

NORTHERN REGIONAL POWER COMMITTEE

**ADDITIONAL AGENDA**

**FOR**

**39<sup>th</sup> MEETING OF TECHNICAL COORDINATION SUB-COMMITTEE**

**&**

**42<sup>nd</sup> MEETING OF NORTHERN REGIONAL POWER COMMITTEE**

**B. OPERATIONAL ISSUES**

**B.26 Monsoon Preparedness 2018 (Agenda by NRLDC)**

As per IMD prediction, rainfall over the country as a whole for 2018 southwest monsoon season (June to September) is most likely to be NORMAL. Northern region meets its highest demand during this period and NRPC LGBR has also predicted that demand of Northern region may be more than 62000MW this monsoon. Due to the paddy loads, Punjab and Haryana meet their highest demand in this season. Many other states UP, Delhi have also experienced high demand in this duration and therefore all the states should be ready to meet the forecasted demand during this period. Following preparedness measures need to be taken care of during this monsoon season:

- 1. Coal availability at thermal stations:** Northern region would be meeting high demand in upcoming months. This year number of units have remained out on fuel shortage which needs to be minimised. Apart from this, utilities are required to keep sufficient reserves, units on bar and shall procure adequate power from the power exchanges to reduce overdrawl from the grid. In the month of September/October, when hydro starts to deplete, it is very important to ensure sufficient coal stocks to meet the high demand. Also information about less/null stock needs to be shared with stakeholders early to provide them sufficient time frame to arrange power from other resources. Stations such as Bara, Lalitpur, Suratgarh, Kawai etc. have reported unit outages on account of coal shortage on number of occasions as described in **Annexure 1**. Some generators are also reducing DC on account of coal shortage issues.
- 2. Gas availability:** Plot showing gas& liquid fuel generation this year as compared to previous years is attached as **Annexure 2**. As seen in past years, at the time of high demand and especially when hydro units are out on silt issues, thermal units are out on coal shortage issues, gas generation becomes very useful. In the month of May this year, gas and liquid fuel generation was used. Thus, it is also necessary to ensure sufficient gas/liquid fuel at gas stations during the monsoon season.
- 3. Silt based outages of hydro units:** Outages of hydro on silt during monsoon is known phenomenon and operational planning to combat the situation has been discussed in

many previous OCC/TCC/Special meeting. Generating units shall improve their silt forecasting so that advance information (say more than few hours) may be available. Planned and staggered outage of hydro generation on silt is equally important as per agreed protocol between the generators.

### **B.27 Outage of lines on tower collapse and long outage of transmission elements (Agenda by NRLDC)**

Tower collapse and subsequent line breakdown has been experienced in past years during summer/monsoon on thunder storm. Various actions plan has been discussed and agreed in OCC/TCC/Special meeting and has been communicated to all the users through various letters also. Ministry of Power (MoP) has also issued guideline to procure at least two ERS for quick restoration for every state.

This year also transmission lines went on breakdown on tower collapse and are still out thereby, affecting the reliability of the system and aggravated constraints in meeting high demand reliably. Number of lines in NR were/are out on tower collapse, damage & other elements are under long outage resulting in depletion of inter-regional links and hence reducing inter-regional transfer capability.

Several important lines such as 765kV Gaya-Varanasi #1, 400kV Gorakhpur-Motihari #2, 400kV Ajmer-Phagi #1, 400kV Hisar-Kaithal D/C; Dhuri ICT and other FSC's are out. Apart from these, other elements including FSC's which have been out since long also need to be revived at the earliest. Important lines which are presently/ were out since thunderstorm events are highlighted as Annexure 3.

15 lines of ISTS were out on tower collapse this year out of which 4 are yet to be revived. Details attached as **Annexure-3**.

S. No.	Voltage Level	ISTS lines out on tower collapse
1	800kV HVDC	2 (1* still out)
2	765kV	7 (1* still out)
3	400kV	4 (2* still out)
4	220kV	2

Further, on account of inclement weather conditions mostly, recent incidents of multiple lines tripping in hydro generation complexes have been observed. The events are tabulated below:

Outage in Baspa-Karcham-Jhakri-Rampur complex:

Date	Lines tripped/Lines available	400kV lines went under forced outage around at the same time
29-Mar-18	10/14	All emanating lines from Karcham and Jhakri

5-May-18	6/14	Abdullapur-Kala Amb D/C, Karcham-Abdullapur-1, Jhakri-Panchkula-1, Nalagarh-Rampur-2, Jhakri-Rampur-2
9-May-18	4/13	Jharki-Panchkula D/C, Jhakri-Karcham-1, Jhakri-Rampur-2

Outage in Tehri-Koteshwar complex:

Date	Lines tripped/Lines available	400kV lines went under forced outage around at the same time
02-May-18	2/6	Tehri-Koteshwar Pool-2 and Meerut-Koteshwar Pool-1
09-May-18	2/6	Both evacuating lines from Tehri
13-May-18	2/6	Both evacuating lines from Tehri
29-May-18	2/6	Koteshwar-Koteshwar Pool-1 and Meerut-Koteshwar Pool-2. (Loss of generation Tehri, Koteshwar occurred due to delayed clearance of fault)

It has been observed that multiple lines are tripping on account of bad weather, tower collapse, windstorm, thunderstorm etc. which could be reduced by timely (pre-monsoon) maintenance activities, maintaining sufficient line clearances and keeping track of vulnerabilities that may arise in future. Simultaneous outages of such large no. of lines lead to very critical grid conditions and are threat to grid security. The criticality also amplifies during the ongoing peak demand summer period. Utilities are requested to practice preventive maintenance activities as well as suggest/implement steps which may reduce the no. of outages on tower collapse, windstorm, thunderstorm etc.

*Members may please like to discuss and decide the ways to avoid such outages and actions for early revival.*

## **B.28 Load crash events in Northern Region (Agenda by NRLDC)**

No. of load crash events were observed in Northern region on account of thunderstorm/ dust storm in past month. Summary of such events is shown below:

Date& Time (in hrs)	Summary	Approx. Load Crash in NR (in MW)	No. of elements tripped during load crash (400kV and above)	Severe trippings/ incidents at the time of load crash events
02.05.18 &14:00	All states of NR affected Complete station outage at Agra(PG) and	14000	34 (36 lines opened to control HV)	Complete station outage at Agra(PG) and Muzaffarnagar; 765kV Aligarh-Orai lines, 1 pole of 800kV Champa-Kurukshetra,

	Muzaffarnagar			1 ckt. of 765kV Gwalior-Phagi severely deteriorated WR-NR path
07.05.18 & 23:00	Haryana, UP, Delhi most affected	7000	6	Heavy underdrawl by states Haryana (~2500MW) UP and Delhi (~1000MW)
13.05.18 & 16:15	UP, Haryana, Delhi, Rajasthan and Uttarakhand were affected mainly	12000	52 (22 lines opened to control HV)	Complete station outage at 400kV Manesar (PG), Muzaffarnagar (UP), Alaknanda HEP, Vishnuprayag HEP and Srinagar
16.05.18 & 02:30	Haryana, Delhi, Rajasthan and UP were affected	4000	12 (16 lines opened to control HV)	In Delhi, 1760MW load crash in 40 minutes, 5 multiple element tripping events
05.06.18 & 19:00	Punjab was the affected state	6000	50 no. 220 kV lines and 36 no. 132 kV lines	Multiple element tripping at Jalandhar, Ludhiana, Patiala, Bhatinda, Amritsar, Hoshiarpur, Nakodar.
09.06.18 & 15:00	Haryana, UP, Delhi and Rajasthan	11000	31 (10 lines opened to control HV)	5 multiple element tripping events, Load crash by 4GW in Haryana, 3 GW in UP, 2.7 GW in Delhi

In addition to that, there were few instances in UP, Punjab, Haryana where load crash was observed locally in these areas at different times. In these instances, as soon as duststorm/thunderstorm started states began under drawal from the grid contributing to poor frequency profile. Thus, frequency remained above the band for considerable time.

In previous OCC/TCC meetings before the summer season the measures that need to be taken by utilities in this regard were reiterated. It is well known fact that states shall maintain their drawl as per schedule, keep sufficient reserves, units on bar and restrict deviation from schedule as it poses challenge to grid operation. Multiple element tripping events including complete station outages need to be taken care by utilities so that grid operation is smooth.

It may be required that state generation needs backing down under load crash scenarios, which needs to be meticulously followed. It has been observed that utilities are manually shutting down their feeders during the storm to avoid collateral damage.

It was decided in last year summer preparedness meeting taken by Joint Secretary (Trans), MOP that the states shall categorize all the feeders in two lists, one which do not require manual opening (in view of safety requirements), and the other with safety concern. The list with safety concern shall be progressively reduced. This aspect has been discussed during different meetings at NRPC level including OCC meetings as well. However, these lists are yet to be received from states.

*Members may please discuss and advise the concerned for implementation of above measures.*

### B.29 Reliability issues in the grid (Agenda by NRLDC)

State	Constraints as per import capability	Actual Constraints observed															
Punjab	TTC: 7000 MW ATC: 6400 MW  N-1 contingency of Amritsar, Rajpura, Ludhiana and Makhu ICTs	<ul style="list-style-type: none"> <li>• N-1 non-compliance issues at Dhuri and Rajpura</li> <li>• High loading of Underlying network of Amritsar, Ludhiana, Dhuri &amp; Jalandhar</li> <li>• ICT at Dhuri need to be revived at the earliest.</li> </ul>															
Haryana	TTC: 7500 MW ATC: 6900 MW  N-1 contingency of Fatehabad, Abdullapur and Panipat & 220kV connectivity of Hissar	<ul style="list-style-type: none"> <li>• 220kV Hisar(PG)-Hisar(IA), 220kV lines from Lula ahir, 220kV Abdullapur-Jorian and other 132kV lines are heavily loaded and need to be strictly monitored.</li> </ul>															
Rajasthan	(Generation : 4890MW) TTC: 6200 ATC: 5600  (Generation : 6390MW) TTC: 5000 ATC: 4400  N-1 contingency of Phagi, Jodhpur & Merta ICTs	<ul style="list-style-type: none"> <li>• As wind injection increases, voltage becomes extremely low at Akal and Barmer.</li> <li>• Constraint for evacuation of power from Rajwest</li> <li>• N-1-1 non-compliance of Kawai-Kalisindh-Chhabra complex evacuation.</li> <li>• Wide voltage variation at Suratgarh, Akal &amp; Jodhpur area</li> </ul>															
Delhi	TTC: 5100 MW ATC: 4800 MW  N-1 contingency of Bamnoli, Mundka & Harsh Vihar & N-1 contingency of 220kV Badarpur-Ballabhgarh D/C	<ul style="list-style-type: none"> <li>• N-1 non-compliance was observed at Mundka, Bamnoli and Maharanibagh.</li> <li>• Loading on 220 kV Ballabhgarh-BTPS, 220 kV Mandola-Burari, 220 kV Mundka-Peegararhi, 220 kV BTPS-Sarita Vihar is not N-1 compliant.</li> </ul>															
Uttar Pradesh	<table border="1"> <thead> <tr> <th>UP Own Gen. (MW)</th> <th>TTC (MW)</th> <th>ATC (MW)</th> </tr> </thead> <tbody> <tr> <td>10000</td> <td>10700</td> <td>10100</td> </tr> <tr> <td>9350</td> <td>11300</td> <td>10700</td> </tr> <tr> <td>9000</td> <td>11600</td> <td>11000</td> </tr> <tr> <td>8000</td> <td>11800</td> <td>11200</td> </tr> </tbody> </table> N-1 contingency of 400/220 kV ICTs at Azamgarh, Lucknow (PG), Meerut,	UP Own Gen. (MW)	TTC (MW)	ATC (MW)	10000	10700	10100	9350	11300	10700	9000	11600	11000	8000	11800	11200	<ul style="list-style-type: none"> <li>• N-1 non-compliance has been observed at 400/220kV ICTs of Azamgarh, Gr. Noida, Meerut, Obra, Lucknow (PG), etc.</li> <li>• Evacuation constraints of Anpara-D, Lalitpur TPS, Paricha TPS and Bara TPS under N-1/N-1-1 compliance have been continuously observed.</li> <li>• 400kV Gr. Noida- Nawada line was opened on no. of occasions to control the loading of 400kV Dadri- Gr. Noida line.</li> <li>• Upgradation of switchgear at Greater</li> </ul>
UP Own Gen. (MW)	TTC (MW)	ATC (MW)															
10000	10700	10100															
9350	11300	10700															
9000	11600	11000															
8000	11800	11200															

	<p>Obra, Gorakhpur(PG)</p> <p>Demand met of UP crossed the 20GW mark and at this instant, N-1 violations were observed at several locations</p>	<p>Noida/Nawada needs to be expedited.</p> <ul style="list-style-type: none"> <li>• Interconnection facility between 400 kV Muradnagarold and 400 kV Muradnagar New may please also be explored as shifting of 400kV Dadri line to Muradnagar New from Muradnagar old is aggravating loading on 400kV Dadri Gr. Noida.</li> </ul>
Jammu & Kashmir	<p>TTC:1800 MW ATC:1500 MW</p> <p>( To be reassessed with commissioning of Network around Amargarh and Kishenganga)</p>	<ul style="list-style-type: none"> <li>• N-1 non-compliance has been observed at 400/220kV ICTs of Wagoora.</li> <li>• Amargarh and Kishenganga stations have been commissioned in recent past. Loading of Wagoora ICTs and 220kV Wagoora-Ziankote has reduced but loading of 220kV Wagoora-Pampore is still high. Shifting of load from Pampore to Ziankote may be expedited.</li> <li>• Commissioning of underlying network at New Wanpoh to be expedited.</li> <li>• Events of loss of generation at Baglihar as buses not coupled</li> </ul>
Uttara khand	<p>TTC: 1600MW ATC: 1450MW</p> <p>220kVRishikesh-Haridwar, 220kV Roorkee-Roorkee, 132 kV Lines from Srinagar, Dehradun, Kashipur, Pithoragarh etc. are heavily loaded</p>	<ul style="list-style-type: none"> <li>• 400/220kV ICT at Kashipur is N-1 non-compliant (at much lower import if gas stations at Shravanti and Gamma Infra are out)</li> <li>• The two buses at Koteshwar (4*100MW) are kept isolated from each other i.e. the bus coupler is kept open. Even after repeated requests to resolve the bus coupler issue Koteshwar still operating in bus split mode.</li> </ul>

*Members may please like to discuss and give necessary directions to all SLDCs/STUs to regularly compute TTC/ATC figures. States are requested to manage loading to ensure N-1 compliance for elements under their jurisdiction.*

### **B.30 Implementation of IEGC 5<sup>th</sup> Amendment provisions (Agenda by NRLDC)**

NRLDC through its letter dated 29<sup>th</sup> April 2017 had advised all the regional entities to ensure that the declared capacity (DC) does not exceed the capacity on bar less normative auxiliary consumption for scheduling purposes. At the time of issuing this letter in April 2017, the Statement of Reasons or SOR was not available. The Statement of Reasons (SoR) dated 13<sup>th</sup> April 2018, for 5<sup>th</sup> amendment to the IEGC was recently updated on the website of the CERC, wherein following has been stated:

#### **Quote**

*“13.2.8 We are of the view that declaration of capacity including overload margins is the prerogative of the generator. Generator based on its experience about the healthiness of the units is allowed to declare its declared capability based on machine and fuel/water*

*availability. However, it was being observed that units which were scheduled beyond ex-bus capability corresponding to 100% of IC were not able to provide primary response as these units were operating on VWO mode leaving no margins for further valve opening by governor action during frequency decrease. As such, through the addition in Regulation 5.2 (h), of IEGC, RLDCs/SLDCs have been allowed not to schedule the units beyond ex - bus generation corresponding to 100% of installed capacity. However, for the purpose of calculation of PAF, DC declared by the generator is not to be reduced. This would ensure proper incentive for the generator for keeping units in readiness for providing much needed grid support in case of frequency excursion.”*

**Unquote**

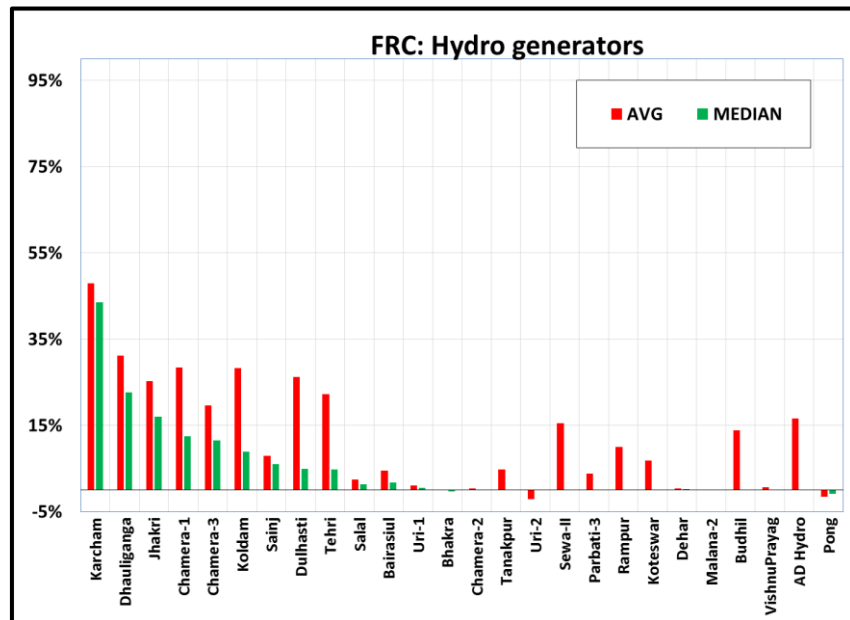
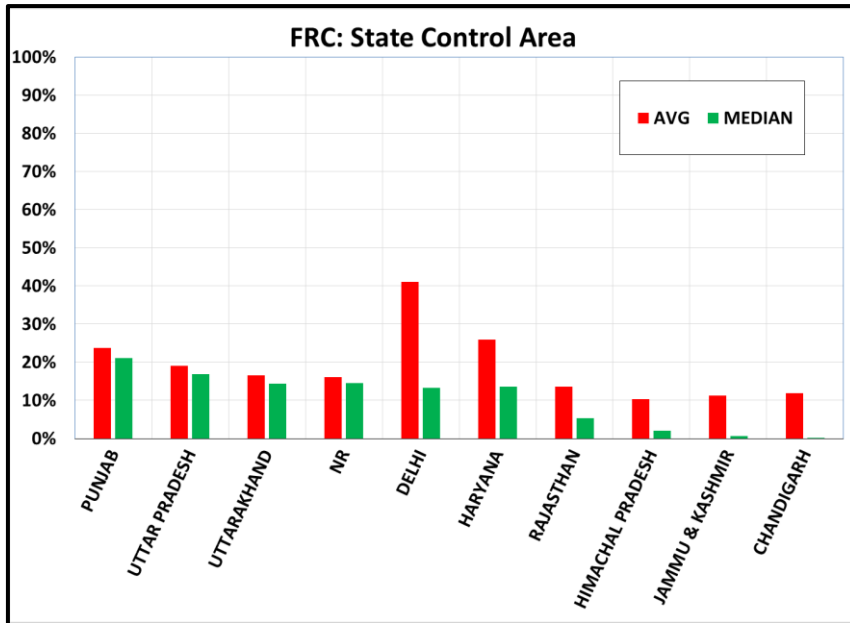
From the above, it is clear that it is the right of the generators to intimate the declare capacity including overload capacity but the schedule to the beneficiaries would be restricted to Installed Capacity (IC) minus normative auxiliary consumption or the DC by generator whichever is less. To ensure the spirit of the SoR, the following methodology was further proposed vide NRLDC letter dated 08.05.18 and discussed in 147<sup>th</sup> OCC meeting:

- i) The generator would indicate the reasons for DC being higher than normative viz. lower ambient temperature, lower auxiliary consumption, inherent overload capability, overflowing hydro etc.
- ii) Primary response would be closely observed for different events in the system and failure to provide the same despite declaring a DC higher than normative DC would be recorded and periodically reported.
- iii) The generator would also ensure that the gap between the DC and normative DC (in case former is higher) is not utilized for generating under Deviation Settlement Mechanism (DSM) on continuous basis but only used for providing primary response.
- iv) In case any unit is under Reserve Shutdown, the DC for the unit under RSD would not exceed the normative DC since the overload capability would not really be available to the system.

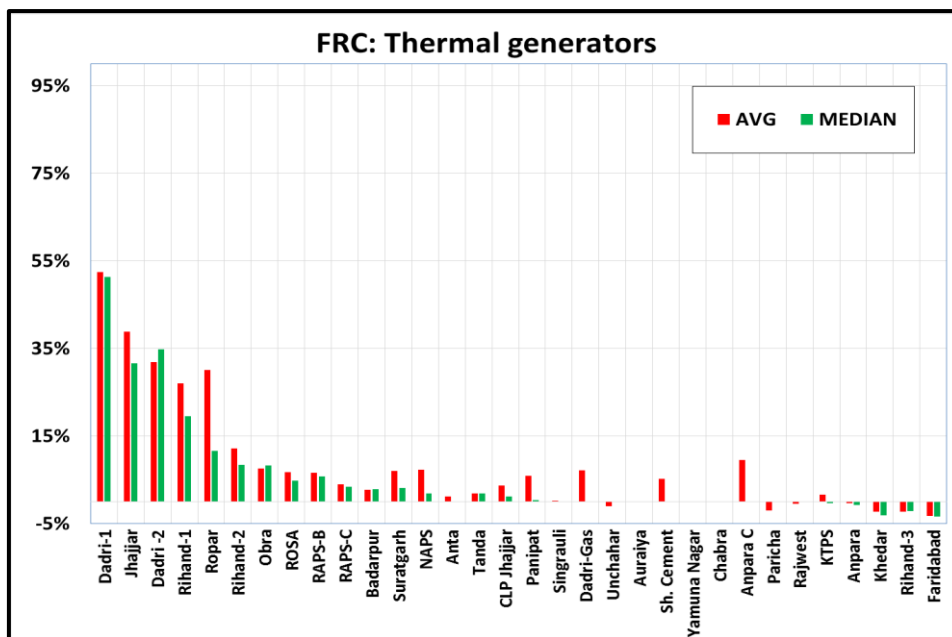
All the stakeholders are requested to kindly cooperate in accordance with the above for seamless and smooth implementation of the amendments. This is for kind information of members.

**B.31 Frequency response characteristic of NR control area: (Agenda by NRLDC)**

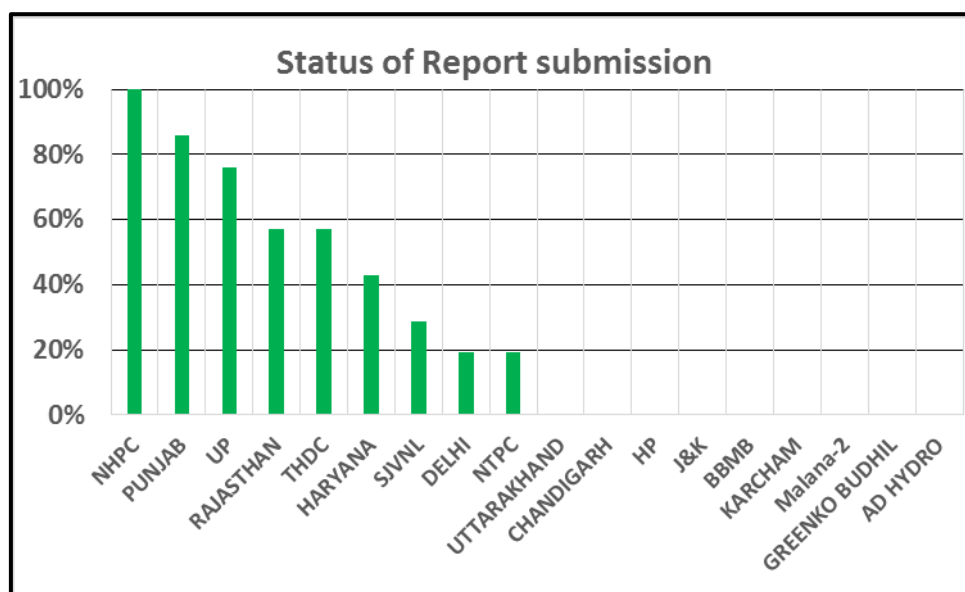
Twenty one (21) FRC based events occurred in year 2017-18. The response as calculated at NRLDC (using SCADA data) or as submitted by constituents from time to time is depicted in the plots below:







Further, the status of FRC calculation submitted by constituents is as follows:



The following could be summarized from above details:

- Among the State control area, HP, J&K and Chandigarh have very less median FRC of less than 5% of ideal response.
- Among the Hydro generators, Karcham(JSW) has highest FRC of more than 40%. The response of almost all other hydro stations is less than 20% of ideal response.
- In thermal generating stations, Dadri TPS (NTPC) and Jhajjar TPS(APCPL) have FRC response of more than 30% of ideal response. The response of almost all other hydro stations is less than 20% of ideal response.
- FRC submissions by utilities are also not consistent with no FRC based calculation received from most of utilities.

*Member may discuss the yearly report of Frequency Response Characteristics and measures to improve the same.*

### **B.32 Grid Events in Northern Region during Jan-May 2018 period: (Agenda by NRLDC)**

Total 101 number of CEA standard based Grid Events have occurred in Northern Region in Jan'18 to May'18 period. The number is 21 (17%) less than the last year (2017) figure of same period.

Monthly GD/GI summary is given below:

Month	Event Category		Event Share (in %)	Fault duration > 100ms/160ms
	GD	GI		
Jan-18	4	6	10%	40%
Feb-18	5	5	10%	30%
Mar-18	4	4	8%	38%
Apr-18	11	20	31%	65%
May-18	19	23	42%	50%
Total	43	58	100%	50%
<b>GD as % of total</b>		<b>43%</b>	<b>Fault duration &gt; 100ms/160ms for every second event</b>	
<b>GI as % of total</b>		<b>57%</b>		

These tripping events have been discussed in various OCC, PSC and other special meetings. From the above, it could be observed that during the past five month period there is a grid event occurrence in almost every 2 out of three days.

*Members may like to discuss plans for reducing such tripping events and for quality analysis and implementation of remedial measures.*

### **B.33 Pending issues with PTCUL (Agenda by NRLDC)**

- **Pending payment of Video Conference System**

NRLDC has supplied and installed Video Conferencing System at PTCUL through M/s Siemens. As referred letter PTCUL shall reimburse the payment to NRLDC as payment to M/s Siemens has already been done by NRLDC. The amount due from PTCUL is Rs. 20,65,562. However, despite repeated reminders from NRLDC and commitments from PTCUL, payment is still pending.

PTCUL is requested to release the payment at the earliest.

- **Reconciliation of old AMC of Alstom system from PTCUL**

Payment of old AMC of Alstom system is still pending with PTCUL. There is some mismatch in outstanding as per PTCUL and NRLDC. Despite repeated requests reconciliation has not been done.

PTCUL is requested to reconcile with NRLDC so that account can be closed at NRLDC end.

**B.34 Real Time data telemetry from Renewable (Agenda by NRLDC)**

With increasing Renewable generation and necessity for forecasting of Renewable generation it is required that telemetry from developer pooling station may be available at concerned load dispatch centre. Telemetry of Wind (926/4292MW installed) and Solar (712/1995MW installed) is very poor from Rajasthan. Rajasthan is requested to arrange for Telemetry from Wind and Solar for better visibility

Members may discuss and finalize the timeline for availability of Telemetry.

**B.35 Non redundancy in wideband network to NRLDC (Agenda by NRLDC)**

Most of the data to NRLDC is being routed through Ballabgarh / Badarpur which is linear section and failure in this section results in major telemetry loss from RTUs/PMUs to RLDC resulting in difficulty in smooth grid operation/monitoring.

It is requested that PGCIL may take up on priority for providing secondary path between NRLDC and Ballabgarh.

*Members may discuss*

**B.36 Reliability of Telemetry (Agenda by NRLDC)**

Reliability of data from newly integrated sub-stations is very poor. Though the telemetry integration is ensured before charging the new element, the reliability of telemetry is not at all ensured. Reliability of telemetry for some of the stations is poor since its integration.

Also though the telemetry is available correct Digital telemetry is not available. Proper status of CBs and Isolators is required so SE can form network model resembling to actual Power System Model via Topology Processor.

Suspected/Inverted status of switches lead to formation of wrong topology and difficulty in smooth grid monitoring/operation.

Northern Region summary sheet and details of current status of implementation of telemetry system															
												Updated Till:		30.04.2018	
Sl. No.	User Name	Total Nos of Stations		Telemetry not Provided				Telemetry Intermittent				Total non-availability of data in %			
		GS	SS	Total nos of		Non-availability		Total nos of		Non-availability		GS	SS		
1	Punjab	17	173	-	92	-	53%	1	26	6%	15%	6%	68%		
2	Haryana	5	70	-	13	-	19%	-	15	-	21%	-	40%		
3	Rajasthan	19	156	-	19	-	12%	2	16	11%	10%	11%	22%		
4	Delhi	6	40	-	-	-	-	-	3	-	8%	-	8%		
5	UP	21	164	-	-	-	-	1	43	5%	26%	5%	26%		
6	Uttarakhand	10	29	-	-	-	-	7	6	70%	21%	70%	21%		
7	HP	12	23	-	-	-	-	-	-	-	-	-	-		
8	JK	4	17	-	-	-	-	3	10	75%	56%	75%	56%		
9	POWERGRID	-	79	-	-	-	-	-	8	-	10%	-	10%		
10	NTPC	14	-	-	-	-	-	2	-	14%	-	14%	-		
11	NHPC	14	-	-	-	-	-	2	-	14%	-	14%	-		
12	NPCIL	5	-	-	-	-	-	1	-	20%	-	20%	-		
13	NJPC	2	-	-	-	-	-	-	-	-	-	-	-		
14	THDC	2	-	-	-	-	-	1	-	50%	-	50%	-		
15	BBMB	6	16	-	-	-	-	-	-	-	-	-	-		
16	IPP/JV/Patran	7	1	-	-	-	-	4	1	57%	100%	57%	100%		
	TOTAL	144	768	0	124	0%	16%	24	128	17%	17%	17%	33%		
	Total (over all)	912		124		14%		152		17%		30%			
Note:															
1. Constituentswise details is as furnished by SLDC's / as available at RLDC.															
2. 'GS' Generating Stations and 'SS' subStations															

***Members may discuss and ensure reliability of data.***

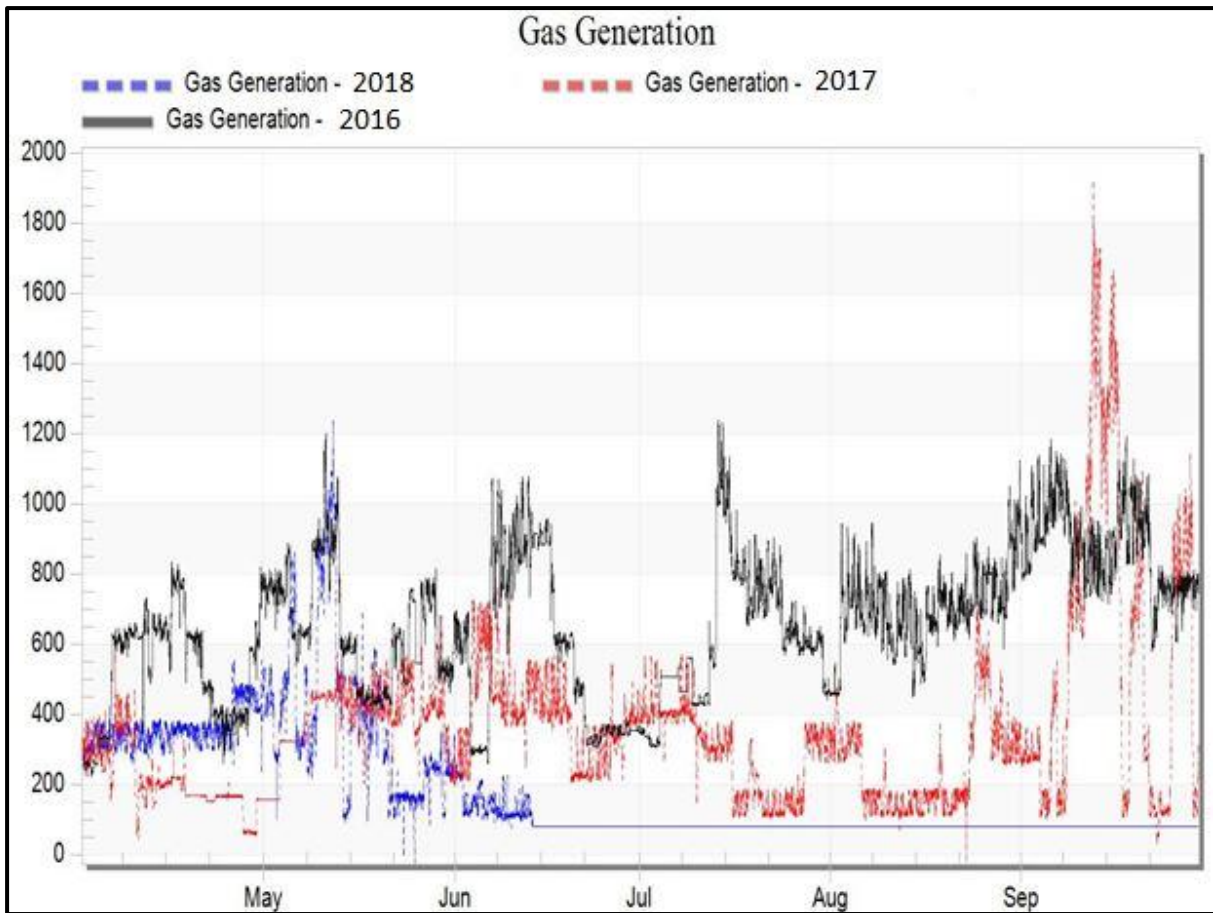
Also the provision of redundant communication was discussed in 13th TeST Meeting held on 24th May, 2018. Redundant data communication is yet to be ensured at NRLDC even after more than a one year of discussion.

Presently 87 RTU out of 124 are reporting on dual channel. It is requested to ensure redundant communication channel to all RTUs. PGCIL/NTPC/IPPs may update the status.

***Members may discuss and finalize timeline for redundancy of RTU data to NRLDC.***

## Annexure - 1

S. No.	Station	Owner	Unit no.	Capacity	Reason	Outage Date	Time	Revival Date	Time
1	Bara PPGCL TPS	Jaypee	3	660	Fuel Shortage. Coal Shortage	3/11/2018	0:00	6/10/2018	10:13
2	Bara PPGCL TPS	Jaypee	3	660	Fuel Shortage. Coal Shortage	3/11/2018	0:00	6/10/2018	10:13
3	Kota TPS	RRVUNL	2	110	Due to Coal Shortage	3/29/2018	7:54	4/9/2018	12:11
4	Kawai TPS	ADANI	1	660	APH hot PA duct expansion bellow leakage. Coal Shortage from 1800 hrs of 03.04.18	3/29/2018	5:39	4/30/2018	5:12
5	Kawai TPS	ADANI	1	660	APH hot PA duct expansion bellow leakage. Coal Shortage from 1800 hrs of 03.04.18	3/29/2018	5:39	4/30/2018	5:12
6	Kota TPS	RRVUNL	2	110	Due to Coal Shortage	3/29/2018	7:54	4/9/2018	12:11
7	Rajpura(NPL) TPS	PSEB	1	700	Fuel Shortage. Coal shortage.	4/4/2018	16:58	4/14/2018	12:43
8	Kawai TPS	ADANI	2	660	Fuel Shortage. Coal shortage.	4/12/2018	1:06	4/19/2018	10:16
9	Kawai TPS	ADANI	2	660	Fuel Shortage. Coal shortage.	4/12/2018	1:06	4/19/2018	10:16
10	Suratgarh TPS	RRVUNL	6	250	Coal shortage.	4/27/2018	2:40	5/9/2018	5:15
11	Suratgarh TPS	RRVUNL	6	250	Coal shortage.	4/27/2018	2:40	5/9/2018	5:15
12	Kawai TPS	ADANI	2	660	Condenser tube leakage./ Coal shortage w.e.f 0000Hrs of 02.05.18	4/29/2018	7:33		
13	Lalitpur TPS	LPGCL	1	660	Fuel Shortage	5/23/2018	6:08	6/1/2018	1:36
14	Lalitpur TPS	LPGCL	1	660	Fuel Shortage	5/23/2018	6:08	6/1/2018	1:36
15	Dadri-II TPS	NTPC	2	490	Boiler tube leakage. Unit Kept out due to coal shortage from 16:25Hrs on 26.05.2018	5/25/2018	12:53	5/27/2018	16:26
16	Dadri-II TPS	NTPC	2	490	Unit Kept out due to coal shortage from 16:25Hrs on 26.05.2018	5/25/2018	12:53	5/27/2018	16:26
17	Chhabra TPS	RRVUNL	2	250	Due to shortage of water.	5/25/2018	1:15	5/30/2018	10:18
18	Rajpura(NPL) TPS	PSEB	2	700	Fuel Shortage	6/3/2018	21:00	6/11/2018	8:55
19	Jhajjar-CLP (IPP) TPS	HPGCL	2	660	Coal shortage.	6/12/2018	23:15		



## Annexure - 3

S. No.	Line	Voltage Level	Owner	Outage Date	Revival Date	Outage days	Reason/Remarks
1	Agra-Jhatikara	765 kV	PGCIL	11/4/2018	5/6/2018	56	Tripped during thunderstorm in Agra area. One tower damaged completely
2	Agra(PG)-Agra(UP) 1	400 kV	PGCIL	11/4/2018	28/4/2018	18	Tripped during thunderstorm in Agra area.
3	Agra(UP)-Fatehabad 765 (UP) 2	400 kV	PGCIL	11/4/2018	28/4/2018	18	One tower damaged completely
4	Agra - Biswanath Chariali line -1	800 kV HVDC	PGCIL	2/5/2018	Still out	*42 (Still out)	Reported three tower collapsed.
5	Agra - Biswanath Chariali line -2	800 kV HVDC	PGCIL	2/5/2018	18/5/2018	17	
6	Agra-Gwalior 1	765 kV	PGCIL	2/5/2018	8/6/2018	37	9 Nos tower collapse.
7	Agra(PG)-Aligarh (PG)	765 kV	PGCIL	2/5/2018	4/6/2018	33	4 nos. tower damaged.
8	Kanpur Varanasi 2	765 kV	PGCIL	3/5/2018	3/6/2018	31	1 No Tower collapse.
9	Kanpur Varanasi 1	765 kV	PGCIL	3/5/2018	3/6/2018	31	Being a double circuit tower, due to tower collapse, ckt-1 is opened on emergency basis
10	Auraiya(NTPC)-Sikandra(UP) 1	220 kV	PGCIL	6/5/2018	31/5/2018	26	3 nos. tower collapsed at location 270, 271 and 272.
11	Auraiya(NTPC)-Sikandra(UP) 2	220 kV	PGCIL	6/5/2018	30/5/2018	25	3 nos. tower collapsed at location 270, 271 and 272.
12	Agra-Fatehpur	765 kV	PGCIL	13/5/2018	30/5/2018	17	Tripped due to stormy weather. Tower bend at Tower 568.
13	Gaya-Varanasi-1	765 kV	PGCIL	13/5/2018	Still out	*32 (Still out)	tower damaged at loc. no. 368 (ER jurisdiction).
14	Hisar-Kaithal 1	400 kV	PGCIL	9/6/2018	Still out	*4 (Still out)	Phase to earth fault(total 09 Nos.) have collapsed due to heavy cyclone & bad weather on date-09.06.2018
15	Hisar-Kaithal 2	400 kV	PGCIL	9/6/2018	Still out	*4 (Still out)	Phase to earth fault(total 09 Nos.) have collapsed due to heavy cyclone & bad weather on date-09.06.2018

\* As on 13.06.2018

<b>S. No.</b>	<b>Utility Name</b>	<b>No. of Lines under outage</b>	<b>Total Outage Days</b>
6	PGCIL	15	391 (As on 13.06.2018)