be established to 220kV Substations at Kundara, Parippally and proposed 220kV substation at Sasthamkotta.

(iii) 400kV Substations at Edamon

Construction of a **400kV Substation at Edamon** with six 400kV Line bays, four spare 400kV Line Bays and two transformer bays with 2x315MVA 400/220kV ICT's. The 400kV connectivity will be established

by charging existing 220kV Tirunelveli – Edamon Twin Moose D/c feeder, constructed in 400kV parameters, at 400kV and by LILO-ing both circuits of under construction 400kV Tirunelveli – Cochin East Quad Moose D/c feeder. Additional connectivity to 400kV Substation, Trivandrum North is planned later by LILO of existing 400kV Tirunelveli – Trivandrum (North) Twin Moose D/c feeder.

Downstream 220kV connectivity: -

- a) 220kV connectivity will be directly to existing 220kV switchyard of Edamon and further to following stations
- b) 220kV D/c feeder to Pothencode
- c) 220kV D/c and 220kV S/c feeders to Sabarigiri
- d) 220kV feeders to Kundara and Edappon.

(iv) **400kV Substation at Kanhirode**

400kV S/s at Kanhirode with a transformer capacity of 2x315MVA, 400/220kV by LILO-ing the proposed 400kV Uduppi- Kasarkode(Mylatti) – Kazhikode D/C feeder

(v) **400kV Substation at Ettumanoor**

400kV S/s at Ettumanoor with a transformer capacity of 2x315MVA, 400/220kV by LILO-ing the proposed 400kV Edamon –Cochin East D/C feeder

29.2 CE, KSEBL proposed the following 220kV transmission System in Kerala and the same was agreed by the Standing Committee. These system will be implemented by KSEBL as state projects.

1- Projects planned under Green Corridor intra-State Scheme

(i) **220kV Substation at Kottathara, Palakkad Dt**

Substation proposed with 220/33kV, 2x100MVA transformers and with two 220kV and four 110kV line bays. Connectivity planned is by construction of a 220kV D/c line to the 220kV substation planned at Vettathur. This substation is planned for evacuating power from the proposed 82MW Wind generation projects at Kottathara and Nallasinga of Attapady region to KSEBL grid. This region has a wind generation potential of around 200MW. Already wind generation of 18MW is being

evacuated through the sub-transmission system in the area. Plans for putting up Solar projects in the area are also being looked into.

Downstream connectivity:

- a) 33kV D/c feeder to existing substations at Agali.
- b) 33kV feeders to 33kV pooling stations of proposed WEG.

(ii) **220kV Substation at Vettathur, Palakkad Dt**

Substation proposed with 220/110kV, 2x100MVA transformers and with two 220kV and four 110kV line bays. Connectivity planned by LILO of existing 220kV Madakathara – Areekode feeder. This substation is planned to be interconnected with the proposed 220kV substation at Kottathara (Agali) for evacuation of 80MW wind.

110kV connectivity:

- a. 110kVD/c feeder to existing substations at Mannarkadu.
- b. 110kV D/c feeder to existing substation at Cherupulassery.

(iii) **220kV Substation Kuyilimala, Idukki Dt**

Substation proposed with 220/110kV, 2x100MVA transformers and with two 220kV line bays. Connectivity planned by LILO of 220kV Pallivasal – Idukki feeder.

110kV connectivity:

- a. 110kV feeders to substations at Vazhathope, Kattappana, and Nedumkandom.
- b. 66kV feeders to Sengulam and Kulamavu.

The station is planned mainly for the constraint free evacuation of existing and upcoming wind generation projects in the area. The area is already having a wind generation of 14.25MW at Ramakkalmedu and additional potential of about 200MW is expected from the area in addition to Solar and Small Hydro Electric Projects.

2- Projects planned under intra-State System Strengthening Scheme

(i) **220kV Substation at Neeleswaram, Kasargode Dt**

Substation proposed with 220/110kV, 2x200MVA transformers and with ten 220kV and eight 110kV line bays.

Connectivity proposed by LILO of both circuits of existing 220kV Kanhirode – Mylatty 220kV D/c feeder. Additional connectivity planned at 220kV level to Mylatty and Thaliparamba by construction of two 220kV D/c feeders along the RoW of existing 110kV lines using MCMV towers. This station is also expected to provide connectivity for Solar PV projects planned in the area.

110kV connectivity:

- a. 110kV D/c feeder to 110kV Substation, Kanjangad
- b. 110kV D/c feeder to 110kV Substation, Cheruvathur

(ii) 220kV Substation at Thalassery, Kannur Dt

Substation proposed with 220/110kV, 2x160MVA transformers and with eight 220kV and six 110kV line bays.

Connectivity proposed by LILO of existing 220kV Orkattery – Kanhirode feeder. Additional connectivity planned at 220kV level to the proposed 220kV Substations at Mundayad and Kakkayam by construction of 220kV D/c feeders along the RoW of existing 110kV lines using MCMV towers.

110kV connectivity:

- a. 110kV D/c feeder to existing 110kV Substation, Thalassery
- b. Additional connectivity by LILO of existing 110kV Kuttiyadi – Kanhirode and Nadapuram – Kanhirode feeders.

(iii) 220kV Substation at Mundayad, Kannur Dt by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x160MVA transformers and with four 220kV line bays. Connectivity planned by construction of 220kV D/c feeders along the RoW of existing 110/66kV lines using MCMV towers from the proposed 220kV Substation, Thalassery and existing 220kV Substation, Kanhirode.

110kV connectivity:

- a. 110kV D/c feeders to existing substations at Kanhirode, Sreekandapuram, Pinarayi, Thalassery, Azhikode and Mangad
- b. 110kV S/c feeder to 110kV Substation Chovva.

(iv) **220kV Substation at Kakkayam** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x200MVA transformers and with four 220kV line bays. Connectivity planned by LILO of existing 220kV Areekode – Kaniampetta S/c feeder. Additional interconnection with the proposed 220kV Substation, Thalassery by construction of 220kV D/c feeder along the RoW of existing 110kV D/c feeder using MCMV towers.

110kV connectivity:

- a. 110kV feeders to existing substations at Kuttiyadi and Orkattery
- b. 110kV feeders to substations at Koduvally and Chevayyur using Wolf equivalent HTLS conductor.

(v) **220kV Substation at Kunnamangalam, Kozhikode Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays. Connectivity planned by LILO of existing 220kV Areekode – Kanhirode feeder.

110kV connectivity:

- a. 110kV feeders to existing substations at Nallalam and Koduvally using Wolf equivalent HTLS conductor.
- b. 110kV feeders proposed to existing substations at Thamarassery and Kuttikattoor by upgrading the 66kV system to 110kV
- c. 110kV D/c feeder to existing 110kV Substation, Agasthyamoozhi

(vi) **220kV Substation at Elamkur, Malappuram Dt**

Substation proposed with 220/110kV, 2x100MVA transformers and with two 220kV and four 110kV line bays. Connectivity planned by LILO of existing 220kV Madakathara – Areekode feeder.

110kV connectivity:

- a. 110kV feeders to existing substations at Malappuram and Manjeri by upgrading the 66kV system to 110kV.
- b. 110kV feeders to existing substations at Nilambur and Edakkara by upgrading the 66kV system to 110kV.

- (vii) **220kV Substation Kunnankulam, Thrissur Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with two 220kV line bays. Connectivity planned by LILO of proposed 220kV Madakathara – Nallalam feeder.

110kV connectivity:

- a. 110kVD/c feeder to existing substations at Punnayurkulam.
- b. 110kV feeders to existing substations at Guruvayoor and Madakkathara.

- (viii) **220kV Substation Edappal, Malappuram Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays. Connectivity planned by LILO of proposed 220kV Madakathara – Malaparamba feeder. Additional interconnectivity with the proposed 220kV Substation Kunnankulam

110kV connectivity:

- a. 110kV feeders to existing substations at Ponnani, Kuttippuram, Kootanadu, Arangottukara, Shornur and Tirur.

- (ix) **220kV Substation at Panjal, Thrissur Dt**

Switching station with eight 220kV line bays proposed for interlinking of 220kV Madakathara – Palakkad, Elappully – Madakathara, Shornur – Areekode and Madakathara – Areekode feeders.

- (x) **220kV Substation Viyyur, Thrissur Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays. Connectivity planned by upgradation of existing 110kV Madakathara – Viyyur D/c feeder to 220kV D/c feeder. Additional interconnectivity with the proposed 220kV Substation North Parur planned by upgrading existing 66kV transmission system to 220/110kV MCMV system.

110kV connectivity:

- a. 110kV feeders to existing substations at Pullazhi, Kandassakadavu, Ollur and Wadakkancherry.

- (xi) **220kV Substation Chalakkudy, Thrissur Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays. Connectivity planned by LILO of one circuit of existing 220kV Lower Periyar – Madakathara D/c feeder. Additional interconnectivity with the proposed 220kV Substation Aluva planned by upgrading existing 66kV transmission system to 220/110kV MCMV system.

110kV connectivity:

- a. 110kV feeders to existing substations at Ollur, Kodakara, Kurumassery, Carbarandum, Poringal, Ayyampuzha, Sholayar, Mala, Kodungalloor, Karukutty, Angamally and Aluva.

- (xii) **220kV Substation Aluva, Ernakulam Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x200MVA transformers and with six 220kV line bays. Connectivity planned by upgradation of existing 66kV Kalamassery – Aluva D/c feeder to 220kV D/c feeder. Additional interconnectivity with the proposed 220kV Substations at Kothamangalam, Pallivasal and Chalakkudy planned by upgrading existing 66kV transmission system to 220/110kV MCMV system using the existing RoW.

110kV connectivity:

- a. 110kV feeders to existing substations at Kurumassery, Carbarandum, Kalamassery, Angamally, Karukutty, Edayar, Edathala, Odakkali and Perumbavoor.

- (xiii) **220kV Substation North Parur, Ernakulam Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays.

Connectivity planned by upgradation of existing 66kV Aluva – North Parur D/c feeder to 220kV D/c feeder. Additional interconnectivity with the proposed 220kV Substation Viyyur planned by upgrading existing 66kV transmission system to 220/110kV MCMV system.

110kV connectivity:

- b. 110kV D/c feeders to substations at Edayar, Kodungalloor, and Cherai.

(xiv) **220kV Substation Kaloor, Ernakulam Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x200MVA transformers and with four 220kV line bays.

Connectivity planned by construction of 220kV Bhramapuram – Kaloor D/c feeder. Additional interconnectivity with the 220kV Substation, Kalamassery also planned by upgrading existing 110kV transmission system to 220/110kV MCMV system.

Downstream connectivity:

- a. 110kV feeders to existing substations at Edappally, Kalamassery and 66kV feeder to 66kV Substation Marine Drive, Ernakulam North and Perumanoor.

(xv) **220kV Substation Kothamangalam, Ernakulam Dt** by upgradation of existing 66kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays. Connectivity planned from the erstwhile 220kV Idukki – Madakathara S/c feeder now terminated near to Kothamangalam Substation and lying idle at present. Additional 220kV interconnectivity with the proposed 220kV Substations at Pallivasal and Aluva is also planned by LILO of one circuit of 220kV Pallivasal – Aluva D/c feeder.

110kV connectivity:

- a. 110kV feeders to substations at Perumbavoor, Odakkali, Koothattukulam, Bhoothathankettu, New Muvattupuzha and Idamalayar.

(xvi) **220kV Substation Pallivasal, Idukki Dt**

Substation proposed with 220/66kV, 2x50MVA transformers and with four 220kV line bays.

Connectivity planned by LILO of existing 220kV Udumalpet – Idukki S/c feeder. Additional interconnectivity with the proposed 220kV Substations at Kothamangalam, Kuyilimala and Aluva are planned by upgrading existing 66kV transmission system to 220/110kV MCMV

system. The station is planned mainly for the constraint free evacuation of existing and upcoming hydro generation projects in the area.

(xvii) **220kV Substation Ettumanoor, Kottayam Dt**

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays. Connectivity planned by LILO of existing 220kV Pallom – Ambalamughal and Sabarigiri – Ambalamughal feeders. The station will be interconnected to existing 66kV substation Ettumanoor after upgrading to 110kV.

110kV connectivity:

- a. 110kV feeders to existing substations at Vaikkom, Cherthala, Thykattuserry, Gandhinagar, Kottayam, Kuruvilangadu, Pooventhuruthu and Pala subsequent to the upgradation of the 66kV network in the area.

(xviii) **220kV Substation Eramalloor, Alleppey Dt**

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays.

Connectivity planned by construction of a 220kV D/c feeder from Brahmapuram. Additional interconnectivity with the 220kV Substation Punnapra is planned by upgrading existing 110kV transmission system to 220/110kV MCMV system.

110kV connectivity:

- a. 110kV feeders to existing substations at Thykattuserry and Aroor.

(xix) **220kV Substation Pathanamthitta** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays.

Connectivity planned by LILO of existing 220kV Sabarigiri – Edamon S/c feeder. Additional interconnectivity with 220kV Substation Edappon planned by upgrading existing 66kV transmission system to 220/110kV MCMV system.

110kV connectivity:

- a. 110kV feeders to existing substations at Ranni, Kozhencherry, Edappon, Kakkad, Maniyar, Koodal, Pathanapuram and Adoor.

- (xx) **220kV Substation Kakkad, Pathanamthitta Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x50MVA transformers and with two 220kV line bays.

Connectivity planned by LILO of existing 220kV Sabarigiri – Pallom feeder. Station planned for constraint free evacuation of power from the hydro generation projects in the area.

110kV connectivity:

- a. 110kV feeders to existing substations at Karikkayam and Pathanamthitta.

- (xxi) **220kV Substation Parippally, Kollam Dt** by upgradation of existing 110kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays. Connectivity planned by upgradation of existing 110kV Kundara – Parippally D/c feeder to 220/110kV MCMV feeder. Additional interconnectivity with 220kV Substations at Pothencode and Edamon planned by constructing a LILO of one circuit of existing 220kV Edamon – Pothencode D/c feeder along the RoW of existing 110kV network by upgrading it to 220/110kV MCMV system.

110kV connectivity:

- a. 110kV D/c feeders to existing substations at Attingal, Kundara, Kottiyam, Ayoor and Varkala.

- (xxii) **220kV Substation Vizhinjam, Trivandrum Dt** by upgradation of existing 66kV Substation

Substation proposed with 220/110kV, 2x100MVA transformers and with four 220kV line bays. Connectivity planned by construction of 220kV Kattakkada – Vizhinjam D/c feeder.

This station is planned for providing 220kV connectivity to Vizhinjam International Port.

110kV connectivity:

- a. 110kV D/c feeders to existing substations at Paruthippara and Neyyatinkara.

29.3 Capacity Enhancements planned in 220kV transmission System

The following augmentation scheme, as proposed by Kerala were also agreed in the meeting. These would be implemented by KSEBL.

- a. Addition of 220/110kV, 1x200 MVA transformer at 220kV Substation Kattakkada
- b. Addition of 220/110kV, 1x200 MVA transformer at 220kV Substation Edappon
- c. Addition of 220/110kV, 1x200 MVA transformer at 220kV Substation Kundara
- d. Addition of 220/110kV, 1x200 MVA transformer at 220kV Substation Pallom
- e. Addition of 220/110kV, 1x200 MVA transformer at 400kV Substation Madakathara
- f. Replacing of existing 220/110kV, 2x160 MVA transformer with 2x200MVA at 220kV Substation Palakkad
- g. Replacing of existing 220/110kV, 2x100 MVA transformer with 2x200MVA at 220kV Substation Shornur
- h. Replacing of existing 220/110kV, 2x100 + 2x60 MVA transformers with 3x200MVA at 220kV Substation Nallalam
- i. Addition of 220/110kV, 1x160 MVA transformer at 220kV Substation Areekode
- j. Replacing of existing 220/110kV, 2x100 MVA transformer with 2x200MVA at 220kV Substation Malapparamba

30.0 Utilization of Salem – Dharmapuri 400kV quad d/c line along with Dharmapuri (Salem New) Pooling Station –reg.

- 30.1** Director, CEA said that PGCIL had submitted that 765/400V Dharmapuri (Salem) Pooling Station (initially charged at 400kV) along with Salem-Dharmapuri PS 400V quad line is ready for energization. However, transmission lines associated with Dharmapuri (Salem New) pooling station are under various stages of implementation and may take some more time for completion. Under this scenario, it would be prudent to utilize Salem-Dharmapuri 400kV quad line by LILoing one circuit of MTPS stage –III – Thiruvalem 400kV D/c line (being constructed by TANTRANSCO) at

Dharmapuri (Salem New) Pooling Station. The proposed LILO shall involve construction of 6km of D/c line and LILO can be terminated at the existing bays constructed for Dharmapuri - Somanhalli 400kV D/c line.

30.2 AGM(CTU-PIg), PGCIL said that this would reduce S1-S2 congestion and enhance the TTC between S1-S2 by 100MW. This setup would relieve the overloading on Kolar- Hosur 400kV D/C line and would provides additional path for feeding the loads at Salem. He also informed that the Dharmapuri - Somanhalli 400kV D/c line is likely to be completed by December, 2016.

30.3 Director, TANTRANSCO stated that the commissioning of Dharmapuri - Somanhalli 400kV D/c line would provide an alternate path between Karnataka and Tamilnadu, hence would help in easing the S1-S2 congestion. As Salem 400kV S/s is well connected with NLC-II switchyard and Shoolgiri 400kV S/s, as such there is no problem for feeding the Salem loads. Hence, TANTRANSCO suggested that PGCIL 765/400V Dharmapuri (Salem) Pooling Station and Salem- Dharmapuri 400kV quad line may be commissioned in the same time frame of Dharmapuri - Somanhalli 400kV D/c line.

TANTRANSCO also said that there is no appreciable increase in the flow towards S2 area due to this LILO arrangement. Hence this proposal need not be considered. Instead, LILO of one of the Rasipalayam – Palavadi (Singarapettai) 400kV line may be permitted at Dharmapuri (new Salem) 765/400kV PGCIL SS as already approved.

30.4 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.

31.0 Termination of Kayathar – Koilpatty(PG) (Tuticorin Pooling point) 400kV DC line

31.1 Director, CEA stated that during the 38th meeting of SCPSPSR the issue of termination of 400kV DC line from Kayathar at Koilpatty (Tuticorin Pooling point) was discussed. As per the minutes, the Kayathar – Koilpatty(PG) 400kV DC line was agreed to be modified as Kayathar- Tirunelveli (Abhishekapatty) 400kV D/C line on suggestion of PGCIL.

31.2 Director(Trans), TANTRANSCO stated that in the meeting, TANTRANSCO has stated that instead of Kayathar – Koilpatty 400kV D/c line, TANTARNSCO's Kanarpatty – Abhishekapatty 400kV SC line on DC tower will be converted into 400kV DC line and requested PGCIL to provide one bay at Abhishekapatty 400kV SS. He further stated that the Kayathar – Tirunelveli

400kV D./C line was not agreed by TANTRANSCO and CEA was requested to issue a corrigendum in this regard. Also termination of 400kV d/c line from Kayathar to Tirunelveli PS will overload the existing Kaythar –Karikudi 400kV D/C line and Kayathar –Kanarpatty 400kV D/c line due to wind injection (who have applied PGCIL for connectivity) at Tirunelveli PS.

- 31.3** AGM(CTU-Plg), PGCIL informed that there is no space at Abhisekhapatty (Tirunelveli) and no bay is likely to be vacant after commissioning of modified ATS of Kudankulam project. After the request of TANTRANSCO, a site inspection was carried out to look into availability of space at Tirunelveli and it was identified that a 63 MVAR 400kV bus reactor is available and the line can be terminated in the bay by converting the bus reactor into switchable line reactor.
- 31.4** Director(Trans), TANTRANSCO informed that the Kayathar – Koilpatty 400kV DC quad line which has been included in the kfw German funding is dropped due to non availability of two numbers of 400kV bays at Koilpatty pooling station. In this connection, a joint study was conducted with PGCIL during 30,31st October 2015 and concluded for the 2nd Kanarpatty – Abisekapatty 400kV circuit for reliability purpose
- 31.5** After further discussions it was agreed that the Kanarpatty to Tirunelveli (Abishekapatty) 400kV (quad) DC line would be mainly for reliability purpose and not for injection of power into ISTS Grid.

32.0 Transmission Scheme for evacuation of 1000 MW Solar Park to be developed by M/S Adani at Kamuthi

- 32.1** Director, CEA said that TANTRANSCO has conveyed that M/S Adani has proposed to develop 1000 MW Solar Park at Kamuthi in Ramnad district of Tamil Nadu within a period of one year. It has been further proposed that TANTRANSCO would enter into PPA with M/S Adani for buying 1000 MW of solar power. Accordingly, TANTRANSCO has requested CEA for in-principle approval for following transmission system of solar park at Kamuthi.
- a) Establishment of 400kV substation at Kamuthi for pooling the proposed 1000 MW solar park to be established by M/S Adani.
 - b) 400kV D/C line from the proposed Kamuthi Solar park to the sanctioned Kamuthi 400/230-110kV S/S (TANTRANSCO).
 - c) 400kV D/C line from the sanctioned Thoppakundu 400/110kV wind substation to the sanctioned Kamuthi 400/230-110kV S/S (TANTRANSCO).

- d) 2x80 MVAR bus reactor at Kamuthi 400/230-110kV S/S (TANTRANSCO).

32.2 Director(Trans), TANTRANSCO informed that as of now, M/S.Adani and other developers have applied under preferential tariff to TANGEDCO at Kamuthi 400/230-110kV SS to a tune of 680 MW only. During the 37th Standing Committee meeting, it was also agreed that a maximum of 1000MW of Solar power would be injected at Kamuthi 400kV SS.

32.3 He further said that in addition to the above, there will be solar power injection from the nearby 230kV new Muthuramalingapuram 230kV SS also. Hence, it is suggested that the Kamuthi – Thappagundu 400kV DC line will be planned later, if any additional quantum of solar generation is proposed. The Kamuthi 400/230-110kV substation work is under progress and it is expected to be commissioned by the end of the year 2016

32.4 Considering that the Adani Solar Park injection is within the earlier agreed 1000 MW power injection at Kamuthi, the above scheme was agreed by the members.

33.0 Implementation of 24x7 power supply in the state of Goa- Interconnection with SR grid to Mapusa-Xeldam(New S/s) – Narendra 400kV D/c line.

33.1 Director, CEA informed that in the 39th SCPSP of WR establishment of 2X500 MVA, 400/200 kV substation at Xeldam and its interconnection with SR grid, was discussed for providing 24x7 power supply in the state of Goa. He further said that out of the 8 alternatives that were discussed in that meeting, there was consensus on **alternative no 6.**

Alternative	Details	Remarks
1	Narendra (existing) - Xeldam- Mapusa 400 kV D/c quad line.	Also proposed in 38 th SCM. Technically better alternative for providing 2 nd 400 kV ISTS feed to Goa system.
2	Kolhapur (PG) - Mapusa – Xeldam 400 kV D/C quad line.	Alternative suggested by POWERGRID along with re-conductoring of Sholapur (PG) – Kolapur 400kV D/C line with HTLS conductor. There would a single source for feeding Goa at 400kV level i.e., 400 kV Kolhapur (PG).
3	Kolhapur(PG) – Xeldam- Mapusa 400 kV D/C quad line	
4	Kolhapur(PG) – Xeldam 400 kV D/C quad line and LILO of one ckt at Mapusa	

5	LILO of one ckt. of Narendra(New)-Kolhapur(PG) 400 kV D/C line at Xeldam	Alternative suggested by POWERGRID in the 38 th SCM. Narendra(New)-Kolhapur (PG) is a 765 kV D/C line which would be initially charged at 400 kV level and in future when this line would be operated at 765 kV voltage level , the Xeldam 400 kV along with the feeding lines also needs to be upgraded to 765 kV level
6	LILO of one ckt. of Narendra(existing) – Narendra (New) 400 kV D/C line at Xeldam	Alternative 6 or 7 equally good as Alternative 1 and could be implemented in case of non-availability of bay at Narendra (existing) 400 kV substation.
7	LILO of one ckt. of Kaiga-Narendra(existing) 400 kV D/C line at Xeldam with LILO point at Narendra end.	
8	LILO of one ckt. of Kaiga-Narendra(existing) 400 kV D/C line at Xeldam with LILO point at Kaiga end.	

33.2 After discussion, the alternative no 6 along with Xeldam- Mapusa 400kV DC Quad was agreed. However, as per KPTCL there would be environmental issues as line would pass through the Western Ghats.

34.0 Raigarh-Pugalur-Trichur HVDC system for import of power by SR constituents:

34.1 Director, CEA said that during the Joint Standing Committee meeting on Power System Planning of Southern and Western Region, held on 20/04/2015, Raigarh-Pugalur-Trichur HVDC system for import of power by SR constituents was agreed. The total transmission scheme was divided in three Schemes.

Scheme No 1: Raigarh- Pugalur 6000 MW HVDC system;

Scheme No 2: AC System strengthening at Pugalur end and

Scheme No 3: Pugalur-Trichur 2000 MW VSC based HVDC system.

During the meeting it was also agreed that the Scheme No 2 and 3 should be in place before the commissioning of Scheme No 1.

34.2 POWERGRID in this regard stated that as the scheme was evolved as a comprehensive scheme, efforts are being made to complete all the three parts in matching time frame. However, in the minutes of the subject meeting it has

been mentioned that Scheme no. 2 and 3 should be in place before commissioning of Scheme-1. They submitted the following:

- i) The implementation of Scheme 2 & Scheme 3 as a pre-condition for commissioning of Scheme-1 may not be appropriate, whereas the commissioning of Scheme-1 irrespective of commissioning of Scheme 3 would be able to transfer large quantum of power to deficit Southern region.
- ii) Similarly, in case Scheme 3 is implemented even before commissioning of Scheme-1, the same can be utilized for export of power to Kerala which is facing large transmission constraints.
- iii) Further, in case part system of Scheme-2 and one pole of Raigarh – Pugalur HVDC link and / or VSC based HVDC to Kerala is commissioned, the system would be benefitted by enabling additional transfer of power.

34.4 Director, CEA said that if Scheme No 1 comes before Scheme No-3 i.e the 2000 MW VSC based HVDC system, then out of the total 6000 MW HVDC system, Kerala will not be benefitted. If Scheme No 2 does not come then due to poor short circuit strength at Pugalur, Scheme No 1 alone may not be able to serve the purpose, therefore strengthening at Pugalur end is must for the dispersal of power.

34.5 COO(CTU-Plg), PGCIL submitted that there are large number of uncertainties while implementing any transmission system mainly due to corridor or land issues which are beyond the control. Keeping above in view it may not be prudent to put pre-condition of commissioning of Scheme 2 and Scheme 3 before commissioning of Scheme 1. Considering this Member(PS), CEA asked PGCIL that the delivery schedule of Scheme No 2 and 3 should be kept ahead of or at least matching with that of Scheme No 1. POWERGRID agreed for the same and stated that schedule of scheme -3 shall be kept as Pole-2 (i.e 3000 MW) of scheme-1.

34.6 He reminded that CEA in March,2015 has requested that CEA needs to be kept apprised of the interaction of PGCIL while exploring technologies being adopted.

34.7 Accordingly, following was agreed:

- (i) PGCIL would involve system planning group of CEA into the process of preparation of specifications for these HVDC systems and the STATCOM.
- (ii) In case of any mismatch during execution of these schemes, their usefulness shall be discussed with CEA before their commissioning.

35.0 Transmission system for LTA of 400 MW for 2x500 MW Neyveli Lignite Corporation Limited TS-1 (Replacement) (NNTPS) in Neyveli.

35.1 Director, CEA informed that during 35th Standing Committee Meeting, the transmission system for connectivity and LTA for 2x500 MW Neyveli Lignite Corporation Limited TS-1 (Replacement) (NNTPS) in Neyveli was agreed

1. Transmission system for connectivity: LILO of existing Neyveli TS-II – Pondicherry 400 kV S/c at NNTPS generation switchyard (by POWERGRID).
2. Transmission system for LTA (as an ISTS): NNTPS switchyard – Villupuram (Ginjee) 400kV D/c line and Villupuram (Ginjee) 400kV S/S with 2x500 MVA transformers has been agreed under transmission system for LTA (as an ISTS).

35.2 AGM(CTU-Plg), PGCIL informed that in the 32nd Empowered Committee Meeting, the Transmission system for LTA of 400 MW from the 2x500 MW Neyveli Lignite Corporation Limited TS-1 (Replacement) (NNTPS) in Neyveli was agreed to be implemented through TBCB route with the following scope.

- NNTPS switchyard – Villupuram (Ginjee) 400kV D/c line.
- Villupuram (Ginjee) 400/220 kV, 2x500 MVA S/S

He further said that the LILO of existing Neyveli TS-II – Pondy cherry 400 kV S/c at NNTPS generation switchyard (by POWERGRID) was inadvertently missed out in the minutes of the Empowered Committee meeting.

35.3 Director(Trans), TANTRANSCO said that with our best efforts, the Ariyalur 765/400kV substation will be commissioned by June 2018. If 400kV NNTPS – Ariyalur 400kV DC line of PGCIL is to be commissioned prior to that, it will be prioritised to commission the 400kV switchyard of Ariyalur SS with LILO of existing Pugalur – Kalivantapattu 400kV DC line, so that the NNTPS – Ariyalur 400kV DC line of PGCIL can be terminated

35.4 Accordingly, the complete transmission system for connectivity and transmission system for LTA for 2x500 MW Neyveli Lignite Corporation Limited TS-1 (Replacement) (NNTPS) in Neyveli includes the following elements:

ISTS

- i. LILO of existing Neyveli TS-II – Pondy cherry 400 kV S/c at NNTPS generation switchyard.
- ii. NNTPS switchyard – Ariyalur (Villupuram) 400 kV D/c line.
- iii. 2 nos. of line bays at Ariyalur (Villupuram) substation for terminating NNTPS switchyard – Ariyalur (Villupuram) 400kV D/c line.

35.5 TANTRANSCO would implement the Ariyalur (Villupuram) 400/220kV substation by LILO of Pugalur- Kalivantapattu 400kV DC line at the earliest.

36.0 POSOCO Quarterly observations on grid constraints.

36.1 POSOCO highlighted the following Transmission Lines constraints:

- (i) The SR has experienced high loading on Kolar-Hosur 400kV DC, due to delay in commissioning of 400kV Somanahalli - Dharmapuri PS-Salem Dc line.

It was decided that with the commissioning of Mysore-Kozhikode S1-S2 capacity has increased to 5640MW as against requirement of about 4000MW. Hence the loading on Kolar –Hosur is limiting value and not a constraint.

- (ii) SR grid has also experienced high loading on 400kV Udumalpet-Palakkad D/C line. Presently the loading on these lines is in the range of 450-500 MW. With commission of Mysore-Kozhikode sufficient relief has been experienced

It was decided that these constraints are likely to be eased with commissioning of the Raigarh-Pugalur-Trichur HVDC system and the transmission system planned by Kerala for absorption of this power.

- (iii) POSOCO report also states that there is constraint in the 400kV Nellore Pooling Station - Nellore DC line. Four generations projects were granted Long Term Access (Simhapuri, Meenakshi, TPCIL and NCC) in Krishnapatnam area. While granting the LTA, in addition to associated transmission lines, some common transmission lines which were expected in that period like Gooty-Madhugiri-Yelahanka 400kV D/c line, Salem-Madhugiri 765kV line etc. were considered in the studies. However, some of these lines are yet to materialise due to ROW constraints. Presently, three generation projects (except NCC) have been commissioned. The MTOA of 800 MW has been granted from these projects, i.e. 500 MW from TPCIL and 300 MW from Simhapuri with commissioning of Gooty – Madhugiri-Yelhanka 400 kV D/C line.

It was observed that Gooty- Madhugiri-Yelahanka 400kV DC and its associated downstream 220kV network, will relieve the problem.

- (iv) The SR has experienced high loading on 400kV Jindal - BTPS SC Line.

It was decided that KPTCL has proposed to retain the LILO to 'BTPS' only, from the existing 400 KV SC line running between 'RTPS-BTPS-JSW-

Guttur (total line length-300 KM). This will relieve the problem.

- (v) 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. Also the 765kV Sholapur-Raichur D/C line commissioned without downstream network is creating further increase in the line flow.

It was decided that Commissioning of 400kV Gooty-Madhugiri-Yelahanka D/C line and its associated downstream 220kV network, will relieve the problem.

- (vi) POSOCO report also states that there is constraint in 220 kV Bangalore Metro Network, 220 kV Shoolagiri- Hosur(TN)- Yerrandahalli- Somanahalli SC line.

TANTRANSCO informed that the work will be awarded shortly for The Shoolagiri – Hosur 230kV 2nd circuit,

- (vii) SR has experienced constraints in Coastal AP.
- (viii) SR has experienced Constraints for Rayalaseema TPS Generation Evacuation.

- (ix) POSOCO reports also cited constraints for Northern Kerala System-

This constraint has eased after commission of Mysore-Kozhikode 400kV D/c line.

- (x) POSOCO reports also cited constraints in Chennai 230kV System and Overloaded 220kV Lines in Tamil Nadu

TANTRANSCO responded that as such there is no constraint in Chennai 230kV network

- (xi) SR has experienced constraints in 230kV Evacuation lines of MTPS and Kundah complex

TANTRANSCO responded that as such there is no constraint in 230kV evacuation lines of MTPS and Kundah

36.2 Based on above observations, it emerged that the issue of constraints in 400kV Nellore Pooling Station - Nellore DC line and Constraints for Rayalaseema TPS Generation Evacuation, would be looked into while carrying out further studies for SR.

36.3 POSOCO also mentioned constraints at these ICTs

- i) 400/220kV 2x315MVA ICTs at Gazuwaka SS, ii) 400/220kV 2x315MVA ICTs at Vemagiri SS, iii) 400/220kV 2 X 315 MVA ICTs at Nellore, iv)

400/220kV 2X500 MVA ICTs at Somanahalli,v) 400/230kV 2X315MVA ICTs at Arasur, vi) 400/220kV 3 X 315 MVA ICTs at Mamidipally,vii) 400/220kV 2X315MVA ICTs at Mysore.

In this regard, CEA stated that there is space constraint at Gazuwaka. With KV Kota 400/220kV S/s of APTRANSCO, ICTs at Vemagiri SS is likely to be relieved. He further stated that redistribution/ reconfiguration of 220kV transmission lines required for ICTs at Somanahalli, augmentation at Arasur was agreed in 38th SCPSPSR and Newly planned substation at Maheshwaram, Gajwel, Yeddu will relieve loading at Mamidipally.

36.4 AGM, POSOCO pointed out high voltage on number of 400kV nodes as given in the POSOCO reports. In this regard PGCIL stated that the planned augmentation of bus reactors, including SVC/STATCOMs would help in bringing down the voltages. Further, regulating generation voltages and reactive absorption limits of generators need to be undertaken. He further said that based on the inputs from POSOCO study has been carried out for identify locations where reactive compensation is required. PGCIL said that Based on the MVAR generation following reactive compensation was simulated.

S/S	Existing/ Approved	Proposed	S/S	Existing/ Approved	Proposed
Cuddapah (PG)	50	125	Davanagere(KTK)	0	125
Srisailam(LB)(TSS)	0	125	Talaguppa(Ktk)	0	125
Chittoor(AP)	0	125	Raichur(765kV)(PG)	240	240
Vijayawada -AP	0	125	Almati(TN)	0	125
VTPS stage IV(AP)	0	125	Kaythar(TN)	0	125
Kurnool(765 kV)(PG)	240	240	Mettur(TN)	0	125
Nellore PS (765 kV)(PG)	240	240	Thiruvallam (765kV)(PG)	0	2X 240

36.5 Director, CEA informed that UPCL has also proposed to install 2x125 MVAR bus reactor at their switchyard to control prevailing system over-voltages. Accordingly, the same was agreed.

36.6 Director(Trans), TANTRANSCO informed that at Thiruvallam end 2X125MVAR line reactors has been commissioned; at MTPS switchyard, 1X125MVAR bus

reactor erection work has been started and at Alamathy 400kV SS, 1X125MVAr bus reactor work has to be started.

36.7 After discussions, it was agreed that reactive compensation at proposed CTU substation will be taken up as grid strengthening scheme and States will suitably take up reactive compensation at their station.

36.8 To the list of transmission lines whose delay is affecting grid operation adversely, it was informed that the status of 400kV Edaman-Cochin DC line is not known as it is held up due to severe ROW issue; 400kV Mysore-Khozhikode DC line, NCTPS-II Evacuation, 400kV Kalvindapattu-Pugalur DC line and 400kV Tiruvalam-Mettur-III DC line are commissioned; Stage-1 Wind evacuation system of TNEB is likely to be commissioned by March 2016.

37.0 Standardisation of OPGW in lieu of One Earth wire in all Transmission lines.

37.1 Director, CEA said that POWERGRID has proposed to include one 24 Fiber (OPGW) in all transmission lines along with communication equipment (SDH-STM-16) at all the upcoming substations to ensure availability of wideband Communication from all substations

37.2 AGM(CTU-PIg), PGCIL informed that the Power System requirement for Communication is increasing manifold due to :

- i) Special protection schemes:
- ii) Ever increasing data reporting to Load Dispatch Centre.
- iii) Phasor measurements based data collection and reporting.
- iv) Remote monitoring/operation of sub-station/elements.
- v) Differential protection on Lines

He said that the practice of putting fibre in select lines lead to situation where station connectivity is held up due to either identified line delay, LILO of under construction line etc. OPGW installation on existing lines is taking long time/ delayed due to shut down, ROW issues as well as capacity constraints of executing agencies.

37.3 He further proposed to include one 24 Fibre (OPGW) in all transmission lines which will ensure availability of wideband communication from all substations

to cater bandwidth for various power system application for which communication equipment (SDH– STM-16) shall be provided at all upcoming substations.

- 37.4** CEA said that the existing CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010 provides that - *The earthwire shall be either of galvanized stranded steel (GSS) or alternatively ACSR or AACSR conductor type. Optical fibre ground wires may also be used as earthwire. Other new technology earthwires conforming to international standards and specifications may also be used. Generally, one earthwire shall be used for transmission lines upto 220 kV and two earthwires shall be used for transmission lines of 400 kV and higher voltage classes.*

The POWERGRID proposal implies that all the transmission lines of 400 kV and above either in interstate or intrastate needs to be provided with one earthwire as OPWG.

- 37.5** POWERGRID clarified that the proposal is for interstate transmission lines. CEA said that the transmission line being implemented under TBCB, the provision for one earthwire as OPGW is included in the scope of works at RFP level. In the transmission lines being implemented by POWERGRID, one of the earthwire is already provided as OPGW. Therefore, one earthwire as OPWG on interstate transmission line was already getting implemented. CTU/POWERGRID said that provision of one earthwire as OPGW was not mentioned anywhere. Therefore, it has been put for the approval of the committee members. This proposal has already been approved by SCM of NR.

- 37.6** CEA informed that in a meeting taken by Secretary (Power) on 24.07.2015. regarding Reliable Communication and Data Acquisition System for substations, POWERGRID has expressed the view that considering importance of reliable communication in various applications and difficulties in installation of OPGW under O&M stage, the provision of OPGW in place of one of the earthwire(s) should be kept in all the upcoming lines so that OPGW is installed during construction of line. The same was agreed upon and Secretary (Power) had advised Chairperson, CEA to issue necessary guidelines in this regard. PCD division of CEA deals with telecommunications issues on transmission lines and they have already taken up the issue. SCM is a planning forum and what kind of communication would be appropriate for

power line communication was not under its purview. Also standardization of OPGW (24 fibers) as one of the earthwire, as proposed by POWERGRID, will restrict use of new upcoming/alternative technology for the purpose.

37.7 After further discussions, the committee acknowledged the importance of wideband communication network for reliable communication requirements from all substations in the power system. For use of earthwire for communication purpose, the necessary changes need to be done in the CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010 which is already under revision.

38.0 Puducherry –Planning proposal for Capacity addition in the existing 230KV Sub-stations

38.1 Director, CEA informed that UT of Puducherry had proposed additions/augmentations of Power Transformer capacities in the existing Auto Sub-stations namely 230/110KV Villianour SS, Bahour SS and 230KV Thondamanatham SS in Puducherry region of UT of Puducherry. Three nos. of 230/110KV Auto SS namely Villianur Auto SS, Bahour Auto SS and Thondamanatham Auto SS with installed capacity of 560MVA is feeding Puducherry region.

38.2 He further said that the recorded peak demand of UT of Puducherry during 14-15 was 465 MW. From that the anticipated Peak Demand of UT of Puducherry during 2021-22 would be 652.31MW. From that the anticipated Peak demand of Puducherry region alone would be around 540 MW during 2021-22. The corresponding installed Transformation capacity required at 230/110 KV level would be 750 MVA. Hence, an additional 190 MVA Power Transformer capacity will be required over and above the existing installed Power Transformer capacity of 560 MVA to safely meet the anticipated Power demand during 2021-22. Hence, it is proposed to install additional Power transformers in the existing 230/110KV Auto-SS as detailed below.

Name of AUTO SS	Existing Capacity in MVA	Proposed additional Capacity in MVA	Total Capacity in MVA after addition	Remarks
230KV VASS	2x 100 MVA= 200	1 x 100	300	This has already been included in the Record notes of discussion of the Meeting held on 17.01.2008 with CE(PSPM)/CEA
230KV BASS	2x 80 MVA	1x80	240	CEA issued technical clearance.

	= 160			
230KV TASS	2x 100 MVA= 200	1 x 100	300	Process to be initiated.
	560	280	840	

- 38.3 Though the capacity addition required is only 190 MVA, it is proposed to add 280MVA due to the fact that presently in case of any emergency/outages in any one of the Auto SS, the other two Auto SSs could not be able to take-in.
- 38.4 After discussion the proposal was accepted.

Annex-I

List of participants of the 39th meeting of Standing Committee on Power System Planning of Southern Region held on 28th & 29th December, 2015 at NRPC Office, Katwaria Sarai, New Delhi

Sl. No.	Name	Designation
	Central Electricity Authority	
1.	S.D. Dubey	Member (PS)
2.	B. Sarkhel	Chief Engineer
3.	Pardeep Jindal	Director
4.	Shivani Sharma	Deputy Director
	SRPC	
1.	S R Bhatt	Member Secretary
2.	Anil	Executive Engineer
	POSOCO, NLDC	
1.	S. R. Narsimhan,	AGM, System Operations
2.	N. Nallarasana,	DGM
	POWERGRID	
1.	Seema Gupta	COO
2.	Arindam Sensarma	DGM(AM)
3.	Mukesh Khanna	AGM (CTU-Plg.), PGCIL
4.	V. Thiagarajan	Asst. GM
5.	Sandeep	Sr. Engr.
6.	V.M. S. Prakash	Sr. Engr. (CTU-Plg.)
7.	G. Venkatesh	Engineer (CTU-Plg.)
8.	Narendra Sathril	Engineer
	POSOCO, SRLDC	
1.	Madhukar G	Dy. Manager
2.	G. Anbunesan	Addl, Gen. Manager.
	NTPC, NOIOA	
1.	S. S. Mishra	AGM-Engr
	APTRANSCO	

1.	R. Nagaraja Swamy	Director Grid & Trans.
2.	S. Subramanyam	Diretcor (Proj.)
3.	V.S. Subba Rao	SE, PS
4.	B.S. Rao	DE, SS
5.	Y.V. Ramakrishna	ADE, SS
	KPTCL	
1.	S. Sumanth	Director
2.	A. J. Hosamani	CEE
3.	T. V. Srinivasa	EE
4.	D. Chethan	EE
	KSEB	
1.	N.N. Shaji	CE, SO
2.	P. Rajan	Dy. Chief Engineer
3.	S. R. Ananad	EE, LD
	TSTRANSCO	
1.	J. suryaprakash	Director (Proj.)
2.	P.V. Prashaklro	CE (Proj.)
3.	M. Sheshagii	ADE, SS
4.	J. Ajay Kumar	DE, SS
	TANGEDCO	
1.	T. Senthilvelan	Director (Trans.)
2.	M. A. Helen,	CE, Plg
3.	D. Ravichandran	SE, System studies
4.	R. Santhana Kumar	EE, System studies
5.	R. Kumutha,	AEE, System Studies