

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

No. 51/4/SP&PA-2012/ 1249-1260

Date: 27 November 2012

To

1.The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, Bangalore 560 009. FAX : 080-22259343	2.The Director (Projects), Power Grid Corp. of India Ltd. “Saudamini”, Plot No.2, Sector-29, Gurgaon 122 001, Haryana. FAX : 95124-2571932
3.The Director (Transmission), Transmission Corp. of Andhra Pradesh Ltd., Vidyut Soudha, Hyderabad – 500 082. FAX : 040-66665137	4.The Director (Transmission), Karnataka State Power Transmission Corp.Ltd., Cauvery Bhawan, Bangalore 560 009. FAX : 080 -22228367
5.The Member (Transmission), Kerala State Electricity Board, Vidyuthi Bhawanam, Pattom, P.B. No. 1028, Thiruvananthapuram - 695 004. FAX : 0471-2444738	6. Member (Distribution), Tamil Nadu electricity Board (TNEB), 6 th Floor, Eastern Wing, 800 Anna Salai, Chennai - 600002. FAX : 044-28516362
7.The Director (Power), Corporate Office, Block – I, Neyveli Lignite Corp. Ltd., Neyveli , Tamil Nadu – 607 801. FAX : 04142-252650	8.The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, Puducherry – 605 001. FAX : 0413-2334277/2331556
9. Director (Projects), National Thermal Power Corp. Ltd. (NTPC), NTPC Bhawan, Core-7, Scope Complex, Lodhi Road, New Delhi-110003. FAX-011-24360912	10. Director (Operations), NPCIL, 12 th Floor, Vikram Sarabhai Bhawan, Anushakti Nagar, Mumbai – 400 094. FAX : 022- 25991258

Sub: 35th meeting of the Standing Committee on Power System Planning of Southern Region
- **Agenda for the meeting.**

Sir,

The **35th meeting** of the Standing Committee on Power System Planning of Southern Region is scheduled to be held in December 2012. Exact date and venue of the meeting would be conveyed separately.

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

Please make it convenient to attend the meeting.

Yours faithfully,

(Pardeep Jindal)
Director (SP&PA)

(Telephone: 011 26198092, Fax No. 011 26102045)

Copy to:

Shri S. K. Soonee, CEO, POSOCO,
B-9, Qutub Institutional Area,
Katwaria Sarai,
New Delhi-110016

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

**Agenda Note for 35th Meeting of
Standing Committee on Power System Planning in Southern Region (SCPSPSR)**

Date and Venue: (to be communicated shortly)

1.0 Confirmation of the minutes of 34th meeting of the Standing Committee

1.1 The Minutes of 34th meeting of the Standing Committee on Power System Planning of Southern Region were issued vide CEA's letter No. 51/4/SP&PA-2012/541-552 dated 21st May, 2012. No observations were received on the circulated minutes. Hence, the minutes of the 34th meeting, as circulated, may be confirmed.

2.0 Transmission System for Evacuation of Wind Power from Andhra Pradesh

2.1 Andhra Pradesh has large potential of renewable energy potential especially wind power. APTRANSCO had proposed to set up the wind projects of about 3150 MW mainly coming up in Uravakonda area (1361 MW), Kondapuram area (1109 MW) and Hindupur area (680 MW) during 2012-17 period. Looking into such large potential and proposed wind generation projects in the State, adequate transmission system is necessary for evacuation as well as supply of wind power to DISCOMs in Andhra Pradesh. To identify the transmission system required for wind generation projects proposed to come up in 12th Plan period (2012-17), system studies were carried out jointly by CEA, POWERGRID and APTRANSCO during 23-25 April, 2012.

2.2 Various network configurations were studied to arrive at optimum transmission addition alternatives. Four number of transmission network alternatives were studied to evolve optimum transmission system for evacuation of wind power and transmit it to load centres in Andhra Pradesh. The details of the alternatives are as below:

2.3 These alternatives are:

Alternative-I→

- Uravakonda – Gooty 400kV quad D/c line
- Uravakonda – Hindupur 400kV D/c line
- Kondapur – Hindupur 400kV D/c line
- Hindupur – Madhugiri 400kV quad D/c line

Alternative-II→

- Uravakonda – Gooty 400kV quad D/c line
- Uravakonda – Kurnool 400kV quad D/c line
- Uravakonda – Hindupur 400kV D/c line
- Uravakonda – Kondapur 400kV D/c line

Alternative-III→

- Uravakonda – Kurnool 400kV quad D/c line
- Uravakonda – Hindupur 400kV D/c line
- Kondapur – Hindupur 400kV D/c line

Alternative-IV→

- Uravakonda – Mehboobnagar 400kV quad D/c line
- Kondapur – Kurnool 400kV quad D/c line
- Uravakonda – Kondapur 400kV D/c line
- Uravakonda – Hindupur 400kV D/c line

- 2.4 From the study results for the above alternatives it is observed that the **Alternative-IV** is the optimum solution for the integration of wind generation with the Andhra Pradesh grid. Study report is given at Annex-I.
- 2.5 For additional reliability and interconnection with ISTS grid, Hindupur – Madhugiri 400kV quad D/c line was also proposed. This line or any other interconnection may be considered after APTRANSCO builds its above transmission system and after analysing the need at that time. In the present studies it is found that Alt-IV is adequate to transmit and absorb wind power under various wind generation conditions and therefore, connectivity with Madhugiri is not critical.
- 2.6 For large scale harnessing of the wind generation, Andhra Pradesh should install wind forecasting centres in each cluster. The information from the wind forecasting centres should be communicated to Andhra Pradesh SLDC. APSLDC should have separate control desk for wind generation. The wind generators of AP should give a day ahead schedule which may be further revised by them from time to time in real time. Depending upon the wind generation the thermal power plants and storage type hydro plants of AP should vary their generation. It has to be ensured that the impact of intermittent nature of the wind generation is mostly absorbed within the AP system and the impact on ISTS is minimum. This is essential for National Grid security. This is equally applicable to other renewable rich states such as Tamil Nadu and Karnataka.
- 2.7 Member may discuss.

3.0 Connectivity for Nirmal 400kV S/S of APTRANSCO:

- 3.1 The issue of connectivity for Nirmal 400kV S/S of APTRANSCO was discussed in the 34th meeting of the standing committee and POWERGRID suggested that instead of LILO of any of the Ramagundam-Hyderabad circuits to Nirmal, a direct 400kV D/C line can be planned from Gajwel(APTRANSCO) to Nirmal S/S which would have a line length of about 145 km as opposed to LILO length of 140 - 152km.
- 3.2 APTRANSCO vide their letter no. CE(PS)/SE(SP)/DE(SS)/F.Nirmal/D. No.143/2012 Dt. 30-06-2012 had informed that system studies were conducted by APTRANSCO for the proposed 400kV Nirmal S/S with following alternatives:

- (i) Connecting the proposed 400kV Nirmal S/S to 400kV Gajwel S/S (as suggested by PGCIL/CEA)
 - (ii) Connecting the proposed 400kV Nirmal S/S to upcoming 400kV switchyard of Singareni Collieries (SCCL) Generation Project at Jaipur Mandal,Adiabad.
 - (ii) Connecting the proposed 400kV Nirmal S/S to upcoming 400kV switchyard of Singareni Collieries (SCCL) Generation Project at Jaipur Mandal,Adiabad and connecting the proposed 400kV Nirmal S/S to proposed 400kV Narsapur S/S
- 3.3 Based on their studies they found that the alternative-ii, i.e. ‘connecting the proposed 400kV Nirmal S/S to upcoming 400kV switchyard of Singareni Collieries (SCCL) Generation Project at Jaipur Mandal, Adiabad’ would be more feasible solution from APTRANSCO’s perspective.
- 3.4 APTRANSCO may present their studies. Members may discuss.

4.0 **Transmission System for evacuation of power from 2x500 MW Neyveli Lignite Corporation Ltd. TS-I (Replacement) (NNTPS) in Neyveli, Tamil Nadu.**

- 4.1 The transmission system for evacuation of power from NNTPS (2x500 MW) was discussed in the 34th meeting of the standing committee and it was decided that a joint study group consisting of NLC, TNEB, POWERGRID and CEA would examine these issues and work out a comprehensive evacuation arrangement including feasibility of a new 400kV Substation by TNEB, re-configuring the existing transmission lines in Neyveli area and ensuing system strengthening, if any, required in ISTS and TNEB grids.
- 4.2 In the joint meeting held on 14-05-2012 at POWERGRID, Gurgaon Based on the discussions the following was agreed for Connectivity/Long-term Access and Strengthening of TNEB network for NNTPS (2x500 MW):

4.2.1 Transmission System for Connectivity

- (i) Provision of 7x167 MVA, 400/220 kV transformers at generation switchyard
- (ii) 1x80 MVAR Bus Reactor at generation switchyard
- (iii) LILO of existing Neyveli TS-II – Neyveli TS-I Expansion 400 kV S/c at NNTPS generation switchyard

Elements at (i) & (ii) shall be in the scope of generation developer. The element at (iii) is a re-arrangement of existing tie-line of POWERGRID between Neyveli generating stations by extending the same with another 3-4 km line length. The bays for terminating this LILO line shall also be in the scope of generation developer.

4.2.2 Transmission System for LTA

- (i) NNTPS switchyard – Dharmapuri (new Salem 765/400 kV Substation of POWERGRID) 400 kV D/c line.

This line shall be an ISTS line.

4.2.3 System Strengthening in Tamil Nadu by TNEB

Option-I (establishment of new 400/230 kV substation at Neyveli)

Further, on the request of TNEB, the following was proposed as system strengthening in Tamil Nadu and evacuation of power to be implemented by TNEB:

- (i) Establishment of new 400/230 kV, 2x315 MVA & 400/110 kV, 3x200 MVA substation at Neyveli (TNEB)
- (ii) NNTPS switchyard – Neyveli (TNEB) 400 kV D/c line
- (iii) Shifting of all 230 kV (3 nos.) & 110 kV (7 nos.) lines owned by TNEB emanating from existing Neyveli TS-I switchyard to Neyveli (TNEB)
- (iv) LILO of both circuits of Neyveli TS-I – Neyveli TS-II 230 kV D/c line at NNTPS switchyard (under the scope of NLC)
- (v) LILO of both circuits of NNTPS – Dharmapuri (POWERGRID) 400 kV D/c line at Dharmapuri (TNEB)
- (vi) Establishment of new 400/230 kV, 2x315 MVA substations at Villupuram (Ginjee)
- (vii) Neyveli (TNEB) – Villupuram (Ginjee) 400 kV D/c line
- (viii) The Pugalur – Singarapet – Sholinganallur/Kalivanthapattu 400 kV D/c (quad) line to be routed as Pugalur - Villupuram (Ginjee) - Sholinganallur/Kalivanthapattu 400 kV D/c (quad) line
- (ix) LILO of one circuit of Neyveli TS-II – Salem line at Neyveli (TNEB) at a later date

Note: Under this option the transformation capacity at NNTPS switchyard shall be 2x315 MVA, 400/220 kV.

Option-II (Establishment of new 230/110 kV substation at Neyveli)

To optimize the total investment, instead of new 400/230/110 kV substation, a 230/110 kV substation at Neyveli by TNEB is also examined. This substation shall require following lines/re-arrangement

- (i) Establishment of new 230/110 kV, 3x100 MVA substation at Neyveli (TNEB)
- (ii) NNTPS switchyard – Neyveli (TNEB) 230 kV D/c line with twin Moose conductor.
- (iii) Shifting of 2 nos. of 230 kV lines & 4 nos. of 110 kV lines owned by TNEB emanating from existing Neyveli TS-I switchyard to Neyveli (TNEB)
- (iv) Retaining 1 no. of 230 kV line & 3 nos. of 110 kV lines at Neyveli TS-I switchyard.
- (v) LILO of both circuits of Neyveli TS-I – Neyveli TS-II 230 kV D/c line at NNTPS switchyard, the section between Neyveli TS-I & NNTPS 220 kV D/c line to be strengthened with twin Moose conductor (under NLC scope)
- (vi) LILO of both circuits of NNTPS – Dharmapuri (POWERGRID) 400 kV D/c line at Dharmapuri (TNEB).
- (vii) Establishment of new 400/230 kV, 2x315 MVA substations at Villupuram

(Ginjee)

(viii) NNTPS – Villupuram (Ginjee) 400 kV D/c line

(ix) The Pugalur – Singarapet – Sholinganallur/Kalivanthapattu 400 kV D/c (quad) line to be routed as Pugalur - Villupuram (Ginjee) - Sholinganallur/Kalivanthapattu 400 kV D/c (quad) line

Note: Under this option the transformation capacity at NNTPS switchyard shall be 7x167 MVA (single phase), 400/230 kV.

4.3 TNEB vide their letter C/Plg&RC/SE/SS/EE1/AEE1/F.NNTPS/D. 210/2012 Dt. 07-06-2012 opined that the option I and II are economically and technically not feasible. **(Ref: EXHIBIT-I)**

4.3.1 Following option was suggested by modifying option –II :

(i) Establishment of new 230/110kV, 3x160 MVA or 4x100 MVA S/S at Neyveli(TNEB)

(ii) Shifting of the 230kV (3 nos) and 110kV(7 nos) lines owned by TNEB emanating from the existing Neyveli TS-I switchyard to Neyveli 230kV S/S (TNEB)

(iii) LILO of both circuits of Neyveli TS-I – Neyveli TS-II 230 kV D/c line at NNTPS Switchyard.(under NLC scope)

(iv) NNTPS switchyard – Neyveli(TNEB) 230kV D/C line with twin moose conductor.(TNEB)

(v) LILO of one of the circuit of Neyveli TS-II – NNTPS switchyard 230kV D/C line at Neyveli TNEB 230kV S/s. The section between Neyveli(TNEB) 230kV S/S to Neyveli TS-II and NNTPS 230kV S/C line is to be strengthened with twin moose conductor.

Note: Under this option the transformation capacity at NNTPS switchyard shall be 7x167 MVA (single phase), 400/230 kV.

4.3.2 Transmission System For LTA

(i) NNTPS – Dharmapuri (new Salem 765/400kV S/S of POWERGRID) 400 kV D/c line

(to be decided on the basis of load flow studies)

4.4 NLC vide their letter no. GM/NNTPP/CEA/T-434/2012 dated 28-07-2012 has communicated that the option put forth by TNEB (given above) is agreeable to NLC. About ‘LILO of one of the circuit of Neyveli TS-II – NNTPS switchyard 230kV D/C line at Neyveli TNEB 230kV S/s’ NLC mentioned that in view of technical and commercial constraints for LILOing of this circuit following option may be considered:

The 230kV TPS-II – TPS-I tie line section between TPS-II and NNTPP may be taken over by TNEB and modifications required to meet their requirement can be done at their own cost and this line section may be owned and maintained by them.

Alternatively

Proposed shifting of feeders MF-I and MF-II from TPS-II to NNTPS 230kV Sw. yd. would lead to spare bays at TPS-II . TNEB may construct one or two line from TPS-II to new TNEB 230kV S/S. This will come under the scope of TNEB.

4.5 NLC also mentioned that following points, proposed in the joint meeting, are also agreeable to NLC:

- (a) NNTPS – Dharmapuri (new Salem 765/400kV S/S of POWERGRID) 400 kV D/c line
- (b) NNTPS – Villupuram (Ginjee) 400 kV D/c line
- (c) LILO of existing Neyveli TS-II – Neyveli TS-I Expansion 400 kV S/c at NNTPS generation switchyard

NLC also pointed out that LILO of the Neyveli TS-II – Neyveli TS-I Expansion 400 kV S/c line also proposed that instead of LILOing the Neyveli TS-II – Neyveli TS-I Expansion 400 kV S/c line any other line emanating from TPS-II may be considered for LILO at NNTPP.

4.5 Members may discuss.

5.0 Associated transmission system for Kaiga APP St-III(U-5& 6)

5.1 The issue of power evacuation system from KAPP St -III (2x700 MW) was discussed in the 34th meeting of the Standing wherein, it was observed that due to involvement of the forest area it may would be difficult to get a new transmission corridor for building additional transmission lines. POWERGRID has confirmed that technically it would be feasible to re-conductor the existing lines i.e. Kaiga – Davangere and Kaiga - Narendra 400kV twin moose D/C line with HTLS conductor. Re-conductoring would take about 18-24 months per D/C line and shall required to be carried out serially one after the other to avoid complete shutdown of the existing Kaiga APP. Further, even with such arrangement, power from the existing KAPP generations (4x220 MW) shall have to evacuated with reduced reliability of the evacuation system.

5.2 During the 34th meeting NPCIL was asked to carry out the studies and confirm that they would upgrade their 400kV switchyard for 2280 MW installed capacity. NPCIL vide their letter no. NPCIL/(Trans)/2012/M/70 dated July 2nd, 2012 informed that the existing switchyard at Kaiga will be upgraded suitably to ensure that main bus/line bays have enough capacity to handle the additional generation of Kaiga-5& 6.

5.3 NPCIL vide their above mentioned letter enquired about the possibility of re-conductoring one circuit of a D/C line while the other circuit is under operation and also the possibility to compress the time duration of re-conductoring by deploying more resources. Also, during re-conductoring process, Kaiga 1-4 will be staying only on one D/C circuit. So, there is a need to study the load angles of Kaiga machines as well as nearby m/cs specially under non availability of S/C of available D/C line.

- 5.4 NPCIL also mentioned that in case of Nuclear plant, the power evacuation lines serve the dual purpose i.e. power evacuation (when unit is under operation) and cooling of reactor core (when unit is under outage) by drawing 'off site power' from the grid for safe shut down of the reactor and to maintain it in the same state. Thus, higher number of evacuation corridors provides more margins from safety considerations. As no new lines are being proposed for safety consideration, there is a need to carry out the system studies along with short circuit and stability studies to establish the adequacy of the existing 400kV 2xD/c lines.
- 5.5 Before carrying out the requisite system studies, NPCIL may confirm whether they accept operation of existing Kaiga units at reduced reliability of evacuation system (which are also needed for cooling of the core) for the period of re-conductoring which may take about 36-48 months in total. Member may discuss.

6.0 KSEB proposals to avoid congestion in S1-S2 corridor

- 6.1 In the 34th meeting of the standing committee KSEB's proposal for 400kV D/C link from NPCL(Uddupi) to Kozhikode 400kV S/s and setting up a new 400kV S/S at Kasargode by LILO of one ckt of above link to avoid congestion in S1-S2 corridor was discussed. KSEB had also proposed to convert existing 110kV Konaje- Manjeswaram single circuit feeder to double circuit as a part of southern region system strengthening scheme. After discussion KPTCL said that they would examine the proposal and inform CEA so that matter could be taken up for further studies /discussion in subsequent meeting of the SCPSPSR.
- 6.2 Further KSEB vide their letter dated 15-11-2012 and quoting discussion in the 20th meeting of SRPC has requested to modify the above proposal and instead as asked to take up following schemes as a part of regional system strengthening schemes for relieving the congestion between S1-S2 bid area:
- (i) 400kV D/C Mapusa(Goa) – Kaiga- UPCL - Areacode line and setting up a 400kV, 2x315 MVA S/s at Mylatty (Kasargode) by LILO of one ckt UPCL - Areacode line
 - (ii) Construction of 220kV Mylatti – Puttur D/C line
 - (iii) Doubling of 110kV Konaje (Karnataka)- Manjeswaram (Kerala) SC feeder.
- 6.3 This recent proposal of connecting Western Region(Goa) with Southern Region via Karnataka and upto Kerala needs to be studied from the point of view of system studies and feasibility of laying of this line along the Western Ghats. Already one 400kV double circuit line from Mysore to Kozhikode is still not completed due to forest and RoW issues. Further, the planned E. City – Hosur 400kV line may have to be put-off due to RoW issues. Members may discuss.

7.0 Proposal of Electricity Department, Puducherry for erection of 230kV line to Karaikal

- 7.1 Electricity Department, Puducherry vide their letter no 257/ED/AEE-EHV/F.14/2013-14 dated 25-09-2012 had proposed the erection of 230kV line to

Karaikal by LILO of existing 230kV Neyveli- Bahour line to proposed 230kV Auto S/s at Karaikal.

- 7.2 At present Karaikal region of Puducherry is fed from 230/110kV Thiruvarur S/s of TNEB through 110kV line and a 32.5 MW gas based power plant at Karaikal. Due to increasing power demand and industrial load growth in Karaikal region, a 230kV Auto S/s at Karaikal region was proposed for which land has been identified. But due to absence of readily available 230kV power source either from nearby TNEB S/s or from Central grid it is proposed to LILO existing 230kV Neyveli- Bahour line to proposed 230kV Auto S/s at Karaikal. The additional power requirement of Karaikal region could be extended from Puducherry through this proposed 230kV line. This proposed connection would also help to extend the power allocated from Central Generating Stations to Karaikal which is at present utilized only for Puducherry and Yanam regions.
- 7.3 In the proposal it is also mentioned that LILOing of existing 230kV Neyveli-Bahour line (owned by POWERGRID) could be taken up by POWERGRID as its own dedicated project. Alternatively a direct line from Neyveli to Karaikal or from any existing 400/230kV S/S of POWERGRID may also be explored. **(EXHIBIT-II)**
- 7.4 Electricity department, Puducherry to present the following in the meeting:
- (i) Projected load growth in Karaikal region and Puducherry region (upto 2017/2020)
 - (ii) Proposal to upgrade their 110/11kV S/S to meet the load.
 - (iii) Physical layout of 110kV and 230kV lines and S/Ss in their area.
- 7.5 Members may discuss.

8.0 Common Transmission System Associated with IPP Projects in Srikakulam Area, Andhra Pradesh

- 8.1 The transmission system for evacuation of power from IPP projects in Srikakulam area was earlier planned to be developed under 2 phases viz. the 765/400 kV Srikakulam Pooling Station alongwith Srikakulam – Angul 765 kV D/c line to be initially charged at 400 kV under the “Common Transmission System Associated with IPP projects in Srikakulam Area Part – A” and subsequently upgraded to 765 kV level in “Common Transmission System Associated with IPP projects in Srikakulam Area Part – C”.
- 8.2 During the 33rd Meeting of Standing Committee on Power System Planning in Southern Region held on 20th October 2011, Srikakulam Pooling Station – Vemagiri Pooling Station 765 kV D/c line was approved to facilitate import of power by SR in view of the changed load generation scenario in Southern region due to uncertainty of generation additions in Southern region. Ministry of Power vide its notification dated 08.10.2012 has appointed Bid Process Co-ordinator for taking up the implementation of this line under Tariff Based Competitive Bidding.

- 8.3 In view of these developments it is prudent to establish 765 kV level at Srikakulam pooling station right at the beginning and accordingly charge the Srikaulam – Angul 765 kV D/c line also at its rated voltage of 765 kV from the beginning itself. This inter-alia would mean taking up Part – A and Part – C of the above mentioned transmission system together with suitable deletion of elements meant for initial charging the system at 400 kV from the scope of Part – A of the system.
- 8.4 POWERGRID in their proposal has informed that they are in the process of land acquisition for Srikakulam Pooling Station and that locating suitable site avoiding physical factors like water bodies, wet land, small holding farmers, forest area, hillocks etc is extremely difficult. Further, there is lot of resistance from local people. From about 20 nos. of sites surveyed, they have zeroed on one of the most suitable site but the same is not enough to accommodate normal 765/400 kV AIS substation. Taking these into consideration, they have proposed that Srikakulam Pooling Station may be constructed with 400 kV portion as AIS and 765 kV portion as GIS.
- 8.5 In this regard, CEA vide its letter dated 21-05-2012 has agreed in-principle clearance for constructing Srikakulam Part – A and Part – C together in the same time and Srikakulam Pooling Station with 400 kV portion as AIS and 765 kV portion as GIS subject to regularization in the next Standing Committee Meeting.
- 8.6 Members may discuss and agree.

9.0 Implementation of Common Transmission System Associated with IPPs in Vemagiri Area, Andhra Pradesh

- 9.1 The Common Transmission System Associated with the IPPs in Vemagiri area, Andhra Pradesh inter-alia comprised of two nos. of 765kV D/c line from Vemagiri to Hyderabad via Khammam. Looking into the uncertainty of the availability of Gas only one 765kV D/c line was under taken for implementation through Tariff Based Competitive Biding route, further this line was planned to be initially charged at 400kV.
- 9.2 In the recently held joint visit by CEA & POWERGRID, it has been gathered that GMR project of 768 MW is already commissioned and Samalkot project of 2400 MW is partially commissioned. Further Srikakulam – Vemagiri 765kV D/c line has been planned to facilitate import of power from IPPs in Odisha. Taking this into consideration it proposed to charge the Vemagiri – Khammam – Hyderabad 765kV D/c line at its rated voltage of 765kV right from the beginning.
- 9.3 CEA vide its letter dated 17 September, 2012 had conveyed its in-principle approval for charging of Vemagiri – Khammam – Hyderabad 765 kV D/c line at its rated voltage.
- 9.4 Members may discuss and agree.

10.0 220 kV downstream Networks at 400 kV Bidadi, Yelahanka and Cochin Substations.

- 10.1 POWERGRID is implementing 400/220 kV substations at Bidadi, Yelahanka and Cochin substations under various schemes. The substations are already commissioned from 400 kV side, however 220 kV downstream network are yet to be implemented by respective STUs. It is requested that the STUs i.e. KPTCL and KSEB should expedite the 220 kV downstream network at these substations.
- 10.2 Further, POWERGRID is planning to augment the transformation capacity at various substations which was approved in earlier standing committee meeting. STUs are requested to assess the requirement for drawing additional power available at these stations and take up the necessary 220 kV network.
- 10.3 (i) POWERGRID to make presentation giving following information in respect of the above new S/s and substations where augmentation is being implemented:
- (a) existing and planned capacity at each S/S,
 - (b) existing number of 220kV lines and
 - (c) Bay provision that they have kept for additional 220kV lines
- (ii) APTRANSCO, KPTCL, KSEB and TANTRANSCO to give their confirmed plan for drawing 220kV lines from above S/Ss giving following information:
- (a) their commissioning schedule,
 - (b) present status and
 - (c) transformation capacity at the 220kV substations at the other end of the lines.
- 10.4 Members may discuss and note.

11.0 Transmission system for 2x800 MW Krishnapatnam AP TPS

- 11.1 APTRANSCO vide their D.O letter dated 10-09-2102 informed that APGENCO's 1600 MW Krishnapatnam power project will be coming up from June 2013 onwards. APTRANSCO will be completing Krishnapatnam AP- Nellore and Krishnapatnam AP- Chittoor 400kV quad lines by that time. APTRANSCO also states that about part of the generation from this project would be coming to 400kV Chittoor S/S of AP and would flow towards Tamil Nadu on the Chittoor – Thiruvalem 400kV line which is under construction. They have requested that Tamil Nadu should complete the down stream 230kV system at Thiruvalem.
- 11.2 Tamil Nadu may give status. Members may discuss.

12.0 Unified Real Time Dynamic State Measurement (URTDSM) Project

- 12.1 The URTDSM project was approved in the Joint Standing Committee Meeting held on 5th March 2012. Based on that, POWERGRID has prepared the detailed project

report (DPR) and filed a petition with CERC for Regulatory Approval. POWERGRID has informed that on the advice of CERC, the project was discussed in the RPC forum of WR, NR, ER and SR. The project would also be discussed in upcoming meeting of NERPC.

12.2 The scope of the project broadly covers installation of 1739 Phasor Measurement Units (PMU), computer hardware and software at SLDCs/RLDCs/NLDC, installation of OPGW based communication system (10,667 km approx.), development of analytics and consultancy services. The estimated cost of the project is Rs. 655.98 crores. Installation of PMUs and associated communication system at IPPs has also been included in the DPR. The NIT for this shall be issued shortly.

12.3 In order to encourage indigenization of synchrophasor technology, in the Joint Standing Committee Meeting, it was agreed that 10 to 15% of the PMUs shall be manufactured and supplied from India. POWERGRID has informed that during discussion with prospective bidders, it emerged that 15% of PMU quantity to be manufactured in India may not attract vendors to establish manufacturing facility in India. Therefore, this percentage needs to be enhanced to 30%. This enhanced provision would help in establishing indigenous manufacturing facility and utilities would have benefit of O&M support available in India. Therefore, it is proposed that 30% of PMUs under this project shall be manufactured and supplied from India.

12.4 POWERGRID to make presentation. Members may discuss and agree.

13.0 Two (2) nos. of 125 MVAR, 400 kV Bus Reactors at Vijayawada Substation of POWERGRID.

13.1 In 20th meeting of SRPC held on 28th September, 2012 at Hyderabad 2 nos. of 125 MVAR, 400 kV Bus Reactors at Vijayawada substation of POWERGRID has been approved in view of the persistent high voltage profile in the area.

13.2 Members may take note of the above.

14.0 Review of Transmission Planning Criteria

14.1 The Enquiry Committee headed by Chairperson, CEA for grid events in July 2012 has recommended that transmission planning criteria needs to be reviewed in the context of market scenario within three months. In this regard, a note on the issues relating to "Review of Planning Criteria" has been prepared. . A copy of this note and the existing "Manual on Transmission Planning Criteria" are available on CEA website.

14.2 Members of the Standing Committee on Power System Planning of Southern Region are requested to furnish their comments/ suggestions regarding review of

transmission planning criteria to the undersigned along with a soft-copy mailed to cea.sppa@yahoo.in.

14.3 Members may give their views/observations in regard to review of Transmission Planning Criteria.

15.0 Integrated planning for State transmission system:

15.1 As per section 39 of the Electricity Act, STUs need to carry out their planning function related to intra-state transmission in coordination with the CEA and CTU. There have been a few instances in the past where, the STU has planned important transmission system or allowed connectivity to large generation capacities without involving CEA and CTU and this may result in congestion/operational difficulties for the ISTS/national grid. To start with, it is proposed that STU should evolve following of their systems involving CEA and CTU, which would subsequently be firmed up through the Standing Committee forum:-

- (a) 220 kV and above system
- (b) Large scale harnessing of renewable generation
- (c) System for evacuation of power from a complex having generation capacity of 250 MW and above in case of conventional and 50 MW and above in case of renewable.

16.0 Statewise assessment of the Load Generation Scenario of Southern region.

16.1 For the assessment of load generation scenario, all STUs of Southern Region are requested to provide the seasonal load and generation data in prescribed format given at Annex-II.

17.0 Status of Under Construction / Approved Schemes:

17.1 POWERGRID may inform the progress of the transmission works that are being implemented by them as part of regional schemes.

17.2 State utilities may also inform the progress on their 400kV transmission works and transmission systems that are necessary to match with the regional schemes by POWERGRID for effective utilization of the system.

**18.0 LTA/ Connectivity Agenda for discussion
(Agenda to be circulated by POWERGRID)**

19.0 Any other issue with the permission of chair.

Annex-I

Report on Joint System Studies conducted by POWERGRID, CEA alongwith APTRANSCO Officials for Evacuation of Wind Generation in Andhra Pradesh

Andhra Pradesh has large potential of renewable energy potential especially wind power. Looking into such large potential and proposed wind generation projects in the State, adequate transmission system is necessary for evacuation as well as supply of wind power to DISCOMs in Andhra Pradesh. To identify the transmission system required for wind generation projects proposed to come up in 12th Plan period (2012-17), system studies were carried out jointly by CEA, POWERGRID and APTRANSCO during 23-25 April, 2012. List of participants is given at Annex-II.

1.0 Wind Generatin scenario in Andhra Pradesh:

As per the information given by APTRANSCO wind generation of about 3150 MW were considered for the present system studies for evolution of transmission system. These wind projects are mainly coming up in Uravakonda area (1361 MW), Kondapuram area (1109 MW) and Hindupur area (680 MW) and are proposed to be set up during 2012-17 period. The area wise details and its Installed Capacity, as provided by APTRANSCO, is given below:

S.No.	Area	Generation	Capacity (MW)
1.	Uravakonda (1361 MW)	Vajrakarur	570
		Borampalli	791
2.	Kondapuram (1109 MW)	Thirumalayapalli	241
		Bethamcherla	259
		Chakarayapet	140
		Porumamilla	270
		Jammalamadugu	199
3.	Hindupur (680 MW)	Penukonda	141
		Pampanaur	539
		Total	3150

2.0 Transmission System Studies

2.1 The following transmission system was earlier proposed by APTRANSCO vide their letter to MNRE dated 25th Nov, 2011:

- Uravakonda – Gooty 400kV quad D/c line
- Uravakonda – Hindupur 400kV D/c line
- Kondapur – Hindupur 400kV D/c line
- Hindupur – Madhugiri 400kV quad D/c line

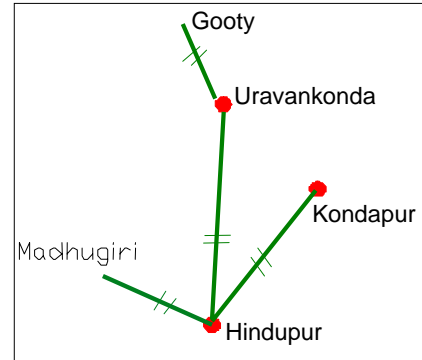
2.2 APTRANSCO had requested that additional system studies needed to be carried out to address changed load generation scenario in Southern Region, as many generation projects under Central sector, State sector and IPPs got delayed. Therefore additional system studies were conducted by POWERGRID, CEA along with APTRANSCO officials during 23-04-2012 to 25-04-2012 for high wind conditions & low wind conditions generation scenarios for the time frame of 2016-17 in Southern Region.

2.3 Four number of transmission network alternatives were studied to evolve optimum transmission system for evacuation of wind power and transmit it to load centres in Andhra Pradesh. The details of the alternatives are as below:

Alternative-I→

- Uravakonda – Gooty 400kV quad D/c line
- Uravakonda – Hindupur 400kV D/c line
- Kondapur – Hindupur 400kV D/c line
- Hindupur – Madhugiri 400kV quad D/c line

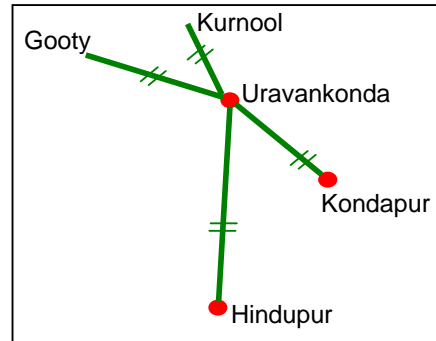
The load flow result for the alternative is given at **Exhibit-I**.



Alternative-II→

- Uravakonda – Gooty 400kV quad D/c line
- Uravakonda – Kurnool 400kV quad D/c line
- Uravakonda – Hindupur 400kV D/c line
- Uravakonda – Kondapur 400kV D/c line

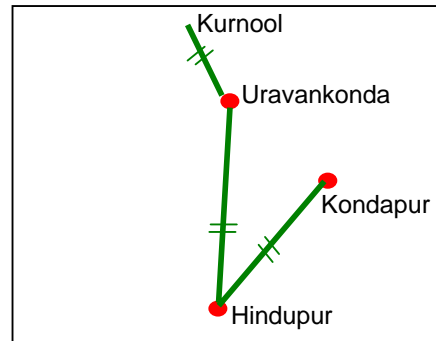
The load flow result for the alternative is given at **Exhibit-II**.



Alternative-III→

- Uravakonda – Kurnool 400kV quad D/c line
- Uravakonda – Hindupur 400kV D/c line
- Kondapur – Hindupur 400kV D/c line

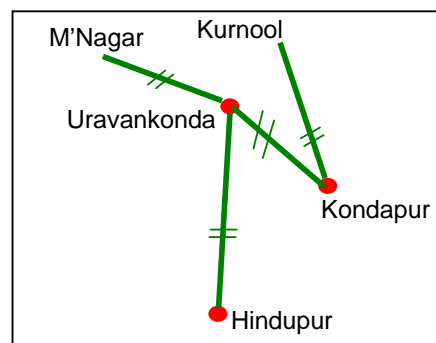
The load flow result for the alternative is given at **Exhibit-III**.



Alternative-IV→

- Uravakonda – Mehboobnagar 400kV quad D/c line
- Kondapur – Kurnool 400kV quad D/c line
- Uravakonda – Kondapur 400kV D/c line
- Uravakonda – Hindupur 400kV D/c line

The load flow result for the alternative is given at **Exhibit-IV**.



2.4 Discussions of Study results:

From the study results for the above alternatives it is observed that the Alternative-IV is the optimum solution for the integration of wind generation with the Andhra Pradesh grid. It is observed from the **Exhibit-IV** that loading on Uravankonda – Mehboobnagar D/c line is about 520 MW, loading on Kondapur – Kurnool D/c line is about 550 MW and loading on Uravakonda – Kondapur D/c line is about 240 MW which are well within the limits under normal conditions. Further it is also observed from the **Exhibit-IV(a)** that the loadings are also well within the limits under N-1 contingency conditions.

Further the transmission system shall also facilitate in meeting the loads of the Uravakonda, Kondapur and Hindupur during no wind conditions and the load flow results for the same is given at **Exhibit-V**.

- 2.5 For additional reliability and interconnection with ISTS grid Hindupur – Madhugiri 400kV quad D/c line was also proposed. This line or any other interconnection may be considered after APTRANSCO build their system and analysing the need at that time. The analysis indicates that Alt-IV is adequate to transmit and absorb wind power under various wind generation conditions and therefore, connectivity with Madhugiri is not critical.

3.0 Recommendation for evacuation of Wind Generation in Andhra Pradesh

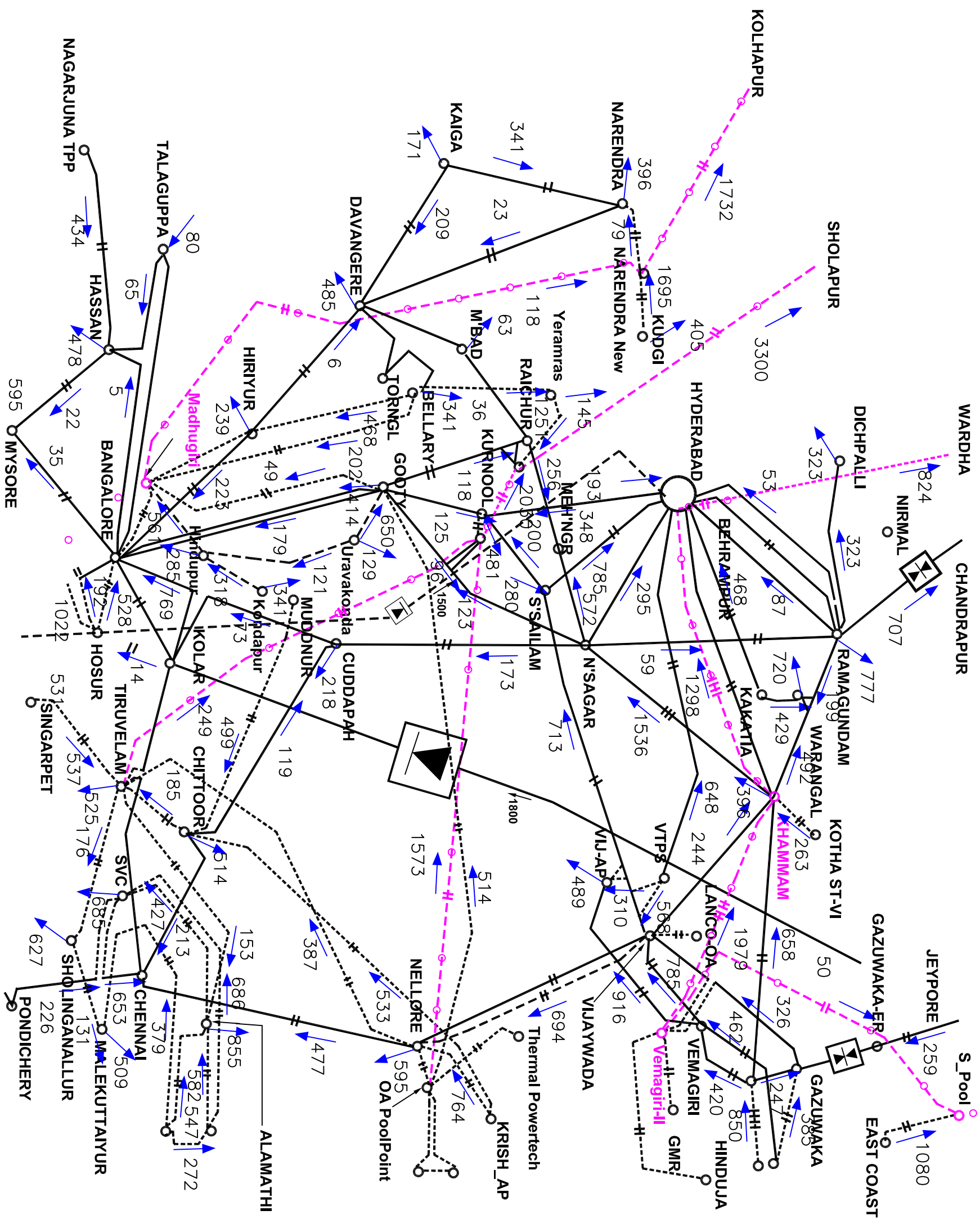
From the study results presented above, following transmission system is proposed for evacuation of Wind Generation in Andhra Pradesh & its integration with AP Grid:

- Uravakonda – Mehboobnagar 400kV quad D/c line
- Kondapur – Kurnool 400kV quad D/c line
- Uravakonda – Kondapur 400kV D/c line
- Uravakonda – Hindupur 400kV D/c line

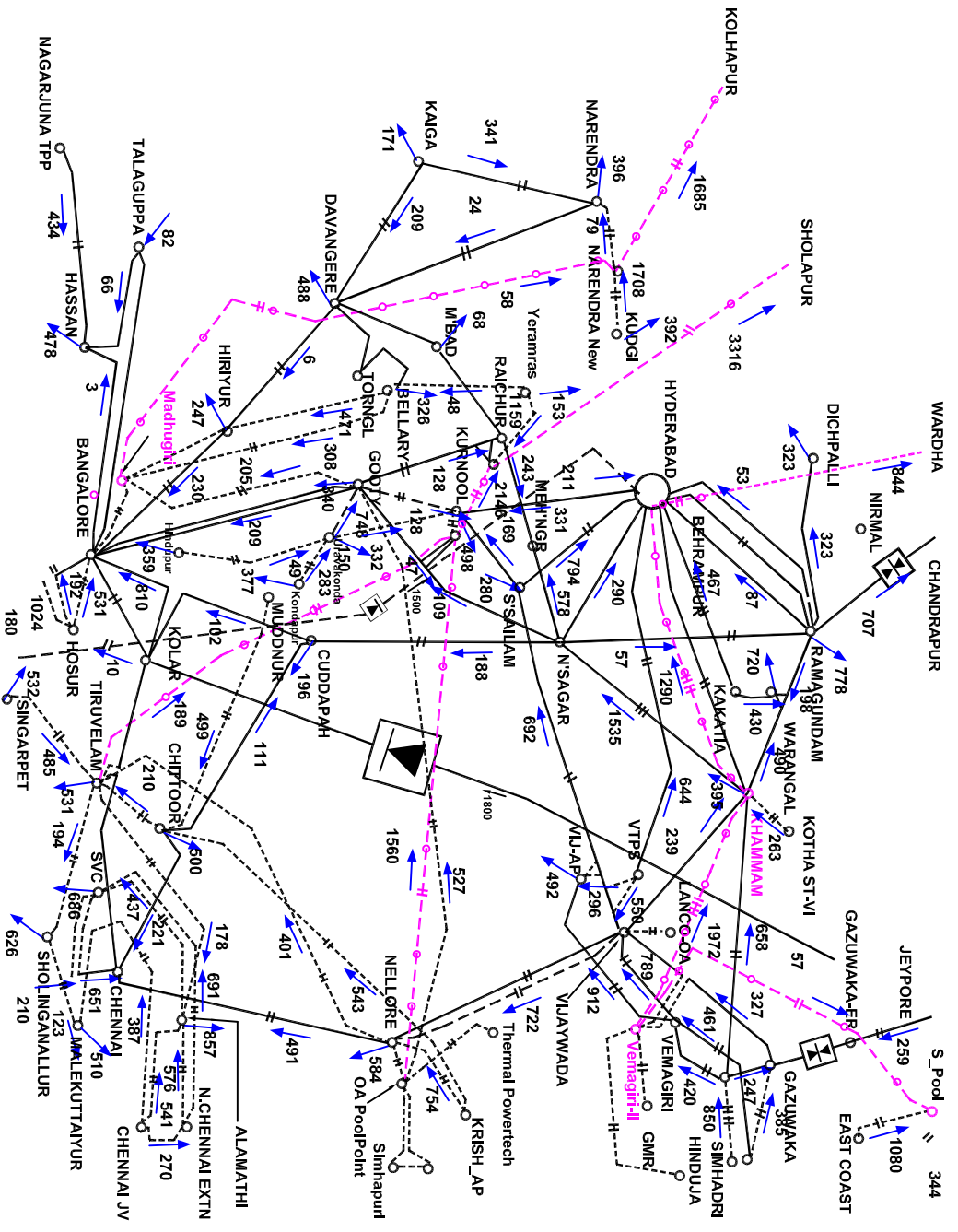
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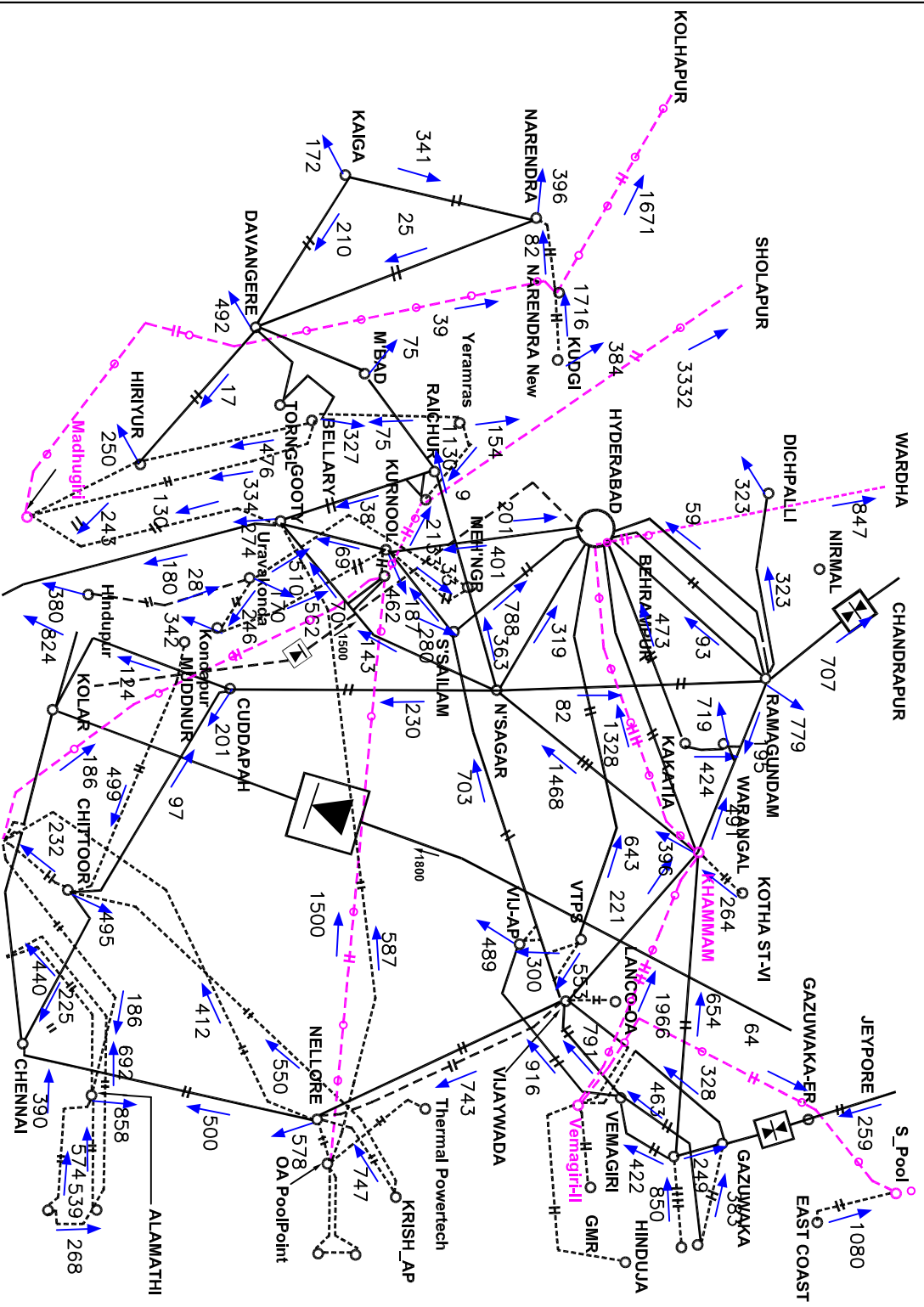
List of participants of joint studies carried out by CEA, APTRANSCO and POWERGRID durind 23-25 April,2012 for evacuation of wind generation in Andhra Pradesh

Sl. No.	Name and Organization	Designation
Central Electricity Authority (CEA)		
1.	Pardeep Jindal	Director (SP&PA)
2.	Manjari Chaturvedi	Dy. Director (SP&PA)
3.	Nageswara Rao Maragani	Engineer (SP&PA)
Power Grid Corporation of India Limited (POWERGRID)		
4.	Dilip Rozekar	DGM(Engg.-SEF)
5.	R V Madan Mohan Rao	CDE (Engg.-SEF)
6.	Anil Kumar Meena	DCDE (Engg.-SEF)
Transmission Corp. of Andhra Pradesh Ltd. (APTRANSCO)		
7.	C V Subba Rao	SE (SP)
8.	V V Ramana Murthy	DE/System Studies
9.	K Ramesh	AD/System Studies



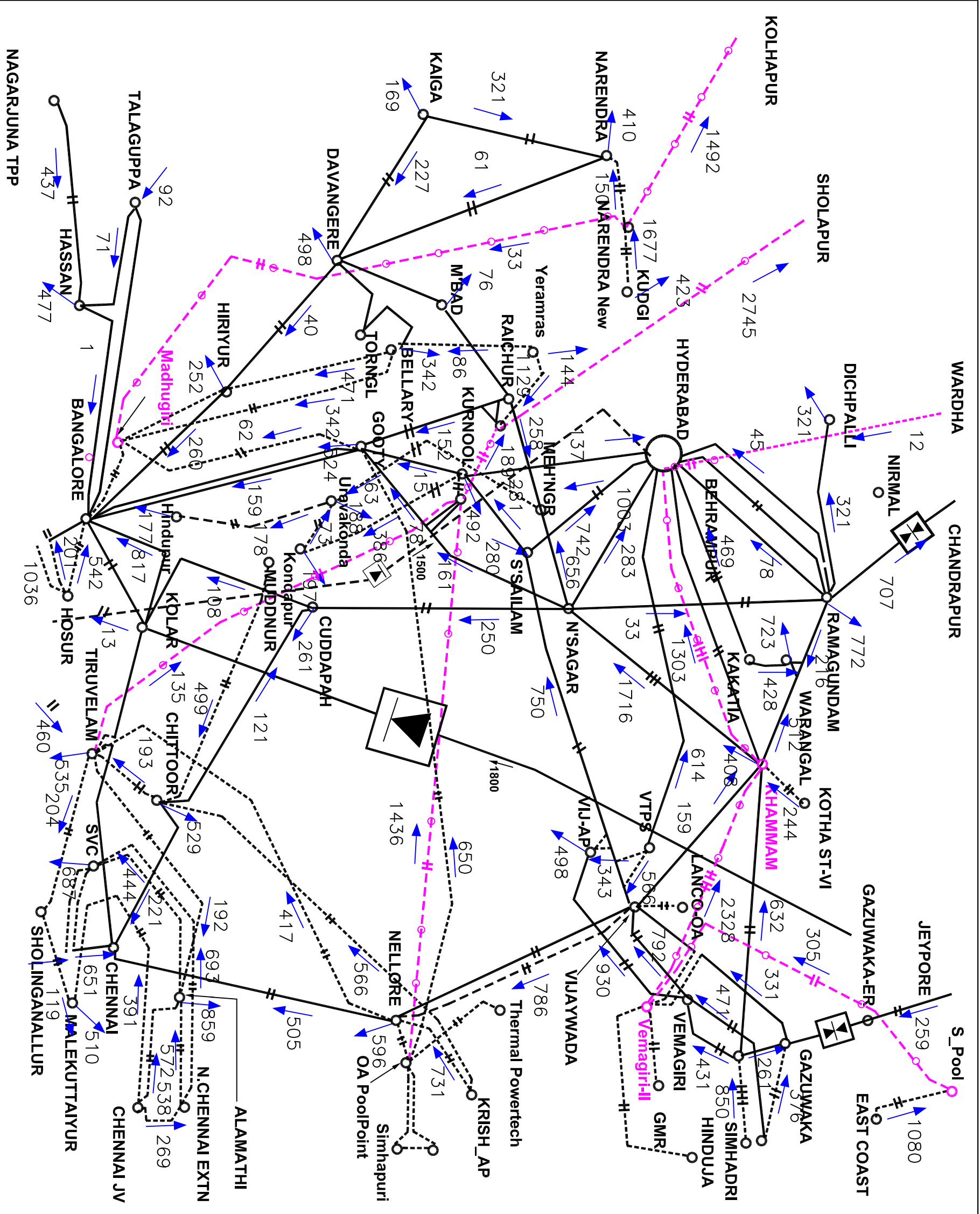
ALTERNATIVE - I





ALTERNATIVE - IV (outage of one circuit of Urvakonda- Mahboobnagar D/C line)

Exhibit- V



ALTERNATIVE - IV (with no wind generation in AP)

State:

LOAD

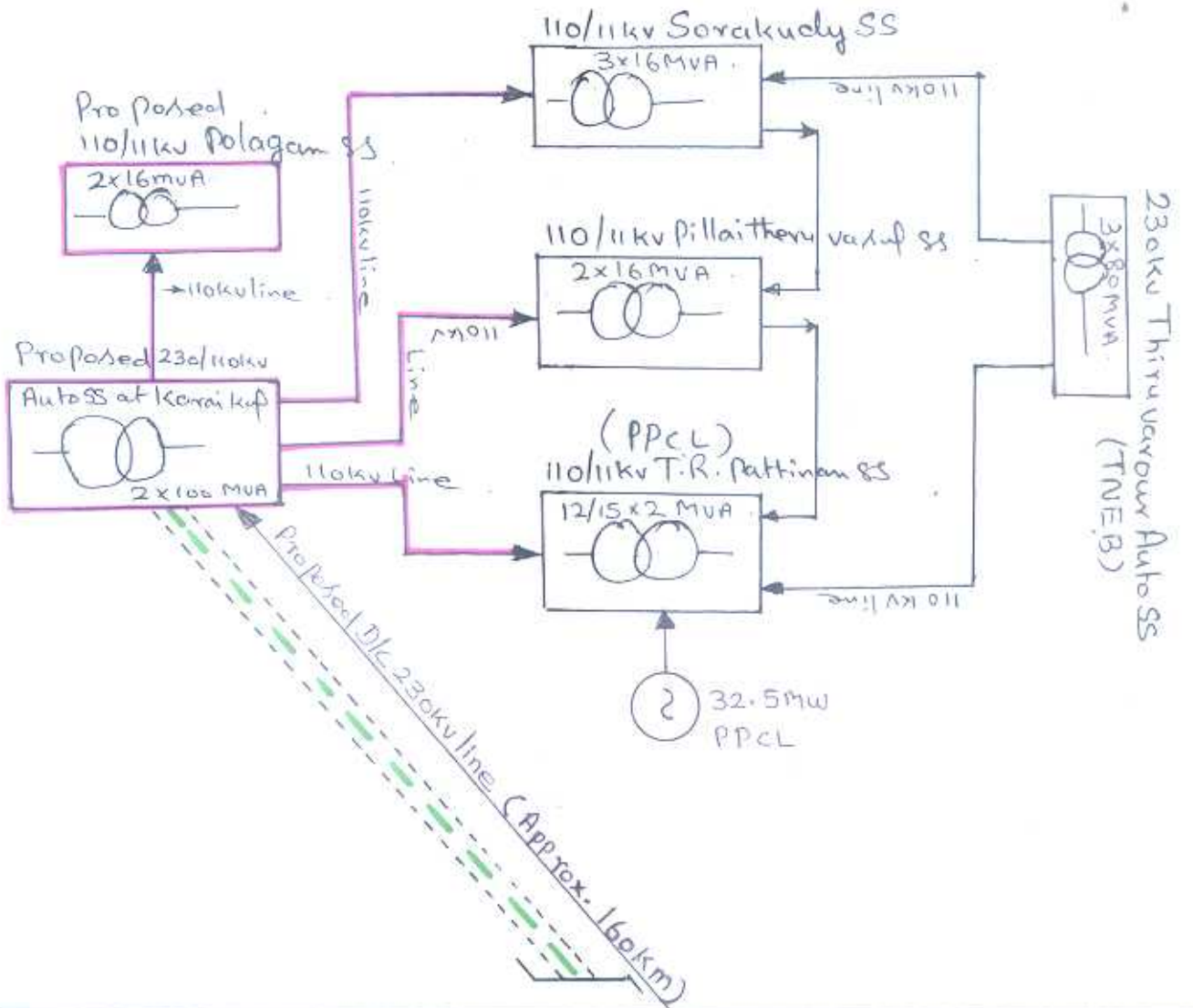
	2014-15	2016-17	2019-20
Summer Peak			
Summer Off- Peak			
Winter Peak			
Winter off- Peak			
Monsoon Peak			
Monsoon Off-Peak			
18th EPS Load			

GENERATION

		2014-15		2016-17		2019-20	
		Installed Capacity	Dispatch	Installed Capacity	Dispatch	Installed Capacity	Dispatch
Summer Peak	Thermal						
	Hydro						
	Wind						
	Solar						
Summer Off- Peak	Thermal						
	Hydro						
	Wind						
	Solar						
Winter Peak	Thermal						
	Hydro						
	Wind						
	Solar						
Winter off- Peak	Thermal						
	Hydro						
	Wind						
	Solar						
Monsoon Peak	Thermal						
	Hydro						
	Wind						
	Solar						
Monsoon Off-Peak	Thermal						
	Hydro						
	Wind						
	Solar						

Maximum Import/Export requirement of State considering various contingencies:

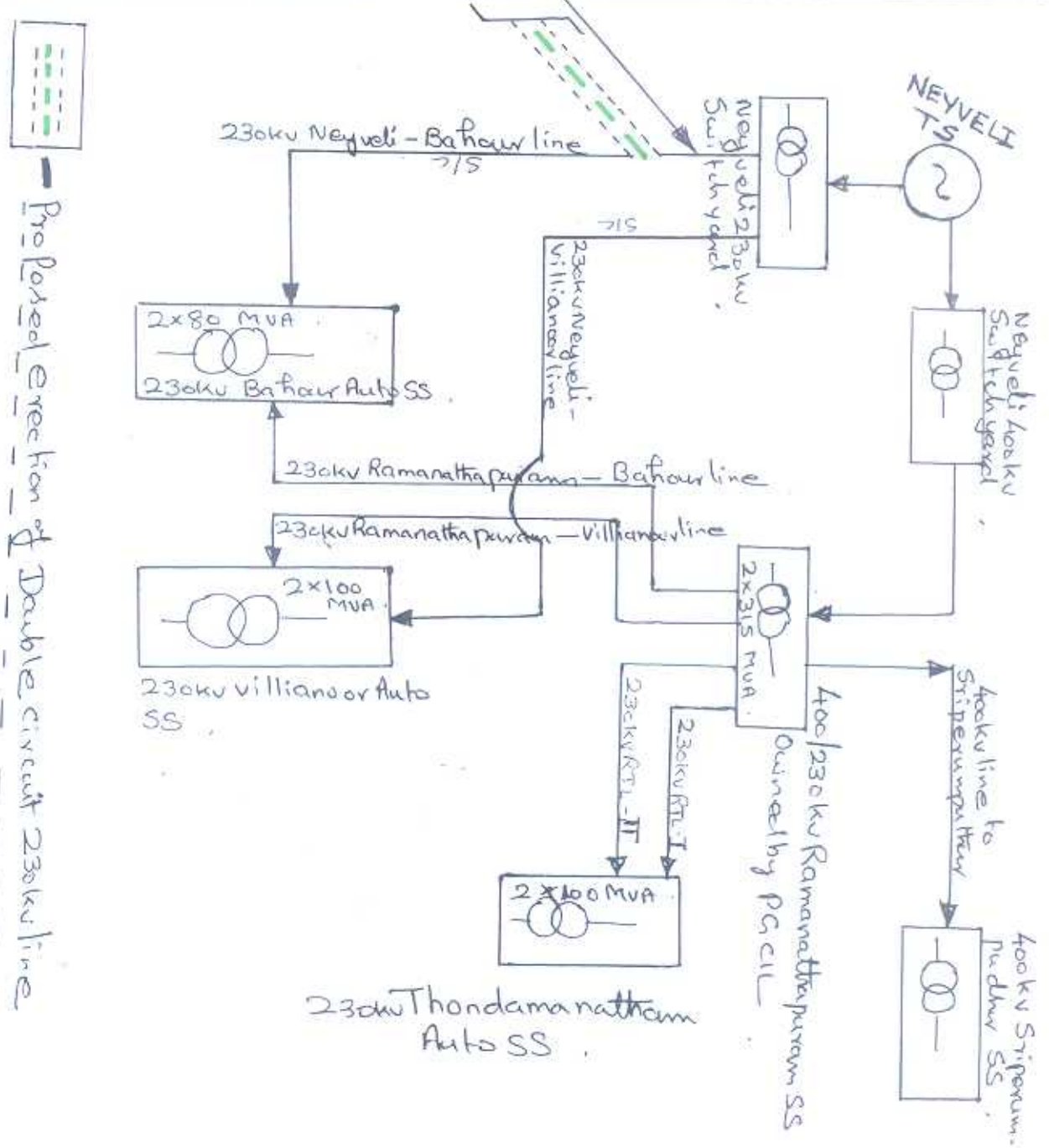
	2014-15	2016-17	2019-20
Summer Peak			
Summer Off- Peak			
Winter Peak			
Winter off- Peak			
Monsoon Peak			
Monsoon Off-Peak			



Proposed Infrastructure

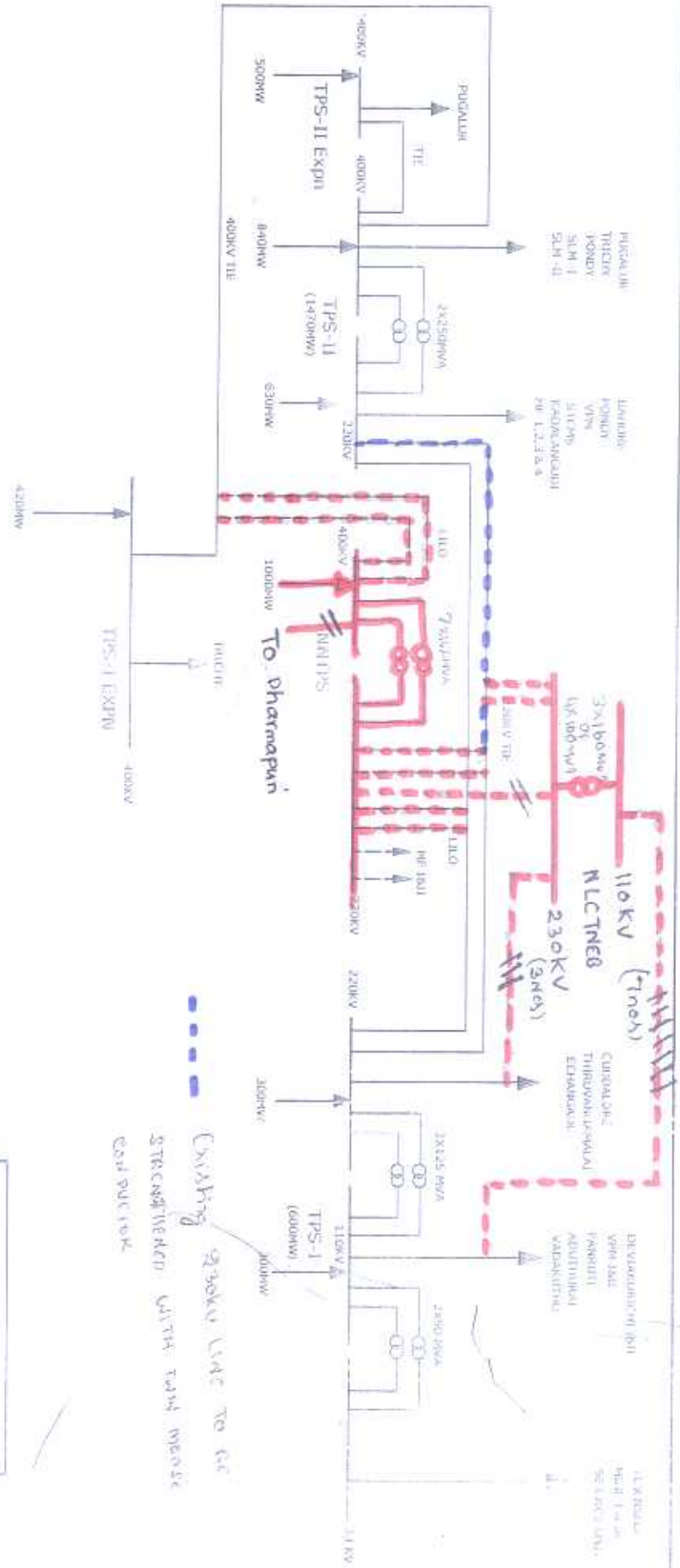
EXISTING INFRASTRUCTURES

KARAICAL REGION EXISTING AND PROPOSED 230kV AND 110kV NETWORK



PUDUKHERRY REGION 230kV NETWORK (EXISTING)

Proposed erection of Double circuit 230kV line



NLC POWER STATIONS AT NEYVELI

400KV, 220KV, 110KV, & 33KV FEEDERS AND STATION INTER CONNECTIONS