सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

सं. उक्षेविस/ वाणिज्यिक/ 209/ आर पी सी (50वीं)/2022/379-426 दिनाँक : 13 जनवरी, 2022

सेवा में / To,

उ.क्षे.वि.स. समिति के सभी सदस्य (संलग्न सूचीनुसार)
Members of NRPC (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 50वीं बैठक की कार्यसूची ।

Subject: 50th meeting of Northern Regional Power Committee – Agenda.

महोदय / Sir,

As you are aware that in accordance to MoP resolution dated 3.12.21, NRPC meeting is required to be held every month. Accordingly, the 50th meeting of Northern Regional Power Committee (NRPC) is scheduled at 1100 Hrs on during last week of January, 2022 via video conferencing. Agenda for the meeting is attached herewith. The exact meeting date, link and password for joining the meeting would be send in due course of time to the respective email-ids

भवदीय
Yours faithfully,

न० भंडारी

(नरेश भंडारी) 13.1.22
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

18-ए, शहीद जीत सिंह मार्ग, कटवारिया सराय, नई दिल्ली- 110016 फोन:011-26513265 ई-मेल: ms -nrpc@nic.in वेबसाईट: www.nrpc.gov.in

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40. Representative of Lanco Anpara Power Ltd., (Fax-124-4741024)
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42. Director and head regulatory and POWER Sale, JSW Energy Ltd., New Delhi (Fax- 48178740)
43. COO, Adani Power Rajasthan Ltd., Ahmedabad-380006 (Fax No- 07925557176)
44. COO, Talwandi Sabo Power Ltd. Distt: Mansa, Punjab-151302(Fax: 01659248083)
45. MD, Lalitpur Power Generation Company Ltd., Noida-201301(Fax: 01204045100/555, 2543939/40)
46. Director (Commercial & Operations), PTC India Ltd., New Delhi (Fax- 01141659144,41659145)
47. CEO, Nabha Power Limited, (Fax: 01762277251 / 01724646802)
48. Representative of Prayagraj Power Generation Co. Ltd.
49. Representative of Greenko Budhil Hydro Power Private Limited (Member IPP<1000 MW)
50. Representative of TPDDL (Delhi Private Discom)

Special Invitee:

i. Member Secretary, WRPC, Mumbai-400 093.
ii. Member Secretary, SRPC, Bangalore-560 009
iii. Member Secretary, ERPC, Kolkata-700 033.
iv. Member Secretary, NERPC, Shillong-793 003.

Contents

उत्तरी क्षेत्रीय वद्युत स मति की 50वीं बैठक

50th MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of NRPC meeting: 11.00 Hrs. In the last week of January 2022

Venue: Video Conferencing

AGENDA

B.1 Transmission system for evacuation of power from Kaza Solar Power Project (880 MW) to be developed by SJVN Limited (agenda by CTUIL)

B.1.1. SJVN is developing a Solar power park (880 MW) in Lahul & Spiti (Kaza) in Himachal Pradesh. SJVN had applied for Stage-I connectivity application in ISTS for Kaza Solar Park, for which the scheme was discussed & agreed in the 49th & 50th meetings of NR constituents regarding Connectivity/LTA applications.

B.1.2. Subsequently, in the 4th NRPC(TP) meeting held on 05.10.21 above scheme was agreed and it was also decided that for transfer of power beyond Wangtoo S/s (HPPTCL), a high-capacity corridor would be planned. HPPTCL had also confirmed the availability of space for total 4 nos. of 400kV line bays at Wangtoo (HPPTCL).

B.1.3. Further, in the 51st Meeting of Connectivity/LTA Applications in NR held on 28/10/2021, it was stated that during the meeting by Himurja on 28/10/2021, availability of additional RE potential in Kinnaur area in proximity to Kaza was confirmed. Accordingly, considering RE potential in contiguous area of Kaza Complex as well as severe RoW limitations in Kaza-Wangtoo corridor, the line capacity of Kaza – Wangtoo 400 kV D/c line was reviewed and it was proposed that entire Kaza-Wangtoo 400 kV D/c line would be developed with high-capacity conductor capable to carry 2500 MVA per circuit at nominal voltage. The same was also discussed in 6th NCT meeting held on 29.10.2021 along with future scope at Kaza.

B.1.4. In line with the discussion held in 4th NRPC(TP) meeting, studies were carried out by CTUIL and Wangtoo (HPPTCL) -Dehradun (PG) 400 kV D/c Line (Twin HTLS) was agreed for power evacuation beyond Wangtoo in 1st NRTP meeting held on 29.11.21.

B.1.5. Subsequently, a meeting was held on 17.12.21 regarding decision on implementation of Kaza S/s as AIS or GIS.In this meeting, CTU informed that due to low temperature, high altitude of Kaza around 3800 m, and Seismic considerations, construction of GIS would be more feasible option

considering the requirement of high insulation levels in AIS. SJVN also opined Space limitation for land at Kaza. CEA also opined that construction of Wangtoo-Dehradun 400 kV D/c line may be difficult as the terrain is completely hilly and may involve National Park and forests near Dehradun. Accordingly, alternate proposal with less difficulty in construction of transmission line may be explored.

B.1.6. In view the above, a Joint Study Meeting was held on 24.12.2021 with CEA, POSOCO, HVPN, PTCUL, HPPTCL, UPPTCL and other STUs of Northern region by CTU to finalize the transmission system for evacuation of power from Kaza Solar Power Project (880MW) beyond Wangtoo. (Minutes of meeting is attached in **Annexure-I**).

B.1.7. In the above Joint study meeting, various transmission alternatives for interconnection with Wangtoo i.e Nallagarh, Hamirpur, Abdullapur, Panchkula, Kala Amb were deliberated. Based on study results, it was decided that 400 kV Wangtoo-Panchkula D/c line (Twin-HTLS) is a preferred transmission alternative for evacuation of power beyond Wangtoo. The above scheme was also discussed in the recent 2nd Consultation Meeting for Evolving Transmission Schemes in Northern Region (CMETS-NR) held on 29/12/2021 wherein composite transmission scheme comprising connectivity and evacuation system for Kaza Solar**-**park was agreed (Extract of Minutes of meeting is attached in **Annexure-II**). Composite Inter**-**state transmission scheme for evacuation of 880 MW power from Kaza Solar Park is as below:

Connectivity System for the Proposed Kaza Solar Park (880 MW)

- Establishment of 1x315 MVA (4x105 MVA single phase units including one spare) $, 400/132kV substation (GIS) at Kaza - under ISTS
- Kaza Wangtoo (HPPTCL) 400 kV D/c (Quad) line along with the associated 400 kV bays at both ends (Line capacity shall be 2500 MVA per circuit at nominal voltage) - under ISTS
- 1x80 MVAR switchable line reactor on each circuit at Kaza end of Kaza Wangtoo 400 kV D/c line- under ISTS
- 125 MVAr (420kV) Bus Reactor at Kaza (1-Ph units)
- 132 kV line bays (9 Nos.) for termination of lines from 7 pockets of solar projects of SJVNL- under applicant scope

$ In case of transportation constraints, 1x200 MVA ICT (4x66.67 MVA, 1-phase unit including one spare) shall be considered

Estimated Cost: Rs.1270 Cr.

Transfer of Power from Kaza Solar Park (880 MW)-under ISTS

- Augmentation of 2x315 MVA (6x105 MVA single phase units) # 400/132 kV ICT at Kaza PS
- Wangtoo (HPPTCL) - Panchkula (PG) 400 kV D/c (Twin HTLS*) Line along with 80 MVAr switchable line reactor at Panchkula end at each circuit-210 Km

 # In case of transportation constraints 4x200 MVA ICT (12x66.67 MVA, 1-phase unit) shall be considered

** with minimum capacity of 2100 MVA on each circuit at nominal voltage*

Estimated Cost: Rs.844 Cr.

Note: Future Scope at Kaza Pooling Station

Space provision for:

- 5 no. of 132 kV line bays for future projects
- 2 nos. of 400/132 kV Transformers

***Members may kindly deliberate and approve accordingly*.**

B.2 Additional 400 kV ISTS interconnections at 400 kV GSS Alwar (agenda by RRVPNL)

B.2.1. The issue of under-voltage / voltage variation at 400 kV GSS Alwar has been discussed many times in the OCC/TCC/NRPC meetings. It was highlighted that voltages at Hindaun and Alwar vary by 50-60 kV in a single day. Rajasthan was asked to find a feasible solution to mitigate this problem of low voltage. Presently, 400 kV GSS Alwar is connected radially to 400 kV GSS Hindaun and voltage at 400 kV level falls to 360 kV and 370 kV respectively.

B.2.2. Following are existing interconnections at 400 kV GSS Alwar (PPP):

- 400 kV S/C Hindaun-Alwar (PPP) line
- 2x315 MVA, 400/220 kV ICT and 1x50 MVAR, 400 kV Bus reactor
- LILO of 220 kV S/C Dausa-Mandawar line
- LILO of 220 kV S/C MIA-Alwar line
- 220 kV D/C Alwar (PPP)-Sikri (Proposed)

B.2.3. To mitigate problem of voltage at 400 kV GSS Alwar, RVPN has carried out a load flow study for condition corresponding to FY 2022-23 for total system load of 15169 MW considering the following two proposals to provide additional 400 kV interconnections to 400 kV GSS Alwar:

- Proposal-1: 20 kM LILO of 400 kV S/C Bassi-Bhiwadi line at 400 kV GSS Alwar (PPP)
- Proposal-2: 24 kM LILO of one circuit of 400 kV D/C Sikar-Agra line at 400 kV GSS Alwar (PPP)

B.2.4. Results of load flow study for base case and proposed cases are tabulated below:

S. N.	Name of Transmission Element	Base Case (kV/MW)	Proposed Case-1 (kV/MW)	Proposed Case-2 (kV/MW)
1.	400 kV Bus at 400 kV GSS Alwar	383 kV	395 kV	396 kV
2.	220 kV Bus at 400 kV GSS Alwar	213 kV	216 kV	216 kV
3.	630 MVA, 400/220 kV ICT at 400 kV GSS Alwar	213 MW	286 MW	282 MW
4.	400 kV S/C Alwar- Hindaun Line	-213 MW	-151 MW	-156 MW
5.	400 kV S/C Bassi-Bhiwadi Line	265 MW	-	274 MW
6.	400 kV S/C Alwar-Sikar Line	-	-	-122 MW
7.	400 kV S/C Alwar-Agra Line	-	-	-3 MW
8.	400 kV S/C Alwar-Bassi Line	-	-298 MW	-
9.	400 kV S/C Alwar-Bhiwadi Line	-	164 MW	-

B.2.5. Analysis of load flow results indicates that voltage at 400 kV GSS Alwar has improved by 12 kV and 13 kV for the proposals-1 & 2 respectively.

B.2.6. The Deputy COO, CTU was also requested vide RVPN office letter dated 16.04.2021 to examine the technical feasibility of aforesaid proposals so that the reliability of power flow at 400 kV GSS Alwar (PPP) may be improved and also reduce the variations of voltage to permissible limits. The Sr. DGM (CTU) has intimated vide e-mail dated 22.07.2021 that both the proposals improve the voltage at 400 kV GSS Alwar. However, marginal higher improvement is observed with the LILO of one circuit of 400 kV D/C Sikar-Agra line at 400 kV GSS Alwar.

B.2.7. Based on results of load flow study, comments of CTU and field reports the following additional transmission system is proposed at 400 kV GSS Alwar (PPP):

24 kM LILO of one circuit of 400 kV D/C Sikar-Agra line at 400 kV GSS Alwar (PPP)

***Members may kindly deliberate and approve accordingly*.**

Annexure-I

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उद्यम)

CENTRAL TRANSMISSION UTILITY OF INDIA LTD.
(A wholly owned subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Ref: C/CTU/N/Kaza

27nd December, 2021

As per Distribution List

Sub: Minutes of Joint Study Meeting held on 24.12.2021 to finalize the Transmission system for evacuation of power from Kaza Solar Power Project (880 MW)

Dear Sir,

Please find enclosed the Minutes of Joint Study Meeting held on 24.12.2021 to finalize the Transmission system for evacuation of power from Kaza Solar Power Project (880 MW) through virtual mode.

Thanking you,

Yours Faithfully,

(Kashish Bhambhani)
Senior DGM (CTU)

Encl : Minutes of Meeting

Distribution List:

Chief Engineer (PSP&A – I) Central Electricity Authority Sewa Bhawan, R.K.Puram, New Delhi-110 066	**Member Secretary** Northern Regional Power Committee 18A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi – 110 016
Director (SO) Power System Operation Corporation Ltd. 9th Floor, IFCI Towers, 61, Nehru Place, New Delhi-110 016	**Executive Director** Northern Regional Load Despatch Centre 18-A, Qutab Institutional Area, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi– 110 016
Director (Technical) HP Power Transmission Corporation Ltd. Barowalias, Khalini, Shimla-171002	**Director(W&P)** UP Power Transmission Company Ltd. Shakti Bhawan Extn, 3rd floor, 14, Ashok Marg, Lucknow-226 001
Director (Technical) Punjab State Transmission Corporation Ltd. Head Office, The Mall, Patiala 147001, Punjab	**Director (Projects)** Power Transmission Corporation of Uttrakhand Ltd. Vidyut Bhawan, Near ISBT Crossing, Saharanpur Road, Majra, Dehradun.
Development Commissioner (Power) Power Development Department Grid Substation Complex, Janipur, Jammu	**Director (Technical)** Rajasthan Rajya Vidyut Prasaran Nigam Ltd. Vidyut Bhawan, Jaipur, Rajasthan-302005.
Member (Power) Bhakra Beas Management Board Sector-19 B, Madhya Marg, Chandigarh - 160019	**Superintending Engineer (Operation)** Electricity Circle, 5th Floor, UT Secretariat, Sector-9 D, Chandigarh - 161009
Director (Operations) Delhi Transco Ltd. Shakti Sadan, Kotla Road, New Delhi-110 002	**Director (Technical)** Haryana Vidyut Prasaran Nigam Ltd. Shakti Bhawan, Sector-6, Panchkula-134109, Haryana

Minutes of Joint Study Meeting held on 24.12.2021 to finalize the Transmission system for evacuation of power from Kaza Solar Power Project (880 MW)

A Joint Study Meeting was held through virtual mode on 24.12.2021 with CEA, POSOCO, HVPN, PTCUL, HPPTCL, UPPTCL and other STUs of Northern region to finalize the transmission system for evacuation of power from Kaza Solar Power Project (880MW). **List of participants is enclosed at Annexure A.**

Gist of the discussions is given as below:

1. CTU stated that connectivity system for Kaza Solar Park was discussed and agreed in the 4th NRPC(TP) held on 05.10.2021 and 12.10.2021. The same was also discussed and approved in the 6th NCT meeting held on 29.10.2021. In the 4th NRPC(TP) meeting, it was discussed that for transfer of power beyond Wangtoo S/s (HPPTCL), a high capacity corridor would be planned. HPPTCL had also confirmed the availability of space for total 4 nos. of 400kV line bays at Wangtoo (HPPTCL).

2. In the 1st NRTP meeting, POSOCO & HPPTCL stated that for evacuation of power beyond Wangtoo S/s, outlet to Nallagarh & Hamirpur may also be explored. Above alternatives were discussed in the 1st NRTP meeting. CTU also carried out the studies and Wangtoo (HPPTCL) -Dehradun (PG) 400 kV D/c Line which was agreed for evacuation of power beyond Wangtoo in the 1st Meeting of Northern Region Transmission Planning (NRTP) held on 29.11.2021

3. Subsequently, a meeting was held on 17.12.21 regarding decision on implementation of Kaza S/s as AIS or GIS. In the meeting, CEA opined that construction of Wangtoo-Dehradun 400 kV D/c line may be difficult as the terrain is completely hilly and may involve National Park and forests near Dehradun. Further, considering the constraint in further evacuation of power beyond Dehradun due to locations like Rishikesh, Rajaji National Park and Saharanpur area may encounter severe RoW , therefore CTUIL may plan the line from Wangtoo to Kala Amb/Yamunanagar to other locations in Haryana and UP may be explored.

4. Accordingly a meeting was convened on 24.12.21 to discuss various transmission alternatives for evacuation of power beyond Wangtoo. CTU informed that considering, envisaged Hydro/Solar generation in above Kaza +Kinnaur complex,(Solar: 880MW+400MW(future)+ Hydro :804MW(future), Shongtong (450 MW)), there would be high loading beyond Wangtoo, for which additional outlet/corridor is required. In view of that studies were carried out with six alternatives considering above envisaged Hydro/Solar generation for evacuation of power beyond Wangtoo. The list of alternatives explored are as below:
   - **Alt-1 :** Wangtoo (HPPTCL) -Nallagarh (PG) 400kV D/c Line (Twin HTLS) –200km
   - **Alt-2 :** Wangtoo (HPPTCL) -Hamirpur (PG) 400kV D/c Line (Twin HTLS)-180km
   - **Alt-3 :** Wangtoo (HPPTCL)-Panchkula (PG) 400 kV D/c Line (Twin HTLS)-210km
   - **Alt-4 :** Wangtoo(HPPTCL)-Abdullapur (PG) 400kV D/c Line (Twin HTLS)-220km
   - **Alt-5 :** Wangtoo(HPPTCL) -KalaAmb 400kV D/c line (Twin HTLS)-180 km & LILO of both ckts of Abdullapur (PG)-Panchkula (PG) 400 kV D/c Line at Kala Amb(Triple Snowbird) – 20km
   - **Alt-6 :** Wangtoo (HPPTCL)-Dehradun (PG) 400 kV D/c Line (Twin HTLS) -220km

5. CTU deliberated that as discussed in meeting held on 17.12.21, CEA stated that construction of Wangtoo-Dehradun 400 kV D/c line may be difficult due to hilly terrain and constraint in evacuation of power beyond Dehradun, if required additional outlets in future. PTCUL also emphasised on RoW issue near Dehradun. **Considering above, Alternative-6 was not considered due to uncertainty in timely implementation of line.**

6. Connectivity to 400kV Saharanpur alternative is not carried out due to severe RoW constraints near Saharanpur and longer line length (250kms) as compared to other alternatives. Further in the 36th standing committee meeting of Northern region held on 13.07.15, it was also deliberated that due to stiff resistance faced from farmers especially in Saharanpur, Muzzafarnagar, Bagpat, Shamli and Meerut area, severed ROW constraints were faced and work was almost stopped which delayed the scheme and required Re-orientation of connectivity at Saharanpur. **In view of above, Saharanpur interconnection is not considered.**

7. CTU deliberated load flow results for each alternative and explained that in Alternative-1 & 2, there is high loading on Jhakri – Gumma – Panchkula D/c line (Triple snowbird) as well as 400kV Kala Amb – Abdullapur D/c line (Quad) in contingency scenario and it requires additional corridor beyond Nallagarh & Hamirpur respectively with future envisaged generation in Kaza/Kinnaur complex. **Therefore Alternative-1 & 2 may not be preferred for evacuation of power beyond Wangtoo due to techno economics.** CEA and HVPN agreed with the same

8. CEA opined that from study result, Alternative-3 i.e. Wangtoo (HPPTCL)-Panchkula (PG) 400 kV D/c Line (Twin HTLS) and Alternative-5 i.e. Wangtoo(HPPTCL) -KalaAmb 400kV D/c line (Twin HTLS) & LILO of Abdullapur (PG)-Panchkula (PG) 400 kV D/c Line at Kala Amb(Triple Snowbird) are better options as compared to others. Both alternatives relieves loading of Jhakri – Gumma – Panchkula D/c line (Triple snowbird) as well as 400kV Kala Amb – Abdullapur D/c line (Quad) substantially during n-1 contingency condition.

9. Further, in Alternative-4 i.e. Wangtoo(HPPTCL)-Abdullapur (Yamunanagar) (PG) 400kV D/c Line, major portion of power from Abdullapur flows towards Dehradun only and evacuation constraint may arises beyond Dehradun in future. CTU also stated that there are short circuit level constraints at Abdullapur (40 kA) being Old station , therefore more interconnections to Abdullapur directly shall further increase fault level (53 kA). **In view of above, Alternative -4 is not preferred.**

10. CTU informed that Alterntiave-5 with LILO at Kala Amb was found suitable in view of diversion of flows towards Abdullapur as well as Panchkula, both load centers. However, there are issues in availability of bay space as this option needs 6 bays at Kala amb (GIS) whereas space for only 4 GIS bays are available. However even for 4 nos. bays with one circuit LILO, as informed by POWERGRID, hillock blasting needs to be carried out at Kala Amb Substation. Further this option will be slightly costlier than Alternative -3.

11. CTU stated that Alternative-3 was also found suitable as beyond Panchkula S/s (AIS), power will be fed to the load centers of Punjab (Patiala) as well as Abdullapur & Panipat. This option also relieves loadings of Jhakri – Gumma – Panchkula D/c line (Triple snowbird) as well as 400kV Kala Amb – Abdullapur D/c line (Quad) significantly, during n-1

contingency condition. HVPN also stated that this alternative is better as compared to other options.

12. HVPN stated that 400kV Quad moose may be considered in place of 400kV twin HTLS line in preferred Alternative-3 due to higher losses in Twin HTLS line. CTU opined that tower for 400kV Quad moose line is much heavier than tower for twin HTLS line. In view of difficult hilly terrain, it is recommended to implement the line as Twin HTLS line. Further, Capital cost of Twin HTLS line is also much lesser than Quad line.

13. HPPTCL mentioned that in view of short time frame for implementation for Kaza Solar park (Mar'24) as well as above considerations, Alternative-3 may be preferred instead of Alternative-5. CEA, HVPN & POSOCO also concurred to the above suggestion. HPPTCL also opined that Twin HTLS configuration is new technological product which facilitate smooth & economic implementation of lines in Hilly Terrain. Considering above,400kV line may be implemented as Twin HTLS line. Further, 125 MVAr Bus reactor at Kaza PS may also be reviewed with 1-ph banks instead of 3-ph due to transportation constraints.

14. NRLDC enquired about power flow on Panchkula- Dehar line and Rampur-Nallagarh D/c line in Alternative-3. CTU informed that with full generation of Dehar, about 210MW power flows towards Panchkula. In Alternative-3, Rampur – Nallagarh D/c line is 450x2 MW (Under N-1 : 630MW)

15. CTU enquired POSOCO about any plan for modification in SPS settings after implementation of Wangtoo-Kala Amb - Abdullapur D/c line and upcoming solar/hydro injections in above complex. POSOCO replied that dynamic studies need to be carried out in view of change in network expansion in above hydro complex and SPS operational settings may be reviewed, based on above for which separate meeting may be convened.

16. POSOCO stated that line reactors at both ends may be required in preferred alternative-3 as line length is more than 200kms. CTUIL stated that switchable line reactor (80 MVAr) at Panchkula end will be considered in the scheme, however there may be space constraint at Wangtoo S/s as informed by HPPTCL earlier.

17. CTU enquired HPPTCL about space for switchable line reactor at Wangtoo S/s for Wangtoo- Panchkula D/c line (about 210 km). HPPTCL informed that there is no space available for line reactor at Wangtoo S/s. CTU requested to provide GA/SLD of 400kV Wangtoo S/s in 2-3 days or earlier so as to verify space availability. HPPTCL agreed for the same. In case of space availability for placement of fixed/switchable line reactor, same shall be considered at Wangtoo end for Wangtoo (HPPTCL)-Panchkula (PG) 400 kV D/c Line.

18. After deliberation on various alternatives in the meeting, it was agreed that the Alternative-3 i.e Wangtoo (HPPTCL)-Panchkula (PG) 400 kV D/c Line (Twin HTLS) along with 1x80 MVAR switchable Line rector at Panchkula end is a preferred option beyond Wangtoo.

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Annexure A

List of Participants

S.No	Name /Designation	Organization
1	Ms. Manjari Chaturvedi (Director)	CEA
2	Sh Kanhaiya Singh Kushwaha	CEA
3	Sh. Alok Kumar (GM)	NRLDC
4	Ms. Suruchi (CM)	NLDC
5	Sh. Gulshan Tuteja (SE-Plg)	HVPNL
6	Sh. Rajesh Kumar Jangra (XEN-System study)	HVPNL
7	Sh. Pawan Chhikara (AEE)	HPPC
8	Sh. Sachin Goyal (AEN)	HVPNL
9	Sh. A K Shukla (SE)	UPPTCL
10	Sh. Satyendra Kumar Kumar (XEN)	UPPTCL
11	Sh. Sujeet Kumar (AEN)	UPPTCL
12	Sh. Rajeev Sood (Director (P&C))	HPPTCL
13	Managing Director	JKPTCL
14	Sh G A Mir	CE, Ladakh
15	Sh. Ashok Kumar	PTCUL
16	Sh. Kashish Bhambhani (Sr. DGM)	CTUIL
17	Sh. Sandeep Kumawat (Ch. Manager)	CTUIL
18	Ms. Ankita Singh (Ch. Manager)	CTUIL
19	Sh. R. Narendra Sathvik (Manager)	CTUIL

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उद्यम)
CENTRAL TRANSMISSION UTILITY OF INDIA LTD.
(A wholly owned subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Ref: CTU/N/00/CMETS/02 **Date:** 11/01/2022

As per distribution list

Subject: 2nd Consultation Meeting for Evolving Transmission Schemes in Northern Region- Minutes of Meeting

Dear Sir/Ma'am,

Please find enclosed the minutes of the 2nd Consultation Meeting for Evolving Transmission Schemes in Northern Region held on 29th December, 2021 through virtual mode.

The minutes are also available at CTU website (www.powergrid.in >> CTU Open Access).

Thanking you,

Yours faithfully,

(Kashish Bhambhani)
Senior DGM

b) LTA Applications received in Southern Region for Drawl in Northern region

It was deliberated that following LTA applications were received in Southern region having drawl in Northern region:

Sl. No.	LTA Application No.	Applicant Name	Nature of Applicant	Location	LTA Quantum (MW)	Injection point	Drawl point	Start date of LTA (as per application)	End date of LTA (as per application)
1.	1200003536	JSW Future Energy Limited	Generator (wind)	Karur	150	Karur PS, Tamil Nadu	Rajasthan, NR (Target basis)	10.03.2023	09.03.2048
2.	1200003537	JSW Future Energy Limited	Generator (wind)	Tuticorin-II	300	Tuticorin-II PS, Tamil Nadu	Rajasthan, NR (Target basis)	10.03.2023	09.03.2048

It was informed that that the above LTA involves power transfer from SR to NR and no constraints are envisaged in above transfer of power and applications were agreed for grant.

B. ISTS expansion schemes in Northern Region

1. Implementation of additional 2 nos. of 220kV line bays at 400/220 kV Jind (PG) S/s

It was informed that during the 3rd NRPC(TP) held on 19/02/2021, HVPN proposed implementation of LILO of both circuits of 220 kV Jind (HVPNL) - PTPS D/c line at 400/220 kV Jind (PG) S/s. This line shall be further LILOed at the proposed 220 kV Nain (HVPN) S/s by HVPN. HVPN informed that the above-proposed system would require four nos. 220 kV line bays at 400 kV Jind (PG) S/s. HVPN intimated the time frame of Nain substation as July-2023, & also informed that 2 nos. of bays are already available at Jind PG S/s. Therefore, only 2 nos. of additional 220 kV bays are required to be constructed at Jind (PG) S/s for the above.

Accordingly, construction of two nos. 220 kV bays at 400/220 kV Jind (PG) S/s in the matching timeframe of Nain S/s (July'23) was approved under ISTS. The matter was also discussed in the 5th NCT held on 25/08/2021 & 02/09/2021. NCT recommended the implementation of 2 no. of 220 kV line bays at Jind (PG) under RTM. MOP vide OM dated 01.12.2021 approved implementation of 2 no. of bays at Jind (PG) under RTM by POWERGRID.

However, POWERGRID vide email dated 30.11.2021 informed that there are no unutilized bays available at Jind (PG) S/s. Therefore, construction of 4 nos. 220kV bays would be required instead of earlier agreed 2 nos. 220kV bays in NRPC TP/NCT & MOP OM dated

01.12.21 at Jind (PG) S/s. The above matter was also taken up with HVPN for their comments. CE, HVPN vide email dated 13.12.2021 has confirmed the requirement of total 4 nos. 220 kV bays at Jind (PG) PS.

Accordingly, considering that the 2 nos. 220 kV bays at Jind (PG) have already been approved, additional 2 nos. of 220 kV line bays (beyond scope agreed in 3rd NRPC (TP), 5th NCT, MOP OM dated 01.12.121) were agreed at 400/220 kV Jind (PG) S/s.

Scope of work along with tentative Cost and Implementation time-frame is as below:

S. No.	Scope of the Transmission Scheme	Capacity	Implementation timeframe
1	220 kV bays at 400/220 kV Jind (PG) S/s for LILO of both circuits of 220 kV Jind HVPNL to PTPS D/C line at 400/220 kV Jind (PG) S/s	220 kV line bays -2 nos.*	July 2023
		Total Estimated Cost:	**8 Cr.**

**Out of requirement of 4 bays for the LILO, 2 Nos. of 220 kV bays have already been approved for implementation under RTM by POWERGRID (in the 5th NCT meeting held on 25/08/2021 & 02/09/2021 and vide MoP dated 01/12/2021)*

2. Transmission System for Evacuation of Power from Kaza Solar Park (880 MW)

- It was deliberated that SJVN is developing a Solar power park (880 MW) in Lahul & Spiti (Kaza) in Himachal Pradesh. Stage-I connectivity application for Kaza Solar Park was discussed in the 49th & 50th meetings of NR constituents regarding Connectivity/LTA applications as well as 4th NRPC(TP). After deliberations in the above meetings, following system was agreed for providing connectivity to Kaza Solar Power Project:

- Establishment of 1x315 MVA (4x105 MVA single phase units including one spare), 400/132kV substation at Kaza - under ISTS
- Kaza– Wangtoo (HPPTCL) 400 kV D/c line along with the associated 400 kV bays at both ends (Line capacity to be min 900 MW per ckt upto LILO point for Jhangi Thopan HEP. Beyond Jhangi Thopan LILO point, line capacity shall be 2500 MVA per circuit at nominal voltage) - under ISTS
- 1x80 MVAR switchable line reactor on each circuit at Kaza end of Kaza– Wangtoo 400 kV D/c line- under ISTS
- 1x125 MVAr bus reactor at Kaza PS-under ISTS
- 132 kV line bays for termination of lines from 7 pockets of solar projects of SJVNL - under SJVNL scope.

- Further, in the 4th NRPC(TP) meeting held on 05/10/21, it was decided that for transfer of power beyond Wangtoo S/s (HPPTCL), a high capacity corridor would be planned. HPPTCL had also confirmed the availability of space for total 4 nos. of 400kV line bays at Wangtoo (HPPTCL). Subsequently, in the 51st Meeting of Connectivity/LTA Applications in NR held on 28/10/2021, it was deliberated that during the meeting by Himurja on 28/10/2021, availability of additional RE potential in Kinnaur area in proximity to Kaza was confirmed. Accordingly, considering RE potential in contiguous area of Kaza Complex as well as RoW severe limitations in Kaza-Wangtoo corridor, the line capacity of Kaza – Wangtoo 400 kV D/c line was reviewed and it was proposed that entire Kaza-Wangtoo 400 kV D/c line would be developed with high capacity conductor capable to carry 2500 MVA per circuit at nominal voltage. The same was also discussed in 6th NCT meeting held on 29.10.2021.
- After deliberations in 1st NRTP meeting held on 29/11/21 based on studies, complete transmission scheme for evacuation of 880 MW power from Kaza Solar Park was agreed as below:

Connectivity System for the Proposed Kaza Solar Park (880 MW)

- Establishment of 1x315 MVA (4x105 MVA single phase units including one spare), 400/132kV substation at Kaza - under ISTS
- Kaza– Wangtoo (HPPTCL) 400 kV D/c line along with the associated 400 kV bays at both ends (Line capacity shall be 2500 MVA per circuit at nominal voltage) - under ISTS
- 1x80 MVAR switchable line reactor on each circuit at Kaza end of Kaza– Wangtoo 400 kV D/c line- under ISTS
- 1x125 MVAr (420kV) Bus Reactor at Kaza
- 132 kV line bays (9 Nos.) for termination of lines from 7 pockets of solar projects of SJVNL- under applicant scope

Transfer of Power from Kaza Solar Park (880 MW)- under ISTS

- Augmentation of 2x315 MVA (6x105 MVA single phase units) 400/132 kV ICT at Kaza PS
- Wangtoo (HPPTCL) -Dehradun (PG) 400 kV D/c Line (Twin HTLS*) along with 80 MVAr switchable line reactor at Dehradun end at each circuit-220 Km

  ** with minimum capacity of 2100 MVA on each circuit at nominal voltage*

Note: Future Scope at Kaza Pooling Station (as per 6th NCT)

Space provision for:

- 5 no. of 132 kV line bays for future projects
- 2 nos. of 400/132 kV Transformers

- It was informed that subsequently, a meeting was taken by CEA on 17/12/21 regarding decision on implementation of Kaza S/s as AIS or GIS. CTU informed that due to low temperature, high altitude of Kaza around 3800 m, and Seismic considerations, construction of GIS would be more feasible option considering the requirement of high insulation levels in AIS. SJVN also opined Space limitation for land at Kaza. In the meeting, CEA also opined that construction of Wangtoo-Dehradun 400 kV D/c line may be difficult as the terrain is completely hilly and may involve National Park and forests near Dehradun. Accordingly, alternate proposal with less difficulty in construction of transmission line may be explored.

- In view the above, Joint Study Meeting was held on 24/12/2021 with CEA, POSOCO, HVPN, PTCUL, HPPTCL, UPPTCL and other STUs of Northern region by CTU to finalize the transmission system for evacuation of power from Kaza Solar Power Project (880MW) beyond Wangtoo ***(Copy of minutes enclosed at Annex-B).***

- It was informed that studies were carried out with envisaged Hydro/Solar generation in above Kaza +Kinnaur complex (Solar: 880MW+400MW (future)+ Hydro :804MW (future), Shongtong (450 MW)) for six alternatives for evacuation of power beyond Wangtoo. The list of alternatives explored were as below:
  - **Alt-1 :** Wangtoo (HPPTCL) -Nallagarh (PG) 400kV D/c Line (Twin HTLS) –200km
  - **Alt-2 :** Wangtoo (HPPTCL) -Hamirpur (PG) 400kV D/c Line (Twin HTLS)-180km
  - **Alt-3 :** Wangtoo (HPPTCL)-Panchkula (PG) 400 kV D/c Line (Twin HTLS)-210km
  - **Alt-4 :** Wangtoo(HPPTCL)-Abdullapur (PG) 400kV D/c Line (Twin HTLS)-220km
  - **Alt-5 :** Wangtoo (HPPTCL) -KalaAmb 400kV D/c line (Twin HTLS)-180 km & LILO of both ckts of Abdullapur (PG)-Panchkula (PG) 400 kV D/c Line at Kala Amb(Triple Snowbird) – 20km
  - **Alt-6 :** Wangtoo (HPPTCL)-Dehradun (PG) 400 kV D/c Line (Twin HTLS) -220km

- From studies, it emerged that Alternative-3 i.e. Wangtoo (HPPTCL)-Panchkula (PG) 400 kV D/c Line (Twin HTLS) and Alternative-5 i.e. Wangtoo (HPPTCL) -Kala Amb 400kV D/c line (Twin HTLS) & LILO of Abdullapur (PG)-Panchkula (PG) 400 kV D/c Line at Kala Amb (Triple Snowbird) are better options as compared to others. Both alternatives relieves loading of Jhakri – Gumma – Panchkula D/c line (Triple snowbird) as well as 400kV Kala Amb – Abdullapur D/c line (Quad) substantially during n-1 contingency condition. Further, there are short circuit level constraints at Abdullapur (40 kA) being old Substation.

- Alternative-5 with LILO at Kala Amb was found suitable in view of diversion of flows towards Abdullapur as well as Panchkula, both load centers. However, there are issues in availability of bay space as this option needs 6 bays at Kala amb (GIS) whereas

space for only 4 GIS bays are available. However even for 4 nos. bays, as informed by POWERGRID, hillock blasting needs to be carried out at Kala Amb Substation. Further this option will be slightly costlier than Alternative -3.

- Alternative-3 was also found suitable as beyond Panchkula (AIS), power will be fed to the load centers of Punjab (Patiala) as well as Abdullapur & Panipat. This option also relieves loadings of Jhakri – Gumma – Panchkula D/c line (Triple snowbird) as well as 400kV Kala Amb – Abdullapur D/c line (Quad) significantly, during n-1 contingency condition.

. HPPTCL mentioned that in view of short time frame for implementation for Kaza Solar Park (Mar'24) as well as above considerations, alternative-3 may be preferred instead of Alternative-5. CEA, HVPN & POSOCO also concurred to the above suggestion.

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- CTU enquired HPPTCL about space for switchable line reactor at Wangtoo S/s for Wangtoo- Panchkula D/c line (about 210 km). HPPTCL informed that there is no space available for line reactor at Wangtoo S/s. CTU requested to provide GA/SLD of 400kV Wangtoo S/s so as to verify space availability. The same was provided by HPPTCL, however, as informed by HPPTCL, no space for line reactor could be worked out at Wangtoo S/s end.
- In the meeting, due to transportation constraints, 125 MVAR bus reactor was also decided to be of 1-ph banks instead of 3-ph bank. It was also deliberated that due to transportation constraints and limitations of load bearing capacity of certain bridges enroute of Wangtoo-Kaza line, transformer rating at Kaza PS may be considered as 200 MVA (1-ph units) instead of 315 MVA (1-ph units), however, this would increase space requirement at Kaza PS.
- Based on detailed deliberations, Alternative -3 was agreed as transmission option beyond Wangtoo. Accordingly, following composite transmission scheme for evacuation of 880 MW power from Kaza Solar Park was agreed:

Connectivity System for the Proposed Kaza Solar Park (880 MW)

- Establishment of 1x315 MVA (4x105 MVA single phase units including one spare)[$], 400/132kV substation (GIS) at Kaza - under ISTS
- Kaza– Wangtoo (HPPTCL) 400 kV D/c (Quad) line along with the associated 400 kV bays at both ends (Line capacity shall be 2500 MVA per circuit at nominal voltage) - under ISTS
- 1x80 MVAR switchable line reactor on each circuit at Kaza end of Kaza– Wangtoo 400 kV D/c line- under ISTS
- 125 MVAr (420kV) Bus Reactor at Kaza (1-Ph units)
- 132 kV line bays (9 Nos.) for termination of lines from 7 pockets of solar projects of SJVNL- under applicant scope

[$] In case of transportation constraints, 1x200 MVA ICT (4x66.67 MVA, 1-phase unit including one spare) shall be considered

Transfer of Power from Kaza Solar Park (880 MW)- under ISTS

- Augmentation of 2x315 MVA (6x105 MVA single phase units)[#] 400/132 kV ICT at Kaza PS
- Wangtoo (HPPTCL) -Panchkula (PG) 400 kV D/c (Twin HTLS*) Line along with 80 MVAr switchable line reactor at Panchkula end at each circuit-210 Km

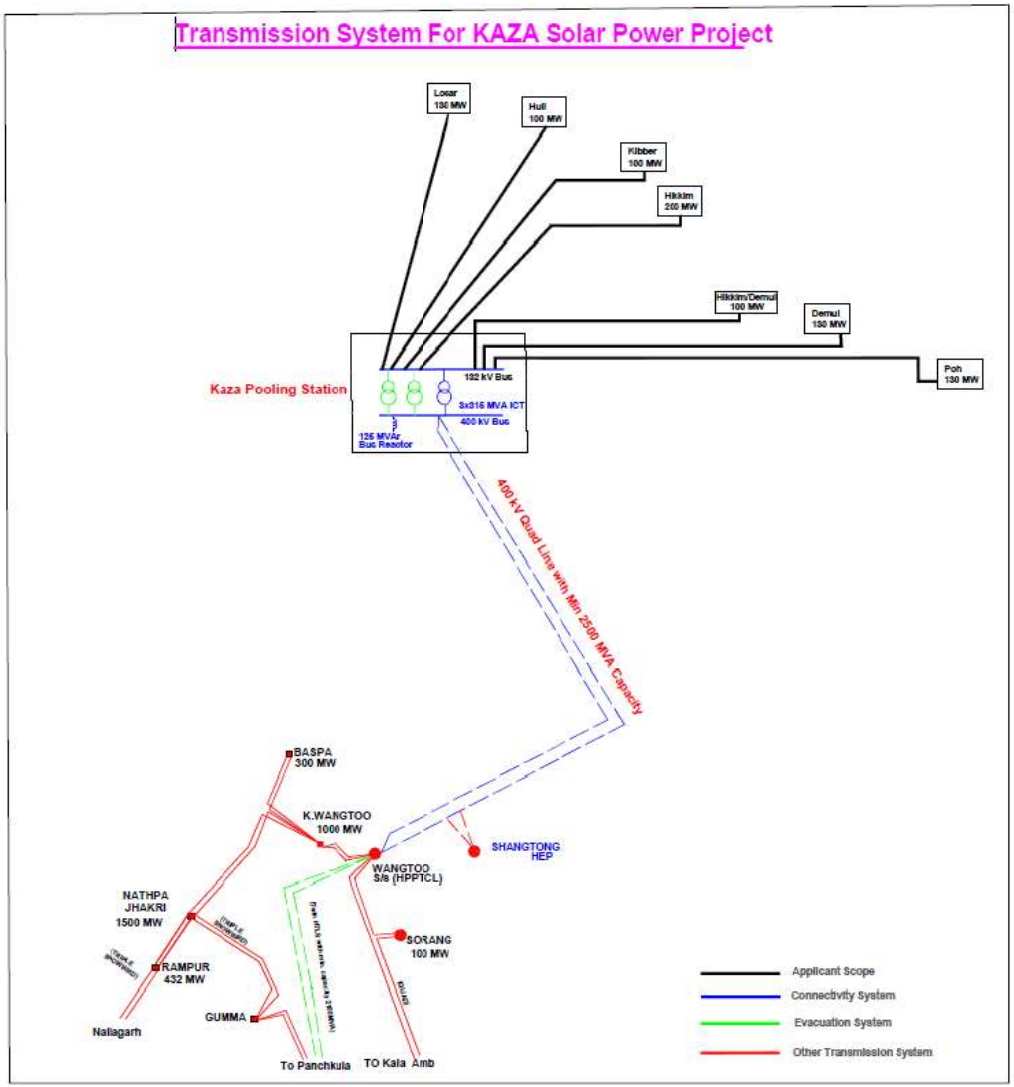
[#] In case of transportation constraints 4x200 MVA ICT (12x66.67 MVA, 1-phase unit) shall be considered

** with minimum capacity of 2100 MVA on each circuit at nominal voltage*

Note: Future Scope at Kaza Pooling Station (as per 6th NCT)

Space provision for:

- 5 no. of 132 kV line bays for future projects
- 2 nos. of 400/132 kV Transformers


Transmission System For KAZA Solar Power Project
Losar 130 MW
Hull 100 MW
Kibber 100 MW
Hikkim 200 MW
Hikkim/Demul 100 MW
Demul 130 MW
Poh 130 MW
Kaza Pooling Station
132 kV Bus
3x315 MVA ICT
400 kV Bus
125 MVAr Bus Reactor
400 kV Quad Line with Min 2500 MVA Capacity
BASPA 300 MW
K.WANGTOO 1000 MW
SHANGTONG HEP
WANGTOO S/s (HPPTCL)
NATHPA JHAKRI 1500 MW
SORANG 100 MW
RAMPUR 432 MW
GUMMA
Nallagarh
To Panchkula
TO Kala Amb
Applicant Scope
Connectivity System
Evacuation System
Other Transmission System

--x—x—x—