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 (44 वीं)/2019/2229-2323 दिनाँक : 08 मार्च, 2019
No. NRPC/ Comml/ 209/ RPC (44th)/2019/ Dated: 08th March, 2019

सेवा में / To,

उ.क्षे.वि.स. और तकनीकी समन्वय समिति के सभी सदस्य (संलग्न सूचीनुसार)
Members of NRPC and TCC (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 44 वीं तथा तकनीकी समंवय उप-समिति की 41 वीं बैठक की कार्यसूची ।

Subject: 44th meeting of Northern Regional Power Committee and 41st meeting of TCC– Agenda.

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 44 वीं बैठक 19 मार्च, 2019 को 1000 बजे होटल रैडिसन ब्लू, उदयपुर, राजस्थान में आयोजित की जाएगी । एन आर पी सी की बैठक से पहले तकनीकी समन्वय उप-समिति की 41 वीं बैठक दिनांक 18 मार्च, 2019 को 1000 बजे उसी स्थान पर आयोजित होगी ।

बैठकों की कार्यसूची उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट, www.nrpc.gov.in पर उपलब्ध है । इसे आप डाउनलोड कर सकते है । आप से अनुरोध है कि बैठक में सम्मिलित होकर अनुग्रहीत करें । कृपया अपनी सहभागिता की पुष्टि नोडल अधिकारियों को करें ।

The 44th meeting of Northern Regional Power Committee (NRPC) will be held at 1000 Hrs on 19th March, 2019 at Hotel Radisson Blu, Udaipur, Rajasthan. NRPC meeting shall be preceded by 41st meeting of Technical Coordination Sub-committee (TCC) at 1000 Hrs on 18th March, 2019 at the same venue. Agenda for the meetings is attached herewith.

A copy of the agenda for the meetings is available on NRPC website, www.nrpc.gov.in. The same may kindly be downloaded. You are requested to make it convenient to attend the meeting. Kindly confirm your participation to the nodal officers.

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
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36. CEO, POSOCO, New Delhi-110016, (Fax-011-26560190)
37. GM, NRLDC, New Delhi-110016, (Fax-011-26853082)
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42. Sh. Sanjay Banga, VP, Tata power-DDL, New Delhi (Fax: 011-27468042)
43. Sh. Satish Jindal, Director and CEO (Trading), JSW Energy Ltd., New Delhi (Fax- 48178740)
44. Sh. Jaydeb Nanda, COO, Adani Power Rajasthan Ltd., Ahmedabad-380006 (Fax No- 079-25557176)
45. Sh. Anil Kumar Garg, General Manager(BD), AD Hydro Power Ltd., Noida-201301, (Fax: 0120-4323271/4278772)
46. Sh. C.N. Singh, COO, Talwandi Sabo Power Ltd. Distt: Mansa, Punjab-151302(Fax: 01659-248083)
47. Sh. R.S. Sharma, MD, Lalitpur Power generation Company Ltd., Noida-201301(Fax: 0120-4045100/555, 2543939/40)
48. Sh. Ajit Kumar, Director (Commercial & Operations), PTC India Ltd., New Delhi (Fax- 011-41659144,41659145)
49. Sh. Athar Sahab, CEO, Nabha Power Limited, (Fax: 01762277251 / 01724646802)(email: atharsahab@larsentoubro.com)
50. Prayagraj Power Generation Co. Ltd.
51. Navjeet Singh Kalsi, MD, Manikaran Power Ltd., Dwarka, New Delhi-110075(Fax:-011-45768467)

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38. Director (Technical) JSW Energy Ltd., New Delhi (Fax: 48178740)
39. Station Head, Adani Power Rajasthan Ltd., Ahmedabad-380006 (Fax No- 079-25557176)
40. Addl. GM, Tata Power-DDL, New Delhi (Fax: 011-27468042)
41. General Manager(BD), AD Hydro Power Ltd., Noida-201301, (Fax: 0120-4323271/4278772)
42. GM(Corporate Affairs), Talwandi Sabo Power Ltd. Distt: Mansa, Punjab-151302(Fax: 01659-248083)
43. President, Lalitpur Power generation Company Ltd., Noida-201301(Fax: 0120-4045100/555, 2543939/40)
44. ED (Marketing), PTC India Ltd., New Delhi (Fax- 011-41659144,41659145)
45. Head (O&M), Nabha Power Limited, (Fax: 01762277251 / 01724646802)(email: ravindersingh.lall@larsentoubro.com)
46. Prayagraj Power Generation Co. Ltd.
47. Director, Manikaran Power Ltd., Dwarka, New Delhi-110075(Fax:-011-45768467)

Special Invitee:

i. Member Secretary, WRPC, Mumbai-400 093.
ii. Member Secretary, SRPC, Bangalore-560 009
iii. Member Secretary, ERPC, Kolkata-700 033.
iv. Member Secretary, NERPC, Shillong-793 003.

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Annexures

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उत्तर क्षेत्रीय विद्युत समिति

NORTHERN REGIONAL POWER COMMITTEE

AGENDA

FOR

41st MEETING OF TECHNICAL COORDINATION SUB-COMMITTEE

&

44th MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of TCC meeting: 10:00 Hrs. on 18.03.2019

Time & Date of NRPC meeting: 10.00 Hrs. on 19.03.2019

Venue: Hotel Radisson Blu, Udaipur, Rajasthan

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 40th meeting of TCC

Minutes of 40th meeting of TCC held on 29th October, 2018, were circulated vide letter No. NRPC/Comml/209/RPC(43rd)/2019/1066-1113 dated 06th February,2019.

POWERGRID vide letter dated 28.02.2019 (enclosed as **Annexure – A.1.1**) has requested to amend the point C 28.2 as follow:

C28.2 Representative of POWERGRID informed that availability of communication equipment at Kishanganga to be provided by NHPC for integration of communication equipment installed at POWERGRID, Wagoora sub-station.

Members may kindly discuss and confirm the minutes.

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 43rd meeting of NRPC

Minutes of 43rd meeting of NRPC held on 30th October, 2018, were circulated vide letter No. NRPC/Comml/209/RPC(43rd)/2019/1066-1113 dated 06th February,2019.

POWERGRID vide letter dated 28.02.2019 (enclosed as **Annexure - A.1.1**) has requested to amend the point C 28.2 as follow:

C28.2 Representative of POWERGRID informed that availability of communication equipment at Kishanganga to be provided by NHPC for integration of communication equipment installed at POWERGRID, Wagoora sub-station.

Members may kindly confirm the minutes.

B. OPERATIONAL ISSUES

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

B.1.1 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 end in the logic of SPS so as to ensure more robust and reliable operation of the scheme.

B.1.1 In 149th OCC , it was also informed that a report has to be submitted to CERC on the status of implementation of the SPS scheme. Accordingly, CERC has been intimated the current status of implementation and CERC has also been informed that a mock testing for the revised 765 kV Agra- Gwalior SPS will be carried out after integration of additional 1000 MW load shedding.

B.1.2 In 40th TCC & 43rd NRPC meetings, POWERGRID was again requested to implement the revised SPS scheme by Dec, 18, submit the implemented logic to NRPC/NRLDC and carry out mock testing of revised SPS scheme in January, 2019.

B.1.3 In the 154th OCC meeting, POWERGRID informed that modifications related to CB ON/OFF status have been completed at both Agra and Gwalior end. It was also intimated that DTPC installation has been completed and the end to end testing has also been done for 20 links out of 21. It was informed that end to end testing was remaining only for Bhiwadi-Heerapura-Bhilwara-Chittorgarh link and requested that the concerned states should terminate the links at the designated feeder on which the load shedding is required to be done.

B.1.4 In 155th OCC meeting, POWERGRID informed that the cable has already been laid down to the Protection panel in all substations and only the terminal connection needs to be done which has to be done by the concerned utilities. Once the terminal connections are done, mock testing of the scheme can be done. Accordingly, Delhi, Haryana, Rajasthan, Punjab and UP were advised to expedite. POWERGRID was requested to coordinate with nodal officers of the concerned states for early termination of the links at their end.

B.1.5 In 156th OCC meeting, it was informed that only Delhi has confirmed the termination of tripping wire. POWERGRID was advised to pursue with the concerned utilities and get the work done at the earliest so that mock testing of the scheme may be conducted in the February 2019.

POWERGRID may kindly apprise the Committee about the status of implementation of the scheme.

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

B.2.1 **38th TCC and 41st NRPC** approved the proposal of getting CPRI to conduct the capacitor requirement study for NR at 11/33 kV level so as to obtain more practical requirement of capacitor in the region.

B.2.2 **39th TCC and 42nd NRPC** approved the Techno Commercial offer of CPRI at **Rs. 32 lakhs (Rs. 20 lakhs for previous study and Rs. 12 lakhs for additional assignment) excluding taxes** for conducting the capacitor study. In the meeting the format for data submission was shared with the members and they were requested to ensure timely submission of the data so that the study may be carried out in the stipulated time frame.

B.2.3 In the **150th OCC meeting**, members expressed concerns on the nature of the format and submitted that the format being lengthy would require some time for better understanding of the format and submission of data accordingly.

B.2.4 To address the concerns of the members of OCC forum, in the **151st OCC meeting**, representative of CPRI made a detailed presentation explaining the format in the meeting and based on the inputs received from the members, the format has been revised and has already been sent to the respective SLDC's through e-mail dated 24.09.2018. CPRI has also shared a video of the presentation explaining the format which can be viewed on Youtube at https://youtu.be/QTXx7owPF3g. Members were also requested to initially fill the data format for any one 220 kV or 132 kV substation and send it to CPRI (manoharsingh@cpri.in) to check its suitability for utilization in carrying out the study and further action.

B.2.5 In the subsequent **OCC meetings**, all the utilities are being regularly requested for submission of data to CPRI. The sample data has only been received from Delhi, Haryana and HP. After analyzing the sample data, CPRI has reverted to the concerned citing anomalies in the sample data submitted to them for rectification. Since then, NO utility except Delhi has submitted the rectified sample data to CPRI.

B.2.6 The issue of non-submission of data was also raised in the 40th TCC and 43rd NRPC Meeting and since then it has been months without any significant progress made to that effect.

B.2.7 In 157th OCC, it was decided that all utilities will submit the data to CPRI in the required format by 30th March, 2019.Else, manpower would be engaged to collect the data for which charges has to be paid by the concerned utility.

Members are requested to kindly deliberate for early submission of data by the utilities.

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

B.3.1 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-B.3.1)*****.** It was also agreed that these reactors shall be provided by the owner of the substations.

B.3.2 37th TCC and 40th NRPC meeting approved the reactors as agreed in the 39th meeting of SCPSPNR.

B.3.3 The updated status of commissioning of these reactors is placed below:

a) POWERGRID:

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

b) PSTCL:

PSTCL representative stated that for 400 kV bus reactor at Dhuri substation and 220 kV bus reactors at Dhuri and Nakodar substations, the Technical bids has already been opened and Price bids were put on hold due to pending PSDF approval.

As per the conditions of PSDF funding, it was decided that the order should be placed only after securing the approval for PSDF funding.

However, the delay in obtaining the PSDF funding approval has delayed the tendering process and the Bidders were now refusing to extend their Bid validity which could lead to jeopardizing the whole process only because of delay in obtaining approval of PSDF funding.

In 157th OCC : PSTCL informed that they are going for retendering.

c) Uttarakhand:

125 MVAr reactors at Kashipur: Technical bids have been opened and are under evaluation.

d) DTL:

The updated status of the reactors as received from DTL is placed below. DTL was requested to pre-pone the commissioning schedule before the onset of winter of 2020.

S.No.	Bus Name	Voltage level (kV)	Reactor (MVAR)	Plg. Status
1	Peeragarhi	220	1x50	PR No 1100002017 Raised.
2	Mundka	400	1x125	Scheme is being placed before BOD,DTL for approval
		220	1x25	
3	Harsh Vihar	220	2x50	Board premble sent for financial vetting & approval. Scheme shall be placed before BOD,DTL.
4	Electric Lane	220	1x50	Feasibility report received from SS&LM division and site revisited. Accordingly,the Scheme is under preparation.
5	Bamnauli	220	2x25	Under financial concurrence
6	Indraprastha	220	2x25	Under financial concurrence

TOTAL	**450**	

e) **Rajasthan:**

Item	**Background**	**Status**
3 Nos. each of 25MVAR (220KV) reactors for Akal, Bikaner & Suratgarh.	DPR submitted for PSDF funding on 27.04.2018. Reply to the observations of NLDC submitted on 28.07.2018	Approved in the Monitoring Committee of PSDF. Minutes of the Monitoring Committee meeting to be issued.
1 No. of 25 MVAR (220KV) reactor for Barmer & 125 MVAR (400KV) reactor for Jodhpur, included in 450 MVAR (13x25+1x125MVAR) proposal	Revised DPR for 450 MVAR Reactor after separating STATCOM was submitted vide letter dtd. 12.10.2018 to POSOCO for approval.	Clarifications has been sought by Techno-Economic Sub Group of PSDF from Rajasthan.

POWERGRID, DTL, PTCUL, Rajasthan and PSTCL may kindly update the status.

B.4 Database of protection settings

B.4.1 As a follow up of one of the recommendations of Enquiry Committee headed by Chairperson, CEA on grid disturbances that took place on 30th and 31st July 2012, Ministry of Power had constituted a 'Task Force on Power System Analysis under Contingencies' in December 2012. The Task Force had submitted its report in August 2013. In a meeting taken by Secretary (Power), GoI on 11.03.2014, it was decided that the report be given wide circulation and its recommendations be implemented in a time bound manner.

B.4.2 Based on the recommendations of the Task Force, it was decided that data regarding settings of relays shall be compiled by the CTU and STUs in their respective network and furnished to RLDC and SLDC respectively with a copy to RPC for maintaining the database. The database was to be kept updated and verified during the audit.

B.4.3 In the 35th TCC/39th NRPC meeting held on 1st/2nd May, 2017, TCC expressed their concern over the non-submission of protection database by the utilities and recommended for engaging a third party for development of Protection database with funding through PSDF in line with ERPC and SRPC.

B.4.4 Chairperson, NRPC, authorized Member Secretary, NRPC to carry out following activities:

i. Formation of group for finalization of detail scope of work of the Project.

ii. Submission of proposal for financing the Project through Power System Development fund (PSDF).

iii. Opening of a separate account in the name of 'NRPC Protection Database Fund' for receiving the grant from PSDF for the Project.

iv. Carry out e-tendering process including tender publication, opening, evaluation etc. for selecting contractor for implementing the scheme based on scope of work of the Project finalized by the group.

B.4.5 Based on the discussions held in 34th PSC meeting, a core committee was formed to define the comprehensive Scope of the project comprising members from the utilities of NR. First meeting of the group for defining the scope of the project was held on 01.02.2018 and based on the inputs received from the members, Bid Document has been prepared by the NRPC Secretariat.

B.4.6 NRPC Secretariat has also submitted the DPR of the project for PSDF funding based on the draft bidding document. The proposal of NRPC was scrutinized by the Techno-Economic Sub Group and further examined by Appraisal Committee as well as Monitoring Committee.

B.4.7 Appraisal Committee as well as Monitoring Committee has recommended the proposal for the grant of from PSDF funding and also qualified proposal from 100% funding through PSDF. Subsequently, grant from PSDF towards Development of Protection Data Base Management System was sanctioned vide NLDC letter dated 01.08.2018.

B.4.8 In pursuance of the above, tender was published on Central Public Procurement (CPP) Portal of Govt. of India and NRPC website on 30.08.2018 and last date for receipt of bid was 15.10.2018 up to 14.00 hrs. The technical bid was to be opened on 16.10.2018 at 15.00 hrs. However, only 2 bids were received at the time of bid opening. Hence, retendering was done. Subsequently after retendering, bid opening was held on 15.11.2018 at NRPC Secretariat, New Delhi. The total three no. of bids were received at the time of bid opening but only one bid was found responsive as per the pre-bid qualifications. In view of the above, agian retendering was carried out to ensure healthy competition. The last date for receipt of bid was 10.01.2019 up to 13.00hrs. The technical bid opened on 11.01.2019 at 14.30 hrs wherein 2 bids were received and both have been admitted for further evaluation.

This is for the kind information of the members.

B.5 LVRT compliance by wind generation

B.5.1 The issue of non-compliance of the Technical Standards for Connectivity to the Grid, (Amendment), regulations, 2012 by most of the wind generators in Rajasthan was discussed in the 38th TCC and 41st NRPC meeting and in 40th TCC and 43rd NRPC meeting

B.5.2 NRPC decided that the must run status of the WTGs should only be granted to LVRT compliant WTGS and non compliant WTGS shall not be scheduled and it should be the

responsibility of state SLDC (Rajasthan SLDC in this case) for the implementation of the same. It was also decided that in future all the constituent States shall not give connectivity to the WTGs unless this compliance was fully met.

B.5.3 Rajasthan SLDC was also advised to issue a notice to all the LVRT non-compliant wind generator providing them with one months' time for compliance to LVRT, failing which SLDC would be constrained to deny scheduling to the noncompliant wind generators.

B.5.4 Rajasthan SLDC was also advised to issue a notice to all the LVRT non-compliant wind generator providing them with one month time for compliance to LVRT, failing which SLDC would be constrained to deny scheduling to the non compliant wind generators.

B.5.5 In 145th OCC meeting, representative of RVPN informed about the office memorandum from MNRE ***(Annexure B.5.1).*** In the said OM, the following has been mentioned:

"Concerned WTG manufactures may apply for LVRT testing to any internationally accredited testing body or NATIONAL institute of WIND ENERGY by 15.3.2018, which should include the following:

i An affidavit that the manufacturer would comply with CEA Technical standards for connectivity to the grid.

ii A bank guarantee of Rs 1 crore per model, which would be returned on producing the compliance certificate for LVRT and other technical standards as stipulated by CEA."

B.5.6 In the **147th OCC meeting**, MS, NRPC stated that all the wind generators shall be LVRT compliant for which retro fitment needs to be done & it shall be responsibility of Rajasthan SLDC to get it enforced. Rajasthan was requested to comply with the decision of 38th TCC/41st NRPC meeting & write letters to wind generators communicating the decision of NRPC.

B.5.7 In the **148th OCC meeting,** it was stated that the time period for applying for LVRT testing to any internationally accredited testing body or NIWE stands expired on 15.3.2018. He added that notice should be issued to all Wind generators who have not done the needful. Rajasthan SLDC representative has intimated the same has been issued

B.5.8 As per 38th TCC and 41st NRPC decision, SLDC should not schedule the wind generators who are not LVRT complaint. Also he added that due to LVRT non compliance on part of the wind generators has lead to a near voltage collapse instances but luckily the grid survived.

B.5.9 A meeting of wind turbine manufacturers was held on 05.07.2018 to sort out the issue of LVRT and to get its compliance expeditiously. Further, the assessment of manufacturer wise non complied WTG has been identified and accordingly 638 generators are LVRT compliant & 106 generators do not require LVRT as per regulation. 2641 generators need to be LVRT compliant. The capacity of generators that are non – compliant is 3019 MW. MS, NRPC also informed that the generators will have to make arrangements for cost of installing LVRT.

B.5.10 In the 40th TCC and 43rd NRPC meeting, it was noted 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.5.11 In the 43rd NRPC meeting, Rajasthan SLDC was advised to file a petition in SERC stating the LVRT non-compliance by WTGs. In 54th OCC meeting, representative of Rajasthan SLDC informed that petition to be filled in SERC was put up for approval; but their management decided that matter may be taken up by the STU in view of the provision of B.3 of CEA (Technical Standards for Connectivity to the Grid) Amendment Regulations, 2013.

B.5.12 On 6th February 2019, CEA Technical Standards for connectivity to the Grid (amendment) regulations 2019 has been notified. As per the amended regulation, wind generating stations, wind-solar PV hybrid systems, energy storage systems and stations using inverters, getting commissioned after six months from the commencement of amended regulation, are required to have frequency response capability (generating stations with installed capacity of more than 10 MW connected to 33 kV & above), LVRT facility, HVRT facility and SCADA facility (Generating stations of 500 MW & above capacity). For remaining generating stations, earlier regulation will be applicable.

Members may kindly deliberate.

B.6 Augmentation of 1 x 1500 MVA, 765/400 kV ICT (3rd) at Moga S/s and Provision of 125 MVAr bus reactors each at Jalandhar & Patiala

B.6.1 In the 2nd meeting of Northern Region Standing Committee on Transmission (NRSCT) held on 13.11.2018, the augmentation of 1 x 1500 MVA, 765/ 400 kV ICT (3rd) at Moga S/s considering outdoor 765 kV & 400 kV GIS switchgear and GIB interconnections (in place of AIS) was approved due to space constraints at the substation.

B.6.2 Similarly, in view of the space constraints at Patiala and Jalandhar substations of POWERGRID, the 125 MVAr reactor to be installed at each substation by providing GIB interconnections along with GIS switchgear instead of AIS switchgear was also approved.

Members may kindly deliberate.

B.7 Issue of evacuation constraints in Chhabra, Kalisindh & Kawai Generation Complex

B.7.1 The issue of evacuation constraints in Chhabra, Kalisindh & Kawai Generation Complex of approx. 4840 MW due to single 315 MVA, 400/220 kV ICT each at Chhabra and Kalisindh has been continuously raised in various NRPC meetings and Standing Committee Meetings of NR.

S. No.	Generating Plant	Installed capacity in MW	
1.	Kalisindh	2 ×600	1200
2.	Kawai	2 × 660	1320
3.	Chhabra TPS	4 × 250	1000
4.	Chhabra SCTPS	2 × 660	1320
TOTAL			4840

B.7.2 Accordingly, the matter was discussed in 1st meeting of NRSCT and a sub-committee of NRSCT was formed to explore the possibility of creating a new 400kV GSS of RVPN in this corridor in place of additional ICT each at Chhabra and Kalisindh.

B.7.3 The sub-committee has presented their proposals in the 2nd NRSCT meeting held on 13.11.2018 wherein it was decided that the following transmission system would be implemented by RVPNL as intra-state Transmission System:

a) 2 x 500 MVA, 400/220 kV Power Transformers at existing 765kV GSS Anta (Distt. Kota).

b) 2 x 160MVA, 220/132kV Power Transformers at proposed 220kV GSS Sangod (Distt. Kota).

c) Anta (765) - Baran (220) 220kV D/C line - 6 km.

d) Anta (765)-Sangod (220)(Proposed) 220kV D/C line - 30km

e) Extension of existing Dahara (220)-Anta (NTPC) 220kV S/C line up to Anta (765) 220kV S/C line - 44km

Members may kindly deliberate.

B.8 Downstream network by State Utilities from ISTS Stations (Agenda by POWERGRID)

B.8.1 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 bays	Commissioning status of S/s / Transformer	Planned 220 kV system and Implementation Status
1	400/220 kV, 3x315 MVA Samba	2 nos. bays utilized under ISTS.	Commissioned (1st & 2nd –Mar'13 3rd –Oct'16)	• LILO of 220 kV Bishnha – Hiranagar D/c line. Target completion - Nov, 2019.

S. No.	Substation	Downstream network bays	Commissioning status of S/s / Transformer	Planned 220 kV system and Implementation Status
		Balance 4 nos to be utilized	Bays-Mar'13	• 220 kV D/c Samba (PG) – Samba (JKPDD) approved in 1st NRSCT. **PDD, J&K to update.**
2	400/220kV, 2x315 MVA New Wanpoh	6 Nos. of 220 kV bays to be utilized	Commissioned in Jul'14 Bays-Jul'14	• 220 kV New Wanpoh - Mirbazar D/c line. Target completion – March, 2019. • 220 kV Alusteng - New Wanpoh Line. Target completion - March, 2019. **PDD, J&K to update.**
3	400/220 kV, 2x315 MVA Parbati Pooling Station (Banala)	2 Nos. of 220 kV bays to be utilized.	Commissioned in Dec'17	• 220 kV Charor- Banala D/c line (18 km). Target completion –Dec'18. **HPSEBL to update.**
4	400/220 kV, 2x500 MVA Kurukshetra (GIS)	8 nos. of 220 kV bays to be utilized	Commissioned in Mar'17.	• 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). Target completion – 31.12.2018. • 220kV D/c Bhadson (Kurukshetra) – Salempur with HTLS conductor equivalent to twin moose. Target completion - 31.03.2020. **HVPNL to update.**
5	400/220 kV, 2x500 MVA Bagpat GIS	8 nos. of 220 kV Downstream lines commissioned. Balance 3 Nos. of 220 kV bays to be utilized.	Commissioned in Mar/Jun'16	• Bagpat(PG) - Modipuram-II 220 kV D/c line. Target completion - Jan'20. • LILO of 220 kV S/c Muradnagar II –Baghpat (PG) at Baghpat SS. Target completion- Mar'19 **UPPTCL to update.**

S. No.	Substation	Downstream network bays	Commissioning status of S/s / Transformer	Planned 220 kV system and Implementation Status
6	400/220 kV, 2x315 MVA Saharanpur	All 6 nos. 220 kV bays utilised.	Commissioned in May'16	• 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). **UPPTCL to update.**
7	400/220 kV, 2x315 MVA Dehradun	Out of 6 bays, only two bays used. Balance 4 bays to be utilised.	Commissioned in Jan'17	• 220 kV Dehradun-Jhajra line. Target completion: Nov, 2021 **PTCUL to update.**
8	400/220 kV, 2x315 MVA Sohawal	4 Nos 220 kV bays utilized. 2 Nos 220 kV bays to be utilized.	Commissioned in Jun'12	• 220 kV D/C Sohawal (PG) – New Tanda line. Target completion- Dec, 2018. **UPPTCL to update.**
9	Shahjahanpur, 2x315 MVA 400/220 kV	Partially utilized. Balance 5 Nos. of 220 kV bays to be utilized.	Commissioned in Jun/Sep'14	• 220 kV D/C Shajahnapur (PG) - Azizpur D/C line. Target completion - Sept, 2019. • 220 kV D/C Shahajahanpur (PG) - Gola Lakhimpur line. Target completion - Sep, 2019. **UPPTCL to update.**
10	02 nos. bays at Moga	Partially utilized. Balance 2 nos. of 220kV bays to be utilized.	Commissioned in Jun'15.	• Moga–Mehalkalan 220 kV D/c line. Target completion - Dec'18. **PSTCL to update.**
11	Hamirpur 400/220 kV 2x 315 MVA Sub-station (Augmentation by 3x105 MVA ICT)	2 nos. bays utilized under ISTS. Balance 6 nos to be utilized	1st-Dec'13, 2nd – Mar'14 & 3rd-Mar'19. 4 bays-Dec'13, 2 bays-Mar'14 2 bays-Mar'19	• 220 kV D/C Hamirpur-Dehan line. Target completion - Apr, 2020. **HPSEBL to update.**

Members may kindly update the status and expedite the downstream system.

B.8.2 **Establishment of new 400/220 kV substations in Northern Region:**

Sl. No.	**Name of Substation**	**MVA Capacity**	**Expected Schedule**	**Downstream connectivity furnished by States in 40th SCPSPNR**
1	400/220kV Dwarka-I GIS (8 nos. of 220kV bays)	4x 500	Sep'19	**DTL to update.**
2	220/66kV Chandigarh GIS (8 nos. of 66kV bays)	2x 160	Jun'19	**Chandigarh to update.**
3	400/220kV Jauljivi GIS Out of these 8 nos. 220kV Line Bays, 4 nos. (Pithoragath-2, & Dhauliganga-2) would be used by the lines being constructed by POWERGRID and balance 4 nos. (Almora-2, Jauljivi-2) bays would be used by the lines being constructed by PTCUL.	2x315	Dec'2019	• 220kV Almora- Jauljivi line. • 220kV Brammah-Jauljivi line **PTCUL to update.**
4	400/220kV Sohna Road Sub-station (TBCB) (8 nos. of 220kV bays)	2x500	May'19	• LILO of both circuits of 220kV D/c Sector-69 - Roj Ka Meo line at 400kV Sohna Road. • LILO of both circuits of 220kV D/c Badshahpur-Sec77 line at 400kV Sohna Road. **HVPNL to update.**
5	400/220kV Prithla Sub-station (TBCB) (8 nos. of 220kV bays)	2x500	May'19	• LILO of existing 220kV Palwal–Rangala Rajpur D/c line at Prithla. Target completion - March 2020. • 220 kV D/c Prithla (400) –Sector-78, Faridabad S/s.

Sl. No.	Name of Substation	MVA Capacity	Expected Schedule	Downstream connectivity furnished by States in 40th SCPSPNR
				Target completion - July 2020. **HVPNL to update.**
6	400/220kV Kadarpur Sub-station (TBCB) (8 nos. of 220kV bays)	2x500	May'19	M/s Sterlite has been asked to change the orientation of LILO in order to ensure the proper emanation of 220 kV line. **HVPNL to update.**

States are requested to kindly update the details of planned downstream network along with implementation status for utilisation of the ISTS substation.

B.9 Certification of Non-ISTS line for inclusion in PoC Charges

B.9.1 Central Electricity Regulatory Commission (Sharing of Inter State Transmission Charges and Losses) (Third Amendment) Regulations, 2015 provides as under:

> *"Certification of non-ISTS lines carrying inter-State power, which were not approved by the RPCs on the date of notification of the Central Electricity Regulatory Commission (Sharing of Transmission Charges and Losses) Regulations, 2009, shall be done on the basis of load flow studies. For this purpose, STU shall put up proposal to the respective RPC Secretariat for approval. RPC Secretariat, in consultation with RLDC, using WebNet Software would examine the proposal. The results of the load flow studies and participation factor indicating flow of Inter State power on these lines shall be used to compute the percentage of usage of these lines as inter State transmission. The software in the considered scenario will give percentage of usage of these lines by home State and other than home State. For testing the usage, tariff of similar ISTS line may be used. The tariff of the line will also be allocated by software to the home State and other than home State. Based on percentage usage of ISTS in base case, RPC will approve whether the particular State line is being used as ISTS or not. Concerned STU will submit asset-wise tariff. If asset wise tariff is not available, STU will file petition before the Commission for approval of tariff of such lines. The tariff in respect of these lines shall be computed based on Approved ARR and it shall be allocated to lines of different voltage levels and configurations on the basis of methodology which is being done for ISTS lines."*

B.9.2 Accordingly, a group was constituted to recommend a methodology for the study to be conducted by NRPC Secretariat, in consultation with RLDC every year to calculate utilization of these lines for inclusion in PoC charges.. As per the recommendations of the

group, certification of state owned transmission lines (Non ISTS) carrying ISTS power will be valid for 01 year and the claims/ re-claims for certification for the next financial year will have to be submitted by the **end of December of every year**.

B.9.3 Till date the claims/ re-claims for certification of Non-ISTS lines carrying ISTS power for inclusion in PoC charges for FY 2019-20 has not been received by this office from any of the utility, **except Rajastan.**

B.9.4 A letter (***Annexure-B.9.1***) in this respect was also issued to all the utilities on 22.01.2019 informing about the non-submission of data.

All the utilities are requested to submit the claims/ re-claims for certification for FY 2019-20 by 31.03.2019 after which no claims for certifications shall be entertained by this office.

B.9.5 In the 156th OCC meeting, HPPTCL has brought an agenda item seeking to amend the methodology for certification of non-ISTS lines for carrying ISTS power by considering the scenario of all the 04 quarters of previous year. In the meeting HPPTCL was advised to sit with NRLDC and work out a case study of HP for FY 2018-19 considering the data for all 04 quarters of 2018-19 and to present its finding to a committee to be formulated, if required, to review the already approved methodology.

NRLDC and HPPTCL may update.

B.10 Phase nomenclature mismatch between BBMB and some interconnected stations of other power utilities

B.10.1 In the 34th PSC meeting, the issue of mismatch of phase sequence nomenclature of BBMB system interconnected with other utilities was highlighted.

B.10.2 The issue was further deliberated in the 138th OCC meeting held on 23.08.2017, wherein it was observed that nomenclature of phases at BBMB end has inadvertently been marked as:

Phase of the grid	Corresponding nomenclature of the phase at BBMB end
R Phase	B Phase
Y Phase	R Phase
B Phase	Y Phase

B.10.3 To resolve the issue, in the 38th TCC / 41st NRPC meeting it was decided that a committee would be formed to comprising of BBMB constituent states, utilities with which BBMB system is interconnected, NRPC Sectt and POWERGRID.

B.10.4 BBMB drew a draft action plan **(**Annexure B.8.1 of agenda of 40th TCC/43rd NRPC meetings**)** which was duly deliberated by the Committee in its 1st meeting held on 04.06.18

and was circulated to all the concerned utilities for their comments. The execution of the action plan is tentatively planned during month of November-December, 2018.

B.10.5 HPSEB and PSTCL are in agreement with the action plan proposed by BBMB. However, NTPC and POWERGRID had some comments on the same. BBMB has agreed with the comments from NTPC and has decided to modify their action plan as per the demands of NTPC.

B.10.6 The reply of BBMB vis-à-vis the comments of POWERGRID were deliberated in the 151st OCC meeting wherein members were of the view that reply of BBMB was generally in order. However, POWERGRID representative stated that the matter pertains with NR-I and NR-II region of POWERGRID and final decision regarding the same is to be taken up at the level Executive Directors of respective regions.

B.10.7 Executive Director of NR-I and NR-II were requested to provide their concurrence to the BBMB action plan vide letter dated 06.10.2018 **(**Annexure B.8.2 of agenda of 40th TCC/43rd NRPC meetings**)**, so as to resolve the issue within the time frame as stipulated by NRPC.

POWERGRID & BBMB may kindly update the status.

B.11 Follow up of Major Decisions of NRPC.

Sl. 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

Sl. No.	Name of the Project /Decision taken	Meeting in which Approval was granted/ Decision was taken	Updated Status
			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. In 37th CSC meeting it was decided 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 CSE 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 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	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; **Nathpa-Jhakri (1x80 MVAr):** To be commissioned by **December 2018**. **Chamera-I (1x125 MVAr):** Charged on **25 August 2018**

Sl. No.	Name of the Project /Decision taken	Meeting in which Approval was granted/ Decision was taken	Updated Status
		to Control Over Voltages	**<u>Parbati-II (1x125 MVAr) and Parbati-III (1x80 MVAr):</u>** NHPC informed that there is no space at Parbati-III and as such reactors will be installed at Parbati-II. 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. Kishenganga – Wagoora 220 kV D/c	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. The revised schedule was: • Kishenganga – Wagoora 220kVD/c line - (expected by **November 2018**)
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.
5.	Fiber Optic based communication system	18th NRPC meeting held on 27th	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-

Sl. No.	Name of the Project /Decision taken	Meeting in which Approval was granted/ Decision was taken	Updated Status
	in NR and Additional OPGW connectivity in Northern Region under fiber optic expansion project	November, 2010 and 28th NRPC meeting held in 22nd March, 2013	II link (10kms) could not be completed due to severe 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. **For PG NR-II links:POWERGRID NR-II may update the status**
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	-
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.
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.

Sl. No.	Name of the Project /Decision taken	Meeting in which Approval was granted/ Decision was taken	Updated Status
			PTCUL: - DPR finalization under process **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.11.1 **Planning, Procurement & Deployment of Emergency Restoration System (ERS) – (Agenda by BBMB)**

In the 40th TCC meeting and 43rd NRPC meeting, BBMB representatives stated that issue regarding procurement of Emergency Restoration System (ERS) by BBMB will be taken up in the Power Sub-Committee meeting of BBMB with the partner States.

Accordingly the issue was taken up in 134th Power Sub-Committee meeting dated 15.11.2018 wherein it was decided that BBMB shall make suitable arrangement for using the ERS systems of respective partner States in order to avoid unnecessary additional burden on the partner States and such arrangement shall be mutually decided by CE/TS, BBMB and concerned Chief Engineers of partner States. The arrangement accordingly would be intimated to NRPC.

In 155th OCC meeting, BBMB informed that decision has been taken in 134th Power Sub-Committee that partner States will provide ERS to BBMB, whenever needed. However Member Secretary, NRPC stated that if such a stance has been taken by the partner states, the partner states shall procure 1 additional set each, to be provided to BBMB whenever they require.

Accordingly it is proposed that matter may be deliberated in NRPC meeting for procurement of one additional set each of ERS by the partner States of BBMB, for use of BBMB to meet any emergency.

B.12 Connectivity to Naitwar Mori HEP (NMHEP) (2X30MW) of SJVN Ltd. in Uttarakhand (Agenda by SJVN)

B.12.1 CTU vide their office letters dated 16.10.2017 & 20.12.2018, has issued the Grant of Connectivity & its revision for NMHEP, wherein it is mentioned that the Tripartite Transmission Agreement is required to be signed within 30 days among SJVN, PTCUL and CTU, failing which the granted connectivity may be liable for revocation.

B.12.2 Further, CTU vide their office letters dated 20.12.2018 & 04.01.2019, has also Granted the Long Term Access (LTA) & its revision for NMHEP, wherein it is also mentioned that the LTA applicant shall enter into tripartite Long Term Access Agreement (LTAA) with CTU and PTCUL within 30 days of the LTA intimation, in default of which the LTA may be liable for revocation.

B.12.3 In compliance of aforesaid timelines, the Tripartite Transmission Agreement (TTA) & Tripartite LTA Agreement (TLTAA) have been signed between SJVN & CTU on 16.01.2019. However, PTCUL has not turned up for signing of same in spite of request made by SJVN & CTU. SJVN vide letter dated 31.01.2019 has again requested PTCUL to sign the Tripartite Transmission TA & Tripartite LTA Agreement, already signed by CTU & SJVN.

B.12.4 Further, as per the minutes of meeting of 9th & 10th Meeting of Northern Region constituents regarding Connectivity / LTA Applications held on 30.05.2016 & 30.05.2017, SJVN is required to sign Implementation Agreement with PTCUL in line with 4th amendment to CERC (IEGC) Regulations.

B.12.5 As per detailed procedure of CERC Connectivity Regulations and sr. no. 2 of Note of FORMAT CON-3 (Intimation for grant of Connectivity) issued by CTU on 16.10.2017, the Bank Guarantee should be made in favour of PTCUL within one month of signing of Transmission Agreement. On signing of Tripartite Transmission Agreement (TTA) & Tripartite LTA Agreement (TLTAA) by PTCUL, SJVN will provide the Bank Guarantee (BG) in favour of PTCUL.

PTCUL is requested to sign Tripartite Transmission Agreement, Tripartite LTA Agreement & Implementation Agreement so that the construction of associated transmission system of NMHEP could be expedited to match with the COD of NMHEP.

Members may kindly deliberate.

B.13 Training Programme/Workshop on Protection system Auditors from CPRI.

B.13.1. Protection is one of the key operational aspects of Power system. The revision in the protection settings/schemes after modification of network topologies is essential for reliable operations of the Grid. Hence, it is important that Protection system engineers are well educated and trained to carry out Protection Audit. It was proposed to organize Training Programme/Workshop on Protection Audit for Protection System Engineers.

B.13.2. In 36th PSC meeting held on 19.09.2018, 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. They have proposed training at 10,500 per participant exclusive of taxes. Participants have to make their own boarding and lodging arrangements.

B.13.3. Members expressed that since CPRI has already carried out Protection audit of many Sub stations, CPRI might be more suitable for imparting training on Protection Audit. The trainees would be trained for carrying out Protection Audit in their State as well as in their Region. CPRI would be requested to make available their Guest House facility for interested trainees at their cost. PSC recommended that the training programme/workshop on Protection audit to be conducted by CPRI. The expenditure on training will be booked in NRPC fund.

B.13.4. The proposal of training programmes was also deliberated in 40th TCC/43rd NRPC meeting held on 29th /30th October, 2018 at Amritsar, Punjab wherein NRPC 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.13.1 NRPC sect. has conveyed the acceptance of offer letter for training programmes to CPRI. Further, CPRI has proposed to organize training in 2 batches of 30 participants each in the month March and April, 2019. Accordingly, training programme for 1st batch of participants would be held from 27th to 29th March, 2019 at Bangalore. The nominations from the members have been sought vide letter dated 05.03.2019. (Enclosed as **Annexure – B.13.1**)

B.13.5. Members may kindly send nominations for training programme.

B.14 Formulation & revision of SPS

A. ***SPS for ICTs at 765 kV Unnao sub-station:***

B.14.1. In 153rd OCC meeting, UPRVUNL updated that the work is under progress. They intimated BHEL has given a list of MAX-DNA Hardware to be procured by department. The offer stands received and procurement process is being done. He further added that BHEL is developing the software logic of the SPS. As on date it is expected that the work would be completed by December 2018

B.14.2. 154th and 155th OCC meeting, it was informed that all the hardware required has been arranged at site. The design of SPS logic is under process with BHEL and the implementation of SPS is expected to be completed by January 2019.

B.14.3. OCC meeting: UPRVUNL in its letter dated 15.01.2019 has intimated that all the hardware required has been arranged at site. BHEL engineer will be available in the 3rd week of January.

B.14.4. 156th OCC meeting, UPRVUNL has intimated that all hardware has been arranged at site. The BHEL engineer will be available w.e.f. 20th Feb 2019 to 24th Feb, 2019. The SPS implementation is expected to be completed by Feb, 2019.

UPRVUNL may update the status.

B. ***SPS for Kawai – Kalisindh - Chhabra generation complex:***

B.14.5. SPS for Kawai-Kalisindh-Chhabra complex has been recommended in 122nd OCC & approved in 34th TCC-38th NRPC meeting, however, till date only partial SPS has been implemented. This issue is being highlighted in OCC meetings regularly, still, the implementation of complete scheme as approved in OCC/TCC meeting is awaited.

B.14.6. In 152nd OCC meeting: it was informed that the Technical specification for implementation of Automatic load shedding scheme under SPS for Kawai Kalisindh generation complex is under approval. Further, it was intimated that the contract would be awarded within 4-5 months and complete implementation of above scheme may take further 6-7 months. It was confirmed that Chabra STPS units have also been wired to the SPS.

B.14.7. Apart from above, in view of recently commissioned/Synchronized Chhabra SC generation of 1320 MW (2 units of 660 MW each) and associated transmission lines i.e. 400kV Chhabra SC-Anta, 400kV Anta-Kota and to be commissioned 400kV Chhabra SC-Chhabra interconnector, review of SPS for entire complex seems necessary for reliability & security of this large generating complex of ~5000 MW.

B.14.8. The issue was deliberated in 156th OCC meeting, wherein Rajasthan was requested to organize internal meeting with RVPNL, RUNL, Kawai generator within a week to deliberate various aspects (generation backing down/ load shedding) under N-1/N-1-1 contingencies and review the SPS schemes. Rajasthan was requested to share the reviewed SPS scheme for the approval of TCC/NRPC at the earliest.

Rajasthan may kindly update.

B.15 Review of Delhi & NAPS Islanding Scheme:

A. *NAPS Islanding Scheme*

B.15.1. NAPS representative stated that NAPS (2X220 MWe) is connected with western UP grid of Northern Regional grid. To safeguard NAPS Units as well as having pockets of generation on event of regional grid failure, a dedicated islanding scheme has been devised for NAPS and it is functioning well.

B.15.2. It was intimated that following network development have taken place at 220 kV Simbholi S/s and adjourning grid substation:

Existing 220 kV Simbholi –Shadbtdinagar line got LILO at 400 kV S/s Hapur.

One new line elements 220 kV Simbholi –Hapur (400 kV) commissioned and now in operation.

One more new line elements 220 kV Simbholi – Hapur (220 kV S/s UPPCL) has been commissioned.

B.15.3. Hence, it was needed to review the NAPS islanding scheme. Accordingly, NAPS vide letter dated 02/08/2018 2018 (Enclosed as **Annexure – B.15.1**) proposed modifications in NAPS islanding scheme which was deliberated in 150th OCC meeting held on 21.08.2018 wherein NPCIL was advised that the extra relays required as detailed in Annexure – B.15.1 may be installed.

B.15.4. Subsequently, vide letter dated 15.10.2018 NAPS has submitted report on modifications in NAPS islanding scheme which has intimated that all UFR relays envisaged in modifications of islanding scheme have installed and commissioned. (Modified islanding scheme is enclosed as **Annexure – B.15.2**)

Members may kindly deliberate regarding modification in Islanding scheme.

B. *Delhi Islanding Scheme*

B.15.5. Following the massive grid disturbance occurred in the grid on 30th & 31st July 2012 the Islanding Scheme was envisaged to take care of the essential load of Delhi in the event of occurrence of such events. The Islanding Scheme has been revised from time to time depending upon the load generation scenario. Revised Islanding Scheme of Delhi was discussed in detail in 32nd PSC held on 30.11.2016 and was found to be in order same was also approved in 35th TCC & 39th NRPC.

B.15.6. In the 153rd OCC meeting held on it was deliberated that POWERGRID intimated that necessary action needs to be taken for Delhi islanding scheme as 400/ 220kv Tughlakabad Substation is commissioned. DTL informed that as per revised scheme the Isolation is to be done now at Tughlakabad Sub station. It was also added that the matter is being taken up with the OEM for providing the new panel which may take 3-4 Months

hence an arrangement was proposed to be done in the relays of POWERGRID at Tughlakabad so that the isolation could be done in case of any problem.

B.15.7. In 154th OCC meeting, POWERGRID & DTL confirmed that work regarding the Islanding scheme stands completed at 400/220 kV Tughlakabad Substation.

Members may kindly deliberate.

B.16 Implementation of Automatic Generation Control (AGC) in India (at Inter-State level)

CERC in its order dated 13.10.2015 in Petition No. 11/SM/2015 reiterated the need for mandating Primary Reserves as well as enabling Secondary Reserves, through Automatic Generation Control (AGC) as follows:

(a) All generating stations that are regional entities must plan to operationalise AGC along with reliable telemetry and communication by 1st April, 2017. This would entail a one-time expense for the generators to install requisite software and firmware, which could be compensated for. Communication infrastructure must be planned by the CTU and developed in parallel, in a cost-effective manner.

(b) On the other hand, National/Regional/State Load Dispatch Centres (NLDC/RLDCs/SLDCs) would need technical upgrades as well as operational procedures to be able to send automated signals to these generators. NLDC /RLDCs and SLDCs should plan to be ready with requisite software and procedures by the same date.

(c) The Central Commission advises the State Commissions to issue orders for intra-state generators in line with this timeline as AGC is essential for reliable operation of India's large inter-connected grid."

In the 7th NPC meeting POSOCO had shared the experience in implementation of AGC at Dadri Station of NTPC in NR. It was decided that AGC would be discussed in detail in a special meeting in respective RPCs. The discussions would include aspects of implementation of primary and tertiary controls also. For this, the agenda would be sent by POSOCO and routed through NPC Secretariat to have a commonality and national perspective. Accordingly, agenda on AGC was submitted by POSOCO and the same was sent to all RPCs for deliberation in the respective RPC forums.

NRPC in the 7th NPC meeting had informed that NRPC is in the process of calling a special meeting for discussing implementation of AGC in the region. However, NRPC is of the view that, if required primary response is available via RGMO, then dependence on AGC would be minimum. Further, the mark-up price of 50 paise proposed by NLDC shall be a burden on the customer in the end. He said that the 50 paise mark-up proposed by NLDC is without taking inputs from any DISCOM or any RPC and it should not be imposed both up and down. NRPC was of the opinion that after implementation of Reserves Regulation Ancillary Services (RRAS), AGC is not needed urgently. NRPC informed that as per CEA

Standards, Generator should have ramp up rate of 3% and it is declared during COD furnished by all the generating stations which also includes letter by their Board of Directors and CMD, but POSOCO had informed NRPC that most stations have ramp up rate of 1% and few of them have ramp up rate of 1.7%. NRPC requested that a meeting of generators could be called to discuss the issue.

Members may kindly discuss.

B.17 Replacement of Porcelain Insulator by Polymer Insulator

B.17.1. Replacement of Porcelain Insulators by Polymer Insulators on various transmission lines of Northern Region is being progressively undertaken by PGCIL in five stages. As per the status furnished in the past TCC/NRPC meetings, replacement work under the first four stages has been completed, except Rihand-Dadri HVDC line. In the 32nd TCC and 36th NRPC meeting, NRPC concurred the recommendation of TCC to replace porcelain insulators with polymer insulators in additional 78 identified transmission lines of PGCIL in Northern Region under stage-V. In the said meeting, it was also advised to apply provisions of CERC regulations in the matter of certification of availability of transmission lines not withstanding approval of NRPC for replacement of insulators.

B.17.2. In the 156th OCC meeting, PGCIL sought outages of ICT, reactors, bus and lines for insulator replacement work; however, it was noted that replacement work in these elements had not earlier been deliberated in the NRPC forum.

B.17.3. PGCIL may furnish the list of elements along with following details based on which replacement of porcelain insulators (not covered under first five stages) has been envisaged:

Element Name & Type; Maximum ESDD (Equivalent Salt Deposit Density) value; Pollution level (as per recommendation of the inquiry committee on grid incident in Northern Region on 27.01.2007); Number of fog related tripping of the element in last one year.

Members may kindly deliberate.

B.18 Strengthening of Transmission Line Tower by PGCIL

B.18.1. While disposing the petition No. 9/SM/2014 & 10/SM/2015, CERC had observed prima-facie deficiency in the design or construction of failed towers of PGCIL and noted that there is a need for comprehensive review of tower design considering the changing wind regime, structural and workmanship aspects and material used. Further, the Commission had directed PGCIL to implement the recommendations of the Standing Committee of experts on failure of towers which inter-alia includes – review of design for further strengthening in case of occurrence of more failures, identification of regions facing

frequent failure of transmission line towers & installation of wind data logger stations on priority basis, installation of anemometer in all substations of PGCIL duly computerized to get output of every one hour of wind data, etc. Reportedly PGCIL in compliance of the above order of CERC has been seeking/taking shutdowns of transmission lines for strengthening of towers identified by them.

POWERGRID may intimate the modifications in tower design undertaken by them so as to avoid tower failure in line with above direction of CERC.

B.19 Incentive schemes for early installation of FGD

B.19.1. A meeting was held on 23.01.2018 under the Chairmanship of Member (Thermal), CEA, New Delhi on the subject "Incentive to Thermal Power Plants for early installation of Pollution Control Equipment". In the meeting Member (Thermal), CEA desired that RPCs should submit the views by discussing with DISCOM/Generators. The matter was discussed in WRPC under following points:

i. Priority in Scheduling of environmentally compliant TPPs. The following three options were discussed:

Option (a). For the purpose of MOD (Merit Order Despatch), two categories in TPPs may be created. one which are environmental norms compliant and the other TPPs which are noncompliant to environmental norms. Priority in scheduling may be given to the TPPs which are environmentally compliant irrespective of their variable cost.

Option (b). The increased variable cost due to installation of FGD and other pollution control equipment may be subtracted from the tariff for MOD in respect of the plants installing pollution control equipment. The existing framework of scheduling priority, which is based on merit order, should continue. This is in order to ensure incentive to plants compliance with new environmental norms.

Option (c). EPO (Environment Power Obligation) may be introduced in line with RPO (Renewable Power Obligation) and should be made mandatory for DISCOM to purchase at least say 10% power from plants which are norms compliant. The finalized dispensation from above may be continued till December,2022 only.

ii. Excise & Custom duty/ GST may be exempted for pollution control equipment like FGD etc.

iii. Present limit of 30% equity to be met by plants to be relaxed to 10%, this will enable plants to raise the fund comfortably and encourage for early installation of pollution control equipment.

iv. NCEF collected through coal cess may be utilized for funding the utilities for installation of pollution control equipment.

v. The amount of coal cess may be reduced for TPPs complying with new environmental norms.

Members may kindly deliberate.

B.20 Status of FGD installation vis-à-vis installation plan at identified TPS.

B.20.1. The timeline for FGDs to be installed was finalized in the 36th TCC (Special) meeting held on 14.09.2017 and the same was approved in the 37th TCC & -- NRPC meeting. Since 144th OCC meeting of NRPC all SLDCs are regularly requested to take update from the concerned generators where FGDs is to be commissioned and submit the progress of FGD installation on monthly basis regularly to NRPC.

B.20.2. CEA held a meeting with generators on 28.08.2018 in which CE, TR&M, CEA 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.20.3. Many IPPs like NPL are waiting for guidelines from the SERCs regarding the FGD installation cost adjustment. MoP is concerned about the issue and a policy decision is being made about the cost to be adjusted duly and CERC is being directed in this regard to pass an order to the SERCs.

B.20.4. All generators should make serious efforts to meet the deadline of installation of FGD. Updated status of progress of FGD installation is enclosed at (***Annexure-B.20.1)***

Member may kindly discuss.

B.21 Anticipated Power Supply Position of NR-April 2019 to June 2019

B.21.1. The anticipated Power Supply Position in terms of MU has been prepared based on the inputs received from constituents is enclosed as:

		MU		
State		**Apr-19**	**May-19**	**Jun-19**
Chandigarh	Availability	134	173	188
	Requirement	133	174	193
	Surplus/Shortfall (MU)	1	-1	-5
	Surplus/Shortfall (%)	0.5%	-0.6%	-2.5%
Delhi	Availability	3054	3355	3292
	Requirement	2770	3540	4095
	Surplus/Shortfall (MU)	284	-185	-803
	Surplus/Shortfall (%)	10.3%	-5.2%	-19.6%
Haryana	Availability	5964	6784	7475
	Requirement	3545	4509	5226
	Surplus/Shortfall (MU)	2419	2275	2249
	Surplus/Shortfall (%)	68.2%	50.5%	43.0%

		MU		
State		**Apr-19**	**May-19**	**Jun-19**
Himachal Pradesh	Availability	255	574	678
	Requirement	812	857	862
	Surplus/Shortfall (MU)	-557	-283	-184
	Surplus/Shortfall (%)	-68.6%	-33.0%	-21.3%
Jammu & Kashmir	Availability	1206	1509	1542
	Requirement	1672	1763	1677
	Surplus/Shortfall (MU)	-466	-254	-135
	Surplus/Shortfall (%)	-27.9%	-14.4%	-8.0%
Punjab	Availability	4347	5353	5960
	Requirement	3840	5290	5976
	Surplus/Shortfall (MU)	507	63	-15
	Surplus/Shortfall (%)	13.2%	1.2%	-0.3%
Rajasthan	Availability	9328	9896	9941
	Requirement	6061	7580	7314
	Surplus/Shortfall (MU)	3267	2316	2627
	Surplus/Shortfall (%)	53.9%	30.6%	35.9%
Uttar Pradesh	Availability	11759	12964	12558
	Requirement	9960	12028	12660
	Surplus/Shortfall (MU)	1799	936	-102
	Surplus/Shortfall (%)	18.1%	7.8%	-0.8%
Uttarakhand	Availability	626	845	959
	Requirement	1161	1326	1353
	Surplus/Shortfall (MU)	-535	-481	-394
	Surplus/Shortfall (%)	-46.1%	-36.3%	-29.1%
Total NR	Availability	36674	41454	42595
	Requirement	29954	37067	39356
	Surplus/Shortfall (MU)	6719	4386	3240
	Surplus/Shortfall (%)	22.4%	11.8%	8.2%

B.21.2. The anticipated Power Supply Position in terms of MW has been prepared based on the inputs received from constituents is as:

		MW		
State		**Apr-19**	**May-19**	**Jun-19**
Chandigarh	Availability	329	352	360
	Requirement	313	376	418
	Surplus/Shortfall (MW)	16	-24	-58
	Surplus/Shortfall (%)	5.2%	-6.4%	-14.0%
Delhi	Availability	5982	5889	6083
	Requirement	5400	6750	7400
	Surplus/Shortfall (MW)	582	-861	-1317
	Surplus/Shortfall (%)	10.8%	-12.8%	-17.8%
Haryana	Availability	9150	9642	11048
	Requirement	7700	8300	9000
	Surplus/Shortfall (MW)	1450	1342	2048
	Surplus/Shortfall (%)	18.8%	16.2%	22.8%
Himachal Pradesh	Availability	1360	1132	1190
	Requirement	1558	1510	1490
	Surplus/Shortfall (MW)	-199	-378	-300
	Surplus/Shortfall (%)	-12.7%	-25.0%	-20.2%
Jammu & Kashmir	Availability	2213	2452	2478
	Requirement	2752	2945	2563
	Surplus/Shortfall (MW)	-539	-493	-85
	Surplus/Shortfall (%)	-19.6%	-16.7%	-3.3%
Punjab	Availability	6966	7944	8904
	Requirement	7039	10511	13113
	Surplus/Shortfall (MW)	-73	-2567	-4209
	Surplus/Shortfall (%)	-1.0%	-24.4%	-32.1%
Rajasthan	Availability	15713	16250	16836
	Requirement	10620	12127	12563
	Surplus/Shortfall (MW)	5093	4124	4273
	Surplus/Shortfall (%)	48.0%	34.0%	34.0%
Uttar Pradesh	Availability	18319	19550	19379
	Requirement	18000	20500	21000
	Surplus/Shortfall (MW)	319	-950	-1621
	Surplus/Shortfall (%)	1.8%	-4.6%	-7.7%
Uttarakhand	Availability	1454	1634	1807
	Requirement	2012	2160	2198
	Surplus/Shortfall (MW)	-558	-526	-391
	Surplus/Shortfall (%)	-27.7%	-24.4%	-17.8%
Total NR	Availability	61485	64845	68086
	Requirement	51529	59797	63578

		MW		
State		**Apr-19**	**May-19**	**Jun-19**
	Surplus/Shortfall (MW)	9956	5049	4508
	Surplus/Shortfall (%)	19.3%	8.4%	7.1%

Members may kindly update the status.

B.22 New Interface Energy Meters, AMR system and meter data processing system installation

B.22.1. The Sub-Group, constituted by Forum of Regulators (FOR) Technical Committee has recommended for five minute scheduling and despatch. WRPC has also decided to replace all SEMs with new AMR compliant Interface meters having capability to integrate energy at 5 minute time interval (user configurable) and having time synchronization facility. In this regard, WRPC has approved the specifications and the execution/ implementation of installation of New Interface Energy Meters, AMR system and meter data processing system has been entrusted to PGCIL.

Members may deliberate on the replacement of SEMs by New Interface Energy Meters, AMR system and meter data processing system installation.

B.23 Cyber Security Preparedness Monitoring

B.23.1. In the 37th TCC and 40th NRPC meeting Chief Information Security Officer (CISO), MoP gave a detailed presentation on potential cyber threats for power sector along with cyber incidences and shared the desired action points to counter cyber threat. All utilities were also requested to monitor actions being taken in regard to the following points and report the status:

a. Appointment of organization-wise Chief Information Security Officers and its status.

b. Identification of organization-wise Critical Infrastructure and its status.

c. Preparation of organization-wise Crisis Management Plan and its status.

d. Status of Cyber Security Mock Drill activity in coordination with CERT-In.

e. Status of Training / Workshops on Cyber Security organized / participated by power sector entities.

f. Status of action taken on CERT-In / NCIIPC advisories.

B.23.2. In the 156th OCC meeting, all utilities were requested to furnished updated status of the aforementioned points to NRPC so that compiled information may be submitted to CISO, MoP. POWERGRID intimated that draft Crisis Management Plan (CMP) for Transmission sector has been prepared and has been submitted for approval. POWERGRID was requested to share the draft Crisis Management Plan (CMP) for Transmission sector with CISO, MoP.

POWERGRID may update the status.

B.23.3. In the 156th OCC meeting it was mentioned that inherent vulnerability in the ICT infrastructure or website or web applications may invite attackers to carry out malicious activities and exploit the targeted organization. In this regard it is necessary for all utilities to conduct Vulnerability Assessment & Penetration Test (VAPT) of their respective ICT infrastructure, websites and web applications for proper assessment and remedial action thereafter.

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

B.24 Timely PTCC clearance of 132 KV & Above Voltage level Transmission lines submitted to Power Telecommunication Coordination Committee (PTCC). (Agenda by PSTCL)

B.24.1. As per Central Electricity Authority Measures relating to safety & electric supply, 2010, Regulation 77 {Protection against electromagnetic interference} enclosed as **Annexure-B.24.1**, PSTCL submitted its proposals for all 132 KV & above voltage level transmission lines for obtaining Power Telecommunication Co-ordination Committee clearance. Also as per PTCC Manual 2010 page no. 142 & 143 enclosed as **Annexure-B.24.1**, the time limit for various steps involved in PTCC clearance is defined as under:

For approval of Power lines above 132 kV (Central cases)

- For furnishing telecom details by P&T/Railways/Army 8 weeks
- Scrutinizing the details, preparing additional copies and 1 week
- Forwarding to Joint Secretary Power
- Furnishing Induced Voltage Calculation by Joint Secretary 6 weeks
- Power & endorsing copies to all concerned
- Furnishing recommendations by Railways/Army 2 weeks
- Final examination and issue of certificate 2 weeks

B.24.2. It is defined in the said pages of PTCC Manual (**Annexure-B.24.1)** that the concerned field units of BSNL Circle/Power Utilities/Railways may kindly adhere strictly to these limits forthwith and thereby ensure speedy clearance of cases refereed to Power & Telecommunication Co-ordination Committee.

B.24.3. PSTCL has already forwarded the proposals of its 132 KV & above voltage level transmission lines for PTCC clearance timely but even after lapse of time frame given as per PTCC manual, route approval certificate has not been issued till date for the following lines. It is also added here that no reference is pending for addressal by PSTCL against these lines which is detailed below:

Sr. No.	Name of Transmission Line	Reference by which case forwarded	Latest PTCC Status as per DE(PTCC), New Delhi

1	PTCC case of 220 KV Makhu-Algon Line	Provisional RAC Issued on dated 19.06.2018 but (NOC from Railway is still pending) Memo No. 1016/36 dated 27.11.2018(CEA) Letters addressed to Railways:- Memo No. 1033/36 dated 28.11.2018 Memo no. 1029 dated 18.07.2014 Memo no. 4041 dated 28.08.2014 Memo no. 2899 dated 06.07.2015 Memo no. 3257 dated 09.06.2016	NOC from Railway pending, Case copy also submitted to Northern Railways at New Delhi by hand in the month of June/18. ***Remarks:-*** ***Provisional RAC Issued on dated 19.06.2018 but (NOC from Railway is still pending)***
2	PTCC case of LILO of 220 KV Himatpura-Jagraon Line at 220 KV Sub-Station Ajitwal	Memo No. 708/15 dated 06.03.2018(to all concerned) Memo No. 1033/36 dated 28.11.2018(Railways) Memo No. 539 dated 14.06.2018(CEA)	CEA has issued IV Calculations, but Railway NOC awaited ***Remarks:-*** ***Defense NOC issued vide letter B/46937/Sigs 7(b)/1050 dated 02.08.2018 (but Copy not Received)***
3	PTCC case of LILO of 220 KV Jadla to Jamsher Line at 220 KV Sub-Station Banga	Memo No. 140 dated 09.01.2018(to all concerned) Memo No. 1033/36 dated 28.11.2018(Railways)	IV Calculations issued by CEA, defence has issued NOC but from NOC railway pending ***Remarks:-*** ***Defense NOC issued vide letter B/46937/Sigs 7(b)/925 dated 13.03.2018 (Copy Received on dated 16.06.2018)***
4	220 KV Line Sandhour to Kup Kalan	Memo no.782/789 dated 28.08.2018 (to all concerned) Memo No. 1037/40 dated 28.11.2018 (Defence) Memo No. 1033/36 dated 28.11.2018(Railways)	Case also submitted by hand in CLPTCC meeting by PSTCL & Pending from all departments ***Remarks:-*** ***Defense NOC issued vide letter B/46937/Sigs 7(b)/1256 dated 27.11.2018 (Copy Received on dated 01.01.2019)***

B.24.4. It is therefore requested in case Route Approval Certificate for the transmission line is not issued by Power Telecommunication Coordination Committee (PTCC) even after lapse of time frame elaborated in PTCC Manual, 2010 and also in case no reference is pending with the applicant, then the transmission line be deemed cleared for PTCC.

Members may kindly deliberate.

B.25 Interest payable due to delay in payment under PSDF. (Agenda by PSTCL)

B.25.1. Various projects have been sanctioned by NLDC under PSDF scheme. As per the provisions of contracts, payments are supposed to be released with 45 days of receipt of supplies/services rendered. In case of delay in payment by the PSTCL, interest becomes payable as per the relevant provisions of the MSME Act etc.

B.25.2. It is seen that release of funds under PSDF gets delayed by NLDC for certain reasons. For instance, "2nd DC Source Scheme" stands sanctioned under PSDF for which 90% amount i.e. Rs. 13.78 crore is to be funded by PSDF. Claims of Rs. 28.13 Lac and 5.78 Crore

stands made on 15.10.2018 and 21.12.2018 respectively but the funds have yet not been released. Payments of about Rs. 1.38 Crore of M/s. Statcon Energiaa Pvt. Ltd. (MSME) and civil contractors are overdue. Firms/Contractors are pressing hard for release of their payments and may submit claims for interest as per MSME Act as well

B.25.3. Moreover, as per the guideline of PSDF, utilities if pay from their own resources for projects sanctioned under PSDF, refinancing will not be permissible. In view of the above, it is proposed that "interest due to delay in payments on account of non-release of funds timely under PSDF" may be booked to cost of project sanctioned under PSDF.

Members may kindly deliberate.

B.26 Funding for the scheme "Provision of STATCOM at Nalagarh & Lucknow in Northern Region" (Agenda by POWERGRID)

B.26.1. The installation of STATCOMs at Nalagarh & Lucknow substations of POWERGRID in Northern Region were agreed in the 32nd Standing Committee meeting of NR & 29th Northern Region Power Committee Meeting held on 13/08/13 & 13/09/13 respectively.

B.26.2. In Jan'16, POWERGRID proposed funding of the scheme through PSDF (vide application dated 07/01/16 to NLDC) considering that the maximum benefit will be accrued by the constituents. Concurrently, POWERGRID had taken up tendering activities and project was awarded in Sept'16. The project execution was taken up on priority in the overall interest of improved stability and reliability of the Northern Region Grid.

B.26.3. NRPC had approved the funding of the scheme through PSDF in the 39th NRPC meeting held on May 2017. However, the project funding proposal through PSDF was not agreed by the Appraisal Committee during its 18th meeting held on 05.02.2018. Subsequently, the matter was taken up by POWERGRID in the 39th TCC/42nd NRPC meeting held on 28.06.2018. During the meeting, POWERGRID proposed that, since the said project proposal was not agreed for PSDF funding, the scheme shall be done as per normal CERC Tariff mechanism. However, NRPC was in favour of PSDF funding and hence requested the PSDF Appraisal Committee to allow PSDF funding for the scheme as a special case (vide NRPC letter **dated 05.10.2018).**

B.26.4. As guided, POWERGRID again requested the Appraisal Committee (vide letter dated 18.10.18) to reconsider PSDF funding for the scheme. The Appraisal Committee deliberated on the request of NRPC/POWERGRID during its 21st meeting held on 15.11.18. However, the committee did not agree to fund the scheme through PSDF, same was communicated vide letter from dated 14.02.19 from NLDC (Copy attached in **Annexure-B.26.1**).

B.26.5. Accordingly, the charges for the implemented scheme "Provision of STATCOM at Nalagarh & Lucknow in Northern Region" may be considered as per norms of CERC

Tariff Regulations including the debt equity ratio. The scheme is expected to be commissioned by March 2019.

Put up for deliberation please.

B.27 Augmentation of transformation capacity in Northern Region (Agenda by POWERGRID)

B.27.1. This scheme involves augmentation of transformation capacity at existing ISTS substations based upon operational constraints & requirement of system:

- 1x500MVA, 400/220kV ICT (3rd) along with ICT bays 400kV Saharanpur (PG) S/s
- 1x500MVA, 400/220kV ICT (5th) along with ICT bays 765/400/220kV Bhadla (PG) S/s

B.27.2. Augmentation of transformation capacity at Saharanpur (PG) has been discussed and agreed in 40th meeting of Standing Committee of Power System Planning of NR held on 22.06.2018.

B.27.3. Augmentation of transformation capacity at Bhadla (PG) has been discussed and agreed in 1st NRSCT meeting held on 11.09.2018.

B.27.4. The above scheme is proposed to be implemented under NRSS-XL.

Members may deliberate and approve.

B.28 2 nos. of 400 kV line bays (GIS) at 400kV Chamera (PG) S/s (Agenda by POWERGRID)

B.28.1. This scheme involves implementation of 2 nos. of 400kV line bays (GIS) at Chamera Pooling Station (GIS) for termination of Lahal (HPPTCL) – Chamera 400kV D/c line under ISTS and to be implemented under NRSS-XLI.

B.28.2. This scheme has been discussed and agreed in 40th meeting of Standing Committee of Power System Planning of NR held on 22.06.2018.

Members may deliberate and approve.

B.29 2 nos. of 220kV line bays (GIS) at 400kV Samba (Jatwal) (PG) S/s (Agenda by POWERGRID)

B.29.1. This scheme involves implementation of 2 nos. of 220kV line bays at Samba (PG) S/s for termination of Samba (Jatwal) (PG) S/s – Samba (JKPDD) 220kV D/c line under ISTS and to be implemented under NRSS-XLII.

B.29.2. This scheme has been discussed and agreed in 1st NR Standing Committee on transmission (SCT) held on 11.09.2018.

Members may deliberate and approve.

B.30 Transmission Schemes for Solar Energy Zones (SEZs) in Rajasthan (Agenda by POWERGRID)

B.30.1. In the 2nd NR SCT meeting held on 13.11.18, transmission scheme for Solar Energy Zones (8.9 GW) in Rajasthan was technically agreed. Earlier, transmission scheme for integration of envisaged RE generation capacity in Solar & Wind Energy Zones including transmission scheme for Solar energy Zones in Rajasthan was discussed in 1st NR SCT meeting. Subsequently, in 2nd NR SCT, the scheme was reviewed based on present Stage-II/LTA applications (3.1 GW) in Bhadla/Fatehgarh/Bikaner complex as well as future solar potential (5.8 GW) of theses complexes. After detailed deliberations in 2nd NR SCT, following system was technically agreed for evacuation of 8.9 GW Solar power from Bhadla/Phalodi (3.55 GW), Fatehgarh (3.5 GW) & Bikaner (1.85 GW) complexes. Following scheme was agreed to be implemented in two parts viz. Part-A and Part-B:

B.30.2. Transmission system for Solar Energy Zones in Rajasthan

Part A

i. Establishment of 765/400kV, 2x1500MVA pooling station at suitable location near Phalodi/ Bhadla in Jodhpur (Bhadla-II PS)**

ii. Establishment of 765/400kV, 2x1500 MVA S/s at suitable location near Khetri

iii. Augmentation of transformation capacity at Bhadla (PG) by 400/220kV, 2x500MVA (6th & 7th) transformers

iv. LILO of both circuits of Ajmer–Bikaner 765kV D/c line at Bhadla-II PS

v. Bhadla-II PS–Bhadla (PG) 400kV D/c Line (Twin HTLS)

vi. Bikaner(PG)–Khetri S/s 765kV D/c line

vii. Khetri – Jhatikara 765kV D/c line

viii. Khetri – Sikar (PG) 400kV D/c line (Twin AL59)

ix. Augmentation with 765/400kV, 1x1500MVA transformer (3rd) at Moga S/s

x. Augmentation with 765/400kV, 1x1000MVA, transformer (3rd) at Bhiwani (PG) S/s

xi. Establishment of 765/400kV, 3x1500MVA pooling station at suitable location near Fatehgarh in Jaisalmer Distt (Fatehgarh-II PS)**

xii. Fatehgarh-II PS– Bhadla -II 765kV D/c line

xiii. LILO of both circuits of Fatehgarh (TBCB) – Bhadla (PG) 765 kV D/c line (op. at 400kV) at Fatehgarh-II PS so as to establish Fatehgarh (TBCB) – Fatehgarh -II 765 kV D/c line (to be op. at 400kV) and Fatehgarh-II-Bhadla (PG) 765kV D/c line

xiv. Charging of Fatehgarh-II PS –Bhadla section at 765kV level

xv. Ajmer (PG)– Phagi 765kV D/c line

xvi. 1x125 MVAr (420kV), 2x240 MVAr (765kV) Bus Reactor each at Fatehgarh-II PS, Bhadla-II PS & Khetri Substation

xvii. 1x240 MVAR Switchable Line reactors for each circuit at Jhatikara end of Khetri – Jhatikara 765kV D/c line

xviii. 1x240 MVAr Switchable line reactor for each circuit at each end of Bikaner – Khetri 765kV D/c line

xix. 1x330 MVAr Switchable line reactor for each circuit at Bhadla-II PS end for Ajmer - Bhadla-II PS 765kV line (after LILO)

xx. 1x240 MVAr Switchable line reactor for each circuit at Bhadla-II PS end for Bikaner-Bhadla-II PS 765kV line (after LILO)

**Space provision to be kept for 220kV level

Part B

B.30.3. Augmentation works to be taken up in above scheme after receipt of Stage-II connectivity/LTA applications at Fatehgarh-II PS, Bhadla-II PS & Bikaner (PG) S/s in Rajasthan (400/220kV ICT shall be taken up in progressive manner commensurate to stage-II connectivity/LTA applications on above pooling stations)

i. Augmentation with 765/400kV, 1x1500MVA transformer (3rd) at Bhadla-II PS

ii. Creation of 220 kV level at Bhadla-II PS with Installation of 400/220kV, 5x500MVA transformers at Bhadla-II PS

iii. Augmentation with 765/400kV, 1x1500MVA transformer (4th) at Fatehgarh-II PS

iv. Creation of 220 kV level at Fatehgarh-II with Installation of 400/220kV, 5x500MVA transformers at Fatehgarh-II PS

v. Creation of 220 kV level at Bikaner (PG) with Installation of 400/220kV, 2x500MVA transformers at Bikaner (PG)

vi. 220kV line bays for interconnection of solar projects at Fatehgarh-II PS (9 nos), Bhadla-II PS (9 nos) and Bikaner (4 nos) S/s

B.30.4. Subsequently, based on the discussion in 2nd NCT & 3rd ECT, finalized future scope/provision to be kept at new substations/pooling stations, in addition to above Part-A/B scope, was also agreed as under:

1) 765/400kV Bhadla-II pooling station
   - 765/400kV ICT along with bays: 2 no.
   - 400/220kV ICTs along with bays: 9 nos.
   - 765kV line bays: 6 nos
   - 400kV line bays: 6 nos.
   - 220kV line bays: 16 nos
   - 400kV bus reactor along with bays: 1 no.
   - 765kV bus reactor along with bays: 1 no.
2) 765/400kV Fatehgarh -II pooling station
   - 765/400kV ICT along with bays: 3 nos
   - 400/220kV ICTs along with bays: 10 nos.
   - 765kV line bays: 4 nos
   - 400kV line bays: 6 nos.
   - 220kV line bays: 18 nos
   - 400kV bus reactor along with bays: 1 no
   - 765kV bus reactor along with bays: 1 no
3) 765/400kV Khetri pooling station
   - 400/220kV ICTs along with bays: 4 nos.
   - 765kV line bays: 4 nos
   - 400kV line bays: 4 nos.
   - 220kV line bays: 7 nos

B.30.5. With Charging of Fatehgarh-II –Bhadla (PG) section at 765kV level, 2 nos. of 400kV bays would be spare at Bhadla (PG) S/s, which could be utilized for 400kV Bhadla-II – Bhadla (PG) D/c line (Twin HTLS). At Bhadla substations, 220kV side will be implemented with hybrid (AIS+GIS) technology and 1500MVA ICT at Moga will be installed considering outdoor 765kV and 400kV GIS switchgear and GIB interconnection

B.30.6. Subsequently, the scheme was also discussed in the 2nd NCT meeting as well as 3rd meeting of Empowered Committee on Transmission. In the ECT meeting it was decided

that part of comprehensive scheme may be implemented by POWERGRID under regulated tariff mechanism and balance scheme may be implemented through TBCB route.

Members may deliberate and approve.

B.31 Early Commissioning of 1X500 MVA ICT at 400/220 kV Lucknow Substation: (Agenda by POWERGRID)

B.31.1. In the 39th Meeting of Standing Committee on Power System Planning of Northern region and subsequently in 40th Meeting of Northern Regional Power Committee, Replacement of 1X315 MVA ICT by 1X500 MVA ICT at 400/220kV Lucknow Substation was approved. This is being implemented under NRSS XL.

B.31.2. Subsequently, Director (Commercial & Planning), UPPTCL, vide letter Ref. No. 754 dated 01/10/2018 **(Annexure – B.31.1)** requested POWERGRID that aforesaid work may be implemented on PRIORITY latest by March'19, as the large demand is likely to show up in March'19 itself.

B.31.3. Accordingly, on the request of UPPTCL for early commissioning of ICT, POWERGRID put its best effort & same is expected to be charged by Mar'19 at 400/220kV Lucknow Substation.

This is for kind information of the member.

B.32 Following elements are anticipated to be commissioned shortly: (Agenda by POWERGRID)

Sl. No.	Scheme Name	Element Name	Anticipated Commissionig Schedule
1	NRSSXL	1X500 MVA ICT at Lucknow	March'2019
2	Augmentation of Transformation Capacity at Raebareily & Sitarganj 220/132 kV Substation	1X100 MVA, 220/132 kV ICT at Sitarganj S/s	March'2019
3	STATCOM at Nalagarh & Lucknow in Northern Region	STATCOM at Lucknow	March'2019
4	NRSS-XXX	400kV S/C Singrauli-Allahabad Line alongwith bays	March'2019

This is for kind information of the member.

B.33 Shut down requirement for 220 kV Sarna-Hiranagar line due to critically damaged foundation caused by change in river flow. (Agenda by POWERGRID)

B.33.1. 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.33.2. Since Feb'18, the matter is being followed up with JKPDD for shut down but consent is not given by JKPDD. Each time the shutdown is rescheduled in OCC meetings. The matter has been brought to the notice of higher officials of JKPDD through mail and written communication also but the consent is still awaited. 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.33.3. In view of the above it is proposed that shutdown of 220 kV Sarna-Hiranagar line may be allowed for 6days, however, best efforts will be put forth to reduce this outage period.

B.33.4. Again, in the 40th TCC and 43rd NRPC meeting, POWERGRID requested for the shutdown for the said line. Letter of request for Shut Down has been sent to Development Commissioner Power (J&K) on dt 05.12.2018 (**Annexure-B.33.1**) & dt 19.02.2019. Consent for Shut Down is still pending at JKPDD end till date.

Members may deliberate.

B.34 Summer preparedness 2019 (Agenda by NRLDC)

Northern region met maximum demand of 61653 MW on 10.07.18 and energy consumption of 1420MUs on 10.07.18 during summer/monsoon in 2018. Typical load curve of NR during summer is enclosed in **Annex-B.34.1(A) .** Demand of Northern Region is likely to increase from Mar'19 onwards with the increase in temperature. Summer of Northern region typically are hot and demand is also high during this time, therefore advance action helps in better planning of Grid operation.

Following points are important that would render smooth Grid operation especially for coming summer:

a. Load-Generation balance

As summer of Northern region used to quite hot, demand of region also increased subsequently and therefore load-generation balance during high demand become more challenging. To avoid any kind of deviations & other grid indiscipline following are the remedial actions for LGB:

i. Weather Monitoring

- ***Dedicated weather monitoring website by IMD****:* During summer, sudden rainfall, thunderstorm, high temperature, humidity etc. is a common phenomenon and all these factors impact the pattern of load or load behavior. Therefore, it is very essential to monitor the weather of our respective control area & region as well for assessing the

load behaviors precisely. Indian Meteorological Department (IMD) has developed dedicated website for power sector. RLDC in collaboration with IMD has been conducted various workshop also for understanding the weather data & utilize it to forecast the load. Utilization of weather data from IMD dedicated website for power sector was discussed & highlighted in 35th TCC-39th NRPC meeting. Since then, it has been requested in regular TCC/OCC meeting that all utilities should utilize the weather data prudently for load forecasting more accurately.

- ***Monitoring of temperature & humidity telemetry***: In addition to IMD data, Northern region have telemetry of temperature & humidity of various nodes in each state control area. This telemetry also helps in indicating the real time weather scenario. It has been observed that since long that telemetry of various nodes is not reliable. The matter has been highlighted in various previous OCC/TCC meeting since long, recently in 35th TCC-39th NRPC and subsequent meetings, even in regular meeting before starting of winter 2018-19, still the status of reliability of these telemetry is either poor or not available and concrete actions are still to be taken in this direction. Current status of temp/humidity is enclosed in **Annex- B.34.1(B)**. It is requested to each utility to take fast actions to rectify the telemetry in their respective control area and monitor these telemetries regularly for demand estimation & subsequent actions.

ii. Demand Forecast

CERC vide its order in Petition No. 152/2009 (suo Moto) dt. 15th Dec, 2009 had issued instructions to all SLDC/States to comply with the provisions of section 5.3.c and 6.4.8 of IEGC in this regard and same was deliberated in 19th TCC-21st NRPC meeting wherein members were requested to implement a suitable mechanism for daily/ weekly/monthly demand forecasting for operational planning and transfer capability estimation. Planning for meeting the demand is also important for effective load management in real time. As per action taken decision in further TCC/OCC meeting, Load forecast has been started by each state control area on daily basis and as of now each state has now mapped the same into SCADA also.

A Symposium on "Load Forecasting for Operational Planning" on 5th August 2016 was also organized by NRPC sectt. in line with the deliberation in the 35th NRPC meeting held in July 2015.

Despite the continuous efforts by all stakeholders, appreciable forecast error has been observed on continuous basis which need to be tuned in line with actual value. Further, some of the states i.e. Punjab, HP is not sharing forecasted data from past 2-3 month and Jammu & Kashmir data is also intermittent. At present, the forecast & forecast error of various states is enclosed in **Annex- B.34.1(C)**. It is understood that demand forecasting need continuous improvement with incorporation of historical trend/ weather information/Special events/ Holidays/Natural occurrence/load growth/load group/Govt

policy etc. so that deviations on daily basis can be minimized. In view of above, following actions are important and agreed in previous OCC/TCC meeting are reiterated below:

- Load forecast on daily basis based on weather, festival, peak, off-peak hours, public holidays, special days, events etc.
- Load ramping forecast especially during peak hours
- Continuous effort to reduce the forecast error.
- Develop the tools that incorporate weather related information, historical trend, growth factor, ramping of load etc.

iii. Portfolio Management

Based on load forecast, availability & other relevant information, portfolio management should be done. It has been observed that due to sudden load changes on account of weather change or switching of load group or sudden generation outage or unmatched ramping of generation with load or any other contingency etc. large deviations occurred lead to sharp change in frequency / voltage poses challenges for grid operation. Following are the important action points:

- Action plan for real time imbalances: Apart from LTA/MTOA/STOA/Market arrangements based on forecast, other short term arrangements should also plan for real time imbalances e.g. adequate margin while schedule own thermal generation, units on bar, maintenance of reserves, technical minimum operation of thermal units in case of load crash, tie up with neighbor states or hydro rich states etc. to bridge the load-generation gap in real time.

- Load staggering while connection/disconnection of load group: Sudden change of large chunk of load poses frequency & voltage excursion leading to line loading/Undesirable line tripping on OV, HV/LV etc. Such issues have been highlighted since long in 27th TCC, 30th TCC-34th NRPC dated 15th May 2015 and subsequent TCC/OCC meeting. The frequency excursion, line tripping on OV & other operation issues due to sudden load changes has been regular issues in OCC since 110th OCC meeting, latest from 148th OCC, 150th, 151st etc. and through separate NRLDC letter also latest in 2nd Feb 2016, 21st Sep-2015 etc. Despite continuous discussion and follow up in TCC/OCC meeting, sharp change in frequency is still being observed at hourly boundaries. States such as Rajasthan and Haryana continue to connect/disconnect large quantum of load at hourly boundaries resulting in frequency spikes and instantaneous over-voltages (last 3 days' demand of Rajasthan and Haryana attached as **Annexure-B.34.1(D**). This has also resulted in tripping of lines on overvoltage in recent past. Therefore, it is again requested to stagger the load groups while connecting/disconnecting to the Grid.

- Ramping of generation commensurate with load ramping: Ramping of load especially during peak hours is very important. Though peak hour ramping during winter is more crucial as the load during winter night remain low and sharp increase in load during morning hours poses challenges. Peak hours during summer also have good ramping therefore, it is now important to forecast load ramping and thus, plan/schedule the generation ramping accordingly to avoid any kind of frequency change due to mismatch of load-generation in peak hours.

- Maximize internal generation: In view of high/increasing demand & transmission constraints if any in importing the power or in case of any contingency in the system, states are requested to maximize their internal generation to avoid low frequency/low voltage operation or other related issues.

It has been observed that states e.g. Uttar Pradesh has explored and keeping their generating units upto 55% as technical minimum. The same can also be seen from the graph enclosed in **Annex-B.34.1(E)**. Keeping the large units on technical minimum would help in keeping the units on bar thus able to maintain the reserves

iv. Maintenance of reserves

During summer, in anticipation of increasing demand, adequate reserves should be maintained and same has been advocated by Hon'ble commission also in IEGC 5th amendment. ISGS generation continue to schedule as per IEGC 5th amendment and it is requested that state should also schedule their own generation so that enough margin would be available for FGMO/RGMO. In line with CERC direction (IEGC 5th amendment dated 12th April 2017) & action taken decision in 37th TCC – 40th NRPC meetings dated 27-28th Oct 2017, wherein Committee decided that mapping of RGMO/FGMO signal in SCADA within 3 months would be done so that real time status is available in SLDC and RLDC and the cost of wiring etc. for the mapping at utility end would be borne by the respective utility. As of now, ISGS units has been mapped along with Punjab, Rajasthan, Haryana & Uttar Pradesh. Some of the telemetry is not reliable and therefore a lot of scope for improvement is still there.

Further, during summer, sudden outage of hydro units on silt or other major generation outage impact frequency/voltage, line loading, reliability and security of the corridor/control area/Generation complex etc. In such cases, apart from portfolio management based on proper forecast as discussed above, re-starting of units under reserve shutdown at state as well as Inter-state level through appropriate transactions.

Keeping reserves and monitoring in real time is also important. NRLDC is monitoring the ISGS reserves in real time and suggested same to SLDC also in various OCC/TCC meetings. SLDC may apprise regarding maintenance of reserves and its

monitoring in real time. It is evident that some of the big states i.e. Punjab, Haryana, Rajasthan, UP etc. having large number of generating units would require considerable reserves for handling any eventualities. Hydro rich states should maintain or arrange some banking arrangement under hydro gen outage during silt.

In addition, as per CERC mandate, ISGS generation should keep their generation upto 55% technical minimum under any load crash/ other events/as per Grid requirement. It has been observed that keeping units on bar at technical minimum also ensure unit on bar and would serve as hot reserves as per requirement.

It is appreciable to note that UP generators are backing down upto 55% technical minimum as per UPSERC direction, which also ensures that sufficient reserves are available to cater any variation in demand. Other states are also requested to take actions to ensure backing down of generators to 55% of their capacity & keeping the units on bar. This would ensure reserves in the system and also make us prepared for extreme situations.

v. Furnishing of coal stock position

Advance information of coal stock of thermal plants ensure the generating units' availability and it is important during high demand season. It has been observed in past years that sudden information of outage of thermal units on coal unavailability poses challenges to meet high demand. Outage of generating unit due to coal shortage in past three year is enclosed in **Annex-B.34.1(F)**.

The same issues have been highlighted in 26th TCC-29th NRPC, 30th TCC-34th NRPC…39th TCC etc., Secretary power meeting in Apr'18, various OCC & other meetings also latest from 139th OCC, 140th OCC…recently in 151st OCC etc. and subsequent meetings thereafter. During 139th OCC meeting issues were raised for requirement of the monitoring of fuel availability at different generating stations. OCC decided that all the utilities shall provide the details of fuel stock one month in advance in the OCC meeting and later on weekly and day ahead basis information would be sought.

In line of above view, it is again suggested to keep monitoring coal supply position so that advance action can be taken to manage portfolio accordingly. Further, it is requested to update & share coal stock position of thermal plants in advance as agreed in TCC/OCC meeting.

vi. Hydro Generation & Silt monitoring

During summer of NR, hydro generation would be at peak and load requirement of NR would also be high. During summer, sudden & frequent hydro plant showdown due to high silt is a major issue. Major Hydro stations like N. Jhakri, Karcham, Rampur, Baspa, Dehar, Bairasuil, Salal, Parbati-3 underwent forced outage on silt. More than 4500-5000

MW of generation in 2018 and 5000-6000 MW in 2017 went under forced outage on several instances due to silt resulting in frequency drop, congestion of some corridor, over drawal, voltage change etc.

Outage of hydro generation on silt has been highlighted since long in various meeting. In Aug 2012, outage of sudden hydro outage on silt causes dip in frequency of ~ 1 Hz which was deliberated in 24th TCC-27th NRPC meeting. Thereafter, it was decided to formulate protocol for hydro station operating in tandem, unit outage in plan & stagger manner. The protocol was discussed and approved in 79th OCC & 29th TCC-33rd NRPC meeting. Since then issues of hydro outage on silt & subsequent issues i.e. frequency dip, overloading, overdrawal, etc. and associated remedial measure has been proposed, discussed and agreed. Overdrawal of various states especially of HP has remain consistent during this outage duration.

Hydro outage on silt for past five years is enclosed in **Annex-B.34.1(F)**. As discussed in various OCC/TCC meetings and an action plan was agreed as given below:

- Action for Generator
  - Silt monitoring/Silt forecasting for planned hydro outage **[Advance information]**
  - Reduction of Generation/Tripping of Units as per protocol (Staggering of units)
  - Slow ramping down of generation on the units to be closed as per protocol.
- Action by SLDC/Constituents
  - **Generation reserve to be maintained**
    - Own Generation
    - Contracted Generation from Other State/Traders
  - Load management to be planned
  - Optimization of Hydro generation as per demand requirement

It is to noted that HP has own generation installed capacity ~ 954MW & ~ 1100 MW share in ISGS hydro generators while only 121 MW share in ISGS thermal generators. During ISGS hydro outage on silt in the order of ~ 5000 MW, share of HP also dropped considerably and its own hydro also get reduced. Consequently, HP overdraw from the grid on continuous basis during this time. It is pertinent to mention here that this is known issue for every year and same has been discussed in various OCC/TCC & other meeting that HP should explore banking arrangement from neighbor states & other resources during this period and avoid any kind of grid indiscipline.

In spite of continuous request and suggestion, HP continue to overdraw from the grid (Graph is enclosed in **Annex-B.34.1.(G)**. In view of upcoming summer and similar situation likely to come in summer, it is requested to all state especially HP to make some banking arrangement in order to avoid any OD or violations.

b. Load crash

Sudden thunder storm during summer in NR is probable phenomenon and subsequent load crash in range of 7-15 GW in region as a whole. Such fast reduction of large load causes frequency/voltage excursions, line loading etc. There have been number of instances of tower collapse & damage also in the past during such thunder storms which resulted in constraints in supply power for extended duration of time. Number of tower collapse incidents occurred during last summer also in May/Jun'18 in which many EHV lines out on tower collapse along with important inter-regional line i.e. 765 kV Agra-Gwalior ckt-1, 765kV Gaya-Varanasi ckt-1, HVDC Agra-BNC Line-1. Apart from EHV line outage on tower collapse, nearly 30-40 lines used to be opened manually to control high voltage. Number of such event, load crash, tower collapse & line outage of past two year is enclosed in **Annex-B.34.1.(H)**.

Load crash during summer is likely phenomenon and discussed in 30th TCC-34th TCC, 31st TCC-35th NRPC, subsequent TCC & OCC meeting and other special meeting also. The matter has been deliberated and following preparatory actions has been suggested during such eventualities:

- Weather monitoring and warning/alert issuance within control centers for taking advance & fast actions
- Backing down of thermal generation up to technical minimum in order to control high frequency operation besides containing over voltages.
- Fast ramping down during reduction in generation.
- Immediate actions to surrender power from ISGS generating stations
- Synchronous condenser mode operation of HEPS to contain high voltage
- NRLDC issued flash / preliminary report to inform all stakeholders, other utilities are also requested to report as early as possible to NRLDC.
- Exercise fast restoration of line out on high voltage or manually opened etc.
- ERS: The tower strengthening and availability of Emergency Restoration System (ERS) [for early restoration of supply] have been observed as mitigation tools for such scenario. Requirement & procurement mandate of ERS has been discussed in 29th TCC-33rd NRPC,30th TCC-34th NRPC, approved in 31st TCC-34th NRPC, 108th OCC meeting, Sec Power meeting/letter dated 5th Dec 2014. Since then follow up of procurement & availability of ERS as per guideline of CEA is being done at regular TCC/OCC meeting. At present ERS has been procured by Delhi, Punjab, UP & J&K only, other states are in process of either procuring or under discussion. Line outage under breakdown during thunder storm in past two year is enclosed in **Annex-B.34.1.(I)**. In view of reliability issues during such eventualities, it is requested to expedite the tower repairing work & procurement of ERS before this April.

c. Reactive power management

Since last summer, it has been observed that voltage profile during summer has been improved. Low voltages have been experienced at some locations e.g. Kashmir valley, Western UP and 220 kV Nodes in Punjab. To maintain the voltage profile of Grid within IEGC band during summer, following known actions are suggested:

i. Switching ON Capacitor/Switching OFF reactor as per system requirement
ii. Tap Optimization at 400/220kV by NRLDC and 220/132kV by respective state control area based on scatter plots of ICTs, offline studies, NRPC RE account etc.
iii. Dynamic reactive support from Generator as per their capability curve.
iv. Synchronous condenser operation [in case water can be stored]
v. SCADA Displays for better visualization

d. Defense Mechanism

Several defense mechanism has been recommended by various committees and advantage of such defense schemes has been discussed in many for a too. Majority of defense mechanism is to cover protection for under voltage, under frequency, rate of change of frequency, SPS for line/ICTs loading/generator complex evacuation etc. NRPC has also recommended and directed to implement all these mechanisms as per recommended given settings. In line with such decision, information regarding feeder, real time load against planned load etc. for UFR and df/dt has been mapped in SCADA displays also. However, due to non-reliability of telemetry upto 132kV feeders, observability is still poor and effective utilization at the need of hours would not be possible. **At present status of df/dt & UFR of all the constituents is enclosed in Annex-B.34.1.(J).**

Further, SPS is an important tool which helps in protecting in real time based on some logic. Therefore, monitoring of SPS is also important to assess its reliability. There are around 33 SPS in Northern Region. Almost all the schemes are in operation. Table-1 below shows different types of SPS in NR. Table-2 shows the NR utilities involved in respective SPS schemes.

Table-1

S.No.	Type	Number
1	Tripping of critical line / Corridor	8
2	Safe evacuation of Generation	7
3	Overloading of Transformers	18

Table-2

Utility involved in SPS	UP	POWERGRID	Delhi	Others	Punjab	Rajasthan	BBMB	Haryana	J&K	ADA
No. of SPS	21	11	9	9	5	5	5	4	2	2

Till date it has been observed that performance of SPS is considerably low. In 2018, around 27% of SPS operation occurred were either malfunction or false operation. A list of these incidents are tabulated below.

Table-3:

SPS	No. of Correct operation	No. of Mal-operation/Failed to operate
Agra-Gwalior	0	1
Rihand-Dadri	5	0
G.Noida (UP) ICT	0	1
Chabra TPS	2	0
Mehrauli Bus coupler	1	0
Agra(UP) ICT	2	0
Mundra-Mohindergarh	0	1
Balia-Bhiwadi	1	1
Total	11	4

A document "Roles and Responsibility regarding SPS" was approved in 121st OCC meeting wherein the following roles were mentioned among others:

- Mapping of SPS feeders CB status, analog data in SCADA or Station Event log.
- Periodic mock testing of SPS schemes (at least once in half year) and certification of healthiness by utility.
- Timely updating the scheme in case of any network or schematic changes.

It has been observed that the utilities are yet to assume the roles and responsibilities as per the approved procedure.

Further, it is pertinent to mention here that SPS is only for operational defense and should not be considered as long term solutions. Therefore, planning of SPS should be done in order to cover short term solution only and provide feedback to planner for its long term solution/arrangements also. Moreover, islanding schemes have also been implemented in NR.

It is suggested that all state control area/Users shall ensure before start of summer that their protection and defense system are in working conditions and settings are as per the recommendations of NRPC. In addition, utilities are requested to abide by the approved Roles and Responsibilities regarding SPS.

e. Telemetry

Real time data is utmost important for monitoring & supervision purpose and therefore, it is very essential to ensure the data availability at control centers for smooth Grid operation. It has been observed number of times, that telemetry of large nos of stations affected during contingency, inclement weather, or in day to day switching operations etc. Such unavailability of data especially during switching or contingency, hampers the fast action at control centers. Therefore, it is requested to all to please ensure the telemetry of all analog & digital points of all stations at respective control centers.

Large number of issues are encountered with new elements. Recently, nos of new substation/elements has been commissioned in UP, Rajasthan, J&K etc. though telemetry of such elements either not available or not reliable. As on 31st Jan 2019, non-availability of telemetry in NR was ~ 22%. The details of current status of implementation of telemetry system is described below.

	Northern Region summary sheet and details of current status of implementation of telemetry system												
										Updated Till:		31.01.2019	
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%	3	18	18%	10%	18%	64%
2	Haryana	5	70	-	13	-	19%	-	-	-	-	-	19%
3	Rajasthan	20	204	-	-	-	-	-	5	-	2%	-	2%
4	Delhi	6	43	-	-	-	-	2	4	33%	9%	33%	9%
5	UP	22	175	-	-	-	-	1	37	5%	21%	5%	21%
6	Uttarakhand	10	29	-	-	-	-	4	4	40%	14%	40%	14%
7	HP	15	25	-	-	-	-	2	-	13%	-	13%	-
8	JK	4	17	-	-	-	-	3	11	75%	56%	75%	56%
9	POWERGRID	-	80	-	-	-	-	-	7	-	9%	-	9%
10	NTPC	14	-	-	-	-	-	2	-	14%	-	14%	-
11	NHPC	14	-	-	-	-	-	1	-	7%	-	7%	-
12	NPCIL	5	-	-	-	-	-	-	-	-	-	-	-
13	NJPC	2	-	-	-	-	-	-	-	-	-	-	-
14	THDC	2	-	-	-	-	-	1	-	50%	-	50%	-
15	BBMB	6	16	-	-	-	-	-	-	-	-	-	-
16	IPP/JV/Patran	6	2	-	-	-	-	3	1	50%	50%	50%	50%
	TOTAL	148	834	0	105	0%	13%	22	87	15%	10%	15%	23%
	Total (over all)	982		105		11%		109		11%		22%	
	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 be much lower percentage based on number of measurands.

Also, even though the telemetry is available correct digital telemetry is not available. Proper status of CBs and Isolators is required for State Estimator (SE) to form network model resembling to actual Power System Model via Topology Processor. Suspected/Inverted status of switches lead to formation of wrong topology and difficulty in smooth grid monitoring/operation.

For reactive power management, MVAr of reactor, generating units, sign, etc. is very important during mapping & monitoring. It has been observed that most of the time, MVAr data of generating units is either not correct or not reliable. Issues of telemetry & related issues has been highlighted since long in OCC/TCC/test meeting/other meetings still analog & digital telemetry availability is poor.

Members may discuss and ensure reliability of data.

B.35 Reliability Issues (Agenda by NRLDC)

a. Computation of TTC/ATC of respective control areas

Assessment of import / export capability of a region/state control area is a dynamic process and should be done on at least monthly basis and revised as per load generation & network scenario. As per CERC regulation each state control area has to compute its TTC/ATC in co-ordination with NRLDC. It has been discussed in various previous OCC/TCC meeting also and considerable progress has also been noticed. Punjab, Uttar Pradesh SLDC are active in assessing their state control area import capability in co-ordination with NRLDC. However, computation of transfer capability on monthly basis is yet to be done. Other states e.g. Haryana, Rajasthan, Delhi, are exchanging the basecases with NRLDC, TTC computation report is still awaited from these SLDCs. All the other states i.e. Uttarakhand, Himachal Pradesh, Jammu & Kashmir & Chandigarh are yet to start the TTC/ATC study.

It is requested to kindly start the computation of transfer capability of its own state control area, sharing the basecase & reports along with likely reliability issues under N-1 contingency, preventive action plan to mitigate such reliability issues, feedback to planner etc. for better Grid operation.

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

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

State	TTC during Summer-18 (MW)	Constraints expected	Actions required
Punjab	State own generation= 5970 MW (High hydro) TTC= 6600 MW (on managing the load locally at Rajpura and Amritsar ICTs) ATC= 6000 MW (Considering reliability margin as 600 MW) TTC figure is dependent on state own generations, its connectivity at various voltage level also, therefore in case Talwandi and Rajpura. Generation reduced, loading on 400/220 kV Moga ICTs would increase.	N-1 compliance issue at Rajpura, Amritsar, Dhuri, Makhu ICTs Numbers of 220kv lines are also loaded	• Increase in generation at 220kV level would help in meeting high demand & also improve voltage profile. • New 220kV lines may be planned to relieve the loading on ICTs and to meet loads through paths that are less loaded.
UP	State own generation= 10590 MW TTC= 12300 MW ATC= 11700 MW (Considering reliability margin as 600 MW) As stated above, this ATC figure is for one snapshot at high state own generation. Change in generation at 400kV or 220kV generating station	N-1 compliance issue at Lucknow (UP), Lucknow (PG), Obra, Sarnath ICTs Numbers of 220kv lines are also loaded	• Monitor and ensure N-1 compliance at Lucknow(PG), Obra, Azamgarh, Moradabad, Gorakhpur (PG) etc. • Expedite commissioning of underlying n/w at recently commissioned 765kV & 400kV stations to reduce loading on other heavily loaded lines and ICTs

	may change the import capability.		• Ensure sufficient generation and units on bar so as to meet demand adequately without violating ATC
Delhi	State own generation= 584 MW (No generation at BTPS) TTC= 6500 MW ATC= 6200 MW (Considering reliability margin as 300 MW)	N-1 non-compliance issue at Bamnoli ICTs and high loading at Harshvihar ICTS and 220 kV Ballabhgarh-BTPS lines	• Loading on 220 kV Harsh Vihar - Preet Vihar - Patparganj to be monitored closely and new arrangements to feed the load to be worked on
Haryana	TTC: 7500 ATC: 6900	• N-1 non-compliance at Fatehabad, Abdullapur and Panipat • 220kV lines from Hisar, Lula ahir, Abdullapur etc. are heavily loaded	• 220kV Hisar(PG)-Hisar(IA), 220kV lines from Lula ahir, 220kV Abdullapur-Jorian and other 132kV lines are heavily loaded and need to be strictly monitored. • Alternate arrangement for reducing loading on above lines need to be expedited.
Rajasthan	(Generation : 4890MW) TTC: 6200 ATC: 5600 (Generation : 6390MW) TTC: 5000 ATC: 4400	• N-1 contingency of Phagi, Jodhpur & Merta ICTs • Constraint for evacuation of power from Rajwest • High loading of ICTs at Akal and need for reactive power support	• Expedite commissioning of 3rd ICT at Phagi • New ICT to be planned at Jodhpur and Akal • Expedite commissioning of 400kV Rajwest-Barmer # 2 bays at Barmer end by RRVPNL

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

B.36 Increasing fault level (Agenda by NRLDC)

Fault level at 400kV nodes in Northern region has increased above 40kA at various locations i.e. fault level at 400kV Dadri, Mandola, Bawana ~60 kA, Meerut, Bhiwani, Kanpur, Ballabhgarh, Agra, Jhatikara, Mundka, Gr.Noida > 50kA, whereas Abdullapur, Hisar, Dhanoda, Mahindergarh, Kabulpur, Daultabad, Gurgaon, CLP Jhajjar in Haryana, Moga, Jallandhar in Punjab, Bassi, Neemrana, Jaipur in Rajasthan, Allahabad, Panki, Lucknow, Balia, Bareilly, Anpara in Uttar Pradesh has crossed 40kA.

Recently, Series line reactor (single phase unit of 75 MVAr, 12 ohms) of 400kV Dadri-Mandola-I & II at Mandola end has been synchronized on 4th & 5th Dec 2018 respectively. Series Bus reactor at Mandola & Ballabhgarh end has also been charged on 2nd Nov 18 & 29th Nov 18 respectively as approved in 32nd standing committee meeting (SCM) of NR dated 31st Aug 2013

Impact after installation of Series Reactors at Dadri, Ballabhgarh and Mandola

As per offline simulation study, three phase short circuit level in kA at Dadri, Mandola & Ballabhgarh has reduced by ~ 10, 20 & 14kA respectively, it means at present fault level at Dadri is ~ 50kA, Mandola ~ 39kA and at Ballabhgarh is ~ 40 kA. However, pre-charging study of series line reactor by POWERGIRD is yet to be submitted to NRLDC. The same has been highlighted and discussed in 40th TCC-43rd NRPC wherein POWERGRID agreed to submit the dynamic study report and again highlighted in 156th OCC meeting wherein POWERGRID complied to submit the study report & data pertaining to series line reactor. However, data & study report is yet to be received.

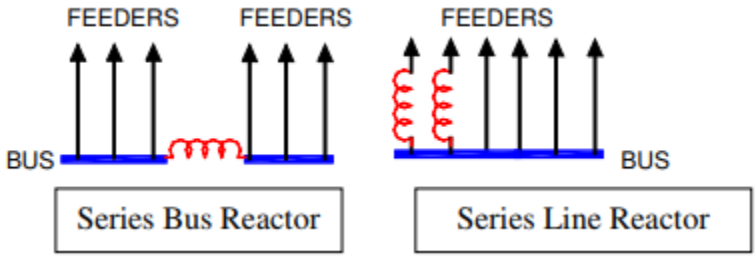


Table below shows a few cases of similar faults (Fault scenarios may differ based on fault nature e.g. fault distance, fault impedance etc.) occurred before and after the installation of series reactor. The fault current is considered from the Ballabgarh end DR submitted by POWERGRID.

Cases of fault in lines emanating from Ballabgarh before 05-Dec-18,

Cases of fault in lines emanating from Ballabgarh before 05-Dec-18,

Faulted line	Date	Time	Voltage Dip, kV	Fault current, kA
400kV Ballabgarh-Nawada	1-Oct-18	10:53hrs	81	22
400kV Ballabagarh-Mainpuri-1	13-Oct-18	17:05hrs	187	7.7
400kV Ballabagarh-Mainpuri-1	15-Oct-18	20:40hrs	214	3.3
400kV Ballabagarh-Kanpur-2	15-Sep-19	13:04hrs	220	1.1
			Median	***5.5***
			Average	***8.5***

Faulted line	Date	Time	Voltage Dip, kV	Fault current, kA
400kV Ballabagarh-Nawada	30-Dec-18	03:14hrs	88	15.6
400kV Ballabagarh-Agra	6-Dec-18	22:53hrs	180	7.2
400kV Ballabagarh-Agra	19-Dec-18	18:46hrs	202	2.6
400kV Ballabagarh-Kanpur-2	25-Dec-18	12:31hrs	310	2.2
			Median	***4.9***
			Average	***6.9***

From above, it is observed that the fault current has been reduced slightly after the installation of series reactors.

B.37 Mock testing of SPS at 765kV Agra-Gwalior D/C (Agenda by NRLDC)

The WR-NR inter-regional corridor has been strengthened after the commissioning of 765kV Gwalior-Orai, 765kV Satna-Orai, 765kV Jabalpur-Orai D/C. However, the existing high capacity 765kV Agra-Gwalior D/C remains an important link between WR-NR. The mock testing of the aforesaid link has been carried out a number of times. However, the last mock exercise was carried out around 2 years ago on 05-Jan-17.

In 115th OCC meeting held on 16-Sep-15 & a meeting of the group regarding review of SPS for contingency of 765kV Agra-Gwalior dated 21-Oct-15, it was decided to map additional 1000MW of load for shedding during SPS operation of Agra-Gwalior. As per the group meeting, the above additional load was to be identified and mapped within 6 months. However, after more than 3 years the revised quantum mapping is yet to be realized on field.

In 155th OCC meeting, POWERGRID informed that once the terminal connections of the state substations are done, the mock testing can be carried out. Further, POWERGRID was advised to pursue with the concerned utilities and get the work done at the earliest so that mock testing of the scheme may be conducted in the first week of

February 2019. However, neither the work was completed by first week of February 2019 nor any information of the completion of work has been received.

The 3 years period in revision of scheme in the ever changing power system seems to be very long and might have brought in any contingency due to this delay. Meanwhile HVDC Champa-Kurukshetra Bipole has also been commissioned for which no separate SPS has been designed considering the revised SPS of 765kV Agra-Gwalior would take care under contingency/outage of HVDC Champa-Kurukshetra.

In view of importance of such vital links & impact under their contingencies, utilities are requested to expedite the completion of work & update status to NRPC. Further, it is proposed to carry out the mock testing of the SPS with revised scheme by fourth week of March'19.

Members may discuss.

B.38 Requirement of power flow and dynamics data for modeling renewable energy generation in Indian grid

In view of 175 GW of generation integration from renewable energy (RE) sources, variability of RE generation, haul of power over large distances through EHV lines, change in pattern of loads connected to the grid, increasing share of power electronic based equipment and a reducing share of rotating mass in the electric grid are likely to pose new challenges in stable operation of power systems.

To ensure security of the interconnected power grid, it is imperative to conduct stability studies in both operational (short-term) and planning (long-term) horizons in the power grid. To gain confidence in the stability studies that adequately represent system performance, fit-for-purpose models of power system elements are of utmost importance.

Accordingly, guidelines for collection of data for modelling utility scale wind and solar generation installations in India have been prepared by POSOCO and enclosed in **Annex-40.1**. The same may be adopted as broad guidelines for collection of information for fit-for-purpose models for steady-state and dynamic simulations. The necessary data for modelling need to be furnished prior to interconnection with the grid. The same has been highlighted in 155th OCC meeting for wide information to members and their feedback.

Moreover, Dynamic data & its importance for stability studies has been highlighted and discussed in 31st TCC-35th NRPC meeting wherein it was apprised that POSOCO had made a presentation on "Dynamic data of Generator Models required in PSSE for Simulations" in the 110th meeting of OCC held in April 2015. The formats for compiling complete generator parameters have also been made available on NRPC website to facilitate collection of generator parameters for simulation studies. All the user agreed to submit the data as per desired format. Dynamic data of conventional generator are still

pending from various agencies. Latest status of dynamic data submission is enclosed in **Annex-40.2.**

Renewable generators of Rajasthan/SLDC Rajasthan, Solar developers in Punjab & UP or Punjab & UP SLDC also need to furnish respective data for offline steady & stability studies. Till date, no information/data for modeling submitted by any SLDC/Renewable power developer.

Members may please deliberate to expedite the dynamic data submission for stability studies.

B.39 Grid Events in Northern Region during Oct'18-Jan'18 period:

A total 79 number of CEA standard based Grid Events have occurred in Northern Region in Oct'18 to Jan'19 period. The number is more than 1.5 times than the last year figure of same period.

Monthly GD/GI summary is given below:

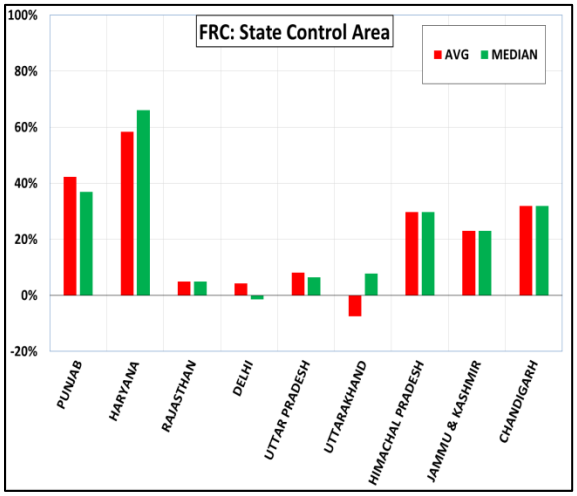
Month	Event Category		Event Share (in %)	Fault duration > 100ms/160ms
	GD	GI		
Oct'18	7	7	12%	36%
Nov'18	3	11	12%	29%
Dec'18	7	14	19%	24%
Jan'19	12	18	27%	17%
Total	29	50	70%	5%
GD as % of total		**37%**	**Fault duration > 100ms/160ms for almost every third event**	
GI as % of total		**63%**		

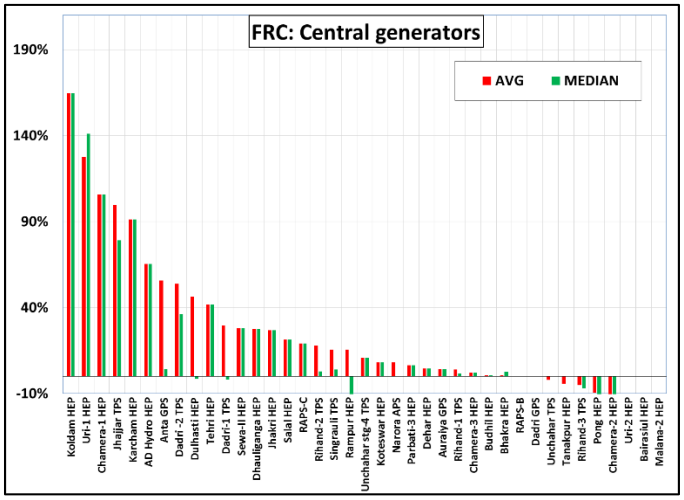
These tripping events have been discussed in various OCC, PSC and other special meetings. From the above, it could be observed that during the past four-month period there are two grid event occurrence in almost every three days.

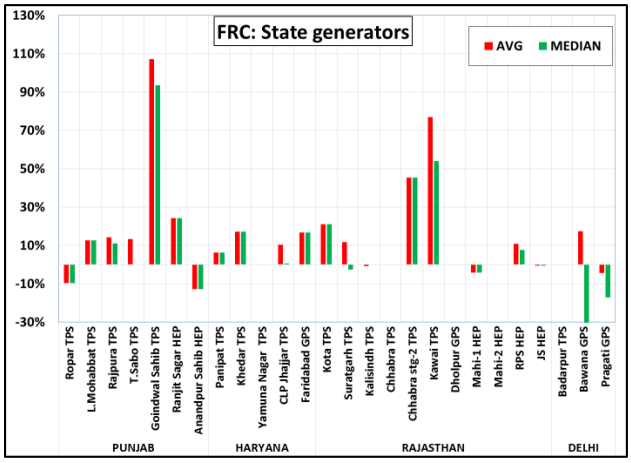
Members may like to discuss plans for reducing such tripping events and for quality analysis and implementation of remedial measures.

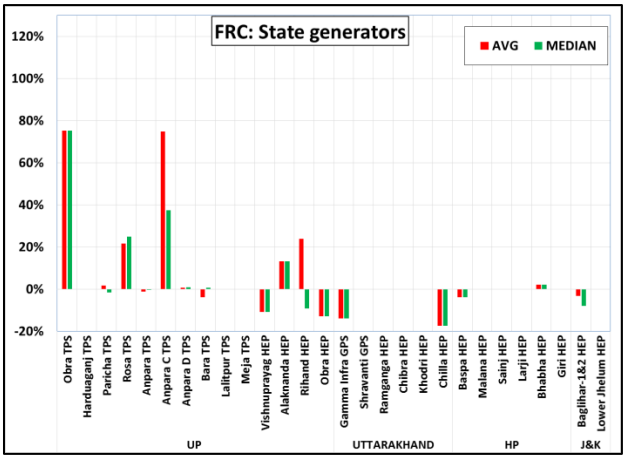
B.40 Frequency response characteristic of NR control area from Oct'18-Jan'19:

Three FRC based events occurred during Jun-Sep'18. The response as calculated at NRLDC (using SCADA data) is shown in the plots below:









The following could be summarized from above details:

- Among the State control area, Punjab, Rajasthan and UP have showed improvement in the FRC. The reason for above could be observed as the improvement in FRC of state control area.
- Among the central generators, Koldam HEP, Uri-I HEP, Chamera-I HEP, Jhajjar TPS, Karcham HEP have good FRC of more than 75% of ideal response. The response of almost all other hydro stations is less than 40% of ideal response.
- Among the state control area generators, Goindwal Sahib TPS, Kawai TPS, Obra TPS, Anpara-C TPS showed good response.

Member may discuss the respective Frequency Response Characteristics as analyzed and measures to improve the same.

Members may please deliberate.

B.41 Capacity Building for Power System Engineers:

It is in respect of POSOCO's initiatives on "Capacity Building" in the last one year. In this direction, POSOCO has imparted 211 man-days training to various constituents' officers during 2018 in which participants from SLDCs were also invited. POSOCO has made over 100 training/capacity building programs in India during 2018.

In practice of continuous improvement, it is important to take review and suggestions from the constituents/Participants for better understanding of their requirements. Therefore, it is requested to all the constituents of Northern region to discuss & share their views as POSOCO is in process of finalizing training programmes of HRD calendar for 2019.

Dir (HR), POSOCO will give a short presentation on various initiatives & activities in respect of capacity building programmes.

Members can give suggestions/feedback to further enhance the effectiveness of POSOCO's capacity building programmes

B.42 Agenda proposed by NRPC in 8th NPC of CEA:

B.42.1 **Periodicity of Third Party Protection Audit:**

The third party protection audit should be carried out periodically and frequency of the same should be 5 years and that after finalization it should be deliberated in the NPC for uniformity at national level. The issues were further deliberated at length in the 39th TCC/42nd NRPC meetings held on 27.06.2018 and 28.06.2018 respectively. TCC recommended and thereafter NRPC approved the recommendations of 35th Protection Sub Committee, 5 years periodicity of third party audit and that the audit can be carried out through any agency out of the list of reputed agencies carrying out protection audit as drawn by Power Sub Committee of RPCs.

NRPC in its 42nd Protection sub-committee meeting held on 28th June 2018, had approved 5 years periodicity of third party audit and that the audit can be carried out through any agency out of the list of reputed agencies carrying out protection audit as drawn by Power Sub Committee of RPCs.

MS NRPC requested for common view of RPCs about the periodicity and agency to be authorized for Third Party Protection Audit for uniformity at National level.

WRPC: For third party protection audit a suitable format is to be developed first.

NLDC & SRPC: The formats available in the reports of M/s Tractebel, Romania could be used.

ERPC: Periodicity, priority of protection audit in a region, either engaging consultant or auditing by the team formed by RPCs, should be at the discretion of respective RPCs.

SRPC endorsed the views of ERPC. After deliberation, it was decided each RPC could have their own arrangements for carrying out the third party protection audit. They may use the audit format template in the reports of Consultant M/s Tractebel Engineering S.A., Romania .

Members may kindly take note.

B.42.2 **Uniform timeline for issuance of Availability Certificate**:

NRPC informed that the timeline for certification of TAFM as approved in the 12th meeting of Commercial sub-committee of NRPC dt. 08.06.2009 is as under:

i) POWERGRID/Transmission Licensee would send the Transmission System availability to NRLDC with copy to NRPC by 2nd of the month

ii) NRLDC would put the data on its website on the same day and invite comments on the data from constituents with 10 days. In case of non-receipt of the comments by the time period, it will be taken as no comments from the constituents.

iii) NRLDC would then verify the data taking into account the comments received from the constituents and furnish the same to MS (NRPC) by 18th day of the month.

iv) Member Secretary would certify the TAFM by 25th of the month.

In the 36th CSC meeting of NRPC held on 11th June 2018, POWERGRID stated that the time lines were not being followed for last few months. NRPC informed that NRLDC was facing practical difficulties in following the timelines. It was stated that since 2009 the number of transmission licences as well as number of elements have increased multi fold. Hence, the timelines specified in the 12th CSC meeting for verification of outage are not sufficient. The forum was requested to review the timeline specified in the procedure keeping in view the number of Transmission Elements and new Transmission Licensees.

Deliberation/Decision in the 8th NPCmeeting:

It was observed that there was no issue in other regions in respect of timeline for issuance of availability certificate, and the issue proposed by NRPC is purely regional in nature. NRPC may review the timeline specified in the procedure.

Members may kindly take note.

B.42.3 **Uniformity in methodology for Open Cycle Certification:**

NRPC informed the following:

i) In the 36th CSC meeting held on 11th June 2018, NTPC stated that the guidelines /procedure finalized for certification of open cycle generation of gas based generating stations in the NR does not cover certification of open cycle generation in the following instances: During stopping of GT (i.e. the duration when GT is disconnected with ST and then stopped) - The same is being certified by WRPC as per NTPC Starting of GTs under RRAS (an incentive

of 50 paisa is already being provided) and mechanism of commercial settlement of the same. The CSC decided that the matter may be referred to NPC to ensure a uniform practice in all regions regarding open cycle certification of CCGT stations by different RPCs.

ii) During the months of September-November 2017, there were several instances when NTPC gas based stations were operated under open cycle mode when schedule was given under RRAS. Since the units were operated under instructions of NRLDC, NTPC has claimed for certification of open cycle generation in those instances. NTPC started submitting variable charges for open cycle mode of operation in AS1 formats submitted to NRPC from 16.11.2017. Before that, only one rate of variable cost for each fuel type was being submitted and merit order prepared accordingly. Certifying open cycle generation revised billing according to this would result in post facto revision in variable charges.

iii) As such, certification of open cycle generation in under RRAS may be discussed in NPC meeting to ensure uniformity in methodology to be adopted by all RPCs.

Deliberation / Decision in the meeting:

After deliberation, it was decided that the issue may be discussed in the respective forum of all the RPCs and the outcome would be communicated to NPC Secretariat for inclusion in the next meeting of NPC.

Members may kindly discuss.

B.42.4 **Automatic Under Frequency Load Shedding (AUFLS) Scheme and Mapping of Feeders.**

8th NPC agreed for the AUFLS scheme with 4 stages and raising the frequency by 0.2 Hz viz. 49.4, 49.2, 49.0 & 48.8 Hz. The quantum for AUFLS would be reworked by NPC Secretariat based on the deliberation. It was also decided that, NRPC may appoint a Consultant from their own resources as proposed by MS (NRPC) for studying the AUFLS scheme for Indian grid and submit the study report to NPC Secretariat within a time of six months.

The revised load relief for AUFLS computed by NPC Secretariat would be discussed along with the report of Consultant appointed by NRPC (if available), in the next meeting of NPC which would be held in the month of May, 2019.

It is proposed that for study on "Determination of quantum for AUFLS" would be got done done by NRPC for All India –Region as well as State wise from a reputed consultant. The order will be placed with due approval of NRPC Chairman and the cost for the study shall be booked to NRPC fund.

B.42.5 **National Energy Account (NEA)**

In the 7th meeting of NPC, MS, SRPC had expressed concern on the proposal of amendment in CBR in respect of inclusion of Preparation and issuance of National Energy Account (NEA) for inter-regional and inter-national energy transactions by NPC Secretariat, as the same was not deliberated in RPC forums. Member Secretary, NPC had clarified that while processing the proposal of membership of NLDC in NPC, MoP had raised some quires/observations and sought comments of CEA. One of the observation was that considering the changing scenarios, the functions of NPC may also be broadened including the functions of maintain the National Energy Account involving the inter-national and inter-regional transmission transactions. Accordingly, comments of CEA had been furnished to MoP.

The following was recorded in the 07th meeting of NPC:

NLDC had informed that the issue of creation of National Pool account was under deliberation in various forums in view of the formation of all India grid. Interregional transactions needed to be accounted at national level and with the formation of National Power Committee it is possible also. Chairperson, NPC had suggested that an agenda in this regard with detailed procedure / institutional arrangement etc. could be presented by NLDC in the next meeting of NPC, and the same was agreed.

NLDC vide letter dated 09th November 2018 has furnished agenda note on National Energy Account & National Deviation Pool Account ***(Annexure B.42.5****). NLDC has stated that in order to streamline the accounting and settlement at national level there is a need for implementing a National Deviation Pool based on the National Energy Account. Summary of the proposed methodology is as follows:*

(a) Scheduling: Scheduling interregional transactions on a net basis for each region. NLDC shall communicate the net inter-regional schedules to the NPC for accounting.

(b) Metering: SEM data shall be collected by the RLDCs, processed meter data shall be made available to NPC through NLDC.

(c) Accounting & Settlement:

Based on the scheduling and meter data provided, NPC shall prepare the National Energy Account (NEA) including the National Deviation Account for the inter-regional and trans-national transactions. The NEA will reflect the payables/receivables for each region on a net-basis and this amount shall be payable/receivable to the National Deviation Pool Account which shall be operated by NLDC. The NEA shall also reflect the cross-border or trans-national transactions and the neighboring countries shall be paying/receiving to/from the National Deviation Pool Account operated by NLDC. Payment to the National DSM Pool shall have the highest priority.

(d) Handling Surplus/Deficit in Regional Pool Accounts and transfer of residual to PSDF:

Once the National DSM Pool becomes operational, all residual/surplus amount in the regional DSM pools shall be transferred to the National

DSM pool account. The NPC accounts would also facilitate the transfer of funds from the surplus available in the National DSM pool to the deficit regional DSM pool accounts as a single transaction thereby simplifying the process. Once all liabilities have been met, any residual in National DSM Pool shall be transferred periodically to the PSDF in accordance with the extant CERC Regulations. Suitable changes/modifications are required to be carried out in the IEGC and DSM Regulations and the functions of NPC also need to be recognized in the regulatory frame work.

Deliberation / Decision in the meeting:

MS (NPC): *While processing the proposal of membership of NLDC in NPC, MoP had raised some queries/observations and sought comments of CEA. One of the observation was that considering the changing scenarios, the functions of NPC may also be broadened including the functions of maintain the National Energy Account involving the inter-national and inter-regional transmission transactions. The proposed functions of NPC Secretariat regarding NEA are (i) collection of data from NLDC on weekly basis (Interregional and International scheduled energy and actual energy data), (ii) preparation of Weekly NDSM & Reactive Energy Account (if required) and (iii) preparation of monthly NEA.*

NLDC: Made a presentation on the proposal. Summary of the proposed methodology is as follows: (a) Scheduling: Scheduling interregional transactions on a net basis for each region. NLDC shall communicate the net inter-regional schedules to the NPC for accounting. (b) Metering: SEM data shall be collected by the RLDCs, processed meter data shall be made available to NPC through NLDC. (c) Accounting & Settlement: Based on the scheduling and meter data provided, NPC shall prepare the National Energy Account (NEA) including the National Deviation Account for the inter-regional and trans-national transactions. The NEA will reflect the payables/receivables for each region on a net-basis and this amount shall be payable/receivable to the National Deviation Pool Account which shall be operated by NLDC. The NEA shall also reflect the cross-border or trans-national transactions and the neighboring countries shall be paying/receiving to/from the National Deviation Pool Account operated by NLDC. Payment to the National DSM Pool shall have the highest priority. (d) Handling Surplus/Deficit in Regional Pool Accounts and transfer of residual to PSDF: Once the National DSM Pool becomes operational, all residual/surplus amount in the regional DSM pools shall be transferred to the National DSM pool account. The NPC accounts would also facilitate the transfer of funds from the surplus

available in the National DSM pool to the deficit regional DSM pool accounts as a single transaction thereby simplifying the process. Once all liabilities have been met, any residual in National DSM Pool shall be transferred periodically to the PSDF in accordance with the extant CERC Regulations. Suitable changes/modifications are required to be carried out in the IEGC and DSM Regulations and the functions of NPC also need to be recognized in the regulatory frame work.

NRPC: *As per CBR of NPC, agenda for NPC meeting shall be put up after discussions in RPCs. As such, the proposal should be first discussed in RPCs before taking up in the meeting of NPC.*
Other RPCs endorsed the view of NRPC.

MS (NPC): *As per clause (7.4) of CBR of NPC, Member Secretary, NPC may also put any agenda involving urgent matters/policy issue directly in consultation with Chairperson, NPC. The proposal on NEA was obtained from NLDC and put up for deliberation in the meeting, after considering the fact that it is a policy issue. The same was also decided in the 07th meeting of NPC. This was also endorsed by Chairperson, CEA & NPC.*

After deliberation, it was decided that the proposal may be discussed in all the RPCs and the observations of RPCs may be furnished to NPC Secretariat. The observations of RPCs may be put up for consideration in the next meeting. RPCs may include the proposal as an agenda item in their upcoming meetings for deliberations and RPCs agreed for the same.

Members may kindly discuss.

C. COMMERCIAL and TeST ISSUES

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

C.1.1 The details of outstanding dues are as under:

THDC (as on 08.02.19)

S. No	Discoms	Total Outstanding including Surcharge (Rs. in Cr.)	Total Outstanding due for > 60 days (Rs. in Cr.)	LPS outstanding (Rs in Cr.)	Remarks
1.	BRPL, Delhi	173.84	134.04	124.30	**(A) Payment due for the bills raised in the months** (i) For Energy bills - Dec'18 to Feb'19 (ii) For LPSC bills - **Aug'13 to Feb'19** (B) BRPL is deducting TDS on LPS bills but not releasing balance payment.
2.	BYPL, Delhi	278.22	267.91	141.93	**(A) Payment due for the bills raised in the months** (i) For Energy bills- **Jan'15 to Feb'19** (ii) For LPSC bills - **Mar'11 to Feb'19** (B)BYPL is deducting TDS on LPS bills but not releasing balance payment
3.	PDD, J&K	216.64	151.26	15.35	**Payment due for the bills raised in the months** (i) For Energy bills - June'18 to Feb'19 (ii) For LPSC bills - June'18 to Feb'19
4.	UPPCL, UP	1435.38	1094.33	307.26	**(A) Payment due for the bills raised in the months** (i) For Energy bills - June'18 to Feb'19 (ii) For LPSC bills - **Jan'17 to Feb'19** **(B)UPPCL has stopped verification of LPS bills**

5.	PSPCL, Punjab	59.55	0.74	1.06	**(A) Payment due for the bills raised in the months** (i) LPSC bills - **Jul'16 to Feb'17** and Jan'19 to Feb'19 **In last TCC & NRPC meetings, PSPCL committed for release of LPS payment but only part payment has been released.**
6.	JdVVNL, Rajasthan	37.45	16.56	0.24	**Payment due for the bills raised in the months** (i) For Energy bills - Nov'18 to Feb'19 (ii) For LPSC bills - Feb'19

C.1.2 UP's bill amount works out to approx. 46% of total energy billing and thus cash flow of THDCIL largely depends upon the revenue received from UP. It has been observed that monthly average payment released by UP during FY 2018-19 is much lower than the monthly average billing and the same is adversely affecting THDCIL's financial commitments.

NHPC (as on 17.02.19)

(Amount in Rs crore)

Sl. No.	Beneficiary	Principal Dues	Outstanding Dues of more than 60 days	Surcharge up to 30.11.2018	Total Dues including Surcharge
1.	PDD, J&K	658.32	554.55	73.54	731.87
2.	UPPCL, UP	820.57	691.92	48.64	869.21
3.	JdVVNL, (Hydro Power) Jodhpur	35.33	18.09	0.78	36.10
4.	JdVVNL (Wind Power), Jodhpur	17.59	15.30	1.08	18.66

C.1.3 Due to non-payment by above defaulting beneficiaries, NHPC is finding it very difficult to meet the debt service obligations and O&M of its power stations. NHPC is a public listed company and is answerable to its stake/share holders and such a huge outstanding balance is also attracting specific attention of the audits.

SJVNL (as on 14.02.19)

S.No.	Beneficiary	Total Dues including Surcharge (in Rs Cr.)	Remarks
1.	Govt. of HP/HPSEB	339.63	Regulation notice was issued twice, however due to assurance in writing by PDD, J &K for release of payment shortly, it was withdrawn. Regulation of power which was issued on 09.11.2018 was withdrawn on 22.11.2018 on the assurance that over dues amount will be cleared by UPPCL
2.	PDD, J&K	196.58	
3.	UPPCL, Uttar Pradesh	172.91	
4.	JDVVNL	4.08	
5.	BYPL, Delhi	74.09	

NPCIL (as on 31.01.19)

S.No.	Beneficiary	Total Dues including Surcharge (in Rs Cr.)	Remarks
1.	UPPCL, Uttar Pradesh	541.67	Total outstanding from RAPS is Rs 905 crore and from NAPS is Rs 443 crore as on 31.01.2019.
2.	J&K	382.83	
3.	BYPL (DELHI)	210.09	
4.	BRPL (DELHI)	14.04	
5.	JDVVNL, JODHPUR	84.92	
6.	HWB (KOTA)	43.66	
7.	JVVNL, JAIPUR	7.94	
8.	UPCL (UTTARANCHAL)	25.12	
9.	AVVNL, AJMER	31.38	

POWERGRID (as on 11.02.19)

Rs. in Cr.

S. No.	DIC	60-90 days dues	>90 Days dues
1.	UP	342.61	199.83

2.	KSK Mahanadi(UP)	54.88	61.3
3.	RAJASTHAN (JODHPUR) JDVVN	37.21	0
4.	HARYANA	0	75.73
5.	JAMMU AND KASHMIR	46.29	109.98
6.	RKM POWERGEN	12.38	0
7.	GMRKEL	6.48	0
8.	MB POWER	19.95	0
9.	LANCO BUDHIL HYDRO	0.22	6.89
10.	HIMACHAL SORANG	0	67
11.	LANCO BUDHIL (PTC)	0	25.08

C.2 Opening of Letter of Credit (LC)

C.2.1 As per mutually signed Power Purchase Agreement, beneficiaries have to submit a confirmed, revolving, irrevocable Letter of Credit for an amount equivalent to 105% of average monthly billing of preceding 12 months with appropriate bank as mutually acceptable to parties. The LC shall be kept valid at all the time during the validity of the Power Purchase Agreement. This matter had been discussed regularly in various Commercial Sub-committee meetings as well as TCC and NRPC meetings. However, the following beneficiaries are yet to submit the requisite LoC for the FY 2018-19.

Utility	Beneficiary	LC Amount	Remarks
SJVNL	PDD, J&K		Request letters for issue of letter of credit for 2019-20 have also been issued. Beneficiaries are requested to issue letter for credit for 2019-20.
	BRPL, Delhi		
	BYPL, Delhi		
	HPSEBL		
	UPCL, Uttarakhand		
NPCIL	PDD, J&K	Rs. 43.23 crores (Rs. 28.48 crores for Rawatbhata Unit and Rs. 13.18 crores at Narora and Rs.1.62 crores at Tarapur	J&K PPD have not provided the letter of credit till now. The LC is required as per PPA /Power Allocation.
	UPPCL, UP	Rs. 77crores Rs. 44 crores for Rawatbhata unit and Rs.33 crores for Narora	UPPCL have only provided LC for Rs. 2.40 crores revolving 5 times a month

			against our requirement of Rs. 77 crores as per PPA
NHPC	PDD, J&K	The amount of LC to be opened by each beneficiary has already been intimated to them.	In spite of regular follow up, PDD (J&K) and BRPL(Delhi) have not provided LC till now
	BRPL (Delhi)		

Members may kindly discuss.

C.3 Recent CERC Orders/draft Regulations

C.3.1 **Fast Response Ancillary Services (FRAS) – implemented w.e.f. 26.11.2018**

CERC vide suomotu order dated 16th July 2018 directed the implementation of FRAS and pilot project for 5-minute metering. Consequently, FRAS got implemented w.e.f. 26th Nov'18. As per CERC directions, FRAS is to be carried out by NLDC across multiple regions (NR, ER and NER). Approved Procedure for FRA is enclosed in **Annex-C.3.1**.

Since implementation of FRAS, some of advantage observed are as:

- Introduction of fast tertiary response in India
- Layer of Centralized Fast Response Ancillary Despatch (from regional to national level)over Decentralized Layer of Scheduling Process
- First time 5-minute scheduling, despatch, accounting and settlement
- Customised FRAS software solution developed In-house.
- Optimization of Hydro generation
- Improved Handling of Frequency Spikes
- Benefits to stakeholders – Hydro Generators & State Utilities
- Freedom and Choice available to states retained
- Cost of Implementation low
- All constraints honoured in FRAS despatch

C.3.2 **Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters)(Fourth Amendment) Regulations, 2018- implemented w.e.f 01.01.19**

CERC notified Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) (Fourth Amendment) Regulations, 2018 on 20.11.2018 which have been implemented w.e.f. 01.01.2019. The salient provision of draft Regulations are:

i. Deviation Price linked to Daily Average Area Clearing Price discovered in the Day ahead market of Power Exchange

ii. The frequency band for deviation pricing has been tightened from 50.05 – 49.70 to 50.05 – 49.85

iii. Cap Rate for deviation of 303.04 paisa /kWh has been changed to Cap rate being equivalent to the energy charges as billed for the previous month for the generators whose tariff is determined by the commission.

iv. For other Generating stations, irrespective of the fuel source, the deviation from the scheduled generation shall not exceed the cape rate of 303.04 Paisa/kWh

v. Regional entity shall have to make sign of their deviation from schedule changed, at least once after every 6 time blocks. In the event of sustained deviation from schedule in one direction (Positive or negative) by any regional entity shall attract an additional surcharge of 20% of the daily base DSM Payable /receivable.

C.3.3 **Central Electricity Regulatory Commission (Open Access in inter-State Transmission) (Fifth Amendment) Regulations, 2018 - notified on 02.01.2019**

C.3.4 **Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) (Seventh Amendment) Regulations, 2019 – notified on 09.01.2019**

C.3.5 **Suo-motu Order for Pilot on Security Constrained Economic Dispatch (SCED) of Inter-State Generating Stations (ISGS) Pan India- to be implemented w.e.f. 01.04.19**

Hon'ble Commission Order in Petition No. 02/SM/2019 (Suo-Motu) dated 31st January, 2019, (http://cercind.gov.in/2019/orders/02-SM-2019.pdf) directed for Pilot on SCED of Inter-State Generating Stations (ISGS) Pan India.

The Central Commission observed that there is an overarching objective to optimize the scheduling and dispatch of the generation resources and reduce the overall cost of production of electricity without major structural changes in the existing system/framework. SCED is a desired step in the Indian grid operation towards optimization methodologies. SCED is an involved procedure requiring developing software, creating interfaces and establishing various protocols, information dissemination and streamlining settlement system etc.

Accordingly, the Commission directed for pilot of SCED for the Inter-State Generating Stations, on pilot basis, w.e.f. 01st April, 2019.

A Detailed Procedure would be formulated by POSOCO in line with CERC directions that would contain the guidelines regarding operational aspects of SCED including scheduling, dispatch, accounting, settlement etc.

NLDC communication vide its letter dated 4th Feb 2019 on above subject for stakeholder's awareness in implementing pilot basis for SCED is enclosed in **Annex-C.3.5**

For kind information to members

C.3.6 **Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019 - notified on 07.03.19**

C.4 Declared Capacity (DC) of SJVN's Generating Stations (Agenda by SJVN)

C.4.1 CERC by its order dated 11.07.2018 in the petition no 74/MP/2018 for consideration of declared capacity of NJHPS & RHPS, directed NRLDC to revise the DC and PAF of the concerned generating stations from the date of implementation of Fifth Amendment to the Grid Code.

C.4.2 Accordingly, calculation towards revision of DC has been forwarded by SJVN to NRLDC on 31.07.2018 for the revision of DC of NJHPS & RHPS w.e.f May, 2017 subsequent letter on 25.09.2018.

C.4.3 NRPC on 24.10.2018 has issued the amendment in final REA from November, 2017 to March, 2018. However, amendment in the REA for balance period is yet to be issued in line with above mentioned CERC order.

C.4.4 Members may impress upon NRLDC/NRPC for revision of DC & issuance of amendment in REA.

C.5 4th amendment of Deviation Settlement Mechanism Regulations, 2014 (Agenda by TPDDL)

C.5.1 With reference to implementation of Central Electricity Regulatory Commission (CERC) published 4th amendment of Deviation Settlement Mechanism Regulations, 2014 which come into force from 01.01.2019.

C.5.2 The key aspects of this amendment are:

1. The upper limit for the frequency have been changed to **50.05** from 50.10 and the lower limit for frequency have been changed to **49.85** from 49.70.
2. Deviation charges have been linked to Daily average Area Clearing Prices (ACP) of the exchange on a daily basis with maximum ceiling limit 800 Paise/kWh at 49.85 Hz.
3. In the event of sustained deviation from schedule in one direction (positive or negative) shall attract an additional surcharge.

C.5.3 The objective of these regulations is to maintain grid discipline and security as envisaged under the Grid Code through the commercial mechanism for Deviation Settlement. The Additional Charge for Deviation are introduced with stringent limit on over and under drawl.

C.5.4 Cause regarding sustained deviation of regulation is re-produced below:

"In the event of sustained deviation from schedule in one direction (positive or negative) by any regional entity, such regional entity (buyer or seller) shall have to make sign of their deviation from schedule changed, at least once, after every 6 time blocks. Provided that violation of the requirement under this clause shall attract an additional surcharge of 20% on the daily base DSM payable / receivable as the case may be."

Ineffectiveness of implementing the amendment:

C.5.5 Purpose of commercial implication on sustained deviation is to restrict continuous over drawl from grid to avoid grid disturbance, black outs, frequency deterioration etc. and to encourage states for proper day ahead power arrangement though power exchange.

C.5.6 The key challenge is to ensure a perfect balance between actual drawl (demand) and schedule generation (power purchased). One can manage only demand through load curtailment or one can manage with continuous over drawl from pool irrespective of grid security. However, balancing between demand and supply with constrains of generation scheduling, no load curtailment, weather uncertainty, grid discipline is the crucial challenge.

C.5.7 Any deviation – either quantum or direction is never planned whatever deviation occurs is due to forecast errors. However, to meet the requirement of section 4.19 of the amendment, one is required to plan one's deviation in advance. Hence we believe that the requirement of sign change indirectly promotes gaming. Also if one is to plan for deviation in a particular direction, the natural tendency is to err on the side of caution. As the penalties for sign change are very high, we believe that it could end up increasing the quantum of deviation, instead of decreasing it. It should also be noted that the effect of frequency at the time of sign change has to be ignored, which is not good for the system.

C.5.8 It is appraised that desired frequency improvement is not experienced for Jan'2019 vs Jan'2018 after implementation of 4th amendment. Average frequency of Jan'19 is 49.99 Hz with standard deviation of 0.05642 against average frequency of 49.98 Hz with standard deviation of 0.04835 of Jan'18. The variation in frequency has increased rather than stabilizing under new amendment. There were few rainy days experienced on 7th, 8th, and 21st, 22nd and 25th Jan 2019 which are also contributed for frequency improvement in northern region.

C.5.9 In most of other states in India, scheduling and dispatching is responsibility of state load dispatch center wherein SLDC has a scheduling power and control over schedule and demand of the state. The control over sign changes in these states are achieved by state generation control and load curtailment of rural feeders.

C.5.10 It is to be noted that in Delhi state, Intra-state ABT mechanism is implemented. Under intra-state ABT, DSM charges were cascaded to discom level. Real time demand and schedule management is onus of Distribution Company. In the state like Delhi where discom have obligation of 24 x 7 supply.

C.5.11 There is no tools available at state level to ensure the polarity reversal. Maintaining the polarity reversal at Distribution level, may or may not be helpful in ensuring polarity reversal at state level. Because every distribution utility will manage the schedule as per their demand and collective effect may or may not be useful for state. Load profile of each utilities is different in Delhi at given time hence it become difficult to have synchronized effect on sign change of Delhi state.

C.5.12 As per IEGC 2010 and subsequent amendments stipulates that the scheduling/revision of power should be executed in four time blocks. This timeline is adhered to incase when revision is within region however, the process takes approx. 6 time blocks in cases when seller and buyer are located in different region. Further, the scheduling of URS takes more than stipulated 4 time blocks as consent of multiple parties is involved in the same.

C.5.13 Our major concern is that while going through acceptance procedure of NRLDC and respective SLDC. Message reaches to beneficiary or generator before one or two time block of actual implementation. Ensuring sign reversal without central mechanism at state level is not feasible.

The 4th amendment can be enforced after implementation of following alternatives /proposal:

i. Intra-State Ancillary:

Ancillary services are an indispensable part of the power system operation, which are required for improving and enhancing reliability of the power system. Ancillary Services may include a number of different operations such as frequency support, voltage support, and system restoration.

Hon'ble Commission has issued regulations on Reserves Regulation Ancillary Services (RRAS) which have been in operation for more than a year now on regional level. In view of above, it is now necessary to lay down Intra-state ancillary services for Delhi State. Objective of the proposal of intra-state ancillary services to smooth implementation of 4th amendment of DSM regulation and absorbing the challenges of renewable penetration at state level. Proposal of intra state ancillary is submitted to Delhi SLDC and Delhi SLDC has already summited the proposal to Hon'ble commission for approval.

ii. Battery Storage:

Battery storage is another important alternative can be look into for immediate sign reversal and demand management during contingency. Detail proposal need to put forward to Hon'ble commission.

iii. Forecasting Solution:

Accurate demand forecast on day ahead basis is bottleneck of optimum power scheduling and dispatching. It is crucial not only for Distribution Company to have good forecast however it is as important for SLDC and RLDC for optimum power scheduling.

Core team constituting members from SLDC, RLDC and state discom, NRPC need to be formed. The deliverable of the core team will be understanding the power sector specific weather and demand forecast requirement. If necessary, we can also hire a consultant for understanding power sector specific weather forecasting.

Proposal can be submitted to CERC after approval of all delegates.

iv. Central Power scheduling software for RLDC, SLDC and Discoms:

Without intervention of technology, adherence to the regulation is very difficult. As explained earlier, Our major concerned is that while going through acceptance procedure of NRLDC and respective SLDC. Message reaches to beneficiary or generator before one or two time block of actual implementation. Ensuring sign reversal without central mechanism at state level is not feasible. Centralized web-based scheduling and power optimization software is need of an hour for all entities. Having common platform for scheduling and dispatching can ensure the transparency and minimize the risk of grid security.

v. Implementation of Gate closure and RTM regulation:

It is very much important to have real time market before implementation of 4th amendment of DSM regulation. Availability of RTM ensured the power redundancy and minimize the dependency of buyer on generation plant availability. Gate closure enable the early planning and mitigate the risk of last time schedule revision.

vi. Dead band for sustained deviation:

The clause only says that sustained deviation should be avoided and the same invites financial penalties. However the deviation quantum is not mention anywhere. Interpretation of sustained deviation for over drawl of 2 MW or 150 MW is same. The additional charges of 20% will be levied on 2 MW or 150 MW over drawl/under drawl.

The over drawl/under drawl limits are already been decided by Hon'ble commission in DSM regulation. Sustained deviation over and above the limit for continuous 6th time block should invite additional charges.

Creation of dead band or considering existing limits for deviation is necessary.

Utilization of PSDF (Power System Development Fund)

C.5.14 The PSDF (Power System Development Fund) is collected on account of the DSM pool contributed by the Generator and Discom. It is to appraise that the schemes for reduction of DSM violation on various front at State level like Ancillary services, battery storage etc should be included and given priority during utilization of PSDF

C.6 Mis-match of SEM and SCADA Data -Undue financial liabilities to PSPCL (Agenda by PSPCL)

C.6.1 It is mentioned that Punjab SCADA data remains suspected / Non-Available during regular intervals. Without regular & accurate SCADA data, it is very difficult to run the system and grid security remains endangered. Further, PSPCL has to bear commercial loss in terms of UI deviations charges. Also over drawal /under drawal violations cannot be ruled in absence of telemetry data. This office is in regular touch with Punjab SLDC, PGCIL and NRLDC authorities through messages/emails & memos for provision of regular and reliable telemetry data, however, the issue has not been resolved so far. In the year 2016-17, PSPCL had to bear commercial loss of Rs. 18.33 crores on account of UI Deviations, even after that situation has not improved, rather it has deteriorated & in the year 2017-18, PSPCL again had to bear commercial loss of 85.62 crores without its fault. It can be observed that Punjab SLDC and PSTCL/PGCIL failed to provide regular and reliable SCADA data, compelling PSPCL to bear huge financial loss during last three years without any fault.

C.6.2 Details of UI deviations and zero crossing pertaining to period Jan 2019 is as below:-

Punjab Zero crossing Violations (Numbers)					
Date	As per Punjab SCADA	As per SEM	Date	As per Punjab SCADA	As per SEM
01-01-19	3	8	16-01-19	1	7
02-01-19	3	9	17-01-19	3	13
03-01-19	4	7	18-01-19	1	7
04-01-19	2	7	19-01-19	1	5
05-01-19	2	10	20-01-19	1	4
06-01-19	3	10	21-01-19	2	7
07-01-19	3	8	22-01-19	1	8
08-01-19	2	9	23-01-19	5	7
09-01-19	0	11	24-01-19	1	7
10-01-19	1	6	25-01-19	3	6
11-01-19	1	10	26-01-19	0	6
12-01-19	3	10	27-01-19	1	5
13-01-19	0	9	28-01-19	1	6
14-01-19	1	8	29-01-19	0	6
15-01-19	0	9	30-01-19	0	4

			31-01-19	0	4
			TOTAL	49	233

Date	UI as per SEM (LUs)	UI as per SCADA (LUs)	%age error	Date	UI as per SEM (LUs)	UI as per SCADA (LUs)	%age error
01-01-19	16.32883	-4.35	126.64	16-01-19	22.3116	-2.19	109.816
02-01-19	14.86781	-8.03	154.009	17-01-19	42.20615	-2.71	106.421
03-01-19	16.13114	-6.25	138.745	18-01-19	11.3696	-3.36	129.552
04-01-19	19.09439	-1.73	109.06	19-01-19	13.25292	-2.1	115.846
05-01-19	18.3767	-0.58	103.156	20-01-19	-1.08125	-3.5	-223.699
06-01-19	23.01698	2.64	88.5302	21-01-19	-4.59	-7.39	61
07-01-19	21.34382	-0.312	101.462	22-01-19	18.02	-1.22	107
08-01-19	21.49816	-1.01	104.698	23-01-19	15.35	-2.14	114
09-01-19	23.67434	3.66	84.5402	24-01-19	15.40	-0.58	104
10-01-19	16.79796	-5.51	132.802	25-01-19	8.08	-2.39	130
11-01-19	8.57013	-2.94	134.305	26-01-19	4.14	-1.17	128
12-01-19	17.56332	-2.87	116.341	27-01-19	-0.72	-1.69	135
13-01-19	21.52842	3.12	85.5075	28-01-19	2.18	-1.6	173
14-01-19	19.17996	1.61	91.6058	29-01-19	12.11	2.02	83
15-01-19	19.70282	3.68	81.3225	30-01-19	11.32	-0.62	105
				31-01-19	5.42	-7.004	229
				Total	452.44	-56.52	112.49

C.6.3 From the perusal of the data, it has been noticed that there are only 49 nos. zero crossing violations as per Punjab SCADA data but as per SEM data, it actually turned out to be 233 in Nos, which implies that there is total mismatch between SEM & Punjab SCADA data. The mismatch between SEM and SCADA data and zero crossing violations numbers is on account of various reasons such as communication failure, time drift of Special Energy Meters and RTU failures/error etc. for which entities such as CTU/RLDC/SLDC/STU are responsible. Further, according to the UI account for Jan-2019, for a net deviation of 452.44 LUs, the total financial implication is to the tune of Rs. 49.56 crore to PSPCL. Although as per Punjab SCADA data, PSPCL has surrendered 56.52 LUs energy for above said

period (against 452.44 LUs of overdrawl as per SEM). Such huge difference in actual data is also threat to grid security as all operations of load/generation management are being done on the basis of SCADA data, which is not as per real system data.

C.6.4 PSPCL has been highlighting this issue at various forums; viz. State OCC, OCC / TeST sub committees of NRPC and CERC however, till now the availability of accurate telemetry data has not been ensured and PSPCL is compelled to bear undue financial losses without any of its fault. Now, with the implementation of 4th amendment to DSM Regulations effective from 01.01.2019, it has nearly become impossible to operate the system without accurate data availability. Accordingly, the implementation of 4th amendment to DSM Regulations is required to be kept in abeyance till accurate and reliable data is made available for system operation.

C.6.5 It is pertinent to mention here that, as per CERC (Communication System for inter-State transmission of electricity) Regulations, 2017 in force, responsibilities have been assigned to CTU/SLDC/STU for the availability of adequate data.

C.6.6 The CTU is responsible for planning and coordination for development of reliable National communication backbone Communication System among National Load Despatch Centre, Regional Load Despatch Centre(s) and State Load Despatch Centre(s) and REMCs along with Central Generating Stations, ISTS Sub -Stations, UMPPs, inter-State generating stations, IPPs, renewable energy sources connected to the ISTS, Intra-State entities, STU, State distribution companies, Centralized Coordination or Control Centres for generation and transmission.

C.6.7 The Regional Load Despatch Centre is the nodal agency for integration and supervision of Communication System of the ISTS, ISGS, SLDCs and IPPs at RLDC end for monitoring, supervision and control of Power System and adequate data availability in real time.

C.6.8 The State Load Despatch Centre is the nodal agency for integration of Communication System in the intra-State network, distribution system and generating stations at SLDC end for monitoring, supervision and control of Power System and adequate data availability in real time.

C.6.9 The STU is responsible for planning, coordination and development of reliable communication system for data communication within a State including appropriate protection path among State Load Despatch Centre, Area LDC, Sub-LDC and DISCOM LDC including Main and backup as applicable along with STU Sub Stations, intra-State Generating Stations.

C.6.10 Further, there is a provision to maintain the communication channel availability at 99.9% annually: Provided that with back up communication system, the availability of communication system should be 100%.

C.6.11 All the entities need to fulfill their responsibilities so as to provide reliable telemetry data.

Members may deliberate and suggest comprehensive solution to ensure availability of reliable and accurate telemetry data.

C.7 Double recovery of transmission charges in respect of BBMB Complex by PGCIL & BBMB (Agenda by Rajasthan)

C.7.1 Rajasthan has a share of 675.08 MW in BBMB projects (Bhakra Complex- 249.93 MW, Pong- 229.11 MW and Dehar- 196.04 MW). The charges till 30.09.2016 for transference of this share to Rajasthan were being raised by BBMB on monthly basis and accordingly paid by Rajasthan to BBMB. However, Powergrid in the month of October 2016 included this share of 675 MW from BBMB Complex in the long term capacity allocation to Rajasthan by increasing the MW entitlement from 3139.153 MW to 3814.247 MW and raised invoices to recover transmission charges for use of ISTS system by Rajasthan to that extent. Rajasthan paid the PoC charges for the respective months onwards from October 2016 to March 2017 including the amount corresponding to the LTA of 675 MW. Rajasthan paid an amount of Rs 151 crore as PoC charges on account of power transmitted from shared project of BBMB. Meanwhile, Rajasthan also continued to pay the O&M charges in respect of transmission charges to BBMB.

C.7.2 Rajasthan raised the matter in the meeting of Validation Committee held on 24.03.2017 and stated that while computing PoC charges and losses for Q3 & Q4 for FY 2016-17, Rajasthan share of 675 MW from shared project of BBMB was included in total LTA of Rajasthan. Rajasthan State emphasized that there is no order of CERC to include generation capacity of BBMB in Rajasthan LTA. It was requested that allocation of BBMB capacity to beneficiary(ies) should not be included in their LTAs. The Commission also took the cognisance of the same and vide order dated 28.04.2017 stated as under:-

> *"The assets of BBMB and LTA in respect of BBMB shall not be included under PoC mechanism and a view on inclusion of these assets under PoC shall be taken after determination of final tariff of these assets."*

C.7.3 Subsequent to CERC order dated 28.04.2017, PGCIL excluded the 675 MW from Rajasthan LTA from the month of April 2017 onwards. BBMB representative requested partner States to continue making payment to BBMB towards their share in the expenditure of BBMB as per the prevailing practice in line with the provisions in Punjab Reorganization Act 1966.

C.7.4 The issue of double recovery of transmission charges on account of inclusion of share from shared project of BBMB in total LTA was also raised by HPSEBL in 33rd meeting of Commercial Sub-Committee of NRPC held on 28.07.2017. The matter was also discussed in the subsequent meeting of Commercial Sub-Committee held on 19.02.2018 and 11.06.2018 respectively. The matter was also discussed in a special meeting held on

11.06.2018 as decided in 36th meeting of Commercial Sub-Committee. The meeting was to discuss the issues and action plan for remedial measures in the matter of double recovery of transmission charges in respect of BBMB transmission system by PGCIL under PoC mechanism as well as directly by BBMB. After deliberation, it was decided that since the matter of tariff determination of BBMB assets is pending with Hon'ble Commission, NRPC Secretariat may take up the matter with the Commission for an early decision. The matter was also discussed in 40th meeting of NRPC held in the month of October 2017.

C.7.5 In the 38th meeting, the commercial sub committee was of the view that since the matter is still pending under consideration in CERC, the outcome of the same may be awaited before the matter is discussed again at this forum.

C.7.6 Now CERC has disposed off the matter vide order dated 09.01.2019 as follows:

a. *As the information submitted by BBMB is not sufficient to calculate all the components of the transmission charges for the 2014-19 tariff period, transmission charges are restricted to O&M Expenses for the transmission system and the SLDC assets owned by the Petitioner.*

b. *The O&M Expenses allowed in the instant order shall not be included in the PoC charges and shall be claimed by the Petitioner from the participating States in proportion to the allocation of power of BBMB.*

C.7.7 Since the matter has been resolved by CERC vide order dated 09.01.2019, it is requested to take up the matter of refund of the excess amount of Rs 151.39 crore doubly recovered from Rajasthan after due reconciliation.

C.8 Regarding commissioning of OPGW under Package V and 1(a) on various transmission lines of PSTCL (Agenda by PSTCL)

C.8.1 In the above context, it is brought to your kind notice that PSTCL is under process of laying OPGW on its various 220 KV/132 kV transmission lines in 2 Packages namely V and 1(a) through PGCIL. Firstly, Package V which consists of 215kms, 220kV transmission lines (List is placed at Annexure-C.8.1.A) and secondly, Package 1(a) which consists of 1378kms, 132kV/220kV transmission lines (List is placed at Annexure-C.8.1.B).

C.8.2 OPGW and its terminal indoor equipments under Package V have already been laid nearly 1 year back but their successful commissioning is still pending. Telemetry data of these 7 sections covering 215 Km isn't operational yet and the same is not reporting to SLDC/ALDC at all. So far as 1378 Km. line under package I (a) is concerned, 1070 kms line has been laid out but only 372 kms is commissioned. Detail is placed at Annexure-C.8.1.C.

C.8.3 Related to Package V, three meetings were held on dated 28.12.2017 (Annexure-C.8.1.D), dated 23.01.2018 (Annexure- C.8.1.E) and dated 05.04.2018 (Annexure- C.8.1.F) to sort out/resolve the issue. Above said issue pertaining to package V was also discussed in 14th TeST sub-committee meeting (Annexure-C.8.1.G) in Oct 2018 for its timely accomplishment.

C.8.4 Recently three communications were made with PGCIL regarding inordinate delay in commissioning of above said project (placed at Annexure- C.8.1.H), but there is no reply from concerned quarter till date.

C.8.5 It is requested that this contentious issue may be resolved by putting up this case in NRPC meeting so that commissioning may get impetus as due to in-ordinate delay, data of few sub-stations of PSTCL is a mismatching with DSM and heavy penalty is being imposed by PSPCL. It is further added that Package 1(a) may be completed in time bound manner and tentative commissioning schedule may be apprised to PSTCL and PGCIL may be made accountable if there is delay in execution of this project.

C.9 OPGW connectivity at NHPC Power Stations under Central Sector scheme (Agenda by NHPC)

C.9.1 **URI-II Power Station:** During 40th TCC and 43rd NRPC held on 29th and 30th October 2018, 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. MS, NRPC requested POWERGRID to complete the OPGW connectivity at the earliest. Further During 14th TeST Meeting held on 17th December 2018, POWERGRID informed that work at Uri-II Power Station shall be completed by February 2019.

C.9.2 **Parbati-III**: During 14th TeST Meeting held on 17th December 2018 POWERGRID informed that some portion of the line at Parbati-III PS belongs to PKTCL which has ROW issue. Member Secretary requested POWERGRID to resolve the ROW issue and commission OPGW at Parbati-III PS at the earliest.

C.9.3 **Sewa-II:** During 40th TCC and 43rd NRPC held on 29th and 30th October 2018, POWERGRID informed that OPGW has been completed and 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. POWERGRID was requested 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 later stage Further, during 14th TeST Meeting held on 17th December 2018 POWERGRID informed that there is a payment issue in the line between Hiranagar and Gladni. J&K representative informed that the work is in process and the payment issue will be resolved shortly. Member Secretary requested POWERGRID to commission OPGW at Sewa-II once the ROW issue is resolved.

POWERGRID may kindly update the status.

C.10 Replacement of S 900 RTU (Agenda by NHPC)

C.10.1 During 14th TeST Meeting held on 17th December 2018 POWERGRID informed that the case for purchase of new RTU is under technical evaluation and work order shall be placed by 30th January 2019.

POWERGRID may kindly update the status.

C.11 Status of DSM Charges:

C.11.1 Deviation Pool Account Fund of NR is being maintained & operated by NRLDC, in accordance with the CERC Regulations. As per Regulations 10 (1) of "Deviation Charges Related matters" the payment of charges for Deviation shall have a high priority and the concerned constituents shall pay the indicated amounts within 10 days of issue of statement of Charges for Deviation including Additional Charges for Deviation by the Secretariat of the respective Regional Power Committee in to the "Regional Deviation Pool Account Fund" of the concern region.

C.11.2 DSM Charges payable to pool status as on 01st March 2019 considering week no-45 (28/01/2019 to 03/02/2019) (due dated of which is 25th Feb 2019) is indicated here in below:

All figures in Rs. Lakhs

S No.	Constituents	Total Deviation Charges Outstanding	Outstanding more than 30 Days	Outstanding more than 90 Days
1	PUNJAB	5079.90	0	0
2	JAMMU AND KASHMIR	3751.71	731.56	0
3	CHANDIGARH	1387.80	0	0
4	POWERGRID-NR	212.42	0	0

C.11.3 All payable utilities are requested to clear the outstanding's at the earliest so that, receivable parties will be paid and to avoid further increase of Delay Payment Interest.

C.11.4 Further, in case of outstanding more than 90 days, NRLDC shall be constrained to invoke denial of STOA as per provisions stipulated in Regulation 25A of CERC (Open Access in

inter-State Transmission Regulations), 2008, in accordance with CERC Order dated 02.09.2015 in Petition No. 142/MP/2012

Members may please deliberate.

C.12 Status of LC against Deviation Charges delayed payment:

C.12.1 NRLDC vide letter dated 30th April 2018 has intimated all concerned constituents regarding the amount for which LC is to be opened in accordance with CERC (Deviation Settlement Mechanism and related matters) Regulations, 2014. The matter was also discussed in the last commercial sub-committee meeting as well in TCC/NRPC meeting. Commercial sub-Committee noted the deliberations and advised all defaulting entities to open LC

C.12.2 Despite deliberations in various Commercial Sub-Committee and TCC/NRPC meeting most of the defaulting constituents have still not opened the LC of the required amount. The status is as below:

Sl. No	Name of NR Pool members	LC Amount (Rs. in Lakh.)	Status	No of defaults in Deviation Payment	
				2017-18	2018-19 (upto W-41)
1	UPPCL,UP	1258.79	LC not opened	47	20
2	UPCL, UTTARAKHAND	530.50	LC not opened	1	1
3	HPSEB, Himachal	246.61	LC not opened	23	-
4	PDD,J&K	1722.64	LC not opened	34	23
5	EPPL	2.48	LC not opened	25	10
6	Greenko, Budhil	14.14	LC not opened	10	4
7	Punjab	1284.93	LC not opened	29	15
8	UT Chandigarh	85.00	LC opened for the period from 03.04.18 to 31.03.19.	5	2
9	PGCIL	41.05	LC not opened	15	3
10	HPPCL	3.19	LC not opened	1	-
11	DTL, Delhi	75.61	LC not opened	3	-
12	NFL	2.40	LC not opened	2	2

C.12.3 NRLDC vide its letter dated 6th August 2018 has also informed to CERC regarding violation of Regulation 10(4) of the CERC (Deviation Settlement Mechanism & related matters) Regulations, 2014 regarding opening of credit.

C.12.4 Defaulting entities are once again requested to open the LC against Deviation Charges as per the Regulations of CERC.

Members may please deliberate.

C.13 Reactive Energy charges status:

C.13.1 Reactive Energy Charges status as on 01st March 2019 considering week no-45 (28/01/2019 to 03/02/2019) (due dated of which is 25th Feb 2019) is indicated here in below: -

Note: (+)ve figure are Payable to Pool and (-)ve figures are receivable from Pool

All figures in Rs. Lakhs

S No.	Constituents	Total RE Charges Outstanding	Outstanding more than 30 Days	Outstanding more than 90 Days
1	JAMMU AND KASHMIR	484.62	246.50	0
2	DELHI	64.41		0
3	PUNJAB	28.68		0
4	UTTARAKHAND	-2.45		0
5	CHANDIGARH	-3.98		0
6	HIMACHAL PRADESH	-22.38		0
7	RAJASTHAN	-36.92		0
8	HARYANA	-94.20		0
9	UTTAR PRADESH	-283.60		0

C.13.2 All Payable constituents are 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.13.3 Further, in case of outstanding more than 90 days, NRLDC shall be constrained to invoke denial of STOA as per provisions stipulated in Regulation 25A of CERC (Open Access in inter-State Transmission Regulations), 2008, in accordance with CERC Order dated 02.09.2015 in Petition No. 142/MP/2012.

Members may please deliberate

C.14 Congestion Charges: -

C.14.1 Congestion charge statement is being issued by NRPC. The amount received in the congestion charges account was disbursed to the receivable parties. Outstanding amount against the entities payable to pool (as on 11' Feb-2019) is indicated here in below: -

All Figures in Rs. Lakhs.

SL. No.	Constituents	Congestion Charges Payable	Congestion Charges Delay Payment Interest	Total Outstanding *(More than 90 Days)*
1	HARYANA	0.00	6.97	**6.97**
2	DELHI	0.00	3.26	**3.26**
3	HIMACHAL PRADESH	0.85	0.93	**1.78**

C.14.2 All Payable constituents are requested 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.14.3 The issue of congestion charge delayed payment interest was discussed in the 40th TCC/43rd NRPC meeting and 38th Commercial Sub-Committee meeting. Accordingly, it is submitted that NRPC may kindly take a view on the waiver of interest payment and revise the congestion charge delayed payment interest account.

Members may please deliberate.

C.15 NRLDC Fee & Charges:

C.15.1 NRLDC is raising the monthly bills in line CERC Regulations 2015, considering up to Dec-2018 bills (due date of which is 01.03.2019), NRLDC Fee and Charges outstanding as on 01' March-2019 is indicated here in below: -

S No.	Constituents	Amount in Rs.	Remarks
1	PDD J&K	19,13,061	Outstanding against Bill of Nov-18.

C.15.2 It is requested to pay the outstanding amount at the earliest.

C.15.3 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**/".

Members may please deliberate.

C.16 Reconciliation of Pool Accounts (Oct-18 to Dec-18):

C.16.1 Reconciliation statement of Deviation Charges and Reactive Energy Charges has been forwarded to entities and uploaded on website by NRLDC on 10.01.2019. The constituents were requested to verify /check the same & comments if any on the same were to be reported to NRLDC by 31.01.2019. In case of non-receipt of any communication it will be presumed that reconciliation statement stands reconciled.

C.17 Status of AGC & Ancillary Services:

C.17.1 The Status from week 01 to 45 of financial year 2018-19 is as herein below as per NRPC bill (**All fig. In Rs. Cr**.): -

week (2018-19)		Surplus in DSM A/c (A)	RRAS Billed			AGC	FRAS
			Regulation UP (B)	Regulation Down (C)	Net (D=B-C)		
W-01	(26.03.18-01.04.18)	17.39	11.38	0.02	11.37	1.01	
W-02	(02.04.18-08.04.18)	19.78	9.90	0.00	9.90	2.47	
W-03	(09.04.18-15.04.18)	10.09	8.38	0.00	8.38	2.15	
W-04	(16.04.18-22.04.18)	15.99	9.51	0.00	9.51	1.31	
W-05	(23.04.18-29.04.18)	17.99	8.33	0.00	8.33	2.21	
W-06	(30.04.18-06.05.18)	13.82	5.75	0.00	5.75	0.00	
W-07	(07.05.18-13.05.18)	29.27	10.20	0.14	10.06	0.00	
W-08	(14.05.18-20.05.18)	30.17	12.88	0.16	12.72	0.05	
W-09	(21.05.18-27.05.18)	26.24	7.68	0.00	7.68	1.69	
W-10	(28.05.18-03.06.18)	21.79	10.91	0.10	10.81	1.46	
W-11	(04.06.18-10.06.18)	19.85	11.35	0.02	11.33	1.43	
W-12	(11.06.18-17.06.18)	28.09	9.60	0.18	9.42	1.79	
W-13	(18.06.18-24.06.18)	43.12	17.48	0.07	17.40	1.85	
W-14	(25.06.18-01.07.18)	26.93	13.40	0.05	13.34	0.69	
W-15	(02.07.18-08.07.18)	42.67	7.52	0.02	7.50	0.85	
W-16	(09.07.18-15.07.18)	43.66	9.51	0.00	9.51	2.31	
W-17	(16.07.18-22.07.18)	37.31	13.12	0.01	13.11	2.18	
W-18	(23.07.18-29.07.18)	50.13	38.26	0.00	38.25	2.79	
W-19	(30.07.18-05.08.18)	50.67	42.24	0.00	42.24	2.61	
W-20	(06-08-18-12.08.18)	59.01	43.07	0.00	43.07	1.50	
W-21	(13.08.18-19.08.18)	41.79	34.12	0.02	34.10	0.00	
W-22	(20.08.18-26.08.18)	46.63	34.75	0.00	34.75	1.11	
W-23	(27.08.18-02.09-18)	43.56	28.22	0.00	28.22	1.24	
W-24	(03.09.18-09.09.18)	27.24	25.84	0.00	25.84	0.49	
W-25	(10.09.18-16.09.18)	36.65	33.00	0.00	33.00	0.63	
W-26	(17.09.18-23.09.18)	29.35	56.05	0.00	56.05	0.38	
W-27	(24.09.18-30.09.18)	57.97	133.40	0.00	133.40	2.34	
W-28	(01.10.18-07.10.18)	41.42	134.26	0.00	134.26	0.40	
W-29	(08.10.18-14.10.18)	47.23	126.53	0.00	126.53	0.22	
W-30	(15.10.18-21.10.18)	33.39	94.56	0.00	94.56	0.00	
W-31	(22.10.18-28.10.18)	44.58	143.49	0.00	143.49	1.43	
W-32	(29.10.18-04.11.18)	50.80	150.23	0.00	150.23	1.08	
W-33	(05-11-18-11.11.18)	15.30	42.63	0.04	42.59	2.72	
W-34	(12.11.18-18.11.18)	-67.77	21.22	0.03	21.19	2.27	
W-35	(19.11.18-25.11.18)	11.05	5.53	0.08	5.46	2.68	
W-36	(26.11.18-02.12.18)	14.30	7.18	0.01	7.17	2.84	0.00
W-37	(03.12.18-09.12.18)	13.39	10.59	0.00	10.59	2.83	0.01
W-38	(10.12.18-16.12.18)	12.77	13.17	0.00	13.17	2.86	0.01
W-39	(17.12.18-23.12.18)	9.16	7.66	0.10	7.56	2.69	0.01
W-40	(24.12.18-30.12.18)	15.48	21.85	0.06	21.79	2.20	0.01
W-41	(31.12.18-06.1.19)	55.15	7.72	0.44	7.28	1.46	0.01
W-42	(07.01.19-13.01.19)	52.15	13.26	0.13	13.13	1.09	0.01
W-43	(14.01.19-20.01.19)	55.40	5.04	0.46	4.58	1.02	0.02
W-44	(21.01.19-27.01.19)	50.43	2.57	0.80	1.77	1.77	0.02
W-45	(28.01.19-03.02.19)	34.94	4.30	0.24	4.06	0.93	0.01

C.17.2 Dues of Rs. 443.98 Crore (**Rs. 413.30 Cr. of NTPC and Rs. 30.68 Cr. of APCPL**) are yet to be settle against RRAS up Regulation from week-31 to week-45 and All dues pertains to AGC and FRAS are settled up to week-44.

This is for kind information of the members.

C.18 Reconciliation of STOA (Short Term Open Access) Charges disbursement:

C.18.1 NRLDC has sent the reconciliation statement of open access disbursement for the Quarter-2 of financial year 2018-19 on 24th October 2018. The applicants/STU/SLDCs were requested to verify /check the reconciliation statement & comment if any on the same by 24th November 2018. The reconciliation statement of Himachal Pradesh STU/SLDC was received on 5th December'18.

C.18.2 In case of non-receipt of any communication it will be presumed that reconciliation statement stands reconciled.

C.19 STATUS of AMR as on 06.02.2019

C.19.1 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 SEMs	NIL
Phase-2	575 SEMS/90 locations	206 SEMs	369
Total	**1825 SEMs**	**1456 SEMS**	**369**

C.19.2 It was decided in 43nd TCC meeting that POWERGRID will ensure that the project will be completed by M/s Kalkiteck by 31st Decemeber-2018. However, at present out of 1825 nos. only 1456 nos. meters have been integrated. Therefore, it is again requested to POWERGRID to take up the matter with highest official of M/s Kalkiteck and expedite the completion for AMR integration project. **No of locations from where AMR data are received in totality and used for energy accounting for last 04 weeks have been given below:**

S. No	Week No	Total no of locations Where SAT is completed	Total No of locations data received in totality	Total No of locations data received in totality by Tuesday	Total No of locations received after Tuesday
1	311218-060119	217	166	145	21
2	070119-130119	217	175	130	45

3	140119-200119	217	169	153	16
4	210119-270119	217	172	142	30

C.19.3 The members may appreciate 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.19.4 This point is being taken up in every meeting; however, there has not been significant improvement in availability of data through AMR. 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

C.20 Integration of AMR System with Elster Meters:

C.20.1 M/s Kalkitech, has carried the elster meter integration test with AMR at Bahadurgarh substation. The npc file of the elster meter was shared by POWERGRID to NRLDC for verification. NRLDC vide its letter Ref. No. NRLDC/MO/metering/2132 dt 31.12.2018 have intimated POWERGRID to take-up the matter with M/s Kalkitech to complete the integration of all elster make meters with AMR at the earliest.

C.21 AMR data through Fibre Optic Network

C.21.1 At present, AMR data communications have been successfully shifted on Optical Fibre Communications at following 24 locations of POWERGRID. The SEM data of all these locations are being provided by M/s Kalkitech on regular basis to NRLDC.

Sl No.	**Station Name**	**Sl No.**	**Station Name**
1	Maharanibagh_pgcil	13	Bahadurgar
2	Bhiwadi_PGCIL	14	Gorakhpur_pgcil
3	Ballabhgarh_Pgcil	15	Sitargunj pgcil
4	Mandaula_PGCIL	16	Lucknow PG
5	Gurgoan_PGCIL	17	Manesar PG
6	RaeBarelliy	18	Allahbad_PGCIL
7	Hissar PGCIL	19	BassiPGCIL
8	Dadri_Hvdc_Pgcil	20	Koteshwar pooling
9	Pithorgarh	21	Kaithal PG

10	Kanpur_PGCIL	22	Baghpat
11	Patiala	23	Moga
12	Abdullapur	24	Merrut

C.21.2 In the last NRPC meeting, TCC urged POWERGRID to submit the cost estimation for shifting of AMR data on OPGW work. All utilities were also requested to send the details of coordinators for each site for AMR to GM(AM), NR-1, POWERGRID and NRPC Sectt. Within 15 days.

C.21.3 It is once again requested to finalize the above information at the earliest.

C.22 Time drift Correction in SEMS:

C.22.1 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 NRLDC metering group is also taking up the matter with concerned over telephonically and/or through e-mail also. Summary regarding time correction of SEMs are given below:

S. No	**Utility**	**Total Nos. of Meters installed**	**Week 14.01.19-20.01.19**		**Week 21.01.19- 27.01.19**	
			Nos. of Meters on which Time-drift has been observed	**% of Time Drift Meters**	**Nos. of Meters on which Time-drift has been observed**	**% of Time Drift Meters**
1	AD Hydro	4	0	0%	0	0%
2	BBMB	269	17	6%	18	7%
3	Budhil HEP	3	0	0%	0	0%
4	CHANDIGARH	5	3	60%	3	60%
5	DTL	42	11	26%	9	21%
6	HPSEB	39	10	26%	10	26%

7	HVPNL	42	20	48%	19	45%
8	J&K	32	18	56%	17	53%
9	KarchamWangtoo-Hydro	16	0	0%	0	0%
10	Malana HEP-2	7	1	14%	1	14%
11	NHPC	134	25	19%	26	19%
12	NPCIL	46	4	9%	3	7%
13	NTPC	218	19	9%	19	9%
14	Patran	6	6	100%	6	100%
15	PGCIL	739	234	32%	229	31%
16	Phojal-HEP	4	4	100%	4	100%
17	PSPTCL	61	7	11%	7	11%
18	PTCUL	46	27	59%	25	54%
19	RAILWAYS	4	4	100%	4	100%
20	RVPNL	58	25	43%	25	43%
21	SAINJ	6	6	100%	6	100%
22	SCL	6	0	0%	0	0%
23	SJVNL	32	0	0%	0	0%
24	Sorang HEP	6	0	0%	0	0%
25	STERLITE	10	10	100%	10	100%
26	THDC	16	0	0%	0	0%
27	UPPTCL	103	41	40%	38	37%
Total		**1954**	**492**	**25%**	**479**	**25%**

All the constituents are requested to send the time correction report on monthly basis in the format given below 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.22.2 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. POWERGRID may apprise the status of time drift correction through AMR system.

C.23 Failure of AMR Servers (both Main & Standby) at NRLDC

C.23.1 NR-1TS, POWERGRID has awarded the Automated Meter Reading (AMR) Project to M/s Kalkitech vide LOA 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 providing the weekly SEM data to NRLDC from various locations of Northern Region. Considering the criticality of the AMR system, the AMR system was designed with 100% redundancy i.e. with Main and Standby Server at NRLDC.

C.23.2 On 23rd November 2018, M/s Kalkitech representative informed that their standby server has failed and they are not able to get meter data. Further, M/s Kalkitech representative apprised that the main server is also out since long (April-2018) and they were operating the AMR system with only one server.

C.23.3 Members may appreciate that, timely availability of meter data is of paramount importance to prepare the weekly regional energy accounts by NRPC and for calculating regional transmission losses for scheduling purpose as per various CERC regulations. Since there is a limitation in data storage capability that only 10 days' data can be recorded in meter memory, the meter data collection from sites was done manually through DCD.

C.23.4 Further, M/s Kalkitech also failed to arrange an extra server till repair/replacement of both main & standby servers till 28.02.2018. Therefore, NRLDC provided the PC to be used as server on dtd 28.02.2018 and the same was being used by M/s Kalkitech till 07.02.2019 for running the AMR System.

C.23.5 Date wise history of AMR Servers Failure and Restoration is as below:

S.No	Event	Date	Remarks
1	Failure of Main Server	Apr-18	Not reported to NRLDC
2	Failure of Standby Server	23.10.2018	AMR system was operating on one single server for almost 8 months

3	Restoration of Main Server	23.12.2018	Restored only one server after Two Months that too without redundant storage i.e. with only 1 TB Hard disk
4	Restoration of Standby Server and redundant storage (+2 TB Harddisk) of Main Server	08.02.2019	

C.23.6 POWERGRID is requested to ensure that situations like this may not arise in future.

C.24 Reconciliation of old Annual Maintenance Contract (AMC) charges for Alstom System by PTCUL.

C.24.1 This issue of reconciliation of AMC charges by PTCUL has been discussed in following meeting:

- 39th TCC and 42nd NRPC meeting at Solan HP on 28th June
- Special meeting between PTCUL, NRLDC & NRPC at Dehradun on 31.08.2017
- Reconciliation meeting between PTCUL and NRLDC through VC on 07th Jan 2019

C.24.2 As discussed in 40th TCC meeting, reconciliation meeting was held between NRLDC and PTCUL through VC. After reconciliation an amount of Rs.8, 30,128/- is pending from PTCUL. PTCUL agreed to release the payment at the earliest.

C.24.3 However, payment from PTCUL is still pending, because of non-payment from PTCUL contract closing is still pending.

Members may like to discuss and convince PTCUL for necessary payment of charges immediately.

C.25 Real Time data telemetry from Renewable Generators

C.25.1 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

1. Turbine Generation (MW/MVAR)
2. Wind Speed (meter/second)
3. Generator Status (on/off- line)-this is requires for calculation of availability of the WTG
4. Wind Direction (degrees from true north)
5. Voltage (Volt)
6. Ambient air temperature (deg. C)

7. Barometric Pressure (Pascal)
8. Relative humidity (in %)
9. Air Density (kg/m3)

For Solar generating plants

1. Solar Generation Unit/ Inverter-wise (MW and MVAR)
2. Voltage at interconnection point (Volt)
3. Generator/Inverter Status (on/off-line)
4. Global horizontal irradiance (GHI)-Watt per meter square
5. Ambient Temperature (o C)
6. Diffuse Irradiance- Watt per meter square
7. Cloud Cover- (Okta)
8. Direct Irradiance- Watt per meter square
9. Sun-rise and sunset Timing
10. Rainfall (mm)
11. Relative humidity (%)
12. Performance Ratio

C.25.2 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. This telemetry is also essential for Renewable Energy Management Centre (REMC). 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.25.3 Matter was discussed in 40th TCC Meeting also where Rajasthan was requested for availability of data from renewable generators.

C.25.4 RRVPNL to update the status

C.26 Non redundancy in wideband network to NRLDC

C.26.1 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 28thOct 2018 there was major interruption of real-time data to NRLDC for 08 hrs. Such outages are very detrimental for system security.

C.26.2 During 39th /40th 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.

Members may discuss

C.27 Redundant communication:

C.27.1 Provision of redundant communication was discussed in 14th TeST Meeting held on 17th Dec, 2018. However, redundant data communication is yet to be ensured at NRLDC after one year of discussion. Presently, 102 RTU out of 125 are reporting on dual channel. Therefore, redundant communication channels from all RTUs need to be ensured. PGCIL/NTPC/IPPs may update the status. Similar, situation would be at SLDC level and therefore, all SLDCs/STUs shall also ensure communication redundancy at their control centres.

Members may discuss and finalize timeline for redundancy of communication channel from RTU to NRLDC and from RTUs to SLDCs.

C.28 Status telemetry of TCSC / FSC

C.28.1 NRLDC has been continuously requesting utilities to ensure reliable telemetry at the control centre. However, it is being observed that FSC/ TCSC status is not available from following locations.

S. No.	Station	Line	FSC Data Status
1	Bareilly 400	Meerut	Not reporting
2	Meerut 400	Koteshwar	Not reporting
3	Unnao	Bareilly (UP)	Not reporting

Utilities are requested to arrange for integration of telemetry of FSC/TCSC at the earliest.

C.29 Telemetry from Kurukshetra HVDC as per agreed in the separate meeting

C.29.1 In meeting held at Kurukshetra on 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.29.2 Matter was discussed in 40th TCC Meeting also in which NRPC requested PGCIL to explore the possibility.

C.29.3 PGCIL to update the status.

C.30 Incorrect analog measurement from many locations

C.30.1 The matter of non-availability/ of correct data from many lines was discussed during 14th TeST Meeting during which NRLDC requested POWERGRID to procure some transducers and cards to create spare for future requirement also. POWERGRID agreed to purchase the same in consultation with NRLDC and during AMC of RTUs, same shall be replaced at the earliest. Further PGCIL informed that all necessary transducers required would be replaced in next 30 days. However, replacement is still pending. PGCIL to update the status.

D. ITEMS FOR NRPC

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

D.1.1 In the 42nd NRPC meeting, Rs. 10 Lakh per member was approved as the contribution for the financial year 2018-19**.**

D.1.2 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.

In the 43rd NRPC meeting All members have agreed to make their payments for current year as well of the past years (if due) by Dec, 2018. But for current FY 2018-19, Contribution received from 12 members only and is still awaited from 30 members .

Since FY 2018-19 is also almost over , members are requested to expedite the contribution at the earliest**.**

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

D.2.1 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 2017-2018		
1	UT of Chandigarh, Chandigarh	10.0Lakh
2	Dakshin Haryana BijliVitaran Nigam Ltd., Hisar	10.0Lakh
3	J&K Power Development Department, Srinagar	10.0Lakh
4	J & K State Power Development Corp. Ltd., Srinagar	10.0Lakh
5	MadhyanchalVidyutVitran Nigam Ltd., Lucknow	10.0Lakh
6	Uttarakhand Power Corporation Ltd., Dehradun	10.0Lakh

7	Rosa Power Supply Company Ltd., Shahjahanpur	10.0Lakh
8	LancoAnpara Power Ltd., Gurgaon	10.0Lakh
9	Prayagraj Power Generation Co Ltd., Allahabad	10.0Lakh
10	Lalitpur Power Generation Company Limited, Noida	10.0Lakh
	Financial Year 2016-2017	
1.	J&K PDD, Srinagar	7.0 Lakh Each
2.	PVVNL, Varanasi	
	Financial Year 2015-2016	
1	J&K State Power Development Corp. Ltd., Srinagar	11.0 Lakh Each
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 Each
2	Dakshinanchal VVNL, Agra	
3	Bajaj Energy Pvt. Ltd., Noida	
	Financial Year 2012-2013	
1	Purvanchal VVNL, Varanasi	10.0Lakh

In the 43rd NRPC meeting NRPC expressed concern over long pending payments and advised concerned members to make payment immediately.

Members are requested to expedite the contribution at the earliest.

D.3 HOSTING OF NEXT MEETINGS OF NRPC / TCC

As per agreed roster for hosting of meetings, the next meetings of TCC (42nd) & NRPC (45th), which would become due in June/July, 2019 are to be hosted by Rajasthan.

पावर ग्रिड कारपोरेशन ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
POWER GRID CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)
पावरग्रिड

केन्द्रीय कार्यालयः "सौदामिनी" प्लॉट सं. 2, सैक्टर–29, गुडगाँव--122 001, (हरियाणा) दूरभाषः 0124-2571700-719, फैक्स : 0124-2571762,
"Saudamini" Plot No. 2, Sector-29, Gurgaon-122 001, (Haryana) Tel. : 0124-2571700-719, Fax : 0124-2571762, Web.: www.powergridindia.com

CIN : L40101DL1989GOI038121

C/AM/NRPC- 43rd /Corrigendum

Date: 28th Feb 2019

The Member Secretary
Northern Regional Power Committee
18 -A, Shaheed Jeet Singh Marg
Katwaria Sarai,
New Delhi – 110016

Sub: Corrigendum to the Minutes of 43rd NRPC meeting held on 30.10.2018 at Amritsar regarding data telemetry NRLDC from NHPC Kishanganga HE Project

Dear Sir,

Please find enclosed herewith Corrigendum to the Minutes of 43rd NRPC meeting held on 30.10.2018 at Amritsar regarding data telemetry NRLDC from NHPC Kishanganga HE Project in line with the discussions held during the meeting.

It is requested to kindly incorporate the same in the agenda of 44th NRPC meeting.

Thanking you,

Yours faithfully,

(D S Yadav)
ED (Asset Management)
28/2/19

Encl : A /a
(Sheets : 1 only)

Corrigendum to the Minutes of 43rd NRPC meeting held on 30.10.2019 at Amritsar regarding Data Telemetry NRLDC from NHPC Kishanganga HE Project

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.~~

C28.2 Representative of POWERGRID informed that availability of communication equipment at Kishanganga to be provided by NHPC for integration of communication equipment installed at POWERGRID, Wagoora sub-station.

NRPC Deliberation

C.28.3 The Committee noted the TCC deliberations.

Annexure B.3.1

Reactors approved in the 39th Standing Committee held on 29th&30th May 2017

Sl.No.	Bus Name	State	Reactors Proposed(MVAr)	Implementing agency
220Kv				
1	Jind(PG)	Haryana	25	TBCB
2	Fatehabad(PG)	Haryana	25	TBCB
3	Kishenpur(PG)	J&K	25	TBCB
4	Jalandhar(PG)	Punjab	2X25	TBCB
5	Nakodar	Punjab	25	PSTCL
6	Amritsar(PG)	Punjab	25	TBCB
7	Dhuri	Punjab	25	PSTCL
8	Akal	Rajasthan	25	RVPNL
9	Suratgarh	Rajasthan	2X25	RVPNL
10	Bikaner	Rajasthan	2X25	RVPNL
11	Barmer	Rajasthan	25	RVPNL
12	Narela	Delhi	25	DTL
13	R.K.Puram-I	Delhi	25	DTL
14	Patparganj 2	Delhi	2X25	DTL
15	Maharanibagh	Delhi	2X25	DTL
16	Bamnoli	Delhi	25	DTL
17	SabjiMandi	Delhi	2X25	DTL
18	Gopalpur	Delhi	2X25	DTL
19	Indraprastha	Delhi	2X25	DTL
20	Geeta Colony	Delhi	2X25	DTL
21	Harsh Vihar	Delhi	2X25	DTL
22	Wazirabad	Delhi	2X25	DTL
23	Electric Lane	Delhi	2X25	DTL
24	Mandola	Delhi	25	DTL
25	AIIMS	Delhi	2X25	DTL
26	SaritaVihar	Delhi	25	DTL
27	Bawana	Delhi	25	DTL
28	PreetVihar	Delhi	25	DTL
29	Mundka	Delhi	25	DTL
30	Masjid Moth	Delhi	25	DTL

400kV				
1	Maharanibagh(PG)	Delhi	125	TBCB
2	Mundka	Delhi	125	DTL
3	Mandola(PG)	Delhi	125	TBCB
4	Hissar(PG)	Haryana	125	TBCB
5	Kala Amb(TBCB)	Himachal	125	TBCB
6	Chamera Pooling	Himachal	125	TBCB

	Stn.(PG)			
7	Kishenpur(PG)	J&K	125	TBCB
8	Nakodar	Punjab	125	PSTCL
9	Jullandhar(PG)	Punjab	125	TBCB
10	Moga(PG)	Punjab	125	TBCB
11	Dhuri	Punjab	125	PSTCL
12	Patiala(PG)	Punjab	125	TBCB
13	Jodhpur	Rajasthan	125	RRVPNL
14	Sikar(PG)	Rajasthan	125	TBCB
15	Allahabad(PG)	U.P	125	TBCB
16	Meerut(PG)	U.P	125	TBCB
17	Kashipur	Uttarakhand	125	PTCUL
18	Srinagar	Uttarakhand	80	PTCUL

File No. 293/8/2017-Wind
Government of India/ भारत सरकार
Ministry of New and Renewable Energy/ नवीन और नवीकरणीय ऊर्जा मंत्रालय
(Wind Power Division)
****

Block No.14, CGO Complex,
Lodhi Road, New Delhi – 110 003
Dated: 01.03.2018

OFFICE MEMORANDUM

Subject: Compliance of WTG models to applicable CEA Technical standards for Connectivity to the Grid (as amended from time to time) as stipulated in the MNRE Guidelines/ procedure for Revised List of Models and Manufacturers (RLMM)- Reg.

The issues and difficulties faced by WTG manufacturers to obtain Statement of Compliance (SoC)/ Conformity Statement (CS) for demonstrating the compliance of applicable CEA Technical standards for Connectivity to the Grid (as amended from time to time) for their WTG models within the stipulated time were examined by this Ministry and the following course of action would be adopted for WTG models which were unable to get LVRT compliance certificate from accredited testing agencies:

1. Self-Certification for compliance of CEA technical Standard will be accepted for the inclusion of WTG manufacturers/ models in the RLMM list until 31.03.2019 for all the wind turbine models irrespective of the capacity subject to the following conditions:

a. Concerned WTG manufacturers may apply for LVRT testing to any internationally accredited testing body or National Institute of Wind Energy (NIWE) by 15th March 2018, which should include the following:
   i. An affidavit that the manufacturer would comply with CEA Technical standards for Connectivity to the Grid by 31.03.2019
   ii. A bank guarantee of Rs. 1 Crore per model, which would be returned on producing the Compliance Certificate for LVRT and other technical standards as stipulated by CEA.

   A copy of the above mentioned application may also be sent to MNRE.

b. WTG models for which the manufacturers had provided the self-certification must obtain a certificate from NIWE, Chennai for demonstrating the compliance of applicable CEA Technical standards for Connectivity to the Grid (as amended from time to time); NIWE will carry out the lab simulation for each of the WTG model testing their capabilities of complying to applicable standards and issue a certificate to that effect.
c. During the self-certification period, RLMM list will have two tables; one for wind turbines having valid SoC/CS as per CEA technical standards as stipulated in MNRE guidelines and another table for the wind turbines for which self-

certification along with NIWE's simulation results confirming compliance of CEA technical standards.

d. Based on report of MNRE/ NIWE/ any authorised agency of MNRE for monitoring of compliance to LVRT and related standards, if it is noted that the OEM has submitted the wrong declaration of self-certification then,
   i. The wind turbines connected to wind farm will be disconnected
   ii. The OEM will be barred from installing turbines in India for the period of five years
   iii. Penalty to an extent of Rs. 2 Crores will be imposed.

2. The Stall regulated wind turbines and the wind turbines with capacity of less than 500 kW which are connected at voltage level at 22 kV/ 11 kV and below, in the distribution generation (part of mixed feeder) are exempted from submitting SoC/ CS for demonstrating their compliance to CEA Technical standards for Connectivity to the Grid (as amended from time to time) as stipulated in the MNRE guidelines/ procedure including LVRT requirements.

3. This issues with the approval of Competent Authority.

1/3/2018

(B.K. Panda)
Director (Wind)

To,

All the Concerned

Copy for information to:

1. PS to Hon'ble Minister
2. Sr.PPS to Secretary
3. PPS to Additional Secretary
4. JS &FA/ JS (BPY)
5. DG, NIWE
6. Director (GU)/ Director (BKP)/ Director (NIC) to upload in MNRE website
7. Scientist 'C'(AHB)/ Scientist 'C'(PKD)

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

No. NRPC/OPR/116/03/2019/ 588-596 **Dated:** 22.01.2019

To,
As per the attached List

Subject: - Certifictaion of Non-ISTS lines carrying ISTS power for inclusion in PoC charges for FY 2019-20- reg.

Central Electricity Regulatory Commission (Sharing of Inter State Transmission Charges and Losses) (Third Amendment) Regulations, 2015 provides as under:

> *"Certification of non-ISTS lines carrying inter-State power, which were not approved by the RPCs on the date of notification of the Central Electricity Regulatory Commission (Sharing of Transmission Charges and Losses) Regulations, 2009, shall be done on the basis of load flow studies. For this purpose, STU shall put up proposal to the respective RPC Secretariat for approval. RPC Secretariat, in consultation with RLDC, using WebNet Software would examine the proposal. The results of the load flow studies and participation factor indicating flow of Inter State power on these lines shall be used to compute the percentage of usage of these lines as inter State transmission. The software in the considered scenario will give percentage of usage of these lines by home State and other than home State. For testing the usage, tariff of similar ISTS line may be used. The tariff of the line will also be allocated by software to the home State and other than home State. Based on percentage usage of ISTS in base case, RPC will approve whether the particular State line is being used as ISTS or not. Concerned STU will submit asset-wise tariff. If asset wise tariff is not available, STU will file petition before the Commission for approval of tariff of such lines. The tariff in respect of these lines shall be computed based on Approved ARR and it shall be allocated to lines of different voltage levels and configurations on the basis of methodology which is being done for ISTS lines."*

Accordingly, a group was constituted to recommend a methodology for the study to be conducted by NRPC Secretariat, in consultation with RLDC every year to calculate utilization of these lines for inclusion in PoC charges.. As per the recommendations of the

18-ए, शहीद जीत सिंह मार्ग, कटवारिया सराय, नई दिल्ली- 110016 फोन:011-26513265 फैक्स: 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

group, certification of state owned transmission lines (Non ISTS) carrying ISTS power will be valid for 01 year and the claims/ re-claims for certification for the next financial year will have to be submitted by the end of December of every year.

In view of the above, it is to be informed that the claims/ re-claims for certification of Non-ISTS lines carrying ISTS power for inclusion in PoC charges for FY 2019-20 has not been received by this office till date. It is, therefore requested to submit the claims/ re-claims at the earliest to this office (seo-nrpc@nic.in, ms-nrpc@nic.in) in the format attached.

Sincerely,

(M. A. K. P. Singh)
Member Secretary

List of recipients

Chief Engineer, Electricity Department, UT of Chandigarh, Secretariat office building, Sector-9D, CHANDIGARH- 160 009	Director (Operations), Delhi Transco Limited, Shakti Sadan, Kotla Road, NEW DELHI-110 002
Director (Technical), Haryana Vidyut Prasaran Nigam Ltd., Shakti Bhawan, Sector-6, PANCHKULA - 134 109.	Director (Projects), H.P. Power Transmission Corp. Ltd Barowalia House, Khalini, SHIMLA-171 004
Development Commissioner (Power), Power Development Department (Jammu & Kashmir), Grid Sub Station Complex, Janipur, JAMMU-180001	Director (Tech.) PSTCL, The Mall, PATIALA-147 001
Director (O), U.P. Power Transmission Corporation Ltd, Shakti Bhawan, 14-Ashok Marg, LUCKNOW-226 001.	Director(O&M), Power Transmission Corporation of Uttarakhand Ltd. (PTCUL), Vidyut Bhawan, Saharanpur Road, Near ISBT, Majra, Dehradun-248001
Director (Technical) Rajasthan Rajya Vidyut Prasaran Nigam Ltd, Vidyut Bhawan, Jyoti Nagar, Janpath JAIPUR-302 005	

Annex

Format for submission of claim on certification of state owned non-ISTS lines carrying ISTS power

Sr. No	Name of the Transmission line	Voltage level/No of circuits	Length	Conductor Configuration of the line	Terrain	Date of Commercial operation	Justification for the claim

ANNEXURE-B.13.1

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

No. NRPC/OPR/107/02/ 2058-2088 Dated: 05.03.2019

To,
As per list attached

Subject: - Training Programme/Workshop on Protection Audit for Protection System Engineers –reg

Protection Sub-Committee (PSC) of NRPC in its 36th meeting held on 19.09.2018 has recommended to conduct a Training Programme/Workshop on Protection Audit for Protection System Engineers at Bengaluru through CPRI. Subsequently, NRPC in its 43rd meeting held on 30th October, 2018, has 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.

Accordingly, NRPC Sectt. would be organizing 1st batch of a non-residential 03 days Training Programme/Workshop on Protection Audit for Protection System Engineers through CPRI at Bengaluru, from 27th to 29th March, 2019. The participants have to make their travel and accommodation arrangements by themselves. However, CPRI may provide accommodation in their Guest House on chargeable basis during the training period, if required. The 2nd batch of training programme would be held in the month of April/May, 2019

In view of the above, it is requested to nominate max. 02 No. of participants from your organization for the above-mentioned Training Programme/Workshop. The nominations may please be forwarded via e-mail (seo-nrpc@nic.in) to this office by 12th March, 2019.

Sincerely,

(M. A. K. P. Singh)
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

List of Recipients

1. Director (Tech.), PSTCL, Patiala, (Fax-0175-2304017)
2. Development Commissioner Power, PDD, Jammu, J&K, (Fax-0191-2534284)
3. Director (Tech), HVPN Ltd, Panchkula-134109, (Fax-0172-2572847/2566330)
4. Director (Tech), HPSEB Ltd, Shimla- 171004, (Fax- 0177-26163554)
5. Member (Power), BBMB, Chandigarh- 160019, (Fax-0172-2549548)
6. Chief Engineer (GM), CEA, R. K. Puram, New Delhi-110066, (Fax-011-26109750)
7. Chief Engineer, NPC, CEA, NRPC Building, Katwaria Sarai, New Delhi-16, (Fax: 011-26565183)
8. Chief Engineer, UT of Chandigarh, Chandigarh-160009, (Fax-0172-2740276)
9. Director (Operation), DTL, New Delhi-110002, (Fax-011-23232721)
10. Director (Technical), IPGCL, New Delhi-110002, (Fax-011-23270590)
11. Chief Engineer (SO&C), SLDC, HVPNL, Sewah, Panipat, (Fax-0172-2560622/2560547)
12. Director (Generation), HPGCL, Panchkula-134109 (Fax-0172-2560622 & 2565042)
13. Director (Projects), HPPTC Ltd., Himfed Bhawan, Shimla-171005, (Fax-0177-2832384)
14. Superintending Engineer, SLDC, HP LDS, Totu, Shimla, (Fax-0177-2837543)
15. Managing Director, J&K State Power Dev. Corp., Srinagar, J&K, (Fax-0194- 2500145)
16. Director (Technical), RVPNL, Janpath, Jaipur-302005, (Fax-0141-2740794)
17. Director (Opn), UPPTCL, Lucknow-226001, (Fax-0522-2286476)
18. Chief Engineer (TO), UPRVUNL, Lucknow-226001, (Fax-0522-2287861)
19. Director (O&M), PTCUL, Dehradun-248001, (Fax-0135-2644495)
20. Executive Director (O&M), NHPC, Faridabad-121003, (Fax-0129-2255706/2271419/2272413)
21. Chief Engineer (E&T), NPCIL, Mumbai-400094, (Fax-022-25993332/25183536)
22. Regional Executive Director (NR), NR-HQ, NTPC, Lucknow-226010, (Fax-0522-2305842)
23. Executive Director (NR-I), PGCIL, New Delhi-110016, (Fax-011-26564849)
24. Director (E), SJVNL, New Delhi, (Fax-0177-2660051)
25. General Manager (Electrical Design), THDC, Rishikesh-249201, (Fax-0135-2438682)
26. General Manager, NRLDC, New Delhi-110016, (Fax-011-26853082)
27. AGM (O&M), Aravali Power Company Pvt. Ltd., Jhajjar (Fax-01251-266265)
28. DGM (Commercial), Jhajjar Power Ltd., Haryana, (Fax-01251-270105)
29. GM, Adani Power Rajasthan Ltd., Ahmedabad-380006 (Fax No- 079-25557176)
30. General Manager(BD), AD Hydro Power Ltd., Noida-201301, (Fax: 0120-4323271/4278772)
31. Head (O&M), Nabha Power Limited, (Fax:01762277251/01724646802) (email: ravindersingh.lall@larsentoubro.com)

न्यूक्लियर पॉवर कॉरपोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Ltd.
(भारत सरकार का उद्यम A Govt. of India Enterprise)
नरौरा परमाणु विद्युत केंद्र Narora Atomic Power Station
डाक एनएपीएस टाउनशिप, नरौरा जिला बुलंदशहर (उ.प्र.) . 203 389
PO : NAPS Township, Narora, Distt. Bulandshahr (UP) - 203 389
वेबसाइट Website : www.npcil.nic.in, सीआईएन CIN : U40104MH1987GOI149458,

संख्या : एन ए पी एस/51400/टी.एस.यू–ई एण्ड आई/ 2018/एस/85, दिनांक : 02/08/2018

Sub: **Modification in NAPS Islanding Scheme after latest network development at Simbholi S/S.**

NAPS (2x220 MWe) is connected with western UP grid of Northern Regional grid. To safeguard NAPS Units as well as having pockets of generation on event of regional grid failure, a dedicated islanding scheme has been devised for NAPS and it is functioning well.

Brief about NAPS islanding scheme:

At Grid frequency 47.9 Hz, NAPS Islanding initiates and NAPS forms Island with Simbholi and Khurja S/S of UPPCL. At Simbholi S/S, the UFR relay (47.9 Hz) trips 220 KV Matore(PG) and 220KV Shatabdi nagar lines to isolate Simbholi from rest of the Grid. Further, backup UFR (47.9 Hz) relays are installed at Matore S/S and Shatbadi Nagar S/S for tripping of respective Simbholi line for full proof isolation of Simbholi S/S for NAPS Islanding.

Similarly at Khurja S/S too, all 220 KV lines except Narora & Debai/Narora feeders tripped at 47.9 Hz through dedicated UFR, installed for the purpose. With this, NAPS forms Island with Simbholi and Khurja loads at 47.9 Hz.

These UFR relays are supplied by NAPS and further installation & annual testing are being done jointly by NAPS & UPPCL- respective T&C division.

Latest Network development at Simbholi S/S:

Recently, following network development have taken place at 220 KV Simbholi S/S and adjourning grid substations:

1. Existing 220 KV Simbholi - Shabtdinagar line got LILO at 400 KV S/S Hapur and hence Shatabdi Nagar S/S has no relevance for NAPS Islanding purpose.
2. One new line element 220 KV Simbholi – Hapur (400 KV) has been commissioned and now in operation.

3. One more new line element 220 KV Simbholi – Hapur (220 KV S/S UPPCL) has been commissioned and now in operation.

With the above, NAPS Islanding scheme is to be modified at the earliest.

Proposed Modifications in NAPS Islanding: Based on above network development at Simbholi and adjourning S/S, following modifications are to be implemented:

1. **At Simbholi S/S**: U/F trip is to be wired for 220 KV Simbholi – Hapur(400 KV S/S) and 220 KV Simbholi – Hapur(220 KV UPPCL S/S) lines through existing UFR of NAPS Islanding scheme.– **UPPCL / NAPS**

2. **At Hapur 400 KV S/S**: One dedicated UFR relay set at 47.9 Hz is to be installed & commissioned for NAPS Islanding function and U/F trip is to be provided for tripping of 220 KV Hapur - Simbholi CKT-I & II. The relay is to be provided by NAPS. **– UPPCL / NAPS**

3. **At Hapur 220 KV S/S:** One dedicated UFR relay set at 47.9 Hz is to be installed & commissioned for NAPS Islanding function and U/F trip is to be provided for tripping of 220 KV Hapur - Simbholi line. The relay is to be provided by NAPS. **– UPPCL / NAPS**

4. **At Shatabdi Nagar 220 KV S/S:** As existing line 220 KV Simbholi – Shatabdinagar got LILO at Hapur 400 KV S/S, existing NAPS Islanding UFR has no relevance.

   Hence, the UFR relay (NAPS Islanding), installed at Shatbadi Nagar is to be removed and its trip circuit is to be deleted. Same relay will be utilized at Hapur S/S. **– UPPCL / NAPS**

Existing and proposed modified NAPS Islanding scheme (due to network development at Simbholi) is attached herewith.

Development of LILO of 220 KV Simbholi – Shatabdi Nagar line at Hapur 400 KV S/S was also discussed in 148th OCC and 35th PCC meeting of NRPC, held in June 2018. NRPC has recommended to shift and commissioned the relay accordingly. As an interim measure, NAPS & UPPCL-T&C has discussed the above development and is in process of implementation.

Recommendations:

Above network development at Simbholi S/S which has affected NAPS islanding scheme, is to be discussed / reviewed in next OCC meeting of

NRPC for implementation of the above proposed modifications at UPPCL S/S to ensure healthiness and effectiveness of the Islanding scheme.

- NRPC / NRLDC/ UPPCL

संजय कुमार 2.8.18

(संजय कुमार)
वरि.तकनीकी अभीयंता (ई एंड आई)

वितरण Distribution:

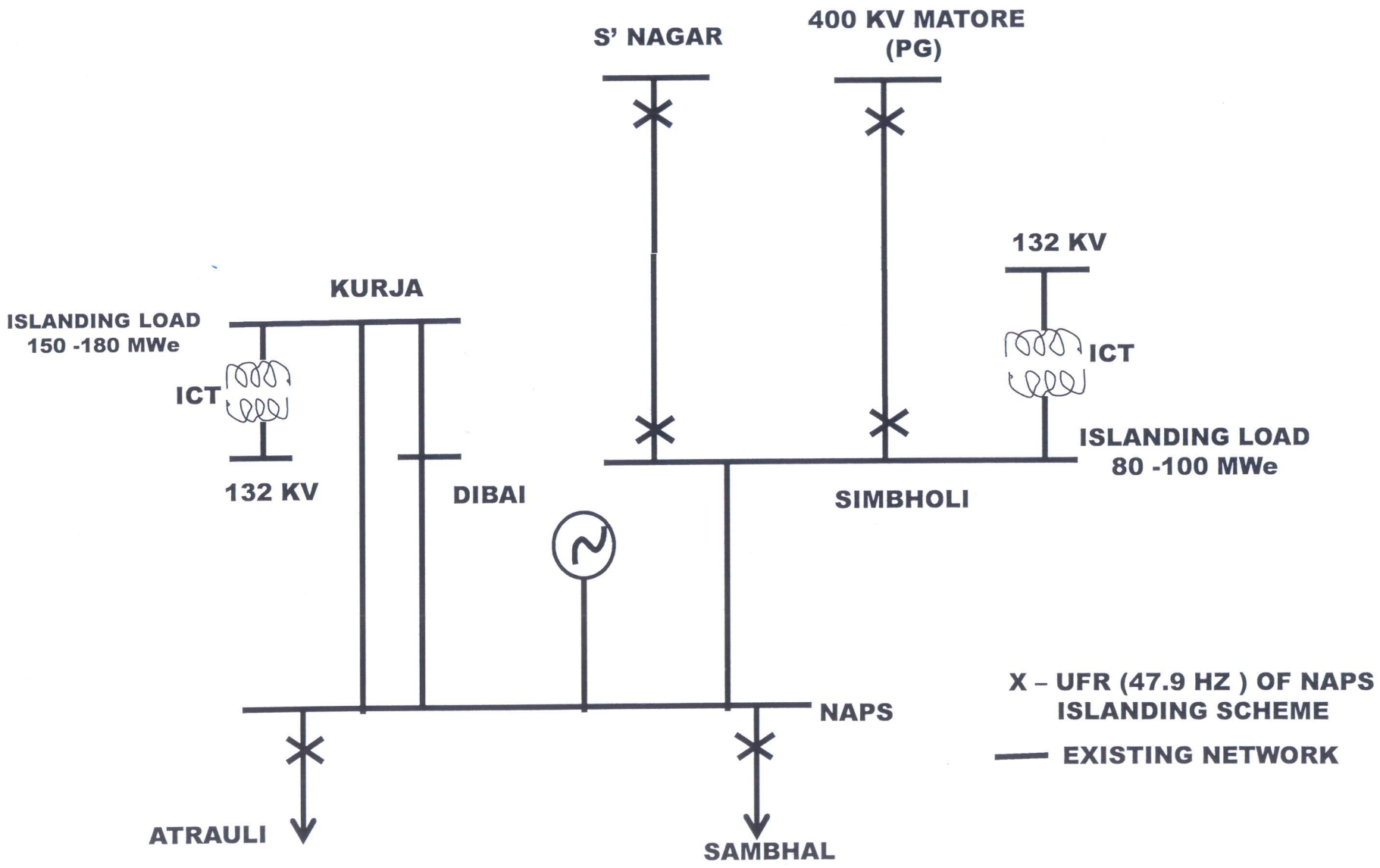
NRPC	Sh Upender Kumar, SE(Opr & Prot) (seo-nrpc@nic.in as-nrpc@nic.in) Fax: 011- 26865206
NRLDC	Sh D K Jain, General Manager (dkj2009@yahoo.co.in) (nrldcoa@gmail.com) Fax: 011- 26853082, 26852747
UPPCL	श्री **नवीन रंजन,** अधीक्षण अभियंता (T&C Division), मेरठ (setncmrt@gmail.com)
	Md A J Siddiqui, SE(SC), Lucknow (secs@upsldc.org)
NPCIL HQ	Sh K P Singh, CE (kpsingh@npcil.co.in)
	Sh S Y Sarwate, ACE (ssarwate@npcil.co.in)

प्रतिलिपि विनम्र सूचनार्थ:

- केंद्र निदेशक
- मुख्य अधीक्षक
- तकनीकी सेवा अधीक्षक
- एस एम ई. (ई)
- फाइल–217

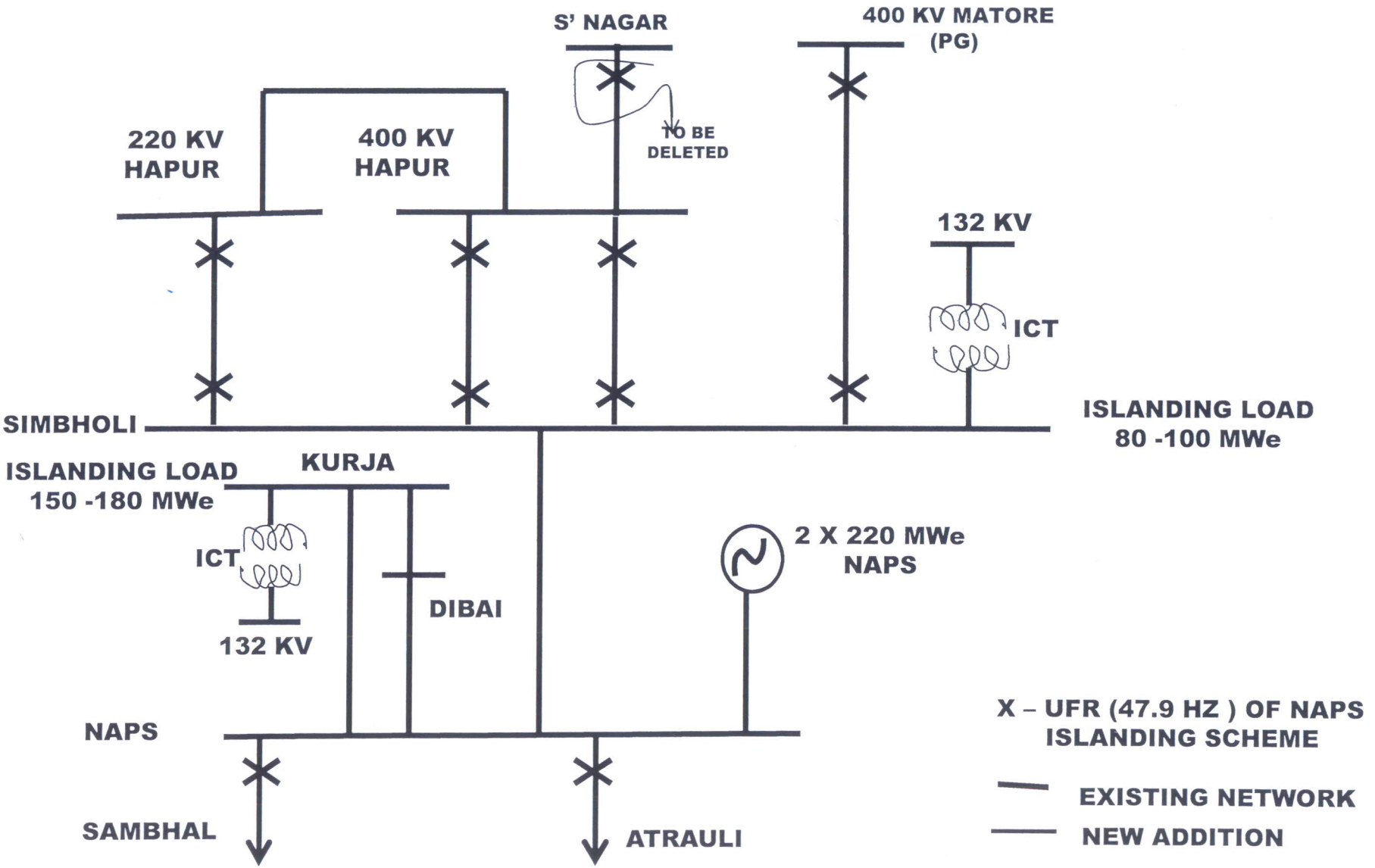
ANN-1

EXISTING NAPS ISLANDING SCHEME & 220 KV SIMBHOLI S/S



ANN-I

NAPS ISLANDING SCHEME AFTER DEVELOPMENT AT 220 KV SIMBHOLI S/S



न्यूक्लियर पॉवर कॉरपोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Ltd.
(भारत सरकार का उद्यम A Govt. of India Enterprise)
नरौरा परमाणु विद्युत केंद्र Narora Atomic Power Station
डाक एनएपीएस टाउनशिप, नरौरा जिला बुलंदशहर (उ.प्र.) . 203 389
PO : NAPS Township, Narora, Distt. Bulandshahr (UP) - 203 389
वेबसाइट Website : www.npcil.nic.in, सीआईएन CIN : U40104MH1987GOI149458,

संख्या : एन ए पी एस/51400/टी.एस.यू–ई एण्ड आई/ 2018/एस/ 104 दिनांक : 15/10/2018

Sub: **Report on modification in NAPS Islanding Scheme after network development at Simbholi S/S.**

Ref: i) संख्या : एन ए पी एस/51400/टी.एस.यू–ई एण्ड आई/ 2018/एस/ 85 दिनांक : 15/10/2018

ii)150th OCC Meeting of NRPC

NAPS (2x220 MWe) is connected with western UP grid of Northern Regional grid. To safeguard NAPS Units as well as having pockets of generation on event of regional grid failure, a dedicated islanding scheme has been devised for NAPS and it is functioning well.

Brief about NAPS islanding scheme:

At Grid frequency 47.9 Hz, NAPS Islanding initiates and NAPS forms Island with Simbholi and Khurja S/S of UPPCL.

At Simbholi S/S, all 220 KV lines except Narora feeder will trip at 47.9 Hz through dedicated UFR, installed for the purpose. Further, backup UFR (47.9 Hz) relays are installed at remote end 220 KV S/S of Simbholi for tripping of respective Simbholi line for full proof isolation of Simbholi S/S.

Similarly at Khurja S/S, all 220 KV lines except Narora & Debai/Narora feeders will trip at 47.9 Hz through dedicated UFR. Further, backup UFR (47.9 Hz) relays are installed at remote end 220 KV S/S of Khurja for tripping of respective Khurja lines for full proof isolation of Simbholi S/S.

To have proper load – generation balance, selected 132 KV feeders also trips at Simbholi & Khurja S/S.

With this, NAPS forms Island with Simbholi and Khurja loads at 47.9 Hz.

These UFR relays are supplied by NAPS and further installation & annual testing are being done jointly by NAPS & UPPCL- respective T&C division.

Latest Network development at Simbholi S/S:

Recently, following network development have taken place at 220 KV Simbholi S/S and adjourning grid substations:

1. Existing 220 KV Simbholi - Shabtdinagar line got LILO at 765/400/220 KV S/S Hapur and hence Shatabdi Nagar S/S has no relevance for NAPS Islanding purpose.
2. One new line element 220 KV Simbholi – Hapur (765/400/220 KV) has been commissioned.
3. One more new line element 220 KV Simbholi – Hapur Hybrid (220 KV S/S UPPCL) has been commissioned.

The above grid network development was reviewed in 150th OCC meeting and recommended to modify the NAPS Islanding scheme at Simbholi, 400 Kv Hapur, 220 KV Hapur hybrid and Shatabdinagar S/S.

Modifications done in NAPS Islanding scheme at UPPCL S/S:

Based on above, following modifications have been implemented at UPPCL S/S:

1. **At Simbholi S/S**:

   U/F trip is has been provided for 220 KV Simbholi – Hapur Ckt-I&II (765/400/220 KV) and 220 KV Simbholi – Hapur Hybrid lines through existing UFR of NAPS Islanding scheme

2. **At Hapur 765/400/220 KV S/S**:

   Two dedicated UFR relays, set at 47.9 Hz has been installed & commissioned for NAPS Islanding function and U/F trip has been provided for tripping of 220 KV Hapur - Simbholi CKT-I & II.

3. **At Hapur hybrid 220 KV S/S**:

   One dedicated UFR relay set at 47.9 Hz has been installed & commissioned for NAPS Islanding function and U/F trip has been provided for tripping of 220 KV Hapur - Simbholi line.

4. **At Shatabdi Nagar 220 KV S/S:**
   The UFR relay (NAPS Islanding), installed at Shatbadi Nagar has been disconnected and its trip circuit has been deleted.

U/F relay & its setting has been kept as per NAPS Islanding Scheme. Details are as follows:

- Make: GEC Alsthom, Model: MFVUM-12
- Frequency setting: 47.9 Hz.
- Time delay setting: 50 msec.

After installation, functional testing was done jointly along with UPPCL officials.

All UFR relays were supplied by NAPS and same was jointly (with UPPCL) installed and commissioned.

After implementation of above changes, modified NAPS Islanding scheme is attached as Annexure-1.

Conclusion:

Recent grid development at and around Simbholi S/S necessitate modification in UFR trip scheme at respective UPPCL S/S for smooth functioning of NAPS Islanding. In consultation with NRPC & UPPCL, same has been implemented and functionally tested.

19.10.18

(संजय कुमार)
वरि.तकनीकी अभीयंता (ई एंड आई)

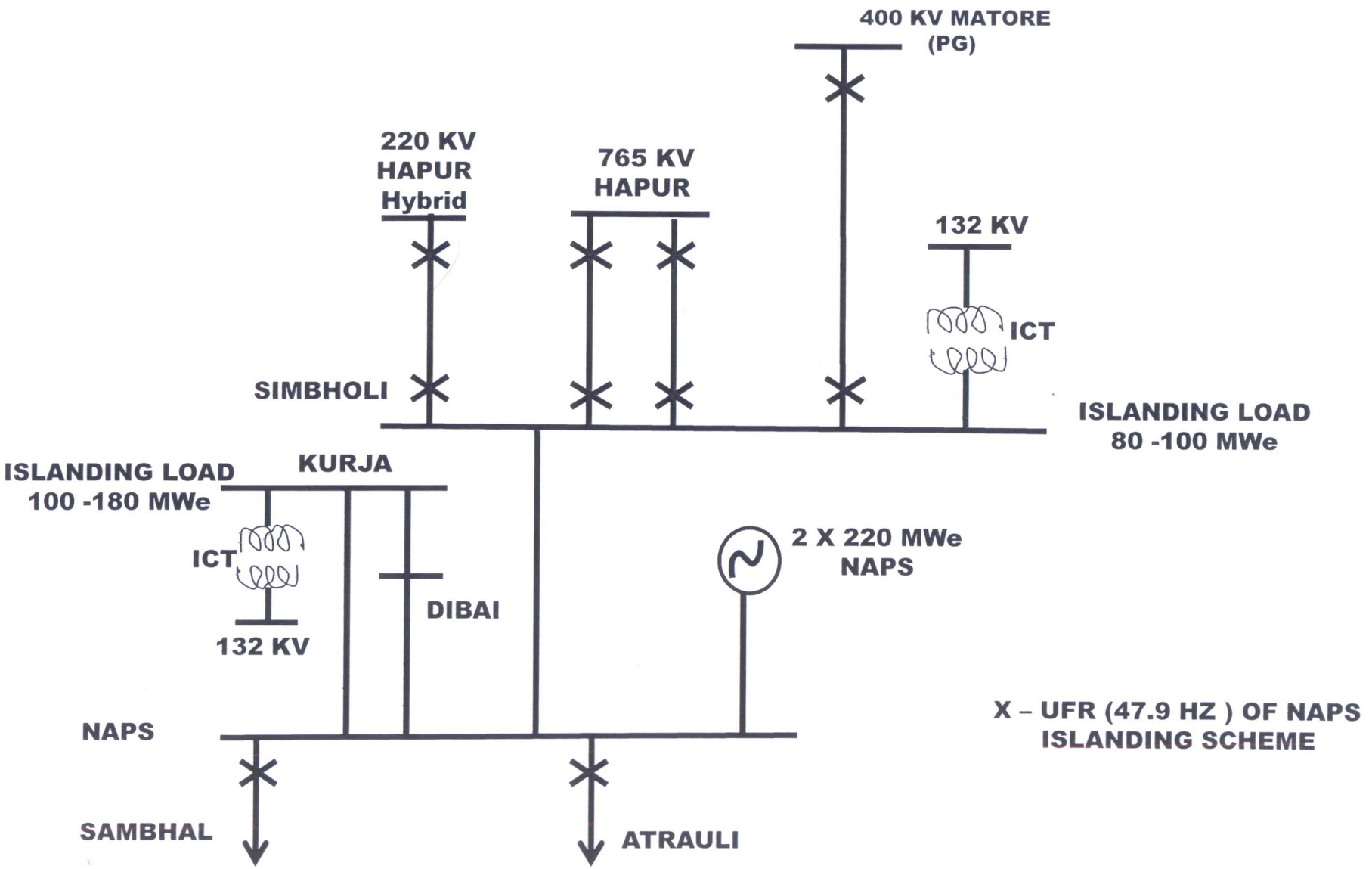
वितरण Distribution:

NRPC	Sh Upender Kumar, SE(Opr & Prot) (seo-nrpc@nic.in as-nrpc@nic.in)
NRLDC	General Manager (nrldcoa@gmail.com)
UPPCL	श्री नवीन रंजन, अधीक्षण अभियंता (T&C Division), मेरठ (setncmrt@gmail.com)
	Md A J Siddiqui, SE(SC), Lucknow (secs@upsldc.org)
765 KV S/S Hapur	Smt Monika Singh (monika.wupptcl@gmail.com)
NPCIL HQ	Sh K P Singh, CE (kpsingh@npcil.co.in)
	Sh S Y Sarwate, ACE (ssarwate@npcil.co.in)

प्रतिलिपि विनम्र सूचनार्थ:

- केंद्र निदेशक
- मुख्य अधीक्षक
- तकनीकी सेवा अधीक्षक
- एस एम ई. (ईं)
- एस सी ई–/ए/बी/सी/डी
- फाइल–217

NAPS ISLANDING SCHEME AFTER DEVELOPMENT AT 220 KV SIMBHOLI S/S



Annexure -B.20.1

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
तापीय परियोजना नवीनीकरण एवं आधुनिकीकरण प्रभाग
Thermal Projects Renovation & Modernisation Division

विषय: दिल्ली एनसीआर में स्थित थर्मल पावर प्लांट में एफजीडी इंस्टॉलेशन / ईएसपी उन्नयन की स्थिति- के बारे में

Reference: MoP's Letter No. 10/3/2017-S.Th. dated 05-04-2018.

The detailed status of implementation of pollution control equipment at the thermal power stations located in Delhi-NCR is enclosed as annexure.

(बी.सी. मलिक)
मुख्य अभियंता

JS (Thermal), MoP

File No. 2/17/CEA/TPRM/FGD&ESP/2018 दिनांक: 11-09-2018

Copy to :

1. Chairperson, CEA
2. Member(Thermal), CEA

As on 11.09.2018

FGD-ESP Phasing Plan of Thermal Power Plants located in Delhi NCR

Sl. No.	Name of Thermal Power Station	Timeline for FGD	Current Status
1.a.	**Dadri (NCTPP), U.P Unit 1-4 (210X4 MW)**	**31.12.2019**	**FGD**: NIT Issued for Dry Sorbent Injection. **DE-Nox**: Statutory limits being complied. **ESP**: Statutory limits being complied.
1.b.	**Dadri (NCTPP), U.P Unit 5-6 (490X2 MW)**	**31.12.2019**	**FGD**: Wet type FGD Package awarded to M/s BHEL. **DE-Nox:** Bid opened on 23.05.2018. **ESP**: Statutory limits being complied.
2.	**GHTP (Lehra Mohabbat), Punjab Unit 1-4(210X2 &250X2 MW)**	**31.12.2019**	**FGD**: Administrative approval under process **ESP**: Case regarding ESP Upgradation will be initiated after finalizing feasibility report to install FGD. **DE-Nox:** Decision will be taken after the results of pilot project.
3.	**Harduaganj, U.P Unit-8&9 (250X2 MW)**	**31.12.2019**	**FGD**: Administrative approval is under process. **ESP**: Offer of Pre-award consultancy for retrofitting of ESP is awaited from M/s NTPC. **DE-Nox:** Decision will be taken after the results of pilot project.
4.	**Indira Gandhi STPP, Haryana Unit 1-3 (500X3 MW)**	**31.12.2019**	**FGD**: Bid Awarded on 30 Jan'18. **DE-Nox:** Scheduled implementation is before Dec 2019 **ESP**: Already designed to meet the environmental norms
5.	**Mahatma Gandhi TPP, Haryana Unit-1-2(660x2 MW)**	**31.12.2019**	**FGD**: FGD Installed and is Under Renovation **ESP**: Statutory limits being complied. **DE-Nox:** A third party has been engaged to control NOX emission through combustion optimisation technique.
6.a.	**Panipat TPS, Haryana Unit-6 (1X210 MW)**	**31.12.2019**	**FGD**: Matter has been taken up with MOEF&CC. **ESP**: SPM values are within limits.
6.b.	**Panipat TPS, Haryana Unit-7-8 (2X250 MW)**	**31.12.2019**	**FGD**: NTPC has been engaged as consultant for pre-bid and post-bid activities for installation of FGD. **ESP:** SPM values are within limits
7.a.	**Rajiv Gandhi TPS, Hisar, Haryana Unit-1(600 MW)**	**31.12.2019**	**FGD**: NTPC has already carried out the Feasibility Study for installation of FGD. **ESP**: NIT is in process
7.b.	**Rajiv Gandhi TPS, Hisar, Haryana Unit-2(600 MW**	**31.12.2019**	**FGD**: NTPC has been engaged as consultant for pre-bid and post-bid activities for installation of FGD. **ESP**: All the ESP fields are in working order.
8.a.	**Yamunanagar (DCTPS), Haryana Unit-1(300 MW)**	**31.12.2019**	**FGD**: NTPC has alredy carried out the Feasibility Study for installation of FGD. **ESP:** SPM are within the limits.
8.b.	**Yamunanagar (DCTPS), Haryana Unit-2(300 MW)**	**31.12.2019**	**FGD**: NTPC has alredy carried out the Feasibility Study for installation of FGD. **ESP:** The revival of ESP fields of has been awarded to M/s GE Power India Ltd.
9.	**Talwandi Sabo TPS, Mansa, Punjab Unit-1-3(660x3 MW)**	**31.12.2019**	**FGD**: PPA issues pending with regulator. **ESP:** Has already installed Hybrid ESP

10.	**Nabha Power Ltd, Rajpura, Punjab Unit-1-2(700x2 MW)**	**31.12.2019**	**FGD**: Bid documents for Wet limestone based FGD completed. Regulatory approval under process. **ESP:** Statutory limits being complied. **De-Nox:** Discussion with proven technology supplier under progress.

ANNEXURE – I

(For Power Lines)

1. (a) Name of the Power Supply authority Seeking approval : PSTCL, Punjab

   (b) Reference number & dated : Memo No. 2291 Dated:- 18.09.2017

   (c)Probable date of energisation : Immediate

2. (a) Name of the power line **LILO of one Ckt. Of 220 KV Humbran- Ferozpur Road Ludhiana at Ladowal Line**

   (b)Route map number & date : ----

   (c) Operating voltage : 220 KV

   (d) Length of HT/EHT line : 12.439 KMs

   (e) Number of circuits : Singlee Ckt.

3. (a) Number of paralleling telecom lines : As per Topo Sheet.

   (b)Length of parallelism : As per Topo Sheet.

4. Average value of earth resistivity in the region : 10000 Ohm -Cm

5. Whether LF test necessary : NIL

6. Fault Current & Induced voltages etc. : As mentioned in Annexure-I of IV calculation sheet of CEA, New Delhi

ANNEXURE – II

i. As per IV calculation by CEA, New Delhi vide No. CEA/PCD/PTCC/PNB-347/1063 dated:- 07.05.2018 the voltage likely to be induced on the BSNL line is above permissible limit **except Nurpur Xchange-Char Pillar**, hence necessary protection (GD Tube) is required for BSNL telecom lines where the IV is above permissible limit.

ii. As per IV calculation by CEA, New Delhi vide No. CEA/PCD/PTCC/PNB-347/1063 dated:- 07.05.2018 there is no railway line is within 08 KM of the proposed power line, hence no additional protection is required for Railway telecom and block circuit.

iii. SO-in-C, Directorate General of Signals-7, General Staff Branch, Integrated HQ of MoD (Army), DHQ PO, New Delhi – 110011 has provided NOC vide letter No. B/46937/Sigs 7(b)/670 dated:-08.12.2017. hence no additional protection is required for defence lines.

19/6/18

DET (PTCC), N
Inspection Circle

POWER SYSTEM OPERATION CORPORATION LIMITED
National Load Despatch Centre
(Designated as Nodal Agency in accordance with Regulation 5 of CERC (PSDF) Regulations, 2014)
(PSDF-Secretariat)
Office Address: B-9, 1st Floor, Qutub Institutional Area, Katwaria Sarai, New Delhi - 16
Tel: 011-26524521, 26536959 Fax: 011-26524525, 26536901
Website: https://psdfindia.in/. Email psdf@posoco.in ; nldc.psdf@gmail.com

Ref: NLDC-PSDF/2018-19/PGCIL-76/NR STATCOM/1524 Dated: 14th February, 2019

To

General Manager (Corporate Planning)
Saudamini, Plot No.2, Sector 29, Near IFFCO Chowk,
Gurgaon (Haryana) - 122001.

Subject: - Proposal for installation of NR-STATCOM-request for PSDF funding

Sir,

This is with reference to the proposal for installation of STATCOM in the Northern Region from PSDF funding.

The proposal was examined by the Appraisal Committee during its 18th meeting held on 5.2.2018. The work had already been awarded before approval of PSDF funding. Therefore, in line with the decision of the Monitoring Committee, the proposal was not considered for PSDF funding and was returned.

Subsequently, request of PGCIL vide letter dated 18.10.2018 to reconsider the proposal for funding and the recommendations of 42nd NRPC held on 28.6.2018 in this regard communicated vide NRPC letter dated 5.10.2018 were deliberated by the Appraisal Committee during its 21st meeting held on 15th Nov, 2018.

The request to reconsider the proposal was not accepted by the Appraisal Committee.

Relevant extract from the Minutes of 21st meeting the Meeting of the Appraisal Committee are reproduced below:

7.1 ***STATCOM at Nalagarh & Lucknow in Northern Region by POWERGRID***

A proposal of POWERGRID for Provision of STATCOM at Nalagarh & Lucknow in Northern Region was examined by the Appraisal Committee during its 18th meeting held on 5.2.2018. The work had already been awarded before approval of PSDF funding. Therefore, in line with the decision of the Monitoring Committee, the proposal was not considered for PSDF and was returned.

*POWERGRID, vide letter dated 18.10.2018 have requested to reconsider the proposal for funding (**Annexure-XIII**). The recommendations of 42nd NRPC held on 28.6.2018 in this regard have also been communicated vide NRPC letter dated 5.10.2018.*

The matter was deliberated by the Committee. The Committee observed that

proposal was put up for recommendation during its 18th meeting held on 5.2.2018. It was observed that LOA had already been placed by PGCIL. As per the directions of the Monitoring Committee conveyed during its third meeting held on 19.3.2015, any proposal where LOA has been placed before approval of PSDF funding shall not be considered. Therefore, the proposal was not considered for funding.

In line with the earlier decisions of the Appraisal Committee and the Monitoring Committee, the request of PGCIL was declined.

This is for your information please.

Thanking you,

Yours faithfully,

(N. Nallarasan) 14/2/19.
Sr. General Manager
NLDC-POSOCO

Copy to :

1. Executive Director (Corporate Planning),
   Saudamini, Plot No.2, Sector 29, Near IFFCO Chowk,
   Gurgaon (Haryana) - 122001.

2. Chief Engineer (NPC), CEA

Annexure-B.31.1

U.P. Power Transmission Corporation Limited

उ0 प्र0 पावर ट्रान्समिशन कार्पोरेशन लिमिटेड

(उ0 प्र0 सरकार का उपक्रम)

कार्यालय
निदेशक (वाणिज्य एवं नियोजन)
5वां तल, शक्ति भवन,
14-अशोक मार्ग, लखनऊ-226001
फैक्स-0522 2218530 फोन नं०-0522 2218530

CIN No.- U40101UP2004SGC028687
GSTIN 09AAACU8823E1Z9

Office of the
Director (Commercial & Planning)
5th Floor, Shakti Bhawan,
14- Ashok Marg, Lucknow-226001
Phone- 0522 2218511
Email- Director_comm @upptcl.org

No. 754 Dir(Comm&Plg)/UPPTCL/2018 Date: 01 Oct. ,2018

The Executive Director,
Power Grid Corporation of India Ltd.,
Regional Headquarter,
12- Rana Pratap Marg,
Lucknow-226001.

Sub : Early Augmentation of 400/220 kV PGCIL substations at Lucknow & Gorakhpur.

Dear Sir,

Kindly refer to letter no. 677 Dir(Comm&Plg)/UPPTCL/2018/TTC dated 29.08.2018 in continuation to other letters previously written on the subject. In this connection, it is further requested that augmentation of 400 KV PGCIL substations 1x315 + 1x500 to 2x500 MVA at Kursi Road, Lucknow and 2x315 to 3x315 MVA at Gorakhpur may please be expedited at the earliest in view of TTC requirement in the network for U.P. The empowered committee on transmission, appreciating the concern of the state, have already exempted the execution of the augmentation from TBCB and have permitted PGCIL to carry out under Regulated Tariff Mechanism (RTM).

It is therefore requested that these works be completed latest by March, 2019. It is not out of place to mention that 400 KV PGCIL substation at Lucknow besides TTC, is also of high importance for reliable supply to capital city.

Hoping for your kind cooperation in the matter,

With regards,

Encl.: As above.

Yours sincerely,

(Suman Guchh)
Director (Commercial & Planning)

C.C.

Chairman, PGCIL, Saudamini, Plot No.2, Sector-29,
Gurugram (Haryana).

Copy also forwarded to :-

1. P.S. to Chairman, UPPTCL.
2. P.S. to Managing Director, UPPTCL.
3. Director (Works & Project), UPPTCL.
4. Director (Operation), UPPTCL.

ANNEXURE-B.33.1

पावरग्रिड

पावरग्रिड कारपोरेशन ऑफ इण्डिया लिमिटेड

सम्पत्ति प्रबन्धन, क्षेत्रीय मुख्यालय (उ0क्षे0 2),

ग्रिड भवन, रेल हैड कॉम्पलैक्स, जम्मू

फोन - 0191-2471640

==========

Ref. No.: PGAM/NR2/2018/6/ Date: 05-12-2018

Development Commissioner Power (J&K),
Near Exhibition Grounds,
Srinagar (J&K)

Subject: Regarding shut down on 220 kV Sarna Hiranagar line for tower erection.

Earlier Ref.: 1. PGAM/NR2/2018/6/ Dated 06.06.18.
2. PGAM/NR2/2018/6/2735 Dated 22.06.18.
3. PGAM/NR2/2018/6/4849 Dated 12.10.18.

Sir,

Kindly refer above communication , it was requested to allow shut down on 220 kV Sarna Hirnagar line due to severe damaged to foundation at location no. 66 caused by change in river flow. The tower position is very critical. The line required to be shifted to another tower at this location.

New tower foundation has been completed around year back. Shut down on this line was denied by JKPDD due to corridor constraint in the Hiranagar area. Now the condition of towers has worsen due leg/members bending, it becomes even more urgent to shift the line on new tower. In case of tower collapse, power supply will be severely affected in this area as it will not be possible to restore the system in less than a month.

Keeping in view the criticality of tower foundation, it is again requested to look into the matter for allowing shut down on 220 kV Sarna Hiranagar line from 15.12.18 to 19.12.18 so that line can be shifted to new tower for ensuring uninterrupted power supply to Jammu.

Thanking You.

Truly Yours,

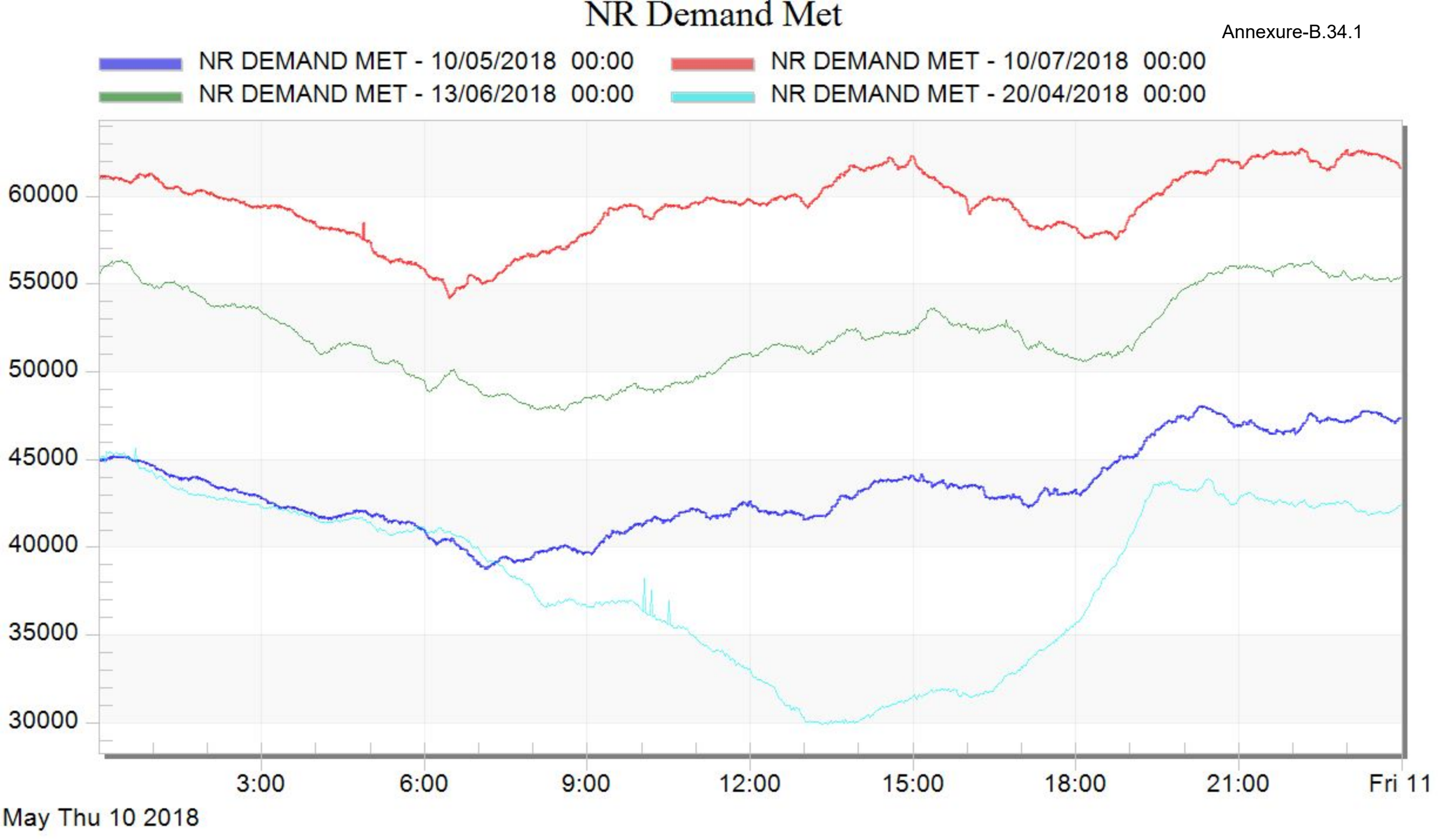
05.12.18

(R.V.S.Kushwaha)
Ch. General Manager (AM)

CC: For kind information please:
1. Secretary (Power), Govt. of J&K.
2. Member Secretary, NRPC, New Delhi.
3. ED, NRLDC - POSOCO, New Delhi.
4. CE (S&O)/ M&RE, JKPDD – Jammu.

Annexure-B.34.1

NR Demand Met



TEMPERATURE AND HUMIDITY DISPLAY

NR-2

STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
ABDULLAPUR	21	69	3
AMRITSAR	s 18	s 64	s 4
BAHADURGARH	28	0	0
FATEHABAD	20	746	37
HISSAR	26	31	1
JALLANDHAR	s 50	s 102	s 2
KAITHAL	17	65	4
KISHENPUR	16	63	4
MALERKOTLA	s 0	s 64	0
MOGA	s 17	s 63	s 4
NALAGARH	17	56	3
PATIALA_PG	17	72	4
WAGOORA	s 0	s 0	0
SONIPAT	-20	35	

NR-1

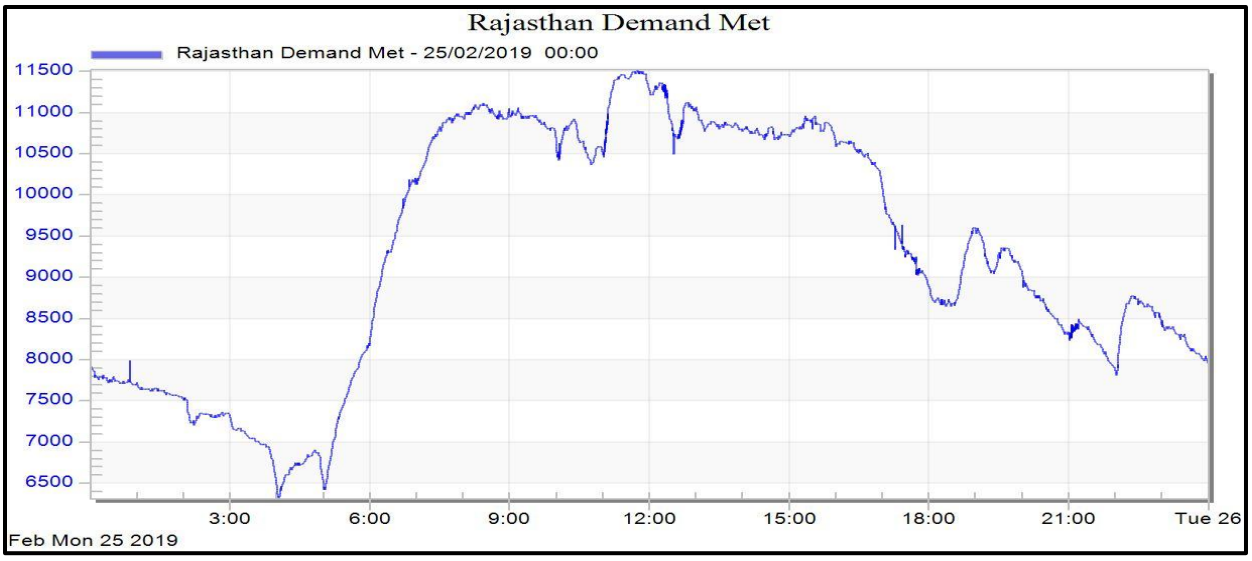
STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
AGRA	18	40	2
ALLAHABAD	18	45	3
ANTA	18	41	2
AURIYA	8	s 0	s 0
BADARPUR	25	54	2
BALIA	s 11	s 15	s 1
BALLABGARH	s 25	s 102	s 4
BASSI	20	18	1
BHIWADI	21	46	2
DADRI HVDC	22	40	2
GORAKHPUR	21	41	2
KANPUR	21	46	2
LUCKNOW_PG	s 6	s 0	s 0
MAINPURI	25	51	2
MANDOLA	26	38	1
M'BAGH	25	51	2
MEERUT	19	43	2
RAIBAREILLY	36	s 0	s 0
RIHAND (HVDC)	s 22	s 94	s 4
RIHAND_NT	20	26	1
SINGRAULI	20	29	1
VINDHYACHAL	19	37	2

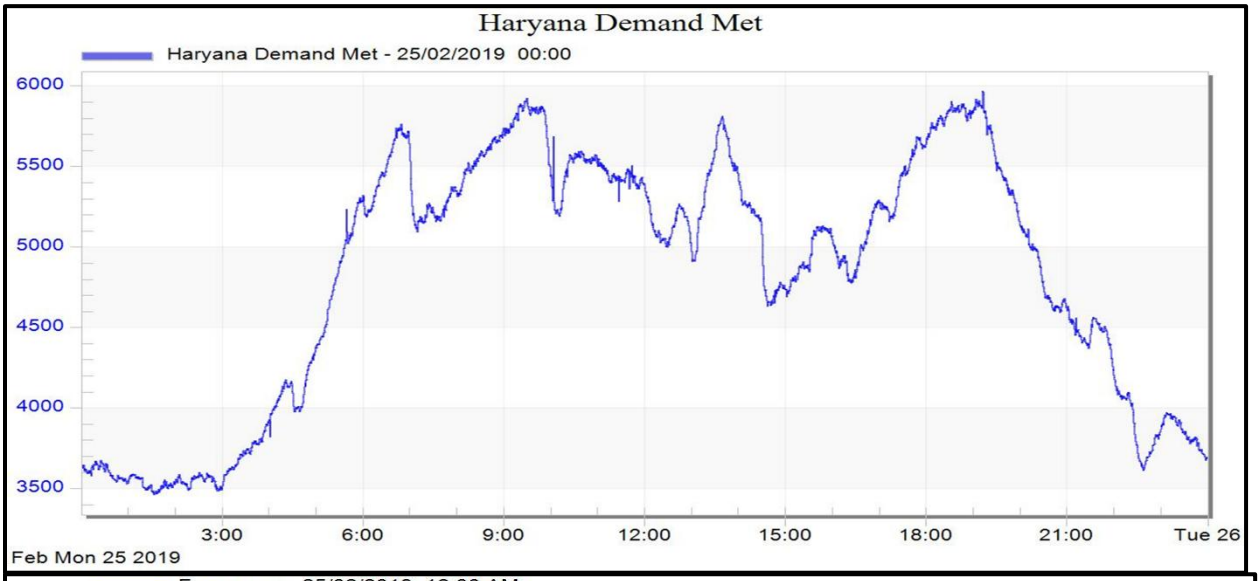
STATES

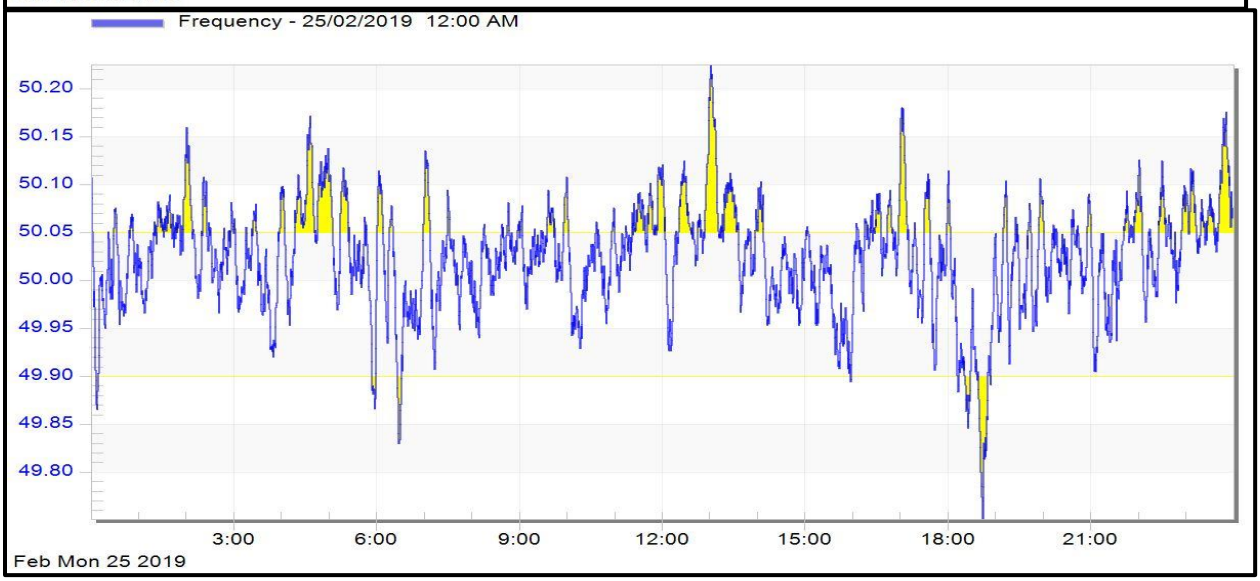
STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
ABLOWEL	18	36	
BADDI	R 33	R 0	
BHIWANI	s 5	s 10	
BWANA	s -30	s 63	s -2
DADRI	21	s ***	
GLADNI	s 0	s 0	
HEERAPURA	s 26	s 27	
JUTOGH	10	s 0	
LUCKNOW	s 0	s 7	0
MINTOROAD	22	37	
MORADABAD	s 0	R 70	
NARWANA	s 33	s 0	
PANIPAT	20	57	
RATANGARH	s 11	s 0	
PANIPAT - BB	25	s 99	

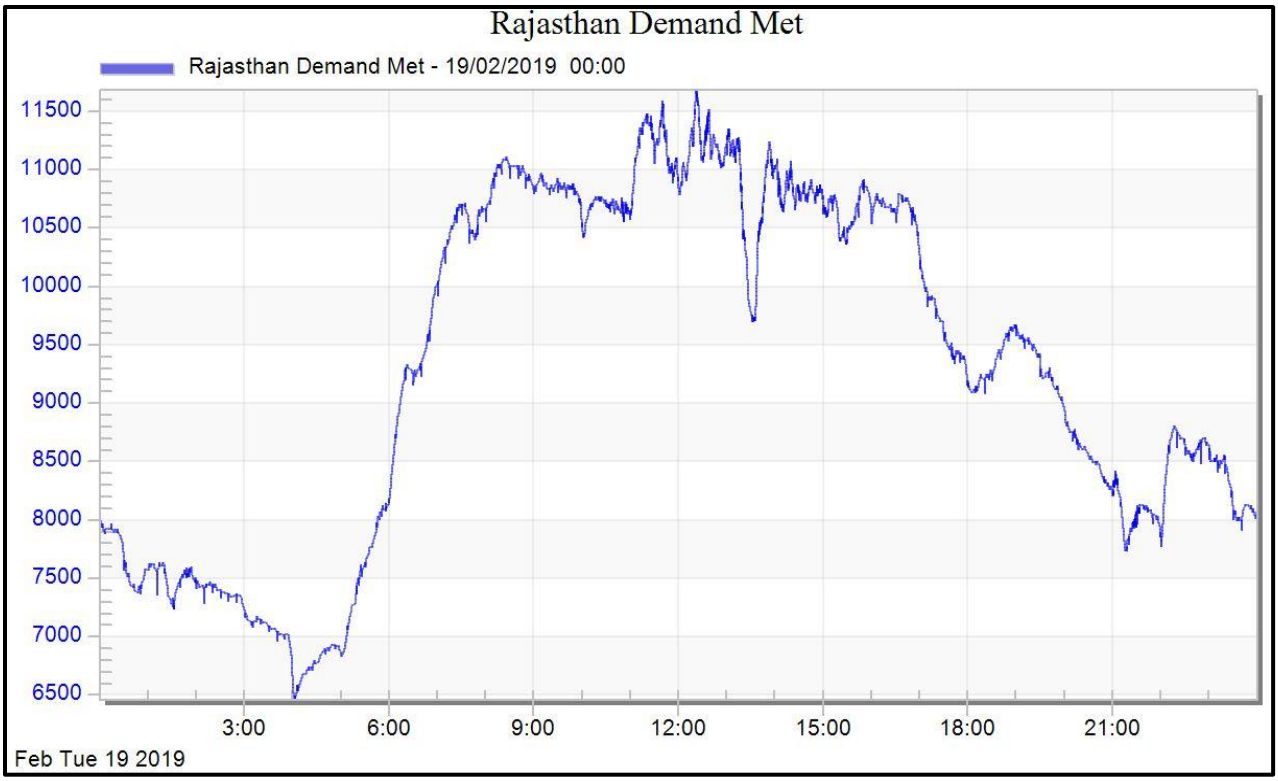
ANNEXURE-III

% RMSE					
State	18.02.2019	19.02.2019	20.02.2019	21.02.2019	22.02.198
Punjab	Forecast File Not send				
Harayana Forecast	4.3	4.4	5.1	6.0	2.8
Rajasthan Forecast	11.9	5.0	3.7	2.7	2.7
Delhi Forecast	3.5	2.6	2.6	2.2	2.4
UP Forecast	5.7	5.6	6.8	5.9	5.5
Uttarakhand Forecast	12.3	7.6	10.7	8.0	6.3
HP Forecast	Forecast File Not send				
J& K Forecast	Forecast File Not send				
Chandigarh Forecast	14.0	17.2	8.1	9.7	10.2


Rajasthan Demand Met
Rajasthan Demand Met - 25/02/2019 00:00
11500
11000
10500
10000
9500
9000
8500
8000
7500
7000
6500
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Tue 26
Feb Mon 25 2019


Haryana Demand Met
Haryana Demand Met - 25/02/2019 00:00
6000
5500
5000
4500
4000
3500
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Tue 26
Feb Mon 25 2019


Frequency - 25/02/2019 12:00 AM
50.20
50.15
50.10
50.05
50.00
49.95
49.90
49.85
49.80
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Feb Mon 25 2019


Rajasthan Demand Met
Rajasthan Demand Met - 19/02/2019 00:00
11500
11000
10500
10000
9500
9000
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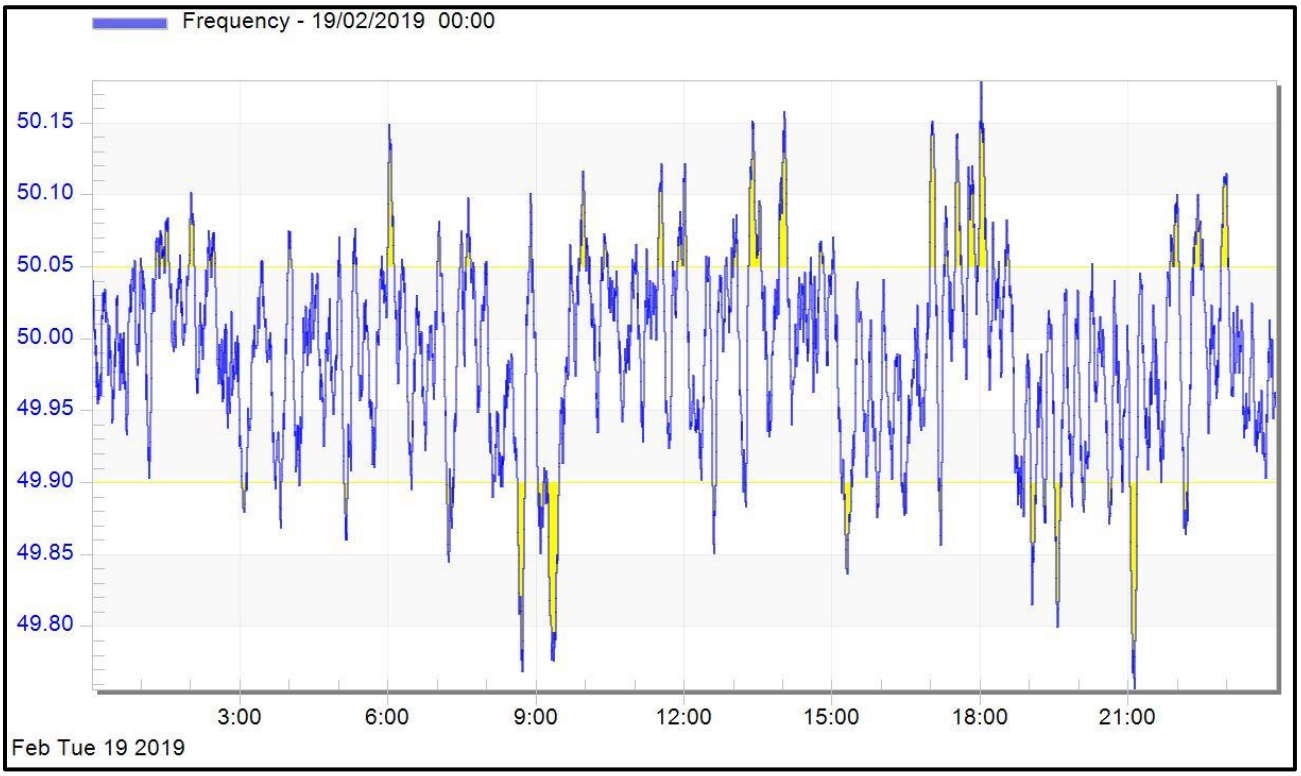
6500
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Feb Tue 19 2019


Frequency - 19/02/2019 00:00
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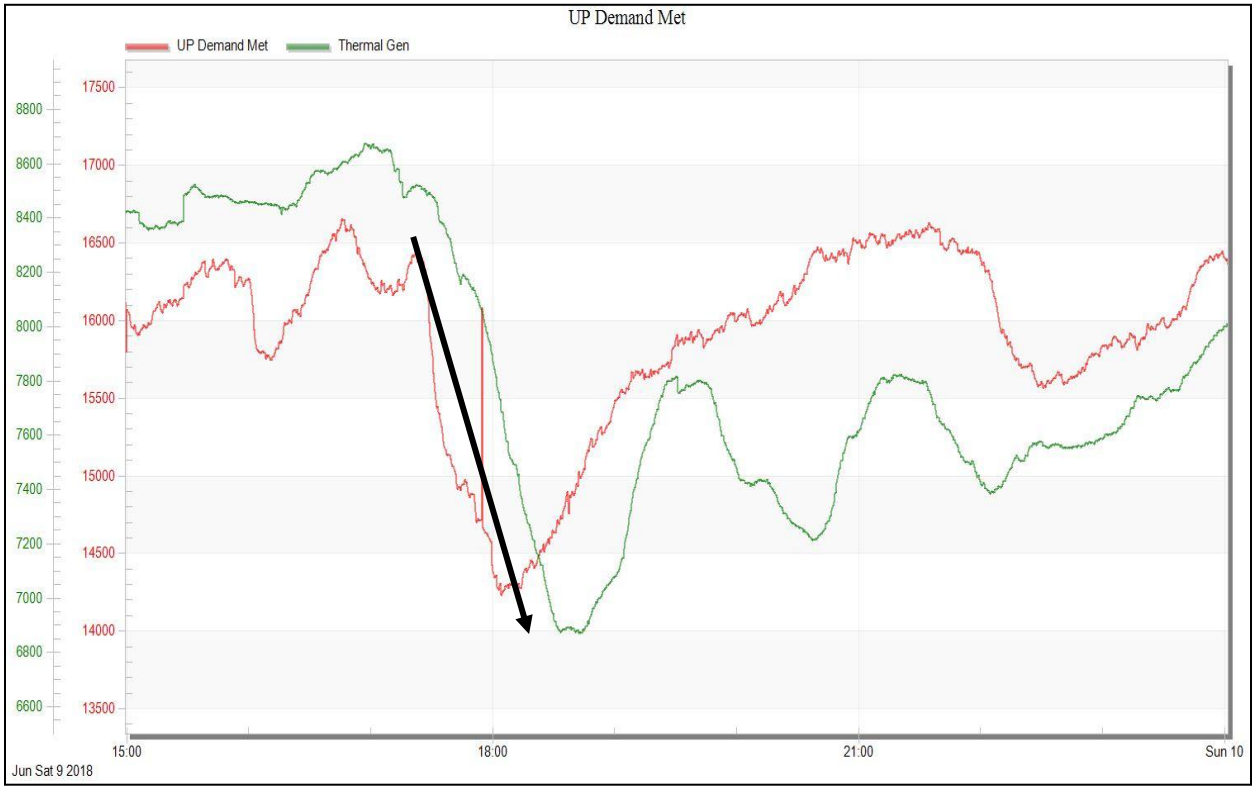
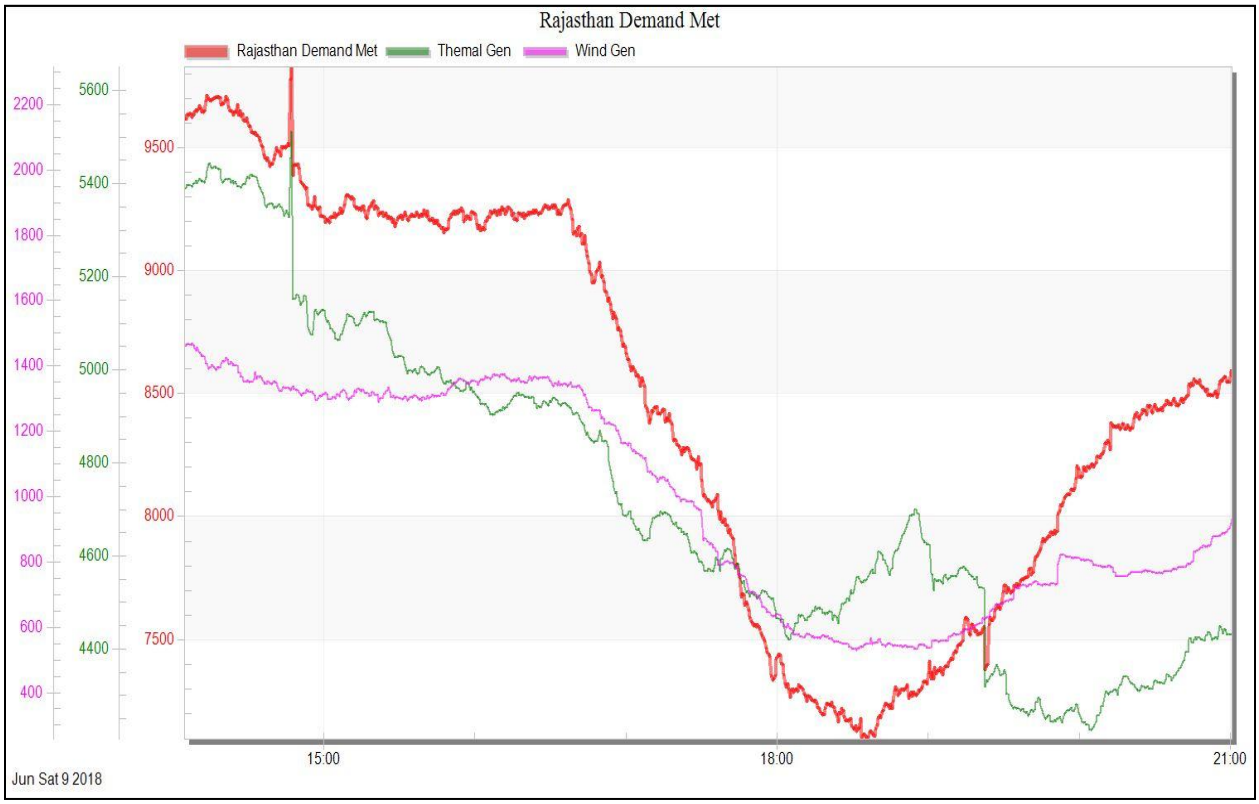
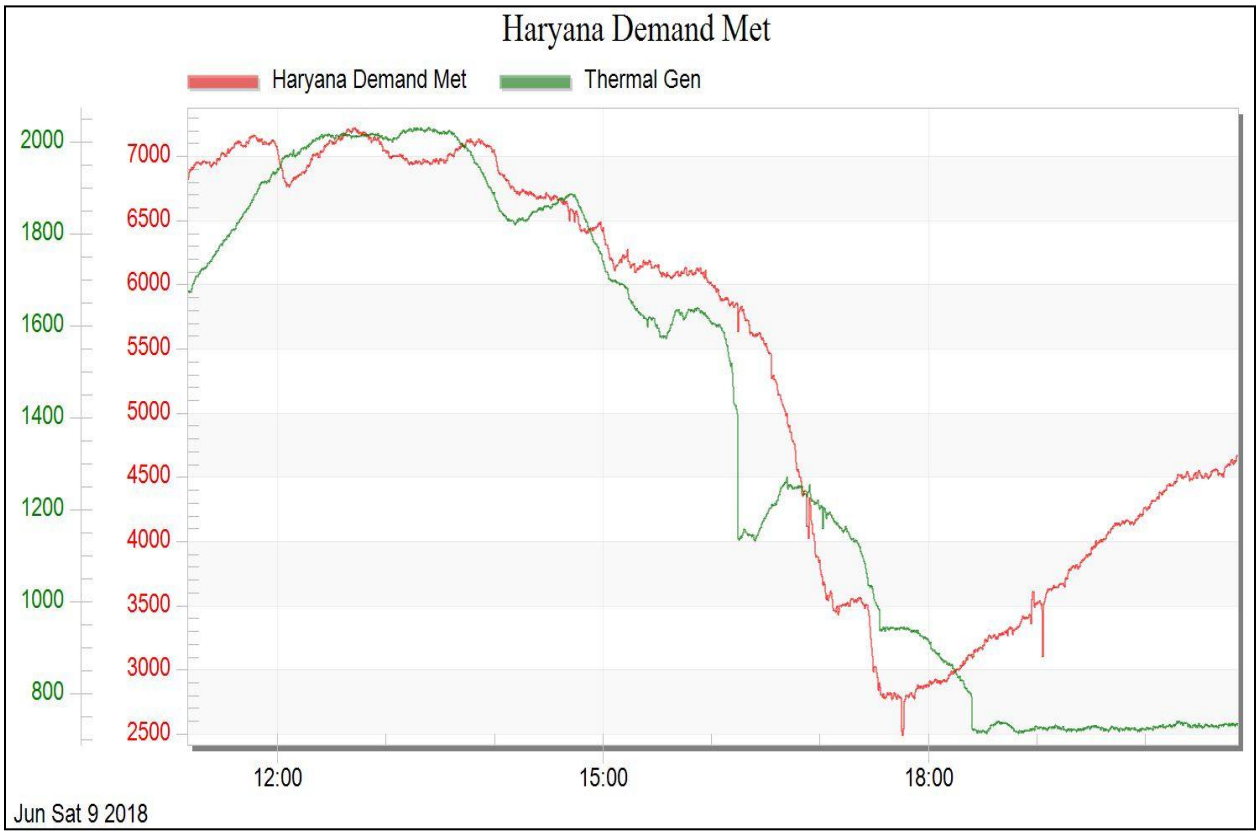
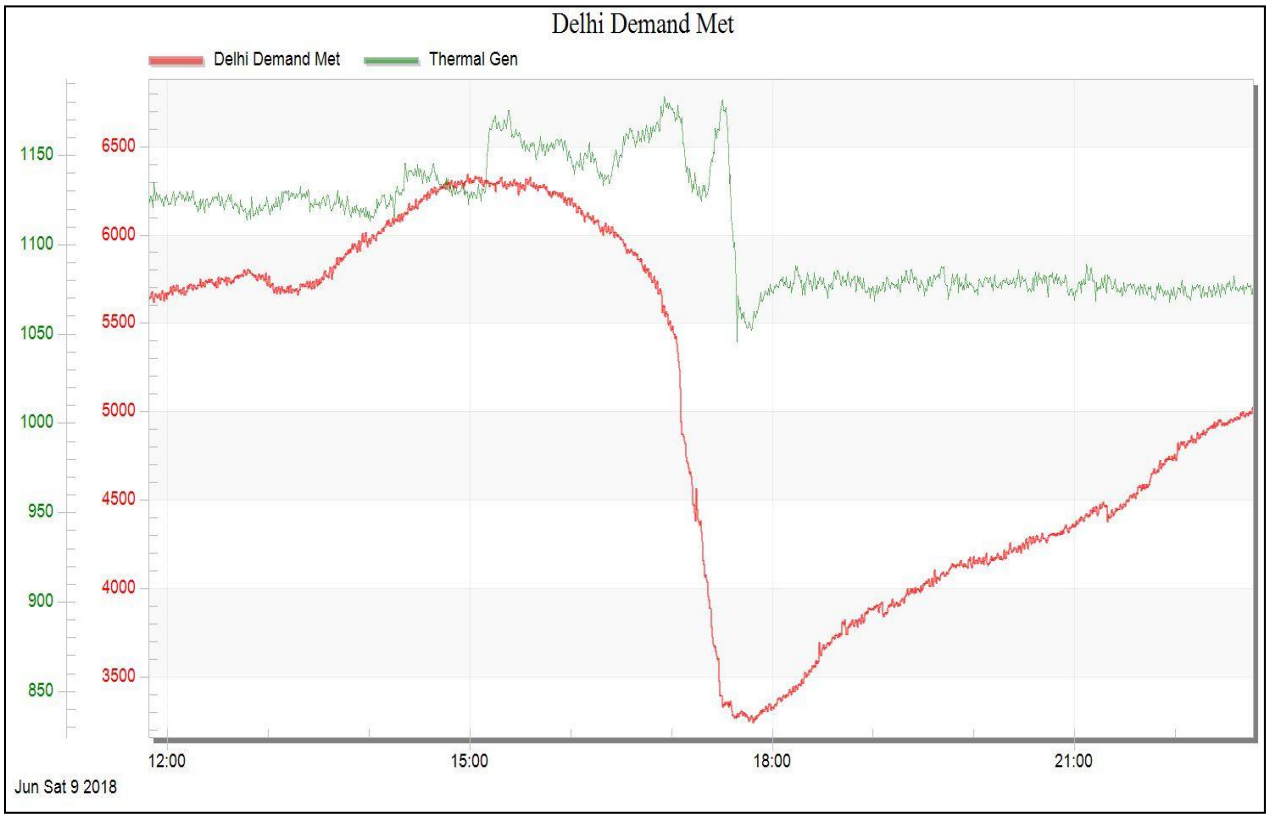
50.05
50.00
49.95
49.90
49.85
49.80
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Feb Tue 19 2019

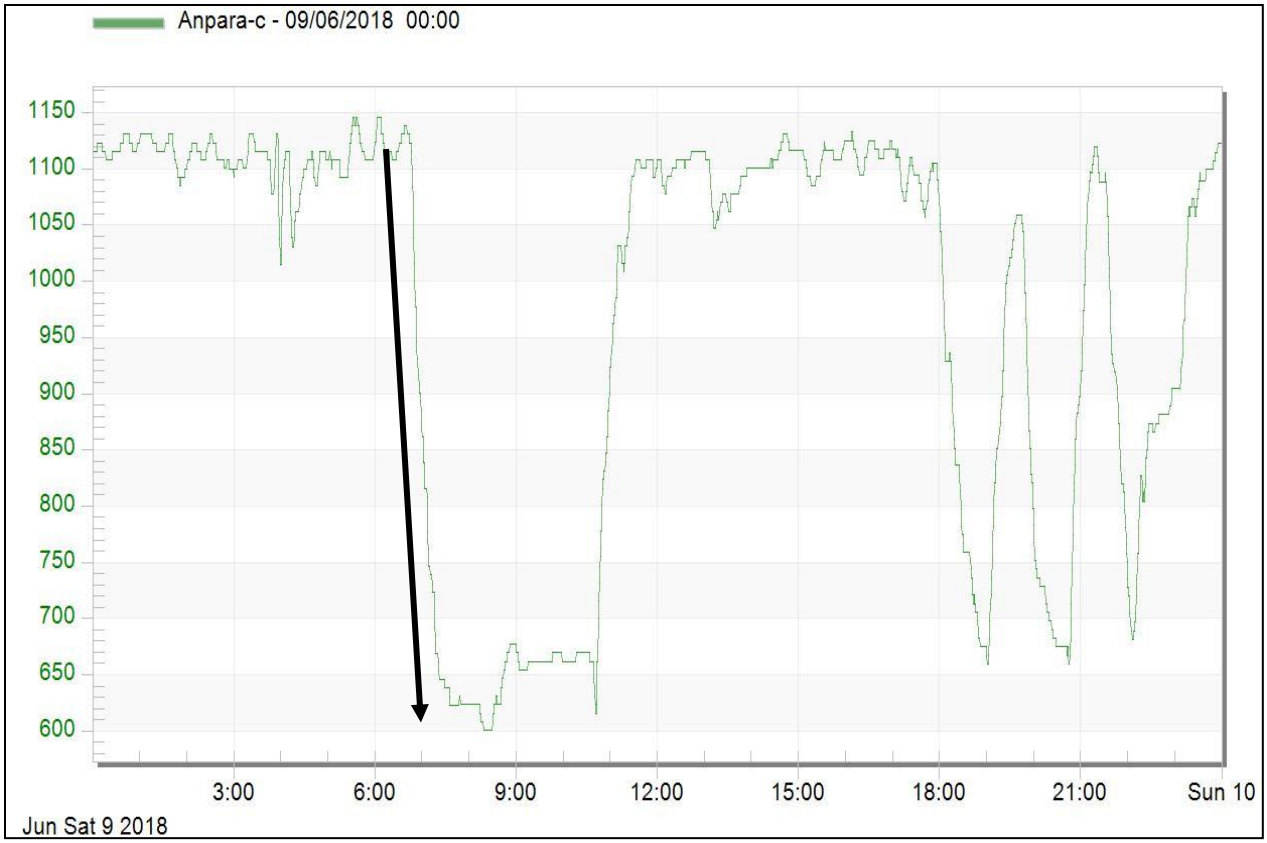
Annexure- Demand crash event on 9th June 2018

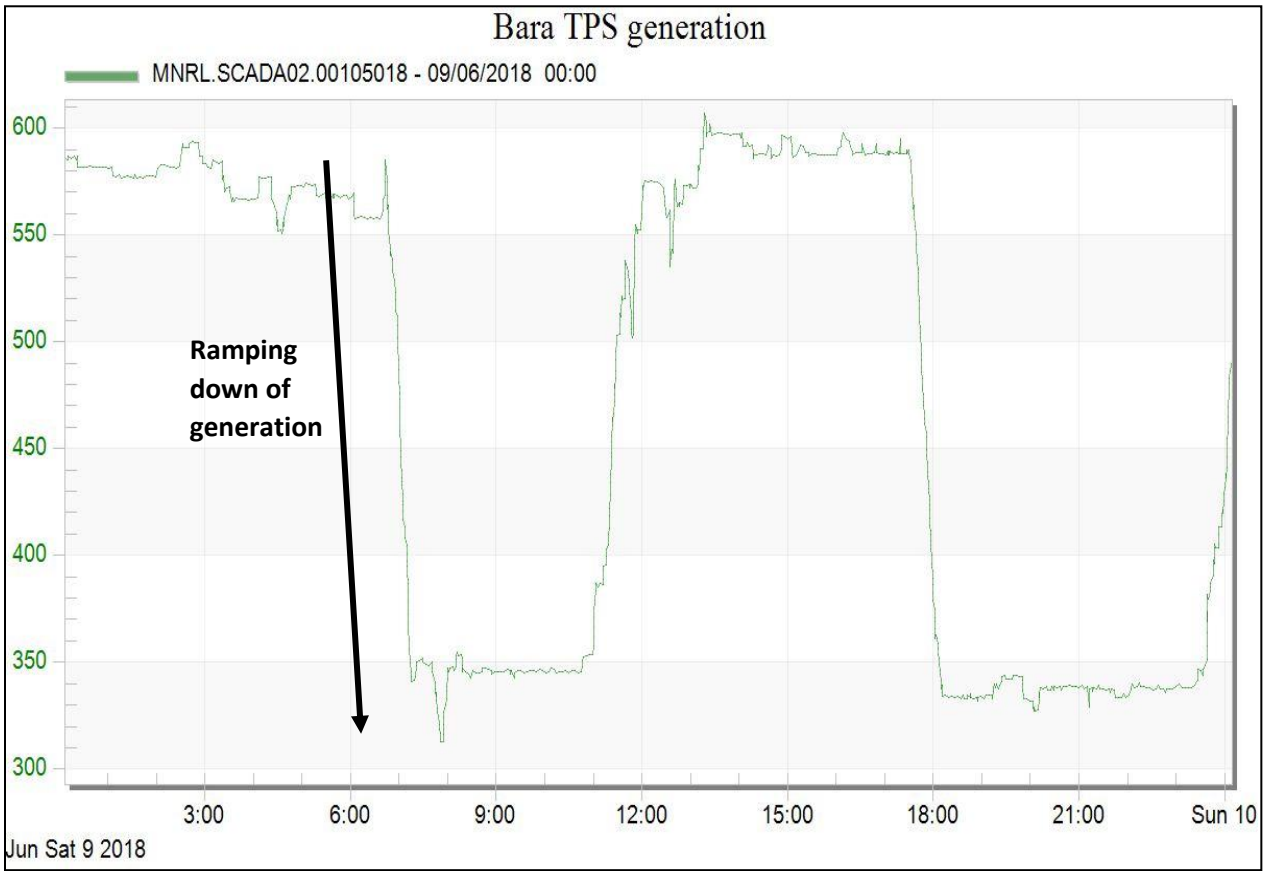





Haryana Demand Met
Haryana Demand Met
Thermal Gen
2000
1800
1600
1400
1200
1000
800
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
12:00
15:00
18:00
Jun Sat 9 2018


Delhi Demand Met
Delhi Demand Met
Thermal Gen
1150
1100
1050
1000
950
900
850
6500
6000
5500
5000
4500
4000
3500
12:00
15:00
18:00
21:00
Jun Sat 9 2018


Anpara-c - 09/06/2018 00:00
1150
1100
1050
1000
950
900
850
800
750
700
650
600
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Sun 10
Jun Sat 9 2018

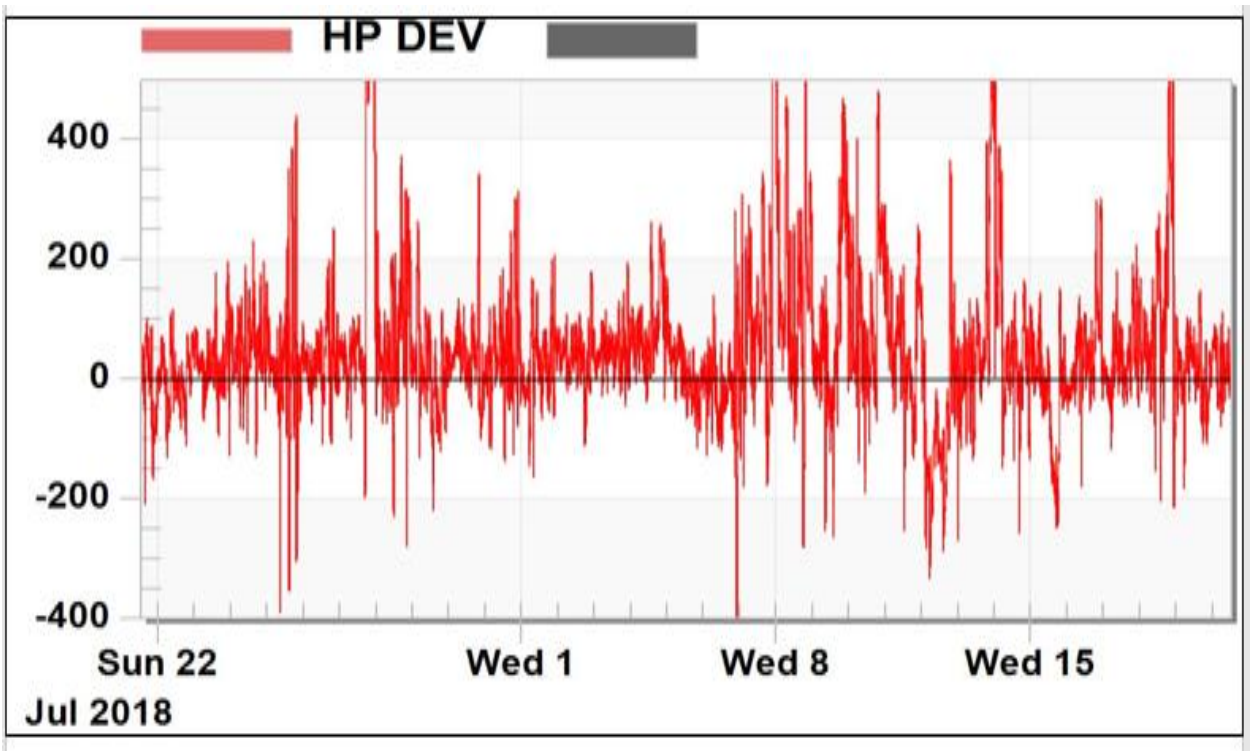

Bara TPS generation
MNRL.SCADA02.00105018 - 09/06/2018 00:00
600
550
500
450
400
350
300
Ramping down of generation
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Sun 10
Jun Sat 9 2018

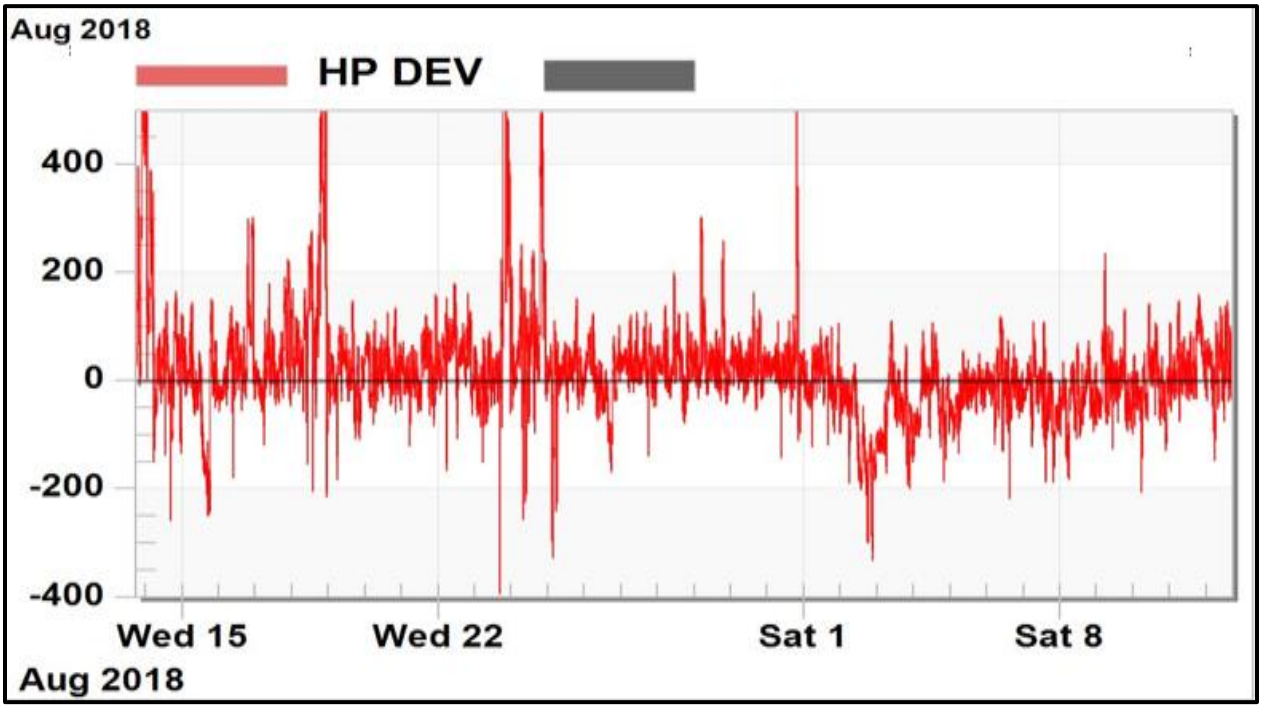
ANNEXURE - VI

STPP (Jhajjar)	HARYANA	NTPC	2	500	Coal problem	07-02-17	14:32	19-07-2017	19:59
ISTPP (Jhajjar)	HARYANA	NTPC	2	500	Boiler tube leakage. / Now closed due to coal shortage. W.e.f 1600hrs of 02.09.17	31-08-2017	7:29	09-08-17	10:02
ISTPP (Jhajjar)	HARYANA	NTPC	1	500	Primary air Heater Problem/ now outage due to coal shortage since 2200 Hrs of 15.09.2017	09-09-17	1:16	22-09-2017	15:50
ISTPP (Jhajjar)	HARYANA	NTPC	2	500	Coal shortage.	30-09-2017	21:10	31-10-2017	20:14
Unchahar TPS	UP	NTPC	2	210	Coal shortage	10-08-17	12:22	24-10-2017	14:56
ISTPP (Jhajjar)	HARYANA	NTPC	2	500	Was out due to coal shortage from 16:10hrs(08.11.2017). Taken under reserve S/D w.e.f. 11:42hrs (29/11/2017).	11-08-17	16:10	12-01-17	5:19
ISTPP (Jhajjar)	HARYANA	NTPC	1	500	Coal shortage.	01-08-18	0:32	02-01-18	12:23
ISTPP (Jhajjar)	HARYANA	NTPC	1	500	Coal shortage	21-02-2018	0:00	03-05-18	2:40
adri-II TPS	UP	NTPC	2	490	Boiler tube leakage. Unit Kept out due to coal shortage from 16:25Hrs on 26.05.2018	25-05-2018	12:53	27-05-2018	16:26
ISTPP (Jhajjar)	HARYANA	NTPC	1	500	Fuel Shortage. Coal shortage.	25-06-2018	22:11	07-01-18	5:14
ISTPP (Jhajjar)	HARYANA	NTPC	2	500	Reserve Shutdown. Coal shortage.	26-08-2018	23:11	09-04-18	8:59
ISTPP (Jhajjar)	HARYANA	NTPC	1	500	Fuel Shortage. Coal shortage.	10-05-18	0:50	11-05-18	13:57
Tanda TPS	UP	NTPC	2	110	Fuel Shortage. Coal shortage.	22-10-2018	11:55	11-01-18	4:45
ISTPP (Jhajjar)	HARYANA	NTPC	3	500	Fuel Shortage. Coal shortage.	23-12-2018	21:33	01-10-19	6:51
ara PPGCL TPS	UP	Jaypee	1	660	Coal problem	05-11-16	15:53	25-05-2016	23:14
Talwandi Sabo TPS	PUNJAB	PSEB	1	660	Poor coal quality.	17-06-2016	23:59	08-06-16	22:00
Bara PPGCL TPS	UP	Jaypee	1	660	Coal problem.	25-06-2016	10:36	07-05-16	0:38
ara PPGCL TPS	UP	Jaypee	1	660	Annual maintenance. Coal shortage.	28-09-2016	14:01	16-10-2016	12:54
Anpara-D TPS	UP	UPRVUNL	2	500	Coal shortage.	29-09-2016	11:51	10-07-16	6:10
Kawai TPS	RAJASTHAN	ADANI	2	660	Due to depletion in coal stock.	11-05-16	13:47	25-12-2016	5:37
Kawai TPS	RAJASTHAN	ADANI	1	660	Due to depletion in coal stock.	14-12-2016	15:59	01-05-17	20:00
Kawai TPS	RAJASTHAN	ADANI	1	660	Depleting coal stock	01-09-17	22:47	16-01-2017	22:02
ara PPGCL TPS	UP	Jaypee	1	660	Coal shortage.	15-03-2017	19:35	04-04-17	5:09
Kawai TPS	RAJASTHAN	ADANI	2	660	Coal shortage due to commercial issue.	06-04-17	1:45	22-06-2017	11:51
awai TPS	RAJASTHAN	ADANI	2	660	coal shortage	19-08-2017	6:02	10-04-17	15:54
RGTPP(Khedar)	HARYANA	HPGCL	1	600	Due to wet coal.	21-08-2017	14:25	22-08-2017	16:32
DCRTPP (Yamuna Nagar)	HARYANA	HPGCL	1	300	Due to wet coal / Now on less demand in Haryana.	24-08-2017	13:07	09-12-17	1:34
Obra TPS	UP	UPRVUNL	13	200	Coal shortage.	27-08-2017	1:52	09-04-17	18:40
Lalitpur TPS	UP	LPGCL	1	660	coal shortage	31-08-2017	0:20	09-11-17	14:51
Rajpura(NPL) TPS	PUNJAB	PSEB	1	700	Fuel Shortage. Coal Shortage	15-09-2017	0:00	10-06-17	22:22
Kawai TPS	RAJASTHAN	ADANI	1	660	Fuel Shortage. Coal shortage.	23-09-2017	6:02	21-12-2017	21:00
Kota TPS	RAJASTHAN	RRVUNL	7	195	Coal shortage.	24-09-2017	11:35	10-11-17	7:40
Kota TPS	RAJASTHAN	RRVUNL	1	110	Coal shortage	27-09-2017	12:59	28-10-2017	2:48
Kota TPS	RAJASTHAN	RRVUNL	2	110	Coal shortage	27-09-2017	18:30	28-10-2017	0:26
Suratgarh TPS	RAJASTHAN	RRVUNL	5	250	Coal shortage	28-09-2017	16:43	10-06-17	19:34
Lalitpur TPS	UP	LPGCL	1	660	Coal shortage.	29-09-2017	16:17	17-10-2017	11:48
Chhabra TPS	RAJASTHAN	RRVUNL	2	250	Coal shortage	10-02-17	20:50	17-10-2017	3:52
Kalisindh TPS	RAJASTHAN	RRVUNL	2	600	Coal shortage.	10-06-17	15:03	17-10-2017	7:35
Suratgarh TPS	RAJASTHAN	RRVUNL	2	250	Coal shortage	10-09-17	13:03	20-10-2017	0:00
Bara PPGCL TPS	UP	Jaypee	1	660	Coal shortage.	10-10-17	12:53	16-10-2017	18:03
Rajpura(NPL) TPS	PUNJAB	PSEB	2	700	Coal shortage.	10-11-17	12:00	13-11-2017	13:46
RGTPP(Khedar)	HARYANA	HPGCL	2	600	Coal shortage	13-10-2017	0:28	23-10-2017	12:27
Jhajjar-CLP (IPP) TPS	HARYANA	HPGCL	2	660	Coal shortage.	16-10-2017	1:04	29-10-2017	5:26
Kalisindh TPS	RAJASTHAN	RRVUNL	2	600	Coal shortage.	17-10-2017	12:55	23-10-2017	11:13
Bara PPGCL TPS	UP	Jaypee	1	660	Coal shortage.	18-10-2017	1:55	26-10-2017	5:19
Bara PPGCL TPS	UP	Jaypee	2	660	Coal shortage.	19-10-2017	8:45	22-10-2017	0:50
Lalitpur TPS	UP	LPGCL	2	660	Coal shortage.	19-10-2017	12:04	22-10-2017	1:45
Kawai TPS	RAJASTHAN	ADANI	2	660	Fuel Shortage. coal shortage	11-08-17	5:55	18-11-2017	3:41
Lalitpur TPS	UP	LPGCL	3	660	Coal shortage	15-11-2017	18:05	12-09-17	4:48
Bara PPGCL TPS	UP	Jaypee	1	660	Coal shortage	25-11-2017	10:36	17-12-2017	10:11
Lalitpur TPS	UP	LPGCL	2	660	Fuel Shortage. Coal shortage.	27-11-2017	9:11	12-03-17	8:54
Bara PPGCL TPS	UP	Jaypee	1	660	Fuel Shortage. Coal shortage	01-03-18	5:54	03-03-18	4:37
Kawai TPS	RAJASTHAN	ADANI	1	660	Coal shortage.	01-06-18	8:31	18-03-2018	10:03
Lalitpur TPS	UP	LPGCL	3	660	Fuel Shortage. Coal shortage	01-12-18	13:02	29-01-2018	9:47
Kawai TPS	RAJASTHAN	ADANI	2	660	Fuel Shortage. Coal shortage	13-01-2018	18:52	30-03-2018	0:42
Bara PPGCL TPS	UP	Jaypee	2	660	Coal shortage.	19-01-2018	10:50	02-05-18	9:56
Lalitpur TPS	UP	LPGCL	1	660	Coal shortage.	22-01-2018	0:17	03-05-18	2:43
Lalitpur TPS	UP	LPGCL	2	660	Fuel Shortage. Coal Shortage	26-01-2018	5:01	31-03-2018	21:21
Talwandi Sabo TPS	PUNJAB	PSEB	3	660	Coal shortage.	30-01-2018	0:07	02-08-18	7:51
Bara PPGCL TPS	UP	Jaypee	2	660	Coal shortage.	02-06-18	14:00	13-02-2018	15:23
Bara PPGCL TPS	UP	Jaypee	3	660	Coal shortage.	20-02-2018	21:37	03-05-18	13:19
Lalitpur TPS	UP	LPGCL	3	660	Coal Shortage	23-02-2018	0:54	03-11-18	15:22
Bara PPGCL TPS	UP	Jaypee	2	660	Fuel Shortage. Coal shortage.	03-05-18	16:52	18-03-2018	13:49
Paricha TPS	UP	UPRVUNL	5	250	Fuel Shortage.	03-10-18	21:47	03-12-18	10:03
Bara PPGCL TPS	UP	Jaypee	3	660	Fuel Shortage. Coal Shortage	03-11-18	0:00	06-10-18	10:13
Talwandi Sabo TPS	PUNJAB	PSEB	2	660	Fuel Shortage. Coal Shortage	03-12-18	0:00	22-03-2018	7:48
Panipat TPS	HARYANA	HPGCL	5	210	Fuel Shortage. Coal Shortage	20-03-2018	15:08	31-03-2018	23:59
Talwandi Sabo TPS	PUNJAB	PSEB	3	660	Fuel Shortage. Coal Shortage.	22-03-2018	9:38	27-03-2018	5:17
Kota TPS	RAJASTHAN	RRVUNL	2	110	Due to Coal Shortage	29-03-2018	7:54	04-09-18	12:11
Rajpura(NPL) TPS	PUNJAB	PSEB	1	700	Fuel Shortage. Coal shortage.	04-04-18	16:58	14-04-2018	12:43
Kawai TPS	RAJASTHAN	ADANI	2	660	Fuel Shortage. Coal shortage.	04-12-18	1:06	19-04-2018	10:16
Suratgarh TPS	RAJASTHAN	RRVUNL	6	250	Coal shortage.	27-04-2018	2:40	05-09-18	5:15
Lalitpur TPS	UP	LPGCL	1	660	Fuel Shortage.	23-05-2018	6:08	06-01-18	1:36
Rajpura(NPL) TPS	PUNJAB	PSEB	2	700	Fuel Shortage.	06-03-18	21:00	06-11-18	8:55
Jhajjar-CLP (IPP) TPS	HARYANA	HPGCL	2	660	Fuel Shortage. Coal shortage.	06-12-18	23:15	23-06-2018	3:00
Kawai TPS	RAJASTHAN	ADANI	1	660	Fuel Shortage. coal shortage	13-06-2018	21:36	18-06-2018	21:32
Bara PPGCL TPS	UP	Jaypee	2	660	Fuel Shortage. Coal shortage.	18-06-2018	7:50	22-06-2018	13:16
Lalitpur TPS	UP	LPGCL	2	660	Coal Shortage	07-01-18	5:27	19-07-2018	14:41

Jhajjar-CLP (IPP) TPS	HARYANA	HPGCL	2	660	Coal Shortage	07-01-18	19:01	07-07-18	4:51
Rajwest (IPP) LTPS	RAJASTHAN	RRVUNL	6	135	Fuel Shortage. Bed material leakage.	07-03-18	21:33	07-08-18	2:18
Kawai TPS	RAJASTHAN	ADANI	2	660	Fuel Shortage. Coal shortage	07-03-18	23:58	17-07-2018	13:30
Rosa TPS	UP	ROSA	4	300	coal shoratge	07-08-18	6:21	08-10-18	12:43
Jhajjar-CLP (IPP) TPS	HARYANA	HPGCL	2	660	Fuel Shortage. Coal shortage	07-10-18	0:11	08-08-18	9:26
Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSEB	2	210	Fuel Shortage.	18-08-2018	20:44	22-08-2018	21:29
Rajpura(NPL) TPS	PUNJAB	PSEB	2	700	Fuel Shortage. Boiler Tube Leakage.	19-09-2018	18:14	26-09-2018	23:04
Jhajjar-CLP (IPP) TPS	HARYANA	HPGCL	2	660	Fuel Shortage. Coal shortage.	20-09-2018	3:00	10-01-18	9:04
Anpara-C TPS	UP	LANCO	2	600	Coal Shortage.	10-08-18	14:30	14-10-2018	17:30
Jhajjar-CLP (IPP) TPS	HARYANA	HPGCL	2	660	Fuel Shortage. Coal shortage	10-09-18	21:30	19-10-2018	18:37
Jhajjar-CLP (IPP) TPS	HARYANA	HPGCL	1	660	Fuel Shortage. Coal shortage	19-10-2018	23:53	27-10-2018	11:56
Talwandi Sabo TPS	PUNJAB	PSEB	1	660	Coal shortage.	29-10-2018	0:00	11-05-18	6:37
Jhajjar-CLP (IPP) TPS	HARYANA	HPGCL	1	660	Coal Shortage	15-11-2018	8:58	12-04-18	16:06
Lalitpur TPS	UP	LPGCL	3	660	Coal shortage	01-12-19	2:17	13-01-2019	4:38
Bara PPGCL TPS	UP	Jaypee	3	660	Fuel Shortage.	22-02-2019	8:14	22-02-2019	19:21

					2017				2016				2015				2014				2013				2012			
S.No.	Station	Location	Owner	Capacity in MW	Outage date	Outage hrs	Remarks	MUs	Outage date	Outage hrs	Remarks	MUs	Outage date	Outage hrs	Remarks	MUs	Outage date	Outage hrs	Remarks	MUs	Outage date	Outage hrs	Remarks	MUs	Outage date	Outage hrs	Remarks	MUs
1	Bairasiul HPS	HP	NHPC	3*60	21-Jul-17	8	All units	17	08-Jul-17	27	All units	5	3-Jul-15	33	All units	10	28-Jul-14	10	All units	77	12-Jun-13	3	All units	4	21-Jun-12	17	All units	11
					17-Jul-17	81	All units						2-Aug-15	21	All units		14-Sep-14	180	All units		24-Jul-13	8	All units		4-Aug-12	17	All units	
					16-Jul-17	11	All units														14-Aug-13	6	All units		20-Aug-12	6	All units	
																					16-Aug-13	8	All units		22-Aug-12	4	All units	
																									25-Aug-12	10	2 units	
																									1-Sep-12	13	All units	
2	Chamera-II HPS	HP	NHPC	3*100	23-Jun-17	21	All units	12	26-Jun-16	19	All units	6.0	12-Aug-15	21	All units	6	1-Jul-14	23	All units	7	17-Aug-13	24	All units	7	4-Aug-12	10	All units	19
					15-Jul-17	19	All units																		22-Aug-12	56	All units	
3	Chamera-III HPS	HP	NHPC	3*77	23-Jun-17	20	All units	9	26-Jun-16	23	All units	5					1-Jul-14	24	All units	6	17-Aug-13	27	All units	6	20-Aug-12	27	2 units	4
					15-Jul-17	19	All units																					
4	Dhauliganga HPS	UTTRAKHAND	NHPC	4*70	6-Jul-17	35	All units	10	15-Jul-16	105		48	27-Jun-15	5	All units	12	19-Jul-14	399	two units	55	16-Jun-13	8845	units(floo	1153	4-Aug-12	29	All units	8
									23-Jul-16	14			11-Jul-15	25	three units													
									02-Aug-16	77	3 units		31-Jul-15	19	All units													
5	Dulhasti HPS	JK	NHPC	3*130	10-Jun-17	18		7	18-Jun-16	18	All units	21	28-Jun-15	18	All units	42	16-Jul-14	16	two units	4	8-Aug-13	4	2 units	13	4-Jul-12	18	All units	17
									24-Jul-16	18	All units		16-Jul-15	11	All units						11-Aug-13	7	All units		3-Aug-12	9	All units	
									11-Aug-16	18	All units		17-Jul-15	6	All units						1-Sep-13	28	All units		18-Aug-12	19	All units	
													22-Jul-15	18	All units													
													9-Aug-15	18	All units (planned)													
													23-Aug-15	17	All units (planned)													
6	Karcham Wangtoo HPS	HP	JSW	4*250	18-Jul-17	20	All units	28	15-Jul-16	4	All units	429	10-Jul-15	20	All units	75	18-Jun-14	5	Three units	36	10-Jun-13	26	All units	143	1-Aug-12	27	All units	85
					19-Jul-17	10			16-Jul-16	20	All units		21-Jul-15	5	Three units		20-Aug-14	5	All units		17-Jun-13	68	All units		20-Aug-12	59	All units	
									06-Aug-16	6	All units		21-Jul-15	4	All units						24-Jun-13	2	All units					
									07-Aug-16	11	All units		4-Aug-15	19	All units						27-Jun-13	11	All units					
									08-Aug-16	22	All units		9-Aug-15	12	All units						5-Jul-13	18	All units					
									09-Aug-16	5	All units		18-Aug-15	19	All units						8-Aug-13	4	All units					
									10-Aug-16	18	All units																	
									24-Aug-16	20	All units																	
7	Nathpa-Jhakri HPS	HP	NJPC	6*250	18-Jul-17	28	All units	59	14-Jul-16	8	All units	214	19-Jun-15	2	All units	166	18-Jun-14	22	All units	64	10-Jun-13	26	All units	278	1-Aug-12	27	All units	117
					19-Jul-17	14			15-Jul-16	29	All units		9-Jul-15	19	All units		20-Aug-14	20	All units		16-Jun-13	74	All units		20-Aug-12	58	All units	
									18-Jul-16	5	All units		10-Jul-15	22	All units						24-Jun-13	12	All units					
									05-Aug-16	11	All units		16-Jul-15	8	All units						26-Jun-13	1	2 units					
									06-Aug-16	40	All units		21-Jul-15	5	All units						27-Jun-13	14	All units					
									09-Aug-16	8	All units		21-Jul-15	11	All units						5-Jul-13	33	All units					
									09-Aug-16	18	All units		9-Aug-15	18	All units						8-Aug-13	18	5 units					
									23-Aug-16	22	All units		18-Aug-15	22	All units						25-Aug-13	11	All units					
8	Rampur HEP	HP	NJPC	6*68.67	18-Jul-17	28	All units	16	14-Jul-16	8	All units	57	19-Jun-15	5	five units	42	20-Aug-14	21	5 units	10								
					19-Jul-17	14			15-Jul-16	29	All units		9-Jul-15	19	All units													
									18-Jul-16	5	All units		10-Jul-15	22	All units													
									05-Aug-16	11	All units		21-Jul-15	6	All units													
									06-Aug-16	40	All units		21-Jul-15	10	All units													
									09-Aug-16	8	All units		9-Aug-15	18	All units													
									09-Aug-16	19	All units		18-Aug-15	22	All units													
									23-Aug-16	21	All units																	
9	Salal HPS	JK	NHPC	6*115	11-Jun-17	24	All units	27	26-Jun-16	24	All units	60	25-Jun-15	12	All units	52	23-Jul-14	24	All units	106	15-Aug-13	14	All units	9	5-Jul-12	20	All units	30
					16-Jul-17	8	five units		22-Jul-16	24	All units		12-Jul-15	7	All units		3-Sep-14	130	All units						4-Aug-12	25	All units	
					18-Jul-17	9	All units		07-Aug-16	17	All units		17-Jul-15	6	All units													
									28-Aug-16	23	All units		26-Jul-15	20	All units													
													9-Aug-15	8	All units													
													30-Aug-15	17	All units													
10	Uri II HPS	JK	NHPC	4*60	30-Jun-17	87	All units	21	13-Aug-16	32	All units	8					5-Sep-14	71	All units	19								
																	12-Sep-14	10	All units									
11	Parbati III HEP	HP	NHPC	4*130					02-Aug-16	25	All units	22	10-Jul-15	40	Three units	21												
									06-Aug-16	7	All units																	
									08-Aug-16	8	All units																	
									24-Aug-16	6	Three units																	
12	Tanakpur HPS	UTTRAKHAND	NHPC	3*31.4					02-Aug-16	12	Two units	1	26-Jun-15	17	All units	3	19-Jul-14	56	One unit	2	16-Jun-13	71	All units	46	4-Aug-12	9	All units	1
													11-Jul-15	6	All units						20-Jun-13	153	All units					
																					8-Jul-13	151	All units					
																					17-Aug-13	18	All units					
13	Dehar HPS	HP	BBMB	6*165									5-Jul-15	31	All units	21									4-Aug-12	9	One unit	2
14	Uri I HPS	JK	NHPC	4*120													5-Sep-14	32	All units	15								


HP DEV
400
200
0
-200
-400
Sun 22
Wed 1
Wed 8
Wed 15
Jul 2018


Aug 2018
HP DEV
400
200
0
-200
-400
Wed 15
Wed 22
Sat 1
Sat 8
Aug 2018

ANNEXURE- IX/X

Year	No. of events	Demand crash (GW)	No. of lines out on tower collapse	Lines opened on HV
2018	6	10-17	15	10-25
2017	3	9-12	15	12-24
2016	4	8-12	7	10-22
2015	4	8-10	8	10-20

RGMO/FGMO status

It was discussed and decided in 138thOCC meeting that all the utilities shall map RGMO/FGMO status in the SCADA system and do the cabling and other work on their own expense. Further RGMO/FGMO status mapping in SCADA was also approved in 37thTCC/40thNRPC meeting.

RGMO status is **yet to be mapped** in SCADA for following plants:

- NHPC: Bairasiul, Salal, Tanakpur, Chamera-2, Uri-1, 2, Dulhasti, Parbati-3
- BBMB: All BBMB plants
- S.Cement
- JSW: Karcham
- Greenko: Budhil
- Everest Power: Malana-2
- AD Hydro

Mapping of UFR, df/dt relay details in SCADA

The present status of UFR &df/dt is tabulated below:

States	UFR	df/ dt	Improvement from status in 146th OCC meeting	Remarks	Data Availability
J&K	No	No			
UP	Yes	Yes	Following are provided since last status: • Feeder wise planned load relief in df/dt. • Alternate feeder details in UFR display. • Total planned relief in df/dt display.	Following yet to be provided: • Feeder-wise planned load relief of UFR. • Telemetry of feeders (Partial details available). • Alternate feeder details in df/dt display (Partial details available for UFR). • Total planned relief in UFR display. (Stage wise) • Total actual relief. (Stage Wise)	Very Poor
Haryana	Yes	Yes	Following are provided since last status: • Stage-2, 3 of df/dt included in display. • Feeder wise planned load relief.	Following yet to be provided: • Telemetry of feeders (Partial details available). • Telemetry of alternate feeders not available. • Calculation of total actual relief in	Poor

			• Alternate feeder details. • Total actual relief in UFR.	df/dt seems incorrect.	
Delhi	Yes	Yes		Following yet to be provided: • Total of actual analog data of MW and alternate feeders. • Data suspected for most of the digital and Analog value at NRLDC display but available at SLDC display.	Poor
HP	Yes	Yes	Following are provided since last status: • Segregation of stage wise load. • Alternate feeder details include for most of the feeders. • Partial telemetry of feeders.	Following yet to be provided: • Telemetry of feeders (Partial data available). • Alternate feeder details in UFR (a few not available).	Poor
Uttarakhand	No	No			
Punjab	Yes	Yes		Following yet to be provided: • Telemetry of feeders (Partial data available). • Alternate feeders details. • Digital Status of all the feeders	Poor
Rajasthan	Yes	Yes	Following are provided since last status: • UFR display provided.	Following yet to be provided: • Analog value and digital data not available in UFR display (only alternate feeder details provided)	Very Poor

Procedure for furnishing information for modelling Solar PV generating stations in Indian Grid

1.0 Introduction:

The purpose of this document is to act as a guideline for exchange of information for accurate modelling of utility scale solar generation installations in India. With India poised to integrate more than 100 GW of solar PV generation in the form of Solar parks and farms (Inland and Offshore) and Rooftop Solar (distributed generation), availability of fit-for-purpose steady state and dynamics models of solar generation installations will enable secure operation of Indian power grid and enable identification of potential weak points in the grid so as to take appropriate remedial actions.

1.1 Applicability:

The guideline shall be applicable to all solar generation installations in India except distributed generation installations (for example rooftop solar), which can have an impact on operation of the power grid of India, irrespective of connection at Intra-STS or ISTS (Inter-state Transmission System).

This document presents the desired information for collection of data for modelling of Solar generation installations in PSS/E software, a software suite being used pan-India at CEA, CTU, SLDCs, RLDCs, and NLDC for modelling of India's power grid. A systematic set of data and basic criteria for furnishing data are presented.

1.2 Need for a fit-for-purpose model:

There is a cost involved in developing and validating dynamic models of power system equipment. But there are much higher benefits for the power system if this leads to a functional, fit-for-purpose model, and arrangements that allow that model to be maintained over time.

A functional fit-for-purpose dynamic model will:

- Facilitate significant power system efficiencies and reliability by allowing power system operations to confidently identify the secure operating envelope and thereby manage security effectively
- Allow assessment of impact on grid elements due to connection of new elements (network elements, generators, or loads) for necessary corrective actions
- Permit power system assets to be run with margins determined on the basis of security assessments
- Facilitate the tuning of control systems, such as power system stabilisers, voltage- and frequency-based special control schemes etc.
- Improve accuracy of online security tools, particularly for unusual operating conditions, which in turn is likely to result in higher reliability of supply to power system users.

The power system model would enable steady state and electromechanical transient stability simulation studies that deliver reasonably accurate outcomes. Electromagnetic transient studies and detailed proprietary individual inverter controls are out of the scope of the models under consideration. A generic Power Plant Controller (PPC) should be modeled for understanding the interactions with the grid.

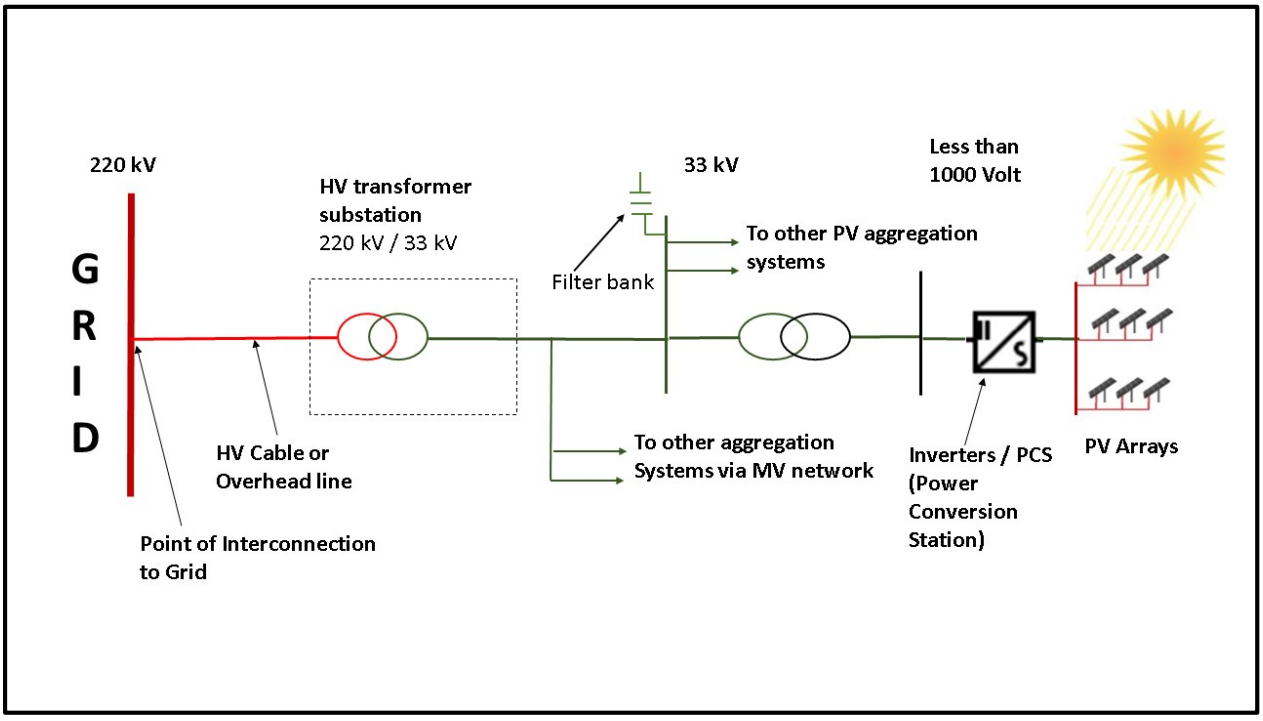
2.0 Solar generation technologies

Electricity generation using energy from sun as the primary energy can be done using 2 distinct methods:

1. Solar thermal technologies: Utilise the **heat** aspect of Sunlight.
2. Solar PV technologies:Utilise the **light** aspect of sunlight
    a. 1st Generation Bulk Silicon technology
    b. 2nd Generation Thin Film technology
    c. 3rd Generation High efficiency concentrated PV technologies

Solar generation plants are being increasingly coupled with complimentary Battery Energy Storage Systems (BESS) to reduce the net variability of power output from the renewable energy plant, provide higher output or provide complimentary grid services such as frequency regulation. Modelling batteries / storage devices assume importance in such cases to capture the net impact of the plant on grid.

3.0 Models for Utility scale Solar generation farms:



In a typical utility scale solar farm / park, arrays of Solar PV panels connected to an inverter (Power Conditioning System / Power Conversion Station – PCS), which is stepped up to form part of the MV

reticulation system (typically at 33 kV or less). A number of inverters are pooled and then stepped up to the voltage of 220 kV / 400 kV prior to connection to EHV grid. A Power Plant controllers (PPC) is usually installed at the point of interconnection to grid or the reticulation system. The PPC(s) control behavior of solar farms in accordance with mandates as per grid codes.

The dynamic components of a solar farm or park consists of the following elements (illustrated in picture below):

1. Generator or Converter
2. Electrical control including fault ride through
3. Power Plant Controller (PPC)
4. Energy storage (i.e. battery), if applicable

Depending on the nature of technology and usage of components at site ('As built'), the requirements for steady state and dynamic modelling evolves.

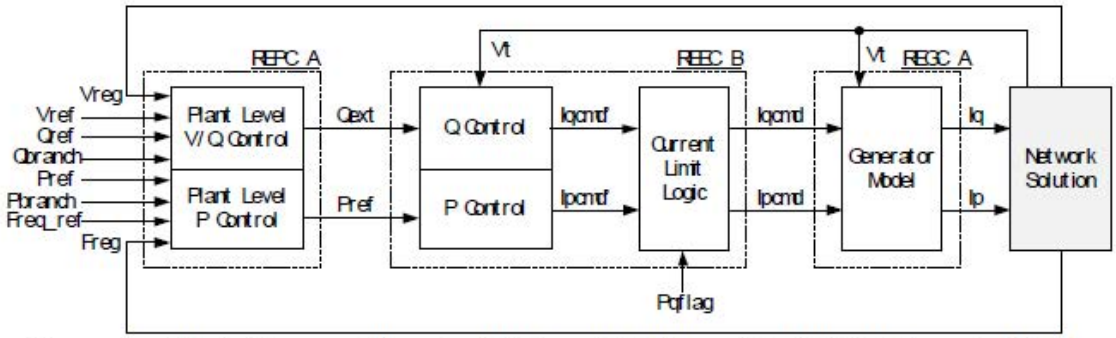


Figure 4 – Block Diagram Showing Different Modules of the WECC Generic Models

For POSOCO to have access to fit-for-purpose models of Solar farms/ parks connected to Indian grid, the following information are required:

1. Electrical Single Line Diagram(SLD) of as built Solar farm /park depicting:
    - For individual Inverters / Power Condition system (PCS): Type, MW rating, MVAR capability, temperature dependent capability curves, short circuit contribution, Manufacturer, Model no., Harmonic profile of inverters
    - Configuration and Details of PV arrays behind each inverter / PCS
    - Reticulation system (MV system within the solar farm): Length of individual branch / twig, Type of conductor, Electrical parameters (R, X, B)
    - Details of MV (~660V/33kV) and HV (~33kV/220kV) step-up transformers: Rating, Impedance, Vector Group, Tap changers (Type, Tap Steps, Max Ratio and Min Ratio in p.u.)
    - Filters (active or passive) or capacitor banks
    - Aggregated steady state model validated for P injection and Q injection at the point of interconnection.

2. Generic models of Solar farms (Refer Section 3.1 to 3.2)
    - Models should be suitable for an integration time step between 1ms and 20ms, and suitable for operation up-to 600s.
    - Including a Generic Power Plant Controller (PPC) model which represents the interaction of power plant with the grid. Settings of the Power Plant Controller may be tuned as per the existing setup on field.
    - Simulation results depicting validation of Generic models against User-Defined models (for P, Q, V, I) and against actual measurement (after commissioning) to be provided.
3. Encrypted user-defined model (UDM) in a format suitable for use in latest release of PSS/E (*.dll files) for electromechanical transient simulation for components of Solar farm: (in case of non-availability of validated generic model)
    - User guide for Encrypted models to be provided including instructions on how the model should be set-up
    - Corresponding transfer function block diagrams to be provided
    - Simulation results depicting validation of User-Defined models against actual measurement (P, Q, V, I) to be provided
    - The use of black-box type representation is not preferred.
    - Models should be suitable for an integration time step between 1ms and 10ms, and suitable for operation up-to and in excess of 100s.
4. Inverter datasheet
5. Voltage/reactive control strategy of farm, reactive capability curves at point of interconnection (temperature and voltage dependence)
6. Settings from an inverter / PCS (each model in the farm)
    - Mapping of settings from the inverter/PCS to the model (UDM and Generic)
7. Settings from the Power plant controller (PPC)
    - Mapping of settings from the inverter/PCS to the model (UDM and Generic)
8. Disturbance recordings – of Solar farm response to disturbance together with any associated information about the circumstances of the disturbance

3.1 Generic models in PSS/E for modelling utility scale Solar PV installations:

Solar Technology	Generic model	Model Description
Utility Scale Solar PV	REGCA1	Renewable energy generator converter model
	REECA1	Renewable energy controls model
	REPCA1	Renewable energy plant controller
Utility Scale Battery Energy Storage System (BESS)	REECCU1	Electrical Control Model (To be used alongwith REGCA1 and REPCA1)

Refer Annexure – II for Detailed block diagrams of the above models

Formats for submission of modelling data for PV inverters

Version History:

Version no.	Release Date	Prepared by*	Checked/Issued by*	Changes

*Mention Designation and Contact Details

Details submitted:

Details pending:

Details of models in PSS/E for modelling Solar plants / farms / parks:

Category	Parameter Description	Data
Inverter Details	Manufacturer, model number and product details	
	Year of commissioning	
	As found settings (obtained either from HMI or downloaded from controller in digital systems)	
Technology	• Grid following • Grid forming (viz. Assist in regulation of Voltage and Frequency) • Reactive power priority (Controls Pf or Voltage? Point of control?)	-
Single Line Diagram	Single line diagram of the solar farm showing number and location of inverters and PV arrays behind each inverter, cable run, transformers, feeders (including type of cables and electrical R,X,B parameters), and connection to transmission system Preferable : Electrical Single Line Diagram including details between PV-array to Inverters, Inverters to MV reticulation system, MV reticulation system till Point of Interconnection (POI) at EHV level (220 kV/400 kV)	
Capability	DC/AC ratio	
	Number of inverters	
	Panel type	
	Number of modules per string	
	Tracking in 0/1/2 axes	
	Capability diagram at nominal (STC) and typical temperature	
Controls	Does the solar farm have a PPC? If yes, whether PPC controls all or part of the inverters in Solar farm	
	What is the method of control – voltage regulation, power factor control, reactive power control?	
	Voltage control strategy (operating mode) • Controls MV bus • Controls HV bus • PF control • Q control	
	Is there a droop setting? • Voltage control • Frequency control	
	Is reactive power limited? Details thereof	
	Is active power limited below MPPT at high output? Details thereof	
	Temperature dependency details	
	Active power ramp rate limiters	
	Fault Ride Through (FRT) protocols and setpoints • LVRT • HVRT	
	Provide settings from controller	

Category	Parameter Description	Data
Reticulation System	Voltage of the reticulation system	
	Number of feeders	
	Cable schedules (lengths, cable size, conductor material, rating info)	
Inverter station transformer	Details of the turbine transformer, including vector group, impedance, and number of taps, tap position, tap ratio	
	Nameplate details	
Solar Farm step-up transformer	Details of the main solar farm step up transformer, including vector group, impedance, and tap position	
	Nameplate ; OLTC?	
	Controlled bus	
	Voltage setpoint	
	Dead band	
	Number of taps	
	Tap ratio range	
Connection Details	Voltage influence (maximum change etc)	
	Short circuit ratio (SCR)	
	· Min	
	· Max	
	Harmonic filters	
	STATCOM	
	Synchronous condensers	
	Battery Energy Storage System (if applicable)	
Power Plant Controller (PPC) Details	Does the solar farm have a PPC? If yes, whether PPC controls all or part of the inverters in solar farm	
	What is the method of control – voltage regulation, power factor control, reactive power control?	
	Voltage control strategy (operating mode) - Controls MV Bus - Controls HV Bus - PF control - Q control - Voltage control	
	Is there a droop setting? - Voltage control - Frequency Control - Is there line drop compensation?	
	Is reactive power limited?	
	Temperature dependency	
	Active power ramp rate limiters	
	FRT protocols and setpoints - LVRT - HVRT	
	Provide settings from controller.	

3.2 Generic Models for Utility Scale Solar-PV generation:

Category	Parameter Description	Data
GENERATOR model		
Solar PV (REGCA1)	Tg, Converter time constant (s)	
	Rrpwr, Low Voltage Power Logic (LVPL) ramp rate limit (pu/s)	
	Brkpt, LVPL characteristic voltage 2 (pu)	
	Zerox, LVPL characteristic voltage 1 (pu)	
	Lvpl1, LVPL gain (pu)	
	Volim, Voltage limit (pu) for high voltage reactive current manage-	
	Lvpnt1, High voltage point for low voltage active current management (pu)	
	Lvpnt0, Low voltage point for low voltage active current management (pu)	
	Iolim, Current limit (pu) for high voltage reactive current management (specified as a negative value)	
	Tfltr, Voltage filter time constant for low voltage active current management (s)-	
	Khv, Overvoltage compensation gain used in the high voltage reactive current management	
	Iqrmax, Upper limit on rate of change for reactive current (pu)	
	Iqrmin, Lower limit on rate of change for reactive current (pu)	
	Accel, acceleration factor (0 < Accel <= 1)	
Electrical Control model		
Large Solar PV : (REECB1) [Refer Block Diagrams]	Vdip (pu), low voltage threshold to activate reactive current injection logic	
	Vup (pu), Voltage above which reactive current injection logic is activated	
	Trv (s), Voltage filter time constant	
	dbd1 (pu), Voltage error dead band lower threshold (≤0)	
	dbd2 (pu), Voltage error dead band upper threshold (≥0)	
	Kqv (pu), Reactive current injection gain during over and undervoltage conditions	
	Iqh1 (pu), Upper limit on reactive current injection Iqinj	
	Iql1 (pu), Lower limit on reactive current injection Iqinj	
	Vref0 (pu), User defined reference (if 0, model initializes it to initial terminal voltage)	
	Tp (s), Filter time constant for electrical power	

Category	Parameter Description	Data
Electrical Control model		
Large Solar PV : (REECB1) [Refer Block Diagrams]	QMax (pu), limit for reactive power regulator	
	QMin (pu) limit for reactive power regulator	
	VMAX (pu), Max. limit for voltage control	
	VMIN (pu), Min. limit for voltage control	
	Kqp (pu), Reactive power regulator proportional gain	
	Kqi (pu), Reactive power regulator integral gain	
	Kvp (pu), Voltage regulator proportional gain	
	Kvi (pu), Voltage regulator integral gain	
	Tiq (s), Time constant on delay s4	
	dPmax (pu/s) (>0) Power reference max. ramp rate	
	dPmin (pu/s) (<0) Power reference min. ramp rate	
	PMAX (pu), Max. power limit	
	PMIN (pu), Min. power limit	
	Imax (pu), Maximum limit on total converter current	
	Tpord (s), Power filter time constant	

Category	Parameter Description	Data
Power Plant Controller (PPC) model		
Generic Power Plant Controller (PPC) model: (REPCA1)	Tfltr, Voltage or reactive power measurement filter time constant (s)	
	Kp, Reactive power PI control proportional gain (pu)	
	Ki, Reactive power PI control integral gain (pu)	
	Tft, Lead time constant (s)	
	Tfv, Lag time constant (s)	
	Vfrz, Voltage below which State s2 is frozen (pu)	
	Rc, Line drop compensation resistance (pu)	
	Xc, Line drop compensation reactance (pu)	
	Kc, Reactive current compensation gain (pu)	
	emax, upper limit on deadband output (pu)	
	emin, lower limit on deadband output (pu)	
	dbd1, lower threshold for reactive power control deadband (<=0)	
	dbd2, upper threshold for reactive power control deadband (>=0)	
	Qmax, Upper limit on output of V/Q control (pu)	
	Qmin, Lower limit on output of V/Q control (pu)	
	Kpg, Proportional gain for power control (pu)	
	Kig, Proportional gain for power control (pu)	
	Tp, Real power measurement filter time constant (s)	
	fdbd1, Deadband for frequency control, lower threshold (<=0)	
	Fdbd2, Deadband for frequency control, upper threshold (>=0)	
	femax, frequency error upper limit (pu)	
	femin, frequency error lower limit (pu)	
	Pmax, upper limit on power reference (pu)	
	Pmin, lower limit on power reference (pu)	
	Tg, Power Controller lag time constant (s)	
	Ddn, droop for over-frequency conditions (pu)	
	Dup, droop for under-frequency conditions (pu)	

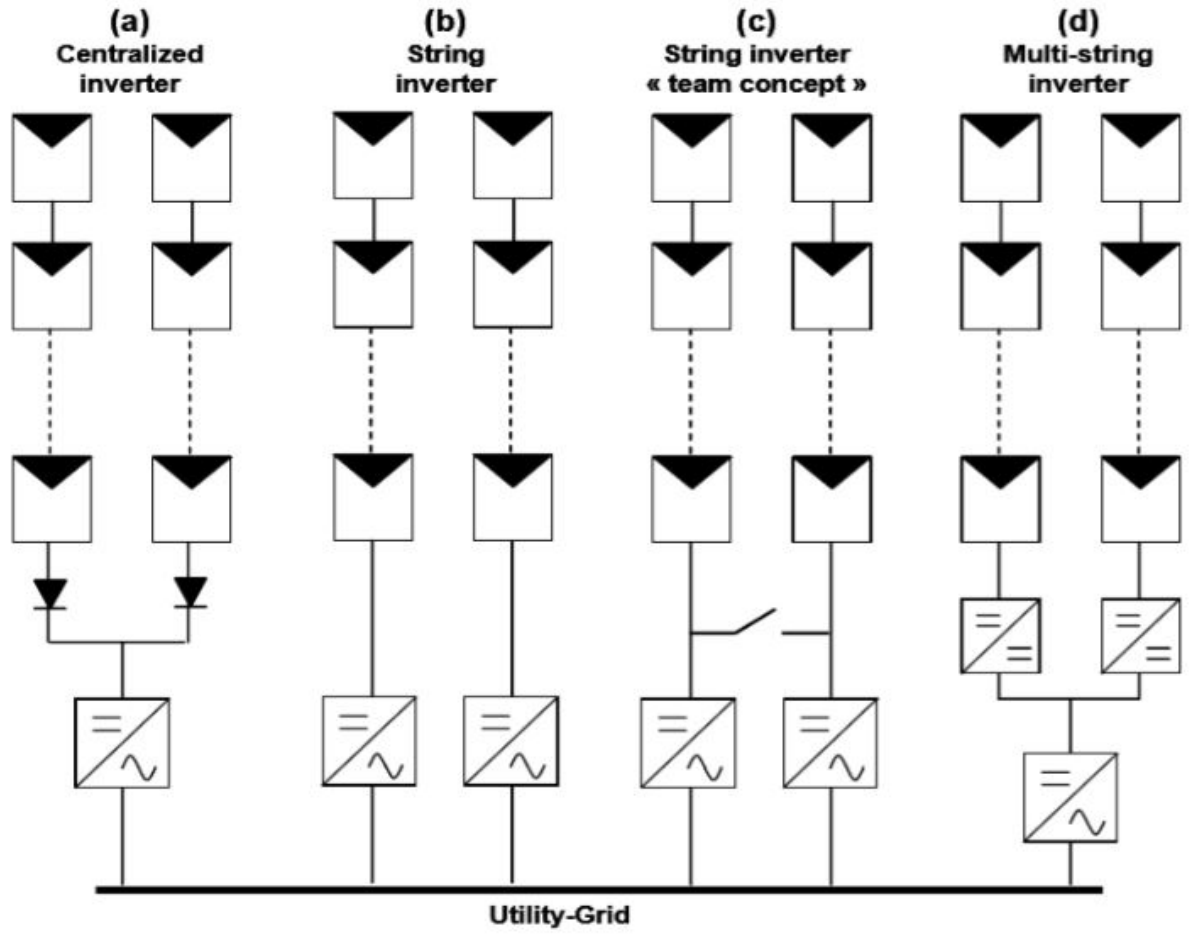
Category	Parameter Description	Data
Electrical Control model : BESS		
Generic Electrical Control model for Utility Scale BESS: (REECCU1)	Vdip (pu), low voltage threshold to activate reactive current injection logic	
	Vup (pu), Voltage above which reactive current injection logic is activated	
	Trv (s), Voltage filter time constant	
	dbd1 (pu), Voltage error dead band lower threshold (≤0)	
	dbd2 (pu), Voltage error dead band upper threshold (≥0)	
	Kqv (pu), Reactive current injection gain during over and undervoltage conditions	
	Iqh1 (pu), Upper limit on reactive current injection Iqinj	
	Iql1 (pu), Lower limit on reactive current injection Iqinj	
	Vref0 (pu), User defined reference (if 0, model initializes it to initial terminal voltage)	
	Tp (s), Filter time constant for electrical power	
	QMax (pu), limit for reactive power regulator	
	QMin (pu) limit for reactive power regulator	
	VMAX (pu), Max. limit for voltage control	
	VMIN (pu), Min. limit for voltage control	
	Kqp (pu), Reactive power regulator proportional gain	
	Kqi (pu), Reactive power regulator integral gain	
	Kvp (pu), Voltage regulator proportional gain	
	Kvi (pu), Voltage regulator integral gain	
	Tiq (s), Time constant on delay s4	
	dPmax (pu/s) (>0) Power reference max. ramp rate	
	dPmin (pu/s) (<0) Power reference min. ramp rate	
	PMAX (pu), Max. power limit	
	PMIN (pu), Min. power limit	
	Imax (pu), Maximum limit on total converter current	
	Tpord (s), Power filter time constant	
	Vq and Iq curve (Reactive Power V-I pair in p.u.) : 4 points	
	Vp and Ip curve (Active Power V-I pair in p.u.) : 4 points	
	T, battery discharge time (s) (<0)	
	SOCini (pu), Initial state of charge	
	SOCmax (pu), Maximum allowable state of charge	
	SOCmin (pu), Minimum allowable state of charge	

Note: SOCini represents the initial state of charge on the battery and is a user entered value. This is entered in pu; with 1 pu meaning that the batter is fully charged and 0 means the battery is completely discharged

Annexure - I

Inverter Configurations:

Inverters within a Solar farm can be present in different configurations, as indicated below:



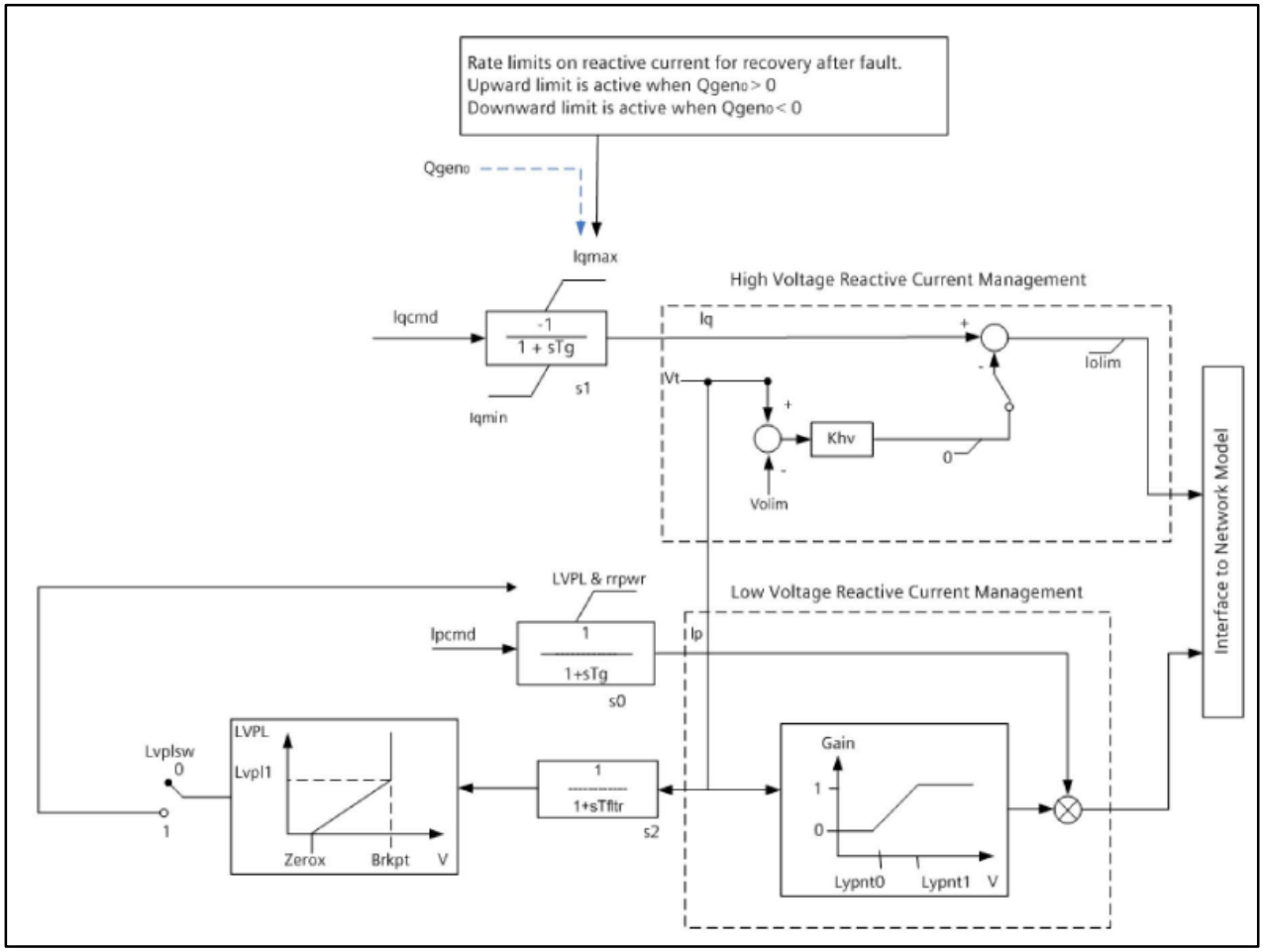
The data furnished must take into account the individual inverter configurations accordingly.

Annexure - II

Block Diagrams:

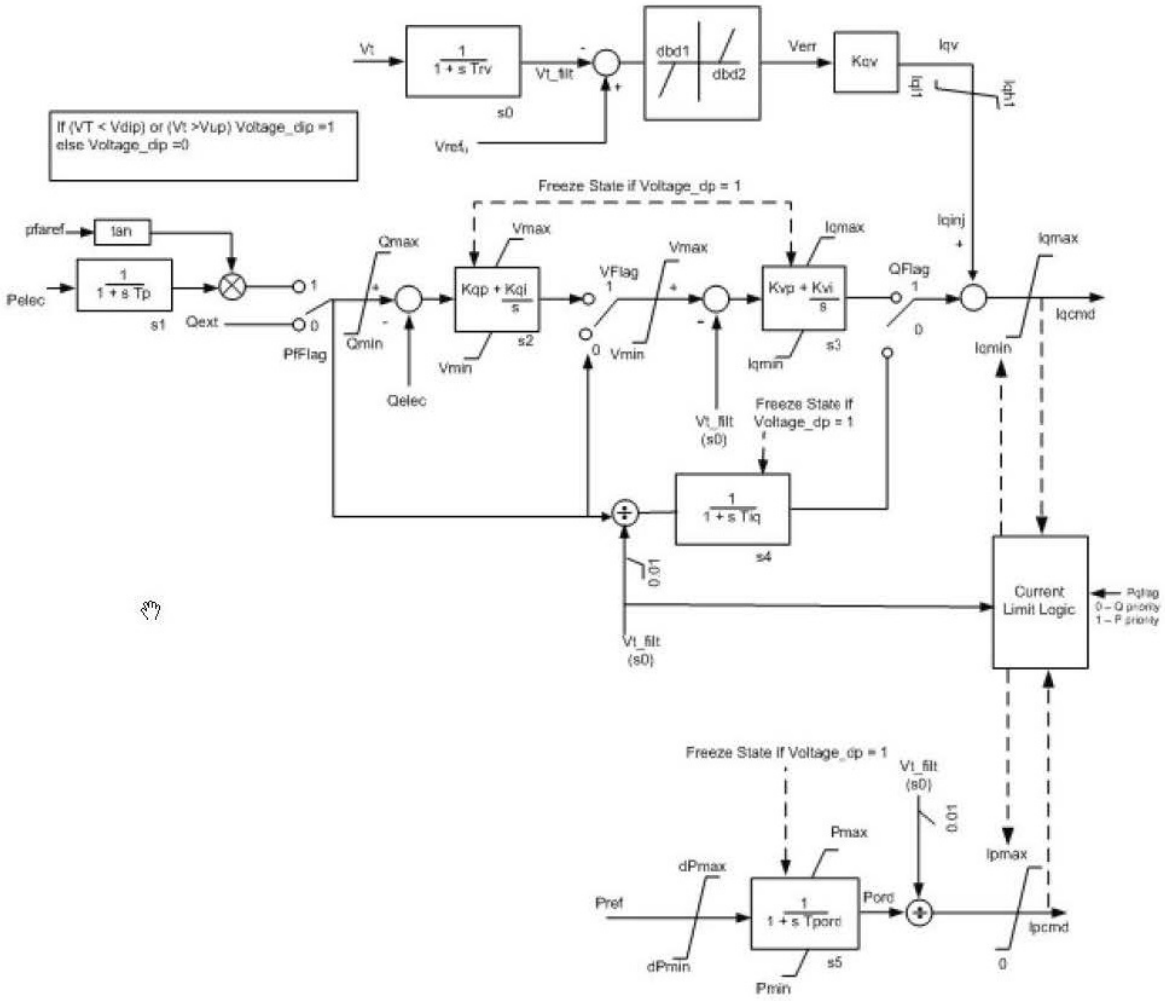
A. Generators:

- **REGCA1:** Generic Model for Utility Scale Solar PV



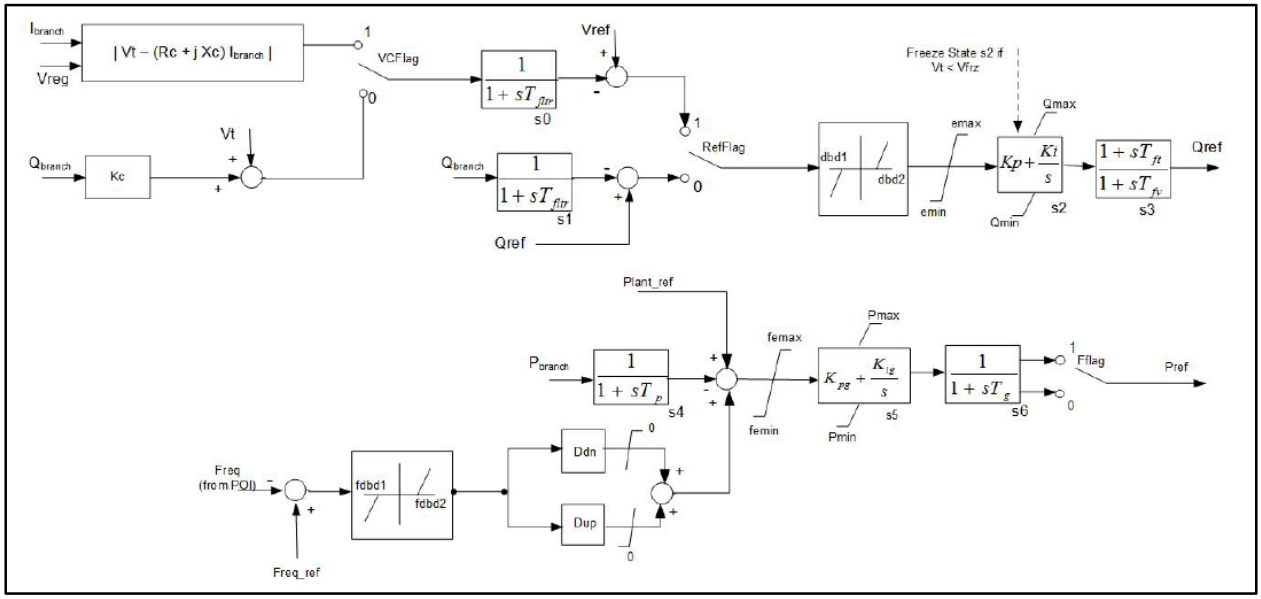
B. Electrical Control:

- **REECB1:** Generic Model for Utility Scale Solar PV

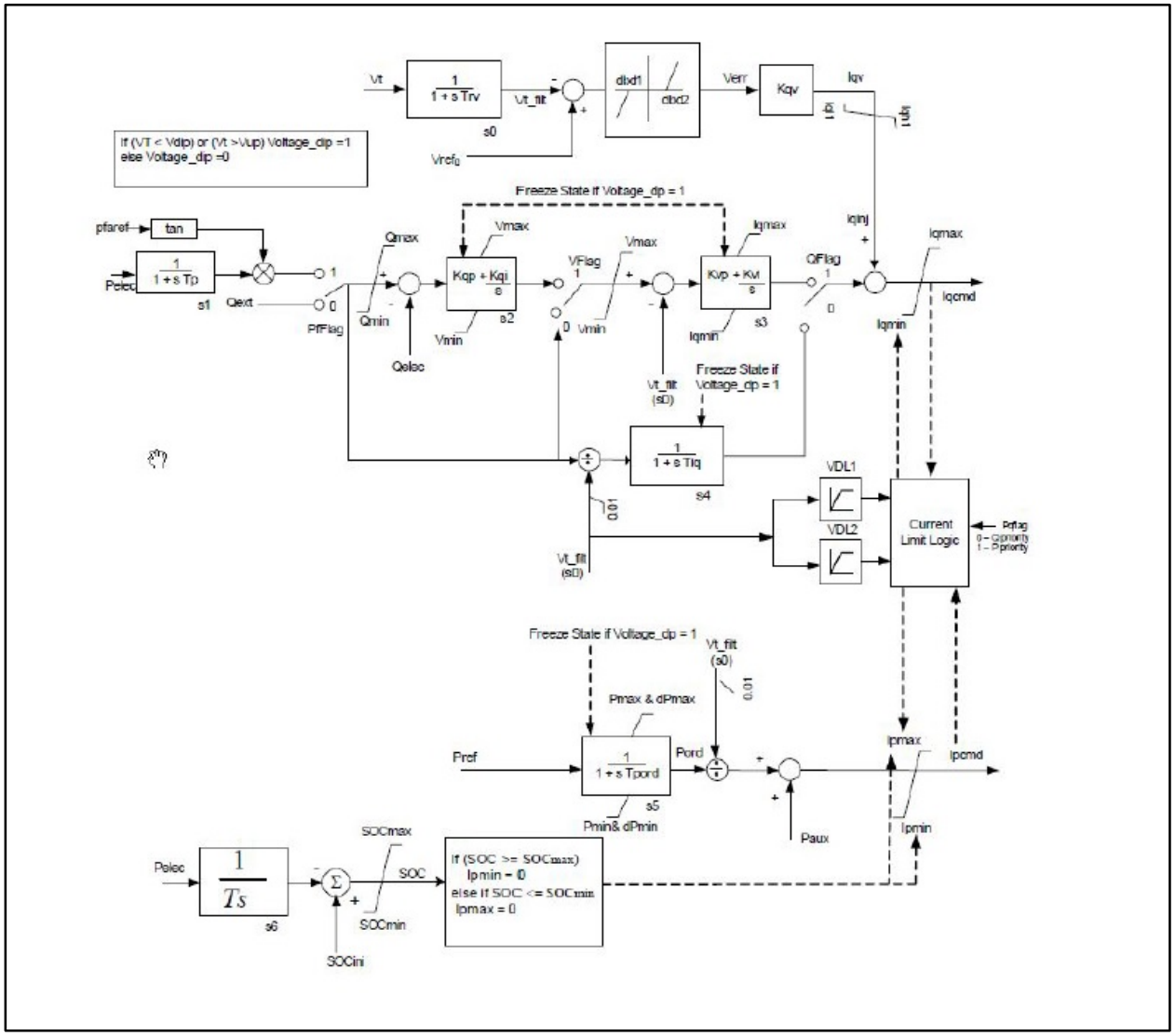


C. Power Plant Controller (PPC) Model:

- **REPCA1** for Utility scale Solar PV:



Electrical Control Model for Utility Scale Battery Energy Storage System (BESS):



Procedure for furnishing information for modelling Wind generating stations in Indian Grid

1.0 Introduction:

The purpose of this document is to act as a guideline for exchange of information for accurate modelling of wind farms and parks in India. With India poised to integrate more than 60 GW of utility scale wind generation, availability of fit-for-purpose steady state and dynamics models of wind turbine generators and wind parks will enable secure operation of Indian power grid and enable identification of potential weak points in the grid so as to take appropriate remedial actions.

1.1 Applicability:

The guideline shall be applicable to all utility scale wind farms in India that can have an impact on operation of the power grid of India, irrespective of connection at Intra-STS or ISTS (Inter-state Transmission System).

This document presents the desired information for collection of data for modelling of Wind generators / Wind farms or parks in PSS/E software, a software suite being used pan-India at CEA, CTU, SLDCs, RLDCs, and NLDC for modelling of India's power grid. A systematic set of data and basic criteria for furnishing data are presented.

1.2 Need for a fit-for-purpose model:

There is a cost involved in developing and validating dynamic models of power system equipment. But there are much higher benefits for the power system if this leads to a functional, fit-for-purpose model, and arrangements that allow that model to be maintained over time.

A functional fit-for-purpose dynamic model will:

- Facilitate significant power system efficiencies and reliability by allowing power system operations to confidently identify the secure operating envelope and thereby manage security effectively
- Allow assessment of impact on grid elements due to connection of new elements (network elements, generators, or loads) for necessary corrective actions
- Permit power system assets to be run with margins determined on the basis of security assessments
- Facilitate the tuning of control systems, such as power system stabilisers, voltage- and frequency-based special control schemes etc.
- Improve accuracy of online security tools, particularly for unusual operating conditions, which in turn is likely to result in higher reliability of supply to power system users.

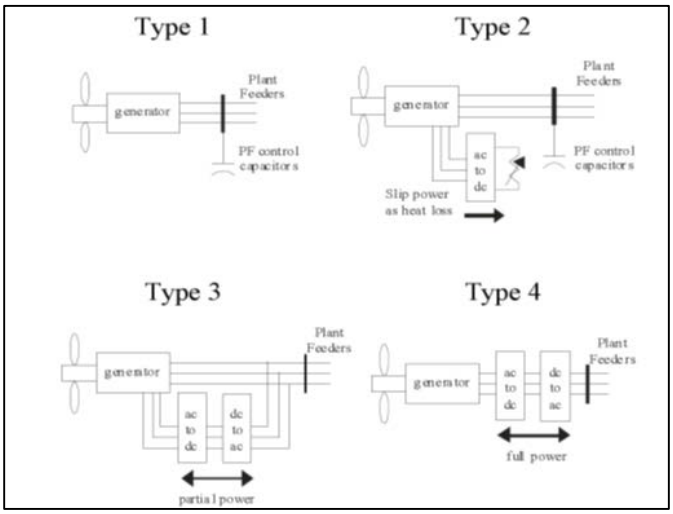
The power system model would enable steady state and electromechanical transient stability simulation studies that deliver reasonably accurate outcomes. Detailed proprietary aerodynamics, electromagnetic

transient studies and proprietary individual inverter controls are out of the scope of the models under consideration. A generic Power Plant Controller (PPC) should be modeled for understanding the interactions with the grid.

2.0 Wind generation technologies:

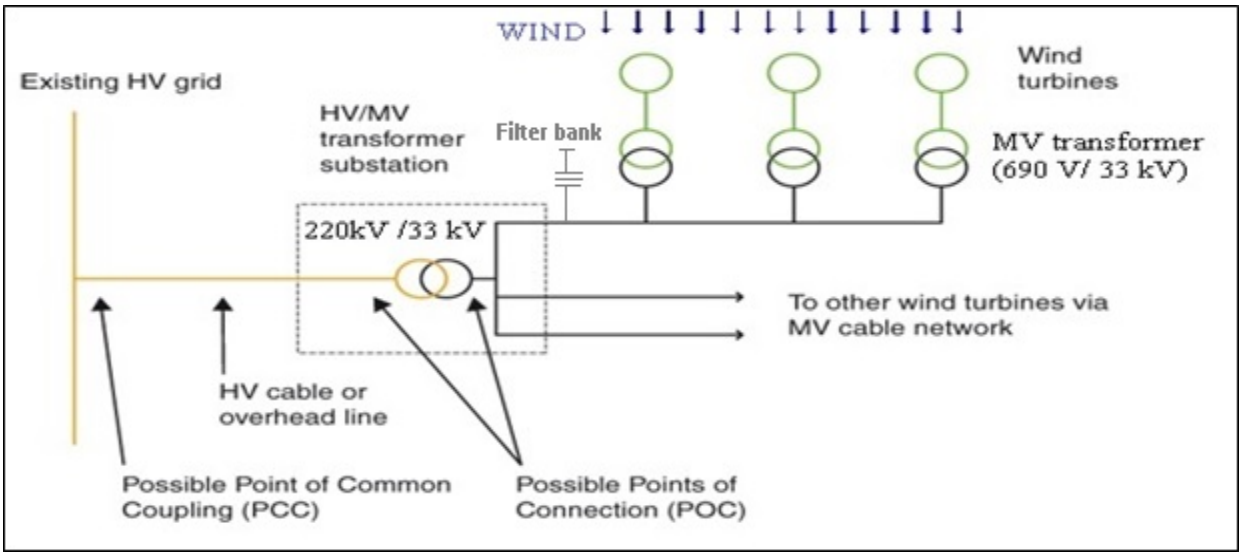
The majority of commercially available wind power plants use one of the wind turbine-generator (WTG) technologies listed below:

- Type-1 : Direct connected (Squirrel cage) induction generator (SCIG)
  - Fixed Speed stall control
  - Fixed Speed Active control
- Type-2 : Wound rotor induction generator (WRIG) with a variable resistor in the rotor circuit
- Type-3 : Doubly fed induction generator (DFIG) wind turbines ; Variable speed with rotor side converter
- Type-4 : Full converter wind turbine
  - Synchronous generator
  - Permanent Magnet Generator (PMG)



Wind energy plants are being increasingly coupled with complimentary Battery Energy Storage Systems (BESS) to reduce the variability of net power output from the renewable energy plant, provide higher output, or provide complimentary grid services such as frequency regulation. Modelling batteries / storage devices assume importance in such cases to capture the net impact of the plant on grid.

3.0 Models for Wind generators:

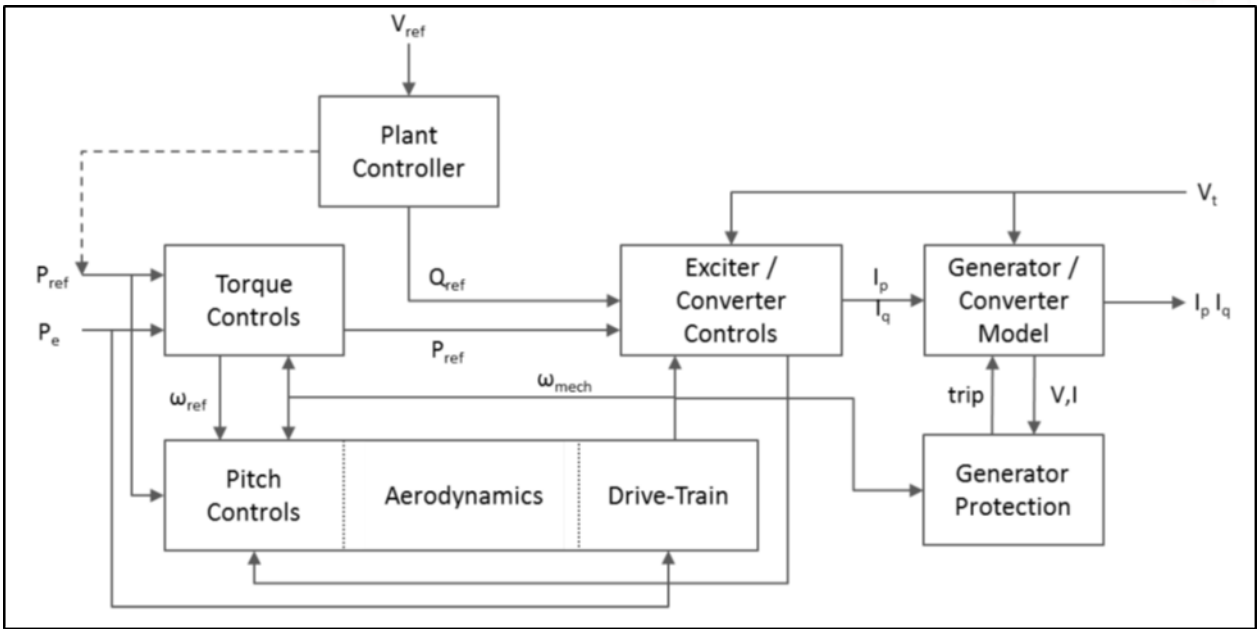


In a typical wind farm / park, individual WTGs (typically rated 3 MW or less) are connected in a system of twigs and feeders. Wind generation at around 660 V / 690 V is stepped up to a MV level of typically 33 kV in Indian system and finally pooled to grid at 220 kV / 400 kV through step-up transformers. A typical wind farm of 300 MW will be spread over an area of 600 acres, and power transmission within the farm is typically at 33 kV through overhead lines or underground cables. A Power Plant controllers (PPC) is usually installed at the point of interconnection to grid or at the reticulation system. The PPC(s) control behavior of wind farms in accordance with mandates as per grid codes.

The dynamic components of a wind farm consists of the following elements (illustrated in picture below):

1. Generator or Converter
2. Electrical control
3. Drive-Train model
4. Aerodynamics
5. Pitch controller
6. Torque controller
7. Power Plant Controller (PPC)
8. Energy storage (As applicable)

The components may or may not be present depending on the nature of technology used for wind power generation (i.e. type of turbine). Depending on the nature of technology, usage/configuration of components at site (‘As built’), the requirements for steady state and dynamic modelling evolves.



For POSOCO to have access to verified fit-for-purpose models of wind farms/ parks connected to Indian grid, the following information are required:

1. Electrical Single Line Diagram (SLD) of as built Wind farm /park depicting:
    - For individual WTGs: Type, MW rating, MVAR capability, Manufacturer, Model no., capability curve
    - Reticulation system (MV system within the wind farm): Length of individual branch / twig, Type of conductor, Electrical parameters (R, X, B)
    - Filters (active or passive) or capacitor banks
    - Details of MV (690V/33kV) and HV (33kV/220kV) step-up transformers: Rating, Impedance, Vector Group, Tap changers (Type, Tap Steps, Max Ratio and Min Ratio in p.u.)
    - Aggregated steady state model validated for P injection and Q injection at the point of interconnection.
2. Generic models of WTGs / Wind farms (Refer sections 3.1 to section 3.4)
    - Models should be suitable for an integration time step between 1ms and 20ms, and suitable for operation up-to 600s.
    - Including a Generic Power Plant Controller (PPC) model which represents the interaction of power plant with the grid. Settings of the Power Plant Controller may be tuned as per the existing setup on field.
    - Simulation results depicting validation of Generic models against User-Defined models (for P, Q, V, I) and against actual measurement (after commissioning) to be provided.
3. Encrypted user defined model (UDM) in a format suitable for latest release PSS/E (*.dll files) for electromechanical transient simulation for components of WTGs / Wind farm (in case non-availability of validated generic model)

- User guide for Encrypted models to be provided including instructions on how the model should be set-up
- Corresponding transfer function block diagrams to be provided
- Simulation results depicting validation of User-Defined models against actual measurement (for P, Q, V, I) to be provided
- The use of black-box type representation is not preferred.
- Models should be suitable for an integration time step between 1ms and 10ms, and suitable for operation up-to and in excess of 100s.

4. Wind Turbine datasheet
5. Voltage/reactive control strategy of farm, reactive capability curves at the point of interconnection (Temperature and Voltage dependence)
6. Settings from a wind turbine (each model in the farm)
   - Mapping of settings from a wind turbine to the corresponding model (both UDM and generic)
7. Settings from the Power plant controller (PPC)
   - Mapping of settings from PPC to the corresponding model (UDM and Generic model)
8. Disturbance recordings – of wind farm response to grid disturbance together with any associated information about the circumstances of the disturbance

3.1 Generic models in PSS/E for different technologies of Wind Turbines

Wind Turbine type	Technology	Generic model	Model Description
Type-1	Direct connected (squirrel cage) induction generator (SCIG) a) Fixed Speed Stall Control b) Fixed Speed Active Control	WT1G1	Generator model (conventional induction generator)
		WT2T1	Drive train model (two-mass drive train model)
		wt1p_b	Pitch controller *(Use only for Type 1 with active stall*)
Type-2	Wound rotor induction generator (WRIG) with a variable resistor in the rotor circuit, and typically employs pitch control	WT2G1	Generator model (induction generator with external rotor resistance
		WT2E1	External resistance controller
		WT12T1	Drive train model
		wt1p_b (no equivalent in PSS/E)	Pitch controller
Type-3	Doubly fed induction generator (DFIG) wind turbines ; Variable speed with rotor side converter	REGCA1	Renewable energy generator converter model
		REECA1	Renewable energy controls model
		WTDTA1	Drive train model
		WTARA	Wind turbine aerodynamic model
		WTPTA1	Simplified pitch controller model
		WTTQA1	Wind generator torque control
		REPCTA1	Renewable energy plant controller
Type-4	Full converter wind turbine Generator types: a) Synchronous b) Permanent Magnet type	REGCA1	Renewable energy generator converter model
		REECA1	Renewable energy controls model
		WTDTA1	Drive train model
		REPCA1	Renewable energy plant controller
Storage	Utility Scale Battery Energy Storage System (BESS)	REECCU1	Electrical Control Model (To be used alongwith REGCA1 and REPCA1)

- Detailed block diagrams are enclosed at Annexure

Annexure: Formats for submission of modelling data for wind turbine generators / wind farms

Version History:

Version no.	Release Date	Prepared by*	Checked/Issued by*	Changes

*Mention Designation and Contact Details

Details submitted:

Details pending:

Details of models in PSS/E for modelling Wind plants / farms / parks:

Category	Parameter Description	Data
Generator Nameplate	Connection point voltage (kV)	
	Terminal voltage (kV)	
	Wind Farm - Rated active power (sent out) in MW	
	Turbine – Rated MVA	
	Turbine – Rated active power (PMAX) in MW	
	Number of wind turbines (Type wise)	
Reactive power capability	Capability chart at connection point [If not available, then for each individual wind turbine, and mode of operation of Power Plant Controller]	-
	QMAX	
	QMIN	
Single Line Diagram	Single line diagram of the wind farm/park showing number and location of turbines, cable run, transformers, feeders (including type of cables and electrical R,X,B parameters), and connection to transmission system Preferable : Electrical Single Line Diagram including details between individual WTGs and b/w WTGs and aggregation points	
Wind Turbine Details	Manufacturer and product details (include Year of Manufacture)	
	Year of commissioning	
	Fixed speed or variable speed	
	Type of turbine: stall control, pitch control, active stall control, limited variable speed, variable speed with partial or full-scale frequency converter	
	Hub height (in metre)	
	Rotor diameter (in metre)	
	Number of blades	
	Rotor speed (in rpm)	
	Gearbox ratio	
Generator	Type of generator: Type 1/ Type 2 / Type 3 / Type 4	
	Number of pole pairs	
	Stator resistance (in Ohms)	
	Rotor resistance (in Ohms)	
Speed control	Details of speed controller in wind turbine	
	Efficiency (Cp) curves	
	Cut-in wind speed	
	Wind speed at which full power is attained Cut-out wind speed	
	Pitch angle at low wind speed	

Category	Parameter Description	Data
Reticulation System	Voltage of the reticulation system	
	Number of feeders	
	Cable schedules (lengths, cable size, conductor material, rating info)	
Turbine Transformer	Details of the turbine transformer, including vector group, impedance, and number of taps, tap position, tap ratio	
	Nameplate details	
Wind-farm Step-up transformer	Details of the main wind farm step up transformer, including vector group, impedance, and tap position	
	Nameplate ; OLTC?	
	Controlled bus	
	Voltage setpoint	
	Dead band	
	Number of taps	
	Tap ratio range	
Connection Details	Voltage influence (maximum change etc)	
	Short circuit ratio (SCR)	
	· Min	
	· Max	
	Harmonic filters	
	STATCOM	
	Synchronous condensers	
	Battery Energy Storage System (if applicable)	
Power Plant Controller (PPC) Details	Does the wind farm have a PPC? If yes, whether PPC controls all or part of the WTGs in wind farm	
	What is the method of control – voltage regulation, power factor control, reactive power control?	
	Voltage control strategy (operating mode) - Controls MV Bus - Controls HV Bus - PF control - Q control - Voltage control	
	Is there a droop setting? - Voltage control - Frequency Control - Is there line drop compensation?	
	Is reactive power limited?	
	Temperature dependency	
	Active power ramp rate limiters	
	FRT protocols and setpoints - LVRT - HVRT	
	Provide settings from controller.	

3.3 Generic Models for Type-1 and Type-2 Wind turbine generators:

Category	Parameter Description	Data
GENERATOR model		
Generator : Type-1 (WT1G1)	Synchronous reactance (ohms or pu) Xs	
	Transient reactance (ohms or pu) X'	
	Wound rotor induction generator (WRIG) with a variable resistor in the rotor circuit, and typically employs pitch control	
	Leakage reactance, X_L	
	Saturation curve (E1, S(E1), E2, S(E2)	
Generator : Type-2 (WT2G1)	XA, stator reactance (pu)	
	Doubly fed induction generator (DFIG) wind turbines ; Variable speed with rotor side converter	
	X1 rotor reactance (put)	
	R_Rot_Mach, rotor resistance (pu)	
	R_Rot_Max (sum of R_Rot_Mach + total external resistance) in pu	
	Saturation curve (E1, S(E1), E2, S(E2)	
	Power – slip curve (Top 5 points in the T-s curve)	
Electrical Control model		
Rotor Resistance Control : Type-2 (WT2E1)	TsP, rotor speed filter time constant, sec.	
	Tpe, power filter time constant, sec.	
	Ti, PI-controller integrator time constant, sec.	
	Kp, PI-controller proportional gain, pu	
	ROTRV_MAX, Output MAX limit	
	ROTRV_MIN, Output MIN limit	
Drive Train model		
Two-Mass Turbine Model for Type 1 and Type 2 Wind Generators : (WT12T1)	H, Total inertia constant, sec	
	DAMP, Machine damping factor, pu P/pu speed	
	Htfrac, Turbine inertia fraction (Hturb/H)1	
	Freq1, First shaft torsional resonant frequency, Hz	
	Dshaft, Shaft damping factor (pu)	

3.4 Generic Models for Type-3 and Type-4 Wind turbine generators:

Category	Parameter Description	Data
GENERATOR model		
Type-3 or Type-4 (REGCA1)	Tg, Converter time constant (s)	
	Rrpwr, Low Voltage Power Logic (LVPL) ramp rate limit (pu/s)	
	Wound rotor induction generator (WRIG) with a variable resistor in the rotor circuit, and typically employs pitch control	
	Zerox, LVPL characteristic voltage 1 (pu)	
	Lvpl1, LVPL gain (pu)	
	Volim, Voltage limit (pu) for high voltage reactive current manage-	
	Doubly fed induction generator (DFIG) wind turbines ; Variable speed with rotor side converter	
	Lvpnt1, High voltage point for low voltage active current manage-	
	ment (pu)	
	Lvpnt0, Low voltage point for low voltage active current manage-	
	ment (pu)	
	Iolim, Current limit (pu) for high voltage reactive current manage-	
	ment (specified as a negative value)	
	Tfltr, Voltage filter time constant for low voltage active current man-	
	agement (s)	
	Khv, Overvoltage compensation gain used in the high voltage reac-	
	tive current management	
	Iqrmax, Upper limit on rate of change for reactive current (pu)	
	Iqrmin, Lower limit on rate of change for reactive current (pu)	
	Accel, acceleration factor (0 < Accel <= 1)	
Electrical Control model		
Type-3 and Type-4 Wind turbines : (REECA1) [Refer Block Diagrams]	Vdip (pu), low voltage threshold to activate reactive current injection logic	
	Vup (pu), Voltage above which reactive current injection logic is activated	
	Trv (s), Voltage filter time constant	
	dbd1 (pu), Voltage error dead band lower threshold (≤0)	
	dbd2 (pu), Voltage error dead band upper threshold (≥0)	
	Kqv (pu), Reactive current injection gain during over and undervoltage conditions	
	Iqh1 (pu), Upper limit on reactive current injection Iqinj	
	Iql1 (pu), Lower limit on reactive current injection Iqinj	
	Vref0 (pu), User defined reference (if 0, model initializes it to initial terminal voltage)	
	Iqfrz (pu), Value at which Iqinj is held for Thld seconds following a voltage dip if Thld > 0	

Category	Parameter Description	Data
Electrical Control model		
Type-3 and Type-4 Wind turbines : (REECA1) [Refer Block Diagrams]	Thld (s), Time for which Iqinj is held at Iqfrz after voltage dip returns to zero (see Note 1)	
	Thld2 (s) (≥0), Time for which the active current limit (IPMAX) is held at the faulted value after voltage dip returns to zero	
	Tp (s), Filter time constant for electrical power	
	QMax (pu), limit for reactive power regulator	
	QMin (pu) limit for reactive power regulator	
	VMAX (pu), Max. limit for voltage control	
	VMIN (pu), Min. limit for voltage control	
	Kqp (pu), Reactive power regulator proportional gain	
	Kqi (pu), Reactive power regulator integral gain	
	Kvp (pu), Voltage regulator proportional gain	
	Kvi (pu), Voltage regulator integral gain	
	Vbias (pu), User-defined bias (normally 0)	
	Tiq (s), Time constant on delay s4	
	dPmax (pu/s) (>0) Power reference max. ramp rate	
	dPmin (pu/s) (<0) Power reference min. ramp rate	
	PMAX (pu), Max. power limit	
	PMIN (pu), Min. power limit	
	Imax (pu), Maximum limit on total converter current	
	Tpord (s), Power filter time constant	
	VQ-IQ characteristic (at least two pairs, up to 4 pairs of voltage and current in pu)	
	VP-IP characteristic (at least two pairs, up to 4 pairs, of voltage and current in pu)	[Refer Block Diagrams]
	Is turbine in PF control or Q control (including controlled by external signal)?	
	Is the turbine controlling voltage (directly, not than through PPC)?	
	If controlling voltage directly what bus does it control?	
	Is the turbine in P or Q priority mode?	
Drive Train model		
	H, Total inertia constant, sec	
	DAMP, Machine damping factor, pu P/pu speed	
	Htfrac, Turbine inertia fraction (Hturb/H)1	
	Freq1, First shaft torsional resonant frequency, Hz	
	Dshaft, Shaft damping factor (pu)	

Category	Parameter Description	Data
Pitch Control model [for Type-3 only]		
Generic Pitch Control model for Type-3 : (WTPA1)	Kiw, Pitch-control Integral Gain (pu)	
	Kpw, Pitch-control proportional gain (pu)	
	Kic, Pitch-compensation integral gain (pu)	
	Kpc, Pitch-compensation proportional gain (pu)	
	Kcc, Gain (pu)	
	Tp, Blade response time constant (s)	
	TetaMax, Maximum pitch angle (degrees)	
	TetaMin, Minimum pitch angle (degrees)	
	RTetaMax, Maximum pitch angle rate (degrees/s)	
	RTetaMin, Minimum pitch angle rate (degrees/s) (< 0)	
Aerodynamic model [For Type-3 only]		
(WTARA1)	Ka, Aerodynamic gain factor (pu/degrees)	
	Theta 0 Initial pitch angle (degrees)	
Torque Controller model [For Type-3 only]		
Generic Torque Controller for Type-3 wind machines : (WTTQA1)	Kpp, Proportional gain in torque regulator (pu)	
	KIP, Integrator gain in torque regulator (pu)	
	Tp, Electrical power filter time constant (s)	
	Twref, Speed-reference time constant (s)	
	Temax, Max limit in torque regulator (pu)	
	Temin, Min limit in torque regulator (pu)	
	p1, power (pu)	
	spd1, shaft speed for power p1 (pu)	
	p2, power (pu)	
	spd2, shaft speed for power p2 (pu)	
	p3, power (pu)	
	spd3, shaft speed for power p3 (pu)	
	p4, power (pu)	
	spd4, shaft speed for power p3 (pu)	
	TRATE, Total turbine rating (MW)	

Category	Parameter Description	Data
Power Plant Controller (PPC) model		
Generic Power Plant Controller (PPC) model for Type-3 and Type-4 wind turbines : REPCTA1 for type 3, and REPCA1 for type 4 turbines	Tfltr, Voltage or reactive power measurement filter time constant (s)	
	Kp, Reactive power PI control proportional gain (pu)	
	Ki, Reactive power PI control integral gain (pu)	
	Tft, Lead time constant (s)	
	Tfv, Lag time constant (s)	
	Vfrz, Voltage below which State s2 is frozen (pu)	
	Rc, Line drop compensation resistance (pu)	
	Xc, Line drop compensation reactance (pu)	
	Kc, Reactive current compensation gain (pu)	
	emax, upper limit on deadband output (pu)	
	emin, lower limit on deadband output (pu)	
	dbd1, lower threshold for reactive power control deadband (<=0)	
	dbd2, upper threshold for reactive power control deadband (>=0)	
	Qmax, Upper limit on output of V/Q control (pu)	
	Qmin, Lower limit on output of V/Q control (pu)	
	Kpg, Proportional gain for power control (pu)	
	Kig, Proportional gain for power control (pu)	
	Tp, Real power measurement filter time constant (s)	
	fdbd1, Deadband for frequency control, lower threshold (<=0)	
	Fdbd2, Deadband for frequency control, upper threshold (>=0)	
	femax, frequency error upper limit (pu)	
	femin, frequency error lower limit (pu)	
	Pmax, upper limit on power reference (pu)	
	Pmin, lower limit on power reference (pu)	
	Tg, Power Controller lag time constant (s)	
	Ddn, droop for over-frequency conditions (pu)	
	Dup, droop for under-frequency conditions (pu)	

Category	Parameter Description	Data
Electrical Control model : BESS		
Generic Electrical Control model for Utility Scale BESS: (REECCU1)	Vdip (pu), low voltage threshold to activate reactive current injection logic	
	Vup (pu), Voltage above which reactive current injection logic is activated	
	Trv (s), Voltage filter time constant	
	dbd1 (pu), Voltage error dead band lower threshold (≤0)	
	dbd2 (pu), Voltage error dead band upper threshold (≥0)	
	Kqv (pu), Reactive current injection gain during over and undervoltage conditions	
	Iqh1 (pu), Upper limit on reactive current injection Iqinj	
	Iql1 (pu), Lower limit on reactive current injection Iqinj	
	Vref0 (pu), User defined reference (if 0, model initializes it to initial terminal voltage)	
	Tp (s), Filter time constant for electrical power	
	QMax (pu), limit for reactive power regulator	
	QMin (pu) limit for reactive power regulator	
	VMAX (pu), Max. limit for voltage control	
	VMIN (pu), Min. limit for voltage control	
	Kqp (pu), Reactive power regulator proportional gain	
	Kqi (pu), Reactive power regulator integral gain	
	Kvp (pu), Voltage regulator proportional gain	
	Kvi (pu), Voltage regulator integral gain	
	Tiq (s), Time constant on delay s4	
	dPmax (pu/s) (>0) Power reference max. ramp rate	
	dPmin (pu/s) (<0) Power reference min. ramp rate	
	PMAX (pu), Max. power limit	
	PMIN (pu), Min. power limit	
	Imax (pu), Maximum limit on total converter current	
	Tpord (s), Power filter time constant	
	Vq and Iq curve (Reactive Power V-I pair in p.u.) : 4 points	
	Vp and Ip curve (Active Power V-I pair in p.u.) : 4 points	
	T, battery discharge time (s) (<0)	
	SOCini (pu), Initial state of charge	
	SOCmax (pu), Maximum allowable state of charge	
	SOCmin (pu), Minimum allowable state of charge	

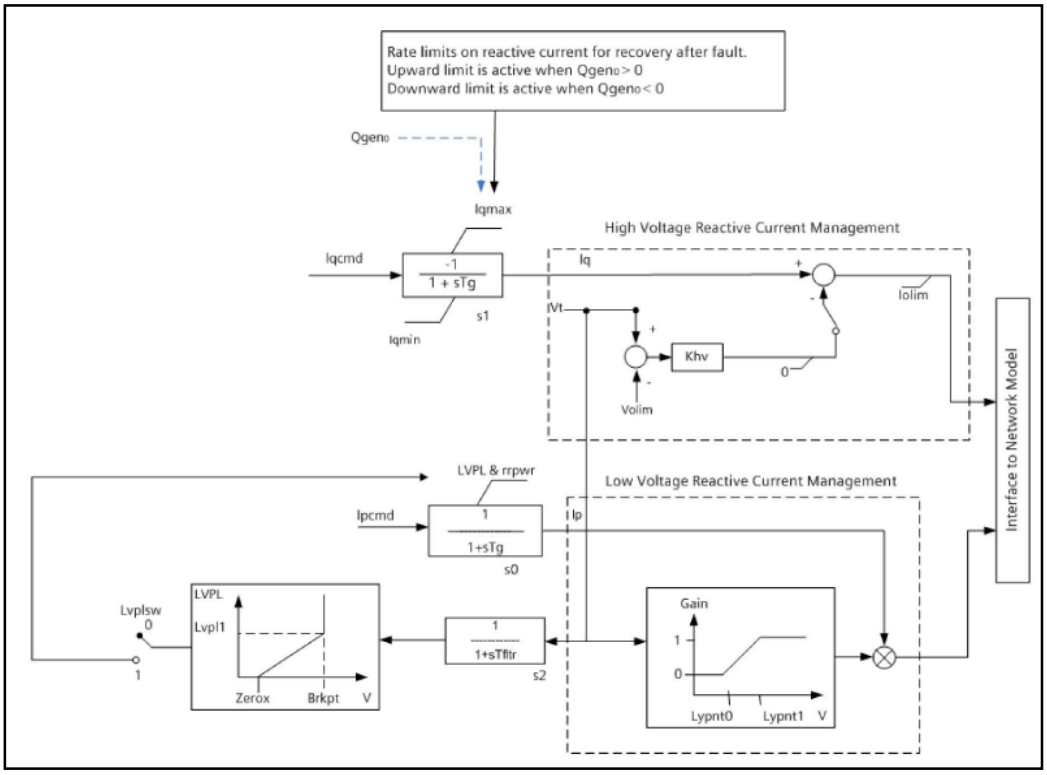
Note: SOCini represents the initial state of charge on the battery and is a user entered value. This is entered in pu; with 1 pu meaning that the batter is fully charged and 0 means the battery is completely discharged

Annexure – I

Block Diagrams

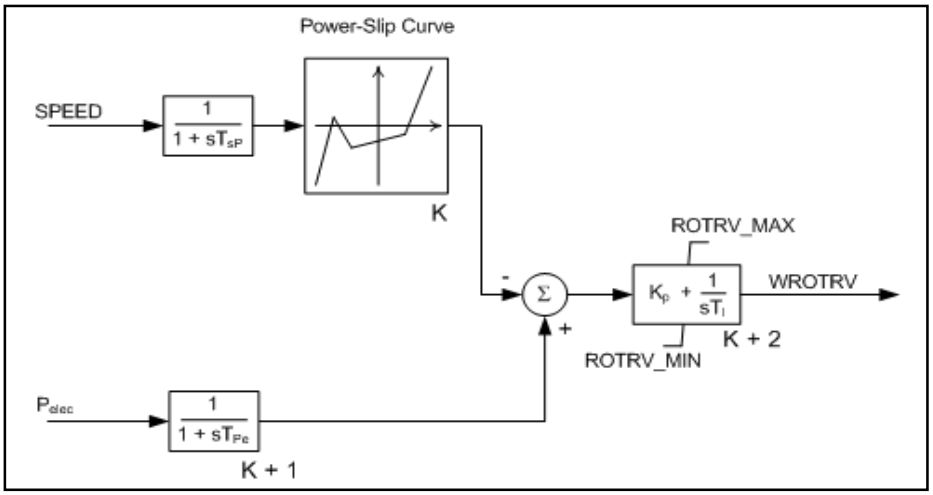
A. Generators:

- REGCA1: Generic Model for Type-3 and Type-4 wind turbines



B. Electrical Control:

- Type-2 (WT2E1) : Rotor Resistance Control



- Type-3 or Type-4 (REECA1) :

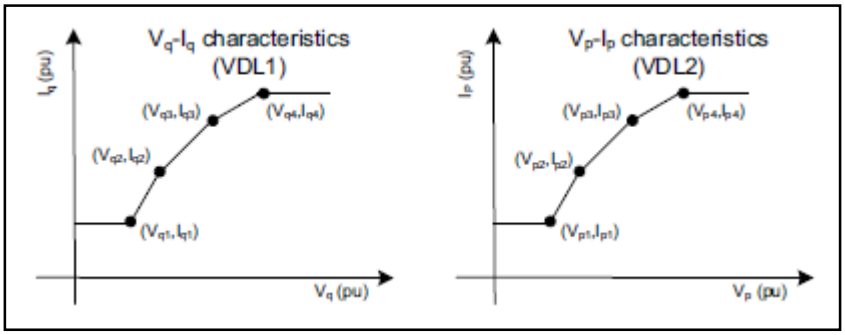
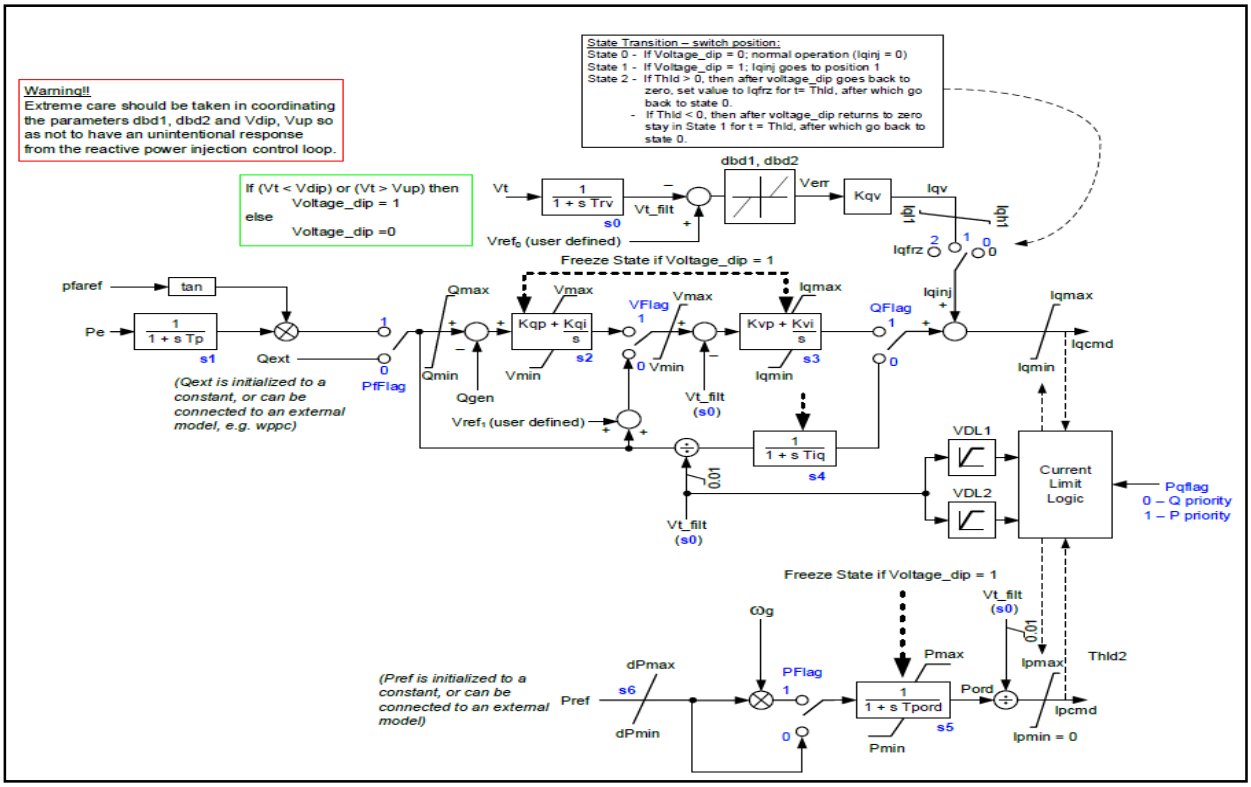
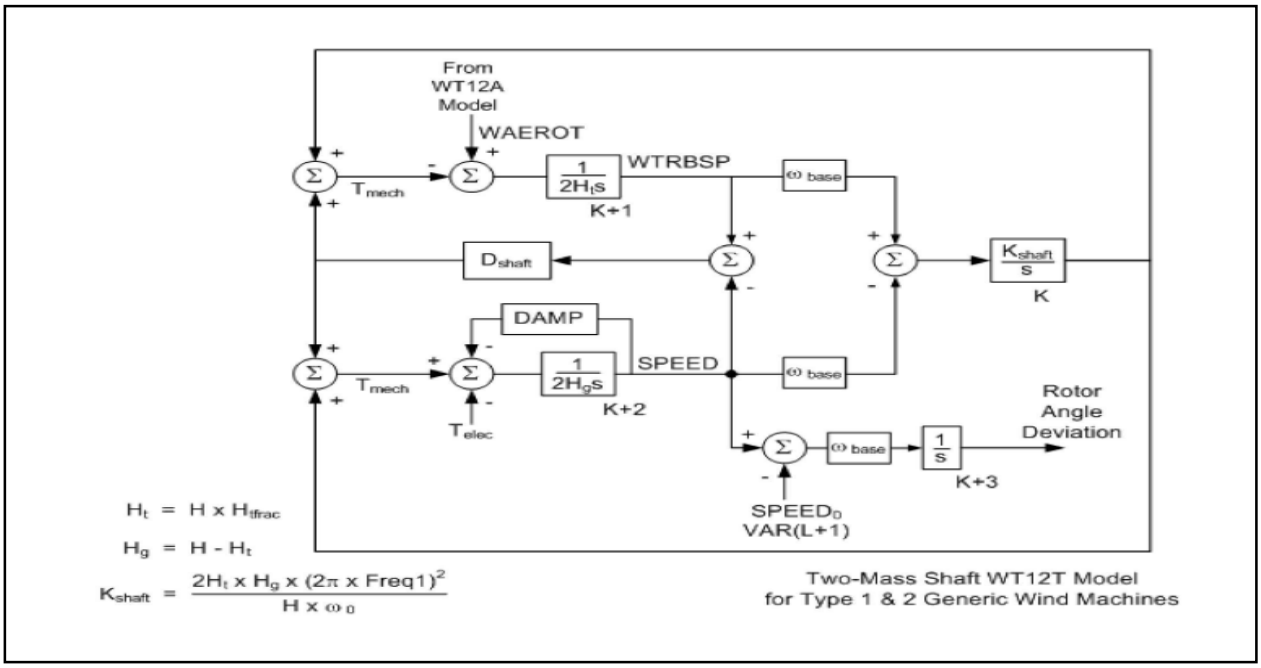


Figure: *Vp-Ip and Vq-Iq curves for REECA1 model*

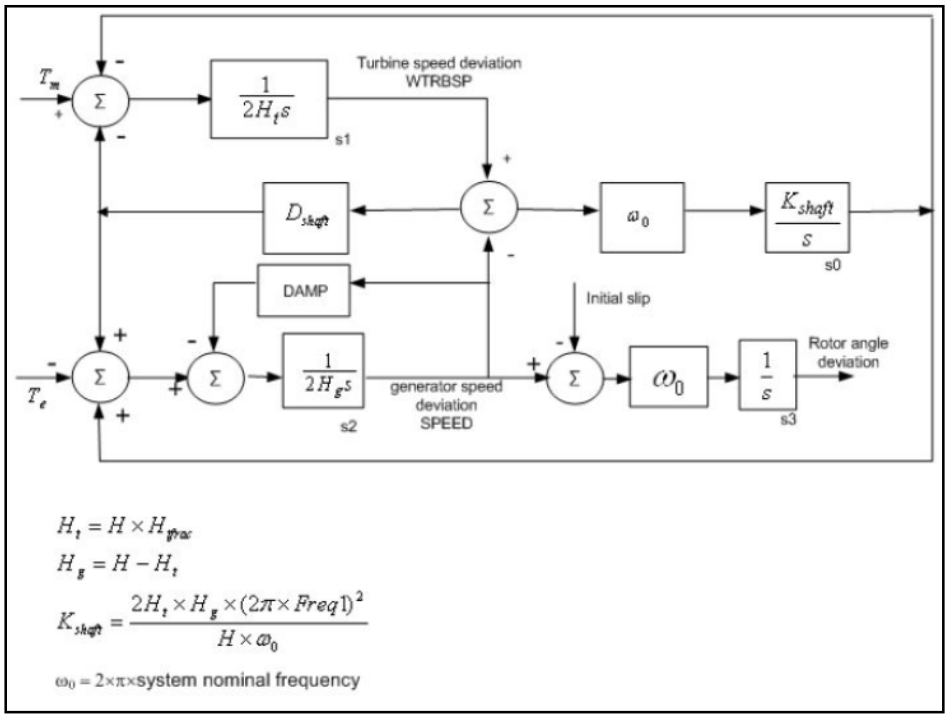


C. Drive Train Model:

- Type-2 (WT12T1) : For Type 1 and Type-2 wind turbines

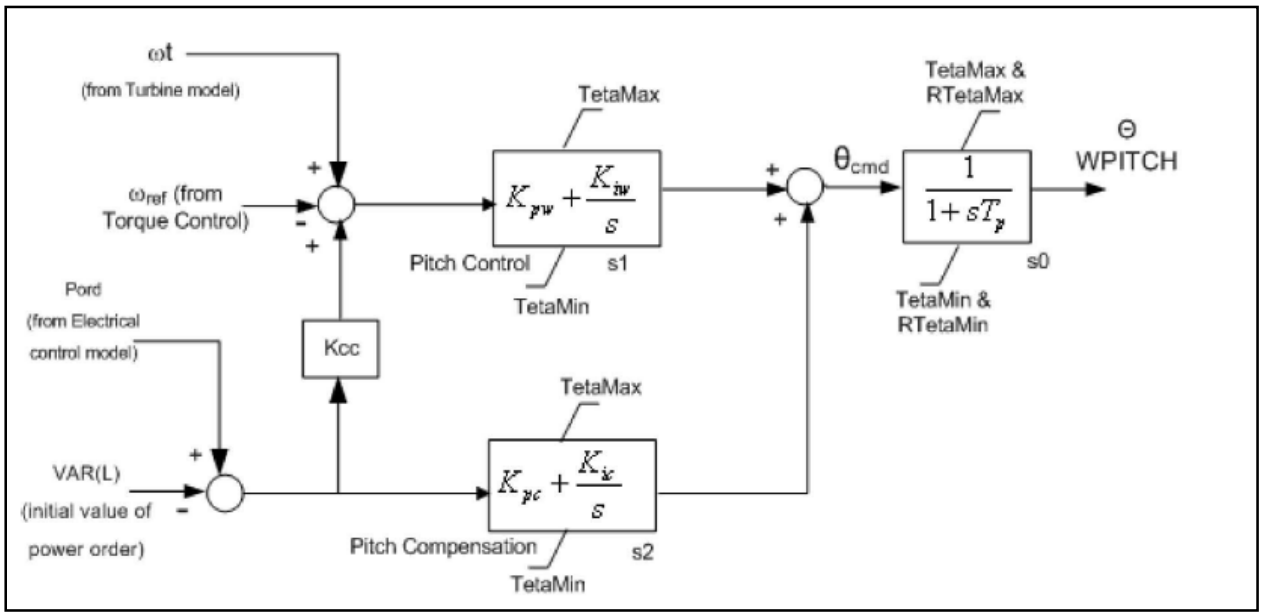


- WTDTA1 : Generic Drive Train model for Type-3 and Type-4 turbines



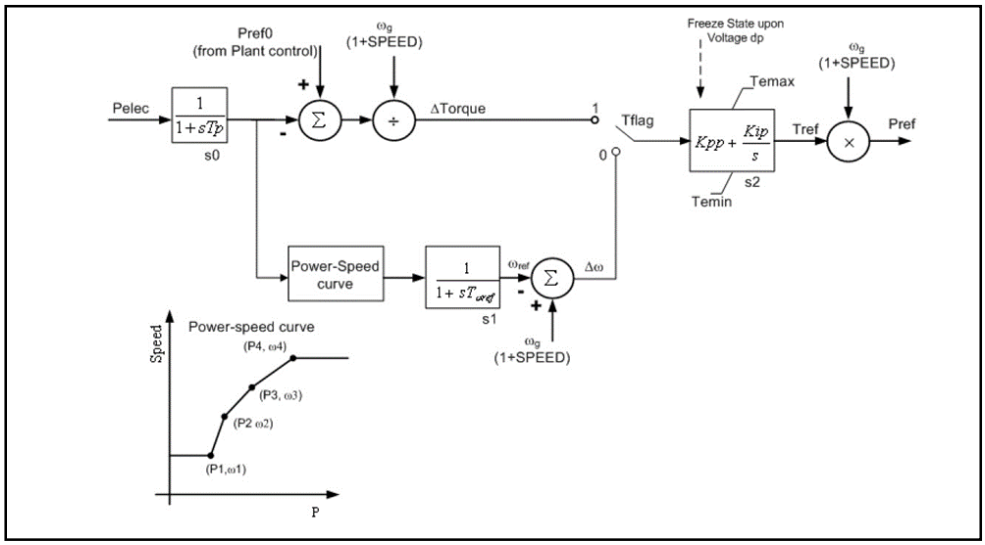
D. Pitch Control:

- Type-3 (WTPTA1) : Generic Pitch Control for Type-3 WTG



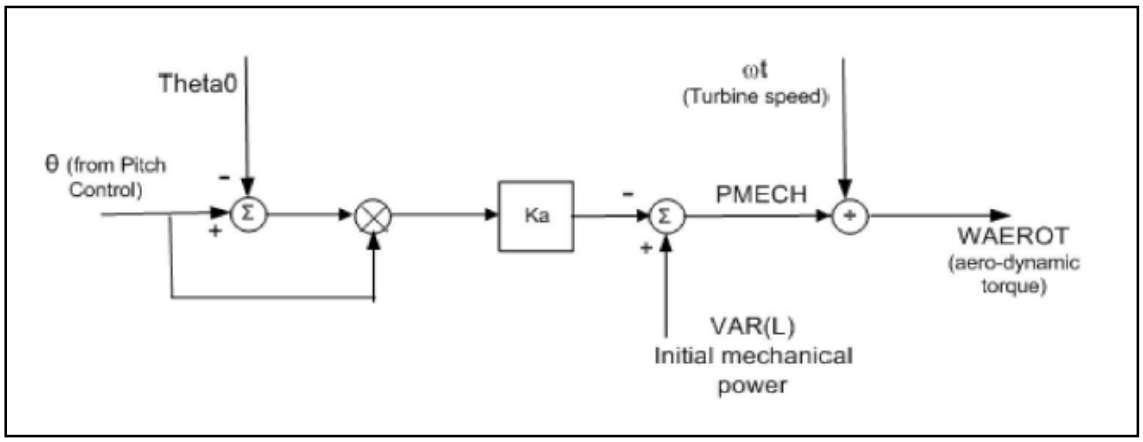
E. Torque Controller Model:

- Type-3 (WTTQA1) : Generic Torque Controller for Type-3 WTG



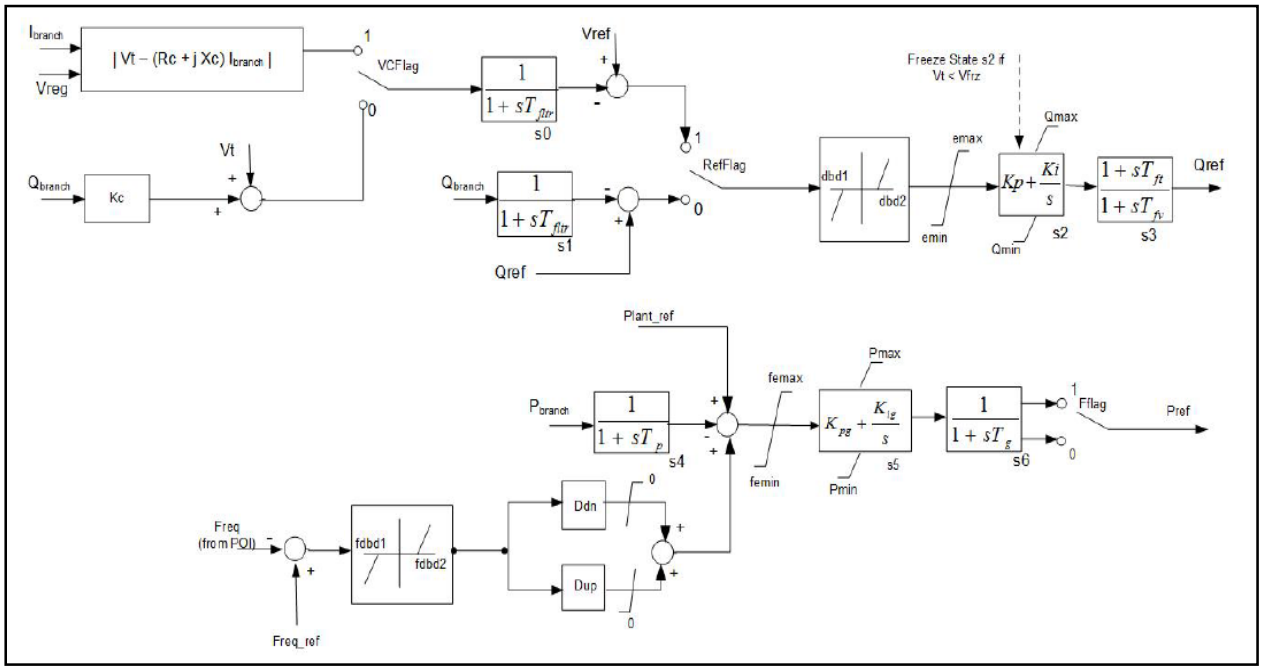
F. Aerodynamic Model:

- Type-3 (WTARA1) : Generic Aerodynamic model Type-3 WTG

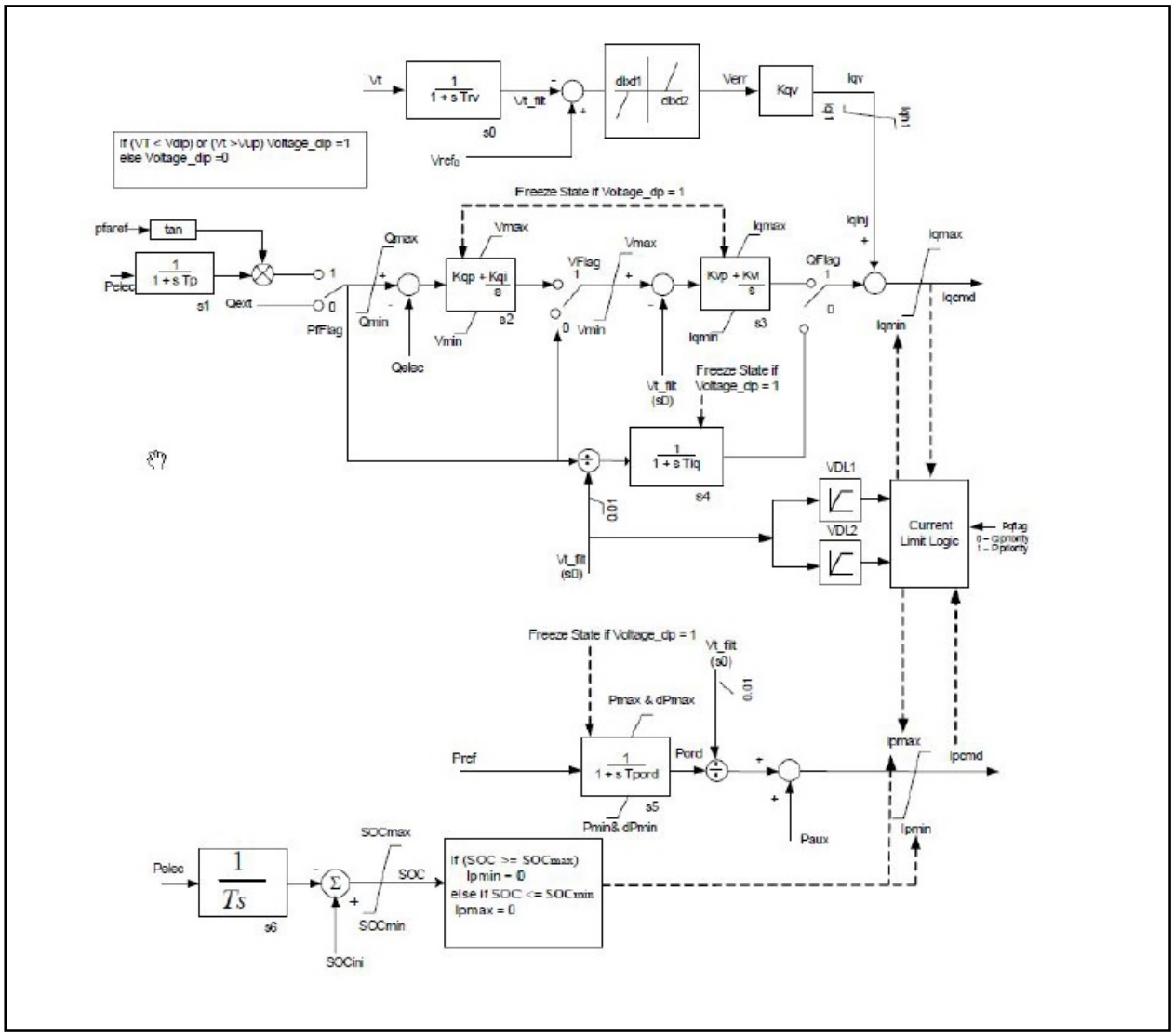


G. Power Plant Controller (PPC) Model:

- REPCTA1 for type 3, and REPCA1 for type 4 turbines



H. Electrical Control Model for Utility Scale Battery Energy Storage System (BESS):



S.No.	Utility	Plant	Generator	Exciter	Governer	Stabilizer	Remarks (data not given)
1	**NHPC**	Chamera-1	Yes	Yes	Partial	Yes	Governor data is not in defined model/format, not able to process that data
		Chamera-2	Yes	Yes	Yes	No	T"q0,Xl & S(1.0)
		Chamera-3	Yes	Yes	Yes	Yes	S(1.0) & S(1.2)
		Dhauliganga	Yes	Yes	Yes	Yes	Exhaustive data for excitattion and stabilizer but not in defined model/format
		Bairasuil	Yes	Yes	Partial	Yes	Exciter & stabilizer coupled in excitation system
		Uri-1	Yes	Yes	Yes	Yes	
		Uri-2	Yes	Partial	Yes	Yes	Exhaustive data given for AVR , though not in defined model.
		Dulhasti	Partial	Partial	yes	No	Excitation data is not in defined model
		Parbati-III	Partial	No	Partial	No	Only block diagram given for excitation system, rest data is not in defined format
		Salal	Partial	Partial	No	Partial	Exciatation system block diagram with and without PSS is given. Some partial data for excitation system is given only. Data not in format
		Sewa-II	Partial	No	Yes	Yes	Governor and stabilizer block diagram has given and data is also shared. As the data is not defined for any standard model, we are checking the data
2	**NTPC**	Rihand	Yes	Yes	No	Yes	Stabilizer data only for Rihand -1 is given
		Dadri Thermal-2	Yes	Yes	No	No	
		Singrauli	Yes	Yes	No	No	
		Unchahar-1	Yes	Yes	No	No	
		Badarpur	Yes	Yes	No	No	Unit # 1,2,3 of 95 MW each
		Unchahar-4	Yes	Yes	Yes	No	
3	**SJVNAL**	NJPC	Yes	Yes	No	Yes	T"d0, T"q0 & S(1.2)
		Rampur	Yes	No	No	No	
4	**UPRVUNL**	Parichha	Partial	Yes	No	No	Time constants & Unit#7
		Harduaganj	Partial	No	No	No	Unit#2
		Anpara-1,2,3	Yes	Yes	No	Yes	
		Anpara- 4,5	Yes	Yes	No	Yes	
		Obra	Yes	No	No	No	
		Harduaganj Unit#7 (120 MW)	Yes	No	No	No	Model name has been given (Transfer function diagram of static excitation system also shared) [Governor model not defined]
5	**HPGCL**	Yamuna nagar	Yes	Yes	No	Yes	Inertia
		Panipat-1,2	Yes	Yes	No	Yes	
		Khedar	Yes	No	No	Yes	
6	**PSTCL**	Ropar	Yes	Yes	Yes	Yes	
		Rajpura	Yes	Yes	Yes	No	
		Talwandi Saboo	Yes	No	No	No	Model name has been given for excitation system, governor though data has not submiited
7	**Karcham**	Karcham Wangtoo	Yes	No	No	No	
8	**Everest**	Malana-2	Yes	No	No	No	
9	**AD Hydro**	AD Hydro	Yes	No	No	No	
10	**Shree Cement**	Shree Cement	Yes	No	No	No	
11	**Roza-IPP**	Roza	Yes	No	No	No	
12	**Lalitpur-IPP**	Lalitpur	Yes	Yes	No	Yes	
13	**RRVPNL**		Partial	yes	Partial	No	Xl, S(1.0),S(1.2)
14	**DTL**	Indra Prastha PPS-I	Partial	No	No	No	
		PPS-III	Partial	Partial	Partial	No	Not in any standard model, exhaustive data has given. Checking the data
15	**HPPCL**	Sainj HEP	Yes	Partial	Partial	Partial	Proposed settings are not given
16	**THDC**	Tehri	Yes	Yes	Yes	Yes	
		Koteshwar	Yes	Yes	Yes	Yes	

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

		Vishnuparyag HPS (IPP)	440
		Alaknanada	330
12	Delhi	Rajghat TPS	135
		Delhi Gas Turbine	282
		Rithala GPS	108
		Bawana GPS	1370
13	HPSEB	Baspa HPS (IPP)	300
		Malana HPS (IPP)	86

Rajasthan RE generators

1	PSS_132KV_DALOT_KANGARH
2	PSS_132KV_KOLAYAT_RAYS
3	PSS_132KV_NOKHADHAIYA_3No_33KV
4	PSS_132KV_PS2_GODAWARI_GREEN
5	PSS_132KV_PS2_PRECISION
6	PSS_132KV_PS3_8N0_33KV
7	PSS_132KV_PS3_WELSPUN
8	PSS_132KV_RANI_RANI
9	PSS_132KV_SHEO_SUZLON
10	PSS_220KV_BADISID_EDEN
11	PSS_220KV_BADISID_TERRAFORM
12	PSS_220KV_BALOTRA__BALOTRA
13	PSS_220KV_BAP__MAHI NDRA
14	PSS_220KV_BHAWAD_SNCA
15	PSS_220KV_GULABPURA_GULABPURA
16	PSS_220KV_KHINWSAR_KHI NWSAR
17	PSS_220KV_PRATAPGARH_DEVGARH
18	PSS_220KV_PRTAPGRH__WELSPUN_TATA
19	PSS_220KV_TINWARI_3N0__33KV
20	PSS_400KV_AKAL_AKAL
21	PSS_400KV_AKAL_DEVIKOT
22	PSS_400KV_AKAL_JAJIYA
23	PSS_400KV_AKAL_BHU
24	PSS_132KV_DALOT_33KV_DALOT
25	PSS_220KV_DECHU DSPPL
26	PSS_220KV_DECHU_RSTEPL
27	PSS_220KV_NEEMRANA_NEEM RANA
28	PSS_220KV_TINWARI_KETUKALAN
29	PSS_132KV_AAU_AAU
30	PSS_132KV_KOLAYAT_8N0_33KV
31	PSS_132KV_OSIAN_DUNDHARA
32	PSS_132KV_SHAHPURA_SHAHPURA_BHILWA
33	PSS_400KV_AKAL_DANGRI
34	PSS_400KV_AKAL_RAJGARH
35	PSS_400KV_AKAL_MULANA
36	PSS_220KV_AMARSAGAR_MOKALA
37	PSS_220KV_AMARSAGAR_LUDARWA
38	PSS_220KV_AMARSAGAR_KALADUNGAR
39	PSS_220KV__BHOPALGARH_DEBARI
40	PSS_220KV_RAMGARH_TEJUWA_II
41	PSS_220KV_RAMGARH_RAMGARH
42	PSS_132KV_CHAMU_DERI A
43	PSS_132KV_PS8_SALODI
44	PSS_132KV_JAYAL_JAYAL

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)

पंजीकृत एवं केन्द्रीय कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016
Registered & Corporate Office : Ist Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in,Tel.: 011- 41035696, Fax : 011- 26536901

संदर्भ संख्या: पोसोको/एनएलडीसी/2018/ दिनाँक: **09th November, 2018**

सेवा मे,

Director,
National Power Committee,
NRPC Building,
3rd Floor, Katwaria Sarai,
New Delhi-110016

(Kind Attn: Sh. Irfan Ahmad)

विषय: Agenda Note on National Energy Account & National Deviation Pool Account for 8th Meeting of National Power Committee.

संदर्भ: NPC letter no: 4/MTGS/NPC/CEA/2018/1122-1123 dtd. 01st Nov, 2018

महोदय,

With reference to the above mentioned NPC communication dated 01st November 2018, an Agenda note on National Energy Account & National Deviation Pool Account for the forthcoming 8th Meeting of National Power Committee is enclosed.

सादर धन्यवाद,

भवदीय,

समीर सक्सेना
09/11/18.

(एस. सी. सक्सेना)
उप महाप्रभंधक (एन एल डी सी)

Encl: As above

Copy to: Chief Engineer, National Power Committee, NRPC Building, 3rd Floor, Katwaria Sarai, New Delhi-110016

National Energy Account & National Deviation Pool Account

Agenda Note for 8th Meeting of the National Power Committee (NPC)
30th November 2018, Guwahati

1. Establishment of National Grid

In the sixties, the country's electricity grid was demarcated into five electrical regions and Regional Electricity Boards were formed. In order to facilitate inter-state power transactions and the development of regional grids, Govt. of India funded construction of a number of inter-state lines. Subsequently multi-beneficiary Central Sector generating stations were developed by utilities like NTPC, NHPC etc. along with associated transmission system for evacuation of power. The concept of regional energy accounting (earlier known as global accounting) was developed with boundary metering of all control areas.

Till late nineties, power system was planned on regional self-sufficiency basis and there were very few inter-regional links. With more and more inter-regional inter-connections coming up, the focus now shifted to formation of a strong National Grid. Initially, HVDC was used to interconnect two regions, e.g., NR-WR, NR-ER, WR-SR, etc. Gradually, AC interconnections also came up and by August 2006, all regional grids except SR were interconnected synchronously into two synchronous systems known as NEW and SR Grids. The strong HVDC links connecting the NEW grid to Southern region are extensively used for optimizing power flows in the NEW grid. With strong AC connections between the regions constituting the NEW grid as well as extensive use of HVDC links in real time operation, inter-regional schedules lost any physical relevance. All the five regional grids in the country were progressively interconnected using AC links and these are now operating as one synchronism system since December 2013. The situation has become more complicated with direct HVDC connections between NER and NR.

2. Existing Scheduling, Metering, Accounting and Settlement Systems

Availability Based Tariff (ABT) was implemented in stages, starting with Western Region in July 2002. With implementation of ABT, the concept of Unscheduled Interchange (UI) pool came up and all RLDCs started operating regional UI pool accounts, which were subsequently known as the "Regional Deviation Accounts". Deviations from the schedules are computed using the net injection/drawal for using boundary metering for each control area. Based on deviations from schedule, utilities pay UI charges to or receive UI charges from the regional UI pool account.

Short-term open access in inter-state transmission was introduced in May 2006 and with this, scheduling of market-based trades/transactions also commenced. Further, in 2008, multiple Power Exchanges were also implemented. Corridor wise margin declaration for market-based transactions was carried out along with net import/export capability for regions for administering the short-term open access transactions. Later from 2009 onwards, long-term and medium-term transactions also commenced within one region and between different regions. Corresponding scheduling on the inter-regional links was carried out for these transactions on a corridor-wise basis e.g., WR-NR, ER-SR, etc. Presently, while corridor wise TTC/ATC are being declared, net import/export margins for the region are being used for administration of short-term transactions.

Special energy meters have been installed at both ends of inter-regional / inter-state tie lines and all inter-connections of CTU system with ISGS as well as states / other entities whose accounting is done at regional level. As specified in the IEGC, meter readings are sent to respective RLDCs by different sub-stations of CTU / ISGS / states. The meter readings are processed at RLDCs and forwarded to respective RPC secretariat for preparation of weekly deviation account. The RPC secretariats issue deviation accounts based on which different utilities pay /receive deviation charges to / from deviation pool account. These also included settlement of inter-regional deviations between neighboring regions. The regional UI pools are being operated satisfactorily and have successfully served the purpose for the last many years.

The deviation rate vector is declared upfront by the CERC from time to time. Prior to 2008, with uniform rates for deviation, the total payable and receivables were supposed to be equal making it a zero-sum game. However, due to difference in estimated loss and actual loss as well as metering errors, total UI/deviation charges payable did not match with total UI/deviation charges receivable. Based on methodology decided in RPC forum, suitable adjustment is done to make total UI charges payable equal to the UI charges receivable. Thus, the UI pool accounts had been zero balance accounts traditionally since introduction of ABT up to 2008.

Regional UI pool accounts became a non-zero sum game since 7th January 2008 with introduction of UI rate cap for Central generating stations with coal or lignite firing and stations burning only APM gas. UI rate cap was retained in the UI regulations, 2009. Further, as per the UI regulations, 2009, additional UI charge is payable by over-drawing or under-injecting utilities based on specified volume limits and frequency bands. Thus a surplus is generated in the UI/deviation pool.

An important feature of the UI accounts issued by RPCs is treatment of inter-regional transactions. The following methodology is followed by the RPCs in this regard:

- No adjustment is done in UI charges payable to / receivable from other regions (otherwise this may lead to an iterative process)
- UI charges payable to other regions has highest priority i.e. UI charges received in UI pool account is used first to clear dues to other regions.

Schedules are reconciled between RLDCs and thereafter final schedules are issued. Moreover, same meter readings are used by both connected regions for computation of UI/deviations. Hence it is expected that normally there should not be any mismatch between UI charges payable / receivable by adjacent regions connected through AC links.

At present, RPCs of each region prepare and issue UI/deviation accounts considering neighboring region as control areas (similar to states within the region). Sometimes, there are cases of mismatch between UI/deviation payable/receivable as per accounts issued by two RPCs of adjacent Regions and reconciliation of accounts by RPCs prior to issuance is required to be done.

Settlement of UI/deviation charges is done between the regions on one to one basis. For example, UI/deviation pool of ER has to pay to or receive from 4 different UI pools (NER, NR, SR, WR). This leads to multiple financial transactions in terms of money flow between regions. There are

instances of circular flows of funds between regions which needs to be avoided. An example of such circular flow of funds between the regions is illustrated in Annex – 1.

The above methodology is gradually losing its relevance with the five regions connected synchronously as power can flow from one region to another via a third region leading to circular and multiple fund transactions. These 'tandem' money transactions between the regions at times also leads to issues in disbursal within the regions.

3. Mandate for NLDC

Section 26 of Electricity Act, 2003 mandates the following:

"Section 26. (National Load Despatch Centre): --- (1) The Central Government may establish a centre at the national level, to be known as the National Load Despatch Centre for optimum scheduling and despatch of electricity among the Regional Load Despatch Centres.
(2) The constitution and functions of the National Load Despatch Centre shall be such as may be prescribed by the Central Government:
Provided that the National Load Despatch Centre shall not engage in the business of trading in electricity.
(3) The National Load Despatch Centre shall be operated by a Government company or any authority or corporation established or constituted by or under any Central Act, as may be notified by the Central Government."

Subsequently vide notification dated 2nd March 2005, the Central Government has notified National Load Despatch Centre Rules 2004, which prescribes functions of NLDC. The functions include following (relevant extracts):

- *Scheduling and dispatch of electricity over inter-regional links in accordance with grid standards specified by the Authority and Grid Code specified by the Central Commission in coordination with Regional Load Despatch Centres.*
- *Coordination with Regional Load Despatch Centres for achieving maximum economy and efficiency in the operation of National Grid.*
- *Supervision and control over the inter-regional links as may be required for ensuring stability of the power system under its control*
- *Coordination with Regional Load Despatch Centres for the energy accounting of inter-regional exchange of power*
- *Coordination for trans-national exchange of power*

From the above mandate it is evident that just as the RLDCs/RPCs are responsible for scheduling, metering, accounting and settlement at the Regional level, NLDC has been made responsible at the inter-regional and trans-national levels. The corresponding roles pertaining to inter-regional and trans-national transactions accounting and settlement need to be taken up at the National level by the NLDC and NPC.

4. Trans-National/Cross-Border Interconnections

At present, India has cross-border interconnections with Nepal, Bhutan, Bangladesh and Myanmar. Briefly, the connectivity of these countries with various regional grids in India is as follows:

- Nepal: With Northern region and Eastern Region
- Bhutan: With Eastern region
- Bangladesh: With Eastern region and North-Eastern region
- Myanmar: With North-Eastern region

In future, other neighboring SAARC countries like Bangladesh and Pakistan may have connectivity with two different regions of India. For the purpose of cross-border interconnections, the country needs to be treated as a single control area for the purpose of transnational exchanges and transactions have to be reconciled on National basis. Further, in line with the mandate provided, NLDC is responsible for all trans-national exchanges.

5. Changing Scenario & Increasing Complexities

A vibrant electricity market is functioning in the country and many regulatory changes have been implemented to address new challenges from the changing scenario which is also leading to increased complexities. Some of the significant changes that have already been implemented at the National level and some future challenges are briefly discussed below.

(a) **Collective Transactions through Power Exchanges:** Open Access Regulations, 2008 issued by CERC paved the way for functioning of power exchanges. As per the Regulations and procedures issued pursuant to the Regulations, collective (i.e. power exchange) transactions are coordinated by NLDC. Two Power Exchanges are functioning at present and another is in the offing. NLDC accepts scheduling request for collective transactions after checking for congestions, and forwards the same to RLDCs for scheduling. Curtailment, if any, has to be done by NLDC in coordination with RLDCs. Accounting and settlement of the Collective Transactions is carried out by NLDC.

(b) **Ancillary Services (RRAS):** The Regulatory Framework for implementation of Ancillary Services has been provided by the Hon'ble CERC in August 2015 and these have been implemented from April 2016. As per the present framework for ancillary services, available generation (thermal) reserves are dispatched by NLDC across regions on a pan-India basis. In the scheduling process, a virtual entity has been created in each regional pool to act as a counterparty to the ancillary schedules (beneficiaries schedules are not disturbed in the ancillary despatch process). Settlement of ancillary transactions is carried out on a regional basis from the DSM Pool. There are times, when the regional DSM pool faces shortfall and NLDC facilitates transfer of funds from a surplus regional pool to the deficit regional pool as per the provisions of the relevant CERC regulations. Again, this involves multiple fund transfers at times.

(c) **Fast Response Ancillary Services (FRAS):** CERC vide suo-motu order dated 16th July 2018 has directed the implementation of FRAS and pilot project for 5-minute metering. The framework for FRAS provides for fast response ancillary services using the flexibility of hydro generation. The dispatch under FRAS is with the primary objective of obtaining regulation services from hydro while at the same time honoring all the hydro constraints. Scheduling, accounting and settlement of FRAS is to be carried out by NLDC across multiple regions (NR, ER and NER).

(d) **Secondary Frequency Control through Automatic Generation Control (AGC):** Based on the directions of CERC a pilot project for AGC has been implemented at Dadri – Stage II in January 2018. The AGC signals are being sent to the generating station from NLDC and the accounting and settlement for the AGC is being facilitated by NLDC. Based on the experience gained by this pilot project, AGC implementation is being taken up at one generating station in each of the other regions. A second pilot implementation of AGC is expected to be commissioned at Simhadri in November 2018. Implementations in other regions are also coming up progressively. Accounting and settlement of all such implementations have to be facilitated at the national level.

(e) **Proposals under various stages of implementation/deliberations:** Some of the other proposals which are under various stages of deliberations or implementation are as follows:

- Replacement of thermal generation by RE generation (Ministry of Power, April 2018)
- Real Time Markets (CERC, July 2018) for facilitating balancing closer to the time of delivery
- Flexibility in scheduling of thermal generation (Ministry of Power, August 2018) to achieve economy in despatch at the national level
- Security Constrained Economic Despatch (POSOCO, September 2018) to achieve economy in despatch at the national level

Almost all of the above-mentioned proposals are intended for scheduling, despatch, accounting and settlement at the national level. The complexity in settlement needs to be streamlined at the national level keeping in view the changing paradigm and new challenges.

6. National Energy Account and National Deviation Pool Account

In order to streamline the accounting and settlement at the national level there is a need for implementing a National Deviation Pool based on the National Energy Account. In this regard, the following methodology is proposed.

(a) **Scheduling:** Corridor-wise (e.g., ER-NR, etc.) scheduling of inter-regional transactions is presently being carried out. However, actual power flows as per the laws of physics. In case of collective transactions, one to one correspondence of source and sink is not there and scheduling on a particular inter-regional corridor may at best be notional. Hence, there is a need to migrate to scheduling inter-regional transactions on a net basis for each region. However, while accepting the transactions for scheduling, corridor-wise TTC/ATC/available margin etc. may be duly taken care of. Inter-regional corridor-wise schedules may also be continued based on the physical power flow patterns as the same is useful for grid security monitoring and checking for any discrepancies. NLDC shall communicate the net inter-regional schedules to the NPC for the purpose of accounting.

Schedules for cross-border transactions shall also be prepared by NLDC on a net-basis to facilitate accounting of cross-border transactions by the NPC. However, individual schedules of

the concerned neighboring country with different region regions shall also be continued at RLDC level for the purpose of grid security monitoring and checking for discrepancies.

(b) **Metering:** The existing practice for metering of the inter-regional points shall continue as per the IEGC and the SEM data shall be collected by the RLDCs, processed and made available to the RPCs. In addition, the processed meter data shall also be made available to the NPC through NLDC. A similar practice shall be adopted for the cross-border metering locations, where the processed meter data shall be provided by the respected RLDCs to the RPCs and NPC (through NLDC).

(c) **Accounting & Settlement:** Based on the scheduling and meter data provided, NPC shall prepare the National Energy Account (NEA) including the National Deviation Account for the inter-regional and trans-national transactions. The NEA will reflect the payables/receivables for each region on a net-basis and this amount shall be payable/receivable to the National Deviation Pool Account which shall be operated by NLDC. The NEA shall also reflect the cross-border or trans-national transactions and the neighboring countries shall be paying/receiving to/from the National Deviation Pool Account operated by NLDC. Payment to the National DSM Pool shall have the highest priority.

In the future, multi-lateral transaction between neighboring countries are also envisaged under the SAARC framework e.g., Bangladesh may purchase power from Nepal or Bhutan through India. Neighboring countries may also participate in a designated Power Exchange for cross-border transactions in the future. For scheduling and settlement of such transactions, the all-India loss figures would need to be declared upfront by NLDC.

(d) **Handling Surplus/Deficit in Regional Pool Accounts and transfer of residual to PSDF:** As has already been mentioned above, sometimes the regional DSM pool may face shortfalls on account of disbursals for reliability support such as RRAS, FRAS, AGC, etc. in accordance with the relevant regulations of CERC. Once the National DSM Pool becomes operational, all residual/surplus amount in the regional DSM pools shall be transferred to the National DSM pool account. The NPC accounts would also facilitate the transfer of funds from the surplus available in the National DSM pool to the deficit regional DSM pool accounts as a single transaction thereby simplifying the process. Once all liabilities have been met, any residual in National DSM Pool shall be transferred periodically to the PSDF in accordance with the extant CERC Regulations.

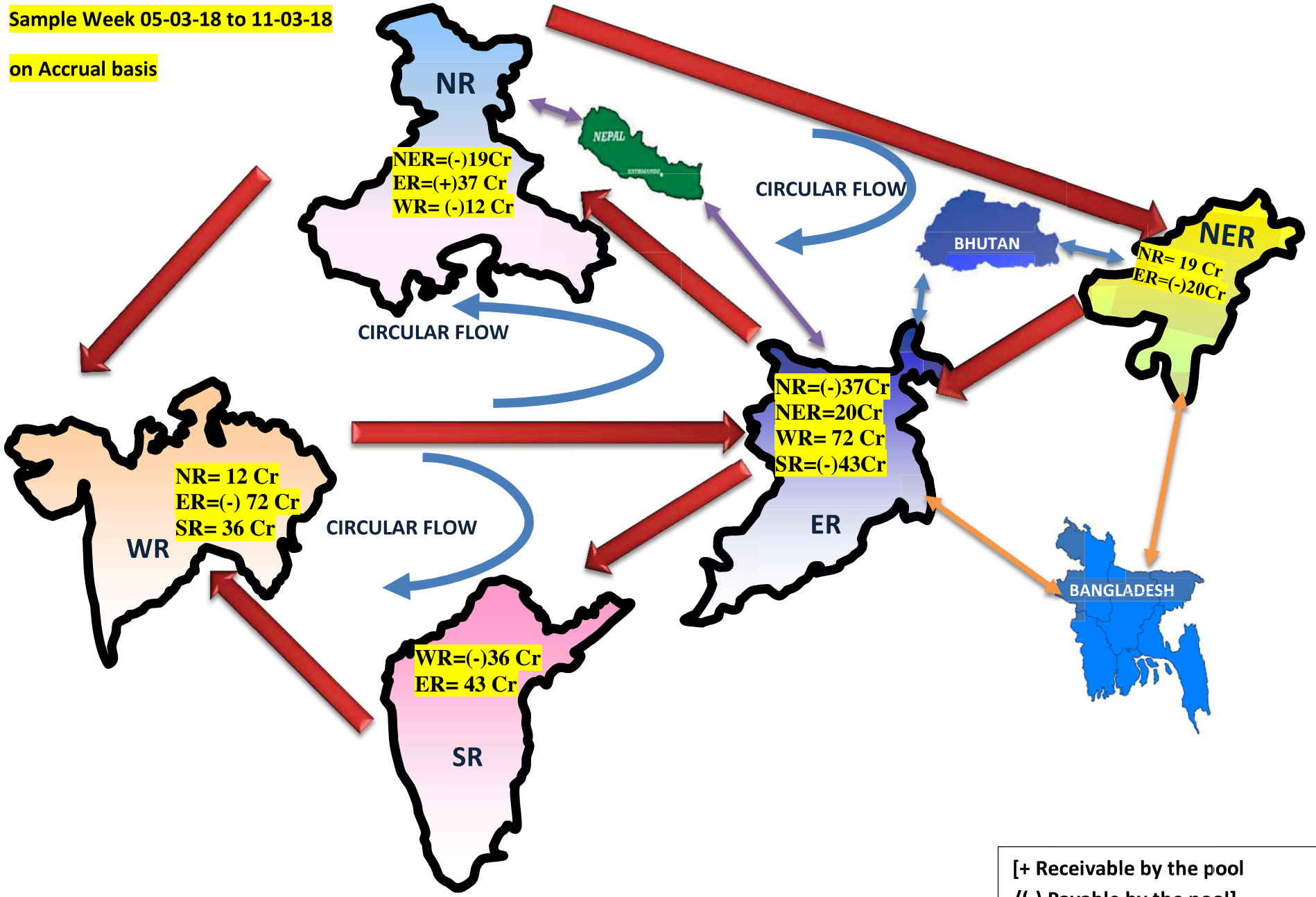
A sample illustration of the flow of funds between different regional DSM pool accounts to the national DSM pool account and that with the neighboring countries is shown at Annex – II.

Suitable changes/modifications are required to be carried out in the IEGC and DSM Regulations and the functions of NPC also need to be recognized in the regulatory framework.

Annex - I

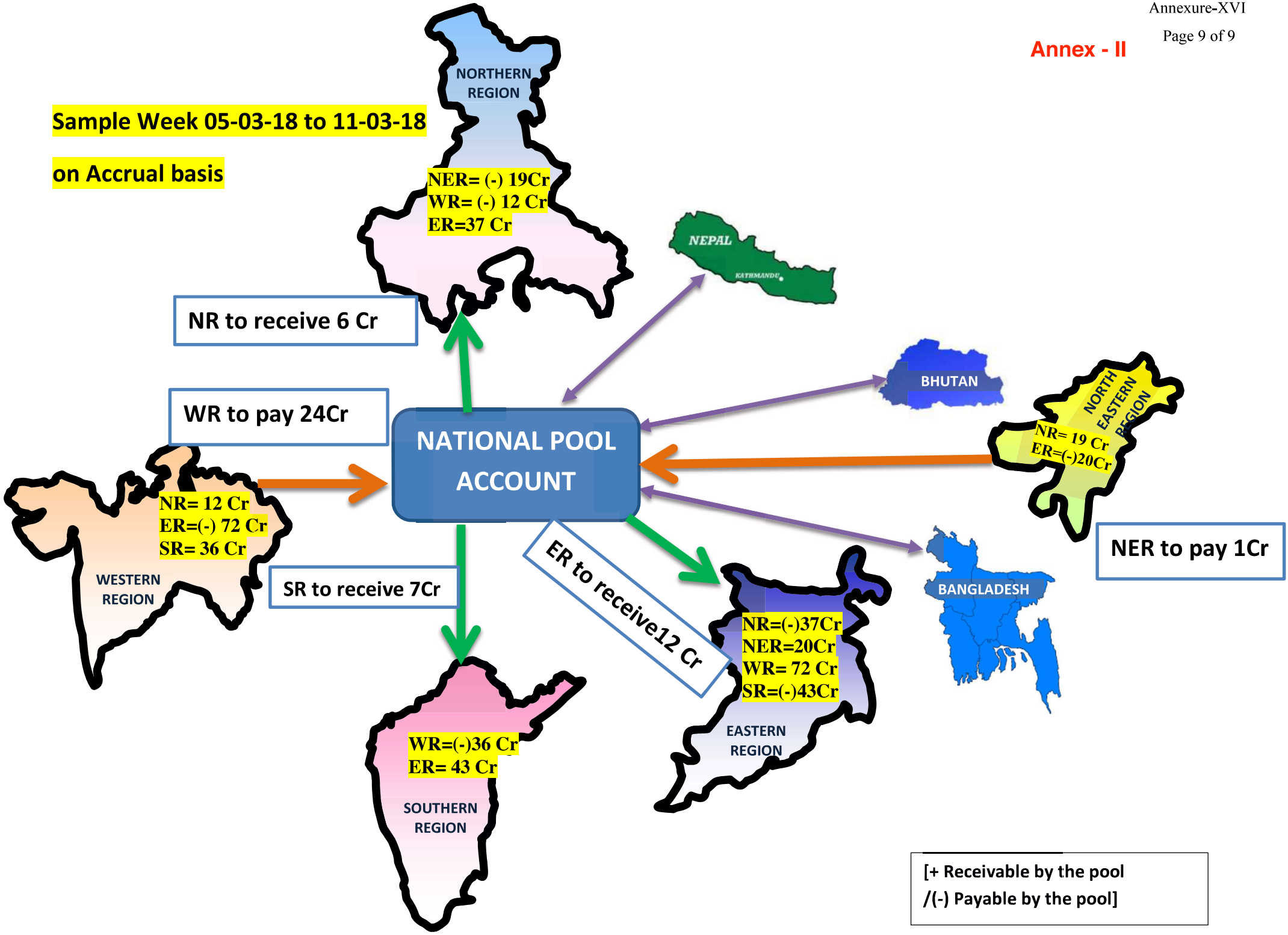
Sample Week 05-03-18 to 11-03-18

on Accrual basis



[+ Receivable by the pool
/(-) Payable by the pool]

Annex - II

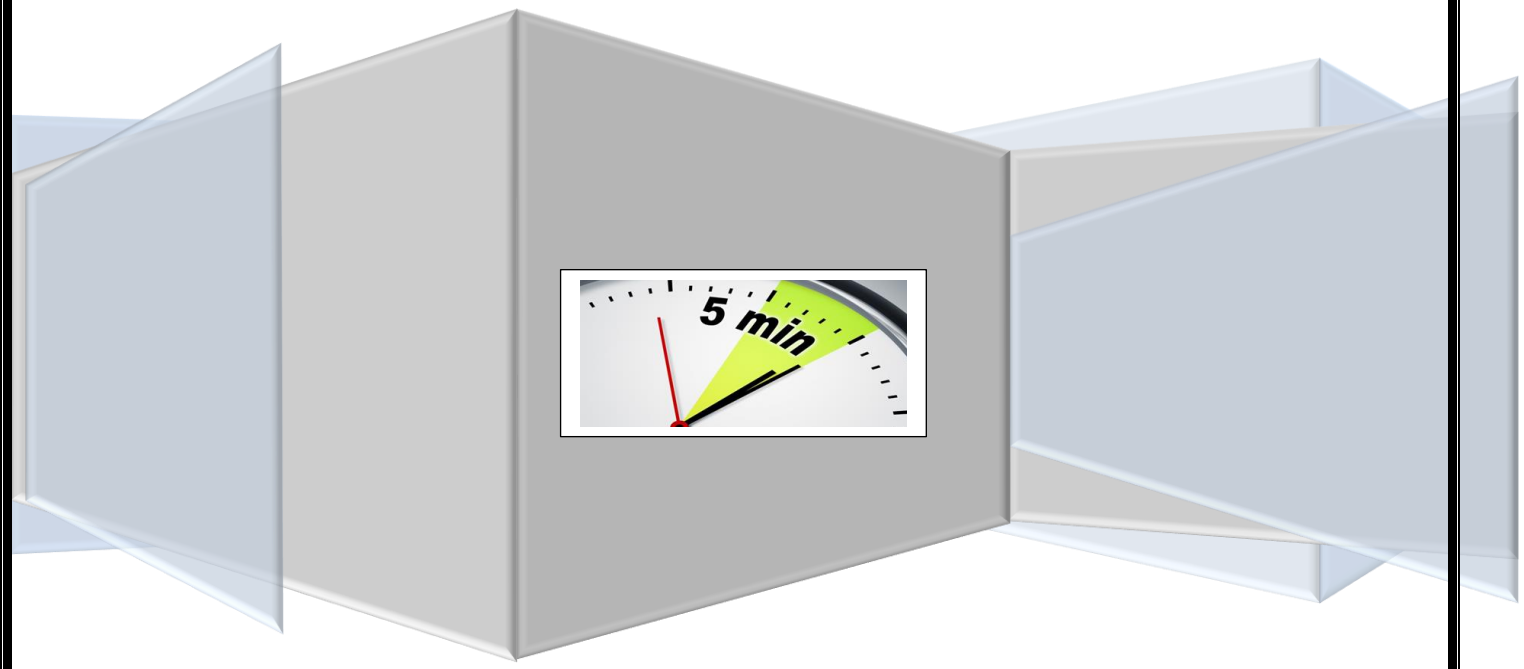

Sample Week 05-03-18 to 11-03-18
on Accrual basis
NORTHERN REGION
NER= (-) 19Cr
WR= (-) 12 Cr
ER=37 Cr
NEPAL
KATHMANDU
NR to receive 6 Cr
BHUTAN
NORTH EASTERN REGION
NR= 19 Cr
ER=(-)20Cr
WR to pay 24Cr
NATIONAL POOL ACCOUNT
NER to pay 1Cr
NR= 12 Cr
ER=(-) 72 Cr
SR= 36 Cr
WESTERN REGION
SR to receive 7Cr
ER to receive12 Cr
BANGLADESH
NR=(-)37Cr
NER=20Cr
WR= 72 Cr
SR=(-)43Cr
EASTERN REGION
WR=(-)36 Cr
ER= 43 Cr
SOUTHERN REGION
[+ Receivable by the pool
/(-) Payable by the pool]

POWER SYSTEM OPERATION CORPORATION LIMITED

National Load Despatch Centre

Fast Response Ancillary Services (FRAS)

Guidelines for Despatch



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Fast Response Ancillary Services
Guidelines for Despatch

A. Introduction

Hydro generators can provide fast response and peaking support. Fast Response Ancillary Service (FRAS) from hydro stations is proposed as 'regulation service' from storage/pondage based hydro stations e.g. to handle the hour-boundary frequency spikes. All constraints declared by the hydro stations would be honored and the total energy delivered over the day would be maintained as declared by the hydro station. In this direction, CERC, vide order in Petition No. 07/SM/2018 (Suo-Motu) dtd. 16th July, 2018, ordered implementation of pilot project for FRAS covering all Central sector hydro generating stations which would help in gaining experience.. This guideline outlines the steps involved in FRAS implementation ranging from scheduling to accounting and settlement. This is meant to act as a guideline only for all the parties involved in FRAS implementation.

B. Scope of FRAS providers

Sl No	Name	Utility	Region	Type (S/P)	I/C (MW)
1	Chamera-II	NHPC	NR	P	300
2	Chamera-I			P	540
3	Dhauliganga			P	280
4	Chamera-III			P	231
5	Parbati III			P	520
6	Sewa-II			P	120
7	Dulhasti			P	390
8	Naptha Jhakri*	SJVN		P	1500
9	Rampur*			P	412
10	Tehri	THDC		S	1000
11	Koteshwar			S	400
12	Koldam	NTPC		P	800
13	Pong	BBMB		S	396
14	Dehar			R/P	990
15	Bhakra complex			S	1379
16	Kopili	NEEPCO	NER	S	200
17	Kopili-II			S	25
19	Khandong			S	50
20	Doyang			S	75
21	Loktak	NHPC		S	105
22	Teesta-V	NHPC	ER	R	510
23	Rangit			R/P	60
Total					**9053**

*For Tandem hydro stations like Nathpa-Jhakri & Rampur FRAS instruction would be given simultaneously

Baira-Siul power station (3 x 60 MW) of NHPC is under renovation & maintenance works from 15th October, 2018 till April, 2019 has therefore been excluded from the above list.

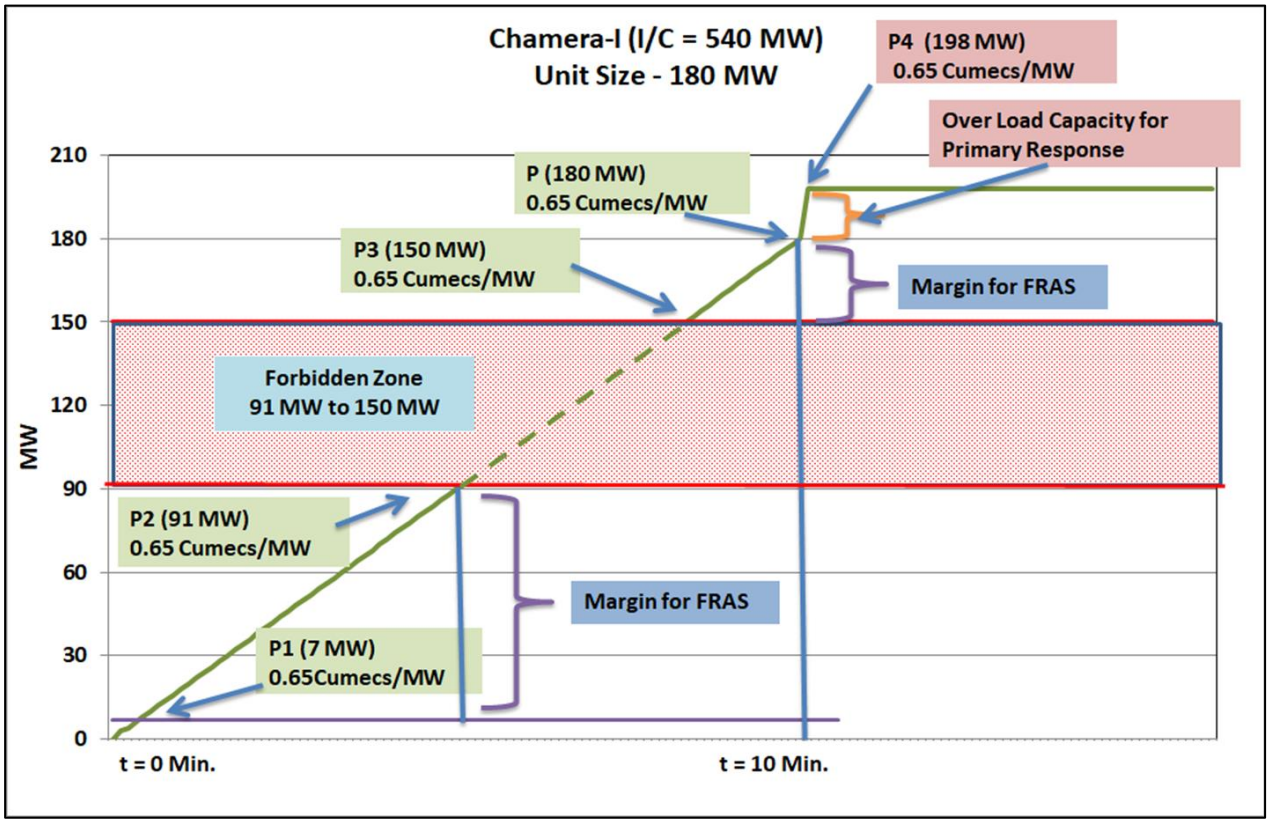
C. **Role of FRAS providers**

The FRAS providers shall provide the following Operational Data (Static data)

S.N	Title	Description
1)	DC	Declared Capacity sent to RLDC on day-ahead basis (MW)
2)	DE	Declared Energy sent to RLDC on day-ahead basis (MU)
3)	P	Installed Capacity of Unit (MW)
4)	P1	Minimum load at which unit stably run after synchronization (MW)
5)	P2 to P3	Forbidden zone or high cavitation zone (From MW to MW)
6)	P4	Maximum loading possible on unit (continuous) (MW)
7)	C0	Cumecs/MW from standstill to synchronization
8)	C1	Cumecs/MW for P1 generation level
9)	C3	Cumecs/MW for P3 generation level
10)	C4	Cumecs/MW for P4 generation level
12)	C	Cumecs/MW for P generation level
13)	C5	Cumecs/MW used for Declared Energy figure given to RLDC
14)		Any other constraints

The Operational Data (Annexure-1) and contact details (Annexure-2) provided by the FRAS provider is enclosed.

Figure: Sample Hydro Station Data



D. **Role of RLDCs**

The following information shall be sent by RLDCs (NR, ER and NER) through File Transfer Protocol (FTP) to NLDC.

S.N	Title	Description
1)	DC	Declared Capability of FRAS Providers
2)	DE	Declared Energy of FRAS Providers
3)	Sch	15-Minute Block wise schedule of FRAS Providers (between P & P3)
4)	U-Sch	15-Minute Block wise Unit Commitment for FRAS Providers schedule
5)	VAE-H	Counter-beneficiary of FRAS in the Regional Deviation Pool

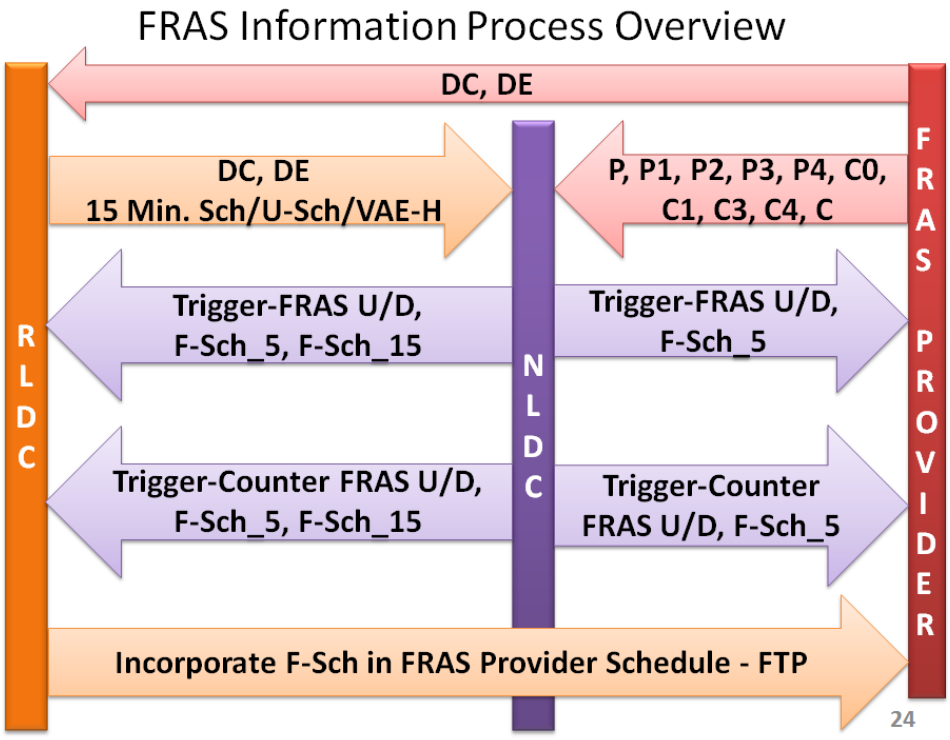
E. **Role of NLDC**

The following information shall be sent by NLDC through email to RLDCs, RPCs and FRAS providers. …

S.N	Title	Description
1)	T-U/D	FRAS Trigger Instruction (Up/Down) to FRAS Providers
2)	F-Sch_5	FRAS Schedule to FRAS Providers (in 5 minute format)
3)	F-Sch_5 F-Sch_15	FRAS Schedule to RLDCs (in 5 minute & 15 minute format) (15 min for calculating deviation)
4)	F-Sch_5	FRAS 5 minute schedule to RPC for Accounting & Settlement

FRAS instruction for down regulation or for counter instruction shall be given 5% above the P3 value. This would ensure that FRAS down instruction does not cause the FRAS provider actual generating entering in cavitation zone while RGMO/FGMO is operational. The software is being designed to take care of this requirement.

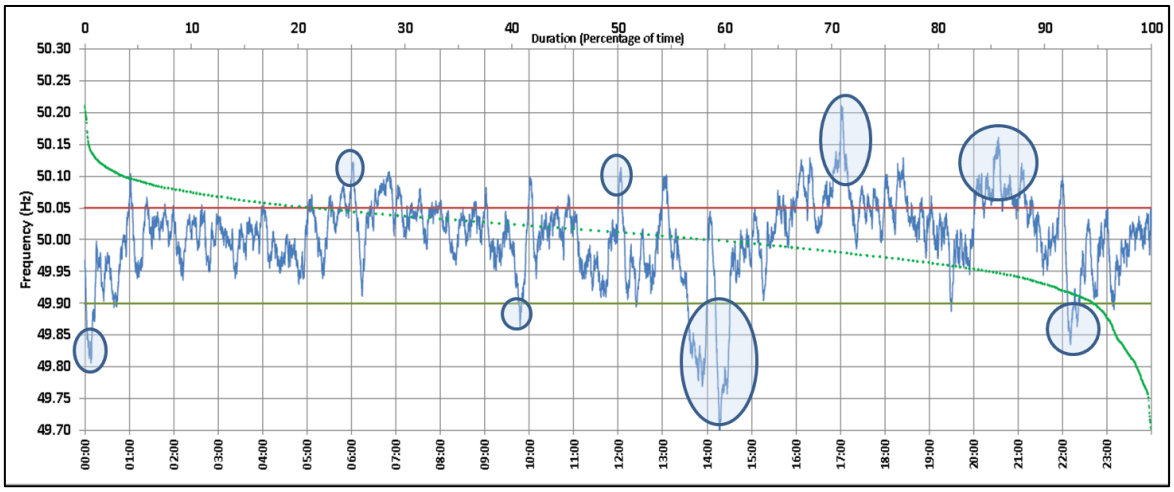
If required we can also despatch Regulation 'Down' first so that reserve for Regulation 'Up' shall be available and regulation 'Up' shall be despatch as counter instruction.



F. Triggering criteria

i. Hour Boundary Frequency Variations
ii. Sudden Variations in Demand
iii. Ramp Management
iv. Grid Contingency
v. RE Variation
vi. Congestion management
vii. Any other

The sample instances (typically 4 to 6 Nos.) during the day in which FRAS may be triggered is depicted below.



G. Despatch of FRAS instructions

1. The FRAS application can be accessed through http://10.5.112.167:1337/
2. The Home page of the software application consist of following information of each FRAS providers (snapshot shown below).
   a. Declared Energy
   b. Schedule energy (cumulative up to current 15 minute time block)
   c. Balance energy= Declared Energy - Schedule energy(Cumulative)
   d. Block wise available margin in MW.

Not secure | 10.5.112.167:1337

FRAS(Fast Response Ancillary Services)

NLDC Home Apply FRAS Inverse FRAS Generators Applied Instructions Reports

Data Status

ALL India Available Margin For FRAS

	GEN	Declared Energy(in MWhr)	Scheduled Energy(in MWhr)	00:00-00:05	00:05-00:10	00:10-00:15	00:15-00:20	00:20-00:25	00:25-00:30	00:30-00:35	00:35-00:40	00:40-00:
1	TEESTA	5025	2926	102	102	102	102	102	102	102	102	102
2	CHAMERA2	2165	1480	0	0	0	0	0	0	0	0	0
3	CHAMERA1	3500	2210	0	0	0	0	0	0	0	0	0
4	CHAMERA3	1350	1007	0	0	0	0	0	0	0	0	0
5	PARBATI3	801	395	0	0	0	0	0	0	0	0	0
6	SEWA2	600	401	0	0	0	0	0	0	0	0	0
7	DULHASTI	4900	3488	0	0	0	0	0	0	0	0	0
8	NJPC	9800	6424	0	0	0	0	0	0	0	0	0
9	RAMPUR	2722	1789	0	0	0	0	0	0	0	0	0
10	TEHRI	6900	4405	0	0	0	0	0	0	0	0	0
11	KOTESHWR	2190	1607	10	10	10	10	10	10	10	10	10
12	KOLDAM	3500	2203	0	0	0	0	0	0	0	0	0
13	KOPILI	822	212	0	0	0	0	0	0	0	0	0
14	KOPILI2	72	0	0	0	0	0	0	0	0	0	0
15	KHANDONG	147	67	0	0	0	0	0	0	0	0	0
16	DOYANG	151	44	0	0	0	0	0	0	0	0	0
17	LOKTAK	1097	521	0	0	0	0	0	0	0	0	0

While triggering the FRAS instruction, the following may be kept in view:

- FRAS instructions are to be given for short durations upto a maximum of 2-3 time blocks of 15-minutes each.
- Energy generated over the day has to be maintained as declared by the hydro station
- The FRAS instruction must be given at least 10 minutes in advance of the despatch time.
- Efforts may be made to give the inverse/counter instruction also in quick succession and ideally, the inverse/counter-instruction should be despatched within the next hour. This is also important to ensure that enough reserve is available for the next FRAS despatch.
- Though preferable, it is not necessary that the inverse/counter-instruction should be for the same number of blocks for which the primary FRAS instruction was given. It can be spread to more or lesser number of 5-minute blocks as per the quantum of reserve available.
- Contact details (email/mobile/control room/Orange phone etc.) have been made available separately to the NLDC control room and the same shall also be shared with concerned RLDCs.
- During the initial phase, immediately after giving the FRAS instructions, a telephonic call to the RLDCs & the hydro stations may also be made to alert them about the FRAS instruction. This was deliberated during the meeting held with the hydro generators and they specifically requested for such an alert during the initial period till the systems and processes are streamlined

3. Apply FRAS option-

a. After clicking the tab of “Apply FRAS” the following information are required to be selected by the shift executives.

i. Region in which FRAS has to be despatched (by default all the three regions are selected)

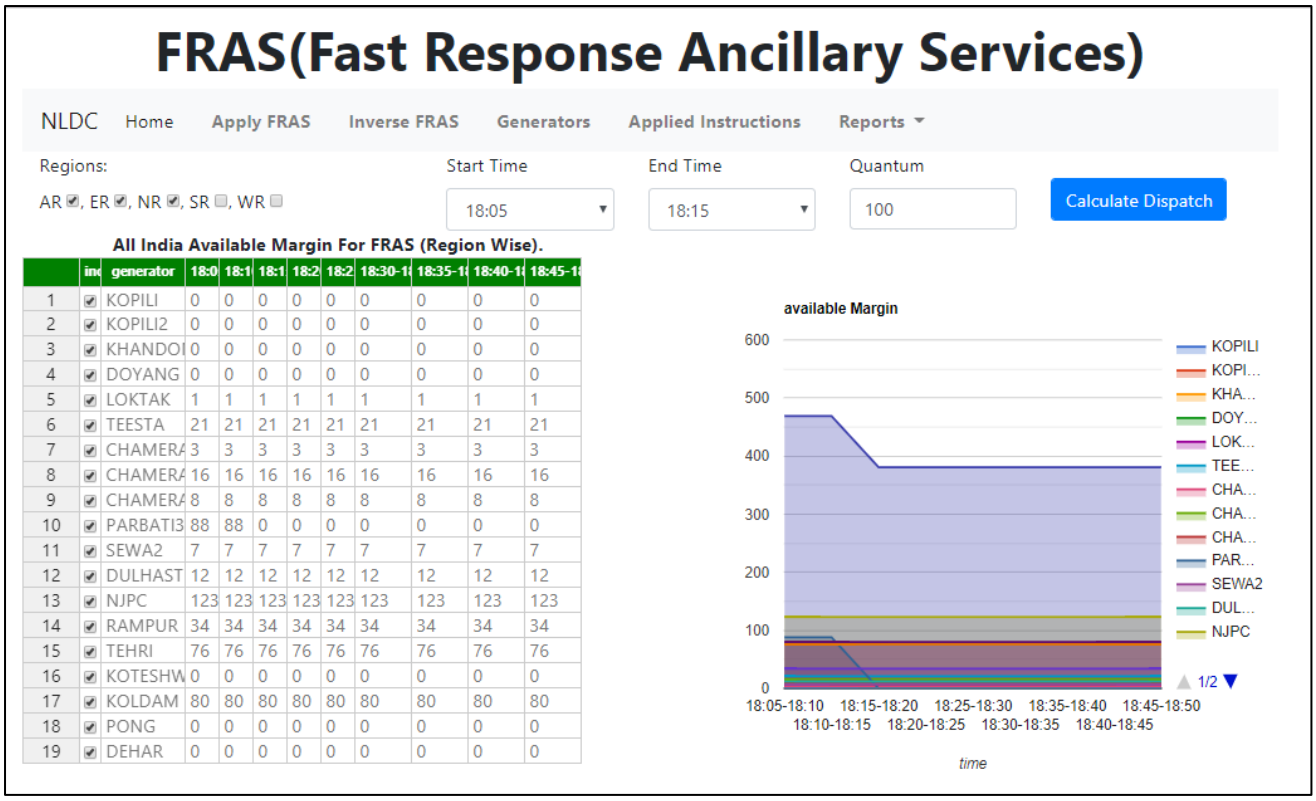
ii. Option for including or excluding specific power station is also available under option “include”. By unchecking the box we can exclude specific generator. By default all power stations are selected.

iii. Start time and end time of despatch.

iv. Quantum of FRAS instruction.

(for eg(+) 100 Up regulation and (-) 100 for Down regulation).

v. Once above steps are done we need to click the “calculate dispatch” tab.



	in	generator	18:0	18:1	18:1	18:2	18:2	18:30-1	18:35-1	18:40-1	18:45-1
1	☑	KOPILI	0	0	0	0	0	0	0	0	0
2	☑	KOPILI2	0	0	0	0	0	0	0	0	0
3	☑	KHANDOI	0	0	0	0	0	0	0	0	0
4	☑	DOYANG	0	0	0	0	0	0	0	0	0
5	☑	LOKTAK	1	1	1	1	1	1	1	1	1
6	☑	TEESTA	21	21	21	21	21	21	21	21	21
7	☑	CHAMERA	3	3	3	3	3	3	3	3	3
8	☑	CHAMERA	16	16	16	16	16	16	16	16	16
9	☑	CHAMERA	8	8	8	8	8	8	8	8	8
10	☑	PARBATI3	88	88	0	0	0	0	0	0	0
11	☑	SEWA2	7	7	7	7	7	7	7	7	7
12	☑	DULHAST	12	12	12	12	12	12	12	12	12
13	☑	NJPC	123	123	123	123	123	123	123	123	123
14	☑	RAMPUR	34	34	34	34	34	34	34	34	34
15	☑	TEHRI	76	76	76	76	76	76	76	76	76
16	☑	KOTESHW	0	0	0	0	0	0	0	0	0
17	☑	KOLDAM	80	80	80	80	80	80	80	80	80
18	☑	PONG	0	0	0	0	0	0	0	0	0
19	☑	DEHAR	0	0	0	0	0	0	0	0	0

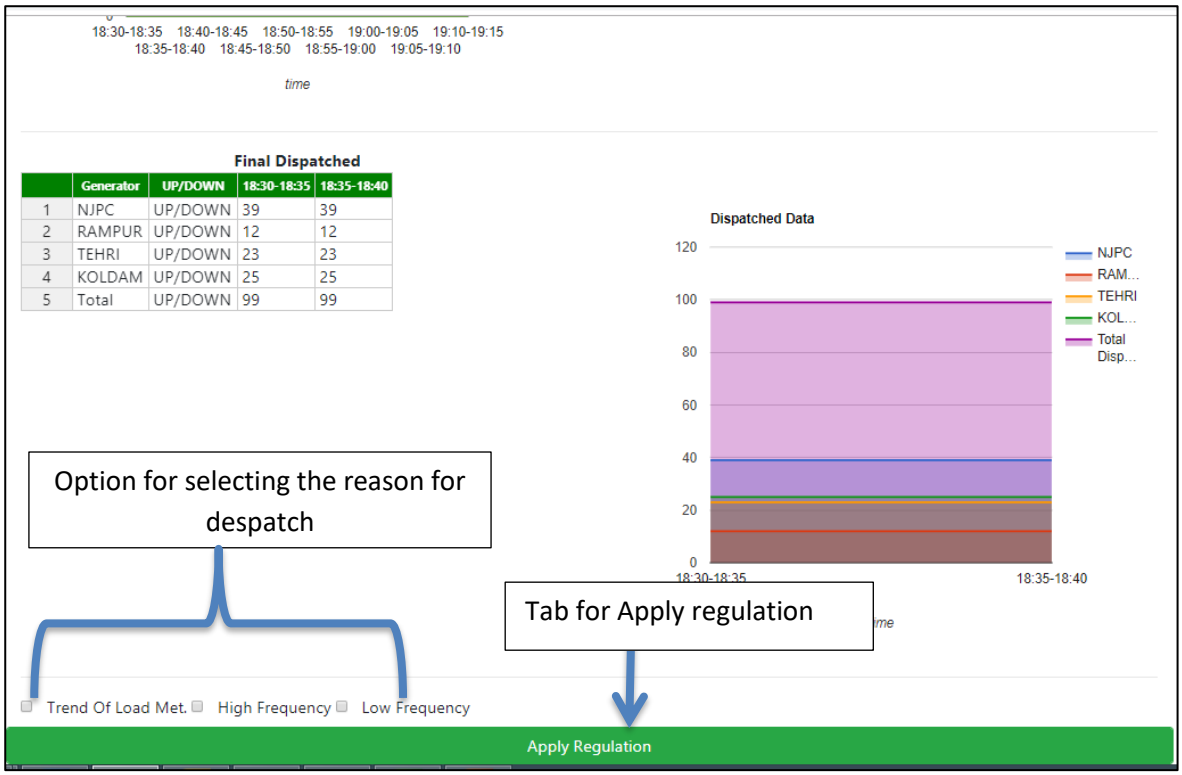
vi. After clicking the calculate despatch tab, the software will calculate the margin available in the selected period (5 minute block wise) and display the available FRAS provider list along with the block wise FRAS margin.

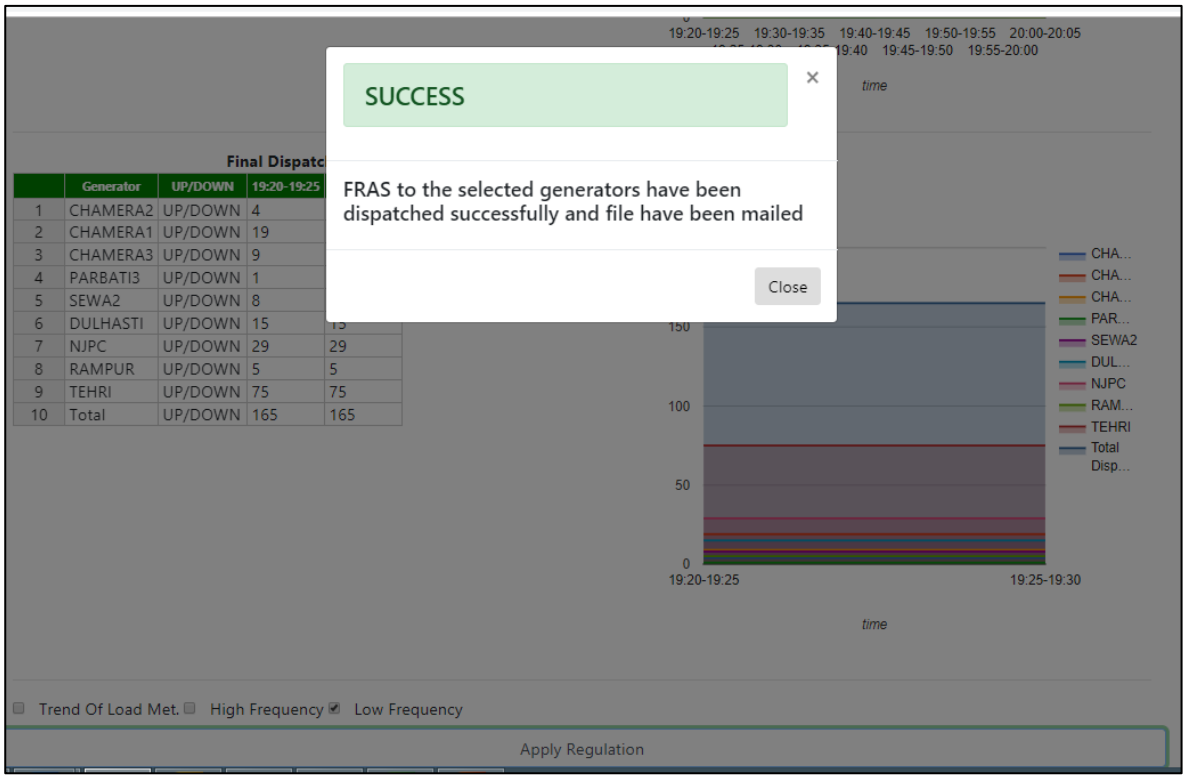
b. In the bottom of the display, shift executive needs to select the reason for despatch and then click the “Apply regulation” tab, similar in line with the RRAS despatch.

c. After clicking the “Apply regulation” tab email will be sent to RLDCs and FRAS generator on which FRAS instruction applied.

1. RLDCs shall receive 15 minute and 5 minutes time block FRAS schedule.

2. FRAS provider shall receive 5 minutes time block FRAS schedule…..Say that they can get the corresponding 15 minute schedules from the respective RLDC websites.

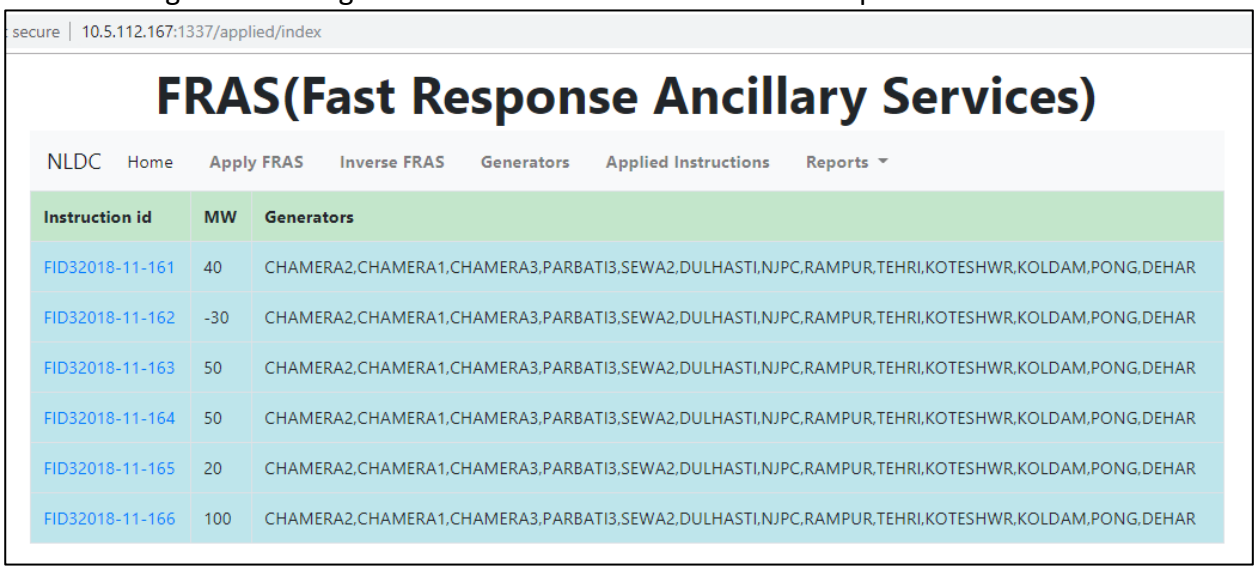




On clicking the Apply regulation above message will generate and email/sms will be sent.

4. Applied Instruction

All the applied FRAS instruction can be checked through the tab named “Applied Instructions”. On clicking the selecting the instruction Id the details of the respective instruction can be seen.



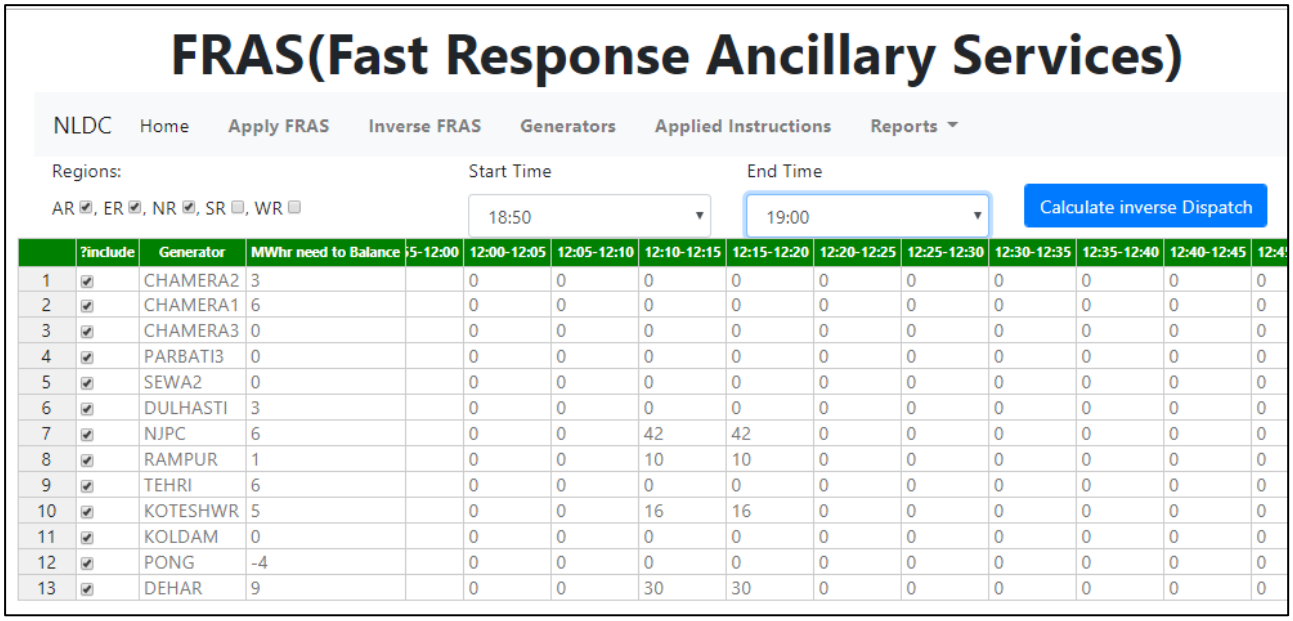
Instruction id	MW	Generators
FID32018-11-161	40	CHAMERA2,CHAMERA1,CHAMERA3,PARBATI3,SEWA2,DULHASTI,NJPC,RAMPUR,TEHRI,KOTESHWR,KOLDAM,PONG,DEHAR
FID32018-11-162	-30	CHAMERA2,CHAMERA1,CHAMERA3,PARBATI3,SEWA2,DULHASTI,NJPC,RAMPUR,TEHRI,KOTESHWR,KOLDAM,PONG,DEHAR
FID32018-11-163	50	CHAMERA2,CHAMERA1,CHAMERA3,PARBATI3,SEWA2,DULHASTI,NJPC,RAMPUR,TEHRI,KOTESHWR,KOLDAM,PONG,DEHAR
FID32018-11-164	50	CHAMERA2,CHAMERA1,CHAMERA3,PARBATI3,SEWA2,DULHASTI,NJPC,RAMPUR,TEHRI,KOTESHWR,KOLDAM,PONG,DEHAR
FID32018-11-165	20	CHAMERA2,CHAMERA1,CHAMERA3,PARBATI3,SEWA2,DULHASTI,NJPC,RAMPUR,TEHRI,KOTESHWR,KOLDAM,PONG,DEHAR
FID32018-11-166	100	CHAMERA2,CHAMERA1,CHAMERA3,PARBATI3,SEWA2,DULHASTI,NJPC,RAMPUR,TEHRI,KOTESHWR,KOLDAM,PONG,DEHAR

5. **Inverse FRAS- Counter instruction for squaring off**

All the FRAS instructions are required to be squared off by the end of the day.

a. Once we click Tab name “Inverse FRAS”, list of FRAS provider will be displayed and along with the energy required to be squared off.

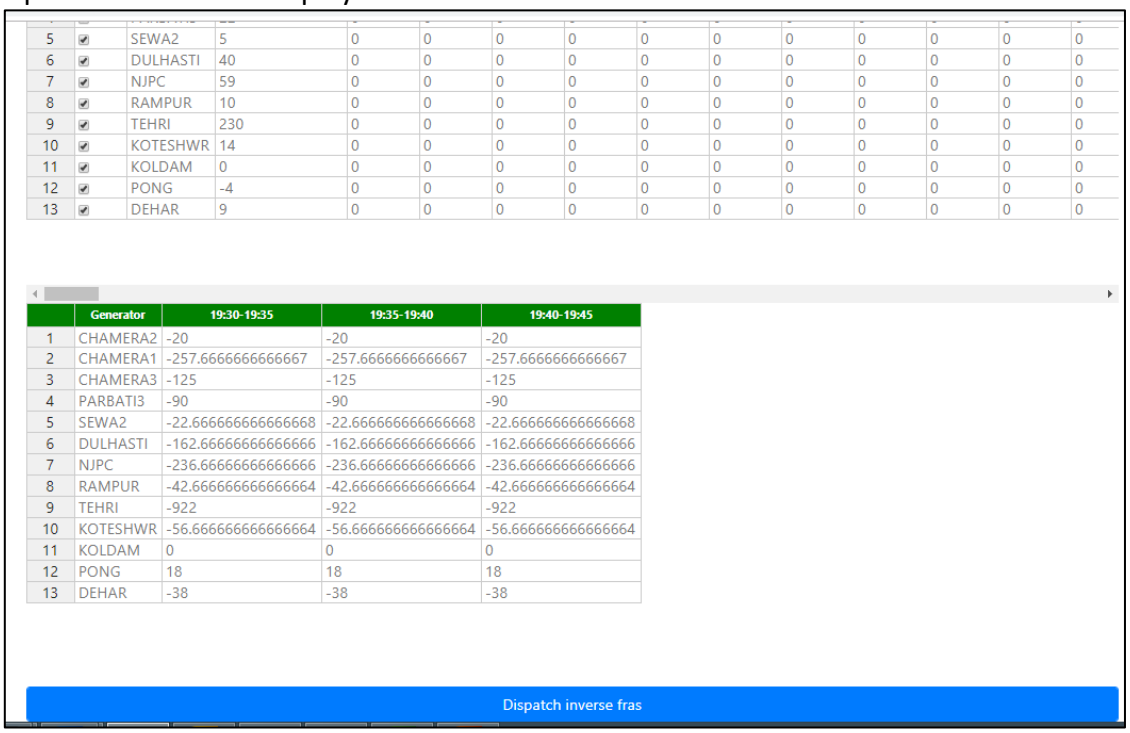
b. User can apply inverse FRAS in all plants or have the option to select/deselect specific region/FRAS provider. By default all regions and plants are selected.



	?include	Generator	MWhr need to Balance	5-12:00	12:00-12:05	12:05-12:10	12:10-12:15	12:15-12:20	12:20-12:25	12:25-12:30	12:30-12:35	12:35-12:40	12:40-12:45	12:4
1	☑	CHAMERA2	3		0	0	0	0	0	0	0	0	0	0
2	☑	CHAMERA1	6		0	0	0	0	0	0	0	0	0	0
3	☑	CHAMERA3	0		0	0	0	0	0	0	0	0	0	0
4	☑	PARBATI3	0		0	0	0	0	0	0	0	0	0	0
5	☑	SEWA2	0		0	0	0	0	0	0	0	0	0	0
6	☑	DULHASTI	3		0	0	0	0	0	0	0	0	0	0
7	☑	NJPC	6		0	0	42	42	0	0	0	0	0	0
8	☑	RAMPUR	1		0	0	10	10	0	0	0	0	0	0
9	☑	TEHRI	6		0	0	0	0	0	0	0	0	0	0
10	☑	KOTESHWR	5		0	0	16	16	0	0	0	0	0	0
11	☑	KOLDAM	0		0	0	0	0	0	0	0	0	0	0
12	☑	PONG	-4		0	0	0	0	0	0	0	0	0	0
13	☑	DEHAR	9		0	0	30	30	0	0	0	0	0	0

c. User need to select the Start time and end time for squared off the energy and then click “calculate inverse dispatch” tab. User have the option to squared off in minimum time block or to spread over a longer period. Preferably user may dispatch inverse FRAS within 1 hour of FRAS despatch to avoid any residual left during end of the day.

d. After clicking the tab ““calculate inverse dispatch”, list of all the FRAS provider needs to be squared off shall be displayed.

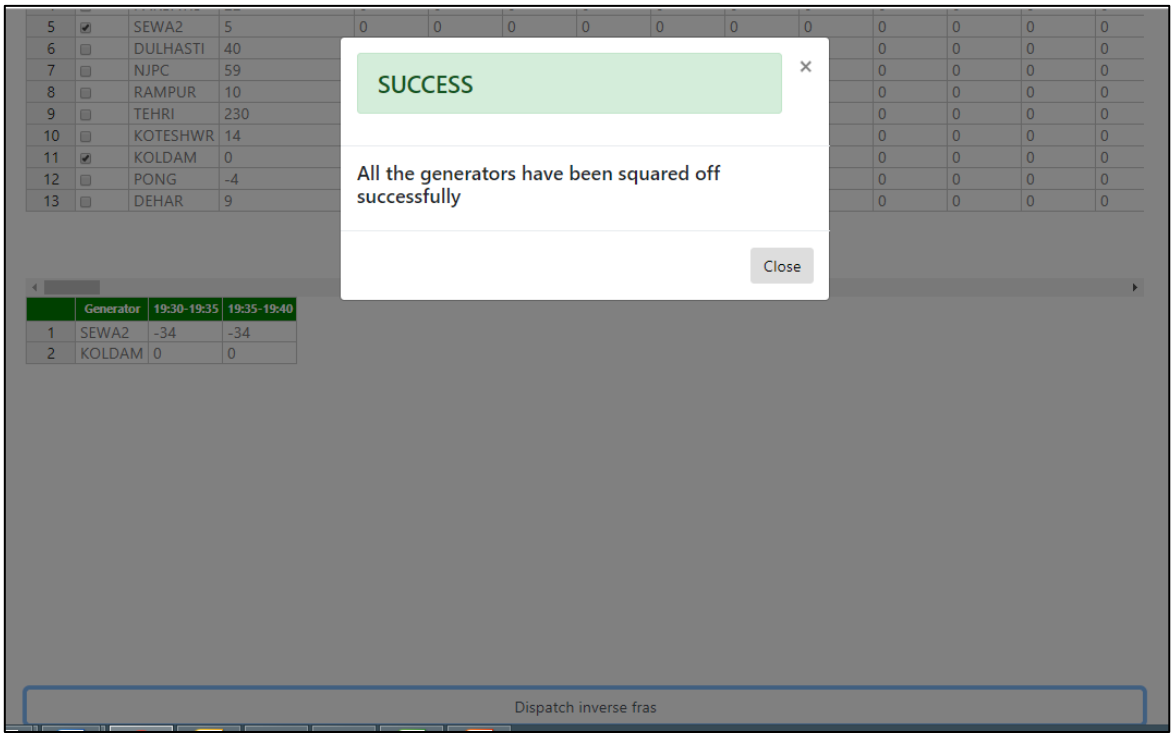


5	☑	SEWA2	5	0	0	0	0	0	0	0	0	0	0	0
6	☑	DULHASTI	40	0	0	0	0	0	0	0	0	0	0	0
7	☑	NJPC	59	0	0	0	0	0	0	0	0	0	0	0
8	☑	RAMPUR	10	0	0	0	0	0	0	0	0	0	0	0
9	☑	TEHRI	230	0	0	0	0	0	0	0	0	0	0	0
10	☑	KOTESHWR	14	0	0	0	0	0	0	0	0	0	0	0
11	☑	KOLDAM	0	0	0	0	0	0	0	0	0	0	0	0
12	☑	PONG	-4	0	0	0	0	0	0	0	0	0	0	0
13	☑	DEHAR	9	0	0	0	0	0	0	0	0	0	0	0

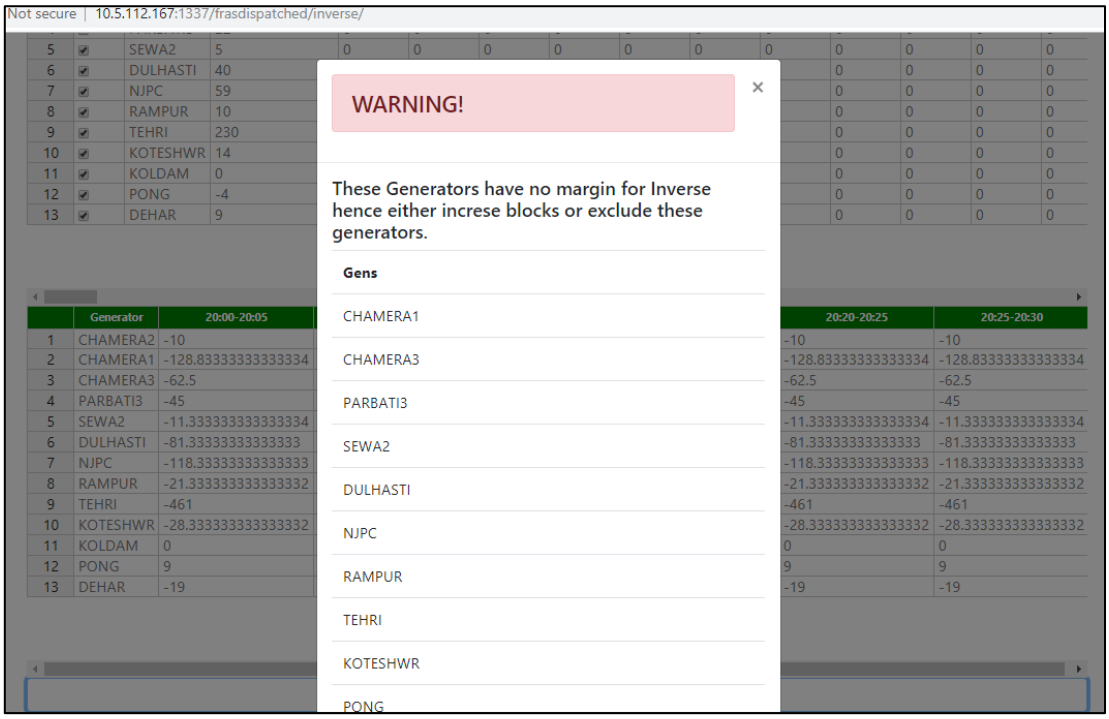
	Generator	19:30-19:35	19:35-19:40	19:40-19:45
1	CHAMERA2	-20	-20	-20
2	CHAMERA1	-257.6666666666667	-257.6666666666667	-257.6666666666667
3	CHAMERA3	-125	-125	-125
4	PARBATI3	-90	-90	-90
5	SEWA2	-22.666666666666668	-22.666666666666668	-22.666666666666668
6	DULHASTI	-162.66666666666666	-162.66666666666666	-162.66666666666666
7	NJPC	-236.66666666666666	-236.66666666666666	-236.66666666666666
8	RAMPUR	-42.666666666666664	-42.666666666666664	-42.666666666666664
9	TEHRI	-922	-922	-922
10	KOTESHWR	-56.666666666666664	-56.666666666666664	-56.666666666666664
11	KOLDAM	0	0	0
12	PONG	18	18	18
13	DEHAR	-38	-38	-38

Dispatch inverse fras

e. Then user need to click the “Dispatch inverse fras” tab for sending the invers FRAS instruction. A message shown below shall be displayed after successful despatch of inverse instruction.



f. If margin is not available in the selected block in a FRAS provider the software will give message to deselect the FRAS provider which cannot be squared off or if user wants to increase the time line for squared off. User need to select the desired option and re-despatch the inverse FRAS.



5. Accounting and settlement

a. The total energy dispatched under FRAS shall be squared off by the end of the day.

Net energy Enet = Σ Eup - Σ Edown(in MWh) (should be zero over the day)

b. The incentive for FRAS would be payable on mileage basis for 'Up' and 'Down' regulation provided by hydro station.
Mileage Em = Σ | Eupt |+ Σ | Edownt| (in MWh)

c. RPCs shall issue weekly FRAS accounts along with the RRAS accounts based on the data provided to them by the RLDCs/NLDC

d. Incentive shall be paid from the DSM Pool on mileage basis at the rate of 10 paise per kWh both for "up" and "down" regulation provided by the hydro station.

e. NLDC shall provide the 05-minute time block FRAS schedule of "up" and "down" regulation to RPCs through RLDCs. RLDCs shall provide FRAS schedule to respective RPCs for calculation of incentive along with implemented schedule.

f.Sample file send by NLDC to RPCs through RLDCs is given below. NLDC will provide two file for mileage calculation.

i.First 5minute time block MW despatch

ii. 5minute time block MWh despatch

Sample file for 5minute time block MW despatch

(+)Ve Value for 'Up' regulation/ (-) Ve Value for 'Down' regulation

GEN	Block	00:00	00:05	00:10	00:15	00:20	00:25	00:30	00:35	00:40	00:45	00:50	00:55	....	23:55
CHAMERA2	UP/DOWN	0	0	10	10	10	0	0	0	0	-10	-10	-10	0	0
CHAMERA1	UP/DOWN	0	0	20	20	20	0	0	0	0	20	-20	-20	0	0
CHAMERA3	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PARBATI3	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEWA2	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DULHASTI	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NJPC	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RAMPUR	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEHRI	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KOTESHWR	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KOLDAM	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PONG	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEHAR	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Sample file for 5minute time block MWh despatch

(+)Ve Value for 'Up' regulation/ (-) Ve Value for 'Down' regulation

GEN	Block	00:00	00:05	00:10	00:15	00:20	00:25	00:30	00:35	00:40	00:45	00:50	00:55	....	23:55
CHAMERA2	UP/DOWN	0	0	0.833333	0.833333	0.833333	0	0	0	0	-0.83333	-0.83333	-0.83333	0	0
CHAMERA1	UP/DOWN	0	0	1.666667	1.666667	1.666667	0	0	0	0	-1.66667	-1.66667	-1.66667	0	0
CHAMERA3	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PARBATI3	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEWA2	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DULHASTI	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NJPC	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RAMPUR	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEHRI	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KOTESHWR	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KOLDAM	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PONG	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEHAR	UP/DOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Case1: In above case Chamera2 got despatch of Regulation 'Up'(+)2.5 MWh and regulation 'Down'(-)2.5 MWh.

Net energy Enet = 2.5 -2.5=0

Mileage Em = |2.5 |+ Σ | -2.5| (in MWh)= 5 (MWh)
Total Incentive= Rs 500 @10P/Unit

Case2: In above case Chamera1 got despatch of Regulation 'Up'(+)5 MWh and regulation 'Down'(-)5 MWh.

Net energy Enet = 5 -5=0

Mileage Em = |5 |+ Σ | -5| (in MWh)=10(MWh)
Total Incentive= Rs 1000 @10P/Unit

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)

पंजीकृत एवं केन्द्रीय कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016
Registered & Corporate Office : Ist Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in,Tel.: 011- 41035696, Fax : 011- 26536901

संदर्भ संख्या: पोसोको/एनएलडीसी/2019/402 दिनाँक: 04th February, 2019

सेवा मे,

As per the Distribution List

विषय: Agenda Item regarding Pilot on Security Constrained Economic Dispatch (SCED) of Inter-State Generating Stations (ISGS) Pan India in respective Operational Coordination Committee (OCC) meetings

संदर्भ: CERC Order vide Petition No. 02/SM/2019(Suo-Motu) dtd. 31st January, 2019 in the matter of Pilot on Security Constrained Economic Dispatch (SCED) of Inter-State Generating Stations (ISGS) Pan India http://cercind.gov.in/2019/orders/02-SM-2019.pdf

महोदय,

With reference to the above-mentioned order by the Hon'ble Commission, it has been directed that stakeholder awareness programs may be conducted by Regional Power Committees (RPCs) and POSOCO for smooth implementation of SCED pan-India.

It is, hereby, requested that an Agenda Item regarding Pilot on Security Constrained Economic Dispatch (SCED) of Inter-State Generating Stations (ISGS) Pan India may be placed in the respective upcoming OCC meetings in the month of February, 2019. In this connection, an agenda note is also enclosed herewith for kind reference.

As and when the detailed procedure on implementation of SCED pan-India is finalized, the same would also be circulated in the forthcoming OCC meetings in the month of March, 2019.

सादर धन्यवाद,

भवदीय,
04/02
(देबासिस डे)
मुख्य महाप्रभंधक

संलग्न: As above

वितरण सूची:

1 सदस्य सचिव, उ. क्षे. वि. स., 18/ए, शहीद जीत सिंह सनसनवाल मार्ग, नई दिल्ली – 110016
2 सदस्य सचिव, प. क्षे. वि. स., एफ-3, एम आई डी सी क्षेत्र, अंधेरी(पूर्व), मुंबई – 400093
3 सदस्य सचिव, द. क्षे. वि. स., 29, रेस कोर्स क्रॉस रोड, बंगलूरु – 560009
4 सदस्य सचिव, पू. क्षे. वि. स., 14, गोल्फ क्लब रोड, कोलकाता – 700033
5 सदस्य सचिव,उ. पू. क्षे. वि. स., उ. पू. क्षे. वि. स. परिसर, दांग परमाव, लापलंग,शिलोंग – 793003
6 मुख्य अभियन्ता, राष्ट्रीय विद्युत समिति (एनपीसी), 18/ए, शहीद जीत सिंह सनसनवाल मार्ग, दिल्ली - 16

प्रतिलिपि :

1. प्रमुख, क्षे. भा. प्रे. के. (नई दिल्ली/मुंबई/ बंगलूरु/ कोलकाता/शिलोंग)

Agenda Note on Security Constrained Economic Dispatch (SCED) of Inter-State Generating Stations Pan-India

- Hon'ble Commission, vide Order in Petition No. 02/SM/2019 (Suo-Motu) dtd. 31st January, 2019, directed for Pilot on SCED of Inter-State Generating Stations (ISGS) Pan India http://cercind.gov.in/2019/orders/02-SM-2019.pdf
- The Central Commission observed that there is an overarching objective to optimize the scheduling and dispatch of the generation resources and reduce the overall cost of production of electricity without major structural changes in the existing system/framework. SCED is a desired step in the Indian grid operation towards optimization methodologies. SCED is an involved procedure requiring developing software, creating interfaces and establishing various protocols, information dissemination and streamlining settlement system etc.
- Accordingly, the Commission directed for pilot of SCED for the Inter-State Generating Stations, on pilot basis, w.e.f. **01st April, 2019**.
- The SCED optimization model is for all the thermal Inter State Generating Stations (ISGS) that are regional entities and whose tariff is determined or adopted by the Commission for their full capacity without violating grid security and honouring the existing scheduling practices prescribed in the Indian Electricity Grid Code.
- A Detailed Procedure would be formulated that would contain the guidelines regarding operational aspects of SCED including scheduling, dispatch, accounting, settlement etc.
- The variable charges declared by the generators for the purpose of Reserve Regulation Ancillary Services (RRAS) would be considered in the optimization process.
- Schedules of the States/beneficiaries would not be changed and the beneficiaries would continue to pay the charges for the scheduled energy directly to the generator as per the existing practices.

- NLDC would open a separate bank account called “National Pool Account (SCED)“. All payments to/from the generators on account of SCED schedules would flow to and from the said National Pool Account.
- For any increment in the injection schedule of a generator due to optimization, the generator would be paid from the National Pool Account (SCED) for the incremental generation at the rate of its variable charge.
- For any decrement in the schedule of a generator due to optimization, the generator would pay to the aforesaid National Pool Account (SCED) for the decremental generation at the rate of its variable charge after discounting compensation due to part load operation as certified by RPC as per the provisions of IEGC.
- The incremental changes in schedules on account of optimization would not be considered for incentive computation for the generating stations. The deviation in respect of such generators would be settled with reference to their revised schedule. The increment or decrement of generation under SCED would not form part of RRAS.
- RPCs would issue weekly SCED accounts along with the DSM, RRAS, FRAS and AGC accounts based on data provided to them by RLDCs.
- RPCs would issue the regional accounts including the SCED schedules and NLDC would issue a consolidated "National SCED Settlement Statement” comprising payment and receipts to/from all generators participating in the SCED.
- The savings obtained through SCED after settlement of all accounts of SCED would be recorded and maintained in the “National Pool Account (SCED)“ by the NLDC.
- CTU is directed to ensure reliable communication between the respective generating stations and Load Despatch Centres.
- As and when the detailed procedure on implementation of SCED pan-India is finalized, the same would also be circulated in the forthcoming OCC meetings in the month of March, 2019.

Package V - List of Lines

Sr. No.	PSTCL Lines	Length Line (in km)
1	Moga-Muktsar	71.082
2	Nakodar-Kartarpur	27.485
3	LILO of Gobindgarh-Ablowal	34.006
4	Goindwal Sahib TPS - Sultanpur	19.058
5	Sultanpur - Jamsher	38.268
6	LILO of Muktsar at Bajakhana	23.975
7	LILO of Muktsar -Bajakhana at Sandhwan	1.673
	Total	**215.547**

ANNEXURE - B

Package 1(a) - List of Lines

Sr. No.	PSTCL Lines	Length Line (in km)
1 (a)	220 kV Sultanpur 220 - Patti 220	37.97
(b)	LILO of 220 kV Sultanpur 220 - Patti 220 at Chola Sahib 220 Kv	4.76
c)	220 kV Patti 220 Kv - Rashiana	30
2 (a)	220 kV Moga 220 - Talwandi Bhai	22.948
(b)	220 kV Talwandi Bhai - Ferozpur	31.53
c)	LILO of Talwandi Bhai- Ferozpur at Sadiq	23.61
3	220 kV Nabha 220 - Phaggan Majra 400	32.90
4	220 kV Lalton Kalan 400 - Pakhowal 220	15.786
5 (a)	220 kV Ablowal 220 - Rajila 220	28.866
(b)	LILO of 220 kV Ablowal 220 - Rajila 220 at Passiana	1.102
c)	220 kV Rajila 220 - Patran 220	35
(d)	LILO of 220 kV Rajila 220 - Patran 220 at Kakrala	3.389
(e)	LILO of 220 kV Rajila 220 - Patran 220 at Patran	6
6	LILO of 220 kV Wadala Granthian- Verpal 220 Kv at Udhoke 220	3
7 (a)	220 kV Patran 220 - Sunam 220	35.66
(b)	LILO of 220 kV Patran 220 - Sunam 220 at Bangan 220	13
c)	220 kV sunam 220 - Mansa 220	39.898
(d)	LILO of 220 kV sunam 220 - Mansa at Jhunir 220	33.585
(e)	220 kV Mansa 220 - GHTP 220	36.910
(f)	LILO of 220 kV Mansa 220 - GHTP at Dhanoula	38
(g)	LILO Portion of GHTP 220 - Mansa at Talwandi Sabo	29.122
(h)	LILO Portion of GHTP 220 - Mansa at Mour	9
8 (a)	220 kV Muktsar 220 - Bathinda	51
(b)	LILO of Muktsar 220 - Bathinda 220 at Malout 220	24
c)	LILO of Muktsar 220 - Bathinda 220 at Badal 220	25
9 (a)	220 kV Lalton kalan 220 - Sahnewal 220	18.008
(b)	220 kV Sahnewal 220 - GGSSTP 220	73
c)	LILO of 220 kV Sahnewal 220 - GGSSTP LILO	2.843

	Point - Koharam 220	
(d)	LILO of 220 kV Sahnewal 220 - GGSSTP at Gaunsgarh 220	17
(e)	LILO of 220 kV Sahnewal 220 - GGSSTP LILO Point 189 - Ghulal 222	5.634
10 (a)	220 kV Jamsher - Mahilpur 220	45
(b)	LILO of 220 kV Jamsher 220 - Mahilpur 220 w at Rehana Jattan	5
11 (a)	132 kV ASPH-I 132 Kv - ASPH II 132	10.32
(b)	LILO of 132 kV ASPH-I 132 Kv - ASPH II 132 at Anandpur Sahib 132	3
12	IGC Bhathinda – GNDTP 220	17.00
13	Butari 220- Verpal 220	31.00
14	Bilaspur 132- Doraha 132 – Sahnewal 220	19.60
15 (a)	132 kV Jal-I 220 Kv - Kapurthala 132	33.93
(b)	LILO of 132 kV Jal-I 220 Kv - Kapurthala 132 at children Park 132	2.42
c)	LILO of 132 kV Jal-I 220 Kv - Kapurthala 132 at PIMS 132	0.4
(d)	LILO of 132 kV Jal-I 220 Kv - Kapurthala 132 at Science city 134	1
16	Mana Singh Wala 132- Ferozpur 220	11.50
17 (a)	132 kV Malaout 132 KV - GNDTP 220	42.06
(b)	LILO of 132 kV Malaout 132 KV - GNDTP 220 at Balluana 132	0.15
c)	LILO of 132 kV Malaout 132 KV - GNDTP 220 at Gidderbaha 133	5.16
18	LILO of 132 kV Verpal 220 Kv - Verka 132 at Malmandi 132	2
19	Muktsar 132-Muktsar 220	2.00
20	Moga 1 132- Moga 220	7.40
21	MPH I-II-III-IV – Shri Hargobindpur – Wadala granthian	80.00
22	Ropar 132- GGSSTP 220	20.00
23 (a)	220 kV Jamsher 220 - Jadla	67.33
(b)	LILO portion of Jamsher 220-Jadla 220 at Goraya220	7
c)	220 kV Jadla 220 - GGSSTP(RTP) 220	43
24 (a)	220 kV Wadala Granthian 220 Kv - FC Churian 220	33.90
(b)	LILO of 220 kV Wadala Granthian 220 Kv - FC Churian 220 at Kotli Surat Mali 220	9
c)	220 kV FC Churian 220 - Civil Lines Asr 220	21.6

(b)	LILO of 220 kV FC Churian 220 - Civil Lines Asr 220 at Majitha	5
(d)	220 kV Civil Lines Asr 220 - Khassa 220	31.53
(e)	LILO of 220 kV Civil Lines Asr 220 - Khassa 220 at Chugawan 220	6
25	132 kV Verpal 220 Kv - Verka 132	13.09
26	Shamaspur 132- Ghulal 132	7.00
27	LILO Portion of Talwandi Bahi 220 - Ferozepur 220 Kv at Botianwala 220 Kv	18.723
28 (a)	220 kV Botianwala 220 Kv - Mastewala 220	12.124
(b)	LILO of 220 kV Botianwala 220 Kv - Mastewala 220 at Makhu 400	0.12
29 (a)	220 kV Mohali I 220 Kv - Dera Bassi	19.469
(b)	LILO of 220 kV Mohali I 220 Kv - Dera Bassi 220 at Lalru 220	16.836
	Total	**1379.97**

ANNEXURE - C

S.No.	PSTCL Links	Agency	Voltage (kV)	Length (Km)	Commulative progress	Material available at site	Balance Material to be Supplied by M/s SDGI	Terminal Equipments supply Status by M/s Tejas & M/s Fibcom						Supply of Approch Cable	Suppy of Duct	Splicing	FODP Supply	FODP Installtion	Gangs	Commissioing	PGCIL Group
								SDH		PDH		DCPS with Battery									
								Supplied	Installed	Supplied	Installed	Supplied	Installed								
	Package 1(a)																				
1 (a)	220 kV Sultanpur 220 - Patti 220	PPCL	220	37.97	37.971	0	0	0	1	1	1	2	1	supplied	supplied	In Progress	supplied	pending		pending	Kartarpur
(b)	LILO of 220 kV Sultanpur 220 - Patti 220 at Chola Sahib 220 Kv	PPCL	220	4.76	4.762	0	0	2	1	2	2	2	1	supplied	supplied	pending	supplied	pending		pending	Kartarpur
c)	220 kV Patti 220 Kv - Rashiana	PPCL	220	30	23.047	7	0	2	1	1	1	1	1	supplied	supplied	Completed (Except 2 drums)	supplied	pending		pending	Kartarpur
2 (a)	220 kV Moga 220 - Talwandi Bhai	PPCL	220	22.948	22.949	0	0	2	Pending	N/A	N/A	Pending at Talwandi Bhai	Pending	supplied	supplied	pending	supplied	pending		pending	Moga
(b)	220 kV Talwandi Bhai - Ferozpur	PPCL	220	31.53	31.562	0	0	2	1	1	1		1	supplied	supplied	Completed (Excepted both side Gantry)	Completed	pending		pending	Moga
c)	LILO of Talwandi Bhai- Ferozpur at Sadiq	PPCL	220	23.61	23.606	0	0	2	1	2	2		1	supplied	supplied	pending	supplied	pending		pending	Moga
3	220 kV Nabha 220 - Phaggan Majra 400	PPCL	220	32.90	32.895	0	0.0	1 OF 2	1	1	1	1	1	supplied	supplied	Completed (Only Both side Gantry is Pending)	supplied	pending		pending	Patiala
4	220 kV Lalton Kalan 400 - Pakhowal 220	PPCL	132	15.786	15.786	0	0	2	Pending	2	2	1	Pending	supplied	supplied	Completed	Completed	Completed		pending	Kartarpur
5 (a)	220 kV Ablowal 220 - Rajila 220	PPCL	220	28.866	28.866	0	0	2	Pending	1	1	1	Pending	supplied	supplied	Completed (Excepted both side Gantry)	completed	Completed		pending	Patiala
(b)	LILO of 220 kV Ablowal 220 - Rajila 220 at Passiana	PPCL	220	1.102	1.102	0	0	2	Pending	1	1	1	Pending	supplied	supplied	pending	supplied	pending		pending	Patiala
c)	220 kV Rajila 220 - Patran 220	PPCL	220	35	0.000	0	35	2	1	2	2	2	1	supplied	supplied	pending	supplied	pending		pending	Patiala
(d)	LILO of 220 kV Rajila 220 - Patran 220 at Kakrala	PPCL	220	3.389	3.389	0	0	2	1	2	2	3	1	supplied	supplied	pending	supplied	pending		pending	Patiala
(e)	LILO of 220 kV Rajila 220 - Patran 220 at Patran	PPCL	220	6	0.000	0	6							supplied	supplied	pending	supplied	pending		pending	Patiala
6	LILO of 220 kV Wadala Granthian- Verpal 220 Kv at Udhoke 220	PPCL	132	3	0.000	3	0	2	Pending	1	1	N/A	N/A	supplied	supplied	pending	supplied	pending		pending	Kartarpur
7 (a)	220 kV Patran 220 - Sunam 220	PPCL	220	35.66	35.66	0	0	2	2	2	2	2	2	supplied	supplied	Completed	Completed	Completed		In progress	Moga
(b)	LILO of 220 kV Patran 220 - Sunam 220 at Bangan 220	PPCL	220	13	7.591	0	5	2	Pending	2	2	2	Pending	supplied	supplied	pending	supplied	pending		pending	Moga
c)	220 kV sunam 220 - Mansa 220	PPCL	220	39.898	39.898	0.000	0	2	1	2	2	2	2	supplied	supplied	Completed (Only Loc. No.110 is pending)	Completed	Completed		In progress	Moga
(d)	LILO of 220 kV sunam 220 - Mansa at Jhunir 220	PPCL	220	33.585	33.585	0	0	2	2	3	3	2	2	supplied	supplied	Completed	Completed	Completed		In progress	Moga
(e)	220 kV Mansa 220 - GHTP 220	PPCL	220	36.910	36.910	0	0	2	Pending	1	1	1	1	supplied	supplied	pending	supplied	pending		pending	Moga
(f)	LILO of 220 kV Mansa 220 - GHTP at Dhanoula	PPCL	220	38	15.128	23	0.0	2	Pending	1	1	1	1	supplied	supplied	pending	supplied	pending		pending	Moga
(g)	LILO Portion of GHTP 220 - Mansa at Talwandi Sabo	PPCL	220	29.122	29.123	0	0.0	2	Pending	1	1	1	1	supplied	supplied	pending	supplied	pending		pending	Moga
(h)	LILO Portion of GHTP 220 - Mansa at Mour	PPCL	220	9	0.000	0	9	2	Pending	1	1	1	1	supplied	supplied		supplied	pending		pending	Moga
8 (a)	220 kV Muktsar 220 - Bathinda	PPCL	220	51	0.000	0	51	2	1	1	1	2	1	supplied	supplied	pending	supplied	pending		pending	Moga

	PSTCL Links	Agency	Voltage (kV)	Length (Km)	Commulative progress	Material available at site	Balance Material to be Supplied by M/s SDGI	Terminal Equipments supply Status by M/s Tejas & M/s Fibcom						Supply of Approch Cable	Suppy of Duct	Splicing	FODP Supply	FODP Installation			
								SDH		PDH		DCPS with Battery									
(b)	LILO of Muktsar 220 - Bathinda 220 at Malout 220	PPCL	220	24	0.000	24	0	2	1	1	1	3	2	supplied	supplied	pending	supplied	pending			
c)	LILO of Muktsar 220 - Bathinda 220 at Badal 221	PPCL	220	25	0.000	0	25							supplied	supplied	pending	supplied	pending			
9 (a)	220 kV Lalton kalan 220 - Sahnewal 220	PPCL	132	18.008	18.008	0	0.0	2	Pending	2	2	1	1	supplied	supplied	Completed (Only Loc. No.260 is pending)	Completed	Completed			
(b)	220 kV Sahnewal 220 - GGSSTP 220	PPCL	220	73	70.021	3	0.0	2	Pending	1	1	2	1	supplied	supplied	In Progress	supplied	pending			
c)	LILO of 220 kV Sahnewal 220 - GGSSTP LILO Point - Koharam 220	PPCL	220	2.843	2.843	0	0.0	2	Pending	1	1	2	2	supplied	supplied	pending	supplied	pending			
(d)	LILO of 220 kV Sahnewal 220 - GGSSTP at Gaunsgarh 220	PPCL	220	17	9.239	7	0							supplied	supplied	pending	supplied	pending			
(e)	LILO of 220 kV Sahnewal 220 - GGSSTP LILO Point 189 - Ghulal 222	PPCL	220	5.634	5.634	0	0.0							supplied	supplied	pending	supplied	pending			
10 (a)	220 kV Jamsher - Mahilpur 220	PPCL	220	45	0.000	45	0	2	Pending	2	2	N/A	N/A	supplied	supplied	pending	supplied	pending			
(b)	LILO of 220 kV Jamsher 220 - Mahilpur 220 w at Rehana Jattan	PPCL	220	5	0.000	5	0	2	Pending	3	3	2	Pending	supplied	supplied	pending	supplied	pending			
11 (a)	132 kV ASPH-I 132 Kv - ASPH II 132	TENDOT	220	10.32	10.32	0	0	2	1	1	1	1	1	supplied	supplied	Completed (Hamirpur Banala)	supplied	Completed (Hamirpur-			
(b)	LILO of 132 kV ASPH-I 132 Kv - ASPH II 132 at Anandpur Sahib 132	PPCL	132	3	2.992	3	0	2	2	1	1	1	1	supplied	supplied	pending	supplied	pending			
12	LILO Bhathinda – GNDTP 220	TENDOT	132	17.00	17.00	0	0	2	1	N/A	N/A	1	1	supplied	supplied	pending	supplied	pending	1		
13	Butari 220- Verpal 220	TENDOT	220	31.00	31.00	0	0	2	Pending	1	1	1	1	supplied	supplied	Completed	supplied	Completed			
14	Bilaspur 132- Doraha 132 – Sahnewal 220	TENDOT	132	19.60	19.60	0	0	2	Pending	3	3	3	3	supplied	supplied	pending	supplied	pending	1		
15 (a)	132 kV Jal-I 220 Kv - Kapurthala 132	TENDOT	220	33.93	33.93	0	0	2	1	N/A	N/A	1	1	supplied	supplied	pending	supplied	pending			
(b)	LILO of 132 kV Jal-I 220 Kv - Kapurthala 132 at children Park 132	PPCL	132	2.42	0.000	2.42	0	2	1	N/A	N/A	4	3	supplied	supplied	pending	supplied	pending			
c)	LILO of 132 kV Jal-I 220 Kv - Kapurthala 132 at PIMS 132	PPCL	132	0.4	0.000	0.41	0							supplied	supplied	pending	supplied	pending			
(d)	LILO of 132 kV Jal-I 220 Kv - Kapurthala 132 at Science city 134	PPCL	132	1	0.000	1.11	0							supplied	supplied	pending	supplied	pending			
16	Mana Singh Wala 132- Ferozpur 220	TENDOT	132	11.50	11.50	0	0	2	1	2	2	2	1	supplied	supplied	Completed	supplied	Completed			
17 (a)	132 kV Malaout 132 KV - GNDTP 220	TENDOT	132	42.06	42.06	0	0	2	Pending	1	1	1	Pending	supplied	supplied	pending	supplied	pending			
(b)	LILO of 132 kV Malaout 132 KV - GNDTP 220 at Balluana 132	PPCL	220	0.15	0.000	0.15	0	2	Pending	1	1	3	2	supplied	supplied	pending	supplied	pending			
c)	LILO of 132 kV Malaout 132 KV - GNDTP 220 at Gidderbaha 133	PPCL	220	5.16	0.000	5.16	0							supplied	supplied	pending	supplied	pending			
18	LILO of 132 kV Verpal 220 Kv - Verka 132 at Maimandi 132	PPCL	132	2	0.000	2	0	2	1	8	8	1	2	supplied	supplied	pending	supplied	pending			
19	Muktsar 132-Muktsar 220	TENDOT	132	2.00	2.00	0	0	2	1	2	2	2	2	supplied	supplied	Completed	supplied	Completed			

	PSTCL Links	Agency	Voltage (kV)	Length (Km)	Commulative progress	Material available at site	Balance Material to be Supplied by M/s SDGI	Terminal Equipments supply Status by M/s Tejas & M/s Fibcom						Supply of Approch Cable	Suppy of Duct	Splicing	FODP Supply	FODP Installtion	Gangs	Commissioing	PGCIL Group
								SDH		PDH		DCPS with Battery									
20	Moga 1 132- Moga 220	TENDOT	132	7.40	7.40	0	0	2	Pending	1	1	1	1	supplied	supplied	Completed	supplied	Completed		Completed	Moga
21	MPH I-II-III-IV – Shri Hargobindpur – Wadala granthian	TENDOT	132	80.00	80.00	0	0	6	3	4	4	5	5	supplied	supplied	Completed	supplied	Completed		Completed	Kartarpur
22	Ropar 132- GGSSTP 220	TENDOT	132	20.00	20.00	0	0	2	Pending	1	1	2	1	supplied	supplied	Completed	supplied	Completed		Completed	Kartarpur
23 (a)	220 kV Jamsher 220 - Jadla	TENDOT	220	67.33	62.56	5	0	2	Pending	1	1	N/A	N/A	supplied	supplied	pending	supplied	pending	1	pending	Kartarpur
(b)	LILO portion of Jamsher 220-Jadla 220 at Goraya220	PPCL	220	7	0.000	0	7	2	Pending	2	2	1	1	supplied	supplied	pending	supplied	pending		pending	Kartarpur
c)	220 kV Jadla 220 - GGSSTP(RTP) 220	PPCL	220	43	25.774	15	2	2	Pending	N/A	N/A	1	Pending	supplied	supplied	pending	supplied	pending		pending	Kartarpur
24 (a)	220 kV Wadala Granthian 220 Kv - FC Churian 220	TENDOT	220	33.90	33.90	0	0	2	Pending	N/A	N/A	1	1	supplied	supplied	Completed	supplied	Completed		Completed	Kartarpur
(b)	LILO of 220 kV Wadala Granthian 220 Kv - FC Churian 220 at Kotli Surat Mali 220	PPCL	220	9	0.000	9	0	2	Pending	N/A	N/A	1	1	supplied	supplied	pending	supplied	pending		pending	Kartarpur
c)	220 kV FC Churian 220 - Civil Lines Asr 220	TENDOT	220	21.6	21.6	0	0	2	Pending	1	1	2	2	supplied	supplied	Completed	supplied	Completed		Completed	Kartarpur
(b)	LILO of 220 kV FC Churian 220 - Civil Lines Asr 220 at Majitha	PPCL	220	5	0.000	5	0	2	Pending	1	1	2	2	supplied	supplied	pending	supplied	pending		pending	kartarpur
(d)	220 kV Civil Lines Asr 220 - Khassa 220	TENDOT	220	31.53	31.53	0	0	2	Pending	1	1	1	1	supplied	supplied	Completed	supplied	Completed		Completed	Kartarpur
(e)	LILO of 220 kV Civil Lines Asr 220 - Khassa 220 at Chugawan 220	PPCL	220	6	0.000	6	0	2	Pending	1	1	2	1	supplied	supplied	pending	supplied	pending		pending	Kartarpur
25	132 kV Verpal 220 Kv - Verka 132	TENDOT	132	13.09	13.090	0	0	2	1	1	1	1	1	supplied	supplied	Completed	supplied	Completed		Completed	Kartarpur
26	Shamaspur 132- Ghulal 132	TENDOT	132	7.00	7.00	0.00	0	2	Pending	N/A	N/A	2	2	supplied	supplied	Completed	supplied	Completed		Completed	Kartarpur
27	LILO Portion of Talwandi Bahi 220 - Ferozepur 220 Kv at Botianwala 220 Kv	PPCL	220	18.723	18.723	0	0	2	1	2	2	PENDING AT	1	supplied	supplied	pending	supplied	pending		pending	Moga
28 (a)	220 kV Botianwala 220 Kv - Mastewala 220	PPCL	220	12.124	12.124	0	0	2	2	1	1	2	2	supplied	supplied	pending	supplied	pending		pending	Moga
(b)	LILO of 220 kV Botianwala 220 Kv - Mastewala 220 at Makhu 400	PPCL	220	0.12	0.000	0.12	0	2	2	2	2	3	3	supplied	supplied	pending	supplied	pending		pending	Moga
29 (a)	220 kV Mohali I 220 Kv - Dera Bassi	PPCL	220	19.469	19.469	0	0.0	2	Pending	1	1	1	1	supplied	supplied	In Progress	supplied	pending		pending	Patiala
(b)	LILO of 220 kV Mohali I 220 Kv - Dera Bassi 220 at Lairu 220	PPCL	220	16.836	16.836	0	0.0	2	Pending	1	1	2	2	supplied	supplied	Completed (Only Lairu Gantry is Pending)	supplied	pending		pending	Patiala
	Total			1378	1069.978																
	Package V																				
1	Moga-Muktsar	ZTT China	220	71.082	71	0	0	2	2	2	2									Not yet Done	Kartarpur
2	Nakodar-Kartarpur	ZTT China	220	27.485	27	0	0	2	2	2	2	1	1							Not yet Done	Kartarpur
3	LILO of Gobindgarh-Ablowal	ZTT China	220	34.006	34	0	0	2	2	2	2	1	1							Not yet Done	Kartarpur
4	Goindwal Sahib TPS - Sultanpur	ZTT China	220	19.058	19	0	0	2	2	4	4	1	1							Completed.	Kartarpur
5	Sultanpur - Jamsher	ZTT China	220	38.268	38	0	0	1	1	2	2	1	1							Completed.	Kartarpur
6	LILO of Muktsar at Bajakhana	ZTT China	220	23.975	24	0	0	1	1	NA	NA	NA	NA							Not yet Done	Moga

S.No.	PSTCL Links	Agency	Voltage (kV)	Length (Km)	Commulative progress	Material available at site	Balance Material to be Supplied by M/s SDGI	Terminal Equipments supply Status by M/s Tejas & M/s Fibcom						Supply of Approch Cable	Suppy of Duct	Splicing	FODP Supply	FODP Installtion	Gangs	Commissioing	PGCIL Group
								SDH		PDH		DCPS with Battery									
7	LILO of Muktsar -Bajakhana at Sandhwan	ZTT China	220	1.673	1.673	0	0	1	1	2	2	NA	NA							Not yet Done	Moga
	Total				214.673																

OPGW LINKS_PSTCL_UNDER PACKAGE-Ia

S.No.	Name of Link	Executing Agency	Voltage (kV)	Length (Km)	STATUS
1	132 kV ASPH-I 132 Kv - ASPH II 132	TENDOT	220	10.32	End to End OPGW SAT Done
2	132 kV Verpal 220 Kv - Verka 132	TENDOT	132	13.09	End to End OPGW SAT Done
3	220 kV Wadala Granthian 220 KV - FC Churian	TENDOT	220	33.90	End to End OPGW SAT Done
4	220 kV FC Churian 220 - Civil Lines Asr 220	TENDOT	220	21.60	End to End OPGW SAT Done
5	220 kV Civil Lines Asr 220 - Khassa 220	TENDOT	220	31.53	End to End OPGW SAT Done
6	132 kV IGC Bathinda - GNDTP 220	TENDOT	132	17.00	End to End OPGW SAT Done
7	220 kV Butari 220 - Verpal 220	TENDOT	220	31.00	End to End OPGW SAT Done
8	132 kV Mana Singh Wala - Ferozepur 220	TENDOT	132	11.50	End to End OPGW SAT Done
9	132 kV Muktsar 132 - Muktsar 220	TENDOT	132	2.00	End to End OPGW SAT Done
10	132 kV Moga I 132 - Moga 220	TENDOT	132	7.40	End to End OPGW SAT Done
11	132 kV MPH-I-II-III-IV - Shri Har Gobindpur - Wadala Granthian 220	TENDOT	132	80.00	End to End OPGW SAT Done
12	220 kV Patran 220 - Sunam 220	PPCL	220	35.66	End to End OPGW SAT Done
13	220 kV sunam 220 - Mansa 220	PPCL	220	39.90	End to End OPGW SAT Done
14	220 kV Mansa 220 - GHTP 220	PPCL	220	36.91	End to End OPGW SAT Done
				371.80	

ANNEXURE-D

1/2

PUNJAB STATE TRANSMISSION CORPORATION Ltd.

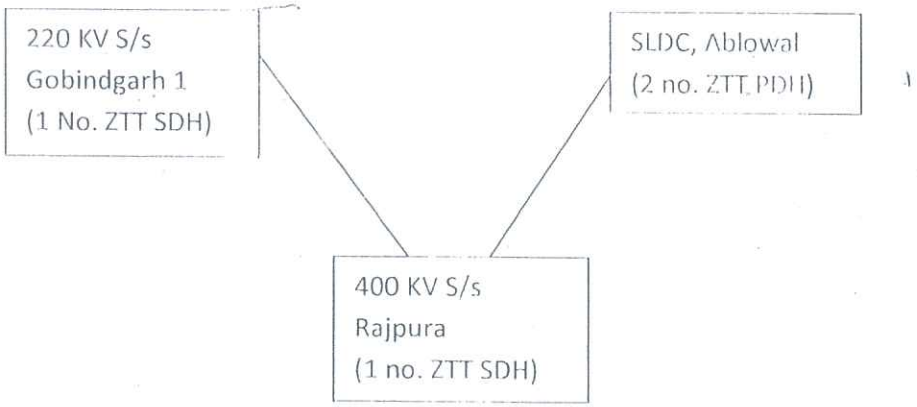
(A Govt. of Punjab Undertaking)
Office:- S.E /Plg and Comm

ZTT/ ECI Engineers	Commtel Engineer	PSTCL Officers
Sh. Bhanupartap Singh	Sh. Anurag Singla	Er. Dharam Pal, SE,P&C
Sh. Kapil		Er. Rupinder Singh Sappal, ASE, Comm(D)
		Er. H.S. Bindra, ASE, CO&C, Div., Ludhiana
		Er. Karan Bansal, AEE, Comm(D)
		Er. Manpreet Kang, AEE, CO&C, Patiala.

A meeting was held between PSTCL Officers and ZTT Engineers at 400 KV S/s Rajpura on dated 28/12/2017to discuss compatibility of SDH of ZTT(ECI) make and SDH of Fibercom make. The following points were discussed and it was decided as below:-

- The drawing sample of existing system is as below:-

In addition to above, LILO of above said T/X Line is proposed to be included in existing Communication system of Fibercom which includes ZTT/ECI Make new SDH :-



In this context apprehension was raised by both Commtel Engineers(dealing in Fiberhome SDH) and ZTT /ECI engineers that it is difficult to integrate the existing system of Fibercom make with proposed system Of ZTT make for Punjab as their is no provision for extra optical ports of SDH of Fibercom make installed at Gobindgarh 1. SDH of M/S ZTT make have STM-4 features while Fibercom make SDH have STM-1 features . Thus both the SDH can't be integrated together.

28/12/2017 28/12/17

- During the discussion/deliberations , many other S/Stns covered under package 5 were also identified where interface /compatibility of Fibercom and ZTT make SDH is required which are mentioned below:-
    1. Gobindgarh 1 to SLDC,Ablowal LILO at 400 KV Rajpura
    2. Nakodar to Kartatpur
    3. GVK Sultanpur to Jamshere
    4. Moga to Muktsar LILO at Bajakhana and Sandhwan

ZTT need to integrate the existing system of PSTCL (Fibercom make) with proposed system for OPGW (ZTT make) for Punjab at various Points. Hence, proper testing related to integration of both system is required. It is decided that this testing should be carried out by Commtel Engineers and ZTT/ ECI Engineers together starting from some remote end. Power Grid should provide required assistance. In order to overcome these bottlenecks ZTT firm and Commtel firms need to approach PGCIL for facilitating of carrying out such exercise and so that error free and flawless data reporting to SLDC can be ensured.

28/12

28/11/2017

(Anuraj Commtel) 28/11/2017

28/12 CAEE, Co+C, S/D, Pb(s)

Addl SE O&C Div Ldh

28/12/17

ANNEXURE-E

Subject:- Recorded note of discuss ons of meeting held between PGCIL, PSTCL, M/s ZTT, M/s ECI and M/s Commtel at Shakti Sadan, Pat ala on Dated 23/01/2018 regarding integration of existing Fibrecom make SDH already insta led at various S/s of PSTCL and proposed system of ZTT make SDH under Package V.

Members Present

PGCIL	PSTCL
Sh. Vishal Badlas (Er. LD &C, PGCIl.)	Er. Dharampal, SE Plg. & Comm.
Sh. Manvinder Pal Singh (Dy. Mar ager/ Consultancy)	Er. Rupinder Singh Sappal, ASE, Comm. (D)
M/s ZTT	Er. Manpreet Kang, AEE, CO&C, Patiala
Sh. Saajan Sharma (Project Co ord nator)	Er. Karan Bansal, AEE, Comm(D)
Ziyaudim (Project Co ordinator)	Er. Sachin Singla, AE, Comm(D)
M/s ECI	M/s CommTel
Sh. Bhanu Partap Singh (Project Lead)	Mr. Anurag
Sh. Sunil Dhyal (Subject Matter Expert)	

A meeting was held by PSTCL at 400kV Rajpura on dated 28.12.2017 with M/s ZTT/ EIC & M/s Commtel and certain issues were raised regarding subject cited above but no decision was taken regarding subject cited matter. Hence again a meeting was called by PSTCL on dated 23.01.2018 and following points were discussed.

1. The issue regarding integration of existing Fibrecom make SDH installed at 220kV Gobindgarh-1 Sub Stn. and proposed system of ECI make SDH is still pending. Similar bottleneck is likely to crop up at all the existing nodes viz. 400 KV/Stn. etc while integrating with ECI make SDH equipment. In this regard PGCIL/ZTT/ECI/Commtel proposed Electrical connectivity between existing nodes and ECI make SDH equipments installed but PSTCL declined the same and preferred to opt for linking them with latest technology i.e optically since it is prone to minimum faults/interruptions. It is further intimated by Fibercom representative discussed telephonically with Sh. Kuldeep, GM, Comtel and apprised integration of above said SDH on optical Level is not possible at their end because of non availability of Extra port in the FIBERCOM SDH (existing).
2. All the members present in this meeting agreed that unless this matter regarding integration is not resolved by both Firms M/s ECI (ZTT) and M/s Fibercom (Comtel) the work related to integration of existing equipments with ECI make SDH at 400 KV Rajpura may please be held up.
3. BOQ of PSTCL under package V was approved by PGCIL with the confirmation from PSTCL, It is later on noticed while commissioning that the capacity of existing communication system of PSTCL is full. Hence, integration using these SDH is not possible. To provide integration between existing system and upcoming proposed system for PSTCL under Package V, the requirement/amendment of SDH is proposed at various nodes where interfacing between Fibercom make and ZTT make SDH are involved. PSTCL will provide the detail list of equipments required SDH for this work after obtaining the details from M/s ZTT and M/s Fibercom. The FIBERCOM will revert back by 31st January, 2018 on the same w th the consultation with NR1 / NR2 region of POWER GRID.
4. DCPS system at 220 KV Baja khana will be provided by 15th April, 2018 & for Moga by 15th June 2018
5. DCPS at 220 KV S/Stn. Sandhvan will be provided by PGCIL itself & at 220 KV Muktsar the same will be provided by FIBERCOM under package IV(a).

23/1/18 23/1/18 23/1/18 23/1/18 23/1/18

ANNEXURE-F

CR56

Sub: [illegible] between PSTCL, PGCIL, M/s ZTT, M/s ECI, M/s Commtel, M/s Tejas at Shakti Sadan, PSTCL, Patiala on dated 05/04/2018 regarding resolving the issue of inter compatibility / integration of Fiberhome make SDH already installed at various Sub Stations of PSTCL and proposed system of ZTT/ECI/Fibcom make SDH

Members Present

PSTCL	Er. Dharampal SE/ P & C, Er. Rupinder Singh Sappal ASE/ Comm(D), Er. Ajit Pal Singh multani Addl. SE/ T & C, Er. Prince Sharma AEE/ T & C, Er. Manpreet Kang AEE, Er. Karan Bansal AEE, Er. Sachin Singla AE
PGCIL	Sh. H. S. Kaushal Dy. G.M., Ms. Nutan Mishra AGM, Sh. Manvinder Pal Singh Manager, Sh. YCS Rao Chief Manager
M/s ZTT	Sh. Saajan Sharma Project Coordinator, Sh. Surinder Sir (National Head), Sh. Kapil Singh Manager Tech.
M/s ECI	Sh. Bhanu Partap Singh Project Lead, Sh. Sunil Dyal Project Matter Expert
M/s Commtel:	Sh. Kuldeep Tevatia, Sh. Anurag Singla Site Engineer
M/s Tejas:	Sh. Rohit Pandey

A meeting was held between PSTCL, PGCIL, M/s ZTT, M/s ECI, M/s Commtel, M/s Tejas, at Shakti Sadan, PSTCL, Patiala on dated 05/04/2018 regarding resolving the issue of inter compatibility / integration of Fiberhome make SDH already installed at various Sub Stations of PSTCL and proposed system of ZTT/ECI make PDH/SDH. Viable solutions has been proposed by PGCIL in consultation with his vendors. The following points were discussed in the meeting and are as tabulated below:-

1.) **Data Route of GVK --Sultanpur--ALDC Jamsher (ALDC) :-** It was jointly decided during the meeting that One no. SDH & 2 no. PDH each have already been considered at GVK & Sultanpur under package V. As PDH was not proposed at ALDC Jamsher earlier, therefore 2 Nos PDH at ALDC Jamsher will be provided by shifting one PDH from 220 KV Bajakhana & another PDH from 220 KV Sultanpur of Package V. The data of GVK thermal Sultanpur & ALDC Jamsher through ECI Link shall be extracted through PDH at ALDC Jamsher & will be fed to CFE at ALDC Jamsher(Interface should be Ethernet/ E1). Now these & upcoming RTU data will be routed to Ablowal SLDC through existing STM-1 Fiberhome Network.

The NMS for above mentioned nodes of ECI shall be provided by M/s ECI through one E1 channel provided by M/s Commtel.

After completion of Package 1(a) being carried out by M/s SDGI for OPGW & equipment package by FIBCOM the redundant path on STM-4 will be provided through data route ALDC Jamsher - Jadla--Sahnewal- Lalton Kalan -Ludhiana PG -SLDC Ablowal (ALDC Jamsher to Lalton kalan FIBCOM Network , Ludhiana PG to SLDC, Ablowal Tejas Network). Also Extra Pair of Fiber for the link Lalton Kalan to Ludhiana PG will be provided by PSTCL and corresponding SFP's at Lalton kalan & Ludhiana PG will be provided by

... in coordination with M/s Tibcom Extra SFP can be used ... spare supply provided by M/s ... communication equipment package.

2. Data Route of 400 Kv Nakodar---ALDC Jamsher (ALDC) :- Proposed SDH at 220 KV Kartarpur is ... so this equipment can be put in spares. The Nakodar data is to be routed to Jamsher ALDC ... fiber optic link of around approx 80 KMs for this ECI stated that no additional interface is required to commission this link. PSTCL will provide 2 extra pairs of fiber for this link. The NMS for above mentioned node under preview of ECI shall be made available by M/s ECI through one E1 channel to be provided by M/s Commtel. Shifting of SFP L 4.2 will be carried out from Kartarpur and the same will be used at Jamsher.

3. Data Route of Muktsar---Sandhwan---Bajakhana---220 KV Moga--- Moga PG---Ablowal:- One no. PDH out of 2 Nos. at Sandhwan shall be shifted to 220 KV Moga and one no. PDH from 220 KV Muktsar shall be shifted to 400 KV Rajpura. The NMS for management of these nodes of Muktsar, Sandhwan, Bajakhana & Moga shall be integrated at 220 KV Moga & will be optically patched & routed to SLDC Ablowal through 400kV PGCIL Moga. Commtel stated that aerial optical fiber (24 F) is already laid between 220 KV Moga & 400kV PGCIL Moga under Microwave replacement package. ECI agreed to connect 220 KV Moga & 400kV PGCIL Moga through 2 fiber pairs on the existing laid optical fiber and corresponding SFP's at 220 KV Moga & 400kV PGCIL Moga will be provided by M/s Tejas in coordination with M/s ECI from the spares supplied done in communication equipment package of NR-I. The ECI confirmed the commissioning date of this link will be by 20/04/2018. The NMS for above mentioned nodes of FCI shall be provided by M/s ECI through one 2 Mbps Optical / electrical channel provided by M/s Tejas between 400 KV PGCIL Moga equipment of M/s Tejas and M/s Tejas Make equipments installed at SLDC, Ablowal.

The existing issue of electrical connectivity of data at 220 KV Moga & 400kV PGCIL Moga of Fiberhome equipment is interim solution and is likely to be resolved by NR 1 PGCIL team.

4. Data route of Gobindgarh-1---Rajpura---Ablowal:- Gobindgarh-1 SDH is not required and will be shifted to SLDC Ablowal. The data collected at 400 KV Rajpura through ... DH (shifted from 220 KV Muktsar) shall be routed to SDH equipment at SLDC Ablowal shifted from Gobindgarh-1. In addition to this E1 connectivity will be provided between existing 400 KV Rajpura Fiberhome equipment and ECI equipment. The NMS of 400 KV Rajpura node ECI shall be monitored at SLDC Ablowal. The management of 3 nodes i.e. 400 KV Rajpura, TPS and 400 KV Dhuri shall be through E 1 Patching between Fiberhome and ECI SDH installed at 400 KV Rajpura.

I. All the items which are to be diverted have been agreed without any financial implication by M/s ZTT and M/s ECI

Dharm P-S (DHARM PAUL) (Er. Ajaypal Singh) (H.S. Kaushal)

ANNEXURE - G

1/2

pstcl

PUNJAB STATE TRANSMISSION CORPORATION LIMITED,

Regd Office: PSEB Head Office, The Mall, Patiala.147001.
Office of: Superintending Engineer/Plg and Comm, 5th Floor,
HeadOffice, The Mall, Patiala-147001.
Telefax-0175-2205502 email: se-planning@pstcl.org
Corporate Identity No. U40109PB2010SGC033814
Website : www.pstcl.org

To

SE/P&S,
SLDC, PSTCL,
Ablowal, Patiala.

Memo No. 5196 /W-349 Dated: 4-9-18.

Subject:- **14th TeST (Telecommunication, SCADA and Telemetry) sub-committee meeting - Agenda thereof.**

Please find enclosed herewith 2 Nos. agenda points pertaining to subject cited meeting duly approved by CE/TS, PSTCL for further necessary action.

DA: As Above

Addl. SE/Comm(D),
dc **PSTCL, Patiala.**

(2/2)

Subject:-- 14th TeST (Telecommunication ,SCADA and Telemetry) sub-committee meeting--Agenda there-of.

1. Package -- V under which 216 Km OPGW has been laid by PGCIL as per target, covering 7 sections but commissioning of 4 sections namely Moga-Mukatsar (71 Km); Nakodar -Kartarpur (27 Km) ; LILO of Gobindgarh- Ablowal at Rajpura(34 Km) and LILO of Mukatsar-Bajakhana at Sandhwan (2 Km) is still pending although their erection has been completed. PGCIL may take expeditious steps in this regard .

2. On-going package I(a)/IV pertaining to laying of OPGW and indoor equipments is being executed by PGCIL and 900 Km OPGW has been laid against target of 1367 Km. As PGCIL has supplied DCPS and batteries at almost all the S/Stns. covered under this project but 48 V ,15 Amp DCPS(battery chargers) and 200 AH VRLA type batteries for following 6 No. S/Stns are required, too, for PDH/ SDH which may be procured/installed by PGCIL as has been done for other S/Stns covered under said package:--

a 220 KV Jhunir
b. 220 KV Verpal
c. 220KV Rashiana
d. 132 KV ASPH-I
e. 220 Kv Bangan
f. 220 KV Chhola SAhib

Submitted for approval by CE/TS so that same may be sent to SLDC ,being a nodal agency for subject cited meeting, please.

31/8/18

SE/ Plg & comm.

C.E./T.S.

ANNEXURE – H

1/3 CR 578

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PUNJAB STATE TRANSMISSION CORPORATION LIMITED,
(Punjab Govt. Undertaking)
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Head office, The Mall, Patiala-147001.
email: se-planning@pstcl.org
Website : www.pstcl.org

To

1. Sh. Pranav Malhotra, AGM,
   PGCIL, Near Bahu Plaza,
   Jammu.
2. Sh. Gurdeep Singh, AGM,
   PGCIL, Kartarpur

Memo No 146 – 47 [illegible] Dated 5-2-19

Subject:-- **Telemetry data route of MPH-I-II-III-IV-Bottleneck in commissioning at at 220 KV Wadala Granthian**

In this context it is intimated that telemetry data route of MPH-I-II-III-IV -220 KV Sri Hargobindpur-Wadala Granthian is still non -functional as it has been learnt that there is a compatibility/integration issue in existing Fiberhome make SDH and FIBCOM make SDH which is to be installed/being installed at 220 kV Wadala Granthian.

Kindly resolve this issue so that said data route may report at SLDC, Ablowal after its successful commissioning.

Addl.S.E/Comm(Design)
PSTCL, Patiala

148
5-2-19

CC:- SE/ Plg & comm, PSTCL, Patiala.

mailed on dt 6-2-19

(2/3)

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Head office, The Mall, Patiala-147001.
email: se-planning@pstcl.org
Website : www.pstcl.org

To

1. Sh. RVS Kushwaha, GM,
   PGCIL, Grid Bhawan, Bahu Plaza,
   Jammu.
2. Sh. A.K Dixit, GM,
   PGCIL, Saudamini, Gurgaon.
3. Sh. H.S Kaushal, DGM,
   PGCIL, Saudamini, Gurgaon.
4. Sh. Pranav Malhotra, AGM,
   PGCIL, Grid Bhawan, Bahu Plaza,
   Jammu.

Memo No 151-54 /W-314 B. Dated. 6-2-19

Subject:-- Delay in Commissioning of lines under Package V

Apropos to monthly progress reports of Dec. 18 and Jan 2019 pertaining to OPGW and terminal equipments , it is pointed out that no-where status of following No. 5 sections which were covered under Package V have been mentioned:-

1. Moga-Mukatsar--71Km
2. Nakodar-Kartarpur -27 Km
3. LILO of Gobindgrah-Ablowal at Rajpura -34 Km
4. LILO of Mukatsar-Moga at Bajakhana -24 KM
5. LILO of Mukatsar-Bajakhana at Sandhwan -2Km

No doubt OPGW and terminal equipments on these 5 sections were installed/erected nearly one and a half year back but their commissioning is yet to see light of the day. Meeting in this regard was also held on 05-4-18 at Patiala where various stakeholder/vendors of PGCIL namely ZTT, ECI, FIBCOM, TEJAS, Fiberhome were

in attendance along with officers of PGCIL, Gurgaon. After deliberations all the firms arrived at common consensus to resolve bottlenecks and to expedite commissioning of such 5 section as per M.O.M. (attached here-with). Moreover ,said agenda was also incorporated/discussed in latest TeST meeting held in Sept 2018 . Communication in this regard was also made with Design office of PGCIL, Gurgaon vide memo no 749-51 dt 10-8-18 (copy enclosed) but even then commissioning of said lines/section is hanging the fire.

It is re-iterated to give impetus to get said sections commissioned without any further inordinate delay, please.

S.E/Plg and Comm
PSTCL, Patiala.

3/3

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Website : www.pstcl.org

To

1. Sh. RVS Kushwaha, GM,
   PGCIL, Grid Bhawan, Bahu Plaza,
   Jammu.
2. Sh. H.S Kaushal, DGM,
   PGCIL, Saudamini, Gurgaon.
3. Sh. Gurdeep Singh, AGM,
   PGCIL, Kartarpur
4. Sh. Pranav Malhotra, AGM,
   PGCIL, Grid Bhawan, Bahu Plaza,
   Jammu.

Memo No 197/201 /W-314-B Dated 12-2-19.

Subject:-- Non-functional data Routes under package V

In continuation to this office memo No. 151-54 dated 6-2-2019 under similar subject cited above ,it is further bring to your kind notice that following 2 no. sections/lines where OPGW and terminal equipments have said/claimed to be erected long time back under package V but their telemetry data are non-functional till date as data isn't reporting to SLDC/ALDC:--

1. Goindwal Sahib TPS-Sultanpur
2. Sultanpur-Jamsher

Kindly ensure viable interfacing of terminal equipments at above mentioned S/Stns so that their data may report to SLDC, Ablowal or ALDC Jamsher, pl.

Addl.S.E/Comm(Design)
PSTCL, Patiala

2002/05
12-2-19

CC:- 1. SE/PLg and Comm, PSTCL, Patiala
2. Addl.S.E/CO&C Divns. Ludhiana and Amritsar.
3. Addl.SE/T&C Divn, Jalandhar

mailed on dt 13-2-19