



Government of India
Ministry of Power
Central Electricity Authority
System Planning & Project Appraisal Division
Sewa Bhawan, R. K. Puram, New Delhi-110066
Website: www.cea.nic.in



No. 66/5/SP&PA-2013/ 110 9 - 1125

Dated: 13.05.2015

-As per List Enclosed-

Sub: Rescheduling of 17th Meeting of Standing Committee on Power System Planning in Eastern Region

Sir,

In continuation of our earlier notice vide even no. dated 05.05.2015, it is to intimate that the 17th Meeting of Standing Committee on Power System Planning in Eastern Region would be held **at 11.00 hrs on 25.05.2015** instead of 21.05.2015 **at NRPC, Katwaria Sarai, New Delhi**. The revised agenda is available on the CEA website: www.cea.nic.in. (path to access-Wings of CEA/Power Systems/Standing Committee on Power System Planning/ Eastern Region. You are requested to kindly attend the meeting.

Yours faithfully,

(K.K. Arya)

Chief Engineer (SP&PA)

Copy for kind information to:

- 1) PPS to Chairperson, CEA
- 2) PPS to Member PS, CEA
- 3) Member Secretary, NRPC, Katwaria Sarai, New Delhi

List of addressee:

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Agenda for 17th Standing Committee Meeting on Power System Planning of Eastern Region

1. Renumbering of the Standing Committee Meeting on Power System Planning (SCMPSP) of Eastern Region

- 1.1 Till now sixteen meetings of the Standing Committee Meeting on Power System Planning (SCMPSP) of Eastern Region (ER) and one joint SCMPSP of ER and NER has been held. These meetings are not numbered in a sequential manner. Now, it is proposed to number these meeting sequentially in chronological order, as given below:

S. No.	SCM held on	Location	Meeting Number
1	8 th Feb., 2000	-	1 st (First)
2	26 th Sep., 2000	CEA, New Delhi	2 nd (Second)
3	16 th Dec., 2002	Bhubaneshwar, Odisha	3 rd (Third)
4	25 th Aug., 2003	Gangtok, Sikkim	4 th (Fourth)
5	24 th Dec., 2004	Puri, Odisha	5 th (Fifth)
6	22 nd June, 2006	Mirik, Darjeeling	6 th (Sixth)
7	5 th May, 2007	Puri, Odisha	7 th (Seventh)
8	5 th Nov., 2007	Ranchi, Jharkhand	8 th (Eighth)
9	8 th Nov., 2008	Bhubaneshwar, Odisha	9 th (Ninth)
10	14 th Sep., 2009	Bhubaneshwar, Odisha	10 th (Tenth)
11	20 th Sep., 2010	NRPC, New Delhi	11 th (Eleventh)
12	28 th Dec., 2010	POWERGRID, Gurgaon	12 th (Twelfth)
13	8 th Feb., 2012	NRPC, New Delhi	13 th (Thirteenth)
14	5 th Jan., 2013	POWERGRID, Gurgaon	14 th (Fourteenth)
15	27 th Aug., 2013	NRPC, New Delhi	15 th (Fifteenth)
16	2 nd May, 2014	NRPC, New Delhi	16 th (Sixteenth)

- 1.2 In addition to above, first joint Standing Committee Meeting on Power System Planning of Eastern Region and North Eastern Region was also held on 3rd January, 2014 at Guwahati, Assam.

- 1.3 Members may please note.

2. Confirmation of the minutes of 16th Standing Committee Meeting on Power System planning of Eastern Region

- 2.1 The minutes of the 16th meeting of the Standing Committee on Power System Planning held on 2nd May, 2014 at NRPC, New Delhi were circulated vide CEA letter no. 66/5/2013-SP&PA/1223-1235 dated 11th July, 2014. No comment from any constituent has been received. The minutes may be confirmed.

3. Eastern Region Strengthening Scheme-XV (ERSS-XV) :System strengthening in Eastern Region for transfer of additional 500MW power to Bangladesh

3.1 Presently, an asynchronous link of 500MW HVDC Back-to-Back terminal at Bheramara (Bangladesh) connects the electrical grids of India and Bangladesh through Baharampur (India)-Bheramara (Bangladesh) 400 kV D/C line. Bangladesh has desired for transfer of additional 500MW power from India. The proposal was discussed in the 7th Joint Working Group (JWG) and 7th Joint Steering Committee (JSC) meetings on Cooperation of Power between India and Bangladesh on 2nd-3rd April 2014 at Dhaka, Bangladesh, wherein, it was decided that both the sides would jointly assess the requirement of system strengthening in their territories for this additional power transfer from India to Bangladesh.

3.2 To identify the transmission system strengthening required on the Indian side for transfer of additional 500MW power to Bangladesh, joint system study were conducted by CEA and POWERGRID. The scheme identified was discussed in a meeting held at New Delhi on 13-06-2014 where representatives from CEA, POWERGRID, ERPC, POSOCO, WBSETCL and NTPC attended the meeting. The system strengthening required in Bangladesh was evolved by BPDB / PGCB of Bangladesh. A combined study report of the subject proposal was presented in 8th JSC meeting held on 10th Oct. 2014 at New Delhi, wherein, following system strengthening requirements were identified:

➤ **System Strengthening on Indian side:**

- (i) 400 kV Farakka - Behrampur D/C (HTLS) line (about 70 km.)
- (ii) Removal of the existing LILO of 400 kV Farakka - Jeerat S/c line at Baharampur.
- (iii) LILO of the above Farakka-Jeerat 400 kV S/c line at Sagardighi.
- (iv) LILO of Sagardighi-Subhasgram 400 kV S/c line at Jeerat

➤ **System Strengthening on Bangladesh side:**

- (i) Bheramara - Ishurdi 230 kV D/c line – 12 km.
- (ii) Additional 500 MW HVDC back-to-back converter unit (2nd module) at Bheramara (Bangladesh).

3.3 During outage of one circuit of Baharampur-Bheramara 400 kV D/C line, Bangladesh would restrict/reduce the loading on the operating (other) circuit to the permissible extent with the help of runback control /ramping down facility on the HVDC system. For reliable and secure supply of 1000 MW against all possible outages (single circuit as well as tower outage), the

construction of 2nd 400kV Baharampur-Bheramara D/C line could be considered at a later date.

- 3.4 In the 8th JSC, it was decided that POWERGRID of India and PGCB of Bangladesh would take up the work in their respective territory, with target date of completion as June, 2017.
- 3.5 In addition to the above lines, following reactive compensation is also proposed to be included in the scheme:
- (i) Installation of 1x125MVAr bus reactor at 400kV at Baharampur substation
 - (ii) Conversion of 50MVAr fixed line reactor at Subhasgram end of Sagardighi – Subhasgram 400kV S/c line to switchable line reactor
- 3.6 The above system strengthening is proposed to be named as “Eastern Region Strengthening Scheme-XV”.

Accordingly, “Eastern Region Strengthening Scheme-XV” comprising of following Scope of Works is proposed :

Transmission Line:

- (i) Farakka - Behrampur 400kV D/C (HTLS) line
- (ii) Removal of the existing LILO of Farakka - Jeerat S/c line at Baharampur
- (iii) LILO of the above Farakka - Jeerat 400 kV S/c line at Sagardighi
- (iv) LILO of Sagardighi - Subhasgram 400 kV S/c line at Jeerat

Substation:

- (i) Extension at 400/220kV Farakka S/s of NTPC
 - 2 nos. 400kV line bays for Farakka – Behrampur 400kV D/C (HTLS) line
- (ii) Extension at 400/220kV Sagardighi S/s of West Bengal
 - 2 nos. 400kV line bays for LILO of Farakka – Jeerat 400kV S/c line (formed after removal of the existing LILO of Farakka – Jeerat 400kV S/c line at Baharampur) at Sagardighi
- (iii) Extension at 400/200kV Jeerat S/s of West Bengal
 - 2 nos. 400kV GIS line bays for LILO of Sagardighi – Subhasgram 400kV S/c line

- (iv) Extension at 400kV Baharampur S/s of POWERGRID
 - 2 nos. 400kV line bays for termination of Farakka - Baharampur 400kV D/C (HTLS) line
 - 125MVAr bus reactor at 400kV at Baharampur substation
- (v) Extension at 400kV Subhasgram S/s of POWERGRID
 - Conversion of 50MVAr fixed line reactor at Subhasgram end of Sagaradighi - Subhasgram 400kV S/c line to switchable line reactor

Note: 2 nos. of 400kV line bays released after removal of existing LILO of Farakka - Jeerat 400kV S/c line at Baharampur are proposed to be utilized for connection of one existing bus reactor which is presently connected to one end of the bus due to space constraint & one new bus reactor mentioned above.

3.7 Further, in view of its international importance, the scheme may be entrusted to POWERGRID for implementation as decided in the 8th JSC meeting between India and Bangladesh.

3.8 **Members may please agree.**

4. High Capacity multi-terminal HVDC bi-pole line interconnecting North-Eastern Region (NER), India, Northern Region (NR), India and Bangladesh

4.1 The master plan for evacuation of Power from Hydro projects in Arunachal Pradesh envisages construction of high capacity HVDC / HVAC lines from NER to other parts of the country. The power from hydro projects in Kameng and Twang basin is proposed to be pooled at Rangia/ Rowta pooling station from where, it would be evacuated to Northern Region. In view of Right of Way (RoW) constraints in chicken neck area, the possibility of routing the HVDC line through Bangladesh was explored, wherein it was proposed to build multi terminal HVDC with one inverter station in Bangladesh. A concept paper on same was presented by the Indian side in 8th JSC meeting on Indo-Bangladesh Co-operation in power sector held on 10th Oct, 2014 at New Delhi. Further, it was decided that a feasibility study report on the proposed system would be submitted by joint team of India and Bangladesh.

4.2 In this regard following transmission system is proposed:

- Establishment of 2x500 MVA, 400/220 kV Pooling Station at Rangia / Rowta[§] in Upper Assam
- LILO of both ckts of Balipara-Bongaigaon 400 kV D/C (twin moose) line at Rangia / Rowta Pooling Station

- LILO of both ckts of Balipara-Bongaigaon 400 kV D/C (quad moose) line at Rangia / Rowta Pooling Station
- 7000MW[@] (2 x 3500 MW), ± 800kV HVDC terminal at Rangia
- 2 x 500 MW, ± 800kV HVDC terminal at Barapukuria
- 2 x 3000 MW, ± 800kV HVDC terminal at Muzaffarnagar (New)
- Rangia – Barapukuria–Muzaffarnagar# (New) 7000MW, ± 800kV HVDC bipole line
- Muzaffarnagar (New) – Bagpat 400kV D/c line (HTLS)
- Muzaffarnagar (New) – Meerut 400kV D/c line (HTLS)

Note:

1-~~\$~~: *Rangia/Rowta pooling station would also have infeed from Bhutan through Yangbari-Rangia/Rowta 400kV 2xD/c (quad) line; from hydro projects in Tawang Basin of Ar. Pradesh through Tawang PP – Rangia/Rowta 400kV D/c (HTLS) line and from hydro projects in Kameng Basin of Ar. Pradesh through Dinchang PP - Rangia/Rowta 400kV D/c (Quad) line.*

2-#: *Muzaffarnagar 765/400/220kV substation along with Muzaffarnagar(New)– Muzaffarnagar(UP) 400kV D/c line (HTLS) and Muzaffarnagar (New) – Saharanpur 400kV D/c line (HTLS) are being planned as a part of high capacity 765kV D/c WR – NR corridor viz. Vindhyachal Pool (WR) – Fatehpur (NR) – Lucknow(NR) – Aligarh(NR) – Muzaffarnagar(NR) – Mohali(NR) – Gurdaspur(NR).*

3-@ : *Regarding MW rating of HVDC terminals, it is to mention that rating of HVDC terminals may be decided so as to ensure injection of 2x3500MW at 400kV AC substation of Rangia/Rowta and 2x500 MW at 400kV AC substation of Barapukuria (Bangladesh).*

4.3 Approximate line length from Rangia (Assam, NER) to Barapukuria (Bangladesh) would be about 400km and that from Barapukuria (Bangladesh) to Muzaffarnagar (Uttar Pradesh, NR) would be about 1500km.

4.4 **Members may discuss and concur.**

5. **Deletion of 3rd 500 MVA transformer at Kishanganj 400/220kV substation and modification of transformation capacity at Kishanganj from 2x315 MVA to 2x500 MVA**

5.1 A 400/220 kV sub-station at Kishanganj in Bihar is under construction by POWERGRID as a part of Transmission System associated with Phase-I IPPs in Sikkim. The scheme included creation of 2x315MVA, 400/220 kV ICTs at Kishanganj.

5.2 Requirement of additional (3rd) transformer of 500MVA at Kishanganj was discussed and approved in the 16th meeting of Standing Committee on Power System Planning for Eastern Region held on 02-05-2014 at New Delhi. However, ERPC in its 28th meeting on 28th-29th Sep., 2014 held at Goa has suggested that the 400/220 kV transformation capacity at Kishanganj be changed to 2x500MVA instead of 2x315 MVA + 1x500 MVA.

5.3 Accordingly, following is proposed:

- i) Installation of 2x500 MVA, 400/220 kV ICTs at Kishanganj instead of earlier approved 2x315MVA,400/220 kV ICTs under Transmission System for Phase-I IPPs in Sikkim.
- ii) Deletion of 3rd 500MVA 400/220 kV ICT at Kishanganj approved in the 16th meeting of Standing Committee on Power System Planning for Eastern Region held on 02-05-2014 at New Delhi.

5.4 **Members may concur.**

6. Installation of STATCOMs in Eastern Region

6.1 Proposal for installation of STATCOM in combination with mechanically switched Reactors (MSR) and Capacitors (MSC) and co-ordinated control mechanism of MSCs and MSRs at Ranchi,Rourkela, Jeypore and Kishanganj substations in Eastern Region was discussed and agreed in the 15th meeting of Standing Committee on Power System Planning in Eastern Region held on 27th August, 2013. The details are as given below:

Sl. No.	Location /Sub-Station of POWERGRID in ER	STATCOM - Dynamic Shunt Controller (MVar)	Mechanically Switched Compensation (MVar)	
			Reactor (MSR)	Capacitor (MSC)
1.	Rourkela	± 300	2x125	-
2.	Kishanganj	± 200	2x125	-
3.	Ranchi(New)	± 300	2x125	-
4.	Jeypore	± 200	2x125	2x125

6.2 The proposal was subsequently taken up for discussion in the 25th TCC and ERPC meetings held on 20th-21st September, 2013 wherein ERPC, in principle, agreed for installation of STATCOM. However, the agreement was subject to funding through PSDF to the maximum extent possible.

6.3 The matter was discussed again in the 28th ERPC/TCC meeting held on 12th -13th September, 2014 at Goa, wherein, it was decided that POWERGRID may go ahead with implementation of the STATCOM project in Eastern Region with debt - equity ratio of 70:30 funding. The debt part should be

refunded through PSDF and Equity Component (30%) to be funded by POWERGRID through regulated tariff mechanism. CTU should initiate the process of availing fund from PSDF.

6.4 Members may discuss and concur.

7. Transmission System associated with Odisha UMPP (4000 MW)

7.1 The subject transmission system was discussed and agreed in the meeting of Standing Committee on Power System Planning for Eastern Region held on 02-05-2014 as well as 27th TCC/ERPC meeting held on 30th – 31st May 2014 and 28th TCC/ERPC meeting held on 12th – 13th Sept 2014.

7.2 Subsequently, the transmission system has been modified keeping in view the space constraints at Sundergarh (Jharsuguda) substation and development of other generation projects in the vicinity. Accordingly, it is now proposed to pool the power to a new pooling substation viz. Sundergarh (New) and plan HVDC bipole line from Sundergarh (New) to NR instead of Angul to NR as envisaged earlier. The modified transmission system for evacuation of power from UMPP is as below :

(A) Evacuation system for Odisha UMPP project

(a) For Immediate Evacuation of power from UMPP Project

1. Odisha UMPP – Sundergarh (New) 765kV 2xD/c line
2. Odisha UMPP – Lapanga 400kV D/c line (quad/HTLS)
3. Odisha UMPP – Kesinga 400kV D/c line (quad/HTLS)

(b) System Strengthening Scheme associated with Odisha UMPP

1. New 3x1500MVA, 765/400kV Pooling Station at Sundergarh (New)
2. LILO of Jharsuguda – Raipur pool 765kV D/c line at Sundergarh (New)
3. ± 800 kV, 3000 MW HVDC terminal at Sundergarh (New) and suitable location in NR (Delhi – Maharani Bagh / Badarpur) with HVDC bipole line capacity of 6000 MW for future utilization
4. Suitable AC strengthening system at the remote end of the HVDC bipole line in NR (Delhi – Maharani Bagh / Badarpur)

(c) Scope of evacuation arrangement at UMPP switchyard

1. Generation to be stepped up at 765kV
2. Provision for Split Bus Arrangement on 765kV UMPP Bus*
3. 4 no. 765 kV line bays
4. 4 no. 400 kV line bays (suitable for quad conductor lines)

5. 2X1500 MVA, 765/400kV ICT with OLTC +/- 5.5 % (as per CEA Standard for 765kV Substation Equipment) (7 nos 1-phase 500 MVA transformers) along with associated bays at Generation Switchyard
6. 2 nos. 240 MVAR (7x80 MVAR Banks) Bus Reactor at 765 kV bus of Generation Switchyard
7. 2x125 MVAR Bus Reactor at 400 kV bus of Generation Switchyard
8. 4x80MVAR switchable line reactor along with 450ohm NGR each for Odisha UMPP – Lapanga 400kV D/c line (quad/HTLS)&Odisha UMPP – Kesinga 400kV D/c line (quad/HTLS) lines
9. Space for future – 2 nos. 400 kV line bays

Note:

1. * Bus splitting is required to control power rushing towards Odisha which has a share of 1300 MW.
2. The 765KV and 400kV switchyard may be designed for 50kA and 63kA fault levels respectively.

7.3 Further, Ministry of Power vide its letter dated 29-12-2014 has asked the bid process co-ordinator for Odisha UMPP i.e. PFC for termination of the bidding process for Odisha UMPP. In view of this, transmission system associated with Odisha UMPP would be taken up for discussion and concurrence of members when the generation project would come.

7.4 **Members may note.**

8. 765 kV System Strengthening Scheme in Eastern Region

8.1 The subject transmission systems were discussed in the meeting of Standing Committee on Power System Planning for Eastern Region held on 02-05-2014. The 765 kV system was proposed along with Orissa UMPP project, having following scope of work :

765 kV System

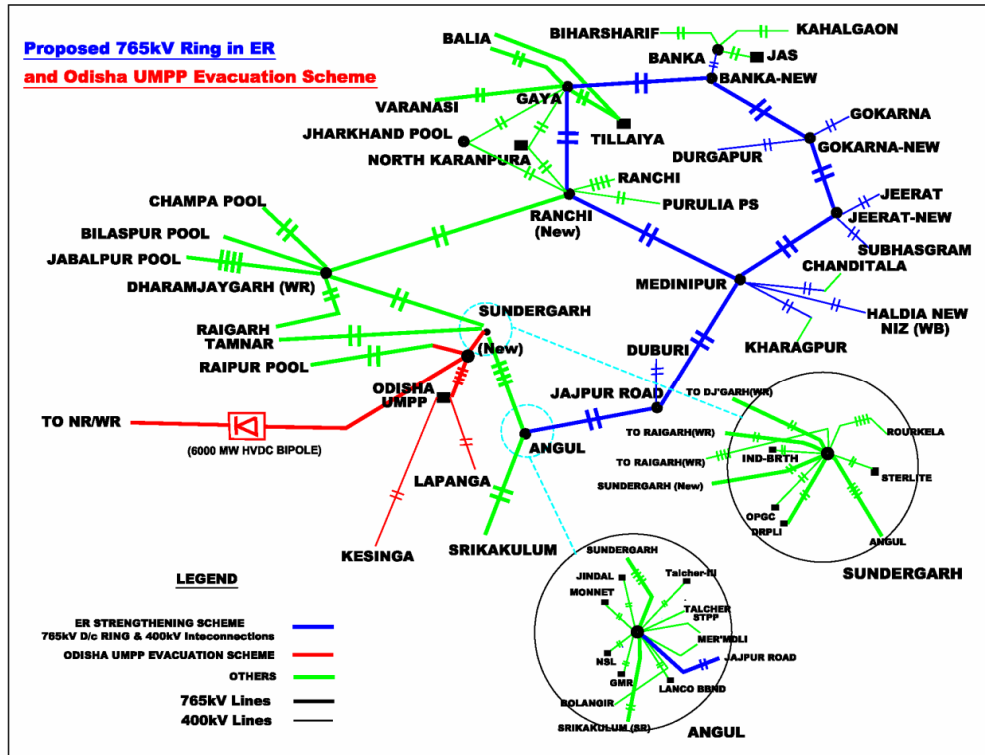
1. Establishment of 765/400 kV new substations at Banka (New), Gokarna(New), Medinipur, Jeerat (New) and Jajpur Road
2. Angul – Jajpur Road 765kV D/c line
3. Jajpur Road – Medinipur 765kV D/c line
4. Ranchi (New) – Medinipur 765kV D/c line
5. Medinipur – Jeerat (New) 765kV D/c line
6. Jeerat (New) – Gokarna (New) 765kV D/c line
7. Gokarna(New) – Banka(New) 765kV D/c line
8. Gaya – Banka (New) 765kV D/c line
9. Gaya – Ranchi (New) 765kV D/c line

400kV Interconnection

10. Jajpur Road – Duburi 400kV D/c line (quad/HTLS)
11. Medinipur – Haldia New (NIZ) (WBSETCL) 400kV D/c line (quad/HTLS)
12. LILO of Chandithala – Kharagpur 400kV D/c line at Medinipur
13. Jeerat (New) – Subhasgram 400kV D/c line(quad/HTLS)
14. Jeerat (New) – Jeerat 400kV D/c line (quad/HTLS)
15. LILO of Jeerat (WB) – Subhasgram 400kV S/c section at Rajarhat**
16. Gokarna (New) – Gokarna 400kV D/c line (quad/HTLS)
17. Gokarna (New) – Durgapur (PG) 400kV D/c line (quad/HTLS)
18. Banka (New) – Banka 400kV D/c line (quad/HTLS)

****Note:** LILO of Sagardighi - Subhasgram 400kV S/c at Rajarhat and LILO of Sagardighi - Rajarhat 400kV S/c (formed after prior LILO) at Jeerat, which were also a part of this scheme, have been modified as they have been included in the scheme for transfer of additional 500MW (total-1000MW) power to Bangladesh.

The corresponding schematic diagram is given below:



8.2 The scheme has been reviewed due to delay in the implementation of Orissa UMPP and other generation scheme, and it has been observed that most of the 765kV corridors are not getting adequately loaded in the study result for 2018-19 time period. Accordingly the requirement of 765kV ring may be postponed for some time. However, a strong East-West connection in the

Eastern Region is found to be necessary. So to begin with, the middle path of the ring i.e. Ranchi – Medinipur – Jeerat 765 kV D/c line may be taken up for implementation. In this connection, a study report on 765kV System Strengthening Scheme in Eastern Region is enclosed at **Annexure-1**.

8.3 Accordingly, 765kV corridor with the following scope of work is proposed

1. Establishment of 765/400kV, 2x1500MVA substations at Medinipur and Jeerat (New)
2. Ranchi (New) – Medinipur 765kV D/c line
3. Medinipur – Jeerat (New) 765kV D/c line
4. Medinipur – Haldia New (NIZ) (WBSETCL) 400kV D/c line (quad/HTLS)
5. LILO of Chandithala – Kharagpur 400kV D/c line at Medinipur
6. Jeerat (New) – Subhasgram 400kV D/c line(quad/HTLS)
7. Jeerat (New) – Jeerat 400kV D/c line (quad/HTLS)
8. LILO of Jeerat (WB) – Subhasgram 400kV S/c section at Rajarhat

8.4 It may be noted that the study has been carried out with 18th EPS load which is on the higher side so far as load growth in last 4-5 years are concerned. Accordingly, members may deliberate whether to take up the above scheme at this stage or later.

9. Downstream 220kV system development of STUs (Bihar, Jharkhand & Odisha)from the various approved and ongoing sub-stations of POWERGRID

9.1 Under the ERSS-III scheme, following new 400 kV sub-stations have been proposed / are being commissioned by POWERGRID :

- 2x200 MVA, 400/132 kV sub-stations at Lakhisarai and Banka in Bihar
- 2x315 MVA, 400/220 kV at Chaibasa and Daltonganj in Jharkhand
- 2x315 MVA, 400/220 kV at Bolangir, Keonjhar and Pandiabil in Odisha

The sub-stations at Lakhisarai, Banka, Chaibasa, Bolangir and Keonjhar have been commissioned by POWERGRID, but the downlinking 220 and 132 kV lines/systems have not yet been commissioned by the concerned STUs.

9.2 Bihar, Jharkhand and Odisha need to expedite their downlinking system for drawl of power from these substations so that proper anchoring of the associated line is achieved to enable proper utilization of transmission assets.

10. Transformer augmentation requirements in Eastern Region

10.1 A review of peak loading on various ICTs in Eastern Region during 2012-13 and 2014–15 was done as per data furnished by ERLDC and substations where transformers were highly loaded and n-1 criterion was being violated were identified. The same has been tabulated below:

Sl. No.	Substation	Peak Loading (2012-13 & 2014-15) (MW)	Aggregate Existing/Planned Tr. Capacity (MVA)	N-1 Capacity (MVA)
1	Durgapur	409	630	315
2	Malda	440	630	315
3	New Siliguri	410	630	315
4	Jeypore	478	630	315
5	Rourkela	424	630	315
6	Gaya	533	815 (500+315)	315/500

10.2 After considering space availability, age of transformers, etc. at the above identified locations, it is proposed to augment transformations capacities as follows:

1. Installation of 3rd 400/220 kV, 1x315 MVA ICT at Durgapur Substation[@]
2. Replacement of 400/220 kV, 2x315MVA ICTs at Malda Substation with 400/220kV, 2x500 MVA ICTs
3. Installation of 3rd 400/220 kV, 1x315MVA ICT at New Siliguri Substation[@]
4. Replacement of 400/220 kV, 2x315MVA ICTs at Jeypore Substation with 400/220 kV, 2x500MVA ICTs
5. Replacement of 400/220 kV, 2x315MVA ICTs at Rourkela Substation with 400/220 kV, 2x500MVA ICTs
6. Installation of 400/220 kV, 1x500 MVA ICT at Gaya Substation

@ The 400/220kV, 1x315MVA transformers being proposed at the above locations shall be supplied from regional spare ICTs obtained after transformer replacements.

10.3 In case of space constraints, 400 kV & 200 kV bays associated with these ICTs may be installed with GIS, wherever required.

10.4 **Members may discuss and concur.**

11. Conversion of fixed Line Reactors to switchable Line Reactors

11.1 Fixed line reactors on small 400 kV lines may lead to cases of over-compensation in lines. Several short 400 kV lines have been identified in

Eastern Region which has a high degree of compensation and the same have been tabulated below:

Sl. No.	Name of the Line	Length (in km)	Capacity (MVAR)		Switchable (S) / Fixed (F)		% Compensation
			End I	End II	End I	End II	
1	Lakhisarai – Biharsharif 400kV D/c	89	--	50	--	F	85.00
2	Keonjhar – Rengali 400kV S/c	100	--	63	--	F	95.00

11.2 It is proposed to convert the fixed line reactors into switchable line reactors so that they may be utilised as Bus Reactors, as and when needed to improve voltage profile. Further, NGR removal/bypassing may be considered for the above lines for successful auto-reclosure. DOV Studies for the above lines have been carried out and no DOV phenomenon has been observed in absence of the line reactor.

11.3 **Members may discuss and concur.**

12. Identification of termination substation at Rourkela end, for Rourkela – Goelkera (Jharkhand) 132kV S/c line

12.1 Rourkela (Odisha) – Goelkera (Jharkhand) 132kV S/c line was originally planned to be terminated at Rourkela substation of OPTCL, Odisha. However, due to construction of buildings and other structures etc. this line could not be terminated at the designated substation.

12.2 Now, POWERGRID is carrying out a consultancy works for the state of Jharkhand wherein Rourkela-Goelkera 132kV S/c line is to be LILO at Manoharpur new substation of JUSNL, Jharkhand.

12.3 As per the preliminary survey done by the contractor (M/s KEC), it has been found that the Rourkela-Goelkera 132 kV S/c line could only be terminated at 220 kV Tarkera S/s of OPTLC, out of the three possible substations namely – 132kV Rourkela, 132 kV Chhend and 220 kV Tarkera substations. The same has also been intimated to JUSNL vide letter dated 20th Oct 2014 by POWERGRID.

12.4 **Members may discuss and concur.**

13. Proposal of JUSNL (Jharkhand UrjaSancharan Nigam Limited) for provision of 220/132 kV Auto transformer in proposed 400/220 kV GSS of M/s PGCIL at Daltonganj with provision of 02 nos. 132 kV bays for JUSNL

- 13.1 JUSNL vide its letter dated 21-04-2015 has informed that due to land acquisition constraints at Daltonganj it is not possible to create 220 kV level at Daltonganj. JUSNL has proposed to provide 220/132 kV Auto transformer in proposed 400/220 kV GSS of M/s POWERGRID at Daltonganj with provision of 02 nos. 132 kV line bays for delivery of power at 132 kV level from the POWERGRID sub-station. The existing 220 kV D/C Latehar – Daltonganj transmission line (presently charged at 132 kV level) of JUSNL is passing nearby proposed grid substation Daltonganj of M/s PGCIL. JUSNL has proposed that line from Latehar to Daltonganj will be LILO at Daltonganj (PG) in such a way Daltonganj (PG)-Latehar would be operated at 220 kV and Daltonganj (PG)-Daltonganj (JUSNL) would be operated at 132 kV. JUSNL has also informed that they are constructing 220/132kV Garhwa S/S and Daltonganj-Garhwa 220kV line. This line would be connected at Daltonganj(PG) substation.
- 13.2 The proposal of JUSNL involves provision of 1x160 MVA 220/132 kV Auto transformer at proposed 400/220 kV GSS of POWERGRID at Daltonganj along with 02 nos. 132 kV bays.
- 13.3 Taking care of the reliability aspect of 220/132kV ICT at Daltonganj, the following is proposed :
- 2x160MVA, 220/132kV Auto transformer at Daltonganj substation along with 4 number of 132 kV bays (under the scope of POWERGRID)
 - LILO of Daltonganj(JUSNL)-Latehar 220kV D/c (operated at 132kV) line of JUSNL at Daltonganj (PG) so that Daltonganj (PG)-LateharD/c would be operated at 220 kV and Daltonganj (PG)-Daltonganj (JUSNL) would be operated at 132 kV. (Scope of JUSNL)
 - Jharkhand (PG) –Garwa Rd. 220kV D/c line along with 220/132kV S/s at Garwa Rd. (Scope of JUSNL)

13.4 **Members may discuss.**

14. **Extension of under construction of Latehar-ESSAR 400 kV D/C line to Chandwa pooling station of POWERGRID - Proposal of JUSNL**

- 14.1 JUSNL vide above referred letter has informed that due to cancellation of coal blocks of M/s Essar Power Ltd., the generation project of M/s Essar would be considerably delayed. JUSNL is constructing 400 kV D/C line from Essar to Latehar (about 45 km) and has requested for extension of this line to Jharkhand Pooling station of POWERGRID at Chandwa. The proposal of JUSNL involves construction of 400 kV D/C line from Essar to Chandwa(PG), which is about 10 km, along with 2 no. of 400 kV bays at

Chandwa(PG) so as to form Latehar (JUSNL) –Chandwa(PG) 400kV D/c line. The scheme would be under the scope of JUSNL.

14.2 **Member may discuss.**

15. Creation of 400/220 kV sub-station at Dhanbad - Proposal of JUSNL

15.1 JUSNL vide above referred letter has informed that under 24x7 power for all, their distribution companies has projected a requirement of about 1000 MW at Dhanbad region. To meet the load requirement of Dhanbad region, JUSNL is also constructing 220/132 kV sub-stations each at Govindpur and Jainamore (Bokaro). In order to feed these 220 kV sub-stations, JUSNL has proposed the establishment of 400/220 kV sub-station at Dhanbad by LILO of Maithon-Ranchi 400 kV D/C line.

15.2 On further analysis, following alternatives were found to be suitable for interconnection with Dhanbad 400kV substation.

Alternative-1

➤ LILO of LILO portion of Maithon-Ranchi line at Raghunathpur so as to form Raghunathpur-Dhanbad 400kV D/c line and Dhanbad-Maithon and Dhanbad-Ranchi 400kV S/c lines.

Alternative-2

➤ LILO of Maithon RB – Ranchi 400kV D/c line at Dhanbad

15.3 2x500MVA, 400/220kV ICT along with suitable 220kV interconnections need to be provided at Dhanbad substation.

15.4 **Member may discuss.**

16. Evacuation of power from (2x48 MW) Jorethang HEP in Sikkim : Interim arrangement

16.1 As per the approved plan, DEPL (Dans Energy Private Limited) was to construct its dedicated transmission line from Jorethang HEP (JHEP) switchyard to the New Melli (PG) sub-station along with 2 nos. 220 kV GIS line bays at New Melli (PG) sub-station. DEPL has informed that due to contractor related issues, the transmission line works of DEPL got delayed. Further, they informed that the generation project is expected to be commissioned by May/June 2015.

16.2 DEPL has informed that a section of the dedicated line about 4 km up to tower no. 14 would be completed by them in May / June 2015. They have

intimated that POWERGRID 220 kV D/C line from New Melli sub-station to Rangpo is also expected to be completed by May 2015. As DEPL would not be able to complete the line up to New Melli sub-station of POWERGRID by May 2015, DEPL has requested that they may be allowed to connect completed section of their dedicated line (from tower no. 14) to the POWERGRID line (tower no. 87) as an interim arrangement. They also informed that DEPL is fully committed towards completion of the entire stretch of transmission line. In this regard, order of 2 nos. 220 kV GIS bays at New Melli S/S has already been placed with Alstom in March 2015. DEPL has intimated that they had taken up upon themselves to complete the entire stretch of transmission line up to New Melli S/S matching with the commissioning of 220 kV bays at New Melli.

16.3 In view of the above, DEPL has requested permission for granting intermediate connection at its 14th tower to PGCIL 220 kV D/C Rangpo-New Melli line at 87th tower as an interim arrangement.

16.4 It is understood that the New Melli substation and New Melli – Rangpo 220kV D/c line of POWERGRID would be completed shortly. Accordingly, it is proposed that LILO of New Melli – Rangpo line at 14th tower location to Jorethang – New Melli line may be allowed subject to their commitment towards completion of the remaining part of the dedicated line along with bays at New Melli by Oct 2015. The LILO may be disconnected, if the developer of Jorethang HEP fails to achieve this target. The developer of Jorethang would have to submit regular progress report regarding the balance portion of the transmission system to CEA and CTU.

16.5 **Members may discuss**

17. **2x500MVA, 400/220kV ICT at Pandiabil instead of approved 2x315MVA**

17.1 Establishment of 2x315 MVA, 400/220 kV new sub-station at Pandiabil in Odisha is under implementation by POWERGRID as part of ERSS-III. In this regard, it is to inform that 2x500 MVA, 400/220 kV ICTs are being installed at Pandiabil instead of 2x315 MVA ICTs earlier approved at the same cost. This shall further augment transformation capacity at this substation to meet future load growth.

17.2 **Members may note.**

18. **400 kV GIS bays at Jharsuguda (Sundergarh) substation for already approved Odisha Phase-II and OPGC Transmission schemes**

18.1 In the Standing Committee Meeting held on 2nd May 2014, LILO of both circuits of Rourkela - Raigarh 400 kV D/c (2nd line) at Jharsuguda

(Sundergarh) was approved under Common Transmission System for Phase-II Generation Projects on Odisha and OPGC – Jharsuguda 400kV D/c line under Immediate Evacuation System for OPGC generation project in Odisha. The said schemes have already been approved in 27th TCC/ERPC meeting held on 30th-31st May 2014 and 33rd meeting of Empowered Committee on transmission held on 30th Sept 2014.

18.2 The said schemes require six (6) 400kV line bays at Jharsuguda (Sundergarh) substation for LILO/line terminations. However, it has emerged from site that there is, not enough space for construction of six 400kV AIS line bays. Therefore, in view of space constraints, it is proposed that these 400 kV line bays (6 nos.) at Jharsuguda (Sundergarh) be constructed with GIS instead of earlier approved AIS.

18.3 The scheme also includes bus splitting at Angul and Jharsuguda. In view of space constraints at Jharsuguda, the split bus arrangement at Jharsuguda (Sundergarh) shall also be implemented with GIS, whereas split bus arrangement at Angul shall also be implemented with AIS.

18.4 **Members may discuss and concur.**

19. LILO of Jharsuguda (Sundergarh) – Dharamjaygarh 765kV D/c (2nd) line at Raigarh (Tamnar) substation of POWERGRID in Western Region

19.1 Raigarh (Tamnar) 765/400kV is a pooling substation in Western Region in Chhattisgarh, where power from a number of generation projects (totalling to about 4500 MW) is being pooled at 400 kV level. Further, for evacuation of power from Raigarh (Tamnar) at 765kV level, there is only Raigarh (Tamnar) – Raigarh (Kotra) 765kV D/c line. Thus to improve the reliability of power evacuation from Raigarh (Tamnar) substation, it was decided, in the 36th Standing Committee Meeting on Power System Planning in Western Region held on 29th Aug 2013, to LILO Jharsuguda (Sundergarh) – Dharamjaygarh 765kV D/c (2nd) line at Raigarh (Tamnar), as the line passes in close vicinity to Raigarh (Tamnar) substation.

19.2 **Members may note / agree.**

20. Change of conductor in “Transmission System for Transfer of power from generation projects in Sikkim to NR/WR” scheme

20.1 In order to optimize the RoW / cost, conductor of few transmission lines under the subject scheme has been changed from Moose to HTLS, having similar transmission capacity. Details of the same are given below :

Transmission Line	Earlier	Revised
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	Conductor	Conductor
LILO of both circuits of Teesta-III – Kishanganj 400kV D/c (quad) line at Rangpo	Quad Moose	Twin HTLS
Rangpo – New Melli 220kV D/c	Twin Moose	Single HTLS

20.2 **Members may kindly note / agree.**

21. Re-conductoring of Maithon RB - Maithon 400kV D/c line of POWERGRID

21.1 Maithon RB (MPL) generation project is connected through 400kV D/c line with Maithon and Ranchi sub-stations of POWERGRID. Whenever there is import of power from Western Region, the Maithon RB - Maithon line remains critically loaded. POSOCO has also highlighted this problem in their operational report.

21.2 It is therefore, proposed to enhance the capacity of this line by re-conductoring it with high capacity HTLS conductor.

21.3 **Members may discuss and concur.**

22. Proposal of BSPTCL regarding LILO of Sasaram – Ara 220 kV D/c line at Pusauli 220/132 kV sub-station of BSPTCL

22.1 BSPTCL vide letter dated 13-04-2015 has informed that they are establishing a 220/132 kV sub-station at Pusauli through LILO of Sasaram - Ara 220 kV D/c line. The scheme is a part of “Sub-Transmission Strengthening in Bihar (Phase-2, Part-II Addendum). The works are nearing completion. Since, Sasaram - Ara 220 kV D/c line is part of ISTS, a formal approval of the Standing Committee is sought to make the LILO.

22.2 **Members may discuss and decide.**

23. Interim Arrangement for India – Nepal Interconnection through Muzaffarpur (India) – Dhalkebar (Nepal) 400 kV D/c line

23.1 Muzaffarpur (POWERGRID) - Dhalkebar (NEA) 400 kV D/c line is under implementation for interconnection of Indian and Nepalese grids. The line is initially proposed to be operated at 220 kV. While the transmission line is expected to be completed shortly, the 220 kV sub-station at Dhalkebar would be delayed.

23.2 In view of the above, an interim arrangement is proposed to charge the subject transmission initially at 132 kV. For enabling 132 kV operation of the

line, a 220/132 kV spare ICT (from regional pool of spare ICTs) is proposed to be installed at Muzaffarpur (POWERGRID) as a goodwill gesture.

23.3 Members may kindly note.

24. Additional works at Sasaram (Pusauli) 765/400 kV sub-station of POWERGRID

24.1 2x1500 MVA, 765/400 kV sub-station at Sasaram was planned as a part of transmission system associated with DVC and Maithon RB generation projects. However, a part of the scope including 1x1500 MVA, 765/400 kV ICT and 330 MVAR, 765 kV Bus Reactor could not be installed due to severe space constraints. Further, Sasaram - Gaya 765 kV S/c & Sasaram - Fatehpur 765 kV S/c lines, constructed under the same scheme, could not be terminated at Sasaram due to space constraints and these lines are being operated as Gaya – Sasaram - Fatehpur 765 kV line with 330 MVAR mid-point reactor at Sasaram. Accordingly, equipments for these works were not purchased. This along with other issues viz. one tie CB at 765 kV, 765/400 kV ICT connected with one 400 kV main CB etc. results in operational constraints.

24.2 In view of the above, layout of Sasaram sub-station has been reviewed to accommodate additional elements. Accordingly, it is proposed to install 2nd 1500 MVA, 765/400 kV ICT, 2nd 330 MVAR, 765 kV Bus Reactor, terminate Sasaram - Gaya 765 kV S/c and Sasaram - Fatehpur 765 kV S/c line (with 330 MVAR line reactor at Sasaram) and other associated works with GIS at 765 kV level and AIS at 400 kV level. This additional scope is proposed to be implemented as a system strengthening scheme.

24.3 Members may discuss and decide.

25. Immediate evacuation for North Karanpura (3x660MW) generation project of NTPC

25.1 NTPC Ltd. had planned a 1980 MW (3x660MW) thermal power project at North Karanpura in the state of Jharkhand. Accordingly Immediate evacuation system and Transmission system strengthening was planned for North Karanpura project in 2007-08. Following transmission system associated with North Karanpura STPP was finalised:

1. North Karanpura – Gaya 400kV D/c (quad)
2. North Karanpura – Ranchi 400kV D/c (quad)
3. WR Pooling Station – Seoni 765kV S/c
4. Lucknow – Bareilly 765kV S/c
5. Bareilly – Meerut 765kV S/c

6. Agra – Gurgaon (ITP) – Gurgaon (PG) 400kV (quad)

7. Gurgaon 400/220kV, 2x315MVA GIS sub-station

25.2 The transmission system of 400kV lines from North Karanpura to Ranchi and Gaya pooling stations was entrusted to POWERGRID in a meeting chaired by Joint Secretary (Transmission), Ministry of Power on 13-12-2007.

25.3 However, the implementation of balance portion of the above transmission system (Item no. 3 to 7) was entrusted to North Karanpura Transmission Company Ltd. through Tariff Based Competitive Bidding route in May, 2010. In view of delay in materialization of North Karanpura generation project, the matter was discussed again in the 29th meeting of Standing Committee in Northern region held on 29-12-2010 at Gurgaon and 19th (Special) meeting of Northern Region Power Committee held on 04-01-2011 at New Delhi wherein it was decided that implementation of item no. 3 to 7 mentioned above are required for transfer of power from Eastern region to Northern region as well as to meet the growing power demand in Northern region. Therefore, implementation of these elements was delinked from the North Karanpura generation project. Matter was also discussed in the 32nd meeting of Standing Committee in Western region held on 13-05-2011 and 17th meeting of Western Region Power Committee held on 20-05-2011 wherein it was decided to delink item no. 3 mentioned above from North Karanpura generation project and consider it as a part of regional system strengthening scheme in Western Region. In view of above, it may be construed that the transmission elements from item no. 3 to item no. 7 mentioned above have been approved as System Strengthening Scheme for Northern and Western regions and the same was to be implemented by North Karanpura Transmission Company Ltd.

Further, the implementation of immediate evacuation system by POWERGRID was deferred due to delay in North Karanpura generation project.

25.4 With revival of North Karanpura generation project, the immediate evacuation system needs to be implemented. As per regulatory requirements, NTPC has submitted applications for grant of Connectivity for North Karanpura, whereas LTA application for the same is awaited. For taking up implementation of the associated transmission system, NTPC need to apply for Long Term Access at the earliest and NTPC/ Beneficiaries may also sign the LTA agreement at the earliest to enable POWERGRID to proceed further for implementation of transmission system for North Karanpura project.

25.5 Now the transmission system of North Karanpura generation project has been reviewed, in view of the transmission system being constructed by POWERGRID as part Transmission System associated with Phase-I Generation Projects (Essar Power-1200MW, Corporate Power-540MW) in Jharkhand. The transmission system includes Chandwa (Jharkhand) Pooling Station and Chandwa - Ranchi & Chandwa - Gaya 400 kV D/c (quad) lines. For overall optimisation of transmission system for evacuation of 1740MW power (from Essar & Corporate) incident at Chandwa pooling station and 1980MW power of NKSTPP, three high capacity 400kV D/c lines (with quad conductor), two towards Gaya and one towards Ranchi have been proposed. In that case NKSTPP would be connected to Chandwa pool with 400kV D/c line(quad). Accordingly, Immediate evacuation System for North Karanpura is proposed to be revised as below:

Immediate evacuation System for North Karanpura

- North Karanpura – Gaya 400 kV D/c with quad moose conductor
- North Karanpura – Chandwa (Jharkhand) Pooling Station 400 kV D/c with quad moose conductor

25.6 Thus, the above system may be approved to be implemented by POWERGRID as an immediate evacuation system for North Karanpura (3x660MW) generation project.

25.7 **Members may concur.**

765kV System Strengthening Scheme in Eastern Region

It has been observed from the future load generation scenario of ER (13th Plan end) that there would be a steady growth in the load all over ER, but major generation projects are envisaged in the central and western part of ER (Odisha, Jharkhand and Bihar), whereas no major generation addition is expected in the eastern part (West Bengal).

The 765kV inter-state substations of ER at Ranchi, Gaya, Angul and Jharsuguda/Sundergarh have been implemented by POWERGRID to mainly enable export of power outside the region. In order to provide reliable and secure power supply within the region from various future generation projects and also to facilitate power exchange with the neighbouring regions under various operating conditions, it is proposed to build high capacity transmission network in ER which would optimize RoW requirements by creating a 765kV ring/corridor, as mentioned below:

1. Ranchi (New)-Medinipur-Jeerat (New)-Gokarna (New)-Banka (New)-Gaya-Ranchi (New) 765kV D/c line along with establishment of 765/400kV new substations at Banka (New), Gokarna (New), Medinipur and Jeerat (New).
2. Angul-Jajpur Road-Medinipur 765kV D/c line, forming a ring line Angul-Jajpur Rd-Medinipur-Ranchi-Dharamjayagarh-Jharsuguda-Angul with establishment of new 765/400kV substation at Jajpur Road.

The above 765/400kV sub-stations would be interconnected with the nearby 400kV substations through 400kV high capacity D/c lines.

The said proposal was discussed and approved in the Standing Committee Meeting of ER held on 02nd May 2014 by all the constituents. However, certain modifications in the proposed scheme were incorporated based on subsequent discussion with the constituents.

The schematic diagram of the scheme is as mentioned below:

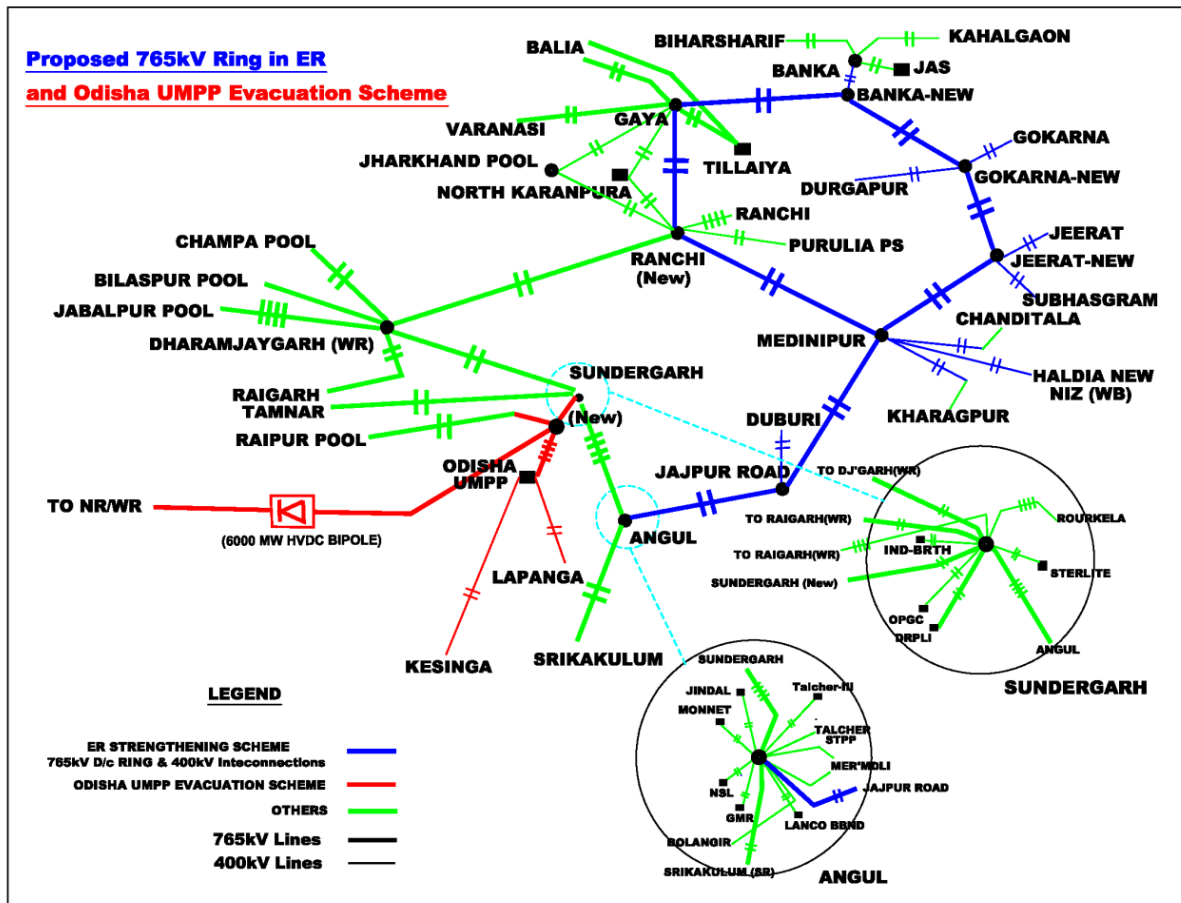


Figure: 765kV Strengthening in ER and the associated 400kV interconnections

Further, the scheme has been reviewed due to delay in the implementation of Orissa UMPP and other generation projects, and it has been observed that most of the 765kV corridors are not getting adequately loaded in the study result for 2018-19 time period. Accordingly, the requirement of 765kV ring may be postponed for some time. However, a strong East-West connection in the Eastern Region is found to be necessary. So to begin with, the middle path of the ring i.e. Ranchi – Medinipur – Jeerat 765kV D/c line may be taken up for implementation, wherein following transmission system is proposed:

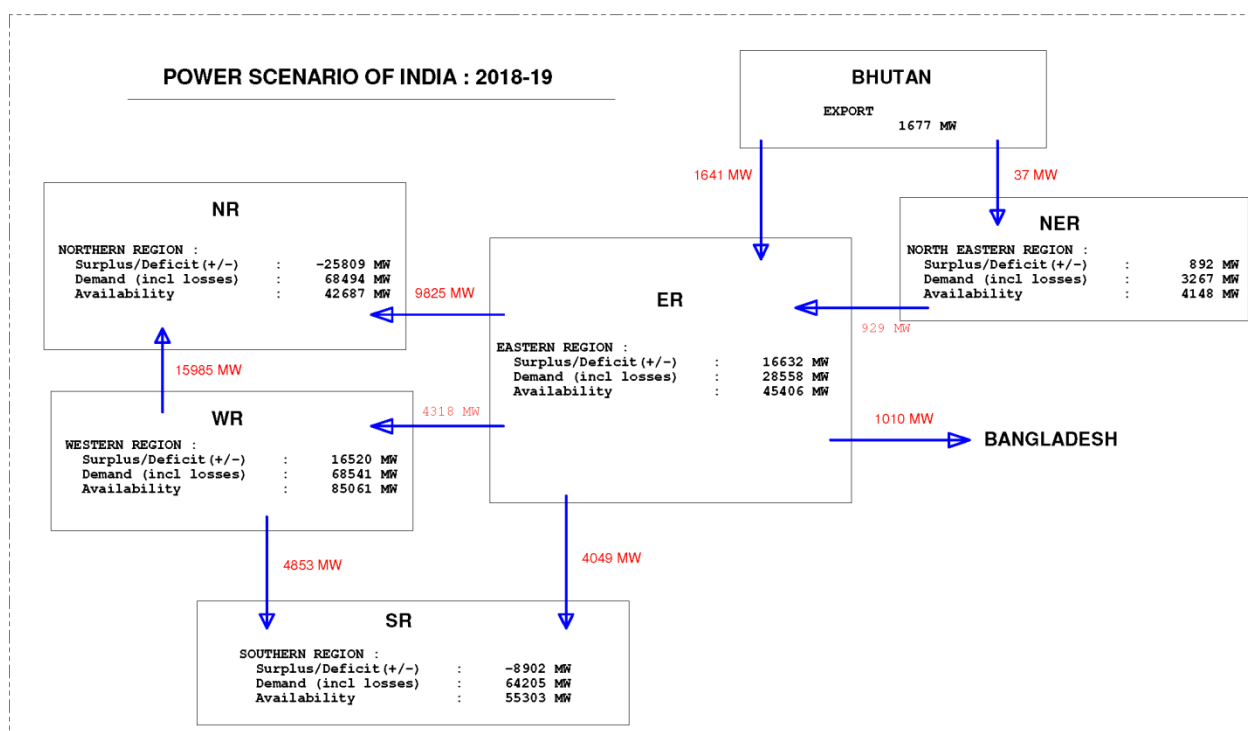
- Establishment of 765/400kV, 2x1500MVA substations at Medinipur and Jeerat (New)
- Ranchi (New) – Medinipur 765kV D/c line
- Medinipur – Jeerat (New) 765kV D/c line
- Medinipur – Haldia New (NIZ) (WBSETCL) 400kV D/c line (quad/HTLS)
- LILO of Chandithala – Kharagpur 400kV D/c line at Medinipur

- (f) Jeerat (New) – Subhasgram 400kV D/c line(quad/HTLS)
- (g) Jeerat (New) – Jeerat 400kV D/c line (quad/HTLS)
- (h) LILO of Jeerat (WB) – Subhasgram 400kV S/c section at Rajarhat

Revised system studies have been carried out for 2018-19 time-frame for two scenarios namely – (i) Expected LGB of Eastern Region and (ii) With reduced self-generation of West Bengal. The LGBs considered for study are as given below:

➤ **LGB: 2018-19**

- **All India**



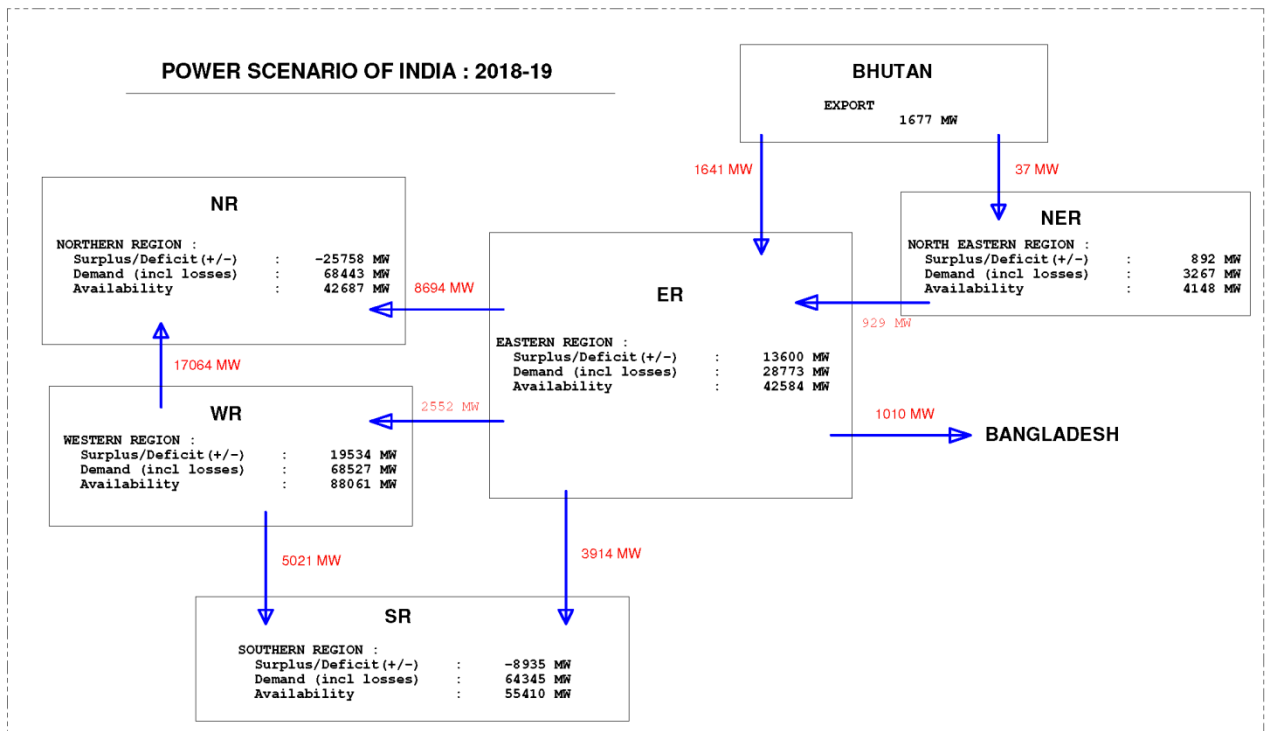
- **Eastern Region**

State	Generation (in MW)	Load + Loss (in MW)	(+) Surplus/ (-) Deficit (in MW)
Bihar	9177	5754.2	3422.8
Odisha	14897	5770.9	9126.1
DVC	5845	4264.4	1580.6
West Bengal	8791.9	11161.2	-2369.3
Jharkhand	5216	1669.1	3546.9
Sikkim	1479	154.4	1324.6
Total	45405.9	28774.2	16631.7

Study Results for this scenario Without Strengthening and With 765kV Strengthening is at **Exhibit-1** and **Exhibit-2** respectively.

➤ **LGB: 2018-19 (Reduced West Bengal Self-Generation)**

- All India



- Eastern Region

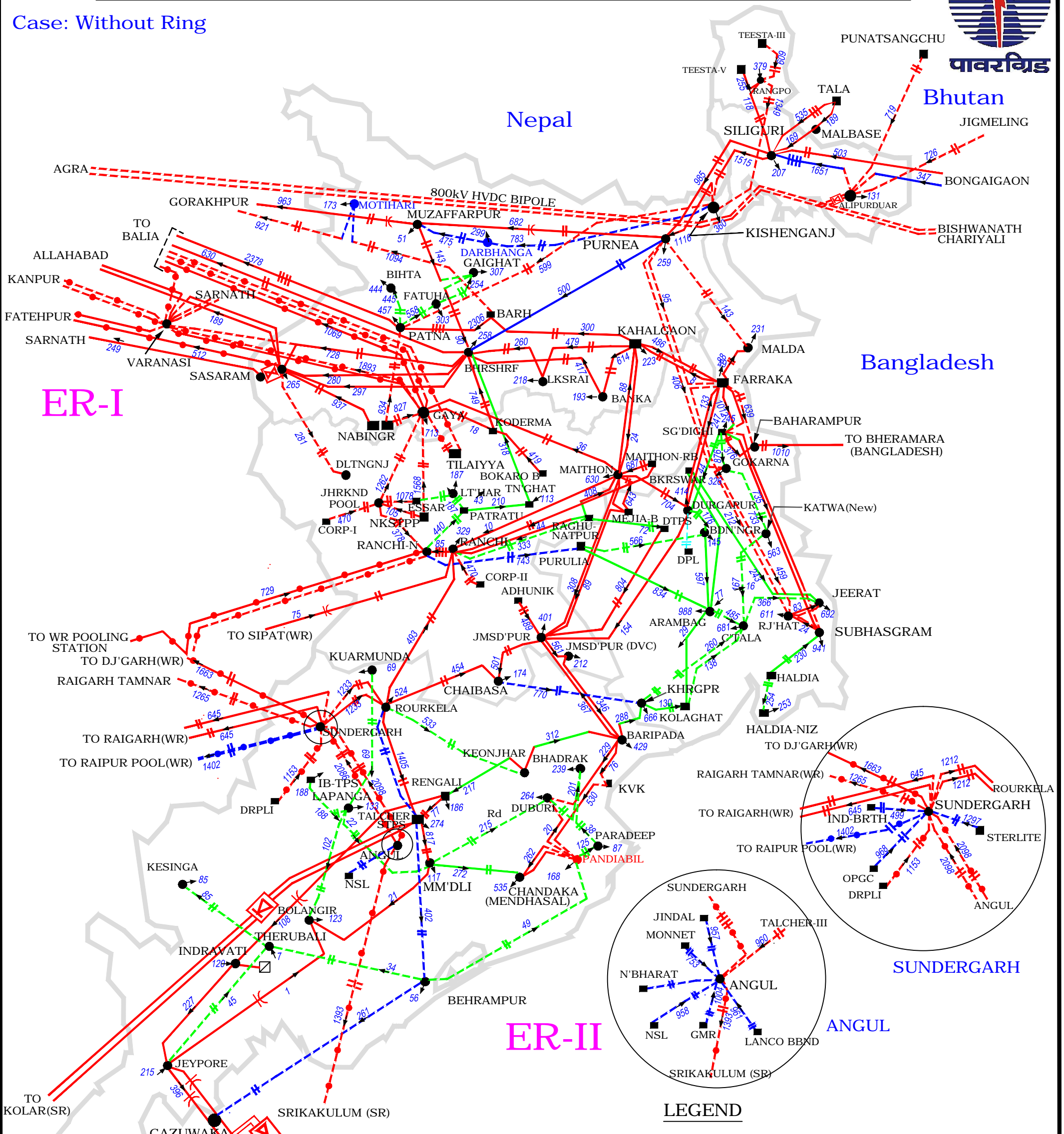
State	Generation (in MW)	Load + Loss (in MW)	(+) Surplus/ (-) Deficit (in MW)
Bihar	9177	5740.2	3436.8
Odisha	14897	5846.8	9050.2
DVC	5845	4295.4	1549.6
West Bengal	5970	11248.4	-5278.4
Jharkhand	5216	1698.8	3517.2
Sikkim	1479	154.5	1324.5
Total	42584	28984.1	13599.9

Study Results for this scenario Without Strengthening and With 765kV Strengthening is at **Exhibit-3** and **Exhibit-4** respectively.

POWER MAP OF EASTERN REGION



Case: Without Ring



ER-I

ER-II

LEGEND

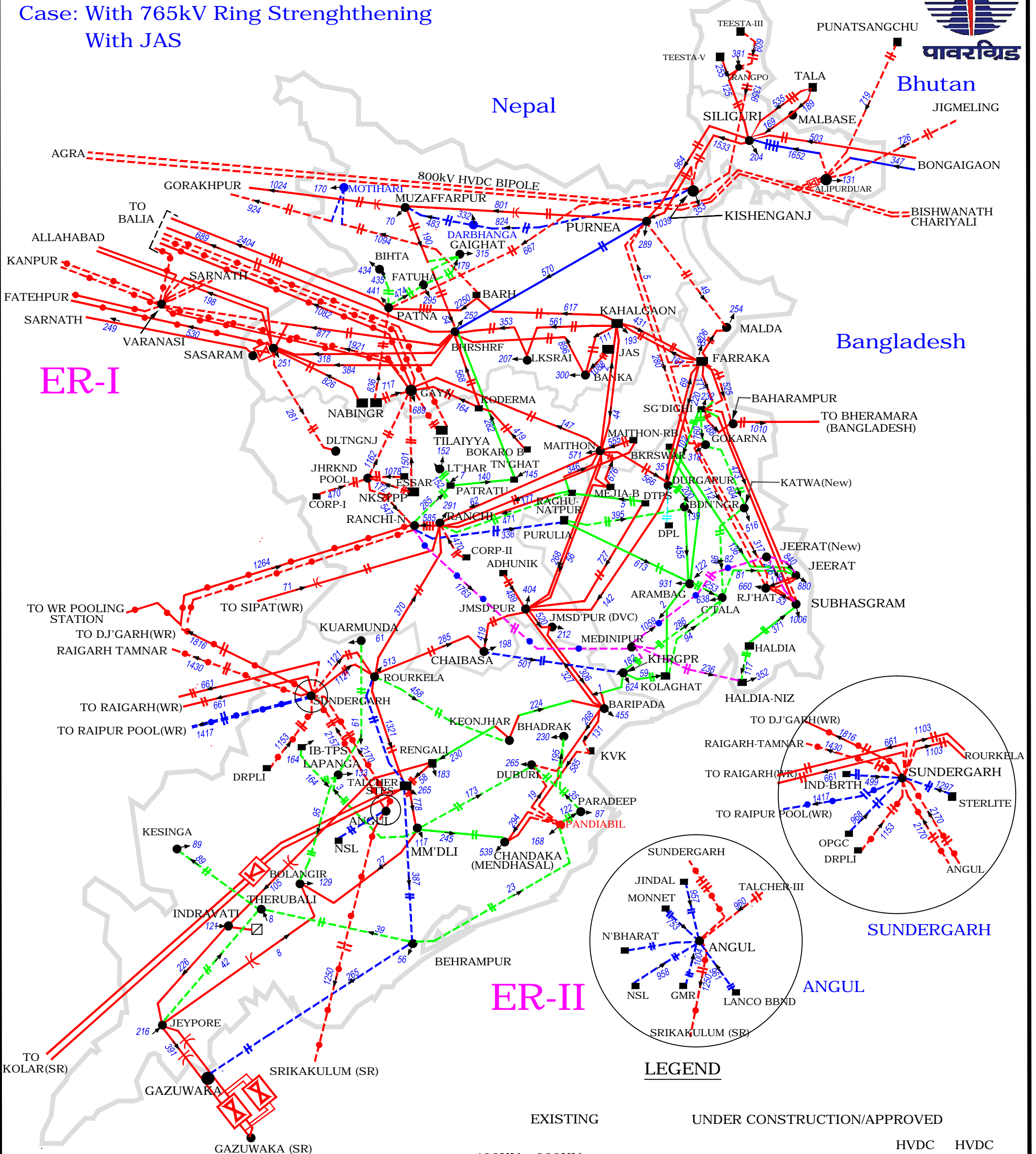
	EXISTING			UNDER CONSTRUCTION/APPROVED			HVDC BTB	HVDC BIPOLE
POWERGRID	400KV	220KV	132KV	765 KV	400 KV	220 KV		
TBCB								
SEB								

Time Frame: 2018-19

Last Updated
17 Feb 2015

POWER MAP OF EASTERN REGION

Case: With 765kV Ring Strengthening
With JAS



ER-I

ER-II

SUNDERGARH

ANGUL

LEGEND

	EXISTING			UNDER CONSTRUCTION/APPROVED			HVDC BTB	HVDC BIPOLE
POWERGRID	400KV	220KV	132KV	765 KV	400 KV	220 KV		
TBCB								
SEB								

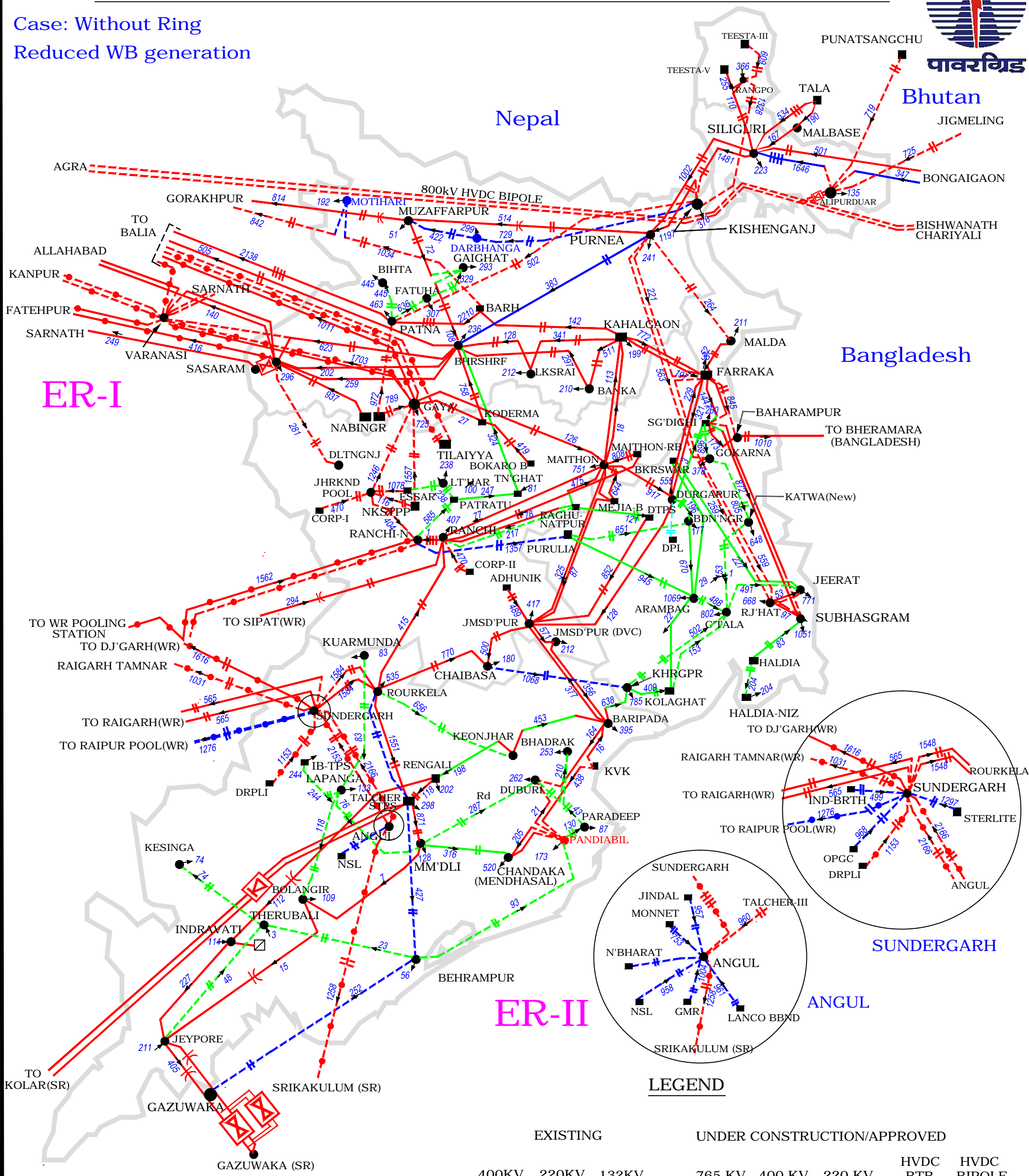
Timeframe: 2018-19

Last Updated
17 Feb 2015

POWER MAP OF EASTERN REGION



Case: Without Ring
Reduced WB generation



ER-I

ER-II

LEGEND

	EXISTING			UNDER CONSTRUCTION/APPROVED			HVDC BTB	HVDC BIPOLE
POWERGRID	400KV	220KV	132KV	765 KV	400 KV	220 KV		
TBCB								
SEB								

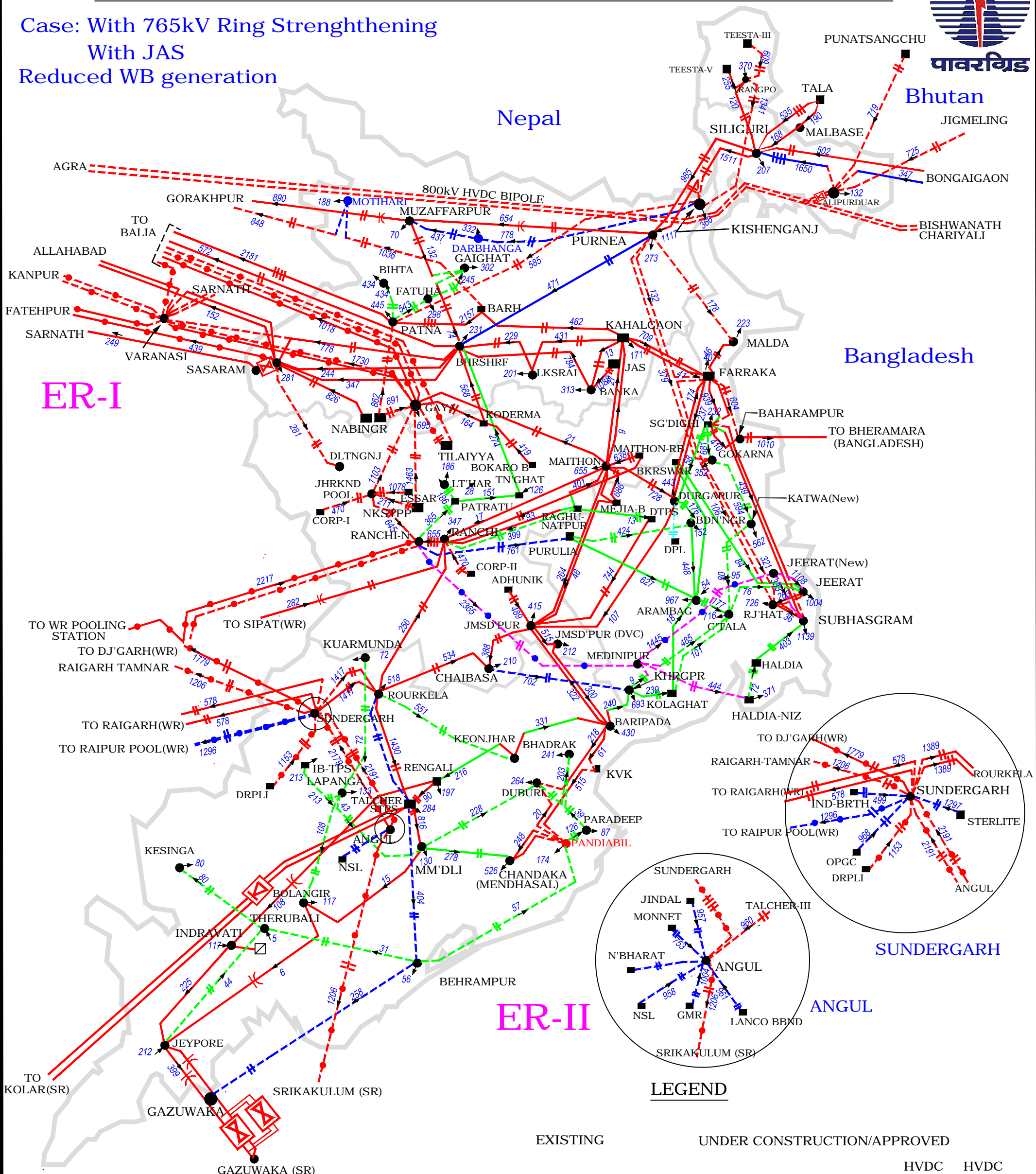
Time Frame: 2018-19

Last Updated
17 Feb 2015

POWER MAP OF EASTERN REGION



Case: With 765kV Ring Strengthening
With JAS
Reduced WB generation



ER-I

ER-II

SUNDERGARH

ANGUL

LEGEND

	EXISTING			UNDER CONSTRUCTION/APPROVED			HVDC BTB	HVDC BIPOLE
POWERGRID	400KV	220KV	132KV	765 KV	400 KV	220 KV		
TBCB								
SEB								

Timeframe: 2018-19

Last Updated 17 Feb 2015