सत्यमेव जयते

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

संख्या: NRPC/OPR/106/01/2019/ 9518-59 दिनांक: 30.08.2019

विषय: उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 162वीं बैठक का कार्यवृत |

Subject: Minutes of 162nd OCC meeting of NRPC.

उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 162वीं बैठक 14.08.2019 को आयोजित की गयी थी। उक्त बैठक का कार्यवृत्त उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट http://www.nrpc.gov.in पर उपलब्ध है। यदि कार्यवृत पर कोई टिप्पणी हो तो कार्यवृत जारी करने के एक सप्ताह के अन्दर इस कार्यालय को भेजें |

162nd meeting of the Operation Co-ordination Sub-Committee of NRPC was held on 14.08.2019. The Minutes of this meeting has been uploaded on the NRPC website http://www.nrpc.gov.in. Any comments on the minutes may kindly be submitted within a week of issuance of the minutes.

संलग्नक: यथोपरि

(सौमित्र मजूमदार)
अधीक्षण अभियंता (प्रचालन)

सेवा में,

प्रचालन समन्वय उप-समिति के सभी सदस्य

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Minutes of the 162nd meeting of the Operation Coordination Sub-Committee (OCC) of NRPC

162nd meeting of OCC of NRPC was held on 14.08.2019 at NRPC Secretariat, New Delhi. The list of participants of the meeting is attached at ***Annexure-I***.

PART-A: NRPC

1. Confirmation of Minutes

The minutes of the 161st OCC meeting which was held on 15.07.2019 and 16.07.2019 at NRPC Secretariat, New Delhi were issued vide letter of even number dated 31.07.2019.

Sub-Committee confirmed the minutes of the 161st OCC meeting.

2. Review of Grid operations of July 2019

2.1. Anticipated vis-à-vis Actual Power Supply Position (Provisional) July 2019.

Sub Committee was informed that there are variations (i.e. > 5.0%) in the Anticipated Vis-à-vis Actual Power Supply Position (Provisional) for the month of July, 2019 in terms of Energy Requirement for Himachal Pradesh, Rajasthan & Uttar Pradesh and in terms of Peak Demand for Chandigarh, Himachal Pradesh, J&K and Rajasthan.

Reasons for variation and comments submitted by the utilities are as under:

Uttar Pradesh informed the reason for variation –

I. Anticipated requirement was more than the actual requirement due to good rains during July.

II. Availability got reduced due to lower purchases from DAM & TAM on account of less requirement.

On the query of 6.8% variation in the anticipated and actual energy requirement, **HP** representative stated that the reason for the variation would be submitted in a written reply.

Rajasthan informed that the variation of 11.3% in peak demand and 8.6% in energy requirement was due to the delayed monsoon.

Haryana informed that the modified Power Supply Position (Provisional) for July 2019 is as under:

State	Avl/ Req.	Anticipated (MU)	Actual (MU)	% age variation	Anticipated (MW)	Actual (MW)	% age variation
Haryana	Avl.	6407	5978	-6.7	11178	11001	-1.58
	Req.	6063	5978	1.41%	10700	11001	2.81

The Sub-Committee requested all SLDCs to furnish the provisional and final power supply position in prescribed formats by 2nd and 15th day of the month respectively for the compliance of CEA (Furnishing of Statistics, Returns and Information) Regulation 2007.

2.2. **Power Supply Position for NCR:**

2.2.1. The Sub-Committee was informed that the NCR Planning Board (NCRPB) is closely monitoring the power supply position of National Capital Region. Monthly power supply position for NCR till the month of July 2019 is placed on NRPC website (http://nrpc.gov.in/operation-category/power-supply-position).

2.2.2. Delhi SLDC was requested to provide the power supply data for their region district-wise, if possible, as all other states were providing the same and it would bring uniformity in the information being provided.

2.3. **The highlights of grid operation during July 2019 are as follows:**

2.3.1. Frequency remained within the IEGC band for **68.62**% of the time during July 2019, which is lower than that of last year during same month (July 2018) when frequency (within IEGC band) remained 78.13% of the time. The maximum and minimum frequencies recorded were 50.32 Hz and 49.64 Hz respectively.

2.3.2. Utilities were requested to take necessary action to improve the frequency regime viz. by not changing abruptly the loads at block boundaries and assuring primary response from the generators.

2.3.3. Maximum and minimum load for the region during July 2019 were 66,615 MW (03.07.2019 at 22:20 hrs) and 41,254 MW (16.07.2019 at 04:20 hrs).

2.3.4. The average Thermal generation in July 2019 was 583.27 MU/day, which increased by 28.05 MU/Day with respect to the corresponding month in the previous year.

2.3.5. The average Hydro generation in July 2019 was 348.66 MU/day, which increased by 24.97 MU/day with respect to the corresponding month in previous year.

2.3.6. The average Renewable generation in July 2019 was 64.37 MU/day, which increased by 18.04 MU/day with respect to the corresponding month in previous year. All utilities were requested to send the data for renewable generation regularly.

2.3.7. The average nuclear generation in July 2019 was 31.24 MU/day, which increased by 3.99 MU/day as compared to corresponding month in previous year.

2.3.8. Long outages of generating Units were discussed in detail and the same is placed at ***Annexure-II (A).***

2.3.9. Long outages of transmission lines were discussed in detail and the same is placed at ***Annexure-II (B)*** and all constituents were requested to revive the elements under long outages at the earliest.

2.3.10. The new elements charged were discussed and the list is attached at ***Annexure-II (C).***

3. Maintenance Programme of Generating Units and Transmission Lines

3.1. **Maintenance Programme for Generating Units.**

The maintenance programme for Generating Units for the month of September 2019 was discussed on 13.08.2019 at NRPC Secretariat, New Delhi.

3.2. **Outage Programme for Transmission Elements.**

The maintenance programme for Generating Units for the month of September 2019 was discussed on 13.08.2019 at NRPC Secretariat, New Delhi.

In the meeting, members were informed that from the next month, the outage proposal/ request would be considered on another portal which has been developed by M/s PWC. In this regard a workshop/ training session will be organised in the last week of August 2019.

All utilities were advised to attend the workshop. Outage for the month of October 2019 needs to be submitted in parallel on both TSOP and the new portal in order to take care of any initial teething problems and thereafter the same should be done on the new portal only.

4. Planning of Grid Operation

4.1. **Anticipated Power Supply Position in Northern Region during September 2019**

4.1.1. **Delhi SLDC** informed that Anticipated availability will be 4758 MU and 6859 MW in place of 3750 MU and 6980 MW respectively.

4.1.2. **Rajasthan-SLDC** informed that anticipated requirement will be 11400 MW in place of 10700 MW.

4.1.3. **UPSLDC** informed that anticipated availability will be 11935 MU and 19400 MW in place of 14200 MU and 22300 MW respectively. Anticipated requirement for the said period will be 12090 MU and 21500 MW in place of 12250 MU and 21000 MW respectively.

5. Information about variable charges of all the generating units in the Region

Citing the deliberations held in the 160th and 161st OCC meeting, all SLDCs were requested to ensure following the MERIT order despatch and regularly fill the details on the portal and report any deviation in this regard on the portal itself.

6. Reactive compensation at 220 kV/400kV level

In the 38th TCC & 41st NRPC dt. 27th & 28th February 2018, following elements in NR were approved:

a) 500 MVAr TCR at 400 kV bus at Kurukshetra S/S of POWERGRID.

b) 30 Nos. of 220 kV bus reactors and 18 nos. of 400 kV bus reactors, subject to availability of space.

6.2 **POWERGRID:**

500 MVAr TCR at Kurukshetra: Award placed in January 2019 with completion schedule of 22 months.

POWERGRID representative informed that for 11 Nos. of 400 kV Bus Reactor and 7 Nos. of 220 kV Bus Reactor, Price Bids could not be opened due to some internal issues in M/s TCIL, which is their e-procurement service provider. It was also

informed that the due to the aforementioned issues, approximately 1200 tenders on TCIL portal are stuck, in which some of them are of POWERGRID also.

It was reported that the issue may be resolved within a month.

6.3 **DTL:**

The updated status of the reactors as received from DTL is placed below:

S. No.	Sub Station	Voltage level (kV)	Reactor (MVAr)	Updated Status (as on 05.08.19)
1	Peeragarhi	220	1x50	PR No 1100002017 Raised.
2	Mundka	400	1x125	PR No 1100002120 Raised.
		220	1x25	
3	Harsh Vihar	220	2x50	PR No 1100002162 Raised.
4	Electric Lane	220	1x50	Under financial concurrence
5	Bamnauli	220	2x25	PR raised.
6	Indraprastha	220	2x25	Under financial concurrence
TOTAL			**450**	

6.4 PSTCL:

PSTCL informed that the bid opening date for 400 kV bus reactor at Dhuri substation and 220 kV bus reactors at Dhuri & Nakodar substations has again been extended and the bids are scheduled to be opened on 19.08.2019. It was further informed that because of no representation from the bidders, the date has been extended.

6.5 Uttarakhand:

125 MVAr reactors at Kashipur: Technical Bid for 125 MVAr reactor at Kashipur has been opened and is being evaluated.

6.6 Rajasthan:

The updated status is placed below:

Item	Background	Status
3 Nos. each of 25 MVAr (220 kV) reactors for Akal, Bikaner & Suratgarh.	-	PSDF funding sanctioned. Tendering under process.
1 No. of 25 MVAr (220 kV) reactor for Barmer & 125 MVAr (400 kV) reactor for Jodhpur, included in 450 MVAr (13x25 + 1x125 MVAr) proposal	Revised DPR for 450 MVAr approved Reactor after separating STATCOM was submitted vide letter dt. 12.10.2018 to POSOCO for approval.	RVPN informed that the approval of TESG has not been obtained yet as was informed in the previous meeting. Also, there were some more clarifications sought by TESG which have already been responded.

7. System Study for Capacitor Requirement in NR for the year 2019-20

7.1. UP representative informed that the sample data of one of their substation has

been prepared and would be sent to CPRI for their comments before moving forward for collection of final data.

7.2. HP, Rajasthan and Uttarakhand were requested to expedite the submission of final data.

8. Phase nomenclature mismatch issue with BBMB and interconnected stations

8.1. SE (O), NRPC informed the committee about the deliberations done in the meeting held on 13.08.2019 on the issue, in which it was highlighted that there might be such phase nomenclature mismatch issue in other utilities also. In view of the above it was decided that all the concerned STUs/SLDCs shall certify about phase nomenclature of their system considering PGCIL phase nomenclature as reference. The format in which the information is to be submitted is attached at ***Annexure-III***.

8.2. All concerned utilities were advised to submit the above information in the prescribed format by 01.09.2019.

9. Follow up of issues from previous OCC Meetings – Status update

The detail of the updated status as discussed in the 162nd OCC meeting is placed at the corresponding agenda point of ***Annexure-IV***.

10. Status of FGD installation vis-à-vis installation plan at identified TPS

10.1. Updated status in the prescribed format in respect of GHTP Lehra Mohabbat and GGSSTP Ropar has been received from Punjab and also from UP for 7 of their projects.

10.2. Regarding the information as submitted by Rajasthan, it was informed that the said information was not in the prescribed format. Rajasthan and all other states were advised to submit the data in the prescribed format (template available at http://164.100.60.165/Oper/2019-20/dataformat/FGDstatus-format.xls).

11. System Protection Scheme (SPS) in NR

11.1. SPS for ICTs at 765 kV Unnao sub-station

NRLDC representative presented following SPS study, which was revised after 161st OCC meeting:

Tripping of two ICT at 765/400kV Unnao			
Sl. No.	Real time flow on 765 kV Anpara-Unnao Line (X) (MW) prior to tripping	Proposed Scheme by UP (after 161 OCC)	NRLDC Remarks
1	1200 <X ≤ 1400	Tripping of one unit at Anpara-C or Anpara-D shall be carried out through SPS. (The logic shall be build such that in one such event tripping of unit shall take place at Anpara-C and in next such event at Anpara-D and so on)	Ok. It seems logic would be able to take care of contingency
2	X > 1400	One unit each shall be tripped simultaneously at Anpara C and Anpara D. In addition to it, for safety of the powergrid, load-shedding of 600MW shall be carried out in UP power system	Ok. It seems logic would be able to take care of contingency. However, UP may clarify whether load-shedding will be automatic/manual

Tripping of three ICT at 765/400kV Unnao or 765kV Anpara C-Unnao line			
Sl. No.	Real time flow on 765 kV Anpara-Unnao Line (X) (MW) prior to tripping	Proposed Scheme by UP (after 161 OCC)	NRLDC Remarks
1	X<1100	No automatic backing down. UP SLDC shall take backing down actions if loadings on other lines are high	Ok. It seems logic would be able to take care of contingency
2	1100<X<1400	Tripping of one unit at Anpara-C or Anpara-D shall be carried out through SPS. (The logic shall be build such that in one such event tripping of unit shall take place at Anpara-C and in next such event at Anpara-D and so on)	Ok. It seems logic would be able to take care of contingency
3	X>1400	One unit each shall be tripped simultaneously at Anpara C and Anpara D. In addition to it, for safety of the powergrid, load-shedding of 600MW shall be carried out in UP power system	Ok. It seems logic would be able to take care of contingency. However, UP may clarify whether load-shedding will be automatic/manual

Representative of NRLDC informed that conditions as per Annexure–III of the Agenda are generally in order and UP may proceed for implementation of the logic at the earliest. Moreover, UP was advised to look into the possibility of automatic load shedding rather than manual load shedding.

11.2. **SPS for Kawai – Kalisindh - Chhabra generation complex**

In the meeting it was informed that Rajasthan has submitted the revised study to NRLDC/ NRPC. NRLDC representative stated that all the conditions are found to be generally in order, except following conditions:

Condition / Contingency	Action suggested by Rajasthan	NRLDC comments
N-1-1/N-2 of Chhabra SCTPS-Anta-1 & 2	Trip one unit at Chhabra SCTPS	Reason needs to be explained as two lines from Chhabra SCTPS to Chhabra would be there for evacuation.
N-1-1/N-2 of 765/400 kV Anta ICTs	Not required	One unit of 600 / 660 MW should be tripped to limit the flow on the remaining ICT within safe range.

Rajasthan was requested that the reason as mentioned for N-1-1/ N-2 of Chhabra SCTPS-Anta 1 & 2 contingencies may be verified and changed accordingly. Also SPS operation for the condition N-1-1/N-2 of 765/400 kV Anta ICT may be required and Rajasthan was advised to review the same.

Rajasthan was requested to discuss internally on these comments and revert at the earliest.

Further, regarding the generator model for dynamic study, Rajasthan was advised to take up the issue of Dynamic model with the OEM (BHEL) requesting them to provide generic PSS/E models.

Rajasthan further informed that SPS would be implemented by October, 2019.

11.3. **SPS for Bara Evacuation**

Following SPS study for Bara evacuation was presented by NRLDC representative:

Details of system condition	Scheme proposed by UP	NRLDC comments
Tripping of 765 kV Bara-Mainpuri line when total ex-bus generation of Bara TPS is equal to or more than 1300 MW	One unit should immediately trip so that the remaining power may be evacuated safely from 1500 MVA Bara ICT	SPS may be wired such that: 1. Generation at Bara generating units is more than 1400MW (considering average p.f. as 0.95) **or** 2. Current at 400kV side of 765/400kV ICT is > (1.02×2165×400 / V) Amperes, where V is 400kV side voltage (in kV)
	Requisite load shedding to be done manually in UP control area	UP SLDC is requested to identify feeders beforehand, which would be manually opened under operation of SPS.

NRLDC representative suggested that the implementation of SPS may be done for ex-bus generation of Bara being more than 1300 MW in case of tripping of 765 kV Bara-Mainpuri line and the setting may be changed to 1400 MW after review. UP SLDC was urged to identify the feeders for load shedding.

UP SLDC agreed for the above suggestion.

12. Automatic Demand Management System

12.1. MS, NRPC expressed concerns regarding idle status of the agenda and reiterated that as per CERC order in petition No. 5/SM/2014 SLDCs/SEB/ DISCOMs should implement ADMS to reduce over drawl from the Grid.

12.2. Haryana was requested to take up the matter with DISCOMs for the implementation at 11 kV level.

12.3. Further, it was decided that a presentation by any DISCOM of Delhi will be held in the next OCC meeting in order to sensitise the members on the issue of implementation of ADMS. Delhi was also requested that the OEM may also be asked to be present during the presentation on ADMS in the next OCC meeting.

12.4. All the utilities were advised to expedite the implementation of ADMS so as to avoid any action by the commission under Section 142 of the Electricity Act for non-compliance of IEGC.

13. Status of implementation of recommendations of Enquiry Committee on grid disturbances on 30th & 31st July 2012

13.1. The status of information received in this regard is as under:

Submitted			Not Submitted
NTPC (NCR) (*19.08.2018*)	POSOCO	SJVNL *(NJHPS: 01.05.2019 RHPS: 08.05.2019)*	HVPNL
BBMB *(24.07.2018)*	NHPC *(07.02.2018)*	Delhi *(01.04.2019)*	Himachal Pradesh
Punjab *(16.07.2018)*	HPGCL (Panipat TPS) *(17.07.2018)*	Uttar Pradesh (*13.08.2019*)	NTPC (NR-HQ)
Rajasthan *(13.06.2018)*	NPCIL *(RAPS: 17.07.2018) (NAPS: 25.07.2018)*		Jammu and Kashmir

THDC *(18.07.2018)* *(19.07.2018)*	POWERGRID (*NR-1: 16.11.2018* *NR-2: 13.07.2018* *NR-3: 01.04.2019*)		UT of Chandigarh

NTPC representative informed that they have already submitted the information in respect of NTPC (NR-HQ) via e-mail dated 16.05.2019. However, it was informed that no such information could be traced on the mail and he was requested to forward the information once again at the earliest.

HP, HVPNL, J&K and Chandigarh were requested to submit status at the earliest so that the information could be forwarded to NPC, CEA.

14. Cyber Security Preparedness Monitoring

14.1. Based on the detailed presentation given by Chief Information Security Officer (CISO), MoP in the 37th TCC and 40th NRPC meeting, all utilities were requested to monitor actions being taken in regard to the following points and report the status:

a. Appointment of organization-wise CISO and its status.
b. Identification of organization-wise Critical Infrastructure and its status.
c. Preparation of organization-wise Crisis Management Plan and its status.
d. Status of Cyber Security Mock Drill activity in coordination with CERT-In.
e. Status of Training / Workshops on Cyber Security organized / participated by power sector entities.
f. Status of action taken on CERT-In / NCIIPC advisories.

The updated status on aforementioned cyber security action points was enclosed as Annexure-IV(A) of the agenda.

All utilities were requested to update the status.

14.2. In the 156th OCC meeting, it was mentioned that inherent vulnerability in the ICT infrastructure or website or web applications shall be accessed and remedial action thereon shall be taken by all utilities by conducting Vulnerability Assessment & Penetration Test (VAPT) of their respective ICT infrastructure, websites and web applications. The updated status of VAPT and cyber security audit is enclosed as Annexure-IV(B) of the agenda.

All utilities were requested to update the status of VAPT conducted in their respective organization and VAPT plan for the future.

15. Expediting Construction of 132kV supply for railway traction substation for railway electrification projects in states in NR region

15.1. Ministry of Railways has accorded high priority to railway electrification projects for reducing dependence on fuel based on crude oil and enhancing energy security of nation. However, progress of ongoing transmission line and substation works, being executed by SEBs (Annexure-VI of the MoM of 160th OCC meeting), is not matching with the targets for railway sections planned to be commissioned on electric traction. State-wise detail in respect of NR is as under:

Sl. No.	State	Tr. Line to be expedited		Contract to be awarded		Estimate awaited	
		(original target)	(updated status)	(original target)	(updated status)	(original target)	(updated status)
1	UP	19	-	5	-	1	-
2	Haryana	5	-	2	-	-	-
3	Punjab	1	-	2	-	2	-
4	Rajasthan	5	4* completed	5	1** completed	7	***
5	J&K	1	-	-	-	-	-

* 1 no. railway end pending due to demarcation in Army area.

** 2 nos. proposals withdrawn by Railways, 1 No. under progress, 1 No. route to be revised by Railways.

*** 3 Nos. proposals withdrawn by Railways, 2 Nos. A&FS pending and 2 Nos. works under progress.

15.2. In the 159th OCC meeting, HVPN has submitted the status (Annexure VI of minutes) of the ongoing works for railway traction substations.

15.3. In the 161st OCC meeting, Punjab representative informed following status:

Sr. No.	Name of Electrification Project	Name of Grid Substation	Status (as provided in the agenda)	Latest Status
1	Rohtak-Bathinda-Lehra Mohabbat	Talwandi	Tr. Line to be expedited	Completed & energized.
2	Jakhal-Dhuri-Ludhiana	Chhajli	Contract to be awarded	Land acquisition for construction of bays is in process by PSPCL
3	Jakhal-Dhuri-Ludhiana	Sandhaur		60 % work completed
4	Hisar-Bathinda-SuratGarh	Bathinda	Estimate awaited	No information available with the concerned offices. Railway to clarify.
5	Hisar-Bathinda-SuratGarh	Yet to be finalised		

15.4. UP submitted the information as under:

	Lines to be expedited	Contracts to be awarded	Estimates awaited
Original	19	5	1
Present status	• 13 lines energized / charged • 2 work in progress (Oct 19) • 1 forest clearance awaited • 2 PTCC clearance awaited • 1 work stopped due to non-payment of crop compensation	• 3 work started (expected completion – Oct 19) • 1 location of coordinates – awaited • 1 Tender under process	• Meeting dt. 11.03.2019 with Rly authorities – Line needs to be dropped.

It was decided that compiled data on the present status may be sent to Ministry of Power.

16. Mapping of UFR, df/dt relay details in SCADA

16.1. Representative of NRLDC informed the members regarding the current status of mapping of UFR/df/dt relay (***Annexure-V***) details in SCADA. He requested each state to provide a consolidated list of the feeders under UFR and df/dt scheme and to ensure at least names of all feeders as submitted in consolidated list are entered in SCADA.

16.2. Considering the slow progress in mapping and importance of this issue of safety of the Grid, it was decided that NRPC Sectt will intimate status as well as progress of the issue to Power Secretaries of the respective states with a copy to Secretary CERC through a DO letter.

17. Maintenance & support (AMC) renewal of PSS@E licenses

17.1. Members were apprised that NLDC is currently negotiating for renewal Maintenance & support (AMC) of PSS@E licenses with M/s Siemens which has been communicated vide NRLDC letter dated 31.07.2019.

17.2. Further, it was decided that SLDCs/STUs will communicate their willingness and approval for renewal of AMC to NRLDC/NLDC by 20th August 2019 so that NLDC can proceed with award placing.

Part-B: NRLDC

1. 2019-20 Solar eclipses Preparation

India is expected to witness two annular solar eclipses on 26th Dec 2019 and 21st June 2020. Since share of solar generation has been on increasing trend and has significant portion in our portfolio, it is necessary that we prepare ourselves for impact of solar eclipse on this solar PV generation. Following is necessary for getting ourselves prepared:

- Estimation of total solar power reduction
- Need of the reserve requirement for managing the reduction in solar generation
- Ramping and balancing Issue in the area of annular solar eclipse and partial solar eclipse
- Potential loading of Inter regional transmission corridor
- Coordination requirement between RLDCs, SLDCs, Generating plants and NLDC
- Studying the potential effect of solar eclipse on Indian Power system.
- Data requirement

NRLDC representative presented the possible impacts of solar eclipse on generation profile and recommended the following during meeting:

- State utilities specially Rajasthan shall estimate the total solar power reduction due to Solar eclipse.
- Keep adequate Reserve to mitigate the impact of solar generation reduction
- Day ahead forecast of PV is very important for 26th December 2019 and 21st Jun 2020 for all the state control area.
- Keeping all state hydro units on bar and maintaining generation at minimum possible levels before start of the eclipse and increasing the generation once Solar eclipse starts.
- Ramp up and Ramp down during solar eclipse start and end time needs to be closely monitored.
- Coordination requirement between RLDCs, SLDCs, Generating plants and NLDC.
- Data needs to be shared after actual impact.

NRLDC representative further requested to all the utilities to take precautionary actions accordingly.

2. Reliability issues in the grid: July 2019

NRLDC representative stated that during past few weeks, NR has met very high demand of order of ~66000MW and several reliability issues are being observed. NRLDC representative presented details about N-1 non-compliance observed at different locations and requested SLDC to manage/control loading of these ICTs and other elements to ensure N-1 compliance (details attached as **Annexure-VI**).

- **Punjab:** ATC/TTC limits of Punjab state control area were assessed as 6400/7000 MW suggesting N-1 non-compliance at 400/220kV Amritsar, Rajpura, Muktsar, Ludhiana, Nakodar and Makhu ICTs. Punjab has started to supply agricultural (paddy) load from 13.06.2019. With this, import of Punjab is close to its ATC limit of 6400MW. Loading at Amritsar and Rajpura ICTs is above N-1 contingency limits while that of Ludhiana, Makhu, Muktsar and Nakodar ICTs is close to N-1 contingency limit. NRLDC representative stated that loading of most of 400/220kV ICTs in Punjab state is high, therefore, an event causing tripping of ICTs at substation may result in cascade trippings with multiple trippings at nearby stations as well. Punjab SLDC was asked to manage loading of ICTs below N-1 contingency limits as this limit of TTC/ATC was agreed on confirmation from Punjab SLDC that they shall manage loadings of ICTs below N-1 contingency limit. Punjab SLDC representative stated that they have already identified different load groups for supply hours from different substations. Constrained ICT stations are being regularly asked to monitor loading of ICTs and connect/disconnect agricultural load groups accordingly. It was also informed that third ICT of 500 MVA capacity at Muktsar is going to be commissioned in a day or so.
- **Haryana:** TTC/ ATC limits were assessed by NRLDC as 7500MW/ 6900MW respectively with N-1 non-compliance at 400/220kV Dipalpur and Panipat ICTs.

In real-time also under import of 6000-7000MW, loading of Dipalpur, Sonipat, Kabulpur and Panipat (BBMB) ICTs are high (close to N-1 limits). Haryana SLDC representative informed that after commissioning of Bahadaurgarh-Nunamajra D/C, there would be relief in Kabulpur ICTs loading.

- **Rajasthan:** N-1 non-compliance at Akal and Bhadla ICTs. High loading of ICTs at Akal is being observed leading to constraints in evacuation of wind generation. As highlighted by NRLDC on previous many occasions, there is need for additional reactive power support at Akal. In real time, loading of ICTs at Bhadla is being observed in range of 900-1200 MW. Thus, there is N-1 non-compliance on daily basis from 10:00hrs to 16:00hrs when solar generation is high.

Under N-1 contingency of ICT at Akal or Bhadla, there could be generation loss of the order of 1000-1300MW, which is severe contingency in grid resulting in large scale frequency excursions (dip). Thus, there is need for SPS design to trip some generation in case of tripping of one ICT at these stations and antecedent loading of ICTs being higher than N-1 contingency limit.

- **Uttar Pradesh**: As discussed in previous OCC meetings, UP and NRLDC officials have assessed TTC around 13400MW (slight difference) under state generation scenario of 10000MW. Considering reliability margin of 600 MW ATC comes out as 12800 MW with N-1 non compliances at 400/220kV Agra(PG) and 400/132kV Mau ICTs. After commissioning of third ICT at Agra (PG), N-1 non compliance issue is resolved but 220 kV lines in the eastern part of UP are highly loaded during high demand.

3. High Reactive power drawal at 400/220kV nodes

With demand of Northern region increasing upto 66GW, loading of ICTs has increased substantially. Apart from high MW loading on various 400/220 kV ICT nodes, it has been observed that MVAr drawal (400kV to 220kV) is also very high which can lead to low voltages in that pocket. NRLDC representative shared the following table and plots showing the nodes with poor power factor (less than 0.9) based on SCADA data of July. (Plots are also attached as **Annexure-VII**):

Station Name	State	Avg. Power factor	Avg. 220kV Voltages (kV)
Kaithal	Haryana	0.81	217
CB Ganj	UP	0.82	228
Amritsar	Punjab	0.83	216
Abdullapur	Haryana	0.86	223
Roorkee	Uttarakhand	0.86	221
Kabulpur	Haryana	0.90	222
Srinagar	J&K	0.91	211
Azamgarh	UP	0.94	227
Dipalpur	Haryana	0.94	226

As per NRPC reactive power account of 15th July 2019 to 21st July 2019, reactive power drawl at low voltages were observed at following nodes:

Drawl of MVAr at ISTS during Low voltage (As per NRPC Reactive energy account)

State	As per NRPC Reactive energy account: drawl of MVAr at ISTS during Low voltage most of the time
Punjab	Jalandhar, Jamalpur, Mahilpur, Mohali, Pong (all BBMB stations), Moga, Nakodar, Patran
Haryana	Hissar, Jagadhari, Kurukshetra, Samaypur (all BBMB stations)
Uttar Pradesh	Atrauli, Gorakhpur, Khurja, Sahupuri, Simbholi, Unnao
Uttarakhand	Sitarganj
J&K	Hiranagar, Jammu, Udhampur, Wagoora
HP	Jassore, Kangoo, Pong

It is well known that high reactive power drawal from 400kV system lead to low voltages and high losses in the system. Hence, such reactive power transfer should be avoided by proper planning of reactive power compensation locally. All the users are requested to limit the reactive power transfer from the EHV grid and take appropriate action to compensate it locally.

In 144th OCC, it was decided that identification of nodes at lower voltage level where actual MVAR drawl/injection is taking place need to be ascertained. New reactors and capacitors are being planned at several locations. Therefore, it is necessary to identify locations where actually there is need for MVAR support. The draft format for feedback from states regarding above was also circulated in minutes of 144th OCC.

States were asked to provide the data in the specified format.

4. Demand and Generation projections of Q3, 2019-20 for POC charges calculation

In line with CERC sharing of ISTS charges and losses regulation 2010 and subsequent amendments thereof, all the DICs have to submit the data for new transmission assets, Yearly transmission charges (YTC), forecast injection and withdrawal and node wise injection/withdrawal data to implementing agency for computation of PoC charges and losses for the application period. NRLDC vide its letter dated 12.07.2019 had requested utilities to furnish Technical and commercial data for Oct'19-Dec'19 Q3 (2019-2020).

NRLDC representative stated that details have been received only from **NTPC, NHPC, SJVNL, Haryana, Delhi, Himachal Pradesh, Rajasthan & Uttarakhand**. Other utilities were also requested to submit data as early as possible.

Amongst the utilities from which data was received, following was decided:

- ***Demand for Haryana and Delhi to be taken as per the data provided by them. Demand data for others need to be finalised in validation committee meeting.***

- ***Generation for NHPC was finalised and for others needs to be discussed in validation committee meeting.***
- ***Generation for Haryana to be taken as 2950MW.***

For utilities, those did not submit data, it was agreed that data will be finalised in validation committee meeting.

5. Station-wise list of Hot spares of Transformers and Reactors

CERC vide their communication dated 06th July 2019, has advised POSOCO to collect details about availability of Hot Spare units installed in various stations on quarterly basis from all ISTS licensees.

MS, NRPC stated that all the transmission utilities are supposed to submit the data on quarterly basis as per the specified format.

6. Status update for element under long outages

NRLDC representative presented the following list of the elements that are under long outage:

Sl. No	Element Name	Voltage Level	Owner	Outage		Reason / Remarks
1	Jaisalmer_2-Barmer Ckt-2	400 kV	RRVPNL	11/5/2019	21:34	Tower collapsed, 2 tower collapsed on 11.05.2019 and 4 towers collapsed on 16.05.2019
2	Jaisalmer_2-Barmer(RS) Ckt-1	400 kV	RRVPNL	11/5/2019	21:34	Tower collapsed, 2 tower collapsed on 11.05.2019 and 4 towers collapsed on 16.05.2019
3	Bhilwara 315 MVA ICT-1	400/ 220 kV	RRVPNL	12/5/2019	23:42	Oil leakage in Transformer
4	FACT at Ballabgarh in Kanpur 1 Line	400 kV	PGCIL	2/7/2016	10:20	Y-Phase current imbalance
5	FSC of Balia-I at Lucknow	400 kV	PGCIL	29/11/2017	13:30	E/SD due to Hot Spot on Isolator
6	FSC (40%) of Kanpur-II at Ballabgarh(PG)	400 kV	PGCIL	16/03/2019	14:39	Fire in B-Ph FSC at Ballabhgarh end.

7	400 kV 63 MVAR Line Reactor of Jaipur (S) line at RAPP C	400 kV	RAPPTCL	17/05/2019	9:30	Emergency SD taken by RAPP C to attend oil leakage in Reactor.
8	+/- 150 MVAR STATCOM 1 at Lucknow II PG	400 kV	PGCIL	17/07/2019	15:03	Due to failure of 3x173 MVA, 400/38.5kV Coupling Transformer at Lucknow.
9	+/- 150 MVAR STATCOM 2 at Lucknow II PG	400 kV	PGCIL	17/07/2019	15:03	Due to failure of 3x173 MVA, 400/38.5kV Coupling Transformer at Lucknow.
10	Chamera III(NHPC)-Chamera pool(PG) 2	220 kV	PGCIL	14/05/2019	11:56	During shifting of Chamera pool-2 line from 220 kV Bus-2 to BUS-1 at Chamera 3 GIS. Line isolator and Circuit Breaker of line 2 got damage at Chamera3 GIS.
11	Chamera 3 HEP 220kV Bus 1	220 kV	NHPC	14/05/2019	11:56	During shifting of Chamera pool-2 line from 220 kV Bus-2 to BUS-1 at Chamera 3 GIS. CB got damage.

NHPC representative informed that there is a problem in isolator at Chamera-3 bus and it will take around 6 to 8 months to resolve this issue.

POWERGRID informed that to restore Chamera III-Chamera Pool -2 line, rerouting of 5 towers is required which will be done by November'19.

For the restoration of Lucknow STATCOM, POWERGRID submitted that the coupling transformer is failed and it will take 5 to 6 months to revive.

7. Frequent forced outages of transmission elements

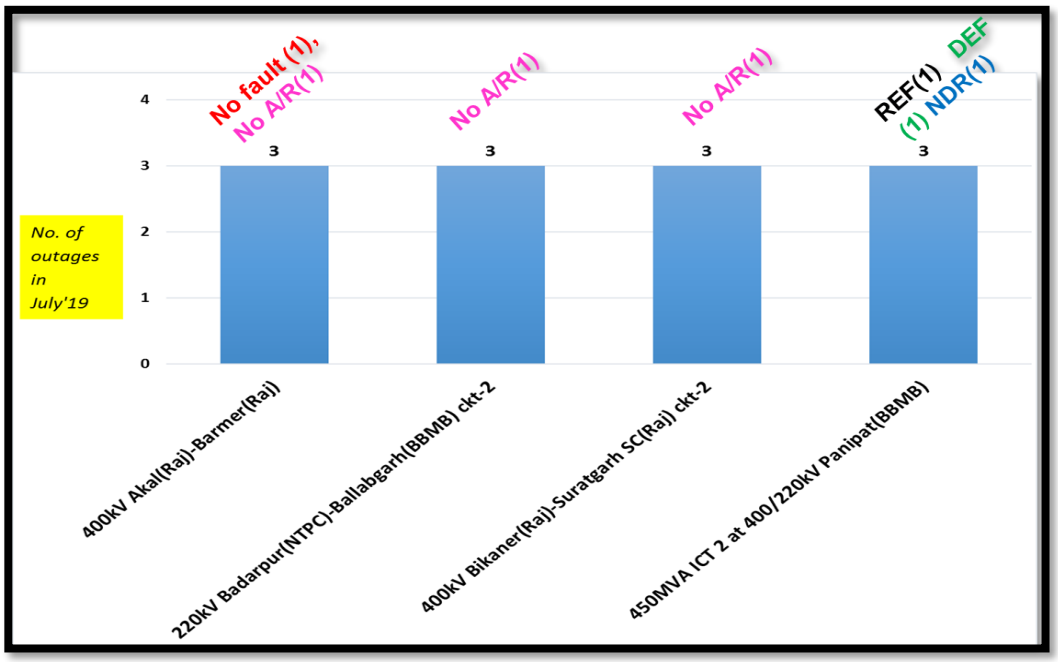
The following transmission elements were frequently under forced outages during the month of **July'19**:

Sl. No.	Element Name	No. of forced outages	Utility/SLDC
1	400kV Akal(Raj)-Barmer(Raj)	3	Rajasthan
2	220kV Badarpur(NTPC)-Ballabhgarh(BBMB) ckt-2	3	BBMB/NTPC
3	400kV Bikaner(Raj)-Suratgarh SC(Raj) ckt-2	3	Rajasthan
4	450MVA ICT 2 at 400/220kV Panipat(BBMB)	3	BBMB

The complete details are attached at **Annexure-X** of the Agenda**.** Frequent outages of such elements affect the reliability and security of the grid. Hence, utilities are requested to look into such frequent outages and share the remedial measures taken/being taken in this respect.

Compiled information of monthly transmission elements outage list starting from Oct 2018 to Jun 2019 is also informed during recent 38th PSC meeting and same is attached as **Annexure-XI** of the Agenda. Action taken and identified during the OCC meeting is also part of the details

Complete status and major cause of tripping is show below in bar graph:



The following were the discussion on the trippings:

- BBMB representative informed that Panipat (BBMB) ICT tripped during through fault condition due to sensitive protection setting of ICT and same has been rectified. NRLDC representative requested BBMB to share the information of protection setting changes with NRPC/ NRLDC.
- NRLDC representative informed that after continuous follow up, reporting of the analysis report and remedial measures report is still very low.

- NRLDC representative raised concern for non-submission of tripping details and remedial measures report after continuous follow up in various OCC & 38th PSC meeting.
- State representative agreed to discuss internally and share the details within 7days.
- NRLDC representative further requested NRPC to also report this non-compliance in its letter to Power Secretary of respective states.
- NRPC suggested SLDCs to take up the issue with STU internally and submit the DR/EL, detailed report along with remedial measures report in time bound manner.
- NRPC representative concerned about non-submission of information for multiple time single element tripping in last twelve months. Information is still pending from most of the NR utilities.
- In 160th, 161st OCC meeting and 38th NRPC meeting, NRPC raised concern on non-submission of details to NRPC/ NRLDC and suggested to all the SLDCs to compile the information and share the remedial measures report for last ten months tripping presented in various OCC meeting. All the concerned utility was suggested to prepare the presentation on remedial measures taken and present during 162nd OCC meeting however no one presented the report during meeting. ***NRPC raised serious concern for non-adherence to the decision taken in 159th, 160th, 161st OCC meeting & 38th PSC meeting.***

NRPC suggested to all the constituents to check the details available in Annexure-X & XI of the Agenda and share the remedial measures report within 7 days, non-compliance of the direction will be reported in its letter to Power Secretary of respective states.

8. Multiple element tripping events in Northern region in the month of July'19

A total of **15** grid events occurred in the month of July'19 of which **7** are of GD-1 category. The preliminary report of all the events have been issued from NRLDC. A list of all these events along with the status of details received by 05-Aug-19 is attached at **Annexure-XII** of the Agenda**.**

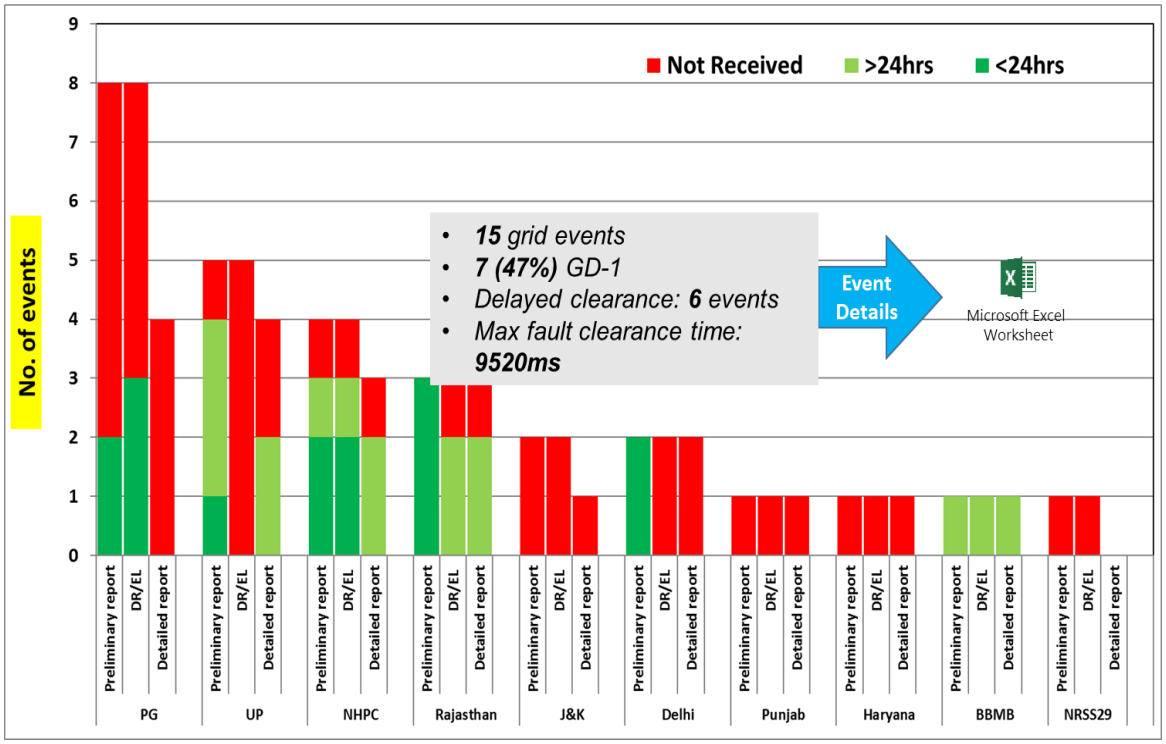
Further, despite persistent discussions/follow-up in various OCC/PCC meetings, the compliance of the regulations is still much below the desired level.

Maximum Fault Duration is **9520ms** in the event of multiple element tripping at 400/220 kV Wagoora (PG) on 26-July-19 at 17:43hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **6** events out of 15 grid events occurred in the month.

NRLDC representative further stated that the compliance of reporting details of events is still below the desired level. He showed the consolidated status of the reporting:

Note: *Details received by 05-Aug-19 are considered*



NRLDC representative once again requested to all the NR utilities to kindly calculate the energy loss in the incident and share the information to NRPC/ NRLDC in its detailed report.

MS, NRPC raised serious concern about non-submission of detailed analysis report by most of the NR utilities. He further informed that detailed analysis report submission is regulatory compliance and each utilities shall adhere to the regulatory compliance. Without detailed analysis, utilities cannot identify and take remedial measures for that particular incident. This issue will also be addressed in NRPC letter to respective state Power Secretary.

NRLDC representative informed to all the members about proposal discussed during 38th PSC meeting for separate "*Post-Dispatch Analysis Group"* in each SLDCs and other NR utilities which will deal with the site officials and share the detailed report based on input from the site. All the PSC member agreed for the proposal and this proposal will be discussed in next TCC/ NRPC meeting for final approval.

Members may take expeditious actions to avoid such tripping in future and discuss the same. Moreover, utilities may impress upon all concerned for providing the Preliminary Report, DR/EL & Detailed Report of the events in line with the regulations.

9. Details of tripping of Inter-Regional lines from Northern Region for July'19

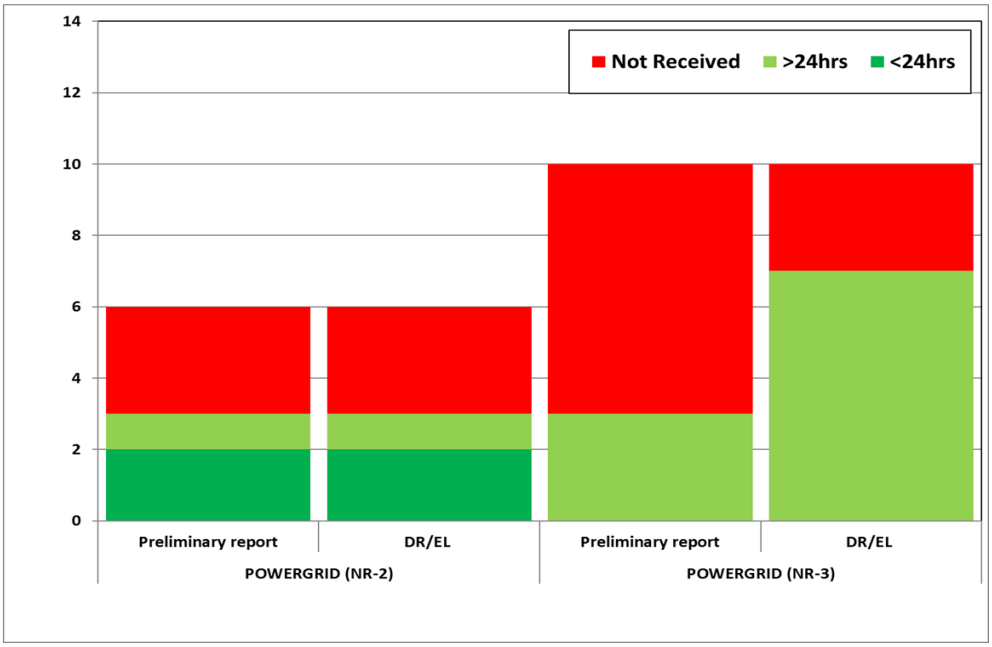
A total of **16** inter-regional lines tripping occurred in the month of July'19. The list is attached at **Annexure-XIII** of the Agenda**.** Out of 16, 11 tripping incidents are related to HVDC system. The status of receipt of preliminary reports, DR/EL within 24hrs of the event and fault clearing time as per PMU data has also been mentioned in the

table. The non-receipt of DR/EL & preliminary report within 24hrs of the event is in violation of various regulations. As per regulations, all the utilities shall furnish the DR/EL, flag details & preliminary report to RLDC/RPC within 24hrs of the event. They shall also furnish the detailed investigation report within 7 days of the event if fault clearance time is higher than mandated by CEA (Grid Standard) Regulations

Status of details received from the NR constituents is as below:

Note:

- *Details received by 08-Aug-19 are considered*
- *No Details received in three events each from POWERGRID NR-2, NR-3*



The following were the discussion on the trippings:

- NRLDC representative informed that frequent tripping of HVDC Champa-Kurukshetra pole was observed in the month of July-2019.
- POWERGRID NR2 representative informed that HVDC Champa-Kurukshetra Pole-3 is under commissioning stage and software logic of existing HVDC system was changed in view of integration of Pole-3. Mal-operation was already in the knowledge of site personal and will be attended during next planned shutdown.
- POWERGRID NR3 representative informed that HVDC Agra-BNC pole jumper was snapped near Auraiya-Kanpur ckt and it has been attended after taking shutdown on the same day.
- POWERGRID NR 3 representative informed that fault again captured in 400 kV Balia-Patna ckt-2 on 26th July 2019 but line successfully A/R. As of now A/R in service, however tripping details of 22nd July 2019 and reason of non-operation of A/R shall be checked and reverted.
- GM, NRLDC informed that tripping details are regularly send to all the concerned utilities, same is also part of the Agenda however details are yet to be informed after OCC meeting.

NRLDC representative once again requested all the concerned utilities to kindly submit the Preliminary Report, DR/EL within 24hrs and also share the remedial measures report for tripping in last one year.

MS, NRPC also raised serious concern for non-submission of information of DR/EL and detailed investigation report from the constituents and suggested all the NR constituents to share the information.

POWERGRID representative agreed to share the DR/EL of all the Inter-Regional tripping within stipulated time period of 24hrs and also share the remedial measures report.

Members may please note and advise the concerned for taking corrective action to avoid such trippings as well as timely submission of the information. Member attending the meeting shall keep all the information with him and share during the meeting.

10. Discussion on shortcoming during mock testing of Agra-Gwalior SPS and finalization of load groups

The 765kV Agra-Gwalior D/C is an important link between WR-NR. An SPS is in place to take care of the contingencies associated with the aforesaid link.

After discussion in various OCC meeting, revised logic of Agra-Gwalior SPS scheme was implemented in the month of Apr-19. As per approval in 158th OCC meeting, mock testing of 765 kV Agra-Gwalior SPS was conducted on 01st May 2019. Detailed report based on input from different utilities is prepared by NRLDC and shared with all the concerned utilities. This report was attached and discussed in 159th OCC meeting and thereafter a separate meeting was also called on 23rd May 2019 through video conferencing. In this meeting concerned utilities shared its input on shortcoming highlighted in the NRLDC report. Details of the shortcoming in mock testing and reply of concerned utility is again discussed in 160th OCC meeting. Following are the key highlights of the discussion during the meeting:

- *NRLDC representative raised concern about submission of load relief information by most of the utilities on the basis of average load on the feeders however it has already been discussed and approved in NRPC meeting that load relief quantum shall be calculated on minimum load on these feeders.*
- *For calculation of minimum load, it was suggested that utilities shall take the yearly data and calculate the average of 30days of minimum load period on that particular feeder and share the details in next OCC meeting.*
- *If there is any shortfall in load relief than utilities shall submit the additional load feeders on the same locations where DTPC is already available/ installed.*
- *Load groups shall be finalized in next OCC meeting after input from all the concerned utilities (Punjab, Haryana, Rajasthan, Uttar Pradesh and Delhi).*

It is requested to all the concerned utilities to kindly share the feeder wise details of load relief based on minimum yearly load on those feeders and also share the input

for finalization of load group along with feeder wise details of MW relief on the basis of suggested procedure.

NRLDC representative raised concerned about non-submission of details, despite continuous discussion in various OCC meeting.

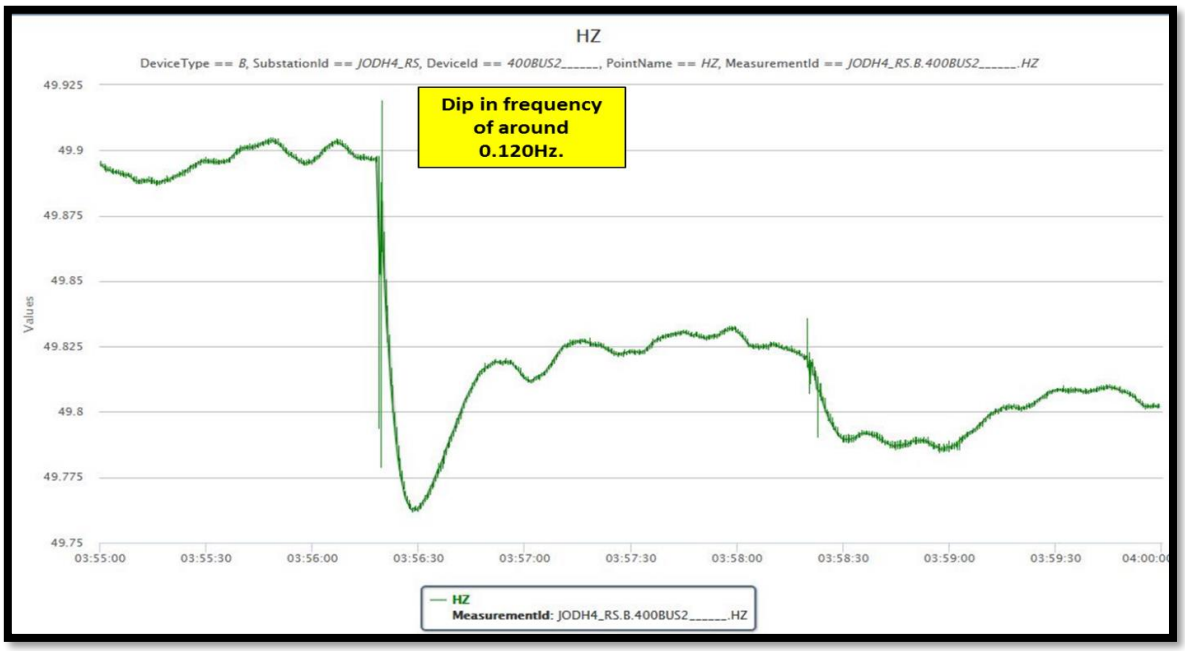
Punjab representative shared the load group information with NRPC/ NRLDC. Rearrangement of feeders for Punjab has been finalized in consultation with POWERGRID and same shall be incorporated in final data sheet.

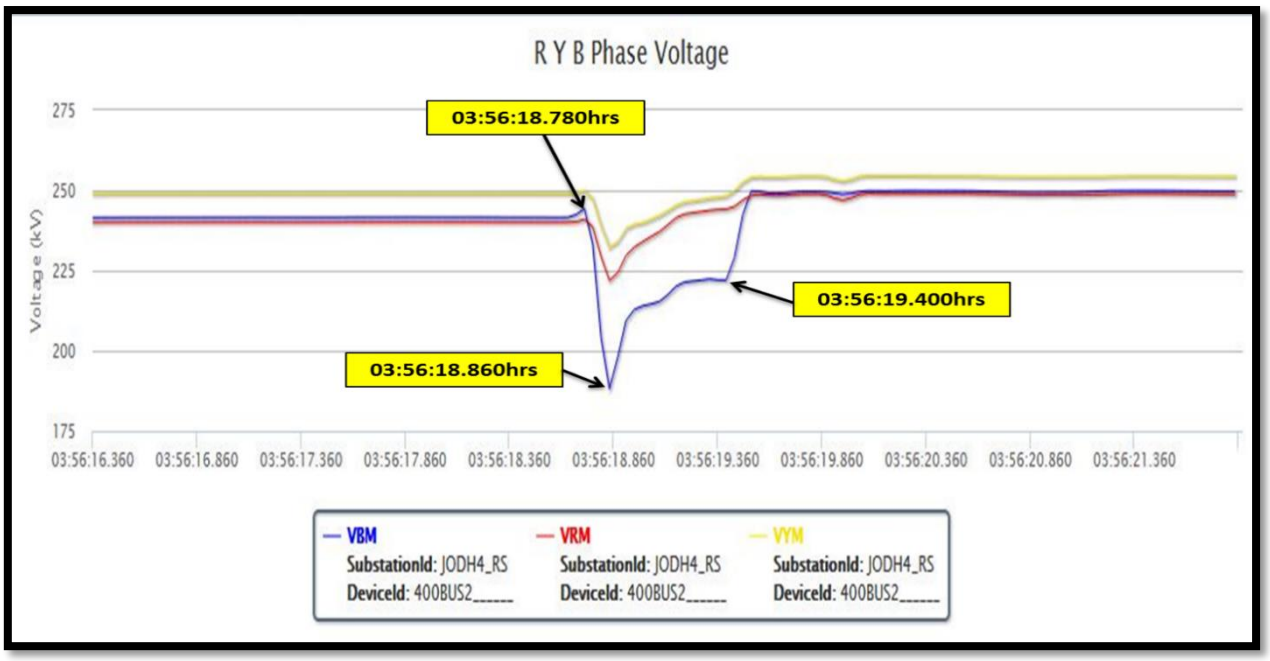
NRLDC representative informed that input will be taken from Punjab and load group data sheet will be finalized and shared in next OCC meeting for final approval of all the constituents. In the meantime, all the concerned utilities kindly share the feeder wise details of MW load relief based on minimum yearly load on those feeders.

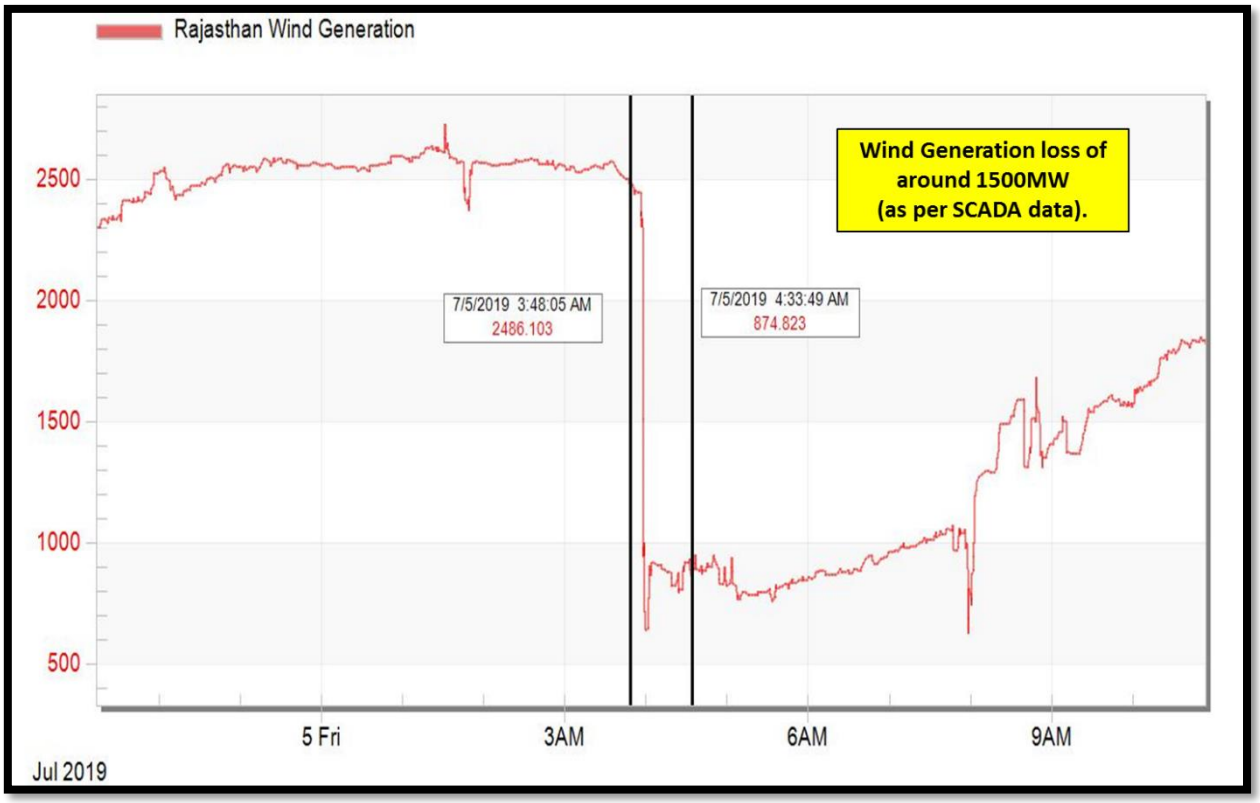
After finalization of the load group and implementation of the changes in load group by POWERGRID and concerned utilities, again mock testing shall be done for 765 kV Agra-Gwalior SPS as approved earlier in OCC meeting.

11. Wind Generation outage in Western Rajasthan during multiple element tripping at 400/220 kV Akal station

At 03:56hrs if 05th July 2019, Blue phase jumper of 220 Akal (end)-Bhu ckt-1 snapped and grounded. It resulted into multiple element tripping at 400/220 kV Akal station. At the same time 1500MW wind generation occurred in the Western Rajasthan area. PMU plot of frequency was showing frequency dip of around 0.12 Hz. PMU plot and SCADA plot is as below:







It is suspected that cause of large renewable generation tripping is due to unavailability of FRT capabilities in various wind generating stations. These large scale trippings are serious threat for security of the entire grid and also occurred in the past.

Rajasthan representative kindly check and share the details in view of following points:

- Timely clearance of Faults in the System (within mandated time as per Grid Standards regulations)

- Fault Ride Through (FRT) or LVRT capabilities are enabled in the wind turbine generators.

It is suggested to Rajasthan representative to kindly check the details and share the detailed report considering the aforesaid points within 7days. Kindly also share the current status of LVRT/ FRT availability in Wind/ Solar generation (plant wise) in Rajasthan.

12. Complete station outage of 220 kV Wagoora(PG) along with 400/220 kV ICTs at Wagoora (PG) and SVC at New Wanpoh

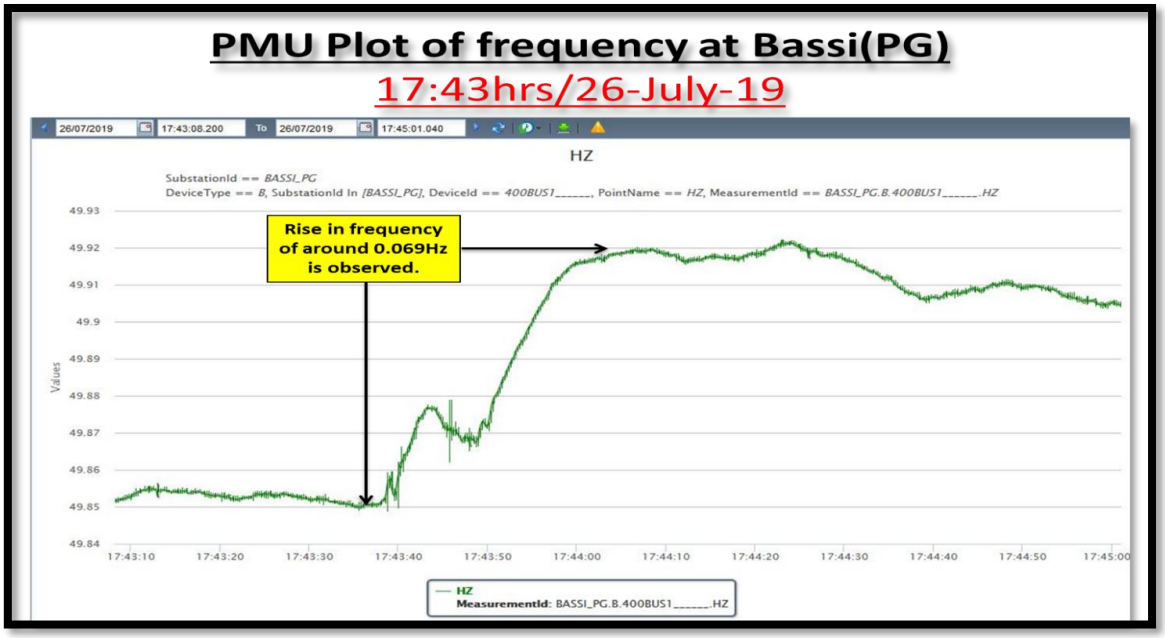
At 17:32hrs of 26th July 2019, first time charging code was issued for anti-theft charging of 220 kV Wagoora (PG) –Kishanganga ckt-1. In order to facilitate antitheft charging, 220 kV Wagoora bus-1 was to be isolated for safe operation. During shifting of lines from 220 kV Bus-1 to Bus-2, isolator dropper of 220 kV Bus-1 at Wagoora (PG) snapped and caused severe bus fault at 220 kV Wagoora (PG). As per PMU data, fault clearing time was ~10second. This incident resulted into multiple element tripping in ad around 220 kV Wagoora (PG) and further blackout in Kashmir valley with generation loss of ~440MW and load loss of ~1000MW. Generation loss occurred at Uri-1, Uri-2 HEP along with Kishanganga HEP. In this regard NRLDC already wrote a letter to POWERGRID, same is attached as **Annexure-XIV** of the Agenda. During the incident following elements were tripped in Kashmir valley along with valley load: -

- 220kV Bus-I at 400/220kV Wagoora(PG)
- 220kV Wagoora(PG)-Pampore(JK) ckt-I & II
- 220kV Wagoora(PG)-Ziankote(JK) ckt-I & II
- 315MVA ICT-I, II, III & IV at 400/220kV Wagoora(PG)
- 220kV Amargarh(NRSS29)-Ziankote(JK)
- 220kV Amargarh(NRSS29)-Delina(JK)
- 220kV Ziankote(JK)-Delina(JK)
- Unit-IV of 400kV URI-I(NHPC) & Unit-I, II & III of 400kV URI-II(NHPC)
- Unit-I, II, III & IV of 220kV Kishanganga(NHPC)
- SVC (-200/+300 MVAR) at New Wanpoh(PG)
- 400kV Amargarh(NRSS29)-URI-I(NHPC) ckt-2
- 220kV Rampur(JK)-Mirbazar(JK) & 220kV Kishenpur(PG)-Mirbazar(JK)

PMU plot and SCADA plot is as below:

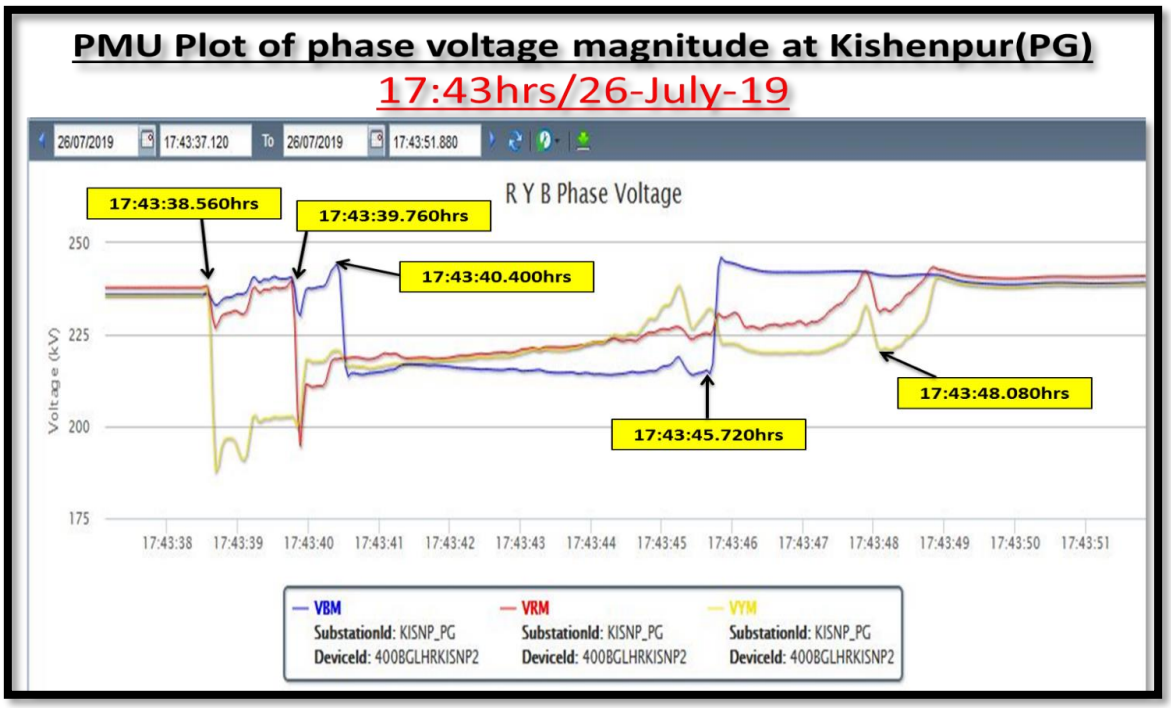
PMU Plot of frequency at Bassi(PG)

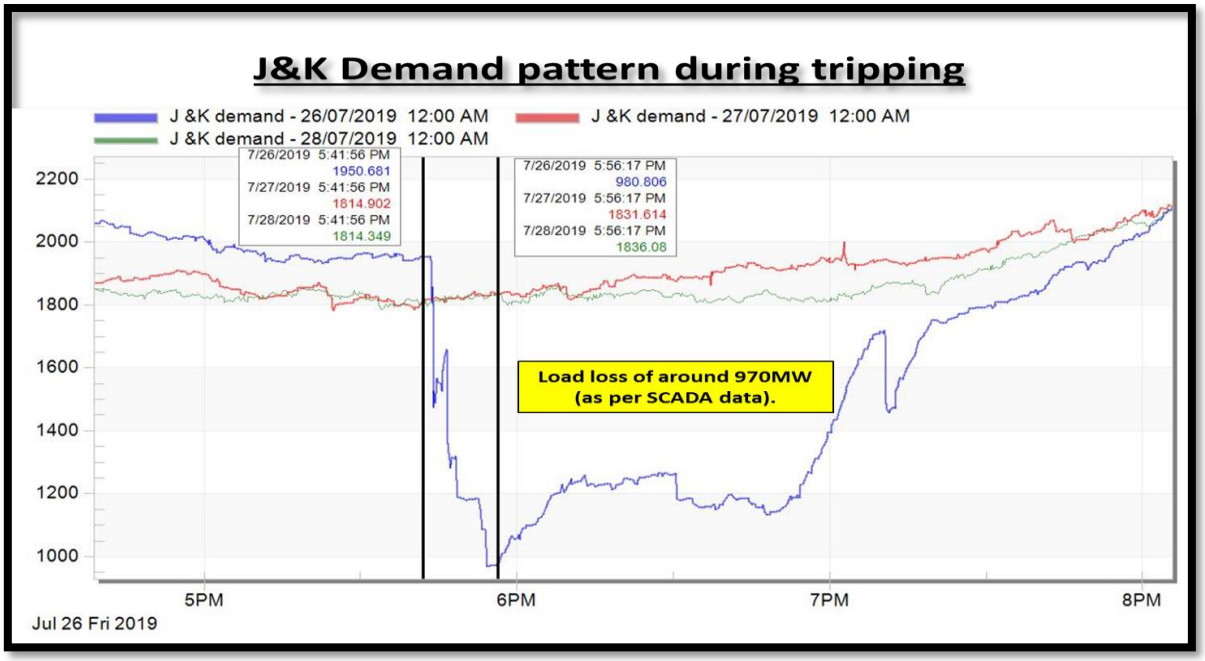
17:43hrs/26-July-19



PMU Plot of phase voltage magnitude at Kishenpur(PG)

17:43hrs/26-July-19





From preliminary observation, it seems that 220 kV bus bar protection at Wagoora (PG) failed to operate during the incident and backup over current earth fault protection at 400/220 kV Wagoora (PG) also didn't operate within desired time.

The following were informed during the meeting:

- POWERGRID representative informed that 220 kV Wagoora- Kishanganga D/C was to be charged from Wagoora as an anti-theft measure. Two days back there was an incident of jumper cutting and the line route is full of ROW issues. As the lines were to be charged for the first time and keeping in view the other issues as above to avoid unwanted tripping occurrence, it was thought that the entire load would be shifted to 220 kV bus-2 and the new lines would be charged from 220 kV bus-1.
- Load shifting was started and 220 kV Pampore-1 line was put on bus-2 by closing 20789B isolator and opening 20789A isolator. While shifting ICT-1 bay-209 to bus-2, 20989B isolator was closed and 20989A isolator (connected to bus-1) was opened. As it got opened its bus side Y-phase jumper along with isolator arm snapped due to breaking of head of the BPI on which it was resting. This resulted in fault on 220 kV Wagoora (PG) bus-1.
- He further informed that major cause of delayed clearance of fault was failure of primary bus bar protection and backup protection of ICTs at 400/220 kV Wagoora (PG)
- 220 kV Bus bar protection at Wagoora (PG) did not operate as it was blocked due non-switching of CT after isolator operation.
- Isolators of ICT-1,2,3, Pampore lines and Zainakote lines were very old and isolator auxiliary contacts are also not reliable.

- As per 220kV RADSS bus bar scheme at Wagoora (PG), if auxiliary contact input to bus bar protection didn't receive for 5 second than bus bar protection became block.
- **Sequence of Event**:
  - 220 kV Bus fault was created by breaking of isolator BPI at 17:43:38.628 hrs.
  - 220 kV Pampore – 1 & 2 lines opened from Pampore end in zone-2 17:43:40.269 and 17:43:38.718 hrs respectively.
  - 220 kV Zainakote – 1 & 2 lines opened at Wagoora in reverse zone at 17:43:39.164 and 17:43:39.182 hrs respectively.
  - ICT-2 tripped on HV Over Current protection operation at 17:43:39.899 hrs.
  - ICT-3 tripped on HV Over Current protection operation at 17:43:39.899 hrs.
  - ICT-4 tripped on Backup Impedance protection operation at 17:43:39.160 hrs.
  - 220 kV Bus coupler tripped at 17:43:46 hrs which cleared the fault.
- **Event Analysis**:
  - 220 kV Zainakote-1 and ICT-3 were feeding the fault directly as these were still connected to bus-1. 220 kV Pampore-1 & 2, ICT-1, 2 & 4 were feeding the fault through bus coupler as these elements were connected to bus-2.
  - 220 kV Bus Bar protection was in blocked mode hence did not operate.
  - Pampore lines tripped from JKPDD Pampore end. However, it seems that Pampore-2 has over reached, the matter needs to be coordinated with PDD.
  - Zainakote lines tripped in reverse zone which is correct operation. However, these lines could have tripped from Zainakote end which needs to be coordinated with PDD end.
  - ICT-1 did not trip which is unacceptable. It would have tripped on BU OC protection. Voltage selection scheme was not working and voltage did not appear to BU OC & EF relay leading to its non-operation. Back up Impedance function was kept disabled in the new HV BU OC EF relay which was retrofitted in July'19.
  - ICT-2 tripped on HV BU OC & EF protection operation. Back Impedance function was kept disabled resulting in its non-operation of Back up IMP protection.
  - ICT-3 tripped on HV BU OC & EF protection operation. Back Impedance function was kept disabled resulting in its non-operation of Back up IMP protection.

- ICT-4 got isolated by operation of Back up Impedance which was enabled in HV OC EF relay. This was a desired operation.
- Finally, fault get isolated by opening of 220 kV Bus Coupler on its backup OC (over current) relay operation

- **Root Cause of the Incident**:
  - Non operative Bus bar protection due to CT switching problem. If the bus bar protection would have operated, nothing would have gone abnormal and cascaded tripping of other elements would have not occurred.
  - Unreliable isolator Auxiliary contact: Isolators are very old and auxiliary contact operation is unreliable.
  - Disabling of Backup IMP protection: Distance protection was kept disabled in HV BU OC EF relays since retrofitting resulting in non-operation of protection.
  - Non operation of Voltage selection scheme: VT selection relay of protection has not been selected, results in non-availability of VT at ICT 1 leading to OC E/F. The magnitude of the current had not gone to high set value and OC EF was the only protection to operate. The cause for VT selection problem is also attributed to auxiliary contact of isolators
- It is found that protection configuration has some issues which need to be resolved immediately. All the settings and functions shall be done as per recommendations.
- *Due to auxiliary contact switching issues, isolator opening closing event did not capture in the events. Moreover, some of the BCUs installed for remote operation also found out of time sync.*
- SVC at New Wanpoh tripped at 17:43:39.889 hrs on neutral over current protection (50Z) operation for coupling transformer. The setting for this protection is 0.44 Amp and 1.2 Sec. TSC component of SVC came in and out of service three times due to capacitive over current protection.

- **Remedial Measures Identified:**
  - Isolator mechanism boxes need to be replaced at the earliest – The case is already under process for replacement of isolators.
  - Protection functions/schemes shall be corrected as per recommendations and approved drawings-- The settings and configuration has been corrected as desired.
  - Automation schemes such as VT selection, CT switching, Isolator interlocks etc. need to be made functional as possible till the replacement of Isolators.
  - Time synchronization of BCU need to be done--Under progress and will be completed by 20.08.19.

- It was observed that crack had developed earlier in the broken BPI at the joint of porcelain and metallic portion. It has also been instructed to the stations to visually inspect for such things during bus shut downs so that mechanical failures like this may be avoided

- The fault was fed through an arc developed between broken isolator arm and pipe structure of that isolator. Also the jumper was swinging which resulted in variation and arc resistance, hence the fault current has not gone that high as in case of a dead bus fault. ICT-1 was feeding the fault for so long but the current was of magnitude of 2.3 kA and high set value of OC relay operation did not reach.
- NHPC representative informed that details are yet to be received from Project and shall be shared with NRPC/ NRLDC after receiving of the same. 400 kV Uri-Amargarh ckt-1 tripped due to over voltage protection operation at Uri-1 HEP.
- POWERGRID representative confirmed that no 400 kV lines tripped from 400/220 kV Wagoora (PG).
- NRLDC representative informed that details have been received from POWERGRID but still awaited from NHPC.

Action Point Identified:

- SVC tripping needs to be relooked in view of tripping of coupling transformer and TSC component outage. Detailed report from manufacturer shall also be shared with NRPC/ NRLDC.
- High Voltage at SVC terminal needs to be checked with New Wanpoh bus voltage and Wagoora bus voltage as during fault condition bus voltage should be low.
- POWERGRID shall further check the details of SVC tripping and other important aspect in the tripping and share the revised report with NRPC/ NRLDC.
- NHPC representative shall share the details (DR/ EL) and detailed report along with remedial measures report within 7days considering the following points:
  - Reason of unit tripping at Uri-1 & Uri-2 HEP.
  - Status of unit-3 tripping of Dulhasti HEP.
  - Exact Reason of tripping of 400 kV Uri1-Amargarh ckt-1
  - Sensitive protection setting at Uri-1 & Uri-2 HEP
  - Protection Co-ordination between 400 kV outgoing line protection with unit protection at Uri-1 & Uri-2 HEP

13. Operationalization of Shutdown Co-ordination and Real-time Operation Management Software

- As communicated and presented in previous OCC meeting, shutdown Co-ordination software (PWC) and Operational management software (Computer ware) have been developed.
- Thorough Checking and testing of the application flow is under process. It has also been demonstrated to core coordinator of NRPC, NLDC and POWERGRID CPCC-1.
- Before going live with the system, brief presentation and hands on training is required for the core users of this software, so that they may get familiarized about the chronological process of various modules of the software.
- A training is likely to be scheduled in the last week of August for which formal communication will be sent to all the stake holders in due course.
- In view of above it is requested to nominate at least two persons from your organization – one who is involved in outage planning and approval process and other one from Real Time System Operation.
- It is proposed to operationalize the system from **1st September, 2019** after successful training.

It is for the information of the members. Member may please nominate the respective person.

14. Opening and Maintaining of adequate Letter of Credit (LC) as Payment Security Mechanism under Power Purchase Agreement (PPA) by distribution Licensees:

In compliance to Ministry of Power's (MoP) direction for implementing the procedure of Scheduling of Power to Distribution Company in the event of Non-maintenance of Letter of Credit, POSOCO has already finalized the procedure and same has been communicated to all the NR utilities.

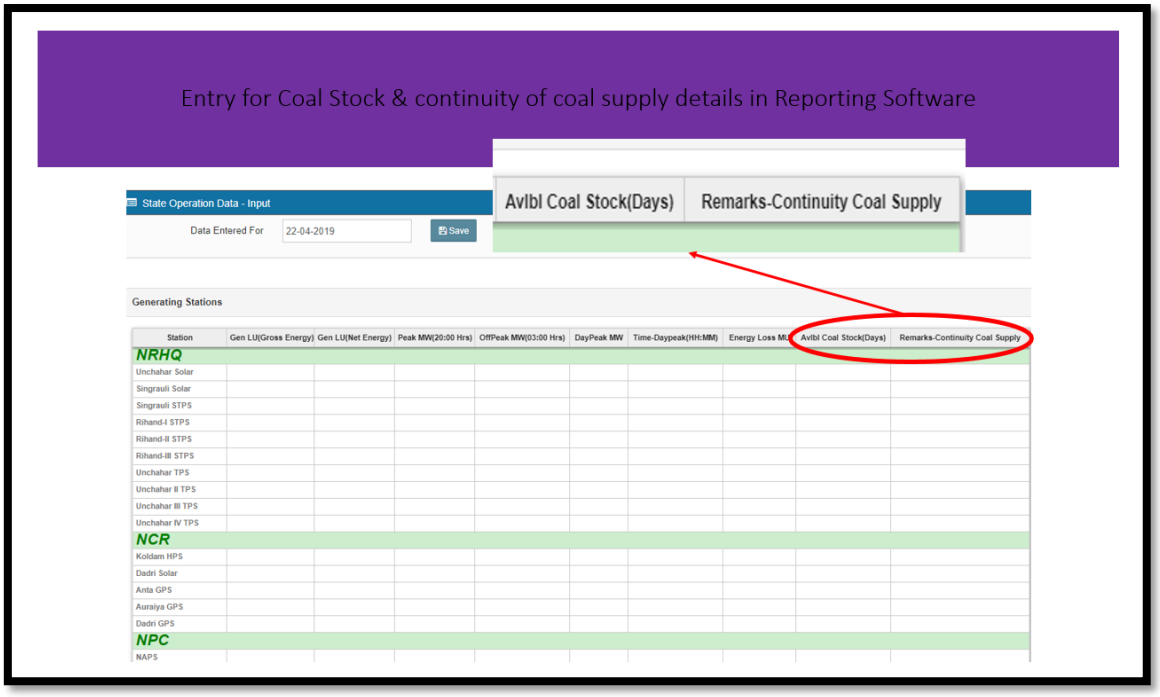
NHPC representative informed that in the NRLDC portal remarks column may be available both for **YES** and **NO** option. As of now, remarks column is not available under option **YES**.

GM, NRLDC informed that portal is prepared in line with the intent of MoP directive.

It is for the information of the members.

15. Reporting of Coal shortage data on Daily Basis

NRLDC representative informed that despite of information in last OCC meeting about how to fill the coal shortage data in reporting software, no entity/ SLDC started to fill the data. Field for entering coal shortage data is available in reporting software and once again shown below:



It is once again requested to all the constituents to kindly fill the coal shortage information in reporting software. Utilities agreed to fill the details in reporting software.

Annexure-I

List of participants in the 162nd OCC meeting held on 14th August 2019, New Delhi

BBMB

Name	Designation	Contact No.	Email
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BYPL

NISHANT GROVER DGM 9560599544 nishant.grover@relianceada.com

Long Outage of Generating Units

SL. No	Station Name	Location	Owner	Unit No	Capacity	Reason	Outage		Outage duration (in days)
							Date	Time	
1	RAPS-A	RAJASTHAN	NPC	1	100	Subject to regulatory clearance . Unit is to be decommissioned.	09-10-04	22:58	5421
2	Giral (IPP) LTPS	RAJASTHAN	RRVUNL	1	125	Bed materials leakage.	11-07-14	8:20	1859
3	Giral (IPP) LTPS	RAJASTHAN	RRVUNL	2	125	Boiler tube leakage	27-01-16	15:27	1294
4	Paricha TPS	UP	UPRVUNL	1	110	R & M Work	02-07-16	17:30	1137
5	Obra TPS	UP	UPRVUNL	12	200	Drum level high.	24-09-18	17:26	323
6	Bairasiul HPS	HP	NHPC	2	60	Renovation and Modernization of the plant	15-10-18	10:02	302
7	Pong HPS	HP	BBMB	2	66	Renovation and Modernization of the plant.	14-02-19	8:00	180
8	Bhakra-L HPS	HP	BBMB	3	108	Renovation and Modernisation of unit(capacity enhancement from 108 to 126 MW)	01-04-19	9:20	134
9	Obra TPS	UP	UPRVUNL	13	200	Problem in Turbine governor system.	14-04-19	13:01	121
10	Paricha TPS	UP	UPRVUNL	5	250	Boiler tube leakage	09-05-19	3:27	96

Annexure-II(B)

SL. No	Element Name	Type	Voltage Level	Owner	Outage		Outage duration (days)	Reason / Remarks
					Date	Time		
1	FACT at BLB in Knp-BLB Line	FACTS	400 kV	PGCIL	02-07-16	10:20	1137	Y-Phase current imbalance
2	FSC of Balia-I at Lucknow	FSC	400 kV	PGCIL	29-11-17	13:30	622	E/SD due to Hot Spot on Isolator
3	Akal (RVPNL)-Ramgarh 400 (RVPNL) 1	Line	400 kV	RRVPNL	10-12-18	10:15	246	General maint work.
4	400 kV Bus coupler Main CB (424) of Bus 1& 2 at Anpara B UP	BAY/CB	400 kV	UPPTCL	21-01-19	12:30	204	For replacement of faulty CB at Anpara B. CB is faulty from 02.01.19
5	FSC (40%) of Kanpur-II at Ballabgarh(PG)	FSC	400 kV	PGCIL	16-03-19	14:39	150	Fire in B-Ph FSC at Ballabhgarh end.
6	Jaisalmer_2-Barmer(RS) Ckt-1	Line	400 kV	RRVPNL	11-05-19	21:34	94	Tower collapsed 2 tower collapse in 11.05.2019 and 4 towers collapsed on 16.05.2019
7	Jaisalmer_2-Barmer Ckt-2	Line	400 kV	RRVPNL	11-05-19	21:34	94	Tower collapsed 2 tower collapse in 11.05.2019 and 4 towers collapsed on 16.05.2019
8	Bhilwara 315 MVA ICT-1	ICT	400/220 kV	RRVPNL	12-05-19	23:42	93	Oil leakage in Transformer

SL. No	Element Name	Type	Voltage Level	Owner	Outage		Outage duration (days)	Reason / Remarks
					Date	Time		
9	Chamera 3 HEP 220kV Bus 1	BUS	220 kV	NHPC	14-05-19	11:56	91	During shifting of Chamera pool-2 line from 220 kV Bus-2 to BUS-1 at Chamera 3 GIS. CB got damaged.
10	Chamera III(NHPC)-Chamera pool(PG) 2	Line	220 kV	PGCIL	14-05-19	11:56	91	During shifting of Chamera pool-2 line from 220 kV Bus-2 to BUS-1 at Chamera 3 GIS.Line isolator and Circuit Breaker of line 2 got damaged at Chamera3 GIS.
11	Aligarh 500 MVA ICT 2	ICT	400/220 kV	UPPTCL	14-05-19	9:56	91	SD taken due to bad result(more formation of acetylene gas) of DGA test result of ICT oil.
12	400 kV 63 MVAR Line Reactor of Jaipur (S) line at RAPP C	Line Reactor	400 kV	RAPPTCL	17-05-19	9:30	88	Emergency SD taken by RAPP C to attend oil leakage in Reactor.
13	Dadri 125 MVAR Bus Reactor	Bus Reactor	400 kV	NTPC	06-06-19	11:50	68	Oil leakage in Bank-1 radiator-4 fin of Bus Reactor.
14	+/- 150 MVAR STATCOM 2 at Lucknow II PG	STATCOM	400 kV	PGCIL	17-07-19	15:03	27	Due to failure of 3x173 MVA, 400/38.5kV Coupling Transformer at LKO.
15	+/- 150 MVAR STATCOM 1 at Lucknow II PG	STATCOM	400 kV	PGCIL	17-07-19	15:03	27	Due to failure of 3x173 MVA, 400/38.5kV Coupling Transformer at LKO.

Si. No.	Type of transmission element	Total No
1	220kV lines	02
2	400kV lines	02
3	765kV	02
4	1500 MVA ICTs	02
5	125 MVAR Bus Reactor	01
6	330 MVAR Bus Reactor	01
7	330 MVAR Line Reactor	02
Total New Elements charged		12

Transmission Lines
(765kV line -536 Ckt. Km & 220kV line– 131 ckt. Km)

S. No.	Name of element	Voltage Level (in kV)	Line Length (In kM)	Conductor Type	Owner	Remarks	Actual date & time of charging (Synchronized)	
							Date	Time
1	765kV Ajmer-Bikaner-1 bay no 704(M),705(T) at Bikaner and 703(M),702(T) at Ajmer along with 330 MVAR Line Reactor(Bay 704R) at Bikaner and 240 MVA Line Reactor(Bay 703R) at Ajmer	765	263	ACSR Hexa Zebra	PGCIL		**04.07.2019**	**12:35**
2	765kV Ajmer-Bikaner-2 bay no 707(M),708(T) at Bikaner and 706(M),705(T) at Ajmer along with 330 MVAR Line Reactor(Bay 707R) at Bikaner and 240 MVA Line Reactor(Bay 706R) at Ajmer	765	263	ACSR Hexa Zebra	PGCIL		**03.07.2019**	**19:48**
3	220kV D/C Kishenganga(NHPC)-Wagoora-1	220	115.2	Single Zebra	PGCIL		**29.07.2019**	**19:02**
4	220kV D/C Kishenganga(NHPC)-Wagoora-2	220	115.2	Single Zebra	PGCIL		**29.07.2019**	**17:59**

LILO of Transmission Lines
(400kV Lines- 18 ckt. Km)

S.No.	Name of element	Voltage Level (in kV)	Line Length (In Km) before LILO	Line Length (In Km)	LILO Line Length (In Km)	Conductor Type	Agency/ Owner	Actual date & time of charging(Synchronized	
								Date	Time
1	400kV Bikaner(PG)-Bhadla(RRVPNL)-1	400	189	174.1	9	Quad Moose	PGCIL(LILO)/RRVPNL	**02.07.2019**	**10:36**
2	400kV Bikaner(PG)-Bikaner(RRVPNL)-2	400	189	32.9	9	Quad Moose	PGCIL(LILO)/RRVPNL	**02.07.2019**	**10:36**

ICT

(ICT Capacity Addition - 3000 MVA)

S.No.	Name of element	Voltage Level	Transformation Capacity (in MVA)	New/replacement /augmentation	Agency/ Owner	Remarks	Actual date & time of charging (on load)	
							Remarks	Date
1	1500 MVA ICT-1 at Bikaner	765/400/33	1500	New	PGCIL		**03.07.2019**	**19:48**
2	1500 MVA ICT-2 at Bikaner	765/400/33	1500	New	PGCIL		**05.07.2019**	**12:30**

Bus Reactor & Line Reactor

(Capacity Addition –Bus Reactor 455 MVAR & Line Reactor 660 MVAR)

S. No.	Name of element	Voltage Level (kV)	Transformation Capacity (in MVAr)	New/ replacement /augmentation	Type	Agency/ Owner	Remarks	Actual date & time of charging	
								Date	Time
1	125 MVAR Bus Reactor at Bikaner(PG)	400	125	New	Bus Reactor	PGCIL		04.07.2019	21:04
2	330 MVAR Bus Reactor at Bikaner(PG)	765	330	New	Bus Reactor	PGCIL		03.07.2019	18:08
3	330 MVAR Line Reactor-1 at Bikaner of Ajmer line	765	330	New	Line Reactor	PGCIL		04.07.2019	12:35
4	330 MVAR Line Reactor-2 at Bikaner of Ajmer line	765	330	New	Line Reactor	PGCIL		03.07.2019	19:48

Solar Generation
(Capacity Addition - 250)

Sr. No	Name of element	Voltage Level	Installed Capacity (in MW)	Fuel Type	Plot No	Make (Inverter & IDT)	Inverter Capacity & No	IDT Capacity & No	Feeder Capacity & No	Agency/ Owner	COD
1	50 MW Renew Solar Power Plant at Bhadla	33kV	50	Solar	10	Huawei inverter & Toshiba Xmer	90kW*556	6.25 MW*8	25 MW*2 Feeder No 304 Feeder No 312	ReNew	**27.04.2019**
2	50 MW Azure Solar Power Plant Bhadla	33kV	200	Solar	7	Sungrow & Schneider	20 MVA*2.5	10MVA*4+5MVA*2	25MW*2 Feeder No 307 Feeder No 315	Azure	**27.04.2019**
	50 MW Azure Solar Power Plant Bhadla	33kV	200	Solar	8	Sungrow & Schneider	3.125MVA*16	12.5MVA*4	25MW*2 Feeder No 306 Feeder No 314		**27.04.2019**
	50 MW Azure Solar Power Plant Bhadla	33kV	200	Solar	9	Sungrow & Schneider	3.125MVA*16	12.5MVA*4	25MW*2 Feeder No 305 Feeder No 313		**27.04.2019**
	50 MW Azure Solar Power Plant Bhadla	33kV	200	Solar	6	Sungrow & Schneider	20 MVA*2.5	10MVA*4+5MVA*2	25MW*2 Feeder No 1 Feeder No 2		**27.07.2019**

Solar Generation
(Capacity Addition - 300)

Sr. No	Name of element	Voltage Level	Installed Capacity (in MW)	Fuel Type	Plot No	Make (Inverter & IDT)	Inverter Capacity & No	IDT Capacity & No	Feeder Capacity & No	Agency/ Owner	COD
1	100 MW SB Energy Solar Power Plant at Bhadla	33kV	200	Solar	4	Xiamen Kehua Hengsheng & Reycham	3.125MW*32	12.5MW*8	25MW*4 Feeder No 5A Feeder No 5B Feeder No 4A Feeder No 4B	SB Energy	**09.07.2019**
	100 MW SB Energy Solar Power Plant at Bhadla	33kV	200	Solar	5	Xiamen Kehua Hengsheng & Reycham	3.125MW*32	12.5MW*8	25MW*4 Feeder No 5C Feeder No 5D Feeder No 4C Feeder No 4D	SB Energy	**03.05.2019**
2	100 MW Mahoba Solar UP Pvt. Ltd at Bhadla	33kV	200	Solar	NA	Hauwei & ORNAT	90KW*1110	6.25MW*4	25MW*4 Feeder No 304 (Blk No 19,20,21,25) Feeder No 305 (Blk No 16,15,17,18) Feeder No 306 (Blk No 11,12,13,14) Feeder No 308	MSUUPL	**Yet to be done**

Annexure-III

Format for details submission related to Phase Nomenclature mismatch

S. No.	Voltage Level (in kV)	S/S Name	Adjacent Grid Connected S/S	Phase Nomenclature at Grid Connected Station/ other Agency	Phase Nomenclature at Local Station end	Name of S/S Incharge	Contact Number & Mail ID	Remarks
1				RYB				
2				RYB				
3				RYB				
4				RYB				
5				RYB				
6				RYB				
7				RYB				
8				RYB				
9				RYB				
10				RYB				
11				RYB				
12				RYB				
13				RYB				
14				RYB				

Contact Details of co-ordinator of the Utility:

It is certify that except above there is no phase mismatch in other stations in my Control Area

SLDC Incharge

Annexure-IV

Follow up issues from previous OCC meetings

Sl. No.	Agenda point	Details	Status
1	Monitoring of schemes funded from PSDF (*Agenda by NPC*)	The latest status of the schemes for which grant has been sanctioned from PSDF for the schemes in NR. Utilities are requested to expedite implementation of the schemes and submit information of physical as well as financial progress in the prescribed format by **first week of every month** on regular basis to Member Convener, PSDF Project Monitoring Group (AGM, NLDC and POSOCO) with a copy to NPC Division.	The available status of schemes submitted by the entities for funding from PSDF was attached as Annexure-III/1 of the agenda of 160th OCC meeting. The updated status from Rajasthan was received via email dated 13.08.2019. UP submitted status dated 05.08.2019. Delhi submitted updated data on 14.08.2019. All other states were requested to update the status of the schemes to be funded from PSDF.
2	Sub-stations likely to be commissioned in next six months.	All the concerned states were requested to submit the details of the downstream network associated specially with POWERGRID substations along with the action plan of their proposed/approved networks.	The updated details of the substations of POWERGRID and their required downstream network was placed at Annexure-V/2 of the agenda note. UP and Haryana submitted the updated information on 13.8.2019. Other utilities were requested to update the status.
3	Progress of installing new capacitors and repair of defective capacitors	Information regarding installation of new capacitors and repair of defective capacitors is to be submitted to NRPC Secretariat.	Information received from **Uttarakhand** (June 2019), **Rajasthan** (up to July 2019), **UP** (up to June 2019) & **Haryana** (up to June 2019). All other states were requested to update.
4.	Healthiness of defence mechanism: Self-certification	Report of Mock exercise for healthiness of UFRs carried out by utilities themselves on quarterly basis is to be submitted to NRPC Secretariat and NRLDC. All utilities were advised to certify specifically, in the report that "*All the UFRs are checked and found functional*".	The information of period ending March 2019 received from **UP, Delhi and Rajasthan** and for period ending June 2019 received from **Haryana, UP and Delhi.** All others are requested to submit information.

Annexure-V

Details of mapping of UFR, df/dt based feeder information in SCADA

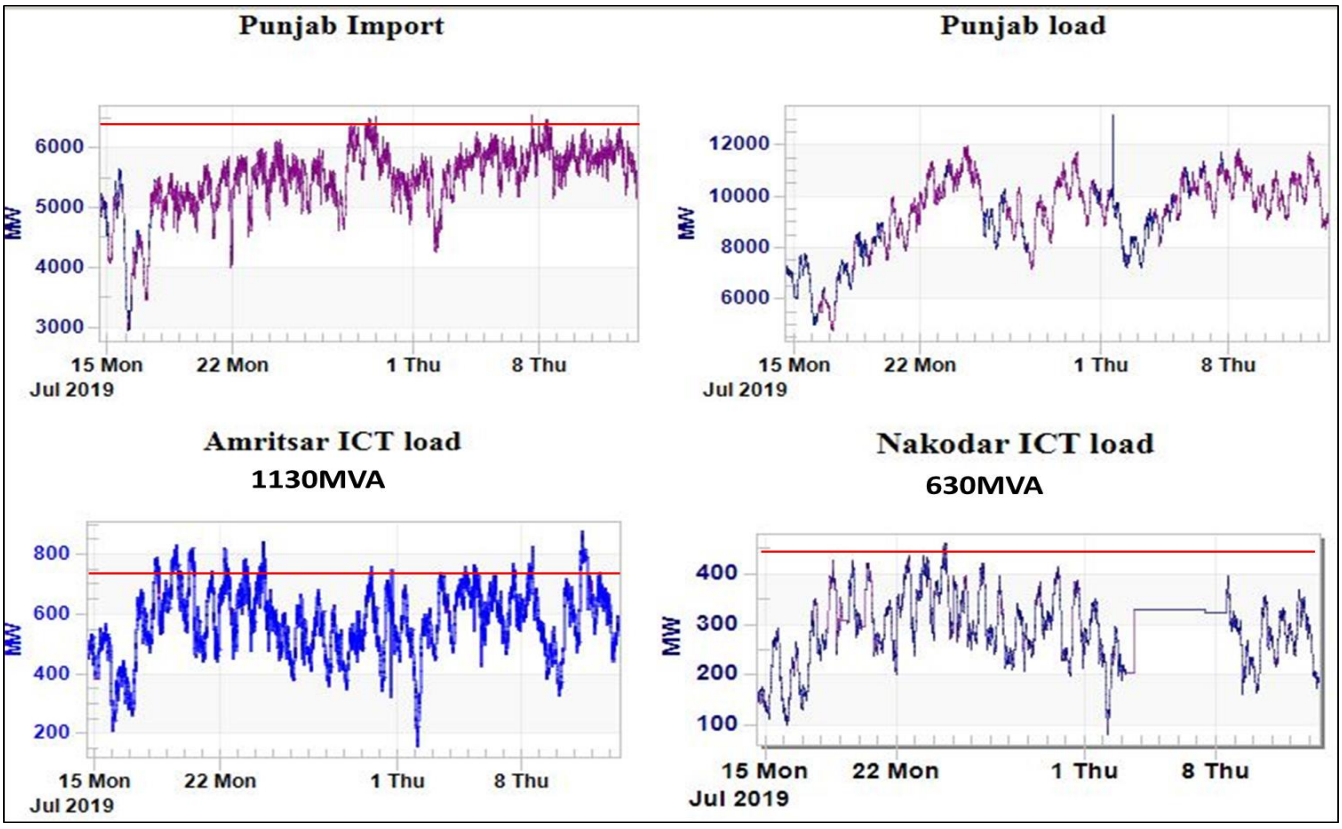
State Name	Defense Scheme	Stage	Planned Relief	Main feeders Mapped (%)	Main feeders real-time availabilty (%)	Altrnate feeders Mapped (%)	Alternate feeders real-time availabilty (%)	Real time Expected relief (%)
UP	UFR	Stage-1	551	91%	47%	100%	60%	159%
		Stage-2	554	93%	54%	99%	84%	174%
		Stage-3	559	88%	45%	94%	59%	83%
		Stage-4	561	85%	19%	89%	78%	59%
		Total	**2225**	**89%**	**39%**	**95%**	**71%**	**119%**
	df/dt	Stage-1	500	93%	57%	89%	86%	57%
		Stage-2	280	98%	46%	100%	100%	156%
		Stage-3	280	93%	80%	100%	98%	182%
		Total	**1060**	**95%**	**61%**	**97%**	**96%**	**116%**
State Name	**Defense Scheme**	**Stage**	**Planned Relief**	**Main feeders Mapped (%)**	**Main feeders real-time availabilty (%)**	**Altrnate feeders Mapped (%)**	**Alternate feeders real-time availabilty (%)**	**Real time Expected relief (%)**
Rajasthan	UFR	Stage-1	390	0%	0%	87%	74%	0%
		Stage-2	392	0%	0%	88%	82%	0%
		Stage-3	395	0%	0%	81%	75%	0%
		Stage-4	397	NM	NM	NM	NM	0%
		Total	**1574**	**0%**	**0%**	**86%**	**77%**	**0%**
	df/dt	Stage-1	330	100%	95%	100%	74%	62%
		Stage-2	370	100%	92%	100%	92%	37%
		Stage-3	370	100%	100%	100%	79%	45%
		Total	**1070**	**100%**	**96%**	**100%**	**80%**	**47%**
State Name	**Defense Scheme**	**Stage**	**Planned Relief**	**Main feeders Mapped (%)**	**Main feeders real-time availabilty (%)**	**Altrnate feeders Mapped (%)**	**Alternate feeders real-time availabilty (%)**	**Real time Expected relief (%)**
Punjab	UFR	Stage-1	400	59%	41%	29%	29%	39%
		Stage-2	402	60%	60%	33%	33%	49%
		Stage-3	406	33%	33%	19%	19%	16%
		Stage-4	408	40%	40%	60%	60%	31%
		Total	**1616**	**47%**	**42%**	**28%**	**28%**	**34%**
	df/dt	Stage-1	430	25%	21%	46%	7%	33%
		Stage-2	490	92%	83%	8%	4%	65%
		Stage-3	490	76%	71%	19%	19%	43%
		Total	**1410**	**62%**	**56%**	**26%**	**10%**	**48%**

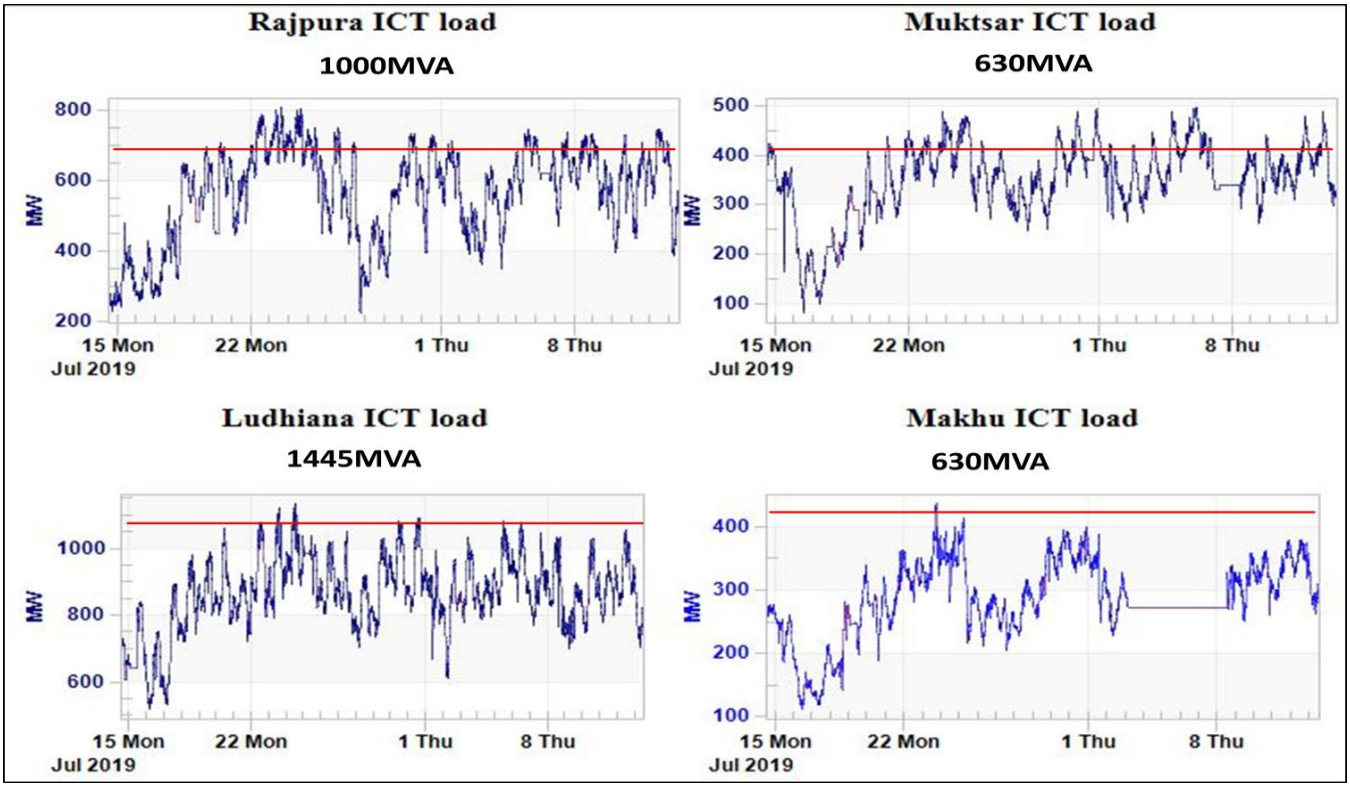
Annexure-V

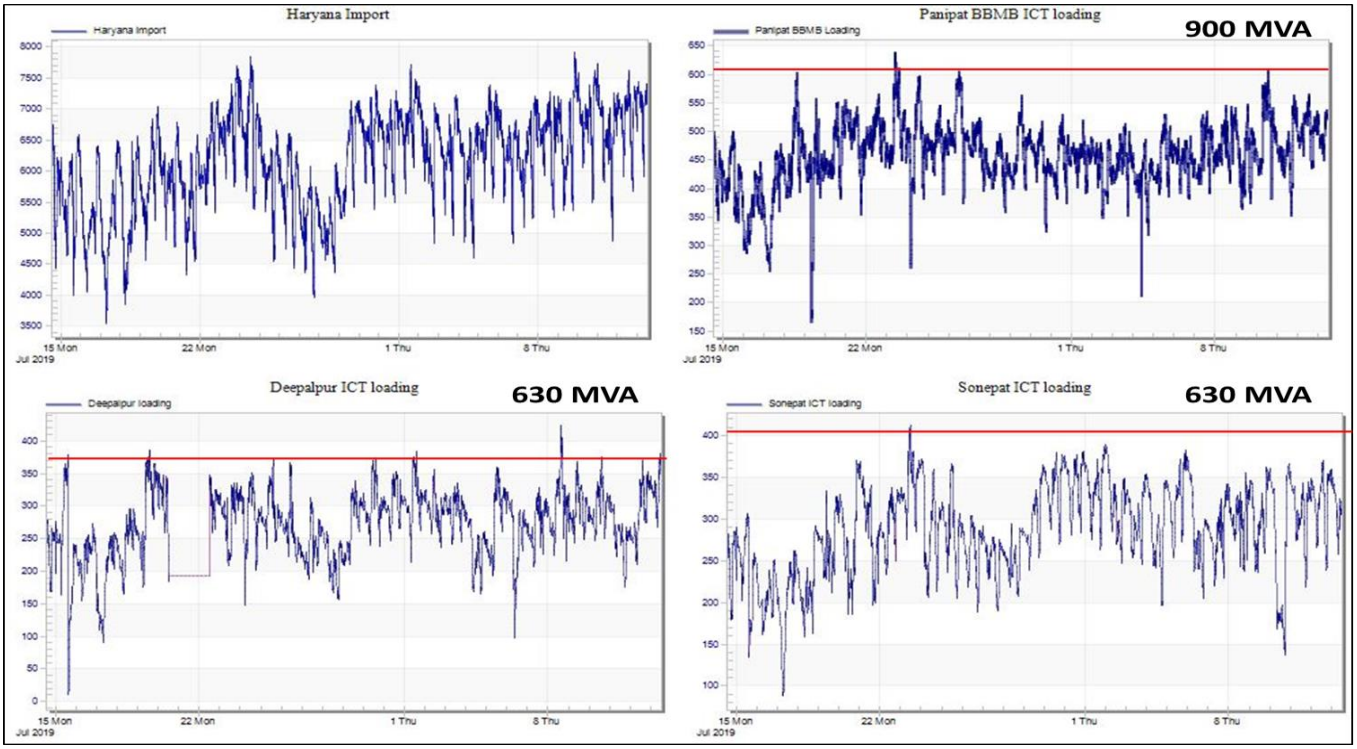
State Name	Defense Scheme	Stage	Planned Relief	Main feeders Mapped (%)	Main feeders real-time availabilty (%)	Altrnate feeders Mapped (%)	Alternate feeders real-time availabilty (%)	Real time Expected relief (%)
Haryana	UFR	Stage-1	308	78%	78%	67%	67%	30%
		Stage-2	309	100%	71%	86%	86%	2%
		Stage-3	312	85%	69%	69%	69%	74%
		Stage-4	314	86%	53%	49%	42%	137%
		Total	**1243**	**86%**	**61%**	**58%**	**54%**	**61%**
	df/dt	Stage-1	280	63%	50%	88%	88%	42%
		Stage-2	310	81%	63%	25%	25%	50%
		Stage-3	310	84%	53%	84%	47%	27%
		Total	**900**	**79%**	**56%**	**63%**	**47%**	**40%**
State Name	**Defense Scheme**	**Stage**	**Planned Relief**	**Main feeders Mapped (%)**	**Main feeders real-time availabilty (%)**	**Altrnate feeders Mapped (%)**	**Alternate feeders real-time availabilty (%)**	**Real time Expected relief (%)**
Delhi	UFR	Stage-1	258	100%	33%	100%	100%	32%
		Stage-2	259	97%	34%	92%	92%	31%
		Stage-3	262	93%	26%	100%	89%	31%
		Stage-4	263	100%	42%	100%	84%	23%
		Total	**1042**	**97%**	**33%**	**97%**	**91%**	**29%**
	df/dt	Stage-1	250	100%	0%	100%	100%	0%
		Stage-2	280	100%	4%	100%	96%	1%
		Stage-3	280	100%	0%	100%	100%	0%
		Total	**810**	**100%**	**2%**	**100%**	**98%**	**0%**
State Name	**Defense Scheme**	**Stage**	**Planned Relief**	**Main feeders Mapped (%)**	**Main feeders real-time availabilty (%)**	**Altrnate feeders Mapped (%)**	**Alternate feeders real-time availabilty (%)**	**Real time Expected relief (%)**
HP	UFR	Stage-1	77	83%	0%	100%	83%	0%
		Stage-2	77	78%	22%	89%	56%	25%
		Stage-3	78	100%	0%	50%	50%	0%
		Stage-4	78	100%	100%	100%	100%	49%
		Total	**310**	**85%**	**12%**	**88%**	**69%**	**18%**
	df/dt	Stage-1	50	100%	100%	0%	0%	112%
		Stage-2	70	100%	0%	0%	0%	0%
		Stage-3	70	100%	0%	0%	0%	0%
		Total	**190**	**100%**	**33%**	**0%**	**0%**	**29%**

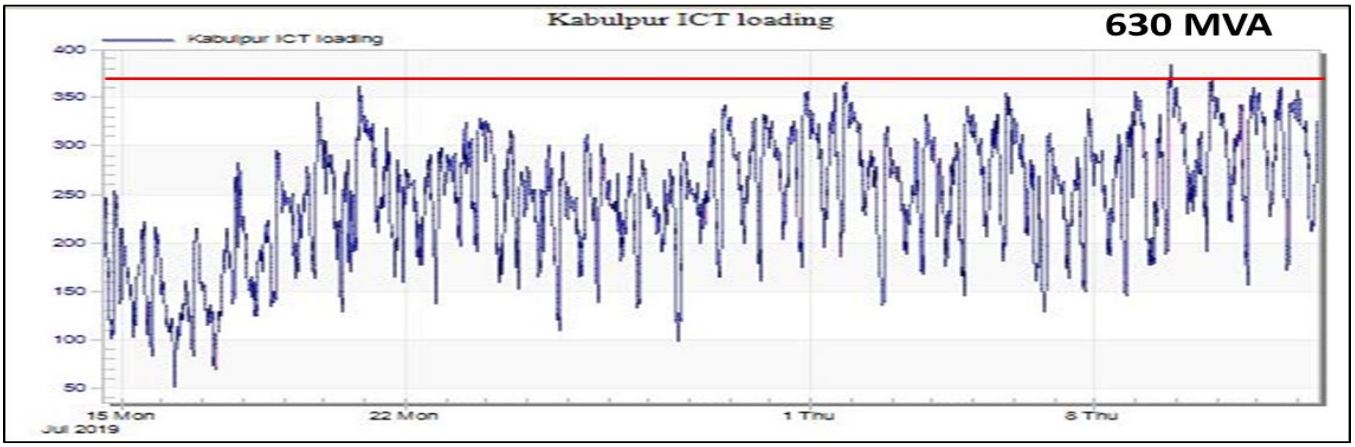
Note: *No SCADA display available for Uttarakhand, Chandigarh and Jammu & Kashmir.*

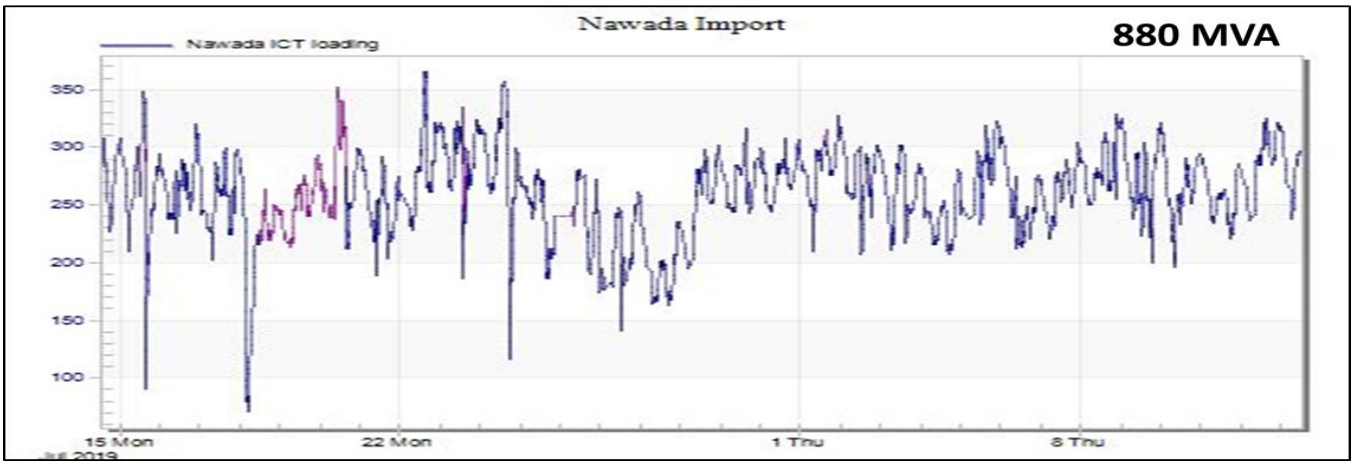
Annexure-VI

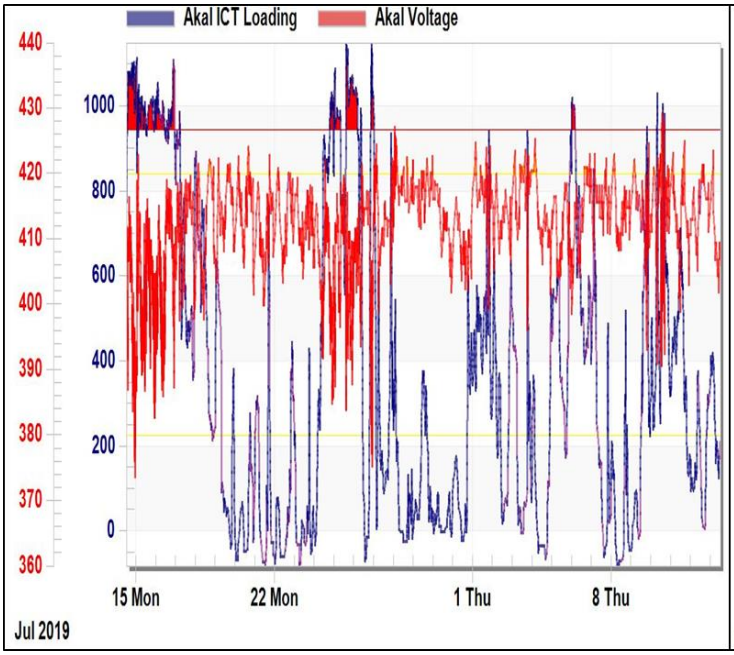

Punjab Import
MW
6000
5000
4000
3000
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019
Punjab load
MW
12000
10000
8000
6000
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019
Amritsar ICT load
1130MVA
MW
800
600
400
200
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019
Nakodar ICT load
630MVA
MW
400
300
200
100
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019

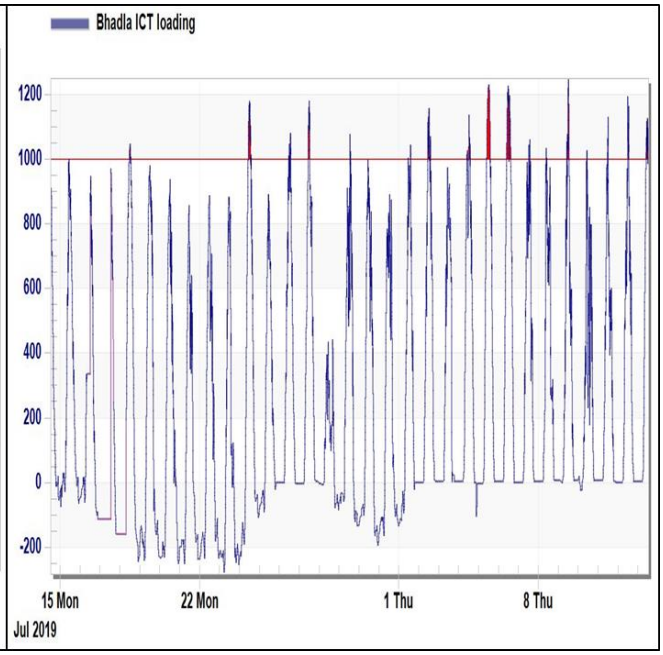

Rajpura ICT load
1000MVA
MW
800
600
400
200
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019
Muktsar ICT load
630MVA
MW
500
400
300
200
100
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019
Ludhiana ICT load
1445MVA
MW
1000
800
600
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019
Makhu ICT load
630MVA
MW
400
300
200
100
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019


Haryana Import
Haryana Import
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019
Panipat BBMB ICT loading
900 MVA
Panipat BBMB Loading
Deepalpur ICT loading
630 MVA
Deepalpur loading
Sonepat ICT loading
630 MVA
Sonepat ICT loading


Kabulpur ICT loading
630 MVA
Kabulpur ICT loading
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019


Nawada Import
880 MVA
Nawada ICT loading
15 Mon
22 Mon
1 Thu
8 Thu


Akal ICT Loading
Akal Voltage
440
430
420
410
400
390
380
370
360
1000
800
600
400
200
0
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019


Bhadla ICT loading
1200
1000
800
600
400
200
0
-200
15 Mon
22 Mon
1 Thu
8 Thu
Jul 2019

Annexure-VII