सत्यमेव जयते

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

सं. उक्षेविस/ वाणिज्यिक/ 209/ आर पी सी (43 वीं)/2019/1066-1113
No. NRPC/ Comml/ 209/ RPC (43rd)/2019/1066-1113

दिनाँक : 06th फ़रवरी, 2019
Dated: 06th February, 2019

सेवा में / To,

उ.क्षे.वि.स. के सभी सदस्य
Members of NRPC/TCC

विषय: उत्तरी क्षेत्रीय विद्युत समिति की 43 वीं तथा तकनीकी समंवय उप-समिति की 40 वीं बैठक का कार्यवृत्त ।

Subject: 43rd meeting of Northern Regional Power Committee and 40th meeting of TCC – Minutes.

महोदय / Sir,

उत्तरी क्षेत्रीय विद्युत समिति की 43 वीं बैठक दिनांक 30 ओक्टोबर, 2018 को तथा तकनीकी समंवय उप-समिति की 40 वीं बैठक दिनांक 29 ओक्टोबर, 2018 को अमृतसर, पंजाब में आयोजित की गयी थी । इन बैठकों के कार्यवृत की एक प्रति आपकी सूचना व आवश्यक कार्यवाही हेतु इस पत्र के साथ संलग्न है।

The 43rd meeting of Northern Regional Power Committee was held on 30th October, 2018 and 40th meeting of TCC was held on 29th October, 2018 at Amritsar, Punjab. A copy of the minutes of the meetings is enclosed herewith for information and necessary action.

भवदीय/Yours faithfully,

(एम.ए.के.पी. सिंह)
(M.A.K.P. Singh)
सदस्य सचिव
Member Secretary

18-ए, शहीद जीत सिंह मार्ग, कटवारिया सराय, नई दिल्ली- 110016 फोन:011-26513265 फेक्स: 011-26865206 ई-मेल: ms -nrpc@nic.in वेबसाईट: www.nrpc.gov.in
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016 Phone: 011-26513265 Fax: 011-26865206 e- mail: ms-nrpc@nic.in Website: www.nrpc.gov.in

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Minutes of the 40th TCC and 43rd NRPC meeting of NRPC held on 29th & 30th October, 2018 at the holy city of Amritsar.

40th TCC & 43rd NRPC meetings were held on 29th & 30th October 2018 respectively at Amritsar. The meeting was hosted by PSTCL. The list of the Participants is enclosed at Annex-I and II. Shri A. K. Kapoor, Director (Technical), PSTCL chaired TCC meeting. Shri Baldev Singh Sran CMD, PSPCL, chaired NRPC meeting in absence of Shri A. Venu Prasad, CMD, PSTCL and Chairman NRPC.

A. Shri A. K. Kapoor, Director(Technical), PSTCL and TCC Chairman speech:

It is an honor and privilege for me to welcome you all, on behalf of PSTCL, to this 40th TCC meeting. I congratulate the entire team of PSTCL for splendid arrangements made by them for organizing this meeting at the holy city of Amritsar which was founded in 1574 by the fourth sikh guru, Guru Ram Das Ji, by laying the foundation of Sri Harmandir Sahib, informally known as the Golden Temple.

CERC vide notification dated 12th April 2017, had notified IEGC (5th Amendment) Regulation 2017. As per this notification, the following provision is added at the end of Regulation 5.2. (g) of Part 5 of the Principal Regulations:

"Provided that periodic checkups by third party should be conducted at regular interval once in two years through independent agencies by RLDCs or SLDCs as the case may be. The cost of such tests shall be recovered by the RLCs or SLDCs from Generators. If deemed necessary by RLDCs/SLDCs, the test may be conducted more than once in two years.

NLDC has initiated action for third party checkup. RLDCs are advised to either select their own third party or get it done from the parties identified by NLDC.

As per CEA report on Large Scale Grid Integration of Renewable Energy Sources-Way Forward dated November 2013, the basic technical challenge comes from the variability of wind and solar power affects the load generation balance and varying demand for reactive power, and has an impact on voltage stability. However the burgeoning problem lies in the sudden loss of wind generation, which has a much more cascading effects as opposed to the gradual variability. There should be an implementing agency to monitor the implementation, operation and performance of LVRT. Even for generators which claim to have LVRT, it should be monitored

whether they are providing desired performance or not. **Hence all SLDC should implement ADMs and ensure that all RE Generating units should have LVRT protection.**

For addressing variability of RE Pump storage are ideal solution but as per recent information 1000 MW Tehri Pump Storage Plant for which earlier the estimate COD date was FY 2018-19 has now again been delayed by 3 yrs and revised expected COD as per project report published by THDC is May 2021. The original cost estimate of the project was Rs. 1657.60 crs which as on date has increased to Rs. 4401.90 crs at Jan 17 price level.

The non-availability of real time data of RE generator to NLDC/RLDCs/SLDCs is another important issue compounding the problem. The data should be integrated in the SCADA.

Despite variation in the RES, forecasting with fair accuracy can be done similar to other countries. Flexibility upto 30% deviation is a potential source of demand generation gap. By use of AI and ML we can reduce the RRAS requirement and thus save lot of many. This month low frequency persisted even on holidays just after dusherra and frequency dipped as low as 49.68 Hz despite repeated request by NRLDC not to over draw. If such situation persists then Members may kindly note that following measures may be initiated by NRLDC like booking of available URS power in ISGS. Schedule Gas turbines on RLNG/Spot RLNG/Liquid fuel and book the same to over drawing States Or load regulation by opening radial feeders. Utilities are requested to bring the machines under RSD on bar in anticipation of their shortfall if any and look for Grid to make up their shortfall.

NRLDC has been insisting for standing committee approval for any integration of new elements. Ideally load dispatch centers should have correct models of any new connectivity along with detailed studies including dynamic /transient stability study reports for the licensee /planners for the new connectivity. There was observance of high Shaft vibration at Dadri stage-2 units (#5 & 6) during power system faults near its vicinity.

I once again welcome all the participants to the holy city of Amritsar.

B. Member Secretary, NRPC welcomed all the participants of 40th TCC meeting of NRPC.

At the outset he thanked CMD, PSTCL Shri A. Venu Prasad, IAS who had accepted and agreed to convene this meeting at the very first instance and the meeting is held as per the schedule. The venue chosen arouses spiritual feeling.

On behalf of all participants he expressed his sincere thanks for excellent and memorable visit arranged by the PSTCL to the Wagha border. From the post on the whatsapp, it seems participant were full of enthusiasm and national fervour. The memory will remain for a long time and one more such memorable visit to the golden temple has also been arranged.

PSTCL has raised the benchmark in hosting TCC/NRPC meetings. Last few meetings held at Srinagar, Parwanoo and this one at Amritsar all will go down the history of NRPC. Till now mostly these meetings were hosted by State/Central utilities. NRPC is proposing IPP's should also hosted as per the roster given in the agenda item.

C O N F I R M A T I O N O F M I N U T E S (T C C)

A.1 Minutes of 39th meeting of TCC

Member Secretary, NRPC informed the Committee members that the minutes of 39th meeting of TCC held on 27th June, 2018, were circulated vide letter No. NRPC/Comml/209/RPC(42nd)/2018/9181-9275 dated 13th August, 2018. He requested members to confirm the minutes as till date no comments on the minutes have been received from any member.

Members confirmed the minutes without any modification.

C. Opening remarks by Sh. Baldev Saran Chairman, NRPC at the 43rd NRPC meeting

It is an honor and privilege for me to welcome you all, on behalf of the PSTCL, to this 43rd NRPC meeting which has been organized by them. I congratulate the entire team of PSTCL for splendid arrangements made by them for organizing this meeting at the holy city of Amritsar which was founded in 1574 by the fourth guru, Guru Ram Das Ji, by laying the foundation of *Sri Harmandir Sahib*, informally known as the *Golden Temple*.

I would like to share with the forum that NR has a total installed capacity of around 92 GW including 13 GW renewables as on September, 2018. I am pleased to inform that the Region has met 61,726 MW peak demand during July this year vis-a-vis 58,448 MW witnessed during the high demand period last year in August, 2017. Though, 2.3% of the peak that was not met, was mainly attributed to the coal shortage.

I am glad to state that, during the past few months no major grid incident has been encountered in the region. Also for 79.45 percentage of the time, frequency has remained within the IEGC band. Considering the ensuing winter season, a meeting was held on 15.10.2018 at NRPC Secretariat to review the status of replacement and cleaning of insulator of transmission lines of NR. All the utilities are requested to stick to the plan finalized so as to reduce the number of fog related tripping in the region this winter.

During this fiscal it was also experienced that low coal availability coupled with early onset of summer led to firming up of spot energy prices. The average year-on-year increase in energy prices in DAM (Day Ahead Market) was close to 39% reaching to Rs 3.34/unit in August, 2018. In fact, the MCP (Market Clearing Price) crossed Rs 14/unit in September for a short trading block. This kind of spot energy prices trend may compel DISCOMs to sign more PPAs instead of shunning these contracts.

However, the union Govt has recently taken various steps to manage coal shortage and reducing PPC (Power Purchase Costs) such as issuing an advisory to the State Govts to import coal, introducing coal linkage rationalization to IPPs, coal swapping and regular compliance with MOD (Merit Order Dispatch) etc. While these initiatives have provided some relief, it is only when the AT&C losses are reduced to 15% or less, ACS-ARR (Average Cost of Supply-Average Revenue Realized) gap is bridged and upcoming coal mines begin production, the Govt objective of quality and affordable electricity would be achieved.

During last 4-5 months, the power sector has also witnessed several policy & regulatory developments.

The major policy developments include:

- Draft amendments to the EA, 2003 – introduction of DBT, freeing up of RE generation and supply from licensing requirements and separation of the carriage and content business in power distribution, penal provision for DISCOMS for violation of PPAs, non-compliance with RPOs, failure to ensure 24x7 power supply etc.,

- Draft amendments to the tariff policy, 2016 - simplification of tariff categories and rationalization of the retail tariff structure with the objective of doing away with different

tariff categories and adoption of a tariff structure based on sanctioned load and the units consumed,

- Concept note on "merit order operation - flexibility in generation & scheduling of thermal power stations to reduce the cost of power to the consumers" aimed at higher dispatch of cheaper ECR (Energy Charge Rate) thermal power stations of a generating company on national level called Generation Bucket Filling (GBF),

- Flexibility in generation & scheduling of thermal power stations to reduce emission – wherein flexibility has been given to a GENCO to supply renewable power against the schedule received for conventional power,

- Emission control cost pass through – wherein installation of emission control technologies like FGDs will be considered for pass through in tariffs. TPPs can approach appropriate commission for the approval of additional capital expenditure and compensation for the increased cost on account of this change-in-law event.

On the regulatory front there are 3 key developments: CERC has issued discussion paper on:

- "Redesigning of AS Mechanism in India" which assesses the performance of the current framework of frequency support and congestion management and suggests next-generation reform by way of introduction of auction-based procurement of AS, and

- "Redesigning of real time electricity market in India" which outlined the improvements required to ensure market operations closer to real time for better harnessing the intermittent RE and optimally utilizing resources in the intra-day time horizon. The proposed real time market redesign seeks to introduce (i) changeover from continuous trade to uniform auction in the intra-day market of the PX and (ii) Gate Closure.

- CERC has passed an order to implement pilot on 5-minute SAMAST for thermal/hydro and on FRAS through storage/pondage based hydro stations. POSOCO in coordination with POWERGRID will implement 5-minute metering at hydro stations in NR, ER & NER and at thermal stations with AGC in all the 5 regions.

I hope that NRPC Sectt and NRLDC will share the details of these developments with the members during the meeting and wish that a healthy deliberation would take place on all the agenda items.

I would like to conclude by thanking all the members for making time for the meeting and wish you all a very successful and conclusive deliberations in the meeting.

D. Member Secretary, NRPC stated that it is the endeavourer of the NRPC Secretariat to comply with the decisions of NRPC and are regularly following up. NRPC extends all required support to all its constituents to enable them to comply with all the regulations. PSTCL has raised concern how to reduce the deviations due to power scheduled by the irrigation wing and the nuclear power actually and the other issue very pertinent to Punjab is the of ATC/TTC issues during the paddy season.

MS, NRPC hoped that NRLDC would be touching ATC/TTC because in the past PSTCL has also written letter to NRLDC & NRPC also for looking into it. He thanked once again for PSTCL hosting this meeting at a very short notice and at such a lovely place and location where everyone felt home with the excellent arrangements and the facilities extended for the sightseeing especially the Wagha border. The memory will remain for a long time for all the participants and the visit to the golden temple was so heart touching that the people will visit again and again.

E. Summary of the presentation on Dynamic Line Rating

Growing demand for power is a major challenge for grid operators worldwide, who are all finding it near impossible to build new lines. Because of this, transmission system operators (TSOs) must explore the idea of increasing the capacity of the existing transmission lines. One way to do this is to maximize the use of the conductors on the towers.

To this end, Elia – the Belgian system operators – decided to take part in the Ampacimon project (short for ampacity monitoring). Launched by the University of Liege. French system operator RTE also showed strong interest in the project and decided to follow it up in collaboration with Elia and ULg. To identify the optimum load for their HV lines, TSOs require a reliable dynamic rating system which is easy to install. This article documents TSOs' use of the Ampacimon innovative rating system to determine line ampacity.

The Ampacimon system measures the sag of an overhead HV line in the real time. The sag – resulting from load and ambient factors such as temperature, wind direction and wind speed – is determined only by measuring conductor vibrations.

Conductor vibrations are measured using accelerometers. Conductor sag is calculated based on these measurements using data processing (fast Fourier transform) and simple mathematical formulae. Once the sag is determined, a special software application can be used to calculate the line's maximum, permissible current and make appropriate forecasts.

A number of measurement modules have been fitted on the HV grids operated by Elia and RTE. Experience has clearly demonstrated that conductor sag is highly variable and heavily dependent on local weather conditions. The Ampacimon real time monitoring system has been proven to be accurate with a sag error margin of 2% which is consistent with a safe time operation of the instrumented lines.

F. Brief of NRLDC presentation in 40th TCC & 43rd NRPC meeting

NRLDC representative gave a detailed presentation on the performance of power system since last TCC/NRPC meeting and highlighted new records of demand met and energy consumption of Region and that of different states. The profile and growth were also depicted. The pattern of load and impact of weather/rain on it were presented. The hydro generation outages and change in hydro generation over the months and their impact on system were also mentioned. Following were the other highlights of the presentation for past performance of the system:

- High demand & high energy consumption
- Hydro outages on silt: This year fewer outages but long hour outages specially in NJHEP complex
- Some of the hydro stations (issues also taken up in OCC meetings):
  - Continuous Generation on overload even without spillage conditions
  - Generation beyond 10% overload such as Karcham Wangtoo HEP
  - Generation of some of Thermal generation less than schedule (Issues also taken up in OCC meetings)
- Deviations: High and continuous specially HP, Rajasthan, Haryana, Uttrakhand etc: Regularly taken up in OCC meetings.

- Major constraint in Generation Complexes:
  - Kawai/Kalisindh/Chhabra
  - Anpara C/D/B/A
  - Lalitpur & Bara
  - Tehri/Dhauliganga/Baglihar
- Major events:
  - **High Shaft vibration at Dadri TPS**
    - On 28-Jun-18, High vibration in Dadri stg-2 units observed during fault.
    - On 09-Aug-18, meeting held between NTPC & POSOCO to look into the issue.
    - After the incident, many times during fault in nearby area high vibration occurred.
    - CTU, CEA informed for further advise. NTPC has been asked to look into the issue.
  - **Oscillation in Grid (Tehri/Koteshwar)**
    - On 08-Aug-18, 400 kV Koteshwar(PG)-Meerut-2 tripped.
    - SPS didn't operate >> Oscillations observed>>Generation loss at Tehri/Koteshwar.
    - SPS checking proposed.
    - Revision in SPS condition of generation>1200MW suggested to be 1100MW.
  - **Oscillation in Grid (Dhauliganga)**
    - Multiple oscillation events occurred due to forced evacuation of Dhaulganga generation through one of two evacuation ckts.
    - CTU, CEA informed for further advise.
    - NHPC asked for tuning of PSS at Dhauliganga and SPS to take care of the issue.
    - SPS got approved in 36th PSC meeting.
  - **Tripping at Akal**
    - From 04.08.2018 to 14.08.2018 : ICT-2 of 315 MVA was under shutdown to attend hotspot.
    - On 05.08.2018, ICT-4 of 500 MVA out due to fire.
    - On 22.08.2018, ICT-2 of 315 MVA out due to fire.
    - On 04.09.2018, ICT-1 of 315 MVA under emergency shutdown
    - Posing constraints for wind energy
  - **Fire at Obra BTPS**
    - On 14-Oct-18, Station Transformer at Obra BTPS tripped due to fire in cable gallery.
    - Subsequently, multiple elements/ units tripped.
    - No fault observed in PMU
    - Evacuation constraints for Anpara Gen
- Important New Commissioning:
  - Transmission System with Kishanganga

    - 2nd ckt LILO of Delina-Ziankote need to be expedited
  - 400 kV Samba-Amargarh D/C
    - Would be helpful for Kashmir valley System in Winter
  - 400 kV Tughlakbad substation
    - Retirement of BTPS
    - Use as Synchronous Condenser?? : TCC member discussed and mentioned that probably its use as synchronous condenser is not possible.
- New Developments
  - **Frequency Response test**
    - As per IEGC 5th amendment, 5.2 (g),….periodic checkup by third party should be conducted at regular intervals through independent agencies selected by respective RLDCs or SLDCs….”
    - In above compliance, NLDC notice inviting Expression of interest (EoI) from interested agencies in leading newspaper of 1st & 3rd Oct 2018 edition of Indian Trade Journal (ITJ)
  - **Security constrained economic dispatch**
    - Consultation paper by POSOCO on ‘**Security Constrained Economic Despatch of Inter State Generating Stations pan India’** submitted to CERC
    - Hon’ble CERC, vide communication dated 27.09.2018, advised POSOCO to seek comments/observations/views from the stakeholders on the consultation paper. Please submit comments at **feedback sced@posoco.in** by **28th October 2018**
    - paper available at https://posoco.in/download/consultation-paper-on-security-constrained-economic-dispatch-of-isgs-pan-india/?wpdmdl=19708.
  - **Committee on LDC infrastructure**
    - POSOCO has submitted the report to FOR technical committee
    - FoR would takeup the report in its meeting dated 11th Nov 2018 for adoption and recommendation for implementation.
  - **Implementation of FRAS:** High requirement in winter. Thus shortly to start. Meeting at NLDC on 31st Oct 2018.
  - **Real Time Market:** CERC staff paper on CERC website.

C O N F I R M A T I O N O F M I N U T E S (N R P C)

A.2 Minutes of 42nd meeting of NRPC

Member Secretary, NRPC informed to the Committee members that the minutes of 42nd meeting of NRPC held on 28th June, 2018, were circulated vide letter No. NRPC/Comml/209/RPC(42nd)/2018/9181-9275 dated 13th August, 2018. He requested member to kindly confirm the minutes as till date no comments on the minutes have been received from any member.

Members confirmed the minutes without any modification.

B. OPERATIONAL ISSUES

B.1 Revised System Protection Scheme (SPS) for 765 kV Agra-Gwalior line.

TCC Deliberation

B.1.1 MS, NRPC informed the Committee that CERC had issued the show-cause notice to NRPC Sectt. on the status of implementation of the SPS scheme for 765 kV Agra-Gwalior line. NRPC Sectt has apprised CERC of the current status of implementation of SPS. CERC has also been informed that a detailed report on operation of revised SPS would be submitted after the mock testing for the revised 765 kV Agra- Gwalior SPS to be carried out after integration of additional 1000 MW load shedding in NR is completed as envisaged in the revised SPS.

B.1.2 POWERGRID was assured of all possible support by the utilities and was requested to go ahead with the decision of 41st NRPC of utilizing the CB signals from both the ends in the logic of SPS so as to ensure more robust and reliable operation of the scheme. In 151st OCC meeting, POWERGRID had informed that substations in Delhi, UP & Haryana were completed and 7 locations in Punjab & 6 locations in Rajasthan were remaining which were expected to be completed by October 2018.

B.1.3 He further stated that the implementation of the scheme is being regularly monitored in the Protection Sub-committee of NRPC as well as WRPC. The following has been recorded in the 130th PCM of WRPC held on 12.09.2017.

(i) **Mock testing of SPS:** Mock testing of SPS for 765 kV Agra-Gwalior line for load shedding in NR and automatic generation backing down in WR was carried out on 05.01.2017. A test signal for loss of import of 1500 MW and above on 765 kV Agra-Gwalior 1 & 2 was sent at 16:07 hrs. It was reported that the signal was received at KSTPS & VSTPS. However signal was not received at CGPL. The matter was taken up with PGCIL and subsequently it was informed that the private operator lease line used for transmission of the SPS signal was down. Since there is no OPGW

connectivity between Agra and Sasan, hence signal on PLCC was sent from Gwalior to Sasan at 17:07 hrs. The signal was received at Sasan. WRLDC have requested PGCIL to update on as what needs to be down to ensure that the lease line links remains healthy always. WRLDC have intimated that the SPS for 765 kV Gwalior-Agra line at Gwalior end is presently working on PLCC link. In this regard following points needs discussion:

a. PGCIL may kindly update the progress of shifting of this SPS scheme at Gwalior end on OPGW.
b. Signal extension to Sasan on OPGW (Presently on PLCC only from Gwalior end) is also pending whose progress may also be updated to WRLDC.
c. As Gwalior end SPS is also acting as Main protection therefore signal extension to all the four generators should also be done through OPGW from Gwalior end also.
d. There is a need of exchange of SPS signal between Gwalior and Agra Substation with each other in view that in case of outage/non-function of one SPS, the other SPS Scheme should operate and send signal via two paths to generators in WR. (As implemented for 765 kV Raichur-Sholapur SPS scheme)
e. Availability of Spare Card module at Gwalior station in case of failure of card.

(ii) **Non-Operation of 765 kV Gwalior-Agra SPS on 12.4.17 from Gwalior end:**

WRLDC in the 491st OCC meeting have intimated that on 12.4.17 at 05:51 hrs 765 kV Gwalior - Agra D/C tripped on R-Y fault. It was observed that SPS had not operated even though one of the SPS condition was satisfied. "Sudden reduction of import by NR on Agra-Gwalior I & II by more than or equal to 1000 MW and less than 1500 MW" generates signals for load shedding in NR. SPS for 765 kV Agra-Gwalior line was mock-tested in recent past however it's non-operation during the actual crisis was highly undesirable. POWERGRID was requested to apprise OCC the reason for non-operation of SPS at Gwalior end, details of action initiated to rectify the issues, current status of OPGW works and the terminal equipment on 765 kV Gwalior- Agra, 765 kV Gwalior-Satna and 765 kV Satna-Sasan, status of SPS signal transfer between Agra and Gwalior over OPGW, availability of Spare Card module at Gwalior station in case of failure of card and ensuring two independent communication channels for SPS and testing these communication channels in each month so as to ensure that in case of crisis it works. GM, WRLDC, in the 491st OCC, expressed serious concern of non-operation of SPS signal at Gwalior end on 12.4.17 at 05:51 hrs on tripping of 765 kV Gwalior-Agra D/c. POWERGRID intimated that, their testing Engineers were looking after the matter of non-operation of SPS signal at Gwalior end and informed that SPS device testing would be conducted at Gwalior on 13.5.17.

128th PCM Discussion: PGCIL representative informed that the OPGW laying on Gwalior-Satna section would be completed by July 17 and Sasan - Satna section would be completed by Oct 17. WRLDC representative regarding non sensing/operation of SPS on 12.4.17, informed that though the loadings on the lines prior to tripping at Agra was more than the SPS condition, the MW flow dropped significantly after the fault which persisted for the duration of un-cleared fault and hence the loss of load was not sensed at Gwalior end. Further WRLDC sought clarification as to whether the redundancy in the SPS by way of sensing the SPS conditions and sending both from Agra end and Gwalior end has been done by PGCIL. PGCIL representative informed that the same has not been done. He further stated that the SPS at Gwalior end was checked and a drift in the MW transducer was observed. The faulty transducer was replaced.

129th PCM Discussion: PCM suggested that the SPS conditions at both Agra and Gwalior end be sensed independently and if SPS conditions at either end are satisfied their shall be independent signal generation and a decision based on the signals generated at both ends should be transmitted to the generators of WR and loads in NR, as the case may be, so that there is adequate redundancy in the SPS. Further as regards to testing the SPS, secondary injection method should be done while carrying out the mock testing of SPS, so that any deviations in the measurements and the measurement circuit for the SPS is also thoroughly checked.

30th PCM discussion: PGCIL representative stated that at present it would be difficult to extend the signal from both Agra and Gwalior ends to all the generators in WR and loads in NR individually. However, the exchange of SPS signal generated on meeting of the SPS condition can be exchanged and sent to generators in WR and loads in NR. Further, PGCIL confirmed that the exchange would be carried out on Fiber communication.

B.1.4 **Considering all above, Member Secretary requested POWERGRID to apprise the Committee about status of implementation of scheme in NR as well as WR.**

B.1.5 POWERGRID representative informed the following:

i) Physical installation at DTPC completed at all the locations.
ii) Communication link for each of the hardware would be completed by Nov', 2018.
iii) Regarding sending generation backing down signal from Agra to Sasan via Gwalior on OPGW, there is RoW issue on 765 kV Gwalior-Satna for stretch of 25 kms which is expected to be resolved by Dec', 2018.
iv) Signal Extension to Sasan over OPGW from Agra has been completed. Repeaters were being installed and expected by Nov, 2018.
v) Mock testing would be done in Jan, 2019.

B.1.6 POWERGRID agreed to give the status in detail in writing so that CERC can be informed accordingly. POWERGRID wanted to know the requirement of the SPS after commissioning of so many WR-NR inter regional links.

B.1.7 NLDC representative asserted the importance of this scheme as no SPS scheme has been installed at Champa-Kurukshetra considering that this scheme would be fall back option when HVDC Champa-Kurukshetra trips and the scheme is designed in such a way that scheme will only operate in worst case. The proposal of SPS for HVDC Champa-Kurukshetra was dropped because of this SPS, hence this SPS should be strengthened and it operations should be ensured whenever the contingency arises. Presently except Mundra - Mahendragarh HVDC this is the only SPS which takes care of trippings of other WR-NR links.

B.1.8 NRLDC representative reiterated for reliability and safety of the Grid the need for independent signal generation to loads shedding in NR and generation reduction in WR at both the ends and send to both ends independently so that there is no chance of failure.

B.1.9 CEA representative stressed that revised scheme should be implemented at the earliest.

B.1.10 POWERGRID informed that scheme would be implemented by Dec, 2018 and logic diagram for the same would also be shared.

B.1.11 TCC recommended that POWERGRID should implement the revised SPS scheme by Dec,18 and submit the logics of the scheme to NRPC. POWERGRID to carry out Mock testing of revised SPS scheme in Jan, 2019 and submit the detailed report.

NRPC Deliberation

B.1.12 SE(O), NRPC requested POWERGRID to share the locations where repeaters were being installed. Representative of POWERGRID agreed for the same.

B.1.13 NRPC noted the deliberations and concurred with the decision of TCC.

B.2 System Study for Capacitor Requirement in NR for the year 2019-20.

TCC Deliberation

B.2.1 MS, NRPC informed the Committee members that as per the decision of 38th TCC and 41st NRPC meeting it has been decided that the study for capacitor requirement in NR for the year 2019-20 will be conducted in two stages:

a) First at 220/132 kV level
b) Subsequently, down to 11/33 kV level

B.2.2 He further informed the Committee that installation of capacitor bank near to the distribution load buses relieves the reactive power stress or artificial loading of the transmission and sub-transmission network. Modelling of distribution network involves the modelling of distribution network comprising of distribution feeder, transformers and their loading. Collection of these data information from the distribution network operators is a laborious & time consuming task due to lack of data records/documents, trained engineers and shortage of manpower.

B.2.3 Central Power Research Institute Bangalore prepared the data collection format in Microsoft excel sheet where power utilities can feed/fill the power elements details downstream of the 220 or 132 kV transmission buses. These data format will enable the utilities to fill the data

with respect to each 220 or 132 kV substation within their network. Availability of data as per format provided is a must and will help the study team to simulate the distribution network correctly especially when the size of network is very big of order of around 10,000 buses as expected in the Northern Grid. Location and sizing of the capacitor banks at distribution buses can only be identified by extending the study to the distribution network, where data requirement for modelling of distribution network is prerequisite requirement.

B.2.4 He further stated that the utilities had expressed their concerns in filling the format prepared by CPRI for data collection stating it to be very cumbersome and confusing. For resolving the issue, representative of CPRI made a detailed presentation in the OCC meeting and modified the format as per the ease of the utilities. CPRI also made a video tutorial, detailing the format and uploaded the same on YouTube (https://youtu.be/QTXx7owPF3g).

B.2.5 MS, NRPC expressed concerns that even after making so much effort, no data have been received from the States, because of which the study was getting delayed and requested all the State utilities to submit the data at the earliest so as to get the study completed in time.

B.2.6 ***All constituents agreed to submit the data at the earliest***.

B.2.7 MS, NRPC informed that Committee that the proposal of capacitor installation by Haryana, Uttar Pradesh, Punjab and Jammu Kashmir through PSDF funding which were recommended by NRPC based on the study conducted by CPRI, Member Secretary, NRPC informed that the same were recommended by TESG to the Appraisal Committee for considering these proposals of capacitor installations as "Deemed Returned" on the non-availability of proper justification.

B.2.8 NLDC representative stated that NLDC is acting as the secretariat for PSDF. TESG of PSDF has brought out the points on which clarifications were required from the utilities and had also sent reminder letters for the submission of the same. However, except partial information from few utilities, no information has been received. In the absence of proper justification, the proposals were recommended by TESG as "Deemed returned". Some of these proposals are 5 years old.

B.2.9. MS, NRPC clarified that all details sought by TESG has already been considered by CPRI in their previous study and details made available with the proposal for PSDF funding submitted by the utilities. If NLDC wants the input file of the study, the same will be made available, so that they can verify the requirement arrived themselves.

B.2.10 NLDC informed that they have written to all RPCs to work out the requirement of the capacitors similar to the initiative taken by NRPC for working out requirement of capacitors banks based on the system studies.

B.2.11 Representative of Punjab stated that the DPR for these proposals of capacitor installation was made in around 2014-15 and was not based on any study conducted by CPRI but was based on some empirical formula which has been justified to an extent by the 2017-18 report of CPRI for capacitor requirement. Now, CPRI would be conducting the study at 11/33 kV level, in which the requirement of the capacitor would be quantified more accurately and would be much more that what Punjab has projected. As the requirement in the already submitted proposal has also been confirmed from the study of CPRI, the same may be now be approved without causing any further delay in the installation of these capacitors. It is not

good for the system that the requirement worked out 5 year back should be held up for want of few clarifications. There would be some improvement in the voltage profile with the proposed quantum and additional requirement would be put up after the conclusion of the fresh study being carried out by CPRI.

B.2.12 Representative of NLDC stated that the requirement of TESG has already been brought out and informed to the utilities. However, if the utilities are facing any problem and require any changes in the same, it may be conveyed to the Convener, TESG for its deliberation in the TESG meeting. The proposal of Punjab will be put to TESG.

B.2.13 NLDC informed that from UP 7 different proposals have been received. Discussion was held in CEA and UP has agreed to withdraw their proposal and submit the comprehensive proposal for requirement from transmission and distribution.

B.2.14 Haryana representative informed that they have also submitted the requisite information

B.2.15 Rajasthan informed that proposal for PSDF funding was submitted in August 2016 and at the end of Jan 2017 they have issued LOI and Rajasthan has installed 40 MVAr capacitors.

B.2.16 TCC Chairman stated that for utilities it is very difficult to fund capacitors and now PSDF funding is also not made available to them.

B.2.17 Representative of NLDC requested all the utilities to submit their replies in the format as mentioned in the minutes of TESG which were attached at ***Annexure B.2.1 of the agenda***

B.2.18 TCC forum requested NLDC to take up that matter with TESG and not to return the DPRs of the utilities for capacitor installation and provide them with additional one-month time for submitting their response and reconsider their proposal favorably for PSDF funding as it will help in maintaining the voltage profile**.**

NRPC Deliberation

B.2.19 MS, NRPC briefed the Committee about discussions held in TCC and that all constituents agreed to submit data pertaining to their utility at the earliest.

B.2.20 Representative of NLDC requested all the utilities to submit their response to TESG about the issues they were facing so as to provide the information as required by TESG so that the same can be brought forwarded to the Appraisal committee who has the final power to make any modification in the approval.

B.2.21 NRPC agreed to the above and concurred with the deliberations of TCC.

B.3 Reactive compensation at 220/400 kV level.

TCC Deliberation

B.3.1 MS, NRPC appraised the Committee that the following reactors were approved in the 39th meeting of SCPSPNR held on 29th & 30th May 2017:

a) TCR of capacity 500 MVAr at Kurukshetra 400 kV bus.

b) Bus Reactors at 30 no. 220 kV sub-stations and 18 no 400 kV level sub-stations subject to the availability of space ***(Annexure-B3.1*** of the agenda***).*** It was also agreed that these reactors shall be provided by the owner of the substations.

B.3.2 He apprised the Committee about the status of implementation of these reactors as submitted by the utilities in the OCC meetings as detailed in the agenda item, and requested utilities for any further update in the status.

B.3.3 Rajasthan representative informed that the DPR for 450 MVAr (13*25+1*125 MVAr) reactors has been sent for PSDF funding.

B.3.4 HP requested that Kala Amb (TBCB) requirement should be reviewed.

B.3.5 POWERGRID agreed to look into the recommendation of the system study.

B.3.6 POWERGRID representative informed that as per the operating procedure of NRLDC reactors has to be switched out at 395 kV and switched in at 405 kV. He informed that POSOCO and NRLDC has been requested to reconsider the range and it to be changed to 385 kV and 415 kV so that it is within grid code range so as to avoid frequent switching operation of reactors and also that equipments are not designed to take so many transients. Accuracy class of CVT is 3% due to which sometime there are also frequent switching operations. Range to be changed to be in line with the IEGC and other region.

B.3.7 NRLDC informed that they have not received the request. Requirement of all region is not same and as such the limits can be different from that in other region. If we take an early action it would be better, but if the operation is delayed then voltage may go below 385 and above 415 kV. The contention of POWERGRID of frequent switching is not correct and as can be seen from the voltage profile wherein generally in night hrs say after 21:00 hrs it goes high and comes down at 5:00 hrs in the morning during winter months. Similarly, in the day time become low during day when load picks up. Before opening of lines, voltage should be controlled through reactors. The proposal of the POWERGRID would be examined.

NLDC stressed that grid should operate smoothly and for that reactors should switched in/out and voltage profile is maintained and no of line opened are reduced. Line opening reduces the reliability of the grid.

B.3.8 MS, NRPC requested NRLDC to have an in-depth discussion followed with study and the same can be brought in the next RPC meeting. All the utilities to expedite the implementation of these reactors.

NRPC Deliberation

B.3.9 MS, NRPC requested Delhi representative to expedite the commissioning of the reactors agreed at Delhi. Further, he requested to pre-pone the target date of completion for installation of these reactors from Dec, 2020 to Oct, 2020 so that the reactors may come into service before the winter (2020). Delhi representative agreed for the same.

B.3.10 Representative of Delhi stated that the fixed reactors which have been approved for Delhi may not be sufficient to provide effective relief in view of the dynamic reactive power injection due to cables in Delhi. He requested that in order to have flexibility in reactive power management for Delhi, some measures like using some of the old generators like BTPS and Rajghat units may be explored for its usage in Synchronous condenser mode

operation. Also some units of Bawana which are presently not in operation may also be used for reactive power management.

B.3.11 PCE, CEA advised Delhi representative to bring up the matter for discussion with Member (Thermal) and Member (Power System) in CEA.

B.3.12 Representative of POWERGRID informed the Committee that the spare reactor of 125 MVAr has been commissioned at Kurukshetra so as to provide voltage relief as per the decision of NRPC. The charges for transportation and installation were around Rs. 50 lakhs. He stated that while the inspection of reactor for charging, Electrical Inspector from CEA had stated that as per the regulations of CEA, emulsifier system needs to be provided along with the reactor. POWERGRID stated that since the hydrant system and other portable fire extinguisher system were already present and now, if the emulsifier system would have to be installed as per CEA inspection, additional cost of Rs. 35 Lakhs would have to be borne by the constituent for this temporary reactor at Kurukshetra. The TCR is scheduled to be commissioned by Dec 2020 and the installation of emulsifier system would take another 1 year. Therefore, effectively the emulsifier system would only be in use for 1 year. So, he requested NRPC to advise POWERGRID, whether to go for the installation of emulsifier system for the temporary reactor at Kurukshetra.

B.3.13 SE (O), NRPC advised PGCIL to send their representation to Chief Electrical Inspector CEA along with a copy marked to Member Secretary, NRPC. The matter would then be taken up with the CEI Div, CEA so that some alternate measures may be explored for the temporary reactor of Kurukshetra.

B.3.14 NRPC concurred with the deliberations of TCC.

B.4 Creation and maintenance of web-based Protection Database Management and PC based Protection setting calculation tool for Northern Region Power System Network.

TCC Deliberations

B.4.1 MS, NRPC informed that NIT for the above project was published on 30th Aug, 18 and last date for the receipt of the bid was 15th Oct, 2018 but only two bids were received in the stipulated period. In the view of the healthy competition, retendering was done as no option was available for extending period after last date for bid receipt.

B.4.2 He informed that now last date of receipt of bid is 14.11.2018 and the same shall be opened on 15.11.2018. The Bid evaluation committee has also been formulated comprising members from NRPC secretariat and NRPC constituents.

B.4.3 TCC noted the information.

NRPC Deliberations

B.4.5 NRPC noted the information and agreed with the recommendations of NRPC.

B.5 LVRT compliance by wind generation

TCC Deliberation

B.5.1 MS, NRPC briefed the Committee about the non-compliance of the CEA (Technical Standards for Connectivity to the Grid), (Amendment), Regulations, 2013 by most of the

WTGs in Rajasthan. He stated that NRPC in its 41st meeting had decided that the must run status of the wind generators should only be granted to LVRT compliant WTGs and non-compliant WTGs shall not be scheduled. It is the responsibility of State SLDC (Rajasthan SLDC in this case) for the implementation of the same.

B.5.2 MS, NRPC stated that a pragmatic technical solution needs to be worked out for making the WTGs LVRT compliant as reporting non-compliance to the regulatory commissions may not resolve the issue. He further stated that the alternative of having a STATCOM at the pooling substation to cater for the voltage drop in case of any fault as proposed by M/s Siemens has not been agreed by SRPC.

B.5.3 MS, NRPC further informed the Committee that in a petition filed by M/s Inox and M/s Suzlon, CERC has directed that no coercive action may be taken against them for not being LVRT compliant.

B.5.4 CEA representative stated that LVRT is mandated for all WTGs connected at voltage level of 66 kV and above by the Central Electricity Authority (Technical Standards for Connectivity to the Grid), (Amendment), Regulations, 2012 and CERC in its order has directed all SLDCs to ensure its compliance. If the SLDCs are not able to implement the same, they may file a petition in their respective SERCs detailing the difficulties being encountered in getting the compliance of the regulations.

B.5.5 Representative of Rajasthan stated that Rajasthan SLDC is very keen to get compliance of decision of 38th TCC and 41st NRPC meeting and issued a notice of one month to all LVRT non-compliant wind generators on 12.06.2018 for installing LVRT with their WTGs, failing which SLDC would be constrained to deny scheduling to the defaulting wind generators.

Thereafter, meeting with wind turbine manufacturer/ generators were held on 05.07.2018 and 23.07.2018 to sort out bottleneck/ issues in implementation of LVRT and to get it expeditious compliance. The assessment of manufacturer wise non-complied LVRT models and Nos. of WTG have been identified. The detail of same has been appraised to NRPC in OCC Meeting.

Looking to poor response observed after meeting held on 23.07.2018, a brain storming meeting session with wind turbine manufacturer/ generators was also held on 09.10.2018 for developing technical and financial awareness followed by presentation by LVRT solution provider (M/s Enerfra), the outcomes of the meeting are as under:

- ***LVRT may be retrofitted or shall be provided at WTG level***
- ***Do we have cheaper and viable alternatives/solutions besides the one suggested by M/s Enerfra?***
- ***Do we have to install LVRT at individual WTG level or installing a single LVRT at polling station level would suffice?***
- ***How other countries like China, Germany are tackling this problem?***
- ***What other solutions they are having needs to be explored at length?***

In continuation to above meetings, NRPC has also conducted a meeting on 23.10.2018 to expedite the LVRT issue and following issue were raised by WTG manufacturer/ generators during the meeting.

- ***Since the concept of LVRT installation on WTG is new in India, so some more discussion on functionality of LVRT or other method like FACT devices / STATCOM plus to control reactive power is required to get rid from outage of WTGs during low voltage.***
- ***A huge financial implication i.e. 25 Lacs to 40 Lacs per WTG is involved. Explore the possibility to arrange funding from PSDF or any other govt. funding scheme for installation of LVRT.***

After a presentation by M/s SIEMENS on FACT devices / STATCOM plus, as one of the alternative solutions of LVRT at PSS level it was decided that, a pilot project may be formulated in coordination with NRPC and Rajasthan SLDC at Ludrwa PSS having 90 Nos. non-compliant WTG of total 76.5 MW capacity of M/s SIEMENS GEMESA. M/s SIEMENS may be asked to implement the pilot project free of charge.

Since no case of LVRT retrofitting of WTG without the help of OEM has been done in notice in India. In this regard possibility may be explored to retrofit of LVRT or change in software, if required any without intervene of OEM, for this a group may be formed of members of NRPC, CEA, NRLDC, SLDC and representative of Wind Generators to visit abroad where such type of solution has been implemented. The expenditure on this account may be made by NRPC / NLDC /PSDF for Power System Development.

B.5.6 MS, NRPC quoted form the CERC order in petition no. 420/MP/2014 as "We direct wind mill owners, which are selling power through open access/banking, to factor the capital expenditure incurred by them for retrofitting WTGs with LVRT feature while quoting price of electricity for sale through open access/banking. In case the estimated cost of installing LVRT is substantially higher as compared to the capital investment in the turbine, RPCs may make a proposal for arrangement of funding from PSDF/NCEF/Green Fund for retrofitting WTGs with LVRT."

B.5.7 He stated that the phrase "substantially higher as compared to the capital investment in the turbine" did not bring much clarity on what amount shall be deemed to be substantially higher cost. He further queried that as to which authority would estimate the justified cost of having LVRT?

B.5.8 Representative of CEA stated that the onus for identifying solution for implementation of regulation is not the responsibility of either CEA or NRPC. It is Hon'ble CERC who has directed the Wind generators for the compliance of regulation and SLDC are having the responsibility of ensuring that all regulations are complied before scheduling them. If the wind generators were not able to implement the provisions of the regulations then they shall approach appropriate forum which is CERC/ SERC for further directives. He advised SLDCs to approach the regulatory commissions stating that the wind generators are not able to comply with the regulations.

B.5.9 Representative of NRLDC also stated that if the CEA regulations are not being followed, SLDCs have to approach SERC/CERC for getting its compliance done.

B.5.10 Representative of NLDC stated that with an increase in the quantum of wind generation in the grid, any incident impacting the wind generation may prove catastrophic for the grid and the LVRT compliance is must for the wind generators so as to ensure grid security.

B.5.11 Representative of CEA clarified that the whole deliberation above was only for wind generators which are LVRT non-compliant and were commissioned before 15 April 2014. For all the wind generators commissioned after 15 April 2014, LVRT compliance is must and if LVRT is not present in the generators, they shall not be provided connectivity to the grid as it will be a clear violation of regulations.

B.5.12 MS, NRPC advised Rajasthan SLDC to write a letter to RSERC.

NRPC Deliberation

B.5.13 MS, NRPC briefed the committee about the deliberations held in the TCC meeting and expressed the concerns of wind turbine generators of not being able to retrofit LVRT citing huge financial implications.

B.5.14 About the alternative option of having a STATCOM at the pooling substation level in place of an LVRT device for every unit, he intimated that SRPC has also explored the same option and has intimated CERC that it may not be a viable option.

B.5.15 Representative of HP stated that if something has been mandated in the regulation, then there was no question of financial implications of compliance with the regulations as the cost will be pass through.

B.5.16 PCE, CEA was also of the similar view and stated that even the implementation of FGD in thermal power plants is being done no matter the cost of installing the same is high as it has been mandated by the environmental norms.

B.5.17 Director, GM Div., CEA again stated that if something has been decided at some higher forums then it should not be discussed at the TCC/ NRPC level. At most the it may be decided to submit representation to the deciding authority about the inability of getting the compliance of the regulation.

B.5.18 MS, NRPC informed the committee that NRPC was not in a position even to get implemented the decision of last NRPC meeting of not scheduling the LVRT non-compliant generators, as CERC has issued direction in petition of M/s Suzlon to take any coercive action against them.

B.5.19 Representative of POSOCO stated that the direction of CERC was only valid for WTG of M/s Suzlon and not for other non-compliant generators. They may not be scheduled for LVRT non-compliance.

B.5.20 NRPC advised Rajasthan SLDC to file a petition to SERC stating the LVRT non-compliance by Wind Turbine Generators (WTG).

B.6 Downstream network by State Utilities from ISTS Stations (Agenda by POWERGRID)

B.6.1 Augmentation of transformation capacity in various existing substations as well as addition of new substations along with line bays for downstream network are under implementation at various locations in Northern Region. For utilization of these transformation capacities, implementation of downstream 220 kV system needs to be commissioned:

S. No.	Substation	Downstream network requirement	Schedule	Planned system and Implementation Status
1	400/220 kV, 3x315 MVA Samba	2 nos. bays utilized under ISTS. Balance 4 Nos to be utilized	Commissioned	**LILO of 220 kV Bishnha – Hiranagar D/c line:** under tendering (PMDP) LoA has been issued and Material has reached the site. Targeted – Nov, 2019 **220kV D/c Samba (PG) – Samba (JKPDD) approved in 1st NRSCT.**
2	400/220 kV, 2x315 MVA New Wanpoh	6 Nos. of 220 kV bays to be utilized	Commissioned	**220 kV New Wanpoh-Mirbazar D/c line**: under tendering (PMDP) **220 kV Alusteng- New Wanpoh line** Targeted Completion – Dec 2018 Anticipated – March, 2019
3	400/220 kV, 2x315 MVA Parbati PS (Banala)	2 Nos. of 220 kV bays to be utilized.	Commissioned	**220 kV Charor- Banala D/c line** (18 km): under construction Target completion –Dec, '18 as intimated by HPPTCL.
4	400/220 kV, 2x500 MVA Kurukshetra (GIS)	8 nos. of 220 kV bays to be utilized	Commissioned	**LILO of one circuit of Kaul-Pehowa 220 kV D/c line** at **Bhadson (Kurukshetra)** **LILO of one circuit of Kaul-Bastara 220 kV D/c line Bhadson (Kurukshetra)** Work awarded. Contractual Completion period is 31.10.2019. Representative of HVPNL informed that work is expected to be completed by March, 2019 earlier than scheduled completion.

S. No.	Substation	Downstream network requirement	Schedule	Planned system and Implementation Status
				22kV D/c Bhadson (Kurukshetra) – Salempur with HTLS conductor equivalent to twin moose. Price bid opened likely to be awarded by 30.09.2018 and completion by 31.03.2020.
5	400/220 kV, 2x500 MVA Bagpat GIS	3 nos. of 220 kV d/s lines to Shamli, Muradnagar and Bagpat commissioned. Balance 5 Nos. of bays to be utilized	Commissioned	220 kV D/C Baghpat (PG)- Baraut line-2 bays Severe RoW LILO of 220 kV Muradnagar II-Shamli S/C line at Baghpat (PG)-2 bays 2 no of 220kV bays to be utilized as under: Bagpat (PG)- Modipur II now D/c line to be completed by Jan, 2020 220 kV S/C Baghpat (PG)-Baghpat line energised – 1 bay LILO of 220 kV S/C Baghpat-Muradnagar(II) at Baghpat SS – 2 bays to be completed by March,19 220 kV Modipuram (II) SS March, 2019
6	400/220 kV, 2x315 MVA Saharanpur	2 nos. 220 kV downstream lines commissioned. (Saharanpur (UP) and Nanauta) Balance 4 Nos. of 220 kV bays to be utilized	Commissioned	6 No. 220 kV bays utilised as under: LILO of Khara-Shamli 220 kV S/C line at SRN(PG) 220 kV SRN(PG)-Sarasawa D/C line LILO of SRN-Nanauta 220 kV S/C line at SRN(PG)
7	400/220 kV, 2x315 MVA Dehradun	Out of 6 bays, only two bays used. Balance 4 bays to be utilised.	Commissioned	220 kV Dehradun-Jhajra line- **02 bays** 220 kV Naugaon SS – **1 bay** 220 kV Selakui SS – **2 bays** Representative of PTCUL

S. No.	Substation	Downstream network requirement	Schedule	Planned system and Implementation Status
				informed that lines were associated with NMHEP. Expected to be completed by Nov, 2021
8	400/220 kV, 2x315 MVA Sohawal	4 Nos 220 kV bays utilised. **4 No. 220 kV bays to be utilized.**	Commissioned	220 kV D/C Sohawal (PG)-Sohawal line - 2 bays 220 kV D/C Sohawal (PG)-Barabanki line– 2 bays 4 No. bays to be utilised as: 220 kV D/C Sohawal -PG(400kV) Tanda line 2 bays By December, 2018 220 kV D/C Sohawal- PG(400kV) Tanda-Behraich line - 2 bays by May, 2019 as informed by the representative of UPPTCL.
9	Shahjahanpur, 2x315 MVA 400/220 kV	Partially utilized. Balance 5 Nos. of 220 kV bays to be utilized.	Commissioned	220 kV S/C Shajahnapur- PG Hardoi commissioned – 1 bay 220 kV D/C Shajahnapur-PG(400kV) Azizpur D/C line – 2 bays – Sept, 2019 220 kV D/C Shahajahanpur-PG(400kV) Gola Lakhimpur line – 2 bays- December, 2019 New S/s at Azizpur by March, 2020.
10	Moga	Partially utilized. Balance 2 nos. of 220 kV bays to be utilized.	Commissioned	Moga–Mehalkalan 220 kV D/c line Work completed. Commissioning pending. Approval from NGT for tree cutting is awaited for balance work to commission line. Expected to be completed by Dec, '18 as informed by PSTCL.
11	Hamirpur 400/220 kV 2x 315 MVA Sub-station	04 nos. 220 kV downstream lines commissioned under ISTS.	Sep'18	220 kV D/C Hamirpur-Dehan line –June, 2020

S. No.	Substation	Downstream network requirement	Schedule	Planned system and Implementation Status
	(Augmentation by 3x105 MVA ICT)	Balance two bays to be utilised by HPSEBL		
12	Kaithal 400/220 kV 1x 315 MVA Sub-station	July 2017 (Shifting of Transformer from Ballabhgarh).	Commissioned	220 kV Kaithal(PG)- Neemwala D/c line - Work awarded on 08.06.2018. Tentative completion date 31.01.2020. 220 kV S/s Neemwala-Work awarded on 06.09.2018. Tentative completion date **March, 2020.**

B.6.2 Establishment of new 400/220kV substations in Northern Region:

Sl. No.	Name of Substation	MVA Capacity	Expected Schedule	Downstream connectivity furnished by States
1	400/220 kV Dwarka-I GIS	4x 500	Dec'18	
2	400/220 kV Tughlakabad GIS	4x 500	Commissioned	
3	220/66 kV Chandigarh GIS	2x160	Feb'19	8 nos. of 66 kV bays.
4	400/220 kV Jauljivi GIS	2x315	December 2019	2 bays for 220 kV Almora-Jauljibi line 2 bays for 220 kV Brammah-Jauljibi line
5	400/220 kV Sohna Road GIS	2x500	May'19 (Under TBCB) (8 bays)	LILO of both ckts. of 220 kV D/C Sector 69- Raj Ka Meo line at 400 kV Sohna road. Under survey. LILO of both ckts. of 220 kV D/c Badshahpur-Sector 77 line at 400 kV Sohna road. Under survey.
6	400/220kV Prithla GIS	2x500	May'19 (Under	LILO of existing 220kV Palwal–Rangala Rajpur D/c

Sl. No.	Name of Substation	MVA Capacity	Expected Schedule	Downstream connectivity furnished by States
			TBCB) (8 bays)	line at Prithla (400) (FY 2019-20): **NIT floated 21.05.2018. Likely date of award Oct 2018.** **Likely completion: March 2020** 220 kV D/c Prithla (400) – Sector-78, Faridabad S/s (FY-2020-21): **NIT floated 29.08.2018.** **Likely completion: July 2020**
7	400/220kV Kadarpur GIS	2x500	May'19 (Under TBCB) (8 bays)	M/s Sterlite has been asked to change the orientation of LILO in order to ensure the proper emanation of 220 kV line. Survey of the line in process.
8	400/220kV Kala Amb GIS	7*105	Commissioned (Jul'17)	HPSEBL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Kala Amb S/s. Details for remaining 4 nos. of line bays may be provided.
9	400/220kV Amargarh GIS	7X105	Oct'18 (Under TBCB) (Sterlite Grid planning to prepone)	JKPDD to confirm for LILO of 220kV D/c Zainkote - Delina line at Amargarh. 20 ckm work completed June-18.

TCC Deliberation

B.6.3 Representative of POWERGRID requested to expedite the implementation of 220 kV downstream network for utilization of transformation capacities.

NRPC Deliberation

B.6.4 NRPC noted the information.

B.7 Funding for the scheme "Provision of STATCOM at Nalagarh & Lucknow in Northern Region" (Agenda by POWERGRID)

TCC Deliberation

B.7.1 MS, NRPC informed the Committee that based on the decision of 42nd NRPC, NRPC Sectt. on behalf of NRPC has requested Member Secretary, Appraisal Committee, PSDF to allow funding for the scheme of STATCOM at Nalagarh & Lucknow as a special case and has also advised POWERGRID to take up the matter further with Appraisal Committee.

B.7.2 Representative of NLDC informed the Committee that the letter from NRPC and thereafter from POWERGRID has been received by them and the matter for funding of the scheme shall be discussed in the next Appraisal Committee meeting scheduled to be held in the first week of Nov, 2018.

B.7.3 MS, NRPC informed the Committee members that NRPC secretariat that if the scheme gets funded from PSDF, the utilities would be spared from the burden which would be imposed on them through tariff.

NRPC Deliberation

B.7.4 NRPC concurred with the deliberations held in TCC.

B.8 Phase nomenclature mismatch between BBMB and some interconnected stations of other power utilities

TCC Deliberation

B.8.1 MS, NRPC briefed the committee about the deliberations held in previous meeting about the phase nomenclature mismatch issue between BBMB and interconnected substations.

B.8.2 He stated that the action plan as submitted by BBMB was agreed by all the other constituents except POWERGRID. POWERGRID was requested to submit their reservations if any so as to complete the work during the lean period of November and December as decided in earlier meetings.

B.8.3 POWERGRID representative stated that the system as such has been working well since last 20-25 years. Now, these lines being S/C line, to change the conductors at the jumper so as to rectify the issue would require some material which is at present not available. The easiest and most practical method may be to get it changed at the 400 kV Dehar end. Such situation has also has been resolved after interchange. POWERGRID requested that the committee should make a visit to the site and give a report.

B.8.4 MS, NRPC stated that the action plan submitted by BBMB has already been discussed separately and now such changes shall not be proposed at the last moment. He requested POWERGRID to form their internal committee to visit the location and give their inputs on what can be done to rectify the phase nomenclature mismatch issue within the stipulated time.

NRPC Deliberation

B.8.5 NRPC concurred with the deliberations of TCC.

B.9 Follow up of Major Decisions of NRPC.

S. No.	Name of the Project /Decision taken	Meeting in which Approval was granted/ Decision was taken	Updated Status
1.	Automatic Meter Reading (AMR) for SEMs	13th NRPC meeting held on 24th June 2009.	Total SEM/locations as per LOA, phase-I:1250SEM/220 Locations phase-II:575SEM/150 DCU • No. of Energy meters for which AMR commissioned: 1320 SEM/266 DCU • Total locations for which data is received: 150 Locations • No. of Energy meters for which data is being received at NRLDC: 1065 SEM Percentage availability of data: 82% on SEM basis and 73% on location basis In the 139th OCC meeting on the issue of provision of the prospective plan of 5-minute scheduling in the AMR, POWERGRID representative expressed their inability to get modifications done for 5-minute scheduling They further stated that once the regulation is notified, they will take the further necessary action. It was decided in 37th CSC meeting that POWERGRID will complete the project by 31st Oct-2018. However, at present out of 1825 nos. only 1409 nos. meters have been integrated. NRPC requested to POWERGRID to expedite work progress to complete AMR integration project by Dec 2018 as agreed in 37th CSC meeting. As per 42 NRPC & 39 TCC minutes of meeting point C.19.1 & C.19.2; it was decided that POWERGRID will arrange the demonstration of integration of Elster meter by 15th July-2018. Further, in the 37th CSC meeting, it was intimated by M/s Kalkitech that they have completed all the activities for integration of these meters through AMR and are ready for testing the same and testing is scheduled to be

S. No.	Name of the Project /Decision taken	Meeting in which Approval was granted/ Decision was taken	Updated Status
			completed by 31.10.2018. In 37th CSC meeting POWERGRID informed that switching work is in progress to connect 70 stations of POWERGRID where minimal cost is required. Work completed at 19 stations., shifted easily with minimal cost. Cost estimate can be submitted only after survey of complete stations.
2.	Provision of Bus Reactors in Northern Region to Control Over Voltages	Provision of Bus Reactors in Northern Region to Control Over Voltages	Out of 17 no. reactors at 15 locations, 12 no. reactors at 10 locations have been Commissioned. The status of remaining 05 reactors was as under; **<u>Nathpa-Jhakri (1x80 MVAr):</u>** To be commissioned by **December 2018**. **<u>Chamera-I (1x125 MVAr):</u>** Charged on **25 August 2018** **<u>Parbati-II (1x125 MVAr) and Parbati-III (1x80 MVAr):</u>** **NHPC informed that there is no space at Parbati-III, hence reactor would not be installed at Parbati- III.** **SE(O), NRPC informed that issue needs to be taken up in standing committee and decision of the standing committee regarding the same to be intimated to NRPC. He highlighted example of DTL who has followed the same process in case of some the capacitor installations.** Reactors at Parbati-II will be commissioned along with the commissioning of the project in 2018-19. The case for purchase of reactor is **under tendering** process.
3.	Transmission system associated with Kishenganga HEP.	33rd Standing Committee Meeting held On 23/12/2013	POWERGRID had informed that completion schedule of Transmission system associated with Kishenganga HEP had been delayed due to unrest in Kashmir.

S. No.	Name of the Project /Decision taken	Meeting in which Approval was granted/ Decision was taken	Updated Status
	Kishenganga – Wagoora 220 kV D/c		The revised schedule was: • Kishenganga – Wagoora 220kVD/c line - (expected by **November 2018**) **POWERGRID informed that 1 foundation and 6 km stringing was remaining. The implementation of the line was also being monitored in the PRAGATI.**
4	Unified Real Time Dynamic State Measurement (URTDSM) Scheme.	Approved in 27th NRPC meeting held on 13th July, 2012 & 30th November, 2012	• Supply: Completed (114 Sub-stations). • PMUs at 112 S/S have been installed and 102 S/S are integrated with NRLDC/SLDCs. • WAMS System Commissioned in NRLDC & SLDCs of Northern Region. • Out of 6 Analytic Software which are being developed by IIT Bombay, 4 have been deployed at NRLDC, Prototype for one application is being tested and remaining one is under development. Installation of Line Parameter Estimation, Vulnerability Analysis of Distance Relay, Supervised Zone-3 Distance Protection, Linear State Estimator is done for NRLDC & Delhi, installation at SLDCs under progress. **POWERGRID informed that installation has completed at UPSLDC. He informed that 2 porotype i.e. CT/CVT calibration and logic based tripping of feeders were under testing.** **MS, NRPC requested to check the performance of 4 analytics in use.**
5.	Fiber Optic based communication system in NR and Additional OPGW	18th NRPC meeting held on 27th November, 2010 and 28th NRPC meeting held	POWERGRID informed that Work on all packages would be completed by August 2017. • Fibre Optic Connectivity under Central sector (5193/5203 Kms) has been completed. Uri-Uri-II link (10kms) could not be completed due to severe

S. No.	Name of the Project /Decision taken	Meeting in which Approval was granted/ Decision was taken	Updated Status
	connectivity in Northern Region under fiber optic expansion project	in 22nd March, 2013	ROW issues. • OPGW connectivity under State Sector & Additional requirement of Central Sector is under progress and same shall be completed progressively by Dec' 2018 **NR-I & NR-III :-** State Sector Completed - 621 Kms Central Sector (Addi. Req): 1350 Kms out of 1643 completed. **Representative of POWERGRID informed that target completion is March, 2019.**
6.	Rectification of deficiencies coming out of Basic Protection Audit carried out by CPRI in association with POWERGRID	27th NRPC meeting held in November 2013	MS, NRPC requested all the utilities to submit the status of rectification as same is to be furnished to NPC.
7.	Third party Protection audit of intra-state system / balance system not covered in Basic Protection Audit	27th NRPC meeting held on 30th November, 2012.	Only UPPTCL had not submitted their action plan. UPPTCL: the action plan would be submitted shortly. **Representative of UPPTCL informed that CPRI is working on this and detailed report will be submitted by June, 2019.**
8.	Planning, procurement and deployment of Emergency Restoration System.	In the 34th NRPC meetings 20th held on March, 2015	**DTL, PSTCL, UPPTCL and J&K** - 02 nos. of ERS procured. **RRVPNL**: - For procurement of ERS, preparation of Tender documents has been completed and it's under approval. **HVPNL**: - BOQ finalization it's under process. **PTCUL:** - DPR finalization under process.

S. No.	Name of the Project /Decision taken	Meeting in which Approval was granted/ Decision was taken	Updated Status
			HPSEBL: – The process of arranging funds for procurement of ERS has been initiated. HPSEBL representative intimated that they were coordinating with PTCUL. He was advised to coordinate with J&K, citing the status of PTCUL. **BBMB**: - BBMB representative stated that the issue will be taken up in the Power Sub –Committee as the partner states do not have their ERS from which it was earlier proposed to be utilized. **Note: - CEA (Grid Standards) regulations 2006,** regulation No. 22 stipulates that each transmission licensees shall have an arrangement for restoration of transmission lines of 400 kV and above & strategic 220 kV lines through the use of ERS in order to minimize the outage time of transmission lines in case of tower collapse. Also Ministry of Power has directed that for 5000 ckt km minimum of 2 No.s of ERS are required.

B.10 **Connectivity to Naitwar Mori HEP (NMHEP) (2x30MW) of SJVN Ltd. in Uttarakhand (Agenda by SJVN)**

TCC Deliberation

B.10.1 MS, NRPC briefed the issue to the Committee and expressed concerns on the delay in finalizing the location of Mori Substation because of which the evacuation of power from Naitwar Mori HEP may be jeopardized.

B.10.2 PTCUL representative informed the Committee that a joint site visit of PTCUL and SJVN was organized on 26.10.2018 to finalise the location of Mori substation, however, the same could not be finalized. He stated that in absence of LTA agreement, PTCUL cannot move forward with the construction of line.

B.10.3 MS, NRPC stated that the connectivity issue of NMHEP has already been discussed at CEA level whereby PTCUL had been advised to approach CERC for any further clarifications.

B.10.4 He further stated that the delay was on account of PTCUL not being able to finalise the location of Mori substation because of which SJVN shall construct their dedicated line for

evacuation of their generation and PTCUL have to construct the LILO portion from the original proposed location of Mori substation to that finalized by PTCUL at their own cost.

B.10.5 SJVN representative stated that they would require connectivity for pre-commissioning activity from August 2021.

B.10.6 TCC advised PTCUL to finalise the location of Mori substation at the earliest and to provide the connectivity to NMHEP as per schedule.

NRPC Deliberation

B.10.7 Representative of PTCUL stated that there were some issues which had been resolved at CEA/CTU level. However, some issues were still not resolved for which CEA / CTU has advised them to approach CERC.

B.10.8 MS, NRPC mentioned that in case PTCUL is not able to provide the final location of Mori substation, SJVN shall construct their dedicated line for evacuation of their generation and PTCUL have to construct the LILO portion from the original proposed location of Mori substation to that finalized by PTCUL at their own cost.

B.10.9 NRPC concurred with the deliberations of TCC and advised PTCUL to expedite the finalization of location of Mori substation.

B.11 Training programme for Protection System Engineers on Power System Protection (Level 2 and 3)

TCC Deliberation

B.11.1 MS, NRPC informed that Training on Protection system Level -2 and Level – 3 (Batch - 1) were successfully conducted from 21st to 25th November, 2016 at Shimla and from 19th to 23rd March, 2018 at Udaipur respectively.

B.11.2 He suggested that no. of participants for 2nd batch of level-2 and level-3 training might be increased to 50 and as per the discussion in 36th Protection Sub-Committee Training is proposed to be organized through any of the OEM for relays. He further informed that programme would include classroom training as well as hands on training. He proposed that expenditure for the same might be booked from NRPC fund.

B.11.3 TCC recommended the proposal and suggested that Member Secretary, NRPC may be authorized to take necessary action in this regard.

NRPC Deliberation

B.11.4 NRPC approved the recommendation of TCC and authorized MS, NRPC to take necessary action in this regard.

B.12 Training Programme/Workshop on Protection system Auditors from CPRI.

TCC Deliberation

B.12.1 MS, NRPC informed that as approved in the 39th TCC/42nd NRPC meeting Third Party Protection audit would be carried out periodically (frequency of 5years) either by a team of Protection Engineers of the utilities as per the list finalized by the Protection Sub-Committee or by any reputed agency working in the field of Power System. He stated that

in view of the above, capacity building of protection engineers for carrying out Protection audit is very important in this regard.

B.12.2 He informed that a proposal from Power System Division of Central Power Research Institute for conducting 3 days Training Programme/Workshop at Bangalore on Protection Audit for Protection System Engineers was discussed in 36th PSC meeting held on 19.09.2018 wherein members were of view that as CPRI has already carried out Protection audit of many Sub stations, it might be more suitable to consider CPRI for imparting training on Protection Audit. The manual on the procedure for carrying out protection audit would also be prepared during their training by CPRI.

B.12.3 He told that training programme isn't residential and participants would have to make their own boarding and lodging arrangements. He informed that guest house accommodation could be provided at CPRI on twin sharing basis on chargeable basis, if available. The fee per participant for 3 days training is Rs. 10,500 exclusives of taxes. The expenditure for approximate 60 nos of participants will be booked in NRPC fund.

B.12.4 TCC recommended the proposal for approval of NRPC.

NRPC Deliberation

B.12.5 NRPC noted the deliberations held in the TCC meeting and approved the proposal of carrying out 3 days Training programme on Protection audit at Bangalore through CPRI for 60 nos of participants from utilities of NR.

B.13 Request for allocation of sufficient APM Gas (Agenda by BRPL)

TCC Deliberation

B.13.1 MS, NRPC stated that the availability of APM gas even for the power sector as a whole is very much restricted. Not only PPCL, but NTPC also is affected by the shortage in supply of APM gas. Similar is the situation in WR also.

B.13.2 However, pointing out the shutting down of Badarpur plant, MS, NRPC stated that the other gas stations operating in Delhi needs to be supplied with the gas. He advised IPGCL to take up the matter once again with the Ministry of Petroleum and Natural Gas.

B.13.2 IPGCL representative informed that they have already taken up the issue and requested NRPC and CEA to further take up the matter with the Ministry.

B.13.3 MS, NRPC stated that NRPC Sectt. would request CEA to take up the issue with the Ministry for allocation of sufficient fuel to PPCL. He further stated that since, Badarpur plant has been decommissioned, for proper execution of Delhi islanding scheme, a generating source needs to be available within Delhi itself and the supply of fuel needs to be ensured to them.

B.13.4 Director, GM Division, CEA stated that as the availability of APM gas is very much restricted there are very bleak chances for allocation of any additional gas. However, there was no harm in expressing our concern to the Ministry.

NRPC Deliberation

B.13.5 NRPC concurred with the deliberations of TCC.

B.14 Acute fuel shortage in power stations (Agenda by BRPL)

TCC Deliberation

B.14.1 MS, NRPC stated that coal stock position is going down and many plants are running at supercritical condition but some DISCOMs feel DC of plants were given full despite of position of coal stock. He added that DISCOMs have also highlighted frequent revisions of DC during real time which creates difficult situations as power exchanges also have limitations like insufficient availability of power on real time basis & transmission constraints, leading to load shedding. He asked NRLDC how it can be ensured that DCs were being given as per coal stock position and further requested to highlight instances of DC revision, if any.

B.14.2 Representative of NRLDC stated that DC would be given by generators and scheduling as per DC is being done by NRLDC and it is difficult for NRLDC to ensure that DCs are being given as per coal stock position. He informed that issue of DC revision was discussed in 37th TCC/40th NRPC wherein it was decided that stations shall not reduce their DC during the day due to coal shortage and shall keep at least two days stock and declare DC accordingly. He further emphasized that generators should ensure that DCs are being given as per coal stock position.

B.14.3 Representative of BRPL highlighted that coal stock position of plants are being sent to various ministries by generators on daily basis which might help NRLDC to ensure rightful declaration of DCs. Representative of NRLDC stated that DISCOMs could also highlight any grievances in DCs using coal stock position of generators.

B.14.3 Representative of Delhi SLDC informed that during acute coal shortage of coals, we were having daily coal stock position of ancillary generators and declaration of DC was being monitored. Representative of BRPL stated that there should be some clear justification for DC declaration depending upon coal stock position as it is very difficult to arrange power during DC revision and penalties for deviations are also high. He asked if any guidelines or rules could be forms which would decrease burden of DISCOMs.

B.14.4 Representative of NRLDC told that generator should ensure coal stock position before DC declaration as per regulation. Representative of CEA informed that as per IEGC clause 6.4.16 which as follows “The ISGS shall make an advance declaration of ex-power plant MW and MWh capabilities foreseen for the next day, i.e., from 0000 hrs to 2400 hrs. During fuel shortage condition, in case of thermal stations, they may specify minimum MW, maximum MW, MWh capability and declaration of fuel shortage”, generators should declare coal stock position in MT while giving DC.

B.14.4 Representative of NTPC stated that fuel shortage condition has not been defined anywhere in the regulations as well as coal stock positions are already being informed to CEA and other ministries. He requested that it should not be binding on generators to give full DC only if 2-3 days coal stock is available and further asked in case of any doubt, generators may be asked to demonstrate the DC. He told that for Dadri, we are using all necessary means to ensure adequate coal stock is maintained. He clarified that we are giving DC as per the coal stock available.

B.14.5 Representative of IPGCL stated that in the agenda BRPL have also mentioned about insufficient Gas allocation of APM and RLNG regarding which he further clarified that gas is never stored and since gas is allocated by GAIL on a daily basis, 2-day availability of gas cannot be ensured in gas based generating stations. He emphasized if there is any doubt about DC declaration, then they could ask us to demonstrate DC. He requested forum to discourage such type of allegations on generators.

B.14.6 Represented of NRLDC stated that in normal circumstances, DC of a generator should remain constant throughout the day and would change only in case of machine tripping. However, it has been observed that there have been instances of DC revision without any pertinent reason which indicates lapse in the assessment of fuel position, hence agenda is only to request generators for proper assessment of fuel position while declaring DC.

B.14.7 MS, NRPC stated that as per IEGC,2010 generators are requested to declare coal stock position in MT during fuel shortage condition.

NRPC Deliberation

B.14.8 MS, NRPC informed the forum that agenda was deliberated in detailed in TCC wherein generators were requested to declare coal stock position in MT during fuel shortage condition. He told that agenda pertaining to DC revision was discussed in 37th TCC/40th NRPC wherein it was decided that stations shall not reduce their DC during the day due to coal shortage and shall keep at least two days stock and declare DC accordingly.

B.14.9 He further told that it has been observed that generators were under injecting when utilized as RRAS which is unhealthy practice. Hence, CERC would be communicated instances of under injection while using as RRAS so that provisions would be kept in upcoming 2019-2024 regulations to discourage such practices.

B.14.10 Representative of NTPC clarified that DC declared was always as per coal stock position and they were complying IEGC and CERC regulations regarding the same. He also informed that coal stock position was improved as far as Dadri is considered for which realization is increased to 104%. He assured that all necessary actions were being taken to ensure adequate coal stock position. He further told that DCs were being revised due to any problems in machine or due to variations in quality of coal stock received.

B.14.11 Representative of CLP-Jhajjar requested that it was necessary to look into commercial aspects also before recommending to declare 2 days coal stock position. He told if

generators have coal stock for only 1 day, then also they were entitled to declare full DC for next day. As generators are already fighting for maintaining coal stock position, it is requested to consider both commercial as well as technical aspects.

B.14.12MS, NRPC reiterated that as per IEGC generators are requested to declare coal stock position in MT during fuel shortage condition and they should ensure that DC is given as per the coal stock position.

B.15 Violation of Protection standard in case of Inter-Regional lines of voltage 220kV and above

TCC Deliberation

B.15.1 SE(O), NRPC informed that section 3.e of Grid Standards Regulation of CEA, 2010 has specified maximum fault clearance time for different voltage levels but during discussions in PSC meetings events violating mentioned limits was being observed repeatedly. These events jeopardize security and safety of the Grid. He requested utilities to avoid such violations by implementing remedial measure as suggested by PSC or carrying out Protection audit of substation, if necessary.

B.15.2 He also highlighted the non-submission DR/EL within 24 hrs which is cause of concern. MS, NRPC informed that whatsapp group has been created of PSC members in which information regarding tripping (name, date, time) and date & time at which details have been submitted could be shared. Further, utilities were advised to share the data on sep-nrpc@nic.in,nrldcso2@posoco.in, nrldcso2@gmail.com.

B.15.3 Representative of NRLDC informed that violation of protection standards was being highlighted regularly for inter-regional lines by circulating letter, bur there were many single elements tripping violating protection standards which might result into multiple element tripping. Representative of NLDC emphasized on submission of DR/EL within 24 hrs as they were very important for further analysis.

B.15.4 MS, NRPC told that utilities should submit the detailed report as well remedial measures taken for such events. He suggested utilities could make presentations in the PSC meetings explaining the tripping, remedial measures taken and learning therefrom like practice being followed in PCM of WRPC.

B.15.5 TCC expressed concern and requested utilities to take remedial measures to mitigate such instances of violation of protection standard.

NRPC Deliberation

B.15.6 NRPC noted the deliberations held in TCC meeting and requested utilities to avoid instances of violation of protection standard.

B.16 General Recommendations/Best Practices in PSC meeting

TCC Deliberation

B.16.1 MS, NRPC informed that compiled list of recommendations of PSC was circulated as General recommendations/Best Practices in PSC meetings. He told that members were requested to adhere to these general recommendations and to forward best practices in their utility or any other utility which can be adopted to include in this compilation.

B.16.2 He told that compendium of all the best practices would be made and same could be followed by the region as whole which might help in mitigating instances of mal-operation/mis-operation.

NRPC Deliberation

B.16.3 NRPC noted the deliberations in TCC and appreciated initiative of NRPC secretariat.

B.17 CERC order on Petition No. 9/SM/2014 and 10/SM/2015

TCC Deliberation

B.17.1 MS, NRPC informed that CERC in its order dated 14.06.2016 in Petition no. 9/SM/2014 for investigation of tower collapse and load crash in Northern Region on 30.5.2014 and Petition no. 10/SM/2014 for investigation of Line Outage due to Tower Collapse in Northern Region during April 2015 to June 2015 directed RPC Secretariat to examine the cases of delayed clearance of faults on transmission system during last two years.

B.17.2 The list of delayed clearance fault was circulated again and again but data has been only received from the utilities mentioned in the agenda. He informed that partial information received till date was submitted to CERC as show cause notice was issued by CERC. He told that complete information would be submitted to CERC after receiving from utilities.

B.17.3 TCC requested all the utilities to expedite the submission of information.

NRPC Deliberation

B.17.4 NRPC expressed concern over non-submission of the data despite regular follow-up in the meeting and urged utilities to furnish the information at the earliest.

B.18 Status of FGD installation vis-à-vis installation plan at identified TPS.

TCC Deliberation

B.18.1 MS, NRPC informed that agenda has been already deliberated in detail at C.6. He told that FGD was installed in only 2 IPP stations in NR and NTPC was in advanced stage of tendering process.

B.18.2 Representative of NTPC informed that FGD has been already installed at Vindhyachal TPS and it was under progress for other stations.

B.18.3 Representative of Rajasthan informed that tender document specifications has been prepared in association with consultant and tendering process would be started for the same.

B.18.4 MS, NRPC informed that the FGD installation deadlines have been advanced for stations falling in NCR and also for the stations above 500 MW capacity or in stations located in the

area having population density more than 400 persons per square km or are in critically polluted area.

B.18.5 TCC requested all the generators to make serious efforts to meet the deadline of installation of FGD.

NRPC Deliberation

B.18.6 NRPC noted the deliberations held in TCC meeting.

B.19 Discrepancies in Generation Schedules (Agenda by NTPC)

TCC Deliberation

B.19.1 Representative of NTPC stated that issue has been discussed in detail in 152nd OCC meeting. MS, NRPC asked NRLDC if parallel operation of old software and new software could be continued. He expressed concern stating that as bugs were being detected in illogical and random pattern, detection of problem may take longer.

B.19.2 Representative of NRLDC informed that parallel operation was not possible as migration to new software was already completed. Regarding discrepancies in the new software, NRLDC assured that issue has been taken up with software developer (PwC) and it would be resolved at the earliest.

B.19.3 TCC requested NRLDC to resolve the issue at the earliest.

NRPC Deliberation

B.19.4 NRPC noted the deliberations held in TCC meeting.

B.20 Minimize gap between supply and demand:

TCC Deliberation

B.20.1 MS, NRPC informed the committee that during the month of September and October 2018, the price of power available on the exchange hovered around Rs 14-18. This was mainly due to the lower wind and hydro power generation during the period along with persistent coal shortage at thermal power plants.

B.20.2 MS, NRPC requested all the generators to bring their RSD units on bar and ensure fuel stock availability at their stations as general elections will be held in March/April. He stated that if the units were not made available on bar, the state would have to pay exorbitant prices for power purchase through the exchanges and that to entire demand may not be met.

NRPC Deliberation

B.20.3 NRPC concurred with the deliberations of TCC.

B.21 New Construction Scheme of Series Bus Reactor at Mandola & Ballabhgarh and Series Line reactor of Dadri line at Mandola end (Agenda by POWERGRID)

TCC Deliberation

B.21.1 Representative of POWERGRID informed the committee that for Grid safety augmentation involving control of the high short circuit levels in the Delhi/NCR areas, provision of series reactors at following locations was agreed to be implemented by POWERGRID:

Series Bus reactors

i. 1 no. of 12Ω Series Bus Reactor at Mandola 400/220 kV (POWERGRID) Substation along with associated bays.
ii. 1 no. of 12Ω Series Bus Reactor at Ballabhgarh 400/220 kV (POWERGRID) Substation along with associated bays.

Series Line reactors:

i. 1 no. of Series Line reactor of 12Ω in Dadri- Mandola 400 kV Ckt-I at Mandola
ii. 1 no. of Series Line reactor of 12Ω in Dadri- Mandola 400 kV Ckt-II at Mandola

Scheduled Commissioning: Feb 2019.

B.21.2 The above works were agreed during the 32nd and 33rd Standing Committee meetings of Power System Planning of Northern Region held on 31/8/2013 and 23/12/2013. The scheme was also discussed and agreed in the 30th NRPC held 28/02/2014.

B.21.3 He stated that the growth of the network & generation addition has resulted in phenomenal increase in short circuit levels beyond the rated capacity of existing equipment in various buses in NCR area which is endangering grid safety & security.

B.21.4 POWERGRID representative stated that the above-mentioned reactors were having the commissioning schedule of Feb 2019, however, for the safety of the grid POWERGRID has expedited the commissioning and the same would be charged in November 2018. **He categorically mentioned that the incentive for early commissioning of the same was not being claimed by POWERGRID.**

B.21.5 Members appreciated the efforts of POWERGRID for the commissioning of the reactors before their scheduled commissioning date.

NRLDC representative requested POWERGRID to submit the Dynamic Performance study report for the series line reactors to which POWERGRID representative agreed.

NRPC Deliberation

B.21.6 NRPC concurred the deliberations of TCC and appreciated the efforts of POWERGRID for early commissioning of the reactors.

B.22 Shut down requirement for 220 kV Sarna-Hiranagar line due to critically damaged foundation caused by change in river flow: (Agenda by POWERGRID)

TCC Deliberation

B.22.1 MS, NRPC stated that as informed by POWERGRID the foundation of tower location no 66 of 220 kV Sarna-Hiranagar line is severely damaged due to change in river flow. This tower is in critical condition and can collapse any time. The conductor of the line needs to be shifted to new tower. Foundation of new tower was completed ten (10) months back and shut down also got approved on subsequent OCCs with a remark of consent from JKPDD.

B.22.2 Since Feb'18, the matter was being followed up with JKPDD for shut down but consent was not given by JKPDD. The condition of this tower foundation is very critical. In case tower collapses it will hamper the power supply in the Hiranagar area for a long time.

B.22.3 He informed the members that the issue was discussed with Secretary (Power) of J&K and it was assured by him that the shutdown will be given in the month of November and the work shall be completed at the earliest.

B.22.4 POWERGRID was requested to reduce the outage period of the line to as minimum as possible.

NRPC Deliberation

B.22.5 Representative of POWERGRID informed that they would require seven (07) days shutdown and will try to reduce it, if possible.

B.22.6 NRPC advised PDD J&K to give shutdown of 220 kV Sarna-Hiranagar line in the month of November 2018.

B.23 Replacement and Cleaning of Insulators of lines in Northern Region (Agenda by PSTCL)

TCC Deliberation

B.23.1 Representative of PSTCL informed the committee that they were proposing to install long rod porcelain insulators in three of their lines on trial basis in place of polymer insulators. The reason for this decision was based on the non-availability of any verified source about the lifetime of polymer insulators and also the usage of polymer insulators being banned by some countries like Australia. He further stated that with time it has been reported that polymer insulators tend to lose their hydrophobicity which was the most important factor to consider them in the first place. Also, as per the report of the committee of CEA formed after the grid incident of 2007, the utilities have an option to choose between the long rod porcelain and polymer insulators. Thereby, PSTCL will go for porcelain insulators on a trial basis for Nakoda- Muktasar line and Muktasar-Talwandi Sabo line.

B.23.2 Representative of POWERGRID informed that the polymer insulators in POWERGRID are in service since 1997-98 in two of their lines and from since last 20 years no problem of reducing hydrophobicity has been encountered. Also, from 2007 onwards, POWERGRID has installed polymer insulators in almost all of their lines and their performance has been good. Regarding the life of polymer insulators, he informed that as per CIGRE papers and various other literatures, the life of polymer insulators is somewhere between 30-35 years as compared with 50-60 years life of porcelin insulators. Also the cost of polymer insulators

was approximately 40% of that of porcelain insulators which makes the overall cost of polymer insulators cheaper as compared to that of porcelain insulators.

B.23.3 Representative of PSTCL stated that only the cost could not be the deciding criteria. The shutdown time required in changing the insulators also needs to be considered. He further informed that the Indian manufacturers of the polymer insulators were not claiming the life of 30-35 years. Also he was of the view that the quality of the imported polymer insulator and that manufactured in India were not comparable.

B.23.4 On the query of PSTCL on having changed some of the insulators from polymer to porcelain in one of their line, representative of POWERGRID informed that they were changed on a trial basis to avoid tripping due to algae formation on the insulators on three towers as cleaning of the porcelain insulators is much easier as compared to the polymer ones.

B.23.5 SE (O), NRPC stated that as per the Draft CEA regulation it is the prerogative of the utility whether to install porcelain or polymer insulator.

B.23.6 TCC advised PSTCL initially to go for any one transmission line on a trial basis and if found successful may be considered further.

NRPC Deliberation

B.23.7 NRPC concurred with the deliberations of TCC and advised PSTCL to install porcelain Long rod insulator on trial basis.

B.24 Winter preparedness: (agenda by NRLDC)

B.24.1 NRLDC representative gave a detailed presentation on the issues & challenges along with action plans for safe grid operation during winter months in Northern Region. The Load profile of NR and different states as well ramping requirement, hydro availability and issues were discussed in detail. The ramping requirement during morning hours in NR is of the order of 7000 MW/hr while that UP and Rajasthan state control area is of the order of 2000 MW/hr. The morning ramping requirement of other states is also in the range of 500 to 700 MW/hr and therefore he stated that all states need to work for improving ramping capability of the generating stations in their respective control areas. He also requested all generating stations to improve their ramping capabilities as the same in actual are much below the mandated value as per CEA regulations.

B.24.2 Following summarized action plans for winter were agreed:

S. No.	Issues	Action plan	Action by
1	Off-peak to peak demand ratio of NR becomes ~ 0.6 while	Load forecasts & its availability in SCADA Portfolio management as per load forecast especially very high ramp up and ramp down	SLDCs

	for some of states this ratio ranges ~0.4-0.5	period. Minimize generation to technical minimum as per CERC directions during low demand.	
2	Morning & evening ramp is very steep, ramping of ~15GW within 2 hrs during peak hour demand.	Co-ordination of ramping of generation during morning & evening peak ramping	Generators & SLDCs
3	Limited Hydro resources & renewable energy	Optimum utilization of Hydro resources for peak hour demand.	NRLDC ,Generators & SLDCs
4	High Voltage Due to less demand especially during night hours persistent high voltage has been observed.	Ensuring switch off capacitors & switch on reactors. Ensuring healthiness of all commissioned reactors in the system Monitoring of reactive power through SCADA displays.	NRLDC, SLDCs, Transmission utilities
		Reactive power support (absorption) by generating station as per the capability curve. NRLDC has been monitoring the response of major generator and observations were presented.	All Generators would monitor their reactive power and would take up corrective actions immediately.
		Synchronous condenser operation especially of hydro units during night hours for dynamic voltage support. Some of the generators has trial tested last year. Other generators (hydro & gas) also need to share their capability & trial testing plan to operate as synchronous condenser mode.	Generators. NHPC, PSPCL, HPSEB agreed for early testing and deployment. IPGPCL was requested to implement the facility in Delhi GTs.
		Tap Optimization at 400kV & above has been done by NRLDC. Same exercise need to be carried out at 220kV & below levels.	SLDCs
		Monitoring of Reactive power flow through 400/220 kV transformers and wherever direction is from 220 kV to 400 kV, detailed study as well as monitoring of switching off the capacitors need to be done. Enhancing reactive power absorption in these areas to be thought of.	SLDCs

		Opening of EHV lines based on relief possible and also considering security & reliability of system	NRLDC, SLDCs
5	EHV line trip during fog/Smog	Progress on cleaning & polymer replacement of insulator. Last year many EHV lines tripped during fog in Punjab area too. Priority wise cleaning & replacement may be carried out	Transmission utilities (STU/ISTS)
6	Load crash due to inclement weather	Weather forecast based on IMD dedicated site ERS procurement	SLDCs STUs

B.24.3 In addition to following was also agreed:

a. Immediate action on Telemetry issues (especially of Generator MVAr/Shunt MVAr, temperature & humidity etc. at various locations). These shall be made available and reliable.
b. SCADA displays updation of following
c. For online monitoring of reactors (BR, LR, SVC etc.)
d. LR shall be used as BR when line is not in service
e. Generating station would monitor units wise MVAr Vs capability curve MVAr limit.
f. Mapping of UFR and df/dt by SLDCs
g. Mapping of SPS and other defense action

NRPC Deliberation

B.24.4 NRPC noted the discussion held in the TCC.

B.25 Switchgear issue of 400 kV Dadri-Gr. Noida-Nawada (Agenda by NRLDC)

TCC deliberations

B.25.1 NRLDC representative gave detailed background and history of the issue of switchgear rating in 400kV Dadri-Gr.Noida-Nawada section and stated that though matter is being discussed regularly as well as reported in operational feedback but on the ground action is yet to be initiated. All the agencies (Dadri NTPC, Gr.Noida, UPPTCL and Nawada, HVPNL) have also agreed in the past for early up gradation of switchgear. However, situation is still same.

B.25.2 He explained that in order to control the loading of 400kV Dadri-Gr.Noida within the switchgear rating of 2 kA (even though the lines are of quad conductor) , 400kV Gr.Noida-Nawada line is being opened on daily basis which reduces the reliability of supply to Nawada as well high capacity Delhi ring is also weakened.

B.25.3 Representative of NRLDC further stated that similar switchgear issue is also at Mahendragarh (ATL) and Dhanoda (HVPNL).

B.25.4 Representative from UP stated that work of replacement of switchgear is being expedited. Haryana representative stated that the equipment manufacturer has done some alignment

work but the problem is resurfacing even at below 2 kA. He asked other utilities to provide feedback on the particular make of the equipment. POWERGRID representative stated that they have not come across such issues.

B.25.5 TCC agreed that switchgear shall be compatible with line conductor capacity and requested all entities to expedite the work of replacement.

NRPC Deliberation

B.25.6 NRPC noted the discussion held in the TCC.

B.26 Utilization of 765/400/220 kV Gr. Noida and nearby Sub Stations (Agenda by NRLDC)

B.26.1 NRLDC representative stated that at present 765/400/220kV Gr.Noida of UPPTCL has following connectivity:

a. Four nos of 765kV ckt i.e. Gr.Noida-Mainpuri, 765kV Gr.Noida-Agra,765kV Gr.Noida-Meerut and 765kV Gr.Noida-Hapur
b. 765/400kV ICT-1 & 2 of 1500 MVA each
c. Six nos of 400kV lines i.e. 400kV Gr.Noida-Gr.Noida (old) D/C, 400kV Gr.Noida-Sikandarabad D/C, and 400kV Gr.Noida-Noida Sec-148 D/C (400kV Noida Sec-48 S/s is yet to commissioned)
d. 400/220kV ICT-1 & 2 of 312 MVA each

B.26.2 Following is the situation:

i. 400kV Gr.Noida- Noida Sec 148 D/C line has been commissioned but the 400kV S/s & downstream network, essential for utilization of these lines is unavailable.
ii. 765/400/220kV Gr.Noida has no 220kV outlet and therefore the 400/220kV ICTs are idle.

B.26.3 Therefore, early Commissioning of following desired:

i. 400/220/132 kV Sector 148 substation along with 220 kV, 132 kV outlets.
ii. 220kV outlet from 765/400/220 kV Greater Noida

B.26.4 The commissioning of above elements would further utilize the infrastructure already available and could also help in reduction in loading at old 400/220kV Greater Noida.

B.26.5 The Representative of UPPTCL stated that work on these projects is under progress (though in some locations there are RoW issues) and number of elements would be completed by March 2019. TCC advised UPPTCL to expedite the work for better utilization of the infrastructure.

NRPC Deliberation

B.26.6 NRPC noted the discussion held in the TCC

B.27 Loading of 400 kV Kota-Anta (agenda by NRLDC)

B.27.1 NRLDC representative gave detailed presentation about the connectivity and issues for the Kawai-Kalisindh-Chhabra complex. He further stated that for a complex of approx 4800 MW transmission system has serious issues under N-1-1 of 765 Anta-Phagi lines and also N-1 of Phagi 765/400 kV ICTs. And a new 400kV Anta-Kota (twin moose) line has been synchronized on 7th July 2018 from this complex. And since its synchronization loading of this line remains in range of ~ 600-900 MW which is near to its thermal limit. The commissioning of generation at Chhabra SCTPS would further increase the loading on this line.

B.27.2 He also mentioned that the above example shows the importance of approval from standing committee on planning for the commissioning of any new elements in the system and therefore, NRLDC has been requesting the same from all the entities.

B.27.3 The very high loading of the line, indicate that more 400/220 kV interconnection from the area are required or more 400 kV line are required from the complex. This aspect needs to be studied by the Rajasthan STU.

B.27.4 He gave following consolidated issues:

- Generation evacuation of ~ 4800 MW from complex through only five nos ckt i.e. 765kV Anta-Phagi two ckts, 400kV Chhabra-Hindaun, 400kV Chhabra-Bhilwara & 400kV Anta-Kota.
- N-1-1 contingency of 765kV Anta-Phagi lines.
- Availability of only one 400/220 kV ICT at both Chhabra & Kalisindh.
- Under N-1 contingency of 765kV Anta-Phagi, the already fully loaded 400kV Anta-Kota would not be able to carry this extra load.
- System Protection Scheme (SPS) for the complex is yet to be made fully functional.

B.27.5 NRLDC representative also suggested that to control loading of 400 kV Anta-Kota line SLDC Rajasthan is requesting opening of 400 kV lines from Kota onwards. He stated that these measures give very less relief of 40-50 MW only but reduce the interconnection strength and therefore not very good measures. He also suggested making Chhabra-Anta-Kota line direct bypassing the Anta substation to reduce the loading on this line. He presented the study on the same as well.

B.27.6 Representative of Rajasthan stated that they are working on the suggestion of NRLDC to bypass the Anta station and making line direct and details from the field has been sought far.

B.27.7 TCC advised all entities to take approvals of standing committee far all major transmission systems as these have bearing on the security of entire grid. TCC also advised RVPNL to do the comprehensive study of the transmission system of the complex and avoid opening major trunk 400 kV lines.

NRPC Deliberation

B.27.8 NRPC noted the discussion held in the TCC

B.28 Grid Events in Northern Region during Jun-Sept 2018: (Agenda by NRLDC)

B.28.1 NRLDC representative stated that a total of 113 number of CEA standard based Grid Events have occurred in Northern Region in Jun'18 to Sep'18 period. The number is more than double the last year (2017) figure of same period.

B.28.2 Monthly GD/GI summary is given below:

Month	Event Category		Event Share (in %)	Fault duration > 100ms/160ms
	GD	GI		
Jun'18	12	24	32%	44%
Jul'18	14	7	19%	29%
Aug'18	19	8	24%	44%
Sep'18	15	14	26%	34%
Total	60	53	100%	39%
GD as % of total		**53%**	**Fault duration > 100ms/160ms for every third event**	
GI as % of total		**47%**		

B.28.3 From the above, it could be observed that during the past four-month period there is a grid event occurrence in almost every day.

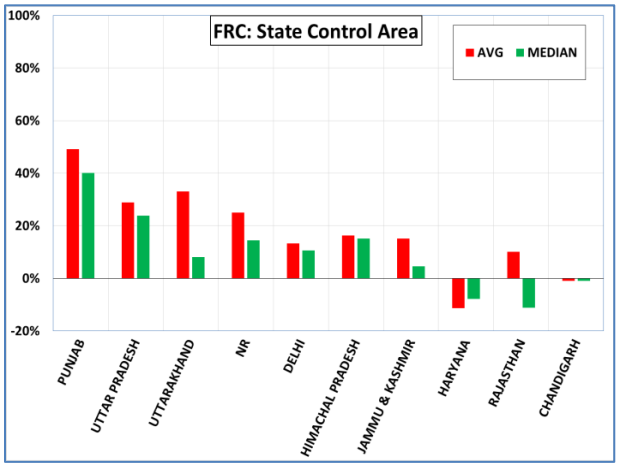
B.28.4 **TCC advised all entities to work on the area of the protection more comprehensively and prompt actions to overcome any shortcoming in the protection system.** TCC **also advised all utilities to analyse each event in detail to find out the root cause and implementation of remedial measures.**

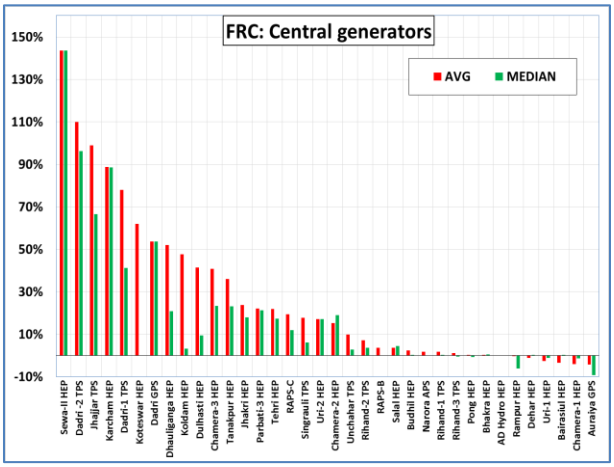
NRPC Deliberation

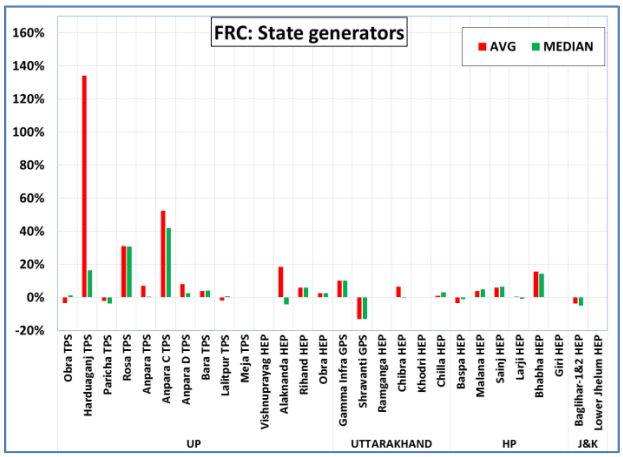
B.28.5 NRPC noted the discussion held in the TCC

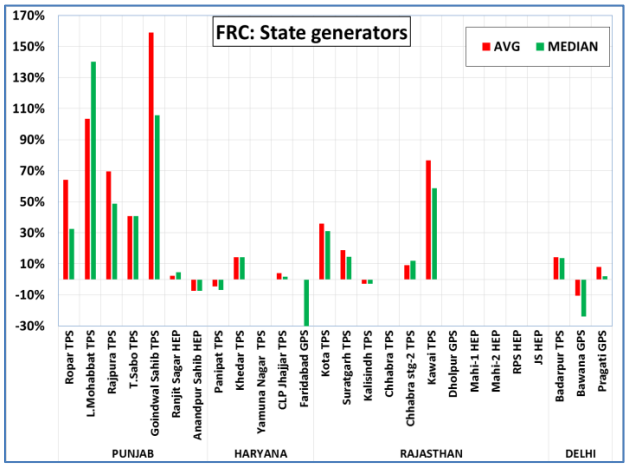
B.29 Frequency response characteristic of NR control area from Jun-Sept'18: (Agenda by NRLDC)

B.29.1 NRLDC representative stated that six FRC based events occurred during Jun-Sep'18. The response as calculated at NRLDC (using SCADA data) was presented as given below:


FRC: State Control Area
AVG
MEDIAN
100%
80%
60%
40%
20%
0%
-20%
PUNJAB
UTTAR PRADESH
UTTARAKHAND
NR
DELHI
HIMACHAL PRADESH
JAMMU & KASHMIR
HARYANA
RAJASTHAN
CHANDIGARH


FRC: Central generators
AVG
MEDIAN
150%
130%
110%
90%
70%
50%
30%
10%
-10%
Sewa-II HEP
Dadri -2 TPS
Jhajjar TPS
Karcham HEP
Dadri-1 TPS
Koteswar HEP
Dadri GPS
Dhauliganga HEP
Koldam HEP
Dulhasti HEP
Chamera-3 HEP
Tanakpur HEP
Jhakri HEP
Parbati-3 HEP
Tehri HEP
RAPS-C
Singrauli TPS
Uri-2 HEP
Chamera-2 HEP
Unchahar TPS
Rihand-2 TPS
RAPS-B
Salal HEP
Budhil HEP
Narora APS
Rihand-1 TPS
Rihand-3 TPS
Pong HEP
Bhakra HEP
AD Hydro HEP
Rampur HEP
Dehar HEP
Uri-1 HEP
Bairasiul HEP
Chamera-1 HEP
Auraiya GPS


FRC: State generators
AVG
MEDIAN
160%
140%
120%
100%
80%
60%
40%
20%
0%
-20%
Obra TPS
Harduaganj TPS
Paricha TPS
Rosa TPS
Anpara TPS
Anpara C TPS
Anpara D TPS
Bara TPS
Lalitpur TPS
Meja TPS
Vishnuprayag HEP
Alaknanda HEP
Rihand HEP
Obra HEP
Gamma Infra GPS
Shravanti GPS
Ramganga HEP
Chibra HEP
Khodri HEP
Chilla HEP
Baspa HEP
Malana HEP
Sainj HEP
Larji HEP
Bhabha HEP
Giri HEP
Baglihar-1&2 HEP
Lower Jhelum HEP
UP
UTTARAKHAND
HP
J&K


FRC: State generators
AVG
MEDIAN
170%
150%
130%
110%
90%
70%
50%
30%
10%
-10%
-30%
Ropar TPS
L.Mohabbat TPS
Rajpura TPS
T.Sabo TPS
Goindwal Sahib TPS
Ranjit Sagar HEP
Anandpur Sahib HEP
Panipat TPS
Khedar TPS
Yamuna Nagar TPS
CLP Jhajjar TPS
Faridabad GPS
Kota TPS
Suratgarh TPS
Kalisindh TPS
Chhabra TPS
Chhabra stg-2 TPS
Kawai TPS
Dholpur GPS
Mahi-1 HEP
Mahi-2 HEP
RPS HEP
JS HEP
Badarpur TPS
Bawana GPS
Pragati GPS
PUNJAB
HARYANA
RAJASTHAN
DELHI

B.29.2 The following was summarized from above details:

- Among the State control area, Punjab and UP have showed improvement in the FRC. The reason for above could be the improvement in FRC of state control area generators of Punjab and UP.
- Among the central generators, Dadri TPS, Jhajjar TPS, Karcham HEP, Sewa-II HEP have good FRC of more than 50% of ideal response. The response of almost all other hydro stations is less than 30% of ideal response.
- Among the state control area generators, Lehra Mohabbat TPS, Goindwal Sahib TPS, Kawai TPS, Harduaganj TPS showed good response.

B.29.3 TCC advised all SLDC/generators to strictly monitor the FRC and advised that all efforts including regular interactions with OEM so that governor of generating stations shall respond effectively and improve the Frequency Response Characteristics.

NRPC Deliberation

B.29.4 NRPC noted the discussion held in the TCC

B.30 Issue related to signing of Transmission Agreement/LTA Agreements for implementation of UITP Scheme (deemed ISTS) by PTCUL for evacuation of power from various Generators. (Agenda by PTCUL)

TCC Deliberations

B.30.1 TCC advised PTCUL to adhere with the outcome of the deliberations held with CEA/CTU and approach CERC in this regard and also advised all utilities in general and PTCUL in particular to not to bring any agenda item to NRPC/TCC which has already been taken up at CEA level.

NRPC Deliberations

B.30.2 NRPC concurred with the advice of TCC.

B.31 Regarding committee for Cyber Security (Agenda by PTCUL)

TCC Deliberations

Agenda dropped by PTCUL representative.

B.32 Certification of Non-ISTS line for inclusion in PoC Charges:

TCC Deliberations

B.32.1 MS, NRPC stated that Central Electricity Regulatory Commission (Sharing of Inter State Transmission Charges and Losses) (Third Amendment) Regulations, 2015 provides for certification of non-ISTS lines carrying Inter-state power by NRPC.

B.32.2 Based on the already approved methodology the study was carried out for certification of non-ISTS lines submitted by HP, Rajasthan, Uttarakhand and Punjab for FY 2018-19. The transmission lines, which fulfil the criteria recommended by the group and

are recommended for certification as ISTS for the current Financial Year (2018-19) by NRPC Secretariat are listed below:

S. No.	Name of Transmission Line	Owner STU
1.	400kV S/C Jodhpur - Merta Line – I	RVPN
2.	400kV S/C Jodhpur - Merta Line – II	RVPN
3.	400kV S/C Merta - Ratangarh Line	RVPN
4.	400kV S/C Merta - Heerapura Line	RVPN
5.	400 kV D/C Chhitorgarh-Bhilwara line	RVPN
6.	400 kV D/C Bhilwara-Ajmer line	RVPN

B.32.3 MS, NRPC further informed the committee that the complete list of transmission lines submitted by STU can be sub-divided in following categories:

i. Transmission lines, which fulfil the criteria recommended by the Group and hence are recommended to be certified as ISTS.
ii. Transmission lines, which do not fulfil the criteria recommended by the Group and hence may not be certified as ISTS.
iii. The lines, which were claimed to be us ed for inter-state transmission by STUs but were not modelled in the PoC transmission charge calculation and hence exercise to see whether or not these lines carry inter-state power could not be carried out. It may be mentioned that the responsibility to submit the requisite details for modelling the lines in PoC transmission charge study rests with STU concerned.
iv. The transmission lines, which are natural inter-state lines and hence need not be certified as ISTS.

B.32.4 The complete category-wise list of transmission lines submitted by STUs was enclosed at ***Annexure B.33.1*** of the agenda note.

B.32.5TCC recommended 6nos of RVPNL lines mentioned by NRPC for certification for Non-ISTS line as deemed ISTS for inclusion in PoC Charges. Rest of the non-ISTS lines do not qualify the criteria formulated by the group constituted by NRPC in its 31st TCC/35th NRPC meetings.

B.32.6 However, HPPTCL requested that they wish to verify the calculations made by NRLDC/NRPC for their 2 lines namely 220 kV Patlikul-Phozal and 220 kV AD Hydro-Patlikul.

B.32.7 TCC advised HPPTCL to send their representative to NRPC/NRLDC to verify the same.

B.32.8 All the utilities were advised to submit fresh claims for certification of non-ISTS lines being used for inter-state power for the **FY 2019-20** by end of December 2018 after which the same shall not be considered.

NRPC Deliberations

B.32.9 NRPC approved the lines mentioned in the above table for inclusion in PoC Charges for the FY 2018-19.

C. COMMERCIAL ISSUES

C.1 Default in payment of outstanding dues and surcharge by beneficiaries

TCC Deliberations

C.1.1 The details of the outstanding dues were enclosed in the Agenda note of this meeting. Representatives of NHPC, SJVNL, THDC, POWERGRID and NPCIL informed the updated status of their outstanding dues to the members of the TCC.

C.1.2 Utility-wise updated status as intimated during the meeting is mentioned below:

NHPC

C.1.3 Representative of NHPC informed that there has been hardly no payment from UPPCL during FY 2018-19. No representative of UPPCL was present in the meeting.

C.1.4 He further informed that PDD J&K and PSPCL have made partial payment and their dues as per latest information stands at Rs 930 crores and Rs 190 crores(as on 23.10.2018) respectively.

C.1.5 Representative of Rajasthan informed that RUVNL is the designated utility which would be making payments on behalf of their discoms.

C.1.6 TCC expressed concern over non-payment of dues by defaulting entities and advised all members present in the meeting to clear the dues at the earliest. Regarding UPPCL, UP SLDC was asked to help utilities in recovering outstanding dues.

SJVNL

C.1.7 Representative of SJVNL informed that outstanding dues of GoHP and HPSEB stood at Rs 321 crores (including LPS). There is an old issue of payment of principal amount of Rs. 25 crores (Rs. 8.5 crores of HPSEB & and remaining of GoHP) pending for a very long time to be resolved between GoHP and HPSEB. Though current payments (except LPS) are made timely by HP but SJVNL is unable to give rebate as they have to yet clear their outstanding dues.

C.1.8 Member Secretary requested for a meeting to be convened between GoHP, HPSEB and SJVNL and to resolve the issue before next RPC meeting. Representative of HP & SJVNL agreed for the hold meeting around Diwali and to resolve the issue at the earliest.

C.1.9 SJVNL informed that UPPCL making partly payments but the outstanding has increased to Rs. 237 crores and hence, SJVNL may be compelled to regulate share of UP, in case outstanding dues are not cleared promptly. PDD J&K has made a payment of Rs. 30 crores and Rs. 95 crores still balance.

C.1.10 There was no representation from UPPCL and PDD J&K, in the meeting.

C.1.11 TCC urged all members to make sure that their utilities are represented in the meeting.

THDCIL

C.1.12 Representative of THDCIL informed that in the last commercial sub-committee meeting it was decided that every beneficiary will provide their liquidation plan but none of them given their plan.

C.1.13 The outstanding of UPPCL has increased to Rs. 951 crores and any delay in payment by UPPCL disturbs their financial position. Member Secretary, NRPC requested THDC to host the next Commercial sub-committee meeting of NRPC at Lucknow itself so that the UPPCL can be apprised of the financial implication of delayed payment.

C.1.14 BRPL has been making regular payments against their principal amount and urged BRPL to submit a liquidation plan of the outstanding late payment surcharge(LPS) dues. Representative of BRPL stated that they would repay the outstanding principal in 1-2 months and would discuss a liquidation plan for LPS dues with THDCIL after that.

C.1.15 THDC stated that against BYPL there is an outstanding payment of Rs. 270 crores and they are making payment of Rs. 2 crores only every month which is very negligible. LPS is increasing. BYPL should atleast submit their liquidation plan.

C.1.16 Representative of THDC urged Punjab to clear LPS of Rs 1 crore which has been pending since last 1 year.

C.1.17 Representative of PSPCL assured that they would reconcile and clear all outstanding dues, at the earliest.

PGCIL

C.1.18 Representative of POWERGRID informed about the outstanding of KSK Mahanandi & UP and request UP, Haryana, J&K, TRN Energy, Sorang and Lanco Budhil to clear their outstanding dues of more than 90 days.

C.1.19 He informed that POWERGRID had warned TRN Energy for regulation of power and TRN Energy has given commitment that they would clear their outstanding dues shortly.

NPCIL

C.1.20 Representative of NPCIL informed that their major outstanding dues are with PDD J&K & UPPCL and urged all constituents to make timely payment and clear all outstanding dues.

DSM Charges

C.1.21 ED, NRLDC informed that most of the utilities have been paying the DSM charges on time and the only major outstanding is ER-NR which has been held up due to difference in DSM accounts issued by NRPC and ERPC.

C.1.22 SE(C), NRPC informed that there was some error in the DSM account issued for ER-NR, due to error in data received from NRLDC. NRPC would be issuing the revised DSM account shortly.

C.1.23 TCC requested all utilities to clear all outstanding dues at the earliest.

NRPC Deliberation

C.1.24 NRPC expressed concern over non-payment of dues by defaulting entities and advised all members to clear the dues timely to avoid LPS and other penal provisions.

C.2 **Opening of Letter of Credit (LC)**

TCC Deliberations

C.2.1 Representatives of NHPC, SJVNL, THDC, POWERGRID, NPCIL and NRLDC gave the list of beneficiaries that are yet to submit the requisite Letter of Credit for the FY 2017-18. The details of the same were enclosed in the Agenda note of this meeting.

C.2.2 Representative of HPSEB informed that they have opened LC towards SOR share of SJVNL. So far as GoHP equity is concerned, LC has not been opened yet. SJVNL representative informed that SOR part is very small compared to that of GoHP equity. Members of HPSEB and SJVNL agreed to hold a joint meeting on 10th Nov, 2018 at Shimla.

C.2.3 MS, NRPC suggested BRPL & BYPL to open LC at the earliest.

C.2.4 ED, NRLDC stated that opening LC is mandatory as per CERC (DSM) Regulations and urged all members to open LC of the requisite amount. For FY 2018-19 LC has to be opened and for any default in FY 2018-19 LC has to be opened for FY 2019-20 also.

C.2.5 TCC advised all constituents to open the LC as per provisions in their PPA and CERC regulations.

NRPC Deliberation

C.2.6 Committee noted the TCC deliberations and advised concerned utilities to expedite opening of LC.

C.3 **Payment of Late Payment Surcharge by the Beneficiaries of SJVN:**

TCC Deliberations

C.3.1 Representative of SJVNL stated that CERC regulations provide for charging of LPS on any delayed payment released by the beneficiaries beyond the due date. Since, LPS is an integral part of energy bill, which is imposed/charged in view of CERC regulations and provisions contained in the Power Purchase Agreement, non-payment of the same is a violation of CERC regulations & PPA terms, which would attract penal provisions like encashment of letter of credit and regulation of power.

C.3.2 He added that while releasing the payment of energy bill, the amount of late payment surcharge was being excluded by the beneficiaries despite the fact that they had delayed the payments.

C.3.3 He further informed that LPS of beneficiaries particularly Himachal Pradesh (Rs 314 crores- GoHP and Rs 7.53 crores HPSEBL) and UPPCL (Rs 131 crores) is enormous and no progress has been made towards clearing these outstanding LPS dues.

C.3.4 MS, NRPC urged the defaulting utilities to take up the matter with their financial departments to make payment of LPS for getting the benefit of rebate in future.

C.3.5 SJVNL and HPSEBL agreed to hold a joint meeting on 10th Nov, 2018 to resolve all payment related issues.

NRPC Deliberation

C.3.6 Committee noted the TCC deliberations and advised all utilities to pay all outstanding dues along with LPS at the earliest.

C.4 **Computation of Declared capacity of Hydro plants-Decision pending (Agenda by BRPL):**

TCC Deliberations

C.4.1 MS, NRPC briefed the agenda item to the members of the Committee. Presently NRLDC has been calculating ith day DC of hydro plants on the average MW that a plant can deliver during three hours (peak declared by NRLDC). However, since the word "at least" has been mentioned in the regulation, some beneficiaries have notion that the minimum MW during peak hours should be taken as DC of the hydro plant.

C.4.2 The matter was discussed in the 37th Commercial Sub-committee meeting and it was agreed that NRPC/NRLDC will seek clarifications from CERC on the computation of DC of hydro generating station. MS, NRPC informed that NRPC Sectt has already written a letter to CERC seeking clarification regarding the interpretation of this regulation but the clarification from CERC in this regard is still pending

C.4.3 NRLDC representative informed the members that in the regulation in case of Run of the River plant, which three hours DC should be taken is not defined as they are must run plant. At present average of maximum DC of three hours is taken to calculate DC of the Run of the River plant. For storage based plant DC is MW declared for three hours (peak) declared by RLDC. The present system of calculation of DC i.e. average of DC of three hours (peak) has been adopted to ensure that neither generators nor beneficiaries are penalized. The same has been in vogue for a very long time and is being followed by other regions also. However, if the forum is of the view that the methodology needs to be revised, then NRLDC is open for reconsideration.

C.4.4 Representative of BRPL stated that as per CERC Tariff Regulations 2014-19, for hydro plants Declared capacity (in ex-bus MW) for the ith day of the month has been defined as the MW which the station can deliver for at least three (3) hours. BRPL is of view that since the word at least three hours has been mentioned in the regulation,

there should guaranteed generation in these three hours to avail the fixed cost based on the DC of the three hours in a day. Hence minimum DC of the three hours (peak hours as declared by the NRLDC) should be taken as DC for storage based plants whereas for run of the river the minimum guaranteed generation for three hours (any) during the day can be taken as DC.

C.4.5 Representative of NHPC/SJVNL stated that using minimum MW during peak hours as DC would be unfair to generators as their DC for the entire day would be reduced to zero in case of tripping even if their plants deliver power for the remaining 2-2.5 hours during peak hours.

C.4.6 NRLDC informed that CERC in its decisions, has already clarified that DC of hydro plants would be judged as per their capability during peak hours.

C.4.7 Representative of CEA was of the view that the word "at least" mentioned in the formula for calculating DC was in reference to the time period i.e. 3 hours and should not be interpreted to mean minimum MW during peak hours. He urged that the interpretation of the formula should be done in line with IEGC clause 6.4.16 and 6.4.17 read together. The revised declaration of DC for peak hours should not be less than other hours(except for RoR).

C.4.8 Representative of NTPC also supported this view and stated that present methodology of calculating DC, adopted by NRLDC appeared to be correct. As per Clauses 2 & 3 of regulation 22 of regulation 2009-2014 emphasis should be given on the daily capacity of delivered for at least three hours and not the minimum MW.

C.4.9 BRPL requested to change the methodology of taking average of the three hours but NHPC/SJVNL/THDC expressed their concern that the current practice should not be changed at the flag end of tariff period 2014-19.

C.4.10 ED, NRLDC pointed out that since the new tariff regulations (2019-24) is in the process of formulation, better clarification in this regard may be sought from CERC in the new regulation.

C.4.11 Chairman TCC suggested that it would be better that CERC clarification should be implemented.

C.4.12 **TCC recommended that the present methodology being followed by NRLDC may be continued till a clarification on various interpretations by members is received from CERC.**

NRPC Deliberation

C.4.13 NRPC concurred with the recommendations of TCC deliberations.

C.5 Quarterly reconciliation of accounts - SJVN not complying (Agenda by BRPL)

TCC Deliberations

C.5.1 Representative of BRPL informed that BRPL is regularly sending and requesting quarterly reconciliation statement to SJVN. However, SJVN is not practicing the same and not signing the reconciliation statement with BRPL.

C.5.2 He requested SJVN to carry out and sign quarterly reconciliation of the accounts for smooth working.

C.5.3 TCC recommended that SJVNL and BRPL may conduct a separate meeting to mutually discuss and resolve the issue if any.

NRPC Deliberation

C.5.4 Committee noted the TCC deliberations.

C.6 **No additional capital investment for plants identified by CEA for retirement (Agenda by BRPL)**

TCC Deliberations

C.6.1 Representative of BRPL stated that additional expenditure for FGD for plants that are due to retire in a few years would lead to tariff shocks as the expenditure would need to be recovered in a small time period only. He requested that the matter may be taken up at appropriate forum so that no major capital expenditure like FGD is incurred for plants which have been identified for retirement in the next 5-10 years because the additional expenditure of say Rs. 50 lakhs/MW to be recovered in the remaining life of the plant will hit discoms financially.

C.6.2 He further urged that Gencos may be directed to bring proposal of major investment like FGD to NRPC or higher forum and seek concurrence of beneficiaries before approaching CERC.

C.6.3 MS, NRPC informed that the deadline for FGD installation at individual thermal plants in NR had been finalized in the 36th TCC (Special) meeting with the deadline of December 2024. As per the revised deadline finalized, all plants are supposed to install FGD by 31st December 2021.

C.6.4 No relaxation has been given to any plant and hence, plants may not be allowed to generate power after their deadline for FGD installation is over.

C.6.5 Representative of NTPC stated that Electricity Act 2003 specified the function of Regulatory Commissions, wherein CERC in the Appropriate Commission to decide upon any major investment/expenditure like FGD, etc for all Central Generating Stations (CGS). Regional Power Committees (RPCs) have been constituted under the Act for facilitating the integrated operation of the power systems and getting the approval for such expenditure is not necessary.

C.6.6 He further added that there is a well-defined process in the form of Regulatory proceedings wherein CERC allow such expenditures after detailed proceedings by taking views of all beneficiaries. Therefore, Appropriate Commission and Authority have only been given power to decide upon such a matter.

C.6.7 Representative of CEA stated that the decision on installation of FGD and timelines was taken after doing consultation with all stakeholders and the said issues could have been raised at that point of time. Raising issues at this stage, would only add to further delays in implementation.

C.6.8 BRPL representative informed that in the past of also many transmission line/reactor issues have been discussed and informed to CERC according. BRPL has brought this agenda item so that views of DISCOMS should also be taken before taking any decisions which has huge financial impact on them. He requested that can forum quantify the impact of FGD cost on DISCOMS if a plant is to retire in 5 to 10 years or so.

C.6.9 Representative of PSTCL, SLDC Delhi and BRPL opined that cost benefit analysis should be conducted before taking such decisions since the consumers would be affected by escalated electricity charges. Though this cost will be pass through as per the change in law but the consumers has to ultimately bear the cost.

C.6.10 Chairman TCC suggested that the order by SC would have to be implemented in its spirit. However, a Committee of beneficiaries and Gencos, may be formed to deliberate the issue for representation at higher forums on cost benefit analysis.

NRPC Deliberation

C.6.11 Principal Chief Engineer, CEA stated that the timelines for FGD installation were fixed after consultation with all stakeholders in the TCC meetings of the respective regions and hence, any request of departure from agreed timelines, at this stage doesn't seem appropriate.

C.7 **Bill data to be provided in standard Excel format (Agenda by BRPL)**

TCC Deliberations

C.7.1 Representative of BRPL stated that despite a decision taken in the 33rd CSC meeting, they are still not receiving bills in excel format from most of the utilities, mainly NTPC. NTPC bills are very huge worth 15000 crores but for verification bills in pdf are to be converted in excel and then verified. This requirement of ease of business.

C.7.2 Representative of NTPC stated that generation of the bills in NTPC is through SAP system. They are not in a position to provide bills in excel form as this is a very cumbersome job and time taking and will not be of any value as there will not be any formula in excel sheets.

C.7.3 MS, NRPC stated that since NTPC had agreed to provide bills in excel format in CSC meeting, they should explore all possibilities to provide the same.

C.7.4 TCC recommended that all utilities may provide bills in excel format as per the requirement of their beneficiaries.

NRPC Deliberation

C.7.5 Committee noted the TCC deliberations.

C.8 **Scheme on 'Merit Order Operation- Flexibility in Generation and Scheduling of Thermal Power Stations to reduce the cost of power to the consumer' by Ministry of Power**

C.8.1 Agenda was dropped with permission of the chair.

C.9 **Reactive Energy charges status**

TCC Deliberations

C.9.1 Representative of NRLDC informed the status of Reactive Energy Charges, details of which were enclosed in the agenda.

C.9.2 He informed that as on 10.10.2018, considering week-25 (due dated of which is 08th October 2018) only Jammu & Kashmir and Punjab had some outstanding due.

C.9.3 TCC urged all payable entities to make payment so that payment can be made to receivable entities.

NRPC Deliberation

C.9.4 Committee noted the TCC deliberations and advised all defaulting entities to make all Payable constituents were requested to release outstanding RE charges payments at the earliest so that, receivable parties will be paid and to avoid further increase of Delay payment Interest.

C.10 **Congestion Charges**

TCC Deliberations

C.10.1 Representative of NRLDC informed the status of outstanding against Congestion Charges, details of which were enclosed in the agenda.

C.10.2 Representative of HPSEBL stated that they have already paid the outstanding principal amount of Rs 85,009. With regard to interest payment, they stated that the interest was accrued due to difference in the congestion charges account issued by NRPC and NRLDC. In the 37th CSC meeting it was discusses and agreed but the same are not reflected in the minutes. He urged that the interest amount may be waived off.

C.10.3 MS, NRPC assured that they will go through the recording and amend the minutes suitably and also if HP wish, they can submit their comments on the minutes.

C.10.4 NRLDC agreed to look into the decision taken to waive off the interest.

C.10.5 Representative of DTL stated that they would reconcile the interest payment with NRLDC. NRLDC agreed to host a meeting on 31st October 2018 in this regard.

C.10.6 TCC requested all payable utilities to reconcile their outstanding dues and make payment at the earliest.

NRPC Deliberation

C.10.7 Committee noted the TCC deliberations and advised all defaulting entities to release outstanding Congestion Charges payments at the earliest so that, receivable parties will be paid and to avoid further increase of delay payment interest.

C.11 **NRLDC Fee & Charges:**

TCC Deliberations

C.11.1 Representative of stated that NRLDC is sending the hard copies of bills to all the users regularly on monthly basis. The bills are also being mailed to all users on the day of billing and soft copies of bills are also available to the link "https://nrldc.in/commercial/bill-details/". NRLDC requested PDD Jammu & Kashmir and Powergrid-Unchahar to pay the outstanding amount at the earliest.

C.11.2 TCC requested J&K and POWERGRID-Unchahar to pay the outstanding at the earliest.

NRPC Deliberation

C.11.3 The Committee concurred with the TCC deliberations.

C.12 **Reconciliation of Pool Accounts (July-18 to Sept 18):**

TCC Deliberations

C.12.1 Representative of NRLDC stated that Reconciliation statement of Deviation Charges and Reactive Energy Charges has been forwarded to entities and uploaded on website by NRLDC on 11.10.2018. The constituents were requested to verify /check the same & comments if any on the same were to be reported to NRLDC by 31.10.2018. In case of non-receipt of any communication it will be presumed that reconciliation statement stands reconciled.

C.12.2 He stated that most of the utilities are not coming for reconciliation to clear outstanding dues. Reconciliation of pool accounts is an audit requirement and asked utilities to submit comments on the reconciliation statements available at NRLDC website by 31.10.2018.

C.12.3 TCC requested all entities to verify/check and submit the signed copy of reconciliation statements to NRLDC.

NRPC Deliberation

C.12.4 The Committee noted the TCC deliberations.

C.13 **Status of AGC & Ancillary Services:**

TCC Deliberations

C.13.1 NRLDC representative shared the status from week 01 to 26 of financial year 2018-19. The details were given in the Agenda. He informed that all dues were settled against RRAS and AGC from pool account up to week -22.

C.13.2 TCC noted the information

NRPC Deliberation

C.13.3 The Committee noted the TCC deliberations.

C.14 **Reconciliation of STOA (Short Term Open Access) Charges disbursement:**

TCC Deliberations

C.14.1 NRLDC has sent the reconciliation statement of open access disbursement for the Quarter- 1 of financial year 2018-19 on 20th July, 2018. The applicants/STU/SLDCs were requested to verify /check the reconciliation statement & comment if any on the same by 16th Aug 2018. He added that in case of non-receipt of any communication it would be presumed that reconciliation statement stands reconciled.

Details of replies received from STU/SLDCs regarding disbursment of STU/SLDC charges			
SL No	Name of the STU/SLDC	Statement for reconciliation was sent on dt:	signed copy of Statement for reconciliation was received on dt:
1	Manipur STU/SLDC	19.07.18	30.07.18
2	Himachal Pradesh STU/SLDC	19.07.18	03.08.18

Details of replies received from Applicants regarding refund of STOA charges			
SL No	Name of the Applicant	Statement for reconciliation was sent on dt:	signed copy of Statement for reconciliation was received on dt:
1	IA Hydro Pvt Ltd	19.07.18	28.07.18
2	Sandhya Hydro Power Ltd	19.07.18	10.08.18
3	Jindal India Thermal Power Ltd	19.07.19	24.07.18

NRPC Deliberation

C.14.2 The Committee noted the TCC deliberations.

C.15 **TDS Reconciliation:**

TCC Deliberations

C.15.1 NRLDC representative informed that TDS verification for FY 2010-11 to FY 2016-17 had been done by NRLDC. After Verification of TDS from Form-26AS, HNGIL and Provestment were requested to pay the short deposited TDS amount in NRLDC STOA account, as per details given in the Agenda:

C.15.2 TCC advised these entities to deposit the balance amount immediately in NRLDC STOA account.

NRPC Deliberation

C.15.3 Committee noted the TCC deliberations

C.16 **Status of Outstanding STOA Delay Payment Interest:**

TCC Deliberations

C.16.1 NRLDC representative informed that as per Regulations 19(2) of Open Access Inter State Regulations 2008, the person committing default in payment has to pay simple interest @ of 0.04% for each day of default. Applicant wise outstanding interest amount (computed till 30.06.2018) was given in the Agenda.

Applicant Name	Outstanding Interest upto 31st March-2016	Outstanding Interest for FY -17-18 Upto Q-3	Outstanding Interest for FY -17-18 for Q-4	Total Outstanding Interest	Action Taken
Provestment	43613	0	0	43613	Punching of Application Portal Blocked
RPPC	2502273	0	0	2502273	Punching of Application Portal Blocked.

C.16.2 STOA charges payment pending since long from RPPC and Provestment though NRLDC has blocked there punching also but as now RUVNL is doing this so there is not impact on them. The due amount is around Rs. 25 Lakhs only He requested Rajasthan to kindly request these utilities to clear the dues.

C.16.3 TCC advised Rajasthan representative to take up the issue for RPPC as the work of erstwhile RPPC is now looked after by RUVN. Representative of Rajasthan agreed to get the issue resolved.

NRPC Deliberation

C.16.4 The Committee concurred with the TCC deliberations.

C.17 **STATUS of AMR**

TCC Deliberations

C.17.1 Representative of NRLDC informed that LOA was awarded by POWERGRID to M/s Kalkitech vide ref: N1/C&M/11-12/AMR/193(A) (Supply portion) and N1/C&M/11-12/AMR/193(B) (Erection portion) dated 15.02.2012 for installation and commissioning of AMR system on approx.1250 nos. of meters installed at 220 locations of Northern Region. Further, Amendment-III was placed vide Ref: N1/C&M/11-12/AMR/193(B)/Amend-III dtd 21.12.2016 for extension of work of scope from 1250 to 1825 meters.

AMR Status	Total No of Meters/Locations awarded	Total No of Meters/Locations completed	Balance
Phase-1	1250 SEMs/220 locations	**1250**	**NIL**
Phase-2	575 SEMS/90 locations	**171**	**404**
Total	1825 SEMs	**1421**	**404**

C.17.2 It was decided in 42nd NRPC meeting that POWERGRID will complete the project by July 2018 and further it was decided in 37th CSC meeting that POWERGRID will complete the integration of all L&T make meters by 31st Oct-2018. However at present out of 1825 nos. only 1421 nos. meters have been integrated. It was also decided that POWERGRID should take up the matter with M/s Kalkitech and ensure that AMR data from all sites shall be made to NRLDC lasted by Tuesday morning. However, there has not been significant improvement in availability of data through AMR.

C.17.3 NRLDC also informed that out in Phase-I all 1250 SEMs and in Phase –II out of 575 159 SEMs completed. SAT of 205 locations is over and NRLDC gets data on an average from 170 locations by Tuesday. Issue has been taken up with vendor but no substantial improvement. Even after AMR integration at 225 locations, data for energy accounting from 25 to 40 Nos. of locations are not received in totality and requested POWERGRID for necessary action to get data from all AMR integrated stations by every Tuesday.

C.17.4 Member Secretary NRPC stated that data from all locations are required for calculation of losses and preparation of weekly regional energy account. Non-availability of data from so many stations is making it difficult for NRLDC to process the meter data for loss calculation and timely submission of data to NRPC for preparation/issuance of weekly energy accounts.

C.17.5 Representative of POWERGRID informed that integration of L&T meters was in progress and would be completed by December 2018.

C.17.6 TCC noted that the progress is slow and requested POWERGRID to expedite the installation of AMR and ensure data availability from all AMR integrated

NRPC Deliberation

C.17.7 Committee noted the TCC deliberations and directed POWERGRID and other utilities to adhere to the timelines given by TCC for 100% availability of data to NRLDC from all stations through AMR.

C.18 **Integration of AMR System with Elster make Meters**

TCC Deliberations

C.18.1 NRPC informed that it was decided in 39th TCC and 42nd NRPC meeting that POWERGRID will arrange the demonstration of integration of Elster meter by 15th July-2018. Further, in the 37th CSC meeting, it was intimated by M/s Kalkitech that they have completed all the activities for integration of these meters through AMR and are ready for testing the same. It was decided that POWERGRID and NRLDC will test the integration of these meters by 31st August-2018 and complete integration of Elster make meters to AMR by Dec 2018.

C.18.2 The testing for integration of Elster meter with AMR was done at Bahadurgarh PG S/S and the npc file was shared with NRLDC on 20-10-18. However, it was found that there were differences in readings of the meter received through AMR and DCD in some blocks. The same observations have been intimated to M/s Kalkitech and POWERGRID for further necessary correction. NRLDC requested POWERGRID to update the status regarding integration of Elster make Meters with AMR system.

C.18.3 Representative of POWERGRID informed that all technical issues for Elster meter AMR integration are resolved and after getting consent from NRLDC, work would commence from November 2018.

C.18.4 TCC observed that the progress is slow and advised POWERGRID to expedite the integration of all Elster make meters to AMR at the earliest.

NRPC Deliberation

C.18.5 The Committee noted the TCC deliberations.

C.19 **AMR data through Fibre Optic Network**

TCC Deliberations

C.19.1 At present, AMR data communications have been successfully shifted on Optical Fibre Communications at 20 locations of POWERGRID and 5 more would be added. The SEM data of all these locations are being provided by M/s Kalkitech on regular basis to NRLDC.

C.19.2 Further, POWERGRID informed in the 37th CSC meeting that switching work is in progress to connect 70 stations of POWERGRID where minimal cost is required. And agreed to provide the details of action plan by 05.09.2018 for AMR shifting on optical fibre for each location & meter at POWERGRID premises, where the AMR data can be shifted easily with minimal cost.

C.19.3 Also, as per last TCC & CSC meetings, it was advised to POWERGRID to submit the cost for shifting of AMR data on OPGW network to NRPC Secretariat by August 2018. All utilities were also advised to send details of the coordinators for each site for AMR to GM(AM), NR-1, POWERGRID and NRPC Sectt. within 15 days.

C.19.4 Representative of POWERGRID informed that as per decision taken in the 39th TCC meeting, POWERGRID is in the process to integrate AMR for 70 stations on OPGW

C.19.5 For other stations, POWERGRID agreed to submit the cost for shifting of AMR data on OPGW network in coordination with nodal officers of the concerned utilities. POWERGRID informed that no requisite information has been received from the nodal officers of utilities.

C.19.6 TCC urged POWERGRID to take initiative and circulate a format in the NRPC meeting to get the required details for cost estimation for end equipment.

NRPC Deliberation

C.19.7 The Committee noted the TCC deliberations.

C.20 **Time drift Correction in SEMS**

TCC Deliberations

C.20.1 Representative of NRLDC informed that NRLDC is regularly uploading the discrepancy report on weekly basis indicating the likely time drift in meters and also replacement/rectification required in special energy meters. All constituents in whose premises the meters are installed are required to take corrective action for time correction based on the weekly discrepancy report of NRLDC. Besides uploading of weekly report the many times the NRLDC metering group is also taking up the matter with concerned over telephonically and/or through e-mail also. However, no improvement is observed.

C.20.2 Further, NRLDC vide its letter Ref. No. NRLDC/MO/2018/108-118 dated 04.01.18, Ref No: NRLDC/MO/2018/372 dated 05.03.2018, Ref No: NRLDC/MO/2018/767-793 dated 14.05.2018 & Ref No: NRLDC/MO/2018/1208-1227 dated 23.07.2018 have circulated the list of SEMs where time correction is required to all the state utilities, SLDCs, POWERGRID Stations, Generation stations and have asked them to submit the reports to NRLDC after necessary time correction.

C.20.3 Summary regarding time correction of SEMs are given below:

S.No.	**Name of the Utility**	**No of SEM meters due for time correction based on meter reading for the week (23.07.18-29.07.18)**	**No of SEM meters due for time correction based on meter reading for the week (05.11.18-11.11.18)**
1	Delhi	10	11
2	Haryana	11	15
3	Himachal Pradesh	07	03
4	J&K	17	20
5	Punjab	26	10
6	Rajasthan	27	26
7	Uttar Pradesh	48	42
8	Uttarakhand	24	24
9	POWERGRID	207	254

10	NTPC	20	16
11	NHPC	21	09
12	BBMB	14	17
13	NPCL	04	03
	Total	436	450

C.20.4 All members in whose premises the meters are installed, were requested to periodically check (at least once in a month) the time drift in meters and send the time drift/ compliance report as per following format. at email Id: nrldcos@yahoo.com, nrldcos@hotmail.com.

Location/ Substation	Meter No.	Meter location details	Time as per S/Stn GPS	Time as per meter	Time Drift	Action Taken

C.20.5 Further, POWERGRID has placed an LOA to M/s Kalkitech for time drift correction through AMR system also. However, it is observed that time drift correction through AMR is not happening till date.

C.20.6 Member Secretary, NRPC stated that POWERGRID had agreed to replace meters which had a time drift more than 10 minutes. He urged all utilities to give a list of such meters to POWERGRID in the NRPC meeting in the format circulated in the agenda. This time drift will have big financial implication once 5 min scheduling will be implemented.

C.20.7 Representative of NRLDC stated that most of the state utilities were not monitoring time drift in their SEMs. Also, time drift correction through AMR is not taking place.

C.20.8 Representative of Delhi SLDC informed that it is also necessary to change the defective DCDs at their stations to have data redundancy. POWERGRID informed that replacement of faulty meters and DCDs is in progress and they are replacing all meters wherever information on faulty meters is reported.

C.20.9 TCC urged all utilities to provide a list of faulty meters/DCDs to POWEGRID by 10th Nov 2018.

NRPC Deliberation

C.20.10 The Committee noted the TCC deliberations.

C.21 **Reconciliation of old Annual Maintenance Contract (AMC) charges for Alstom System by PTCUL.**

TCC Deliberations

C.21.1 This issue of reconciliation of AMC charges by PTCUL has been discussed in following meeting:

a) 39th TCC and 42nd NRPC meeting held 27th/28th June, 2018.

b) Special meeting between PTCUL, NRLDC & NRPC held at Dehradun on 31.08.2017.

C.21.2 Even after such protracted discussions, the payment of old AMC for Alstom system is still pending from PTCUL in view of small mismatch in outstanding as per PTCUL and NRLDC. During last 39th TCC meeting, it was decided that PTCUL would reconcile accounts with NRLDC. However, despite repeated requests /letters, follow ups from NRLDC, the reconciliation is yet to be done by PTCUL. Because of non-payment from PTCUL contract closing is still pending.

C.21.3 Representative of NRLDC clarified to PTCUL that Rs 32 Lakh is still outstanding with PTCUL for an old AMC for Alstom system even though they had agreed for releasing payment in last NRPC meeting. Representative of PTCUL informed that they would look into the matter and try to release the payment at the earliest.

C.21.4 TCC recommended PTCUL to release the pending AMC payment to NRLDC at the earliest.

NRPC Deliberation

C.21.5 NRPC endorsed the TCC recommendations.

C.22 Real Time data telemetry from Renewable Generators

TCC Deliberations

C.22.1 NRLDC informed that as per CERC approved procedure for "implementation of the framework on forecasting, scheduling and imbalance handling for Renewable Energy(RE) generating stations including Power Parks on Wind and Solar at Inter-State Level" following data points are required from Wind and Solar Power Plants.

Wind Turbine Generating Plants

- Turbine Generation (MW/MVAR)
- Wind Speed (meter/second)
- Generator Status (on/off- line)-this is requires for calculation of availability of the WTG
- Wind Direction (degrees from true north)
- Voltage (Volt)
- Ambient air temperature (deg. C)
- Barometric Pressure (Pascal)
- Relative humidity (in %)
- Air Density (kg/m3)

For Solar generating plants

- Solar Generation Unit/ Inverter-wise (MW and MVAR)
- Voltage at interconnection point (Volt)
- Generator/Inverter Status (on/off-line)
- Global horizontal irradiance (GHI)-Watt per meter square
- Ambient Temperature (o C)
- Diffuse Irradiance- Watt per meter square

- Cloud Cover- (Okta)
- Direct Irradiance- Watt per meter square
- Sun-rise and sunset Timing
- Rainfall (mm)
- Relative humidity (%)
- Performance Ratio

C.22.2 With increasing Renewable generation and necessity for forecasting of Renewable generation, the telemetry from developer's pooling station is required to be available at the concerned load dispatch center. Telemetry of Wind and Solar is very poor from Rajasthan state control area. Rajasthan is requested to please arrange for Telemetry from Wind and Solar for better visibility.

C.22.3 Total Availability from Rajasthan is tabulated below:

State	**Wind**		**Solar**	
	Installed Capacity(MW)	**Telemetered Cap.(MW)**	**Installed Capacity(MW)**	**Telemetered Cap.(MW)**
Rajasthan	4292	926	1995	712

C.22.4 Apart from telemetry, integration of AMR (on OPGW) also needs to take care in case of ISTS connected renewable generators. Moreover, Solar & wind models for PSS/e modeling also need to be provided for every renewable generator connected at 132 kV & above.

C.22.5 Representative of NRLDC informed that telemetry from RE generators (wind and solar) is very poor in Rajasthan. Only 926 MW out of 4292 MW wind and 712 MW out of 1995 MW of solar is telemetered and for safe and reliable operation of the grid, data telemetry from RE sources is very critical. He further added that solar and wind models for PSS/e modeling also need to be provided for every renewable generator connected at 132 kV and above.

C.22.6 Representative of Rajasthan stated that they are getting most of RE generator data at SLDC Rajasthan. However, due to system constraints the same could not be transferred to NRLDC on real time.

C.22.7 TCC recommended that SLDC Rajasthan should make all arrangements to ensure RE generation data is made available to NRLDC at the earliest

NRPC Deliberation

C.22.8 NRPC endorsed the TCC recommendations.

C.23 **Non-redundancy in wideband network to NRLDC**

TCC Deliberations

C.23.1 MS, NRPC informed that most of the real-time data to NRLDC is being routed through Ballabgarh / Badarpur substations which are linear section and therefore, failure in this section results in major telemetry loss from RTUs/PMUs to RLDC resulting in difficulty in smooth grid operation/monitoring. Last time on 17th Sep 2018

there was major interruption of real-time data to NRLDC for 013 hrs. Such outages are very detrimental for system security.

C.23.2 During 39th TCC meeting, PGCIL agreed to expedite the process of alternate route, however same is yet to be implemented. Therefore, again, it is requested that PGCIL shall take up provisioning of secondary path between NRLDC and Ballabgarh on top priority.

C.23.3 Representative of NRLDC informed that most of the real-time data received by NRLDC is being routed through Ballabgarh / Badarpur substations through radial link. Due to non-redundancy, data from 40 out of 124 RTUs would not be received at NRLDC in case of any failure in this section and PMU data also goes out of sight. Such a scenario arose of 17th September 2018 and again on 27th October 2018.

C.23.4 Representative of POWERGRID informed that after commissioning of Tughlaqabad S/s, this redundancy is restored for Badarpur.

C.23.5 After completion of Dadri-Maharanibagh work (held up due to ROW issue) in 15 days, this problem would be resolved permanently.

C.23.6 TCC urged POWERGRID to expedite the issue to establish channel redundancy to NRLDC.

NRPC Deliberation

C.23.7 NRPC endorsed the TCC recommendations

C.24 **Reliability of Telemetry**

TCC Deliberations

C.24.1 Based on CERC/CEA regulations and decisions of TCC/NRPC, the telemetry integration is being insured before charging of new system element at ISTS (super grid) level. However, the reliability of data from newly integrated sub-stations is very poor. Though the telemetry integration is ensured before charging the new element, the reliability of telemetry is not at all ensured. Reliability of telemetry for some of the stations is poor since its integration.

C.24.2 Also even though the telemetry is available correct Digital telemetry is not available. Proper status of CBs and Isolators is required for SE to form network model resembling to actual Power System Model via Topology Processor.

C.24.3 Suspected/Inverted status of switches lead to formation of wrong topology; leads to difficulty in smooth grid monitoring/operation. Also the provision of redundant communication was discussed in 13th TeST Meeting held on 24th May, 2018, However, redundant data communication is yet to be ensured at NRLDC after one year of discussion.

C.24.4 Presently, 101 RTU out of 125 are reporting on dual channel. Therefore, redundant communication channels from all RTUs need to be ensured by PGCIL/NTPC/IPPs. Similar, situation would be at SLDC level and therefore, all SLDCs/STUs shall also ensure communication redundancy at their control centres.

	Northern Region summary sheet and details of current status of implementation of telemetry system												
										Updated Till:		31.08.2018	
Sl. No.	User Name	Total Nos of Stations		Telemetry not Provided				Telemetry Intemittent				Total non-availability of data in %	
				Total nos of		Non-availability		Total nos of		Non-availability			
		GS	SS	GS	SS	GS	SS	GS	SS	GS	SS	GS	SS
1	Punjab	17	173	-	92	-	53%	-	17	-	10%	-	63%
2	Haryana	5	70	-	13	-	19%	-	1	-	1%	-	20%
3	Rajasthan	20	190	-	-	-	-	1	12	5%	6%	5%	6%
4	Delhi	6	41	-	-	-	-	-	3	-	7%	-	7%
5	UP	20	168	-	-	-	-	1	47	5%	28%	5%	28%
6	Uttarakhand	10	29	-	-	-	-	4	4	40%	14%	40%	14%
7	HP	12	25	-	-	-	-	2	2	17%	8%	17%	8%
8	JK	4	17	-	-	-	-	3	11	75%	56%	75%	56%
9	POWERGRID	-	79	-	-	-	-	-	7	-	9%	-	9%
10	NTPC	14	-	-	-	-	-	5	-	36%	-	36%	-
11	NHPC	14	-	-	-	-	-	4	-	29%	-	29%	-
12	NPCIL	5	-	-	-	-	-	-	-	-	-	-	-
13	NJPC	2	-	-	-	-	-	-	-	-	-	-	-
14	THDC	2	-	-	-	-	-	-	-	-	-	-	-
15	BBMB	6	16	-	-	-	-	-	-	-	-	-	-
16	IPP/JV/Patran	6	2	-	-	-	-	2	1	33%	50%	33%	50%
	TOTAL	143	810	0	105	0%	13%	22	105	15%	13%	15%	26%
	Total (over all)	953		105		11%		127		13%		24%	
	Note:												
	1. Constituentswise details is as furnished by SLDC's / as available at RLDC.												
	2. 'GS' Generating Stations and 'SS' subStations												

Note: The above % is based on number of RTU/gateway reporting and not based on number of measurands. It would much lower percentage based on number of measurands.

C.24.5 Representative of NRLDC informed out of 125 channels, 23 are reporting only on single channel. Channel redundancy (dual alternate path) is required for these 23 RTUs for reliable data. State also should ensure the channel redundancy for data reporting to their SLDCs.

C.24.6 MS, NRPC stated that a new regulation on reliable communication has been proposed. Mandatory dual channel requirement with different path is part of the proposed regulation.

C.24.7 Representative of POWERGRID informed that they are working towards reliable communication to meet the regulatory requirements. POWERGRID also assured the improvement in services to be delivered by Siemens.

C.24.8 DTL representative wanted refresher training for engineers on the basic concepts of SE as most of them are not aware. Documents provided by Siemens are not of the requisite quality for self-understanding.

C.24.9 NRLDC informed that EMS training has been concluded and now SLDC engineers should work upon the experience gained in system modelling required for system operation as no of sub stations has increased in each State. All SLDC were requested to run SE and generate report which will help in analysing the problems.

C.24.10 TCC Members agreed for giving very priority to telemetry issues and resolving them early. TCC also advised that redundancy of communication channel from RTU to NRLDC and from RTUs to SLDCs shall be ensured.

NRPC Deliberation

C.24.11 The Committee concurred with the TCC deliberations.

C.25 **Status telemetry of TCSC / FSC**

TCC Deliberations

C.25.1 NRLDC has been continuously requesting utilities to ensure reliable telemetry at the control center. However, it is being observed that FSC/ TCSC status is not available from following locations.

S. No.	Station	Line	FSC Data Status
1	Ballabgarh	Kanpur	Not reporting
2	Bareilly 400	Meerut	Not reporting
3	Lucknow 400	Gorakhpur	Not reporting
4	Mainpuri	Fatehpur	Not reporting
5	Meerut 400	Koteshwar	Not reporting
6	Gorakhpur	Muzaffarpur	Not reporting
7	Unnao	Bareilly (UP)	Not reporting

C.25.2 NRLDC requested utilities are requested to arrange for integration of telemetry of FSC/TCSC at the earliest as it is a simple job of wiring. The status of bypass is very important.

C.25.3 POWERGRID informed that Koteshwar FSC will come in service by March 2019 however to make available the status it has to be ensured that the port/transducer is available or not and also to be seen if it is in the original contract or not.

C.25.4 TCC requested all utilities to arrange for integration of telemetry of FSC/CSC at the earliest.

NRPC Deliberation

C.25.5 NRPC endorsed the TCC recommendations.

C.26 **Telemetry from Kurukshetra HVDC as per agreed in the separate meeting**

TCC Deliberations

C.26.1 In meeting held at Kurukshetra on 12.07.2018, POWERGRID had agreed to provide telemetry of additional data of HVDC as shown below which is still to be completed.

S. No.	Description	Clause in MoM dated 12-07-2018

1	Extinction angle *(inverter and rectifier stations)* and Firing angle *(inverter and rectifier stations)*	17
2	Telemetry of "real-time mode *(bi-polar with both DMR, bi-polar with one DMR, etc.)* of operation" and "instance of changeover"	20

C.26.2 Representative of POWERGRID informed that they have explored that possibility of providing the data as requested. However, due to non-availability of provision in the contract, the issue could not be resolved with GE. However, as per requirement of NRPC, they will pursue with OEM to provide telemetry of firing angle and extinction angle.

C.26.3 MS, NRPC informed about the discussion held at at Kurukshetra on 12.07.2018 wherein POWERGRID had informed that RVO mode is for a very short duration but it has been observed that in last few months the poles are operating in RVO mode continuously for hours together.

C.26.4 POWERGRID representative informed that there is bushing problem and they are going to replace with ABB bushing. During FAT no problems were encountered. These problems were encountered only at site. There were problem also due to software.

C.26.5 HP and DTL representative wanted POWERGRID to apprise the forum the problems that were in the software and what has been done by OEM in resolving these problems. POWERGRID should get written reply from OEM and submit to NRDC/NRPC.

C.26.6 TCC recommended that telemetry from HVDC Kurukshetra may be provided by POWERGRID as agreed in the last meeting.

NRPC Deliberation

C.26.7 NRPC endorsed the TCC recommendations.

C.27 **OPGW connectivity &Telemetry status of NHPC stations (Agenda by NHPC)**

TCC Deliberations

C.27.1 Representative of NHPC informed the status of OPGW connectivity at NHPC Power Stations under Central Sector scheme and requested POWERGRID to update the status

i) URI-II Power Station: During 39th TCC & 42nd NRPC meetings held on 27th/28th June 2018, TCC advised POWERGRID to resolve the compensation issue at the earliest for commission of OPGW at URI-II Power Station.

ii) Sewa-II and Parbati-III: During 39th TCC & 42nd NRPC meetings held on 27th/28th June 2018, POWERGRID had informed that OPGW connectivity for data telemetry of Bairasiul and Sewa II shall be completed by July 2018 and that at Parbati-III shall be completed by June 2018 .

C.27.2 NHPC apprised the members that they have completed so many projects in J&K with the help of locals and now work on small segments are pending at POWERGRID end since long. POWERGRID will have to make due payment for ROW.

C.27.3 Representative of POWERGRID expressed their inability to complete connectivity at Uri-II due to local law and order issues. POWERGRID requested for help from NHPC and administration for completing the pending work. With regard to Sewa-II, POWERGRID informed that OPGW has been completed, the integration for the same is pending due to some pending payment to agency by PDD J&K since last one and half year as this was the deposit work.

C.27.4 MS, NRPC requested POWERGRID to complete the OPGW connectivity using own funds as this is a small amount and the same may be recovered from PDD J&K at a latter stage.

C.27.5 POWERGRID agreed to review scope for any such arrangement if TCC recommends.

C.27.6 TCC requested POWERGRID to explore all possible ways to complete the work.

NRPC Deliberation

C.27.7 NRPC endorsed the TCC recommendations.

C.28 **Data Telemetry NRLDC from NHPC Kishanganga HE Project**

TCC Deliberations

C.28.1 Member Secretary NRPC informed that POWERGRID informed in 39th TCC & 42nd NRPC Meetings held on 27th/28th June, 2018 that they will confirm later regarding installation of Terminal Equipment at Kishanganga HE projects once Fibre is available. POWERGRID was requested to update the status.

C.28.2 Representative of POWERGRID informed that work at Kishanganga work held up due to non-payment out standing by J&K. MS NRPC requested POWERGRID to complete the pending work and assured to take up the payment issue with J&K authorities.

NRPC Deliberation

C.28.3 The Committee noted the TCC deliberations.

C.29 **Replacement of S900 RTUs:**

TCC Deliberations

C.29.1 Member Secretary NRPC informed that AMC of S900 RTUs, installed under ULDC is valid till July 2018. During 12th TeST meeting it was decided that PGCIL would replace S900 RTUs at stations owned by PGCIL and for other members/constituents who have given their consent for replacement of their RTUs through POWERGRID, by July 2018.

C.29.2 In 13th TeST meeting POWERGRID informed that they had sent MoU/Agreement for replacement of old S-900 RTUs to all constituents in first week of Feb' 2018. However, only two constituents namely SJVNL & THDC Limited have signed MoU/Agreement. POWERGRID had also informed that award shall be placed only after signing of MoU/Agreement between POWERGRID & respective constituents of Northern Region & deposit of advance payment. The TeST sub-committee expressed concern over delay in procurement process and advised all the concerned constituents to submit the signed copy of MoU to POWERGRID latest by 15th May 2018. It was also decided by the sub-Committee that if any Constituent doesn't submit the signed copy of MoU by 15th May 2018, it will be the concerned Utilities responsibility to make necessary arrangement for procurement on their own so that their RTUs are replaced before expiry of AMC.

C.29.3 In 39th TCC & 42nd NRPC meeting POWERGRID informed that they were in process of procurement of 93 Nos. S 900 RTUs as per requirement given by different utilities. HPSEB informed that they would replace S900 RTU on their own.

C.29.4 POWERGRID further informed that NIT has been published on 18.09.2018 as MOU/Agreement have been signed by all Constituents, however payment from NTPC, DTL and IPGCL are still pending.

C.29.5 NRPC Secretariat requested POWERGRID to expedite procurement process and requested to take necessary action to extend AMC of S900 RTUs till their replacement in Northern region

C.29.6 NRPC approved replacement of RTUs at all locations of Northern Region Constituents & Central Sector locations including POWERGRID in 38th TCC and 41st NRPC meeting.

C.29.7 RTUs of NR constituents are being replaced as deposit work. For RTUs of POWERGRID, it was informed that replacement of RTUs shall be done on cost plus basis and tariff for the investment made to be shared by all constituents as CERC notification under reliable communication scheme.

C.29.8 TCC requested POWERGRID to expedite procurement process and requested to take necessary action to extend AMC of S900 RTUs till their replacement in Northern region TCC noted the estimated cost of Rs. 5.2 Crore for 21 Nos RTUs of POWERGRID.

NRPC Deliberation

C.29.9 The Committee noted the TCC deliberations.

C.30 **Training for EMS application:**

TCC Deliberations

C.30.1 Member Secretary NRPC informed that EMS training was approved in the 37th TCC and 40th NRPC meeting held on 27th and 28th October 2017 and NRPC secretariat

had placed order on SIEMENS for hands on Training on EMS applications at respective NR SLDCs. Training for Delhi, BBMB, HP, UP, Punjab and Haryana SLDCs has been completed and 90% payment Rs 1070496/- was released to SIEMENS. Training at J&K SLDC was completed from 22nd to 26th Oct 2018.

C.30.2 Member Secretary NRPC also informed that lot of efforts were put by NRPC secretariat for this training but response at SLDCs is not observed as per expectations. It was informed that poor attendance was observed at some SLDCs. Since training at all 8 SLDCs was completed by SIEMENS this contract will be closed after receiving invoice for training at SLDC Jammu.

C.30.3 TCC requested members to update the skills of man-power deputed at SLDCs for State estimator and EMS applications of SCADA system.

NRPC Deliberation

C.30.4 NRPC endorsed TCC deliberations and requested members to take all necessary action for proper functioning of EMS applications of SCADA system.

C.31 **Issues in installation of OPGW on PKTCL Lines (75.915 km)**

TCC Deliberations

C.31.1 Member Secretary NRPC informed that NRPC approved OPGW based Reliable Communication Scheme for Central Sector to provide voice and data communication for Central Sector stations and IPPs in Northern Region in In 39th TCC & 42 NRPC meeting. The Scheme envisages establishment of 7248 Kms of OPGW network along with Communication equipment.

C.31.2 The scheme covers installation of OPGW on transmission lines of POWERGRID and other utilities to meet the requirement of network connectivity of stations under Central Sector and IPP stations. The scheme envisages requirement of OPGW installation on following lines owned by Pārbati Koldam Transmission Co. Ltd. (PKTCL), a subsidiary company of Reliance in northern region:

(i) 400 kV Pārbati Pooling – Pārbati III T/L (part)

(ii) 400 kV Pārbati III – Pārbati II T/L (part)

(iii) 400 kV Pārbati Pooling Station – Koldam T/L (part)

C.31.3 NHPC in 42nd NRPC meeting, had requested for early completion of OPGW installation to provide data & voice connectivity to Parbati III station. Accordingly, POWERGRID had taken up installation of OPGW on 400 kV Pārbati Pooling – Parbati III T/L under NR Fiber optic Expansion(Additional requirement) project & completed the installation of OPGW in POWERGRID portion. However, OPGW installation in PKTCL portion is balanced. POWERGRID has taken up with M/s PKTCL for installation of OPGW in their portion of line. PKTCL vide their letter dated 31.07.18 have raised certain issues for OPGW installation on their lines. The

issues raised are regarding indemnifying PKTCL towards following on account of installation of OPGW on their line:

(i) any dispute, arbitrations, ROW issues with locals

(ii) Outage /tripping of transmission lines, decrease in availability of PKTCL transmission system

C.31.4 Loss of revenue etc. Similar issues came up during OPGW installation on transmission lines of Reliance Power Transmission Ltd (RPTL) in Western Region. These issues are to be resolved immediately so that OPGW installation is taken up by POWERGRID on PKTCL lines for smooth implementation of the scheme.

C.31.5 TCC stated that a separate meeting may be conducted with PKTCL to resolve this issue.

NRPC Deliberation

C.31.6 The endorsed the TCC recommendations

C.32 Scheduling of RRAS during high grid frequency (Agenda by UP SLDC)

TCC Deliberations

C.32.1 UP SLDC representative stated that as per the regulatory provisions, RRAS is to be scheduled only when frequency remains continuously below 49.9 Hz or in case of congestion in the grid in real time. He informed that on scrutiny of RRAS data for 15th, 16th and 17th October 2018, it was found that frequency remained below 49.9 Hz in 13-time blocks (enclosed in Annexure 32.1 of Agenda note)

C.32.2 Generators are also scheduled under RRAS to give them Technical minimum schedule so that these units remain available during peak hours. requirement is there Regulation up as well down and for refereed days. Under injection even if RRAS up. In every OCC meeting NRLDC has been pointing out instances of under injection by utilities when RRAS up schedule has been given to them. Utilities should not take granted that they have been permitted to deviate 12% is not granted Representative of NLDC gave a detailed presentation of the grid condition during the above-mentioned days. It was informed that the frequency would have dropped out of the band had RRAS not been triggered. Copy of the presentation is enclosed at Annexure-III.

C.32.3 MS, NRPC appreciated the role of NRLDC and NLDC in maintaining grid frequency in the band. He stated that RRAS is usually triggered because of continuous overdrawal by some constituents. Due to this indiscipline by these constituents, the entire region has to suffer as payment for RRAS has to be made from the NR pool account which reduces the amount which can be made available to the PSDF.

C.32.4 He urged that NRLDC may schedule power to the overdrawing entities before scheduling the same under RRAS.

C.32.5 TCC recommended that the agenda may be taken up in the NRPC meeting.

NRPC Deliberation

C.32.6 Representative of UP SLDC stated that as per the regulatory provisions, RRAS is to be scheduled only when frequency remains continuously below 49.9 Hz or in case of congestion in the grid in real time. He informed that on scrutiny of RRAS data for 15th, 16th and 17th October 2018, it was found that frequency remained below 49.9 Hz in 13-time blocks (enclosed in Annexure 32.1 of Agenda note)

C.32.7 Representative of NLDC gave a detailed presentation of the grid condition during the above-mentioned days. It was informed that the frequency would have dropped out of the band had RRAS not been triggered. Copy of the presentation is enclosed at Annexure-III.

C.32.8 MS, NRPC appreciated the role of NRLDC and NLDC in maintaining grid frequency in the band. He stated that RRAS is usually triggered because of continuous overdrawal by some constituents. Due to this indiscipline by these constituents, the entire region has to suffer as payment for RRAS has to be made from the NR pool account which reduces the amount which can be made available to the PSDF.

C.32.9 He urged that NRLDC may schedule power to the overdrawing entities before scheduling the same under RRAS.

C.33 **Replacement of S900 RTUs for POWERGRID Station (Agenda by POWERGRID)**

C.33.1 Already covered under C.29

C.34 **Challenges in Demand Forecasting (Agenda by TPDDL)**

TCC Deliberations

C.34.1 Representative of TPDDL stated that accurate demand forecast on day ahead basis is a big challenge for optimum power scheduling and dispatching.

C.34.2 He requested NRPC to arrange a meeting with Gujarat DISCOM to understand practices being followed by them in demand forecasting.

C.34.3 MS, NRPC stated that representative from Gujarat would be invited in the next special meeting of NR DISCOMs. He asked TPDDL to come up with the ToR of a sub group to be constituted to improve scheduling

C.34.4 BRPL requested that IMD may be urged to provide weather data in 15 minutes time period.

C.34.5 Representative of CEA stated that they have developed a forecasting tool to reduce deviation charges with the help of KPMG and a pilot project for the same has successfully been carried out in Telangana.

C.34.6 He informed that a training program for long term forecasting is being organized in the November 2018 by TERI at Gwal Pahadi, Gurgaon. All SLDCs would be send invites to attend the same

C.34.7 MS, NRPC urged CEA to invite DISCOMs also, to the training program. CEA agreed for the same for the second batch on short term load forecasting.

NRPC Deliberation

C.34.8 NRPC noted the TCC deliberations.

C.35 Centralized software for SLDC, RLDC and DISCOMs (Agenda by TPDDL)

TCC Deliberations

C.35.1 Representative of TPDDL stated that there is a need for centralized software for power scheduling and dispatching as without intervention of technology, adherence to the newly proposed regulation is a very challenging task.

C.35.2 TCC requested CEA to provide hand holding to DISCOMs to improve their scheduling despatch and reduce deviation charges.

NRPC Deliberation

C.35.3 NRPC noted the TCC deliberations.

C.36 Ancillary Services (Agenda by TPDDL)

TCC Deliberations

C.36.1 Representative of TPDDL stated that for Delhi, gas and hydro generation can be utilised as ancillary services. Generators can be given regulation up or down instruction by Delhi SLDC. Financial settlement for ancillary services can be done through pool balance.

C.36.2 He stated that SOP of intra-state ancillary services can be submitted to SERC jointly by the SLDC and DISCOMs of Delhi.

C.36.3 Representative of NRLDC informed that FOLD has already recommended that intra state RRAS regulation may be implemented in states that have intra state DSM.

C.36.4 Similar RRAS mechanism has been successfully implemented in Madhya Pradesh.

C.36.5 TCC was of the view that Delhi SLDC may approach DERC to get intra state RRAS mechanism implemented. No intervention or recommendation of NRPC is required in this regard.

NRPC Deliberation

C.36.6 NRPC noted the TCC deliberations.

D. ITEMS FOR NRPC

D.1 Reimbursement of Expenditure of NRPC Sectt. for the FY 2017-18 and FY 2018-19 by the members of NRPC

D.1.1 MS, NRPC informed the Committee about the budget estimates approved by GoI for the financial year 2018-19 and expenditure likely to be incurred towards outsourcing of staff, conduct of various meetings, leasing of vehicle, petrol for vehicles, AMC of software, training etc through NRPC fund and balance amount available in the NRPC Fund. Accordingly, Rs. 10 Lakh per member was approved by NRPC in 42nd NRPC meeting as the contribution for the financial year 2018-19**.**

D.1.2 MS NRPC informed that in the 40th NRPC meeting held on 28.10.2017, it was decided to contribute the amount of Rs. 10.0 Lakh per member for the year 2017-18 toward reimbursing NRPC expenditure to GoI for the year 2017-18, for meeting the expenditure for meetings at Secretariat and other expenditure as approved by Chairperson, NRPC.

D.1.3 List of members from which contribution is still awaited is given below.

Sl. No.	Constituent Member
1	UT of Chandigarh, Chandigarh
2	Dakshin Haryana BijliVitaran Nigam Ltd., Hisar
3	J&K Power Development Department, Srinagar
4	J & K State Power Development Corp. Ltd., Srinagar
5	MadhyanchalVidyutVitran Nigam Ltd., Lucknow
6	Uttarakhand Power Corporation Ltd., Dehradun
7	Rosa Power Supply Company Ltd., Shahjahanpur
8	LancoAnpara Power Ltd., Gurgaon
9	Shree Cement Limited, Bewar
10	Prayagraj Power Generation Co Ltd., Allahabad
11	Lalitpur Power Generation Company Limited, Noida

D.1.4 Since the financial year 2017-18 and first half of FY 2018-19 is already over, NRPC members are requested to expedite the contribution.

D.1.5 All members agreed to make their payments current year as well of the past years (if due) by Dec, 2018.

D.2 Reimbursement of Expenditure of NRPC Sect. by the members of NRPC for the previous years

D.2.1 MS, NRPC stated that for reimbursing NRPC expenditure to GoI and meeting the expenditure for meetings at Secretariat and other expenditure as approved by Chairperson, NRPC, constituent members are to pay annual contribution as decided at NRPC meetings from time to time.

D.2.2 The contribution for previous years is still awaited from following members:

Sl. No.	Constituent Member	Amount (Rs.)
	Financial Year 2016-2017	
1.	AVVNL, Jaipur	7.0 Lakh
2.	J&K PDD, Srinagar	
3.	PVVNL, Varanasi	
	Financial Year 2015-2016	
1	J&K State Power Development Corp. Ltd., Srinagar	11.0 Lakh
2	Paschimanchal VVNL, Meerut	
3	GMR Energy Trading Limited, New Delhi	
	Financial Year 2014-2015	
1	J&K State Power Development Corp. Ltd., Shrinagar	11.0 Lakh
2	Dakshinanchal VVNL, Agra	
3	Bajaj Energy Pvt. Ltd., Noida	
	Financial Year 2012-2013	
1	Purvanchal VVNL, Varansi	10.0Lakh

D.2.3 NRPC expressed concern over long pending payments and advised concerned members to make payment immediately.

D.3 Membership in NRPC for Rotational Members

D.3.1 MS, NRPC apprised the committee that as in the 39th TCC/42nd NRPC JSW Power Trading Company was recommended for membership on NRPC for the year 2018-19 by CEA as a Power Trader. However, representative of JSW Energy informed that JSW PTC is not existence anymore and the membership of NRPC for inter-state electricity trader may be offered to some other trader.

D.3.2 He further told that subsequently, name of Manikaran Power Ltd was recommended for membership by CEA. Accordingly, Manikaran Power Ltd. has been nominated as trader member of NRPC for the year 2018-19.

D.3.3 He informed that Sterlite Power Transmission Limited has requested that private transmission licensees should also be invited to participate in the RPC meetings. He told that matter was discussed at CEA which would be forwarded to MoP for consideration. He also stated that RE generators were going to play major part in the future, hence membership for the RE generators with aggregate generation of 1000MW and more might be considered as member of RPC forum.

D.3.4 NRPC approved that proposal may be forwarded to CEA for considering membership for private transmission licensees with highest ckt kms by rotation and RE generators with aggregate generation of 1000MW and more.

D.4 Roster for Hosting NRPC Meetings

D.4.1 MS, NRPC informed that it is proposed that roster for hosting of NRPC meeting may be revised as old roster included state utilities and PSUs but not IPPs. He informed that currently there are 10 IPPs which are members of NRPC and after every 4 meeting member IPP will get an opportunity to host the meeting. The modified roster is as followed:

1.Member IPP	9. Punjab	17. Member Trader/PTC
2.NPCIL	10.Member IPP	18. Delhi
3.J&K	11. Rajasthan	19.Member IPP
4.THDC	12. POWERGRID	20. BBMB
5.Member IPP	13. UT of Chandigarh	21. Uttarakhand
6. Haryana	14.Member IPP	22. HP
7. SJVN	15. NHPC	
8. NTPC	16. UP	

Roster for Members IPP is as followed:

1.Adani Power	6.LPGCL
2.APCPL	7.NPL
3.CLP	8.PPGCL
4.JSW Power	9.RPSCL
5.LAPL	10.TSPCL

D.4.2 NRPC approved the revised roster for the hosting of the meeting.

D.5 Capacity Building Program on Transition to 5 Minute Balancing & Scheduling-International Experiences

D.5.1 MS, NRPC informed that capacity building program on 5 Minute Balancing & Scheduling is very important keeping in mind future shift to 5 Minute scheduling from 1st April 2019. Currently, 5 Minute scheduling is being implemented in Australia and USA, hence international exposure would be very helpful for gradual changeover to 5 Minute scheduling. (Details attached at **Annexure - IV**)

D.5.2 He informed that PSDF would be approached for funding and 1-2 members from STU, SLDCs, POSOCO, GENCOs, CTU, CEA, and NRPC. He informed that 11 days training program is proposed including 2 days travel. He stated that accounting would also be gradually shifted to 5 Minute.

D.5.3 NRPC approved that PSDF may be approached for the funding of proposed program.

D.6 Renovation of Recreation centre at NRPC Secretariat

D.6.1 MS, NRPC informed that there are very old and non-functional gym equipments in the Recreation centre which needs to replaced. Hence, it is proposed that new gym equipment might purchase as decided by Canteen Committee and expenditure of around 5 lakh for the same is proposed to be met from NRPC fund

D.6.2 NRPC approved the renovation of recreation centre and expenditure for the same.

D.7 HOSTING OF NEXT MEETINGS OF NRPC / TCC

MS, NRPC informed that as per revised roster for hosting of meetings, the next meetings of TCC (41st) & NRPC (44th), which would become due in Feb/March, 2019 are to be hosted by Member IPP (Adani Power Ltd).

D.8 Verification of NRPC Fund Account

D.8.1 MS, NRPC informed that As per the Bye-laws for NRPC Fund the "NRPC Fund" account was required to be audited annually for each financial year. Accordingly, the NRPC fund account for financial year 2017-18 was audited by the officers nominated by Chairperson, NRPC.

D.8.2 Audit of NRPC Fund account was also carried out through the Chartered Accountant appointed with the approval of Chairperson, NRPC. The statement of audited accounts of NRPC Fund for the Financial Year 2017-18 duly audited by the Chartered Accountant is enclosed in the agenda at Annexure-D.6.

D.8.3 NRPC approved the audited account of "NRPC – Fund" for the Financial Year 2017-18.

D.9 Verification of Regional Board Fund

D.9.1 MS, NRPC informed that as per Bye-laws for Regional Board Fund (RBF), the account for each financial year was required to be audited annually by the officers nominated by Chairperson, NRPC. The auditing of expenditure of RBF account for the year 2018-19 was carried out by the officers nominated by Chairperson, NRPC and statement is placed in the agenda at Annexure-D.6.

D.9.2 NRPC approved the audited account for the Financial Year 2017-18.

D.10 NICNET (National Informatics Centre) connectivity at NRPC Secretariat

D.10.1 MS, NRPC informed that e-Office is being implemented at CEA for which NICNET is essential but NICNET is not available at NRPC secretariat. He also told that large no. of accounts was being issued by NRPC which also handles very sensitive information. Hence, it is very important to have safe and secure internet.

D.10.2 The NICNET is also needed for implementation of e-Office at NRPC Secretariat. Video Conferencing services can also be availed over the NICNET which is state of the art technology with high quality- high speed service.

D.10.3 Hence, it is proposed to install NICNET service at NRPC secretariat with all necessary equipment. The estimated capital cost expenditure for the complete installation is 45-50 lakhs without any recurring charges in the future which may be met from NRPC fund.

D.10.4 NRPC approved the implementation of NICNET service at NRPC secretariat and expenditure for the same.

Annexure-I

List of Participants of 40th Meeting of TCC on 29.10.2018 at Amritsar, Punjab

S.No.	Name of Officer	Designation	Organization
A	**Members of TCC**		
1.	Sh. A. K. Kapur	TCC Chairman and Director (Tech)	PSTCL
2.	Sh. Asgar Ali Majaz	Dev. Commissioner (Power)	PDD-J & K
3.	Shri. Ajmer Singh Gill	Director(Tech.)	HVPNL
4.	Shri Rakesh jolly	Chief Engineer/SO&C	HVPNL
5.	Sh. Rajesh Thakur	Director (Projects)	HPPTC
6.	Sh. N K Sharma	Dir (Dist)	PSPCL
7.	Shri Prem Prakash	Director(O)	DTL
8.	Shri Harjiwan Vyas	Executive Director(T)	SLDC, Delhi
9.	Sh. K.K. Singh	Regional Executive Director (NR)	NTPC
10.	Shri S.P.Chaubay	Chief Engineer (TO)	UPRVUNL
11.	Sh. N. S. Parameshwaram	Executive Director (O&M)	NHPC
12.	Sh. Anil Kumar Garg	GM	ADHPL
13.	Sh. Parveen Verma	Add. GM	TPDDL
14.	Sh. S.S. Barpanda	Executive Director	NRLDC
15.	Shri. Jagdish Kumar	Director (T)	IPGCL
16.	Sh. L. P. Joshi	General Manager (Electrical Design)	THDCIL
B	**Other Participants**		
I	**NRPC, Secretariat**		
17.	Shri. M.A.K.P. Singh	Member Secretary	NRPC
18.	Shri Upendra Kumar	Superintending Engineer	NRPC
19.	Shri R. P. Pradhan	Superintending Engineer	NRPC
20.	Shri Akshay Dubey	Asst. Executive Engineer(O)	NRPC
21.	Shri Vikrant Singh Dhillon	Asst. Executive Engineer(C)	NRPC
22.	Shri. Kaushik Panditrao	Asst. Engineer(P)	NRPC
II	**CEA**		
23.	Sh. Vikram Singh	Director (GM)	CEA
III	**BBMB**		
24.	Sh. Rajesh Gupta	CE/Transmission	BBMB
25.	Sh. Harminder Singh	CE/SO	BBMB
26.	Sh. Anil Gautam	Director Power Regulation	BBMB
IV	**DELHI**		
27.	Shri S.M. Verma	Executive Director (T)	IPGCL/PPCL
28.	Sh. Loveleen Singh	GM (PMDMS)	DTL
29.	Sh. Sanjay Srivastav	Head Power Management	BRPL
30.	Sh. Gurmeet Singh	GH Power Management	BRPL
V	**HARYANA**		
31.	Sh. Ravi Sher Singh	Executive Engineer	Haryana SLDC
32.	Sh. Ashok Garg	Dy. Secy	HPGCL

VI	**HIMACHAL PRADESH**		
33.	Sh. Deepak Uppal	CE(Syst. Op)	HPSEB
34.	Sh. Joginder Singh	SE (IlS)	HPSEB
35.	Sh. Keshav Singh A	Director(P&C)	HPPTC
36.	Sh. Naresh Kumar Sharma	CE	HP, SLDC
VII	**J&K**		
VIII	**PUNJAB**		
37.	Sh. Sanjeev Gupta	CE/TS.	PSTCL
38.	Sh. Harmesh Kumar	CE/SLDC	PSTCL
39.	Sh. Madan Singh	SE/SLDC	PSTCL
40.	Sh. Parmjeet Singh	CE/PPR	PSPCL
IX	**RAJASTHAN**		
41.	Sh. R.K. Jain	Chief Engineer (PPD)	RVPNL
42.	Sh. A.K. Arya	SE (SO&LD)	RVUNL/ SLDC
43.	Sh. A.K. Saxena	ACE (PPMC&IT)	RVUNL
44.	Sh. C.L. Koli	SE(PP)	RVUNL
X	**UTTAR PRADESH**		
45.	Sh. Mithilesh K. Gupta	EE/ UPSLDC	UPPTCL
46.	Sh. S.C. Rawat	EE/ UPSLDC	UPPTCL
47.	Sh. Shekhar Agarwal	Chief Engineer	UPPTCL
48.	Sh. Brijesh Singh	EE(TO)	UPRVUNL
XII	**NHPC**		
49.	Sh. M. G. Gokhale	CE(Elect.)-Commercial	NHPC
XIII	**NTPC**		
50.	Sh. H. Harchandani	GM (Comml) NR	NTPC
51.	Sh. E.P. Rao	Addl. GM (Comml)	NTPC
XIV	**PGCIL**		
52.	Sh. K. N. Singh	G.M.	PGCIL
53.	Sh. R.K. Tyagi	G.M.	PGCIL
54.	Sh. R.K. Arora	GM(AM) NR-I	PGCIL
XV	**SJVNL**		
55.	Sh. Romesh Kapoor	Chief GM	SJVNL
56.	Sh. Rajeev Agarwal	Dy. GM	SJVNL
XVI	**THDCIL**		
57.	Sh. R.K. Verma	DGM (Commercial)	THDCIL
XVI.	**NRLDC**		

58.	Sh. Rajeev Porwal	Deputy General Manager	NRLDC
59.	Sh. Aashutosh Pandey		NRLDC
XVIII	**Adani Power Raj. Ltd.**		
60.	Shri Manoj Taunk	General Manager	Adani Power Ltd.
XIX	**NLDC**		
61.	Sh. N.Nallarasan	DGM	NLDC,POSOCO
XX	**APCPL**		
62.	Sh. Debashis Das	GM (O&M)	APCPL
63.	Sh. J.K. Chaudhary	DGM	APCPL
XXI	**Uttarakhand**		
64.	Sh. Kamal Kant	CE (C&R)	PTCUL
65.	Sh. Himanshu Baliyan	Ex. Engg. (C&R)	PTCUL
66.	Sh. Sanjay Kumar Tamta	CE Comml.	UPCL
XXII	**JPL**		
67.	Sh. Prabhat Misra	Dy. Mgr.	Jhajjar Power (CLP)

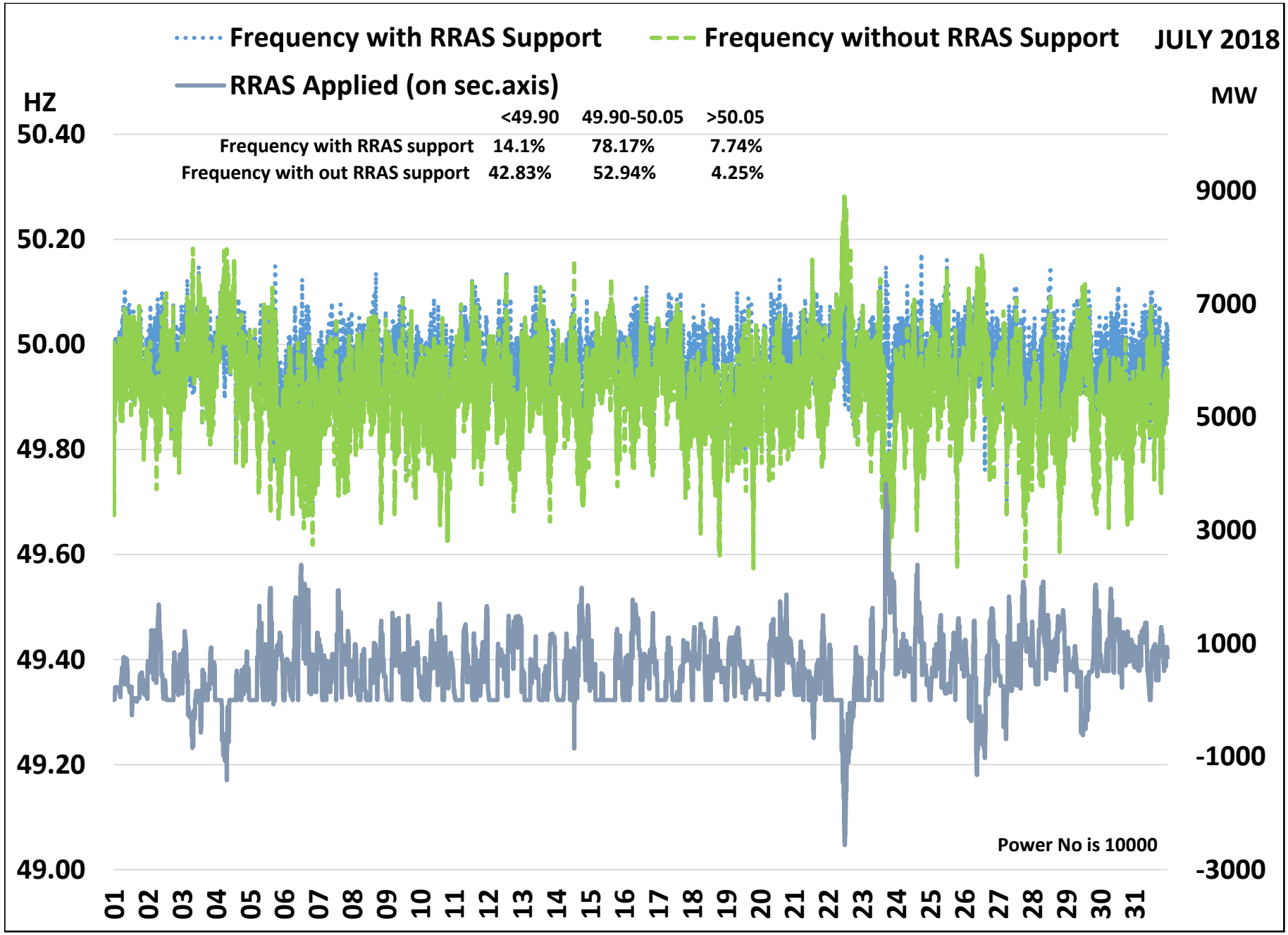
Annexure-II

List of Participants of 43rd Meeting of NRPC on 30.10.2018 at Amritsar, Punjab

S.N	Name of Officer	Designation	Organization
A	**Members of NRPC**		
1.	Sh. Baldev Singh Sran	CMD	PSPCL
2.	Sh. B.K. Sharma	PCE (GO&D)	CEA
3.	Shri Rakesh Jolly	Chief Engineer /SO&Comml.	HVPNL
4.	Sh. S.S. Barpanda	Executive Director	NRLDC
5.	Shri M.A.K.P. Singh	Member Secretary	NRPC
6.	Shri. R. K. Sharma	MD	HPPTCL
7.	Sh. P. K. Aggarwal	Director	POSOCO
8.	Sh. Anil Kumar Garg	GM	ADHPL
9.	Sh. Satish Jindal	CEO (Trading)	JSW Energy Ltd.
10.	Sh. Karunakar Jha	GM (Comm)	JPL
B	**Members of TCC**		
11.	Sh. A. K. Kapur	TCC Chairman and Director (Tech)	PSTCL
12.	Sh. Asgar Ali Majaz	Dev. Commissioner (Power)	PDD-J & K
13.	Shri. Ajmer Singh Gill	Director(Tech.)	HVPNL
14.	Shri Rakesh jolly	Chief Engineer/SO&C	HVPNL
15.	Sh. Rajesh Thakur	Director (Projects)	HPPTC
16.	Sh. N K Sharma	Dir (Dist)	PSPCL
17.	Shri Prem Prakash	Director(O)	DTL
18.	Shri Harjiwan Vyas	Executive Director(T)	SLDC, Delhi
19.	Sh. K.K. Singh	Regional Executive Director (NR)	NTPC
20.	Shri S.P.Chaubay	Chief Engineer (TO)	UPRVUNL
21.	Sh. N. S. Parameshwaram	Executive Director (O&M)	NHPC
22.	Sh. Anil Kumar Garg	GM	ADHPL
23.	Sh. Parveen Verma	Add. GM	TPDDL
24.	Sh. Rakesh Kumar Bansal	Director (E)	SJVNL
25.	Shri. Jagdish Kumar	Director (T)	IPGCL
26.	Sh. L. P. Joshi	General Manager (Electrical Design)	THDCIL
C	**Other Participants**		
I.	**NRPC, Secretariat**		
27.	Shri Upendra Kumar	Superintending Engineer	NRPC
28.	Shri Hemant Kumar Pandey	Superintending Engineer	NRPC
29.	Shri Akshay Dubey	Asst. Executive Engineer(O)	NRPC
30.	Shri Vikrant Singh Dhillon	Asst. Executive Engineer(C)	NRPC
31.	Shri. Kaushik Panditrao	Asst. Engineer(O)	NRPC

S.N	Name of Officer	Designation	Organization
II.	**CEA**		
32.	Shri Vikram Singh	Director	CEA
III	**BBMB**		
33.	Sh. Rajesh Gupta	CE/Transmission	BBMB
34.	Sh. Harminder Singh	CE/SO	BBMB
35.	Sh. Anil Gautam	Director Power Regulation	BBMB
IV	**DELHI**		
36.	Shri S.M. Verma	Executive Director (T)	IPGCL/PPCL
37.	Sh. Loveleen Singh	GM (PMDMS)	DTL
38.	Sh. Sanjay Srivastav	Head Power Management	BRPL
39.	Sh. Gurmeet Singh	GH Power Management	BRPL
V	**HARYANA**		
40.	Sh. Ravi Sher Singh	Executive Engineer	Haryana SLDC
41.	Sh. Ashok Garg	Dy. Secy	HPGCL
VI	**HIMACHAL PRADESH**		
42.	Sh. Deepak Uppal	CE(Syst. Op)	HPSEB
43.	Sh. Joginder Singh	SE (IlS)	HPSEB
44.	Sh. Keshav Singh A	Director(P&C)	HPPTC
45.	Sh. Naresh Kumar Sharma	CE	HP, SLDC
VII	**J&K**		
VIII	**PUNJAB**		
46.	Sh. Sanjeev Gupta	CE/TS.	PSTCL
47.	Sh. Harmesh Kumar	CE/SLDC	PSTCL
48.	Sh. Sandeep Kumar	CE/OP ASR	PSPCL
49.	Sh. Parmjeet Singh	CE/PPR	PSPCL
IX	**RAJASTHAN**		
50.	Sh. R.K. Jain	Chief Engineer (PPD)	RVPNL
51.	Sh. A.K. Arya	SE (SO&LD)	RVUNL/ SLDC
52.	Sh. A.K. Saxena	ACE (PPMC&IT)	RVUNL
53.	Sh. C.L. Koli	SE(PP)	RVUNL
X	**UTTAR PRADESH**		
54.	Sh. Mithilesh K. Gupta	EE/ UPSLDC	UPPTCL
55.	Sh. S.C. Rawat	EE/ UPSLDC	UPPTCL

S.N	Name of Officer	Designation	Organization
56.	Sh. Shekhar Agarwal	Chief Engineer	UPPTCL
57.	Sh. Brijesh Singh	EE(TO)	UPRVUNL
XII	**NHPC**		
58.	Sh. M. G. Gokhale	CE(Elect.)-Commercial	NHPC
XIII	**NTPC**		
59.	Sh. H. Harchandani	GM (Comml) NR	NTPC
60.	Sh. E.P. Rao	Addl. GM (Comml)	NTPC
XIV	**PGCIL**		
61.	Sh. Sunil Agarwal	ED	PGCIL
62.	Sh. K. N. Singh	G.M.	PGCIL
63.	Sh. R.K. Tyagi	G.M.	PGCIL
64.	Sh. R.K. Arora	GM(AM) NR-I	PGCIL
XV	**SJVNL**		
65.	Sh. Romesh Kapoor	Chief GM	SJVNL
66.	Sh. Rajeev Agarwal	Dy. GM	SJVNL
XVI	**THDCIL**		
67.	Sh. R.K. Verma	DGM (Commercial)	THDCIL
XVI.	**NRLDC**		
68.	Sh. Rajeev Porwal	Deputy General Manager	NRLDC
69.	Sh. Aashutosh Pandey		NRLDC
XVI II	**Adani Power Raj. Ltd.**		
70.	Shri Manoj Taunk	General Manager	Adani Power Ltd.
XIX	**NLDC**		
71.	Sh. N.Nallarasan	DGM	NLDC,POSOCO
XX	**APCPL**		
72.	Sh. Debashis Das	GM (O&M)	APCPL
68.	Sh. J.K. Chaudhary	DGM	APCPL
XXI	**Uttarakhand**		
69.	Sh. Kamal Kant	CE (C&R)	PTCUL
70.	Sh. Himanshu Baliyan	Ex. Engg. (C&R)	PTCUL
71.	Sh. Sanjay Kumar Tamta	CE Comml.	UPCL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Frequency without RRAS Support
JULY 2018
RRAS Applied (on sec.axis)
HZ
MW
<49.90 49.90-50.05 >50.05
Frequency with RRAS support 14.1% 78.17% 7.74%
Frequency with out RRAS support 42.83% 52.94% 4.25%
50.40
50.20
50.00
49.80
49.60
49.40
49.20
49.00
9000
7000
5000
3000
1000
-1000
-3000
Power No is 10000
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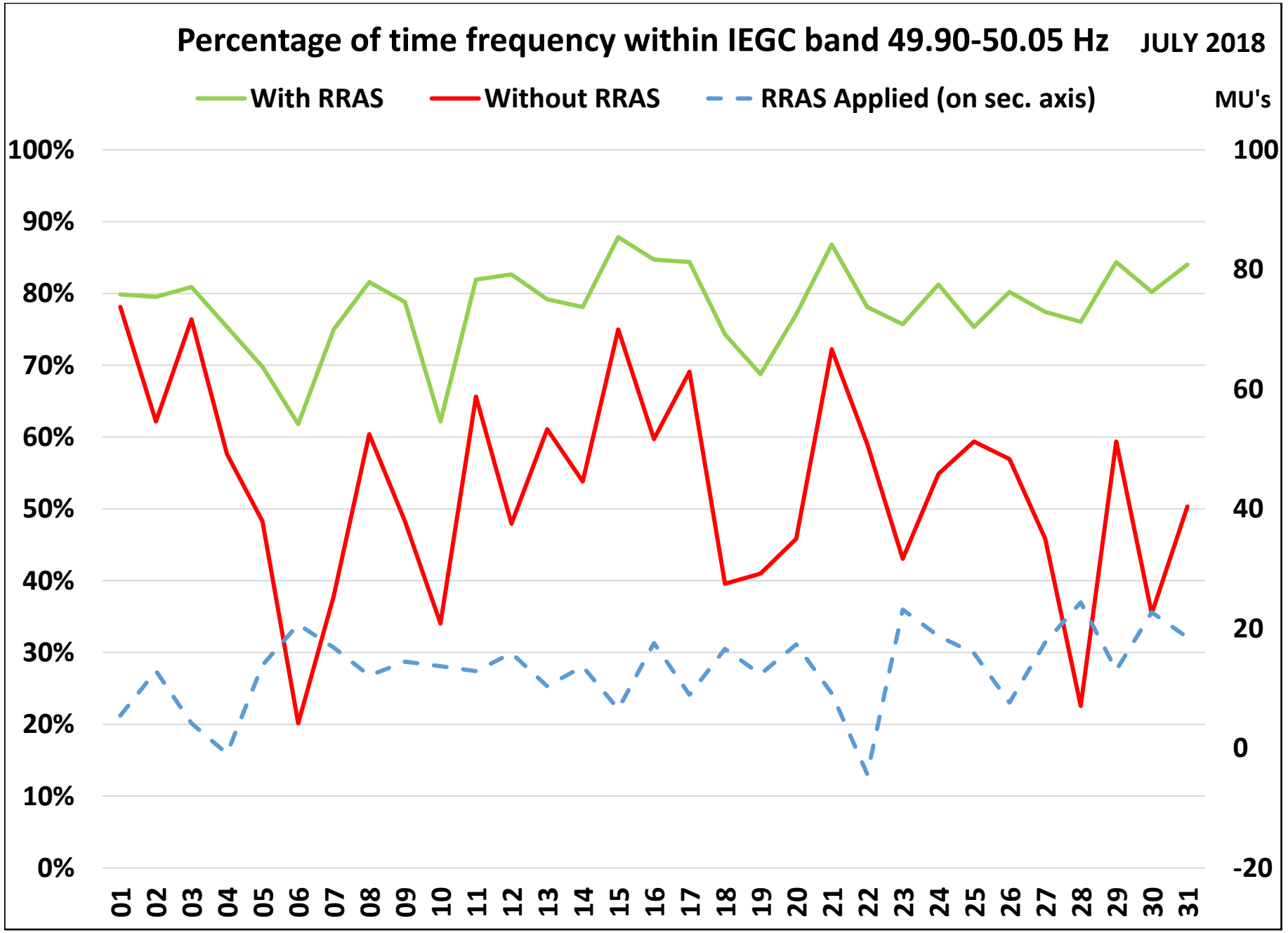
Percentage of time frequency within IEGC band 49.90-50.05 Hz
JULY 2018
With RRAS
Without RRAS
RRAS Applied (on sec. axis)
MU's
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
100
80
60
40
20
0
-20
01
02
03
04
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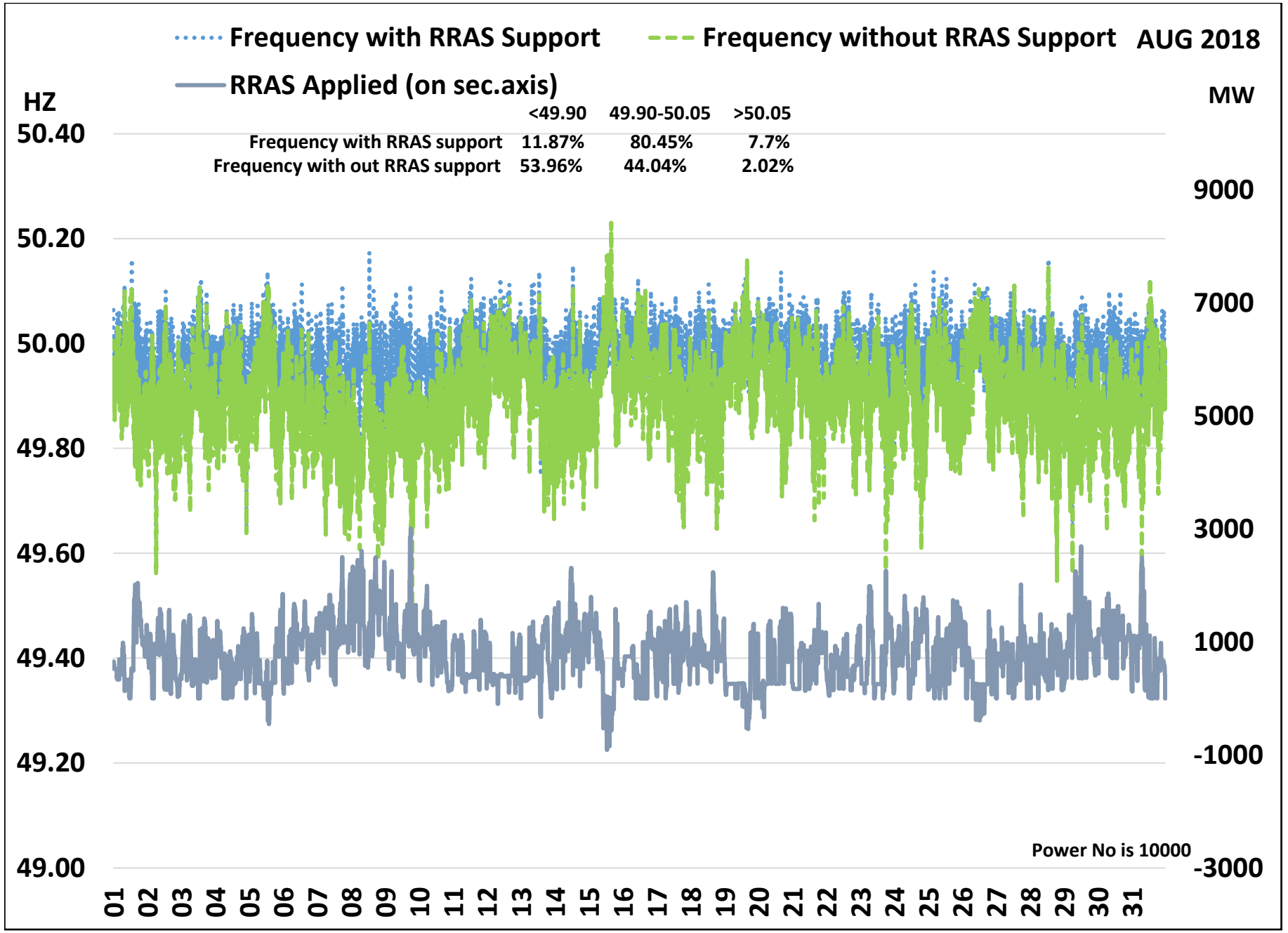
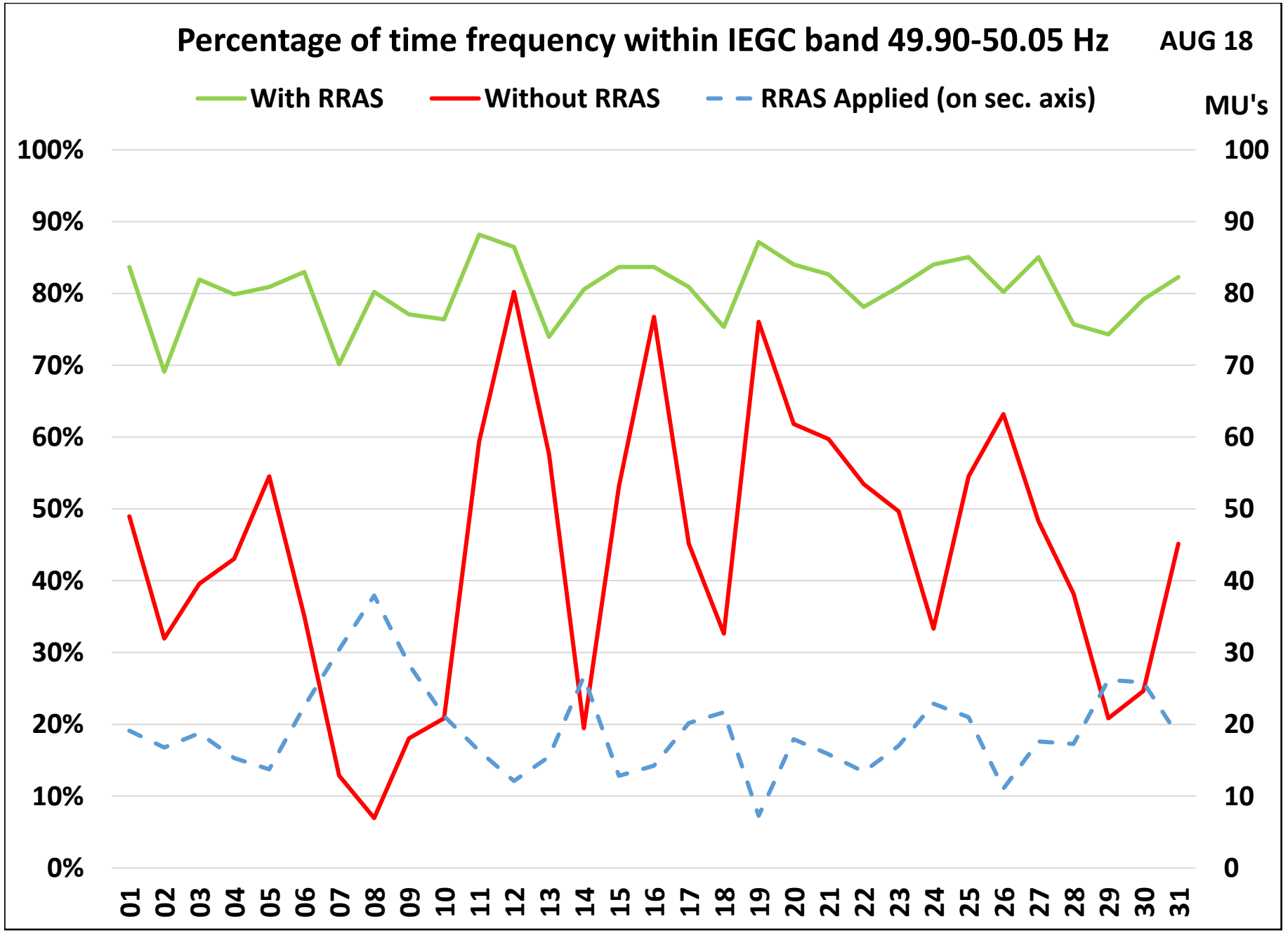
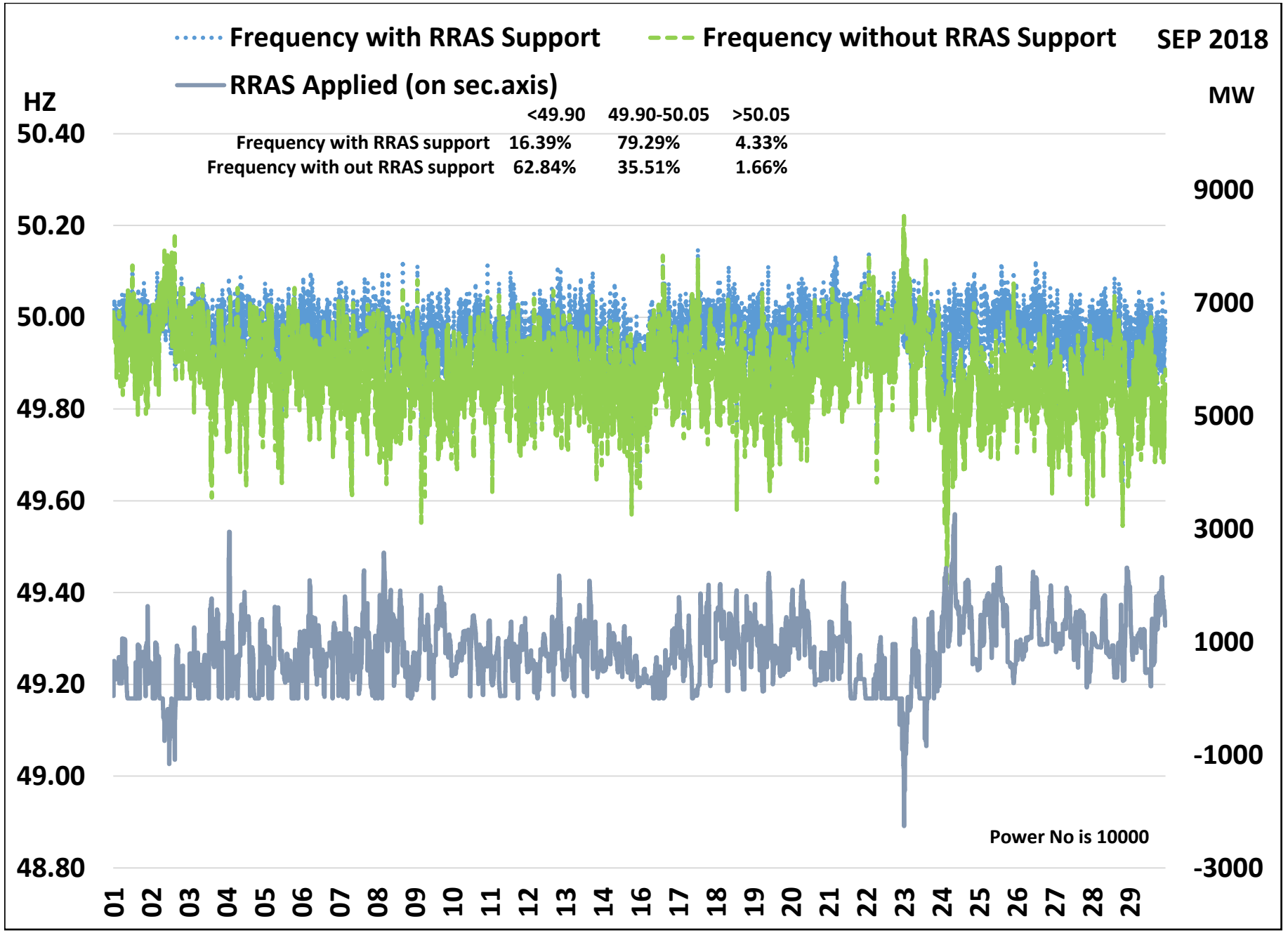
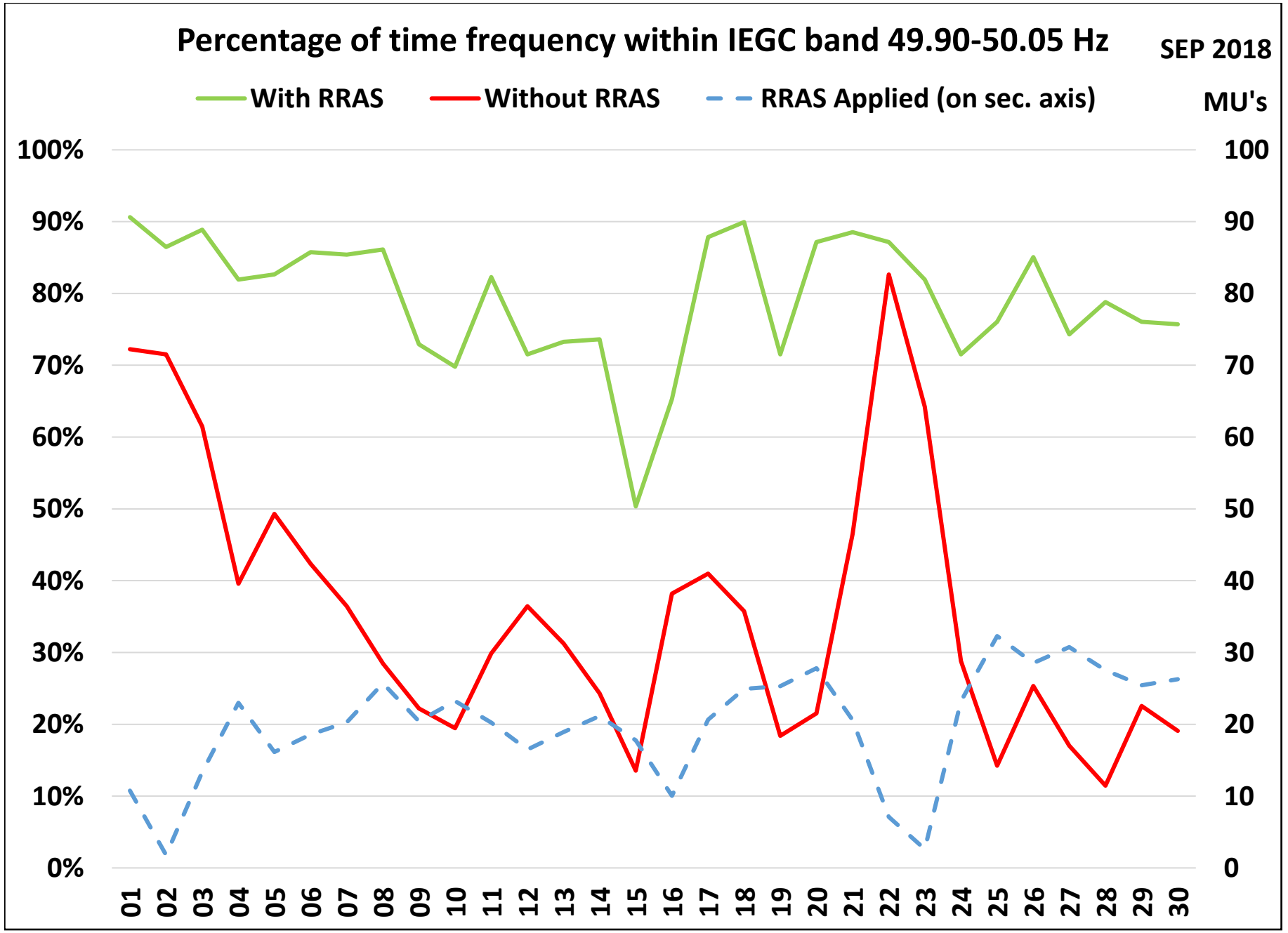
30
31


Frequency with RRAS Support
Frequency without RRAS Support
AUG 2018
RRAS Applied (on sec.axis)
HZ
MW
<49.90 49.90-50.05 >50.05
Frequency with RRAS support 11.87% 80.45% 7.7%
Frequency with out RRAS support 53.96% 44.04% 2.02%
50.40
50.20
50.00
49.80
49.60
49.40
49.20
49.00
9000
7000
5000
3000
1000
-1000
-3000
Power No is 10000
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31


Percentage of time frequency within IEGC band 49.90-50.05 Hz
AUG 18
With RRAS
Without RRAS
RRAS Applied (on sec. axis)
MU's
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
100
90
80
70
60
50
40
30
20
10
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31


Frequency with RRAS Support
Frequency without RRAS Support
SEP 2018
RRAS Applied (on sec.axis)
HZ
MW
<49.90 49.90-50.05 >50.05
Frequency with RRAS support 16.39% 79.29% 4.33%
Frequency with out RRAS support 62.84% 35.51% 1.66%
50.40
50.20
50.00
49.80
49.60
49.40
49.20
49.00
48.80
9000
7000
5000
3000
1000
-1000
-3000
Power No is 10000
01 02 03 04 05 06 07 08 09 10 11 12 13 14 16 17 18 19 20 21 22 23 24 25 26 27 28 29


Percentage of time frequency within IEGC band 49.90-50.05 Hz
SEP 2018
With RRAS
Without RRAS
RRAS Applied (on sec. axis)
MU's
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
100
90
80
70
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50
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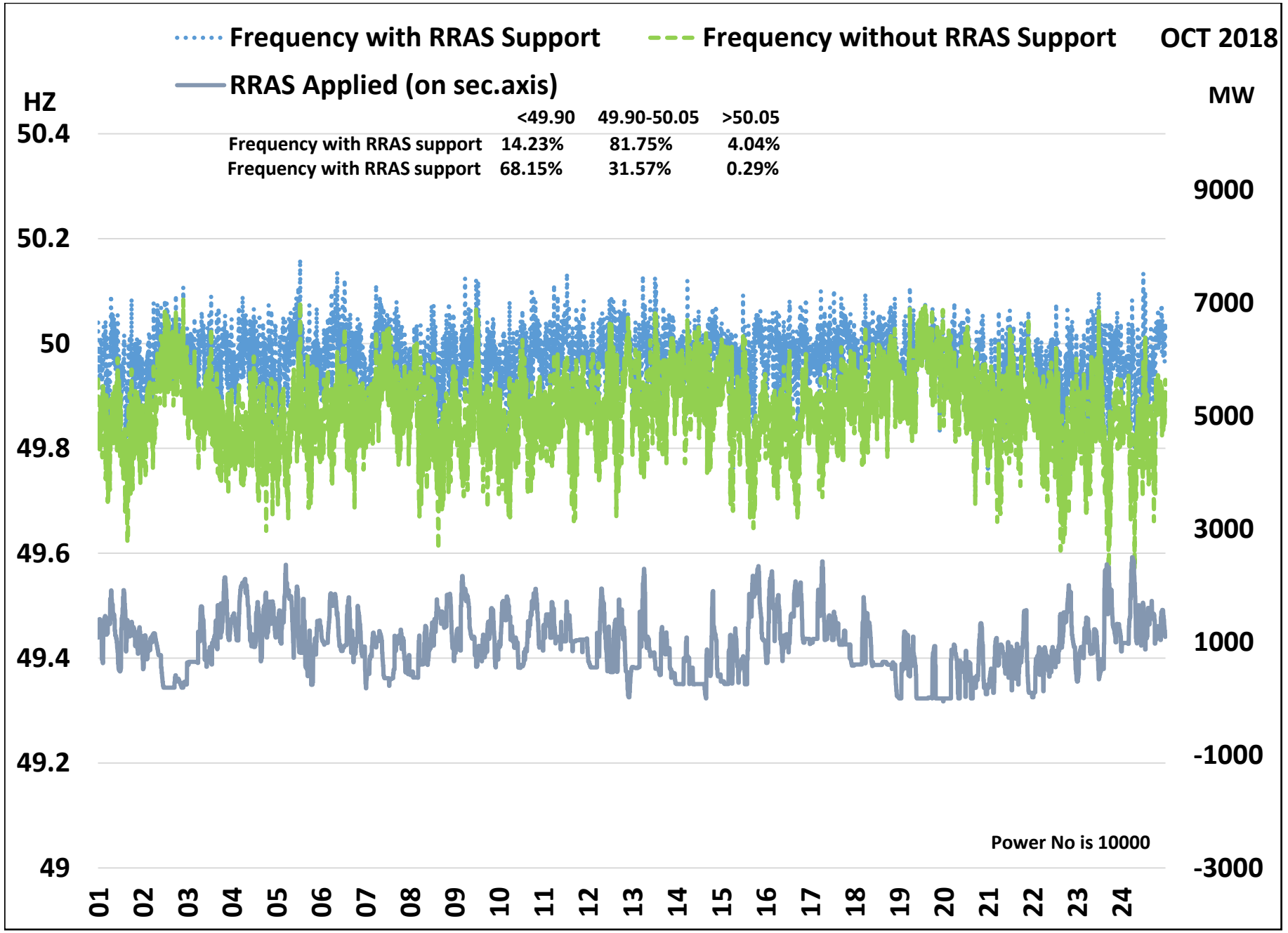
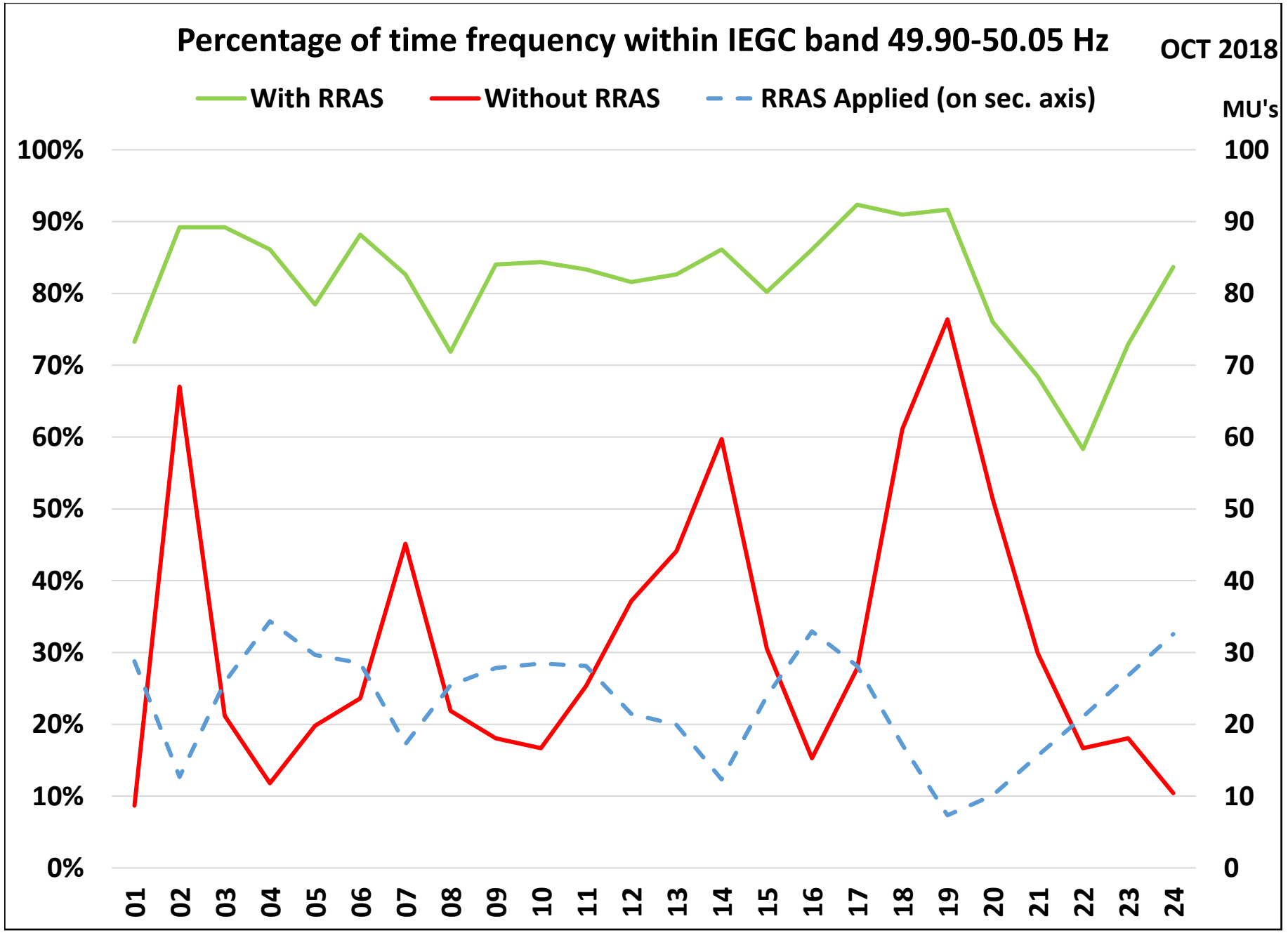
30
20
10
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30


Frequency with RRAS Support
Frequency without RRAS Support
OCT 2018
RRAS Applied (on sec.axis)
HZ
MW
<49.90 49.90-50.05 >50.05
Frequency with RRAS support 14.23% 81.75% 4.04%
Frequency with RRAS support 68.15% 31.57% 0.29%
50.4
50.2
50
49.8
49.6
49.4
49.2
49
9000
7000
5000
3000
1000
-1000
-3000
Power No is 10000
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24


Percentage of time frequency within IEGC band 49.90-50.05 Hz
OCT 2018
With RRAS
Without RRAS
RRAS Applied (on sec. axis)
MU's
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
100
90
80
70
60
50
40
30
20
10
0
01
02
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04
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Capacity Building on Transition to Low Market Resolution of 5 Minute Balancing & Scheduling International Experiences

Internationally various market resolution is maintained as per the policy making and design objectives catering to respective needs. Certain markets have opted for a simple design with "low resolution", i.e. they capture few of the underlying physical properties of the system, which they leave to system operators to handle. Others adopted a market design with "high resolution", to factor the physical reality of power systems into the process of price formation on the market itself.

Following is the gist of various developed markets, based on market resolution:

	High resolution	Low-resolution	Intermediate (high temporal resolution with low geographic resolution)
Example of market	PJM	Germany	Australian National Electricity Market
Power market platform	System operator	Power exchange	Power exchange
Bidding information	Unit/plant, complex bids	Portfolio, aggregated bid	Unit/plant
Geographic resolution	Nodal	Single national price	Zonal
Primary market	Real-time	Day-ahead	Real-time
Real-time balancing prices	Single marginal price	Asymmetric prices	Single marginal price
Dispatch interval	5 minutes	15 minutes or longer	5 minutes
Operating reserves	Co-optimised with energy	Separate markets	Separate markets

Source: IEA

- Low resolution market design is found in European Markets, with high RE Integration
- European Markets largely have 15 minute resolution
- In Australia, Scheduling and despatch is at 5-minute interval and settlement at 30 minute interval using average of 5-minute prices in that interval
- In USA, CAISO, NYISO, PJM and USA have 5 minute despatch and scheduling

: Comparison of Despatch Interval and Settlement Interval across USA ISOs

RTO / ISO	Despatch Interval	Settlement Interval
CAISO	5-minute	5-minute
ISO - NE	5-minute	Hourly average
MISO	5-minute	Hourly average
NYISO	5-minute	5-minute
PJM	5-minute	Hourly average
SPP	5-minute	5-minute

Proposed Capacity Building:

- Market Design for implementing 5 minute Trading, Despatch & Scheduling

International Experience:

- Understanding of Overall Market Design of Australia/US Market Design with High Resolution
- Trading Systems in high resolution market
- IT Integration and appropriate facilitative mechanisms
- Real-time/Balancing Markets
- Scheduling and Despatch with High Resolution