

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

No. 26/10/2009-SP&PA/

Date: 24th December, 2010

To

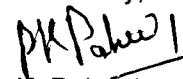
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Sub: 31st meeting of the Standing Committee on Power System Planning in Western Region.
Sir,

In continuation to our letter of even no. dated 16th December 2010 informing uploading of additional agenda for the above meeting, it is to intimate that subsequently an additional agenda item on Orissa UMPP has been proposed by PGCIL for inclusion in the 31st meeting of the Standing Committee on Power System Planning of Western Region scheduled to be held on 27th December 2010 (Monday) at 11.00 A.M.

The additional agenda on Orissa UMPP has been uploaded on CEA website (www.cea.nic.in) at the following link: Home page-Power Systems-Standing Committee on Power System Planning-Western Region). It may be noted that this item is proposed for deliberation in next Standing Committee meeting of Eastern Region.

Yours faithfully,


(P. K. Pahwa)
Director, SP&PA

Additional Agenda on Orissa UMPP

1.0 Transmission System Associated with the Orissa UMPP (5x800MW) and Phase-II IPPs in Orissa.

Transmission system has been evolved for UMPP generation project as well as IPP generation project coming up under phase-II in Orissa. Transmission system for phase-II IPPs in Orissa has also been finalized. The summary of the generation projects are given below:

Sl No	Generation Project	Installed Capacity(MW)	LTOA/LTA/Connectivity	Remarks
1	KVK Neelanchal	600	560	Scheme finalized, LTOA granted
2	Phase-I Orissa IPPs	10090	6080	Scheme finalized, LTOA granted
3	Orissa UMPP	4000	4000	Scheme evolved
4	Phase-II Orissa IPPs	12650	11882	Scheme evolved

- 1.1 Orissa Ultra Mega Power Project (4000 MW) shall be set up near Bhedabahal village in Sundergarh district of Orissa by Orissa Integrated Power Ltd. (OIPL) and OIPL has applied for grant of Long Term Open Access. Ministry of Power vide their letter No. 12/11.2010-UMPP dated 24-09-2010 allocated the power to following states from the Orissa UMPP (4000MW):

Eastern Region (1300MW)

1. Orissa 1300MW

Northern Region (1800MW)

1. Punjab 500MW
2. Rajasthan 400MW
3. Haryana 400MW
4. Utter Pradesh 300MW
5. Uttarakhand 200MW

Western Region (600MW)

1. Madhya Pradesh 400MW
2. Chhattisgarh 200MW

Southern Region (300MW)

1. Tamil Nadu 300MW

Total 4000MW

- 1.2 The unit wise commissioning schedule as indicated by generation developer is as given below:

Sl. No.	Unit	Commissioning
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		Schedule
1	1st Unit (800 MW)	Mar - 2016
2	2nd Unit (800 MW)	Sep - 2017
3	3rd unit (800 MW)	Mar - 2017
4	4th unit (800 MW)	Sep - 2017
5	5th unit (800 MW)	Mar - 2018

1.3 Phase-II IPP projects in Orissa

In addition to the Phase-I IPPs in Orissa for which transmission system has already been finalized, transmission system requirements for generation projects coming up under Phase-II (POWERGRID has received application for Connectivity/LTA for transfer of power to beneficiaries in different regions) have been evolved. The list of Phase-II IPP projects along with Phase-I IPP projects is given below:

Sl. No	LTA Applicant / Project	Installed Capacity (MW)	LTA/ Connectivity (MW)	Applied for
1. Phase-I Generation Projects				
1	Sterlite	2400	400	LTOA
2	GMR	1050	800	LTOA
3	Navbharat	1050	720	LTOA
4	Monnet	1050	900	LTOA
5	Jindal	1200	1044	LTOA
6	Lanco Babandh	2640	1600	LTOA
7	Ind Bharat	700	616	LTOA
	Total	10090	6080	
2. Phase-II Generation Projects				
1	CESC Ltd.(Orissa)	1320	1100	LTOA
2	Essar Power Ltd.	1200	900	LTOA
3	Navabharat Power Private Ltd(Phase-II)	1200	1100	LTOA
4	VISA Power Ltd	1320	1250	Connectivity
5	Mahanadi Aban Power Co Ltd	1320	850	Connectivity
6	Bhushan Energy Ltd	2640	2482	Connectivity
7	Tata Power company Ltd	1320	1000	Connectivity & LTA
8	GMR Energy Limited	350	220	Connectivity & LTA
9	J R Power Gen Pvt Ltd	1980	1980	Connectivity
10	Jindal	600	550	Connectivity

Sl. No	LTA Applicant / Project	Installed Capacity (MW)	LTA/ Connectivity (MW)	Applied for
1. Phase-I Generation Projects				
				& LTA
11	Sterlite	(already considered in Phase-I projects)	1000	LTA
	Total	12650	11882	

1.4 Evolution of Transmission System

A comprehensive transmission system comprising of high capacity transmission corridors from Orissa to Northern region via Western region has already been planned for evacuation of power from Phase-I Generation projects in Orissa and the same is under implementation. This high capacity corridor mainly consists of 765kV HVAC lines.

Keeping in view the techno-economical viability as well as operational flexibility of hybrid transmission system, high capacity HVDC transmission link supported with HVAC system has been evolved for evacuation of combined power from Orissa UMPP and Orissa phase-II IPPs by taking into consideration the following aspects:

- i) Due to uncertainty in progress and time-frame of Orissa IPPs, 50% dispatch of Phase-II IPPs (except Sterlite-II) has been considered for the load flow studies.
- ii) As the addition of Phase-II generation capacity is uncertain and is expected to be developed over a long period, the transmission system has been developed without any redundancy in the transmission system i.e. without considering N-1 contingency criteria of transmission planning. The augmentation in the transmission system would be planned depending upon the progress of generation projects.
- iii) It is also to mention here that a number of generation projects are expected to come up in coastal Andhra Pradesh (Srikakulam area) in Southern region. Accordingly, the power injection (1320MW) from these projects alongwith Angul-Jharsuguda-Dharamjaygarh 765kV D/c corridor (2nd corridor) planned for evacuation of power from these projects has been considered for evolution of transmission system.
- iv) In order to control the heavy rush of power in the underlying 400kV system the LILO of Rourkela-Raigarh line at Jharsuguda as well as the Orissa interconnection for delivery of its share from the UMPP project along with two units of UMPP generation project need to be isolated from the main evacuation system. Accordingly split bus arrangement has been proposed in Jharsuguda 400kV bus.

1.5 Transmission System for Orissa-UMPP

For Orissa UMPP, the evacuation has been planned through high capacity +800kV, 6000MW HVDC line from Orissa hub (Angul/Jharsuguda) to Bulandshahar in Northern region. As the state of Orissa has considerable share (1300MW out of 4000MW) from UMPP, the transmission system has been planned with two (2) drawl points for the state of Orissa. Depending upon the location of HVDC station in Orissa (Angul / Jharsuguda), following two alternatives of transmission system has been considered.

- ± 800 kV, 6000 MW HVDC Bi-Pole from Orissa hub(Angul/Jharsuguda) to Bulandshahar

Option-I

- ± 800 kV, 6000 MW HVDC Bi-Pole from Jharsuguda to Bulandshahar.
- UMPP-Jharsuguda 400kV 2x D/c line with Quad Moose Conductor.
- System Strengthening in NR and WR (to be identified)

Option-II

- ± 800 kV, 6000 MW HVDC Bi-Pole from Angul to Bulandshahar.
- UMPP - Jharsuguda 765kV D/c line.
- System Strengthening in NR and WR (to be identified)

- Power Supply to Orissa.

- 400/220kV, 2x315MVA substation at Kumarmundi
- Jharsuguda – Kumarmundi 400kV D/c line
- LILO of one ckt of IB – Meramundali 400kV D/c line at Jharsuguda

1.6 Transmission System for Phase-II IPPs in Orissa

Following Transmission System has been considered for Phase-II IPPs in Orissa.

<u>Dedicated Transmission System.</u>		
1	Essar Power Ltd.	Essar Power – Dhenkanal 400kV D/c with high capacity (Tripple Snowbird) conductor.
2	Navabharat Power Private Ltd(Phase-II)	Navbharat-Angul 400kV D/c line with Quad Moose conductor (Proposed with Phase-I Project)
3	CESC Ltd.(Orissa)	CESC – Dhenkanal 400kV D/c with high capacity (Tripple Snowbird) conductor.
4	VISA Power Ltd	Visa – Dhenkanal 400kV D/c with high capacity (Tripple Snowbird) conductor.
5	Mahanadi Aban Power Co Ltd	Mahanadi Aban– Dhenkanal 400kV D/c with high capacity (Tripple Snowbird) conductor.
6	Bhushan Energy Ltd	Bhushan-Dhenkanal 765 kV D/c line
7	Tata Power company Ltd	Tata Power – Dhenkanal 400kV D/c with high capacity (Tripple Snowbird) conductor.
8	GMR Energy Limited	GMR-Angul 400kV D/c line with quad Moose(Proposed with Phase-I Project)
9	J R Power Gen Pvt Ltd	LILO of one ckt of Angul/Dhenkanal - Jharsuguda 765kV line at JR Power
10	Jindal	Jindal – Angul 400kV D/c line (2 nd)
11	Sterlite	Sterlite – Jharsuguda 400kV D/c line (2 nd)
<u>Common Transmission System</u>		

New 4x1500MVA, 765/400kV substation at Dhenkanal.

LILO of Angul – Jharsuguda 765kV 2xS/c at Dhenkanal.

Angul-Jharsuguda-Dharamjaygargh 765 kV D/c line (Planned for southern region Projects)

1.7 Short Circuit Studies and Analysis-Splitting of 765kV Jharsuguda Bus

The Transmission System for evacuation of power from Phase-I Generation projects including Angul and Jharsuguda Pooling Stations in Orissa is presently under implementation. With the proposed system for connectivity of Phase-II Generation Projects and Orissa UMPP, the total power pooled at Angul, Jharsuguda & new Pooling Station at Dhenkanal are to the tune of 7550 MW, 8300 MW, 6500 MW respectively.

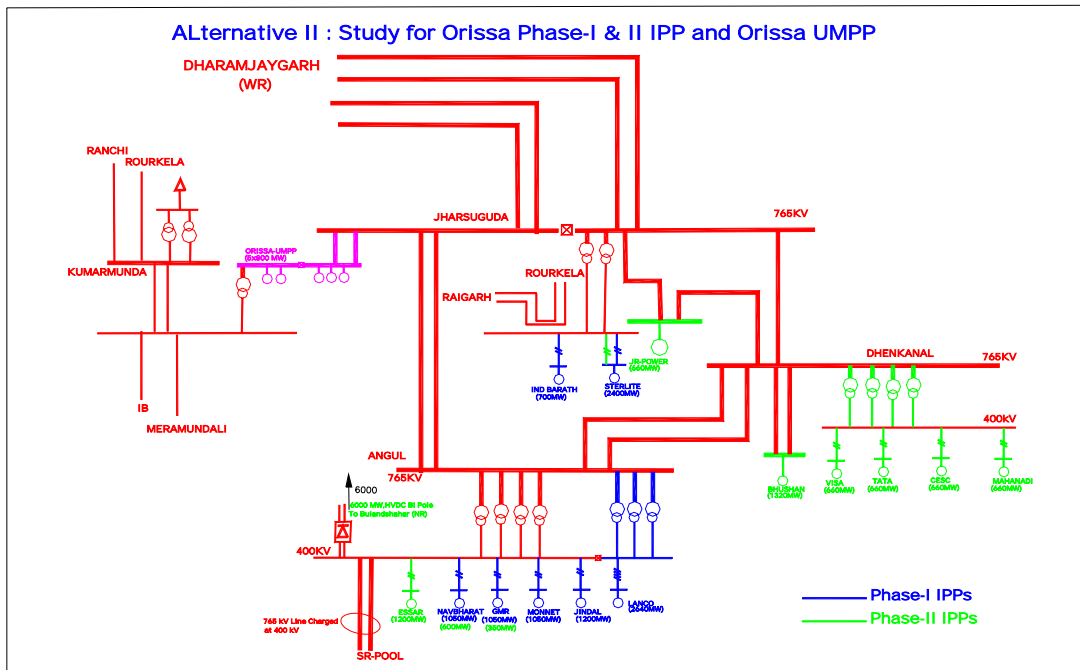
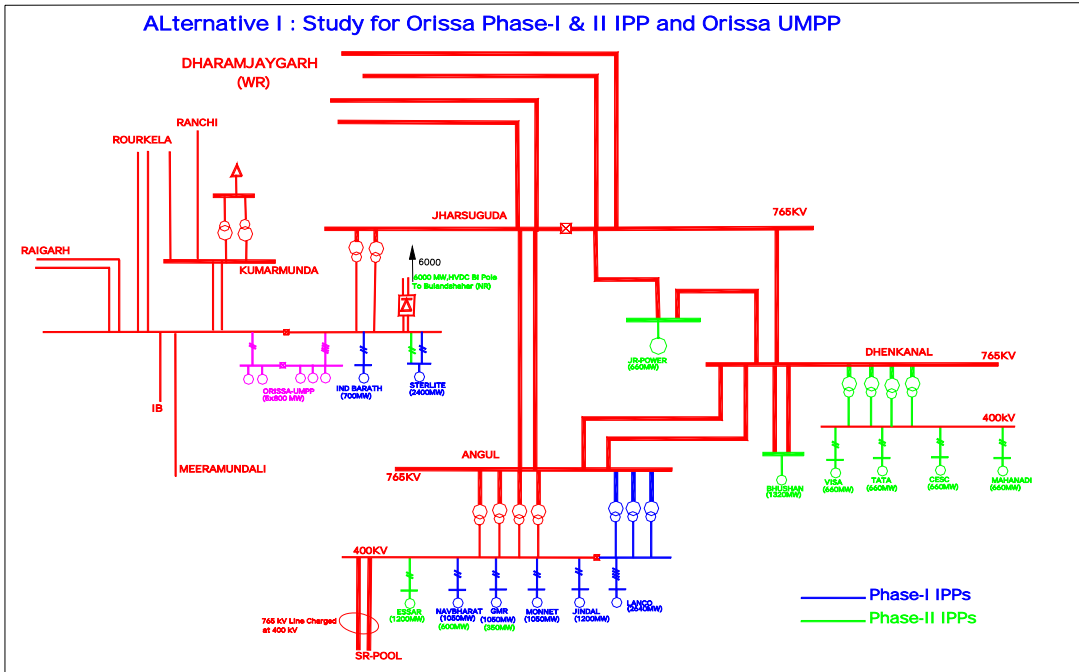
Short circuit studies have been conducted with above Generation Projects and proposed transmission systems. Results of the studies are given at Annexures. As per the studies, the short circuit level at Angul, Jharsuguda and Dhenkanal for various case studies are given below:

SI no	Cases	Short Circuit Level (kA)					
		Angul 400kV	Jharsuguda 400kV	Dhenkanal 400kV	Angul 765kV	Jharsuguda 765kV	Dhenkana 765kV
I Alternative-I (HVDC bipole line from Jharsuguda)							
Ia	3 UMPP M/c connected, 2 M/c isolated for Orissa (Annexure-Ia)	55	54 / 32	31	32	43	26
Ib	5 UMPP M/c connected (Annexure-Ib)	55	64	31	32	45	26
Ic	5 UMPP M/c connected, split of 765kV bus (Annexure-Ic)	55	61	31	32	35 / 25	25
II Alternative-II (HVDC bipole line from Angul)							
IIa	3 UMPP M/c connected, 2 M/c isolated for Orissa (Annexure-IIa)	55	39 / 21	32	32	47	26
IIb	5 UMPP M/c connected (Annexure-IIb)	55	42	32	32	55	26
IIc	5 UMPP M/c connected, split of 765kV bus (Annexure-IIc)	55	43	32	32	35 / 35	26

In view of high Short Circuit levels at Jharsuguda substation, it is required to split the Jharsuguda 765kV bus.

1.8 Power Flow Studies and Analysis

With the outcome of the short circuit studies resorting to split up of Jharsuguda 765kV bus, the schematic single line diagrams indicating UMPP ATS Alternative-I and Alternative-II of the proposed composite scheme is given below.



The power flow study for the above alternatives is enclosed at EXHIBIT-IIIA/A1 and EXHIBIT-IIIB/B1 respectively.

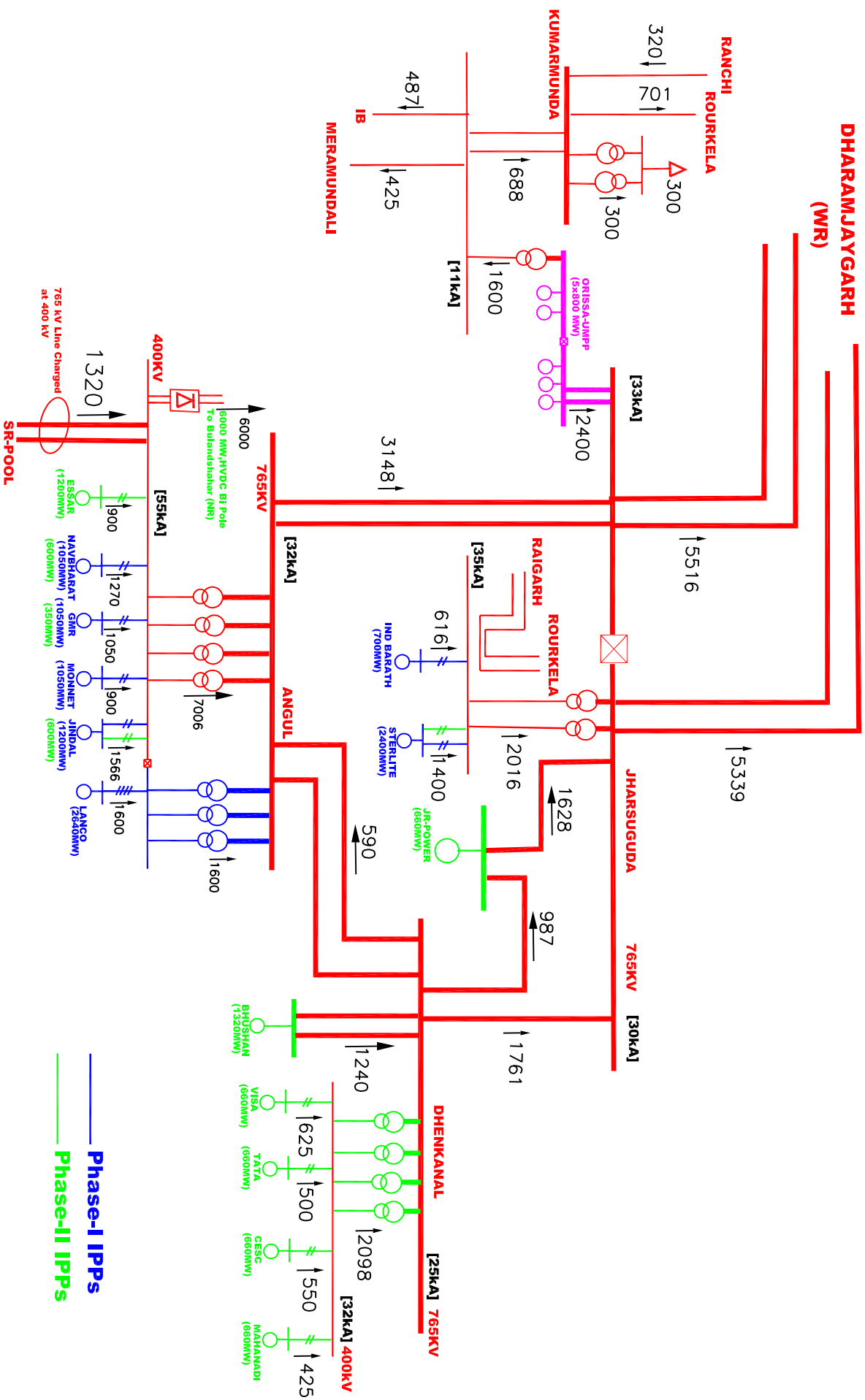
It has been observed that out of the two transmission alternatives proposed for UMPP, Alternative-I appears to be better option and can be adopted. However in this Alternative-I

(Exhibit-III), powerflow in the Angul- Jharsuguda section becomes critical (6978 MW) and this corridor needs to be strengthened at a later stage depending upon the growth of Orissa Phase-II IPP projects.

Further, for delivery of Orissa share, 400kV interconnection to Orissa grid from Jharsuguda substation has been planned. However, as soon as the Orissa grid gets connected with Jharsuguda, there is a huge flow of power through the 400kV interconnection apart from enhancement of short circuit level on either side. Accordingly, it is suggested that share of Orissa may be delivered in radial mode through segregating two units of Orissa UMPP at Jharsuguda 400kV bus.

Members may discuss and concur.

Alternative II: Study for Orissa Phase-I, Orissa UMPP, 50 % of Orissa Phase-II



Phase-I IPPs
Phase-II IPPs

Exhibit-III(b)

Load flow for Alternative-II

