सत्यमेव जयते

भारत सरकार/Government of India

विद्युत मंत्रालय/Ministry of Power

केन्द्रीय विद्युत प्राधिकरण/Central Electricity Authority

एन.पी.सी. प्रभाग/National Power Committee Division

Ist Floor, Wing-5 ,West Block-II, RK Puram, New Delhi-66, e-mail:cenpc-cea@gov.in

No. 4/MTGS/NPC/CEA/2021/ Date:25th March 2021

To
(As per distribution list)

विषय: NPC की 10 वीं बैठक के लिए मीटिंग नोटिस / एजेंडा के सम्बन्ध में।

Subject:Meeting Notice/ Agenda for the 10th Meeting of NPC-Reg.

महोदया/महोदय,

NPC की 10वीं बैठक **09 अप्रैल 2021 (शुक्रवार) को 03:00 बजे** वीडियो कॉन्फ्रेंस के माध्यम से आयोजित होने वाली है। मीटिंग वेब लिंक को नियत समय में साझा किया जाएगा। बैठक के लिए एजेंडा आपकी जानकारी के लिए संलग्न है। एजेंडा सीईए की वेबसाइट पर भी उपलब्ध है।

कृपया बैठक में भाग लेने के लिए सुविधाजनक बनाएं।

The 10th meeting of NPC is scheduled to be held on **09th April 2021 (Friday) at 03:00 PM** through video conference. The meeting web link will be shared in due course. The Agenda for the meeting is enclosed for kind information please. The same is also available on CEA website.

Kindly make it convenient to attend the meeting.

भवदीय/Yours faithfully

25/3/2021.

(ऋषिका शरण/Rishika Sharan)
मुख्य अभियन्ता एवं सदस्य सचिव,रा.वि.स /
Chief Engineer & Member Secretary, NPC

Distribution List (Members of NPC)

1. Shri Neiphui Rio, Chairman, NERPC & Hon'ble Chief Minister & I/C of Power, Govt. of Nagaland, Nagaland Civil Secretariat, Kohima-797004. [Email: cmngl@nic.in]
2. Shri Mr. Senthil Pandian C, Chairperson, Northern Regional Power Committee (NRPC) and Managing Director U.P. Power Transmission Corporation Limited, 7th Floor Shakti Bhawan, 14-Ashok Marg, Lucknow, Uttar Pradesh [Email: md@upptcl.org]
3. Shri Vijay Singhal (IAS), Chairman, Western Regional Power Committee (WRPC) & CMD MSEDCL & Director MSEB Hold. Co. Ltd., Prakashgad, 6th Floor, Plot No. G-9, Bandra (East), Mumbai-400051.[Email:vijaysinghal@hotmail.com]
4. Shri N.S. Pillai, IA&AS, Chairperson, Southern Regional Power Committee (SRPC) & CMD, KSEB Ltd., Vydyuthi Bhavanam, Pattom, Thiruvananthapuram, PIN - 695004, Kerala. [Email: cmdkseb@kseb.in]
5. Shri Santanu Basu, IAS , Chairperson, Eastern Regional Power Committee (ERPC) & & CMD,WBSEDCL, Vidyut Bhavan, 7th floor, Block- DJ Sector-II, Bidhannagar, Kolkata-700091. [Email: basus2k@nic.in]
6. Shri Er. R. K. Singh, Chairperson, Technical Coordination Committee(TCC), NRPC & Director(Operation), 11th Floor Shakti Bhawan Extension, Lucknow, Uttar Pradesh. [Email: director_op@upptcl.org]
7. Shri Sanjay Taksande, Chairman ,TCC(WRPC) & Director (Opn.), MSETCL, Prakashganga, Plot No. C-19, E-Block, Bandra Kurla Complex, Bandra (East), Mumbai : 400 051. [Email: dirop@mahatransco.in]
8. Dr Rajan P, Chairperson TCC & Director (Tr., SO & REES), Kerala State Electricity Board Ltd. Vydyuthi Bhavanam, Pattom Thiruvananthapuram PIN - 695004, Kerala.[E-mail: dtkseb@kseb.in]
9. Shri S Ghosh, Chairperson, TCC(ERPC) & Director (O&M) WBPDCL, Bidyut Unnayan Bhaban, 3/C, LA Block, Sector – III, Salt Lake City, Kolkata – 700106. [Email: s.ghosh03@wbpdcl.co.in]
10. Shri Shikato Sema, Chairman, TCC (NERPC) & Engineer-in-chief, Department of Power Govt. of Nagaland, Kohima-797001. [Email: encpowerkma@gmail.com]
11. Shri Naresh Bhandari, Member Secretary, NRPC, 18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016.[Email: ms-nrpc@nic.in]
12. Shri Satyanarayan S., Member Secretary, WRPC, Plot No. F-3, MIDC Area, Marol, Opp. SEEPZ, Central Road, Andheri (East), Mumbai-400093. [Email: ms-wrpc@nic.in]
13. Shri A.Balan, Member Secretary, SRPC, No.29, Race Course Cross Road, Bengaluru-560009. [Email: mssrpc-ka@nic.in]
14. Shri N. S. Mondal, Member Secretary, ERPC, 14, Golf Club Road, ERPC Building, Tollygunje,Kolkata-700 033.[Email: mserpc-power@nic.in]
15. Shri A. K. Thakur, Member Secretary, NERPC, NERPC Complex, Dong Parmaw, Lapalang, Shillong-793006. [Email: nerpc@ymail.com]

Special Invitees:

1. CMD, POSOCO, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016.
2. Shri Subir Sen, COO, CTU, Saudamini, Plot No.2, Sector-29, Guragon-122001.
3. Chief Engineer, PCD Division, CEA, 3rd Floor, NRPC Building, 18 A Shahid Jit Singh Marg, Katwaria Sarai, New Delhi – 110016
4. Shri Gopal Gajjar, Room. 220, Power Anser Labs Dept. of Elec. Engg. IIT Bombay, Powai, Mumbai-400076

Copy for kind information to:

1. Chairperson, CEA, New Delhi
2. Member (G&OD), CEA, New Delhi

केंद्रिय विधुत प्राधिकरण
Central Electricity Authority
राष्ट्रीय विधुत समिति
National Power Committee (NPC)

Agenda Notes - 10th Meeting of National Power Committee

To be held on 09th April 2021 (through VC/Online)

Contents

केंद्रिय विधुत प्राधिकरण

Central Electricity Authority

राष्ट्रीय विधुत समिति

National Power Committee (NPC)

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Agenda Notes - 10th Meeting of National Power Committee to be held on 09th April 2021

1. Introduction

The 10th Meeting of the National Power Committee (NPC) is scheduled to be held on 09th April, 2021 through Online Platform. The meeting Link will be shared subsequently through Mail.

2. Confirmation of Minutes of 9th meeting of NPC

The Minutes of 9th meeting of NPC held on 22nd November 2019 at New Delhi was circulated vide letter No. 4/MTGS/NPC/CEA/2020/72-93 dated 01.12.2020. No comments had been received from the members.

The Committee may confirm the minutes of the 9th meeting of NPC.

New Agenda Items

3. Telemetry of real time active power (MW) data to SLDCs

3.1 After implementation of Deviation Settlement Mechanism (DSM) Regulations 2014 of CERC and subsequent amendments, many constituents raising the issue of accuracy of SCADA data. As per present practice, the utilities take decisions of their drawal management, based on real-time MW SCADA data. This leads to increase in DSM penalty, which is computed subsequently from weekly IEM energy data.

3.2 The issue was raised by utilities of SRPC, NRPC and WRPC in their respective forums. To mitigate this problem, the utilities suggested to get the real time active power (MW) data to SLDCs through IEMs. As the existing IEMs in service are not capable of telemetry of real-time MW data, the issue of installing additional energy meter in series with existing IEMs or Provision of real time MW data to SLDCs in the technical specification of the new 5/15-minute IEMs to be supplied and installed was emerged.

3.3 CEA also received communications from PGCIL dated 20.07.2020 and WRPC dated 25.09.2020 on the above issue.

3.4 A meeting was convened on 19.11.2020 by MS, NPC on the issue which was chaired by Chairperson CEA. The minutes of the meeting is at **Annexure-I**. In the meeting followings were decided:

a) All the existing IEMs shall be replaced with new technology IEMs having facility to communicate recorded data to LDCs in real time. The modalities for

the project shall be decided later on.

b) All future IEMs at ISTS interface points shall have the feature of user configurable 5/15 min time block along with real time streaming of 1 min (at least) instantaneous data. A reliable communication system (preferably OFC) would be adopted while finalizing the Technical specifications. In order to harmonize the new age end-to-end metering solution, the Technical Specifications (TS) of the new technology IEMs shall be followed on Pan-India basis.

c) A Joint Committee comprising members from all RPCs, CEA, and CTU / POWERGRID & POSOCO shall be formed to deliberate and finalise the above TS.

d) To minimise DSM penalties during the interim period, the state utilities may put additional meters in series with the existing meters at the ISTS locations at their own cost in consultation with CTU (POWERGRID). With a view to help the States / DISCOMs to take decision in this regard, it was decided with the consent of GETCO that they (GETCO) shall carry out the pilot project for real time monitoring of metering data at ISTS points of their state at their own cost and share the outcome of the project with NPC. Subsequently, similar project may be taken up by other interested states if they find outcome of the Pilot Project commercially beneficial to them.

e) POSOCO would assess the feasibility of placing new AMR-MDP system at its RLDCs/NLDC and make efforts to arrange the same, or suggest a techno-economic solution to collect the metered data at RLDCs/NLDC from the AMR-MDP system.

3.5 Accordingly, NPC Secretariat vide letter No. 4/MTGS/NPC/CEA/2020/94-104 dated 02.12.2020 had constituted the Joint Committee (**Annexure-II)**. comprising members from each RPC, CEA, and CTU, POWERGRID & POSOCO to deliberate and finalise the Technical Specifications of IEMs.

3.6 The first meeting of the Joint committee was held on 05.02.2021through online, wherein the draft technical specification of Interface Energy meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP) was discussed. The work is under progress.

Members may like to discuss/deliberate.

4. Guidelines for locating PMU for URTDSM Phase II project

4.1 Indian grid has grown manifolds and complexity has also increased. Managing grid safety, security and reliability is a great challenge. To address this, intelligence through smart grid technology application of Wide Area Measurement System (WAMS) is used to provide better visualization and situational awareness to operator.

4.2 Accordingly, a Pilot Project was implemented with 52 Phasor Measurement Units (PMUs) installed all over the Country progressively from 2008 to 2010. Based on the experience gained in Pilot Projects, a Feasibility Report was prepared for Nation-wide development of WAMS namely Unified Real Time Dynamic State Measurement (URTDSM) Project. The Project was agreed for implementation in a Joint Meeting of all the five Regional Standing Committees on Power System Planning held on 5th March, 2012 **(Annexure-III)**. During the meeting, following PMU placement philosophy was decided:

1. All 400 kV stations in State and ISTS grids
2. All generating stations at 220 kV and above
3. HVDC terminals and inter-regional and inter-national tie lines
4. Both ends of all the transmission lines at 400kV and above: State and ISTS sector

4.3 In addition to the PMU deployment, six (6) analytical software such as Line Parameter Estimation, Online Vulnerability Analysis, Linear State Estimation, CT/CVT Calibration, Supervised Zone-3 Distance Protection and Control Schemes for Improving System Security were also proposed to be developed by IIT Bombay.

4.4 A Detailed Project Report (DPR) was prepared in 2012 for implementation of 1740 PMUs on Pan -India basis. Based on communication availability, URTDSM Project has been taken up in two phases as follows:

- **Phase-I :** 1186 PMUs at 351 substations(communication existing) - Rs. 278.89 crs
- **Phase-II:** 554 PMUs at 301 substations (with installation of 11,000 Kms OPGW) - Rs.377 crs.
- Phasor Data Concentrators with 6 Analytical Software at 32 Control centres considering requirement of both i.e. Phase-I & Phase-II.

4.5 CERC granted in-principle approval for the project in Sept'2013 with 70% funding from PSDF & 30% equity from POWERGRID. CERC granted in-principle approval for the implementation of URTDSM Phase-I and advised to take up Phase-2 after receiving feedback on Phase-I performance from POSOCO.

4.6 POWERGRID has taken up the implementation of URTDSM Project in Jan'2014 and 1409 PMUs were installed under the Project. The increase in quantity of PMUs is due to addition of new bays etc.at the substations.

4.7 The feedback on URTDSM Phase-I performance is received from POSOCO vide their letter dated 06-10-2020 **(Annexure –IV)**.

4.8 In line with agreed philosophy in Joint Meeting of all the five Regional Standing Committees on Power System Planning, POWERGRID taken up the requirement of URTDSM Phase – II in all Regional Power Committees. During the discussion on finalization of PMU quantity for URTDSM phase–II, requirement of additional measurements by PMU has emerged. POSOCO has also desired additional Analytical software using PMU data.

4.9 NRLDC (in 45th TCC, 48th NRPC meeting) and SRLDC (in TCC & 37th SRPC meeting) proposed following additional PMU locations beyond the already agreed philosophy in standing committee:

1. Generating Transformers (GTs) at LV side (having HV side of 220kV and above).
2. FACTS devices such as STATCOM, SVC, FSC, TCSC etc.
3. HVDC Convertor transformers
4. Phase Shifting Transformers
5. Renewable Energy Pooling Stations (PS).

Further, additional WAMS analytics for URTDSM Phase – II are also proposed as follows:

a. Real time Automated Event Analysis tool
b. Oscillation Source location tool/engine.
c. Real time Inertia Estimation Tool
d. Big data analytics tool/engine

4.10 The number of PMUs initially envisaged in Phase II would increase, if the above philosophy is taken under consideration. This quantum increase in number of PMUs will also affect the performance of Phasor Data Concentrator (PDC) and other equipment such as Historian etc.at the Control Centre Location at SLDC, RLDC and NLDC, RPCs/NPC which may also need upgradation / installation. The additional WAMS analytics shall also require additional hardware.

NLDC is requested to make a presentation on URTDSM Phase I performance.
Members may deliberate on the uniform philosophy of PMU locations, new analytics and requirement of upgradation of Control Centre.

5. Meeting to review islanding schemes held on 28th December 2020

5.1 On 28th December 2020, Hon'ble Minister of State (IC) for Power and New & Renewable Energy reviewed the Islanding Schemes through video conference.

5.2 A presentation on the status of the Islanding scheme was given showing the islanding schemes, which were in operation before the grid disturbances of 30th & 31st July 2012 and the islanding scheme which were designed and made operational subsequently.

5.3 Hon'ble Minister directed that the following points must be considered while designing the Islanding schemes:

(i) Islanding schemes should be designed for all major cities of the country. If there is a need to establish a power plant in / around such a city for the purpose, the proposal for the same may be submitted for consideration of the ministry. Possibility of installation of storage system at such location may also be explored.
(ii) All the strategic and essentials loads should be covered in the Islanding schemes. For finalization of strategic loads, Ministry of Defence may also be consulted.
(iii) Generating Stations, which are spatially nearby the strategic and essential loads, shall be given priority in designing the Islanding schemes.
(iv) MS, MS, SRPC was requested to take up designing of Islanding scheme for Bangalore.
(v) All concerned entities to ensure functionality of AUFLS and df/dt relays at all points of time.

Minutes of the meeting is attached at **Annexure- V**

This is for information of the committee.

Agenda Items from Previous Meetings

6. Automatic Under Frequency Load Shedding (AUFLS) Scheme and Mapping of Feeders

(A) Review of AUFLS Settings

6.1 As per the decision in the 2nd meeting of NPC held on 16th July 2013, the following AUFLS scheme at four (4) stages of frequency viz. 49.2 Hz, 49.0 Hz, 48.8 Hz & 48.6 Hz had been implemented in all the regions:

AUFLS	Frequency (Hz)	Load relief in MW					
		NR	WR	SR *	ER	NER	Total
Stage-I	**49.2**	2160	2060	2350	820	100	7490
Stage-II	**49.0**	2170	2070	2360	830	100	7530
Stage-III	**48.8**	2190	2080	2390	830	100	7590
Stage-IV	**48.6**	2200	2100	2400	840	100	7640
Total (MW)		**8720**	**8310**	**9500**	**3320**	**400**	**30250**

****SR grid not integrated with NEW grid at that point of time***.

The existing Region-wise/State-wise details of AUFLS and df/dt settings are given at **Annexure-VI.**

6.2 Subsequently, in the 7th meeting of NPC held on 8th September 2017, a need was felt for review of the quantum of load shedding without introduction of additional slabs/stages of frequency.

6.3 In the 8th Meeting of NPC, it was decided that the frequency settings of AUFLS scheme (with 4 stages) may be raised by 0.2 Hz viz. 49.4, 49.2, 49.0 & 48.8 Hz and quantum of load shedding may be worked out considering the requirement to increase the frequency to 50 Hz.

6.4 In the 9th meeting of NPC, explaining the background of the Zalte Committee Report, Member Secretary, WRPC, expressed that Power Number and Frequency Dependence factor are both in MW/Hz which may result into wrong calculation for the quantum of load to be shed for achieving the nominal frequency in case of a contingency. He further, suggested that as a thumb rule devised from the analysis of IEEE references for the last 50 years, it was found that 1 Hz drop in the frequency requires load shedding of 3% of the connected load at the instant of contingency in the grid. In view of this, he suggested that the quantum of AUFLS as evaluated by NPC Secretariat, needs to be relooked into.

Representatives of Power Grid were of the view that the loads need to be categorized state-wise and region-wise for the requisite load relief.

Representatives of POSOSCO mentioned that percentage of load relief should be specified. They stated that the scheme needs to be reworked considering the primary frequency response. Continental Europe was stated to be a good comparison and Power Number of 9000 MW/Hz will be realistic. It was informed that as per international practice, 25% of the total load is kept for operation under AUFLS. The relay settings can be cited in the Grid

Code as per the global practice and the AUFLS scheme can be evolved with contingency of 4500 MW generation outage at 49.5 Hz frequency.

6.5 In the 9th meeting of NPC, it was decided that a Sub-Committee may be formed under the chairmanship of Member Secretary, WRPC, with representatives from POSOCO and all the RPCs to study the AUFLS Scheme and submit its report to the NPC.

6.6 NPC Secretariat vide letter dated 19.01.2021 has formed the Sub-Committee (Annexure-VII) under the Chairmanship of Member Secretary, WRPC with representatives from POSOCO and all the RPCs to study the AUFLS Scheme.

MS, WRPC may update the present status to the Committee.

(B) Mapping of Feeders:

In the 9th Meeting of NPC held on 22.11.2019, it was reiterated that each RPCs would submit the details / progress of feeder mapping on SCADA to NPC Secretariat regularly on a quarterly basis. However, no data is being received in NPC on quarterly basis. The status of Mapping of feeders furnished by RPCs in the 9th meeting of NPC is summarized below:

S.NO	Name of RPCs	Status (As on Nov,2019)
1	SRPC	Mapping of around 84% of feeders on SCADA.
2	ERPC	100% mapping of feeders will be achieved in few months in ER.
3	WRPC	In the absence of adequate communication facilities at 33kV and 11kV feeders in western region, mapping is not fully implemented. However, the mapping of feeders with SCADA was in progress.
4	NRPC	Due to inadequate communication facilities at 33 and 11 kV feeders and difficulties in feeder separation to implement various defense mechanisms (UFR, df/dt, SPS, ADMS etc.), implementation of the mapping of feeder in NR region is facing difficulty.
5	NERPC	No update received from NERPC

RPCs may update the status to the Committee.

7. Ensuring Proper Functioning of Under Frequency Relays (UFR) & df/dt Relays

7.1 In the 7th meeting of NPC held on 08.09.2017, it was decided that mock test is good enough to test the healthiness of the UFR & df/dt relays. RPC Secretariats were mandated to carry out periodic inspection in line with the provisions of IEGC. The frequency of site inspection was proposed to be up to six months and the inspection reports were to be furnished by RPCs to NPC Secretariat.

7.2 In the 9th meeting of NPC, information furnished by the RPCs was placed for consideration of the Committee.

S.NO	Name of RPC	Status as on Nov, 2019
1	ERPC	All the constituents are submitting the healthiness certificate of UFRs installed in their control area, no feeders are available after implementation of AUFLS, hence there is no df/dt scheme in ER. A sub-group has been constituted which is carrying out regular inspection of functioning of UFRs by following a roster.
2	WRPC	All the relays installed in the region have been tested successfully.
3	SRPC	UFR & df/dt relays was being carried out regularly and subsequent to the 8th meeting of NPC, UFR & df/dt relays were inspected in 25 sub-stations (2 of Andhra Pradesh, 3 of Telangana, 12 of Karnataka, 5 of Kerala and 3 of Tamil Nadu).
4	NRPC	UFRs and df/dt relays is being regularly monitored in OCC meetings. Further, the utilities were undertaking mock exercise for healthiness of UFRs which is being submitted to NRPC and NRLDC on quarterly basis.
5	NERPC	No status was furnished

RPCs may update the status to the Committee.

7.3 In the 9th meeting of NPC it was noted that there was no df/dt relays in ER & NER and also the df/dt schemes were different in NR, WR & SR. It was suggested to have a uniform scheme of df/dt relays.

In the 9th meeting of NPC, it was decided that the Sub-Committee formed for studying the AUFLS scheme, will also work out on a common approach for df/dt settings in all the five regions.

MS, WRPC may update the status regarding the progress of Study.

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

8.1 CERC in its order dated 13.10.2015 in Petition No. 11/SM/2015 had 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 operationalize 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 Centers (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."

8.2 In the 9th meeting on NPC, **it was agreed that all RPCs and NLDC shall provide the updated information on status of implementation of AGC, regularly to NPC Secretariat on a quarterly basis.**

8.3 A meeting to discuss the Ancillary Services was held on 21.01.2021 in Ministry of Power. There, Hon'ble Minister of State(I/C) for Power and NRE has given the direction that the implementation of AGC needs to be expedited and should cover all generators including the intra state generators in the grid.

8.4 An email dated 17.12.2020 was sent to NLDC and RPCs by NPC to sought the status of implementation of AGC. The Status of implementation of AGC as furnished by POSOCO, SRPC and ERPC is at **Annexure-VIII**.

RPCs and POSOCO may update the status to the Committee.

9. Scheme for Protection Data Base Management System (PDMS) in RPCs

9.1 The Committee was informed that the Task Force headed by Shri V. Ramakrishna had submitted the Report on "Power System Analysis under Contingencies" which had recommended for creation of database for relay settings as under:

"10.12.3 There is also a need for creating and maintaining data base of relay settings. Data regarding settings of relays in their network should be compiled by the CTU and STUs and furnished to the RLDC and SLDC respectively and a copy should also be submitted to RPC for maintaining the data base."

9.2 The schemes of ERPC and SRPC for the said purpose had been sanctioned grant from Power System Development Fund (PSDF) by Ministry of Power (MoP). In the 6th meeting of NPC held on 19.12.2016, it was agreed that NRPC, WRPC & NERPC would also create data base of relay setting in their regions as per the scheme finalized by ERPC/SRPC.

9.3 In the 7th meeting of NPC held on 08.09.2017, NRPC and NERPC had informed that they were in the process of submission of DPRs for funding from PSDF. WRPC had informed that they would like to go for in-house development of the data base which could be in excel or SQL format and if any needs arises they would opt for development through third party.

9.4 NPC Secretariat had sought the status of implementation of PDMS from RPCs and the same has been received from NRPC, ERPC and SRPC (**Annexure-IX**). The status of implementation of PDMS as available with the NPC Secretariat is summarized below:

S.NO	RPC	Status of Implementation of PDMS
1	ERPC	Protection System Data Base has been implemented and it is in service from 31.10.2017.
2	SRPC	The Protection Management System (PMS) project will be Go-Live in **February – March, 2021**.

3	NERPC	The PDMS project was awarded in September,2018, and the project is completed.
5	NRPC	In various Protection sub-committee meetings, it was decided to start data collection in a phase manner by initially collecting protection setting data for 400 kV & above lines, reactors as well as ICTs of 400/220kV level and nominations of Nodal officer from each Utility was requested who will co-ordinate for submitting new as well as updating the settings. Currently, 80-90% Protection setting data of 400 kV and above system has been collected and utilities are being followed up for submission of 220kV system data at the earliest. Further, a committee is also being constituted for preparing comprehensive specifications of relay setting parameters for Web based database.
6	**WRPC**	The in-house development of protection database is in good progress. Work of around 30% is over. The scheme would be implemented in WR and the experience would be shared. The in-house relay setting database was stated to be under preparation.

NRPC and WRPC may update the status of implementation of PDMS to the Committee. SRPC/ERPC/NERPC may share the benefits& experience with other RPCs wrt PDMS software through presentation.

10. Monitoring of Schemes Sanctioned Grant from PSDF

10.1 The Committee was apprised that MoP has sanctioned grant of around ₹11650.95 Crore (160 Schemes as on 31.01.2021) to States/ Central Power utilities/RPCs from Power System Development Fund (PSDF). The region wise summary of schemes funded through PSDF is given below:

S. No.	Region	No. of Schemes	Grant Sanctioned (in ₹ crore)	Grant Disbursed (in ₹ crore)	Grant Disbursed (%)
1	Northern	34	2245.08	1026.45	45.72
2	Western	34	1149.72	205.04	17.83
3	Southern	34	1943.01	1149.69	59.17
4	Eastern	25	1018.12	503.076	49.41
5	North Eastern	25	712.7	458.24	64.30
6	All India Schemes (PGCIL,REC, BBMB, DVC)	8	4582.32	4251.25	92.78
	Total	**160**	**11650.95**	**7593.74**	**65.18**

It was observed that the utilization of grant by state utilities in different regions was not satisfactory (particularly in WR) vis-a-vis central sector utilities.

RPCs may take up the matter at their level for improvement of the fund disbursement and expeditious implementation of the sanctioned projects under PSDF.

11. In the 9th meeting of NPC, it was decided by Chairperson, CEA & NPC, that a "Standing Committee on Communication Technology in Power System" will be constituted to evolve a common approach for implementation of Reliable Communication Schemes.

Accordingly, the "Standing Committee on Communication System Planning in Power Sector" vide office order dated 29.10.2020 has been constituted (Annexure-X).

This is for information to the Committee.

12. National Energy Account (NEA)

12.1NLDC had vide letter dated 09th November 2018 **(Annexure-XI)** furnished the Agenda Note on National Energy Account & National Deviation Pool Account. NLDC was of the view that there is a need for implementing a National Deviation Pool Account based on the National Energy Account, for streamlining the accounting and settlement at national level. Further, suitable changes/modifications were required to be effected in the Indian Electricity Grid Code (IEGC) and Deviation Settlement Mechanism (DSM) Regulations apart from recognizing the functions of NPC in the regulatory frame work. In the 8th meeting of NPC held on 30.11.2018, it was decided that the said proposal may be discussed in all the RPCs as an agenda item in their upcoming meetings for deliberations and the observations of RPCs be furnished to NPC Secretariat.

12.2In the 08th meeting of NPC held on 30.11.2018, it was decided that the proposal may be discussed in all the RPCs and the observations of RPCs may be furnished to NPC Secretariat.

12.3As per discussion's in the 8th meeting of NPC, the 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 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 need to be recognized in the regulatory frame work.

12.4In the 9th meeting of NPC, it was informed that the subject proposal of NEA had been discussed in the RPC forum of all the Regions except NER. The following information w.r.t NEA have been received from RPCs.:

SRPC:	The proposal of National Energy Account was discussed in the Special Meeting held on 11.01.2019. The proposal of NEA was also discussed in the 34th TCC / 35th SRPC meetings held on 01/02.02.2019 wherein, NLDC had informed that Hon'ble CERC had sought a paper on NEA. The observations of SRPC would be duly considered while submitting the final proposal to Hon'ble Commission
NRPC	The agenda has been discussed in 44th NRPC meeting held on 19th March, 2019, wherein it was decided that a National Pool Account may be maintained by NLDC for settlement of inter-regional and cross border transactions.
WRPC:	In the 37th WRPC meeting held on 18.12.2018, Member Secretary requested all the constituents to submit their views. All constituents were agreed that they will submit views on NEA . WRPC may update. NPCIL have given comments that the existing practice of preparing REA by RLDC and approval may continue. National Energy Account (NEA) may be prepared by NPC Secretariat for inter-regional and international energy account from the REA issued by RPCs.
ERPC:	In 40th TCC meeting, it was clarified by NLDC that the existing responsibilities of the RPCs for energy accounting including inter regional and trans-national transactions shall remain intact. Only the national DSM pool account shall take care of the receipt and disbursement of interregional and trans-national transactions. This will avoid loop flow of money. TCC observed that before operationalization

	of the DSM pool account, necessary changes in the regulation are required.
NER	No comment received.

The matter was discussed in the 9th meeting and followings were emerged

(i) A detailed list of the accounts which would be prepared by NLDC/NPC may be brought out.
(ii) The data requirements from RLDC/RPC could be outlined.
(iii) Further, the readiness of NPC to bring out the accounts may be assessed.
(iv) It was to be ensured that there would be no duplication of accounts.
(v) The ease of convenience of doing accounting at Regional level is not hampered in any way.
(vi) NLDC also informed that they are in the process of submitting the paper on NEA to CERC and the NPC will be apprised accordingly.

Accordingly it was decided that observations of CERC on the proposed paper on NEA, would be furnished to NPC Secretariat and the presentation be made by NLDC in the next meeting of NPC.

12.5 Now NLDC vide letter dated 12th Feb 2021**(Annexure-XII)** have informed followings:

(i) National Energy Account (NEA) & National Pool Account related feedback have been submitted to Honorable CERC through various feedback report from time to time. CERC, being a quasi-judicial body, does not normally respond to such feedback through letters etc. A petition may be required to be filed either suo-moto or by respective parties, for getting the appropriate directions from CERC. Introduction of the NEA needs the notification of the Regulatory Framework by CERC through appropriate Regulations, which also needs pre-publication, stakeholder consultation and final notification.

(ii) NLDC has also mentioned that CERC has mentioned the National Pool account in SCED order Petition No. 02 /SM/2019 (Suo-Motu) Date of Order: 31st of January, 2019. The same is reproduced below:

Quote

"10.(c) POSOCO has suggested implementation of the National Pool Account to take care of changes in injection schedule for each region due to optimisation process. There would be a need for pay-in/pay- out from the National Pool Account for incremental changes In schedules (Up/Down). As per the present mechanism, the generators receive their variable charges based on the schedules issued by the concerned RLDC. Optimization would result in

incremental/decremental changes in the existing schedules of generators and these would need to be settled through the National Pool Account mentioned above."

Unquote

(iii) As per the direction of CERC, National Pool Account (SCED) is maintained and operated by NLDC for settlement of SCED.

(iv) Similarly, National Deviation Pool Account for Deviation Settlement (DSM) can also be maintained/operated by NLDC in case of any direction received from the appropriate Commission.

RPCs are requested to update the status . NLDC is requested to make a presentation on the subject matter.

Members may deliberate on the issue.

13. Power System Stabilisers (PSS) Tuning:

13.1 It was informed that the Enquiry Committee constituted by Govt. of India to enquire into the grid disturbances of July, 2012, had inter-alia recommended proper tuning of electronic devices and PSS of generators. In this context, recommended procedure of NRPC was submitted in the 4th meeting of NPC for comments/adoption by other RPCs so as to bring uniformity across all the regions.

13.2 In the 5th meeting of NPC held on 08.04.2016, SRPC had informed that in line with NRPC, the PSS methodology has been agreed and implemented in SR. ERPC had informed that the scheme had been implemented in CESC Budge Budge Generating station under the supervision of IIT, Mumbai.WRPC informed that more interaction was required with NR on PSS tuning for proper documentation of the scheme. The experience and documentation was to be shared by WRPC with all the RPCs.

13.3The issue was further discussed in the 6th meeting of NPC held on 19.12.2016. The experience of WRPC in PSS Tuning was shared. WRPC stressed the need to focus on the correctness of setting otherwise there may be a chance of destabilizing the system. It was suggested that interaction with experts was required and knowledge could be shared as a team.

13.4In **the 9th meeting of NPC, it was decided that a Sub-group may be constituted comprising of representatives of Protection Sub-Committee of respective RPCs, NPC, NLDC, CTU, NTPC and NHPC, to finalize a common procedure for Power System Stabilizers (PSS) Tuning.**

13.5 **NPC Secretariat vide letter dated 08.02.2021 (Annexure-XIII) has formed the Sub-Committee under the chairmanship of MS, WRPC to finalize a common procedure for Power System Stabilizers (PSS) Tuning.**

MS, WRPC may update the status to the Committee.

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List of Annexures

Annexure No.	Description
I	Minutes of the Meeting on the issue of Telemetry of Real-time MW through IEM held on 19.11.2020.
II	Constitution of Joint Committee to deliberate and finalize the Technical Specifications of IEMs.
III	MoM of Joint Meeting of Regional Standing Committees on Power System Planning held on 5th March, 2012.
IV	Feedback on URTDSM Phase-I performance received from POSOCO vide their letter dtd. 06-10-2020.
V	Minutes of the meeting to review islanding schemes held on 28th December 2020
VI	Region-wise/State-wise details of AUFLS and df/dt settings as on date.
VII	Formation of Sub-Committee to study the AUFLS Scheme.
VIII	Status of implementation of AGC as furnished by POSOCO and RPCs.
IX	Status of implementation of PDMS from RPCs.
X	Formation of "Standing Committee on Communication System Planning in Power Sector" office order dated 29.10.2020.
XI	NLDC's letter dated 09th November 2018 regarding Agenda Note on National Energy Account & National Deviation Pool Account.
XII	NLDC letter dated 12th Feb 2021 on issue of NEA
XIII	Formation of Sub-Committee to study Power System Stabilizers (PSS) Tuning.

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Annexure- I

सत्यमेव जयते

भारत सरकार/Government of India

विद्युत मंत्रालय/ Ministry of Power

केन्द्रीय विद्युत प्राधिकरण/Central Electricity Authority

राष्ट्रीय विद्युत समिति प्रभाग/NPC Division

1st Floor, Wing-5, West Block-II, R.K. Puram, New Delhi-66, Mail: cenpc-cea@gov.in

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No. 4/MTGS/NPC/CEA/2020/ 113–133 **दिनांक: 16.12.2020**

To,
(As per distribution list)

Subject: Minutes of the meeting on the issue of telemetry of real-time active power (MW) data to SLDCs through Interface Energy Meters (IEMs)-Reg.

Madam/Sir,

The minutes of the meeting on the issue of telemetry of real-time active power (MW) data to SLDCs through Interface Energy Meters (IEMs) held on 19th November, 2020 is enclosed for kind information and necessary action please.

Yours faithfully,

16/12/2020

(Rishika Sharan)
Chief Engineer & Member Secretary, NPC

Distribution List:

1. Smt. Seema Gupta, Director (Operations), Saudamini, Plot No.2, Sector-29, Guragon-122001. [Email: sgupta@powergridindia.com]
2. Shri S. S. Barpanda, Director (Market Operation), POSOCO, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016. [Email: ssbarpanda@posoco.in]
3. Shri Subir sen, COO, CTU, Saudamini, Plot No.2, Sector-29, Guragon-122001. [Email: subir@powergridindia.com]
4. Shri H S Kaushal, GM, CTU, Saudamini, Plot No.2, Sector-29, Guragon-122001. [Email: hsk@powergridindia.com]
5. Shri Debasis De, ED, NLDC, POSOCO, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016. [Email: debasis.de@posoco.in]

6. Shri Naresh Bhandari, Member Secretary, NRPC, 18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016.[Email: ms-nrpc@nic.in]
7. Shri Satyanarayan S., Member Secretary, WRPC, Plot No. F-3, MIDC Area, Marol, Opp. SEEPZ, Central Road, Andheri (East), Mumbai-400093. [Email: ms-wrpc@nic.in]
8. Shri A.Balan, Member Secretary, SRPC, No.29, Race Course Cross Road, Bengaluru-560009. [Email: mssrpc-ka@nic.in]
9. Shri N. S. Mondal, Member Secretary, ERPC, 14, Golf Club Road, ERPC Building, Tollygunje,Kolkata-700 033.[Email: mserpc-power@nic.in]
10. Shri A. K. Thakur, Member Secretary, NERPC, NERPC Complex, Dong Parmaw, Lapalang, Shillong-793006. [Email: nerpc@ymail.com]
11. Shri B.B. Mehta, Director, SLDC, OPTCL, Janpath, Bhubaneswar, Odisha – 751022
12. Shri Nasir Quadri, Chief Engineer, AC&I, MSETCL, 'PRAKASHGANGA', C-19, E-Block, Bandra Kurla Complex, Bandra (E) Mumbai, Maharashtra- 51.
13. Shri Shrikant Jaltare, Executive Director, MSLDC, Thane - Belapur Rd, MSEB Staff Colony, TTC Industrial Area, Airoli, Navi Mumbai, Maharashtra -400708.
14. Shri Jueli Wagh Chief Engineer, MSLDC, Thane - Belapur Rd, MSEB Staff Colony, TTC Industrial Area, Airoli, Navi Mumbai, Maharashtra -400708.
15. Shri Vipul Vyas, Chief Engineer, SLDC, GETCO, 132kV Gotri Sub Station Compound, Gotri Road, near T.B. Hospital, Vadodara, Gujarat -390007.
16. Shri A K Singh, Chief Engineer, SLDC, Vibhuti Khand, Gomati Nagar, Lucknow, Uttar Pradesh-226010.
17. Smt. M. Mallika, Chief Engineer (Grid Operations), TANTRANSCO, 144, Anna Salai, Chennai, Tamil Nadu -600 002.

Copy for kind information to:

1. Chairperson, CEA
2. Member, GO&D, CEA
3. CMD, POSOCO, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016.
4. CMD, Power Grid, Saudamini, Plot No.2, Sector-29, Guragon-122001.

CENTRAL ELECTRICITY AUTHORITY
NATIONAL POWER COMMITTEE DIVISION

MINUTES OF THE MEETING ON THE ISSUE OF TELEMETRY OF REAL-TIME ACTIVE POWER (MW) DATA TO SLDCs THROUGH INTERFACE ENERGY METERS HELD ON 19th NOVEMBER, 2020

Agenda-

1. **Telemetry of real time active power (MW) data to SLDCs.**

2. **Modalities of Implementation and O&M of Automatic Meter Reading- Meter Data Processing (AMR -MDP) System.**

Deliberations

1. Chairperson, CEA extended a warm welcome to all the participants and appreciated good participation from the states in the meeting. List of participants enclosed as **Annexure-I.**

2. CE, NPC briefed the agenda points and gave a presentation (**Annexure-II**) regarding the same. She explained that the state utilities are continuously raising the issues of high DSM penalties due to mismatch in SCADA & Metering data. They are requesting the access to real time instantaneous MW data at their respective SLDC from the IEMs (Interface Energy Meter) to resolve this issue. CEA also received communications from POWERGRID dated 20.07.2020 and WRPC dated 25.09.2020 on the above issue. She also briefed about the relevant clauses from the CEA metering regulations and BIS standards.

3. She further requested CTU (POWERGRID) and Adani to give a presentation on the ISTS IEM related issues.

4. CTU (POWERGRID) gave a brief presentation on ISTS metering system, transition from 15 min to 5 min block period, status of 5-minute Pilot Project and salient points of Technical Specification of "**5 min metering with AMR, MDP system**" which are proposed to be used for new age metering scheme on PAN India basis (**Annexure – III**). This followed by M/s Adani Power Limited (APL) with their presentation (**Annexure-IV**) on their system for monitoring DSM online. APL informed that they are using such system since 2014. The system consisted of approx. 250 meters having feature of online streaming at refresh rate of 2sec. Adani further explained that they are fetching the energy data through DLMS protocol and instantaneous data through Modbus protocol.

5. M/s L&T raised their concern regarding time stamping of meter data over polling of large number of IEMs from control centre.

6. Member (GO&D), CEA requested MS, WRPC to present their views on the issue. MS, WRPC recapped the discussions held in several WRPC forum. He informed that

in 33rd WRPC meeting dtd. 01.02.2017, it was decided to replace all SEMs with AMR compliant Interface meters having capability to integrate energy at 5 min time interval (user configurable) and having time synchronization facility. Accordingly, Technical Specifications (TS) for **"5 min metering with AMR-MDP system"** was approved in 34th WRPC meeting dtd. 28.07.2017.

However, the functionality of online streaming of meter data was not considered in the said TS. Subsequently, in the 39th meeting of WRPC, the different state DISCOMs were expressing concern over the large data mismatch between RTU-SCADA real time data and the DSM energy meter data that is used for computation by the WRPC Secretariat. The DSM regulations are becoming stricter, and there is a need to have advanced energy meters communicating to the SLDCs data that is accurate in real time. Due to the delay in implementation of AMR MDP System, STUs had come up with a proposal to install additional energy meter in series with existing IEMs at their own cost. He also informed that GETCO had performed a pilot case where an additional energy meter in series with existing IEMs was used, having facilities to communicate on SIM card, to a control centre in real time. Since, the installation of additional energy meter was found to be technically feasible and economically helpful to all beneficiaries, the WRPC in its 39th meeting decided to install the energy meters with real time communication facility, in CTU premises so that drawal is calculated accurately. However, in the meeting, POWERGRID informed that they are not willing to allow the installation on their premises unless the Hon'ble Commission allows them. However, POWERGRID was advised that installation of additional energy meter may not be violation of CEA metering regulations.

Member Secretary, WRPC added that the issue to have telemetry of real time active power data to SLDC from **New IEMs** or from **additional energy meters in series with existing IEMs** was also deliberated in WRPC forum. WRPC conducted a special meeting on 4th February, 2020 wherein it was decided that the time block of new IEM would be user configurable 5/15 min and the AMR should have the feature of streaming of real time data from IEM to SLDC. Further, in 83rd WR-CCM dtd. 11.09.2020, it was decided that the minimum desired rate of online streaming should be at least 1 min, and if technology permits it can even be lower. It was also decided that the accounting data should be the final data for all accounting purpose and shall not be disputed by stake holders by comparing it with the instantaneous data acquired. The instantaneous data streaming is only for the purpose of taking actions/decisions in real time (since the data is from same source, the data difference is expected to be insignificant and much better than the existing SCADA data).

Member Secretary, WRPC also expressed concern that the Adani model may be working on small scale with some small number of meters but its feasibility for large nos. of meters and for whole WR grid is yet to be assessed. He further reiterated that the SLDC should get the IEM instantaneous data to reduce DSM penalty of the utilities.

7. OPTCL appreciated that the true concern of states had been addressed by MS, WRPC.

He welcomed the proposal of replacing old meters with new age IEMs. He was of the view that installation of additional energy meter may not be the violation of CEA metering regulations. He also informed that CTU itself has installed additional meters for different purposes. They requested to allow states to install new IEMs at ISTS interface points. Subsequently OPTCL vide their letter dated 24.11.2020 (**Annexure-V**) informed that SLDC Odisha/GRIDCO is in the support of the above proposal and also ready to bear the expenditure, if any. But due to financial crisis arising out of Covid pandemic situation, the said expenditure may be charged from PSDF.

8. Member (GO&D), CEA requested POWERGRID to present their views on the above proposal of the states. Director (O), POWERGRID opined that the high DSM penalties faced by the states due to mismatch between meter and SCADA data need to be mitigated. She further added that POWERGRID do not have any concern on GETCO's proposal if they are ready to bear the cost and proposal is in line with the Metering Regulations of CEA. She also informed that TS of 5 min metering with AMR & MDP system could not be finalized as there were different viewpoints from POSOCO & RPCs.

9. ED (NLDC-POSOSCO), highlighted the following points-

   i) A robust Communication network is the first and foremost requirement to implement successful AMR system to access instantaneous MW data or energy data.
   ii) Improvement in communication channel may reduce the difference between SCADA data and meter data.
   iii) Automatic replacement of faulty meter data with standby meter data may not be possible in case of real time monitoring of meter data.
   iv) Operator may face difficulty to control the system using 80% of SCADA data and 20% of meter data.
   v) Data security related issues due to transmission of data between different utilities.

   He informed that time synchronization function is yet to be implemented in 5 min pilot project meters. He expressed his concern regarding implementation of streaming of instantaneous MW data which may disturb the existing accounting system. He also informed that they have space constraint in the RLDCs to accommodate the proposed IEMDC system.

   He suggested that a pilot project for AMR-MDP system with streaming of instantaneous MW data to SLDC be taken up for a particular utility having good communication network to assess the feasibility of the same.

10. Rajasthan stated that they are also in the process of implementation of AMR system in which they are getting real time meter data (through Modbus protocol) and 15 min energy data (through DLMS protocol) from 175 locations. They also agreed to replace old ISTS meters with new age IEMs.

11. Member Secretary, NRPC welcomed the proposal of replacement of old SEMs with new age 5 min metering with AMR-MDP system along with real time streaming of MW data. However, he also emphasised to strengthen the communication system of state level. He further stated that proposal of placing additional energy meter in series of existing IEM shall not be of much help.

12. Member Secretary, SRPC also endorsed the opinion regarding communication network strengthening. He also opined that the basic issues i.e. accuracy of RTU, Transducers need to be addressed for betterment of SCADA data. He also agreed for the pilot project for instantaneous data at SLDC.

13. GETCO opined that the execution of new IEMs, AMR-MDP System by POWERGRID may take two to three years and new DSM regulation may be enforced in few months which may lead to increase in DSM penalties on the states so there is need to make improvements in the existing system till the execution of new IEMs AMR-MDP System. This was also agreed by TANTRANSCO. TANTRANSCO also welcomed the proposal regarding telemetry of real time MW data to SLDCs through IEMs. TANTRANSCO further stated that the state was bearing huge DSM penalties due to substantially high RE volume in the state. However, they wanted implementation of the advanced technology IEMs through funding from PSDF.

    GETCO further informed that they had carried out a small Pilot project at 400 kV Kasor S/s on two feeders i.e. 400 kV Kasor - Chorania Line & 220 kV Kasor - Botad Line, for real time data monitoring through clip-on type solution without breaking CT secondary. They also agreed to bear the cost to implement the same at their all ISTS points. They were prepared to go ahead on this at their own cost if permitted by CTU/POWERGRID.

14. POWERGRID sought advice of CEA on the above proposal as there is no provision in CEA metering regulations for additional IEMs and this issue had been raised at many fora.

15. Member (GO&D), CEA opined that CEA Metering Regulations stipulate the minimum requirement of IEMs from techno-economic angle. So, if additional meters along with additional features are required by an entity, it may install the same at its own cost. However, for accounting purposes, they should follow the metering arrangement laid down in the regulations.

16. M/s Secure meters stated that it is understood that the said proposal is for interstate interface points only and all the existing meters shall be replaced with new meters by CTU/POWERGRID in a phased manner. 1 min instant MW data of ISTS metering points will be shared to respective SLDCs through web portals of AMR system and this will be for operation purpose only. 5min/15min block Load survey data will be used for DSM and energy accounting and both data may have some differences. He added that 1min. refresh rate data needs a dedicated and reliable communication i.e. Optical-Fiber Cable (OFC) which needs to be ensured. However, he added that the

facility in IEMs for 1min instant data polling has not been executed anywhere in India for more than 400-500 meters and with wide spread locations of large no. of meters (say ~2500-3000 nos.) with high refresh rate of 1min would be a testing scenario for all IEM manufacturers and AMR solution providers. He suggested a pilot project may be taken up first for large no of meters (2500-3000 meters).

17. COO (CTU-POWERGRID) suggested that a committee comprising of members from RPCs, CEA, CTU/POWERGRID & POSOCO may be formed to finalize the Technical Specification of "5 min metering with AMR-MDP system at ISTS interface points" on PAN India basis.

18. Chairperson CEA stated that there is a need for IEM data to be available in real time at SLDCs as this will help the state utilities mitigate the DSM penalties. This could be achieved by implementing AMR scheme. The metered data shall be communicated to the respective State Load Despatch Centre by using a secured and dedicated communication system. He appreciated GETCO's initiatives on real time metering data and asked them to carry out a Pilot Project at their own cost in this regard. GETCO agreed for the same.

After detailed deliberations, the following decisions were taken:

1. All the existing IEMs shall be replaced with new technology IEMs having facility to communicate recorded data to LDCs in real time. The modalities for the project shall be decided later on.

2. All future IEMs at ISTS interface points shall have the feature of user configurable 5/15 min time block along with real time streaming of 1 min (at least) instantaneous data. A reliable communication system (preferably OFC) would be adopted while finalising the Technical specifications. In order to harmonize the new age end-to-end metering solution, the Technical Specifications (TS) of the new technology IEMs shall be followed on PAN India basis.

3. A joint committee comprising members from each RPC, CEA, and CTU/POWERGRID & POSOCO shall be formed to deliberate and finalise the above TS.

4. To minimise DSM penalties during the interim period, the state utilities may put additional meters in series with the existing meters at the ISTS locations at their own cost in consultation with CTU (POWERGRID). With a view to help the States / DISCOMs, it was decided with the consent of GETCO that they (GETCO) shall carry out the pilot project for real time monitoring of metering data at ISTS points of their state at their own cost and share the outcome of the project with NPC. Subsequently, similar project may be taken up by other interested states if they find outcome of the Pilot Project commercially beneficial to them.
5. POSOCO would assess the feasibility of placing new AMR-MDP system at its RLDCs/NLDC and make efforts to arrange the same, or suggest a techno-economic

solution to collect the metered data at RLDCs/NLDC from the AMR-MDP system.

Meeting ended with vote of Thanks to the Chair.

Annexure-I

List of Participants in the meeting of Telemetry of real time Active Power (MW) data to SLDCs held on 19.11.2020

Central Electricity Authority (CEA)

1. Shri Prakash S. Mhaske, Chairperson
2. Shri Dinesh Chandra, Member, GO&D
3. Smt. Rishika Sharan, Chief Engineer, NPC
4. Shri Hemant Jain, Chief Engineer, GM
5. Shri Himanshu Lal, Assistant Director, NPC
6. Shri Kotthapally Satishkumar, Assistant Director, NPC

Northern Region Power Committee (NRPC)

1. Shri Naresh Bhandari, Member Secretary

North Eastern Region Power Committee (NERPC)

1. Shri A.K.Thakur, Member Secretary
2. Shri B.Lyngkhoi, Superintending Engineer

Western Region Power Committee (WRPC)

1. Shri Satyanarayan.S, Member Secretary
2. Shri Pramod Lone, Superintending Engineer

Eastern Region Power Committee (ERPC)

1. Shri N S Mondal, Member Secretary
2. Shri Kejriwal, Superintending Engineer

Southern Region Power Committee (SRPC)

1.Shri Alagarsamy Balan, Member Secretary

Power System Operation Corporation Ltd. (POSOCO)

1. Shri S. S. Barpanda, Director(Market Operation)
2. Shri Debasis De, ED, NLDC
3. Shri Manoj Agrawal, Sr.GM
4. Shri Samir Saxena, Sr. GM

Power Grid Corporation of India Ltd. (POWERGRID)

1. Smt Seema Gupta, Director (Operations), CTU
2. Shri Subir sen, COO, CTU
3. Shri H S Kaushal, GM, CTU
4. Smt Sangita Sarkar, Manager, CTU

Representatives from States

1. Shri B.B. Mehta, Director, SLDC, OPTCL, Odisha
2. Shri Nasir Quadri, Chief Engineer, AC&I, MSETCL, Maharashtra
3. Shri Milind Deole, Executive Engineer, MSETCL, Maharashtra
4. Shri Shrikant Jaltare, Executive Director, MSLDC, Maharashtra
5. Shri Jueli Wagh Chief Engineer, MSLDC, Maharashtra

6. Shri Eknath Dengale, Superintending Engineer, MSLDC, Maharashtra
7. Shri Vipul Vyas, Chief Engineer, SLDC, GETCO, Gujarat
8. Shri K P Rathod, Add. Chief Engineer, SLDC, GETCO
9. Shri A K Singh, Chief Engineer, SLDC, Uttar Pradesh
10. Smt. Mallika, Chief Engineer (Grid Operations), Tamil Nadu.

Special invitees

1. Shri Jitendra Raheja, Secure Meters Limited
2. Shri Anil Mehta, Secure Meters Limited
3. Smt. Nimisha Chauhan, Secure Meters Limited
4. Shri Manoj Taunk, Adani Power Limited
5. Shri Amarjeet Singh, L&T Meters
6. Shri Akshay Deshpande, L&T meters

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Telemetry of real time active power (MW) data to SLDCs from new IEMs to be installed in WR

or

Provision of additional Energy Meters in series with existing IEMs by the STUs

CEA, Nov 2020

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDCS

After implementation of Deviation Settlement Mechanism (DSM) Regulations 2014 of CERC and subsequent amendments, the constituents have been **raising issue of accuracy of SCADA data**.

As per present practice, the utilities take decisions of their drawal management, based upon not-so accurate **real-time MW SCADA data.** This leads to increase in DSM penalty, which is computed subsequently from weekly IEM energy data.

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDCS

The issue was raised by utilities of **SRPC, NRPC and WRPC** in their respective forums.

To mitigate this problem, the utilities suggested to get the **real time active power (MW) data to SLDCs through IEMs.**

As the **existing IEMs** installed are **not capable** of telemetry of real-time MW data, the issue of **installing additional energy meter in series with existing IEMs or** Provision of real time MW data to SLDCs in the technical specification of the new 5/15-minut IEMs to be supplied and installed was emerged.

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDCS

CEA also received communications from PGCIL dated 20.07.2020) and WRPC dated 25.09.2020 on the above issue.

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDCS

As per 83rd CCM of WRPC held on 11.09.2020, it has been decided that the following points may be incorporated in the TS of Interface meters of WR AMR

- The AMR system shall be **capable of streaming online instantaneous MW data** at a user configurable rate to SLDCs/WRLDC. The minimum desired rate **at least 1 min,**
- A **stringent clause** that technical/basic performance of the meter should not get affected at any cost because of above feature may be included in CEAs metering regulations/standards.
- The **accounting data should be the final data** for all accounting purpose and shall **not be disputed** by stake holders by comparing it with the instantaneous data acquired.

(since the data is from same source, the data difference is expected to be insignificant and much better than the existing SCADA data or additional meter data)

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDCS

- CTU, POWERGRID has prepared the desired TS.
- **CTU has requested that the Specification of the IEMs shall be followed on PAN India basis.**
- However, WRPC vide letter dated 25.09.2020 to CEA has communicated that **an additional energy meter in series with the existing energy meter (capable of real-time transfer of data) may be allowed to be installed.**
- He pointed out that providing additional Energy meter in series would not increase any significant burden on the CTs & PTs since the Energy meters are low burden device and the CTs & PTs are adequately rated to take this burden.
- However, **POWERGRID has rejected the request of installation of additional EM in series with existing IEMs by STUs in their premises.**

May like to discuss/deliberate.

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDC

As per **CEA metering Regulations** and its amendments following clauses have been modified:

- *"(1) (a)* ***all new Interface Meters and Energy Accounting and Audit Meters shall be of static type and shall have automatic remote meter reading facility;"***
- *....."Provided that the time block for recording of meter data by the meter shall be* ***15 minutes or as specified by the Central Commission.";***
- *....."All* ***new meters*** *shall be re-configurable at site for change of time block as specified by the Central Commission."*
- *The metered data shall be communicated to the* ***respective Load Despatch Centre by using a secured and dedicated communication system."***

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDC

As per BIS Standard 14697 for interface meters following have also been mentioned:

- *G-2.2 It should be possible to display various* ***instantaneous quantities****, for example phase wise details of* ***kW, kVA and power factor****, overall kVA, overall kW, overall power factor, frequency, count for number of MD resets, real time and check for display segments, within accuracy* ***limits agreed by the manufacturer and the user."***

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDC

Technical Specifications submitted by POWERGRID have also following clauses inserted for **Telemetry of real time active power (MW) data to SLDCs from new IEMs**

- *Moreover, in view of the new DSM regulation, which are more stringent, there is a need to get **streaming online instantaneous MW data at a user configurable rate (minimum 1 min) at SLDCs** via IEMDCs.*
- *The Technical/basic performance of the meter (as envisaged in the CEA metering regulations/standards) should not get affected at any cost because of this streaming online instantaneous MW data functionality.*
- *This instantaneous MW data is only for the purpose of taking actions/decisions in real time.*
- *The intent of **AMR scheme proposed in this document is to automate the task of data collection including streaming online instantaneous MW data** at a user configurable rate from each meter/location to the Central Data Collection System (CDCS) at IEMDC followed by validation, processing and generation of customized reports. The data shall be stored in Standard RDBMS and archived in Historian.*
- *The user based access to view **instantaneous MW data** shall be provided to SLDCs **through WEB portal.***
- *For **instantaneous MW data, the 120 days data** should be available to view by respective SLDCs.*

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDCS (SRPC COMMENTS)

- The issues of mismatch in SCADA data with SEM data were raised by SR constituents in various forums.
- In SR, it may please be noted that **there is no such proposal** (as proposed by STUs of WR) to install additional energy meter
- The crux of the issue of that **there is a need for IEM data to be available in real time at SLDCs,** this will help the SLDCs/DISCOMs for real time operation as well as commercial settlement. This could be achieved by implementing AMR scheme.

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDCS(SRPC COMMENTS)

- On PGCIL comments that there is **no provision of telemetry of real time MW data in CEA metering regulations 2006 and amendments thereof up till Dec'2019**, the same capability should not be considered as part of upcoming TS of the 5/15 minutes IEMs.
- As per Regulation 14(1)(b) of Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2019 stipulates as below:

"The metered data shall be communicated to the respective Load Despatch Centre by using a secured and dedicated communication system."

- In view of the above provisions, real time active power data to Load dispatch Centers i.e SLDCs and RLDC may be provided.

TELEMETRY OF REAL TIME ACTIVE POWER (MW) DATA TO SLDCS(ADANI POWER LIMITED SYSTEM)

- Adani Power Limited (APL) has conveyed that they **are already using these types of meters** since 2014, which are proposed for procurements.
- APL is using 250+meters for their **DSM online monitoring system**. They are streaming instantaneous MW data @1 Sec at SLDC through IEMs
- In APL system architecture all the data is fetch through plant server, and client is extended to Ahmedabad for commercial decisions.
- In case of WRLDC network all the data from meters will be **collected by DCU** and data can be **transferred to WRLDC over ULDC network**. In case of absence of **failure of ULDC link, 3G/4G GPRS can link** can be used to get the data as back up link.
- Once the data is collected at WRLDC, respective data can be shared with SLDC.

MODALITIES OF IMPLEMENTATION & O&M OF AMR -MDP SYSTEM (AGENDA SUBMITTED BY CTU)

Background-

In the 11th meeting held on 28th March'2017, the FOR technical committee members appreciated the need to move to 5-minute scheduling and settlement in view of the increasing RE penetration and constituted a Sub-Group comprising of CEA, CTU, RPCs, POSOCO & CERC staff.

As per Sub-Group Report, February 2018 on '**Introduction of Five Minute Scheduling, Metering, Accounting and Settlement in Indian Electricity Market' mentioned the need for requirement of AMR along with communication infrastructure, storage enhancement etc**. The report also recognized that the AMR/MDP software along with associated hardware for meter data collection, validation and processing at RLDC has to be ensured.

Issues-

As this system is being taken up PAN India on regional basis, the **modalities need to be clearly specified for its implementation and O&M.**

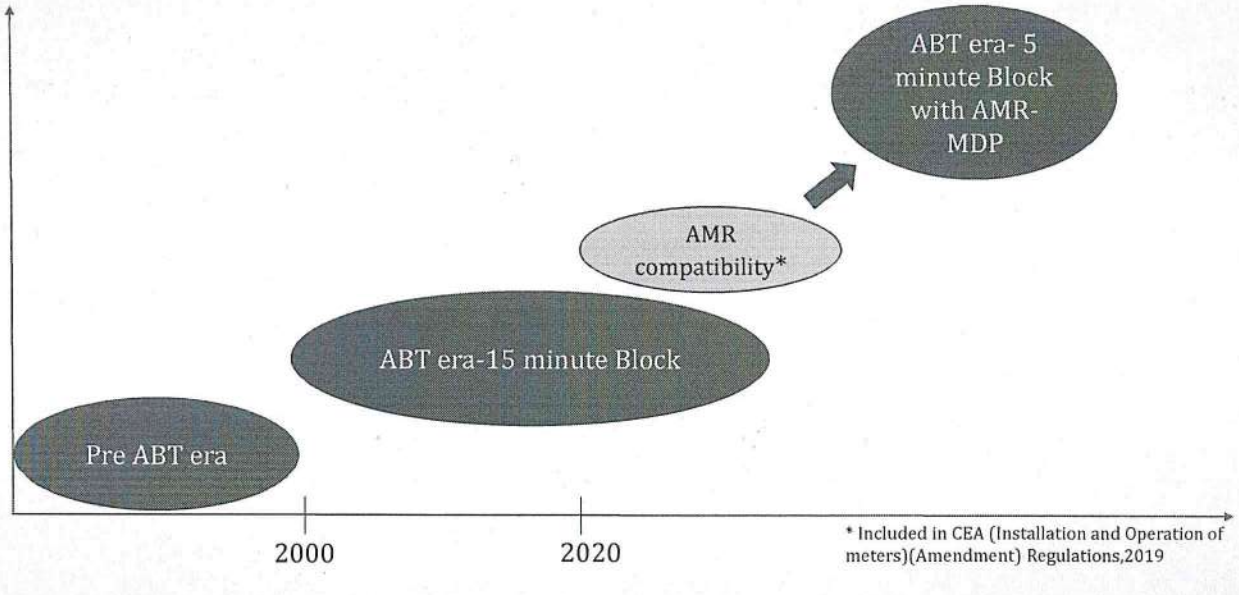
May like to discuss/deliberate.

Thank you

Annexure-III

ISTS METERING

EVOLUTION OF ISTS METERING SYSTEM:



TRANSITION STAGES

15 minute Time block ⟹ 5 minute Time block

- RE capacity Target (by GoI)- 175GW by 2022.
- Recommendation of FOR Technical Committee
  - need to move to 5 minute scheduling and settlement.
  - Formation of a sub-group comprising of CEA, CTU, RPCs, POSOCO & CERC.
- The sub-group report dtd. **February'2018** provides directives on
  - i) Action plan for migration to the 5 minute scheduling and settlement in a phase wise manner,
  - ii) Inclusion of Automatic Meter Reading(AMR),
  - iii) Suitable Communication Infrastructure,
  - iv) Storage enhancement,
  - v) Standardized data/format & protocols.
  - vi) Location of AMR reading/ MDP software along with associated hardware shall be at RLDC (IEMDC Main & Back-up)
- Live Demo of 5 minute Meter:
  - At PGCIL 400/220kV Magarwada SS, UT Daman-Diu on 13th September'2017
  - At PGCIL 765/400kV Vadodara SS on 10th Oct'2017.
  - witnessed jointly by representatives of POSOCO (NLDC, WRLDC), POWERGRID, Gujarat SLDC.
  - As a part of the action plans ordered by CERC dtd. 16th july'2018, execute **a pilot project with 5 min metering** in all regions. Technical Specification (TS) for this was considered as approved in the 34th TCC/WRPC (on 27-28th July'2017).

5 MIN PILOT PROJECT

- Procurement and Installation –done by POWERGRID as CTU in coordination with POSOCO.
- POSOCO shall share experience report with CERC and all concerned tentative by January'21

Status of pilot project

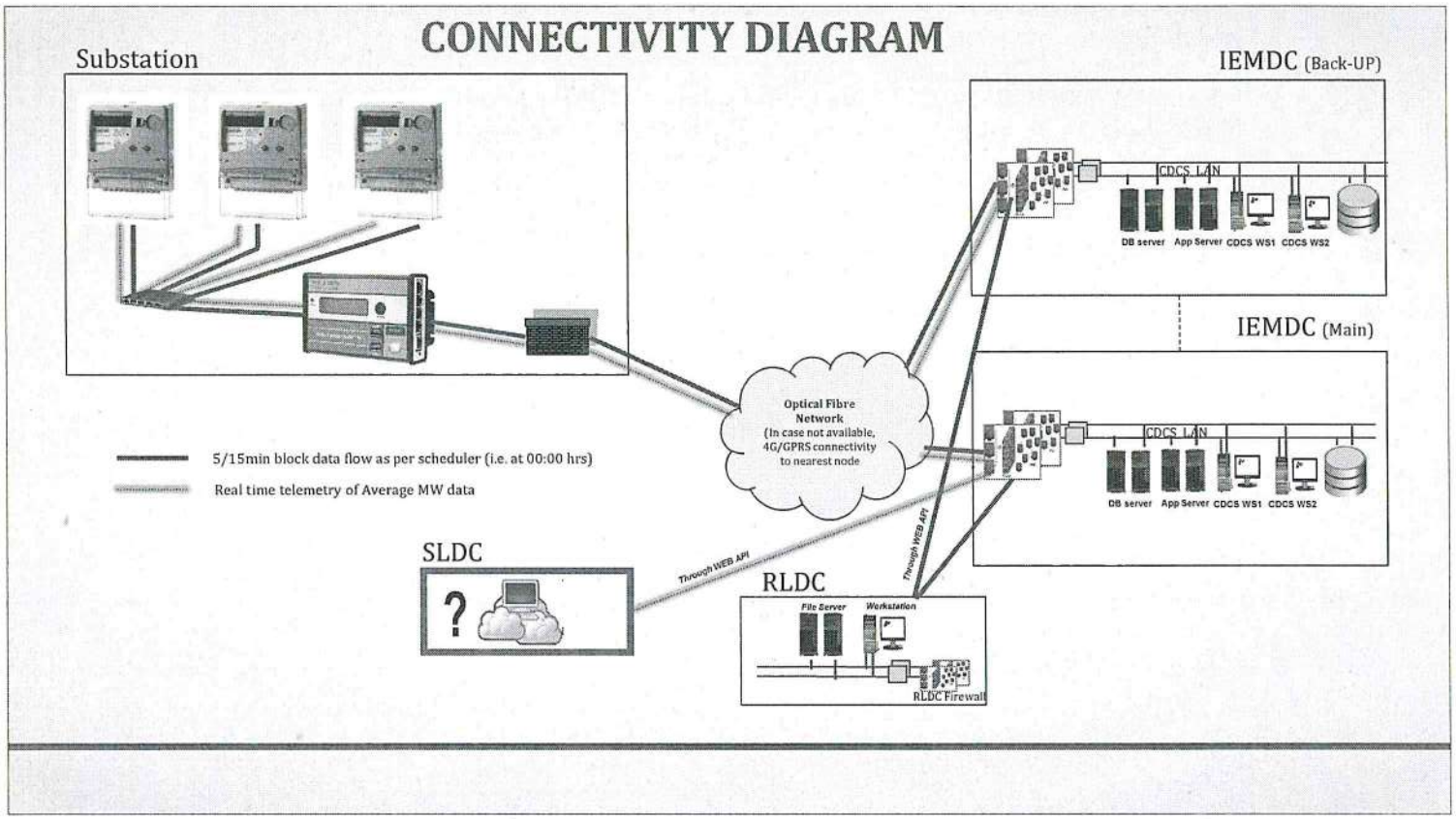
Sl. No	Location	Total meters (As per LOA)	Total DCU (As per LOA)	Supplied	Commissioned	Remarks
1	NTPC Dadri	36	2	Yes	Yes	
2	THDC Tehri	5	1	Yes	Yes	
3	NTPC Mouda	33	1	Yes	Yes	
4	NTPC Simhadri	14	1	Yes	Yes	
5	NTPC Bongaingaon	10	1	Yes	Yes	
6	NTPC Barh	10	1	Yes	NO	Due to COVID & Bihar Election
7	NHPC Teesta	5	1	Yes	Yes	
8	NHPC Loktak	9	1	Yes	Yes	
Total Meters		**122**	**9**			

REQUIREMENT OF REAL TIME TELEMETRY OF METER DATA

- In the era of ABT/DSM (Deviation Settlement Mechanism) Regulations, the issue of heavy penalty came up for discussion in various RPC meetings.
- Persisting follow up with RPC by GETCO-Gujrat SLDC to receive accurate Average MW data from all interface points related to Regional Energy Accounting.
- Approval of real time energy data transfer to SLDCs in **39th WRPC -Dec'19**
- Special meeting for finalization of TS of real time telemetry of MW data at WRPC on **4th Feb 2020**.
- Draft TS -prepared by CTU and communicated to WRPC & CEA

SALIENT POINTS OF TS

Comparison of Existing & Proposed Interface Meters for ISTS locations				
Sl. No.	Feature	Existing TS	TS of 5 min metering with AMR & MDP System	
			1st Revision 34th WRPC TS	2nd Revision TS_ after 4th Feb'2020 Meeting (sent to WRPC, POSOCO and OEMs on 17th May'2020)
1	Time Block	15 min	5min/15 min	User configurable 5 min/15min
2	Meter Port	Optical admin port. RS 485 port	Optical admin port. RS 485 port	Optical Ethernet ports. Optical Admin Port
3	Meter Reading	By Portable Hand Held Data Collection Devices	Primarily by AMR By Portable Hand Held Data Collection Devices during contingency	Primarily by AMR By Portable Hand Held Data Collection Devices during contingency
4	Real Time Meter data at SLDC	Not envisaged	Not envisaged	Presently Excluded from TS To be discussed
5	Redundancy	NA	NA	Redundancy at main and Back-UP IEMDCs.
6	Cyber Security	NA	NA	Included Cyber Security requirements as per the relevant standards and CERT-in guideline
7	MDP System	NA	Functionaly & report formats considered as provided by POSOCO.	Functionaly & report formats considered as provided by POSOCO.



➢ Location of IEM Data Centre

- As per the FOR sub-group report'2017-Respective RLDCs.
- Separate locations other than RLDCs and NLDC requested by POSOCO due to the issues of space constraint and overall system maintenance.

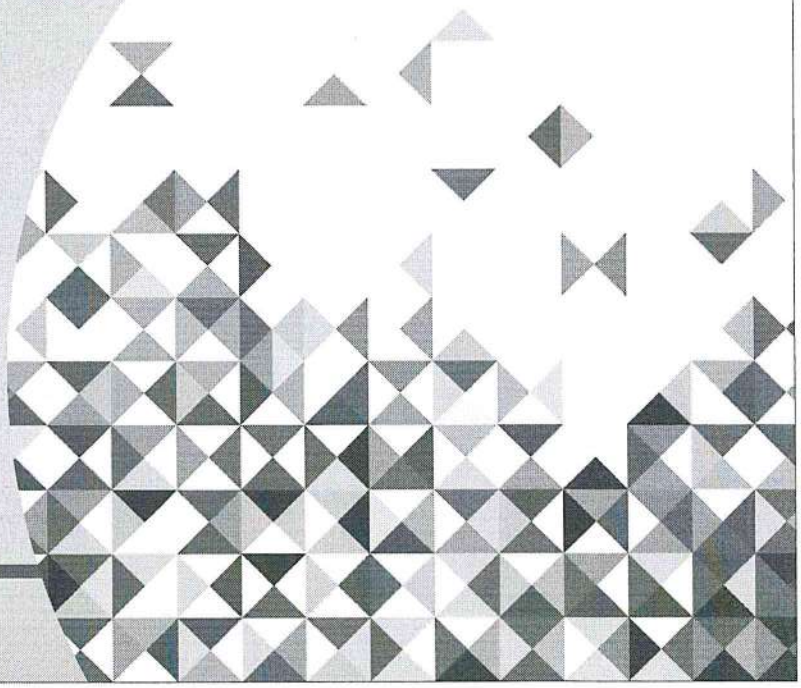
➢ Modality of Implementation

- -To be Decided

5 MIN METERING WITH AMR+MDP SYSTEM

- Technical Specification
- Location of IEM Data Centre
  - RLDCs -As per the FOR sub-group report'2017.
- Modality of Implementation
  - To be Decided

THANK YOU FOR YOUR KIND ATTENTION

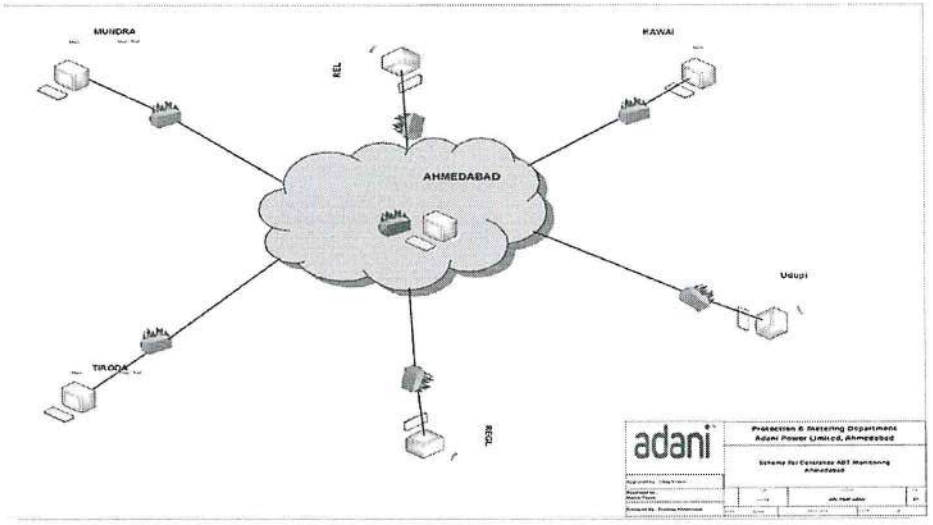


DSM Monitoring system
Adani Power Ltd

adani

DSM Monitoring System

Centralized Monitoring Architecture



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DSM Monitoring System

Total Metering Points : 150 +

Equipment	Mundra	Tiroda	Kawai	Udupi	REGL	REL
Lines	18	4	3	4	2	2
GTs	9	5	2	2	1	2
STs	7	5	2	2	1	2
Generator	9	5	2	2	1	2
UATs	18	10	4	4	2	4
ICT/BS	8	2	0	4	0	0

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DSM Monitoring System

Systems Details: - APC (2000+), DSM (130+)

Location	APC Systems	DSM Systems
APMul, Mundra	(550+)	(70)
APML, Tiroda	(557)	Yes (31)
APRL, Kawai	(300+)	Yes (13)
UPCL, Udupi	(200+)	Yes (18)
REL, Raipur	(240+)	(12)
REGL, Raigarh	(130+)	(7)

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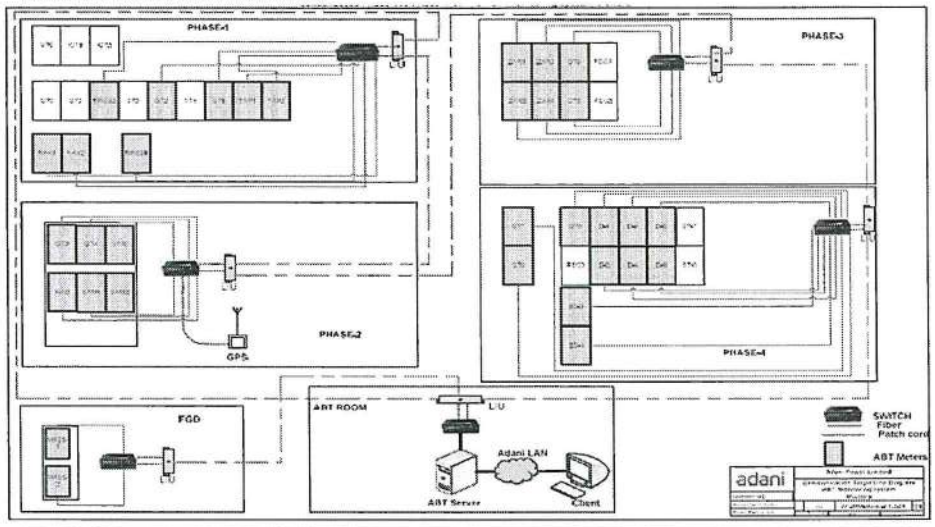
DSM Monitoring System

Mundra DSM Architecture



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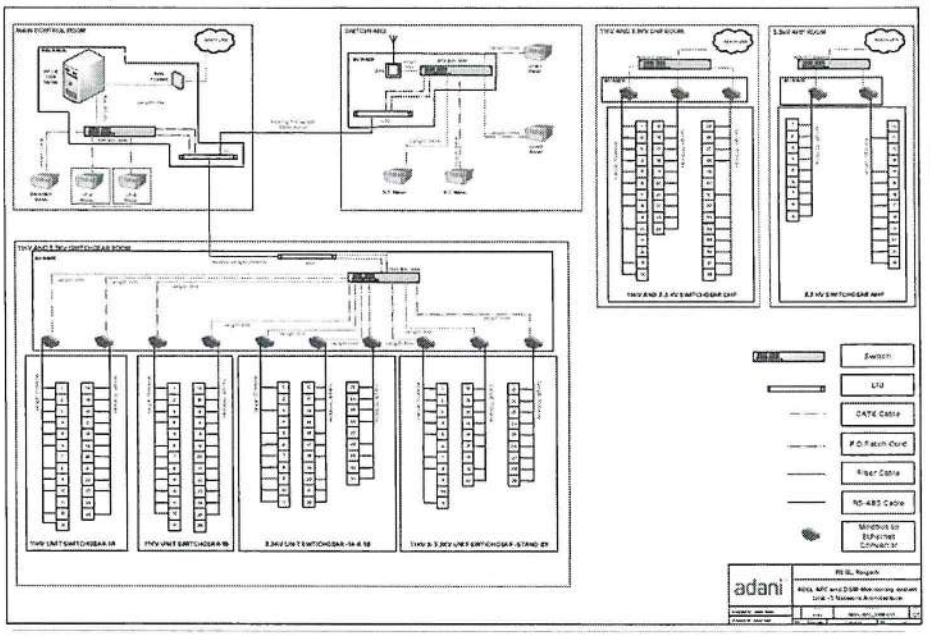

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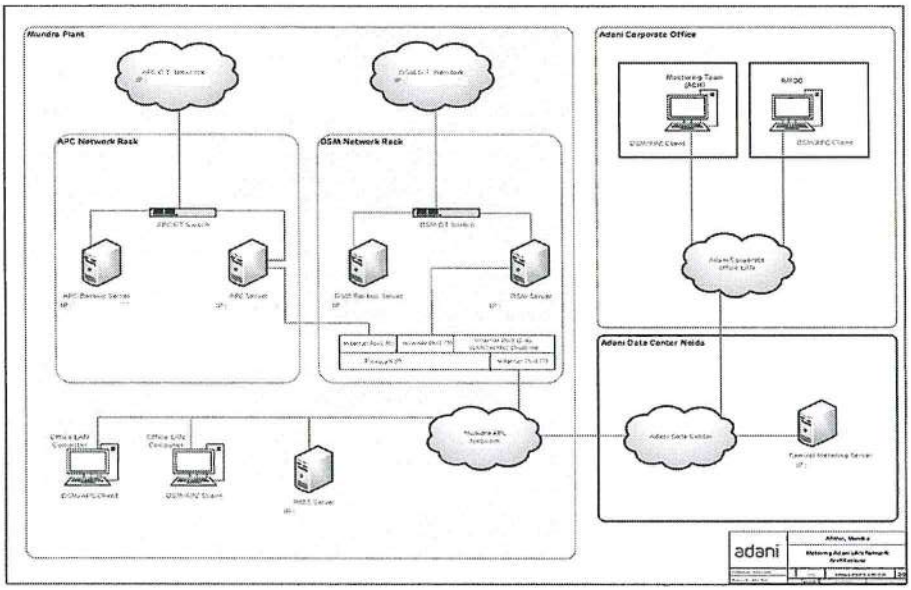

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DSM Monitoring System

System development includes

- All Lines, GTs, STs, Gens, UATs, ICTs and BS meters real time and Profile data.
- Monitoring and DSM Calculation as per CERC regulation 5th amendment.
- Different report generation on Customized format.
- Profile data retrieval facility even after failure of communication.
- Central data backup for all the plants
- Centralized monitoring at Ahmedabad using concurrent client.

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DSM Monitoring System

Highlights of the system

- Dedicated server for each plant at plant location.
- All data communication is done with servers and Servers have database that stored all data in respective server.
- Server has application like Modbus Logger, DLMS Logger.
- Server has application for DSM Calculation.
- Reporting Tool like DGR, DC/ SG, DSM Calculation.
- All Plant DSM System is monitoring at plant level as well as at centrally ACH Ahmedabad 24x7.
- Connectivity between plant and Ahmedabad is through lease line network.
- Time synchronized using Masibus GPS Clock over NTP Protocol.
- Kapware OPC server for providing data over OPC DA Protocol to third party system (PIMS Honeywell System)

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DSM Monitoring System

Communication : TCP /IP over Modbus and DLMS

- Meter having Instantaneous and 15 minute block profile data facility.
- Instantaneous data polled from Meter over Modbus TCP protocol and data refresh time is about 2sec.
- Block data polled after IP cross over and at 00.00 Hrs

Communication Ports supported in the meters: -

- Ethernet Port
- RS-485
- RS-232
- Optical Port
- USB Port (Optional)

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DSM Monitoring System

2 second update required for following parameter of energy meter :

- Active Import Energy
- Active export Energy
- Reactive Import while active import Energy
- Reactive Export while active import Energy
- Reactive Import while active export Energy
- Reactive Export while active export Energy
- Reactive High Energy
- Reactive low Energy
- Apparent Import Energy
- Apparent Export Energy
- Net Active energy
- Net Active energy
- Average Frequency of current SIP
- Average power of current SIP
- Voltages
- Currents
- Instantaneous frequency
- Instantaneous power

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DSM Monitoring System

15 minute block data required for following parameter of energy meter :

- Active Import Energy
- Active export Energy
- Reactive Import while active import Energy
- Reactive Export while active import Energy
- Reactive Import while active export Energy
- Reactive Export while active export Energy
- Reactive High Energy
- Reactive low Energy
- Apparent Import Energy
- Apparent Export Energy
- Net ACTIVE energy
- Average frequency
- Average Voltage
- Average Current

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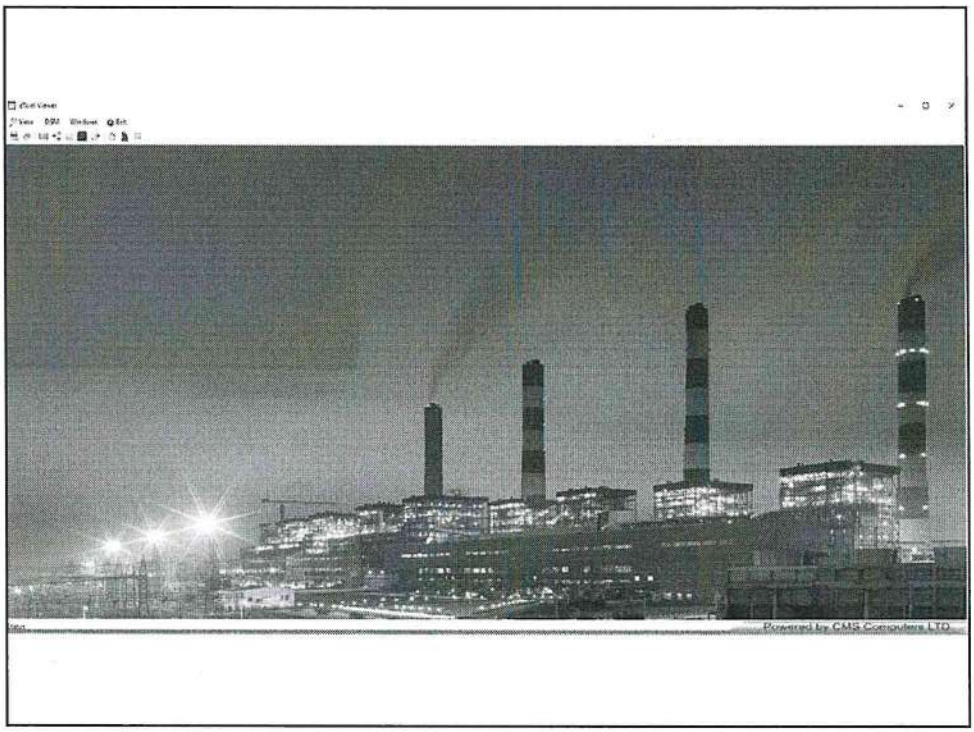
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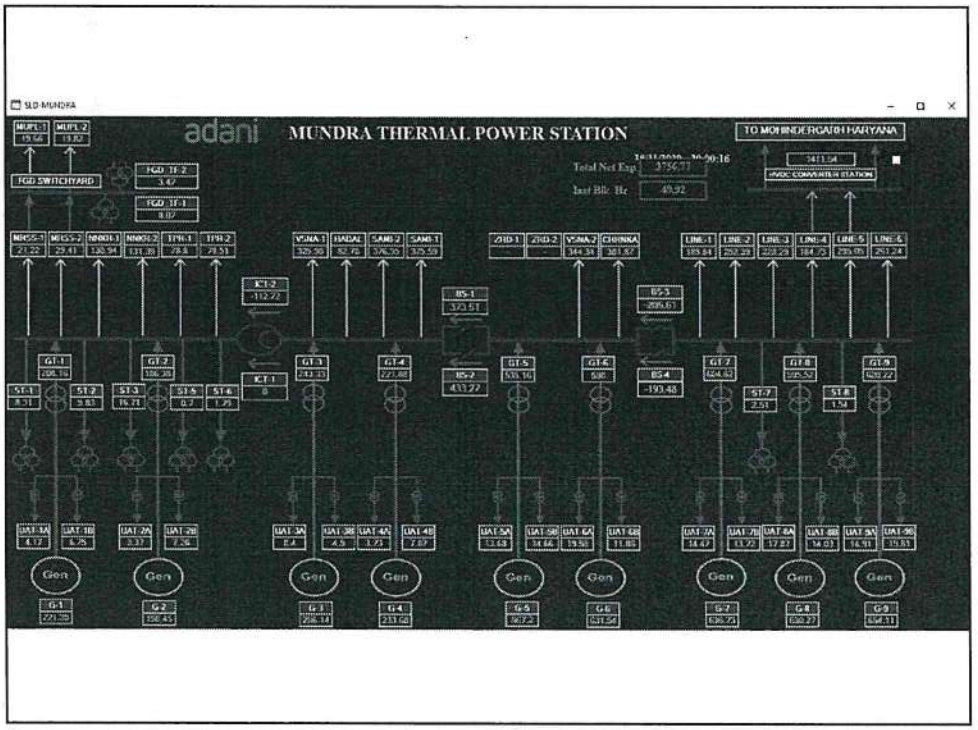
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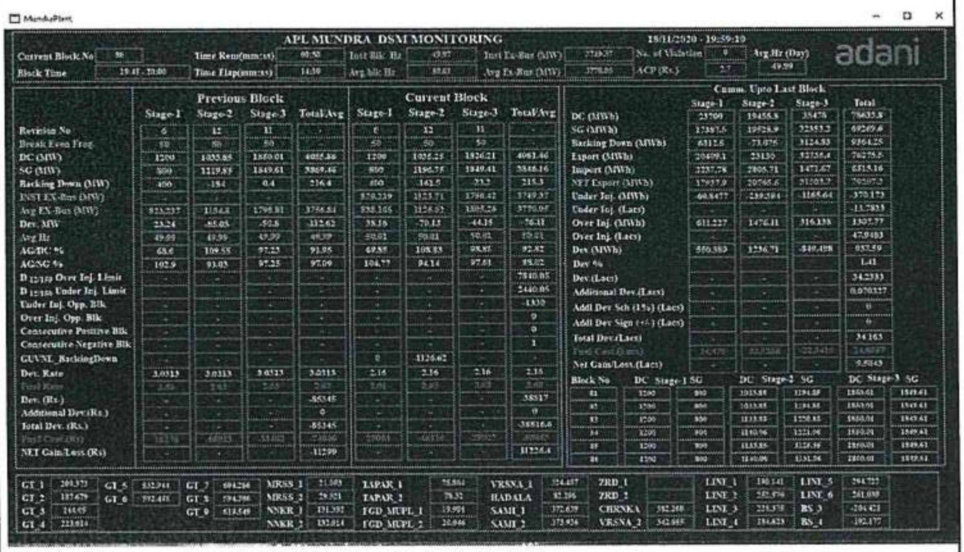
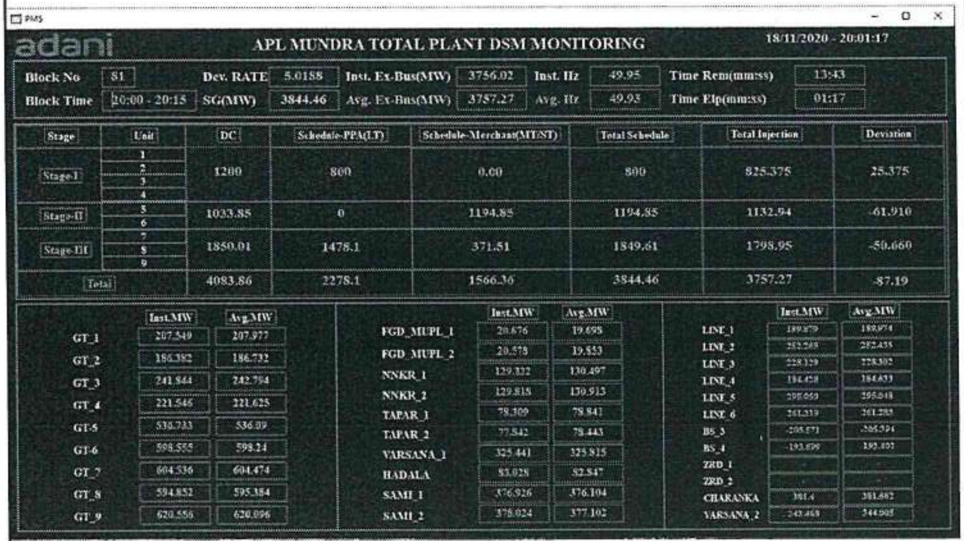
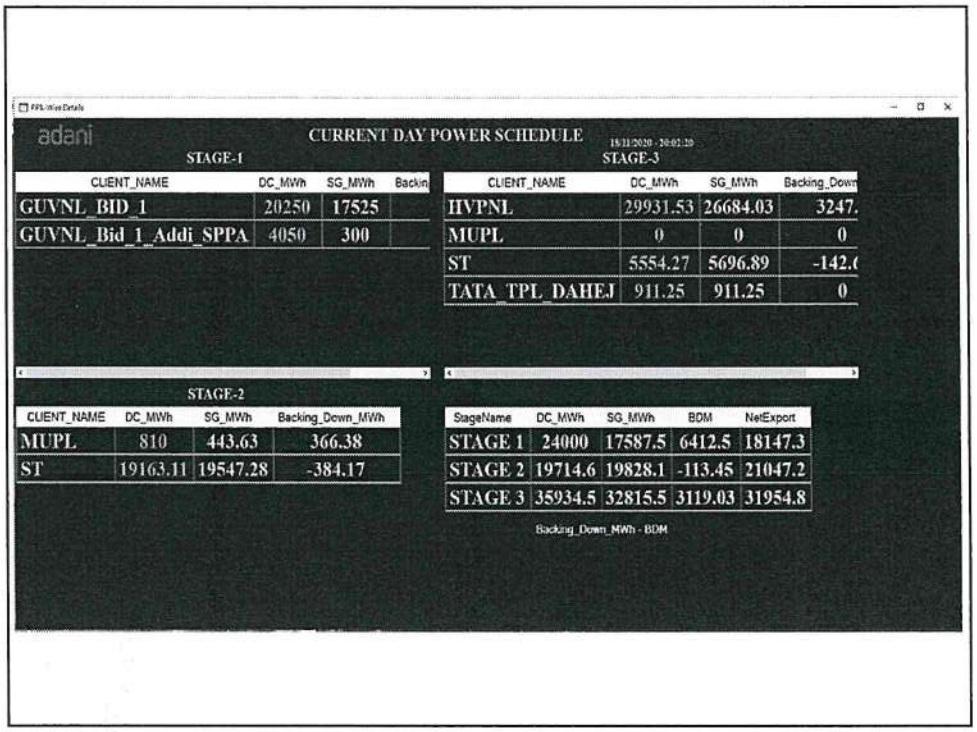
MUNDRA THERMAL POWER STATION
TO MOHINDERGARH HARYANA
FGD SWITCHYARD
Gen


MundraPlant
APL MUNDRA DSM MONITORING
adani
Current Block No
Block Time
Previous Block
Current Block
Cumm. Upto Last Block
Stage-1
Stage-2
Stage-3
Total/Avg
Total


PMS
adani
APL MUNDRA TOTAL PLANT DSM MONITORING
18/11/2020 - 20:01:17
Block No 81
Block Time 20:00 - 20:15
Dev. RATE 5.0188
SG(MW) 3844.46
Inst. Ex-Bus(MW) 3756.02
Avg. Ex-Bus(MW) 3757.27
Inst. Hz 49.95
Avg. Hz 49.95
Time Rem(mm:ss) 13:43
Time Elp(mm:ss) 01:17
Stage
Unit
DC
Schedule-PPA(LT)
Schedule-Merchant(MT/ST)
Total Schedule
Total Injection
Deviation
Stage-I 1200 800 0.00 800 825.375 25.375
Stage-II 1033.85 0 1194.85 1194.85 1132.94 -61.910
Stage-III 1850.01 1478.1 371.51 1849.61 1798.95 -50.660
Total 4083.86 2278.1 1566.36 3844.46 3757.27 -87.19
Inst.MW
Avg.MW
GT_1 207.549 207.977
GT_2 186.382 186.732
GT_3 241.844 242.794
GT_4 221.546 221.625
GT-5 538.733 536.09
GT-6 598.555 598.24
GT_7 604.536 604.474
GT_8 594.852 595.384
GT_9 620.556 620.096
FGD_MUPL_1 20.676 19.695
FGD_MUPL_2 20.578 19.553
NNKR_1 129.322 130.497
NNKR_2 129.815 130.915
TAPAR_1 78.309 78.841
TAPAR_2 77.842 78.443
VARSANA_1 325.441 325.815
HADALA 83.028 82.547
SAMI_1 376.926 376.104
SAMI_2 378.024 377.102
LINE_1
LINE_2
LINE_3
LINE_4
LINE_5
LINE_6
BS_3
BS_4
ZRD_1
ZRD_2
CHARANKA 381.4 381.682
VARSANA_2



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CURRENT DAY POWER SCHEDULE

15/11/2020 - 20:02:20

STAGE-1

CLIENT_NAME	DC_MWh	SG_MWh	Backin
GUVNL_BID_1	20250	17525	
GUVNL_Bid_1_Addi_SPPA	4050	300	

STAGE-3

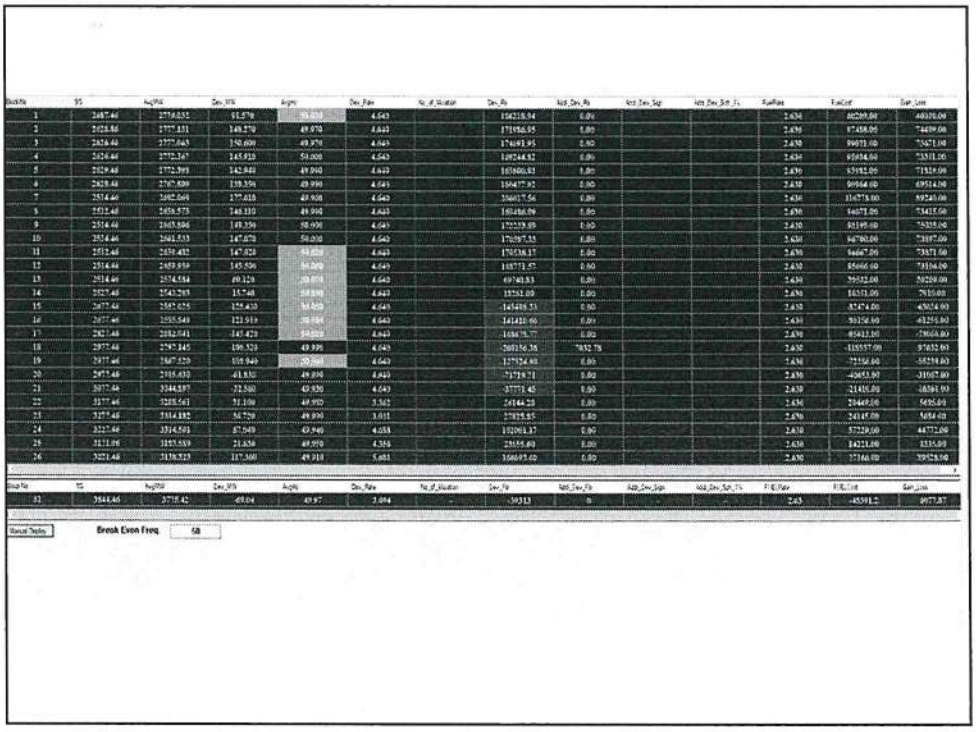
CLIENT_NAME	DC_MWh	SG_MWh	Backing_Down
HVPNL	29931.53	26684.03	3247.
MUPL	0	0	0
ST	5554.27	5696.89	-142.(
TATA_TPL_DAHEJ	911.25	911.25	0

STAGE-2

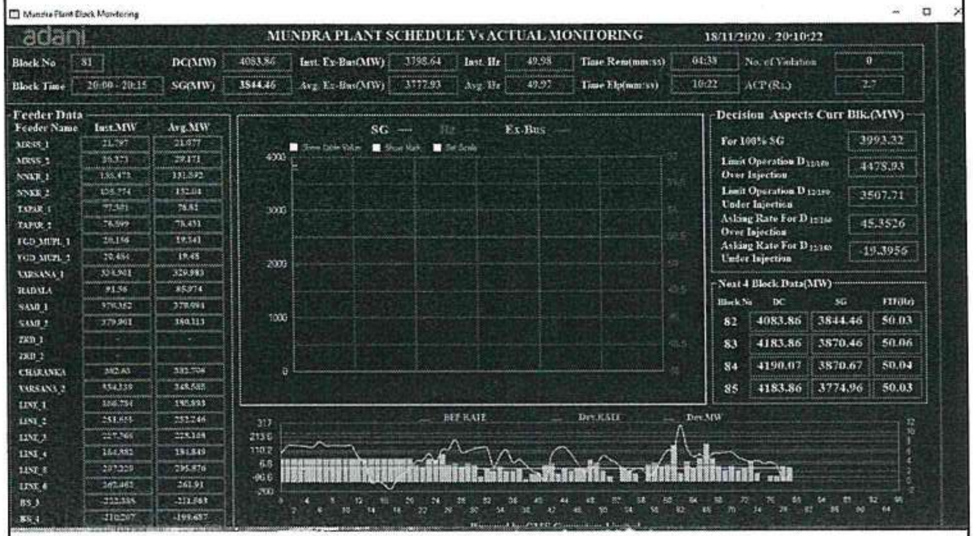
CLIENT_NAME	DC_MWh	SG_MWh	Backing_Down_MWh
MUPL	810	443.63	366.38
ST	19163.11	19547.28	-384.17

StageName	DC_MWh	SG_MWh	BDM	NetExport
STAGE 1	24000	17587.5	6412.5	18147.3
STAGE 2	19714.6	19828.1	-113.45	21047.2
STAGE 3	35934.5	32815.5	3119.03	31954.8

Backing_Down_MWh - BDM



Break Even Freq 58


Mundra Plant Block Monitoring
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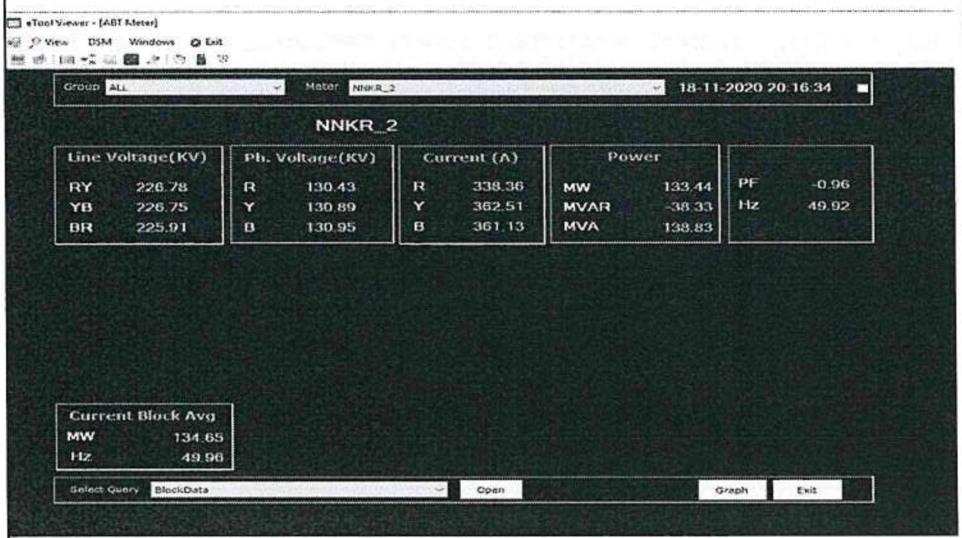
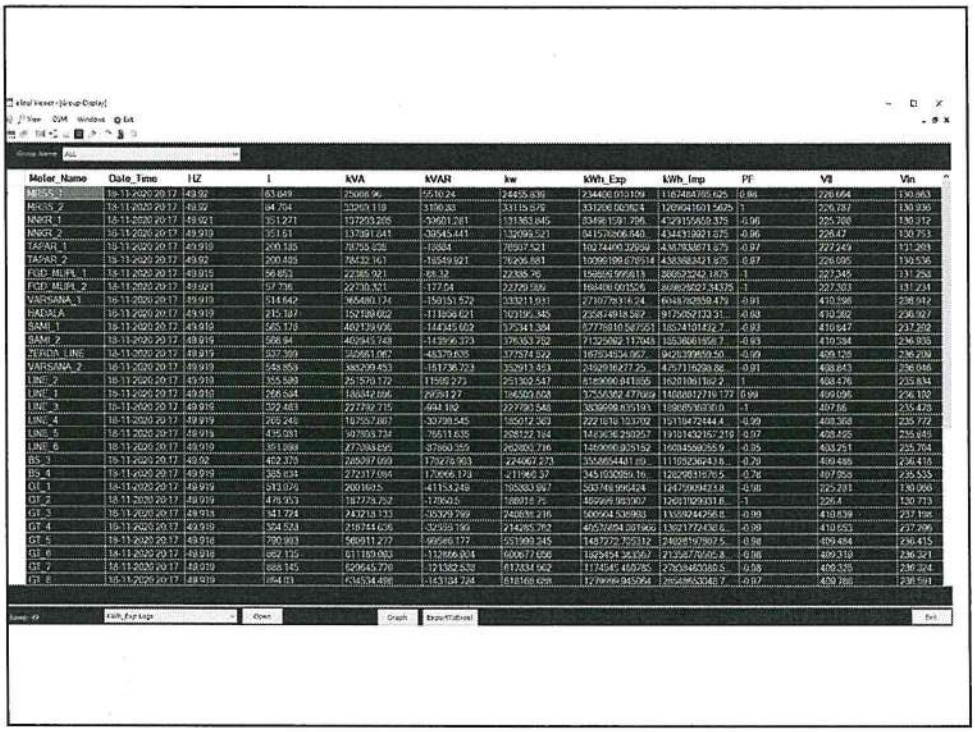
MUNDRA PLANT SCHEDULE Vs ACTUAL MONITORING
18/11/2020 - 20:10:22
Block No 81
Block Time 20:00 - 20:15
DC(MW) 4083.86
SG(MW) 3844.46
Inst. Ex-Bus(MW) 3798.64
Avg. Ex-Bus(MW) 3777.93
Inst. Hz 49.98
Avg. Hz 49.97
Time Rem(mm:ss) 04:38
Time Elp(mm:ss) 10:22
No. of Violation 0
ACP(Rs.) 2.7
Feeder Data
Feeder Name
Inst.MW
Avg.MW
SG
Ex-Bus
Decision Aspects Curr Blk.(MW)
For 100% SG 3993.32
Limit Operation D Over Injection 4478.93
Limit Operation D Under Injection 3507.71
Asking Rate For D Over Injection 45.3526
Asking Rate For D Under Injection -19.3956
Next 4 Block Data(MW)
Block No DC SG FTF(Hz)
82 4083.86 3844.46 50.03
83 4183.86 3870.46 50.06
84 4190.07 3870.67 50.04
85 4183.86 3774.96 50.03
DEF RATE
Dev RATE
Dev MW


eTool Viewer - [ABT Meter]
View DSM Windows Exit
Group ALL
Meter NNKR_2
18-11-2020 20:16:34
NNKR_2
Line Voltage(KV)
RY 226.78
YB 226.75
BR 225.91
Ph. Voltage(KV)
R 130.43
Y 130.89
B 130.95
Current (A)
R 338.36
Y 362.51
B 361.13
Power
MW 133.44
MVAR -38.33
MVA 138.83
PF -0.96
Hz 49.92
Current Block Avg
MW 134.65
Hz 49.96
Select Query BlockData
Open
Graph
Exit



Meter_Name	Date_Time	HZ	I	kVA	kVAR	kw	kWh_Exp	kWh_Imp	PF	Vll	Vln
MBSS_1	16-11-2020 20:17	49.92	83.849	25068.96	5510.24	24455.836	234406.013109	1167484765.625	0.96	226.664	130.863
MBSS_2	16-11-2020 20:17	49.92	84.704	33269.119	3139.83	33115.578	331206.093624	1209041601.5625	1	226.787	130.936
NNKR_1	16-11-2020 20:17	49.921	351.271	137293.205	-30601.281	133863.845	03498.1591.796	4329155650.375	-0.96	225.788	130.312
NNKR_2	16-11-2020 20:17	49.919	351.61	137591.041	-30545.441	134099.521	0415.26206.640	4344319921.875	-0.96	228.47	130.753
TAPAR_1	16-11-2020 20:17	49.919	200.185	78759.038	-10884	78097.521	10274400.32899	4347833671.875	-0.97	227.249	131.203
TAPAR_2	16-11-2020 20:17	49.92	200.489	78432.161	-10549.921	78206.881	10299199.676514	4358382421.875	-0.97	226.695	130.536
FDD_MUPL_1	16-11-2020 20:17	49.915	56.853	22365.921	88.12	22336.76	1968919.99813	886923242.1875	1	227.345	131.258
FDD_MUPL_2	16-11-2020 20:17	49.921	57.736	22718.321	-127.54	22729.599	1964061.901526	868636822.34375	1	227.303	131.234
VARSANA_1	16-11-2020 20:17	49.919	514.642	165480.124	-159151.572	333211.931	27197.7816.674	6048.92858.479	-0.91	410.598	236.942
HADALA	16-11-2020 20:17	49.919	215.187	152189.062	-111896.621	103196.345	2358749.18.582	9175052.733.31	-0.68	410.282	236.927
SAMI_1	16-11-2020 20:17	49.919	565.178	402739.906	-144345.602	375341.384	8777881.0.587561	1852.4101.432.7	-0.93	410.647	237.282
SAMI_2	16-11-2020 20:17	49.919	566.84	402945.748	-143996.373	376353.252	7132.5092.117.045	1853.6061.958.7	-0.93	410.384	236.936
ZERDA_LINE	16-11-2020 20:17	49.919	537.399	382661.062	-143379.635	377574.922	1675.34534.067	942.8.39.859.50	-0.99	409.128	236.209
VARSANA_2	16-11-2020 20:17	49.919	548.859	388209.453	-151736.723	352913.453	2.892.9.6.277.25	4.257.1.6.298.86	-0.91	408.843	236.046
LINE_2	16-11-2020 20:17	49.919	355.589	251579.172	-11595.273	251302.547	6.1.8.9.0.0.9.4.1.8.8.6	1.6.2.0.1.0.6.1.8.2.2	1	408.476	235.834
LINE_1	16-11-2020 20:17	49.919	268.584	188342.656	-2934.127	196503.808	3.7.5.5.6.3.8.2.4.7.7.8.6.9	1.4.6.8.8.1.2.7.1.9.1.7.7	0.99	409.696	236.102
LINE_3	16-11-2020 20:17	49.919	322.483	227792.215	-994.182	227790.548	3.8.3.9.9.9.8.8.3.5.1.9.3	1.9.9.8.5.9.3.8.3.0.0.0	-1	407.66	235.428
LINE_4	16-11-2020 20:17	49.919	265.248	187557.887	-30738.545	185012.362	2.2.2.1.8.1.8.1.0.3.7.0.2	1.5.1.1.9.4.7.2.4.4.4	-0.99	408.368	235.772
LINE_5	16-11-2020 20:17	49.919	415.281	293769.734	-76511.635	283122.164	1.4.6.9.8.3.6.2.9.0.2.5.7	1.9.1.9.1.4.3.2.1.6.7.2.1.9	-0.97	408.495	235.845
LINE_6	16-11-2020 20:17	49.919	351.888	277393.656	-37860.359	262800.716	1.4.6.9.0.9.0.3.5.1.5.2	1.6.0.1.4.5.6.0.0.5.5.9	-0.95	403.751	235.704
BS_3	16-11-2020 20:17	49.92	402.378	285097.059	17927.963	274067.273	3.5.5.8.6.5.4.4.8.1.8.0	1.1.1.0.5.2.3.6.2.4.3.8	-0.79	409.486	236.416
BS_4	16-11-2020 20:17	49.919	385.634	272317.094	17066.173	211966.37	3.4.5.1.9.3.0.8.9.1.6.5	1.2.6.2.9.3.1.9.7.6.5	-0.76	407.958	235.535
GT_1	16-11-2020 20:17	49.919	513.076	2601935	-4115.249	195383.997	3.6.3.7.8.1.9.9.4.2.4	1.2.4.7.5.0.9.4.2.3.8	-0.98	225.231	130.066
GT_2	16-11-2020 20:17	49.919	478.953	187779.752	-1706.5	188918.75	4.5.9.9.6.6.9.9.3.3.0.7	1.2.6.1.0.2.9.9.3.3.1.8	-1	226.4	130.713
GT_3	16-11-2020 20:17	49.919	741.774	243218.133	-36329.799	240838.216	5.0.0.9.0.4.5.3.6.9.8.3	1.3.3.9.8.2.4.4.2.9.6.8	-0.99	410.839	237.198
GT_4	16-11-2020 20:17	49.919	304.523	218744.606	-32309.799	214285.252	4.9.5.7.0.6.9.4.0.9.7.9.6.6	1.3.9.2.1.7.7.2.4.3.8.6	-0.99	410.653	237.299
GT_5	16-11-2020 20:17	49.919	790.903	580911.277	-99549.177	551999.245	1.4.8.7.7.2.5.2.3.3.1.2	1.4.9.2.8.1.9.7.9.0.7.5	-0.98	409.484	236.415
GT_6	16-11-2020 20:17	49.919	662.115	611189.063	-112666.304	600677.656	1.9.8.5.4.5.3.6.3.9.6.7	2.1.2.5.7.7.6.6.6.6.8	-0.96	409.319	236.321
GT_7	16-11-2020 20:17	49.919	668.145	629645.776	-121382.539	617234.562	1.1.7.4.5.4.5.4.9.7.8.5	2.7.6.3.4.6.3.0.8.8.5	-0.98	409.325	236.324
GT_8	16-11-2020 20:17	49.919	654.01	634534.496	-143134.124	618768.688	1.2.7.9.9.9.9.4.5.9.5.4	2.6.5.4.6.5.3.0.4.5.7	-0.97	409.286	236.501

DSM Monitoring System

Application Used

1. E-Tools Viewer
2. Grid Logic
3. Vijeo Citech
4. Database (SQL)

adani

THANKS

adani

Annexure-V

ରାଜ୍ୟ ବିଦ୍ୟୁତ୍ ଭାର ପ୍ରେରଣ କେନ୍ଦ୍ର
STATE LOAD DESPATCH CENTRE
ODISHA POWER TRANSMISSION CORPORATION LIMITED
SLDC Building, P.O.-Mancheswar Rly. Colony, Bhubaneswar-751017
Email: system_support@sldcorissa.org.in, cld_sldc@sldcorissa.org.in
CIN – U40102OR2004SGC007553

Letter No. CLD-OS- 4033(2) /Dt. 24/11/2020

From

Sri B. B. Mehta
Director/Chief Load Despatcher,
SLDC, OPTCL, Bhubaneswar-17

To

The Chief Engineer, NPC,
CEA, New Delhi - 110066.

Sub: Streaming of real time MW data and provision of additional energy meter at ISTS interface points.

Ref : - Meeting held on 19.11.2020 at 11.30 hrs on the above subject matter.

Sir,

The large data mismatch between SCADA real time data and DSM energy meter data causes UI penalty for net drawal. The following points are addressed in the above said meeting.

i) Provision of additional energy meters in series with IEMs by STU at interface points.
ii) Provision of telemetry of real time MW data to SLDC via RLDC server from new IEMs to be procured and installed.

SLDC Odisha/Gridco is in the support of the above proposal and also ready to bear the expenditure if any. But due to financial crisis arising out of Covid pandemic situation the said expenditure may be realized from PSDF.

It is opine to grant in principle PSDF approval for the said work, later state shall submit specific application for PSDF. This shall facilitate respective management to decide quickly.

This is for your information and necessary action.

Yours faithfully,

Sri B. B. Mehta 24/11
Director/Chief Load Despatcher,
SLDC, OPTCL, Bhubaneswar

C.C.: Chief Engineer(GM Division), CEA, New Delhi for information.

Annexure II

सत्यमेव जयते

भारत सरकार/Government of India

विद्युत मंत्रालय/ Ministry of Power

केन्द्रीय विद्युत प्राधिकरण/ Central Electricity Authority

राष्ट्रीय विद्युत समिति प्रभाग/ NPC Division

1st Floor, Wing-5, West Block-II, R.K. Puram, New Delhi-66, Mail: cenpc-cea@gov.in

No. 4/MTGS/NPC/CEA/2020/ 94-104 **Date: 02.12.2020**

To,

As per distribution list

Subject: Constitution of "Joint Committee on Technical Specification (TS) of the 5/15 minute IEMs with AMR, MDP system"-reg.

विषय: AMR, MDP प्रणाली के साथ 5/15 मिनट IEM की "तकनीकी विशिष्टता (टीएस) पर संयुक्त समिति का गठन। " -Reg

A meeting on the issue of Telemetry of Real-time Active Power (MW) data to SLDCs through IEMs was held on 19th November, 2020 chaired by Chairperson, CEA. In this meeting, it was decided that the Technical Specification (TS) of the 5/15 minute Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP) for Interstate transmission system may be prepared at PAN India basis.

A joint committee comprising members from each RPCs, CEA, and CTU/PGCIL and POSOCO has been constituted to deliberate and finalise the above Technical Specifications.

The Constitution of the joint committee is as follows

1	Chief Engineer (GM), CEA	Member
2.	Chief Engineer, DP&T, CEA	Member
3	Member Secretary, WRPC	Member
4	Member Secretary, NRPC	Member
5	Member Secretary, ERPC	Member
6	Member Secretary, SRPC	Member
7	Member Secretary, NERPC	Member
8	Representative from PGCIL*(at the level of Sr.GM/GM)	Member
9	Representative from POSOCO**(at the level of Sr. GM/GM)	Member
10	Chief Engineer(NPC), CEA	Member & Convener of the committee

*To be nominated by PGCIL

**To be nominated by POSOCO

In this regard it is requested that PGCIL and POSOCO may send their nominations at the level of Sr.GM/GM.

Terms of Reference of the Committee is to "To prepare the Technical Specification (TS) of the 5/15 minute Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP) for Interstate transmission system."

This letter is issued with the approval of the Competent Authority.

21/12/2020

(Rishika Sharan)
Chief Engineer (NPC)

Distribution List

1. CMD, PGCIL
2. CMD, POSOCO
3. Chief Engineer (GM), CEA
4. Chief Engineer (DP&T), CEA
5. Member Secretary, WRPC/ NRPC/ ERPC/SRPC/ NERPC

Copy for information to:

1. PS to Chairperson, CEA
2. SA to Member (GO&D)

Annexure III

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
सेवा भवन आर के पुरम नई दिल्ली-110066
Sewa Bhawan, R. K. Puram, New Delhi-110066

[ISO: 9001-2008]

No.200/5/2012/SP&PA/ 310-362 Date/दिनांक: 15-03-2012

To

(As per List attached)

Subject: Minutes of Joint Meeting of all the regional Standing Committees on Power System Planning for firming up the 'Unified Real Time Dynamic State Measurement (URTDSM)' scheme as part of Smart Transmission Grid development.

विषय: विद्युत प्रणाली के आयोजन की सभी क्षेत्रीय स्थायी समितियों की संयुक्त बैठक – स्मार्ट पारेषण ग्रिड विकास हेतु 'यूनिफाईड रियल टाईम डाईनमिक स्टेट मैजरमेन्ट' की योजना रिपोर्ट पर चर्चा

A Joint Meeting of all the five Regional Standing Committees on Power System Planning was held **on March 5, 2012 (Monday) at 10.30 am at Conference Room, Fifth Floor, Power Grid Corp. of India Ltd., Plot No:2, "Saudamini", Sector-29, Gurgaon, Haryana-122001**.

Minutes of the meeting are enclosed. It is also available at CEA's website (www.cea.nic.in).

भवदीय /Yours faithfully,

15/3/2012

(प्रदीप जिंदल)/ (Pardeep Jindal)
निदेशक(प्र यो एवं प मू प्रभाग)/ Director (SP&PA)
(Telephone: 011 26198092, Fax No. 011 26102045)

Address List

1. The Director (Projects) Power Grid Corp. of India Ltd., "Saudamini", Plot No. 2, Sector-29, **Gurgaon-122001** Fax 0124-2571760/2571932	2. CEO,POSOCO B-9, Qutab Institutional Area, Katwaria Sarai, **New Delhi-110016** Fax 011-26852747
3 Director (Projects), National Thermal Power Corp. Ltd. (NTPC), NTPC Bhawan, Core-7, Scope Complex, Lodhi Road, **New Delhi-110003.** FAX-011-24360912	4. Director (Technical) NHPC Office Complex, Sector – 33, NHPC, **Faridabad - 121 003** (Fax-0129-2277941)
5. Director (Operations), NPCIL, 12th Floor,Vikram Sarabhai Bhawan, Anushakti Nagar, **Mumbai – 400 094**. FAX : 022- 25991258	

Northern Region

1. Member Secretary Northern Region Power Committee, 18-A Shajeed Jeet Singh Sansanwal Marg, Katwaria Sarai, **New Delhi – 110016** (Fax-011-26865206)	2. Member (Power) BBMB, Sectot-19 B Madya Marg, **Chandigarh-160019** (Fax-0172-2549857)
3. Managing Director, HP Power Transmission Corporation Ltd. Himfed Bhawan, Panjari, old MLA Quarters, **SHIMLA-171004** (Fax-0177-2626284, 2626283)	4. Director (Transmission) UPPTCL, Shakti Bhawan Extn, 3rd floor, 14, Ashok Marg, **Lucknow - 226 001** (Fax-0522-2288410)
5. Director (Transmission) Urja Bhawan, Kawali Road, Dehradun,**Uttarakhand - 248 001** (Fax-0135-2762460)	6. Director (Operations) Delhi Transco Ltd. Shakti Sadan, Kotla Marg, **New Delhi - 110 002** (Fax-011-23234640)
7. Director(Technical) Punjab State Transmission Corp. Ltd. (PSTCL) Head Office The Mall, **Patiala - 147 001** (Fax-0175-2304017)	8. Director (Projects) HVPNL , Shakti Bhawan, Sector -6, **Panchkula - 134 109** (Fax-0172-2560640)
9. Development Commissioner (Power), Civil Secretariat, **JAMMU - 180 001** (Fax-0191-2545447, 2530265)	10 Director (Transmission) RRVPNL, Vidyut Bhawan, Janpath, Jyoti Nagar, Jaipur ,**Rajasthan** Fax-0141-2740794

11. Chief Engineer (Operation) Ministry of Power, UT Secretariat,Sector-9 D **Chandigarh - 161 009** (Fax-0172-2637880)	12. Director(Technical) THDC Ltd. Pragatipuram, Bypass Road, Rishikesh, **Uttarakhand- 249201** (Fx-0135-2431519)

Western Region

1. The Member Secretary, Western Regional Power Committee, MIDC Area, Marol, Andheri East, **Mumbai** Fax 022 28370193	2. Chairman and Managing Director, MPPTCL, Shakti Bhawan, Rampur, **Jabalpur-482008** Fax 0761 2664141
3. The Managing Director, Chhattisgarh State Power Transmission Corporation Ltd.(CSPTCL) , Dangania, **Raipur (CG)-492013.** Fax 0771 2574246/ 4066566	4. The Managing Director, GETCO, Sardar Patel Vidyut Bhawan, Race Course, **Baroda-390007.** Fax 0265-2338164
5. Director (Operation), MAHATRANSCO, 'Prakashgad', Plot No.G- 9, Bandra-East, **Mumbai-400051.** Fax 022-26390383/26595258	6. The Chief Engineer, Electricity Department, The Government of Goa, **Panaji**, **Goa** Fax 0832 2222354
7. Executive Engineer (Projects) UT of Dadra & Nagar Haveli, Department of Electricity , **Silvassa .** Ph. 0260-2642338/2230771	8. Executive Engineer Administration of Daman & Diu (U.T.) Department of Electricity **Moti Daman-396220** . Ph. 0260-2250889, 2254745

Southern Region

1.The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, **Bangalore 560 009.** FAX: 080-22259343	2. The Director (Grid Operation), Transmission Corp. of Andhra Pradesh Ltd., Vidyut Soudha, **Hyderabad – 500 082**. FAX : 040-66665137/ 66665133
3.The Director (Transmission), Karnataka State Power Transmission Corp.Ltd., Cauvery Bhawan, **Bangalore 560 009.** FAX : 080 -22228367	4. The Member (Transmission), Kerala State Electricity Board, Vidyuthi Bhawanam, Pattom, P.B. No. 1028, **Thiruvananthapuram - 695 004.** FAX : 0471-2444738

5. Member (Distribution), Tamil Nadu electricity Board (TNEB), 6th Floor, Eastern Wing, 800 Anna Salai, **Chennai - 600002.** FAX : 044-28516362	6. The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, **Puducherry – 605 001.** FAX : 0413-2334277/2331556
7.The Director (Power), Corporate Office, Block – I, Neyveli Lignite Corp. Ltd., **Neyveli** , **Tamil Nadu – 607 801.** FAX: 04142-252650/ 252570	

Eastern Region

1. Member Secretary, Eastern Regional Power Committee, 14, Golf Club Road, Tollygange, **Kolkata-700033**.	2.Director (System), Damodar Valley Corporation DVC Towers, VIP Road, **Kolkata-700054.**
3. Member (Transmission), Bihar State Electricity Board Vidyut Bhavan, Baily Road, **Patna-800021.**	4. Director (Transmission), Orissa Power Transmission Corporation Jan path, **Bhubaneshwar-751022.**
5. Director (System Operation), West Bengal State Electricity Transmission Company Ltd., Vidyut Bhavan, 5th Floor, Block-D, Bidhannagar, Sector-**II Kolkata-700091.**	6.Member (Transmission), Jharkhand State Electricity Board, In front of Main Secretariat, Doranda, **Ranchi-834002.**
7. Principal Chief Engineer cum Secretary, Power Department Government of Sikkim, **Sikkim**	

North Eastern Region

1. The Member Secretary, North Eastern Regional Power Committee, Meghalaya State Housing Finance Cooperative Society Ltd. Building, Nongrim Hills Shillong **(Meghalaya) 793003** Fax: 0364 – 22520030	2. The Chairman and Managing Director, North Eastern Electric Power Corporation Ltd Brookland Compound, Lower New Colony, **Shillong (Meghalaya) – 793003**. Fax: 0364 – 2226417

3. The Managing Director, Assam Electricity Grid Corporation Limited, Bijulee Bhawan; Paltan Bazar, Guwahati **(Assam) – 781001** Fax: 0361 – 2739513 & 0361 – 2739989	4. The Chairman-cum-Managing Director, Meghalaya Energy Corporation Limited, Lum Jingshai, Short Round Road, Shillong **(Meghalaya) – 793001**. Fax: 0364 – 2590355
5. The Chief Engineer (Power), Electricity Department, Keisampat, **Imphal (Manipur)** Fax: 0385 – 2220702	6.The Chief Engineer, Department of Power, Nagaland, **Kohima** Fax: 0832 – 2222354
7. Engineer-in-Chief Power & Electricity Department, Govt. of Mizoram, Tuikhuahtlang, **Aizawl (Mizoram)** Fax:0389-2320862	8. The Chief Engineer (Power), Vidyut Bhawan, Department of Power, Zero Point Tinali, Itanagar **(Arunachal Pradesh) – 791111.** Fax: 0360 – 2217302
9. The Chairman-cum-Managing Director, Tripura State Electricity Corporation Limited, Bidyut Bhavan, Banamalipur, **Agartala, Tripura**. Fax: 0381 – 2319427	

Copy to:

1.The Chairman & Managing Director Power Grid Corp. of India Ltd., "Saudamini", Plot No. 2, Sector-29, **Gurgaon-122001** Fax 0124-2571760/2571932	2. Executive Director (Smart Grid) Power Grid Corp. of India Ltd., "Saudamini", Plot No. 2, Sector-29, **Gurgaon-122001** Fax 0124-2571760/2571932
4. SA to Chairperson, Central Electricity Authority, Sewa Bhawan, R. K. Puram, **New Delhi-110066**.	3.The Member (PS), Central Electricity Authority, Sewa Bhawan, R. K. Puram, **New Delhi-110066**.
5. Prof S.A Soman, Department of Electrical Engineering, Indian Institute of Technology Bombay, **Powai, Mumbai-400076**	

Minutes of Joint Meeting of all the five Regional Standing Committees on Power System Planning was held on March 5, 2012 (Monday) at 10.30 am at Conference Room, Fifth Floor, Power Grid Corp. of India Ltd., Plot No:2, "Saudamini", Sector-29, Gurgaon, Haryana-122001

1.0 List of participants is given at Annex-I.

2.0 Chairperson CEA in his address emphasized the need of modern tools for reliable, secure and economical system operation on real time basis to give confidence to the system planner as well as operators to bring efficiency in system operation. He highlighted that dimension of Indian power system is growing manifolds and their complexity is increasing in all fronts viz. generation, transmission and distribution. Maintaining grid safety, security and reliability is a great challenge in the new regime of open electricity market. He informed that for sustainability, non-conventional energy resources must be developed and needs to be integrated with the grid in one hand, while variability & intermittency in their output is a new challenge in system operation on the other. He mentioned that India would soon be having 1000 MW single generating units, 4000 MW single power plants, high capacity 765 kV and 800kV HVDC transmission system feeding large cities and various critical loads. Any incident - natural calamity etc., even on single element of this capacity, has the potential to cause a major grid disturbance. Highest order of real time measurements, monitoring and control system is a must to avoid or to reduce the impact of such incidences. To address these issues, he emphasized that introduction of intelligence in transmission through Smart Grid applications is inevitable. Application of synchrophasor technology using Phasor Measurement Unit (PMU), integrated with Phasor Data Concentrators (PDC) and fibre optic communication links has emerged to address above critical developments in the grid. In this context proposed "Unified Real Time Dynamic State Measurement" (URTDSM) scheme would help in identifying and developing modules for more inclusive and intelligent measurements, monitoring, analysis, control and communication capabilities with aim to improve reliability and efficiency of available resources. He requested all the members of the regional standing committees to join hands together for implementation of this much needed scheme quickly.

3.0 CMD POWERGRID shared his experience of implementation of Unified Load Dispatch and Communication (ULDC) scheme throughout the country. He also informed about the upcoming large number of EHV network specially 765 kV substations and transmission lines. He informed that by 2014, all the five(5) regions of the country will be synchronized together. Within coming five year plan about 30,000 MW of Renewable Energy mainly in the form of Wind and Solar generation will be added to the existing 23,000MW of Renewable Energy generations in the country. He stressed the requirement of better visibility of system and fast update of operating scenario for safe, secure and reliable operation on real time basis as well as for system planning. To keep ourselves abreast with the latest technology, he urged that early implementation of this "Unified Real Time Dynamic State Measurement" (URTDSM) project is a

necessity. He emphasized that looking at the large number of PMUs deployment in the country, it is necessary that about 10 to 15% of PMUs shall be manufactured and supplied from India, towards indigenization of this technology to cater to future requirement. He also emphasized that a PMU test certification laboratory may be setup in India to certify the PMUs of various manufacturers to be deployed in the grid. He stressed upon the research work required in collaboration with premier academic institutions for analytics development based on the PMUs data for improved situational awareness, decision support tools and control actions in Indian context to be taken up in parallel.

4.0 Member (PS), CEA informed that country has good institutional mechanism for handling power system related issues and the market mechanism is evolving. Technical aspects of grid safety and security in real time, however, still need to be strengthened. He informed that synchrophasor technology using PMU and PDC through fiber optic communication channel having low latency would be very effective in reliable, secure and economical grid operation. He also informed about how PMU has helped in reliable evacuation of Karcham-Wangtoo hydro generation during the monsoon season of 2011. Large quantum of renewable capacity is going to be integrated with the system in coming years. To take care of uncertain characteristics of renewable generation, he emphasized the need of adoption of latest technology like synchrophasor measurement for informed decision making in real time. This shall also facilitate to estimate the transmission capability in a more realistic way which shall bring efficiency in operation as well as economy in cost of power supply. He informed that cost of the proposed "Unified Real Time Dynamic State Measurement (URTDSM)" is meager in comparison to the cost of one EHV transmission line. He informed that in future all the substations and generating stations, including those of IPPs shall be provided with PMU along with fiber optic communication link by the respective developer.

5.0 CEO POSOCO made a presentation on the need of synchrophasor measurements for system monitoring and control. He shared the experience of PMU pilot project in Northern Region. He described how the Indian power sector has been benefited by taking preventive actions based on synchrophasor measurements in advance avoiding large scale disturbances and operating the system in a more reliable manner. PMU pilot Project in Northern Region has helped a lot understanding the new technology and in system operation in real time, protection co-ordination, disturbance analysis and network model validation. He informed that wide band communication is the basic necessity for PMU installation. He presented the case of better transmission system utilization with reliability for evacuation of Karcham-Wangtoo hydro generation along with Baspa and Jhakri Hydro generation during the monsoon season in 2011. PMU also helped in detection of oscillations on 765kV Tehri-Meerut line (Charged at 400 kV). Based on PMU data PSS tuning was done to avoid such oscillations. During foggy winter nights, large number of auto-reclosure operation took place and its detection in real time by system operator helped a lot in effective real time monitoring and control of the grid. He informed that PMU technology is a kind of meta tool that will create new tools in future. Expertise needs to be developed for handling large volume of data generated by PMUs through capacity building exercise.

6.0 Prof S. A. Soman from IIT Bombay presented the need and benefits of synchrophasor technology for system monitoring and control that has been made possible due to technological development in the field of GPS, communication and computation. He emphasized that this technology has capability of measuring & monitoring the system in real time, which would be helpful in better visualization of the system and utilization of existing transmission assets with reliability, security and economy. He emphasized that in the Indian context PMUs need to be installed in such a way that voltage phasor of each substation and current phasor at both ends of each transmission line can be monitored to take care of redundancy in outage of PMU, associated communication link etc. for wide area measurement and control. He highlighted the possible utilization of PMU data through following analytical software; supervised zone-3 blocking, dynamic (linear) state estimator, CVT/CT validation, angular stability, emergency control like frequency control, voltage instability, network parameter validation, transient stability model validation etc.

7.0 POWERGRID presented the "Unified Real Time Dynamic State Measurement (URTDSM)" project details. The approach adopted for deployment of PMU and PDC at State and Central sector stations and transmission lines in a unified manner was presented as under:

Approach on PMU Placement:

i. All 400 kV stations in State and ISTS grids

ii. All generating stations at 220 kV and above

iii. HVDC terminals and inter-regional and inter-national tie lines

iv. Both ends of all the transmission lines at 400kV and above: State and ISTS sector

7.1 POWERGRID informed that PDCs would collect data from PMUs and other PDCs and time aligns these data. Approach on PDC placement –

i. One number of Nodal PDC is proposed for more than 40 PMUs in a State

ii. Data from all Nodal PDC are to be sent to Master PDC proposed at each SLDC

iii. Data from all Master PDC will be sent to Super PDC proposed at each RLDC

iv. Data from all Super PDC are to be sent to PDC proposed at NLDC

It was informed that by 2014-15 altogether about 581 sub-stations (272 ISTS and 309 State sector) and about 3199 transmission lines (1792 ISTS and 1407 State Sector) at 400 kV and above level including 220 kV generating stations are expected to be in place. It was informed that considering the PMUs with three(3) analog input channels total number of PMUs required would be around 1669.

7.2 Further, it was highlighted that as the installation of PMU requires Fiber Optic communication channel, the installation of PMUs and PDCs is proposed in two stages;

Stage-I: Installation of PMUs at the locations where Fiber Optic communication is available or would be made available under microwave frequency vacating program and regional strengthening program by 2014-15 along with installation of PDCs at all SLDCs, RLDCs, NLDC, NTAMC, strategic locations in State, remote consoles at RPCs, CEA, CTU and other locations.

Stage-II: Installation of PMUs at balance locations along with communications links. The stage wise deployment of PMUs and PDCs was given as under.

Table 1: Proposed Stage- I

Region	Sub-stations		No of Transmission line		PMU		Nodal PDC	MPDC	SPDC	Main & B/U NLDC
	ISTS	STU	ISTS	STU	ISTS	STU				
NR	74	42	394	224	206	120	6	9	1	
WR	49	18	456	135	234	71	11	4	1	
ER	51	31	395	149	202	79	4	5	1	
SR	57	16	338	90	178	47	6	4	1	
NER	9	5	69	24	36	13	0	3	1	
Total	240	111	1652	622	856	330	27	25	5	
	351		***2274***		***1186***		***57***			***2***

Table 2 : Proposed Stage- II

Region	Sub-stations		No of Line		PMU	
	ISTS	STU	ISTS	STU	ISTS	STU
NR	9	55	40	211	21	111
WR	11	58	64	280	33	145
ER	-	13	-	50	-	26
SR	3	55	10	199	5	105
NER	9	17	26	45	14	23
Total	32	198	140	785	73	410
	230		***925***		***483***	

It was informed that to effectively utilize the synchrophasor technology, capacity building through training is required. For this purpose training of engineers from

State utilities, RPCs, CEA, CTU, POSOCO are proposed as part of this URTDSM project.

Broad estimated cost of this URTDSM scheme is about Rs. 355 Crore for both Stage-I and Stage-II.

7.3 In addition development of analytical software and hardware as informed by IIT Bombay are to be taken up in parallel. List of analytics proposed to be developed in association with premier academic institution like by IITs and other agencies are as under:

- Vulnerability analysis of distance relays.
- PMU based state estimator.
  - Enable system operator to understand if the system is in secure, alert or emergency state from both steady state and dynamic perspective.
  - Along with steady state contingency analysis tools, one can also use dynamic security assessment tools.
  - Enable monitoring of system unbalances.
  - Enable monitoring of power swing and supervisory control of backup protection scheme i.e., adaptive protection.
- CVT/CT validation
- PMU based supervised zone-3 tripping/blocking
- Assessment of angular, voltage and frequency stability and control through PSS, FACTS devices and HVDC controls.
- Development of improved restoration schemes
  - Synchrophasor check is available at control center itself.
- Network parameter validation, dynamic(transient stability) model validation

7.4 Towards indigenization of this technology, about 10 to 15 % of PMUs shall be manufactured and supplied from India. Further, a PMU test and certification laboratory is also proposed to be setup in India to certify the PMUs of various manufacturers to be deployed in the grid.

8.0 Participants of the regional Standing Committees on Power System Planning deliberated on the proposed “Unified Real Time Dynamic State Measurement (URTDSM)” scheme for implementation by POWERGRID.

Gist of the deliberations are as under:

8.1 RVPNL said that PMU placement should be accompanied with fiber optic communication link so that real time measurement benefit can be derived. Therefore, emphasis shall be given for placement of PMUs at those locations where fiber optic communication links are available. Wherever fiber links are not available the actions need to be taken to install the fiber optic link along with PMU in a time bound manner.

It was clarified that realizing the need for fiber optic communication to facilitate data transfer from PMU on real time basis the entire URTDSM project has been planned for implementation in a 2 stages. Stage-1 involves placement of PMU at those locations which are either already connected through FO or likely to be

connected by 2014-15 at the control centers along with installation of PDCs. In the next stage the PMUs shall be placed at those locations where fiber optic link are to be installed simultaneously.

8.2 On the issue of inclusion of already on-going PMU deployment plan in different regions under WAMS project with this URTDSM project, it was agreed that while finalizing the scheme necessary care will be taken to integrate the existing PMUs of the on-going project.

8.3 Members inquired about the methodology of investment. It was clarified that the cost of the project shall be added in the National transmission pool account and to be shared by all the Designated ISTS Customers(DICs) as per the POC mechanism under the CERC regulation.

8.4 NTPC enquired about provision of RTUs under ULDC scheme, whether they will continue or it will be replaced by the PMUs. It was clarified that, initially, the URTDSM project will not affect the provision of RTUs under ULDC scheme and upgradation of ULDC scheme would continue as planned. Later on, when PMU based measurements get matured, installation of RTUs can be reviewed.

8.5 BBMB enquired about necessity of current measurement of transmission line as the state of the system can be determined with Voltage magnitude and angle only. It was clarified that along with voltage and phasor measurement, measurement of current is also very important for validation of CT, CVT and distance protection and also for network parameters of the system.

8.6 Maharashtra SLDC enquired about using numerical relays as PMUs as most of the numerical relays have such capability. It was clarified that technically there is not any issue in using such relays provided that a phasor measurement unit alongwith GPS clock is available in the numeric relay.

8.7 Rajasthan raised the issue of error in PMU measurement due to limited inaccuracy in CT / CVT. On this issue it was clarified that PMU on its own does not introduce any error and sensors have certain errors. To filter out this errors State Estimation would be carried out.

8.8 Gujarat SLDC enquired about current measurement of ICTs. It was clarified that presently it has not been included; however, in subsequent stages this aspect may be deliberated. Gujarat also suggested that hierarchy of data transfer for central sector PMUs may be through SLDC PDC. It was clarified that going through SLDC PDCs would increase latency of information from ISTS network reacing at RLDC/NLDC and hence may not be desirable..

8.9 Delhi enquired about availability of fast protection and control mechanism that can act within say 40 ms. It was clarified that PMU based protection and control mechanisms are not going to replace the primary protection, it will only be used to enhance the backup protection based the global information and suitable for the system as a whole.

9.0 It was agreed that the scheme would be implemented in the following manner:

i) The URTDSM scheme will cover placement of PMU at sub-stations and both ends of transmission lines at 400kV and above level including generating stations at 220 kV level under State and Central Sector coming up by 2014-15 time frame.

ii) The proposed URTDSM scheme will be implemented in two stages. In the stage-I PMUs will be placed at those locations where fiber optic communication link is either available or would be made available under microwave frequency vacating program and regional strengthening program by 2014-15 along with installation of PDCs at all SLDCs, RLDCs, NLDC, NTAMC, strategic locations in state, remote consoles at RPCs, CEA, CTU and other locations. Nodal PDC shall be provided for collection of data from 40 PMUs in a cluster.

In stage-II, PMUs would be installed at balance locations along with communications links. Summary of the stage wise deployment of PMUs and PDCs is given in Table1 and Table-2 above.

iii) For effective utilization of synchrophasor technology national and international level training programs will be arranged for engineers from State utilities, RPCs, CEA, CTU and POSOCO under the URTDSM scheme.

10.0 After deliberations, members of regional Standing Committees on Power System Planning agreed that “Unified Real Time Dynamic State Measurement (URTDSM)” scheme to be taken up for implementation. It was also agreed that scheme is to be implemented by POWERGRID as system strengthening and cost shall be added in the National transmission pool account and to be shared by all the Designated ISTS Customers(DICs) as per the POC mechanism under the CERC regulation.

11.0 It was agreed that POWERGRID shall file a petition with CERC for getting regulatory approval for this project. It was also requested that all the constituents/States would support POWERGRID in CERC.

12.0 As the Analytics are to be developed in parallel with implementation of the URTDSM scheme, it was agreed that these would be developed in association with premier academic institutions (like by IITs) and in consultation with POSOCO, CEA and RPCs and some of the STUs. It was also agreed that cost of development of the Analytics would be added in the National transmission pool account.

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Annex-I

List of participants:

S.No	Organization	Name (S/Shri)	Designation
	Central Electricity Authority		
1	CEA	Ravinder	Member (PS)
2	CEA	K.K Arya	CE(I/c)
3	CEA	Pardeep Jindal	Director
4	CEA	B K Sharma	Director
5	CEA	AK Yadav	Dy. Director
6	CEA	Manoj Chaturvedi	Dy. Director
7	CEA	Nageswara Rao M	Engr.
	Regional Power Commitees		
8	NRPC	P K Pahwa	Member Secretary
9	WRPC	S D Taksande	Member Secretary
10	WRPC	Satyanarayana	SE
11	SRPC	S R Bhat	Member Secretary (I/c)
12	SRPC	Satbir Singh	SE
13	ERPC	A K Bandopadhyay	Member Secratary (I/c)
14	ERPC	B Sarkhel	Superitending Engineer
15	ERPC	J Bandyopadhyay	SE
16	NERPC	P D Siwal	Member Secretary (I/c)
17	NERPC	AK Mishra	SE
	Central Transmission Utility		
18	POWERGRID	R. N. Nayak	CMD
19	POWERGRID	I. S. Jha	Dir (Projects)
20	POWERGRID	Y. K. Sehgal	Exe. Director (Smart Grid)
21	POWERGRID	Pankaj Kumar	Exe. Director (SEF,CE,ERP&IT)
22	POWERGRID	BS Pandey	Exe. Director (Engg.)
23	POWERGRID	NS Sodha	Exe. Director (LD&C)
24	POWERGRID	R K Sarkar	GM (Engg.)
25	POWERGRID	A S Kuswaha	AGM (LD&C)
26	POWERGRID	Subir Sen	AGM (Smart Grid)
27	POWERGRID	Dilip Rozekar	DGM (SEF)
28	POWERGRID	Manoj Gupta	DGM (SEF)
29	POWERGRID	H Aggarwal	CM
30	POWERGRID	M K Tiwari	CM
31	POWERGRID	RK Gupta	CM
32	POWERGRID	Sunita Chouhan	CM
33	POWERGRID	Vineta Agarwal	CM
34	POWERGRID	Rajesh Kumar	CM
35	POWERGRID	M.S Rao	Manager
36	POWERGRID	Kashish Bhambhani	Manager
37	POWERGRID	Anil Kr. Meena	Dy. Mgr
38	POWERGRID	Pradeep Varun	Engr.
39	POWERGRID	Sandeep Kumawat	Engr.
40	POWERGRID	Ankit Rastogi	Officer
41	POWERGRID	Debajyoti Majumdar	ET
42	POWERGRID	G Sreenivasan	Resident Engineer
	POSOCO		
43	POSOCO	S. K. Soonee	CEO
44	NLDC	VK Agrawal	GM
45	NLDC	SR Narasimhan	DGM

46	NLDC	N Mishra	Engr.
47	NLDC	Pradeep Reddy	Engr.
48	NRLDC	PK Aggarwal	DGM
49	NRLDC	Rajeev Porwal	CM
50	WRLDC	P Pentayya	GM
51	WRLDC	Abhimanyu Gartia	DGM
52	SRLDC	P Bhaskar Rao	AGM
53	SRLDC	T Srinivas	CM
54	ERLDC	UK Verma	GM
55	ERLDC	SK Chandrakar	Mgr. (SLDC)
56	NERLDC	TS Singh	AGM
	Central PSUs & Multi State Agencies		
57	BBMB	Naveen Gupta	Dy. Director
58	DVC	BK Yadav	SE
59	IIT - Bombay	S A Soman	Professor
60	NHPC	DP Bhargava	Director (I&B)
61	NHPC	Nain Singh	ED (Des.I & M)
62	NPCIL	Devendra singh	Shift Charge Engr.
63	NPCIL	Sandeep Gupta	Sr. Maint Engr.
64	NTPC	Abhijeet Sen	AGM
65	NTPC	S S Mishra	DGM
66	THDC	Sarosh Majid Siddiq	Sr. Mgr. (Comml)
	State Transmission Utilities / SLDCs		
67	AEGCL (Assam)	N C Das	CGM
68	AEGCL (Assam)	GK Bhugan	Manager
69	AP TRANSCO (Andhra Pr.)	M Balasubramanyam	Divisional Engineer
70	AP TRANSCO (Andhra Pr.)	M Jaganmohan Rao	Asst. Div. Enginer
71	AP TRANSCO (Andhra Pr.)	S Harish	Superitending Engineer
72	DTL (Delhi)	Roop Kumar	GM (SLDC)
73	DTL (Delhi)	AK Ghyant	Mgr. (SLDC)
74	Me ECL (Meghalaya)	F E Kharshing	EE (SLDC)
75	Elect. Deptt., DNH	HM Patel	EE
76	HPPTCL(Himacghal Pr.)	K Kapoor	DGM
77	HPPTCL(Himachal Pr.)	S K Chauhan	DGM
78	HVPNL (Haryana)	RK Arora	Director (Tech.)
79	HVPNL (Haryana)	Sunil Seth	SE
80	KPTCL (Karnataka)	Suresh Kumar	Exe. Engineer (SCADA)
81	KPTCL(Karnataka)	Gajanana Sharma	Superitending Engineer
82	KSEB (Kerala)	MA Rawther	Member (T&GO)
83	KSEB (Kerala)	VG Manoharan	Chief Engr. (P&C)
84	Manipur Elect. Deptt	B Lalneisang Saiate	Ex. Engr.
85	MPPTCL (Madhya Pr.)	SK Tiwari	EE
86	MSETCL (Maharashtra)	H M Sahara	SE
87	MSLDC (Maharashtra)	VD Pande	EE
88	PSTCL (Punab)	Rajbir Singh Walia	Sr. Exe. Engr.
89	RVPNL (Rajasthan)	Y K Raizada	Director
90	RVPNL (Rajasthan)	l N Mimawat	SE
91	SLDC (Chhattisgarh)	KS Manothiya	CE
92	SLDC GETCO (Gujarat)	BB Mehta	ACE
93	SLDC GETCO (Gujarat)	PB Sathar	DE
94	SLDC MPPTCL (Madhya Pr.)	AP Bhainve	CE
95	TSECL (Tripura)	Subhas Chakraborty	DGM
96	UPPTCL (Uttar Pr.)	VP Tewari	SE
97	WB SETCL(West Bengal)	Subrata Nag	Director (operations)

****

Annexure IV

पावर सिस्टम ऑपरेशन कारपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)

CIN NO : U40105DL2009GOI188682

दक्षिण क्षेत्रीय भार प्रेषण केन्द्र, 29, रेस कोर्स क्रास रोड, बेंगलूर 560 009.
दूरभाष : कार्यालय : 080–2225 0047, 2235 2850, 2225 4525, 2225 1169, 2225 5962 फैक्स : 080 2226 8725, 2225 9219
Southern Regional Load Despatch Centre, 29 Race Course Cross Road, Bangalore 560 009.
Tel : Off : 080- 2225 0047, 2235 2850, 2225 4525, 2225 1169, 2225 5962, Fax : 080 2226 8725, 2225 9219 www.srldc.org / www. posoco.in

संदर्भ संख्या / Ref. No. दिनांक / Date :

Ref SRLDC/URTDSM/10-20/02 5119 **Dated 06-10-2020**

To,

Chief General Manager (Asset Management),
Southern Regional Transmission System-II,
Power Grid Corporation of India Ltd.
Yelahanka-Dodaballapur Road
Bengaluru-560064

Sub: OPERATIONAL FEEDBACK OF URTDSM PROJECT PHASE-1 IN SOUTHERN REGION
Ref: - SRTS-2/RTAMC/URTDSM/20/237

Dear Sir

This is in reference to your above cited letter dated 30.09.2020 regarding operational feedback of the URTDSM project phase -1 as commissioned in southern region.

URTDSM project phase-1 was commissioned successfully and is in operation since 28.09-2018 in southern region. The system is used in real time grid operation for monitoring dynamic behaviour of power system and also in post-dispatch tripping analysis. The feedback is enclosed in the given format as (Annexure -1)

It is desirable to include real time analytical applications for enhancing efficiency and reliability of the grid operation in phase –II of URTDSM project. It would be better to consult real time grid operators at national, regional and state levels for ascertaining the real time grid requirements.

Thanking you

Yours faithfully

(Abhimanyu Gartia)
6/10/2020
(EXECUTIVE DIRECTOR, SRLDC)
अभिमन्यु गर्तिया/ABHIMANYU GARTIA
कार्यपालक निदेशक/Executive Director
पोसोको / POSOCO
एस. आर. एल. डी. सी / SRLDC
29, रेस कोर्स क्रास रोड / 29, Race Course Cross Road
बेंगलूर–560 009 / Bangalore - 560 009.

Copy:
1. Member Secretary, SRPC
2. Executive Director, NLDC, WRLDC,NRLDC,ERLDC,NERLDC POSOCO
3. Executive Director, SRTS-II/SRTS-1, POWERGRID

ANNEXURE -1

Operational Feedback of Unified Real time dynamic state measurement project

	Name of the Project	Unified Real Time Dynamic State Measurment Project			
	Date of commercial operation	28.09.2018			
	LOA No	CC-CS/363-WR1/SCADA-2162/3G1/R/CA-1/4859 (Supply) dated 31.03.2014.			
	Contractor	M/s GE T&D ltd(Erstwhile M/s Alstom T&D)			
Sl No	**Decsription of item**	**From**	**To**	**Operational feedback(Satisfactory/Non Satisfactory)**	**Remarks**
1	HARDWARE for Real Time PDC & Analytical Applications,PDS server ,Historian & Data archiving,Infrastructure management,work station consoles ,remote consoles,printer,GPS receivers etc	28.09.2018	30.09.2020	SATISFACTORY	
2	Phasor Measurement Units(PMUs) and associated hardware ,panels and cabling	28.09.2018	30.09.2020	SATISFACTORY	
3	Super PDC Software,Analytical Applications - Oscillation Monitoring System (OMS),Programming Development System (PDS) Software,Software for Remote Consoles,Software for Historian & Data Archiving,Software for Network Management System & Centralised Management System,Patch Management Software,Identity Server Software,Antivirus Software for all machines in the Control center	28.09.2018	30.09.2020	SATISFACTORY	
4	Networking Hardware like Firewall,WAN Routers,Layer3 switches,PDC LAN,Historial LAN,Infrastructure Management LAN at Control center	28.09.2018	30.09.2020	SATISFACTORY	
5	IITB ANALYTICAL APPLICATION 1. Linear State Estimator - LSE 2. Vulnerability Analysis of Distance Relay - VADR 3. CT/CVT calibration 4. line parameter estimation 5.Supervised Zone-3 Distance protection 6. Control scheme for improving system security	28.09.2018	30.09.2020	1. INSTALLED - OPERATION NOT SATISFACORY 2. INSTALLED- SATISFACTORY 3. INSTALLED - NOT APPLICABLE FOR GRID OPERATION 4. INSTALLED- OPERATION NOT SATISFACTORY 5. PROTOTYPE INSTALLED NOT FUNCTIONAL 6. NOT INSTALLED	FUTURE REQUIREMENT REAL TIME APPLICATIONS IS DESIRED AS MOST OF THE APPLICATIONS IN PHASE 1 ARE NOT REAL TIME
	Date 06-10-2020			EXECUTIVE DIRECTOR SRLDC	

ABHIMANYU GARTIA
कार्यपालक निदेशक / Executive Director
पोसोको / POSOCO
एस. आर. एल. डी. सी / SRLDC
29, रेस कोर्स क्रास रोड / 29, Race Course Cross Road
बेंगलूरु - 560 009 / Bangalore - 560 009.

Annexure V

MOST IMMEDIATE

सं. 22-1306/37/2020-OM
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi-110 001

Dated: 8th February, 2021

OFFICE MEMORANDUM

Subject: Minutes of the Review Meeting on Islanding Scheme held on 28.12.2020

The undersigned is directed to refer to the subject mentioned above and to forward herewith the Minutes of the Review Meeting on Islanding Scheme held on 28.12.2020 under the Chairmanship of Hon'ble MoS (P) (I/C) for information and necessary action.

Encls. as above

(Rita Singh)
Under Secretary to the Government of India
Email: rita.singh71@nic.in

As per list enclosed

List for circulation of Minutes

MINISTRY OF POWER

1. PS to MoSP
2. PPS to Secretary(Power)
3. PPS to Joint Secretary(OM)
4. PS to Deputy Secretary(OM)

CENTRAL ELECTRICITY AUTHORITY (CEA)

1. Shri Prakash Mhaske, Chairperson
2. Shri Dinesh Chandra, Member (GO&D)
3. Smt. Rishika Sharan, Chief Engineer, NPC
4. Shri Saurabh Mishra, Deputy Director, NPC
5. Shri Himanshu Lal, Assistant Director-I, NPC
6. Shri Satish Kumar, Assistant Director-II, NPC

NORTHERN REGION POWER COMMITTEE (NRPC)

1. Shri Naresh Bhandari, Member Secretary

NORTH EASTERN REGION POWER COMMITTEE (NERPC)

1. Shri B. Lyngkhoi, Superintending Engineer

WESTERN REGION POWER COMMITTEE (WRPC)

1. Shri Satyanarayan S, Member Secretary
2. Shri J.K.Rathod, Superintending Engineer
3. Shri Sachin K. Bhise, Executive Engineer
4. Shri Deepak Sharma, Executive Engineer

EASTERN REGION POWER COMMITTEE (ERPC)

1. N. S. Mondal, Member Secretary

SOUTHERN REGION POWER COMMITTEE (SRPC)

1. Shri A Balan, Member Secretary

POWER SYSTEM OPERATION CORPORATION LTD. (POSOCO)

1. Shri KVS Baba, CMD
2. Shri S.R. Narasimhan, Director

POWER GRID CORPORATION OF INDIA LTD. (PGCIL)

1. Shri K Sreekant, CMD

MINUTES OF THE MEETING TO REVIEW ISLANDING SCHEMES HELD ON 28TH DECEMBER 2020

1. On 28th December 2020, Hon'ble Minister of State (IC) for Power and New & Renewable Energy reviewed the Islanding Schemes through video conference. The list of the participants is at **Annexure-I**.

2. Chief Engineer, NPC, CEA gave a presentation on the status of the Islanding scheme. She briefed about the islanding schemes, which were in operation before the grid disturbances of 30th & 31st July 2012 and the islanding scheme which were designed and made operational subsequently. The copy of the presentation is at **Annexure-II**.

3. On a query from Hon'ble Minister about the Islanding scheme for the cities of Bangalore and Hyderabad, it was informed that city of Hyderabad was covered under Ramagundam Islanding Scheme; however, city of Bangalore was not covered under any of the Islanding schemes due to non-availability of any generating station in the vicinity of the city. Member Secretary, SRPC was advised to quickly design the Islanding scheme for Bangalore and get it implemented.

4. Hon'ble Minister advised design of islanding schemes on state / regional basis so as to prevent spread of disturbance/fault from one area/system to another. On this Member (GO&D), CEA informed that if any fault/disturbance occurs in any element of the power system, the faulty element or system automatically get isolated from the rest of the healthy system by the operation of the local protection system. Thus, the faults/disturbances of one system, generally, do not spread to the rest of the system. He also stated that islanding mechanism is the last resort to avoid total blackout. A successfully survived Island helps in quicker restoration of the grid. He added that if frequency goes down below a 48.6 Hz at the time of grid disturbance, around 30,000 MW of load relief happens in milliseconds through automatic operation of under-

frequency relays and/or rate of change of frequency (i.e. df/dt) relays to prevent formation of Islands. Hon'ble Minister appreciated the aforesaid defense mechanisms and directed all concerned entities to ensure functionality of such protection mechanisms at all points of time.

5. In this regard, Director, (System Operations), POSOCO also informed that these days attention has been shifting from islanding to resilience of the grid. Resilience recognizes that systems can fail locally but can be quickly revived through black start resources (bottom-up approach) or by extending supply from healthy parts of the system (top-down approach).

6. Hon'ble Minister also directed that the cyber security in the power system must be ensured and hence, procurement of power system elements and devices from companies in which other countries have majority share holding, should be done strictly in accordance with the guidelines issued by Government of India.

7. Hon'ble Minister also directed that the following points must be considered while designing the Islanding schemes:

(i) Islanding schemes should be designed for all major cities of the country. If there is a need to establish a power plant in / around such a city for the purpose, the proposal for the same may be submitted for consideration of the ministry. Possibility of installation of storage system at such location may also be explored.

(ii) All the strategic and essentials loads should be covered in the Islanding schemes. For finalization of strategic loads, Ministry of Defence may also be consulted.

(iii) Generating Stations, which are spatially nearby the strategic and essential loads, shall be given priority in designing the Islanding schemes.

The meeting ended with thanks to the chair.

***

Annexure-I

List of Participants of the Review meeting of Islanding Schemes held on 28th December 2020 through video conference

MINISTRY OF POWER

1. Shri R.K Singh**,** Hon'ble Minister of State (IC) for Power and NRE……(in chair)
2. Shri Sanjiv Nandan Sahai, Secretary(Power)
3. Shri Ghanshyam Prasad, Joint Secretary
4. Shri Devashish Bose, Deputy Secretary

CENTRAL ELECTRICITY AUTHORITY (CEA)

1. Shri Prakash Mhaske, Chairperson
2. Shri Dinesh Chandra, Member (GO&D)
3. Smt. Rishika Sharan, Chief Engineer, NPC
4. Shri Saurabh Mishra, Deputy Director, NPC
5. Shri Himanshu Lal, Assistant Director-I, NPC
6. Shri Satish Kumar, Assistant Director-II, NPC

NORTHERN REGION POWER COMMITTEE (NRPC)

1. Shri Naresh Bhandari, Member Secretary

NORTH EASTERN REGION POWER COMMITTEE (NERPC)

1. Shri B. Lyngkhoi, Superintending Engineer

WESTERN REGION POWER COMMITTEE (WRPC)

1. Shri Satyanarayan S, Member Secretary
2. Shri J.K.Rathod, Superintending Engineer
3. Shri Sachin K. Bhise, Executive Engineer
4. Shri Deepak Sharma, Executive Engineer

EASTERN REGION POWER COMMITTEE (ERPC)

1. N. S. Mondal, Member Secretary

SOUTHERN REGION POWER COMMITTEE (SRPC)

1. Shri A Balan, Member Secretary

POWER SYSTEM OPERATION CORPORATION LTD. (POSOCO)

1. Shri KVS Baba, CMD
2. Shri S.R. Narasimhan, Director

POWER GRID CORPORATION OF INDIA LTD. (PGCIL)

1. Shri K Sreekant, CMD

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Presentation on
Islanding Schemes in Indian Grid
by
Central Electricity Authority
28-12-2020

Islanding Scheme in Indian Grid

- Islanding is a **defense mechanism as a final stage** in which a part of the system is islanded from a disturbed grid so that if healthy, this subpart could **survive in isolation from rest of grid.**

- Basic objective of islanding scheme is to **avoid total blackout** and **quicker restoration** of failed grid.

- Islanding should take place only when all **other defense plans** have been allowed their full opportunity to bring back and maintain system integrity.

Central Electricity Authority (Grid Standards), Regulations, 2010

- Central Electricity Authority (Grid Standards), Regulations, 2010 , Clause 10 mentions that
- *“Islanding Schemes.- (1) The **Regional Power Committees** shall prepare Islanding schemes for separation of systems with a view to save healthy system from total collapse in case of grid disturbance.*
- *(2) The Entities shall ensure proper implementation of the Schemes referred to in subregulation (1).”*

Present status of Islanding Schemes

Status of the schemes	Northern Region	Western Region	Southern Region	Eastern Region	NER	Total
Operational before the Grid Disturbance of 2012	2	4	1	1	0	8
Designed and made Operational after Grid Disturbance of 2012	2	2	3	4	2	13
Schemes under implementation Stage	1	0	1	3	0	5
Schemes under proposal	1	1	0	0	0	2
Total	**6**	**7**	**5**	**8**	**2**	**28**

Islanding schemes are designed keeping following facts under consideration

- Having a very large number of islanding schemes may **not be in interest** of secure integrated operation of grid.
- Opening of a large number of elements simultaneously may trigger mal-operation and **the islanding scheme itself would become a cause of grid disturbance.**

Islanding schemes are designed keeping following facts under consideration

- Generally implemented for only those sub-parts of network which connect to grid in radial manner with few interconnecting lines and having their own load generation balance
- Other suitable areas, not necessarily radial but which could be isolated from rest of grid by tripping of very few interconnecting lines, may be considered.
- Islanding schemes should not be taken as a system for continued supply to important loads. Emergency supply to important critical loads must be made separately

Islanding schemes are designed keeping following facts under consideration

- System specific islanding scheme solution should be devised. Essential load, if any, in the island are primarily served through Islanding scheme during contingency.

- For survival of the Islands, they should be created in such a manner that the possibility of generation exceeding load is more.

- Islanding should take place only when all other defense plans viz. fault clearance, SPS, UFLS and df/dt etc have been allowed their final operational opportunity and the system is still on the path of deterioration towards collapse.

Details of Islanding Schemes at All India Level (Region-wise):
(a) Operational before the Grid Disturbance of 2012

Details of Islanding Schemes				
Sr No.	Name of the Islanding Scheme	Participating Generators	Area/Load Covered	Status of the Scheme (Operational before the Grid Disturbance of 2012)
	Northern Region			
1	NAPS Islanding Scheme	NAPS (440 MW)	Load at Simbholi S/s and Kurja S/s in UP (350 MW)	Operational
2	Islanding scheme of Delhi	Dadri, Jhajjar, Pragati and Bawana (4300 MW)	Delhi load (3100 MW)	Operational and modified in 2013 and again in 2017

Details of Islanding Schemes at All India Level (Region-wise):
(a) Operational before the Grid Disturbance of 2012

Western Region				
Sr No.	Name of the Islanding Scheme	Participating Generators	Area/Load Covered	Status of the Scheme (Operational before the Grid Disturbance of 2012)
1	Mumbai Islanding	Trombay; Dahanu; TATA Hydro (1877MW)	Mumbai & Mumbai suburban City (1800 MW)	Operational
2	Ahmdabad Electric Company Islanding (Surat)	Nicol GPS (360 MW)	Ahmedabad (300 MW)	Operational
3	Guj.Ind. PCL Islanding	GIPCL (120 MW)	Vadodara (30 MW)	Operational
4	Uran Islanding Scheme	Uran GTPS (872 MW)	Uran & Panvel area of New Mumbai (432 MW)	Operational

Details of Islanding Schemes at All India Level (Region-wise): Operational before the Grid Disturbance of 2012

	Southern Region			
Sr No.	Name of the Islanding Scheme	Participating Generators	Area/Load Covered	Status of the Scheme (Operational before the Grid Disturbance of 2012)
1	Ramagundam islanding scheme	Ramagundam STPS, Kakateeya TPS, Singareni, Ramgundam-B (4963 MW)	Ramagundam adjacent area (4800 MW)	Operational
	Eastern Region			
1	CESC Kolkata	Budge-Budge TPS and Southern TPS (875 MW)	CESC load of Kolkata area (840 MW)	Operational
	North-Eastern Region			
	NIL			

(b) Designed and made operational after Grid disturbance of 2012

Details of Islanding Schemes				
Sr No.	**Name of the Islanding Scheme**	**Participating Generators**	**Area/Load Covered**	**Status of the Scheme (Operational after the Grid Disturbance of 2012)**
	Northern Region			
1	RAPS 'A' & 'B' Islanding Scheme	RAPP A & B (640 MW)	Partial Load at Chittor, Sawa, Nimbahera, Debari and Banswara S/s in Rajasthan (570 MW)	Operational
2	Punjab Islanding scheme	Guru Hargobind TPs (Lehra Mohabat) (920 MW)	Lehra Mohabat, Himatpura, Bajakhanna, Barnala(PSTCL) Mansa, Jhunir (670MW)	Operational , & Under Review due to dismantling of Bhatinda TPS

(b) Designed and made operational after Grid disturbance of 2012

Western Region				
Sr No.	Name of the Islanding Scheme	Participating Generators	Area/Load Covered	Status of the Scheme (Operational after the Grid Disturbance of 2012)
1	Kakrapar -1 & 2 Islanding	KAPS (440 MW)	Vapi (400 MW)	Operational
2	Sugen Islanding	Sugen, PP (1147 MW)	Surat (600 MW)	Operational
	Southern Region			
1	Chennai islanding scheme	Generators Participating with generation of 4468 MW(14 No)	Chennai adjacent area (3900 MW)	Operational
2	Neyveli islanding scheme	Generators Participating with generation of 7238 MW(30 No.)	Neyveli adjacent area (5700 MW)	Operational
3	Kudankulam islanding scheme	Generators Participating with generation of 5007 MW(17 no) (6300 MW)	Kudankulam adjacent area	Operational

(b) Designed and made operational after Grid disturbance of 2012

Eastern Region				
Sr No.	**Name of the Islanding Scheme**	**Participating Generators**	**Area/Load Covered**	**Status of the Scheme (Operational after the Grid Disturbance of 2012)**
1	Bakreswar TPS, WBPDCL	Bakreswar TPS, (1050 MW)	LOADS: Satgachia, Krishnanagar, Ranaghat, Debagram, Katwa, Kalna, Gokarna, Behrampur, Amtala, Rampurhat, Raghunathganj & Lalgola (715 MW)	Operational
2	Tata Power, Haldia	Haldia , three units of TataPower (240 MW)	Haldia and its adjoining area LOADS: Industrial areas of Haldia and Port (84 MW)	Operational
3	Bandel WBPDCL	Bandel TPS, three units of Bandel TPS (335 MW)	LOADS: Khanyan, Chanditala & Bighati (110 MW)	Operational
4	Farakka STPS, NTPC	One unit of Farakka STPS, One of the pre-selected unit of FSTPS (Unit 1 or Unit 3) (200 MW)	Lalmatia, Dumka and Sahebgunj LOADS : Coal mines and Indo- Bangladesh international border (135 MW)	Operational

(b) Designed and made operational after Grid disturbance of 2012

North-Eastern Region				
Sr No.	**Name of the Islanding Scheme**	**Participating Generators**	**Area/Load Covered**	**Status of the Scheme (Operational after the Grid Disturbance of 2012)**
1	Island 1 of NER	AssamGBPP (Gas), NamrupTPS (Gas) & LakwaTPS (Gas) (380-400 MW)	loads of Upper Assam system & Deomali Area (Arunachal Pradesh) (200-300 MW)	Operational
2	Island 2 of NER	AgartalaGTPP (Gas), Baramura (Gas), Rokhia (Gas) & Gumati (Hydro) (200-210MW)	loads of Tripura system & Dullavcherra area (Assam)	Operational

(c)Schemes under implementation Stage

Details of Islanding Schemes				
Sr No.	Name of the Islanding Scheme	Participating Generators	Area/Load Covered	Status of the Scheme (Schemes under implementation Stage)
	Northern Region			
1	Unchahar Islanding scheme	Unchahar (1050 MW)	50% of Lucknow, Raibareily and Fatehpur (760 MW)	Under Review as Network and Load consumption of identified load have under gone significant changes as well as, there is need to explore if another unit of 500MW at Unchahar TPS can be incorporated in the Islanding Scheme.

(c)Schemes under implementation Stage

Southern Region				
Sr No.	**Name of the Islanding Scheme**	**Participating Generators**	**Area/Load Covered**	**Status of the Scheme (Schemes under implementation Stage)**
1	Simhadri islanding scheme	Simhadri	Simhadri	Under Implementation Stage (Estimated date of implementation- June 2021)

(c)Schemes under implementation Stage

	Eastern Region			
Sr No.	**Name of the Islanding Scheme**	**Participating Generators**	**Area/Load Covered**	**Status of the Scheme (Schemes under implementation Stage)**
1	Chandrapura (132KV) of DVC system	Chandrapura TPS (Unit 7 & 8) (500 MW)	Chaddrapura connected area (125 MW)	Under planning stage (Estimated date of implementation- June 2021)
2	MTPS, KBUNL Islanding Scheme, Bihar	Stage II units of Muzaffarpur TPS, KBUNL, Kanti (390 MW)	Station load and radial load of Gopalganj (Bihar) (190 MW)	Scheme has been finalised, Under implementation (Estimated date of implementation - Dec 2021)
3	IB TPS Islanding Scheme. Odisha	IB TPS, One unit of IBTPS (210 MW)	Budhipadar local loads to power plant (149 MW)	Scheme has been finalised, Under implementation (Estimated date of implementation - May 2021)

(d) Schemes under Proposal Stage

Details of Islanding Schemes				
Sr No.	Name of the Islanding Scheme	Participating Generators	Area/Load Covered	Status of the Scheme (Schemes under implementation Stage)
NR	Scheme for revival and operation of Kashmir valley in island after its collapse	Uri-I HEP, Uri-II HEP, Kishenganga HEP, Pampore GT, Upper Sindh and Lower Jhelum HEP (1440 MW)	Kashmir Valley (300-400 MW)	Proposed
WR	Kakrapar -3 & 4 Islanding	yet to be commissioned (1400 MW)	DNH & DD	Formulated -would be implemented after commissioning of KAPS-3 & 4 units. (750 MW)

Thank you….

A. Regionwise / Statewise AUFLS:

1. Northern Region:

S.No	State/UT	Relief Quantum in MW			
		49.2 Hz	49.0. Hz	48.8 Hz	48.6 Hz
1.	Punjab	400	402	406	408
2.	Haryana	308	309	312	314
3.	Rajasthan	390	392	395	397
4.	Delhi	258	259	262	263
5.	UP	551	554	559	561
6.	Uttarakhand	77	77	78	78
7.	HP	77	77	78	78
8.	J & K	83	84	84	85
9.	Chandigarh	16	16	16	16
	Total	2160	2170	2190	2200

2. Western Region:

S.No	State/UT	Relief Quantum in MW			
		49.2 Hz	49.0. Hz	48.8 Hz	48.6 Hz
1.	Gujarat	580	580	580	590
2.	Madhya Pradesh	460	460	460	465
3.	Chattisgarh	150	150	155	155
4.	Maharashtra	805	810	815	820
5.	Goa	25	25	25	25
6.	Daman & Diu	10	15	15	15
7.	TPC(Tata Power)	30	30	35	35
	Total	2060	2070	2085	2105

3. Southern Region:

S.No	State/UT	Relief Quantum in MW			
		49.2 Hz	49.0. Hz	48.8 Hz	48.6 Hz
1.	Andhra Pradesh	392	393	418	399
2.	Telangana	422	432	430	542
3.	Tamil Nadu	796	771	787	767
4.	Karnataka	580	587	597	595
5.	Kerala	254	234	277	221
6.	Puducherry	27	24	22	18
	Total	2471	2441	2531	2542

4. Eastern Region:

S.No	State/UT	Relief Quantum in MW			
		49.2 Hz	**49.0. Hz**	**48.8 Hz**	**48.6 Hz**
1.	Bihar	98	99	99	101
2.	Jharkhand	61	62	61	62
3.	DVC	134	135.5	136	137
4.	Odisha	181.5	183.5	184	186
5.	WBSETCL & CESC	345.5	350	350	354
Total		**820**	**830**	**830**	**840**

5. North Eastern Region:

S.No	State/UT	Relief Quantum in MW			
		49.2 Hz	49.0. Hz	48.8 Hz	48.6 Hz
1.	Ar.Pradesh	5.00	5.00	5.50	4.50
2.	Assam	54.50	61.00	59.00	57.00
3.	manipur	5.00	6.00	5.00	4.00
4.	Meghalaya	15.00	15.00	15.00	15.00
5.	Mizoram	5.09	5.31	5.10	5.20
6.	Nagaland	6.00	4.50	5.00	4.50
7.	Tripura	11.00	10.00	14.50	12.50
Total		**101.59**	**106.81**	**109.10**	**102.70**

B. df/dt Settings (Region-wise):

1. Northern Region:

S.No	State/UT	Load Relief in MW		
		Stage-I 49.9Hz& 0.1Hz/sec	**Stage-II 49.9Hz&0.2Hz/sec**	**Stage-III 49.9Hz&0.3Hz/sec**
1.	Punjab	430	490	490
2.	Haryana	280	310	310
3.	Rajasthan	330	370	370
4.	Delhi	250	280	280
5.	UP	500	280	280
6.	Uttarakhand	70	70	70
7.	HP	50	70	70
8.	J & K	90	90	90
9.	Chandigarh	0	50	50
TOTAL		2000	2010	2010

2. Western Region:

S.No	State/UT	Load Relief in MW		
		Stage-I 49.9Hz& 0.1Hz/sec	**Stage-II 49.9Hz&0.2Hz/sec**	**Stage-III 49.9Hz&0.4Hz/sec**
1.	Gujarat	1006	905	1001
2.	Madhya Pradesh	371	355	392
3.	Chattisgarh	27	37	120
4.	Maharashtra	546	621	686
5.	TPC (Tata Power)	60	82	273
TOTAL		2000	2010	2472

Gujarat additional df/dt setting at 49.9Hz & 0.3Hz/sec= 399MW
TPC additional df/dt setting at 49.9Hz & 0.5Hz/sec = 931MW

3. **Southern Region:**

S.No	State/UT	Load Relief in MW	
		Stage-I 49.5Hz& 0.2Hz/sec	**Stage-II 49.3Hz&0.3Hz/sec**
1.	Andhra Pradesh	345	855
2.	Telangana	369	992
3.	Tamil Nadu	578	417
4.	Karnataka	480	741
5.	Kerala	235	175
6.	Puducherry	12	6
TOTAL		2019	3186

4. **Eastern Region:**
5. **North Eastern Region:**

Not Implemented.

Annexure VII

सत्यमेव जयते

भारत सरकार/Government of India
विद्युत मंत्रालय/Ministry of Power
केन्द्रीय विद्युत प्राधिकरण/Central Electricity Authority
एन.पी.सी. प्रभाग/National Power Committee Division
Ist Floor, Wing-5 ,West Block-II, RK Puram, New Delhi-66, e-mail:cenpc-cea@gov.in

No. 4/MTGS/NPC/CEA/2020/ Date: 19th January 2021

To,
(As per distribution list)

Subject: Constitution of "Sub-Committee to study AUFLS Scheme and to work out on a uniform approach for df/dt settings"- reg.

In the 9th meeting of NPC, it was decided that a Sub-Committee may be formed under the Chairmanship of Member Secretary, WRPC, with representatives from POSOCO and all the RPCs to study the AUFLS Scheme. NPC Secretariat vide letter No. 4/MTGS/NPC/CEA/2020/01-06 dated 01.01.2021 had asked for nominations from all the RPCs. Based on the receipt of nominations from all the RPCs, the composition of the **Sub-Committee** has been formed as follow:

Designation & Organisation	Name	Constitution of the Committee
Member Secretary, WRPC	Sh. Satyanarayan S.	Chairman
Member Secretary, NPC	Smt. Rishika Sharan	Member
Superintending Engineer (P), WRPC	Sh. J. K Rathod	Member Convener
Superintending Engineer, NERPC	Sh. B. Lyngkhoi	Member
Executive Engineer, SRPC	Ms. N S Malini	Member
Executive Engineer, ERPC	Sh. Pranaya Piyusha Jena	Member
Executive Engineer, NRPC	Sh. Ratnesh Kumar,	Member
General Manager, NLDC	Sh. Rajiv Porwal,	Member

Term of Reference (TOR) of the Sub-Committee:

1. To examine the AUFLS scheme for all Indian Grid currently deployed and suggest any revision for the same.
2. To examine the df/dt setting in different Regions for all India grid and suggest a suitable approach for effective working of the same.

The Sub- Committee may Co-opt/ associate any other expert in the field as they feel necessary.
The Sub-Committee may submit the report in 3 months time.

Yours faithfully,

19th Jan 2021

(ऋषिका शरण/Rishika Sharan)
मुख्य अभियन्ता एवं सदस्य सचिव,रा.वि.स /
Chief Engineer & Member Secretary, NPC

Distribution list:

1. Member secretary, WRPC
2. Member secretary, NRPC
3. Member secretary, ERPC
4. Member secretary, SRPC
5. Member secretary, NERPC
6. Rajiv Porwal, GM, NLDC, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi, Delhi 110016

Copy for kind information to:

1. Chairperson, CEA
2. Member (GO&D), CEA

Annexure VIII

Status of Implementation of Automatic Generation Control (AGC) in India

Inter-State Level

S. No.	States	NLDC/SLDC	Participating Generators (MW)	Status of Implementation: Operational/Planned	Remarks, if any
1	Andhra Pradesh	NLDC	Simhadri-2 (1000 MW)	Ready to be operational#	Migrated to new AGC software from Nov 2020
2	Bihar	NLDC	Barh-2 (1320 MW)	Ready to be operational#	Migrated to new AGC software from Nov 2020
3	Maharashtra	NLDC	Mauda-2 (1320 MW)	Ready to be operational#	Migrated to new AGC software from Nov 2020
4	Assam	NLDC	Bongaigaon (750 MW)	Ready to be operational#	Migrated to new AGC software from Nov 2020
5	Uttar Pradesh	NLDC	Dadri-2 (980 MW)	Planned	Migration to new AGC software under implementation
6	Jharkhand	NLDC	MPL (1050 MW)	Ready to be operational#	Added to new AGC software from Nov 2020
7	Gujarat	NLDC	CGPL (4150 MW)	Ready to be operational#	Added to new AGC software from Nov 2020
8	Uttarakhand	NLDC	Koteshwar (400 MW)	Ready to be operational#	Added to new AGC software from Nov 2020
9	Tamil Nadu	NLDC	NTPL (1000 MW)	Planned	Planned for January 2021
10	Himachal Pradesh	NLDC	Nathpa Jhakri (1500 MW)	Planned	Planned for January 2021
11	Himachal Pradesh	NLDC	Chamera-3 (231 MW)	Planned	Planned for January 2021
12	Madhya Pradesh	NLDC	Vindhyachal-II(1000MW)	Planned	Planned for January 2021
13	Madhya Pradesh	NLDC	Vindhyachal-IV(1000MW)	Planned	Planned for January 2021
14	Madhya Pradesh	NLDC	Vindhyachal-III(1000MW)	Planned	Planned for January 2021
15	Madhya Pradesh	NLDC	Vindhyachal-V(500MW)	Planned	Planned for January 2021

Technical evaluation of performance of these plants in AGC is being conducted

S. No.	States	NLDC/SLDC	Participating Generators (MW)	Status of Implementation: Operational/Planned	Remarks, if any
16	Madhya Pradesh	NLDC	Vindhyachal-I(1260MW)	Planned	Planned for January 2021
17	Bihar	NLDC	Kahalgaon-1 (840 MW)	Planned	Planned for January 2021
18	Bihar	NLDC	Kahalgaon-2 (1500 MW)	Planned	Planned for January 2021
19	Chhattisgarh	NLDC	Sipat-1 (1980 MW)	Planned	Planned for January 2021
20	Chhattisgarh	NLDC	Sipat-2 (1000 MW)	Planned	Planned for January 2021
21	Madhya Pradesh	NLDC	Sasan (3960 MW)	Planned	Planned for January 2021
22	Jammu & Kashmir	NLDC	Dulhasti (390 MW)	Planned	Planned for January 2021
23	Uttarakhand	NLDC	Tehri (1000MW)	Planned	Planned for January 2021
24	Sikkim	NLDC	Teesta-V (510MW)	Planned	Planned for January 2021
25	Chhattisgarh	NLDC	Korba STPS STG -III (500MW)	Planned	Planned for Jan-Apr 2021
26	Chhattisgarh	NLDC	Korba STPS STG (I & II)(2100MW)	Planned	Planned for Jan-Apr 2021
27	Chhattisgarh	NLDC	SIPAT TPS Stg-I(1980MW)	Planned	Planned for Jan-Apr 2021
28	Chhattisgarh	NLDC	SIPAT TPS Stg-II(1000MW)	Planned	Planned for Jan-Apr 2021
29	Madhya Pradesh	NLDC	Sasan Power Ltd(3960MW)	Planned	Planned for Jan-Apr 2021
30	Uttar Pradesh	NLDC	Rihand TPS Stage - II(1000MW)	Planned	Planned for Jan-Apr 2021
31	Uttar Pradesh	NLDC	Rihand TPS Stage - I(1000MW)	Planned	Planned for Jan-Apr 2021
32	Uttar Pradesh	NLDC	Rihand TPS Stage - III(1000MW)	Planned	Planned for Jan-Apr 2021
33	Uttar Pradesh	NLDC	Singrauli STPS(2000MW)	Planned	Planned for Jan-Apr 2021
34	Tripura	NLDC	AGTPP - Agartala(135MW)	Planned	Planned for Jan-Apr 2021
35	Odisha	NLDC	Talcher STPS - I(1000MW)	Planned	Planned for Jan-Apr 2021
36	Odisha	NLDC	Talcher STPS - II(2000MW)	Planned	Planned for Jan-Apr 2021
37	Assam	NLDC	AGBPP - Kathalguri(291MW)	Planned	Planned for Jan-Apr 2021
38	Maharashtra	NLDC	Ratnagiri Gas & Power Pvt Ltd GF(1968MW)	Planned	Planned for Jan-Apr 2021

S. No.	States	NLDC/SLDC	Participating Generators (MW)	Status of Implementation: Operational/Planned	Remarks, if any
39	Bihar	NLDC	Nabinagar Thermal Power Project(750MW)	Planned	Planned for Jan-Apr 2021
40	Chhattisgarh	NLDC	NTPC-SAIL Power Company Pvt. Ltd(500MW)	Planned	Planned for Jan-Apr 2021
41	Gujarat	NLDC	Gandhar Gas Power Project GF(657MW)	Planned	Planned for Jan-Apr 2021
42	Gujarat	NLDC	Kawas Gas Power Project GF(656.2MW)	Planned	Planned for Jan-Apr 2021
43	West Bengal	NLDC	Farakka STPS - I & II(1600MW)	Planned	Planned for Jan-Apr 2021
44	West Bengal	NLDC	Farakka STPS - III(500MW)	Planned	Planned for Jan-Apr 2021
45	Tamil Nadu	NLDC	NLC TPS - II Exp(500MW)	Planned	Planned for Jan-Apr 2021
46	Tamil Nadu	NLDC	NLC TPS - I Exp(420MW)	Planned	Planned for Jan-Apr 2021
47	Telangana	NLDC	Ramagundam STPS – III (500MW)	Planned	Planned for Jan-Apr 2021
48	Telangana	NLDC	Ramagundam STPS - I & II (2100MW)	Planned	Planned for Jan-Apr 2021
49	Tamil Nadu	NLDC	NLC TPS - I(630MW)	Planned	Planned for Jan-Apr 2021
50	Tamil Nadu	NLDC	NLC TPS – II (840MW)	Planned	Planned for Jan-Apr 2021
51	Uttar Pradesh	NLDC	Unchahar TPS Stage – IV (500MW)	Planned	Planned for Jan-Apr 2021
52	Andhra Pradesh	NLDC	Simhadri STPS - I (1000MW)	Planned	Planned for Jan-Apr 2021
53	Uttar Pradesh	NLDC	Unchahar TPS Stage - I(420MW)	Planned	Planned for Jan-Apr 2021
54	Uttar Pradesh	NLDC	Unchahar TPS Stage - II(420MW)	Planned	Planned for Jan-Apr 2021
55	Uttar Pradesh	NLDC	Unchahar TPS Stage – III (210MW)	Planned	Planned for Jan-Apr 2021
56	Tamil Nadu	NLDC	NTECL - Vallur TPS (1500MW)	Planned	Planned for Jan-Apr 2021
57	Rajasthan	NLDC	Anta Gas Power Project GF (419.33MW)	Planned	Planned for Jan-Apr 2021
58	Haryana	NLDC	Indra Gandhi STPS (1500MW)	Planned	Planned for Jan-Apr 2021

S. No.	States	NLDC/SLDC	Participating Generators (MW)	Status of Implementation: Operational/Planned	Remarks, if any
59	Maharashtra	NLDC	Mouda STPP Stage-I (1000MW)	Planned	Planned for Jan-Apr 2021
60	Uttar Pradesh	NLDC	Dadri Gas Power Project GF (829.78MW)	Planned	Planned for Jan-Apr 2021
61	Uttar Pradesh	NLDC	Auraiya Gas Power Project GF (663.36MW)	Planned	Planned for Jan-Apr 2021
62	Uttar Pradesh	NLDC	Dadri TPS Stage – I (840MW)	Planned	Planned for Jan-Apr 2021
63	Karnataka	NLDC	Kudgi STPS I (2400MW)	Planned	Planned for Jan-Apr 2021
64	Maharashtra	NLDC	Solapur Super Thermal Power Project(1320MW)	Planned	Planned for Jan-Apr 2021
65	Uttar Pradesh	NLDC	Tanda TPS Stage – II (660MW)	Planned	Planned for Jan-Apr 2021
66	Madhya Pradesh	NLDC	Gadarwara (800MW)	Planned	Planned for Jan-Apr 2021
67	Madhya Pradesh	NLDC	Khargone (1320MW)	Planned	Planned for Jan-Apr 2021
68	Chhattisgarh	NLDC	Lara (1600MW)	Planned	Planned for Jan-Apr 2021
69	Bihar	NLDC	NSTPP (NPGC)(660MW)	Planned	Planned for Jan-Apr 2021
70	Odisha	NLDC	Darlipalli (800MW)	Planned	Planned for Jan-Apr 2021
71	Bihar	NLDC	MTPS Stage – II (390MW)	Planned	Planned for Jan-Apr 2021
72	Sikkim	NLDC	Rangit (60MW)	Planned	Planned for Jan-Apr 2021
73	Himachal Pradesh	NLDC	Bairasiul (180MW)	Planned	Planned for Jan-Apr 2021
74	Himachal Pradesh	NLDC	Chamera-II (300MW)	Planned	Planned for Jan-Apr 2021
75	Himachal Pradesh	NLDC	Chamera-I (540MW)	Planned	Planned for Jan-Apr 2021
76	Jammu & Kashmir	NLDC	Uri Stage – I (480MW)	Planned	Planned for Jan-Apr 2021
77	Jammu & Kashmir	NLDC	Salal (690MW)	Planned	Planned for Jan-Apr 2021
78	Uttarakhand	NLDC	Dhauliganga (280MW)	Planned	Planned for Jan-Apr 2021
79	Uttarakhand	NLDC	Tanakpur (94.2MW)	Planned	Planned for Jan-Apr 2021
80	Himachal Pradesh	NLDC	Parbati III (520MW)	Planned	Planned for Jan-Apr 2021

S. No.	States	NLDC/SLDC	Participating Generators (MW)	Status of Implementation: Operational/Planned	Remarks, if any
81	Jammu & Kashmir	NLDC	Sewa-II (120MW)	Planned	Planned for Jan-Apr 2021
82	Jammu & Kashmir	NLDC	Uri Stage – II (240MW)	Planned	Planned for Jan-Apr 2021
83	Himachal Pradesh	NLDC	Rampur (412MW)	Planned	Planned for Jan-Apr 2021
84	Uttarakhand	NLDC	Koldam (800MW)	Planned	Planned for Jan-Apr 2021
85	Assam	NLDC	Kopili (200MW)	Planned	Planned for Jan-Apr 2021
86	Assam	NLDC	Kopili-II (25MW)	Planned	Planned for Jan-Apr 2021
87	Assam	NLDC	Khandong (50MW)	Planned	Planned for Jan-Apr 2021
88	Arunachal Pradesh	NLDC	Ranganadi (405MW)	Planned	Planned for Jan-Apr 2021
89	Arunachal Pradesh	NLDC	Pare (110MW)	Planned	Planned for Jan-Apr 2021
90	Nagaland	NLDC	Doyang (75MW)	Planned	Planned for Jan-Apr 2021
91	Manipur	NLDC	Loktak (105MW)	Planned	Planned for Jan-Apr 2021
92	Himachal Pradesh	NLDC	Pong (396MW)	Planned	Planned for Jan-Apr 2021
93	Himachal Pradesh	NLDC	Dehar (990MW)	Planned	Planned for Jan-Apr 2021
94	Himachal Pradesh	NLDC	Bhakra complex (1379MW)	Planned	Planned for Jan-Apr 2021

AGC Implimentation status in SR (as on 31st December 2020)

State	NLDC/SLDC	Participating Generaotrs	Status of impementation: Operatioinal/Planned	Remarks if Any
APTRANSCO	SLDC	(APGENCO: Krishnapatnam - 2 x 800 MW)	Discussions with APGENCO and SRLDC are in progress. A meeting though VC was requested for guidance and technical support for impelementing the AGC.	In addition to Krishnapatnam, planning AGC at VTPS, RyTPP, Upper Sileru & Lower Sileru. The Prposal submitted to APERC. Concurrence from APERC is awaited.
Telangana	SLDC	KTPS- VI(500 MW) (TSGENCO: Kothagudem E-132 MW downward)	TSGENCO informed that they had procured all the cards etc. for implementation of AGC and handed over to OEM (Siemens) as per the specification furnised by them. Siemens engineers had come to site and tried to establish the signal which was failed due to the incompatibility of existing RTU. TSGENCO had initiated action to procure the RTU and another three months would be taken for implementation of AGC (By March 2021).	
Karnataka	SLDC	Sharavathy Generating Station (1035 MW)	Implementation of AGC Pilot under USAID GTG Scheme has been completed(live demonstration) as on 08.12.2020. Available MW for AGC is 10 % of Live load upto maximum of 100MW (10% 0f 1035 MW).	
Karnataka	SLDC	Varahi Under Groung Power House (4 x 115 MW)	AGC Implementation works taken up. W.O placed on OEM ,M/S Andritz Hydro India Ltd. Materials required for AGC implementation supplied. Expected to be completed by Feb 2021. Available MW for AGC at VUGPH is 20% of live load upto maximum of 80 MW as per the programme planned.	
Kerala	SLDC	Kuttiady Unit No. 5-50MW	Operational	State Regulator has been appoached for putting AGC on regular basis
		Idukki Unit No.1-130MW	Planned	AGC will be implemented once the Optical Fibre link from SLDC to Idukki PH is estabished.
Tamil Nadu	SLDC	North Chennai TPS Stage-II (one unit i.e. 1 x 600 MW)	The logic for implementation of AGC in DCS at NCTPS-II end is ready. The mode of communication to be estabilished between NCTPS-II switchyard and SLDC Chennai. Based on the above, action had been taken to procure of hardware items such as Remote Terminal Unit, Fiber Optic concentor,Fiber Optic cable and other accessiories and works would be completed within three months. (TANGEDCO: North Chennai Stage-II -60 MW)	

		MTPS - II (1 x 600 MW)	The logic for implementation of AGC in DCS at MTPS-II end is ready. The mode of communication to be estabilished between MTPS-II switchyard and SLDC Chennai. Based on the above, action had been taken to procure of hardware items such as Remote Terminal Unit, Fiber Optic concentor,Fiber Optic cable and other accessiories and works would be completed within three months. (TANGEDCO:MTPS Stage II-60 MW)	

NLCIL	NLDC	TPS II (7 x 210 MW)	TPS2e: Erection of panels completed. Testing of one channel is complete. One more channel testing is pending. NNTPP: Commissioning works are going on For TPS1E and TPS II, works will be taken up subsequently For all stations, ABB is the agency	
NLCIL	NLDC	TPS I Expn (2 x 210 MW)		
NLCIL	NLDC	TPS II Expn (2 x 250 MW)		
NNTPP	NLDC	NNTPP (1 x 500 MW)		
NTPL	NLDC	NTPL (2 x 500 MW)	Panels supplied by ABB are not matching with NLDC server for some inputs. This issue had been taken up and ABB has to come up with solution. NLDC also had been apprised on the issue.	
NTECL Vallur TPS	NLDC	NTECL Vallur (3 x 500 MW)	AGC Panel received at site he Contracted agency M/S ABB is expected to start work from 18th Jan 2021 ,work will be completed in twenty days.	
NTPC	NLDC	All NTPC Stations in SR, Ramagundam station (3 x 200 + 4 x 500), Simhadri Stage I (2 x 500), Simhadri Stage II (2 x 500 - already implemented), Talcher (4 x 500)	In SR, AGC was first implemented in Simhadri Stage II (2 x 500 MW). AGC was being taken at Organization level (Jointly for all the stations). Order is placed on M/s ABB with completion schedule of Dec 2020. Even though all the materials had reached at site, ABB had requested for 4 months extension for completion of the works (by April 2021 end).	
NP-Kunta	NLDC	Solar in AP AGC :5 blocks of 50 MW i.e. 5 x 50 = 250 MW	Placing of order by Delloitte (consultant of USAID) is in progress.	

Implementation of Automatic Generation Control in Eastern Region

Status of implementation as updated in OCC Meeting and TeST Meetings as follows:

Sl. No	Station	Status of Communication link from plant substation to PGCIL node	Status of communication system integration from unit to plant substation	Target date for implementation of AGC at plant
1	Farakka STPS - I & II	Both links established	Pending	February 2021
2	Kahalgaon STPS - II	Both links established	Pending	February 2021
3	Barh STPS	Both links established	Installed	Running since August 2019
4	NPGC, Nabinagar	Links from Gaya and Patna has been established.	NPGC, Nabinagar informed that OPGW is available but end equipment need to be procured and installed to establish communication link from their station to NLDC. NTPC further informed that they have placed order for Providing the end equipment.	February 2021
5	Maithon Power Limited	One link established. Other link, Ranchi-Maithon(RB) would complete by March, 2020.	Completed	Installed and testing is in progress
6	Talcher STPS - I	Both links established.		February 2021
7	Kahalgaon STPS - I	Both links established.	NTPC informed that they are approaching CERC for exemption.	
8	Nabinagar Thermal Power Project - BRBCL	Only one link Sasaram- Nabinagar OPGW installation is pending. It would take two years for Completion.		February 2021
9	Darlipalli STPS	Communication established.	Integration is in progress	February 2021
10	Teesta – V	One link established		February 2021
11	FarakkaSTPS - III	Link established		February 2021

12	MTPS Stage – II (Kanti)	Link established		February 2021
13	Rangit HPS	One link established		February 2021

Note: OPGW from Barh to Gorakhpur is redundant path for ER to NR which would be completed by March, 2020.

In 168th OCC meeting NTPC ER-II informed that implementation of AGC got delayed due to lockdown.

BRBCL informed that they would implement AGC after installation of OPGW link in 400kV Sasaram-Nabinagar line.

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Annexure IX

Status of Scheme for Protection System Data Base Management System (PDMS) in NRPC

The status of the Protection setting Data Base in being regularly monitored in the Protection sub-committee meetings of NRPC.

The issue of PDMS was discussed with POWERGRID in 39th Protection sub-committee where it was informed that protection settings are decided at Corporate level by all regions and same are shared at Regional level for implementation and protection setting data as extracted from the Relay is available at NTAMC, Manesar. However, protection setting updating need to be done only from OEM software of Relays and change in the setting of Relay are communicated to NTAMC for updating setting which is a Manual process for which template of Relays (Excel files) are being used. Further, NTAMC visit was also carried out by team of NRPC, NRLDC and POWERGRID to check infrastructure available with POWERGRID.

Considering the same and upon deliberation in various Protection sub-committee meetings, it was decided to start data collection in a phase manner by initially collecting protection setting data for 400 kV & above lines, reactors as well as ICTs of 400/220kV level and nominations of Nodal officer from each Utility was requested who will co-ordinate for submitting new as well as updating the settings.

Meanwhile, necessity of web-based protection setting which can be updated regularly and freezing up the format for the same was also deliberated. Accordingly, NRPC and NRLDC had a meeting wherein possibility to build the data base for web-based protection setting was explored. Accordingly, it has been decided to freeze up generalized format of protection settings, needed for analysis works, which can be used for building web-based protection setting.

Currently, 80-90% Protection setting data of 400 kV and above system has been collected and utilities are being followed up for submission of 220kV system data at the earliest. Further, a committee is also being constituted for preparing comprehensive specifications of relay setting parameters for Web based database.

Protection Database Management System of Eastern Regional Grid

The Project "Creation & Maintenance of webbased Protection Database Management System for ER grid" under PSDF project has been implemented and declared Go-live on 31.10.2017. The on-site support has been started w.e.f. 01.11.2017 for the period of 5 years as per the terms of contract. This project consists the following three modules:

A. Protection database Management System(PDMS)

- This module consists of all the protection settings, relay details (like make,model etc), CT/PT details of 132kV and above level (except Sikkim, where it is 66 kV and above). Single line diagram(Bus-Breaker Model) of the substations and Grid maps of Eastern Region as well as individual state utilities are also available. These details can be accessed by all the utilities in the ER through the online PDMS platform.

- The existing protection/relay settings available in the database is regularly reviewed and modified in case of any change in relay or network configuration. The new relays along with settings are being added to the database whenever any new substation/elements is added to the Grid. Further due to change in network configuration on account of addition/modification of any element(s) the change in protection settings are also being incorporated in the database.

- The protection settings are readily available to all the utilities through online protection database as a result the analysis of grid disturbances becomes easier and faster.

- The zone-3 reach settings of all existing 400 kV lines have been analysed using the database and the settings have been reviewed as per ERPC protection philosophy.

- The database of protection relays such as list of Electromechanical/Numerical/Static relays are readily available in the PDMS which helps in monitoring of the protection system.

- The database is also helpful for the constituent utilities as they have access to the relay settings/data related to any of the substations under their control area through PDMS. Thus the database acts as a central repository for their system as well. This helps in calculation of the protection settings as they can now access the remote end/adjacent line protection settings and line parameters easily through the PDMS platform.

B. Protection Settings Calculation Tool

- The offline PSCT tool is an integral part of protection database system which is helpful for the constituents to carryout short circuit studies, protection studies, load flow studies and analysis of disturbance recorder files.
- The existing relay settings of a relay can be populated in PSCT tool and the relay settings can be tested for different system conditions. This helps in reviewing protection settings of the relay.
- With the help of database and PSCT tool, protection coordination is being carried out and implemented wherever any addition of new Line/substation/ ICT or change in network take place.
- Comtrade viewer is also available in PSCT which is useful in analysing the comtrade/DR files while analysing the grid disturbances.

C. On-Line Disturbance Reporting System

- Online disturbance reporting system is also implemented along with the protection database which helps in monitoring the Disturbance report, Disturbance recorder and Event Logger files through on-line portal.
- The files are immediately accessible to ERLDC and ERPC as well as to remote end utilities for carrying out detailed analysis of any disturbance.
- This portal acts as a central repository of Disturbance report, Disturbance recorder and Event Logger files which can be accessed through on-line.

Status of Protection Management System (PMS) Project being implemented in Southern Region through PSDF funding

1. In pursuance of the recommendations of Task Force on Power System Analysis under Contingencies constituted in the aftermath of Grid Disturbances in July, 2012, SRPC in their 26th meeting held on 20th December, 2014 had approved a proposal to procure Protection Suite (Protection Management System - PMS) that comprises Web-based Management Software and Protection Setting Calculation Tool through PSDF funding.
2. Subsequently, steps had been taken to get the scheme approved from PSDF, and Sanction Order in this regard had been received vide MoP letter no: 10/1/2014-OM dated 02.01.2017. Based on this, tender for executing the Project, *"Procurement of Web-based Management Software and Protection Setting Calculation Tool for Southern Region*", had been invited through open bidding process from qualified and reputed bidders through SRPC tender notification dated 23rd March 2017. After evaluation of the received bids (technical & financial), the project was awarded to M/s PRDC Pvt. Ltd. (Executing Agency), on 09.08.2017. The execution period for the Project is about 18 months from the date of placement of LoA (also called "Effective Date"), and is followed by an Extended Technical Services period of 5 years.
3. The project execution is being monitored in terms of achieving the following Eleven (11) identified Milestones mentioned in the Letter of Award (LoA). The present status of project execution status in terms of achieving these milestones is given below:

Sl No	Milestone	Time-line for achieving the Milestone (in months from Date of placement of LoA – 09.08.2017)	Completion Percentage
1	Submission of High level Design Document for implementation of web based protection management system & protection setting calculation tool for Southern Region to SRPC	1	100
2	Delivery of 35 No of base license of protection calculation engine along with laptops	2	100
3	Delivery of associated servers, Installation and deployment of application and database software along with standard operating System	2	100
4	Delivery of web based database management for Southern Region	2	100
5	Building the network data for operational load flow and fault calculation	3	90
6	Completion of Training program on the desktop based protection setting calculation software	4	100
7	Completion of Site Acceptance Tests with one pilot state system	6	95
8	Delivery of Real time interactive hardware and software at selected 400 kV substation at central location for fault analysis and reporting	9	100

9	Completion of Protection database for entire southern region and substation SLD preparation for protection study	16	**92**
10	Uploading all SRPC constituents data along with SLD and Go Live	18	15
11	Extended technical services for 5-year period paid @1% for every six months	Additional 5 years	0

From above, it can be seen that the Executing Agency has fully completed Milestones – 1 & 2 & 3 & 4 & 6 & 8 and partially completed Milestones - 5 & 7 & 9 & 10. Presently, the activities relating to Milestones – 5, 7, 9 & 10 are under progress.

4. Even though the project was originally envisaged to be made operational in about 18 months from the effective date (09.08.2017), its implementation got delayed due to following:
   - Coverage of large no. of Stations (880) from the originally envisaged figure of 650-700 Stations: In consideration of requests being posed by various SR-Constituents to include all commissioned stations (up to December, 2018), extended data collection activities from all identified Stations were continued till 31st January, 2019. Since data collection is the primary step on which other critical steps, like modelling of network, building of protection database (network database & relay settings database) and preparation of protection SLDs are dependent, completion of the these have necessitated time-extension for various milestones of project (Milestones – 5, 7, 9 & 10).
   - Embedding of Lower Voltage Network (132/ 110/ 66 kV) of various States in Project Database: As per the scope of the project, even though PRDC has been tasked with modelling all Stations in the Southern Region connected at 132/ 110/ 66 kV & above voltage level, the responsibility of making available required data for various stations at 132/ 110/ 66 kV & above voltage level was fixed on SR-constituents. In view of the observed mismatches w.r.t. connectivity of certain substations at 132/ 110/ 66 kV level state-wise Network Reconciliation meetings were conducted during December 2018 – February 2019 and subsequently during 03- 07 June 2019.
   - Since embedding of reconciled 132/110/66 kV Network of various states in PMS Database is quintessential to guarantee orderliness & correctness of the SR-Network being modelled, incorporation of the reconciled data obtained as a result of above meetings into PMS Database has also necessitated time-extension for completing the Milestones - 5, 7, 9 & 10.
   - Refinement of features of Protection Setting Calculation tool (PSCT) and Protection Database Management System (PDMS) has also demanded time-extension for completing Milestone-7.
   - Small percentage of relay settings could not be downloaded from relays due to various reasons like failure of communication ports of relays, non-availability of suitable software for downloading of settings etc. These had to be entered manually into the database by PRDC. This has also necessitated time – extension for completing Milestone- 9 & 10.
   - Verification of protection settings embedded into protection database.
   - Lockdown and subsequent restrictions owing to Covid-19 pandemic situation.

5. The PMS project comprises two parts, viz., Web-based Protection Data Management System (PDMS), and Desktop-based Protection Setting Calculation Tool (PSCT). While PSCT is the Calculation Software for carrying out various studies (load-flow, short-circuit, transient stability, protection), and houses Network Database of all modelled network & protection elements, PDMS is an Asset Management Tool for maintaining information on

relay attributes and settings (Protection Database). PDMS is a workflow driven web-based system with Role-based access control.

6. The first part as mentioned above, viz., PDMS was made available online w.e.f. 20th January 2020. The constituents were requested to scrutinize the relay settings uploaded in PDMS. Accordingly, based on the feedback to SRPC detailed discussion regarding PDMS data verification was held with most of the constituents, to resolve discrepancies. Besides, changes, additions etc. of network and protection elements in field are being regularly communicated, by the utilities, to the Executing Agency (EA) through Data Modification Notification System (DMNS) portal of PMS, and get the same updated in the PDMS.

7. Regarding the second part of the project, viz., PSCT, modelling of Power System Network of Southern Region is under final stage of completion.

8. Various features of the PDMS & PSCT modules have been verified and analyzed by the Monitoring Committee of the project as and when the features are made available by EA. Inadequacies and shortcomings observed in them are being pursued with EA for expeditious resolution.

9. Efforts are being made to operationalise the PMS project as a whole (commencement of Go-Live) in **February – March, 2021**.

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Annexure X

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत संचार विकास प्रभाग
Power Communication Development Division

Dated: the 29th October, 2020

Office Order

Subject: - **Formation of Standing Committee on Communication System Planning in Power Sector – reg.**

Clause (a) of the Section 73 of the Electricity Act, 2003 mandates the Central Electricity Authority to formulate short-term and perspective plans for development of the electricity system and co-ordinate the activities of the planning agencies for the optimal utilisation of resources to subserve the interests of the national economy. In order to prepare the perspective plan for development of the Communication System for Power Sector in the country in line with the transmission planning carried out by CEA through Regional Power Committees on Transmission Planning, it has been decided to constitute a **Standing Committee on Communication System Planning in Power Sector** with the following composition@, with immediate effect:

1.	Principal Chief Engineer, CEA	Chairman
2.	Chief Engineer, PCD, CEA	Member Secretary
3.	Chief Engineer, PSPA, CEA*	Member
4.	Member Secretary, NPC, CEA	Member
5.	Member Secretary, RPCs (NRPC/WRPC/SRPC/ERPC/NERPC)	Member
6.	Executive Director, NLDC#	Member
7.	Executive Director, CTU##	Member
8.	Executive Director, POWERGRID###	Member
9.	Representatives** (At the level of Chief Engineer or equivalent) from Transmission Licensees/STUs$$: **Northern Region:** Uttar Pradesh, Punjab, Rajasthan, Haryana, Himachal Pradesh, Uttarakhand, Delhi, UT of Jammu and Kashmir, UT of Ladakh, UT of Chandigarh. **Eastern Region:** Bihar, Jharkhand, Odisha, Sikkim, West Bengal, UT of A&N.	Members

18-ए, कुतुब इंस्टीट्यूशनल एरिया, शहीद जीत सिंह मार्ग, एनआरपीसी परिसर, कटवारिया सराय, नई दिल्ली-110016
18-A, Qutab Institutional Area, Shaheed Jeet Singh Marg, NRPC Complex, Katwaria Sarai, New Delhi-110066
टेलीफैक्स/Telefax: 011-26565214, ईमेल/E-mail: celdntcea@gmail.com, वेबसाइट/Website: www.cea.nic.in

	Western Region: Goa, Gujarat, Madhya Pradesh, Maharashtra, Chhattisgarh, UT of Daman and Diu, UT of DNH. **Southern Region:** Karnataka, Andhra Pradesh, Telangana, Kerala, Tamil Nadu, UT of Puducherry, UT of Lakshadweep. **North-Eastern Region:** Assam, Tripura, Meghalaya, Manipur, Arunachal Pradesh, Nagaland, Mizoram.	
10.	Expert from the relevant field (2 Nos)[$]	Member

* - To be nominated by Member (Power System), CEA.
** - To be nominated by Transmission Licensees/STUs.
# - To be nominated by POSOCO.
- To be nominated by CTU.
- To be nominated by PGCIL.
$ - To be decided by the Committee.
$$ - Transmission Licensees/STUs to coordinate with their respective DISCOMs
@ - The Committee may co-opt more members, as it deems necessary.

2. The Terms of Reference (ToR) of the Committee are to:

(i) prepare a short-term plan and perspective plan for communication system for power sector in line with the transmission planning prepared by CEA through RPCTP and National Committee for Transmission (NCT).

(ii) coordinate the activities of the planning agencies like CTU/STUs for communication purposes for the optimal utilization of transmission assets. The communication planning proposed by the CTU/STU shall be presented to the Standing Committee for consideration.

(iii) carry out periodic review of the short-term plan and perspective plan for communication system for power sector.

(iv) formulate norms for operation and maintenance of communication network.

3. The Standing Committee shall meet at least twice in a year.

4. The recommendations of the Standing Committee shall be placed before the Chairperson, CEA for approval.

5. This issues with the approval of Chairperson, CEA.

(Upendra Kumar)
Chief Engineer

To:

1. C. Kureel, Principal Chief Engineer, CEA
2. Me (Power System), CEA – With a request to nominate the concerned Chief Engineer.
3. r Secretary, National Power Committee, CEA

18-ए, कुतुब इंस्टीट्यूशनल एरिया, शहीद जीत सिंह मार्ग, एनआरपीसी परिसर, कटवारिया सराय, नई दिल्ली-110016
, Qutab Institutional Area, Shaheed Jeet Singh Marg, NRPC Complex, Katwaria Sarai, New Delhi-110066
टेलीफैक्स/Telefax: 011-26565214, ईमेल/E-mail: celdntcea@gmail.com, वेबसाइट/Website: www.cea.nic.in

4. Member Secretary (NRPC/ERPC/WRPC/SRPC/NERPC)
5. Chairman and Managing Director, POSOCO
6. Chief Operating Officer, CTU
7. Chairman and Managing Director, PowerGrid
8. Heads of Transmission Licensees/State Transmission Utilities

With a request to nominate the concerned Member.

Copy for information to:
PPS to Chairperson, CEA.

18-ए, कुतुब इंस्टीट्यूशनल एरिया, शहीद जीत सिंह मार्ग, एनआरपीसी परिसर, कटवारिया सराय, नई दिल्ली-110016
18-A, Qutab Institutional Area, Shaheed Jeet Singh Marg, NRPC Complex, Katwaria Sarai, New Delhi-110066
टेलीफैक्स/Telefax: 011-26565214, ईमेल/E-mail: celdntcea@gmail.com, वेबसाइट/Website: www.cea.nic.in

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.

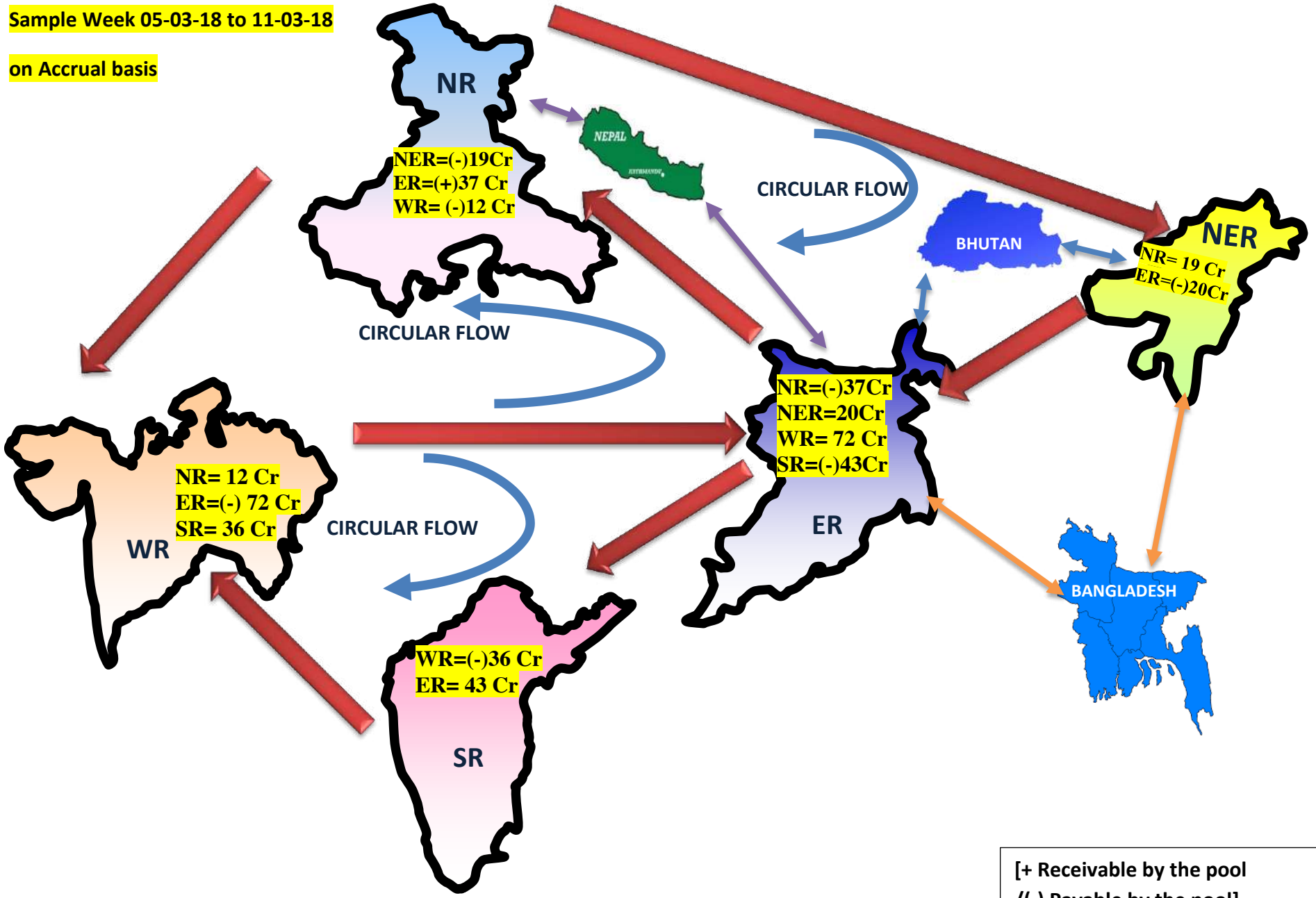
In the future, multi-lateral transaction between neighboring countries are also envisaged under the SAARC framework e.g., Bangladesh may purchase power from Nepal or Bhutan through India. Neighboring countries may also participate in a designated Power Exchange for cross-border transactions in the future. 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.

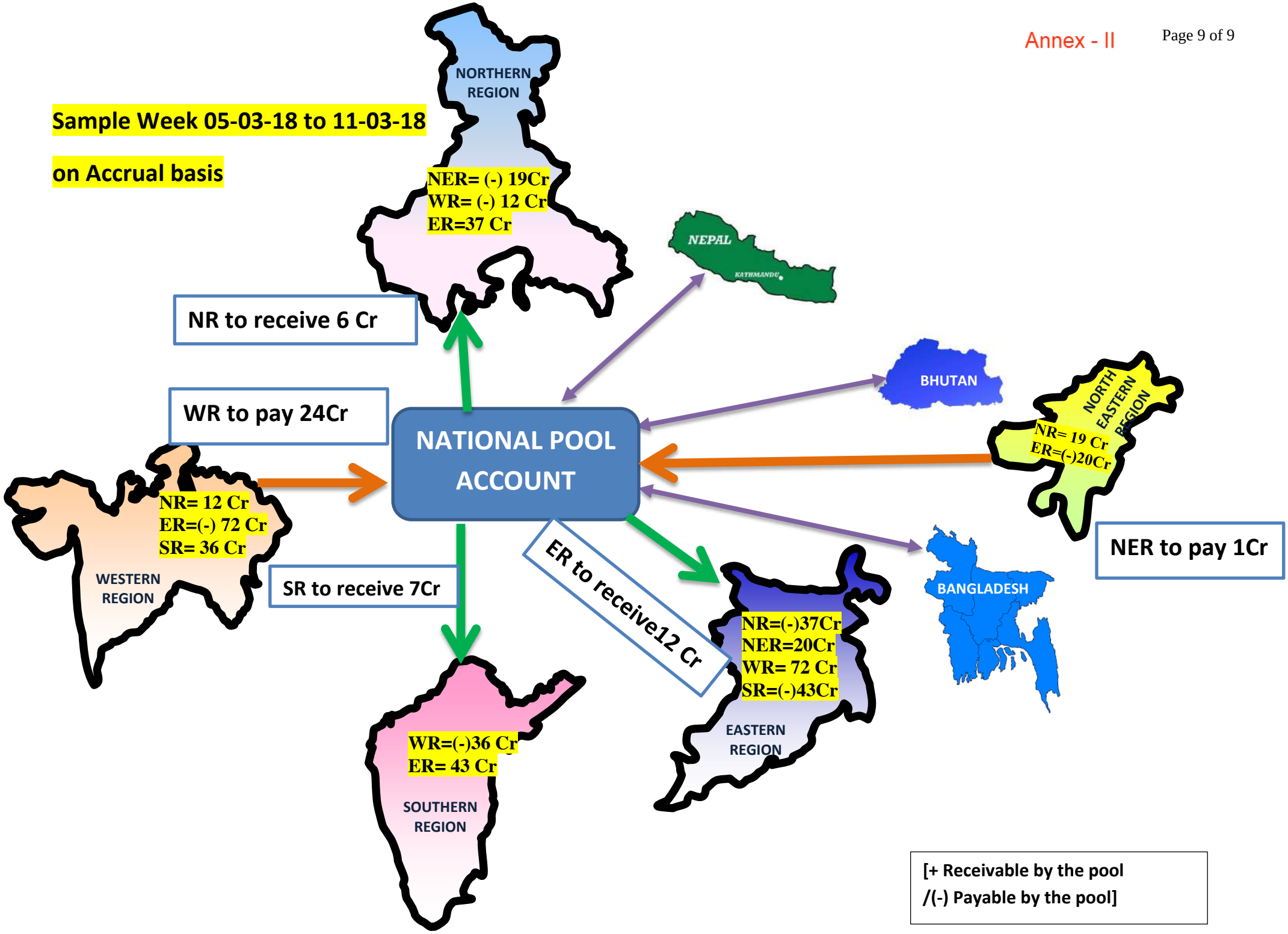
Suitable changes/modifications are required to be carried out in the IEGC and DSM Regulations and the functions of NPC also need to be recognized in the regulatory framework.

Annex - I


Sample Week 05-03-18 to 11-03-18
on Accrual basis
NR
NER=(-)19Cr
ER=(+)37 Cr
WR= (-)12 Cr
NEPAL
CIRCULAR FLOW
CIRCULAR FLOW
BHUTAN
NER
NR= 19 Cr
ER=(-)20Cr
NR=(-)37Cr
NER=20Cr
WR= 72 Cr
SR=(-)43Cr
ER
NR= 12 Cr
ER=(-) 72 Cr
SR= 36 Cr
WR
CIRCULAR FLOW
BANGLADESH
WR=(-)36 Cr
ER= 43 Cr
SR
[+ Receivable by the pool
/(-) Payable by the pool]

Sample Week 05-03-18 to 11-03-18

on Accrual basis



[+ Receivable by the pool
/(-) Payable by the pool]

Annexure XII

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
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संदर्भ संख्या:पोसोको/एनएलडीसी/2021/97 दिनाँक: 12th फरवरी, 2021

सेवा मे,

Chief Engineer,
National Power Committee,
Central Electricity Authority,
01st Floor, Wing-5, West Block-II,
R.K.Puram, New Delhi-66

विषय: **NPC Agenda on National Energy Account(NEA).**

संदर्भ:1.**POSOCO Communication: पोसोको/एनएलडीसी/2018/329 dated 09th Nov'2018**

2.NPC email National Energy Account (NEA)_9th NPC meeting follow up-reg. dated 29th Jan'2021

महोदय,

In order to streamline and harmonize the accounting and settlement at the national level, POSOCO has submitted the agenda of "National Energy Account (NEA)" for discussion on 08th National Power Committee (NPC) (Annex-1).

As per the above-mentioned proposal, it is envisaged that NPC shall prepare the National Energy Account (NEA) comprising of the interregional and trans-national transactions. The NEA shall 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 transnational transactions and the neighbouring countries shall be paying/receiving to/from the National Deviation Pool Account operated by NLDC.

National Energy Account (NEA) & National Pool Account related feedback have been submitted to Honourable CERC through various feedback report from time to time. CERC being a quasi-judicial body, does not normally respond to such feedback through letters etc. A petition may be required to be filed either suo-moto or by respective parties, for getting the appropriate directions from CERC. It may also be appreciated that introduction of the NEA needs the notification of the Regulatory Framework by CERC through appropriate Regulations, which also needs pre-publication, stakeholder consultation and final notification.

In this regard, it is pertinent to mention that CERC has mentioned the National Pool account in SCED order Petition No. 02 /SM/2019 (Suo-Motu) Date of Order: 31st of January, 2019. The same is reproduced below

Quote

"10.(c) POSOCO has suggested implementation of the National Pool Account to take care of changes in injection schedule for each region due to optimisation process. There would be a need for pay-in/pay-out from the National Pool Account for incremental changes in schedules (Up/Down). As per the present mechanism, the generators receive their variable charges based on the schedules issued by the concerned RLDC. Optimization would result in incremental/decremental changes in the existing schedules of generators and these would need to be settled through the National Pool Account mentioned above."

Unquote

As per the direction of CERC, National Pool Account (SCED) is maintained and operated by NLDC for settlement of SCED. Similarly National Deviation Pool Account for Deviation Settlement (DSM) can also be maintained/operated by NLDC in case of any direction received from the appropriate Commission.

In 08th NPC Meeting it was decided that RPCs may provide their observation/views after deliberations in the respective RPCs meeting. Accordingly, it is suggested that considering the suggestions received from the RPCs, a framework for implementation of NEA/National Pool Agenda can be finalized in the next NPC Meeting. Once this is agreed upon, POSOCO would submit the necessary feedback once again to the Hon'ble CERC for consideration & further directions.

सादर धन्यवाद,

भवदीय

देबाशिस दे

कार्यपालक निदेशक, रा.भा.प्रे.के.

Enclosures: As above

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
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(Kind Attn: Sh. Irfan Ahmad)

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09/11/18.

(एस. सी. सक्सेना)
उप महाप्रबंधक (एन एल डी सी)

Encl: As above

Copy to: Chief Engineer, National Power Committee, NRPC Building, 3rd Floor, Katwaria Sarai, New Delhi-110016

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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.

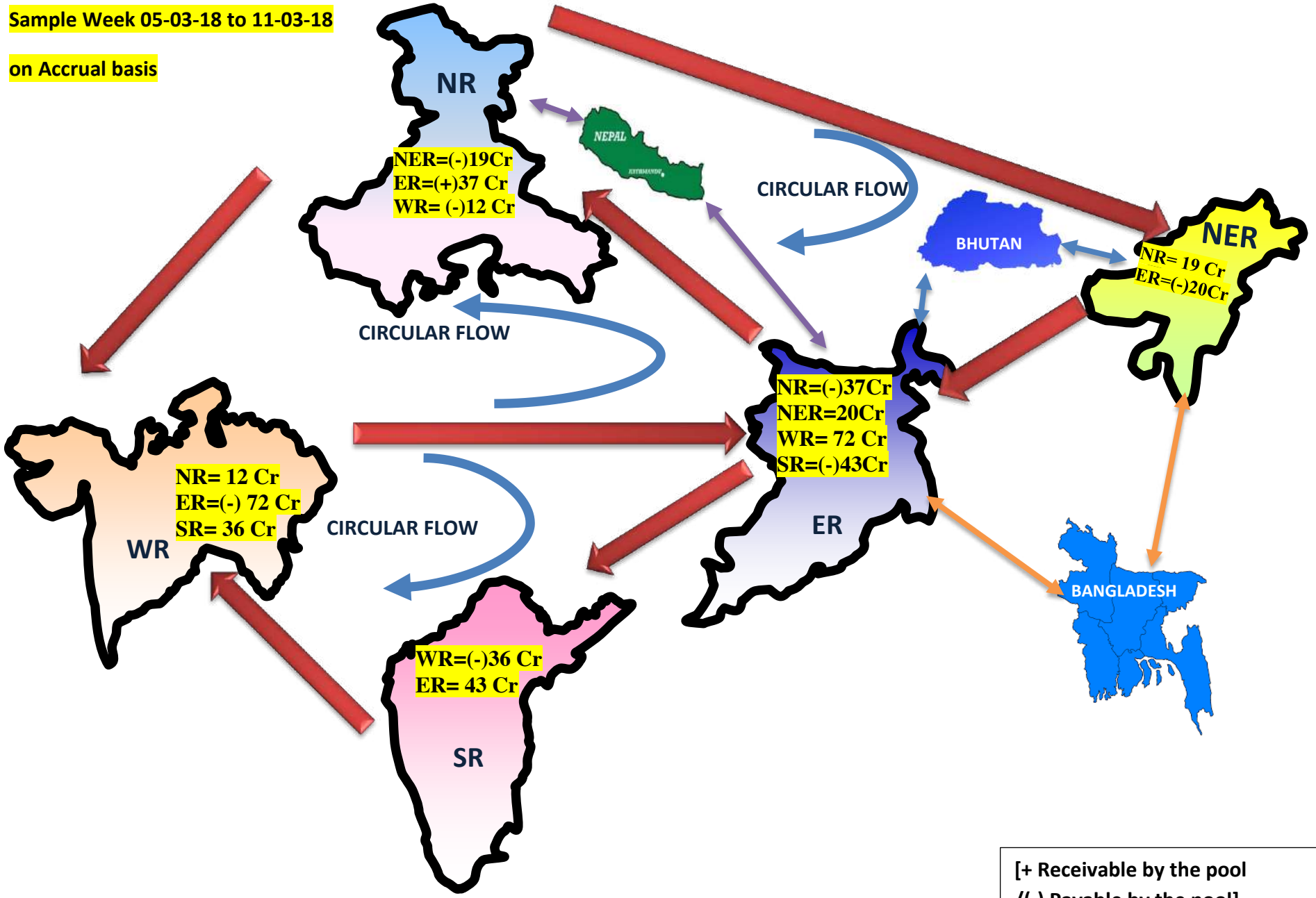
In the future, multi-lateral transaction between neighboring countries are also envisaged under the SAARC framework e.g., Bangladesh may purchase power from Nepal or Bhutan through India. Neighboring countries may also participate in a designated Power Exchange for cross-border transactions in the future. 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.

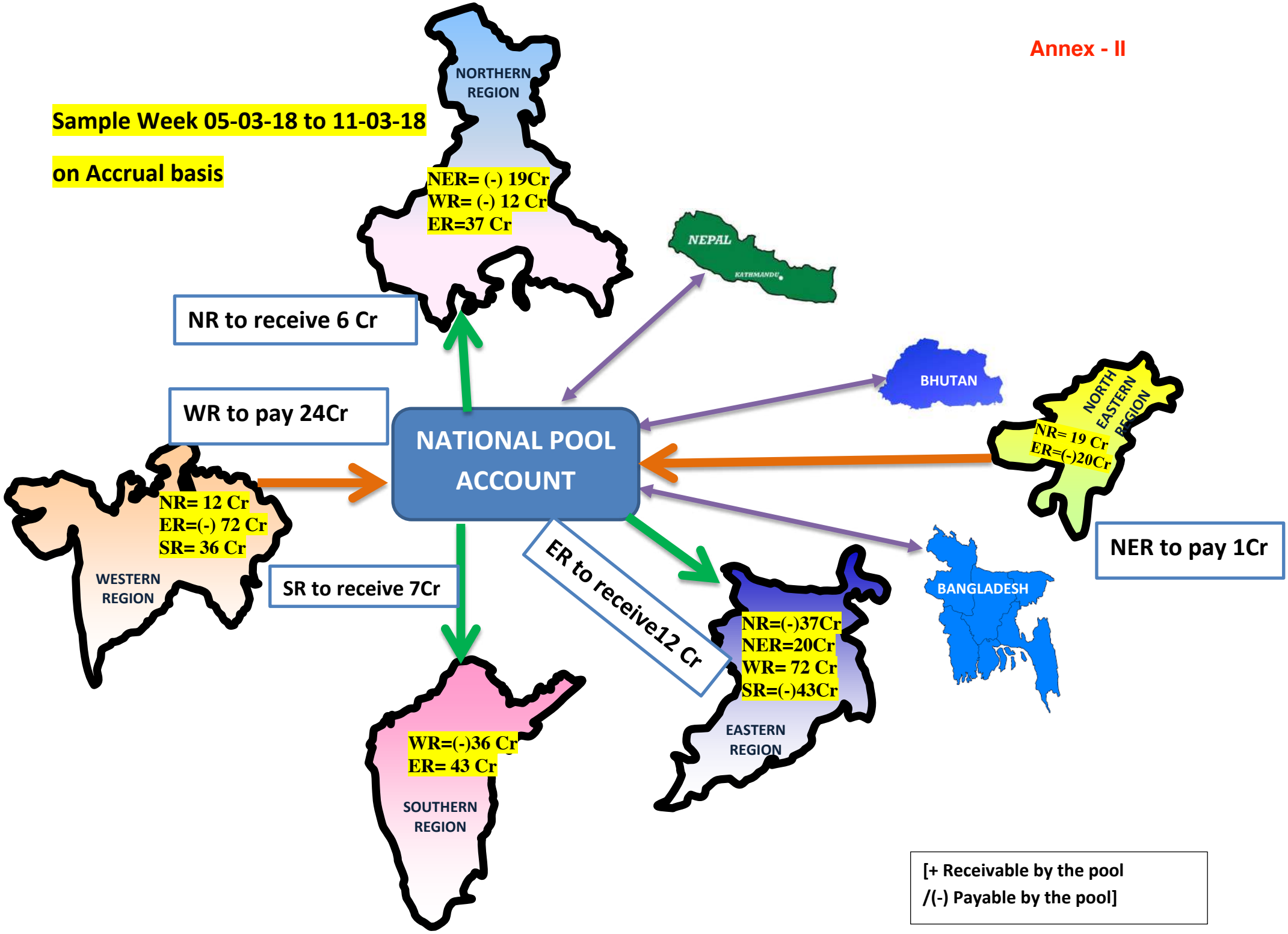
Annex - I


Sample Week 05-03-18 to 11-03-18
on Accrual basis
NR
NER=(-)19Cr
ER=(+)37 Cr
WR= (-)12 Cr
NEPAL
CIRCULAR FLOW
CIRCULAR FLOW
BHUTAN
NER
NR= 19 Cr
ER=(-)20Cr
NR=(-)37Cr
NER=20Cr
WR= 72 Cr
SR=(-)43Cr
ER
NR= 12 Cr
ER=(-) 72 Cr
SR= 36 Cr
WR
CIRCULAR FLOW
BANGLADESH
WR=(-)36 Cr
ER= 43 Cr
SR
[+ Receivable by the pool
/(-) Payable by the pool]

Annex - II

Sample Week 05-03-18 to 11-03-18

on Accrual basis



[+ Receivable by the pool
/(-) Payable by the pool]

Annexure XIII

सत्यमेव जयते
भारत सरकार/Government of India
विद्युत मंत्रालय/Ministry of Power
केन्द्रीय विद्युत प्राधिकरण/Central Electricity Authority
एन.पी.सी. प्रभाग/National Power Committee Division
Ist Floor, Wing-5 ,West Block-II, RK Puram, New Delhi-66, e-mail:rishika@nic.in

No. 4/MTGS/NPC/CEA/2020/ 71–81 Date: 8th February, 2020

To,
(As per distribution list)

Subject: Constitution of "Sub-group to finalize a common procedure for Power System Stabilizers (PSS) Tuning"-reg.

In the 9th meeting of NPC, it was decided that a Sub-group may be constituted comprising of representatives of Protection Sub-Committee (PSC) of respective RPCs, NPC, NLDC, CTU, NTPC and NHPC, to finalize a common procedure for Power System Stabilizers (PSS) Tuning. NPC Secretariat vide letter No. 4/MTGS/NPC/CEA/2020/07-14 dated 01.01.2021 had asked for nominations from all the RPCs, NLDC, CTU, NTPC and NHPC. Based on the receipt of nominations, the composition of the Sub-group has been formed as follow:

S. No.	Designation	Organisation	Name	Constitution of the Committee
1	Member Secretary	WRPC	Sh. Satyanarayan S.	Chairman
2	Member Secretary	NPC	Smt. Rishika Sharan	Member
3	Superintending Engineer	WRPC	Sh. P. D.Lone	Member Convener
4	Executive Engineer	NERPC	Sh. S. Mukherjee	Member
5	Executive Engineer	NRPC	Sh. Ratnesh Kumar,	Member
7	Executive Engineer	ERPC	Sh. Pranaya Piyusha Jena	Member
6	Assistant Executive Engineer	SRPC	Sh. Sriharsha Mundluri	Member
8	Sr. General Manager	CTU	Sh. Partha Sarathi Das	Member
9	General Manager	NHPC	Sh. Umesh Kumar Nand	Member
10	General Manager	NLDC	Sh. Vivek Pandey	Member
11	Chief Manager	NLDC	Sh Phanishankar	Member
11	AGM (OS-SIIS)	NTPC	Sh. Sanjeev Kumar Singh	Member

Term of Reference (TOR) of the Sub-group:

1. To examine the present procedure of Power System Stabilizer (PSS) tuning of generating units in all the five regions of Indian Power System.
2. To study the PSS tuning exercise in the past and to finalize a common procedure for PSS Tuning at all India Level.

Sub-Group may Co-opt/associate any other expert in the field, as they feel necessary.

Yours faithfully,

(ऋषिका शरण/Rishika Sharan)
मुख्य अभियन्ता एवं सदस्य सचिव,रा.वि.स /
Chief Engineer & Member Secretary, NPC

Distribution list:

1. Member secretary, WRPC
2. Member secretary, NRPC
3. Member secretary, ERPC
4. Member secretary, SRPC
5. Member secretary, NERPC
6. PGCIL, CTU-Planning (1st Floor-A Wing), Saudamini, Plot No.- 2, Sector-29, Near IFFCO Chowk Metro Station, Gurgaon – 122 001, Haryana
7. CMD, NHPC,NHPC Office Complex, Sector-33, Faridabad – 121003 (Haryana)
8. CMD,NTPC, NTPC Bhawan, SCOPE Complex, Institutional Area, Lodhi Road, New Delhi – 110003
9. CMD – POSOCO, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110016

Copy for kind information to:

1. Chairperson, CEA
2. Member (GO&D), CEA