I/31579/2023

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 (70 वीं)/2023/ दिनांक: 13 नवंबर, 2023

सेवा में / To,

तकनीकी समन्वय समिति/उ.क्षे.वि.स. के सभी सदस्य एवं विशेष आमंत्रित (संलग्न सूचीनुसार)
Members of TCC & NRPC & Special Invitees (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 70 वीं बैठक और तकनीकी समन्वय समिति (टीसीसी) की 48 वीं बैठक की अतिरिक्त कार्यसूची के संदर्भ में ।

Subject: Additional agenda for 70th Northern Regional Power Committee (NRPC) meeting & 48th Technical Co-ordination Committee (TCC) meeting-reg.

महोदय / महोदया,

तकनीकी समन्वय समिति (टीसीसी) की 48 वीं बैठक और उत्तरी क्षेत्रीय विद्युत समिति (एनआरपीसी) की 70 वीं बैठक क्रमशः 17.11.2023 (सुबह 10:30 बजे) और 18.11.2023 (10:30 बजे) को अमृतसर, पंजाब में आयोजित की जाएगी। बैठक की कार्यसूची पत्र दिनांक 08.11.2023 के द्वारा जारी की गयी थी। कृपया बैठक की संलग्न अतिरिक्त कार्यसूची प्राप्त करें ।

The 48th Technical Co-ordination Committee (TCC) meeting & 70th meeting of Northern Regional Power Committee (NRPC) will be held on **17.11.2023 (10:30 AM)** & **18.11.2023 (10:30 AM)** respectively at **Amritsar, Punjab**. Agenda was issued vide letter dated 08.11.2023. Additional agenda for the same may be found attached.

Encl: As above

भवदीय
Yours faithfully

Signed by Vijay Kumar Singh
Date: 13-11-2023 16:30:50
Reason: Approved

(वी.के. सिंह)
(V.K. Singh)
सदस्य सचिव
Member Secretary

प्रतिलिपि: मोहम्मद शायिन, एमडी, एचवीपीएनएल एवं अध्यक्ष, एनआरपीसी) md@hvpn.org.in)

सत्यमेव जयते

उत्तर क्षेत्रीय विद्युत समिति
NORTHERN REGIONAL POWER COMMITTEE

Additional agenda of
the 48th meeting of
Technical Co-ordination Committee &
70th meeting of
Northern Regional Power Committee

Date: 17th & 18th November 2023

Time: 10:30 AM

Venue: Le Méridien, Ajnala Rd, Bal Schander, Raja Sansi, Bal,Amritsar, Punjab

Contents

Additional Agenda for TCC meeting

AA.1 Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3 :3.6GW) in Bikaner Complex (agenda by CTU)

AA.1.1 Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3; Bikaner-IV) is evolved for evacuation of 3.6 GW RE from Bikaner complex. The scheme involves establishment of 765/400/220kV Bikaner-IV PS, 765/400kV Churu & Siwani S/s along with their interconnections.

AA.1.2 The scheme was discussed in the Joint study meeting (s) held on 18.10.2023 and 23.10.2023 with all stakeholders. Minutes are attached as **Annexure-AA-I**. The scheme was also discussed & agreed in the 25th CMETS-NR meeting held on 31.10.2023.

AA.1.3 Tentative cost of the scheme is Rs 8600 Cr with 24 months implementation schedule.

AA.1.4 Detailed scheme is attached as **Annexure-AA-II.**

Decision required from Forum:

Forum may deliberate above proposal of CTU and may approve accordingly.

AA.2 Issues faced in RE power evacuation in Rajasthan (agenda by Sekura Energy Pvt. Ltd.)

AA.2.1 Subsidiaries of Sekura Energy Pvt. Ltd. are connected in the northern region grid as below:

S.N.	Solar Project	Location	MW AC capacity	Connected to RVPN GSS
1	Pokaran Solaire Energy Pvt Ltd	site-Village-Bawdi, Barsingha, Tehsil-Bap, dist-Jodhpur, Rajasthan	5	220/33kV Bap GSS
2	Northern Solaire Prakash Pvt Ltd	Village: Khetusar, Tehsil: Bap, District: Jodhpur, Rajasthan	20	132kV Khetusar GSS
3	Suryauday Solaire Prakash Pvt Ltd	Village: Khetusar, Tehsil: Bap, District: Jodhpur, Rajasthan	10	132kV GSS Khetusar GSS
4	Solaire Surya Urja Pvt Ltd-Plot-8 & Plot 10	Plot 08 NTPC Solar Park , Phase-II,	2X 70	220/440kV Bhadla GSS

		Village - Bhadla, Post- Noore ki Bhurj, Tehsil- Bap, District- Jodhpur (Rajasthan)		

AA.2.2 Various grid operation related issued are being faced as detailed below:

a) Requirement of Additional ICT Transformer Capacity at RRVPNL 400/220 kV Bhadla GSS - *(SEPL affected entity - Solaire Surya Urja Pvt Ltd-Plot-8 & Plot 10 – 140 MW)*

- At present approx. 1450 MW Plant load of various SPDs is connected at RRVPNL 400/220 kV Bhadla GSS and in operation, but for the evacuation only 03 nos. ICT Transformers of 500 MVA each (500 x 3 = 1500 MVA) are currently in operation. It is to note that in case of ICT Capacity, (N-1) grid contingency criterion has not been adhered at 400/220 kV RRVPNL Bhadla GSS.

- On 19th April 2023, one of the 500 MVA transformer at RRVPNL GSS failed and subsequently curtailment instructions were issued by RRVPNL on daily basis to all solar power developers between 19th Apr 2023 and 24th May 2023, which caused huge RE generation loss to all the connected solar power developers.

- In light of Electricity (Promotion of Generation of Electricity from Must-Run Power Plant) Rules, 2021 issued by MoP and as a preventive measure to stop occurrence of such grid curtailments and RE generation loss because of any ICT failure incidents in future, RRVPNL may inform its plan to this forum for the augmentation of transformer capacity at the 400/220 kV Bhadla GSS.

- Further, it is to highlight that similar issue of RE evacuation was discussed in 212th OCC meeting (held on 20.10.2023) at agenda no. 28, wherein following was discussed:

Quote

Some of the lines in RVPN control area wherein this issue was observed are listed below:

- *400kV Bikaner(PG)-Bikaner(RJ) D/C: Issue in ISTS-RE evacuation in Dec 2022 and SPS logic had to be implemented to avoid RE curtailment.*
- *400kV Bhadla(PG)-Bhadla(RJ) D/C: N-1 non-compliance observed. SPS proposal under discussion, difficult to provide shutdown in the RE complex.*

Unquote

b) RE Power curtailment because of multiple & frequent tower collapse incident in RRVPNL operated transmission network

- The affected assets are:

SEPL affected entity -

Solaire Surya Urja Pvt. Ltd. -Plot-8 & Plot 10 (SSUPL) – 140 MW

Northern Solaire Prakash Pvt. Ltd. (NSPPL) – 20 MW

Suryauday Solaire Prakash Pvt. Ltd. (SSPPL)– 10 MW

- First Tower collapse incident in FY 23-24:

The entities SSUPL, NSPPL and SSPPL faced continuous grid curtailment instructions for its operating Solar power projects, located at Bhadla Solar Park, and Distt. – Khetusar, Rajasthan after tower collapse incident happened on 26th May 2023 in 400 kV Bhadla -Jodhpur-Merta line of RRVPNL control area. From the day of the tower collapse incident, instructions were being issued to all RE Generators for the curtailment of RE Generation upto 20% of plant capacity (Ref. NRLDC Circular dt. 06th June 23). This grid curtailment was continued till complete restoration of these towers (upto 15th Jul 2023).

- Second Tower collapse incident in FY 23-24:

On 16th October 2023, 220 kV towers collapse occurred in the RRVPNL network at 220KV Bhadla-Bap-Badisid line at location No. 26, 27 & 28, at Bhadla-Bap Region, Jodhpur District, resulting in curtailment of RE generation. Instructions from RRVPNL were issued for curtailment of 20-22% in RE generation.

This is an ongoing event and SEKURA is receiving curtailment instructions from RRVPNL since then and is expected until the restoration of the towers.

The issue of RVPNL transmission tower collapse incident was also discussed in earlier 209th OCC meeting (held on 19.07.2023) under Agenda item no. 14 for the tower collapse incident of 400 kV Bhadla- Bikaner D/C, 400 kV Bhadla- Jodhpur and 400 kV Bhadla- Merta lines.

However, the recent tower collapse incident in RVPN 220KV Bhadla-Bap-Badisid line held on 16th Oct 2023 seeks urgent attention towards transmission line inspections-

maintenance and immediate tower & line strengthening works. It seems that negligence at part of transmission line inspections & maintenance may be the root cause of frequent tower collapses in RVPNL transmission line.

c) Frequent trappings in RRVPNL Grid Network due to frequent voltage fluctuation (phase jump issue)

- The affected assets are:
  SEPL affected entity - -Suryauday Solaire Prakash Pvt. Ltd. (SSPPL) – 10 MW
  Northern Solaire Prakash Pvt. Ltd. (NSPPL) – 20 MW

- NSPPL and SSPPL solar plants are operational since May-2015 & Apr-2015 respectively wherein load evacuation is being done at 33kV connected at 132/33kV Khetusar grid sub-station. However, there are continuous events of grid voltage fluctuation (phase jump issue) wherein SEKURA have been constrained from generating green energy at our optimum level on account of frequent grid failure events leading to lower grid availability. The details are:

FY 21-22 :

Sr. No.	Site Name	Tripping count (No.)
1	SSPPL	34
2	NSPPL	47

FY 22-23:

Sr. No.	Site Name	Tripping count (No.)
1	SSPPL	366
2	NSPPL	379

FY 23-24 (Till Oct 2023):

Sr. No.	Site Name	Tripping count (No.)
1	SSPPL	194
2	NSPPL	203

- As evident above, the number of tripping at 132/33kV Khetusar grid sub-station has increased manifold in FY 23-24 vis-à-vis FY 22-23 and in turn impacting plant performance, asset life and negatively impacting project economics.

- Similar issue related to Grid Operation in RVPNL network was also discussed in earlier 211th OCC Meeting (held on 19.09.2023) under Agenda item no. 19 and has

also been requested time to time and followed up with the RVPNL authorities, however the resolution is yet to be arrived.

- Since this is a prolonged issue affecting grid operations, it is requested to RRVPNL to kindly take this issue in the consideration and resolve this at the earliest so as to achieve the objective of reliable & stable grid operation.

AA.2.3 Hence, to ensure uninterrupted power evacuation from RE plants of Bhadla Region and to avoid any such tower collapse incidents in near future, forum may kindly direct RVPN to -

- Release the ongoing RE Power curtailment and complete permanent restoration work of 220KV Bhadla-Bap-Badisid line in at the earliest & in a time bound manner.

- Ensure grid reliability criterion for the RE generation evacuating lines of “Bhadla RE Complex”.

- Ensure the annual maintenance schedule of RE evacuating lines of Bhadla region as per prudent Utility Practices.

- Take necessary steps to contain voltage fluctuations.

Decision required from Forum:

Forum may deliberate on above issues raised by M/s Sekura and may take decision accordingly.

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List of addressee (via mail)

NRPC Members for FY 2023-24

S. No.	NRPC Member	Category	Nominated/ Notified/Delegated Member	E-mail
1	Member (GO&D), CEA	Member (Grid Operation & Distribution), Central Electricity Authority (CEA)	Member (GO&D), CEA	member.god@cea.nic.in
2	Member (PS), CEA	Nodal Agency appointed by the Government of India for coordinating cross-border power transactions	Member (PS), CEA	memberpscea@nic.in
3	CTUIL	Central Transmission Utility	Chief Operating Officer	pcgarg@powergrid.in
4	PGCIL	Central Government owned Transmission Company	Director (Operations)	tyagir@powergrid.in
5	NLDC	National Load Despatch Centre	Executive Director	scsaxena@grid-india.in
6	NRLDC	Northern Regional Load Despatch Centre	Executive Director	nroy@grid-india.in
7	NTPC	Central Generating Company	Director (Finance)	jaikumar@ntpc.co.in
8	BBMB		Chairman	cman@bbmb.nic.in
9	THDC		CGM (EM-Design)	akghildiyal@thdc.co.in
10	SJVN		CMD	sectt.cmd@sjvn.nic.in
11	NHPC		Director (Technical)	ykchaubey@nhpc.nic.in
12	NPCIL		Director (Finance)	df@npcil.co.in
13	Delhi SLDC	State Load Despatch Centre	General Manager	gmsldc@delhisldc.org
14	Haryana SLDC		Chief Engineer (SO&C)	cesocomml@hvpn.org.in
15	Rajasthan SLDC		Chief Engineer (LD)	ce.ld@rvpn.co.in
16	Uttar Pradesh SLDC		Director	directorsldc@upsldc.org
17	Uttarakhand SLDC		Chief Engineer	anupam_singh@ptcul.org
18	Punjab SLDC		Chief Engineer	ce-sldc@punjabsldc.org
19	Himachal Pradesh SLDC		Chief Engineer	cehpsldc@gmail.com
20	DTL	State Transmission Utility	CMD	cmd@dtl.gov.in
21	HVPNL		Managing Director	md@hvpn.org.in
22	RRVPNL		CMD	cmd.rvpn@rvpn.co.in
23	UPPTCL		Managing Director	md@upptcl.org
24	PTCUL		Managing Director	md@ptcul.org
25	PSTCL		CMD	cmd@pstcl.org
26	HPPTCL		Managing Director	md.tcl@hpmail.in
27	IPGCL	State Generating Company	Managing Director	md.ipgpp@nic.in
28	HPGCL		Managing Director	md@hpgcl.org.in
29	RRVUNL		CMD	cmd@rrvun.com
30	UPRVUNL		Director (Technical)	director.technical@uprvunl.org
31	UJVNL		Managing Director	mdujvnl@ujvnl.com
32	HPPCL		Managing Director	md@hppcl.in
33	PSPCL	State Generating Company & State owned Distribution Company	CMD	cmd-pspcl@pspcl.in
34	DHBVN	State owned Distribution Company (alphabetical rotaional basis/nominated by state govt.)	Director (Projects)	directorprojects@dhbvn.org.in
35	Jaipur Vidyut Vitran Nigam Ltd.		Managing Director	md@jvvnl.org
36	Madhyanchal Vidyut Vitaran Nigam Ltd.		Managing Director	mdmvvnl@gmail.com
37	UPCL		Managing Director	md@upcl.org
38	HPSEB		Managing Director	md@hpseb.in
39	Prayagraj Power Generation Co. Ltd.	IPP having more than 1000 MW installed capacity	Head (Commercial & Regulatory)	sanjay.bhargava@tatapower.com
40	Aravali Power Company Pvt. Ltd		CEO	SRBODANKI@NTPC.CO.IN
41	CLP Jhajjar Power Ltd.,		CEO	rajneesh.setia@apraava.com
42	Talwandi Sabo Power Ltd.		COO	Vibhav.Agarwal@vedanta.co.in
43	Nabha Power Limited		CEO	sk.narang@larsentoubro.com
44	Lanco Anpara Power Ltd		President	sudheer.kothapalli@lancogroup.com
45	Rosa Power Supply Company Ltd		Station Director	Hirday.tomar@relianceada.com
46	Lalitpur Power Generation Company Ltd		Managing Director	vksbankoti@bajajenergy.com
47	MEJA Urja Nigam Ltd.		CEO	hopmeja@ntpc.co.in
48	Adani Power Rajasthan Limited		COO, Thermal, O&M	jayadeb.nanda@adani.com
49	JSW Energy Ltd. (KWHEP)		Head Regulatory & Power Sales	jyotiprakash.panda@jsw.in
50	RENEW POWER	IPP having less than 1000 MW installed capacity (alphabetical rotaional basis)	CEO	sumant@renew.com
51	UT of J&K	From each of the Union Territories in the region, a representative nominated by the administration of the Union Territory concerned out of the entities engaged in generation/ transmission/ distribution of electricity in the Union Territory.	Chief Engineer, JKPTCL	sojpdd@gmail.com
52	UT of Ladakh		Chief Engineer, LPDD	cepdladakh@gmail.com
53	UT of Chandigarh		Executive Engineer, EWEDC	elop2-chd@nic.in
54	BYPL	Private Distribution Company in region (alphabetical rotaional basis)	CEO	Amarjeet.Sheoran@relianceada.com
55	Bikaner Khetri Transmission Limited	Private transmission licensee (nominated by cetral govt.)	Vice-President	nihar.raj@adani.com
56	Adani Enterprises	Electricity Trader (nominated by central govt.)	Head Power Sales & Trading	anshul.garg@adani.com
57	Ajmer Vidyut Vitran Nigam Ltd.	Special Invitee	Managing Director	md.avvnl@rajasthan.gov.in

Special Invitees:

RE Holding companies in NR with installed capacity of more than 1000 MW (provsional members as decided in 59th NRPC meeting)

List of addressee (via mail)

TCC Members for FY 2023-24

S. No.	TCC Member	Category	Nominated/ Notified/Delegated Member	E-mail
1	Director (Projects), HVPNL	Chairperson, TCC		directorprojects@hvpn.org.in
2	Member (GO&D), CEA	Member (Grid Operation & Distribution), Central Electricity Authority (CEA)	Chief engineer(GM Division)	cegm-cea@gov.in
3	Member (PS), CEA	Nodal Agency appointed by the Government of India for coordinating cross-border power transactions	Chief Engineer, PSPA-I Division	i.sharan@nic.in
4	CTUIL	Central Transmission Utility	Dy Chief Operating Officer	ashok@powergrid.in
5	PGCIL	Central Government owned Transmission Company	ED, NR-I	akmishra2@powergrid.in
6	NLDC	National Load Despatch Centre		nomination awaited
7	NRLDC	Northern Regional Load Despatch Centre	Executive Director	nroy@grid-india.in
8	NTPC	Central Generating Company	Regional ED, NR	rednr@ntpc.co.in
9	BBMB		Member (Power)	mp@bbmb.nic.in
10	THDC		GM (EMD)	neerajverma@thdc.co.in
11	SJVN		Director (Projects)	de.sectt@sjvn.nic.in
12	NHPC		ED (O&M)	hod-om-co@nhpc.nic.in
13	NPCIL			nomination awaited
14	Delhi SLDC	State Load Despatch Centre		nomination awaited
15	Haryana SLDC		Chief Engineer/SO & Comml.	cesocomml@hvpn.org.in
16	Rajasthan SLDC			nomination awaited
17	Uttar Pradesh SLDC		Chief Engineer	cepso@upsldc.org
18	Uttarakhand SLDC			nomination awaited
19	Punjab SLDC		Chief Engineer	ce-sldc@pstcl.org
20	Himachal Pradesh SLDC			nomination awaited
21	DTL	State Transmission Utility		nomination awaited
22	HVPNL		Chief Engineer/SO & Comml.	cesocomml@hvpn.org.in
23	RRVPNL		Chief Engineer (PP&D)	ce.ppm@rvpn.co.in
24	UPPTCL			nomination awaited
25	PTCUL		Chief Engineer	ce_oandmk@ptcul.org
26	PSTCL		Director / Technical	dir-tech@pstcl.org
27	HPPTCL		GM (C&D)	gmcd.tcl@hpmail.in
28	IPGCL	State Generating Company	Director(Tech.)	corporate.ppcl@gmail.com
29	HPGCL		Director/Technical	dirtech@hpgcl.org.in
30	RRVUNL			
31	UPRVUNL		Director (Technical)	director.technical@uprvunl.org
32	UJVNL		General Manager	kkjaiswal99@gmail.com
33	HPPCL			nomination awaited
34	PSPCL	State Generating Company & State owned Distribution Company		nomination awaited
35	DHBVN	State owned Distribution Company (alphabetical rotaional basis/nominated by state govt.)	Director (Operation)	directoroperations@dhbvn.org.in
36	Jaipur Vidyut Vitran Nigam Ltd.			nomination awaited
37	Madhyanchal Vidyut Vitaran Nigam Ltd.			nomination awaited
38	UPCL		Director (P)	dpupcl29@gmail.com
39	HPSEB			nomination awaited
40	Prayagraj Power Generation Co. Ltd.	IPP having more than 1000 MW installed capacity	Head – Commercial & Regulatory	Sanjay.bhargava@tatapower.com
41	Aravali Power Company Pvt. Ltd		GM (O&M)	sanjayasati@ntpc.co.in
42	CLP Jhajjar Power Ltd.,			nomination awaited
43	Talwandi Sabo Power Ltd.		Dy. Head O&M	ravinder.thakur@vedanta.co.in
44	Nabha Power Limited			nomination awaited
45	Lanco Anpara Power Ltd			nomination awaited
46	Rosa Power Supply Company Ltd		VP-Technical Services	Niranjan.Jena@relianceada.com
47	Lalitpur Power Generation Company Ltd		President	rnbedi.ltp@lpgcl.com
48	MEJA Urja Nigam Ltd.		GM (O&M)	piyushkumar@ntpc.co.in
49	Adani Power Rajasthan Limited		AVP	Manoj.taunk@adani.com
50	JSW Energy Ltd. (KWHEP)		Head of Plant	kaushik.maulik@jsw.in
51	RENEW POWER	IPP having less than 1000 MW installed capacity (alphabetical rotaional basis)		nomination awaited
52	UT of J&K	From each of the Union Territories in the region, a representative nominated by the administration of the Union Territory concerned out of the entities engaged in generation/ transmission/ distribution of electricity in the Union Territory.		nomination awaited
53	UT of Ladakh			nomination awaited
54	UT of Chandigarh			nomination awaited
55	BYPL	Private Distribution Company in region (alphabetical rotaional basis)	VP	Jitendra.nalwaya@relianceada.com
56	Bikaner Khetri Transmission Limited	Private transmission licensee (nominated by cetral govt.)	Associate Vice President- O&M	nitesh.ranjan@adani.com
57	Adani Enterprises	Electricity Trader (nominated by central govt.)	Manager	mayursinhd.gohil@adani.com
58	Ajmer Vidyut Vitran Nigam Ltd.	Special Invitee	Director (Technical)	DT.AVVNL@RAJASTHAN.GOV.IN

Special Invitees:

1. Shri. Chowna Mein, Hon'ble Dy. Chief Minister and I/C Power, Govt. of Arunachal Pradesh, Block No.2, 5th Floor, A.P. Civil Secretariat, Itangar-791111. [Email: chowna.mein@gov.in]Tel -03602212671
2. Shri Ginko Lingi, Chairman, TCC, NERPC & Chief Engineer (P), TPMZ , Department of Power, Govt. of Arunachal Pradesh, Vidyut Bhawan, zero Point, Itanagar-791111. [Email: ginko.lingi@gmail.com] Tel -9612153184
3. Shri K Vijayanand, Chairperson, SRPC, Chairman & Managing Director , Transmission Corporation of Andhra Pradesh Limited, Vidyut Soudha, Gunadala, Eluru Rd, Vijayawada, Andhra Pradesh 520004. [Email: cmd.aptransco@aptrandco.in ; vjanand@nic.in] Tel -08662429201
4. Shri AKV Bhaskar, Chairperson TCC, SRPC, Director (Trasmission & Grid Management), Transmission Corporation of Andhra Pradesh Limited, Vidyut Soudha, Gunadala,Eluru Rd, Vijayawada, Andhra Pradesh 520004. [Email: kannanvenkatabhaskar.angulabharanam@aptransco.co.in] Tel -.08662429209
5. Sri Nikunja Bihari Dhal, IAS, Chairman, ERPC, Additional Chief Secretary to Govt., Department of Energy, Govt. of Odisha, Bhubaneswar. [Email-chairman@gridco.co.in] Tel -06742540098
6. Shri Trilochan Panda, Managing Director, GRIDCO, Chairperson TCC, ERPC, GRIDCO Limited, Regd. Office: Janpath, Bhubaneswar – 751022. Tel -06742540877 [Email- md@gridco.co.in]
7. Shri Sanjay Dubey, Chairman, WRPC & Principal Secretary(Energy), GoMP, VB-2, Vallabh Bhawan Annex, Mantralay, Bhopal: 462 001 (M.P.), Email: psenergyn@gmail.com, Tel. 0755-2708031
8. Shri Raghuraj Rajendran, Chairman-TCC, WRPC & Managing Director MPPMCL, Block No-15, Shakti Bhawan, Vidyut Nagar, Rampur, Jabalpur-482008. [Email-mdofmppmcl@gmail.com]
9. Smt. Rishika Saran, Member Secretary, NPC, Sewa Bhawan, R. K. Puram, New Delhi-66 [Email-cenpc-cea@gov.in]
10. Shri Deepak Kumar, Member Secretary, WRPC, Plot No- F-3, MIDC Area, Marol, Opp. SEEPZ, Central Road, Andheri (East), Mumbai-40093.[email: ms-wrpc@nic.in] Tel - 02228221636
11. Shri Asit Singh, Member Secretary, SRPC, No.29, Race Course Cross Road, Bengaluru-560009. [Email: mssrpc-ka@nic.in] Tel -08022287205/9449047107
12. Shri N.S. Mondal, Member Secretary, ERPC,14,Golf Club Road, ERPC Building, Tollygunje,Kolkata-700033. [Email: mserpc-power@nic.in]- Tel 03324239651/9958389967
13. Shri K B Jagtap, Member Secretary, NERPC, NERPC Complex, Dong Parmaw, Lapalang, Shillong-793006. [Email: ms-nerpc@gov.in] Tel -03642534077/ 8652776033

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Annexure-AA-I

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उद्यम)
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-3) **Date:** 10.11.23

As per distribution list

Sub: Minutes of Joint study meeting (s) held on 18.10.23 and 23.10.23 to finalize the Transmission system for evacuation of power from Bikaner Complex as part of Rajasthan REZ Ph-IV (Part-3)

Dear Sir,

Please find enclosed the minutes of Joint study meeting (s) held on 18.10.23 and 23.10.23 to finalize the Transmission system for evacuation of power from Bikaner Complex as part of Rajasthan REZ Ph-IV (Part-3) through virtual mode.

Thanking you,

Yours Faithfully,

10/11/23

(Kashish Bhambhani)
GM (CTU)

Encl : Minutes of Meeting

Distribution List:

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Director (Operations) Delhi Transco Ltd. Shakti Sadan, Kotla Road, New Delhi-110 002	**Director (Technical)** Haryana Vidyut Prasaran Nigam Ltd. Shakti Bhawan, Sector-6, Panchkula-134109, Haryana

Minutes of meeting of Joint study meeting (s) held on 18.10.23 and 23.10.23 to finalize the Transmission system for evacuation of power from Bikaner Complex as part of Rajasthan REZ Ph-IV (Part-3)

Joint Study Meeting(s) were held in virtual mode on 18.10.23 and 23.10.23 with SECI, CEA, GRID-INDIA, RVPN, HVPN, PSTCL and other STUs of Northern region to discuss the Transmission system for evacuation of power from Bikaner Complex as part of Rajasthan REZ Ph-IV (Part-3) scheme. In the meeting, SECI/MNRE were also asked to confirm on RE potential of Bikaner complex.

Gist of discussion held in First Joint study meeting on 18.10.23

In the meeting, It was informed 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. In this regard, a Comprehensive transmission plan for evacuation of 75GW RE potential from Rajasthan is evolved. Details of schemes approved scheme as part of above is as under:

S.No	Transmission Scheme	RE Potential	Status
1	Rajasthan REZ Ph-IV (Part-1 :7.7GW) (Bikaner Complex)	14 GW (Solar 14GW, BESS:6GW)	Under Advance stage of Bidding
2	Rajasthan REZ Ph-IV (Part-2 :5.5GW) (Jaisalmer/Barmer Complex)	14GW (Wind : 7GW, Solar:7GW, BESS: 3 GW)	Under Bidding

CTU stated that Transmission scheme is evolved for about 7.7GW (Solar) in Bikaner complex (14 GW potential along with 6 GW BESS) in Rajasthan for RE potential identified at Bikaner complex as part of committee report. However, no application of BESS (linked with RE) against envisaged 6GW was received. Accordingly, RE potential of about 7.7GW (in place of 14GW) can be evacuated from planned system (Ph-IV scheme) from Bikaner complex (Bikaner-II(3.7 GW) & Bikaner-III(4 GW)).

At Bikaner-II PS & Bikaner-III PS connectivity of about 7.7GW utilizing above Ph-IV (Part-1) system for transfer of power is already granted and no further margin is available for additional connectivity due to technical limitation. Further, additional Connectivity of about 1.7 GW RE (Solar) is also received at Bikaner complex and more applications are expected due to land availability and being outside of GIB area for which new pooling station i.e. Bikaner-IV and onwards 765kV high capacity corridors will be required. In the meeting, SECI/MNRE were also asked to confirm on RE potential of Bikaner complex.

In the above meeting, SECI stated that as part of committee report, RE potential of 30GW (out of 75GW) was planned in non GIB areas of Rajasthan viz. Bikaner, Jalore, Sanchore, Sirohi, Ajmer etc. in phase-II & III scheme (except in Bikaner which was in Ph-I also), however Bikaner complex has much more RE potential and waste land availability out of above Non GIB zones.

SECI stated that at present 75GW is not yet fully harnessed and therefore adjustment of RE potential may be considered at present within Non-GIB area and if required the potential of 75

GW will be reviewed and increased in consultation and approval with MNRE later on. Further 6GW BESS at Bikaner-II/III PS could not be developed.

CEA stated that as informed by CTU that no margin available for connectivity in Bikaner complex, potential for new substation at Bikaner-IV needs to be frozen for next phase of planning. CEA enquired SECI on progress of new bids for RE with BESS. SECI stated that at present there is no clear visibility for such projects (RE with BESS) before 2027 as award process will take time (1-2 years). CEA mentioned that 6 GW RE potential (solar) remains untapped due to non-materialisation of BESS capacity. CTU also informed that at present no RE application are received from any of complexes in non GIB areas viz. Sanchore, Jalore Pali etc.

SECI also stated that 6GW potential at Bikaner complex can be considered for now as part of 75GW potential in Rajasthan with some portion from adjustment of potential from other Non-GIB complexes i.e. Sanchore, Jalore, Pali etc. and balance from 6GW unharnessed RE potential (with BESS) at Bikaner complex. Accordingly, it was decided that cumulatively 6 GW RE potential may be considered for planning of transmission scheme from Bikaner-IV PS.

CTU stated that considering requirement of 6 GW evacuation capacity from Bikaner-IV PS, 3GW RE capacity to be evacuated through EHVAC system as part of present proposal and balance 3GW along with Bhadla-IV potential (4GW) through HVDC system, which is under planning. In view of that system studies were carried and proposed Transmission scheme is as under

Proposed Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3)

Bikaner-IV : 3GW (Solar)

- Establishment of 3x1500 MVA, 765/400 kV & 3x500 MVA 400/220 kV Bikaner-IV Pooling Station along with 2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor at a suitable location near Bikaner *
- 220kV line bays (4 nos.) for RE connectivity at Bikaner-IV PS
- STATCOM (2x$\pm$300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr) along with 2 nos. 400kV line bays at Bikaner-IV PS
- Establishment of 765/400 kV, 3x1500 MVA Hissar-II S/s along with 2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor at a suitable location near Hissar*
- Bikaner-IV – Hissar-II 765 kV D/c line (~320 km) along with 330 MVAr switchable line reactor for each circuit at each end
- Bikaner-IV – Sikar-II 400 kV D/c line (Quad) (~270 km) along with 63 MVAr switchable line reactor for each circuit at each end
- Hissar-II- Jind(PG) 400 kV D/c line (Quad) (~50 km)
- Hissar-II- Patran 400 kV D/c line (Quad) (~110 km)

Study files for solar maximized scenario was shared on 13.10.23 with all NR constituents. Grid-India vide mail 18.10.23 sent their observations on proposal and studies. Same was also deliberated in meeting. Reply of major observation is under

1. **Demands of Punjab, Haryana & Rajasthan seem to be on the lower side looking at demand observed in the current time-period.**

CTU stated that in winter scenario, demand of Punjab and Haryana is lesser, and they will review the demand and change it in revised files for 2026 time frame, however Rajasthan demand in winter and summer scenario is as per 20th EPS demand (load+losses).

2. **N-1 non compliance of ICTs in Rajasthan**

   CTU stated that most of the 400/220kV ICTs which are N-1 non compliant are in intra state (STUs), some of which are already highlighted in OCC/NRPC meetings. Regarding ICTs at Kota (PG), high loading is observed due to no KTPS generation considered in study files. RVPN confirmed that KTPS units will be operational by 2027-28 and decision on KTPS units to take out of the system will be taken by management. In view of that in revised files KTPS unit will kept on. Loading of 400/220kV Bassi ICT is marginally higher in N-1 (320MW). Same will be reviewed and taken up separately in consultation with Grid-India & CEA based on real time loading.

3. **High fault current at 220kV buses**

   Regarding high fault level of some of RE injection stations (at 220kV level), CTUIL stated that fault level of 220 kV level at old RE pooling stations i.e. Bhadla(PG), Bhadla-II, Fatehgarh-II is marginally higher (designed for 40kA). It was informed that during fault level calculation fault level contribution from RE generation of designated 220kV bus is not considered. Same philosophy is also considered for SCR calculation. Grid-India stated that in case of distant fault, there is a possibility that RE generation will also contribute in fault. CTU stated that matter will be separately discussed with Grid-India as new proposed scheme does not influence the fault levels on these RE pooling stations.

4. **Angular difference between 765kV Bikaner-IV & Hissar**

   Grid-India stated that under N-2 contigency of 765kV Bikaner-IV – Hissar line (both ckts out), there are severe file convergence issues. CTUIL stated that in the event of N-2 contingency, there will be no path available for evacuation of 3GW power from Bikaner-IV PS. CTUIL stated that they have carried out various cases to provide anchoring to Bikaner-IV from nearby ISTS stations i.e. Bikaner(PG), Bikaner-II, Bikaner-III. In all scenarios, power will flow towards Bikaner-IV and evacuation system requirement will increase substantially in base case.

Based on deliberations, various other options were also carried out i.e. LILO of Bikaner-III – Neemrana-II D/c at Bikaner-IV, Bikaner-IV-Sikar-II 765kV D/c etc. CTU stated that with LILO of Bikaner-III – Neemrana-II D/c at Bikaner-IV case is converged in ‘N-2’ contingency but angular separation will be more than 30 degree.

In the meeting, CTUIL stated that critical loading is observed in 220kV Patran – Patran (PSTCL) D/c line in studies. PSTCL stated that the loading was higher in past and for that they have carried out the LILO of 220 kV Mansa-Sunam line at Patran (Indi Grid). PSTCL stated that in future Peddy scenarios, line loading will be higher and N-1 non compliant. CTU stated that even without injection at Patran from above scheme, 220kV Patran – Patran (PSTCL) D/c line remains N-1 non compliant and PSTCL may take suitable measures to relieve the loading. PSTCL stated that whether reconductoring of line will be done by PSTCL or it will be in interstate. CTU stated that ownership of this intra state line is with STU (PSTCL), accordingly, suitable strengthening needs to be planned and implemented by PSTCL as part of intra state scheme. PSTCL stated that they will revert on the same.

Based on Grid-India comments (S no.4), CTU stated that N-1-1 or N-2 is a rare contingency and deliberations are required on N-1-1/N-2 compliance in planning studies in reference to manual on transmission planning criteria 2023. In view of above in the first meeting it was concluded that that other options may be explored by CTU in consultation with CEA and Grid-India and will be discussed in next Joint study meeting.

Gist of discussion held in Second Joint study meeting on 23.10.23

In the 2nd joint study meeting held on 23.10.23, CTU stated that they have explored various other alternatives and in new proposal, an intermediate substation in 765/400kV Churu is created with its connectivity to LILO of one ckt of 765 kV Sikar-II (PG) -Khetri (PG) D/c line at Churu S/s and Fatehabad (PG) through 400 kV D/c line. To provide anchoring at Bikaner-IV, LILO of one ckt of 765 kV Bikaner-III -Neemrana-II D/c line (2nd) at Bikaner-IV PS is also considered. With above revised proposal, power flow is in order and angular separation incl. in N-2 contingency and voltages are within limit. Revised Study files for solar maximized scenario was shared with all constituents on 20.10.23. **Result of system studies enclosed in Exhibit-I**

Grid-India stated that the proposed system is optimal & balanced and loading is equally distributed among various feeders. The proposed system is stable and comply the N-1 & N-1-1 requirements. CEA stated that as per transmission planning criteria 2023, under N-1-1, some of the equipment may be loaded up to their emergency limits. To bring the system parameters back within their normal limits, load shedding/re-scheduling of generation may have to be done, either manually or through automatic system protection schemes (SPS).

In view of that in planning stage, N-1-1 or N-2 criteria may not be considered except in critical lines (Inter regional corridors) as it will increase the transmission system requirement. Therefore, in revised proposal a direct interconnection between Bikaner-IV and Siwani may be considered and 400kV interconnection towards Fatehabad may be planned from Siwani in place of via Churu.

CTU stated that in above alternative with direct interconnection to Siwani, file is converged, and power flow is in order, however angular separation between Siwani and Bikaner-IV is more than 50 degree in N-2 contingency in case of direct interconnection of Bikaner-IV and Siwani. The angular separation would be more than 30 degree even with significant less RE capacity (<1GW) at Bikaner-IV PS.

Grid-India stated that it is not recommended that SPS implementation is considered at planning stage . SPS requirement will generally come when study assumption considered in studies during planning may deviate at later stage i.e. load change or delay in interlinked transmission system which influence the load flow.

Further, in case of direct interconnection of Bikaner-IV to Siwani i.e. not considering 765/400kV Churu in between and onward transmission system, the Transmission system is kind of radial system connected with RE generation pocket and poses stability issues in various operational scenarios in future. Grid-India also emphasised that some margin should be kept in planning studies for operational scenarios. Further, the angular difference (>30 degrees) in N-1-1 /N-2 may cause problems in synchronization of lines after corridor outage. The proposed system is stable and well interconnected with Grid provides reliable power evacuation under various operational scenarios

CEA stated that N-1-1 or N-2 is a rare contingency and deliberations are required on N-1-1/N-2 compliance in planning studies as it may incur additional investment for strengthening of transmission system.

CTU stated that in above case the transmission scheme i.e. establishment of Churu substation along with LILO of one ckt of 765 kV Sikar-II (PG) -Khetri (PG) D/c line at Churu S/s and Churu – Fatehabad (PG) 400 kV D/c line will improve the system resiliency and address the Grid India concern for synchronization of lines after corridor outage in N-1-1 /N-2) contingency

Considering 3.6GW generation at Bikaner-IV PS, loading and angular separation in contingency is as under:

Transmission Line	**N-1 (Loading)**	**N-1-1 (N-2) (Degree)**
765 kV Bikaner-IV-Churu D/c line	14.1 (3098 MW)	29.2
765 kV Churu- Siwani D/c line	7.7 (2743 MW)	28.6

CTU further stated that in next phase, EHVAC/HVDC system (5-6GW) for evaluation of RE power from Bhadla-IV potential & balance potential of Bikaner-IV (~2.4GW) towards UP/outside NR region is under planning and will be taken up in subsequent meetings. CTU requested CEA to convene a joint meeting for compliance of N-1-1/N-2 in planning studies in reference of planning criteria 2023 by next week. CEA agreed for same. PSTCL stated that they will take suitable measures to relieve loading of 220kV Patran – Patran (PSTCL) D/c line in matching timeframe of above agreed ISTS scheme.

In view of above deliberations, it was decided that CEA will convene a joint meeting with CTU and Grid-India for deliberation on compliance of N-1-1/N-2 compliance in planning studies. Based on outcome of above CEA meeting, proposed system requirement will be reviewed and if system requirement is reduced (with scheme like Bikaner-IV – Siwani direct interconnection), same shall be suitably incorporated as part of minutes of CMETS-NR meeting.

Considering grant of connectivity to new RE generators in Bikaner complex as well as for evacuation of power beyond Bikaner complex, following transmission scheme was agreed in Joint study meeting for evacuation of power from Rajasthan REZ Ph-IV (Part-3:3.6GW) [Bikaner complex] and to be taken up in CMETS-NR meeting for finalization.

Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3 :3.6GW)

Bikaner-IV: 3.6GW (Solar)

- Establishment of 4x1500 MVA, 765/400 kV & 4x500 MVA, 400/220 kV Bikaner-IV Pooling Station along with 2x240 MVAr (765kV) & 2x125 MVAr (420kV) Bus Reactors at a suitable location near Bikaner *

  Future provisions at Bikaner-IV PS:
  Space for
  - *765/400kV ICT along with bays- 2 no.*
  - *765 kV line bays along with switchable line reactors – 10 nos.*
  - *765kV Bus Reactor along with bay: 1 no.*
  - *400 kV line bays along with switchable line reactor –4 nos.*

- *400 kV line bays–4 nos.*
- *400/220kV ICT along with bays -6 nos.*
- *400 kV Bus Reactor along with bay: 1 no.*
- *400kV Sectionalization bay: 2 sets*
- *220 kV line bays for connectivity of RE Applications -11 nos.*
- *220kV Sectionalization bay: 3 sets*
- *220 kV BC (2 nos.) and 220 kV TBC (2 nos.)*

  along with provision of 80MVAr and 110MVAr spare reactor (Single phase)

- 220kV line bays (5 nos.) for RE connectivity at Bikaner-IV PS
- 400kv line bay (1 no.) for RE connectivity at Bikaner-IV PS
- 220kV Sectionalization bay (1 set) along with BC (2 nos.) and 220 kV TBC (2 nos.) at Bikaner-IV PS
- 400kV Sectionalization bay (1 set) at Bikaner-IV PS
- STATCOM (2x$\pm$300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr) along with 2 nos. 400kV line bays at Bikaner-IV PS
- LILO of one ckt of 765 kV Bikaner-III -Neemrana-II D/c line (2nd) at Bikaner-IV PS (~20 km) along with 330 MVAR switchable line reactor at Bikaner-IV PS end of 765 kV Bikaner-IV - Neemrana-II line (formed after LILO)
- Establishment of 765/400 kV, 2x1500 MVA S/s at suitable location near Churu along with 2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor

  Future provisions at Churu S/s:

  Space for

  - *765/400kV ICTs along with bays- 4*
  - *765 kV line bays along with switchable line reactors – 12*
  - *765kV Bus Reactor along with bay: 1 nos.*
  - *400 kV line bays along with switchable line reactor –8*
  - *400 kV Bus Reactor along with bays: 1 no.*
  - *400kV Sectionalization bay: 2 sets*
  - *400/220kV ICT along with bays -4 nos.***
  - *220 kV line bays for drawl -4 nos. ***
  - *220kV Sectionalization bay: 2 sets ***

    along with provision of 80MVAr spare reactor (Single phase)

    *****Drawl requirement at Churu to be confirmed by RVPN***

- Bikaner-IV PS – Churu 765 kV D/c line along with 240 MVAr switchable line reactor for each circuit at Bikaner-IV PS end (~175 km)
- LILO of one ckt of 765 kV Sikar-II (PG) -Khetri (PG) D/c line at Churu S/s (~80 km)
- Churu – Fatehabad (PG) 400 kV D/c line (Quad) along with 80 MVAr switchable line reactor for each circuit at Churu S/s end (~165 km)
- Establishment of 765/400 kV, 3x1500 MVA S/s at suitable location near Siwani (Distt. Bhiwani) along with 2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor*

  Future provisions at Siwani S/s:

  Space for

  - *765/400kV ICT along with bays- 3*
  - *765 kV line bays along with switchable line reactors – 6*
  - *765kV Bus Reactor along with bay: 1 nos.*
  - *400 kV line bays along with switchable line reactor –10*

- *400 kV Bus Reactor along with bays: 1 no.*
- *400kV Sectionalization bay: 2 sets*
- *400/220kV ICT along with bays -4 nos.***
- *220 kV line bays for drawl -4 nos. ***
- *220kV Sectionalization bay: 2 sets ***

****along with provision of 80MVAr spare reactor (Single phase)***

*****Drawl requirement at Siwani to be confirmed by HVPN***

- Siwani – Churu 765 kV D/c line (~110 km)
- Siwani – Jind (PG) 400 kV D/c line (Quad Moose) (~100 km)
- Siwani – Patran (Indi Grid) 400 kV D/c line (Quad) (~150 km) along with 63 MVAr switchable line reactor for each circuit at Siwani S/s end

Tentative commissioning schedule : 24 months from allocation

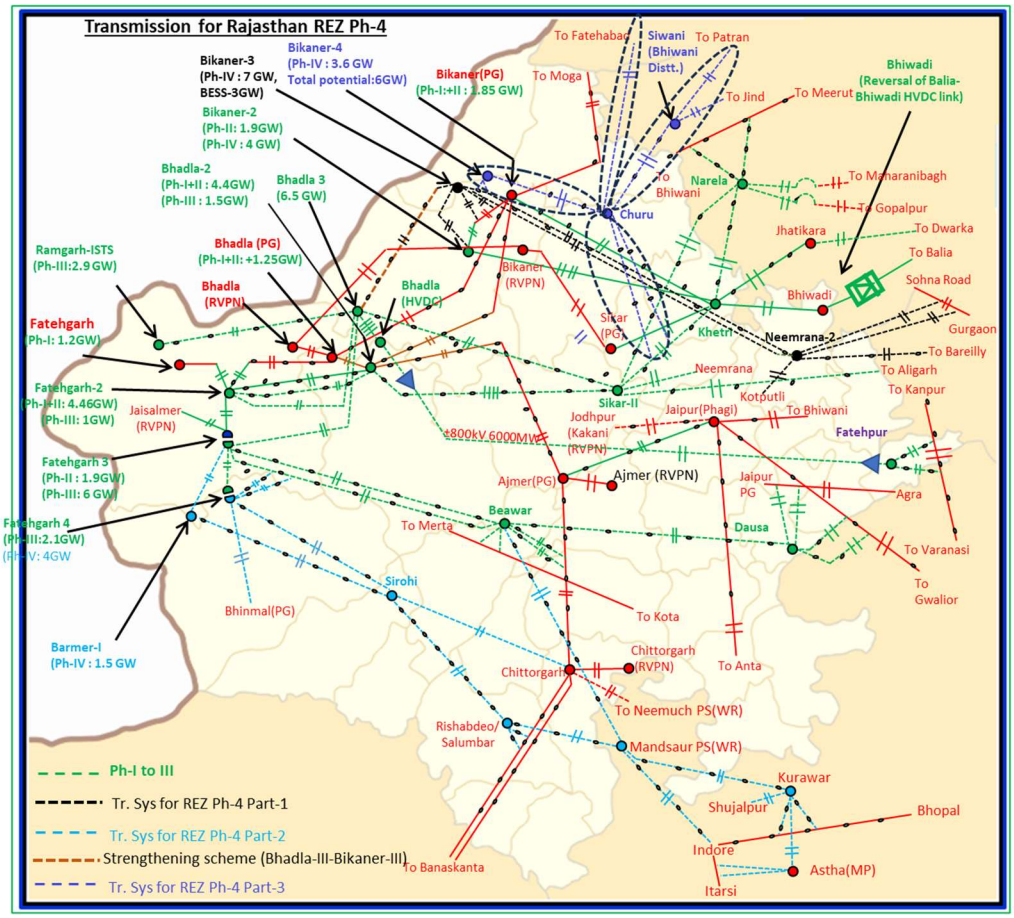
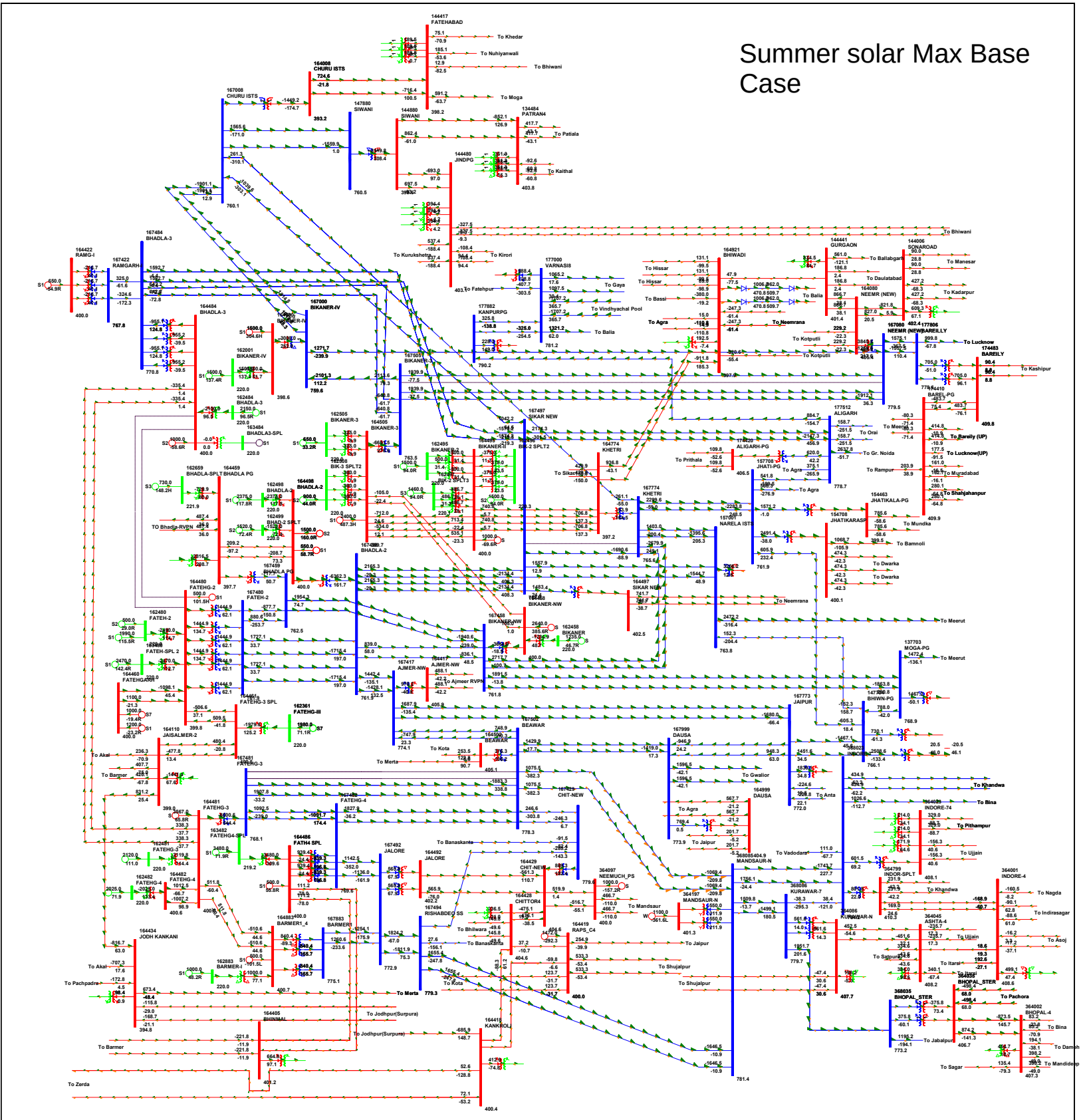
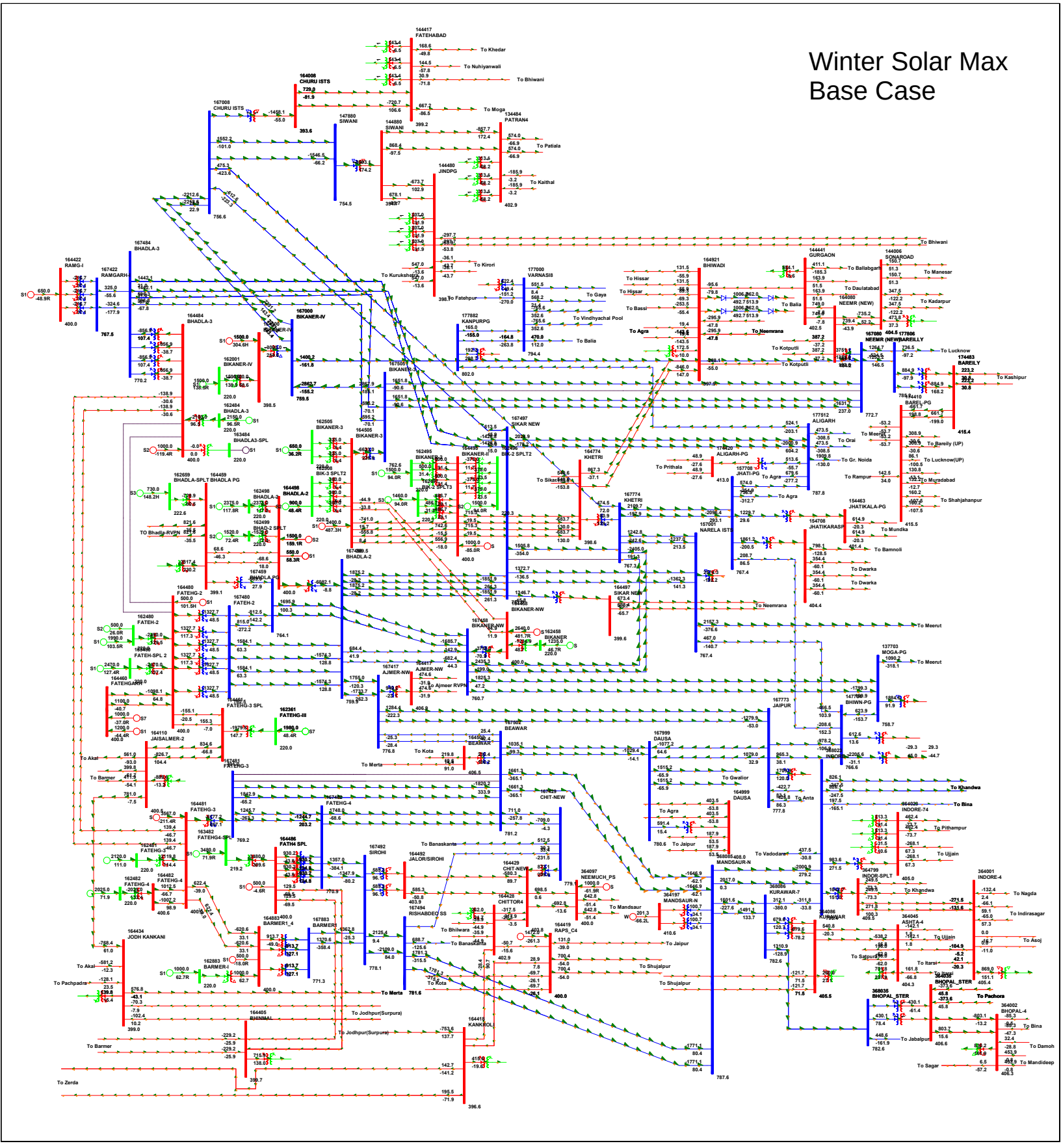


Fig 1: Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3 :3.6GW) (Bikaner Complex)

Exhibit-I

Summer solar Max Base Case




Winter Solar Max
Base Case

Enclosure-I

Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3 :3.6GW)[Bikaner complex]

S. No.	Items	Details
1.	Name of Scheme	**Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3 :3.6GW) [Bikaner complex]**
2.	Scope of the scheme	**Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3 :3.6GW)** **Bikaner-IV: 3.6GW (Solar)** ➢ Establishment of 4x1500 MVA, 765/400 kV & 4x500 MVA, 400/220 kV Bikaner-IV Pooling Station along with 2x240 MVAr (765kV) & 2x125 MVAr (420kV) Bus Reactors at a suitable location near Bikaner * **Future provisions at Bikaner-IV PS: Space for** ▪ *765/400kV ICT along with bays- 2 no.* ▪ *765 kV line bays along with switchable line reactors – 10 nos.* ▪ *765kV Bus Reactor along with bay: 1 no.* ▪ *400 kV line bays along with switchable line reactor –4 nos.* ▪ *400 kV line bays–4 nos.* ▪ *400/220kV ICT along with bays -6 nos.* ▪ *400 kV Bus Reactor along with bay: 1 no.* ▪ *400kV Sectionalization bay: 2 sets* ▪ *220 kV line bays for connectivity of RE Applications -11 nos.* ▪ *220kV Sectionalization bay: 3 sets* ▪ *220 kV BC (2 nos.) and 220 kV TBC (2 nos.)* ***along with provision of 80MVAr and 110MVAr spare reactor (Single phase)*** ➢ 220kV line bays (5 nos.) for RE connectivity at Bikaner-IV PS ➢ 400kV line bays (1 no.) for RE connectivity at Bikaner-IV PS ➢ 220kV Sectionalization bay (1 set) along with BC (2 nos.) and 220 kV TBC (2 nos.) at Bikaner-IV PS ➢ 400kV Sectionalization bay (1 set) at Bikaner-IV PS ➢ STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr) along with 2 nos. 400kV line bays at Bikaner-IV PS ➢ LILO of one ckt of 765 kV Bikaner-III -Neemrana-II D/c line (2nd) at Bikaner-IV PS (~20 km) along with 330 MVAR switchable line reactor at Bikaner-IV PS end of 765 kV Bikaner-IV -Neemrana-II line (formed after LILO) ➢ Establishment of 765/400 kV, 2x1500 MVA S/s at suitable location near Churu along with 2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor **Future provisions at Churu S/s: Space for** ▪ *765/400kV ICTs along with bays- 4* ▪ *765 kV line bays along with switchable line reactors – 12* ▪ *765kV Bus Reactor along with bay: 1 nos.*

S. No.	Items	Details
		▪ *400 kV line bays along with switchable line reactor –8* ▪ *400 kV Bus Reactor along with bays: 1 no.* ▪ *400kV Sectionalization bay: 2 sets* ▪ *400/220kV ICT along with bays -4 nos.*** ▪ *220 kV line bays for drawl -4 nos. *** ▪ *220kV Sectionalization bay: 2 sets *** ***along with provision of 80MVAr spare reactor (Single phase)*** ****Drawl requirement at Churu to be confirmed by RVPN*** ➢ Bikaner-IV PS – Churu 765 kV D/c line along with 240 MVAr switchable line reactor for each circuit at Bikaner-IV PS end (~180 km) ➢ LILO of one ckt of 765 kV Sikar-II (PG) -Khetri (PG) D/c line at Churu S/s (~90 km) ➢ Churu – Fatehabad (PG) 400 kV D/c line (Quad) along with 63 MVAr switchable line reactor for each circuit at Churu S/s end (~150 km) ➢ Establishment of 765/400 kV, 3x1500 MVA S/s at suitable location near Siwani (Distt. Bhiwani) along with 2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor* **Future provisions at Siwani S/s: Space for** ▪ *765/400kV ICT along with bays- 3* ▪ *765 kV line bays along with switchable line reactors – 6* ▪ *765kV Bus Reactor along with bay: 1 nos.* ▪ *400 kV line bays along with switchable line reactor –10* ▪ *400 kV Bus Reactor along with bays: 1 no.* ▪ *400kV Sectionalization bay: 2 sets* ▪ *400/220kV ICT along with bays -4 nos.*** ▪ *220 kV line bays for drawl -4 nos. *** ▪ *220kV Sectionalization bay: 2 sets *** ***along with provision of 80MVAr spare reactor (Single phase)*** ****Drawl requirement at Siwani to be confirmed by HVPN*** ➢ Siwani – Churu 765 kV D/c line (~95 km) ➢ Siwani – Jind (PG) 400 kV D/c line (Quad Moose) (~110 km) ➢ Siwani – Patran (Indi Grid) 400 kV D/c line (Quad) (~160 km) (400kV GIS duct :700m) along with 80 MVAr switchable line reactor for each circuit at Siwani S/s end
3.	**Depiction of the scheme on Transmission Grid Map**	Attached at **Exhibit-I**
4.	**Upstream/downstream system associated with the scheme**	400/220kV Jind (PG), Patran (Indi Grid) and Fatehabad (PG) are existing ISTS substation. 400kV Fatehabad S/s is interconnected with Khedar, Bhiwani and Nuhiyanwali S/s whereas Patran S/s is connected with Patiala and Kaithal S/s. 400kV Jind S/s is interconnected with Kirori, Kurukshetra and Bhiwani S/s. 765/400/220kV Bikaner-III PS is under advance stage of bidding and proposed to be interconnected with Neemrana-II S/s through

S. No.	Items	Details
		765kV 2xD/c lines and Bikaner (PG) and Bikaner-II S/s through 400kV D/c lines
5.	**Objective / Justification**	1. The present scheme comprises Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3) from Bikaner complex (Bikaner-IV: 3.6GW) 2. Joint Study Meeting(s) were held in virtual mode on 18.10.23 and 23.10.23 with SECI, CEA, GRID-INDIA, RVPN, HVPN, PSTCL and other STUs of Northern region to discuss the Transmission system for evacuation of power from Bikaner Complex as part of Rajasthan REZ Ph-IV (Part-3) scheme. In the meeting, SECI/MNRE were also asked to confirm on RE potential of Bikaner complex. **3. Gist of discussion held in First Joint study meeting on 18.10.23** • CTU stated that Transmission scheme is evolved for about 7.7GW (Solar) in Bikaner complex (14 GW potential along with 6 GW BESS) in Rajasthan for RE potential identified at Bikaner complex. However, no application of BESS (linked with RE) against envisaged 6GW was received. Accordingly, RE potential of about 7.7GW (in place of 14GW) can be evacuated from planned system (Ph-IV scheme) from Bikaner complex (Bikaner-II(3.7 GW) & Bikaner-III(4 GW)). • At Bikaner-II PS & Bikaner-III PS connectivity of about 7.7GW utilizing above Ph-IV (Part-1) system for transfer of power is already granted and no further margin is available for additional connectivity due to technical limitation. Further, additional Connectivity of about 1.7 GW RE (Solar) is also received at Bikaner complex and more applications are expected due to land availability and being outside of GIB area for which new pooling station i.e. Bikaner-IV and onwards 765kV high capacity corridors will be required. • SECI stated that 6GW potential at Bikaner complex can be considered for now as part of 75GW potential in Rajasthan with some portion from adjustment of potential from other Non-GIB complexes i.e. Sanchore, Jalore, Pali etc. and balance from 6GW unharnessed RE potential (with BESS) at Bikaner complex. Accordingly, it was decided that cumulatively 6 GW RE potential may be considered for planning of transmission scheme from Bikaner-IV PS. • CTU stated that considering requirement of 6 GW evacuation capacity from Bikaner-IV PS, 3GW RE capacity to be evacuated through EHVAC system as part of present proposal and balance 3GW along with Bhadla-IV potential (4GW) through HVDC system, which is under planning. In view of that system studies were carried and proposed Transmission scheme is as under ➢ Establishment of 3x1500 MVA, 765/400 kV & 3x500 MVA 400/220 kV Bikaner-IV Pooling Station along with 2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor at a suitable location near Bikaner ➢ 220kV line bays (4 nos.) for RE connectivity at Bikaner-IV PS

S. No.	Items	Details
		➢ STATCOM (2x+300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr) along with 2 nos. 400kV line bays at Bikaner-IV PS ➢ Establishment of 765/400 kV, 3x1500 MVA Hissar-II S/s along with 2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor at a suitable location near Hissar ➢ Bikaner-IV – Hissar-II 765 kV D/c line (~320 km) along with 330 MVAr switchable line reactor for each circuit at each end ➢ Bikaner-IV – Sikar-II 400 kV D/c line (Quad) (~270 km) along with 63 MVAr switchable line reactor for each circuit at each end ➢ Hissar-II- Jind(PG) 400 kV D/c line (Quad) (~50 km) ➢ Hissar-II- Patran 400 kV D/c line (Quad) (~110 km) • Study files for solar maximized scenario was shared on 13.10.23 with all NR constituents. Grid-India vide mail 18.10.23 sent their observations on proposal and studies which was deliberated in meeting. • Grid-India stated that under N-2 contingency of 765kV Bikaner-IV – Hissar line (both ckts out), there are severe file convergence issues. CTUIL stated that in the event of N-2 contingency, there will be no path available for evacuation of 3GW power from Bikaner-IV PS. • Based on deliberations, various other options were also explored i.e. LILO of Bikaner-III – Neemrana-II D/c at Bikaner-IV, Bikaner-IV-Sikar-II 765kV D/c etc. CTU stated that with LILO of Bikaner-III – Neemrana-II D/c at Bikaner-IV case is converged in 'N-2' contingency but angular separation will be more than 30 degree. • In the meeting, CTUIL stated that critical loading is observed in 220kV Patran – Patran (PSTCL) D/c line in studies. PSTCL stated that in future Peddy scenarios, line loading will be higher and N-1 non compliant. CTU stated that even without injection at Patran from above scheme, 220kV Patran – Patran (PSTCL) D/c line remains N-1 non compliant and PSTCL may take suitable measures to relieve the loading. CTU stated that ownership of this intra state line is with STU (PSTCL), accordingly, suitable strengthening needs to be planned and implemented by PSTCL as part of intra state scheme. PSTCL stated that they will revert on the same. • Based on Grid-India comments, CTU stated that N-1-1 or N-2 is a rare contingency and deliberations are required on N-1-1/N-2 compliance in planning studies in reference to manual on transmission planning criteria 2023. In view of above in the first meeting it was concluded that that other options may be explored by CTU in consultation with CEA and Grid-India and will be discussed in next Joint study meeting. **4. Gist of discussion held in 2nd Joint study meeting on 23.10.23** • CTU stated that studies have carried out various other alternatives and in new proposal, an intermediate substation in 765/400kV Churu is created with its connectivity to LILO of one ckt of 765 kV Sikar-II (PG) -Khetri (PG) D/c line at Churu S/s and Fatehabad (PG) through 400 kV D/c line. To provide anchoring at Bikaner-IV, LILO of one ckt of 765 kV Bikaner-III - Neemrana-II D/c line (2nd) at Bikaner-IV PS is also considered.

S. No.	Items	Details
		With above revised proposal, power flow is in order and angular separation incl. in N-2 contingency and voltages are within limit. Revised Study files for solar maximized scenario was shared with all constituents on 20.10.23. • Grid-India stated that the proposed system is optimal & balanced and loading is equally distributed among various feeders. The proposed system is stable and comply the N-1 & N-1-1 requirements. CEA stated that as per transmission planning criteria 2023, under N-1-1, some of the equipment may be loaded up to their emergency limits. To bring the system parameters back within their normal limits, load shedding/re-scheduling of generation may have to be done, either manually or through automatic system protection schemes (SPS). • In view of that in planning stage, N-1-1 or N-2 criteria may not be considered except in critical lines (Inter regional corridors) as it will increase the transmission system requirement. Therefore, in revised proposal a direct interconnection between Bikaner-IV and Siwani may be considered and 400kV interconnection towards Fatehabad may be planned from Siwani in place of via Churu. • CTU stated that in above alternative with direct interconnection to Siwani, file is converged, and power flow is in order, however angular separation between Siwani and Bikaner-IV is more than 50 degree in N-2 contingency in case of direct interconnection of Bikaner-IV and Siwani. The angular separation would be more than 30 degree even with significant less RE capacity (<1GW) at Bikaner-IV PS. • Grid-India stated that it is not recommended that SPS implementation is considered at planning stage. SPS requirement will generally come when study assumption considered in studies during planning may deviate at later stage i.e. load change or delay in interlinked transmission system which influence the load flow. Further, in case of direct interconnection of Bikaner-IV to Siwani i.e. not considering 765/400kV Churu in between and onward transmission system, the Transmission system is kind of radial system connected with RE generation pocket and poses stability issues in various operational scenarios in future. Grid-India also emphasised that some margin should be kept in planning studies for operational scenarios. Further, the angular difference (>30 degrees) in N-1-1 /N-2 may cause problems in synchronization of lines after corridor outage. • CEA stated that N-1-1 or N-2 is a rare contingency and deliberations are required on N-1-1/N-2 compliance in planning studies as it may incur additional investment for strengthening of transmission system. • CTU stated that in above case the transmission scheme i.e. establishment of Churu substation along with LILO of one ckt of 765 kV Sikar-II (PG) -Khetri (PG) D/c line at Churu S/s and Churu – Fatehabad (PG) 400 kV D/c line will improve the system resiliency and address the Grid India concern for synchronization of lines after corridor outage in N-1-1/N-2 contingency

S. No.	Items	Details
		• CTU further stated that in next phase, EHVAC/HVDC system (5-6GW) for evacuation of RE power from Bhadla-IV potential & balance potential of Bikaner-IV (~2.4GW) towards UP/outside NR region is under planning and will be taken up in subsequent meetings. CTU requested CEA to convene a joint meeting for compliance of N-1-1/N-2 in planning studies in reference of planning criteria 2023 by next week. CEA agreed for same. PSTCL stated that they will take suitable measures to relieve loading of 220kV Patran – Patran (PSTCL) D/c line in matching timeframe of above agreed ISTS scheme. 5. Subsequently the issue was deliberated in the CEA meeting with CTU and Grid-India held on 30.10.23 in which philosophy and applicability for consideration of N-1-1/N-2 in planning studies in reference to Manual on transmission planning criterion 2023 was discussed. In the meeting it was concluded that issue will be further deliberated with Member (PS) and accordingly scheme will be finalized in CMETS-NR meeting. 6. Subsequently, in CMETS-NR meeting held on 31.10.23, CEA opined that Bikaner-IV S/s is planned for 6GW evacuation and at present direct interconnection between Bikaner-IV and Siwani is to be planned in first phase (3GW) and 765/400kV Churu S/s along with associated transmission scheme will be taken up in later stage while planning of balance 3 GW transmission scheme. Grid-India further emphasised that in case Churu S/s to be taken up at later stage of planning, 765kV Bikaner-IV-Siwani D/c line may not able to synchronize after corridor outage (765kV Bikaner-IV-Siwani D/c line) due to higher angular difference (>30 degrees) in N-1-1 (N-2) in peak solar hours. Grid-India stated that due to potential delays in the restoration of the 765 kV Bikaner-IV to Siwani D/c line, synchronization of lines might not be feasible during peak solar hours. Instead, this process might need to be deferred to non-solar hours, which would entail running the system in a depleted condition for several hours. 7. CTU stated that Bikaner-IV S/s is planned for evacuation of 6GW generation, out of which 3.6GW power will be evacuated through proposed system and in subsequent phase transmission system will be planned for evacuation of 2.4GW.CTU stated that one no. of high capacity corridor is provided under present scheme towards Punjab/Haryana to meet the demand requirement. In next phase of planning (for balance 2.4GW potential at Bikaner-IV PS) transmission scheme to be planned towards UP/other regions. CTU stated that they have already received about 1.7GW of connectivity applications in last 2 months at Bikaner-IV and with more applications, it is expected that new system to be planned within 2-3 months. Considering above, it is expected that 765/400kV Churu S/s along with associated transmission scheme may also be utilized in next phase to facilitate evacuation of power along with new corridors towards UP/WR. However it will be only at the time of planning of next phase of transmission scheme. 8. As time difference in between implementation of these two schemes will be lesser (2-3 months), it is recommended that

S. No.	Items	Details
		765/400kV Churu S/s along with associated transmission scheme shall be taken up in Ph-I as part of present proposed scheme as it will improve resiliency and angular stability under N-1-1/N-2 contingency. CEA agreed for the same. 9. Further , line length were reviewed in reference to Gati Shakti portal and modified slightly and accordingly reactive compensation was also modified. Considering grant of connectivity to new RE generators in Bikaner complex as well as for evacuation of power beyond Bikaner complex, transmission scheme was agreed (as per S.No.2) in CMETS-NR meeting for evacuation of power from Rajasthan REZ Ph-IV (Part-3) [Bikaner IV :3.6GW]
6.	**Estimated Cost**	**Rs. 8600 Cr.**
7.	**Need of phasing, if any**	Not Applicable
8.	**Implementation timeframe**	24 months from allocation of project
9.	**System Study for evolution of the proposal**	Studies discussed and agreed in following meeting • Joint study meeting (s) held on 18.10.23 and 23.10.23 (Minutes of meeting attached in **Annexure-I**) • 25th CMETS-NR meeting held on 31.10.23 (Minutes of meeting to be issued shortly) Load flow results is attached at **Exhibit-II**

Exhibit-I

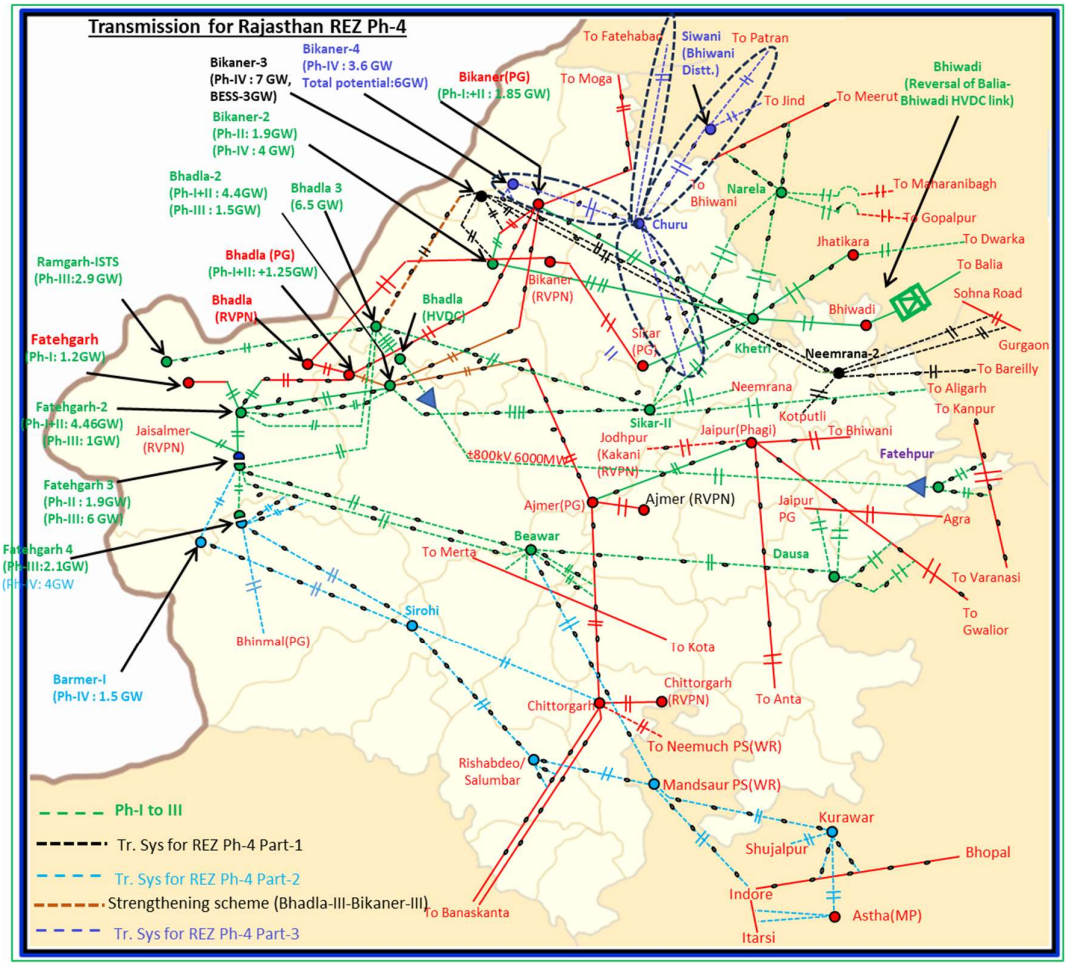
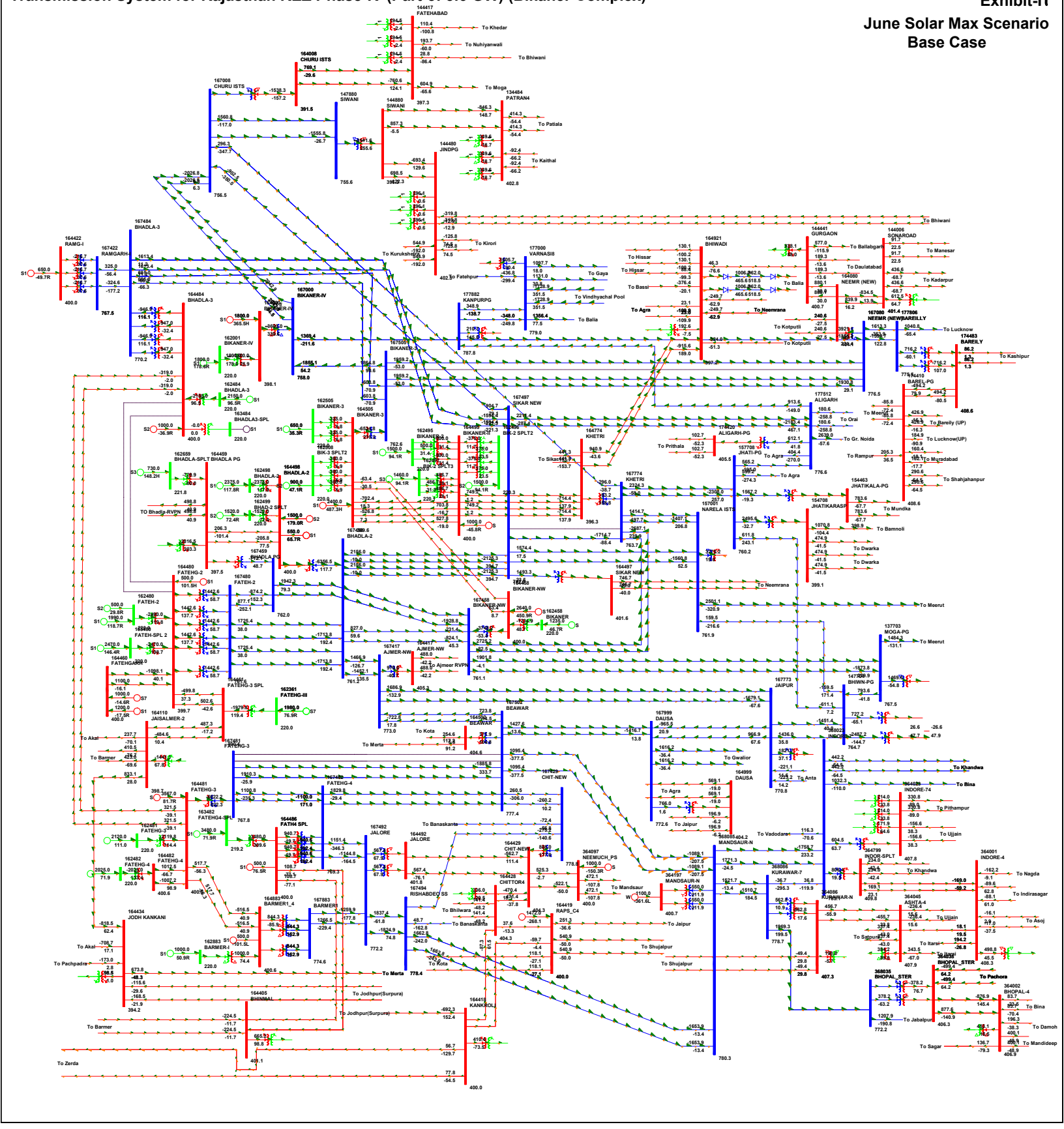


Fig : Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-3 :3.6GW) (Bikaner Complex)

Transmission System for Rajasthan REZ Phase-IV (Part-3: 3.6 GW) (Bikaner Complex)

Exhibit-II

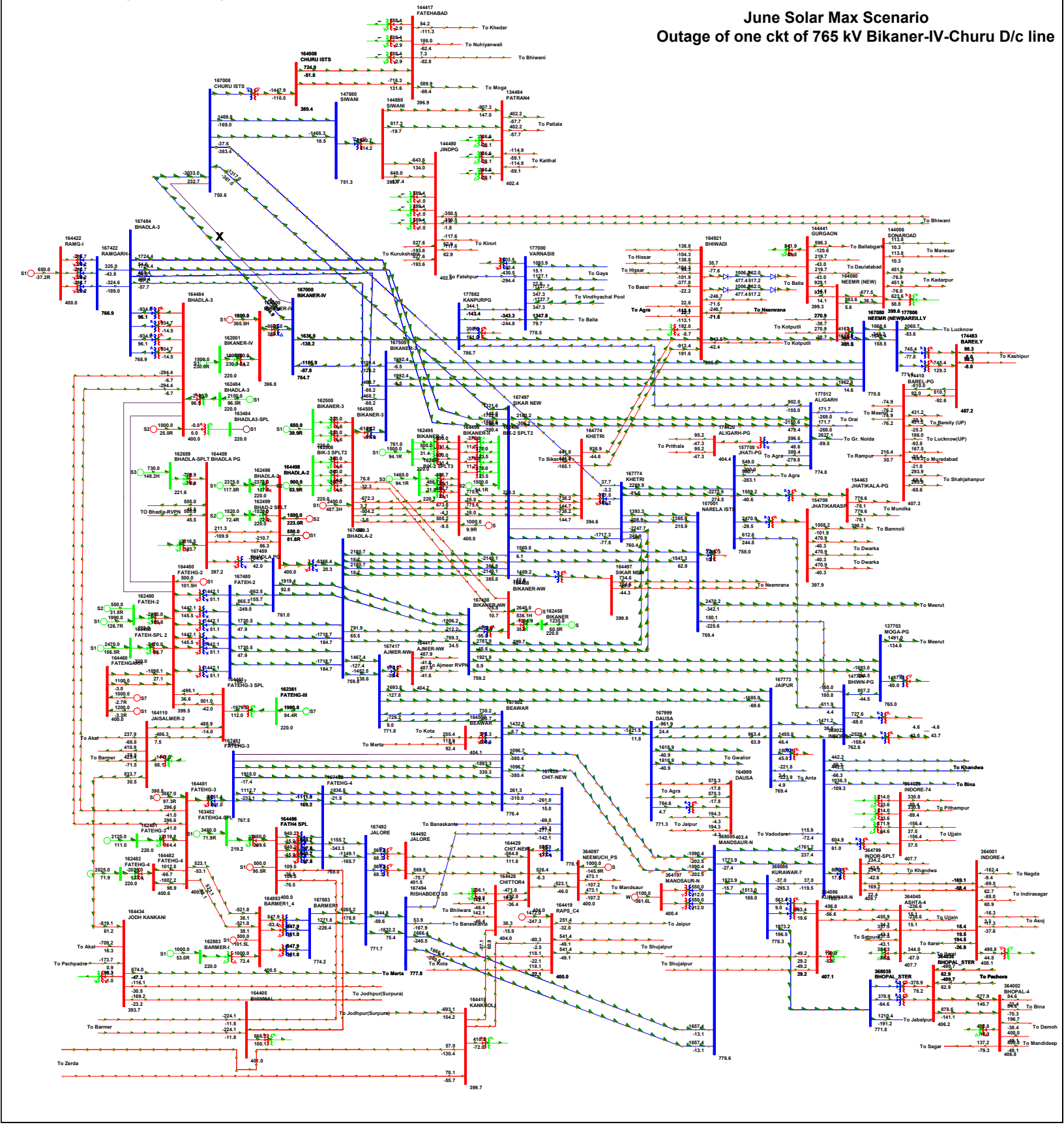
June Solar Max Scenario
Base Case



Transmission System for Rajasthan REZ Phase-IV (Part-3: 3.6 GW) (Bikaner Complex)

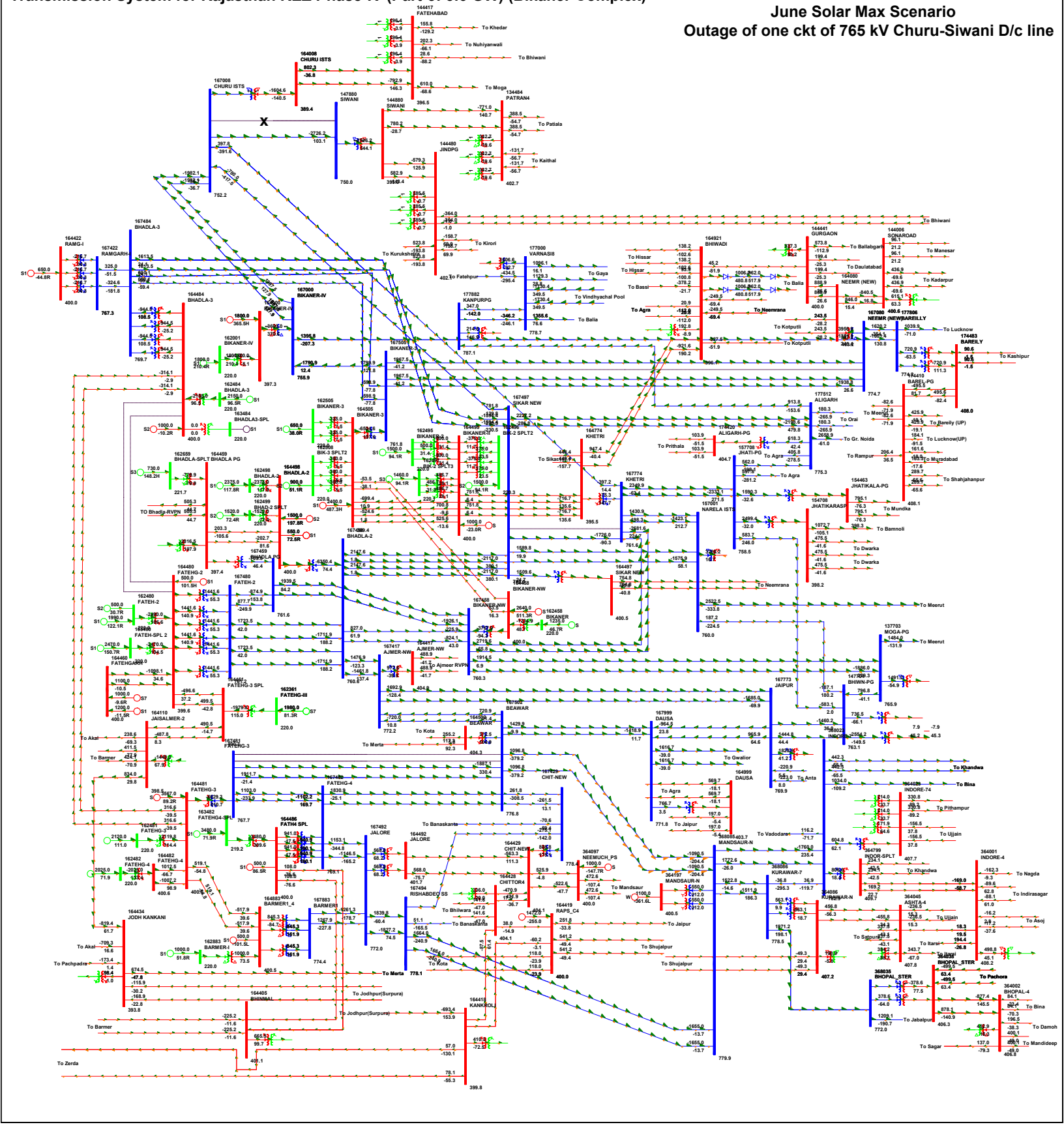
June Solar Max Scenario

Outage of one ckt of 765 kV Bikaner-IV-Churu D/c line



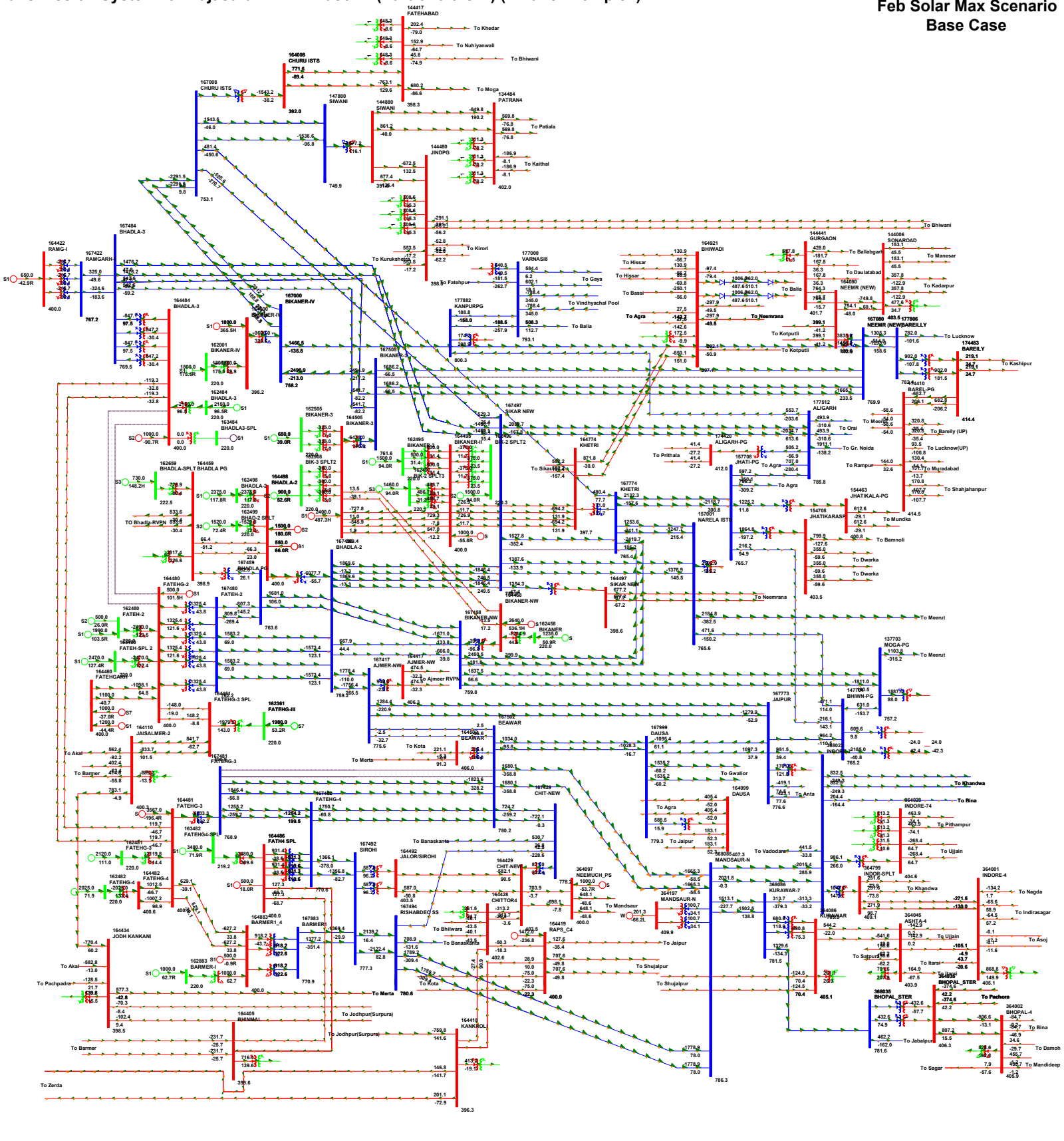
Transmission System for Rajasthan REZ Phase-IV (Part-3: 3.6 GW) (Bikaner Complex)

June Solar Max Scenario
Outage of one ckt of 765 kV Churu-Siwani D/c line



Transmission System for Rajasthan REZ Phase-IV (Part-3: 3.6 GW) (Bikaner Complex)

Feb Solar Max Scenario
Base Case



Transmission System for Rajasthan REZ Phase-IV (Part-3: 3.6 GW) (Bikaner Complex)

Feb Solar Max Scenario

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