Central Electricity Authority
System Planning & Project Appraisal Division
Sewa Bhawan, R.K. Puram, New Delhi – 100 66.

No. 51/4/SP&PA-2001/ Date : , 2003.

To

1.The Member Secretary, Southern Regional Electricity Board, 29, Race Course Cross Road, Bangalore 560 009. **FAX : 080-2259343**	2.The Executive Director (Engineering), Power Grid Corp. of India Ltd. B-9, Institutional Area, Katwaria Sarai, New Delhi 110 016. **FAX : 011-6466823, 6564751**
3.The Director (Transmission), Transmission Corp. of Andhra Pradesh Ltd., Vidyut Soudha, Hyderabad – 500 082. **FAX : 040-3317652, 3320565**	4.The Director (Transmission), Karnataka State Power Transmission Corp. Ltd., Cauvery Bhawan, Bangalore 560 009. **FAX : 080 -2228367, 221352**
5.The Member (Transmission), Kerala State Electricity Board, Vidyuthi Bhawanam, Pattom, P.B. No. 1028, Thiruvananthapuram - 695 004. **FAX : 0471-446774**	6.The Executive Director/ Planning, Tamil Nadu Electricity Board, 6th Floor, Eastern Wing, 800 Anna Salai, Chennai – 600 002. **FAX : 044-8521210, 8544528**
7.The Director (Power), Corporate Office, Block – I, Neyveli Lignite Corp. Ltd., Neyveli, Tamil Nadu – 607 801. **FAX : 04142-52646**	8.The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, Pondicherry – 605 001. **FAX : 0413-334277**
9.The Executive Director (Engineering), NTPC Ltd., Engg. Office Complex, A-8, Sector 24, Noida – 201 301. **FAX : 91-539462, 91-4410136, 91-4410137**	10. The General Manager (Transmission), Nuclear Power Corp. of India Ltd., 9th Floor, South Wing,Vikram Sarabhai Bhawan, Anushakti Nagar, Mumbai – 400 094. **FAX : 022-25563350**
11. The Director (Tech), Power Trading Corpn. of India Limited, 2nd Floor, NBCC Tower, 15 Bhikaji Cama Place, NewDelhi 110066. **FAX-011-51659504**	

Sub: Seventeenth meeting of the Standing Committee on Power System Planning in Southern Region.

Sir,

Enclosed please find summary record of discussions in the 17th meeting of the Standing Committee on Power System Planning in Southern Region held at SREB, Bangalore on 15th September 2003.

Kindly acknowledge the receipt.

Yours faithfully,

Encl: As above.

(A.K. Asthana)
Director (SP & PA)

Summary record of discussions in the 17th meeting of the Standing Committee on Power System Planning in Southern Region,held at SREB,Bangalore on 15th September 2003.

List of participants is enclosed at Annex-I.

Chief Engineer (SP&PA), CEA welcomed all the participants in the 17th standing committee meeting and initiated the discussions. Director, KPTCL wanted to know the status in regard to National Grid issues which was deliberated in the last meeting. Chief Engineer (SP&PA) stated that for connecting the Southern Region to National Grid, three different transmission alternatives in combination with 400kV AC quad lines, 765kV lines and HVDC system were conceptualized and presented in the last meeting and the members were to sentdtheir suggestions. However, no suggestions were received from the constituents. Director (SP&PA) stated that based on further inputs, issue could be discussed in the next meeting of the Standing Committee.

The agenda items were thereafter taken up for discussion.

1. Confirmation of Summary record of discussions of the 16h Standing Committee Meeting.

1.1 Chief Engineer (SP&PA), CEA stated that the summary record of the 16th meeting held on 21-1-2003 at Kaiga , NPCIL were circulated vide No.51/4/SP&PA –2002/184-97 dt. 31-1-2003 and the same could be confirmed.

1.2 Director(Technical) KPTCL stated that construction of 400 kV Pugalur-Madurai D/C line agreed to be part of NLC TS-II Expansion Project in the last Standing Committee Meeting needed to be reviewed as their studies indicated that loading on this line was low. CE(SP&PA) stated that the loading of any transmission line in interconnected system would depend on the oad and generation scenario considered in the study and the proposal could not be rejected just because of light loading indicated under some typical system condition. However, it was agreed that the matter would be reviewed.

1.3 Thereafter, the summary record was taken as confirmed.

2. REVIEW OF EVACUATION ARRANGEMENT FOR KUDANKULAM APP STAGE-I (2X1000MW)

2.1 Chief Engineer (SP&PA),CEA stated that Kudamkulam evacuation system was discussed in the last Standing Committee Meeting and in view of RoW problems in Kerala it was decided to ascertain feasibility of constructing new lines in Kerala before framing the proposal. Accordingly, a joint route survey was conducted and subsequently the issues were discussed in KSEB office in May, 2003. In the discussion, KSEB had agreed to provide RoW by utilizing some of their existing 220kV lines. Accordingly, the proposal were formulated and detailed system studies on KAPP evacuation arrangement were carried out by CEA. He requested Director(SP&PA) to explain the various options considered for KAPP evacuation system.

2.2 Director (SP&PA), CEA stated that based on feasibility of RoW for transmission lines in Kerala and the requirements and alternative proposals as suggested by NPCIL,

POWERGRID, KSEB and TNEB, various options have been worked out and analyzed. The first take-off from KAPP would be Tirunelveli because Tirunelveli was suitable for establishment of 400kV sub-station which to could be connected to Madurai and Thiruvananthapuram by LILO of 400kV Madurai - Thiruvananthapuram 400 kV D/C line. The choice of Tirunelveli, which was close to Kayathar in TN and where land could be available, was based on survey done by POWERGRID which has shown that Tirunelveli being would be a suitable location for construction of new 400kV sub-station instead of Tenkasi considered earlier. The arrangement for the first outlet from KAPP, establishment of Tirunelveli S/s, and connection of Tirunelveli to Thiruvananthapuram, Madurai, Cochin/Trissur and Edamon were same in all the alternatives and as such the following works were common in all the above alternatives:

(i) KAPP-Tirunelveli 400kV Quad D/C line.

(ii) LILO of both circuits of Madurai - Thiruvananthapuram 400 kV D/C line at Tirunelveli.

(iii) Tirunelveli –Cochin – Trissur 400kV Quad D/C line. **

(iv) Tirunelveli –Edamon 400kV D/C line – Initially to be operated at 220 kV. ** (later, after construction of Edamon-Thiruvananthapuram 400kV D/C section in a future system strengthening project, this would become direct Tirunelveli-Thiruvananthapuram 400kV D/C line)

(v) Establishment of new 400/220kV,2x315MVA Sub-station at Tirunelveli and Cochin (Muvattapuzha)

(vi) 3rd 400/220kV, 1x315MVA transformer Thiruvananthapuram S/s.

** The construction of 400 kV Tirunelveli-Cochin 400kV Quad D/C line and Tirunelveli -Edamon 400 kV TM D/C line (to be operated initially at 220 kV) would utilize the RoW of the existing 220kV inter-state Kayathar-Edamon S/C line and a multi-ckt line from Tirunelveli up to Edamon would be erected utilizing the existing corridor. This would consist of four 400kV circuits – two Quad and two Twin. These would be 2-circuits of Tirunelveli-Cochin 400kV Quad D/C line and 2-circuits of Tirunelveli-Edamon 400kV D/C line (initially to be operated at 220kV and later to become Tirunelveli-Thiruvananthapuram 400kV D/C line).

The alternatives differed in respect of second outlet from KAPP as per following:

Alternative-I: KAPP- Madurai 400kV D/C Quad line.

Alternative-II KAPP-Tirunelveli second 400kV D/C Quad line.

Alternative-III KAPP-Udumalpet 400kV D/C Quad line with 3rd 400/220kV, 1x315MVA transformer at Udumalpet.

2.3 CE(Planning), TNEB stated that adequate provision of transmission line towards TN system and substations/additional transformation capacity in TN corresponding to their share of about 1200 MW from KAPP project, were not made in the proposed alternatives. He stated that new 400 kV substations at Karaikudi and Jayamkondam locations and an additional transmission corridor viz. KAPP-Karaikudi should be covered under the KAPP evacuation system. He further stated that this would also facilitate to pass on share of Andhra Pradesh from KAPP project. Director (SP&PA) stated that the creating new transmission corridors and enhancing transformation facilities should be considered on the basis of total shares from Central Sector stations not project-wise and if necessary, a separate scheme could be worked out. Chief Engineer (SP&PA) stated that after adding its share from KAPP, total allocation for TN from CS projects would work out to about 4000MW against which the already provided/planned 400/220kV CS transformation capacity in TN was of about 6300MVA. As such the provisions were adequate and there would be no problem in supplying its share to TN and an additional 1000-1500MW, over and above KAPP share could also be supplied.

2.4 CE(Planning), TNEB stated that provision of 400/220kV transformers at Cochin could be reduced to one transformer as the loading as per the studies did not show need of second transformer. CE(SP&PA), CEA stated that in Kerala about 1260MVA 400/220 transformation capacity was provided under CS against their CS share of about 1000MW which would increase to about 1200MW after adding their share in KAPP. As such additional CS transformation capacities were required to be planned in Kerala and provision of 3rd transformer at Thiruvananthapuram and 2x315 MVA at Cochin under KAPP was in that context. The loading at Cochin would increase when KSEB re-works their supply arrangements in 220kV system.

2.5 CE(SP&PA), CEA explained that Alternative-I, providing two different transmission corridors from KAPP, one towards Tirunelveli and the other towards Madurai, was based on NPCIL suggestion. Study had shown that part of the power flowing from KAPP towards Madurai would flow back towards Tirunelveli through Madurai-Tirunelveli line. Alternative-II, in which second outlet is proposed to Tirunelveli, with the second KAPP-Tirunelveli 400kV Quad D/C on a different line routing, would provide better power flow distribution. GM(Transmission),NPCIL stated that two independent transmission corridors for KAPP evacuation were required from reliability and security considerations. CE(SP&PA), CEA clarified that with second KAPP-Tirunelveli 400kV Quad D/C line on different route, the requirement of two independent transmission corridors from KAPP was being met. Further, by utilizing the operational flexibility of one and a half breaker scheme at Tirunelveli, the independence of corridors could be extended beyond Tirunelveli by connecting the lines in such a way that the corridor towards Madurai in TN is one and the corridor towards Thiruvananthapuram and Cochin in Kerala is the other.

2.6 ED(Engg), POWERGRID stated that the third alternative involving construction of KAPP-Tirunelveli and KAPP- Udumalpet lines emanating from KAPP station would provide adequate system flexibility in the longer time frame due to upcoming Kayamkulam (2000 MW) project of NTPC and Tuticorin TPS Expansion (2x500 MW). He further stated that due to RoW difficulties in Kerala, construction of lines towards KSEB system had the risk of time overrun and provision of line towards Udumalpet would also serve as a fall back in such condition. GM(SRLDC), POWWRGRID stated that provision of interconnection up to Udumalpet would also provide operational advantages in evacuating KAPP power under different Demand-Availability balance conditions. Director(SP&PA), CEA stated that the line towards Udumalpet was fitting in to the perspective plan but in order to achieve even distribution of flows, the alternative could be modified to the extent that the proposed line from KAPP to Udumalpet could be routed through and bussed at Tirunelveli, and KAPP-Tirunelveli with quad conductors and Tirunelveli-Udumalpet with twin conductors. This would also reduce the cost of Tirunelveli-Udumalpet section. Director, KPTCL asked whether Tirunelveli-Cochin line could be avoided by considering the Udumalpet line. CE(SP&PA), CEA stated that Cochin being one of the potential load center in Kerala would require additional in-feed at 400kV level apart from the existing Udumalpet-Trissur 400kV D/C line. This would also complete the connectivity to form Tirunelveli-Cochjn-Trissur-Udumalpet ring enhancing the reliability and security of the system.

2.7 On a query regarding optimization of KAPP evacuation system with respect to Kayamkulam Expansion Project (2000MW) in Kerala, Director(SP&PA), CEA stated that preliminary studies for post Kayamkulam scenario had also been done which had indicated that the proposed KAPP evacuation system would fit into the perspective plan. The members wanted to know the time frame and the likely cost of generation of

Kayamkulam Expansion project. HOD, NTPC stated that the bids based on global tendering process for supply of requisite fuel and related cost had been initiated and were to be opened in December, 2003 and the unit cost of generation could be worked out only after opening of the bids and the status of the project would be known thereafter. If the unit cost worked out to be reasonable, the project could be expected by September 2008.

2.8 Director(Transmission), APTRANSCO submitted a study report for consideration of three 400 kV substation at Gajwel, Ditchpally and Anantpur locations under the KAPP transmission system.. Chief Engineer (SP&PA) stated that Anantpur 220kV S/S was well connected at 220kV level from Muddannur Power Station (2x210 MW) and creation of 400kV level there might not be justifiable at this stage. However, he stated that the proposal of APTRANSCO for new 400kV sub-stations would be examined and if found necessary, could be suitably covered under regional strengthening scheme.

2.9 Director(Transmission), KPTCL stated that proposal to create a 400 kV substation at Hassan along with Hassan-Davanagere-Mysore 400 kV transmission lines could also be included under KAPP transmission system. CE(SP&PA) stated that detail system studies would be needed for justification of these transmission works. It was decided that joint system study by KPTCL and CEA would be carried out to assess the transmission requirements of KPTCL and the specific work could be considered as a regional system strengthening scheme..

2.10 GM (Transmission) NPCIL pointed out that against allocation of about 530 MW made by MOP for AP from KAPP Project, no confirmation from the State was received till date. Director (Transmission) APTRANSCO stated that the requisite share of AP from KAPP project would be absorbed and necessary confirmation would be conveyed to NPCIL.

2.11 Based on deliberations of various alternatives the following transmission system for KAPP evacuation system was agreed to :

1. **KAPP-Tirunelveli 400kV Quad D/C line-1.***
2. **KAPP-Tirunelveli 400kV Quad D/C line-1.***
3. **LILO of both circuits of Madurai - Thiruvananthapuram 400 kV D/C line at Tirunelveli.**
4. **Tirunelveli-Udumalpet 400kV D/C line.**
5. **Tirunelveli –Cochin – Trissur 400kV Quad D/C line. ****
6. **Tirunelveli –Edamon 400kV D/C line – Initially to be operated at 220 kV. ****
7. **Establishment of new 400/220kV,2x315MVA Sub-station at Tirunelveli and Cochin (Muvattapuzha)**
8. **3rd 400/220kV, 1x315MVA transformers at Thiruvananthapuram and Udumalpet substations..**

* **The two KAPP-Tirunelveli 400kV Quad D/C lines to be on different routes.**

** **The construction of 400 kV Tirunelveli-Cochin 400kV Quad D/C line and Tirunelveli -Edamon 400 kV TM D/C line (to be operated initially at 220 kV) would utilize the RoW of the existing 220kV inter-state Kayathar-Edamon S/C line and a multi-ckt line from Tirunelveli up to Edamon would be erected utilizing the existing corridor. This would consist of four 400kV circuits – two Quad and two Twin. These would be 2-circuits of Tirunelveli-Cochin 400kV Quad D/C line and 2-circuits of Tirunelveli-Edamon 400kV D/C line (initially to be operated at 220kV and later to become Tirunelveli-Thiruvananthapuram 400kV D/C line).**

3. START-UP POWER ARRANGEMENT FOR KUDANKULAM APP

3.1 Chief Engineer (SP&PA) stated that start-up power for KAPP project was to be provided by TNEB at 220kV level from their 220kV sub-stations at Kayathar and Nagarcoil/Tuticorin and asked confirmation of the same from TNEB. Director (Planning), TNEB stated that they would finalize the start-up power arrangements for KAPP project with NPCIL. GM (Transmission) NPCIL wanted to know whether 220kV lines would also be used for power evacuation and if not, could they do away with the 400/220 kV transformer at KAPP. Director(SP&PA), CEA stated that 220kV lines that would be provided for start-up power, were not meant for evacuation and the provision of ICTs at KAPP station could be left at the discretion of NPCIL.

4. PROVISION OF SWITCHING ARRANGEMENT AT SONANAHALLY FOR UTILIZING THE 50 MVAR LINE REACTOR AS SWITCHABLE REACTOR AND A NEW 80 MVAR BUS REACTOR AT NELLORE.

4.1 Chief Engineer(SP&PA) stated that POWERGRID had proposed that the line reactor of 50MVAR at Sommanahally end of 400 kV Cuddapah-Sommanahally S/C line be made switchable and a 80MVAR bus reactor at Nellore end of Vijaywada-Nellore-Sriperumbadur 400 kV S/C line be provided. He requested POWERGRID to explain the purpose of their proposal. GM(SRLDC), POWERGRID explained that at Sommanahally S/s, with an additional breaker arrangement, the line reactor could be operated as bus reactor and it would provide operational flexibility to control system over-voltages. As regards provision of a 80MVAR bus reactor at Nellore, he stated that Vijaywada-Nellore-Sriperumbadur 400 kV D/C line planned to be bussed at Nellore by establishment of a 400/220kV S/s by APTRANSCO. As this S/s has not been taken-up as yet by APTRANSCO, the charging and operation of this line had become difficult. To anchor the line and control the over-voltages, a 80MVAR bus reactor at Nellore was proposed. CE(SP&PA) wanted to know the progress of APTRANSCO's substation at Nellore. Director(Transmission), APTRANSCO stated that tender evaluation for procurement of material and equipment for Nellore station was taken up and it would be finalized by December, 2003. He requested POWERGRID to hand over the requisite land at Nellore so that the erection of the work could be completed within a schedule period of 18 months. He also requested that the Nellore transformers be considered as a regional scheme.

4.2 In view of the operational advantage of switchable reactor at Sommanahally and need of providing reactor at Nellore, the proposal of POWERGRID was agreed.

4.3 GM(SRLDC), POWERGRID stated that the existing 400kV line reactors(fixed) in many places of the Southern Grid should be operated as bus reactor with an additional isolator arrangement at optimum cost. CE(Sp&PA) suggested that a detailed scheme report in this context should be prepared by POWERGRID before implementation. However, it was agreed to make the line reactor at Sommanhally to be utilized as bus reactor with an additional breaker arrangement.

5. AUGMENTATION OF TRANSFORMERS AT CUDDAPAH, KHAMMAM, GOOTY, VIZAG, MUNIRABAD AND KOLAR 400/220 KV SUB-STATIONS

5.1 Chief Engineer (SP&PA) mentioned that specific proposal on the augmentation of transformation capacity with second transformer at Cuddapah, Khammam, Gooty, Vizag, Munirabad and Kolar 400/220 kV substation was forwarded by POWERGRID vide their letter No. C\ENG\SEF\S\00\PLG dated 12th September,2003, a copy of which was circulated in the meeting. He requested POWERGRID to give a brief overview on the issue. ED(Engg), POWERGRID stated that these S/Ss have been provided with single transformer, some of them being very old, would pose a threat to healthy operation of southern grid during their maintenance or any contingency. Director(Tr/GO), APTRANSCO shared the similar experience with POWERGRID and suggested that 400 kV /220 kV S/S capacity whether in Central sector or State Sector should be created with a minimum of 2 nos. transformers. All the members agreed to this principle. Chief Engineer(SP&PA), CEA requested POWERGRID to include the augmentation of transformers as part of system strengthening scheme in Southern Region.

6. SUMMARY OF DECISIONS:

(1) Summary record of discussions of the 16th Standing Committee Meeting as circulated vide No. 51/4//SP&PA-2002// 557/567 dated 11-8-2003 were confirmed subject to KPTCL's proposal to review of Pugalur-Madurai 400 kV D/C line covered under Neyveli TS-Stage II Expansion Transmission System.

(2) The following transmission works would be covered under the Regional Transmission Scheme for evacuation of power from Kudankulam APP(2x1000 MW).

Kudankulam (2000MW) Evacuation Arrangement:

(a) 400kV Transmission system

1. KAPP-Tirunelveli 400kV Quad D/C line-1.*
2. KAPP-Tirunelveli 400kV Quad D/C line-1.*
3. LILO of both circuits of Madurai - Thiruvananthapuram 400 kV D/C line at Tirunelveli. (2xD/C LILO lines)
4. Tirunelveli-Udumalpet 400kV D/C line.
5. Tirunelveli –Cochin – Trissur 400kV Quad D/C line. **
6. Tirunelveli –Edamon 400kV D/C – Initially to be operated at 220 kV. **
7. Establishment of new 400/220kV,2x315MVA Sub-station at Tirunelveli and Cochin (Muvattapuzha)
8. 3rd 400/220kV, 1x315MVA transformers at Thiruvananthapuram and Udumalpet substations..

* The two KAPP-Tirunelveli 400kV Quad D/C lines to be on different routes.

** The construction of 400 kV Tirunelveli-Cochin 400kV Quad D/C line and Tirunelveli -Edamon 400 kV TM D/C line (to be operated initially at 220 kV) would utilize the RoW of the existing 220kV inter-state Kayathar-Edamon S/C line and a multi-ckt line from

Tirunelveli up to Edamon would be erected utilizing the existing corridor. This would consist of four 400kV circuits – two Quad and two Twin. These would be 2-circuits of Tirunelveli-Cochin 400kV Quad D/C line and 2-circuits of Tirunelveli-Edamon 400kV D/C line (initially to be operated at 220kV and later to become Tirunelveli-Thiruvananthapuram 400kV D/C line).

(b) The start up power for KAPP project would be finalized mutually by TNEB and NPCIL.

(c) Creation of 400/220 kV transformer facility at KAPP station would be at the discretion of NPCIL. This arrangement would not be essential for evacuation of power from KAPP station

(d) Establishment of 400 kV KAPP-Tirunelveli 2xD/C quad lines would follow two separate and independent corridors at a considerable distance from each other.

(3) Augmentation of transformation capacity with a second transformer at Cuddapah, Khammam, Gooty, Vizag, Munirabad and Kolar 400/220 kV sub-stations under Ccentral Sector would be covered as part of system strengthening scheme in the Southern Region by POWERGRID.

(4) 50 MVAR line reactor existing at Sommanhaly end of Cuddapah-Sommonahallty 400 kV S/C line would be utilized as bus reactor with provision of an additional circuit breaker.

(5) KPTCL's requirements for a 400 kV substation at Hassan and connecting 400 kV lines would be assessed by joint study to be carried out by KPTCL and CEA. Accordingly, transmission works would be suitably covered under system strengthening scheme in the Southern Region by POWERGRID.

(6) APTRANSCO's proposal and study report relating to creation of 400 kV substations at Ditchpally, Gajwel and Anantpur and TNEB proposal for 400kV substations at Karaikudi and Jayamkondam would be examined and the specific requirements could be firmed up for inclusion in system strengthening scheme under Central Sector.

Annex-I

List of Participants in the 17th Standing Committee Meeting on Power System Planning in Southern Region held on 15th September,2003 at SREB, Bangalore.

ORGANISATION AND NAME	DESIGNATION
Central Electricity Authority	
1. ShriV.Ramakrishna	Chief Engineer (SP&PA)
2. Shri A.K.Asthana	Director
3. Shri R.Saha	Dy. Director
S.R.E.B.	
1. Shri K.Srinivasa Rao	Member Secretary (Incharge)
2. Shri P.Patel	SE
3. Shri A.K.Yadav	AD-I
4. Shri Rakesh Kumar	AD-I
POWERGRID	
1. Shri R.N. Nayak	Executive Director(Engg.)
2. Shri N.R.Chanda	ED (SRI)
3. Shri V.Lakshmpathi	GM (Engg.),SR-II
4. Shri S. K. Soonee	GM,SRLDC
5. Shri K.Ananda Kumar	AGM (O&M),SR-I
6. Shri Bharat Bhushan	AGM(constr.),SR-II
7. Shri Y.K.Sehgal	DGM.
8. Shri S.P.Kumar,	SRLDC
N.T.P.C	
1. Shri A.K.Gupta	HOD (Elect)
N.P.C.I.L.	
1. Shri K.J..Sebastian	Director(Transmission)
2. Shri N.S.M.Rao	GM (Transmission)
3. Shri Rajesh Laad	DGM(Transmission)
P.T.C	
1. Shri S.K.Dube	Director (Operation)
APTRANSCO	
1. Shri G. Kesava Rao	Director(Trans. & GO)
K.P.T.C.L.	
1. Shri S.Shivamallu	Director(Trans)
2. Shri B. L. Lingoshetta	SE(Planning)
3. Shri K.Balaraman	AEE(Plg.)
T.N.E.B.	
1. Shri M.Dorairaj	Chief Engineer(Plg.)
Neyveli Lignite Corpn.	
1. Shri S. .Muthu	DGM.(Elect)
K.S.E.B.	
1. Shri P.N.Mohanan	Member(Gen & Trans.)
Pondicherry	
1. Shri V.Ramamurthy	SE,Elecy. Deptt.