सत्यमेव जयते

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

सं. उक्षेविस/ वाणिज्यिक/ 209/ आर पी सी (61वीं)/2022/12488-12535 दिनाँक: 20 दिसंबर 2022

सेवा में / To,

उ.क्षे.वि.स. के सभी सदस्य (संलग्न सूचीनुसार)
Members of NRPC (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 61वीं बैठक की कार्यसूची ।
Subject: Agenda for 61st meeting of Northern Regional Power Committee-reg

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 61वीं बैठक दिनांक **26 दिसंबर 2022** को **1100** बजे विडियो कोंफ्रेंसिंग के माध्यम से आयोजित की जाएगी । बैठक की कार्यसूची संलग्न है। बैठक का लिंक एंव पासवर्ड नियत समय पर ईमेल द्वारा उपलब्ध करा दिया जायेगा ।

The 61st meeting of Northern Regional Power Committee (NRPC) will be held at **1100 Hrs** on **26 December 2022** via video conferencing. Agenda for the same is attached. The link and password for joining the meeting shall be sent in due course of time.

भवदीय
Yours faithfully,

(नरेश भंडारी) 20/12/22
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

-18ए, शहीद जीत सिंह मार्ग ,कटवारिया सराय, नई दिल्ली110016 - फोन:011-26513265 ई-मेल: ms -nrpc@nic.in वेबसाईट: www.nrpc.gov.in
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016 Phone: 011-26513265 e- mail: ms-nrpc@nic.in Website: www.nrpc.gov.in

List of NRPC Members

1. Chairperson, NRPC & CMD, Delhi Transco Limited (DTL), Shakti Sadan, Kotla Marg, New Delhi-110002
2. MD, PTCUL, Dehradun-248001, (Fax- 0135-2764496)
3. MD, UPPTCL, Lucknow-226001, (Fax-0522-2287792)
4. CMD, RRVPNL, Jaipur-302005, (Fax -01412740168)
5. Member (GO&D), CEA, New Delhi, (Fax-011-26108834)
6. CMD, PSTCL, Patiala-147001, (Fax-0175-2307779)
7. Commissioner/Secretary, PDD, J&K, Jammu, (Fax-0191- 2545447/ 01942452352)
8. Managing Director, HVPN Ltd, Panchkula -134109 (Fax-0172-2560640)
9. Chairman, BBMB, Chandigarh-160019, (Fax-0172-2549857/2652820)
10. Chief Engineer, UT of Chandigarh, Chandigarh-160066, (Fax-0172-2637880)
11. Managing Director, DTL, New Delhi-110002, (Fax-011-23234640)
12. General Manager, SLDC, DTL, New Delhi-110002, (Fax-011-23221069)
13. Managing Director, IPGCL, New Delhi-110002, (Fax-011-23275039)
14. Chief Engineer (SO&C), SLDC, HVPNL, Panipat, (Fax-0172-2560622/2585266)
15. Managing Director, HPGCL, Panchkula-134109, (Fax-0172-5022400)
16. Representative of DHBVNL (Haryana Discom)
17. Managing Director, HPSEB Ltd, Shimla -171004 (Fax-0177-2658984)
18. Managing Director, HPPTC Ltd, Himfed Bhawan, Shimla-171005, (Fax-0177-2832384)
19. Managing Director, HPSLDC, HP State Load Despatch Authority, Totu, Shimla, (Fax-0177-2837649)
20. Managing Director, J&K State Power Dev. Corp., Srinagar, J&K, (Fax-0194-2500145)
21. Chairman and Managing Director, PSPCL, Patiala-147001, (Fax-0175-2213199)
22. Chief Engineer (LD), SLDC, Heerapur, Jaipur-302024, (Fax-0141-2740920)
23. CMD, RRVUNL, Jaipur-302005, (Fax-0141-2740633)
24. Representative of JVVNL (Rajasthan Discom)
25. Managing Director, SLDC, UPPTCL, Lucknow-226001, (Fax-0522-2287792)
26. Managing Director, UPRVUNL, Lucknow-226001, (Fax-0522-2288410)
27. Representative of MVVNL (UP Discom)
28. Managing Director, SLDC, PTCUL, Rishikesh, (Fax-0135-2451160)
29. Managing Director, UJVNL, Dehradun-248001, (Fax-0135-2763507)
30. Managing Director, UPCL, Dehradun-248001, (Fax-0135-2768867/2768895)
31. Director (Technical), NHPC, Faridabad-121003, (Fax-0129-2258025)
32. Director (Finance), NPCIL, Mumbai-400094, (Fax-022-25563350)
33. Director (Commercial), NTPC, New Delhi-110003, (Fax-011-24368417)
34. Representative of CTUIL, Gurgaon-122001
35. CMD, SJVNL, New Delhi, (Fax-011-41659218/0177-2660011)
36. Director (Technical), THDC, Rishikesh-249201, (Fax-0135-2431519)
37. Director (Commercial), POSOCO, New Delhi-110016, (Fax-011-26560190)
38. ED, NRLDC, New Delhi-110016, (Fax-011-26853082)
39. CEO, Aravali Power Company Pvt. Ltd., NOIDA, (Fax-0120-2591936)
40. CEO, Jhajjar Power Ltd., Haryana, (Fax-01251-270105)
41. Representative of Lanco Anpara Power Ltd., (Fax-124-4741024)
42. Station Director, Rosa Power Supply Company Ltd., (Fax-05842-300003)
43. Director and head regulatory and POWER Sale, JSW Energy Ltd., New Delhi (Fax- 48178740)
44. COO, Adani Power Rajasthan Ltd., Ahmedabad-380006 (Fax No- 07925557176)
45. COO, Talwandi Sabo Power Ltd. Distt: Mansa, Punjab-151302(Fax: 01659248083)
46. MD, Lalitpur Power Generation Company Ltd., Noida-201301(Fax: 01204045100/555, 2543939/40)
47. Director (Commercial & Operations), PTC India Ltd., New Delhi (Fax- 01141659144,41659145)
48. CEO, Nabha Power Limited, (Fax: 01762277251 / 01724646802)
49. Representative of Prayagraj Power Generation Co. Ltd.
50. Representative of Greenko Budhil Hydro Power Private Limited (Member IPP<1000 MW)
51. Representative of TPDDL (Delhi Private Discom)

Special Invitee:

i. Member Secretary, WRPC, Mumbai-400 093.
ii. Member Secretary, SRPC, Bangalore-560 009
iii. Member Secretary, ERPC, Kolkata-700 033.
iv. Member Secretary, NERPC, Shillong-793 003.
v. RE Generators/Holding companies as per mail list.

Contents

उत्तरी क्षेत्रीय विद्युत समिति की 61वीं बैठक

61st MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of NRPC meeting: 11:00 HRS; 26 December 2022

Venue: Video Conferencing

AGENDA

A.1 Approval of MoM of 60th NRPC meeting

A.1.1 Minutes of 60th NRPC meeting (held on 30.11.2022) has been issued vide letter dtd. 08.12.2022. No comment has been received till the date.

Members may kindly approve.

A.2 Disbursement of encashed CBG amount to DICs pending settlement of legal disputes on relinquishment charges (agenda by CTUIL)

A.2.1 CTUIL, in his letter dated 14.12.2022 (**Annexure-I**) apprised to NRPC Sectt. that in line with CERC order dated 08.03.2019 passed in petition No. 92/MP/ 2015, CTU calculated relinquishment charges for LTAs relinquished by various generators and uploaded the same on its website from time to time. However, the relinquishment charges computed and notified by CTU in line with above CERC Order 08.03.2019 in Petition No. 92/MP/2015 was disputed by more than 20 relinquishing IPPs, who had filed appeals in APTEL which are pending adjudication. In view of pending disputes and GST issues concerning the raising invoices, CTU issued demand letters to concerned relinquishing LTA customers pending disposal of appeals in APTEL.

A.2.2 During the proceedings in the matter, APTEL vide its order dated 08.10.2020 in appeal no. 251 of 2019, had restrained CTU from raising invoices with respect to the relinquishment charges during pendency of similar Appeals except where insolvency proceedings are faced by the generators. All the appeals on the relinquishment charges are yet to be decided as on date and matter is being pursued by CTU. Further, where the IPPs are undergoing insolvency proceedings, CTU had filed claims before RPs/Liquidators for recovery of relinquishment charges.

A.2.3 Meanwhile, CTU encashed the CBGs of some of the IPPs who have abandoned their projects or undergoing insolvency proceedings and the encashed BG amount of approx. Rs 400 Crores was kept in FDs since the legal proceedings on relinquishment charges are still to be concluded and the BG amount may have to be refunded to IPPs along with interest in case of judgements in their favour in future.

A.2.4 The status of relinquishment charges and treatment of encashed BG amount has been reviewed in recent 42nd SRPC meeting held in Jun'22 and it was desired by the state utilities of SRPC that the BG amount be disbursed to all the DICs pending settlement of disputes on relinquishment charges. CTU informed that it is common money of all the five regions and cannot be given state-wise or region-wise and hence it needs to be taken up with all the RPCs for their consent. CTU further informed that, in case the BG amount is disbursed to the DICs in the pool and disputes are settled in favour of the relinquishing IPPs later, the amount so disbursed in the pool shall be collected from respective DICs along with interest to refund to the IPPs. Hence, CTU requested for deliberation on the above and provide consent on disbursing the encashed BG amount to the DICs in the pool with the conditions mentioned above.

A.2.5 Subsequently, the matter has been deliberated in 59th NRPC meeting wherein it was decided that DICs of NR may submit comments regarding the agenda to CTU with copy to NRPC in one month (i.e by 30 November 2022). CTU was also asked to regularly follow up with DICs at all regions for earliest submission of comments. Subsequently, agenda may be deliberated at upcoming NPC meeting along with comments of DICs.

A.2.6 CTU has submitted that comments are yet to be received from DICs of NR.

Members may deliberate kindly.

A.3 Draft guidelines on manpower adequacy for SLDCs (agenda by GM Division, CEA)

A.3.1 GM, Division CEA in its letter dated 14.12.2022 informed that the meeting was taken by Secretary (P) with CEA and GCI (erstwhile POSOCO) on 30.11.2022 to discuss draft guidelines on manpower adequacy for SLDCs. Draft guidelines for strengthening of SLDCs in India is attached as **Annexure-II.**

A.3.2 Stakeholders may submit their views/inputs for onward submission to CEA.

Members may submit kindly.

A.4 Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2:7.5GW) (Jaisalmer/Barmer Complex) (agenda by CTU)

A.4.1 CTU vide mail dtd. 19.12.2022 has proposed scheme for transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2:7.5GW) (Jaisalmer/ Barmer Complex).

A.4.2 The scheme is attached as **Annexure-III.**

A.4.3 CTU has intimated that the above scheme has been discussed in NR Joint study meeting held on 05.12.22, and 13th CMETS-WR meeting held on 07.12.2022.

A.4.4 The scheme is being taken by CTU for approval in 14th CMETSNR meeting scheduled to be held on 23.12.22

Members may deliberate kindly.

*****

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
CENTRAL TRANSMISSION UTILITY OF INDIA LIMITED
(Wholly Owned Subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Annexure I

Date:14-12-2022

To,
Member Secretary,
18-A, Qutab Institutional Area, Shaheed Jeet Singh Marg,
Katwaria Sarai, New Delhi-110 016

Sub: Agenda from CTUIL for 61st NRPC meeting on **"Disbursement of encashed CBG amount to DICs pending settlement of legal disputes on relinquishment charges"**

Sir,

Please find enclosed Agenda from CTUIL on "Disbursement of encashed CBG amount to DICs pending settlement of legal disputes on relinquishment charges" and the same may be included for 61st NRPC meeting to be held on 23.12.2022.

Thanking you,

Yours faithfully,

14/12/22

(V. Srinivas)
Chief General Manager (Commercial)
For & on behalf of CTUIL

CC: COO, CTUIL, Gurgaon

Agenda
on
Disbursement of encashed CBG amount to DICs pending settlement of legal disputes on relinquishment charges

In line with CERC Order dated 8.3.2019 passed in Petition No.92/MP/2015, CTU calculated relinquishment charges for LTAs relinquished by various generators and uploaded the same on its website from time to time. However, the relinquishment charges computed and notified by CTU in line with above CERC Order 08.03.2019 in Petition No. 92/MP/2015 was disputed by more than 20 relinquishing IPPs, who had filed appeals in APTEL which are pending adjudication. In view of pending disputes and GST issues concerning the raising of invoices, CTU issued demand letters to concerned relinquishing LTA customers pending disposal of appeals in APTEL.

During the proceedings in the matter, APTEL vide its order dated 08.10.2020 in appeal no 251 of 2019, had restrained CTU from raising invoices with respect to the relinquishment charges during pendency of similar Appeals except where insolvency proceedings are faced by the generators. All the appeals on relinquishment charges are yet to be decided as on date and matter is being pursued by CTU. Further, where the IPPs are undergoing insolvency proceedings, CTU had filed claims before RPs/Liquidators for recovery of relinquishment charges.

Meanwhile, CTU encashed the CBGs of some of the IPPs who have abandoned their projects or undergoing insolvency proceedings and the encashed BG amount of approx. Rs 400 Crores was kept in FDs since the legal proceedings on relinquishment charges are still to be concluded and the BG amount may have to be refunded to IPPs along with interest in case of judgements in their favour in future.

The status of relinquishment charges and treatment of encashed BG amount has been reviewed in recent 42nd SRPC meeting held in Jun'22 and it was desired by the state utilities of SRPC that the BG amount be disbursed to all the DICs pending settlement of disputes on relinquishment charges. CTU informed that it is common money of all the five regions and cannot be given state-wise or region-wise and hence it needs to be taken up with all the RPCs for their consent. CTU further informed that, in case the BG amount is disbursed to the DICs in the pool and the disputes are settled in favor of the relinquishing IPPs

later, the amount so disbursed in the pool shall be collected from respective DICs along with interest to refund to the IPPs. Hence, CTU requested for deliberation on the above and provide consent on disbursing the encashed BG amount to the DICs in the pool with the conditions mentioned above.

Subsequently, the matter has been deliberated by CTU in recent 59th NRPC meeting held in Oct'22. The same has been reviewed and decided that, DICs of NR may submit comments regarding the agenda to CTU with copy to NRPC in one month (i.e by 30 November 2022). However, comments are yet to be received from DICs of NR. Copy of relevant extract of MOM of 59th NRPC meeting is enclosed.

The status of consent from DICs may be reviewed.

****

Issue No : I/25047/2022

Annexure II

File No.CEA-GO-12-29/2/2022-GM Division

केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
ग्रिड प्रबंधन प्रभाग
Grid Management Division
****

Sub : Guidelines on manpower adequacy for SLDCs

It is to inform that the meeting was taken by Secretary(P) with CEA & GCI (erstwhile POSOCO) on 30.11.2022 to discuss draft guidelines on manpower adequacy for SLDCs. The draft circulated by MoP on 29.11.2022 was discussed (copy enclosed).

It was decided for restructuring of the draft report including organogram of typical SLDC & capturing new areas like cyber security, resource adequacy, disturbances etc.

For the above activity the list of documents to be referred are as below:

(1) Pradhan Committee Report 2008-GoI (Report of the Combined Committee on Manpower Certification, Incentives for System Operators and Ring Fencing Load Despatch Centres)
(2) Detailed organogram
(3) Model distribution structure
(4) GCI (erstwhile POSOCO) report filed to CERC
(5) Other documents as mentioned under references of the draft circulated by MoP on 29.11.2022.

It is requested to submit views/inputs of all stakeholders of the RPCs for preparation/ restructuring of above cited draft report. It is also requested that the views/inputs may be discussed in some forum of RPCs and compiled views may be submitted to this Division.

This issues with the approval of Member(GO&D~~)/Chairperson~~, CEA

(M M Dhakate)
Chief Engineer

Member Secretary (NRPC/WRPC/SRPC/ERPC/NERPC)

No: CEA-GO-12-29/2/2022-GM Division दिनांक:14.12.2022

Draft

Guidelines for Strengthening of State Load Despatch Centres in India

Table of Contents

List of Figures

Guidelines For Strengthening of State Load Despatch Centres in India

1. Background

The Electricity Act 2003 designates the Load Despatch Centres (LDCs) as apex bodies to ensure integrated, secure, reliable, economic, and efficient operation of power system under their jurisdiction. The LDCs would play an important rote in facilitating the energy transition towards a sustainable and decarbonised electricity grid. The availability of human resources in the State Load Despatch Centres was reviewed by, Secretary (Power), Ministry of Power, Government of India on 16th September 2022. These guidelines have been formulated to provide a benchmark to the State governments / utilities for strengthening -the State Load Despatch Centres by ensuring adequacy of trained and certified human resources.

2. Categorization of State Load Despatch Centres

Considering the diversity of power system profile of different states in terms of their peak demand met, energy consumption and installed capacity of Renewable Energy Sources, the thirty-five SLDCs could be grouped into three categories —Large SLDCs{Medium SLDCs, Emerging SLDCs.

No.	Large SLDCs	Medium SLDCs	Emerging SLDCs
1	Andhra Pradesh	Assam	Arunachal Pradesh
2	Gujarat	Bihar	Chandigarh
3	Haryana	Chhattisgarh	*Dadra and Nagar Haveli
4	Karnataka	Damodar Valley Corporation	Daman & Diu
5	Maharashtra	Delhi	Goa
6	Madhya Pradesh	Himachat Pradesh	Manipúr
7	Punjab	'Jammu & Kashmir and Ladakh	Meghataya
8	Rajasthan	Jharkhand	Mizoram
9	Tamil Nadu	Kerala	Nagaland
10	Telangana	Odisha	Puducherry
11	Uttar Ptadesh	Uttarakhand	Sikkim
12	West Bengal		Tripura

3. Functional areas within State Load Despatch Centre

The functions discharged by SLDCs could be broadly classified into following categories System Operation (SO), Market Operation (MO), System Logistics, and Support services. The System Operation function covers operational planning, real-time operation and post despatch analysis. The market operation function covers open access administration, day ahead market, real-time market, energy accounting and settlement activities. System logistics covers decision support, Information technology and cyber security related activities. The regulatory and legal affairs; human resource management contract services, finance and account, establishment, administration are support services. Further details regarding these functions are enclosed as Annexure-I.

There are Thirteen Renewable Energy Management Centre (REMC) in India which includes the REMCs in Rajasthan, Gujarat, Madhya Pradesh, Maharashtra Telangana Tamil Nadu: Karnataka and Uttar Pradesh which are collocated with SLDCs. The REMCs are also envisaged for UT Ladakh and UT Andaman Nicobar. takes care of forecasting, scheduling and real-time monitoring renewable energy resources

4. Recommended deployment of human resources

The recommended number-of human resources in a SLDC would vary depending upon whether the SLDC is large, medium', or emerging. The SLDCs where REMC is co-located would require additionaL18-24 nos. of executives. SLDCs should staff 2- 4 nos of experts for ensuring compliance to cyber security protocols and guidelines. Typically, the number of personnel in any SLDC, REMC and Cyber Security functions should be in the range as indicated in the table below. These numbers include only the executive staff including Supervisors but- excluding- staff for physical infrastructure security and sub-LDCs. It may further be noted that the SLDCs where a dedicated Cyber Security operation Centre is established would require additional human resources

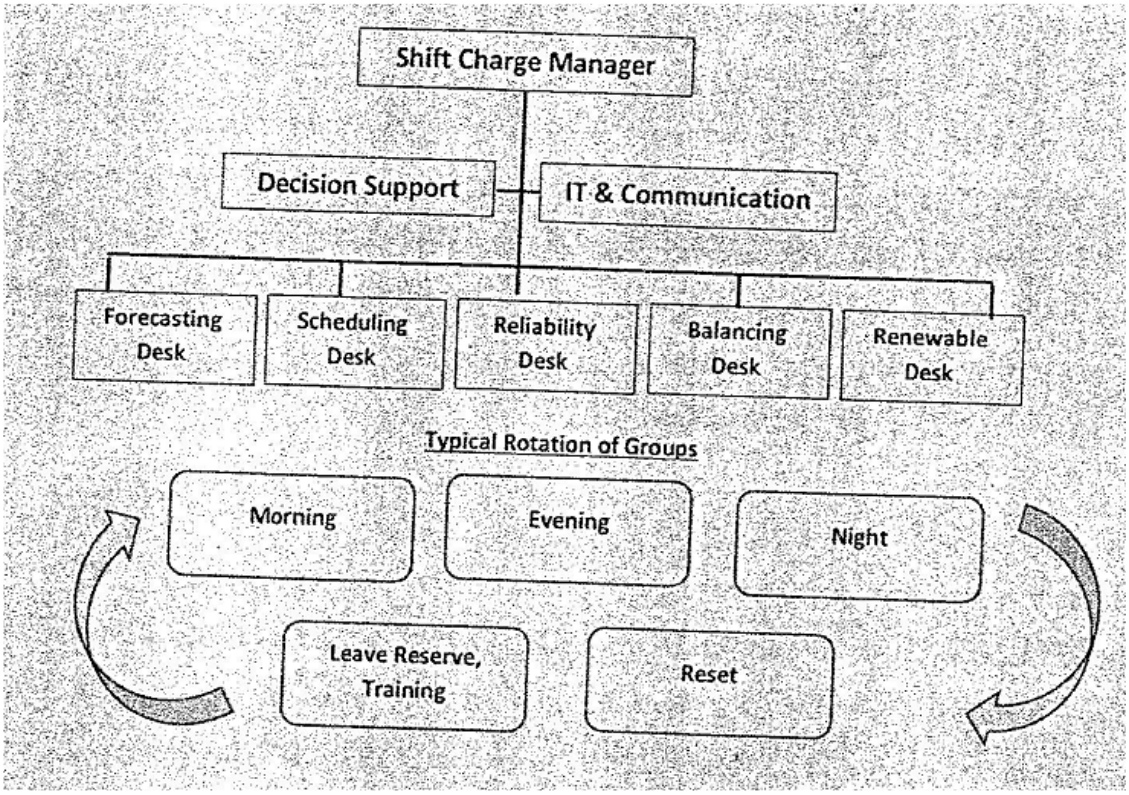
Table 1:- HR Requirement in Diff. Categories of SLDCs

Category of SLDCs	Total personnel required for SO, MO, Sys-Logistics & Support services	Personnel for REMC	Personnel for Cyber Security
Large	100 - 150	18-24	2-4
Medium	70- 100		
Emerging	30 - 50		

In order to maintain an optimum balance of staff in critical functions, it is recommended that the proportion of executive staff in System Operation, Market Operation, System Logistics, Support services is maintained in the range of (35 - 45) % : (20- 30) % : (15 - 20) % : (10 15) % of the total strength. The ratio of (Executive + Supervisors) to Nonexecutive must be endeavored to be maintained at around 95%: 5%. The regular personnel deployed in non-core, non-critical functions may be optimized by out-sourcing and automation of routine activities.

Real-Time operation is at the heart of any SLDC. Thereforet adequate deployment of trained and certified personnel is required. Each control room must operate in five shift groups with 3-8 Nos. per shift.' The fifth group is recommended to factor leave reserves and training needs of real-time operations personnel: Thus the HR budget for real-time operatiðns should take •into account round-the clock operationst entitled leaves, public holidays, festivalst business travely training, special assignments etc. making a total of 15-40 Nos. Overall for control room shift operation.

Figure 1:- Typical Organization of Rea/ Time Team for LDC



5. Training of System Operators

System operators need to be up-to-date with the evolving technology, policies, rules standards, regulations, procedures and best practices. Therefore, capacity building through training and refresher programme has been implemented through National Power Training Institute (NPTI) for Load Despatchers. It is categorized into 3 levels - Basic Level Specialist Level and Management Level. Basic Level System Operation programme is the foundation course required for all System Operators and can also be attended by those

posted in other functional areas in LDCs. Basic Level Course on Cyber Security is required for those posted in IT & OT functions. The specialist courses on topics such as Reliability, Regulatory Framework in Power Sector, and Advanced course on Cyber Security are available for experienced specialist professionals employed in these respective fields in LDCs,, The payment of Tuition fee for these courses is exempt for employees of SLDCs.

Detailed list of Training Courses for LDC personnel is given at Annexure-II.

6. Certification of System Operators

National Power Training Institute has been entrusted as Nodal Agency for certification of System Operators and various certification exams for Basic and Specialist Level are being conducted by NPTI. List of training/certification programs is given at Annexure-ll. Basic Level Certifications are mandatory to work in critical area of System Operation in an LDC. Guidelines regarding mandatory certification are being separately notified vide Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulationsó2022: Specialist level certification is optional. Each certificate has a validity of 03 years and must be renewed thereafter.

7. Short term exposure Programme for System Operators

A Short Term Exposure Programme has been envisaged provide opportunity the system operators to learn from each other and to propagate best-practices Rotation of System Operators would also enhance cohesive working and coordination in operations.The programme Will include 2-10 days' duration rotational assignments to other LDCs.The officials from one LDC will be rotated to other LDCs in System Operation, Market Operation and Logistics functions.' Detailed modalities of the Short-Term Exposure Programme ate given as Annexure- III.

8. Tenure of Posting in SLDCs

Reliable and safe operation of power systems is critical to the country. Tacit knowledge gained through practical experience is essential for handling minute to minute challenges and entrants. Therefore, a minimum posting for a period of three years is recommended for any Official posted in SLDC. Any person posted in an CDC shall be provided training -and must acquire relevant basic level certificate within six months of being posted in the LDC.

Annexure-I : Functional areas in a Load Despatch Centre

1. System Operation functions

System Operation function includes but shall not be limited to the following functions:

a) Operational Planning ;

i) Load Forecasting ii) RE forecasting iii) Fuel security assessment iv) Production cost optimization studies v) Generating outage planning vi) Transmission outage planning vii) Assessment of Transfer Capability víii) Reactive Power studies ix) Short circuit and transient stability studies x) Small Signal stability studies xi) Electromagnetic transient studies xii) Mock black start drills xiii) Operation of back up control centre xiv) Preparations for special events like festivals, natural calamities like cyclone, floods etc. xv) Documentation of procedures (operating, restoration)

b) Scheduling and Despatch on day-ahead and real-time basis

i) Day ahead security studies factoring all outages ii) Unit commitment iii) Day ahead optimization and scheduling 'iv) Shift Crew Resource Management v) Anticipating and mitigating congestion vi) Preparation for speciat events vii) -Handling requests for emergency/urgent outages unforeseen In operational planning horizon

c) Reat Time Operation

i) Frequency Control ii) Voltage control iii) Tie line loading control iv)•Congestion management v) Ensuring security at all times vi) Ancillary -Services vii) Balancing Services, Automatic Generation Control viii) Real Time Contingency Analysis ix) Dynamic Security Assessment x) Monitoring weather updates xi) Handling emergency outage requests xii) Restoration of network after tripping xiii) Rescheduling of generation xiv) Reporting of a grid disturbance (GD)/grid incident(GI) xv) Periodic communication with stakeholders and sensitizing in case of emergency xvi) De-briefing after an extreme event

d) After the Fact or Post Despatch Analysis.

i) Analysis of frequency and voltage ii) Analysis of Grid Code violations and follow up with agencies iii) Analysis of Grid Events (GD/GI) iv) Evaluating primary response viz. computation of Frequency Response Characteristics (FRC) of individual control areas v) Low Frequency Oscillations (IFO) monitoring and analysis vi) Detailed reports of Grid Disturbances/Grid Events vii) Simulation of events and learnings thereof viii) Event replay, lessons learnt and dissemination of same ix) Taking up shortcomings with stakeholders Submission of Operational feedback to policy makers/regulators/planners f) Information dissemination

2. Market Operation functions

Market Operation function includes but shall not be limited to the following functions: (a) facilitating grid access to new entities including but not limited to first time charging of elements (b) feedback in respect of electricity market design, • for complementing reliability and causing economy (c) open access administration, (d) finalization of Interchange schedules for energy accounting (e) Day Ahead Market, (f) Real Time Market, (g) Ancillary Services Market (h) Interface Energy Metering (i) energy accounting and settlement.

3. System Logistics functions

System Logistics functions includes designs operations and maintenance of but shall not be limited to the Engineering of new SCADA/EMS/WAMS/RÉMC upgrades (b) Maintenance of- SCADA/EMS/WAMS/REMC infrastructure (c) Synchro- ' phasor technologies (d) Real time software applications (e) Off-line software applications (f) Big Data •Analytics tools (g) ' k Decision Support Systems Information Technology Networking and Communication systems Including websites; Wi-Fi access security and other related systems (i) conference and meeting related facilities including audio-visual equipment such as video conference equipment etc., (j) Power supp(y system (k) firefighting and alarm systems (l) Ergonomic systems (m) Public Address System.

Annexure II: Training and Certification Program for capacity building

1 . System Operator Training Programmes

SN	Name of the Training Program	Level	Duration of the Training Pro rams	Remarks
1	Basic Level Programme on power System Operation	Basic	03 weeks (Full Length) 3 Days (Refresher)	Mandatory
2	Power Market	Specialist	02 weeks	Desirable
3	Regulatory Framework in Power Sector	Specialist	02 weeks	Desirable
4	Power System Logistics	Specialist	02 weeks	Desirable
5	Power System Reliability	Specialist	02 weeks (Full Length) 03 Days Refresher	Desirable
6	RE source and Grid Integration	Specialist	02 weeks	Desirable
7	Familiarization on Despatcher Training Simulator		02 weeks	Desirable
Cyber Security (Training cum Certification)				
8	Training and Certification Program on Cyber Security	Basic	02 weeks	Mandatory
9	'Training and Certification Program on Cyber Security	Intermediate	02 weeks	Desirable
10	Training and Certification Program on Cyber Security	Advance	02 weeks	Desirable

2. System Operator Certification

SN	Name of the Certification	Level	Validity of Certification	Remarks
1	Basic Level Power System Operation Certification	Basic	03 Years	Mandatory

2	Specialist Level Power System Reliability Certification	Specialist	03 Years	Desirable
3	Specialist Level Regulatory Framework in Power Sector Certification	Specialist	03 Years	Desirable
4	Specialist Level Power System Logistics Certification	Specialist	03 Years	Desirable

Annexure-III: Short Term Exposure Program

A Short-Term Exposure Programme to facilitate rotation of System Operators, to enhance cohesion and exposure among System Operators in LDCs is being implemented for all State Load Despatch Centres, Regional Load Despatch Centres and National Load Depatch Centre. The objective of this programme is to propagate best-practices, facilitate peer-to-peer learning from each other and propagate best-practices through hands on exposure of real time working of other LDCs This will be beneficial for new and emerging SLDCs, where resource adequacy concerns for multi-tasking executive's have been expressed. The planned programme comprises of rotation of LDC officials to other LDCs for a duration of Two to Ten Days.

1. Modalities

a. Rotational assignments will be done on reciprocity basis. Generally the ratio of requirement and number of persons to be rotated will endeavored to be kept as 1 : 1; however, .in certain cases especially for emerging LDCs this can be relaxed

b. All LDCs will analyse their own requirement, work out number of officers they wish to post' to other LDCs for exposure, clearly specifying periods of assignments in both cases. Each LDC can prepare an Annual Rotation Plan for— (i) officials they wish to rotate to other LDCs and (ii) officials they can host in their LDC keeping in mind their Human Resource Adequacy.

c. The host organization may design specific programme Including a few-class-room Sessions to facilitate the learning delivery in share with the visiting organization beforehand

d. In order to leverage familiarity and already established sense of comfort, initially the rotation will be within the same

e: The Rotation will be in the areas of System Operation; Market Operation, Logistics and REMC Functions.

f. Any short-term assignment will be for a minimum period of 2 working days but not exceeding 10 working days in total.

2. Eligibility:-

a. All LDC officials working in System Operation, Market Operation, Logistics and REMC functions will be eligible to be rotated to other LDCs-

b. LDC officials should have minimum 1 year or regular service in an LDC before they can be considered for the exposure programme.

3. Execution

a. LDCs can send their Annual Rotation Plan to the Forum of Load Despatchers (FOLD) Secretariat at the beginning of the financial year.

b. FOLD secretariat will compile requirements and assist in devising a Region-wise rotational plan on round-robin basis so that Human Resource adequacy is maintained at all Load Despatch Centres.

c. This programme is focused on increasing capacity building of SLDCs, therefore, the focus must be on giving exposure to SLDC officials. However, to kickstart the

programme, RLDCs and NL-DC will start by posting their officers out to SLDCs and host officers from other LDCs in their region. FOLD Secretariat will coordinate the liasoning with LDCs, if require. Travel arrangement including accommodation & logistics will be done by respective LDCs.

4. TADA including accommodation expenses will be borne by the parent organization as per their rules. Host organization wilt not be obligated to provide ,any facility to the visiting officer.*

Annexure to Short Term Exposure Programme:- Requirement Detail Format

Name of the LDC
-Total number of Job Roles identified for officers from other LDCs
Details of the rotes identified for officers from other LDCs

st. No.	Department	Area of the task/ project	Proposed Assignment Details (To which the officer from LDCs will be deputed)	Proposed Period of the Assignment (Start Date & End Date)

References

1 Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2022 -- Draft regulation,

2. MOP 0M No. 13/3/2019-OM-Part(1) dated 23rd March, 2022- Mandatory certification for personnel posted in Load Despatch Centres (NLDC/ RLDCs / SLDCs).

3. NPTI Letter - NPTI/PSTI/PSO/2022-23 dated 26th April, 2022 & 1 st September, 2022 Training & Certification of System Operators.

Capacity Building of Indian Load Despatch Centres (CABIL) Report 2018 - Report of the Forum of Regulators Technical Committee sub-group.

5. Dhiman Committee Report, 2010 (Report of the Combined Committee for Training and Certification of System Operators, March 2010).

6 Reports of task Force headed by Chairperson, CEA on Manpower Selection and Recruitment Procedure and Tenures for Personnel in SLDCs, June 2009 (Rakesh Nath Committee Report 2009).

7. Pradhan Committee Report 2008 - GoI (Report of the Committee on Manpower Certification; Incentives for System Operators and Ring Fencing Load Despatch Centres).

Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

S. No.	Items	Details
1.	**Name of Scheme**	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 7.5GW) (Jaisalmer/Barmer Complex)
2.	**Scope of the scheme**	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) **(Jaisalmer/Barmer Complex)** **Fatehgarh-IV : 4GW (4GW Solar, 4GW Wind, 2GW BESS) and Barmer-I : 3.5GW (3 GW Solar, 3 GW Wind, 1 GW BESS**) **A. Fatehgarh-IV : 4 GW (4 GW Solar + 4GW Wind + 2 GW BESS)** • Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA^, 400/220 kV Fatehgarh- IV (Section-2) Pooling Station along with 2x240 MVAr (765 kV) Bus Reactor & 2x125 MVAr (400 kV) Bus Reactor* • Fatehgarh-IV (Section-2) PS – Bhinmal (PG) 400 kV D/c line (Twin HTLS) along with 50 MVAr switchable line reactor on each ckt at each end (~200 km) • LILO of both ckts of 765 kV Fatehgarh-III- Beawar D/c line(2nd) at Fatehgarh-IV (Section-2) PS along with 330 MVAr switchable line reactors at Fatehgarh-IV PS end of each ckt of 765 kV Fatehgarh-IV- Beawar D/c line (formed after LILO) (~15 km) • Beawar- Mandsaur PS 765 kV D/c line along with 240 MVAr switchable line reactor on each circuit at each end (~250 km) • Augmentation by 1x1500 MVA, 765/400 kV ICT at Fatehgarh-II PS (7th) • 6 nos. of 220 kV line bays at Fatehgarh-IV PS (for RE connectivity) • 220kV Sectionalization bay (1 set) along with BC (2 nos.) and TBC (2 nos.) at Fatehgarh- IV (Section-2) Pooling Station ***Future provisions at Fatehgarh-IV PS is already approved in 8th NCT meeting dated 25.03.22*** **^incl 1x500MVA ICT to fulfill 'N-1' requirement** ***Incl. spare one ICT unit (500MVA) and spare one reactor unit (110MVAr and 80MVAr) at Fatehgarh-IV PS*** **B. Barmer-I : 3.5 GW (3 GW Solar + 3GW Wind + 1 GW BESS)** • Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA^, 400/220 kV Barmer-I Pooling Station along with 2x240 MVAr (765 kV) Bus Reactor & 2x125 MVAr (400 kV) Bus Reactor* **<u>Future provisions at Barmer-I S/s:</u>** **Space for** ➢ 765/400kV ICT along with bays- 2 no.

S. No.	Items	Details
		➢ 765 kV line bays along with switchable line reactors – 4 nos. ➢ 765kV Bus Reactor along with bay: 1 no. ➢ 400 kV line bays –4 ➢ 400 kV line bays along with switchable line reactor –4 nos. ➢ 400/220kV ICT along with bays -5 nos. ➢ 400 kV Bus Reactor along with bay: 1 no. ➢ 400kV Sectionalization bays: 2 sets ➢ 220 kV line bays for connectivity of RE Applications - 8 nos. ➢ 220kV Sectionalization bay: 2 sets ➢ BC (2 nos.) & TBC (2 nos.) ➢ STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr) • Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line (Quad)(~50 km) • 6 nos. of 220 kV line bays at Barmer-I PS (for RE connectivity) • 220kV Sectionalization bay (1 set) along with BC (2 nos.) and TBC (2 nos.) at Barmer-I PS **^incl 1x500MVA ICT to fulfill 'N-1' requirement** ***Incl. spare one ICT unit (500MVA) and spare one reactor unit (80MVAr) at Barmer-I PS*** **C. Common Transmission System for Fatehgarh-IV and Barmer-I in NR** • Establishment of 2x1500 MVA, 765/400 kV Substation at suitable location near Jalore PS along with 2x240 MVAr (765 kV) & 2x125 MVAr (400 kV) Bus Reactor * **Future provisions at Jalore S/s:** **Space for** ➢ 765/400kV ICT along with bays- 4 no. ➢ 765 kV line bays along with switchable line reactors – 4 no. ➢ 765kV Bus Reactor along with bay: 1 no. ➢ 400 kV line bays along with switchable line reactor –4 no. ➢ 400 kV line bays –4 no. ➢ 400 kV Bus Reactor along with bay: 1 no. ➢ 400kV Sectionalization bay: 2 sets ➢ 400/220kV ICT along with bay - 6 no. ➢ 220kV line bays -10 no. ➢ 220kV Sectionalization bay: 2 sets ➢ BC (3 nos.) & TBC (3 nos.) ➢ STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr)

S. No.	Items	Details
		• Fatehgarh-IV (Section-2) PS – Jalore PS 765 kV D/c line along with 240 MVAr switchable line reactor for each circuit at each end(~200 km) • Barmer-I PS– Jalore PS 765 kV D/c line along with 330 MVAr switchable line reactor for each circuit at Jalore PS end(~165 km) • Jalore PS-Chittorgarh (PG) 400 kV D/c line along with 50 MVAr switchable line reactor for each circuit at each end (Quad) (~200 km) • Jalore PS- Mandsaur PS 765 kV D/c line along with 330 MVAr switchable line reactor for each circuit at each end(~320 km) ***Incl. spare one ICT unit (500MVA) and spare one reactor unit (110MVAr and 80MVAr) at Jalore PS*** **In addition to the above, following transmission scheme is also required in Western region for further dispersal of power for above RE complexes (Fatehgarh-IV and Barmer-I)** **D. Common Transmission System for Fatehgarh-IV (4GW) and Barmer-I (3.5GW) in Western Region** • Establishment of 765kV Mandsaur Pooling Station along with 2x330MVAr (765kV) Bus Reactors • Mandsaur PS – Indore(PG) 765 kV D/c Line (200km) along with 1x330MVAr switchable line reactor (SLR) on each ckt at Mandsaur end • Establishment of 765/400 (2x1500MVA) 400/220 (2x500MVA) & 220/132kV (3x200MVA) Kurawar S/s with 2x330MVAr 765kV bus reactor and 1x125MVAr 420kV bus reactor • Mandsaur – Kurawar 765kV D/c line (~235km.) with 240MVAr switchable line reactors at both ends • LILO of Indore – Bhopal 765kV 765kV S/c line at Kurawar (LILO length 15km.) • Kurawar – Ashtha 400kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line (65km.) • LILO of one circuit of Indore – Itarsi 400kV D/c line at Astha (LILO length 30km.) • Shujalpur – Kurawar 400kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line (40km.)
3.	**Depiction of the scheme on Transmission Grid Map**	Attached at **Exhibit-I**
4.	**Upstream/downstream system associated with the scheme**	765/400/220kV Fatehgarh-III PS and Beawar S/s is under bidding as part of Rajasthan REZ Ph-III system and proposed to be interconnected with Ph-II/Ph-III system whereas

<table>
<tr><th>S. No.</th><th>Items</th><th>Details</th></tr>
<tr><td></td><td></td><td>765/400kV Chittorgarh S/s and 400/220kV Bhinmal S/s are existing S/s.

765/400kV Chittorgarh S/s is connected with Banaskantha (WR) and Ajmer (Proposed to be LILOed at Beawar) S/s through 765kV D/c lines and 400V interconnection with Chittorgarh (RVPN) S/s. 400/220kV Bhinmal S/s is connected with Zerda (WR) and Kankroli S/s (to be bypassed in future) as well as Barmer (RVPN) S/s.</td></tr>
<tr><td>5.</td><td>Objective / Justification</td><td>1. The transmission scheme shall faciliatate evacuation of about 7.5GW power from Rajasthan REZ Ph-IV (Part-2) envisaged in Jaisalmer/Barmer Complex.
2. Ministry of Power vide letter No. 15-3/2017-Trans (part 1) dated 7th December, 2021, had constituted a Committee on Transmission Planning for RE under the Chairmanship of Chairperson, CEA, for planning of the requisite Inter- State Transmission System required for the targeted RE capacity by 2030.
3. Renewable Energy Zones (REZs) were identified by MNRE/SECI with a total capacity of 181.5 GW for likely benefits by the year 2030 in eight states, which includes 75 GW REZ potential in Rajasthan comprising of 15 GW Wind and 60 GW Solar.
4. Accordingly, a Comprehensive transmission scheme was evolved for evacuation of 181.5 GW RE power including 75GW from Rajasthan. As part of committee report as well as MNRE/SECI inputs, 12GW potential (Wind: 6GW, Solar: 6GW) along with 4GW BESS envisaged at Fatehgarh-IV in Jaisalmer complex by 2030. Out of 12GW potential, 8GW potential (Wind: 4GW, Solar: 4GW) along with 2GW BESS considered by 2027 at Fatehgarh-IV PS. Similarly, 7GW potential (Wind: 3GW, Solar: 4GW) along with 1.5GW BESS envisaged at Barmer-I in Barmer complex by 2030. Out of 7GW potential, 6GW potential (Wind: 3GW, Solar: 3GW) along with 1GW BESS considered in Barmer-I by 2027.
5. BESS of 3GW (Fatehgarh-IV : 2GW, Barmer-I : 1GW) is considered for net dispatch at Fatehgarh-IV PS and Barmer-I PS while evolving the evacuation scheme
<table>
<tr><th rowspan="2">Pooling Station</th><th colspan="2">Total RE Potential (by 2030)</th><th>RE Potential (by 2027)</th><th>Net (Max) Dispatch Considered by 2027(GW)</th></tr>
<tr><th>Source</th><th>Capacity (GW)</th><th>Capacity (GW)</th></tr>
<tr><td rowspan="3">Fatehgarh-IV</td><td>Wind</td><td>6</td><td>4</td><td rowspan="3">4</td></tr>
<tr><td>Solar</td><td>6</td><td>4</td></tr>
<tr><td>BESS</td><td>4</td><td>2</td></tr>
<tr><td rowspan="3">Barmer-I</td><td>Wind</td><td>3</td><td>3</td><td rowspan="3">3.5</td></tr>
<tr><td>Solar</td><td>4</td><td>3</td></tr>
<tr><td>BESS</td><td>1.5</td><td>1</td></tr>
<tr><td></td><td colspan="3">Total (GW)</td><td>7.5</td></tr>
</table></td></tr>
</table>

S. No.	Items	Details
		6. As part of Rajasthan REZ Ph-III (20GW) transmission system, 400/220kV Fatehgarh-IV PS and associated transmission system is already under bidding. The evacuation system planned earlier in Ph-III from 400/220kV Fatehgarh-IV PS is adequate for evacuation of about 2 GW RE capacity. Considering above, space provision for separate 765/400//220kV (Section-2) at Fatehgarh-IV PS was already approved in 8th NCT meeting held on 25.03.22 7. At present, St-II Connectivity for about 2.8 GW RE, against the potential of 2.1 GW (under Ph-III), is already received at Fatehgarh-IV PS and Stage-II connectivity received has already exceeded the envisaged potential of Fathegrah-IV PS [Ph-III potential: 2.1 GW). Considering grant of connectivity to new RE generators at Fatehgarh-IV PS as well as for evacuation of power from Fatehgarh-IV PS beyond 2 GW in Jaisalmer Complex and Barmer-I PS in Barmer complex, 765kV high capacity corridors will be required from above pooling stations **8.** Accordingly, system studies were carried out and study plots along with network files were sent to all stakeholders dated 30.11.22. A Joint Study Meeting was held in virtual mode on 05.12.22 with NRPC, CEA, GRID-INDIA (Formerly known as POSOCO), RVPN, HVPN, UPPTCL, PSTCL and other STUs of Northern region to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex). **Minutes of above Joint study meeting is enclosed in Annexure-1.** 9. In the meeting, GRID-INDIA/NRLDC stated that switching on/off of 330MVAr bus reactor may cause large voltage variation on ISTS pooling station under various operating condition. To minimize this impact, bus reactors of lower capacity i.e. 240MVAr may be considered in place of 330MVAr on new pooling stations proposed in this scheme. Accordingly, based on studies, CTU reviewed and modified the bus reactor capacity from 330MVAr to 240MVAr at Fatehgarh-IV PS, Barmer-I PS and Jalore PS in the revised proposal. GRID-INDIA/NRLDC also requested to provide evening peak (summer season) and off peak file (winter season) with proposed system. 10. In the meeting, RVPN stated that Rajasthan is facing high voltage issues in night off peak time due to integration of large RE generation at Intra state as well as inter state level. Therefore, HVDC corridors may be planned in future to control power flow as well as voltages in RVPN system. It was deliberated that adequate reactive commiseration (bus+line) as well as STATCOMs (with MSC+MSR) planned at inter state level, however reactive MVAr shall flow from intra state system to ISTS network. In view of that it was stated that RVPN may also plan suitable static/ dynamic compensation in existing and proposed RVPN system. It was also stated that in

S. No.	Items	Details
		subsequent phases HVDC Corridors will be planned from Jaisalmer/Barmer complex. 11. RVPN also enquired that with proposed interconnection of Fatehgarh-IV with Bhinmal S/s may cause loading issues in underlying network of Bhinmal S/s after bypassing scheme. CTU stated that in studies, loading of Bhinmal ICTs as well as underlying network is in order in all scenarios after considering bypassing scheme. It was also stated that Bypassing scheme at Bhinmal along with reconductoring (Jodhpur-Kankroli) is already agreed with implementation timeframe progressively from Nov'23 with a provision of suitable switching arrangement inside the Bhinmal substation. 12. PSTCL in the meeting as well as their mail dated 08.12.22 stated to increase the intra state generation and load of Punjab in winter and summer solar maximized scenario along with inclusion of solar capacity connected at intra state level. In meeting UPPTCL also stated to review the intra state generation of UP system in both the scenarios. Accordingly, CTU reviewed the load generation of Punjab and UP and modified in the revised study files circulated on 16.12.22. HVPN stated that they do not have any observations on proposal as well as on studies. 13. Based on observations received from Stakeholders as well as discussion held in joint study meeting, CTU shared the revised study files along with evening peak/off peak files to all constituents on 16.12.22 incorporating the suggestions and inputs from UP, Punjab & GRID-INDIA/NRLDC. **Result of system studies enclosed in Exhibit-II.** 14. In Feb solar maximized scenario (revised case) loading of 400kV RAPP- Shujalpur D/c line is marginally higher (about 910MW) in N-1 contingency. The loading of above line will be reviewed with progress of RE generation projects at Rajasthan and strengthening requirement will be identified later, if required. In revised and additional cases, line loadings of other lines in above RE complex were found to be in order as well as voltages were within limits on all substations. 15. Subsequently, the scheme is being taken up for approval in 14th CMETS-NR scheduled to be held on 23.12.22. Detailed scope of the scheme is mentioned in S. No. 2 (as agreed in Joint study meeting) 16. The transmission system for WR portion was discussed in a meeting amongst CEA, CTUIL, MPPTCL and GRID-INDIA on 01.12.2022, wherein the above system was in-principally agreed. The scheme was further agreed in 13th CMETS-WR meeting held on 07.12.2022 (MOM awaited)
6.	**Estimated Cost**	**Total: Rs. 14000 Cr. (NR Portion)** **Rs. 6000 Cr. (WR Portion)**
7.	**Need of phasing, if any**	Not Applicable

S. No.	Items	Details
8.	**Implementation timeframe**	24 months from SPV transfer/ OM (Both for NR and WR)
9.	**System Study for evolution of the proposal**	Studies discussed and agreed in following meetings • NR Joint study meeting held on 05.12.22 (Minutes of meeting enclosed in **Annexure-I**) • 13th CMETS-WR meeting held on 07.12.2022 (Minutes of meeting awaited • The scheme is being taken up for approval in 14th CMETS-NR meeting scheduled to be held on 23.12.22 Load flow results is attached at **Exhibit-II** Study assumptions are enclosed in **Annexure-II**

Annex-I

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उदयम)
CENTRAL TRANSMISSION UTILITY OF INDIA LTD.
(A wholly owned subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Ref: C/CTU/N/ REZ Ph-IV (Part-2) **Date:**16th December,2022

As per distribution list

Sub: Minutes of Joint Study Meeting held on 05.12.2022 to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

Dear Sir,

Please find enclosed the Minutes of Joint Study Meeting held on 05.12.2022 to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex) through virtual mode.

Thanking you,

Yours Faithfully,

16/12/22

(Kashish Bhambhani)
GM (CTU)

Encl : Minutes of Meeting

Distribution List:

Chief Engineer (PSP&A – I) Central Electricity Authority Sewa Bhawan, R.K.Puram, New Delhi-110 066	**Member Secretary** Northern Regional Power Committee 18A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi – 110 016
Director (SO) Grid Controller of India Ltd. 9th Floor, IFCI Towers, 61, Nehru Place, New Delhi-110 016	**CGM I/c** Northern Regional Load Despatch Centre 18-A, Qutab Institutional Area, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi– 110 016
Director (P & C) HPPTCL, Headoffice, Himfed Bhawan, Panjari, Shimla-171005 Himachal Pradesh	**Director(W&P)** UP Power Transmission Company Ltd. Shakti Bhawan Extn, 3rd floor, 14, Ashok Marg, Lucknow-226 001
Director (Technical) Punjab State Transmission Corporation Ltd. Head Office, The Mall, Patiala 147001, Punjab	**Director (Projects)** Power Transmission Corporation of Uttrakhand Ltd. Vidyut Bhawan, Near ISBT Crossing, Saharanpur Road, Majra, Dehradun.
Development Commissioner (Power) Power Development Department Grid Substation Complex, Janipur, Jammu	**Director (Technical)** Rajasthan Rajya Vidyut Prasaran Nigam Ltd. Vidyut Bhawan, Jaipur, Rajasthan-302005.
Director (Operations) Delhi Transco Ltd. Shakti Sadan, Kotla Road, New Delhi-110 002	**Superintending Engineer (Operation)** Electricity Circle, 5th Floor, UT Secretariat, Sector-9 D, Chandigarh - 161009
Director (Technical) Haryana Vidyut Prasaran Nigam Ltd. Shakti Bhawan, Sector-6, Panchkula-134109, Haryana	

Minutes of Joint Study Meeting held on 05.12.22 to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

A Joint Study Meeting was held in virtual mode on 05.12.22 with CEA, GRID-INDIA (Formerly known as POSOCO), RVPN, HVPN, UPPTCL, PSTCL and other STUs of Northern region to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex). **List of participants is enclosed at Annexure A.**

Gist of the discussions is given as below:

1. CTU stated that Renewable Energy Zones (REZs) were identified by MNRE/SECI with a total capacity of 181.5 GW for likely benefits by the year 2030 in eight states, which includes 75 GW REZ potential in Rajasthan comprising of 15 GW Wind and 60 GW Solar. In this regard a Committee on Transmission Planning for RE was constituted by MOP for planning of the requisite Inter State Transmission System required for the targeted RE capacity by 2030.

2. In this regard, a Comprehensive transmission plan for evacuation of 75GW RE potential from Rajasthan is evolved. As part of committee report as well as MNRE/SECI inputs, 12GW potential (Wind: 6GW, Solar: 6GW) along with 4GW BESS envisaged at Fatehgarh-IV in Jaisalmer complex by 2030. Out of 12GW potential, 8GW potential (Wind: 4GW, Solar: 4GW) along with 2GW BESS considered by 2027 at Fatehgarh-IV PS.

   Similarly, 7GW potential (Wind: 3GW, Solar: 4GW) along with 1.5GW BESS envisaged at Barmer-I in Barmer complex by 2030. Out of 7GW potential, 6GW potential (Wind: 3GW, Solar: 3GW) along with 1GW BESS considered in Barmer-I by 2022.

S.No	Pooling Station	Total RE Potential (by 2030)		RE Potential (by 2027)	Net (Max) Dispatch Considered by 2027(GW)	Application Status
		Source	Capacity (GW)	Capacity (GW)		
1	Fatehgarh-IV	Wind	6	4	**4**	At present St-II Connectivity for 2.8 GW RE, against the potential of 2.1 GW (under Ph-III), is already received at Fatehgarh-IV (Section-1).
		Solar	6	4		
		BESS	4	2		
2	Barmer-I	Wind	3	3	**3.5**	No application received yet
		Solar	4	3		
		BESS	1.5	1		
				Total (GW)	**7.5**	

Solar Dispatch considered @100%, Wind dispatch considered @50% in June Solar Max Scenario

3. It was deliberated that as part of Rajasthan REZ Ph-III (20GW) transmission system, 400/220kV Fatehgarh-IV PS and associated transmission system is already under bidding. The evacuation system planned earlier in Ph-III from 400/220kV Fatehgarh-IV PS is adequate for evacuation of about 2 GW RE capacity. Considering above, space provision for separate 765/400//220kV (Section-2) at Fatehgarh-IV PS was already approved in 8th NCT meeting held on 25.03.22

4. CTU stated that at present, St-II Connectivity for about 2.8 GW RE, against the potential of 2.1 GW (under Ph-III), is already received at Fatehgarh-IV PS and Stage-II connectivity received has already exceeded the envisaged potential of Fathegrah-IV PS [Ph-III potential : 2.1 GW).

5. Considering grant of connectivity to new RE generators at Fatehgarh-IV PS as well as for evacuation of power from Fatehgarh-IV PS beyond 2 GW in Jaisalmer Complex and Barmer-I PS in Barmer complex, 765kV high capacity corridors will be required from above pooling stations

6. Accordingly, system studies were carried out and study plots along with network files were sent to all stakeholders dated 30.11.22. It was stated in the meeting that loading of 400kV RAPP- Shujalpur D/c line is marginally higher in Feb solar maximized scenario (about 910MW) in N-1 contingency. The loading of above line will be reviewed with progress of RE generation projects at Rajasthan and strengthening requirement will be identified later, if required.

7. GRID-INDIA/NRLDC stated that it was observed that switching on/off of 330MVAr bus reactor may cause large voltage variation on ISTS pooling station under various operating condition. To minimize this impact, bus reactors of lower capacity i.e. 240MVAr may be considered in place of 330MVAr on new pooling stations proposed in this scheme. CTU stated that they will review the bus reactor capacity (330MVAr or 240MVAr) on new pooling stations as per voltages in solar max as well as night off peak scenario. Accordingly, based on studies, CTU modified the bus reactor capacity from 330MVAr to 240MVAr at Fatehgarh-IV PS, Barmer-I PS and Jalore PS in the revised proposal. GRID-INDIA/NRLDC also requested to provide evening peak (summer season) and off peak file (winter season) with proposed system.

8. RVPN stated that Rajasthan is facing high voltage issues in night off peak time due to integration of large RE generation at Intra state as well as inter state level. Therefore, HVDC corridors may be planned in future to control power flow as well as voltages in RVPN system. CTU replied that they have planned adequate reactive commiseration (bus+line) as well as STATCOMs (with MSC+MSR) at inter state level, however reactive MVAr shall flow from intra state system to ISTS network. In view of that it was stated that RVPN may also plan suitable static/ dynamic compensation in existing and proposed RVPN system. CTU also stated that in subsequent phases HVDC Corridors will be planned from Jaisalmer/Barmer complex.

9. RVPN also enquired that with proposed interconnection of Fatehgarh-IV with Bhinmal S/s may cause loading issues in underlying network of Bhinmal S/s after bypassing scheme. CTU stated that in studies, loading of Bhinmal ICTs as well as underlying network is in order in all scenarios after considering bypassing scheme. It was also stated that Bypassing scheme at Bhinmal along with reconductoring (Jodhpur-Kankroli) is already agreed with implementation timeframe progressively from Nov'23 with a provision of suitable switching arrangement inside the Bhinmal substation.

10. PSTCL in the meeting as well as their mail dated 08.12.22 stated to increase the intra state generation and load of Punjab in winter and summer solar maximized scenario along with inclusion of solar capacity connected at intra state level. In meeting UPPTCL also stated to review the intra state generation of UP system in both the scenarios as generation in summer is on lower side whereas in winters generation is on higher side. CTU stated that they will review the load generation of Punjab and UP and incorporate it suitably in revised file. Accordingly, CTU incorporated inputs from UP and Punjab in the revised study files circulated on 16.12.22. HVPN stated that they do not have any observations on proposal as well as on studies.

11. Based on observations received from Stakeholders as well as discussion held in joint meeting, CTU shared the revised study files to all constituents on 16.12.22 incorporating the suggestions and inputs from UP, Punjab & GRID-INDIA/NRLDC. In revised and additional cases, line loadings in above RE complex were found to be in order as well as voltages were within limit. With above observations the scheme was agreed and to be taken up in ensuing CMETS-NR meeting. The agreed comprehensive Transmission scheme is as under:

Proposed Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 7.5 GW)

Northern Region

A. Fatehgarh-IV PS: 4 GW (4GW (Solar) + 4GW (Wind) + 2 GW BESS)

- Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA^, 400/220 kV Fatehgarh- IV (Section-2) Pooling Station along with 2x240 MVAr (765 kV) Bus Reactor & 2x125 MVAr (400 kV) Bus Reactor
- Fatehgarh-IV (Section-2) PS – Bhinmal (PG) 400 kV D/c line (Twin HTLS) along with 50 MVAr switchable line reactor at each end (~200 km)
- LILO of both ckts of 765 kV Fatehgarh-III- Beawar D/c line (2nd) at Fatehgarh-IV (Section-2) PS along with 330 MVAr switchable line reactors at Fatehgarh-IV PS end of each ckt of 765 kV Fatehgarh-IV PS - Beawar D/c line (formed after LILO) (~15 km)
- Beawar- Mandsaur PS 765 kV D/c line along with 240 MVAr switchable line reactor for each circuit at each end (~250 km)
- Augmentation by 1x1500 MVA, 765/400 kV ICT at Fatehgarh-II PS (7th)
- 6 nos. of 220 kV line bays at Fatehgarh-IV PS (for RE connectivity)
- 220kV Sectionalization bay (1 set) along with BC (2 nos.) and TBC (2 nos.) at Fatehgarh- IV PS

Future provisions at Fatehgarh-IV PS is already approved in 8th NCT meeting dated 25.03.22
^incl 1x500MVA ICT to fulfill 'N-1' requirement

B. Barmer-I PS: 3.5GW (3GW (Solar) + 3GW (Wind) +1 GW BESS)

- Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA^, 400/220 kV Barmer-I Pooling Station along with 2x240 MVAr (765 kV) Bus Reactor & 2x125 MVAr (400 kV) Bus Reactor
- Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line (Quad) (~50 km)
- 6 nos. of 220 kV line bays at Barmer-I PS (for RE connectivity)
- 220kV Sectionalization bay (1 set) along with BC (2 nos.) and TBC (2 nos.) at Barmer-I PS

Future provisions at Barmer-I PS:

Space for

- 765/400kV ICT along with bays- 2 no.
- 765 kV line bays along with switchable line reactors – 4 nos.
- 765kV Bus Reactor along with bay: 1 no.
- 400 kV line bays –2 no.
- 400 kV line bays along with switchable line reactor –4 nos.
- 400/220kV ICT along with bays -5 nos.
- 400 kV Bus Reactor along with bay: 1 no.
- 400kV Sectionalization bays: 2 sets
- 220 kV line bays for connectivity of RE Applications -6 nos.
- 220kV Sectionalization bay: 2 sets
- BC (2 nos.) & TBC (2 nos.)
- STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr)

^incl 1x500MVA ICT to fulfill 'N-1' requirement

C. Common Transmission System for Fatehgarh-IV and Barmer-I in NR

- Establishment of 2x1500 MVA, 765/400 kV Substation at suitable location near Jalore PS along with 2x240 MVAr (765 kV) & 2x125 MVAr (400 kV) Bus Reactor
- Fatehgarh-IV (Section-2) PS – Jalore PS 765 kV D/c line along with 240 MVAr switchable line reactor for each circuit at each end (~200 km)
- Barmer-I PS– Jalore PS 765 kV D/c line along with 330 MVAr switchable line reactor for each circuit at Jalore PS end (~165 km)
- Jalore PS-Chittorgarh (PG) 400 kV D/c line along with 50 MVAr switchable line reactor for each circuit at each end (Quad) (~200 km)
- Jalore PS- Mandsaur PS 765 kV D/c line along with 330 MVAr switchable line reactor for each circuit at each end (~320 km)

Future provisions at Jalore PS:

Space for

- 765/400kV ICT along with bays- 4 no.
- 765 kV line bays along with switchable line reactors – 4 no.
- 765kV Bus Reactor along with bay: 1 no.
- 400 kV line bays along with switchable line reactor –4 no.
- 400 kV line bays –4 no.
- 400 kV Bus Reactor along with bay: 1 no.
- 400kV Sectionalization bay: 2 sets
- 400/220kV ICT along with bay - 6 no. *
- 220kV line bays -10 no.*
- 220kV Sectionalization bay: 2 sets
- BC (3 nos.) & TBC (3 nos.)
- STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr)

**** RVPN may confirm the drawl requirement from Jalore PS in future***

Estimated Cost : Rs 14000 Cr (NR Portion)

Implementation Time-frame: 24 months from SPV transfer/ OM

The agreed transmission scheme Map is attached at **Exhibit-I**

In addition to above, following transmission scheme is also required in Western region for further dispersal of power for above RE complexes (Fatehgarh-IV and Barmer-I).

Western Region

Common Transmission System for Fatehgarh-IV (4GW) and Barmer-I (3.5GW) in Western Region

- Establishment of 765kV Mandsaur Pooling Station along with 2x330MVAr (765kV) Bus Reactors
- Mandsaur PS – Indore(PG) 765 kV D/c Line (200km) along with 1x330MVAr switchable line reactor (SLR) on each ckt at Mandsaur end
- Establishment of 765/400 (2x1500MVA) 400/220 (2x500MVA) & 220/132kV (3x200MVA) Kurawar S/s with 2x330MVAr 765kV bus reactor and 1x125MVAr 420kV bus reactor
- Mandsaur – Kurawar 765kV D/c line (~235km.) with 240MVAr switchable line reactors at both ends
- LILO of Indore – Bhopal 765kV 765kV S/c line at Kurawar (LILO length 15km.)
- Kurawar – Ashtha 400kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line (65km.)
- LILO of one circuit of Indore – Itarsi 400kV D/c line at Astha (LILO length 30km.)
- Shujalpur – Kurawar 400kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line (40km.)

Implementation Time-frame: 24 months from SPV transfer/ OM

Estimated Cost : Rs 6000 Cr (WR Portion)

The transmission system for WR portion was discussed in a meeting amongst CEA, CTUIL, MPPTCL and GRID-INDIA on 01.12.2022, wherein the above system was in-principally agreed. The scheme was further agreed in 13th CMETS-WR meeting held on 07.12.2022

----------x----------

Exhibit-I

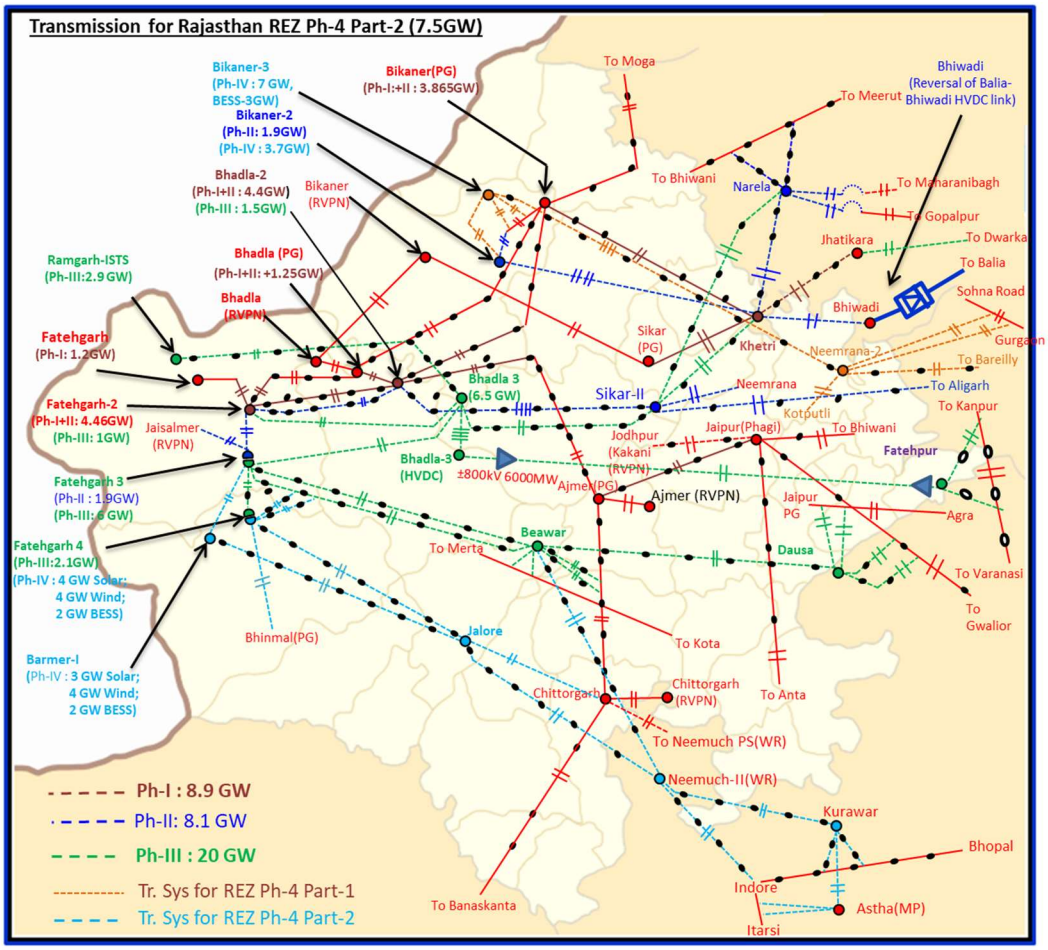


Fig 1: Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2) (Jaisalmer/Barmer Complex)

Annexure A

List of Participants

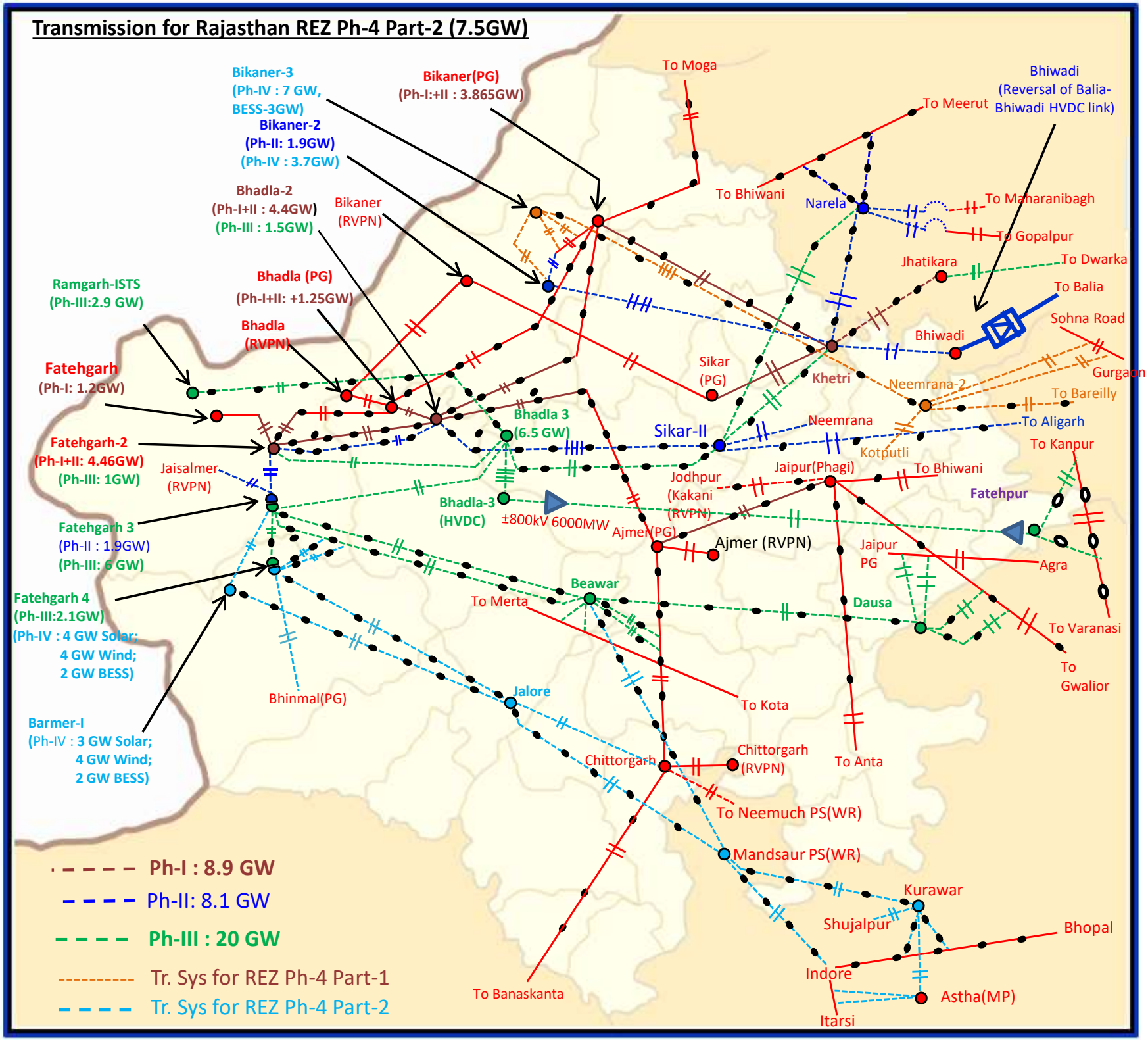
S.No	Name /Designation	Organization
1	Sh. Rajat Dixit	NRPC
2	Ms. Komal	CEA
3	Sh Kanhaiya Singh Kushwaha	CEA
4	Sh Nitin Deswal	CEA
5	Sh. Asif	NRLDC
6	Sh. Gaurav Singh	NRLDC
7	Sh. Sanjay Mathur	RVPN
8	Sh. Rajesh Kumar Jangra	HVPNL
9	Sh. Satyendra Kumar Kumar	UPPTCL
10	Sh. Vivek Khanna	PSTCL
11	Sh. Nitin	PSTCL
12	Sh. Lovleen Singh	DTL
13	Sh. Kashish Bhambhani	CTUIL
14	Sh. Sandeep Kumawat	CTUIL
15	Ms. Ankita Singh	CTUIL
16	Sh. R. Narendra Sathvik	CTUIL

Annexure-II

Study Assumptions

1. Studies were carried out for 2027 time frame for solar maximized scenario (afternoon peak) in June and February seasons. Further, studies were also carried out for June Evening peak & Feb Night Off Peak scenarios based on NR stakeholders request.
2. For evacuation studies,100% Solar dispatch for ISTS solar generation and 80% for intra state solar is considered in Northern region. Solar generation in other regions is considered 90-95%. In evening peak & night off peak scenarios, no solar generation is considered.
3. During solar maximized scenario of June season, wind Generation of NR is considered as 50% whereas wind generation of other regions is considered 50-55%. During evening peak of June season, wind Generation of NR is considered as 70% whereas wind generation of other regions is considered 70-75%. In Feb Season (Winter), low dispatch (up to 10%) of wind generation is considered in in all regions and all scenarios (solar max and night off peak)
4. During solar maximized scenario, Hydro Generation of NR, ER & NER is considered 60-70% and in other regions 30-40% is considered in June season. In Feb season, hydro generation is considered as 30% in all regions.
5. During evening peak scenario, Hydro Generation of NR, ER & NER is considered 90-95 % and in other regions 60-70% is considered in June season.
6. All India projected Peak Demand by 2027 is considered as per the 19th EPS of CEA as well as based on NR constituents' inputs.
7. Central sector/IPP Thermal generation is taken based on merit order dispatch with 55% technical minimum. State sector units dispatched to variable dispatch (55-85%) in a way that maximum thermal units will be available for generation in evening peak.
8. In the studies, all India transmission network up to 220kV level has been simulated. It includes, existing as well as under construction transmission network

Exhibit-I

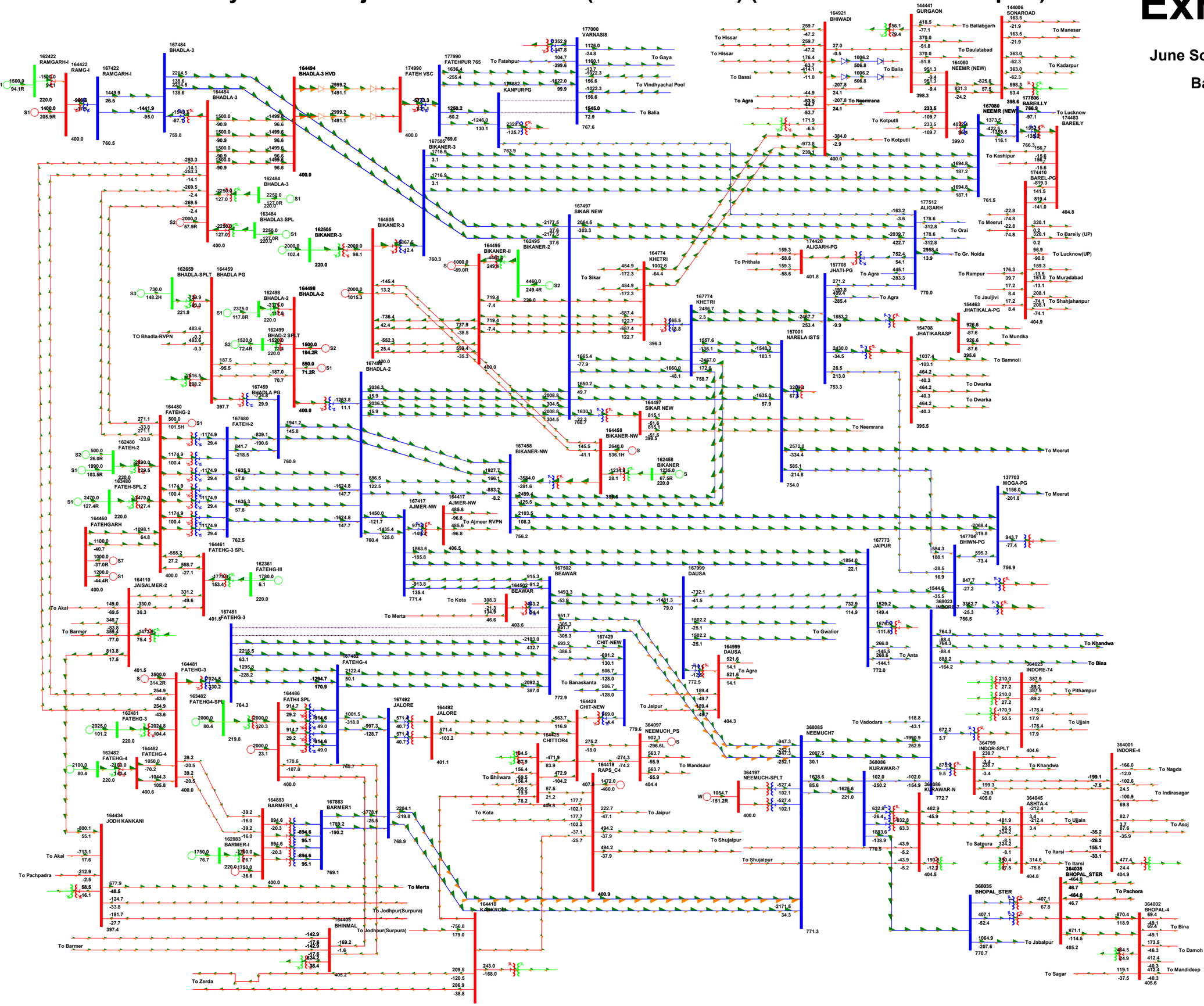

Transmission for Rajasthan REZ Ph-4 Part-2 (7.5GW)
Bikaner-3
(Ph-IV : 7 GW,
BESS-3GW)
Bikaner-2
(Ph-II: 1.9GW)
(Ph-IV : 3.7GW)
Bhadla-2
(Ph-I+II : 4.4GW)
(Ph-III : 1.5GW)
Ramgarh-ISTS
(Ph-III:2.9 GW)
Fatehgarh
(Ph-I: 1.2GW)
Fatehgarh-2
(Ph-I+II: 4.46GW)
(Ph-III: 1GW)
Fatehgarh 3
(Ph-II : 1.9GW)
(Ph-III: 6 GW)
Fatehgarh 4
(Ph-III:2.1GW)
(Ph-IV : 4 GW Solar;
4 GW Wind;
2 GW BESS)
Barmer-I
(Ph-IV : 3 GW Solar;
4 GW Wind;
2 GW BESS)
Bikaner(PG)
(Ph-I:+II : 3.865GW)
Bikaner
(RVPN)
Bhadla (PG)
(Ph-I+II: +1.25GW)
Bhadla
(RVPN)
Jaisalmer
(RVPN)
Bhadla 3
(6.5 GW)
Bhadla-3
(HVDC)
±800kV 6000MW
Bhinmal(PG)
Jalore
Beawar
To Merta
To Kota
Chittorgarh
Chittorgarh
(RVPN)
To Neemuch PS(WR)
Mandsaur PS(WR)
To Banaskanta
Sikar
(PG)
Sikar-II
Ajmer(PG)
Ajmer (RVPN)
Jodhpur
(Kakani
(RVPN)
To Moga
To Meerut
To Bhiwani
Narela
To Maharanibagh
To Gopalpur
Bhiwadi
(Reversal of Balia-
Bhiwadi HVDC link)
Jhatikara
To Dwarka
To Balia
Bhiwadi
Sohna Road
Gurgaon
Khetri
Neemrana-2
To Bareilly
To Aligarh
Neemrana
Kotputli
To Kanpur
Jaipur(Phagi)
To Bhiwani
Fatehpur
Jaipur
PG
Agra
Dausa
To Varanasi
To
Gwalior
To Anta
Kurawar
Shujalpur
Bhopal
Indore
Astha(MP)
Itarsi
Ph-I : 8.9 GW
Ph-II: 8.1 GW
Ph-III : 20 GW
Tr. Sys for REZ Ph-4 Part-1
Tr. Sys for REZ Ph-4 Part-2

Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

Exhibit-II

June Solar Max Scenario

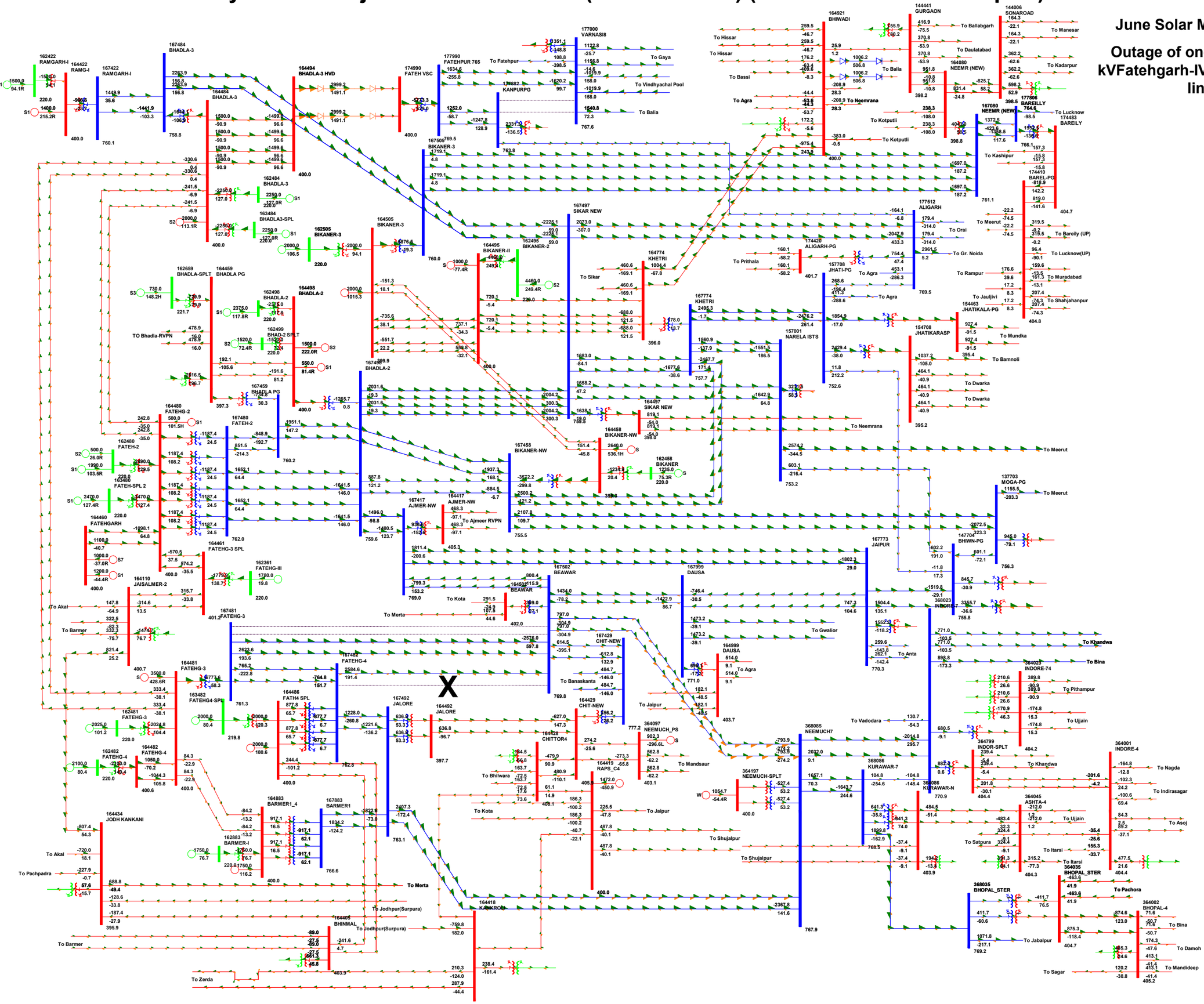
Base Case



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

June Solar Max Scenario

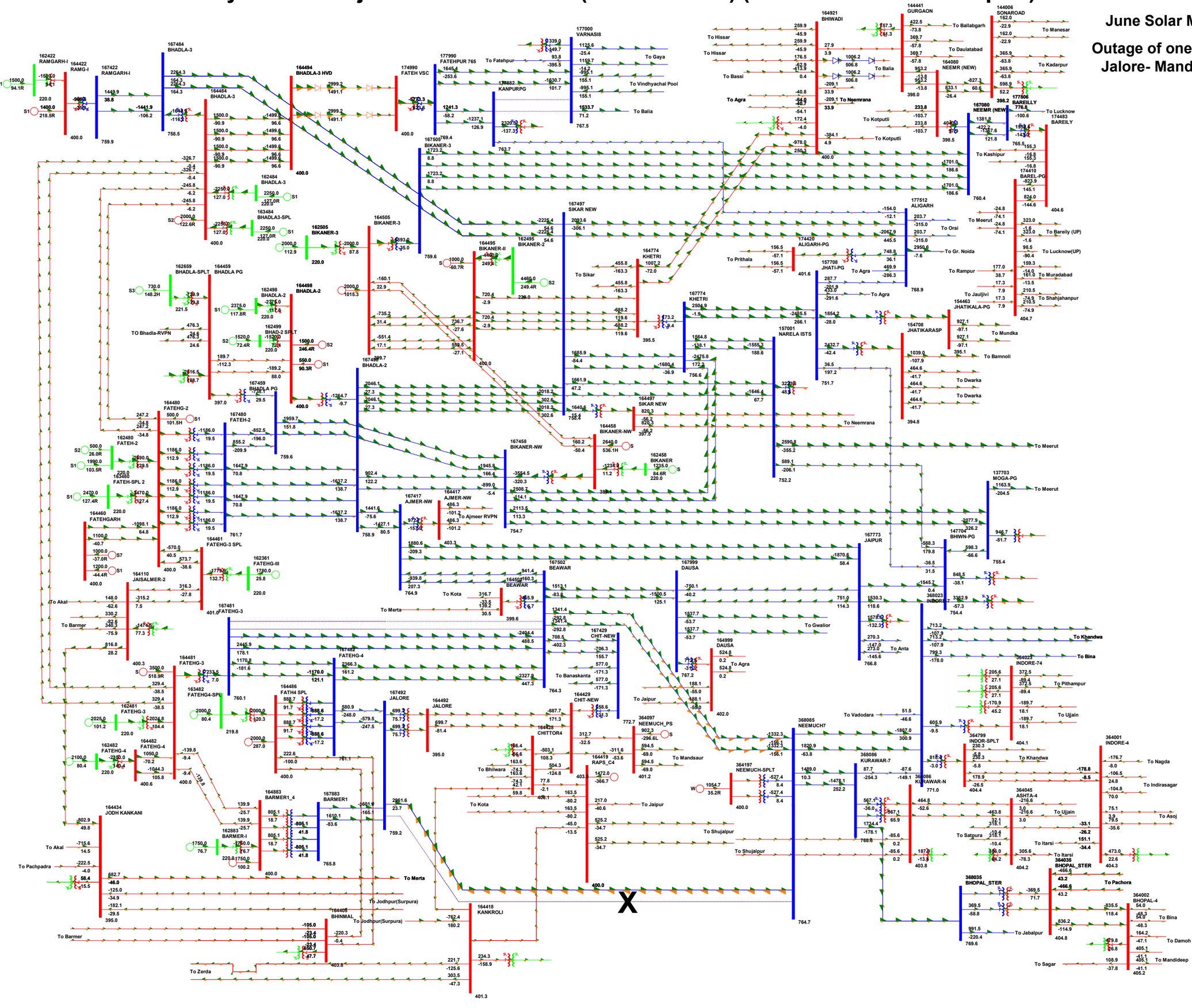
Outage of one ckt of 765 kVFatehgarh-IV- Beawer D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

June Solar Max Scenario

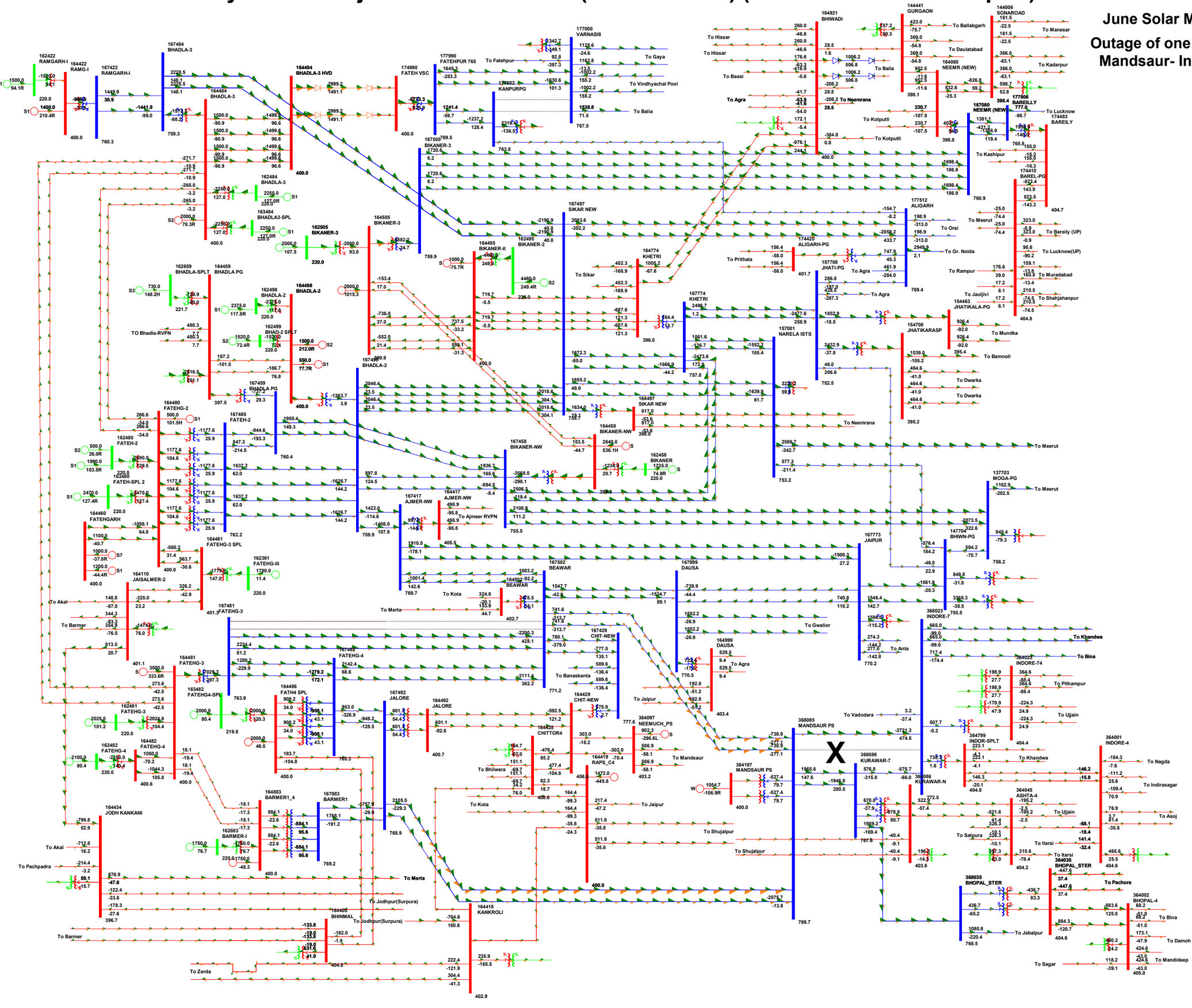
Outage of one ckt of 765 kV Jalore- Mandsaur D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

June Solar Max Scenario

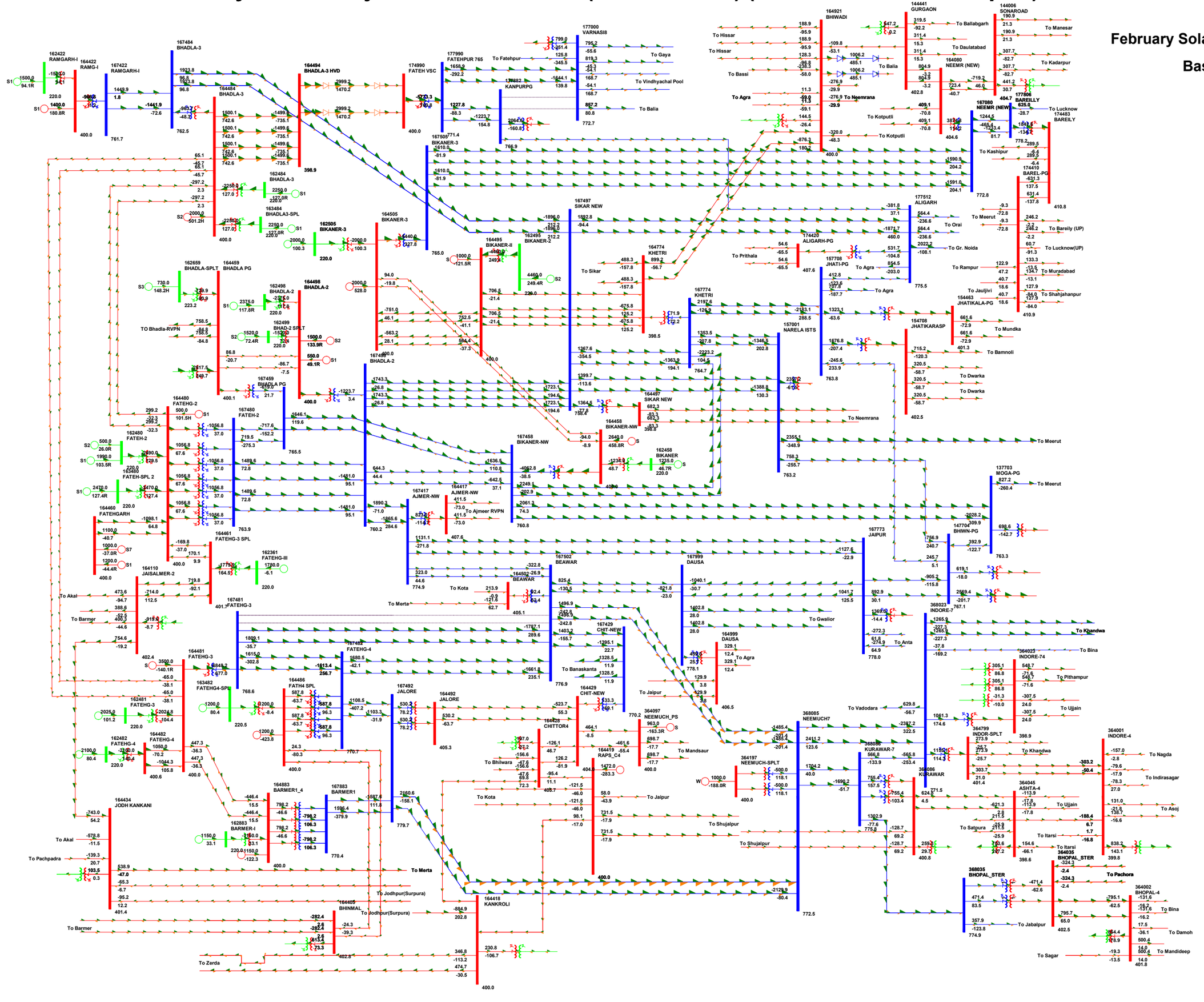
Outage of one ckt of 765 kV Mandsaur- Indore D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

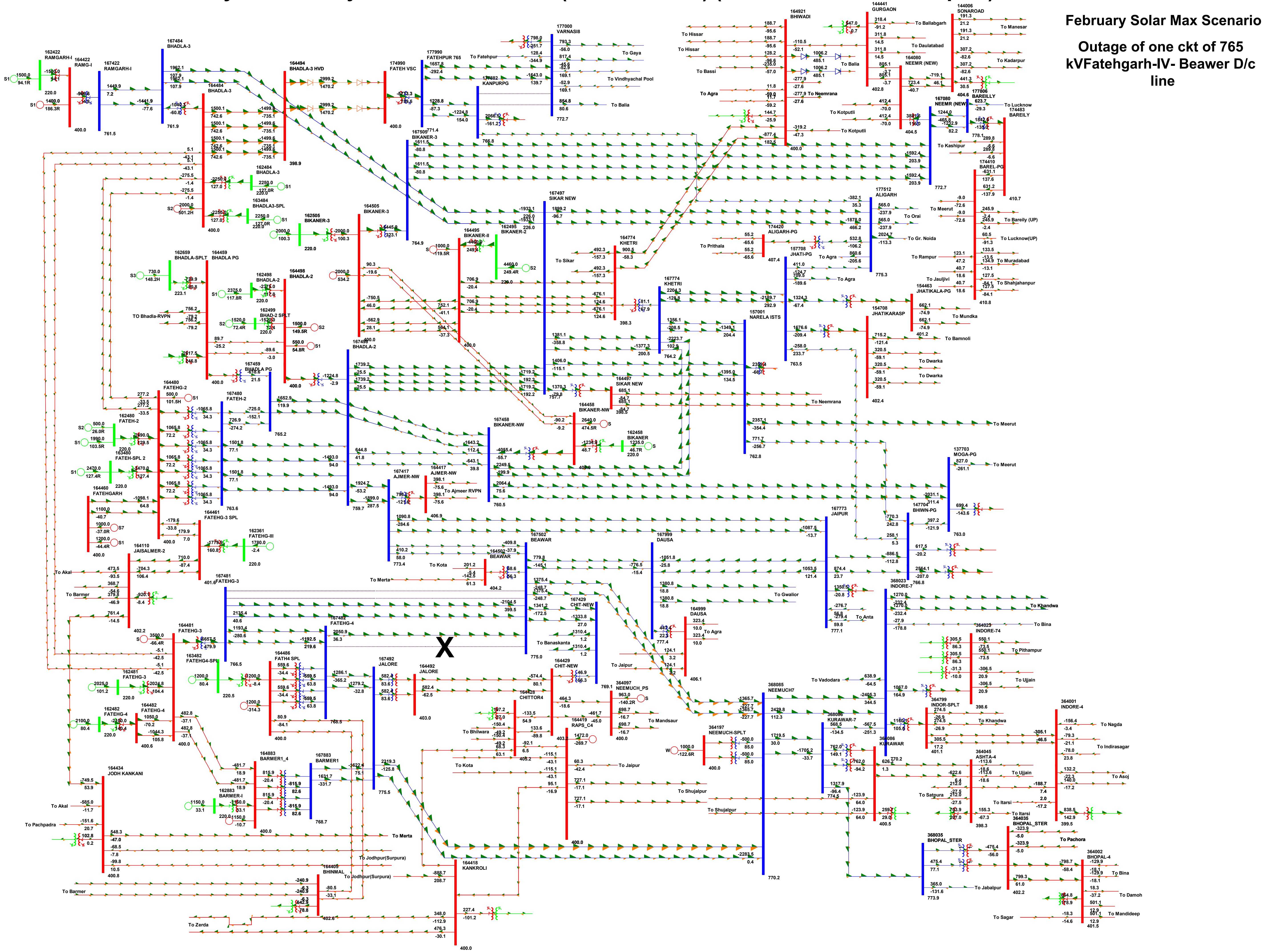
Base Case



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

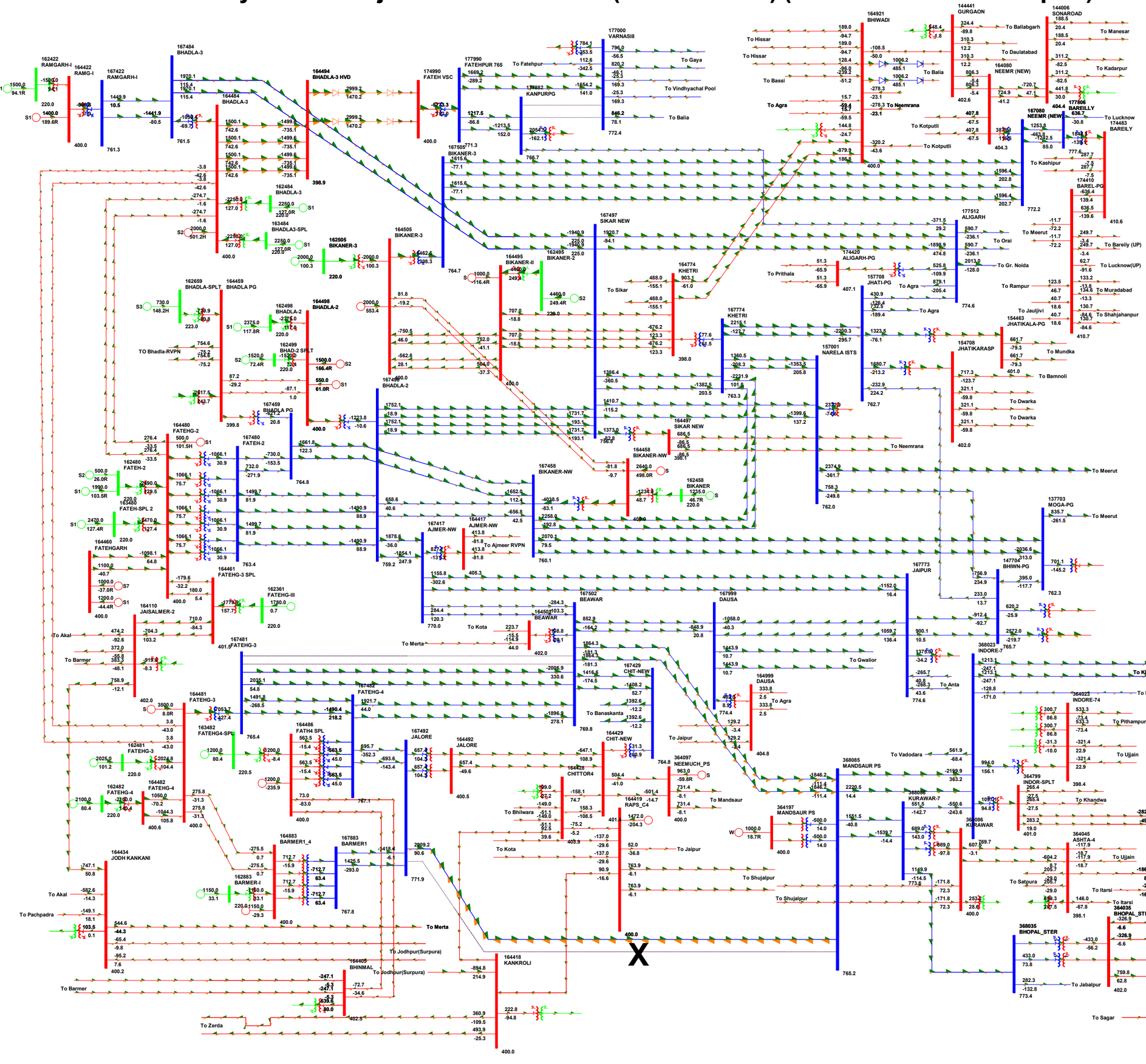
Outage of one ckt of 765 kVFatehgarh-IV- Beawer D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

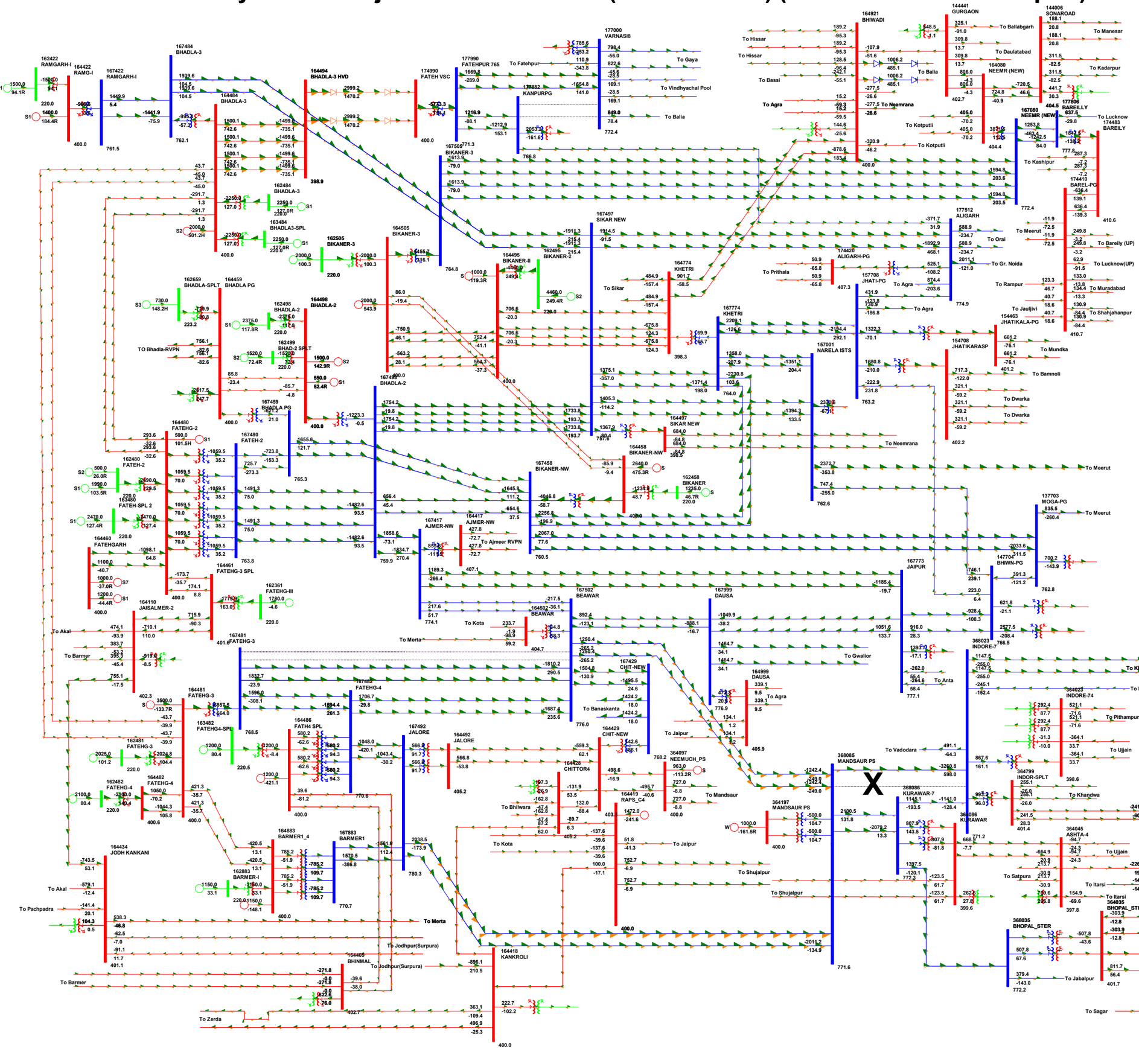
Outage of one ckt of 765 kV Jalore- Mandsaur D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

Outage of one ckt of 765 kV Mandsaur- Indore D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

Outage of one ckt of 400 kV RAPS- Shujalpur D/c line