

ADDITIONAL AGENDA FOR 153rd OCC MEETING

NRLDC AGENDA

1. Reliability issues in the grid:

Rajasthan: 400kV Anta-Kota having twin moose conductor was synchronized on 09.07.2018. It remains heavily loaded as all remaining 400kV lines connected at Anta are transferring power to Anta. Thus, loading of this line remains in range of 800-900MW and pose serious threat in case of other trippings in this area. When Chhabra Supercritical would be fully commissioned (2*660MW) loading of 400kV Anta-Kota would rise further. This clearly shows importance of studies to be carried out during planning stage. **Only single ICT** is available at **Rajwest, Chhabra and Kalisindh**. N-1 non-compliance is observed in winter months at **765/400kV Phagi and 400/220kV Akal, Jodhpur, Merta, Sikar**.

Jammu & Kashmir: In past years, there have been multiple elements tripping incidents and collapse of valley system during winter months/ high demand period on N-1 contingency in the Kashmir valley power system. In order to improve reliability of power to the valley the following measures have been suggested in previous meetings and operational feedbacks and are once again reiterated:

- a. The **New Wanpoh** substation has been commissioned in 2013. However, the **underlying network** is yet to be commissioned which needs to be expedited.
- b. **LILo of 220 kV Ziankote- Delina S/C at Amargarh** completed, other circuit LILo also to be done
- c. J&K may explore possibilities of **shifting some load fed through 220kV Pampore to 220kV Ziankote** to reduce loading of 220kV Wagoora-Pampore d/c.

In order to increase reliability in valley on long-term basis, POWERGRID and J&K state utility may like to update about their preparations for the above highlighted issues & their action plan indicating timeline for remedy of various issues.

UP: In case of N-1 contingency of 765kV Bara-Mainpuri ckt-2 whole generation of Bara TPS (3 × 660 MW) and Meja (2×660MW) (one unit commissioned) is difficult to evacuate through 400kV Meja-Allahabad D/C & 400kV Meja- Rewa Road D/C lines and this poses challenge to evacuation of Bara & Meja TPS. Under full generation scenario at Bara (3*660MW) and Meja (2*660MW), total of nearly 3000MW would be under threat due to evacuation issues. Also, under N-1-1 contingency of 765/400kV Bara ICT and 765kV Bara-Mainpuri S/C, no generation can be evacuated from Bara. Commissioning of **765kV Bara-Mainpuri ckt 1** needs to be expedited. Commissioning of **765kV Hapur-Mainpuri** line would provide additional evacuation path for 765kV Mainpuri (apart from 765kV Mainpuri- G. Noida) under N-1 contingency of 765/400 ICT at Mainpuri and hence needs to be expedited.

Early commissioning of **765kV Anpara D-Unnao S/C** would help to reduce the loading of 400kV Anpara-Sarnath D/C, Anpara-Obra & Anpara-Mau.

Uttarakhand: N-1 non-compliance at Kashipur ICTs (under less/no gas generation) and high loading of 220 kV Roorkee (PG)-Roorkee & Roorkee (PG)-Haridwar lines under import of 1400-1500MW. For full gas generation, under import of ~2100MW constraint at Roorkee ICTs as well however, both 220 kV lines from Roorkee (PG) will be critically loaded (around 200 MW each).

Members may please like to discuss.

2. Deviation by NR entities

NRLDC/NRPC has been advocating continuously to state utilities for portfolio management in advance so that deviations remain within permissible limits in real time. It has been discussed in number of previous meeting that load forecast should be carried out accurately and subsequently states shall plan their load generation balance. Deviation of NR utilities is being shown in every OCC meeting to sensitize the issues on regular basis still it has been observed that NR utilities are over/under drawing from the Grid on various instances. Deviation Graph for Oct-Nov'18 (9th Oct-8th Nov'18) is enclosed at **Annexure-1**.

Major observations:

1. Rajasthan, Himachal Pradesh and Haryana were seen to be highly overdrawing most of the time.
2. Uttar Pradesh had over drawl for considerable portion of the time.

This trend was also observed in Aug-Sep-Oct'18 when same was presented in OCC meetings. However, actions are still to be taken. States are requested to provide reasons for these deviations and actions being taken by them to avoid such deviations in future.

Members may please like to discuss.

3. Demand and Generation projections of Q4-2018-19 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. The format for data submission is available on NLDC website at <https://posoco.in/transmission-pricing/formats-for-data-submission/>.

NRLDC vide its letter dated 05.11.2018 had requested utilities to furnish Technical and commercial data for Jan'18-Mar'18 Q4 (2018-2019). Details have been received only from **NTPC, Rajasthan, HP and SJVNL**. Other utilities are also requested to submit data as early as possible.

Further, generation and load projection has been done by NLDC/RLDCs based on monthly maximum injection/demand met in the last 3 years from actual metered data and accordingly projections have been made as attached in **Annexure-2**. Utilities are requested to kindly check the data and correct anomalies, if any with valid justification.

Members may please like to discuss.

4. Reactive power management in the grid

i. Reactive power performance of generators

Reactive power response in respect of MVAR vs Voltage for past 30 days as per NRLDC SCADA data is enclosed in **Annexure-3**. In Northern region, light loading of lines results in high MVAR generation which results in high voltages. It has been observed that there are margins available as per capability curves for most of the generating stations. In addition, telemetry (sign and magnitude of MVAR) of various generating station is yet to be corrected. The matter has been discussed in numbers of OCC/TCC meetings. Based on available data, MVAR performance of generators is shown below:

Rihand:	Absorbing up to 250 MVAR
Singrauli:	Absorption up to 170 MVAR and generation up to 50 MVAR
Dadri-Th:	Generating and absorbing in range of 220 to -50 MVAR
Jhajjar:	Generating and absorbing in the range of 100 to -230 MVAR
Unchahar:	Absorption and generation -100 to 70 MVAR
Anpara-C:	Generating up to 100 MVAR most of the time
Bara TPS:	Generating up to 100 MVAR most of the time
Lalitpur TPS:	Absorption and generation -100 to 100 MVAR
Anpara-D:	Absorption and generation -50 to 50 MVAR
Anpara TPS:	Absorption and generation -100 to 100 MVAR
Rosa:	Absorption and generation -50 to 150 MVAR
CLP Jhajjar:	Absorbing and generating -270 to 100 MVAR
Khedar:	Absorption and generation -200 to 100 MVAR
Kalisindh:	Absorption and generation -100 to 60 MVAR
Suratgarh:	Absorption and generation -70 to 100 MVAR
Chhabra:	Absorbing up to 200 MVAR
Rajpura:	Absorption up to 450 MVAR

It has been experienced that any significant improvement in reactive power response as per its capability curve is still awaited. Moreover, utilities are also requested to generate MVAR vs voltage plots for generators under them as well.

Member may please discuss and suggest.

ii. Reactive Power injection at ISTS nodes:

As per NRPC REA account, following are the nodes that are injecting MVAR into the Grid and need quick attention to check all the possible desired actions.

State	As per NRPC Reactive energy account (15/10/18-21/10/18): Injection of MVAr at ISTS during High voltage
Punjab	Ganguwal, Jamalpur, Jamsher, Lehra Mohabbat, Mohali, Ropar, Amritsar (PG), Moga (PG) & Sarna
Haryana	Bahadurgarh, Bhiwadi, Gurgaon & Hissar
Rajasthan	Hissar, Khetri, Bhinmal, Heerapura, Jaipur South, Kota, Merta & Sikar
Uttar Pradesh	Chinhat, Mainpuri, Moradabad, Muradnagar, Rosa & Simbholi
Delhi	Narela, Bamnauli, Bawana, Maharani Bagh & Mundka
HP	Jessore

MW and MVAr of 400/220kV ICT nodes where MVAr is being injected from 220kV to 400kV system are as:

State	400/220kV nodes where 220kV nodes is injecting MVAr to 400kV nodes
Punjab	Patiala, Dhuri, Nakodar
Haryana	Bhiwani, Hissar, Kankroli, Dhanonda, Kirori, Nuhiyanwali,
Rajasthan	Neemrana, Sikar, Jodhpur
Uttar Pradesh	Lucknow, Sohawal, Paricha
Delhi	Maharani Bagh, Bamnauli, Bawana, Mundka
HP	Jessore
J&K	Kishanpur

In 144th and 149th OCC meeting, it was agreed 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. This would help in better and more efficient utilization of resources. The draft format for feedback from states regarding above was also circulated in minutes of 144th OCC. States are again requested to provide progress on the same.

iii.Reactor utilization:

- a. Updated list of Bus reactor, its availability and data at control centers.
- b. Update List of lines whose line reactor can be switched as bus reactor on opening of such lines. A list of lines wherein there is a provision of such switching (including those for which confirmation from the respective utility is pending) is attached at **Annexure-4**. As per the current list:

No. of transmission lines having LRs with provision to be used as BR	Total no. of LRs having provision to be used as BR	Total no. of LRs that have the confirmation by utilities for the usage as BR
115	147	95

Utilities were requested to confirm whether line reactors can be used as bus reactor in 151st OCC meeting as well; however, information is yet to be received. Respective constituents are requested to confirm the same as soon as possible to utilize it for voltage regulation.

Apart from this following actions are also suggested:

- *Progress of control switching logic change/confirmation from respective utility wherever required or provisions to use line reactor as Bus reactor on opening of lines so that such reactor can be used for voltage regulation as per grid conditions.*
- *Directive to each site personnel to use LR as BR when line is out of service as per voltage conditions.*

5. Frequent forced outages of transmission elements

The following transmission elements were frequently under forced outages during the month of Sep'18:

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	800kV HVDC (Agra-BNC) Pole-2 at Agra HVDC	4	POWERGRID
2	400kV Anpara(UP)-Mau(UP)	3	UP
3	400kV Azamgarh(UP)-Gorakhpur(UP)	3	UP
4	400kV Kashipur(PTCUL)-Nehtaur(UP)	3	UP/Uttarakhand

The complete details are attached at **Annexure-5**. The 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.

Members may like to discuss.

6. Multiple element tripping events in Northern region in the month of Oct'18:

A total of **14** grid events occurred in the month of Oct'18 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-Nov-18 is attached at **Annexure-6**.

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

Maximum Fault Duration is **1640ms** in the event of multiple element tripping at Kashipur(PTCUL) substation on 25th Oct 2018 at 13:28hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **5** events out of 14 events in the month.

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.

Members may like to discuss.

7. Details of tripping of Inter-Regional lines from Northern Region for Oct'18:

A total of **11** inter-regional lines tripping within a month occurred in the month of Oct'18. The list is attached at **Annexure-7**. 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.

It could be observed from attached table that not all information regarding the tripping is received from the utilities.

Members may please note and advise the concerned for taking corrective action to avoid such trippings as well as timely submission of the information.

8. Frequency response characteristic:

One FRC based events has occurred in the month of Oct'18. Description of the events is as given below:

Table:

S. No.	Event Date	Time (in hrs)	Event Description	Starting Frequency (in Hz)	End Frequency (in Hz)	Δf
1	30-Oct-18	19:22hrs	Unit # 30, 40 and 50 (830 MW each) of CGPL Mundra UMPP tripped due to generator Class-A2 Protection operation. Total generation loss as per SCADA data was 2240MW.	49.937	49.787	0.15

The Hon'ble CERC approved procedure has already been shared with all concerned during previous OCC meetings. FRC observed for state control area, ISGS stations and few state generators is as follows:

STATE Control Area	PUNJAB	HARYANA	RAJASTHAN	DELHI	UTTAR PRADESH	UTTARAKHAND	CHANDIGARH	HIMACHAL PRADESH	JAMMU & KASHMIR	NR
FRC	37%	26%	10%	-2%	29%	8%	32%	18%	3%	19%

Generator	FRC	Generator	FRC
Singrauli TPS	4%	Salal HEP	-13%
Rihand-1 TPS	-1%	Tanakpur HEP	141%
Rihand-2 TPS	3%	Uri-1 HEP	Suspect SCADA data
Rihand-3 TPS	-3%	Uri-2 HEP	12%
Dadri-1 TPS	-44%	Dhauliganga HEP	-2%
Dadri -2 TPS	0%	Dulhasti HEP	56%
Unchahar TPS	-4%	Sewa-II HEP	7%
Unchahar stg-4 TPS	No generation	Parbati-3 HEP	27%
Jhajjar TPS	46%	Jhakri HEP	16%
Dadri GPS	0%	Rampur HEP	Suspect SCADA data
Anta GPS	4%	Tehri HEP	Suspect SCADA data
Auraiya GPS	4%	Koteswar HEP	80%
Narora APS	24%	Karcham HEP	Suspect SCADA data
RAPS-B	Suspect SCADA data	Malana-2 HEP	1%
RAPS-C	3%	Budhil HEP	4%
Chamera-1 HEP	3%	Bhakra HEP	-4%
Chamera-2 HEP	2%	Dehar HEP	-11%
Chamera-3 HEP	2%	Pong HEP	2%
Bairasiul HEP	No generation	Koldam HEP	65%
	-7%	AD Hydro HEP	
Generator	FRC	Generator	FRC
PUNJAB		UP	
Ropar TPS	-10%	Obra TPS	Suspect SCADA data
L.Mohabbat TPS	No generation	Harduaganj TPS	Suspect SCADA data
Rajpura TPS	32%	Paricha TPS	-2%
T.Sabo TPS	26%	Rosa TPS	25%
Goindwal Sahib TPS	93%	Anpara TPS	0%
Ranjit Sagar HEP	36%	Anpara C TPS	38%
Anandpur Sahib HEP	No generation	Anpara D TPS	3%
HARYANA		Bara TPS	4%
Panipat TPS	No generation	Lalitpur TPS	No generation
Khedar TPS	17%	Meja TPS	No generation
Yamuna Nagar TPS	No generation	Vishnuprayag HEP	-11%
CLP Jhajjar TPS	1%	Alaknanda HEP	-22%
Faridabad GPS	No generation	Rihand HEP	-9%
RAJASTHAN		Obra HEP	Suspect SCADA data
Kota TPS	31%	UTTARAKHAND	
Suratgarh TPS	-3%	Gamma Infra GPS	Suspect SCADA data
Kalisindh TPS	0%	Shravanti GPS	Suspect SCADA data
Chhabra TPS	No generation	Ramganga HEP	Suspect SCADA data
Chhabra stg-2 TPS	-8%	Chibra HEP	Suspect SCADA data
Kawai TPS	31%	Khodri HEP	No generation
Dholpur GPS	No generation	Chilla HEP	Suspect SCADA data
Mahi-1 HEP	No generation	HP	
Mahi-2 HEP	No generation	Baspa HEP	-6%
RPS HEP	1%	Malana HEP	Suspect SCADA data
JS HEP	Suspect SCADA data	Sainj HEP	0%
DELHI		Larji HEP	Suspect SCADA data
Badarpur TPS	No generation	Bhabha HEP	2%
Bawana GPS	17%	Giri HEP	Suspect SCADA data
Pragati GPS	8%	J&K	
		Baglihar-1&2 HEP	0.084069794
		Lower Jhelum HEP	No generation

In line with the decisions taken during various OCC meetings, the time and date of the FRC events were e-mailed to respective utilities. Constituents may submit the FRC of their control areas for both the events and reason of poor response, if observed.

9. Mock black start exercise in NR:

As per Indian Electricity Grid Code (IEGC) clause 5.8(b) “Mock trial runs of the procedure for different sub-systems shall be carried out by the Users/ CTU/ STU at least once every six months under intimation to the RLDC”.

Mock Black-start exercise of power stations are therefore needs to be carried out in-order to ensure healthiness of black start facility. The winter months are off peak hydro period and therefore good time to carry out such exercises.

The schedule of mock exercise is as follows:

Hydro Power Stations:

Date	Revised Date	Name of stations	Remarks
18-Oct-18	NA	*Kishanganga (new plant)	Date shall be intimated separately
24-Oct-18	NA	*Malana-2	Exercise was not successful.
26-Oct-18	15-Jan-19	Dhauliganga	Revised date by NHPC
2-Nov-18	NA	*Salal	Exercise carried out successfully. However, due to less load on account of bad weather, frequency kept on varying and island could not be synchronized with grid.
13-Nov-18	21-Jan-19	Nathpa Jhakri & Rampur	Revised date by SJVNL
16-Nov-18		*Uri-I, II HEP, Lower Jhelum HEP, Pampore GT's & Upper Sindh	NHPC confirmed
19-Nov-18		*Budhil	
28-Nov-18		Chamera-3	NHPC confirmed
30-Nov-18		Sewa-2	NHPC confirmed
3-Dec-18		Chamera-1 & Chamera-2	NHPC confirmed
11-Dec-18		Parbati-3	NHPC confirmed
14-Dec-18		Bairasiul	Power House shall be under complete shutdown since 01/10/2018 for R&M of power house
19-Dec-18		Koteshwar	
28-Dec-18		AD Hydro	
4-Jan-19		Tehri	
8-Jan-19		Karcham Wangtoo & *Baspa	
11-Jan-19		Koldam	

** Mock black-Start exercise not carried out during Year 2017-18.*

Mock black-Start procedure circulated during last exercise/ previous year may be used. The unit selection may be changed from the one taken during last year exercise.

Mock black start exercise of Gas power stations viz. Auraiya, Dadri, Anta also to be carried out. NTPC may confirm the respective dates to carry out the exercise and share the procedure.

As requested in 152nd OCC meeting, SLDC's may also carryout mock black-start of station in their respective control area & inform the tentative dates to the OCC as well as outcome of these exercises. The proposed Hydro Power Stations to undergo the exercise are as follows:

S. NO.	Utility	Hydro Power Station	Installed Capacity(MW)
1	J&K	Baglihar	3x150
2		Baglihar stage-2	3x150
3		Lower Jhelum	3x35
4		Upper Sindh	2x11+3x35
5	HP	Sainj	2x50
6		Larji	3x42
7		Bhabha	3x40
8		Malana -I	2x43
9		Baspa	3x100
10	Punjab	Anandpur Sahib	4x33.5
11		Ranjit Sagar	4x150
12	Rajasthan	Mahi-I&II	2x25+2x45
13		Rana Pratap Sagar	4x43
14		Jawahar Sagar	3x33
15		Gandhi Sagar	5x23
16		Dholpur GPS	3x110
17		Ramgarh GPS	1x35.5+2x37.5+1x110
18	UP	Rihand	6x50
19		Obra	3x33
20		Vishnuprayag	4x100
21		Srinagar (Alaknanda)	4x82.5
22	Uttarakhand	Gamma Infra	2x76+1x73
23		Shravanti	6x75
24		Ramganga	3x66
25		Chibro	4x60
26		Khodri	4x30
27		Chilla	4x36
28		Maneri Bhali-I&II	3x30+4x76
29	Delhi	IP Extn GTs	6x30+3x30
30		Pragati GPS	2x104.6+1x121.2
31		Rithala	3x36
32	Haryana	Faridabad GPS	2x137.75+1x156.07

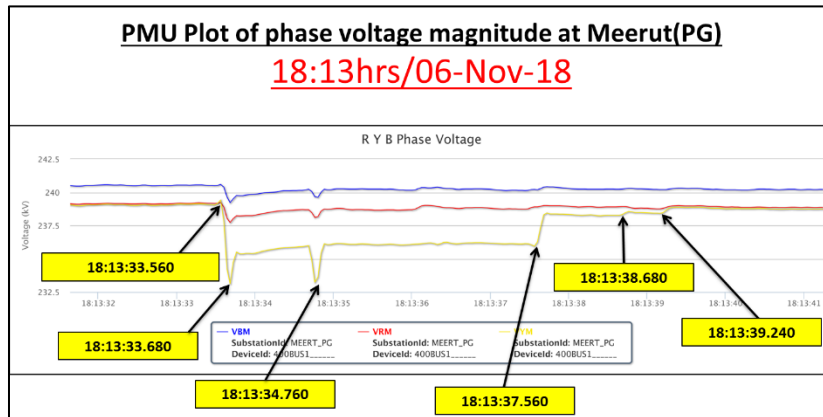
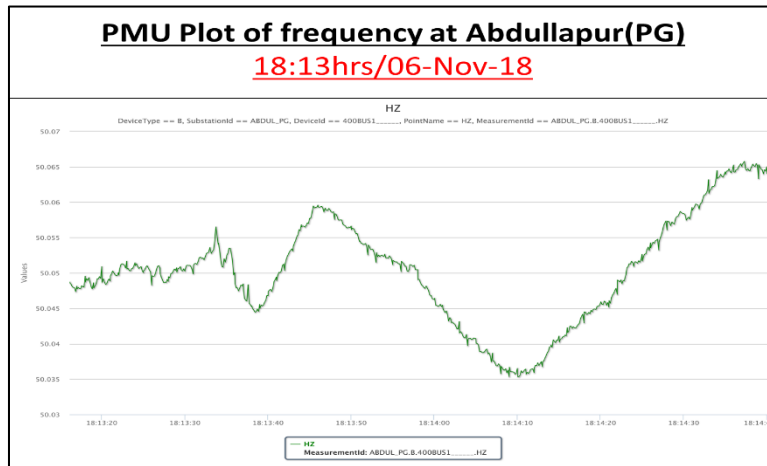
During last winter, SLDCs had been requested to carry out mock drills and share their experiences. However, the information was received from HP (Sainj, Baspa) and Rajasthan (only

schedule of exercises) only. The information may please be shared by SLDCs and program for this year's mock black start exercises shall also be shared. SLDCs shall submit the reports of black start exercise in their respective control area. SLDCs may also identify further generating stations/unit for black start exercise.

Members may please discuss.

10. Tripping of all 400kV elements at 400/220kV Aligarh(UP):

As reported, on 06-Nov-18 at 18:13hrs, B-N fault occurred resulted in tripping of all 400kV ckts from Aligarh(UP) along with both 400/220kV ICTs except 400kV Sikandrabad-Aligarh D/C which were hand tripped. 400kV Muradnagar-Ataur, 765/400kV ICT #1 at Mainpuri(UP) and 400kV Sikandrabad-G.Noida also tripped during the event. As per PMU, fault cleared in 4000ms. As per NRLDC SCADA SoE, elements tripped in sequential manner in around 5000ms. A preliminary report of the event has been issued from NRLDC. The PMU plot and NRLDC SCADA SoE are as follows:



Time (hrs)	Station	Voltage (kV)	Element	Protection/ Device	Status	Remarks	Reference Time
18:13:33.560	B-N fault occurred as seen from PMU data.						0ms
18:13:33,697	ALIGR_UP	400	LIMUR1N	Protection Trip	App	Aligarh-Muradnagar opened from Aligarh end	190ms
18:13:33,750	ALIGR_UP	400	02TIE	Circuit Breaker	Open		
18:13:34,472	MURADNGR -1	400kV	F_03(PANK1)	Circuit Breaker	Close	Aligarh-Muradnagar closed from Muradnagar end	910ms
18:13:34,862	MANP1_U	765	LIAT1	Protection Trip	App	765/400kV ICT #1 at Mainpuri(UP) tripped	1345ms
18:13:34,904	MANP1_U	765	03AT1	Circuit Breaker	Open		
18:13:34,906	MANP1_U	400	03T1	Circuit Breaker	Open		
18:13:34,907	MANP1_U	400	02T1ORI	Circuit Breaker	Open		
18:13:34,973	MURADNGR -1	400kV	F_01(MUZA1)	Circuit Breaker	Open	Muradnagar-Ataur opened from Muradnagar end	1410ms
18:13:35,104	SHARN_UP	132kV	D_03(DEOBD)	BusBar Isolator 2	Close		1545ms
18:13:35,161	ATAUR_U	400	04MUR1N	Circuit Breaker	Open	Muradnagar-Ataur opened from Ataur end	1600ms
18:13:36,022	ALIGR_UP	400	LIT1	Protection Trip	App	400/220kV ICT #1 at Aligarh tripped	2550ms
18:13:36,068	ALIGR_UP	400	LIT2	Protection Trip	App		
18:13:36,082	ALIGR_UP	400	09T1	Circuit Breaker	Open		
18:13:36,090	ALIGR_UP	400	08TIE	Circuit Breaker	Open		
18:13:36,109	ALIGR_UP	220	04T1	Circuit Breaker	Open		
18:13:36,113	MURADNGR -1	400kV	F_03(PANK1)	Circuit Breaker	Open	Aligarh-Muradnagar opened from Muradnagar end	2555ms
18:13:36,130	ALIGR_UP	400	21T2	Circuit Breaker	Open	400/220kV ICT #2 at Aligarh tripped	2595ms
18:13:36,140	ALIGR_UP	400	20TIE	Circuit Breaker	Open		
18:13:36,152	ALIGR_UP	220	10T2	Circuit Breaker	Open		
18:13:36,447	MANP1_U	400	LIALGRH1	Protection Trip	App	Aligarh-Mainpuri-1 tripped from both ends	2980ms
18:13:36,479	MANP1_U	400	08ALMNP1	Circuit Breaker	Open		
18:13:36,480	ALIGR_UP	400	LIMANP71	Protection Trip	App		
18:13:36,481	MANP1_U	400	09ALIGRH	Circuit Breaker	Open		
18:13:36,519	ALIGR_UP	400	10MANP71	Circuit Breaker	Open		
18:13:36,541	ALIGR_UP	400	11TIE	Circuit Breaker	Open		
18:13:37,531	ALIGR_UP	400	LIMANP72	Protection Trip	App	Aligarh-Mainpuri-2 opened from Aliagarh end. Fault cleared as per PMU data.	3970ms
18:13:37,572	ALIGR_UP	400	07MANP72	Circuit Breaker	Open		
18:13:38,446	PANK1_UP	400kV	F_10(MUR1N)	Circuit Breaker	Open	Panki-Aligarh opened from Panki end	4885ms
18:13:38,521	SKNBD_UP	220kV	08SIKND1	Circuit Breaker	Open	Sikandrabad(400)-Sikandrabad D/C opened from sikandrabad end	4990ms
18:13:38,549	SKNBD_UP	220kV	09SIKND2	Circuit Breaker	Open		

UP is requested to kindly look into the following:

- **Exact reason and location of fault.**
- **Delayed clearance of fault of around 4000ms.**
- **Simultaneous tripping of multiple elements within 5 seconds of fault.**
- **Status of tripping of 220kV feeders at Aligarh to be confirmed as per SCADA SLD, power flow is observed in the 220kV ckts.**
- **Reason for tripping of 400kV Sikandrabad(UP)-G.Noida(UP) as well as all other elements.**
- **Review of settings of ICTs at Aligarh and Mainpuri.**
- **Explanation for sequential tripping of elements as tabulated in attached NRLDC SoE data.**
- **DR/EL, Report along with remedial measures taken to be shared covering above points.**

An event of such magnitude wherein forced outage of elements occurred at complete voltage level of a station may affect the safety and security of the grid. Further, delayed clearance of 4000ms as against the standard of 100ms is also very alarming and indicate towards an immediate and in depth analysis. UP is requested to kindly look into the event.

Members may discuss.

11. Revision of document for Reactive Power Management for Northern Region:

Reactive Power Management document for Northern region is due for revision. The last updated document link is as below:

<https://nrlcdc.in/download/nr-reactive-power-management-2018/>

Document is password protected and password was already informed to all the NR constituents through letter dated 29th Dec 2017.

Constituents may provide the feedback, suggestion and updated information by 15th December 2018.

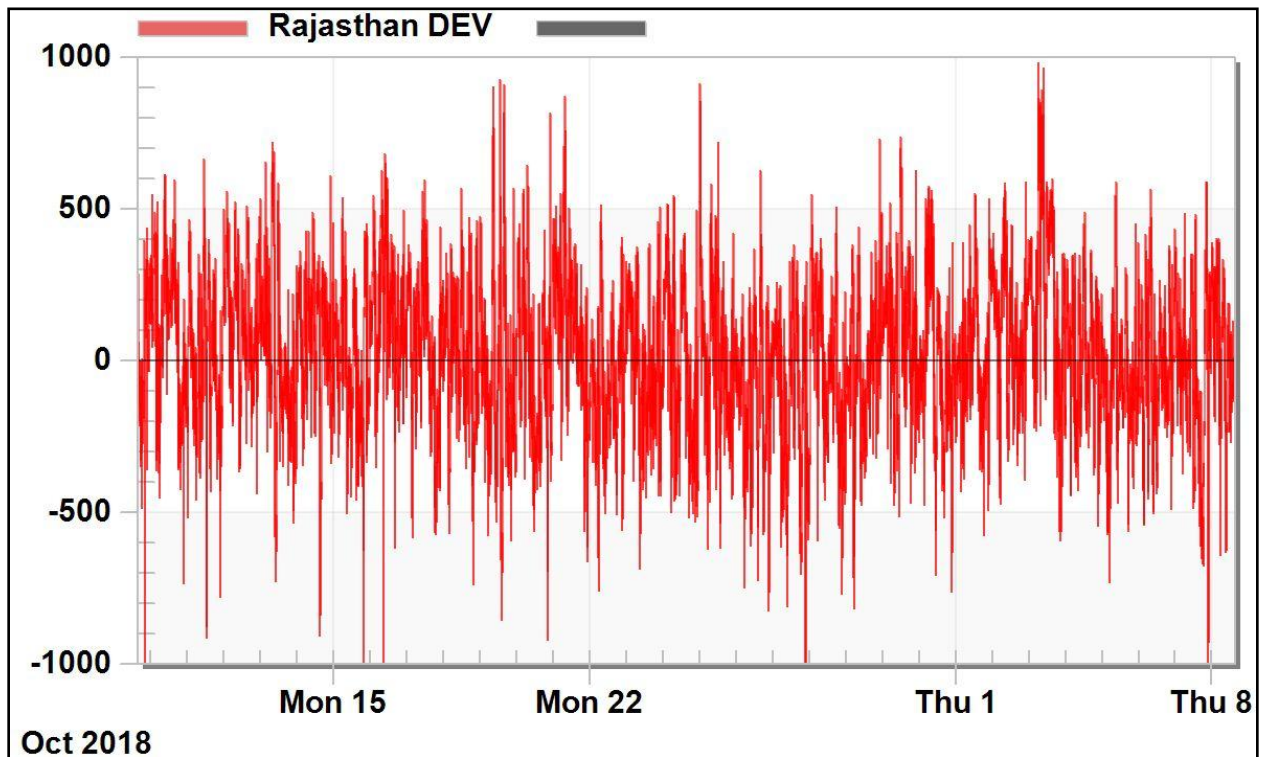
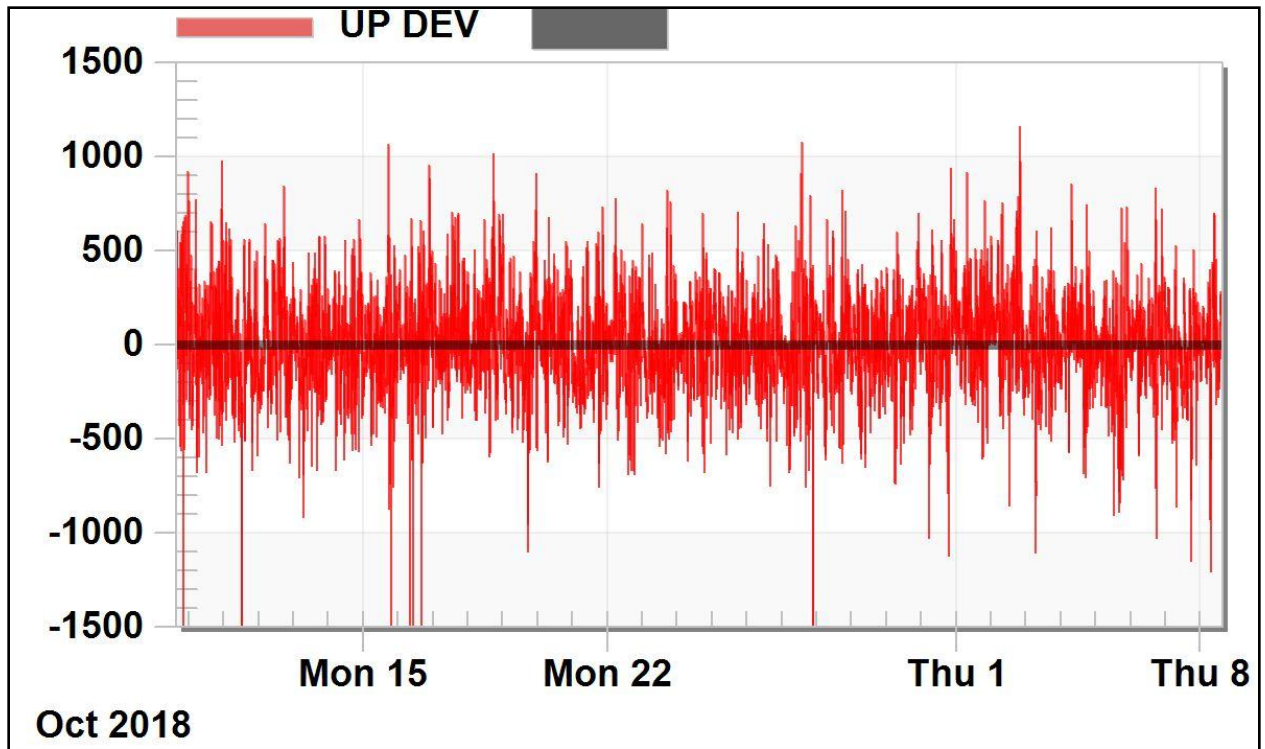
12. Revision of document for System Restoration Procedure (SRP) for Northern Region:

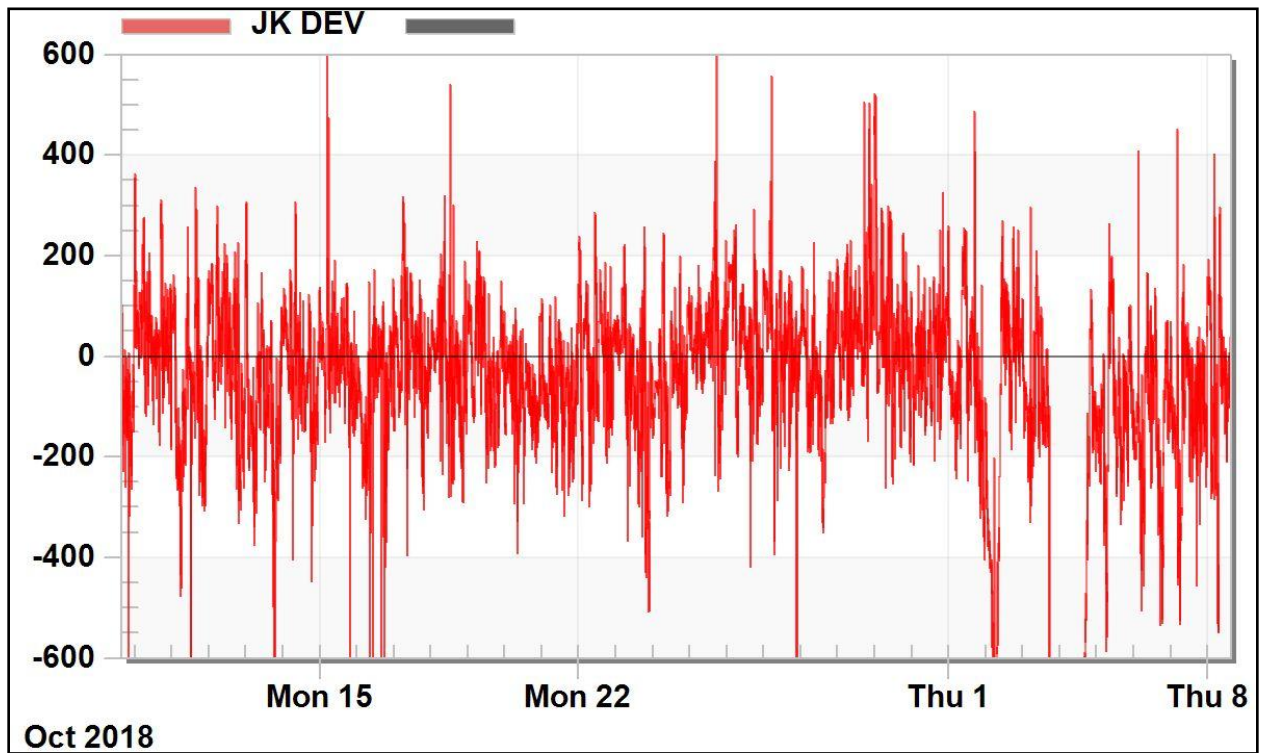
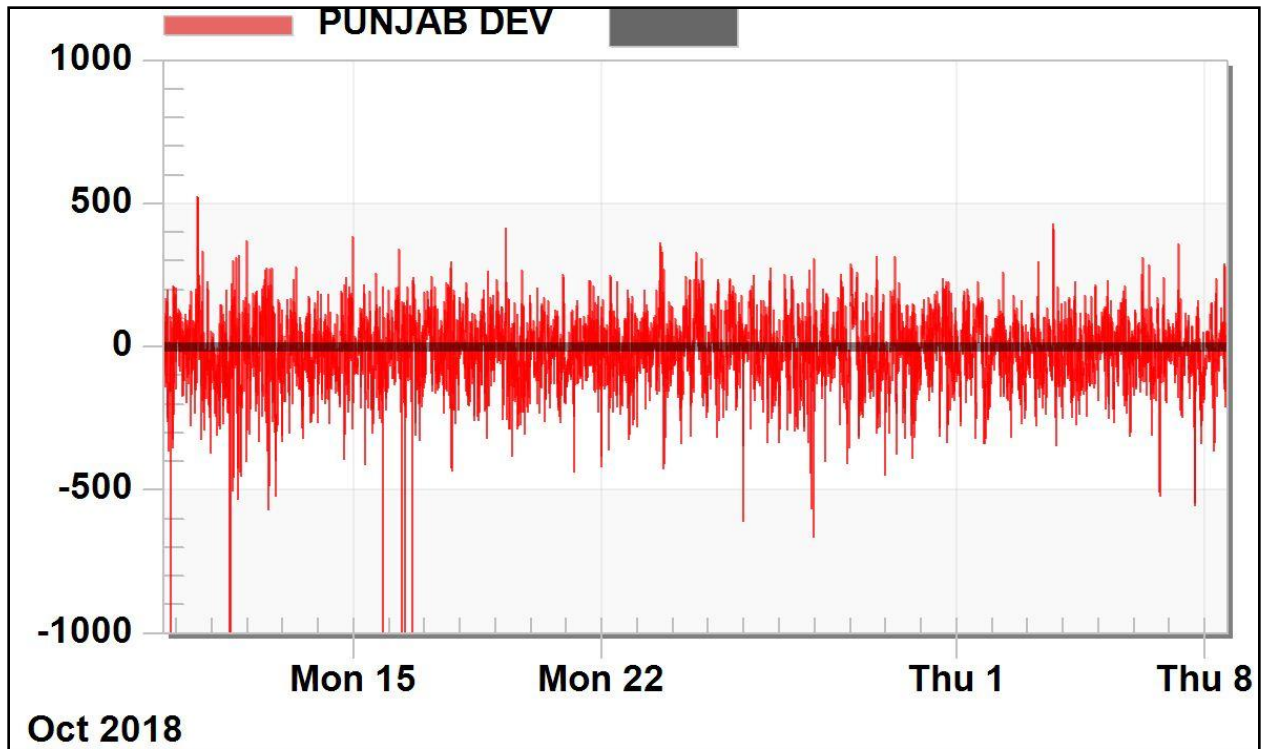
System restoration procedure for Northern region is due for revision. The last updated document link has already been shared with the constituents.

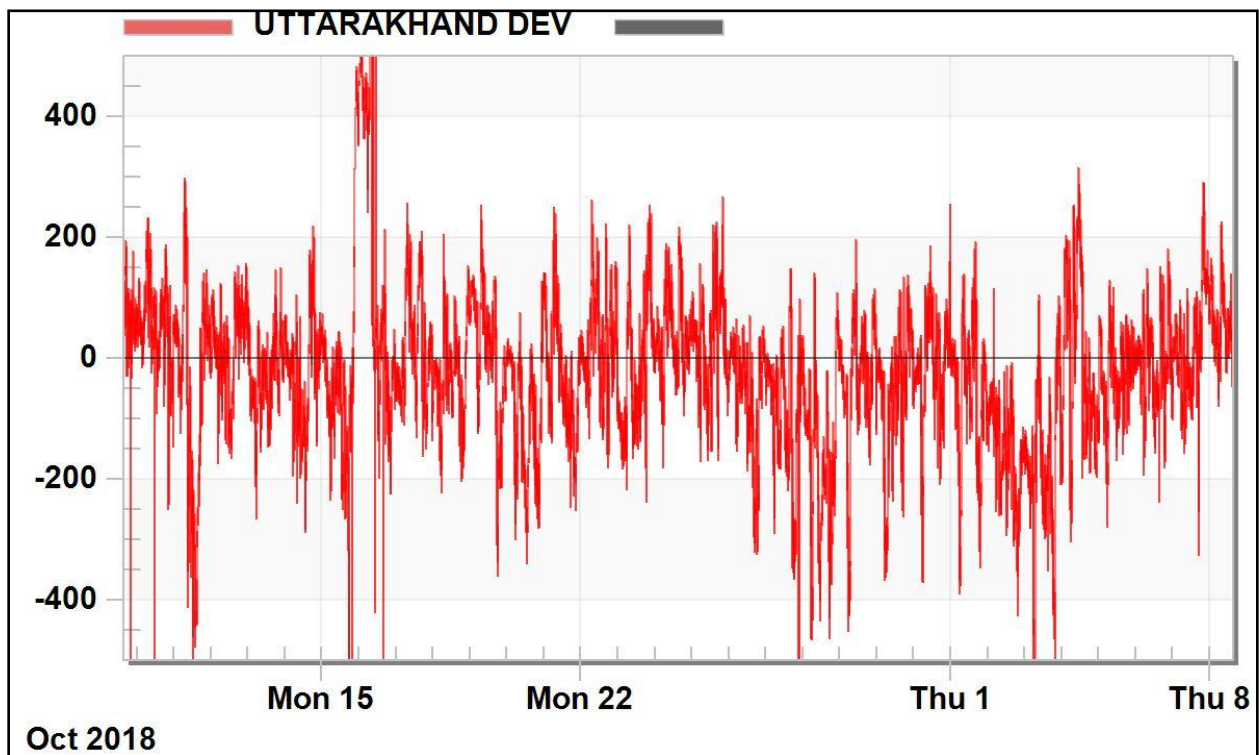
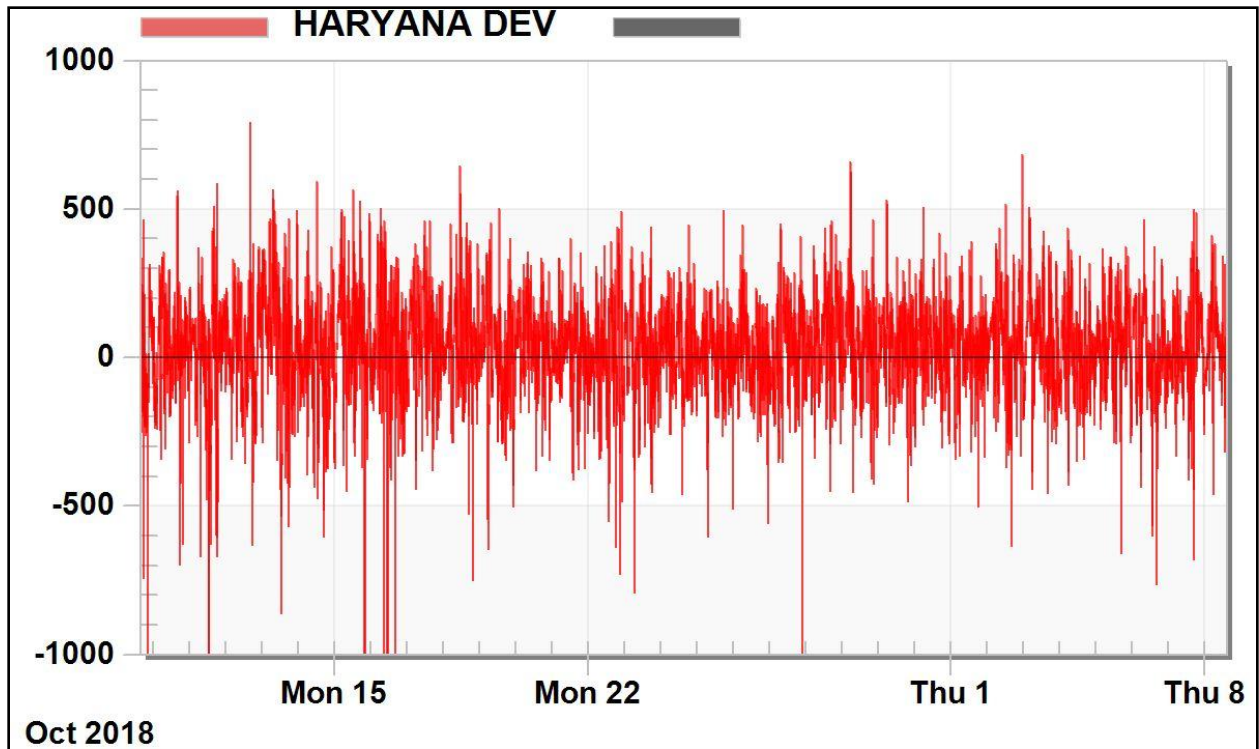
<https://nrlcdc.in/Websitedata/NR-SRP-2018.pdf>

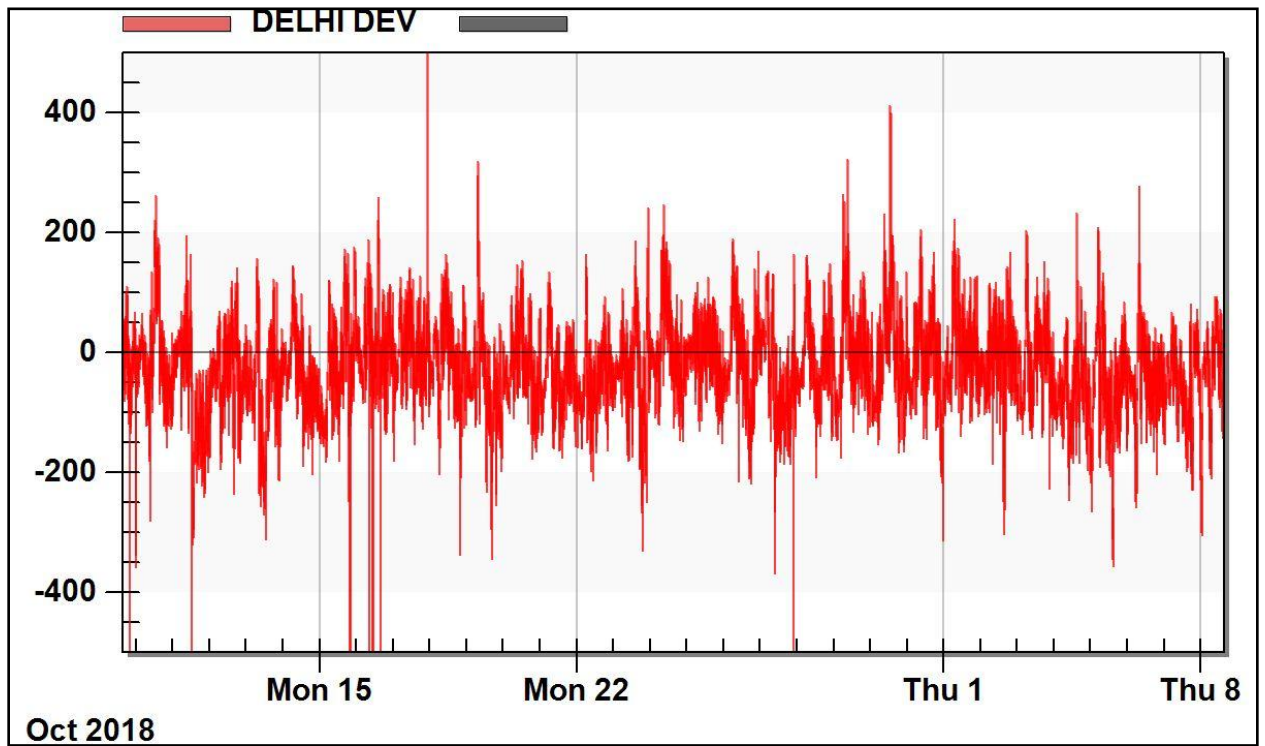
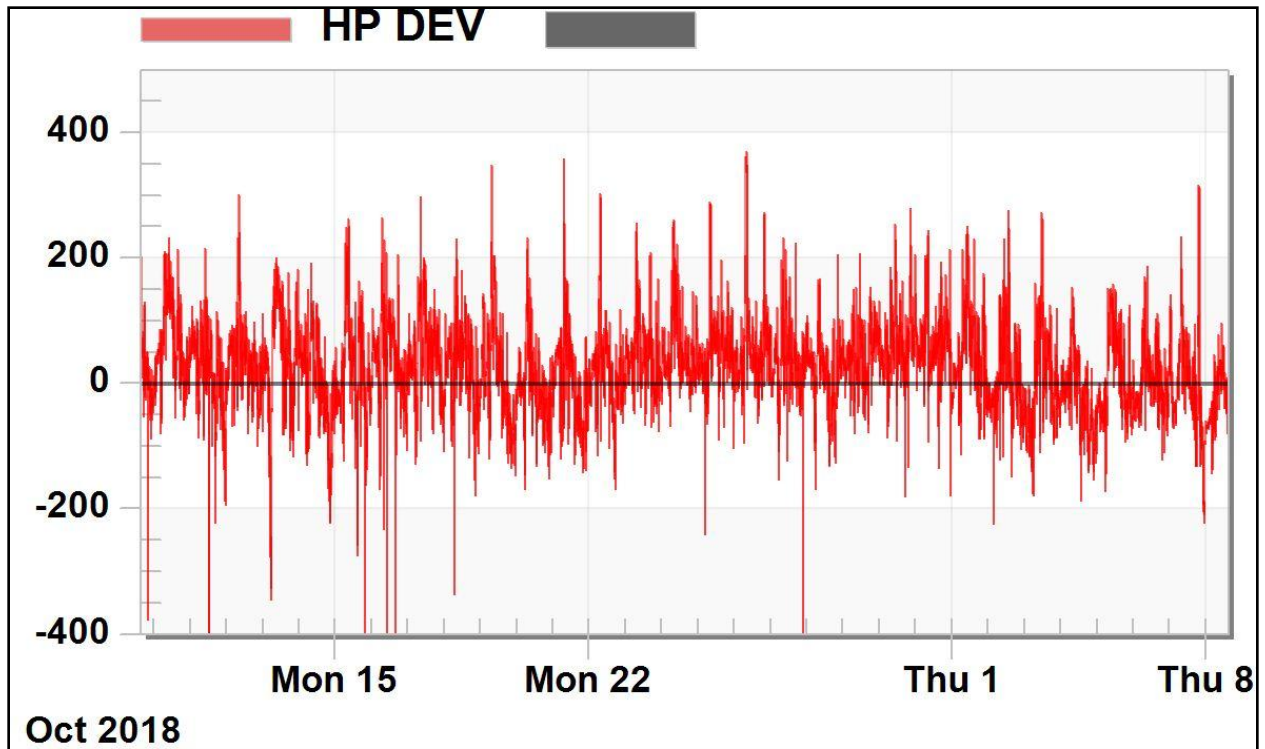
Document is password protected and password was already informed to all the NR constituents through letter dated 31st Jan 2018.

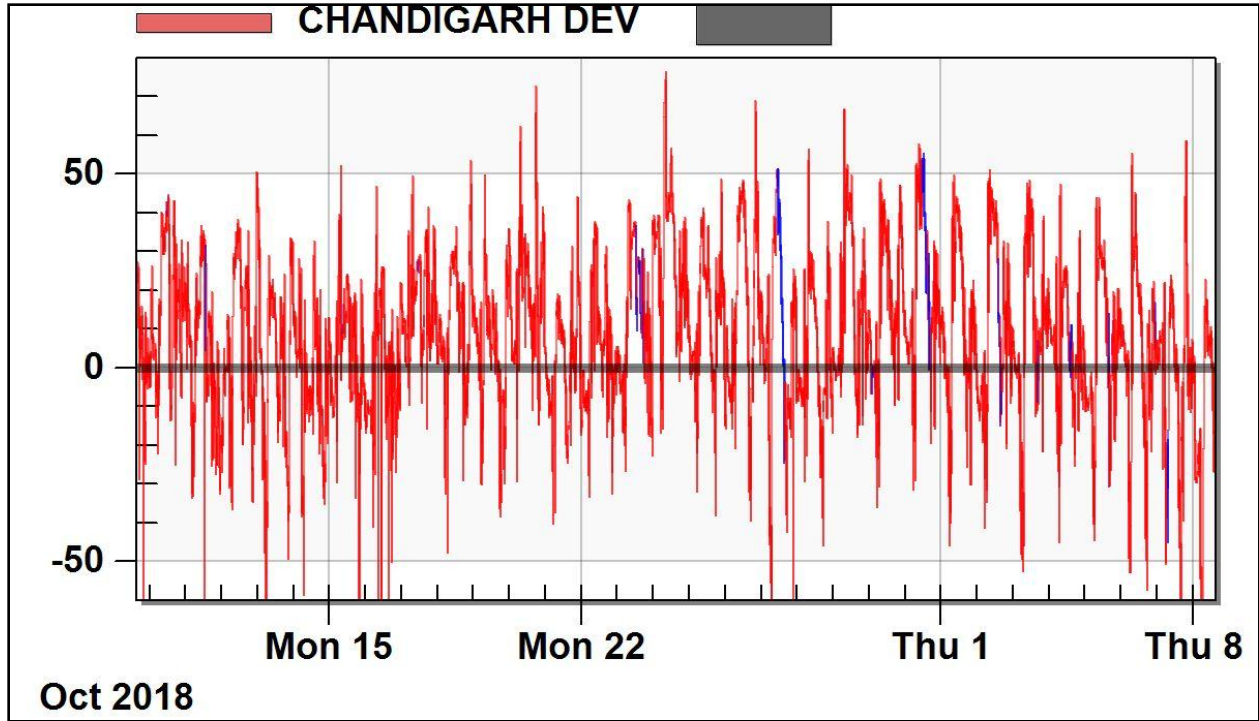
Constituents are requested to go through the document and provide any modification/addition in respect of their system. SLDC/Generating utilities are requested to kindly update and share the restoration procedure in respect of their state/generating station. The updates may kindly be sent by 15th December 2018.











Generation Projection (Jan 2019 - Mar 2019)																	
				Generation declared Commercial from 1st Apr'18 to 30th Sep'18					Generation declared/expected to be declared Commercial from 1st Oct'18 to 31st Dec'18								
Sl. No.	Entities	Region	Projections based on 3 Years Data	Bus Name	Unit No.	Installed Capacity	Gen. considered	Sub Total	Bus Name	Unit No.	Installed Capacity	Gen. considered	Sub Total	TOTAL	Comments From DICs /Others (if any)	Figure as per Comments/PoC Data	Projected Generation before normalization w.r.t projected All India Peak Demand
			(MW)			(MW)	(MW)	(MW)			(MW)	(MW)	(MW)	(MW)			(MW)
1	Uttar Pradesh	NR	9045						Meja	1	660	432	432	9477			9477
2	Delhi	NR	651											651			651
3	Haryana	NR	2792											2792			2792
4	Uttarakhand	NR	649	Shravanti Gas	4	75	59	178						827			827
				Shravanti Gas	5	75	59										
				Shravanti Gas	6	75	59										
5	Punjab	NR	4380											4380			4380
6	Rajasthan	NR	6714	Chhabra	5	660	432	432						7146			7146
7	Himachal Pradesh	NR	364											364			364
8	Jammu & Kashmir	NR	369											369			369
9	BBMB	NR	2081											2081			2081
10	Chandigarh	NR	0											0			0
11	Railways	NR	0											0			0
12	Dadri Thermal	NR	1476											1476			1476
13	Rihand	NR	2890											2890			2890
14	Singrauli	NR	1865											1865			1865
15	Unchahar	NR	1005											1005			1005
16	Auraiya	NR	176											176			176
17	Dadri CCPP	NR	418											418			418
18	NAPS	NR	421											421			421
19	Jhajjar	NR	1387											1387	As per APCPL Jhajjar	1500	1500
20	DHAULIGANGA	NR	269											269			269
21	Tanakpur	NR	39											39			39
22	Koteshwar	NR	404											404			404
23	Tehri	NR	898											898			898
24	Anta	NR	244											244			244
25	RAAP B	NR	377											377			377
26	RAPP C	NR	457											457			457
27	AD Hydro	NR	131											131			131
28	Everest	NR	79											79			79
29	Karcham Wangtoo	NR	884											884			884

Generation Projection (Jan 2019 - Mar 2019)

		Generation declared Commercial from 1st Apr'18 to 30th Sep'18						Generation declared/expected to be declared Commercial from 1st Oct'18 to 31st Dec'18									
Sl. No.	Entities	Region	Projections based on 3 Years Data	Bus Name	Unit No.	Installed Capacity	Gen. considered	Sub Total	Bus Name	Unit No.	Installed Capacity	Gen. considered	Sub Total	TOTAL	Comments From DICs /Others (if any)	Figure as per Comments/ PoC Data	Projected Generation before normalization w.r.t projected All India Peak Demand
			(MW)			(MW)	(MW)	(MW)			(MW)	(MW)	(MW)	(MW)			(MW)
30	Bairasul	NR	170											170			170
31	Chamera 1	NR	543											543			543
32	Chamera 2	NR	308											308			308
33	Chamera 3	NR	182											182			182
34	Naptha Jhakri	NR	1602											1602			1602
35	Lanco Budhil	NR	70											70			70
36	DULHASTI	NR	401											401			401
37	Salal	NR	480											480			480
38	Sewa-II	NR	130											130			130
39	URI 1 HPS	NR	432											432			432
40	URI II HPS	NR	203											203			203
41	Sree Cement	NR	265											265			265
42	Parbati III	NR	189											189			189
43	Rampur HEP	NR	442											442			442
44	KOLDAM	NR	850											850			850
	Rosa Power	NR															0
	Kishanganga	NR		Kishanganga	1	110	76	229						229			229
				Kishanganga	2	110	76										
				Kishanganga	3	110	76										
	Sainj HEP	NR		Sainj HEP	1	50	35	69					69			69	
				Sainj HEP	2	50	35										
	TOTAL		46732					908					432	48073			48186

Note:

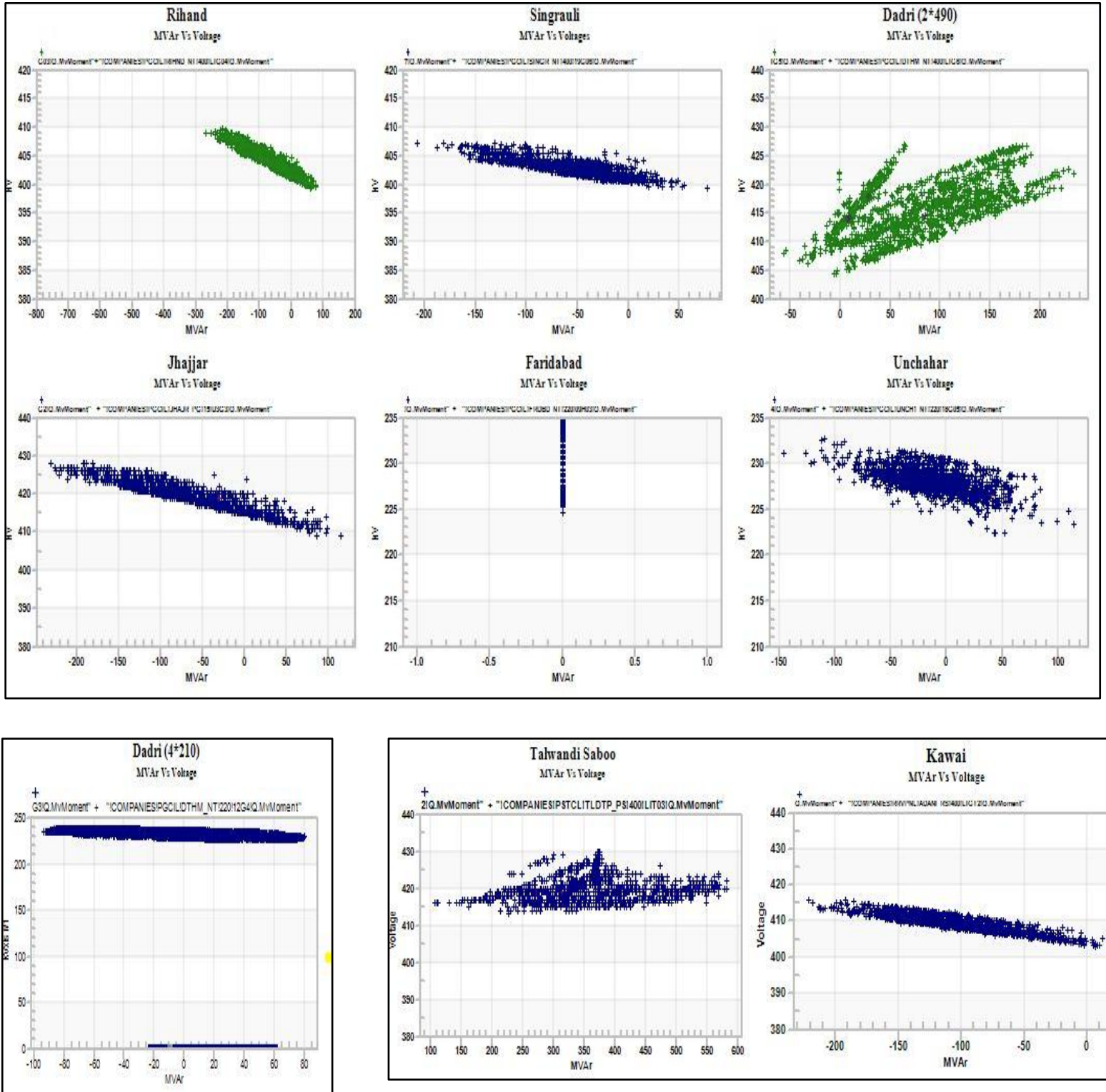
1. Projections are based on monthly maximum injection in the last 3 years from actual metered data.
2. Generation forecast has been done based on the following criteria
 - (i) If there is an increasing trend then last year average generation has been considered
 - (ii) Otherwise average of past three year average generation has been considered
3. In case of new generators where past data was not available following has been assumed
 - (i) 0.7 pif for hydro generators
 - (ii) 0.7 pif for thermal generators.
 - (iii) 0.3 pif for gas stations

DEMAND FORECAST USING PAST 3 YEARS DATA (Jan 2019 - Mar 2019)														Data given by DICs	Comments
2015-16			2016-17			2017-18			1	2	3	4			
Jan-16	Feb-16	Mar-16	Jan-17	Feb-17	Mar-17	Jan-18	Feb-18	Mar-18	2015-16 Average	2016-17 Average	2017-18 Average	Projected Demand for (Jan 2019 - Mar 2019) before normalization			
Chandigarh	248	223	195	213	217	214	242	235	232	222	215	236	239		
Delhi	4,125	3,845	3,617	4,168	3,882	4,139	4,464	3,946	3,766	3,862	4,063	4,059	4,191		
Haryana	7,045	6,799	6,433	6,815	6,556	6,668	6,940	7,120	6,815	6,759	6,680	6,958	6,998		
Himachal Pradesh	1,480	1,457	1,428	1,492	1,479	1,499	1,594	1,555	1,494	1,455	1,490	1,548	1,590		
Jammu & Kashmir	2,158	2,034	2,069	2,140	2,098	2,033	2,319	2,199	2,162	2,087	2,090	2,227	2,274		
Punjab	6,118	6,095	5,688	6,120	6,475	6,536	6,260	6,277	6,687	5,967	6,377	6,408	6,692		
Rajasthan	10,720	10,190	9,677	10,348	10,332	9,859	11,564	11,449	10,723	10,196	10,180	11,245	11,590		
Uttar Pradesh	11,625	12,558	13,964	14,344	14,133	16,110	14,989	15,015	15,223	12,716	14,862	15,076	16,578		
Uttarakhand	2,034	1,964	1,817	2,037	1,973	1,843	2,149	2,134	1,886	1,938	1,951	2,056	2,100		

Notes

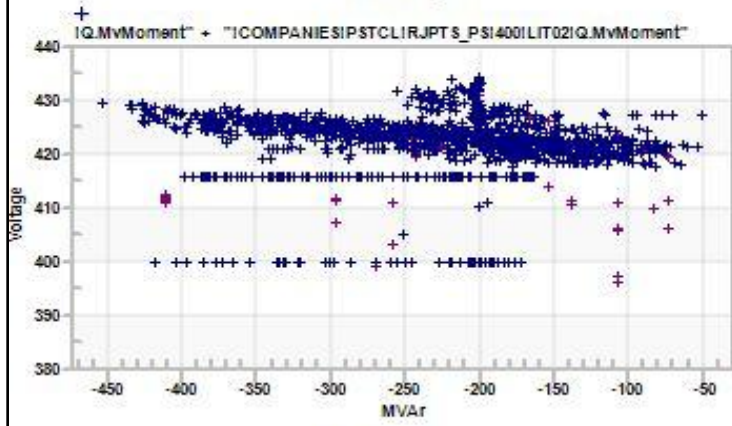
1. Projections are based on the past 3 years' monthly Peak Demand Met data available on the website of CEA
2. The above projections are being done for financial year 2018-2019 (Q4) i.e Jan 2019- Mar 2019
3. Projections are being done based on the forecast function available in MS Office Excel
4. CEA Reports can be accessed from the following links:
http://www.cea.nic.in/reports/monthly/powersupply/2018/psp_peak-01.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2018/psp_peak-02.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2018/psp_peak-03.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2017/psp_peak-01.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2017/psp_peak-02.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2017/psp_peak-03.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2016/psp_peak-01.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2016/psp_peak-02.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2016/psp_peak-03.pdf

Reactive Power Performance of Generators



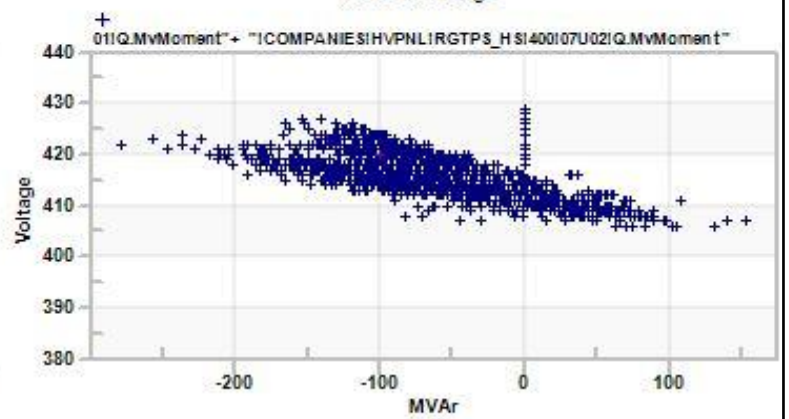
Rajpura

MVAr Vs Voltage



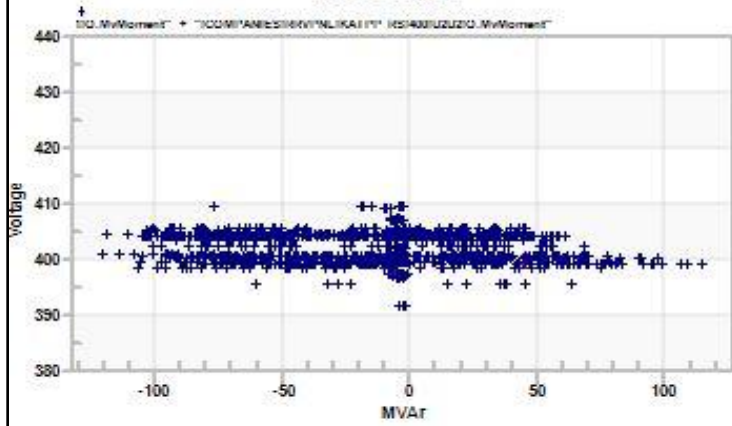
Khedar

MVAr Vs Voltage



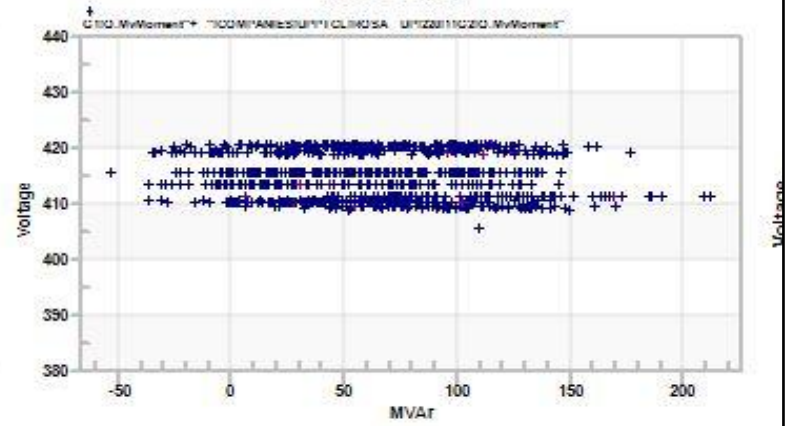
Kalisindh

MVAr Vs Voltage



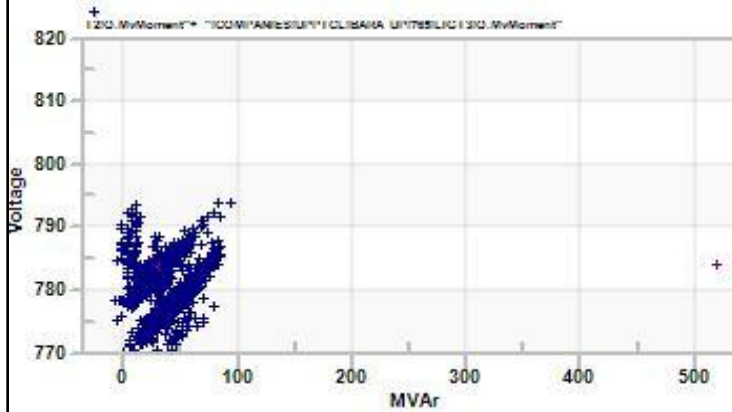
Rosa

MVAr Vs Voltage



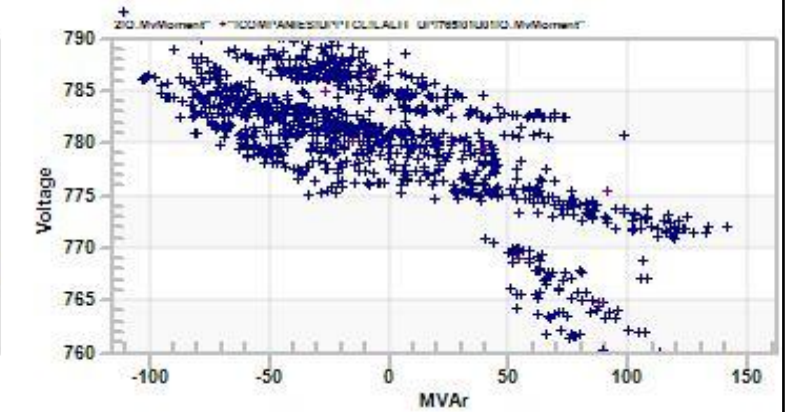
Bara

MVAr Vs Voltage



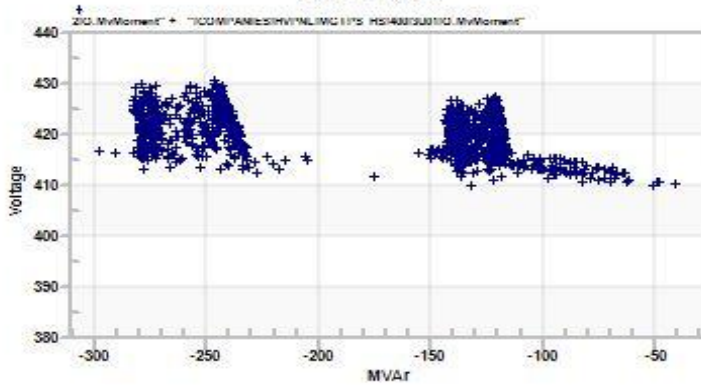
Lalitpur

MVAr Vs Voltage



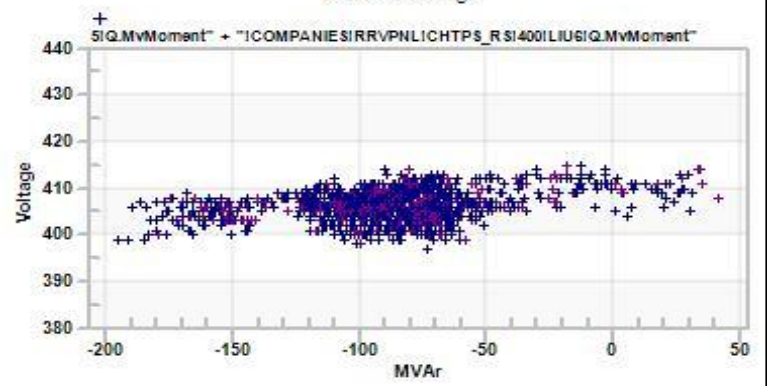
MGTPS

MVAr Vs Voltage



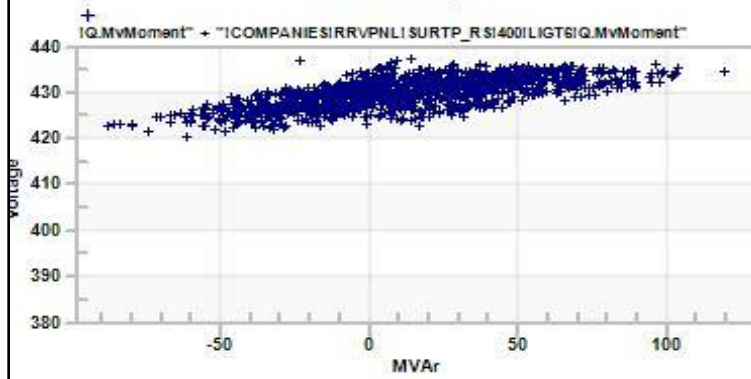
CHhabra

MVAr Vs Voltage



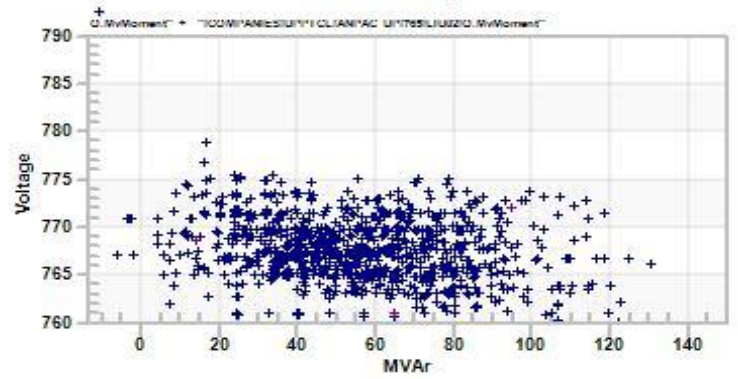
Suratgarh

MVAr Vs Voltage



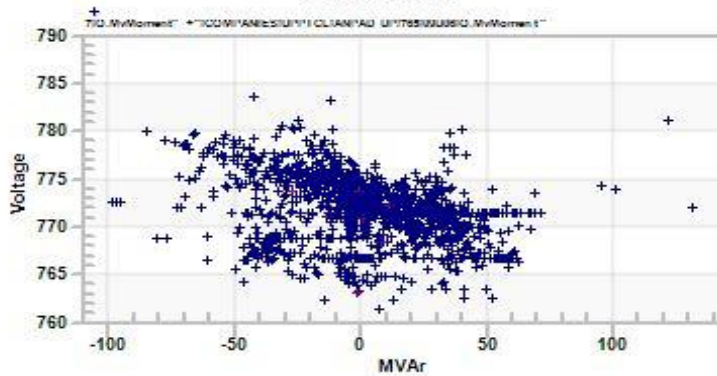
Anpara C

MVAr Vs Voltage



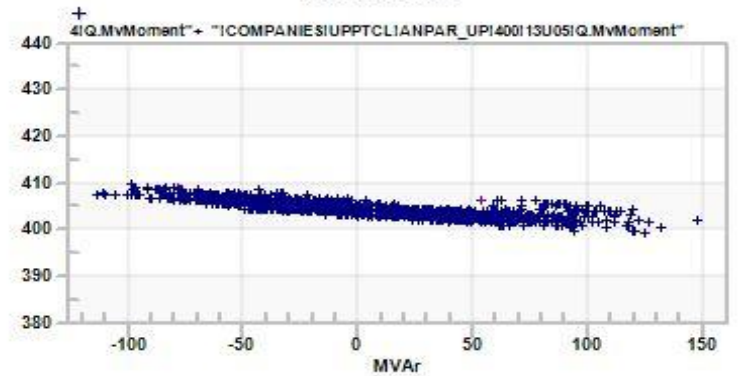
Anpara D

MVAr Vs Voltage



Anpara

MVAr Vs Voltage



Annexure-4

Sl No	Lines	Ckt ID	The line reactors having provision to be used as bus reactors						Remarks
			End-1	MVAR Rating at End-1	Provision to use as Bus Reactor (position of line isolator)	End-2	MVAR Rating at End-2	Provision to use as Bus Reactor (position of line isolator)	
1. 765kV Transmission line									
A. NR-1									
1	Agra-Jhatikara	1	Agra	---	---	Jhatikara	3*80	YES	
2	Bhiwani-Meerut	1	Bhiwani(PG)	3*80	YES	Meerut	---	---	NGR bypassing yet to be done & Line yet to be charged
3	Bhiwani-Phagi	1	Bhiwani(PG)	3*80	YES	Phagi	3*80	YES	Line & Reactors ownership of POWERGRID
4	Bhiwani-Phagi	2	Bhiwani(PG)	3*80	YES	Phagi	3*80	YES	
5	G.Noida-Meerut	1	G. Noida	---	---	Meerut	3*80	YES	Agra-Meerut LILoed at G. Noida
6	Merrut-Moga	1	Merrut	3*80	YES	Moga	3*80	YES	
7	Phagi-Gwalior	1	Phagi	3*80	YES	Gwalior	3*80	YES	Line & Reactors ownership of POWERGRID
8	Phagi-Gwalior	2	Phagi	3*80	YES	Gwalior	3*80	YES	
B. NR-2									
1	Moga-Bhiwani	1	Moga	3*80	YES	Bhiwani	---	---	
C. NR-3									
1	Agra-Fatehpur	1	Agra	3*80	YES	Fatehpur	3*110	YES	
2	Agra-Fatehpur	2	Agra	3*80	YES	Fatehpur	3*110	YES	
3	Balia-Gaya	1	Balia	3*80	YES	Gaya	-	---	
4	Balia-Lucknow	1	Balia	3*80	YES	Lucknow	3*80	YES	
5	Fatehpur-Sasaram	1	Fatehpur	3*110	YES	Sasaram	-	---	
6	Kanpur GIS - Jhatikara	1	Kanpur GIS	3*110	YES	Jhatikara	3*110	YES	
7	Lucknow-Bareilly	1	Lucknow	3*80	YES	Bareilly	3*80	YES	
8	Varanasi-Balia	1	Varanasi	3*80	YES	Balia	-	---	
9	Varanasi-Fatehpur	1	Varanasi	-	---	Fatehpur	110*3	YES	
10	Varanasi-Gaya	1	Varanasi	3*80	YES	Gaya	3*80	---	
11	Varanasi-Gaya	2	Varanasi	3*80	YES	Gaya	-	---	765kV Fatehpur-Sasaram-Gaya LILoed at Varanasi and 330MVAR Mid point reactor at Sasaram shifted to Bus Reactor at Varanasi
12	Varanasi-Kanpur GIS	1	Varanasi	3*80	YES	Kanpur GIS	3*110	YES	
13	Varanasi-Kanpur GIS	2	Varanasi	3*80	YES	Kanpur GIS	3*110	YES	
D. UPPTCL									
1	AnparaC-Unnao	1	Anpara-C	3*110	YES	Unnao	3*110	YES	
2	Anpara D-Unnao	1	Anpara-D	3*110	YES	Unnao	---	---	
3	Bara-Mainpuri	1	Bara	3*110	YES	Mainpuri	3*110	YES	Bara end yet to be charged
4	G.Noida-Mainpuri	1	G. Noida	3*80	YES	Mainpuri	---	---	
5	Fatehabad-Lalitpur	1	Fatehabad	3*80	YES	Lalitpur	3*110	YES	
6	Fatehabad-Lalitpur	2	Fatehabad	3*80	YES	Lalitpur	3*110	YES	
E. Rajasthan									
1	Anta-Phagi	1	Anta	3*80	YES	Phagi	3*80	YES	
2	Anta-Phagi	2	Anta	3*80	YES	Phagi	3*80	YES	
2. 765kV Transmission line charged at 400kV									
A. NR-1									
1	Koteshwar pooling-Meerut	1	Koteshwar Pool	---	---	Meerut	50	YES	
2	Koteshwar pooling-Meerut	2	Koteshwar Pool	---	---	Meerut	50	YES	
B. NR-2									
1	Kishenpur-Moga	1	Kishenpur	63	YES	Moga	63	YES	
2	Kishenpur-Moga	2	Kishenpur	63	YES	Moga	63	YES	
3. 400kV Transmission line									
A. NR-1									
1	Bassi-Kotputli	1	Bassi	50	YES	Kotputli	---	---	LILo of Bassi-Bhiwadi at Kotputli
2	Bhiwadi-Hisar	1	Bhiwadi	---	---	Hisar	50	YES	
3	Bhiwadi-Hissar	2	Bhiwadi	63	YES	Hissar	---	---	
4	Bhiwadi-Hissar	3	Bhiwadi	63	YES	Hissar	---	---	
5	Dadri-Kaithal	1	Dadri	---	---	Kaithal	50	YES	Dadri-Malerkotla LILoed at Kaithal
6	Hissar-Kaithal	2	Hissar	50	YES	Kaithal	---	---	
7	Hissar-Moga	1	Hissar	50	YES	Moga	---	---	
8	Kankroli-Bhinmal	1	Kankroli	50	YES	Bhinmal	50	YES	
9	Kankroli-RAPP	1	Kankroli	50	YES	RAPP	---	---	
10	Kankroli-Zerda	1	Kankroli	50	YES	Zerda	50	---	
11	Kota-Merta	1	Kota	50	YES	Merta	50	---	
12	Kota-Shree cement	1	Kota	50	YES	Shree cement	---	---	
13	Sikar-Bikaner	1	Sikar	50	YES	Bikaner	---	---	

14	Sikar-Bikaner	2	Sikar	50	YES	Bikaner	---	---	
B. NR-2									
1	Abdullapur-Panchkula	1	Abdullapur	50	YES	Panchkula	---	---	LILO of Jhakri-Abdullapur at Panchkula
2	Abdullapur-Panchkula	2	Abdullapur	50	YES	Panchkula	---	---	
3	Kaithal-Malerkotla	1	Kaithal	---	---	Malerkotla	63	YES	Dadri-Malerkotla LILOed at Kaithal
4	Fatehabad-Moga	1	Fatehabad	63	YES	Moga	---	---	NGR bypass isolator supply expected to be completed by Jan'17.
5	Hissar-Moga	2	Hissar	---	---	Moga	63	YES	
6	Hissar-Moga	3	Hissar	---	---	Moga	63	YES	
7	Jalandhar-Chamba (GIS)	1	Jalandhar	50	YES	Chamba GIS	---	---	
8	Jalandhar-Chamba (GIS)	2	Jalandhar	50	YES	Chamba GIS	---	---	
9	Jalandhar-Kurukshetra	1	Jalandhar	50	YES	Kurukshetra	---	---	
10	Kaithal(PG)-Baghpat(PG)	1	Kaithal	50	YES	Baghpat	---	---	Kaithal-Meerut LILOed at Baghpat(PG). The line may please be opened early in the
11	Kaithal(PG)-Baghpat(PG)	2	Kaithal	50	YES	Baghpat	---	---	
12	Nakodar-Kurukshetra	1	Nakodar	50	YES	Kurukshetra	---	---	
13	Nathpa Jhakri-Panchkula	1	Nathpa Jhakri	---	---	Panchkula	50	YES	NGR bypass isolator supply expected to be completed by Feb'17.
14	Nathpa Jhakri-Panchkula	2	Nathpa Jhakri	---	---	Panchkula	50	YES	
15	New Wanpoh-Wagoora	1	New Wanpoh	---	---	Wagoora	50	YES	
16	New Wanpoh-Wagoora	2	New Wanpoh	---	---	Wagoora	50	YES	
17	Rampur-Nalagarh	1	Rampur	---	---	Nalagarh	50	YES	
18	Rampur-Nalagarh	2	Rampur	---	---	Nalagarh	50	YES	
C. NR-3									
1	Agra(PG)-Bhiwadi	1	Agra	50	YES	Bhiwadi	---	---	3*16.66MVAr Bus Reactor at Agra(PG) end used as Line Reactor
2	Agra(PG)-Jaipur South	1	Agra	50	---	Jaipur South	50	YES	LILo of Agra-Bassi at Jaipur South
3	Agra(PG)-Jaipur South	2	Agra	50	---	Jaipur South	50	YES	
4	Agra(PG)-Sikar	1	Agra	50	---	Sikar	50	YES	
5	Agra(PG)-Sikar	2	Agra	50	---	Sikar	50	YES	
6	Allahabad-Fatehpur	1	Allahabad	50	YES	Fatehpur	---	---	LILo of Allahabad-Mainpuri at Fatehpur
7	Allahabad-Fatehpur	2	Allahabad	50	YES	Fatehpur	---	---	LILo of Allahabad-Mainpuri at Fatehpur
8	Allahabad-Kanpur GIS	1	Allahabad	---	---	Kanpur	50	YES	
9	Allahabad-Kanpur GIS	2	Allahabad	---	---	Kanpur	50	YES	
10	Allahabad-Rihand	1	Allahabad	50	YES	Rihand	-	---	---
11	Allahabad-Rihand	2	Allahabad	50	YES	Rihand	-	---	---
12	Balia-Biharshariff	1	Balia	50	YES	Biharshariff	---	---	Biharshariff end is in Eastern Region
13	Balia-Biharshariff	2	Balia	50	YES	Biharshariff	---	---	Biharshariff end is in Eastern Region
14	Balia-Patna	1	Balia	50	YES	Patna	---	---	
15	Balia-Patna	2	Balia	50	YES	Patna	---	---	
16	Balia-Patna	3	Balia	63	YES	Patna	---	---	
17	Balia-Patna	4	Balia	63	YES	Patna	---	---	
18	Balia-Sohawal	1	Balia	63	YES	Sohawal	50	YES	Lucknow end line reactor shifted at Sohawal
19	Balia-Sohawal	2	Balia	63	YES	Sohawal	50	YES	
20	Bareilly(PG)-Lucknow(UP)	1	Bareilly	50	YES	Lucknow(UP)	50	---	Lucknow(UP)-Reactor is of UPPTCL
21	Bareilly(PG)-Meerut	1	Bareilly	50	YES	Meerut	---	---	Lilo of Bareilly-Mandola D/C line at Meerut
22	Bareilly(PG)-Meerut	2	Bareilly	50	YES	Meerut	---	---	
23	Gorakhpur(PG)-Motihari	1	Gorakhpur	80	YES	Motihari	---	---	Motihari End is in Eastern Region
24	Gorakhpur(PG)-Motihari	2	Gorakhpur	80	YES	Motihari	---	---	Motihari End is in Eastern Region
25	Gorakhpur(PG)-Muzzaffarpur	1	Gorakhpur	---	---	Muzzaffarpur	63	YES	MUZZAFARPUR End is in Eastern Region
26	Gorakhpur(PG)-Muzzaffarpur	1	Gorakhpur	---	---	Muzzaffarpur	63	YES	MUZZAFARPUR End is in Eastern Region
27	Gorakhpur-Lucknow	1	Gorakhpur	50	YES	Lucknow(PG)	---	---	
28	Gorakhpur-Lucknow	2	Gorakhpur	50	YES	Lucknow(PG)	---	---	
29	Gorakhpur-Lucknow	3	Gorakhpur	63	YES	Lucknow(PG)	63	YES	
30	Gorakhpur-Lucknow	4	Gorakhpur	63	YES	Lucknow(PG)	63	YES	
31	Kanpur-Ballabgarh	2	Kanpur	80	YES	Ballabgarh	80	YES	---
32	Kanpur-Ballabgarh	3	Kanpur	80	YES	Ballabgarh	80	YES	---
33	Lucknow(PG) -Shahjahanpur	1	Lucknow	50	YES	Shahjahanpur	---	---	LILo of Bareilly-Lucknow 2 at Shahjahanpur
34	Mainpuri-Fatehpur	1	Mainpuri	80	YES	Fatehpur	---	---	LILo of Allahabad-Mainpuri at Fatehpur
35	Mainpuri-Fatehpur	2	Mainpuri	80	YES	Fatehpur	---	---	LILo of Allahabad-Mainpuri at Fatehpur
36	Shahjahanpur-Lucknow(PG)	2	Shahjahanpur	---	---	Lucknow(PG)	50	YES	LILo of Bareilly-Lucknow S/C at Rosa-II
37	Singrauli-Fatehpur	1	Singrauli	80	---	Fatehpur	80	YES	LILo of Singrauli-Kanpur at Fatehpur
38	Varanasi- Biharshariff	1	Varanasi	50	YES	Biharshariff	---	---	Biharshariff end is in Eastern Region

39	Varanasi- Biharshariff	2	Varanasi	50	YES	Biharshariff	---	---	Biharshariff end is in Eastern Region
D. Rajasthan									
1	Akal-Jodhpur	1	Akal	50	YES	Jodhpur	50	YES	Akal end LR was out of service.
2	Bikaner-Bhadla	1	Bikaner	---	---	Bhadla	50	YES	
3	Bikaner-Bhadla	2	Bikaner	---	---	Bhadla	50	YES	
4	Chhabra-Bhilwara	1	Chhabra	50	YES	Bhilwara	50	YES	
5	Chhabra-Hindaun	1	Chhabra	50	YES	Hindaun	50	YES	
6	Heerapura-Hindaun	1	Heerapura	50	YES	Hindaun	---	---	Bus Reactor at Heerapura end used as a line reactor
7	Merta-Bikaner	1	Merta	50	YES	Bikaner	50	YES	
8	Rajwest-Jodhpur	1	Rajwest	50	YES	Jodhpur	50	YES	
9	Rajwest-Jodhpur	2	Rajwest	50	YES	Jodhpur	50	YES	

SI No	Lines	Ckt ID	The line reactors that can be used as bus reactors and confirmed by utilities						Remarks
			End-1	MVAr Rating at End-1	Confirmation by Utility for usage as Bus reactor	End-2	MVAr Rating at End-2	Confirmation by Utility for usage as Bus reactor	
1. 765kV Transmission line									
A. NR-1									
1	Agra-Jhatikara	1	Agra	---	---	Jhatikara	3*80	YES	
2	Bhiwani-Meerut	1	Bhiwani(PG)	3*80	YES	Meerut	---	---	NGR bypassing yet to be done & Line yet to be charged
3	Bhiwani-Phagi	1	Bhiwani(PG)	3*80	---	Phagi	3*80	YES	Line & Reactors ownership of POWERGRID
4	Bhiwani-Phagi	2	Bhiwani(PG)	3*80	---	Phagi	3*80	YES	
5	G.Noida-Meerut	1	G. Noida	---	---	Meerut	3*80	YES	Agra-Meerut LILOOed at G. Noida
6	Merrut-Moga	1	Merrut	3*80	YES	Moga	3*80	---	
B. NR-3									
1	Agra-Fatehpur	1	Agra	3*80	YES	Fatehpur	3*110	---	
2	Agra-Fatehpur	2	Agra	3*80	YES	Fatehpur	3*110	YES	
3	Balia-Lucknow	1	Balia	3*80	---	Lucknow	3*80	YES	
4	Varanasi-Fatehpur	1	Varanasi	-	---	Fatehpur	110*3	YES	
C. UPPTCL									
1	G.Noida-Mainpuri	1	G. Noida	3*80	YES	Mainpuri	---	---	
2	Fatehabad-Lalitpur	1	Fatehabad	3*80	---	Lalitpur	3*110	YES	
3	Fatehabad-Lalitpur	2	Fatehabad	3*80	---	Lalitpur	3*110	YES	
2. 765kV Transmission line charged at 400kV									
A. NR-1									
1	Koteshwar pooling-Meerut	1	Koteshwar Pool	---	---	Meerut	50	YES	
2	Koteshwar pooling-Meerut	2	Koteshwar Pool	---	---	Meerut	50	YES	
B. NR-2									
1	Kishenpur-Moga	2	Kishenpur	63	YES	Moga	63	YES	
3. 400kV Transmission line									
A. NR-1									
1	Bassi-Kotputli	1	Bassi	50	YES	Kotputli	---	---	LILO of Bassi-Bhiwadi at Kotputli
2	Bhiwadi-Hisar	1	Bhiwadi	---	---	Hisar	50	YES	
3	Bhiwadi-Hissar	2	Bhiwadi	63	YES	Hissar	---	---	
4	Bhiwadi-Hissar	3	Bhiwadi	63	YES	Hissar	---	---	
5	Hissar-Kaithal	2	Hissar	50	YES	Kaithal	---	---	
6	Kankroli-Bhinmal	1	Kankroli	50	YES	Bhinmal	50	YES	
7	Kankroli-RAPP	1	Kankroli	50	YES	RAPP	---	---	
8	Kankroli-Zerda	1	Kankroli	50	YES	Zerda	50	---	
9	Kota-Merta	1	Kota	50	YES	Merta	50	---	
10	Kota-Shree cement	1	Kota	50	YES	Shree cement	---	---	
B. NR-2									
1	Abdullapur-Panchkula	1	Abdullapur	50	YES	Panchkula	---	---	LILO of Jhakri-Abdullapur at Panchkula
2	Abdullapur-Panchkula	2	Abdullapur	50	YES	Panchkula	---	---	
3	Hissar-Moga	3	Hissar	---	---	Moga	63	YES	
4	Jalandhar-Kurukshetra	1	Jalandhar	50	YES	Kurukshetra	---	---	
5	Kaithal(PG)-Baghpat(PG)	1	Kaithal	50	YES	Baghpat	---	---	Kaithal-Meerut LILOOed at Baghpat(PG). The line may release be opened early in
6	Kaithal(PG)-Baghpat(PG)	2	Kaithal	50	YES	Baghpat	---	---	NGR bypass isolator supply expected to be completed by Feb'17.
7	Nathpa Jhakri-Panchkula	1	Nathpa Jhakri	---	---	Panchkula	50	YES	
8	Nathpa Jhakri-Panchkula	2	Nathpa Jhakri	---	---	Panchkula	50	YES	
9	Rampur-Nalagarh	1	Rampur	---	---	Nalagarh	50	YES	
10	Rampur-Nalagarh	2	Rampur	---	---	Nalagarh	50	YES	
C. NR-3									
1	Agra(PG)-Bhiwadi	1	Agra	50	YES	Bhiwadi	---	---	3*16.66MVAr Bus Reactor at Agra(PG) end used as Line Reactor
2	Agra(PG)-Jaipur South	1	Agra	50	---	Jaipur South	50	YES	LILO of Agra-Bassi at Jaipur South
3	Agra(PG)-Jaipur South	2	Agra	50	---	Jaipur South	50	YES	
4	Agra(PG)-Sikar	1	Agra	50	---	Sikar	50	YES	
5	Agra(PG)-Sikar	2	Agra	50	---	Sikar	50	YES	
6	Allahabad-Fatehpur	1	Allahabad	50	YES	Fatehpur	---	---	LILO of Allahabad-Mainpuri at Fatehpur
7	Allahabad-Fatehpur	2	Allahabad	50	YES	Fatehpur	---	---	LILO of Allahabad-Mainpuri at Fatehpur
8	Allahabad-Rihand	1	Allahabad	50	YES	Rihand	-	---	---
9	Allahabad-Rihand	2	Allahabad	50	YES	Rihand	-	---	---

10	Balia-Biharshariff	1	Balia	50	YES	Biharshariff	---	---	Biharshariff end is in Eastern Region
11	Balia-Biharshariff	2	Balia	50	YES	Biharshariff	---	---	Biharshariff end is in Eastern Region
12	Balia-Patna	1	Balia	50	YES	Patna	---	---	
13	Balia-Patna	2	Balia	50	YES	Patna	---	---	
14	Balia-Patna	3	Balia	63	YES	Patna	---	---	
15	Balia-Patna	4	Balia	63	YES	Patna	---	---	
16	Balia-Sohawal	1	Balia	63	YES	Sohawal	50	YES	Lucknow end line reactor shifted at Sohawal
17	Balia-Sohawal	2	Balia	63	YES	Sohawal	50	YES	Lucknow end line reactor shifted at Sohawal
18	Bareilly(PG)-Lucknow(UP)	1	Bareilly	50	YES	Lucknow(UP)	50	---	Lucknow(UP)-Reactor is of UPPTCL
19	Bareilly(PG)-Meerut	1	Bareilly	50	YES	Meerut	---	---	Lilo of Bareilly-Mandola D/C line at Meerut
20	Bareilly(PG)-Meerut	2	Bareilly	50	YES	Meerut	---	---	Lilo of Bareilly-Mandola D/C line at Meerut
21	Gorakhpur(PG)-Motihari	1	Gorakhpur	80	YES	Motihari	---	---	Motihari End is in Eastern Region
22	Gorakhpur(PG)-Motihari	2	Gorakhpur	80	YES	Motihari	---	---	Motihari End is in Eastern Region
23	Gorakhpur(PG)-Muzzaffarpur	1	Gorakhpur	---	---	Muzzaffarpur	63	YES	MUZZAFARPUR End is in Eastern Region
24	Gorakhpur(PG)-Muzzaffarpur	1	Gorakhpur	---	---	Muzzaffarpur	63	YES	MUZZAFARPUR End is in Eastern Region
25	Gorakhpur-Lucknow	1	Gorakhpur	50	YES	Lucknow(PG)	---	---	
26	Gorakhpur-Lucknow	2	Gorakhpur	50	YES	Lucknow(PG)	---	---	
27	Gorakhpur-Lucknow	3	Gorakhpur	63	YES	Lucknow(PG)	63	YES	
28	Gorakhpur-Lucknow	4	Gorakhpur	63	YES	Lucknow(PG)	63	YES	
29	Kanpur-Ballabgarh	2	Kanpur	80	YES	Ballabgarh	80	YES	---
30	Kanpur-Ballabgarh	3	Kanpur	80	YES	Ballabgarh	80	YES	---
31	Lucknow(PG) -Shahjahanpur	1	Lucknow	50	YES	Shahjahanpur	---	---	LILO of Bareilly-Lucknow 2 at Shahjahanpur
32	Mainpuri-Fatehpur	1	Mainpuri	80	YES	Fatehpur	---	---	LILO of Allahabad-Mainpuri at Fatehpur
33	Mainpuri-Fatehpur	2	Mainpuri	80	YES	Fatehpur	---	---	LILO of Allahabad-Mainpuri at Fatehpur
34	Shahjahanpur-Lucknow(PG)	2	Shahjahanpur	---	---	Lucknow(PG)	50	YES	LILO of Bareilly-Lucknow S/C at Rosa-II
35	Singrauli-Fatehpur	1	Singrauli	80	---	Fatehpur	80	YES	LILO of Singrauli-Kanpur at Fatehpur
D. Rajasthan									
1	Akal-Jodhpur	1	Akal	50	YES	Jodhpur	50	YES	Akal end LR was out of service.
2	Bikaner-Bhadla	1	Bikaner	---	---	Bhadla	50	YES	
3	Bikaner-Bhadla	2	Bikaner	---	---	Bhadla	50	YES	
4	Chhabra-Bhilwara	1	Chhabra	50	YES	Bhilwara	50	YES	
5	Chhabra-Hindaun	1	Chhabra	50	YES	Hindaun	50	YES	
6	Heerapura-Hindaun	1	Heerapura	50	YES	Hindaun	---	---	Bus Reactor at Heerapura end used as a line reactor
7	Merta-Bikaner	1	Merta	50	YES	Bikaner	50	YES	
8	Rajwest-Jodhpur	1	Rajwest	50	YES	Jodhpur	50	YES	
9	Rajwest-Jodhpur	2	Rajwest	50	YES	Jodhpur	50	YES	

Annexure-5

S. NO.	Element Name	Outage Date	Outage Time	Reason/Remarks
1	800 kV HVDC (Agra-BNC) Pole-2 at Agra HVDC	1-Oct-18	23:54	Pole-2 of BNC got tripped at 23:54hrs due to line fault with fault distance 205.9Km from BNC end and fault current (2393.43A). Due to this Pole-2 of Agra got blocked on low current requirement.
		27-Oct-18	12:16	DC line fault, 185 Km from BNC(PG) end.
		28-Oct-18	11:06	Protective Y blocking
		30-Oct-18	9:08	During the testing of Pole-2 of AGRA & BNC for Ground Return to Metallic Return at 09:08hrs, both the poles (Pole-2 & 4) got tripped due to failure of Ground Return to Metallic Return sequences. During the event, the 1 No. Neutral Bus LA of Bipole-2 got damaged (at Agra).
2	400 kV Anpara(UP)-Mau(UP)	13-Oct-18	23:45	Y-N fault, 125 Km from Mau(UP) end. As per PMU, no auto-reclosing observed.
		19-Oct-18	19:01	Details awaited. As per PMU, B-N fault occurred, no auto-reclosing observed.
		20-Oct-18	5:21	B-N fault. As per PMU, no auto-reclosing observed.
3	400 kV Azamgarh(UP)-Gorakhpur(UP)	13-Oct-18	15:48	Y-N fault. As per PMU, no auto-reclosing observed and fault cleared with 400ms delay.
		14-Oct-18	12:33	Y-B fault, 25.2KM from Gorakhpur(UP) end. As per PMU, Y-B fault.
		23-Oct-18	12:10	Y-B fault. As per PMU, Y-B fault.
4	400 kV Kashipur(PTCUL)-Nehtaur(UP)	8-Oct-18	14:06	Y-N fault, 77 km from Kashipur(Utt) end. As per PMU, unsuccessful auto-reclosing observed.
		14-Oct-18	19:48	R-N fault at Kashipur(Utt) end and the Line is autoreclosed at Nehtaur(UP) end. As per PMU, R-N fault occurred and cleared in 480ms, line also seems to be auto-reclosed successfully from one end.
		25-Oct-18	13:29	R-N fault. As per PMU, Y-B fault occurred and cleared in 1640ms.

Annexure-6

S.No.	Region	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Duration	Event (As reported)	Generation Loss(MW)	Load Loss(MW)	Category as per CEA Grid Standards	Energy Unservd (in MU)	Preliminary Report receipt status			DR/EL receipt status		Detailed Report receipt status		Fault Clearance time (in ms)		
					Date	Time	Date	Time							within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Received	Not Received			
1	NR	1) 450 MVA ICT 1 at 400/220kV Panipat(BBMB) 2) 450 MVA ICT 2 at 400/220kV Panipat(BBMB) 3) 220kV Panipat(BBMB)-Kurukshetra(HVFNL) 4) 220kV Chhapar(HVFNL) - Panipat(BBMB) ckt-1 5) 220kV Panipat(BBMB)-Dhulkote(BBMB) ckt-2 6) 220kV Panipat(BBMB)-Dhulkote(BBMB) ckt-2 7) 220kV Panipat(BBMB)-Narela(DTL) ckt-1, ckt-2 & ckt-3 8) 220kV Chhapar(HVFNL) - Panipat(BBMB) ckt-2 9) 220kV Panipat(BBMB)-Charkhi Dadr 10) 220kV Panipat TPS(HVFNL)-Panipat(BBMB) ckt-2, ckt-3, ckt-4 11) 220kV Panipat TPS(HVFNL)-Pipili	Delhi & Haryana	BBMB, Haryana & Delhi	1-Oct-18	10:34	1-Oct-18	12:13	1:39	Bus bar protection of 220 kv Bus-1 & 2 operated at 400/220kV Panipat(BBMB) due to broken conductor of 220kV Panipat- Kurukshetra fall down on 220 kv BUS-2 at 400/220kV Panipat(BBMB). As per PMU, R-R fault is observed and Rise in frequency of around 0.03Hz is observed. In antecedent conditions, 450 MVA ICT 1 & ICT 2 carrying 210 MW each.	280		GD-1	0.48	Y(BBMB)	Y(Har), Y(Delhi)		Y(BBMB)	Y(Har), Y(Delhi)	Y(BBMB)		120ms		
2	NR	1) 220kV Amargarh(NRSS29)-Delina(JK) ckt-1 2) 220kV Amargarh(NRSS29)-Ziankot(JK) ckt-1	Jammu & Kashmir	NRSS29 & J&K	1-Oct-18	18:53	1-Oct-18	22:22	3:29	220kV Amargarh(NRSS29)-Delina(JK) ckt-1 & 220kV Amargarh(NRSS29)-Ziankot(JK) ckt-1 tripped on Phase to earth fault. As per PMU, R-R fault is observed. In antecedent conditions, 220kV Amargarh(NRSS29)-Delina(JK) ckt-1 carrying 43 MW.								Y(JK), Y(NRSS29)	Y(JK), Y(NRSS29)	Y(JK), Y(NRSS29)		80ms		
3	NR	1) 400kV Bus 1 at 400kV Chamera (NHPC) 2) 400kV Chamera (NHPC)-Jalandhar(PG) ckt-1 3) Bus reactor 1 at 400kV Chamera (NHPC)	Himachal Pradesh & Punjab	NHPC & POWERGRID	6-Oct-18	2:29	6-Oct-18	11:39	9:10	400kV Bus 1 at 400kV Chamera (NHPC) tripped due to operation of Bus Bar Differential relay. At the same time, 400kV Chamera (NHPC)-Jalandhar(PG) ckt-1 also tripped. In antecedent conditions, 400kV Chamera (NHPC)-Jalandhar(PG) ckt-1 carrying 80 MW. As per PMU, R-N fault is observed with no auto reclosing attempt.			GI-2		Y(NHPC)	Y(PG)			Y(NHPC), Y(PG)	Y(NHPC)		40ms		
4	NR	1) 450 MVA ICT 1 at 400/220kV Panipat(BBMB) 2) 220kV Panipat(BBMB)-Kurukshetra(HVFNL) 3) 220kV Chhapar(HVFNL) - Panipat(BBMB) ckt-1 4) 220kV Panipat(BBMB)-Narela(DTL) ckt-1 5) 220kV Panipat(BBMB)-Narela(DTL) ckt-3 6) 220kV Panipat TPS(HVFNL)-Panipat(BBMB) ckt-1 7) 220kV Panipat TPS(HVFNL)-Panipat(BBMB) ckt-3 8) 220kV Panipat(BBMB)-Dhulkote(BBMB) ckt-1	Delhi & Haryana	BBMB, Haryana & Delhi	8-Oct-18	11:50	8-Oct-18	12:12	0:22	Bus bar protection of 220 kv Bus-1 operated at 400/220kV Panipat(BBMB) leading to tripping of 450 MVA ICT 1 at 400/220kV Panipat(BBMB) and connected 220kV lines to 220kV Bus 1. As per PMU, Y-N fault is observed and Rise in frequency of around 0.023Hz is observed. In antecedent conditions, 450 MVA ICT 1 carrying 245 MW.	160		GD-1	0.06	Y(BBMB)	Y(Har), Y(Delhi)		Y(BBMB)	Y(Har), Y(Delhi)	Y(BBMB)		280ms		
5	NR	1) 315 MVA ICT 1 at 400/220kV Bawana(DTL) 2) 315 MVA ICT 2 at 400/220kV Bawana(DTL)	Delhi	Delhi	8-Oct-18	19:43	8-Oct-18	22:28	2:45	315 MVA ICT 1 & ICT 2 at 400/220kV Bawana(DTL) tripped on auxiliary Buchholz relay. As per PMU, Y-N fault is observed. In antecedent conditions, 315 MVA ICT 1 & ICT 2 carrying 144 MW & 141 MW respectively.			GI-2		Y(Delhi)			Y(Delhi)		Y(Delhi)	80ms			
6	NR	1) 220kV Sala(NHPC)-Kishenpur(PG) ckt-1 2) 220kV Sala(NHPC)-Kishenpur(PG) ckt-2	Jammu & Kashmir	POWERGRID & NHPC	9-Oct-18	3:15	9-Oct-18	3:59	0:56	220kV Sala(NHPC)-Kishenpur(PG) ckt-2 tripped on Phase to earth fault(B-N fault), 8.03 kms from Sala(NHPC) end. At the same time, 220kV Sala(NHPC)-Kishenpur(PG) ckt-1 also tripped only at Kishenpur(PG) end. As per PMU, R-B fault is observed. In antecedent conditions, 220kV Sala(NHPC)-Kishenpur(PG) ckt-1 & ckt-2 carrying 36 MW & 39 MW respectively.			GI-2		Y(PG)	Y(NHPC)		Y(PG)	Y(NHPC)	Y(NHPC)		80ms		
7	NR	1) 315 MVA ICT 1 at 400/220kV Jalandhar(PG) 2) 315 MVA ICT 2 at 400/220kV Jalandhar(PG)	Punjab	POWERGRID & Punjab	9-Oct-18	5:17	9-Oct-18	6:13	0:44	315 MVA ICT 1 & ICT 2 at 400/220kV Jalandhar(PG) tripped due to operation of Back up earth fault protection at 220 kv side as there was Fire at 220kV Kanjali station of Punjab. As per PMU, Voltage dip in three phases is observed. In antecedent conditions, 315 MVA ICT 1 & ICT 2 at 400/220kV Jalandhar(PG) carrying 22 MW & 24 MW respectively.			GI-2		Y(PUN)	Y(PG)		Y(PG)		Y(PUN)				
8	NR	1) 400 kv Obra-B(UP)-Rewa road(UP) 2) 400 kv Obra-B(UP)-Sultanpur(UP) 3) 315 MVA ICT-1 at 400/220kV Obra-B(UP) 4) 315 MVA ICT-2 at 400/220kV Obra-B(UP) 5) Unit -9 (200 MW) at 400/220kV Obra-B(UP) 6) Unit -10 (200 MW) at 400/220kV Obra-B(UP) 7) Unit -11 (200 MW) at 400/220kV Obra-B(UP) 8) 220 kv/6.6 kv, 30 MVA Station transformer at 400/220kV Obra-B(UP)	Uttar Pradesh	UP	14-Oct-18	4:37	27-Oct-18	10:36	317:59:00	Fire was observed around 04.30 hrs in cable gallery at 400/220kV Obra-B(UP). 220 kv/6.6 kv, 30 MVA Station transformers was tripped at 04.37 hrs, results in failure of station supply. Consecutively unit no 9, 10 & 11 each of 200 MW of capacity tripped at 04.37 hrs and total generation loss was of 460 MW. At the same time 04.37 hrs, 400 kv Obra (B) - Rewa road and 400 kv Obra (B) - Sultanpur lines also tripped. At 04.43 hrs 400 kv Obra (B) - Anpara line was manually opened from both ends. As per PMU, no fault is observed.	460	160	GD-1		Y(UP)				Y(UP)			Y(UP)		NA
9	NR	1) 200 MVA ICT1 at 400/220kV Rosa(UP) 2) 200 MVA ICT2 at 400/220kV Rosa(UP)	Uttar Pradesh	UP	14-Oct-18	13:20	14-Oct-18	14:21	1:01	200 MVA ICT1 & ICT2 at 400/220kV Rosa(UP) tripped on earth fault. In antecedent condition, both ICTs carrying 64MW each. As per PMU, B-N fault followed by R-N fault is observed.			GI-2		Y(UP)			Y(UP)		Y(UP)	1280ms			
10	NR	1) 400 kv Bus 1 at Jharkri(SIVNL) 2) 400 kv Jharkri(SIVNL)-Rampur(SIVNL) ckt-1 3) 400 kv Jharkri(SIVNL)-Panchkula(PG) ckt-1 4) 400 kv Jharkri(SIVNL)-Karchamwangoon(JP)	Himachal Pradesh	SIVNL & POWERGRID	16-Oct-18	3:48	16-Oct-18	6:40	2:52	Flash over occurred in R-phase circuit breaker pole of 400 kv NIPC-Rampur ckt-1 in 400 kv GIS of NIPC due to which Bus bar protection operated at NIPC. This line was already opened on HV. Only CB was opened and isolator was connected to Bus-1 at NIPC end as reported. Due to this BUS-1 Bus bar protection operation 400kV Jharkri-Panchkula-1 and 400 kv Jharkri-Karchamwangoon(UP) tripped. As per PMU, R-N fault is observed. In antecedent conditions, 400 kv Jharkri(SIVNL)-Karchamwangoon(JP) & 400 kv Jharkri(SIVNL)-Panchkula(PG) ckt-1 carrying 103 MW & 32 MW respectively.			GI-2		Y(SIVNL)	Y(PG)	Y(SIVNL)		Y(PG)		Y(SIVNL)		120ms	
11	NR	1) 220kV Kanpur(PG)-Naubasta(UP) 2) 220kV Fatehpur(PG)-Naubasta(UP)	Uttar Pradesh	UP & POWERGRID	17-Oct-18	11:16	17-Oct-18	12:03	0:47	220kV Fatehpur(PG)-Naubasta(UP) tripped on B-N fault. At the same time, 220kV Kanpur(PG)-Naubasta(UP) also tripped on Y-N fault. As per PMU, B-N fault is observed. In antecedent conditions, 220kV Kanpur(PG)-Naubasta(UP) & 220kV Fatehpur(PG)-Naubasta(UP) carrying 119 MW & 49 MW respectively.	130		GD-1	0.10	Y(PG), Y(UP)			Y(PG)	Y(UP)	Y(UP)		80ms		
12	NR	1) 220kV Kota Th(Raj)-Sakatpura(Raj) ckt 1,2,3,4 2) 220kV Kota Th(Raj)-Modak(Raj) 3) 220kV Kota Th(Raj)-Kot(PG) D/c 4) 220kV Kota Th(Raj)-vatika(Raj) 5) 220kV Kota Th(Raj)-Beawar(Raj) 6) 220kV Kota Th(Raj)-Hirepur(Raj) 7) 220kV Kota Th(Raj)-Sitor(Raj) 8) 220kV Kota Th(Raj) Unit#1,2, 4, 5, 6, 7 9) 220kV Sakatpura(Raj)- RAPP A ckt 1,3 10) 220kV Sakatpura(Raj)- RAPP B ckt 2 11) 100MVA ICT 2 & 3, 160MVA ICT 1 & 4 at 220kV Sakatpura(Raj)	Rajasthan	Rajasthan & POWERGRID	20-Oct-18	21:00	20-Oct-18	22:47	1:47	At 220kV KTPS (Raj) switchyard heavy arcing occurred at 220kV Kota Th(Raj)-Morak(Raj) feeder during restoration activity of 220kV Bus 3 & 5, due to this Bus coupler 1 tripped on earth fault and various emanating feeders tripped resulting in tripping of all the running units. As per PMU, Voltage dip in all the three phases is observed and dip in frequency of around 0.052Hz is observed.	850	150	GD-1	0.27	Y(Raj)	Y(PG)		Y(Raj)	Y(PG)	Y(Raj)		840ms		

S.No.	Region	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Duration	Event (As reported)	Generation Loss(MW)	Load Loss(MW)	Category as per CEA Grid Standards	Energy Unreserved (in MU)	Preliminary Report receipt status			DR/EL receipt status			Detailed Report receipt status		Fault Clearance time (in ms)	
					Date	Time	Date	Time							within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Not Received	Received	Not Received		
13	NR	1) 315 MVA ICT 2 at 400KV Gorakhpur(UP) 2) 500 MVA ICT 1 at 400KV Gorakhpur(UP) 3) 220KV Gorakhpur(UP)-Gorakhpur(UP) II ckt-1 4) 220KV Gorakhpur(UP)-Gorakhpur(UP) II ckt-2 5) 220KV Deoria(UP)-Gorakhpur(UP) 6) 220KV Gorakhpur(UP)-Gorakhpur New(UP) ckt-1 7) 220KV Gorakhpur(UP)-Gorakhpur New(UP) ckt-2	Uttar Pradesh	UP & POWERGRID	22-Oct-18	10:03	22-Oct-18	10:48	0:45	Bus bar protection operated at 220KV side of 400/220KV Gorakhpur(UP) leading to tripping of all ICTs and 220KV transmission line connected with 400/220KV Gorakhpur(UP). As per PMU, R-N fault observed with delayed clearance. In antecedent condition, 500 MVA ICT 1 & 315 MVA ICT 2 carrying 130 MW & 81 MW respectively.		210	GD-1	0.15	Y(UP)		Y(PG)				Y(UP), Y(PG)		Y(UP)	80ms or 440ms
14	NR	1) 400KV Kashipur (UTT)-Nehtaur 400 (UP) 2) 400KV Kashipur(UTT)-Moradabad(UP) 3) 315 MVA ICT 1 at 400/220KV Kashipur(UTT) 4) 315 MVA ICT 2 at 400/220KV Kashipur(UTT) 5) 160 MVA ICT 2 at 220/132KV Kashipur(UTT) 6) 400KV Kashipur (UTT)-Pantnagar(UTT) ckt-1 7) 400KV Kashipur (UTT)-Pantnagar(UTT) ckt-2	Uttarakhand	Uttarakhand & UP	25-Oct-18	13:28	25-Oct-18	14:27	0:59	200KV Main Bus 1 and 160 MVA ICT 1 was under shutdown for maintenance. At 14:28 Hrs, Y and B phases of Isolator 201-89B(160 MVA ICT 1 main Bus 2 Isolator) got stuck mechanically while closing and created a spark resulting into complete burnout of mentioned Isolator phases leading to a Bus fault on 220KV Bus 2. This resulted into tripping of 315 MVA ICTs, 160 MVA ICTs, all 220KV feeders and 400KV Kashipur (UTT)-Nehtaur 400 (UP) & 400KV Kashipur(UTT)-Moradabad(UP). As per PMU, Y-B fault is observed with delayed clearance of 1640ms.	182	225	GD-1	0.22	Y(UTT)		Y(UP)	Y(UTT)		Y(UP)		Y(UTT)	1640ms	

Northern Regional inter regional lines tripping for Oct-18

S. No.	Name of Transmission Element Tripped	Owner/ Utility	Outage		Load Loss/ Gen. Loss	Brief Reason (As reported)	Category as per CEA Grid standards	Restoration		# Fault Clearance Time (>100 ms for 400 kV and 160 ms for 220 kV)	*FIR Furnished (YES/NO)	DR/EL provided in 24 hrs (YES/NO)	Other Protection Issues and Non Compliance (inference from PMU, utility details)	Suggestive Remedial Measures	Remarks
			Date	Time				Date	Time						
1	800kV HVDC (Agra-BNC) Pole-2 at Agra^^	POWERGRID	1-Oct-18	23:54	Nil	Pole-2 of BNC got tripped at 23:54hrs due to line fault with fault distance 205.9Km from BNC end and fault current (2393.43A). Due to this Pole-2 of Agra got blocked on low current requirement.	NA	2-Oct-18	2:09	NA	NO	YES (After 24hrs)		Information received from NR end. Details/Definition of DR digital signals may also be provided with the DR. From PMU, no fault observed.	
2	800kV HVDC (Agra-BNC) Pole-1 at Agra	POWERGRID	21-Oct-18	21:31	Nil	Pole tripped on ABS minimum filter requirement during filter been taken out manually to control over voltage	NA	21-Oct-18	21:50	NA	YES (After 24hrs)	YES (After 24hrs)	As mentioned in the report received from PG, RPC Auto mode should also have functionality for ABS min filter as experienced very often so that additional filters can be removed by system	Information received from NR end. Details/Definition of DR digital signals may also be provided with the DR. From PMU, fluctuations in voltage observed.	
3	800kV HVDC (Agra-BNC) Pole-2 at Agra^^	POWERGRID	27-Oct-18	12:16	Nil	TRIPPED ON DC LINE FAULT AT 185KM FROM BNC	NA	27-Oct-18	12:56	NA	NO	YES (After 24hrs)		Information received from both ends. From PMU, no AC system fault observed.	
4	800kV HVDC (Agra-BNC) Pole-2 at Agra	POWERGRID	28-Oct-18	11:06	Nil	Protective Y blocking	NA	28-Oct-18	12:03	NA	NO	NO	Details of tripping yet to be received.	From PMU, no AC system fault observed.	
5	800kV HVDC (Agra-BNC) Pole-2 at Agra	POWERGRID	30-Oct-18	9:08	Nil	During the testing of Pole-2 of AGRA & BNC for Ground Return to Metallic Return at 09:08hrs, both the poles (Pole-2 & 4) got tripped due to failure of Ground Return to Metallic Return sequences. During the event, the 1 No. Neutral Bus LA of Bipole-2 got damaged (at Agra).	NA	30-Oct-18	11:54	NA	NO	NO	Details of tripping yet to be received.	From PMU, no AC system fault observed.	
6	800kV HVDC Agra-BNC-2	POWERGRID	30-Oct-18	9:08	Nil		NA	30-Oct-18	11:54	NA	NO	NO			
7	800kV HVDC (Agra-Allipurdwara) Pole-4 at Agra	POWERGRID	30-Oct-18	9:08	Nil		NA	30-Oct-18	22:14	NA	NO	NO			
8	800kV HVDC (Champa(PG)-Kurukshetra(PG)) Pole-2 at Kurukshetra	POWERGRID	5-Oct-18	16:01	Nil	External Block	NA	5-Oct-18	16:51	NA	YES	YES	Reason for External block command to be ascertained and rectified if wrongly operated.	Information received from NR end. Complete investigation report yet to be received. From PMU, no AC system fault observed.	
9	800kV HVDC (Champa(PG)-Kurukshetra(PG)) Pole-2 at Kurukshetra	POWERGRID	25-Oct-18	13:51	Nil	Due to VESDA	NA	25-Oct-18	15:52	NA	NO	NO	Details of tripping yet to be received.	From PMU, no AC system fault observed.	
10	400kV RAPS(NPC)-Shujalpur(PG)-2	NPCIL/ POWERGRID	6-Oct-18	11:47	Nil	DT received at RAPS end	NA	6-Oct-18	13:09	NA	YES	YES	Reason for DT received from Shujalpur end to be investigated.	Information received from NR end. From PMU, no fault observed.	
11	765kV Orai(PG)-Satna(PG)^^	POWERGRID	21-Oct-18	1:54	Nil	tripped on B-N fault	NA	21-Oct-18	15:18	NO	NO	YES (After 24hrs)		Information received from NR end. From PMU, B-N fault observed.	

Fault Clearance time has been computed using PMU Data from nearest node available and/or DR provided by respective utilities (Annexure- II)

*Yes, if written Preliminary report furnished by constituent(s)

R-Y-B phase sequencing (Red, Yellow, Blue) is used in the list content.All information is as per Northern Region unless specified.

^^tripping seems to be in order as per PMU data, reported information. However, further details awaited.

Reporting of Violation of Regulation for various issues for above tripping

1	Fault Clearance time(>100ms for 400kV and >160ms for 220kV)	1. CEA Grid Standard-3.e 2. CEA Transmission Planning Criteria
2	DR/EL Not provided in 24hrs	1. IEGC 5.2(r) 2. CEA Grid Standard 15.3
3	FIR Not Furnished	1. IEGC 5.9.6.a 2. CEA Grid Standard 12.2 (Applicable for SLDC, ALDC only)
4	Protection System Mal/Non Operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.A 2. CEA (Technical Standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1. (6.1, 6.2, 6.3)
5	A/R not operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.C 2. CEA Technical Planning Criteria