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

No. 51/4/SP&PA-2006/ Date: 08-08-2006

To

1. The Member Secretary,
Southern Regional Power Committee,
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Bangalore - 560 009.
FAX : 080-22259343

2. The Director (Projects),
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FAX : 95124-2571760

3. The Director (Transmission),
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4.The Director (Transmission),
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5. The Member (Transmission),
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6. Member (Distribution),
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7. The Director (Power),
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8. The Superintending Engineer –I,
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9. Director (Projects),
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10. Shri N. S. M. Rao
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11. The Director (Operation),
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Sub: 22nd meeting of the Standing Committee on Power System Planning of Southern Region

Sir,

22nd meeting of the Standing Committee on Power System Planning of Southern Region would be held on August 17, 2006 (Thursday) at 11 00 AM at Southern Regional Power Committee office at 29, Race Course Cross Road, Bangalore – 560 009.
Kindly make it convenient to attend the meeting.

Agenda for this meeting has already been sent vide our letter dated 01-08-2006.

Yours faithfully,

(A. K. Asthana)
Chief Engineer (SP&PA)
Ph: 011-26102045

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

No. 51/4/SP&PA-2006/ Date: 1-08-2006

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 : 95124-2571760**
3.The Director (Transmission), Transmission Corp. of Andhra Pradesh Ltd., Vidyut Soudha,Hyderabad – 500 082. **FAX : 040-55665137**	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 : 0471-2446452, 2448213**	6. Member (Distribution), Tamil Nadu electricity Board (TNEB), 6th Floor, Eastern Wing, 800 Anna Salai, Chennai - 600002. **FAX : 044-28525587, 28525639**
7.The Director (Power), Corporate Office, Block – I, Neyveli Lignite Corp. Ltd., Neyveli, Tamil Nadu – 607 801. **FAX : 04142-252646**	8.The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, Pondicherry – 605 001. **FAX : 0413-2334277**
9. Director (Projects), National Thermal Power Corp. Ltd. (NTPC), NTPC Bhawan, Core-7,Scope Complex-7, Institutional Area, Lodhi Road, New Delhi-110003. **FAX-011-24360912**	10. Shri N. S. M. Rao Chief Engineer (Transmission), Nuclear Power Corp. of India Ltd., 12th Floor,Vikram Sarabhai Bhawan, Anushakti Nagar, Mumbai – 400 094. **FAX : 022-25556513/25563350**
11. The Director (Operation), Power Trading Corpn. of India Limited, 2nd Floor, NBCC Tower, 15 Bhikaji Cama Place, NewDelhi 110066. **FAX-011-51659504**	

Sub: 22nd meeting of the Standing Committee on Power System Planning of Southern Region

Sir,

Agenda note for the 22nd meeting of the Standing Committee on Power System Planning of Southern Region to be held during third week of August 2006, is enclosed.

Date and venue of the meeting will be intimated separately.

Encl. as above

Yours faithfully,

(A. K. Asthana)
Chief Engineer (SP&PA)
Ph: 011-26102045

Standing Committee on Power System Planning in Southern Region

Agenda for 22nd Meeting

1. Confirmation of the minutes of 21st standing committee meeting held on 22nd September, 2005 at Bangalore

The summary record of the 21st meeting held on 22nd September 2005 at SREB, Bangalore was circulated vide our letter No.CEA/51/4/SP&PA/2001 dated 24-10-2005, to which observations were received from NPCIL vide their letter No. NPCIL/CE(ED-TAPS)/2005/M/131 dated November 9,2005. Accordingly, corrigendum of the minutes was issued vide our letter No.CEA/51/4/SP&PA/2001 dated 22-11-2005.

No further observations have been received. The minutes with corrigendum may, therefore, be confirmed.

2. Transmission Systems for Evacuation of power from Tuticorin TPS (2x500 MW, JV of TNEB & NLC) and North Chennai (2x500 MW, JV of TNEB & NTPC).

2.1 In the last Standing Committee meeting of power system planning in Southern Region held on 27th Sept 2005 at Bangalore, the results of the system studies carried out in CEA on the evacuation arrangements for both the thermal projects were discussed. In that study, Ennore CCP (1000MW) was one of the generation project considered amongst the various generation projects during 2011-12. TNEB had desired that the transmission system requirement for the two generation projects at North Chennai and Tuticorin would require to be evolved by taking into consideration about 2000 MW wind power generation in and around Tuticorin area during the same time frame. It was also decided that along with wind generation, revised system study needs to be carried out to evolve evacuation system(s) for the proposed North Chennai and Tuticorin Projects corresponding to two scenarios viz. Ennore (1000MW) and without Ennore project, because, programme of Ennore gas based generation project has become uncertain.

2.2 Accordingly, based on the inputs furnished by TNEB for wind power generating stations at various locations in Tamilnadu, revised system studies have been carried out jointly in CEA by CEA and TNEB to identify the evacuation system requirements for the projects by taking into consideration Ennore CCP and also without it. The list of various wind power generating stations and dispatch from stations are depicted below:

S.No.	Wind generating stations	Existing Capcity (MW)	Wind generation addition (MW)	Despatch (MW)
1.	S.R. Pudur	225	-	225
2.	Sankaveri	275	50	325
3.	Amudhapuram	170	150	320
4.	Kodikurichi	150	100	250
5.	Udayathur	170	150	320
6.	Veeruananu	170	100	270
7.	Kayathar	175	100	275
8.	Tuticorin Auto	125	50	175
9.	Kovilpatti	150	100	250
10.	Kadambathur	150	200	350

2.3 Both the generation projects viz. North Chennai and Tuticorin, are deemed to be mega projects and Tamilnadu will have 75% share and balanced 25% would be for other beneficiaries in the Southern Region from each of the projects. Regarding share of other beneficiaries, NTPC and NLC have yet to confirm the share allocation for their respective projects. As power evacuation would take place by displacement the transmission requirements for these projects have been evolved without any firm allocation from these two projects.

2.4 Transmission System for Tuticorin TPS TPS (2x500 MW)

Following transmission alternatives were considered:

Alternatives	Transmission System
Option-I	(i) 400 kV Tuticorin JV TPS-Madurai twin moose D/C line (ii) 400 kV Tuticorin JV-TPS-Karaikudi twin moose D/C line (iii) 2x315 MVA, 400/230 kV auto transformer at Tuticorin JV TPS (iv) 230 kV inter connection with existing Tuticorin TPS.
Option-II	(i) 400 kV Tuticorin JV TPS -Madurai Quad D/C line (ii) 2x315 MVA, 400/230 kV auto transformer at Tuticorin JV TPS. (iii) 230 kV interconnection with existing Tuticorin TPS.

From the result of the power flow studies, it has been observed that with the proposed wind power generation of about 2760 MW in Tuticorin area, power flow through the 400/230kV ICT at Tuticorin takes place from 230kV to 400kV level, but the quantum of flow is not having much impact as such over 400kV lines emerging from Tuiticorin station.

Option-I: [Exhibit I(a)-I(b)] It is seen that power flowing through the Tuticorin-Karaikudi line is re-injecting at Madurai and off-take through Karaikudi 400/230kV ICT is marginal. The requirement of this 400kV D/C line can not be justified as such and it is seen that two 400 kV transmission corridors to Karaikal and Madurai are over provision.

Option-II: [Exhibit II(a)-II(e)], It is seen that power flow through 400kV Tuticorin-Madurai quad D/C line is fairly within limits under normal and single circuit outage conditions and would cater to the evacuation requirement.

In view of above, Option-II is recommended. TNEB have also, subsequently conveyed to adopt this system vide their letter No. SE/SS/EE1/AEE1/F Stg. Committee/D410/2006 dated 19.1.06.

2.5 Transmission System for North Chennai TPS (2x500 MW)

Following three Alternatives were considered:

Alternatives	Transmission System
Option-I	(i) North Chennai -Alamathi 400 kV T-moose D/C line (ii) North Chennai- Melakotaiyur 400 kV T-moose D/C line (iii) 2x315 MVA 400/230 kV auto transformer at North Chennai JV TPS. (iv) 230 kV inter connection with existing North Chennai TPS.
Option-II	(i) North Chennai -Alamathi 400 kV Quad D/C (ii) 2x315 MVA 400/230 kV auto transformer at North Chennai JV TPS. (iii) 230 kV inter connection with existing North Chennai TPS.
Option-III	(i) LILO of Alamathy-Sriperumbudur 400 kV D/C at the North ChennaiTPS. (ii) Melakottaiyut-Alamathy 400 kV D/C line with twin moose conductor. (iii) 2x315 MVA 400/230 kV auto transformer at North Chennai JV TPS. (iv) 230 kV inter connection with existing North Chennai TPS.

Analysis of the power flow studies is given below:

Option-I: [Exhibit IIIa), III(b)] In the third Option, one 400 kV D/C line from North Chennai to Alamathy with quad conductor is considered to meet single circuit outage of the line. It is seen that the 400kV D/C line would be able to meet system requirement.

Option-II: [Exhibit IV(a), IV(b)] In Option-II, 400 kV D/C lines to Alamathy and Melakottaiyur are considered with twin moose conductor. It is seen that the power flow through the 400kV lines are within limits under normal as well as contingency situation and provides alternative technical solution.

Option-III: [Exhibit V(a), V(b)] In this option, a 400kV loop around Chennai is envisaged with LILO of Alamathy-Sriperumbudur 400 kV D/C line at North Chennai JV TPS, Melakottaiyur-Alamathy 400 kV D/C and existing Melakottaiyur- Sriperumbudur 400kV S/C line. From the results of the studies, it is seen that that power flow through the 400kV lines is normal both under normal and outage conditions.

It is observed that Option-III would provide better solution for reliable evacuation of power from North Chennai JV TPS. It would also enable to improve reliability and security of power supply in North Chennai area in view of formation of 400kV loop for Chennai. TNEB have also conveyed to adopt this system vide their letter No. SE/SS/EE1/AEE1/F Stg. Committee/D410/2006 dated 19.1.06.

2.6 Further regional system strengthening in other states would be needed to absorbe their allocation from Tuticorin and North Chennai. The same would be evolved based on allocation of 25% of power.

2.7 Members may discuss and concur to the above proposal that is option-II of para 2.4 for Tuticorin and Option-III of para 2.5 for Ennore.

3. TNEB's request for release of 230 kV bays of the Tirunelveli-Trivandrum 400kV (operated at 230kV) for TNEB

TNEB's request for providing three numbers of 230kV bays at Tirunelveli was discussed and accorded at their cost, in the previous meeting of the committee. TNEB have now requested to allot them, in future, two 230kV bays at Tirunelveli S/S which would get vacated after energizing the Tirunelveli – Trivandrum 400kV D/C line, presently operated at 230kV to 400kV in future time.

Members may discuss and concur to the proposal of TNEB.

4. APTRANSO'S Proposal for 400 kV Ring main around twin cities of Hyderabad and Secunderabad and Rangareddy district

APTRANSCO has formulated the transmission scheme to form a 400kV ring main around twin cities of Hyderabad and Secunderabad and Rangareddy district to meet the increasing load growth in and around Hyderabad and Rangareddy districts and to facilitate 400kV inter connectivity of Ramagundam, Gajwel, Yeddumailaram, Mamidipally, Ghanapur and

Malkaram for system strengthening, security and reliability of supply. The 400 kV works covered in the scheme are:

1. Gajwel – Yeddumailaram 400kV D/C line - 115 km
2. Yeddumailaram – Mamidipally 400kV D/C line – 74 km
3. LILO of Ramagundam – Ghanapur 400kV S/C line of Powergrid at proposed Malkaram 400kV S/S, 400kV D/C line – 32 km
4. Yeddumailaram 400/220kV (new) S/S, 3x315 MVA
5. Malkaram 400/220kV (new) S/S, 2x315 MVA
6. 400kV Bay Extensions- 2 Nos. at Gajwel 400kV S/S
7. 400kV Bay Extensions- 2 Nos. at Mamidipally 400kV S/S

The Gajwel 400kV S/S is proposed to be established by APTRANSCO by LILO of one circuit of Ramagundam – Ghanapur 400kV line of POWERGRID. This was agreed in the 20th meeting of the Standing Committee on Power System Planning in Southern Region. APTRANSCO now propose to establish a new 400 kV S/S at Malkaram by LILO of POWERGRID's 400kV S/C line between Ramagundam and Ghanapur. The scheme has been firmed-up by APTRANSCO based on the studies conducted by them and Japanese study group. The proposed 400kV S/S at Malkaram would provide alternate 400kV feed point for meeting the growing load demand of Hyderabad and would improve the reliability of the supply system. A sketch showing the proposed works is at ANNEX-I.

APTRANSCO may present their study.

Members may discuss and concur to the proposal of APTRANSCO.

5. Backup Transmission System for Talcher Stage II (4x500 MW) Power Evacuation and further system towards WR/NR.

5.1 Proposal of CEA for 400kV D/C line from Bhuvaneshwar (Mendhasal) to Gazuwaka via Berhampur with 50:50 transmission charge sharing between SR and ER together with SR seeking Long-term Open-access for 500 MW through ER system was agreed in the meeting of the SREB held at Hyderabad on 19.12.2005.

The proposal was taken-up in the Standing Committee of Eastern Region in its meeting held on 22.6.06 and the constituents of ER have sought some time to respond to the proposal and their response is awaited.

In the event ER constituents are not agreeable to the above proposal, the transmission system would need to be built with 100% transmission charges by SR constituents and SR seeking open access on short-term basis for wheeling through ER system. Members may concur.

5.2 There is also a need for strengthening of transmission system from Talcher towards Rourkela/Raigarh so that when SR is in surplus and wants to export its power from Talcher-II, the same could be transmitted towards WR/NR either directly or through displacement. Appropriate system could be evolved based on requirement of SR constituents for Long-term open access through ER system towards WR/NR.

Members may give their view and discuss.

6. Requirement of Reactors to contain the over voltages in the Southern Region.

It was decided in the 21st meeting of the Standing Committee held in September 2005 that requirements of reactors in the 400 kV system would be determined based on studies for light load conditions and a proposal would be worked out to be taken up as system strengthening scheme. The issue of over voltages in the SR grid was also discussed in the 138th SREB meeting wherein it was decided that POWERGRID would examine the issue for providing a long term solution to the problem through installation of shunt reactors.

The studies have since been completed by POWERGRID and a report containing the results of the studies has been received in CEA. The main features of the studies are:

i) The off-peak load demand of about 13000 MW has been considered. This is based on the data collected from SREB.

ii) 64 numbers of existing reactors (56 numbers line reactors and 8 numbers bus reactors) amounting to 3500 MVAR have been taken in these studies.

iii) One circuit of lightly loaded 400kV transmission lines which are generally taken out of service to control high voltages have been considered to be switched off.

Following cases for minimum load have been studied:

i) Base case –with existing reactors and opening of the lines as per existing practice - The results indicate high voltage profile throughout the grid (the voltage ranges between 416 kV and 445 kV).

ii) The above base case with the addition of 15 numbers of reactors of 63 MVAR each – the results indicate that provision of 15 numbers of reactors is not adequate to control the voltages under acceptable limits even with some of the transmission lines switched off. Even large generating stations like Ramagundam, Neyveli, Vijayawada, Raichur TPS are not able to hold their voltages as these are crossing reactive power absorption limit. As such these stations may also be considered for installation of bus reactors.

iii) The above studies have been repeated with additional reactors at 10 more locations (making it 25 locations). The studies have been made with and without opening of lines. The results indicate that there has to be a trade off between number of reactors and the number of lines taken out to control bus voltages. When the transmission lines mentioned above are out of service, the voltages at various buses are generally controlled and are less than 420 kV. With the above lines in, the voltages are higher going up to 431 kV. Therefore, it can be concluded that provision of large number of reactors to control the high voltages with all lines in service leads to sub-optimal utilization and there has to be trade-off between the number of reactors provided and the number of lines taken out of service to control bus voltages.

iv) Another case has been studied with reactors and regulation of HVDC flow while keeping some of the lines open. It is found that depending upon the system conditions, HVDC flow regulation may be utilized to minimize the line opening requirement.

v) Peak load case with reactors. This has been studied to identify the proposed reactors whether bus or line reactors resulting in cost optimization.

Recommendations

Based on the results of the studies 25 number reactors (20 bus reactors and 5 line reactors) of 63 MVAR each have been proposed. The name of the substation is given below:

Bus Reactors

S.NO	Bus Name
POWERGRID	
1.	Hosur
2.	Kolar
3.	Hiriyur
4.	Salem
5.	Munirabad
6.	Hyderabad (PG)
7.	Sriperumbudur
NTPC	
8.	Ramagundam
NPCIL	
9.	Kaiga
NLC	
10.	Neyveli-Expn
11.	Neyveli TS-II

S.No	Bus Name
KPTCL	
12.	Raichur TPS
13.	Talaguppa
14.	Davanagere
15.	Neelamangala
16.	Hoody
APTRANSCO	
17.	Simhadri
18.	Srisailam LBPH
19.	Kurnool
20.	Vizag

No. of Existing Reactors- 64 nos (56 line, 8 bus) =3500 MVAR

Line Reactors

S.No	Bus Name	Name of the Line
	POWERGRID	
1.	Trichy	Neyveli - Trichy- I
2.	Madurai	Madurai - Trichy-I
3.	Udumalpet	Salem – Udumalpet-II
4.	Trivandrum	Madurai – Trivandrum -I
	APTRANSCO	
5.	Hyderabad (AP)	Khammam-Hyderabad-I

Powergrid may make presentation on their studies. To meet the requirement of installation of required reactors, it is proposed that POWERGRID may formulate a comprehensive regional system strengthening scheme including required provision at all the substations that is their own as well as others so that the scheme could be implemented in a unified manner.

Members may discuss and concur.