

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

No. 51/4/SP&PA-2008/ 298-307

Date: April 24, 2008

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: 25th meeting of the Standing Committee on Power System Planning of Southern Region
- Minutes of the meeting

Sir,

25th meeting of the Standing Committee on Power System Planning of Southern Region was held on March 28, 2008 at Hyderabad. Minutes of the meeting are enclosed. Your comments and observations, if any, may be sent to us at the earliest.

This issues with the approval of Member(PS).

Yours faithfully,

Encl: Minutes

(Pardeep Jindal)
Director (I/c) (SP&PA-III)
(Telephone No. 011 26732325)

**Standing Committee on Power System Planning in Southern Region
(SCPSP SR)**

Minutes of the 25th Meeting held on March 28, 2008 at Hyderabad

- ❖ 25th meeting of the Standing Committee on Power System Planning in Southern Region (SCPSP SR) was held on 28th March 2008 (Friday) at Hotel Marriott, Hyderabad.
- ❖ Agenda note for discussion for this meeting was circulated by CEA on March 14, 2008 and subsequently, supplementary agenda note was circulated on March 26, 2008. For reference, a copy of the agenda is given at Annex-I.
- ❖ The meeting was chaired by Member (Power System), CEA. The list of participants is given at Annex-II.

Summary Record of Discussions:

1.0 Shri V. Ramakrishna, Member (Power System), CEA welcomed the participants and requested the participants to give their introduction. He also thanked POWERGRID for excellent arrangements made by them for holding of this meeting. After the introduction by participants, opening the discussions, Member (PS) stated that the new generating capacities were being added at much faster rate than before, and therefore, the transmission system should also be put in place promptly so as to match with commissioning of generation projects so that the generations do not become stranded assets.

2.0 Confirmation of the minutes of 24th meeting of the Standing Committee

Member (PS) stated that the minutes of the 24th meeting held on June 18, 2007 were circulated on 17-07-2007, to which KSEB had sought amendment to para 15.2 of the minutes regarding termination of Tirunelveli – Edamon 400kV D/C line. He informed that this issue was taken up for discussion in the 5th SRPC meeting, wherein, it was clarified that the minutes issued by CEA were as per the discussions. Therefore, there was no need to issue any corrigendum on the minutes of 24th meeting of SCPSPSR. Minutes as circulated were confirmed.

3.0 Status of under construction / approved schemes

Member (PS) stated that the transmission schemes, after discussion in the Standing Committee, go through various stages like preparation of DPR and investment approval, before actual implementation of the project. He emphasized that these activities should be planned in such a way that the associated transmission system (ATS) are matched with generation project and the system strengthening projects are implemented at the decided target dates. He also stated that all the constituents should sign required agreement before commercial operation of the projects. He asked PGCIL to give status of implementation of various transmission schemes, which were earlier discussed and agreed in the previous meetings of this Standing Committee. GM, POWERGRID provided the progress on various transmission schemes the details of which are given at Annex-III.

4.0 Advancement of Warangal 400 kV S/S

- 4.1 Member (PS) stated that the Warrangal 400kV substation is a part of transmission system associated with Neyveli TS-II expansion generation project. The issue of advancing the completion of Warrangal 400kV S/S to meet APTRANSCO requirement was discussed in the previous meeting. He asked the participants to agree to share the transmission charges on account of this advancement, and further asked the APTRANSCO representatives about the readiness of their 220kV system at Warrangal so as to firm up the target date for completion of Warrangal 400kV S/S. POWERGRID informed that construction of Warrangal 400/220kV substation is in advanced stage and can be completed in about months time notice. Chief Engineer, APTRANSCO stated that the 220kV works for drawing power from Warrangal were in progress, however, the precise completion schedule of the works would be intimated in a week's time.
- 4.2 APTRANSCO would inform about progress of their 220kV lines that would be connected with Warangal 400kV S/S and date by which the Warangal 400kV should be made ready for APTRANSCO. It was decided that matter would be discussed in the next SRPC meeting for sharing of transmission charges for period of advancement.

5.0 Kalpakkam PFBR 500 MWe ATS

- 5.1 ATS for the Kalpakkam PFBR was agreed in the 21st meeting of the Standing Committee. For implementation of this system, POWERGRID had requested BHAVINI to communicate the commissioning schedule of the generation project, to which, BHAVINI had informed that the project was scheduled to start commercial operation by March, 2011 and had indicated requirement of commissioning of power evacuation system by April, 2010. GM, NPCIL indicated that for start-up requirement of Nuclear station, availability of start-up power from two independent sources was necessary. Member (PS), CEA advised that one of the sources could be 220kV cable inter-connection with the existing MAPS and for the second source, one of the other 220kV lines that were planned as evacuation system for the project, based on convenience of erection, could be constructed early to meet start-up power needs. GM, POWERGRID stated that BHAVINI would all have to bear transmission charges for the system commissioned early for meeting the startup power requirement as per the practice followed for other generation project with similar requests.
- 5.2 PGCIL and NPCIL/BHAVINI would inform about progress of the transmission lines.

6.0 Augmentation of Talcher II Transmission scheme

Member(PS) said that, the 'Augmentation of Talcher-II Transmission' scheme comprising of Talcher II – Rourkela 400kV Quad D/C line, and Talcher II – Berhampur – Gazuwaka 400kV D/C line with switching station at Berhampur, had been identified for execution through tariff based competitive bidding. The project had been entrusted to the SPV of REC who was preparing to issue the RfQ for this scheme. AGM, NTPC said that as the bays at Talcher-II for these transmission lines were to be provided by NTPC, they wanted to know the exact schedule of the scheme. Member(PS) suggested that NTPC may contact the SPV of REC for this purpose.

7.0 Requirement of Reactors to contain over voltages in the Southern Region

- 7.1 Member(PS) stated that the scheme of provision of 25 numbers of reactors to contain over voltages in Southern Region was deliberated in the 22nd, 23rd and 24th meeting and was approved by SRPC in the 5th meeting held on 25-08-2007. He emphasized that for the scheme to be effective the identified reactors should be commissioned at the earliest. He asked the implementing utilities about progress on installation of reactors in their respective Substations.
- 7.2 GM, POWERGRID informed that LOA for all the eleven reactors had been placed in February 2008 and the reactor would be progressively installed by November 2010 based on priority that would be decided in consultation with SRLDC.
- 7.3 AGM, NTPC stated that management approval for the Ramagundam reactor has been obtained and the Simhadri reactor would be taken up along with switchyard works at Simhadri-II project. Member(PS) stated that Simhadri reactor needed to be installed at an early date and should not be associated with construction of Simhadri-II project.
- 7.4 NPCIL representative informed that they had undertaken an MoU with PGCIL for implementation of the reactor at Kaiga. PGCIL informed that this reactor would be installed by them, on behalf of NPCIL, alongwith other reactors.
- 7.5 APTRANSCO representatives said that they were yet to take action for implementation of the reactors in there area.
- 7.6 Member, KPTCL informed that the reactor at Raichur would be implemented by KPCL and for the other reactors preparation of DPR was under process by KPTCL.
- 7.7 Member(PS) expressed concern on slow progress on implementation of the reactors. Member Secretary(SRPC) also expressed concern and said that with such slow progress on reactors by the constituents they should not complain for high voltages in the grid. He, however, added that SRPC would take up speedy implementation of reactors at chairmen level of utilities.

8.0 Shifting of 3rd 400/220 kV, 315 MVA Transformer

- 8.1 Member(PS),CEA stated that, based on KSEB request to meet urgency of high loading at their Madakkathara S/S, one of the transformers being procured by POWERGRID for installation at Thiruananthapuram under Kudankulam transmission system had been decided to be loaned to KSEB and that a new transformer in lieu of this would be given by KSEB to POWERGRID. GM, PGCIL informed that they have received technical compatibility report of the transformers and accordingly the 3rd transformer at Thiruananthapuram was being diverted to Madakkathara.
- 8.2 He further said that KSEB had confirmed in the 6th SRPC meeting held on 15-02-2008 that the loaned asset would be returned by KSEB by September 2009 as mutually agreed between KSEB and POWERGRID. Member (Trans.), KSEB indicated that after procurement of new transformer by KSEB, it would return the same (old) transformer taken from POWERGRID for installation at Madakkathara

(North Trichur). POWERGRID representative argued that as per discussions with KSEB, return of already installed transformer at Madakkatahara was never in consideration. Member(PS) said that from technical considerations, shifting of transformer by dismantling at one location and transporting to new location would not be advisable as this could result in shifting of its core and thereby adversely affecting its life. Member (Trans.), KSEB assured that KSEB would resolve the issue amicably with POWERGRID and do the needful. MS, SPRC said that he would take up the matter at next SRPC meeting to ratify the above decision.

9.0 Termination of Tirunelveli –Edamon 400kV circuit under Kudankulam evacuation system at Edamon

9.1 Member(PS) stated that the issue of termination of Tirunelveli – Edamon 400kV D/C line (to be initially operated at 220kV) was discussed in the previous meeting and subsequently in the 6th SRPC meeting held on 15-02-2008, in which it was agreed that both the feeders would be terminated at the Edamon bus with an arrangement to connect one feeder to one circuit of Edamon-Pothencode 220kV line by bypassing the Edamon S/S. He asked PGCIL and KSEB about progress of the scheme.

9.2 GM, PGCIL said that in the 6th SRPC meeting it was also decided that charges for the additional bay required for termination should be shared by all beneficiaries as regional asset while existing bay cost would continue to be borne by KSEB, and that the bypassing scheme would be taken-up at appropriate time with the Kayamkulam expansion project. Updating the Committee about progress of the scheme, POWERGRID representative informed that due to space constraint in the Edamon substation, the existing bay shall require dismantling and re-erecting after bus bar extension. The KSEB representative requested that cost of dismantling and re-erection should also be covered under the regional scope. Member (PS), CEA stated that this was a minor work to be carried out on KSEB bay, hence it should be borne by KSEB only and did not warrant reopening of the issue already settled. He requested POWERGRID to cover the cost of the additional bay at Edamon under regional strengthening scheme.

10.0 Transmission System for Evacuation of Power from Nagarjuna TPS (1015 MW) in Karnataka, of M/s Nagarjuna Power Corporation Ltd

Director(Transmission), KPTCL informed that Nagarjuna TPS generation project was under construction stage and was likely to be completed by Feb 2010. The 220kV lines connecting NPCL to local substation would be completed in 2009 and the NPCL-Hassan 400kV D/C line would be completed matching with commissioning of generating station. POWERGRID informed that DPR for the Hassan-Mysore 400kV D/C line regional scheme was under preparation.

11.0 Transmission System for Vallur TPS (2x500 MW+1x500 MW) of NTECL (JV of NTPC & TNEB)

11.1 Member(PS) said that NTECL (NTPC Tamilnadu Energy Company Ltd.) had informed that the capacity of their project was now being enhanced from 2x500 MW to 3x500 MW. The transmission system for the Vallur TPS (2x500 MW) was discussed in the 22nd, 23rd and 24th Standing Committee meetings and approved by SRPC in the 5th meeting held on 25-08-2007 at Trivandrum. The agreed system,

comprising of LILO of Alamathy - Sriperumbudur 400 kV D/C line at Vallur TPS, was adequate for evacuation of power from only 2x500 MW units. In view of 3rd 500 MW unit, its allocation of power to beneficiaries and the new generation capacities under planning by TNEB in the vicinity of Chennai, the transmission system would be required to be supplemented.

- 11.2 AGM, NTPC informed that NTECL had already communicated the allocation of power from 3x500MW Vallur project as - Tamil Nadu:1125 MW, Karnataka:125 MW, Kerala:75 MW, Andhra Pradesh:75 MW, Puducherry:50 MW and Unallocated/reserved for Merchant Power:50MW. NTPC also informed that above allocations had also been informed to Ministry of Power by NTECL vide letter dated 13-02-2008. He further said that based on above, the Committee might firm up transmission system requirement for the project. NTPC also informed that the first unit at Vallur TPS was scheduled for commissioning by September 2010 and therefore they would require start-up power by September 2009.
- 11.3 The issue of was deliberated at length and it emerged that due to urgency of the meeting startup power requirement of Vallur TPS and due severe ROW constraints, the LILO line would have to be constructed with multi circuit towers therefore, LILO of both circuits should be implemented at once. It was decided that POWERGRID should go ahead with LILO of both circuits of Alamathy – Sriperumbudur 400 kV D/C line. The two LILO lines from the Vallur switchyard shall be extended keeping in view convenience of drawing transmission lines in ROW constrained Chennai area. The actual configuration of this strengthening shall be decided in the next meeting of Standing Committee based on the feedback from POWERGRID/TNEB. GM, POWERGRID said that they would make all efforts for early commissioning of LILO work as per NTECL request subject to NTECL agreeing to bear transmission charges for the period of early commissioning i.e. from actual commissioning of the transmission line upto its commercial operation. He also emphasized the necessity of completion of the Alamathy – Sunguvarchatram 400 kV D/C line by TNEB matching with the commissioning of generation project. TNEB agreed to take necessary action for meeting this requirement.
- 11.4 POWERGRID representative further added that NTECL had been requested to confirm bearing of transmission charges for early commissioning period, to which NTECL had forwarded confirmation letter for bearing transmission charges towards LILO of one circuit only. In this regard it was informed that due severe ROW constraints and as decided above, LILO of both circuits would be implemented at once. Accordingly, POWERGRID requested NTPC representative to convey NTECL's confirmation to bear transmission charges for LILO of both the circuits. NTPC representative agreed for the same.
- 11.5 Regarding additional transmission system requirement on account of 3rd 500 MW at Vallur and in view of TNEB plan for Ennore TPS Extn (500 MW) and North Chennai Extn (500 MW) in the same vicinity, Member(PS), CEA said that these could be taken up as supplementary scheme. For this, he asked TNEB representatives to coordinate with CEA and POWERGRID in carrying out further system studies so that transmission schemes could be decided in the next meeting of the Standing Committee, which would have to be held at an early date. TNEB representatives agreed for the same.

12.0 Transmission System for Tuticorin TPS (2x500 MW)

- 12.1 Member(PS) said that the transmission scheme for Tuticorin JV TPS as agreed in the 22nd meeting of the Standing Committee included: Tuticorin JV TPS–Madurai 400 kV D/C Quad line, 2x315 MVA 400/220kV ICT at Tuticorin TPS JV and LILO of 2 nos. of 220 kV circuits at Tuticorin TPS JV. He asked about progress of the generation project and the status of allocation of power from the project. NLC representative informed that they were planning to commission the Tuticorin project by October 2011(first unit) and February 2012 (second unit).
- 12.2 Member Secretary(SRPC) informed that Ministry of Power was being approached for early finalization of allocation of power from this project. He further said that in the 6th SRPC meeting held on 15-02-2008, it was felt that notwithstanding finalization of allocation, POWERGRID could go ahead with the Tuticorin JV TPS–Madurai 400 kV D/C Quad line for which the Standing Committee would be approached. Member(PS) agreed for this proposal and asked POWERGRID to take up steps for implementation of this line and added that the additional system strengthening could be decided based on finalization of the allocations. All the members agreed for the same.

13.0 Approval of modifications in the originally approved evacuation scheme of RGCCPP sought by KSEB.

Member(PS) said that CEA had given approval for LILO of one circuit of Kayamkulam-Pallom 220 kV D/C line and LILO of one circuit of Kayamkulam-Edamon 220 kV D/C line at Edappon 220 kV S/S and Kundara 220 kV S/S respectively. Subsequently, KSEB in consultation with PGCIL had decided to connect Edappon 220 kV S/S also by LILO of other circuit of Kayamkulam-Edamon 220 kV D/C line instead of LILO of the Kayamkulam-Pallom 220 kV D/C line. KSEB have sought approval of the committee. Members agreed for the above modifications.

14.0 Transmission system for evacuation of power from Kothagudam TPS (1X500 MW) in Andhra Pradesh

- 14.1 Member(PS) said that for evacuation of power from APGENCO's Kothagudam TPS Stage-IV (1x500 MW) project, APTRANSCO had proposed following transmission system:
- (i) KTPS Stage-IV - Khammam, 400 kV D/C line, 105 km
 - (ii) 1X315 MVA, 400/220 kV ICT at KTPS.

For this, APTRANSCO had requested for allocation of 2 nos. of 400 kV bays at the Khammam 400/220 kV S/S of POWERGRID for the 400 kV D/C line from KTPS. He said that to avail this interconnection with the regional grid, APTRANSCO/APGENCO would be required to share transmission charges in proportion of 500 MW i.e. the capacity of the Kothagudam TPS. Alternatively, they may plan to connect Kothagudam to Suryapet at 400kV by planning a new 400kV S/S at Suryapet. APTRANSCO representatives said that they would take up the issue with their management and inform accordingly.

- 14.2 Member(PS) further stated that, based on the studies conducted by CEA, there was a need for strengthening of the 220kV network in the Kothagudam-Khammam-Suryapet

area. He asked the APTRANSCO representatives to carry out system studies for planning 220kV strengthening in their system. He also suggested that they could take help from CEA in this regard. APTRANSCO representatives agreed to carry out the system studies as suggested by CEA.

15.0 Transmission System for Evacuation of Power from Simhadri-II TPS (2x500 MW) of NTPC

15.1 Member(PS) stated that as decided in the 24th standing committee meeting, in view of Vizag TPS of 2x525 MW generation of AP getting rescheduled and not yet firmed up, a part of the transmission capacity of Vizag – Vemagiri 400kV D/C line of APTRANSCO would be utilized for power evacuation from Simhadri-II, which, APTRANSCO had built keeping in view 2x525 MW Vizag TPS. It has also been decided that when Vizag TPS generation is firmed up or any new generation comes up in that area, additional line could be constructed as a regional system strengthening scheme. And, till such time NTPC should approach regulatory commission for determination of transmission charges. He further said that APTRANSCO vide their letter dated 15th and 21st February, 2008 have given 'in principle' agreement for utilization of existing network built by APTRANSCO for evacuation of power from Simhadri Stage-II subject to the payment of transmission charges and SLDC charges by NTPC or beneficiaries as determined by AP State Electricity Regulatory Commission from time to time.

15.2 NTPC representative said that they were yet to receive the APTRANSCO's 'in principle' agreement. He, however, said that as per APTRANSCO's 'in principal' agreement mentioned in the agenda, utilization of APTRANSCO's existing network had been made subject to the payment of Transmission charges and SLDC charges by NTPC or beneficiaries as determined by APSEERC from time to time. In this regard, he clarified that as per the PPAs for Simhadri Stage-II signed with various beneficiaries of Southern Region, sale of power by NTPC to various beneficiaries was at bus bars of the generating station and the respective beneficiaries were required to make arrangement for evacuation of power. Further, the payment of charges for utilization of transmission system was to be made directly by the beneficiaries to the transmission service provider. He said that they had agreed, as a special case, to make application to APERC on behalf of various beneficiaries of Simhadri Stage-II for determination of transmission charges to be paid by the beneficiaries of Simhadri-II project to APTRANSCO for use of APTRANSCO's transmission system and added that the beneficiaries would be required to enter into Bulk Power Transmission Agreement (BPTA) directly with APTRANSCO and these beneficiaries would be responsible for payment of transmission charges, SLDC charges and any other charges directly to APTRANSCO. All the members agreed to this arrangement.

15.3 POWERGRID representative mentioned that the transmission system for Simhadri-II TPS of NTPC, as finalized in the 24th Standing Committee meeting, comprised of 400kV D/C line from Simhadri-II to Gazuwaka or Kalpakka (Vizag Pooling point). POWERGRID, after further examination, was to confirm the location of terminating station i.e. whether Gazuwaka or Kalpakka. In this regard, he informed that, based on feedback from SRLDC that on numerous occasions and for extended period of time, bus sectionalisation was required to be carried out at Kalpakka due to faults in CTs thereby reducing reliability of evacuation of existing Simhadri generation. Accordingly, it was suggested by SRLDC to explore of diverting few feeders from Kalpakka to

Gazuwaka. Therefore, POWERGRID had reviewed the arrangement of existing 400 kV feeder terminations in the substation, and found that with some minor modifications it would be possible to accommodate two circuits from Simhadri-II generation project at Gazuwaka.

15.4 Based on above discussions, following transmission system was agreed for evacuation of power from Simhadri-II TPS of NTPC:

(i) Simhadri STPP-II TPS – Gazuwaka 400kV D/C line

(It was also decided that part capacity of APTRANSCO's existing Vizag – Vemagiri – Narsaraopet 400kV transmission corridor would be utilized through applying for long term open access to APTRANSCO. It was also been decided that when Vizag TPS generation is firmed up or any new generation comes up in that area, APTRANSCO line could be spared and, another line could be taken up as a regional system strengthening scheme.)

15.5 GM, POWERGRID requested CEA to reflect these changes in the scope of ATS for Simhadri-II, so that Section-68 approval obtained earlier with termination of 400kV circuits from Simhadri-II to Kalpakka (Vizag pooling point) may be modified accordingly.

15.6 All the members agreed to the above proposals.

16.0 Evacuation of Power from Kaiga complex

16.1 Member(PS), CEA stated that NPCIL had conveyed their plan for additional generation of 2x700 MWe at Kaiga. He said that planning an adequate transmission system for evacuation of power from Kaiga complex with total capacity of 2280 MWe (U1 to 4: 4x220=880 MW, + U5&6:2x700 MW=1400 MW) would be a huge technical challenge in terms of limited options available for adding new transmission lines, especially in view of the fact that during the process of obtaining forest clearance for transmission system for KaigaU1&2, we had already committed to the NGOs operational in that area that there would not be any additional RoW requirement in future. With these limitations, the only option available would be to re-conductor the existing lines and also provide suitable compensation/FACTS devices so as to increase operational capacity of the transmission system. This, however, would require detailed examination of procedures for dismantling/re-conductoring of existing lines, backing down of Kaiga generation during construction work, timing of construction, alternate arrangements to meet system demand etc, and detailed system studies evaluating effectiveness of compensation devices and their impact on the grid and the Atomic power generators.

16.2 The issue was discussed and it was felt that a firm schedules for the 2x700 MW units would be needed for carrying out these studies. NPCIL representative agreed to provide a firm schedule of the new units. It was decide that the matter would be discussed in the next meeting, accordingly.

17.0 Transmission system for Evacuation of Power from Wind Power Projects (WPP) and Requirements of Grid connectivity of WPP

17.1 Member(PS) stated that wind power projects were being set up at a much faster rate now, especially in Southern and Western Regions. CEA's Manual on Transmission

Planning Criteria that was brought out in 1994 does not deal very effectively the requirements of transmission system for evacuation and grid connectivity of WPPs and thus need to be updated to include various requirements specific to absorption of power from the WPPs in the grid. He further said that wind generation is random and seasonal in nature and has low PLF in the range of 15-20%. Owing to these characteristics, transmission planning for wind projects was required to be carried out different from that for regular hydro and thermal projects. He also said that it had been noted that some of the utilities were insisting on providing N-1 reliability criteria for the inter-connecting transformers (ICT) between the WPPs and evacuation level voltage for connecting to State Grid. Representatives of KPTCL and TNEB informed that they were not insisting for any such criteria for wind projects in their system.

- 17.2 Member(PS) further asked the participants to express their views on whether the N-1 criteria should be followed for assessing transmission requirement for absorption of wind power within State Grids. The issue was discussed and it was decided that these issues should further be discussed alongwith wind power producers and/or their associations.

18.0 Transmission Proposals sent by Karnataka Power Transmission Corp Ltd

18.1 Establishment of Basvana Bagewadi 400/220 kV S/S with inter-link line to Maharashtra:

KPTCL representative expressed requirement of establishing a 400kV S/S at Basavana Bagewadi and an inter-link with Maharashtra for export of power from Southern Region to Western Region on account of additional generating stations at Bellary, Raichur, Jewargi, Bidar, Gulbarga etc. The issue was discussed by members and it was decided that KPTCL would furnish relevant system studies in support of their proposal to CEA in two-four weeks time and the results would be further studied in the next meeting of the Standing Committee.

- 18.2 In regard to requirement of transmission system for IPPs, or for export of power from State generation projects to other State(s)/Region(s), Member(PS) explained that these generators should apply to CTU/related STU, seeking long term open access (LTOA) as per the procedure.

18.3 Establishment of 400kV D/C line from Shanthigram(Hassan) to Basthipura(Mysore) as regional strengthening scheme:

KPTCL representative stated that this issue has already been resolved in the 6th meeting of SRPC and as such need not be discussed.

18.4 Construction of two number of 400kV D/C lines from Raichur TPS to Yelahanka, and HVDC link from vicinity of Raichur TPS to Bangalore:

KPTCL proposal for construction of two number of 400kV D/C lines from Raichur TPS to Yelahanka, and an HVDC link from vicinity of Raichur TPS to Bangalore was discussed and it was found that these links could not be justified. However, in respect of the Yelahanka 400kV S/S, for meeting requirement of connectivity of Yelahanka S/S, LILO of any one of the Gooty – Nelamangla/Gooty-Hoody 400kV circuits could be made at Yelahanka. Member(PS) stated that with above connectivity, a link between Raichur-Gooty-Yelahanka would get established. He further suggested that for realizing a bigger ring main around Bangalore, KPTCL should undertake

Yelahanka-Kolar 400kV D/C line as State work. KPTCL representative agreed to consider the proposal.

18.5 Establishing a HVDC link from Northern Grid to Southern Grid:

KPTCL representative expressed that in view of ongoing exercise of planning a strong national grid, their proposal for establishing a HVDC link from Northern Grid to Southern Grid may be deferred for the time being. Committee noted KPTCL views.

18.6 Establishing a 400kV S/S near Parappana Agrahara in Bangalore South taluk:

Director, KPTCL stated that considering future load growth in southern part of Bangalore, especially due to number of IT and BT parks that have been proposed there, they had proposed establishment of a 400kV S/S near Parappana Agrahara. Member(PS) stated that already six numbers of 400kV S/Ss in/around Bangalore are existing/planned (existing are - Nelamangla, Hoody, Somanahalli and Kolar, and planned are – Bidadi and Yelahanka), which include two of KPTCL and rest four as regional S/Ss. He further said that if needed, KPTCL could plan Parappana Agrahara 400kV S/S on their own and by LILO of some existing 400kV line, possibly the Salem-Somanahalli 400kV line, to be carried out by KPTCL at their cost. For this, KPTCL would be required to carry out appropriate system studies and the matter then, could be discussed in the next meeting of the Standing Committee.

18.7 Member(PS) stressed the need to carry out an analysis of existing/planned 400kV level transformation capacities in Southern Region alongwith share of all the states from central sector generating stations so that there is an equitable transformer capacity in all the States. He said that after carrying out the necessary analysis, the same would be discussed in next meeting and this would help in determining need for having new substations in various States.

19.0 Transmission Proposals sent by Kerala State Electricity Board

19.1 Proposal for LILO of Udumalpet-Madakathara 400kV D/C line at Chulliar (Palakkad) and a new 400/220kV substation at Chulliar with 2x315MVA transformer:

Member(PS) said that KSEB have sent proposal for – (i) LILO of Udumalpet-Madakathara 400kV D/C line at Chulliar (Palakkad) and (ii) Setting up of a new 400/220kV substation at Chulliar (near Palakkad) with 2x315MVA transformer, to be taken up as regional schemes in Southern Region. KSEB representative indicated that the 3rd transformer at Thiruvantapuram, which is being temporarily shifted to Madakathara on loan basis, could be finally installed at Chulliar (Palakkad). Member(PS) state that as already explained shifting of an installed transformer could cause damage to its core and that it was not advisable to shift transformer from Madakathara to Chulliar. After discussions the committee decided that these proposals should be taken up as regional strengthening scheme for Southern Region. Member(PS) stated that there could be difficulty in finding suitable space for substation at Chulliar and obtaining RoW for the transmission line work. He, therefore, asked KSEB to help POWERGRID in land acquisition process and for obtaining necessary RoW. Member, KSEB agreed to provide necessary help to POWERGRID in this matter.

19.2 Proposal for Madakathara - Areakode 400kV D/C line as regional project:

Member(PS) said that KSEB have also sent proposal for Madakathara - Areakode 400kV D/C as regional scheme in Southern Region. He stated that this line does not appear to be justified based on power flow conditions and may be considered while firming up the transmission system for future generation projects like Kayamkulam-II or Kudankulam Extension generation projects provided these could be justified based on system studies.

19.3 Proposal for transmission system to Kerala for evacuation of Kerala share from Nagarjuna Power Corporation (NPCL) project in Karnataka:

CE, KSEB stated that the generation capacity at Nagarjuna PCL was being increased by 600 MW and that they were in the process of entering into a contract with NPCL for purchase of up to 200MW of power from this project. Therefore, KSEB had proposed following transmission schemes as part of evacuation system for Nagarjuna Power Corporation (NPCL generation project in Karnataka) / as system strengthening schemes in Southern Region:

- i) NPCL-Areakode 400kV D/C line.
- ii) LILO of NPCL Areakode D/C line at Mylatty.
- iii) Mylatty 400/220 kV substation.

Member(PS) stated that these schemes could be considered after confirmation of additional generation capacity at NPCL and its beneficiaries.

20.0 Transmission proposals sent by Tamil Nadu Electricity Board

- (i) **Establishment of Sunguvarchatram, Sholinganallur 400kV S/S and associated lines**
- (ii) **Tirunelveli (to evacuate power from wind projects in south of Tamil Nadu) 400/230 kV S/S**
- (iii) **Transmission Systems Associated with Generation projects by TNEB.**

20.1 Member(PS), CEA stated that regarding establishment of Sunguvarchatram, Sholinganallur 400kV S/S and associated lines by TNEB and the transmission systems for evacuation of power from Mettur TPS Stage-III (1x500 MW), North Chennai TPS St.-II(1x500 MW) and Ennore TPS Annex (1x500 MW) of TNEB, as deliberated earlier while discussing ATS for Vallur TPS, it was necessary to revisit the already evolved transmission system. For this, TNEB would coordinate with CEA and POWERGRID in carrying out further studies, and the results would be discussed in next meeting of the Standing Committee.

20.2 For evacuation of power from TNEB's Tuticorin TPS Stage-IV(2x500 MW) the transmission system as identified through joint study by CEA and TNEB i.e. Tuticorin TPS-Karaikudi 400kV D/C Quad line and Tuticorin-Kayathar 400kV D/C Quad line was considered to be in order. POWERGRID representative stated that TNEB with the commissioning of new generation projects would be surplus in power and would be utilizing ISTS to transfer the surplus to other constituents within and across the Southern region, therefore, TNEB should seek long term open access for utilization of ISTS for new generation projects planned for development under State sector. TNEB representatives agreed to look into the matter.

- 20.3 Regarding the establishment of Tirunelveli 400/230 kV substation to evacuate wind projects in the south of Tamil Nadu, GM, POWERGRID informed that there was only one bay space available at Tirunelveli (POWERGRID) and therefore, TNEB should either construct a single circuit interconnection between Tirunelveli (TNEB) and Tirunelveli (POWERGRID) or alternatively, consider bunching of both the circuits of the planned D/C line. TNEB agreed to look into the options and inform the same to Standing Committee accordingly.
- 20.4 POWERGRID representative also stated that in regard to evacuation of power from the wind power projects in Tamil Nadu, TNEB should apply for long term open access for utilization of ISTS complying with the decision of CERC in this regard. TNEB agreed to comply with the directions of CERC.

21.0 Transformation Capacity Additions in Southern Region

- 21.1 Member(PS), CEA stated that in the previous meeting some new transformation capacity additions required in view of share from Simhadri-II TPS and North Chennai JV(Vallur) TPS were discussed and the State representatives had suggested Pendurthi in Andhra Pradesh, Bidadi and Yelahanka in Karnataka, and Singarapet and Karmadai in Tamil Nadu. The Bidadi (400/220kV S/S, 7x167 MW with LILO of one circuit of Nelamangla – Somanahalli 400kV D/C line at Bidadi) and Yelahanka in Karnataka, were confirmed and agreed as regional system strengthening schemes. Subsequently, TNEB have proposed augmentation of transformer capacity at Arasur and Madurai S/Ss, however, new 400kV S/Ss or transformer capacity augmentations in Andhra Pradesh and Kerala were yet to be confirmed by these States. Capacity of Yelahanka S/S and associated transmission lines are also to be firmed up. He asked the participants to confirm their proposals so that the same could be taken up for discussion.
- 21.2 In regard to Bidadi substation, POWERGRID representative indicated that land acquisition for the Bidadi substation in the urban area of Bangalore is proving to be difficult due high growth density. In this regard, POWERGRID suggested for adoption of GIS option for Bidadi substation in view of land scarcity. POWERGRID further explained that for the substation located in urban areas, the high cost of land off-sets high cost of GIS equipment to a large extent and the overall cost of GIS proves to be economical from land usage considerations. Member(PS), CEA suggested that option of establishing GIS substation on the lines of Maharaniabagh and Gurgaon shall required to adopted for all the metro cities where land acquisition is difficult. It was decided that KPTCL shall assist POWERGRID for identifying land for Bidadi substation and based on the feedback from POWERGRID/KPTCL decision regarding adoption of GIS shall be taken in next meeting of standing committee proposed to be held shortly.
- 21.3As regards the Yelahanka substation, POWERGRID informed the Committee that land identified by KPTCL was very near to a defense establishment near Jakkur and also close to the International airport at Bangalore. KPTCL has intimated that they had already taken up issue of clearances from these establishments for the substation and line and would arrange the same at the earliest to POWERGRID. With regard to connectivity of Yelahanka substation to the grid, as already discussed(refer para 18.4 above) LILO of any one of the Gooty – Bangalore 400 kV lines viz Gooty –

Neelamanla/ or Gooty – Hoody 400kV circuits could be made at Yelahanka. Member (PS), CEA suggested that for realizing a bigger ring main around Bangalore, KPTCL should undertake Yelahanka – Kolar 400 kV D/C line as State work. It was decided that POWERGRID would examine the suitability of the identified plot for accommodating required bays based on its size and shape. Based on the feedback from POWERGRID, decision regarding adequacy of the area for substation construction as well as connectivity of the substation with the grid shall be taken in the next standing Committee meeting.

- 21.4 Member(PS) again asked state representatives to confirm their transformer capacity addition requirements so that it could be taken up for finalization. APTRANSCO, KSEB and TNEB representatives agreed to send their response to CEA at the earliest. Member(PS) reiterated need to carry out an analysis of existing/planned 400kV level transformation capacities in Southern Region alongwith share of all the states from central sector generating stations so that there is an equitable transformer capacity in all the States. He said that after carrying out the necessary analysis, the same would be discussed in next meeting and this would help in determining need for having new substations in various States.

22.0 Sharing of Charges for Transmission System Associated with Krishnapatnam UMPP

- 22.1 Member (PS), CEA stated that transmission system required with Krishnapatnam UMPP was discussed and agreed in the 24th meeting of the Standing Committee. The entire scheme, essentially, envisaged two parts - (i) part of the system meant for evacuation of power from Krishnapatnam UMPP ('associated transmission system'), which would be shared by the all the beneficiaries of the Krishnapatnam project in ratio of their respective shares from the project, and (ii) the system to be built as regional/inter-regional strengthening requirement ('common system'), transmission charges of which are to be shared by regional constituents as regional project. The transmission has since been also discussed at various forums including Standing Committees and Regional Power Committees of SR and WR. He further stated that the present allocation of power from Krishnapatnam UMPP does not include any share allocation to Kerala and Puducherry. However, they may be getting shares in future projects like TN UMPP or some other mega/ultra project. The transmission capacity being added through 'Associated Transmission System' or as 'Common System' scheme would have spare capacities to accommodate transmission requirement from future projects, and to that extent, they shall be user of the part of transmission system created with Krishnapatnam UMPP. He added that, he wanted to flag this concept for further discussion and appreciation by the constituents so as to make use of this concept to speed up finalization of various transmission requirements for future projects. The members agreed to discuss internally with their management and convey their view accordingly.

- 22.2 Member(PS) also asked the members from the state transmission utilities to sign the BPTA for the Krishnapatnam UMPP transmission scheme. The constituents agreed for the same.

23.0 Inter-connection of Kolhapur HVDC station with existing Kolhapur substation of POWERGRID under SR-WR Interconnection project

Member (PS), CEA stated that in the 6th SPRC held on 15-02-2008, the scheme for increasing Inter-regional capacity between SR and WR through Narendra - Kolhapur 400 kV D/C line and 1000 MW HVDC back-to-back at Kolhapur or Narendra, depending on availability of suitable land had been approved. Subsequently, POWERGRID had confirmed that suitable land had been identified near Kolhapur where HVDC station could be established and which could be inter- connected with the Western Region grid through LILO of both the circuits of Kolhapur - Mapusa 400 kV D/C that passes in its vicinity. The committee noted the proposal and all the members agreed the above proposal.

24.0 Fourth Transformer at Ghanapur (Hyderabad) 400/220kV S/S of POWERGRID

ED, SR-I, POWERGRID informed that the existing three 400/220 kV, 315 MVA transformers at Hyderabad (Ghanapur) substation of POWERGRID were frequently getting loaded to their rating leaving no margin for contingency. He further informed that these transformers were quite old and such high loading can lead to their accelerated aging. Therefore, he proposed that additional 315 MVA transformer should be provided at the Ghanapur substation to meet demand requirement of Hyderabad area. Member (PS), CEA stated that with the commissioning of 3rd 315 MVA transformer at Mamidipalli, APTRANSCO should realign some of the loads fed from Ghanapur to Mamidipalli substation. He further said that with two more 400/220kV stations under construction at Yeddumailaram and Malkaram by APTRANSCO, there might not be any need of putting another transformer at Ghanapur. He said that APTRANSCO should carry out studies to realign/strengthen their 220kV network in Hyderabad area so that all the transformers are equally loaded with sufficient reliability margins. Based on the study results decision regarding augmentation of transformation capacity would be taken in the next meeting of standing committee. He asked APTRANSCO representatives to coordinate with CEA for carrying out these studies. APTRANSCO agreed to do the same.

25.0 Meeting ended with vote of thanks to the chair.

**Agenda Note for 25th Meeting of
Standing Committee on Power System Planning in Southern Region**

1.0 Confirmation of the minutes of 24th meeting of the Standing Committee

The minutes of the 24th meeting held on June 18, 2007 at Bangalore, was circulated vide our letter No.51/4/SP&PA/2007/625-635 dated 17-07-2007.

KSEB, vide their letter No. CP/LFS/SRPC/SC-Corrections/2007-08/70 dated 04.08.2007 had sought amendment to para 15.2 of the minutes regarding termination of Tirunelveli – Edamon 400kV D/C line. The matter was also raised by KSEB in the 5th meeting of SRPC, wherein Member (PS) had clarified the issue and had said that minutes were in line with the decision arrived at in the 24th meeting.

Minutes as circulated may be confirmed.

2.0 Review of Progress on Earlier Agreed Transmission Schemes

2.1 Status of under construction / approved schemes

The under construction schemes along with their revised targets of completion, as submitted by PGCIL in the 24th meeting of Standing Committee is as given below:

Sl. No.	Name of Scheme	Revised Target
1.	System Strengthening Scheme in Southern Region – V	June 2007
2.	System Strengthening scheme in Southern Region- VI	Dec. 2007
3.	Neyveli TS-II Expansion Transmission System	Feb. 2009
4.	Kaiga U 3&4 Transmission System	Sept. 2007/ Dec. 2007
5.	Kudankulam Transmission System	Dec. 2008
6.	System Strengthening scheme in Southern Region- VII	Dec. 2008

POWERGRID may update the progress of under construction schemes.

2.2 Advancement of Warangal 400 kV S/S

In the 24th meeting of Standing Committee APTRANSCO had requested POWERGRID to advance the completion of Warrangal 400kV S/S to meet their requirement. POWERGRID was agreeable to the proposal provided APTRANSCO was willing to pay transmission charges for the period of advancement. Response of APTRANSCO awaited on the issue.

2.3 Kalpakkam PFBR 500 MWe ATS

ATS for the Kalpakkam PFBR was agreed in the 21st meeting of the Standing Committee. For implementation of this system, POWERGRID has requested BHAVINI to communicate the commissioning schedule of the generation project. BHAVINI / NPCIL may intimate the commissioning schedule of the generation project along with progress details.

2.4 Augmentation of Talcher II Transmission scheme

The scheme agreed in the SRPC includes the following works:-

- (i) Talcher II – Rourkela 400kV Quad D/C
- (ii) Talcher II – Berhampur – Gazuwaka 400kV D/C with switching station at Berhampur

The Empowered Committee (constituted for identifying transmission projects for execution through tariff based competitive bidding), has identified this scheme to be executed through tariff based competitive bidding and for steering the process, Government of India has entrusted this project to the SPV of REC. The SPV is preparing to issue the RfQ for this scheme shortly.

2.5 Requirement of Reactors to contain over voltages in the Southern Region

The scheme of provision of reactors to contain over voltages in Southern Region was deliberated in the 22nd, 23rd and 24th meeting and was approved by SRPC in the 5th meeting held on 25.08.2007. The finalized scheme is as follows:

- POWERGRID - 11 nos. of reactor (7 bus reactors + 4 line reactors)
- NTPC – 2 nos. of bus reactors
- NPCIL – 1 no. of bus reactor
- NLC – 2 nos. of bus reactors
- APTRANSCO - 4 nos. of reactor (3 bus reactors + 1 line reactors)
- KPTCL – 5 nos. of bus reactors.

For the scheme to be effective it is required that all the identified reactors may be commissioned in same time frame. Progress made on installation of these reactors may be given by respective utilities.

2.6 Shifting of 3rd 400/220 kV, 315 MVA Transformer

PGCIL has informed that that they were yet to receive report on technical compatibility from KSEB and also the time schedule for the return of the transformer. The issue was also discussed in the 6th SRPC meeting, wherein, Chairman KSEB had confirmed that the loaned asset would be returned by KSEB by September 2009 as mutually agreed between PGCIL and KSEB. KSEB/PGCIL may intimate the progress on the technical compatibility the transformers and progress on implementation.

2.7 Termination of Tirunelveli –Edamon 400kV circuit under Kudankulam evacuation system at Edamon

The issue of termination of Tirunelveli – Edamon 400kV D/C line (to be initially operated at 220kV) was discussed in the previous meeting and subsequently in the 6th SRPC meeting held on Feb 15, 2008, in which it was agreed that both the feeders would be terminated at the Edamon bus with an arrangement to connect one feeder to one circuit of Edamon-Pothencode 220kV line by bypassing the Edamon S/S.

PGCIL/KSEB may inform about progress of the scheme.

2.8 Transmission System for Evacuation of Power from Nagarjuna TPS (1015 MW) in Karnataka, of M/s Nagarjuna Power Corporation Ltd

The transmission system for evacuation of power from this project in the context of the LTOA application was discussed in the 24th standing committee meeting. According to the minutes of these discussions, circulated by POWERGRID, the evacuation scheme is as follows:
Transmission system for Nagarjuna TPS to be taken as dedicated transmission system for NPCL to be owned, operated and maintained by M/s NPCL:

- a) NPCL switchyard – Hassan 400 kV D/C line
- b) Provision of 1X315 MVA, 400/220 kV transformer at NPCL switchyard
- c) 220 kV D/C transmission line from NPCL switchyard to local substation

The following transmission system to be taken up as regional strengthening scheme:

- (i) Hassan – Mysore 400 kV D/C line.

KPTCL and POWERGRID may inform about progress of these schemes.

3.0 Transmission System for Vallur TPS (formerly as North Chennai JV TPS) (2x500 MW)

The transmission system for Vallur TPS (1000 MW) JV of NTPC and TNEB was evolved in the 22nd Standing Committee meeting. The evacuation system was revised in the 23rd and 24th Standing Committee meeting and was approved by SRPC in the 5th meeting held on 25.08.2007 at Trivandrum. The following evacuation system was agreed:

- i) LILO of Alamathy-Sriperumbudur 400 kV D/C line at Chennai JV TPS.

NTECL (NTPC Tamilnadu Energy Company Ltd.) vide their letter dated 27-11-2007 had informed that the capacity of the project has now been enhanced from 2X500 MW to 3X500 MW with the following allocations – Tamil Nadu (1125 MW), Karnataka (187.5 MW), Kerala (112.5 MW), Puducherry (75 MW). The allocation, however, is yet to be confirmed by Ministry of Power/GOI.

For evolving the revised ATS for the generation project NTPC/TNEB/JV may intimate the time schedule of the project commissioning and the allocation confirmed by Ministry of Power, GOI. Southern Region states may send their requirements for transformation capacities/ substations. Members may discuss.

4.0 Transmission System for Tuticorin TPS (2x500 MW)

Following transmission system for Tuticorin TPS (1000 MW) of JV of NLC and TNEB was agreed in the 23rd meeting:

- i) Tuticorin JV TPS –Madurai 400 kV D/C Quad.
- ii) 2x315 MVA 400/220kV ICT at Tuticorin TPS JV.
- iii) LILO of 2 nos. of 220 kV circuits at Tuticorin TPS JV.

POWERGRID/ NLC/TNEB/JV may intimate the progress of the above transmission scheme.

Allocation of 25% of power from the generation project to beneficiaries other than TNEB is yet to be firmed up. NLC/TNEB/JV may intimate the allocation confirmed by Ministry of Power, GOI so that supplementary transmission scheme corresponding this allocation could be evolved.

5.0 Approval of modifications in the originally approved evacuation scheme of RGCCPP sought by KSEB.

CEA had given approval for LILO of one circuit of Kayamkulam-Pallom 220 kV D/C line and LILO of one circuit of Kayamkulam-Edamon 220 kV D/C line at Edappon 220 kV S/S and Kundara 220 kV S/S respectively.

Subsequently KSEB in consultation with PGCIL had decided to connect Edappon 220 kV S/S also by LILO of other circuit of Kayamkulam-Edamon 220 kV D/C line instead of Kayamkulam-Pallom 220 kV D/C line. KSEB seeks the approval of the committee.

Members may discuss and concur.

6.0 Transmission system for evacuation of power from Kothagudam TPS (1X500 MW) in Andhra Pradesh

APTRANSCO have informed that APGENCO's Kothagudam TPS Stage-IV (1x500 MW) is programmed for commissioning by December 2009. For evacuation of power from this project, they have proposed following transmission system:

- (i) KTPS Stage-IV - Khammam, 400 kV D/C line, 105 km
- (ii) 1X315 MVA, 400/220 kV ICT at KTPS.

For above transmission requirements, APTRANSCO has requested for allocation of 2 nos. of 400 kV bays at the Khammam 400/220 kV S/S of POWERGRID for the 400 kV D/C line from KTPS.

Studies conducted by CEA indicate that the 220kV lines emanating from existing Kothagudam generation get over loaded, especially the Kothagudam-Khammam 220kV D/C line carrying load flow of 440 MW. The loading further increases under outage of one circuit of the KTPS-Khammam 400kV D/C line. APTRANSCO would need to strengthen the 220kV network in this area.

Members may discuss and concur.

7.0 Proposals sent by Karnataka for placing it before the Standing Committee.

Chief Engineer (Planning & Cord.), KPTCL has sent following six proposals for discussion in the Standing Committee:

7.1 Establishment of Basvana Bagewadi 400/220 kV S/S with inter-link line to Maharashtra : KPTCL

has informed that M/s PTC Ltd and M/s Jewargi Power Private Limited (JPPL) were intending to set up generation plants of 1000 MW and 1320 MW capacity in Bidar and Gulbarga districts, respectively. They have also said that about 1500 MW out of these new capacity additions would flow to Maharashtra. For transmission of power, they have proposed a new 400/220kV S/S at Basvana Bagewadi and 400kV ISTS interlink line to Sholapur in Maharashtra.

In this regard, CEA has suggested to KPTCL that - for tying up the transmission system requirements for evacuation of power from these projects, the generation companies would need to apply seeking long term open access (LTOA). For the power to be absorbed in Karnataka, they would need to apply for LTOA to the State Transmission Utility of Karnataka i.e. KPTCL and for the 1500 MW of power which they intend to sell to Maharashtra, they should apply to the Central Transmission Utility i.e. PGCIL. Based on their application(s) for LTOA, transmission addition requirements in Karnataka state grid, regional grids of Southern and Western regions and requirements for enhancing transmission capacity of SR-WR inter-regional links would be assessed, and would be considered by the Standing Committees of Southern and Western regions for firming up the transmission schemes. KPTCL was

also requested to furnish data for studies and examination of their proposal. Response from KPTCL regarding LTOA application status or system data is awaited.

- 7.2 Establishment of 400kV D/C line from Shanthigram(Hassan) to Basthipura(Mysore) as regional strengthening scheme:** KPTCL have proposed Hassan –Mysore 400kV D/C line. It may be noted that a Hassan-Mysore 400kV D/C line has already been agreed as regional transmission system in the 24th meeting of this committee held in June 18, 2007 and also agreed by all the constituents as a regional strengthening scheme in the 6th meeting of SRPC. The scheme is already being tied up. As such, the purpose of KPTCL's proposal at this stage is not clear.
- 7.3 Construction of two number of 400kV D/C lines from Raichur TPS to Yelahanka, and HVDC link from vicinity of Raichur TPS to Bangalore:** KPTCL have informed that KPCL is establishing two generating stations at Edlapur and Yaramaras near Raichur TPS. To evacuate power from these generating stations of KPCL and the private sector projects in Bidar and Gulbarga districts, they have proposed that Raichur-Yelahanka 400kV 2xD/C (with quad conductor) lines be established. KPTCL has also proposed an HVDC link from vicinity of Raichur TPS to Bangalore.

These transmission addition proposals are basically for the requirement of Karnataka's State grid development. KPTCL may present their studies/proposals. As this network would have major implications for parallel regional network, KPTCL should formulate their proposal based on detailed system studies coordinating the regional grid. Prima-facie, establishment of HVDC line of such short length would generally not be economically viable. KPTCL may submit the techno-economic viability of the proposal.

- 7.4 Establishing a HVDC link from Northern Grid to Southern Grid:** KPTCL have expressed that peak power requirements of Northern and Southern grids are occurring in different seasons, therefore, an HVDC link between Northern and Southern grids may be examined.

The proposal of KPTCL sent to CEA is not based on supporting study. Exchange between SR and NR can take place through displacement via ER/WR and as such, prima-facie the proposal of KPTCL seems redundant.

- 7.5 Establishing a 400kV S/S near Parappana Agrahara in Bangalore South taluk:** KPTCL have informed that they have carried out load flow studies for Bangalore outer ring and proposed a 400kV S/S near Parappana Agrahara in Bangalore South taluk for reliable power supply to load pockets and to ensure loss reduction and grid stability. KPTCL have suggested 600-800 MW load for a 400kV S/S. It may be noted that, a 400kV S/S for cities like Bangalore where demand density is quite high, is normally for supply of 900-1100 MW per 400kV S/S. Already six numbers of 400kV S/Ss in/around Bangalore are existing/planned (existing are - Nelamangla, Hoody, Somanahalli and Kolar, and planned are – Bidar and Yelahanka) , which include two of KPTCL and rest four as regional S/Ss. As such, the proposal of KPTCL seems an over provision.

8.0 Evacuation of Power from Kaiga complex

NPCIL had informed that an additional generation of 2X700 MWe is expected to be operational by 2015-16. To evacuate the power from Kaiga complex (Kaiga 1 to 6 i.e, 2280 MWe) PGCIL had expressed that laying of new transmission lines and reconductoring of the existing 400kV lines with higher capacity conductors would be difficult, in view of difficulty because of problem in obtaining forest clearance and due to backing down of generation at Kaiga complex during construction period. NPCIL have now suggested use of FACTS technology (TCSC and FSC) for upgradation of capacity of existing 400 kV lines emanating from Kaiga i.e., provision of 50% series compensation on Kaiga-Narendra and Kaiga-Davanagere 400 kV D/C lines.

This proposal would require detailed system studies evaluating effectiveness of FACTS devices and their impact on the grid and the Atomic power generators as well as detailed examination of procedures for dismantling/Reconductoring (if needed) and backing down of Kaiga generation during construction work, timing of construction, alternate arrangements to meet system demand etc. It is also important to confirm real schedule of commissioning of the 2x700 MW units. A committee with participation from CEA, SRPC, CTU, NPCIL, SRLDC and KPTCL may be constituted to look into these aspects. The members may discuss.

9.0 Transmission System for Evacuation of Power from Simhadri-II TPS (2x500 MW) of NTPC

Simhadri Stage-II TPS (1000 MW) of NTPC is targeted for 2010-11. The tentative allocation of power from this project, as informed by NTPC is – Andhra Pradesh (398 MW), Karnataka (175 MW), Kerala (77 MW), Tamilnadu (190 MW), Pondicherry (10 MW) and Unallocated (150 MW).

In the 24th standing committee meeting the evacuation system was discussed and in view of Vizag TPS 2x525 MW generation of AP getting rescheduled and not yet firmed up, it was decided that a part of the transmission capacity of Vizag – Vemagiri 400kV D/C line of APTRANSCO would be utilized for power evacuation from Simhadri-II, which, APTRANSCO had built keeping in view 2x525 MW Vizag TPS. It was also decided that when Vizag TPS generation is firmed up or any new generation comes up in that area, APTRANSCO line could be spared and, another line could be taken up as a regional system strengthening scheme. And, till such time NTPC should apply for open access from APTRANSCO. APTRANSCO vide their letter dated 15th and 21st February, 2008 have given 'in principle' agreement for utilization of existing network built by APTRANSCO for evacuation of power from Simhadri Stage-II subject to the payment of transmission charges and SLDC charges by NTPC or beneficiaries as determined by AP State Electricity Regulatory Commission from time to time. It is suggested that NTPC should now take up necessary action for obtaining Open Access of the APTRANSCO lines.

10.0 Transformation Capacity Additions in Southern Region

In the previous meeting some new transformation capacity additions required in view of share from Simhadri-II TPS and North Chennai JV TPS were also discussed. The State representatives had suggested Pendurthi in Andhra Pradesh, Bidadi and Yelahanka in Karnataka, and Singarapet and Karmadai in Tamil Nadu. Bidadi (400/220kV S/S, 7x167 MW with LILO of one circuit of Nelamangla – Somanahalli 400kV D/C line at Bidadi) and Yelahanka were been confirmed and agreed as regional system strengthening schemes. Subsequently, TNEB has proposed augmentation of transformer capacity at Arasur and Madurai S/Ss, which is to be considered by the Standing Committee. Similar strengthening schemes with new 400kV S/Ss or transformer capacity augmentations in AP and Kerala were yet to be confirmed by these states. Capacity of Yelahanka S/S and associated transmission lines are also to be firmed up.

Members may confirm the proposals and the same may be discussed.

11.0 Proposals of Tamil Nadu for placing it before the Standing Committee.

- (i) Establishment of Sunguvarchatram, Sholinganallur 400kV S/S and associate lines**
- (ii) Tirunelveli (to evacuate power from wind projects in south of Tamil Nadu) 400/230 kV S/S**
- (iii) Transmission Systems Associated with Generation projects by TNEB.**

11.1 The transmission proposals of TNEB for establishment of their Sunguvarchatram and Sholinganallur 400kV S/S with associate lines and the transmission requirements to evacuate power from wind projects in south of Tamil Nadu with establishment of a 400/230kV S/S near Tirunelveli (PGCIL) S/S and associated 400kV lines were discussed in the 23rd Standing Committee. Pugalur – Sunguvarchatram / Melakottaiyur(PG) 400kV D/C Quad line was agreed to be established by opening the Sunguvarchatram – Melakottaiyur link thus making connection between Pugalur – Sunguvarchatram and Pugalur - Melakottaiyur. In the 24th Standing Committee meeting while deliberating on the issue it was observed that, as the Sunguvarchatram – Melakottaiyur link was with Twin conductors and the line coming from Pugalur was with quad conductors, therefore, the above line might not have desired transmission capacity. CEA suggested that the 400kV D/C Quad line from Pugalur might be terminated at an intermediate 400kV S/S at Singarapet, from where connections might be established up to Sunguvarchatram / Melakottaiyur. In the meeting TNEB informed that there might be right-of-way problem in linking Sholinganallur 400kV S/S of TNEB with Melakottaiyur 400kV S/S of PGCIL. Therefore it was decided to review the arrangements in a joint study at CEA with TNEB. Studies were carried out at CEA, New Delhi in July 2007 jointly with TNEB. The studies also included transmission system requirements for additional wind power projects near Kayathar and evacuation of power from TNEB's Tuticorin TPS Stage-IV(2x500 MW), Mettur TPS Stage-III (1x500 MW), North Chennai Stage-II (1x500 MW) and Ennore TPS Annex (500 MW).

Results of the studies are given at Appendix-I.

11.2 Works to be implemented by POWERGRID as Southern Region System Strengthening schemes in Tamil Nadu :

In addition to the transmission schemes of TNEB as given the above study report, following transmission system have also been proposed as Regional System Strengthening schemes:

1. Establishment of 400/230 kV SS at Singarapet with 2 x 315 MVA ICT
2. Hosur - Singarapet 400 kV D/C line
3. LILO of the both the Pugalur – Sholiganallur (Ottiampakkam) DC Quad line at Singarapet 400 kV SS with Quad conductor
4. Augmentation of ICT capacity in the regional 400 kV S/S (s). TNEB has proposed augmentation at Madurai, Arasur. Decision in this regard may be taken in the next meeting of the Standing Committee on Power System Planning in SR.

11.2 POWERGRID has expressed that the Kanarpapatty (Tamil Nadu Wind) – Tirunelveli (PGCIL) line may be made as S/C instead of D/C as only one spare bay would be available their due to large number of line terminations at Tirunelveli.

11.3 Members may discuss.

12.0 Transmission system for Evacuation of Power from Wind Power Projects (WPP) and Requirements of Grid connectivity of WPP

Wind power projects are being set up at a much faster rate now, especially in Southern and Western Regions. CEA's Manual on Transmission Planning Criteria that was brought out in 1994 does not deal very effectively the requirements of transmission system for evacuation and grid connectivity of WPPs and thus need to be updated to include various requirements specific to absorption of green power from the WPPs in the grid. The special characteristics of wind power generation are –

- (i) Low PLF,
- (ii) Random nature of generation,
- (iii) Generation not generally available with peak load requirement.

Accordingly, the evacuation system requirement for wind power generation needs to be reviewed with respect to the requirement of thermal/nuclear power generation, which are generally base load stations.

One of these is requirement of reliability of inter-connecting transformers (ICT) between the WPPs and evacuation level voltage for connecting to State Grid. Considering special nature of generation of WPPs, it would be appropriate to consider the group of WPPs connecting to Grid as a consolidated unit and the ICT at the connecting substation of State Grid be treated similar to a Generator Transformer (GT) for the purpose of assessing reliability requirements. Also, the transmission planning criteria of N-1 may not be necessarily applied for the transmission system requirements/deign within the network connecting the group of WPPs i.e. before interface with the state grid.

Members may discuss. Members may also discuss various other transmission assessment requirements specific to absorption of green power from the WPPs in the grid.

25th Meeting of the SCPSP SR - Supplementary Agenda

A. Transmission System for Strengthening the Regional Grid for increasing transmission capacity for supply of additional inter-state power to Kerala

A.1 KSEB have sent following transmission proposals to be taken up as regional schemes in Southern Region:

Proposal # 1:

- i) LILO of Udumalpet-Madakathara 400kV D/C line at Chulliar (Palakkad)
- ii) Chulliar (Palakkad) 400/220kV substation, 2x315MVA transformer

KSEB have proposed that theses transmission works may be taken up as evacuation scheme of Neyveli-II Expansion project. KSEB have also informed that the load at Thiruvantapuram can be met by the 2x315MVA transformers at Thiruvantapuram and therefore, the 3rd transformer at Thiruvantapuram, which is being temporarily shifted to Madakathara on loan basis, could be finally installed at Chulliar (Palakkad). With this new 400kV substation at Chulliar, the loading at the transformers at Madakathara would get reduced.

Proposal # 2:

- i) Madakathara - Areakode 400kV D/C line

KSEB have proposed that this transmission system may be taken up as System Strengthening Scheme in Southern Region.

A.2 **Proposal#1:**The above proposals have been examined and its felt that the transmission system of Neyveli-II Expansion has already been firmed up and is under implementation stage and therefore, the Proposal#1 would not be feasible to be included in the ATS for Neyveli-II Expansion as on today. However, for supply of additional inter-state power to Kerala from Simhadri-II and Vallur TPS and as requirement of system strengthening of Southern Region grid, the transmission system at Proposal#1 above may be taken up System Strengthening Scheme in Southern Region with 2x315 MVA transformers at Chulliar as regional project. Members may discuss and concur.

A.3 **Proposal#2:**The requirement of Madakathara - Areakode 400kV D/C line does not appear to be justified based on power flow conditions and may be taken up while firming up the transmission system for Kayamkulam-II generation project. Members may discuss.

B. Power evacuation from Nagarjuna Power Corporation -NPCL - Areakode 400kV DC line, and 400/220kV substation at Mylatty

B.1 KSEB has stated that the generation capacity at Nagarjuna PCL is being increased by 600 MW and that they are in the process of entering into a contract with NPCL for purchase of up to 200MW of power from this project. KSEB has proposed following transmission schemes as part of evacuation system for Nagarjuna Power Corporation (NPCL generation project in Karnataka) / as system strengthening schemes in Southern Region:

- i) NPCL-Areakode 400kV D/C line.
ii) LILO of NPCL Areakode D/C line at Mylatty.
iii) Mylatty 400/220 kV substation.

B.2 The above proposal have been examined and it is felt that these schemes may be considered after confirmation of additional generation capacity at NPCL and its beneficiaries. Members may discuss.

Appendix-I

Report on System Studies for evolving Transmission Schemes in Tamil Nadu

System studies were carried out in CEA during July 09, 2007 to July 13, 2007 jointly by CEA and TNEB for evolving transmission systems for following transmission schemes:

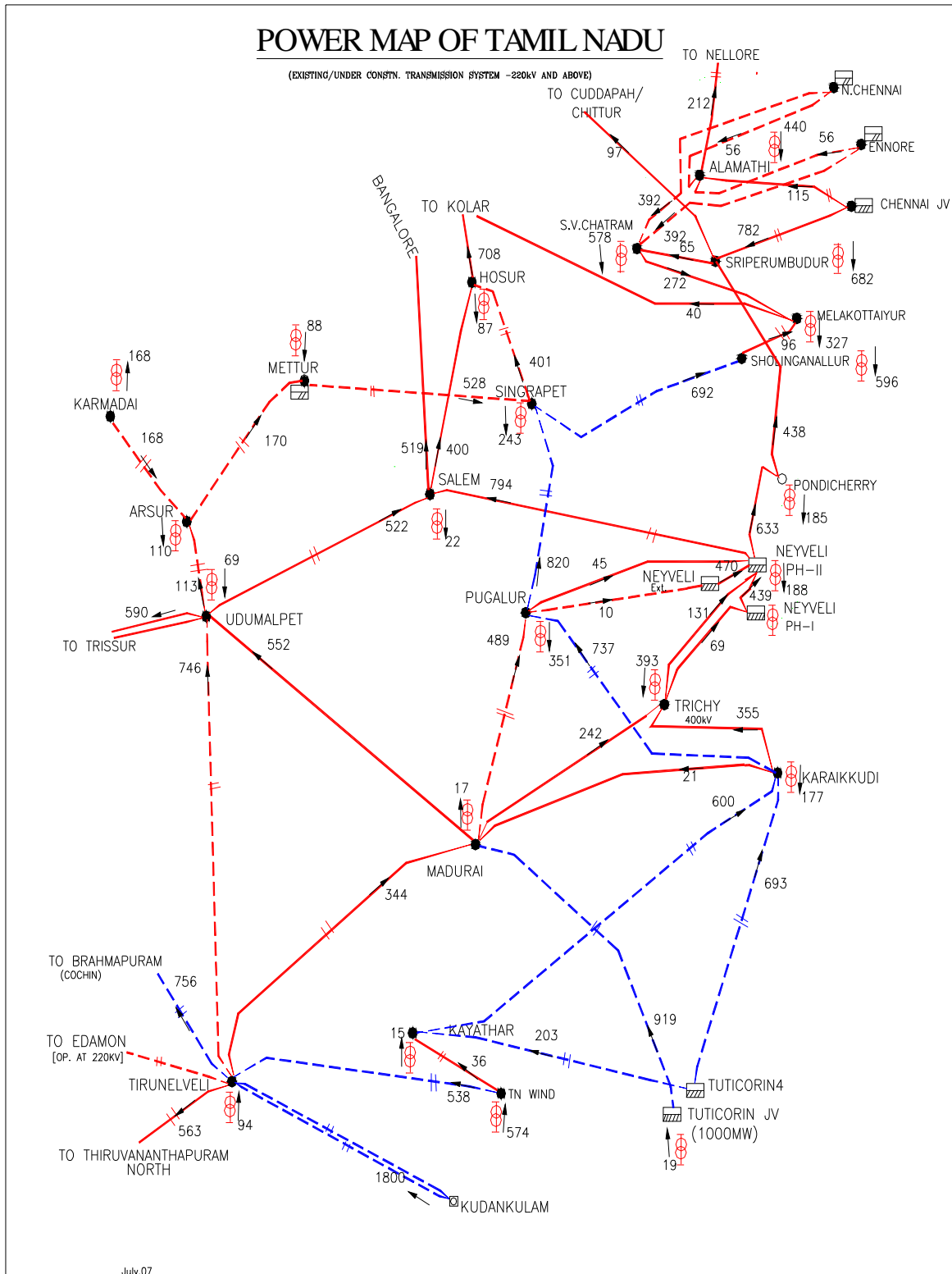
- I) Transmission System for evacuation of power from Wind projects in Tirunelveli/Kayathar area in TN.
II) Transmission System for evacuation of power from Tuticorin TPS Stage-IV (2x500 MW) of TNEB.
III) Transmission System for evacuation of Power from Mettur TPS Stage-III (1x500 MW) of TNEB.
IV) Transmission System for evacuation of Power from North Chennai TPS St.-II(1x500 MW) of TNEB.
V) Transmission System for evacuation of Power from Ennore TPS Annex (1x500 MW) of TNEB

Based on the studies, following transmission systems were emerged:

(I) Transmission System for evacuation of power from wind projects in Tirunelveli/Kayathar area in Tamil Nadu: (Refer Exhibit-I)

1. Kanarappty (TN Wind) - Kayathar 400 KV, 400 kV D/C Twin Moose line.
2. Kayathar - Karaikudi , 400 kV D/C Quad line
3. Karaikudi - Pugalur 400 kV D/C Quad line
4. Establishment of 400/230-110 kV S/S with 2x315 MVA 400/230 kV ICT, and 2x200 MVA 400/110 kV ICT at Kayathar and associate 230 KV and 110 KV link lines.
5. Pugalur – Sholinganallur (Ottiampakkam), 400 kV D/C Quad line. (instead of connecting one of the D/C Quad circuit of Pugalur to SVChattram and another circuit of Pugalur to Melakottaiyur, as envisaged earlier. With this, the LILO of the S.P.Pudur – Melakottaiyur 400 kV S/C line at SVChattram 400 kV S/S (TNEB) would be retained)

- (II) **Transmission System for evacuation of power from Tuticorin TPS Stage-IV (2x500MW) :** (Refer Exhibit-I)
1. Tuticorin TPS - Karaikudi 400 kV D/C Quad line
 2. Tuticorin TPS - Kayathar 400 kV D/C Quad line .
- (III) **Transmission System for evacuation of power from Mettur TPS Stage-III (1x500MW):** (Refer Exhibit-I)
1. Mettur TPS - Arasur 400 kV D/C line
 2. Mettur TPS - Singarapet 400 kV D/C line
 3. Establishment of 400/230 kV S/S with 2x315 MVA ICT at Mettur TPS S/S and associate 230 kV link lines.
- (IV) **Transmission System for evacuation of power from North Chennai TPS St.-II (1x500 MW):** (Refer Exhibit-I)
1. LILO of the one circuit of the Alamathy – SVChattram 400 kV D/C line (already proposed) at North Chennai TPS project.
- (V) **Transmission System for evacuation of power from Ennore TPS Annex (1x500 MW):** (Refer Exhibit-I)
1. LILO of the second circuit of the Alamathy – SVChattram 400 kV D/C line (already proposed) at Ennore TPS Annex project.
- ⇒ The LILO of Alamathy – SVChattram 400 kV D/C line for North Chennai TPS and Ennore TPS Annex projects, would be carried out by selecting a suitable site for a 400kV S/S at the LILO point. The new substation would be taken-up soon in the next phase.
- (VI) **Works to be implemented by POWERGRID as Southern Region System Strengthening schemes in Tamil Nadu :** (Refer Exhibit-I)
- In addition to the above transmission schemes of TNEB, the following transmission system have also been proposed as Regional System Strengthening schemes:
1. Establishment of 400/230 kV SS at Singarapet with 2 x 315 MVA ICT
 2. Hosur - Singarapet 400 kV D/C line
 3. LILO of the both the Pugalur – Sholiganallur (Ottiampakkam) DC Quad line at Singarapet 400 kV SS with Quad conductor
 4. Augmentation of ICT capacity in the regional 400 kV S/S (s). TNEB has proposed augmentation at Madurai, Arasur. Decision in this regard may be taken in the next meeting of the Standing Committee on Power System Planning in SR.



List of participants during the 25th meeting of Standing Committee on Power System Planning held on 28th March, 2008 at Hyderabad

<u>Sl. No.</u>	<u>Name and Organization</u>	<u>Designation</u>
<u>Central Electricity Authority (CEA)</u>		
1.	V. Ramakrishna	Member (PS)
2.	Pardeep Jindal	Deputy Director (SP&PA)
<u>Southern Region Power Committee (SRPC)</u>		
3.	K. Srinivasa Rao	Member Secretary
4.	Asit Singh	Ex. Engineer
<u>Power Grid Corporation of India Ltd (POWERGRID)</u>		
5.	Anand Mohan	ED (SRTS-I)
6.	Y.K. Sehgal	GM (Engg.)
7.	M.R.V. Holla	AGM (SR-II)
8.	Kanikram	AGM (O&M) SR-I
9.	Dilip Rozekar	CDE (Engg.)
10.	A. Nagaraju	CM (Coml.)STRS-II
<u>National Thermal Power Corp. (NTPC)</u>		
11.	A.K. Gupta	AGM/HoD (Elect.)
12.	A.K. Juneja	DGM (Comml.)
13.	S. Gouri Shankar	DGM (Elect) NTPC, Simhadri
<u>Nuclear Power Corp of India Ltd (NPCIL)</u>		
14.	M.L. Jadhav	CE(Trans.)
<u>Neyveli Lignite Corp. (NLC)</u>		
15.	S. Raja Gopal	CGM
16.	S. Muthu	DGM(PSE)
<u>Southern Region Load Dispatch Center(SRLDC)</u>		
17.	V.K. Agrawal	GM
18.	S.P. Kumar	CM
<u>Transmission Corp. of Andhra Pradesh Ltd. (APTRANSCO)</u>		
19.	S. Viswanathan	CE/Power System
20.	M. Balasubramanyam	DE/System Studies
<u>Karnataka Power Transmission Corp. Ltd. (KPTCL)</u>		
21.	Pratap Kumar S	Director(Transmission)
22.	S. Babu	CEE(P&C)
23.	Srinivasa TV	AEE (E) PSS

<u>Sl. No.</u>	<u>Name and Organization</u>	<u>Designation</u>
<u>Kerala State Electricity Board (KSEB)</u>		
24.	K. Asokan	Member (Trans)
25.	K. Ramachandran Nair	Chief Engineer
26.	S.R. Anand	Ex. Engineer
<u>Tamil Nadu Electricity Board (TNEB)</u>		
27.	K. Balasubramanian	Chief Engineer/Plg.
28.	S. Balaguru	EE/System Studies
29.	S. Sowmyanarayanan	Consultant
<u>Puducherry Electricity Dept. (PED)</u>		
30.	G. Venkatesar	EE/SCC

Annex-III

Status of Southern Region New Schemes of POWERGRID

Sl. No	Name of Scheme & Elements	Standing Committee Approval	FR Date	Investment approval by POWERGRID Board/CCEA	Target as of now	Comments/Reasons of delay
1.	System Strengthening – V a) Augmentation of transformation capacity at Cuddapah, Gooty, Khammam, Gazuwaka, Munirabad and Kolar and 1x80 MVAR bus reactor at Nellore	17 th Meeting on 15.09.03	Jan, 04	POWERGRID Board Approval – June, 2004	Comm issione d	
2.	System Strengthening – VI a) LILO of both circuits of Gazuwaka – Vijayawada 400 kV D/c line at Vemagiri 400/220 kV substation of APTRANSCO b) 2nd 1x315 MVA 400/220 kV transformer at Vijayawada	19 th Meeting on 14.06.04	Aug, 04	POWERGRID Board Approval – March, 05	Mar/ April 2008	<ul style="list-style-type: none"> - Vemagiri (AP) bays are not ready for LILO arrangement - Vijayawada trf. was shifted to Hyderabad due to failure and later replenished transformer supplied
3.	Neyveli TS-II Expn Tr. System a) Neyveli TS-II Expansion – Neyveli TS-II 400 kV 2xS/c b) Neyveli TS-I I- Pugalur 400kV D/C c) Pugalur–Madurai 400 kV D/C d) Udumalpet–Arasur 400kVD/C e) LILO of Ramagundam-Khammam 400 kV S/c at Warrangal f) LILO of Neyveli – Sriperumbudur 400 kV S/c at Pondicherry g) Establishment of new 400/220kV S/S at Pugalur, Arasur, Pondicherry and Warrangal with 2x315 MVA transformer each.	16 th Meeting on 20.01.03	Aug, 03	CCEA Approval – January, 2005	Feb'09	<ul style="list-style-type: none"> – Commn schedule as per CCEA is Dec'07. – However, NLC have indicated that generation project has been delayed to Feb'09 – IN 6th SPRC meeting held on 15th Feb, 08, NLC have indicated a further delay of generation revised schedule – Aug'09 – NLC to confirm form schedule for POWERGRID coordinate ATS
4.	Kaiga U-3&4 Tr. System a) Narendra–Davangere 400kV D/c line b) Mysore – Kozhikode 400kV D/c line c) LILO of existing Kolar – Sriperumbudur 400 kV S/c at new 400/220 kV substation at Melakottaiyur d) Establishment of new 400/220 kV substations at Kozhikode and Melakottaiyur with 2x315 MVA, 400/220kV trf. e) Provision of 2nd 315 MVA, 400/220 kV transformer at Hiriyur 400/220 kV substations each.	16 th Meeting on 20.01.03	Oct, 03	CCEA Approval – March, 2005	April 2008 (Exce pt Mysore matter for which is with court)	<ul style="list-style-type: none"> – Narendra-Davagere 400kV D/c has already been commissioned – LILO of Kolar-SP'Budur line at Malekottaiyur substation delayed due to forest clearance & court cases. Expected by Apr' 08 – However, Mysore – Kozhikode is getting delayed due to ROW (50 Kms) & forest clearance problem in Karnataka portion

Sl. No	Name of Scheme & Elements	Standing Committee Approval	FR Date	Investment approval by POWERGRID Board/CCEA	Target as of now	Comments/Reasons of delay
5.	Kudankulam Tr. System a) Kudankulam – Tirunelveli 2x400 kV D/c lines with Quad conductors b) Tirunelveli – Udumalpet 400 kV D/c lines with Twin conductors. c) LILO of both circuits of Madurai – Trivandrum 400 kV D/c line at Tirunelveli d) Tirunelveli – Edamon 400 kV Multi-ckt line (2 ckts of quad & 2 ckts of twin) e) Edamon – Muvattupuzha 400 kV D/c line (with Quad conductors) constructed in new ROW corridor f) Muvattupuzha - North Trichur 400 kV D/c line with quad conductor g) Establishment of new 400/220 kV transformers with 2x315 MVA transformers at Tirunelveli and Muvattupuzha. h) Transformation augmentations with 1x315 MVA transformers at Udumalpet and Trivandrum 400/220 kV substations.	18 th Meeting on 05.03.04	June, 04	CCEA – May, 2005	Dec'08	– Generation project is delayed to Dec'08/June'09. – System to be commn. Matching with generation project. – Tirunelveli 400/220 kV S/stsn and LILO of Madurai – Trivandrum to be commn early as per request of TNEB in Mar/Apr' 08
6.	System Strengthening – VII a) Establishment of 400/220 kV new substation with 2x315 MVA transformers at Karaikudi. b) LILO of one circuit of Madurai-Trichy 400 kV D/c line at Karaikudi c) Establishment of 400/220 kV new substation with 2x315 MVA transformers at Hassan. d) LILO of one circuit of existing Talguppa-Neelmangla 400 kV D/c line at Hassan	18 th Meeting on 05.03.04	July, 04	POWERGRID Board Approval - April, 05	July' 09	– Construction of line & substation are in progress as per schedule
7.	System Strengthening – VIII 11 nos. of 63 MVAR Reactors (7 bus reactors + 4 line reactors)	23 rd Meeting on 22.01.07	Mar, 07	POWERGRID Board Approval – Jan, 08	Nov' 10	– Activities in progress