

**Part-A (NRPC):**

**1. Confirmation of Minutes:** Comments in Minutes of Meeting of 156th OCC

Following comments received:

- a) **HVPNL:** Annexure 4 Haryana Anticipated MW for March 2019 was intimated 6960 MW on Month ahead basis during the meeting.
- b) **APCPL:** The additional agenda point regarding "DSM 4<sup>th</sup> amendment sign reversal mandate" submitted by APCPL-IGSTPS Jhajjar has not been included in the minutes.

The issues faced by the Utilities will be referred to the Honorable CERC for perusal/review.

- c) **ADHPL:** Under item no. 28 – Certification of Non-ISTS line for inclusion in PoC charges for hydro rich States (Agenda by HPPTCL), the following is also to be incorporated in the Minutes of the Meeting.

1. The ADHPL-Nalagarh Transmission Line is a dedicated Transmission Line.
2. During the meeting in CEA for the approval of the sub-station after commissioning, it was agreed that the connectivity arrangement of the sub-station with ADHPL Dedicated Transmission Line by LILO in one circuit is an interim arrangement only so that the small hydro generations is not bottled up.
3. ADHPL-Nalagarh Dedicated Transmission Line does not fulfill the planning criteria prescribed in Indian Electricity Grid Code for ISTS system.
4. ADHPL Dedicated Transmission Line has already lost the N-1 criteria and is not capable of taking enough power for transmission. CEA has already recorded the fact in its minutes of meeting dated 04.02.2013.
5. The issue of terms for the use of the dedicated transmission line is subjudice before CERC pursuant to the order of the Hon'ble Supreme Court of India.

**2. Review of Grid operations of February, 2019:**

- Supply Position (Provisional) for February, 2019
- Anticipated Power Supply Position v/s Actual Power Supply Position (Provisional) of Northern Region during the month of February, 2019 is as given below:

<b>February</b>							
State	Req/ Avl	Anticipated	Actual	%age Variation	Anticipated	Actual	%age Variation
		(MU)			(MW)		
Chandigarh	Avl	110	97	-12.0	315	194	-38.4
	Req	100	97	-3.3	230	194	-15.7
Delhi	Avl	3220	1856	-42.4	5770	4386	-24.0
	Req	1790	1855	3.7	4110	4398	7.0

<b>February</b>							
State	Req/ Avl	Anticipated	Actual	%age	Anticipated	Actual	%age
		(MU)		Variation	(MW)		Variation
Haryana	Avl	5030	3310	-34.2	8380	6946	-17.1
	Req	3510	3310	-5.7	7550	6946	-8.0
H.P.	Avl	920	803	-12.7	2320	1679	-27.6
	Req	790	801	1.4	1650	1679	1.8
J&K	Avl	770	1320	71.4	2040	2433	19.3
	Req	1610	1588	-1.4	2800	3041	8.6
Punjab	Avl	4782	2881	-39.8	8144	5716	-29.8
	Req	3350	2881	-14.0	6890	5716	-17.0
Rajasthan	Avl	8052	6480	-19.5	12318	12650	2.7
	Req	6392	6482	1.4	12198	12650	3.7
U.P.	Avl	9520	7177	-24.6	16700	14908	-10.7
	Req	7980	7177	-10.1	15400	14908	-3.2
Uttarakhand	Avl	900	1037	15.2	1950	2182	11.9
	Req	1170	1038	-11.3	2150	2182	1.5

- As per above, it has been observed that there are much variations (i.e. > 5.0%) in the Anticipated vis-à-vis Actual Power Supply Position (Provisional) for the month of February, 2019 in terms of Energy Requirement for Haryana, Punjab, Uttarakhand & UP and in terms of Peak Demand for J&K, Punjab, Chandigarh, Delhi & Haryana. **These states are requested to submit reasons for such variations in writing so that the same can be deliberated in the meeting.**
- All SLDCs are requested to furnish the provisional and revised power supply position in prescribed formats by 2nd and 15th day of the month respectively in compliance to the provision 5.3 of IEGC.

### 2.1 Power Supply Position of NCR:

- NCR Planning Board (NCRPB) is closely monitoring the power supply position of National Capital Region. Monthly power supply position for NCR till the month of January, 2019 is placed on NRPC website. ([www.nrpc.gov.in/meetings/occ.html](http://www.nrpc.gov.in/meetings/occ.html))

### 3. Planning of Grid Operation:

- Anticipated Power Supply Position in Northern Region for April, 2019
- The Anticipated Power Supply Position in Northern Region for April, 2019 is enclosed at **Annexure 4.**

- SLDCs are requested to inform their updated estimate of power supply position for April, 2019 and measures proposed to be taken to bridge the gap in availability as well to dispose of the surplus, if any, in the prescribed format.

#### **4. Technical Minimum loading of Steam Turbines of NTPC Gas Stations - Reg. (Agenda by NTPC)**

In the Detailed Operating Procedure approved by CERC which came into effect from 15/05/2017, under para 4(v) Definitions:- "On Bar Installed Capacity" means the summation of name plate capacities or the capacities as approved by the Commission from time to time, of all units of the generating station in MW which are on bar. In case of a combined cycle module of a gas/liquid fuel stations, the installed capacity of steam turbine shall be in proportion to the on bar capacity of Gas turbines of the the module.

It is observed that most of the time, gas stations are scheduled on technical minimum even when half module is on bar. This leads to steam turbine loading of 18% of its capacity in case of Anta GPS where we have 3 GT plus 1 ST module combination and 24% in case of other Gas Stations with 2 GT plus 1 ST module combination. This is much below the "Technical Minimum" defined under para 4(vii) in the same DOP which is reproduced as below:- "Technical Minimum for operation in respect of a Unit(s) of a Thermal Generating Station shall be 55% of Maximum Continuous Rating or MCR loading or installed capacity of the units on bar at the generating station after deducting normative auxillary Energy Consumption plus Auxiliary Energy consumption compensation as per the provisions of the grid code."

Heavy erosion are observed on last stages of LP steam Turbines blades and casing which are outcome of low load operation of Steam turbines of Gas Stations. Few photographs are attached herewith.

In view of of above NRLDC is requested to ensure technical minimum of 55% loading of Steam Turbines of Gas Stations while scheduling power from these stations in line with the practice being followed for Coal Based Stations.

#### **5. FY 19-20 Over haul of NTPC/NR Stations pending for approval: (Agenda by NTPC)**

FY 19-20 Over haul of NTPC/NR Stations will start from 01.04.19, till date NRPC Approved over haul plan is not available. Over haul plan may be approved by 10.03.19, so that Contracting agencies, Material can be mobilized well before beginning of over haul.

#### **6. Exemption from sign reversal for solar power stations for DSM calculation: (Agenda by NTPC)**

As there is no way out for sign reversal in solar power station, exemption may be given to solar power station from sign reversal for DSM Calculation, similar to the practice in WRPC.

**7. Replacement of existing HVPNL ABT Energy Meters with GPS synchronized & ether net port Energy Meters at JPL site (Agenda by CLP Jhajjar)**

HVPNL are facing issue of time drift since 2012 in existing HVPNL ABT Energy Meters (Main & Check both) installed at all 400 KV outgoing feeders emanating from Jhajjar Power Ltd (CLP India). Many 400 KV line shutdowns have been taken by us for rectification of time drift of these Energy Meters. Time correction requires presence of 04 agencies and this is time consuming activity. Hence, we suggest to replace the existing ABT Energy Meter with GPS Synchronized Energy Meters and also Ethernet port for remote online metering & Energy accounting purpose.

**8. NRPC:** A meeting was held in CEA on 05.03.2019 to discuss the feasibility of optimization of maintenance schedule of Pan India ISGS units by considering availability of surplus power in one region and deficit in other region.

**Member may deliberate on the matter.**

**Part-B (NRLDC)**

**1. Summer preparedness 2019**

Demand of Northern Region is likely to increase from Mar'19 onwards with increase in temperature. Summer of Northern region are typically hot and demand is also high during this time, therefore advance actions help in better grid operation.

Following few points are important that would help in smooth Grid operation especially for coming summer:

S. No.	Issues	Action plan	Action by
1	<b>Weather Monitoring</b> During summer, sudden rainfall, thunderstorm, high temperature, humidity etc. is a common phenomenon and all these factors impact the pattern of load or load behavior.	Indian Meteorological Department (IMD) has developed dedicated website for power sector. RLDC in collaboration with IMD has conducted various workshops also for understanding the weather data & utilize it to forecast the load. In addition to IMD data, Northern region has telemetry of temperature & humidity of various nodes in each state control area however, it needs improvement. Even before 2018-19 winter, in 40 <sup>th</sup> TCC-43 <sup>rd</sup> NRPC meeting and in 150 <sup>th</sup> and subsequent OCC meetings this issue of temperature and humidity telemetry has been highlighted, yet concrete actions are still to be taken in this direction.	NRLDC, SLDCs, and POWERGRID
2	<b>Demand Forecast</b>	Despite the continuous efforts by all stakeholders, deviations on daily basis are experienced therefore,	SLDCs

S. No.	Issues	Action plan	Action by
	Load forecast has been started by each state control area on daily basis and as of now each state has mapped the same into SCADA also.	load forecast prediction needs more accuracy. J&K, Punjab and HP have not shared load forecasted by them from past 3-4 months.	
3	<p><b>Portfolio Management, load staggering</b></p> <p>States such as Rajasthan and Haryana continue to connect/disconnect large quantum of load at hourly boundaries resulting in frequency spikes and instantaneous overvoltages. This has also resulted in tripping of lines on overvoltage in recent past.</p>	<p>Apart from LTA/MTOA/STOA/Market arrangements based on forecast, other short term arrangements should also be planned for real time imbalances. For example, adequate margin while scheduling own thermal generation, units on bar, maintenance of reserves, technical minimum operation of thermal units in case of load crash, tie up with neighbor states or hydro rich states etc. to bridge the load-generation gap in real time.</p> <p>In view of high/increasing demand &amp; transmission constraints (if any) in importing the power or in case of any contingency in the system, states are requested to maximize their internal generation to avoid low frequency/low voltage operation or other related issues.</p>	SLDCs
4	<p><b>Maintenance of reserves</b></p> <p>During summer, in anticipation of increasing demand, adequate reserves shall be maintained. Same has been advocated by Hon'ble commission also in IEGC 5<sup>th</sup> amendment.</p>	<p>During summer, sudden outage of hydro units on silt or other major generation outage affects frequency/voltage, line loading, reliability and security of the corridor/control area/Generation complex etc. In such cases, apart from portfolio management based on proper forecast as discussed above, re-starting of units under reserve shutdown at state as well as Inter-state level through appropriate transactions is required.</p> <p>Moreover, display window showing reserve available in ISGS generators has been developed at NRLDC. SLDCs are also requested to arrange for such display window at their control centers so that system operators readily know quantum of reserve available and hence better real-time actions can be taken.</p> <p>In events of sudden load crash, ISGS generators are being instructed to back down to 55% of their installed capacity. However, amongst states only UP state controlled generators are seen to be backing down upto 55%, which ensures that sufficient reserves are available to cater any variation in demand. Other states are also requested to take actions to ensure backing</p>	NRLDC, SLDCs, Generators

S. No.	Issues	Action plan	Action by
		down of generators to 55% of their capacity in case of critical situations. This would ensure reserves in the system and also make us prepared for extreme situations.	
5	<p><b>Furnishing of coal stock position</b></p> <p>Advance information of coal stock of thermal plants ensures generating units availability and it is very important during high demand season.</p>	It has been observed in past years that sudden information of outage of thermal units on coal unavailability pose challenges to meet high demand. It is therefore requested to update & share coal stock position of thermal plants at least a week in advance as agreed earlier in TCC/NRPC meeting.	Generators, SLDCs
6	<p><b>Hydro Generation &amp; Silt monitoring</b></p> <p>During summer, sudden &amp; frequent hydro plant shutdown due to high silt is a major issue in which major Hydro stations like Karcham, N. Jhakri, Rampur, Baspa, Dehar, Bairasuil, Salal, Parbati-3 are affected . More than 4500-5000 MW of generation in 2018 and 5000-6000 MW in 2017 went under forced outage on several instances due to silt resulting in frequency drop, congestion of corridor, over drawl etc.</p>	<p>This issue has been discussed in various OCC/TCC meetings and an action plan was agreed as given below:</p> <ul style="list-style-type: none"> <li>• Action for Generator <ul style="list-style-type: none"> <li>– Silt monitoring/Silt forecasting for planned hydro outage [<b>Advance information</b>]</li> <li>– Reduction of Generation/Tripping of Units as per protocol (Staggering of units)</li> <li>– Slow ramping down of generation on the units to be closed as per protocol.</li> </ul> </li> <li>• Action by SLDC/Constituents <ul style="list-style-type: none"> <li>– <b>Generation reserve to be maintained</b> <ul style="list-style-type: none"> <li>• Own Generation</li> <li>• Contracted Generation from Other State/Traders</li> </ul> </li> <li>– Load management to be planned</li> <li>– Optimization of Hydro generation as per demand requirement</li> <li>– States such as HP has 954MW of share in ISGS hydro generators and nearly 1100MW of state owned hydro while only 121MW of share in ISGS thermal generators. When hydro generators get out on silt based outages most</li> </ul> </li> </ul>	Generators, SLDCs

S. No.	Issues	Action plan	Action by
		<p>of this generation is not available, and hence HP faces critical situations and has to resort to overdrawl, request power from RRAS to meet demand. It is requested to explore options for broadening state generation portfolio and making agreements with conventional generators.</p>	
7	<p><b>Tower Strengthening and availability of ERS</b></p> <p>There have been number of instances of tower collapse &amp; damage in the past during such thunder storms which resulted in constraints in supply power for extended duration of time.</p>	<p>Number of tower collapse incidents occurred during last summer also in May/Jun'18 in which many EHV lines out on tower collapse along with important inter-regional line i.e. 765 kV Agra-Gwalior ckt-1, 765kV Gaya-Varanasi ckt-1, HVDC Agra-BNC Line-1. Apart from EHV line outage on tower collapse, nearly 30-40 lines used to be opened manually to control high voltage.</p> <p>The tower strengthening and availability of Emergency Restoration System (ERS) [for early restoration of supply] have been observed as mitigation tools for such scenario: Each utility shall work on plan for tower repairing work before April.</p>	STUs and POWERGRID
8	<p><b>Reactive power management</b></p>	<p>Since last summer, it has been observed that voltage profile during summer has improved. Low voltages have been experienced at some locations e.g. Kashmir valley, Western UP and 220 kV Nodes in Punjab. To maintain the voltage profile of Grid within IEGC band during summer, following known actions are suggested:</p> <ol style="list-style-type: none"> <li>i. Switching ON Capacitor/Switching OFF reactor as per system requirement</li> <li>ii. Tap Optimization at 400/220kV by NRLDC and 220/132kV by respective state control area based on scatter plots of ICTs, offline studies, NRPC RE account etc.</li> <li>iii. Dynamic reactive support from Generator as per their capability curve.</li> <li>iv. Synchronous condenser operation [in case water can</li> </ol>	NRLDC, SLDCs

S. No.	Issues	Action plan	Action by
		be stored] v. SCADA Displays for better visualization	
9	<p><b>Defense Mechanism</b></p> <p>Several defense mechanisms have been recommended by various committees and advantages of such defense schemes have been discussed in many fora too. Majority of defense mechanisms are to cover protection for under voltage, under frequency, rate of change of frequency, SPS for line/ICTs loading/generator complex evacuation etc.</p>	<p>Till date it has been observed that performance of SPS is considerably low. Accurate operation of SPS is very essential and hence, mapping of SPS in SCADA is also being done. It is pertinent to mention here that SPS is only for operational defense and should not be considered as long term solution.</p> <p>Moreover, islanding schemes have also been implemented in NR.</p> <p>It is suggested that all state control area/Users shall ensure before start of summer that their protection and defense system are in working conditions and settings are as per the recommendations of NRPC. In addition, all states/user need to provide update for changes or modifications carried out if any.</p>	Transmission utilities (STU/ISTS) and SLDCs
10	<p><b>Telemetry</b></p> <p>It has been observed number of times, that telemetry of large nos of stations is affected during contingency, inclement weather, or in day to day switching operations etc.</p>	<p>Such unavailability of data especially during switching or contingency, hampers the fast action at control centers. Therefore, all are requested to ensure the telemetry of all analog &amp; digital points of all stations at respective control centers. Large number of issues are encountered with new elements. Recently, many new substation/elements have been commissioned in UP, Rajasthan, J&amp;K etc. though telemetry of some elements is either not available or not reliable.</p>	SLDCs STUs

**2. Computation of TTC/ATC of respective control areas**



NRLDC has done preliminary studies for assessing the TTC/ATC of large state control area for upcoming summer as per information available at NRLDC. Before summer season, each state shall assess and share its ATC/TTC as agreed earlier and as per CERC regulations.

TTC/ATC of summer 2019 and constraints expected this summer are given below:

State	TTC during Summer-18 (MW)	Constraints anticipated	Actions required
Punjab	<p>State own generation= 5970 MW (High hydro)</p> <p>TTC= 6600 MW (on managing the load locally at Rajpura and Amritsar ICTs)</p> <p>ATC= 6000 MW (Considering reliability margin as 600 MW)</p>	<p>N-1 compliance issues at Rajpura, Amritsar, Dhuri and Makhu ICTs</p> <p>Many 220kV lines near Amritsar(PG) and Ludhiana(PG) are also critically loaded</p> <p>TTC figure is dependent on the quantum of generation at higher voltage level like Talwandi and Rajpura. Less generation at these stations would assist in drawing more interstate power. However, backing down of generation at Talwani or Rajpuraincreases loading on 400/220 kV Moga ICTs.</p>	<ul style="list-style-type: none"> <li>• Increase in generation at 220kV level would help in meeting high demand &amp; also improve voltage profile.</li> <li>• New 220kV lines may be planned and existing network reorganised to relieve the loading on ICTs and to meet loads through paths that are less loaded.</li> </ul>
UP	<p>State own generation= 10590 MW</p> <p>TTC= 12300 MW</p> <p>ATC= 11700 MW (Considering reliability margin as 600 MW)</p>	<p>N-1 compliance issue at Lucknow (UP), Obra, Unnao, Sarnath ICTs</p> <p>Many 220 kV lines like Bareilly-Dohna, Bareilly-CB Ganj and Meerut-Modipuram are critically loaded.</p>	<ul style="list-style-type: none"> <li>• Monitor and ensure N-1 compliance at Lucknow (PG), Obra, Azamgarh, Moradabad, Gorakhpur (PG) etc.</li> <li>• Expedite commissioning of underlying n/w at recently commissioned 765kV &amp; 400kV stations to reduce loading on other heavily loaded lines and ICTs</li> </ul>

State	TTC during Summer-18 (MW)	Constraints anticipated	Actions required
Delhi	State own generation= 584 MW (No generation at BTPS) TTC= 6500 MW ATC= 6200 MW (Considering RM as 300 MW)	N-1 compliance issue at Bamnoli ICTs and high loading at Harshvihar ICTS and 220 kV Ballabgarh-BTPS lines	<ul style="list-style-type: none"> <li>• Loading on 220 kV Harsh Vihar - PreetVihar - Patparganj to be monitored closely and new arrangements to feed the load to be worked on</li> </ul>
Haryana	TTC: 7500 ATC: 6900	<ul style="list-style-type: none"> <li>• N-1 non-compliance at Fatehabad, Abdullapur and Panipat</li> <li>• 220kV lines from Hisar, Lula ahir, Abdullapur etc. are heavily loaded</li> </ul>	<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> <li>• Alternate arrangement for reducing loading on above lines need to be expedited.</li> </ul>
Rajasthan	(Generation : 4890MW) TTC: 6200 ATC: 5600  (Generation : 6390MW) TTC: 5000 ATC: 4400	<ul style="list-style-type: none"> <li>• N-1 contingency of Phagi, Jodhpur &amp; Merta ICTs</li> <li>• Constraint for evacuation of power from Rajwest</li> <li>• High loading of ICTs at Akal and need for reactive power support</li> </ul>	<ul style="list-style-type: none"> <li>• Expedite commissioning of 3rd ICT at Phagi</li> <li>• New ICT to be planned at Jodhpur and Akal</li> <li>• Expedite commissioning of 400kV Rajwest-Barmer # 2 bays at Barmer end by RRVPNL</li> </ul>

States are requested to regularly compute TTC/ATC figures and manage loading to ensure N-1 compliance for elements under their jurisdiction. Members may please discuss.

### 3. Requirement of power flow and dynamics data for modeling renewable energy generation in Indian grid

Need of power flow and dynamic data for modeling renewable energy generation was discussed in detail in 155th OCC meeting. It was highlighted that to ensure security of the interconnected power grid, it is imperative to conduct stability studies in both operational (short-term) and planning (long-term) horizons in the power grid. To gain confidence in the stability studies that

adequately represent system performance, fit-for-purpose models of power system elements are of utmost importance.

Procedure issued by CTU for grant of connectivity to projects based on renewable sources to Inter-state transmission system does not specify any format for collection of modelling data. Although RE generation is being progressively added to both ISTS and Intra-STS, gap exists in terms of availability of necessary data for modelling.

Accordingly, guidelines for collection of data for modelling utility scale wind and solar generation installations in India have been prepared by POSOCO and were enclosed in Annexure in 155th OCC meeting as well (attached as Annexure again for reference). No data has been received thereafter.

Dynamic data of conventional generator are still pending from various agencies. Latest status of dynamic data submission is enclosed in **Annexure-I**.

**Members may please discuss.**

#### 4. Frequent forced outages of transmission elements

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

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	315MVA ICT 1 at 400/220kV Makhu(Pun)	14	Punjab
2	315MVA ICT 1 at 400/220kV Mukatsar(Pun)	9	Punjab
3	400kV Dadri(NTPC)-Panipat(BBMB) ckt-1	8	POWERGRID/NTPC/BBMB
4	500MVA ICT 1 at 400/220kV Dhuri(Pun)	8	Punjab
5	400kV Anpara(UP)-Mau(UP)	6	UP
6	400kV Kishenpur(PG)-New Wanpoh(PG) ckt-1	6	POWERGRID
7	400kV Bareilly(UP)-Unnao(UP) ckt-1	5	UP
8	315MVA ICT 2 at 400/220kV Mukatsar(Pun)	5	Punjab
9	315MVA ICT 1 at 400/220kV Nakodar(Pun)	5	Punjab
10	400kV Kishenpur(PG)-New Wanpoh(PG) ckt-4	4	POWERGRID
11	315MVA ICT 4 at 400/220kV Abdullapur(PG)	3	POWERGRID
12	765kV Anpara C(UP)-Unnao(UP)	3	UP
13	400kV Bareilly(UP)-Unnao(UP) ckt-2	3	UP
14	400kV Bikaner(Raj)-Suratgarh(Raj)	3	Rajasthan
15	400kV Chamera pool(PG)-Jalandhar(PG) ckt-1	3	POWERGRID

S. NO.	Element Name	No. of forced outages	Utility/SLDC
16	400kV Dadri(NTPC)-Muradnagar(UP)	3	POWERGRID/NTPC/UP
17	400kV Khedar(HVPNL))- Nuhiyawali(HVPNL) ckt-2	3	Haryana

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

#### 5. Multiple element tripping events in Northern region in the month of Feb'19:

A total of **20** grid events occurred in the month of Feb'19 of which **9** 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 04-Mar-19 is attached at **Annexure-III**.

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

Maximum Fault Duration is **1000ms** in the event of tripping of 400kV Khedar-Kirori D/C on 24<sup>th</sup> Feb 2019 at 20:51hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **4** events out of 20 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.**

#### 6. Details of tripping of Inter-Regional lines from Northern Region for Feb'19:

A total of **13** inter-regional lines tripping occurred in the month of Feb'19. The list is attached at **Annexure-IV**. 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.

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

## Annexure 4

State		MU	MW
		Apr-19	Apr-19
Chandigarh	Availability	134	329
	Requirement	133	313
	Surplus/Shortfall (MU)	1	16
	Surplus/Shortfall (%)	0.5%	5.2%
Delhi	Availability	3054	5982
	Requirement	2770	5400
	Surplus/Shortfall (MU)	284	582
	Surplus/Shortfall (%)	10.3%	10.8%
Haryana	Availability	5964	9150
	Requirement	3545	7700
	Surplus/Shortfall (MU)	2419	1450
	Surplus/Shortfall (%)	68.2%	18.8%
Himachal Pradesh	Availability	255	1360
	Requirement	812	1558
	Surplus/Shortfall (MU)	-557	-199
	Surplus/Shortfall (%)	-68.6%	-12.7%
Jammu & Kashmir	Availability	1206	2213
	Requirement	1672	2752
	Surplus/Shortfall (MU)	-466	-539
	Surplus/Shortfall (%)	-27.9%	-19.6%
Punjab	Availability	4347	6966
	Requirement	3840	7039
	Surplus/Shortfall (MU)	507	-73
	Surplus/Shortfall (%)	13.2%	-1.0%
Rajasthan	Availability	9328	15713
	Requirement	6061	10620
	Surplus/Shortfall (MU)	3267	5093
	Surplus/Shortfall (%)	53.9%	48.0%

	(%)		
Uttar Pradesh	Availability	11759	18319
	Requirement	9960	18000
	Surplus/Shortfall (MU)	1799	319
	Surplus/Shortfall (%)	18.1%	1.8%
Uttarakhand	Availability	626	1454
	Requirement	1161	2012
	Surplus/Shortfall (MU)	-535	-558
	Surplus/Shortfall (%)	-46.1%	-27.7%
Total NR	Availability	36674	61485
	Requirement	29954	51529
	Surplus/Shortfall (MU)	6719	9956
	Surplus/Shortfall (%)	22.4%	19.3%

## ANNEXURE-1

S.No.	Utility	Plant	Generator	Exciter	Governor	Stabilizer	Remarks (data not given)
1	NHPC	Chamera-1	Yes	Yes	Partial	Yes	Governor data is not in defined model/format, not able to process that data
		Chamera-2	Yes	Yes	Yes	No	T <sup>o</sup> q,XI & S(1.0)
		Chamera-3	Yes	Yes	Yes	Yes	S(1.0) & S(1.2)
		Dhauliganga	Yes	Yes	Yes	Yes	Exhaustive data for excitation and stabilizer but not in defined model/format
		Bairasuil	Yes	Yes	Partial	Yes	Exciter & stabilizer coupled in excitation system
		Uri-1	Yes	Yes	Yes	Yes	
		Uri-2	Yes	Partial	Yes	Yes	Exhaustive data given for AVR, though not in defined model.
		Dulhasti	Partial	Partial	yes	No	Excitation data is not in defined model
		Parbati-III	Partial	No	Partial	No	Only block diagram given for excitation system, rest data is not in defined format
		Salal	Partial	Partial	No	Partial	Excitation system block diagram with and without PSS is given. Some partial data for excitation system is given only. Data not in format
2	NTPC	Sewa-II	Partial	No	Yes	Yes	Governor and stabilizer block diagram has given and data is also shared. As the data is not defined for any standard model, we are checking the data
		Rihand	Yes	Yes	No	Yes	Stabilizer data only for Rihand -1 is given
		Dadri Thermal-2	Yes	Yes	No	No	
		Singrauli	Yes	Yes	No	No	
		Unchahar-1	Yes	Yes	No	No	
		Badarpur	Yes	Yes	No	No	Unit # 1,2,3 of 95 MW each
		Unchahar-4	Yes	Yes	Yes	No	
		NJPC	Yes	Yes	No	Yes	T <sup>o</sup> d <sub>0</sub> , T <sup>o</sup> q <sub>0</sub> & S(1.2)
		Rampur	Yes	No	No	No	
		Parichha	Partial	Yes	No	No	Time constants & Unit#7
3	SJVNAL	Hariduaganj	Partial	No	No	No	Unit#2
		Anpara-1,2,3	Yes	Yes	No	Yes	
		Anpara-4,5	Yes	Yes	No	Yes	
		Obra	Yes	No	No	No	
		Hariduaganj Unit#7 (120 MW)	Yes	No	No	No	Model name has been given (Transfer function diagram of static excitation system also shared) [Governor model not defined]
		Yamuna nagar	Yes	Yes	No	Yes	Inertia
		Panipat-1,2	Yes	Yes	No	Yes	
		Khedar	Yes	No	No	Yes	
		Ropar	Yes	Yes	Yes	Yes	
		Rajpura	Yes	Yes	Yes	No	
4	UPRVUNL	Talwandi Saboo	Yes	No	No	No	Model name has been given for excitation system, governor though data has not submitted
		Karcham Wangtoo	Yes	No	No	No	
		Malana-2	Yes	No	No	No	
		AD Hydro	Yes	No	No	No	
		Shree Cement	Yes	No	No	No	
		Roza-IPP	Yes	No	No	No	
		Lalitpur-IPP	Yes	Yes	No	Yes	
		RRVPNL	Partial	yes	Partial	No	XI, S(1.0),S(1.2)
		DTL	Partial	No	No	No	
		PPS-III	Partial	Partial	Partial	No	Not in any standard model, exhaustive data has given. Checking the data
15	HPPCL	Sainj HEP	Yes	Partial	Partial	Partial	Proposed settings are not given
		Tehri	Yes	Yes	Yes	Yes	
		Koteshwar	Yes	Yes	Yes	Yes	

S.No.	Utility	Plant Name	Plant Capacity		
1	NTPC	Dadri thermal-1	1820		
		Unchahar-2,3	1050		
		Dadri GPS	830		
		Anta GPS	419		
		Auraiya GPS	663		
		Faridabad GPS (NTPC)	432		
		Koldam	800		
2	NHPC	Tanakpur-HPS	690		
		NAPS	440		
3	NPC	RAPS A (NPC)	300		
		RAPS- b	440		
		RAPS- c	440		
		Bhakra HPS	1379		
4	BBMB	Dehar HPS	990		
		Pong HPS	396		
		Budhil HPS(IPP)	70		
5	IPP	Guru Nanak Dev TPS(Bhatinda)	460		
		Guru Hargobind Singh TPS(L.mbt)	920		
6	PSTCL		1320		
		Haryana	Jhajar(CLP)	1320	
		J&K	Baglihar HPS (IPP)	1240	
		9	Uttarakhand	All hydro plants	1500
				kota TPS	1240
		10	Rajasthan	Suratgarh TPS	1500
				Chabra TPS	1660
				Dholpur GPS	330
				Ramgarh GPS	271
				Barsingsar (NLC)	250
Giral LTPS	250				
Rajwest LTPS (IPP)	1080				
Kalisindh	1200				
11	UPPTCL			Panki TPS	210
				Tanda TPS (NTPC)	440
		Anpara-C (IPP)	1200		
		Bajaj Energy Pvt.Ltd(IPP) TPS	450		
		Anpara-D	1000		
		Bara	1980		
		Vishnuparyag HPS (IPP)	440		
12	Delhi	Alakananda	330		
		Rajghat TPS	135		
		Delhi Gas Turbine	282		
		Rithala GPS	108		
		Bawana GPS	1370		
13	HPSEB	Baspa HPS (IPP)	300		
		Malana HPS (IPP)	86		

### Rajasthan RE generators

1	PSS_132KV_DALOT_KANGARH
2	PSS_132KV_KOLAYAT_RAYS
3	PSS_132KV_NOKHADHAIYA_3No_33KV
4	PSS_132KV_PS2_GODAWARI_GREEN
5	PSS_132KV_PS2_PRECISION
6	PSS_132KV_PS3_BNO_33KV
7	PSS_132KV_PS3_WELSPUN
8	PSS_132KV_RANI_RANI
9	PSS_132KV_SHEO_SUZLON
10	PSS_220KV_BADISID_EDEN
11	PSS_220KV_BADISID_TERRAFORM
12	PSS_220KV_BALOTRA_BALOTRA
13	PSS_220KV_BAP_MAHI_NDRA
14	PSS_220KV_BHAWAD_SNCA
15	PSS_220KV_GULABPURA_GULABPURA
16	PSS_220KV_KHINWSAR_KHI_NWSAR
17	PSS_220KV_PRATAPGARH_DEVGARH
18	PSS_220KV_PRTAPGRH_WELSPUN_TATA
19	PSS_220KV_TINWARI_3NO_33KV
20	PSS_400KV_AKAL_AKAL
21	PSS_400KV_AKAL_DEVIKOT
22	PSS_400KV_AKAL_JAJIYA
23	PSS_400KV_AKAL_BHU
24	PSS_132KV_DALOT_33KV_DALOT
25	PSS_220KV_DECHU_DSPPL
26	PSS_220KV_DECHU_RSTPL
27	PSS_220KV_NEEMRANA_NEEM_RANA
28	PSS_220KV_TINWARI_KETUKALAN
29	PSS_132KV_AAU_AAU
30	PSS_132KV_KOLAYAT_BNO_33KV
31	PSS_132KV_OSIAN_DUNDHARA
32	PSS_132KV_SHAHPURA_SHAHPURA_BHILWA
33	PSS_400KV_AKAL_DANGRI
34	PSS_400KV_AKAL_RAIGARH
35	PSS_400KV_AKAL_MULANA
36	PSS_220KV_AMARSAGAR_MOKALA
37	PSS_220KV_AMARSAGAR_LUDARWA
38	PSS_220KV_AMARSAGAR_KALADUNGAR
39	PSS_220KV_BHOPALGARH_DEBARI
40	PSS_220KV_RAMGARH_TEJUWA_II
41	PSS_220KV_RAMGARH_RAMGARH
42	PSS_132KV_CHAMLU_DERI_A
43	PSS_132KV_PS8_SALODI
44	PSS_132KV_JAYAL_JAYAL



S. NO.	Element Name	Outage Date	Outage Time	Reason/Remarks
1	315MVA ICT 1 at 400/220kV Makhu(Pun)	1-Feb-19	1:52	Over fluxing.
		3-Feb-19	1:14	Over fluxing.
		4-Feb-19	3:06	Over fluxing.
		6-Feb-19	2:50	Over fluxing.
		7-Feb-19	23:42	Over fluxing.
		9-Feb-19	3:55	Over fluxing.
		11-Feb-19	1:43	Over fluxing.
		12-Feb-19	1:15	Over fluxing.
		13-Feb-19	3:09	Over fluxing.
		14-Feb-19	4:51	Over fluxing.
		14-Feb-19	22:57	Over fluxing.
		16-Feb-19	2:32	Over fluxing.
		17-Feb-19	2:28	Over fluxing.
2	315MVA ICT 1 at 400/220kV Mukatsar(Pun)	18-Feb-19	2:22	Over fluxing.
		4-Feb-19	3:13	Over fluxing.
		6-Feb-19	0:56	Over fluxing.
		7-Feb-19	0:25	Over fluxing.
		7-Feb-19	23:17	Over fluxing.
		10-Feb-19	2:56	Over fluxing.
		11-Feb-19	4:01	Over fluxing.
		13-Feb-19	4:00	Over fluxing.
3	500MVA ICT 1 at 400/220kV Dhuri(Pun)	15-Feb-19	0:31	Over fluxing.
		18-Feb-19	3:33	Over fluxing.
		3-Feb-19	0:32	Over fluxing.
		6-Feb-19	20:06	Over fluxing.
		8-Feb-19	0:08	Over fluxing.
		12-Feb-19	1:50	Over fluxing.
		15-Feb-19	1:42	Over fluxing.
4	400kV Dadri(NTPC)-Panipat(BBMB) ckt-1	16-Feb-19	2:46	Over fluxing.
		17-Feb-19	3:52	Over fluxing.
		18-Feb-19	3:57	Over fluxing.
		8-Feb-19	4:03	Over voltage.
		11-Feb-19	3:25	Over voltage.
		15-Feb-19	2:44	Over voltage.
		18-Feb-19	12:30	Tripped due to bus bar protection operated due to CT blast in Tie-bay of Dadri-Panipat ckt 2 at Panipat(BBMB) end.
		25-Feb-19	4:03	Over voltage.
5	400kV Anpara(UP)-Mau(UP)	25-Feb-19	23:46	Over voltage.
		26-Feb-19	22:01	Over voltage.
		28-Feb-19	1:25	Over voltage.
		8-Feb-19	2:33	R-B fault.
		8-Feb-19	12:12	B-N fault, 164.6 km from Anpara(UP) end.
		9-Feb-19	5:55	R-N fault, 176 km from Anpara(UP) end.
6	400kV Kishenpur(PG)-New Wanpoh(PG) ckt-1	15-Feb-19	11:33	R-N fault, 177.4 km from Anpara(UP) end.
		15-Feb-19	12:40	Fault at tower no-156.
		24-Feb-19	17:56	B-N fault, 16.2 km from Anpara(UP) end.
		1-Feb-19	10:00	R-N fault.
		7-Feb-19	13:37	B-N fault.
		7-Feb-19	16:54	R-N fault.
7	315MVA ICT 2 at 400/220kV Mukatsar(Pun)	20-Feb-19	22:28	B-N fault, 122 km from Kishenpur(PG) end.
		21-Feb-19	13:27	B-N fault, 16.6Km from N.Wanpoh(PG) end.
		27-Feb-19	2:50	Y-N fault, 31.4 Km from new Wanpoh(PG) end.
		3-Feb-19	0:52	Over fluxing.
		4-Feb-19	3:06	Over fluxing.
8	315MVA ICT 1 at 400/220kV Nakodar(Pun)	8-Feb-19	3:46	Over fluxing.
		12-Feb-19	1:36	Over fluxing.
		15-Feb-19	2:03	Over fluxing.
		6-Feb-19	3:49	Over fluxing.
		7-Feb-19	0:04	Over fluxing.
9	400kV Bareilly(UP)-Unnao(UP) ckt-1	12-Feb-19	4:26	Over fluxing.
		15-Feb-19	2:27	Over fluxing.
		18-Feb-19	3:45	Over fluxing.
		4-Feb-19	21:32	R-N fault, Line auto reclosed at Bareilly(UP) end.
		9-Feb-19	4:43	R-N fault, 182km from Unnao(UP) end.
10	400kV Kishenpur(PG)-New Wanpoh(PG) ckt-4	11-Feb-19	2:09	B-N fault, 13.5 km from Unnao(UP) end.
		15-Feb-19	15:02	R-Y fault, 28.7km from Bareilly(UP) end.
		28-Feb-19	19:09	B-N fault, 121.7 km from Unnao(UP) end.
		7-Feb-19	14:21	R-N fault. Line under breakdown
		1-Feb-19	5:37	B-N Fault.
		1-Feb-19	9:23	B-N Fault.
		7-Feb-19	13:01	B-N Fault.

11	315MVA ICT 4 at 400/220kV Abdullapur(PG)	8-Feb-19	0:43	Over fluxing.
		21-Feb-19	3:55	Over fluxing.
		27-Feb-19	3:18	Over fluxing.
12	765kV Anpara C(UP)-Unnao(UP)	6-Feb-19	6:30	Y-N fault, 17.6 km from Unnao(UP) end.
		15-Feb-19	3:49	Y-N fault.
		16-Feb-19	5:59	Y-N fault, 155.2 km from Unnao(UP) end.
13	400kV Bareilly(UP)-Unnao(UP) ckt-2	5-Feb-19	3:51	Over voltage.
		17-Feb-19	11:08	Y-B Fault.
		22-Feb-19	15:46	Y-B fault, 27.6km from Unnao(UP) end.
14	400kV Bikaner(Raj)-Suratgarh(Raj)	5-Feb-19	21:22	R-N fault, 8.2 Km Bikaner(Raj) end.
		6-Feb-19	21:21	R-N fault, 87.5km from Bikaner(Raj) end.
		27-Feb-19	3:44	Over voltage.
15	400kV Chamera pool(PG)-Jalandhar(PG) ckt-1	7-Feb-19	3:59	R-Y Fault.
		7-Feb-19	16:00	B-N fault.
		8-Feb-19	2:21	B-N fault.
16	400kV Dadri(NTPC)-Muradnagar(UP)	25-Feb-19	23:46	Over voltage.
		26-Feb-19	22:01	Over voltage.
		28-Feb-19	1:25	Over voltage.
17	400kV Khedar(HVPL)-Nuhiyawali(HVPL) ckt-2	1-Feb-19	19:46	Over voltage (439kV).
		2-Feb-19	19:35	Over voltage (437kV).
		17-Feb-19	13:13	Over voltage.

S.No.	Region	Name of Elements (Tripped/Manually opened)	Owner/ Agency	Outage		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		Fault Clearance time (in ms)
				Date	Time						within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Not Received	Received	Not Received	
1	NR	1) 400kV Kishenpur(PG)-New Wanpoh(PG) ckt-1 2) 400kV Kishenpur(PG)-New Wanpoh(PG) ckt-2	POWERGRID	1-Feb-19	10:00	400kV Kishenpur(PG)-New Wanpoh(PG) ckt-2 tripped on B-N fault, 88.1km from Kishenpur(PG) end. At the same time, 400kV Kishenpur(PG)-New Wanpoh(PG) ckt-1 also tripped on R-N fault, 91.3km from Kishenpur(PG) end. As per PMU, B-N fault followed by R-N fault with unsuccessful auto-reclosing is observed. In antecedent conditions, 400kV Kishenpur(PG)-New Wanpoh(PG) ckt-1 & 2 carrying 36 MW & 40 MW respectively.			GI-2				Y(PG)			Y(PG)		Y(PG)	80ms
2	NR	1) 400kV Banda(UP)-Orai(UP) ckt-1 2) 400kV Banda(UP)-Orai(UP) ckt-2	UP	3-Feb-19	7:07	400kV Banda(UP)-Orai(UP) ckt-2 tripped on B-N fault, 47.2km from Banda(UP) end. At the same time, 400kV Banda(UP)-Orai(UP) ckt-1 tripped on R-N fault, 47.6km from Banda(UP) end. As per PMU, R-N fault followed by B-N fault with unsuccessful auto-reclosing is observed. In antecedent conditions, 400kV Banda(UP)-Orai(UP) ckt-1 & 2 carrying 116 MW & 115 MW respectively.			GI-2			Y(UP)			Y(UP)		Y(UP)	80ms	
3	0	0	Delhi & NTPC	5-Feb-19	11:57	Multiple element tripping at 220kV Sarita Vihar(DTL) occurred due to Birdage resulting in tripping of 220kV Sarita Vihar(DTL)-Pragati(DTL), 220kV Sarita Vihar(DTL)-Maharani Bagh(DTL), 220kV Sarita Vihar(DTL)-BTPS(NTPC) ckt-1 & 2. As per PMU, three phase fault with delayed clearance of 360ms is observed. In antecedent conditions, 220kV Sarita Vihar(DTL)-Pragati(DTL) & 220kV Sarita Vihar(DTL)-Maharani Bagh(DTL) carrying 43 MW & 72 MW respectively.		230	GD-1	0.06	Y(Delhi)			Y(NTPC)	Y(Delhi)		Y(NTPC)	Y(Delhi)	360ms
4	NR	1) 220 kV Bus 2 at 400/220kV Hamirpur(PG) 2) 315 MVA ICT 1 at 400/220kV Hamirpur(PG)	POWERGRID & HP	6-Feb-19	11:13	220 kV Bus 2 at 400/220kV Hamirpur(PG) tripped due to operation of Bus Bar protection during SF6 refilling in GIS bus/bay resulting in tripping of 315 MVA ICT 1 & 2, 220kV Hamirpur(HPSEB)-Hamirpur(PG) ckt-1 & 2. As per PMU, No fault is observed in the system. In antecedent conditions, 315		25	GD-1	0.02	Y(PG)		Y(HP)	Y(PG)		Y(HP)		Y(PG)	NA
5	NR	1) 500 MVA ICT 3 at 400/220kV Dadri(NTPC) 2) 500 MVA ICT 4 at 400/220kV Dadri(NTPC)	NTPC	7-Feb-19	17:44	500 MVA ICT 3 & 500 MVA ICT 4 at 400/220kV Dadri(NTPC) tripped due to operation of overhead differential protection. As per PMU, R-N fault and no auto-reclosing is observed in the system.			GI-2				Y(NTPC)			Y(NTPC)		Y(NTPC)	80ms
6	NR	1) 220kV Rosa(UP)-Dohna(UP) 2) 220kV Rosa(UP)-Sahajahanpur(UP) ckt 1 & 2 3) 220kV Rosa(UP)-Badaun(UP) ckt 1 & 2 4) 200 MVA ICT1 at 400/220kV Rosa(UP) 5) 200 MVA ICT2 at 400/220kV Rosa(UP)	UP	7-Feb-19	21:45	Phase to earth fault occurred in 220kV Rosa(UP)-Dohna(UP) Line. Breaker at 400/220kV Rosa(UP) did not trip, resulting in tripping of all 220kV elements and 200 MVA ICT1 & ICT2 at 400/220kV Rosa(UP). As per PMU, R-B fault is observed.		125	GD-1	0.25	Y(UP)				Y(UP)		Y(UP)		80ms
7	NR	1) 400kV Dulhasti(NHPC)-Kishenpur(PG) ckt-1 2) 130 MW Unit#1, #2, #3 at 400kV Dulhasti(NHPC).	POWERGRID & NHPC	7-Feb-19	17:07	400kV Dulhasti(NHPC)-Kishenpur(PG) ckt-1 tripped on R-N fault. 400kV Dulhasti(NHPC)-Kishenpur(PG) ckt-2 already tripped at 1647Hrs due to R-N fault. Consequently, Unit#1, #2, #3 at 400kV Dulhasti(NHPC) tripped due to loss of evacuation path. As per PMU, R-N fault with unsuccessful autoreclosing is observed. In antecedent conditions, 400kV Dulhasti(NHPC)-Kishenpur(PG) ckt-1 carrying 259 MW.	250		GD-1			Y(NHPC)		Y(PG)		Y(PG),Y(NHPC)	Y(NHPC)		80ms
8	NR	1) 220kV Kishenpur(PG)-Mirbazar(JK) 2) 220kV Kishenpur(PG)-Ramban(JK)	POWERGRID & J&K	7-Feb-19	16:14	220kV Kishenpur(PG)-Mirbazar(JK) & 220kV Kishenpur(PG)-Ramban(JK) tripped on R-Y fault. As per PMU, multiple R-Y fault with delayed clearance of 360ms is observed. In antecedent conditions, 220kV Kishenpur(PG)-Mirbazar(JK) carrying 16 MW.			GI-2				Y(PG),Y(JK)		Y(PG),Y(JK)		Y(PG)	360ms	
9	NR	1) 400kV Hapur 765(UP)-Muradnagar(UP) 2) 400kV Aligarh(UP)-Muradnagar(UP) 3) 400kV Atau(UP)-Muradnagar(UP) 4) 500 MVA ICT 2 at 400/220kV Muradnagar(UP) 5) 315 MVA ICT 1 at 400/220kV Muradnagar(UP) 6) 315 MVA ICT 3 at 400/220kV Muradnagar(UP)	UP	7-Feb-19	12:49	while working on 400kV Bus coupler at 400/220kV Muradnagar(UP), 400kV Bus bar protection operated leading to complete outage of 400/220kV Muradnagar(UP). As per PMU, R-N fault is observed. In antecedent conditions, 315 MVA ICT 1, 500 MVA ICT 2 & 315 MVA ICT 3 carrying 130 MW, 205 MW & 115 MW respectively.		375	GD-1	0.47	Y(UP)					Y(UP)		Y(UP)	80ms
10	NR	1) 500kV HVDC Rihand-Dadri Pole 1 2) 400kV Dadri(NTPC)-Harsh Vihar(DTL) ckt-1 3) 220kV Palwal(HVPLN)-Samaypur(BBMB) ckt-1 & 2	POWERGRID, NTPC, Haryana & Delhi	14-Feb-19	9:03	500kV HVDC Rihand-Dadri Pole 1 tripped due to operation of transformer differential protection leading to operation of SPS and tripping of 220kV feeders. At the same time, 400kV Dadri(NTPC)-Harsh Vihar(DTL) ckt-1 also tripped. As per PMU, B-N fault is observed in the system. In antecedent conditions, 500kV HVDC Rihand-Dadri Pole 1 carrying 700 MW.		570	GD-1	0.29	Y(PG)		Y(Delhi),Y(UP),Y(NTPC)	Y(PG),Y(Delhi)		Y(UP),Y(NTPC)		Y(PG)	80ms

## ANNEXURE – I I I

S.No.	Region	Name of Elements (Tripped/Manually opened)	Owner/ Agency	Outage		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		Fault Clearance time (in ms)
				Date	Time						within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Not Received	Received	Not Received	
11	NR	1) 400kV Dadri(NTPC)-Maharanibagh(PG) 2) 400kV Ballabgarh(PG)-Maharanibagh(PG) 3) 220kV Maharanibagh(PG)-HCML(DTL) ckt-1 4) 220kV Maharanibagh(PG)-Trauma Centre(DTL) ckt-1 5) 220kV Maharanibagh(PG)-Trauma Centre(DTL) ckt-2	POWERGRID & Delhi	15-Feb-19	4:22	400kV Ballabgarh(PG)-Maharanibagh(PG) tripped on overvoltage. At the same time, 400kV Dadri(NTPC)-Maharanibagh(PG) tripped due to DT received from Maharanibagh(PG) end. As per PMU, No fault is observed in the system. In antecedent conditions, 400kV Dadri(NTPC)-Maharanibagh(PG) & 400kV Ballabgarh(PG)-Maharanibagh(PG) carrying 232 MW & 7 MW respectively.	54	291	GD-1	0.05	Y(Delhi)		Y(PG)		Y(Delhi), Y(PG)		Y(PG)	NA (Over voltage)	
12	NR	1) 220kV Akal(Raj)-Barmer(Raj) 2) 220kV Akal(Raj)-Akal(Raj) ckt-2 3) 220kV Akal(Raj)-Rajgarh(Raj) 4) 220kV Akal(Raj)-Jajla(Raj) 5) 220kV Akal(Raj)-Bhu(Raj) ckt-2 6) 220kV Akal(Raj)-Mulana(Raj)	Rajasthan	17-Feb-19	17:15	Fault was observed in 220kV Akal- Barmer line which was connected with 220kV Bus-1 at 400/220kV Akal(Raj). Delay in opening of breaker at Akal end resulted in LBB operation causing opening of feeders and Bus coupler connected with Bus-1. Wind generation loss also occurred at 2127Hrs and 2233Hrs due to tripping of Bus coupler on overcurrent at 220kV Amarsagar(Raj). As reported by Rajasthan SLDC, Similar incident occurred	700		GD-1		Y(Raj)			Y(Raj)		Y(Raj)	200ms		
13	NR	1) 400kV Bus 1 at 400/220kV Panipat(BBMB) 2) 400kV Dadri(NTPC)-Panipat(BBMB) ckt-1 3) 400kV Dadri(NTPC)-Panipat(BBMB) ckt-2	BBMB, NTPC & POWERGRID	18-Feb-19	12:30	400kV Bus 1 at 400/220kV Panipat(BBMB) tripped due to bus bar protection operated due to CT blast in Tie-bay of 400kV Dadri-Panipat ckt 2 at Panipat(BBMB) end. At the same time, 400kV Dadri(NTPC)-Panipat(BBMB) ckt-1 & 2 also tripped. As per PMU, B-N fault is observed in the system. In antecedent conditions, 400kV Dadri(NTPC)-Panipat(BBMB) ckt-1 & 2 carrying 257 MW & 249 MW respectively.			GI-2				Y(PG), Y(NTPC), Y(BBMB)		Y(PG), Y(NTPC), Y(BBMB)	Y(BBMB)	80ms		
14	NR	1) 400kV Kala Amb(PKATL)-Karchamwangtoo(JSW) ckt-2 2) 400kV Jhakri(SJVNL)-Karchamwangtoo(JSW) ckt-1	JSW, HP and SJVNL	19-Feb-19	1:59	400kV Kala Amb(PKATL)-Karchamwangtoo(JSW) ckt-2 tripped on B-N fault, 183km From Kala Amb(PKATL) end. At the same time, 400kV Jhakri(SJVNL)-Karchamwangtoo(JSW) ckt-1 tripped on Over voltage at Karcham end and DT received at Jhakri(SJVNL) end. As per PMU, B-N fault with unsuccessful autoreclosing is observed. In antecedent conditions, 400kV Jhakri(SJVNL)-Karchamwangtoo(JSW) ckt-1 carrying 94 MW.	30		GD-1				Y(JSW),Y(HP), Y(SJVNL)		Y(JSW),Y(HP), Y(SJVNL)	Y(JSW)	80ms		
15	NR	1) 400kV Kishenpur(PG)-New Wanpoh(PG) ckt-1 2) 80 MVAR B/R at 400/220kV Kishenpur(PG) 3) 63 MVAR B/R at 400/220kV Kishenpur(PG)	POWERGRID	21-Feb-19	13:27	400kV Kishenpur(PG)-New Wanpoh(PG) ckt-1 tripped on B-N fault, 95.9Km from Kishenpur(PG) end. At the same time, 80 MVAR B/R & 63 MVAR B/R at 400/220kV Kishenpur(PG) also tripped due to Problem in CB. As per PMU, B-N fault with unsuccessful auto-reclosure is observed in the system. In antecedent conditions, 400kV Kishenpur(PG)-New Wanpoh(PG) ckt-1 carrying 67 MW.			GI-2				Y(PG)		Y(PG)	Y(PG)	80ms		
16	NR	1) 220kV Delina(J&K)-Kishanganga(NHPC) ckt-1 2) 220kV Delina(J&K)-Kishanganga(NHPC) ckt-2	NHPC/JKPPD/NRS S29/POWERGRID	24-Feb-19	16:47	220kV Delina-Kishanganga-2 tripped on R-Y phase to phase fault. 220kV Delina-Kishanganga-1 tripped from Delina end only. From SCADA data, it seems 220kV Delina-Amargarh also tripped. As per PMU data, R-Y fault occurred.			GI-1		Y(NHPC)		Y(JK), Y(NRSS29), Y(PG)	Y(NHPC)	Y(JK), Y(NRSS29), Y(PG)	Y(NHPC)	Y(JK)	80ms	
17	NR	1) 400kV Khedar-Kirori ckt-1 2) 400kV Khedar-Kirori ckt-2	Haryana	24-Feb-19	20:51	400kV Khedar-Kirori D/C tripped simultaneously. As per PMU data, Y-N fault occurred.			GI-2				Y(Har)		Y(Har)	Y(Har)	1000ms		
18	NR	1) 400kV Ballabgarh(PG)-Kanpur(PG)-1 2) 400kV Ballabgarh(PG)-Kanpur(PG)-2 3) 400kV Ballabgarh(PG)-Kanpur(PG)-3 4) 400kV Ballabgarh(PG)-Mainpuri(PG)-2 5) 400kV Bus-3 at Ballabgarh(PG)	POWERGRID	25-Feb-19	10:03	400kV Bus-4 was to be taken under shutdown. Inadvertently, earth switch of Bus-3 was applied in place of Bus-4 resulted in tripping of all elements connected to Bus-3. As per PMU data, R-N fault occurred.			GI-2				Y(PG)		Y(PG)	Y(PG)	80ms		
19	NR	1) 400kV Dadri(NTPC)-Panipat(BBMB) Ckt-1 2) 400kV Dadri(NTPC)-Muradnagar(UP)	NTPC/BBMB/UP	25-Feb-19	23:46	400kV Dadri(NTPC)-Panipat(BBMB)-1 and 400kV Dadri(NTPC)-Muradnagar(UP) tripped on over voltage. As per PMU data, Voltage dip observed. (Dadri PMU data didn't report)			GI-2				Y(NTPC), Y(BBMB), Y(UP)		Y(NTPC), Y(BBMB), Y(UP)	Y(NTPC)	NA (Over voltage)		
20	NR	1) 315 MVA ICT 1 at 400/220kV Suratgarh(Raj) 2) 315 MVA ICT 2 at 400/220kV Suratgarh(Raj)	Rajasthan	27-Feb-19	3:32	315 MVA ICT 1 & 2 at 400/220kV Suratgarh(Raj) tripped due to overfluxing. 400kV Bikaner(Raj)-Suratgarh(Raj) and 400kV Bikaner(Raj)-Suratgarh(Raj) SC 1 also tripped at 0344 Hrs and 0345Hrs on overvoltage. As per PMU, No fault is observed in the system. In antecedent conditions, 315 MVA ICT 1 & 2 carrying 89 MW each.			GI-2				Y(Raj)		Y(Raj)	Y(Raj)	NA (Over voltage)		

Northern Regional inter regional lines tripping for Feb-19

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	6-Feb-19	11:54	Nil	DC line level protection	NA	6-Feb-19	13:13	NA	YES	y	Wrong operation of protection	As per POWERGRID report, inverter end current VDCOL order remained frozen subsequent to the ramp-down in pole-2, resulting in loss of synchronism of inverter lo. The same needs to be investigated thoroughly and rectified in order to prevent such events.	Information received from NR end. From PMU, fluctuation in AC voltage observed.
2	800kV HVDC Agra-BNC line-2	POWERGRID	17-Feb-19	12:37	Nil	DC line fault.	NA	17-Feb-19	14:22	NA	NO	NO	Around 30kV difference observed between B-phase and rest of the phases.	Details of tripping yet to be received.	From PMU, fluctuation in voltage observed.
3	800kV HVDC Agra-BNC line-2	POWERGRID	19-Feb-19	12:45	Nil	Air supply duct of Ventilation system of Pole-2 damaged AT bnc end	NA	19-Feb-19	14:26	NA	NO	NO		Details of tripping yet to be received.	From PMU, fluctuation in voltage observed.
4	800kV HVDC Champa-Kurukshetra line-1	POWERGRID	3-Feb-19	8:01	Nil	DC Line fault.	NA	3-Feb-19	9:29	NA	NO	NO		Details of tripping yet to be received.	From PMU, fluctuation in voltage observed.
5	800kV HVDC Champa-Kurukshetra line-2	POWERGRID	6-Feb-19	21:24	Nil	Tripped on CLD HV protection due to transient DC line fault.	NA	6-Feb-19	22:22	NA	NO	NO		Details of tripping yet to be received.	From PMU, fluctuation in voltage observed.
6	800kV HVDC Champa-Kurukshetra line-2	POWERGRID	7-Feb-19	21:38	Nil	Got blocked due to voltage above TOVC limit at Kurukshetra.	NA	7-Feb-19	22:08	NA	NO	NO		Details of tripping yet to be received.	From PMU, fluctuation in voltage observed.
7	800kV HVDC Champa-Kurukshetra line-1	POWERGRID	11-Feb-19	0:19	Nil	Blocked on Lane changeover failed protection operated at kurukshetra	NA	11-Feb-19	0:51	NA	YES	YES		Remedial measures yet to be received from POWERGRID.	Information received from NR end. From PMU, fluctuation in AC voltage observed.
8	800kV HVDC Champa-Kurukshetra pole-1 at Kurukshetra	POWERGRID	25-Feb-19	14:41	Nil	Tripped due to mal-operation of BCU	NA	25-Feb-19	15:31	NA	NO	NO	Mal-operation of protection.	Details of tripping yet to be received.	From PMU, fluctuation in voltage observed.
9	220kV Modak(RRVPNL)-Bhanupura(MPPTCL)	Rajasthan/MP	13-Feb-19	22:59	Nil	R-N fault. DT received at Modak end	NA	14-Feb-19	15:22	YES	NO	NO	Delayed fault clearance.	Details of tripping yet to be received. Reason for delayed fault clearance of fault to be ascertained and problem to be rectified.	From PMU, R-N fault observed with delayed fault clearance.
10	220kV Sakatpura(RRVPNL)-Bhanupura(MPPTCL)	Rajasthan/MP	27-Feb-19	3:40	Nil	Over voltage.	NA	27-Feb-19	5:21	NO	NO	NO		Details of tripping yet to be received. Overvoltage setting to be shared and reviewed.	From PMU, no fault observed.
11	400kV Gorakhpur(PG)-Muzaffarpur(PG)-2**	POWERGRID	5-Feb-19	5:38	Nil	Y-N fault. 88 kms from Gorakhpur. FC-4.8 kA	NA	5-Feb-19	6:10	NA	NO	YES (After 24hrs)			Information received from NR end. From PMU and Dr details, Y-N fault observed. Line tripped on unsuccessful auto-reclosing.
12	765kV Ballia(PG)-Gaya(PG)**	POWERGRID	8-Feb-19	7:31	Nil	Phase to earth fault. Y-N, 49.84 km from Ballia end, F.C. - 7.7 kA	NA	8-Feb-19	8:07	NO	NO	YES (After 24hrs)			Information received from NR end. From PMU, successive Y-N fault occurred within reclaim time.
13	765kV Jabalpur(PG)-Orai(PG)-2	POWERGRID	22-Feb-19	14:40	Nil	Line tripped at 14:40 with R phase reactor at Jabalpur end	NA	22-Feb-19	16:46	NO	NO	NO		Details of tripping yet to be received.	From PMU, no 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.

Northern Regional inter regional lines tripping for Feb-19

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

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