

**Agenda for 15<sup>th</sup> Meeting of the Standing Committee on Transmission System Planning in Northern Region**

- 1. Confirmation of the minutes of the minutes of 14<sup>th</sup> standing committee meeting held at Jaipur on 30.12.2002**
  - 1.1 The minutes of 14<sup>th</sup> meeting of the Standing Committee on Power system planning of Northern Region held at Jaipur on 30.12.2002 were circulated to the constituents of Northern Region vide CEA letter No. 1/9/SP&PA-03/ 187-95 dated 13/2/03 . No comments on the minutes of the meeting have since then been received on the minutes of the minutes from any of the constituents. As such the minutes of the 14<sup>th</sup> standing committee may please be confirmed.
  
- 2. Provision for 2 nos. of 220 kV bay at Kishenpur for J&K.**
  - 2.1 Chief Engineer (System Operation) PDD, J&K had put up a request to CEA vide letter dated 8.2.03 for allocation of 2 nos. of 220 kV bay at Kishenpur to J&K for terminating the Kishenpur – Burn 220 kV D/C line. Chief Engineer, PDD, Jammu had also taken up the matter with POWERGRID who in turn have agreed in-principal for allocation of the bay to J&K subject to concurrence of CEA. It may be mentioned that 2 nos. of 220 kV line bay at Kishenpur were constructed as a part of Dulhasti contingency scheme. Subsequently, due to delay in Dulhasti generation programme, the contingency scheme has been dispensed with and have been replaced with the original evacuation proposal from Dulhasti at 400 kV level. As such the 220 kV line bay constructed at Kishenpur by POWERGRID for contingency plan are now lying vacant. The same can be utilized by J&K for drawl of their share of power from Dulhasti. So the same can be agreed to be handed over to J&K.  
**The members of the committee may concur on this issue.**
  
- 3. 400/220 kV ICT along with 2 nos. of 220 kV line bay at Wagoora S/S**
  - 3.1 CEA, on the request of PDD, J&K, had carried out the details study in transmission requirement in the Srinagar valley for the 10<sup>th</sup> plan period. The studies show that the loading at ICT at Wagoora increases more than 700 MW(result of the study is enclosed in Exhibit A-1). Presently 2 nos. of 2x315 MVA ICT are provided at Wagoora as a part of Uri evacuation system. It may be intimated that during the winter season the load of the valley increases

while the valley generation reduces and the drawl from the grid increase substantially. The existing 220 kV D/C line between Kiahenpur – Pampore gets critically over loaded. With the commissioning of 400 kV Wagoora - Kishenpur D/C line the winter demand of the Valley could be met provided an additional 400/220 kV 315 MVA transformer along with 2 nos. of 220 kV line bay is agreed for Srinagar valley. As such, it is proposed that a provision for 400/220 kV 315 MVA ICT along with 2 nos. of 220 kV line bay may be made at Wagoora S/S of POWERGRID.

**Members of the committee may concur on this issue.**

**4. Evacuation system from Sewa HEP St II 3x40 MW.**

4.1 Sewa HEP St-II (3x40 MW) is being commissioned by NHPC. The generation project has obtained the techno-economic clearance of CEA in October 2002. The generation at Sewa St II is likely to be commissioned by early 2007. The generation unit at Sewa St II would be stepped up at 132 kV level. NHPC have kept a provision for 3 nos. of 132 kV line bay at Sewa HEP switchyard. The matter regarding evacuation of power from Sewa HEP St II was discussed with POWERGRID on several occasions and Chief Engineer, CEA on 1<sup>st</sup> April 2003 had called a meeting with POWERGRID and NHPC to evolve an evacuation system from Sewa HEP. Wherein following evacuation arrangement were agreed:-

- (i) NHPC was asked to explore the possibility of one additional 132 kV bay.
- (ii) Sewa to Hiranagar 132 kV D/C line with Zebra conductor.
- (iii) Sewa to Khatua via Mahanpur 132 kV D/C line with Zebra conductor.

The above system was studied during winter load condition for evacuation of full generation from Sewa II (Copy of the study result enclosed in Exhibit- B-1) and it has been found to be adequate under normal as well as outage condition. As such the above system is recommended for evacuation of power from Sewa II subject to confirmation from NHPC regarding (i) above..

**Members of the committee may concur on this issue.**

**5. Transmission system for evacuation of power from Barh, Kahalgaon-II, Maithon (RB) TPS from Eastern Region to Northern Region and related transmission system strengthening in the Northern Region.**

5.1 The transmission system for evacuation of power from Barh, Kahalgaon-II, North Karanpura and Maithon (RB) TPS was discussed in the 14<sup>th</sup> meeting of the Standing Committee held at Jaipur on 30<sup>th</sup> December 2002. Presentations on the transmission system required for evacuation of power from above projects and also for evacuation of surplus power from the Eastern Region was made by CEA and POWERGRID in that meeting and all the constituents except UPPCL, who wanted some time for sending their comments, had given their ‘in-principle’ consent. It was concluded that, while the proposal as discussed in that meeting was prima facie in order, the same would be reviewed depending upon the beneficiaries as well as the time frame of these projects. It was also decided that UPPCL would sent their comments to CEA with in a month and other constituents could also intimate if they had any further observations.

5.2 Subsequently, neither UPPCL nor any other beneficiary constituents have sent any comment. However, as decided, the proposal has been reviewed in light of firm indication of time frame of the projects which is as under:

Kahalgaon –II (2x500)	December 2006, March 2007
Barh (3x660)	1 <sup>st</sup> unit March 2007
Maithon (RB) (2x500)	2006 – 2007

Firm indication for North Karanpura is not yet available. Accordingly, Daltonganj 765kV, where the power from North Karanpura was proposed to be pooled, together with 765kV Daltonganj-Balia and Daltonganj-Sipat 765kV lines has been excluded. Time frame for Hirma is also uncertain and therefore Hirma transmission system has also been excluded. The maximum import by Northern Region has also been limited in view of exclusion of North Karanpura and Hirma. Further, proposal of POWERGRID for locating the HVDC receiving end terminal at Bhiwadi instead of Bahadurgarh has been considered and system accordingly re-optimized. POWERGRID proposal for increasing Balia-Bhiwadi HVDC bi-pole capacity

from 2000MW to 2500/3000MW has also been studied. It is found that increasing of HVDC capacity does not help in reducing/ optimizing the requirement in AC system at this stage. Also, if HVDC were operated above 2000MW, it would call for additional strengthening in AC system to take care of outage of higher capacity of pole. Hence if additional HVDC capacity were provided at this stage, it would be kept unutilized till additional AC system is added with some future project. The plots of the various cases are at Exhibit I-1 to I-3, II-1 to II-7, III-1 to III-4, IV-1 to IV-2, V-1 and VI-1. The salient points are:

- (a) It is anticipated that Northern Region would have a deficit of 12000 MW of power during 2008-09 considering projection of loads as per 16<sup>th</sup> EPS.
- (b) About 8000 MW of power can be made available to Northern Region from ER. This includes NR shares plus unutilized ER shares in projects located in ER plus additional import out of ER/NER surplus.
- (c) Existing and already planned inter-regional transmission system connecting Northern Region from Eastern Region, viz. Sasaram HVDC back to back and Muzaffarpur–Gorakhpur (under Tala transmission system) would provide for power transfer capacity of about 2500 MW to Northern Region.
- (d) Additional transmission system with transfer capacity of about 6000 MW would need to be built in another 4-6 years in a phased manner matching with commencement of generation projects and short-term system strengthening needs of Northern Region.
- (e) **Base Case for 8000 MW import:** Load flow results of the base case for 2008-09 conditions with Northern Region load of 36700 MW and self-generation of 28600 MW is depicted at Exhibit-1. The import by NR under these conditions is of the order of 8100 MW. This is received as per the following:

Muzaffarpur-Gorakhpur 400 DC QUAD	2350 MW
Sasaram HVDC back-to-back	500 MW
Biharsharif-Balia 400 DC QUAD	1400 MW

Kahalgaon/Barh/Patna- Balia 400 2xDC QUAD	2700 MW
Malanpur-Agra 765 kV DC 400kV operation	1150 MW
Total	8100 MW

WR receives about 1600 MW from ER via ER-WR lines.

From Balia, the pooled power is transmitted into rest of the northern region over Balia–Bhiwadi 2000MW HVDC bi-pole, Balia–Luknow–Bareilly 400kV and Balia–Unnao–Agra 765kV operated at 400kV system. The 400kV AC lines carry about 450 MW per circuit and the 765kV operated at 400kV carry less than 600 MW.

- (f) Base case of this series has been studied for critical outage contingencies. The results of the following contingencies are reported:

SINGLE OUTAGE CONTINGENCIES

BASE CASE OF THIS SERIES:

Exhibit-I-1

Outage of (one circuit)	Exhibit	Observations
1. Barh-Balia 400kV DC QUAD	I-2	<ul style="list-style-type: none"> <li>• Loading of other circuits feeding Balia is well within limits</li> <li>• Flow on Muzaffarpur-Gorakhpur becomes 2382 MW which is also within limits.</li> </ul>
2. Muzaffarpur-Gorakhpur 400 kV DC QUAD	I-3	<ul style="list-style-type: none"> <li>• Loading on the other Muzaffarpur-Gorakhpur circuit is 1784 MW which is in limits</li> <li>• Flow on circuits feeding to Balia well within limits</li> <li>• Flow via WR increases by 75 MW</li> </ul>

OUTAGE OF SINGLE CIRCUIT WITH PRE-CONTINGENCY OF ONE POLE OUTAGE ON BALIA-BHIWADI HVDC Bi-POLE

BASE CASE OF THIS SERIES:

Exhibit-II-1

Outage of (one circuit)		Exhibit	Observations
1.	Balia-Lucknow 400 DC	II-2	<ul style="list-style-type: none"> <li>No criticality observed.</li> <li>Flow on other circuit of Balia-Lucknow is 588 MW which is within limits</li> </ul>
2.	Balia-Unnao 765 kV SC 400 kV operation	II-3	<ul style="list-style-type: none"> <li>No criticality observed.</li> <li>Flow on Balia-Lucknow 400kV DC becomes 1200 MW which is within limits</li> <li>Flow via WR increases to 1356 MW</li> </ul>
3.	Allahabad-Mainpuri 400kV DC	II-4	<ul style="list-style-type: none"> <li>The other circuit of Allahabad-Mainpuri carries 1045 MW. This line is with 95°C design and can take higher load up to this level. Series compensation on the line has also been recommended. However, under the pole outage pre-contingency, the loading on this circuit may have to be limited from operational consideration and this may require restricting the maximum import under the pre-contingency.</li> <li>No other criticality.</li> </ul>
4.	Lucknow-Bareilly 400kV	II-5	<ul style="list-style-type: none"> <li>No criticality.</li> </ul>
5.	Unnao-Bareilly 400kV	II-6	<ul style="list-style-type: none"> <li>No criticality.</li> </ul>
6.	Outage of second pole of Balia-Bhiwadi HVDC	II-7	<ul style="list-style-type: none"> <li>System requires about 2000 MVAR support in the area around Agra/Meerut/ Malanpur/Bina/ Lucknow/ Bareilly etc. Further, 400kV Agra-Bhiwadi DC line would be needed, in addition to Agra-Jaipur 400kV DC.</li> <li>It is proposed to provide SVC support for the above which would also be helpful in operational control of voltages. The exact specification and location of the SVCs to be finalized based on voltage sensitivity/transient/stability studies.</li> <li>In absence of above additional support, maximum import by NR under the pre-condition of one pole outage on Balia-Bhiwadi HVDC would need to be limited to 6200 MW</li> </ul>

OUTAGE OF SINGLE CIRCUIT WITH PRE-CONTINGENCY OF ONE POLE OUTAGE ON RIHAND-DADRI HVDC Bi-POLE

BASE CASE OF THIS SERIES:

Exhibit-III-1

Outage of (one circuit)		Exhibit	Observations
1.	Outage of second pole of Rihand-Dadri HVDC	III-2	<ul style="list-style-type: none"> <li>• Observations similar to those as in Exhibit II-7.</li> </ul>
2.	Outage of one pole of Balia-Bhiwadi HVDC	III-3	<ul style="list-style-type: none"> <li>• Observations similar to those as in Exhibit II-7.</li> </ul>
3.	Allahabad-Mainpuri 400kV DC	III-4	<ul style="list-style-type: none"> <li>• The other circuit of Allahabad-Mainpuri carries 1013 MW. This line is with 95°C design and can take higher load up to this level. Series compensation on the line has also been recommended. However, under the pole outage pre-contingency, the loading on this circuit may have to be limited from operational consideration and this may require restricting the maximum import under the pre-contingency.</li> <li>• No other criticality.</li> </ul>

(g) It has been found that if only one circuit of 765kV (at 400kV operation) is taken between Bina-Malanpur-Agra, the outage of this would not be met satisfactorily. As the second 765kV line between Bina-Malanpur-Agra was proposed to be covered with North Karanpura, the time frame of which has become uncertain, we may either have to provide this second line in the Kahalgaon/Barh time frame itself, or limit the amount of maximum import by NR. Case study with import by NR kept at 7000 MW level has therefore also been done. The result of Base case corresponding to 7000 MW import by NR is at Exhibit-IV.

(h) **Base Case for 7000 MW import:** Load flow results of the base case with Northern Region load of 35800 MW and self-generation of 28800 MW is depicted at Exhibit-IV-1. The import by NR under these conditions is of the order of 7000 MW. This is received as per the following:

Muzaffarpur-Gorakhpur 400 DC QUAD	2100 MW
Sasaram HVDC back-to-back	500 MW
Biharsharif-Balia 400 DC QUAD	1280 MW
Kahalgaon/Barh/Patna- Balia 400 2xDC QUAD	2570 MW
Malanpur-Agra 765 kV SC(only one ckt) 400kV operation	570 MW
Total	7020 MW

WR receives about 800 MW from ER via ER-WR lines.

- (i) The case of Exhibit-IV-1 studied for the critical outage contingency of outage of Bina-Malanpur with pre-contingency of outage of one pole of Balia-Bhiwadi bi-pole line is at Exhibit-IV-2. It is observed that with SVC support at Malanpur/Agra/Lucknow, the contingency can be met. As such, import of the order of 7000MW can be sustained even with only one line on Bina-Malanpur-Agra route.
- (j) POWERGRID had suggested that the Balia-Bhiwadi HVDC Bi-pole line be designed for higher capacity of 2500 MW (or 3000MW) so that the same corridor is used for increased transmission capacity. To analyze the impact of increased HVDC capacity on the transmission expansion plan, studies with Balia-Bhiwadi HVDC capacity of 2500MW and 3000MW and NR import of 8100 MW have been done. It is observed that this increase in HVDC capacity does not result in saving in AC network. Base case for the same are at Exhibit V-1 and Exhibit VI-1 respectively. The import by NR in these cases are received as per the following (flows for HVDC capacity of 2000MW corresponding to Exhibit I-1 are also indicated for comparison):

	Exhibit-I-1	ExhibitV-1	ExhibitVI-1
Balia-Bhiwadi HVDC Capacity	2000 MW (500kV)	2500 MW (500kV)	3000 MW (500kV)
Muzaffarpur-Gorakhpur 400 DC QUAD	2350 MW	2310 MW	2230 MW
Sasaram HVDC back-to-back	500	500	500
Biharsharif-Balia 400 DC QUAD	1400	1440	1500
Kahalgaoon/Barh/Patna- Balia 400kV 2xDC Quad	2700	2750	2820
Malanpur-Agra 765 kV DC 400kV operation	1150	1100	1050
Total losses in All India system	3363	3328	3323
Losses in Balia-Bhiwadi HVDC bi-pole	106	167	240

5.3 The total transmission system has been optimized and then project-wise transmission schemes have been identified. The proposal is following:

ROUTE	KILOMETERS	S/S	Project Cost
	400 DC	400 kV line bays	excluding line bays
765KV QUAD	400 DC	400 SC	
70	95	55 30	4.5
All figures are indicative only			

**System Strengthening NR Target 2005-06**

Kanpur-Auraiya 400 DC	70	4	71
LILO of Kanpur-Agra 400 SC at Auraiya	3	2	13
Bareilly Switching station of PG			15 19
LILO of Lucknow-Moradabad at BareillyPG	10	2	18



LILO of Bareilly-Mandola at bareilly 2xD/C	20	4		36
Bareilly-Moradabad 400kV SC		100	2	49
LILO of one circuit of Sasaram-Allahabad at Saranath			2	11
LILO of Sultanpur-Lucknow at Lucknow PG	30		2	32
				<b>249</b>

### System Strengthening NR Target 2006-07

Fixed sereis comp 40% on Allahabad-Mainpuri			40	50
LILO of Lucknow-Bareilly at Lucknow PG	40	2		39
Malekotla-Ludhiyana-Jullundur S/C	125	4		108
Ludhiyana S/Stn of PG			35	44
				<b>241</b>

### Bhiwadi de-pooling station and System Strengthening scheme of Northern Region \_Target 2005-07

Bhiwadi substation and LILO of B/gard-Jaipur - Transfer from RSEB account to Regional account wef April 2005			Proposal already agreed in last Standing Committee Meeting - Members may concur the proposed date of transfer	
LILO of Hisar-Jaipur at Bhiwadi	40	2		39
Bhiwadi-Agra 400kV DC	200	4		160
Agra-Jaipur 400kV DC	250	4		194
Bhiwadi-Moga 400kV DC	300	4		229
Provision of SVC support in NR system			600	750
				<b>1372</b>

### NR-WR Inter-regional (50% NR, 50% WR) Target 2006-07

Agra-Malanpur 765 kV SC 400kV OPERATION	110		2	<b>108</b>
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### Kahalgaon Ext.

Kahalgaon - Balia 400kV QDAD DC	340	2		415
Biharsharif-Balia 400kV QUAD DC	200	4		260
Balia-Mau 400kV DC	40	4		50
Tenughat-Ranchi 400 DC and Ranchi S/s of PG	80	4	25	109

Ranchi-Sipat 400 KV DC (in case Sipat Switchyard and 765kV lines from Sipat to Seoni covered under Sipat-II transmission systm are delayed, then, instaed of Ranchi-Sipat, it would be Ranchi-Rourkela-Raipur 400kV DC with TCSC at Raipur and the cost in that case would be about 500 crores)

Ranchi-Sipat 400 KV DC (in case Sipat Switchyard and 765kV lines from Sipat to Seoni covered under Sipat-II transmission systm are delayed, then, instaed of Ranchi-Sipat, it would be Ranchi-Rourkela-Raipur 400kV DC with TCSC at Raipur and the cost in that case would be about 500 crores)	400	4		298
Balia-LucknowPG 400 DC	350	4		263
LucknowPG-BareillyPG 400 DC	250	4		194

**1589**

### Maithon

MaithonRBTPS-MaithonPG 400 DC	25	2		28
MaithonRBTPS-Ranchi 400 DC	120	4		105
Balia-Unnao 765 SC 400kV operation	350	2		318
Unnao-Agra 765kV SC 400KV OPERATION	250	2		230
Agra-Meerut 765kV SC 400kV OPERATION	220	2		204

Meerut-Malerkotla 400 DC	300	4		229
				<b>1113</b>
<b>Barh</b>				
LILO of Kahalgaon-Balia at Barh 2xDC	10			12
Barh-Patna-Balia 400 QUAD DC and PatnaPG S/s	220	6	25	326
Balia-Bhiwadi HVDC bi-pole			2000	2500
Seoni-Bina 765kV SC 400kV OPERATION	330	2		300
				<b>3138</b>

5.4 Members may discuss and concur the above proposal.

## LIST OF ADDRESSES

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**Shri P K Tripathy**  
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**Fax Message**

**CENTRAL ELECTRICITY AUTHORITY  
SYSTEM PLANING AND PROJECT APRAISAL DIVISION**

**No.1/9/03-SP&PA/**

**Dated : 17 /05/03**

**-As per List enclosed-**

**Sub: The 15<sup>th</sup> meeting of the Standing Committee on Power System Planning of Northern Region.**

Sir,

The 15<sup>th</sup> meeting of the standing committee on Power System Planning of Northern Region would be held **on 30<sup>th</sup> of May 2003 at 1100 Hrs. in Manali, Himachal Pradesh at Hotel Kanishka, Near Circuit House, Mall, Manali.** The Agenda for the meeting has already been circulated vide our letter No. 1/9/2003-SP&PA/ 328-43 dated 1/05/02. Kindly make it convenient to attend the meeting.

The participants for the meeting may confirm their participation along with the details of their inward/outward journey to and from Manali to **Mr. D P Singh, Manager (HR), NTPC**, who would be the nodal officer for the arrangement of the meeting, **through phone (O) 01907-286248, ( R) 01978-222092 and Fax No. - 01978-245063, 01907-286306.**

Confirmation regarding your participation may also be sent to CEA in **Fax No. 011-6102045** or in E-mail address **krishna1950in@yahoo.com**

Yours faithfully,

**(A.K.Asthana)  
DIRECTOR(SP&PA)**