Summary record of discussions held during 22nd meeting of the Standing Committee on Power System Planning of Northern Region on 12th March 2007 at Udaipur.

List of participants is at Annex.

Member (PS), CEA welcomed the participants and thanked RVPNL for hosting the meeting. Thereafter the agenda items were taken up

1. Confirmation of the Minutes of the 21st meeting of the Standing Committee held on 03.11.06 at New Delhi.

1.1 CE (SP&PA), CEA stated that Minutes of the 21st meeting of the Standing Committee were circulated vide CEA letter no. 1/9/2006-SP&PA/740-55 dated 21.11.06. Comments had been received from PGCIL and RVPNL.

1.2 AGM, PGCIL stated that in the meeting it was decided to have 400kV Meerut - Kaithal D/c line with quad bundle conductor while the minutes issued by CEA did not mention the quad. The meeting noted that this was an inadvertent omission and the proposed amendment was agreed.

1.3 Director, RVPNL stated that while discussing the transmission system for power evacuation from Sasan and Mundra Ultra Mega Projects, RVPNL and PSEB had suggested that another transmission corridor through Gujarat - Rajasthan-Punjab may be studied, as this would strengthen the western part of Northern Region and help in reducing loading in the east-west corridor of the Northern Region. The matter was also discussed, but the recording did not reflect the full discussions.

1.4 After discussions the following amendments to the Minutes of the 21st meeting were agreed:-

(i) In Item (7) Transmission system for power evacuation from Sasan and Mundra Ultra Mega Projects, the work under **NR Strengthening Scheme XI required with Loharinagpala HEP or Sasan UMTP or Mundra UMTP whichever is earliest** may be read as

400 kV Meerut - Kaithal D/C line with quad bundle conductor

(ii) The following may be appended to the first para on page 12.

"RVPNL and PSEB also suggested that another transmission corridor through Gujarat - Rajasthan-Punjab may be studied, as this would strengthen the western part of Northern Region and help in reducing loading in the east-west corridor of the Northern Region. The matter was discussed in detail and it was informed that, with the inter-regional transmission system created with Tala HEP and being created with Barh TPS, Kahalgaon Extn., and proposed with North Karanpura TPS, Maithon RB, Palatna CCGT, lower Subansiri HEP etc. and additional inter-regional transmission system proposed with Sasan and Mundra UMPS, adequate transmission capacity would be available in the ER -NR corridor. It was also informed that Gujarat-Rajasthan-Punjab Corridor may not be justified under the Sasan and Mundra time frame as there would not be adequate flow on the proposed line section. However, it was agreed that this would be studied further based on suggestions from RVPNL".

1.5 The Minutes of the 21st meeting were thereafter approved with the above amendments.

2. Development of Gujarat-Rajasthan-Punjab transmission corridor

2.1 In the context of transmission system for power evacuation from Mundra UMPP and delivery of the same to the beneficiaries in the Northern Region, further to discussions held in the 21st meeting of the Northern Region Standing Committee, RVPNL vide their letter dated 18/11/06 had proposed to consider the following systems:-

With Mundra UMPP

i) 400 kV D/C line from Bhinmal (PG) to 400kV GSS at Barmer (RVPNL)
ii) 400 kV D/C line from Barmer to Bikaner (RVPN)
iii) 400 kV D/C line from Suratgarh (STPS) to Moga (PG)

With Sasan UMPP

i) 400 kV GSS on 400 kV D/C Jaipur (PG)-Suratgarh line should be located at Sikar instead of Reengus as Sikar is the load center of Jaipur.

2.2 Member (PS), CEA stated that the proposal of RVPNL for the Bhinmal-Barmer-Bikaner and Suratgarh-Moga 400kV D/C line had been studied and it was found that flow on this proposed corridor in the Sasan and Mundra time frame was only

of the order of 50 to 100 MW. As such, the feasibility of the proposal was not justified during Sasan-Mundra time frame. The proposal would however be reviewed at an appropriate time. In regard to proposal of RVPNL for locating the 400kV S/S at Sikar instead of Reengus(or Alwar), Member (PS), CEA stated that the proposed substation was for delivery into the RVPN system and as such the modification suggested by RVPNL that is to have the substation at Sikar, could be agreed. However RVPNL should ensure appropriate take off from Sikar.

2.3 After discussions it was agreed that the 400kV substation on the 400kV Jaipur (PG) - Suratgarh D/c line would be located at Sikar instead of Reengus (or Alwar). Accordingly, the transmission system for Sasan and Mundra in Northern Region would stand revised as per following:-

(i) Agra - Sikar (instead of Agra - Reengus (or Alwar)) 400 kV D/C quad
(ii) New 400/220 kV 2x315 MVA substation at Sikar (instead of Reengus (or Alwar)) with 220 kV D/C line interconnecting to 220kV S/S
(iii) Sikar - Jaipur (PG) (instead of Reengus (or Alwar)- Jaipur PG)) 400kV D/C
(iv) Sikar - Ratangarh (instead of Reengus (or Alwar) - Ratangarh) 400 kV D/C

The Members concurred to the above modification.

3. Transmission system from the new generation capacity planned by DVC for supply of power to Delhi, Punjab and Haryana including review of transmission system associated with North Karanpura MPP

3.1 CE (SP&PA), CEA stated that DVC had undertaken generation addition programme which included generation at Koderma TPS (2x500 MW), Bokaro Extension (1x500 MW), Mejia Extension (2x500 MW), Durgapur (2x500 MW) and Raghunathpur TPS(2x500 MW). Out of the above 3600 MW and 500 MW would be exported to Northern and Western Region respectively. Besides this, Maithon Right Bank generation of 2x500 MW was also being taken up which was expected by 2010, from which 400 MW of power was to be supplied to Delhi. All the generation above projects were on fast track. DVC had informed that Mejia TPS Extension would be expected by mid of 2010 and other projects like Kodarma TPS, Bokaro TPS ext., Raghunathpur and Durgapur were also planned by 11th plan. DVC had signed long-term PPAs with Delhi, Punjab, Haryana for 2500 MW, 700 MW and 200 MW respectively. The other generation projects in Eastern region which were likely to yield benefit during 11th /early 12th

plan time frame were Barh TPS and North Karanpura TPS of NTPC and generation projects in West Bengal. Of all the projects, North Karanpura TPS which was earlier scheduled to be the first and for which transmission system had been evolved and agreed earlier, was re-scheduled towards the end of XI plan/early XII plan. The transmission system for North Karanpura TPS was evolved earlier and discussed in the 18th Northern Region Standing Committee meeting. That transmission system was required to be reviewed. The review had become necessary because as per the revised programme of generation capacity addition, the generations of North Karanpura TPS was envisaged in the 11th plan timeframe of early 12th plan time frame while the DVC projects were scheduled ahead of North Karanpura. As the transmission corridor for power from the Projects in Eastern Region to Northern Region would be the same for North Karanpura as well as new generation capacity planned in DVC, there was a need to review the evacuation system. He thereafter presented the revised studies and explained the alternatives/proposal as circulated in the agenda. The presentation highlighted creation of 765kV pooling stations at Sasaram and Gaya for the Northern Region and at Ranchi for the Western Region. For the Northern Region, the overall transmission system from Gaya at 765 kV would be through three number of 765 kV lines, two on the Sasaram-Fatehpur-Agra corridor and one through the Balia-Lucknow-Bareili-Meerut corridor. Gaya would be connected to Sasaram as well as Balia via 765 kV lines whereas Sasaram and Balia both would receive power from east at 400kV also. The studies had also shown the requirement of 765 kV ring for NCR connecting Agra, Mundka(Delhi) and Meerut 765kV substations in a triangle and 765 kV line to Moga from Mundka. Punjab would receive its share of 700 MW from DVC through the 765 kV Mundka-Moga line and Haryana would absorb its share of 200 MW from DVC through displacement. Establishment of the required 765 kV substations, common transmission network for all the proposed generation projects and generation specific transmission schemes were identified and proposed to be taken-up through various transmission schemes to be executed by PGCIL, Private Sector in Transmission, Generators (or their transmission agency) and DVC, as detailed in Appendix-1.

3.2 Member (PS), CEA stated that the Government of India had constituted an Empowered Committee to identify the transmission schemes for execution by the private sector through competitive tariff based bidding. The list of schemes proposed to be implemented by the private sector identified by the Empowered Committee included the transmission schemes for evacuation system for North Karanpura, Maithon RB, Kodarma and Mejia Extn. As the evacuation system for Bokaro Extn was integrated with evacuation system for Kodarma, this had also been included in the list.

3.3 After discussions, the Committee concurred to all the transmission schemes as listed in Appendix-1.

3.4 Regarding sharing of the transmission charges, the Committee noted the proposal that transmission system from the generation projects up to the pooling stations was proposed to be shared by all the beneficiaries of the generation project (or projects) and transmission system beyond the pooling points for NR and WR was proposed to be shared by the beneficiaries of the respective region. It was decided that the proposal would be referred to RPC for approval.

3.5 The committee also observed that there could be need for shifting some elements between the schemes depending on initial progress in the process of implementation of schemes through private sector and the finally emerging schedule of generation projects and required time frame of execution of the transmission projects and it was agreed that if any such changes were required, CEA would decide the same in consultation with PGCIL and also take-up with the Empowered Committee and Ministry of Power for the needful. It was also decided that provision of reactors as proposed in the above agreed schemes would be reviewed by PGCIL before firming up the projects.

4. Evacuation system for Jhajjar TPS (1500 MW) and Badarpur-II TPS (2x500 MW)

4.1 CE (SP&PA), CEA stated that Jhajjar TPS of 1500 MW located west of Delhi near Jhajjar in Haryana and Badarpur TPS Extension of 2x500 MW were proposed to be constructed by NTPC. Beneficiaries of the power from Jhajjar were Delhi and Haryana in the ratio of 50:50 and the beneficiary for Badarpur Extension was Delhi. Considering the power requirement in Delhi for the ensuing Commonwealth Games, both these generation projects were being programmed

for commissioning schedule so that the benefit of these generation as well as the associated transmission system was made available before the Commonwealth Games to be held during 2010. The following transmission system had been evolved for these generation projects:

For Jhajjar TPS :-

(i) Step up at 400 kV

(ii) Jhajjar - Mundka 400kV D/C line

(iii) Jhajjar - Daulatabad (Gurgaon) 400 kV D/C

For Badarpur TPS Extension

(i) Step up at 400 kV, no inter-connection with 220 kV

(ii) LILO of one circuit of Maharani Bagh - Samaypur line at Badarpur 400 kV switchyard

4.2 CE, SP&PA, CEA further stated that from the results of the studies (which were circulated with the Agenda note), the above system was found to be adequate for evacuation of power from Jhajjar TPS and Badarpur TPS Extension. From Mundka power into Delhi system was proposed to be fed at 220kV radially. Due to increasing short circuit levels in Delhi system, Badarpur Extension was proposed not be connected to the 220kV. Also, appropriate bus splitting/provision of bus reactors was required to contain the short circuit levels.

4.3 AGM, PGCIL stated that increasing short circuit levels in the Delhi system was a critical problem. While evolving evacuation system for any additional generation in and around Delhi, it was necessary to consider and study this aspect in detail. PGCIL were considering technology solutions through bus reactors and radial/reliable feeding network through VSC based HVDC for this purpose.

4.4 After discussions it was agreed that:

- Evacuation at Jhajjar TPS would be at 400kV and 400kV Daulatabad (Gurgaon) substation by HVPNL would be provided.
- Step-up for Badarpur TPS Ext. would be at 400kV and it would not be interconnected to 220kV at Badarpur.
- Further system would be decided based on further studies by PGCIL in consultation with CEA and discussed/firmed up in the next meeting of Standing Committee.

5. Northern Region System Strengthening Scheme

5.1 CE, SP&PA, CEA stated that in the in the last (21st) meeting of the Standing Committee, provision of 400/220 kV, 2x315 MVA substation at Sonepat & Bahadurgarh – Sonepat 400 kV D/C triple conductor line was agreed under the transmission scheme of Sasan and Mundra UMPPs in Northern Region. As the load demand around Sonepat was increasing very fast and was slated to grow further in the coming years, the 400kV substation at Sonepat was required to be advanced and therefore, it was proposed that 400/220 kV, 2x315 MVA substation at Sonepat & Bahadurgarh – Sonepat 400 kV D/C triple conductor line may be taken up as a separate System strengthening scheme. Further, the provision for two nos. of 220 kV bays at Nalagarh for HPSEB was also agreed under regional strengthening scheme and this work could also be included in the same regional strengthening scheme.

Members concurred to the above.

5.2 Directior, RVPNL stated that there was also a requirement of additional two nos. of 220kV bays each at 400/220kV substations of PGCIL at Bhiwadi and Kota. One bay at Bhiwadi was required for taking 220kV line to their proposed 220kV substation at Nimrana and one bay was required for providing second 220kV interconnection between Bhiwadi 400kV substation of Powergrid and Bhiwadi 220kV substation of RVPNL. The 220kV bays at Kota were required for taking 2 nos. of additional 220kV feeders which will provide load take off from 400/220kV Kota. The proposal was discussed. Director, HVPNL stated that they were in process of utilizing the two nos. of 220kV bays ear-marked for them at Bhiwadi. It was agreed that additional 2 nos. of 220kV bays at Bhiwadi would be provided for RVPNL as a regional system strengthening and this provision, related to provision of third 400/220kV transformer, would be ahead of the third 400/220kV transformer. When the requirement of 3rd 400/220kV transformer emerges, additional 220kV bays provided for RVPNL would be factored into, before firming up proposal for further 220kV outlets. In regard to additional 220kV bays at Kota, it was noted that provision of additional 220kV bays for load outlets would help to improve the evacuation system for RAPP and as such

the additional 2 nos. of 220kV bays as proposed by RVPNL could be agreed and covered as a part of regional system strengthening scheme.

5.3 It was agreed that all the above works would be covered under **Northern Region Strengthening – XII** which would include the following works:

- Bahadurgarh – Sonepat 400 kV D/C triple conductor line
- Establishment of 400/220 kV, 2x315 MVA substation at Sonepat
- Two nos. of 220 kV bays at Nalagarh for HPSEB
- Two nos. 220kV bays at Bhiwadi for RVPNL
- Two nos 220kV bays at Kota for RVPNL

6. Evacuation System for Hissar TPS (1200 MW)

6.1 CE, SP&PA, CEA ststed that transmission system for Hissar TPS in Haryana was studied in CEA in consultation with HVPNL. Hissar TPS would be located near Barwala town near Hissar. The project would be excuted by HVUNL and while Haryana was to the major beneficiary, inter-state sale of power from Hissar TPS was also being contemplated. For evolving power evacuation system from Hissar TPS, first the following transmission system suggested by HVPLN was studied:-

(i) Step-up at 400kV
(ii) Provision for 400/220 kV, 3 nos. of 315 ICT at Hissar generating switchyard
(iii) Creation of 220 kV level at Hissar generating switchyard
(iv) LILO of both circuits of the existing Jind to Hissar industrial area D/C line at Hissar generation switchyard.
(v) 400kV D/C line from Hissar generation switchyard to 400 kV Mohana Substation of Haryana
(vi) Hissar TPS – Fethabad 400 kV D/C line

Result of the studies carried out with the above system (exhibit-VI of agenda note) indicated that 400kV Hissar-Mohana line was transmitting power in Mohana-Hissar direction and the utility of this line was not much in the timeframe of the study. Based on the result of the study, the following system was recommended from Hissar TPS (1200 MW)

Alternative –I (preferred option) (study result at exhibit-VII of agenda note)

(i) Provision for 400/220 kV, 3 nos. of 315 ICT at Hissar generating switchyard
(ii) Creation of 220 kV level at Hissar generating switchyard
(iii) LILO of both circuits of the existing Jind to Hissar industrial area 220kV D/C line at Hissar generation switchyard.

(iv) Conductor upgradation of Hissar TPS – Hissar (IA) 220 kV D/C line
(v) Hissar TPS – Fatehabad 400 kV D/C line

In event of non-availability of adequate space for construction of 220 kV Switchyard at Hissar TPS, up-gradation of the existing 220 kV Hissar Industrial Area (I.A) substation to 400kV to be considered with provision for 3x315MVA, 400/220 kV, ICTs at Hissar (I.A) substation and 400kV D/C line from Hissar generation switchyard to 400 kV Hissar (I.A) substation of Haryana with 85ºC conductor design.

In case of problem encountered in obtaining additional space/land also at 220 kV Hissar Industrial Area existing substation, possibility for creation of a new 400/220kV substation at Hissar to be explored with provision for 3x315MVA, 400/220 kV, ICTs at Hissar (new) substation and 400kV D/C line from Hissar generation switchyard to 400 kV Hissar (new) substation of Haryana with 85ºC conductor design and connectivity of Hissar 400 kV new S/S of HVPN with Hissar IA 220 kV substation through LILO or new 220 kV lines, the connecting 220 kV lines to be with higher rating conductors.

For feeding power from Hissar TPS into regional grid for inter-state sale of power, 400 kV D/C line line from Hissar to Fatehabad was proposed. Concurrence of the standing committee for the same was required as it covered termination of 400 kV lines at Fatehabad substation of PGCIL.

6.2 AGM, PGCIL stated that for firming-up the connectivity with Fatehabad substation, application for seeking open access was required

6.3 The proposal was discussed and was found it to be generally in order. The members also noted the point made by PGCIL.

7. Transmission system for power evacuation from hydro projects in Uttranchal

7.1 CE(SP&PA), CEA stated that as the Members were already aware, Government of Uttanchal was steering development of a number of hydro projects power from which would be consumed in Uttranchal and also exported outside the state and that Power Transmission Corporation of Uttranchal Ltd. had proposed to develop

through ADB funding a comprehensive transmission system based on a master plan evolved in consultation with CEA. The proposed transmission system would be used for intra-state as well as inter-state transmission. The proposal of PTCUL Uttaranchal was discussed in the meeting taken by Secretary (Power) on 15th September 2006 and it was decided that the matter may be discussed in the regional power committee of the Northern Region. Accordingly, the matter was discussed in the 2nd TCC meeting held at Moussoorie on 9th November 2006, wherein Chairman/members of TCC observed that PTCUL could take up the intra-state transmission system up to the pooling point on their own, for which there was no requirement of any commitment for payment of transmission charges by other constituents and arrangement of recovery of transmission charges will be only between PTCUL and the generators and it was agreed in TCC that PTCUL/generators would apply for open access for inter-state transmission system to CTU so that POWERGRID in consultation with CEA could firm up inter-state transmission system and necessary modification in the system up to pooling point would also be firmed up in the process. The above views of TCC were endorsed in the 3rd NRPC meeting held at Mossoourie on 10th November 2006. Subsequently, the scope of transmission system proposed by PTCUL was further examined in CEA and it was observed that PTCUL had proposed the transmission system from the generation projects within Uttaranchal and up to the pooling point within Uttaranchal i.e 400 kV Tehri/ Koteshwar pooling station, 400 kV Roorkee, Kashipur and Pithoragarh (Annex-II of Agenda) and the proposed system was found to be in order.

The Committee took note of the above development.

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