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

No. 51/4/SP&PA-2001/ Date : 10-3-2004

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. Shri N.S.M. Rao 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: Eighteenth the Standing Committee on Power System Planning in Southern Region.

Sir,

Enclosed please find summary record of discussions in the 18h meeting of the Standing Committee on Power System Planning in Southern Region held Chennai on 5-3-2004.

Kindly acknowledge the receipt.

Yours faithfully,

Encl: As above.

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

Summary record of discussions in the 18th meeting of the Standing Committee on Power System Planning in Southern Region held at Chennai on 5th March 2004.

List of participants is enclosed at Annex-I

Executive Director(SR-II), POWERGRID welcomed all the participants.

Chief Engineer (SP&PA), CEA thanked POWERGRID for hosting the meeting and welcomed the participants. Initiating the discussions he stated that the surplus of Eastern Region was being utilized for the benefit of Southern Region and Regional Power Exchange between the Eastern Region and Western Region were taking place in a big way. With increasing inter-regional exchanges, the transmission system was required to be developed keeping in view the overall perspective. In this time-specific requirement, ROW constraints and the need for margins for open access was to be considered. The difficulty of getting ROW was causing delay in execution of projects. In this context he gave example of Madurai-Thiruvananthapuram 400 kV D/C line which was getting delayed due to severe ROW constraints faced in Kerala and Kaiga-Narendra 400kV D/C line which got delayed due to unduly long time consumed in getting forest clearance. In context of Kudankulam APP, which had been ahead of completion target and was expected in 2006-07, for timely completion of transmission system, it was necessary to finalise the requirements and take decisions without delay.

The agenda items were thereafter taken up for discussion.

1. Confirmation of Summary record of discussions of the 17h Standing Committee Meeting.

1.1 Chief Engineer (SP&PA), CEA stated that the summary record of the 17th meeting held on 15-9-2003 at SREB, Bangalore, were circulated vide No.51/4/SP&PA – 2001/756-766 dt. 3-10-2003 and the same could be confirmed.

1.2 Director (Transmission), KPTCL stated that the following amendment was required to correctly record the views expressed by KPTCL:

The following to be added at the end of para 2.9:

"Director (Transmission), KPTCL stated that KPTCL was agreeable to the proposed transmission system for Kudankulam subject to inclusion of Hassan 400 kV substation alongwith connecting 400 kV lines under the scheme. "

1.3 Thereafter, the summary record was taken as confirmed with above amendment.

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

2.1 ED, NPCIL stated that the commissioning schedule of the first unit had been advanced to March 2007 and the 2nd unit to be followed subsequently after six months. As regards progress of works, he stated that 30% physical construction work was completed and the mechanical works was scheduled to start from end of this year. All equipments including turbines etc. would reach the site by December 2004.

2.2 Chief Engineer (SP&PA), CEA requested NPCIL to send a progress report to all the beneficiaries for information.

2.3 CE(SP&PA), CEA stated that the evacuation system for KAPP was discussed, finalised and agreed in September 2003 itself during the last meeting of the Standing Committee held at Banglore. However, in the SREB Board meeting held on 15.11.2003, TNEB wanted a review on account of APTRANSCO not availing power from Kudankulam APP and consequently TNEB getting more power from the project. In the SREB meeting, Member(GO&D), CEA had explained that since the power flows in the grid takes place by displacement, the proposed transmission would hold good and any additional transmission scheme under the project required for TNEB could be examined by CEA. However, TNEB insisted for a review. Subsequently, MoP, vide their letter No. 3/9/2003-OM dated 5th February 2004 finalised the following allocation:

Tamil Nadu:	925 MW
Kerala	266 MW
Pondicherry	67 MW
Karnataka	442 MW
Unallocated	300 MW
TOTAL	2000 MW

2.4 CE(SP&PA), CEA stated that further studies were done considering the already evolved system and also the options suggested by constituents. As the power flow takes place through displacement, the system as already evolved had been found to holds as expected. He asked Director(SP&PA), CEA to make a presentation on the studies.

2.5 Director(SP&PA), CEA stated that base case and outage cases for the following options had been studied.

Option-1: As per proposal evolved in the last Standing Committee meeting.

Option-2: Option-1 plus Madurai-Karaikudi 400kV D/C

Option-3: Option-1 plus LILO of one circuit of Madurai-Trichy 400kV D/C line at Karaikudi

Option-4: Option-2 with the change that one of 400kV quad D/C line from KAPP to Tirunelveli and one 400kV quad D/C line to Madurai with series compensation, and the 400kV D/C line to Udumalpet from Madurai instead of from Tirunelveli.

Option-5: Option-4 with the change that additional 400kV line Karaikudi-Jayamkondan-Melakottaiyur taken and 400kV D/C line from Cochin to Trissur deferred.

He gave an overview of finding of the study results which had already been elaborated in the agenda note. The system as was already evolved and finalised in the last meeting worked out to be the most cost effective option. The proposal for 400kV line to from Karaikudi to Jayamkondan-Melakottaiyur was not felt justified. Karaikudi s/s could be considered with feeding arrangement through LILO of one circuit of Madurai-Trichy line (Option-3).

2.6 Director (Transmission), KPTCL stated that for catering to increased allocation to Karnataka from KAPP, 400kV Hassan s/s should be established and the 400kV Davanagere-Hassan-Mysore D/C line should also be included in the scheme. He stated that KPTCL had forwarded studies in this context to CEA. CE(SP&PA), CEA stated that the studies were examined in CEA and views of CEA indicating that the proposal of KPTCL was not justified were already communicated to KPTCL. While the s/s at Hassan, which could be justified late 11th Plan or early 12th Plan work, could be preponed and considered in KAPP time frame, the proposal for Davanagere-Hassan-Mysore 400kV D/C line was not found justified because Mysore was already planned to be connected from Neelamangala by 400kV D/C line which was sufficient to meet the requirements. KPTCL stated that they had not received observations of CEA on their studies/proposal. CE (SP&PA), CEA stated that the above views were communicated to KPTCL in October 2003 itself, when their proposal was received and a copy of CEA's letter would be sent again to KPTCL. However, Director (Trans.), KPTCL insisted that requirement of Hassan 400 kV substation would be needed to meet KPTCL system requirement on account of its increased allocation from Kudankulam APP.

2.7 Director (Transmission/GO), APTRANSCO stated that regional transmission system for power evacuation and also the regional system strengthening requirements should be planned as identified by CEA and he agreed with the system as proposed by CEA.CE (SP&PA), CEA thanked him for his remarks.

Director (Transmission/GO), APTRANSCO further stated that the requirements to be covered under the regional scheme as suggested by State utilities should be studied by CEA for overall perspective. The scheme should be taken up only when found justified based on studies/examination done by CEA. In this process, due care of the transmission requirements for secured operation of grid is ensured with optimal investment and the State utilities should not insist if justification for their proposal was not established. In this context, he appreciated the efforts made by CEA in analyzing the requirements and proposal of the State utilities.

2.8 Member (Gen & Trans), KSEB endorsed the views expressed by APTRANSCO and stated that Kerala also agreed with the system as proposed by CEA.

2.9 TNEB stated that they agreed with the proposal as per Option-3. However, arrangement of multi-circuit line proposed in the existing corridor of Kayathar-Edamon 220 kV S/C line would need to be reviewed as they had planned a 220kV s/s at Kudikorchi by LILO of this line. Chief Engineer(SP&PA),CEA stated that with Kudikorchi s/s coming up in Tamil Nadu, new ROW for the multi-circuit line from Tirunelveli towards Edamon would be needed in Tamil Nadu area. However, in Kerala, where getting new ROW was not feasible, the existing ROW of Kayathar-Edamon line could be utilized. This was agreed.

2.10 Pondicherry representative had no comments.

2.11 After further discussions, it was agreed that the transmission system for evacuation of of power from Kudankulam APP (2x1000MW), as was finalised in the 17th meeting of the Standing Committee held on 15th September 2003 shall be taken up for execution by POWERGRID for evacuation of power from the project. This would include the following works:

400kV Transmission system for Kudankulam APP (2x1000MW):

(i) KAPP-Tirunelveli 400kV Quad D/C line-1.*

(ii) KAPP-Tirunelveli 400kV Quad D/C line-2.*

(iii) LILO of both circuits of Madurai - Thiruvananthapuram 400 kV D/C line at Tirunelveli. (2xD/C LILO lines)

(iv) Tirunelveli-Udumalpet 400kV D/C line.

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

(vi) Tirunelveli –Edamon 400kV D/C – Initially to be operated at 220 kV. **

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

(viii) 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 in Kerala. As TNEB would establish Kudikorchi 220kV s/s in Tamil Nadu by LILO of Kayathar-Edamon S/C line, utilization of RoW of Kayathar-Edamon S/C line in Tamil Nadu would be considered only between Kudikorchi and Edamon.**

2.12 In addition, with enhanced allocation from KAPP to KPTCL and TNEB, the following schemes ware also agreed by all the constituents for execution by POWERGRID under regional system strengthening scheme:

(i) LILO of one circuit of the 400kV Madurai-Trichy line at Karaikudi alongwith 2x315 MVA 400/220kV s/s at Karaikudi.

(ii) 400/220kV, 2x315 MVA s/s at Hassan alongwith interconnecting 400kV line for Hassan s/s which will be decided by CEA in consultation with KPTCL. The interconnecting line to Hassan s/s will also be executed by POWERGRID under the same regional strengthening scheme.

The above (i) and (ii) will be covered under same regional strengthening scheme.

3. START-UP POWER ARRANGEMENT FOR KUDANKULAM APP

3.1 Chief Engineer (SP&PA), CEA stated that in the last meeting it was decided that start of power arrangement would be jointly worked out by NPCIL and TNEB. He requested NPCIL to inform the final arrangement as finalised by them.

3.2 ED, NPCIL stated that the start-up arrangement at 220kV would be through two sources – one through LILO of Tuticorin-S R Pudur 220 kV line at KAPP and the other through 220kV Tirunelveli-KAPP S/C line.

3.3 ED (Engg), POWERGRID stated that for the S/C line from Tirunelveli, additional 220kV bay would be required to be provided. It was confirmed and agreed that the additional 220kV bay at Tirunelveli would be provided and considering 2 nos. 220kV line bays for each 400/220kV ICT, the total number of 220kV line bays at Tirunelveli would be 5.

3.4 Regarding the provision of 400/220kV ICT at KAPP station, ED, NPCIL stated that they had decided to have the ICT. This would be normally kept open so as to avoid power rushing to 220kV side and overloading the 220kV lines.

4. Enhancement of transfer capacity of Talcher-Kolar HVDC link and run back scheme for Talcher STPS-II generating units in the event of contingency of pole outage, so as to improve grid security.

4.1 CE(SP&PA), CEA stated that as the SR constituents had not agreed providing for back-up transmission system for Talcher-II and there is no back-up transmission system for evacuation of power from Talcher-II under the contingency of outage of any pole of the Talcher-Kolar HVDC line. Whenever there is any pole outage on this line, the additional power gets injected into ER-WR system causing heavy jerks because of sudden and large magnitude of change in load-generation balance. Such events have caused grid disturbance in the WR system in the recent past. To improve the security of grid, the following scheme was proposed.

- ➔ Enhancement of the capacity of each pole of Talcher-Kolar HVDC Bi-pole link to 1250 MW at an additional cost of Rs 90 crores.
- ➔ In the event of one pole outage, (with both poles are in operation prior to incident), power order on the other healthy pole to be automatically increased to 1250 MW. Simultaneously, automatic run-back/tripping of generating unit at Talcher-II so that jerk on ER-WR system is limited to about 150 MW.
- ➔ In the event of pole outage when only one pole is in operation prior to incident, automatic run-back/tripping of two generating units at Talcher-II so that jerk on ER-WR system is limited to about 350 MW.
- ➔ POWEGRID to implement upgrading of the HVDC terminal stations to achieve 1250 MW per pole capability and also implement necessary control logic for automatic increase of power order on HVDC to 1250MW in case of one pole outage.
- ➔ NTPC to implement control logic for automatic run back/tripping of generating units at Talcher-II to affect required reduction in ex-bus output.

As the performance of HVDC, especially in the Indian conditions, has not been satisfactory particularly that of converter transformers, the enhanced capacity of the HVDC link is to be used only under contingency conditions and not for increasing the HVDC capacity for firm transfer of 2500 MW on the Bi-pole.

4.2 DGM, NTPC stated that NTPC was working for a scheme of runback when simultaneous outage of both poles took place and they had discussed this in the ERLDC/EREB forum.CE(SP&PA), CEA stated that the scheme proposed was to cater to grid security which was required to be ensured for the single pole outage contingency also. NTPC

representative stated that NTPC could not agree to the run back/tripping scheme unless transmission strengthening to provide back-up system to cover contingency of one pole outage on Talcher-Kolar HVDC link was also provided.

4.3 CE(SP&PA), CEA stated that such condition on issues connected with grid security measures could not be accepted. All the members agreed with this view.

4.4 Director(Transmission), KPTCL wanted to know the engineering details and break-up of investment of Rs 90 crores. ED (Engg.), POWERGRID stated that the capacity would be enhanced by providing additional cooling arrangement and filters. The thyristor models already had inherent higher capacity limit. The converter transformer was designed for ambient temperature of 50^{o} C. In practice, the ambient temperature would be lower. The margin would be utilized through an automated mechanism for raising loading limit of converter transformers. With increase in ambient temperature loading limit would automatically get reduced. Thus the capacity per pole could be increased to 1250MW to cater to contingency.

4.5 After discussion, all the participants agree to the scheme as proposed by CEA.

5. Provision of 80 MVAR bus reactor at Nellore.

5.1 CE(SP&PA), CEA stated that in the last meeting, provision of 80MVAR switchable reactor at Nellore was agreed considering the operational advantage. However, TNEB had suggested to review the provision of reactor at Nellore in view of APTRANSCO taking the ICT works. He stated that as the provision of switchable reactor at Nellore would provide operational flexibility in regulation voltages, this could be agreed.

5.2 The members agreed to the proposal.

6. SUMMARY OF DECISIONS:

(1) Summary record of discussions of the 17^{th} Standing Committee Meeting as circulated vide No. 51/4//SP&PA-2002// 756-66 dated 03-10-2003 were confirmed with amendment as given in para 1.2.

(2) The transmission system for Kudankulam APP as detailed in para 2.11 was agreed.

(3) System strengthening scheme as detailed in para 2.12 was agreed.

(4) Scheme for enhancement of transfer capacity of Talcher-Kolar HVDC link and run back/tripping of Talcher STPS-II generating units in the event of contingency of pole outage, so as to improve grid security, as detailed in para 4.1 was agreed.

(5) Provision of 80 MVAR switchable reactor at Nellore was agreed.

The meeting ended with a vote of thanks to the chair.

Annex-I

List of Participants in the 18th Standing Committee Meeting on Power System Planning in Southern Region held on 5th March 2004 at Chennai.

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 S. Sivan	Member Secretary
2. Shri P.Patel	SE
POWERGRID	
1. Shri R.N. Nayak	Executive Director (Engg.)
2. Shri K. Satyam	ED (SR II)
3. Shri S. K. Soonee	GM, SRLDC
4. Shri Y.K.Sehgal	DGM.
5. Shri S.P.Kumar,	SRLDC
N.T.P.C	
1. Shri Pramod Kumar	DGM (Elect)
N.P.C.I.L.	
1. Shri V. K. Kaushik	Executive Director (LWR)
2. Shri N.S.M.Rao	GM (Transmission)
3. Shri M. K. Kannan	CE (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 K.Balaraman	AEE (Plg.)
T.N.E.B.	
1. Shri S. Velmurughan	Chief Engineer (Plg.)
2. Shri S. Sowmyanarayanan	Consultant
3. Shri C. Vijaykumar	EE
Neyveli Lignite Corpn.	
1. Shri S. Muthu	DGM.(Elect)
K.S.E.B.	
1. Shri P.N.Mohanan	Member(Gen & Trans.)
Pondicherry	
1. Shri B. Krishnaswamy	SE,Elecy. Deptt.