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भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन - I प्रभाग

Power System Planning & Appraisal - I Division

सेवा में / To

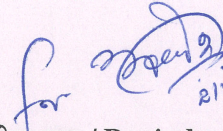
-As per enclosed list-

विषय: "ट्रांसमिशन पर राष्ट्रीय समिति" (एनसीटी) की 6th बैठक के कार्यवृत्त।Subject: Minutes of the 6th Meeting of "National Committee on Transmission" (NCT)

महोदया / महोदय / Sir / Madam,

The 6th meeting of the "National Committee on Transmission" (NCT) was held on 29.10.2021 under the Chairmanship of Chairperson, CEA & Chairman, NCT, through Video Conferencing (Microsoft Teams). The minutes of the meeting is enclosed herewith.

भवदीय,

for  21/12/2021.
(रवीन्द्र गुप्ता / Ravinder Gupta)

मुख्य अभियन्ता एवं सदस्य सचिव/
Chief Engineer & Member Secretary (NCT)

Copy to:

- (i) Joint Secretary (Trans), Ministry of Power, Shram Shakti Bhawan, New Delhi-110001.

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List of addressees:

1.	Chairperson, Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	2.	Member (Power System), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.
3.	Member (Economic & Commercial), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	4.	Director (Trans), Ministry of Power Shram Shakti Bhawan, New Delhi-110001.
5.	Sh. Dilip Nigam, Scientist ‘G’, MNRE, Block no. 14, CGO Complex, Lodhi Road, New Delhi – 110003	6.	Chief Operating Officer, CTUIL, Saudamini, Plot No. 2, Sector-29, Gurgaon – 122 001.
7.	Sh. Rajnath Ram, Adviser (Energy), NITI Aayog, Parliament Street, New Delhi – 110 001.	8.	CMD, POSOCO, B-9, Qutub, Institutional Area, Katwaria Sarai, New Delhi – 110010
9.	Dr. Radheshyam Saha, Ex. Chief Engineer, Central Electricity Authority	10	Shri Sushanta Kumar Ray Mohapatra, Ex. Chief Engineer, Central Electricity Authority

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Minutes of the 6th meeting of National Committee on Transmission (NCT)

List of participants is enclosed at **Annexure A**.

Chairperson, CEA, welcomed the participants to the 6th meeting of NCT and informed that NCT has been re-constituted by MoP vide letter dated 28.10.2021. Chief Engineer (PSPA-I), CEA, briefed the committee members about the Terms of Reference of re-constituted NCT.

1. Re-Constitution of National Committee on Transmission (NCT) vide MoP order dated 28.10.2021

1.1 MoP vide Order No. 15/3/2018-Trans-Pt (5) dated 28.10.2021 has re-constituted National Committee on Transmission (NCT). The same has been enclosed at **Annexure-I**.

1.2 Chief Engineer (PSPA-I), CEA highlighted that following new Terms of Reference have been added as per above MoP order:

- *CTU after consulting RPC shall submit the proposal for expansion of ISTS to the NCT. For proposal upto Rs. 500 Crores, prior consultation with RPC would not be required.*
- *CTU shall prepare 5 year rolling-plan for ISTS augmentation. The plan is to updated every year. The annual plan shall be put up to NCT six months in advance. Annual plan for a year shall be submitted to NCT by September of previous year.*
- *The NCT shall recommend to MoP for implementation of the ISTS for projects with cost more than Rs. 500 Crore, along with their mode of implementation, i.e. TBCB/RTM, as per the existing Tariff Policy. However, the NCT shall approve the ISTS costing between Rs. 100 Crore to Rs. 500 Crore or such limit as prescribed by MoP from time to time, along with their mode of implementation under intimation to MoP. The ISTS costing less than or equal to Rs. 100 Crore, or such limit as prescribed by MoP from time to time, will be approved by the CTU, along with their mode of implementation under intimation to the NCT and MoP. After approval of the ISTS by the NCT or the CTU (as the case may be), the TBCB project shall be allocated to BPC's through Gazette Notification, while the RTM project shall be allocated to CTU.*

1.3 As per revised ToR, ISTS projects, costing up to Rs. 100 Crore or such limit as prescribed by MoP from time to time, would be approved by CTU and its mode of implementation to be decided by CTU under intimation to NCT. As implementation of transmission scheme through RTM mode is generally preferred for small schemes, therefore, Members of NCT were of the view that clarifications may be sought from MoP as to how the CTU can approve and recommend the schemes to CTU itself (under RTM). In order to avoid issues related to operation, coordination and complications in implementation, if small transmission scheme such as augmentation / modification works such as bay extension, addition or replacement of transformer, reactor installation etc. if implemented under TBCB by different TSPs, NCT was of the view that such works should be implemented by TSP who owns the sub-station / transmission line under RTM mode. A clarification in this regard may be sought by CTU from MoP.

1.4 After detailed discussions, it was decided that CTU shall seek clarifications from MoP in this regard.

1.5 As per the revised ToR of re-constituted NCT, only the transmission schemes with estimated cost exceeding Rs. 100 Crore were to be deliberated. NCT took note of the following

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transmission schemes costing less than or equal to 100 Cr. The implementing agency for the schemes shall be decided by CTU after seeking clarifications from MoP.

S. No.	Transmission scheme
1.	Requirement of 765 kV spare (1-Ph) Reactors units at 765 kV Warangal New and Chilkaluripeta
2.	Scheme to bypass NGR to use Switchable Line Reactor as Bus Reactor
3.	1 no. 400 kV bay at 765/400 kV Kurnool (New) Substation
4.	Grant of 400 kV & 220 kV bays to RE generators at ISTS Pooling Stations and ICT augmentation at Bikaner-II PS
5.	Additional ICT at Kurukshetra (PG)
6.	Installation of new 400/220kV, 1x500MVA ICT along with associated bays at existing Ranchi (POWERGRID) S/s
7.	CT of 132 kV Imphal (POWERGRID) – Imphal (Manipur) bay-2 to be upgraded to 1200 A at Imphal (POWERGRID) end

2. Confirmation of the minutes of the 5th NCT meeting held on 25.08.2021 and 02.09.2021.

2.1 The two sittings of the 5th meeting of the “National Committee on Transmission (NCT)” were held on 25.08.2021 and 02.09.2021. Subsequently, minutes of the meeting were issued vide CEA letter No. CEA-PS-11-15(11)/1/2020-PSPA-I Division dated 29.09.2021.

2.2 No comments/observations were received on the minutes. Hence, the minutes of the meeting were confirmed by the Members.

3. New Transmission schemes recommended by Southern Regional Power Committee (Transmission Planning) [SRPC(TP)]

3.1 Augmentation of Transformation Capacity in Southern Region:

3.1.1 Chief Engineer (PSPA-I), CEA, stated that in the 3rd meeting of SRPC(TP) held on 24th August 2021, ICT Augmentation were agreed at Palakkad (PG), Kolar (PG) and Nizamabad (PG) under regional system strengthening due to ‘N-1’ non-compliance of existing ICTs under peak load conditions.

3.1.2 Some of the NCT Members were of the view that the above scheme could be bifurcated into three separate packages as the ICT augmentation is at three different locations. In this regard, Member (Power System), CEA, stated that the above mentioned ICT augmentation are required for system strengthening in Southern Region and the ‘n-1’ constraints have been highlighted in operational feedback report of POSOCO, therefore it would be better to approve the scheme as one package in order to avoid any delay in implementation.

3.1.3 After deliberations, NCT agreed to the following:

Name of the scheme/est. cost/schedule	Mode of implementation	Purpose /Justification
Augmentation of Transformation	RTM	Due to ‘N-1’ non-

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Name of the scheme/est. cost/schedule	Mode of implementation	Purpose /Justification
Capacity in Southern Region. Estimated Cost: Rs 125 Crore. Implementation Timeframe: 15 months		compliance of existing ICTs under peak load conditions

3.1.4 The detailed scope of works in the scheme is as given below:

“Augmentation of Transformation Capacity in Southern Region”

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Augmentation by 1x500 MVA, 400/220kV Transformer (3 rd) at Palakkad (PG) (2x315 MVA already existing)	400/220kV 500 MVA ICT:1 no 400 kV ICT bays – 1 no. 220 kV ICT bays – 1 no
2.	Augmentation by 1x500 MVA, 400/220 kV Transformer (3 rd) at Kolar (PG) (2x500 MVA already existing)	400/220 kV 500 MVA ICT:1 no 400 kV ICT bays – 1 no. 220 kV ICT bays – 1 no
3.	Augmentation by 1x1500 MVA, 765/400 kV Transformer (3 rd) at Nizamabad (PG) (2x1500 MVA already existing)	765/400 kV, 1x1500 MVA ICT:1 no 765 kV ICT bays – 1 no. 400 kV ICT bays – 1 no

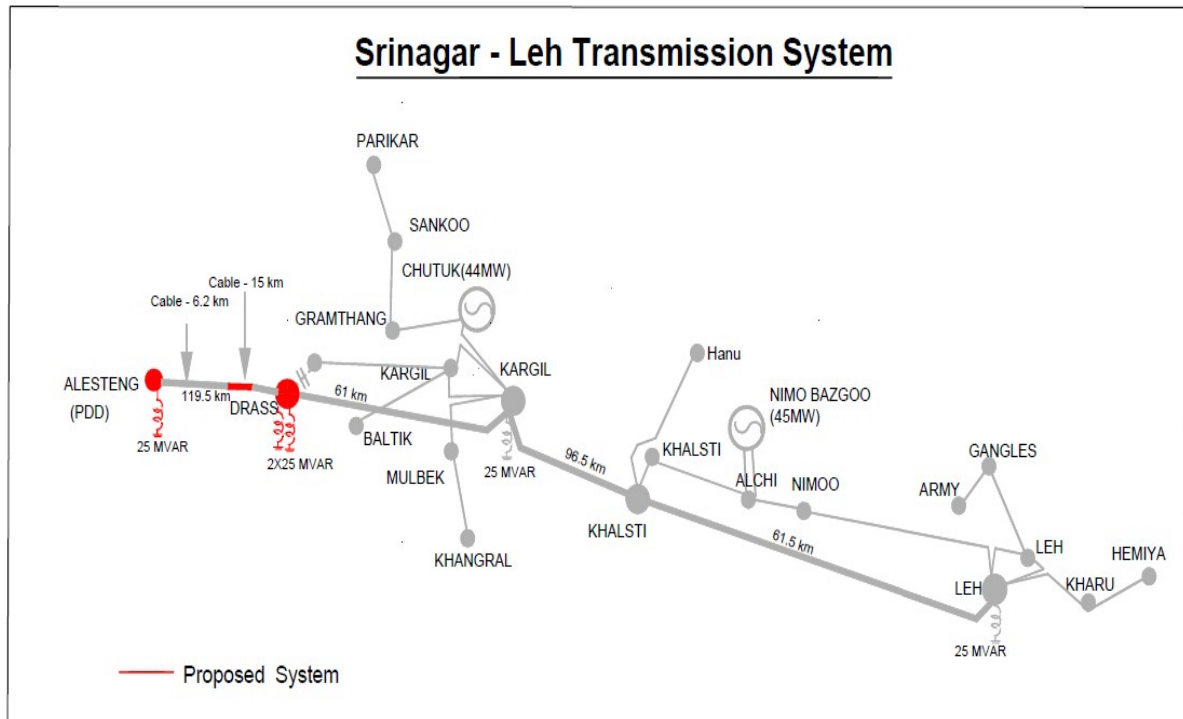
4. New Transmission schemes recommended by Northern Regional Power Committee (Transmission Planning) [NRPC(TP)]

4.1 Transmission System Strengthening for ‘Srinagar – Leh Transmission System’

- 4.1.1** Chief Engineer (PSPA-I), CEA, stated that Srinagar-Leh Transmission line has become an ISTS line after bifurcation of state of J&K into UT of J&K and UT of Ladakh and the transmission line has been transferred to POWERGRID by MoP vide letter dated 23.03.2021. Further, this line passes through difficult mountainous terrain in Minamarg to Zojilla top portion of Alusteng – Drass 220kV section, which is also an avalanche prone zone. 6 km of 220 kV underground cable is already laid between Gagangir & Shitkari section of this transmission line due to corridor constraints and heavy snowfall zone.
- 4.1.2** A committee comprising officials from JKPDD and POWERGRID recommended laying of 220 kV cable in the section between Minamarg & Zojilla Top having line length of about 15 km. With the implementation of 15 km proposed cable section, total length of cable in 220kV Alusteng –Leh transmission line would be about 21 km. With the proposed cable, the reliability of power supply to Ladakh would improve and the cable would be in parallel to the

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overhead line. POWERGRID had also proposed installation of bus reactors at Drass and Alusteng S/s.



4.1.3 Expert Member, Dr. Saha opined that the dimensions of the cable based on which the cost of the transmission scheme has been calculated, needs to be mentioned. CTUIL stated that the cable details have been already been mentioned in the DPR. The same would be communicated to CEA.

4.1.4 Most of the Members were of the view that since the project belongs to the critical area of J&K, therefore, the scheme may be proposed under RTM route considering the project security and urgency of work. CTUIL highlighted that the revised estimated cost of the above works is Rs 277 Crore instead of Rs 226 Crore as mentioned in the agenda.

4.1.5 After deliberations, NCT agreed to the following:

Name of the scheme/est. cost/schedule	Mode of implementation	Purpose /Justification
Transmission System Strengthening for 'Srinagar – Leh Transmission System' Estimated Cost: Rs 277 Crores Implementation Timeframe: 36 months (3 working seasons)*	RTM	To increase the reliability of power in Ladakh region.

* Efforts should be made to complete the works at the earliest.

4.1.6 The detailed scope of works in the scheme is as given below:

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Transmission System Strengthening for ‘Srinagar – Leh Transmission System’

S. No.	Scope of the Transmission Scheme	Capacity /km
1	Laying of cable (800 sq mm XLPE power cable) between Minamarg and Zojila Top section of Alusteng –Drass 220 kV section	Length- 15 km
2	2x25 MVAR, 220 kV bus reactors at 220/66 kV Drass S/s	25 MVAR, 220 kV bus reactor – 2 nos. 220 kV reactor bay – 2 nos.
3	1x25 MVAR, 220 kV bus reactors at 220/66 kV Alusteng S/s	25 MVAR, 220 kV bus reactor – 1 no. 220 kV reactor bay – 1 no.

4.2 Transmission system for evacuation of 10 GW RE power from renewable energy parks in Leh**Background:**

4.2.1 MoP had directed MNRE and POWERGRID to explore the possibility of developing and evacuating 10 GW of renewable energy from Leh and POWERGRID was directed to prepare a DPR for 10 GW capacity transmission infrastructures for evacuating renewable energy from Leh.

Accordingly, two locations were identified for pooling of renewable energy in Leh i.e. Nyoma and Pang with a capacity of 5 GW each and Powergrid proposed following transmission schemes for evacuation of 10 GW renewable energy from Leh:

- (i) Evacuation from Leh UMSP at Pang (5 GW) through VSC based HVDC system up to Kaithal (Haryana) beyond which it shall be integrated with Meerut/Moga and Aligarh in the National Grid.
- (ii) Evacuation from Leh UMSP at Nyoma (5 GW) through VSC based HVDC system upto Kashipur (UKD) beyond which it shall be integrated with Narela (Delhi) and Bareilly (UP) in the National Grid.

4.2.2 Subsequently, MoP, decided that the transmission system for evacuation of 10 GW RE generation would comprise of 5 GW transmission link from Pang to Kaithal along with Battery Energy Storage System (BESS) as Phase I. The Phase II of 5 GW with Nyoma-Kashipur section is fraught with uncertainty because of Changthang wild life area coming in between. Accordingly, Powergrid was directed to submit revised DPR for transmission project with BESS.

4.2.3 Powergrid in its DPR has mentioned that by integrating 12 GWh of BESS at Pang, one transmission system corridor of 5 GW from Pang to Kaithal shall be sufficient to cater to the evacuation up to 13 GW (9 GW Solar + 4 GW Wind) RE capacity. The requirement of BESS storage capacity can be determined on the basis of RE generation being set up in Leh region during implementation of Phase-I of the project. BESS can be scaled up to 12 GWh in stages, matching with the additional RE generation in Leh.

Similarly, implementation of Phase-II of the project can be taken up after Phase-I is commissioned and depending on the scale of RE generation, i.e., if it goes beyond 13 GW, thus entirely utilising Phase-I transmission system as well as Battery energy storage system.

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4.2.4 MNRE in its letter dated 24.3.2021 has informed that DoE has granted its in-principle approval for providing Central grant of 40% of the project cost for ISTS component related to Ladakh RE projects.

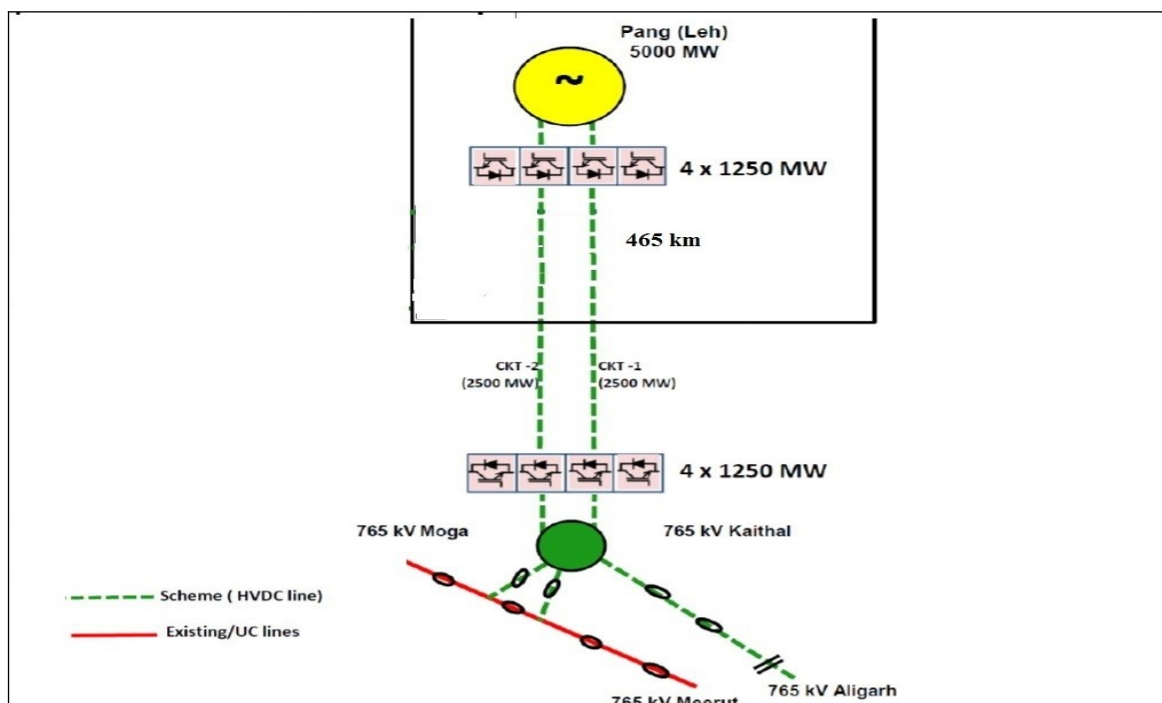
4.2.5 The details of Phase-I scheme as per POWERGRID's DPR is as under:

A. Pang (Leh) to Kaithal (Haryana) transmission system: Phase-I, Part-A

Transmission system with a capacity of 5 GW on continuous power flow basis from Pang area is proposed through Voltage Source Converter (VSC) based High Voltage Direct Current (HVDC) system upto Kaithal (Haryana), beyond which it shall be integrated with Meerut/Moga and Aligarh in the national grid.

B. Battery Energy Storage System (12 GWh): Phase-I, Part-B

BESS with a peak storage capacity up to 12GWh is proposed to be installed at Pang depending on the scale of RE generation that will be set up towards the later stages of implementation of Phase – I, Part A. The BESS will be integrated with the transmission system of Pang – Kaithal evacuation system and the same would also improve utilisation of this corridor.



After deliberations in the 4th meeting of NRPC(TP), Pang- Kaithal VSC based HVDC system (5 GW) was agreed. Further, due to constraints observed in integration of the system with Moga and Aligarh, it was decided that the AC interconnections from VSC terminal at Kaithal would be worked out again and accordingly, intimated to constituents in the next NRPC(TP) meeting.

In order to provide interconnection with 220 kV transmission network in Leh, it was agreed to consider 400/220/33 kV transformers at Pang instead of 400/132/33kV transformers.

Deliberations in the meeting:

4.2.6 SECI vide e mail dated 29.10.2021 had informed that for the evacuation of 13GW RE power, VSC HVDC system of 5GW is being planned. This 13GW power shall be combined along with storage system in Ladakh so that the proposed 5 GW HVDC transmission system could be utilised more efficiently. For establishing 13GW RE system, around 40,000 acres of land

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is required and allotment of same is in advanced stages by UT Ladakh Administration. The transmission system shall be planned in such a way that 3-4 pooling stations at 400 kV, based on the capacity of RE plants need to be considered. These pooling stations shall have the provision for connectivity of RE generation and also the storage systems. After pooling of the power from these 3-4 pooling stations, it shall be connected to the 5 GW HVDC station. In view of the climatic conditions and accessibility of the locations, the transmission lines connecting the individual pooling stations to the HVDC station should be planned with 'N-1' redundancy.

- 4.2.7** Director (Trans), MoP, stated that as per the discussions held in MoP, Battery Energy Storage System (BESS) should also be planned simultaneously with the 5 GW HVDC system in order to supply round the clock power.
- 4.2.8** Member (Power System), CEA, opined that the time required for implementation of BESS would be around 3 years and since the quantum of BESS required at Pang needs to be analysed by MNRE/SECI, therefore as of now, the 5 GW HVDC system from Pang to Kaithal could be taken up for implementation as it's implementation time (around 6-7 working seasons as per DRP) would be much more than the implementation time of BESS. The BESS could be taken up subsequently in matching timeframe with the RE generation.
- 4.2.9** Chairman, NCT, also opined that the looking into the implementation timeframe of HVDC system, the 5 GW HVDC system from Pang to Kaithal could be agreed and the BESS could be taken up subsequently.
- 4.2.10** NCT members opined that, for supplying round the clock power, the quantum of BESS needs to be decided as with 5 GW round the clock power, the size and cost of BESS would become huge.
- 4.2.11** CTU informed that planned 5 GW Transmission corridor (HVDC) from Pang to Kaithal comprises two circuits of 2500 MW each. In case of outage of one circuit, 2500 MW power will have to be curtailed during peak RE/solar condition. In order to avoid curtailment of RE generation during outage of one circuit out of two circuits in peak RE condition, additional BESS capacity may be planned by REIA.
- 4.2.12** POSOCO stated that regarding the BESS, the details in terms of both capacity (GW) and duration of storage (GWh) needs to be mentioned. The solar and wind profile over the 8760 hrs in a year could be studied to analyse the quantum of storage which could be feasible. Representative of MNRE informed that it would take a few months to ascertain the wind and solar profile in Leh.
- 4.2.13** Expert Member, Dr. Saha, stated that for determining the storage capacity, wind and solar profile is a must. He further stated that the option of overhead line could also be re-considered as it is a sensitive area and tower height might create issues. Also, there is not enough justification as to how the 12 GWh capacity of BESS has been assessed by SECI. Representative of MNRE stated that SECI would be requested to give a presentation in the next NCT meeting regarding assessment of storage capacity. POSOCO stated that SECI could circulate a report regarding the studies carried out for ascertaining 12 GWh capacity of BESS.
- 4.2.14** Regarding the in-principle approval for providing Central grant of 40% of the project cost, MNRE updated that it has been decided that MNRE would be involved only in the GEC intra-state projects. Since, the Ladakh RE project is related to ISTS component, therefore, MNRE has communicated to MoP for taking up the matter further with DoE.

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- 4.2.15** After detailed deliberations, NCT decided to recommend the transmission system for evacuation of 5 GW power from Pang to Kaithal. Further, due to the time gap in the implementation of the BESS and HVDC system and the quantum of BESS yet to be finalised, the BESS was agreed in-principle and it was decided that implementation of the same could be taken up at later stage. NCT also opined that for better utilization of the transmission system, RE generation capacity in excess of 5 GW needs to be added in the matching time frame of HVDC system in order to charge the BESS and supply power to the grid during non- solar hours.
- 4.2.16** Regarding the mode of implementation, some members opined that Ladakh being a sensitive area, the project should be implemented by a Central agency, therefore RTM mode could be considered. It was also highlighted that since this project is of National importance and Central Government grant is also involved in it, so RTM mode of implementation should be considered. It was further added that in India, only Powergrid has experience of implementation of VSC based system and Powergrid is the only agency who has worked in relatively inhospitable areas of Ladakh, so Powergrid is in better position to implement the scheme, therefore, the project should be recommended for implementation through RTM.
- 4.2.17** Some of the Members were of the view that to increase competition, TBCB mode of implementation could be preferred. Private players may also be given chance to implement HVDC system in India. Further, Powergrid can also participate in the bidding process for implementation of the project.
- 4.2.18** After detailed deliberations, no consensus could be reached among members of NCT and it was decided that the decision regarding mode of implementation may be taken by MoP.
- 4.2.19** After detailed deliberations, NCT recommended the following:

Name of the scheme/est. cost/schedule	Mode of implementation	Purpose /Justification
<p>Transmission system for evacuation of RE power from renewable energy parks in Leh: Pang (Leh) to Kaithal (Haryana) - Phase-A, Part-I</p> <p>Estimated Cost: Rs 18,500 Crores (excluding cost of AC system beyond Kaithal and cost of Battery Energy Storage System)</p> <p>Implementation Timeframe: 72 months (6-7 working seasons)</p>	Ministry to decide.	For evacuation of 10 GW power from renewable energy parks in Ladakh region.

- 4.2.20** The detailed scope of works in the scheme is as given below:

- i.) **Pooling point in Pang (Leh):** ± 350 kV, 2 nos. of 2500 MW HVDC terminal
- ii.) **Pooling point in Kaithal New(Haryana):** ± 350 kV, 2 nos. of 2500 MW HVDC terminal (Each 2500 MW Symmetrical monopole link shall consist of 2 x 1250 MW parallel converter of symmetric monopoles along with Interface transformers of suitable capacity at both terminals)

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<p>iii.) 4 Nos. of 400 kV converter (VSC) bays at Pang</p> <p>iv.) 4 Nos. of 765 kV converter (VSC) bays at Kaithal New</p> <p>v.) 2 Nos. of 400/220/33 kV, 200 MVA Transformers along with associated Bays at Pang</p> <p>vi.) 2 Nos. of 765/400/33 kV, 1500 MVA Transformers along with associated bays at Kaithal New along with 2 nos. of 400kV line bays and 2 nos. of 765 kV line bays.</p> <p><u>Future provisions:</u></p> <p>(i) Space provision to be kept at Kaithal New for future augmentation of AC system:</p> <ul style="list-style-type: none"> • 2 no. of 765/400kV ICT at Kaithal New • 4 no. of line bays both at 400kV and 765kV at Kaithal New <p>(ii) Space provision to be kept at Pang on AC side:</p> <ul style="list-style-type: none"> • 4 nos. of 220kV line bays • 4 nos. of 400kV line bays for pooling of RE generation (to be confirmed from MNRE/SECI)
<p>DC GIS/ AIS -</p> <p>vii.) DC GIS / AIS at Pang and DC AIS at Kaithal New</p> <p>viii.) 3 nos. of transition stations with DC GIS/ AIS</p>
<p>HVDC Line (OHL and UG Cable)</p> <p>ix.) 480 kms of ± 350kV HVDC line between Pang & Kaithal New PS (combination of 465km overhead line (Quad) and 15 km underground cable)</p>
<p>x.) 6 nos. 400kV line bays at Pang for termination of lines from renewable energy Park developer's PS in Leh</p>

Note:

- i. The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey
- ii. Suitable clause needs to be added in the bid document to enable the TSP to provide the dynamic data and PSCAD model of the VSC HVDC to CTUIL and POSOCO.

4.2.21 BESS was agreed in-principle with the timeframe of implementation matching with the above HVDC system. However, it was agreed that the quantum of storage to be installed would be discussed and finalised subsequently.

4.3 Transmission system for evacuation of power from Kaza Solar Power Project to be developed by SJVN limited (880 MW):

4.3.1 Chief Engineer (PSPA-I), CEA, stated that SJVNL had applied for grant of connectivity for solar project of 880 MW at Kaza, Lahul & Spiti, Himachal Pradesh. SJVNL had informed CTUIL that they would be developing the solar project at seven locations with the capacity as (4x100+130+150+200) MW. Since, there is no pooling station existing in that area, so in order to provide connectivity to SJVNL for their solar project in Kaza, construction of

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400/132 kV substation at Kaza along with Kaza to Wangtoo 400 kV D/c line was agreed in 4th NRPC(TP) meeting. The Solar projects would be connected at 132 kV level with the 132 kV bays at Kaza under the scope of SJVNL.



- 4.3.2 Chief Engineer (PSPA-I), CEA, further informed that in the 4th NRPC(TP) meeting, the line capacity for Kaza– Wangtoo (HPPTCL) 400 kV D/c line was agreed to be min 900 MW per ckt upto LILO point for Jangi Thopan HEP. However, in a meeting held with HIMURJA, SJVNL, HPPTCL and CTUIL on 28.10.21, it was informed by HIMURJA that there would be additional injection of around 800 MW, through planned small HEPs in that area and 400 MW of additional solar generation. Further, considering the RoW issues in the area, it is proposed that the complete transmission line from Kaza to Wangtoo may be constructed with same conductor configuration i.e. 2500 MW/circuit. NCT members agreed for the same.
- 4.3.3 CTUIL updated that SJVNL has applied only for Stage-I connectivity with the time schedule of March, 2024.
- 4.3.4 Members opined that looking in the difficulty of construction of the line in difficult mountainous terrain and the schedule of the RE project, the scheme may be recommended for implementation.
- 4.3.5 After deliberations, NCT recommended the following:

Name of the scheme/est. cost/schedule	Mode of implementation	Purpose /Justification
Transmission system for evacuation of power from Kaza Solar Power Project to be developed by SJVN Limited (880 MW) Estimated Cost: Rs 630 Crore	TBCB	For evacuation of 880 MW power from Kaza Solar Project and integration of future solar and hydro projects in HP.

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Name of the scheme/est. cost/schedule	Mode of implementation	Purpose /Justification
Implementation Timeframe: March, 2024		

4.3.6 The detailed scope of works in the scheme is as given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 3x315 MVA (10x105 MVA single phase units including one spare unit), 400/132kV substation at Kaza along with Space provision for 9 no. of 132 kV line bays for termination of lines from 7 pockets of solar projects of SJVNL Additional Space provision for future scope at Kaza Pooling station: <ul style="list-style-type: none"> • 5 no. of 132kV line bays for future projects • 2 nos. of 400/13 2kV transformers 	400/132 kV, 315 MVA ICT- 3 nos. (10x105 MVA single phase units, including one spare unit) 400 kV ICT bays- 3 nos. 132 kV ICT bays- 3 nos. 400 kV line bays- 2 nos.
2.	Kaza– Wangtoo (HPPTCL) 400 kV D/c line along with 80 MVAr switchable line reactor at Kaza end	Length- 180 km 400 kV, 80 MVAr Switchable line reactor- 2 nos. Switching equipment for 400 kV 80 MVAr switchable line reactor –2
3.	400 kV line bays at Wangtoo for Kaza– Wangtoo (HPPTCL) D/c line	400 kV line bays- 2 nos.

Note:

- (i) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey
- (ii) HPPTCL to provide space for 2 nos. of 400kV bays at Wangtoo S/s

4.4 400 kV Khandukhal(Srinagar)-Rampura (Kashipur) D/c line

4.4.1 Chief Engineer (PSPA-I), CEA, stated that in the 3rd NRPC(TP) meeting, implementation of 400 kV D/c Khandukhal(Srinagar)-Rampura (Kashipur) line was agreed to be taken up under central sector as an ISTS scheme with the matching time frame of commissioning of Vishnugad Pipalkoti HEP of THDC or Tapovan Vishnugad HEP of NTPC, whichever is earlier. Subsequently, the scheme was taken up for discussions in 5th meeting of NCT for decision on its mode of implementation. In the NCT meeting, it was pointed out by CTUIL that the conductor configuration of the line, Quad Bersimis needs to be mentioned. Also, earlier the line length noted was 150 km and now, it has been modified to 195 km, which would require line reactor. 80 MVAR switchable line reactor may be considered in each circuit at any end with inter-tripping arrangement could be utilized at both ends.

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The availability of space for construction of 400 kV bays along with space for installation of switchable line reactor at 400 kV S/s Khandukhal (Srinagar) and 400 kV S/s Rampura (Kashipur) was enquired from PTCUL in the 4th NRPC(TP) meeting held on 5.10.2021 and 12.10.2021. PTCUL in response stated that there was no space for reactor at Khandukhal (Srinagar). The space at Kashipur S/s needs to be checked. PTCUL had also informed that two number of bays are existing at Khandukhal (Srinagar) for termination of this line.

4.4.2 Chief Engineer (PSPA-I), CEA, further stated that recently, CTUIL after discussions with PTCUL, conveyed that the bay rating at Srinagar needs to be upgraded from 2000 A to 3150 A. Accordingly, the cost of the scheme would change.

4.4.3 CTUIL stated that instead of Quad Bersimis conductor, Twin HTLS conductor with the same capacity of 2500 MVA may be considered, keeping in mind the difficulty of the terrain and less weight of Twin HTLS conductor. Also, regarding bay upgradation at Srinagar, details from PTCUL would be required and the same could be included in the RfP document. CTUIL further suggested that a joint visit could be planned to examine the space availability for line reactor at Kashipur end.

4.4.4 Member (Power System), CEA, agreed with CTU stating that a joint visit could be carried out by CEA, CTU and PTCUL for confirmation of space availability for switchable line reactor at Kashipur.

4.4.5 After deliberations, NCT recommended the following:

Name of the scheme/est. cost/schedule	Mode of implementation	Purpose /Justification
400 kV Khandukhal(Srinagar)-Rampura (Kashipur) D/c line Estimated Cost: Rs 550 Crores Implementation Timeframe: The timeline to be considered as matching time frame of commissioning of Vishnugad Pipalkoti HEP (Dec'23) of THDC or Tapovan Vishnugad HEP of NTPC, whichever is earlier.	TBCB	To evacuate power from upcoming projects in the Alaknanda basin

4.4.6 The detailed scope of works in the scheme is as given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1	400 kV D/c Khandukhal (Srinagar)-Rampura (Kashipur) line (Twin HTLS)	Length – 195 km
2	1x80MVAR switchable line reactor at Rampura (Kashipur) end on each circuit of Khandukhal(Srinagar) -Rampura (Kashipur) line	Switching equipment for 420 kV 80 MVAR switchable line reactor –2 420 kV, 80 MVAR Switchable line reactor- 2

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Sl. No.	Scope of the Transmission Scheme	Capacity /km
3	2 nos. of 400 kV bays both at Rampura(Kashipur) S/s	400 kV line bays -2
4	Upgradation of existing 400kV bays at Khandukhal (Srinagar)	Upgradation works for 400 kV line bays -2

Note:

- (i) The timeline to be considered as matching timeframe of commissioning of Vishnugad Pipalkoti HEP (December, 2023) of THDC or Tapovan Vishnugad HEP of NTPC, whichever is earlier.
- (ii) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey
- (iii) PTCUL to provide space for 2 nos. of 400kV bays at Rampura (Kashipur) along with the space for line reactors.

4.4.7 NCT also recommended that a joint visit to be carried out by CEA, CTU and PTCUL for confirmation of space availability for switchable line reactor at Kashipur end. In case space is not available for switchable line reactor, feasibility of fixed line reactor could be ascertained.

5. Modification in the already approved and notified ISTS scheme recommended by North Eastern Regional Power Committee (Transmission Planning) [NERPC(TP)]:

5.1 Modification in intra-state transmission system to be implemented in the similar timeframe of ISTS scheme “Establishment of new 220/132kV substation at Nangalbibra”

5.1.1 Chief Engineer (PSPA-I), CEA, stated that NCT in its 3rd meeting held on 26.05.2020 & 28.05.2020 had recommended the Transmission Scheme “Establishment of new 220/132kV substation at Nangalbibra” to be implemented through TBCB route. The scheme was notified vide Gazette notification dated 25.09.2020 by MoP for implementation through TBCB route. The details are as given below:

“Establishment of new 220/132kV substation at Nangalbibra”

Sl. No.	Scope of the Transmission Scheme	Capacity / line length km
1.	<p>Establishment of new 220/132kV, 2x160MVA substation at Nangalbibra.</p> <p>Additional space for future expansion:</p> <p>220/132kV 200MVA ICT-1 (along with associated bays at both levels)</p> <p>400/220kV 500MVA ICT-3 (along with associated bays at both levels)</p> <p>Space for 400kV upgradation:</p> <p>Line bays along with space for switchable line reactor: 8 no. [2 no. for 400kV operation of</p>	<p>220/132kV, 160 MVA ICT-2</p> <p>220 kV ICT bays- 2</p> <p>132 kV ICT bays- 2</p> <p>220 kV Line bays: 2 [for termination of Bongaigaon (POWERGRID) – Nangalbibra 400kV D/c line (initially operated at 220kV) – under this scheme]</p> <p>132 kV Line bays: 2</p>

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Sl. No.	Scope of the Transmission Scheme	Capacity / line length km
	<p>Bongaigaon (POWERGRID) – Nangalbibra 400kV D/c line (initially operated at 220kV) and 6 no. for other lines]</p> <p>Bus reactor 420kV, 125MVA_r -3 Bus reactor bays-3.</p> <p>Space for future 220 kV line bays: 6 no. [2 no. for termination of Mawngap (Meghalaya) – Nangalbibra 220 kV D/c line of MePTCL and 4 no. for future lines]</p> <p>Space for future 132 kV line bays: 6 no. (for future lines)</p>	<p>[for termination of Nangalbibra – existing Nangalbibra (MePTCL) 132kV D/c (Single Moose) line of MePTCL]</p> <p>Bus reactor 31.5 MVA_r- 2 Bus reactor bays: 2 no.</p>
2.	Extension at Bongaigaon (POWERGRID) S/s: 2 no. of line bays for termination of Bongaigaon (POWERGRID) – Nangalbibra 400kV D/c line (initiated operated at 220kV)	220 kV line bays - 2
3.	Extension at Hatsinghmari (Assam) S/s: 2 no. of 132kV line bays for termination of Hatsinghmari (Assam) – Ampati (Meghalaya) 132kV D/c line.	132 kV line bays - 2
4.	Extension at Ampati (Meghalaya) S/s: 2 no. of 132kV line bays for termination of Hatsinghmari (Assam) – Ampati (Meghalaya) 132kV D/c line.	132 kV line bays - 2
5.	Bongaigaon (POWERGRID) – Nangalbibra 400kV D/c line (initially operated at 220kV)	140 km
6.	Hatsinghmari (Assam) – Ampati (Meghalaya) 132kV D/c line	30 km

Implementation Timeframe: 24 months

Note:

- POWERGRID to provide space for extension at Bongaigaon (POWERGRID) S/s: 2 no. of 220kV line bays for termination of Bongaigaon (POWERGRID) – Nangalbibra 400kV D/c line (initially operated at 220kV)*
- AEGCL/Assam to provide space for extension at Hatsinghmari (Assam) S/s: 2 no. of 132kV line bays for termination of Hatsinghmari (Assam) – Ampati (Meghalaya) 132kV D/c line.*
- MePTCL/Meghalaya to provide space for extension at Ampati (Meghalaya) S/s: 2 no. of 132kV line bays for termination of Hatsinghmari (Assam) – Ampati (Meghalaya) 132kV D/c line.*
- To be implemented by MePTCL, Meghalaya under intra-state scheme in matching timeframe of this ISTS scheme:*

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- (i) Mawngap (Meghalaya) – Nangalbibra (ISTS) 220kV D/c line alongwith 220kV line bays at both ends(space for construction of 2 no. 220kV line bays at Nangalbibra (ISTS) to be provided by licensee to MePTCL)
- (ii) Nangalbibra (ISTS) – existing Nangalbibra (MePTCL) 132kV D/c (Single Moose) line (2 no. 132kV line bays at Nangalbibra (MePTCL) is to be implemented by MePTCL, however, 2 no. 132kV line bays at Nangalbibra (ISTS) is under the scope of this ISTS scheme)

5.1.2 Subsequently, in the 3rd meeting of NERPC(TP) held on 19.07.2021, it has been agreed that New Shillong (Meghalaya) – Nangalbibra (ISTS) 220kV D/c line alongwith 220kV line bays at both ends would be implemented by MePTCL under intra-state scheme instead of earlier approved Mawngap (Meghalaya) – Nangalbibra (ISTS) 220kV D/c line alongwith 220kV line bays at both ends.

5.1.3 Accordingly, in the notified scheme, nomenclature of 2 nos. of bays at Mawngap (Meghalaya) needs to be read as New Shillong (Meghalaya). This would have no implication on the scope of works of the already notified ISTS scheme to be implemented through TBCB route.

Members noted the same.

6. Transmission schemes approved by NCT: Transmission packages and their mode of implementation.

6.1 As per the MoP order dated 28.10.2021, the following transmission schemes with ISTS costing between Rs. 100 Crore to Rs. 500 Crore are approved by NCT and the same is for intimation to MoP:

Sl. No.	Transmission scheme	Implementation mode	Survey agency	Estimated cost (Rs. Crore)
1.	Augmentation of Transformation Capacity in Southern Region	RTM		125
2.	Transmission System Strengthening for 'Srinagar – Leh Transmission System'	RTM		277

7. Transmission schemes recommended by NCT: Transmission packages and their mode of implementation.

7.1 NCT has recommended the following transmission schemes with ISTS costing greater than Rs. 500 Crore to MoP:

Sl. No.	Transmission scheme	Implementation mode	Survey agency	Estimated cost (Rs. Crore)
1.	Transmission system for evacuation of 10 GW RE power from renewable energy parks in Leh: Pang (Leh) to Kaithal	MoP to decide		18500

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Sl. No.	Transmission scheme	Implementation mode	Survey agency	Estimated cost (Rs. Crore)
	(Haryana) transmission system- Part-1			
2.	Transmission system for evacuation of power from Kaza Solar Power Project	TBCB	RECPDC L	630
3.	400 kV Khandukhal (Srinagar)-Rampura (Kashipur) D/c line	TBCB	PFCCL	550

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Annexure A

List of participants of 6th NCT meeting held on 29.10.2021 through VC

Sl. No.	Name (Sh./Smt.)	Designation
Central Electricity Authority		
1.	Dinesh Chandra	Chairperson
2.	Goutam Roy	Member (Power System)
3.	G. Veera Mahendar	Member (E&C)
4.	Ravinder Gupta	Chief Engineer
5.	Ishan Sharan	Chief Engineer (PSPA-I)
6.	Awdhesh Kumar Yadav	Director (PSPA-I)
7.	B.S. Bairwa	Director (PSPA-II)
8.	Manjari Chaturvedi	Director (PSPA-I)
9.	Kanchan Chauhan	Dy. Director
10.	Nitin Deswal	Asst. Director
11.	Komal Dupare	Asst. Director
12.	Mayank Wadhwa	Asst. Director
Ministry of Power		
13.	Gautam Ghosh	Director (Trans)
MNRE		
14.	Dilip Nigam	Adviser
15.	Irfan Ahmad	Director
16.	Rohit Thakwani	Scientist-C
NITI Aayog		
17.	Rajnath Ram	Adviser (Energy)
Technical Experts		
18.	Dr. Radheshyam Saha	Technical Expert
19.	S. K. Ray Mohapatra	Technical Expert
Central Transmission Utility of India Limited		
20.	P.C Garg	COO
21.	Ashok Pal	Dy. COO
POSOCO		
22.	K.V.S. Baba	CMD
23.	S. R. Narasimhan	Director (System Operation)
24.	Rajiv Porwal	Chief General Manager (NLDC)

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25.	Priyam Jain	Manager
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