
Standing Committee on Power System Planning in Northern Region

Agenda note for 23rd meeting of the Standing Committee Meeting on Power System Planning of Northern Region

1. Confirmation of the minutes of 22nd meeting of the Standing Committee held on 12.3.2007 at Udaipur, Rajasthan.

The minutes of the 22nd meeting of Standing Committee on Power System Planning in Northern Region held on 12.03.2007 at Udaipur, Rajasthan , were circulated vide CEA letter No. 1/9/2004-SP&PA/135-150 dated 13.04.07 and subsequent corrigendum circulated vide CEA letter No. 1/9/2007-SP&PA/540-555 dated 15.06.07 and no Comments /objection from any constituents have been received so far, as such the minutes of the 22nd meeting of Standing Committee on Power System Planning in Northern Region along with the corrigendum circulated may be confirmed.

2. Review of Progress on Earlier Agreed Transmission Schemes

POWERGRID may give the progress of earlier schemes agreed in the Standing Committee Meeting on Power System Planning of Northern Region and are under implementation giving

- I. Date of firming-up in Standing Committee
- II. Target as in the standing committee meeting
- III. Date of FR for the scheme
- IV. Date of approval by PGCIL board or PIB as the case may be
- V. Date of award of the major part
- VI. Target date as of now
- VII. Reason for delay if any

3. Evacuation of power from Jhajjar TPS(1500 MW) to Delhi and Haryana

- 3.1 Jhajjar TPS (3x500 MW) would be located near Jhajjar, Haryana and would be developed by Aravalli Power Corporation Limited and the Beneficiaries of the power from Jhajjar are Delhi and Haryana in the ratio of 50:50. The generation projects has been programmed for commissioning before the Commonwealth Games to be held during 2010.

The evacuation proposal from Jhajjar was reviewed by Member (PS), CEA in a meeting taken by him on 25/07/07 with DTL, HVPN & Powergrid, wherein the following evacuation arrangements from Jhajjar TPS had been evolved.

- I. Jhajjar - Mundka 400kV D/C line
- II. Jhajjar - Daulatabad 400kV D/C line
- III. Daulatabad 400kV substation of HVPNL

- 3.2 The line from Jhajjar to Mundka substation is to benefit Delhi for enabling its drawal of power from Jhajjar. In a meeting taken by Secretary power on 12/12/07 regarding the evacuation system from Jhajjar TPS(1500 MW) and Dadri TPS(980 MW) it was decided that for delivering the share of Delhi from this project dedicated lines to Delhi from Jhajjar would be constructed by the generating company namely M/S Aravali Power Company Ltd and the cost of the transmission system would become a part of generation project cost and this part of the cost would be chargeable to Delhi in form of transmission charges.
- 3.3 For drawal of the Harayana's share of power from Jhajjar, HVPNL would construct 400 kV D/C line from Jhajjar up to Daulatabad together with a 400/220 kV S/S at Daulatabad. This would facilitate evacuation of total share of Harayana from Jhajjar as the demand in Daulatabad/Gurgaon are much more than 750 MW. Jhajjar - Daulatabad 400 kV D/C line together with Daulatabad 400kV S/S should be covered under the scheme for the absorption of the Harayana's share of power from Jhajjar TPS and would be constructed by HVPNL matching with Jhajjar timeframe.

Members may take note of above.

4. Transmission system associated with Dadri II TPS(2x490 MW)

- 4.1 NTPC is putting-up extension at Dadri Thermal by adding 2 more unit of 490MW each. Benefit of power from Dadri-II is for Delhi and U.P. in the ratio of 90:10. Expected commissioning was 2009-10. Evacuation system for this extension project had been discussed in the 21 SCM of NR and the following tentative system had been evolved keeping in view the short circuit level in the grid.

- NTPC would provide 2 nos. additional 400 kV bays at Dadri
- The 400 kV bus at Dadri would be split to have
- Thermal units of Stage-I
- Dadri-Panipat
- Dadri – Muradnagar
- Additional 400 kV bays

on one Section and

- Gas plant units
- Thermal units of stage-II
- HVDC
- Dadri-Mandola
- Dadri-G.Noida/Samaypur
- Dadri-Malaharkotla line

on the other section

- 4.2 The evacuation proposal from Delhi Exten. Was reviewed by Member (PS), CEA in a meeting taken by him on 25/07/07, wherein the following evacuation arrangements from Dadri II TPS had been evolved.
- i) 400kV Dadri – Bamnoli D/C line with part of the circuit between Badarpur – Bamnoli on multicircuit tower, if necessary.
 - ii) 400 kV bus at Dadri to be split into two portions in order to contain the short circuit level. The transmission lines emanating from Dadri switchyard would be rearranged as decided in the 21st Standing Committee Meeting, to enable suitable evacuation of power from Dadri Complex. (The studies have shown that with bus splitting and opening of the 400 kV Delhi ring on provision of 765 kV viz.a.viz. Agra-Mundka (Jhatikara More)-Merrut, the short circuit level issue gets addressed corresponding to Dadri extn.)
- 4.3 It was also discussed that as the Dadri-Bannoli line would be exclusively for transmission of Delhi's share from Dadri-II directly in to DTL system, this should be taken up as a dedicated transmission system of Dadri-II. Accordingly, building of line is to be arranged by NTPC, the generator and transmission charges recovered only from Delhi. DTL also planed to have a 400 kV S/S on this line near Maidan Garhi.
- 4.4 For evacuation of U.P.'s share of 10% power from Dadri II, UP has requested for providing direct 220 kV feeder to U.P from 220 kV Dadri switchyard. However this would have an implication on the short circuit level at Dadri and as such needs to be examined. In case feasible, it would be provided, otherwise, UP may be allowed to draw its share of power from Dadri II by displacement from the existing system without tariff implication.

Members may take note of above.

5. Transmission system associated with Bawana CCGT (1500 MW)

- 5.1 Bawana CCGT (1500 MW) in North West of Delhi at Bawana had been proposed by IPGCL, the project was for benefit to Delhi only. The generation at Bawana as per IPGCL was expected in 2009 before the ensuing Commonwealth Games in 2010. While evolving the evacuation system from Bawana CCGT, the issue of fault level condition existing in Delhi network was considered to be an important factor. Keeping in view the high fault level problems in the 400 kV ring main around Delhi and in 220 kV Delhi network, it was felt that the power from Bawana need to be fed to Delhi radially. On the basis of result of the study following system was suggested
- (i) Stepping up the generation of Bawana CCGT at 400 kV
 - (ii) Creation of 2 nos. of new 400/220 kV, 3x315 MVA S/S -one in the North Delhi and one near Loni Road
 - (iii) Bawana CCGT -North Delhi (new) 400kV S/S -Loni Road (new) 400kV S/S 400 kV D/C quad line

For connectivity of the Bawana CCGT with the rest of the grid, basically to provide support to the power station under contingency and at the same time addressing the issue of short circuit level, the 400 kV D/C line from Bawana to Bahadurgarh/Hissar can be opened from Bawana 400kV S/S end and terminated at Bawana CCGT switchyard.

- 5.2 In a meeting taken by Member (PS), CEA on 7/12/07 DTL had suggested that considering the high fault level of Delhi system and the problem of availability of suitable/adequate land near Bawana for a new 400 kV S/S, Power from Bawana CCGT could be fed to the existing Bawana 400 kV S/S with split bus arrangement to contain the short circuit level. If the space for the bays are available at Bawana 400 kV S/S the line to North Delhi(new) and Loni Road (new) could be from split bus section of Bawana 400 kV S/S and in that case Bawana CCGT would have 2 nos. of 400 kV line Bawana 400kV S/S would have 4no.s of additional 400 kV line bays. However, if adequate space is not available at Bawana 400 kV, then line to North Delhi-Loni Road would be from Bawana CCGT and in that case Bawana CCGT would have 4 nos. of 400 kV line bays and Bawana 400 kV would have 2 Nos. of additional 400 kV line bays. Further, the line from Bawana 400 kV S/S going to Bahadurgarh/Hissar should also be connected to the same bus section as that of the Bawana Gas units.
- 5.3 It was also noted that in the above arrangement, the 400 kV line to Bahadurgarh/Hissar would get delinked with the existing Bawana 400 kV bus of Delhi Ring. In the present system, this provided an alternate path for flow of power in the event of disturbance and separation of East-West corridor of Northern Region. In order to retain the alternate path, it was also decided that the existing link between Bahadurgarh- Bawana 400kV S/S should be splitted to split bus at Bawana only when the 400 kV Abdullapur-Sonepat-Bahadurgarh D/C line was commissioned and considering the urgency of the system associated with Bawana CCGT and construction of the 400 kV Abdullapur-Sonepat- Bahadurgarh D/C line needs to be expedited to match with the Bawana CCGT transmission system.

Members may discuss and concur on the issue.

6.0 Region System Strengthening Scheme – New Proposal

The following proposal for Northern Region System Strengthening have been received/suggested :

State	Proposal	Purpose	Remarks
<u>Haryana</u>	1. 400 kV Gurgaon (PGCIL Sector 72)-Daultabad 400 kV Quad D/C	For meeting increasing demand of Gurgaon to be fed from Daultabad with reliability.	This would also facilitate grid connectivity of Jhajjar TPS via Daultabad.
	2. 400 kV S/S at Gurgaon (4 th S/S) (2x315 MVA) Sector 20 by using Samaypur-Barnauli 400 kV D/C.	Meeting increasing demand of Gurgaon.	Samaypur- Barnauli 400 kV D/C is passing close to proposed location.
	3. Creation of 400/220, 2x315 MVA S/S at Faridabad (Nawada)	For meeting increasing demand of Faridabad area with a connectivity from grid.	400 kV D/C Dadri-Samaypur line could be LILoed at Nawada from the same ckt on which LILo is for G.NOIDA
	4. Creation of 400/220, 2x315 MVA S/S at Mandkola (in distt Faridabad)	For meeting increasing demand in the area	This S/S can be created through LILo of Agra – Gurgaon line
	5. Establishment of new 400/220 kV, 2x315 MVA S/S at Mohindergarh (Dhanonda)	The S/S has been proposed to be Created by LILo of the Existing 400 kV Hissar – Jaipur (to be LILoed at Bhiwadi). The line would facilitate reliable supply of power in the south western part of Haryana.	Mohindergarh could be on Bhiwadi – Hissar line

	6. 2 nos 400 kV bays and 2 nos. 220 kV bays at Fatehabad (Danger) S/S	To feed Choner 220 kV S/S and connection with proposed Hissar-Sirsa 400 kV D/C line of HVPNL	Would facilitate meeting additional demand of Haryana as well provide connectivity to Hissar TPS. If long term injection from Hissar TPS is envisaged, the same should be tied-up. Otherwise, STOA capacity may be limited.
<u>Punjab</u>	1. Preponing of LILO of Nalagarh – Kaithal line at 400kV Phagan Majra (Patiala Station) and 3 rd 315 MVA ICT at Phagan Majra 400 kV S/S	To equitably distribute the loading on the line section between Nalagarh to Phagan Majra S/S (Patiala S/S) which remains very high and Nalagarh to Kaithal section which remains low.	The LILO of Nalagarh – Kaithal line at Patiala is covered as a part of transmission system for Rampur HEP. Installation of 3 rd 315 MVA 400/220 kV S/S at Phagan Majra, is needed for maintaining proper power supply in that area.
	2. Installation of 3 rd 315 MVA 400/220 kV S/S at Malerkotla.	To meet increasing demand at Malerkotla.	Existing 2x315 MVA ICT are getting overloaded.
<u>Rajasthan</u>	400/220 kV, 2x315 MVA S/S at Kotputli, Neemrana and Jaipur(new).	To meet increasing demand at these areas.	Kotputli could be fed via a new 400 D/C line from Bhiwadi and the line could be further extended up to Hissar so as to provide strengthening of outlets from Bhiwadi. Neemrana could be fed by LILO from Bhiwadi – Jaipur section of Bhiwadi LILO on Hissar – Jaipur. Feeding lines to Jaipur (new) would

			depend on its location. PGCIL may find the S/S location and the feeding lines would be decided accordingly.
<u>UP</u>	1. 400/220 kV, 2x315 MVA substation at Hapur	To meet increasing demand at these areas.	The S/s to be created by LILO of both ckts of Bareilly – Meerut/Mandaula 400 kV D/C line.
	2..400/220 kV, 2x315 MVA substation at Shamli	To meet increasing demand at these areas.	The S/S to be created by LILO of both ckts of the Meerut-Kaithal 400 kV D/C line.
<u>H.P</u>	1. 2x315 MVA S/S at Hamirpur	To meet increasing demand at these areas.	The S/S to be created by LILO of both ckts of Parbati/Panarsa PS-Amritsar 400 kV D/C line
<u>Uttrakhand</u>	1. 2x315 MVA S/S at Dehradun The S/S to be created by providing 400kV D/C line from Roorkee 400kV s/s	To meet increasing demand of the capital city.	.For grid connectivity which would also be useful for power evacuation, 400kV D/C line from Dehradun to Sahmli with 400kV s/s at Saharanpur enroute could also be considered.
<u>J&K</u>	1. 2x315 MVA S/S at New Wanpoh by LILO of both ckts of Kishenpur – Wagoora 400 kV D/C	For meeting increasing demand of Kashmir valley	A new 400 kV D/C line for Kishenpur to Wagoora would also be needed. This should be with quad conductor.
	2. Establishment of new 400/220 kV, 2x315 MVA S/S at Samba (Jammu)	To meet the increased demand of that area reliably.	The S/S could be established by providing 400 kV D/C line from Kishenpur to the new S/S at Samba.

7.0 **Second 400 kV line from Dulhasti HEP(3x130 MW)**

7.1 The combined transmission system associated with Dulhasti HEP (3x130 MW)

with the following elements was accorded TEC of CEA on April 2000

- Duhlasti to Kishenpur 400kV 2xS/C
- Kishenpur to Wagoora 400kV D/C line

However, while considering the scheme for PIB, the PIB made the following observations :-

“as power from Dulhasti HEP can be evacuated with the 1st ckt of 400 kV S/C Dulhasti – Kishenpur which is already completed , 2nd ckt. of 400 kv S/C Dulhasti – Kishenpur line may be deffered for the time being. The cost on this account would be deducted from the project cost. The situation may be reviewed some time during 2002 depending upon the progress made by various generation projects in this area.”

7.2 As such PIB agreed and cleared the following transmission system associated with Dulhasti HEP (3x130 MW).

- Duhlasti to Kishenpur 400kV S/C
- Kishenpur to Wagoora 400kV D/C line

7.3 Presently the Dulhasti HEP (3x130 MW) is operational with the following evacuation system

- Duhlasti to Kishenpur 400kV S/C

The Kishenpur to Wagoora 400kV D/C line is completed , however the line is to facilitate export of power from other generation projects in the valley during summer and for import of power from the grid for meeting the increased winter peak demand of the Kashmir valley.

7.4 NHPC have recently indicated that with frequent tripping of Dulhasti - Kishenpur S/C 400 kV line there has been bottling of Dulhasti power and has therefore requested that a second circuit may be constructed.

The Members of the Committee may discuss.

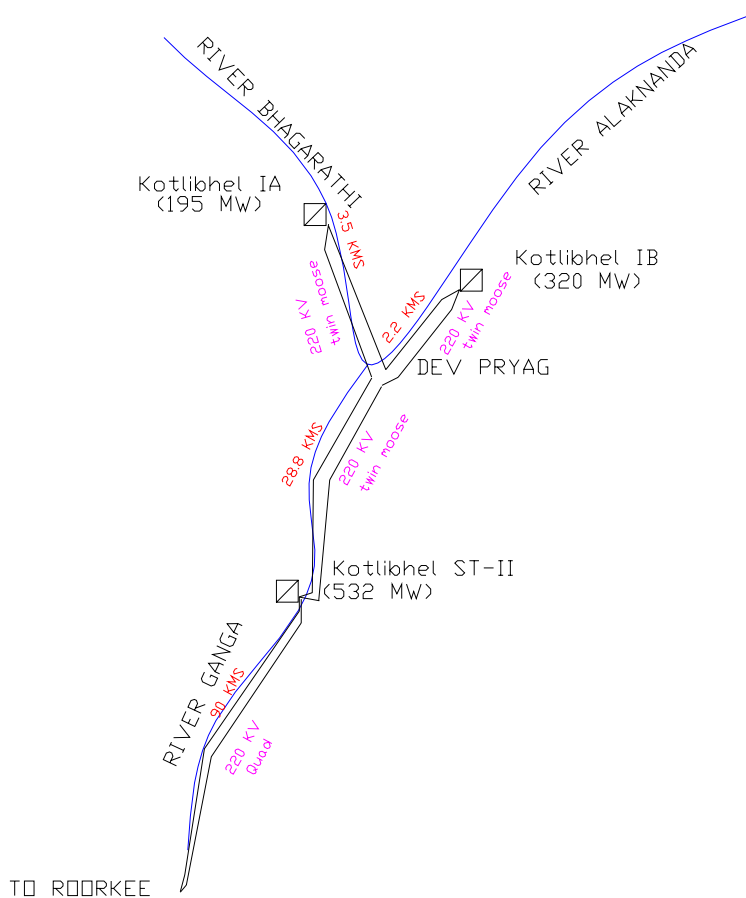
8. **Evacuation system from Kotlibhel IA(195 MW), IB (320 MW) and Kotlibhel II (530 MW) HEPs in Uttarakhand.**

8.1 Kotli Bhel HEP St IA is located at about 3.5 kms. upstream of Devprayag confluence in River Bhagarathi near village Muneth. The project is a run of the river scheme and envisages installation of 3x65 MW machines totaling to 195 MW. Kotli Bhel HEP St IB is located at about 2.2 kms. upstream of the confluence of River Bhagarathi and Alaknanda at Devprayag in district Garhwal of Uttatanchal. The project envisages installation of 4x80 MW machines totaling to 320 MW. Kotli Bhel HEP St-II is proposed to be located

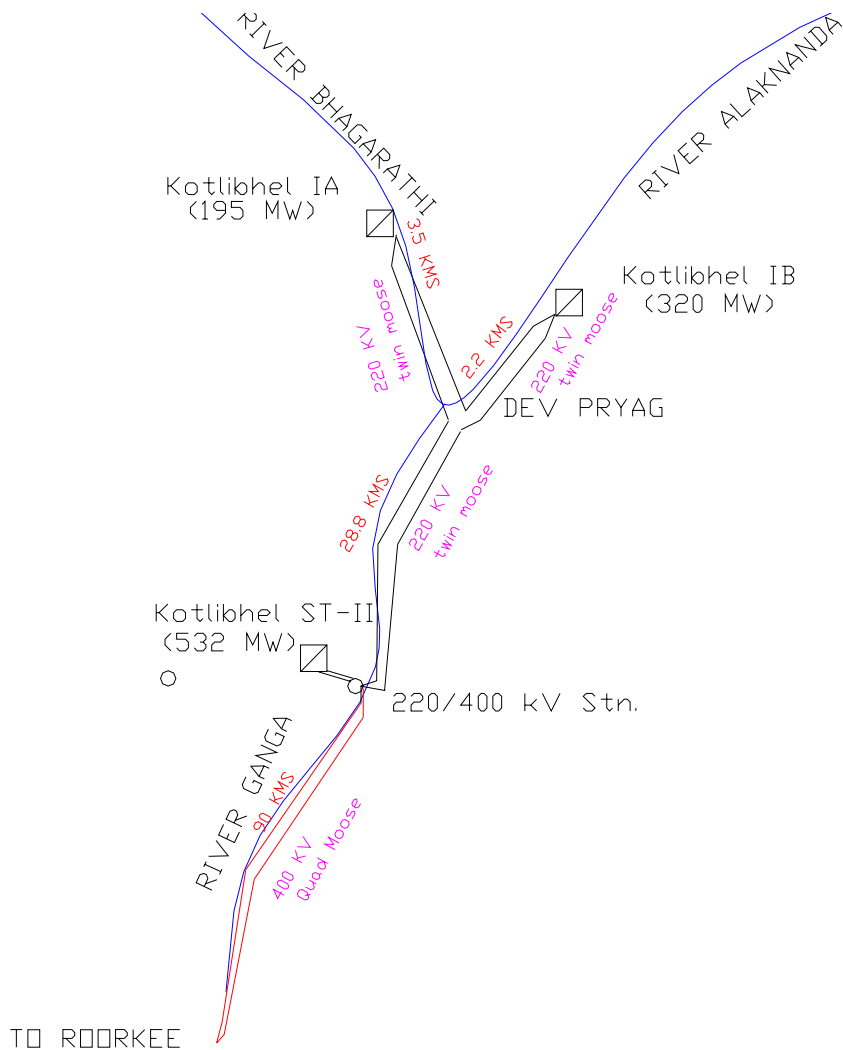
28.8 km down stream of Devprayag confluence. This would be about 90 km from Roorkee 400/220 kV S/S of PGCIL.

8.2 For evacuation of power from Kotli Bhel IA, IB and Stage II stepping up at 220 kV and evacuation upto Roorkee at 220 kV has been evolved as following :

- Kotli Bhel IA – Roorkee 220 kV D/C twin/quard line (125 km)
(Twin up to Kotli Bhel II : 35 km)
(quad between Kotli Bhel II – Roorkee : 90 km)
- LILO of one circuit of Kotli Bhel IA – Roorkee 220 kV D/C line at Kotli Bhel IB (220 kV D/C : 2km)
- LILO of both circuit at Kotli Bhel II (220 kV D/C twin : 1km)



For meeting the contingency outage of one circuit , the 220 kV twin/Quad lines have to be with higher specification viz. Gap or Lapwrig and the line designed with higher temperature specification. Also, if space is available 220/400 kV stepup S/S and thereafter 400 kV D/C Quad moose line upto Roorkee could be considered.



- 8.3 The above system is proposed to be constructed by Power Transmission Corporation of Uttaranchal Limited PTCUL. NHPC have intimated to have signed up MoU with Govt of Uttarakhand for development of Kotlibhel projects. Teriff for the scheme would be recovered by PTCUL from generation developer or power purchaser.

The Members of the Committee may discuss and concur.

9. Evacuation of power from Chamera III HEP (230 MW)

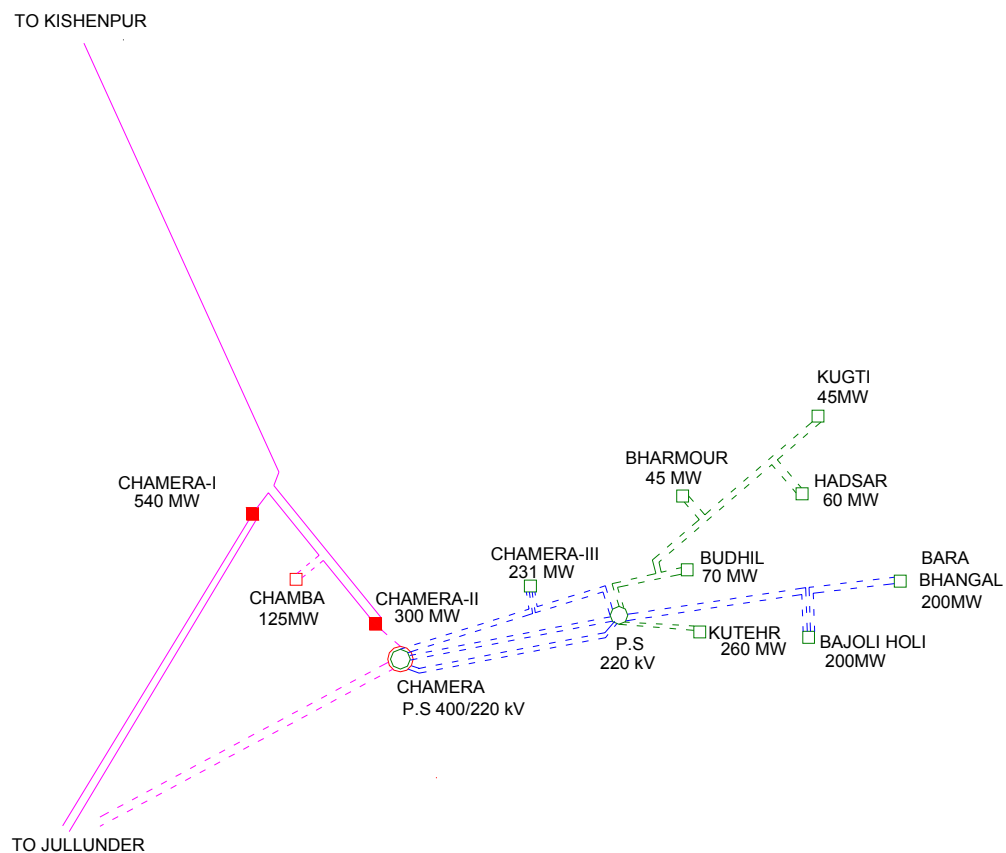
- 9.1 The power evacuation from Chamera III HEP was discussed in the 19th Standing Committee Meeting for transmission system planning of Northern Region. Wherein following systems were agreed for evacuation of power from Chamera III HEP :-

- i) Creation of 400/220kV pooling station near Chamera II
- ii) 220kV D/C line from Chamera III to Chamera pooling station

- iii) Inter-connection between Chamera II and Chamera Pooling station by 400kV S/C line
- iv) Chamera pooling station to Jullundhur 400kV D/C line

9.2 It may be mentioned that NHPC has indicated commissioning schedule of July 2010 for Chamera III project. The other projects which are expected in that Rabi basin upstream of Chamera III are Budhil HEP (70 MW), Kutehr HEP (260 MW), Barb Bhangal HEP (180 MW), Bijoli Holi (200 MW). Out of this Budhil HEP with 70 MW has already been allocated to M/s. Lanco.

9.3 Considering the severe R-O-W constrain in the hilly region, CEA in consultation with HEPSEB and Powergrid have evolved an integrated system for evacuation of power from the Rabi basin project. The details of the systems is as under:-



9.4 For evacuation of power from the projects upstream of Chamera-II, a 400/220kV pooling station is planned near Chamera-II which is required matching with Budhil HEP which would be the next project in the valley. This pooling station would be connected to Chamera-II through a 400kV S/C line and to Jullundhar through 400kV D/C line. The line to Jullundhar would be needed with the next generation project which is Chamera-III. A 220kV pooling station at a suitable location upstream of Chamera III is also proposed where power is proposed to be pooled and transmitted to Chamera-

II 400/220kV pooling station through three numbers of 220kV D/C lines with 1xMoose conductors.

9.5 Since the Budhil HEP is the first project coming in the area and is ahead of Chamera III and other HEPs, the first 220kV D/C line with 1xmoose conductor from Budhil to Chamera-II PS is to be constructed matching with Budhil HEP. Till commissioning of Chamera-III HEP, this line would be evacuating only Budhil power. After commissioning of Chamera III, the line between Chamera III and Chamera II PS would be common and become a part of regional system. After commissioning of other projects, the section between proposed pooling station near Budhil/Kutehar and Chamera III would also become common and become a part of regional system. In view of the above requirement, the following regional transmission schemes are required:-

- (i) pooling station near Chamera II
- (ii) 2x315 MVA, 400/220 kV transformers with bays at Chamera II PS
- (iii) Chamera II PS – Jullundhur 400 kV D/C line with bays on both sides
- (iv) 80 MVAR bus reactors with bay at Chamera II PS
- (v) Provision of 6 nos. of 220 kV line bays at Chamera II PS
- (vi) Budhil – Chamera II PS 220 kV D/C 1x moose (bays at Chamera II PS covered in (v) above and bays at Budhil to be provided by generation developer)
- (vii) LILO of both ckts of Budhil –Chamera II PS 220 kV D/C at Chamera III (2 bays covered under Chamera III generation project and 2 bays to be covered under transmission scheme)
- (viii) 220 kV pooling station near Budhil/Kutehar
- (ix) LILO of both ckts of 220 kV D/C line from Budhil HEP at proposed pooling station near Budhil/Kutehar
- (x) Budhil/Kutehar PS – Chamera II PS 220 kV 2xD/C lines with 1x moose conductors with bays at Budhil/Kutehar PS (bays at Chamera II PS covered under (v))
- (xi) Space for bays at Budhil/Kutehar PS for incoming lines as per plan

9.6 Works at (i), (ii), (iii), (iv), & (v) have already been agreed and are under construction by PGCIL. Of these, works at (i), (ii) and 2 bays of (v) are scheduled for commissioning matching with Budhil HEP and (iii) & (iv) matching with Chamera III and the remaining 4 bays of (v) with the 2xD/C 220 kV lines from Budhil/Kutehar PS.

Work at (vi) is being implemented by generation developer of Budhil HEP matching with their generation project expected by end 2009.. As the section of this line from Budhil/Kutehar PS to Chamera II PS, which is the major part, would be common system, the developer would need to seek CERC approval for tariff to be subsequently shared by Chamer-III and other generation projects.

Transmission scheme for Chamera III evacuation would be LILO of both ckts of Budhil –Chamera II PS 220 kV D/C at Chamera III (2 bays covered under Chamera III generation project and 2 bays to be covered under transmission scheme). Chamera-III – Chamera-II PS section of line from Budhil would also

become a regional line with pooled transmission charges and the regional injection point for Budhil would shift to Chamera-III. .

- 9.7 With regard to transmission charges, all provision at Chamera II PS should form a part of regional system from beginning. Though, initially only Budhil HEP power would be injected, as 70 MW of Budhil HEP would share the regional transmission charges, the required facilities at Chamera II PS should be pooled in the regional charges.

The Members of the Committee may discuss and decide.

10. Sharing of charges for transmission system associated with Sasan and Mundra UMPPs

- 10.1 Evacuation system and system strengthening for Sasan and Mundra UMPPs has already been discussed and agreed in earlier meetings. However, signing of BPTA has not materialized due to those not having share in these generation projects opposing the pooling of transmission charges for these systems. In a series of meeting with the constituents of Western Region it has emerged that the total transmission system is divided into generation specific and common purpose components. The generation specific component is proposed to be shared only by beneficiaries in the generation in ratio of their allocation. Common purpose component is proposed to be pooled with the regional system and the additional generation and its allocations also considered in working out revised transmission charge sharing ratios.
- 10.2 Identification of generation project specific and common purpose components of the transmission system, as proposed, is as following:

ATS for generation projects: Proposed components exclusively required with the specific generation project

1.	<p>Mundra UMPP 4000MW (Transmission charges to be shared only by beneficiarries of Mundra UMPP in ratio of their allocated power)</p> <p>(1) Mundra-Limbdi 400 kV D/C (Triple Snowbird)</p> <p>(2) Mundra-Ranchhodpura 400 kV D/C (Triple Snowbird)</p> <p>(3) Mundra-Jetpur 400 kV D/C (Triple Snowbird)</p>
2.	<p>Sasan UMPP 4000MW (Transmission charges to be shared only by beneficiarries of Sasan UMPP in ratio of their allocated power)</p> <p>(1) Sasan-Satna 765 kV 2x S/C</p> <p>(2) Satna 765/400 kV, 2x1000 MVA S/S</p> <p>(3) Satna- Bina (PG) 765 kV 2x S/C</p> <p>(4) Bina(PG)-Bina(MP) 400 kV D/C (2nd line)</p> <p>(5) LILO of both circuits of one of the Vindhyachal-Satna 400 kV D/C line at Sasan 400 kV 2xD/C</p> <p>(6) FSC on 400 kV Sasan-Satna D/C</p> <p>(7) FSC on both of Satna-Bina 2xD/C</p> <p>(8) Line bays for 765kV operation of Agra-Gwalior-Bina-Seoni lines</p> <p>(9) Sasaram-Fatehpur 765kV S/C</p> <p>(10) Fatehpur-Agra 765kV S/C</p>

System strengthening in Northern region – transmission charges to be pooled in the regional system and additional 3800 MW of NR share in Sasan and Mundra UMPPs to be included in working out the ratios for sharing of regional pooled transmission charge

1.	Agra-Sikar 400kV D/C quad
2.	New 400/200kV 2x315MVA s/s at Sikar with 220kV D/C line interconnecting to 220kV s/s
3.	Sikar – Jaipur PG 400kV D/C
4.	Sikar – Ratangarh 400kV D/C
5.	LILO of both circuits of Nathpajahkri-Abdullapur 400kV D/C at Panchkula with 2x315MVA, 400/220kV S/S at Panchkula

10.3 Power allocation from Mundra, Sasan and Krishnapatnam UMPPs

	Mundra	Sasan	Total Sasan+Mundra
WR			
M.P.		1500	1500
Chattisgarh			
Gujrat	1900		1900
Maharashtra	800		800
TOTAL WR	2700	1500	4200
NR			
Delhi		450	450
U.P.		500	500
Uttarakhand		100	100
Punjab	500	600	1100
Rajasthan	400	400	800
Haryana	400	450	850
TOTAL NR	1300	2500	3800

10.4 It may also be noted that the standard/tested line designs are available for triple Snow bird conductors but not for Triple Moose conductors. The testing of new line design with Triple Moose conductor will add to the existing cost of the lines. Also the thermal capacity of the Triple Snow bird (1625 MVA at 85⁰ C) and Triple Moose (1635 MVA at 85⁰ C) conductor is almost same. Therefore, for the triple conductor 400kV D/C lines from Mundra UMPP, triple Snow bird conductor would be adopted.

Members may take note, discuss and concur.+