वार्षिक रिपोर्ट 2015-16

Annual Report 2015-16

पूर्वी क्षेत्रीय विद्युत् समिति, कोलकाता

Eastern Regional Power Committee, Kolkata

भूमिका

वर्ष 2015-16 के दौरान पूर्वी क्षेत्र में विद्युत् सेक्टर से सम्बंधित विभिन्न महत्वपूर्ण कार्यो को ज़ोर देते हुए, पूर्वी क्षेत्रीय विद्युत् समिति का वार्षिक रिपोर्ट तैयार किया गया है. रिपोर्ट को तैयार करने के लिए बहुत सारा डाटा और सूचना एकत्रित किया गया, विश्लेषण किया गया एवं समायोजित किया गया | यह रिपोर्ट, पूर्वी क्षेत्रीय विद्युत् समिति के अधिकारीगन एवं कर्मचारियों की मिली एवं समर्पित भावना और प्रयास से हो पाया है |

मुझे यह आपको सूचित करने में खुशी है की वर्ष 2015-16 में पूर्वी क्षत्रिय विद्युत् समिति ने सामाजिक दायित्व निभाते हुए होप हॉस्पिटल कोलकाता को 4 आटोमेटिक सिरिंज पंप डोनेट किया | होप हॉस्पिटल दरिद्र जनों को मुफ्त में इलाज प्रदान करने का काम करती है | इसके उपरांत स्टेट सेक्टर स्टैंडिंग समिति का गठन किया गया | इसी वर्ष के दौरान पूर्वी क्षेत्र में प्रोटेक्शन डेटाबेस का निर्माण का काम भी शुरू किया गया और पूर्वी क्षेत्र की प्रोटेक्शन फिलोसोफी को अंतिम रूप दिया गया |

वर्ष 2015-16 के दौरान पूर्वी क्षेत्र में ग्रिड पैरामीटर के विभिन्न प्रोफाइल में काफी उन्नति देखि गयी है | पूर्वी क्षेत्र में विद्युत् की मांग का उपरी रुख बरक़रार रहा जो विकास की तरफ इशारा करता है | पूर्वी क्षेत्र के उर्जा उत्पादन में, उर्जा भोग तथा उर्जा निर्यात में काफी विकास देखा गया |

पूर्वी क्षेत्र में अधिकतम संपाती मांग 18170 मेगावाट रहा जो की पिछले वर्षा की तुलना में 5.4 प्रतिशत अधिक है | पूर्वी क्षेत्र में दैनिक उर्जा भोग लगभग 340 मिलियन यूनिट रहा जो की पिछले वर्षा के तुलना में 4 प्रतिशत अधिक था | विगत वर्ष की तुलना में उर्जा निर्यात 6.8 प्रतिशत अधिक रहा | इस वर्ष के दौरान बिहार का भोग 27 प्रतिशत (मिलियन यूनिट) अधिक रहा | पीक में भी बिहार का लोड 17 प्रतिशत (मेगावाट) ज्यादा रहा जो की सराहनीय है |

400 किलोवोल्ट फरक्का-बरहामपुर-भेरामेरा (बांग्लादेश) संचरण लाइन द्वारा बांग्लादेश को 3764 मिलियन यूनिट विद्युत् निर्यात हुआ है|

फेब्रुअरी 2016 से पूर्वी ग्रिड के जरिये नेपाल को 400 kV (132 kV पर चार्ज किया गया) मुजफ्फरपुर-सुरसंड-ढल्केबार (नेपाल) लाइन के द्वारा पॉवर भेजना शुरू किया गया |

पूर्वी क्षेत्र ही एक मात्र ऐसा क्षेत्र है जो की भारत की सभी चार अन्य क्षेत्रों (उत्तरी क्षेत्र, उत्तर-पूर्वी क्षेत्र, पश्चिमी क्षेत्र एवं दक्षिणी क्षेत्र) के साथ तथा अन्य तीन विदेशी विद्युत् प्रणाली (नेपाल, भूटान और बांग्लादेश) से भी जुरा हुआ है |

रिपोर्ट की तैयारी हेतु आवश्यक डाटा देने के लिए, मैं पूर्वी क्षेत्र के सभी संघटकों को धन्यवाद ज्ञापन करता हूँ | आवश्यक एवं सम्बंधित डाटा के माध्यम से, वार्षिक रिपोर्ट को और भी अधिक विकसित करने के लिए पूर्वी क्षेत्रीय विद्युत् समिति सदा ही प्रयास जरी रखेगा | इस रिपोर्ट को और भी सूचनात्मक बनाने के लिए , मैं आप सभी के सुझावों का आमंत्रण करता हूँ |

अंकन कुमार बंद्योपाध्याय

(अंकन कुमार बंद्योपाध्याय)

सदस्य सचिव

FOREWORD

The Annual Report 2015-16 of the Eastern Regional Power Committee has been prepared highlighting various important activities and statistics related to power sector in the region during the year. For preparation of this report, voluminous data and information were collected, analyzed and compiled. This has been possible with coordinated efforts of dedicated officers & staff of ERPC.

It is my pleasure to inform that during the year towards Social Responsibility initiatives, ERPC has donated four number automatic syringe pumps to Hope Hospital, Kolkata which serves the underprivileged, Standing Committee on transmission planning for state sectors of Eastern Region was constituted, ERPC has taken up the project for "Creation and maintenance of a Web based Protection Database and a Desktop based Protection Setting Calculation Tool for Eastern Regional Grid" with PSDF funding and also the Protection Philosophy for Eastern Region was agreed

The various profiles of the grid parameters in the Eastern Region have registered further improvements in the year 2015-16. The upward trend of overall demand in the region is a healthy sign and augurs well for development of the region. Particularly there was substantial growth in Bihar system which consumed around 5000 MU more (27%) energy as well as met peak demand around 500 MW more (17%) than the previous year. During the year there was substantial growth in energy generation/availability (7%), consumption (4.1%) in the region. Eastern Region exports 26271 MU during the year, which have increased by 6.8% compared to previous year.

Maximum coincident demand met in ER was 18170 MW which is 5.4% more than the previous year. Daily energy consumption in the region was about 340 MU, which was 4% more than the previous year.

Around 3764 MU was exported to Bangladesh through 400 kV Farakka – Berhampur – Bheramara (Bangladesh) transmission line.

Export of power from ER grid to Nepal (apart from Bihar grid) started from February'2016 through 400 kV (charged at 132 kV) Muzaffarpur – Sursand – Dhalkheber (Nepal) line.

This is the only region which is connected to all other regions (NR, NER, WR & SR) of India along with three foreign countries namely Nepal, Bhutan and Bangladesh.

Finally I would like to take this opportunity to thank all the constituents of Eastern Region for their sincere effort and promptness in furnishing the requisite data and information. ERPC would continuously strive to improve the Annual Report by incorporating relevant and useful data & information. For this I would like to invite suggestions for making this report more informative.

Kolkata

(A. K. Bandyopadhyaya)
Member Secretary

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HIGHLIGHTS

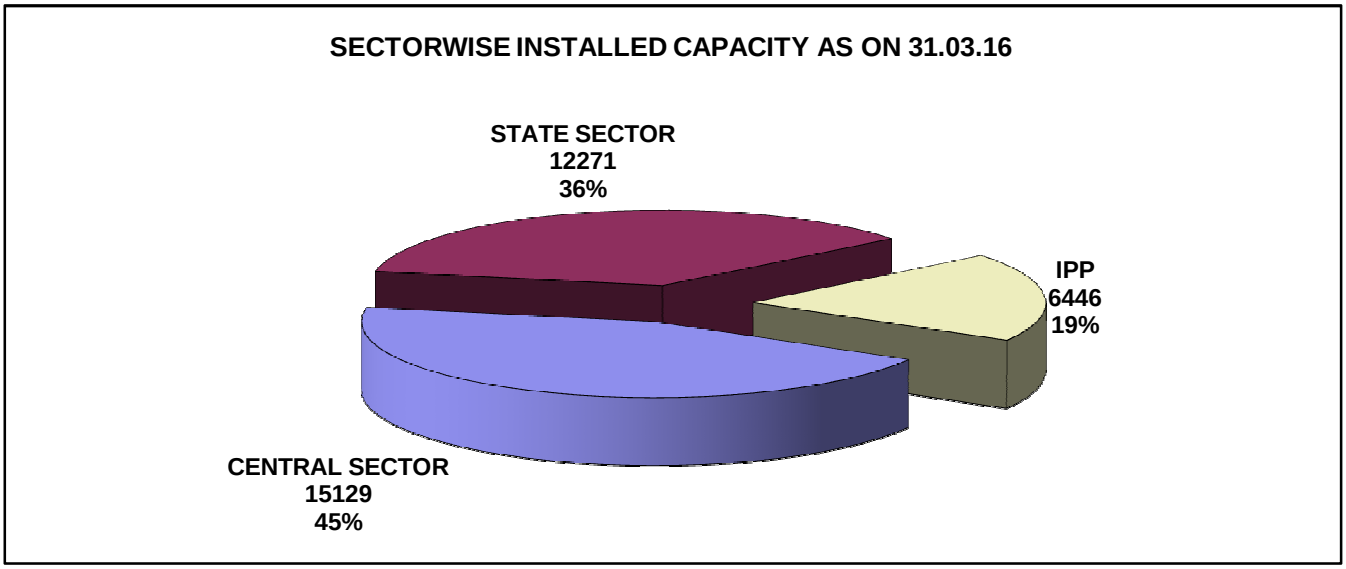
Salient features of ER Grid

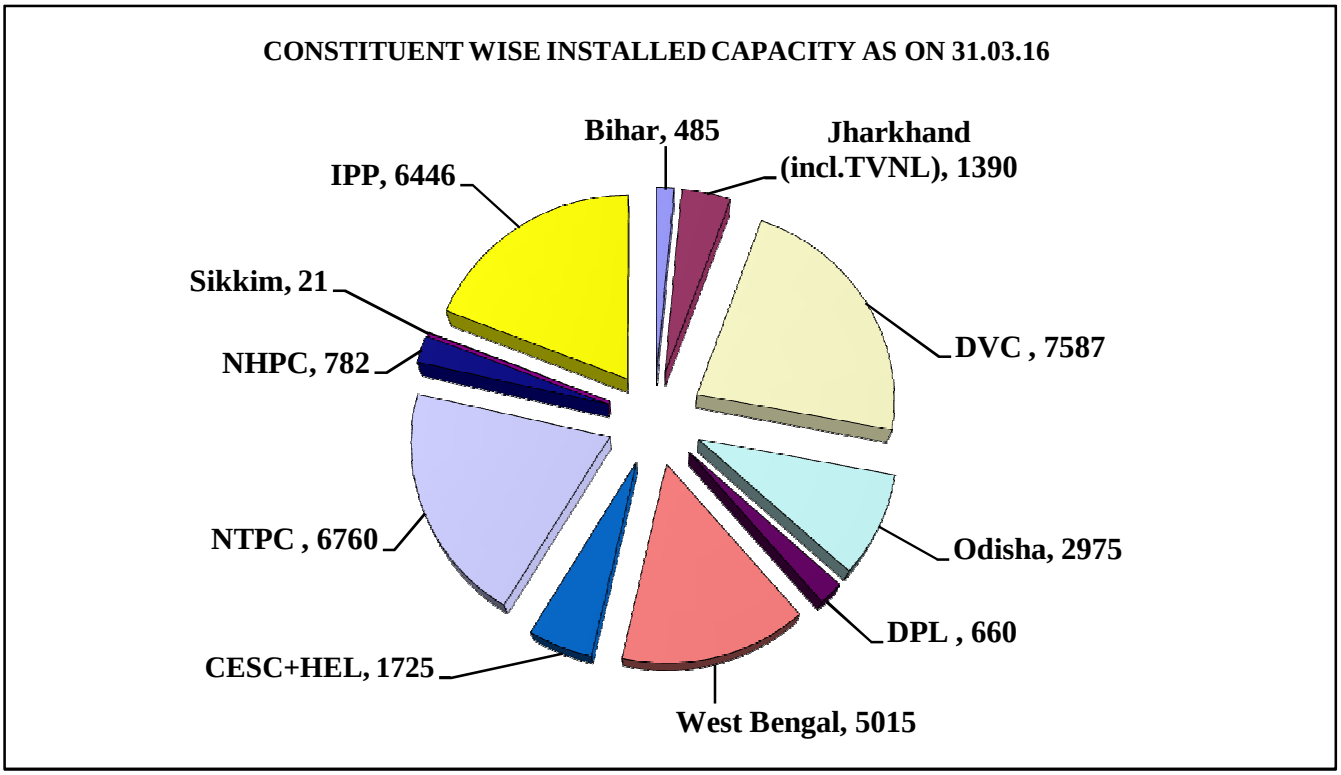
As on 31.03.2016

Installed Capacity	
Thermal	29372 MW
Hydro	4474 MW
Solar	10 MW
Capacity addition during 2015-16	
Thermal	1860 MW
Hydro	176 MW
Total Installed Capacity (Thermal+Hydro+Diesel+Solar)	**33856 MW**
Total Effective Capacity (Thermal+Hydro+ Diesel+Solar)	**33646 MW**
Demand	
Peak Demand Met (Max.)	**18170 MW**
Increase Over Previous Year	5.4 %
Peak Demand Met (Min.)	16692 MW
ER System Load Factor (%)	**77.8 %**
Energy Requirement	
Energy Generation (Gross) (incl. Bhutan Imp, excl. CPP)	**157486.5 MU**
Increase over previous year	7 %
Net Energy Met	**124409.4 MU**
Frequency Regime	
% Time frequency remained Below 49.9 Hz	13.5 %
Between 49.9-50.05 Hz (IEGC Band)	**66.8 %**
Above 50.05 Hz	19.7 %
Inter-regional / Outside Country Energy Transfer	
Net Energy export to WR	1777 MU
Net Energy export to SR	7037 MU
Net Energy export to NR	12435 MU
Net Energy export to NER	1182 MU
Net Energy export to Bangladesh	3764 MU
Net Energy export to Nepal	76 MU
Total Net Regional Export	**26271** MU
Net Energy Export to Nepal through Bihar System	**1211 MU**

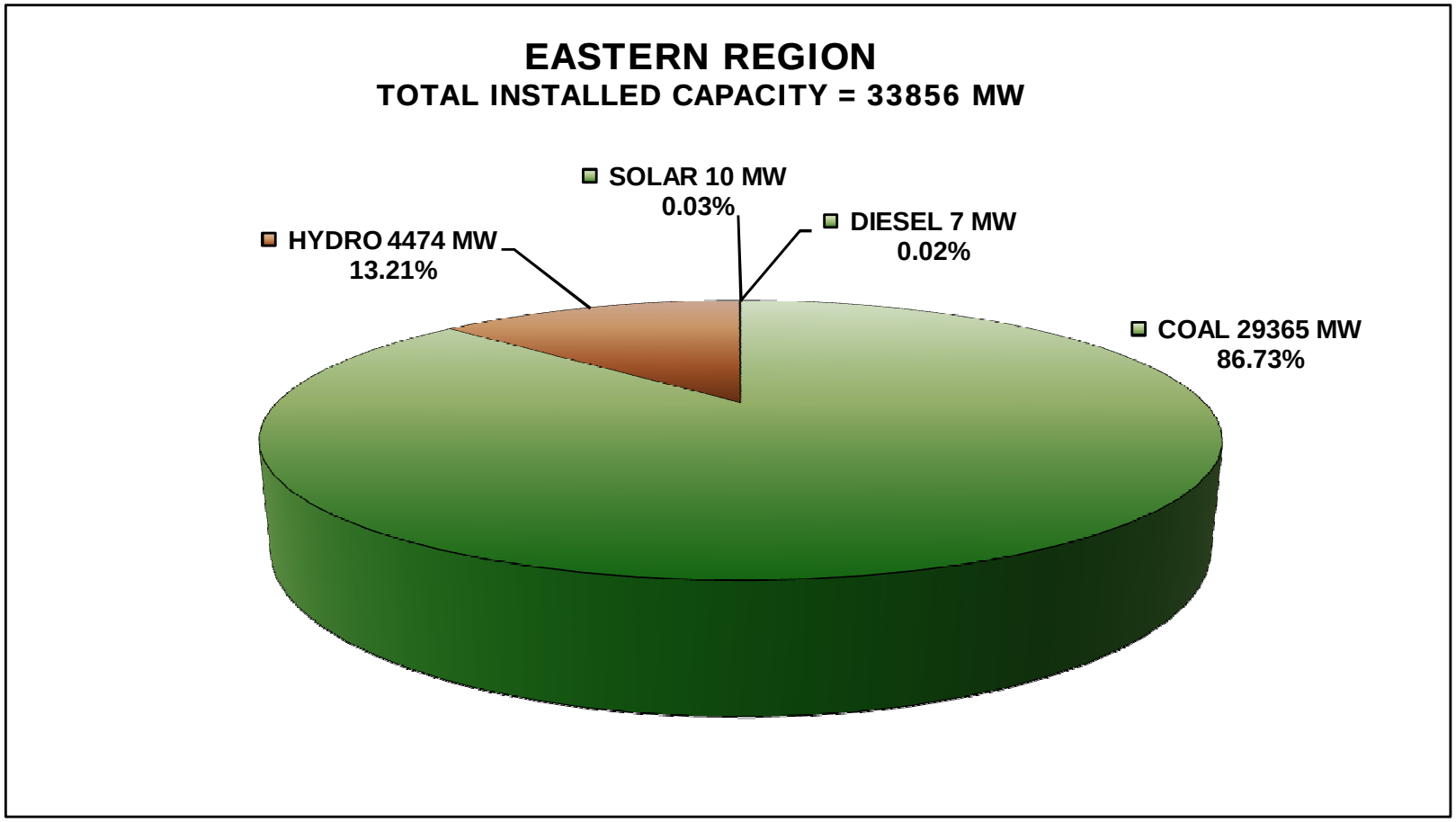
INSTALLED CAPACITY IN EASTERN REGION AS ON 31-03-2016

Figs. In MW

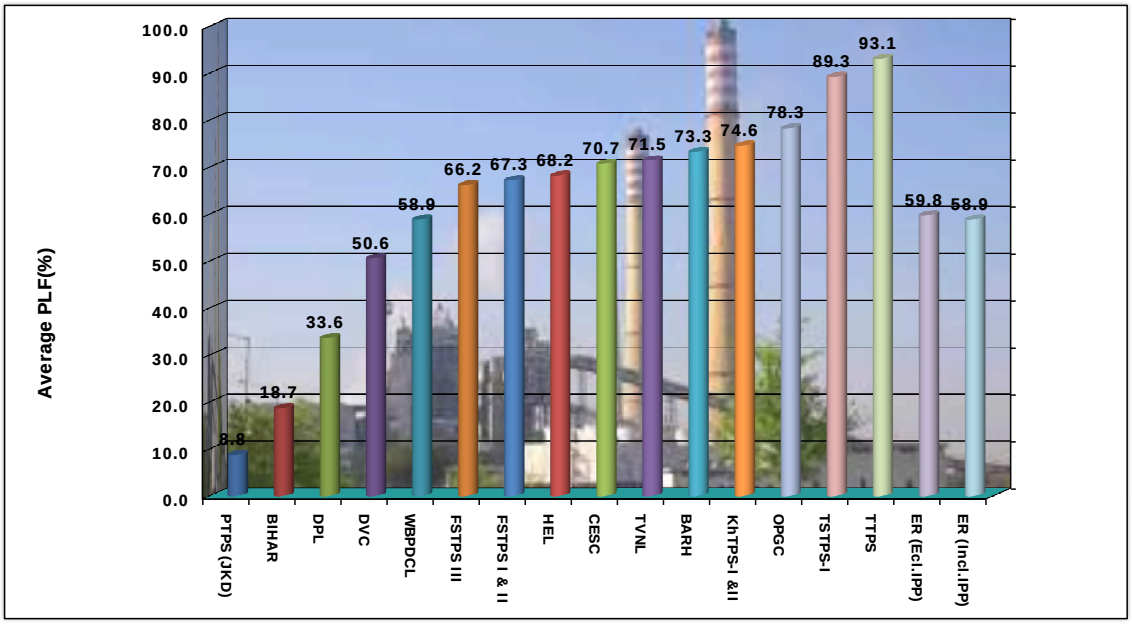




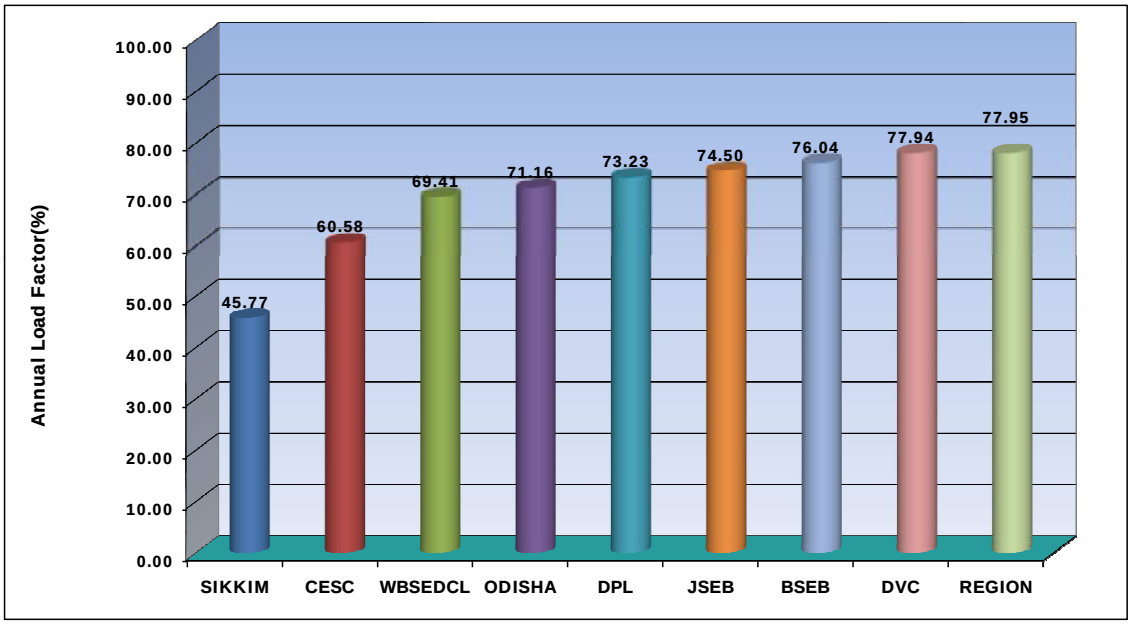
FUEL WISE INSTALLED GENERATING CAPACITY
AS ON 31-03-2016



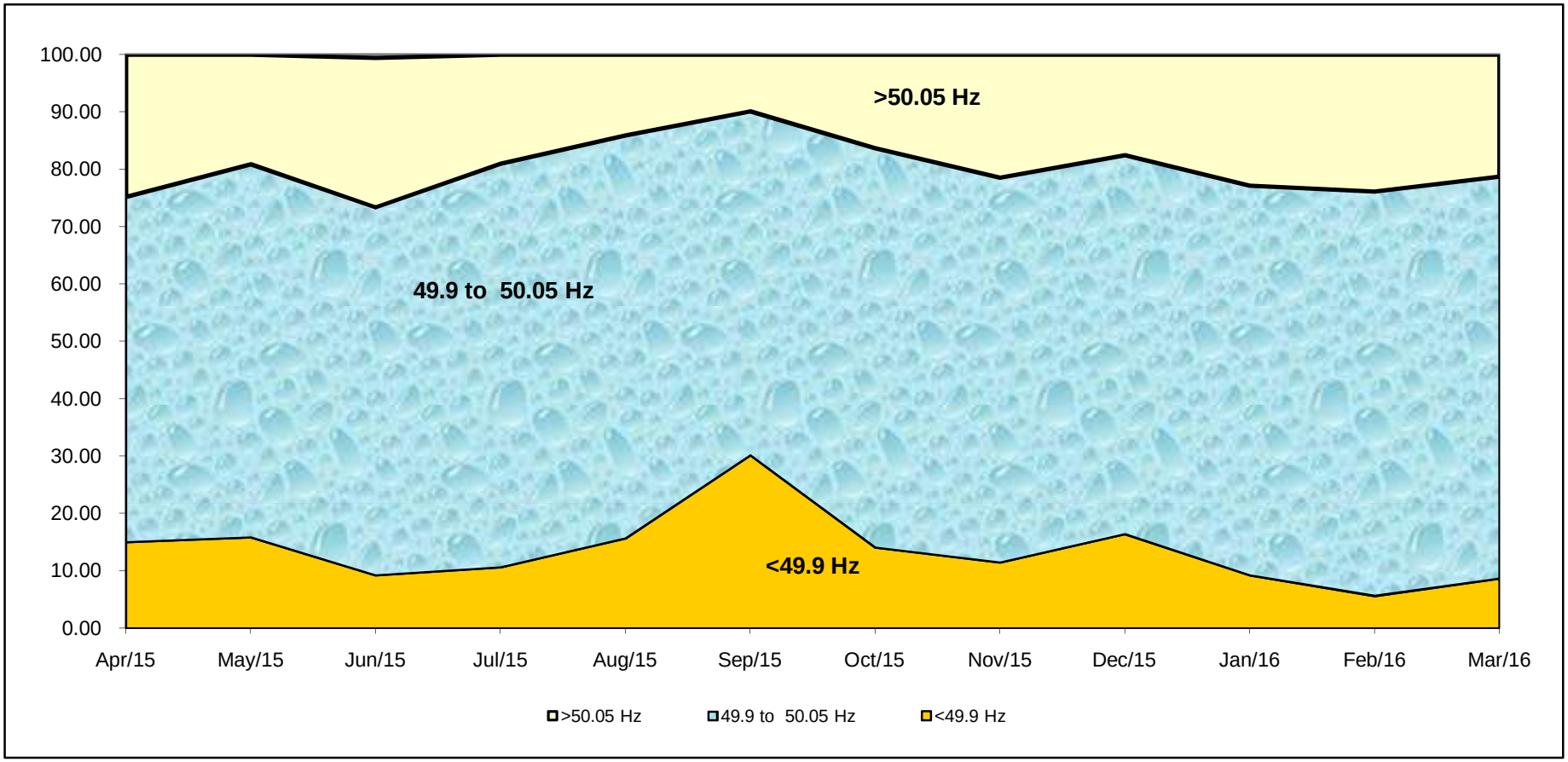
ANNUAL PLF OF THERMAL POWER STATION IN EASTERN REGION DURING 2015-16



ANNUAL LOAD FACTOR OF THE CONSTITUENTS IN EASTERN REGION DURING 2015-16



Eastern Grid Frequency Regime during the year 2015-16



CHAPTER-1

CONSTITUTION, FUNCTIONS AND ORGANISATIONAL SETUP

1.1 INTRODUCTION

Electricity is one of the most essential elements for growth of a country and development of modern society. Accordingly electricity demand is increasing day by day with improvement in living standards as the nation modernizes and its economy develops. To meet the challenges of ever growing demand, power sector has become the key area for reforms as well as to attract investment.

For efficient & integrated system planning and operational purposes, the power system of the country has been divided into five regions namely Northern Region, Southern Region, Western Region, Eastern Region and North-Eastern Region. Each region has its own regional power grid. Initially, State grids were inter-connected to form the regional grid. The integration of regional grids, and thereby establishment of National Grid, was conceptualized in early nineties. Initially inter-regional links were planned for exchange of operational surpluses amongst the regions. Subsequently felt that synchronisation of all regional grids would help in optimal utilization of scarce natural resources by transfer of power from resource centric regions to load centric regions. Further, this should pave way for establishment of vibrant electricity market facilitating trading of power across regions. 'One Nation One Grid' should synchronously connect all the regional grids and there would be one national frequency.

The integration of regional grids which began with asynchronous HVDC back-to-back inter-regional links facilitating limited exchange of regulated power subsequently graduated to high capacity synchronous links between the regions. In October, 1991 North Eastern and Eastern grids were connected. In March, 2003 WR and ER-NER were interconnected. On 26th August, 2006 North and East grids were interconnected thereby four regional grids Northern, Eastern, Western and North-Eastern grids were synchronously connected forming Central Grid (NEW GRID) operating at one frequency. On 31st December, 2013 Southern Region was connected to Central Grid (NEW GRID) in synchronous mode with the commissioning of 765kV Raichur-Solapur Transmission line thereby achieving 'ONE NATION'-'ONE GRID'-'ONE FREQUENCY'.

The Eastern Region comprises of the States of Bihar, Jharkhand, Odisha, West Bengal and Sikkim. The region has an area of 4,25,432 Sq. km which is about 13% of the total area of the country.

The Regional Power Committees have been established by Central Government for a specified region for facilitating the integrated operation of the power system of that region. The Eastern Regional Power Committee (ERPC) is one out of five (5) Regional Power Committees.

The Organisation Chart of ERPC Secretariat is given at **Exhibit-I**. Power Maps showing transmission system of the Eastern Region is given at **Exhibit-II & III.**

1.2 CONSTITUTION

Eastern Regional Power Committee (ERPC) is the present form of erstwhile Eastern Regional Electricity Board (EREB). Initially EREB came into operation on 01.06.1965 in accordance with the Govt. of India's resolution no. EL-II-35 (7)/63 dated 6th March, 1964 in order to promote integrated operation of the power systems in the region and to ensure optimum utilisation of the generation in the region. Government of India, under the provision of Sub-Section 55 of Section 2 of the Electricity Act 2003 vide Resolution F.No.23/1/2004-R&R dated 25th May, 2005 had established Eastern Regional Power Committee comprising the states of Bihar, Jharkhand, Orissa, West Bengal and Sikkim with following members and was subsequently amended from time to time on 29.11.2005 and 08.05.2008.

i) Member (Grid Operation), Central Electricity Authority (CEA).
ii) One representative each of Central Generating Companies, Central Transmission Utility (CTU), National Load Despatch Centre (NLDC) and the Eastern Regional Load Despatch Centre (ERLDC).
iii) From each of the States in the region, the State Generating Company, State Transmission Utility (STU), State Load Despatch Centre (SLDC), one of the State owned distribution companies as nominated by the State Government and one Distribution Company by alphabetical rotation out of the private distribution companies functioning in the region.
iv) A representative each of every generating company (other than central generating companies or State Government owned Generating Companies) having more than 1000 MW installed capacity in the region.
v) A representative of the generating companies having power plants in the region [not covered in (ii) to (iv) above] by alphabetical rotation.
vi) One member representing the electricity traders in the region by alphabetical rotation which has trading volume of more than 500 million units during the previous financial year.
vii) Member Secretary, ERPC – Convenor.

It is further stated in the notification that wherever a member is represented by rotation, the nomination would be for a period of one year. The representative from respective organizations should be either the head of the organization or at least a person not below the rank of a Director on the Board of the company / corporate entity except for Central Public Sector Undertaking (CPSUs) where representative could also be at the level of Executive Director.

Chairperson of the ERPC would represent the States of the region by rotation in alphabetical order. Members of the ERPC from the particular State would nominate the Chairperson of ERPC from amongst themselves. Term of the Chairperson would be for a period of one year.

For the FY 2015-16 Shri N. T. Bhutia, Principal Chief Engineer-cum-Secretary, Energy & Power Deptt., Govt. of Sikkim, was the Chairperson of ERPC from 01.04.2015 to 05.07.2015. Then Shri Narayan Swaroop Nigam, IAS, Chairman & Managing Director, WBSEDCL took over the charge of Chairpersonship from 06.07.2015 and continued upto 03.01.2016 and thereafter Shri Rajesh Pandey, IAS, Chairman & Managing Director, WBSEDCL hold the post from 04.01.2016 to 31.03.2016.

Members of ERPC during the year 2015-16 are given as under:

Sl. No.	Name of ERPC Member Organisation	Designation of the Member
1	West Bengal State Electricity Distribution Co. Ltd. (WBSEDCL)	Chairman &Managing Director
2	Bihar State Power Holding Co. Ltd.	Chairman & Managing Director
3	Bihar State Power Transmission Co. Ltd.	Managing Director
4	South Bihar Power Distribution Co. Ltd.	Managing Director
5	Jharkhand Urja Vikas Nigam Ltd.	Chairman & Managing Director
6	Jharkhand Urja Sancharan Nigam Ltd.	Managing Director
7	Jharkhand Bijli Vitaran Nigam Ltd	Managing Director
8	Tenughat Vidyut Nigam Ltd.	Managing Director
9	GRIDCO Ltd.	Chairman-cum-Managing Director
10	Orissa Power Transmission Corporation Ltd.(OPTCL)	Chairman- cum-Managing Director
11	Orissa Hydro Power Company Ltd. (OHPC)	Chairman- cum-Managing Director
12	Orissa Power Generation Company Ltd. (OPGC)	Managing Director
13	West Bengal State Electricity Transmission Co. Ltd. (WBSETCL)	Managing Director
14	Energy & Power Department, Govt. of Sikkim	Principal Chief Engineer-cum-Secretary
15	West Bengal Power Development Corporation Ltd. (WBPDCL)	Chairman & Managing Director
16	Durgapur Projects Ltd. (DPL)	Managing Director
17	CESC Ltd.	Managing Director
18	Damodar Valley Corporation (DVC)	Chairman
19	Central Electricity Authority (CEA)	Member (GO & D)
20	NTPC Ltd.	Director (Commercial)
21	NHPC Ltd.	Director (Finance)
22	Powergrid Corporation of India Ltd. (POWERGRID)	Director (Operations)
23	ERLDC	General Manager
24	National Load Despatch Centre, POSOCO	CEO
25	PTC India Ltd.	Director (C & O)
26	Jindal India Thermal Power Limited	CEO
27	Adhunik Power & Natural Resources Ltd. (APNRL)	Managing Director
28	Vedanta Ltd.	COO
29	Maithan Power Limited (MPL)	CEO
30	GMR Kamalanga Energy Ltd.	Director & COO
31	NTPC Vidyut Vyapar Nigam Ltd. (NVVNL)	CEO
32	Tata Power Trading Co. Ltd.	Managing Director
33	Gati Infrastructure Pvt. Ltd.	President & Director (Projects)
34	ERPC	Member Secretary

1.3 FUNCTIONS

The functions of ERPC, as per the resolution of Govt. of India dated 25.05.2005, amended vide resolution dated 29.11.2005 and the revised Indian Electricity Grid Code issued by CERC are given below and are effective from 01.04.2006:

- Clause 29 (4) of the Act provides that "the Regional Power Committee in the region may, from time to time, agree on matters concerning the stability and smooth operation of the integrated grid and economy and efficiency in the operation of the power system in that region."

- As per Para (6) of the MOP Resolution dated 25.5.2005, ERPC shall discharge the following functions:-

    - To undertake Regional Level operation analysis for improving grid performance
      .
    - To facilitate inter-state / inter-regional transfer of power.

    - To facilitate all functions of planning relating to inter-state / intra-state transmission system with CTU / STU.

    - To coordinate planning of maintenance of generating machines of various generating companies of the region including those of inter-state generating companies supplying electricity to the Region on annual basis and also to undertake review of maintenance programme on monthly basis.

    - To undertake planning of outage of transmission system on monthly basis.

    - To undertake operational planning studies including protection studies for stable operation of the grid.

    - To undertake planning for maintaining proper voltages through review of reactive compensation requirement through system study committee and monitoring of installed capacitors.

    - To evolve consensus on all issues relating to economy and efficiency in the operation of power system in the region.

- Besides, as per the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010, following specific functions have been entrusted to RPC:
    - RPC Secretariats shall carry out all Regional Energy Accounting calculations.

- Regional Energy Accounts on monthly basis shall be prepared and issued by the RPC Secretariats for the purpose of billing and payment of various charges.

- RPC shall prepare and issue the Unscheduled inter-change (UI) account [newly terminology ‘ Deviation Settlement Mechanism (DSM)] for which RLDC will provide actual net injection / drawal of concerned regional entities, 15 minute-wise, based on the above meter readings on a weekly basis by each Thursday noon for the seven day period ending on the previous Sunday mid-night.

- RPC shall monitor the status of UI payment and installation of capacitor.

- RPC shall prepare and issue monthly Regional Transmission Accounts (RTA) and Regional Transmission Deviation Accounts (RTDA) based on data supplied by NLDC and ERLDC respectively.

- RPC Secretariats shall also issue the weekly statement for VAR charges, to all regional entities who have a net drawal / injection of reactive energy under low/high voltage conditions.

- RPC shall decide from time to time to utilize the money remaining in the regional reactive account after payout of all VAR charges upto 31st March of every year for training of the SLDC operators and other similar purposes which would help in improving/streamlining the operation of the respective regional grids

- The Regional Power Committee (RPC) in the region shall continuously monitor the instances of non-compliance of the provisions of IEGC and try to sort out all operational issues and deliberate on the ways in which such cases of non-compliance are prevented in future by building consensus.

- RPC shall decide on installation of capacitors by states vis-à-vis the requirement/targets.

- RPC in consultation with RLDC finalise the quantum and time frame for reactive compensation.

- RPC shall regularly monitor the status regarding the installation and healthiness of the reactive compensation equipment.

- RPC shall finalise action plan and give instructions to restore power system elements under prolonged outage in a specified time period.
- RPC will be allowed to carry out checking of Power System Stabilizers (PSS) in AVRs of generating units and further tuning it, wherever considered necessary

- RPC will finalise the plan for providing automatic under-frequency and df/dt relays for load shedding in respective systems, to arrest frequency

decline that could result in a collapse/disintegration of the grid and shall ensure that the above under-frequency and df/dt load shedding/islanding schemes are always functional.

- RPC Secretariat shall carry out periodic inspection of the under frequency relays and maintain proper records of the inspection.

- RPC shall decide and intimate the action required by SEB, distribution licensee and STUs to get required load relief from Under Frequency and df/dt relays.

- RPC shall finalise the voltage control measures through voltage relay to prevent voltage collapse / cascade tripping.

- RPC shall finalise the loads to be shed through under frequency relays / df/dt relays and System Protection Scheme in order to maintain the frequency within the stipulated band and maintaining the network security.

- RPC shall monitor the forced outages of important network elements in the grid.

- The RPC Secretariat shall be primarily responsible for finalization of the annual outage plan for the following financial year by 31st January of each year and reviewed during the year on quarterly and Monthly basis.

- RPCs shall submit quarterly, half-yearly reports to the Commission indicating deviation in outages from the plan along with reasons.

- RPC Secretariat shall provide assistance for finalising detailed plans and procedures for restoration of the regional grid under partial/total blackout and shall be reviewed / updated annually.

- RPC shall initiate investigation/action whether any of the regional entities are indulging in unfair gaming or collusion if such practice is detected and reported.

- RPC shall discharge any other responsibilities assigned by CERC.

1.4 ORGANISATIONAL STRUCTURE

Chairperson of ERPC would represent the states of the region by rotation in alphabetical order. Members of ERPC of that particular state would nominate the Chairperson of ERPC from amongst themselves. Term of the Chairperson would be for a period of one year.

Member Secretary who is an officer of Central Power Engineering Services (Group-A), is the administrative and technical head of ERPC Secretariat with the powers of the Head of Department. The other Group-A officers in the ERPC Secretariat also belong to Central Power Engineering Service (Group-A) Cadre.

Group-B officers in ERPC Secretariat are borne on the strength of CPES (Group-B) Cadre of the Govt. of India, while Group – B, C and D (reclassified as Group-C) staff are on the strength of General Central Service of the Govt. of India.

The details regarding the present ERPC Secretariat officers and staff as on 31.3.16 are given at **Annexure-I**.

Names of the Chairpersons and Member Secretaries of the ERPC and erstwhile EREB, since inception, are shown in **Annexure-II** and **Annexure-III** respectively.

1.5 DETAILS OF BUDGET & EXPENDITURE FOR 2015-16

The sanctioned budget (RE) of ERPC for the year 2015-16 vis-a-vis actual expenditure for the same period is given in table (A) & (B):

(A) **Major Head 2801 (Non-Plan): Regional Co-ordination (RCC)**

(Figures in Lac of Rs.)

Sl. No.	Sub-Head	Item	Sanctioned Budget (RE) for 2015-16	Actual Expenditure (RE) for 2015-16
1	01.04.01	Salaries	64.20	63.66
2	01.04.03	O.T.A.	0.10	0.00
3	01.04.06	Medical treatment	0.70	0.21
4	01.04.11	Domestic TE	5.00	5.13
5	01.04.13	Office expenses	3.83	3.73
6	01.04.14	Rent/Rates/ Taxes	0.90	0.18
7	01.04.20	Other Admtv. Exp.	0.00	0.00
8	01.04.27	Minor Works	3.90	3.88
Total			**78.63**	**76.78**

(B) Major Head 2801 (Non-Plan): Regional Load Dispatch Station (RLDS)

(Figures in Lac of Rs.)

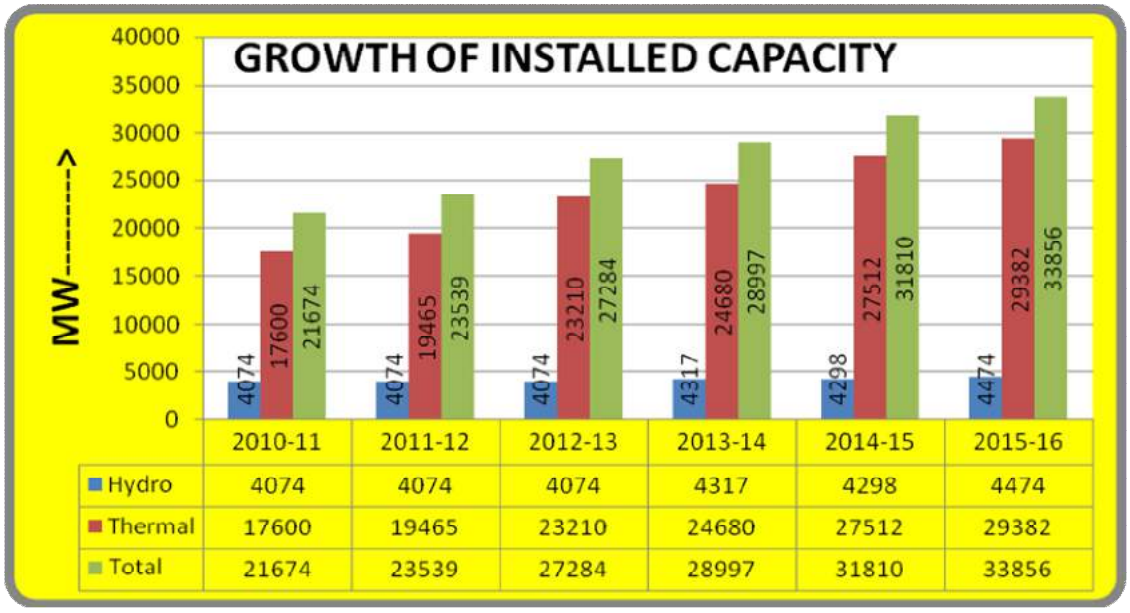
Sl. No	Sub-Head	Item	Sanctioned Budget (RE) for 2014-15	Actual Expenditure (RE) for 2014-15
1	01.02.01	Salaries	90.00	87.44
2	01.02.03	O.T.A.	0.12	0.00
3	01.02.06	Medical treatment	1.80	1.61
4	01.02.11	Domestic TE	4.50	4.90
5	01.02.13	Office Expenses	28.05	28.15
6	01.02.50	Other Charges	12.00	11.60
Total			**136.47**	**133.69**

CHAPTER-2

GRID PERFORMANCES

2.1 INSTALLED CAPACITY

The installed capacity of the power generating units in Eastern Region connected to Eastern grid as on 31st March 2016 was 33856 MW, comprising 29365 MW (87 %) of thermal, 4474 MW (13 %) of hydel, 10 MW Solar and 7 MW Diesel. The total effective capacity of the Region as on 31.03.2016 was 33646 MW. In addition to this, Chukkha HEP, Kurichhu HEP, Tala HEP and Daghachu HEP of Bhutan contributed about 270 MW, 60 MW, 867 MW and 126 MW respectively of hydel power to Eastern Region. PTC is the nodal agency for facilitating power purchase from Chukha, Kurichhu & Tala HPS and TPTCL is the nodal agency for facilitating power purchase from Dagachu HPS in Bhutan. Constituent-wise installed and effective capacity as on 31.03.2016 are shown in **Annexure-IVA**. The growth in installed capacity in Eastern Region for last six years (i.e. 2010-2011 onwards) is shown in the diagram below:



	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Hydro	4074	4074	4074	4317	4298	4474
Thermal	17600	19465	23210	24680	27512	29382
Total	21674	23539	27284	28997	31810	33856

The Compounded Annual Growth Rate of installed capacity during the last 5 years was of the order of 9.3 %.

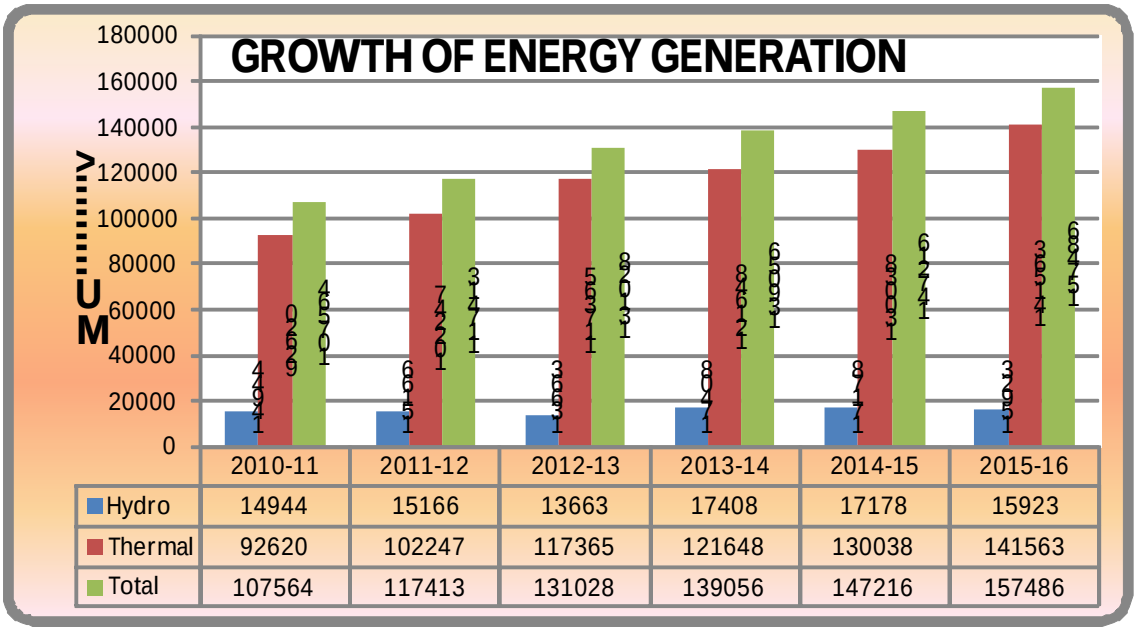
2.2 POWER SUPPLY POSITION

2.2.1 GENERATION:

During the year 2015-16, the total generation availability in ER (excluding generation/import from CPPs but including import from Bhutan) was 157486 MU (Gross) comprising of 141563 MU of thermal (90 %) and 15923 MU hydel (10 %) compared to total generation of 147216 MU in 2014-15 comprising 130038 MU thermal and 17178 MU hydel. The total generation was 10270 MU more than that of 2014-15. Details of constituent-wise generation and auxiliary consumption are given in **Annexure-V**.

As regards to regional thermal generation, the generation of DVC and NTPC have increased reasonably but that of WBPDCL, CESC have been declined considerably as compared to last year. Hydro generation of Odisha has been decreased significantly as compared to last year.

Generation of last six years (2010-11 to 2015-16) in the region is shown in graph below:



	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Hydro	14944	15166	13663	17408	17178	15923
Thermal	92620	102247	117365	121648	130038	141563
Total	107564	117413	131028	139056	147216	157486

As against Compounded Annual Growth Rate *(CAGR)* of installed capacity of 9.3 %, the same of energy generation of the last 5 years is 7.9 % including energy exchange of 5427 MU from Bhutan. The growth in generation was mainly due to commissioning of new generating units of 2036 MW in Eastern Region in 2015-16. Maximum utilisation of available hydel power from Tala, Kurichhu, Chukha and Daghachu Hydel Power Station of Bhutan was made by import through PTC & TPTCL as nodal agency as per international agreement between Government of India and Royal Government of Bhutan.

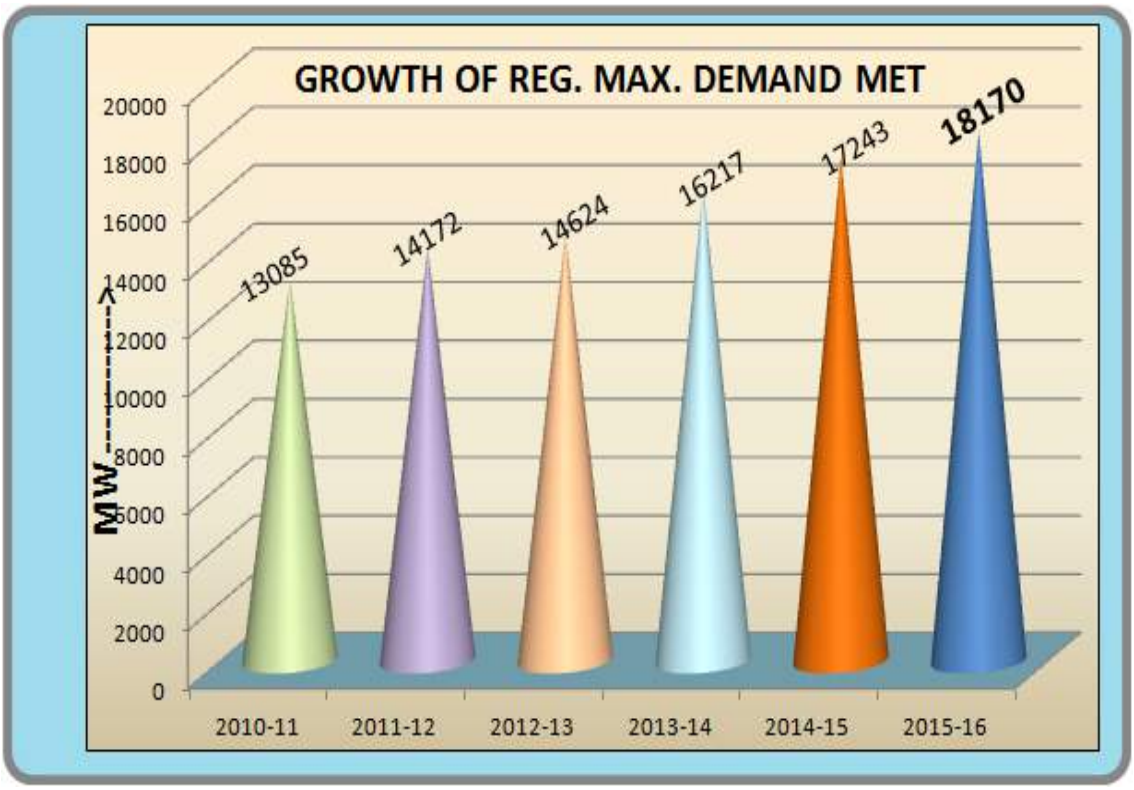
2.2.2 MAXIMUM DEMAND

During the year 2015-16, the maximum coincident demand met in the Eastern Region was 18170 MW (net) compared to demand of 17243 MW (net) during the preceding year. It was 927 MW (5.4 %) more than the maximum demand of last year. Maximum demand met by the constituents during 2015-16 is given below:

BSEB	**-**	**3431 MW**	**WBSEDCL**	**-**	**5901 MW**
JSEB	**-**	**1117 MW**	**DPL**	**-**	**310 MW**
DVC	**-**	**2786 MW**	**CESC**	**-**	**2030 MW**
GRIDCO	**-**	**4152 MW**	**SIKKIM**	**-**	**95 MW** (assumed)

EASTERN REGION: - 18170 MW

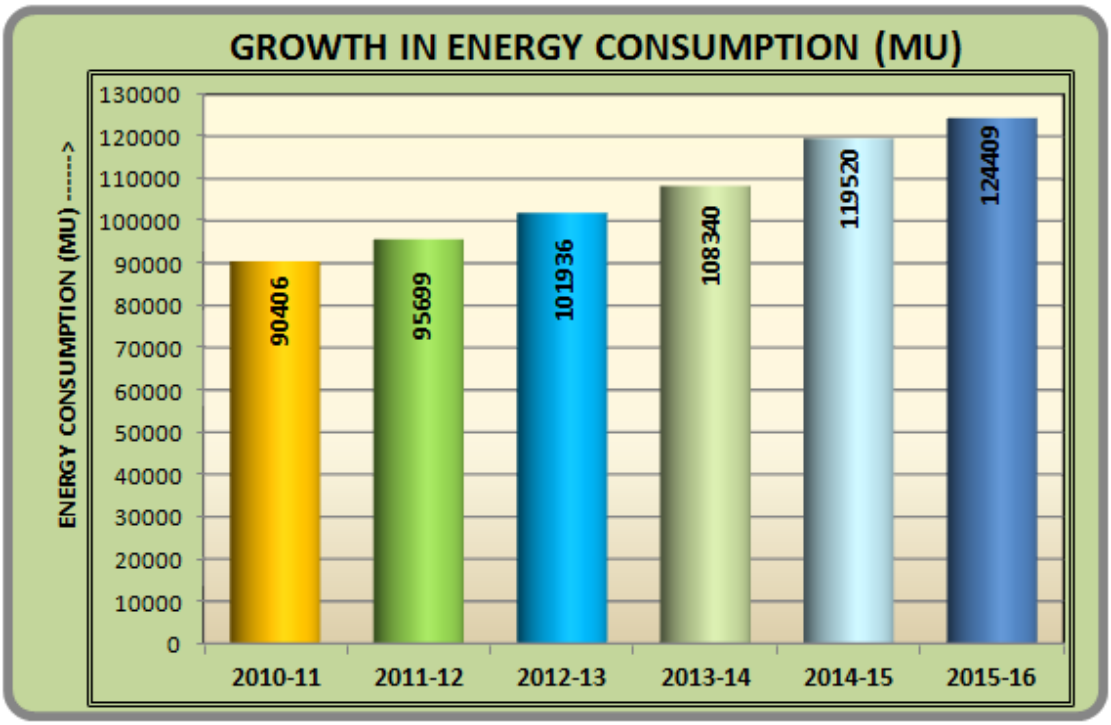
The growth in the maximum demand was restricted mainly due to bottlenecks in sub-transmission and distribution system of respective utility of E.R. The growth in maximum demand in Eastern Region for the last six years is shown below:



Compounded Annual Growth Rate (CAGR) of Peak Demand in ER of last five years was 6.8 %. Constituent & month wise peak demand (MW) met are shown in **Annexure-VI**.

2.2.3 ENERGY CONSUMPTION

During the year 2015-16, the total energy consumption (net) in Eastern Region was 124409 MU compared to consumption of 119520 MU during previous year. The energy consumption was 4889 MU (4.1 %) more than last year's consumption. The growth in regional energy consumption is mainly due to heavy increase in energy consumption by Bihar. The daily average energy consumption in the region was about 340 MU/day compared to about 328 MU/day during the previous year. These figures exclude consumption of different industries from their respective captive power plants.



The energy consumption in Eastern Region for the last six years is shown in the above figure. Compounded Annual Growth Rate (CAGR) of energy consumption of the last five years works out as 6.6 % as compared to the growth of peak demand figure of 6.8 %. Constituent-wise yearly energy consumption has been shown in **Annexure-V** and monthly energy consumption has been shown in **Annexure-VII**.

2.2.4 EXPORT TO OUTSIDE REGION

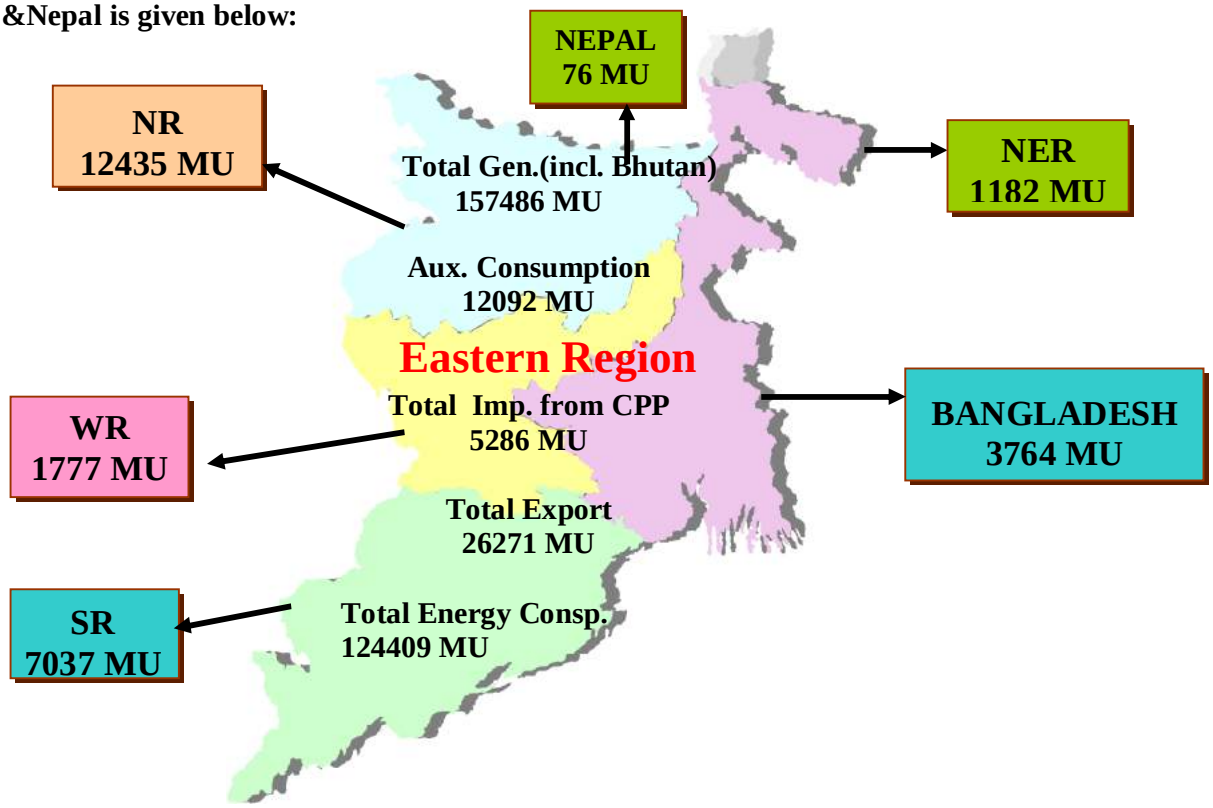
During the year 2015-16, the total export of power (net) outside the region was 26271 MU compared to export of 24597 MU in the last year, which is 1674 MU more than the last year's export. As per decision of the MoP, GoI power export to Bangladesh has been undertaken and regular supply has been commenced from October'2013 through 400 kV Farakka – Berhampur – Bheramara line with HVDC (2x500 MW) station at Bheramara (Bangladesh). Also power flow from ER grid to Nepal has been started from February'2016 through 400 kV (charged at 132 kV) Mazaffarpur-Sursand -Dhalkheber (Nepal) line. Growth of export of Energy (MU) outside Eastern Region during last six years is given below:

	EXPORT OF NET ENERGY (MU) FROM ER GRID							
Year	**NR**	**SR**	**WR**	**NER**	**B'DESH**	**NEPAL**	**TOTAL EXPORT**	**Growth ***
2010-11	**14726**	**1154**	**-2699**	**705**			**13886**	**18.7%**
2011-12	**13599**	**3624**	**-2053**	**1886**			**17056**	**22.8%**
2012-13	**15168**	**6106**	**1580**	**2171**			**25025**	**46.7%**
2013-14	**13892**	**6711**	**1727#**	**2267**	**1492**		**26088**	**4.2%**
2014-15	**11848**	**6254**	**780.5#**	**2368.4***	**3346.6**		**24597**	**-5.7%**
2015-16	**12435**	**7037**	**1777**	**1182**	**3764**	**76**	**26271**	**6.8%**

(*)- After adjustment of 447.5 MU import from NER i.e. net export to NER.
(#)- After adjustment of 581.4 MU import from WR i.e. net export to WR.

The details of inter/intra regional exchange of energy during 2015-16 are shown in **Annexure-VIII**.

A schematic diagram showing inter-regional exchange & exchange with Bangladesh &Nepal is given below:



2.2.5 FREQUENCY

Duration of different frequency blocks in terms of percentage (%) of time during the period 2015-16 and 2014-15 are given below:-

YEAR	< 49.9 Hz	49.9 – 50.05 Hz	> 50.05 Hz
2014-2015	**25.15**	**52.73**	**22.03**
2015-2016	**13.48**	**62.33**	**24.14**

Upto 24:00 Hrs. of 16.02.2014 IEGC Frequency Band was 49.70 Hz to 50.20 Hz and thereafter from 00:00 Hrs. of 17.02.2014, IEGC Frequency Band has been changed to 49.90 Hz to 50.05 Hz.

During the year 2015-16, for **62.33** % time the frequency remained in the IEGC Frequency Band i.e. between 49.90 to 50.05 Hz. Month wise average frequency in different period of the day during 2015-16 and average frequency in % of time during 2015-16 are given at **Annexure IX A** and **IX B** respectively.

2.2.6 VOLTAGE

During the year 2015-16, the voltage profile except a few important 400 kV sub–stations and 220 kV sub-stations remained satisfactory. Maximum & Minimum Voltage touched during 2015-16 at some of the important 400 kV sub-stations are shown below:

SUB-STATION	MAXIMUM VOLTAGE (kV)	MINIMUM VOLTAGE (kV)
RANCHI	429	396
PATNA	434	397
SUBHASGRAM	435	364
JEERAT	431	369
PURNEA	437	383
MUZAFFARPUR	430	363
JAMSHEDPUR	437	411
RENGALI	424	390
JEYPORE	434	368
DURGAPUR	425	398
MEERAMUNDALI	425	392

2.3 PLANT LOAD FACTOR

The average annual Plant Load Factor (PLF) of the thermal power stations in the Eastern Region for the year 2015-16 was 59.78% (without considering the IPP) against 63.00 % for 2014-15 and after considering the IPP the Regional PLF during 2015-16 was 58.88 % against that of 58.93 % for 2014-15. The PLF has been calculated based on the capacity and generation of the commercially declared units only. Infirm generation and period not considered for PLF calculations. As the IPPs were generating with restrictions for transmission & other constraints, the regional PLF has been reduced while those IPPs are being taking into account for Regional PLF calculations. Details of PLF have been shown in **Annexure - X**.

The average PLF (excluding IPP) of ER for the last six years is shown below:-

Period	PLF (in %)
2010-11	67.45
2011-12	65.13
2012-13	65.01
2013-14	61.67
2014-15	63.00
2015-16	**59.78**

2.4 SYSTEM LOAD FACTOR

The Annual Load Factor of the Eastern Region during 2015-16 was 77.95 % compared to 79.13 % in the preceding year. The load factor was highest in DVC areas (77.94 %) due to mostly industrial flat load and the load factor was 2nd lowest in CESC (60.58 %) mainly due to domestic & commercial load. 1st lowest was Sikkim (45.77 %) whose base data for calculation was only the estimated one as the actual data were not available and mainly consisting of domestic loads.

2.5 INTERNATIONAL EXCHANGE

Eastern Region has a unique geographical advantage of having inter-Regional links with all the regions of the country along with international lines to Nepal, Bhutan and Bangladesh. Eastern Region exports power to the rest of the country. Eastern Region receives power from Chukha, Kurichhu, Tala and Daghachu HPS of Bhutan and exports power to Nepal & Bangladesh. Power export to Bangladesh is through 400 kV Farakka – Berhampur – Bheramara (Bangladesh) line. Power export from ER grid to Nepal is through 400 kV (charged at 132 kV) Mazaffarpur-Sursand-Dhalkheber (Nepal) line. Also power to Nepal is supplied from Bihar state network which has been shown separately.

The table below depicts quantum of power import from Bhutan and exchange (net) with Nepal & Bangladesh in last six years:

YEAR	IMPORT FROM BHUTAN (CHPC, KHPC, TALA & DAGHACHU) IN MU	NET EXPORT TO NEPAL IN MU		NET EXPORT TO BANGLADESH IN MU
		Through Bihar State network by BSPHCL	Through CTU network by NVVN	
2010-11	5577.0	511.2		
2011-12	5252.7	498.9		
2012-13	4786.3	581.13		
2013-14	5536.34	715.81		1491.78
2015-16	4926.04	1009.79		3346.60
2015-16	**5427.04**	**1210.57**	**76.0**	**3764.0**

Though all the international lines are not operational all the times however, details of the lines are indicated below:

1. **Between ER – NEPAL**

   (a) **Through Bihar System**

   132 kV Balmiknagar (Bihar) - Surajpura (Nepal)
   132 kV Kataiya (Bihar) - Duhabi (Nepal)
   33 kV Thakurganj (Bihar) - Bhadarpur (Nepal)
   33 kV Raxaul (Bihar) - Birganj (Nepal)
   33 kV Kataiya (Bihar) - Biratnagar (Nepal)
   33 kV Jaynagr (Bihar) - Siraha (Nepal)
   33 kV Kataiya (Bihar) - Rajbiraj (Nepal)
   33 kV Sitamari (Bihar) - Jaleswar (Nepal)
   11 kV Jogbani (Bihar) - Biratnagari (Nepal)
   11 kV Bargania (Bihar) - Gaur (Nepal)

   (b) **Through CTU System**

   400 kV (charged at 132 kV) Mazaffarpur-Sursand-Dhalkheber (Nepal)

2. **Between ER – BHUTAN**

   400 kV Binaguri (PGCIL) - Tala-I (Bhutan)
   400 kV Binaguri (PGCIL) -Tala- II (Bhutan)
   400 kV Binaguri (PGCIL) -Tala- IV (Bhutan)

400 kV Binaguri (PGCIL) -Malbase-III (Bhutan)
220 kV Birpara (PGCIL) - Chukha - I (Bhutan)
220 kV Birpara (PGCIL) -Chukha - II (Bhutan)
220 kV Birpara (PGCIL) - Malbase (Bhutan)
11 kV Kalchini (WBSETCL) - Phuntsholing (Bhutan)
11 kV Jaldhaka (WBSETCL) -Sibsoo (Bhutan)
11 kV Banarhat (WBSETCL) - Samchi (Bhutan)

3. Between ER – BANGLADESH

400 kV Berhampur (PGCIL) - Bheramara (Bangladesh) D/C

4. Between NER - BHUTAN

Power is also exchanged between Bhutan and India through the following lines of NER but the exchange of power is booked against/from ER only.

132 kV Salakati (Assam, PG) – Gelephu (Bhutan)
132 kV Rangia (AEGCL) – Deothang (Bhutan)
11 kV Bongaigaon (AEGCL) -Gaylegphug (Bhutan)
11 kV Tamalpur (AEGCL) -SamdrupJongkhar (Bhutan)
11 kV Dampuri (AEGCL) -Daifan (Bhutan)

2.6 SALIENT FEATURES OF HYDRO RESERVOIR

Salient data regarding FRL, MDDL and the water level reached on the last day of the month in respect of major hydro reservoirs are given in **Annexure - XI.**

2.7 POWER CUTS IN THE REGION

Power supply position in Eastern Region was by and large satisfactory except for sub-transmission and distribution constraints in some of the constituents and perpetual shortage in area served by SBPDCL, NBPDCL and JBVNL during peak hours.

2.8 UNITS AND TRANSMISSION ELEMENTS COMMISSIONED DURING THE YEAR

Generating units and transmission elements commissioned during the year 2015-16 are given at **Annexure – IV B and IV C** respectively.

2.9 PROGRESS OF CONSTRUCTION OF GENERATING UNITS & TRANSMISSION LINES

List of ongoing Power Projects / Generating Units and progress of construction of ongoing transmission lines are given at **Annexure – XII A and XII B** respectively**.**

2.10 ALLOCATION OF POWER FROM CENTRAL GENERATING STATIONS.

Allocation of power from Central generating stations in Eastern Region including Chukha HEP, Kurichu HEP, Tala HEP & Daghachu HEP of Bhutan during 2015-16 is given at **Annexure – XIII.**

CHAPTER-3

GRID DISTURBANCES

Grid disturbances which occurred during the year 2015-16 are as follows:

Sl No	Name of Elements	Date & Time of occurrence	Gen. loss (MW)	Load loss (MW)	Category	Reasons
1	OPTCL (Mendhasal)	02/04/15 at 14:27hrs	0	170	GD-1	Total power failed at Mendhasal S/s due to tripping of 400kV Mendhasal- Baripada D/C line on L-L-G fault.
2	WBSETCL (Santaldih, Asansol, New Bishnupur)	03/04/15 at 11:57hrs	380	150	GD-1	All the 220kV feeders along with U#5 & 6 of Santaldih TPP tripped due to B-Ø jumper of 220kV Santaldih-Chandil line snapped at Chandil end.
3	OPTCL (Mendhasal)	07/04/15 at 20:06hrs.	0	0	GD-1	Various 400kV, 220kV and ICTs tripped from Mendhasal and Bhanjanagar S/s due tripping of 220kV Meramundali-Bhanjanagar-I on R-Ø to ground fault.
4	OPTCL (South Odisha) & Jeypore S/s	12/04/15 at 10:53 – 11:10hrs	0	100	GD-1	Multiple tripping occurred in South Odisha including ISTS system due to tripping of 400 Angul Bolangir on R-N Fault
5	400kV New Purnea and 220kV Old Purnea S/s	21/04/15 at 21:59hrs	0	250	GD-1	Various 400kV and 220kV lines emanating from 400kV New Purnea and 220kV Old Purnea S/s tripped due to inclement weather condition in Bihar.
6	OPTCL (Mendhasal, Bhanjanagar)	22/04/15 at 18:23hrs	0	100	GD-1	Various 220kV lines and ICTs from Bhanjanagar and Mendhasal S/s tripped due to tripping of 220kV Meramundali-Bhanjanagar-II line on R-Ø E/F due to snapping of earth wire of 400kV Meramundali-IBTPS-II at loc no-116/0 and 117/0 (which was antitheft charged from the said 220kV line)
7	BSPTCL (Fatuah)	23/04/15at 19:36hrs	0	200	GD-1	Total power failure occurred at 220kV Fatuah S/s due to tripping of 220kV Biharsariff (BSEB)-Fatuah-D/C on E/F and O/C protection.

Sl No	Name of Elements	Date & Time of occurrence	Gen. loss (MW)	Load loss (MW)	Category	Reasons
8	JSEB (Patratu)	28/04/15 at 13:53hrs	74	20	GD-1	Total power failure occurred at 220kV Patratu S/s due to tripping of 220kV Patratu-Hatia line on E/f.
9	JUSNL (Lalmatia)	03/06/15 at 16:50hrs.	0	118	GD-1	Total power failure occurred at Lalmatia S/s due to bursting of Y-Phase CT of 132kV Lalmatia-Kahalgaon (NTPC) line at Lalmatia.
10	BSHPCL (Biharsarif)	08/06/15 at 15:24 & 23:58hrs.	200	410 & 140	GD-1	Total power failure occurred at 400/220kV Biharsarif S/s due to fire hazard occurred in 315MVA ICT-I at Biharsarif.
11	JSEB (Hatia)	14/06/15 at 07:28hrs	165	280	GD-1	Total power failure occurred at 220/132kV Hatia S/s due to jumper snapping of 132kV Patratu-Hatia-D/C
12	DVC (Kalyaneswari, Maithon HS, Panchet HS, Kumardubi and Patherdih)	21/06/15 at 07:12 hrs.	0	330	GD-1	Total power failure occurred at 220/132kV Kalyaneswari S/S due to bursting of R-Ø CT of 220kV bus coupler bay at Kalyaneswari.
13	OPTCL (Budhipadar)	03/07/15 at 22:27hrs	730	450	GD-1	Total power failure occurred at 220kV Budhipadar S/s of OPTCL system due to bursting of Y-Ø CT of 220kV Budhipadar-Raigarh line at Budhipadar end
14	OPTCL (Tarkera)	06/07/15 at 09:55 & 10:54 hrs	0	130	GD-1	Total power failed at 220kV Tarkera S/s in OPTCL system due to fault in 132kV Tarkera-Rajgangpur-I & 220kV Tarkera-Budhipadar-I
15	Chukha HPS	18/07/15 at 18:43hrs	270	0	GD-1	All units of Chukha HPS tripped due to tripping of 220kV Chukha-Birpara-D/C tripped on 3-Ø to ground fault.
16	220kV Maithon S/s	21/07/15 at 22:44 hrs	0	0	GD-1	Total power failure occurred at 220kV Bus of Maithon S/s due to operation of Bus bar protection in 220kv MB-II.

Sl No	Name of Elements	Date & Time of occurrence	Gen. loss (MW)	Load loss (MW)	Category	Reasons
17	JSEB (Chandil)	29/07/15 at 16:53 Hrs	0	250	GD-5	Total power failed at 220kV Chandil S/s in JSEB system due to fault in 132kV Chandil-Hatia line
18	Chukha HEP	02/08/15 at 23:44hrs	300	0	GD-1	All units of Chukha HPS tripped due to tripping of 220kV Chukha-Birpara-D/C tripped on 3-Ø to ground fault.
19	Chukha HEP	09/08/15 at 08:06hrs	300	0	GD-1	All units of Chukha HPS tripped due to tripping of 220kV Chukha-Birpara-D/C tripped on B-Ø to ground fault.
20	Chukha HEP	10/08/15 at 14:55 hrs	280	0	GD-1	All units of Chukha HPS tripped due to tripping of 220kV Chukha-Birpara-D/C tripped on R-Ø to ground fault.
21	BSPTCL (Madhepura,Supaul, Katiya)and Part of Nepal	11/08/15 at 13:09hrs	0	300	GD-1	Total Power failure occurred in part of North Bihar (Madhepura, Supaul, Katiya) due to tripping of 220kVPurnea (PG)-Madhepura-II on B-Ø to ground fault. Power supply to Nepal also got interrupted.
22	JUSNL (Chandil)	14/08/15 at 10:10hrs	0	300	GD-1	Total power failed at 220kV Chandil S/s in JUSNL system due mal-operation of LBB relay i.r.to 220kV Chandil-Ramchandrapur line
23	BSHPCL(Dehri) and Sasaram (PG)	15/08/15 at 13:20hrs	0	250	GD-1	Various 220kV, 132kV and ICTs emanating from 220kV Dehri S/s and 220kV Sasaram S/s due to conductor of 132kV Dehri-Banjari line snapped at a distance of around 8kM from Dehri.
24	Chukha HEP	16/08/15 at 23:19hrs	290	0	GD-1	All units of Chukha HPS tripped due to tripping of 220kV Chukha-Birpara-D/C tripped on 3-Ø to ground fault.
25	BSPTCL (Madhepura,Supaul, Katiya) and Part of Nepal	18.08.15 at 11:35, 11:42hrs	0	222	GD-1	Total Power failure occurred in part of North Bihar (Madhepura, Supaul, Katiya) due to tripping of 220kVPurnea (PG)-Madhepura-II on B-Ø to ground fault. Power supply to Nepal also got interrupted.
26	WBSETCL (Birpara)	22/08/15 at 20:26hrs	0	100	GD-1	Power supply failed at Birpara and adjacent area due to bursting of R-Ph LA of 132kV Birpara (PG)- Birpara(WB)-I at Birpara (WBSETCL) end.

Sl No	Name of Elements	Date & Time of occurrence	Gen. loss (MW)	Load loss (MW)	Category	Reasons
27	JUSNL (Chandil)	28/08/15 at 16:05hrs	0	314	GD-1	Total power failed at 220kV Chandil S/s in JUSNL system due to SLG fault occurred in 132kV Ramchandrapur- Adityapur-I and subsequent tripping of all lines from Chandil S/S on operation of LBB relay for 220kV Chandil-Ramchandrapur line.
28	JUVNL (Lalmatia)	02/09/15 at 12:29hrs	0	90	GD-1	Total power interruption occurred at 220/132kV Lalmatia S/s due to tripping of both 220kV FSTPP-Lalmatia and 132kV Kahalgaon (NTPC)-Lalmatia on B-Ø to ground fault.
29	BSPHCL (Madhepura)	08/09/15 at 12:35hrs,	0	90	GD-1	Total power failure occurred at 220kV Madhepura S/s due to tripping of 220kV Purnea (PG)-Madhepura-D/C on B-Ø to ground fault.
30	Biharsharif (BSPHCL)	10/09/15 at 11:00hrs	0	450	GD-1	Total power failure occurred at 220kV Biharsharif (BSEB) S/s due to tripping of all 440/220kV, 3X315 MVA ICT at Biharsharif on operation of back up overcurrent protection
31	JUVNL (Hatia, Patratu)	14/09/15 at 11:38hrs	255	370	GD-1	Total power failure occurred at 220/132kV Hatia S/S due to occurrence of fault on 220kV Ranchi (PG) - Hatia S/c line
32	JUVNL (Lalmatia)	17/09/15 at 13:10hrs	0	70	GD-1	Total power failure occurred at Lalmatia S/s of JUVNL system due to tripping of 132kV Kahalgaon (NTPC)-Lalmatia on O/C, E/F and 220kV FSTPP-Lalmatia on back up O/C.
33	OPTCL (Meramundali)	18/09/15 at 04:59hrs	0	200	GD-1	Total power failure occurred at 220kV Meramundali S/s due to Y-Ø Jumper of 400kV Meramundali-New Duburi-II snapped at Loc. No-23 and fell on 220kV Meramundali- Duburi-I.
34	OPTCL (Meramundali)	22/09/15 at 11:43hrs	0	0	GD-1	Total power failure occurred at 400kV Meramundali S/s due to Y-Ø to ground fault in 400kV Meramundali- IBTPS-I line which was idle charged from Meramundali end.
35	JUVNL (Lalmatia)	27/09/15 at 17:43hrs	0	50	GD-1	total power failure occurred at Lalmatia S/s of JUVNL system due to bursting of Y-ØCT of 132kV Bus (NTPC Section) at Lalmatia

Sl No	Name of Elements	Date & Time of occurrence	Gen. loss (MW)	Load loss (MW)	Category	Reasons
36	Biharshariff (BSPTCL)	08/10/15, at 08:30hrs	0	350	GD-1	Total power failure occurred at 220kV Biharsariff S/s due to tripping of 220kV Biharshariff-Begusarai-I on B-Ø to ground fault.
37	BSPTCL (Madhepura)	10/10/15, at 17:48hrs	0	400	GD-1	Total power failure occurred at 220kV Madhepura S/s and adjacent 132kV s/s due to tripping of 220kV Purnea-madhepura-D/C line. Part of Nepal load also got interrupted due to this incident.
38	Rangpo, Teesta-V and Jorethang HEP	17/10/15 at 10:45hrs	416	0	GD-1	Multiple tripping occurred at Rangpo S/s due to which all running units of Teesta HEP and Jorethang HEP tripped due to loss of evacuation path.
39	JSEB (Ramchandrapur)	20/10/15, at 05:36Hrs	0	180	GD-1	Total power failure occurred at Ramchandrapur S/s due to bursting of R-Ph CT of 220kV Ramchandrapur- Chandil S/c line at Ramchandrapur end.
40	JSEB (Chandil)	21/10/15, at 00:15Hrs	0	320	GD-1	Total power failure at 220kV Chandil S/s due of bursting of R-Ph CT of 220/132kV ATR-I at Chandil at LV side.
41	Rangpo, Teesta-V and Jorethang HEP	23/10/15 at 14:41hrs.	389	0	GD-1	Multiple tripping occurred at Rangpo S/s due to which all running units of Teesta HEP and Jorethang HEP tripped due to loss of evacuation path.
42	WBSETCL (220kV Kasba S/s)	29/10/15 at 01:07hrs	0	150	GD-1	Total power failure occurred at due to fault occurred in wave trap of 220kV Jeerat- Kasba-II line at Kasba end.
43	JUSNL (Chandil)	06/11/15 at 19:29-19:31hrs	0	140	GD-1	Total power interruption occurred at Chandil S/s due to heavy sparking in earth phase pipe connector point of 220kV Chandil-Santaldih bay at Chandil end
44	BSPTCL (Purnea & Madhepura)	11/11/15 at 19:57hrs	0	530	GD-1	Total power failure occurred in North Bihar and part of Nepal due to tripping of 132kV Madhepura-Supaul-D/C line on over current protection.
45	BSPTCL (Purnea & Madhepura)	19/11/15 at 21:43hrs	0	486	GD-1	Total power failure occurred in North Bihar and part of Nepal due to tripping of 132kV Madhepura-Supaul-D/C line on over current protection.

Sl No	Name of Elements	Date & Time of occurrence	Gen. loss (MW)	Load loss (MW)	Category	Reasons
46	400kV Malda and 220kV Dalkhola	20/11/15 at 20:55hrs	0	380	GD-1	Multiple trippings occurred from 400kV Malda and 220kV Dalkhola S/s due to which total power failure occurred at Malda and Dalkhola.
47	Biharsaiff (BSEB), Tenughat TPS	**23/11/15** at 13:11 hrs.	454	320	GD-1	Multiple trippings occurred from 220kV Biharsariff and tenughat S/s due to bursting of Y-Ph CT of 132kV Biharshariff- Hatida Ckt –I at Biharshariff end .
48	Biharsaiff (BSEB)	**28/11/15** at 17:32 hrs.	0	450	GD-1	Total power interruption occurred in Biharsariff (BSPTCL) systems due to Snapping of R-Ph jumper of 315 MVA ICT-III bay (220kV side) at Biharsariff (BSEB)
49	BSPTCL (220kV Dehri S/s)	16.12.15 at 08:42 hrs	0	170	GD-1	Total power failure occurred at 220kV Dehri S/s due to R-Ø jumper of 132kV Dehri-Kochas snapped on Y phase of same line at Dehri.
50	BSPTCL (220kV Dehri S/s)	17.12.15 at 17:10hrs	0	410	GD-1	Total power failure occurred at 220kV Dehri S/s due to tripping of both the ICTs at Gaya (PG) S/s. 220kV Dehri-Sasaram(PG) S/C tripped on overloading.
51	220kV Arrah S/s	23.12.15 at 23:06hrs	0	100	GD-1	While first time charging attempt of 220/132kV, 160MVA ICT-III at Arrah(PG) was taken, all the 220kV lines emanating from Arrah (PG) S/s tripped from remote end resulting total power failure at Arrah.
52	BSPTCL (Madhepura)	02.01.16 at 06:01 hrs.	0	450	GD-1	Total power failure occurred at North Bihar and some part of Nepal due to tripping of all 220/132kV, 100 MVA ATR-I, II & III at Madhepura on operation of REF protection from 220kV side.
53	OPTCL (TTPS)	19.01.16 at 10:50hrs	460	0	GD-1	All the 220 & 132kV feeders emanating from 220kV TTPS S/s along with all the running unit of TTPS tripped while opening of Bus-II side isolator of 220kV TTPS- Joda –I (idle charged from TTPS) at TTPS end
54	Mejia-B (DVC)	31.01.16 at 03:27 hrs	769 MW	0	GD-1	All the 400kV lines emanating from Mejia- B S/s along with running unit of Mejia-B (U#7 & 8) tripped due to initiation of LBB protection for both main Bus-I & main Bus-II.
55	JUSNL (Chandil)	24/02/16 at 16:59 hrs	0	125	GD-1	Total Power Failure occurred at 220/132kV Chandil S/s due to burning of 220/132kV, 100 MVA ATR-IV at Chandil and consequently all the 220/132kV lines emanating from Chandil

Sl No	Name of Elements	Date & Time of occurrence	Gen. loss (MW)	Load loss (MW)	Category	Reasons
						S/s along with remaining ATRs at Chandil tripped.
56	WBSETCL (Kolaghat)	24/02/16 at 18:54 hrs	270	0	GD-1	Multiple elements tripping occurred at 220kV Kolaghat S/s due to operation of LBB protection for 220kV Main Bus-II at Kolaghat S/s and hence all the elements connected to Main Bus-II tripped.
57	WBSETCL (Lakhikantapur, Subhasgram) , CESC	01/03/16 at 09:31 & 09:39 hrs	0	150 (WB) + 200 (CESC)	GD-1	Total power interruption occurred at Lakhikantapur and 200 MW load loss occurred in CESC system due to maloperation of LBB protection of 220kV Main Bus- I at Subhasgram and at the same time 220kV Jeerat- Kasba D/c tripped on indication of Y-N fault. Thereafter CESC system separated from WBSETCL system due to U/F scheme and SPS action in CESC system
58	PGCIL & BSPTCL (Muzaffarpur)	01/03/16 at 17:55 hrs	0	580	GD-1	Power interruption occurred at 400/220 kV Muzaffarpur S/S & its surrounded area due to tripping of 400/220kV, 315 MVA ICT-II at Muzaffarpur on maloperation of auxiliary trip relay and subsequently 500 MVA ICT- III at Muzaffarpur (PG) tripped on overcurrent
59	DVC (Waria)	09/03/16 at 23:47 hrs	0	80	GD-1	While desynchronizing of Waria (DTPS) U#4 due to boiler tube leakage, Y-Ph pole of CB of the corresponding GT got stuck. And to isolate the unit (to prevent from motoring mode of generator), 220kV Bus at Waria S/s was made dead by manually opening of all the 220kV feeders emanating from 220/132kV Waria S/s. And hence 220kV bus became dead at Waria S/s.

Sl No	Name of Elements	Date & Time of occurrence	Gen. loss (MW)	Load loss (MW)	Category	Reasons
60	PGCIL & OPTCL (Jeypore, Nayagarh, Bhanjanagar, Theruvali, Chandaka)	10/03/16 at 12:24-12:31 hrs	150	580	GD-1	Total power failure occurred in South Orissa system as well as ISTS system due to tripping of all the 400/220kV lines emanating from Jeypore, Indravati S/s as well as multiple 220kV lines in south Orissa system along with running units of Indravati, Balimela & U.Kolab.
61	WBSETCL, PGCIL,Bhutan & Sikkim (Dalkhola, Siliguri, Birpara, NJP, Rangit and Chukha.)	16/03/16 18:09 hrs & 18:17 hrs	180	550	GD-1	Total power interruption occurred in N. Bengal system due to tripping of both 315 MVA ICT at Binaguri along with 220kV Dalkhola bus coupler on overcurrent. Thereafter cascading tripping occurred in Bhutan (running unit of Chukha tripped) as well as Sikkim system(all 132kV lines from Rangit S/s as well as running unit of Rangit tripped)
62	WBSETC(Kasba)	19/03/16 16:53 hrs	0	150	GD-1	Total power failure occurred in Kasba (WB) system due to tripping of multiple 220kV lines emanating from Kasba as well as Subhasgram (PG) system.
63	OPTCL(Mendhasal, Chandaka)	30/03/16 16:59 hrs	0	400	GD-1	Total power failure occurred at Chandaka S/s due to occurrence of SLG (I.e R-N) fault on 400kV Meeramandali- Mendhasal S/c line. And due to non-clearance/delayed clearance of fault from Mendhasal end all the 400kV lines emanating from Mendhasal s/s tripped from remote end on Z-II. Thereafter MW flow became zero on both 315 MVA ICTS at Mendhasal

CHAPTER-4

COMMERCIAL

4.1 REGIONAL ENERGY ACCOUNTING (REA)

CERC Regulations on Availability Based Tariff (ABT), applicable for accounting of Capacity charges and Energy charges of Central Sector Generating Stations; transmission charges of Central Sector Transmission Systems and transactions of interstate power through exchange and bilateral mechanisms, was implemented in ER w.e.f 01.04.2003. After end of tariff period 2009-14, CERC has issued "CERC TARIFF REGULATIONS, 2014 (Terms and Conditions of Tariff)" which has come into force on and from 01.04.2014. This regulation shall remain in force for a period of five years, i.e upto 2019 from the date of commencement unless reviewed earlier or extended by the Commission.

The following are the major components of Availability Based Tariff (ABT):

a. Capacity Charge inclusive of incentive (for recovery of annual fixed cost)
b. Energy Charge (for recovery of primary fuel cost)
c. Transmission Charges (for recovery of annual fixed cost)
d. Unscheduled Interchange (UI)/Deviation Settlement Mechanism, etc

The first three topics would be dealt with in this section and the fourth topic would be dealt with in the next section. The regional energy accounts bring out the transactions/accounts for Central Generating Stations (CGS), IPPs, LTOA, STOA, etc.

4.1.1 SHARE ALLOCATION FROM EASTERN REGIONAL CENTRAL GENERATING STATIONS

Regional Energy Accounting for CGS is based on the allocations from MoP/CEA. The percentage share of total capacity of each ISGS in ER is allocated to the beneficiaries of Eastern, Northern, Western, Southern and North Eastern Region, which is revised from time to time. Allocations of shares from each ISGS in Eastern Region during 2015-16 are given at **Annexure-XIII.**

In case of Un-requisitioned surplus (URS), statement of URS is issued based on the data for surrender/avail of URS.

4.1.2 ACCOUNTING OF CENTRAL GENERATING STATIONS

Capacity Charges:

The capacity charge (inclusive of incentive) in the 2014-19 regulations payable to a thermal or hydro generating station for a calendar month is ensured if availability of 83 % or more is achieved.

For hydro generating stations the annual Capacity charge is recoverable from the beneficiaries as per percentage share allocation of each beneficiary after adjustment of 12 % free share of home

state. The payment of capacity charge is independent of the energy drawn by the beneficiary and is dependent only on the Plant Availability Factor for the Month (PAFM). To minimize the cost of power procurement, the beneficiary has the option of lower drawal of energy (paying full capacity charge for its share) and meet demand from other source such as bilateral and power exchange.

The indicative annual capacity charges per year for the thermal and hydro power stations of the Central Sector Generating stations in Eastern Region as on 31.03.2016 for all the ISGS are as under (as per CERC orders).

Sl No	Station Name	Annual Fixed Charges
		Thermal
1	Talcher STPS Stage I	Rs. 38549.05 Lakhs
2	Kahalgaon-I STPS	Rs. 54357.71 Lakhs
3	Kahalgaon-II STPS	Rs. 127063.80 Lakhs
4	Farakka STPS Stage I & II	Rs. 90876.06 Lakhs
5	Farakka STPS Stage III	Rs. 58661.97 Lakhs
6	Barh	Rs. 176098.00 lakhs
		Hydro
1	Rangit HPS	Rs. 10074.03 Lakhs
2	TEESTA Stage-V HPS	Rs. 51558.71 Lakhs

Energy Charges:

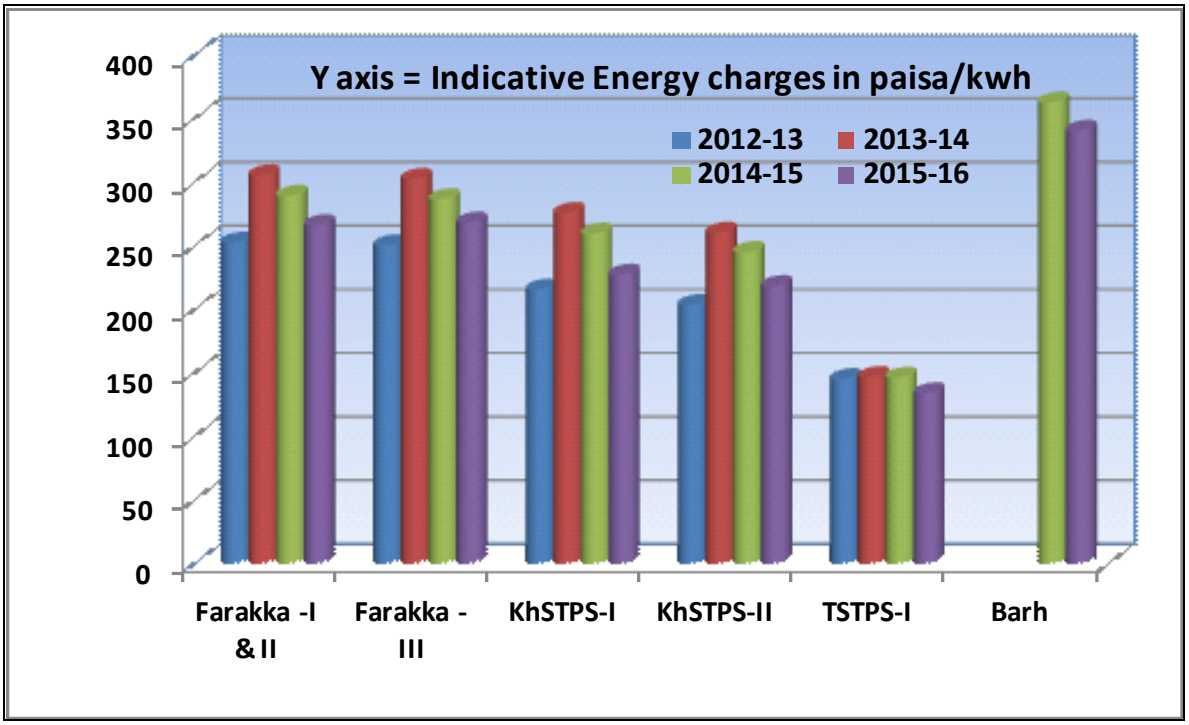
The Energy charges of the Central Generating Thermal Power Stations cover primary fuel cost and monthly fuel price adjustment (FPA). From July, 2011 onwards, the Fuel Price Adjustment has been included in the energy charges. The energy charges payable by every beneficiary, in case of a hydro station, on ex-power plant basis is at the computed Energy Charge Rate (ECR).

The indicative average energy rates for C.S Thermal stations in ER for the year 2015-16 were as under:

Average Energy Charge during 2015-16 (Paise/kWh)

FSTPS Stg- I & II	FSTPS Stg- III	KhSTPS Stg-I	KhSTPS Stg-II	TSTPS Stg-I	Barh Stg-II
266.025	**268.075**	**227.058**	**218.092**	**133.675**	**340.258**

The year wise variation in energy charges for, 2012-13, 2013-14, 2014-15 & 2015-16 is given below for reference.



For Rangit HPS & Teesta HPS the indicative energy charge rates were 137.9 paise/kWh and 111.1 paise/kWh respectively for 2015-16 as computed in line with existing CERC Regulation.

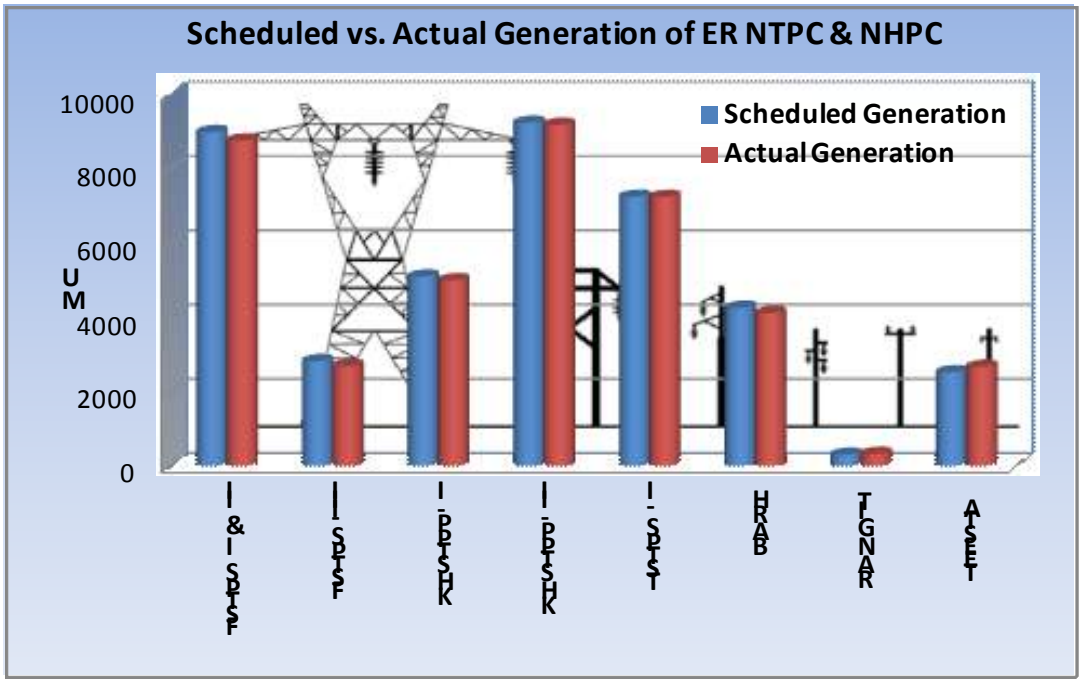
Annual Generation of NTPC and NHPC stations in ER during the year 2015-16:

1. Station wise Generation Scheduled in MU (Ex-Bus)

FSTPS - I & II	FSTPS -III	KHSTPP- I	KHSTPP- II	TSTPS - I	BARH- II	RANGIT HPS	TEESTA HPS
8997.35	2837.07	5109.79	9248.21	7256.87	4270.56	319.00	2537.22

2. Station wise Actual Generation in MU (Ex-Bus)

FSTPS - I & II	FSTPS -III	KHSTPP- I	KHSTPP- II	TSTPS - I	BARH-II	RANGIT HPS	TEESTA HPS
8743.17	2689.34	5005.81	9185.09	7252.27	4389.9	339.53	2686.19

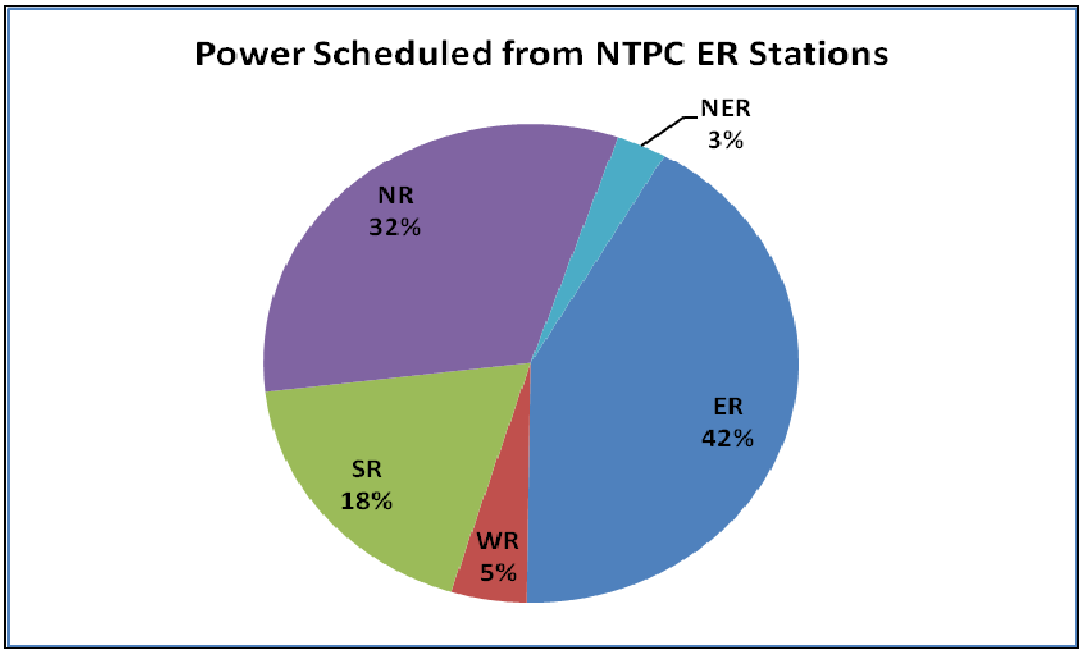


➢ Net scheduled power to other regions (MU) from NTPC Eastern Region Stations [Imp. Sch.(+) / Exp. Sch.(-)] :

WR	SR*	NR #	NER	TOTAL
-1724.62	-6881.13	-12160.57	-1143.33	-21909.65

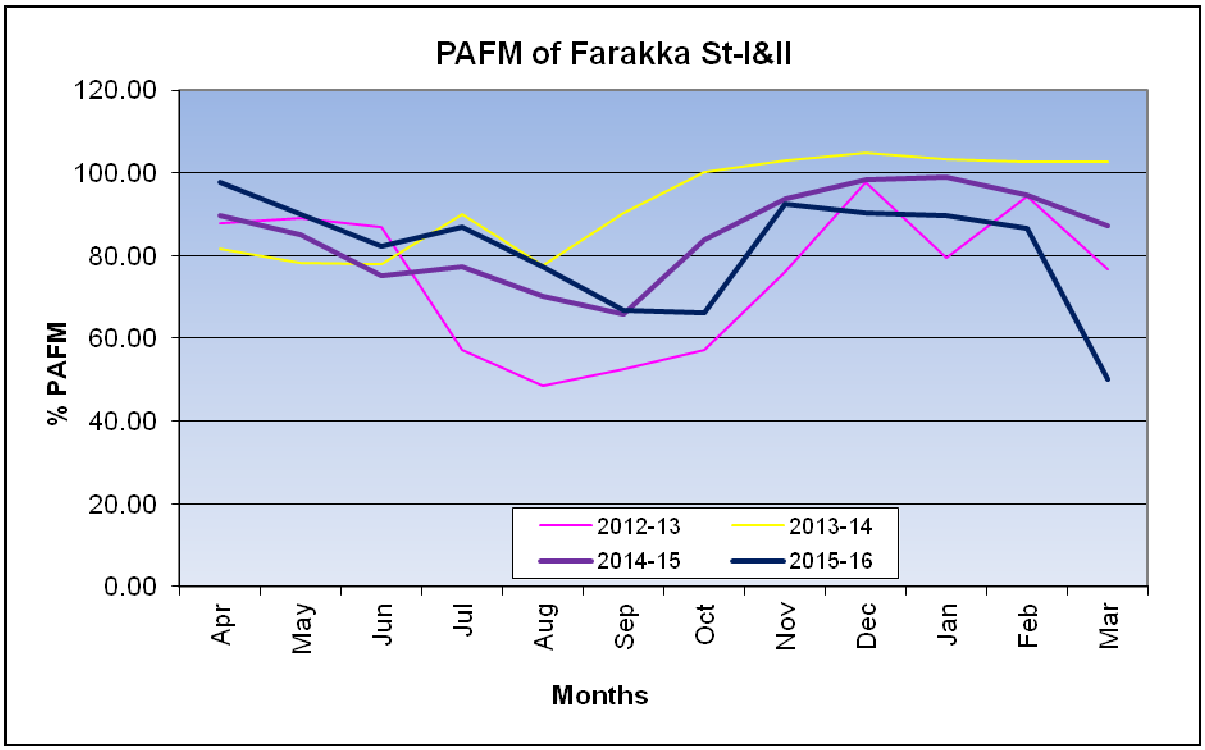
* In addition, 1499.46 MU TSTPP Stage-II power has been allocated to Odisha as home state share during the year

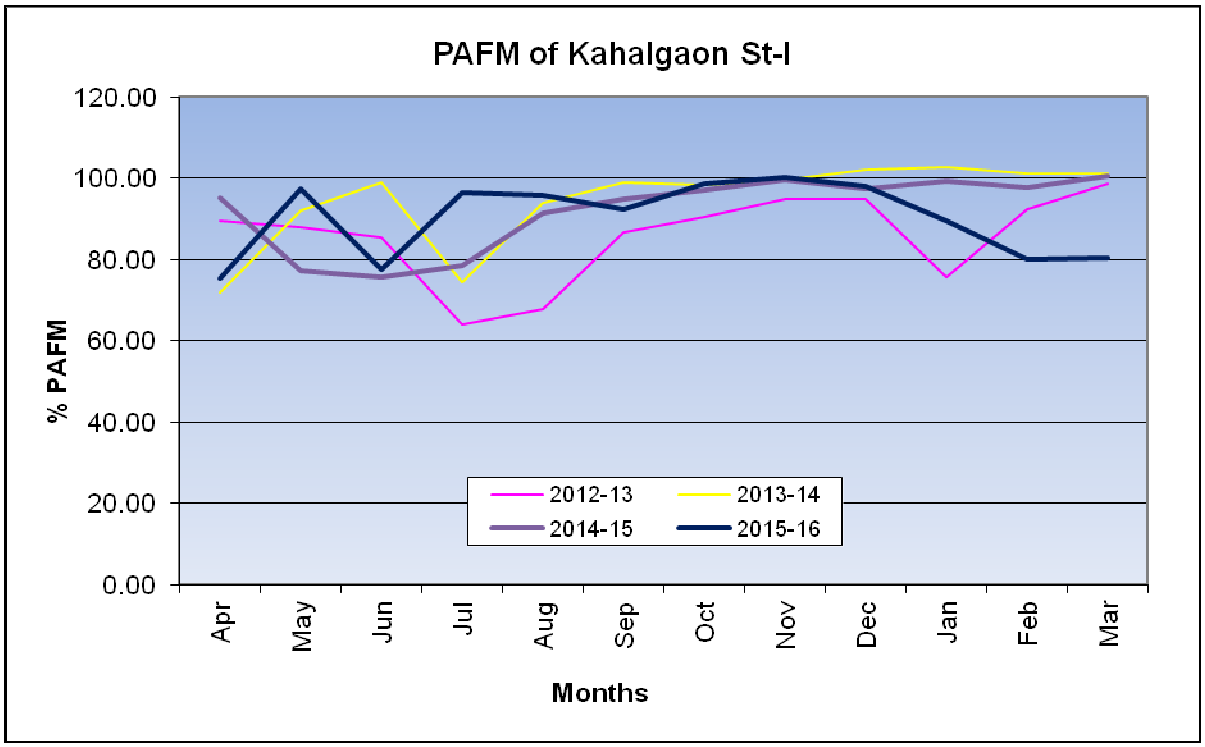
Apart from this, 396.83 MU share from Tala HPS has been scheduled to NR in 2015-16

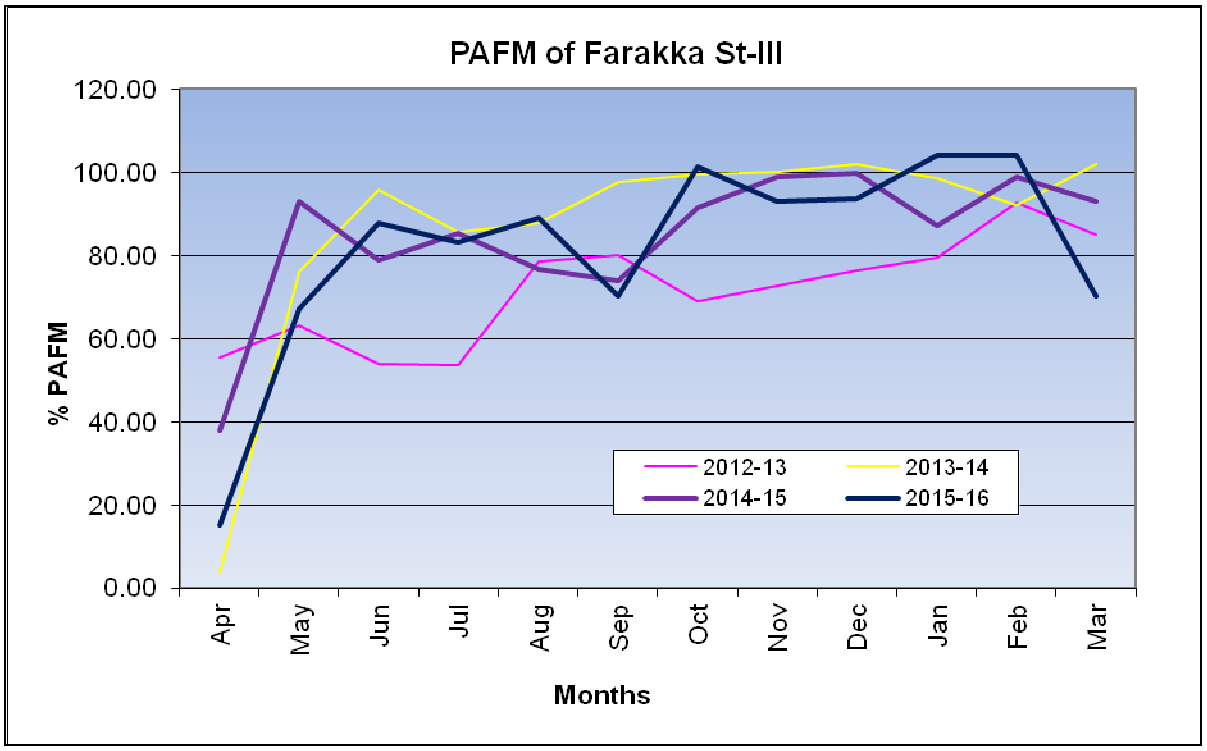


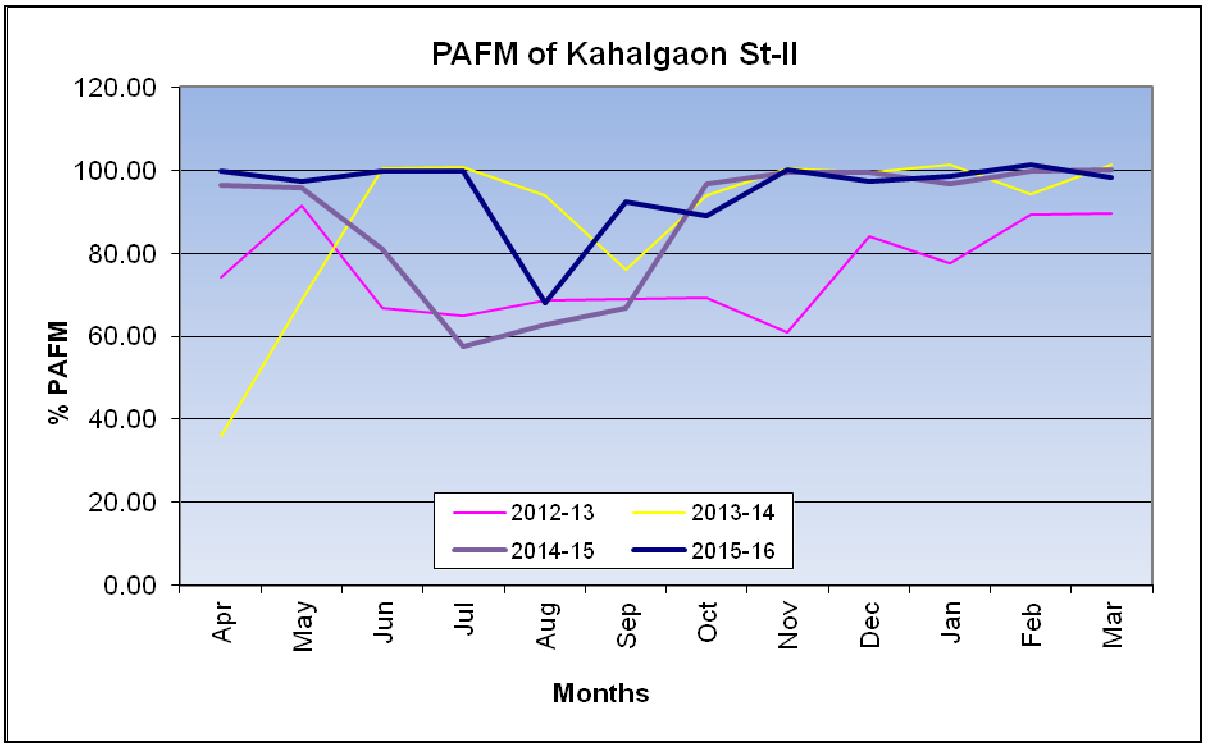
Performance of NTPC Thermal Generating Stations in ER:

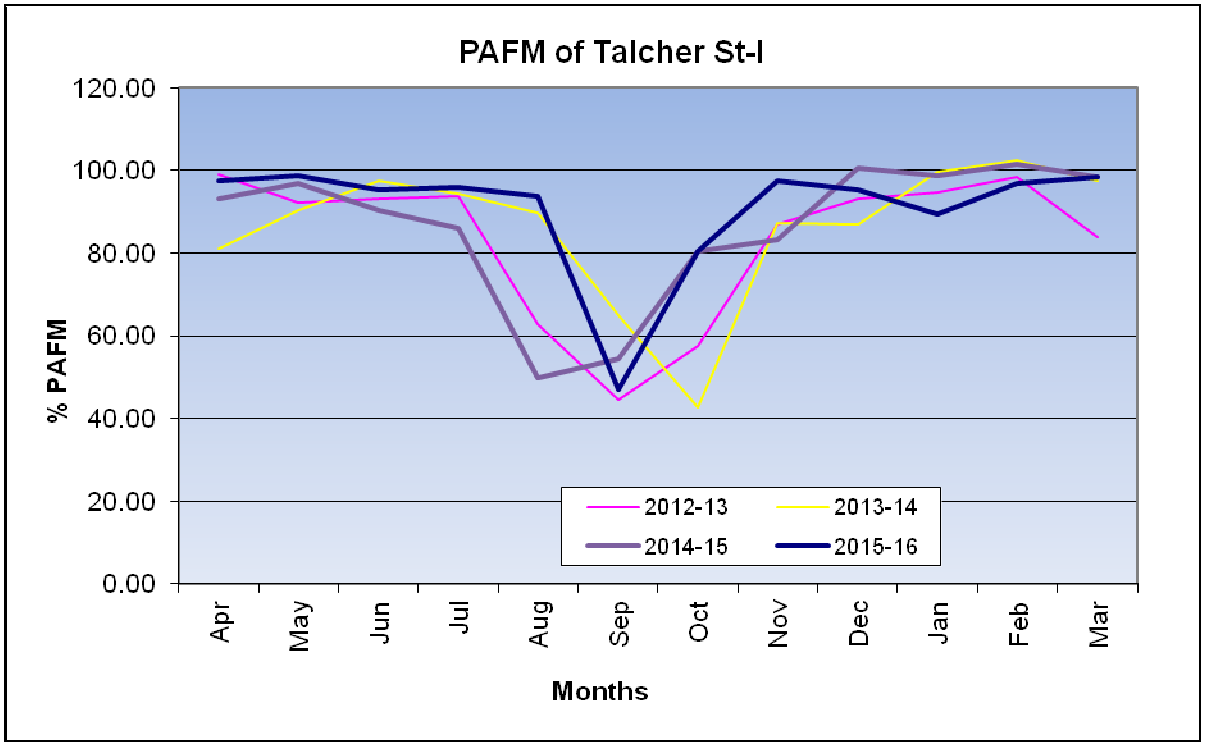
The month wise Plant Availability Factor (PAF) for NTPC stations in Eastern Region is illustrated below:

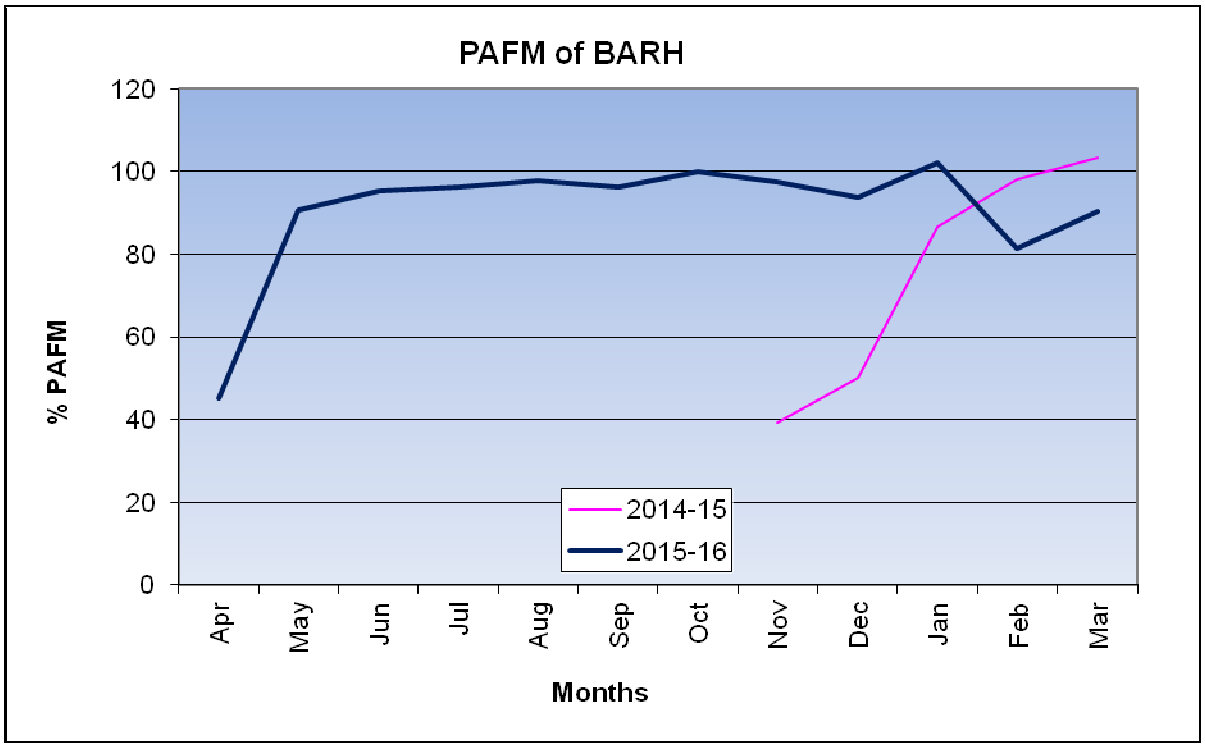




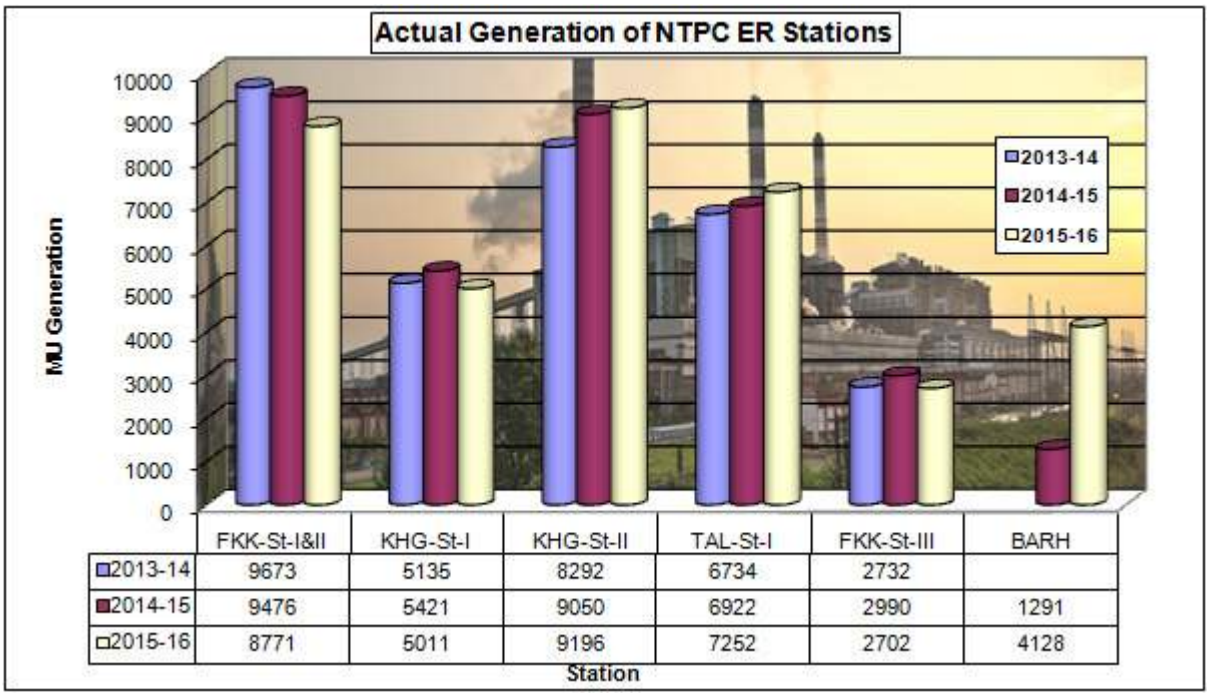

PAFM of Farakka St-III
120.00
100.00
80.00
60.00
40.00
20.00
0.00
% PAFM
2012-13
2013-14
2014-15
2015-16
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Months


PAFM of Kahalgaon St-II
120.00
100.00
80.00
60.00
40.00
20.00
0.00
% PAFM
2012-13
2013-14
2014-15
2015-16
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Months


PAFM of Talcher St-I
120.00
100.00
80.00
60.00
40.00
20.00
0.00
% PAFM
2012-13
2013-14
2014-15
2015-16
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Months


PAFM of BARH
120
100
80
60
40
20
0
% PAFM
2014-15
2015-16
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Months

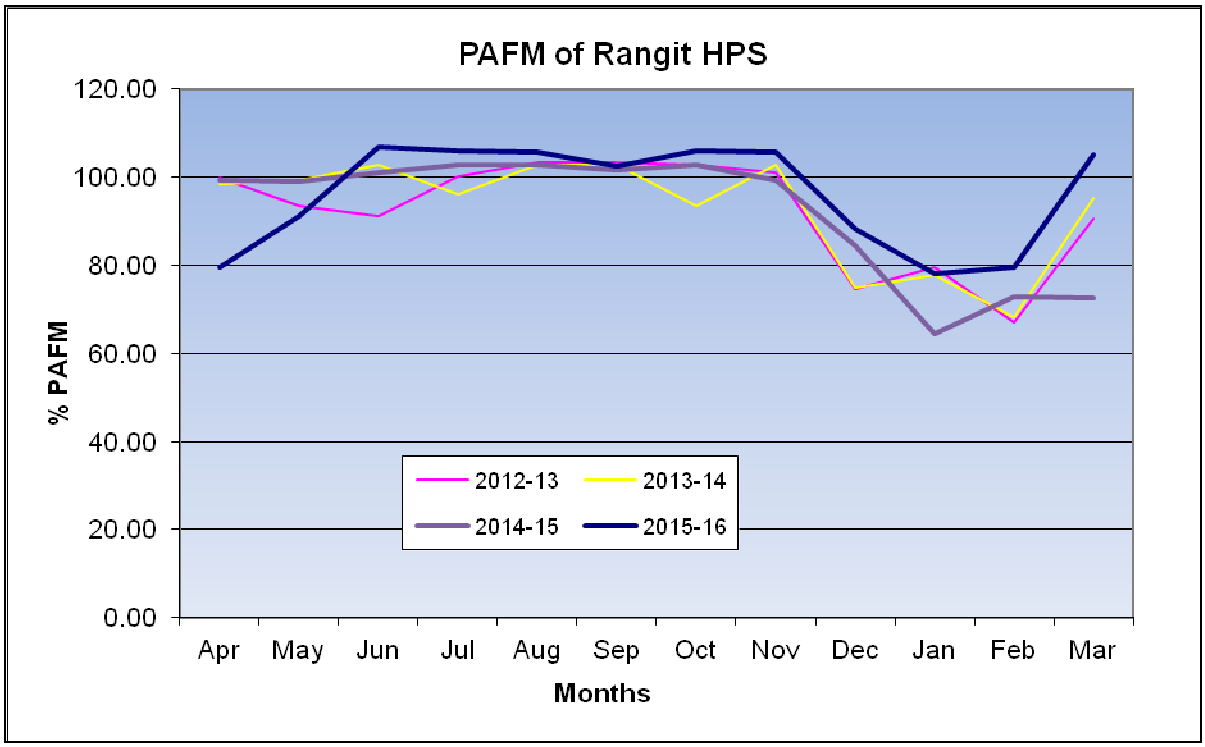
The year on year Actual Generation of NTPC ER Stations are as under:

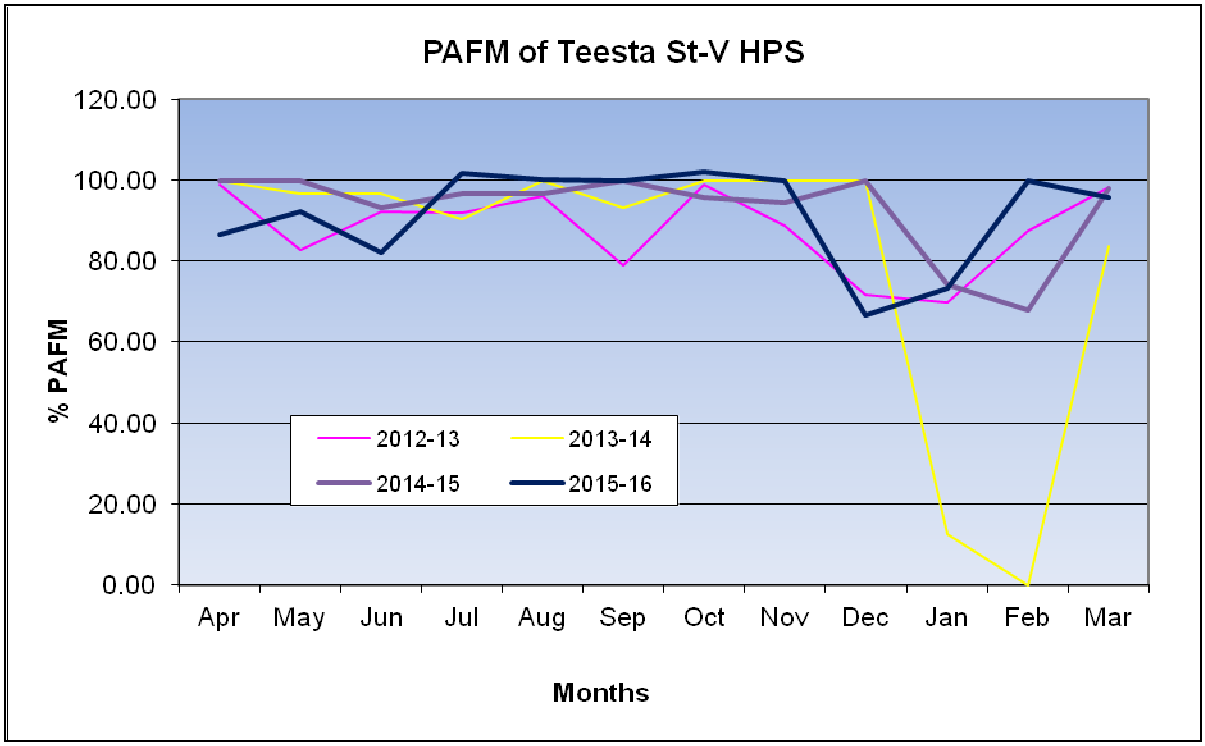


	FKK-St-I&II	KHG-St-I	KHG-St-II	TAL-St-I	FKK-St-III	BARH
2013-14	9673	5135	8292	6734	2732	
2014-15	9476	5421	9050	6922	2990	1291
2015-16	8771	5011	9196	7252	2702	4128

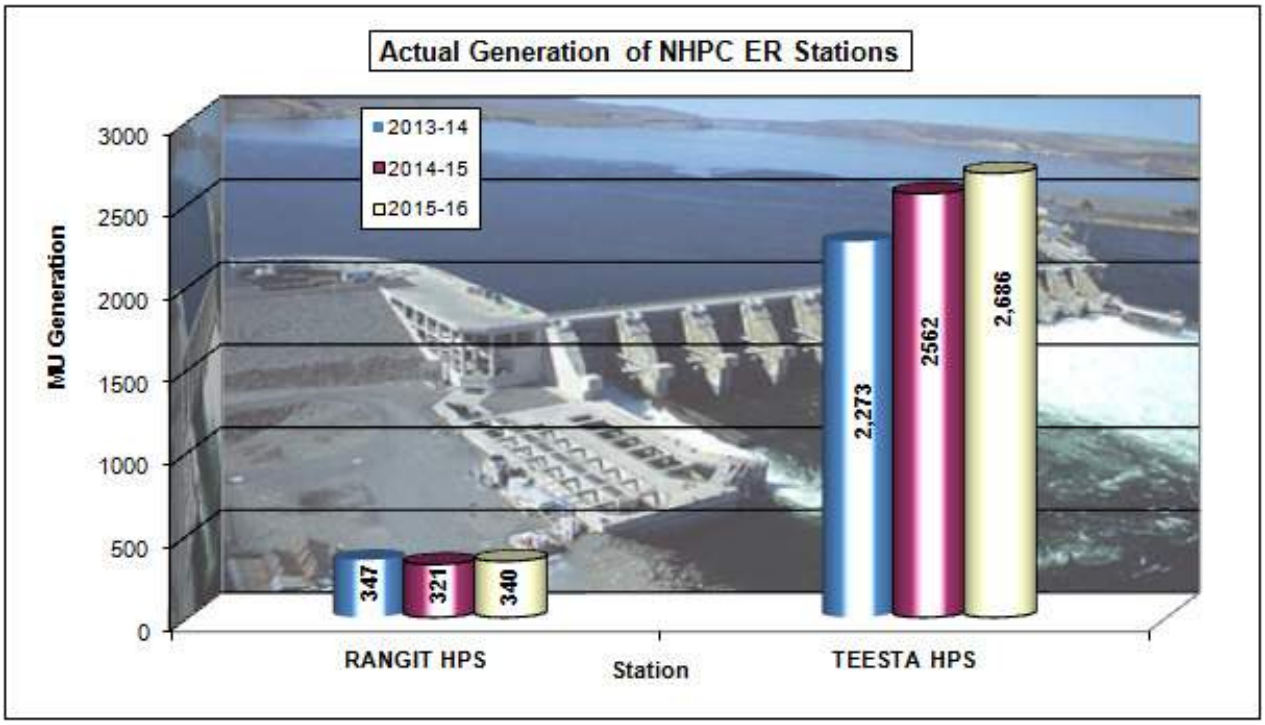
Performance of NHPC stations in ER:

The month wise Plant Availability Factor (PAF) for NHPC stations in Eastern Region is shown below:





The year on year Actual Generation of NHPC ER Hydro Stations are as under:



4.2 TRANSMISSION CHARGE

4.2.1 Long Term Transmission Charges:

From July, 2011 onwards the transmission charges of the beneficiaries is calculated based on CERC (Sharing of Inter State Transmission Charges & Losses), Regulations, 2010. This has brought a new paradigm change in the transmission sector of the country and attempts to make transmission charges sensitive to distance, direction and use.

The objective of the new regulations is to remove pan caking in transmission charges. The new methodology uses load flow studies and point of connection charging method so as to get one injection PoC charge rate and one drawl PoC charge rate for each 400 KV nodes considering the Indian Power system as a whole and does away with the Regional Postal Stamp method used earlier. The above rates are reviewed/revised and approved on quarterly basis the central Commission and applicable rates as on 31.03.2016 is given at **Annexure - XIV**

The usage of lines by the nodes is calculated based on Hybrid method, which combines Marginal participation and Average Participation approaches. The electrically and physically proximate nodes are then combined to get one injection PoC rate and one drawl PoC rate for each state.

It is expected that the new system would provide signals for generators and bulk consumers and transmission licensees to create infrastructure in profitable locations.

Regional Transmission Accounts is being prepared by ERPC Secretariat based on the new methodology and data furnished by NLDC, which is also the Implementing Agency for these new regulations.

4.2.2 Transmission Charges for Short Term transactions:

In case of bilateral and collective transactions, transmission charges for the energy approved for transmission separately for each point of injection and for each point of drawal, shall be payable in accordance with the provisions of Central Electricity Regulatory Commission (Sharing of Inter State Transmission Charges and Losses) Regulations, 2010 and as amended from time to time.

The intra-State entities shall pay the transmission charges for use of the State network as fixed by the respective State Commission in addition to the charges specified under clauses (1) of this regulation. Where the State Commission has not determined the transmission charges, the charges for use of respective State network shall be payable at the rate of Rs.80/MWh for the energy approved.

4.3 COLLECTION & DISBURSEMENT OF SHORT TERM TRANSMISSION CHARGES:

The Transmission charges and the operating charges payable by the persons allowed short-term open access shall be indicated by nodal agency while approving the Open Access. The

Transmission charges payable for Inter-State Transmission system and Transmission Charges for State network shall be indicated separately. The Transmission Charges and the Operating Charges shall be collected by the nodal agency except for transmission charges for State network in the case of collective transaction.

The transmission charges collected by the nodal agency for use of the transmission system other than State network, for a bilateral or collective transaction for each point of injection and each point of drawl shall be given to Central Transmission Utility (CTU) for disbursement. The CTU shall disburse these transmission charges to the long-term customers of the synchronously connected grid where the point of injection or point of drawal is situated, as the case may be, in proportion to the monthly transmission charges payable by them after making adjustments against Long-term Access to target region in accordance with the Central Electricity Regulatory Commission (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2010 as amended from time to time. The transmission charges for use of State network shall be disbursed to the State Transmission Utility concerned.

4.4 OPEN ACCESS AND BILATERAL POWER TRANSACTION

4.4.1. Bilateral Trading 2015-16

Short term transactions are governed by "Central Electricity Regulatory Commission (Open Access in inter-State Transmission) Regulations, 2008" as amended from time to time for exchange of energy (MWh) between a specified buyer and a specified seller, directly or through a trading licensee or discovered at power exchange through anonymous bidding.

Trading of power in line with the CERC regulations on Short Term Open Access in transmission system started in Eastern Region with effect from 06.05.2004, and over the years the volume of bilateral trade has seen continuous increase. The number of traders and utilities indulging in bilateral trade and collective transactions through the IEX and PXI has also seen healthy growth. The indicative volume of trade in Eastern Region during 2015-16 by various traders is provided in Table below:

TRADERS/LTOA/MTOA	EXPORT	IMPORT	TOTAL
PTC	2659.15	2397.25	5056.41
NVVNL	523.45	296.94	820.39
TPTCL	2111.21	62.24	2173.46
Aarti Steel Limited_Punjab	48.43	0.00	48.43
ACCIL	2.84	0.00	2.84
ACR ALLAHABAD	26.31	0.00	26.31
AEL	0.00	2045.38	2045.38
APDCL	165.36	0.00	165.36
APPCPL	0.00	118.40	118.40
Arvind Cotspin	2.64	0.00	2.64
BALCO	6.40	0.00	6.40

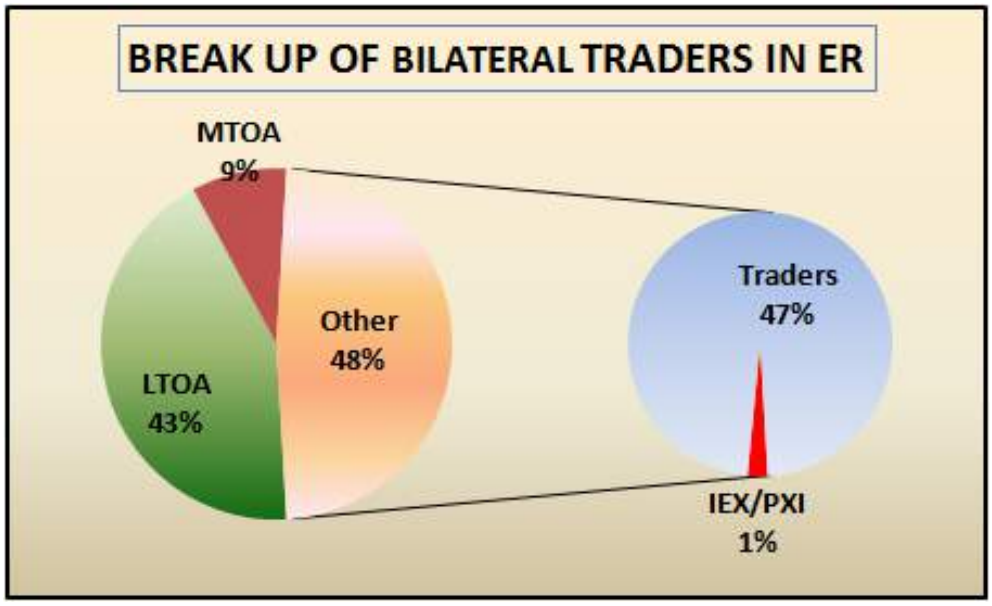
BSPHCL	0.00	31.48	31.48
Century Enka Ltd.	14.26	0.00	14.26
Century Rayon	10.49	0.00	10.49
CESC	0.00	1.11	1.11
CHPL	0.80	0.00	0.80
DVC	87.30	0.00	87.30
FBML	0.01	0.00	0.01
GETL	3.00	0.00	3.00
GMR KEL	1683.77	0.00	1683.77
GMRETL	1100.06	55.10	1155.16
HIL MOUDA NAGPUR	15.15	0.00	15.15
Hindalco Industries Ltd.	4.27	0.00	4.27
IAML	0.97	0.00	0.97
IEEL	6.61	4.20	10.81
IEX	132.12	121.30	253.42
JSWPTCL	0.68	42.83	43.50
Kisan Moulding Ltd	1.84	0.00	1.84
KISPL	2.69	0.00	2.69
JITPL	340.50	0.00	340.50
II&PL	9.22	0.00	9.22
JUVNL	0.00	1168.21	1168.21
JSL	26.29	0.00	26.29
LTOA	15567.34	165.21	15732.55
TALCHER	16.15	0.00	16.15
MANIKARAN PL	247.07	0.00	247.07
MITTAL	1.10	0.00	1.10
MPL	13.94	0.00	13.94
MPPL	18.89	6.52	25.41
MTOA	2553.80	650.03	3203.83
NCR ALLAHABAD	199.94	0.00	199.94
GMR (Direct)	3.07	0.00	3.07
NPC	11.53	0.00	11.53
OCL	14.48	0.00	14.48
PMSPL	27.01	0.00	27.01
PXIL	149.61	28.50	178.12
RPTCL	15.33	0.67	16.00
SAILRSP	0.00	47.34	47.34
SHREE CEMENT KTD	117.43	0.00	117.43
SDD	2.84	0.00	2.84
SECI	0.00	81.44	81.44
SEL	832.70	0.00	832.70
Senere PPL	7.11	0.00	7.11
SS MILL LTD	5.83	0.00	5.83

Sterlite Technologies Ltd.	123.35	0.00	123.35
STL SHENDRA MSEB	1.24	0.00	1.24
SURYAAMBA S M L NAGPUR	2.01	0.00	2.01
Tata Steel Limited	68.57	0.00	68.57
TPTL	133.23	4.17	137.40
TSFAP	85.13	0.00	85.13
VEDANTA LTD	5.91	0.00	5.91
WBSEDCL	7.92	0.00	7.92
TOTAL	**29218.35**	**7328.31**	**36546.67**

The bilateral transactions consist of long term, medium term and short term trades through traders, direct or via IEX/PXI. The participants in the short term market trade electricity to meet short term demand or surplus situation or peaks requirement. It is also helpful in evacuation of generators for which LTA have not yet operationalized due to various constraints.

While short term market helps in balancing the energy pool by making small adjustments, it suffers from lack of assured access in case of congestion and depleted network scenario.

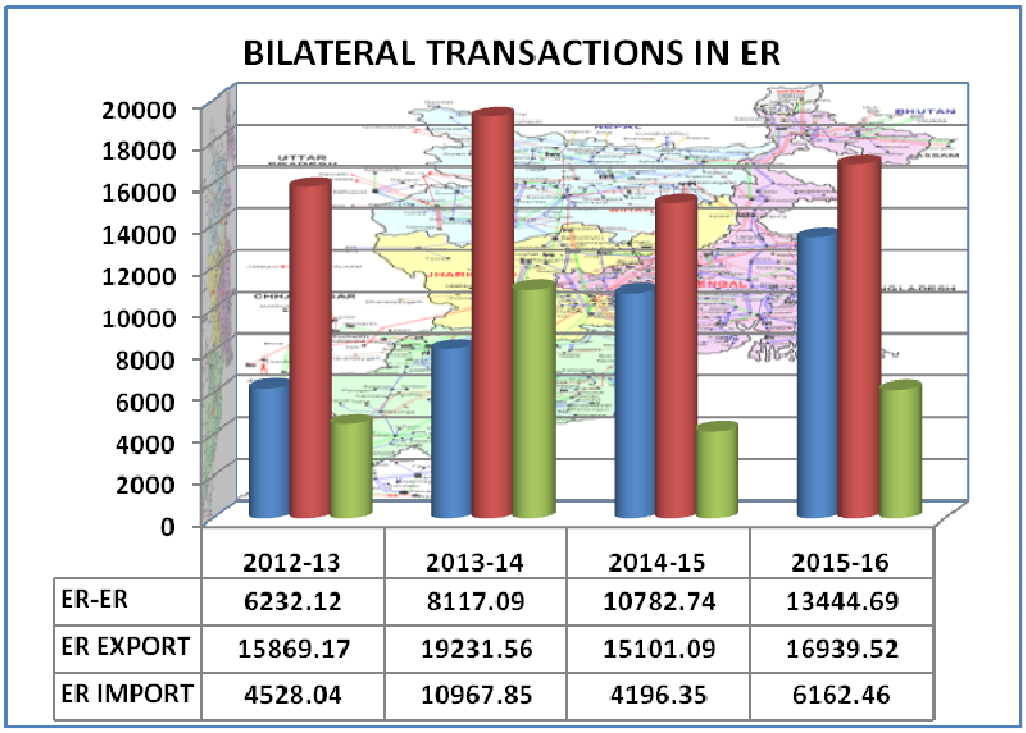
The breakup of bilateral trades in LTOA, MTOA, IEX/PXI, Direct and via Traders in Eastern Region is provided in the following Pie-Chart.



Figures in MU

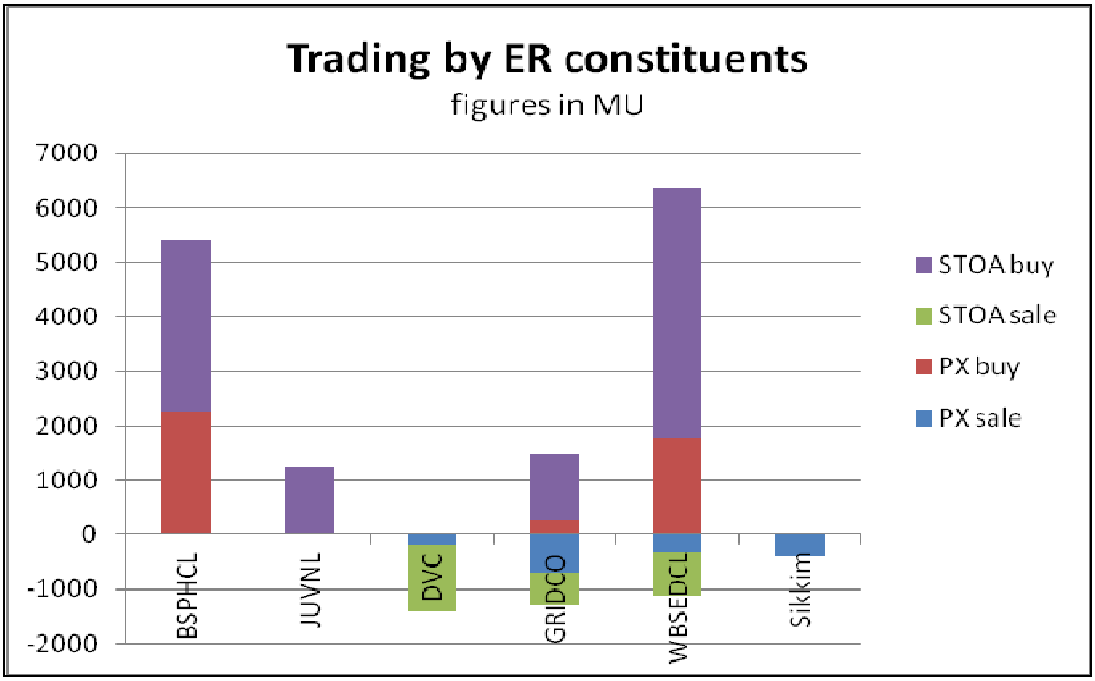
Long Term & Medium Term		Short Term Bilateral Transactions	
LTOA	**MTOA**	**IEX/PXI**	**Traders**
15732.55	**3203.83**	**431.54**	**17178.75**

During 2015-16, scheduled bilateral transaction of power through ER was to the tune of **36546.7** MU. The breakup of year on year scheduled bilateral transactions has been indicated below for 2012-13, 2013-14, 2014-15 & 2015-16:



	2012-13	2013-14	2014-15	2015-16
ER-ER	6232.12	8117.09	10782.74	13444.69
ER EXPORT	15869.17	19231.56	15101.09	16939.52
ER IMPORT	4528.04	10967.85	4196.35	6162.46

During the year substantial amount of transaction took place through IEX/PXI by means of anonymous bidding. Participation of ER states in short term bilateral and anonymous power transaction through exchange for 2015-16 was as follows:



4.4.2 International Trades 2015-16

4.4.2.1 Trading of Power with Bangladesh:

Based on MoU between the two countries, MoP, Govt. of India decided to allocate 250 MW power round the clock (in Stages) from coal based NTPC stations in the country to Bangladesh. NTPC Vidyut Vyapar Nigam Ltd. (NVVN) as nodal agency has entered into a Power Purchase Agreement (PPA) with Bangladesh counterpart (BPDB) for cross border trading of power and to facilitate delivery of such power. Accordingly, export of power from India (through 400 kV Behrampur (West Bengal) – Bheramara (Bangladesh) D/C line and 500 MW HVDC back-to-back at Bheramara) to Bangladesh through BPDB commenced from 05.10.2013. Presently, 250 MW power from NTPC Stations (out of which 50 MW from Eastern Region stations) is being exported to Bangladesh with effect from 04.12.2013. The energy exported (scheduled) to Bangladesh during 2015-16 was to the tune of 370.37 MU from Eastern Region NTPC Stations.

Further, West Bengal exported power to Bangladesh through NVVN BPDB to the tune of 1891 MU on medium term open access (MTOA) basis in 2015-16.

4.4.2.2 Trading of power with Bhutan:

Over and above the availability of power from NTPC and NHPC stations in ER, the region has imported power from Govt. of Bhutan through PTC as below:

	2012-13 (MU)	2013-14 (MU)	2014-15 (MU)	2015-16 (MU)
Chukha HPS (Receipt at Birpara)	**1563.67**	**1813.12**	**1628.75**	**1729.2**
Kurichhu HPS	**122.488**	**146.23**	**59.88**	**101.3**
Tala HPS	**3100.11**	**3619.38**	**3278.89**	**3319.1**
Daghachu				**270.8**

Additionally, 335.19 MU was traded by TPTCL from Dagachu HPS in Bhutan which is also under Deviation settlement mechanism.

4.4.2.3 Trading of power with Nepal:

Power was scheduled on short term trading basis to Nepal to the tune of 73.13 MU. Power was traded through mainly NVVN.

4.5 LONG TERM AND MEDIUM TERM ACCESS

Long term transactions are governed by "Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009" on 07.08.2009.

The LTA to / from Eastern Region informed by NLDC during 2013-14 is provided in Table below (except CGS):

LTA Status as on March, 2016

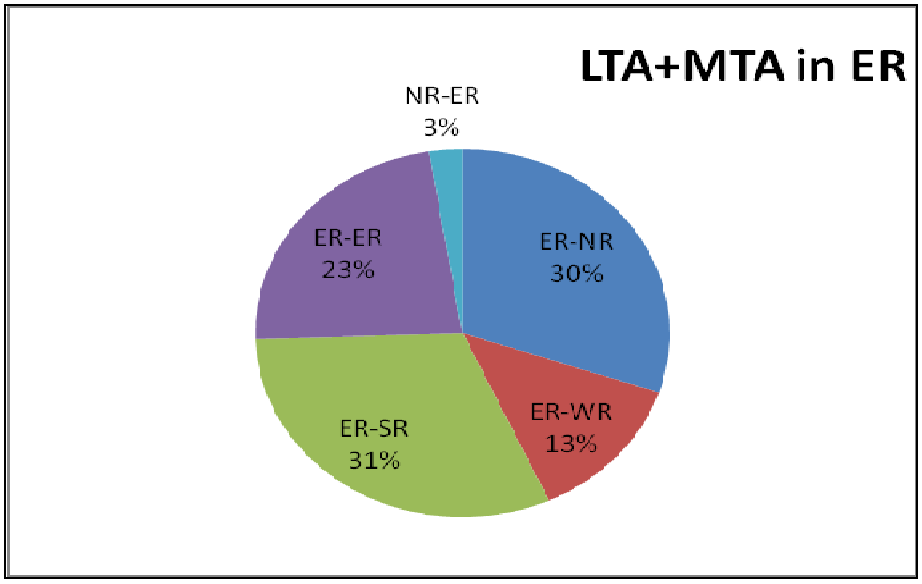
S. No.	Name of LTA Customer (Injecting utility)	Generator/Load/ Trader	Region	Quantum of LTA granted	Name of the beneficiaries	Region To
1	DVC Power	Load	ER	100	BRPL	NR
2	DVC Power	Load	ER	31	BRPL	NR
3	DVC Mejia U#7	Load	ER	119.19	BYPL	NR
4	DVC Mejia U#8	Load	ER	119.19	BYPL	NR
5	DVC Power	Load	ER	63	BYPL	NR
6	DVC Power	Load	ER	19	BYPL	NR
7	DVC Durgapur U#2	Generator	ER	100	PSPCL	NR
8	DVC Koderma U#1	Generator	ER	50	Haryana	NR
9	DVC (DVC Mejia U#7)	Load	ER	12.5	DVC	ER
10	DVC (DVC Mejia U#8)	Load	ER	12.5	DVC	ER
11	DVC (MPL U#1)	Load	ER	140.5	DVC	ER
12	DVC (MPL U#2)	Load	ER	140.5	DVC	ER
13	DVC Mejia U#7	Load	ER	50	Haryana	NR
14	DVC Mejia U#8	Load	ER	50	Haryana	NR
15	DVC Power	Trader	ER	500	MP	WR
16	DVC Power	Load	ER	67	NDPL	NR
17	MPL U#1	Load	ER	140.5	NDPL	NR
18	NDPL (MPL U#2)	Load	ER	140.5	NDPL	NR
19	DVC Power	Load	ER	20	NDPL	NR
20	DVC Durgapur U#1	Load	ER	100	PSPCL	NR
21	MPL U #1&2	Load	ER	140.5	WBSEDCL	ER
22	MPL U#1	Load	ER	70	WBSEDCL	ER
23	MPL U#2	Load	ER	70	WBSEDCL	ER
24	Adhunik Power & Natural Resources Ltd	Generator	ER	100	WBSEDCL	ER

25	DVC, Mejia B	Load	ER	100	Tata Steel	ER
26	DVC, DSTPS	Load	ER	100	Tata Steel	ER
27	Ind-Barath Energy (Utkal) Ltd, Odisha	Generator	ER	500	TANGEDCO, TN	SR
28	Maithon Power Ltd-RBTPP	Load	ER	140.5	KSEB	SR
29	Mejia 7&8, DVC	Load	ER	200	BESCOM, Kar	SR
30	Adhunik Power & Natural Resources Ltd	Generator	ER	100	TANGEDCO, TN	SR
31	DVC Koderma	Load	ER	250	BESCOM, Kar	SR
32	Mejia 7&8-DVC	Load	ER	18.85	KSEB	SR

MTA Status as on March, 2016

S.No	From	To	Region	Quantum	Date
1	WBSEDCL	Bangladesh	International	250	31.07.2016
2	SPDC, Jammu & Kashmir	West Bengal	NR	100	30.06.2018

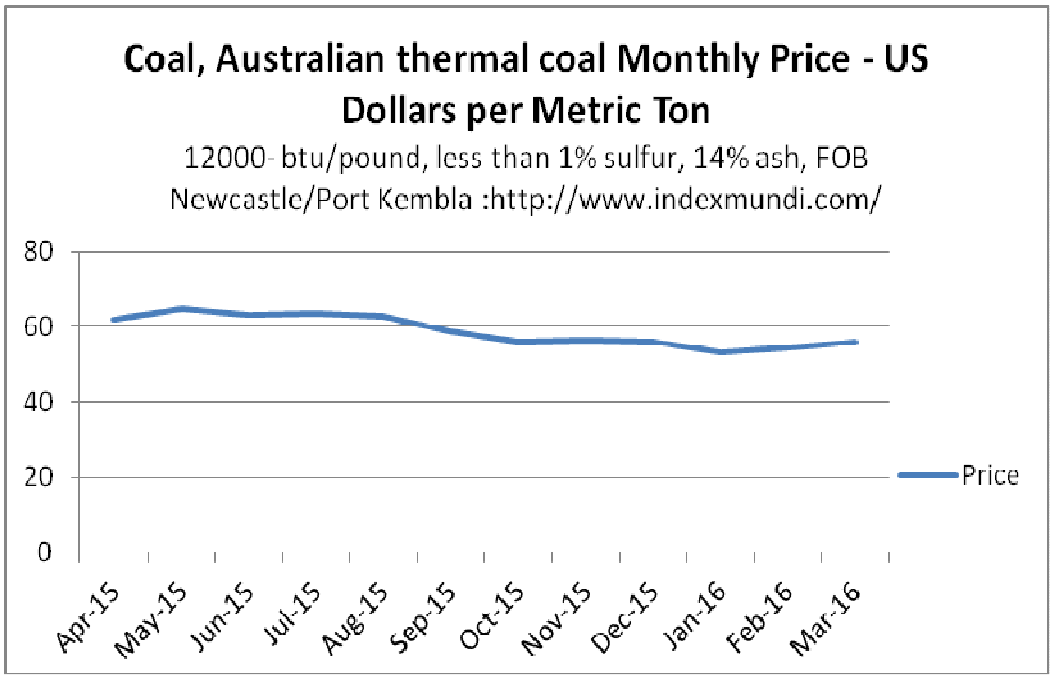
The breakup of approved LTOA and MTOA transactions in ER is illustrated in the pie chart below.

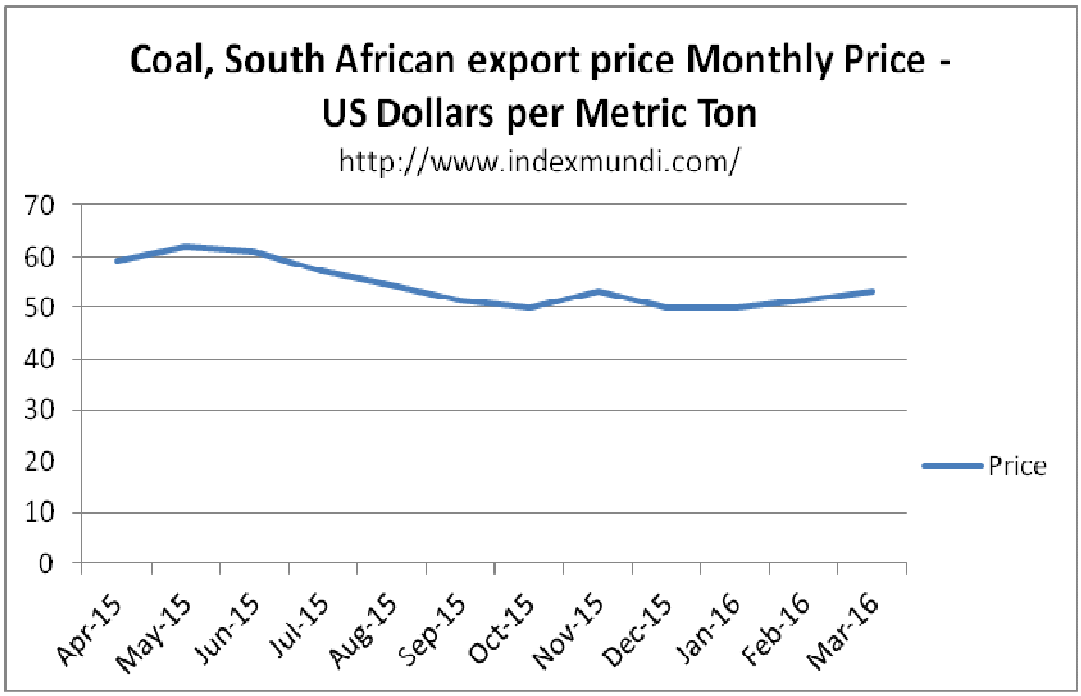


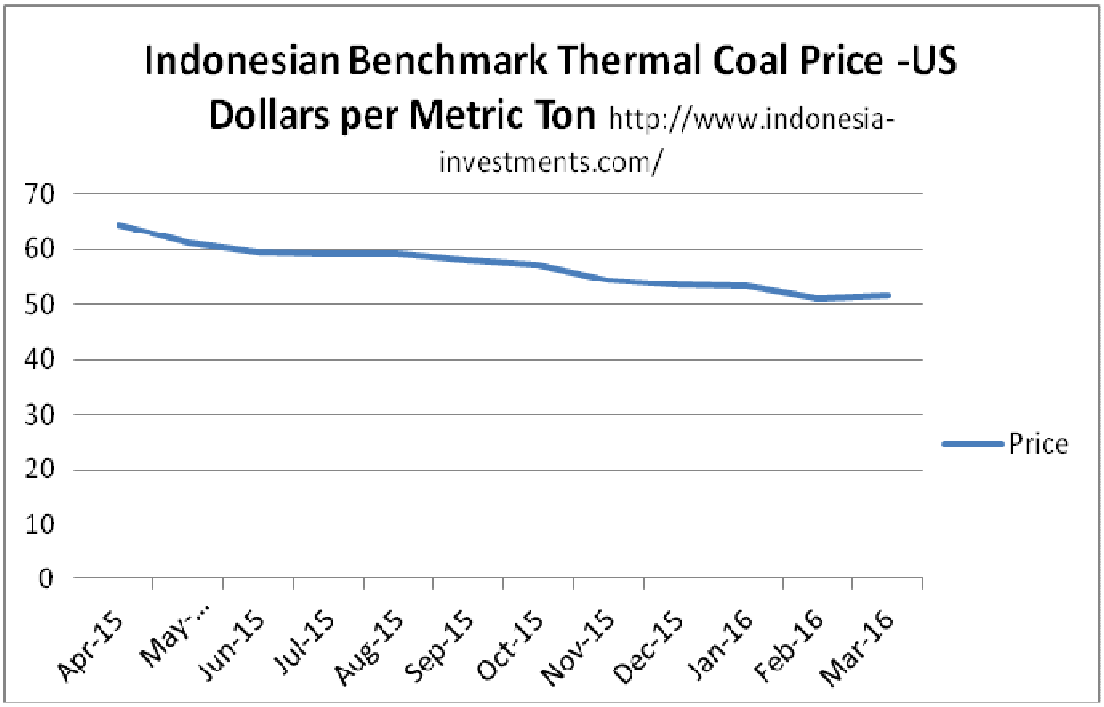
ER-NR	ER-WR	ER-SR	ER-ER	NR-ER
1169.38 MW	500 MW	1209.35 MW	886.50 MW	100 MW

4.6 INPUT COSTS- COAL PRICE IN INTERNATIONAL MARKETS

Since cost of coal is one of the single largest inputs in power generation and as imported coal is playing a significant role now, the price of coal in some international markets is shown below:







4.7 COMMERCIAL DECLARATION OF NEW GENERATING STATIONS OF ER

The following new generating stations in ER were declared under commercial operation during the year 2015-16.

State	Agency	Name of Power Station	Type	Unit No	Capacity (MW)	Date of COD
Sikkim	IPP	JLHEP	Hydro	2	48	26-Sep-15
Sikkim	IPP	JLHEP	Hydro	2	48	1-Oct-15
Bihar	NTPC	BARH II	Thermal	5	660	18-Feb-16
West Bengal	NHPC (W.B.)	TLDP- IV	Hydro	1	40	11-Mar-16
West Bengal	DVC	Raghunathpur	Thermal	1	600	31-Mar-16
West Bengal	DVC	Raghunathpur	Thermal	2	600	31-Mar-16
West Bengal	NHPC (W.B.)	TLDP- IV	Hydro	2	40	31-Mar-16

4.8 SOLAR POWER GENERATION IN THE REGION

The renewable sources of electricity have zero marginal cost and are must run in nature. The development of Solar Power generation in India has been initiated for quite some time. The development of solar power generation process confronts several barriers like financial, investment, technology, institutional and other incidental factors. To overcome these barriers substantial support is required for development of solar power generation. Foremost among them is the relatively high cost of solar generation. Several options were explored to give incentive to the cost of solar power and the option of "bundling" solar power with the power out of the cheaper unallocated quota of Central Coal based Stations and selling this bundled power to state distribution utilities at the CERC regulated price was decided.

In order to facilitate grid connected solar power generation in the first phase, the Mission provides for NTPC Vidyut Vyapar Nigam (NVVN) to be the designated Nodal Agency for procuring the solar power by entering into a Power Purchase Agreement(PPA) with Solar Power Generation Project Developers who will be setting up Solar Projects during the next three years, i.e. Before March 2013 and are connected to a grid at a voltage level of 33 kV and above. For each MW of installed capacity of solar power for which a PPA is signed by NVVN, the Ministry of Power (MoP) shall allocate to NVVN an equivalent amount of MW capacity from the unallocated quota of NTPC coal based stations and NVVN will supply this "bundled" power to the Distribution Utilities.

Solar power bundling implemented in ER at present:

1) Ministry of Power (GoI) has allocated 5 MW of power to Odisha from the un-allocated power of coal based NTPC power stations in Eastern Region for bundling with the power from 5 MW solar PV power project of M/s Aftaab Solar in Odisha [under JNNSM scheme (Phase-I)]. The same has been made effective from 01.05.2012 in the Regional Energy Accounts (REA) of ER.

2) Ministry of Power (GoI) has allocated 5 MW of power to GRIDCO from the un-allocated power of coal based NTPC power stations in Eastern Region for pooling with the power from 5 MW Dadri solar power project of NTPC. The same has been made effective in the Regional Energy Accounts (REA) of ER with effect from 00:00 hrs. of 30.03.2013.

3) Ministry of Power (GoI) has allocated un-allocated power of NTPC stations in ER for bundling with 65 MW of solar power from Rajasthan with effect from 00:00 hrs. of 16.08.2013 in favour of Gridco : 10 MW; West Bengal : 35 MW; DVC : 15 MW; and Assam : 5.

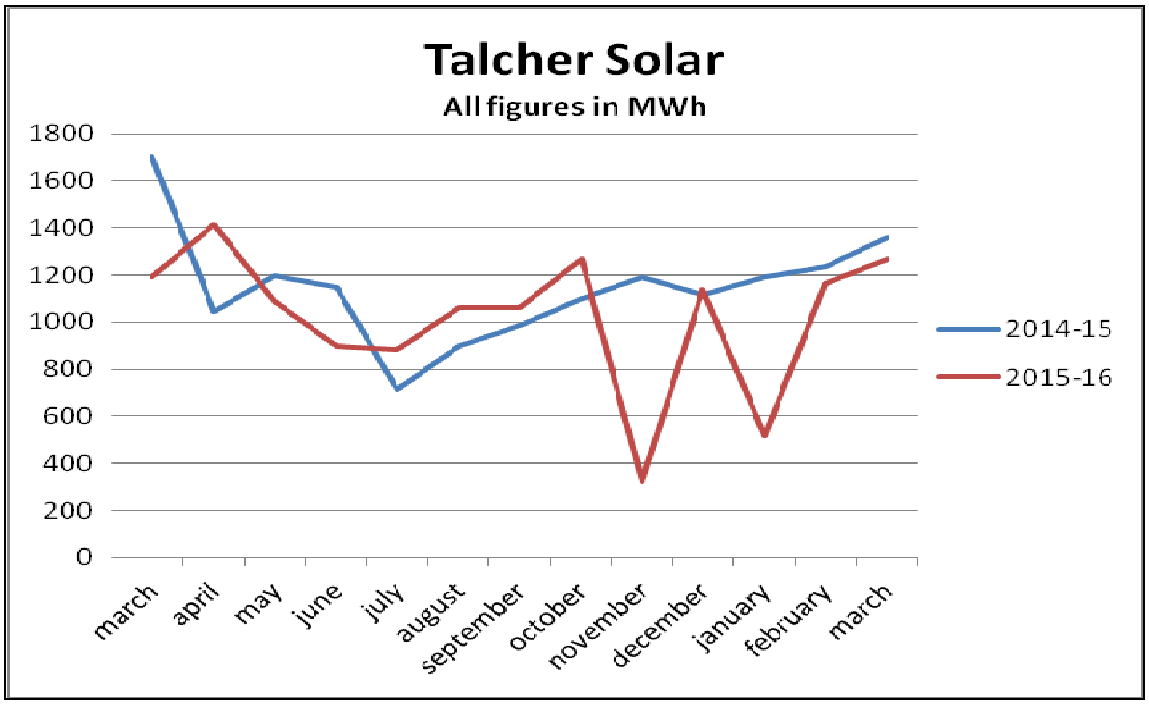
4) Ministry of Power (GoI) has allocated 5 MW of power to DVC from the un-allocated power ofcoal based NTPC power stations in Eastern Region for bundling with the power from 5 MW Talcher solar power project of NTPC. The same has been made effective in the Regional Energy Accounts (REA) of ER with effect from 00:00 hrs. of 28.03.2014.

5) Ministry of Power (GoI) has allocated 10 MW of power to DVC from the un-allocated power of coal based NTPC power stations in Eastern Region for bundling with the power from Unchahar solar power project of NTPC. The same has been made effective in the Regional Energy Accounts (REA) of ER with effect from 00:00 hrs. of 31.03.2014.

6) Ministry of Power (GoI) has allocated 5 MW of power to Gridco from the un-allocated power of coal based NTPC power stations in Eastern Region for bundling with the power from Faridabad solar power project of NTPC. The same has been made effective in the Regional Energy Accounts (REA) of ER with effect from 00:00 hrs. of 31.03.2014.

7) 25 MW of Solar Power from Rajasthan (M/s Sun Technique Solar Pvt. Ltd.) under the scheme of JNNSM Phase – I was allocated to West Bengal-15 MW, Odisha-5 MW, DVC-5 MW which which have been implemented w.e.f. 00:00 Hrs. of 05.12.2014.

8) Total generation from Talcher Solar Station of NTPC for 2015-16 is 13283 MWh



4.9 FUNDS TRANSFERRED TO POWER SYSTEM DEVELOPMENT FUND FROM EASTERN REGION

The Power System Development Fund (PSDF) Regulations were notified by CERC on 04.06.2010. As per this regulation the following funds are transferred to the PSDF:

1. Congestion charges standing to the credit of the "Congestion Charge Account" after release of amounts payable to Regional Entities entitled to receive congestion charge along with interest, if any, in accordance with the Central Electricity Regulatory Commission (Measures to relieve congestion in real time operation) Regulations, 2009 as amended from time to time;
2. Congestion amount arising from the difference in the market prices of different regions as a consequence of market splitting in power exchanges in accordance with Central Electricity Regulatory Commission (Power Market) Regulations, 2010.

3. Unscheduled Interchange charges standing to the credit of the "Unscheduled Interchange Pool Account Fund" after final settlement of claims of Unscheduled Interchange Charges in accordance with the Central Electricity Regulatory Commission (Unscheduled Interchange Charges and related matters) Regulations, 2009 as amended from time to time;

4. RLDC reactive energy charges standing to the credit of Reactive Energy Charges Account;

5. Such other charges as may be notified by the Commission from time to time

The total funds transferred to PSDF from Eastern Region upto 31.03.2016 was around Rs 864.64 Crores.

4.10 ANCILLARY SERVICES

Power systems require ancillary services to maintain reliability and support their primary function of delivering energy to customers. Ancillary services are principally real-power generator control capacity services the system operator uses over various time frames to maintain the required instantaneous and continuous balance between aggregate generations and load. Ancillary Services consist of services required for:

a) Maintaining load – generation balance (frequency control)
b) Maintaining voltage and reactive power support
c) Maintaining generation and transmission reserves

Renewable energy generation is variable in nature (diurnal & seasonal) and implementation of ancillary services would facilitate integration of renewable energy generation in the country. Ancillary services will certainly help in controlling the variability of renewable generation.

4.10.1 Primary Control

Continuous load changes result in mismatch of generation and load leading to variation in frequency of interconnected power system. Governors free to operate would enable smooth control of frequency fluctuations as well as security against grid disturbances. Time frame for primary governor control action is about a few seconds i.e. 2- 5 seconds.

4.10.2 Secondary Control

If the load generation imbalance caused by an outage of large generator or load causing sudden variation in frequency of interconnected power system, primary response through governor action described above would help arrest the change fall in frequency. However, the frequency has to be brought back to 50 Hz through corrective action taken by the Control Area within which the generation or load is affected. Supplementary corrective action or secondary control has to be taken to bring frequency back to 50 Hz. For large interconnection system this automatic secondary control is known as Automatic Generation Control (AGC). Time line of secondary control action is a few minutes.

4.10.3 Tertiary Control

Loss of large generator (or load) may cause a large enough system excursion that cannot be handled by regulatory reserve alone. The above secondary control reserves also needs to be restored through tertiary reserves. Tertiary reserve provides significant insurance against wide spread outages.

The ancillary services are a potent tool in the hands of the system operator. The Central Commission is actively considering bringing in regulation to implement full fleged ancillary services in the country.

4.11 UNSCHEDULED INTERCHANGE CHARGE / DEVIATION CHARGE

4.11.1 Introduction

Unscheduled Interchange (UI) charge is the backbone of Availability Based Tariff (ABT) mechanism. It acts like a financial barometer, which measures a licensee's responsiveness towards healthiness of the regional grid. It also provides a settlement mechanism for intra-day power transfer from licensees with surpluses to licensees experiencing deficit. The UI mechanism has established a real time balancing market that is workably competitive and provides a powerful force for efficiency and innovation.

In ABT tariff system apart from Capacity (Fixed) charges and Energy charges the third important component is Unscheduled Interchange charges .It is the payment for deviations from schedule at a rate dependent on system conditions (Frequency) at that time. The deviation from schedule is technically termed as Unscheduled Interchange (UI) in ABT terminology.

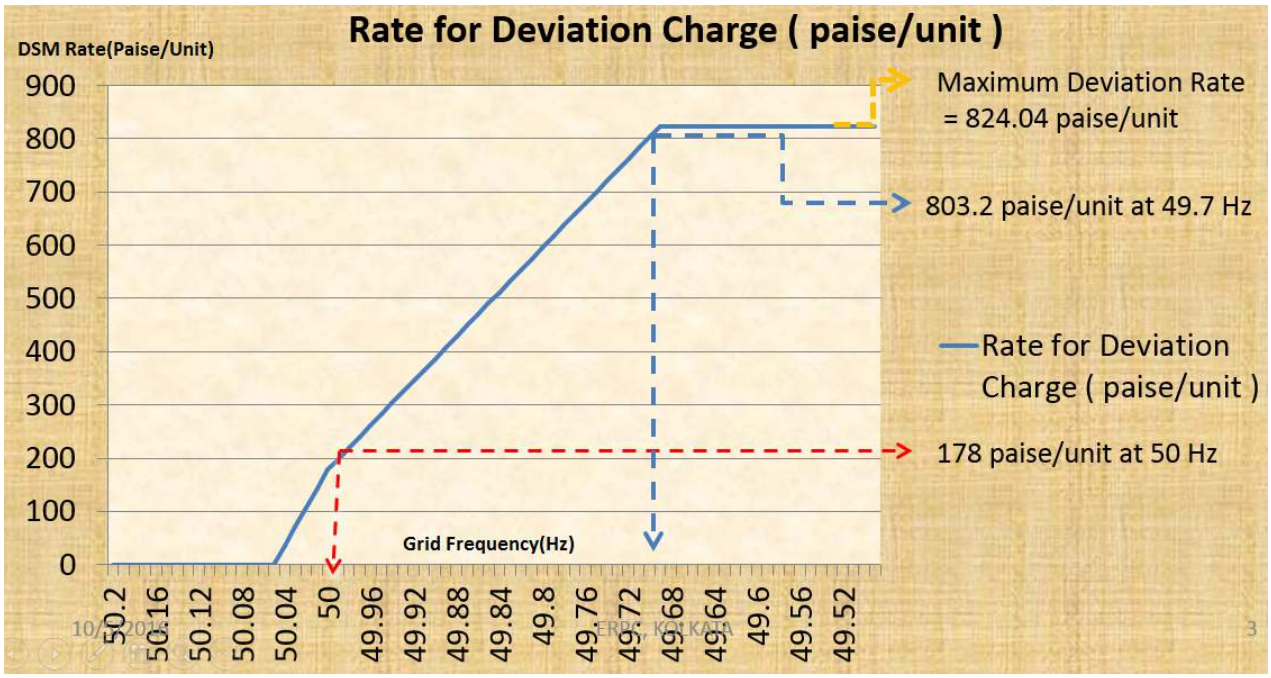
For a generator, UI is the difference between Actual generation (ex-bus) and Schedule generation (ex-bus), whereas for a beneficiary, it is equal to Actual drawl (periphery) and Schedule drawl (periphery). UI charge is obtained by multiplying the UI energy with UI rate. UI rate is a frequency dependent energy rate notified by Central Electricity Regulatory Commission. A constituent may receive/pay UI charge depending on whether it has assisted/undermined the grid frequency.

CERC vide its notification no No.L-1/132/2013/CERC dated 06.01.14 directed for implementation of Deviation **Settlement Mechanism** w.e.f 17.02.2014 in place of UI regulations. With the implementation of this regulation, the UI regulation stood repealed.

4.11.2 Rates for Deviation Charge with effect from 17.02.2014 are as under:-

The UI rate is a frequency-actuated signal available at any wall socket. Every utility reacts to this signal in real time and adjusts its generation/ demand and a new equilibrium is achieved. The UI curve by virtue of its design empowers every utility that has some means to regulate supply/demand to readjust its interchange with the grid and gain from the migration of frequency/UI rate from the earlier level. The decreasing marginal returns with every additional unit of deviation from the scheduled interchange acts as a counterweight, which forces the utility to seriously weigh the consequences of its actions.

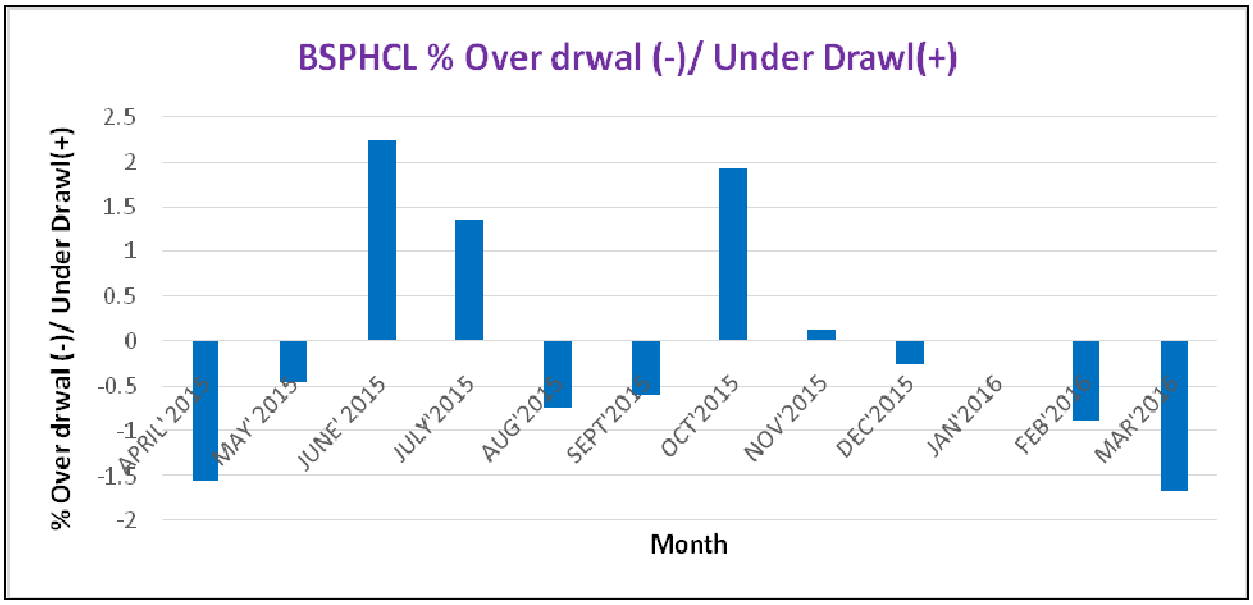
Average frequency of time block	Rate for Deviation charge (Paise per kWh)
50.05 Hz and above	0
Below 50.05 Hz and upto 50.00 Hz	35.6
Below 50.01 Hz and upto 50 Hz	178
Between 50.05 Hz and upto 50 Hz	Linear in 0.01Hz step (each 0.01Hz step is equivalent to 35.6 paise/kwh within this range
Below 50 Hz and upto 49.99 Hz	198.84
Below 49.71 Hz and upto 49.7 Hz	803.2
Between 50 Hz and upto 49.7 Hz	Linear in 0.01Hz step (each 0.01Hz step is equivalent to 20.84paise/kwh within this range
Below 49.70 Hz	824.04

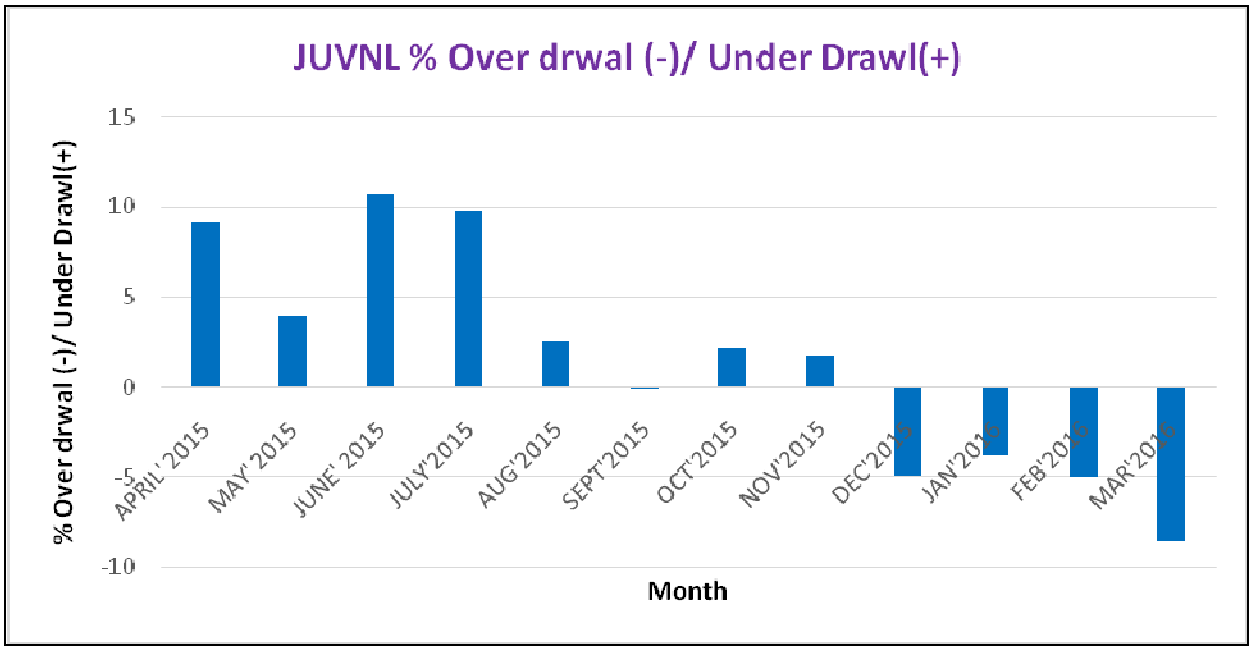


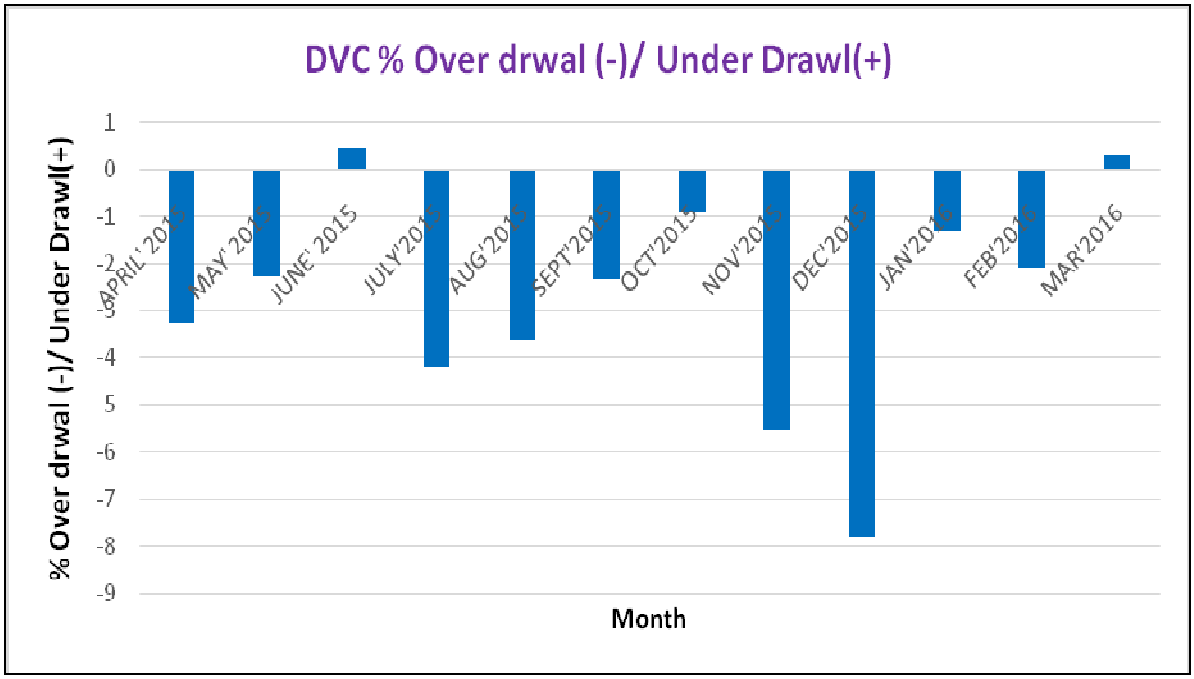
4.11.3 Performance of the constituents:

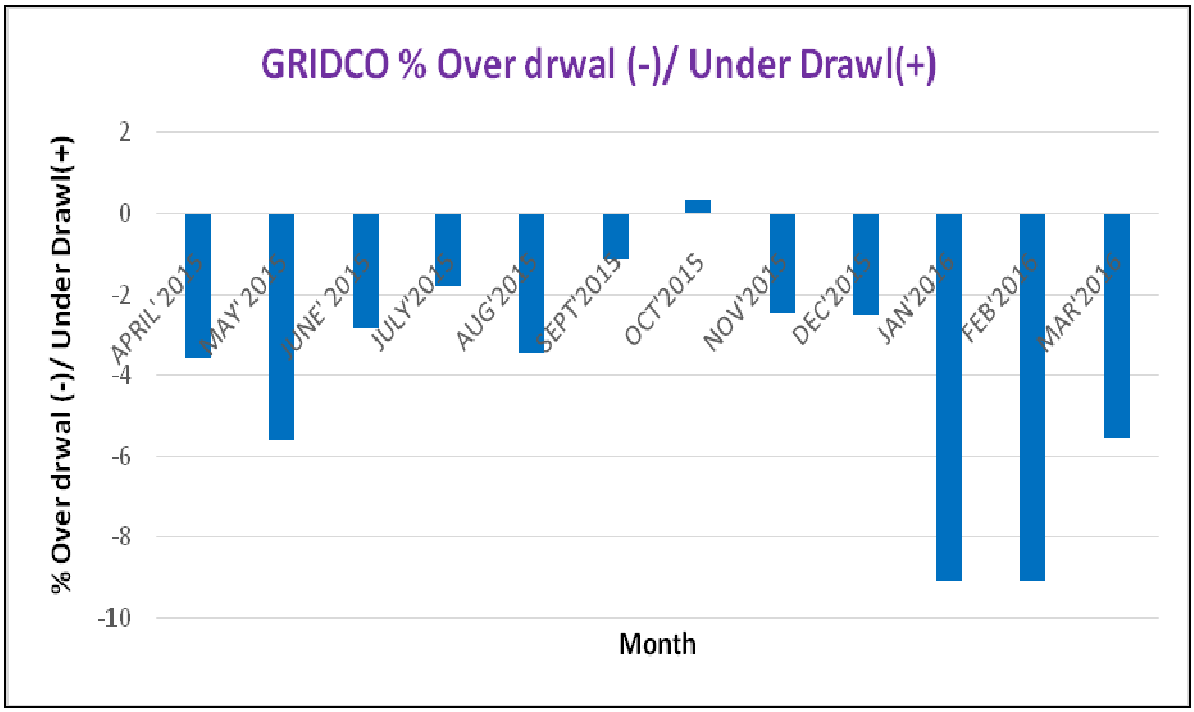
During the financial year 2015-16, the total UI/Deviation Amount payable by Eastern Region to other regions is **Rs 223.3 Crores**. Northern Region has total receivable UI/Deviation Charge amount of **Rs 1053.4** Crores from Eastern Region and Eastern Region has received UI/Deviation Charge amount of Rs **16.28 Crores** from North Eastern Region **Rs.530.5** Crores from Western

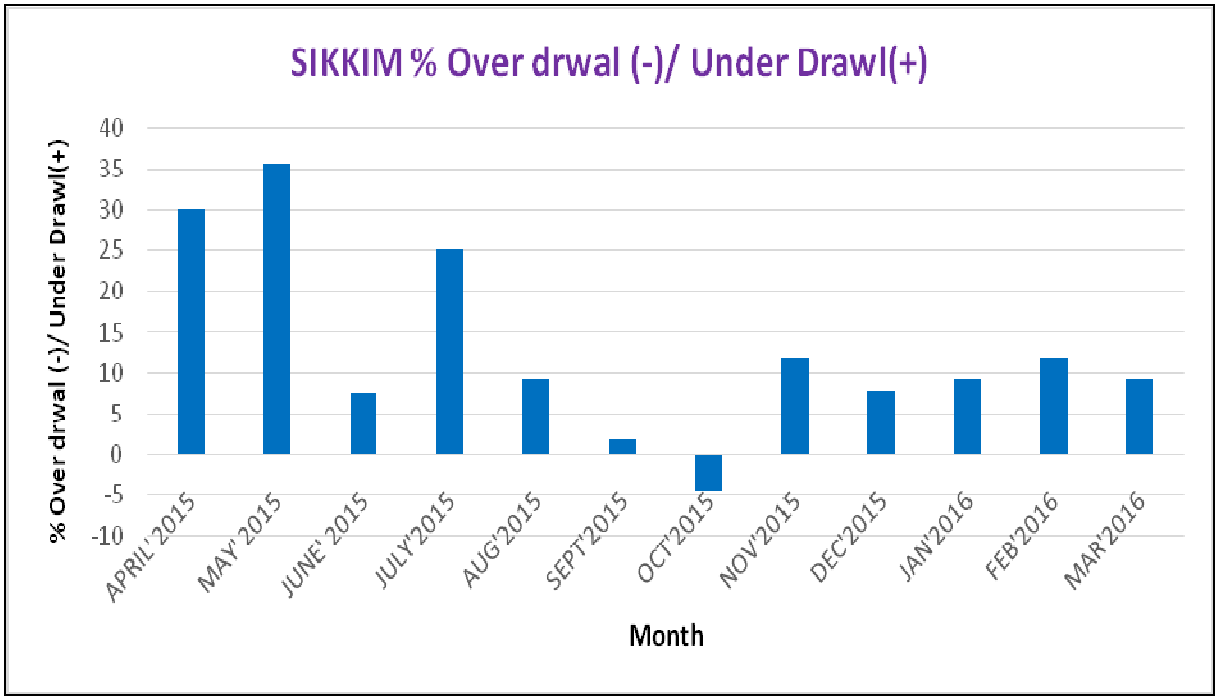
Region and **283.2** Crores from Southern Region respectively. Among the constituents of Eastern Region, maximum UI/Deviation Charge has been received by BARH (NTPC) amounting to Rs **28.56** Crores and maximum UI/Deviation Charge has been paid by BSPTCL i.e., Rs.**103.54** Crores Details of Schedule Drawal/Generation, Actual Drawal/Generation, Receivable/Payable of UI/Deviation Charge amount month-wise and year-wise are furnished in **Annexure XV-A, B**. Graphical representation is given below for ready reference.

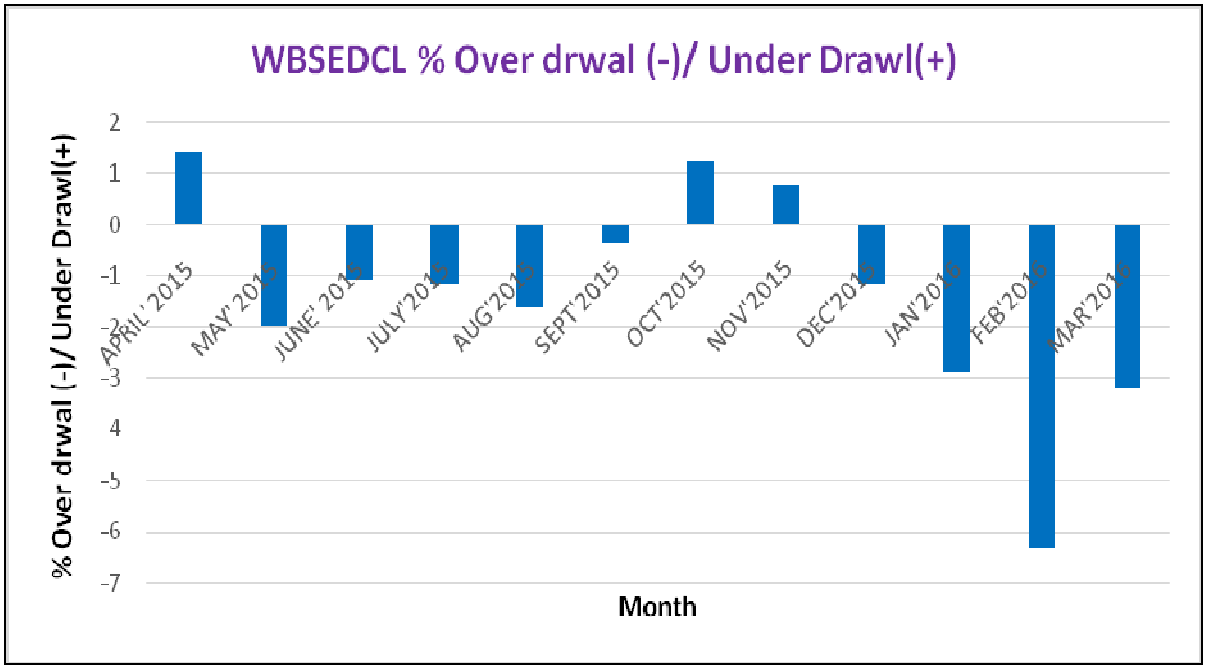


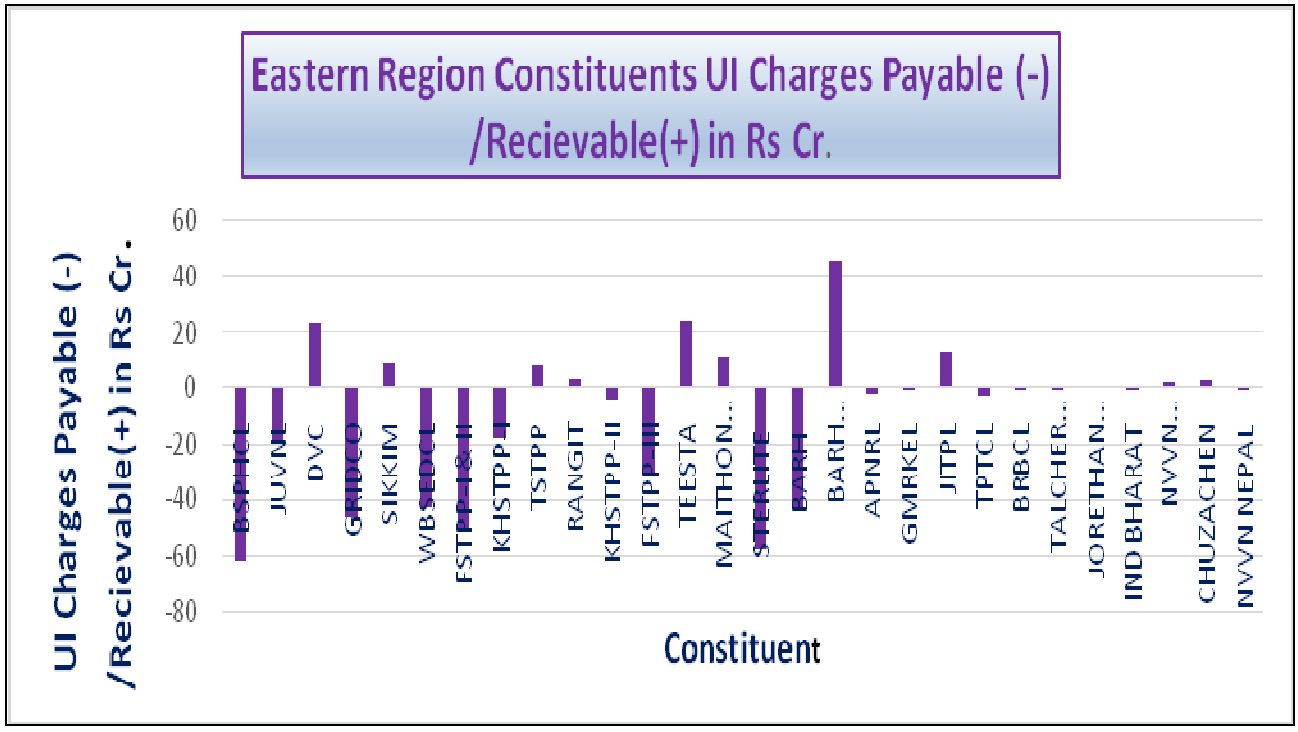



DVC % Over drwal (-)/ Under Drawl(+)
% Over drwal (-)/ Under Drawl(+)
1
0
-1
-2
-3
-4
5
-6
-7
-8
-9
APRIL '2015
MAY' 2015
JUNE' 2015
JULY'2015
AUG'2015
SEPT'2015
OCT'2015
NOV'2015
DEC'2015
JAN'2016
FEB'2016
MAR'2016
Month


GRIDCO % Over drwal (-)/ Under Drawl(+)
% Over drwal (-)/ Under Drawl(+)
2
0
-2
-4
-6
-8
-10
APRIL '2015
MAY' 2015
JUNE' 2015
JULY'2015
AUG'2015
SEPT'2015
OCT'2015
NOV'2015
DEC'2015
JAN'2016
FEB'2016
MAR'2016
Month


SIKKIM % Over drwal (-)/ Under Drawl(+)
% Over drwal (-)/ Under Drawl(+)
40
35
30
25
20
15
10
5
0
-5
-10
APRIL'2015
MAY'2015
JUNE'2015
JULY'2015
AUG'2015
SEPT'2015
OCT'2015
NOV'2015
DEC'2015
JAN'2016
FEB'2016
MAR'2016
Month


WBSEDCL % Over drwal (-)/ Under Drawl(+)
% Over drwal (-)/ Under Drawl(+)
2
1
0
-1
-2
-3
4
-5
-6
-7
APRIL'2015
MAY'2015
JUNE'2015
JULY'2015
AUG'2015
SEPT'2015
OCT'2015
NOV'2015
DEC'2015
JAN'2016
FEB'2016
MAR'2016
Month



4.12 REACTIVE ENERGY CHARGES:

Reactive power compensation should ideally be provided locally,by generating reactive power as close to the reactive power consumption as Possible. The Regional Entities except Generating Stations are therefore expected to provide local VAr compensation/generation such that they do not Draw VArs from the EHV grid, particularly under low-voltage condition. To Discourage VAr drawals by Regional Entities except Generating Stations, VAr

Exchanges with ISTS shall be priced as follows:

i) The Regional Entity except Generating Stations pays for VAr drawl when voltage at the metering point is below 97%
ii) The Regional Entity except Generating Stations gets paid for VAr return when voltage is below 97%
iii) The Regional Entity except Generating Stations gets paid for VAr drawl when voltage is above103%
iv) The Regional Entity except Generating Stations pays for VAr return when Voltage is above 103%.

Provided that there shall be no charge/payment for VAr drawl/return by a Regional Entity except Generating Stations on its own line emanating directly from an ISGS.

As per IEGC, the beneficiary states of the region are billed for reactive energy exchange with the CTU system. ERPC also prepares reactive energy exchange for interstate system. The procedure for reactive energy charge calculation is governed by clause 1.6 and 1.7 of IEGC. The rate for reactive energy charge was 12 paise/unit during the year 2014-15. The current rate

for reactive energy charge was 13 paise/unit during 2015-16. The statement indicating reactive energy charge billing details during the year is enclosed at **Annexure-XVI**.

In the year 2015-16 WBSETCL has paid Rs 9.78 Crores, GRIDCO has paid 7.08 Crores and Sikkim 1.52Lacs to the ER Reactive Pool Account. The Total amount deposited in ER Reactive Pool Account for the year 2015-16 as per published account up to 27.03.2016 is Rs. 16.88 Crores.

4.13 REGIONAL TRANSMISSION DEVIATION CHARGES:

As per the CERC (Sharing of Transmission charges and Losses Regulations), 2016, in case the metered MWs (ex-bus) of a power station or the aggregate demand of a Designated ISTS Customer exceeds, in any time block,

(a) In case of generators: The Approved Injection + Approved Additional Medium Term Injection + Approved Short Term Injection or;

(b) In case of demand customers: The Approved Withdrawal + Approved Additional Medium Term Withdrawal + Approved Short Term Demand,

Then for first 20% deviation in any time block, the Designated ISTS Customer shall be required to pay transmission charges for excess generation or demand at the same rate and beyond this limit, the Designated ISTS Customer shall be required to pay additional transmission charges which shall be 25% above the zonal Point of Connection charges determined for zone where the Designated ISTS Customer is physically located. Such additional charges shall not be charged to the generators in case of rescheduling of the planned maintenance program which is beyond the control of the generator and certified to be so by the appropriate RPC. Further, any payment on account of additional charges for deviation by the generator shall not be charged to its long term customer and shall be payable by the generator.

CHAPTER-5

ISSUES ON OPERATION, PROTECTION, COMMUNICATION AND SYSTEM STUDIES

ERPC Secretariat in general does not involve in day to day real time grid operation. However, it resolves the Operational issues including Protection, Communication, System Study etc. in the meetings of various sub-committees working under ERPC viz Technical Coordination Sub-committee (TCC), Operation Coordination Sub-Committee (OCC), Protection Coordination Sub-Committee (PCC) etc. Further for any emergent operational matters, it is resolved through mutual discussion between the ERPC Secretariat and concerned utilities. Sometimes Special committees/groups are formed comprising members from utilities to resolve/investigate/study such issues. Third Party Protection Audit, Under Frequency Relay (UFR) Audit etc. are such issues which were taken up by the various audit groups as formed by OCC/PCC. In view of smooth functioning of the regional grid and uninterrupted power supply to the core sectors i.e. Railways, Coal etc. healthy protection system has become an integral part of power system operation. Some major operational/protection issues which were taken up are placed below:

5.1 MOCK BLACKSTART EXERCISES IN EASTERN REGION

After any major grid disturbance causing total black out, restoration procedure starts with the Black Start operation of power stations which supply the initial power to neighbouring load centres and the system gradually restored. Mainly the hydro units, due to their flexibility in many fronts, are used as the main source for black start operation. Hence, it is given top priority to keep ready the hydro power stations of the region for any eventuality so that they could be used for black start operation. In line with directives of IEGC, every year OCC plans to conduct mock black start of hydro generating stations. During the year 2015-16, following hydro plants conducted the mock black start exercises.

Sl. No.	Power Plant	Organisation	Date of mock black start
1	Subarnarekha HPS	Jharkhand	09.06.15
2	Upper Indravati HPS	OHPC	16.07.15 & 28.03.16
3	Upper Kolab HPS	OHPC	16.07.15 & 28.03.16
4	Rengali HPS	OHPC	13.10.15 & 09.02.2016
5	Maithon HPS	DVC	23.12.2015
6	Balimela HPS	OHPC	21.03.16
7	Chuzachen HPS	Gati	29.03.16
8	Theesta V HPS	NHPC	30.03.16

As per the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010, under clause 5.8 (b) “Diesel Generator sets for black start would be tested on weekly basis and test report shall be sent to RLDC on quarterly basis”.Test run of Diesel Generator sets on weekly basis for black start in Eastern Region were generally conducted and test reports were submitted by the concerned utility to ERLDC. Status reports are being regularly reviewed in OCC meetings.

5.2 REACTIVE CAPABILITY TESTING OF GENERATORS IN EASTERN REGION

A large number of transmission corridors of Eastern Region were facing high voltage problem due to various reasons, amongst which, insufficient VAR absorption by the generators was one of such causes. It led to sustained high voltage condition thereby causing unnecessary line tripping on over voltage. In view of above, OCC decided to carry out Reactive Capability Testing of Generators connected to 400 & 220 kV systems to check the present reactive capability so that the same can be harnessed when required.

During the year following generating station has carried out reactive capability tests:

Sl. No.	Power Plant	Organisation	Date of test
1	Koderma unit #2	DVC	December 2015

The reactive performances of all generators (including IPPs) during high voltage conditions are being regularly monitored and reviewed for their improvement in OCC meetings.

5.3 RESTRICTED GOVERNOR MODE OF OPERATION (RGMO)

IEGC has made it mandatory that all thermal generating units of 200 MW & above and all hydro units of 10 MW & above, which are synchronized with the grid, irrespective of their ownership, shall be in RGMO at all times, if not exempted for any specific/technical reason by CERC, for taking care of fluctuation of system frequency due to some or other reason and save the system in an emergent condition by contributing automatic control of generation.

Accordingly, performances of eligible generators are regularly reviewed in OCC meeting. Some of the units in Eastern Regions are very old and facing technical difficulties in implementing RGMO. Accordingly, they were advised to seek exemption from CERC. Status of the RGMO of the generating units of Eastern Region is enclosed at **Annexure-XVII.**

5.4 UNDER FREQUENCY RELAY (UFR) OPERATION

In 2nd National Power Committee (NPC) meeting held on 16.07.2013, it was decided that total quantum of load relief based on UFR operation would be 3320 MW for ER. It was also decided that UFR would be operational in 4 (four) stages, where Stage –I would be operated at 49.2 Hz, Stage-II at 49.0 Hz, Stage-III at 48.8 Hz and Stage-IV at 48.6 Hz. Accordingly, OCC distributed and implemented the total quantum of load relief as per existing proportion for ER constituents as given below:

Control Area	**Stage-I (49.2 Hz) (MW)**	**Stage-II (49.0 Hz) (MW)**	**Stage-III (48.8Hz) (MW)**	**Stage-IV (48.6Hz) (MW)**	**Total Relief by Control Area**
BSEB	98	99	99	101	397
JSEB	61	62	61	62	246
DVC	134	135.5	136	137	542.5

Odisha	181.5	183.5	184	186	735
WBSETCL & CESC	345.5	350	350	354	1399.5
Total	**820**	**830**	**830**	**840**	**3320**

The operation of UFRs, if any, in the constituent systems is reviewed regularly in the monthly OCC meetings of ERPC.

5.5 INSPECTION OF UNDER FREQUENCY RELAYS (UFR)

The enquiry committee constituted by MoP after the major grid disturbances during 30th & 31st July'2012 recommended in its report (9.3) for ensuring proper function of defence mechanism like UFR etc. Also, as per section 5.2(n) IEGC, RPC Secretariat shall have to carry out periodic testing of UFR relays. In the 22nd TCC & ERPC meeting it was decided that UFR Audit of the ER constituents would be taken up by the UFR Audit group, nominated by the respective constituents.

Accordingly, a sub-group is constituted and carrying out inspection of UFR relays installed in Eastern Region regularly in the following manner:

i. In case secondary injection kit is available, frequency setting and ability of the Under Frequency Relay to actuate may be tested with the injection kit.
ii. In case secondary injection kit is not available, then frequency setting of UFR may be reset within the operating frequency available at the time of testing and the ability of UFR to actuate may be checked.
iii. The previous history of relay operation along with requisite load relief may also be checked from log book register maintained in the sub-station.

Following UFRs were inspected during the year 2015-16.

Sl No	Date	Substation/feeder inspected by the sub-group
1	09.07.2015	132kV Brajarangnagar of OPTCL
2	09.07.2015	132kV Sambalpur of OPTCL
3	10.07.2015	132kV Sundargarh of OPTCL
4	10.07.2015	132kV Rourkela of OPTCL

All the inspected UFRs are found working as per the requirement.

5.6 PROTECTION PHILOSOPHY OF EASTERN REGION

Several special PCC meetings were convened to review the zone settings based on CEA recommendations at ERPC, Kolkata. In the Special meetings of PCC held on 30.12.2014, 10.04.2015 & 20.07.2015 the Protection Philosophy for Eastern Region was agreed which is as given below:

Sl. No.	Zone	Direction	Protected Line Reach Settings	Time Settings (in Seconds)	Remarks
1	Zone-1	Forward	80%	Instantaneous (0)	As per CEA
2a	Zone-2	Forward	For single ckt- 120 % of the protected line	0.5 to 0.6 - if Z2 reach overreaches the 50% of the shortest line ; 0.35- otherwise	As per CEA
			For double ckt- 150 % of the protected line		As per CEA
2b	Zone-2 (for 220 kV and below voltage Transmission lines of utilities)	Forward	120 % of the protected line, or 100% of the protected line + 50% of the adjacent shortest line	0.35	As per CEA with minor changes
3	Zone-3	Forward	120 % of the (Protected line + Next longest line)	0.8 - 1.0	As per CEA
4	Zone-4	Reverse	10%- for long lines (for line length of 100 km and above) 20%- for shot lines (for line length of less than 100 km)	0.5	As per CEA

Note:

1) **Zone-2:- Z2 Reach should not encroach the next lower voltage level.**
2) **Zone-3:- If Z3 reach encroaches in next voltage level (after considering "in-feed"), then Z3 time must be coordinated with the fault clearing time of remote end transformer.**
3) **Zone-4:- If utility uses carrier blocking scheme, then the Z4 reach may be increased as per the requirement. It should cover the LBB of local bus bar and should be coordinated with Z2 time of the all other lines.**
4) **The above settings are recommended primarily (exclusively) for uncompensated lines.**

Subsequently, all the constituents were requested to adopt the above philosophy for their inter as well as intra state lines for better protection co-ordination of their systems and Eastern Regional system as a whole.

5.7 THIRD PARTY PROTECTION AUDIT OF EASTERN REGION

As a follow up of one of the recommendations of Enquiry Committee headed by Chairman, CEA on grid disturbances that took place in Indian grid on 30th and 31st July 2012, Ministry of Power constituted a 'Task Force on Power System Analysis under Contingencies' in December 2012. As per the recommendations of Task force the third party audit of the protection system needs to be carried out periodically.

The checklist of ERPC used in its 1st third party protection audit was modified in line with the recommendation by the Task Force committee and a road map for 2nd Protection Audit of ER was finalized in OCC & PCC meetings.

The latest status of 2nd Third Party Protection audit during the year 2015-16.is as follows:

1)	Jeerat (PG)	Carried out on 15th July 2015
2)	Subashgram (PG)	Carried out on 16th July 2015
3)	Kolaghat TPS (WBPDCL)	Carried out on 7th August 2015
4)	Kharagpur (WBSETCL) 400/220kV	Carried out on 7th August 2015
5)	Bidhannagar (WBSETCL) 400 &220kV	Carried out on 8th September, 2015
6)	Durgapur (PG) 400kV S/s	Carried out on 10th September, 2015
7)	DSTPS(DVC) 400/220kV	Carried out on 9th September, 2015
8)	Mejia (DVC) TPS 400/220kV	Carried out on 11th September, 2015
9)	400/220/132kV Mendhasal (OPTCL)	Carried out on 2nd November, 2015
10)	400/220kV Talcher STPS (NTPC)	Carried out on 3rd November, 2015
11)	765/400kV Angul (PG)	Carried out on 4th November, 2015
12)	400kV JITPL	Carried out on 5th November, 2015
13)	400kV GMR	Carried out on 5th November, 2015
14)	400kV Malda (PG)	Carried out on 23rd February, 2016
15)	400kV Farakka (NTPC)	Carried out on 24th February, 2016
16)	400kV Behrampur (PG)	Carried out on 25th February, 2016
17)	400kV Sagardighi (WBPDCL)	Carried out on 25th February, 2016
18)	400kV Bakreswar (WBPDCL)	Carried out on 26th February, 2016

5.8 ISLANDING SCHEMES

After the last major grid disturbances occurred simultaneously in NR, ER & NER on 30th & 31st July, 2012, the enquiry committee constituted by MoP has made a number of recommendations in its report published on 16.08.2012. One of the recommendations (no. 9.12 of the report) suggested planning for implementation of islanding schemes.

New Islanding schemes for ER were proposed, approved & monitored by the TCC/ ERPC in its meeting. The latest status of the same are placed below:

(i) Bakreswar TPS of WBPDCL – Operational w.e.f. from 31.03.2015
(ii) Chandrapura TPS (132 kV) of DVC - Operational w.e.f. from 15.06.2015
(iii) Farakka STPS of NTPC – Under implementation
(iv) Tata Power, Haldia – Operational w.e.f. 24.04.2015.
(v) Bandel TPS of WBPDCL- In implementation
(vi) IB TPS Islanding Scheme of OPGC- Scheme finalized

The Islanding Scheme of CESC system is also operational in Eastern Region and successfully operated in the past.

5.9 SYSTEM (SPECIAL) PROTECTION SCHEME (SPS)

Due to enhanced complexity of electrical grid with the formation of 'NEWS' grid through addition of interconnectivity & use of high capacity transmission lines etc., System (Special) Protection Scheme (SPS) has been envisaged for safety & security of integrated grid operation. SPS is

designed to detect abnormal system conditions such as outage of large generating units, high capacity corridors or HVDC interconnections. SPS preserve the integrity of electric system by using predetermined corrective measures that are simple, reliable and safe for the system as a whole and provide acceptable system performance against all possible extreme credible contingencies. SPS has an advantage of wide-area coverage and it is pre-emptively sense the danger in the system and takes corrective actions. SPS has also been evolved to prevent system deterioration i.e. to reduce the impact of power failure and ensure early restoration.

Eastern Region has also adopted the SPS. Presently there are 5 (five) nos. approved SPS in Eastern Region.

a) Tripping of Talcher - Kolar HVDC Bipole (s) - SPS at Talcher stage-II, NTPC (SPS 450 & SPS 1000)

Talcher Super thermal power station having a capacity of 3000 MW (6x500 MW) is located in Orissa of Eastern Region. The station was commissioned with 2x500 MW capacity and subsequently its second stage was commissioned and station capacity was augmented to 3000 MW with commissioning of its further 4x 500 MW machines.

The station is the largest capacity station in the region. However, the capacity of the entire stage II (4x500 MW) was allocated to the beneficiaries of southern region.

Subsequently, 10% of the capacity was allocated to the Orissa, in Eastern region. For evacuation of Talcher STPS –II generation to Southern Region, +/- 500kV HVDC bipole transmission system was commissioned right upto the load centre of Southern Region at Kolar. The HVDC substation at Talcher has two pole blocks 1000 MW capacity each (subsequently augmented to 1250 MW).

The very basic design of the evacuation system of Talcher stage II to SR poses a major threat to Eastern Region and subsequently to the New Grid as any sudden forced outage of one or both the poles would mean that Eastern Grid has to initially absorb a jerk of load throw off to the tune of 1800-2000 MW. The surplus power would get wheeled through 400kV Talcher- Rourkella D/C and Rengali –Baripada-Kolaghat S/C. During monsoon as such these corridors remain heavily loaded and such contingency of pole block at Talcher would lead to a definite cascade tripping leading to isolation /possible collapse of Orissa system including TSTPP station.

In order to avoid such contingency two automatic special protection schemes were envisaged and have been implemented at Talcher Super Thermal power station. The 1st scheme as commonly known as SPS 450 was first implemented and subsequently a further improvised 2nd scheme was devised as known as SPS 1000 scheme. Both the schemes and their modalities of arming and disarming is described below:

SPS 450: This scheme was originally implemented with a view that Eastern and Western Region would absorb a jerk of 450 MW, therefore rest of the generation as available at Talcher stage II generation must be shed in order avoid a cascade tripping of the network. However, during monsoon, from Eastern Regional point of view at times absorbing even 450MW under N-1 contingency criteria of Talcher-Rourkella 400kV D/C Line becomes critical when major

generation at Talcher stage II must be shed in order to avoid further criticality of the Grid. Further under any critical outage condition in the rest of the New Grid outage of HVDC bipole might pose a serious threat when it might necessitate arming of SPS 450 scheme with due coordination with NLDC. Under this mode of SPS the power injection to N-E-W grid is limited to 450 MW. The actual generation by the generators is considered for building the logic.

SPS 1000: Post formation of the NEW Grid this scheme was subsequently envisaged in order to minimise shedding of generation at Talcher STPP. The basic philosophy of this scheme is to absorb 1000MW in place of 450 MW as the Grid size increased. However, as one of the prerequisites for arming this scheme Eastern Regional operator has to ensure that sufficient evacuation margin (approx 1000 MW) is available at the AC evacuation system of TSTPP. Under this mode of SPS the power injection to N-E-W grid is limited to 1000 MW. The actual injection to the HVDC system (by measuring the flow on four a/c lines between TSTPS and Talcher HVDC station) is considered for building the logic. Under SPS 1000 scheme no generation shedding is required for a single pole tripping. For contingencies of both pole tripping and for single pole tripping with the HVDC system going to ground return mode, generation shedding will be done. Extent of generation shedding depends on the actual power flow through the HVDC link and to limit the actual injection to N-E-W grid to 1000 MW.

b) Modification in Talcher-Kolar SPS in ER Region due to Synchronisation of SR grid with NEW grid (Additional 600MW Gen Reduction)

Background:

In Southern Region, there is a provision for load shedding in three groups depending on the power loss on HVDC (Trip Signal 1 for 800 MW load shedding, Trip Signal 2 for 700 MW additional load shedding, Trip signal 3 for 500 MW additional load shedding considering extended operation of HVDC in the 2000-2500 MW range). So a total of 2000 MW shedding is envisaged in Southern Region.

In the NEW grid side of Talcher-Kolar HVDC bipole, there is automatic reduction/tripping of generation at Talcher Stage-II of NTPC. Two schemes are available at Talcher Stage-II; SPS 450 and SPS 1000 where the number indicates the quantum of power injected into the NEW grid after tripping of Talcher-Kolar HVDC pole or bipole. In SPS 450, three units are tripped at Talcher Stage-II while in SPS 1000, a maximum of one unit is tripped and the balance reduction in generation achieved through fast automatic reduction of generation.

In normal operation, SPS 1000 is armed and in some exceptional cases such as an outage of elements in the NEW grid, SPS 450 is activated. There are instances when a single pole trips on line fault and the other pole goes to ground return. In such cases, the healthy pole retries thrice for going to metallic return and in case it fails, it goes in ground return mode where there is a restriction of 150 MW.

There have been instances when the Talcher-Kolar SPS fails to operate leading to high frequency in the NEW grid and low frequency in the Southern Grid. Post 765 kV Sholapur-Raichur in operation, the impact of any failure of Talcher-Kolar SPS would lead to wheeling of additional

power to Southern Region through the NEW grid creating insecure conditions. In fact, even injection of 1000 MW into NEW grid and inadequate load shedding in Southern Region can lead to insecure conditions as the entire power would be wheeled through 765 kV Sholapur-Raichur. So, additional safeguards are required.

Triggering the SPS and SPS action:

In case of single pole or bipole outage or blocking of Talcher-Kolar HVDC sensed at Talcher HVDC terminal, it is proposed that a trip signal be extended to nearby generators such as Vedanta, GMR, JITPL ensuring minimum communication so that the objective of restricting injection to NEW grid to 450 MW is achieved. The reduction in generation to be achieved through these stations is 600 MW so that the injection into NEW grid is restricted to 450 MW. This would be in addition to SPS 1000 already in operation at Talcher-II.
SPS 1000 will be functional as it is with additional relief of 600 MW in the event of Talcher- Kolar pole tripping to ensure grid security.

In 108th OCC held on 17.04.2015 it was decided that the generation relief during HVDC Talcher-Kolar pole tripping will be shared among GMR, Vedanta & JITPL as follows: Vedanta - 200 MW, GMR-200 MW and JITPL- 200 MW.

c) SPS for Chuzachen HPS in Sikkim

Chuzachen HPS is connected with Rangpo through 132 kV Zebra S/C line and with Melli through 132 kV Panther S/C line. Chuzachen was allowed to enhance their generation upto 99 MW with SPS operation of one unit tripping (whichever is generating more). SPS is installed at Chuzachen to reduce generation at hydro power station in event of contingency to avoid high loading and cascading tripping of neighbouring 132 kV transmission lines.

Sl No.	Event	Sensing at	Action
1	Tripping of 132 kV Rangit-Rammam	132 kV Rangit	Trip One unit at CHEP
2	Tripping of 132 kV Rangit-Kerseong	132 kV Rangit	Trip One unit at CHEP
3	Flow of Rangit-Rammam crosses 70 MW or 320 Amps	132 kV Rangit	Trip One unit at CHEP
4	Flow of Rangit-Kerseong crosses 70 MW or 320 Amps	132 kV Rangit	Trip One unit at CHEP
5	Flow of Chuzachen-Melli crosses 75 MW	132 kV Chuzachen	Trip One unit at CHEP
6	Flow of Chuzachen-Rangpo crosses 75 MW	132 kV Chuzachen	Trip One unit at CHEP

Thereafter, the scenario has been changed due to commissioning of LILO of 400 kV Teesta - Binaguri line at Rangpo 400/132 kV sub-station. Chuzachen authority requested for removal of following signals from the schemes as in the present scenario these incidences will not endanger the grid:

i. Tripping of 132 Rangit- Rammam line
ii. Tripping of 132 kV Rangit- Kurseong line
iii. Loading of 132 Melli- Chuzachen line

In 29th PCC held on 20.03.2015, PCC agreed to waive the tripping of one Chuzachen Unit from SPS on following contingencies:

- Tripping of 132kV Rangit – Rammam Line CB at Rangit End
- Tripping of 132kV Rangit – Kurseong Line CB at Rangit End

However, PCC felt that N-2 contingency may occur in North Bengal and Sikkim area and PCC decided to continue the SPS with following conditions:

- Power flow > 70 MW or Line Current > 320 A in Rangit-Rammam Feeder
- Power flow > 70 MW or Line Current > 320 A in Rangit-Kurseong Feeder
- Power flow > 75 MW in Chuzachen –Melli Feeder

d) SPS for Power Export to Bangladesh

As per decision of the MoP, GoI power export to Bangladesh has been explored and regular supply has been commenced from October'2013 through 400 kV Farakka – Berhampur – Bheramara line with HVDC (2x500 MW) station at Bheramara (Bangladesh). During 2015-16 ER exported 3764 MU power to Bangladesh.

The details of SPS implemented to facilitate power transfer to Bangladesh are provided below for ready reference:

S. No.	Triggering Criteria for SPS	SPS actions (signal shall be generated to do following)	Signal to be sent Bheramara (Yes/No)
1	Tripping of 400kV Farakka-Behrampur, the SPS shall generate a signal	To trip 80 MVAR Bus reactor at 400kV Behrampur.	No, Local action at Behrampur.
		To ramp down HVDC set-point to 350 MW (with Appropriate Filter switching to maintain Bheramara Voltage)	Yes
	Voltage at 400kV Behrampur going below 390kV	To trip 80 MVAR Bus reactor at 400kV Behrampur.	No, Local action at Behrampur.
2	Voltage at 400kV Behrampur going below 380kV, the SPS shall generate a signal.	To ramp down HVDC set-point to 350 MW (with Appropriate Filter switching to maintain Bheramara Voltage)	Yes
3	If the frequency goes below 49.5 Hz.	To ramp down HVDC set-point to 350 MW (with Appropriate Filter switching to maintain Bheramara Voltage)	Yes
4	If the 400kV Farakka-Behrampur line flow goes above 780 MW (Flow may touch 800 MVA).	To ramp down HVDC set-point to 350 MW (with Appropriate Filter switching to maintain Bheramara Voltage)	yes

In order to avoid high loading of 400 kV Farakka – Berhampur – Jeerat S/C line section particularly during peak hours as well as lower voltage/frequency at 400 kV Berhampur Sub-station, SPS has been envisaged to reduce the export quantum to Bangladesh.

e) **SPS for Vedanta Limited (formerly known as SSL)**

Principle and working:

Actuates in event of tripping of any 400 kV outgoing line from Vedanta i.e either of 400 kV Vedanta-Rourkela line-I, or 400 kV Vedanta-Raigarh line-I.
Backing down of generation or tripping of unit is done to reduce injection in grid for controlling line loading.

Assumptions:

Unit 1, 3 & 4 are connected to PGCIL bus (400 kV). Unit 2 is connected to OPTCL bus (400 kV).
Both the buses are decoupled

Principle of operation:

i) Overloading of 400 kV Vedanta – Rourkela line – I (beyond 650 MW) or tripping

ii) Overloading of 400 kV Vedanta – Raigarh line – I (beyond 650 MW) or tripping

5.10 POLLUTION MAPPING FOR EASTERN REGION

Pollution flashover poses serious threat to the reliability of the power system. As the level of transmission voltage increases insulation contamination poses serious threat to the reliability of the power system. In order to maintain the system external insulation plays an important role for design of insulators. Power system is getting affected due to failure of insulators caused due to pollution. Pollution mapping at zones is of greater importance for selection of insulators.

The enquiry committee chaired by Member (GO & D), CEA on Northern Region grid disturbance which occurred on 7th & 9th March 2008 recommended that pollution mapping of the entire country should be done in order to map the condition of insulators due to pollution. Accordingly the matter was discussed in various OCC meetings. Finally, ERPC in its 24th meeting held on 27.04.2013 advised Powergrid to initiate the implementation of pollution mapping in Eastern Region. Pollution mapping for Eastern Region has been initiated and the survey work was carried out jointly by Powergrid and CPRI. Numbers of training programme had been arranged to train the field officials of various utilities how to measure the pollution levels of a particular area.

For pollution mapping the concerned constituents were to complete a grid map and identify the locations as per 25x25 grid map with GPRS coordinates in respective control area. Then one dummy insulator has to be placed in position in the identified location for carrying out pollution mapping on site.

Constituents installed the dummy insulators. The Instrument Kits for measurement related to Pollution Mapping were dispatched to the constituents. The Pollution Mapping work in ER was started with on-site measurement of ESDD and NSDD.

Powergrid created a template at their server for online filling of measurement data which will be directly coming to their database and accordingly respective constituents were advised for online filling of measurement data.

Schedule for 3rd set, 4th set, 5th set & 6th set of measurements was also prepared

Status as on March'2016 is produced below:

Utility	Scope	Installed Locations	Number of locations where 1st set of Measurements Completed	Number of locations where 2nd set of Measurements Completed
JUSNL	67	27	**21**	**19**
BSPTCL	59	52	**52**	**35**
WBSETCL	73	70	**43**	
OPTCL	164	102	**102**	**42**
Sikkim	12	9	**6**	**6**
Powergrid ER 1	99	99	**99**	**47**
Powergrid ER 2	40	40	**40**	**40**
Powergrid Odisha	42	42	**42**	**42**

5.11 SCADA DATA

For effective management and monitoring of the grid parameters availability of various live data viz generation of power stations, line flows and voltages at important sub-stations are the vital inputs to the grid operators. All the required data should be made available on real time basis in the control room through SCADA system. OCC/TCC advised all constituents to do the needful for restoration of SCADA data at the earliest and the status of availability of SCADA data are monitored regularly by the OCC/SCADA O&M meetings. Apart from the concerned utility, CTU/Powergrid plays a major role in availability of the SCADA data as installation of RTU are done by them.

5.12 PSS Tuning of Budge Budge TPS

As per the provision of IEGC and with the approval of ERPC, PSS tuning programme of the generating units of ER was started in the year 2007. In line with WRPC the job was entrusted to IIT, Mumbai, with Dr. (Prof.) A. M. Kulkarni as consultant to carry out necessary dynamic study with the existing networks in ER and to suggest and implement the necessary PSS tuning in the Power Stations. The study was carried out by IIT, Mumbai and it was revealed that PSS tuning of ER has to be done in stage wise and in the first stage the following units were proposed:

1) Kolaghat stage-II, 400 kV, U # 4, 5 & 6 (210 MW each) of WBPDCL
2) Farakka U# 4 & 5 (500 MW each) of NTPC
3) U. Kolab -4 units (80 MW each) of OHPC
4) Budge Budge U # 1 & 2 (250 MW) of CESC Ltd.

Thereafter, PSS tuning of all units were carried out with the help of BHEL Service Manager, Shri K. Partha Sarathi in the presence of Prof. Kulkarni except Budge Budge units.

OCC in its 105th meeting decided that PSS tuning programme for ER should get restarted for the generators where the PSS were not in service and/or needs tuning. To start with OCC advised CESC to do the PSS tuning for its Budge-Budge unit I and II.

It was reported during 29th PCC that from 1st January, 2015 mostly during lean hours CESC have observed significant active power flow fluctuations in MW (but not in MVAR). On 6th January, 2015 the oscillations were so severe, fluctuations of power flow remained in the ranges of about 130 MW to 150 MW. Finding no other alternatives, they had changed the grid synchronizing point from 132kV Kasba S/s to Howrah S/s and thereafter the situation got stabilized. After that no oscillations was observed.
CESC engaged PRDC to investigate the problem. PRDC had advised for PSS tuning of all Budge-Budge units to minimize the oscillations during light load periods. Subsequently CESC informed that the grid synchronization point has been shifted to Kasba from 4th March 2015 and no oscillations were observed in the system with the increase in summer load.

A special meeting on PSS tuning of Budge Budge units of CESC was held on 09.04.2015. It was decided that on the issue advice from Prof. Kulkarni, IIT, Mumbai will be sought and as per his guidance PSS tuning of CESC units as proposed by OCC/PCC will be carried out. Towards this a small group comprising members from ERPC, ERLDC, WBSETCL and CESC was formed and the following members were nominated:

1) Shri B. Sarkhel, SE (PS), ERPC
2) Shri S. Banerjee, Astt. GM, ERLDC
3) Shri A. Biswas, CE, SLDC, WBSETCL
4) Shri S. Roy, ACE, CLD, WBSETCL
5) Shri J. R. Bhattacharya, DCE (Plg), CESC
6) Shri Rahul Chakravorty, DGM, CESC
7) Shri Manik Basu, DCE(T), CESC
8) Shri Sibir Roy, DGM, BBGS, CESC

Finally the following was implemented:

1. Prof. (Dr.) A.M.Kulkarni, Mr. B.Sarkhel and Mr. K.Partha Sarathy visited Budge Budge on 28th and 29th July, 2015 to check the PSS tuning parameters and thereafter put it Online.
2. The PSS parameters as given in OEM report were set in the AVR and step response tests (1%,2%) was carried out. Minor changes in the parameters were done.
    a. Time constant T4 and T6 was changed from 0.02 secs to 0.05 secs
    b. PSS Gain was changed from 4.0 to 6.0
    c. P1 pressure gain trim was changed to 1.07 to match the mechanical and electrical power
3. Step response tests (1% and 2%) were carried out at both units (at 160 MW and 250 MW) and the response was found to be satisfactory.
4. Further shifting of synchronizing point from Howrah to Kasba was done at full load (for both units) and response studied with PSS Online condition which was satisfactory. Switching operations were also done with both PSS Offline and Online condition. It was observed that with PSS offline oscillations were poorly damped, which subsided on putting the PSS online. However, with the PSS Online the oscillations were adequately damped.

CHAPTER-6

MEETINGS, REPORTS, CERTIFICATION AND WORKSHOP

6.1 MEETINGS HELD DURING 2015-16

In order to discharge various duties entrusted to ERPC as per Indian Electricity Act 2003 and IEGC, various meetings were organised during 2015-16 and detail of meetings are given at **Annexure-XVIII**.

6.2 REPORTS ISSUED

ERPC has been issuing various reports regarding system operational data, load generation balance data, system studies data, etc. The details of various reports issued during 2015-16 by ERPC are given below:

- Monthly Progress Reports
- Monthly Power Supply Position Reports
- Load Generation Balance Report for the year 2016-17
- Annual Report for the year 2014-15

6.3 CERTIFICATION OF TRANSMISSION AVAILABILITY

In line with CERC order, ERPC Secretariat has certified availability of transmission system for the year 2015-16.

6.4 TRAINING / WORKSHOP HELD

As a follow up of one of the recommendations of Enquiry Committee headed by Chairperson, CEA on grid disturbances that took place in in India on 30th & 31st July'2012, Ministry of Power constituted a "Task Force on Power System Analysis and Contingencies". The Task Force strongly recommended for training in protection related issues. Based on the recommendation, 29th ERPC accorded approval for arranging quarterly one week workshop/training on protection related issues in addition to arranging workshop on black start as well as on emerging issues.

Following training programmes/workshops were held during 2015-16:

Sl. No.	Date	Workshop on	Venue
1	11.05.2015 to 15.05.2015	Training on "Power System Protection"	ERPC, Kolkata
2	27.08.2015 to 28.08.2015	Workshop on "Focusing the Power System Operation and Market Operation including recent development & best practices"	Hotel Sandy Tower, Bhubaneswar
3	23.11.2015 to 27.11.2015	Training on "Generator Protection & HVDC Protection"	Talcher STPS, Kaniha

CHAPTER – 7

IMPORTANT DECISIONS TAKEN IN VARIOUS MEETING OF ERPC DURING 2015-16

1. Issue: Social Responsibility initiatives of ERPC

Decision: ERPC in its 27th meeting approved the proposal for expenditure on social activities under CSR as a noble initiative from ERPC. Based on this, ERPC has donated four number automatic syringe pumps to Hope Hospital, Kolkata which serves the underprivileged.

2. Issue: PSS Tuning of Budge Budge TPS of CESC

Decision: In line with IEGC, OCC in its 105th meeting decided that PSS tuning programme for ER should get restarted for the generators where the PSS were not in service and/or needs tuning. To start with OCC advised CESC to do the PSS tuning for its Budge-Budge unit I and II.

M/s PRDC was engaged by CESC to investigate the problem of oscillations in CESC system and M/s PRDC had advised for PSS tuning of all Budge-Budge units to minimize the oscillations during light load periods.

29th PCC in its meeting agreed to convene a separate meeting to discuss the PSS turning issue of Budge-Budge units.

In the Special Meeting on PSS tuning of Budge Budge units of CESC Ltd on 09.04.2015, after detailed deliberation, it was decided that advice from Prof. (Dr.) Kulkarni, IIT, Mumbai will be sought and as per his guidance PSS tuning of CESC units will be carried out.

Finally Prof. (Dr.) A.M.Kulkarni, IIT, Mumbai, Shri B.Sarkhel SE (PS), ERPC and Shri K.Partha Sarathy, Service Manager, BHEL visited Budge Budge on 28th and 29th July, 2015, check the PSS tuning parameters and thereafter finally put it in operation.

3. Issue: Standing Committee on Transmission Planning for State Sectors

Decision: In its 30th meeting dated 20.06.2015 ERPC approved the formation of Standing Committee on Transmission Planning for State Sector of Eastern Region. ERPC advised all state representatives to nominate Chief Engineer/General Manager level officer having experience in transmission planning in the respective STUs as a member of this committee. ERPC advised Member Secretary to constitute the State Standing committee consisting of senior level officials of respective planning wings of various STUs of Eastern Region. It was decided that all transmission schemes of state sectors should be discussed and finalized in this forum before forwarding state requirements to Standing Committee on central sectors, usually convened by CEA/CTU. It was also decided that Standing Committee of ER on central sector before placing an agenda in SCM must circulate the same to respective constituents to facilitate reviewing and finalising at state level in Standing Committee on transmission planning for state sectors which is being constituted.

In its 31st meeting dated 14.11.2015 ERPC felt that all constituents should plan their state network to match with the 20 years National level perspective plan prepared by the CTU and ERPC advised Secretariat to discuss the 20 years plan of each state in turn in State Sector

SCM of Eastern Region. ERPC requested CTU to share the SCM agenda before forwarding the same to CEA so that these agenda items can be deliberated upon in detail in State Sector SCM and the constituent members would be better prepared for fruitful decision making at SCM. Standing Committee on transmission planning for state sectors of Eastern Region was constituted and they meet as per requirement to discuss various issues.

4. Issue: Protection database for transmission system of Eastern Region

Decision: As a recommendation of the Enquiry committee headed by Chairperson CEA on Grid Disturbance in Indian grid on 30th and 31st July 2012, Ministry of Power constituted a Task Force on Power System Analysis under Contingencies in December 2012. Among the many thought provoking and actionable points discussed in their report, the task force recommended creation and maintenance of Protection database under RPCs. Following the decision of Ministry of Power regarding implementation of the recommendations of the task force, ERPC has taken up the project for "Creation and maintenance of a Web based Protection Database and a Desktop based Protection Setting Calculation Tool for Eastern Regional Grid" with PSDF funding approved by Ministry of Power. Presently, the scheme is under process of implementation.

5. Issue: Protection Philosophy of Eastern Region

Decision: Several special PCC meetings were convened to review the zone settings based on CEA recommendations. In the Special meetings of PCC held on 30.12.2014, 10.04.2015 & 20.07.2015 the Protection Philosophy for Eastern Region was agreed. All the constituents are to adopt the philosophy for their inter as well as intra state lines for better protection co-ordination of their systems and Eastern Regional system as a whole.

6. Issue: Checking of Healthiness of SPS existing in Eastern Region

Decision: In 105th OCC meeting held on 22.01.2015, it was decided that constituents should certify the healthiness of SPS in every OCC meeting, after carrying out simulated checking of SPS. In subsequent OCC meetings the procedural details for certifying the healthiness were designed. Accordingly, in every OCC, healthiness of SPS existing in Eastern Region is assessed.

7. Issue: Islanding Scheme of Bandel TPS of WBPDCL

Decision: 23rd TCC approved the new Islanding Scheme of Bandel TPS. It was also decided that implementation of Bandel Islanding Scheme will commence only after Islanding Scheme of Bakreswar TPS putting into operation.

Upon implementation of Bakreswar TPS islanding scheme, 30th ERPC advised to initiate implantation process of Bandel TPS. After detail deliberation in various OCC and PCC meeting, 35th PCC held on 15.09.2015 advised WBSETCL and ERLDC to check whether the islanding scheme can be put into service specifically for peak periods or more load station can be added in off-peak conditions.

But in 114th OCC, WBSETCL informed that adding more load stations during off-peak conditions is a difficult task with huge seasonal variation in load. Considering the facts &

figures, OCC decided that Bandel Islanding Scheme could be implemented for grid security meant for peak periods only. 31st TCC & ERPC also approved the same.

8. Issue:Transfer of power from Rantnagiri Gas and Power Pvt. Ltd. (RGPPL), Maharashtra to Railways drawal point in Jharkhand

Decision: 100 MW power from RGPPL was allocated by MOP to Railways to be drawn through various drawal point in Jharkhand and NOC was granted by JUSNL for the transaction.

In a special meeting dated 31.12.2015 the modalities of transfer the required power from RGPPL to various drawal point of Railways in Jharkhand was finalised. WRPC & WRLDC also attended the meeting through video conferencing. Railways would draw their share from Jharkhand Grid Substations. Scheduling and despatch procedure would be as per CERC regulations.

Inter regional mechanism of scheduling, commercial accounting including all technicalities etc. were finalised in the meeting itself. For intra state technical, commercial, scheduling, metering and any other issues Railways and JUSNL were advised to settle mutually.

Finally Railway started to draw power from RGPPL w.e.f 16.01.2016.

9. Issue: Handing over of 400 kV LILO of Farakka-Subhasgram at SgTPP & 400 kV D/C SgTPP- Parulia line to Powergrid

Decision: ERPC in its 30th meeting dated 20.06.2015 endorsed the views of TCC that since 400kV SgTPP-Parulia D/C line is important element in view of power export to Bangladesh, the line should be maintained by CTU and advised Powergrid to continue the O&M of this line as per the existing commercial arrangement till alternative arrangements are formalised.

10. Issue: Reconciliation of various Accounts (Deviation, Reactive, STOA etc.)

Decision: In its 30th meeting dated 20.06.2015 ERPC decided that reconciliation should be done in Commercial Sub-Committee meeting itself and for this purpose concerned finance personnel from respective constituents were advised to be present in the Commercial Sub-Committee meetings.

11. Issue: Installation of polymer insulators on New Transmission lines

Decision: In its 30th meeting dated 20.06.2015 ERPC agreed for installation of polymer insulators in new transmission lines and replacement of porcelain insulators with polymer insulators in existing transmission lines. ERPC in principle agreed to consider the replacement period as per the provisions of existing regulations. Powergrid was advised to place the detailed roadmap for implementation of this scheme along with other requisite details such as time frame for completion, deemed availability, etc in lower forum of ERPC.

In 32nd meeting dated 20.02.2016, ERPC agreed that the deemed availability will be allowed only for the period of insulator replacement work which will be decided & cleared in OCC meeting. Powergrid shall submit the shutdown request for insulator replacement in OCC.

12. Issue: Reporting and Analysis of Disturbances in PCC Meeting - Submission of DR, EL and other relevant information.

Decision: ERPC in its 31st meeting dated 14.11.2015 advised all constituents to send the tripping reports along with DR, EL, Comtrade files, SOE outputs etc. to ERPC/ERLDC within the stipulated time frame. ERPC also advised all constituents to send their concerned representative from protection wing including SLDC engineers to attend the PCC meetings of ERPC with the details of the tripping incidences in their respective control areas along with their analysis to facilitate PCC in finding solutions to prevent recurrence of uncoordinated tripping in system.

13. Issue: Identification of non-ISTS carrying inter-state power

Decision: ERPC in its 31st meeting dated 14.11.2015 advised all the constituents to submit the list of lines along with the requisite details to facilitate ERPC Secretariat and ERLDC to carry out load flow studies using WebNet software so that decision about the certification of those lines as ISTS lines may be taken.

14. Issue: Status of construction of 400 kV Sterlite (presently Vedanta)-Jharsuguda D/C sections

Decision: In its 30th meeting dated 20.06.2015, ERPC opined that Sterlite may bring the transmission line before March, 2016, if maximum efforts are given. It was felt that discontinuance of LILO may not be a feasible solution as it may result in a loss of significant generation to the grid.

ERPC should exercise stringent monitoring/assessment of monthly progress made by Sterlite. Sterlite agreed to complete the construction work as per monthly target fixed. Status of the line is being monitored in various forum of ERPC.

15. Issue: Introduction of LOGO for ERPC

Decision: With suggestions for minor modification, ERPC in its 31st meeting dated 14.11.2015 approved the LOGO of ERPC.

16. Issue: ERPC Academic Initiative

Decision: ERPC in its 31st meeting dated 14.11.2015, appreciated the proposal and authorized Member Secretary to do the needful in this regard.

17. Issue: Internal renovation of ERLDC Building through CPWD

Decision: ERPC in its 31st meeting dated 14.11.2015, approved the proposal of taking funds into "ERPC Establishment Fund" from ERLDC for internal renovation works of ERLDC technical block and onward transfer of the same to CPWD.

अध्याय-8

पूर्वी क्षेत्रीय विद्युत् समिति में राजभाषा नीति का कार्यान्वयन

वर्ष 2015-16 के दौरान पूर्वी क्षेत्रीय विद्युत् समिति में राजभाषा नीति के अनुपालन में निम्नलिखित कार्य किये गए: -

7.1 हिन्दी पत्राचार

- ओ०सी०सी०, प्रोटेक्शन उप-समिति, वाणिज्यिक उप-समिति, तकनिकी समन्वय उप-समिति और ई०आर०पी०सी० की बैठकों के कार्यवृत एवं कार्यवाही के कवरिंग-पत्र एवं पतों की सूची दिभाषी में जारी किये गए|
- राजभाषा अधिनियम के नियम-5 के अनुपालन में, हिन्दी में प्राप्त पत्रों के उत्तर हिन्दी में ही दिये जाते हैं|

7.2 राजभाषा कार्यान्वयन समिति की बैठकें

राजभाषा नीति के अनुसार वर्ष 2015-16 में राजभाषा कार्यान्वयन समिति की बैठकें 06-04-2015, 17-07-2015, 06-10-2015, 01-03-2016 को हुईं| इन बैठकों में, तिमाही प्रगति रिपोर्ट की समीक्षा की गई, वार्षिक कार्यक्रम के विभिन्न निर्देशों पर चर्चा हुई एवं तदनुसार निर्णय लिए गये|

7.3 प्रोत्साहन योजना

हिन्दी के प्रयोग को बढ़ावा देने एवं हिन्दी में काम करने के लिए प्रोत्साहित करने हेतु, इस कार्यालय में विभिन्न प्रकार के प्रोत्साहन योजना लागू किये गये| प्रोत्साहन योजनायें इस प्रकार है - (1)मूल रूप टिप्पण-आलेखन हिन्दी में करना (2)हिन्दी में श्रुतलेख (3)कंप्यूटर पर हिंदी में टंकन का काम करने के लिए भी, प्रोत्साहन योजना लागू किया गया|

7.4 हिन्दी दिवस/हिन्दी सप्ताह का आयोजन

14 सितम्बर 2016 को इस कार्यालय में हिन्दी दिवस मनाया गया एवं 12-09-2016 से 18-09-2016 के दौरान हिन्दी सप्ताह का आयोजन किया गया| इस अवसर पर विभिन्न हिन्दी प्रतियोगितायें हुईं जिसमें अधिकारीगण एवं कर्मचारियों ने बड़े उत्साह के साथ भाग लिया|

7.5 राजभाषा कार्यान्वयन से संबंधित अन्य काम

- हिन्दी के प्रगामी प्रयोग से संबंधित तिमाही एवं अर्ध-वार्षिक प्रगति रिपोर्ट नियमित रूप से मुख्यालय -के०वि०प्रा० एवं राजभाषा विभाग के क्षेत्रीय कार्यालय को प्रेषित किया गया|
- सेवा पुस्तिकाओं में प्रविष्टियां हिन्दी में किये गए|
- छुट्टी से सम्बंधित कार्यालय आदेश दिभाषी में जारी किये गये|
- 10 पी०सी० पर हिन्दी सॉफ्टवेर (गूगल इनपुट टूल्स) लोड है एवं सभी पर अधिकारी एवं कर्मचारी आवश्यकता अनुसार काम करते हैं|
- 23-11-2015 से 25-11-2015 तक भारतीय राजभाषा परिषद् द्वारा आयोजित, राष्ट्रीय राजभाषा सम्मलेन में इस कार्यालय के एक अधिकारी ने भाग लिया|

गृह मंत्रालय राजभाषा विभाग के कार्यक्रमानुसार, इस कार्यालय में हिन्दी के प्रगति तथा प्रचार हेतु सभी आवश्यक कार्य कार्यांवित किये जाते हैं|

ANNEXURE-I

MANPOWER STRENGTH OF ERPC SECRETARIAT

The status of posts of various grades at ERPC Secretariat (**as on 31st March 2016**) is given below:

POST	SANCTIONED	FILLED	VACANT
GAZETTED			
Member Secretary	1	1	0
Superintending Engineer/Director	3	1	2
Assistant Secretary/Executive Engineer	4	4	0
Assistant Director Grade-I	4	3	1
Assistant Director Grade-II	2	0	2
Senior P.A	1	0	1
NON-GAZETTED			
Foreman	1	0	1
Head Clerk	1	1	0
Hindi Translator	1	1	0
Electrician	2	1	1
Upper Division Clerk	3	1	2
Draftsman Gr. II	1	0	1
Stenographer Gr. I	1	0	1
Stenographer Gr. II	1	0	1
Lower Division Clerk	4	2	2
Driver	2	0	2
MTS	6	4	2
TOTAL	**38**	**19**	**19**

Note:

i) One post of Driver has been temporarily transferred to RPSO (W), Mumbai.
ii) One post of peon has been temporarily transferred to SRPC, Bangalore.
iii) Post of Foreman has been temporarily transferred to RPSO, Bangalore
iv) One Addl. Gen. Manger of NVVN and one Sr. Admn. Officer of DVC are posted in ERPC on informal deputation.

ANNEXURE – II (Page-1/2)

CHAIRPERSONS / CHAIRMEN OF EASTERN REGIONAL POWER COMMITTEE (ERPC) & ERSTWHILE EASTERN REGIONAL ELECTRICITY BOARD (EREB) SINCE ITS INCEPTION

Period	Constituent	Name of the Chairmen/Chairpersons
01.06.65 to 31.05.66	BSEB	Sh. R.S. Mishra, IAS Sh. R. Prasad, IAS
01.06.66 to 31.05.67	DVC	Sh. T. Sivasankara, ICS
01.06.67 to 31.05.68	OSEB	Sh. V.V. Ananthakrishnan, IAS
01.06.68 to 31.05.69	WBSEB	Sh. Dutta Mazumdar, IAS
01.06.69 to 31.05.70	BSEB	Sh. H.N. Thakur, IAS
01.06.70 to 31.05.71	DVC	Sh. N.E.S. Raghavachari, ICS
01.06.71 to 31.05.72	OSEB	Sh. A.K. Mazumdar, IAS Sh. A.C. Bandyopadhyay, IAS
01.06.72 to 31.05.73	WBSEB	Sh. S.K. Mukherjee, IAS Sh. J.C. Talukdar, IAS
01.06.73 to 31.05.74	BSEB	Sh. B.N. Ojha
01.06.74 to 31.05.75	DVC	Sh. S.J. Majumdar, ICS Lt. Gen. P.S. Bhagat, VC, PVSM
01.06.75 to 31.05.76	OSEB	Sh. K.C. Gantayet
01.06.76 to 31.05.77	WBSEB	Brig. D.N. Mallick
01.06.77 to 31.05.78	BSEB	Sh. K.P. Sinha, IAS Sh. J.D. Sahay Brig. S.P. Kochar
01.06.78 to 31.05.79	DVC	Sh. A.C. Bandyopadhyay, IAS
01.06.79 to 31.05.80	OSEB	Sh. J.M. Patnaik Sh. B.N. Dash
01.06.80 to 31.05.81	WBSEB	Sh. N.C. Basu
01.06.81 to 31.05.82	BSEB	Sh. Z.S. Haque Sh. S.K. Chaturvedi, IAS Sh. R.P. Khanna, IAS
01.06.82 to 31.05.83	DVC	Sh. P.C. Luthar
01.06.83 to 31.05.84	OSEB	Sh. A. Panda Sh. S.K.Nanda
01.06.84 to 31.05.85	WBSEB	Sh. A. Ghatak
01.06.85 to 31.05.86	BSEB	Sh. S. Kumar Sh. I.C. Kumar, IAS
01.06.86 to 31.05.87	DVC	Lt. Gen. M.M.L. Ghai, PVSM Sh. A. Ghatak
01.06.87 to 31.05.88	OSEB	Sh. P.K. Kar
01.06.88 to 31.05.89	WBSEB	Dr. B.P. Banerjee Dr. D.K. Bose, (from 1.5.89)
01.06.89 to 31.05.90	BSEB	Sh. J.C. Jetli, IAS Sh. J.C. Kundra (from 26.12.89) Sh. P.K. Misra (from 3.4.90)

ANNEXURE – II (Page-2/2)

01.06.90 to 31.05.91	DVC	Sh. P.K. Sarkar, IAS
01.06.91 to 31.05.92	OSEB	Sh. K.C. Mahapatra Sh. S.K. Mahapatra (from 22.12.91)
01.06.92 to 31.05.93	WBSEB	Sh. D.K. Bose Sh. S.K. Dasgupta
01.06.93 to 31.05.94	BSEB	Sh. B. Prasad
01.06.94 to 31.05.95	DVC	Sh.Maj.Gen. Sharad Gupta,V.S.M Sh. A.K. Misra, IAS (from 1.5.95)
01.06.95 to 31.05.96	OSEB	Sh. M.Y. Rao, IAS
01.06.96 to 31.05.97	WBSEB	Sh. S.R. Sikdar
01.06.97 to 31.05.98	BSEB	Sh. R.P. Yadav Sh. A.K. Upadhyay (from 18.5.98)
01.06.98 to 31.05.99	DVC	Sh. A.K. Misra, IAS
01.06.99 to 31.05.00	GRIDCO	Sh. B.C. Jena
01.06.00 to 31.05.01	WBSEB	Dr. G.D. Gautama, IAS
01.06.01 to 31.05.02	BSEB	Sh. C.M. Jha, IAS Sh. N.K. Agrawal (from 22.10.01)
01.06.02 to 31.05.03	DVC	Sh. J.C. Jetli, IAS
01.06.03 to 31.05.04	GRIDCO	Sh. S.C. Mahapatra, IAS
01.06.04 to 31.05.05	JSEB	Sh. B.K. Chauhan Dr. H.B. Lal (from 18.10.2004)
01.06.05 to 31.03.06	WBSEB	Sh. M. K. De, IAS
01.04.06 to 31.03.07	BSEB	Sh. M. M. Singh, IAS Sh. Swapan Mukherjee (from 01.03.07)
01.04.07 to 31.03.08	JSEB	Sh. V. N. Pandey Sh. B. M. Verma (from 29.12.07)
01.04.08 to 31.03.09	OPTCL & GRIDCO	Sh. C.J.Venugopal, IAS
01.04.09 to 31.03.10	Energy and Power Deptt., Govt. of Sikkim	Sh. Pema Wangchen
01.04.10 to 31.03.11	WBSEDCL & WBSETCL	Sh. M. K. De, IAS
01.04.11 to 31.03.12	BSEB	Sh. P. K. Rai
01.04.12 to 31.03.13	JSEB	Sh. S. N. Verma
01.04.13 to 31.03.14	OPTCL & GRIDCO	Sh. P. K. Jena, IAS Sh. Hemant Sharma, IAS (from 16.07.13)
01.04.14 to 05.07.15 (contd. beyond Mar'15 due to late receipt of new nomination)	Energy and Power Deptt., Govt.of Sikkim	Sh. P. B. Subba, Principal Chief Engg.-cum-Secretary Shri N. T. Bhutia, Principal Chief Engg.-cum-Secretary (w.e.f. 1.4.15 to 5.7.15)
06.07.15 to 31.03.16	WBSEDCL	Shri Narayan Swaroop Nigam, IAS Shri Rajesh Pandey, IAS (from 04.01.16)

ANNEXURE - III

MEMBER SECRETARIES OF EASTERN REGIONAL POWER COMMITTEE (ERPC) & ERSTWHILE EASTERN REGIONAL ELECTRICITY BOARD (EREB) SINCE ITS INCEPTION

Sl. No.	Names of Member Secretaries	From	To
1	Shri Z.S. Haque	1964	1965
2	Shri G. Mukherjee	1965	1967
3	Shri B. Choudhury	1971	1977
4	Shri M.M. Turabi (I/C)	1977	1978
5	Shri B.C. Ghosh (I/C)	06.03.78	06.04.82
6	Shri U.V. Senoy	08.04.82	31.08.82
7	Shri B.C. Ghosh (I/C)	06.09.82	12.12.82
8	Shri P.K.Kar	13.12.82	15.10.85
9	Shri B.C. Ghosh (I/C)	16.10.85	01.12.87
10	Shri B.C. Ghosh	31.12.87	09.03.88
11	Shri B. Sengupta (I/C)	28.03.88	26.03.89
12	Shri B. Sengupta	27.03.89	31.05.93
13	Shri A. Roy (I/C)	01.06.93	17.07.93
14	Dr. S. Mukhopadhyay	18.07.93	03.08.95
15	Shri P. Ray (I/C)	04.08.95	04.02.96
16	Shri S. Santhanam	05.02.96	16.08.96
17	Shri P. Ray (I/C)	17.08.96	26.11.97
18	Shri V.S. Verma	27.11.97	30.07.98
19	Shri P. Ray (I/C)	30.07.98(A/N)	06.07.99
20	Shri B.K. Misra	07.07.99	28.11.03
21	Shri R.B. Sharma	27.11.03	31.01.05
22	Shri M.K.Mitra (I/C)	01.02.05	05.12.05
23	Shri M.K.Mitra	06.12.05	31.02.06
24	Shri K. N. Garg (I/C)	01.04.06	30.04.06
25	Shri Raffi-ud-din	01.05.06	10.09.06
26	Shri R. K. Grover	11.09.06	17.09.09
27	Shri A. K. Rampal	18.09.09	06.09.11
28	Shri A. K. Bandyopadhyaya (I/C)	07.09.11	30.09.14
29	Shri A. K. Bandyopadhyaya	01.10.14	Continuing

INSTALLED AND EFFECTIVE CAPACITY OF POWER STATIONS
IN THE EASTERN REGION AS ON 31.03.2016

SL. N0.	NAME OF THE POWER SYSTEM/ STATION	INSTALLED CAPACITY (MW)			PRESENT CAPACITY (AFTER DERATION) (MW) AS ON 31.03.2016	EFFECTIVE CAPACITY (MW) AS ON 31.03.16
		NO. & CAPACITY OF UNITS ON 31-03-15	ADDITION IN 2015-16	TOTAL AS ON 2015-16		
I	**BSPHCL**					
	THERMAL:					
1	BARAUNI	2x110		220	**2x105**	210
2	MUZAFFARPUR (Kanti, operated by NTPC)	2x110		220	2x110	220
	SUB TOTAL (THERMAL)	**440**		**440**	**430**	**430**
	HYDRO					
3	KOSI	4x5		20	4x5	20
4	SONE WESTERN LINK CANAL HEP	4x1.65		6.6	4x1.65	6.6
5	EASTERN GANDAK CANAL HEP	3x5		15	3x5	15
6	SONE WESTERN LINK CANAL HEP	2x1.65		3.3	2x1.65	3.3
	SUB TOTAL (HYDRO)	**44.9**		**44.9**	**44.9**	**44.9**
	GRAND TOTAL (TH+HY) (BSPHCL)	**484.9**		**484.9**	**474.9**	**474.9**
II	**JUVNL**					
7	PATRATU(THERMAL)*	4x50+2x100+4x110		840	**4x40+2x90+2x105**+2x110	770
	SUB TOTAL (THERMAL)	**840**		**840**	**770**	**770**
8	SUBERNREKHA (HYDRO)	2x65		130	2x65	130
	SUB TOTAL (HYDRO)	**130**		**130**	**130**	**130**
	GRAND TOTAL (TH+HY) (JUVNL)	**970**		**970**	**900**	**900**
	TVNL					
9	**TENUGHAT TPS (THERMAL)**	**2x210**		**420**	**2x210**	**420**
III	**D V C**					
	THERMAL :					
10	BOKARO "B"(U#1,2&3)	3x210		630	3x210	630
11	CHANDRAPURA (U#1-3,7&8) **	3x140+2x250		920	**3x130**+2x250	890
12	DURGAPUR(U#3,4)	1x140+1x210		350	1x140+1x210	350
13	MEJIA(U#1-4, 5-6, 7-8)	4x210+2x250+2x500		2340	4x210+2x250+2x500	2340
14	DURGAPUR STEEL TPS (U#1 & 2))	2x500		1000	2x500	1000
15	KODERMA STPS (U# 1& 2)	2x500		1000	2x500	1000
16	RAGHUNATHPUR(U# 1&2)		2x600	1200	2x600	1200
	SUB TOTAL (THERMAL)	**6240**	**1200**	**7440**	**7410**	**7410**
	HYDRO					
16	MAITHON	2x20+1x23.2		63.2	2x20+1x23.2	63.2
17	PANCHET	2x40		80	2x40	80
18	TILAIYA	2x2		4	2x2	4
	SUB TOTAL(HYDRO)	**147.2**		**147.2**	**147.2**	**147.2**
	GRAND TOTAL (TH+HY) (DVC)	**6387.2**	**1200**	**7587.2**	**7557.2**	**7557.2**

* - JUSNL communicated U#1, 2, 3, 5 & 8 are phased out from their side.
** - Chandrapura U#4,5&6 (120 MW each) has been decommissioned during 2010-11.

ANNEXURE - IV A (Page-2/3)

SL. N0.	NAME OF THE POWER SYSTEM/ STATION	INSTALLED CAPACITY (MW)			PRESENT CAPACITY (AFTER DERATION) (MW) AS ON 31.03.2016	EFFECTIVE CAPACITY (MW) AS ON 31.03.16
		NO. & CAPACITY OF UNITS ON 31-03-15	ADDITION IN 2015-16	**TOTAL AS ON 2015-16**		
IV	**ODISHA**					
	THERMAL					
19	TALCHER TPS (Operated by NTPC)	4x62.5+2x110		470	**4x60**+2x110	460
	OPGC					
20	IB TPS	2x210		420	2x210	420
	SUB TOTAL (THERMAL)	**890**		**890**	**880**	**880**
	HYDRO					
	OHPC					
21	BURLA (Hirakud-I)*	2x49.5+2x32+3x37.5		275.5	2x49.5+2x32+3x37.5	275.5
22	CHIPLIMA (Hirakud-II)	3x24		72	3x24	72
23	BALIMELA	6x60+2x75		510	6x60+2x75	510
24	RENGALI	5x50		250	5x50	250
25	UPPER KOLAB	4x80		320	4x80	320
26	INDRAVATI	4x150		600	4x150	600
27	MACHKUND (Odisha Share)**	57.38		57.38	57.38	57.38
	SUB TOTAL (HYDRO)	**2084.88**		**2084.88**	**2084.88**	**2084.88**
	GRAND TOTAL (TH+HY) (ODISHA)	**2974.88**		**2974.88**	**2964.88**	**2964.88**
V	**WBPDCL**					
	THERMAL					
28	BANDEL @	4x82.5+1x210		540	**4x60**+1x210	450
29	SANTALDIH (U#5&6) ^	2x250		500	2x250	500
30	KOLAGHAT	6x210		1260	6x210	1260
31	BAKRESHWAR	4x210+1x210		1050	5x210	1050
32	SAGARDIGHI (U# 1&2)	2x300		600	2x300	600
	TOTAL THERMAL(WBPDCL)	**3950**		**3950**	**3860**	**3860**
VI	**WBSEDCL**					
33	JALDHAKA-I	3x9		27	3x9	27
34	JALDHAKA-II	2x4		8	2x4	8
35	MASSANJORE	2x2		4	2x2	4
36	MICRO HYDEL	8		8	8	8
37	RAMAM HYDEL	4x12.73		51	4x12.73	51
38	TISTA CANAL FALLS	9x7.5		67.3	9x7.5	67.3
39	PURULIA PUMP STORAGE	4x225		900	4x225	900
	TOTAL HYDRO (WBSEDCL)	**1065.30**		**1065.30**	**1065.30**	**1065.30**
	GRAND TOTAL (TH+HY) (WB)	**5015.30**		**5015.30**	**4925.30**	**4925.30**

* - BURLA U#1&2 uprated from 37.5 MW to 49.5 MW each w.e.f 16.4.98 &1.4.98 and U#3&4 from 24 MW to 32 MW each.

** - Machkund share raised from 34.42 MW to 57.38 MW during 2000-01.

@ - Unit No. 1,2,3,4 of Bandel TPS of WBPDCL has been derated from 82.5 MW to 60 MW w.e.f 22.12.06.

^ - Santaldih U#1,2,3,4 (4x120=480MW) has been decommissioned w.e.f 18.12.09, 04.10.09, 20.09.09 & 07.10.08 respectively.

SL. NO.	NAME OF THE POWER SYSTEM/ STATION	INSTALLED CAPACITY (MW)			**PRESENT CAPACITY (AFTER DERATION)** (MW) AS ON 31.03.2016	**EFFECTIVE CAPACITY (MW) AS ON 31.03.16**
		NO & CAPACITY OF UNITS ON 31-03-15	ADDITION IN 2016-16	**TOTAL AS ON 2015-16**		
VII	**DPL THERMAL**					
40	DPPS *	1x110+1x300+1x250		660	1x110+1x300+1x250	660
	TOTAL(DPL)	**660**		**660**	**660**	**660**
VIII	**CESC THERMAL**					
41	SOUTHERN	2x67.5		135	135	135
42	TITAGARH	4x60		240	240	240
43	BUDGE BUDGE	3x250		750	750	750
	TOTAL (CESC)	**1125**		**1125**	**1125**	**1125**
44	**HALDIA ENERGY LTD. (HEL)**	600		**600**	600	**600**
IX	**SIKKIM**					
45	**HYDRO**	**14**		**14**	**14**	**14**
46	**DIESEL**	**7**		**7**	**7**	**7**
	TOTAL (SIKKIM)	**21**		**21**	**21**	**21**
X	**NTPC**					
46	FARAKKA STPS - I&II	3x200+2x500		1600	3x200+2x500	1600
	FARAKKA STPS - III (U# 6)	1x500		500	1x500	500
47	KAHALGAON STPS - I&II	4x210+3x500		2340	4x210+3x500	2340
48	TALCHER STPS - I	2x500		1000	2x500	1000
49	BARH (U# 4&5)	1x660	1x660	1320	2x660	1320
	TOTAL (NTPC)	**6100**	**660**	**6760**	**6760**	**6760**
XI	**NHPC**					
49	RANGIT HPS	3x20		60	3x20	60
50	TEESTA HPS	3x170		510	3x170	510
51	TLDP-III @@	4x33		132	4x33	132
	TLDP-IV @@		2x40	80	2x40	80
	TOTAL	**702**	**80**	**782**	**782**	**782**
XII	**IPP**					
52	**MPL (Thermal U#1,2)**	2x525		1050	2x525	1050
53	**SSL (Thermal U#1,2,3&4)**	4x600		2400	4x600	2400
54	**APNRL (Thermal U# 1,2)**	2x270		540	2x270	540
55	**GMR (Thermal U# 1,2&3)**	3x350		1050	3x350	1050
56	**JITPL(Thermal U# 1,2)**	2x600		1200	2x600	1200
57	**CHUZACHEN (Hydro U#1,2)**	2x55		110	2x55	110
58	**JORETHANG(Hydro U#1,2)**		2x48	96	2x48	96
	TOTAL IPP (THERMAL + HYDRO)	**6350**	**96**	**6446**	**6446**	**6446**
XIII						
58	**TALCHER SOLAR**	**10**		**10**	**10**	**10**
XIV	**BHUTAN IMPORT**					
59	**CHPS**	4x90		360	4x90	270
60	**KURICHHU HPS**	4x15		60	4x15	60
61	**TALA HPS**	6x170		1020	6x170	867
62	**DAGHACHU**	2x63		126	2x63	126
	TOTAL BHUTAN IMPORT	**1556**		**1556**	**1556**	**1323**
XV	**EASTERN REGION(Excluding Bhutan import)**					
	THERMAL	**27505**	**1860**	**29365**	**29155**	**29155**
	HYDRO	**4298**	**176**	**4474**	**4474**	**4474**
	DIESEL	**7**		**7**	**7**	**7**
	SOLAR	**10**		**10**	**10**	**10**
	ER GRAND TOTAL (Excl. Bhutan)	**31820**	**2036**	**33856**	**33646**	**33646**

Allocated import by ER from Bhutan (90 MW of Chukha power is for own consumption of Bhutan & 15% of Tala power allocated to NR)
100% power of TLDP under NHPC is allocated for West Bengal.
TSTPS Stage-II (4x500 MW) though geographically situated in Orissa but it is meant for SR, hence not considered for I.C. of ER.
Capacity of A&N Island (Installed & Effective Capacity of DG 28.03 MW & 23.56 MW respectively) not considered
Lachung HEP (3MW), Mangley HEP (2 MW), Rangia HEP (5 MW), Meyong Chu HEP (4 MW) are considered in Sikkim Hydro
Gangtok Diesel Power House (4 MW), Ranipool DPH (1 MW) and Jali Power House St.-I (2.1 MW) are considered for Sikkim Diesel

ANNEXURE - IV B

NEW UNITS DECLARED COMMERCIAL IN EASTERN REGION DURING 2015-16

Sl. No.	State	Agency	Power Station	Type	Unit No	Unit Capacity	Dt. of Syn.	Date of Commercial Operation
1	Sikkim	IPP	JLHEP (Jorthang)	Hydro	1	48	20-Sep-15	26-Sep-15
2	Sikkim	IPP	JLHEP (Jorthang)	Hydro	2	48	21-Sep-15	1-Oct-15
3	Bihar	NTPC	BARH - II	Thermal	5	660	17-Sep-15	18-Feb-16
4	West Bengal	NHPC	TLDP - IV	Hydro	1	40	14-Feb-16	11-Mar-16
5	West Bengal	DVC	Raghunathpur	Thermal	1	600	18-Apr-15	31-Mar-16
6	West Bengal	DVC	Raghunathpur	Thermal	2	600	18-Jan-16	31-Mar-16
7	West Bengal	NHPC	TLDP- IV	Hydro	2	40	16-Mar-16	31-Mar-16
TOTAL						**2036**		

ANNEXURE - IV C

NEW TRANSMISSION ELEMENTS COMMISSIONED DURING 2015-16

A. TRANSMISSION LINES ADDITION DURING THE YEAR

Sl. No.	Name of the lines	Organisation	No. of Circuit	Date of Commissioning
1	132 kV Rangit- Sagbari	PGCIL	I	6-May-15
2	132 kV Sagbari- Melli	PGCIL	I	19-May-15
3	220 kV Rangpo- New Melli	PGCIL	I	19-May-15
4	220 kV Rangpo- New Melli	PGCIL	II	19-May-15
5	400 kV Barh- Gorakhpur	PGCIL	II	31-May-15
6	400 kV Barh- Gorakhpur	PGCIL	I	1-Jun-15
7	132 kV Banka- Sultangunj	BSPPCL	I	15-Jul-15
8	220 kV Maithon- Dumka	JUSNL	I	20-Jul-15
9	220 kV Maithon- Dumka	JUSNL	II	20-Jul-15
10	400 kV Ranchi- Chandwa	PGCIL	I	11-Aug-15
11	400 kV Baripada- New Duburi	PGCIL	I	17-Aug-15
12	400 kV New Duburi- Mendhasal	PGCIL	I	17-Aug-15
13	220 kV Sasaram (PG) - Sasaram (BSPTCL)	PGCIL	I	19-Aug-15
14	220 kV Sasaram (BSPTCL) - Arrah (PG)	PGCIL	I	19-Aug-15
15	220 kV Rangpo- Jorethang	PGCIL	I	4-Sep-15
16	220 kV Jorethang - New Melli	PGCIL	I	5-Sep-15
17	400 kV New Duburi- Meeramundali	PGCIL	II	11-Sep-15
18	220 kV Kharagpur- Vidyasagar Park	WBSETCL	I	24-Sep-15
19	220 kV Kharagpur- Vidyasagar Park	WBSETCL	II	24-Sep-15
20	132 kV Mathabhanga- Maynaguri	WBSETCL	I	30-Sep-15
21	132 kV Mathabhanga- Birpara	WBSETCL	I	30-Sep-15
22	132 kV Lakhisarai (PG)- Jamui	BSPTCL	I	5-Oct-15
23	132 kV Lakhisarai (PG)- Jamui	BSPTCL	II	5-Oct-15
24	132 kV Khejuria- Farakka	WBSETCL	I	9-Oct-15
25	132 kV Khejuria- Farakka	WBSETCL	II	9-Oct-15
26	400 kV New Duburi - Meeramundali	OPTCL	I	19-Oct-15
27	220 kV Chaibasa (PG)- Chaibasa (JUSNL)	JUSNL	I	16-Nov-15
28	220 kV Chaibasa (PG)- Chaibasa (JUSNL)	JUSNL	II	16-Nov-15
29	132 kV Rajgangpur- OISL	OPTCL	I	27-Nov-15
30	765 kV New Ranchi- Dharamjaigarh	PGCIL	II	24-Dec-15
31	400 kV Meeramundali- Sterlite	OPTCL/SEL	I	30-Dec-15
32	400 kV Meeramundali- Sterlite	OPTCL/SEL	II	30-Dec-15
33	765 kV Angul- Jharsuguda	PGCIL	I	25-Jan-16
34	132 kV Jamtara- Madhupur	JUSNL	I	26-Jan-16
35	132 kV Jamtara- Madhupur	JUSNL	II	26-Jan-16
36	220 kV Gokarna- Krishnanagar	WBSETCL	I	28-Jan-16
37	220 kV Gokarna- Krishnanagar	WBSETCL	II	28-Jan-16
38	132 kV Ujanu- NBU	WBSETCL	I	29-Jan-16
39	132 kV Ujanu- Silliguri (WB)	WBSETCL	I	29-Jan-16
40	220 kV NJP- TLDP- IV	WBSETCL	I	13-Feb-16
41	220 kV NJP- TLDP- IV	WBSETCL	II	13-Feb-16
42	132 kV Muzaffarpur (PG)- Dhalkebar (Nepal)	PGCIL	II	17-Feb-16
43	132 kV Chuzachen - Mellli	CHUZACHEN	I	27-Feb-16
44	132 kV Rangpo- Gangtok	PGCIL	I	27-Feb-16
45	220 kV Dalkhola (PG)- Kishangunj	PGCIL	I	1-Mar-16
46	220 kV Dalkhola (PG)- Kishangunj	PGCIL	II	1-Mar-16
47	220 kV Kishangunj- Silliguri	PGCIL	I	1-Mar-16
48	220 kV Kishangunj- Silliguri	PGCIL	II	1-Mar-16
49	765 kV Gaya- Varanasi	PGCIL	I	10-Mar-16
50	400 kV Patna - Kishangunj	PGCIL	II	14-Mar-16
51	400 kV Patna - Kishangunj	PGCIL	I	15-Mar-16
52	400 kV Purnea- Kishangunj	PGCIL	I	16-Mar-16
53	400 kV Kishangunj- Binaguri	PGCIL	I	16-Mar-16
54	400 kV Purnea- Kishangunj	PGCIL	II	16-Mar-16
55	400 kV Kishangunj- Binaguri	PGCIL	II	16-Mar-16
56	400 kV Biharshariff- Varanasi	PGCIL	II	29-Mar-16
57	400 kV Biharshariff- Varanasi	PGCIL	I	30-Mar-16

B. SUB-STATIONS / ATRS / REACTORS ADDITION DURING THE YEAR 2015-16

Sl. No.	Substation	Utility	Voltage level (kV)	Date of Commissioning
1	3*500 MVA ICT -III at Angul	POWERGRID	765/400	2-May-15
2	160 MVA ICT- II at Purnea	POWERGRID	220/132	9-Jun-15
3	500 MVA ICT- I at New Purnea	POWERGRID	400/220	10-Jul-15
4	125 MVAr Bus Reactor at Indravati	POWERGRID	400	1-Aug-15
5	80 MVAr Bus Reactor-I at New Duburi	OPTCL	400	17-Aug-15
6	315 MVA ICT- I at New Duburi	OPTCL	400/220	28-Aug-15
7	315 MVA ICT- II at New Duburi	OPTCL	400/220	28-Aug-15
8	150 MVA ATR- I at Chaibasa (JUSNL)	JUSNL	220/132	16-Nov-15
9	150 MVA ATR- II at Chaibasa (JUSNL)	JUSNL	220/132	16-Nov-15
10	50 MVA ATR- I at Chaibasa (JUSNL)	JUSNL	132/33	17-Nov-15
11	50 MVA ATR- II at Chaibasa (JUSNL)	JUSNL	132/33	17-Nov-15
12	80 MVAR Bus Reactor at Chaibasa	POWERGRID	400	24-Nov-15
13	125 MVAr Bus Reactor at Jeypore	POWERGRID	400	30-Nov-15
14	160 MVA ICT- I at Birpara	POWERGRID	220/132	28-Dec-15
15	500 MVA ICT- III at Muzaffarpur	POWERGRID	400/220	30-Dec-15
16	160 MVA ICT- III at Arrah	POWERGRID	220/132	31-Dec-15
17	3 * 500 MVA ICT-III at Angul	POWERGRID	765/400	23-Jan-16
18	50 MVA ATR- I at Madhupur	JUSNL	132/33	26-Jan-16
19	50 MVA ATR- I at Madhupur	JUSNL	132/33	26-Jan-16
20	160 MVA ICT- I at Silliguri	POWERGRID	220/132	29-Jan-16
21	100 MVA ICT at Muzaffarpur (PG)	POWERGRID	220/132	31-Jan-16
22	500 MVA ICT at Kishangunj	POWERGRID	400/220	1-Mar-16
23	125 MVAr Bus Reactor at Kishangunj	POWERGRID	400	14-Mar-16
24	500 MVA ICT at Sasaram	POWERGRID	400/220	30-Mar-16
25	160 MVA ICT- I at Purnea	POWERGRID	220/132	31-Mar-16

ANNEXURE - V

CONSTITUENT-WISE PERFORMANCE DATA DURING 2015-16

SYSTEM	GROSS GENERATION (MU)			AUX. CONSUMPTION (MU)			NET GENERATION (MU)			NET IMPORT (+) / EXPORT (-)**	ENERGY CONSUMP-	PEAK DEMAND
	HYDRO	THERMAL	TOTAL	HYDRO	THERMAL	TOTAL	HYDRO	THERMAL	TOTAL	(MU)	TION (MU)	MET (MW)
BSEB	53.71	705.14	758.85	0.00	70.52	70.52	53.71	634.62	688.33	22228.94	22917.27	3431
JSEB+TVNL	51.30	3230.76	3282.06	0.00	397.97	397.97	51.30	2832.79	2884.09	4425.61	7309.70	1117
DVC	184.68	27592.18	27776.86	1.74	2235.65	2237.39	182.94	25356.53	25539.47	-6465.67	19073.80	2786
ODISHA (OPGC+OHPC+TTPS)	4519.08	6651.11	11170.19	16.43	736.87	753.30	4502.65	5914.24	10416.89	15537.49	25954.38	4152
WBPDCL+WBSEDCL	1562.37	19968.03	21530.40	0.00	2186.98	2186.98	1562.37	17781.05	19343.42	16632.82	35976.24	5901
DPL	0.00	1950.52	1950.52	0.00	221.10	221.10	0.00	1729.42	1729.42	264.61	1994.03	310
CESC	0.00	6988.48	6988.48	0.00	581.15	581.15	0.00	6407.33	6407.33	4394.67	10802.00	2030
HEL	0.00	3596.07	3596.07	0.00	333.29	333.29	0.00	3262.78	3262.78	-3262.78	0.00	
SIKKIM*	36.00	0.00	36.00	0.00	0.00	0.00	36.00	0.00	36.00	345.98	381.98	95
NTPC	0.00	40284.88	40284.88	0.00	3018.36	3018.36	0.00	37266.52	37266.52	-37266.52	0.00	
NHPC (Incl. TLDP)	3543.17	0.00	3543.17	0.00	0.00	0.00	3543.17	0.00	3543.17	-3543.17	0.00	
CHPS (BIR. RECEIPT)	1732.41	0.00	1732.41	0.00	0.00	0.00	1732.41	0.00	1732.41	-1732.41	0.00	
KHPS	103.03	0.00	103.03	0.00	0.00	0.00	103.03	0.00	103.03	-103.03	0.00	
TALA	3320.76	0.00	3320.76	0.00	0.00	0.00	3320.76	0.00	3320.76	-3320.76	0.00	
DACHACHU	270.80	0.00	270.80	0.00	0.00	0.00	270.80	0.00	270.80	-270.80		
MPL (IPP)	0.00	7240.17	7240.17	0.00	459.75	459.75	0.00	6780.42	6780.42	-6780.42	0.00	
Vedant (IPP)#	0.00	8094.48	8094.48	0.00	647.73	647.73	0.00	7446.75	7446.75	-7446.75	0.00	
APNRL (IPP)	0.00	2900.15	2900.15	0.00	243.11	243.11	0.00	2657.04	2657.04	-2657.04	0.00	
GMR(IPP)	0.00	6021.18	6021.18	0.00	470.73	470.73	0.00	5550.45	5550.45	-5550.45	0.00	
JITPL	0.00	6339.96	6339.96	0.00	468.60	468.60	0.00	5871.36	5871.36	-5871.36	0.00	
CHUZACHEN (IPP)	429.86	0.00	429.86	2.39	0.00	2.39	427.47	0.00	427.47	-427.47	0.00	
JOTETHANG(IPP)	116.20	0.00	116.20	0.00	0.00	0.00	116.20	0.00	116.20	-116.20	0.00	
REGION	15923.37	141563.11	157486.48	20.56	12071.81	12092.37	15902.81	129491.30	145394.11	-26271.11	124409.41	18170
		BSEB	JSEB	DVC	ODISHA	WBSEDCL	DPL	CESC	SIKKIM	REGION		
ANNUAL LOAD FACTOR:		76.04	74.50	77.94	71.16	69.41	73.23	60.58	45.77	77.95		

Note: 1. BSEB exchange excluding the exchange with Nepal.
2. Sikkim's generarion & demand figures are estimated
3. Net Import/Export of Energy is including Transmission loss at the periphery of their system.
4. Regional Export = Reg. Net Gen. + Imp. from CPP/IPP by Utility - Reg. Consumption

ANNEXURE-VI

CONSTITUENT WISE PEAK DEMAND MET DURING 2015-16

(All figures in Net MW)

MONTH	BSEB	JSEB	DVC	ODISHA	WBSEDCL	CESC	DPL	SIKKIM	ER
	Peak Demand Met	Peak Demand Met	Peak Demand Met	Peak Demand Met	Peak Demand Met	Peak Demand Met	Peak Demand Met	Peak Demand Met	Peak Demand Met
Apr-15	2920	1064	2590	3867	5513	1806	253	81	17346
May-15	2955	1054	**2786**	3876	5567	**2030**	278	80	17602
Jun-15	2933	1094	2675	3983	5513	2024	277	76	17013
Jul-15	3150	1081	2610	3998	5691	1776	285	61	17632
Aug-15	3103	1091	2618	3999	5499	1757	277	93	17107
Sep-15	3326	1089	2635	3786	5884	1862	290	83	17712
Oct-15	**3431**	1105	2499	3886	**5901**	1815	299	**95**	**18170**
Nov-15	3329	**1117**	2452	3860	5542	1660	248	70	17444
Dec-15	3363	1043	2442	3827	4995	1544	249	74	16993
Jan-16	3375	1026	2484	3731	5161	1315	249	77	16692
Feb-16	3274	1106	2419	3889	5411	1543	255	88	17125
Mar-16	3400	1103	2471	**4152**	5843	1692	**310**	89	18086
MAXIMUM	**3431**	**1117**	**2786**	**4152**	**5901**	**2030**	**310**	**95**	**18170**
MINIMUM	**2920**	**1026**	**2419**	**3731**	**4995**	**1315**	**248**	**61**	**16692**
AVERAGE	**3213**	**1081**	**2557**	**3904**	**5543**	**1735**	**272**	**81**	**17410**

ANNEXURE-VII

Constituent wise net energy consumption during 2014-15										(All Figures in Net MU)
MONTH	BSEB	JSEB	DVC (OWN)	ODISHA	WBSEDCL (OWN)	DPL	CESC	WEST BENGAL (TOTAL)	SIKKIM	ER (TOTAL)
Apr-14	1356	576	1536	2315	3479	157	991	4627	34	**10423**
May-14	1316	564	1588	2368	3198	164	1014	4376	33	**10233**
Jun-14	1377	563	1540	2340	3251	155	980	4386	34	**10227**
Jul-14	1470	581	1618	2226	3375	151	979	4505	34	**10416**
Aug-14	1431	570	1518	2335	3433	137	969	4539	34	**10410**
Sep-14	1516	561	1509	2275	3296	120	993	4410	36	**10298**
Oct-14	1637	612	1554	2229	3275	150	840	4265	34	**10328**
Nov-14	1518	595	1455	2052	2525	147	701	3372	35	**9043**
Dec-14	1648	627	1477	2037	2593	146	648	3388	35	**9231**
Jan-15	1670	591	1559	2012	2825	130	644	3600	36	**9479**
Feb-15	1488	554	1436	1887	2721	138	647	3506	32	**8909**
Mar-15	1654	593	1566	2264	3388	158	819	4366	33	**10469**
TOTAL	**18082**	**6988**	**18357**	**26342**	**37359**	**1754**	**10227**	**49341**	**409**	**119519**
AVERAGE	1507	582	1530	2195	3113	146	852	4112	34	**9956**
MAXIMUM	1670	627	1618	2368	3479	164	1014	4627	36	**10469**
MINIMUM	1316	554	1436	1887	2525	120	644	3372	32	**8909**
% Growth wrt 13-14	***23.42***	***0.75***	***-1.46***	***5.18***	***20.64***	***-4.25***	***4.25***	***15.80***	***-2.55***	***10.32***
Per day Consumption	**49.54**	**19.15**	**50.29**	**72.17**	**102.35**	**4.81**	**28.02**	**135.18**	**1.12**	**327.45**

Constituent wise net energy consumption during 2015-16										(All Figures in Net MU)
MONTH	BSEB	JSEB	DVC (OWN)	ODISHA	WBSEDCL (OWN)	DPL	CESC	WEST BENGAL (TOTAL)	SIKKIM	ER (TOTAL)
Apr-15	1497	555	1525	2129	2764	196	924	3884	48	9631
May-15	1727	591	1678	2086	3146	196	1088	4431	48	10551
Jun-15	1689	578	1658	2181	2994	197	1009	4200	48	10345
Jul-15	1834	557	1611	2253	3111	138	930	4179	22	10445
Aug-15	2081	641	1635	2340	3501	164	974	4639	24	11350
Sep-15	2011	598	1632	2163	3302	161	1020	4483	22	10898
Oct-15	2115	634	1635	2287	3283	170	980	4433	23	11120
Nov-15	1926	641	1566	1996	2530	156	867	3553	25	9710
Dec-15	2043	636	1598	1962	2439	131	744	3314	28	9589
Jan-16	2076	637	1551	2048	2682	158	659	3499	31	9851
Feb-16	1883	595	1421	2129	2752	158	746	3656	31	9717
Mar-16	2035	647	1564	2379	3471	170	861	4501	32	11152
TOTAL	**22917**	**7310**	**19074**	**25954**	**35976**	**1994**	**10802**	**48772**	**382**	**124410**
AVERAGE	1910	609	1589	2163	2998	166	900	4064	32	10363
MAXIMUM	2115	647	1678	2379	3501	197	1088	4639	48	11350
MINIMUM	1497	555	1421	1962	2439	131	659	3314	22	9589
% Growth wrt 14-15	***26.74***	***4.60***	***3.91***	***-1.47***	***-3.70***	***13.66***	***5.62***	***-1.15***	***-6.65***	***4.09***
Per day Consumption	**62.62**	**19.97**	**52.11**	**70.91**	**98.30**	**5.45**	**29.51**	**133.26**	**1.04**	**339.92**

ANNEXURE-VIII (Page-1/4)

INTER-REGIONAL AND INTRA-REGIONAL EXCHANGE OF ENERGY DURING 2015-16

(All figures in MU)

Month	DRAWAL												Total Drawal (Without Loss)	Total Trans. Loss	% age Trans. Loss
	BSEB	JSEB	DVC	ODISHA	WBSEDCL	SIKKIM	WR	SR	NR	NER	B'DESH	NEPAL			
Apr-15	1448.0	300.7	0.0	614.5	1109.5	26.1	328.9	489.9	428.9	239.1	313.1		5298.6	94.4	1.8
May-15	1695.9	351.4	0.0	720.8	1408.7	26.0	513.6	535.3	880.6	269.8	337.1		6739.2	103.9	1.5
Jun-15	1658.1	317.3	0.0	538.8	1402.6	25.5	300.6	628.8	1121.7	64.3	318.8		6376.5	90.8	1.4
Jul-15	1768.6	346.8	0.0	552.8	1479.4	25.5	228.6	684.0	1309.9	0.0	313.1		6708.6	184.8	2.7
Aug-15	1885.0	406.5	0.0	605.3	1649.0	25.3	0.0	907.6	1331.0	0.0	324.8		7134.2	140.5	1.9
Sep-15	1947.0	407.9	0.0	500.3	1593.0	24.2	0.0	533.3	1425.6	0.0	318.0		6749.3	157.2	2.3
Oct-15	2011.2	362.0	0.0	526.0	1465.4	25.2	0.0	716.0	980.2	136.4	333.8		6556.2	133.1	2.0
Nov-15	1846.1	354.8	0.0	674.7	854.9	28.5	191.2	549.0	1162.3	0.0	273.5		5934.9	116.5	1.9
Dec-15	1918.5	361.7	0.0	709.0	696.5	32.5	274.5	463.9	1223.4	0.0	250.1		5930.1	184.1	3.0
Jan-16	1931.7	375.6	0.0	650.8	862.1	35.6	150.5	292.7	702.7	396.7	274.1		5672.5	180.3	3.1
Feb-16	1746.1	371.7	0.0	688.1	856.5	35.4	254.2	547.1	825.1	246.8	281.5	20.3	5872.8	150.9	2.5
Mar-16	1880.7	371.3	0.0	820.6	1220.9	36.3	63.8	533.6	768.6	240.7	342.5	54.1	6333.2	168.4	2.6
TOTAL	21736.9	4327.6	0.0	7602	14598	346	2306	6881	12160	1594	3680	74	75306	1705	2.2

Drawal incl. Trans. Loss	22229	4426	0	7774	14929	354	2358	7037	12435	1630	3764	76	77011
Trans. Loss	492	98	0	172	330	8	52	156	275	36	83	2	1703

INTER-REGIONAL AND INTRA-REGIONAL EXCHANGE OF ENERGY DURING 2015-16

(All figures in net MU)

Month	GENERATION BY							IMPORT FROM					GRAND TOTAL (GEN + IMP)	INJECTION BY																NET TOTAL EXPORT	TOTAL EXP. WITH TRANS. LOSS
	FSTPS (I, II & III)	KhSTPS (I & II)	TSTPS (I)	BARH STPP	TOTAL NTPC	RANGIT HPS	TEESTA HPS	CHPC	KHPS	TALA HPS	DAGH-ACHU	TOTAL HYDRO		DVC	ODISHA	WBSEDCL	MPL	Vedant	APNRL	GMR	JITPL	Chuzachen	JLHEP	NER	NR	SR	WR	B'DESH	TOTAL INJEC.		
Apr-15	834.3	1123.9	615.7	133.9	2707.8	19.0	169.6	140.0	-1.7	72.4		399.3	3107.1	486.1	0.00	0.00	498.5	410.9	150.5	351.4	365.6	22.9		0.0	0.0	0.0	0.0	0.00	5393.0	1799.8	1831.9
May-15	1028.8	1282.0	659.0	277.4	3247.2	24.7	258.4	157.7	0.0	251.2		692.0	3939.2	926.3	0.00	0.00	575.3	485.0	152.0	205.0	516.7	43.7		0.0	0.0	0.0	0.0	0.00	6843.0	2536.4	2575.5
Jun-15	953.2	1104.6	599.9	274.5	2932.2	41.8	305.5	214.0	0.0	422.8		984.1	3916.3	713.0	0.00	0.00	576.3	438.2	137.6	259.7	401.6	24.6		0.0	0.0	0.0	0.0	0.00	6467.3	2434.2	2468.8
Jul-15	989.1	1209.2	623.0	292.1	3113.4	40.8	389.7	277.4	26.3	677.4	47.9	1459.5	4572.9	564.1	0.00	0.00	590.0	230.8	151.2	274.2	378.7	79.3		52.2	0.0	0.0	0.0	0.00	6893.4	2483.4	2553.2
Aug-15	1012.9	1048.6	643.2	327.6	3032.4	42.7	367.5	268.0	21.6	684.6	60.2	1444.6	4477.0	502.6	0.00	0.00	634.3	192.6	189.4	387.8	463.2	80.1		148.7	0.0	0.0	199.0	0.00	7274.7	2215.5	2266.0
Sep-15	874.3	1210.1	321.5	338.3	2744.2	40.0	364.0	257.4	29.6	655.8	63.3	1410.1	4154.3	534.3	0.00	0.00	392.8	401.8	160.9	332.2	490.9	76.6	3.7	87.6	0.0	0.0	271.4	0.00	6906.5	1917.9	1970.9
Oct-15	893.3	1264.4	557.3	376.9	3091.9	42.3	262.7	197.6	24.4	332.3	51.4	910.6	4002.5	415.3	0.00	0.00	538.9	343.6	276.2	378.5	542.4	40.0	41.0	0.0	0.0	0.0	110.9	0.00	6689.4	2055.5	2099.4
Nov-15	1060.8	1196.1	654.0	311.9	3222.8	26.5	152.3	98.9	1.2	122.6	28.1	429.6	3652.4	273.5	0.00	0.00	638.9	278.0	210.1	345.6	525.4	19.8	23.6	84.2	0.0	0.0	0.0	0.00	6051.4	2091.8	2134.5
Dec-15	1101.7	1253.9	661.3	317.5	3334.3	19.1	109.7	55.0	0.0	47.2	16.2	247.2	3581.4	395.0	0.00	0.00	638.3	168.9	314.7	390.0	522.1	13.1	16.0	74.8	0.0	0.0	0.0	0.00	6114.3	2137.1	2205.8
Jan-16	1080.1	1166.6	605.5	446.0	3298.2	15.2	89.9	15.2	0.0	20.5	0.0	140.8	3439.0	521.6	0.00	0.00	577.8	253.3	326.6	247.2	464.8	10.1	12.4	0.0	0.0	0.0	0.0	0.00	5852.8	1816.8	1874.5
Feb-16	974.9	1119.6	623.7	569.3	3287.6	13.2	85.8	17.7	0.0	12.9	0.0	129.6	3417.2	573.2	0.00	0.00	515.3	315.5	288.2	313.3	586.7	5.9	8.4	0.0	0.0	0.0	0.0	0.00	6023.7	2175.1	2230.9
Mar-16	629.2	1212.0	688.1	724.3	3253.6	14.2	131.0	30.3	0.0	19.6	3.6	198.6	3452.2	817.2	0.00	0.00	604.2	340.8	299.7	350.2	613.4	12.8	11.1	0.0	0.0	0.0	0.0	0.00	6501.6	2003.4	2056.6
TOTAL	11432.5	14190.9	7252.2	4389.9	37265.6	339.3	2686.2	1729.2	101.3	3319.1	270.8	8445.9	45711.5	6722.2	0.00	0.00	6780.4	3859.3	2657.0	3835.2	5871.4	428.8	116.2	447.5	0.0	0.0	581.4	0.00	77011.0	25666.8	26264.2

ANNEXURE - VIII (Page-3/4)

INTER-REGIONAL AND INTRA-REGIONAL EXCHANGE OF ENERGY DURING 2014-15

IMPORT BY ODISHA FROM (All figures in net MU)

Month	Meenakshi Power Ltd.	OPCL (Samal)	Arati Steel (G'khal)	Vedant (IPP)	GMR (IPP)	NALCO Angul	IMFA Choudwar	RSP	HIDALCO	NINL Dubri	NBVL K.Prasad	Bhusan Power	Bhusan Steel	Jindal N.Dubri	TSIL Joda	Vedant L'garh	SHYAM Metalics	Vedant J'guda	PSAL K'jhar	VISA Steel	IFFCO P'deep	Aryan Ispat	Yazdani Steel & Power	Narbh-eram	Maitha n Ispat Ltd.	JSPL Angul	MSP J'guda	Shree Ganesh	Action Ispat	SMC Power	Mahavir Ferro Alloys	*Total Odisha Imp. from Captive & IPP*
Apr-15	10.8	2.3	15.0	174.8	133.4	21.3	32.5	0.0	4.6	2.3	17.9	8.8	0.6	46.4	10.8	0.7	0.8	79.9	0.0	0.7	0.002	3.4	0.0	0.0	0.6	15.4	0.4	0.5	8.0	0.4	0.2	592.3
May-15	14.7	8.1	15.6	229.4	105.6	20.5	33.3	0.0	5.3	1.5	16.5	6.1	1.8	49.0	5.6	0.7	0.7	52.0	0.0	0.8	0.0	1.4	0.2	0.0	0.9	12.4	0.3	0.7	4.7	0.7	0.4	588.6
Jun-15	24.1	9.9	15.6	205.4	162.2	21.8	25.9	0.0	3.1	1.1	10.6	7.4	4.2	33.7	7.7	0.7	0.3	67.4	0.0	0.9	0.0	3.4	0.1	0.0	1.1	31.9	1.0	1.0	4.1	0.3	0.3	644.8
Jul-15	26.6	9.8	8.6	147.0	143.8	26.1	31.0	0.0	2.2	1.5	9.8	3.9	3.2	35.2	8.8	0.7	0.4	106.3	0.0	0.1	0.0	1.7	0.0	0.0	0.7	32.7	0.7	0.8	4.2	0.2	0.2	605.7
Aug-15	28.8	9.7	12.9	149.0	168.1	28.1	30.4	0.0	3.3	1.5	11.5	8.6	3.6	34.8	6.1	0.4	0.5	80.1	0.0	0.0	0.0	1.3	0.0	0.0	0.4	46.0	0.5	0.0	3.9	0.2	0.1	629.9
Sep-15	24.9	10.7	20.8	154.2	150.4	23.2	29.2	0.0	3.9	2.0	13.2	18.5	6.8	38.7	6.9	0.5	0.3	94.2	0.0	0.1	0.0	3.6	0.0	0.0	0.4	99.9	0.5	1.0	4.3	0.2	0.2	708.4
Oct-15	24.9	1.7	17.7	155.2	193.5	27.0	31.5	0.0	3.8	1.3	11.8	16.3	4.8	36.2	11.1	0.5	0.5	105.8	0.0	0.1	0.0	4.6	0.4	0.0	0.9	107.9	0.7	1.1	3.6	0.3	0.2	763.4
Nov-15	11.1	2.7	1.8	167.4	169.7	25.7	21.7	0.0	4.2	1.3	6.2	15.9	6.7	1.0	0.0	0.4	0.6	96.5	0.0	0.0	0.0	2.5	0.1	0.0	2.3	12.8	0.8	0.7	3.2	0.4	0.2	555.9
Dec-15	5.2	2.4	17.1	284.6	141.9	25.9	2.8	0.0	3.7	1.6	10.7	21.6	5.2	0.7	13.4	0.5	0.4	8.1	0.0	0.0	0.0	2.0	0.0	0.0	0.6	33.7	0.6	0.9	2.5	0.3	0.2	586.7
Jan-16	8.3	1.1	13.8	235.2	188.4	23.4	2.3	0.0	2.8	1.6	9.8	15.1	4.3	0.0	9.6	0.6	0.0	121.6	0.0	0.1	0.0	1.2	0.2	0.0	0.7	40.1	1.1	1.0	4.6	0.3	0.1	687.0
Feb-16	10.3	1.3	12.5	320.4	157.8	24.1	1.7	0.0	1.6	0.0	8.2	18.6	6.1	9.6	11.1	0.5	0.5	97.1	0.0	0.0	0.0	1.6	0.0	0.0	0.8	26.6	0.2	1.0	4.6	0.3	0.1	716.8
Mar-16	12.5	5.5	11.3	227.6	191.3	27.3	6.4	0.0	2.1	0.0	20.4	12.7	9.0	14.2	12.0	0.5	0.6	93.5	0.0	0.0	0.0	0.0	0.0	0.3	0.3	33.0	0.0	0.9	2.5	0.5	0.1	684.4
TOTAL	202.1	65.3	162.6	2450.2	1906.1	294.3	248.8	0.0	40.7	15.8	146.5	153.6	56.2	299.6	102.9	6.8	5.6	1002.2	0.0	2.9	0.0	26.8	1.0	0.3	9.6	492.3	6.7	9.6	50.4	4.1	2.3	7763.8

ANNEXURE-VIII (Page-4/4)

INTER-REGIONAL AND INTRA-REGIONAL EXCHANGE OF ENERGY DURING 2015-16

(All figures in MU)

Month	Import by DVC From TISCO	IMPORT BY WBSEDCL FROM									REGIONAL Total Imp. from CPP, IPP
		Renuka	Tata Power Haldia	Electro Steel	Concast Bengal	TLDP (NHPC)	Himadri Chem.	Bengal Energy	Crecsent Power	*Total WBSEDCL Imp. from CPP, IPP*	
Apr-15	21.20	0.00	64.84	6.65	0.43	23.83	3.86	22.16	26.16	147.93	761.39
May-15	18.22	0.00	69.30	6.05	0.33	47.32	2.84	21.31	25.94	173.09	779.93
Jun-15	6.95	0.00	54.05	5.03	0.16	75.87	4.92	21.05	24.21	185.29	837.01
Jul-15	17.53	0.00	58.22	5.77	0.27	42.76	4.58	20.76	24.16	156.51	779.73
Aug-15	24.32	0.00	56.37	5.78	0.03	87.39	3.09	19.73	27.04	199.43	853.61
Sep-15	29.89	0.00	51.51	5.69	0.00	89.12	4.25	19.86	25.67	196.09	934.36
Oct-15	26.70	0.00	66.18	4.83	0.72	47.65	5.09	19.70	26.29	170.46	960.58
Nov-15	25.18	0.00	59.79	4.81	0.92	24.20	5.40	17.80	26.41	139.32	720.36
Dec-15	23.02	0.00	64.90	6.41	0.52	17.83	4.77	16.67	24.20	135.31	745.01
Jan-16	6.67	0.00	63.50	6.93	0.49	13.89	5.46	17.08	27.61	134.95	828.65
Feb-16	26.26	0.00	56.84	6.36	0.43	13.09	4.40	16.31	25.94	123.37	866.40
Mar-16	30.59	0.00	62.14	5.28	0.53	35.13	4.81	14.65	27.85	150.38	865.41
TOTAL	256.53	0.00	727.66	56.88	4.82	446.92	46.75	227.07	311.49	1912.14	9932.44

ANNEXURE - IX A

FREQUENCY SUMMARY OF THE EASTERN REGION DURING 2015-16

AVERAGE FREQUENCY IN DIFFERENT PERIODS OF THE DAY

	< -----HOURS----->					
	00-05	**05-10**	**10-17**	**17-22**	**22-24**	**OO-24**
Apr-15	49.95	50.01	49.95	49.98	49.91	49.96
May-15	49.95	50.01	49.91	49.98	49.85	49.95
Jun-15	50.00	50.05	49.98	49.96	49.94	49.99
Jul-15	49.99	50.00	49.98	49.97	49.97	49.98
Aug-15	49.96	49.98	49.97	49.96	49.96	49.97
Sep-15	49.94	49.97	49.92	49.94	49.94	49.93
Oct-15	49.94	49.94	49.93	49.94	49.94	49.94
Nov-15	49.99	49.95	49.98	50.00	49.99	49.98
Dec-15	49.99	49.94	49.96	49.98	50.00	49.97
Jan-16	50.00	49.96	49.99	50.00	50.00	49.99
Feb-16	50.00	49.96	49.98	50.00	50.00	49.99
Mar-16	49.99	49.99	49.98	49.99	49.98	49.99
MAXIMUM	**50.00**	**50.05**	**49.99**	**50.00**	**50.00**	**49.99**
MINIMUM	**49.94**	**49.94**	**49.91**	**49.94**	**49.85**	**49.93**
AVERAGE	**49.98**	**49.98**	**49.96**	**49.98**	**49.96**	**49.97**

ANNEXURE - IX B

AVERAGE FREQUENCY IN PERCENTAGE OF THE TIME (%) INCLUDING MAX. AND MIN. FREQUENCY DURING 2015-16

	FREQUENCY (HZ) IN % OF TIME			INST. FREQ. (HZ)						15 MINUTES INTEGRATED FREQ.	
	<49.9	49.9-50.05	>50.05	MAX	Date	HRS.	MIN	Date	HRS.	MAX	MIN
Apr-15	14.97	**60.22**	24.81	50.71	4-Apr	19:10	49.5	7-Apr	21:04	50.3	49.67
May-15	15.81	**65.05**	19.14	50.55	19-May	18:03	49.55	5-May	14:45	50.4	49.57
Jun-15	9.20	**64.17**	26.03	50.55	13-Jun	15:05	49.56	26-Jun	19:15	50.55	49.69
Jul-15	10.64	**70.29**	19.07	50.33	26-Jul	6:02	49.58	13-Jul	14:39	50.23	49.65
Aug-15	15.64	**70.26**	14.11	50.27	12-Aug	13:04	49.55	3-Aug	19:27	50.19	49.6
Sep-15	30.12	**60.00**	9.87	50.33	20-Sep	16:06	49.52	3-Sep	19:13	50.14	49.65
Oct-15	14.05	**69.60**	16.35	50.33	1-Oct	18:02	49.62	17-Oct	18:22	50.14	49.65
Nov-15	11.48	**67.06**	21.46	50.28	13-Nov	13:02	49.04	21-Nov	7:52	50.19	49.72
Dec-15	16.38	**66.07**	17.55	50.28	13-Dec	13:02	49.64	21-Dec	7:52	50.21	49.72
Jan-16	9.19	**67.96**	22.85	50.39	26-Jan	18:01	49.70	16-Jan	9:13	50.2	49.8
Feb-16	5.62	**70.49**	23.89	50.39	14-Feb	18:03	49.71	19-Feb	9:14	50.03	49.76
Mar-16	8.69	**70.01**	21.29	50.35	7-Mar	18:03	49.68	17-Mar	19:10	50.17	49.75
MAX	**30.12**	**70.49**	**26.03**	**50.71**			**49.71**			**50.55**	**49.80**
MIN	**5.62**	**60.00**	**9.87**	**50.27**			**49.04**			**50.03**	**49.57**
AVG	**13.48**	**66.77**	**19.70**	**50.40**			**49.55**			**50.23**	**49.69**

Note: New IEGC Frequency Band is 49.90 Hz to 50.05 Hz with effect from 00:00 Hrs. of 17.02.2014

Previous IEGC Frequency Band was 49.70 Hz to 50.20 Hz and was effective upto 24:00 Hrs. of 16.02.2014

ANNEXURE-X (Page-1/2)

ENERGY GENERATION BY VARIOUS POWER STATIONS AND PLANT LOAD FACTOR OF THERMAL STATIONS OF EASTERN REGION FOR THE YEAR 2014-15 & 2015-16

(Comparison Statement)

SYSTEM	TYPE	POWER STATION	INSTALLED CAPACITY IN MW	EFFECTIVE CAPACITY IN MW	2014-15		2015-16	
					Generation (MU)	PLF (%)	Generation (MU)	PLF (%)
BSPHCL	*Th*	Barauni	220.00	210.00	**0.00**	**0.00**	**0.00**	**0.00**
		Muzaffarpur	220.00	220.00	**824.31**	**42.77**	**705.14**	**36.49**
		Thermal Total	**440.00**	**430.00**	**824.31**	**21.88**	**705.14**	**18.67**
	Hy	Kosi	20.00	20.00	**0.00**		**31.73**	
		Dehri & others	24.90	24.90	**89.32**		**21.99**	
		Hydro Total	**44.90**	**44.90**	**89.32**		**53.72**	
	Total BSEB		**484.90**	**474.90**	**913.63**		**758.86**	
JUVNL	*Th*	Patratu	840.00	770.00	**773.79**	**11.47**	**594.02**	**8.78**
	Hy	Subarnrekha	130.00	130.00	**33.71**		**51.29**	
	Total JSEB		**970.00**	**900.00**	**807.50**		**645.31**	
TVNL	*Th*	Tenughat U1	210.00	210.00	**1013.55**	**55.10**	**1272.69**	**68.99**
		U 2	210.00	210.00	**1366.72**	**74.29**	**1364.05**	**73.95**
	Total TVNL		**420.00**	**420.00**	**2380.27**	**64.70**	**2636.74**	**71.47**
DVC	*Th*	Bokaro-B (U 1-3)	630.00	630.00	**1634.38**	**29.61**	**1859.85**	**33.61**
		Chandrapura(U1-3)	420.00	390.00	**1738.79**	**50.90**	**2211.43**	**64.55**
		Chandrapura(U 7-8)	500.00	500.00	**3237.24**	**73.91**	**2864.06**	**65.21**
		Durgapur(U 3-4)	350.00	350.00	**1302.22**	**42.47**	**903.84**	**29.40**
		Mezia(U 1-6)	1340.00	1340.00	**6247.22**	**53.22**	**5792.48**	**49.21**
		Mezia(U 7-8)	1000.00	1000.00	**5373.52**	**61.34**	**6193.70**	**70.51**
		Durgapur STPS (U 1-2)	1000.00	1000.00	**3823.24**	**43.64**	**4440.01**	**50.55**
		Koderma STPS (U 1-2)	1000.00	1000.00	**1822.75**	**23.15**	**3326.80**	**37.87**
		Raghunathpur (U 1-2)	1200.00	1200.00				
		Thermal Total*	**7440.00**	**7410.00**	**25179.36**	**47.05**	**27592.17**	**50.58**
	Hy	Maithon	63.20	63.20	**137.27**		**106.75**	
		Panchet	80.00	80.00	**129.14**		**69.17**	
		Tilaya	4.00	4.00	**9.59**		**8.78**	
		Hydro Total	**147.20**	**147.20**	**276.00**		**184.70**	
	Total DVC		**7587.20**	**7557.20**	**25455.36**		**27776.87**	
WBPDCL	*Th*	Bandel	540.00	450.00	**1094.77**	**27.77**	**1110.04**	**28.08**
		Santaldih(U 5-6)	500.00	500.00	**3444.35**	**78.64**	**3701.99**	**84.29**
		Kolaghat	1260.00	1260.00	**7199.01**	**65.22**	**5766.15**	**52.10**
		Bakreswar	1050.00	1050.00	**8010.79**	**87.09**	**6669.45**	**72.31**
		Sagardighi TPS	600.00	600.00	**4104.36**	**78.09**	**2720.30**	**51.61**
	Total WBPDCL		**3950.00**	**3860.00**	**23853.28**	**70.54**	**19967.93**	**58.89**
WBSEDCL	*Hy*	Jaldhaka	35.00	35.00	**109.41**		**173.37**	
		Ramam	51.00	51.00	**237.33**		**253.96**	
		Teesta CF	67.30	67.30	**143.27**		**80.03**	
		Micro Hydel	12.00	12.00	**0.00**		**0.00**	
		Purulia PSP	900.00	900.00	**1415.89**		**1055.00**	
	Total WBSEDCL		**1065.30**	**1065.30**	**1905.90**		**1562.36**	
DPL	*Th*	DPPS	**660.00**	**660.00**	**1342.23**	**28.66**	**1950.52**	**33.64**

ENERGY GENERATION BY VARIOUS POWER STATIONS AND PLANT LOAD FACTOR OF THERMAL STATIONS OF EASTERN REGION FOR THE YEAR 2014-15 & 2015-16

(Comparison Statement)

SYSTEM	TYPE	POWER STATION	INSTALLED CAPACITY IN MW	EFFECTIVE CAPACITY IN MW	2014-15		2015-16	
					Generation (MU)	PLF (%)	Generation (MU)	PLF (%)
CESC	Th	New Cossipore			68.93	12.07		
		Titagarh	240.00	240.00	1684.23	80.11	663.83	31.49
		Southern	135.00	135.00	990.20	83.73	531.28	44.80
		Budge-Budge	750.00	750.00	5852.51	89.08	5793.36	87.94
	Total CESC		1125.00	1125.00	8595.87	87.22	6988.47	70.72
HEL	Th	Haldia	600.00	600.00	337.00	45.89	3596.26	68.24
ODISHA (NTPC)	Th	Talcher-I	250.00	240.00	2024.23	96.28	2001.78	94.95
		Talcher-II	220.00	220.00	1756.82	91.16	1760.73	91.11
		Thermal Total	470.00	460.00	3781.05	93.83	3762.51	93.12
		Burla (Hirakud-I)	275.50	275.50	582.40		457.09	
		Chiplima (Hirakud-II)	72.00	72.00	278.46		217.03	
		Balimela	510.00	510.00	1315.75		608.78	
		Rengali	250.00	250.00	746.50		574.97	
		Upper Kolab	320.00	320.00	719.48		727.62	
		Indravati HPS	600.00	600.00	2655.28		1653.32	
		Mckd.(Orissa dr)	57.38	57.38	284.66		280.25	
	Total ODISHA (NTPC + OHPC)	Hydro Total	2084.88	2084.88	6582.53		4519.06	
OPGC	Th		2554.88	2544.88	10363.58		8281.57	
		IB TPS	420.00	420.00	2798.92	76.07	2888.60	78.30
SIKKIM*	Hy	Total	14.00	14.00	36.00		36.00	
NTPC	Th	Diesel	7.10	7.10				
		FSTPS - I&II	1600.00	1600.00	10243.96	73.09	9452.07	67.25
		FSTPS - III (U#6)	500.00	500.00	3232.93	73.81	2907.40	66.20
		KhSTPP-I & II	2340.00	2340.00	15644.30	76.32	15338.30	74.62
		TSTPP - I	1000.00	1000.00	7481.13	85.40	7840.25	89.26
		BARH HPS - II	1320.00	1320.00	1335.53	61.54	4746.87	73.27
	Total NTPC		6760.00	6760.00	37937.85	76.14	40284.89	74.24
NHPC	Hy	Rangit	60.00	60.00	322.10		339.53	
		Teesta HEP	510.00	510.00	2575.39		2686.19	
	Total NHPC	TLDP (NHPC) **	212.00	212.00	385.78		518.07	
			782.00	782.00	3283.27		3543.79	
EASTERN REGION								
		THERMAL (EXCL. IPP)	23125.00	22915.00	107803.93	63.00	110967.25	59.78
		HYDRO	4268.28	4268.28	12206.73		9950.92	
IPP	Th	MPL (U 1&2)	1050.00	1050.00	6683.72	72.66	7240.00	78.50
		SSL (U 1-4)	2400.00	2400.00	8210.17	39.05	8094.48	38.40
		APNRL (U 1&2)	540.00	540.00	2212.56	46.77	2900.14	61.14
		GMR (U 1-3)	1050.00	1050.00	4821.30	52.42	6021.18	65.28
		JITPL(U 1-2)	1200.00	1200.00	586.90	10.76	6339.96	60.15
	Hy	CHUZACHEN (U 1-2)	110.00	110.00	431.46		429.87	
		JORTHANG (U# 1&2)	96.00	96.00			112.54	
EASTERN REGION								
		THERMAL (INCL. IPP)	29365.00	29155.00	130318.58	58.93	141563.01	58.88
		HYDRO	4378.28	4378.28	12638.19		10493.33	
		TOTAL(TH+HY)	33743.28	33533.28	142956.77		152056.34	
IMPORT FROM BHUTAN	Hy							
		CHPC	360.00	270**	1628.74		1732.40	
		KHPS	60.00	60**	46.10		103.03	
		TALA HPS	1020.00	867**	3251.20		3320.77	
GRAND TOTAL (TH+HY) INCLUDING IMPORT FROM BHUTAN					147882.81		157212.54	

* Sikkim's data are estimated as actual data not received.

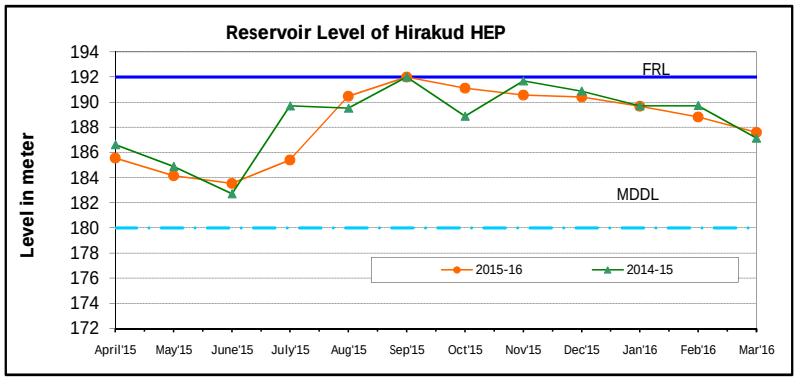
** Actual import by ER from HPS of Bhutan

NOTE: PLF has been calculated based on the capacity and generation of the commercially declared units only.

WATER LEVEL IN THE MAJOR HYDRO RESERVOIRS IN THE REGION DURING 2015-16

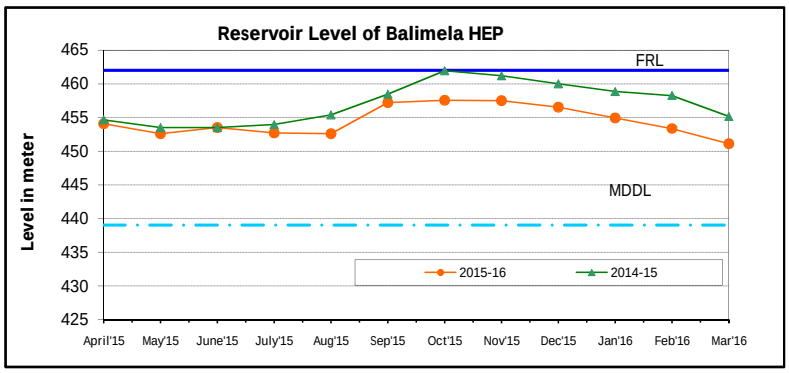
Reservoir Level of Hirakud HEP

Month	FRL	MDDL	**2015-16**	2014-15
April'15	192.00	180.00	**185.570**	186.640
May'15	192.00	180.00	**184.170**	184.900
June'15	192.00	180.00	**183.550**	182.720
July'15	192.00	180.00	**185.430**	189.720
Aug'15	192.00	180.00	**190.490**	189.540
Sep'15	192.00	180.00	**192.020**	192.020
Oct'15	192.00	180.00	**191.140**	188.900
Nov'15	192.00	180.00	**190.590**	191.710
Dec'15	192.00	180.00	**190.420**	190.900
Jan'16	192.00	180.00	**189.700**	189.730
Feb'16	192.00	180.00	**188.850**	189.740
Mar'16	192.00	180.00	**187.610**	187.150



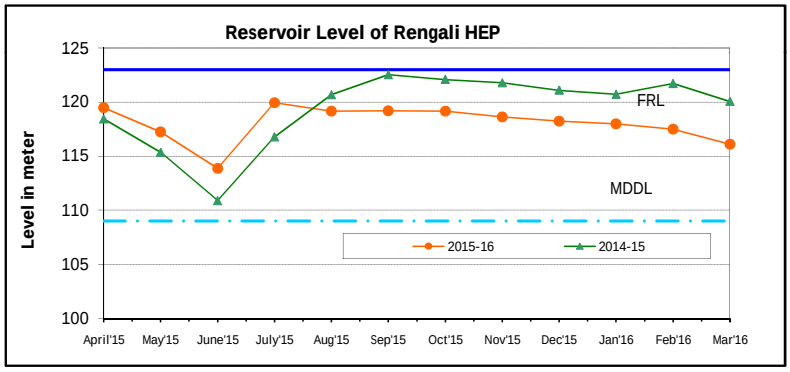
Reservoir Level of Balimela HEP

Month	FRL	MDDL	**2015-16**	2014-15
April'15	462.00	439.00	**454.06**	454.67
May'15	462.00	439.00	**452.54**	453.51
June'15	462.00	439.00	**453.45**	453.51
July'15	462.00	439.00	**452.68**	453.94
Aug'15	462.00	439.00	**452.54**	455.40
Sep'15	462.00	439.00	**457.17**	458.48
Oct'15	462.00	439.00	**457.54**	461.95
Nov'15	462.00	439.00	**457.50**	461.19
Dec'15	462.00	439.00	**456.50**	460.03
Jan'16	462.00	439.00	**454.88**	458.85
Feb'16	462.00	439.00	**453.33**	458.27
Mar'16	462.00	439.00	**451.07**	455.16



Reservoir Level of Rengali HEP

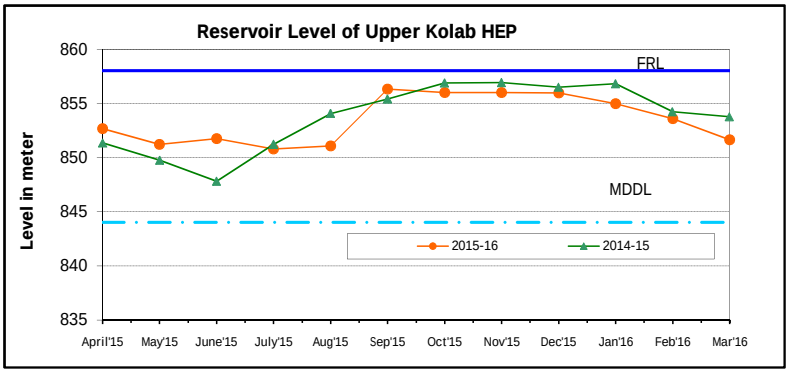
Month	FRL	MDDL	**2015-16**	2014-15
April'15	123.00	109.00	**119.47**	118.42
May'15	123.00	109.00	**117.21**	115.33
June'15	123.00	109.00	**113.85**	110.87
July'15	123.00	109.00	**119.92**	116.77
Aug'15	123.00	109.00	**119.15**	120.67
Sep'15	123.00	109.00	**119.16**	122.52
Oct'15	123.00	109.00	**119.14**	122.07
Nov'15	123.00	109.00	**118.62**	121.78
Dec'15	123.00	109.00	**118.20**	121.08
Jan'16	123.00	109.00	**117.95**	120.70
Feb'16	123.00	109.00	**117.46**	121.70
Mar'16	123.00	109.00	**116.10**	120.05



WATER LEVEL IN THE MAJOR HYDRO RESERVOIRS IN THE REGION DURING 2015-16

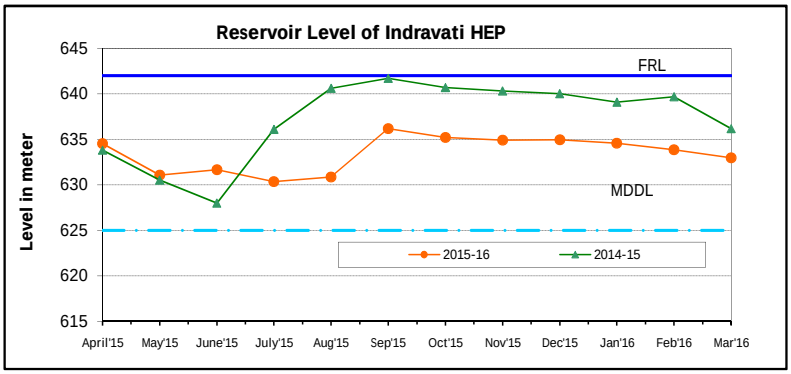
Reservoir Level of Upper Kolab HEP

Month	FRL	MDDL	**2015-16**	2014-15
April'15	858.00	844.00	**852.66**	851.34
May'15	858.00	844.00	**851.23**	849.75
June'15	858.00	844.00	**851.74**	847.82
July'15	858.00	844.00	**850.79**	851.23
Aug'15	858.00	844.00	**851.06**	854.06
Sep'15	858.00	844.00	**856.31**	855.40
Oct'15	858.00	844.00	**856.00**	856.87
Nov'15	858.00	844.00	**855.98**	856.91
Dec'15	858.00	844.00	**855.94**	856.49
Jan'16	858.00	844.00	**854.96**	856.79
Feb'16	858.00	844.00	**853.58**	854.21
Mar'16	858.00	844.00	**851.64**	853.76



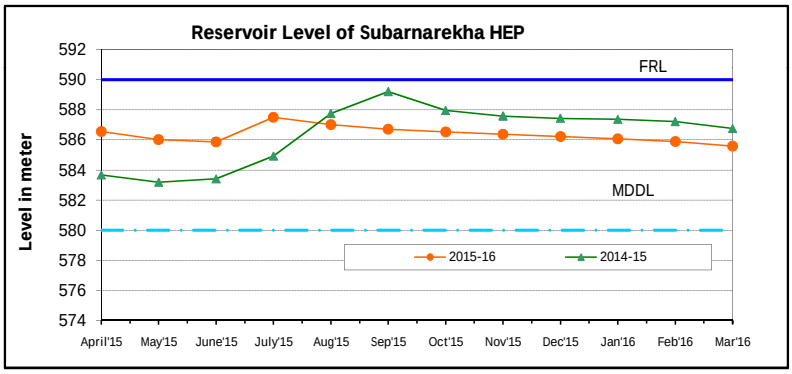
Reservoir Level of Indravati HEP

Month	FRL	MDDL	**2015-16**	2014-15
April'15	642.00	625.00	**634.52**	633.83
May'15	642.00	625.00	**631.10**	630.52
June'15	642.00	625.00	**631.68**	628.00
July'15	642.00	625.00	**630.37**	636.12
Aug'15	642.00	625.00	**630.86**	640.62
Sep'15	642.00	625.00	**636.18**	641.72
Oct'15	642.00	625.00	**635.22**	640.72
Nov'15	642.00	625.00	**634.91**	640.33
Dec'15	642.00	625.00	**634.95**	640.02
Jan'16	642.00	625.00	**634.60**	639.09
Feb'16	642.00	625.00	**633.87**	639.70
Mar'16	642.00	625.00	**632.98**	636.18



Reservoir Level of Subarnarekha HEP

Month	FRL	MDDL	**2015-16**	2014-15
April'15	590.00	580.00	**586.56**	583.69
May'15	590.00	580.00	**586.01**	583.20
June'15	590.00	580.00	**585.86**	583.42
July'15	590.00	580.00	**587.50**	584.94
Aug'15	590.00	580.00	**587.01**	587.75
Sep'15	590.00	580.00	**586.71**	589.21
Oct'15	590.00	580.00	**586.53**	587.96
Nov'15	590.00	580.00	**586.37**	587.59
Dec'15	590.00	580.00	**586.22**	587.44
Jan'16	590.00	580.00	**586.07**	587.38
Feb'16	590.00	580.00	**585.89**	587.23
Mar'16	590.00	580.00	**585.58**	586.77



ANNEXURE - XII A

THERMAL POWER PROJECT UNDER CONSTRUCTION IN THE ER

State	Project Name	Impl. Agency	Unit No.	Capacity (MW)	Expected date of Synchronisation
Bihar					
	Muzaffarpur TPP Exp.	NTPC	U-3	195	Apr'17
			U-4	195	Jun'17
	Nabi Nagar TPP	Joint Venture of NTPC and Railways	U-1	250	**Test Synd. Sep'16**
			U-2	250	Mar'17
			U-3	250	Jun'17
			U-4	250	Dec'17
	New Nabi Nagar STPP	Joint Venture of NTPC and Bihar	U-1	660	Dec'17
			U-2	660	Dec'17
			U-3	660	Dec'17
	Barh-St-II	NTPC	U-1	660	Jan'18
			U-2	660	
			U-3	660	
Jharkhand	BokaroTPS "A"Exp.	DVC	U-1	500	
	Mata shri Usha TPP-Ph-I	Corporate Power Ltd	U-1	270	
			U-2	270	
Orissa	Ind Bharat TPP (Orissa)	Ind. Bharat	U-1	350	**C.O.D on19.07.16**
			U-2	350	Expected any Day
	KVK Nilanchal TPP	KVK Nilachal	U-1	350	
	Lanco Babandh TPP	Lanco Babandh Power Ltd	U-1	660	
West Bengal	Raghunathpur TPP, Ph-II	DVC	U-1	660	
			U-2	660	
	Sagardighi TPP	WBPDCL	U-3	500	**C.O.D on 01.07.16**
			U-4	500	Dec'16

HYDRO POWER PROJECT UNDER CONSTRUCTION IN THE ER

State	Project Name	Impl. Agency	Unit No.	Unit Size & Capacity (MW)	Likely Commissioning Year
Sikkim	Teesta - III	Teesta Urja Ltd.	U-1 to U-6	6x200	Dec'16-Mar'17
	Teesta- VI	Lanco	U-1 to U-4	4x125	2016-17
	Rangit-IV	Jal Power corp. Ltd.	U-1 to U-3	3x40	2016-17
	Bhasmey	Gati Infrastructure	U-1 to U-3	3x17	2016-17
	Tashiding	Shiga Energy Pvt. Ltd.	U-1 to U-2	2x48.5	Dec'16
	Dikchu	Sneha Kinetic Power Proj. Pvt. Ltd.	U-1 to U-3	3x32	Mar'17
	Rangit-II	Sikkim Hydro Power Ltd.	U-1 to U-2	2x33	2017-18
	Rongnichu	Madhya Bharat Power Corp. Ltd.	U-1 to U-2	2x48	2017-18
	Panan	Himgiri Hydro Energy Pvt. Ltd.	U-1 to U-4	4x75	2018-19

ANNEXURE – XII B (Page-1/3)

STATUS OF IMPORTANT TRANSMISSION LINES/ ICTs UNDER CONSTRUCTION

Sl. No.	Name of the Trans. Line	Length (CKM)	Completion Target		Remarks/Constraints
			Schedule	Ant. / Act.	
1.	**EASTERN REGION**				
1.1	**Transmission system for development of Pooling station in Northern Region Part of West Bengal and trans fer of power from Bhutan to N|R/WR**	**168**	**Jan'15**	**Mar'17**	**Gen. Project delayed (ant. in 2017-18). Works slowed down to the extent feasible to match generation.**
1.1.1	LILO of Biswanath Chariali – Agra HVDC line at new pooling station in Alipurduar of parallel operation of the HVDC station.	22		Mar'17	Commissioning matching with associated HVDC terminal.
1.1.2	LILO of 400kv D/C Bongaigaon siliguri line(pvt. Sector line) at New Polling station in Alipurduar.	13		Mar'17	Completion matching with Alipurduar PS
1.1.3	LILO of 400kv D/C Tala – Sliguri line at New Pooling station in Alipurduar.				SCOPE DELAYED
1.1.4	400 KV D/C Punatsangchu-1 (Gen. Proj. In Bhutan – Alipurduar line (HTLS Contd.) India portion.	128		Mar'17	Stage I clearance obtained from WB in Jun'16.
1.1.5	LILO of 220kV D/C Birpara-Salakati line at New Polling station in Alipurduar.	5			Completion matching with Alipurduar PS
1.2	**Eastern Region Strengthening Scheme - III**	**772**	**Nov'12/ Dec'16**	**Jun'17**	
1.2.1	400 kV D/C Sasaram-Daltonganj line	392		Jun'17	Completion matching with Daltanganj s/s.
1.2.2	LILO of 400kv D/C (one ckt) Baripada-Mendhasal line at Dubri (OPTCL)	32			Commissioned
1.2.3	400 KV D/C Baripada-Mendhasal- at Pandiabil.	56			Commissioned
1.3	**Transmission System for Phase-I Generation Projects in Jharkhand and West Bengal-Part-AI.**	**372**	**Jul'16**	**Jul'16**	**Project completed.**
1.3.1	400kv D/C Ranchi (765/400kv S/S)-Jharkhand Pool-Gaya line (Quad)	138		Jul'16	Commissioned
1.3.2	400kv D/C Jharkhand Pool- Gaya line (Quad)	234		Jul'16	Commissioned
1.4	**Transmission System for Transfer of Power from Generation in SIKKIM to NR/WR Part-A**	**52**	**Mar'16**	**Oct'16**	**Revised BPTA Schedule-May'13 land for Kishangang substation acquired in Aug'13.**
1.4.1	LILO of Siliguri (Existing)-Purnea 400 KV D/c line at New Pooling station at Kishanganj	16			Commissioned in Mar'16

1.4.2	LILO of Siliguri (Existing)-Purnea 400 KV D/c line (on which reconductoring is being carried out) at Kishanganj with QUAD Cond.	48		Jun'15	Completion matching with Kishenganj S/s.
1.4.3	LILO of Siliguri-Dalkhola 220KV D/c line at New pooling sation Kishanganj	36			Commissioned in Mar'16
1.4.4	LILO of Gangtok-Melli 132 KV S/c line up to Rangpo	19			Commissioned
1.5	**Eastern Region Strengthing Scheme - V**	**961**	**Apr'16**	**Mar'17**	
1.5.1	400 kV Rajarhat – Purnea line(Tripal) with LILO of one Ckt at Gokarana (WBSETCL) & other Ckt at Farakka(NTPC)	953		Dec'16	Severe row problem in Jharkand area.
1.5.2	LILO of Subhasgram-Jeerat 400 kV S/C line at Rajarhat.	8		Sep'16	
1.6	**Trans mission system associated with Darlipali TPS**	**48**	**Jun'18**	**Jun'18**	
1.6.1	765 kV D/C Darlipalli TPS – Jharsuguda (Sundergarh) Polling Stn. Line.	48		Jun'18	Award placed in Jan'16. Efforts being made to complete in 2016-17 for start up power to NTPC.
1.7	**Eastern Region Strengthing Scheme - XV**	**195**	**Apr'18**	**Apr'18**	
1.7.1	400 kV D/C Farakka – Baharampur line (Twin HTLS)	160		Apr'18	Work under progress.
1.7.2	LILO 400 kV S/C Farakka – Jeerat line at sagardighi.	30		Apr'18	Award place in Apr'16
1.7.3	LILO 400 kV S/C Sagardighi – Subhasgram t line at Jeerat.	2		Apr'18	Award place in Apr'16
1.7.4	Removal of the existing LILO Farakka – Jeerat S/C line at Baharampur.	3		Apr'18	Award place in Apr'16
1.8	**Powergrids works associated with Common trans. System for Phase II Gen. Proj. in Odisha.**	**136**	**Apr'19**	**Apr'19**	
1.8.1	LILO of both Ckt of 400kV D/C Rourkela- Raigarh (2nd line) at Jharsuguda.	136		Apr'19	Award place in Apr'16
1.9	**Associted transmission system for Nabinagar-II TPS.**	**482**	**Jun'19**	**Jun'19**	
1.9.1	400kV D/C Nabinagar II- Gaya Line(Q)	204		Jun'19	Work under progress.
1.9.2	400kV D/C Nabinagar II- Patna Line (Q)	278		Jun'19	
2.	**JUSNL**				
2.1	220kV Govindpur- Dumka D/C				Present status awaited
2.2	220kV Dalton ganj - Garwah				Present status awaited
2.3	400kV Patratu-New Ranchi(PG)				Expected in Oct'16
2.4	400kV Patratu- Latehar				Present status awaited

3.	**DVC**				
3.1	220 KV D/C MTPS- Ramgarh line via Gola	342	Dec' 08	Mar'16	Working clearance obtained in 6.3.13. 108ckm of line has been charged at 220 kV from MTPS end on 09.09.15.
3.2	220 KV D/C Gola-Ranchi Line	112	Nov,14	Jul'16	Railway Crossing proposal, Line crossing proposal and PTCC proposal to be submitted in Feb'14.
3.3	220 KV D/C Koderma – Giridih	212			Commissioned.
3.4	2nd Circuit LILO of MTPS-Kalyaneswari line at Burnpur Sub-station	37	Dec'10	Mar'16	Severe ROW problem in most locations.
4.	**ODISHA**				
4.1	220 KV D/C line from Bidanasi to Cuttack	20.84			Commissioned.
4.2	400 KV line from Meramundali to Mendhasal	200			Commissioned.
4.3	Construction of 2 nos. 220kv feeders from 220/132/33 kv Grid s/s of OPTCL at Jaynagar to 400/220 kv Grid s/s of PGCIL at Jaynagar having line length of approx. 8.608 kms with 2 nos. of 220 kv bay extension at each end.	15	--		Commissioned.
4.4	Commissioning of 220kV/132kV Cuttack S/s				Expected in Sep'16
5.	**WBSETCL**				
5.1	Subhasgram (PG) – Saintala 220 KV D/C line (ACSR Zebra)	25	--	--	Converted to M/C line. Work will be carried jointly with CESC.
5.2	TLDC-IV-NJP 220 KV D/C (ACSR Zebra)-ckt-2				Commissioned.
5.3	Santaldhi TPS-Bishnupur 220 KV D/C	224			Work held up due to Contractual problem.
5.4	Raghunathpur to Hura 220 KV D/C	72			
5.5	2x160MVA 220/132kV Singur S/s				Present status awaited
5.6	220kV Arambagh- Rishra LILO at Singur				Present status awaited

BENEFICIARY % Weighted Average for the month of Apr-15

		1600	425	840	1500	1000	660	1020	270	60	510	60
ER	FSTPP		FSTPP-III	KHSTPP-I	KHSTPP-II	TSTPP-I	BARH-II (U-4)	TALA	CHUKHA	RANGIT	TEESTA-STG V	KIRUCHHU
BIHAR		31.397867	21.517874	41.858039	4.979867	41.245380	76.564706	25.500000	29.630000	35.000000	21.260000	0.000000
JHARKHAND		8.574292	6.948474	3.200751	1.248565	7.667664	7.129412	11.460000	10.740000	13.330000	12.340000	0.000000
DVC		0.000000	6.360000	0.000000	0.000000	0.310000	0.000000	5.540000	10.370000	10.000000	8.640000	50.000000
(DVC-RAJ)		0.275735	0.275735	0.275735	0.275735	0.275735	0.000000					
(DVC-RAJ_II)		0.091912	0.091912	0.091912	0.091912	0.091912	0.000000					
DVC (Talcher)		0.192231	0.183575	0.157197	0.197531	0.172303	0.000000					
DVC (Unchahar)		0.191680	0.182708	0.157306	0.197934	0.172920	0.000000					
ORISSA		13.630000	16.620000	15.240000	2.050000	31.800000	14.788235	4.250000	15.190000	0.000000	20.590000	0.000000
NVVN Coal Power Aftaab		0.099049	0.000000	0.098249	0.106629	0.099049	0.000000					
NTPC Coal Power Dadri		0.082937	0.162663	0.082268	0.089285	0.082937	0.000000					
(GRIDCO-RAJ)		0.183824	0.183824	0.183824	0.183824	0.183824	0.000000					
(GRIDCO-RAJ-II)		0.091912	0.091912	0.091912	0.091912	0.091912	0.000000					
GRIDCO (Faridabad)		0.095840	0.091354	0.078653	0.098967	0.086460	0.000000					
WEST BENGAL		30.540000	31.278940	0.000000	0.000000	9.100000	0.000000	38.250000	31.850000	28.340000	23.980000	50.000000
(WB-RAJ)		0.643382	0.643382	0.643382	0.643382	0.643382	0.000000					
(WB-RAJ_II)		0.275735	0.275735	0.275735	0.275735	0.275735	0.000000					
SIKKIM		1.630000	0.000000	1.550000	0.330000	2.400000	1.517647	0.000000	2.220000	13.330000	13.190000	0.000000
		87.996395	**84.908088**	**63.984963**	**10.861277**	**94.699212**	**100.000000**	**85.000000**	**100.000000**	**100.000000**	**100.000000**	**100.000000**
SR												
TAMIL NADU		1.290000	0.000000	0.700000	0.000000	0.850000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
PUDUCHERY		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ANDHRA PRADESH		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
KERALA		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
KARNATAKA		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		1.290000	**0.000000**	**0.700000**	**0.000000**	**0.850000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
WR												
CHATTISGARH		0.000000	0.000000	0.000000	2.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
GUJRAT		0.000000	0.000000	0.000000	9.400000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MADHYA PRADESH		0.000000	0.000000	0.000000	4.930000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MAHARASHTRA		0.000000	0.000000	0.000000	9.870000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
DADRA & NAGAR HAVELI		0.000000	0.000000	0.000000	0.200000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
DAMAN & DIU		0.000000	0.000000	0.000000	0.130000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
GOA		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		0.000000	**0.000000**	**0.000000**	**26.530000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
NR												
UTTAR PRADESH		2.080000	0.000000	9.120000	16.730000	0.000000	0.000000	4.410000	0.000000	0.000000	0.000000	0.000000
HARYANA		0.690000	0.000000	3.040000	4.580000	0.000000	0.000000	1.470000	0.000000	0.000000	0.000000	0.000000
RAJASTHAN		0.690000	0.000000	3.040000	7.110000	0.000000	0.000000	1.470000	0.000000	0.000000	0.000000	0.000000
JAMMU & KASHMIR		0.850000	0.000000	3.680000	5.560000	0.000000	0.000000	1.770000	0.000000	0.000000	0.000000	0.000000
HIMACHAL PRADESH		0.000000	0.000000	0.000000	1.530000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
DELHI		1.390000	0.000000	6.070000	10.490000	0.000000	0.000000	2.940000	0.000000	0.000000	0.000000	0.000000
PUNJAB		1.390000	0.000000	6.070000	8.020000	0.000000	0.000000	2.940000	0.000000	0.000000	0.000000	0.000000
UTTARAKHAND		0.000000	0.000000	0.000000	1.870000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
CHANDIGARH		0.000000	0.000000	0.000000	0.200000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		7.090000	**0.000000**	**31.020000**	**56.090000**	**0.000000**	**0.000000**	**15.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
NER												
ASSAM		2.455737	15.000000	2.104847	5.093479	2.095419	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
(ASSAM-RAJ)		0.091912	0.091912	0.091912	0.091912	0.091912	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MEGHALAYA		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
NAGALAND		0.429803	0.000000	0.424446	0.000000	0.424823	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ARUNACHAL		0.191917	0.000000	0.191747	0.000000	0.196898	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MIZORAM		0.141736	0.000000	0.141610	0.000000	0.141736	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		3.311105	**15.091912**	**2.954562**	**5.185391**	**2.950787**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
NVVN (BPDB)		0.312500	0.000000	1.190476	1.333333	1.500000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
POWERGRID		0.000000	0.000000	0.150000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		0.000000	**0.000000**	**0.150000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
STERLITE												
		100.000000	100.000000	100.000001	100.000001	100.000000	100.000000	100.000000	100.000000	100.000000	100.000000	100.000000

BENEFICIARY % Weighted Average for the month of Sept-15

		1600	425	840	1500	1000	660	1020	270	60	510	60
ER	FSTPP		FSTPP-III	KHSTPP-I	KHSTPP-II	TSTPP-I	BARH-II (U-4)	TALA	CHUKHA	RANGIT	TEESTA-STG V	KIRUCHHU
BIHAR		31.397867	36.517874	41.858039	4.979867	41.245380	76.564706	25.500000	29.630000	35.000000	21.260000	0.000000
JHARKHAND		8.574292	6.948474	3.200751	1.248565	7.667664	7.129412	11.460000	10.740000	13.330000	12.340000	0.000000
DVC		0.000000	6.360000	0.000000	0.000000	0.310000	0.000000	5.540000	10.370000	10.000000	8.640000	50.000000
(DVC-RAJ)		0.275735	0.275735	0.275735	0.275735	0.275735	0.000000					
(DVC-RAJ_II)		0.091912	0.091912	0.091912	0.091912	0.091912	0.000000					
DVC (Talcher)		0.192231	0.183575	0.157197	0.197531	0.172303	0.000000					
DVC (Unchahar)		0.191680	0.182708	0.157306	0.197934	0.172920	0.000000					
ORISSA		13.630000	16.620000	15.240000	2.050000	31.800000	14.788235	4.250000	15.190000	0.000000	20.590000	0.000000
NVVN Coal Power Aftaab		0.099049	0.000000	0.098249	0.106629	0.099049	0.000000					
NTPC Coal Power Dadri		0.082937	0.162663	0.082268	0.089285	0.082937	0.000000					
(GRIDCO-RAJ)		0.183824	0.183824	0.183824	0.183824	0.183824	0.000000					
(GRIDCO-RAJ-II)		0.091912	0.091912	0.091912	0.091912	0.091912	0.000000					
GRIDCO (Faridabad)		0.095840	0.091354	0.078653	0.098967	0.086460	0.000000					
WEST BENGAL		30.540000	31.278940	0.000000	0.000000	9.100000	0.000000	38.250000	31.850000	28.340000	23.980000	50.000000
(WB-RAJ)		0.643382	0.643382	0.643382	0.643382	0.643382	0.000000					
(WB-RAJ_II)		0.275735	0.275735	0.275735	0.275735	0.275735	0.000000					
SIKKIM		1.630000	0.000000	1.550000	0.330000	2.400000	1.517647	0.000000	2.220000	13.330000	13.190000	0.000000
		87.996395	**99.908088**	**63.984963**	**10.861277**	**94.699212**	**100.000000**	**85.000000**	**100.000000**	**100.000000**	**100.000000**	**100.000000**
SR												
TAMIL NADU		1.290000	0.000000	0.700000	0.000000	0.850000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
PUDUCHERY		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ANDHRA PRADESH		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
KERALA		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
KARNATAKA		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		1.290000	**0.000000**	**0.700000**	**0.000000**	**0.850000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
WR												
CHATTISGARH		0.000000	0.000000	0.000000	2.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
GUJRAT		0.000000	0.000000	0.000000	9.400000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MADHYA PRADESH		0.000000	0.000000	0.000000	4.930000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MAHARASHTRA		0.000000	0.000000	0.000000	9.870000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
DADRA & NAGAR HAVELI		0.000000	0.000000	0.000000	0.200000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
DAMAN & DIU		0.000000	0.000000	0.000000	0.130000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
GOA		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		0.000000	**0.000000**	**0.000000**	**26.530000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
NR												
UTTAR PRADESH		2.080000	0.000000	9.120000	16.730000	0.000000	0.000000	4.410000	0.000000	0.000000	0.000000	0.000000
HARYANA		0.690000	0.000000	3.040000	4.580000	0.000000	0.000000	1.470000	0.000000	0.000000	0.000000	0.000000
RAJASTHAN		0.690000	0.000000	3.040000	7.110000	0.000000	0.000000	1.470000	0.000000	0.000000	0.000000	0.000000
JAMMU & KASHMIR		0.850000	0.000000	3.680000	5.560000	0.000000	0.000000	1.770000	0.000000	0.000000	0.000000	0.000000
HIMACHAL PRADESH		0.000000	0.000000	0.000000	1.530000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
DELHI		1.390000	0.000000	6.070000	10.490000	0.000000	0.000000	2.940000	0.000000	0.000000	0.000000	0.000000
PUNJAB		1.390000	0.000000	6.070000	8.020000	0.000000	0.000000	2.940000	0.000000	0.000000	0.000000	0.000000
UTTARAKHAND		0.000000	0.000000	0.000000	1.870000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
CHANDIGARH		0.000000	0.000000	0.000000	0.200000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		7.090000	**0.000000**	**31.020000**	**56.090000**	**0.000000**	**0.000000**	**15.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
NER												
ASSAM		2.455737	0.000000	2.104847	5.093479	2.095419	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
(ASSAM-RAJ)		0.091912	0.091912	0.091912	0.091912	0.091912	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MEGHALAYA		0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
NAGALAND		0.429803	0.000000	0.424446	0.000000	0.424823	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ARUNACHAL		0.191917	0.000000	0.191747	0.000000	0.196898	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MIZORAM		0.141736	0.000000	0.141610	0.000000	0.141736	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		3.311105	**0.091912**	**2.954562**	**5.185391**	**2.950787**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
NVVN (BPDB)		0.312500	0.000000	1.190476	1.333333	1.500000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
POWERGRID		0.000000	0.000000	0.150000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
		0.000000	**0.000000**	**0.150000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.000000**
STERLITE												
		100.000000	100.000000	100.000001	100.000001	100.000000	100.000000	100.000000	100.000000	100.000000	100.000000	100.000000

Slabs for PoC Rates - North Eastern Region (May-June 2015)			
Sl. No.	**Name of Entity**	**PoC Slab Rate (₹MW/Month)**	**Reliability Support Charges Rate (₹/MW/Month)**
1	Assam	305438	22669
2	Mizoram	305438	22669
3	Meghalaya	272649	22669
4	Nagaland	207069	22669
5	Arunachal Pradesh	174279	22669
6	Manipur	75909	22669
7	Tripura	75909	22669

Slabs for PoC Rates - Eastern Region (May-June 2015)			
Sl. No.	**Name of Entity**	**PoC Slab Rate (₹MW/Month)**	**Reliability Support Charges Rate (₹/MW/Month)**
1	West Bengal	141489	22669
2	Orissa	141489	22669
3	Bihar	141489	22669
4	Maithon Power Ltd.	141489	22669
5	Jharkhand	108699	22669
6	DVC	75909	22669
7	Sikkim	43119	22669
8	Bangladesh	43119	22669

Slabs for PoC Rates-Eastern Region (July 2015-September 2015)			
Sl. No.	**Name of Entity**	**PoC Slab Rate (₹/MW/Month)**	**Reliability Support Charges Rate (₹/MW/Month)**
1	Bihar	238571	22034
2	Jharkhand	208226	22034
3	West Bengal	177882	22034
4	Orissa	147537	22034
5	DVC	117193	22034
6	MPL	86848	22034
7	Sikkim	56503	22034
8	Bangladesh	56503	22034

Slabs for PoC Rates-Eastern Region (October-December 2015)			
Srl. No.	**Name of Entity**	**PoC Slab Rate (₹/MW/Month)**	**Reliability Support Charges Rate (₹/MW/Month)**
1	Bihar	278253	21473
2	Jharkhand	182091	21473
3	West Bengal	150037	21473
4	MPL	117983	21473
5	Orissa	117983	21473
6	DVC	117983	21473
7	Sikkim	53874	21473
8	Bangladesh	53874	21473

Slabs for PoC Rates - Eastern Region(January 2016- March 2016)				
Sl. No.	**Name of Entity**	**PoC Slab Rate (₹/MW/Month)**	**Reliability Support Charges Rate (₹/MW/Month)**	**HVDC Charges Rate for ER (₹/MW/Month)**
1	Bihar	272487	23703	7343
2	West Bengal	202125	23703	7343
3	Orissa	166944	23703	7343
4	Jharkhand	131763	23703	7343
5	DVC	96582	23703	7343
6	Bangladesh	61401	23703	7343
7	Sikkim	61401	23703	7343

ANNEXURE-XV-B

DETAILS OF UI TRANSACTIONS FROM APRIL2015 TO MARCH2016

BENEFICIARY	SCHEDULE (MWH)	ACTUAL (MWH)	UI Charges (Rs) Payable (-) /Recievable(+)
BSEB	-21734397.744	-21736873.539	-617954774.894
JSEB	-4394644.410	-4327640.415	-182439926.335
DVC	6590584.277	6740207.166	237872524.763
GRIDCO	-7304011.265	-7600836.824	-462509967.565
SIKKIM	-402838.044	-345981.487	93550189.285
WBSEB	-14442387.694	-14615528.758	-426254512.147
NER	-1104256.665	-1143331.628	-162767191.314
NR	-16954409.285	-12160569.028	10533960069.226
SR	-5513475.175	-6881128.748	-2832262526.160
WR	536605.060	-1724621.366	-5305579584.797
FSTPP-I & II	8996584.281	8751163.309	-501078347.012
KHSTPP-I	5109795.368	5000722.662	-175253388.891
TSTPP	7256873.652	7252220.061	87426578.408
RANGIT	327657.279	339529.561	33283437.038
CHPC	1178619.693	1733886.406	1249350104.519
KHPC	210862.750	83470.684	-252236291.472
THPC	4224930.201	3302188.825	-1827027924.909
KHSTPP-II	9248206.715	9190207.383	-42595496.738
FSTPP-III	2837071.855	2689344.525	-300071064.141
TEESTA	2592074.118	2686186.854	242344748.884
MAITHON R/B	6751109.033	6780441.951	112996695.496
STERLITE	4132991.778	3859719.799	-577279840.163
BARH	4270561.626	4108958.955	-432360076.797
BARH START UP/INFIRM	0.000	368503.207	457674957.114
APNRL	2601492.438	2584666.542	-25301486.807
GMRKEL	3837593.170	3825338.311	-2815286.270
JITPL	5783966.663	5817505.309	130243001.122
TPTCL	480902.573	466537.504	-31475842.995
BRBCL	0.000	-3887.960	-6944167.087
TALCHER SOLAR	3316.337	3146.767	209368.121
JORETHANG HEP	114133.018	115611.864	8189056.693
IND BHARAT	0.000	6242.473	-8195766.582
NVVN BANGLADSEH	-3694404.335	-3680205.936	17003872.767
CHUZACHEN	414560.455	428539.842	27103196.648
NVVN NEPAL	-69380.14	-74441.33	-9760620.92

ANNEXURE-XV-A

Monthwise statement of over/under generation of ISGS & over/under drawal by the constituents

MONTH	BENEFICIARY	SCHEDULE (MWH)	ACTUAL (MWH)	UI Charges (Rs) Payable (-) /Recievable(+)
APRIL' 2015	BSEB	-1425872.7	-1448043.8	-143499887.1
	JSEB	-330929.8	-300681.8	17412840.8
	DVC	470756.8	486122.4	25611781.3
	GRIDCO	-593183.1	-614494.9	-9448725.1
	SIKKIM	-37325.6	-26066.2	19323388.2
	WBSEB	-1125611.7	-1109493.7	-11683063.7
	NER	-210553.8	-236132.7	-55622899.0
	NR	-853276.5	-428854.1	843220054.9
	SR	-470340.4	-489869.8	-27557209.2
	WR	7725.7	-328877.1	-696989889.2
	FSTPP-I & II	806851.3	793346.8	-23317069.6
	KHSTPP-I	335963.6	330441.3	-6346487.7
	TSTPP	616869.6	615675.9	7690759.1
	RANGIT	18960.8	18982.5	1766163.3
	CHPC	55174.6	140010.7	190881208.3
	KHPC	17528.0	-1696.5	-38064538.5
	THPC	177836.1	72388.0	-208787205.0
	KHSTPP-II	794456.4	793450.2	2924487.5
	FSTPP-III	41215.7	40949.4	-352759.9
	TEESTA	164662.4	169641.4	14985514.2
	MAITHON R/B	495384.4	498445.6	12462124.4
	STERLITE	444338.2	410903.8	-49507435.6
	BARH	156505.5	135474.0	-33999470.8
	BARH START UP/INFIRM	0.0	-1536.9	-2992405.7
	APNRL	150019.0	150508.4	3308280.8
	GMRKEL	349812.8	351387.3	6189410.3
	JITPL	353693.6	365616.4	25896641.0
	TPTCL	13111.7	15428.3	4586464.8
	BRBCL	0.0	0.0	0.0
	TALCHER SOLAR	0.0	0.0	0.0
	JORETHANG HEP	0.0	0.0	0.0
	IND BHARAT	0.0	-588.4	-1514537.6
	NVVN BANGLADESH	-314640.0	-313105.9	1653734.6
	CHUZACHEN	22659.1	22893.0	986647.3
MAY' 2015	BSEB	-1688074.0	-1695856.3	-108156596.8
	JSEB	-365933.4	-351415.8	-10326386.0
	DVC	905436.1	926294.9	65361306.5
	GRIDCO	-682529.7	-720750.0	-45770796.1
	SIKKIM	-40304.3	-25972.5	26228932.7
	WBSEB	-1381177.9	-1408732.6	-79226681.0
	NER	-217514.0	-269808.1	-135952263.8
	NR	-1480907.9	-880595.5	1372160219.5
	SR	-427038.6	-535320.5	-184608019.0
	WR	-184019.8	-513569.4	-822121057.7
	FSTPP-I & II	851410.0	832741.1	-38581632.4
	KHSTPP-I	472928.2	464182.3	-12851104.2
	TSTPP	661027.7	659039.1	8011422.1
	RANGIT	24146.3	24725.6	2829465.7
	CHPC	103992.3	155057.3	114896474.9
	KHPC	24915.0	15067.3	-19498382.6
	THPC	324869.9	246989.3	-154203490.9
	KHSTPP-II	819987.9	817770.7	2103556.3

	FSTPP-III	202898.0	196054.3	-12729146.9
	TEESTA	251608.9	258395.3	19157414.4
	MAITHON R/B	573283.08	575262.1716	9080070.405
	STERLITE	484564.3175	485413.8097	7503493.36
	BARH	312085.2151	277399.0178	-69188675.86
	BARH START UP/INFIRM	0	-1214.2512	-2330083.045
	APNRL	152429.385	152017.9594	-990469.8082
	GMRKEL	204544.9075	204960.7954	3384155.711
	JITPL	517672.545	516673.3921	1335335.418
	TPTCL	15834.18	16834.52232	1722013.599
	BRBCL	0	0	0
	TALCHER SOLAR	0	0	0
	JORETHANG HEP	0	0	0
	IND BHARAT	0	-941.74541	-2031890.067
	NVVN BANGLADESH	-337897.53	-337076.9481	1480280.181
	CHUZACHEN	42807.2525	43652.988	-2967483.902
JUNE' 2015	BSEB	-1696035.722	-1658077.504	-35595763.54
	JSEB	-355238.445	-317311.1215	18853050.93
	DVC	716037.395	712969.1295	-3048803.218
	GRIDCO	-523885.0029	-538784.6184	-5894220.166
	SIKKIM	-27619.36539	-25543.3536	2459417.989
	WBSEB	-1387473.821	-1402595.142	-39594727.97
	NER	-73421.67	-64290.19175	-4327633.712
	NR	-1709915.544	-1121734.141	1101732027
	SR	-632626.3075	-628764.7895	92960687.59
	WR	236658.551	-300640.363	-1085535300
	FSTPP-I & II	735831.2584	718609.1247	-29744155.6
	KHSTPP-I	350613.0747	342478.3949	-10551226.41
	TSTPP	605827.4297	599935.0476	4234644.717
	RANGIT	40017.0435	41797.6008	3563425.274
	CHPC	135952	211281.4155	169491184.9
	KHPC	18236.25	18650.1384	819499.032
	THPC	518828.8	416113.2	-203376762.5
	KHSTPP-II	766591.7	762109.9	-2870123.2
	FSTPP-III	253271.2	242539.9	-19148585.5
	TEESTA	296803.9	305541.5	21725160.4
	MAITHON R/B	578039.5	576333.0	2781665.5
	STERLITE	448756.0	438194.2	-13183340.5
	BARH	306239.2	274528.7	-55746887.0
	BARH START UP/INFIRM	0.0	-1179.6	-1980087.8
	APNRL	136874.4	137552.7	3598441.6
	GMRKEL	258922.4	259698.5	4693288.0
	JITPL	399578.3	401601.4	4245862.7
	TPTCL	33899.4	27775.5	-12191447.8
	BRBCL	0.0	0.0	0.0
	TALCHER SOLAR	0.0	0.0	0.0
	JORETHANG HEP	0.0	0.0	0.0
	IND BHARAT	0.0	-1322.7	-2700054.0
	NVVN	-319923.8	-318791.9	630482.3
	CHUZACHEN	22273.5	24608.7	3106217.1
	BSEB	-1792732.9	-1768563.5	-444417.7
	JSEB	-384379.3	-346776.9	29038229.5
	DVC	541327.9	564130.4	18378263.2
	GRIDCO	-542206.9	-552031.5	-15615284.3
	SIKKIM	-34017.4	-25491.8	16819589.8
	WBSEB	-1479400.8	-1496523.1	-42780803.8
	NER	40640.7	52184.6	16429406.4
	NR	-1526300.6	-1309923.6	424878639.5
	SR	-563445.0	-683957.3	-202521944.0
	WR	-157712.5	-228619.1	-171357558.1

JULY'2015	FSTPP-I & II	776289.4	757875.9	-35837428.8
	KHSTPP-I	423325.3	417354.0	-10411184.5
	TSTPP	623972.7	623039.6	8269044.6
	RANGIT	39843.8	40843.4	2156536.3
	CHPC	201473.0	265861.0	144873002.0
	KHPC	27768.0	28010.7	480481.8
	THPC	774415.3	671788.0	-203201932.7
	KHSTPP-II	794207.3	791827.5	-847230.0
	FSTPP-III	241784.0	231205.9	-21460151.2
	TEESTA	375762.0	389731.9	31974681.6
	MAITHON R/B	587795.7	590030.2	10564993.1
	STERLITE	244597.0	230797.4	-32513978.7
	BARH	324454.8	292103.6	-63608996.0
	BARH START UP/INFIRM	0.0	-1856.9	-3466089.9
	APNRL	159395.9	151163.9	-13994021.6
	GMRKEL	271724.9	274187.8	5997145.4
	JITPL	372904.3	378687.2	11565837.9
	TPTCL	50896.3	47922.0	-5890225.1
	BRBCL	0.0	0.0	0.0
	TALCHER SOLAR	0.0	0.0	0.0
	JORETHANG HEP	0.0	0.0	0.0
	IND BHARAT	0.0	-5564.0	-13321027.7
	NVVN BANGLADESH	-313854.5	-313072.5	712999.0
	CHUZACHEN	77925.0	79454.0	3003902.9
AUG'2015	BSEB	-1870932.245	-1885004.95	-70513140.06
	JSEB	-417085.25	-406448.27	5826149.293
	DVC	502247.8046	520565.16	33914498.5
	GRIDCO	-584928.3606	-605249.66	-29054607.76
	SIKKIM	-27846.3695	-25286.80	4942356.076
	WBSEB	-1622295.141	-1648947.56	-56222664.21
	NER	145330.53	148730.92	12050517.68
	NR	-1816349.009	-1330954.79	1179321079
	SR	-736059.275	-907562.82	-361737058.9
	WR	337726.2526	199040.24	-425298921.5
	FSTPP-I & II	765392.083	745445.86	-44669038.21
	KHSTPP-I	480788.2125	470496.93	-18156464.61
	TSTPP	643277.5435	643227.58	7094413.481
	RANGIT	41833	42859.11	2318469.29
	CHPC	197713.25	267969.07	158075605.9
	KHPC	22008	21610.11	-787831.704
	THPC	806555	684640.51	-241390699.9
	KHSTPP-II	583575.3582	578127.07	-8188404.473
	FSTPP-III	279960.6242	267460.04	-26684213.3
	TEESTA	352336.7	367501.08	37589635.36
	MAITHON R/B	628870.86	634254.65	16674161.64
	STERLITE	243687.69	192615.94	-135300783.1
	BARH	346497.0896	327035.82	-46095647.04
	BARH START UP/INFIRM	0	-4416.63	-9423609.512
	APNRL	196761.465	189437.81	-19169738.97
	GMRKEL	398293.62	387822.58	-28076064.86
	JITPL	448355.065	463179.90	40558727.42
	TPTCL	61962.99	60215.29	-4693608.801
	BRBCL	0	0	0
	TALCHER SOLAR	0	0	0
	JORETHANG HEP	0	0	0
	IND BHARAT	0	-4123.13	-7569761.281
	NVVN BANGLADESH	-325723.9475	-324749.88	1824369.087
	CHUZACHEN	77367.035	80012.66	6910657.583
	BSEB	-1935330.0	-1947025.1	-85687804.8
	JSEB	-407446.2	-407885.6	-31483293.0

SEPT'2015	DVC	522114.8	534326.9	38912060.5
	GRIDCO	-494691.8	-500324.1	-7298952.2
	SIKKIM	-24673.8	-24216.6	-166587.2
	WBSEB	-1587148.2	-1592950.8	-35961888.0
	NER	125704.2	87611.6	-129561318.8
	NR	-1774378.0	-1425643.2	1102785657.6
	SR	-465060.6	-533303.2	-227996694.7
	WR	408479.6	271419.8	-449084022.9
	FSTPP-I & II	679911.1	661177.2	-44968305.9
	KHSTPP-I	485148.5	474089.1	-23305942.2
	TSTPP	314688.0	321456.9	20881509.5
	RANGIT	38467.0	39960.0	4388773.6
	CHPC	206885.3	257436.0	113739075.4
	KHPC	23938.3	29572.6	11155969.4
	THPC	769928.5	655813.7	-225947259.8
	KHSTPP-II	740842.5	736039.8	-5369900.9
	FSTPP-III	226604.7	213155.6	-33771441.0
	TEESTA	350610.0	364010.8	41447270.4
	MAITHON R/B	385254.7	392772.1	21670218.6
	STERLITE	414395.2	401815.8	-40280939.2
	BARH	361126.4	338306.9	-60498596.1
	BARH START UP/INFIRM	0.0	4500.0	2106321.6
	APNRL	163507.6	160862.9	-8074658.3
	GMRKEL	328994.4	332249.1	13430182.9
	JITPL	475112.6	490886.9	57484307.5
	TPTCL	63381.0	63279.4	227273.5
	BRBCL	0.0	0.0	0.0
	TALCHER SOLAR	0.0	0.0	0.0
	JORETHANG HEP	1435.0	3069.4	2606618.0
	IND BHARAT	0.0	-1607.0	-5274372.6
	NVVN	-318274.4	-317980.6	198626.6
	CHUZACHEN	74052.7	76751.2	7908029.6
OCT'2015	BSEB	-2050751.6	-2011249.2	51813343.0
	JSEB	-369914.1	-362014.3	3070283.9
	DVC	411421.6	415285.1	1832879.7
	GRIDCO	-527796.3	-525987.4	5363249.5
	SIKKIM	-24131.0	-25216.7	-5238487.3
	WBSEB	-1483375.3	-1465390.3	38950297.5
	NER	-58691.2	-136385.9	-166793539.8
	NR	-1462872.5	-980183.7	1053033247.9
	SR	-457904.0	-716032.9	-599936038.8
	WR	286737.2	110924.7	-394470538.5
	FSTPP-I & II	629531.7	610273.7	-40901963.2
	KHSTPP-I	483997.5	472536.7	-21341408.2
	TSTPP	553367.4	557281.9	13843753.4
	RANGIT	40821.5	42281.4	3886798.3
	CHPC	153753.0	197638.5	98742340.7
	KHPC	27133.5	24350.2	-5510951.4
	THPC	450342.8	332251.8	-233820047.3
	KHSTPP-II	797190.3	791876.4	-6003666.6
	FSTPP-III	299706.4	283022.2	-34031666.6
	TEESTA	252704.4	262670.5	25650531.6
	MAITHON R/B	534747.6	538893.8	11400485.8
	STERLITE	355900.5	343571.7	-21801926.3
	BARH	343372.9	376938.8	-23580021.2
	BARH START UP/INFIRM	0.0	56002.6	75908849.0
	APNRL	276083.5	276192.7	561577.3
	GMRKEL	379491.9	378539.0	-184586.3
	JITPL	534045.0	542389.3	24098789.7

	TPTCL	51494.3	51439.7	-355039.5
	BRBCL	0.0	0.0	0.0
	TALCHER SOLAR	0.0	0.0	0.0
	JORETHANG HEP	37294.85	41035.704	9146139.927
	IND BHARAT	0.0	-1039.3	-2586576.5
	NVVN BANGLADESH	-337036.7	-333771.7	7503624.1
	CHUZACHEN	39005.6	40096.2	2295993.2
NOV'2015	BSEB	-1848626.5	-1846079.8	-11142827.1
	JSEB	-361080.1	-354761.6	245188.8
	DVC	259079.7	273461.2	15856430.8
	GRIDCO	-658471.2	-674682.8	-38508030.7
	SIKKIM	-32341.5	-28461.8	6767661.5
	WBSEB	-861412.5	-854926.9	19257519.9
	NER	-72644.4	84203.1	305016028.7
	NR	-1398985.2	-1162767.4	510264154.7
	SR	-341080.9	-549012.6	-446951579.3
	WR	-79027.9	-191230.0	-273610690.2
	FSTPP-I & II	828289.1	811541.8	-32529821.0
	KHSTPP-I	438703.4	431079.2	-11410553.5
	TSTPP	656019.9	653979.4	2643527.7
	RANGIT	25947.5	26457.2	1979155.6
	CHPC	63655.3	98897.7	79295525.4
	KHPC	16508.0	1233.1	-30244214.9
	THPC	195881.8	122558.0	-145180951.1
	KHSTPP-II	768848.2	765039.3	-1706754.1
	FSTPP-III	269778.9	249216.4	-39477392.9
	TEESTA	146562.0	152294.1	13931212.1
	MAITHON R/B	636222.4	638882.0	7784103.8
	STERLITE	297111.8	278038.8	-37729656.4
	BARH	320666.7	311935.4	-32736188.6
	BARH START UP/INFIRM	0.0	36302.3	50855561.9
	APNRL	207538.7	210084.1	6125171.7
	GMRKEL	346098.1	345581.2	987618.6
	JITPL	528242.9	525393.7	-4460843.7
	TPTCL	28579.4	28159.1	-719730.3
	BRBCL	0.0	0.0	0.0
	TALCHER SOLAR	0.0	0.0	0.0
	JORETHANG HEP	24395.5	23563.9	-878994.4
	IND BHARAT	0.0	-344.3	-1081600.5
	NVVN	-275416.4	-273489.0	1108934.6
	CHUZACHEN	19421.3	19841.5	1120313.8
DEC'2015	BSEB	-1913620.46	-1918531.671	-29852350.65
	JSEB	-344804.18	-361668.2479	-51134193.08
	DVC	366380.92	395015.4662	42208909.7
	GRIDCO	-691602.24	-709034.0118	-49069012.7
	SIKKIM	-35211.32	-32452.1184	5788578.901
	WBSEB	-688547.53	-696549.6079	-17796113.22
	NER	-177327.27	74818.08359	561504682.4
	NR	-1505409.10	-1223444.839	747235162.7
	SR	-271198.08	-463876.7922	-482533698.9
	WR	-44507.82	-274490.3744	-610191862.7
	FSTPP-I & II	857233.33	839264.32	-45149530.15
	KHSTPP-I	467483.19	459338.3354	-14156611.78
	TSTPP	659633.19	661249.3297	8968092.957
	RANGIT	17806.50	19100.616	3153374.473
	CHPC	20984.50	54985.18196	76501534.4
	KHPC	12816.00	-10435.23	-46037435.4
	THPC	106840.50	47149.41563	-118188347.1
	KHSTPP-II	796315.66	794510.4602	3792467.27
	FSTPP-III	285404.66	262387.8557	-50748107.72

	TEESTA	105339.00	109705.3789	10899399.32
	MAITHON R/B	633141.68	638260.9351	13056033.67
	STERLITE	177318.07	168881.1764	-14721790.91
	BARH	323213.34	319372.4293	-7577124.027
	BARH START UP/INFIRM	0.00	-1855.9656	-3820484.218
	APNRL	311288.98	314730.0303	6892150.165
	GMRKEL	391565.69	390021.9573	-695144.6496
	JITPL	520125.55	522118.7554	5938853.855
	TPTCL	16016.58	16197.45019	594414.122
	BRBCL	0.0	0.0	0.0
	TALCHER SOLAR	240.50	323.35365	695978.5635
	JORETHANG HEP	16725.04	15977.872	-363257.7252
	IND BHARAT	0.00	461.45	-80922.89
	NVVN	-250749.37	-250101.09	-630967.01
	CHUZACHEN	12874.47	13018.81	518291.84
JAN'2016	BSEB	-1931801.73	-1931689.446	-42015468.94
	JSEB	-361717.07	-375588.363	-42295117.37
	DVC	514758.07	521600.804	-2215064.609
	GRIDCO	-596666.09	-650799.7899	-96798061.49
	SIKKIM	-39223.35	-35581.4898	5570935.474
	WBSEB	-837618.00	-862064.6372	-40180834.05
	NER	-223279.95	-396747.8911	-341412752.9
	NR	-1347289.10	-702728.8046	1311037167
	SR	-252040.34	-292721.1582	-79874976.72
	WR	193662.28	-150519.3722	-702518839.2
	FSTPP-I & II	827233.30	806304.3385	-44007935.67
	KHSTPP-I	411999.84	403239.3998	-12813167.58
	TSTPP	605674.05	605507.3947	5334348.133
	RANGIT	14652.18	15157.722	1431538.404
	CHPC	15681.00	36764.03406	47436826.63
	KHPC	17448.00	-16097.922	-66420925.56
	THPC	43008.00	20529.37396	-44507679.56
	KHSTPP-II	769462.16	763399.3728	-5419416.759
	FSTPP-III	287365.93	273826.9467	-25648674.84
	TEESTA	86730.00	89949.4158	7505072.022
	MAITHON R/B	576441.11	577824.1734	6351560.016
	STERLITE	276440.32	253253.0842	-58763491.07
	BARH	344574.46	343280.8588	-2243138.094
	BARH START UP/INFIRM	0.00	102685.3127	128800775.1
	APNRL	330834.04	330186.4664	711906.1583
	GMRKEL	248760.21	248836.1402	1291066.111
	JITPL	466885.97	464754.3015	-4504120.082
	TPTCL	0.00	0	0
	BRBCL	0.00	-865.417089	-1598443.591
	TALCHER SOLAR	1053.15	1138.4835	676796.6645
	JORETHANG HEP	12961.43	12419.272	-562183.434
	IND BHARAT	0.00	728.072757	-569748.6073
	NVVN BANGLADESH	-274653.12	-274072.9034	267760.4265
	CHUZACHEN	9889.81	10046.916	436251.0808
	BSEB	-1730726.3	-1746063.7	-48765930.4
	JSEB	-353983.3	-371747.0	-43678448.1
	DVC	561375.1	573224.3	10351874.3
	GRIDCO	-630754.5	-688085.6	-92214727.9
	SIKKIM	-40151.2	-35381.4	5797721.6
	WBSEB	-805533.1	-856453.4	-82545475.3
	NER	-183194.5	-246786.4	-117380138.7
	NR	-1035579.3	-825099.5	362226952.4
	SR	-432361.2	-547107.4	-179771392.9
	WR	-301810.2	-254229.1	109174059.2
	FSTPP-I & II	760066.1	725740.5	-63028490.9

FEB'2016	KHSTPP-I	360687.5	347847.0	-18778082.5
	TSTPP	628792.0	623738.4	-4384651.9
	RANGIT	12061.5	13203.2	2815650.2
	CHPC	7901.6	17702.8	22052781.4
	KHPC	2563.8	-13230.2	-31271967.1
	THPC	22491.7	12393.8	-19993859.6
	KHSTPP-II	784221.3	771725.0	-14627599.2
	FSTPP-III	259462.6	249187.4	-18084138.3
	TEESTA	82614.0	85746.7	6501752.9
	MAITHON R/B	516973.5	515274.2	409246.0
	STERLITE	353819.8	315466.9	-83404685.8
	BARH	396161.3	388261.4	-13781105.5
	BARH START UP/INFIRM	0.0	181073.2	224016209.8
	APNRL	220821.3	212232.4	-12705142.7
	GMRKEL	304226.5	301808.6	-3568676.5
	JITPL	542595.2	532847.6	-11892166.8
	TPTCL	142118.5	135671.6	-14744095.8
	BRBCL	0.0	-775.1	-1234117.3
	TALCHER SOLAR	875.0	520.3	-1293680.6
	JORETHANG HEP	8795.3	8426.1	137482.1
	IND BHARAT	0.0	21274.3	29952418.6
	NVVN-BANGLADESH	-282735.0	-281504.0	913578.1
	CHUZACHEN	5795.2	5881.7	173717.1
	NVVN_NEPAL	-18589.4	-20339.9	-3426552.5
MAR'2016	BSEB	-1849893.6	-1880688.4	-94093930.8
	JSEB	-342133.3	-371341.5	-77968231.9
	DVC	819647.9	817211.3	-9291611.9
	GRIDCO	-777296.2	-820612.5	-78200798.7
	SIKKIM	-39992.8	-36310.8	5256681.5
	WBSEB	-1182793.7	-1220901.1	-78470078.2
	NER	-199305.4	-240728.8	-106717279.8
	NR	-1043146.5	-768639.5	526065707.9
	SR	-464320.4	-533599.5	-131734601.3
	WR	-167306.2	-63831.4	216425035.8
	FSTPP-I & II	478545.7	448842.6	-58342975.6
	KHSTPP-I	398157.1	387640.0	-15131155.6
	TSTPP	687724.1	688089.6	4839714.6
	RANGIT	13100.3	14161.2	2994086.6
	CHPC	15454.0	30282.7	33364544.6
	KHPC	0.0	-13563.6	-26855994.5
	THPC	33932.0	19573.6	-28429689.4
	KHSTPP-II	832508.0	824331.7	-6382912.5
	FSTPP-III	189619.1	180338.6	**-17934785.9**
	TEESTA	126340.9	130998.8	10977104.7
	MAITHON R/B	604954.5	604209.1	762032.5
	STERLITE	392063.0	340767.2	-97575305.9
	BARH	735664.7	724322.0	-23304226.7
	BARH INFIRM/START UP	0.0	0.0	0.0
	APNRL	295938.2	299697.2	8435017.1
	GMRKEL	355157.8	350245.3	-6263681.1
	JITPL	624755.6	613356.4	-20024223.7
	TPTCL	3608.3	3614.4	-11861.7
	BRBCL	0.0	-2247.4	-4111606.2
	TALCHER SOLAR	1147.7	1164.7	130273.4
	JORETHANG HEP	12525.9	11119.6	-1896747.8
	IND BHARAT	0.0	-690.7	-1417693.4
	NVVN-BANGLADESH	-343499.6	-342489.4	1340450.8
	CHUZACHEN	10489.5	12282.1	3610659.0
	NVVN-NEPAL	-50790.8	-54101.5	-6334068.4

Annexure - XVI

STATUS OF REACTIVE CHARGES

RECEIVABLE IN ER POOL AS PER PUBLISHED A/C UPTO 27.03.16 (2015 -16)
AS ON 04.11.16

CONSTITUENT	AMOUNT RECEIVABLE IN THE POOL (Rs.)	AMOUNT RECEIVED IN THE POOL (Rs.)	OUTSTANDING (Rs.)
WBSETCL	97847689	79693561	18154128
JUVNL	0	0	0
GRIDCO	70874354	70874354	0
SIKKIM	152983	152983	0
TOTAL	168875026	150720898	18154128

STATUS OF RGMO OF THE GENERATING UNITS OF EASTERN REGION

Sl. No.	Details of stations/Units required to operate under RGMO/FGMO as per IEGC							Whether operating under RGMO	Whether operating in FGMO with manual intervention to achieve RGMO	whether exempted from FGMO/RGMO by CERC	Whether applied to CERC for exemption/ extension	whether units operating with locked governors	Remarks
	Name of State	Type	Name of Uitlity	Sector (CS/SS/ Private)	Name of Station	Name of Stage/ Unit	Installed capacity (MW)						
1	JHARKHAND	Thermal	TVNL	SS	Tenughat	1	210	No			No		Difficulties in implementing RGMO & exemption not applied.
2				SS		2	210	No			No		
3		Hydro	JSEB	SS	Subarnrekha	1	65	Yes					
4				SS		2	65	Yes					
5	WEST BENGAL	Termal	WBPDCL	SS	Bandel TPS	1	82.5	No			Yes		
6				SS		2	82.5	No			Yes		
7				SS		3	82.5	No			Yes		
8				SS		4	82.5	No			Yes		
9				SS		5	210	No			Yes		
10				SS	Santaldih	5	250	Yes					Unit#6 could not be implemented because of some technical problem and the issue was refereed to manufacturer BHEL.
11				SS		6	250	No					
12				SS	Kolaghat	1	210	No	No	No	Yes	Yes	Nil
13				SS		2	210	No	No	No	Yes	Yes	Nil
14				SS		3	210	No	No	No	Yes	Yes	Nil
15				SS		4	210	No	No	No	Yes	Yes	Nil
16				SS		5	210	No	No	No	Yes	Yes	Nil
17				SS		6	210	No	No	No	Yes	Yes	Nil
18				SS	Bakreshwar	1	210	Yes					
19				SS		2	210	Yes					
20				SS		3	210	Yes					
21				SS		4	210	Yes					
22				SS		5	210	Yes					
23				SS	Sagardighi	1	300	No	No	No	No	Yes	Without OEM support it is not possible to put in FGMO/RGMO. At present OEM support is not available.
24				SS		2	300	No	No	No	No	Yes	
25		Hydro		SS	Raman Hydel	1	12.5	No					Station is not in RGMO. WBSETCL is pursuing with Rammam.
26				SS		2	12.5	No					
27				SS		3	12.5	No					
28				SS		4	12.5	No					
29				SS	PPSS	1	225	No			Yes		
30				SS		2	225	No			Yes		
31				SS		3	225	No			Yes		
32				SS		4	225	No			Yes		
33		Thermal	CESC	SS	Budge-Budge	1	250	Yes					
34				SS		2	250	Yes					
35				SS		3	250	Yes					
36		Thermal	DPL	SS	DPL	7	300	Yes					
37	ODISHA		OPGC	SS	IB TPS	1	210	No					Not adequate response in RGMO
38				SS		2	210	No					
39		Hydro	OHPC	SS	Burla	1	49.5	No			Yes		
40				SS		2	49.5	No			Yes		
41				SS		3	32	No			Yes		
42				SS		4	32	No			Yes		
43				SS		5	37.5	No			Yes		
44				SS		6	37.5	No			Yes		
45				SS		7	37.5	No			Yes		
46				SS	Chiplima	1	24	No			Yes		
47				SS		2	24	No			Yes		
48				SS		3	24	No			Yes		
49				SS	Balimela	1	60	No			Yes		
50				SS		2	60	No			Yes		
51				SS		3	60	No			Yes		
52				SS		4	60	No			Yes		
53				SS		5	60	No			Yes		
54				SS		6	60	No			Yes		
55				SS		7	75	No			Yes		
56				SS		8	75	No			Yes		
57				SS	Rengali	1	50	No			Yes		
58				SS		2	50	No			Yes		
59				SS		3	50	No			Yes		
60				SS		4	50	No			Yes		
61				SS		5	50	No			Yes		
62				SS	Upper Kolab	1	80	No			Yes		
63				SS		2	80	No			Yes		
64				SS		3	80	No			Yes		
65				SS		4	80	No			Yes		
66				SS	Indravati	1	150	No			Yes		
67				SS		2	150	No			Yes		
68				SS		3	150	No			Yes		
69				SS		4	150	No			Yes		

STATUS OF RGMO OF THE GENERATING UNITS OF EASTERN REGION

70	CENTRAL SECTOR	Thermal	DVC	CS	Bokaro-B	1	210	No			Yes		RGMO mode of operation would not be possible for units1, 2 and 3. Because of non-availability of electro-hydraulic governor, digital voltage recorder and CMC. DVC has already applied for exception to Secretary, CERC.
71				CS		2	210	No			Yes		
72				CS		3	210	No			Yes		
73				CS	Chandrapura	1	140	No			Yes		RGMO mode of operation would not be possible for units1, 2 and 3. Because of non-availability of electro-hydraulic governor, digital voltage recorder and CMC.DVC has already applied for exception to Secretary, CERC.
74				CS		2	140	No			Yes		
75				CS		3	140	No			Yes		
76				CS		7	250	No					Efforts are being made for RGMO mode of operation in the new units of CTPS 7 & 8.
77				CS		8	250	No					
78				CS	WARIA	3	210	No			Yes		
79				CS		4	210	No			Yes		
80				CS	Mejia	1	210	No			Yes		
81				CS		2	210	No			Yes		
82				CS		3	210	No			Yes		
83				CS		4	210	Yes					
84				CS		5	250	Yes					
85				CS		6	250	Yes					
86				CS	Mejia - B	7	500	No					Efforts are being made for RGMO mode of operation in the new units 7 & 8.
87				CS		8	500	No					
88				CS	DSTPS	1	500	No					Units 1 & 2 would put in RGMO within a short period.
89				CS		2	500	No					
90		Hydro		CS	Maithon	1	20	No					RGMO mode of operation would not be possible for units1, 2 and 3. Because of non-availability of electro-hydraulic governor, digital voltage recorder and CMC. DVC has already applied for exception to Secretary, CERC.
91				CS		2	20	No					
92				CS		3	23.2	No					
93				CS	Panchet	1	40	No					RGMO mode of operation would not be possible for units1 & 2. Because of non-availability of electro-hydraulic governor, digital voltage recorder.
94				CS		2	40	No					
95		Thermal	NTPC	CS	Farakka STPP-I	1	200	Yes					
96				CS		2	200	Yes					
97				CS		3	200	Yes					
98				CS	Farakka STPP-II	1	500	Yes					
99				CS		2	500	Yes					
100				CS	Farakka-U#6		500	Yes					Kept in RGMO mode from April, 2014.
101				CS	Kahalgoan STPP	1	210	Yes					
102				CS		2	210	Yes					
103				CS		3	210	Yes					
104				CS		4	210	Yes					
105				CS		5	500	Yes					
106				CS		6	500	Yes					
107				CS		7	500	Yes					
108				CS	Talcher STPP Stg-I	1	500	Yes					
109				CS		2	500	Yes					
110		Hydro	NHPC	CS	Rangit	1	20	No					Pondage capacity is to generate power upto 3 hours only.Hence not under the perview of RGMO.
111				CS		2	20	No					
112				CS		3	20	No					
113				CS	Teesta HEP	1	170	Yes					
114				CS		2	170	Yes					
115				CS		3	170	Yes					
116	IPP	Thermal	IPP	PS	Maithon RB TPP	1	525	Yes					Under RGMO since Jan'2014
117						2	525	No					
118					Sterlite	1	600	Yes					
119						2	600	Yes					
120						3	600	Yes					
121						4	600	Yes					
122					Adhunik Power	1	270	No					Not Implemented & exemption not applied.
123						2	270	No					

ANNEXURE - XVIII (Page-1/2)

IMPORTANT MEETINGS HELD DURING 2015-16

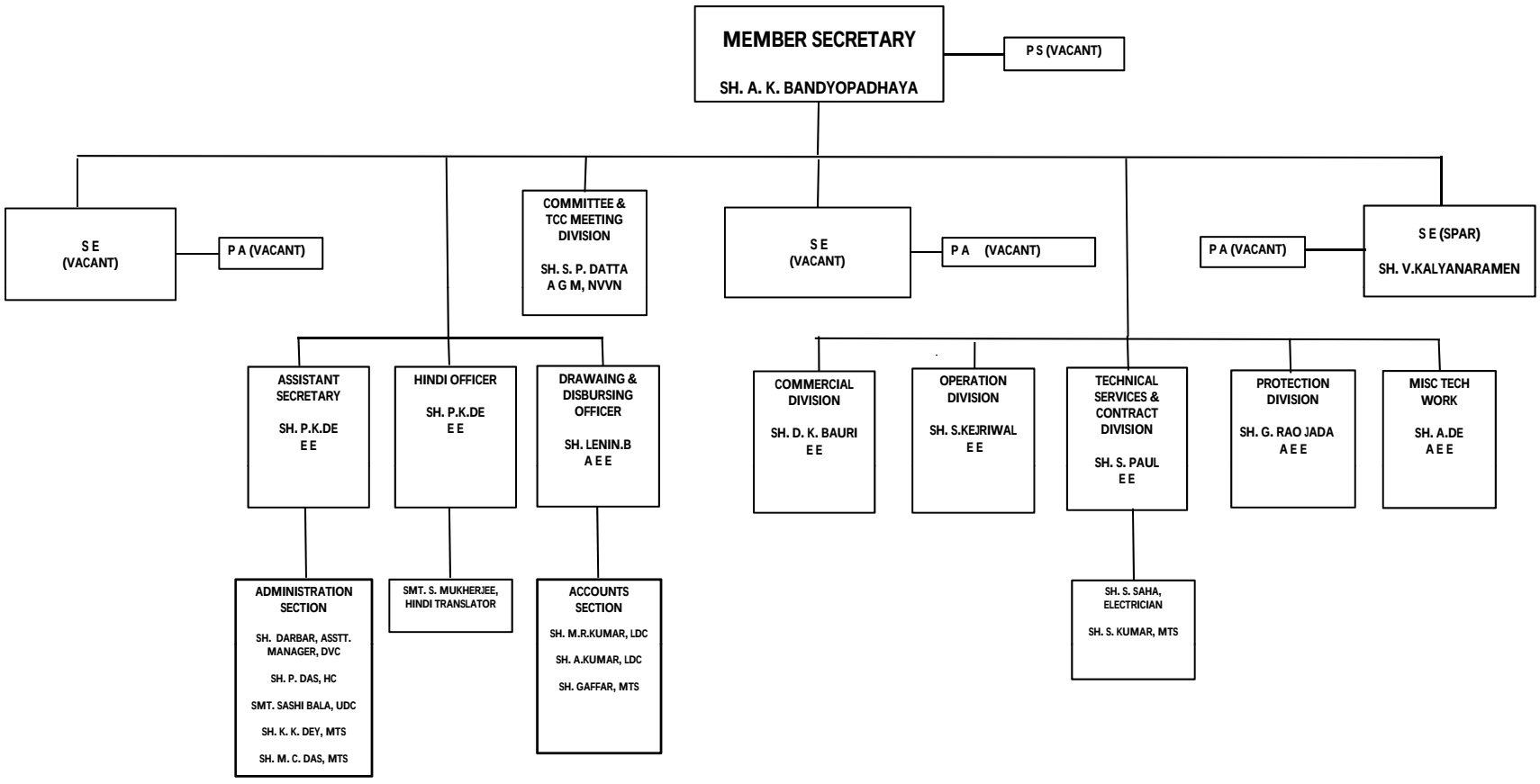
Sl. No	Description	Date	Venue
	A. ERPC MEETINGS		
i)	30th ERPC Meeting	20.06.2015	Simla
ii)	31st ERPC Meeting	14.11.2015	Bhubaneswar
iii)	32nd ERPC Meeting	20.02.2016	Ranchi
	B. TCC MEETINGS		
i)	30th TCC Meeting	19.06.2015	Simla
ii)	31st TCC Meeting	13.11.2015	Bhubaneswar
iii)	32nd TCC Meeting	19.02.2016	Ranchi
	C. OPERATION COORDINATION SUB-COMMITTEE (OCC) MEETINGS		
i)	108th OCC Meeting	17.04.2015	ERPC, Kolkata
ii)	109th OCC Meeting	29.05.2015	ERPC, Kolkata
iii)	110th OCC Meeting	29.06.2015	ERPC, Kolkata
iv)	111th OCC Meeting	24.07.2015	ERPC, Kolkata
v)	112th OCC Meeting	21.08.2015	ERPC, Kolkata
vi)	113th OCC Meeting	14.09.2015	ERPC, Kolkata
vii)	114th OCC Meeting	16.10.2015	ERPC, Kolkata
viii)	115th OCC Meeting	20.11.2015	ERPC, Kolkata
ix)	116th OCC Meeting	23.12.2015	ERPC, Kolkata
x)	117th OCC Meeting	22.01.2016	ERPC, Kolkata
xi)	118th OCC Meeting	26.02.2016	ERPC, Kolkata
xii)	119th OCC Meeting	18.03.2016	ERPC, Kolkata
	D. COMMERCIAL SUB- COMMITTEE MEETINGS		
i)	29th CC Meeting	20.05.2015	ERPC, Kolkata
ii)	30th CC Meeting	16.09.2015	ERPC, Kolkata
iii)	31st CC Meeting	08.02.2016	ERPC, Kolkata
	E. PROTECTION COORDINATION SUB-COMMITTEE (PCC) MEETINGS		
i)	30th PCC Meeting	16.04.2015	ERPC, Kolkata
ii)	31st PCC Meeting	28.05.2015	ERPC, Kolkata
iii)	32nd PCC Meeting	30.06.2015	ERPC, Kolkata
iv)	33rd PCC Meeting	21.07.2015	ERPC, Kolkata
v)	34th PCC Meeting	14.08.2015	ERPC, Kolkata
vi)	35th PCC Meeting	15.09.2015	ERPC, Kolkata
vii)	36th PCC Meeting	15.10.2015	ERPC, Kolkata
viii)	37th PCC meeting	19.11.2015	ERPC, Kolkata
ix)	38th PCC Meeting	28.12.2015	ERPC, Kolkata
x)	39th PCC Meeting	21.01.2016	ERPC, Kolkata
xi)	40th PCC Meeting	25.02.2016	ERPC, Kolkata
xii)	41st PCC Meeting	17.03.2016	ERPC, Kolkata

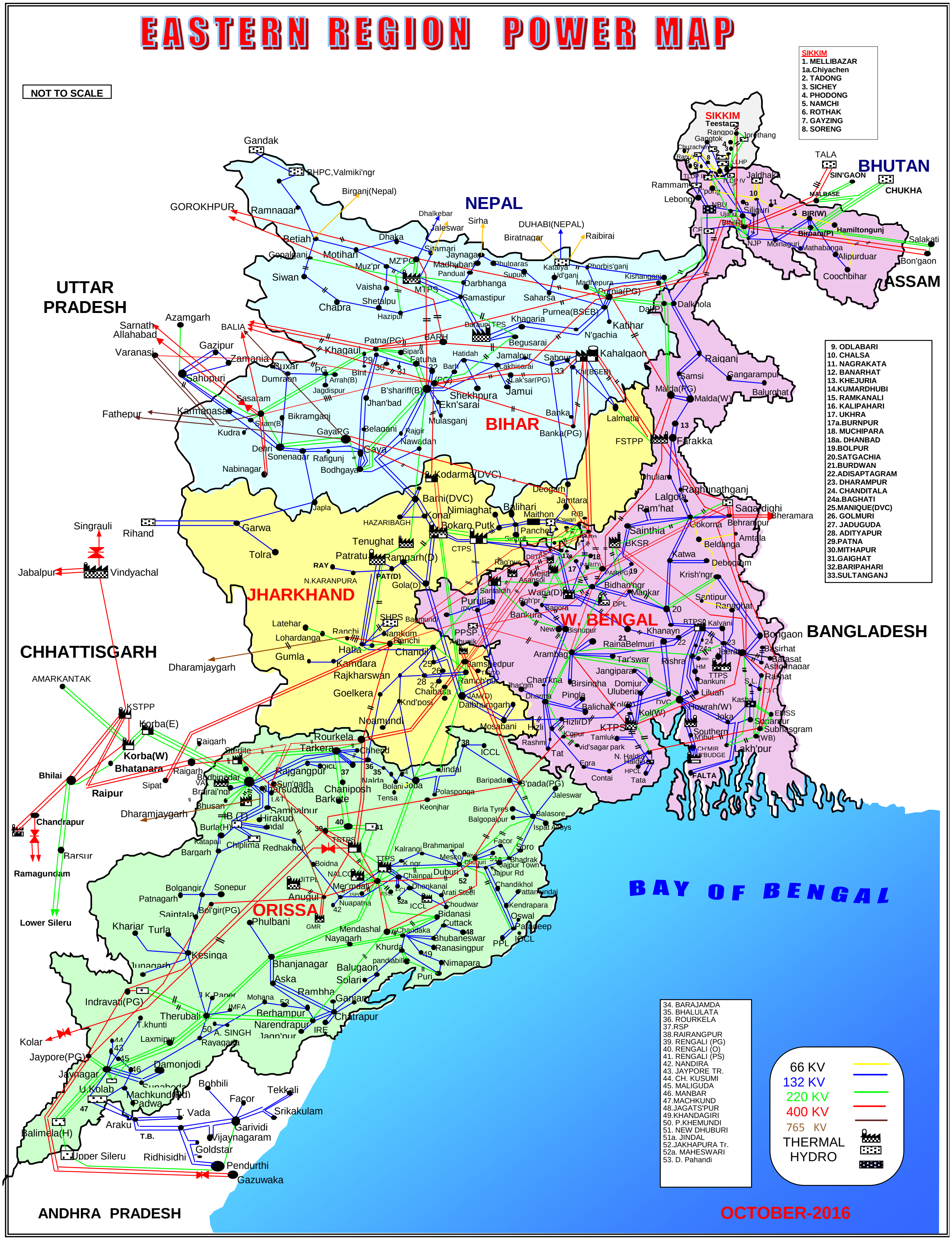
F. SPECIAL MEETINGS

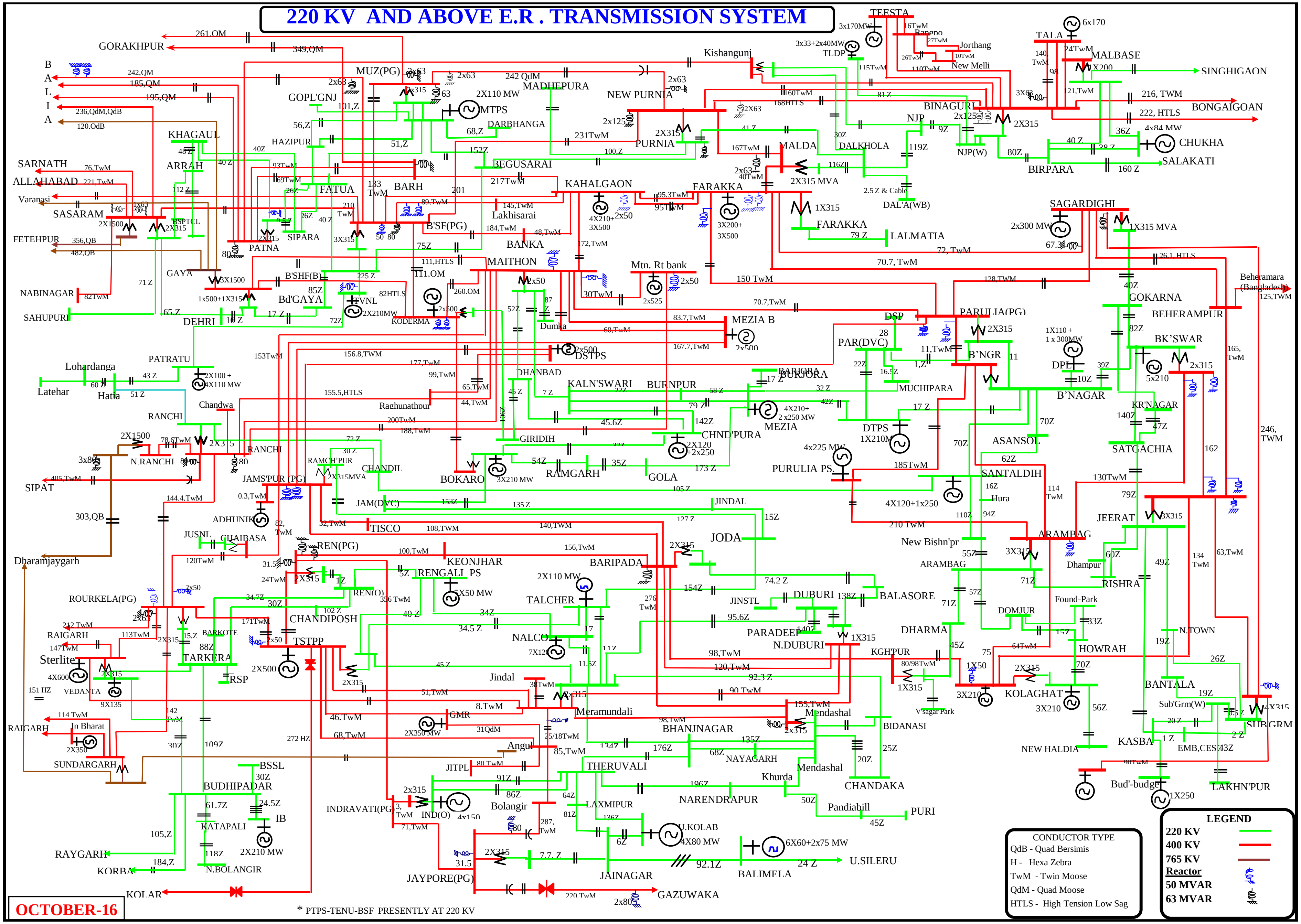
i)	2nd Project Review Meeting for status of ULDC schemes	08.04.2015	ERPC, Kolkata
ii)	Special Meeting for PSS tuning of Budge Budge units of CESC	09.04.2015	ERPC, Kolkata
iii)	Special PCC Meeting	10.04.2015	ERPC, Kolkata
iv)	3rd Project Review Meeting for status of ULDC schemes	02.06.2015	ERPC, Kolkata
v)	Special PCC Meeting	20.07.2015	ERPC, Kolkata
vi)	4th Project Review Meeting for status of ULDC schemes	23.07.2015	ERPC, Kolkata
vii)	special Meeting for Synchronization of unit #1 of IBEUL	10.08.2015	ERPC, Kolkata
viii)	Meeting/Interaction with consultants (M/s Tractabel, Romania) for Task-I: To study the status of implementation of recommendations of Enquiry Committee on Grid Disturbance	31.08.2015 to 04.09.2015	ERPC, Kolkata
ix)	1st State Standing Committee Meeting	21.09.2015	ERPC, Kolkata
x)	5th Project Review Meeting for status of ULDC schemes	24.09.2015	ERPC, Kolkata
xi)	2nd State Standing Committee Meeting	04.12.2015	ERPC, Kolkata
xii)	Special Meeting for Protection team for site visit	08.12.2015	ERPC, Kolkata
xiii)	6th Project Review Meeting for status of ULDC schemes	29.12.2015	ERPC, Kolkata
xiv)	Meeting on LGBR	30.12.2015	ERPC, Kolkata
xv)	Special Meeting for discussion on issue related to flow of power from Ratnagiri	31.12.2015	ERPC, Kolkata
xvi)	19th Electric Power Survey Committee Meeting (by CEA)	11.01.2016	ERPC, Kolkata
xvii)	Meeting for finalization of Electricity Generation Target of ER & NER for 2016-17 (by CEA)	15.01.2016	ERPC, Kolkata
xviii)	3rd State Standing Committee Meeting	28.01.2016	ERPC, Kolkata
xix)	Special Meeting for threadbare deliberation on Bihar Power System	05.02.2016	ERPC, Kolkata
xx)	Special Meeting on BSPTCL & JUSNL	29.03.2016	ERPC, Kolkata

EXHIBIT - I

ORGANISATION CHART OF ERPC, KOLKATA
AS ON 31.03.2016




EASTERN REGION POWER MAP
NOT TO SCALE
SIKKIM
1. MELLIBAZAR
1a.Chiyachen
2. TADONG
3. SICHEY
4. PHODONG
5. NAMCHI
6. ROTHAK
7. GAYZING
8. SORENG
9. ODLABARI
10. CHALSA
11. NAGRAKATA
12. BANARHAT
13. KHEJURIA
14.KUMARDHUBI
15. KANKANALI
16. KALIPAHARI
17. UKHRA
17a.BURNPUR
18. MUCHIPARA
18a. DHANBAD
19.BOLPUR
20.SATGACHIA
21.BURDWAN
22.ADISAPTAGRAM
23. DHARAMPUR
24. CHANDITALA
24a.BAGHATI
25.MANIQUE(DVC)
26. GOLMURI
27. JADUGUDA
28. ADITYAPUR
29.PATNA
30.MITHAPUR
31.GAIGHAT
32.BARIPAHARI
33.SULTANGANJ
34. BARAJAMDA
35. BHALULATA
36. ROURKELA
37.RSP
38.RAIRANGPUR
39. RENGALI (PG)
40. RENGALI (O)
41. RENGALI (PS)
42. NANDIRA
43. JAYPORE TR.
44. CH. KUSUMI
45. MALIGUDA
46. MANBAR
47.MACHKUND
48.JAGATS'PUR
49.KHANDAGIRI
50. P.KHEMUNDI
51. NEW DHUBURI
51a. JINDAL
52.JAKHAPURA Tr.
52a. MAHESWARI
53. D. Pahandi
66 KV
132 KV
220 KV
400 KV
765 KV
THERMAL
HYDRO
UTTAR PRADESH
NEPAL
BHUTAN
ASSAM
BIHAR
JHARKHAND
W. BENGAL
BANGLADESH
CHHATTISGARH
ORISSA
ANDHRA PRADESH
BAY OF BENGAL
OCTOBER-2016


220 KV AND ABOVE E.R . TRANSMISSION SYSTEM
GORAKHPUR
MUZ(PG)
MADHEPURA
NEW PURNIA
Kishanganj
TEESTA
TALA
MALBASE
SINGHIGAON
BONGAIGOAN
CHUKHA
SALAKATI
BIRPARA
BINAGURI
NJP
MALDA
DALKHOLA
PURNIA
DARBHANGA
MTPS
BEGUSARAI
KAHALGAON
FARAKKA
LALMATIA
SAGARDIGHI
KHAGAUL
ARRAH
SARNATH
ALLAHABAD
Varanasi
SASARAM
FETEHPUR
NABINAGAR
SAHUPURI
GAYA
DEHRI
PATNA
SIPARA
BARH
FATUA
Lakhisarai
BANKA
MAITHON
B'SF(PG)
Bd'GAYA
KODERMA
Mtn. Rt bank
MEZIA B
DSTPS
PARULIA(PG)
DSP
PAR(DVC)
GOKARNA
BEHERAMPUR
BK'SWAR
Beheramara (Bangladesh)
Lohardanga
Latehar
Hatia
PATRATU
RANCHI
Chandwa
N.RANCHI
SIPAT
DHANBAD
KALN'SWARI
BURNPUR
BURJORA
MUCHIPARA
B'NAGAR
DPL
KR'NAGAR
SATGACHIA
MEZIA
CHND'PURA
DTPS
ASANSOL
GIRIDIH
RAMGARH
GOLA
BOKARO
PURULIA PS
SANTALDIH
JAMS'PUR (PG)
CHANDIL
JAM(DVC)
JINDAL
TISCO
ADHUNIK
JUSNL
CHAIBASA
REN(PG)
KEONJHAR
BARIPADA
JODA
RENGALI PS
New Bishn'pr
ARAMBAG
JEERAT
Dharamjaygarh
ROURKELA(PG)
RAIGARH
Sterlite
VEDANTA
TARKERA
CHANDIPOSH
TSTPP
TALCHER
NALCO
DUBURI
BALASORE
JINSTL
PARADEEP
N.DUBURI
DHARMA
KGH'PUR
KOLAGHAT
DOMJUR
HOWRAH
RISHRA
Dhampur
BANTALA
SUB'GRM
KASBA
EMB,CES
NEW HALDIA
LAKHN'PUR
Bud'-budge
Meramundali
Jindal
GMR
Angul
BHANJNAGAR
Mendashal
NAYAGARH
BIDANASI
CHANDAKA
Khurda
PURI
Pandiabill
NARENDRAPUR
THERUVALI
JITPL
Bolangir
LAXMIPUR
U.KOLAB
BALIMELA
U.SILERU
JAINAGAR
GAZUWAKA
JAYPORE(PG)
INDRAVATI(PG)
IND(O)
BSSL
BUDHIPADAR
KATAPALI
IB
N.BOLANGIR
RAYGARH
KORBA
KOLAR
SUNDARGARH
In Bharat
RAIGARH
OCTOBER-16
* PTPS-TENU-BSF PRESENTLY AT 220 KV
CONDUCTOR TYPE
QdB - Quad Bersimis
H - Hexa Zebra
TwM - Twin Moose
QdM - Quad Moose
HTLS - High Tension Low Sag
LEGEND
220 KV
400 KV
765 KV
Reactor
50 MVAR
63 MVAR