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 (54वीं)/2022/ 5057-5104 दिनाँक: 27, जून, 2022

सेवा में / To,

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

**विषय: उत्तर क्षेत्रीय विद्युत समिति की 54वीं बैठक का कार्यवृत ।**
**Subject: 54th meeting of Northern Regional Power Committee – MoM**

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 54वीं बैठक दिनांक **31 मई, 2022** को **1100** बजे **विडियो कोंफ्रेंसिंग के माध्यम से** आयोजित की गयी थी । बैठक का कार्यवृत संलग्न है। **यह** उ.क्षे.वि.स. की वेबसाइट (http://164.100.60.165/) पर भी उपलब्ध है।

The 54th meeting of Northern Regional Power Committee (NRPC) was held at **1100 Hrs** on **31st May, 2022** via video conferencing. MoM of the same is attached herewith. The same is also available on NRPC Sectt. website (http://164.100.60.165/).

भवदीय
Yours faithfully,

Naresh 27/6/22
(नरेश भंडारी)
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

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# Contents

# उत्तरी क्षेत्रीय विद्युत समिति की5 4वीं बैठक
# 54th MEETING OF NORTHERN REGIONAL POWER COMMITTEE

**Time & Date of NRPC meeting: 11:00 HRS; 31st May 2022**

**Venue: Video Conferencing**

**Minutes of Meeting**

The meeting started with the opening remark from Chairman, NRPC. He emphasised on the crisis faced by states during summers and instructed everyone to work as a team and maintain grid discipline, thereby ensuring smooth and seamless power supply in the northern region.

Member Secretary, NRPC also mentioned that every constituent/SLDC should maintain grid discipline so that frequency remains within the permissible IEGC band so as to ensure secure grid operation. MS, NRPC urged the states to keep their drawl within the permissible limit so as to keep frequency near to 50 Hz.

## A.1 Approval of MoM of 53rd NRPC meeting

A.1.1 Forum was apprised that Minutes of 53rd NRPC meeting was issued on 26th May, 2022. No comment has been received till the date.

A.1.2 Forum approved the minutes of meeting of 53rd NRPC meeting.

## A.2 Non-inclusion of LTA quantum for calculation of transmission charges for UPPCL share in UCH Stage-II (132 MW), UCH Stage-III (66 MW) & ROSA Stage-II (300 MW) (Agenda by UPPCL)

A.2.1 Forum was apprised that the issue was discussed in 52nd NRPC meeting held on 31.03.2022, wherein, it was decided that matter may be discussed at NRPC Secretariat firstly and then may be taken in upcoming NRPC meeting.CTU stated that they have already shared all the relevant documents reg. Unch-II, Unch -III & Rosa-II in reference to Non-inclusion of LTA quantum for calculation of transmission charges for UPPCL vide mail dated 07.04.22 with NRPC secretariat.

A.2.2 The forum was apprised that para no. 6 of minutes of 27th meeting of the Standing Committee on Transmission System Planning of Northern Region held on 29th/30th May, 2009 at Nainital, Uttarakhand, issued vide CEA letter no. 1/9/06-SP&PA dated 11.06.2009 states as below:-

"6. Long Term Open Access to Rosa Power Supply Company Limited for transfer of 600 MW from their Rosa Thermal Power Project (Stage II) located at Shahjahanpur, Uttar Pradesh.

Concluding the discussions, following was agreed:

Long-term Open Access can be granted for 25 years subject to following:

- Long Term Open Access to Rosa Power Company shall be granted after the commissioning of following strengthening scheme:
    - One ckt of Lucknow – Bareilly 765 kV line.

- Bareilly – Meerut 765 kV S/c
- Bareilly-Kashipur-Roorkee-Saharanpur 400 kV D/c (Quad conductor)

➢ For connectivity of Rosa Power Plant with the grid the following was agreed:

- Rosa – Shahjahanpur 400 kV D/c

➢ For supply of power to Uttar Pradesh, Rosa Power Company shall provide 400/220 kV ICTs of adequate capacity at Rosa switchyard, therefore ISTS charges for supply of power to Uttar Pradesh would not be applicable.

➢ M/s Rosa Company would sign the requisite BPTA for Northern regional Transmission system charges for 300 MW (150 MW for Delhi & 150 MW for Haryana)."

A.2.3 UP mentioned that it is clear from above that no ISTS charges were applicable for supply of power from Rosa Power Company (Stage-II) to Uttar Pradesh.

A.2.4 M/s Rosa Power Company would sign the requisite BPTA for Northern Regional Transmission system charges for 300 MW (150 MW for Delhi & 150 MW for Haryana). However, later on Delhi and Haryana backed out to share 300 MW generation of power of Rosa Power Company. So, LTA charges on this account must either by borne by Delhi / Haryana or Rosa Power Company instead of being charged from UPPCL.

A.2.5 UP requested that LTA of Rosa Power Company (Stage-II) for 300 MW must be excluded with immediate effect by CTU while submitting the Transmission charges bill to UPPCL. Case of Unchahar-II & Unchahar-III, also may be taken up.

A.2.6 Quoting Para 3 of conclusions of Point No. 6 of MoM of 27th meeting of the Standing Committee on Transmission System Planning of Northern Region held on 29th/30th May, 2009, CTU representative apprised the forum that, it was mentioned that for supply of power to Uttar Pradesh, Rosa Power Company shall provide 400/220 KV ICTs of adequate capacity at Rosa Switchyard, therefore ISTS charges for supply of power to Uttar Pradesh would not be applicable. So, this clause clearly mentionss about the 300 MW power that was allocated to U.P and nowhere deals with LTOA of 300 MW quantum that was allocated to Delhi (150 MW) and Haryana (150 MW).

A.2.7 CTU representative also highlighted that 400/220 KV ICT that Rosa Power Company had installed are of 2×200 MVA. So, on technical grounds, it could not be possible to put 600 MW on 400 MVA ICTs. The 2×200 MVA ICT was meant to carry 300 MW share of U.P for which CTU is already not charging to UPPCL.

A.2.8 In subsequent time, U.P had requested to take the remaining 300 MW allocation (earlier allocated as 150 MW of Delhi & 150 MW of Haryana). As a result of this, LTOA was revised from Delhi and Haryana to UPPCL. **UPPCL had also signed BPTA for Northern Regional transmission charges for 300 MW (150 MW of Delhi & 150 MW of Haryana) in this regard.**

A.2.9 With reference to revised intimation dated 3rd Feb, 2014 by CTU (POWERGRID) to Rosa Power Company Limited, it was mentioned that, as agreed in the minutes of Connectivity/LTA meeting held on 2nd January, 2013, now the beneficiary for

entire quantum of LTA shall be UPPCL. Also, as UPPCL has signed PPA with Rosa Power Company for said quantum of power as informed by Rosa Power Company. UPPCL shall make payment of transmission charges in line with CERC regulations. Therefore, bills for the same shall be raised on UPPCL.

A.2.10 UP was asked to submit reply on clarifications from CTU. However, no reply was received from UP rather they requested to submit their reply at later stage.

A.2.11 Member Secretary, NRPC concluded that as per the inputs received from CTU, UPPCL shall bear the transmission charges as mentioned in the BPTA signed by UPPCL for Rosa-Stage-II (300 MW). Further, as the SRPC philosophy on exemption/non exemption of ISTS charges, mentioned by CTU, is generic in nature and all relevant documents are provided, UPPCL should bear applicable transmission charges for Unchahar-II (420 MW) & Unchahar-III (210 MW) also.

A.2.12 Further, CTU representative also requested UPPCL to expedite the clearance of bills of payment of transmission charges.

A.2.13 Member Secretary, NRPC concluded the agenda by mentioning that UPPCL may raise the issue, if required, in upcoming meetings. MS, NRPC also asked UPPCL to clear all pending dues and CTU to expedite the submission of revised bills after accounting for revision on exclusion of transmission charges for earlier agreed Unchahar Stage-I, NAPP, Tanda Stage-II to UPPCL.

## A.3 Default in release of outstanding dues by THDCIL's Beneficiary (agenda by THDCIL)

A.3.1 Forum was apprised that the issue was discussed in 51st and 53rd NRPC meeting also, wherein JKPCL stated that matter is taken up with government of J&K.

A.3.2 THDC vide mail dt. 19.05.2022 has mentioned that as on 18.05.2022, an overdue amount including LPS of approx. Rs.341.04 Cr. is due for payment. THDC India Ltd has been vigorously pursuing with JKPCL (J&K DISCOM) for expeditious payment. Despite vigorous follow up, JKPCL (J&K DISCOM) has still to liquidate its old outstanding due. The details of the overdue amount on JKPCL (J&K DISCOM), as on 18.05.2022, is as under:

| **DISCOMs** | **Principal Outstanding (Rs. in Cr.)** | **Late Payment Surcharge (Rs. in Cr.)** | **Overdue amount including LPS (Rs. in Cr.)** |
|---|---|---|---|
| **1** | **2** | **3** | **4=2+3** |
| PDD & JKPCL, J&K | 329.69 | 11.35 | 341.04 |

A.3.3 Long pending dues are to be liquidated by the JKPCL (J&K DISCOM). The amount is quite substantial and crucial. Due to scarce availability of funds with us, we are compelled to avail borrowings to meet our day-to-day requirements. Thus, immediate payment is very much crucial for sustenance of THDCIL.

A.3.4 JKPCL (J&K DISCOM) is requested to liquidate its above overdue amount immediately.

A.3.5 Representative from JKPCL informed the forum that JKPCL had released 8.90 crores to THDCIL.

A.3.6 Member Secretary, NRPC deliberated that the funds being released by JKPCL to THDCIL is meagre in comparison to overdue amount including late payment surcharge and with this rate, JKPCL could never be able to cover up their principal outstanding amount of Rs. 329.69 crores.

A.3.7 Member Secretary, NRPC asked JKPCL to expedite the release of fund to THDCIL, by mentioning that late payment surcharge is an important factor and present rate of release of funds by JKPCL could only be able to compensate for it and will not be able to cover principal outstanding amount.

**A.4 Request for opening of Letter of Credit (agenda by THDCIL)**

A.4.1 Forum was apprised that the issue was discussed in 51st and 53rd NRPC meeting also, wherein JKPCL stated that matter is taken up with government of J&K.

A.4.2 THDC vide mail dated 19.05.2022 has mentioned that despite repeated request and reminders, J&K has not opened the Letter of Credit (LC) amounting to Rs.14.45 Cr for Financial Year 2022-23.

A.4.3 It is requested to J&K to open the LC of requisite amount immediately.

A.4.4 JKPCL representative informed the forum that in response to deliberations made in 53rd NRPC meeting, they had taken up this matter with Gov. of J&K on 5th May, 2022.

A.4.5 Member Secretary, NRPC emphasised that opening of Letter of Credit (LC) is necessary and is a mandatory requirement as per the guidelines of Ministry of Power. Member Secretary, NRPC also asked J&K to open the LC of requisite amount at the earliest.

**A.5 Transmission System for evacuation of power from Kaza Solar Power project (880 MW) (agenda by CTU)**

A.5.1 Forum was apprised that in the 50th NRPC meeting held on 28.01.22, Transmission System for evacuation of power from Kaza Solar Power project (880 MW) was approved with an estimated cost of about Rs 2134 Cr.

A.5.2 During the 8th NCT meeting held on 25.03.22, above transmission scheme was also discussed & recommended the scheme to MOP for implementation through TBCB route. In the NCT meeting, CTU explained that based on availability of cost estimate on March 2020 PL (Price Level) as well as envisaged generation schedule of Mar'24 (24 months), cost of above scheme was estimated to be about Rs 2135 Cr which was put up to NRPC.

A.5.3 However, M/s SJVN vide letter dated 21.02.22 revised/postponed the generation schedule to Mar'25 from earlier Mar'24. Therefore, considering revised schedule (36 months) as well as latest available cost estimate (Sep'21 PL), the cost estimate for Kaza transmission scheme was revised to Rs 3251 Crore based on September, 2021 PL unit cost estimate. NCT also decided that CTU shall intimate NRPC regarding increase in estimated cost for Kaza transmission scheme.

A.5.4 Further, based on NRPC comments on higher transmission cost for proposed scheme and to take up proposal with NCT for Govt. budgetary support/grant for the transmission scheme so as to rationalize transmission charges on the consumers, same was put up to NCT by the CTU. In the meeting, NCT requested MoP/MNRE to consider the case for Govt. budgetary support/grant as has been done in case of Transmission system for evacuation of RE power from renewable energy parks in Leh. CTU representative informed the forum that the approval of Kaza transmission project is in consideration with the MOP/Government.

A.5.5 CTU representative informed the forum that there are three hydro-electric power stations (880 MW Jangi Thopan HEP of SJVN, 150 MW Tidong HEP of Statkraft,450 MW Shongtong Karcham HEP of HPPCL) which are getting connected to the same system near wangtoo. Hence, this network will be utilised both for solar and hydro. In that way, it will rationalize some of the cost of transmission and sharing of charges by the consumers.

A.5.6 In response to enquiry from NRLDC representative regarding the expected date of coming of these projects, CTU representative explained the forum that 880 MW Kaza Solar Power Project is expected to come by March 2025,150 MW Tidong HEP Project is expected to come by 2023, 450 MW Shongtong-Wangtoo HEP is expected to come by the mid of 2025. Probably, in next month, Consultation Meetings for Evolving Transmission Schemes in Northern Region will be taking up agenda for these HEP stations getting inter-connected with Kaza to Wangtoo transmission system. In addition to this, double circuit line from Wangtoo to Panchkula is already planned.

A.5.7 NRLDC representative asked CTU to take issues related to coincident transmission of solar and hydro power under consideration.

A.5.8 Member Secretary, NRPC clarified NR constituents that since 880 MW Kaza Solar Power project is a RE generation project, its transmission system cost shall be under national component of CERC sharing regulation, therefore cost of this project will be socialised through constituents of all regions.

**A.6 Scheduling and settlement of URS power (agenda by TPDDL)**

A.6.1 Agenda could not be deliberated, since no representative from TPDDL was present.

**A.7 Status of remedial measures to mitigate the transmission constraints in power system (agenda by NRLDC)**

A.7.1 In the meeting, it was discussed that transmission constraints and associated issues at both inter-state and intra-state level are being compiled & reported by NRLDC and shared to all stakeholders in regular OCC / NRPC meetings.

A.7.2 All such transmission/ICT/generation constraints are being shared by POSOCO in quarterly operation feedback to CTU/CEA also. These constraints are discussed in the regional power committee meetings and CEA/ CTU consider the operational feedback from POSOCO as an input in the future transmission planning.

A.7.3 Several projects/schemes have been made by STU/CTU to address these constraints with time bound implementation. Some of the projects got delayed due to various reason viz. RoW issue, land acquisition etc.

In reference to this, a virtual meeting was taken by Joint Secretary (OM & RR), Ministry of Power on 12th Jan 2021 to review the transmission constraints in power system network and approved scheme as remedial measures in various standing committee meetings (SCM/now RPCTPs) and states forums (Attended by Officials from RPCs, POSOCO, CTU, POWERGRID, SLDCs and STUs).

A.7.4 State-wise status of upcoming transmission systems discussed in the meeting is as follows:

**Punjab:**

- 500MVA ICT commissioned at 400/220kV Rajpura
- Augmentation at Nakodar from 2*315MVA to 2*500MVA (approved in 3 NRPCTP held on 19.02.2021, expected by May 2023)
- Reconductoring of 220 KV Jalandhar – Kartarpur (PSDF grant section, reconductoring of one line to be completed by 10.06.2022 and second circuit by 20.06.2022)
- 220 KV Amritsar-Patti (approved in 4 NRPCTP held on 05.10.2021, one bay at PGCIL available, Survey completed). For Verpal-Rashiana line, POWERGRID needs to commission one bay at Amritsar.
- NRLDC representative highlighted that 400/220kV ICTs at other stations such as Malerkotla, Patiala, Patran are expected to be on verge of N-1 non-compliance in this paddy season. Capacity augmentation may be planned well in time by PSTCL after discussion with CTU/CEA so as to avoid any issue during next years.

**Haryana:**

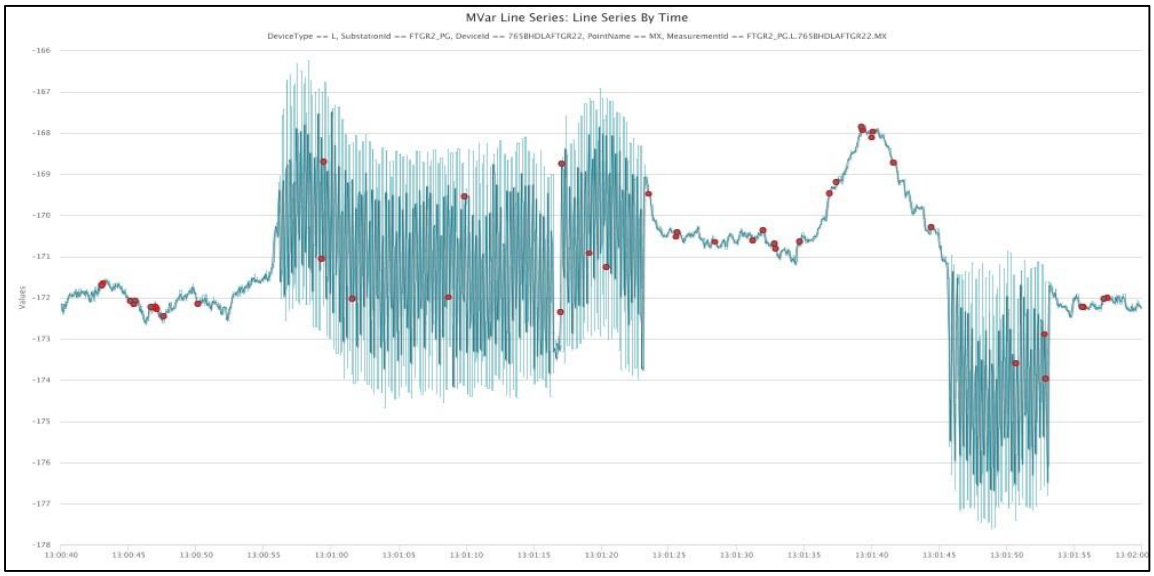
- 500MVA ICT at Kurukshetra (SPS not commissioned, new ICT approved in 4 NRPCTP held on 05.10.2021). HVPN informed that SPS at Kurukshetra would be implemented within 2-3 months in coordination with POWERGRID.
- 500MVA ICT at Deepalpur (SPS commissioned, new ICT approved in 4 NRPCTP held on 05.10.2021). HVPN informed Deepalpur S/s was commissioned under TBCB so there is expected to be some delay in commissioning of new ICT due to commercial issues.
- Reconductoring of 220kV Hisar(PG)- Hisar (IA) D/C. HVPN will take up the matter with CTU/CEA. Connector replaced at Hisar (IA) end.

**Delhi:**

- 400/220kV Dwarka substation (commissioned)
- One ICT still under outage at 400/220kV Mundka. SPS implemented at Mundka.
- 400/220kV Gopalpur substation under construction by LILO of under commissioning 400kV Bawana-Maharanibagh D/C. No update could be received in the meeting.

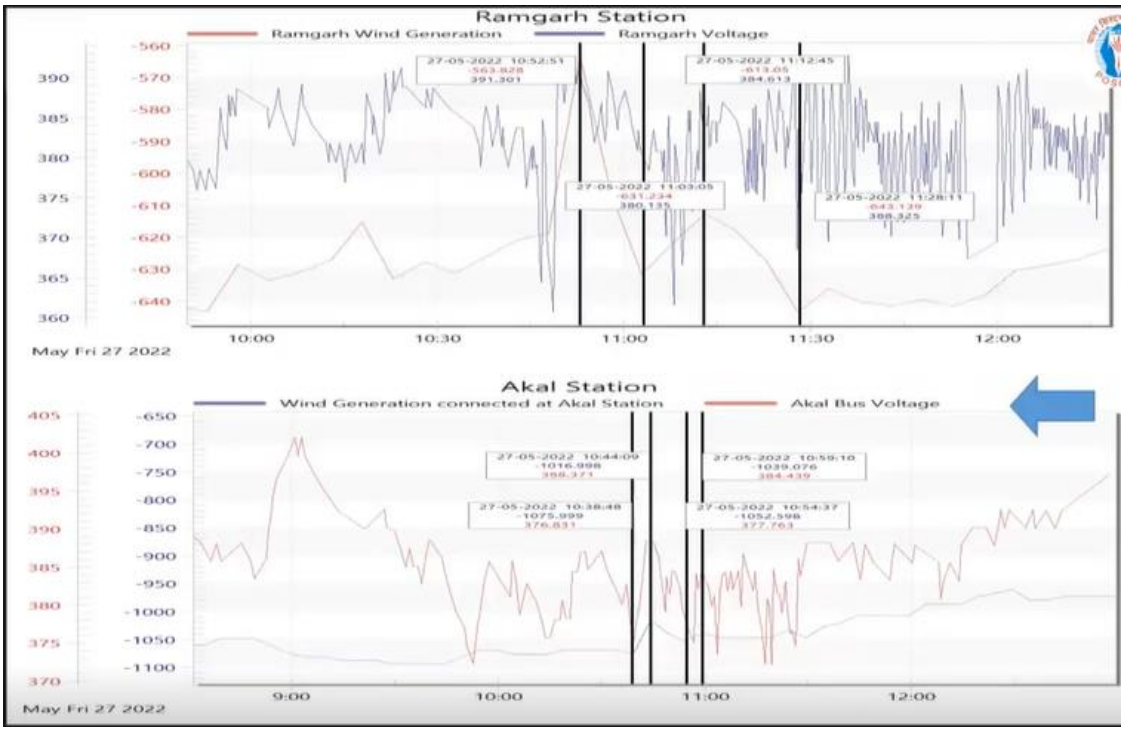
**Rajasthan:**

- LILO of 400kV Agra-Sikar at 400/200kV Alwar substation. In 3 NR-CMTES held on 28.01.2022, CTU requested RVPN to revert back on their management decision for implementation of above scheme as Intra state.
- In 54th NRPC meeting, RVPN representative stated that they are exploring possibility of 765kV substation instead of 400kV LILO. CTU and NRLDC representative suggested that issue of low voltage is persisting at Hindaun and Alwar since many years, still no scheme has been finalized. Again, Rajasthan has proposed a different scheme which will take time for discussion and implementation. CTU also highlighted that 765kV Kankani which was proposed in 2018 but still not commissioned. RVPN representative also stated that there is space issue at Alwar therefore, connection at 765kV was being discussed.
- Capacity augmentation at 400/220kV Ajmer, Bikaner, Bhinmal, Merta, Jodhpur, Chittorgarh ICTs. New ICT approved at Bikaner, Merta, Jodhpur and Chittorgarh substations.
- NRLDC representative stated that oscillations were observed in grid during high wind and high solar in Rajasthan. Huge variations in voltage at Ramgarh and nearby RE pooling stations including huge MVAr drawl from grid.




- NRLDC representative also highlighted that low SCR (below prescribed value of 5) is being observed at number of ISTS as well as intrastate substations in real-time specially in Western Rajasthan pockets. Same has also been communicated by NRLDC vide different written communications.
- RVPN representative stated they are planning STATCOMS in intrastate schemes which would be put up for PSDF approval. They would also analyze and share their observations on oscillations observed in the grid.
- CTU representative also asked about the procedure being followed by Rajasthan for first time charging. RVPN representative stated that during first time charging, undertakings are being taken from different RE developers; however, no model is being submitted by plants. Team of DISCOM, TRSANCO and GENCO visit the plant before granting first time charging.
- NRLDC representative also informed that FTC procedure followed by NRLDC was also discussed in OCC meeting and all utilities were asked to follow similar

procedure at intrastate level. The procedure is also available at NRLDC/POSOCO website.




- RVPN was asked to analyze and study the reasons for oscillations in the grid including injection of harmonics or any other issues.

**UP:**

- 500MVA ICT at Sohawal (expected by March 2023)
- Capacity augmentation at Gorakhpur(UP) from 1055MVA to 1315MVA (expected by Oct 2022). With commissioning of Rasra, loading of Gorakhpur (UP) would reduce.
- 400/220kV S/s at Machhalishahr (Jaunpur) (getting delayed, expected by August 2022)
- 400/220kV Basti substation (commissioned)
- 765kV Bara-Mainpuri ckt1 (under SEUPPTCL, Tatas have been selected by NCLT, earlier there was insolvency issues, work to start after 2-3 months, will take at least 2 years for commissioning)
- 400/220kV Sahupuri (substation expected shortly, but lines expected before Sep 2022)

**J&K:**

- 400/220 kV, 2x315 MVA S/S at Siot (pending, approved in 3 NRPCTP held on 19.02.2021)
- Addition of new 1x315 MVA (or 1x500 MVA if possible), 400/220kV ICT at Amargarh (pending, approved in 3 NRPCTP held on 19.02.2021)
- Commissioning of 220kV Wagoora-Budgam-Ziankote (pending)

- Reconductoring of 220kV Wagoora-Ziankote D/C by HTLS. (Pending, approved by administrative council in Jul'2021)
- No update could be provided in the meeting.

**HP:**

- Utilization of already existing of 6 no. 220kV bays at 400/220kV Kala Amb substation (pending)
- 400kV Lahal-Chamera Pooling D/c line (expected in Sep 2022). Bajoli Holi generation being evacuated through interim arrangement.
- High loading of 400/220kV Nallagarh ICTs and 220kV Nallagarh-Upernangal D/C (proposal being studied by HPPTCL)

**Uttarakhand:**

- High loading of 400/220kV Kashipur ICTs.
- High loading of 220kV Roorkee-Roorkee, CBGanj-Pantnagar, Dehradun-Jhajra (any issue after LILO)
- STU to plan & discuss future transmission system requirements with CTU/CEA/POSOCO
- No update could be provided in the meeting.

***All STUs/ POWERGRID were asked to regularly update the status of upcoming transmission lines in OCC/ NRPC meetings.***

## A.8 TTC/ATC of state control areas for summer 2022 (agenda by NRLDC)

A.8.1 It was discussed that most of the NR states except J&K, Ladakh and Chandigarh UT are sharing base-case and ATC/TTC assessment report with NRLDC. It is observed that some states are still not regularly declaring/assessing the TTC/ATC for the import and export capability of power from its state periphery. OCC has advised all states to timely declare TTC/ATC for prospective months and revise the figures as per requirement.

A.8.2 In 195th OCC, SLDCs were requested to go through the tentative ATC/TTC limits for June 2022 as assessed by NRLDC and provide comments. Based on comments received till date, following is ATC/TTC of different state control areas for Summer/Monsoon 2022:

| State | Last assessment shared on | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) |
|---|---|---|---|---|
| Punjab* | 29.05.2022 | 8700 | 500 | 8200 |

| | | | | |
|---|---|---|---|---|
| UP | 16.05.2022 | 15100 | 600 | 14500 |
| Rajasthan | Dec 2021 | 6200 | 300 | 5900 |
| Haryana | 25.05.2022 | 9100 | 600 | 8500 |
| Delhi | 27.05.2022 | 7100 | 300 | 6800 |
| HP | 07.05.2022 | 1400 | 100 | 1300 |
| Uttarakhand | 18.04.2022 | 1600 | 100 | 1500 |
| J&K | NA | 2100 | 100 | 2000 |

* ATC/TTC would be enhanced by 300MW further if reconductoring of 220kV Jalandhar-Kartarpur is completed before paddy 2022.

In addition, as per latest LGBR issued by NRPC on 29.04.2022 attached as Annexure-II of agenda, several states had given anticipated shortage figures. Thus, it was requested to review and proper plan may be furnished by all states to meet their Load-Generation balance safely during summer 2022.

A.8.3 Moreover, state-wise issues were discussed in the meeting:

**Punjab:**

- Plan to meet anticipated maximum demand of 15,500MW during paddy 2022: SLDC representative informed 8,500MW would be imported from ISTS while 6,500MW internal generation would be available.
- Low generation at Pong: SLDC representative informed that four out of six machines are running at Pong.
- Low peaking support from RSD despite higher reservoir level (4m) compared to last year's due to construction of Shahpur Kandi Power station. Full generation at RSD would be available before paddy season.
- SLDC representative was also asked to take up the matter with Talwandi Saboo regarding numerous machine outages.
- Availability of power from WR plants to Haryana/ Punjab due to commercial issues: Punjab representative stated that CGPL has filed new petition under section 11(2) with much higher price around Rs. 9.11/- instead of Rs 6.05/- agreed earlier. Weekly payments are also being sought by CGPL. Therefore, power procurement from CGPL is still under grey area.

**Rajasthan:**

- High demand observed even during summer season.
- SPS implementation at 400/220kV Ajmer, Merta and Chittorgarh to be expedited by RVPN.
- Plan to ensure loadings at these 400/220kV ICTs below their N-1 contingency limits to be shared by SLDC

- Numerous forced outages of state control area thermal generating stations especially at Suratgarh TPS (forced outage on 19.05.2022 = 2500MW)
- Dholpur Gas (330MW) out due to unavailability of gas.

**Delhi:**

- Uploading of ATC/TTC on website is yet to done.
- Loading of 400/220kV Harshvihar and Mundka ICTs close to their N-1 contingency limits.

**Haryana:**

- Updated list of radial feeders for physical regulation to be shared by SLDC.
- Expedite commissioning of SPS at Kurukshetra (PG).
- Gas power station at Faridabad Gas is still under outage.

**Uttarakhand:**

- Plan to meet anticipated maximum demand, maximum energy consumption.
- Updated list of radial feeders for physical regulation
- In upcoming season, challenge of outage of hydro units on silt

**UP:**

- Plan to meet anticipated maximum demand, maximum energy consumption during summer/monsoon 2022.
- Expedite revival of Meja unit-2 under long outage (expected by 25th June'2022)

**HP:**

- Plan to meet anticipated maximum demand, maximum energy consumption.
- In upcoming season, challenge of outage of hydro units on silt.

**J&K:**

- J&K and Ladakh U/Ts were once again requested to advise the concerned officers to evaluate their ATC/TTC limits in coordination with NRLDC and share latest assessment with NRLDC and NRPC.

  It was requested that SLDCs may ensure that loading of ICTs and lines are below their N-1 contingency limits. While requisitioning power from various sources, states should take care to limit their scheduled drawl as well as actual drawl in real time within the Available Transfer Capability (ATC) limits assessed by SLDC and NRLDC.

## A.9 RE related issues in Northern region grid operation (agenda by NRLDC)

A.9.1 In the meeting, NRLDC representative stated that recently in Jan-Feb'22, various trippings were observed at 765/400/200 kV Fatehgarh-II pooling station. Majority of tripping and generation loss were observed during switching of Line reactor (LR)/Bus reactor (BR) at 765/400/220 kV Fatehgarh-II. Switching of BR and LR is usual action for voltage management at pooling and nearby station. Number of trippings and detailed report of one of the events during Jan-Feb'22 (Based on the data available at NRLDC and data provided by other stakeholder) is enclosed in Annexure Ib of agenda.

A.9.2 Based on data and observation, NRLDC communicated vide letter reference NRLDC\ RES\TS-108 dated 15th Feb 202 2to all RE at Fatehgarh-II regarding non-operation of HVRT at their stations during tripping in Jan-Feb'22. Copies of letters and reply received are enclosed in Annexure II of agenda. Actions taken by some SPD and pending actions by other SPD as per direction of NRLDC is enclosed in Annexure III of agenda.

A.9.3 Following are the major issues that are being faced with RE generation in Northern region:

**a. High Voltage Ride Through (HVRT) non-compliance by RE Generators at interconnection point:**

As per the CEA Regulation. "The generating station (Invertor based) connected to the grid, shall remain connected to the grid when the voltage at the interconnection point, on any or all phases (symmetrical or asymmetrical overvoltage condition) rises above the specified values given below for specified time."

**High Voltage Ride Through (HVRT)**

| Over voltage (p.u.) | Minimum time to remain connected (Seconds) |
|---|---|
| 1.30 < V | 0 Sec (Instantaneous trip) |
| 1.30 ≥ V > 1.20 | 0.2 Sec |
| 1.20 ≥ V >1.10 | 2 Sec |
| V ≤ 1.10 | Continuous |

In recent tripping of Jan & Feb 2022, it has been experienced that voltage at interconnection point was less than 1.1.p.u. (as per PMU data) and as per the HVRT compliance, there should not be any disconnection of solar generation. However, in all the events, partial or large number of solar generation loss occurred due to non-compliance of HVRT as one of the main reasons.

*Based on the event analysis, RE generators were advised to review their protection settings so as to comply with HVRT requirement. NRLDC has communicated through email/letter (Annexure IV of agenda) to all RE for detail analysis and data sharing at Inverter and PPC end. Some of the RE generators shared the preliminary observations and analysis however, inverter level data has not been shared by any RE (Input given by RE is enclosed in Annexure IV of agenda).*

The modelling data submitted by REs at point of registration and first time charging, is showing the HVRT & LVRT compliances which is in contradiction with real time

events. In view of the above, off-line models also need to retune/corrected as per actual field data.

In this regard, Working Group consisting of CEA, CTU, POSOCO, SECI recommended the following:

The RE developer shall submit the final validated plant model of the implemented RE generating Station within 03 months of commissioning of all such additional equipment/parameter tuning/setting changes.

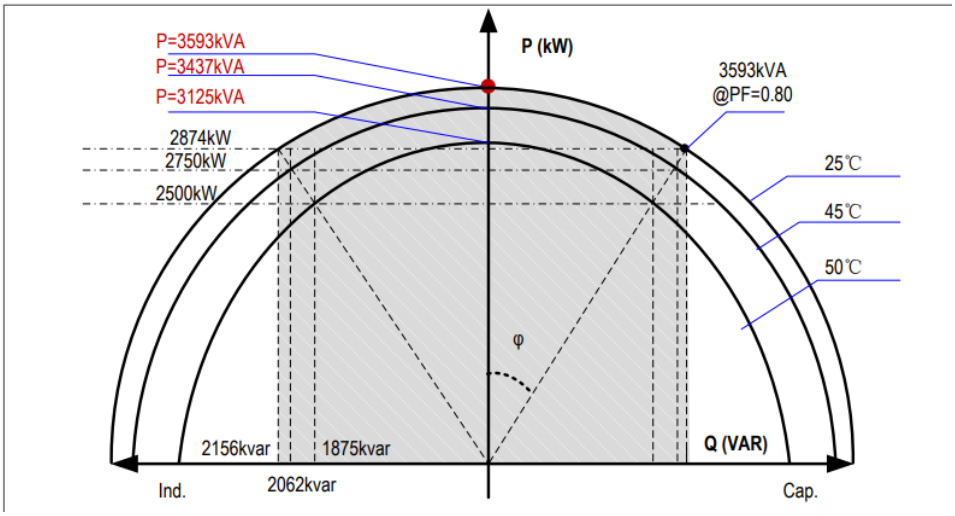
For active power/frequency control & reactive power/voltage control, reactive power capability, and power quality this model shall be validated through field measurements/on-site testing. Further, for LVRT and HVRT, the model shall be validated preferably against field test results. In case the same is not possible within prescribed time-frame, the plant model shall be validated against grid event, if any, after complete plant commissioning and same shall be included in the validation reports.

**b. Dynamic varying Reactive power support in power factor range of +/- 0.95 lag and lead**

RE generators are required to meet CEA (Technical standard for connectivity to the grid) regulation for supplying dynamically varying reactive power support so as to maintain power factor within limits of 0.95 lagging to 0.95 leading. Working Group consisting of CEA, CTU, POSOCO, SECI has also clarified that the RE generator should be able to demonstrate reactive power capability to operate at least up to 'V-curve' boundaries (0.95lag/lead level at the POI/PCC).

RE power is injected at unity power factor and **no reactive power support is available from solar generator bus at PCC/ISTS point**. Plot of voltage at all pooling station for Jan-Mar'22 is enclosed in Annexure V of agenda.

At the time of registration and FTC, RE generators are submitting the reactive power capability of inverter at different design temperatures. Typical graph of capability curve of one of the invertor of 3.125 MVA @50$^{o}$C was presented in the meeting. The shaded area in the figure below shows the inverter's P-Q capability. So, RE plant are registering the installed capacity as 3.125 MW (considering unity power factor in design itself at invertor terminal). For example, 300 MW plant comprising of this invertor model would have 96 invertor.



| | |
|---|---|
| Qmax | : +2156Kvar, when the power factor is +0.8, at 25°C; |
| Qmin | : -2156Kvar, when the power factor is -0.8, at 25°C; |

Thus, if plant is generating at its peak i.e. at rated installed capacity of 300 MW, solar generator are operating at unity power factor and the station is operating at leading MVAr i.e. drawing MVAr from the grid during peak generation scenario. The reactive power requirement from the invertor terminal to Invertor duty transformer (600V to 33kV), 33kV cables, 33/220kV ICTs, 220kV lines to pooling station would be drawn from grid only.

As per CEA guideline, this generator of 300 MW should be capable of providing reactive power in the range of 33% (based on 0.95 power factor) of active power in both lag & lead at rated installed capacity i.e. ~ 90 MVAr (0.9373 MVAr per invertor) at PoI not at invertor terminal irrespective of temperature.

Following are the major operational issues:

i. Except winter, temperature in Rajasthan used to be greater than 40$^{o}$C during day time. Thus, in design itself, RE invertor /generator don't have reactive capability at higher temperature at rated peak generation.

ii. As the temperature in Rajasthan area is already above 45$^{o}$C, it is understood that reactive support margin (as required in line with CEA regulation) would reduce considerably. In such scenario, RE solar would mostly dependent on grid which would further aggravate the situation as there is no reactive margin left under any N-1 non-compliance at EHV pooling stations.

iii. During rated or maximum power generation only, reactive power drawn from the grid increases. All RE generators are advised to operate in voltage control mode however, most of the time invertor operating at unity power factor and plant as leading mode. After continuous follow up by NRLDC for voltage control mode, it has been observed that adequate reactive support is not available at hour of need.

iv. All RE solar used to draw reactive power during peak solar generation causing the low voltage at pooling station and any switching/tripping during such scenario are leading to inadvertent tripping/voltage fluctuations.

v. In Jan/Feb'22, there were numbers of tripping and solar generation loss in Rajasthan RE ISTS pooling stations, and it has been observed from the submitted data that inadequate reactive support attributes to such events.

In view of above, it is evident that adequate reactive support is required for normal operation as well as for stability under any switching/contingency. Insufficient reactive support/margin during design itself are imposing a daily operational challenge. As such inverters would scale up in upcoming times, present experiences necessitates timely action of reactive planning (design temperature, LVRT/HVRT compliance, dynamic varying reactive power capability at 0.95 p.f at all points) for upcoming inverter (Inverters should have high capabilities for reactive support) integrating into the grid.

**c. Injection of harmonics by wind/solar generators at injection point (Agenda by Power grid):**

CEA Grid Standards stipulates a limit of current harmonic injections from RE plants as per IEEE 519 which is THD (Total Harmonic Distortion) of 1.5% and between 0.025% to 1% for individual harmonics.

**Table 4—Current distortion limits for systems rated > 161 kV**

| Maximum harmonic current distortion in percent of $I_L$ | | | | | | |
|---|---|---|---|---|---|---|
| Individual harmonic order (odd harmonics)[a, b] | | | | | | |
| $I_{sc}/I_L$ | $3 \le h < 11$ | $11 \le h < 17$ | $17 \le h < 23$ | $23 \le h < 35$ | $35 \le h \le 50$ | TDD |
| $< 25$[c] | 1.0 | 0.5 | 0.38 | 0.15 | 0.1 | 1.5 |
| $25 < 50$ | 2.0 | 1.0 | 0.75 | 0.3 | 0.15 | 2.5 |
| $\ge 50$ | 3.0 | 1.5 | 1.15 | 0.45 | 0.22 | 3.75 |

[a]Even harmonics are limited to 25% of the odd harmonic limits above.

[b]Current distortions that result in a dc offset, e.g., half-wave converters, are not allowed.

[c]All power generation equipment is limited to these values of current distortion, regardless of actual $I_{sc}/I_L$.

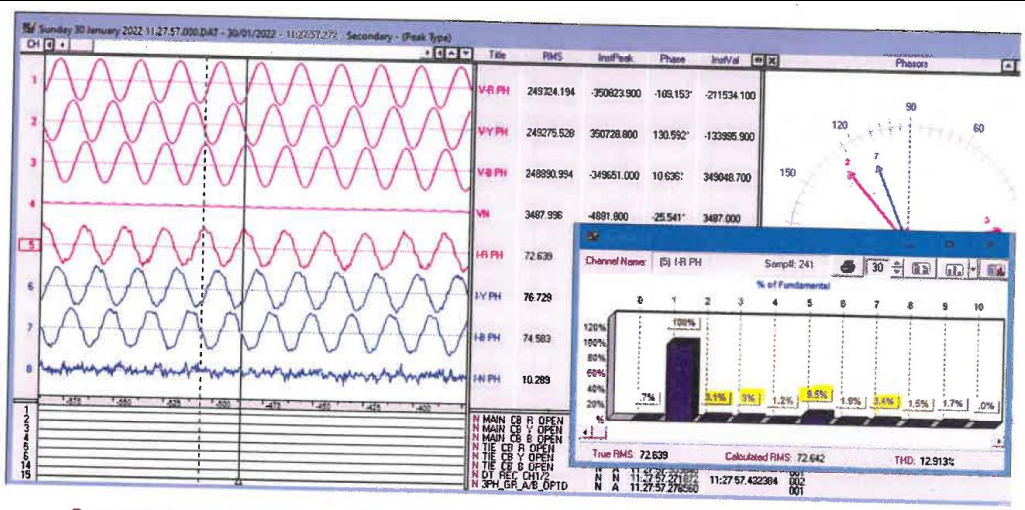
where

$I_{sc}$ = maximum short-circuit current at PCC

$I_L$ = maximum demand load current (fundamental frequency component) at the PCC under normal load operating conditions

The voltage generated by the wind and solar power sources contain harmonic content, which gets injected in the grid.

On analysis of the voltage and current data of Fatehgarh 1- Adani line, POWERGRID has observed that the individual harmonics are ranging in 3% to 9% as against the limit of 0.025% to 1% mentioned in the Standard. THD is around 7-13% as against the limit of 1.5%.




Current harmonics seen in 400kV Fatehgarh-1(Adani) Solar Generator

As per CEA technical Standards for connectivity to the Grid-2007 as amended, measurement of harmonic content, DC injection and flicker shall be done at least once in a year in presence of the parties concerned. However, no RE Generator has provided any such measurement report to CTU. Standard methodology may be taken into consideration for the measurement.

*NRDLC has also requested to all RE to submit the CEA compliances regarding harmonic vide letter dated 13.04.2022 (enclosed as Annexure VI of agenda)*

In the meeting, POWERGRID representative expressed concern on the DC current quantum observed at Fatehgarh-II. It was observed that DC currents are exceeding 8-10A as per PQA measurements done by POWERGRID which are not designed to face such issues. Since the transformer design at RE ISTS pooling substation is similar to the transformer commissioned at other AC substations, therefore this reduces life of the transformer.

RVPN representative stated that only undertakings are being taken by SLDC as of now, no field measurements are being taken. It was informed that such tests are being done by MPTS wing and they shall share with CTU & POSOCO.

MS, NRPC enquired whether if RE generator can be disconnected if it is not able to comply CEA regulations.

CTU representative stated that as per amended CEA regulations on technical standards for connectivity to grid issuedin 2019, it is clear that the user may be disconnected from the grid in case of non-compliance of any provision of the regulations reported by licensee or SLDC/RLDC

MS, NRPC states that number of issues are being faced related to RE compliances. Same may also be discussed in a separate meeting with participation from CTU, NRLDC, NRPC, RVPN and RE developers.

POWERGRID representative also stated that regular protection audits may also be conducted by team from NRLDC, NRPC, POWERGRID and STU so that all RE developers are sensitized and remain active.

NRPC concurred with view of members.

**A.10 Review of Transmission Planning criteria for RE (N-0) to N-1 (agenda by NRLDC)**

A.10.1 Continuous overloading of 400/220 kV Transformers at Bhadla in early stage of substation: The ICT in Bhadla substation generally run under full load condition. In the initial period after commissioning (2019) the 03 ICTs (approx. 1470 MW) were running in overloaded condition. Sometimes, the loading went upto 110% loading with all fans & pumps operational. A sample datapoint for loading is exhibited below.

A.10.2 In Fatehgarh-II PS also similar loading levels are observed on 5 nos. 500 MVA ICTs. The overloading of transformers, variations in their loading throughout the day and heating/cooling cycle do affect the life of the transformer in the long run.

A.10.3 Therefore, it was discussed in the meeting that high RE capacity Substations must have N-1 compliance at 400/220 kV level i.e., Fatehgarh-II (both sections)/Fatehgarh-III PS, Bhadla-II PS etc. for which revised transmission planning criteria must have suitable provisions.

A.10.4 POSOCO representative that POSOCO has always advocating the N-1 compliance of ICTs, lines for evacuation of bulk RE power reliably and safely.

In addition, bus sectionalization at pooling station should have arrangements such that sharing on ICTs loading on each bus remain commensurate with underlying RE connected generation and ICTs on each bus should be N-1 compliant. Recently, in NR, it has been observed that at 765/400/220kV Bhadla, bus sectionalization couldn't be utilized because of unequal sharing of load amongst

ICTs. NRLDC has highlighted this issue vide NRLDC letter dated 26th April 2022 to CTU/CEA/PGCIL/NRPC, enclosed as Annexure VII of agenda.

A.10.5 NRPC forum agreed that CTU may explore possibility of ensuring N-1 non-compliance at 400/220kV RE pooling stations with higher 400/220kV capacity on case-to-case basis and take up the ICT augmentation proposal for approval on priority. CTU agreed for the same.

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