सत्यमेव जयते

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

सं: उ.क्षे.वि.स./प्रचालन/106/01/2022/10900-10941 दिनांक: 11.11.2022

विषय: प्रचालन समन्वय उप-समिति की 201वीं बैठक की कार्यसूची।

Subject: Agenda of 201st OCC meeting.

प्रचालन समन्वय उप-समिति की **201वीं** बैठक का आयोजन वीडियो कॉन्फ्रेंसिंग के माध्यम से दिनांक **15.11.2022** को **10:30** बजे से किया जायेगा। उक्त बैठक की कार्यसूची उत्तर क्षेत्रीय विद्युत् समिति की वेबसाइट http://164.100.60.165 पर उपलब्ध है।

बैठक में सम्मिलित होने के लिए लिंक व पासवर्ड सभी सदस्यों को ई-मेल द्वारा प्रदान किया जाएगा।

कृपया बैठक में उपस्थित होने की सुविधा प्रदान करें।

201st meeting of the Operation Co-ordination sub-committee will be conducted through Video Conferencing on **15.11.2022** from **10:30 Hrs**. The agenda of this meeting has been uploaded on the NRPC web-site http://164.100.60.165.

The link and password for joining the meeting will be e-mailed to respective e-mail IDs in due course.

Kindly make it convenient to attend the meeting.

Santosh
11.11.2022

(संतोष कुमार)
अधीक्षण अभियंता (प्रचालन)

सेवा में : प्रचालन समन्वय उप समिति के सभी सदस्य।
To : All Members of OCC

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

1. Confirmation of Minutes

The minutes of the 200th OCC meeting were issued vide letter of even number dated 10.11.2022.

In regard to agenda No. 7, Uttarakhand representative requested OCC forum that following statement may kindly be inserted after para 7.76:

"Uttarakhand SLDC representative iterated that scheme will not be feasible even Vyasi HEP does not run on continuous basis and also not available round the clock and data for study not available for one year as it has started generation in last week of April'22 and insisted to drop Dehradun as islanding scheme based on discussion with higherups and feasibility report submitted accordingly."

Sub-committee may deliberate and kindly confirm the Minutes.

2. Review of Grid operations

2.1 Power Supply Position (Provisional) for October 2022

Anticipated Power Supply Position v/s Actual Power Supply Position (Provisional) of Northern Region during the month of October-2022 is as under:

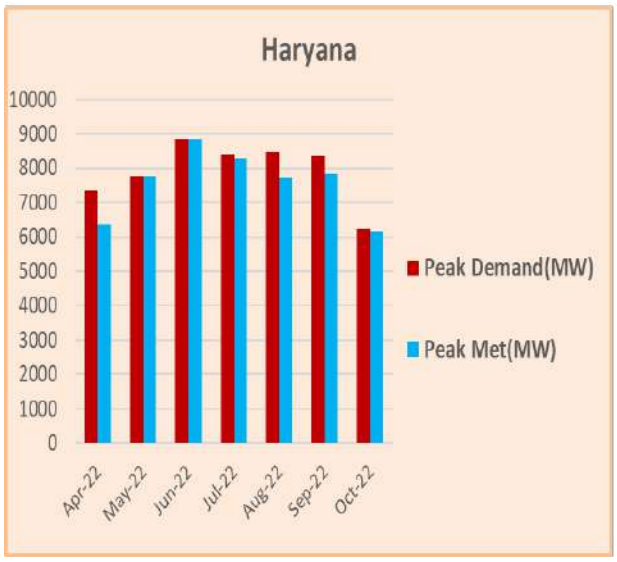
State / UT	Req. / Avl.	Energy (MU)			Peak (MW)		
		Anticipated	Actual	% Variation	Anticipated	Actual	% Variation
CHANDIGARH	(Avl)	140	121	-13.8%	400	260	-35.0%
	(Req)	110	121	9.7%	220	260	18.2%
DELHI	(Avl)	3273	2447	-25.3%	5400	4990	-7.6%
	(Req)	2750	2447	-11.0%	5400	4990	-7.6%
HARYANA	(Avl)	4660	4358	-6.5%	11220	8663	-22.8%
	(Req)	5750	4359	-24.2%	9356	8663	-7.4%
HIMACHAL PRADESH	(Avl)	981	954	-2.8%	1714	1771	3.3%
	(Req)	961	958	-0.3%	1740	1771	1.8%
J&K and LADAKH	(Avl)	1200	1557	29.7%	3040	2823	-7.1%
	(Req)	1510	1573	4.1%	2470	2823	14.3%
PUNJAB	(Avl)	5420	5050	-6.8%	11410	11498	0.8%
	(Req)	5745	5056	-12.0%	12500	11498	-8.0%
RAJASTHAN	(Avl)	7930	7884	-0.6%	17920	14072	-21.5%
	(Req)	8500	7901	-7.0%	14360	14072	-2.0%
UTTAR PRADESH	(Avl)	12400	10022	-19.2%	23500	22631	-3.7%
	(Req)	12090	10030	-17.0%	23500	22631	-3.7%
UTTARAKHAND	(Avl)	1215	1103	-9.2%	2129	2092	-1.7%
	(Req)	1225	1107	-9.6%	2200	2092	-4.9%
NORTHERN REGION	(Avl)	37220	33493	-10.0%	76200	60700	-20.3%
	(Req)	38640	33550	-13.2%	63700	60700	-4.7%

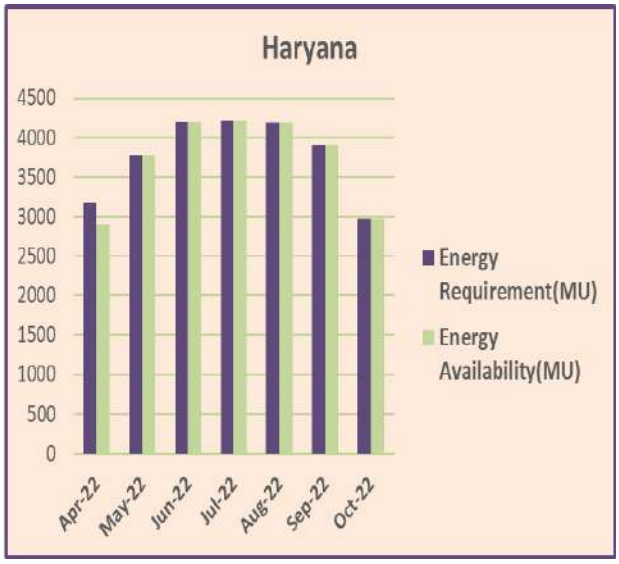
As per above, negative / significant variation (≥5%) in Actual Power Supply Position(Provisional) vis-à-vis Anticipated figures is observed for the month of October-2022 in terms of Energy Requirement for Chandigarh, Delhi, Haryana, HP, Punjab, Rajasthan, UP, and Uttarakhand and in terms of Peak Demand similar variation is noted for Chandigarh, Delhi, Haryana, UTs of J&K and Ladakh, Punjab, Rajasthan, UP, and Uttarakhand. These states/UTs are requested to submit reason for such variations so that the same can be deliberated in the meeting.

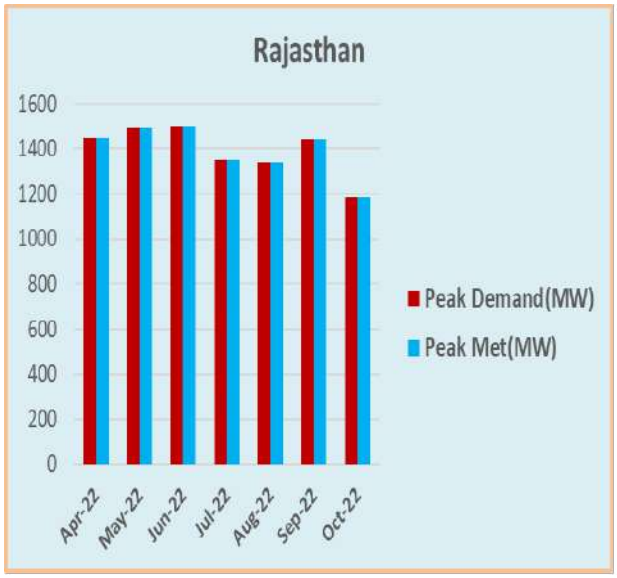
All SLDCs are requested to furnish provisional and revised power supply position in prescribed formats on NRPC website portal by 2nd and 15th day of the month respectively for the compliance of Central Electricity Authority (Furnishing of Statistics, Returns and Information) Regulations, 2007.

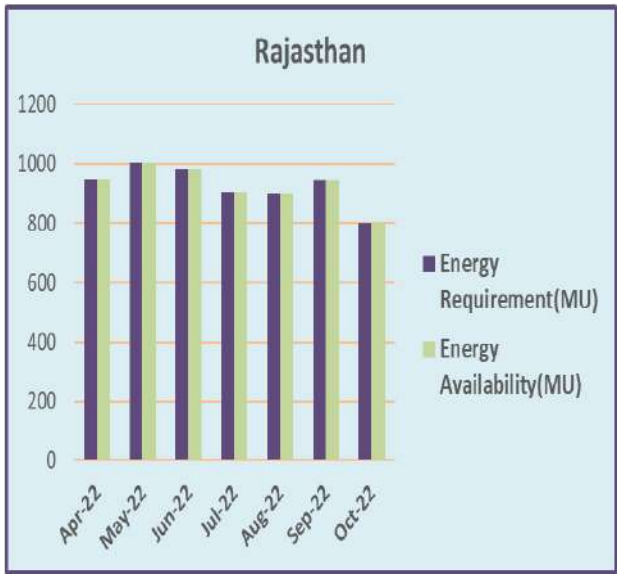
2.2 Power Supply Position of NCR

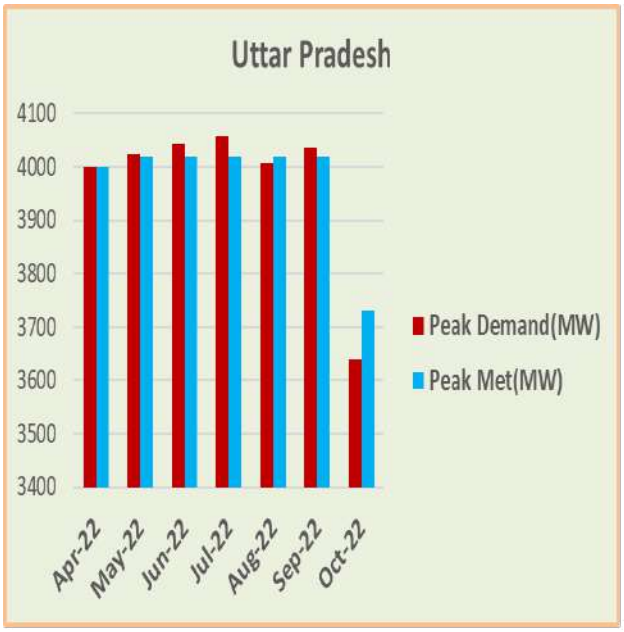
NCR Planning Board (NCRPB) is closely monitoring the power supply position of National Capital Region. Monthly power supply position for NCR till the month of October-2022 is available on NRPC website (*http://164.100.60.165*). Power supply position during the current financial year is shown as under:

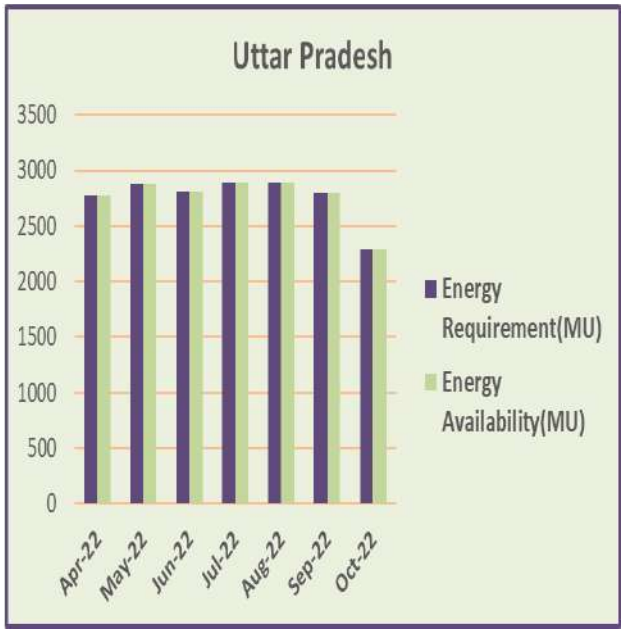


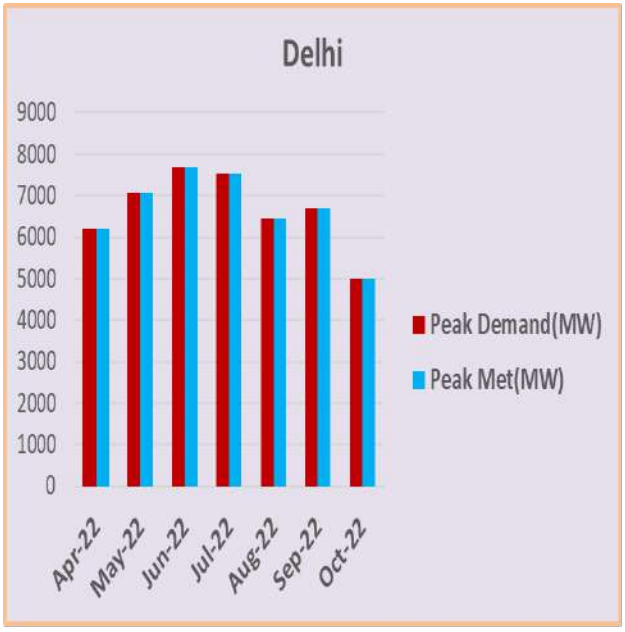


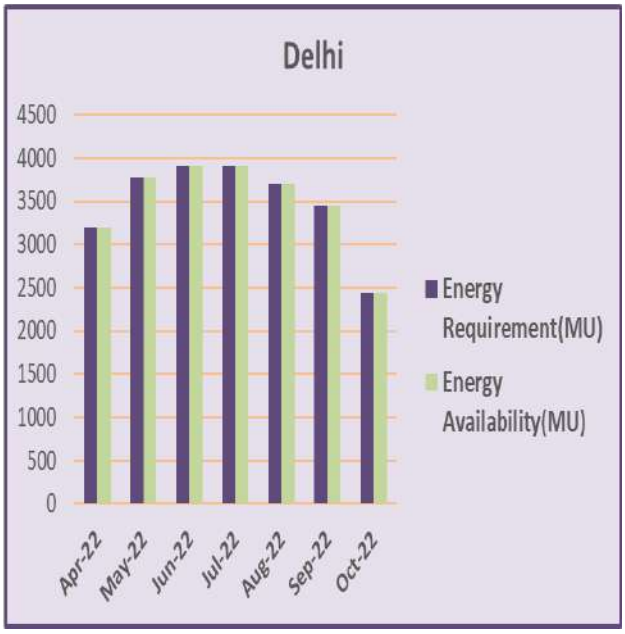












3. Maintenance Programme of Generating Units and Transmission Lines

3.1. Maintenance Programme for Generating Units

The meeting on proposed maintenance programme for Generating Units for the month of December-2022 is scheduled on 14-November-2022 via Video Conferencing

3.2. Outage Programme for Transmission Elements

The meeting on proposed outage programme of Transmission elements for the month of December-2022 is scheduled on 14-November-2022 via Video conferencing.

4. Planning of Grid Operation

4.1. Anticipated Power Supply Position in Northern Region for December 2022

The Anticipated Power Supply Position in Northern Region for December 2022 is as under:

State / UT	Availability / Requirement	Revised Energy (MU)	Revised Peak (MW)	Date of revision
CHANDIGARH	Availability	120	270	No Revision submitted
	Requirement	120	270	
	Surplus / Shortfall	0	0	
	% Surplus / Shortfall	0.0%	0.0%	
DELHI	Availability	2260	6010	No Revision submitted
	Requirement	2300	5470	
	Surplus / Shortfall	-40	540	
	% Surplus / Shortfall	-1.7%	9.9%	
HARYANA	Availability	4390	10640	No Revision submitted
	Requirement	4180	8010	
	Surplus / Shortfall	210	2630	
	% Surplus / Shortfall	5.0%	32.8%	
HIMACHAL PRADESH	Availability	1114	2000	9-Nov-22
	Requirement	1104	1995	
	Surplus / Shortfall	11	5	
	% Surplus / Shortfall	1.0%	0.3%	
J&K and LADAKH	Availability	910	3270	No Revision submitted
	Requirement	1980	2980	
	Surplus / Shortfall	-1070	290	
	% Surplus / Shortfall	-54.0%	9.7%	
PUNJAB	Availability	5160	11390	No Revision submitted
	Requirement	3970	7450	
	Surplus / Shortfall	1190	3940	
	% Surplus / Shortfall	30.0%	52.9%	
RAJASTHAN	Availability	7640	18970	10-Nov-22
	Requirement	9455	16500	
	Surplus / Shortfall	-1815	2470	
	% Surplus / Shortfall	-19.2%	15.0%	
UTTAR PRADESH	Availability	11570	25130	9-Nov-22
	Requirement	9920	19500	
	Surplus / Shortfall	9765	19500	
	% Surplus / Shortfall	155	0	
UTTARAKHAND	Availability	1215	2250	7-Nov-22
	Requirement	1237	2350	
	Surplus / Shortfall	-22	-100	
	% Surplus / Shortfall	-1.8%	-4.3%	
NORTHERN REGION	Availability	32729	67700	
	Requirement	34111	58800	
	Surplus / Shortfall	-1382	8900	
	% Surplus / Shortfall	-4.1%	15.1%	

SLDCs are requested to update the anticipated power supply position of their respective state / UT for the month of November-2022 and submit the measures proposed to be taken to bridge the gap between demand & availability, as well to dispose-off the surplus, if any, in the prescribed format.

5. Submission of breakup of Energy Consumption by the states

5.1 The updated status on the submission of energy consumption breakup is presented below:

State / UT	From	To
DELHI	Apr-2018	Jul-2022
HARYANA	Apr-2018	Aug-2022
HIMACHAL PRADESH	Apr-2018	Aug-2022
PUNJAB	Apr-2018	Aug-2022
RAJASTHAN	Apr-2018	Sep-2022
UTTAR PRADESH	Apr-2018	Jul-2022
UTTARAKHAND	Apr-2018	Jul-2022

All the remaining UTs viz., J&K and Ladakh and Chandigarh are requested to submit the requisite data w.e.f. April 2018 as per the billed data information in the format given as under:

Category→	Consumption by Domestic Loads	Consumption by Commercial Loads	Consumption by Agricultural Loads	Consumption by Industrial Loads	Traction supply load	Miscellaneous / Others
<Month>						

6. Follow-up of issues from previous OCC Meetings- Status update.

The updated status of agenda items is enclosed at ***Annexure-A.I***.

All utilities are requested to update the status.

7. NR Islanding scheme

7.1 Based on the decisions taken in the meeting taken by Hon'ble Minister of State (IC) for Power and New & Renewable Energy on 28.12.2020, Islanding Schemes for NR have been continuously reviewed/discussed in various forums.

7.2 In 187th OCC, it was decided that respective states would submit MIS report before every OCC meeting so that same may be discussed. It was also highlighted that MoP has agreed for PSDF funding for implementation of islanding schemes and states were requested to prepare and submit DPR for the same. Further, a sample DPR on implementation of Islanding scheme for PSDF funding has been already circulated vide email dated 07.10.2021 and requested to expedite the preparation of DPR.

7.3 Utilities were requested to refer and submit SOP for every Islanding scheme in their control area.

7.4 A meeting was also taken by Honorable Cabinet Minister (Power, New & Renewable Energy) on 07.10.2021 wherein emphasis was given on PSDF funding for Islanding

schemes and DPR submission for the same. MoM has been issued and copy of the same was enclosed as Annexure-A.II of 189th OCC agenda.

7.5 In 189th OCC, NRPC representative highlighted no progress from states of Punjab, Uttarakhand, Himachal, J&K, Ladakh.

7.6 In the meeting, UP and Punjab representatives stated that they have sent the offer along with data to CPRI for study of Islanding Schemes. HP intimated that system study is under process at DISCOM end. Rajasthan SLDC assured the submission of RAPS SCADA display on the same day.

7.7 NRLDC submitted that they use PSSE software for system study but Rajasthan has submitted details of Islands in MI Power Software, therefore, they are exploring whether they can use that file.

7.8 MS, NRPC desired to know the reason for sending data to CPRI for system study. He stated that it may be done at state level itself.

7.9 UP representative stated that they are not able to perform dynamic system study as it involves parameters like rotor inertia, hunting, etc.

7.10 MS, NRPC expressed concern regarding apathy of states in implementation of Islanding Schemes. He stated that all SLDCs will intimate the names of Islands for which system study from CPRI is required along with justification for the same by 30th Nov, 2021. He also set timeline of 30th Nov, 2021 for Delhi to submit SOP data. He stated that communication may be sent to RAPS for submission of SOP data at the earliest.

7.11 In the 190th OCC, NRPC representative informed that SOP data in respect of Delhi and RAPS have been received.

7.12 UPSLDC vide email dated 01.12.2021 has submitted the names of islands for which system study from CPRI is required. UPSLDC has highlighted, *inter-alia*, that involvement of long length 765kV line and high number of buses necessitates them to go for system study by CPRI. It has mentioned that SLDC/STU has no expertise in such studies and before doing any investment on the project, proper study is must for successful implementation and operation of Islands.

7.13 HPSLDC vide letter dtd. 18.12.2021 has intimated that a meeting was held on 26.11.2021 between HPSLDC and HPSEBL wherein a team of officers from HPSLDC and HPSEBL has been formed to carry out transient study of all islands within a month.

7.14 In 190th OCC, UPSLDC representative informed that CPRI has asked for some additional details and technical commercial offer would be provided to them by CPRI by 15th Jan 22.

7.15 NRLDC representative informed that report received from Rajasthan regarding the Jodhpur-Barmer-Rajwest islanding scheme and Suratgarh islanding scheme is in order and Rajasthan SLDC can proceed ahead. Further, NRLDC submitted that they use PSSE software for system study but Rajasthan has submitted details of Islands in MI Power Software, therefore, they are not able to access the file.

7.16 Rajasthan SLDC representative informed that they have given the details in the hard copy of the load and generation to be considered for islanding scheme, and based on that have requested NRLDC to simulate it in PSSE software for validation.

NRLDC representative agreed to the request of the Rajasthan SLDC.

7.17 Uttarakhand SLDC representative informed that hydro stations near Dehradun are peaking stations and the proposed Dehradun islanding scheme appears to be infeasible. NRPC representative informed that some schemes in NR have been proposed by considering Hydro stations and Dehradun islanding scheme was proposed by the state SLDC itself in view of all factors. Thus, Uttarakhand SLDC shall immediately conduct study on the proposed Islanding Scheme having Khodri & Chibro units and provide status on the feasibility of scheme with supporting data so that same may be communicated to the Ministry.

7.18 In 191st OCC, HPSLDC representative informed that they need further two weeks to submit the outcome of transient study of all islands.

7.19 Uttarakhand representative informed that major hydro stations e.g. Chibro, Khodri etc at Dehradun Region in Yamuna valley are non-must run and peaking stations. Therefore, it is technically not feasible to implement Dehradun as an islanding scheme. However, nominations of nodal officers from various utilities (PTCUL, UJVN Ltd & UPCL) are being sought for the formation of internal committee for accessing the possibility of Dehradun as Islanding scheme and the report shall be submitted to NRPC Secretariat subsequently.

7.20 NRPC representative asked Uttarakhand to expedite the submission regarding the status on feasibility of the proposed Islanding scheme.

7.21 MS, NRPC stated that all constituents that have given their information about the planning of islanding scheme shall take up the work on top priority and submit the progress in time bound manner by submitting the updated MIS format every month.

7.22 NRLDC representative informed that Rajasthan SLDC is modelling data on PSSE software and it is expected to be completed within one week. Thereafter, NRLDC will submit its comments on the same. Rajasthan representative consented for the same.

7.23 UP and Punjab were asked to update the status of their study being done by CPRI. Both informed that there is no progress since last OCC and they are waiting for response from CPRI.

7.24 A meeting was convened by HPSLDC with officials of NRPC Sectt., NRLDC, HPSEBL, & HPPTCL on 11.02.2022 for apprising the status on implementation of Islanding scheme and MoM of the same is awaited. In the meeting, it was observed that system study work has been pending due to pre-occupation of the concerned resource. Therefore, it was decided that HPSLDC shall write letters to MDs of HPSEBL & HPPTCL for expediting the implementation and NRPC Sectt may be kept in copy so that the matter may be apprised to MoP in next review meeting. Further, it was decided to review the status in another meeting in the first week of March 22.

7.25 HPSLDC convened a meeting with the officials of NRPC Sectt., NRLDC, HPSEBL & HPPTCL on 04.03.2022 and presented the results of static and dynamic study of the islanding scheme in the HP control area.

7.26 A meeting was convened by UPSLDC with officials of NRPC Sectt., NRLDC & UPPTCL on 07.03.2022 to review progress of implementation of Unchahar and Agra Islanding schemes and MoM of the same is awaited.

7.27 In the 193rd OCC, Punjab and J&K representative were requested to convene a meeting in the last week of March with the officials of NRPC and NRLDC to deliberate about the updated status of the islanding scheme in their control area.

7.28 Observing slow pace of implementation of Islanding Schemes in NR states, a series of review meetings has been conducted by NRPC Secretariat as detailed below:

State	Meeting Date
Punjab	05/07/2022
Rajasthan	06/07/2022
Uttar Pradesh	07/07/2022
Delhi	13/07/2022
Himachal Pradesh	15/07/2022

States are requested to expedite the submission of data/study results as discussed in meetings above.

7.29 A meeting was convened by NRPC Sectt. with officials of NRLDC, UPSLDC & NTPC Unchahar on 07.10.2022 for discussing implementation of Unchahar Islanding schemes. MoM of the same is attached at Annexure-A.III of agenda of 200th OCC.

7.30 Uttarakhand SLDC vide letter dated 07.10.2022 (copy enclosed as Annexure-A.IV of agenda of 200th OCC) has submitted the feasibility study report of Dehradun as proposed islanding scheme.

7.31 In regard to discussion held in meeting conducted by NRPC Sectt.on 04.11.2022 with the officials of RVPN and NRLDC to discuss the implementation of Islanding schemes for the Suratgarh Thermal Power plant and Rajwest LTPS in Rajasthan, RVPN has submitted the updated version of these islanding schemes which is attached as **Annexure-A.VIII**.

Latest status of Islanding Scheme of NR is attached as **Annexure-A.II.**

Members may kindly deliberate.

8. Coal Supply Position of Thermal Plants in Northern Region

8.1 In 186th OCC meeting, it was agreed that coal stock position of generating stations in northern region may be reviewed in the OCC meetings on the monthly basis.

8.2 Accordingly, coal stock position of generating stations in northern region during current month (till 09th November 2022) is as follows:

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd (Days)	Actual Stock (Days)
ANPARA C TPS	1200	73.25	14	**1.9**
ANPARA TPS	2630	87.72	14	15.6
BARKHERA TPS	90	9.12	22	17.2
DADRI (NCTPP)	1820	45.49	22	12.3
GH TPS (LEH.MOH.)	920	22.43	22	16.0

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd (Days)	Actual Stock (Days)
GOINDWAL SAHIB TPP	540	32.09	22	**0.4**
HARDUAGANJ TPS	1265	36.06	22	8.6
INDIRA GANDHI STPP	1500	35.61	22	17.5
KAWAI TPS	1320	87.31	22	8.7
KHAMBARKHERA TPS	90	9.02	22	16.3
KOTA TPS	1240	71.17	22	**2.5**
KUNDARKI TPS	90	9.12	22	23.3
LALITPUR TPS	1980	46.07	22	14.9
MAHATMA GANDHI TPS	1320	46.65	22	15.6
MAQSOODPUR TPS	90	9.15	22	14.4
MEJA STPP	1320	48.84	22	9.1
OBRA TPS	1094	61.05	22	**2.3**
PANIPAT TPS	710	83.88	22	5.1
PARICHHA TPS	1140	52.09	22	**2.3**
PRAYAGRAJ TPP	1980	78.01	22	**1.9**
RAJIV GANDHI TPS	1200	68.66	22	8.4
RAJPURA TPP	1400	78.38	22	12.8
RIHAND STPS	3000	90.81	14	21.6
ROPAR TPS	840	13.94	22	23.3
ROSA TPP Ph-I	1200	64.37	22	**2.8**
SINGRAULI STPS	2000	93.19	14	14.8
SURATGARH TPS	1500	32.74	22	**3.4**
TALWANDI SABO TPP	1980	51.98	22	**4.0**
TANDA TPS	1760	13.29	22	15.9
UNCHAHAR TPS	1550	32.10	22	16.9
UTRAULA TPS	90	9.17	22	23.4
YAMUNA NAGAR TPS	600	83.52	22	8.2
CHHABRA-I PH-1 TPP	500	71.31	22	**1.1**
KALISINDH TPS	1200	36.65	22	5.3
SURATGARH STPS	1320	0.00	22	5.2
CHHABRA-I PH-2 TPP	500	39.67	22	**0.8**
CHHABRA-II TPP	1320	59.10	22	**1.0**

9. Format for data submission of RE generation loss events to "Technical Committee under the chairmanship of Member (GO&D), CEA" (Agenda by NRLDC)

9.1 NRLDC vide mail dated 09.10.2022 has mentioned that in view of the recurrence of

RE generation loss in Rajasthan RE complex of Northern Region and its further investigation, a Committee has been constituted by Chairperson, CEA, under the chairmanship of Member (GO&D), CEA.

9.2 Format (**Annexure-A.III.a**) is attached for submission of data/information/implemented settings for the following events of RE generation loss in NR.

a. ~3485MW on 09.07.2022 at 13:42 hrs.
b. ~6157MW on 11.08.2022 at 11:23 hrs.
c. ~3800MW on 11.09.2022 at 12:22 hrs.

9.3 Details of several events of RE generation loss took place in Northern Region in 2022 is also enclosed as **Anneuxure-A.III.b**.

9.4 All RE plants are hereby requested to submit the requisite information for the investigation of aforementioned events.

Members may kindly note.

10. Proposed SPS for Grid stability through load shedding from various sub-stations in Kumaon region (Agenda by PTCUL)

10.1 PTCUL vide letter dated 10.11.2022 (copy enclosed as **Annexure-A.IV**) have submitted a proposed SPS for Grid stability through load shedding from various sub-stations in Kumaon region after incorporating the changes suggested by NRLDC as per the discussion held in 199th OCC meeting to finalize the SPS at 400/220 kV S/s Kashipur in case of tripping of 220kV Pantnagar-Barielly line to avoid overloading 315 MVA, 400/220 kV ICTs at Kashipur.

Members may kindly deliberate.

11. Issues faced by SJVN Hydro Power stations due to increased silt, cloud burst etc. (Agenda by SJVN)

11.1. SJVN vide its mail dated 12.10.2022 (copy attached as **Annexure-A.V**) has requested that existing Joint Protocol signed during the year 2012 for shut Down of KWHPS, NJHPS and Rampur HPS may be reviewed, so that NJHPS can take its own decision for shutdown on the basis of Silt level at its intake and other upstream locations as may be decided.

11.2. SJVN has desired that reviewing the existing Joint Protocol for improved co-ordination between hydro power stations of KWHEP, NJHPS and Rampur HPS during high silt conditions is required with OCC members to safeguard the generating plants in long run, avoid spillage of water and penalty on account of DSM charges.

11.3. Further, SJVN has also requested that a committee may be constituted of Hydro experts from CWC, CEA, NRPC, and NRLDC to identify the state-of-the-art technology for discharge, silt sampling, measurement and for joint sedimentation/silt management.

Members may kindly deliberate.

12. Frequent trippings in 220kV Baghpat – Sambhli and 220kV Baghpat – Mandola transmission lines of UPPTCL. (Agenda by Powergrid, NR-1)

12.1 Powergrid, NR-1 vide letter dated 07.11.2022 (copy attached as **Annexure-A.VI**) has intimated that frequent trippings in 220kV Baghpat – Sambhli and 220kV Baghpat – Mandola transmission lines of UPPTCL has been observed since last $2^1/_2$ years. The details are enclosed in the abovecited letter.

12.2 Powergrid has informed that UPPTCL has been intimated about these frequent faults from time to time, however no noticeable reduction in these trippings have been observed.

12.3 Further, Powergrid has also mentioned that these frequent high value faults are drastically affecting the life of transformer and GIS equipment at Baghpat and may result is failure in future.

Members may kindly deliberate.

13. Tanda Stage#2 Unit#6 (660MW) Revival from RSD dated 22.10.2022 (Agenda by NTPC)

13.1 NTPC vide mail dated 02.11.2022 has mentioned the following:

- Both Units of Tanda stage-2 (660MWX2) were under reserve shutdown from 07-Oct-2022, 23:00 Hrs
- On 20-Oct-2022 at 21:46 hrs communication was received from NRLDC regarding revival of one St-2 Units by 16.00 Hrs of 21.10.2022. (As per AS1 form attached as **Annexure-A.VII**, revival time of Tanda St-2 Unit from cold start is 35 Hrs (when 2nd stage#2 Unit is running) and 48 Hrs when both Units are under s/d).
- Accordingly, Unit#6 was synchronized at 18:00 Hrs of 22.10.2022
- Another communication received from NRLDC regarding reserve shutdown of above Unit at 22.56 Hrs on 22.10.2022 with immediate effect.
- Unit was taken off bar at 01:57 Hrs on 23.10.2022.
- Approximately 300 KL of Secondary fuel is consumed during Cold start-up of super critical Machines.
- Better demand projection can reduce precious national reserve.

Members may kindly deliberate.

खण्ड-ख: उ.क्षे.भा.प्रे.के. Part-B: NRLDC

14. NR Grid Highlights for October 2022

- Maximum energy consumption of Northern Region was **1332 MUs** on 04th October'22 and it was 7.6 % higher than October' 2021 (1238 Mus 12th October'21)

- Average energy consumption per day of Northern Region was **1081 MUs** and it was 1 % higher than October'21 (1070 Mus per day)

- Maximum Demand met of Northern Region was **60710 MW** on 01st October'22 @20:00 hours (*based on data submitted by Constituents)* as compared to 57491 MW on 12th October'21 @13:00 hours.

Northern Region all time high value recorded in October'22:

Solar Generation	All Time High Record		Previous Record (upto September-22)	
	Value (MU)	Achieved on	Value (MU)	Achieved on
	124.79	03-10-2022	121.81	03-09-2022

Comparison of Average Energy Consumption (MUs/Day) of NR States for the October'21 vs October'22

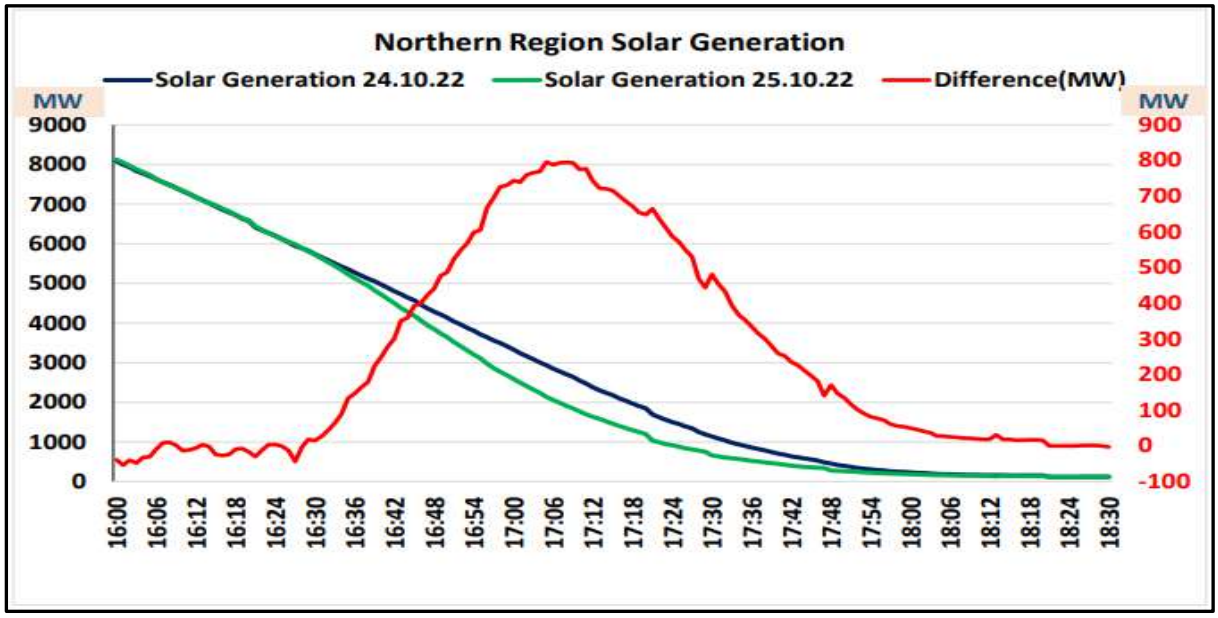
State	October'21	October'22	% Diff
Chandigarh	4.1	3.9	-4.4
Delhi	85.4	78.5	-8.0
HP	31.3	30.2	-3.4
Haryana	149.5	140.1	-6.3
J&K	44.1	50.2	14.0
Punjab	157.3	163.0	3.6
Rajasthan	226.6	254.4	12.3
Uttarakhand	36.9	36.0	-2.3
UP	334.8	324.2	-3.1
NR	1069.8	1080.6	1.0

Frequency Data

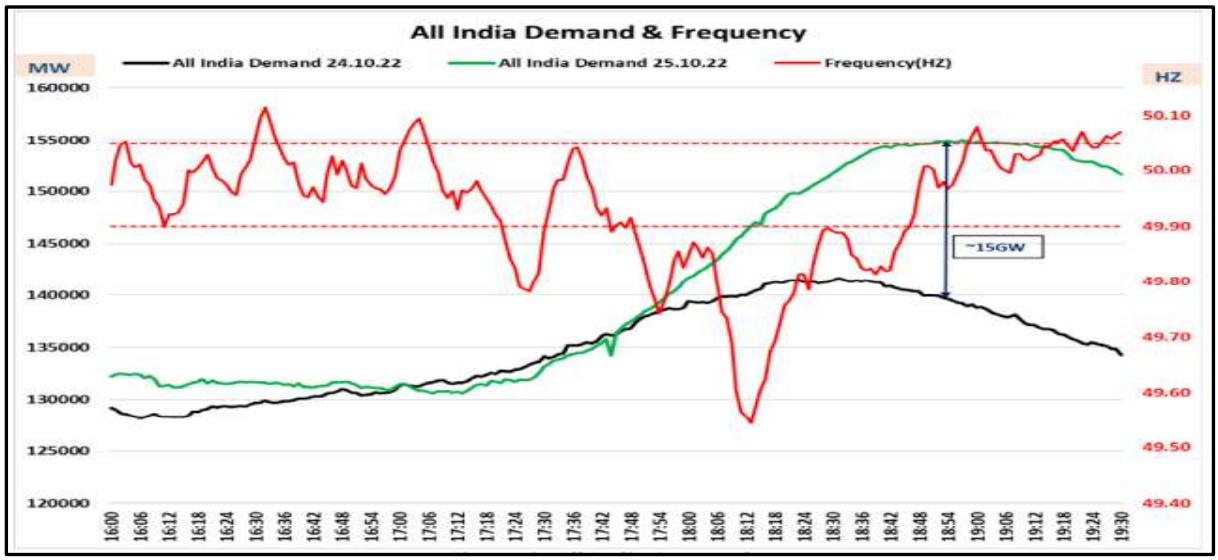
Month	Avg. Freq. (Hz)	Max. Freq. (Hz)	Min. Freq. (Hz)	<49.90 (% time)	49.90 – 50.05 (% time)	>50.05 (% time)
Oct'22	50.01	50.41	49.53	4.9	78.3	16.9
Oct'21	49.99	50.29	49.50	11.1	74.4	14.5

Grid operation on Solar eclipse on 25.10.2022:

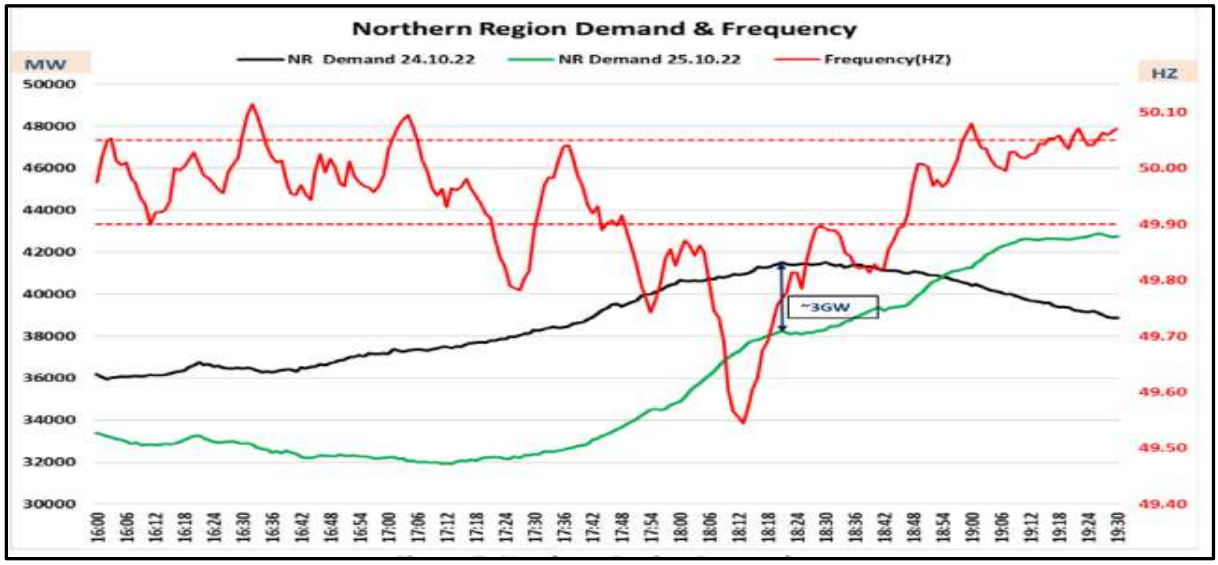
Solar generation started reducing from 16:40 hrs and maximum reduction in solar generation was approximately 800 MW at 17:11 hrs w.r.t day before (24.10.2022) trend.



The All India demand was approximately 4 GW higher at 16:00 hrs than day before (24.10.2022) demand and at peak it was higher by 15 GW.



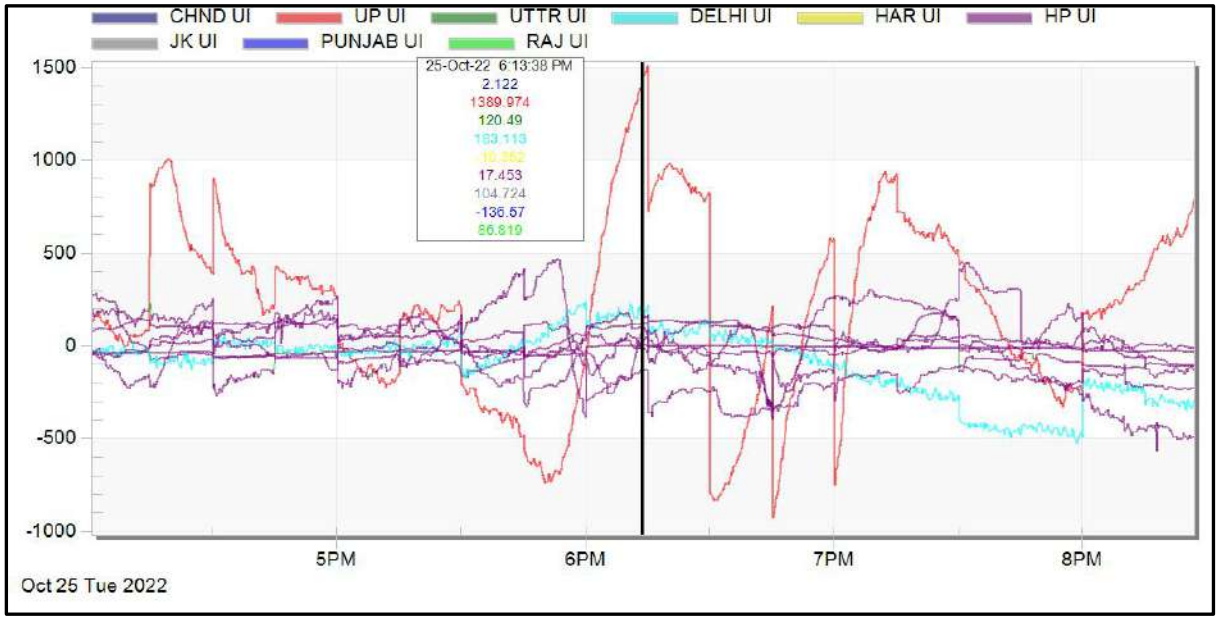
NR demand was approximately 5000 MW less than day before (24.10.2022) demand at 16:00 hrs and at peak also it was less by 3000 MW.



Similar to previous solar eclipses on 26 Dec 2019 & 21 Jun 2020, since demand of most of the states had an increasing trend after the eclipse was over, there was low frequency operation from 18:05 to 18:20 hrs. The increase in demand after an eclipse event needs to be taken care in future and appropriate ramp in generation resources also need to be provided both at intrastate as well as interstate generating stations.

As can be seen from the plots shown below, most of the NR states had overdrawl just after the eclipse was over due to increased demand. It can be seen that overdrawl of NR states were:

UP: 1400MW, Uttarakhand: 120MW, Delhi: 180MW, J&K: 100MW, Rajasthan: 90MW at the instant when frequency dipped to 49.53 Hz.



For kind information of members and necessary actions in future.

15. Winter preparedness

In 199 & 200 OCC meetings, it was deliberated that winter in Northern region is likely to start from mid of October till February end, and the challenges faced during these

months were also deliberated in the meeting. Following issues still persist related to winter preparedness measures:

a. <u>Plan for high voltage management at SLDC level:</u>

In 200 OCC meeting, all states were requested to prepare and share high voltage management plan for winter months with NRPC/ NRLDC. It was discussed that such plan would include instructions with priority to manage high voltage during winter months including pre-maintenance activites.

In 200 OCC meeting, MS NRPC stated that such plan developed by states should be readily available with NRLDC as well as SLDC control room officials so that effective voltage control is possible during winter months and real-time operator at SLDC as well as RLDC end are aware of the actions to be taken.

States are requested to provide update.

b. <u>Synchronous condenser operation</u>: Especially of hydro units during night hours for dynamic voltage support. Some of the generators have already been tested successfully (Tehri, Chamera, Pong etc.) in synchronous condenser mode and shall be available for condenser mode of operation as and when required. As discussed in 199 OCC, RSD is expected to be used as synchronous condenser from this winter.

In 200 OCC meeting, following was discussed with respect to synchronous condenser mode of operation:

- RSD representative stated that each generating unit of capacity 150MW has been able to absorb 10MVAR when operated as synchronous condenser. Under excitation limiter is limiting further MVAr absorption.
- NRLDC representative stated that generally unit should be able to absorb much higher MVAR whereas RSD unit is only absorbing 5-6% of MVA capacity which is very low. THDC representative added that generally they are able to absorb upto 30-40% of their MVA capacity.
- ***NRLDC representative requested that report/reasons submitted by OEM limiting further MVAR absorption by RSD generating units may be shared with NRPC/ NRLDC.***
- HP representative stated that the matter has been taken up with DISCOM for using Larji as synchronous condenser however response is pending. NRLDC representative stated that the matter is pending since long and may be taken on priority, if required separate online meeting may be convened with NRLDC, NRPC, HP SLDC and Larji.
- NHPC representative stated that Unit-5 of Chamera-2 has been tested for synchronous condenser mode of operation and Unit-3 may also be tested this year. Further, testing may be carried out after confirmation from NHPC for utilisation as synchronous condenser.
- BBMB representative stated that two machines are under overhauling and other machines are available for synchronous condenser mode of operation.

Punjab (RSD), HP (Larji) and NHPC are requested to provide update.

c. <u>ICT Tap Optimization at 400kV:</u>

NRLDC has identified few 400/220kV nodes where it seems that there is need for tap change exercise. The analysis has been done based on the SCADA data of October month available at NRLDC. Following 400/220kV nodes have been identified for tap change exercise:

- **Increase by 2 steps:**
  - 400/220kV Sonepat
  - 400/220kV New Wanpoh
  - 400/220kV Daultabad
  - 400/220kV Nuhiyawali
  - 400/220kV Dhuri

Scatter Plots are attached as **Annexure-B.I**. Same exercise needs to be carried out by SLDCs at 220kV & below levels.

d. Utilisation of line reactors as bus reactor:

To ensure that line reactors are available even after opening of lines are optimally utilized it is necessary that updated details of all the stations where the provision of using line reactors as bus reactors exist, is available at all control centers. The Reactive power document being compiled by NRLDC has the details of all such line reactors. Last updated document is available at NRLDC website under documents section:

https://nrldc.in/download/nr-reactive-power-management-2022/?wpdmdl=9908

All utilities are once again requested to go through the document and report if any incorrect or missing information is noticed. The document is being utilized in real-time operation by control room operators at NRLDC, and thus it is necessary that list of all reactors where such provision is available are updated in the document.

e. Insulator cleaning and replacement of damaged insulators/ porcelain insulator with polymer insulators

As discussed in the 199th and 200th OCC meeting, Northern Regional power transmission lines are exposed to the high pollution levels along their routes. Such pollution levels with the onset of the winter season, lead to the frequent trippings and finally to breakdown and long outages of the transmission lines. These outages make the grid weak, thereby endangering the grid reliability and security.

Therefore, in order to avoid/mitigate tripping of lines during foggy (smog) weather in winter season, preventive actions like cleaning/washing of insulators, replacement of conventional insulators with polymer insulators have been recommended and are being taken every year.

This being a regular activity, all the transmission licensees in the Northern Region are being requested in monthly OCCM to update line wise data for insulator replacement and cleaning in the format attached as **Annexure-B.II**.

Concerned transmission licensees are requested to provide the updated status of cleaning/washing of insulators, replacement of conventional insulators with polymer insulators works being done at their end.

It has also been once again requested vide NRLDC mail dated 09.11.2022 to provide the latest status.

Utilities are requested to share the latest status at the earliest.

Members may please discuss.

16. TTC/ATC of state control areas for winter 2022

Most of the NR states except J&K, Ladakh and Chandigarh U/Ts are sharing basecase and ATC/TTC assessment with NRLDC. OCC has advised all states to timely declare TTC/ATC for prospective months and revise the figures as per requirement.

Based on feedbacks received till date, SLDCs are requested to go through the tentative ATC/TTC limits for December 2022 (**Annexure-B.III**) and provide comments. If no comments are received, these limits will be assumed confirmed and uploaded on NLDC website. SLDCs are also requested to upload these limits in their respective websites. States are also requested to regularly provide update regarding the upcoming transmission elements which would improve import capability of respective state control area.

Loading of 400/220kV ICTs and important 220kV lines observed above or close to N-1 contingency limits is also attached as **Annexure-B.IV**.

Punjab

Punjab SLDC is requested to share:

- ATC/TTC limits for low demand period i.e. winter months based on anticipated state generation scenario.
- Plan to control high voltages during winter months including list of 220kV lines that are being kept open continously during winter months

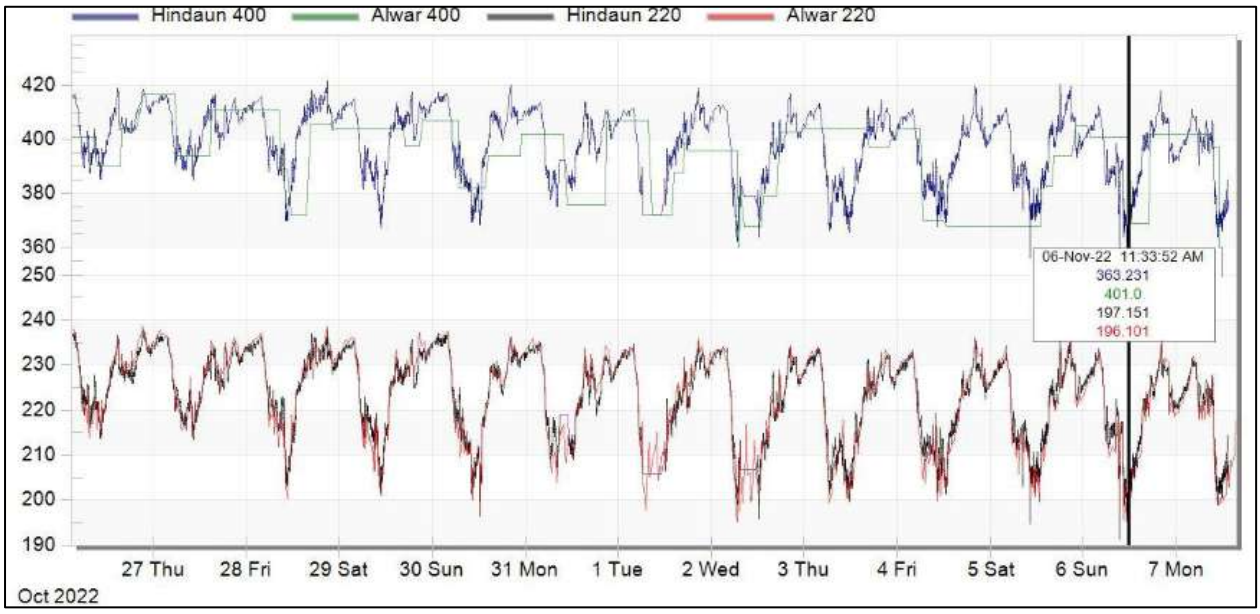
UP

UP SLDC to provide update on:

- ATC/TTC limits for low demand period i.e. winter months based on anticipated state generation scenario.
- Status of Obra and Sohawal SPS

Rajasthan

As per the data available at NRLDC, it can be seen that voltages at 400kV Alwar and Hindaun are getting low even below 360kV during the day-time since last few days.



It is requested to provide present tap settings of 400/220kV Hindaun and Alwar ICTs & other 220/132kV ICTs and below voltage level ICTs for underlying network at Hindaun and Alwar (if they are not an nominal position) for study purposes.

It is further to be noted that Hindaun is connected with 400kV lines from Heerapura and Chhabra and as per simulation studies, if any one of these lines trip (N-1 contingency), the 400kV voltages would further fall by 15-20kV, thereby further degrading the voltage profile in that area. It is requested to keep restricted drawl of Hindaun and Alwar loads so as to maintain voltages within the IEGC band and supply any agricultural load such that demand pattern of this area is predominantly stable and not very high during certain hours.

Further, as mentioned in RVPN letter dated 31.10.2022, it is requested to share any tap change done at SLDC level. It has also been mentioned in the letter that overloading of 220kV lines may be managed by opening certain lines and feeding 132kV GSS(s) in radial mode as per real time system conditions. It is also requested to share the details of the same so that it can be simulated.

From, the available data it can be seen that loading of 400/220kV ICTs is remaining very high since last two weeks (under import of 6500-7000MW), therefore, it is requested that loading of 400/220kV ICTs may be kept below their N-1 contingency limits and at places where SPS is installed, loading needs to be such that SPS relief is able to manage loading within safe limits in case of N-1 contingency. Plots showing loading of highly loaded 400/220kV ICTs such as Jodhpur, Merta, Ajmer, Chittorgarh, Bikaner, Bhilwara, Bhinmal along with their N-1 contingency limits is attached as Annexure-B.IV. It is to be noted that as per information available with NRLDC, there is no SPS at 400/220kV Bikaner, Bhinmal and Bhilwara ICTs and therefore loading of these ICTs needs to be below their N-1 contingency limits.

Rajasthan SLDC to provide update.

Delhi

Delhi SLDC is requested to share:

- Plan to control high voltages during winter months
- Status of commissioning of reactors.

In 200 OCC meeting, Delhi SLDC agreed to share the updated status and high voltage management plan through mail. However, it is still pending.

Haryana

Haryana SLDC to provide update on:

- ATC/TTC limits for low demand period i.e. winter months based on anticipated state generation scenario.
- Plan to manage loading of 400/220kV Deepalpur and Panipat ICTs.
- Plan to control high voltages during winter months

In 200 OCC meeting, Haryana SLDC agreed to share the updated status and high voltage management plan through mail. However, it is still pending.

Uttarakhand

Uttarakhand SLDC representative visited NRLDC to finalise SPS for 400/220kV Kashipur and 220kV CBGanj-Pantnagar line as there were some issues regarding SPS scheme which needed to be discussed.

During last 30 days, loading was close to N-1 contingency limits of 400/220kV ICTs at Kashipur when import of Uttarakhand was close to their ATC limits.

Uttarakhand SLDC representative stated that revised SPS scheme has been mailed to NRLDC on 17.10.2022. NRLDC has provided their comments vide mail dated 02.11.2022 with request for slight modifications and submission of logic to NRPC for further deliberation in OCC meeting.

Uttarakhand to provide update.

HP

HP SLDC to provide update on:

- Revised ATC/TTC limits of HP state control area for winter 2022-23.
- Switchgear capacity augmentation at Nallagarh (220kV) for 220kV Nallagarh-Upernangal line.

J&K

Loading of 400/220kV Amagarh ICTs was close to N-1 contingency limits for last 30 days

Not assessing its ATC. J&K representatives had intimated during 47th TCC and 49th NRPC meeting that they would be sharing ATC/TTC assessment with NRLDC from October 2021, however the same is still awaited.

J&K and Ladakh U/Ts are once again requested to advise the concerned officers to evaluate their ATC/TTC limits in coordination with NRLDC and share latest assessment with NRLDC and NRPC. ***J&K officers may also take online/ offline assistance from NRLDC officers if required.***

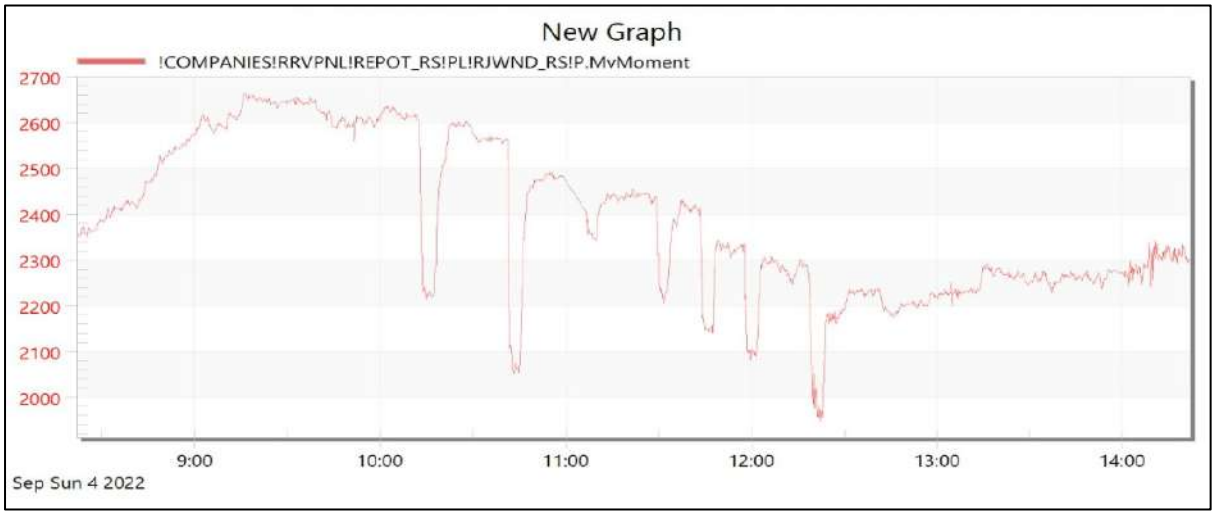
It is again requested that SLDCs may ensure that loading of ICTs and lines are below their N-1 contingency limits. While requisitioning power from various sources, states should take care to limit their scheduled drawl as well as actual drawl in real time within the Available Transfer Capability (ATC) limits assessed by SLDC and NRLDC. NRLDC is continuously sending emails in real-time for ensuring N-1 compliances as well as restricting schedule till ATC limit and maximizing internal generation. SLDCs need to ensure this during real-time operation.

Members may like to discuss.

17. Grid operation related issues

(i) Wind generation fluctuation in Rajasthan control area

Various dips were observed in Rajasthan wind generation between 10:10 hrs to 12:30 hrs in the tune of 200 MW to 500MW on 4th September 2022. During this time huge variations in voltage were also observed in RE pooling substations of Rajasthan state control area such as Jaisalmer, Ramgarh, Bikaner and Bhadla.



In 199th OCC meeting, Rajasthan SLDC was asked to gather wind speed, voltage profile, MVAR drawl and action taken from RE developers and RE pooling stations. Cut-in & cut-out speed for wind turbines may also be gathered along with actual wind speed data. It was also requested that wind generators may be asked to provide reasons for manually tripping wind turbines as soon as voltages fall below 0.9 p.u. & what issue would be there if machine is made to operate at slightly lower voltage say 0.88 p.u. Rajasthan SLDC agreed to provide update on the above issues.

In 200th OCC meeting, Rajasthan SLDC representative informed that some of the wind developer such as those having SUZLON machines are manually tripping their units when voltages are getting below 0.9 p.u.. MVAR drawl by solar generators, wind generators and load is coinciding which is leading to severe low voltages especially in Western Rajasthan pockets. NRLDC representative requested that SUZLON may be asked to furnish the reason for manually tripping their units and a separate meeting with Rajasthan SLDC, NRLDC, NRPC and wind developers may be convened.

Rajasthan SLDC to provide update.

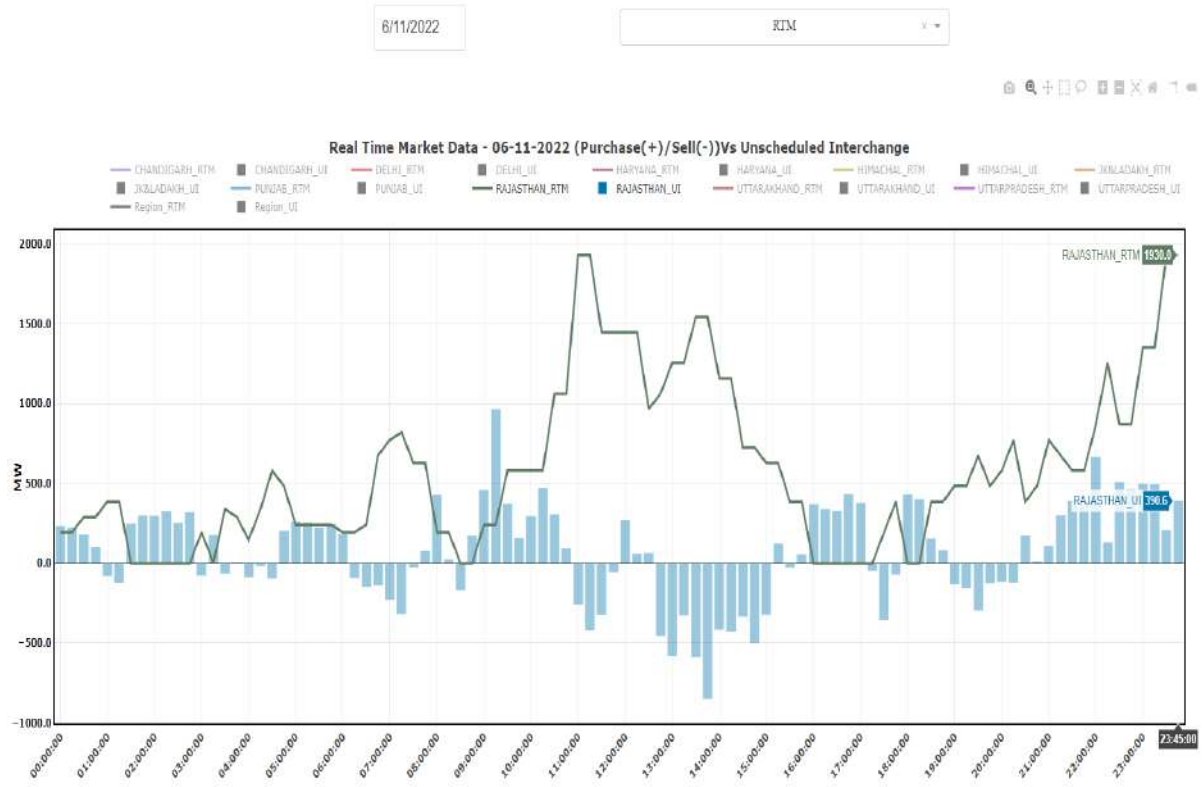
(ii) Generation outage in Rajasthan control area and over-drawl from Grid

Outages of Rajasthan internal thermal generation are in the range of 3000MW (about 27.5% of total internal generation (thermal+gas) of Rajasthan). Status of generating unit ouatge in Rajasthan state as on 10.11.2022 is as follows :

S. No.	Station	Unit No	Capacity (MW)	Reason(s)	Outage (Time & Date)	
1	Dholpur GPS	1	110	Reserve Shutdown (Non availability of domestic gas & NIL requisition by Rajasthan in RLNG and Spot Gas).	05:48	25-08-2020
2	Dholpur GPS	2	110	Reserve Shutdown (Non availability of domestic gas & NIL requisition by Rajasthan in RLNG and Spot Gas).	00:35	05-12-2020

3	Dholpur GPS	3	110	Reserve Shutdown (Non availability of domestic gas & NIL requisition by Rajasthan in RLNG and Spot Gas).	00:40	05-12-2020
4	Shree Cement (IPP) TPS	2	150	Shutdown due to Commercial reason	16:27	25-10-2022
5	Shree Cement (IPP) TPS	1	150	Shutdown due to Commercial reason	23:55	31-10-2022
6	Ramgarh GPS	2	38	Due to fire accident in GT - 2	01:17	04-06-2022
7	Suratgarh TPS	1	250	Stator earth fault	18:24	30-06-2022
8	Kota TPS	3	210	Due to problem in seal oil flow of generator.	23:44	08-08-2022
9	Kalisindh TPS	1	600	For ID fan 1B motor & Fan bearing replacement work & internal checking of ESP	22:19	01-11-2022
10	Barsingsar (NLC)	1	125	Due to suspected refractory failure.	20:20	02-11-2022
11	Kalisindh TPS	2	600	Due to chocking of Ash hoppers and overfilling of ESPs.	00:05	05-11-2022
12	Suratgarh TPS	6	250	Due to Furnance Pressure High.	06:33	05-11-2022
14	Rajwest (IPP) LTPS	1	135	Bed Material Leakage.	06:03	08-11-2022
15	Suratgarh TPS	4	250	Due to steam leakage in the superheater drain Line	07:14	08-11-2022
Total Outage (MW) :			3088			

Due to large no. of generating unit outages, Rajasthan has been resorting to over-drawl from the Grid to the tune of 400 to 1100MW, higher purchase from RTM in the range of 400 to 1900MW and Load shedding in the range of 1.5 to 9 MU daily. Moreover, N-1 loading violations of ICTs at number of 400/220kV sub-stations such as Bhinmal, Ajmer, Merta has been observed.



Details of Load Shedding by Rajasthan :

Sr. No.	Date	Daily Load Shedding (MU)
1	05-11-2022	0.53
2	06-11-2022	1.62
3	07-11-2022	5.86
4	08-11-2022	9.18
5	09-11-2022	4.13

The Grid frequency has been remaining below 49.90Hz (lower operational band) for considerable time for the last few days. Such low frequency operation is threat to the system security.

The details of Grid frequency remaining below 49.90Hz (lower operational band), minimum frequency of the day, and maximum MW over-drawl by Rajasthan (based on 5 minutes' average telemetered data for the last few days) is given below :

Date	Max. Over-drawl (MW)	Total Daily Deviation (in MU)	Minimum Frequency of the Day (Hz)	% of time frequency below 49.90Hz (lower operational band)
06-11-2022	1165 MW	2.08	49.71Hz at 12:58Hrs	7.2%
07-11-2022	901 MW	2.27	49.77Hz at 16:52Hrs	11.6%
08-11-2022	866 MW	2.11	49.44Hz at 18:30Hrs	8.3%
09-11-2022	618 MW	2.99	49.71Hz at 13:44Hrs	5%

Such large deviations from schedule are to be avoided to maintain system security.

During high demand, the prices in power exchange may increase and at times power is unavailable in real time market. Thus too much reliance on RTM could be avoided specially during high demand period.

As per Indian Electricity Grid Code (IEGC) clause 5.3 to balance their portfolio in operational planning as well as real-time operation as per clause no. 5.4.

Therefore, it is requested that portfolio of Rajasthan state control area shall be balanced in both operational planning as well as real-time operation by initiating required control by state authorities.

Members may like to discuss.

(iii) MVAR support from generators

During winter season, demand of Northern region is low and high voltages are a common phenomenon predominantly in Punjab, Haryana and Delhi area. Even after several actions being taken by control centers, it is seen that there is persistent high voltage in Northern region. The reactive power absorption by generators becomes an important resource that helps in managing high voltages in the grid. However, even after continuous follow up in OCC meetings, it is seen that MVAR data telemetry is poor/ inaccurate from most of the generating stations. For some of the generators it is seen that there is inadequate reactive power absorption based on their capability curve especially during night hours. The performance of generators in absorption of reactive power for last 30 days (12 Oct 2022 – 10 Nov 2022) is shown below:

S.No.	Station	Unit No.	Capacity	Geographical location	MVAR capacity as per capability curve (on LV side)	MVAR performance (-) Absorption (+) Generation (HV side data)	Voltage absorption above (in KV)
1	Dadri NTPC	1	490	Delhi-NCR	-147 to 294	-170 to 70	414
		2	490		-147 to 294	-	-
2	Singrauli NTPC	1	200	UP	-60 to 120	-15 to 10	405
		2	200		-60 to 120	-5 to 15	408
		3	200		-60 to 120	-15 to 15	404
		4	200		-60 to 120	-20 to 0	402
		5	200		-60 to 120	-25 to -5	400
		6	500		-150 to 300	-35 to 15	404
		7	500		-150 to 300	-40 to 15	404
3	Rihand NTPC	1	500	UP	-150 to 300	-80 to 20	396
		2	500		-150 to 300	-40 to 40	403
		3	500		-150 to 300	-100 to 0	396

		4	500		-150 to 300	-55 to 30	400
4	Kalisindh RS	1	600	Rajasthan	-180 to 360	-110 to 60	404
		2	600		-180 to 360	-110 to 50	404
5	Anpara C UP	1	600	UP	-180 to 360	-30 to 80	765
		2	600		-180 to 360	-40 to 80	765
6	Talwandi Saboo PB	1	660	Punjab	-198 to 396	-200 to 0	415
		2	660		-198 to 396	-200 to 80	420
		3	660		-198 to 396	-	-
7	Kawai RS	1	660	Rajasthan	-198 to 396	-150 to 20	400
		2	660		-198 to 396	-140 to 30	400
8	IGSTPP Jhajjar	1	500	Haryana	-150 to 300	-85 to 100	415
		2	500		-150 to 300	-	-
		3	500		-150 to 300	-	-
9	Rajpura (NPL)	1	700	Punjab	-210 to 420	-250 to 0	410
		2	700		-210 to 420	-250 to 80	410
10	MGTPS	1	660	Haryana	-198 to 396	-130 to 50	415
		2	660		-198 to 396	-150 to 50	412
11	Bawana	1	216	Delhi-NCR	-64.8 to 129.6	-	-
		2	216		-64.8 to 129.6	-	-
		3	216		-64.8 to 129.6	-60 to 40	410
		4	216		-64.8 to 129.6	-50 to 30	415
		5	253		-75.9 to 151.8	-	-
		6	253		-75.9 to 151.8	-40 to 60	415
12	Bara PPGCL	1	660	UP	-198 to 396	-40 to 50	770
		2	660		-198 to 396	-35 to 65	770
		3	660		-198 to 396	-80 to 40	765
13	Lalitpur TPS	1	660	UP	-198 to 396	-60 to 60	760
		2	660		-198 to 396	-	-
		3	660		-198 to 396	-85 to 65	760
14	Anpara D UP	1	500	UP	-150 to 300	-80 to 40	760
		2	500		-150 to 300	0 to 50	765
15	Chhabra TPS	1	250	Rajasthan	-75 to 150	-70 to 10	404
		2	250		-75 to 150	-80 to 0	405
		3	250		-75 to 150	-	-
		4	250		-75 to 150	-	-
		5	660		-198 to 396	-40 to 80	408

		6	660		-198 to 396	-45 to 90	408

All generating stations are requested to resolve any issues related to telemetry and make sure that MVAr absorption is as per grid requirement and capability curve of machine.

Some of the generating units such as Dadri, Bawana need to explore possibility of further MVAR absorption. Generators may also set their Vsch (voltage set point) such that units are absorbing MVAR as per their capability and grid requirement.

Members may like to discuss.

(iv) Long outage of transmission elements/ generating units

Reasons and revival date for elements under long outage are being discussed regularly in OCC meetings. Any update on the status of these elements from last OCC meeting may be shared with the forum (**Annexure-B.V**).

Some of the important elements which are under long outage are shown below:

- 400/220 kV 315 MVA ICT-2 at Mundka (DTL)
- 400kV Bus-2 at Parbati-2 HEP (NHPC)
- 400kV Parbati-3(NHPC)-Sainj(HP) line
- 400kV Bus-2 at Parbati-3 HEP (NHPC)
- 765kV Anpara_D-Unnao(UP) Ckt-1 (UPPTCL)
- 50 MVAR Non-Switchable LR on 400kV Agra-Unnao (UP) Ckt-1 at Agra(UPPTCL)
- 50 MVAR Bus Reactor No 1 at 400KV Moradabad(UPPTCL)
- 50 MVAR BUS REACTOR NO 1 AT 400KV PANKI(UP)
- 125 MVAR Bus Reactor No 1 at 400KV Chamera_1(NH)
- 63 MVAR Bus Reactor No 1 at 400KV Muzaffarnagar(UP)
- 80 MVAR Bus Reactor No 1 at 400KV Nathpa Jhakri(SJ)

All utilities are requested to make it a practice to update status of elements under long outage in the NRLDC outage software portal. Utilities are requested to take necessary actions to revive elements which are under long outage.

Members may please discuss.

Information about new transmission elements/ generating units to be commissioned in next 45 days

In 176th OCC meeting, it was discussed that first time charging procedure is not being diligently followed by some entities. The documents are being submitted at the last minute and thereafter it is being urged to NRLDC to give the code for charging. In the meeting it was also requested that utilities should inform about elements expected for first time charging in the next one month in advance in OCC meeting. This information would be helpful in carrying out studies, SPS requirement/modification etc. in time.

Utilities are also requested to make sure that list of 220kV and underlying intra-state lines and ICTs is readily available with them, so that the same can be shared with NRLDC/NRPC as and when required. This data is to be shared with NRLDC/NRPC for timely updation of Powermaps, PSSebasecase, Protection analysis etc.

In line with the above decisions, all utilities are requested to share the information about transmission elements/ generating units which are expected to be first time charged in the next 45 days.

Members may like to discuss.

18. Frequent forced outages of transmission elements in the month of October'22:

The following transmission elements were frequently under forced outages during the month of **October 22**:

Sr. No	Element Name	Number of Outages	Utility
1	220 KV Nara(UP)-Roorkee(UK) (UP) Ckt-1	4	UP
2	220 KV Saharanpur(UP)-Khodri(UK) (UP) Ckt-1	4	UP

The complete details are attached at **Annexure-B.VI**. It may be noted that frequent outages of such elements affect the reliability and security of the grid. Hence, utilities are requested to analyze the root cause of the tripping and share the remedial measures taken/being taken in this respect.

Members may like to discuss.

19. Multiple element tripping events in Northern region in the month of October '22:

A total of 12 grid events occurred in the month of October '22 of which **10** are of GD-1 category **01** is of GI-2 Category and **01** is of GI-1 Category. The preliminary report of all the events have been issued from NRLDC. A list of all these events is attached at **Annexure-B.VII.**

Further, despite persistent discussions/follow-up in various OCC/PCC meetings, it is observed that provisions 5.2(r) and 5.9.4(d) of the IEGC, pertaining to reporting of events / tripping to RLDC, is not being complied with by many utilities.

Maximum Fault Duration observed is 1.8 seconds in the event of multiple element tripping at 400/220kV Kashipur(UK). As reported at 13:39hrs, Y-phase conductor of 220 KV Kashipur-Jafarpur(UK) Ckt (220 KV Kashipur-Pantnagar(UK) Ckt-2 LILO at Jafarpur) broke from gantry at Kashipur end and got in contact with top cover of CT hence created bus fault on 220kV Bus at Kashipur(UK). As per PMU at Roorkee(PG), Y-B fault which further converted into R-Y-B fault with delayed clearance of 1800ms is observed. Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total 4 events out of **12** grid events occurred in the month.

Members may take necessary preventive measures to avoid such grid incidents / disturbances in future and report actions taken by respective utilities in OCC & PSC forum. Moreover, utilities may impress upon all concerned for providing the Preliminary Report, DR/EL & Detailed Report of the events to RLDC in line with the regulations.

Members may like to discuss.

20. Details of tripping of Inter-Regional lines from Northern Region for October' 22:

A total of 8 inter-regional lines tripping occurred in the month of October'22. The list is attached at **Annexure-B.VIII.** The status of receipt of preliminary reports, DR/EL within 24hrs of the event and fault clearing time as per PMU data has also been mentioned in the table. The non-receipt of DR/EL & preliminary report within 24hrs of the event from SLDCs / ISTS licensees / ISGSs is in violation of regulation 5.2(r) of IEGC and regulation 15(3) of CEA Grid Standards. As per regulations, all the utilities shall furnish the DR/EL, flag details & preliminary report to RLDC/RPC within 24hrs of the event. They shall also furnish the detailed investigation report within 7 days of the event if fault clearance time is higher than that mandated by CEA (Grid Standard) Regulations.

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

21. Status of submission of DR/EL and tripping report of utilities for the month of October'22.

The status of receipt of DR/EL and tripping report of utilities for the month of September'2022 is attached at **Annexure-B.IX**. It is to be noted that as per the IEGC provision under clause 5.2 (r), detailed tripping report along with DR & EL has to be furnished within 24 hrs of the occurrence of the event. However, it is evident from the submitted data that reporting status is not satisfactory and needs improvement. Also, it is observed that reporting status has been improved from POWERGRID, CPCC2, Delhi, Haryana Uttarakhand and Uttar Pradesh in September'2022 compared to the previous month.

Members may please note and advise the concerned for timely submission of the information. It is requested that DR/EL of all the trippings shall be **uploaded on Web Based Tripping Monitoring System "http://103.7.128.184/Account/Login.aspx"** within 24 hours of the events as per IEGC clause 5.2.r and clause 15.3 of CEA grid standard. Apart from prints of DR outputs, the corresponding COMTRADE files may please also be submitted in tripping portal / through email.

Members may like to discuss.

22. Status of PSS tuning/ re-tuning and Step Response Test of generator

In last 18 OCC meetings, this point was discussed and Utilities were requested to submit the present status of PSS tuning/re-tuning and Step Response Test of their respective generators as per the below mentioned format.

S. No.	Name of the Generating Station	Date of last PSS tuning / re-tuning performed (in DD/MM/YYYY format)	Date of last Step Response Test performed (in DD/MM/YYYY format)	Report submitted to NRLDC (Yes/ No)	Remarks (if any)

The status of test performed till date is attached at **Annexure-B.X.**

It is to be noted that as per regulation 5.2(k) of IEGC, Power System Stabilizers (PSS) in AVRs of generating units (wherever provided), shall be got properly tuned by the respective generating unit owner as per a plan prepared for the purpose by the CTU/RPC from time to time.

Members were requested to update about their future plan for PSS tuning as there is no significant progress despite including this agenda in every OCC meeting and a separate meeting may be called for detail discussion on this matter.

Members may please discuss.

23. Frequency response characteristic:

Three FRC based event occurred in the month of **October-2022**. Description of the event is as given below:

Table:

S. No.	Event Date	Time (In hrs.)	Event Description	Starting Frequency (in Hz)	End Frequency (in Hz)	*Δf*
1	15-Oct-22	11:23hrs	On 15th Oct'22 at 11:23:44 hrs, R-N phase to earth bus fault occurred on 765kV Bhiwani(PG) Bus-1 due to blast of Main CB of 765kV Bhiwani-Phagi ckt-1. On this fault, bus bar protection of Bus-1 operated at Bhiwani(PG) end. At the same time, drop of approx. 3579MW of ISTS solar generation connected in Rajasthan RE complex and drop of approx. 150MW of Rajasthan State solar generation observed (as per SCADA data). Hence, net 3729MW generation loss figure has been considered for FRC	50.05	49.76	0.29

			calculation.			

Status of Data received till date:

Status of Field Data received of FRC of Grid event occurred at Rajasthan ISTS RE complex at 11:23 Hrs on 15.10.2022			
Data Received from		Data Not Received from	
NHPC	Rajasthan	Uttarakhand	APCPL Jhajjar
Singrauli NTPC	Dadri NTPC	Haryana	AD Hydro HEP
Rosa Reliance		UP	Rihand NTPC
		Punjab	Karcham HEP
		HP	
		BBMB	

PFR as per NRLDC SCADA data:

States	15-Oct-22 event	Remarks
PUNJAB	21.89%	
HARYANA	30.08%	
RAJASTHAN	-11.06%	Affected control area
DELHI	-119.95%	
UTTAR PRADESH	13.33%	
UTTARAKHAND	-33.37%	
CHANDIGARH	-48.65%	
HIMACHAL PRADESH	4.27%	
JAMMU & KASHMIR	-5.28%	
NR	29.77%	

ISGS Generators:

Generator	15-Oct-22 event	Generator	15-Oct-22 event
Singrauli TPS	6%	Salal HEP	4%
Rihand-1 TPS	11%	Tanakpur HEP	-2%
Rihand-2 TPS	14%	Uri-1 HEP	178%
Rihand-3 TPS	0%	Uri-2 HEP	0%
Dadri-1 TPS	33%	Dhauliganga HEP	34%
Dadri -2 TPS	61%	Dulhasti HEP	65%
Unchahar TPS	No generation	Sewa-II HEP	No generation
Unchahar stg-4 TPS	No generation	Parbati-3 HEP	No generation
Jhajjar TPS	29%	Jhakri HEP	235%
Dadri GPS	No generation	Rampur HEP	No generation
Anta GPS	No generation	Tehri HEP	No generation
Auraiya GPS	No generation	Koteswar HEP	No generation
Narora APS	5%	Karcham HEP	83%
RAPS-B	5%	Malana-2 HEP	No generation
RAPS-C	2%	Budhil HEP	-42%
Chamera-1 HEP	No generation	Bhakra HEP	-5%
Chamera-2 HEP	No generation	Dehar HEP	-6%
Chamera-3 HEP	No generation	Pong HEP	-5%
Bairasiul HEP	Suspected SCADA data	Koldam HEP	No generation
		AD Hydro HEP	0%

State control generators:

Generator	15-Oct-22 event	Generator	15-Oct-22 event
PUNJAB		UP	
Ropar TPS	No generation	Obra TPS	0%
L.Mohabbat TPS	No generation	Harduaganj TPS	No generation
Rajpura TPS	-18%	Paricha TPS	17%
T.Sabo TPS	23%	Rosa TPS	16%
Goindwal Sahib TPS	128%	Anpara TPS	2%
Ranjit Sagar HEP	No generation	Anpara C TPS	21%
Anandpur Sahib HEP	0%	Anpara D TPS	1%
HARYANA		Bara TPS	12%
Panipat TPS	-2%	Lalitpur TPS	40%
Khedar TPS	13%	Meja TPS	-1%
Yamuna Nagar TPS	No generation	Vishnuprayag HEP	0%
CLP Jhajjar TPS	4%	Alaknanda HEP	0%
Faridabad GPS	No generation	Rihand HEP	No generation
RAJASTHAN		Obra HEP	No generation
Kota TPS	3%	UTTARAKHAND	
Suratgarh TPS	2%	Gamma Infra GPS	No generation
Kalisindh TPS	No generation	Shravanti GPS	No generation
Chhabra TPS	No generation	Ramganga HEP	No generation
Chhabra stg-2 TPS	4%	Chibra HEP	0%
Kawai TPS	89%	Khodri HEP	0%
Dholpur GPS	No generation	Chilla HEP	0%
Mahi-1 HEP	0%	HP	
Mahi-2 HEP	0%	Baspa HEP	1%
RPS HEP	0%	Malana HEP	-2%
JS HEP	12%	Sainj HEP	0%
DELHI		Larji HEP	0%
Bawana GPS	No generation	Bhabha HEP	1%
Pragati GPS	No generation	Giri HEP	-2%
		J&K	
		Baglihar-1&2 HEP	-4%
		Lower Jhelum HEP	No generation

In line with the decisions taken during various OCC meetings, the time and date of the FRC events were e-mailed to respective utilities. ***Constituents may submit the***

FRC of their control areas for the above event and reason of poor response, if observed.

Other utilities are also requested to kindly share the FRC calculations and further action taken at their end.

24. Mock black start exercises in NR:

As per Indian Electricity Grid Code (IEGC) clause 5.8(b)

"*Detailed plans and procedures for restoration after partial/total blackout of each user's/STU/CTU system within a Region, will be finalized by the concerned user's/STU/CTU in coordination with the RLDC. The procedure will be reviewed, confirmed and/or revised once every subsequent year. Mock trial runs of the procedure for different subsystems shall be carried out by the users/CTU/STU at least once every six months under intimation to the RLDC*".

Mock Black-start exercise of power stations therefore needs to be carried out in-order to ensure healthiness of black start facility.

The summary of last conducted mock black start exercise of ISGS hydro & gas stations during 2020-21 & 2021-22 is tabulated below:

Hydro Power Stations:

Name of stations	**Last conducted exercise date**	**Remark**
Uri-I, II HEP, Lower Jhelum HEP, Upper Sindh and Kishenganga	–	
Dhauliganga	28th Dec 2021	Exercise carried out successfully
Bairasiul	04th Dec 2020	
Sewa-2	29th May 2022	
N. Jhakri and Rampur	17th Dec 2019	
Karcham and Baspa	29th Dec 2021	Exercise was partially successful
Budhil	–	
Parbati-3 and Sainj	22nd Dec 2020	Black start of only Parbati-3 was carried out successfully. Sainj to explore blackstart capability.
Salal	-	
Chamera-3	-	
Kishenganga	-	
Koteshwar	19th Jan 2022	Exercise carried out successfully
Chamera-1 and Chamera-2	08th Dec 2020	
Malana-2, AD Hydro and Phozal	08th Jan 2021	

Tehri	12th Jan 2022	
Koldam	22nd Jan 2021	Partially successful.

Gas Power Stations:

Name of stations	Last conducted exercise date	Remark
Anta GPS	09th Feb 2021 (with load) 01st Feb 2022 (without load)	Exercise carried out successfully
Auraiya GPS	-	
Dadri GPS	28th Jan 2022 (without load)	Exercise carried out successfully

The winter months are off peak hydro period and therefore good time to carry out such exercises. Therefore, the schedule of mock exercise dates for different hydro & Gas power station need to be finalized. The power stations may propose the tentative date for mock black start exercise of their generating units. Power stations may confirm and inform to all the concerned persons of control centre/ substations to facilitate the exercise.

Hydro Power Stations:

Name of stations	Tentative Date for Mock Black start exercise (proposed by power plants)
*Uri-I, II HEP, Lower Jhelum HEP, Upper Sindh and Kishenganga	31st Jan 2023
Dhauliganga	28th Feb 2023
*Bairasiul	18th Nov 2022
Sewa-2	12th Jan 2023
*N. Jhakri and Rampur	
Karcham and Baspa	
*Budhil	
*Parbati-3 and Sainj	09th Nov 2022(to be rescheduled)
*Salal	15th Dec 2022
*Chamera-3	27th Jan 2023
*Kishenganga	
Koteshwar	Mid December
*Chamera-1 and Chamera-2	10th Nov 2022(to be rescheduled)
*Malana-2, AD Hydro and Phozal	12th Dec 2022
Tehri	Mid December
*Koldam	11th Nov 2022

Mock Black start exercise not carried out during Year 2021-22

Gas Power Stations:

Name of stations	Tentative Date for Mock Black start exercise (proposed by power plants)
Anta GPS	23rd Jan 2023
*Auraiya GPS	Mar 2023
Dadri GPS	Jan 2023

Mock Black start exercise not carried out during Year 2021-22

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

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

30		Rithala	3x36
31	Haryana	Faridabad GPS	2x137.75+1x156.07

SLDCs shall submit the reports of black start exercise in their respective control area. SLDCs may also identify further generating stations/unit for black start exercise.

25. Revision of document for Reactive Power Management and System Restoration Procedure (SRP) for Northern Region:

NRLDC has been issuing 'Reactive Power document of Northern Region' on annual basis. Reactive Power Management document for Northern region was last revised on 31st Dec 2021 & updated document link is as below:

https://nrldc.in/download/nr-reactive-power-management-2022/.

Document is password protected and password was already informed to all the NR constituents through letter dated 31st Dec 2021.

In view of new addition/modification of transmission & generation element in NR grid since Dec'21, the document is being review for update.

Constituents are requested to provide the feedback, suggestion and updated information by 30th Nov 2022.

A communication regarding the same from NRLDC has already been shared with all the constituents vide letter dated 03rd Nov 2022.

System restoration procedure document for Northern region has been revised on 31stJan 2022 & updated document link is as below:

https://nrldc.in/wp-content/uploads/2022/01/System-Restoration-Procedure_NR_2022.pdf

Document is password protected and for password request can be sent to nrldcso2@gmail.com Constituents are requested to go through the document and provide any modification/addition in respect of their system. SLDC/Generating utilities are requested to kindly update and share the restoration procedure in respect of their state/generating station.

Constituents are requested to provide the feedback, suggestion and updated information by 31st Dec 2022.

All the NR constituent may please go through these document and provide the feedback, suggestion if any. All the state SLDCs are also requested to kindly prepare these documents for their own control area.

Follow up issues from previous OCC meetings

Annexure-A.I

<table>
<tr><td>1</td><td>Down Stream network by State utilities from ISTS Station</td><td>Augmentation of transformation capacity in various existing substations, addition of new substations along with line bays as well as requirement of line bays by STUs for downstream network are under implementation at various locations in Northern Region. Further, 220kV bays have already been commissioned at various substations in NR. For its utilization, downstream 220kV system needs to be commissioned.</td><td>List of downstream networks is enclosed in Annexure-A.I.I.</td></tr>
<tr><td>2</td><td>Progress of installing new capacitors and repair of defective capacitors</td><td>Information regarding installation of new capacitors and repair of defective capacitors is to be submitted to NRPC Secretariat.</td><td>Data upto following months, received from various states / UTs:
◎ CHANDIGARH — Sep-2019
◎ DELHI — Aug-2022
◎ HARYANA — Aug-2022
◎ HP — Jan-2022
◎ J&K and LADAKH — Not Available
◎ PUNJAB — Jul-2022
◎ RAJASTHAN — Aug-2022
◎ UP — Sep-2022
◎ UTTARAKHAND — Oct-2022
All States/UTs are requested to update status on monthly basis.</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Healthiness of defence mechanism: Self-certification</td><td>Report of mock exercise for healthiness of UFRs carried out by utilities themselves on quarterly basis is to be submitted to NRPC Secretariat and NRLDC. All utilities were advised to certify specifically, in the report that “All the UFRs are checked and found functional”.</td><td>Data upto following months, received from various states / UTs:
◎ CHANDIGARH — Not Available
◎ DELHI — Sep-2022
◎ HARYANA — Sep-2022
◎ HP — Aug-2022
◎ J&K and LADAKH — Not Available
◎ PUNJAB — Jun-2022
◎ RAJASTHAN — Sep-2022
◎ UP — Sep-2022
◎ UTTARAKHAND — Sep-2022
◎ BBMB — Sep-2022
All States/UTs are requested to update status for healthiness of UFRs on monthly basis for islanding schemes and on quartely basis for the rest .</td></tr>
<tr><td>In compliance of NPC decision, NR states/constituents agreed to raise the AUFR settings by 0.2 Hz in 47th TCC/49th NRPC meetings.</td><td>Status:
◎ CHANDIGARH — Not Available
◎ DELHI — Increased
◎ HARYANA — Increased
◎ HP — Increased
◎ J&K and LADAKH — Not increased</td></tr>
</table>

			◎	PUNJAB	Increased
			◎	RAJASTHAN	Increased
			◎	UP	Increased
			◎	UTTARAKHAND	Increased
			◎	BBMB	Increased
			BBMB was requested to submit the updated self certification report indicating increase of 0.2 Hz in AUFR settings, within one week. J&K and LADAKH were requested to update status for increasing settings of UFRs.		
4	Status of FGD installation vis-à-vis installation plan at identified TPS	List of FGDs to be installed in NR was finalized in the 36th TCC (special) meeting dt. 14.09.2017. All SLDCs were regularly requested since 144th OCC meeting to take up with the concerned generators where FGD was required to be installed. Further, progress of FGD installation work on monthly basis is monitored in OCC meetings.	Status of the information submission (month) from states / utilities is as under:		
			◎	HARYANA	Sep-2022
			◎	PUNJAB	Sep-2022
			◎	RAJASTHAN	Sep-2022
			◎	UP	Sep-2022
			◎	NTPC	Feb-2022
			FGD status details are enclosed as **Annexure-A.I.II**. All States/utilities are requested to update status of FGD installation progress on monthly basis.		
5	Information about variable charges of all generating units in the Region	The variable charges detail for different generating units are available on the MERIT Order Portal.	All states/UTs are requested to submit daily data on MERIT Order Portal timely.		
6	Status of Automatic Demand Management Sysytem in NR states/UT's	The status of ADMS implementation in NR, which is mandated in clause 5.4.2 (d) of IEGC by SLDC/SEB/DISCOMs is presented in the following table:	Status:		
			◎	DELHI	Fully implemented
			◎	HARYANA	Scheme not implemented
			◎	HP	Scheme not implemented
			◎	PUNJAB	Scheme not implemented
			◎	RAJASTHAN	Under implementation. Likely completion schedule is 31.12.2022.
			◎	UP	Scheme implemented by NPCIL only

7	Reactive compensation at 220 kV/ 400 kV level at 15 substations			
	State / Utility	Substation	Reactor	Status
i	POWERGRID	Kurukshetra	500 MVAr TCR	Anticipated commissioning: Nov'22 2022
ii	DTL	Peeragarhi	1x50 MVAr at 220 kV	PO awarded to M/s Kanohar Electricals Ltd. Drawings approved and under final stage inspection. GIS Bay is already available.
iii	DTL	Harsh Vihar	2x50 MVAr at 220 kV	PO awarded to M/s Kanohar Electricals Ltd. Drawings approved and under final stage inspection. GIS Bay is already available.
iv	DTL	Mundka	1x125 MVAr at 400 kV & 1x25 MVAr at 220 kV	Bay work awarded to M/s. Ethos. Bay work is expected to be completed by Dec.21. Reactor part tender is dropped and at present same is under revision.
v	DTL	Bamnauli	2x25 MVAr at 220 kV	Bay work awarded to M/s. Ethos. Bay work is expected to be completed by Dec.21. Reactor part tender is dropped and at present same is under revision.
vi	DTL	Indraprastha	2x25 MVAr at 220 kV	Bay work awarded to M/s. Ethos. Bay work is expected to be completed by Dec.21. Reactor part tender is dropped and at present same is under revision.
vii	DTL	Electric Lane	1x50 MVAr at 220 kV	Under Re-tendering due to Single Bid
viii	PUNJAB	Dhuri	1x125 MVAr at 400 kV & 1x25 MVAr at 220 kV	400kV Reactors - LOA issued on dated. 17.08.2021 and date of completion of project is 18 months from the date of LOA. 220kV Reactors - LOA issued on dated 19.07.2021 and date of completion of project is 18 months from the date of LOA.
ix	PUNJAB	Nakodar	1x25 MVAr at 220 kV	220kV Reactors - LOA issued on dated 19.07.2021 and date of completion of project is 18 months from the date of LOA.
x	PTCUL	Kashipur	1x125 MVAR at 400 kV	Price bid has been opened and is under evaluation

xi	RAJASTHAN	Akal	1x25 MVAr	1x25 MVAR Reactor at Akal has been commissioned on dated 25th July' 2022.
xii	RAJASTHAN	Bikaner	1x25 MVAr	Erection work of 1x25 MVAR Reactors at Bikaner and Suratgarh completed and testing work is pending. The same are likely to be commissioned in Aug / Sept 2022.
xiii	RAJASTHAN	Suratgarh	1x25 MVAr	Erection work of 1x25 MVAR Reactors at Bikaner and Suratgarh completed and testing work is pending. The same are likely to be commissioned in Aug / Sept 2022.
xiv	RAJASTHAN	Barmer & others	13x25 MVAr	Agreement signed on dt. 22.06.2020. Grant of Ist Instalment received on dt.19.02.21 &work order placed on dt. 7.04.2022 to M/s Kanohar Electricals Ltd.
xv	RAJASTHAN	Jodhpur	1x125 MVAr	Agreement signed on dt. 22.06.2020. Grant of Ist Instalment received on dt.19.02.21 &work order placed on dt. 7.04.2022 to M/s Kanohar Electricals Ltd.

Annexure-A-I.I

1. Down Stream network by State utilities from ISTS Station:

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
1	400/220kV, 3x315 MVA Samba	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• Network to be planned for 2 bays.	-	PDD, J&K to update the status.
2	400/220kV, 2x315 MVA New Wanpoh	Commissioned: 6 Total: 6	Utilized: 2 Unutilized: 4	• 220 kV New Wanpoh - Alusteng D/c Line	-	PDD, J&K to update the status.
				• 220 kV New Wanpoh - Mattan D/c Line	-	PDD, J&K to update the status.
3	400/220kV, 2x315 MVA Amargarh	Commissioned: 6 Total: 6	Utilized: 6 Unutilized: 2	• 220kV D/C line from 400/220kV Kunzar - 220/33kV Sheeri	-	PDD, J&K to update the status.
4	400/220kV, 2x500 MVA Kurukshetra (GIS)	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• 220kV Bhadson (Kurukshetra) – Ramana Ramani D/c line	-	HVPNL to update the status.
5	400/220 kV, 2x315 MVA Dehradun	Commissioned: 6 Total: 6	Utilized: 2 Unutilized: 4	• Network to be planned for 4 bays	-	PTCUL to update the status.
6	Shahjahanpur, 2x315 MVA 400/220 kV	Commissioned: 6 Approved/Under Implementation:1 Total: 7	Utilized: 5 Unutilized: 1 (1 bays to be utilized shortly) Approved/Under Implementation:1	• 220 kV D/C Shahajahanpur (PG) - Gola line	Dec'22	Updated in 200th OCC by UPPTCL
				• LILO of Sitapur – Shahjahanpur 220 kV SC line at Shahjahanpur (PG)	Commissioned	Energization date: 25.02.2022 updated by UPPTCL in 196th OCC
7	Hamirpur 400/220 kV Sub-station	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4 (2 bays to be utilized shortly)	• 220 kV Hamirpur-Dehan D/c line	Commissioned	Commisioned date: 09.06.2022. Updated in 198th OCC by HPPTCL
				• Network to be planned for 4 bays	-	HPPTCL to update the status.
8	Sikar 400/220kV, 1x 315 MVA S/s	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• LILO of 220 kV Sikar (220 kV GSS)-Dhod S/c line at Sikar (PG)	Commissioned	LILO of 220 kV S/C Sikar-Dhod line at 400 kV GSS PGCIL, Sikar has been charged on dt. 31.03.2022
				• Network to be planned for 2 bays.	-	Against the 3rd ICT at 400 kV GSS Sikar, only 2 bays were constructed and same has been utilized by RVPN by constructing LILO of 220 kV S/C Sikar – Dhod line as updated by RVPNL in 195th OCC
9	Bhiwani 400/220kV S/s	Commissioned: 6 Total: 6	Utilized: 0 Unutilized: 6	• 220 kV D/C line Bhiwani (PG) – Bhiwani (HVPNL) line	Dec'22	Updated in 197th OCC by HVPNL
				• 220 kV Bhiwani (PG) - Isherwal (HVPNL) D/c line.	Dec'22	Issue related to ROW as intimated in 192nd OCC.HVPNL to update the status.
				• 220 kV Bhiwani (PG) - Dadhibana (HVPNL) D/c line.	Apr'24	Issue related to ROW as intimated in 192nd OCC.HVPNL to update the status.
10	Jind 400/220kV S/s	Commissioned: 4 Approved:4 Total: 8	Utilized: 4 Unutilized: 0 Approved:4	• LILO of both circuits of 220 kV Jind HVPNL to PTPS D/C line at 400 kV substation PGCIL Khatkar (Jind) with 0.5 sq inch ACSR conductor	May'24	Updated in 197th OCC by HVPNL
11	400/220kV Tughlakabad GIS	Commissioned: 6 Under Implementation: 4 Total: 10	Utilized: 6 Unutilized: 0 Under Implementation:4	• RK Puram – Tughlakabad (UG Cable) 220kV D/c line – March 2023.	-	DTL to update the status.
				• Masjid Mor – Tughlakabad 220kV D/c line.	-	DTL to update the status.
12	400/220kV Kala Amb GIS (TBCB)	Commissioned: 6 Total: 6	Utilized: 0 Unutilized: 6	• HPPTCL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Kala Amb S/s	Mar'23	Updated in 198th OCC by HPPTCL
				• Network to be planned for 4 bays	-	HPPTCL to update the status.

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
13	400/220kV Kadarpur Sub-station	Commissioned: 8 Total: 8	Utilized: 0 Unutilized: 8	• LILO of both circuits of 220 KV Pali - Sector 56 D/C line at Kadarpur along with augmentation of existing conductor from 220 KV Sector-56 to LILO point with 0.4 sq inch AL-59 conductor.	Mar'23	Updated in 197th OCC by HVPNL
				• LILO of both circuits of 220KV Sector 65 - Pali D/C line at Kadarpur along with augmentation of balance 0.4 sq. inch ACSR conductor of 220 kV Kadarpur - Sector 65 D/C line with 0.4sq inch AL-59 conductor	May'23	Updated in 197th OCC by HVPNL
14	400/220kV Sohna Road Sub-station	Commissioned: 8 Total: 8	Utilized: 2 Unutilized: 4	• LILO of both circuits of 220kV D/c Sector-69 - Roj Ka Meo line at 400kV Sohna Road	Jun'23	Updated in 197th OCC by HVPNL
				• LILO of both circuits of 220kV D/c Badshahpur-Sec77 line at 400kV Sohna Road	Jun'23	Updated in 197th OCC by HVPNL
15	400/220kV Prithla Sub-station	Commissioned: 8 Total: 8	Utilized: 2 Unutilized: 4 Under Implementation:2	• Prithla - Harfali 220kV D/c line with LILO of one ckt at Meerpur Kurali	Commissioned	Commisioned date: 31.12.2021. Updated in 198th OCC by HVPNL
				• LILO of both ckt of 220kV D/c Ranga Rajpur – Palwal line	-	HVPNL to update the status
				• 220kV D/C for Sector78, Faridabad	02.03.2023	Updated in 198th OCC by HVPNL
				• Prithla - Sector 89 Faridabad 220kV D/c line	31.03.2024	Under Implementation (Mar'24). Updated in 198th OCC by HVPNL
16	400/220kV Sonepat Sub-station	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 2 Unutilized: 2 Under Implementation:2	• LILO of both circuits of 220kV Samalkha - Mohana line at Sonepat	-	HVPNL to update the status.
				• Sonepat - HSIISC Rai 220kV D/c line	Nov'22	Updated in 196th OCC by HVPNL
17	400/220kV Neemrana Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• LILO of Bhiwadi - Neemrana 220kV S/c line at Neemrana (PG)	Oct'22	In Tendering stage as updated in 192nd OCC by RVPNL.
18	400/220kV Kotputli Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Kotputli - Pathreda 220kV D/c line	-	Bid documents under approval as updated in 195th OCC by RVPNL.
19	400/220kV Jallandhar Sub-station	Commissioned: 10 Total: 10	Utilized: 8 Unutilized: 2	• Network to be planned for 2 bays	May'24	LILO of 220 kV BBMB Jalandhar - Butari line at 400 kV PGCIL Jalandhar being planned. Work expected to be completed by May 2024. Updated in 198th OCC by PSTCL.
20	400/220kV Roorkee Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Roorkee (PG)-Pirankaliyar 220kV D/c line	Commissioned	Roorkee (PG)-Pirankaliyar 220kV D/c line comiisioned in 2020 as intimated by PTCUL in 197th OCC
21	400/220kV Lucknow Sub-station	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4	• Network to be planned for 4 bays	Oct'22	• Lucknow -Kaurasa (Sitapur), 220 kV D/C line expected energization date Oct'22 updated by UPPTCL in 196th OCC _____ • No planning for 2 no. of bays upated by UPPTCL in 196th OCC
22	400/220kV Gorakhpur Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Network to be planned for 2 bays	Dec'22	• Gorakhpur(PG)- Maharajganj, 220 kV D/C line expected energization date Dec'22 updated by UPPCL in 196th OCC

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
23	400/220kV Fatehpur Sub-station	Commissioned: 8 Under Implementation:2 Total: 10	Utilized: 6 Unutilized: 2 Under Implementation:2	• Network to be planned for 4 bays	-	• UPPTCL intimated that 02 no. of bays under finalization stage _____ • No planning for 2 no. of bays updated by UPPTCL in 196th OCC
24	400/220kV Abdullapur Sub-station	Commissioned: 10 Under Implementation:2 Total: 12	Utilized: 10 Unutilized: 0 Under Implementation:2	• Abdullapur – Rajokheri 220kV D/c line	Oct'22	Updated in 198th OCC by HVPNL
25	400/220kV Pachkula Sub-station	Commissioned: 8 Under tender:2 Total: 10 Out of these 10 nos. 220kV Line Bays, 2 bays would be used by the lines being constructed by POWERGRID (Chandigarh-2) and balance 8 nos. bays would be used by HVPNL	Utilized: 2 Unutilized: 4 Under Implementation:2	• Panchkula – Pinjore 220kV D/c line	31.12.2022	Updated in 194th OCC by HVPNL
				• Panchkula – Sector-32 220kV D/c line	31.12.2022	Updated in 194th OCC by HVPNL
				• Panchkula – Raiwali 220kV D/c line	Commissioned	Updated in 194th OCC by HVPNL
				• Panchkula – Sadhaura 220kV D/c line: Sep'23	Sept'23	Updated in 194th OCC by HVPNL
26	400/220kV Amritsar S/s	Commissioned:7 Approved in 50th NRPC- 1 no. Total: 8	Utilized: 6 Unutilized: 1 Approved in 50th NRPC- 1 no.	• Amritsar – Patti 220kV S/c line	May'23	Route survey/tender under process. Work expected to be completed by May 2023. Updated in 198th OCC by PSTCL.
				• Amritsar – Rashiana 220kV S/c line (2 bays shall be required for above lines. However, 1 unutilized bay shall be used for Patti and requirement of one additional bay approved for Rashiana by NRPC)	May'23	Route survey/tender under process. Work expected to be completed by May 2023. Updated in 198th OCC by PSTCL.
27	400/220kV Bagpat S/s	Commissioned: 8 Total: 8	Utilized:6 Unutilized: 2	• Bagpat - Modipuram 220kV D/c line	Aug'22	Updated in 196th OCC by UPPTCL, within 10 day tentative charging updated in 198th OCC by UPPTCL.
28	400/220kV Bahardurgarh S/s	Commissioned: 4 Total: 4	Utilized:2 Unutilized: 2	• Network to be planned for 2 bays.	Mar'24 and July'24	Updated in 198th OCC by HVPNL
29	400/220kV Jaipur (South) S/s	Commissioned: 4 Total: 4	Utilized:2 Unutilized: 2	• Network to be planned for 2 bays.	-	LILO case of 220 kV Dausa – Sawai Madhopur line at 400 kV GSS Jaipur South (PG) is under WTD approval as updated by RVPNL in 195th OCC
30	400/220kV Sohawal S/s	Commissioned: 8 Total: 8	Utilized: 8	• Sohawal - Barabanki 220kV D/c line	Commissioned	Energization date: 14.04.2018 updated by UPPTCL in 196th OCC
				• Sohawal - New Tanda 220kV D/c line	Commissioned	Energization date: 28.05.2019 updated by UPPTCL in 196th OCC
				• Network to be planned for 2 bays	Commissioned	• Sohawal - Gonda 220kV S/c line (Energization date: 27.04.2020) updated by UPPTCL in 196th OCC _____ • Sohawal - Bahraich 220kV S/c line (Energization date: 15.02.2021) updated by UPPTCL in 196th OCC
31	400/220kV, Kankroli	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Network to be planned for 2 bays	-	RVPNL to update the status

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
32	400/220kV, Manesar	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4	• Network to be planned for 4 bays	-	One bay 220 kV Manesar (PG)-Panchgaon ckt commissioned on 05.09.2022
33	400/220kV, Saharanpur	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 6 Unutilized: 0 Under Implementation:2	• Network to be planned for 2 bays	Oct'22	Saharanpur(PG)-Devband D/c line expected energization date Oct'22 updated by UPPTCL in 199th OCC
34	400/220kV, Wagoora	Commissioned: 10 Total: 10	Utilized: 6 Unutilized: 4	• Network to be planned for 4 bays	-	PDD, J&K to update the status.
35	400/220kV, Ludhiana	Commissioned: 9 Total: 9	Utilized: 8 Unutilized: 1	• Network to be planned for 1 bay	Mar'23	Direct circuit from 220 kV Lalton Kalan to Dhandari Kalan to be diverted to 400 kV PGCIL Ludhiana. Work expected to be completed by March 2023.Updated in 198th OCC by PSTCL.
36	400/220kV, Chamba (Chamera Pool)	Commissioned: 3 Under tender:1 Total: 4	Utilized:3 Unutilized: 0 Under tender:1	• Stringing of 2nd ckt of Chamera Pool – Karian 220kV D/c line	-	Stringing of 2nd Circuit of Chamera Pool-Karian Tansmission line has been completed & terminal bay at 400/220 kV chamera pooling substation (PGCIL) is not ready.Updated in 198th OCC by HPPTCL
37	400/220kV, Mainpuri	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 6 Unutilized: 0 Under Implementation:2	• Network to be planned for 2 bays	-	• 02 no. of bays under finalization stage updated by UPPTCL in 196th OCC
38	400/220kV, Patiala	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• Network to be planned for 2 bays	May'24	2 Nos. bays for 400 kV PGCIL Patiala - 220 kV Bhadson (D/C) line being planned. Work expected to be completed by May 2024. Updated in 198th OCC by PSTCL.

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

Sl. No.	Name of Substation	MVA Capacity	Expected Schedule		Downstream connectivity by States
1	400/220kV Dwarka-I GIS (8 nos. of 220kV bays)	4x 500	Mar'22		DTL to update the status
2	220/66kV Chandigarh GIS (8 nos. of 66kV bays)	2x 160	Apr'22		Chandigarh to update the status.
3	400/220kV Jauljivi GIS Out of these 8 nos. 220kV Line Bays, 4 nos. (Pithoragath-2, & Dhauliganga-2) would be used by the lines being constructed by POWERGRID and balance 4 nos. bays would be used by the lines being constructed by PTCUL.	2x315	Feb'22		• 220kV Almora-Jauljibi line • 220kV Brammah-Jauljibi line PTCUL to update the status of lines.

FGD Status

Updated status of FGD related data submission

NTPC (25.02.2022)
MEJA Stage-I (Updated by UP on 18.06.2022)
RIHAND STPS
SINGRAULI STPS
TANDA Stage-I
TANDA Stage-II
UNCHAHAR TPS
UPRVUNL (17.10.2022)
ANPARA TPS
HARDUAGANJ TPS
OBRA TPS
PARICHHA TPS

PSPCL (15.09.2022)
GGSSTP, Ropar
GH TPS (LEH.MOH.)
RRVUNL (12.10.2022)
CHHABRA SCPP
CHHABRA TPP
KALISINDH TPS
KOTA TPS
SURATGARH SCTPS
SURATGARH TPS

Updated status of FGD related data submission

Lalitpur Power Gen. Co. Ltd. (17.10.2022)
Lalitpur TPS
Lanco Anpara Power Ltd. (18.06.2022)
ANPARA-C TPS

HGPCL (14.09.2022)
PANIPAT TPS
RAJIV GANDHI TPS
YAMUNA NAGAR TPS

Adani Power Ltd. (18.02.2022)
KAWAI TPS

Rosa Power Supply Company (18.06.2022)
Rosa TPP Phase-I
Prayagraj Power Generation Company Ltd. (17.10.2022)
Prayagraj TPP
APCPL (25.02.2022)
INDIRA GANDHI STPP

Pending submissions

GVK Power Ltd.
GOINDWAL SAHIB

NTPC
DADRI (NCTPP)
Talwandi Sabo Power Ltd.
TALWANDI SABO TPP
L&T Power Development Ltd.
Nabha TPP (Rajpura TPP)

Target Dates for FGD Commissioning (Utility-wise)

Adani Power Ltd.	KAWAI TPS U#1 (Target: 31-12-2024), KAWAI TPS U#2 (Target: 31-12-2024)
APCPL	INDIRA GANDHI STPP U#1 (Target: 30-09-2022), INDIRA GANDHI STPP U#2 (Target: 30-09-2022), INDIRA GANDHI STPP U#3 (Target: 30-09-2022)
GVK Power Ltd.	GOINDWAL SAHIB U#1 (Target: 30-04-2020), GOINDWAL SAHIB U#2 (Target: 29-02-2020)
HGPCL	PANIPAT TPS U#6 (Target: 30-04-2021), PANIPAT TPS U#7 (Target: 28-02-2021), PANIPAT TPS U#8 (Target: 31-12-2020), RAJIV GANDHI TPS U#1 (Target: 30-04-2022), RAJIV GANDHI TPS U#2 (Target: 28-02-2022), YAMUNA NAGAR TPS U#1 (Target: 31-12-2021), YAMUNA NAGAR TPS U#2 (Target: 31-10-2021)

NTPC	DADRI (NCTPP) U#1 (Target: 31-12-2020), DADRI (NCTPP) U#2 (Target: 31-10-2020), DADRI (NCTPP) U#3 (Target: 31-08-2020), DADRI (NCTPP) U#4 (Target: 30-06-2020), DADRI (NCTPP) U#5 (Target: 30-06-2022), DADRI (NCTPP) U#6 (Target: 30-06-2022), RIHAND STPS U#1 (Target: 30-06-2024), RIHAND STPS U#2 (Target: 30-06-2024), RIHAND STPS U#3 (Target: 31-12-2023), RIHAND STPS U#4 (Target: 31-12-2023), RIHAND STPS U#5 (Target: 30-06-2023), RIHAND STPS U#6 (Target: 30-06-2023), SINGRAULI STPS U#1 (Target: 30-06-2024), SINGRAULI STPS U#2 (Target: 30-06-2024), SINGRAULI STPS U#3 (Target: 30-06-2024), SINGRAULI STPS U#4 (Target: 30-06-2024), SINGRAULI STPS U#5 (Target: 30-06-2024), SINGRAULI STPS U#6 (Target: 31-03-2023), SINGRAULI STPS U#7 (Target: 31-03-2023), UNCHAHAR TPS U#1 (Target: 31-12-2023), UNCHAHAR TPS U#2 (Target: 31-12-2023), UNCHAHAR TPS U#3 (Target: 30-06-2024), UNCHAHAR TPS U#4 (Target: 30-06-2024), UNCHAHAR TPS U#5 (Target: 30-06-2024), UNCHAHAR TPS U#6 (Target: 30-06-2022), MEJA Stage-I U#1 (Target: 31-12-2022), MEJA Stage-I U#2 (Target: 31-03-2023), TANDA Stage-I U#3 (Target:), TANDA Stage-I U#4 (Target:), TANDA Stage-II U#3 (Target: 31-12-2022), TANDA Stage-II U#4 (Target: 31-12-2022)

L&T Power Development Ltd (Nabha)	Nabha TPP (Rajpura TPP) U#1 (Target: 30-04-2021), Nabha TPP (Rajpura TPP) U#2 (Target: 28-02-2021)
Lalitpur Power Gen. Company Ltd.	LALITPUR TPS U#1 (Target: 31-12-2026), LALITPUR TPS U#2 (Target: 30-09-2026), LALITPUR TPS U#3 (Target: 30-06-2026)
Lanco Anpara Power Ltd.	ANPARA C TPS U#1 (Target: 31-12-2023), ANPARA C TPS U#2 (Target: 31-12-2023)
Prayagraj Power Generation Company Ltd.	PRAYAGRAJ TPP U#1 (Target: 31-12-2024), PRAYAGRAJ TPP U#2 (Target: 31-12-2024), PRAYAGRAJ TPP U#3 (Target: 31-12-2024)
PSPCL	GH TPS (LEH.MOH.) U#1 (Target: 31-12-2024), GH TPS (LEH.MOH.) U#2 (Target: 31-12-2024), GH TPS (LEH.MOH.) U#3 (Target: 31-12-2024), GH TPS (LEH.MOH.) U#4 (Target: 31-12-2024), GGSSTP, Ropar U#3 (Target: 31-03-2022), GGSSTP, Ropar U#4 (Target: 31-05-2022), GGSSTP, Ropar U#5 (Target: 31-07-2022), GGSSTP, Ropar U#6 (Target: 30-09-2022)

Rosa Power Supply Company	ROSA TPP Ph-I U#1 (Target: 31-12-2026), ROSA TPP Ph-I U#2 (Target: 31-12-2026), ROSA TPP Ph-I U#3 (Target: 31-12-2026), ROSA TPP Ph-I U#4 (Target: 31-12-2026)
RRVUNL	KOTA TPS U#5 (Target: 31-08-2022), KOTA TPS U#6 (Target: 31-08-2022), KOTA TPS U#7 (Target: 31-08-2022), SURATGARH TPS U#1 (Target: 31-12-2026), SURATGARH TPS U#2 (Target: 31-12-2026), SURATGARH TPS U#3 (Target: 31-12-2026), SURATGARH TPS U#4 (Target: 31-12-2026), SURATGARH TPS U#5 (Target: 31-12-2026), SURATGARH TPS U#6 (Target: 31-12-2026), SURATGARH SCTPS U#7 (Target: 28-02-2025), SURATGARH SCTPS U#8 (Target: 28-02-2025), CHHABRA TPP U#1 (Target: 31-12-2026), CHHABRA TPP U#2 (Target: 31-12-2026), CHHABRA TPP U#3 (Target: 31-12-2026), CHHABRA TPP U#4 (Target: 31-12-2026), CHHABRA SCPP U#5 (Target: 28-02-2025), CHHABRA SCPP U#6 (Target: 28-02-2025), KALISINDH TPS U#1 (Target: 28-02-2025), KALISINDH TPS U#2 (Target: 28-02-2025)
Talwandi Sabo Power Ltd.	TALWANDI SABO TPP U#1 (Target: 28-02-2021), TALWANDI SABO TPP U#2 (Target: 31-12-2020), TALWANDI SABO TPP U#3 (Target: 31-10-2020)
UPRVUNL	ANPARA TPS U#1 (Target: 31-12-2023), ANPARA TPS U#2 (Target: 31-12-2023), ANPARA TPS U#3 (Target: 31-12-2023), ANPARA TPS U#4 (Target: 31-12-2023), ANPARA TPS U#5 (Target: 31-12-2023), ANPARA TPS U#6 (Target: 31-12-2023), ANPARA TPS U#7 (Target: 31-12-2023), HARDUAGANJ TPS U#8 (Target: 31-12-2024), HARDUAGANJ TPS U#9 (Target: 31-12-2024), OBRA TPS U#9 (Target: 31-12-2024), OBRA TPS U#10 (Target: 31-12-2024), OBRA TPS U#11 (Target: 31-12-2024), OBRA TPS U#12 (Target: 31-12-2024), OBRA TPS U#13 (Target: 31-12-2024), PARICHHA TPS U#3 (Target: 30-04-2022), PARICHHA TPS U#4 (Target: 31-12-2024), PARICHHA TPS U#5 (Target: 31-12-2024), PARICHHA TPS U#6 (Target: 31-12-2024)

Annexure-A.II

MIS Report for Status of Islanding Schemes

Implemented Schemes

Sl. No.	Islanding Scheme	SLDC	Status	Submission of Self Certification of Healitheness	SOP	SCADA Display Page	Remarks
1	Delhi IS	Delhi	Implemented	Yes (Sept - 2021)	No	Yes	List of officials in-charge and relays in Delhi IS submitted by DTL on 16.08.2021.
2	NAPS IS	UP	Implemented	Yes (08-10-2021)	Yes	Yes	-
3	RAPS IS	Rajasthan	Implemented	16-Aug-21	Yes	Yes	List of officials in-charge, format for generation, islanding scheme sld and relays in RAPP IS submitted by RVPN on 04.12.2021.

Under Implementation/ Newly Proposed/Under Discussion

Sl. No.	Islanding Scheme	SLDC	Status	Details of progress	DPR for PSDF funding (Required /	Timelines Status - Proposed/Actual									
						Study		Design		Approval		Procurement		Commissioning	
						Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual
1	Lucknow-Unchahar IS	UP	Under Implementation	A scheme has been approved in 200th OCC meeting. Implementation timeline to be submitted by UPSLDC.		-		-	-	-	-	-	-	-	-
2	Agra IS	UP	Newly Proposed	UP has placed offer to CPRI for dynamic study in July, 2022. The estimated time of study is 5 months from date of acceptance.		-		-	-	-	-	-	-	-	-
3	Jodhpur-Barmer-Rajwest IS	Rajasthan	Newly Proposed	RVPN submitted proposal as per discussion in 56th NRPC meeting which was deliberated in detail on meeting held on 04.11.2022. Accordingly, RVPN has submitted revised proposal on 09.11.22 for deliberation in upcoming OCC meeting. SCADA display implementation timeline: Dec, 2022; Scheme implementation timeline: July,2023	-	-		-	-	-	-	-	-	-	-
4	Patiala-Nabha Power Rajpura IS	Punjab	Newly Proposed	Scheme has been discussed in the meeting held on 04/11/2022. Scheme was agreed subject to OCC/NRPC approval. SCADA display implementation timeline: Dec, 2022		-		-	-	-	-	-	-	-	-
5	Pathankot-RSD IS	Punjab	Newly Proposed	Scheme has been discussed in the meeting held on 04/11/2022. Scheme was agreed subject to OCC/NRPC approval. SCADA display as well as scheme implementation timeline: Dec, 2022		-		-	-	-	-	-	-	-	-
6	Talwandi Sabo IS	Punjab	Newly Proposed	Punjab has submitted islanding scheme on 12.07.2022 which has been examined. Punjab has been requested for clarification on few points. However, reply is awaited. However, tentative timeline intimated by Punjab is 2 years to implement TSPL islanding Schemes as some changes in downstream network is under planning phase.		-		-	-	-	-	-	-	-	-
7	Dehradun IS	Uttarakhand	Newly Proposed	Uttarakhand has submitted feasibility report of Dehradun IS vide letter dated 07.10.2022 whcih was deliberated in 200 th OCC meeting. A group of NRLC and UK SLDC to be constituted for examining feasibility report.		-	-	-	-	-	-	-	-	-	-
8	Jammu-Salal IS	J &K	Under Discussion	No proposal submitted by J&K.		-	-	-	-	-	-	-	-	-	-
9	Suratgarh IS	Rajasthan	Under Discussion	RVPN submitted proposal as per discussion in 56th NRPC meeting which was deliberated in detail on meeting held on 04.11.2022. Accordingly, RVPN has submitted revised proposal on 09.11.22 for deliberation in upcoming OCC meeting. SCADA display implementation timeline: Dec, 2022; Scheme implementation timeline: July,2023	-	-		-	-	-	-	-	-	-	-
10	Chamba-Chamera IS	HP	Withdrawn	Scheme has been withdrawn by HPSLDC in meeting dtd. 15/07/2022.		-	-	-	-	-	-	-	-	-	-
11	Kangra-Chamba-Bairasuil IS	HP	Withdrawn	Scheme has been withdrawn by HPSLDC in meeting dtd. 15/07/2022.		-	-	-	-	-	-	-	-	-	-
12	Kullu-Dehar IS	HP	Withdrawn	HP has withdrwan this scheme and has proposed Kullu-Manali-Mandi islanding scheme, and Shimla-Solan Islanding scheme in meeting dtd. 15/07/2022.		-	-	-	-	-	-	-	-	-	-
13	Kullu-Manali-Mandi IS	HP	Newly Proposed	Scheme has been discussed in the meeting held on 04/11/2022. Submission of revised scheme is pending.											
14	Shimla-Solan IS	HP	Newly Proposed	Scheme has been discussed in the meeting held on 04/11/2022. Submission of revised scheme is pending.SCADA display has been created by HPSLDC											
13	Butari-Jamsher-Verpal IS	Punjab	Under Discussion	No proposal submitted by Punjab.		-	-	-	-	-	-	-	-	-	-
14	Kargil-Ladakh IS	Ladakh	Under Discussion	No proposal submitted by J&K.		-	-	-	-	-	-	-	-	-	-

Annexure-A.III.a

Date: 12.10.22

Format for data/Information/Settings required from RE plants

1. SOE of Plant showing tripping (if any) of 220kV lines, 220/33kV ICTs, 33kV feeders, 33/0.69 kV or 33/0.63 kV IDTs, Inverters/WTG.
2. **Inverters/WTG logs showing any alarm of LVRT/HVRT/Tripping.**
3. **Present implemented settings (Downloaded settings) from inverters for LVRT, HVRT, Active power Ramp up rate, Over & Under voltage and Over & Under frequency.**
4. **Present implemented settings (Downloaded settings from PPC), firmware version of PPC.**
5. Reason for significant reduction in active power before tripping of any evacuating elements.
6. Reason for slow active power ramp up rate.
7. Reason for not injecting MVAR during the fault and not absorbing MVAR during high voltage.
8. Active Power (MW) of Inverters terminal with resolution of atleast 50ms.
9. Reactive Power (MVAR) of Inverters terminals with resolution of atleast 50ms.
10. RMS voltage and current at Inverter/WTG terminal with resolution of atleast 50ms.
11. Inverter inherent characteristic during HVRT (Whether it maintain its active power (MW) or reduces MW during HVRT?).

** All logs/data should be properly time synced.*

1. Format for Important settings of PPC that should be readily available all the time for monitoring Plant performance;

Important Parameter of PPC		
Description	**Value**	**Unit**
Active Power control mode		Enabled/Disabled
Maximum Active power command		MW
Active Power ramp rate		%/sec
Voltage control mode		Enabled/Disabled
PPC Reference voltage		kV (or PU)
Minimum Reactive Power command		MVAR
Maximum Reactive power command		MVAR
Voltage dead band		%
Voltage droop		%
Over Voltage limit		kV (or PU)
Under Voltage limit		kV (or PU)
Power Factor limit		
PPC Reference point		Point from which PPC is taking reference Voltage(kV), Active power(MW), Reactive Power(MVAR) and frequency(Hz) for controlling the plant. (Bus name)
PPC Communication time		ms
Sampling time of PQ meter		ms
PPC total execution time		(ms) PPC total execution time once it senses any required change with respect to reference set points and send commands to inverters.

2. Format for Important settings of Inverters/WTG that should be readily available all the time for monitoring Plant performance;

Important Parameter of Inverters/WTG		
Description	**Value**	**Unit**
LVRT		
LVRT		Enable/Disable
LVRT Mode		Reactive power priority(Yes/No)
LVRT Triggering threshold		V
LVRT K-factor		
LVRT Response time		ms
Level-1 UV protection		V
Level-1 UV protection time		ms
Level-2 UV protection		V
Level-2 UV protection time		ms
Level-3 UV protection		V
Level-3 UV protection time		ms
Level-4 UV protection		V
Level-4 UV protection time		ms
Active power change gradient		%/sec
HVRT		
HVRT		Enable/Disable
HVRT Mode		Reactive power priority(Yes/No)
HVRT Triggering threshold		V
HVRT K-factor		
LVRT Response time		ms
Level-1 OV protection		V
Level-1 OV protection time		ms
Level-2 OV protection		V
Level-2 OV protection time		ms
Level-3 OV protection		V
Level-3 OV protection time		ms
Level-4 OV protection		V
Level-4 OV protection time		ms
VRT active power recovery gradient		%/sec
Frequency		
Level-1 Over frequency protection		Hz
Level-1 Over frequency protection time		sec
Level-1 Under frequency protection		Hz
Level-1 Under frequency protection time		sec
Other important setting		
Inverter recovery time		sec (Time required for revival of inverter after tripping)
Duration of momentary cessation of Inverter		ms

Large Generation Loss Events in RE Complex of Northern Region in 2022

Annexure-A.III.b

S. No.	Region	Generation Loss (MW)	Date and Time	Frequency Dip (Hz)	Initiating Event	Pooling Stations Involved
1	Northern	~3729	15.10.2022 11:23:44:188 hrs	0.4	R-ph pole of Main CB at Bhiwani(PG) end of 765 kV Phagi(RS)-Bhiwani(PG) (PG) Ckt-1 burst which led to R-ph bus fault on 765kV Bus-1 at Bhiwani(PG).	i) 765 kV Fatehgarh 2 (PG) ii) 765 kV Bhadla (PG) iii) Bikaner (PG) iv) Bhadla 2 (PG)
2	Northern	~1600	17.09.2022 10:14:29:840 hrs	0.25	R-ph CT blast in 220 kV Adani Hybrid II – 220 kV Fatehgarh – II	i) 765 kV Fatehgarh 2 (PG) ii) 400 kV Fatehgarh (Adani)
3	Northern	~3800	11.09.2022 12:22:02:680 hrs	0.44	Y-B phase to phase fault on 220 kV Bhadla-Clean Solar Jodhpur ckt	i) 765 kV Fatehgarh2 (PG) ii) 765 kV Bhadla (PG) iii) Bikaner (PG) iv) Bhadla2 (PG)
4	Northern	~6157	11.08.2022 11:23:17:715 hrs	0.7	Y-B phase to phase fault on 220 kV Bhadla-Clean Solar Jodhpur ckt	i) 765 kV Fatehgarh 2 (PG) ii) 765 kV Bhadla (PG) iii) Bikaner (PG) iv) Bhadla 2 (PG)
5	Northern	~3485	09.07.2022 13:42:49:185 hrs	0.4	R-Y phase to phase fault on 400 kV Bikaner(PG)-Bikaner (RS) (PG) Ckt-1	i) 765 kV Fatehgarh 2(PG) ii) 765 kV Bhadla (PG) iii) Bikaner (PG) iv) Bhadla 2 (PG)

Large Generation Loss Events in RE Complex of Northern Region in 2022

S. No.	Region	Generation Loss (MW)	Date and Time	Frequency Dip (Hz)	Initiating Event	Pooling Stations Involved
6	Northern	~3014	20.05.2022 12:31:03:720 hrs	0.29	B-N phase to earth fault on 765kV Bhadla-Bikaner(PG) ckt-1	i) 765 kV Fatehgarh – 2 (PG) ii) 765 kV Bhadla (PG) iii) Bikaner (PG) iv) Bhadla - 2 (PG)
7	Northern	~1861	02.05.2022 11:06:20:300 hrs	0.19	On over voltage due to tripping of 400/220 kV 500 MVA ICT 1 & ICT 2 at ADANI Solar Park on maloperation of thermal overload protection.	i) 765 kV Fatehgarh-2 (PG) ii) 765 kV Bhadla (PG)
8	Northern	~1246	24.02.2022 10:51:38:440 hrs	0.11	On R-Y phase to phase fault on 220kV Bhadla-TPREL ckt	i) 765 kV Fatehgarh-2(PG) ii) 765 kV Bhadla (PG)
9	Northern	~2807	11.02.2022 12:38:52:040 hrs	0.27	On over voltage during charging of 765kV Bhadla2-Ajmer ckt-1	i) 765 kV Fatehgarh - 2 (PG) ii) 765 kV Bhadla (PG)

Large Generation Loss Events in RE Complex of Northern Region in 2022

S. No.	Region	Generation Loss (MW)	Date and Time	Frequency Dip (Hz)	Initiating Event	Pooling Stations Involved
10	Northern	~1600	11.02.2022 11:47 hrs	0.21	On over voltage during charging of 765kV Bhadla2-Fatehgarh2 ckt-1	i) 765kV Fatehgarh - 2 (PG)
11	Northern	~2286	11.02.2022 11:45:51:160 hrs	0.2	On over voltage due to opening of 240MVAr Line reactor-2 of 765kV Fatehgarh2-Bhadla2 ckt-1 at Fatehgarh2 end.	i) 765kV Fatehgarh - 2 (PG)
12	Northern	~1882	04.02.2022 13:22:06:000 hrs	0.17	On over voltage during charging of 765kV Bhadla2-fatehgarh2 ckt-2 from Bhadla2 end	i) 765kV Fatehgarh-2 (PG)
13	Northern	~1100	04.02.2022 13:15:53:960 hrs	0.12	R-N fault on 765kV Bhadla2-Fatehgarh2 ckt-2	i) 765kV Fatehgarh - 2 (PG)
14	Northern	~2038	30.01.2022 11:27:43:600 hrs	0.18	On over voltage due to opening of 240MVAr Bus reactor-2 at 765kV Fatehgarh2(PG)	i) 765kV Fatehgarh - 2 (PG)
15	Northern	~1400	23.01.2022 14:16:06:680 hrs	0.096	R-Y-B fault on 400kV Jaipur South-Bassi (PG) Ckt-1 & 2	i) 765kV Fatehgarh - 2 (PG) ii) 765kV Bhadla (PG)

पावर ट्राँसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि0
(उत्तराखण्ड सरकार का उपक्रम)
अधीक्षण अभियन्ता, प्रान्तीय भार निस्तारण केन्द्र कार्यालय
विद्युत भवन, नजदीक–आई0एस0बी0टी0 क्रासिंग, सहारनपुर रोड़, माजरा, देहरादून–248002
दूरभाष नं0 0135–2645768 फैक्स नं0 0135–2645758 email:- sldc1@rediffmail.com

Letter No. 436 **/SLDC/SE/** **Dated:** 10 **/11/2022**

Superintending Engineer(Operation)
Northern Regional Power Committee
18A, Saheed Jeet Sigh Marg, Katwaria Sarai,
New Delhi-110016.

Sub: - Regarding proposed SPS for Grid stability through load shedding from various substations in Kumaon Region, Uttarakhand.

In reference to above mentioned subject, kindly find enclosed herewith proposed SPS for Grid stability through load shedding from various substations in Kumaon Region, Uttarakhand as submitted by SE(T&C), PTCUL, Haldwani after incorporating the changes suggested by NRLDC, New Delhi as desired in reference to discussion held in 199th OCC meeting to finalize the SPS at 400/220kV S/s Kashipur in case of tripping of 220kV Pantnagar-Barielly line to avoid overloading 315MVA , 400/220kV ICTs at Kashipur for kind information.

It is requested to include as a agenda in the 201st OCC meeting to be held tentatively on 15.11.2022 for further deliberation/approval in the matter.

Encls: As above.

(Amit Kr. Singh)
Superitending Engineer

Cc:-

1. Chief Engineer(T&C), PTCUL, Dehradun.
2. Chief Engineer, SLDC, PTCUL, Dehradun.
3. Superintending Engineer(T&C), PTCUL, Haldwani in reference to your letter no. 644 dated 03/11/2022 in the matter.

PROPOSED SPS FOR GRID STABILITY THROUGH LOAD SHEDDING FROM VARIOUS SUB-STATION IN KUMAON REGION

Kumaon region has one of the largest 400 kV sub-station having transformation capacity of 2 X 315 MVA and is also connected through four Nos. PGCIL lines which caters approximately 60 % load of Kumaon and partial load of Garhwal region also. It is also connected to 400kV Moradabad and 400kV Nehtaur sub-stations of Uttar Pradesh. It is also connected to two Gas based generators through 220 kV Lines having capacity of 110 MW and 225 MW capacity. In view of the above it acts as a gateway of chunk power for Kumaon region. This sub-station meets the power demand of Kashipur, Bazpur, Mahuakheraganj, Ramnagar and Jaspur. This sub-station also supplies the power to industrial area of SIDCUL Pantnagar, Haldwani and Kamaluaganja, Bhowali and portion of Kichha region also through two Nos 220 kV lines. One of them is directly connected to Pantnagar sub-station and another is connected to Pantnagar sub-station through 220 kV sub-station Jafarpur.

Another very important source of power is available at 220kV sub-station Pantnagar from 220 kV sub-station Barielly which compliments the power demand in Kumaon region together with the power available from 400 kV sub-station Kashipur.

Another source of power is available at 132kV sub-station Pithoragarh and 132kV sub-station Almora from PGCIL Chandak sub-station. This substation also compliments in maintaining the grid stability by providing the additional power supply required to meet the power demand of hilly region of Kumaon Zone.

There is another very important source of power supply available at 132kV sub-station Sitarganj and ELDECO Sitarganj which meets the power demand of Sitarganj, ELDECO Sitarganj, Khatima ,Kichha region and other nearby areas.

In view of the above it can be identified that at present there are four major source of power supply in Kumaon region which makes the interconnecting lines very crucial and important through which these sources cater the power supply to other region and also the lines which meets the N-1 contingency for these lines means acts as an alternate source of power in case these lines or sources goes off.

The total transformation capacity of Kumaon Region is 2542MVA (total avg loading 1644 MVA) and total load connected to transmission network is 138.5MVA however the total power which can be supplied through various networks depends on following transmission elements-

i. The two Nos. Transformers of 2 X 315MVA capacity i.e., 630MVA
ii. One No. 220 kV Barielly-Pantnagar Line having single moose conductor of approximate 250 MVA capacity.
iii. One No. 220 kV Kashipur-Pantnagar Line and another line connecting 400 kV Kashipur to 220 kV sub-station Pantnagar through 220 kV sub-station Jafarpur.

iv. 132 kV Almora Chandak line in case of direction of power flow from Chandak to Almora.
v. 132 kV Kathgodam-Bhowali line in case of direction of power flow from Bhowali to Amora.

Note- These constraints have been taken without considering the generation received from two large gas power generators having generation capacity approx 107MVA and 225 mVA and various other small solar generators connected at 33 kV voltage level.

The single line diagram of whole of the Kumaon region is enclosed for getting clear picture and understanding of the network and contingency.

The need of implementing the SPS in Kumaon region has arisen to avoid the occurrence of grid failure and black out situation in Kumaon region. The various cases of failure of grid are being discussed hereinbelow along with the solution through SPS to avoid grid failure-

Case-1

When 220kV Pantnagar-Barielly line goes off and rest of the network remains intact.

Generally, the average load on 220 kV Pantnagar-Barielly line is approx. 230MW. In case of failure of this line all the load is immediately shifts on both 220 kV line from 400 kV Kashipur to Pantnagar thereby putting an extra load of approx. 230 MW on 2 X 315 MVA transformers. The load on single 315MVA transformer in general remains approximately 250MVA i.e., both the transformers together cater 500MVA load in normal conditions. If we consider to load these transformers for 100%, a window of only 130 MVA surplus loading on these transformers is available. Whereas in above situation extra load of approx. 230MW takes place which trips the both 2X315MVA transformers at 400 kV sub-station Kashipur.

Proposed SPS Scheme-

Contingency: - Tripping of 220kV Pantnagar- Bareilly Line carrying approx. 230MW

Total load shift observed due to tripping of 220 kV Pantnagar - Bareilly on 2 x315MVA transformer is =230 MVA

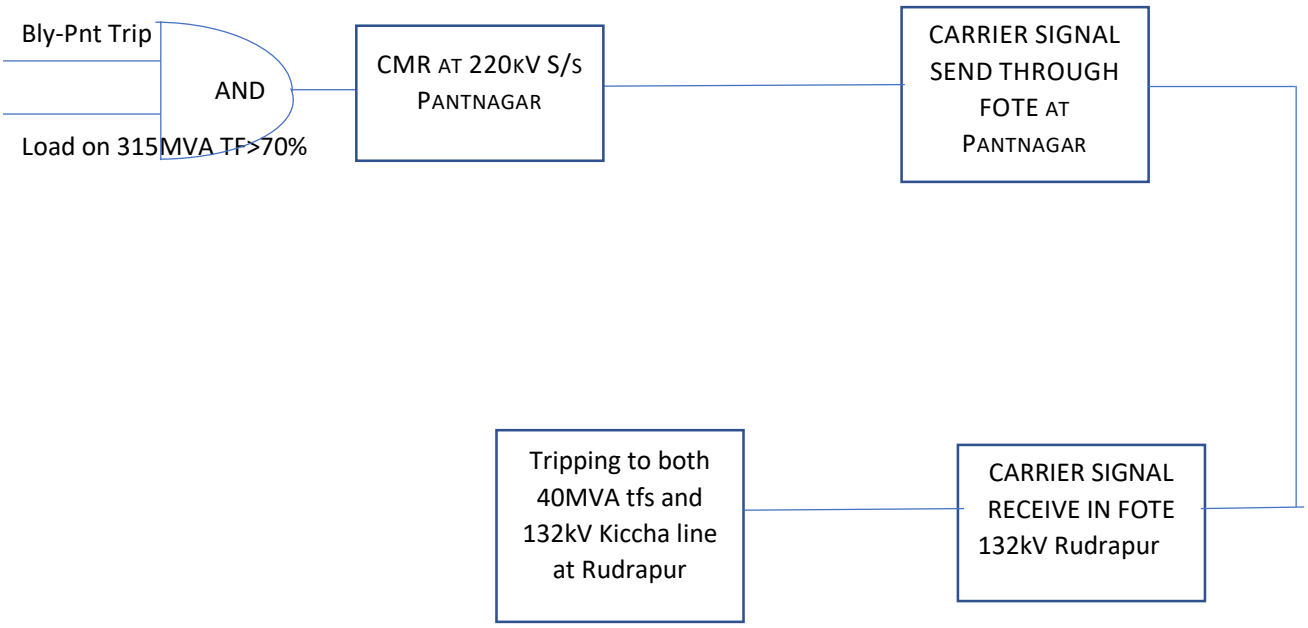
Available surplus loading on 2 X 315 MVA transformers at 400 kV =130 MVA as well as approx. 30 MW load can be transfer to Chandak-Almora Line.

Action 1: - In case of tripping of 220kV Pantnagar-Bareilly line, load shedding is required when load on both 315MVA transformers is more than 70%. When load on both 315MVA TFs is more than 70% then required load shedding from Rudrapur and kichcha is approx. 70 MW to save both transformers from tripping. 70 MW load shedding shall be done by tripping both 40 MVA Transformer at 132 kV Rudrapur and disconnecting 132 kV Rudrapur-Kichcha Line. This will be done by reading tripping of 220 kV Barielly line and loading of 315MVA TFs through carrier and then sending a Carrier Signal to 132 kV Rudrapur s/s through FOTE.

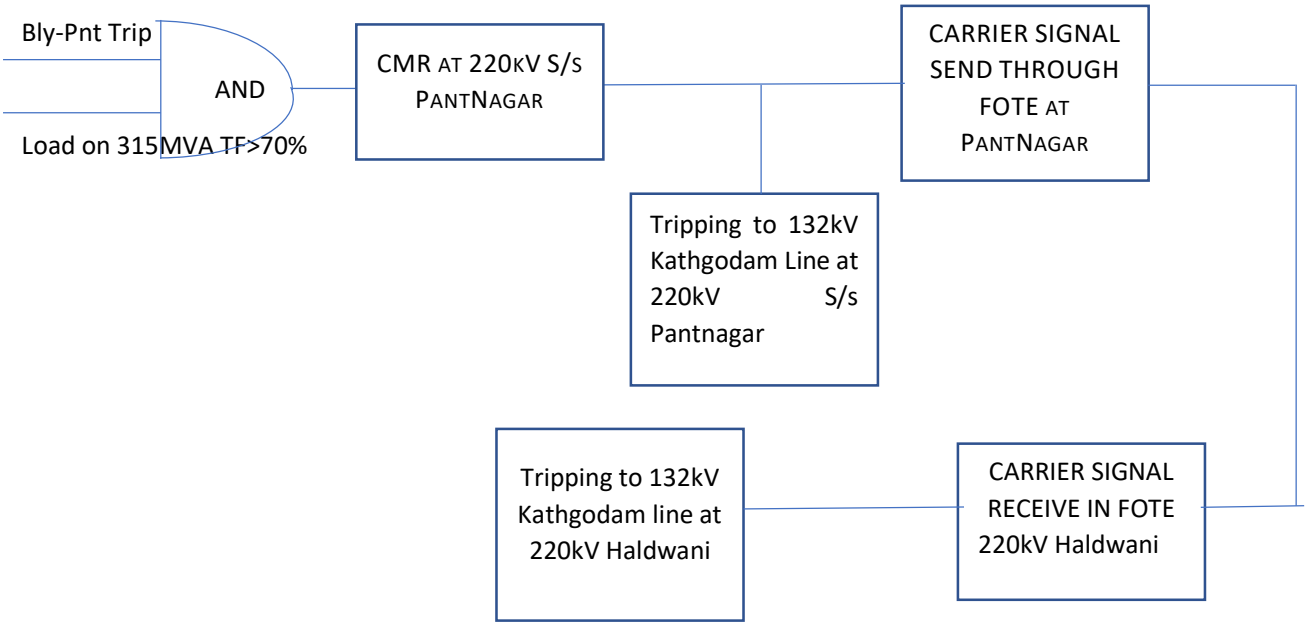
Action 2: - With tripping of 220kV Pantnagar-Bareilly Line,132 kV Pantnagar Kathgodam as well as 132 kV Kamaluaganja-Kathgodam disconnected to create Islanding at 132 kV Kathgodam to avoid overloading of 132 kV Chandak-Almora Line. This will give approx. 30 MW load relaxation on 315 MVA ICTs

The tabular presentation and logic diagram is given below-

Action-1



Action-2



Case Discription	Peak load of Element tripped	Total Load Shedding Required	Name of Substation	Load Shedding at substation	Remark
220kV Pantnagar-Bareilly line trip and other lines are normal	230MW	70MW	132kV Rudrapur	50MW	To save 315MVA TFs at 400kV Kashipur from overloading
			132kV Kiccha	20MW	

Case 2:

When one of 315 MVA ICTs at 400 kV S/s Kashipur tripped.

Generally, the average load on each 315MVA transformer is approx. 250MVA when there is no generation available from the two Gas based generators at Mahuakheraganj region. In case of tripping of any one of 315MVA Transformer, all the load is immediately shifts on other 315MVA transformer thereby putting an extra load of approx. 250MVA on 1 X 315MVA transformer. If we consider to load the transformer for 100%, a window of only 65MVA surplus loading on single transformer is available. Whereas in above situation extra load of approx. 250MVA takes place which also trips the other 315 MVA transformer at 400 kV sub-station Kashipur.

Proposed SPS Scheme-

Contingency: - Tripping of any one 315MVA transformer carrying approx. 250MVA

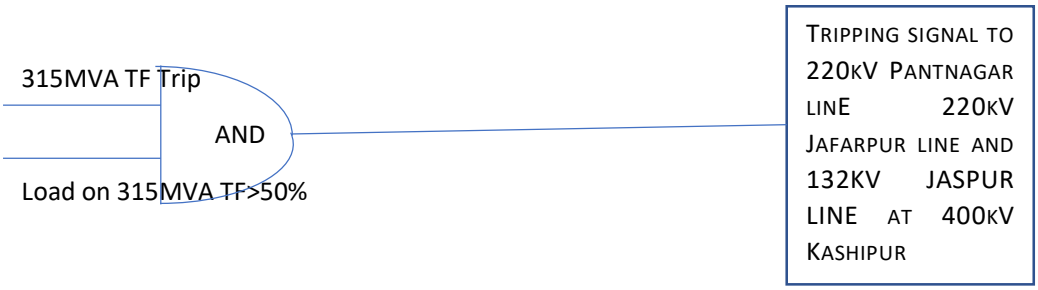
Total load shift observed due to tripping of one 315MVA transformer on other 315MVA transformer is =250MVA

Available surplus loading on 1X 315MVA transformer at 400 kV Kashipur=65MVA.

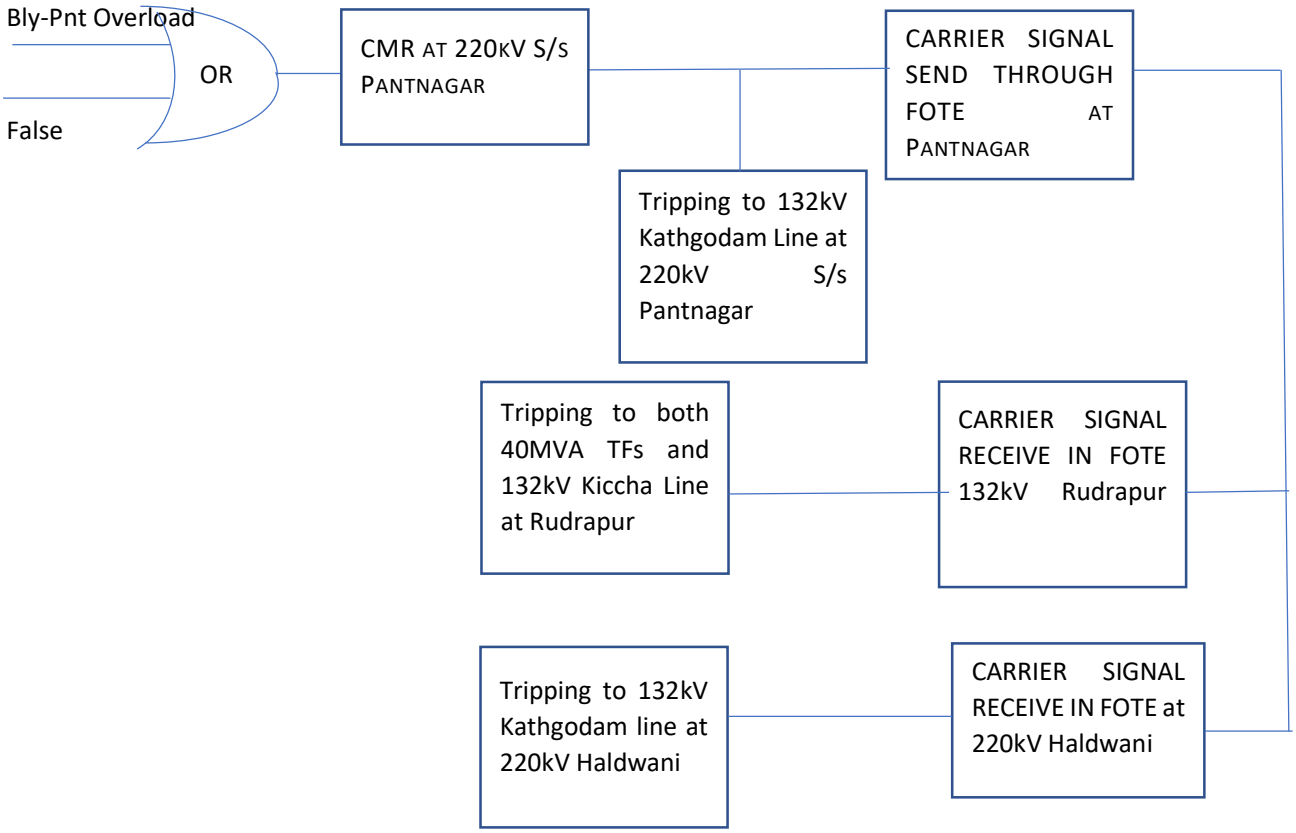
Action 1: - If load on other transformer is more than 50% then load shedding at 400kV S/s Kashipur shall be done by tripping 220kV Kashipur-Pantnagar line, 220kV Kashipur-Jafarpur line and 132kV Jaspur line at 400kV S/s Kashipur by using overcurrent setting of relay (with TMS 0.25 while TMS of overload tripping of transformers is 0.40) thus making Kashipur region a separateisland. After this all load of Pantnagar region and Kamalwaganja region shifted to 220kV Pantnagar-Bareilly line, due to this load shifting 220kV Pantnagar-Bareilly line may get overload.

Action 2: - To avoid overloading of 220kV Pantnagar- Bareilly line some load relief is being done by tripping 132kV kathgodam feeder at 220kV S/s Kamalwaganja and both 40MVA Transformers at 132kV S/s Rudrapur using PLCC/FOTE communication. The logic diagram is given below-

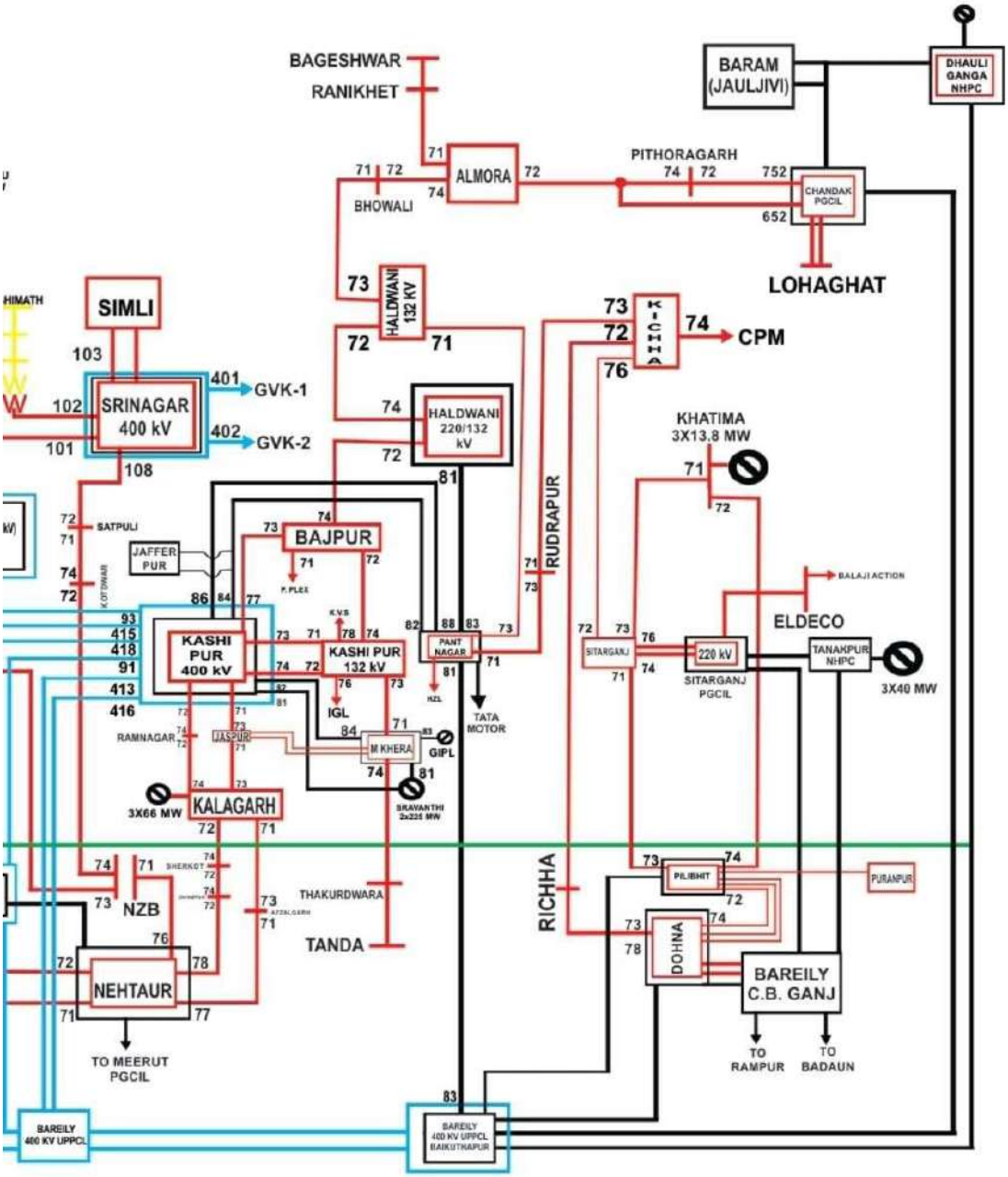
Action-1



Action-2



SLD of Kumaun Zone



Agenda item for inclusion in forthcoming OCC meeting of NRPC:

SJVN's two operational Hydro Plants viz NJHPS and RHPS are located on Satluj Basin, where problem of high silt is very prominent during the monsoon season which leads to shutdown of plants as and when the level of silt increases beyond the permissible limits. During the high silt conditions, the shutdown of the plant is generally on emergency basis and is required to be managed within few blocks time or on Immediate basis in case of Cloud Burst situation.

NJHPS has four silt monitoring stations in Satluj Basin at Khab, Powari, Wangtoo and Jhakri Power House, with following details:

A) NJHPS Khab silt site on Satluj and Spiti rivers is about 100 Km upstream of Nathpa Dam before the confluence of two rivers (Satluj and Spiti) at Khab.

B) NJHPS Powari silt site is about 40 Kms upstream of Nathpa Dam and about 20 km upstream of Karcham Dam.

C) NJHPS Wangtoo silt site is about 2 km upstream of Nathpa Reservoir area and about 200 meters upstream of TRT of KWHEP and 14 km downstream of Flushing Tunnel outlet of KWHEP into river satluj.

D) NJHPS Jhakri silt site where the sample is being collected from Draft tube of the project.

NJHPS is adopting Gravimetric method for silt analysis at their four sites. During the silt testing, three silt components Coarse, Medium and Fine silt are being measured and recorded. The total time required for silt analysis in the silt lab is about 45-60 minutes after collecting the sample and taking into silt analysis lab.

NJHPS Wangtoo site is acting as main forecasting station for silt inflow into the Nathpa Reservoir and for shut down of NJHPS and RHPS. The NJHPS Wangtoo site takes care the silt coming from Karcham Dam through gates/Spillway and silt coming through Karcham Dam's silt Flushing Tunnel (SFT) into the satluj river. The water travelling time between NJHPS Wangtoo site to the Nathpa Reservoir area is about 5 minutes only. The silt observation at NJHPS Wangtoo site is being carried out round the clock after every one hour during the peak summer and monsoon season. Increase in frequency of the silt analysis at the silt sites is being done, as per the requirement of the increasing trend of the silt.

There was an emergency meeting held at NRPC on 22.08.2012, wherein following main decisions were taken in respect of generation reduction at KWHPS and NJHPS during high silt conditions:

- Joint Protocol was signed among NRPC, NRLDC, SJVN & KWHPS for co-ordinated generation reduction of cascaded projects viz NJHPS, KWHPS during High silt condition and Reservoir Flushing.

- A group comprising of one member each from CEA, CWC, NRPC, NRLDC, NJHPS, NHPC, THDC and KWHPS was constituted to identify the state-of-the-art technology

for discharge, silt sampling, measurement and for joint sedimentation/silt management.

Further, after COD of Rampur HPS of SJVN, aforesaid joint protocol was extended up to Rampur HPS in the year 2014. The copy of Joint protocol is enclosed as **Annexure-I.**

Also, as decided in the meeting held at NRPC on 22.08.12, committee was constituted of experts from NRPC (Co-ordinator), CWC, CEA, NRLDC and Power Grid for improved co-ordination between hydro power stations of KWHEP, NJHPS along with other upstream and down stream upcoming Projects in future. Committee visited the silt sites from 29.08.12 to 01.09.12 and submitted their report. The copy of same is enclosed as **Annexure-II.**

As per existing joint protocol, when silt level at intake of KWHPS crosses 4500 ppm, cascading plants viz KWHPS, NJHPS and Rampur HPS have to start shutdown of their plants in a co-ordinated manner. As per Joint protocol in all cases, benchmark for shut down of plants are measurement of silt at KWHPS intake, which is being measured by KWHEP.

Due to very high silt content in the Satluj river, NJHPS and RHPS are being shut down every year during high inflow season. Moreover, silt flushing at Reservoir is being done every year. During Fy 2022-23, NJHPS and Rampur HPS plants were shut down due to high silt on 09.08.22, 10.08.22 and 15.08.22 (cloud burst near Reservoir).

During such events, there was lesser silt at KWHPS intake silt site and higher silt was observed in the downstream of KWHPS silt site i.e. NJHPS Wangtoo site, which is near to NJHPS DAM reservoir. This has resulted into shut down of NJHPS and RHPS unit (s) within few time blocks, as water travelling time between NJHPS Wangtoo site to the Nathpa Reservoir area is about 5 minutes only.

During aforesaid circumstances, NJHPS and RHPS were levied heavy penalty on account of DSM charges due to deviation in schedule in compliance of Clause (18) of Regulation 6.5 (Part 6) of CERC IEGC Regulations, as the schedule of the generating station is revised only after 7^{th} or 8^{th} time block after intimation to NRLDC. The details of such events including DSM penalty occurs during Fy 2022-23 is enclosed as **Annexure-III.**

It is, therefore, requested that existing Joint Protocol signed during the year 2012 for shut Down of KWHPS, NJHPS and Rampur HPS may be reviewed, so that NJHPS can take its own decision for shutdown on the basis of Silt level at its intake and other upstream locations as may be decided.

In view of above, deliberation on aforesaid issue for reviewing the existing Joint Protocol for improved co-ordination between hydro power stations of KWHEP, NJHPS and Rampur HPS during high silt conditions is required with OCC members to safeguard the generating plants in long run, avoid spillage of water and penalty on account of DSM charges. Also, committee may be constituted of Hydro experts from CWC, CEA, NRPC, and NRLDC to identify the state-of-the-art technology for discharge, silt sampling, measurement and for joint sedimentation/silt management.

Annexure-I

(2)

Annex-XXI

Decisions taken in the emergency meeting held on 21st August 2012 at NRLDC for finalizing the protocol for operational coordination

The incidents of sudden reduction in generation at Karcham HEP and Jhakri HEP on 01st August 2012 and 20th August 2012 was discussed threadbare and need for improved coordination between tandem hydro power stations was felt necessary to reduce the impact on the grid and at the same time protect the generating units from damage. List of participants is enclosed.

The following decisions were taken in the emergency meeting:

1. Representatives of Karcham Wangtoo and Nathpa Jhakri HEP would meet on 22nd August 2012. Expert from CEA/CWC would also be invited in the aforesaid meeting. The members may discuss/finalize the following:
    a. Share the past data of Silt pattern available with Jhakri HEP and KWHEP
    b. Identify the level of silt at the intake / upstream observatory at which closing down or ramping down of generation would be initiated.
    c. Explore the possibility of increasing the frequency of silt sampling.
    d. Explore possible solutions for enhancing monitoring and forecasting of silt level at intake of KWHEP and NJHPS.
    e. List out the various eventualities such as flash floods/cloud burst or normal increase in silt levels along with the likely pattern/trend of silt level increase and possible action plan for such conditions.
    f. Finalize the protocol for coordination. Protocol may also include coordination with other upstream and downstream upcoming projects in future such as Rampur HEP.
2. The protocol finalized in the aforesaid meeting and the historical data of silt pattern would be submitted to NRLDC/NRPC.
3. Reduction of generation would start adequately in advance and it shall be staggered to reduce the overall impact on the grid.
4. Silt flushing at Karcham to be delayed after closing the units/reducing the generation due to high silt so that sudden rise of silt level at intake of Jhakri HEP is delayed and generation ramping down period of the complex is extended.
5. It was discussed that schedules in power exchange are collective in nature and any in between revisions would upset the national electricity market, thus the stations with such uncertainty of silt may avoid scheduling through power exchange.
6. The stations would take immediate action for revising the schedules at the time of initiating generation reduction. With regards to revision of schedule more than one time, KWHPS may suitably take up the matter with CERC.
7. Communication facilities at Karcham Wangtoo would be strengthened and particularly fax machine would be provided immediately.
8. All the provisions of the IEGC would be complied.

21/8/2012

(SJVN Limited)

SANJAY GUPTA
AGM (BD & RA)

DIRECTOR

(Jaiprakash Power Ventures Limited)

(NRLDC)

(NRPC)

(P.K. PAHWA)
Member Secretary

Meeting:

Date: 20/08/2012

Place: NRLDC, Delhi

Sr.No.	Name	Designation	Company	Contact No.	e-mail ID	Signature
1	Harsha Gupta	Sr. Manager	JPVL	9873746888	arshjaiswal@rediffmail.com	
2	Suresh Chandra	Director	JPVL	9810606796	sureshchandra@jalindia.co.in	
3	S. Singh	Director	JPL	9958893607	sachchidanand.singh@jalindia.co.in	
4	G. P. Singh	Advisor	JPVL	9810227533	gp.singh@jalindia.co.in	
5	SANJAY GUPTA	AGM	JIVN	9971778568	ippal.sanjay@gvn.nic.in	
6	Sonia Dogra	Manager	SJVN	9871666002	sonidyuvi@gmail.com	
7	S.K. SONEE	CEO	POSOCO	9871909105	skSonee@posoco.in	
8	P.K. PAHWA	M S	NRPC	9818243524	msnrpc1@yahoo.com	
9	V.K. AGRAWAL	GM	NLDC	9818933799		
10	AJAY TALEGAONKAR	S.E(O)	NRPC	[redacted]3 9910728144	stcnrpc@yahoo.in	
11	V.V. SHARMA	GM	NRLDC	9873509464		
12	D.K. Jain	DGM	NRLDC	9910344127	dkj2009@yahoo.co.in	
13	Rajiv Porwal	Ch. Mgr.	NRLDC	9871581193	rajivporwal@gmail.com	
14	Vivek Pandey	Manager	NRLDC	9910170824	vpandey76@yahoo.co.in	

(5)

पावर सिस्टम ऑपरेशन कारपोरेशन लिमिटेड
(भारतीय की पूर्ण स्वामित्व वाला सहायक कंपनी)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A wholly owned subsidiary company of POWERGRID)

NORTHERN REGIONAL LOAD DESPATCH CENTRE
18/A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi - 110 016
Tel: 2685 4015, 2685 3082, Tele Fax: 011- 2685 2747 e-mail: nrldc@vsnl.com

21-अगस्त 2012

सेवा में,

निदेशक (जेपी करचम वंगतू पन बिजली केंद्र)
जयप्रकाश पावर वैंचर लिमिटेड
सैक्टर-128, नोएडा -201304, उत्तर प्रदेश
फ़ैक्स : +91 (120) 4609464, 4609496

अध्यक्ष एवं प्रबंध निदेशक, नाथपा झाकरी एच ई पी
इरकॉन बिल्डिंग, सी-4,
डिस्ट्रिक्ट सैंटर, साकेत, नई दिल्ली-110017
फ़ैक्स :

महोदय,

Please refer the decisions taken during the emergency meeting held at NRLDC on 21st August 2012 regarding the need for improved coordination between tandem hydro power stations of Karcham Wangtoo HEP and Nathpa Jhakri HEP. In this regard as decided in the meeting it is requested that the concerned persons from the two stations along with hydro experts from CWC/CEA may meet on 22nd August 2012 to discuss/finalize the following issues:

1. Share the past data of Silt pattern available with Jhakri HEP and KWHEP
2. Identify the level of silt at the intake / upstream observatory at which closing down or ramping down of generation would be initiated.
3. Explore the possibility of increasing the frequency of silt sampling.
4. Explore possible solutions for enhancing monitoring and forecasting of silt level at intake of KWHEP and NJHPS.
5. List out the various eventualities such as flash floods/cloud burst or normal increase in silt levels along with the likely pattern/trend of silt level increase and possible action plan for such conditions.
6. Finalize the protocol for coordination between KWHEP and NJHPS. Protocol may also include coordination with other upstream and downstream upcoming projects in future such as Rampur HEP.

It is further requested that the protocol may be finalized at the earliest and the same along with the historical data of silt pattern shall be submitted to NRLDC/NRPC and generation at KWHEP and NJHPS is revived at the earliest opportunity with due consideration of safety and security of the grid.

धन्यवाद,

भवदीय,

(वी० वी० शर्मा) 21/8/12

महाप्रबंधक

1. सदस्य सचिव, उत्तर क्षेत्रीय विद्युत समिति, नई दिल्ली: With a request to kindly coordinate so that the meeting is held in the presence of experts from CWC/CEA, as discussed
2. महाप्रबंधक, राष्ट्रिय भार प्रेषण केंद्र, नई दिल्ली
3. मुख्य कार्यकारी अधिकारी, पोसोको, नई दिल्ली

Summary of decisions taken in the meeting held on 22nd August, 2012 for finalizing the protocol in respect of generation reduction at KWHPS and NJHPS during high silt conditions

List of participants is enclosed as Annexure-I

1. In addition to the data furnished by NJHPS and KWHPS, past data on concurrent discharge and silt flushing would be submitted to NRLDC, CWC, CEA and NRPC within a week.
2. SJVN, KWHPS and NHPC informed that permissible silt recommended at intake is around 5000 ppm.
3. Normal silt sampling rate of KWHPS is 30 minutes. It was decided that when silt level is higher than 3000 ppm, KWHPS would reduce sampling interval to 15 minutes at intake of Karcham dam and results would be communicated to NJHPS and NRLDC by e-mail/phone/fax/sms.
4. NJHPS informed that they are measuring silt level through evaporation method. KWHPS informed that they are measuring the same with coagulation method using Alum. CWC representative opined that coagulation method using Alum gives erroneous result. More accurate result could be obtained with Acoustic Doppler Current Profiler (ADCP) method. It was decided that a group comprising of one member each from CEA, CWC, NRPC, NRLDC, NJHPS, NHPC, THDC and KWHPS would be constituted to identify the state of the art technology for discharge, silt sampling, measurement and for joint future sedimentation/silt management. This technique shall be put in place at KWHPS, NJHPS, THDC and NHPC by the end of April 2013.
5. The above group would also explore the technology for real time flood and inflow forecasting as advised by CWC expert and give its recommendation within one month.
6. Presently it is very difficult to forecast cloud burst or flash flood. Under such condition action would be taken by project authority as per disaster management plan.
7. The protocol for coordinated generation reduction is as per Table-I. This protocol shall be implemented by KWHPS and NJHPS with immediate effect. Similar protocol may be prepared by other large/tandem hydro generating stations.

22/8/2012

(SJVN Ltd.)
R K BANSAL
Ex Director (NJHPS)

(JP Ventures Limited)
DIRECTOR

22/8/2012
NRLDC
MANAGER(SO)

22.08.2012
NRPC
(AJAI TALEGAONKAR)
S.E.(O)

Table-I: **Agreed Protocol for Coordinated Generation reduction and silt flushing at KWHPS and NJHPS**

Time			Time = 0 minutes	15 minutes	30 minutes	45 Minutes	60 minutes	75 minutes
Milestone	**Silt level at KWHPS intake is ≥3000 ppm**	**Silt level at KWHPS intake is ≥4000 ppm**	**Silt level at KWHPS intake is ≥4500 ppm**	**15 minutes after previous action**	**15 minutes after previous action**	**15 minutes after previous action**	**15 minutes after previous action**	
Action by KWHPS	Inform to NRLDC, NJHPS and customers. Reduce the silt sampling interval to 15 minutes.	Take operation code from NRLDC and start reducing generation from 1200 MW to 1000 MW and inform NJHPS simultaneously	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, NJHPS prior to starting the action and confirm after completion).	Monitor frequency, Hold Generation	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, NJHPS prior to starting the action and confirm after completion.	Monitor the reservoir level	Monitor the reservoir level	KWHPS would initiate reservoir flushing after confirming closing down of all units of NJHPS
Action by NJHPS	Inform to NRLDC, and respective SLDCs.	Alert the personnel operating the station.	Take Operation code from NRLDC to initiate action for closing down units.	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, KWHPS prior to starting the action and confirm after completion)	Monitor frequency, Hold Generation	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, NJHPS prior to starting the action and confirm after completion)	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, KWHPS prior to starting the action and confirm after completion	NJHPS would initiate reservoir flushing.
Impact on Grid	Nil	200 MW	500 MW	500 MW	500 MW	500 MW	500 MW	

(SJVN Ltd.)
K L Bansal
Ex Director, NJHPS

(JP Ventures Limited)
SURESH CHANDRA
DIRECTOR

NRLDC
MANAGER(SO)

NRPC
(AJAY TALEGAONKAR)
S.E.(O)

Note(Added by NRLDC): Rampur HEP would also operate as Jhakri during co-ordinated reduction & flushing activity as Jhakri informed that Rampur is in tandem with Jhakri.

5

List of Participants
DATE 22/06/2012

In-Chair – MS, NRPC

Name	Designation	Organization	Mobile/Phone	e-mail ID	Signature
Jamil Prasad	Director (HPE)	CEA	26195023	[illegible]	
DP MATHURIA	DIRECTOR, CWC (RMC DCA)	CWC	9911325111	rmdte@nic.in	
VIVEK PANDEY	MANAGER (SO-II)	NRLDC	9910170824	upandey76@yahoo.co.in	
D. CHATTOPADHYAY	G.M (O&M)	NHPC	8800211161	dcnhpc@yahoo.co.in	
S.P SINGH	CE (O&M)	NHPC	9971863565	Satpalnhpc@yahoo.co.in	
[illegible]	ED (NJHPS)	NJHPS, SJVN	[illegible]	[illegible]	
SANJAY LUPAK	AGM	SJVN Ltd	9871773582	lupak.sanjay@sjvn.nic.in	
Harish Sharma	Sr. Mgr.	SJVN	9418162544	harishsharma@gmail.com	
Sonia Gupta	Manager	SJVNL	9816666-8	soniagupta@sjvn.nic.in	
[illegible]	Trainee	NPYL	9810666 796	[illegible]	
VATSAL CHOPRA	JT. President	JIV	9871191055	vatsal.chopra@jalindia.co.in	
[illegible]	Sr. Mgr.	SJVL	9425946555	[illegible]	
Ajay Kalgaonkar	SE(O)	NRPC			
Naresh Kumar	EE(O)	NRPC			

Table - 1: Proposed Protocol for Coordinated Generation reduction and silt flushing at KWHPS, RHPS and NJHPS

Time			Time = 0 minutes	15 minutes	30 minutes	45 minutes	60 minutes	75 minutes	90 minutes
Milestone	Silt level at KWHPS intake is >= 3000ppm	Silt level at KWHPS intake is >= 4000ppm	Silt level at KWHPS intake is >= 4500ppm	15 minutes after precious action	15 minutes after precious action	15 minutes after precious action			
Action by KWHPS	Inform NRLDC, NJHPS and customers. Reduce the silt sampling intervals to 15 minutes	Take operation code from NRLDC and start reducing generation from 1200MW to 1000 MW and inform the NJHPS simultaneously.	Trip 2 units one after another over a period of 15 minutes (Inform NRLDC, NJHPS prior to starting the action and confirm after completion.	Monitor frequency, Hold Generation	Trip 2 units one after another over a period of 15 minutes (Inform NRLDC, NJHPS prior to starting the action and confirm after completion.	Monitor the reservoir level	Monitor the reservoir level	Monitor the reservoir level	KWHPS would initiate reservoir flushing after confirming closing down of all units of NJHPS/HRT Intake gates of NJHPS dam
Action by RHPS	Inform NRLDC and customers about the situation. (i.e. high silt in the River)	Take operation code from NRLDC and start reducing generation from 412MW to 300 MW and inform the NJHPS simultaneously.	Trip 3 units one after another over a period of 15 minutes (Inform NRLDC, NJHPS prior to starting the action and confirm after completion.	Monitor frequency, Hold Generation	Trip 2 units one after another over a period of 15 minutes (Inform NRLDC, NJHPS prior to starting the action and confirm after completion.	Monitor the system parameters	Trip 1 unit one after another over a period of 15 minutes (Inform NRLDC, NJHPS prior to starting the action and confirm after completion.	Monitor the system parameters	Monitor the system parameters
Action by NJHPS	Inform NRLDC and respective SLDCs.	Alert the personnel operating the station	Take Operation code from NRLDC to initiate action for closing down units.	Trip 2 units one after another over a period of 15 minutes (Inform NRLDC, KWHPS, RHPS prior to starting the action and confirm after completion	Monitor frequency, Hold Generation	Trip 2 units one after another over a period of 15 minutes (Inform NRLDC, KWHPS, RHPS prior to starting the action and confirm after completion.	Monitor the system parameters	Trip 2 units one after another over a period of 15 minutes (Inform NRLDC, KWHPS, RHPS prior to starting the action and	NJHPS would initiate reservoir flushing.
Imapct on Grid	Nil	312 MW	650 MW	500MW	600MW	500MW	50 MW	500 MW	

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→ GM (Project)

May like to see please.
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AGM (OP)

OK see please
(Action) may be taken.

Control room
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Annexure-II

Committee Report

on

Jhakri,Karcham and Baspa Hydro Power complex in Satluj Basin in Himachal Pradesh

(Committee visited Satluj Basin from 29th August to 1st September-2012)

11th September-2012

Committee Report
on Jhakri-Wangtoo and Baspa Power House complex based on the Committee Visit to Satluj Basin from 29th August-2012 to 1st September-2012.

****

As decided in the meeting held at NRPC on 22.08.2012, a visit to Nathpa Jhakri, Karcham Wangtoo and Baspa Hydro Power Houses and their silt sites was organized from 29th August to 1st September-2012. The visit was aimed at issues like silt measurement and monitoring, protocol being followed for operation of the three HEPs which are virtually running in tandem, SPS scheme implemented for Jhakri /KWHEP and status of PSS /AVR at these stations. Following officials were nominated by their respective organizations:

S.No.	Name	Designation	Organization
1.	Shri B.S. Bairwa	Executive Engineer	NRPC(Coordinator)
2.	Shri P. Dorje Gyamba	Director	CWC
3.	Shri Devendra Kumar	DGM	NRLDC
4.	Shri Janki Prasad	Director	CEA
5.	Shri Pankaj Gupta	Deputy Director	CEA
6.	Shri C.P. Gupta	DGM	POWERGRID

Background

The committee visited Nathpa Jhakri HPS (1500 MW), Karcham Wangtoo HEP (1000 MW) and Baspa HEP (300 MW) powerhouses and reservoirs along with silt measurement and monitoring centers of SJVN & Karcham (JP) at Powari. Baspa gets inflow from Baspa river whereas Karcham gets its inflow from Baspa & Satluj with Satluj contributing major part. At downstream, Jhakri gets the inflow after Karcham. In between, several minor streams/drains join the river.

A. Silt Measurement at Jhakri, Karcham & Baspa :-

Present Silt measurement arrangement with NJHPS for Nathpa Dam Operation:-

NJHPS has Four Silt Monitoring Stations in Sutlej Basin at Khab, at Powari, at Wangtoo and at Jhakri Power House. The details are as under:-

1. NJHPS Khab Silt site on Satluj and Spiti rivers is about 100 Km upstream of Nathpa dam before the confluence of two rivers (Satluj and Spiti) at Khab.

2. NJHPS Powari Silt Site is about 40 Kms upstream of Nathpa dam and about 20 Kms upstream of Karcham Dam.
3. NJHPS Wangtoo Silt Site is about 2 Kms upstream of Nathpa Reservoir area & about 200 mtrs upstream of TRT of KWHEP and about 14 Km downstream of flushing tunnel outlet of KWHEP into river Sutlej.
4. NJHPS Jhakri Silt Site is at Power House where the sample is being collected from draft tube of the project.

The Committee noted that both the Powerhouse and Dam of NJHPS were equipped with BSNL & Airtel Landlines with Fax facilities.

Method of Silt Analysis by NJHPS at their Silt Sites:-

Gravimetric method is being adopted by the NJHPS for silt analysis at their four sites. The team during the visit to the project conducted the silt measurement test at Jhakri, at Wangtoo and at Powari. During the silt testing three silt components **Coarse, Medium** and **Fine** silt were being observed by the team along with complete process for silt analysis along with 1000ml sample collection. It was observed by the team that the total time required for silt analysis in the Silt Lab is about 35 minutes after collecting the sample and taking to silt analysing Lab. 75 ppm for course & 5000 ppm overall are the critical factors for closing the operation of Jhakri HEP.

The detailed Silt sampling and silt analysis method followed by SJVN are recorded in their Plant Operating manual. SJVN officials informed that the silt measuring procedure adopted by them is as per the procedure followed by BBMB. Further, the closure of NJHPS machines in relation to silt is determined by both the Coarse content as well as the total silt content. As per the NJHPS officials the Coarse content of silt is much more damaging to the machines as compared to the Medium and Fine contents. The Team has also seen the damaged portion of the turbine inside the power house.

Observations of the team on the present SJVN Silt monitoring Arrangement:-

1. It was observed that NJHPS Wangtoo site is acting as a Forecasting station for silt inflow into the Nathpa reservoir. The NJHPS Wangtoo site takes care the silt coming from Karcham Dam through gates/Spillway and silt coming through Karcham Dam's Silt Flushing Tunnel (SFT) into the Satluj river. The water travelling time between NJHPS Wangtoo site to the Nathpa Reservoir area is about 5 minutes only. However, the silt coming into the river with TRT water of KWHEP is not being monitored by NJHPS since this has still lesser lead time for flowing to their intake. The Silt observations at NJHPS Wangtoo site is being carried out round the clock continuously after every one hour during the peak summer and monsoon season. Further the NJHPS officials intimated the team regarding increasing the frequency of the silt analysis at the silt site as per the requirement of the increasing trend of the silt.
2. The team observed that the NJHPS Powari silt site was acting as a 2nd base station for Nathpa Dam (before construction of KWHEP Dam) after the 1st base station at Khab. After

the construction of Karcham Dam the silt data of NJHPS Powari site has a less significance for inflow forecasting of silt into Nathpa Dam due to pondage of water at Karcham Dam. The Silt observations at NJHPS Powari site is being carried out round the clock continuously after every one hour during the peak summer and monsoon season.

3. The team observed that the present method of data exchange arrangement between the Nathpa dam and Karcham Dam is through Voice only over the phone lines since there is no fax arrangement at KWHEP dam site. Whereas the silt flow into river Satluj from Karcham Dam through Gate/Spillway and its silt flushing tunnel and its TRT are very important for the Nathpa Dam operation as the water travelling time between the TRT of Karcham Project and Nathpa Dam is less than 5 Minutes. It was also observed that the major concern of NJHPS officials is not only silt content alone, but especially the silt flushing activities of KWHEP when all their gates are opened without adequate or no warning by KWHEP to NJHPS, giving only 20 minutes time to NJHPS to react to this situation.

4. It was informed by NJHPS officials to the team that the silt flushing activities need to be coordinated by both NJHPS and KWHEP, since after flushing of KWHEP dam, the silt ppm in NJHPS reservoir can go from 30,000 ppm upto 1,00,000 ppm in a very short duration and which may sucked into the desilting chambers/ HRT if their machines are in running condition. In such a condition, after the machines are stopped, the silt flow through the underwater components and the silt settlement in the desilting chambers and the HRT (tunnel) is very damaging to their machines.

5. The Silt sampler for collection of sample used by NJHPS at their Silt Sites at Powari, at Wangtoo and at Khab is a cylindrical container and further the sample is being collected from the centre of the river. The matter was discussed with NJHPS officials and NJHPS officials intimated the team that the present method is adopted due to constraint in travelling time of river which is less than 10 minutes from Wangtoo site to the Nathpa Dam, Further, in view of paucity of time, the Centre/ Mean of the river would be the closest approximation to the actual silt load and this is borne out as observed and responded to, during the last 8 years of operation of NJHPS. Further, since there is time for only one sample on an hourly basis, if the silt sample were to be taken at the river-bank , this reading would be under-estimated from the actual silt content by between 25%– 30% and this has been verified in earlier times by them. Thus, the only sample approximation can be from the middle point of the river.

6. The same procedure is almost being followed by NJHPS at Powari and Khab sites. However, at Powari site, the time required for Sample collecting is about 25 minutes before analyzing the sample.

The team could not visit the NJPHS Khab site due to blockage of National Highway 22, However the Director, Central Water Commission, Shimla visited the NJHPS Khab site and it was observed that almost the same procedure is being followed there except at Khab the sample is being collected at river bank and silt observations are being carried out from morning 0700hrs to 1900 hrs only due to harsh condition of site and no habitation nearby the NJHPS silt sampling site.

Silt Monitoring by KWHEP in Satluj Basin:-

The Team observed the two Silt Monitoring Sites of KWHEP one at Karcham Dam HRT intake and another at upstream of Karcham Dam at Powari. The details are as under:-

1. KWHEP monitors silt at HRT intake at Karcham Dam site.
2. And another at Powari.

As discussed with the KWHEP officials the Silt sampling has been done as per the following criteria:

i) At every 4 hours if silt is less than 1000 ppm.
ii) At every 2 hours if silt content is > 1000 ppm but upto 2000 ppm.
iii) At every 1 hour if silt content is > 2000 ppm but upto 2500 ppm.
iv) At every 1/2 hour if silt content is > 2500 ppm.

During the visit to the Karcham Dam, the committee observed that the Water is flowing through the gates and team also saw the Spillway of the Dam and its gates operation and water flow through the Spillway into river Satluj. The KWHEP Dam authorities intimated that the approximate capacity of Spillway is about 47 cumecs.
The team also observed leakage of Water (in some case silted water) at number of places from KWHEP Water Conductor System. The matter was discussed with KWHEP authorities and they assured the team that the KWHEP authorities are doing needful in this regard. The matter requires regular monitoring and permanent remedial measures for the betterment/ safety of the project.

Method of Silt Analysis by KWHEP at their Sites

The coagulation method of silt analysis in being carried out by KWHEP at their Silt Sites. The detail method is as under:-

Step -1 :- 1000ML Sample Collection .

Step -2 :- Adding approximately 1 gram alum in the collected sample, shake the sample for mixing of alum.

Step -3 :- Keep the sample till all silt settle down. (**which takes about 25 to 35 minutes** depending upon silt contents)

Step -4 :- Remove about 900 ML clear water from the sample water & alum.

Step -5 :- Get a filter paper of 150 mm dia & measure its weight, Put the filter paper in to a funnel.

Step -6 :- Filter the balance 100 ml water of the sample on this filter paper, to collect all the silt deposited on this filter paper.

Step -8 :- Dry the filter paper along with silt on a hot plate.

Step -9 :- Weigh the filter paper along with silt.

Step -10 :- Deduct the weight of filter paper from above weight to obtain the weight of silt in milligram. Divide the obtained wt. by 1.4 to get the PPM of silt.

The complete procedure for silt monitoring at Karcham dam was seen by the team during the visit to the Dam and it was observed that silt sample is being collected at intake of HRT (i.e at river-bank) through a fixed pump arrangement at fixed level at relatively almost still water going into desilting chamber. Further it was also observed that the KWHEP monitors the total silt contained in the water at HRT and **does not analyse Coarse, Medium and Fine silt contents.**

Again, at Powari site the sample water is collected from the river bank at surface Level (instead of standard midsream & 0.6d) and the same silt analysis procedure adopted at Dam site is being followed at Powari Silt measurement site.

The silt ppm (particles per million) readings by KWHEP at Powari and at their intake (taken at river-bank) were compared with the silt ppm readings of SJVN at Powari (taken at river-centre), It was concluded that the silt readings by KWHEP were generally about 20% to 30% lower than that of SJVN (the difference is mostly probably due to the sample collection method and different procedures followed by KWHEP & NJHPS).

The team had a detailed discussion with Shri Kanti Prasad, Vice President, KWHEP and officials and he intimated the Team that the Powari site silt data is crucial for the Karcham reservoir. The project/Dam operation is based on the advanced silt load data observed at Powari and further the silt observed at HRT at Karcham Dam site in PPM.

Observations of the Team on the KWHEP Present Silt Monitoring Arrangement :-

The team observed that the present silt observation procedure followed by KWHEP needs to be improved by the way of sample collection through Standard Samplers at the centre of the River and further by measurement of different contents like Coarse, Medium and Fine silt. The Silt data at Powari is being collected by both the Dam authorities in isolation and Dam operation at Karcham is done on the basis of the Data being observed at Powari and data being observed at Karcham Dam. The Communication facility with KWHEP is rudimentary since there is no Fax and landline available with powerhouse and dam of KWHEP. Thus, there is no standard arrangement for sharing the observed silt data at Powari between KWHEP and NJHPS with only Voice being used, and the team observed that there should be a standard procedure for having Joint data observation at Powari and further sharing the data sharing between the two Dams for betterment and efficient operation of the project, Generation and from disaster management point of view in the Sutlej Basin.

B. Protocol for operation of the Baspa, Karcham & Jhakri

The protocol for coordinated generation reduction and silt flushing for the operation of Baspa,Karcham & Jhakri as decided and agreed in the meeting on 22.08.2012 held at NRPC, is being followed as confirmed by the respective officials of the three hydro generating stations during the visit to the respective sites. Copy of the agreed protocol is given at **Annex-1** .The regular feedback in this regards needs to be provided by the both agency to NRLDC.

C. System Protection Scheme (SPS) for Jhakri

SPS scheme already in place for Jhakri HEP/ KWHPS provides tripping of two units(unit-1 & 4 at present) of KarchamWangtoo HEP in case of power flow on any transmission line emanating from Nathpa Jhakri crossing 800 MW. Logic has been implemented at Jhakri and direct trip signal is sent through PLCC from Jhakri to Karcham. On 22nd August, this condition appeared and direct trip was sent from Jhakri **4 times** to Karcham, but the tripping did not take place. As clarified by KWHEP, the contacts being used for tripping of the units at their own end, were faulty, which caused non-tripping of the units as desired. They also stated that now the contacts have been replaced and tested once. Details of SPS scheme enclosed at **Annex-2**

D. AVR at Jhakri & Karcham HEP

AVR is enabled at all the units of Jhakri, Karcham & Baspa. Committee members physically checked the status at the maintenance penal of all the units at these stations. However, the effectiveness of the AVR could not be ascertained during the visit.On the issue of volatge oscillations observed through PMU data on 24th August,2012 at about 0400 Hrs, KWHEP stated that they did not observe ant such oscillations.

AVR at Jhakri

Make: Siemens

Model: Thyripol-D , KWU FRW5

Detailed parameter settings are given at **Annex-3**

AVR settings at Karcham

Make: Voith, Germany

Model: Thyricon 600

Detailed parameter settings are given at **Annex-4**

E. PSS at Jhakri & Karcham

Power System Stabilizer(PSS) at Jhakri is tuned and in place at all the units of Jhakri. However, normally they keep it on for units 1,3 & 5 whereas PSS on units 2,4 & 6 is manually switched on as and when needed. It was informed by SJVNL that they have observed hunting if PSS at all the units is switched on simultaneously. Effectiveness of the PSS could not be ascertained during the visit. PSS details are as under:

PSS at Jhakri

Make: Siemens

Model: Thyripol-D, KWU FRW5

Detailed parameter settings are given at Annex-5

PSS at Karcham

As per KWHEP, PSS is tuned by the supplier and is switched on all the units. However, effectiveness of PSS could not be ascertained during the visit. Present PSS settings for Karcham are as under:

Make: Voith, Germany

Model: Thyricon 600

Detailed parameter settings are given at Annex-6

Recommendations of committee

A. Silt Measurement, Monitoring and Reporting

Based on the present silt sampling and Silt analysis procedure followed by the two agencies KWHEP and NJHPS in isolation and based on the discussion on 21st August, 2012 and 22nd August 2012 at New Delhi following Short term and Long term recommendations are made by the team for immediate actions :-

1. Short Term Recommendations which Requires Immediate actions:-

i) **As recorded in the Minutes of August 22, 2012, KWHEP must immediately install landlines and fax machines at their Dam and Powerhouse control rooms and the Landline and Fax numbers needs to be share by two Dam/ Power House at the earliest under intimation to NRLDC.** During emergency situations both the dam authorities will immediately intimate the situation to NRLDC without any lag in time.

For fastest communication of data to downstream with minimum lag time and as the distance between the two Dams is about 22 kms only the possibility of having a **Hot line communication arrangement between the two Control Rooms needs to be explored.**

ii) As the Silt and discharge data at Powari is crucial for both the projects (KWHEP & NJHPS) there should be a **joint silt and discharge observation at Powari** instead of

data observations in isolation. For real time reliable discharge observation and silt observation at Powari and as discussed at New Delhi, Team proposes to equip the Powari Site with ADCP with Standard silt sampler at Powari Site. The Powari Site will be active till the Completion of Powari Dam for Shongtong Karcham Project and Team also proposes to shift the Powari Joint observation site to upstream at Moorang after the Completion of Powari Dam for Shongtong Karcham Project. The Site shifting upstream to Moorang will not cost much in terms of expenditure involvement as same ADCP & Silt equipment and other equipment will be reused at upstream Moorang Site.

iii) Based on the discussion at New Delhi and as agreed by the both dam authorities regarding installation of ADCP at Powari Site and as desired by the both Dam authorities, CWC will arrange a trip for 2-3 high-level officials of both Project/Company authorities each to the CWC, ADCP equipped discharge site and Silt Site to see the functioning & working of the ADCP and silt observation being carried out by CWC.

Further CWC has real time river water level recorder at one hour interval at Powari with satellite transmitter , in light of less travelling time to Karcham Dam CWC will do needful for changing the one hour interval to 20 minutes interval to know the real time river water level after every 20 minutes.

iv) The data observed under the Joint observations at Powari with latest equipment should be adopted both the KWHEP & NJHPS for regulation of Dams, silt flushing and power generations. The Joint observation data will be provided to both developers along with the copy to NRLDC.

v) As discussed and agreed by the both agencies on 21st and 22nd August 2012 at New Delhi the "Agreed Protocol for coordinated Generation reduction and Silt Flushing at KWHPS and NJHPS needs to be followed by the both agencies and the Communications made between the two Dams Control Rooms is needed to be recorded. The regular feedback in this regards needs to be provided by both the agencies to NRLDC.

2. Long Term Recommendations which require actions:-

As the river Satluj has a maximum Hydro power potential in the State of Himachal Pradesh. 1500 MW NJHPS, 1000 MW Karcham Wantoo HEP along with 300 MW Baspa-II HEP has already been commissioned and are under operation and further two more Hydro Projects namely Shongtong Karcham and Jhangi Thopan Powari with an installed capacity of 960 MW and 450 MW respectively has already been allocated to private developer, and the work on Shongtong Karcham HEP has already been started on ground, the team observed that the situation after completion of these two additional Projects Dam/Barrages just upstream of Powari, the necessity of inflow forecasting and silt forecasting will be of more useful/ necessity of the River Basin for better coordination in the river basin among the power developers specially for Dam Operation, Silt Flushing , Scheduling of power generation, Overloading etc. Following Long term recommendation are proposed by the Team :-

a) As two more additional HEP are under construction across the Satluj river upstream of the KWHEP it will be more appropriate to have a Joint Observation base station / forecasting site at Khab equipped with ADCP and latest silt samplers for observation of reliable Discharge and Silt data at Khab. The infrastructure, manpower and recurring cost of this Joint Observatory Lab will be shared by all the Developers/ Users in the river basin. The Historic Silt data needs to be computed and discharge Silt correlation needs to be established at NJHPS Site at Khab and by having reliable discharge data though ADPC the Silt may be computed accordingly.

b) Standard data sharing mechanism and faster communication mechanism between all the Dam authorities needs to be established in the river basin for better coordination for Dam filling, flushing of silt and power generation based on the inflow data of Khab.

B. Other Issues

1. Periodic check of the working of SPS, Dummy Check of the relay/Contacts should be done every 3 month by KWHEP in coordination with Jhakri so that SPS works in a reliable manner in future.

2. AVR and PSS are in place as per the respective hydro generating station. However in order to study the status of tuning of AVR and SPS and their effectiveness in disturbance conditions, the committee is of the opinion that a specialized group of experts may be deputed to Jhakri, Karcham & Baspa HEPs.

(Pankaj Gupta)
Dy. Director
CEA New Delhi

(B.S. Bairwa)
Executive Engineer
NRPC, New Delhi

(C.P. Gupta)
DGM
POWERGRID, New Delhi

(Janki Prasad)
Director
CEA, New Delhi

(P. Dorje Gyamba)
Director
Central Water Commission
Shimla (Himachal Pradesh)

(Devendra Kumar)
DGM
NRLDC, New Delhi

Table-I: Agreed Protocol for Coordinated Generation reduction and silt flushing at KWHPS and NJHPS

Time			Time = 0 minutes	15 minutes	30 minutes	45 Minutes	60 minutes	75 minutes
Milestone	Silt level at KWHPS intake is ≥3000 ppm	Silt level at KWHPS intake is ≥4000 ppm	Silt level at KWHPS intake is ≥4500 ppm	15 minutes after previous action	15 minutes after previous action	15 minutes after previous action	15 minutes after previous action	
Action by KWHPS	Inform to NRLDC, NJHPS and customers. Reduce the silt sampling interval to 15 minutes.	Take operation code from NRLDC and start reducing generation from 1200 MW to 1000 MW and inform NJHPS simultaneously.	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, NJHPS prior to starting the action and confirm after completion).	Monitor frequency. Hold Generation	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, NJHPS prior to starting the action and confirm after completion.	Monitor the reservoir level	Monitor the reservoir level	KWHPS would initiate reservoir flushing after confirming closing down of all units of NJHPS
Action by NJHPS	Inform to NRLDC, and respective SLDCs.	Alert the personnel operating the station.	Take Operation code from NRLDC to initiate action for closing down units.	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, KWHPS prior to starting the action and confirm after completion)	Monitor frequency. Hold Generation	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, NJHPS prior to starting the action and confirm after completion)	Trip 2 units one after another over a period of 15 minutes(Inform NRLDC, KWHPS prior to starting the action and confirm after completion	NJHPS would initiate reservoir flushing.
Impact on Grid	Nil	200 MW	500 MW	500 MW	500 MW	500 MW	500 MW	-

A K Bansal 27/9/2017
(SJVN Ltd.)
A K BANSAL
In Direct, NTHPS

(JP Ventures Limited)
DIRECTOR

NRLDC
MANAGER(SO)

NRPC 22.10.17
(AJAY TALEGAONKAR)
S.E.(O)

1) Details on SPS:

M/s NRLDC vide their letter No. 1444-52 dated 29.06.2012 addressed to Director (JP KWHPS), has requested for the implementation of SPS-1, SPS-2 & SPS-3 for the security of GRID. Accordingly, following action has been taken by NJHPS on top priority for the security & reliability of the GRID:

The SPS Logic **(SPS-1)** for 1500MW NJHPS & 1000MW KWHPS has been successfully programmed & implemented by NJHPS in Distributed Control System (DCS) under following condition:

- Power flow from any evacuating 400KV feeders from Jhakri exceeds 800MW. In that case, the SPS tripping signal will be generated by NJHPS DCS software & the same will be extended to KWHPS through PLCC System. The SPS tripping signal generated by NJHPS DCS System shall be further internally used by KWHPS for tripping of their Generating Units as per NRLDC guidelines as stipulated in above refereed letter.

- The SPS Logic **(SPS-3)** for 1500MW NJHPS & 1000MW KWHPS has been successfully programmed & implemented by NJHPS in Distributed Control System (DCS) under following condition:
    - Tripping of any 02 Nos, 400KV Feeders at Jhakri end results in exceeding the 800MW flow condition in remaining Lines. In that case, the SPS tripping signal generated by our DCS software programmed will trip the Generating Unit of NJHPS as per Drawing enclosed by NRLDC vide above referred letter & SPS tripping signal generated by NJHPS DCS System will be further extended to KWHPS through PLCC System for further tripping of Generating Units of KWHPS as per NRLDC guidelines as stipulated in above refereed letter.

SIEMENS

Erregereinrichtung THYRIPOL - D
Excitation System THYRIPOL - D

Serial No.: 98 453 454 - 00128

Nr.: No.:	Beschreibung Explanation	Auslegung Rating	Bemerkungen Remarks
0.	**Auslegungsdaten** Rated data		
.1	Maximaler Dauererregerstrom Ifmax	2 904 A	entsprechend Maschinendatenblatt
.2	Ausgangsstrom und Spannung der Erregereinrichtung bei Nennleistung des Generators Rated excitation current and voltage	2 400 A / 249 V	
.3	Deckenspannung UfD Ceiling Voltage UfD	448 V / 10s 535 V contractual	according Generator Data Sheet
.4	Deckenstrom IfD Ceiling current	3 600 A / 10s 4 560 A contractual	
.5	Leerlauferregerstrom Ifo No Load current Ifo	1 270 A	
.6	Sekundärstrom Hauptstromwandler secondary current main current transformer	5 A eff 12 500 A / 5 A	
.7	Sekundärspannung Hauptspannungswandler secondary voltage main voltage transformer	110 V eff 15 750 V / 110 V	

Ergänzende Erläuterung (gültig für alle Blätter)
** Skalenteile = Skt für Potentiometereinstellungen*

AS BUILT

Remark (valid for all pages)
** Scale division = Skt for potentiometer settings*

SIEMENS

Erregereinrichtung THYRIPOL - D
Excitation System THYRIPOL - D

Serial No.: 96 453 454 - 00126

Nr.: No.:	Beschreibung Explanation	+CJN	PN	Softwarebaustein Software block	Vorgabe Setting	Prüffeld Test Field	Inbetriebsetzung Commissioning	Wartung / Hinweise Maintenance / Remarks
6	**Sollwertsteller Automatik** Reference setter AVR							
6.1	maximaler Sollwert max reference value	A22.3	2 PN	FP-SWREG.U-IBSU.X1	110%	110%	ok	
6.2	Grenze oben bei Entriegelter Betrieb Limit by unlocked Mode	A22.3	2 PN	FP-SWREG.U-IBSU.X2	125%	125%	ok	
	minimaler Sollwert min. reference value	A22.3	2 PN	FP-SWREG.U-IBS.X1	90%	90%	ok	
6.3	Setzwert nach Erregung EIN Setting value by excitation on	A22.4	2 PN	FP-SWREG.U-USV.X1	100%	100%	ok	
6.4	Sollwertsteller Verstellgeschwindigkeit Reference setter acceleration / deceleration time	A22.5	2 PN	FP-SWREG.U-TUTD.X1	100s	100s	ok	
	für Nachführung / for follow up control	A22.5	2 PN	FP-SWREG.U-TUTD.X2	1s	1s	ok	
6.5	Skalierung für OP1-Anzeige Scale for OP1 annunciation		1 PN OP1	FP-OP1-EMP-06.Y Taste / Push button 6	15 750 V	15 750 V	ok	
7	**Erregerstromsollwert** Reference value excitation current							
7.1	max. Sollwert bei Hand = Ein max. reference value excitation current	A22.6	PN 2	FP-SWREG.U-LUNN.X1	110%	110%	ok	
7.2	max. Sollwert bei Generator nicht am Netz max. reference value at no load	A22.6	PN 2	FP-SWREG.REF_LL.X	58,200%	1,1 Ifo / IfN 58,208%	65,008	Leerlauferregerstrom x 1,1
7.3	Glättung Istwert If für Übernahme	A22.6	PN 2	FP-SWREG.PT1-IF.T	48ms	48ms	ok	
7.4	min. Sollwert / min. reference value	A22.6	PN 2	FP-SWREG.H.LL	20%	10,583%		

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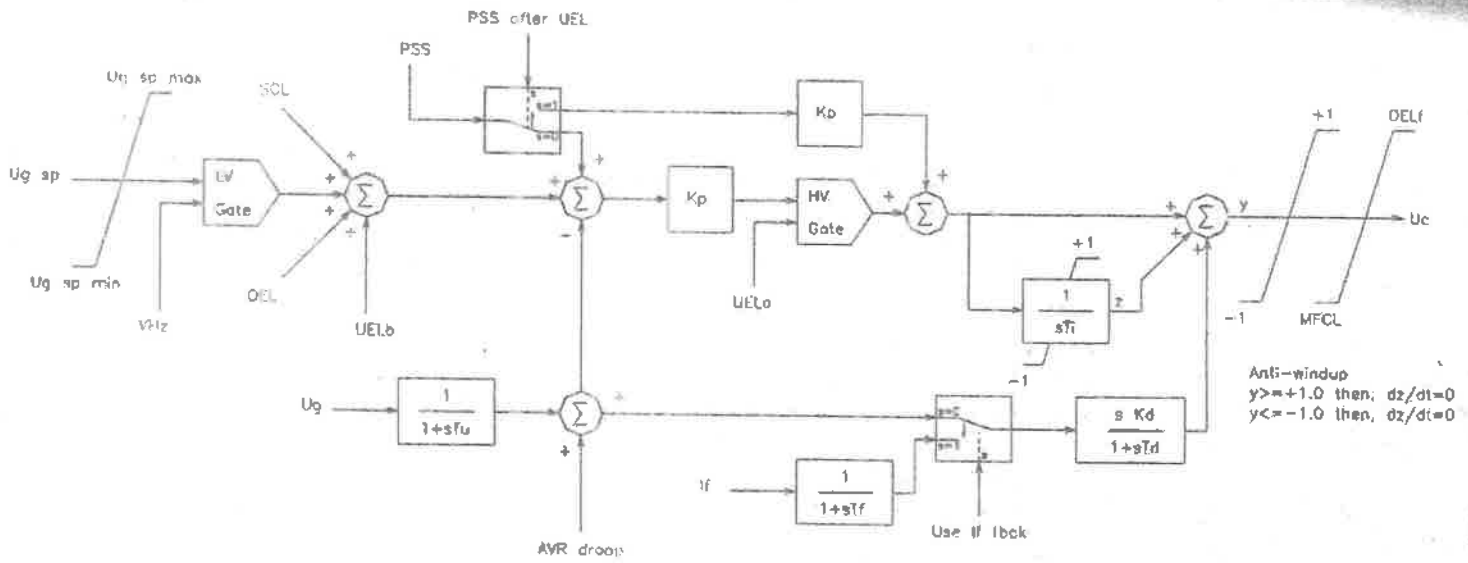
3 AVR Main Loop



Parameters		Range	Typical Value	Adjusted	Comments
Ug sp max	Maximum allowed AVR set point	0,9 ~ 1,2	1,1	+8%	
Ug sp min	Minimum allowed AVR set point	0,7 ~ 1	0,9	-5%	
Tu	Stator voltage transducer time constant	-	20ms		
Tf	Field current smoothing time constant	20 ~ 500ms	20ms		
Kp	Proportional gain for controller	0,1 ~ 40	10	28	
Ti	Integral time for PI-controller	0 ~ 10s	1s	2	
Kd	Derivative gain for D-controller	-40 ~ 0	0		
Td	Smoothing time constant for D-controller	0,1 ~ 10s	1s	5s	
Use If fdbck	Use If as feedback into the control loop	0 or 1	0		Only for brushless excitation systems
PSS after UEL	Use PSS after Underexcitation Limiter	0 or 1	0		

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Erregereinrichtung THYRIPOL - D
Excitation System THYRIPOL - D

Serial No.: 96 453 454 - 00126

Nr.: No.:	Beschreibung Explanation	+CJN	PN	Softwarebaustein Softwareblock	Vorgabe Setting	*Prüffeld Test Field*	*Inbetriebsetzung Commissioning*	Wartung / Hinweise Maintenance / Remarks
4.4.2	untererregt / underexcited max. Hub / max. range	A24.3	PN 2	FP-REGEL.I-IGRN.LU	20%	20%	*20%*	negative Ständerstrombegrenzung
	Integrationszeit / integral time constant		PN 2	FP-REGEL.I-IGRN.Ti	33s	33s	*33s*	negative Stator current limiter
	Startwert Integrierer / lower limit integrator		PN 2	FP-REGEL.I-IGRN.LL	-10%	-10%	*-10%*	
9.5	**Pendeldämpfungsgerät** Power System Stabilizer							
9.5.1	Wirkleistungseinfluß Active Power influence	A29.1	PN 2	FP-PSS.PSS16.I	0	0	*ok*	
	Glättung Smoothing	A29.2	PN 2	FP-PSS.PSS20.T	20ms	20ms	*ok*	
	Integrierzeit Filter Integration time filter	A29.2	PN 2	FP-PSS.PSS36.TI	1500ms	1500ms		
	P-Anteil P-Part	A29.3	PN 2	FP-PSS.PSS231.KP	-0,75	-0,75		
	PT1-Glied PT1-Part	A29.3 A29.3	PN 2 PN 2	FP-PSS.PSS22.T FP-PSS.PSS23.KP	20ms 0	20ms 0		
9.5.2	Frequenzeinfluß Frequency influence	A29.2	PN 2	FP-PSS.PSS19.I	1	1		
	Glättung Smoothing	A29.2	PN 2	FP-PSS.PSS201.T	20ms	20ms		

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Erregereinrichtung THYRIPOL - D
Excitation System THYRIPOL - D

Serial No.: 96 453 454 - 00126

Nr.: No.:	Beschreibung Explanation	*CJN	PN	Softwarebaustein Software block	Vorgabe Setting	Prüffeld Test Field	Inbetriebsetzung Commissioning	Wartung / Hinweise Maintenance / Remarks
	Integrierzeit Filter Integration time filter	A29.2	PN 2	FP-PSS.PSS381.TI	1500ms	1500ms		
	PT1-Glied PT1-Part	A29.3 A29.3	PN 2 PN 2	FP-PSS.PSS24.T FP-PSS.PSS26.KP	20ms 0	20ms 0		
9.5.3	Verstärkung Gain	A29.3	PN 2	FP-PSS.PSS27.KP	1	1		
	Grenzen Limits	A29.3 A29.3	PN 2 PN 2	FP-PSS.PSS27.LU FP-PSS.PSS27.LL	5% -5%	5% -5%		
	Abschaltungszeit Disable PSS Time		PN 2	FP-PSS.PSS282.T	10s			
9.6	**U/f - Begrenzung** U/f - limiter	A22.3	PN 2	FP-SWREG.F5.I Dumy1	0	0	1	"0" Begrenzung nicht aktiviert "0" not used
	max. zul. Spannung bei 50 Hz		PN 2	FP-SWREG.U-F1.X1	110%	110%	110%	
	Freigabe Frequenzmessung		PN 2	FP-SWREG.U-F9.M FP-SWREG.U-F9.HY	30% 2%	30% 2%	30% 2%	
9.7	**Q - Regelung** reactive power regulator	A23.1	PN2	FP-QREG.QEFREI.I2	0	0		"0" einschaltverriegelt
			PN2	FP-QREG.QAFREI.I2	1	1		"1" deaktiviert / not used

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13.2 Parameters - PSS

Parameters		Range	Typical Value	Adjusted	Comments
Tf	Tranducer time constant	-	20ms		
Tp	Tranducer time constant	-	20ms		
Tw1	Frequency wash-out time constant	0,1 ~ 20s	3s		
Tw2	Frequency wash-out time constant	0,1 ~ 20s	3s		
Tw3	Active power wash-out time constant	0,1 ~ 20s	3s		
Tw4	Active power wash-out time constant	0,1 ~ 20s	3s		
T6	Frequency filter time constant	0 ~ 20s	0s		
T7	Active power filter time constant	0,1 ~ 20s	3s		
Ks2	Proportional gain	0 ~ 50	0,39	0·432	$K_{s2} = T_7 / 2H$
Ks3	Proportional gain	-1 ~ 1	1		
T8	Filter time constant	0,001 ~ 20s	0,4		$T_8 = M * T_9$
T9	Filter time constant	0,001 ~ 20s	0,1		
M	Filter indice	1, 2, 3, 4 or 5	4		
N	Filter indice	1 or 2	1		
Ks1	Proportional gain	0 ~ 50	5		
T1	Lead lag time constant	0,001 ~ 20s	0,12s	0·075	
T2	Lead lag time constant	0,001 ~ 20s	0,03s	0·02	
T3	Lead lag time constant	0,001 ~ 20s	0,12s	0·075	
T4	Lead lag time constant	0,001 ~ 20s	0,03s	0·02	
T10	Lead lag time constant	0,001 ~ 20s	1s		
T11	Lead lag time constant	0,001 ~ 20s	1s		
PSS max	PSS maximum contribution	0 ~ 0,2	0,05		
PSS min	PSS minimum contribution	-0,2 ~ 0	-0,05		

Annexure-III

Details of Events and DSM Penalty on account of non revision of Schedule

Date	Block No.	NJHPS Generation (MW)		Details of Penalty on account of DSM (Rs in Lakh)	RHPS Generation (MW)		Details of Penalty on account of DSM (Rs in Lakh)
		Schedule Generation	Actual Generation		Schedule Generation	Actual Generation	
09.08.22	93	272	0	42.84	75	0	10.35
	94	544	0		149	0	
	95	1088	0		299	0	
	96	1615	0		444	0	
10.08.22	1	1615	0	68.34	445	0	17.92
	2	1615	136		445	0	
	3	1615	649		445	136	
	4	1615	821		445	229	
	5	0	318		0	108	
15.08.22	21	1615	1540	256.26	438	424	64.39
	22	1615	1087		438	302	
	23	1615	560		438	156	
	24	1615	70		438	20	
	25	1615	0		438	0	
	26	1615	0		438	0	
	33	1615	250		70	0	
	34	1615	550		151	19	
	35	1615	1080		296	178	
	36	1615	1615		438	370	
	77	1633.5	1289		449.5	368	
	78	1633.5	514		449.5	158	
	79	1633.5	39		449.5	12	
	80	1633.5	0		449.5	0	
	81	1633.5	0		449.5	0	
	82	1633.5	0		449.5	0	
	86	500	0		138	0	
	87	1000	0		275	0	
	88	1615	0		442	0	

Annexure-III

पावरग्रिड
POWERGRID

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

Ref: - N1/AM/

Date:- 7th November'2022

To,

The Member Secretary,
Northern Regional Power Committee,
18-A, Qutab Institutional Area,
Katwaria Sarai, New Delhi-110 016

Subject: ***Additional agenda point for forthcoming 201st OCC meeting of NR- frequent trippings in 220kV Baghpat- Shamli and 220KV Baghpat – Mandola transmission lines of UPPTCL***

Dear Sir,

400/220kV Baghpat substation was commissioned in May'2016 with SIEMENS make GIS system and since then it caters the power requirement of M/s UPPTCL through 220KV transmission lines owned by M/s UPPTCL.

The frequent trippings in 220KV Baghpat- Shamli and 220KV Baghpat – Mandola has been observed since last 2½ years as tabulated below:

Name of Line	The no. of trippings since June'20		Fault current observed	
220kV Baghpat-Mandola Vihar	34	Zone1: 32 Zone2: 02	Fault Current < 5KA	1
			5kA < Fault Current < 10kA	20
			10kA < Fault Current < 15kA	9
			Fault Current > 15KA	4
220kV Baghpat- Shamli Vihar	61	Zone1: 50 Zone2: 11	Fault Current < 5KA	21
			5kA < Fault Current < 10kA	24
			10kA < Fault Current < 15kA	10
			Fault Current > 15KA	6

M/s UPPTCL have been intimated about these frequent faults and the chronic effects of this fault from time to time, but despite multiple reminders, situation has not changed till now and no noticeable reduction in these trippings has been observed. These frequent high value faults are drastically affecting the life of transformer and GIS equipment at Baghpat and may result is failure in future.

Therefor, this issue needs due deliberation in forthcoming 201st OCC meeting of Northern Region for required corrective action by M/s UPPTCL w.r.t. healthiness of the aforesaid lines.

Thanking you with regards,

Yours sincerely,

07/11/2022

(A. K. Behera)
Chief GM (AM, NR-1)

Copy :-

i) ED, NR1
ii) ED(AM), CC

For kind information please.
--- do--

Annexure-A.VII

Format AS1:Generator Details by RRAS Provider

From:**TANDA SUPER THERMAL POWER STATION(STAGE-II)/NTPC LTD**

TO: **NRPC**

Validity of the information - **From: 16.10.2022** **To: 15.11.2022**

Date: **01/10/2022**

S.no	Title/Parameters	Value/Data
a)	Number of generating units (e.g. 1X210MW + 2X500MW)	**2X660 MW**
b)	Total installed capacity(MW)	**1320 MW**
c)	Maximum possible Ex-bus injection (including overload if any)**(105 % of Ex Bus Installed Capacity)**	**1306.305MW**
d)	Technical minimum(MW)	**342.1275 MW/Unit**
e)	Type of Fuel	**COAL**
f)	Region	**NR**
g)	Bid area	
h)	Fixed cost (Paise/kWh upto decimal place)	
i)	Variable cost (Paise/kWh upto decimal place)	
j)	Ramp-up rate (MW/BLOCK) for each unit	**93.50 MW/Time Block/Unit**
k)	Ramp-down rate (MW/BLOCK)for each unit	**93.50 MW/Time Block/Unit**
l)	Start up Time from cold start (in min) & Warm start of each unit	**Cold: 2100 min** **Warm: 900 min**
m)	Start up Time from cold start (in min) of first unit (when both units under S/D)	**Cold: 2880 min**
n)	Any other information	**Nil**

Copy to:

Signature of Authorized Signatory
(With stamp)

डि० मंडल
D. MANDAL
महाप्रबन्धक (प्रचालन सेवाएं)
General Manager (OS)
एन टी पी सी लिमिटेड, उत्तरी क्षेत्र मुख्यालय, लखनऊ
NTPC Limited, Northern Region Headquarters, Lucknow

Name: **DEBDULAL MANDAL**

Designation: **HOD (OS-NR)**

RAJASTHAN RAJYA VIDYUT PRASARAN NIGAM LIMITED.
[Corporate Identity Number (CIN):U40109RJ2000SGC016485]
(Regd. Office: Vidyut Bhawan, Jan Path, Jyoti Nagar, Jaipur - 302 005)
OFFICE OF THE SUPERINTENDING ENGINEER (PROJECT & PLANNING)
✆ +91-141-2740623,Fax:+91-141-2740794;
e-mail: se.pp@rvpn.co.in; website:www.rvpn.co.in
RVPN An ISO 9001:2000 Certified Company

No. RVPN/SE(P&P)/XEN-2(P&P)/AE-2/ F. /D 1490 Jaipur, Dt. 09.11.2022

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

Sub:- Islanding Schemes for the Suratgarh Supercritical Thermal Power Plant and Rajwest LTPS in Rajasthan

Ref:- Discussion in the meeting held on dated 04.11.2022 to discuss implementation of Islanding Schemes in NR

Dear Sir,

In reference to the above referenced subject, suggestions provided during discussion in the meeting held on dated 04.11.2022 to discuss implementation of Islanding Scheme in NR have been incorporated in the proposed islanding Schemes for Suratgarh Supercritical TPS and Rajwest LTPS. Updated version fo these islanding schemes are attached for your kind consideration and necessary approval.

Encl: as above

Your's faithfully,

(K. K. Meena)
Additional Chief Engineer (PP&D)

Copy to the following for information and necessary action please:-

1. The Chief Engineer (LD/MPT&S), RVPN, Heerapura/Jaipur
2. The Chief Engineer, Suratgarth Supercritical Thermal Power Station, RVUN, Suratgarh, Rajasthan.
3. The Superintending Engineer (Communication-Corporate Office/Automation) , RVPN, Heerapura/Jaipur.
4. The Superintenting Engineer (Operation), Northern Regional Power Committee, 18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016.
5. The Plant Head, JSW Energy (Barmer) Ltd. (Formerly Rajwest LTPS), Barmer, Rajwest (E-mail: operationsupport.rwpl@jsw.in)

Encl: as above

Additional Chief Engineer (PP&D)

PROPOSED ISLANDING SCHEME FOR RAJWEST (JSW) POWER PLANT

A Generation Details

1. The installed capacity of generators at Rajwest LTPS is 8x135 MW i.e. 1080 MW. Each unit gives a net dispatch of 120 MW. Under various scenarios, only 5-6 units are generating at Rajwest LTPS.
2. Islanding scheme is designed for Generation-720 MW and following units of Rajwest Power Plant are considered
   - 2 units at 220 kV voltage level= 2x120 MW=240 MW
   - 4 units at 400 kV voltage level= 4x120 MW=480 MW

   OR

   - 1 unit at 220 kV voltage level= 1x120 MW=120 MW
   - 5 units at 400 kV voltage level= 5x120 MW=600 MW
3. All other generating units at Rajwest LTPS are to be tripped at 48.0 Hz.
4. No RE Power Projects have been considered in the island. Presently, there are no RE generators in the island. However, all future RE generators are to be tripped at 48.0 Hz.

B Power System at Rajwest LTPS

Rajwest LTPS has following 400 kV and 220 kV system

- 400 kV S/C Rajwest-Barmer Line
- 400 kV S/C Rajwest-Jodhpur (Surpura) Line
- 400 kV S/C Rajwest-Kankani (Jodhpur) Line
- 220 kV D/C Rajwest-Barmer Line
- 220 kV S/C Rajwest-Dhorimanna Line

C Load Details

Identified load around Rajwest LTPS is 701 MW which includes loads of Barmer (293 MW) and Jodhpur (408 MW). GSS wise load details for 701.5 MW is placed at **Annexure-A.** The critical loads viz. defence, Railways, Refinery & PHED is being fed from the following GSS:-

- 400 kV GSS Barmer
- 132 kV GSS Gadra Road
- 132 kV GSS Barmer
- 220 kV GSS Dhaurimanna
- 132 kV GSS Gudamalani
- 132 kV GSS NPH (Jodhpur)
- 132 kV GSS MBM Engineering College
- 132 kV GSS OPH (Jodhpur)
- 132 kV GSS Banar

- 132 kV GSS Mandore
- 132 kV GSS Chopasani Housing Board
- 132 kV GSS Soorsagar

The identified load considering 90% of total load is **629 MW** which is placed at **Annexure-A1.** General condition of islanding is considered for the total system of 629MW which is 90% (approx.) of the maximum capacity of generation unit considered for island.

D Proposed Islanding Scheme

1. No RE Power Projects have been considered in the island. Presently, there are no RE generators in the island. However, all future RE generators are to be tripped at 48.0 Hz. **List of feeders is attached at Annexure-F.**
2. All dedicated feeders for critical loads viz. Defence, DRDO, refinery, railway etc. are to be kept in blocked mode even if these are open access consumers. Dedicated feeders for rest of open access consumers are to be kept operative at frequency of 48.0 Hz (Note: to be monitored by SE (SO&LD). **List of feeders is attached at Annexure-F.**
3. Transmission lines of 400 kV, 220 kV and 132 kV voltage levels considered for the islanding are attached at **Annexure-B.** The settings of under frequency relays in the Island are to be kept as indicated in the **Annexure-B.** All under frequency relays settings are to be considered as 47.90 Hz instantaneous. During the condition of light loads, the load-generation balance is to be maintained by changing the blocked/operative status of the additional lines identified to include additional GSS in the island **(Annexure-B).**
4. Islanding shall take place at 47.90 Hz instantaneous i.e. all identified feeders to form island will be tripped at this frequency.
5. 80 MVAR, 400 kV bus reactor at 400 kV GSS Kankani, and 125 MVAR, 400 kV bus reactor at 400 kV GSS Barmer are to be equipped with the UFR relays in order to maintain the voltages within permissible limits.
6. To indicate the blocked/operative mode of transmission lines, SLD for 400 kV network, 220 kV & 132 kV network of Barmer region and 220 kV & 132 kV network of Jodhpur region are placed at **Annexure-C, D and E** respectively.

F. Results of Load Flow Study

A load flow study is carried out considering the blocked and operative status of line included in **Annexure-B** as per SLD diagram indicated in **Annexure-C, D and E** for a total load of 701 MW included in **Annexure-A.** Power flow plot of the network included in the island is placed at **Exhibit-1.** The results of load flow study indicate the following load-generation balance:-

Generation	=	720 MW
Load	=	701 MW
Losses	=	19 MW

Similarly, the results of load flow study indicate the following load-generation balance for system **load of 629 MW (90% of the generation units):-**

Generation	=	720 MW
Load	=	629.1800 MW
Losses	=	18.8403 MW

A snapshot of the load flow results for load of **629MW** is placed at Exhibit-2. It is observed that loading on all the lines and transformers included in the island of Rajwest LTPS is normal and overloading is not observed.

G. Results of Transient Stability Studies

Transient stability study is carried for the network included in the island of Rajwest LTPS by opening all the lines which are kept in the operative state at time=1 second after the start of simulation. Various plots are discussed below:-

1. Active Power Curve

Plots of the electrical power generated by the generators (4x135 MW +2x135 MW) at Rajwest LTPS are illustrated in Fig. 1. It is observed that the generated active power varies between 480 MW to 475 MW (Excluding the auxiliary power) for the generator connected on the 400 kV voltage level (4x135 MW). Further, it is also observed that the generated active power varies between 234MW to 246 MW (Excluding the auxiliary power) for the generator connected on the 220 kV voltage level (2x135 MW). Variations in the generated active power are settling after a time period of 10 seconds and island becomes stable.

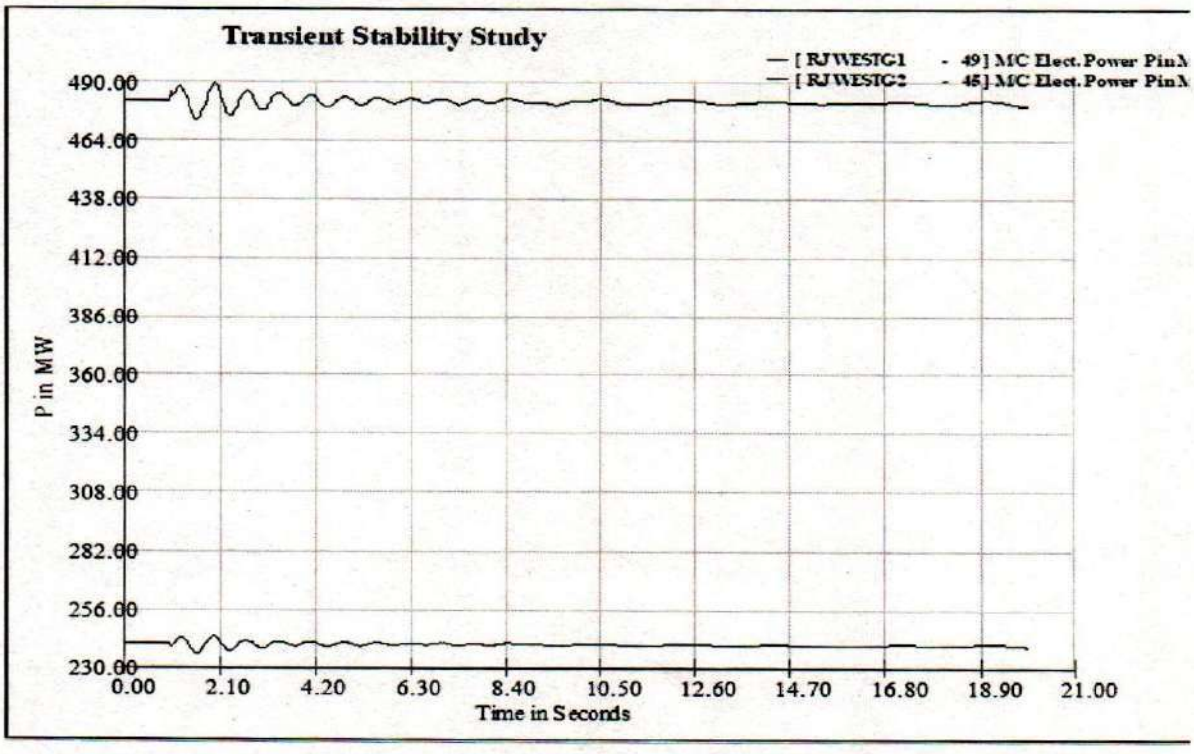


Fig. 1 Active power curve of Rajwest LTPS generators

2. Reactive Power Curve

Plots of the reactive power generated by the generators (4x135 MW +2x135 MW) at Rajwest LTPS are illustrated in Fig. 2. It is observed that the reactive power exchanged between generator connected on the 400 kV voltage level (4x135 MW) and grid varies from -55 MVAR and settles to a value of +5 MVAR after a time period of 5 seconds. Similarly, the reactive power exchange between the generator connected on the 220 kV voltage level (2x135 MW) and grid varies from +0.25 MVAR and settles to a value of +35 MVAR after a time period of 5 seconds. This indicates that reactive power settles down after 5 seconds and island becomes stable.

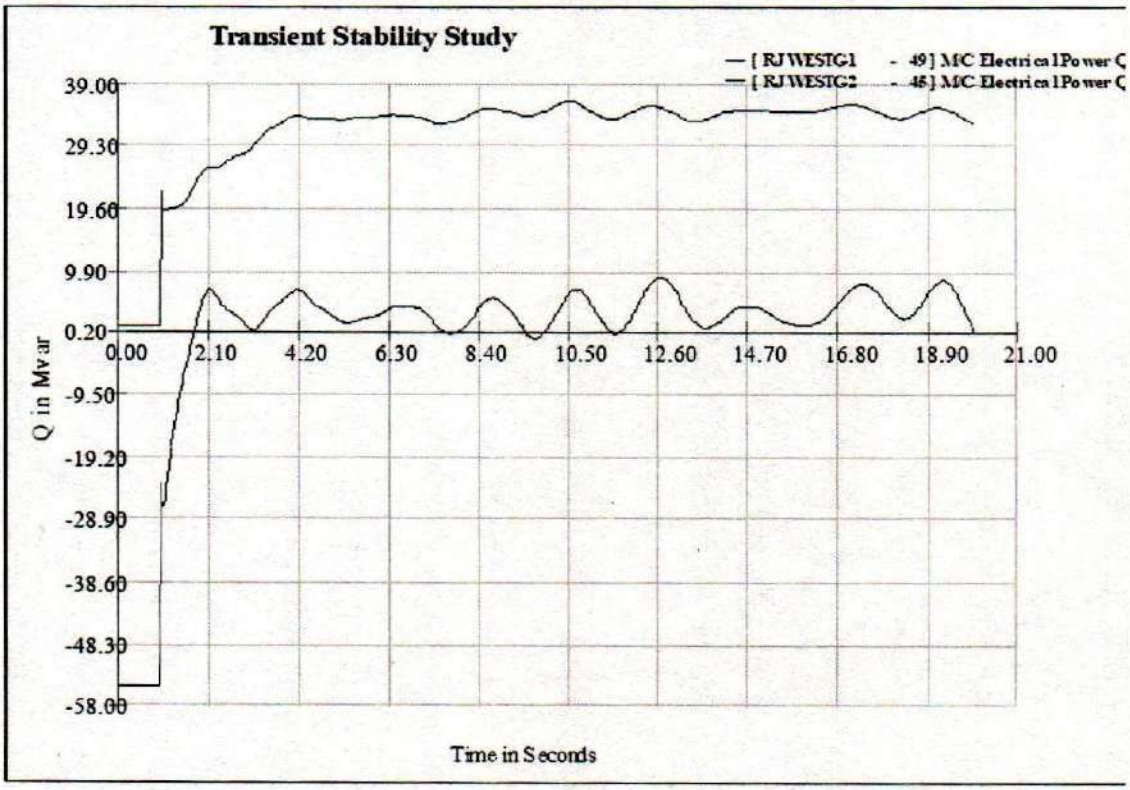


Fig. 2 Reactive Power variations during islanding condition

3. Load Angle Curve

The load angle curves of the generators (4x135 MW +2x135 MW) at Rajwest LTPS are illustrated in Fig. 3. Load angle for generator connected to 220 kV voltage bus (2x135 MW) first decreases from 24.5° to 22° and finally settles at 41.5° in 18.5 seconds. Further, load angle for generator connected to 400 kV voltage bus (4x135 MW) first decreases from 23° to 21.5° and finally settles at 40° in 18.5 seconds. Hence, network included in the island of Rajwest LTPS will operate at a new load angle in stable state.

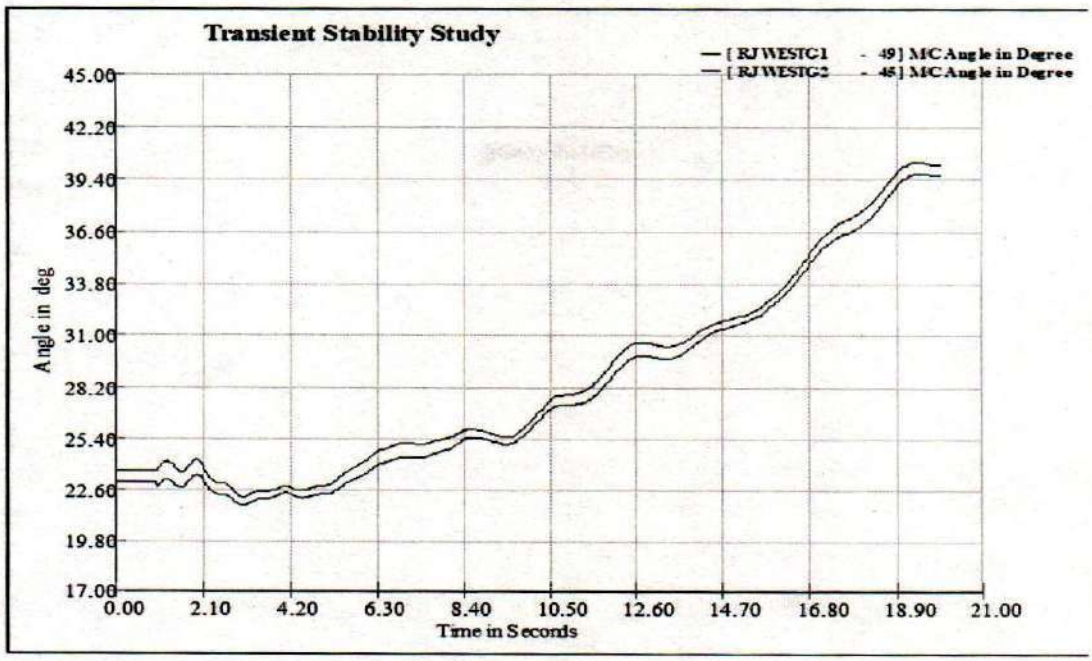


Fig. 3 Load angle curve

4. Frequency Plot

Plot of grid frequency is illustrated in Fig. 4. It is observed that grid frequency varies between 49.97 HZ to 50.01 HZ after the formation of island and finally again settles to the value of 50 HZ in a time period of 20 seconds for both the generators connected to 400 kV voltage bus and 220 kV voltage bus (4x135 MW +2x135 MW) which indicates that the island will operate in the stable state.

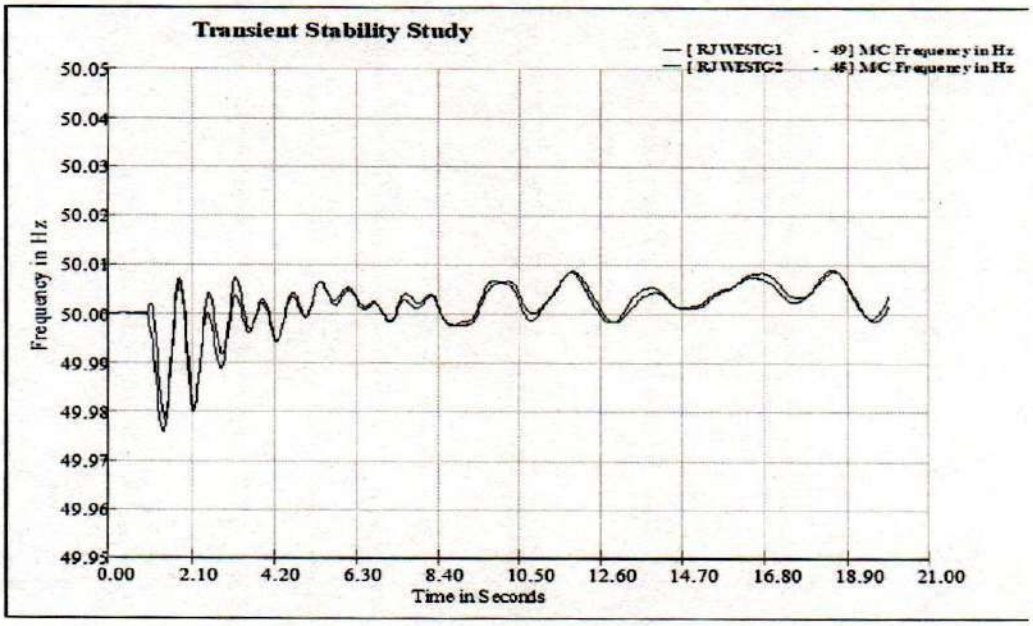


Fig. 4 Variation of frequency during islanding condition

5. Variation of Voltage

Plot of grid voltage at the Rajwest LTPS at the terminals of both generators connected to 400 kV voltage bus and 220 kV voltage bus (4x135 MW +2x135 MW) is illustrated in Fig. 5. It is observed that grid voltage first dips to 0.975 pu and finally again settles at 1.0pu

after a time period of 20 seconds. This indicates that the island will operate in the stable state.

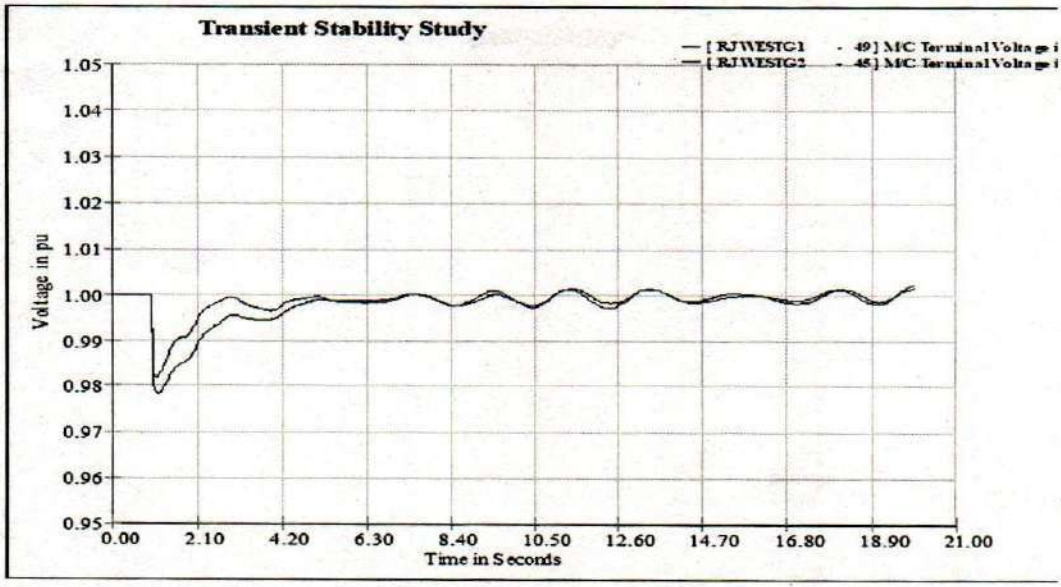


Fig. 5 Voltage variations during islanding condition

H. Conclusion

Proposed islanding is designed after detailed discussion with the field officers and officers from the MPT&S, Communications, Automations and LD. Based on the feedback/inputs of Officers and results of load flow studies & Transient stability studies, it is concluded that:

- Results of load flow study indicate that load generation balance can be maintained in the network considered for the island of Rajwest LTPS.
- All the transmission lines included in the island will be equipped with under frequency relays (UFRs) and additional transmission lines are considered for the island to manage the load generation balance for different load scenario considering the large seasonal variations of load in the region.
- Results of transient stability study indicate that network included in the island of Rajwest LTPS becomes stable after incidence of islanding event in respect of voltage variations, frequency variations, load angle variations, active power variations and reactive power variations.
- Proposed islanding scheme can be practically implemented on the transmission network of RVPN considering 4x135 MW machines at Rajwest LTPS connected to 400 kV voltage bus and 2x135 MW machines at Rajwest LTPS connected to 220 kV voltage bus. However, continuous monitoring of load-generation balance is required and action to change status of UFRs from blocked to operative and vice-versa will be needed for load-generation balance.

Annexure-A

Load on GSS considered in Islanding Scheme for Rajwest TPS					
S. No.	Name of GSS	Maximum Load (MW)	Simultaneous Load (MW)	Minimum Load (MW)	Essential Loads
A	**Load in Barmer**				
1	400 kV GSS Barmer	11.54	5.00	4.00	Defennce
2	132 kV GSS Gadra Road	30.32	19.00	0.474	Defence
3	132 kV GSS Barmer	44.44	35.00	12.88	Defence
4	132 kV GSS Mahloo	34.18	18.00	9.91	
	Load at Barmer	**120.48**	**77.00**	**27.26**	
5	220 kV GSS Dhaurimanna	59.64	43.00	0.47	Defence
6	132 kV GSS Ranasar	22.13	18.00	0.68	
7	132 kV GSS Ramji ki Gol	19.82	12.00	8.06	
8	132 kV GSS Gudamalani	23.03	22.00	10.73	RGD
9	132 kV GSS Sawa	42.34	27.00	8.5	
10	132 kV GSS Chouhtan	19.06	12.00	3.9	
	Load at Dhaurimanna	**186.02**	**134.00**	**32.34**	
11	220 kV GSS Balotra	64.84	37.00	0.7	
12	132 kV GSS Sindhari	22.29	15.00	4.1	
13	132 kV GSS Samdari	16.97	13.00	0.23	
14	132 kV GSS Siwana	24.66	17.00	2.25	
	Load at Balotra	**128.76**	**82.00**	**7.28**	
	Total load in Barmer	**435.26**	**293.00**	**66.884**	
B	**Load in Jodhpur**				
1	220 kV GSS Boranada	52.00	35.00	0.98	
2	220 kV GSS Jodhpur	65.00	57.00	1.00	
3	220 kV GSS Barli	24.00	0.00	0.94	
4	220 kV GSS Jhalamand	13.17	1.00	0.22	
5	132 kV GSS NPH (Jodhpur)	64.00	73.00	15.00	Air Force, AIIMS, MGH, MDMH
6	132 kV GSS MBM Engineering College	19.58	19.00	1.89	DRDO. Airport
7	132 kV GSS OPH (Jodhpur)	43.00	29.00	2.00	Railway through DISCOM's 33/11 kV GSS
8	132 kV GSS Banar	72.00	52.00	44.00	Defence
9	132 kV GSS Kuri Bhagtasani	30.86	23.00	1.60	
10	132 kV GSS Mandore	32.00	12.00	8.00	Defence, DRDO
11	132 kV GSS Pratapnagar (Jodhpur)	38.00	32.00	3.00	
12	132 kV GSS Chopasani Housing Board	67.28	45.00	6.43	MDM Hospital
13	132 kV GSS PS8	4.50	1.00	0.02	
14	132 kV GSS Soorsagar	35.42	29.00	1.33	Defence
	Total load in Barmer	**560.81**	**408.00**	**86.41**	
	Total load in Barmer & Jodhpur	**996.07**	**701.00**	**153.29**	

Annexure-A1

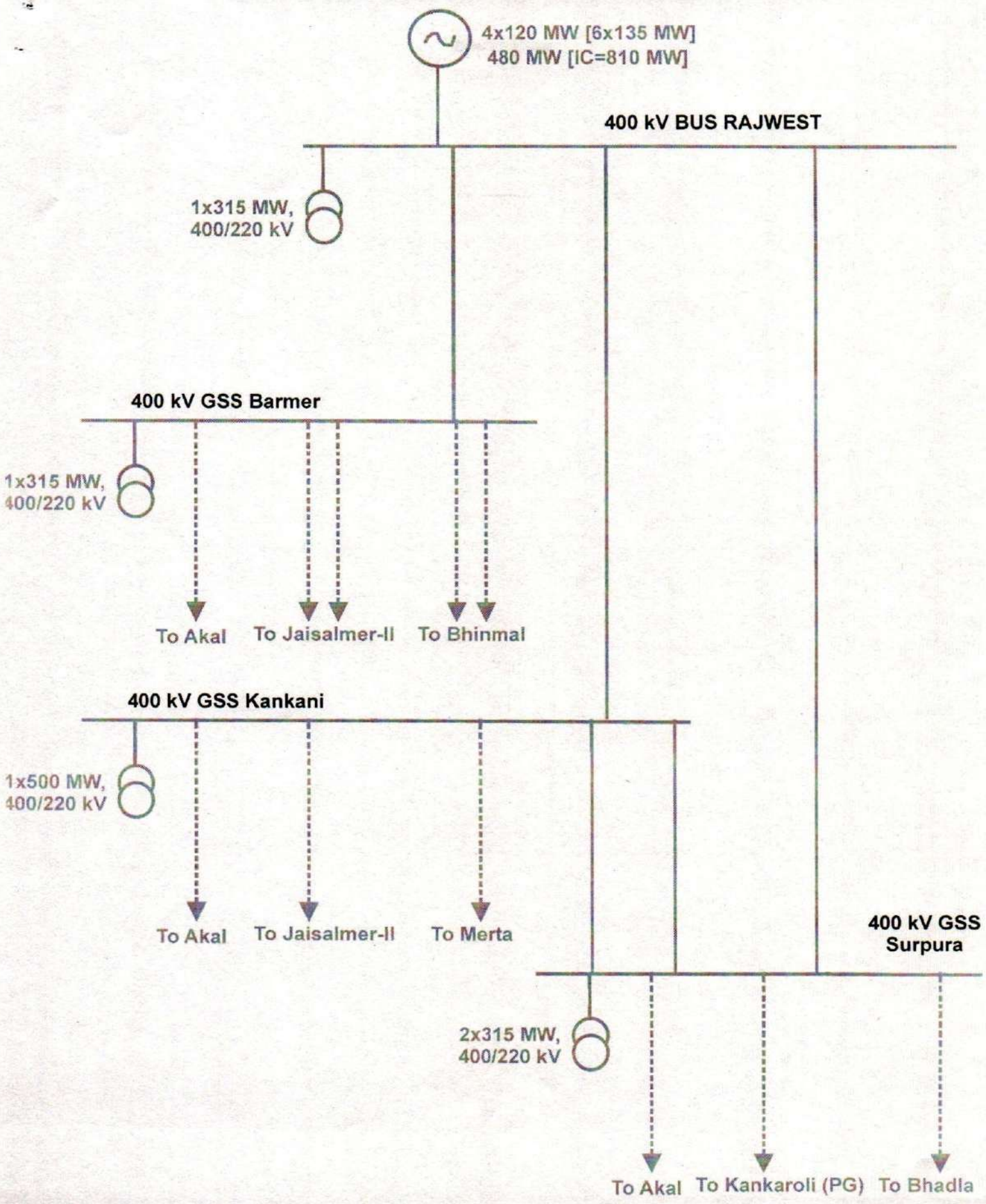
Load on GSS considered in Islanding Scheme for Rajwest TPS					
S. No.	Name of GSS	Maximum Load (MW)	Simultaneous Load (MW)	Minimum Load (MW)	Essential Loads
A	**Load in Barmer**				
1	400 kV GSS Barmer	11.54	5.00	4.00	Defennce
2	132 kV GSS Gadra Road	30.32	19.00	0.474	Defence
3	132 kV GSS Barmer	44.44	35.00	12.88	Defence
4	132 kV GSS Mahloo	34.18	18.00	9.91	
	Load at Barmer	**120.48**	**77.00**	**27.26**	
5	220 kV GSS Dhaurimanna	59.64	43.00	0.47	Defence
7	132 kV GSS Ramji ki Gol	19.82	12.00	8.06	
8	132 kV GSS Gudamalani	23.03	22.00	10.73	RGD
	Load at Dhaurimanna	**102.49**	**77.00**	**23.16**	
11	220 kV GSS Balotra	64.84	37.00	0.7	
13	132 kV GSS Samdari	16.97	13.00	0.23	
14	132 kV GSS Siwana	24.66	17.00	2.25	
	Load at Balotra	**106.47**	**67.00**	**3.18**	
	Total load in Barmer (A)	**329.44**	**221.00**	**57.704**	
B	**Load in Jodhpur**				
1	220 kV GSS Boranada	52.00	35.00	0.98	
2	220 kV GSS Jodhpur	65.00	57.00	1.00	
3	220 kV GSS Barli	24.00	0.00	0.94	
4	220 kV GSS Jhalamand	13.17	1.00	0.22	
5	132 kV GSS NPH (Jodhpur)	64.00	73.00	15.00	Air Force, AIIMS, MGH, MDMH
6	132 kV GSS MBM Engineering College	19.58	19.00	1.89	DRDO. Airport
7	132 kV GSS OPH (Jodhpur)	43.00	29.00	2.00	Railway through DISCOM's 33/11 kV GSS
8	132 kV GSS Banar	72.00	52.00	44.00	Defence
9	132 kV GSS Kuri Bhagtasani	30.86	23.00	1.60	
10	132 kV GSS Mandore	32.00	12.00	8.00	Defence, DRDO
11	132 kV GSS Pratapnagar (Jodhpur)	38.00	32.00	3.00	
12	132 kV GSS Chopasani Housing Board	67.28	45.00	6.43	MDM Hospital
13	132 kV GSS PS8	4.50	1.00	0.02	
14	132 kV GSS Soorsagar	35.42	29.00	1.33	Defence
	Total load in Barmer (B)	**560.81**	**408.00**	**86.41**	
	Total load in Barmer & Jodhpur (A+B)	**890.25**	**629.00**	**144.11**	
C	**Additional Load**				
6	132 kV GSS Ranasar	22.13	18.00	0.68	
9	132 kV GSS Sawa	42.34	27.00	8.5	
10	132 kV GSS Chouhtan	19.06	12.00	3.9	
12	132 kV GSS Sindhari	22.29	15.00	4.1	
	Total additional Load (C.)	**105.82**	**72.00**	**17.18**	
	Total Load (A+B+C)	**996.07**	**701.00**	**161.29**	

Annexure-B

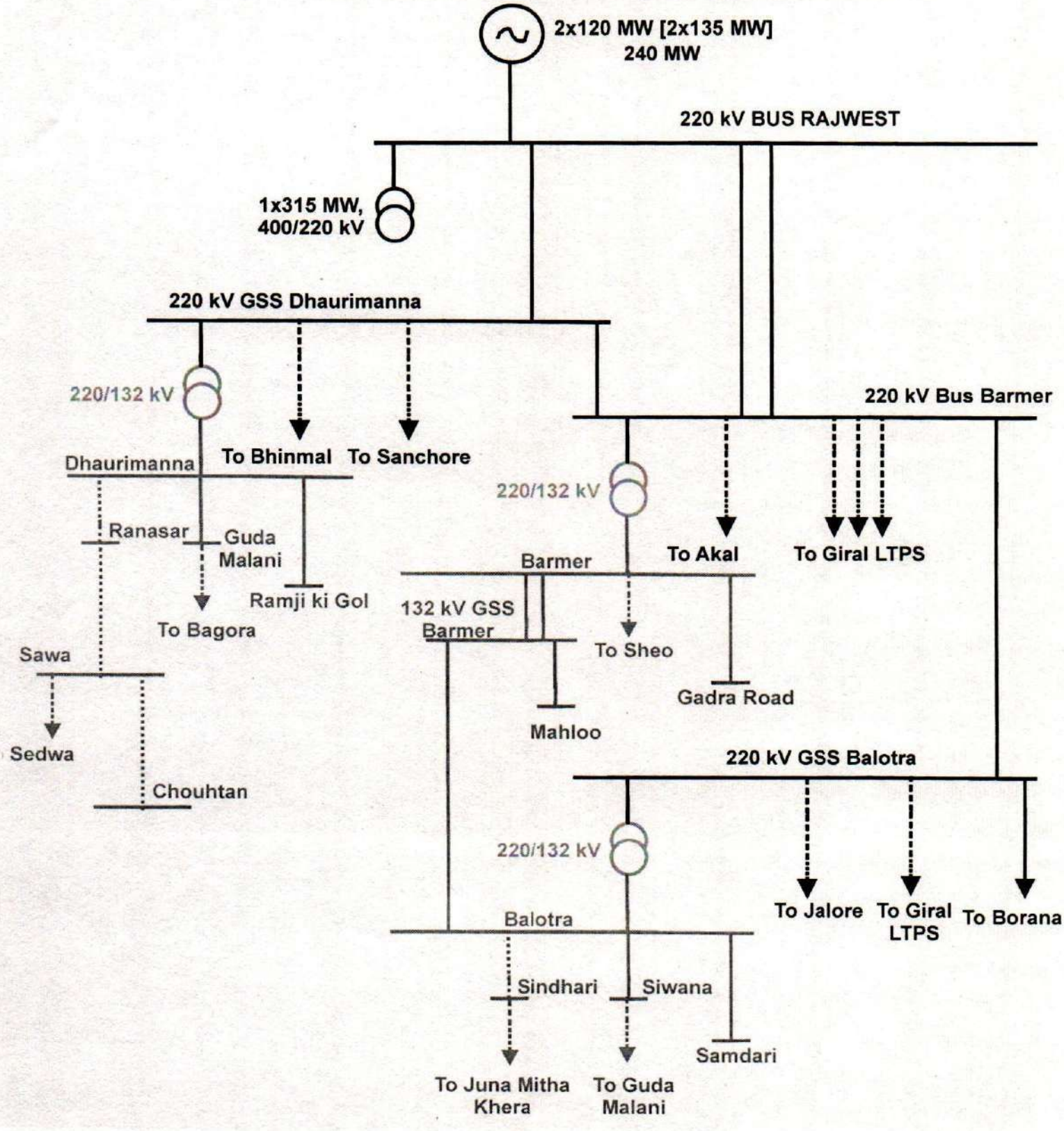
	Transmission Lines and Status of Under Frequency Relays for Rajwest Islanding Scheme	
S. No.	**Name of Line**	**Status**
1	400 kV S/C Rajwest-Barmer line	Blocked
2	400 kV S/C Rajwest-Jodhour (Surpura) line	Blocked
3	400 kV S/C Rajwest-Kanknai (Jodpur) line	Blocked
4	220 kV D/C Rajwest-Barmer line	Blocked
5	220 kV S/C Rajwest-Dhaurimana line	Blocked
6	400 kV D/C Barmer-Jaisalmer-II line	Operative
7	400 kV S/C Barmer-Jaisalmer-I (Akal) line	Operative
8	400 kV D/C Barmer-Bhinmal line	Operative
9	220 kV S/C Barmer-Dhaurimana line	Blocked
10	220 kV D/C Barmer-Giral LTPS line	Operative
11	220 kV S/C Barmer-Giral LTPS line	Operative
12	220 kV S/C Barmer-Jaisalmer-I (Akal) line	Operative
13	220 kV S/C Barmer-Balotra line	Blocked
14	220 kV D/C Giral LTPS-Balotra line	Operative
15	132 kV S/C Barmer (400 kV GSS)-Gadra Road line	Blocked
16	132 kV S/C Barmer (400 kV GSS)-Barmer line Ckt-I	Blocked
17	132 kV S/C Barmer (400 kV GSS)-Barmer line Ckt-II	Blocked
18	132 kV S/C Barmer (400 kV GSS)-Sheo line	Operative
19	132 kV S/C Barmer(132 kV GSS)-Balotra line	Blocked
20	132 kV S/C Barmer(132 kV GSS)-Mahloo line	Blocked
21	220 kV S/C Dhaurimanna-Sanchore line	Blocked/Operative
22	220 kV S/C Dhaurimanna-Bhinmal line	Operative
23	132 kV S/C Dhaurimanna-Ranasar line	Operative
24	132 kV S/C Dhaurimanna-Ramji ki Gol line	Blocked
25	132 kV S/C Dhaurimanna-Gudamalani line	Blocked
26	132 kV S/C Gudamalani-Bagora line	Operative
27	220 kV S/C Balotra-Jalore line	Operative
28	220 kV S/C Balotra-Boranada line	Blocked
29	132 kV S/C Balotra-Samdari line	Blocked
30	132 kV S/C Balotra-Siwana line	Blocked
31	132 kV S/C Balotra-Sindhari line	Blocked
32	132 kV S/C Siwana-Mandawala line	Operative
33	132 kV S/C Sindhari-Juna Mitha Khera line	Operative
34	400 kV S/C Jodhpur (Surpura)-Bhadla line	Operative
35	400 kV S/C Jodhpur (Surpura)-Akal line	Operative
36	400 kV S/C Jodhpur (Surpura)-Kankroli line	Operative
37	400 kV S/C Jodhpur (Surpura)-Kankani line Ckt-I	Blocked
38	400 kV S/C Jodhpur (Surpura)-Kankani line Ckt-I	Blocked
39	220 kV D/C Jodhpur (Surpura)-Bhawad line	Operative
40	220 kV 2xS/C Jodhpur (Surpura)-Tinwari line	Operative
41	220 kV S/C Jodhpur (Surpura)-Bilara line	Operative
42	220 kV S/C Jodhpur (Surpura)-Barli line	Blocked

43	132 kV S/C Madore (Surpura)-Banar line	Blocked
44	132 kV D/C Banar-OPH line	Blocked
45	132 kV S/C OPH-MBM Engineering college line	Opened
46	132 kV D/C MBM Engineering college-NPH line	Blocked
47	132 kV D/C NPH-Jodhpur (Basni) line	Blocked
48	132 kV S/C Jodhpur (Basni)-Kuri line	Blocked
49	132 kV S/C Kuri-Banar line	Blocked
50	132 kV S/C Mandore-Mathania line	Operative
51	220 kV S/C Jodhpur (Basni)-Barli line	Blocked
52	220 kV S/C Jodhpur (Basni)-Boranada line	Blocked
53	220 kV S/C Jodhpur (Basni)-Jhalamand line	Blocked
54	220 kV S/C Jodhpur (Basni)-Kankani line	Blocked
55	132 kV D/C Jodhpur (Basni)-CHB line	Blocked
56	132 kV S/C Jodhpur (Basni)-Bhawad line	Operative
57	132 kV S/C Jodhpur (Basni)-Jhalamand line	Blocked
58	132 kV S/C Jodhpur (Basni)-Boranada line	Blocked
59	132 kV S/C Boranada-Pali line	Operative
60	220 kV D/C Jhalamand-Kankani line	Blocked
61	132 kV S/C Jhalamand-Bilara line	Operative
62	220 kV D/C Barli-Kankani line	Blocked
63	132 kV S/C Barli-PS8 line	Blocked
64	132 kV D/C Barli-CHB line	Blocked
65	132 kV D/C CHB-Pratap Nagar line	Blocked
66	132 kV S/C Barli-Soorsagar line	Blocked
67	132 kV S/C Soorsagar-Tinwari line	Operative
68	132 kV S/C PS8-Tinwari line	Operative
69	400 kV S/C Kankani-Merta line	Operative
70	400 kV S/C Kankani- Akal line	Operative
71	400 kV S/C Kankani- Jaisalmer-II line	Operative
72	220 kV S/C Kankani- Pali line	Operative
73	132 kV Sawa-Sedwa line	Operative
74	132 kV Sawa-Chouhtan line	Blocked
Additional lines proposed for installation of UFRs for load management		
75	220 kV S/C Sanchore-Bhinmal (PG) line	Blocked/Operative
76	132 kV S/C Sedwa-Sata line	Blocked/Operative
77	132 kV S/C Sata-Galifa line	Blocked/Operative
78	132 kV S/C Sata-Sanchore line	Blocked/Operative
79	132 kV S/C Sanchore-Paladar line	Blocked/Operative
80	132 kV S/C Sanchore (220 kV GSS)-Sanchore (132 kV GSS) line	Blocked/Operative
81	132 kV S/C Sanchore (220 kV GSS)-Bhadroona line	Blocked/Operative
82	132 kV S/C Bhadroona-Bhinmal line	Blocked/Operative
83	132 kV S/C Dhaurimanna-Bagora line	Blocked/Operative
84	132 kV S/C Bagora-Jeran line	Blocked/Operative
85	132 kV S/C Ranasar-Sawa line	Blocked/Operative
86	132 kV S/C Sawa-Sedwa line	Blocked/Operative
87	132 kV S/C Sawa-Chouhtan line	Blocked/Operative

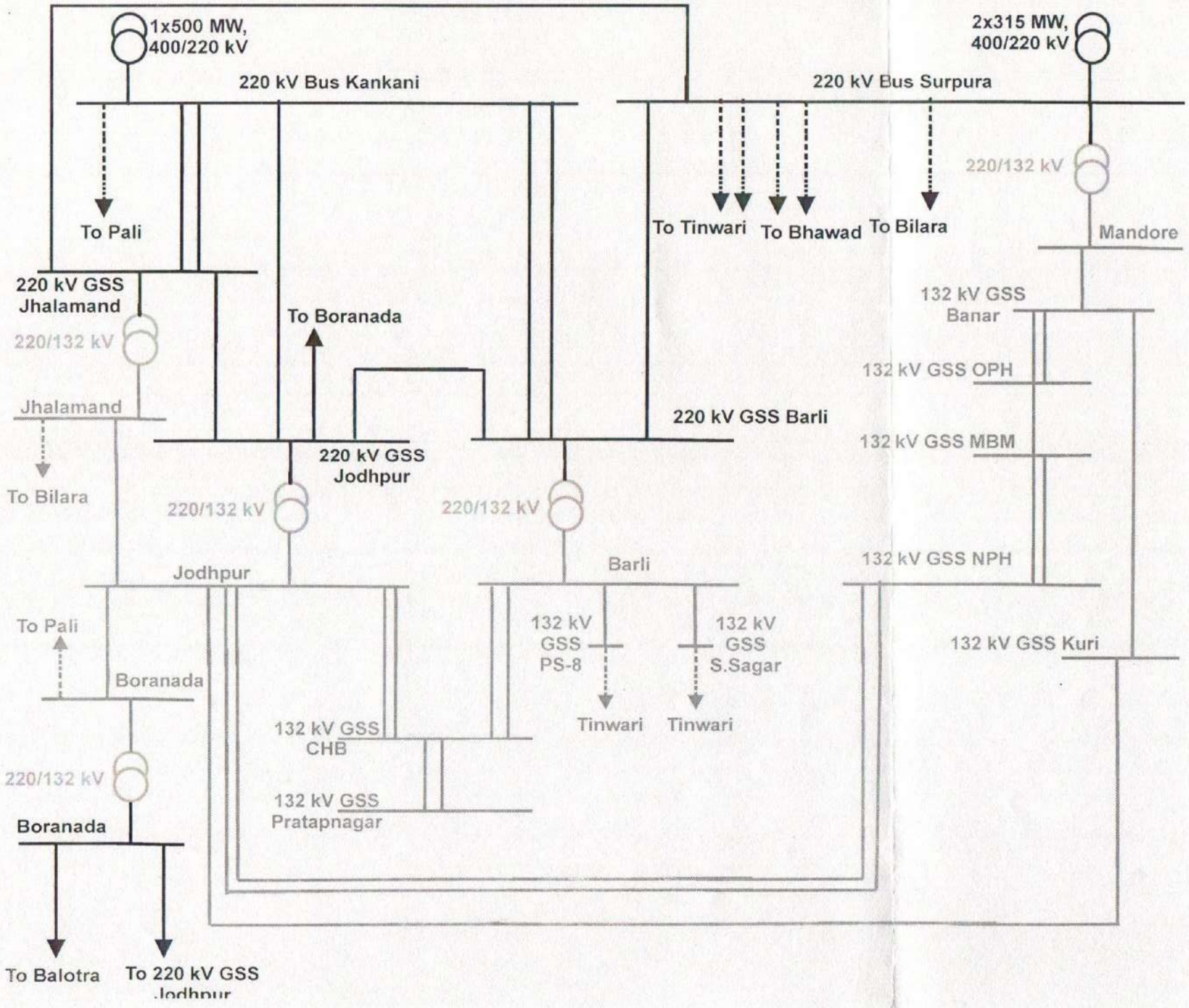
400 kV Network Included in Rajwest Island



220 kV Network Included in Rajwest Island



220 kV Network included in Rajwest Island (Jodhpur City)



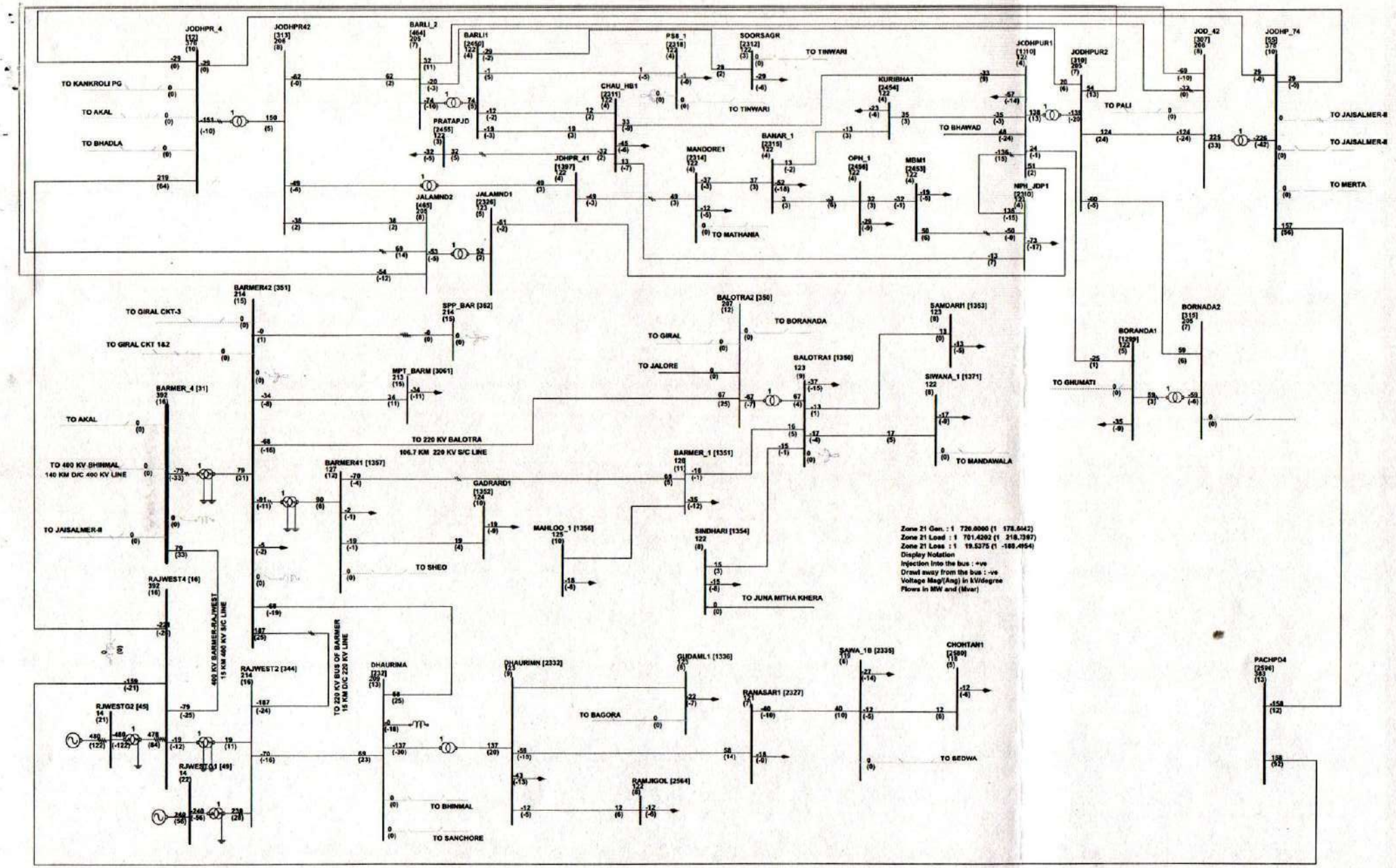
ANNEXURE-F

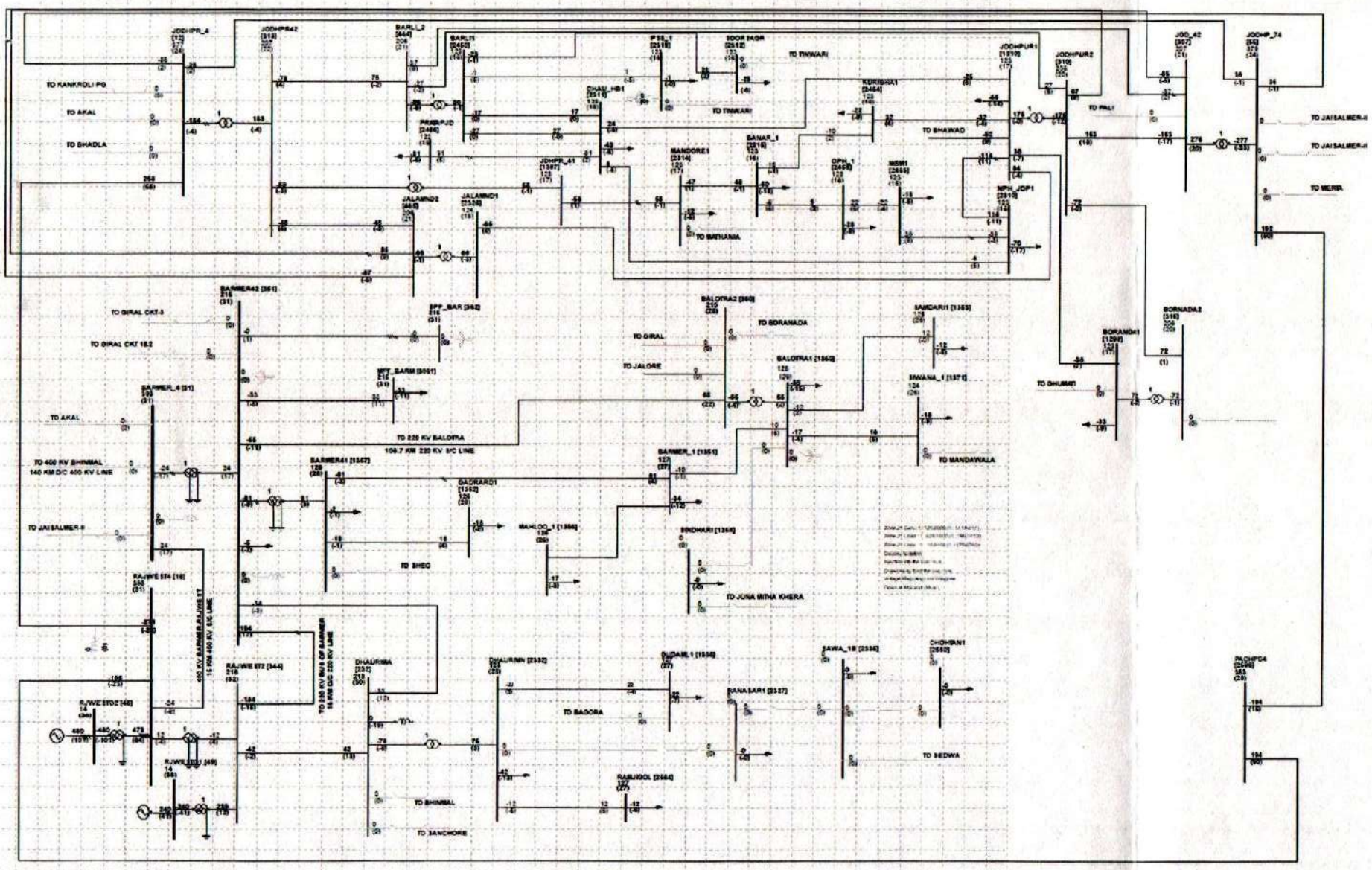
List of Dedicated Feeders of Open Access Consumers/RE Generators to be tripped at 48.20HZ for STPS Island

S. No.	Name of GSS	Name of Feeder	Quantum of Load
1	132 kV GSS Mandore	33KV O/G Jodhpur Alloy	Feeder DC since 12.07.2022
2	132 kV GSS PS8	132 KV O/G ENERCON	350 A, 70-72 MW

Note:

1. Dedicated feeders for open access consumers are to be kept operative at frequency of 48.0 Hz.
2. All RE feeders are to be tripped at 48.0 Hz.


JODHPR_4
JODHPR42
BARLI_2
BARLI1
PS8_1
SOORSAGR
TO TINWARI
JODHPUR1
JODHPUR2
JOD_42
JODHP_74
TO KANKROLI PG
TO AKAL
TO BHADLA
TO JAISALMER-II
TO JAISALMER-II
TO MERTA
TO PALI
KURIBHA1
TO BHAWAD
CHAU_HS1
PRATAPJD
JODHPR_41
MANDORE1
BANAR_1
OPH_1
MBM1
NPH_JDP1
JALAMND2
JALAMND1
TO MATHANIA
BARMER42 [351]
SPP_BAR [352]
TO GIRAL CKT-3
TO GIRAL CKT 1&2
BALOTRA2 [350]
TO BORANADA
TO GIRAL
TO JALORE
SAMDARI [1353]
BORANDA1
BORNADA2
BALOTRA1 [1350]
SIWANA_1 [1371]
TO GHUMATI
MPT_BARM [3061]
BARMER_4 [31]
TO AKAL
TO 220 KV BALOTRA
106.7 KM 220 KV S/C LINE
TO 400 KV BHINMAL
140 KM D/C 400 KV LINE
BARMER41 [1357]
GADRARD1
BARMER_1 [1351]
TO MANDAWALA
TO JAISALMER-II
MAHLOO_1 [1356]
SINDHARI [1354]
TO SHEO
TO JUNA MITHA KHERA
RAJWEST4 [10]
400 KV BARMER-RAJWEST
15 KM 400 KV S/C LINE
RAJWEST2 [344]
TO 220 KV BUS OF BARMER
15 KM D/C 220 KV LINE
DHAURIMA
DHAURIMN [2332]
GUDAML1 [1336]
SAINA_1B [2335]
CHOHTAN1
PACHPD4
TO BAGORA
RANASAR1 [2327]
TO SEDWA
RJWESTG2 [45]
RJWESTG1 [49]
TO BHINMAL
TO SANCHORE
RAMJIGOL [2564]
Zone 21 Gen. : 1 720.8000 (1 178.6442)
Zone 21 Load : 1 701.4202 (1 216.7397)
Zone 21 Loss : 1 19.5375 (1 -168.4954)
Display Notation
Injection into the bus : +ve
Drawl away from the bus : -ve
Voltage Mag/(Ang) in kV/degree
Flows in MW and (Mvar)


TO KANKROLI PG
TO AKAL
TO BHADLA
TO TINWARI
TO BHAWAD
TO PALI
TO JAISALMER-II
TO MERTA
TO BATHANDA
TO GIRAL CKT-1
TO GIRAL CKT-2
TO BORANADA
TO GIRAL
TO JALORE
TO BHUMAT
TO 220 KV BALOTRA
109.7 KM 220 KV S/C LINE
TO 400 KV BHINMAL
140 KM D/C 400 KV LINE
TO MANDAWALA
TO SHEO
TO JUNA MITHA KHERA
TO BAGORA
TO BHINMAL
TO SANCHORE
TO NEDWA
400 KV BARMER-RAJWEST
15 KM 400 KV S/C LINE
TO 220 KV BUS OF BARMER
15 KM D/C 220 KV LINE

PROPOSED ISLANDING SCHEME FOR SURATGARH SUPERCRITICAL POWER PLANT

A. Generation Details

1. The installed capacity (IC) of generators at Suratgarh Super-critical TPS is 2x660 MW (Units 7 &8) i.e. 1320 MW. Each unit gives a net dispatch of **617 MW (Installed Capacity -Auxiliary consumption).**
2. Islanding scheme is designed considering only one unit of 660 MW (Unit #7) and the available generation would be 617 MW.

B. Transmission System at Suratgarh Super Critical TPS (2x660 MW) & Suratgarh TPS (6x250 MW)

I:- Suratgarh SCTPS has following 400 kV System

- 400 kV D/C Suratgarh SCTPS-Suratgarh TPS line (2 km)
- 400 kV D/C Suratgarh SCTPS-Bikaner Line (170 km)

II:- Suratgarh TPS has following 400 kV & 220 kV System

- 400 kV 2xS/C STPS-Ratangarh line (144 km)
- 400 kV S/C STPS-Bikaner line (170 km)
- 2x315 MVA, 400/220 kV ICT at STPS
- 220 kV S/C STPS-Rawatsar line (66.16 km)
- 220 kV S/C STPS-Halasar line (97.4 km)
- 220 kV D/C STPS-Suratgarh (220 kV GSS) line (25km)
- 220 kV S/C STPS-Bhadra line (115.62 km)
- 220 kV S/C STPS-Udyogvihar line (97km)

C. Load Details

The identified load around Suratgarh SCTPS is 600 MW which is placed at **Annexure-A** and detailed below:-

- 220 kV GSS Suratgarh (**190 MW**)
- 220 kV GSS Rawatsar **(68 MW)**
- 220 kV GSS Bhadra (**92 MW**)
- 220 kV GSS Padampur **(57 MW)**
- 220 kV GSS Hanumangarh (**77 MW**)
- 220 kV GSS Udyogvihar (**123 MW**)

The identified load considering 90% of total load is 550MW which is placed at **Annexure-A1.** General condition of islanding is considered for the total system of 550MW which is 90% (approx.) of the maximum capacity of generation unit considered for island. In this case 27MW of load is considered at the 220 kV GSS Hanumangarh.

Further, Seasonal variations of load are high in the region. In the summer season (April-August), the maximum load of approximately 725 MW is observed in the region due to high agriculture load and minimum load is observed in the winter season (December-January) which is approximately 300 MW. Hence, islanding scheme is designed to have some of the transmission lines in both operative/blocked mode so that SLDC, Rajasthan can monitor and decide upon mode of the lines so as to match the load with generation in the island.

The critical loads viz. defence, Railways, IGNP & PHED of **52.40 MW** are being fed from the following GSS which would be included in the island:-

- 132 kV GSS Sadulpur (Rajgarh) (**7.98 MW**)
- 220 KV GSS Udyogvihar (Sri Ganganagar) (**4 MW**)
- 132 KV GSS Sri Ganganagar (**3.5 MW**)
- 220 KV GSS Padampur (**0.4 MW**)
- 132 KV GSS Raisinghnagar (**1 MW**)
- 132 KV GSS Srikaranpur (**0.4 MW**)
- 132 KV GSS Kaminpura (**0.4 MW**)
- 220 KV GSS Suratgarh (**9.6 MW**)
- 132 KV GSS Rajiasar (**11 MW**)
- 132 KV GSS Pallu (**0.3 MW**)
- 132 KV GSS Jokhasar (**13.82 MW**)

D. Proposed Islanding Scheme

1. All generating units at Suratgarth TPS and Suratgarth SCTPS except unit #7 of rated capacity 660 MW are to be tripped at 48.0 Hz.
2. No RE Power Projects have been considered in the island. All RE generators are to be tripped at 48.0 Hz.
3. All dedicated feeders for critical loads viz. Defence, DRDO, railway etc. are to be kept in blocked mode even if these are open access consumers. Dedicated feeders for rest of open access consumers are to be kept operative at frequency of 48.0 Hz. List of the identified feeders is placed at **Annexure-D.**
4. Islanding shall take place at 47.90 Hz instantaneous i.e. all identified feeders to form island will be tripped at this frequency.
5. Blocked and operative status of all transmission lines of 400 kV, 220 kV and 132 kV voltage levels considered for the islanding are at **Annexure-B.** During the condition of light loads, the load-generation balance is to be maintained by changing the blocked/operative status of the additional lines which have also been identified to include additional GSS in the island.
6. A single line diagram of 400 kV network, 220 kV & 132 kV network is at **Annexure-C.**

E. Results of Load Flow Study

A load flow study is carried out considering the blocked and operative status of line included in **Annexure-B** as per SLD diagram indicated in **Annexure-C** for a total load of 600 MW and 550MW. Power flow plot of the network included in the island considering load of 600MW is placed at **Exhibit-1**. The results of load flow study indicate the following load-generation balance for system load of 600MW:-

Generation	=	617.1 MW
Load	=	600.3 MW
Losses	=	16.8 MW

Similarly, the results of load flow study indicate the following load-generation balance for system **load of 550 MW (90% of the generation unit):-**

Generation	=	567.6645 MW
Load	=	553.9511 MW
Losses	=	13.7134 MW

A snapshot of the load flow results for load of 550MW is placed at Exhibit-2. It is observed that loading on all the lines and transformers included in the island of Suratgarh SCTPS is normal and overloading is not observed.

F. Results of Transient Stability Studies

Transient stability study is carried for the network included in the island of Supercritical Suratgarh thermal power station by opening all the lines which are kept in the operative state at time=1 second after the start of simulation. Various plots are discussed below:-

1. Active Power Curve

Plots of the mechanical power input to the 1x660 MW generator at Suratgarh SCTPS and electrical power generated by this generator are illustrated in Fig. 1. It is observed that variation in the input mechanical power is minimum and limited to 5 MW. Further, the generated active power varies between 556 MW to 675 MW against the rated value of 617 MW (Excluding the auxiliary power). Variations in the generated active power are settling after a time period of 20 seconds and island becomes stable.

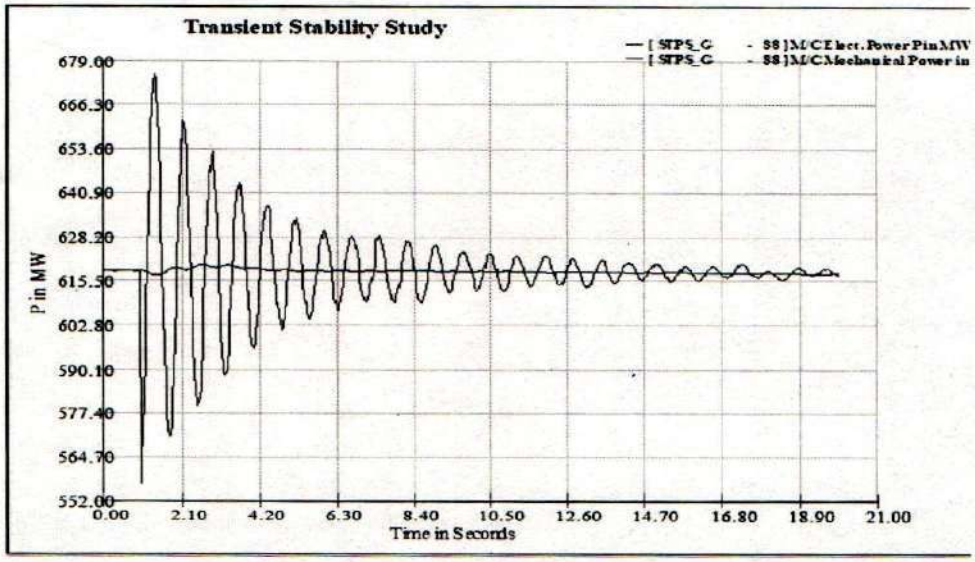


Fig. 1 Active power curve of SC-STPS generator

2. Reactive Power Curve

Reactive power plot of 1x660 MW generator at SC-STPS is described in Fig. 2. Before the initiation of islanding event the reactive power exchanged between the generator and grid was -110 MVAR which settles to a value of -15 MVAR after a time period of 6 seconds. However, maximum deviations are up to +5.0 MVAR. This indicates that reactive power settles down and island becomes stable.

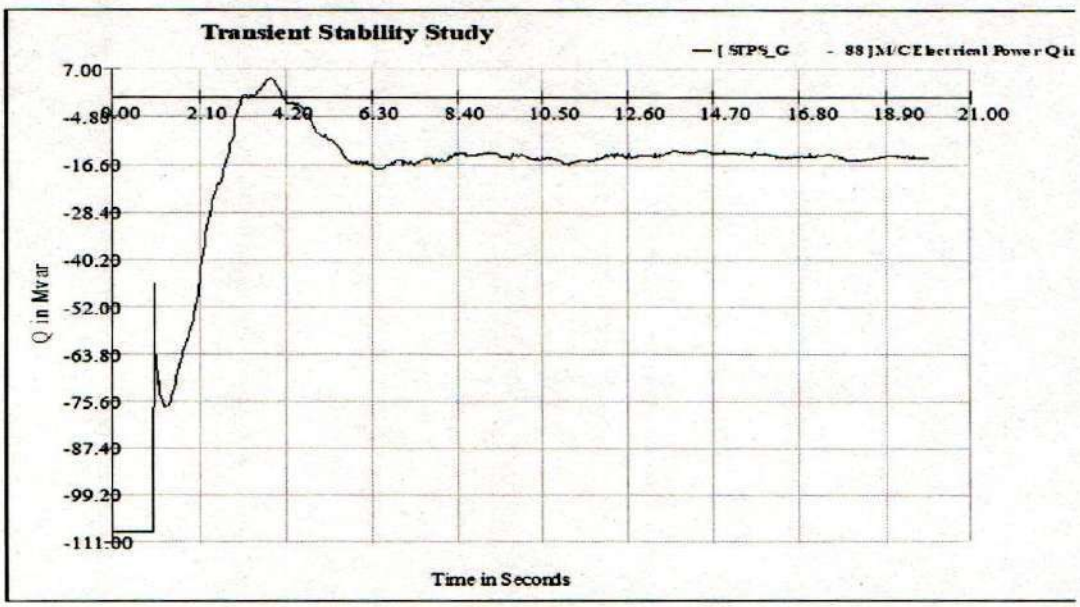


Fig. 2 Reactive Power variations during islanding condition

3. Load Angle Curve

The load angle curve of the 1x660 MW generator at SC-STPS is illustrated in Fig. 3. Load angle increases from 7° to new value after the island formation. The transients associated with the load angle curve settles down after a time period of 10

seconds. Hence, network included in the island of SC-STPS will operate at a new load angle in stable state.

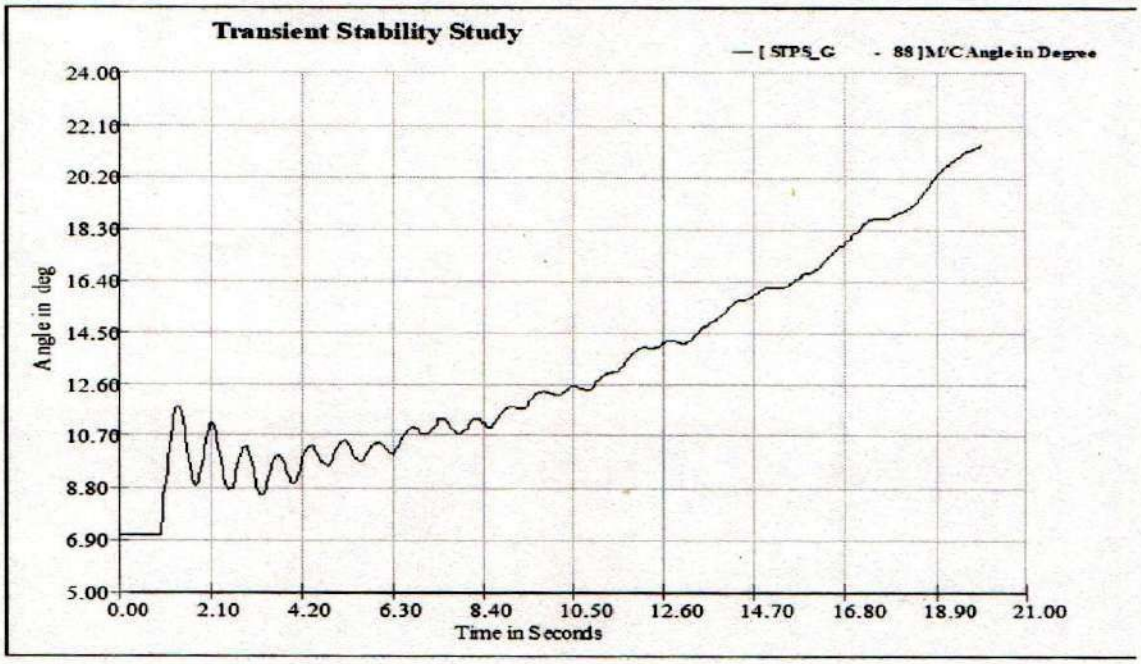


Fig. 3 Load angle curve

4. Frequency Plot

Plot of grid frequency is illustrated in Fig. 4. It is observed that grid frequency varies between 49.50HZ to 50.5 HZ after the formation of island and finally again settles to the value of 50 HZ in a time period of 10 seconds which indicates that the island will operate in the stable state.

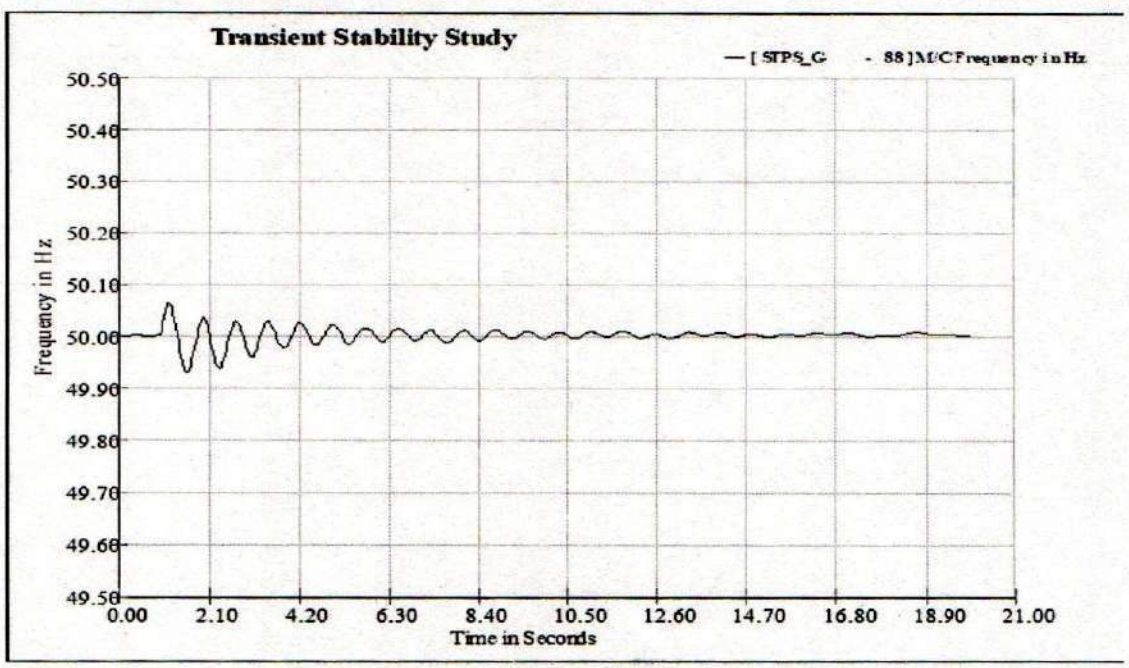


Fig. 4 Variation of frequency during islanding condition

5. Variation of Voltage

Plot of grid voltage at the SC-STPS bus is illustrated in Fig. 5. It is observed that grid voltage 0.97 pu to 1.012 pu and finally again settles at 1.05pu after a time period of 20 seconds. This indicates that the island will operate in the stable state.

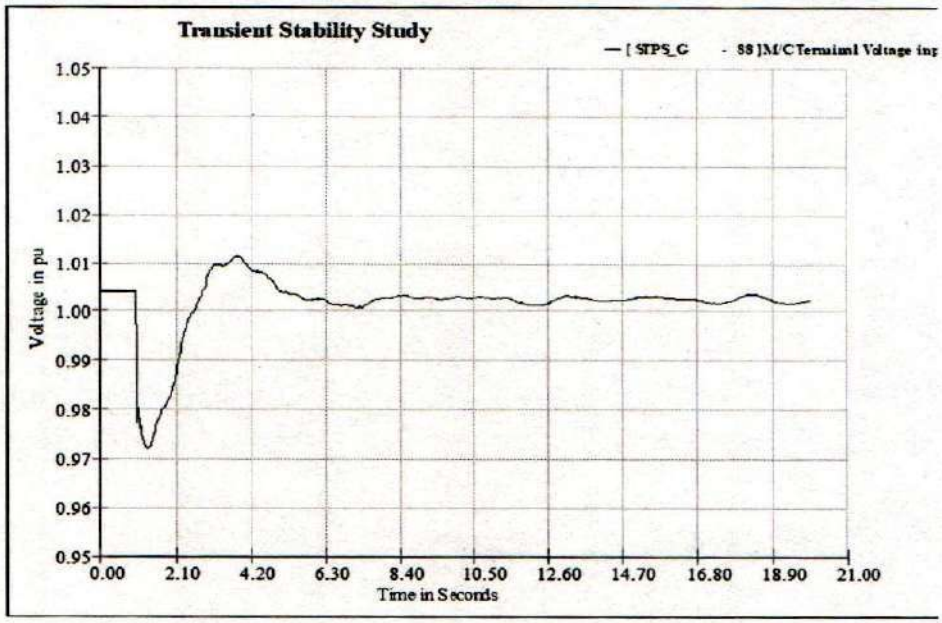


Fig. 5 Voltage variations during islanding condition

G. Conclusion

Proposed islanding is designed after detailed discussion with the field officers and officers from the MPT&S, Communications, Automations and LD. Based on the feedback/inputs of Officers and results of load flow studies & Transient stability studies it is concluded that:

- Results of load flow study indicate that load generation balance can be maintained in the network considered for the island of Suratgarh SC-STPS.
- All the transmission lines included in the island will be equipped with under frequency relays (UFRs) and additional transmission lines are considered for the island to manage the load generation balance for different load scenario considering the large seasonal variations of load in the region.
- Results of transient stability study indicate that network included in the island of Suratgarh SC-STPS becomes stable after incidence of islanding event in respect of voltage variations, frequency variations, load angle variations, active power variations and reactive power variations.
- Proposed islanding scheme can be practically implemented on the transmission network of RVPN considering 1x660 MW machine at Suratgarh SC-STPS. However, continuous monitoring of load-generation balance is required and action to change

status of UFRs from blocked to operative and vice-versa will be needed for load-generation balance.

Annexure-A

Load on GSS considered in Islanding Scheme for STPS

S. No.	Name of GSS	Maximum Load (MW)	Average Load (MW)	Minimum Load (MW)	Essential Loads
1	132 KV GSS Hanumangarh	85	50	21	NIL
2	132 KV GSS Goluwala	22.9	9	4.2	NIL
3	132 KV GSS Amarpura Thedi	52.42	28	9	NIL
4	132 KV GSS Fatehgarh	20.36	11	4.8	NIL
5	132 KV GSS, Rawatsar	30.21	10	7.8	NIL
6	132 KV GSS Tibbi	21.12	11	2	NIL
7	132 KV GSS Sangaria	45.17	22	0.22	NIL
8	132 KV GSS Nohar	49.48	19	29.04	NIL
9	220 KV GSS Bhadra	17.1	6	9	NIL
10	132 KV GSS Bhadra	42	20	14	NIL
11	132 kV GSS Sadulpur (Rajgarh)	49.36	20	9.5	7.98 (PHED)
12	132 kV GSS Taranagar	28.11	8	3.2	NIL
13	220 KV GSS Udyogvihar (Sri Ganganagar)	40	20	12	4 (Defence)
14	132 KV GSS, Sri Ganganagar	89	42	11	3.5 (Defence)
15	132 KV GSS, Sadulshahar	18.11	13	4	NIL
16	220 KV GSS Padampur	30	16	4	0.4 (Defence)
17	132 KV GSS Raisinghnagar	31.36	13	3	1 (Defence)
18	132 KV GSS Srikaranpur	20	9	5	0.4 (Defence)
19	132 KV GSS Kaminpura	15.73	7	3.5	0.4 (Defence)
20	132 KV GSS Tatarsar	4.76	4	1	NIL
21	220 KV GSS Suratgarh	55	28	15	9.6 (Airforce/Defence)
22	132 KV GSS Rajiasar	36.61	16	26.35	11 (IGNP)
23	132 KV GSS Pallu	22.39	7	8	0.3
24	132 KV GSS Jokhasar	13.54	6	6.5	13.82 (IGNP)
25	132 KV GSS, Srivijaynagar	31.84	12	16.7	NIL
26	132 KV GSS, Anoopgarh	29.5	12	14.996	NIL
27	132 KV GSS Ghamurwali	17.29	7	1	NIL
28	132 KV GSS Pilibanga	75.34	28	20	NIL
29	220 kV GSS Ratangarh	26	17	7	NIL
30	132 kV GSS Ratangarh	26.23	14	1.997	NIL
31	132 kV GSS Sardarsahar	67	27	35	NIL
32	132 kV GSS Momasar	62.91	49	0.9	8.0(PHED)
33	132 kV GSS Bhanipura	45.1	19	10	NIL
34	132 kV GSS Patlisar	50.3	20	11	NIL
	Total load (A)	**1271.24**	**600.00**	**331.70**	
	Additional Load For SC-STPS Island				
35	132 kV GSS Bissau	29.31	14	8	NIL
36	132 kV GSS Parsaneu	30.38	15	8.5	NIL
37	132 kV GSS Kitasar	43.6	21	12.8	NIL
38	132 kV GSS Fatehpur	42.4	20	11.9	NIL
39	132 kV GSS Antroli	33.34	17	9.11	NIL
	Total Load (B)	179.03	87	50.31	
	Total Load (A+B)	**1450.27**	**687.00**	**382.01**	

Annexure-A1

Load on GSS considered in Islanding Scheme for STPS

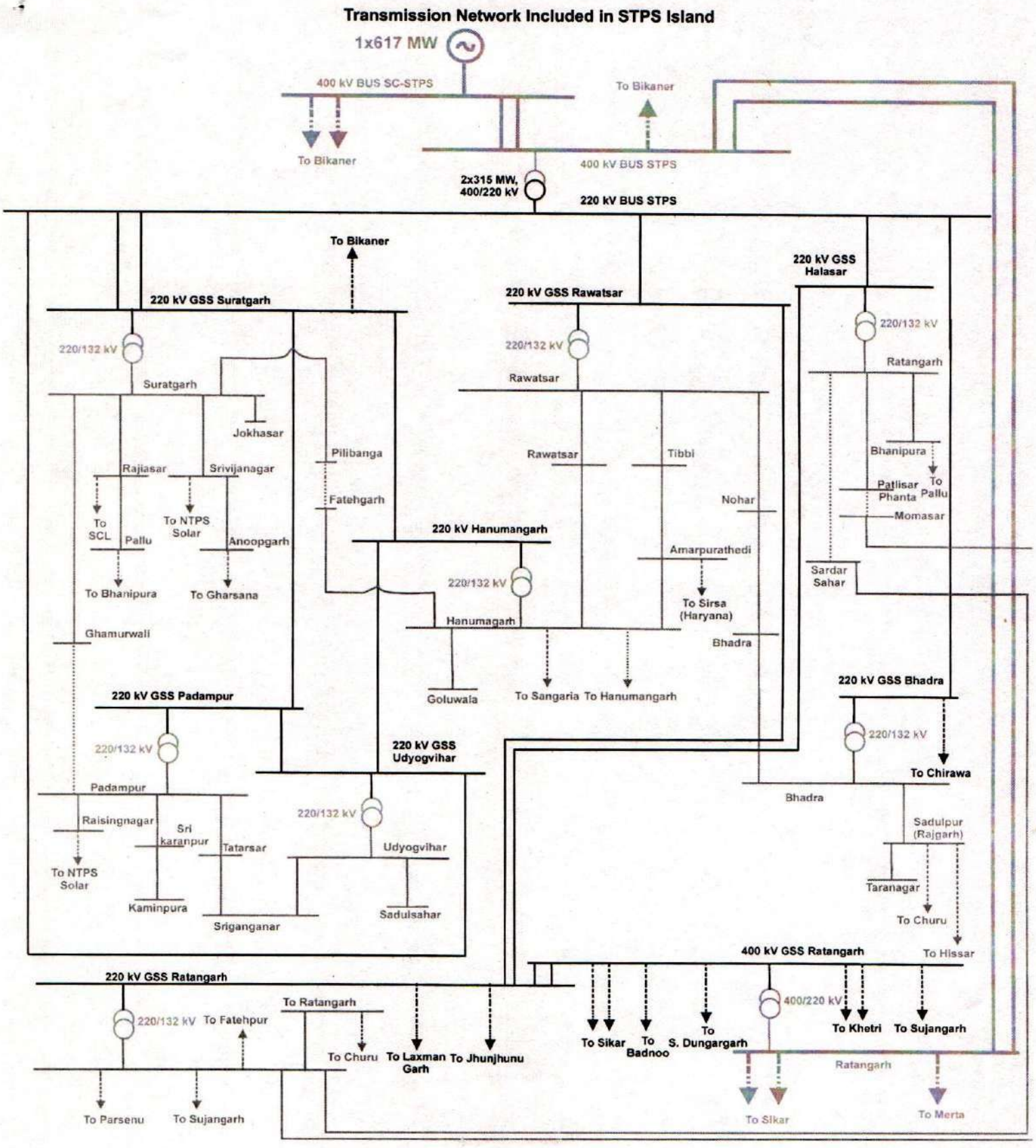
S. No.	Name of GSS	Maximum Load (MW)	Average Load (MW)	Minimum Load (MW)	Essential Loads
1	132 KV GSS Goluwala	22.9	9	4.2	NIL
2	132 KV GSS Amarpura Thedi	52.42	28	9	NIL
3	132 KV GSS Fatehgarh	20.36	11	4.8	NIL
4	132 KV GSS, Rawatsar	30.21	10	7.8	NIL
5	132 KV GSS Tibbi	21.12	11	2	NIL
6	132 KV GSS Sangaria	45.17	22	0.22	NIL
7	132 KV GSS Nohar	49.48	19	29.04	NIL
8	220 KV GSS Bhadra	17.1	6	9	NIL
9	132 KV GSS Bhadra	42	20	14	NIL
10	132 kV GSS Sadulpur (Rajgarh)	49.36	20	9.5	7.98 (PHED)
11	132 kV GSS Taranagar	28.11	8	3.2	NIL
12	220 KV GSS Udyogvihar (Sri Ganganagar)	40	20	12	4 (Defence)
13	132 KV GSS, Sri Ganganagar	89	42	11	3.5 (Defence)
14	132 KV GSS, Sadulshahar	18.11	13	4	NIL
15	220 KV GSS Padampur	30	16	4	0.4 (Defence)
16	132 KV GSS Raisinghnagar	31.36	13	3	1 (Defence)
17	132 KV GSS Srikaranpur	20	9	5	0.4 (Defence)
18	132 KV GSS Kaminpura	15.73	7	3.5	0.4 (Defence)
19	132 KV GSS Tatarsar	4.76	4	1	NIL
20	220 KV GSS Suratgarh	55	28	15	9.6 (Airforce/Defence)
21	132 KV GSS Rajiasar	36.61	16	26.35	11 (IGNP)
22	132 KV GSS Pallu	22.39	7	8	0.3
23	132 KV GSS Jokhasar	13.54	6	6.5	13.82 (IGNP)
24	132 KV GSS, Srivijaynagar	31.84	12	16.7	NIL
25	132 KV GSS, Anoopgarh	29.5	12	14.996	NIL
26	132 KV GSS Ghamurwali	17.29	7	1	NIL
27	132 KV GSS Pilibanga	75.34	28	20	NIL
28	220 kV GSS Ratangarh	26	17	7	NIL
29	132 kV GSS Ratangarh	26.23	14	1.997	NIL
30	132 kV GSS Sardarsahar	67	27	35	NIL
31	132 kV GSS Momasar	62.91	49	0.9	8.0(PHED)
32	132 kV GSS Bhanipura	45.1	19	10	NIL
33	132 kV GSS Patlisar	50.3	20	11	NIL
	Total load (A)	**1186.24**	**550.00**	**310.70**	
	Additional Load For SC-STPS Island				
34	132 kV GSS Bissau	29.31	14	8	NIL
35	132 kV GSS Parsaneu	30.38	15	8.5	NIL
36	132 kV GSS Kitasar	43.6	21	12.8	NIL
37	132 kV GSS Fatehpur	42.4	20	11.9	NIL
38	132 kV GSS Antroli	33.34	17	9.11	NIL
39	132 KV GSS Hanumangarh	85	50	21	NIL
	Total Load (B)	**264.03**	**137**	**71.31**	
	Total Load (A+B)	**1450.27**	**687.00**	**382.01**	

Annexure-B

	Transmission Lines and Status of Under Frequency Relays for Sc-STPS Island	
S. No.	**Name of Line**	**Status**
1	400 kV S/C Suratgarh TPS-Bikaner Line	Operative
2	400 kV D/C Suratgarh SCTPS-Bikaner Line	Operative
3	400 kV D/C SCSTPS-STPS interconnector line	Blocked
4	400 kV D/C Suratgarh TPS-Ratangarh Line	Blocked
5	400 kV S/C Ratangarh-Merta Line	Operative
6	400 kV S/C Ratangarh-Sikar (PG) Line (Line owned by PGCIL)	Operative
7	220 kV S/C STPS-Halsar Line	Blocked
8	220 kV S/C Halsar-Ratangarh Line	Blocked
9	220 kV S/C STPS-Rawatsar Line	Blocked
10	220 kV S/C Rawatsar-Ratangarh Line	Blocked
11	220 kV S/C STPS-Bhadra Line	Blocked
12	220 kV S/C Bhadra-Chirawa Line	Operative
13	220 kV D/C STPS-Suratgarh Line	Blocked
14	220 kV S/C STPS-Udyogvihar Line	Blocked
15	220 kV S/C Suratgarh-Bikaner Line	Operative
16	220 kV S/C Suratgarh-Padampur Line	Blocked
17	220 kV S/C Suratgarh-Hanumangarh Line	Blocked
18	220 kV S/C Hanumangarh-Udyogvihar Line	Blocked
19	220 kV S/C Udyogvihar-Padampur Line	Blocked
20	220 kV D/C Ratangarh (400 kV GSS)-Ratangarh (220 kV GSS) Line	Blocked
21	220 kV D/C Ratangarh (400 kV GSS)-Sikar (PG) Line (RVPN line)	Operative
22	220 kV S/C Ratangarh (400 kV GSS)-Sujangarh Line	Operative
23	220 kV S/C Ratangarh (400 kV GSS)-Sridungargarh Line	Operative
24	220 kV S/C Ratangarh (400 kV GSS)-Badnoo Line	Operative
25	220 kV D/C Ratangarh (400 kV GSS)-Khetri Line	Operative
26	220 kV S/C Ratangarh (220 kV GSS)-Jhunjhunu Line	Operative
27	220 kV S/C Ratangarh (220 kV GSS)-Laxmangarh Line	Operative
28	132 kV S/C Suratgarh-Srivijaynagar Line	Blocked
29	132 kV S/C Srivijaynagar-Anoopgarh Line	Blocked
30	132 kV S/C Anoopgarh-Gharsana Line	Operative
33	132 kV S/C Suratgarh-Rajiasar Line	Blocked
34	132 kV S/C Rajiasar-Pallu Line	Blocked
35	132 kV S/C Pallu-Bhanipura Line	Operative
37	132 kV S/C Suratgarh-Jokhasar Line	Blocked
38	132 kV S/C Suratgarh-Ghamurwali Line	Blocked
39	132 kV S/C Ghamurwali-Padampur Line	Blocked/Operative
40	132 kV S/C Suratgarh-Pilibanga Line	Blocked
41	132 kV S/C Pilibanga-Fatehgarh Line	Blocked/Operative
42	132 kV S/C Fatehgarh-Hanumangarh Line	Blocked
43	132 kV S/C Hanumangarh-Goluwala Line	Blocked
44	132 kV S/C Hanumangarh-Sangaria Line	Operative
45	132 kV S/C Hanumangarh-Amarpura Theri Line	Blocked
46	132 kV S/C Amarpura Their-Tibbi Line	Blocked

47	132 kV S/C Amarpura Their-Sirsa (Haryana) Line	Operative
48	132 kV S/C Hanumangarh (220 kV GSS)-Hanumangarh (132 kV GSS) Line	Blocked
49	132 kV S/C Hanumangarh-Rawatsar (132 kV GSS) Line	Blocked
50	132 kV S/C Udyogvihar-Sadulsahar Line	Blocked
51	132 kV S/C Udyogvihar-Sri-ganganar Line	Blocked
52	132 kV S/C Sri-ganganar-Tatarsar Line	Blocked/Operative
53	132 kV S/C Tatarsar-Padampur Line	Blocked
54	132 kV S/C Padampur-Raisingnagar Line	Blocked
55	132 kV S/C Padampur-Srikaranpur Line	Blocked
56	132 kV S/C Srikaranpur-Kaminpura Line	Blocked
57	132 kV S/C Rawatsar (220 kV GSS)-Rawatsar (132 kV GSS) line	Blocked
58	132 kV S/C Rawatsar (220 kV GSS)-Tibbi line	Blocked
59	132 kV S/C Rawatsar (220 kV GSS)-Nohar line	Blocked
60	132 kV S/C Nohar-Bhadra (132 kV GSS) line	Blocked
61	132 kV S/C Bhadra-Bhadra (220 kV GSS) line	Blocked
62	132 kV S/C Bhadra (220 kV GSS)-Sadulpur (Rajgarh) line	Blocked
63	132 kV S/C Sadulpur (Rajgarh)-Taranagar line	Blocked
64	132 kV S/C Sadulpur (Rajgarh)-Hissar (Haryana) line	Operative
65	132 kV S/C Sadulpur (Rajgarh)-Churu line	Operative
66	132 kV S/C NTPS Solar-Srivijaynagar	Operative
67	132 kV S/C NTPS Solar-Raisinghnagar	Operative
68	132 kV S/C Ratangarh (220 kV GSS)-Ratangarh (132 kV GSS) line	Blocked
69	132 kV S/C Ratangarh (132 kV GSS)-Sujangarh line	Operative
70	132 kV S/C Ratangarh (132 kV GSS)-Fatehpur line	Operative
71	132 kV S/C Ratangarh (132 kV GSS)-Parsenu line	Operative
72	132 kV D/C Patalisar Fanta-Halasar line	Blocked
73	132 kV S/C Sardarsahar-Halasar line	Operative
74	132 kV S/C Ratangarh (220 kV GSS)-Momasar line	Blocked
75	132 kV S/C Ratangarh (220 kV GSS)-Sardarsahar line	Blocked
76	132 kV S/C Halasar-Bhanipura line	Blocked
77	132 kV S/C Ratangarh (132 kV GSS)-Churu line	Operative
78	132 kV S/C Momasar-Patalisar Fanta line	Operative
Additional Lines to Install Under Frequency Relays		
79	132 kV S/C Churu-Bissau line	Blocked/Operative
80	132 kV S/C Gharsana-Khajuwala Line	Blocked/Operative
81	132 kV S/C Bissau-Jhunjhunu line	Blocked/Operative
82	132 kV S/C Parsaneu-Kitasar line	Blocked/Operative
83	132 kV S/C Kitasar-Sridungargarh line	Blocked/Operative
84	132 kV S/C Fatehpur-Antroli line	Blocked/Operative
85	132 kV S/C Antroli-Laxmangarh line	Blocked/Operative

ANNEXURE-C


Transmission Network Included in STPS Island
1x617 MW
400 kV BUS SC-STPS
To Bikaner
To Bikaner
400 kV BUS STPS
2x315 MW, 400/220 kV
220 kV BUS STPS
To Bikaner
220 kV GSS Suratgarh
220/132 kV
Suratgarh
Jokhasar
Rajiasar
Srivijanagar
To SCL
Pallu
To NTPS Solar
Anoopgarh
To Bhanipura
To Gharsana
Ghamurwali
Pilibanga
Fatehgarh
220 kV GSS Rawatsar
220/132 kV
Rawatsar
Rawatsar
Tibbi
Nohar
Amarpurathedi
To Sirsa (Haryana)
220 kV Hanumangarh
220/132 kV
Hanumagarh
Goluwala
To Sangaria
To Hanumangarh
Bhadra
220 kV GSS Halasar
220/132 kV
Ratangarh
Bhanipura
To Pallu
Patlisar Phanta
Momasar
Sardar Sahar
220 kV GSS Padampur
220/132 kV
Padampur
Raisingnagar
Sri karanpur
Tatarsar
To NTPS Solar
Kaminpura
Sriganganar
220 kV GSS Udyogvihar
220/132 kV
Udyogvihar
Sadulsahar
220 kV GSS Bhadra
220/132 kV
To Chirawa
Bhadra
Sadulpur (Rajgarh)
Taranagar
To Churu
To Hissar
400 kV GSS Ratangarh
400/220 kV
To Khetri
To Sujangarh
To Sikar
To Badnoo
To S. Dungargarh
Ratangarh
To Sikar
To Merta
220 kV GSS Ratangarh
220/132 kV
To Fatehpur
To Parsenu
To Sujangarh
To Ratangarh
To Churu
To Laxman Garh
To Jhunjhunu

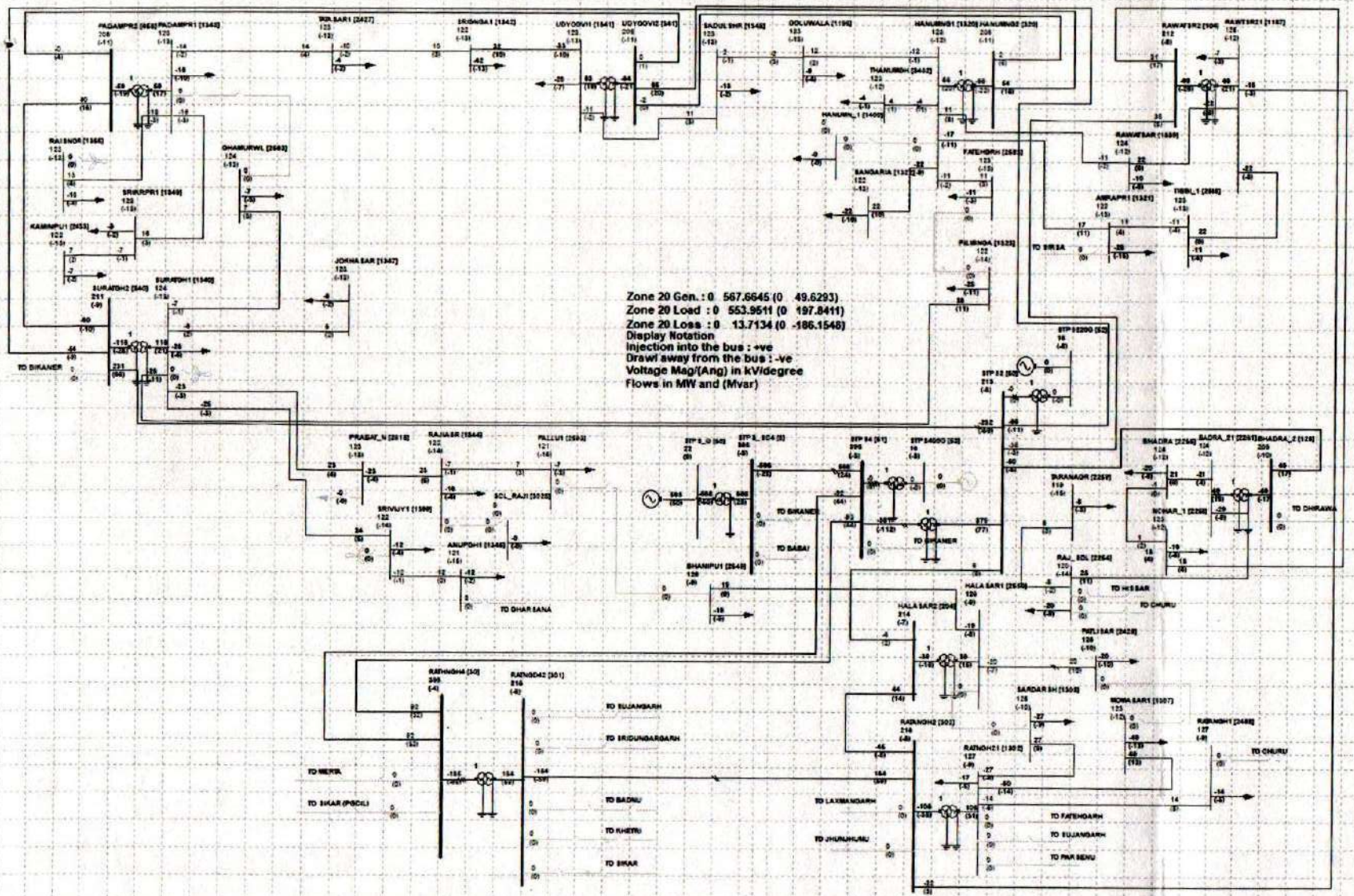
ANNEXURE-D

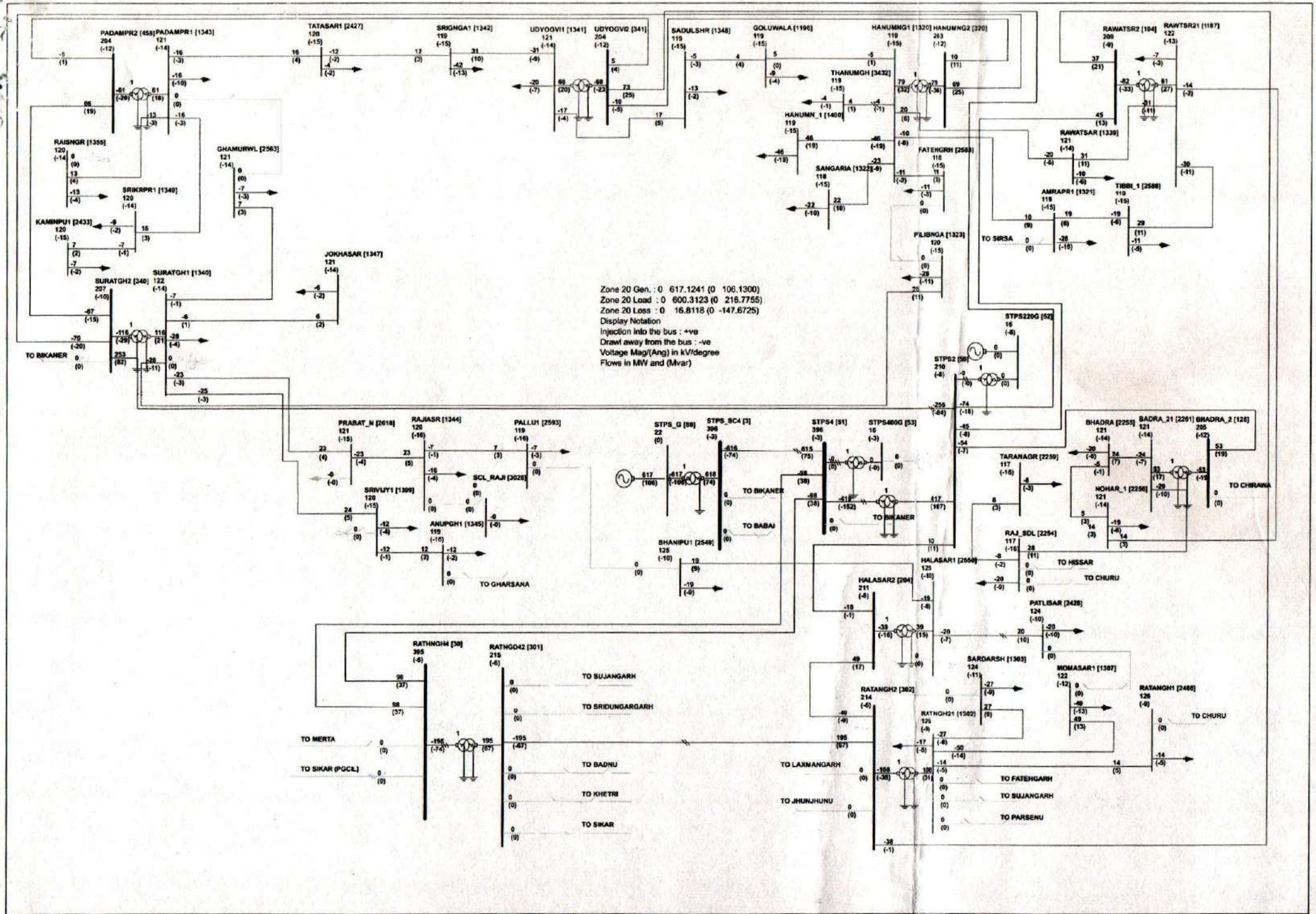
List of Dedicated Feeders of Open Access Consumers/RE Generators to be tripped at 48.20HZ for STPS Island

S. No.	Name of GSS	Name of Feeder	Quantum of Load	Remark
1	132 KV GSS Raisinghnagar	132 KV NTPC Jetsar	80 MW	RE Feeder
2	132KV GSS Sangaria	132KV Sanjog Biomass	10 MW	RE Feeder
3	132 KV GSS Srivijaynagar	132 KV NTPC Srivijaynagar-Jaitsar Solar Line	80 MW	RE Feeder
4	220 KV GSS Padampur	33 KV KPTL	7.8 MW	Open Access Consumer
5	132 KV GSS Kaminpura	33 KV Sugar Mill	4.95 MW	Open Access Consumer
6	132 KV GSS Rajiasar	132 KV Shree Cement Ltd.	21 MW	Open Access Consumer

Note:

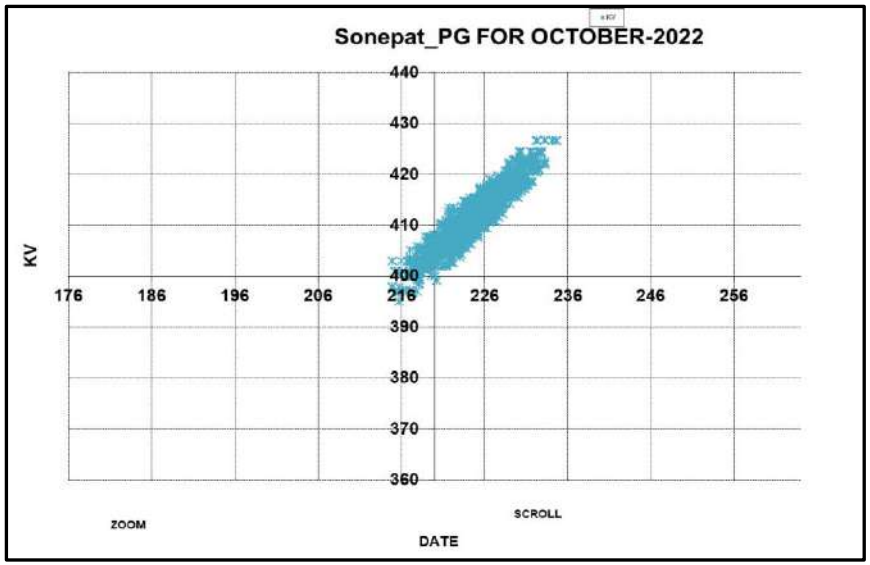
1. Dedicated feeders for open access consumers are to be kept operative at frequency of 48.0 Hz.
2. All RE feeders are to be tripped at 48.0 Hz.

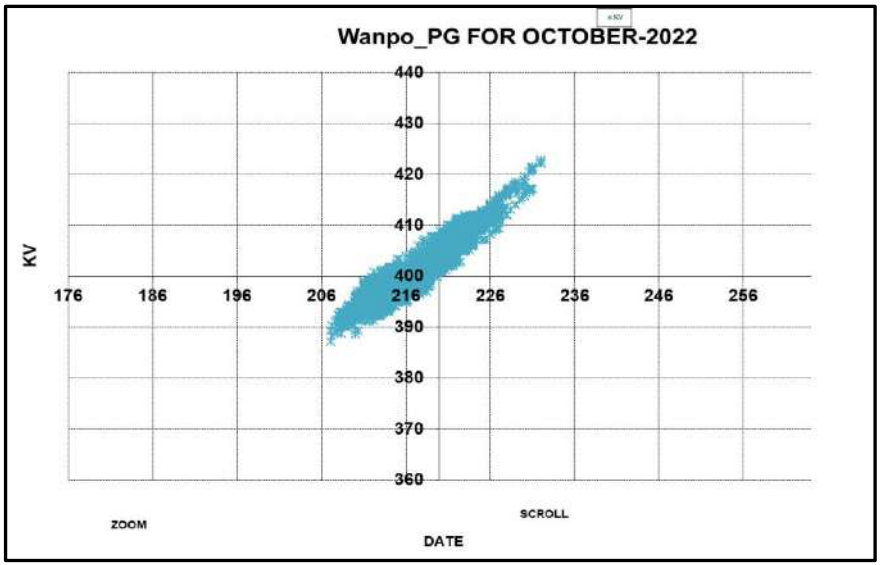

Zone 20 Gen. : 0 567.6645 (0 49.6293)
Zone 20 Load : 0 553.9511 (0 197.8411)
Zone 20 Loss : 0 13.7134 (0 -186.1548)
Display Notation
Injection into the bus : +ve
Drawl away from the bus : -ve
Voltage Mag/(Ang) in kVdegree
Flows in MW and (Mvar)
TO SIKANER
TO DHARSANA
TO BABAI
TO SRISA
TO HISSAR
TO CHURU
TO DHIRAWA
TO SUJANGARH
TO SRIDUNGARGARH
TO MERTA
TO SIKAR (PGCIL)
TO BADNU
TO KHETRI
TO SIKAR
TO LAXMANGARH
TO JHUNJHUNU
TO FATEHGARH
TO SUJANGARH
TO PAR BENU

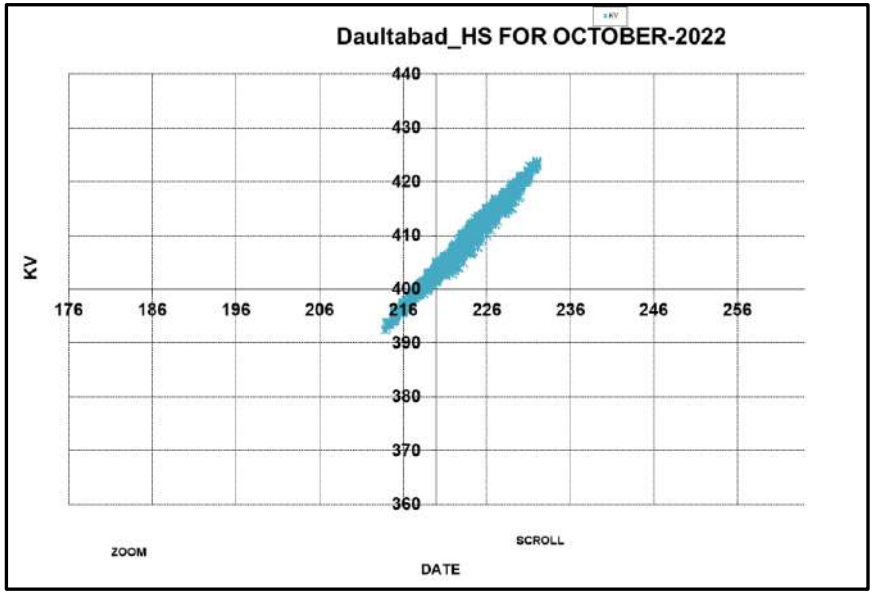


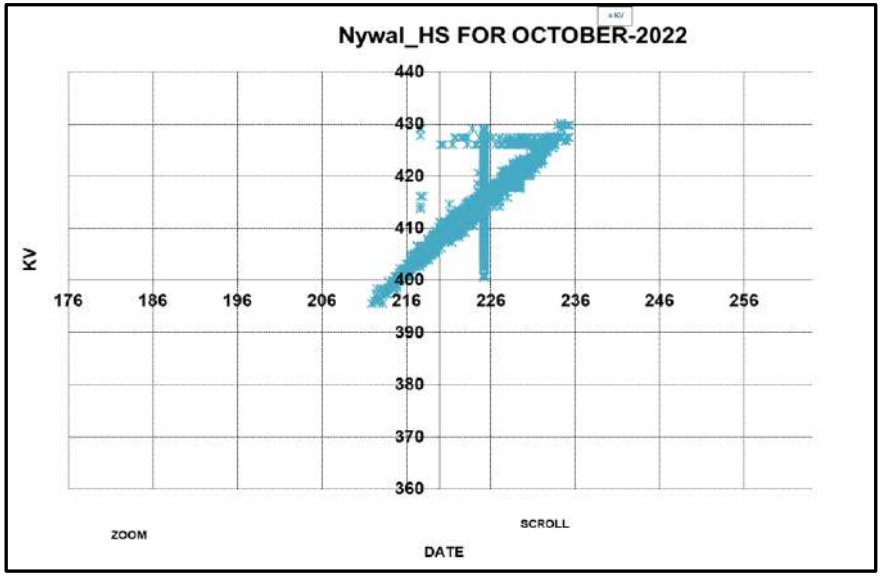
PROPOSED CASE: TRANSMISSION NETWORK INCLUDED IN ISLAND OF SUPERCRITICAL THERMAL POWER STATION

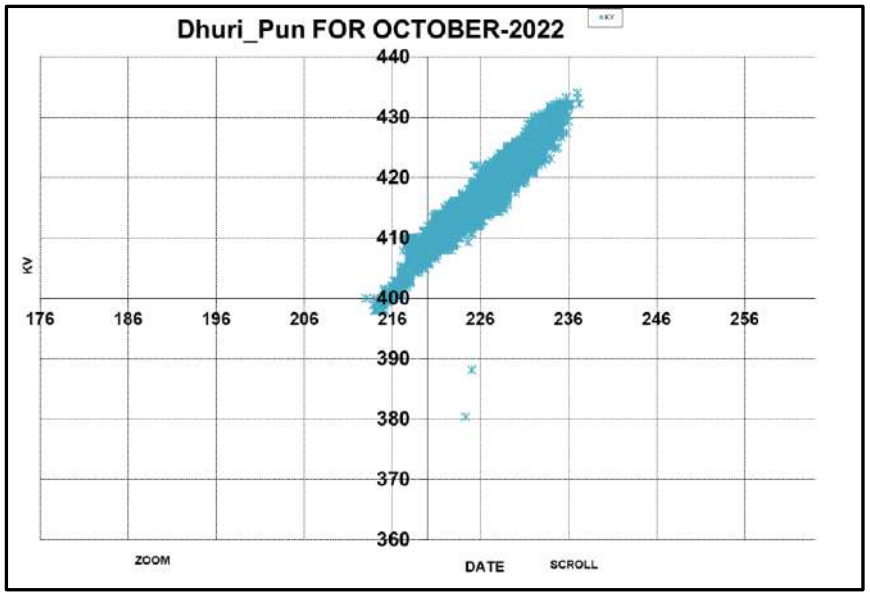
EXHIBIT-1


Sonepat_PG FOR OCTOBER-2022
KV
440
430
420
410
400
390
380
370
360
176
186
196
206
216
226
236
246
256
ZOOM
SCROLL
DATE


Wanpo_PG FOR OCTOBER-2022
KV
440
430
420
410
400
390
380
370
360
176
186
196
206
216
226
236
246
256
ZOOM
SCROLL
DATE


Daultabad_HS FOR OCTOBER-2022
KV
440
430
420
410
400
390
380
370
360
176
186
196
206
216
226
236
246
256
ZOOM
SCROLL
DATE


Nywal_HS FOR OCTOBER-2022
KV
440
430
420
410
400
390
380
370
360
176
186
196
206
216
226
236
246
256
ZOOM
SCROLL
DATE


Dhuri_Pun FOR OCTOBER-2022
KV
440
430
420
410
400
390
380
370
360
176
186
196
206
216
226
236
246
256
ZOOM
DATE
SCROLL

Status of replacement of Porcelain insulators with Polymer insulators												
S.No.	Name of Line/voltage/ S/C or D/C	Voltage Level (in kV)	Line details			Insulators to be replaced by Polymer (Total target for repalcement despite completion in any year)	Insulators to be replaced by Polymer (Target for Present year)	Progress (Work already completed wrt to present year target)	Progress (Work already completed wrt to total line)	Schedule for completion of Replacement		Remarks *(If only partial location of the line has planned then may please indicate the location numbers or part kMs of line which have been planned)*
			Total Length of line (in kM)	Total Towers location (Nos)		Total Towers location (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Start Date	End Date	
				Tension	Suspension							
1	2	3	4	5		6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												
7												

Note:1. Line constructed with Polymer Insulator may please also be indicated in the table

2. Similar separate table shall be formulated for Antifog insulators line as well for line which would be cleaned

3. Lines for whom there is no planning of cleaning or replacement may please also be given in the table but with '--' in planning as well as progress columns

National Load Despatch Centre

Import Capability of Uttar Pradesh for December 2022

Issue Date: - Issue Time: 1600 Revision No. 0

Date	Time Period in IST (hrs)	Total Transfer Capability (TTC) (MW)	Reliability Margin (MW)	Available Transfer Capability (ATC) (MW)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) (MW)	Margin Available for Short Term Open Access (STOA) (MW)	Changes in TTC w.r.t. Last Revision	Comments
1st December 2022 to 31st December 2022	00-24	15100	600	14500	8420	6080		https://www.upsldc.org/documents/20182/0/ttc_atc_24-11-16/4c79978e-35f2-4aef-8c0f-7f30d878dbde
Limiting Constraints		N-1 contingency of 400/220kV Azamgarh, Obra, Mau, Sohawal (PG), Gorakhpur (UP), Sarnath, Lucknow (PG) ICTs						

80% of LTA/MTOA/ISGS allocation capacity considered to account for machine outages

National Load Despatch Centre
Import Capability of Rajasthan for December 2022

Issue Date: - Issue Time: 1600 Revision No. 0

Date	Time Period in IST (hrs)	Total Transfer Capability (TTC) (MW)	Reliability Margin (MW)	Available Transfer Capability (ATC) (MW)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) (MW)	Margin Available for Short Term Open Access (STOA) (MW)	Changes in TTC w.r.t. Last Revision	Comments
1st December 2022 to 31st December 2022	00-24	7600	600	7000	3400	3600		https://sldc.rajasthan.gov.in/rrvpnl/scheduling/downloads
Limiting Constraints		N-1 contingency of 400/220kV Chittorgarh, Jodhpur, Bikaner, Ajmer, Merta and Bhinmal ICTs						

80% of LTA/MTOA/ISGS allocation capacity considered to account for machine outages

National Load Despatch Centre
Import Capability of Haryana for December 2022

Issue Date: - Issue Time: 1600 Revision No. 0

Date	Time Period in IST (hrs)	Total Transfer Capability (TTC) (MW)	Reliability Margin (MW)	Available Transfer Capability (ATC) (MW)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) (MW)	Margin Available for Short Term Open Access (STOA) (MW)	Changes in TTC w.r.t. Last Revision	Comments
1st December 2022 to 31st December 2022	00-24	9100	600	8500	3000	5500		https://hvpn.org.in/#/atcttc
Limiting Constraints		N-1 contingency of 400/220kV ICTs at Deepalpur, Panipat(BBMB) and Kurukshetra(PG)						

80% of LTA/MTOA/ISGS allocation capacity considered to account for machine outages

National Load Despatch Centre
Import Capability of Delhi for December 2022

Issue Date: - Issue Time: 1600 Revision No. 0

Date	Time Period in IST (hrs)	Total Transfer Capability (TTC) (MW)	Reliability Margin (MW)	Available Transfer Capability (ATC) (MW)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) (MW)	Margin Available for Short Term Open Access (STOA) (MW)	Changes in TTC w.r.t. Last Revision	Comments
1st December 2022 to 31st December 2022	00-24	7100	300	6800	4150	2650		
Limiting Constraints		N-1 contingency of 400/220kV Mundka, HarshVihar and Mandola ICTs.						

80% of LTA/MTOA/ISGS allocation capacity considered to account for machine outages

National Load Despatch Centre
Import Capability of HP for December 2022

Issue Date: - Issue Time: 1600 Revision No. 0

Date	Time Period in IST (hrs)	Total Transfer Capability (TTC) (MW)	Reliability Margin (MW)	Available Transfer Capability (ATC) (MW)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) (MW)	Margin Available for Short Term Open Access (STOA) (MW)	Changes in TTC w.r.t. Last Revision	Comments
1st December 2022 to 31st December 2022	00-24	1400	100	1300	1400	-100		https://hpsldc.com/mrm_category/ttc-atc-report/
Limiting Constraints		N-1 contingency of 400/220kV Nallagarh ICTs. High loading of 220kV Nallagarh-Upernangal D/C and 220kV Hamirpur-Hamirpur D/C						

80% of LTA/MTOA/ISGS allocation capacity considered to account for machine outages

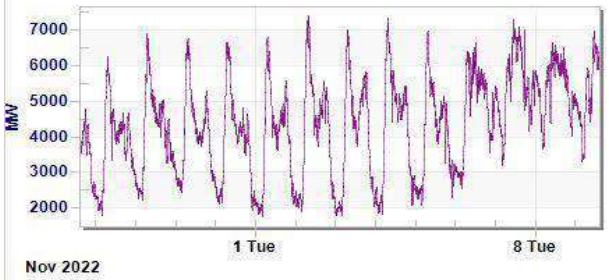
National Load Despatch Centre
Import Capability of Uttarakhand for December 2022

Issue Date: - Issue Time: 1600 Revision No. 0

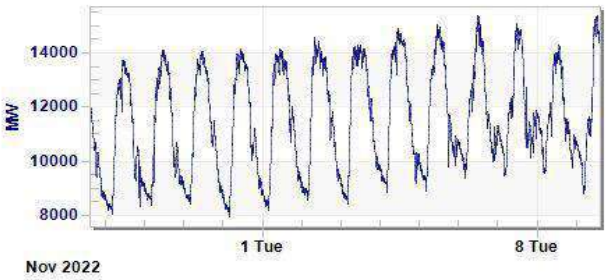
Date	Time Period in IST (hrs)	Total Transfer Capability (TTC) (MW)	Reliability Margin (MW)	Available Transfer Capability (ATC) (MW)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) (MW)	Margin Available for Short Term Open Access (STOA) (MW)	Changes in TTC w.r.t. Last Revision	Comments
1st December 2022 to 31st December 2022	00-24	1600	100	1500	1020	480		http://uksldc.in/transfer-capability
Limiting Constraints		N-1 contingency of 400/220kV Kashipur ICTs. High loading of 220kV Roorkee-Roorkee and 220kV CBGanj-Pantnagar lines						

80% of LTA/MTOA/ISGS allocation capacity considered to account for machine outages

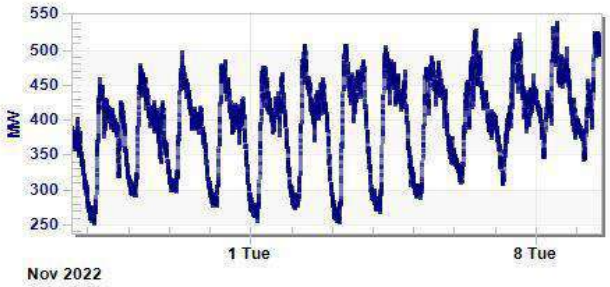
Rajasthan import



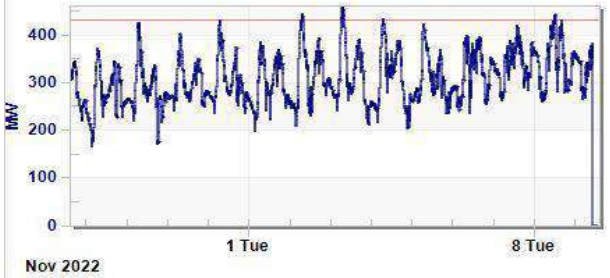
Rajasthan Load



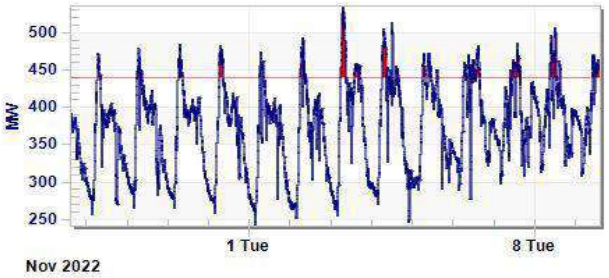
Ajmer ICT loading



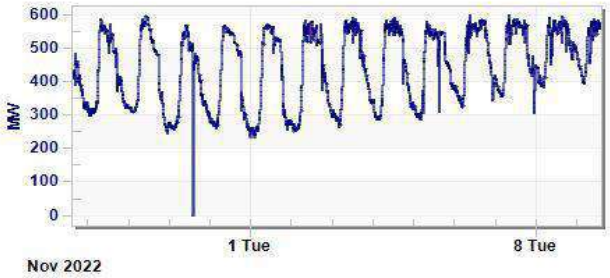
Jodhpur ICT loading



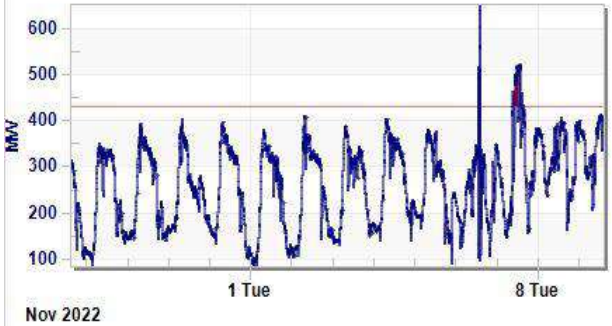
Merta ICT loading



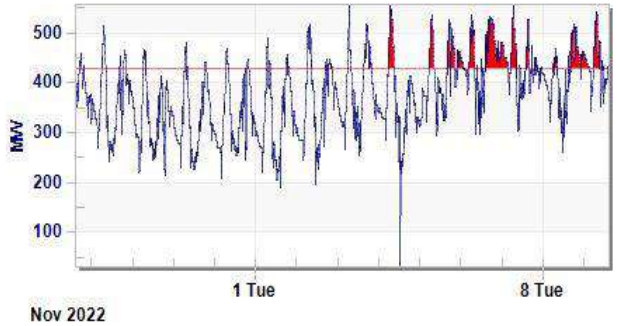
Chittorgarh ICT loading



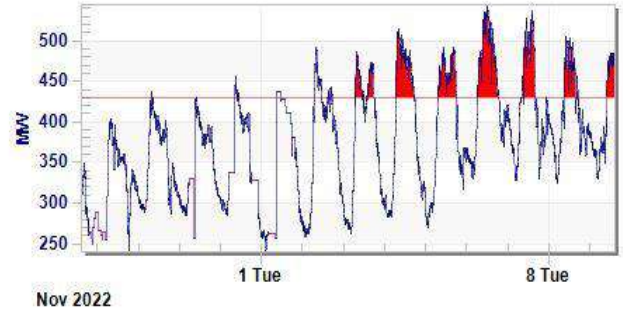
Bhinmal ICT loading

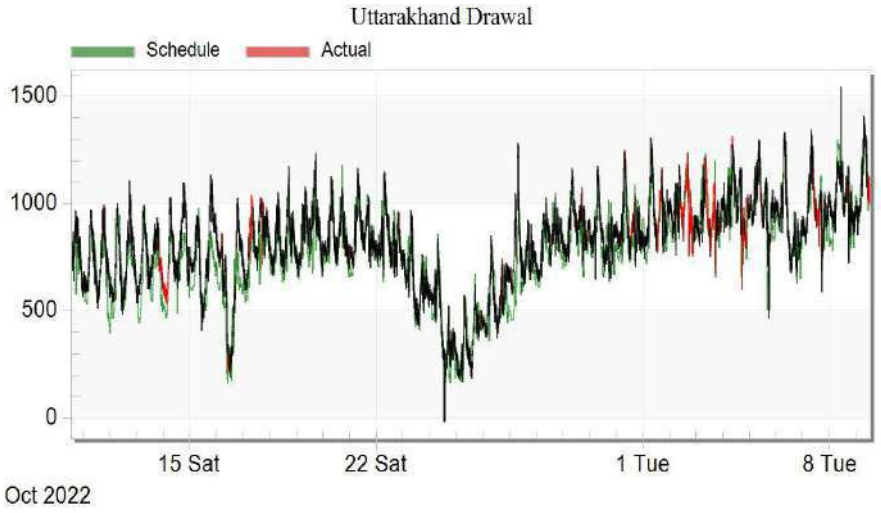


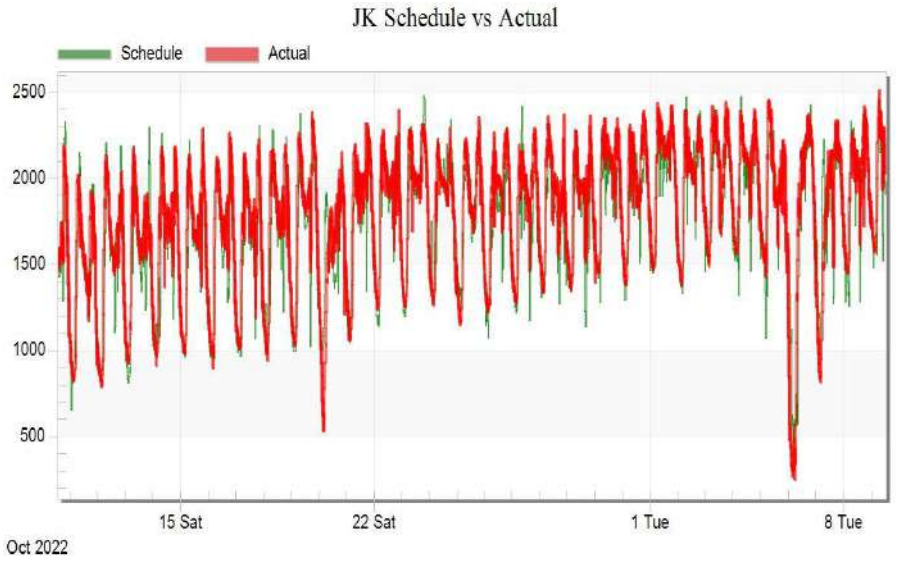
Bikaner ICT loading

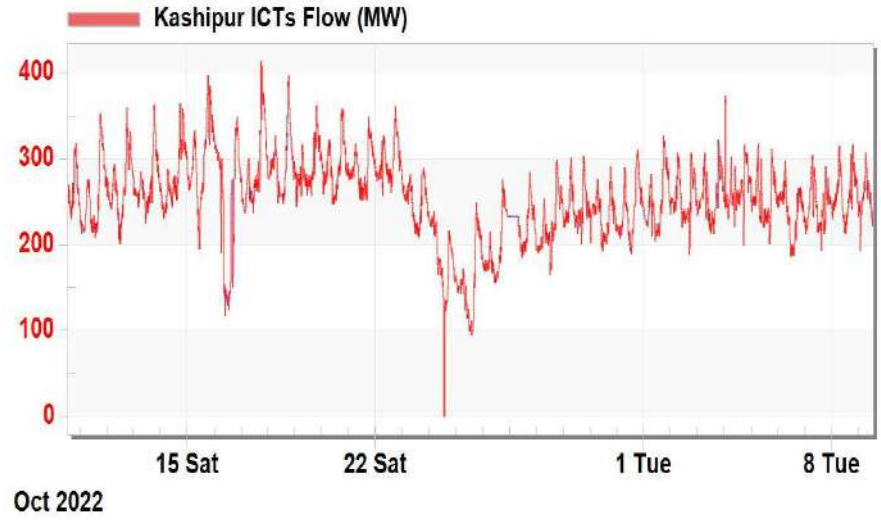


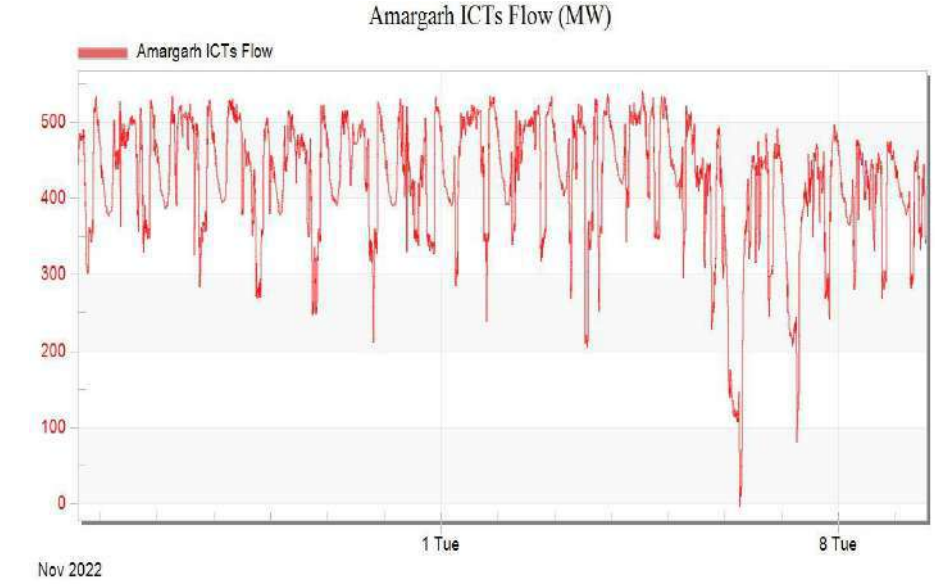
Bhilwara ICT loading

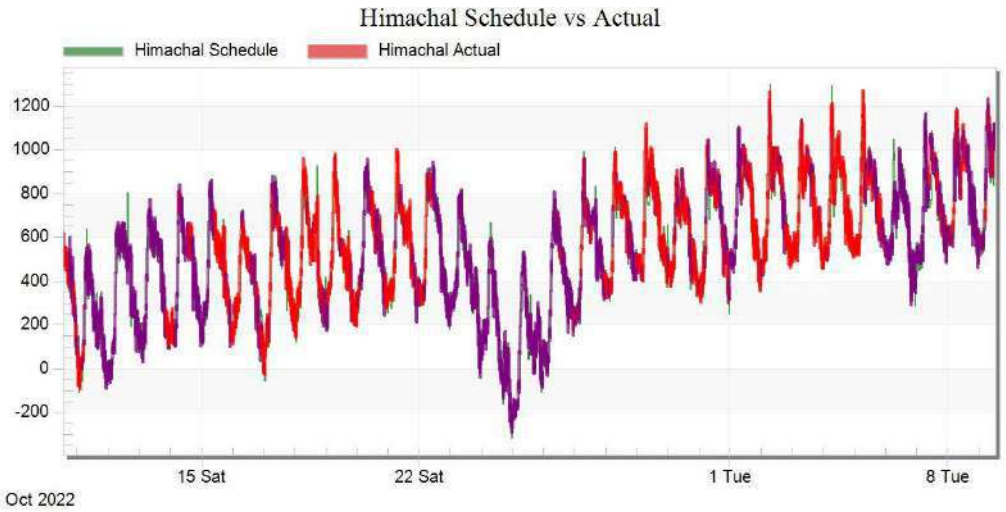


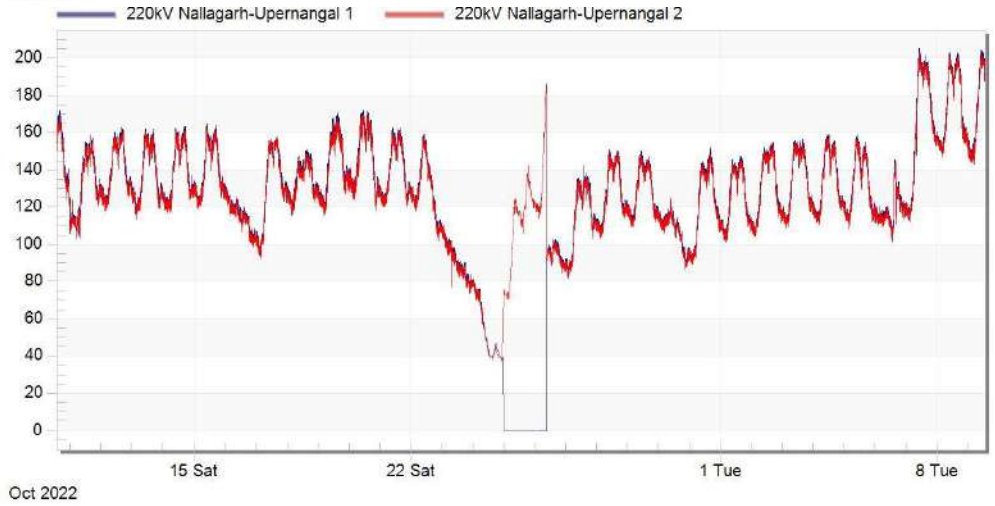

Uttarakhand Drawal
Schedule
Actual
1500
1000
500
0
15 Sat
22 Sat
1 Tue
8 Tue
Oct 2022


JK Schedule vs Actual
Schedule
Actual
2500
2000
1500
1000
500
15 Sat
22 Sat
1 Tue
8 Tue
Oct 2022


Kashipur ICTs Flow (MW)
400
300
200
100
0
15 Sat
22 Sat
1 Tue
8 Tue
Oct 2022


Amargarh ICTs Flow (MW)
Amargarh ICTs Flow
500
400
300
200
100
0
1 Tue
8 Tue
Nov 2022


Himachal Schedule vs Actual
Himachal Schedule
Himachal Actual
1200
1000
800
600
400
200
0
-200
15 Sat
22 Sat
1 Tue
8 Tue
Oct 2022


220kV Nallagarh-Upernangal 1
220kV Nallagarh-Upernangal 2
200
180
160
140
120
100
80
60
40
20
0
15 Sat
22 Sat
1 Tue
8 Tue
Oct 2022

A. Details of Long Duration Transmission elements Outage as on 09.11.2022:-

S.No	Element Name	Type	Owner	Outage			Reason / Remarks	Status updated during last OCC
1	400/220 kV 315 MVA ICT 2 at Mundka(DV)	ICT	DTL	20-09-2019	00:19	1146	Due to fire in ICT	30.11.2022
2	80 MVAR Bus Reactor No 1 at 400KV Nathpa Jhakri(SJ)	BR	SJVNL	17-10-2019	12:58	1118	Flashover/Fault in 80MVAR Bus Reactor cleared by Bus Bar Protection.	30.11.2022
3	50 MVAR LR on Akal-Jodhpur (RS) Ckt-1 @Akal(RS)	LR	RRVPNL	17-08-2021	23:47		Akal: DT Receive Jodhpur: DT Send, 400 kV Reactor Manually Trip at 400 kV GSS, Jodhpur due to low voltage(before tripping reactor was charged as a bus reactor)	30.11.2022
4	400/220 kV 315 MVA ICT 1 at Muradnagar_1(UP)	ICT	UPPTCL	13-03-2020	02:46	971	Buccholz relay alarm and Local Breaker Backup protection operated. Tripped along with Hapur-Muradnagar line. Flags are not reset because of cable flashover.	TWC approved on 09.12.2021 for replacement with 500MVA new ICT . 30 Dec 2022
5	400/220 kV 500 MVA ICT 2 at Noida Sec 148(UP)	ICT	UPPTCL	19-08-2020	08:12	812	ICT tripped on REF protection. Transformer caught fire and got damaged.	30 Nov 2022
6	50 MVAR Non-Switchable LR on Agra-Unnao (UP) Ckt-1 @Agra(UP)	LR	UPPTCL	28-10-2021	22:27	376	R and Y phase bushing damaged at Agra(UP). Concerned written to OEM for inspection of reactor. Order placed for testing by manufacturer	Testing done by OEM, Report awaited.
7	220 KV AGRA(PG)-FEROZABAD(UP) (UP) CKT-1	Line	UPPTCL	27-11-2021	09:55	347	Jumpering work for making Lilo point of 220 kv Firozabad(400)-Agra(765) PG line at 220 kv Tundla	Jumpering work for making Lilo point of 220 kv Firozabad(400)- Agra(765) PG line at 220 kv Tundla. FTC process completed but yet to be charged due to PLCC issue at Tundla end.
8	400KV Bus 1 at Vishnuprayag(JP)	BUS	JPVL	02-12-2021	14:42	341	Bus bar protection operated at Vishnuprayag. Sparking in Bus Coupler CB.	March 2023
9	400/220 kV 240 MVA ICT 3 at Moradabad(UP)	ICT	UPPTCL	13-12-2021	22:38	330	Due to high DGA values, Hydrogen gas is above permissible limit.	30 Dec 2022
10	50 MVAR Bus Reactor No 1 at 400KV Moradabad	BR	UPPTCL	03-12-2021	00:00	340	Bushing Damged , Not available in UPPTCL . Written to designe circle .	30 Dec 2022
11	50 MVAR BUS REACTOR NO 1 AT 400KV PANKI(UP)	BR	UPPTCL	29-01-2022	08:56	284	Replacement of 50 MVAR Bus reactor by new 125 MVAR Bus Reactor.	30.11.2022
12	765 KV ANPARA_D-UNNAO (UP) CKT-1	Line	UPPCL	08-02-2022	10:06	274	Shifting of Line Reactor from Anpara-D to Obra-C S/S (OCC 190)	LILO of the line at Obra C under processing. Annexure-B documents awaited.
13	220 KV Kishenpur(PG)-Mir Bazar(PDD) (PDD) Ckt-1	Line	PDD JK	19-02-2022	21:45	262	Tower no. 170 collapsed.	
14	400 KV Parbati_3(NH)-Sainj(HP) (PKTCL) Ckt-1	Line	PKTCL	11-03-2022	03:21	243	Phase to earth fault R-N , Zone-1 from Parbati_3(NH). R-phase XLPE cable has been punctured between GIS and Pothead yard of Parbati-III PS.	
15	400 KV Sainj(HP) - Bus 2	ICT	HPPTCL	11-03-2022	03:21	242	Phase to earth fault R-N xlpe cable puncture at parawti 3 end which led to tripping of the line as well as bus	
16	220 KV Gazipur(DTL)-Shahibabad(UP) (UP) Ckt-2	Line	UPPTCL	30-04-2022	19:30	192	Line remains charge at No load from UP end. Manually open at 19:30 on 30/04/22 due bending of tower no. 4	
17	220 KV Gazipur(DTL)-Noida Sec62(UP) (UP) Ckt-1	Line	UPPTCL	30-04-2022	22:55	192	Tower tilted on one side at tower no 10 from Gazipur (DTL) end.	
18	FSC of 400 KV Koteshwar-Meerut (PG) Ckt-1 at Meerut(PG)	FSC	POWERGRID	20.02.2020	10:02		FSC out for upgradation work at 765kV. Upgraded to 765kV. Expected revival status awaited from PG-NR1.Waiting for CEA clearance.	FTC under processing
19	FSC of 400 KV Fatehpur-Mainpuri (PG) Ckt-1 at Mainpuri(PG)	FSC	POWERGRID	24.10.2021	21:07	317	BHEL breaker hydraulic pressure could not be developed in B phase and (loss of N2 pressure) doesn't allow the FSC-1 taken into service as reported by CPCC3.	
20	FSC of 400 KV Fatehpur-Mainpuri (PG) Ckt-2 at Mainpuri(PG)	FSC	POWERGRID	29.01.2022	08:25	321	VME protection system was blocking the FSC back in service as reported by CPCC3.	
21	407 MAIN BAY - 80 MVAR BUS REACTOR NO 1 AT 400KV AGRA SOUTH(UP) AND SELECT	BAY	UPPTCL	21-07-2022	00:00	84	Due To Problem In Reactor Side Isolator While Shut Down Return Of 80 MVAR Bus Reactor. Opened At 15:58 Of 07/04/22	30.11.2022
22	50 MVAR Non-Switchable LR on Akal-Jodhpur (RS) Ckt-1 @Jodhpur(RS)	LR	RRVPNL	07-07-2022	21:10	97	To take-out Line Reactor out of service due to high DGA violation; for internal inspection by OEM.	
23	400/220 kV 500 MVA ICT 1 at Bhiwani(BB)	ICT	BBMB	31-07-2022	04:42	101	Tripped due to tripping of 220 KV Bhiwani-Hissar ckt-2.ICT under inspection.	
24	220/33 kV 125 MVA ICT 4 at Saurya Urja Solar(SU)	ICT	Saurya Urja	31-07-2022	16:28	100	Differential, PRD, HV REF and Buchholz tripping	
25	125 MVAR Bus Reactor No 1 at 400KV Chamera_1(NH)	BR	NHPC	14-08-2022	11:31	87	High Acetylene content found during DGA of Y-Phase Bus Reactor.	
26	412 MAIN BAY - 400KV AKAL-JODHPUR (RS) CKT-1 AT JODHPUR(RS)	BAY	RRVPNL	02-09-2022	15:05	67	Replacement of circuit breaker (Bus B side breaker 852B CB of 400kV Jodhpur-Akal line at jodhpur end) Line will remain in service with 852 A CB.	
27	400/220 kV 315 MVA ICT 3 at Mundka(DV)	ICT	DTL	05-09-2022	19:18	64	Fire observed on both sides bushing of 315 MVA ICT-3.	
28	400 KV BAREILLY-UNNAO (UP) CKT-2	Line	UPPTCL	13-09-2022	10:26	57	for Preventive Maintenance	
29	400KV Bus 2 at Parbati_3(NH)	BUS	NHPC	14-09-2022	16:32	55	Rectification work in Generator GIS Bay CB.	
30	400/220 kV 240 MVA ICT 2 at Orai(UP)	ICT	UPPTCL	24-09-2022	00:03	46	Differential protection Trip, REF protection Trip.	
31	FSC(40%) of 400 KV Kala Amb(PKTL)-Sorang(Greenko) (Greenko) Ckt-1 at Kala Amb(PKTL)	FSC	POWERGRID	26-09-2022	09:47	44	To attend Unbalance current that is rapidly increasing in B phase. Charging code was issued as NR2209-4483, but cancelled due to Unbalance alarm is still not rectified.	
32	63 MVAR Bus Reactor No 1 at 400KV Muzaffarnagar(UP)	BR	UPPTCL	28-09-2022	11:37	42	To attend hot-spot on R-phase pentagraph isolator of main Bus-1.	
33	40352T TIE BAY - 400KV SURATGARH(RVUN)-RATANGARH(RS) (RS) CKT-2 AND 400/220KV 315 MVA ICT 1 AT RATANGARH(RS)	BAY	RRVPNL	06-10-2022	22:07	33	For attending the closing problem of Y-phase Pole Of Tie CB(40352T).	
34	405 TIE BAY - 400/220KV 315 MVA ICT 2 AT JODHPUR(RS) AND 400KV BHADLA(RS)-JODHPUR(RS) (UNDEF) CKT-1	BAY	RRVPNL	10-10-2022	16:31	29	for replacement of the circuit breaker.	
35	765 KV MOGA-BHIWANI (PG) CKT-1	Line	POWERGRID	18-10-2022	10:37	22	for Railway diversion works.	
36	411 TIE BAY - 400KV BAREILLY(PG)-MEERUT(PG) (PL) CKT-2 AND 400KV SHAHJAHANPUR-BAREILLY (PG) CKT-1 AT BAREILLY(PG)	BAY	POWERGRID	22-10-2022	09:32	18	for AMP work.	

B. Details of Long Duration Generating Units Outage :-

S.No	Element Name	Type	Owner	Outage			Reason / Remarks	Status updated during last OCC
1	100 MW Koteshwar HPS - UNIT 1		THDC	04-11-2021	22:58	369	Due to fault in GT	
2	108 MW Bhakra HPS - UNIT 1		BBMB	15-12-2021	12:05	328	Renovation Modernization and upgradation of capacity to 126MW	
3	34 MW Delhi Gas Turbines - UNIT 9		DTL	12-02-2022	20:00	269	STG Governor oil leakage	
4	30 MW Delhi Gas Turbines - UNIT 5		DTL	12-02-2022	21:04	269	Due to tripping of associated STG at 20:00 hrs	
5	210 MW Guru Hargobind Singh TPS (Lehra Mohabbat) - UNIT 2		PSPCL	13-05-2022	21:36	179	ESP breakdown. Rectification works under progress as confirmed by SLDC-PS.	
6	253 MW Bawana GPS - UNIT 5		DTL/Pragati CCGT	03-06-2022	22:04	158	C&I problem	
7	Ramgarh GPS - UNIT 2		RRVPNL	04-06-2022	01:17	158	Due to fire accident in GT - 2	

8	109.3 MW Auraiya GPS - UNIT 6		NTPC	28-06-2022	22:50	133	hunting in line pressure of Liquid fuel (now RSD)	
9	250 MW Suratgarh TPS - UNIT 1		RRVPNL	30-06-2022	18:24	131	Stator earth fault	
10	210 MW Kota TPS - UNIT 3		RRVPNL	08-08-2022	23:44	92	Due to problem in seal oil flow of generator.	
11	200 MW RAPS-A - UNIT 2		NPCIL	13-09-2022	00:48	57	boiler replacement ar per AERB mandatory requirement	
12	110 MW Tanda TPS - UNIT 2		NTPC	03-10-2022	03:42	37	Oil leakage from Air preheater guide bearing. (now Reserve Shutdown)	
13	270 MW Goindwal(GVK) - UNIT 1		PSPCL	06-10-2022	19:47	33	Boiler Protection Operated (now on Coal Shortage since 10.10.2022)	

Sr No	Element Name	Outage Date	Outage Time	Reason
1	400 KV Bareilly-Unnao (UP) Ckt-1	1-Oct-22	20:52	B-N fault, Zone-1, Dist. 63.5km, Fault current 5.24kA from Bareilly.
		3-Oct-22	14:32	Y-B fault, Zone-1, Dist. 10.9km, Fault current 12.12kA from Bareilly & Dist. 269.9km, Fault current 1.36kA from Unnao.
		14-Oct-22	12:00	Unnao end flags- CH1 DTR, Grp A trip relay operated, CB trip Ckt 1/2 faulty, Line is already charged from Bareilly end. Clearance has been given by T&C wing for charging.
		14-Oct-22	13:25	400 kV Bareilly Unnao ckt-I line tripped from both ends with following flags CH1&2 DTR
		16-Oct-22	0:20	Phase to earth fault Y-N
		19-Oct-22	12:08	DT received at Unnao end.
		21-Oct-22	3:16	R-N fault, Zone-1, Dist. 86.7km, Fault current 3.88kA from Unnao(UP).
		22-Oct-22	5:40	B-N Fault, Dist. 241.7km, Fault current 2.20kA from Bareilly end.
		22-Oct-22	19:49	Y-N fault, Dist. 228.2km, Fault current 2.10kA from Unnao end.
		24-Oct-22	7:47	B-N fault, Zone-1, Dist. 31.6km, Fault current 8.95kA from Unnao (UP) & Dist. 228.7km, Fault current 1.62kA from Bareilly end.
2	00 KV Muradnagar_2-Mathura (UP) Ckt-	9-Oct-22	0:52	400kv Mathura Muradnagar line tripped from both end at 00:52:20.193hrs dtd 09/10/2022 Flags: Main-1:- Phase-B-phase(R, Y, B) Location-40.0km Zone - 1 Fault Current IR-51.857A IY-429.527A IB-4.992KA IN-4.539KA
		25-Oct-22	21:28	R-N fault, Zone-1, Fault current 1.097kA, Dist. 78.920km from Muradnagar end.
		26-Oct-22	21:46	Y-N fault, Zone-1, Fault current 2.958kA, Dist. 69.207km from Muradnagar.
		28-Oct-22	10:44	400KV Muradnagar-Mathura Line has tripped and auto-reclosed 05 times on dtd-26th/27th oct 2022 detailed below:- 1- Auto-reclosed at Time- 19:46hrs on dtd-. 26.10.2022 R-ph, 68.20Km 2- Tripped at time 21:46hrs on dtd-. 26.10.2022 Y-ph, 68.70Km 3- Auto-reclosed at time 23:18hrs on dtd- 26.10.2022 R-ph, 67.90Km 4- Auto-reclosed at time 03:27hrs on dtd- 27.10.2022 B-ph 68.50Km 5- Auto-reclosed at time 05:18 hrs on dtd- 27.10.2022 R-ph 68.40Km Patrolling of this line has been done on dtd-. 27.10.202
3	) KV Saharanpur(UP)-Khodri(UK) (UP) Ck-	1-Oct-22	8:44	Phase to earth fault B-N
		5-Oct-22	21:45	R-N fault, Zone-1, Dist. 33.6km, Fault current 2.68kA from Khodri(UK).
		6-Oct-22	2:27	B-N fault, Zone-1 from Khodri(UK).
		9-Oct-22	4:45	Phase to earth fault Y-N
4	0 KV RAPS_A(NP)-Sakatpura(RS) (RS) Ck	11-Oct-22	11:28	Y-B fault, Zone-2, Dist. 39.92km, Fault current 4.75kA from Sakatpura(RS).
		12-Oct-22	12:22	Y-N fault, Dist. 15.79km, Fault current 4.918kA from Sakatpura(RS). Charging attempt taken at 13:58Hrs, but did not hold.
		12-Oct-22	13:59	Line has tripped on Y-N fault at 12:22 hrs (12.10.2022). Charging attempt taken at 13:58Hrs, but did not hold.
		14-Oct-22	5:01	R-N fault, Zone-1, Fault current 6.44kA, Dist. 12.61km from Sakatpura(RS).
		28-Oct-22	21:57	At sakatpura:- R- PHASE, DIST=25.6 Km, Z-1, Ia=2.71KAM and at RAPP(A) END:- R-PHASE, Z=1, DIST.12.6 KM, IC.= 6.22Ka

Grid Event summary for October 2022

S.No.	Category of Grid Disturbance	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Outage Duration (hh:mm)	Event (As reported)	Energy Unserved due to Generation loss (MU)	Energy Unserved due to Load loss (MU)	Loss of generation / loss of load during the Grid Disturbance		% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance		Antecedent Generation/Load in the Regional Grid		Fault Clearance time (in ms)
	(GD-I to GD-V)				Date	Time	Date	Time					Generation Loss(MW)	Load Loss (MW)	% Generation Loss(MW)	% Load Loss (MW)	Antecedent Generation (MW)	Antecedent Load (MW)	
1	GD-1	1) 220 KV Sarsawan(UP)-Khodri(UK) (UP) Ckt-1 2) 220 KV Saharanpur(UP) -Khodri(UK) (UP) Ckt-1 3) 60 MW UNIT 1 at Khodri HEP 4) 60 MW UNIT 2 at Khodri HEP 5) 60 MW UNIT 4 at Khodri HEP	Uttarakhand	UPPTCL, PTCUL	6-Oct-22	02:27	6-Oct-22	02:56	00:29	1. As reported, at 02:27 hrs, 220 KV Sarsawan (UP)-Khodri (UK) (UP) Ckt-1 tripped from both ends on B-N phase to earth fault. Fault distance was ~52km from Khodri end. 2. At the same time, 220 KV Saharanpur (UP) -Khodri (UK) (UP) Ckt-1 tripped from Saharanpur end only followed by tripping of 60MW unit-1, 2 & 4 at Khodri HEP carrying total ~60MW. 3. As per PMU at Roorkee (PG), B-N phase to earth fault with delayed clearance in 1160ms is observed. 4. As per SCADA, change of approx. 60MW in Uttarakhand generation is observed.	0.029	0	60	0	0.183	0.000	32745	46719	1160
2	GI-2	1) 400/220 kV 500 MVA ICT 2 at Moradabad(UP) 2) 400 KV Hapur(UP)-Moradabad(UP) (PG) Ckt-1	Uttar Pradesh	UPPTCL	9-Oct-22	10:29	9-Oct-22	17:34	07:05	1. At 10:29 hrs, 400/220 kV 500 MVA ICT 2 at Moradabad (UP) and 400 kV Hapur(UP)-Moradabad(UP) (PG) Ckt-1 tripped. As reported, LBB protection operated due to DC supply fault in 400/220kV 500MVA ICT-2 bay at Moradabad (UP). 2. As per PMU at Meerut (PG), no fault observed in system. 3. In antecedent condition, 400/220 kV 500 MVA ICT 2 at Moradabad (UP) and 400 kV Hapur(UP)-Moradabad(UP) (PG) Ckt-1 were carrying ~41MW & ~7MW respectively	0	0	0	0	0.000	0.000	44077	45322	NA
3	GD-1	1) 50MW Sainj Unit 1 2) 50MW Sainj Unit 2 3) 250MW Unit 1 at Parbati2 HEP 4) 400 KV Parbati_2(NH)-Parbati Pooling Banala(PG) (PKTCL) Ckt-1 5) 400 KV Parbati_2(NH)-Sainj(HP) (PKTCL) Ckt-1 6) 400kV Bus 1 at Parbati 2(NH)	Himachal Pradesh	HPPTCL, NHPC, POWERGRID	11-Oct-22	14:43	11-Oct-22	20:57	06:14	1. During antecedent condition, 250MW Unit-1 at Parbati2 HEP (generating ~58MW), 400 KV Parbati_2(NH)-Parbati Pooling Banala(PG) (PKTCL) Ckt and 400 KV Parbati_2(NH)-Sainj(HP) (PKTCL) Ckt were connected at 400kV Bus-1 at Parbati 2(NH). 400kV Bus-2 at Parbati(NH) is out since 29th July22 on fire incident. 2. As reported, at 14:43 hrs, Main-1 relay of Bus bar protection mal operated which led to the tripping of 250MW Unit-1 at Parbati2 HEP, 400 KV Parbati_2(NH)-Parbati Pooling Banala(PG) (PKTCL) Ckt and 400 KV Parbati_2(NH)-Sainj(HP) (PKTCL) Ckt. 3. Due to tripping of aforementioned line, 50MW Sainj Unit 1 & 2 also tripped due to loss of evacuation path. 4. As per PMU at Amritsar(PG), no fault in system is observed. 5. As per SCADA, loss of approx. 60MW generation at Parbati2(NH) and ~33MW at Sainj(HP) observed.	0.205	0	93	0	0.218	0.000	42568	43716	NA
4	GD-1	1) 220 kV ACME Heeragarh (AHPPL) – Bhadla2(PG) ckt	RAJASTHAN	AHPPL, POWERGRID	12-Oct-22	11:18	12-Oct-22	12:04	00:46	1. As reported at 11:18 hrs, 220 kV ACME Heeragarh (AHPPL) – Bhadla2(PG) ckt tripped due to PLCC malfunction at Bhadla2(PG) end. 2. As per PMU, no fault is observed. 3. As per PMU at AHPPL RE Station, generation loss of approx. 233MW occurred at AHPPL.	0.178	0	233	0	0.509	0.000	45769	46966	NA
5	GD-1	1) 765kV Bus-1 at Bhiwani(PG) 2) 765 KV Phagi(RS)-Bhiwani(PG) (PG) Ckt-1	RAJASTHAN	POWERGRID, RVPNL and RE plants connected at Fatehgarh2, Bhadla, Bhadla2 & Bikaner ISTS stations	15-Oct-22	11:23	15-Oct-22	11:29	00:06	1. On 15.10.2022 at 11:23 hrs, R-ph pole of Main CB at Bhiwani(PG) end of 765 KV Phagi(RS)-Bhiwani(PG) (PG) Ckt-1 burst which led to R-ph bus fault on 765kV Bus-1 at Bhiwani(PG). 2. On this fault, bus bar protection of 765kV Bus-1 at Bhiwani(PG) operated. All the main CB connected at 765kV Bus-1 opened. As tie CB of 765 KV Phagi(RS)-Bhiwani(PG) (PG) Ckt-1 was already in opened condition, this line tripped from Bhiwani end. 3. As per PMU at Bhiwani(PG), R-N phase to earth fault which cleared within 100ms is observed. As per PMU plot of phase voltage at RE stations, during the fault, voltage dropped to 0.8-0.9pu only. 4. At the same time, during the fault, drop in generation of almost all the RE generation pooled at 765kV Fatehgarh2(PG), Bhadla(PG), Bhadla2(PG) & Bikaner(PG) is observed. Generation at few of the RE station revived back with the clearance of fault but at some stations partial or no recovery is observed. PMU plots of the MW/Mvar and phase voltages of RE stations are attached for the reference. 5. As per SCADA, total solar generation drop of approx. 3729MW in Rajasthan RE complex is observed (3579MW ISTS RE stations and ~150MW of Rajasthan state solar generation). 6. As per SCADA, no change is observed in state demands.	0.31	0	3729	0	8.472	0.000	44014	47669	80
6	GD-1	1) 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-2 2) 660 MW Lalitpur TPS - UNIT 2 3) 660 MW Lalitpur TPS - UNIT 1 4) 220kV Lalitpur TPS - Jhansi ckt-1&2 5) 220kV Lalitpur TPS - Babina(220kV Lalitpur) ckt-1&2	Uttar Pradesh	UPPTCL	15-Oct-22	12:57	15-Oct-22	14:49	01:52	1. During antecedent condition, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-1 was under planned shutdown to attend hot point jumper tightening and fixing jumper nut bolt work, 660MW Lalitpur Unit 1, 2 & 3 were carrying 345MW, 348MW & 339MW respectively and 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-2 was carrying 961MW. 2. At 12:57 Hrs, during testing and commissioning work of spare phase 80MVAR line reactor for charging in place of R-phase line reactor of 765kV Agra Fatehabad-Lalitpur ckt-1 at Agra Fatehabad end, unwanted tripping command of line reactor generated and DT sent to 765kV Agra Fatehabad-Lalitpur ckt-2 at Lalitpur end. 3. As per PMU, no fault in system is observed. 4. Due to this 765kV Lalitpur Agra (Fatehabad) ckt - II tripped and as 765kV Lalitpur Agra (Fatehabad) ckt – I was already under shutdown, SPS for evacuation of Lalitpur TPS Generation operated. SPS case which operated is as follows: **Case-3**: If both 1500MVA ICTs at Fatehabad (UP) or both765kV Lalitpur TPS-Fatehabad (UP) circuit –I & II got tripped at 765kV sub-station Fatehabad. **Action:** In this condition, to safe guard the running units of Lalitpur TPS, it will be essential to bring down the generation immediately of running units to house load. Both 220kV circuits of i.e. 220kV Jhansi & Lalitpur should also get opened from Lalitpur TPS end. In this regard it is suggested that Lalitpur TPS should be considered to be taken into 'Islanding Scheme'. 5. As reported, on SPS operation 660 MW Lalitpur TPS - UNIT 1 & UNIT 2 tripped and generation of 660 MW Lalitpur TPS - UNIT 3 back downed to house load. In addition to that, 220kV lines to Jhansi and Babina (220kV Lalitpur) also tripped. 6. As per SCADA, generation loss of approx. 980MW at Lalitpur TPS is observed.	0	0	980	0	2.302	0.000	42576	47444	NA
7	GD-1	1) 220 KV Samba(PG)-Hiranagar(PDD) (PG) Ckt-1 2) 220 KV Samba(PG)-Hiranagar(PDD) (PDD JK) Ckt-2 3) 220kV Bishna – Hiranagar ckt 4) 220kV Ghatti – Hiranagar ckt 5) 220kV BUS 1 Hiranagar(JK PDD) 6) 220/132kV 200 MVA ICT 1 7) 220/132kV 120 MVA ICT2	J&K(UT) & Ladakh(UT)	POWERGRID,JKPTCL	16-Oct-22	04:31	16-Oct-22	05:38	01:07	1. At 04:31 hrs, R-N phase to earth fault occurred on 220kV Hiranagar-Ghatti ckt, fault distance was ~6.94km from Hiranagar end. As reported by NR-2 POWERGRID, fault distance was ~14km (~100%) from Sambha(PG) end. 2. On this fault, all the elements connected at 220kV Hiranagar(JK) tripped from Hiranagar end. 220 KV Samba(PG)-Hiranagar(PDD) (PG) Ckt-1 tripped from Sambha end on DT received from Hiranagar end and 220 KV Samba(PG)-Hiranagar(PDD) (PG) Ckt-2 didn't trip from Sambha end. 3. As per PMU at Sambha(PG), R-N phase to earth fault with delayed clearance in 320ms is observed. 4. As per SCADA, load loss of approx. 130MW observed in J&K(UT) & Ladakh(UT) control area.	0	0.145	0	130	0.000	0.331	30538	39282	320
8	GI-1	1) 220KV Bus 2 at Jamalpur(BB) 2) 220 KV Jamalpur(BB)-Sangrur(PS) (BB) Ckt-2 3) 220 KV Jamalpur(BB)-DandhariKalanI(PS) (PSTCL) Ckt-2 4) 220 KV Ganguwal-Jamalpur (BB) Ckt-2	Punjab	BBMB, PSTCL	19-Oct-22	22:38	20-Oct-22	00:32	01:54	1. During antecedent condition, 220 KV Jamalpur(BB)-Sangrur(PS) (BB) Ckt-2, 220 KV Jamalpur(BB)-DandhariKalanI(PS) (PSTCL) Ckt-2 and 220 KV Ganguwal-Jamalpur (BB) Ckt-2 were connected at 220kV Bus-2(C) and rest of the elements were connected at 220kV Bus-1 & Bus-2(B). 2. As reported at 22:38hrs, Y-ph bus fault occurred on 220kV Bus-2 (C) due to flashover on Y-phase insulator string of 220kV Bus sectionalizer (A-18). On this fault, bus bar protection of Bus-2 (C) operated which led to tripping of all 220kV feeders connected at 220kV Bus-2(C) and bus coupler breaker opened. 3. As per PMU at Bhakhra(BBMB), Y-N phase to earth fault which cleared within 120ms is observed. 4. As per SCADA, no load loss observed in Punjab control area as alternate feeders were intact.	0	0	0	0	0.000	0.000	35724	44753	120
9	GD-1	1) 220kV Hapur_765- Simbholi (UP) Ckt-2 2) 220kV Hapur_765- Simbholi(UP) Ckt-2 3) 220 KV Meerut(PG)-Simbholi(UP) (PG) Ckt-1 4) 220 KV NAPP(NP)-Simbholi(UP) (UP) Ckt-1 5) 220kV Hapur- Simbholi (UP) Ckt	Uttar Pradesh	UPPTCL, POWERGRID, NAPP	20-Oct-22	10:17	20-Oct-22	10:50	00:33	1. As reported at 10:17 hrs, B-N phase to earth fault occurred on 220kV Hapur-Simbholi (UP) ckt due to damage of polymer insulator of line, fault distance was 54.19km & ~5km and fault current was 2.4kA & 9.8kA from Simbholi & Hapur end respectively. 2. On this fault, distance protection operated at both ends. Line tripped from Hapur end but due to failure of mechanical mechanism of breaker at Simbholi end, B-ph pole of breaker got stuck and hence line didn't trip from Simbholi end. 3. As breaker of 220kV Hapur-Simbholi (UP) ckt at Simbholi end didn't open, LBB of this CB operated. However, due to defective wiring between busbar protection & LBB line protection, the CBF (Circuit Breaker Failure) initiation wasn't detected by busbar protection and busbar could not operate. Hence all 220 kV lines emanating from Simbholi S/s tripped from remote end in zone 2. 4. As per PMU, B-N phase to earth fault with delayed clearance in 640msec is observed. 5. As per SCADA, change in demand of approx. 50MW is observed in UP control area.	0	0.035	0	65	0.000	0.136	44515	47639	640

S.No.	Category of Grid Disturbance	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Outage Duration (hh:mm)	Event (As reported)	Energy Unserved due to Generation loss (MU)	Energy Unserved due to Load loss (MU)	Loss of generation / loss of load during the Grid Disturbance		% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance		Antecedent Generation/Load in the Regional Grid		Fault Clearance time (in ms)
	(GD-I to GD-V)				Date	Time	Date	Time					Generation Loss(MW)	Load Loss (MW)	% Generation Loss(MW)	% Load Loss (MW)	Antecedent Generation (MW)	Antecedent Load (MW)	
10	GD-1	1) 400/220 kV 315 MVA ICT 1 at Kashipur(UK) 2) 400/220 kV 315 MVA ICT 2 at Kashipur(UK) 3) 220 KV Pantnagar(UK)-Bareilly(UP) (UP) Ckt-1 4) 220 KV Kashipur-Pantnagar(UK) Ckt 5) 220 KV Kashipur-Jafarpur(UK) Ckt 6) 132 KV Almora-Bhowali(UK) Ckt	Uttarakhand	PTCUL, UPPTCL	24-Oct-22	13:39	24-Oct-22	14:16	00:37	1. As reported at 13:39 hrs, Y-phase conductor of 220 KV Kashipur-Jafarpur(UK) Ckt (220 KV Kashipur-Pantnagar(UK) Ckt-2 LILO at Jafarpur) broke from gantry at Kashipur end and got in contact with top cover of CT hence created bus fault on 220kV Bus at Kashipur(UK). 2. As per PMU, Y-B fault which further converted into R-Y-B fault with delayed clearance of 1800ms is observed. 3. On this fault, 220 KV Kashipur-Jafarpur(UK) Ckt tripped on distance protection operation in Z-1 but as fault had converted into bus fault and bus bar protection is not in service at 400/220kV Kashipur S/s, 400/220 kV 315 MVA ICT 1 & ICT 2 at Kashipur(UK) tripped on overcurrent protection operation. At the same time, 220 KV Pantnagar(UK)-Bareilly(UP) (UP) Ckt-1 (Z-3 time delay 800ms) and 220 KV Kashipur-Pantnagar(UK) Ckt (Z-3 time delay 1000ms) tripped from remote end on distance protection operation in Z-3. 4. As reported, bus bar protection is not in service at 400/220kV Kashipur(Utt) S/s. 5. With the tripping of aforementioned elements, all load of Haldwani and Pantnagar shifted on 132kV Almora-Bhowali due to which it got overloaded and tripped on over-current protection after approx. 5sec of occurrence of fault. 6. As per SCADA, change in demand of approx. 210MW is observed in Uttarakhand control area.	0	0.13	0	210	0.000	0.532	38998	39507	1800
11	GD-1	1) 220kV/132kV 150MVA ICT-3 at Pampore 2) 220kV/132kV 150MVA ICT-1 at Pampore 3) 220kV/132kV 150MVA ICT-2 at Pampore	J&K	JKPTCL	26-Oct-22	08:42	26-Oct-22	09:01	00:19	1. As reported at 08:42 hrs, 220kV/132kV 150MVA ICT-3 at Pampore tripped on over current protection operation due to overloading, load was connected at 132kV level without proper communication which led to the sudden increase in loading of ICTs at Pampore. 2. With the tripping of ICT-3, 220kV/132kV 150MVA ICT-1 & ICT-2 also tripped on over current protection operation. 3. As per PMU, no fault is observed in system. 4. As per SCADA, change in load of approx. 480MW occurred in J&K control area.	0	0.15	0	480	0.000	1.173	35679	40922	NA
12	GD-1	1) 400KV Bus 2 at Rampur HEP(SJ) 2) 68.67 MW Rampur HEP - UNIT 2 3) 68.67 MW Rampur HEP - UNIT 4 4) 68.67 MW Rampur HEP - UNIT 6 5) 400 KV Rampur HEP(SJ)-Nallagarh(PG) (PG) Ckt-2 6) 400 KV Nathpa Jhakri(SJ)-Rampur HEP(SJ) (PG) Ckt-2	Himachal Pradesh	SJVN	26-Oct-22	16:39	26-Oct-22	17:29	00:50	1. During antecedent condition, 68.67 MW Rampur HEP - UNIT 1, 400 KV Rampur HEP(SJ)-Nallagarh(PG) (PG) Ckt-1 & 400 KV Nathpa Jhakri(SJ)-Rampur HEP(SJ) (PG) Ckt-1 were connected at 400kV Bus-1 at Rampur GIS and 68.67 MW Rampur HEP - UNIT 4 & UNIT 6, 400 KV Rampur HEP(SJ)-Nallagarh(PG) (PG) Ckt-2 & 400 KV Nathpa Jhakri(SJ)-Rampur HEP(SJ) (PG) Ckt-2 were connected at 400kV Bus-2 at Rampur GIS. 2. 68.67 MW Rampur HEP - UNIT 2 was having schedule from 16:30hrs. At 16:39 hrs, while charging 68.67 MW Rampur HEP - UNIT 2, flashover occurred on B-ph of CB compartment of 68.67 MW Rampur HEP - UNIT 2. 3. As fault was in bus bar zone, bus bar protection of 400kV bus-2 operated which led to the tripping of all the elements connected at 400kV Bus-2 at Rampur GIS. 4. As per PMU, B-N phase to earth fault which cleared within 80ms is observed. 5. As reported by Rampur (SJVN), draeger tube test was conducted and the presence of SO2 particles found at B phase of circuit breaker compartment of 68.67 MW Rampur HEP - UNIT 2. After detecting the fault, faulty bay of UNIT 2 was isolated and remaining tripped system was restored successfully. 6. As per SCADA, generation loss of approx. 145MW occurred at Rampur HPS.	0	0	145	0	0.417	0.000	34740	38097	80

S. No.	Name of Transmission Element Tripped	Owner/ Utility	Outage		Load Loss/ Gen. Loss	Brief Reason (As reported)	Category as per CEA Grid standards	# Fault Clearance Time (>100 ms for 400 kV and 160 ms for 220 kV)	*FIR Furnished (YES/NO)	DR/EL provided in 24 hrs (YES/NO)	Other Protection Issues and Non Compliance (inference from PMU, utility details)	Suggestive Remedial Measures	Remarks
			Date	Time									
1	132 KV Rihand(UP)-Garwa(JS) (UP) Ckt-1	UPPTCL	28-Oct-22	5:31	Nil	B-N fault, Zone-1, Fault current 1.282kA from Rihand(UP).	NA	NA	yes	yes (After 24 hrs)			
2	132 KV Rihand(UP)-Garwa(JS) (UP) Ckt-1	UPPTCL	4-Oct-22	22:47	Nil	Phase to earth fault Y-N	NA	NA	yes	yes			
3	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	POWERGRID	9-Oct-22	18:32	Nil	R-N fault, Zone-1, Dist. 21.51km, Fault current 5.648kA from Auraiya and Zone-1, Dist. 109.60km from Malanpur.	NA	NA	yes	yes	A/R operation		
4	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	POWERGRID	8-Oct-22	21:03		Phase to earth fault R-N	NA	NA	yes	yes	A/R operation		
5	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	POWERGRID	16-Oct-22	7:03	Nil	Phase to earth fault R-N	NA	NA	yes	yes (After 24 hrs)	A/R operation		
6	220 KV Auraiya(NT)-Mehgaon(MP) (MPSEB) Ckt-1	POWERGRID	12-Oct-22	5:52	Nil	B N phase Zone- I Loc. 67.73 km, faulty current B 2502 A , From auraiya end	NA	NA	yes	yes	A/R operation		
7	220 KV Auraiya(NT)-Mehgaon(MP) (MPSEB) Ckt-1	POWERGRID	11-Oct-22	2:32	Nil	Phase to earth fault R-N	NA	NA	yes	yes	A/R operation		
8	765 KV Orai-Jabalpur (PG) Ckt-1	POWERGRID	4-Oct-22	16:04	Nil	Phase to earth fault B-N	NA	NA	yes	yes (After 24 hrs)			

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

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

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

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

Reporting of Violation of Regulation for various issues for above tripping

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

Status of submission of FIR/DR/EL/Tripping Report on NR Tripping Portal

Time Period: 1st October 2022 - 31st October 2022

S. No.	Utility	Total No. of elements tripped	First Information Report (Not Received)		Disturbance Recorder (Not Received)	Disturbance Recorder (NA) as informed by utility	Disturbance Recorder (Not Received)	Event Logger (Not Received)	Event Logger (NA) as informed by utility	Event Logger (Not Received)	Tripping Report (Not Received)	Tripping Report (NA) as informed by utility	Tripping Report (Not Received)	Remark
			Value	%	Value		%	Value		%	Value		%	
1	ACME_HEERGARH	1	1	100	1	0	100	1	0	100	1	0	100	DR/EL & Tripping report needs to be submitted
2	ANTA-NT	2	0	0	1	0	50	1	0	50	0	0	0	
3	AURAIYA-NT	7	0	0	1	0	14	1	0	14	1	0	14	DR/EL & Tripping report needs to be submitted
4	BBMB	24	12	50	12	2	55	13	8	81	12	1	52	
5	CPCC1	38	0	0	0	3	0	0	4	0	0	1	0	
6	CPCC2	24	0	0	0	4	0	0	4	0	0	1	0	
7	CPCC3	29	8	28	7	3	27	7	3	27	10	0	34	DR/EL & Tripping report needs to be submitted
8	INDIGRID	1	0	0	0	0	0	0	0	0	0	1	0	
9	KOLDAM-NT	1	1	100	1	0	100	1	0	100	1	0	100	DR/EL & Tripping report needs to be submitted
10	NAPP	6	0	0	0	0	0	0	0	0	0	0	0	
11	NJPC	1	0	0	0	0	0	0	0	0	0	0	0	
12	PARBATI-II-NH	3	0	0	0	2	0	0	1	0	0	0	0	
13	RAMPUR	4	0	0	0	0	0	0	0	0	0	0	0	
14	RAPPA	9	8	89	8	0	89	9	0	100	9	0	100	DR/EL & Tripping report needs to be submitted
15	RAPPB	2	0	0	0	0	0	0	0	0	0	0	0	
16	RAPPC	1	0	0	0	0	0	0	0	0	0	0	0	
17	SALAL-NH	1	0	0	0	0	0	0	0	0	0	0	0	
18	SINGRAULI-NT	1	0	0	0	0	0	0	0	0	0	0	0	
19	SLDC-CHD	1	1	100	1	0	100	1	0	100	1	0	100	DR/EL & Tripping report needs to be submitted
20	SLDC-DV	15	1	7	4	4	36	4	4	36	7	1	50	
21	SLDC-HP	6	0	0	0	4	0	0	5	0	0	0	0	
22	SLDC-HR	13	1	8	1	0	8	0	1	0	0	0	0	
23	SLDC-JK	7	1	14	7	0	100	7	0	100	7	0	100	
24	SLDC-PS	26	6	23	11	6	55	12	2	50	24	0	92	

Status of submission of FIR/DR/EL/Tripping Report on NR Tripping Portal

Time Period: 1st October 2022 - 31st October 2022

S. No.	Utility	Total No. of elements tripped	First Information Report (Not Received)		Disturbance Recorder (Not Received)	Disturbance Recorder (NA) as informed by utility	Disturbance Recorder (Not Received)	Event Logger (Not Received)	Event Logger (NA) as informed by utility	Event Logger (Not Received)	Tripping Report (Not Received)	Tripping Report (NA) as informed by utility	Tripping Report (Not Received)	Remark
			Value	%	Value		%	Value		%	Value		%	
25	SLDC-RS	40	2	**5**	11	1	**28**	11	0	**28**	14	0	**35**	DR/EL & Tripping report needs to be submitted
26	SLDC-UK	24	0	**0**	1	12	**8**	4	14	**40**	3	0	**13**	
27	SLDC-UP	243	56	**23**	66	28	**31**	66	27	**31**	68	10	**29**	
28	INDIGRID	2	1	**50**	1	0	**50**	1	0	**50**	1	1	**100**	
29	TANDA-NT	3	3	**100**	3	0	**100**	3	0	**100**	3	0	**100**	
30	TEHRI	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	
31	UNCHAHAR-NT	7	2	**29**	2	1	**33**	2	0	**29**	2	0	**29**	
32	TANAKPUR-NH	2	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	
33	TATAPOWER	1	0	**0**	0	0	**0**	0	0	**0**	1	0	**100**	DR/EL & Tripping report needs to be submitted
Total in NR Region		**546**	**105**	**19**	**140**	**70**	**29**	**145**	**73**	**31**	**166**	**16**	**31**	

As per the IEGC provision under clause 5.2 (r), detailed tripping report along with DR & EL has to be furnished within 24 hrs of the occurrence of the event

S. No.	Name of the Generatng Station (Capacity in MW)	Date of last PSS tuning / re-tuning performed (in DD/MM/YYYY format)	Date of last Step Response Test performed (in DD/MM/YYYY format)	Report submitted to NRLDC/NRPC (Yes/ No)	Remarks (if any)	Tentative schedule for PSS tuning / re-tuning in FY 2021-22
1	**THDC**					
	TEHRI HPS(4 * 250)	15.12.2021 to 20.12.2021	15.12.2021 to 20.12.2021	Yes	(Report shared vide email dt.19.01.2019)	
	KOTESHWAR HPS(4 * 100)	17/03/2019 to 19/03/2019	17/03/2019 to 19/03/2019	Yes	(Report shared vide email dt.11.02.2021)	
2	**SJVNL**					
	NATHPA-JHAKRI HPS(Unit1 #250)	10.03.2020	-	No	Excitation system upgraded in 2020	
	NATHPA-JHAKRI HPS(Unit2 #250)	14.03.2013	-	No	The existing excitation system is very old and obsoleted forwhich support for PSS tuning is not available from OEM (Mls Voith Hydro), although NJHPS, SJVN has placed work order on 08/12/201 5. Further being the critical component, it is not possible"io get the PSS tuning done from any other vender except OEM (Mls Voith Hydro) being the system and software specific job. Therefore, prpposal for upgradation of the excitation system of this unit is under process and PSS tuning shall be carried out during upgradation of excitation system.	3rd Quarter
	NATHPA-JHAKRI HPS(Unit3 #250)	03.03.2020	-	No	Excitation system upgraded in 2020	
	NATHPA-JHAKRI HPS(Unit4 #250)	14.03.2013	-	NO	The existing excitation system is very old and obsoleted forwhich support for PSS tuning is not available from OEM (Mls Voith Hydro), although NJHPS, SJVN has placed work order on 08/12/201 5. Further being the critical component, it is not possible"io get the PSS tuning done from any other vender except OEM (Mls Voith Hydro) being the system and software specific job. Therefore, prpposal for upgradation of the excitation system of this unit is under process and PSS tuning shall be carried out during upgradation of excitation system.	3rd Quarter
	NATHPA-JHAKRI HPS(Unit5 #250)	14.05.2016	14.05.2016	NO	Excitation system upgraded in 2013	3rd Quarter
	NATHPA-JHAKRI HPS(Unit6 #250)	14.05.2017	14.05.2017	NO	Excitation system upgraded in 2013	3rd Quarter
	RAMPUR HEP(6 * 68.67)	29.11.2014	27.10.2020,10.02.2021	YES	PSS tuning was done at the time of commissioning of Excitation System by OEM (M/s BHEL). Since then response of PSS is checked regularly and found satisfactory.	
3	**HVPNL**					
	PANIPAT TPS(unit1# 250)	29.03.2016	29.03.2016	YES	--	3rd Quarter
	PANIPAT TPS(unit2# 250)	15.01.2018	15.01.2018	YES	--	3rd Quarter
	DCRTPP (YAMUNA NAGAR)(unit1#300)	19-12-2018	19-12-2018	YES	(Report attached)	3rd Quarter
	DCRTPP (YAMUNA NAGAR)(unit1#300)	Will be carried out shortly				
	RGTPP(KHEDAR) (2*600)	5th to 6th July 2013	5th to 6th July 2013	Report attached. Previous record being looked into	No MW capacity addition after 2013 at RGTPP Khedar. No new line addition in vicinity of station	
	JHAJJAR(CLP) (2*660)	20-05-2017	20-05-2017	YES	--	3rd Quarter
4	**NTPC**					
	Rihand (Unit1#500)	03-03-2017	03-03-2017	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	Rihand (Unit2#500)	02-07-2016	02-07-2016	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	Rihand (Unit3#500)	15-08-2015	15-08-2015	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	Rihand (Unit4#500)	25-05-2017	25-05-2017	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	Rihand (Unit4#500)	11-12-2014	11-12-2014	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	Rihand (Unit5#500)	11-12-2014	11-12-2014	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	SINGRAULI STPS(Unit1#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit2#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit3#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit4#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit5#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit6#500)	02.05.2018	02.05.2018	NO	--	3rd Quarter
	SINGRAULI STPS(Unit7#500)	15.07.2018	15.07.2018	NO	--	3rd Quarter

	UNCHAHAR I(2 * 210)	29-03-2016	29-03-2016	YES	--	3rd Quarter
	UNCHAHAR II TPS(unit1# 210)	13-07-2019	13-07-2019	YES	--	
	UNCHAHAR II TPS(unit2# 210)	10-08-2018	10-08-2018	YES	--	3rd Quarter
	UNCHAHAR UNIT6#500	-	31.03.2017	YES	--	3rd Quarter
	KOLDAM HPS(4 * 200)	01-07-2015	01-07-2015	YES	--	3rd Quarter
	DADRI GPS(2 * 154.51) (ST- Steam Turbine)	-	18-11-2015	YES	--	3rd Quarter
	ANTA GPS(3 * 88.71)(GT- Gas Turbine)	08-08-2014	08-08-2014	YES	--	3rd Quarter
	ANTA GPS(1 * 153.2)(ST- Steam Turbine)	08-08-2014	08-08-2014	YES	--	3rd Quarter
5	**Aravali Power Company Private Ltd**					
	ISTPP (JHAJJAR)(3 * 500)	-	25-08-2015	YES	--	3rd Quarter
6	**NHPC**					
	CHAMERA HPS (3*180)	06-08-2020	27-12-2019	YES	--	
	CHAMERA II HPS(3 * 100)	11-10-2015	11-10-2015	NO	Replacement of Excitation system in two units	3rd Quarter
	CHAMERA III HPS(Unit1#77)	29-10-2015	07-01-2012	YES	--	3rd Quarter
	CHAMERA III HPS(Unit2,3#77)	29-10-2015	19-06-2012	YES	--	3rd Quarter
	PARBATI III HEP (Unit1# 130)	21-01-2016	21-01-2016	YES	Have been done recetly. The report on PSS turning shall be submitted seperately.	3rd Quarter
	DULHASTI HPS(Unit2#130)	21-01-2020	21-01-2020	YES	--	
	DULHASTI HPS(Unit1#130)	29-12-2019	29-12-2019	YES	--	
	URI HPS(Unit3# 120)	10-01-2021	10-01-2021	YES	--	
	URI HPS(Unit4# 120)	15-02-2021	15-02-2021	YES	--	
	URI HPS(Unit2# 120)	07-03-2016	07-03-2016	YES	--	3rd Quarter
	URI-II HPS(4 * 60)	Mar-14	Mar-14		Re-tunning& Step response test shall be carriedout in 2021-22	
	SALAL HPS (Unit-3,4,5,6 # 115)	16-12-2014	16-12-2014	YES	--	3rd Quarter
	KISHANGANGA(3 * 110)	18-05-20 18	18-05-20 18	YES	--	3rd Quarter
	BAIRASIUL HPS(3 * 60)	30-07-2015	30-07-2016	YES	--	3rd Quarter
	SEWA-II HPS(3 * 40)	09-07-2016	09-07-2016	YES	--	3rd Quarter
	PARBATI III HEP(4 * 130)	16-12-2016	16-12-2016	YES	--	3rd Quarter
	TANAKPUR HPS(Unit1# 31.42)	09-01-2015	09-01-2015	YES	--	3rd Quarter
	TANAKPUR HPS(Unit2,3#31.4)	24-05-2014	24-05-2014	YES	--	3rd Quarter
	DHAULIGANGA HPS(Unit1 ,2# 70)	04-05-2014	17-04-2018	YES	--	3rd Quarter
	DHAULIGANGA HPS(Unit3,4# 70)	26-06-2014	17-04-2018	YES	--	3rd Quarter
7	**PUNJAB**					
	RAJPURA(NPL) TPS(2 * 700)	22-04-2014	22-04-2014	YES	--	3rd Quarter
8	**Rajasthan**					
	KAWAI TPS(Unt1# 660)	08-08-2014	08-08-2014	YES	--	3rd Quarter
	KAWAI TPS(Unt2# 660)	09-10-2014	09-10-2014	YES	--	3rd Quarter
	CHHABRA TPS(Unit 1#250)	22-05-2018	22-05-2018	NO	--	3rd Quarter
	CHHABRA TPS(Unit 2,3,4#250)	04-10-2015	04-10-2015	NO	--	3rd Quarter
	CHHABRA TPS(Unit5# 660)	10-02-2016	10-02-2016	YES	--	3rd Quarter
	CHHABRA TPS(Unit6# 660)	7/28/2018	7/28/2018	YES	--	3rd Quarter
	KALISINDH TPS(Unit1# 600)	10-02-2016	10-02-2016	YES	--	3rd Quarter
	KALISINDH TPS(Unit2# 600)	08-02-2016	08-02-2016	YES	--	3rd Quarter
	KOTA TPS(Unit1#110)	PSS tuning and step response test of Unit#1,2,3,4,6&7 were sucessfully done on 02.03.22 to 04.03.22		YES		3rd Quarter
	KOTA TPS(Unit2#110)				--	3rd Quarter
	KOTA TPS(Unit3#195)				--	
	KOTA TPS(Unit4#195)				--	
	KOTA TPS(Unit6#110)				--	3rd Quarter
	KOTA TPS(Unit7#110)				--	3rd Quarter
	SURATGARH TPS (Unit5#250)	14-03-2022	14-03-2022	Yes	--	3rd Quarter
	SURATGARH TPS (Unit2,4#250)	06-06-2022		Yes	--	
	SURATGARH TPS (Unit1,3,,6#250)	05.02.22 & 06.02.22		Yes	--	
	SURATGARH SSCTPS (Unit 7&8)	PSS tuning and step response test of Unit#7&8 were carried out on 28.11.20 & 30.03.21.				
	RAJWEST (IPP) LTPS(Unit1# 135)	26-04-2016	26-04-2016	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit2# 135)	14-07-2016	14-07-2016	No	--	3rd Quarter

	RAJWEST (IPP) LTPS(Unit3# 135)	03-01-2014	03-01-2014	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit4# 135)	03-11-2015	03-11-2015	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit5# 135)	21-09-2014	21-09-2014	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit6# 135)	14-08-2014	14-08-2014	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit7# 135)	20-02-2016	20-02-2016	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit8# 135)	11-06-2014	11-06-2014	No		3rd Quarter
9	**UTTAR PRADESH**					
	ANPARA-C TPS(Unit1# 600)	22-08-2015	22-08-2015	Yes	--	3rd Quarter
	ANPARA-C TPS(Unit2# 600)	08-03-2016	08-03-2016	Yes	--	3rd Quarter
	ROSA TPS(Unit1 #300)	05-10-2021	05-10-2021	Yes	--	
	ROSA TPS(Unit2# 300)	18/2/2018	18/2/2018	Yes	--	4th Quarter
	ROSA TPS(Unit3 # 300)	03-02-2017	03-02-2017	Yes	--	4th Quarter
	ROSA TPS(Unit4# 300)	05-10-2021	05-10-2021	Yes	--	
	Anpara-A (Unit1#210)	27.09.2021	27.09.2021	Yes	--	
	Anpara-A(Unit2#210)	27.09.2021	27.09.2021	Yes	--	
	Anpara-A(Unit3#210)	25.09.2020	25.09.2020	Yes	--	
	Anpara-B(Unit4#500)	07.12.2014	07.12.2014	Yes		3rd Quarter
	Anpara-B (Unit5#500)	17.08.2014	Dec., 2019	Yes	--	
	Anpara-D(Unit6#500)	15.11.2016	15.11.2016	No	--	3rd Quarter
	Anpara-D (Unit7#500)	15.04.2017	15.04.2017	No	--	3rd Quarter
	Obra-B(Unit9#200)	22.03.2016	22.03.2016	Yes	Report enclosed.	3rd Quarter
	Obra-B(Unit10#200)	28.06.2016	20.06.2016	Yes	Report enclosed.	3rd Quarter
	Obra-B (Unit11#200)	21.01.2017	21.01.2017	Yes	Report enclosed.	3rd Quarter
	Obra-B (Unit12#200)	Unit taken on load after R&M on 22		-	PSS tuning and SRT scheduled in April, 2021.	
	Obra-B(Unit13#200)	Unit closed under R&M.		-	PSS tuning and SRT scheduled in April, 2021.	
	Parichha-B(Unit3#210)	08.01.2016	08.01.2016	Yes	--	3rd Quarter
	Parichha-B (Unit4#210)	08.01.2016	08.01.2016	Yes	--	3rd Quarter
	Parichha-C (Unit5#250)	08.02.2020	08.02.2020	No	--	
	Parichha-C(Unit3#250)	09.01.2016	09.01.2016	No	--	3rd Quarter
	Harduaganj (Unit8#250)	20.08.2015	20.08.2015	No	--	3rd Quarter
	Harduaganj (Unit3#250)	13.04.2016	13.04.2016	No	--	3rd Quarter
	Harduaganj(Unit7#105)	16.07.2021	16.07.2021	yes	--	
	Harduaganj(Unit9#250)	16.07.2021	16.07.2021	yes	--	
	LALITPUR TPS(Unit1# 660)	23.02.2022	23.02.2022	yes	--	
	LALITPUR TPS(Unit2# 660)	30.03.2021	30.03.2021	yes	--	
	LALITPUR TPS(Unit3# 660)	15.01.2022	15.01.2022	yes	--	
	ALAKNANDA HEP(Unit1# 82.5)	12.072017	12.072017	No	--	3rd Quarter
	ALAKNANDA HEP(Unit2# 82.5)	12.072017	12.072017	No	--	3rd Quarter
	ALAKNANDA HEP(Unit3# 82.5)	12.072017	12.072017	No	--	3rd Quarter
	ALAKNANDA HEP(Unit4# 82.5)	12.072017	12.072017	No	--	3rd Quarter
	MEJA TPS(Unit1#660)	16.10.2018	05.09.2017	yes	--	3rd Quarter
	MEJA TPS(Unit2#660)	16.01.2021	18.05.2020	yes	--	
	Bara Unit#1				Step test for PSS checking was not performed since commissioning by erstwhile owner as per information available. PSS tuning along with step test will be performed in next AOH (May 2022 or planned shutdown)	
	Bara Unit#2	01.02.2022	01.02.2022	Yes		
	Bara Unit#3				Step test for PSS checking was not performed since commissioning by erstwhile owner as per information available. PSS tuning along with step test will be performed in next AOH (May 2022 or planned shutdown)	
	Vishnuprayag Unit#1	06/02/2021	06/02/2021	Submitted in the prescribed format provided by NRLDC to SE (R&A)		
	Vishnuprayag Unit#2	06/04/2021	06/04/2021			
	Vishnuprayag Unit#3	06/04/2021	06/04/2021			
	Vishnuprayag Unit#4	05/02/2021	05/02/2021			
10	**BBMB**					

	BHAKRA HPS(Unit1#108)	--	--	No	PSS is not provided ,shall be provided in ongoing RM&U	
	BHAKRA HPS(Unit1#108)	24.07.2015	24.07.2015	No	--	3rd Quarter
	BHAKRA HPS(Unit3#126)	--	--	No	PSS is not provided ,shall be provided in ongoing RM&U	
	BHAKRA HPS(Unit4#126)	--	--	No	--	
	BHAKRA HPS(Unit5#126)	--	--	No	--	
	BHAKRA HPS(Unit6#157)	--	--	No	The original Rusian excitation system is under replacement PO issued Hence,PSS not got tuned.	
	BHAKRA HPS(Unit7#157)	--	--	No	The original Rusian excitation system is under replacement PO issued Hence,PSS not got tuned.	
	BHAKRA HPS(Unit7#157)	--	--	No	The original Rusian excitation system is under replacement PO issued Hence,PSS not got tuned.	
	BHAKRA HPS(Unit7#157)	18.02.2016	18.02.2016	No	--	3rd Quarter
	BHAKRA HPS(Unit7#157)	18.02.2017	18.02.2017	No	--	3rd Quarter
	DEHAR HPS(Unit#1 165)	08.08.2017	08.08.2017	No	--	3rd Quarter
	DEHAR HPS(Unit#2 165)	08.08.2018	08.08.2018	No	--	3rd Quarter
	DEHAR HPS(Unit#3 165)	08.08.2019	08.08.2019	No	--	
	DEHAR HPS(Unit#4 165)	02.07.2017	02.07.2017	No	--	3rd Quarter
	DEHAR HPS(Unit#5 165)	08.08.2019	08.08.2019	No	--	
	DEHAR HPS(Unit#6 165)	02.07.2017	02.07.2017	No	--	3rd Quarter
	PONG HPS(6 * 66)	--	--	--	PSS not provided.RM&U agenda under considration.	