

Ministry of Power
Central Electricity Authority
Power System Planning & Appraisal – 2 Division
Sewa Bhawan, R.K. Puram, New Delhi – 110066

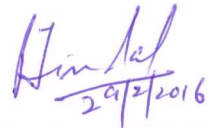
Subject : 20-Year (2016-36) Perspective Transmission Plan Report

A perspective transmission plan for 20-years (2014-2034) was prepared in August 2014 by CEA in association with POWERGRID and POSOCO. The objective of the plan was to present broad outlines of the requirement of additional transmission system in the Indian grid in next twenty years.

Based on the data obtained from the States, internal sources of CEA and from POWERGRID, a 20-year Perspective Transmission Plan report, which is an update of the previous report(of August 2014) has been prepared. This report has two parts, i.e. Part – A: 'Advance National Transmission Plan for 2021-22', and Part – B: 'Perspective Transmission Requirements for 2022-36'. The Part-A of the report has already been submitted to Ministry of Power vide our letter no. 200/15/2016-PSPA-II/32 on 18-January 2016. A consolidated perspective report on transmission system requirement for next twenty years is enclosed for consideration of the Ministry.

It may please be noted that CEA is preparing National Electricity Plan (N.E.Plan) u/S 3(4) of the Electricity Act 2003, and also working on 19th Electric Power Survey report. This N.E.Plan would give generation capacity and transmission system addition requirement for the period up to 2022 based on the 19th EPS load projections. This is being prepared considering the on-going generation projects, integrated resource planning, the Power for All programme of the government, integration of renewable sources and deliberations in the Standing Committees on Power System Planning with detailed analysis for transmission planning.

This is issued with the approval of Chairperson, CEA.


29/2/2016

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No. 200 / 15 / 2016-PSPA-2 /161-163

Date: 29-February-2016

Copy to:

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Report (Part – A)

on

**Advance National Transmission Plan
for 2021-22**

Central Electricity Authority

January 2016

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Report (Part-A) on Advance National Transmission Plan for Year 2021-22

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Report (Part-A) on Advance National Transmission Plan for Year 2021-22

1.0 Background:

- 1.1 A meeting was held in Ministry of Power (MoP) on 3rd November, 2015, chaired by Secretary(Power), to discuss - advance transmission planning for additional requirements of transmission system till 2021-22. In the meeting, CEA and PGCIL presented possible scenarios of load growth and generation capacity additions by the end of 13th Plan. And accordingly, region-wise and all-India surplus-deficit scenario for assessing transmission requirements was worked out.

Regarding the renewable generation capacity by 2021-22, it was brought out that the RES(only Wind and Solar) capacity, would increase from 26 GW to 160 GW(solar- 100 GW, and Wind- 60 GW) during the same period. As Wind and solar generation projects may not give benefit during peak load (i.e. 6-8 pm), so their availability may generally be taken as zero for this analysis. However, for the high wind season/quarter, a minimal availability of about 10% of wind capacity may be taken for serving the peak load.

MoP also suggested that sensitivity scenarios like - reduced gas availability, outage of nuclear plant, monsoon failure, costly generations not dispatching in importing regions, about 5% of generation installed capacity not available due to various reasons, etc may be considered. This, however, should be taken one at a time and not simultaneously. It was also suggested that though the planning criteria provides 'n-1-1' reliability criteria for 400kV system and practically 'n-1' for 765kV systems, however, for the inter-regional corridor requirements 'n-2' criteria for both 400kV and 765kV may be considered.

Ministry of Power (MoP) asked CEA to firm up the generation capacity and load projections for better assessment of transmission capacity requirement.

- 1.2 Based on above discussions, CEA and CTU presented various cases scenarios considering above mentioned sensitivity analysis on 18th Nov 2015. This analysis was based on the generation and load data as available at that time. From the analysis it appeared that Northern and Southern regions would still be in deficit and the other regions i.e. Eastern, Western and Northeastern regions would be in surplus. The NR may need to import about 24000 MW (during Years of Monsoon failure) , and the SR

may need to import about 14600 MW in 2021-22. This analysis was based on assumption that - about 117 GW Generation I/C would be added during the period of November 2015 – March 2022, Wind and Solar would not contribute at all during NR and SR peak load hours, Gas plants would give only 40% during peak hours etc.

- 1.3 To assess transmission capacity to serve the NR and SR deficits from the surplus available in ER, WR and NER, detailed modeling would be needed. Accordingly, the load flow modeling was carried out and same was presented to MoP on 18-December-2015. In the meantime, the likely generation addition data was also collected from internal sources of CEA. Regarding the RE addition data, inputs from MNRE were not available, however, as we were not considering much contribution from wind/solar plant to meet the peak demand, only the available information was modeled for load flow analysis. Regarding the Load projections for 2021-22, a rough estimate was made on basis of historic data in the absence of 19th EPS projections. The 19th EPS and National Electricity Plan (u/S 3(4) of the Electricity Act 2003) are under preparation in CEA.
- 1.4 The basic methodology presented by CEA/PGCIL was considered workable for the time being. It was recognized that for proper analysis we would need the economic analysis software which can capture for 8760 hours of system behaviour and are based on optimization of combined cost of production and transmission.
- 1.5 **This report is based on the detailed load flow modeling carried out with the available generation addition data and the rough estimates for the load demand projections.** The studies and the Report have been prepared by CEA in association with POWERGRID (the CTU) and POSOCO. A list of officials, who provided guidance and help in completion of this task, is given at [Annex-6](#).

2.0 Assumptions - Load demand estimates for 2021-22:

- 2.1 The 19th Electric Power Survey (19th EPS) which gives of electric demand projections is under preparation. The EPS report is expected to be available by April 2016. In the absence of EPS demand projections, rough estimates were made for region-wise load demand of 2021-22. The state-wise demand was further estimated in the same proportion as given in the 18th EPS (i.e. the previous EPS). Region-wise loads assumed for the present studies is given below:

Region-wise load for 2021-22 period, in MW

Sl. No.	Region	Peak Load
1.	Northern	76167
2.	Western	71682
3.	Southern	60120
4.	Eastern	26852
5.	North-east	3688
A.	Total – All India (1+2+3+4+5)	238509
B.	Bangladesh Export	1100
C.	TOTAL load on Indian grid	239609

2.2 As the quarterly peak load would vary from quarter to quarter for each State/region, following peak loads were assumed for each quarter of the year 2021-22:

State-wise and Quarter-wise Peak Load considered

Region/ States	Peak Load in MW			
	Q1	Q2	Q3	Q4
Northern Region:				
Chandigarh	402	431	364	326
Delhi	6871	6956	6313	5182
Haryana	10813	10979	9991	9314
Himachal Pradesh	1443	1470	1996	1989
Jammu and	2830	2759	3207	3250
Punjab	10910	11216	8978	6748
Rajasthan	12666	12863	14338	15178
Uttar Pradesh	26622	27795	25799	26778
Uttarakhand	1886	1698	2041	2236
NR TOTAL	74443	76167	73027	71000

	Peak Load in MW			
Region/ States	Q1	Q2	Q3	Q4
Western Region:				
Chattisgarh	4583	4362	4561	4975
Gujarat	19229	19281	20001	20334
Madhya Pradesh	12232	12059	14166	14174
Maharashtra	27801	27210	28117	29870
Daman And Diu	427	442	441	456
Dadra and Nagar	906	937	970	978
Goa	831	817	899	894
WR TOTAL	66009	65107	69155	71682

	Peak Load in MW			
Region/ States	Q1	Q2	Q3	Q4
Southern Region:				
Andhra Pradesh	9571	9631	9377	10405
Telangana	11186	11256	10959	12160
Karnataka	11158	10344	11088	12510
Kerala	3721	3636	3808	4142
Tamil Nadu	20017	20285	19423	20376
Puducherry	532	514	502	527
SR TOTAL	56185	55666	55158	60120

	Peak Load in MW			
Region/ States	Q1	Q2	Q3	Q4
Eastern Region:				
Bihar	6258	6103	6159	6035
Odisha	4407	4388	4284	4538
West Bengal	11221	11655	11298	11904
Jharkhand	3850	3867	3857	4264
Sikkim	85	90	118	112
ER TOTAL	25820	26105	25717	26852

	Peak Load in MW			
Region/ States	Q1	Q2	Q3	Q4
North–Eastern Region:				
Arunachal Pradesh	116	112	135	131
Assam	1891	1935	1899	1931
Manipur	320	345	379	377
Meghalaya	405	445	444	455
Mizoram	239	229	265	269
Nagaland	191	183	200	207
Tripura	274	298	360	318
NER TOTAL	3437	3548	3684	3688

	Peak Load in MW			
Region/ States	Q1	Q2	Q3	Q4
Bangladesh	1100	1100	1100	1100
TOTAL	226994	227693	227841	234443

3.0 Assumptions - Generation Addition up to 2021-22:

- 3.1 The Nation Electricity Plan is under preparation u/S 3(4) of the Electricity Act 2003. This Plan would inter-alia give generation capacity addition for period up to 2021-22 based on integrated resource planning requirements for the country. In the absence of the generation addition programme for 13th Plan period, an estimate was made considering the ongoing and likely capacity addition for the conventional generation projects. For the renewable generation projects, as explained above, we do not have data corresponding to the 175 GW RES target, as such the modeling and analysis was carried out with only the known RE generation projects.
- 3.2 Accordingly, following Existing, Under-construction/Planned and Total generation capacity (Conventional) was assumed for these studies:

Region-wise Installed Capacity Summary, in MW

Existing as on Oct'2015					
Region	Coal	Gas	Nuclear	Hydro	Total____Conv.
Northern	41281	4995	3120	19961	69356
Western	68303	11231	1840	9322	90696
Southern	31613	7795	3320	11451	54178
Eastern	30895	90	0	4208	35193
North-east	0	1648	0	2133	3780
Bhutan	0	0	0	1416	1416
Total	172091	25759	8280	48490**	254620

** - The hydro capacity here also includes the grid connected Small Hydro Plants

UC/Planned between Nov'2015 - 22					
Region	Coal	Gas	Nuclear	Hydro	Total____Conv.
Northern	11380	0	1400	6657	19437
Western	33910	0	3140	0	37050
Southern	29290	0	1500	236	31026
Eastern	23030	0	0	3786	26816
North-east	750	0	0	4905	5655
Bhutan	0	0	0	2920	2920
Total	98360	0	6040	18504	122904

Total by 2021-22					
Region	Coal	Gas	Nuclear	Hydro	Total____Conv.
Northern	52661	4995	4520	26618	88793
Western	102213	11231	4980	9322	127746
Southern	60903	7795	4820	11687	85204
Eastern	53925	90	0	7994	62009
North-east	750	1648	0	7038	9435
Bhutan	0	0	0	4336	4336
Total	270451	25759	14320	66994	377524

3.3 Project-wise generation capacity addition in each State/region assumed for the studies is given below:

Generation Addition List (Nov.' 2015 – March 2022)

	Coal	Hydro	Nuclear	Total, in MW
NORTHERN REGION:	11380	6657	1400	19437
HARYANA			1400	1400
GVAHP-NPCIL 400.00			1400	1400
HIMACHAL		2476		2476
BAJOLIHOLI 400.00		180		180
CHANGO-YANTG400.00		270		270
CHANJU-1 220.00		36		36
KASANG 220.00		195		195
PARBT-II 400.00		800		800
SAINJ 400.00		100		100
SAWRA-KUDDU 400.00		111		111
SHANGTONG 400.00		450		450
SORANG 400.00		100		100
TANGU-ROMAI1400.00		44		44
TIDONG 220.00		100		100
UHL-3 132.00		90		90
J&K		1375		1375
BAGLIHAR4 400.00		150		150
KISHANNGA-GE220.00		330		330
RATLE 400.00		895		895
PUNJAB	1200	280		1480
GOINDWAL 220.00	540			540
SHAPUR-KHAND132.00		280		280
TALWANDISABO400.00	660			660
RAJASTHAN	2640			2640
CHABRA-4 400.00	1320			1320
SURATG-4 400.00	1320			1320
UP	7540			7540
ANPARA-D 765.00	500			500
BARA 400.00	1980			1980
LALITPUR 765.00	1980			1980
MEJA 400.00	1260			1260

	Coal	Hydro	Nuclear	Total, in MW
TANDA2 400.00	1320			1320
UNCHAHAAR 400.00	500			500
UTTRAKHAND		2526		2526
CHIBRO-H 220.00		120		120
KOTLIBHEL 220.00		195		195
LATATAPOVAN 220.00		171		171
PHATABYUNG 220.00		76		76
TEHRI4 400.00		1000		1000
TPVNVISHNUGD400.00		520		520
VISHNU4 400.00		444		444

Generation Addition List (Nov.' 2015 – March 2022)

	Coal	Hydro	Nuclear	Total, in MW
WESTERN REGION:	33910		3140	37050
CHATTISGARH	14140			14140
KSK MAHNADI400.00	2400			2400
ATHENA 400.00	1200			1200
BALCO 400.00	300			300
DB POWER 400.00	1200			1200
GMR 400.00	685			685
KPCL 400.00	1320			1320
LANCO-AMARKA 400	1320			1320
LARA STPP 400.00	1600			1600
MARWA 400.00	500			500
RKM 400.00	1080			1080
SKS 400.00	1200			1200
VANDANA 400.00	135			135
VISA POWER 400.00	1200			1200
GUJARAT	800		1400	2200
KAKRAPARAPP 400.00			1400	1400
WANAK4 400.00	800			800
MAHARASTRA	8490		1740	10230
AMRAVATI IBL400.00	1350			1350
CHANDRPR-II 400.00	500			500
JAITAPUR NPP400.00			1740	1740
KORADI-II 400.00	1320			1320

	Coal	Hydro	Nuclear	Total, in MW
MAUDA 400.00	1320			1320
PARLI2 220.00	250			250
SINNAR TPP 400.00	2430			2430
SOLAPUR STPP400.00	1320			1320
MP	10480			10480
ANUPPUR 400.00	600			600
BARETHI 765.00	2640			2640
DWARKESH 400.00	1320			1320
GADARWARA ST 765	1600			1600
JHABUA POWER 400	1200			1200
KHARGONE 400.00	1320			1320
MAHAN 400.00	600			600
MALWA 400.00	1200			1200

Generation Addition List (Nov.' 2015 - March 2022)

	Coal	Hydro	Nuclear	Total, in MW
SOUTHERN REGION:	29290	236	1500	31026
ANDHRA	10450			10450
EAST-OA 400.00	1320			1320
HINDJ-OA 400.00	1050			1050
MENAK-OA 400.00	700			700
MUDN400 400.00	600			600
NCCPPL 400.00	1320			1320
PUDIMADAKA4 400	4000			4000
TPCIL4 400.00	660			660
VIJTP-IV 400.00	800			800
KARNATKA	5160			5160
BELLARY 400.00	700			700
KUDGI-NT 400.00	2400			2400
TORNG4 400.00	1260			1260
YERAMRS 400.00	800			800
TAMILNAD	7600		1500	9100
CEPL 400.00	600			600
ETPSEXP4 400.00	660			660
ETPSREP7 765.00	1320			1320
IND-BARATH 400.00	600			600

KALP-FBR2	230.00			500	500
KUDAN4	400.00			1000	1000
NCTPS765KV	765.00	800			800
NEY(REP)4	400.00	1000			1000
NEY_IIEX	400.00	500			500
UDNGDI4	400.00	1320			1320
UDNGDI7	765.00	800			800
TELANGANA		6080	236		6316
JURLPRKR	220.00		236		236
KAKTIYA	400.00	1400			1400
KOTH-VII	400.00	800			800
MANUGURU	400.00	1080			1080
RSTP	400.00	1600			1600
SINGARENI	400.00	1200			1200

Generation Addition List (Nov.' 2015 - March 2022)

	Coal	Hydro	Nuclear	Total, in MW
EASTERN REGION:	23030	3786		26816
BIHAR	5460			5460
BARAUNI 220.00	500			500
BARH-I 400.00	1980			1980
NABINAGAR-I 400.00	1000			1000
NABINAGAR-II 400.00	1980			1980
JHARKAND	3180			3180
ESSAR 400.00	1200			1200
NORTHKARNPRA 400.00	1980			1980
ORISSA	9050			9050
DARLIPALLI 765.00	1600			1600
IBTPS2 220.00	420			420
IND-BHARATH 400.00	700			700
LANCOBDN 400.00	1320			1320
MONNET 400.00	1050			1050
NSL-ODISHA 400.00	1320			1320
OPGC 400.00	1320			1320
TALCHER-III 400.00	1320			1320
SIKKIM		2056		2056
BHASMEY 132.00		51		51

DIKCHU 132.00		96		96
JORETHAN 220.00		96		96
PANAN HIMGRI 400.00		300		300
RANGIT4 220.00		120		120
RONGNCHU 220.00		96		96
TASHIDIN 220.00		97		97
TEESTA3 400.00		1200		1200
W.BENGAL	5340	1730		7070
IPCL-HALDIA 220.00		450		450
KATWA-TPS 400.00	1320			1320
RAGHUNATH 400.00	2520			2520
RAMMAM-III 132.00		120		120
SAGARDIGHI 4400.00	1500			1500
TSTLD-4 220.00		160		160
TURGA_PSP 400.00		1000		1000

Generation Addition List (Nov.' 2015 - March 2022)

	Coal	Hydro	Nuclear	Total, in MW
NORTH-EASTERN REGION:	750	4905		5655
AR PRADESH		4719		4719
ATHENA DEMWE 400.00		740		740
GMR LONDA 400.00		225		225
KAMENG 400.00		600		600
L-SUBANSRI 400.00		2000		2000
NYAMJUNGCHU 400.00		780		780
PARE 132.00		110		110
PATEL HYDRO 220.00		144		144
SEW NAFRA 220.00		120		120
ASSAM	750			750
BTPS4 400.00	750			750
NAGALAND		186		186
DIKHU HYDEL 220.00		186		186
BHUTAN		2920		2920
MANGDECHU 400.00		720		720
PUNATSANC1&2 400.00		2200		2200

4.0 Assessment of Transmission Capacity Requirement:

4.1 Surplus/deficit for each region was estimated for each quarter of 2021-22 based on the above assumptions and considering the peak availability factors.

Load Generation Balance Analysis (all fig. in MW)

	Q1		
Region:	Availability	Demand	Sur(+)/Def(-)
NR	52174	74443	-22269
WR	78056	66009	12046
SR	51313	56185	-4872
ER	38545	25820	12725
NER	4658	3437	1221
Bhutan+ Bangladesh	2168	1100	1068
Net Balance	226913	226994	-81

	Q2		
Region:	Availability	Demand	Sur(+)/Def(-)
NR	54323	76167	-21843
WR	75877	65107	10770
SR	50934	55666	-4732
ER	37857	26105	11752
NER	5687	3548	2139
Bhutan+ Bangladesh	2818	1100	1718
Net Balance	227496	227693	-196

	Q3		
Region:	Availability	Demand	Sur(+)/Def(-)
NR	52332	73027	-20695
WR	78362	69155	9207
SR	51496	55158	-3662
ER	38707	25717	12990
NER	4660	3684	976
Bhutan+ Bangladesh	2168	1100	1068
Net Balance	227724	227841	-116

Region:	Q4		
	Availability	Demand	Sur(+)/Def(-)
NR	52247	71000	-18753
WR	82541	71682	10859
SR	53372	60120	-6748
ER	40604	26852	13751
NER	3994	3688	306
Bhutan+ Bangladesh	1734	1100	634
Net Balance	234492	234443	49

- 4.2 The above analysis indicates that the Northern and Southern regions would be required to import of power and the other three regions would be in position to export power in 2021-22. This situation is similar to as it is today, except that the quantum of deficit/surplus would change in 2021-22.
- 4.3 To cater to above import/export requirement, a number of inter-regional transmission corridors have already been planned. These high capacity transmission corridors are in various stages of implementation and most of these are likely to be commissioned by 2021. A summary of these corridor capacities is given below. The detailed list is given at [Annex-1](#).

INTER-REGIONAL TRANS. LINKS & CAPACITY (MW)			As on 29.10.2015	
Inter-Regional corridors	Present (as on 29-10-2015)	Expected by 2017	Additional planned	Expected by 2021-22
East - North	15830	17930	1600	19530
West - North	12920	16920	3000	19920
North East - North	1500	6000		6000
East - West	10690	12790		12790
East - North East	2860	2860		2860
East - South	3630	7830		7830
West - South	7920	7920	14400	22320
Total	55,350	72,250	19,000	91,250

5.0 System studies for Additional Transmission Planning:

5.1 The above scenarios were modeled for load flow analysis to determine the possible constraints in transmitting the required power from surplus regions/states to the deficit regions/States. As a first step, the base case analysis was carried out for each Quarter of 2021-22 and then contingency/outage analysis was also carried out taking 'n-2' for the inter-regional links. Further, sensitivity analysis was also performed for crucial corridors along with the contingency studies for reliability.

5.2 Analysis for Base case quarterly load-generation scenarios:

During Q-1, it is observed that the NR import requirement of about 22300 MW gets met from ER (8900 MW) and WR (13400 MW). The SR import requirement of about 4700 MW is met by import from ER (3100 MW) and WR (1600 MW). The ER which would be surplus by 14500 MW (also including inflow from NER/Bhutan and net of Bangladesh) would send 8900 MW of power towards NR, 2500 MW towards WR and 3100 MW towards SR. The WR which would have peaking time surplus of 15000 MW (including inflow from ER) would send 13400 MW towards NR and 1600 MW towards SR. From the study results, it is seen that the transmission corridor that are existing, under-construction/planned are able to transfer these power flows among various regions.

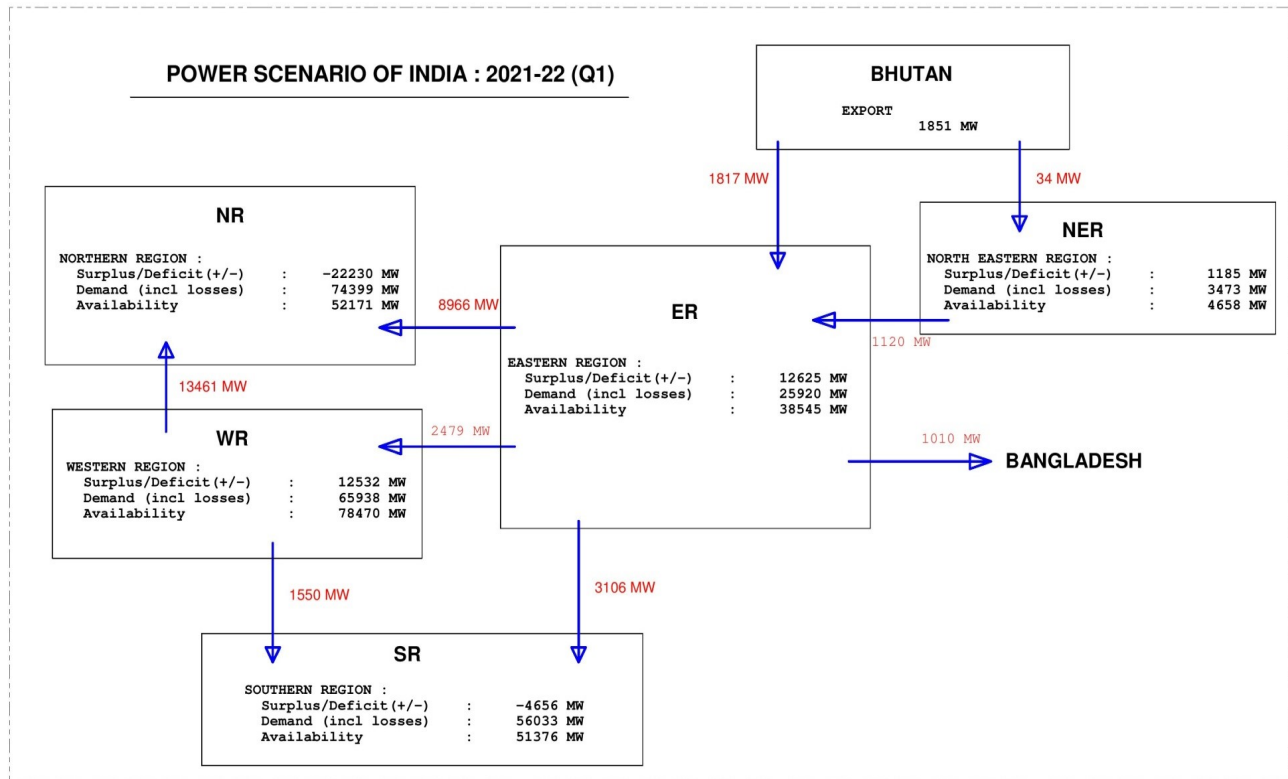
During Q-2, it is observed that the NR import requirement of about 21200 MW gets met from ER (8900 MW) and WR (12300 MW). The SR import requirement of 4600 MW is met by import from ER (3000 MW) and WR (1600 MW). The ER which would be surplus by 14700 MW (also including inflow from NER/Bhutan and net of Bangladesh) would send 8900 MW of power towards NR, 2800 MW towards WR and 3000 MW towards SR. The WR which would have peaking time surplus of 13900 MW (including inflow from ER) would send 12300 MW towards NR and 1600 MW towards SR. From the study results, it is seen that the transmission corridor that are existing, under-construction and planned are able to transfer these power flows among various regions.

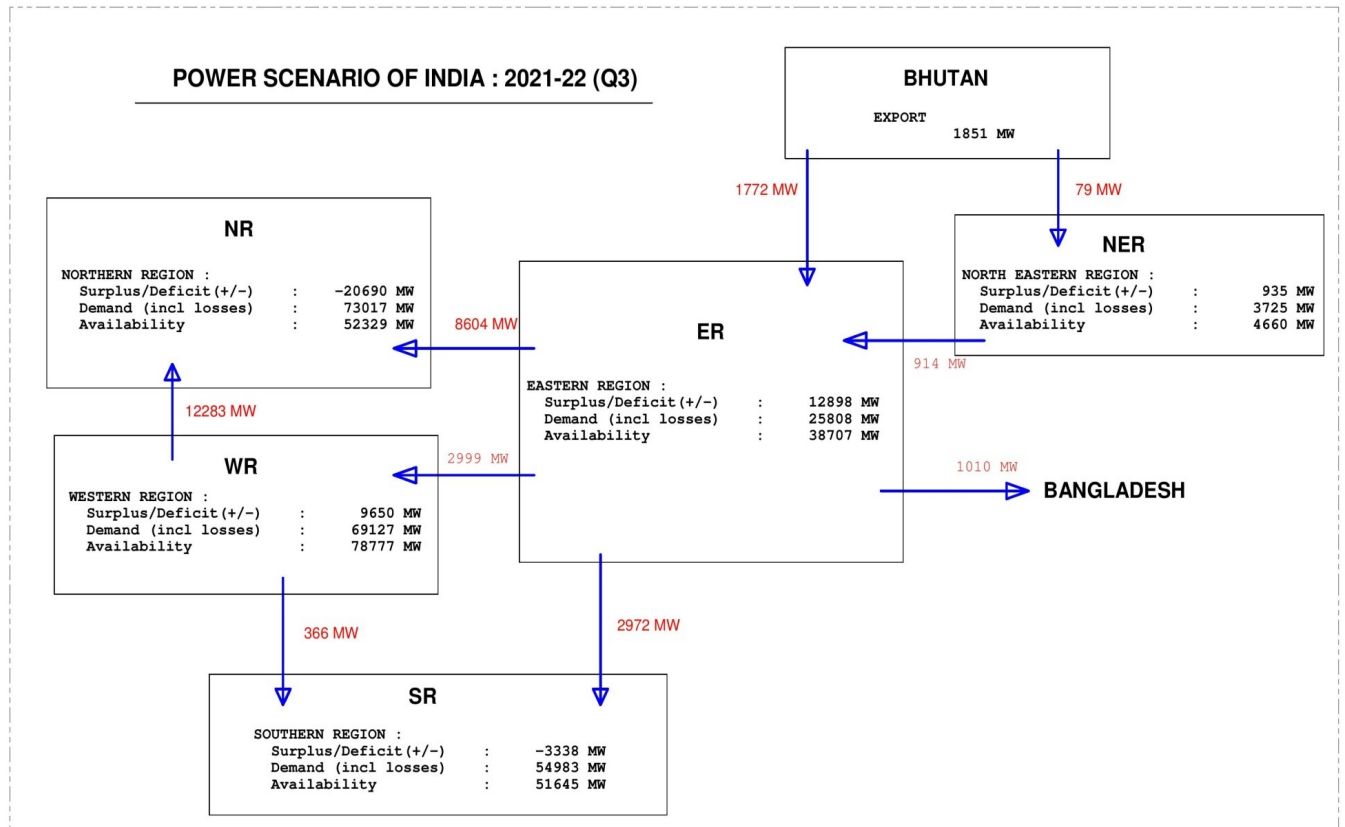
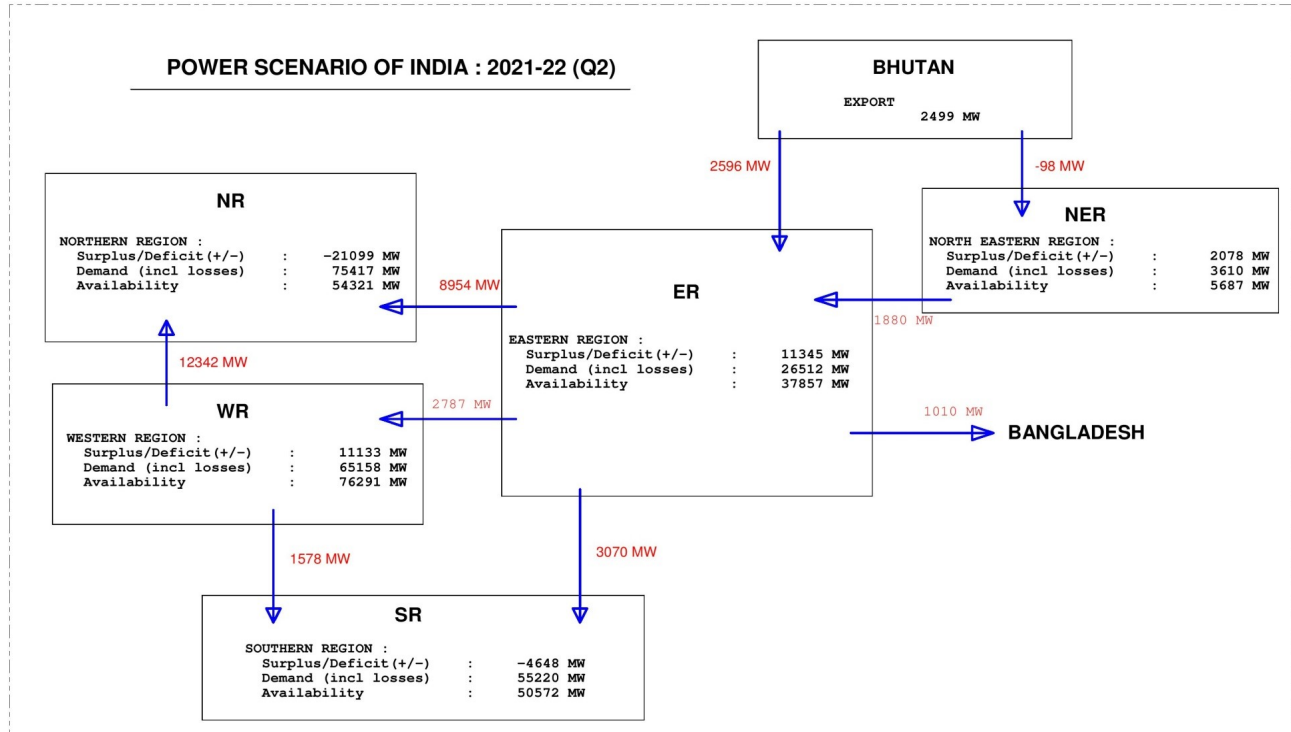
During Q-3, it is observed that the NR import requirement of about 20900 MW gets met from ER (8600 MW) and WR (12300 MW). The SR import requirement of 3400 MW is met by import from ER (3000 MW) and WR (400 MW). The ER which would be surplus by 14600 MW (also including inflow from NER/Bhutan and net of Bangladesh) would send 8600 MW of power towards NR, 3000 MW towards WR and 3000 MW towards SR. The WR which would have peaking time surplus of 12700 MW (including inflow from ER) would send 12300 MW towards NR and 400 MW towards SR. From the study results, it is seen that the transmission corridor that are existing, under-

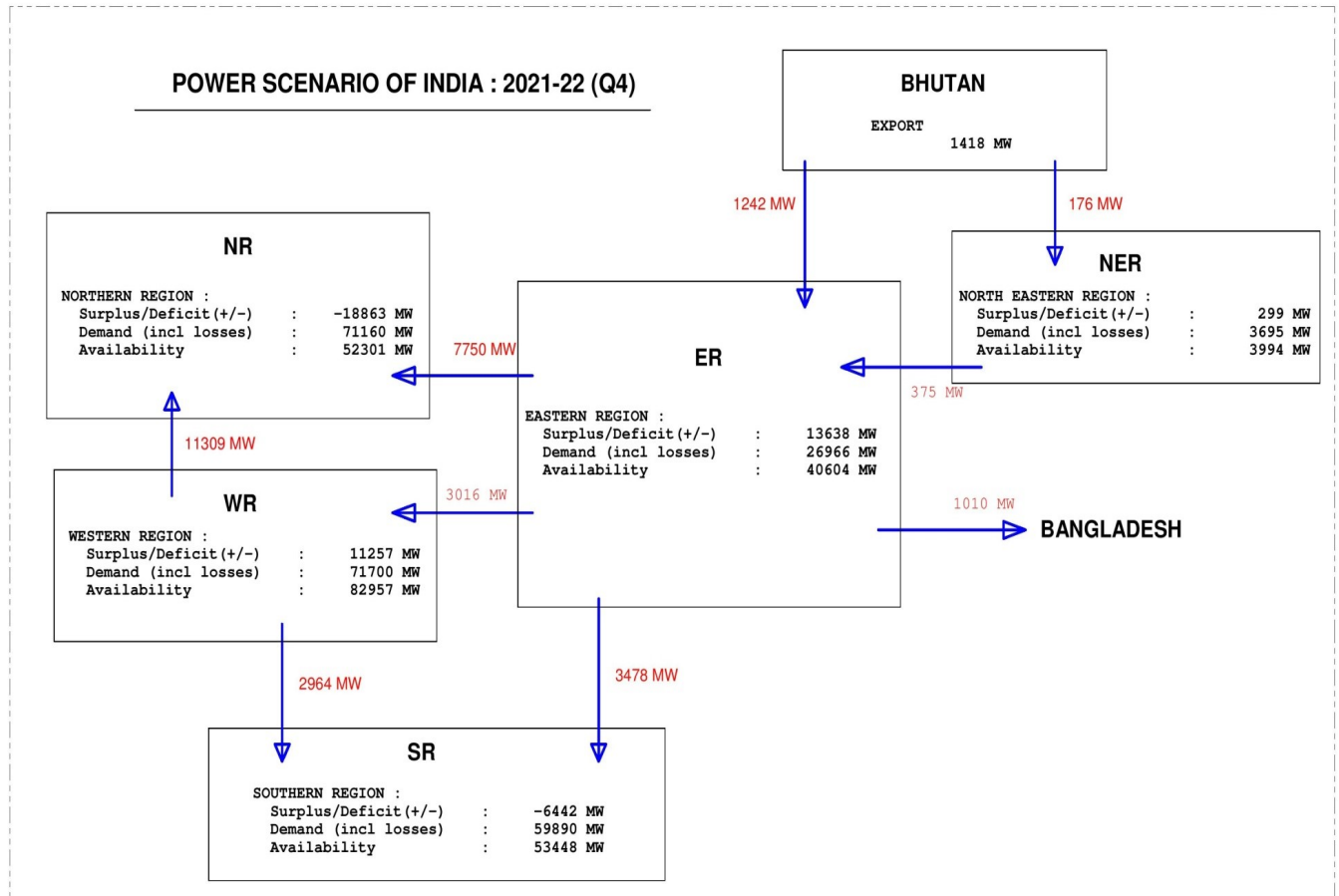
construction and planned are able to transfer these power flows among various regions.

During Q-4, it is observed that the NR import requirement of about 19000 MW gets met from ER (7700 MW) and WR (11300 MW). The SR import requirement of 6500 MW is met by import from ER (3500 MW) and WR (3000 MW). The ER which would be surplus by 14200 MW (also including inflow from NER/Bhutan and net of Bangladesh) would send 7700 MW of power towards NR, 3000 MW towards WR and 3500 MW towards SR. The WR which would have peaking time surplus of 14300 MW (including inflow from ER) would send 11300 MW towards NR and 3000 MW towards SR. From the study results, it is seen that the transmission corridor that are existing, under-construction and planned are able to transfer these power flows among various regions.

The details of inter-regional power flow for each of these four quarters are depicted in following figures. The detailed load flows within each region and among the states in each region and tie-line flows are given at **Annex – 2** (sub Annex : BQ-1, BQ-2, BQ-3 and BQ-4 for each of the four quarters, respectively).







5.3 Analysis for Outages in the Base case scenarios:

From the base case, it is observed that the already planned transmission corridors towards SR viz-a-viz the SR import requirement assessed for year 2021-22 gives a very comfortable situation, and nothing much can be derived by carrying out contingency analysis for the SR links and therefore, the same is not reported here. For the NR import requirement, it is observed that the WR - NR link would need more attention at this stage. So, following 'n-2' outages/contingency analysis was carried out for second quarter(Q-2), when NR requirement is highest.

Sl. No.	Name of transmission link	Contingency/ reliability criteria
1.	Gaya - Varanasi	765kV D/C outage
2.	Agra - Gwalior	765kV 2xS/C outage

Sl. No.	Name of transmission link	Contingency/ reliability criteria
3.	Jabalpur - Orai	765kV D/C outage
4.	Champa - Kurukshetra	HVDC one pole out
5.	Alipurduwar - Agra	HVDC one pole out

From the study results, it is seen that the power flow on the transmission corridors are within limits. The results of study i.e. load flows and tie-line flows are given under **Annex- 3**.

5.4 Analysis for Sensitivity Cases:

Sensitivity cases were studied for analysing impact of change in base-load-generation assumptions and operational variations. As observed above, the sensitivity of import towards NR and SR is important, therefore following Sensitivity Cases have been analysed:

Sl. No.	Qtr. under study	Region under study	Sensitivity
1.	Q-1	Northern Region	5% less generation in NR
2.	Q-4	Southern Region	5% less generation in NR
3.	Q-2	Northern	Situation of monsoon failure in NR
4.	Q-4	Southern Region	Situation of monsoon failure in SR

The results of study i.e. load flows and tie-line flows are given in **Annex- 4**. From the study results, it is seen that the power flow on the transmission corridors are within limits.

5.5 Analysis for Outages in the Sensitivity Cases:

From the Sensitivity cases above, it is observed that the “Q-2 – Monsoon failure in

NR” case is more crucial. As such, further outages were carried out under this sensitivity case also. For this, same contingency/outage cases were studied as given under Para 5.3 (same as those in Base Case). From the study results, it is seen that the power flow on the transmission corridors are within limits. The results of study i.e. load flows and tie-line flows are given in **Annex- 5**.

6.0 Conclusion:

1. The above analysis and studies indicate that the major high capacity transmission corridors that have already been planned and which are under implementation would be sufficient to meet import/export of power among various regions in the year 2021-22. This is based on the assumptions of load growth and generation capacity addition as stated in this report.
2. Initially, the High Capacity Corridors from Chhatisgarh and Orrisa were planned with reduced reliability due to uncertainties in generation addition by IPPs. The generations which were associated with these high capacity corridors are coming up in phased manner and till now no major constraint is being faced. However, with the coming up of more generations, additional transmission strengthening may be required to meet the reliability criteria. This would be taken up with firm status of new generation projects.
3. The State Transmission Utilities (STU) should take up planning and implementation of their respective intra-state systems and its interconnection with ISTS matching with the schedule of implementation of various ISTS schemes.
4. Further high capacity transmission system would be needed for new UMPP or any high capacity generation projects. These would be planned as soon as their schedule becomes visible.
5. CEA is preparing National Electricity Plan u/S 3 of the Electricity Act 2003, and also working on 19th Electric Power Survey report. The National Electricity Plan would give Generation capacity addition requirement for the period up to 2022 based on the 19th EPS load projects and Transmission system requirement in country to serve both the generation and the load demand. This is being prepared considering the ongoing generation projects, Power for All programme of the Government, integrated resource planning analysis, deliberations in the Standing Committees on Power System Planning and detailed analysis for transmission planning.

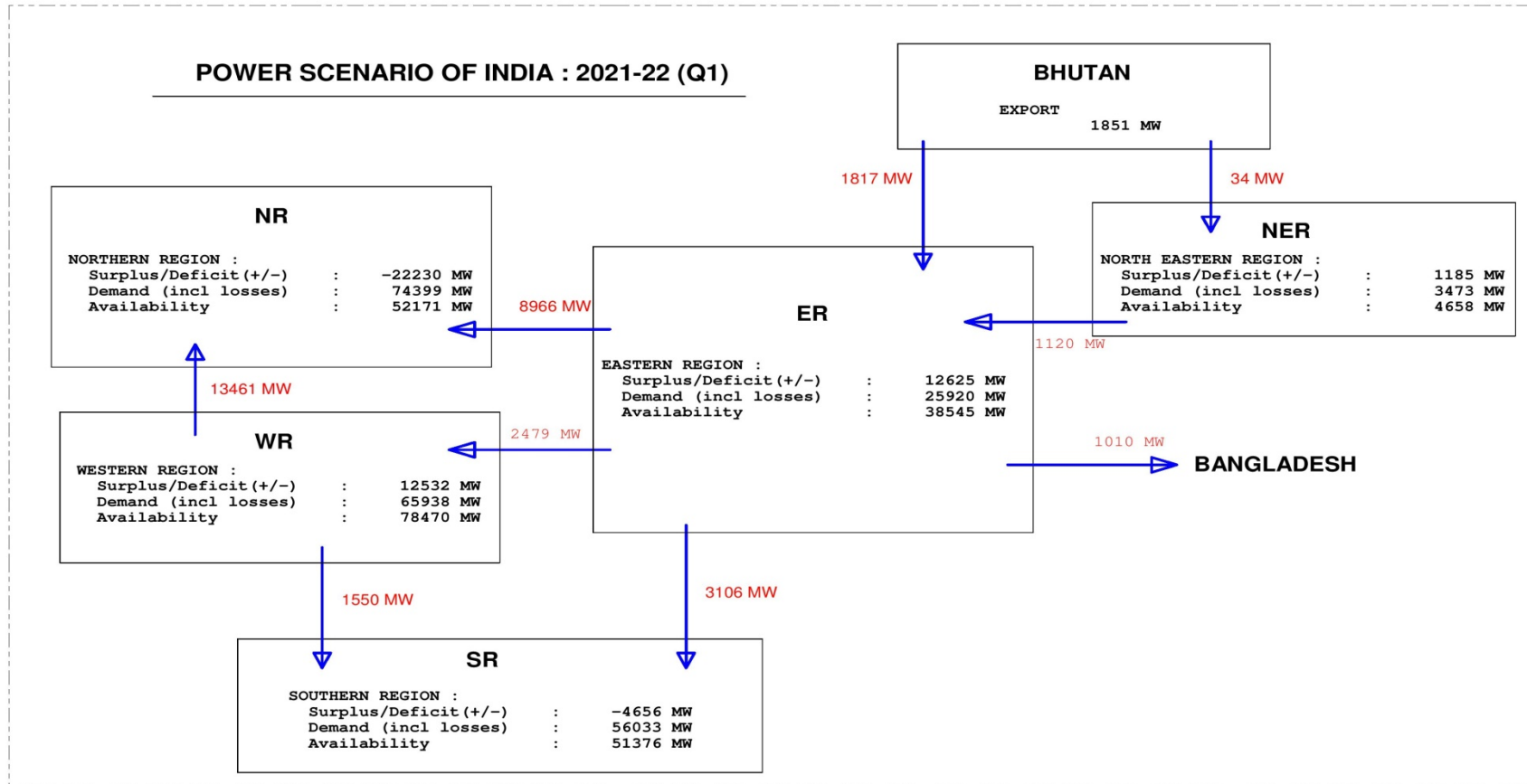
Annex-I**Inter-Regional Lines**

INTER-REGIONAL TRANS. LINKS & CAPACITY (MW)			
As on 29.10.2015			
	Present	By 2017	Between 2017-2022
EAST-NORTH			
Dehri-Sahupuri 220 kV S/c	130	130	
Sasaram HVDC back-to-back	500	500	
Muzaffarpur-Gorakhpur 400 kV D/c (with Series Cap+TCSC)	2000	2000	
Patna – Balia 400kV D/c (Quad)	1600	1600	
Biharshariff – Balia 400kV D/c(Quad)	1600	1600	
Barh – Balia 400kV D/c (Quad)	1600	1600	
Gaya - Balia 765kV S/c	2100	2100	
Sasaram bypassing(additional capacity)	500	500	
Sasaram - Fatehpur 765kV2x S/c	4200	4200	
Barh-II-Gorakhpur 400kV D/c (Quad) line	1600	1600	
Gaya-Varanasi 765 kV S/c line		2100	
Biharsharif-Varanasi 400kV D/c line (Quad)		0	1600
Sub-total	15830	17930	1600
EAST-WEST			
Budhipadar-Korba 220 kV 3 ckts.	390	390	
Rourkela-Raipur 400 kV D/c with series comp.+TCSC	1400	1400	
Ranchi –Sipat 400 kV D/c with series comp.	1200	1200	
Rourkela-Raipur 400 kV D/c (2 nd) with series comp.	1400	1400	
Ranchi - Dharamjayagarh - WR Pooling Station 765kV S/c line	2100	2100	

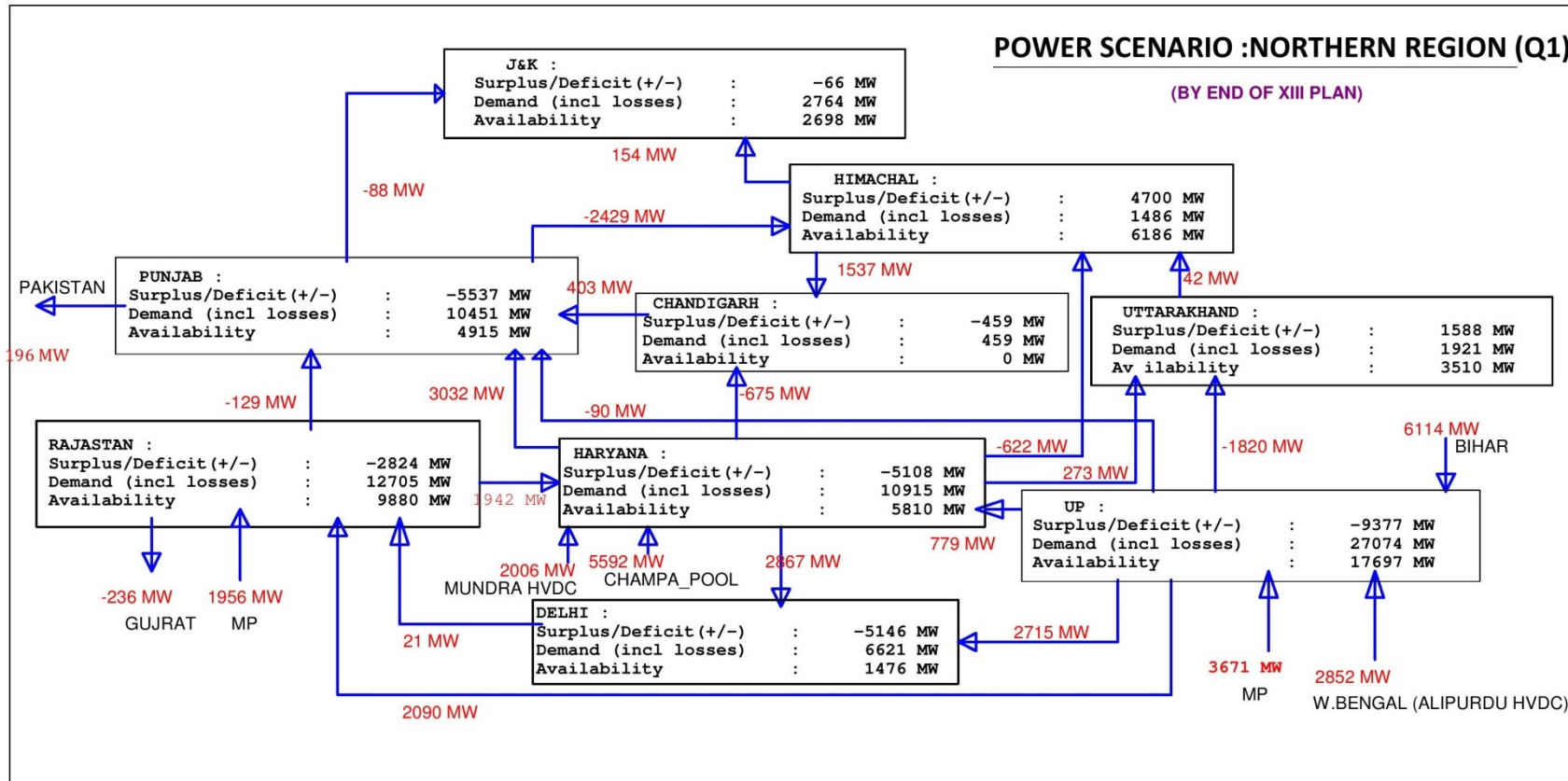
INTER-REGIONAL TRANS. LINKS & CAPACITY (MW)			
As on 29.10.2015			
	Present	By 2017	Between 2017-2022
Ranchi - Dharamjaygarh 765kV 2nd S/c		2100	
Jharsuguda-Dharamjaygarh 765kV D/c line	4200	4200	
Sub-total	10690	12790	
WEST- NORTH			
Auriya-Malanpur 220 KV D/c	260	260	
Kota - Ujjain 220 KV D/c	260	260	
Vindhyachal HVDC back-to-back	500	500	
Gwalier-Agra 765 kV 2 x S/c	4200	4200	
Zerda-Kankroli 400kV D/c	1000	1000	
Champa Pool- Kurukshetra HVDC Bipole		3000	
Gwalior-Jaipur 765kV 2xS/c lines	4200	4200	
RAPP-Sujalpur 400kV D/c		1000	
Adani(Mundra) - Mahendranagar HVDC bipole	2500	2500	
Upgradation of Champa Pool- Kurukshetra HVDC Bipole			3000
Sub-total	12920	16920	3000
EAST- SOUTH			
Balimela-Upper Sileru 220kV S/c	130	130	
Gazuwaka HVDC back-to-back	1000	1000	
Talcher-Kolar HVDC bipole	2000	2000	
Upgradation of Talcher-Kolar HVDC Bipole	500	500	
Angul - Srikakulum		4200	
Sub-total	3630	7830	
WEST- SOUTH			
Chandrapur HVDC back-to-back	1000	1000	
Kolhapur-Belgaum 220kV D/c	260	260	
Ponda – Nagajhari 220kV D/c	260	260	

INTER-REGIONAL TRANS. LINKS & CAPACITY (MW)			
As on 29.10.2015			
	Present	By 2017	Between 2017-2022
Raichur - Sholapur 765kV S/c line (PG)	2100	2100	
Raichur - Sholapur 765kV S/c line (Pvt. Sector)	2100	2100	
Narendra - Kolhapur 765kV D/c (ch at 400kV)	2200	2200	
Wardha - Hyderabad 765kV D/c line			4200
Warora Pool - Warangal (New) 765kV D/c line			4200
Raigarh-Pugulur HVDC line			6000
Sub-total	7920	7920	14400
EAST- NORTH EAST			
Birpara-Salakati 220kV D/c	260	260	
Malda - Bongaigaon 400 kV D/c	1000	1000	
Siliguri - Bongaigaon 400 kV D/c (Quad) line	1600	1600	
Sub-total	2860	2860	
NORTH EAST-NORTH			
Biswanath Chariali - Agra +/- 800 kV, 3000 MW HVDC Bi-pole\$	1500	3000	
LILO of Biswanath Chariali - Agra +/- 800 kV, 3000 MW HVDC Bi-pole at new pooling station in Alipurduar and addition of second 3000 MW module		3000	
Sub-total	1500	6000	
TOTAL	55,350	72,250	19,000
TOTAL (CUMULATIVE)	55,350	72,250	91,250

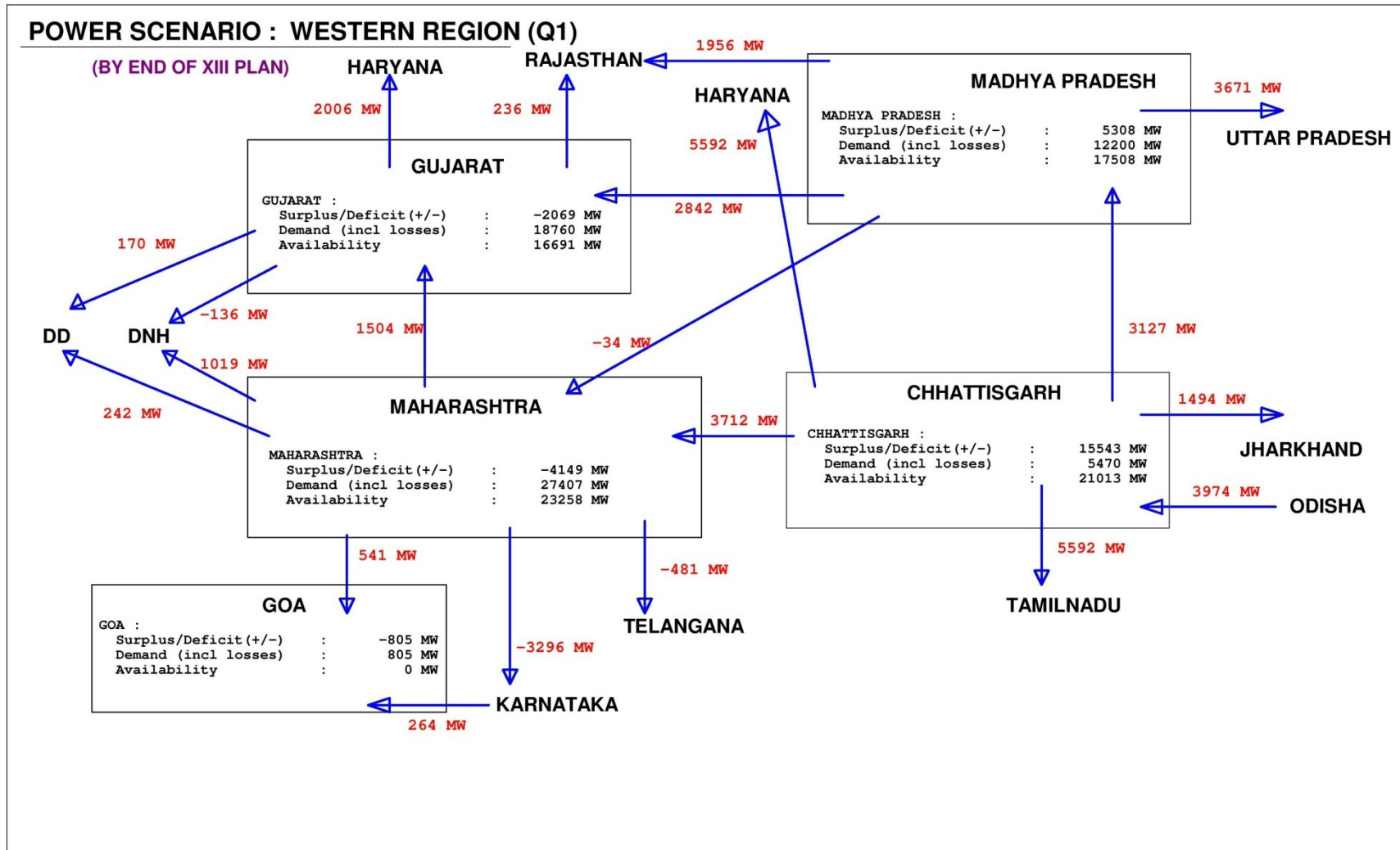
Annex 2 BQ1 All India



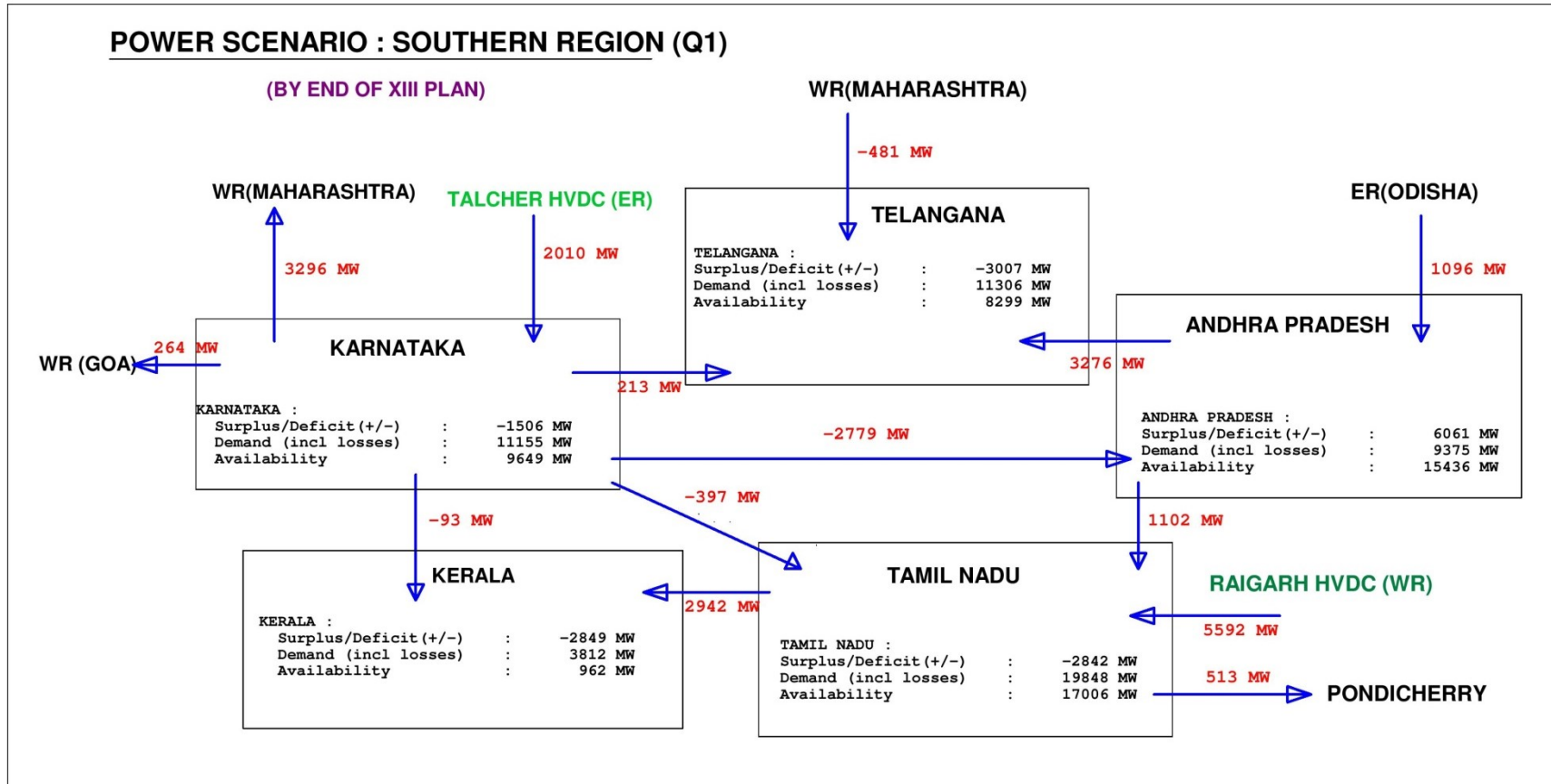
Annex 2 BQ1-NR



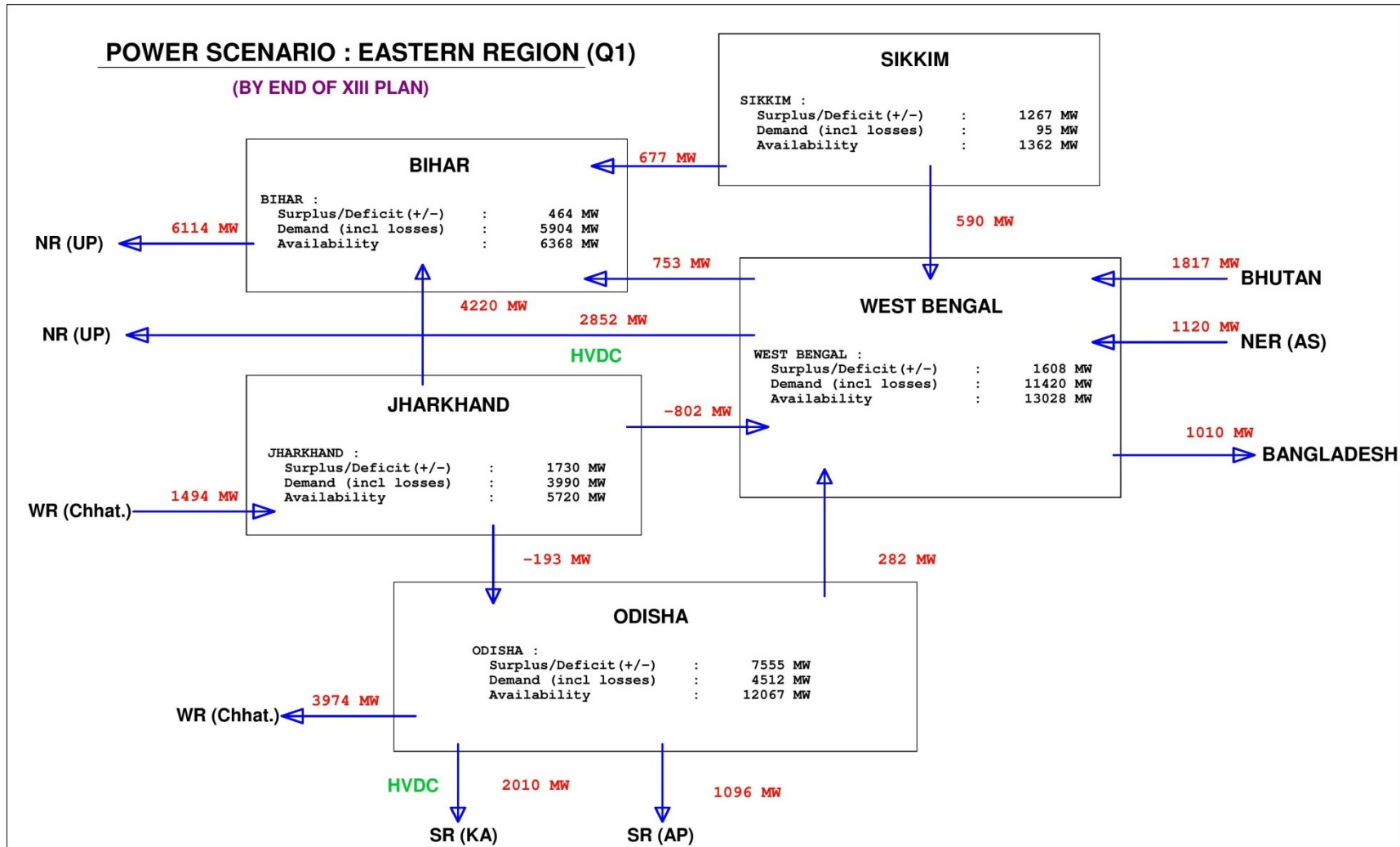
Annex 2 BQ1-WR



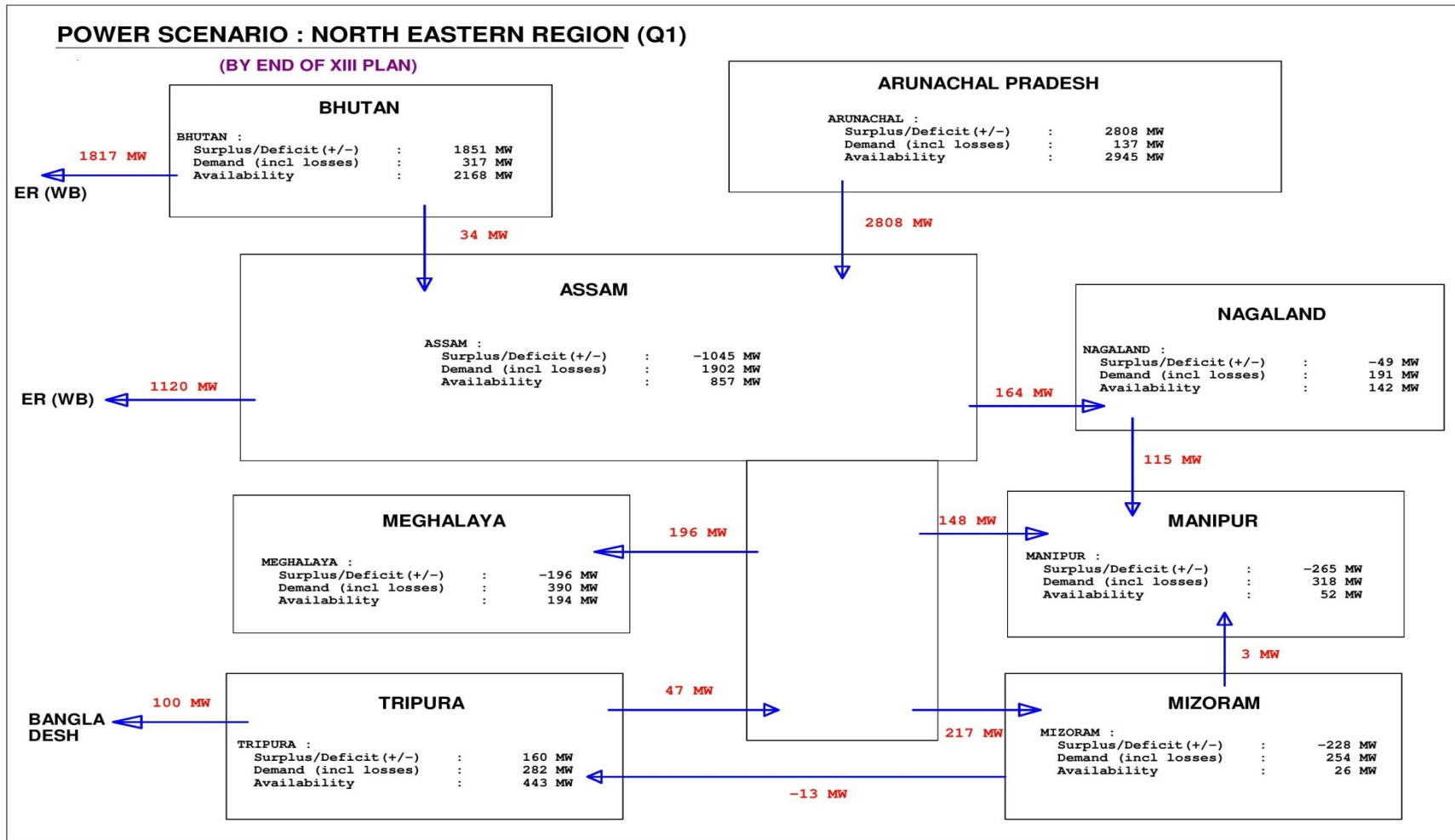
Annex 2 BQ1-SR



Annex 2 BQ1-ER



Annex 2 BQ1-NER



Annex 2 BQ1-Tie Line Flow

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AREA TIE LINE FLOW FLOW
INTERCHANGE

FROM AREA 3 WEST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR	
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4	TWO TRM DC "15"
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4	TWO TRM DC "16"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "3"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "4"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "75"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "76"
354019	ZERDA	400.00*	184403	BHINMAL	400.00	1	-206.7	-305.1	
354019	ZERDA	400.00*	184404	KANKROLI	400.00	1	-203.1	-93.9	
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	1	241.2	-145.8	
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	2	241.2	-145.8	
362040	MALNP2	220.00*	182234	AURYA2	220.00	1	-4.5	27.8	
362041	MEHGAON2	220.00*	182234	AURYA2	220.00	1	-58.2	30.1	
362045	BADO2	220.00*	162221	SAKATPUR	220.00	1	-56.9	16.3	
362045	BADO2	220.00*	162232	MODAK	220.00	1	-95.2	44.9	
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	1	10.5	32.2	
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	2	10.5	32.2	
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	1	-320.0	243.4	
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	2	-320.0	243.4	
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	1	-0.1	-72.1	
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	2	-0.1	-72.1	
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	1	524.1	115.6	
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	2	560.2	128.6	
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	1	1113.1	-37.2	
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	2	1121.8	-35.0	
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	3	904.2	110.8	
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	4	904.2	110.8	
378057	BARETHI	765.00	188258	ORAI	765.00*	1	842.2	-261.8	
378057	BARETHI	765.00	188258	ORAI	765.00*	2	842.2	-261.8	
TOTAL FROM AREA 3 TO AREA 1							13898.6	-1883.7	

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR	
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	1	63.8	-41.0	
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	2	63.8	-41.0	
312008	RAIGR2	220.00	422015	BUDHIPADAR	220.00*	1	51.5	-12.2	
314006	RAIG4	400.00*	424015	JHARSUGUDA-A	400.00	3	-303.6	90.7	

314006 RAIG4	400.00*	424015 JHARSUGUDA-A	400.00	4	-303.6	90.7
314006 RAIG4	400.00*	424091 JHARSUGUDA-B	400.00	1	-129.4	28.8
314006 RAIG4	400.00*	424091 JHARSUGUDA-B	400.00	2	-129.4	28.8
314008 SIPAT4	400.00*	474046 RANCHI	400.00	1	69.8	-15.7
314008 SIPAT4	400.00*	474046 RANCHI	400.00	2	69.8	-15.7
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A	765.00	1	-419.2	-308.3
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A	765.00	2	-419.2	-308.3
318031 TAMNAR	765.00	428015 JHARSUGUDA-A	765.00*	1	-785.7	-23.3
318031 TAMNAR	765.00	428015 JHARSUGUDA-A	765.00*	2	-785.7	-23.3
318032 DHARAMJAIGAR	765.00*	428091 JHARSUGUDA-B	765.00	1	-519.1	4.1
318032 DHARAMJAIGAR	765.00*	428091 JHARSUGUDA-B	765.00	2	-519.1	4.1
318032 DHARAMJAIGAR	765.00	478046 RANCHI-NEW	765.00*	1	538.5	34.4
318032 DHARAMJAIGAR	765.00	478046 RANCHI-NEW	765.00*	2	538.5	34.4
TOTAL FROM AREA 3 TO AREA 4					-2918.5	-473.0

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "11"	
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "12"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "33"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "34"	
342002 PONDA2	220.00	522031 AMBD	220.00*	1	-263.8	-28.2		
372013 TALANDGE	220.00*	522026 CHIKKODI	220.00	1	-173.5	-9.3		
372041 KOLHA2	220.00*	522026 CHIKKODI	220.00	1	-185.7	-6.2		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	1	-428.8	-94.3		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	2	-428.8	-94.3		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	1	-349.4	-178.9		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	2	-349.4	-178.9		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	1	-1036.3	-288.8		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	2	-1036.3	-288.8		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	1	-385.7	-393.7		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	2	-385.7	-393.7		
TOTAL FROM AREA 3 TO AREA 5					1562.3	-5066.7		

TOTAL FROM AREA 3 WEST 12542.4 -7423.5

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:01
 AREA TIE LINE FLOW FLOW
 INTERCHANGE

FROM AREA 4 EAST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "39"	
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "40"	
412026 SASARAM-PG	220.00	172278 SAHUPU_N	220.00*	1	224.6	-86.4		

414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	1	186.9	-78.4
414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	2	186.9	-78.4
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	1	145.9	-19.7	
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	2	145.9	-19.7	
414006 PATNA	400.00*	184475 BAL74-PG	400.00	1	234.8	-28.2
414006 PATNA	400.00*	184475 BAL74-PG	400.00	2	234.8	-28.2
414006 PATNA	400.00*	184475 BAL74-PG	400.00	3	264.2	-17.3
414006 PATNA	400.00*	184475 BAL74-PG	400.00	4	264.2	-17.3
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	1	285.5	-117.1
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	2	285.5	-117.1
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	1	213.1	-82.5	
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	3	213.1	-82.5	
414491 SASARAM-ER	400.00*	174479 VARANASI	400.00	1	-17.2	-98.8
414492 SASARAM-NR	400.00*	184474 ALLAHABA	400.00	1	249.3	-2.3
418008 GAYA	765.00*	187000 VARNASI8	765.00	1	649.4	-208.3
418008 GAYA	765.00*	187000 VARNASI8	765.00	2	760.9	-161.8
418008 GAYA	765.00	187701 BALI7-PG	765.00*	2	946.6	-112.1
418892 SASARAM	765.00	187705 FATEH-PG	765.00*	1	191.0	-12.2
TOTAL FROM AREA 4 TO AREA 1					8517.1	-3224.7

TO AREA 2 NRTHEAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "79"
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "80"
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	1	-7.2	-31.7
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	2	-7.2	-31.7
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	1	33.1	-76.4
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	2	33.1	-76.4
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	3	-88.7	-135.6
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	4	-88.7	-135.6
TOTAL FROM AREA 4 TO AREA 2							-1119.5	-68.3

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	1	-63.8	41.0
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	2	-63.8	41.0
422015	BUDHIPADAR	220.00*	312008	RAIGR2	220.00	1	-51.5	12.2
424015	JHARSUGUDA-A400.00	314006 RAIG4	400.00*	3	303.6	-90.7		
424015	JHARSUGUDA-A400.00	314006 RAIG4	400.00*	4	303.6	-90.7		
424091	JHARSUGUDA-B400.00	314006 RAIG4	400.00*	1	129.4	-28.8		
424091	JHARSUGUDA-B400.00	314006 RAIG4	400.00*	2	129.4	-28.8		
428015	JHARSUGUDA-A765.00	318030 RAIPUR_POOL	765.00*	1	419.2	308.3		
428015	JHARSUGUDA-A765.00	318030 RAIPUR_POOL	765.00*	2	419.2	308.3		
428015	JHARSUGUDA-A765.00*	318031 TAMNAR	765.00	1	785.7	23.3		
428015	JHARSUGUDA-A765.00*	318031 TAMNAR	765.00	2	785.7	23.3		
428091	JHARSUGUDA-B765.00	318032 DHARAMJAIGAR	765.00*	1	519.1	-4.1		
428091	JHARSUGUDA-B765.00	318032 DHARAMJAIGAR	765.00*	2	519.1	-4.1		
474046	RANCHI	400.00	314008 SIPAT4	400.00*	1	-69.8	15.7	
474046	RANCHI	400.00	314008 SIPAT4	400.00*	2	-69.8	15.7	

478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	1	-538.5	-34.4
478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	2	-538.5	-34.4
TOTAL FROM AREA 4 TO AREA 3					2918.5	473.0

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X-- NAME --X BASKV	BUS# X-- NAME --X BASKV	CKT	MW	MVAR
424019 TALCHER 400.00*	524011 KOLAR 400.00	2DC	1004.8	413.0 TWO TRM DC "10"
424099 GAZ-ER 400.00	514010 GAZU-SR 400.00*	2DC	397.3	-229.2 TWO TRM DC "13"
424099 GAZ-ER 400.00	514010 GAZU-SR 400.00*	2DC	397.3	-229.2 TWO TRM DC "14"
424019 TALCHER 400.00*	524011 KOLAR 400.00	2DC	1004.8	413.0 TWO TRM DC "9"
428090 ANGUL-B 765.00*	518091 SRI_POOL 765.00	1	163.8	-667.2
428090 ANGUL-B 765.00*	518091 SRI_POOL 765.00	2	163.8	-667.2
TOTAL FROM AREA 4 TO AREA 5			3131.9	-966.9

TO AREA 6 BHUTAN

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X-- NAME --X BASKV	BUS# X-- NAME --X BASKV	CKT	MW	MVAR
442025 BIRPARA-PG 220.00	282001 CHUKHA 220.00*	1	-37.5	15.9
442025 BIRPARA-PG 220.00	282001 CHUKHA 220.00*	2	-37.5	15.9
442025 BIRPARA-PG 220.00*	282002 MALBAS2 220.00	1	5.0	16.9
444072 SILIGURI-PG 400.00	284001 TALA 400.00*	1	-114.4	61.7
444072 SILIGURI-PG 400.00	284001 TALA 400.00*	2	-114.4	61.7
444072 SILIGURI-PG 400.00	284001 TALA 400.00*	3	-114.4	61.7
444072 SILIGURI-PG 400.00	284079 MALBASE 400.00*	4	-61.5	29.2
444073 ALIPURDU 400.00	284002 PUNATSANC1&2400.00*	1	-257.2	46.3
444073 ALIPURDU 400.00	284002 PUNATSANC1&2400.00*	2	-257.2	46.3
444073 ALIPURDU 400.00	284002 PUNATSANC1&2400.00*	3	-257.2	46.3
444073 ALIPURDU 400.00	284002 PUNATSANC1&2400.00*	4	-257.2	46.3
444073 ALIPURDU 400.00*	284009 JIGMELING 400.00	1	-156.5	-148.2
444073 ALIPURDU 400.00*	284009 JIGMELING 400.00	2	-156.5	-148.2
TOTAL FROM AREA 4 TO AREA 6			-1816.5	151.8

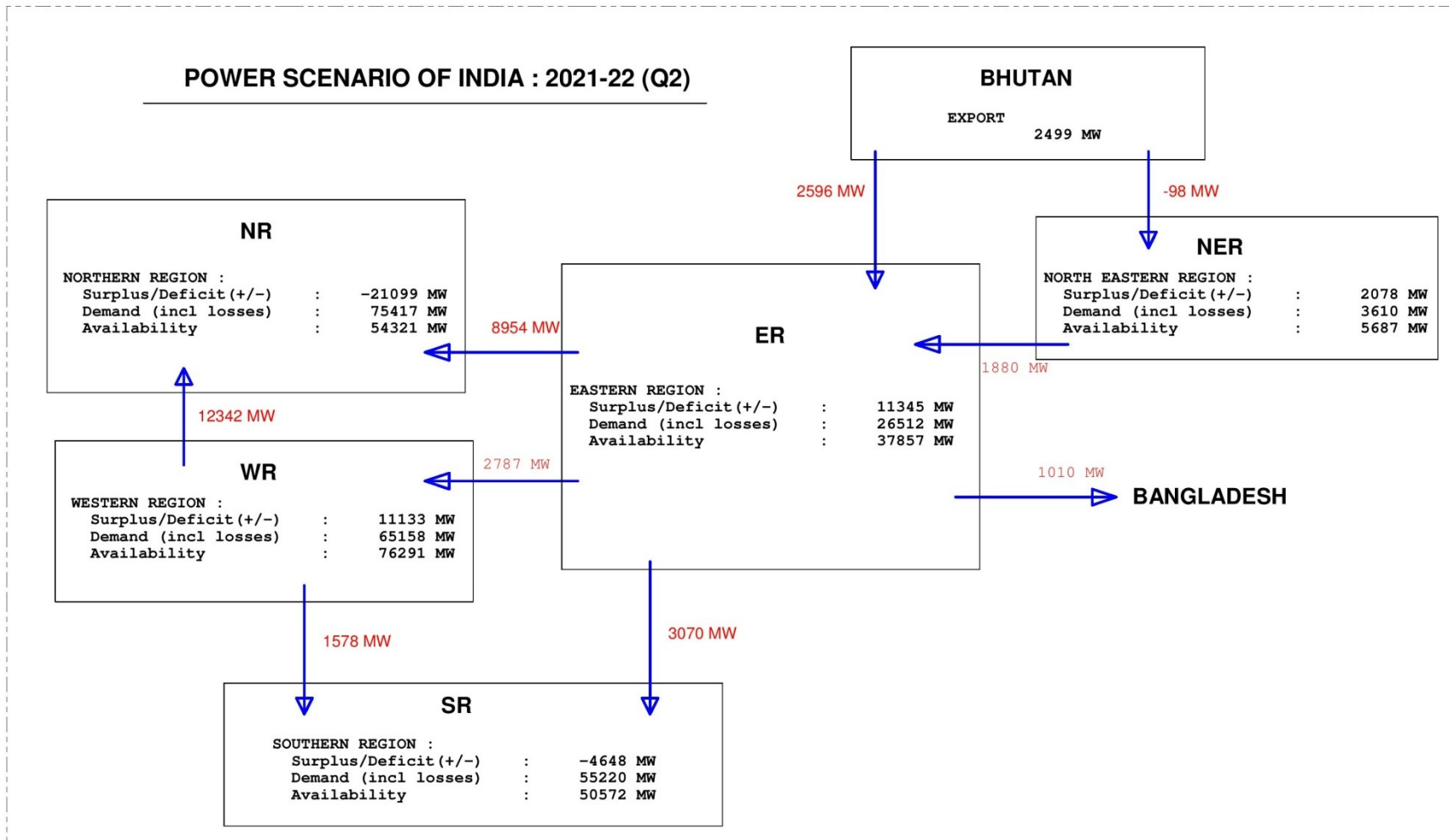
TO AREA 7 BANGLADESH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

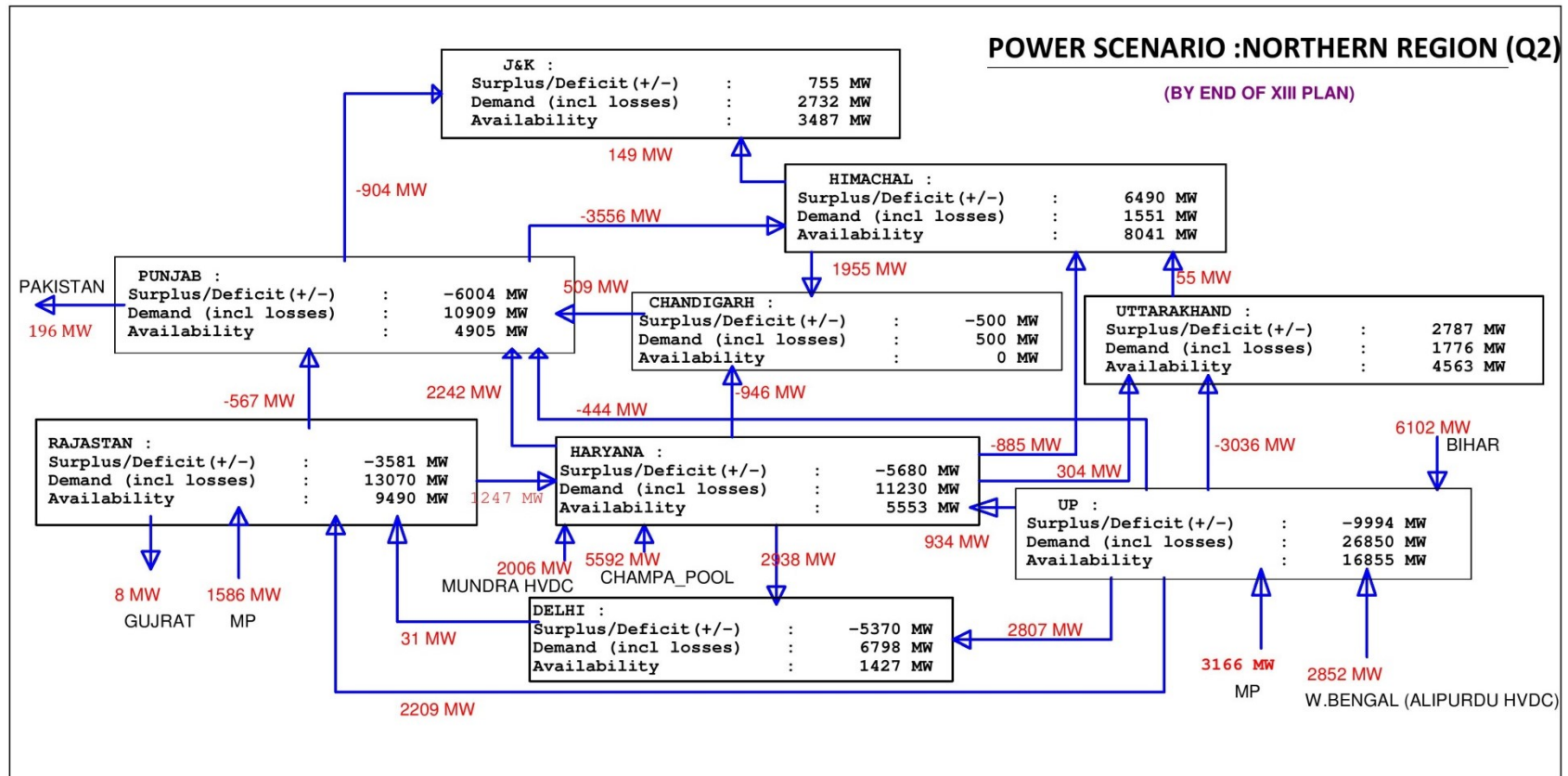
BUS# X-- NAME --X BASKV	BUS# X-- NAME --X BASKV	CKT	MW	MVAR
444101 BEHRAMPUR 400.00*	444102 BHERAMARA 400.00	1	504.8	97.6
444101 BEHRAMPUR 400.00*	444102 BHERAMARA 400.00	2	504.8	97.6
TOTAL FROM AREA 4 TO AREA 7			1009.7	195.1

TOTAL FROM AREA 4 EAST			12641.2	-3439.9
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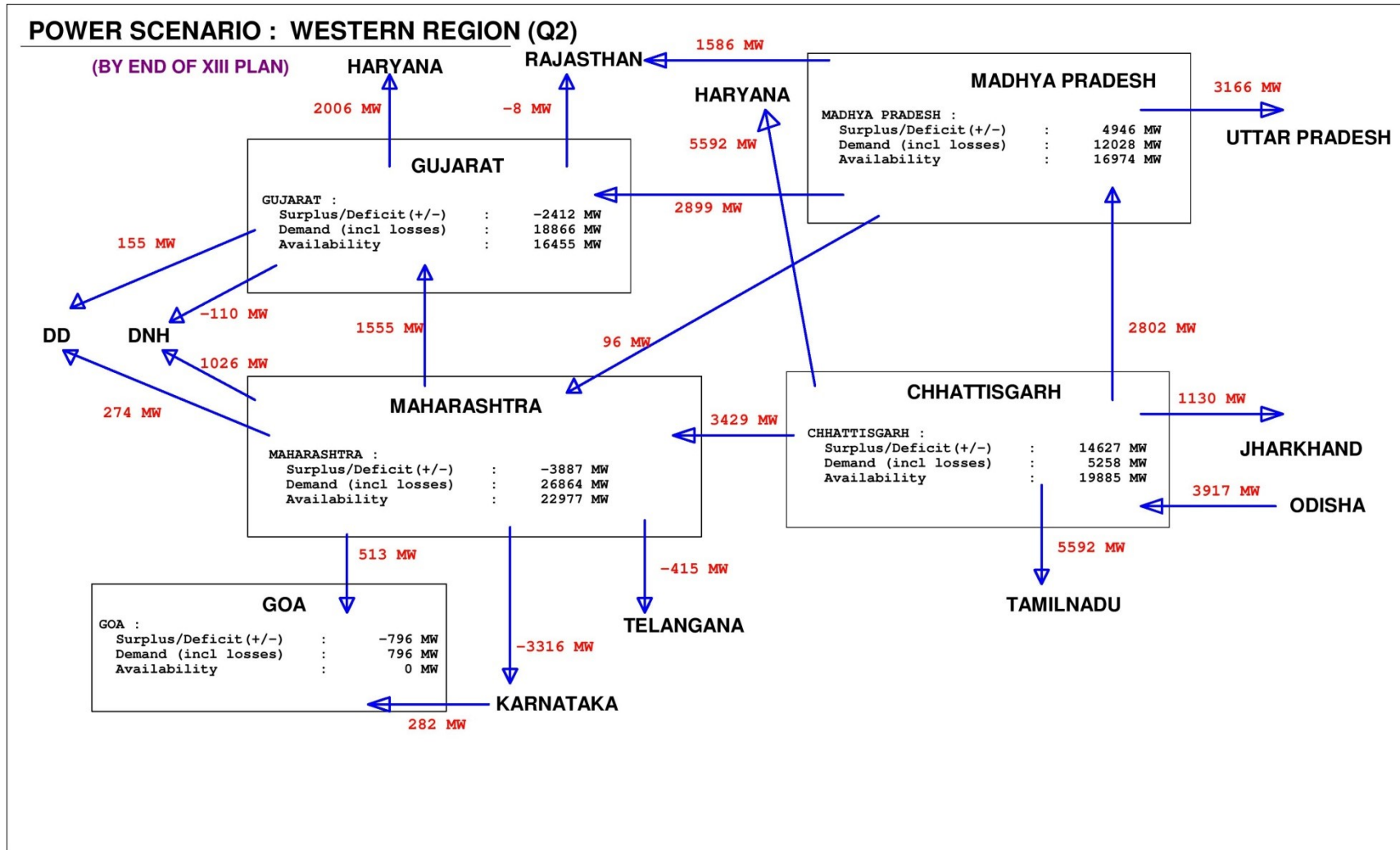
Annex 2 BQ2 All India



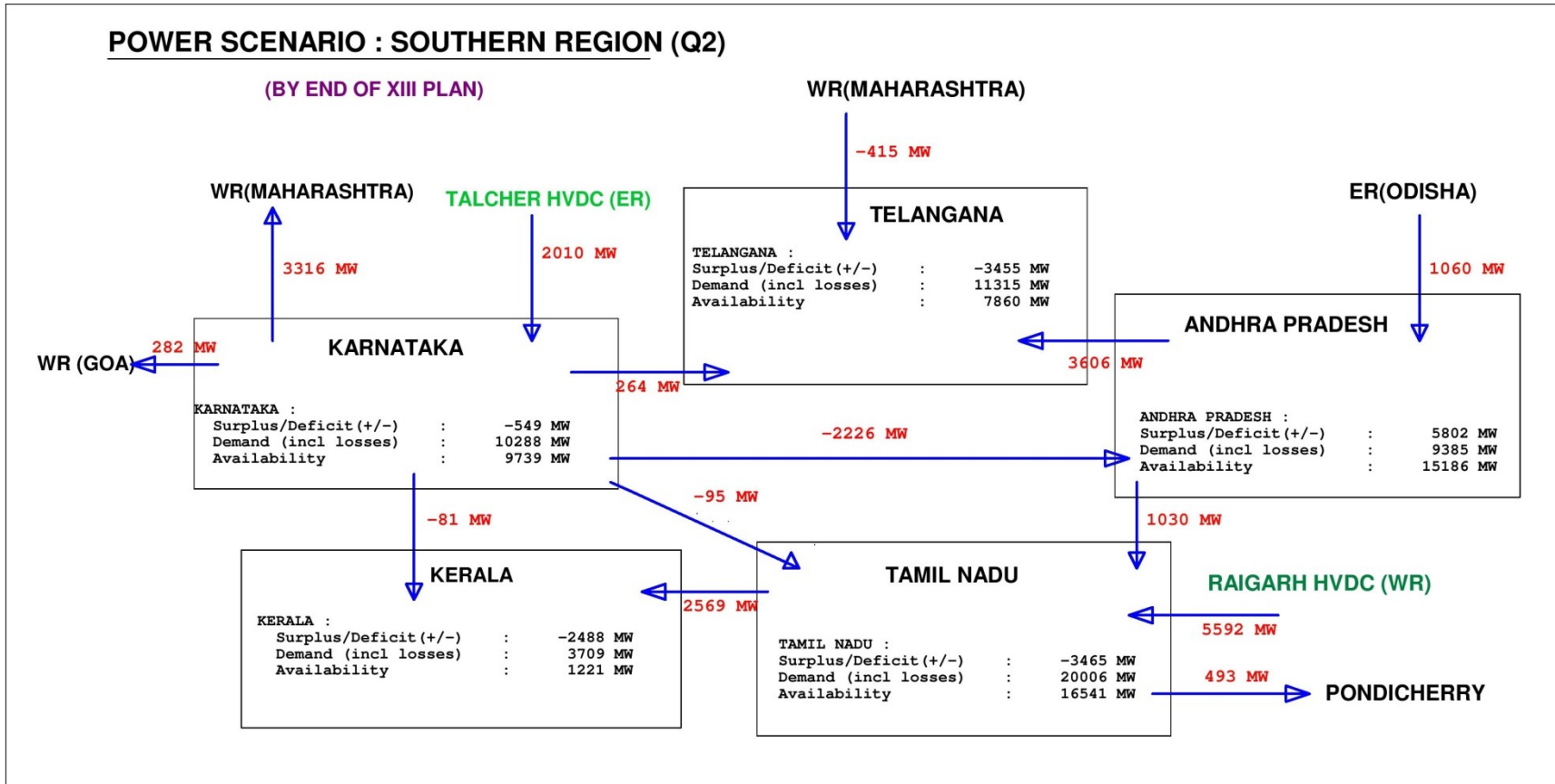
Annex 2 BQ2-NR



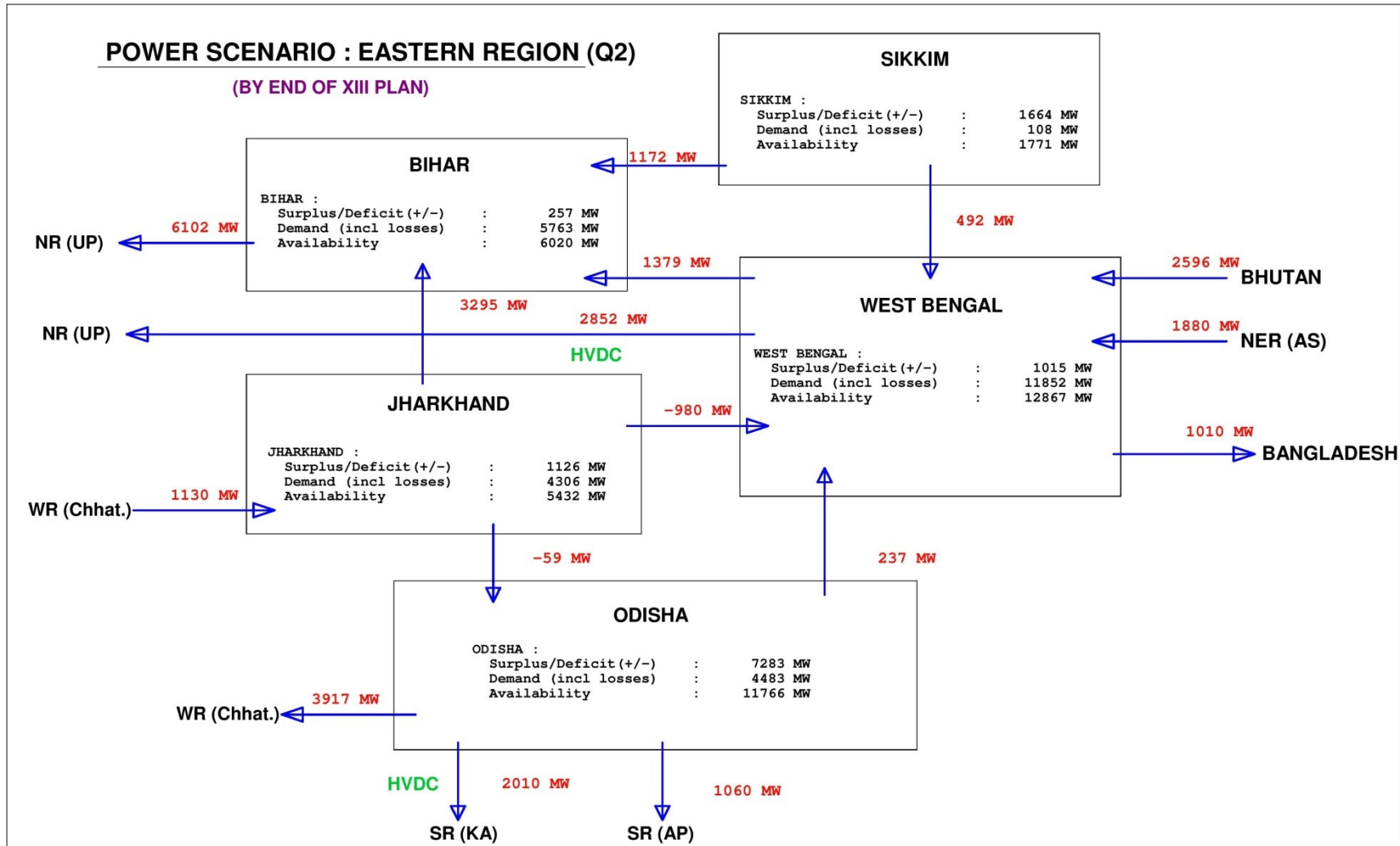
Annex 2 BQ2-WR



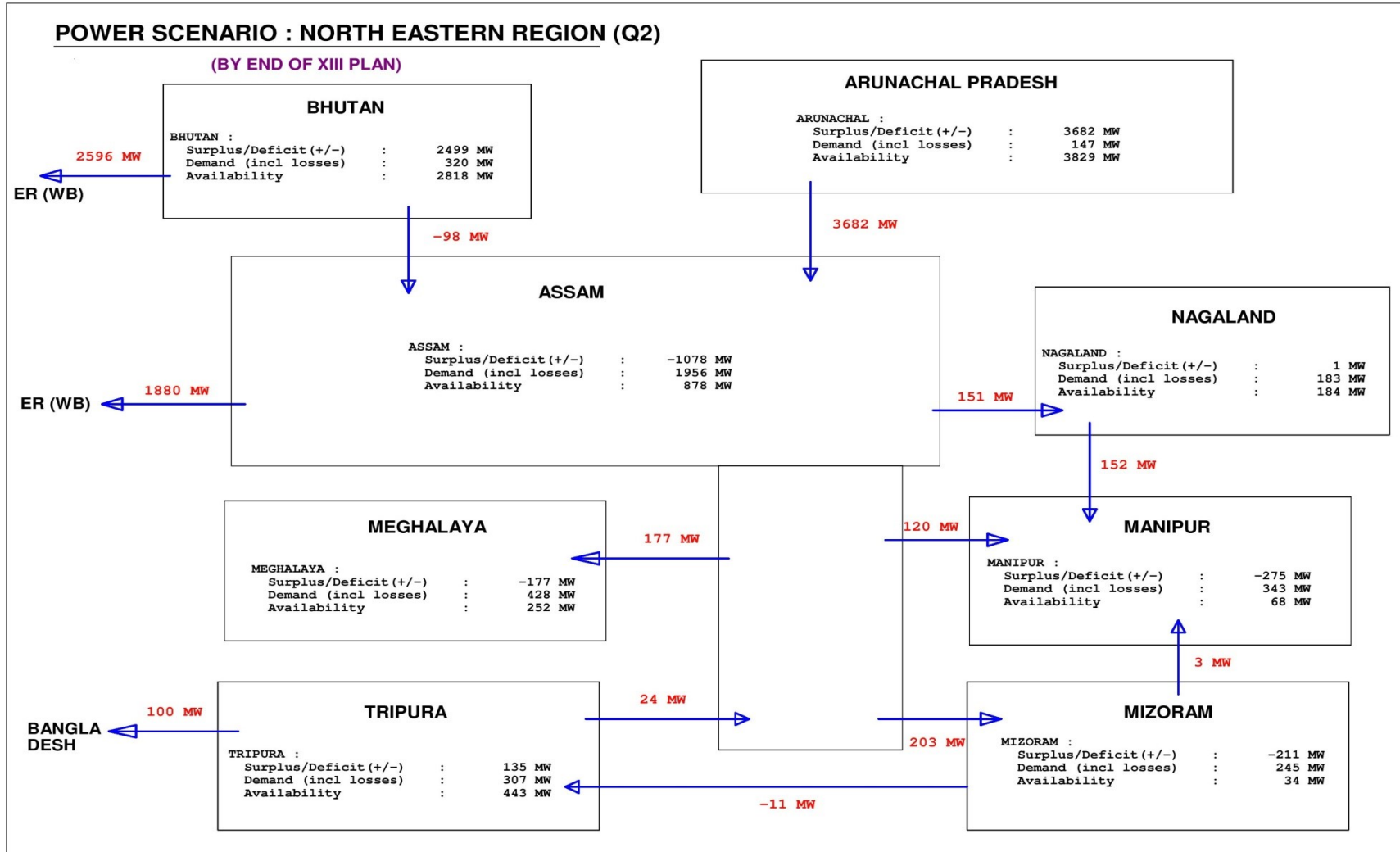
Annex 2 BQ2-SR



Annex 2 BQ2-ER



Annex 2 BQ2-NER



Annex 2 BQ2-Tie Line Flow

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:02
 AREA TIE LINE FLOW FLOW
 INTERCHANGE

FROM AREA 3 WEST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR	
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	44.4	TWO TRM DC "15"
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	44.4	TWO TRM DC "16"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "3"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "4"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "75"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "76"
354019	ZERDA	400.00*	184403	BHINMAL	400.00	1	-240.8	-274.8	
354019	ZERDA	400.00*	184404	KANKROLI	400.00	1	-234.5	-76.4	
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	1	167.6	-128.2	
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	2	167.6	-128.2	
362040	MALNP2	220.00*	182234	AURYA2	220.00	1	-11.3	43.1	
362041	MEHGAON2	220.00*	182234	AURYA2	220.00	1	-63.6	46.9	
362045	BADO2	220.00*	162221	SAKATPUR	220.00	1	-52.8	27.6	
362045	BADO2	220.00*	162232	MODAK	220.00	1	-91.0	56.9	
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	1	-6.1	62.8	
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	2	-6.1	62.8	
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	1	-302.5	243.4	
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	2	-302.5	243.4	
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	1	-0.1	-70.1	
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	2	-0.1	-70.1	
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	1	443.1	175.5	
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	2	473.7	193.0	
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	1	906.7	57.2	
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	2	913.8	60.2	
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	3	744.6	123.5	
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	4	744.6	123.5	
378057	BARETHI	765.00	188258	ORAI	765.00*	1	796.3	-252.3	
378057	BARETHI	765.00	188258	ORAI	765.00*	2	796.3	-252.3	
TOTAL FROM AREA 3 TO AREA 1							12690.7	-1311.5	

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR	
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	1	59.6	-31.9	
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	2	59.6	-31.9	
312008	RAIGR2	220.00	422015	BUDHIPADAR	220.00*	1	47.0	-1.0	
314006	RAIG4	400.00*	424015	JHARSUGUDA-A	400.00	3	-285.5	120.5	

314006 RAIG4	400.00*	424015 JHARSUGUDA-A400.00	4	-285.5	120.5
314006 RAIG4	400.00*	424091 JHARSUGUDA-B400.00	1	-124.6	40.2
314006 RAIG4	400.00*	424091 JHARSUGUDA-B400.00	2	-124.6	40.2
314008 SIPAT4	400.00*	474046 RANCHI	400.00	1	47.2 -0.5
314008 SIPAT4	400.00*	474046 RANCHI	400.00	2	47.2 -0.5
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	1	-401.9	-293.7
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	2	-401.9	-293.7
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	1	-791.3	-11.7
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	2	-791.3	-11.7
318032 DHARAMJAIGAR765.00*	428091 JHARSUGUDA-B765.00	1	-501.8	1.1	
318032 DHARAMJAIGAR765.00*	428091 JHARSUGUDA-B765.00	2	-501.8	1.1	
318032 DHARAMJAIGAR765.00	478046 RANCHI-NEW	765.00*	1	408.2	86.5
318032 DHARAMJAIGAR765.00	478046 RANCHI-NEW	765.00*	2	408.2	86.5
TOTAL FROM AREA 3 TO AREA 4				-3133.0	-180.0

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS ----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "11"	
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "12"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "33"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "34"	
342002 PONDA2	220.00	522031 AMBD	220.00*	1	-281.9	-32.0		
372013 TALANDGE	220.00*	522026 CHIKKODI	220.00	1	-181.2	-12.8		
372041 KOLHA2	220.00*	522026 CHIKKODI	220.00	1	-192.6	-10.1		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	1	-442.0	-101.7		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	2	-442.0	-101.7		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	1	-336.0	-191.7		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	2	-336.0	-191.7		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	1	-1028.4	-306.6		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	2	-1028.4	-306.6		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	1	-368.1	-416.0		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	2	-368.1	-416.0		
TOTAL FROM AREA 3 TO AREA 5					1581.0	-5198.3		

TOTAL FROM AREA 3 WEST 11138.7 -6689.8

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:02
 AREA TIE LINE FLOW FLOW
 INTERCHANGE

FROM AREA 4 EAST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS ----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "39"	
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "40"	
412026 SASARAM-PG	220.00	172278 SAHUPU_N	220.00*	1	229.0	-95.2		

414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	1	255.6	-89.1
414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	2	255.6	-89.1
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	1	175.5	-23.3	
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	2	175.5	-23.3	
414006 PATNA	400.00*	184475 BAL74-PG	400.00	1	269.3	-31.1
414006 PATNA	400.00*	184475 BAL74-PG	400.00	2	269.3	-31.1
414006 PATNA	400.00*	184475 BAL74-PG	400.00	3	302.9	-20.5
414006 PATNA	400.00*	184475 BAL74-PG	400.00	4	302.9	-20.5
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	1	277.6	-117.7
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	2	277.6	-117.7
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	1	207.0	-85.1	
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	3	207.0	-85.1	
414491 SASARAM-ER	400.00*	174479 VARANASI	400.00	1	-19.6	-110.2
414492 SASARAM-NR	400.00*	184474 ALLAHABA	400.00	1	249.3	-3.4
418008 GAYA	765.00*	187000 VARNASI8	765.00	1	594.5	-217.4
418008 GAYA	765.00*	187000 VARNASI8	765.00	2	696.7	-172.1
418008 GAYA	765.00	187701 BALI7-PG	765.00*	2	840.1	-97.8
418892 SASARAM	765.00	187705 FATEH-PG	765.00*	1	180.5	-27.9
TOTAL FROM AREA 4 TO AREA 1					8598.2	-3313.6

TO AREA 2 NRTHEAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "79"
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "80"
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	1	-65.0	-19.4
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	2	-65.0	-19.4
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	1	-132.1	-56.9
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	2	-132.1	-56.9
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	3	-245.7	-105.6
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	4	-245.7	-105.6
TOTAL FROM AREA 4 TO AREA 2							-1879.6	55.1

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	1	-59.6	31.9
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	2	-59.6	31.9
422015	BUDHIPADAR	220.00*	312008	RAIGR2	220.00	1	-47.0	1.0
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	3	285.5	-120.5	
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	4	285.5	-120.5	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	1	124.6	-40.2	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	2	124.6	-40.2	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	1	401.9	293.7	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	2	401.9	293.7	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	1	791.3	11.7	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	2	791.3	11.7	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	1	501.8	-1.1	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	2	501.8	-1.1	
474046	RANCHI	400.00	314008	SIPAT4	400.00*	1	-47.2	0.5
474046	RANCHI	400.00	314008	SIPAT4	400.00*	2	-47.2	0.5

478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	1	-408.2	-86.5
478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	2	-408.2	-86.5
TOTAL FROM AREA 4 TO AREA 3					3133.0	180.0

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "10"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "13"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "14"
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "9"
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	1	142.5	-729.7
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	2	142.5	-729.7
TOTAL FROM AREA 4 TO AREA 5							3089.3	-1092.0

TO AREA 6 BHUTAN

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	1	-55.9	15.4
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	2	-55.9	15.4
442025	BIRPARA-PG	220.00*	282002	MALBAS2	220.00	1	2.8	16.7
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	1	-156.4	58.3
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	2	-156.4	58.3
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	3	-156.4	58.3
444072	SILIGURI-PG	400.00	284079	MALBASE	400.00*	4	-118.7	26.5
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	1	-346.9	47.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	2	-346.9	47.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	3	-346.9	47.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	4	-346.9	47.2
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	1	-255.9	-127.2
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	2	-255.9	-127.2
TOTAL FROM AREA 4 TO AREA 6							-2596.4	183.3

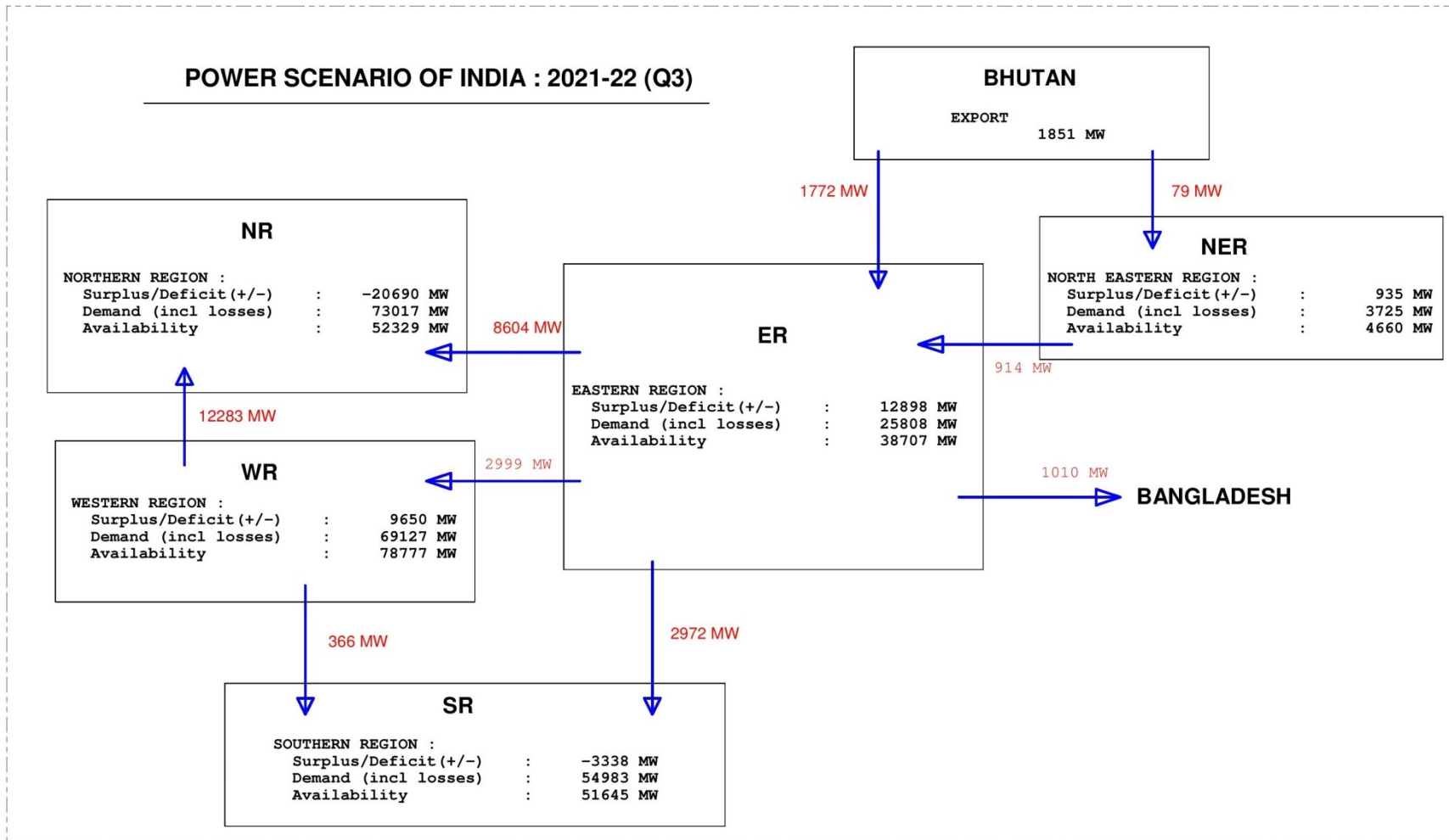
TO AREA 7 BANGLADESH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

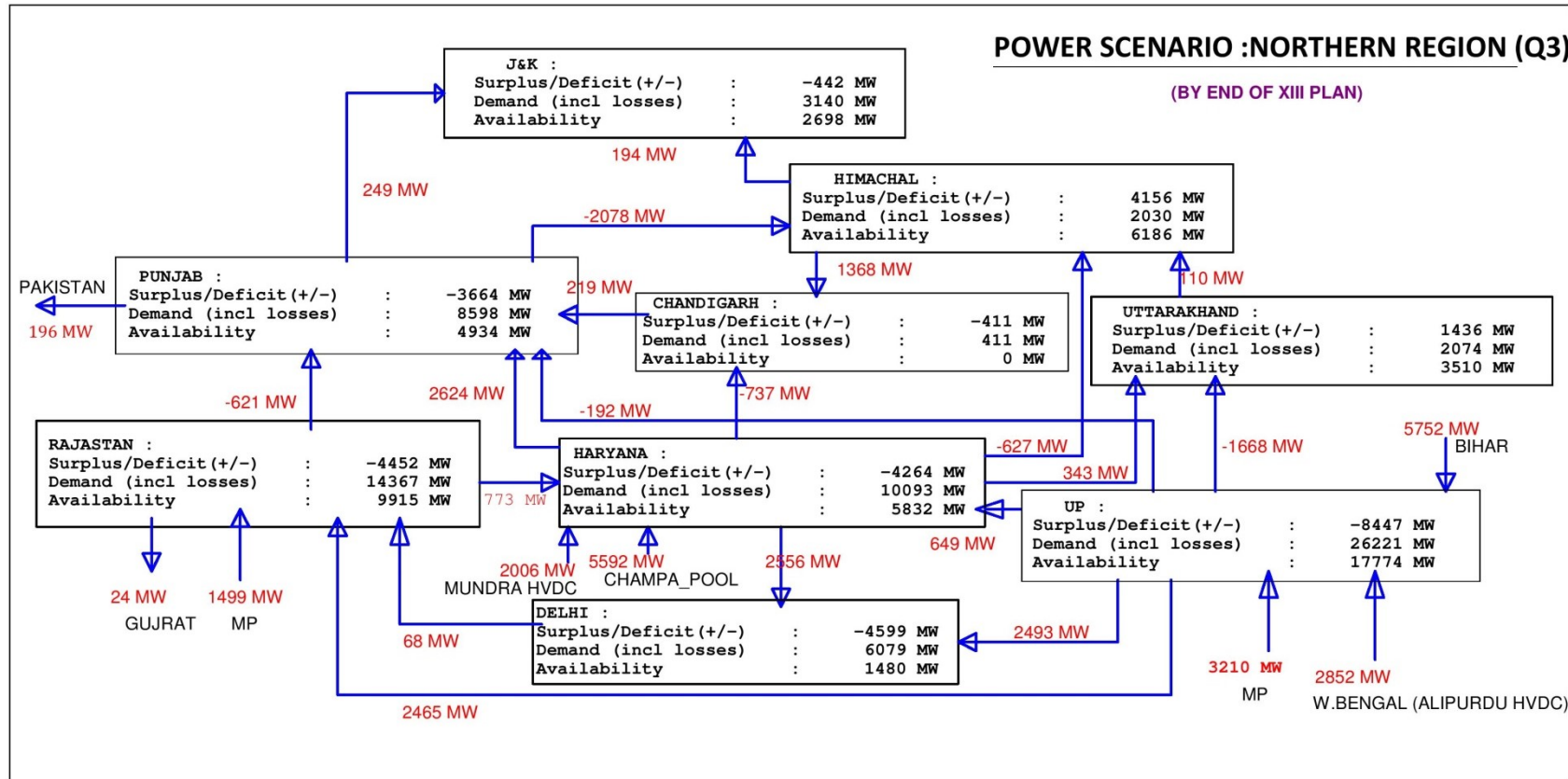
BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	1	504.9	98.5
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	2	504.9	98.5
TOTAL FROM AREA 4 TO AREA 7							1009.8	197.1

TOTAL FROM AREA 4 EAST							11354.1	-3790.1
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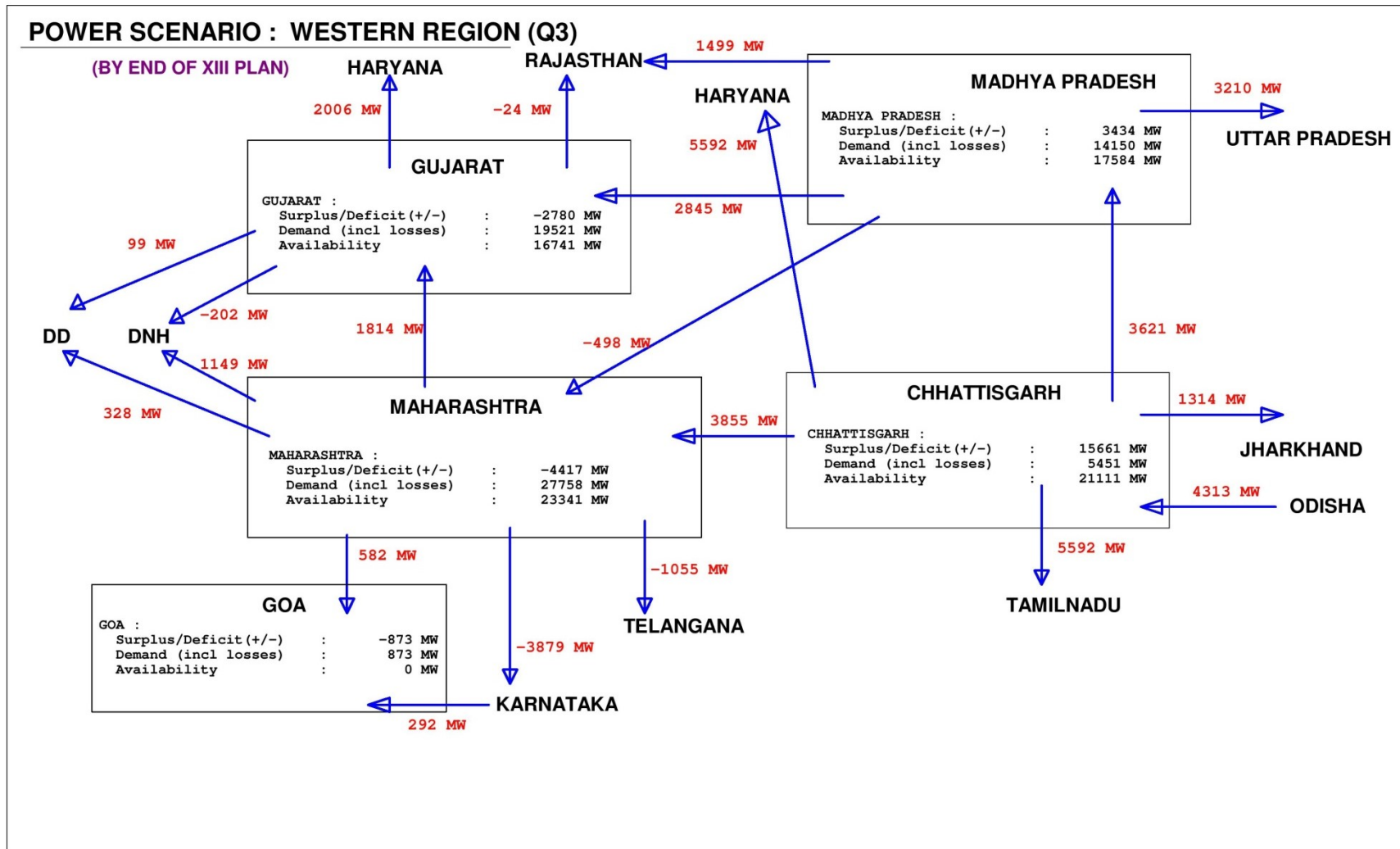
Annex 2 BQ3 All India



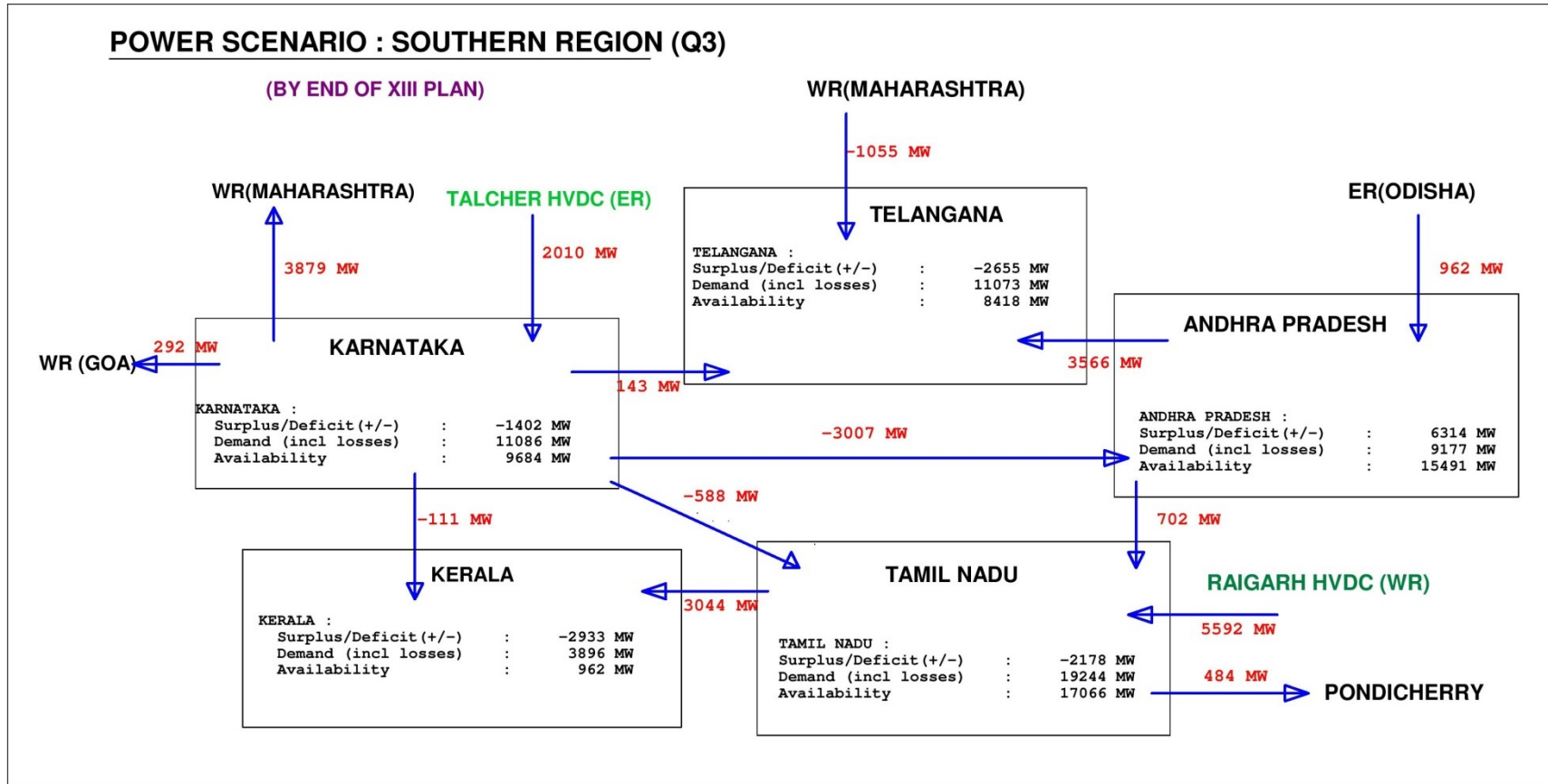
Annex 2 BQ3-NR



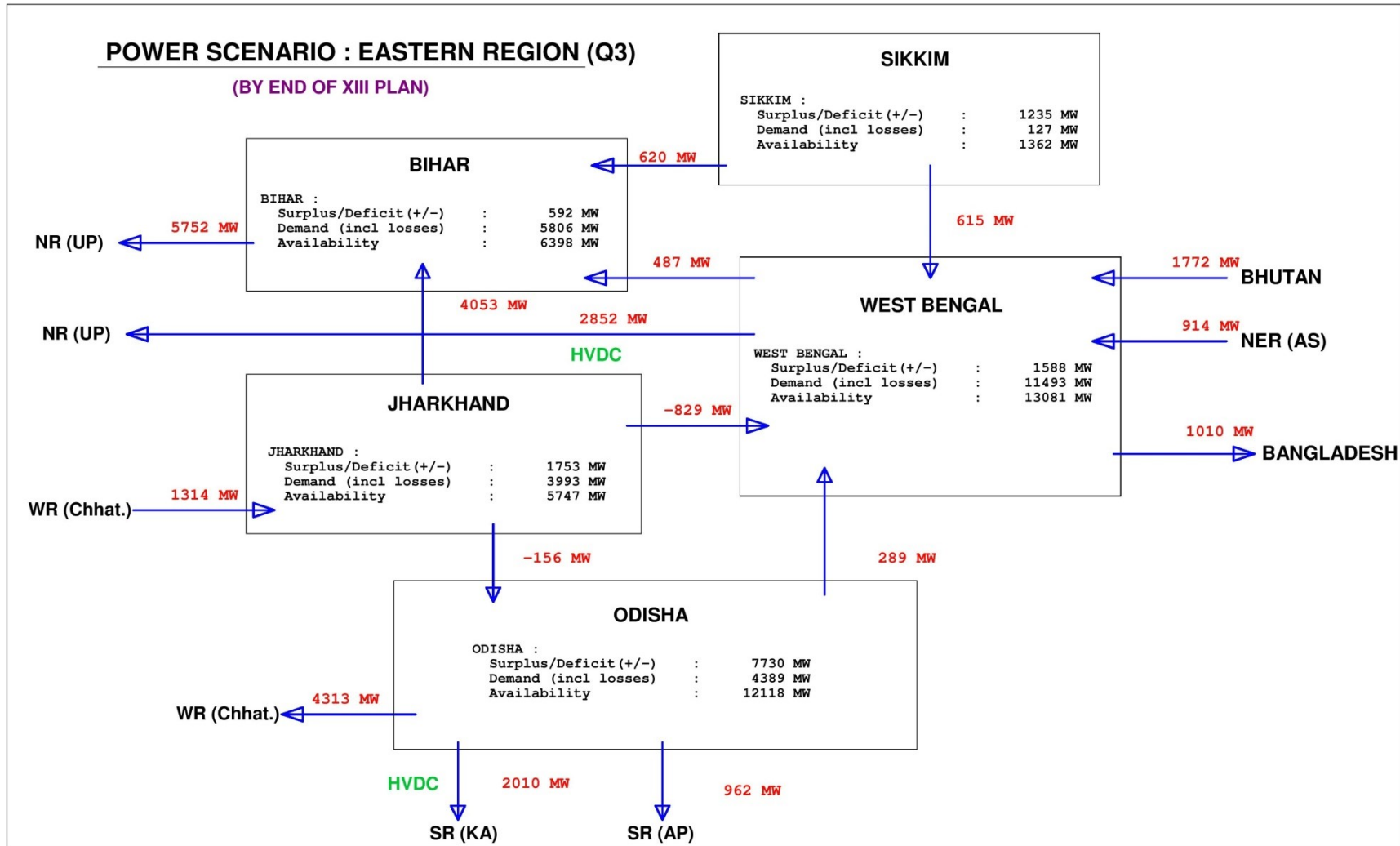
Annex 2 BQ3-WR



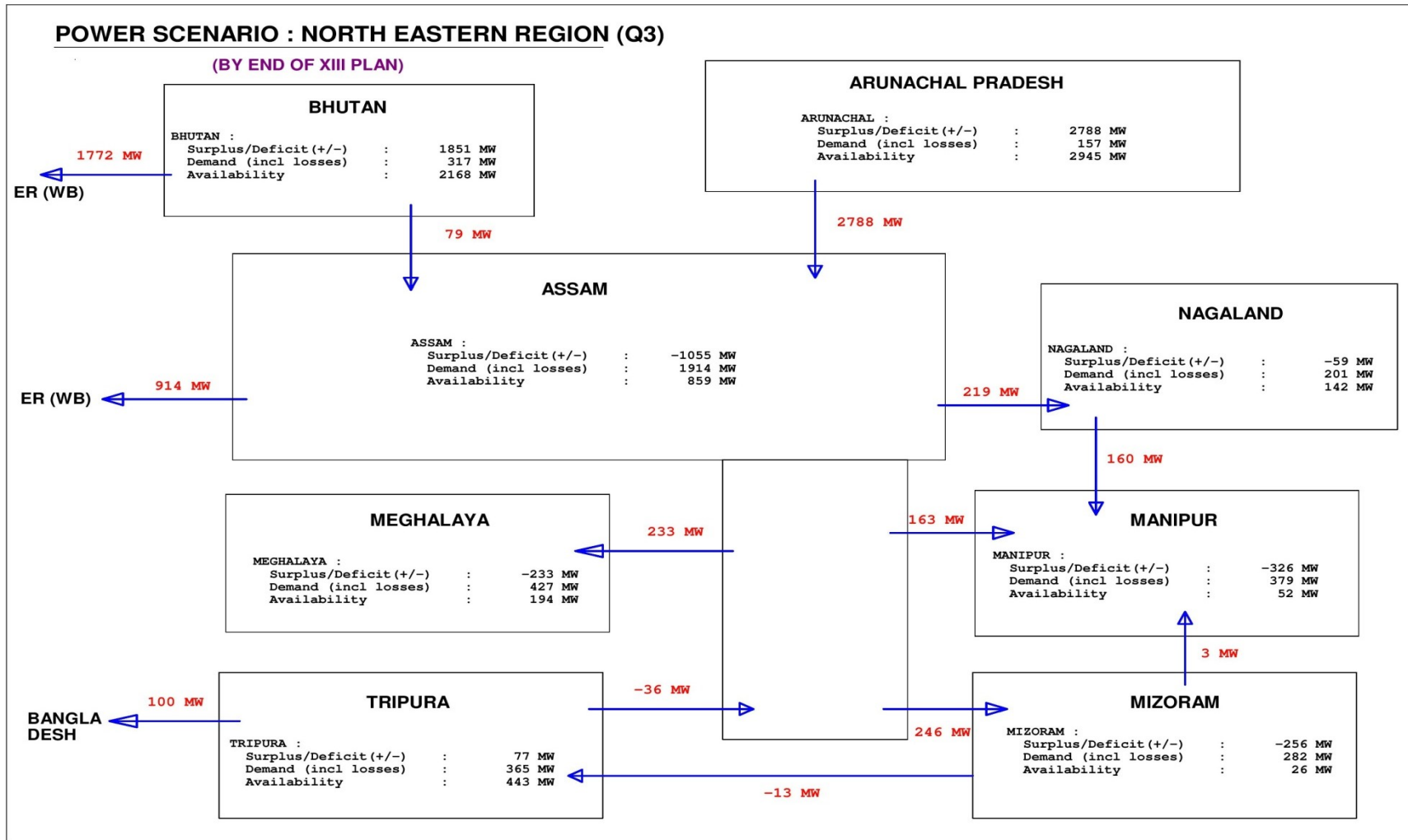
Annex 2 BQ3-SR



Annex 2 BQ3-ER



Annex 2 BQ3-NER



Annex 2 BQ3-Tie Line Flow

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 14:57
 AREA TIE LINE FLOW
 INTERCHANGE

FROM AREA 3 WEST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4 TWO TRM DC "15"
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4 TWO TRM DC "16"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3 TWO TRM DC "3"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3 TWO TRM DC "4"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1 TWO TRM DC "75"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1 TWO TRM DC "76"
354019	ZERDA	400.00*	184403	BHINMAL	400.00	1	-234.6	-155.5
354019	ZERDA	400.00*	184404	KANKROLI	400.00	1	-233.6	-17.2
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	1	159.6	-60.5
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	2	159.6	-60.5
362040	MALNP2	220.00*	182234	AURYA2	220.00	1	-36.4	4.7
362041	MEHGAON2	220.00*	182234	AURYA2	220.00	1	-101.7	2.3
362045	BADO2	220.00*	162221	SAKATPUR	220.00	1	-77.6	6.7
362045	BADO2	220.00*	162232	MODAK	220.00	1	-124.2	32.5
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	1	-28.5	24.1
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	2	-28.5	24.1
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	1	-321.5	228.0
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	2	-321.5	228.0
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	1	-0.0	-52.0
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	2	-0.0	-52.0
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	1	468.5	94.2
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	2	500.6	105.8
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	1	884.9	-171.4
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	2	891.8	-170.2
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	3	772.2	27.5
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	4	772.2	27.5
378057	BARETHI	765.00	188258	ORAI	765.00*	1	846.1	-262.8
378057	BARETHI	765.00	188258	ORAI	765.00*	2	846.1	-262.8
TOTAL FROM AREA 3 TO AREA 1							12641.2	-2048.5

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	1	50.9	-46.2
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	2	50.9	-46.2
312008	RAIGR2	220.00	422015	BUDHIPADAR	220.00*	1	38.4	-16.8
314006	RAIG4	400.00*	424015	JHARSUGUDA-A400.00	400.00	3	-325.9	75.5
314006	RAIG4	400.00*	424015	JHARSUGUDA-A400.00	400.00	4	-325.9	75.5
314006	RAIG4	400.00*	424091	JHARSUGUDA-B400.00	400.00	1	-143.5	25.0
314006	RAIG4	400.00*	424091	JHARSUGUDA-B400.00	400.00	2	-143.5	25.0

314008	SIPAT4	400.00*	474046	RANCHI	400.00	1	51.8	-22.8		
314008	SIPAT4	400.00*	474046	RANCHI	400.00	2	51.8	-22.8		
318030	RAIPUR_POOL	765.00*	428015	JHARSUGUDA-A765.00	1		-446.1	-323.0		
318030	RAIPUR_POOL	765.00*	428015	JHARSUGUDA-A765.00	2		-446.1	-323.0		
318031	TAMNAR	765.00	428015	JHARSUGUDA-A765.00*	1		-849.1	-25.0		
318031	TAMNAR	765.00	428015	JHARSUGUDA-A765.00*	2		-849.1	-25.0		
318032	DHARAMJAIGAR765.00*	428091	JHARSUGUDA-B765.00	1			-527.3	2.7		
318032	DHARAMJAIGAR765.00*	428091	JHARSUGUDA-B765.00	2			-527.3	2.7		
318032	DHARAMJAIGAR765.00	478046	RANCHI-NEW	765.00*	1		493.2	20.9		
318032	DHARAMJAIGAR765.00	478046	RANCHI-NEW	765.00*	2		493.2	20.9		
TOTAL FROM AREA 3 TO AREA 4								-3353.5	-602.8	

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR		
374007	BHADR4	400.00	514009	CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "11"	
374007	BHADR4	400.00	514009	CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "12"	
314029	RAIGARH_POOL	400.00	544016	PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "33"	
314029	RAIGARH_POOL	400.00	544016	PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "34"	
342002	PONDA2	220.00	522031	AMBD	220.00*	1	-291.6	-38.6		
372013	TALANDGE	220.00*	522026	CHIKKODI	220.00	1	-191.8	-2.2		
372041	KOLHA2	220.00*	522026	CHIKKODI	220.00	1	-204.2	1.5		
374050	KOLHAPURPG	400.00	524015	NARDR-NW	400.00*	1	-498.2	-109.9		
374050	KOLHAPURPG	400.00	524015	NARDR-NW	400.00*	2	-498.2	-109.9		
378021	WARDHA	765.00	518062	NIZAMABAD	765.00*	1	-497.9	-196.1		
378021	WARDHA	765.00	518062	NIZAMABAD	765.00*	2	-497.9	-196.1		
378040	SHOLAPUR-PG	765.00*	528003	RAIC800	765.00	1	-1241.3	-291.7		
378040	SHOLAPUR-PG	765.00*	528003	RAIC800	765.00	2	-1241.3	-291.7		
378091	WARORA POOL	765.00*	518079	WARN800	765.00	1	-525.9	-389.4		
378091	WARORA POOL	765.00*	518079	WARN800	765.00	2	-525.9	-389.4		
TOTAL FROM AREA 3 TO AREA 5								371.8	-5125.0	

TOTAL FROM AREA 3 WEST 9659.5 -7776.3

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 14:57
 AREA TIE LINE FLOW
 INTERCHANGE

FROM AREA 4 EAST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR	
444073	ALIPURDU	400.00	184922	AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "39"
444073	ALIPURDU	400.00	184922	AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "40"
412026	SASARAM-PG	220.00	172278	SAHUPU_N	220.00*	1	204.1	-93.0	
414001	MUZAFARPUR	400.00*	184927	GORAKHPU	400.00	1	159.0	-82.5	
414001	MUZAFARPUR	400.00*	184927	GORAKHPU	400.00	2	159.0	-82.5	
414005	BIHARSHARF-A400.00*	184475	BAL74-PG	400.00	1		130.5	-17.3	

414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	2	130.5	-17.3
414006 PATNA	400.00* 184475 BAL74-PG	400.00	1	220.9	-25.1
414006 PATNA	400.00* 184475 BAL74-PG	400.00	2	220.9	-25.1
414006 PATNA	400.00* 184475 BAL74-PG	400.00	3	248.5	-13.8
414006 PATNA	400.00* 184475 BAL74-PG	400.00	4	248.5	-13.8
414068 MOTIHARI	400.00* 184927 GORAKHPU	400.00	1	285.2	-122.6
414068 MOTIHARI	400.00* 184927 GORAKHPU	400.00	2	285.2	-122.6
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	1	202.6	-84.8
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	3	202.6	-84.8
414491 SASARAM-ER	400.00* 174479 VARANASI	400.00	1	-28.1	-105.7
414492 SASARAM-NR	400.00* 184474 ALLAHABA	400.00	1	249.3	-3.0
418008 GAYA	765.00* 187000 VARNASI8	765.00	1	627.9	-213.7
418008 GAYA	765.00* 187000 VARNASI8	765.00	2	735.8	-168.0
418008 GAYA	765.00 187701 BALI7-PG	765.00*	2	922.1	-108.6
418892 SASARAM	765.00 187705 FATEH-PG	765.00*	1	185.6	-16.2
TOTAL FROM AREA 4 TO AREA 1				8242.0	-3256.5

TO AREA 2 NRTHEAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "79"
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "80"
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	1	10.9	-28.1
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	2	10.9	-28.1
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	1	70.2	-71.8
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	2	70.2	-71.8
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	3	-41.3	-118.3
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	4	-41.3	-118.3
TOTAL FROM AREA 4 TO AREA 2							-914.3	-17.3

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	1	-50.9	46.2
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	2	-50.9	46.2
422015	BUDHIPADAR	220.00*	312008	RAIGR2	220.00	1	-38.4	16.8
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	3	325.9	-75.5	
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	4	325.9	-75.5	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	1	143.5	-25.0	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	2	143.5	-25.0	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	1	446.1	323.0	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	2	446.1	323.0	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	1	849.1	25.0	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	2	849.1	25.0	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR765.00*	1	527.3	-2.7		
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR765.00*	2	527.3	-2.7		
474046	RANCHI	400.00	314008	SIPAT4	400.00*	1	-51.8	22.8
474046	RANCHI	400.00	314008	SIPAT4	400.00*	2	-51.8	22.8
478046	RANCHI-NEW	765.00*	318032	DHARAMJAIGAR765.00	1	-493.2	-20.9	
478046	RANCHI-NEW	765.00*	318032	DHARAMJAIGAR765.00	2	-493.2	-20.9	
TOTAL FROM AREA 4 TO AREA 3							3353.5	602.8

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "10"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "13"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "14"
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "9"
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	1	93.7	-647.3
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	2	93.7	-647.3
TOTAL FROM AREA 4 TO AREA 5							2991.7	-927.0

TO AREA 6 BHUTAN

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	1	-37.4	14.7
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	2	-37.4	14.7
442025	BIRPARA-PG	220.00*	282002	MALBAS2	220.00	1	1.6	15.7
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	1	-113.6	61.2
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	2	-113.6	61.2
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	3	-113.6	61.2
444072	SILIGURI-PG	400.00	284079	MALBASE	400.00*	4	-57.3	29.1
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	1	-253.9	46.3
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	2	-253.9	46.3
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	3	-253.9	46.3
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	4	-253.9	46.3
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	1	-142.6	-146.3
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	2	-142.6	-146.3
TOTAL FROM AREA 4 TO AREA 6							-1771.9	150.3

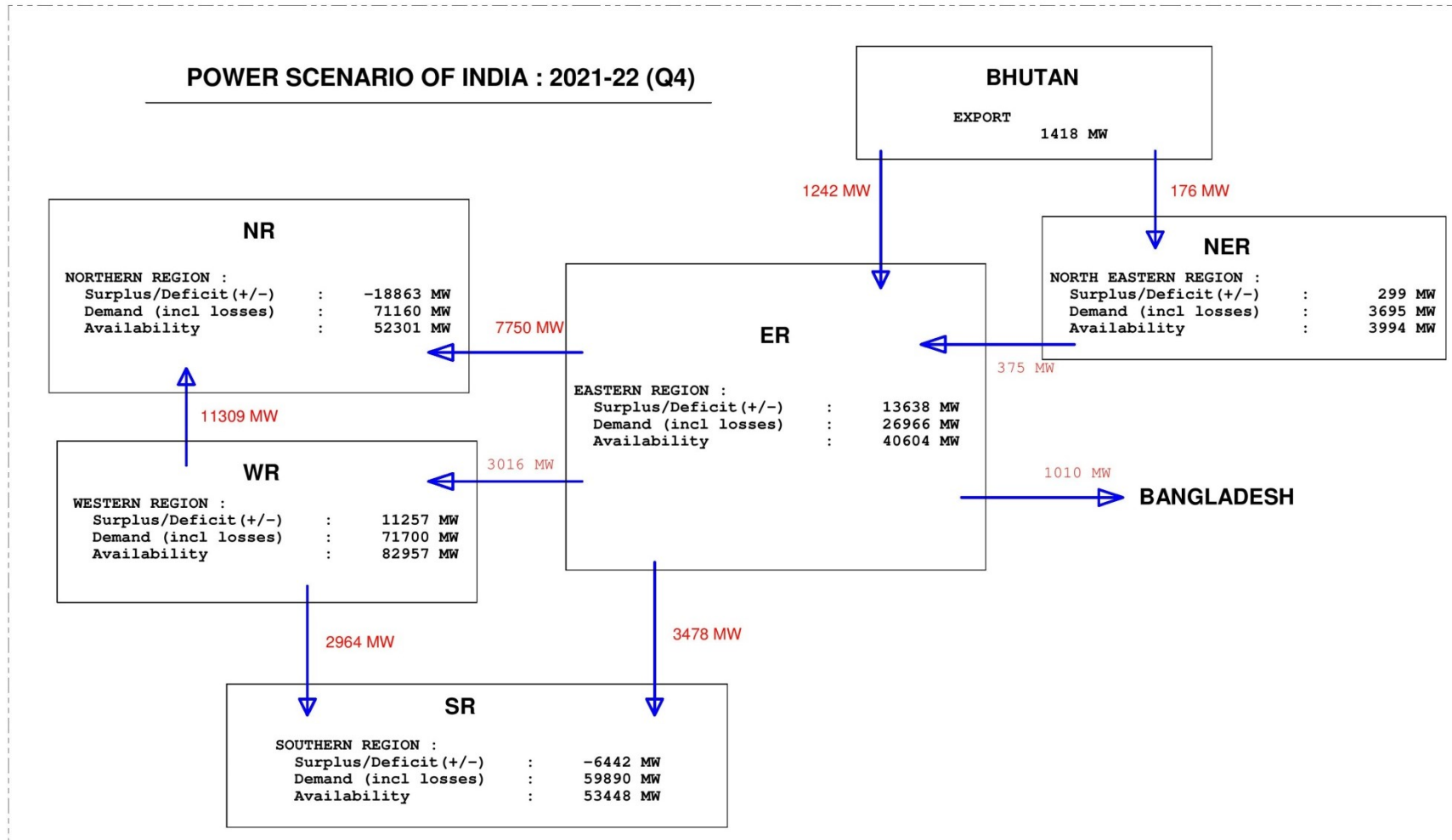
TO AREA 7 BANGLADESH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

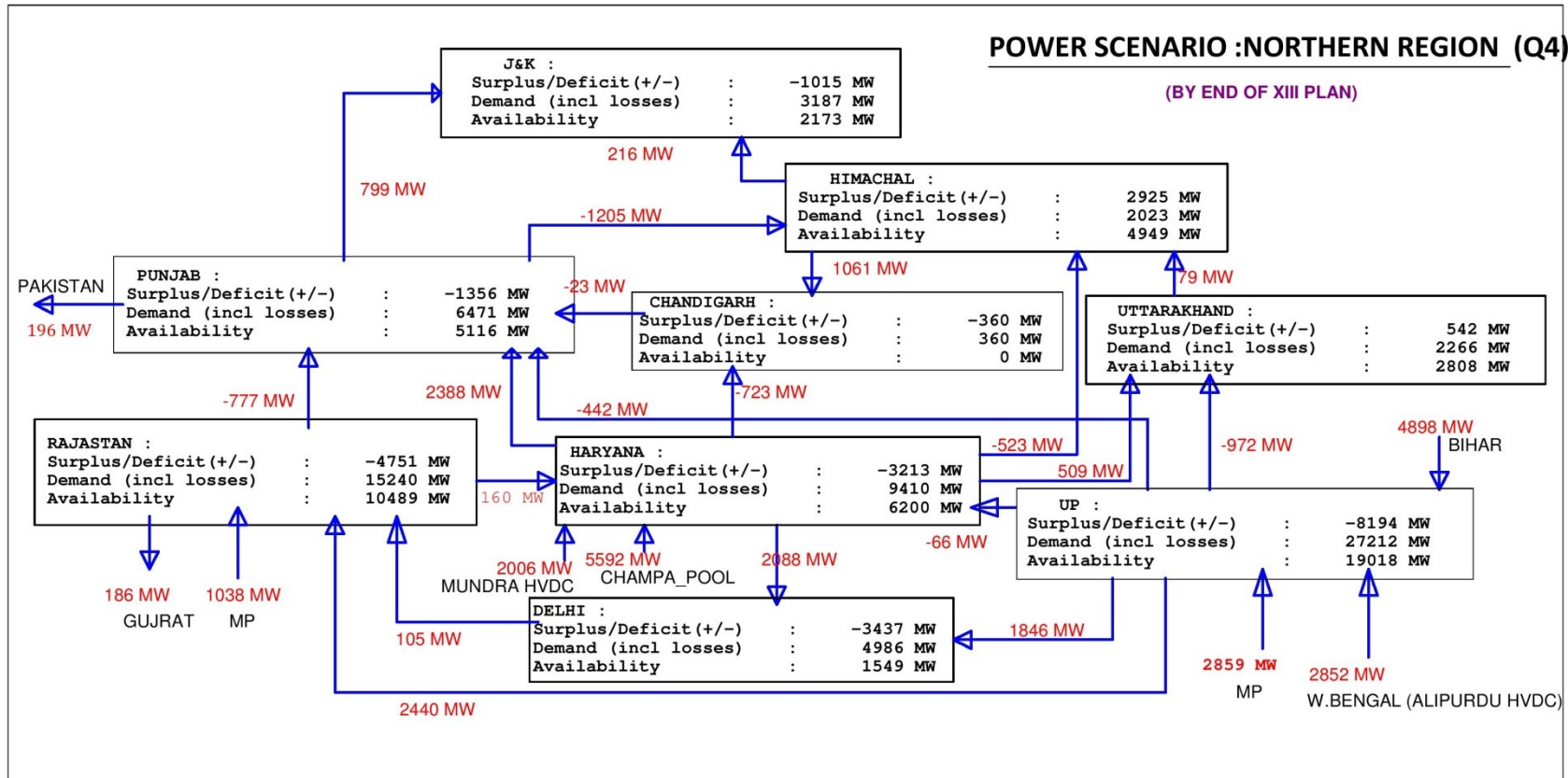
BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	1	504.8	97.8
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	2	504.8	97.8
TOTAL FROM AREA 4 TO AREA 7							1009.7	195.6

TOTAL FROM AREA 4 EAST 12910.8 -3252.2

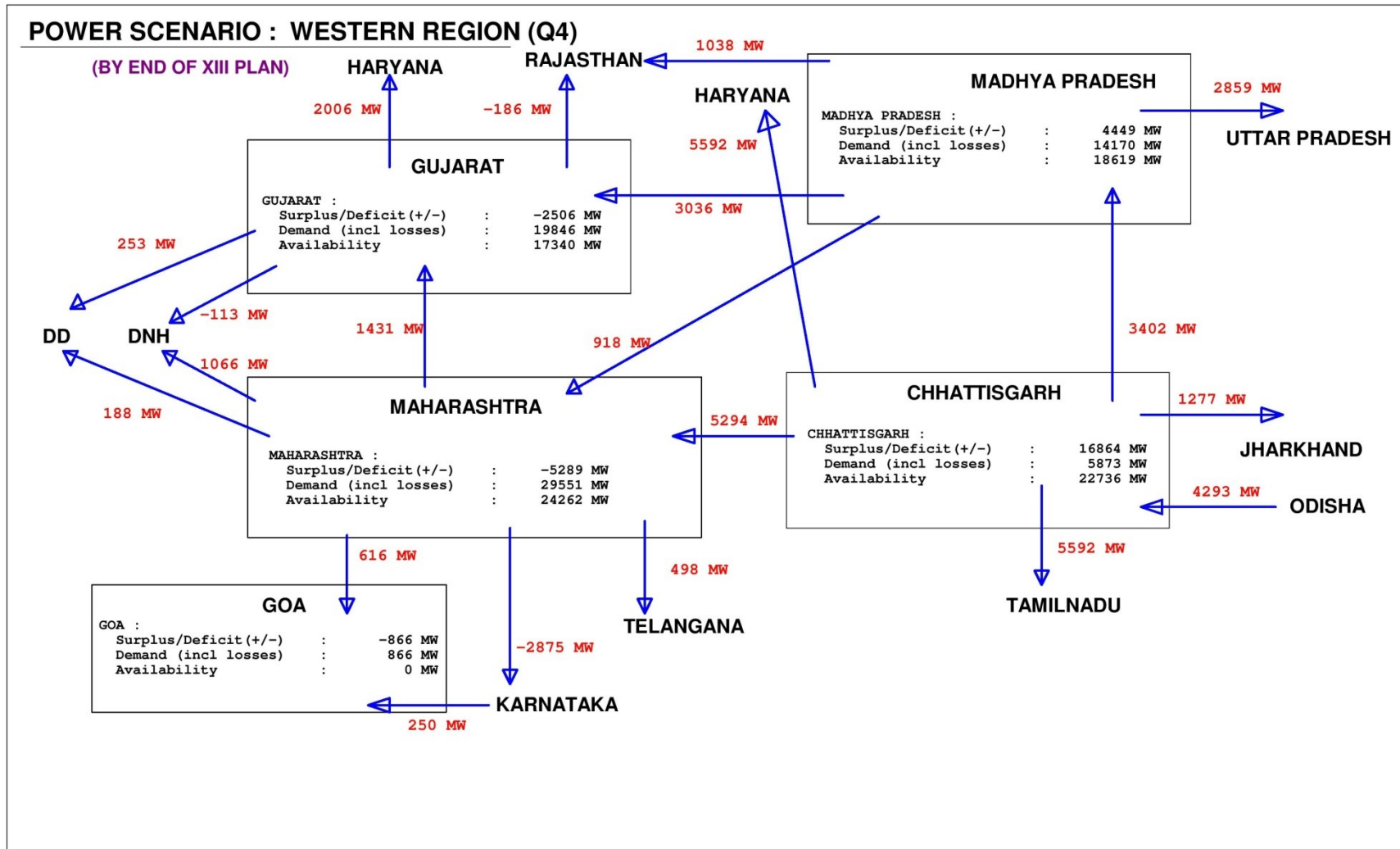
Annex 2 BQ4 All India



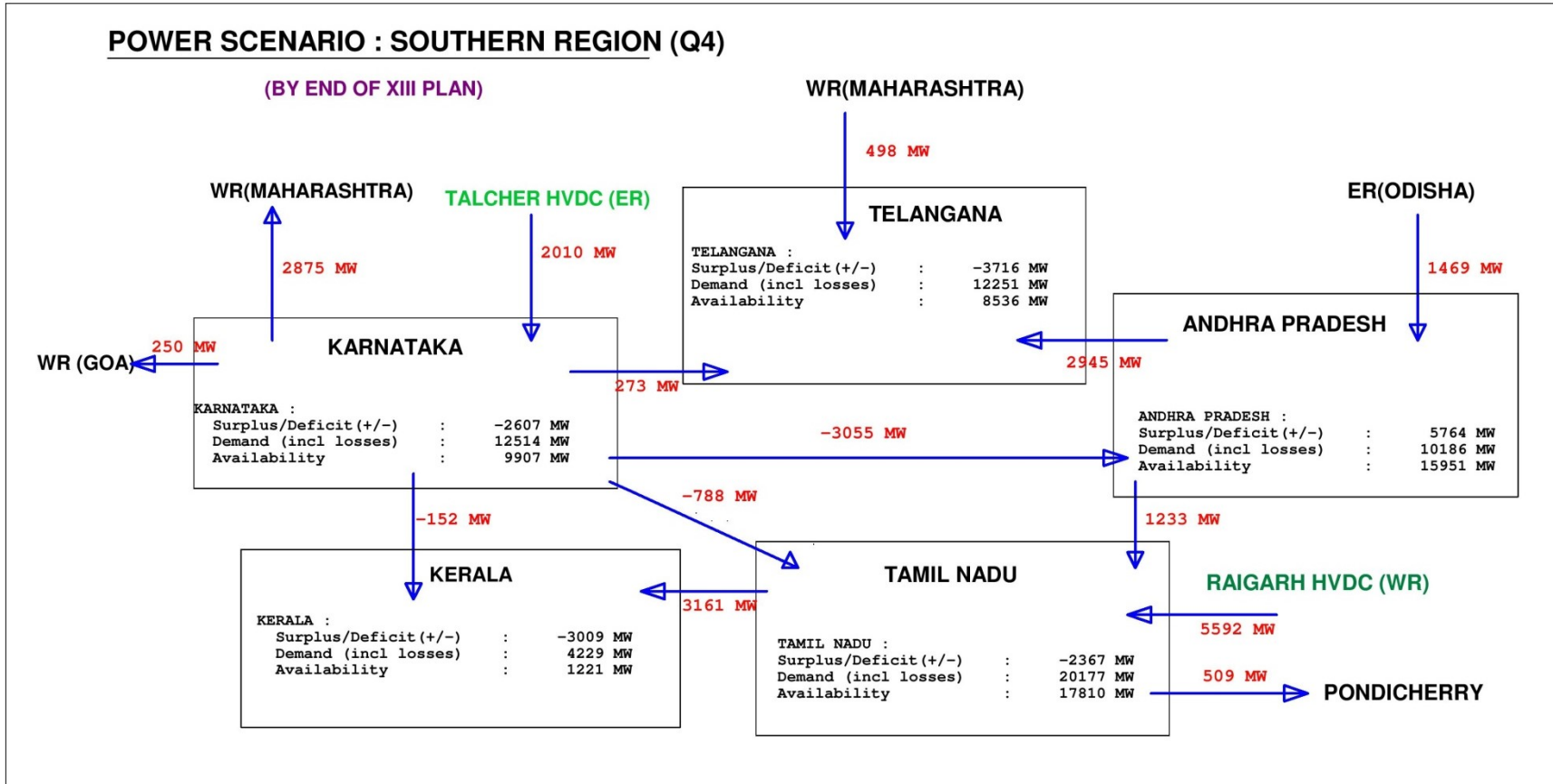
Annex 2 BQ4-NR



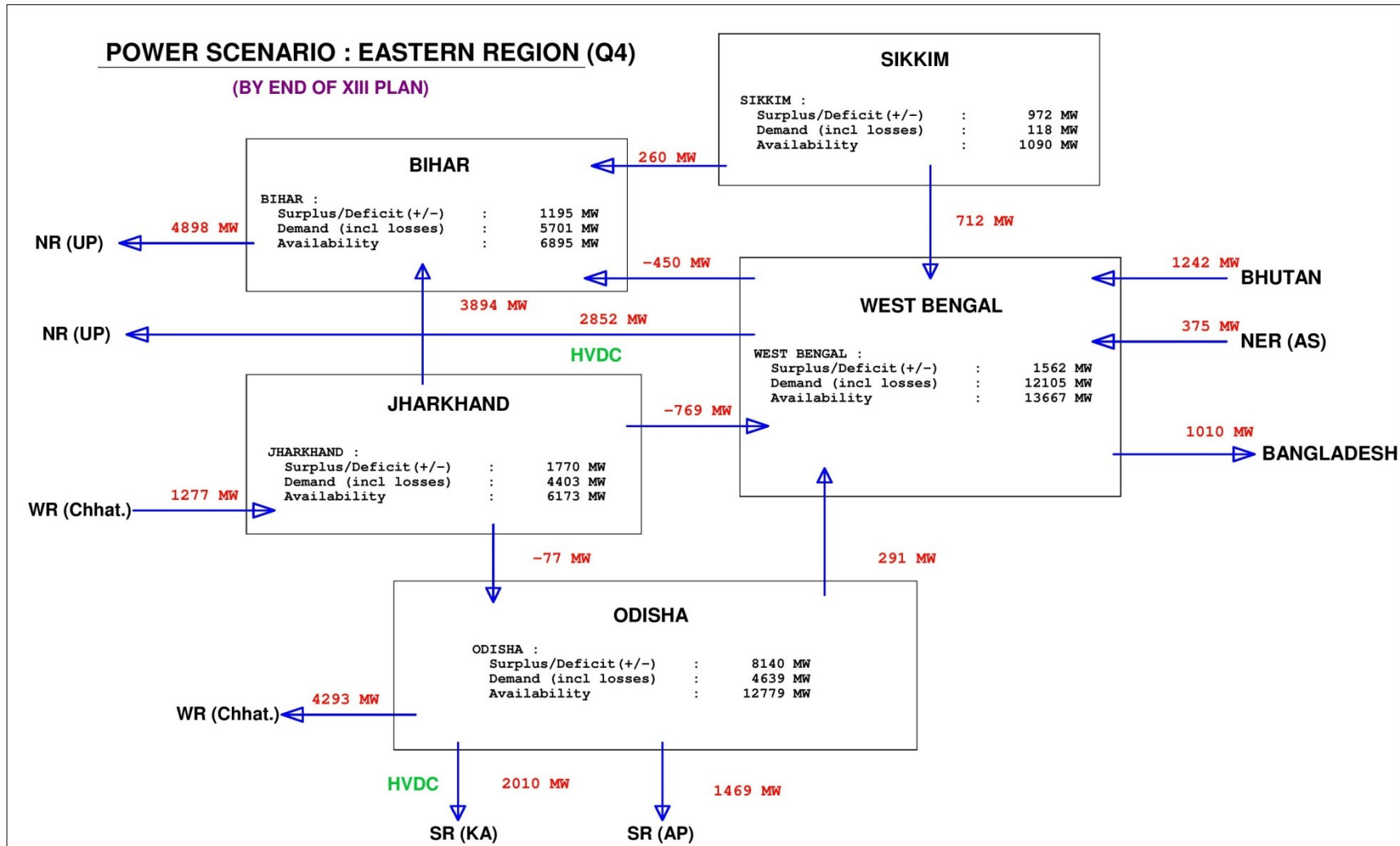
Annex 2 BQ4-WR



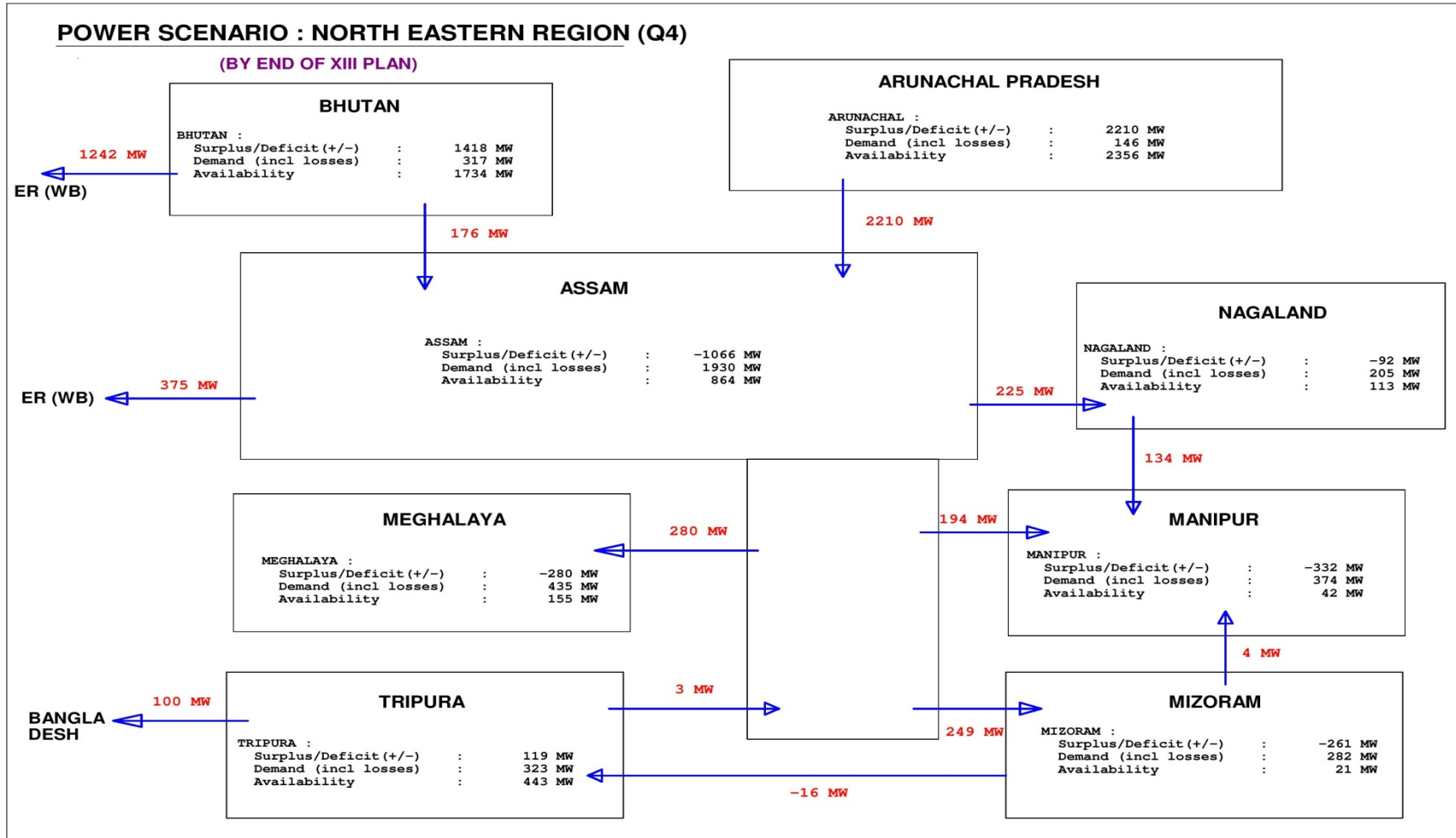
Annex 2 BQ4-SR



Annex 2 BQ4-ER



Annex 2 BQ4-NER



Annex 2 BQ4-Tie Line Flow

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 14:59
 AREA TIE LINE FLOW
 INTERCHANGE

FROM AREA 3 WEST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR	
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4	TWO TRM DC "15"
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4	TWO TRM DC "16"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "3"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "4"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "75"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "76"
354019	ZERDA	400.00*	184403	BHINMAL	400.00	1	-267.6	-11.4	
354019	ZERDA	400.00*	184404	KANKROLI	400.00	1	-260.4	51.4	
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	1	120.0	20.6	
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	2	120.0	20.6	
362040	MALNP2	220.00*	182234	AURYA2	220.00	1	-42.6	2.1	
362041	MEHGAON2	220.00*	182234	AURYA2	220.00	1	-108.4	-0.3	
362045	BADO2	220.00*	162221	SAKATPUR	220.00	1	-92.5	5.8	
362045	BADO2	220.00*	162232	MODAK	220.00	1	-146.0	42.0	
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	1	-69.2	45.1	
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	2	-69.2	45.1	
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	1	-346.5	188.7	
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	2	-346.5	188.7	
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	1	-0.0	-19.8	
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	2	-0.0	-19.8	
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	1	362.2	122.6	
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	2	387.1	136.5	
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	1	746.6	-187.9	
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	2	752.4	-187.0	
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	3	600.6	2.8	
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	4	600.6	2.8	
378057	BARETHI	765.00	188258	ORAI	765.00*	1	911.7	-225.3	
378057	BARETHI	765.00	188258	ORAI	765.00*	2	911.7	-225.3	
TOTAL FROM AREA 3 TO AREA 1							11611.9	-1590.6	

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR	
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	1	55.7	-37.5	
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	2	55.7	-37.5	
312008	RAIGR2	220.00	422015	BUDHIPADAR	220.00*	1	40.0	-13.5	
314006	RAIG4	400.00*	424015	JHARSUGUDA-A	400.00	3	-351.0	50.1	

314006 RAIG4	400.00*	424015 JHARSUGUDA-A400.00	4	-351.0	50.1
314006 RAIG4	400.00*	424091 JHARSUGUDA-B400.00	1	-177.1	23.6
314006 RAIG4	400.00*	424091 JHARSUGUDA-B400.00	2	-177.1	23.6
314008 SIPAT4	400.00*	474046 RANCHI	400.00	1	41.2 -12.4
314008 SIPAT4	400.00*	474046 RANCHI	400.00	2	41.2 -12.4
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	1	-495.4	-340.9
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	2	-495.4	-340.9
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	1	-703.2	18.8
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	2	-703.2	18.8
318032 DHARAMJAIGAR	765.00*	428091 JHARSUGUDA-B765.00	1	-550.6	21.7
318032 DHARAMJAIGAR	765.00*	428091 JHARSUGUDA-B765.00	2	-550.6	21.7
318032 DHARAMJAIGAR	765.00	478046 RANCHI-NEW	765.00*	1	503.6 81.8
318032 DHARAMJAIGAR	765.00	478046 RANCHI-NEW	765.00*	2	503.6 81.8
TOTAL FROM AREA 3 TO AREA 4				-3313.8	-403.5

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "11"	
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "12"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "33"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "34"	
342002 PONDA2	220.00	522031 AMBD	220.00*	1	-249.8	-12.3		
372013 TALANDGE	220.00*	522026 CHIKKODI	220.00	1	-159.2	10.2		
372041 KOLHA2	220.00*	522026 CHIKKODI	220.00	1	-172.3	13.9		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	1	-411.2	2.7		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	2	-411.2	2.7		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	1	-118.1	-18.9		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	2	-118.1	-18.9		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	1	-859.8	-103.4		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	2	-859.8	-103.4		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	1	-130.4	-199.2		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	2	-130.4	-199.2		
TOTAL FROM AREA 3 TO AREA 5					2965.6	-3737.2		

TOTAL FROM AREA 3 WEST 11263.8 -5731.4

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 14:59
 AREA TIE LINE FLOW
 INTERCHANGE

FROM AREA 4 EAST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "39"	
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "40"	
412026 SASARAM-PG	220.00	172278 SAHUPU_N	220.00*	1	188.7	-45.9		

414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	1	61.1	-76.6
414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	2	61.1	-76.6
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	1	72.9	-39.5	
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	2	72.9	-39.5	
414006 PATNA	400.00*	184475 BAL74-PG	400.00	1	174.2	-39.4
414006 PATNA	400.00*	184475 BAL74-PG	400.00	2	174.2	-39.4
414006 PATNA	400.00*	184475 BAL74-PG	400.00	3	195.9	-29.9
414006 PATNA	400.00*	184475 BAL74-PG	400.00	4	195.9	-29.9
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	1	302.9	-106.0
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	2	302.9	-106.0
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	1	173.2	-82.4	
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	3	173.2	-82.4	
414491 SASARAM-ER	400.00*	174479 VARANASI	400.00	1	-66.0	-70.4
414492 SASARAM-NR	400.00*	184474 ALLAHABA	400.00	1	249.3	-1.2
418008 GAYA	765.00*	187000 VARNASI8	765.00	1	571.6	-203.5
418008 GAYA	765.00*	187000 VARNASI8	765.00	2	669.8	-156.6
418008 GAYA	765.00	187701 BALI7-PG	765.00*	2	896.0	-108.2
418892 SASARAM	765.00	187705 FATEH-PG	765.00*	1	125.3	12.5
TOTAL FROM AREA 4 TO AREA 1					7446.8	-3177.1

TO AREA 2 NRTHEAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "79"
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "80"
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	1	49.3	-29.3
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	2	49.3	-29.3
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	1	188.6	-77.9
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	2	188.6	-77.9
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	3	71.6	-90.4
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	4	71.6	-90.4
TOTAL FROM AREA 4 TO AREA 2							-375.1	23.7

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	1	-55.7	37.5
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	2	-55.7	37.5
422015	BUDHIPADAR	220.00*	312008	RAIGR2	220.00	1	-40.0	13.5
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	3	351.0	-50.1	
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	4	351.0	-50.1	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	1	177.1	-23.6	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	2	177.1	-23.6	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	1	495.4	340.9	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	2	495.4	340.9	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	1	703.2	-18.8	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	2	703.2	-18.8	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	1	550.6	-21.7	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	2	550.6	-21.7	
474046	RANCHI	400.00	314008	SIPAT4	400.00*	1	-41.2	12.4
474046	RANCHI	400.00	314008	SIPAT4	400.00*	2	-41.2	12.4

478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	1	-503.6	-81.8
478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	2	-503.6	-81.8
TOTAL FROM AREA 4 TO AREA 3					3313.8	403.5

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "10"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "13"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "14"
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "9"
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	1	344.5	-344.9
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	2	344.5	-344.9
TOTAL FROM AREA 4 TO AREA 5							3493.2	-322.3

TO AREA 6 BHUTAN

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	1	-26.5	4.9
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	2	-26.5	4.9
442025	BIRPARA-PG	220.00*	282002	MALBAS2	220.00	1	-1.7	10.9
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	1	-84.8	50.0
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	2	-84.8	50.0
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	3	-84.8	50.0
444072	SILIGURI-PG	400.00	284079	MALBASE	400.00*	4	-15.4	20.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	1	-193.2	44.9
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	2	-193.2	44.9
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	3	-193.2	44.9
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	4	-193.2	44.9
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	1	-72.4	-146.1
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	2	-72.4	-146.1
TOTAL FROM AREA 4 TO AREA 6							-1241.8	77.9

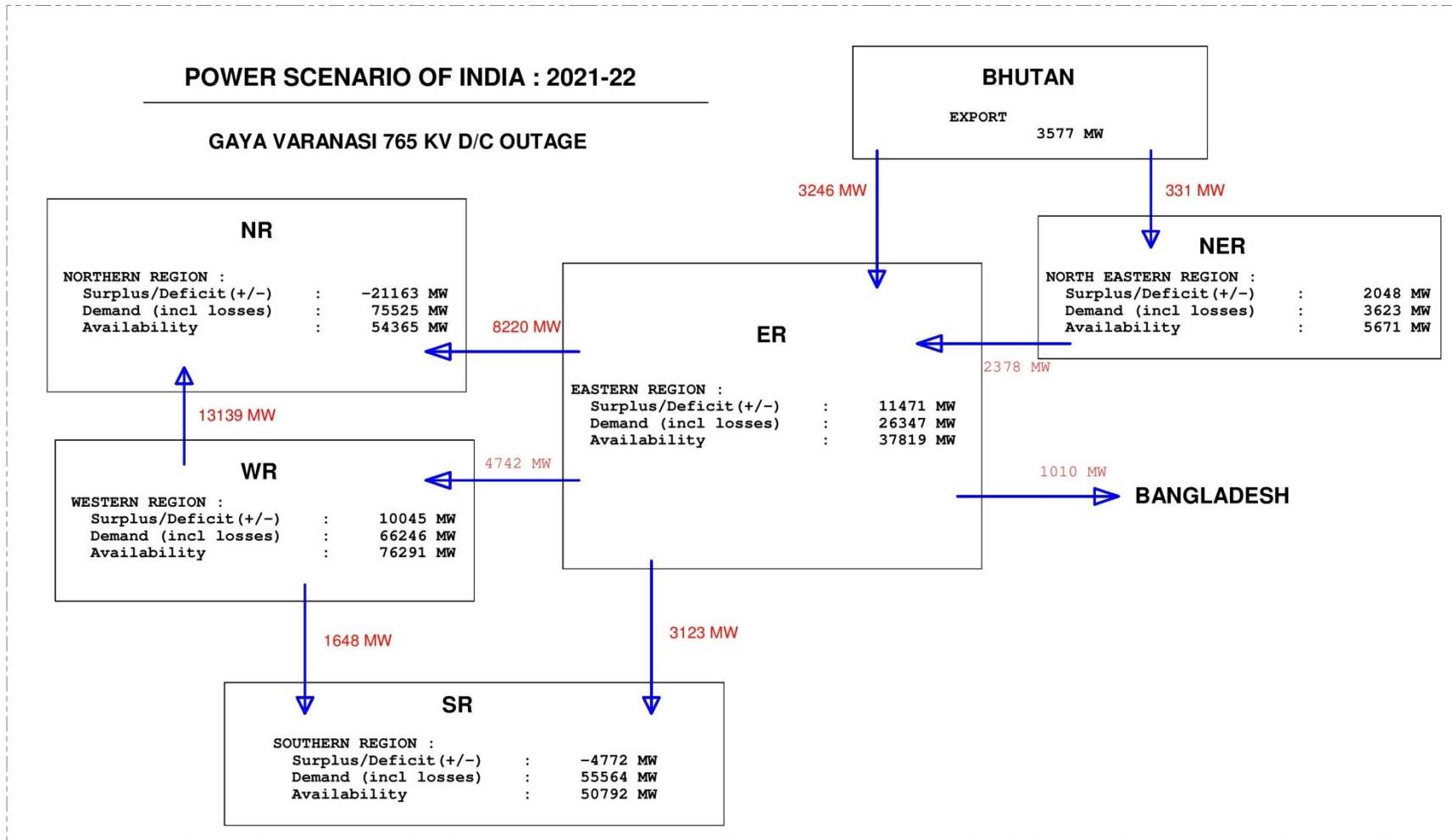
TO AREA 7 BANGLADESH

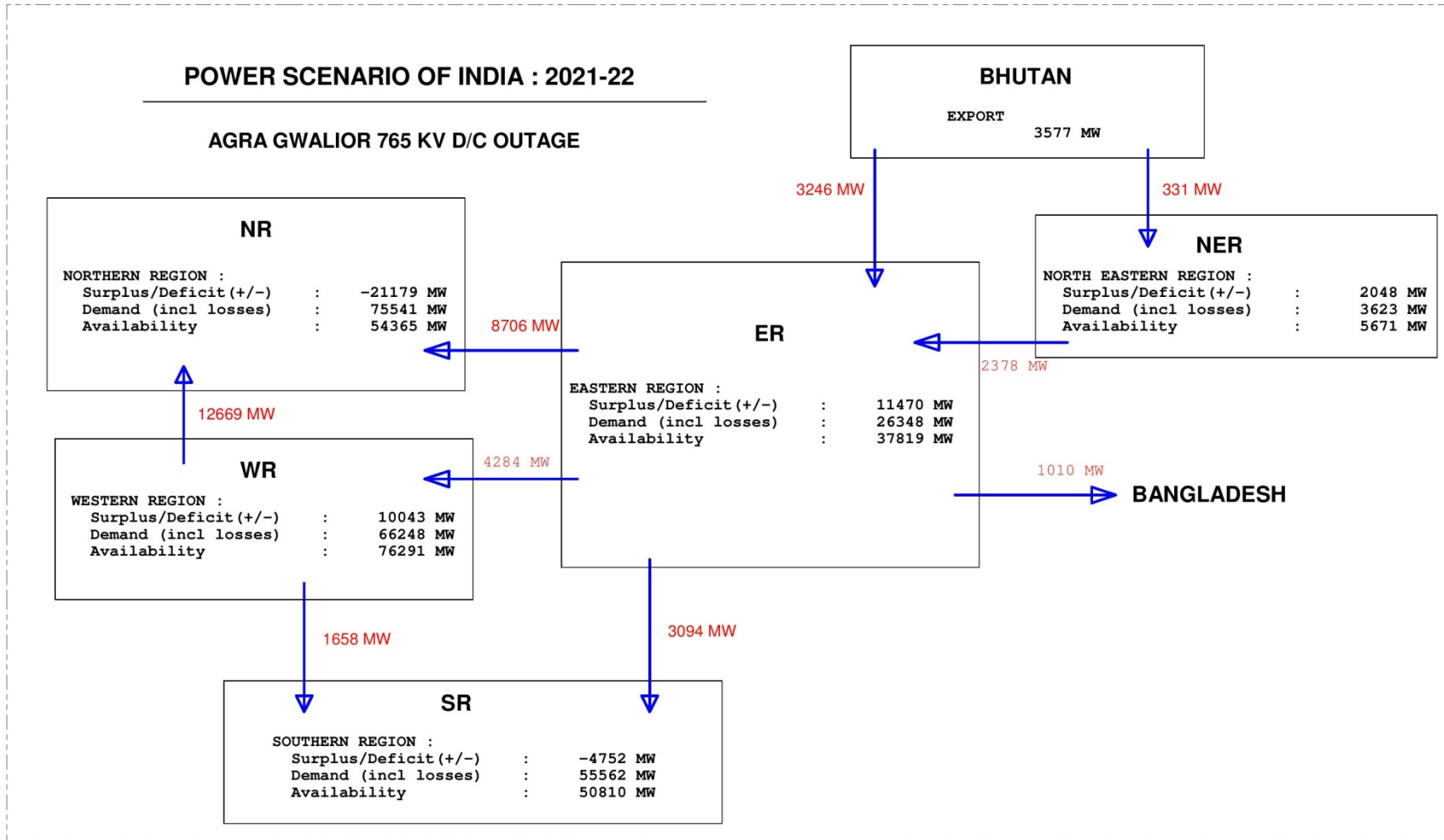
X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

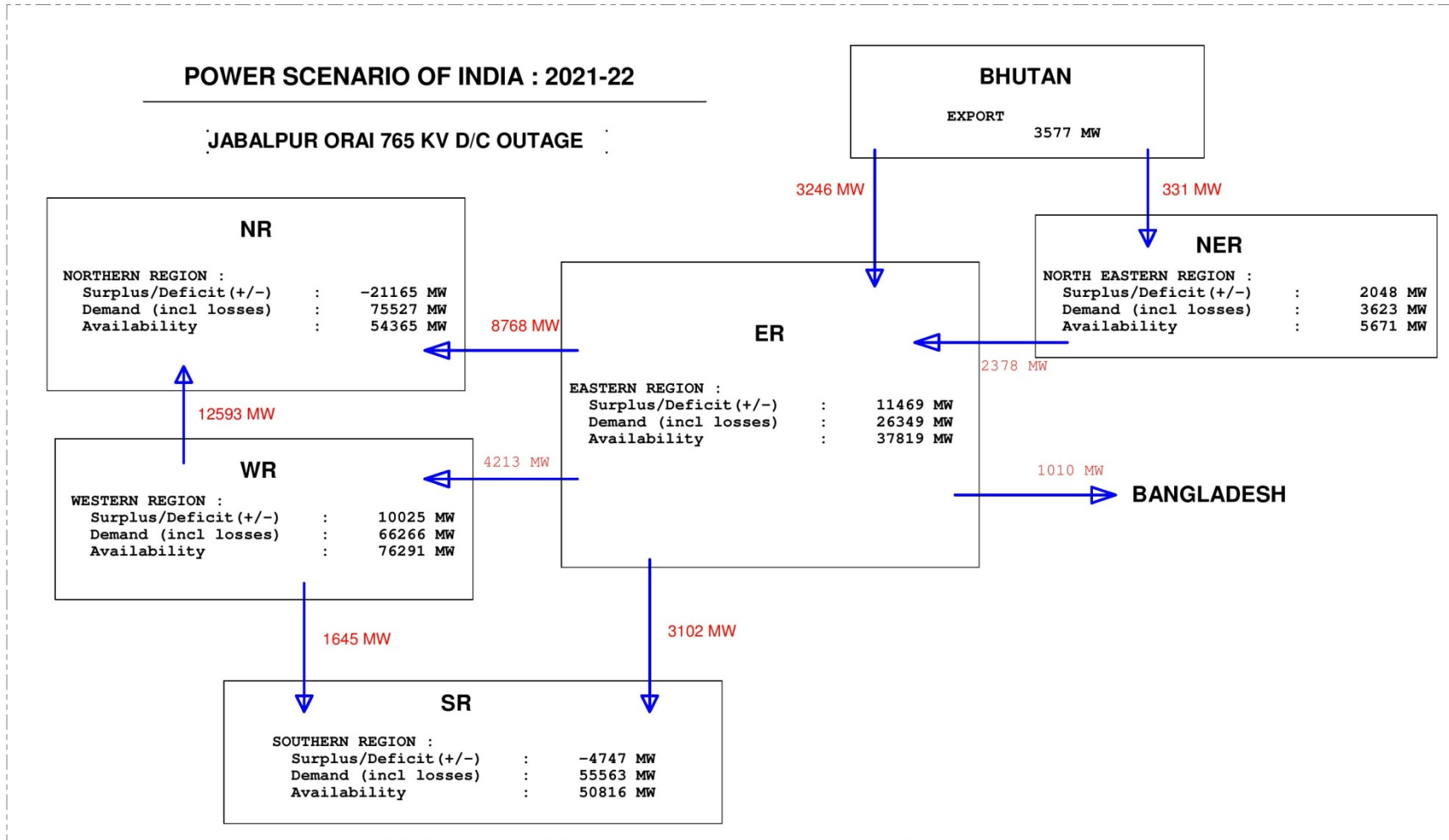
BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	1	505.1	102.8
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	2	505.1	102.8
TOTAL FROM AREA 4 TO AREA 7							1010.1	205.6

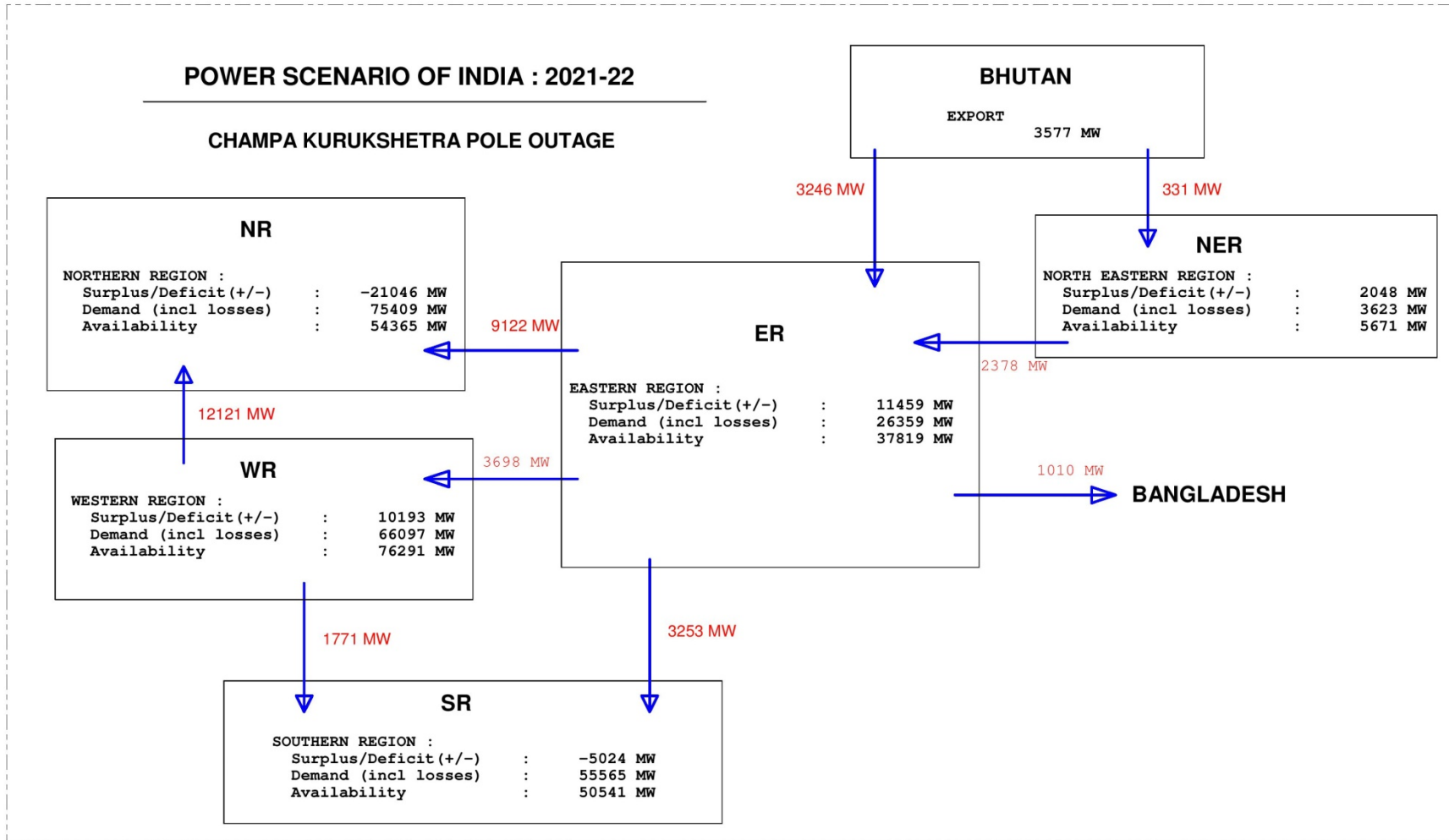
TOTAL FROM AREA 4 EAST							13647.0	-2788.7
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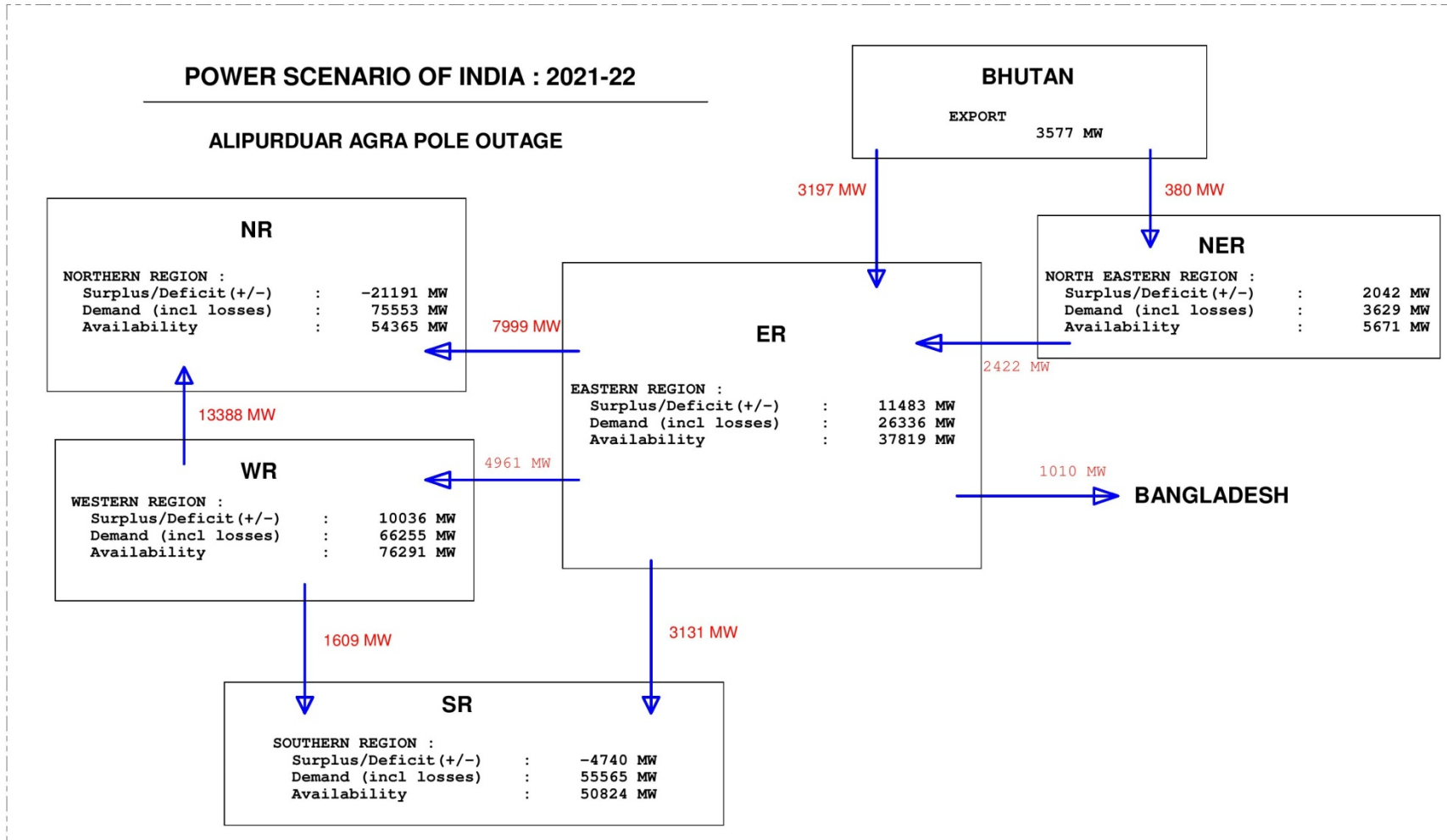
Annex 3 - A :Outage in BQ2











Annex -3B : Tie Line Flow (Outage in BQ2)

GAYA VARANASI D/C OUTAGE

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
184432		VINDHYBT		400.00	364008		VINDH_W4		400.00*	2DC	-125.1	-45.0
TWO TRM DC "15"												
184432		VINDHYBT		400.00	364008		VINDH_W4		400.00*	2DC	-125.1	-45.0
TWO TRM DC "16"												
184459		MAHIN_HV		400.00	354015		MUNDRA4		400.00*	2DC	-1002.9	-470.3
TWO TRM DC "3"												
184459		MAHIN_HV		400.00	354015		MUNDRA4		400.00*	2DC	-1002.9	-470.3
TWO TRM DC "4"												
184483		KURUKSHETR		400.00*	314033		CHAMPA_POOL		400.00	2DC	-2795.9	1304.1
TWO TRM DC "75"												
184483		KURUKSHETR		400.00*	314033		CHAMPA_POOL		400.00	2DC	-2795.9	1304.1
TWO TRM DC "76"												
162221		SAKATPUR		220.00	362045		BADO2		220.00*	1	40.5	-53.8
162232		MODAK		220.00	362045		BADO2		220.00*	1	79.4	-87.1
164429		CHIT-NEW		400.00	364086		NEEMUCH		400.00*	1	0.0	51.9
164429		CHIT-NEW		400.00	364086		NEEMUCH		400.00*	2	0.0	51.9
167773		JAIPURR		765.00*	368007		GWALIOR		765.00	1	-480.2	-280.6
167773		JAIPURR		765.00*	368007		GWALIOR		765.00	2	-513.8	-305.6
168429		CHIT-NEW		765.00*	358136		BANASKANTHA		765.00	1	-171.7	31.9
168429		CHIT-NEW		765.00*	358136		BANASKANTHA		765.00	2	-171.7	31.9
182234		AURYA2		220.00	362040		MALNP2		220.00*	1	-5.7	-88.1
182234		AURYA2		220.00	362041		MEHGAON2		220.00*	1	44.7	-93.2
184403		BHINMAL		400.00	354019		ZERDA		400.00*	1	228.5	94.6
184404		KANKROLI		400.00	354019		ZERDA		400.00*	1	223.1	10.4
184405		RAPS_C4		400.00*	364021		SHUJALPR		400.00	1	-10.7	-171.7
184405		RAPS_C4		400.00*	364021		SHUJALPR		400.00	2	-10.7	-171.7
184446		RIHNDEXT		400.00*	364025		VIN-POOL		400.00	1	302.5	-243.4
184446		RIHNDEXT		400.00*	364025		VIN-POOL		400.00	2	302.5	-243.4
187706		AGRA-PG		765.00	368007		GWALIOR		765.00*	1	-984.2	-591.5
187706		AGRA-PG		765.00	368007		GWALIOR		765.00*	2	-991.9	-599.0
188258		ORAI		765.00	368026		JABALPR-POOL		765.00*	3	-789.6	-418.5
188258		ORAI		765.00	368026		JABALPR-POOL		765.00*	4	-789.6	-418.5
188258		ORAI		765.00*	378057		BARETHI		765.00	1	-796.3	251.5
188258		ORAI		765.00*	378057		BARETHI		765.00	2	-796.3	251.5
TOTAL FROM AREA 1 TO AREA 3											-13139.1	-1412.4

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
184922		AGRA		400.00*	444073		ALIPURDU		400.00	2DC	-1425.9	928.1
TWO TRM DC "39"												
184922		AGRA		400.00*	444073		ALIPURDU		400.00	2DC	-1425.9	928.1
TWO TRM DC "40"												
172278		SAHUPU_N		220.00*	412026		SASARAM-PG		220.00	1	-283.4	55.6
174479		VARANASI		400.00	414405		BIHARSHARF-B400.00*		1	-279.3	77.2	
174479		VARANASI		400.00	414405		BIHARSHARF-B400.00*		3	-279.3	77.2	
174479		VARANASI		400.00	414491		SASARAM-ER		400.00*	1	-59.7	72.5
184474		ALLAHABA		400.00	414491		SASARAM-ER		400.00*	1	-28.6	81.6
184475		BAL74-PG		400.00	414005		BIHARSHARF-A400.00*		1	-218.6	59.9	
184475		BAL74-PG		400.00	414005		BIHARSHARF-A400.00*		2	-218.6	59.9	

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184475	BAL74-PG	400.00	414006	PATNA	400.00*	1	-331.4	54.6
184475	BAL74-PG	400.00	414006	PATNA	400.00*	2	-331.4	54.6
184475	BAL74-PG	400.00	414006	PATNA	400.00*	3	-372.8	47.2
184475	BAL74-PG	400.00	414006	PATNA	400.00*	4	-372.8	47.2
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	1	-313.1	75.7
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	2	-313.1	75.7
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	1	-287.4	85.7
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	2	-287.4	85.7
187701	BALI7-PG	765.00*	418008	GAYA	765.00	2	-1169.2	250.1
187705	FATEH-PG	765.00*	418892	SASARAM	765.00	1	-222.1	44.4
TOTAL FROM AREA 1 TO AREA 4							-8219.9	3161.1

AGRA GWALIOR D/C OUTAGE

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-57.8	TWO TRM DC "15"			
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-57.8	TWO TRM DC "16"			
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3	TWO TRM DC "3"			
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3	TWO TRM DC "4"			
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1	TWO TRM DC "75"			
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1	TWO TRM DC "76"			
162221	SAKATPUR	220.00	362045	BADO2	220.00*	1	26.8	-67.6				
162232	MODAK	220.00	362045	BADO2	220.00*	1	66.6	-101.5				
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	1	0.0	55.2				
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	2	0.0	55.2				
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	1	-850.6	-555.2				
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	2	-910.6	-598.0				
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	1	-203.9	36.7				
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	2	-203.9	36.7				
182234	AURYA2	220.00	362040	MALNP2	220.00*	1	-60.7	-135.4				
182234	AURYA2	220.00	362041	MEHGAON2	220.00*	1	-12.8	-139.4				
184403	BHINMAL	400.00	354019	ZERDA	400.00*	1	191.0	109.1				
184404	KANKROLI	400.00	354019	ZERDA	400.00*	1	196.3	17.2				
184405	RAPS_C4	400.00*	364021	SHUJALPR	400.00	1	-56.0	-208.4				
184405	RAPS_C4	400.00*	364021	SHUJALPR	400.00	2	-56.0	-208.4				
184446	RIHNDEXT	400.00*	364025	VIN-POOL	400.00	1	302.5	-243.4				
184446	RIHNDEXT	400.00*	364025	VIN-POOL	400.00	2	302.5	-243.4				
188258	ORAI	765.00	368026	JABALPR-POOL	765.00*	3	-980.0	-613.0				
188258	ORAI	765.00	368026	JABALPR-POOL	765.00*	4	-980.0	-613.0				
188258	ORAI	765.00*	378057	BARETHI	765.00	1	-796.4	249.9				
188258	ORAI	765.00*	378057	BARETHI	765.00	2	-796.4	249.9				
TOTAL FROM AREA 1 TO AREA 3							-12669.2	-1364.6				

TO AREA 4 EAST

X---- FROM AREA BUS ----X		X----- TO AREA BUS -----X						
BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1 TWO TRM DC "39"
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1 TWO TRM DC "40"
172278	SAHUPU_N	220.00*	412026	SASARAM-PG	220.00	1	-268.7	50.0
174479	VARANASI	400.00	414405	BIHARSHARF-B400.00*	400.00	1	-236.6	74.7
174479	VARANASI	400.00	414405	BIHARSHARF-B400.00*	400.00	3	-236.6	74.7
174479	VARANASI	400.00	414491	SASARAM-ER	400.00*	1	-11.9	71.5
184474	ALLAHABA	400.00	414491	SASARAM-ER	400.00*	1	-23.1	81.4
184475	BAL74-PG	400.00	414005	BIHARSHARF-A400.00*	400.00	1	-215.4	59.8
184475	BAL74-PG	400.00	414005	BIHARSHARF-A400.00*	400.00	2	-215.4	59.8
184475	BAL74-PG	400.00	414006	PATNA	400.00*	1	-317.8	54.2
184475	BAL74-PG	400.00	414006	PATNA	400.00*	2	-317.8	54.2
184475	BAL74-PG	400.00	414006	PATNA	400.00*	3	-357.6	46.7
184475	BAL74-PG	400.00	414006	PATNA	400.00*	4	-357.6	46.7
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	1	-305.3	72.8
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	2	-305.3	72.8
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	1	-286.0	83.0
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	2	-286.0	83.0
187000	VARNASI8	765.00	418008	GAYA	765.00*	1	-529.2	190.5
187000	VARNASI8	765.00	418008	GAYA	765.00*	2	-620.2	141.9
187701	BALI7-PG	765.00*	418008	GAYA	765.00	2	-727.3	97.6
187705	FATEH-PG	765.00*	418892	SASARAM	765.00	1	-235.8	16.1
TOTAL FROM AREA 1 TO AREA 4							-8705.7	3287.3

JABALPUR ORAI D/C OUTAGE

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-49.5 TWO TRM DC "15"
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-49.5 TWO TRM DC "16"
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3 TWO TRM DC "3"
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3 TWO TRM DC "4"
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1 TWO TRM DC "75"
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1 TWO TRM DC "76"
162221	SAKATPUR	220.00	362045	BADO2	220.00*	1	28.3	-56.4
162232	MODAK	220.00	362045	BADO2	220.00*	1	65.3	-89.0
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	1	0.0	52.8
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	2	0.0	52.8
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	1	-570.6	-297.5
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	2	-610.5	-323.4
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	1	-206.9	33.4
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	2	-206.9	33.4
182234	AURYA2	220.00	362040	MALNP2	220.00*	1	-22.0	-90.7
182234	AURYA2	220.00	362041	MEHGAON2	220.00*	1	27.6	-95.4
184403	BHINMAL	400.00	354019	ZERDA	400.00*	1	188.9	103.6
184404	KANKROLI	400.00	354019	ZERDA	400.00*	1	194.2	16.2

184405 RAPS_C4	400.00*	364021 SHUJALPR	400.00	1	-48.9	-180.6
184405 RAPS_C4	400.00*	364021 SHUJALPR	400.00	2	-48.9	-180.6
184446 RIHNDEXT	400.00*	364025 VIN-POOL	400.00	1	302.5	-243.4
184446 RIHNDEXT	400.00*	364025 VIN-POOL	400.00	2	302.5	-243.4
187706 AGRA-PG	765.00	368007 GWALIOR	765.00*	1	-1268.9	-679.6
187706 AGRA-PG	765.00	368007 GWALIOR	765.00*	2	-1278.8	-687.7
188258 ORAI	765.00*	378057 BARETHI	765.00	1	-796.3	100.2
188258 ORAI	765.00*	378057 BARETHI	765.00	2	-796.3	100.2
TOTAL FROM AREA 1 TO AREA 3					-12593.3	-1106.3

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1 TWO TRM DC "39"
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1 TWO TRM DC "40"
172278	SAHUPU_N	220.00*	412026	SASARAM-PG	220.00	1	-272.8	50.5
174479	VARANASI	400.00	414405	BIHARSHARF-B400.00*	1		-240.3	76.7
174479	VARANASI	400.00	414405	BIHARSHARF-B400.00*	3		-240.3	76.7
174479	VARANASI	400.00	414491	SASARAM-ER	400.00*	1	-17.6	71.5
184474	ALLAHABA	400.00	414491	SASARAM-ER	400.00*	1	-33.2	80.6
184475	BAL74-PG	400.00	414005	BIHARSHARF-A400.00*	1		-218.3	59.5
184475	BAL74-PG	400.00	414005	BIHARSHARF-A400.00*	2		-218.3	59.5
184475	BAL74-PG	400.00	414006	PATNA	400.00*	1	-320.5	54.1
184475	BAL74-PG	400.00	414006	PATNA	400.00*	2	-320.5	54.1
184475	BAL74-PG	400.00	414006	PATNA	400.00*	3	-360.5	46.6
184475	BAL74-PG	400.00	414006	PATNA	400.00*	4	-360.5	46.6
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	1	-310.7	74.3
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	2	-310.7	74.3
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	1	-286.8	84.6
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	2	-286.8	84.6
187000	VARNAS18	765.00	418008	GAYA	765.00*	1	-535.8	198.4
187000	VARNAS18	765.00	418008	GAYA	765.00*	2	-627.9	151.0
187701	BAL17-PG	765.00*	418008	GAYA	765.00	2	-735.8	102.3
187705	FATEH-PG	765.00*	418892	SASARAM	765.00	1	-218.9	38.2
TOTAL FROM AREA 1 TO AREA 4							-8768.0	3340.2

CHAMPA KURUKSHETRA ONE POLE (3000 MW)

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-44.0 TWO TRM DC "15"
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-44.0 TWO TRM DC "16"
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3 TWO TRM DC "3"
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3 TWO TRM DC "4"
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1 TWO TRM DC "76"
162221	SAKATPUR	220.00	362045	BADO2	220.00*	1	24.5	-39.6
162232	MODAK	220.00	362045	BADO2	220.00*	1	60.6	-69.5

164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	1	0.0	49.0
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	2	0.0	49.0
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	1	-665.3	-198.8
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	2	-711.4	-217.4
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	1	-236.6	34.5
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	2	-236.6	34.5
182234	AURYA2	220.00	362040	MALNP2	220.00*	1	-14.9	-70.1
182234	AURYA2	220.00	362041	MEHGAON2	220.00*	1	36.1	-73.8
184403	BHINMAL	400.00	354019	ZERDA	400.00*	1	158.5	104.6
184404	KANKROLI	400.00	354019	ZERDA	400.00*	1	172.5	19.1
184405	RAPS_C4	400.00*	364021	SHUJALPR	400.00	1	-66.7	-141.8
184405	RAPS_C4	400.00*	364021	SHUJALPR	400.00	2	-66.7	-141.8
184446	RIHNDEXT	400.00*	364025	VIN-POOL	400.00	1	302.5	-243.4
184446	RIHNDEXT	400.00*	364025	VIN-POOL	400.00	2	302.5	-243.4
187706	AGRA-PG	765.00	368007	GWALIOR	765.00*	1	-1230.2	-460.5
187706	AGRA-PG	765.00	368007	GWALIOR	765.00*	2	-1239.8	-466.9
188258	ORAI	765.00	368026	JABALPR-POOL	765.00*	3	-1032.7	-400.1
188258	ORAI	765.00	368026	JABALPR-POOL	765.00*	4	-1032.7	-400.1
188258	ORAI	765.00*	378057	BARETHI	765.00	1	-796.3	256.3
188258	ORAI	765.00*	378057	BARETHI	765.00	2	-796.3	256.3
TOTAL FROM AREA 1 TO AREA 3							-12120.8	-2088.2

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1	TWO TRM DC "39"			
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1	TWO TRM DC "40"			
172278	SAHUPU_N	220.00*	412026	SASARAM-PG	220.00	1	-280.8	54.2				
174479	VARANASI	400.00	414405	BIHARSHARF-B	400.00*	1	-256.4	76.1				
174479	VARANASI	400.00	414405	BIHARSHARF-B	400.00*	3	-256.4	76.1				
174479	VARANASI	400.00	414491	SASARAM-ER	400.00*	1	-21.2	71.0				
184474	ALLAHABA	400.00	414491	SASARAM-ER	400.00*	1	-46.8	82.9				
184475	BAL74-PG	400.00	414005	BIHARSHARF-A	400.00*	1	-233.0	61.9				
184475	BAL74-PG	400.00	414005	BIHARSHARF-A	400.00*	2	-233.0	61.9				
184475	BAL74-PG	400.00	414006	PATNA	400.00*	1	-335.0	54.7				
184475	BAL74-PG	400.00	414006	PATNA	400.00*	2	-335.0	54.7				
184475	BAL74-PG	400.00	414006	PATNA	400.00*	3	-376.8	47.3				
184475	BAL74-PG	400.00	414006	PATNA	400.00*	4	-376.8	47.3				
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	1	-331.3	72.0				
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	2	-331.3	72.0				
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	1	-290.1	82.1				
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	2	-290.1	82.1				
187000	VARNAS18	765.00	418008	GAYA	765.00*	1	-577.1	195.2				
187000	VARNAS18	765.00	418008	GAYA	765.00*	2	-676.3	147.5				
187701	BALI7-PG	765.00*	418008	GAYA	765.00	2	-781.2	112.3				
187705	FATEH-PG	765.00*	418892	SASARAM	765.00	1	-241.5	33.2				
TOTAL FROM AREA 1 TO AREA 4							-9121.9	3340.6				

ALIPURDUAR AGRA POLE OUTAGE

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
184432		VINDHYBT		400.00	364008		VINDH_W4		400.00*	2DC	-125.1	-45.0
TWO TRM DC "15"												
184432		VINDHYBT		400.00	364008		VINDH_W4		400.00*	2DC	-125.1	-45.0
TWO TRM DC "16"												
184459		MAHIN_HV		400.00	354015		MUNDRA4		400.00*	2DC	-1002.9	-470.3
TWO TRM DC "3"												
184459		MAHIN_HV		400.00	354015		MUNDRA4		400.00*	2DC	-1002.9	-470.3
TWO TRM DC "4"												
184483		KURUKSHETR		400.00*	314033		CHAMPA_POOL		400.00	2DC	-2795.9	1304.1
TWO TRM DC "75"												
184483		KURUKSHETR		400.00*	314033		CHAMPA_POOL		400.00	2DC	-2795.9	1304.1
TWO TRM DC "76"												
162221		SAKATPUR		220.00	362045		BADO2		220.00*	1	37.5	-51.6
162232		MODAK		220.00	362045		BADO2		220.00*	1	76.1	-84.4
164429		CHIT-NEW		400.00	364086		NEEMUCH		400.00*	1	-0.0	51.8
164429		CHIT-NEW		400.00	364086		NEEMUCH		400.00*	2	-0.0	51.8
167773		JAIPURR		765.00*	368007		GWALIOR		765.00	1	-491.1	-269.5
167773		JAIPURR		765.00*	368007		GWALIOR		765.00	2	-525.4	-293.7
168429		CHIT-NEW		765.00*	358136		BANASKANTHA		765.00	1	-180.5	32.3
168429		CHIT-NEW		765.00*	358136		BANASKANTHA		765.00	2	-180.5	32.3
182234		AURYA2		220.00	362040		MALNP2		220.00*	1	-6.4	-85.5
182234		AURYA2		220.00	362041		MEHGAON2		220.00*	1	44.1	-90.4
184403		BHINMAL		400.00	354019		ZERDA		400.00*	1	217.9	96.7
184404		KANKROLI		400.00	354019		ZERDA		400.00*	1	214.9	12.3
184405		RAPS_C4		400.00*	364021		SHUJALPR		400.00	1	-23.3	-166.6
184405		RAPS_C4		400.00*	364021		SHUJALPR		400.00	2	-23.3	-166.6
184446		RIHNDEXT		400.00*	364025		VIN-POOL		400.00	1	302.5	-243.4
184446		RIHNDEXT		400.00*	364025		VIN-POOL		400.00	2	302.5	-243.4
187706		AGRA-PG		765.00	368007		GWALIOR		765.00*	1	-1044.7	-577.6
187706		AGRA-PG		765.00	368007		GWALIOR		765.00*	2	-1052.9	-584.9
188258		ORAI		765.00	368026		JABALPR-POOL		765.00*	3	-807.1	-414.0
188258		ORAI		765.00	368026		JABALPR-POOL		765.00*	4	-807.1	-414.0
188258		ORAI		765.00*	378057		BARETHI		765.00	1	-796.3	252.1
188258		ORAI		765.00*	378057		BARETHI		765.00	2	-796.3	252.1
TOTAL FROM AREA 1 TO AREA 3											-13387.6	-1326.6

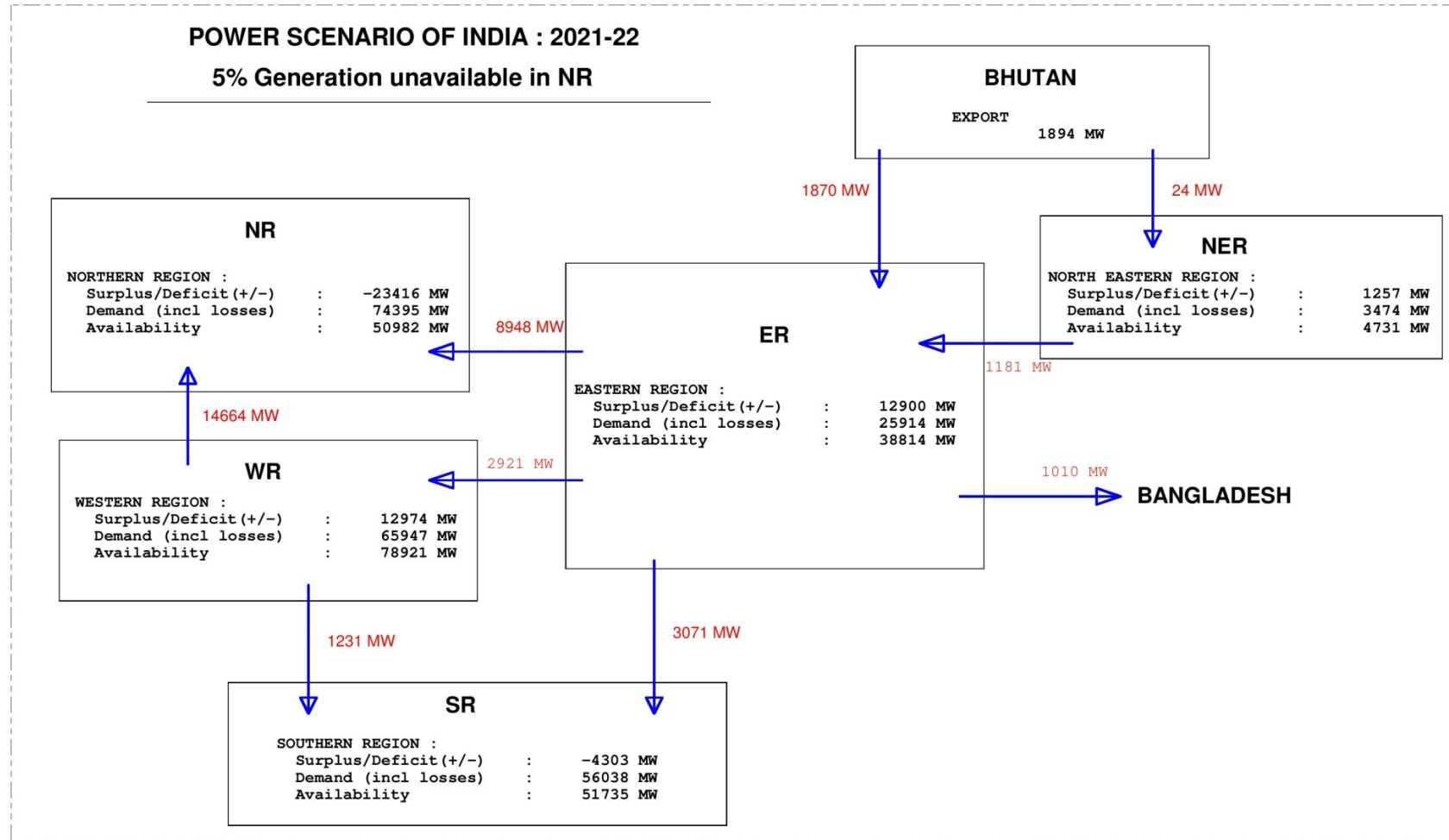
TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
184922		AGRA		400.00*	444073		ALIPURDU		400.00	2DC	-1425.9	928.1
TWO TRM DC "40"												
172278		SAHUPU_N		220.00*	412026		SASARAM-PG		220.00	1	-284.8	57.7
174479		VARANASI		400.00	414405		BIHARSHARF-B400.00*		1	-260.5	77.2	
174479		VARANASI		400.00	414405		BIHARSHARF-B400.00*		3	-260.5	77.2	
174479		VARANASI		400.00	414491		SASARAM-ER		400.00*	1	-31.0	75.6
184474		ALLAHABA		400.00	414491		SASARAM-ER		400.00*	1	-55.5	84.9
184475		BAL74-PG		400.00	414005		BIHARSHARF-A400.00*		1	-262.6	71.9	
184475		BAL74-PG		400.00	414005		BIHARSHARF-A400.00*		2	-262.6	71.9	
184475		BAL74-PG		400.00	414006		PATNA		400.00*	1	-372.5	60.3
184475		BAL74-PG		400.00	414006		PATNA		400.00*	2	-372.5	60.3
184475		BAL74-PG		400.00	414006		PATNA		400.00*	3	-419.1	53.7
184475		BAL74-PG		400.00	414006		PATNA		400.00*	4	-419.1	53.7
184927		GORAKHPU		400.00	414001		MUZAFARPUR		400.00*	1	-389.5	81.5

184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	2	-389.5	81.5
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	1	-299.1	78.3
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	2	-299.1	78.3
187000	VARNASIS8	765.00	418008	GAYA	765.00*	1	-554.4	197.0
187000	VARNASIS8	765.00	418008	GAYA	765.00*	2	-649.7	149.4
187701	BALI7-PG	765.00*	418008	GAYA	765.00	2	-718.8	102.6
187705	FATEH-PG	765.00*	418892	SASARAM	765.00	1	-272.7	47.8
TOTAL FROM AREA 1 TO AREA 4							-7999.3	2488.9

Annex 4A : Scenario 5% Generation U/A in NR



Annex 4B Tie Line Flow 5% Generation U/A in NR

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:12

AREA TIE LINE
INTERCHANGE

FROM AREA 3 WEST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4 TWO TRM DC "15"
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4 TWO TRM DC "16"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3 TWO TRM DC "3"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3 TWO TRM DC "4"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1 TWO TRM DC "75"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1 TWO TRM DC "76"
354019	ZERDA	400.00*	184403	BHINMAL	400.00	1	-161.4	-309.6
354019	ZERDA	400.00*	184404	KANKROLI	400.00	1	-172.2	-98.1
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	1	279.2	-146.3
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	2	279.2	-146.3
362040	MALNP2	220.00*	182234	AURYA2	220.00	1	0.5	23.5
362041	MEHGAON2	220.00*	182234	AURYA2	220.00	1	-53.3	25.3
362045	BADO2	220.00*	162221	SAKATPUR	220.00	1	-47.4	12.9
362045	BADO2	220.00*	162232	MODAK	220.00	1	-83.6	39.7
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	1	36.5	26.4
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	2	36.5	26.4
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	1	-312.5	243.4
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	2	-312.5	243.4
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	1	-0.1	-71.6
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	2	-0.1	-71.6
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	1	585.6	96.0
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	2	625.8	107.4
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	1	1208.8	-58.0
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	2	1218.3	-56.0
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	3	997.6	119.0
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	4	997.6	119.0
378057	BARETHI	765.00	188258	ORAI	765.00*	1	846.8	-256.0
378057	BARETHI	765.00	188258	ORAI	765.00*	2	846.8	-256.0
TOTAL FROM AREA 3 TO AREA 1							14663.8	-1975.9

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	1	63.6	-41.7
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	2	63.6	-41.7
312008	RAIGR2	220.00	422015	BUDHIPADAR	220.00*	1	51.2	-13.1
314006	RAIG4	400.00*	424015	JHARSUGUDA-A	400.00	3	-306.1	87.8
314006	RAIG4	400.00*	424015	JHARSUGUDA-A	400.00	4	-306.1	87.8
314006	RAIG4	400.00*	424091	JHARSUGUDA-B	400.00	1	-125.9	29.0
314006	RAIG4	400.00*	424091	JHARSUGUDA-B	400.00	2	-125.9	29.0

314008 SIPAT4	400.00*	474046 RANCHI	400.00	1	76.0	-16.7	
314008 SIPAT4	400.00*	474046 RANCHI	400.00	2	76.0	-16.7	
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	765.00	1	-420.5	-309.8	
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	765.00	2	-420.5	-309.8	
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	765.00*	1	-813.5	-24.3	
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	765.00*	2	-813.5	-24.3	
318032 DHARAMJAIGAR765.00*	428091 JHARSUGUDA-B765.00	765.00	1	-524.7	3.3		
318032 DHARAMJAIGAR765.00*	428091 JHARSUGUDA-B765.00	765.00	2	-524.7	3.3		
318032 DHARAMJAIGAR765.00	478046 RANCHI-NEW	765.00*	765.00*	1	564.6	28.6	
318032 DHARAMJAIGAR765.00	478046 RANCHI-NEW	765.00*	765.00*	2	564.6	28.6	
TOTAL FROM AREA 3 TO AREA 4					-2921.5	-500.6	

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X-- NAME --X BASKV	BUS# X-- NAME --X BASKV	CKT	MW	MVAR		
374007 BHADR4	400.00 514009 CHAND-SR	400.00* 2DC	497.0	-251.6	TWO TRM DC "11"	
374007 BHADR4	400.00 514009 CHAND-SR	400.00* 2DC	497.0	-251.6	TWO TRM DC "12"	
314029 RAIGARH_POOL	400.00 544016 PUGALUR-NEW	400.00* 2DC	2795.9	-1304.1	TWO TRM DC "33"	
314029 RAIGARH_POOL	400.00 544016 PUGALUR-NEW	400.00* 2DC	2795.9	-1304.1	TWO TRM DC "34"	
342002 PONDA2	220.00 522031 AMBD	220.00* 1	-267.7	-28.7		
372013 TALANDGE	220.00* 522026 CHIKKODI	220.00 1	-177.0	-7.4		
372041 KOLHA2	220.00* 522026 CHIKKODI	220.00 1	-189.0	-4.2		
374050 KOLHAPURPG	400.00 524015 NARDR-NW	400.00* 1	-442.1	-95.7		
374050 KOLHAPURPG	400.00 524015 NARDR-NW	400.00* 2	-442.1	-95.7		
378021 WARDHA	765.00 518062 NIZAMABAD	765.00* 1	-395.0	-175.5		
378021 WARDHA	765.00 518062 NIZAMABAD	765.00* 2	-395.0	-175.5		
378040 SHOLAPUR-PG	765.00* 528003 RAIC800	765.00 1	-1084.7	-279.4		
378040 SHOLAPUR-PG	765.00* 528003 RAIC800	765.00 2	-1084.7	-279.4		
378091 WARORA POOL	765.00* 518079 WARN800	765.00 1	-438.7	-385.8		
378091 WARORA POOL	765.00* 518079 WARN800	765.00 2	-438.7	-385.8		
TOTAL FROM AREA 3 TO AREA 5			1231.3	-5024.8		

TOTAL FROM AREA 3 WEST 12973.6 -7501.3

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:12
 AREA TIE LINE
 INTERCHANGE

FROM AREA 4 EAST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X-- NAME --X BASKV	BUS# X-- NAME --X BASKV	CKT	MW	MVAR		
444073 ALIPURDU	400.00 184922 AGRA	400.00* 2DC	1425.9	-928.1	TWO TRM DC "39"	
444073 ALIPURDU	400.00 184922 AGRA	400.00* 2DC	1425.9	-928.1	TWO TRM DC "40"	
412026 SASARAM-PG	220.00 172278 SAHUPU_N	220.00* 1	240.8	-91.0		
414001 MUZAFARPUR	400.00* 184927 GORAKHPU	400.00 1	215.8	-78.2		
414001 MUZAFARPUR	400.00* 184927 GORAKHPU	400.00 2	215.8	-78.2		
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00 1	164.6	-22.4		

414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	2	164.6	-22.4
414006 PATNA	400.00* 184475 BAL74-PG	400.00	1	254.3	-30.3
414006 PATNA	400.00* 184475 BAL74-PG	400.00	2	254.3	-30.3
414006 PATNA	400.00* 184475 BAL74-PG	400.00	3	286.1	-19.7
414006 PATNA	400.00* 184475 BAL74-PG	400.00	4	286.1	-19.7
414068 MOTIHARI	400.00* 184927 GORAKHPU	400.00	1	292.2	-115.3
414068 MOTIHARI	400.00* 184927 GORAKHPU	400.00	2	292.2	-115.3
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	1	231.6	-82.5
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	3	231.6	-82.5
414491 SASARAM-ER	400.00* 174479 VARANASI	400.00	1	1.0	-96.9
414492 SASARAM-NR	400.00* 184474 ALLAHABA	400.00	1	249.3	-2.0
418008 GAYA	765.00* 187000 VARNASI8	765.00	1	692.6	-204.7
418008 GAYA	765.00* 187000 VARNASI8	765.00	2	811.6	-157.8
418008 GAYA	765.00 187701 BALI7-PG	765.00*	2	991.5	-121.3
418892 SASARAM	765.00 187705 FATEH-PG	765.00*	1	220.4	-8.7
TOTAL FROM AREA 4 TO AREA 1				8948.2	-3235.4

TO AREA 2 NRTHEAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "79"
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "80"
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	1	-11.9	-31.1
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	2	-11.9	-31.1
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	1	20.1	-75.9
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	2	20.1	-75.9
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	3	-101.6	-134.7
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	4	-101.6	-134.7
TOTAL FROM AREA 4 TO AREA 2							-1180.6	-64.4

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	1	-63.6	41.7
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	2	-63.6	41.7
422015	BUDHIPADAR	220.00*	312008	RAIGR2	220.00	1	-51.2	13.1
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	3	306.1	-87.8	
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	4	306.1	-87.8	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	1	125.9	-29.0	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	2	125.9	-29.0	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	1	420.5	309.8	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	2	420.5	309.8	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	1	813.5	24.3	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	2	813.5	24.3	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	1	524.7	-3.3	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	2	524.7	-3.3	
474046	RANCHI	400.00	314008	SIPAT4	400.00*	1	-76.0	16.7
474046	RANCHI	400.00	314008	SIPAT4	400.00*	2	-76.0	16.7
478046	RANCHI-NEW	765.00*	318032	DHARAMJAIGAR	765.00	1	-564.6	-28.6
478046	RANCHI-NEW	765.00*	318032	DHARAMJAIGAR	765.00	2	-564.6	-28.6
TOTAL FROM AREA 4 TO AREA 3							2921.5	500.6

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "10"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "13"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "14"
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "9"
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	1	133.6	-659.0
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	2	133.6	-659.0
TOTAL FROM AREA 4 TO AREA 5							3071.5	-950.6

TO AREA 6 BHUTAN

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	1	-38.7	15.9
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	2	-38.7	15.9
442025	BIRPARA-PG	220.00*	282002	MALBAS2	220.00	1	5.1	17.0
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	1	-117.3	61.4
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	2	-117.3	61.4
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	3	-117.3	61.4
444072	SILIGURI-PG	400.00	284079	MALBASE	400.00*	4	-65.6	28.8
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	1	-263.3	46.4
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	2	-263.3	46.4
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	3	-263.3	46.4
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	4	-263.3	46.4
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	1	-163.7	-147.2
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	2	-163.7	-147.2
TOTAL FROM AREA 4 TO AREA 6							-1870.4	153.3

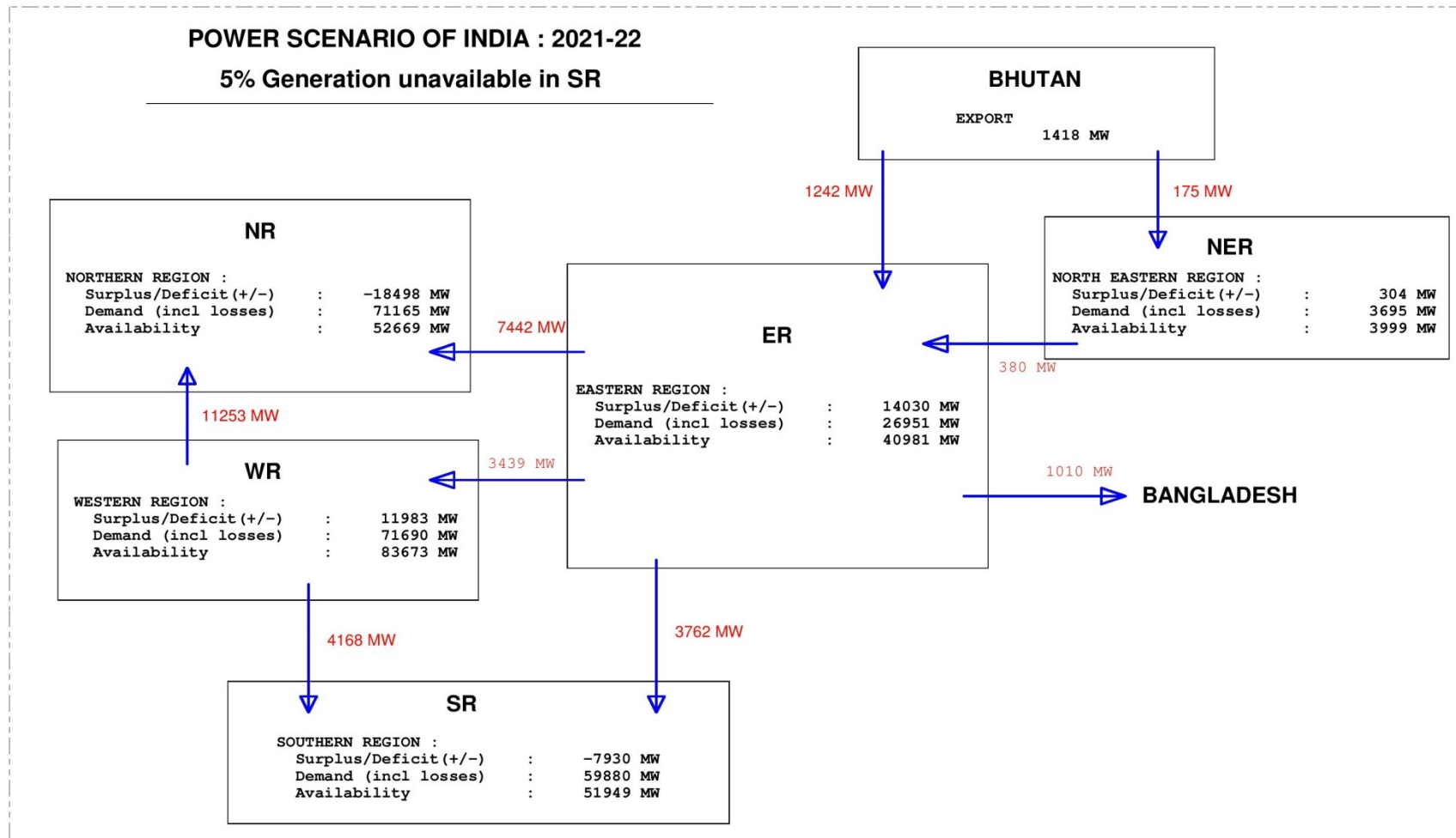
TO AREA 7 BANGLADESH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X-- NAME --X	BASKV	BUS#	X-- NAME --X	BASKV	CKT	MW	MVAR
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	1	504.8	97.7
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	2	504.8	97.7
TOTAL FROM AREA 4 TO AREA 7							1009.7	195.4

TOTAL FROM AREA 4 EAST							12899.7	-3401.0
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Annex 4-C : Scenario 5% Generation U/A in SR



Annex 4D :Tie Line Flow 5% Generation U/A in SR

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:15

AREA TIE LINE
INTERCHANGE

FROM AREA 3 WEST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR		
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4	TWO TRM DC "15"					
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4	TWO TRM DC "16"					
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "3"					
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "4"					
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "75"					
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "76"					
354019	ZERDA	400.00*	184403	BHINMAL	400.00	1	-281.9	-8.2						
354019	ZERDA	400.00*	184404	KANKROLI	400.00	1	-270.2	53.8						
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	1	111.7	21.2						
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	2	111.7	21.2						
362040	MALNP2	220.00*	182234	AURYA2	220.00	1	-45.9	3.1						
362041	MEHGAON2	220.00*	182234	AURYA2	220.00	1	-111.7	0.9						
362045	BADO2	220.00*	162221	SAKATPUR	220.00	1	-97.0	7.2						
362045	BADO2	220.00*	162232	MODAK	220.00	1	-151.3	44.2						
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	1	-81.6	45.7						
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	2	-81.6	45.7						
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	1	-350.0	189.9						
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	2	-350.0	189.9						
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	1	0.0	-19.6						
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	2	0.0	-19.6						
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	1	334.8	127.3						
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	2	357.9	141.6						
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	1	689.7	-184.7						
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	2	695.1	-183.7						
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	3	541.9	-0.4						
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	4	541.9	-0.4						
378057	BARETHI	765.00	188258	ORAI	765.00*	1	920.9	-232.5						
378057	BARETHI	765.00	188258	ORAI	765.00*	2	920.9	-232.5						
TOTAL FROM AREA 3 TO AREA 1											11253.0	-1578.5		

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR	
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	1	53.7	-37.5					
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	2	53.7	-37.5					
312008	RAIGR2	220.00	422015	BUDHIPADAR	220.00*	1	35.5	-12.9					
314006	RAIG4	400.00*	424015	JHARSUGUDA-A	400.00	3	-349.2	49.5					

314006 RAIG4	400.00*	424015 JHARSUGUDA-A400.00	4	-349.2	49.5
314006 RAIG4	400.00*	424091 JHARSUGUDA-B400.00	1	-185.8	23.8
314006 RAIG4	400.00*	424091 JHARSUGUDA-B400.00	2	-185.8	23.8
314008 SIPAT4	400.00*	474046 RANCHI	400.00	1	26.5 -11.9
314008 SIPAT4	400.00*	474046 RANCHI	400.00	2	26.5 -11.9
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	1	-506.8	-343.4
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	2	-506.8	-343.4
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	1	-648.0	13.0
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	2	-648.0	13.0
318032 DHARAMJAIGAR	765.00*	428091 JHARSUGUDA-B765.00	1	-566.2	23.0
318032 DHARAMJAIGAR	765.00*	428091 JHARSUGUDA-B765.00	2	-566.2	23.0
318032 DHARAMJAIGAR	765.00	478046 RANCHI-NEW	765.00*	1	438.7 86.9
318032 DHARAMJAIGAR	765.00	478046 RANCHI-NEW	765.00*	2	438.7 86.9
TOTAL FROM AREA 3 TO AREA 4				-3438.8	-406.3

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS ----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "11"	
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "12"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "33"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "34"	
342002 PONDA2	220.00	522031 AMBD	220.00*	1	-235.0	-9.8		
372013 TALANDGE	220.00*	522026 CHIKKODI	220.00	1	-144.1	4.5		
372041 KOLHA2	220.00*	522026 CHIKKODI	220.00	1	-157.3	7.9		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	1	-350.3	5.2		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	2	-350.3	5.2		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	1	39.4	-29.5		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	2	39.4	-29.5		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	1	-671.3	-127.0		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	2	-671.3	-127.0		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	1	41.6	-212.4		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	2	41.6	-212.4		
TOTAL FROM AREA 3 TO AREA 5					4168.3	-3836.1		

TOTAL FROM AREA 3 WEST 11982.6 -5821.0

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:15
 AREA TIE LINE
 INTERCHANGE

FROM AREA 4 EAST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS ----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "39"	
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "40"	
412026 SASARAM-PG	220.00	172278 SAHUPU_N	220.00*	1	186.8	-45.3		

414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	1	59.6	-76.2
414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	2	59.6	-76.2
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	1	72.0	-39.1	
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	2	72.0	-39.1	
414006 PATNA	400.00*	184475 BAL74-PG	400.00	1	175.3	-39.4
414006 PATNA	400.00*	184475 BAL74-PG	400.00	2	175.3	-39.4
414006 PATNA	400.00*	184475 BAL74-PG	400.00	3	197.2	-29.9
414006 PATNA	400.00*	184475 BAL74-PG	400.00	4	197.2	-29.9
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	1	307.0	-106.3
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	2	307.0	-106.3
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	1	172.7	-82.3	
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	3	172.7	-82.3	
414491 SASARAM-ER	400.00*	174479 VARANASI	400.00	1	-67.3	-70.2
414492 SASARAM-NR	400.00*	184474 ALLAHABA	400.00	1	249.3	-1.2
418008 GAYA	765.00*	187000 VARNASI8	765.00	1	568.1	-203.4
418008 GAYA	765.00*	187000 VARNASI8	765.00	2	665.7	-156.4
418008 GAYA	765.00	187701 BALI7-PG	765.00*	2	890.4	-107.1
418892 SASARAM	765.00	187705 FATEH-PG	765.00*	1	129.1	11.8
TOTAL FROM AREA 4 TO AREA 1					7441.7	-3174.3

TO AREA 2 NRTHEAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "79"
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "80"
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	1	48.9	-29.3
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	2	48.9	-29.3
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	1	187.8	-77.9
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	2	187.8	-77.9
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	3	70.4	-90.4
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	4	70.4	-90.4
TOTAL FROM AREA 4 TO AREA 2							-379.7	23.7

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	1	-53.7	37.5
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	2	-53.7	37.5
422015	BUDHIPADAR	220.00*	312008	RAIGR2	220.00	1	-35.5	12.9
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	3	349.2	-49.5	
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	4	349.2	-49.5	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	1	185.8	-23.8	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	2	185.8	-23.8	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	1	506.8	343.4	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	2	506.8	343.4	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	1	648.0	-13.0	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	2	648.0	-13.0	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	1	566.2	-23.0	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	2	566.2	-23.0	
474046	RANCHI	400.00	314008	SIPAT4	400.00*	1	-26.5	11.9
474046	RANCHI	400.00	314008	SIPAT4	400.00*	2	-26.5	11.9

478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	1	-438.7	-86.9
478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	2	-438.7	-86.9
TOTAL FROM AREA 4 TO AREA 3					3438.8	406.3

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "10"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "13"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "14"
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "9"
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	1	478.8	-335.1
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	2	478.8	-335.1
TOTAL FROM AREA 4 TO AREA 5							3761.9	-302.6

TO AREA 6 BHUTAN

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	1	-26.5	4.9
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	2	-26.5	4.9
442025	BIRPARA-PG	220.00*	282002	MALBAS2	220.00	1	-1.6	10.9
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	1	-84.8	50.0
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	2	-84.8	50.0
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	3	-84.8	50.0
444072	SILIGURI-PG	400.00	284079	MALBASE	400.00*	4	-15.5	20.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	1	-193.2	44.9
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	2	-193.2	44.9
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	3	-193.2	44.9
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	4	-193.2	44.9
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	1	-72.6	-146.2
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	2	-72.6	-146.2
TOTAL FROM AREA 4 TO AREA 6							-1242.5	78.2

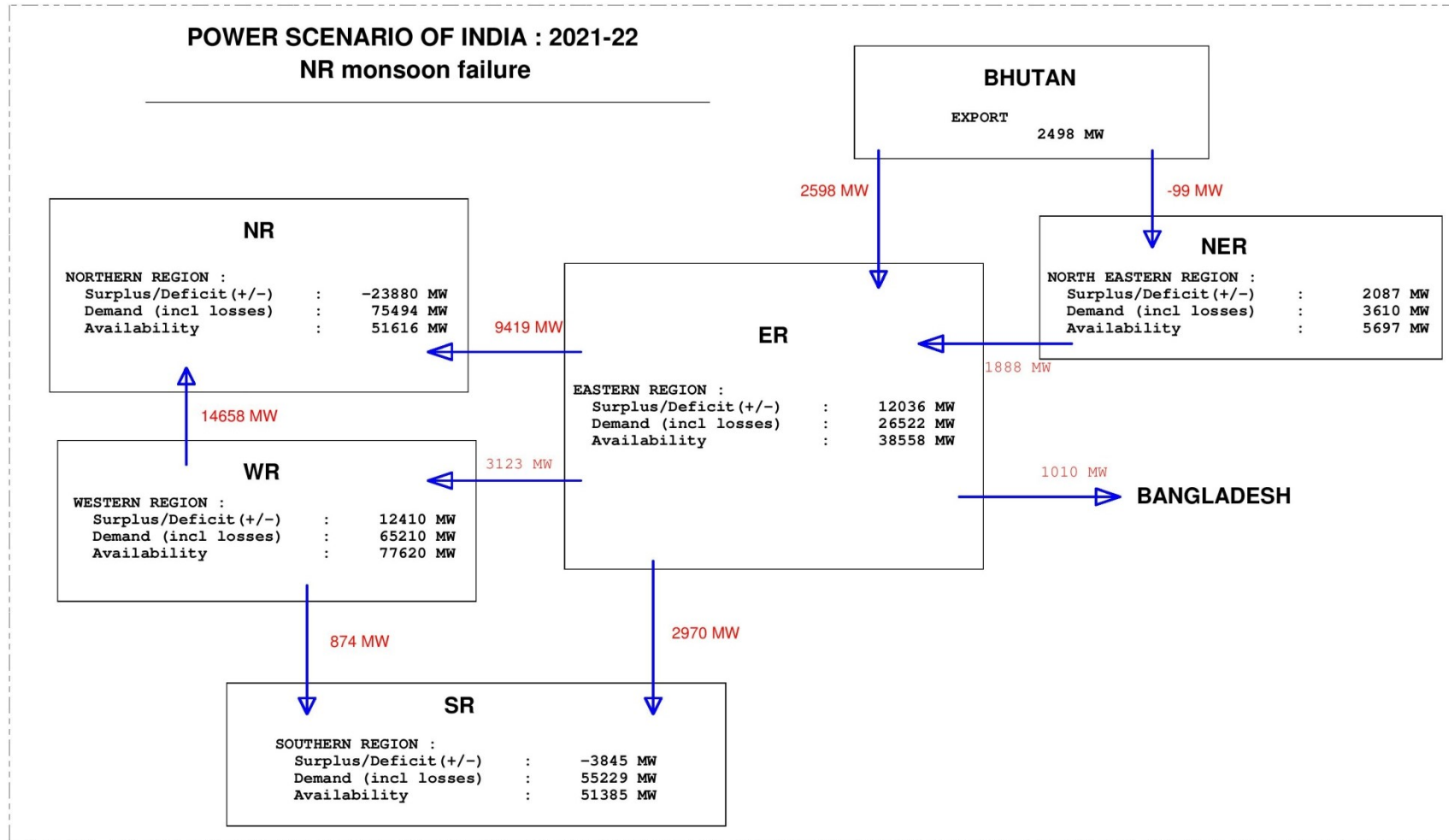
TO AREA 7 BANGLADESH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	1	505.1	102.8
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	2	505.1	102.8
TOTAL FROM AREA 4 TO AREA 7							1010.1	205.6

TOTAL FROM AREA 4 EAST							14030.4	-2763.1
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Annex 4E Scenario Monsoon Failure in NR



Annex 4F Tie Line Flow Monsoon Failure in NR

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:33

AREA TIE LINE
INTERCHANGE

FROM AREA 3 WEST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR		
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4	TWO TRM DC "15"					
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	39.4	TWO TRM DC "16"					
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "3"					
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3	TWO TRM DC "4"					
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "75"					
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "76"					
354019	ZERDA	400.00*	184403	BHINMAL	400.00	1	-149.1	-277.5						
354019	ZERDA	400.00*	184404	KANKROLI	400.00	1	-159.4	-80.7						
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	1	279.6	-122.8						
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	2	279.6	-122.8						
362040	MALNP2	220.00*	182234	AURYA2	220.00	1	-0.8	27.6						
362041	MEHGAON2	220.00*	182234	AURYA2	220.00	1	-53.5	30.1						
362045	BADO2	220.00*	162221	SAKATPUR	220.00	1	-37.9	20.9						
362045	BADO2	220.00*	162232	MODAK	220.00	1	-77.1	46.4						
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	1	54.5	45.3						
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	2	54.5	45.3						
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	1	-340.0	243.4						
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	2	-340.0	243.4						
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	1	-0.0	-66.8						
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	2	-0.0	-66.8						
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	1	613.4	120.1						
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	2	655.6	133.1						
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	1	1203.3	-25.6						
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	2	1212.7	-23.3						
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	3	994.2	143.9						
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	4	994.2	143.9						
378057	BARETHI	765.00	188258	ORAI	765.00*	1	813.3	-257.5						
378057	BARETHI	765.00	188258	ORAI	765.00*	2	813.3	-257.5						
TOTAL FROM AREA 3 TO AREA 1											14658.2	-1646.8		

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR	
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	1	60.0	-36.0					
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	2	60.0	-36.0					
312008	RAIGR2	220.00	422015	BUDHIPADAR	220.00*	1	47.4	-5.3					
314006	RAIG4	400.00*	424015	JHARSUGUDA-A	400.00	3	-292.3	105.4					

314006 RAIG4	400.00*	424015 JHARSUGUDA-A400.00	4	-292.3	105.4
314006 RAIG4	400.00*	424091 JHARSUGUDA-B400.00	1	-116.4	38.4
314006 RAIG4	400.00*	424091 JHARSUGUDA-B400.00	2	-116.4	38.4
314008 SIPAT4	400.00*	474046 RANCHI	400.00 1	63.4	-6.7
314008 SIPAT4	400.00*	474046 RANCHI	400.00 2	63.4	-6.7
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	1	-408.0	-300.8
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	2	-408.0	-300.8
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	1	-851.3	-25.0
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	2	-851.3	-25.0
318032 DHARAMJAIGAR	765.00*	428091 JHARSUGUDA-B765.00	1	-518.6	-0.8
318032 DHARAMJAIGAR	765.00*	428091 JHARSUGUDA-B765.00	2	-518.6	-0.8
318032 DHARAMJAIGAR	765.00	478046 RANCHI-NEW	765.00* 1	478.0	64.5
318032 DHARAMJAIGAR	765.00	478046 RANCHI-NEW	765.00* 2	478.0	64.5
TOTAL FROM AREA 3 TO AREA 4				-3123.2	-327.4

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0		-251.6	TWO TRM DC "11"
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0		-251.6	TWO TRM DC "12"
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9		-1304.1	TWO TRM DC "33"
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9		-1304.1	TWO TRM DC "34"
342002 PONDA2	220.00	522031 AMBD	220.00*	1	-289.1		-33.4	
372013 TALANDGE	220.00*	522026 CHIKKODI	220.00	1	-188.7		-8.4	
372041 KOLHA2	220.00*	522026 CHIKKODI	220.00	1	-200.1		-5.5	
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	1	-472.6		-106.0	
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	2	-472.6		-106.0	
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	1	-429.2		-188.0	
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	2	-429.2		-188.0	
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	1	-1135.0		-287.8	
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	2	-1135.0		-287.8	
378091 WARORA POOL	765.00*	518079 WARN800	765.00	1	-480.0		-402.2	
378091 WARORA POOL	765.00*	518079 WARN800	765.00	2	-480.0		-402.2	
TOTAL FROM AREA 3 TO AREA 5					874.5		-5126.9	

TOTAL FROM AREA 3 WEST 12409.5 -7101.1

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:33
 AREA TIE LINE
 INTERCHANGE

FROM AREA 4 EAST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9		-928.1	TWO TRM DC "39"
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9		-928.1	TWO TRM DC "40"
412026 SASARAM-PG	220.00	172278 SAHUPU_N	220.00*	1	242.3		-91.3	

414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	1	301.6	-81.9
414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	2	301.6	-81.9
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	1	207.1	-28.7	
414005 BIHARSHARF-A400.00*	184475 BAL74-PG	400.00	2	207.1	-28.7	
414006 PATNA	400.00*	184475 BAL74-PG	400.00	1	302.5	-33.2
414006 PATNA	400.00*	184475 BAL74-PG	400.00	2	302.5	-33.2
414006 PATNA	400.00*	184475 BAL74-PG	400.00	3	340.3	-22.9
414006 PATNA	400.00*	184475 BAL74-PG	400.00	4	340.3	-22.9
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	1	293.0	-109.5
414068 MOTIHARI	400.00*	184927 GORAKHPU	400.00	2	293.0	-109.5
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	1	234.9	-80.2	
414405 BIHARSHARF-B400.00*	174479 VARANASI	400.00	3	234.9	-80.2	
414491 SASARAM-ER	400.00*	174479 VARANASI	400.00	1	-3.2	-91.6
414492 SASARAM-NR	400.00*	184474 ALLAHABA	400.00	1	249.3	-1.8
418008 GAYA	765.00*	187000 VARNASI8	765.00	1	690.7	-198.9
418008 GAYA	765.00*	187000 VARNASI8	765.00	2	809.4	-151.0
418008 GAYA	765.00	187701 BALI7-PG	765.00*	2	950.0	-113.6
418892 SASARAM	765.00	187705 FATEH-PG	765.00*	1	269.4	-7.2
TOTAL FROM AREA 4 TO AREA 1					9418.6	-3224.4

TO AREA 2 NRTHEAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "79"
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5 TWO TRM DC "80"
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	1	-65.6	-19.5
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	2	-65.6	-19.5
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	1	-133.6	-57.7
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	2	-133.6	-57.7
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	3	-247.9	-105.0
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	4	-247.9	-105.0
TOTAL FROM AREA 4 TO AREA 2							-1888.1	54.6

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	1	-60.0	36.0
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	2	-60.0	36.0
422015	BUDHIPADAR	220.00*	312008	RAIGR2	220.00	1	-47.4	5.3
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	3	292.3	-105.4	
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	4	292.3	-105.4	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	1	116.4	-38.4	
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	2	116.4	-38.4	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	1	408.0	300.8	
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	2	408.0	300.8	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	1	851.3	25.0	
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	2	851.3	25.0	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	1	518.6	0.8	
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	2	518.6	0.8	
474046	RANCHI	400.00	314008	SIPAT4	400.00*	1	-63.4	6.7
474046	RANCHI	400.00	314008	SIPAT4	400.00*	2	-63.4	6.7

478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	1	-478.0	-64.5
478046 RANCHI-NEW	765.00*	318032 DHARAMJAIGAR	765.00	2	-478.0	-64.5
TOTAL FROM AREA 4 TO AREA 3					3123.2	327.4

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "10"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "13"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "14"
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "9"
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	1	83.0	-701.7
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	2	83.0	-701.7
TOTAL FROM AREA 4 TO AREA 5							2970.2	-1035.9

TO AREA 6 BHUTAN

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	1	-55.9	15.1
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	2	-55.9	15.1
442025	BIRPARA-PG	220.00*	282002	MALBAS2	220.00	1	2.9	16.5
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	1	-156.4	57.5
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	2	-156.4	57.5
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	3	-156.4	57.5
444072	SILIGURI-PG	400.00	284079	MALBASE	400.00*	4	-118.9	25.6
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	1	-347.0	47.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	2	-347.0	47.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	3	-347.0	47.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	4	-347.0	47.2
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	1	-256.3	-127.1
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	2	-256.3	-127.1
TOTAL FROM AREA 4 TO AREA 6							-2597.7	179.7

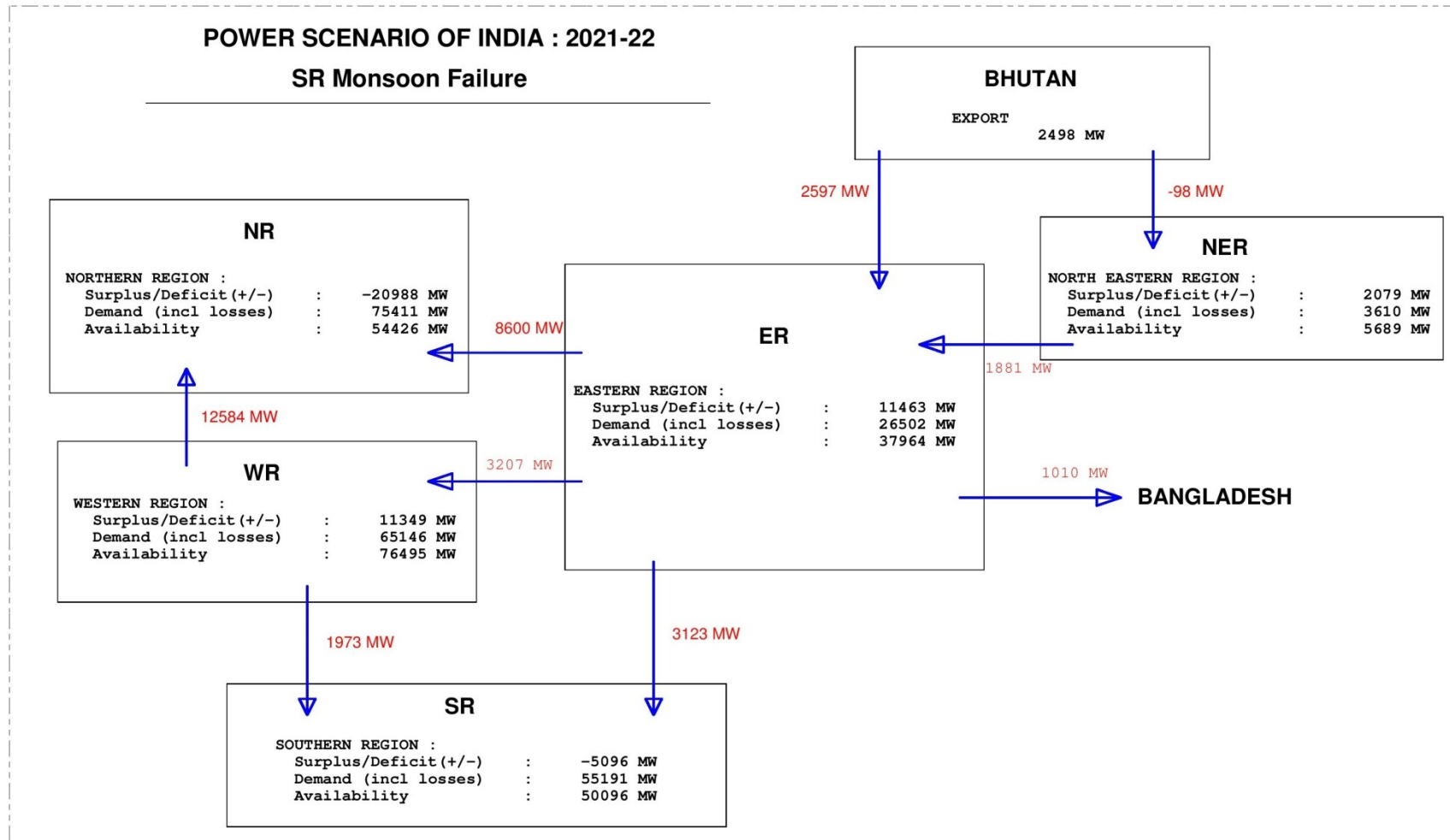
TO AREA 7 BANGLADESH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	1	504.9	98.9
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	2	504.9	98.9
TOTAL FROM AREA 4 TO AREA 7							1009.8	197.8

TOTAL FROM AREA 4 EAST							12035.9	-3500.8
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Annex 4G Scenario Monsoon Failure in SR



Annex 4H Tie Line Flow Monsoon Failure in SR

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:21
 AREA TIE LINE
 INTERCHANGE

FROM AREA 3 WEST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	44.5 TWO TRM DC "15"
364008	VINDH_W4	400.00*	184432	VINDHYBT	400.00	2DC	125.1	44.5 TWO TRM DC "16"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3 TWO TRM DC "3"
354015	MUNDRA4	400.00*	184459	MAHIN_HV	400.00	2DC	1002.9	470.3 TWO TRM DC "4"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1 TWO TRM DC "75"
314033	CHAMPA_POOL	400.00	184483	KURUKSHETR	400.00*	2DC	2795.9	-1304.1 TWO TRM DC "76"
354019	ZERDA	400.00*	184403	BHINMAL	400.00	1	-245.9	-273.9
354019	ZERDA	400.00*	184404	KANKROLI	400.00	1	-238.0	-75.7
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	1	164.7	-128.2
358136	BANASKANTHA	765.00	168429	CHIT-NEW	765.00*	2	164.7	-128.2
362040	MALNP2	220.00*	182234	AURYA2	220.00	1	-12.2	43.6
362041	MEHGAON2	220.00*	182234	AURYA2	220.00	1	-64.5	47.5
362045	BADO2	220.00*	162221	SAKATPUR	220.00	1	-54.3	28.1
362045	BADO2	220.00*	162232	MODAK	220.00	1	-92.7	57.6
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	1	-10.1	63.5
364021	SHUJALPR	400.00	184405	RAPS_C4	400.00*	2	-10.1	63.5
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	1	-303.5	243.4
364025	VIN-POOL	400.00	184446	RIHNDEXT	400.00*	2	-303.5	243.4
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	1	-0.1	-70.1
364086	NEEMUCH	400.00*	164429	CHIT-NEW	400.00	2	-0.1	-70.1
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	1	435.2	177.5
368007	GWALIOR	765.00	167773	JAIPURR	765.00*	2	465.4	195.2
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	1	889.9	59.3
368007	GWALIOR	765.00*	187706	AGRA-PG	765.00	2	896.9	62.4
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	3	728.0	122.1
368026	JABALPR-POOL	765.00*	188258	ORAI	765.00	4	728.0	122.1
378057	BARETHI	765.00	188258	ORAI	765.00*	1	799.0	-252.5
378057	BARETHI	765.00	188258	ORAI	765.00*	2	799.0	-252.5
TOTAL FROM AREA 3 TO AREA 1							12583.6	-1301.1

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	1	58.8	-31.8
312001	KORBE2	220.00*	422015	BUDHIPADAR	220.00	2	58.8	-31.8
312008	RAIGR2	220.00	422015	BUDHIPADAR	220.00*	1	45.5	-0.7
314006	RAIG4	400.00*	424015	JHARSUGUDA-A400	400.00	3	-286.9	120.7
314006	RAIG4	400.00*	424015	JHARSUGUDA-A400	400.00	4	-286.9	120.7
314006	RAIG4	400.00*	424091	JHARSUGUDA-B400	400.00	1	-127.3	40.3

314006 RAIG4	400.00*	424091 JHARSUGUDA-B400.00	2	-127.3	40.3
314008 SIPAT4	400.00*	474046 RANCHI	400.00	1	42.7 -0.4
314008 SIPAT4	400.00*	474046 RANCHI	400.00	2	42.7 -0.4
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	1	-409.9	-293.4
318030 RAIPUR_POOL	765.00*	428015 JHARSUGUDA-A765.00	2	-409.9	-293.4
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	1	-787.4	-11.1
318031 TAMNAR	765.00	428015 JHARSUGUDA-A765.00*	2	-787.4	-11.1
318032 DHARAMJAIGAR765.00*	428091 JHARSUGUDA-B765.00	1	-506.3	1.4	
318032 DHARAMJAIGAR765.00*	428091 JHARSUGUDA-B765.00	2	-506.3	1.4	
318032 DHARAMJAIGAR765.00	478046 RANCHI-NEW	765.00*	1	390.2	87.4
318032 DHARAMJAIGAR765.00	478046 RANCHI-NEW	765.00*	2	390.2	87.4
TOTAL FROM AREA 3 TO AREA 4				-3207.0	-174.4

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "11"	
374007 BHADR4	400.00	514009 CHAND-SR	400.00*	2DC	497.0	-251.6	TWO TRM DC "12"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "33"	
314029 RAIGARH_POOL	400.00	544016 PUGALUR-NEW	400.00*	2DC	2795.9	-1304.1	TWO TRM DC "34"	
342002 PONDA2	220.00	522031 AMBD	220.00*	1	-250.6	-27.2		
372013 TALANDGE	220.00*	522026 CHIKKODI	220.00	1	-168.2	-16.7		
372041 KOLHA2	220.00*	522026 CHIKKODI	220.00	1	-179.8	-14.2		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	1	-411.4	-95.1		
374050 KOLHAPURPG	400.00	524015 NARDR-NW	400.00*	2	-411.4	-95.1		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	1	-289.0	-189.7		
378021 WARDHA	765.00	518062 NIZAMABAD	765.00*	2	-289.0	-189.7		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	1	-980.5	-304.7		
378040 SHOLAPUR-PG	765.00*	528003 RAIC800	765.00	2	-980.5	-304.7		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	1	-326.4	-415.4		
378091 WARORA POOL	765.00*	518079 WARN800	765.00	2	-326.4	-415.4		
TOTAL FROM AREA 3 TO AREA 5					1972.6	-5179.5		

TOTAL FROM AREA 3 WEST 11349.2 -6655.0

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, JAN 06 2016 15:21
 AREA TIE LINE
 INTERCHANGE

FROM AREA 4 EAST

TO AREA 1 NORTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "39"	
444073 ALIPURDU	400.00	184922 AGRA	400.00*	2DC	1425.9	-928.1	TWO TRM DC "40"	
412026 SASARAM-PG	220.00	172278 SAHUPU_N	220.00*	1	228.5	-95.1		
414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	1	255.4	-89.0		
414001 MUZAFARPUR	400.00*	184927 GORAKHPU	400.00	2	255.4	-89.0		

414005	BIHARSHARF-A400.00*	184475	BAL74-PG	400.00	1	175.4	-23.1	
414005	BIHARSHARF-A400.00*	184475	BAL74-PG	400.00	2	175.4	-23.1	
414006	PATNA	400.00*	184475	BAL74-PG	400.00	1	269.7	-31.1
414006	PATNA	400.00*	184475	BAL74-PG	400.00	2	269.7	-31.1
414006	PATNA	400.00*	184475	BAL74-PG	400.00	3	303.5	-20.5
414006	PATNA	400.00*	184475	BAL74-PG	400.00	4	303.5	-20.5
414068	MOTIHARI	400.00*	184927	GORAKHPU	400.00	1	278.9	-117.8
414068	MOTIHARI	400.00*	184927	GORAKHPU	400.00	2	278.9	-117.8
414405	BIHARSHARF-B400.00*	174479	VARANASI	400.00	1	207.0	-85.1	
414405	BIHARSHARF-B400.00*	174479	VARANASI	400.00	3	207.0	-85.1	
414491	SASARAM-ER	400.00*	174479	VARANASI	400.00	1	-19.8	-110.2
414492	SASARAM-NR	400.00*	184474	ALLAHABA	400.00	1	249.3	-3.4
418008	GAYA	765.00*	187000	VARNASI8	765.00	1	594.0	-217.4
418008	GAYA	765.00*	187000	VARNASI8	765.00	2	696.1	-172.1
418008	GAYA	765.00	187701	BALI7-PG	765.00*	2	839.0	-97.6
418892	SASARAM	765.00	187705	FATEH-PG	765.00*	1	182.0	-28.3
TOTAL FROM AREA 4 TO AREA 1						8600.5	-3313.3	

TO AREA 2 NRTHEAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5	TWO TRM DC "79"			
444073	ALIPURDU	400.00*	214044	BISWA-CHARI	400.00	2DC	-497.0	209.5	TWO TRM DC "80"			
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	1	-65.1	-19.4				
442073	ALIPURDU	220.00	212190	BONGAIGAON	220.00*	2	-65.1	-19.4				
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	1	-132.4	-56.9				
444072	SILIGURI-PG	400.00*	214170	BONGAIGAON	400.00	2	-132.4	-56.9				
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	3	-246.1	-105.6				
444073	ALIPURDU	400.00	214170	BONGAIGAON	400.00*	4	-246.1	-105.6				
TOTAL FROM AREA 4 TO AREA 2											-1880.9	55.2

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	1	-58.8	31.8				
422015	BUDHIPADAR	220.00	312001	KORBE2	220.00*	2	-58.8	31.8				
422015	BUDHIPADAR	220.00*	312008	RAIGR2	220.00	1	-45.5	0.7				
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	3	286.9	-120.7					
424015	JHARSUGUDA-A400.00	314006	RAIG4	400.00*	4	286.9	-120.7					
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	1	127.3	-40.3					
424091	JHARSUGUDA-B400.00	314006	RAIG4	400.00*	2	127.3	-40.3					
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	1	409.9	293.4					
428015	JHARSUGUDA-A765.00	318030	RAIPUR_POOL	765.00*	2	409.9	293.4					
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	1	787.4	11.1					
428015	JHARSUGUDA-A765.00*	318031	TAMNAR	765.00	2	787.4	11.1					
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	1	506.3	-1.4					
428091	JHARSUGUDA-B765.00	318032	DHARAMJAIGAR	765.00*	2	506.3	-1.4					
474046	RANCHI	400.00	314008	SIPAT4	400.00*	1	-42.7	0.4				
474046	RANCHI	400.00	314008	SIPAT4	400.00*	2	-42.7	0.4				
478046	RANCHI-NEW	765.00*	318032	DHARAMJAIGAR	765.00	1	-390.2	-87.4				
478046	RANCHI-NEW	765.00*	318032	DHARAMJAIGAR	765.00	2	-390.2	-87.4				

TOTAL FROM AREA 4 TO AREA 3 3207.0 174.4

TO AREA 5 SOUTH

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "10"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "13"
424099	GAZ-ER	400.00	514010	GAZU-SR	400.00*	2DC	397.3	-229.2 TWO TRM DC "14"
424019	TALCHER	400.00*	524011	KOLAR	400.00	2DC	1004.8	413.0 TWO TRM DC "9"
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	1	159.5	-723.8
428090	ANGUL-B	765.00*	518091	SRI_POOL	765.00	2	159.5	-723.8
TOTAL FROM AREA 4 TO AREA 5							3123.2	-1080.0

TO AREA 6 BHUTAN

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	1	-55.9	15.4
442025	BIRPARA-PG	220.00	282001	CHUKHA	220.00*	2	-55.9	15.4
442025	BIRPARA-PG	220.00*	282002	MALBAS2	220.00	1	2.8	16.7
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	1	-156.4	58.3
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	2	-156.4	58.3
444072	SILIGURI-PG	400.00	284001	TALA	400.00*	3	-156.4	58.3
444072	SILIGURI-PG	400.00	284079	MALBASE	400.00*	4	-118.7	26.5
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	1	-346.9	47.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	2	-346.9	47.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	3	-346.9	47.2
444073	ALIPURDU	400.00	284002	PUNATSANC1&2400.00*	400.00*	4	-346.9	47.2
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	1	-256.0	-127.2
444073	ALIPURDU	400.00*	284009	JIGMELING	400.00	2	-256.0	-127.2
TOTAL FROM AREA 4 TO AREA 6							-2596.6	183.4

TO AREA 7 BANGLADESH

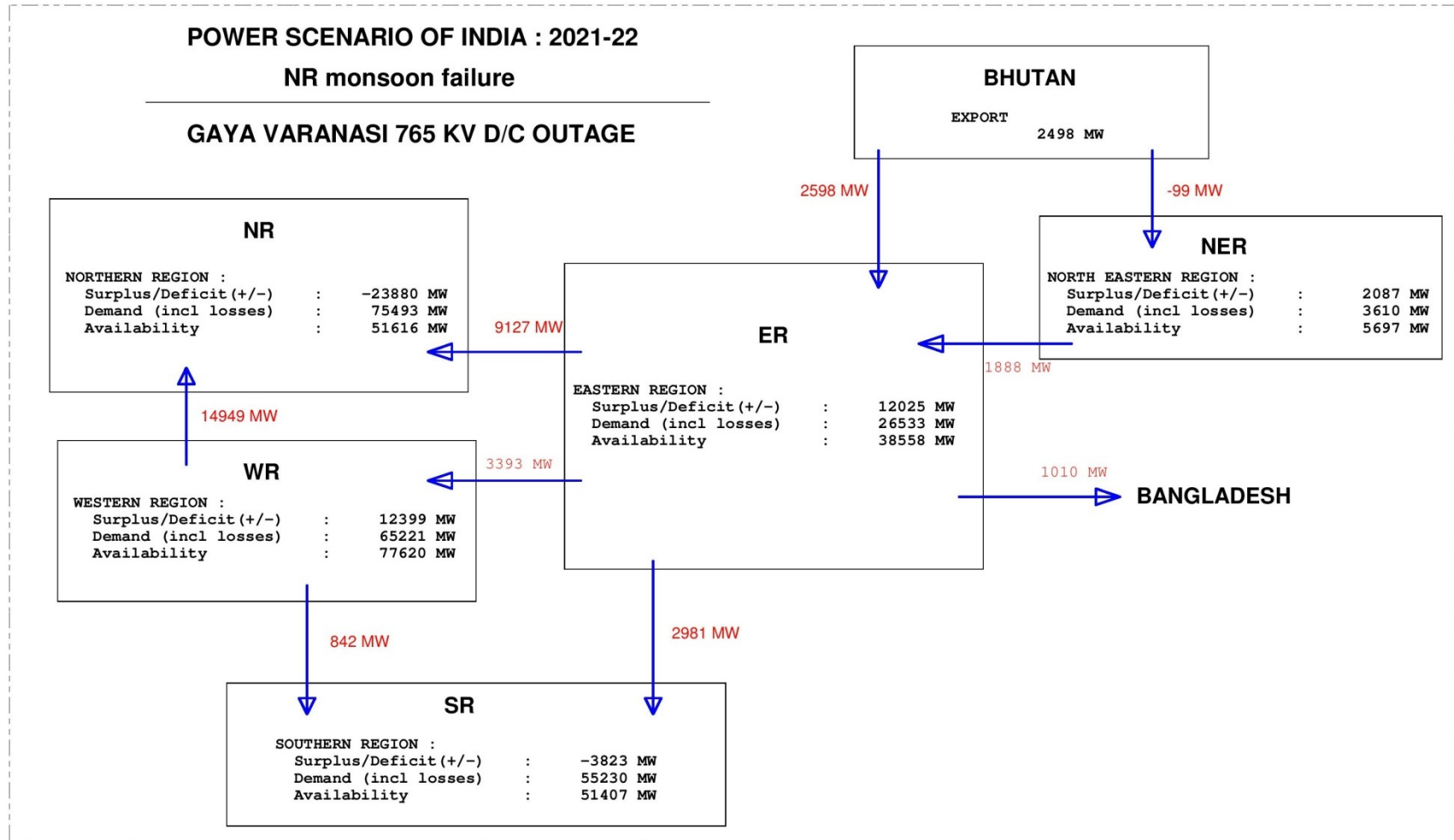
X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

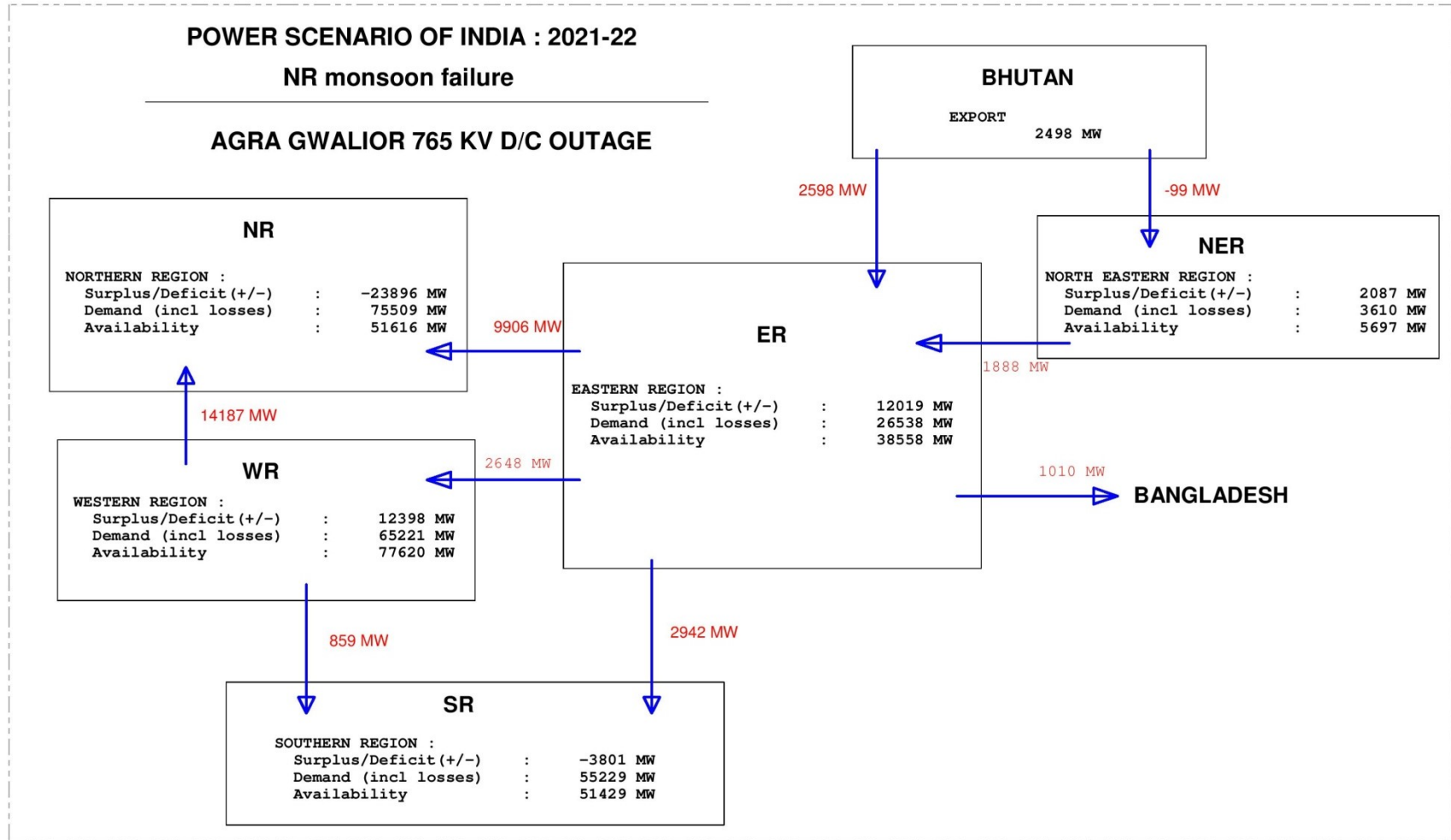
BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	1	504.9	98.5
444101	BEHRAMPUR	400.00*	444102	BHERAMARA	400.00	2	504.9	98.5
TOTAL FROM AREA 4 TO AREA 7							1009.7	197.0

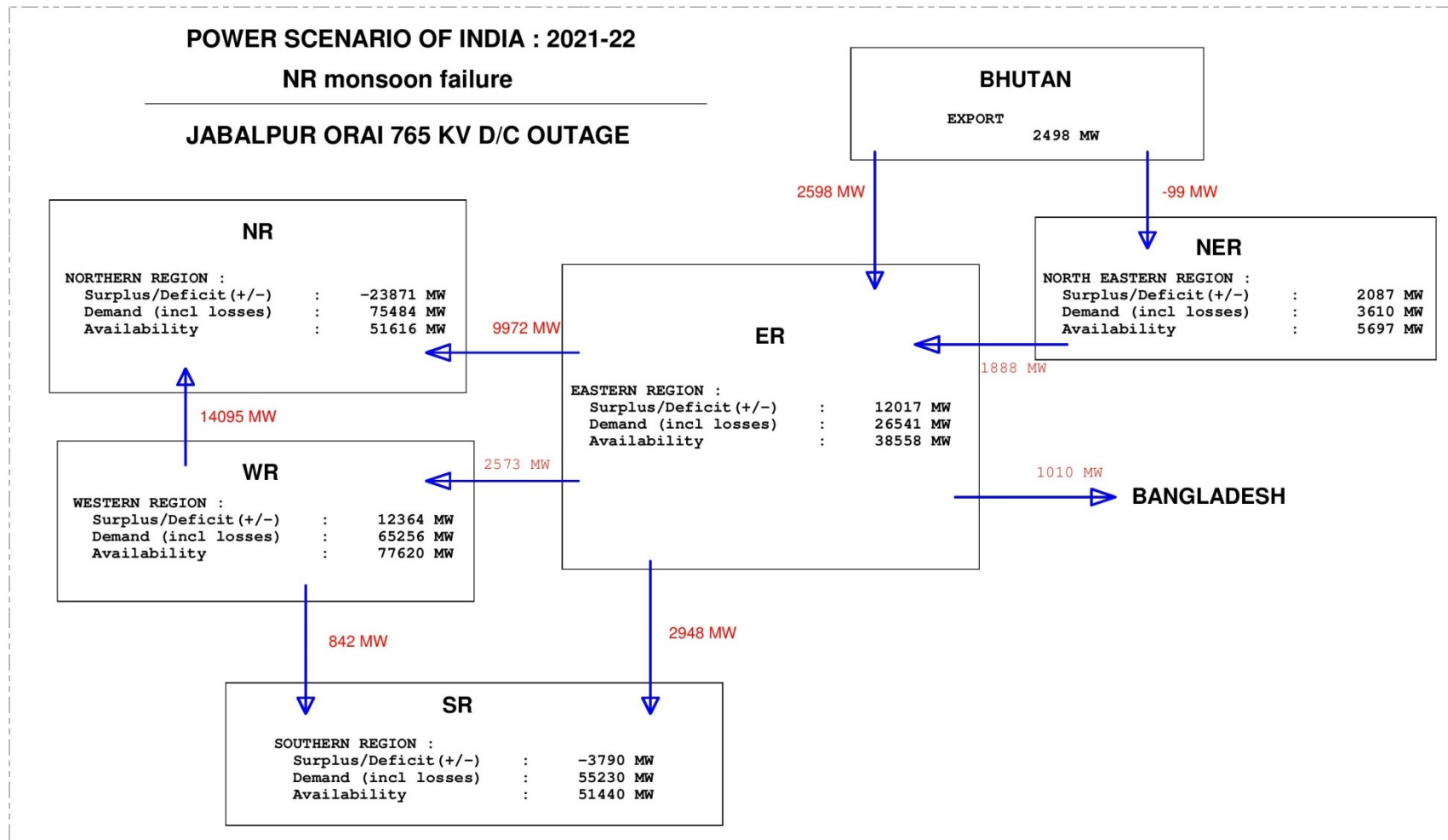
TOTAL FROM AREA 4 EAST 11462.9 -3783.3

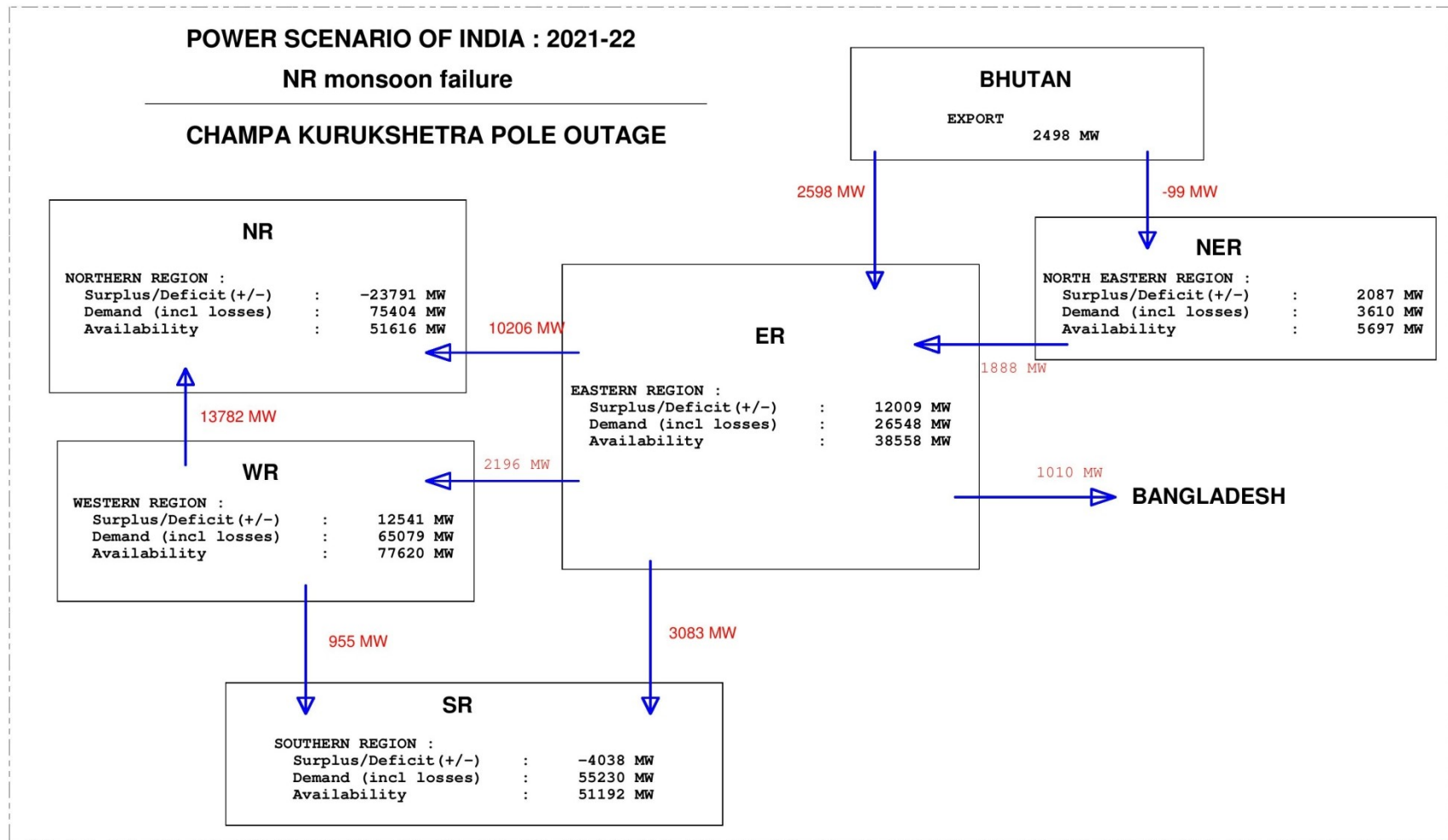
Annex 5 : Outages in Monsoon Failure in NR

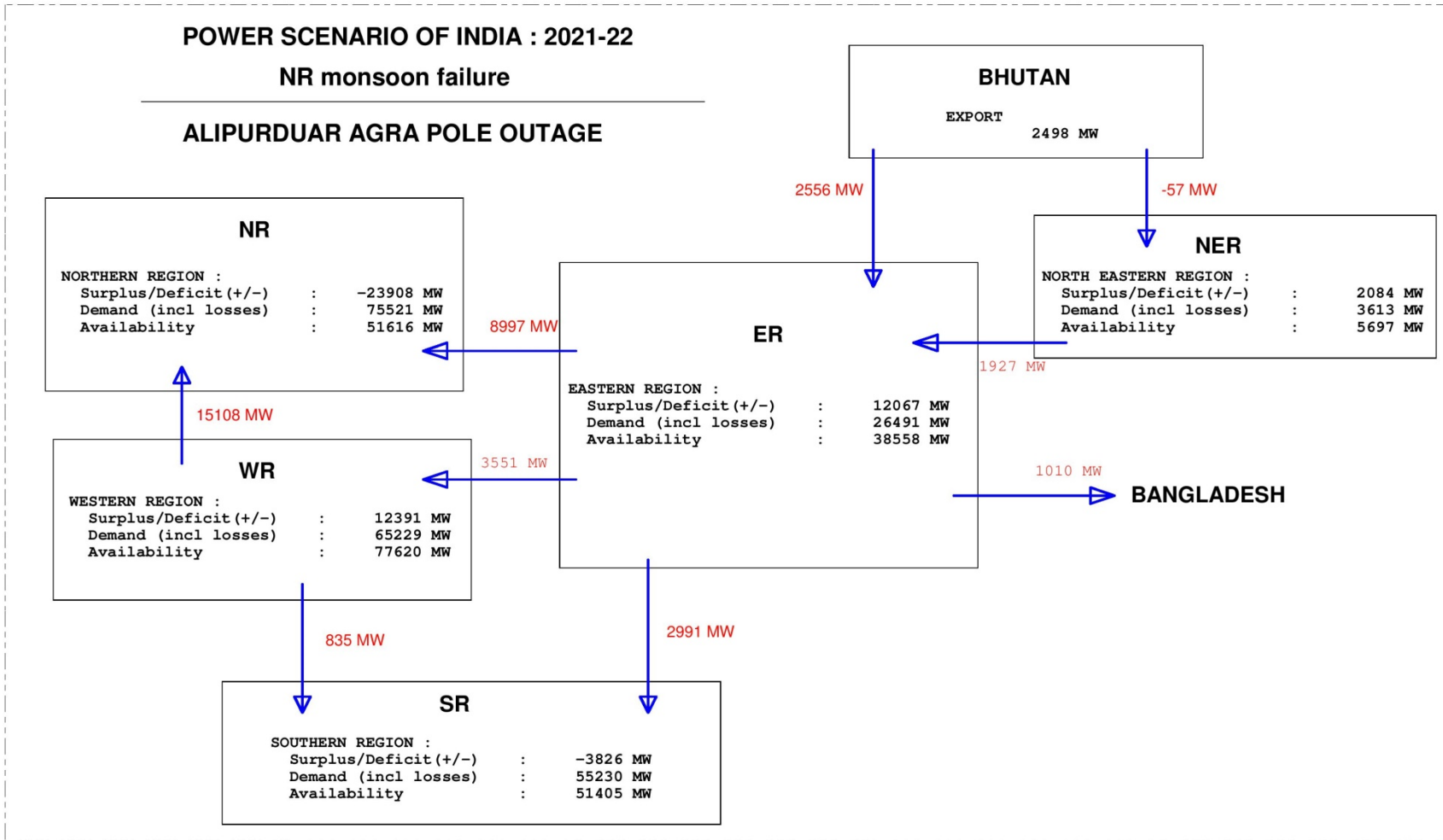
Annex 5A : Outage in Monsoon Failure in NR











Annex 5B : Tie Line Flow (Outage in Monsoon Failure in NR)

GAYA VARANASI D/C OUTAGE

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
184432		VINDHYBT		400.00	364008		VINDH_W4		400.00*	2DC	-125.1	-39.4
TWO TRM DC "15"												
184432		VINDHYBT		400.00	364008		VINDH_W4		400.00*	2DC	-125.1	-39.4
TWO TRM DC "16"												
184459		MAHIN_HV		400.00	354015		MUNDRA4		400.00*	2DC	-1002.9	-470.3
TWO TRM DC "3"												
184459		MAHIN_HV		400.00	354015		MUNDRA4		400.00*	2DC	-1002.9	-470.3
TWO TRM DC "4"												
184483		KURUKSHETR		400.00*	314033		CHAMPA_POOL		400.00	2DC	-2795.9	1304.1
TWO TRM DC "75"												
184483		KURUKSHETR		400.00*	314033		CHAMPA_POOL		400.00	2DC	-2795.9	1304.1
TWO TRM DC "76"												
162221		SAKATPUR		220.00	362045		BADO2		220.00*	1	35.6	-19.7
162232		MODAK		220.00	362045		BADO2		220.00*	1	74.3	-44.5
164429		CHIT-NEW		400.00	364086		NEEMUCH		400.00*	1	0.0	66.5
164429		CHIT-NEW		400.00	364086		NEEMUCH		400.00*	2	0.0	66.5
167773		JAIPURR		765.00*	368007		GWALIOR		765.00	1	-627.0	-112.1
167773		JAIPURR		765.00*	368007		GWALIOR		765.00	2	-670.0	-124.5
168429		CHIT-NEW		765.00*	358136		BANASKANTHA		765.00	1	-288.4	122.6
168429		CHIT-NEW		765.00*	358136		BANASKANTHA		765.00	2	-288.4	122.6
182234		AURYA2		220.00	362040		MALNP2		220.00*	1	-2.6	-25.4
182234		AURYA2		220.00	362041		MEHGAON2		220.00*	1	50.2	-27.6
184403		BHINMAL		400.00	354019		ZERDA		400.00*	1	138.9	277.9
184404		KANKROLI		400.00	354019		ZERDA		400.00*	1	152.0	81.3
184405		RAPS_C4		400.00*	364021		SHUJALPR		400.00	1	-62.0	-42.6
184405		RAPS_C4		400.00*	364021		SHUJALPR		400.00	2	-62.0	-42.6
184446		RIHNDEXT		400.00*	364025		VIN-POOL		400.00	1	340.0	-243.4
184446		RIHNDEXT		400.00*	364025		VIN-POOL		400.00	2	340.0	-243.4
187706		AGRA-PG		765.00	368007		GWALIOR		765.00*	1	-1258.8	37.3
187706		AGRA-PG		765.00	368007		GWALIOR		765.00*	2	-1268.7	35.1
188258		ORAI		765.00	368026		JABALPR-POOL		765.00*	3	-1039.0	-143.5
188258		ORAI		765.00	368026		JABALPR-POOL		765.00*	4	-1039.0	-143.5
188258		ORAI		765.00*	378057		BARETHI		765.00	1	-813.3	245.3
188258		ORAI		765.00*	378057		BARETHI		765.00	2	-813.3	245.3
TOTAL FROM AREA 1 TO AREA 3											-14949.2	1676.4

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
184922		AGRA		400.00*	444073		ALIPURDU		400.00	2DC	-1425.9	928.1
TWO TRM DC "39"												
184922		AGRA		400.00*	444073		ALIPURDU		400.00	2DC	-1425.9	928.1
TWO TRM DC "40"												
172278		SAHUPU_N		220.00*	412026		SASARAM-PG		220.00	1	-272.5	101.2
174479		VARANASI		400.00	414405		BIHARSHARF-B		400.00*	1	-316.9	82.5
174479		VARANASI		400.00	414405		BIHARSHARF-B		400.00*	3	-316.9	82.5
174479		VARANASI		400.00	414491		SASARAM-ER		400.00*	1	-77.2	89.9
184474		ALLAHABA		400.00	414492		SASARAM-NR		400.00*	1	-249.3	1.8
184475		BAL74-PG		400.00	414005		BIHARSHARF-A		400.00*	1	-231.5	32.3

184475	BAL74-PG	400.00	414005	BIHARSHARF-A	400.00* 2	-231.5	32.3
184475	BAL74-PG	400.00	414006	PATNA	400.00* 1	-342.2	35.1
184475	BAL74-PG	400.00	414006	PATNA	400.00* 2	-342.2	35.1
184475	BAL74-PG	400.00	414006	PATNA	400.00* 3	-385.0	25.1
184475	BAL74-PG	400.00	414006	PATNA	400.00* 4	-385.0	25.1
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00* 1	-334.4	81.2
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00* 2	-334.4	81.2
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00* 1	-298.5	107.7
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00* 2	-298.5	107.7
187701	BALI7-PG	765.00*	418008	GAYA	765.00 2	-1546.0	275.7
187705	FATEH-PG	765.00*	418892	SASARAM	765.00 1	-313.6	10.1
TOTAL FROM AREA 1 TO AREA 4						-9127.2	3062.9

AGRA GWALIOR D/C OUTAGE

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-39.4	TWO TRM DC "15"			
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-39.4	TWO TRM DC "16"			
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3	TWO TRM DC "3"			
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3	TWO TRM DC "4"			
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1	TWO TRM DC "75"			
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1	TWO TRM DC "76"			
162221	SAKATPUR	220.00	362045	BADO2	220.00*	1	24.1	-17.8				
162232	MODAK	220.00	362045	BADO2	220.00*	1	64.7	-41.6				
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	1	0.0	65.0				
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	2	0.0	65.0				
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	1	-1067.8	-81.0				
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	2	-1141.1	-89.5				
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	1	-323.6	118.2				
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	2	-323.6	118.2				
182234	AURYA2	220.00	362040	MALNP2	220.00*	1	-57.5	-16.2				
182234	AURYA2	220.00	362041	MEHGAON2	220.00*	1	-4.6	-15.3				
184403	BHINMAL	400.00	354019	ZERDA	400.00*	1	96.2	275.6				
184404	KANKROLI	400.00	354019	ZERDA	400.00*	1	122.4	81.0				
184405	RAPS_C4	400.00*	364021	SHUJALPR	400.00	1	-111.2	-37.5				
184405	RAPS_C4	400.00*	364021	SHUJALPR	400.00	2	-111.2	-37.5				
184446	RIHNDEXT	400.00*	364025	VIN-POOL	400.00	1	340.0	-243.4				
184446	RIHNDEXT	400.00*	364025	VIN-POOL	400.00	2	340.0	-243.4				
188258	ORAI	765.00	368026	JABALPR-POOL	765.00*	3	-1279.4	-196.6				
188258	ORAI	765.00	368026	JABALPR-POOL	765.00*	4	-1279.4	-196.6				
188258	ORAI	765.00*	378057	BARETHI	765.00	1	-813.4	200.1				
188258	ORAI	765.00*	378057	BARETHI	765.00	2	-813.4	200.1				
TOTAL FROM AREA 1 TO AREA 3						-14186.5	1495.6					

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1 TWO TRM DC "39"
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1 TWO TRM DC "40"
172278	SAHUPU_N	220.00*	412026	SASARAM-PG	220.00	1	-252.4	93.6
174479	VARANASI	400.00	414405	BIHARSHARF-B400.00*	1		-254.0	79.3
174479	VARANASI	400.00	414405	BIHARSHARF-B400.00*	3		-254.0	79.3
174479	VARANASI	400.00	414491	SASARAM-ER	400.00*	1	-6.0	85.0
184474	ALLAHABA	400.00	414492	SASARAM-NR	400.00*	1	-249.3	1.6
184475	BAL74-PG	400.00	414005	BIHARSHARF-A400.00*	1		-225.7	32.1
184475	BAL74-PG	400.00	414005	BIHARSHARF-A400.00*	2		-225.7	32.1
184475	BAL74-PG	400.00	414006	PATNA	400.00*	1	-320.1	34.3
184475	BAL74-PG	400.00	414006	PATNA	400.00*	2	-320.1	34.3
184475	BAL74-PG	400.00	414006	PATNA	400.00*	3	-360.1	24.1
184475	BAL74-PG	400.00	414006	PATNA	400.00*	4	-360.1	24.1
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	1	-325.5	79.9
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	2	-325.5	79.9
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	1	-296.7	106.4
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	2	-296.7	106.4
187000	VARNASI8	765.00	418008	GAYA	765.00*	1	-751.9	191.1
187000	VARNASI8	765.00	418008	GAYA	765.00*	2	-881.1	142.2
187701	BALI7-PG	765.00*	418008	GAYA	765.00	2	-1017.0	126.4
187705	FATEH-PG	765.00*	418892	SASARAM	765.00	1	-332.6	-1.3
TOTAL FROM AREA 1 TO AREA 4							-9905.9	3206.9

JABALPUR ORAI D/C OUTAGE

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-39.4 TWO TRM DC "15"
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-39.4 TWO TRM DC "16"
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3 TWO TRM DC "3"
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3 TWO TRM DC "4"
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1 TWO TRM DC "75"
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1 TWO TRM DC "76"
162221	SAKATPUR	220.00	362045	BADO2	220.00*	1	22.5	-15.5
162232	MODAK	220.00	362045	BADO2	220.00*	1	59.0	-37.7
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	1	0.0	65.3
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	2	0.0	65.3
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	1	-734.1	-76.8
167773	JAIPURR	765.00*	368007	GWALIOR	765.00	2	-784.4	-86.3
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	1	-332.8	121.5
168429	CHIT-NEW	765.00*	358136	BANASKANTHA	765.00	2	-332.8	121.5
182234	AURYA2	220.00	362040	MALNP2	220.00*	1	-19.0	-16.7
182234	AURYA2	220.00	362041	MEHGAON2	220.00*	1	33.7	-17.6
184403	BHINMAL	400.00	354019	ZERDA	400.00*	1	87.3	279.1
184404	KANKROLI	400.00	354019	ZERDA	400.00*	1	115.1	83.7
184405	RAPS_C4	400.00*	364021	SHUJALPR	400.00	1	-107.8	-32.6
184405	RAPS_C4	400.00*	364021	SHUJALPR	400.00	2	-107.8	-32.6

184446	RIHNDEXT	400.00*	364025	VIN-POOL	400.00	1	340.0	-243.4		
184446	RIHNDEXT	400.00*	364025	VIN-POOL	400.00	2	340.0	-243.4		
187706	AGRA-PG	765.00	368007	GWALIOR	765.00*	1	-1593.5	66.5		
187706	AGRA-PG	765.00	368007	GWALIOR	765.00*	2	-1606.0	64.5		
188258	ORAI	765.00*	378057	BARETHI	765.00	1	-813.4	178.8		
188258	ORAI	765.00*	378057	BARETHI	765.00	2	-813.4	178.8		
TOTAL FROM AREA 1 TO AREA 3								-14095.0	2011.4	

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR		
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1	TWO TRM DC "39"					
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1	TWO TRM DC "40"					
172278	SAHUPU_N	220.00*	412026	SASARAM-PG	220.00	1	-258.6	95.6						
174479	VARANASI	400.00	414405	BIHARSHARF-B400.00*	1		-258.0	79.8						
174479	VARANASI	400.00	414405	BIHARSHARF-B400.00*	3		-258.0	79.8						
174479	VARANASI	400.00	414491	SASARAM-ER	400.00*	1	-17.3	86.9						
184474	ALLAHABA	400.00	414492	SASARAM-NR	400.00*	1	-249.3	1.7						
184475	BAL74-PG	400.00	414005	BIHARSHARF-A400.00*	1		-229.3	32.4						
184475	BAL74-PG	400.00	414005	BIHARSHARF-A400.00*	2		-229.3	32.4						
184475	BAL74-PG	400.00	414006	PATNA	400.00*	1	-323.2	34.4						
184475	BAL74-PG	400.00	414006	PATNA	400.00*	2	-323.2	34.4						
184475	BAL74-PG	400.00	414006	PATNA	400.00*	3	-363.6	24.3						
184475	BAL74-PG	400.00	414006	PATNA	400.00*	4	-363.6	24.3						
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	1	-332.0	80.0						
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	2	-332.0	80.0						
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	1	-297.8	106.5						
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	2	-297.8	106.5						
187000	VARNASI8	765.00	418008	GAYA	765.00*	1	-758.6	192.7						
187000	VARNASI8	765.00	418008	GAYA	765.00*	2	-889.0	144.1						
187701	BALI7-PG	765.00*	418008	GAYA	765.00	2	-1027.0	129.5						
187705	FATEH-PG	765.00*	418892	SASARAM	765.00	1	-312.6	1.6						
TOTAL FROM AREA 1 TO AREA 4								-9972.0	3223.1					

CHAMPA KURUKSHETRA ONE POLE (3000 MW)

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME	--X	BASKV	BUS#	X--	NAME	--X	BASKV	CKT	MW	MVAR	
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-39.4	TWO TRM DC "15"				
184432	VINDHYBT	400.00	364008	VINDH_W4	400.00*	2DC	-125.1	-39.4	TWO TRM DC "16"				
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3	TWO TRM DC "3"				
184459	MAHIN_HV	400.00	354015	MUNDRA4	400.00*	2DC	-1002.9	-470.3	TWO TRM DC "4"				
184483	KURUKSHETR	400.00*	314033	CHAMPA_POOL	400.00	2DC	-2795.9	1304.1	TWO TRM DC "76"				
162221	SAKATPUR	220.00	362045	BADO2	220.00*	1	18.8	-12.2					
162232	MODAK	220.00	362045	BADO2	220.00*	1	54.8	-32.7					
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	1	0.0	64.0					
164429	CHIT-NEW	400.00	364086	NEEMUCH	400.00*	2	0.0	64.0					

167773 JAIPURR	765.00*	368007 GWALIOR	765.00	1	-788.4	-57.5
167773 JAIPURR	765.00*	368007 GWALIOR	765.00	2	-842.4	-65.4
168429 CHIT-NEW	765.00*	358136 BANASKANTHA	765.00	1	-356.1	120.1
168429 CHIT-NEW	765.00*	358136 BANASKANTHA	765.00	2	-356.1	120.1
182234 AURYA2	220.00	362040 MALNP2	220.00*	1	-10.7	-14.0
182234 AURYA2	220.00	362041 MEHGAON2	220.00*	1	42.4	-15.1
184403 BHINMAL	400.00	354019 ZERDA	400.00*	1	61.8	277.2
184404 KANKROLI	400.00	354019 ZERDA	400.00*	1	97.3	83.2
184405 RAPS_C4	400.00*	364021 SHUJALPR	400.00	1	-117.1	-25.3
184405 RAPS_C4	400.00*	364021 SHUJALPR	400.00	2	-117.1	-25.3
184446 RIHNDEXT	400.00*	364025 VIN-POOL	400.00	1	340.0	-236.3
184446 RIHNDEXT	400.00*	364025 VIN-POOL	400.00	2	340.0	-236.3
187706 AGRA-PG	765.00	368007 GWALIOR	765.00*	1	-1466.4	97.1
187706 AGRA-PG	765.00	368007 GWALIOR	765.00*	2	-1477.9	95.5
188258 ORAI	765.00	368026 JABALPR-POOL	765.00*	3	-1262.8	-148.3
188258 ORAI	765.00	368026 JABALPR-POOL	765.00*	4	-1262.8	-148.3
188258 ORAI	765.00*	378057 BARETHI	765.00	1	-813.4	163.1
188258 ORAI	765.00*	378057 BARETHI	765.00	2	-813.4	163.1
TOTAL FROM AREA 1 TO AREA 3					-13781.5	515.7

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS# X--	NAME --X	BASKV	BUS# X--	NAME --X	BASKV	CKT	MW	MVAR
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1 TWO TRM DC "39"
184922	AGRA	400.00*	444073	ALIPURDU	400.00	2DC	-1425.9	928.1 TWO TRM DC "40"
172278	SAHUPU_N	220.00*	412026	SASARAM-PG	220.00	1	-264.7	96.6
174479	VARANASI	400.00	414405	BIHARSHARF-B	400.00*	1	-267.4	79.0
174479	VARANASI	400.00	414405	BIHARSHARF-B	400.00*	3	-267.4	79.0
174479	VARANASI	400.00	414491	SASARAM-ER	400.00*	1	-24.6	82.3
184474	ALLAHABA	400.00	414492	SASARAM-NR	400.00*	1	-249.3	1.5
184475	BAL74-PG	400.00	414005	BIHARSHARF-A	400.00*	1	-238.5	34.7
184475	BAL74-PG	400.00	414005	BIHARSHARF-A	400.00*	2	-238.5	34.7
184475	BAL74-PG	400.00	414006	PATNA	400.00*	1	-332.0	35.0
184475	BAL74-PG	400.00	414006	PATNA	400.00*	2	-332.0	35.0
184475	BAL74-PG	400.00	414006	PATNA	400.00*	3	-373.5	25.0
184475	BAL74-PG	400.00	414006	PATNA	400.00*	4	-373.5	25.0
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	1	-345.7	77.8
184927	GORAKHPU	400.00	414001	MUZAFARPUR	400.00*	2	-345.7	77.8
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	1	-300.0	103.6
184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	2	-300.0	103.6
187000	VARNAS18	765.00	418008	GAYA	765.00*	1	-786.8	187.4
187000	VARNAS18	765.00	418008	GAYA	765.00*	2	-922.0	138.1
187701	BALI7-PG	765.00*	418008	GAYA	765.00	2	-1058.8	135.6
187705	FATEH-PG	765.00*	418892	SASARAM	765.00	1	-333.9	-4.8
TOTAL FROM AREA 1 TO AREA 4							-10205.9	3203.2

ALIPURDUAR AGRA POLE OUTAGE

FROM AREA 1 NORTH

TO AREA 3 WEST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME --X	BASKV	BUS#	X--	NAME --X	BASKV	CKT	MW	MVAR
184432		VINDHYBT	400.00	364008		VINDH_W4	400.00*	2DC	-125.1	-39.4 TWO TRM DC "15"
184432		VINDHYBT	400.00	364008		VINDH_W4	400.00*	2DC	-125.1	-39.4 TWO TRM DC "16"
184459		MAHIN_HV	400.00	354015		MUNDRA4	400.00*	2DC	-1002.9	-470.3 TWO TRM DC "3"
184459		MAHIN_HV	400.00	354015		MUNDRA4	400.00*	2DC	-1002.9	-470.3 TWO TRM DC "4"
184483		KURUKSHETR	400.00*	314033		CHAMPA_POOL	400.00	2DC	-2795.9	1304.1 TWO TRM DC "75"
184483		KURUKSHETR	400.00*	314033		CHAMPA_POOL	400.00	2DC	-2795.9	1304.1 TWO TRM DC "76"
162221		SAKATPUR	220.00	362045		BADO2	220.00*	1	33.3	-18.5
162232		MODAK	220.00	362045		BADO2	220.00*	1	71.9	-43.0
164429		CHIT-NEW	400.00	364086		NEEMUCH	400.00*	1	0.0	66.5
164429		CHIT-NEW	400.00	364086		NEEMUCH	400.00*	2	0.0	66.5
167773		JAIPURR	765.00*	368007		GWALIOR	765.00	1	-632.5	-105.0
167773		JAIPURR	765.00*	368007		GWALIOR	765.00	2	-676.0	-116.8
168429		CHIT-NEW	765.00*	358136		BANASKANTHA	765.00	1	-294.9	123.3
168429		CHIT-NEW	765.00*	358136		BANASKANTHA	765.00	2	-294.9	123.3
182234		AURYA2	220.00	362040		MALNP2	220.00*	1	-2.4	-24.1
182234		AURYA2	220.00	362041		MEHGAON2	220.00*	1	50.4	-26.2
184403		BHINMAL	400.00	354019		ZERDA	400.00*	1	130.2	279.5
184404		KANKROLI	400.00	354019		ZERDA	400.00*	1	145.5	82.6
184405		RAPS_C4	400.00*	364021		SHUJALPR	400.00	1	-71.8	-39.3
184405		RAPS_C4	400.00*	364021		SHUJALPR	400.00	2	-71.8	-39.3
184446		RIHNDEXT	400.00*	364025		VIN-POOL	400.00	1	340.0	-243.4
184446		RIHNDEXT	400.00*	364025		VIN-POOL	400.00	2	340.0	-243.4
187706		AGRA-PG	765.00	368007		GWALIOR	765.00*	1	-1299.2	38.4
187706		AGRA-PG	765.00	368007		GWALIOR	765.00*	2	-1309.4	36.3
188258		ORAI	765.00	368026		JABALPR-POOL	765.00*	3	-1045.9	-141.3
188258		ORAI	765.00	368026		JABALPR-POOL	765.00*	4	-1045.9	-141.3
188258		ORAI	765.00*	378057		BARETHI	765.00	1	-813.3	236.3
188258		ORAI	765.00*	378057		BARETHI	765.00	2	-813.3	236.3
TOTAL FROM AREA 1 TO AREA 3									-15107.7	1696.3

TO AREA 4 EAST

X---- FROM AREA BUS ----X X----- TO AREA BUS -----X

BUS#	X--	NAME --X	BASKV	BUS#	X--	NAME --X	BASKV	CKT	MW	MVAR
184922		AGRA	400.00*	444073		ALIPURDU	400.00	2DC	-1425.9	928.1 TWO TRM DC "40"
172278		SAHUPU_N	220.00*	412026		SASARAM-PG	220.00	1	-268.4	100.8
174479		VARANASI	400.00	414405		BIHARSHARF-B4	400.00*	1	-269.2	79.7
174479		VARANASI	400.00	414405		BIHARSHARF-B4	400.00*	3	-269.2	79.7
174479		VARANASI	400.00	414491		SASARAM-ER	400.00*	1	-27.7	86.2
184474		ALLAHABA	400.00	414492		SASARAM-NR	400.00*	1	-249.3	1.7
184475		BAL74-PG	400.00	414005		BIHARSHARF-A4	400.00*	1	-264.7	41.8
184475		BAL74-PG	400.00	414005		BIHARSHARF-A4	400.00*	2	-264.7	41.8
184475		BAL74-PG	400.00	414006		PATNA	400.00*	1	-366.6	39.9
184475		BAL74-PG	400.00	414006		PATNA	400.00*	2	-366.6	39.9
184475		BAL74-PG	400.00	414006		PATNA	400.00*	3	-412.4	30.5
184475		BAL74-PG	400.00	414006		PATNA	400.00*	4	-412.4	30.5
184927		GORAKHPU	400.00	414001		MUZAFARPUR	400.00*	1	-400.0	85.2
184927		GORAKHPU	400.00	414001		MUZAFARPUR	400.00*	2	-400.0	85.2
184927		GORAKHPU	400.00	414068		MOTIHARI	400.00*	1	-308.0	101.3

184927	GORAKHPU	400.00	414068	MOTIHARI	400.00*	2	-308.0	101.3
187000	VARNAS18	765.00	418008	GAYA	765.00*	1	-755.8	189.9
187000	VARNAS18	765.00	418008	GAYA	765.00*	2	-885.7	140.8
187701	BALI7-PG	765.00*	418008	GAYA	765.00	2	-988.1	122.2
187705	FATEH-PG	765.00*	418892	SASARAM	765.00	1	-354.1	6.6
TOTAL FROM AREA 1 TO AREA 4							-8996.8	2333.2

Annex - 6

List of officials from CEA, POWERGRID and POSOCO who provided guidance and help in preparation of this Report

<u>Sl. No.</u>	<u>Name and Organization</u>	<u>Designation</u>
	<u>Central Electricity Authority :</u>	
1.	S. D. Dubey	Member(Power System)
2.	Pardeep Jindal	Chief Engineer
3.	Shivani Sharma	Deputy Director
4.	Ajay K. Dahyia	Asstt. Director
	<u>Power Grid Corp. of India Ltd. :</u>	
5.	Seema Gupta	COO(CTU-Plg.)
6.	Ashok Pal	General Manager
7.	Mukesh Khanna	Add. General Manager
8.	Anupam Kumar	Engineer
	<u>POSOCO:</u>	
9.	S. K. Soonee	Chief Executive Officer
10.	S. R. Narasimhan	Add. General Manager
11.	Malla Mahendra Nath	Engineer
12.	Shyam Sunder Goyal	Engineer

Report (Part – B)

on

Perspective Transmission Requirements for 2022-36

Central Electricity Authority

February 2016

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Report (Part-B) on Perspective Transmission Requirements for 2022-36

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Report on Perspective Transmission Requirements for 2022-36

1.0 Objective:

- 1.1 Transmission planning is a continuous process of identification of transmission system addition requirements, their need and timeframe of implementation commensurate with generation addition and growth in demand for electricity. It has to be in consonance with principle of development of power system enshrined in Section 3 of the Electricity Act 2003, i.e. '.....for development of the power system based on optimal utilisation of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy'.
- 1.2 A perspective plan of next 20 years, in the Indian context, can provide some information on possible growth of broad inter-regional transmission corridors.

2.0 Background:

- 2.1 A perspective transmission plan for 20 years (2014-2034) was prepared in August 2014 by CEA in association with CTU and POSOCO. The objective of the plan was to present a broad outline of the requirement of transmission system in the Indian grid in next 20 years. While this perspective plan has set up broad contour for the transmission requirement in the next 20 years, it was desired that detailed analysis for the immediate time-frame of 2021-22 may be carried out.
- 2.2 Classically, the need for development of transmission system arises from new generation additions, increase in demand and general system strengthening for better reliability. These development goals are achieved based on a definite implementable 'transmission plan'. The National Electricity Plan that would cover detailed generation programme and transmission plan for period up to 2022 i.e. the 13th five-year plan is under preparation. However, an 'Advance National Transmission Plan for Year 2021-22' has been prepared by CEA and submitted to the Ministry of Power vide letter no. 200/15/2016-PSPA-II/32 on 18-January-2016.
- 2.3 In the absence of affirmative information about new generation additions beyond 2021-22, the expected growth in load demand may serve as driving factor for a perspective transmission plan. Accordingly, a 'Perspective Transmission Plan for Year 2022-36' has been prepared based on initial indications of peak load demand projections and consequential generation addition requirements.

2.4 Notwithstanding the above, CEA is preparing National Electricity Plan u/S 3 of the Electricity Act 2003, and also working on 19th Electric Power Survey report. The National Electricity Plan would give Generation capacity addition requirement for the period up to 2022 based on the 19th EPS load projects and Transmission system requirement in country to serve both the generation and the load demand. This is being prepared considering the ongoing generation projects, Power for All programme of the Government, integrated resource planning analysis, deliberations in the Standing Committees on Power System Planning and detailed analysis for transmission planning.

3.0 The Perspective Plan:

3.1 This report covers broad transmission corridors that may be required between 2022 to 2036 i.e. 8th year onwards and up to 20th year ahead. The generation plants that may come up in these 14 years (2022-36) are not known. The all-India peak demand is expected to rise from the current level of 153 GW to about 690 GW i.e. more than four(4) times by 2035-36. This implies roughly quadrupling the generation installed capacity as well as transmission systems of about 4 to 5 times the present capacities. The perspective plan for this period i.e. 2022-36 which includes 14th Plan, 15th Plan and first three years of 16th Plan, therefore, can at best be an indicative plan giving broad transmission corridors across various regions and possible international exchange corridors.

3.2 This assessment of indicative corridors requires an assessment of state-wise load growth and state-wise generation capacity additions of various fuel types i.e. coal, Gas nuclear, hydro, etc. to serve the load demand.

4.0 Assessment of Demand:

4.1 Demand assessment is an essential prerequisite for planning of generation capacity addition and associated transmission infrastructure required to meet the future power requirement of various sectors of our economy. The type and location of power projects to be planned in the system is largely dependent on the magnitude, spatial distribution as well as the variation of demand during the day, seasons and on a yearly basis. Therefore, reliable planning for generation and transmission capacity addition for future is largely dependent on an accurate assessment of the future demand.

4.2 The 19th Electricity Power Survey Committee has been constituted with wide representation from the Stake-holders in the Power Sector, to forecast the demand for

electricity both in terms of peak electric load and electrical energy requirement. CEA has been regularly bringing out the Electric Power Survey Reports. The last available report is the 18th Electric Power Survey (EPS) Report. Though the work on 19th EPS forecast is yet to be completed, a tentative estimate for period up to 2035-36 and the terminal years of the 13th, 14th and 15th Plan periods is given below:

(in MW)

State/UTs	13 th Plan	14 th Plan	15 th Plan	For year
	2021-22	2026-27	2031-32	2035-36
Northern Region	76167	106530	148900	195000
Western Region	71682	112450	163100	217800
Southern Region	60120	98210	146700	203400
Eastern Region	26852	42770	63000	85800
North- Eastern Region	3688	7020	10500	14000
Total All India (All Peak)	236000	349500	506900	681900

- 4.3 In addition to above, following peak **export demand** has also been assumed for neighbouring countries of SAARC region. Thus the total Peak load to be served from Indian grid is also given.

(in MW)

Neighbouring Country	13 th Plan	14 th Plan	15 th Plan	For year
	2021-22	2026-27	2031-32	2035-36
SAARC Exports				
Bangladesh	1000	1500	2000	2000
Nepal	200	400	500	500

(in MW)

Neighbouring Country	13 th Plan 2021-22	14th Plan 2026-27	15th Plan 2031-32	For year 2035-36
Sri Lanka	0	0	500	1000
Pakistan	0	500	1000	1000
SAARC Exports	1200	2400	4000	4500
Total All India + SAARC	237000	352000	511000	686000

5.0 Assessment of Generation Capacity:

5.1 Generation capacity addition during a five year plan and the type-wise and region-wise (including the possible exportable capacity in neighbouring countries) for terminal year of each plan and for the year 2035-36 assumed for the purpose for this report are given below:

5.2 Generation Capacity for Year 2021-22 (end of 13th Plan):

The Nation Electricity Plan is under preparation u/S 3(4) of the Electricity Act 2003. This Plan would inter-alia give generation capacity addition for period up to 2021-22 based on integrated resource planning requirements for the country. In the absence of the generation addition programme for 13th Plan period, an estimate was made considering the ongoing and likely capacity addition for the conventional generation projects. For the renewable generation projects, as explained above, we do not have data corresponding to the 175 GW RES target, as such the modeling and analysis was carried out with only the known RE generation projects. Accordingly, following Existing, Under-construction/Planned and Total generation capacity (Conventional) was assumed for these studies:

Region-wise Installed Capacity Summary, in MW

Existing as on Oct'2015					
Region	Coal	Gas	Nuclear	Hydro	Total____Conv.
Northern	41281	4995	3120	19961	69356
Western	68303	11231	1840	9322	90696
Southern	31613	7795	3320	11451	54178
Eastern	30895	90	0	4208	35193
North-east	0	1648	0	2133	3780
Bhutan	0	0	0	1416	1416
Total	172091	25759	8280	48490	254620

** - The hydro capacity here also includes the grid connected Small Hydro Plants

UC/Planned between Nov'2015 - 22					
Region	Coal	Gas	Nuclear	Hydro	Total____Conv.
Northern	11380	0	1400	6657	19437
Western	33910	0	3140	0	37050
Southern	29290	0	1500	236	31026
Eastern	23030	0	0	3786	26816
North-east	750	0	0	4905	5655
Bhutan	0	0	0	2920	2920
Total	98360	0	6040	18504	122904

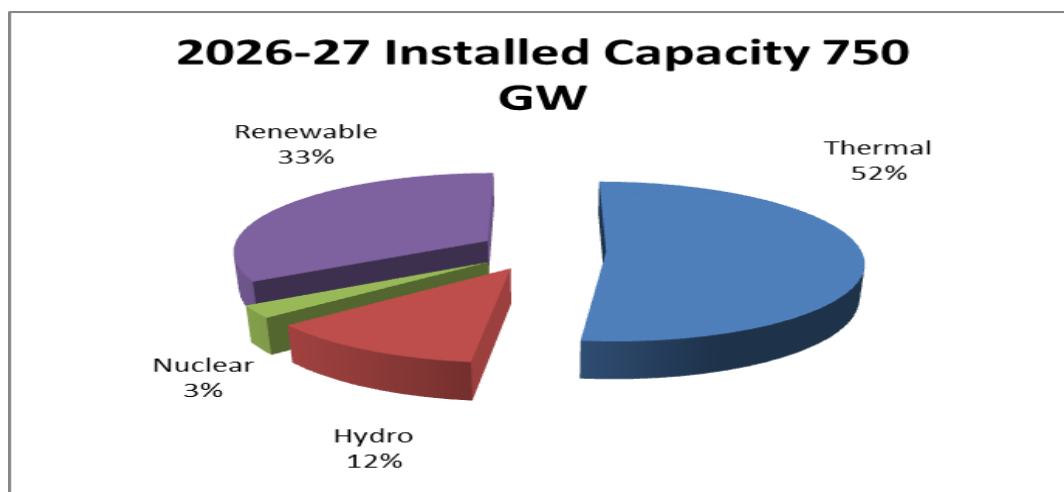
Total by 2021-22					
Region	Coal	Gas	Nuclear	Hydro	Total____Conv.
Northern	52661	4995	4520	26618	88793
Western	102213	11231	4980	9322	127746
Southern	60903	7795	4820	11687	85204
Eastern	53925	90	0	7994	62009
North-east	750	1648	0	7038	9435
Bhutan	0	0	0	4336	4336
Total	270451	25759	14320	66994	377524

5.3 Generation Capacity for Year 2026-27(end of 14th Plan):

Following generation capacity, including importable generation capacity within SAARC countries, has been assumed for the terminal year of 14th five year plan i.e. for 2026-27:

(all figures in MW)

Regions	Thermal	Hydro	Nuclear	RES	Total
Northern	66956	27348	5920	66995	167218
Western	150694	9322	6380	77755	244151
Southern	87348	11747	6820	84964	190878
Eastern	81915	8084	0	18162	108161
North Eastern	2398	10658	0	2620	15675
ALL INDIA	389311	67159	19120	250496	726083
Bangladesh					
Nepal	0	10000	0	0	10000
Bhutan	0	14336	0	0	14336
SAARC Total	0	24336	0	0	24336
Total	389311	91495	19120	250496	750419

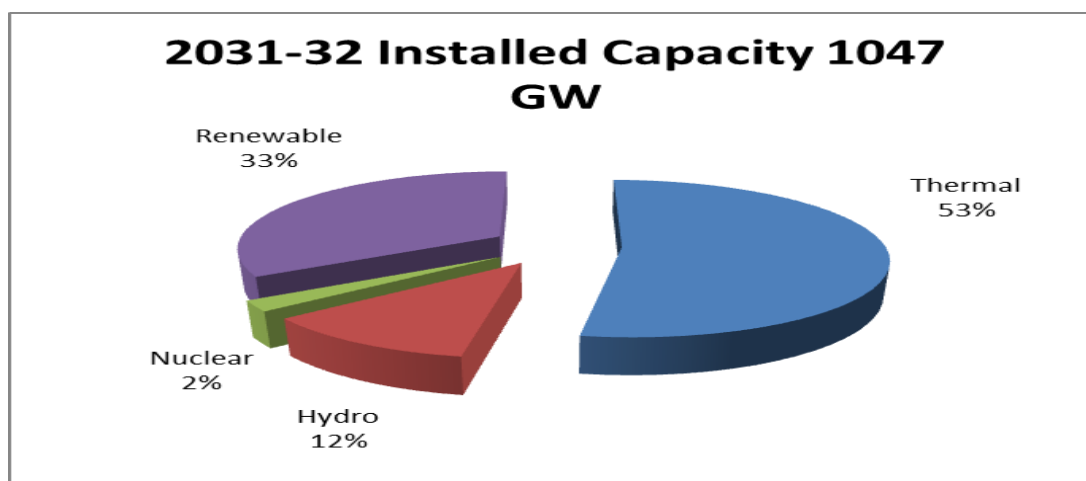


5.4 Generation Capacity for Year 2031-32 (end of 15th Plan):

Following generation capacity, including importable generation capacity within SAARC countries, has been assumed for the terminal year of 15th five year plan i.e. for 2031-32:

(all figures in MW)

Regions	Thermal	Hydro	Nuclear	RES	Total
Northern	83266	28548	7320	93740	212873
Western	215934	9322	7780	108795	341831
Southern	119968	11857	8220	118883	258927
Eastern	130845	8244	0	25413	164502
North Eastern	2398	16688	0	3666	22751
ALL INDIA	552411	74659	23320	350496	1000883
Bangladesh					
Nepal	0	20000	0	0	20000
Bhutan	0	26336	0	0	26336
SAARC Total	0	46336	0	0	46336
Total	552411	120995	23320	350496	1047219

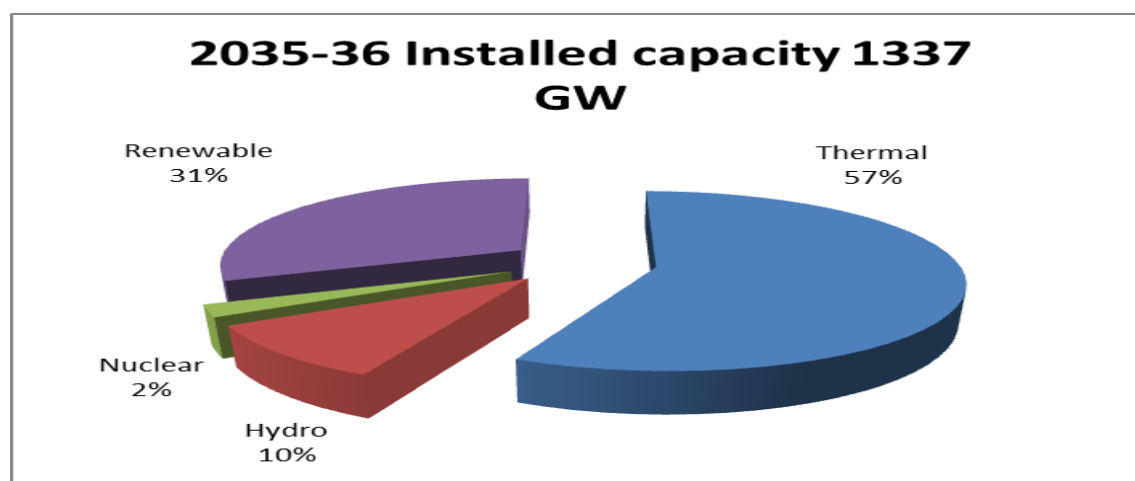


5.5 Generation Capacity for Year 2035-36 (in the 16th Plan):

Following generation capacity, including importable generation capacity within SAARC countries, has been assumed for the third year of 16th plan i.e. for 2035-36:

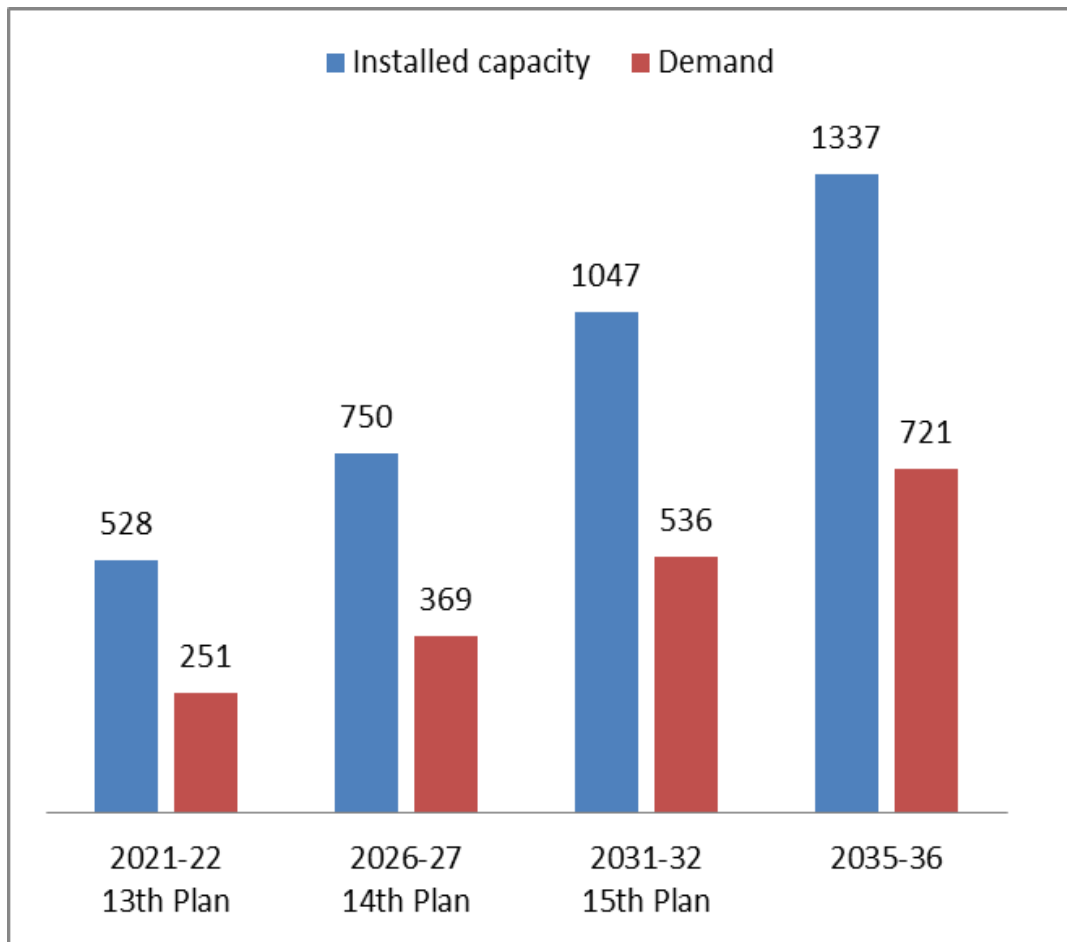
(all figures in MW)

Regions	Thermal	Hydro	Nuclear	RES	Total
Northern	104346	29818	8720	109786	252669
Western	300254	9342	7780	127419	444795
Southern	162128	11967	13220	139234	326548
Eastern	194085	8414	0	29763	232262
North Eastern	2398	23118	0	4294	29809
ALL INDIA	763211	82659	29720	410496	1286083
Bangladesh					
Nepal	0	25000	0	0	25000
Bhutan	0	26336	0	0	26336
SAARC Total	0	51336	0	0	51336
Total	763211	133995	29720	410496	1337419



5.6 A total picture of Load and Generation Capacity:

A relative growth of generation capacity with respect to the load demand, year-wise, is depicted below. The higher growth in the Installed capacity is due to increasingly higher Renewable energy capacity assumed for this analysis. The RE capacity not only has low PLF (about 20%) but also is not available during peak hours. The solar power is not available during the peak hours of (6- 9 pm), and the wind is available only during April-September months. Thus RE contributes lesser towards meeting the energy demand and the peak load demand.



6.0 Assessment of Transmission Capacity Requirement:

6.1 The projection of generation and demand projection under different scenarios as estimated above for 2021-22, end of 14th Plan (2026-27), 15th Plan(2031-32) and 2035-36 time-frame are being used to find out the demand-generation surplus-deficit analysis for each region and for each quarter of the year.

- 6.2 The variation in generation dispatch and availability has been worked out for each quarter of the terminal years and would be discussed in subsequent paragraphs of this report.
- 6.3 In all of these analyses, following peak demand variation has been assumed for the five regions for each of the four quarters:

Region	Q-1	Q-2	Q-3	Q-4
NR	98.2%	100.0%	93.5%	91.7%
WR	93.9%	92.6%	96.2%	100.0%
SR	93.9%	91.4%	90.9%	100.0%
ER	93.7%	95.7%	94.6%	100.0%
NER	94.8%	96.0%	100.0%	99.9%
Bangladesh	100.0%	100.0%	100.0%	100.0%
Nepal	100.0%	100.0%	100.0%	100.0%
SriLanka	100.0%	100.0%	100.0%	100.0%
Pakistan	100.0%	100.0%	100.0%	100.0%
Bhutan	100.0%	100.0%	100.0%	100.0%

- 6.4 On the basis of the demand supply position, the requirement of flow of power between various regions has been worked out. The transmission corridors between the regions including the SAARC countries have been indicated which may be required to meet the need of the power transfer among various regions. The capacity of transmission corridors, thus assessed are based on only empirical analysis and therefore are only indicative in nature.

7.0 Transmission corridor capacity requirement for 2021-22 (end of 13th Plan):

The quarter-wise demand-supply surplus/deficit analysis for the year 2021-22 is given below:

7.1 First Quarter (i.e. Q1 of 2021-22):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	61%	50%	70%	10%
Western	61%	50%	70%	10%
Southern	61%	50%	70%	10%
Eastern	61%	50%	70%	10%
NER	61%	50%	70%	10%
Bangladesh	61%	50%	70%	10%
Nepal	61%	50%	70%	10%
SriLanka	61%	50%	70%	10%
Pakistan	61%	50%	70%	10%
Bhutan	61%	50%	70%	10%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Availab.	Demand	surplus/ deficit
Northern	35170	13309	3164	4025	55668	74021	-18353
Western	69201	4661	3486	4671	82019	71665	10354
Southern	41906	5844	3374	5105	56228	61370	-5142
Eastern	32949	3997	0	1091	38037	27142	10895
North Eastern	1463	3519	0	157	5139	4297	842
ALL INDIA	180689	31330	10024	15050	237092	238496	-1404
Bangladesh	0	0	0	0	0	500	-500
Nepal	0	0	0	0	0	200	-200
SriLanka	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	0	0
Bhutan	0	2168	0	0	2168	0	2168
SAARC Total	0	2168	0	0	2168	700	1468
Total	180688	33497	10024	15050	239260	239196	63

7.2 Second Quarter (i.e. Q1 of 2021-22):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	57%	65%	70%	10%
Western	57%	65%	70%	10%
Southern	57%	65%	70%	10%
Eastern	57%	65%	70%	10%
NER	57%	65%	70%	10%
Bangladesh	57%	65%	70%	10%
Nepal	57%	65%	70%	10%
SriLanka	57%	65%	70%	10%
Pakistan	57%	65%	70%	10%
Bhutan	57%	65%	70%	10%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Availab.	Demand	surplus/ deficit
Northern	33095	17302	3164	4025	57585	75378	-17793
Western	65117	6059	3486	4671	79334	70673	8660
Southern	39433	7597	3374	5105	55508	59736	-4229
Eastern	31005	5196	0	1091	37292	27721	9570
North Eastern	1376	4575	0	157	6109	4352	1757
ALL INDIA	170025	40728	10024	15050	235827	237861	-2034
Bangladesh	0	0	0	0	0	500	-500
Nepal	0	0	0	0	0	200	-200
SriLanka	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	0	0
Bhutan	0	2818	0	0	2818	0	2818
SAARC Total	0	2818.4	0	0	2818.4	700	2118.4
Total	170025	43547	10024	15050	238645	238561	85

7.3 Third Quarter (i.e. Q3 of 2021-22):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	60%	50%	70%	10%
Western	60%	50%	70%	10%
Southern	60%	50%	70%	10%
Eastern	60%	50%	70%	10%
NER	60%	50%	70%	10%
Bangladesh	60%	50%	70%	10%
Nepal	60%	50%	70%	10%
SriLanka	60%	50%	70%	10%
Pakistan	60%	50%	70%	10%
Bhutan	60%	50%	70%	10%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Availab.	Demand	surplus/ deficit
Northern	34536	13309	3164	4025	55034	70478	-15444
Western	67953	4661	3486	4671	80771	73421	7351
Southern	41150	5844	3374	5105	55472	59410	-3937
Eastern	32355	3997	0	1091	37443	27403	10040
North Eastern	1436	3519	0	157	5113	4533	580
ALL INDIA	177430	31330	10024	15050	233833	235245	-1411
Bangladesh	0	0	0	0	0	500	-500
Nepal	0	0	0	0	0	200	-200
SriLanka	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	0	0
Bhutan	0	2168	0	0	2168	0	2168
SAARC Total	0	2168	0	0	2168	700	1468
Total	177430	33498	10024	15050	236001	235945	57

7.4 Fourth Quarter (i.e. Q4 of 2021-22):

Generation dispatch factors

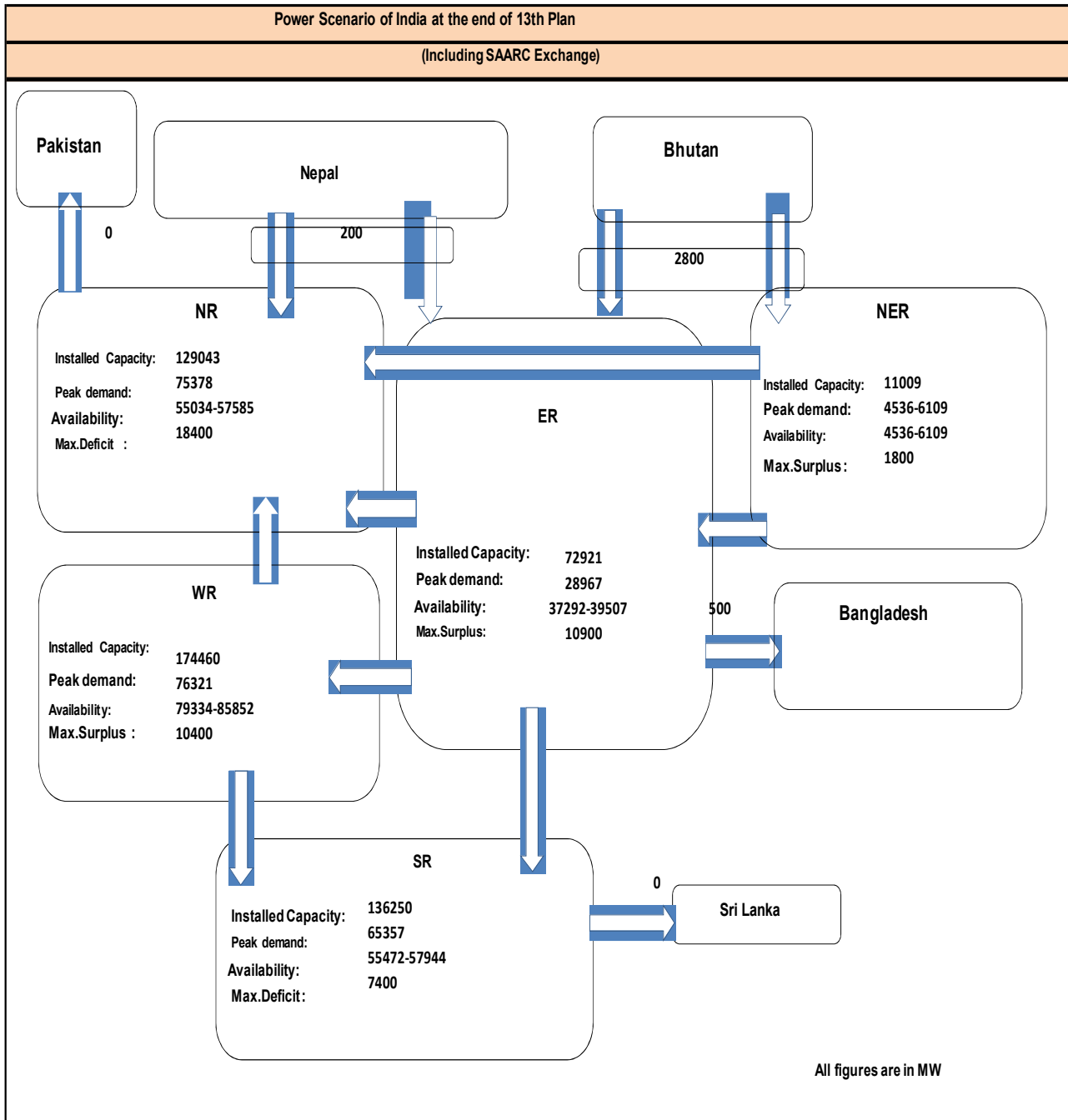
Region	Thermal	Hydro	Nuclear	RES
Northern	65%	40%	70%	10%
Western	65%	40%	70%	10%
Southern	65%	40%	70%	10%
Eastern	65%	40%	70%	10%
NER	65%	40%	70%	10%
Bangladesh	65%	40%	70%	10%
Nepal	65%	40%	70%	10%
SriLanka	65%	40%	70%	10%
Pakistan	65%	40%	70%	10%
Bhutan	65%	40%	70%	10%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Availab.	Demand	surplus/ deficit
Northern	37592	10647	3164	4025	55428	69122	-13694
Western	73965	3729	3486	4671	85852	76321	9531
Southern	44791	4675	3374	5105	57944	65357	-7413
Eastern	35218	3198	0	1091	39507	28967	10540
North Eastern	1563	2815	0	157	4536	4528	8
ALL INDIA	193130	25064	10024	15050	243267	244295	-1028
Bangladesh	0	0	0	0	0	500	-500
Nepal	0	0	0	0	0	200	-200
SriLanka	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	0	0
Bhutan	0	1734	0	0	1734	0	1734
SAARC Total	0	1734.4	0	0	1734.4	700	1034.4
Total	193130	26798	10024	15050	245001	244995	6

7.5 Accordingly, the transmission capacity requirement for 2021-22 may be assessed as given below:



8.0 Transmission corridor capacity requirement for 2026-27 (end of 14th Plan):

The quarter-wise demand-supply surplus/deficit for the year 2026-27 is given below:

8.1 First Quarter (i.e. Q1 of 2026-27):**Generation dispatch factors**

Region	Thermal	Hydro	Nuclear	RES
Northern	65%	50%	70%	15%
Western	65%	50%	70%	15%
Southern	65%	50%	70%	15%
Eastern	65%	50%	70%	15%
N. Eastern	65%	50%	70%	15%
Bangladesh	65%	50%	70%	15%
Nepal	65%	50%	70%	15%
SriLanka	65%	50%	70%	15%
Pakistan	65%	50%	70%	15%
Bhutan	65%	50%	70%	15%

Load Generation Balance Analysis (all fig. in MW)

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	43789	13674	4144	10049	71656	104612	-32956
Western	98554	4661	4466	11663	119344	105591	13754
Southern	57126	5874	4774	12745	80518	92219	-11701
Eastern	53572	4042	0	2724	60339	40075	20263
N. Eastern	1568	5329	0	393	7290	6655	635
ALL INDIA	254609	33580	13384	37574	339147	349153	-10005
Bangladesh	0	0	0	0	0	1500	-1500
Nepal	0	5000	0	0	5000	400	4600
SriLanka	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	500	-500
Bhutan	0	7168	0	0	7168	0	7168
SAARC Total	0	12168	0	0	12168	2400	9768
Total	254609	45748	13384	37574	351315	351553	-237

8.2 Second Quarter (i.e. Q2 of 2026-27):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	62%	65%	70%	15%
Western	62%	65%	70%	15%
Southern	62%	65%	70%	15%
Eastern	62%	65%	70%	15%
North Eastern	62%	65%	70%	15%
Bangladesh	62%	65%	70%	15%
Nepal	62%	65%	70%	15%
SriLanka	62%	65%	70%	15%
Pakistan	62%	65%	70%	15%
Bhutan	62%	65%	70%	15%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	41312	17776	4144	10049	73281	106530	-33249
Western	92978	6059	4466	11663	115167	104129	11038
Southern	53894	7636	4774	12745	79048	89764	-10716
Eastern	50542	5255	0	2724	58521	40931	17590
North Eastern	1480	6928	0	393	8800	6739	2061
ALL INDIA	240205	43653	13384	37574	334817	348093	-13276
Bangladesh	0	0	0	0	0	1500	-1500
Nepal	0	6500	0	0	6500	400	6100
SriLanka	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	500	-500
Bhutan	0	9318	0	0	9318	0	9318
SAARC Total	0	15818.4	0	0	15818.4	2400	13418.4
Total	240205	59472	13384	37574	350635	350493	142

8.3 Third Quarter (i.e. Q3 of 2026-27):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	68%	50%	70%	10%
Western	68%	50%	70%	10%
Southern	68%	50%	70%	10%
Eastern	68%	50%	70%	10%
North Eastern	68%	50%	70%	10%
Bangladesh	68%	50%	70%	10%
Nepal	68%	50%	70%	10%
SriLanka	68%	50%	70%	10%
Pakistan	68%	50%	70%	10%
Bhutan	68%	50%	70%	10%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	45195	13674	4144	6699	69713	99606	-29893
Western	101718	4661	4466	7775	118621	108177	10444
Southern	58960	5874	4774	8496	78104	89273	-11169
Eastern	55293	4042	0	1816	61151	40460	20690
North Eastern	1619	5329	0	262	7210	7020	190
ALL INDIA	262785	33580	13384	25050	334798	344536	-9738
Bangladesh	0	0	0	0	0	1500	-1500
Nepal	0	5000	0	0	5000	400	4600
SriLanka	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	500	-500
Bhutan	0	7168	0	0	7168	0	7168
SAARC Total	0	12168	0	0	12168	2400	9768
Total	262785	45748	13384	25050	346966	346936	30

8.4 Fourth Quarter (i.e. Q4 of 2026-27):

Generation dispatch factors

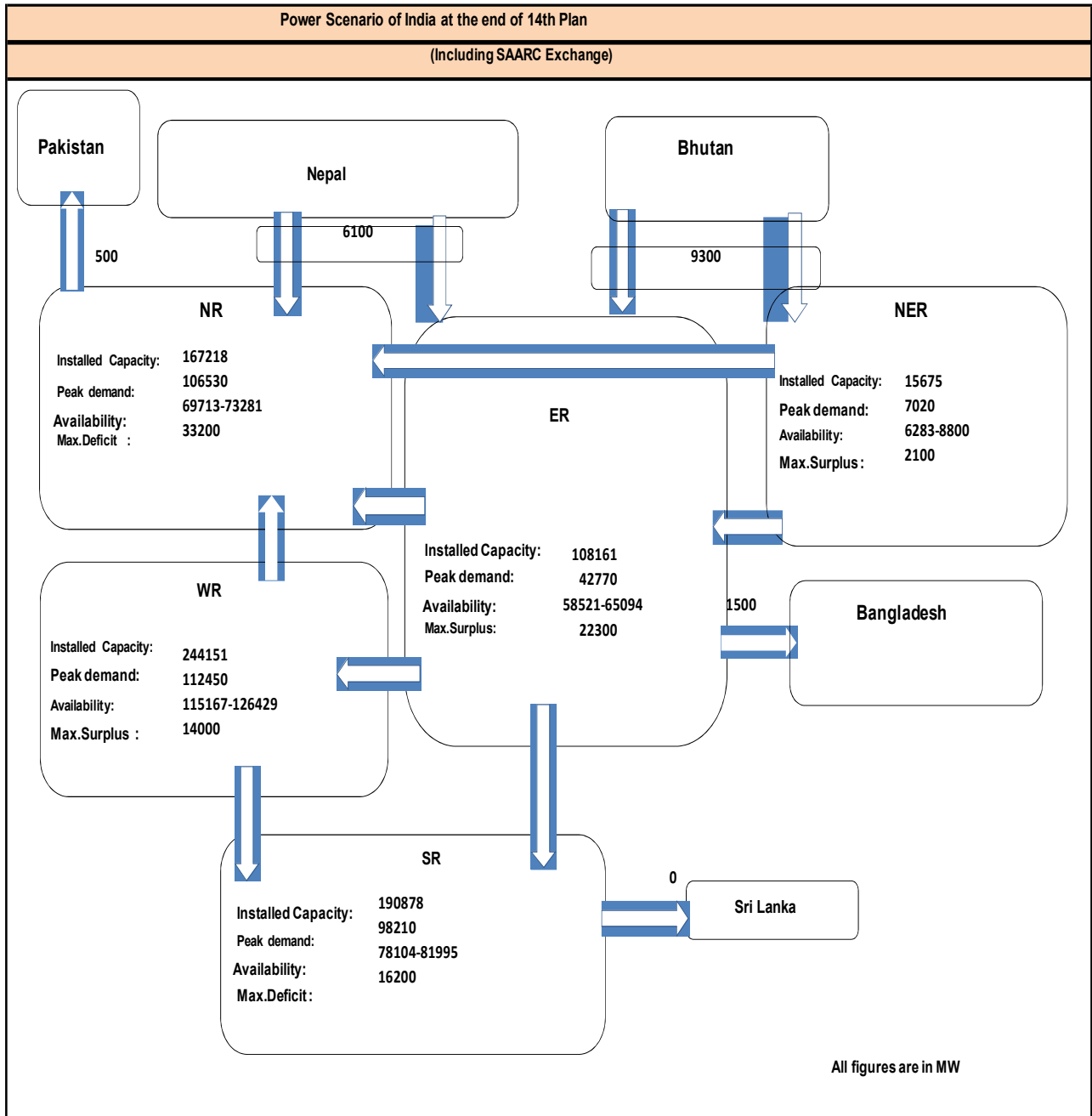
Region	Thermal	Hydro	Nuclear	RES
Northern	73%	40%	70%	10%
Western	73%	40%	70%	10%
Southern	73%	40%	70%	10%
Eastern	73%	40%	70%	10%
North Eastern	73%	40%	70%	10%
Bangladesh	73%	40%	70%	10%
Nepal	73%	40%	70%	10%
SriLanka	73%	40%	70%	10%
Pakistan	73%	40%	70%	10%
Bhutan	73%	40%	70%	10%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	49079	10939	4144	6699	70861	97688	-26827
Western	110459	3729	4466	7775	126429	112450	13979
Southern	64026	4699	4774	8496	81995	98210	-16215
Eastern	60044	3234	0	1816	65094	42770	22324
North Eastern	1758	4263	0	262	6283	7013	-730
ALL INDIA	285365	26864	13384	25050	350662	358131	-7469
Bangladesh	0	0	0	0	0	1500	-1500
Nepal	0	4000	0	0	4000	400	3600
SriLanka	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	500	-500
Bhutan	0	5734	0	0	5734	0	5734
SAARC Total	0	9734.4	0	0	9734.4	2400	7334.4
Total	285365	36598	13384	25050	360397	360531	-134

8.5 Accordingly, the transmission capacity requirement for 2026-27 (end of 14th Plan) may be assessed as given below:



9.0 Transmission corridor capacity requirement for 2031-32 (end of 15th Plan):

The quarter-wise demand-supply surplus/deficit analysis for 2026-27 is given below:

9.1 First Quarter (i.e. Q1 of 2031-32):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	66%	50%	70%	20%
Western	66%	50%	70%	20%
Southern	66%	50%	70%	20%
Eastern	66%	50%	70%	20%
N. Eastern	66%	50%	70%	20%
Bangladesh	66%	50%	70%	20%
Nepal	66%	50%	70%	20%
SriLanka	66%	50%	70%	20%
Pakistan	66%	50%	70%	20%
Bhutan	66%	50%	70%	20%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	54706	14274	5124	18748	92852	146220	-53368
Western	141869	4661	5446	21759	173735	153151	20584
Southern	78819	5929	5754	23777	114278	137751	-23473
Eastern	85965	4122	0	5083	95170	59031	36139
N. Eastern	1575	8344	0	733	10653	9954	699
ALL INDIA	362934	37330	16324	70099	486687	506107	-19420
Bangladesh	0	0	0	0	0	2000	-2000
Nepal	0	10000	0	0	10000	500	9500
SriLanka	0	0	0	0	0	500	-500
Pakistan	0	0	0	0	0	1000	-1000
Bhutan	0	13168	0	0	13168	0	13168
SAARC Total	0	23168	0	0	23168	4000	19168
Total	362934	60498	16324	70099	509855	510107	-252

9.2 Second Quarter (i.e. Q2 of 2031-32):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	62%	65%	70%	20%
Western	62%	65%	70%	20%
Southern	62%	65%	70%	20%
Eastern	62%	65%	70%	20%
North Eastern	62%	65%	70%	20%
Bangladesh	62%	65%	70%	20%
Nepal	62%	65%	70%	20%
SriLanka	62%	65%	70%	20%
Pakistan	62%	65%	70%	20%
Bhutan	62%	65%	70%	20%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	51791	18556	5124	18748	94220	148900	-54680
Western	134311	6059	5446	21759	167575	151031	16545
Southern	74620	7707	5754	23777	111858	134084	-22226
Eastern	81386	5359	0	5083	91827	60291	31536
North Eastern	1492	10847	0	733	13072	10080	2992
ALL INDIA	343600	48528	16324	70099	478551	504385	-25834
Bangladesh	0	0	0	0	0	2000	-2000
Nepal	0	13000	0	0	13000	500	12500
SriLanka	0	0	0	0	0	500	-500
Pakistan	0	0	0	0	0	1000	-1000
Bhutan	0	17118	0	0	17118	0	17118
SAARC Total	0	30118.4	0	0	30118.4	4000	26118.4
Total	343600	78647	16324	70099	508670	508385	284

9.3 Third Quarter (i.e. Q3 of 2031-32):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	68%	50%	70%	15%
Western	68%	50%	70%	15%
Southern	68%	50%	70%	15%
Eastern	68%	50%	70%	15%
N. Eastern	68%	50%	70%	15%
Bangladesh	68%	50%	70%	15%
Nepal	68%	50%	70%	15%
SriLanka	68%	50%	70%	15%
Pakistan	68%	50%	70%	15%
Bhutan	68%	50%	70%	15%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	56371	14274	5124	14061	89830	139222	-49391
Western	146187	4661	5446	16319	172614	156902	15711
Southern	81218	5929	5754	17832	110733	133350	-22617
Eastern	88582	4122	0	3812	96516	59598	36918
North Eastern	1623	8344	0	550	10517	10500	17
ALL INDIA	373982	37330	16324	52574	480210	499572	-19362
Bangladesh	0	0	0	0	0	2000	-2000
Nepal	0	10000	0	0	10000	500	9500
SriLanka	0	0	0	0	0	500	-500
Pakistan	0	0	0	0	0	1000	-1000
Bhutan	0	13168	0	0	13168	0	13168
SAARC Total	0	23168	0	0	23168	4000	19168
Total	373982	60498	16324	52574	503378	503572	-194

9.4 Fourth Quarter (i.e. Q4 of 2031-32):

Generation dispatch factors

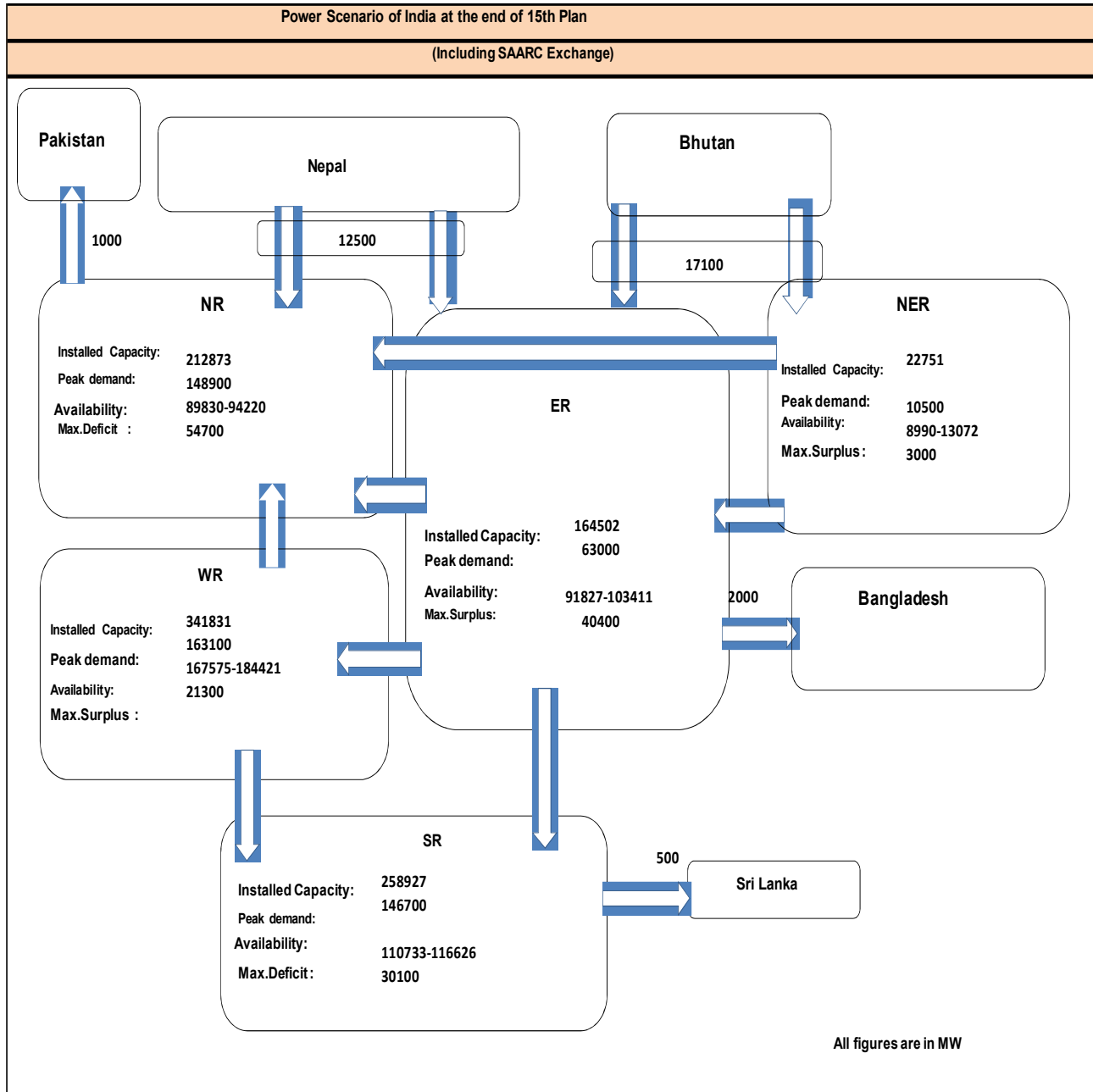
Region	Thermal	Hydro	Nuclear	RES
Northern	74%	40%	70%	15%
Western	74%	40%	70%	15%
Southern	74%	40%	70%	15%
Eastern	74%	40%	70%	15%
N. Eastern	74%	40%	70%	15%
Bangladesh	74%	40%	70%	15%
Nepal	74%	40%	70%	15%
SriLanka	74%	40%	70%	15%
Pakistan	74%	40%	70%	15%
Bhutan	74%	40%	70%	15%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	61284	11419	5124	14061	91888	136541	-44653
Western	158927	3729	5446	16319	184421	163100	21321
Southern	88296	4743	5754	17832	116626	146700	-30074
Eastern	96302	3298	0	3812	103411	63000	40411
North Eastern	1765	6675	0	550	8990	10490	-1499
ALL INDIA	406574	29864	16324	52574	505336	519831	-14494
Bangladesh	0	0	0	0	0	2000	-2000
Nepal	0	8000	0	0	8000	500	7500
SriLanka	0	0	0	0	0	500	-500
Pakistan	0	0	0	0	0	1000	-1000
Bhutan	0	10534	0	0	10534	0	10534
SAARC Total	0	18534.4	0	0	18534.4	4000	14534.4
Total	406574	48398	16324	52574	523871	523831	40

9.5 Accordingly, for 2031-32 (end of 15th Plan), the transmission capacity requirement may be assessed as given below:



10.0 Transmission corridor capacity requirement for 2035-36:

The quarter-wise demand-supply surplus/deficit analysis for 2035-36 is given below:

10.1 First Quarter (i.e. Q1 of 2035-36):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	68%	50%	70%	20%
Western	68%	50%	70%	20%
Southern	68%	50%	70%	20%
Eastern	68%	50%	70%	20%
N. Eastern	68%	50%	70%	20%
Bangladesh	68%	50%	70%	20%
Nepal	68%	50%	70%	20%
SriLanka	68%	50%	70%	20%
Pakistan	68%	50%	70%	20%
Bhutan	68%	50%	70%	20%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	70434	14909	6104	21957	113404	191490	-78086
Western	202671	4671	5446	25484	238272	204514	33758
Southern	109436	5984	9254	27847	152521	190993	-38472
Eastern	131007	4207	0	5953	141167	80395	60772
N. Eastern	1619	11559	0	859	14036	13272	764
ALL INDIA	515167	41330	20804	82099	659400	680663	-21263
Bangladesh	0	0	0	0	0	2000	-2000
Nepal	0	12500	0	0	12500	500	12000
SriLanka	0	0	0	0	0	1000	-1000
Pakistan	0	0	0	0	0	1000	-1000
Bhutan	0	13168	0	0	13168	0	13168
SAARC Total	0	25668	0	0	25668	4500	21168
Total	515167	66998	20804	82099	685068	685163	-95

10.2 Second Quarter (i.e. Q2 of 2035-36):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	65%	65%	70%	20%
Western	65%	65%	70%	20%
Southern	65%	65%	70%	20%
Eastern	65%	65%	70%	20%
North Eastern	65%	65%	70%	20%
Bangladesh	65%	65%	70%	20%
Nepal	65%	65%	70%	20%
SriLanka	65%	65%	70%	20%
Pakistan	65%	65%	70%	20%
Bhutan	65%	65%	70%	20%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	67408	19382	6104	21957	114851	195000	-80149
Western	193964	6072	5446	25484	230966	201683	29283
Southern	104735	7779	9254	27847	149614	185908	-36294
Eastern	125379	5469	0	5953	136801	82111	54690
N. Eastern	1549	15027	0	859	17435	13440	3995
ALL INDIA	493034	53728	20804	82099	649666	678141	-28475
Bangladesh	0	0	0	0	0	2000	-2000
Nepal	0	16250	0	0	16250	500	15750
SriLanka	0	0	0	0	0	1000	-1000
Pakistan	0	0	0	0	0	1000	-1000
Bhutan	0	17118	0	0	17118	0	17118
SAARC Total	0	33368	0	0	33368	4500	28868
Total	493034	87097	20804	82099	683034	682641	393

10.3 Third Quarter (i.e. Q3 of 2035-36):

Generation dispatch factors

Region	Thermal	Hydro	Nuclear	RES
Northern	69%	50%	70%	15%
Western	69%	50%	70%	15%
Southern	69%	50%	70%	15%
Eastern	69%	50%	70%	15%
N. Eastern	69%	50%	70%	15%
Bangladesh	69%	50%	70%	15%
Nepal	69%	50%	70%	15%
SriLanka	69%	50%	70%	15%
Pakistan	69%	50%	70%	15%
Bhutan	69%	50%	70%	15%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	72103	14909	6104	16468	109584	182325	-72741
Western	207476	4671	5446	19113	236705	209524	27182
Southern	112030	5984	9254	20885	148153	184891	-36738
Eastern	134113	4207	0	4464	142784	81167	61617
North Eastern	1657	11559	0	644	13860	14000	-140
ALL INDIA	527379	41330	20804	61574	651087	671906	-20819
Bangladesh	0	0	0	0	0	2000	-2000
Nepal	0	12500	0	0	12500	500	12000
SriLanka	0	0	0	0	0	1000	-1000
Pakistan	0	0	0	0	0	1000	-1000
Bhutan	0	13168	0	0	13168	0	13168
SAARC Total	0	25668	0	0	25668	4500	21168
Total	527379	66998	20804	61574	676755	676406	349

10.4 Fourth Quarter (i.e. Q4 of 2035-36):

Generation dispatch factors

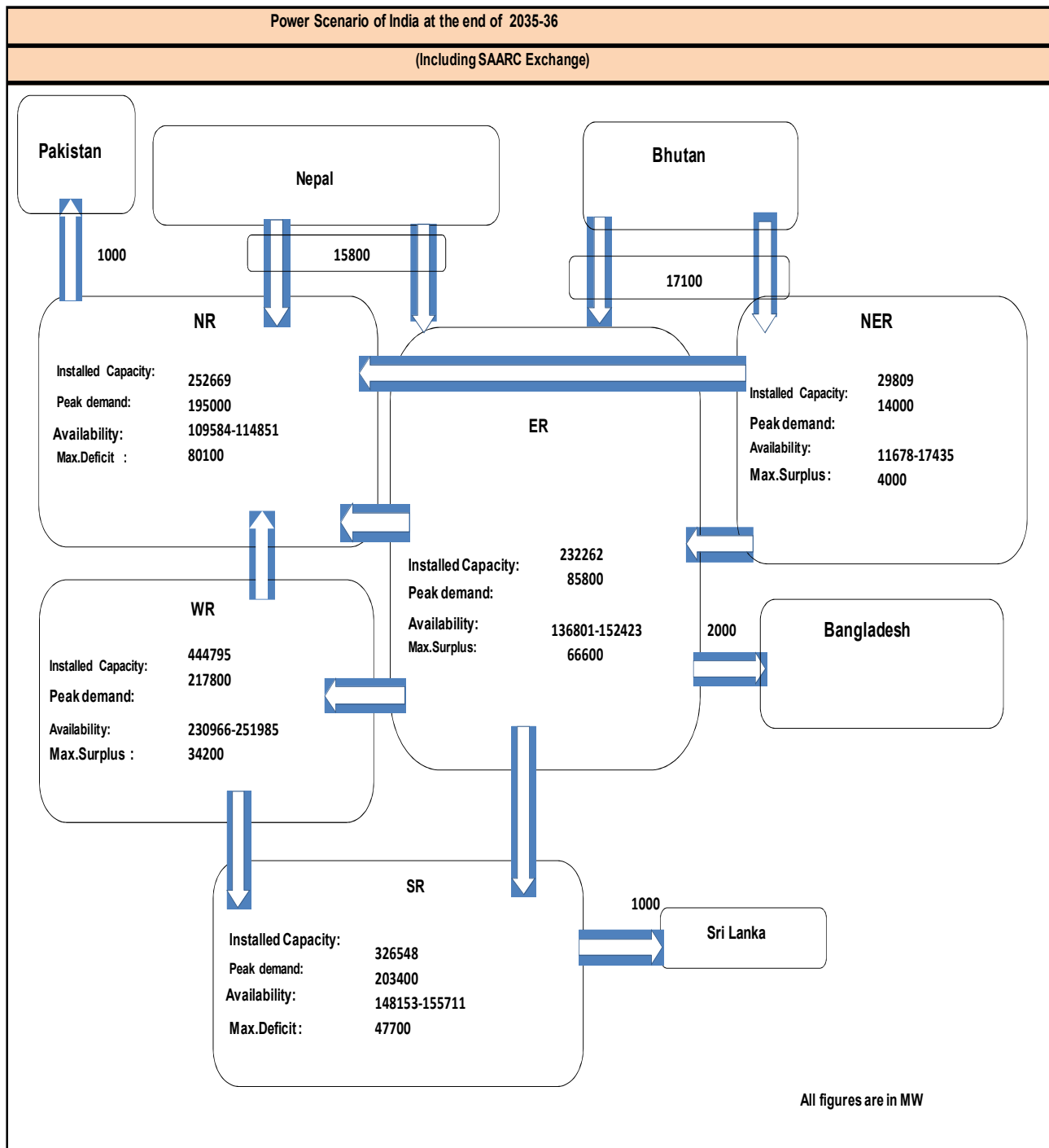
Region	Thermal	Hydro	Nuclear	RES
Northern	75%	40%	70%	15%
Western	75%	40%	70%	15%
Southern	75%	40%	70%	15%
Eastern	75%	40%	70%	15%
N. Eastern	75%	40%	70%	15%
Bangladesh	75%	40%	70%	15%
Nepal	75%	40%	70%	15%
SriLanka	75%	40%	70%	15%
Pakistan	75%	40%	70%	15%
Bhutan	75%	40%	70%	15%

Load Generation Balance Analysis (all fig. in MW)

The Surplus/deficit for various regions is calculated as given below:

	Thermal	Hydro	Nuclear	RES	Total	Demand	surplus/deficit
Northern	77738	11927	6104	16468	112237	178815	-66578
Western	223689	3737	5446	19113	251985	217800	34185
Southern	120785	4787	9254	20885	155711	203400	-47689
Eastern	144593	3366	0	4464	152423	85800	66623
North Eastern	1787	9247	0	644	11678	13986	-2308
ALL INDIA	568592	33064	20804	61574	684034	699801	-15767
Bangladesh	0	0	0	0	0	2000	-2000
Nepal	0	10000	0	0	10000	500	9500
SriLanka	0	0	0	0	0	1000	-1000
Pakistan	0	0	0	0	0	1000	-1000
Bhutan	0	10534	0	0	10534	0	10534
SAARC Total	0	20534	0	0	20534	4500	16034
Total	568592	53598	20804	61574	704569	704301	268

10.5 Accordingly, for 2035-36 (i.e. 20-years from now and by 3rd year of the 16th Plan), the transmission capacity requirement may be assessed as given below:



11.0 Conclusion:

11.1 The transmission corridor capacity requirements have been worked out based on advance estimates of peak load demand and preliminary assessment of region-wise generation addition possibility of next 20 years. It is seen that massive transmission corridors may be needed towards Northern and Southern regions. There is need to enhance hydro generation capacity in Northern and Southern regions to lessen this massive transmission system.

11.2 It is seen that the renewable energy sources contribute very less towards meeting peak load requirements. In view of large RE capacity addition being proposed, we would need to review, explore and adopt different approach to maintain load-generation balance and operation of grid.

11.3 As detailed in the report, the transmission capacity requirements considering export /import for various regions for the period 2022-36 is summarized below:

Region/SAARC	2021-22	2026-27	2031-32	2035-36
Northern	-18400	-33200	-54800	-80100
Western	10400	14000	21300	34200
Southern	-7400	-16200	-30100	-47700
Eastern	10900	22300	40600	66600
North-east	1800	2100	3000	4000
All INDIA	-2100	-13400	-26000	-28500
Bangladesh	-500	-1500	-2000	-2000
Nepal	-200	6100	12500	15800
Sri Lanka	0	0	-500	-1000
Pakistan	0	-500	-1000	-1000
Bhutan	2800	9300	17000	17100
SAARC Total	2100	13400	26000	28500

11.4 The transmission capacity requirements are sensitive to load growth and generation addition assumptions, especially when load growth may be in a range of 5-8 % per annum and location of generation additions of next 20 years can not be accurately ascertained. As such, these transmission capacity requirements are only indicative in nature.

Annex - 1

List of officials from CEA and POWERGRID who provided guidance and worked in preparation of this Report (Part-B)

<u>Sl. No.</u>	<u>Name and Organization</u>	<u>Designation</u>
	<u>Central Electricity Authority :</u>	
1.	Major Singh	Chairperson
2.	S. D. Dubey	Member(Power System)
3.	Pardeep Jindal	Chief Engineer(PSPA-II)
	<u>Power Grid Corp. of India Ltd. :</u>	
4.	Seema Gupta	COO(CTU-PIg.)
5.	Ashok Pal	General Manager
6.	Anupam Kumar	Engineer
<p>The Generation data for this report was provided by Shri J.Bandyopadhyay Chief Engineer(IRP Division), CEA.</p> <p>The peak demand forecast data was provided by Shri Bhupinder Singh, Consultant under guidance of Chief Engineer(PSLF Division), CEA.</p>		