

जल विद्युत गृहों के कार्य
निष्पादन का पुनर्विलोकन

**REVIEW OF PERFORMANCE OF
HYDRO POWER STATIONS
2015-16**

भारत सरकार
विद्युत मंत्रालय



Government of India
Ministry of Power

केन्द्रीय
विद्युत
प्राधिकरण



**CENTRAL
ELECTRICITY
AUTHORITY**

विद्युत अधिनियम, 2003 की धारा 73 (आई) व (जे) के तहत के0वि0प्रा0 के सचिधिक दायित्व का निर्वहन करते हुए प्रकाशित

(PUBLISHED IN FULFILLMENT OF CEA'S STATUTORY OBLIGATION UNDER SECTION 73 (i) & (j) OF THE ELECTRICITY ACT, 2003)

FUNCTIONS AND DUTIES OF CEA AS PER ELECTRICITY ACT-2003

- a) Advise the Central Government on the matters relating to the national electricity policy, formulate short-term and perspective plans for development of the electricity system and coordinate the activities of the planning agencies for the optimal utilization of resources to sub serve the interests of the national economy and to provide reliable and affordable electricity to all consumers;
- b) Specify the technical standards for construction of electrical plants, electric lines and connectivity to the grid;
- c) Specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines;
- d) Specify the Grid Standards for operation and maintenance of transmission lines;
- e) Specify the conditions for installation of meters for transmission and supply of electricity;
- f) Promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system;
- g) Promote measures for advancing the skills of persons engaged in electricity industry;
- h) Advise Central Government on any matter on which its advice is sought or make recommendation to that Government on any matter if, in the opinion of the Authority, the recommendation would help in improving the generation, transmission, trading, distribution and utilization of electricity;
- i) Collect and record the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters;
- j) Make public from time to time the information secured under this Act, and provides for the publication of reports and investigations;
- k) Promote research in matters affecting the generation, transmission, distribution and trading of electricity;
- l) Carry out, or cause to be carried out, any investigation for the purpose of generating or transmitting or distributing electricity;
- m) Advise any State Government, licensees or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in coordination with any other Government, licensee or the generating company owning or having the control of another electricity system;
- n) Advise the Appropriate Government and the Appropriate Commission on all technical matters relating to generation, transmission and distribution of electricity; and
- o) Discharge such other functions as may be provided under this Act.

केन्द्रीय विद्युत प्राधिकरण
CENTRAL ELECTRICITY AUTHORITY

**जल विद्युत गृहों के कार्य निष्पादन का
पुनर्विलोकन 2015-16**

**REVIEW OF PERFORMANCE OF
HYDRO POWER STATIONS 2015-16**

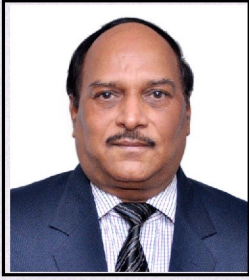


जल विद्युत परियोजना आयोजन एवं अन्वेषण प्रभाग
HYDRO PROJECT PLANNING & INVESTIGATION DIVISION

नई दिल्ली
NEW DELHI
सितंबर-2016
SEPTEMBER-2016

विद्युत अधिनियम, 2003 की धारा 73 (आई) व (जे) के तहत के0वि0प्रा0 के संविधिक दायित्व का निर्वहन करते हुए प्रकाशित

(PUBLISHED IN FULFILLMENT OF CEA'S STATUTORY OBLIGATION UNDER SECTION 73 (i) & (j) OF THE ELECTRICITY ACT, 2003)



प्राक्कथन

जल विद्युत शक्ति हमारे देश में पिछले 100 वर्षों से नवीनीकरण ऊर्जा का सबसे विश्वसनीय स्रोत रहा है। जल विद्युत शक्ति केंद्रों की उपलब्धता में सतत सुधार के उद्देश्य से केन्द्रीय विद्युत प्राधिकरण (के०वि०प्रा०), केन्द्रीय पी० एस० यू० और राज्य व निजी क्षेत्र में विद्युत यूटिलिटियों के निकट सहयोग से उनके वार्षिक निष्पादन की समीक्षा के लिए अध्ययन करता है।

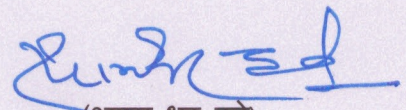
वर्ष 2015-16 के दौरान जल विद्युत शक्ति केन्द्रों के निष्पादन की समीक्षा संबंधी रिपोर्ट विद्युत अधिनियम, 2003 के खंड 73 (आई) और (जे) के तहत सांविधिक दायित्व को आंशिक रूप से पूरा करने में केन्द्रीय विद्युत प्राधिकरण द्वारा किए गए ऐसे प्रकाशनों की श्रृंखला में 29वीं हैं। इस रिपोर्ट में 42783.42 मेगावाट की कुल प्रतिस्थापित क्षमता वाले 194 जल विद्युत केन्द्रों की 676 जल विद्युत इकाइयों के निष्पादन का व्यापक विश्लेषण किया गया है, जिसके लिए केन्द्रीय, राज्य और निजी क्षेत्रों में उत्पादन यूटिलिटियों द्वारा आउटेज संबंधी आंकड़े उपलब्ध कराए गए हैं।

प्रचालन उपलब्धता संबंधी सूचना पर्याप्त और विश्वसनीय विद्युत आपूर्ति सुनिश्चित करने में काफी महत्वपूर्ण है। अध्ययनों के अनुसार वर्ष 2015-16 के दौरान जल विद्युत केन्द्रों की औसत प्रचालन उपलब्धता 87.93% थी। प्रणोदित और योजनाबद्ध आउटेज के कारण जल विद्युत इकाइयों की औसत गैर-उपलब्धता क्रमशः 4.86% और 7.21% थी। वर्ष 2015-16 के दौरान जल विद्युत केन्द्रों से उत्पादन 121.377 बिलियन यूनिट था, जो 128 बिलियन यूनिट के उत्पादन लक्ष्य से 5.17% कम था।

मुझे विश्वास है कि यह समीक्षा विद्युतकेन्द्र प्राधिकारियों को उपयुक्त प्रचालन एवं रखरखाव की (ओ० एंड एम०) नीति तैयार करके जल विद्युत संयंत्रों की उपलब्धता में और सुधार लाने में उपयोगी मार्गदर्शन प्रदान करेगा। प्रणोदित कामबंदी (Forced Outages) के कारणों का भी व्यापक विश्लेषण करने की आवश्यकता है ताकि विनिर्माताओं/ओ० एंड एम० एजेंसियों द्वारा उचित उपाय किये जायें और इनकी पुनरावृत्ति को कम किया जा सके तथा प्रचालन उपलब्धता में सुधार किया जा सके।

समीक्षा के लिए आउटेज आंकड़े/सूचना उपलब्ध कराने के लिए मैं सभी उत्पादन यूटिलिटियों का हार्दिक धन्यवाद करता हूँ। मैं इस रिपोर्ट के लिए अपेक्षित निविष्ट आंकड़ों का विश्लेषण करने में सूचना प्रौद्योगिकी प्रभाग द्वारा प्रदान किए गए सहयोग के लिए धन्यवाद देता हूँ।

नई दिल्ली
सितंबर, 2016


(श्याम धर दुबे)

सदस्य (जल विद्युत), के०वि०प्रा०



FOREWORD

Hydro Electric Power has been the most reliable source of renewable energy for the last over 100 years in our country. In the quest for continuous improvement in availability of Hydro Power Stations, Central Electricity Authority (CEA) carries out studies to review their annual performance in close co-operation with Central PSUs and Power Utilities in State & Private Sector.

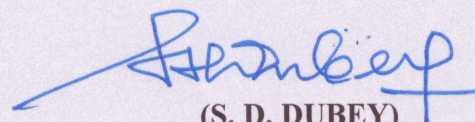
The report on 'Review of Performance of Hydro Power Stations during the year 2015-16' is 29th in the series of such publication by Central Electricity Authority in partial fulfillment of the statutory obligations under Section 73(i) & (j) of the Electricity Act, 2003. The report provides exhaustive analysis of performance of 676 hydro-electric units installed at 194 hydro-electric stations having total installed capacity of 42783.42 MW for which outage data has been provided by generation utilities in State, Central and Private sectors.

The information on operation availability is of vital importance in ensuring adequate and reliable power supply. According to the studies, the average operating availability of hydroelectric stations during the year 2015-16 was 87.93%. The average non-availability of hydro units due to forced and planned outages was 4.86% and 7.21% respectively. The generation from hydro stations during 2015-16 was 121.377 Billion Units which was 5.17% less than the generation target of 128 Billion Units.

I am confident that the review would provide useful guidance to power station authorities in making further improvement in the availability of hydel plants by chalking out suitable O&M strategies. There is also a need to undertake detailed analysis of the reasons of forced outages and to devise measures by the manufacturers/O&M agencies so as to minimise the recurrence of the same and to improve the operating availability.

I wish to express my sincere thanks to all the generating utilities for providing outage data/information for the review. I would also like to put on record the co-operation extended by Information Technology Division in undertaking the analysis of the input data required for this report.

NEW DELHI
September, 2016


(S. D. DUBEY)
Member (Hydro), CEA



प्रस्तावना

किसी भी देश के विकास के लिए विद्युत शक्ति महत्वपूर्ण बुनियादी आवश्यकताओं में से एक है। हमारे देश में 100 वर्षों से भी अधिक समय से जल विद्युत सबसे विश्वसनीय नवीकरणीय ऊर्जा का स्रोत रहा है। दिनांक 31.03.2016 को 302087.84 मेगावाट की कुल प्रतिष्ठापित विद्युत उत्पादन क्षमता में से 42783 मेगावाट (14.16%) (25 मेगावाट से ज्यादा स्टेशन प्रतिष्ठापित क्षमता) की जल विद्युत क्षमता है।

केन्द्रीय विद्युत प्राधिकरण (के. वि. प्रा.) उत्पादन निष्पादन के सतत् प्रबोधन, ब्रेकडाउन के कारणों के विश्लेषण, नवीनीकरण तथा आधुनिकीकरण कार्यों आदि के द्वारा ऊर्जा उत्पादक यूटिलिटीज के सहयोग से जल विद्युत केन्द्रों के निष्पादन में सुधार के लिए सघन प्रयास कर रहा है। यह आवश्यक है कि विद्यमान विद्युत केन्द्रों को विद्युत की कमी को कम करने के लिए तथा विश्वसनीय आपूर्ति करने के लिए अपने निष्पादन तथा उपलब्धता में सुधार अवश्य करना चाहिए।

यह वार्षिक पुनर्विलोकन वर्ष 2015-16 के दौरान देश में जल विद्युत केन्द्रों के कार्य निष्पादन का विश्लेषण प्रस्तुत करता है तथा 194 जल विद्युत केन्द्रों पर 676 यूनितों के निष्पादन का विस्तृत विश्लेषण दर्शाता है। कोई भी एक सूचकांक जल विद्युत केन्द्रों के कार्य निष्पादन के लिए पर्याप्त रूप से मापक युनिट प्रदान नहीं कर सकता। जल विद्युत केन्द्रों के निष्पादन को योजनाबद्ध अनुरक्षण, गैर-निर्धारित पूर्ण/आंशिक कामबंदी, अंतर्प्रवाह की वास्तविक प्रवृत्ति आदि जैसे घटक प्रभावित करते हैं। अनुरक्षण में आद्यतन पद्धति अपनाने की आवश्यकता है ताकि परिहार्य कामबन्दियों (Planned outages) का निराकरण किया जा सके।

नवीनीकरण तथा आधुनिकीकरण विषय से संबंधित अध्याय इसके लाभों का विस्तार से उल्लेख करता है तथा ऊर्जा उत्पादक यूटिलिटीज को अपने प्रचालाधीन पुरानी यूनितों में इस प्रकार के कार्य को हाथ में लेने की संभावनाओं को सुनिश्चित करने में प्रोत्साहित करेगा।

इस प्रकाशन का अध्ययन के0वि0प्रा0 के जल विद्युत परियोजना आयोजन एवं अन्वेषण (एच0पी0पी0&आई0) प्रभाग के निदेशक श्रीमती शारदा प्रसाद के संपूर्ण मार्गदर्शन में किया गया है।

मैं सभी विद्युत राज्य परिषदों, सरकारी/निजी क्षेत्र के उपक्रमों और विद्युत केंद्र के अधिकारियों को पुनर्विलोकन के लिए जरूरी आंकड़े उपलब्ध कराने के लिए हार्दिक धन्यवाद देना चाहता हूँ।

मैं सभी ऊर्जा उत्पादक यूटिलिटीज से अनुरोध करूंगा कि जल विद्युत केन्द्रों के संबंध में माहवार निष्पादन तथा आउटेज आंकड़े तुरंत तथा नियमित रूप से प्रस्तुत करते रहें ताकि भविष्य में भी विश्लेषण तथा निष्पादन पुनर्विलोकनों का प्रकाशन समय से हो सके।

के0वि0प्रा0 इस रिपोर्ट की विषयवस्तु तथा प्रस्तुतीकरण में सुधार के लिए समन्वित प्रयास कर रहा है। इस संबंध में रचनात्मक सुझाव हर्षप्रद तथा सराहनीय होंगे।

नई दिल्ली

सितंबर, 2016,

(जयदीप सिंह बावा)

मुख्य अभियन्ता(एच0पी0पी0&आई0), के0वि0प्रा0



PREFACE

Electric power is one of the most important infrastructure requirements for the development of any country. Hydel Power has been the most reliable source of renewable energy for the last more than 100 years in our country. As on 31.03.2016, out of a total installed generating capacity of 302087.84 MW, hydro capacity was 42783 MW (14.16%) (above 25 MW capacity).

Central Electricity Authority (CEA) is making concerted efforts for improving the performance of Hydro Power Stations in cooperation with the generating utilities through close monitoring of generation performance, analysis of causes for break downs, Renovation & Modernization works etc. It is imperative that the existing power stations must improve their performance and availability to reduce power shortage and deliver reliable supply.

This Annual Review provides an analysis of performance of Hydro Power Stations in the country during the year 2015-16 and provides an exhaustive analysis of performance of 676 units at 194 H.E. Stations. No single operating index can adequately provide a measuring unit for performance of Hydro Power Stations. The factors that influence the performance of hydro power stations are planned maintenance, unscheduled total/partial outages, pattern of actual inflows, etc. There is a need to adopt state-of-the-art practices in maintenance so that avoidable outages could be obviated.

The chapter on RM&U enumerates the advantages of RM&U and would motivate generating utilities to explore the possibilities of undertaking such works on older units under operation with them.

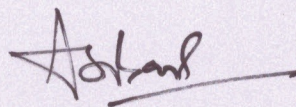
Studies for this publication have been carried out in Hydro Project Planning & Investigation (HPP&I) Division of CEA under the overall guidance of Mrs. Sharda Prasad, Director.

I wish to express my sincere thanks to various State Electricity Boards, Public and Private Sector hydro power utilities and Power Station Authorities for making available the necessary data for the review.

I would urge all generating utilities to continue furnishing month-wise performance & outage data regularly in respect of all Hydro Electric Power Stations for analysis & timely publishing of performance reviews in future also.

CEA has been making concerted efforts to improve the contents and presentation of the report. Constructive suggestions in this regard are welcome and will be appreciated.

NEW DELHI
September, 2016


(Jaideep Singh Bawa)
Chief Engineer (HPP&I), CEA

आभार

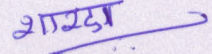
मैं निम्नलिखित अधिकारियों का जल विद्युत गृहों के कार्य का निष्पादन पुनर्विलोकन 2015-16 के प्रकाशन में सहयोग के लिए धन्यवाद देती हूँ ।

मुख्य अभियन्ता (जल विद्युत निष्पादन प्रबोधन प्रभाग), के0वि0प्रा0 को वर्ष 2015-16 के दौरान यूनितों के प्रचालन के लिए टरबाइन तथा जेनरेटर निर्माताओं के विवरण समय पर उपलब्ध कराने के लिये धन्यवाद देती हूँ ।

मुख्य अभियन्ता (एच0ई0 एण्ड आर0एम0 प्रभाग) के0वि0प्रा0 का जल विद्युतयूनितों के नवीनीकरण एवं आधुनिकीकरण एवं उन्नयन पर अध्याय तैयार करने के लिए धन्यवाद देती हूँ ।

मैं सदस्य (जल विद्युत), के0वि0प्रा0 तथा मुख्य अभियन्ता (एच0पी0पी0&आई0) का इस पुनर्विलोकन के निर्माण में उनके अमूल्य सुझावों तथा मार्ग निर्देशन के लिये आभारी हूँ ।

मैं सर्वश्री बलवान कुमार, उप निदेशक, भीम देव नेगी, उप प्रबंधक, एस जे वी एन एल, राहुल सिंह, सहायक निदेशक व अन्य अधिकारियों तथा कर्मचारियों का भी इस पुनर्विलोकन के प्रकाशन में सहयोग के लिये धन्यवाद देती हूँ ।



(शारदा प्रसाद)

निदेशक (एच0पी0पी0&आई0) के0वि0प्रा0

ACKNOWLEDGEMENTS

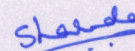
I express my sincere thanks to the following officers in bringing out this Review of Performance of HE Stations 2015-16.

Chief Engineer (HPM), CEA for providing the details of turbine and generator manufacturers, date of commissioning and type of turbine etc. for the units commissioned during the year 2015-16.

Chief Engineer (HE&RM), CEA for preparing the chapter on Renovation Modernisation & Uprating of Hydro generating units.

I am grateful to Member (Hydro), CEA and Chief Engineer (HPP&I), CEA, for their valuable suggestions and guidance in preparation of this Review.

I also express my thanks to Shri Balwan Kumar, Deputy Director, Shri Bhim Dev Negi, Deputy Manager, SJVNL, Shri Rahul Singh, Assistant Director and other officers/officials for their assistance in making it possible to bring out this Review.



(Sharada Prasad)
Director (HPP&I), CEA

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SUMMARY

SUMMARY

1.0 General

1.1 This review covers the performance of Hydro-Electric Stations having installed capacity of more than 25 MW. As on 31st March, 2016 there were 676 H.E. generating units installed in 194 Hydro-Electric Stations with an aggregate installed capacity of 42783.42 MW in operation. Performance of 31 important Reservoir based schemes has also been discussed separately in the report.

1.2 Region wise summary of the existing HE Stations in operation with installed capacity above 25 MW as on 31.3.2016 in the country vis-à-vis that on 31.3.2015 is given below in **Table S-1**.

TABLE S-1

**REGIONWISE SUMMARY OF HYDRO-ELECTRIC STATIONS
(2015-16 VIS-A-VIS 2014-15)**

Region	No of Stations as on		No of Units as on		Capacity (MW) as on	
	31.03.16	31.03.15	31.03.16	31.03.15	31.03.16	31.03.15
Northern	68	66	234	225	18302.27	16386.26
Western	28	28	101	101	7392.00	7392.00
Southern	69	68	247	243	11592.45	11432.45
Eastern	19	17	65	61	4254.70	4078.70
N-Eastern	10	10	29	29	1242.00	1242.00
All India	194	189	676	659	42783.42	41267.42

1.3 The report contains outage data of 194 H.E. Stations (above 25 MW) covering 676 units and having an aggregate installed capacity of 42783.42 MW which was made available by various utilities for the purpose of this Review.

1.4 The performance review also analyses year-wise generation, planned maintenance, forced outages and operating availability for the last 10 years (viz 2006-07 to 2015-16)

1.5 This review covers information in respect of renovation & modernization, uprating and life extension of HE stations in the country for the year of 2015-16, achievements during the year 2015-16 and programme for renovation, modernization, life extension and uprating of HE Stations for the year 2016-17.

1.6 The report comprises of nine chapters as under:

Chapter No.	Particulars
1	Hydro Power Potential and Development
2	Generation Performance
3	Major Reservoir Based H.E. Schemes
4	Planned Maintenance of H.E. Units
5	Forced Outage of H.E. Units
6	Operating Availability of H.E. Units
7	Generation Programme for the year 2016-17
8	Renovation & Modernisation of Hydro Electric Power Projects
9	Definitions and Abbreviations

2.0 Generation Performance

The generation from the hydro electric power Stations in the country during 2015-16 was 121376.75 MU (excluding import from Bhutan) which was 5.17% less than target of 128000 MU.

2.1 Utility wise/ Sector wise Performance of H.E. Stations

The utility wise/ sector wise target of energy generation vis-à-vis actual Generation and surplus /shortfall in respect of Hydro Electric stations are given below in **Table S-2**.

TABLE S-2

**UTILITY WISE PERFORMANCE OF HYDRO ELECTRIC POWER STATIONS
(2015-16 VIS-A-VIS 2014-15)**

Utilities	Target		Actual		Surplus (+)/ Shortfall (-) in %	
	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15
CENTRAL SECTOR						
BBMB	9076	9275	11818.90	10599.78	30.22	14.28
NHPC	21190	20770	23403.43	22040.92	10.45	6.12
SJVNL	8000	7800	9297.20	8155.07	16.22	4.55
NTPC LTD	890	0	2308.60	0.25	159.39	-
THDC	3952	3952	4349.05	4233.72	10.05	7.13
NHDC	3315	3455	2929.22	3670.83	-11.64	6.25
DVC	219	218	176.51	267.30	-19.40	22.61
NEEPCO	2283	2358	2400.24	1991.95	5.14	-15.52
SUB TOTAL	48925	47828	56683.15	50959.82	15.86	6.55

Utilities	Target		Actual		Surplus (+)/ Shortfall (-) in %	
	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15
PRIVATE SECTOR						
MPCL	341	340	341.94	328.43	0.28	-3.40
TPCL	1450	1420	1098.49	1441.5	-24.24	1.51
DLHP	36	65	82.55	65.4	129.31	0.62
EPPL	370	360	354.42	250.41	-4.21	-30.44
ADHPL	700	700	724.96	677.78	3.57	-3.17
GBHPPL	255	291	287.85	235.83	12.88	-18.96
HBPCL	5676	5627	6030.82	5493.01	6.25	-2.38
HSPL	245	-	-	-	-	-
AHPCL	1114	-	901.37	-	-19.09	-
JPPVL	1776	1776	1210.65	1815.94	-31.83	2.25
DEPL	85	75	75.06	-	-11.69	-
TUL	47	136	-	-	-	-
GIPL	475	537	421.43	430.86	-11.28	-19.77
SUB TOTAL	12570	11327	11529.54	10739.16	-8.28	-5.19
STATE SECTOR						
JKSPDCL	3634	3437	3980.30	3844.10	9.53	25.71
HPSEB LTD.	1062	1603	1161.81	1649.61	9.40	3.17
RRVUNL	700	562	1033.80	863.33	47.69	61.37
PSPCL	3719	3920	4327.84	4039.07	16.37	2.57
UPJVNL	1115	1006	935.08	1247.69	-16.14	12.20
UJVNL	4498	4574	4762.86	4199.36	5.89	-5.67
SSNNL	3544	3141	2170.43	2909.42	-38.76	-19.21
GSECL	840	690	781.42	902.16	-6.97	28.88
MAHAGENCO	3956	3873	3519.33	3780.98	-11.04	-1.84
MPPGCL	2621	2575	1940.60	2628.93	-25.96	2.09
CSPGCL	250	250	323.30	258.18	29.32	3.27
APGENCO	3773	3442	2511.31	3854.04	-33.44	11.97
TSGENCO	3606	3632	282.33	3113.81	-92.17	-14.27
KPCL	12726	12619	7350.01	12975.65	-42.24	2.83
KSEBL	6751	6849	6363.75	6852.65	-5.74	0.05
TANGEDCO	4962	5061	4474.27	5058.96	-9.83	-0.04
JUUNL	154	128	51.24	33.73	-66.73	-73.65
OHPC	5749	5571	4432.83	6399.69	-22.89	14.88
WBSEDCL	1596	958	1491.70	1755.62	-6.53	83.26
APGCL	390	390	408.88	402.43	4.84	3.19
MePGCL	859	820	860.94	775.29	0.23	-5.45
SUB TOTAL	66505	65142	53164.06	67544.70	-20.06	3.69
ALL INDIA	128000	124297	121376.75	129243.68	-5.17	3.98

During the year 2015-16, overall hydro generation was more than the target in respect of BBMB, NHPC Ltd., SJVNL, NTPC, THDC, & NEEPCO in Central Sector and MPCL, ADHPL, GBHPPL, HBPCCL & DLHP in Private Sector. As regards generation by State Electricity Boards/Corporations / Departments, hydro generation was more than the target in respect of JKSPDCL, HPSEBL, RRUVNL, PSPCL, UJVNL, CSPGCL, APGCL & MePGCL.

2.2 Sector wise Performance of H.E. Stations

Sector wise generation performance of H.E. Stations during 2015-16 is given in **Table S-3**. It would be seen that there was excess generation as compared to target in Central Sector & less generation in State & Private Sector.

TABLE S-3

SECTOR WISE PERFORMANCE OF HYDRO ELECTRIC POWER STATIONS (2015-16 VIS-A-VIS 2014-15)

Sector/Board/ Corporation	Energy Generation (MU)					
	Target		Actual		Surplus (+)/ Deficit(-)in %	
	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15
Central	48925	47828	56683.15	50959.82	15.86	6.55
State	66505	65142	53164.06	67544.70	-20.06	3.69
Private	12570	11327	11529.54	10739.16	-8.28	-5.19
Total	128000	124297	121376.75	129243.68	-5.17	3.98

3.0 Outage Analysis

For outage data analysis during 2015-16, outage data of 194 H.E. Stations (above 25 MW capacity) covering 676 units and having an aggregate installed capacity of 42783.42 MW made available by various utilities have been considered for the purpose of this Review. Region wise details of these 194 hydro power stations are given below in **Table S-4**.

TABLE S-4

**REGION WISE SUMMARY OF HE STATIONS ANALYSED
(2015-16 VIS-A-VIS 2014-15)**

Region	No of Stations		No of Units		Capacity(MW)as on	
	31.03.16	2014-15	31.03.16	2014-15	31.03.16	31.03.15
Northern	68	66	234	225	18302.27	17122.27
Western	28	28	101	101	7392.00	7392.00
Southern	69	68	247	243	11592.45	11432.45
Eastern	19	17	65	61	4254.70	4078.70
North Eastern	10	10	29	29	1242.00	1242.00
All India	194	189	676	659	42783.42	41267.42

3.1 Planned Maintenance

The number of H.E. Stations falling under various ranges of non-availability due to planned maintenance during the year 2015-16 vis-à-vis 2014-15 is summarized below in **Table S-5**.

TABLE S-5

**NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2015-16 VIS-A-VIS 2014-15)**

% Non availability due to planned maintenance	2015-16		2014-15	
	Nos of Stations	Capacity (MW) As on 31.03.16	Nos of Stations	Capacity (MW) As on 31.03.15
0	30	7056.00	23	5670.75
Up to 5	64	14678.42	87	17185.42
>5 to 10	50	11240.35	35	8331.70
>10 to 15	24	3434.20	14	2503.95
>15 to 20	11	2923.75	14	3751.80
>20 to 25	5	1100.10	5	970.00
>25 to 30	4	990.00	7	2427.60
above 30	6	1360.60	4	426.20
Total	194	42783.42	189	41267.42

It could be seen from above that, no planned maintenance was carried out at 30 hydro-electric stations during 2015-16 as compared to 23 hydro-electric stations during 2014-15.

Non-availability due to planned maintenance was more than 30% at 6 H.E. Stations during 2015-16 as compared to 4 H.E. Stations during 2014-15. Details of which are given below in **Table S-6**.

TABLE S-6

**H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE
FOR THE PERIOD: (2015-16)**

Sl. No	Name of Station	Capacity (MW)	N.A. due to P.M.*(%)
1	BHADRA	39.20	47.75
2	RIHAND	300	46.71
3	KHATIMA	41.40	45.44
4	PARBATI-III	520	40.21
5	UPPER KOLAB	320	34.16
6	PERIYAR	140	30.06

* N.A. -Non availability, P.M.- Planned Maintenance

The duration of various types of periodic planned maintenance varied considerably from station to station. Details of average time taken for various types of maintenance are given in **Table S-7**.

TABLE S-7

**AVERAGE DURATION OF VARIOUS TYPES OF PLANNED
MAINTENANCE
PERIOD: (2015-16)**

Sl. No	Type of Planned maintenance	Average duration at any unit (Hrs)
1	Capital	906.59
2	Annual	681.67
3	Half Yearly	10.95
4	Quarterly	155.39
5	Monthly	64.62
6	Routine	89.77
7	Renovation & Modernisation	917.61
8	Up rating	0.00
9	Civil Structure	223.17
10	Turbine	76.48
11	Generator	211.54
12	Other Equipments	84.61
13	Miscellaneous	45.90

It has been observed that there were wide variations in the time taken at different hydro units for the same type of periodic maintenance. The reasons for this can be attributed to following factors.

- The nature and the extent of work involved may vary from unit to unit.
- Availability of spare parts could be a constraint at some units.
- The working of the agency entrusted with the maintenance work could be different.
- Administrative and procedural difficulties may be faced at some of the stations.

Summary of planned maintenance carried out on various equipments like generators, turbine and other equipments during 2015-16 vis-à-vis 2014-15 is given below in **Table S-8**.

TABLE S-8
**DURATION OF PLANNED MAINTENANCE FOR GENERATOR,
TURBINE & OTHER EQUIPMENTS**
(2015-16 vis-à-vis 2014-15)

S. No.	Equipments	Duration			
		Maximum Hours for any unit		Average Hours	
		2015-16	2014-15	2015-16	2014-15
1	Generator	3236.75	2234.53	211.54	113.47
2	Turbine	2171.50	1854.25	76.48	152.23
3	Other Equipment	3236.75	753.83	84.61	71.40
4	Civil Structure	2640.75	3336.07	223.17	496.25

It could be seen that the average hours utilized for carrying out various repairs increased for generator, other equipments and Civil Structure during 2015-16 as compared to 2014-15.

3.2 Forced Outages

The summary of forced outages caused due to break-down of generator, turbine and other equipments during 2015-16 vis-à-vis 2014-15 is given below in **Table S-9**.

TABLE S-9

**FORCED OUTAGES DUE TO GENERATOR, TURBINE & OTHER EQUIPMENT
FAULTS
(2015-16 VIS-A-VIS 2014-15)**

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage	
		2015-16	2014-15	2015-16	2014-15
1	Generator	101627.39	92631.67	17.18	18.95
2	Turbine	69945.81	68836.24	11.82	14.08
3	Civil Structure	59548.33	47307.32	10.06	9.68
4	Other Equipments	63787.49	60658.19	10.78	12.41
5	Others	296767.57	219322.03	50.16	44.87
	Total	591676.59	488755.44	100.00	100.00

Region wise planned maintenance, forced outages and operating availability of H.E. Units for 2015-16 is indicated below in **Table S-10**.

TABLE S-10

**AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2015-16**

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AVAILABILITY
1	NORTHERN	234	18302.27	8.70	2.60	88.70
2	WESTERN	101	7392.00	4.74	2.76	92.50
3	SOUTHERN	247	11592.45	6.55	6.68	86.77
4	EASTERN	65	4254.70	7.73	12.02	80.25
5	NORTH EASTERN	29	1242.00	4.26	8.75	86.99
	ALL INDIA	676	42783.42	7.21	4.86	87.93

On analyzing various types of planned shut downs, it may be concluded that:

- Generating units installed in Northern Region accounted for Maximum non-availability due to planned maintenance (8.70%) whereas generating units installed in North Eastern Region accounted for the least non-availability due to planned maintenance (4.26%) as indicated in **Table S-10** above.

3.2 General Overview

General overview indicating generation, planned maintenance (PM), forced outage (FO) and operating availability (OP.AV.) of H.E. Stations during the past 10 years is given below:

OVERVIEW

YEAR	INSTALLED CAPACITY	GENERATION (MU)		VARIA- TION	UNITS ANALYSED		PM	FO	OP.AV
	(MW)	TARGET	ACTUAL	%	Nos	CAP (MW)	%	%	%
2015-16	42783.42	128000	121376.75	(-)5.17	676	42783.42	7.21	4.86	87.93
2014-15	41262.42	124267	129244	(+)3.98	659	41262.42	7.21	4.30	88.49
2013-14	40531.41	122263	134848	(+)10.29	653	40531.41	5.97	5.55	88.48
2012-13	39491.40	122045	113720	(-)6.82	634	39491.40	7.56	3.27	89.17
2011-12	38990.40	112050	130510	(+)16.47	620	38990.40	7.43	4.48	88.09
2010-11	37567.40	111352	114257	(+)2.61	609	37567.40	7.23	3.94	88.83
2009-10	36863.40	115468	103916	(-)10.00	589	36203.40	6.19	2.90	90.91
2008-09	36846.40	114841	109840	(-)4.35	572	35312.45	6.38	2.45	91.17
2007-08	37002.10	109450	123424	(+)12.80	641	31033.00	5.66	2.34	92.00
2006-07	34546.10	101000	113359	(+)12.24	684	32016.05	7.03	3.65	89.32

CHAPTER 1

HYDRO POWER POTENTIAL AND DEVELOPMENT

CHAPTER-1

HYDRO-ELECTRIC POWER POTENTIAL AND DEVELOPMENT

1.1 Hydro-electric Potential

Reassessment studies of Hydro Electric Power Potential in various river basins of the country were carried out by Central Electricity Authority during the period 1978-87. As per these studies, total Hydro Electric Power potential in the country was assessed as 84044 MW (at 60% load factor) from a total of 845 number of identified H.E. Schemes which when fully developed would result in an installed capacity of about 148701 MW on the basis of probable average load factor. The total energy potential is assessed as 600 billion units per year. The identified potential of H.E. schemes above 25 MW installed capacity works out to be 145320 MW from a total of 592 H.E. schemes.

As on 31.03.2016, H.E. Schemes having total installed capacity of 37997.80 MW (26.15%) excluding pumped storage stations of capacity of 4785.60 MW have already been developed and the schemes under development account for capacity of 12422 MW (excluding PSS of 1080 MW) (8.55%). It would be observed that about 65.30% in terms of Installed Capacity is yet to be harnessed. Summary of the status of Hydro Electric Potential development in the country is indicated in **Tables 1.1, and 1.2** respectively as well as shown in **Exhibits 1.1 and 1.2**.

TABLE 1.1

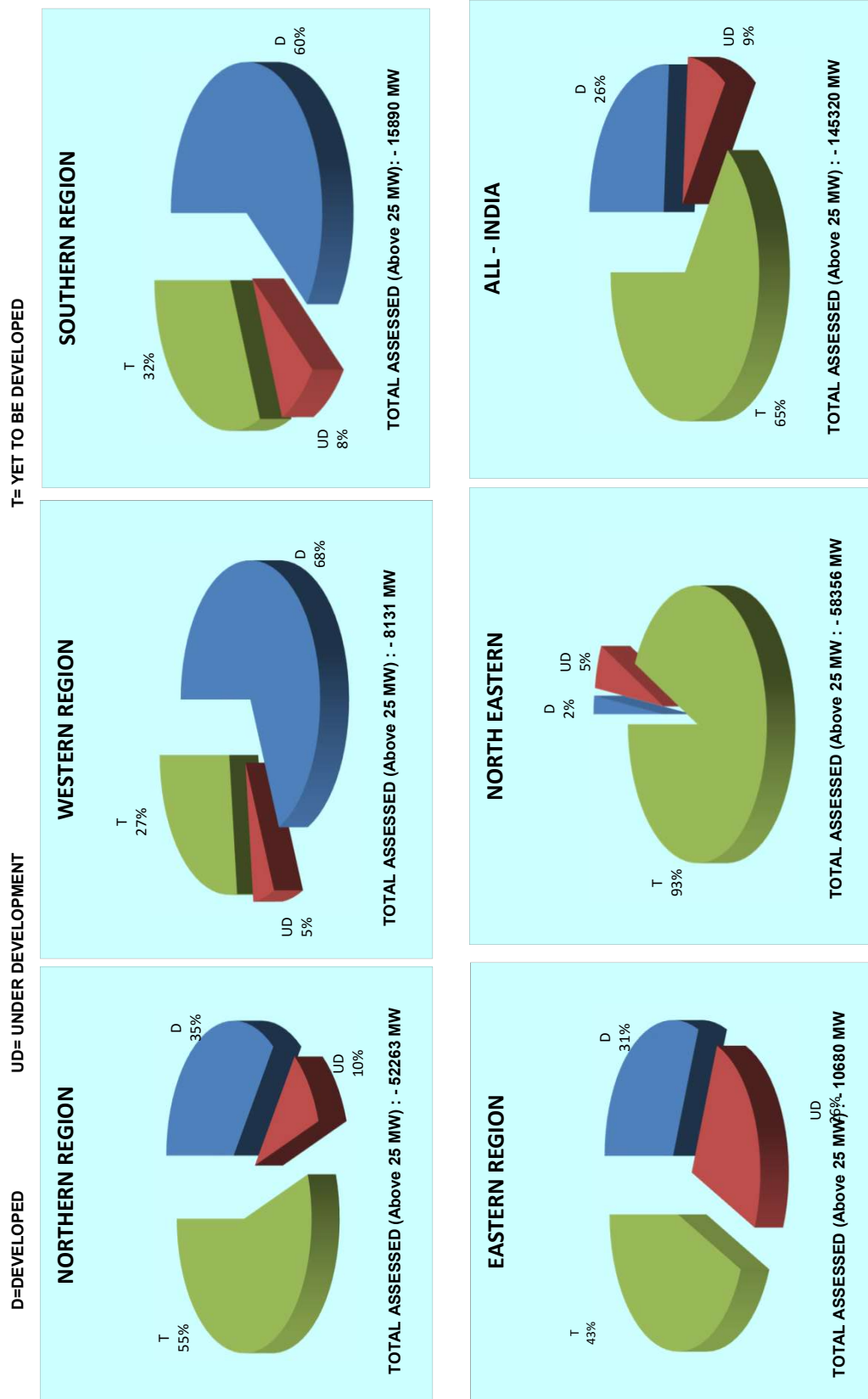
REGIONWISE/STATEWISE STATUS OF HYDRO ELECTRIC CAPACITY (In terms of Installed Capacity-above 25 MW as on 31.03.2016)

Region/ State	Identified Capacity as per reassessment study (MW)		Capacity Developed		Capacity Under construction		Capacity yet to be developed	
	Total (MW)	Above 25 MW	(MW)	(%)	(MW)	(%)	(MW)	(%)
NORTHERN								
Jammu & Kashmir	14146	13543	3119	23.03	1180	8.71	9244.00	68.26
Himachal Pradesh	18820	18540	9308	50.20	2216.0	11.95	7016.00	37.84
Punjab	971	971	1206.3	100	206.0	21.22	0.00	0.00
Haryana	64	64	0.00	0.00	0.00	0.00	0.00	0.00
Rajasthan	496	483	411.0	85.09	0.00	0.00	0.00	0.00
Uttarakhand	18175	17998	3756.4	20.87	1430.0	7.95	1281.17	71.18
Uttar Pradesh	723	664	501.6	75.54	0.0	0.00	39.00	5.87
Sub Total(NR)	53395	52263	18302.3	35.02	5032.0	9.63	28928.8	55.35
WESTERN								
Madhya Pradesh	2243	1970	2395.00	100	400.00	20.30	0.00	0.00
Chhattisgarh	2242	2202	120.00	5.45	0.00	0.00	2082.00	94.55
Gujarat	619	590	550.00	100	0.00	0.00	0.00	0.00
Maharashtra	3769	3314	2487.00	75.05	0.00	0.00	827.00	24.95

Region/ State	Identified Capacity as per reassessment study (MW)		Capacity Developed		Capacity Under construction		Capacity yet to be developed	
	Total (MW)	Above 25 MW	(MW)	(%)	(MW)	(%)	(MW)	(%)
Goa	55	55	0.00	0.00	0.00	0.00	55.00	100
Sub Total (WR)	8928	8131	5552.00	68.28	400.00	4.92	2179.00	26.80
SOUTHERN								
Andhra Pradesh	2366	2341	1746.80	74.62	1010.0	43.14	0.00	0.00
Telangana	2058	2019	591	29.27	200.0	9.91	1228.0	60.82
Karnataka	6602	6459	3585.40	55.51	0.00	0.00	2873.60	44.49
Kerala	3514	3378	1881.50	55.70	100.00	2.96	1396.50	41.34
Tamil Nadu	1918	1693	1782.20	100	0.00	0.00	0.00	0.00
Sub Total (SR)	16458	15890	9586.9	60.33	1310.0	8.24	4993.2	31.42
EASTERN								
Jharkhand	753	582	170.00	29.21	0.00	0.00	412.00	70.79
Bihar	70	40	0.00	0.00	0.00	0.00	0.00	0.00
Odisha	2999	2981	2027.50	68.01	0.00	0.00	953.50	31.99
West Bengal	2841	2829	352.20	12.45	200.0	7.07	2276.80	80.48
Sikkim	4286	4248	765.00	18.01	2526.0	59.46	957.00	22.53
Sub Total (ER)	10949	10680	3314.7	31.04	2726.0	25.52	4639.30	43.44
NORTH EASTERN								
Meghalaya	2394	2298	282.00	12.27	40.0	1.74	1976.00	85.99
Tripura	15	0	0.00	0.00	0.00	0.00	0.00	0.00
Manipur	1784	1761	105.00	5.96	0.00	0.00	1656.00	94.04
Assam	680	65	375.00	57.69	0.00	0.00	275.00	42.31
Nagaland	1574	1452	75.00	5.17	0.00	0.00	1377.00	94.83
Arunachal Pradesh	50328	50064	405.00	0.81	2854.0 0	5.70	46805.00	93.49
Mizoram	2196	2131	0.00	0.00	60.00	2.82	2071.00	97.18
Sub Total (NER)	58971	58356	1242.00	2.13	2954.00	5.06	54160.00	92.81
ALL INDIA	148701	145320	37997.8	26.15	12422.00	8.55	94900.2	65.30

Note:- 1. In addition to above 4785.60 MW PSS are under operation and 1080 MW PSS under construction.
2. In some states the total capacity developed and balance capacity is different from the potential assessed . This is due to change in capacity of the schemes, addition/ deletion of the schemes and merger of two schemes into one etc.

REGION-WISE STATUS OF HYDRO ELECTRIC CAPACITY AS ON 31.03.2016



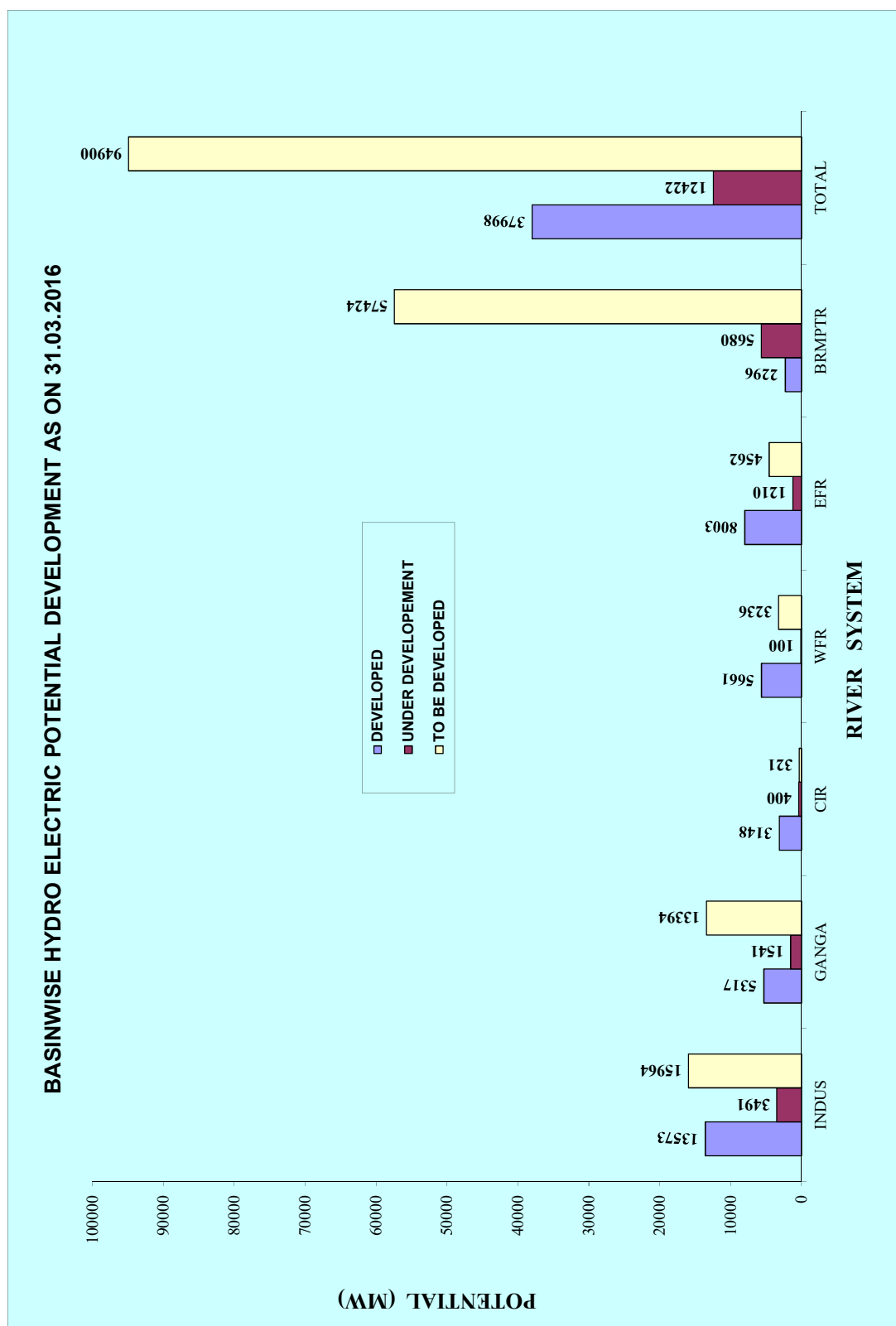


TABLE 1.2

BASINWISE STATUS OF H.E. POTENTIAL DEVELOPMENT-BASINWISE
(In terms of Installed Capacity-above 25 MW as on 31.03.2016)

River Basin	Identified Capacity as per Reassessment Study (MW)		Capacity Developed		Capacity Under Construction		Capacity Yet to be Developed	
	Total	Above 25	(MW)	(%)	(MW)	(%)	(MW)	(%)
Indus	33832	33028	13573.3	41.10	3491.0	10.57	15963.69	48.33
Ganga	20711	20252	5317.2	26.26	1541.0	7.61	13393.60	66.14
Central Indian River System	4152	3868	3147.5	81.37	400.0	10.34	320.50	8.29
West Flowing Rivers System	9430	8997	5660.7	62.92	100.0	1.11	3236.30	35.97
East Flowing Rivers System	14511	13775	8003.2	58.10	1210.0	8.78	4561.9	33.12
Brahmaputra	66065	65400	2296.0	3.51	5680.0	8.69	57424.0	87.80
Total	148701	145320	37997.8	26.15	12422.0	8.55	94900.2	65.30

Note:- 1. In addition to above 4785.60 MW PSS are under operation and 1080 MW PSS under construction.

1.2 Growth of Installed Capacity

A small Hydro-Electric Plant (130 kW) established near Darjeeling in 1897 ushered the beginning of hydro-electric power development in the country. Since then, development of hydro-electric power in the country has made rapid strides. The hydel installed capacity which was only 508 MW in 1947 with 12 H.E.Stations, 51 units and the maximum unit size of 22 MW at Bhira H.E.Project under Tata's, has risen to 42783.42 MW (as on 31.03.2016) from H.E. station above 25 MW capacity. Conventional Hydro Electric Stations of run-of-river type, single purpose hydro electric stations with storage, multipurpose projects as well as pumped storage projects have been executed through-out the country. The maximum unit size is now 250 MW at Koyna Stage-IV of MAHAGENCO, Nathpa Jhakri of SJVNL, Tehri of THDC and Karcham Wangtoo of JSW ENERGY.

Contribution of electricity generation from Hydro Electric Power Stations has risen from 2194 MU during 1947 to about 121376.75 MU in 2015-16. Hydro generation during 2015-16 was, however, 7866.93 MU less than the generation of 129243.68 MU during 2014-15.

1.3 Share of Hydro-electric Installed Capacity & Generation

The installed capacity of Hydro-Electric Stations vis-à-vis total capacity, the contribution in generation by hydro electric plants and trend of hydro capacity & generation over the years are indicated in **Table-1.3** and at **Exhibits 1.3, 1.4 and 1.5**. From Table 1.3, it may

be observed that the overall share of hydro in terms of installed capacity in the country has risen from 37.30% at the end of 1947 to 50.61% during 1962-63 and thereafter declined to 14.16% at the end of 2015-16. The generation from hydro stations during the year 2015-16, accounts for 11.01% of the total energy generation in the country.

TABLE 1.3

**HYDRO-ELECTRIC CAPACITY & GENERATION
VIS-À-VIS TOTAL CAPACITY & GENERATION**

Year	Installed Capacity			Generation		
	Total (MW)	Hydro (MW)	Hydro as % of Total	Total (MU)	Hydro (MU)	Hydro as % of Total
1947	1362	508	37.30	4072	2194	53.88
1950	1713	560	32.63	5106	2519	49.33
1955-56	2886	1061	36.76	9145	4295	46.97
1960-61	4653	1917	41.20	16937	7837	46.27
1962-63	5801	2936	50.61	22365	11805	52.78
1965-66	9027	4124	45.68	32890	15225	46.29
1968-69	12957	5907	45.59	47434	20723	43.69
1973-74	16664	6966	41.80	66689	28972	43.44
1978-79	26680	10833	40.60	102523	47159	46.00
1979-80	28448	11384	40.02	104627	45478	43.47
1984-85	42585	14460	33.96	156859	53948	34.39
1989-90	63636	18307	28.77	245437	62116	25.31
1991-92	69065	19194	27.79	287028	72757	25.35
1996-97	85795	21658	25.24	395889	68901	17.40
1997-98	89203	21904	24.58	421748	74582	17.68
1998-99	92269	22479	24.10	447464	82923	18.53
1999-00	97837	23857	24.37	481128	80755	16.78
2000-01	101450	25153	24.75	499429	74362	14.89
2001-02	105046	26269	25.01	515066	73759	14.32
2002-03	107877	26767	24.81	531607	63834	12.01
2003-04	112684	29507	26.19	558113	73775	13.22
2004-05	118419	30936	26.12	587416	84495	14.38
2005-06	124287	32326	26.01	624631	101293	16.22
2006-07	132321	34662	26.19	659513	113359	17.19
2007-08	143061	37002	25.86	704469	123424	17.52
2008-09*	147917	36846	24.91	714653	109840	15.37
2009-10*	159398	36863	23.13	763429	103916	13.61
2010-11*	173626	37567	21.64	805532	114257	14.18
2011-12*	199877	38990	19.51	871602	130510	14.97
2012-13*	223344	39491	17.68	907262	113720	12.53
2013-14*	243029	40531	16.68	961552	134848	14.02
2014-15*	267637	41267	15.42	1043665	129244	12.38
2015-16*	302088	42783	14.16	1102578	121377	11.01

* Capacity above 25 MW only has been considered.

EXHIBIT 1.3

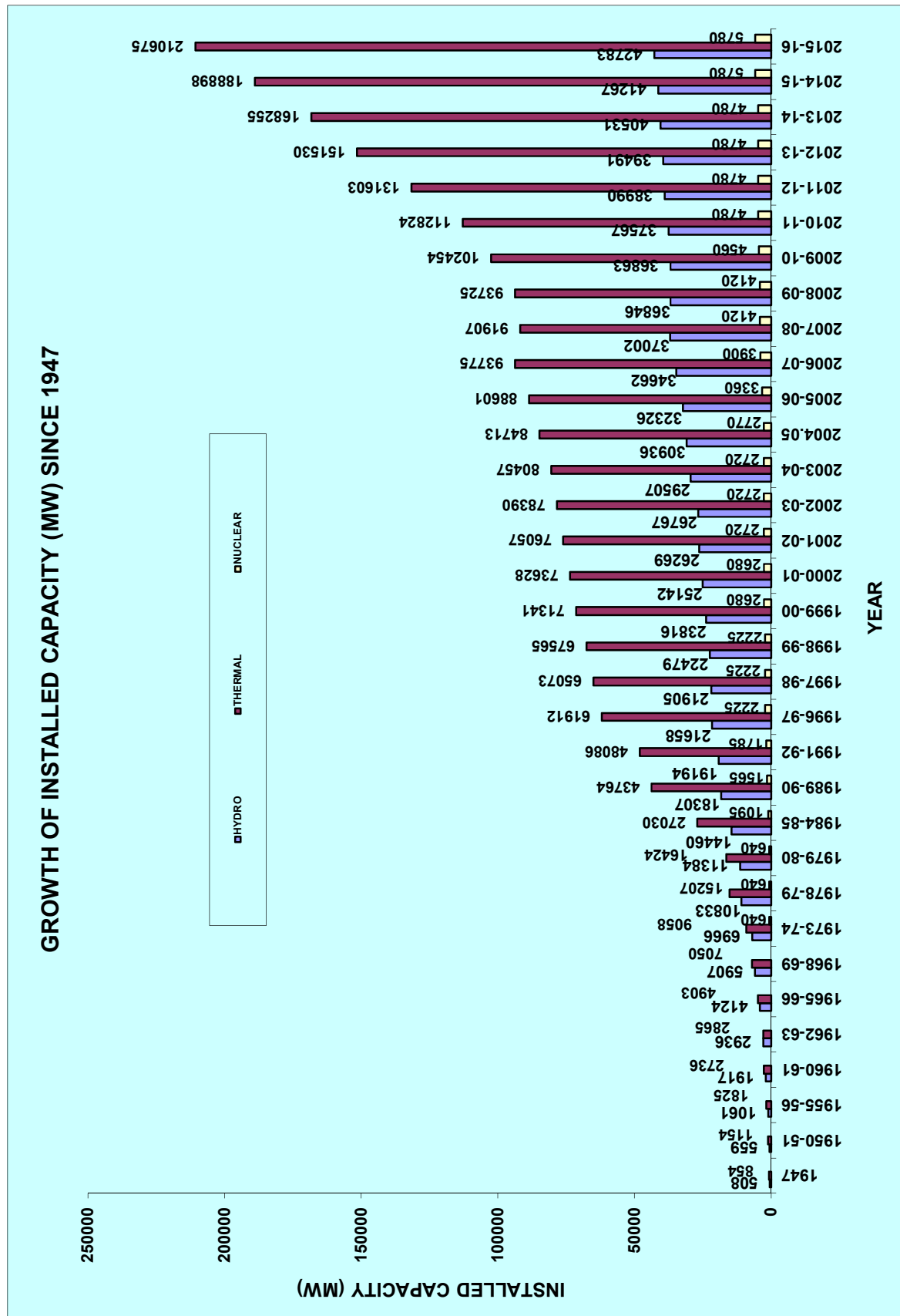
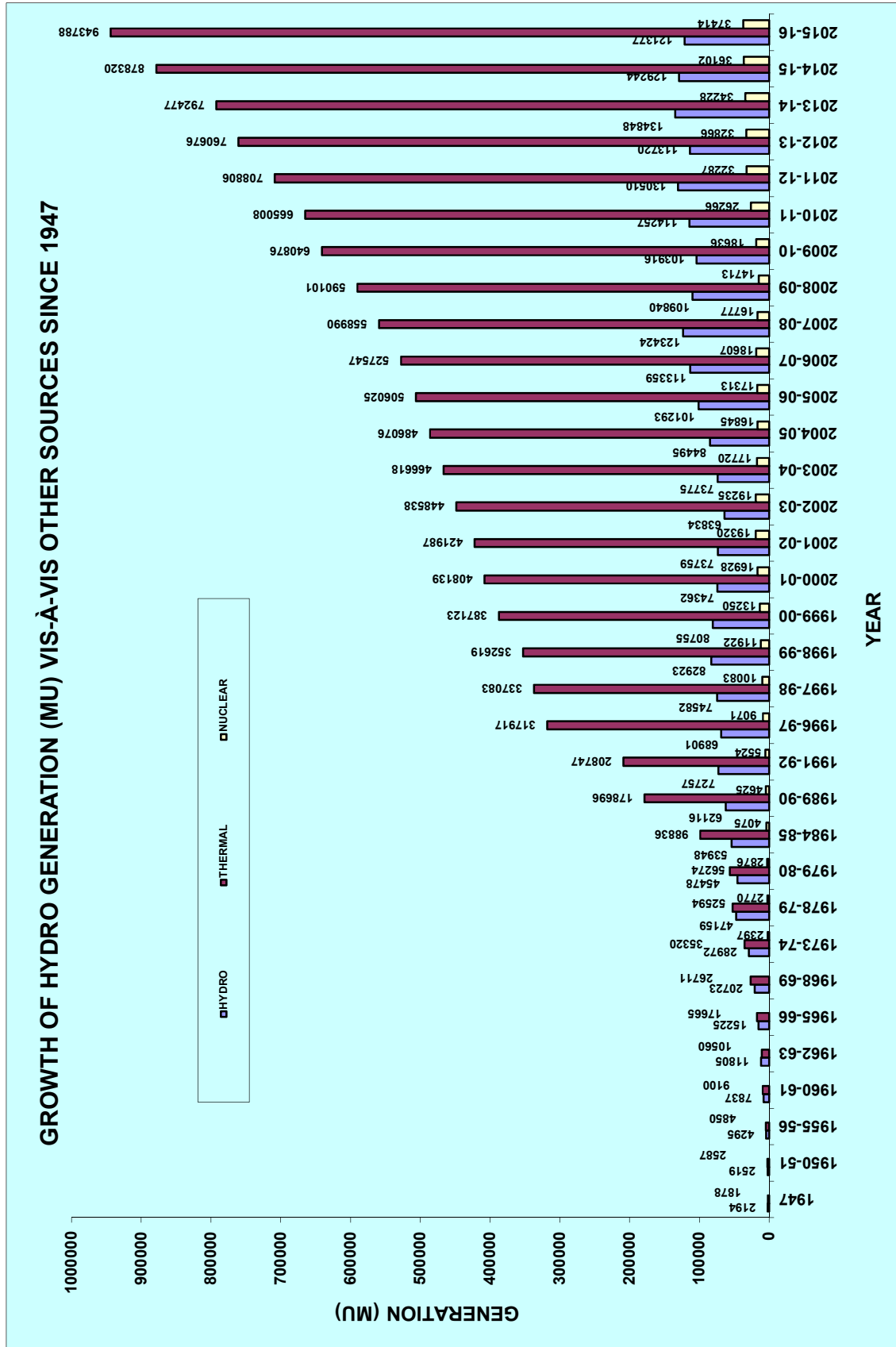
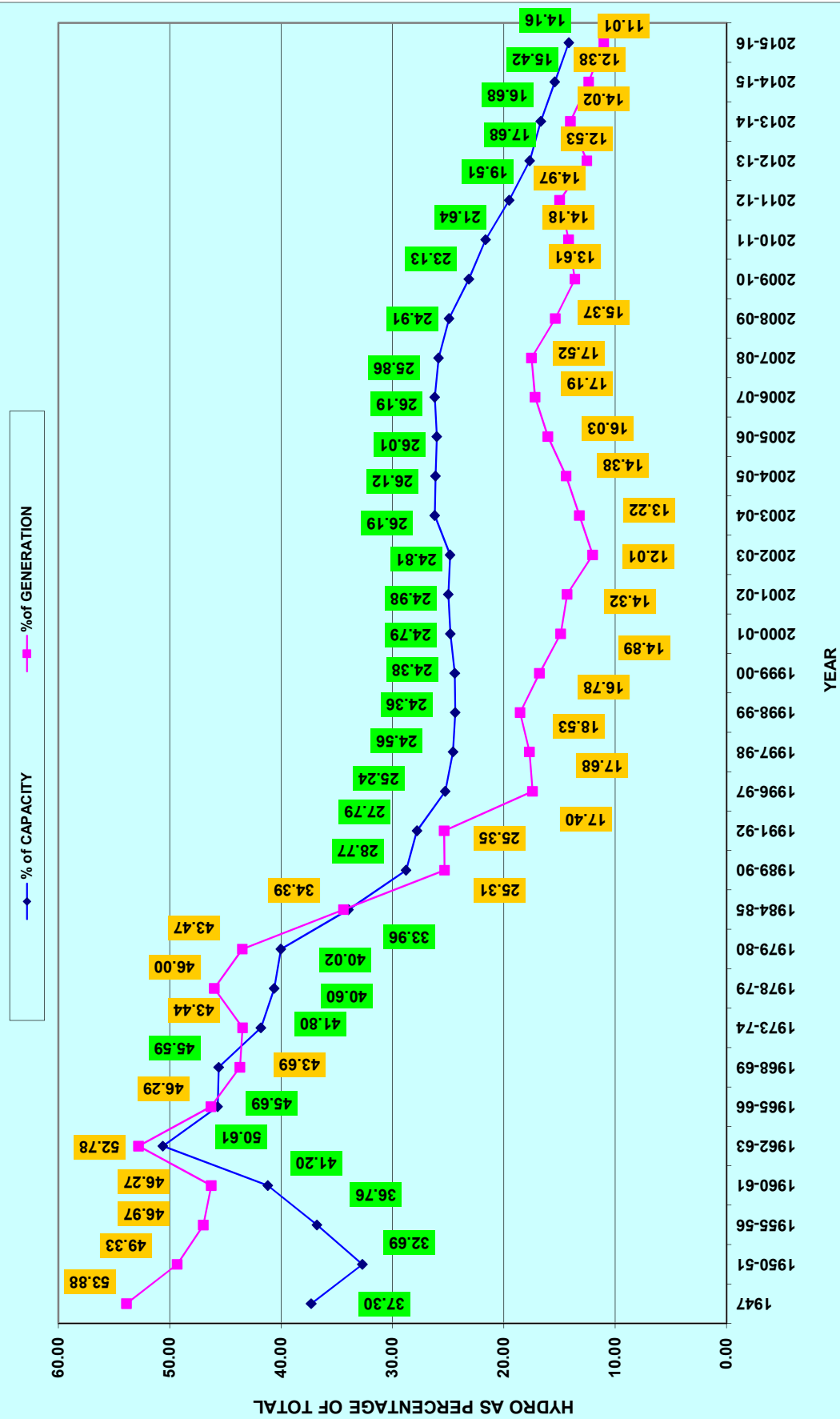


EXHIBIT 1.4



TREND OF HYDRO CAPACITY AND GENERATION SINCE 1947



1.4 Monitored Hydro Installed Capacity

For generation performance, the monitored hydro-electric installed capacity in the country as on 31st March, 2016 was 42783.42 MW (above 25 MW capacity). Region-wise summary of the hydel installed capacity is indicated in **Table 1.4**. Regionwise, Sector wise/Utility wise and station-wise details of installed capacity are given in **Annex 1.1, 1.2 & 1.3** respectively.

TABLE 1.4

**REGIONWISE SUMMARY OF HYDRO ELECTRIC INSTALLED CAPACITY
(Above 25 MW capacity as on 31.03.2016)**

S. No.	Region	No. of Units	Installed Capacity (MW)
1.	Northern	234	18302.27
2.	Western	101	7392.00
3.	Southern	247	11592.45
4.	Eastern	65	4254.70
5.	North - Eastern	29	1242.00
Total		676	42783.42

Capacity wise grouping of H.E. Stations as on 31st March, 2016 is given in **Annex- 1.4**.

17 H.E. Generating units having installed capacity of 1516 MW were added during the year 2015-16. Details of these units are given in **Annex-1.5**.

Share of hydro installed capacity and hydro generation vis-a-vis total installed capacity and total generation in the Country as on 31.03.2016 was 14.16% and 11.01% respectively. These details are indicated in **Exhibits 1.6 and 1.7**. Sector-wise distribution of hydro installed capacity in Central, Private and State Sectors were 33.75%, 7.37% and 58.88% respectively. Sector wise contribution of hydro generation in Central, Private and State sectors were 46.70%, 9.50% and 43.80% respectively. These details are illustrated in **Exhibits 1.8 & 1.9**.

1.5 Hydro Generating Units : Indigenous and imported

As on 31.03.2016, there were 676 hydro generating units in operation comprising of indigenous and imported units at 194 stations as per details given in **Table 1.5** below. Among the imported Turbines, it is observed that Japan, UK and Canada have supplied largest number of turbines but capacity-wise, Japan, Canada and USSR are the largest suppliers. However, in case of generators, Switzerland, France and UK have supplied largest number of generators but capacity-wise, Switzerland, UK and USA are the largest suppliers.

TABLE 1.5

**HYDRO GENERATING UNITS INDIGENOUS/IMPORTED
FROM VARIOUS COUNTRIES AS ON 31-03-2016**

Name of Country	Turbines supplied		Generators supplied	
	Numbers	Capacity (MW)	Numbers	Capacity (MW)
A-Indigenous				
BHEL	290	18523.02	287	18246.02
OTHERS	24	1087	26	1205.5
Sub Total	314	19610.02	313	19451.52
B-Imported				
U.K.	64	1257.1	44	3132
CANADA	44	3132	17	1726
SWITZERLAND	22	815.2	75	6029.4
JAPAN	76	6362.2	11	219
FRANCE	33	2186.4	59	1637.9
USSR	26	2804	26	543.15
USA	9	351	26	2804
Other	88	6265.5	105	7240.45
SUB-TOTAL	362	23173.4	363	23331.9
TOTAL	676	42783.42	676	42783.42

EXHIBIT-1.6

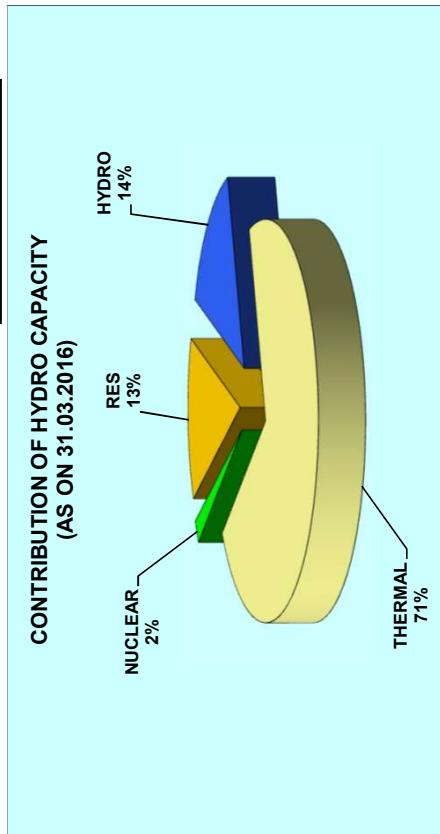


EXHIBIT-1.8

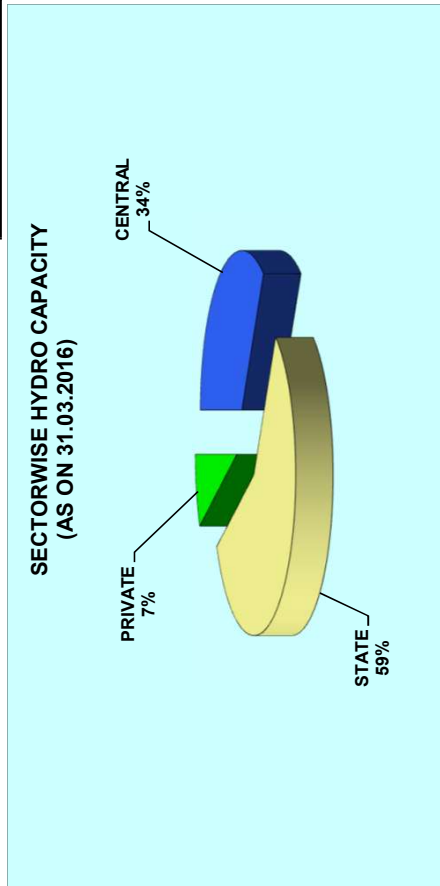


EXHIBIT-1.7

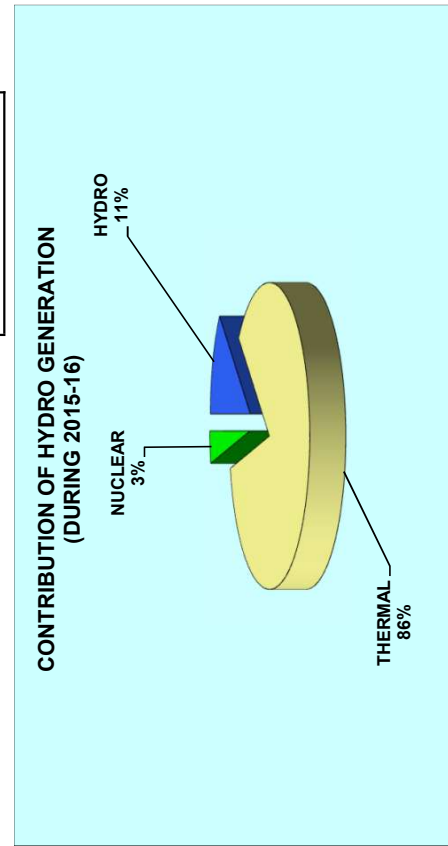
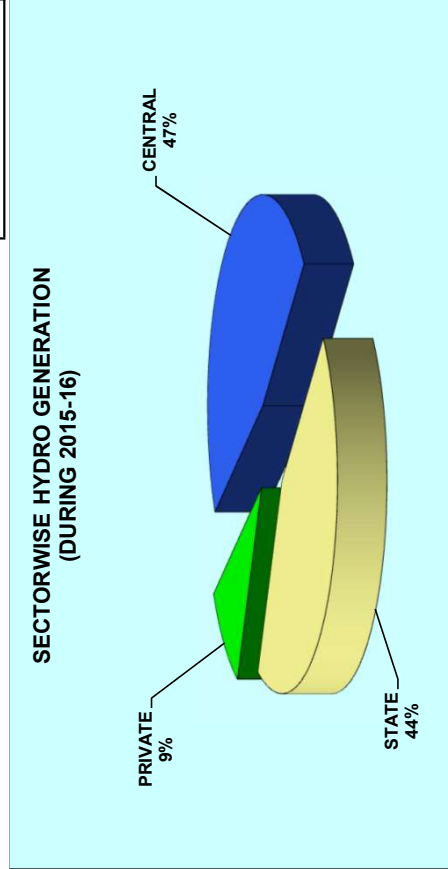


EXHIBIT-1.9



**REGION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)**

(As on 31.03.2016)

REGION	NO. OF UNITS	CAPACITY OF CONVENTIONAL HE STATIONS (MW)	NO. OF UNITS	CAPACITY OF PUMPED STORAGE SCHEMES (PSS) (MW)	TOTAL UNITS (CONV. +PSS)	TOTAL INSTALLED CAPACITY (CONV.+PSS) (MW)
NORTHERN	234	18302.27	0	0.00	234	18302.27
WESTERN	88	5552.00	13	1840.00	101	7392.00
SOUTHERN	230	9586.85	17	2005.60	247	11592.45
EASTERN	60	3314.70	5	940.00	65	4254.70
NORTH EASTERN	29	1242.00	0	0.00	29	1242.00
TOTAL	641	37997.82	35	4785.60	676	42783.42

**SECTOR/UTILITYWISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)**

(AS ON 31.03.2016)

Sl. No.	NAME OF THE SECTOR/ UTILITY	NO. OF UNITS	INSTALLED CAPACITY (MW)
CENTRAL SECTOR			
1	BBMB	28	2866.30
2	NHPC	65	5041.20
3	SJVNL	12	1912.02
4	NTPC	4	800.00
5	THDC	8	1400.00
6	NHDC	16	1520.00
7	DVC	5	143.20
8	NEEPCO	13	755.00
	SUB TOTAL CENTRAL	151	14437.72
PRIVATE SECTOR			
1	MPCL	2	86.00
2	EPPL	2	100.00
3	GBHPPL	2	70.00
4	ADHPL	2	192.00
5	HBPCL	7	1300.00
6	JPPVL	4	400.00
7	AHPC	4	330.00
8	TPCL	15	447.00
9	GIPL	2	99.00
10	DEPL	2	96.00
11	DLHP	1	34.00
	SUB TOTAL PRIVATE	43	3154.00

**SECTOR/UTILITYWISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)**

(AS ON 31.03.2016)

Sl. No.	NAME OF THE SECTOR/ UTILITY	NO. OF UNITS	INSTALLED CAPACITY (MW)
STATE SECTOR			
1	HPSEBL	12	366.00
2	JKSPDCL	12	1110.00
3	PSPCL	25	1051.00
4	RRVUNL	11	411.00
5	UPJVNL	15	501.60
6	UJVNL	34	1252.15
7	GSECL	8	540.00
8	SSNNL	11	1450.00
9	MPPGCL	23	875.00
10	CSPGC	3	120.00
11	MAHAGENCO	24	2406.00
12	APGENCO	32	1746.75
13	TSGENCO	29	2196.60
14	KPCL	68	3585.40
15	KSEB	48	1881.50
16	TANGEDCO	70	2182.20
17	JUUNL	2	130.00
18	OHPC	31	2027.50
19	WBSEDCL	11	977.00
20	APGCL	2	100.00
21	MePGCL	11	282.00
	SUB TOTAL STATE	482	25191.70
	TOTAL	676	42783.42

STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
	CONVENTIONAL H.E. STATIONS				
	NORTHERN				
	BBMB				
	HIMACHAL PRADESH				
1	BHAKRA LEFT	(5X108)	S(MP)	540.00	1960-1961
2	BHAKRA RIGHT	(5X157)	S(MP)	785.00	1966-1968
3	DEHAR	(6X165)	R	990.00	1977-1983
4	PONG	(6X66)	S(MP)	396.00	1978-1983
	SUB-TOTAL BBMB (HP)			2711.00	
	PUNJAB				
1	GANGUWAL	(2X24.2)+(1X29.25)	R	77.65	1955-1962
2	KOTLA	(2X24.2)+(1X29.25)	R	77.65	1956-1961
	SUB-TOTAL BBMB (PUNJAB)			155.30	
	TOTAL BBMB			2866.30	
	NHPC				
	HIMACHAL PRADESH				
1	BAIRA SIUL	(3X60)	R	180.00	1980-1981
2	CHAMERA- I	(3X180)	R(UG)	540.00	1994
3	CHAMERA- II	(3X100)	R(UG)	300.00	2003-2004
4	CHAMERA- III	(3X77)	R(UG)	231.00	2012
5	PARBATI-III	(4X130)	R(UG)	520.00	2014
	SUB-TOTAL HP			1771.00	
	JAMMU AND KASHMIR				
1	DULHASTI	(3X130)	R(UG)	390.00	2007
2	SALAL -I	(3X115)	R	345.00	1987
3	SALAL -II	(3X115)	R	345.00	1993-95
4	URI-I	(4X120)	R(UG)	480.00	1996-1997
5	URI-II	(4X60)	R(UG)	240.00	2013-14
6	SEWA-II	(3X40)	R	120.00	2010-11
7	CHUTAK	(4X11)	R	44.00	2012-13
8	NIMOO BAZGO	(3X15)	R	45.00	2013
	SUB-TOTAL J&K			2009.00	
	UTTARAKHAND				
1	DHAULI GANGA	(4X70)	R(UG)	280.00	2005
2	TANAKPUR	(3X31.4)	R	94.20	1992
	SUB-TOTAL UTTARAKHAND			374.20	
	TOTAL NHPC			4154.20	
	SJVNL				
	HIMACHAL PRADESH				
1	NATHPA JHAKRI	(6X250)	R(UG)	1500.00	2003-2004

**STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)**

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
2	RAMPUR	(6X68.67)	R	412.02	2014-15
	TOTAL SJVNL			1912.02	
	NTPC LTD.				
1	KOLDAM	(4X200)	S	800.00	2015
	TOTAL NTPC LTD.			800.00	
	THDC				
	UTTARAKHAND				
1	TEHRI ST-1	(4X250)	S(UG)	1000.00	2006-2007
2	KOTESHWAR	(4X100)	R	400.00	2010-12
	TOTAL THDC			1400.00	
	TOTAL CENTRAL			11132.52	
	PRIVATE				
	HIMACHAL PRADESH				
	MPCL				
1	MALANA	(2X43)	R	86.00	2001
	TOTAL MPCL			86.00	
	GBHPPL				
1	BUDHIL	(2X35)	R	70.00	2012
	TOTAL GBHPPL			70.00	
	EPPL				
1	MALANA-II	(2X50)	R	100.00	2011-12
	TOTAL EPPL			100.00	
	ADHPL				
1	ALLAIN DUHANGAN	2X96	R	192.00	2010-11
	TOTAL ADHPL			192.00	
	HBPCL				
1	BASPA	(3X100)	R(UG)	300.00	2003
2	KARCHAM WANGTOO	(4X250)	R(UG)	1000.00	2011-12
	TOTAL HBPCL			1300.00	
	TOTAL PVT			1748.00	
	HPSEBL				
1	BASSI	(4X15)	R	60.00	1970-1981
2	GIRI BATA	(2X30)	R	60.00	1978
3	LARJI	(3X42)	R	126.00	2006
4	SANJAY	(3X40)	R(UG)	120.00	1989
	TOTAL HPSEBL			366.00	
	JKSPDC				
	JAMMU AND KASHMIR				
1	BAGLIHAR	(3X150)	R	450.00	2008
2	BAGLIHAR II	(3X150)	R	450.00	2015

STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
3	LOWER JHELM	(3X35)	R	105.00	1978-1979
4	UPPER SINDH-II	(3X35)	R	105.00	2001-2002
	TOTAL JKSPDC			1110.00	
	PSPCL				
	PUNJAB				
1	ANANDPUR SAHIB-I	(2X33.5)	R	67.00	1985
2	ANANDPUR SAHIB-II	(2X33.5)	R	67.00	
3	MUKERIAN -I	(3X15)	R	45.00	1983
4	MUKERIAN -II	(3X15)	R	45.00	1988-89
5	MUKERIAN -III	(3X19.5)	R	58.50	1989
6	MUKERIAN -IV	(3X19.5)	R	58.50	1989
7	RANJIT SAGAR	(4X150)	S(MP)	600.00	2000
8	SHANAN	(1X50)+(4X15)	R	110.00	1932-1982
	TOTAL PSPCL			1051.00	
	RRVUNL				
	RAJASTHAN				
1	JAWAHAR SAGAR	(3X33)	S	99.00	1972-1973
2	MAHI BAJAJ -I	(2X25)	R	50.00	1986
3	MAHI BAJAJ -II	(2X45)	R	90.00	1989
4	R P SAGAR	(4X43)	S(MP)	172.00	1968
	TOTAL RRVUNL			411.00	
	UJVNL				
	UTTARAKHAND				
1	CHIBRO (YAMUNA)	(4X60)	R(UG)	240.00	1975-1976
2	CHILLA	(4X36)	R	144.00	1980-1981
3	DHAKRANI	(3X11.25)	R	33.75	1965-1970
4	DHALIPUR	(3X17)	R	51.00	1965-1970
5	KHATIMA	(3X13.8)	R	41.40	1955-1956
6	KHODRI	(4X30)	R(UG)	120.00	1984
7	KULHAL	(3X10)	R	30.00	1975
8	MANERI BHALI - I	(3X30)	R	90.00	1984
9	MANERI BHALI - II	(4X76)	R	304.00	2008
10	RAMGANGA	(3X66)	S(MP)	198.00	1975-1977
	TOTAL UJVNL			1252.15	
	AHPC				
1	SRINAGAR	(4X82.50)	R	330.00	2015
	JPPVL				
	UTTARAKHAND				
1	VISHNU PRAYAG	(4X100)	R(UG)	400.00	2006

**STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)**

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
	UPJVNL				
	UTTAR PRADESH				
1	KHARA	(3X24)	R	72.00	1992
2	MATATILLA	(3X10.2)	R	30.60	1965
3	OBRA	(3X33)	R	99.00	1970-1971
4	RIHAND	(6X50)	S	300.00	1961-1965
	TOTAL UPJVNL			501.60	
	TOTAL STATE SECTOR			5421.75	
	TOTAL NORTHERN REGION			18302.27	
	WESTERN				
	NHDC				
	MADHYA PRADESH				
1	INDIRA SAGAR	(8X125)	S	1000.00	2004-2005
2	OMKARESHWAR	(8X65)	R	520.00	2007
	TOTAL NHDC			1520.00	
	TOTAL CENTRAL			1520.00	
	DODSON-LINDBLOM HYDRO POWER PVT. LTD. (DLHP)				
	MAHARASHTRA				
1	BHANDARDHARA ST-II	(1X34)	R	34.00	1996
	TOTAL DLHP			34.00	
	TATA POWER COMPANY (PVT.)				
	MAHARASHTRA				
1	BHIRA	(6X25)	S	150.00	1927-1949
2	BHIVPURI	(3X24) + (2X1.5)	S	75.00	1997-1999
3	KHOPOLI	(3X24)	S	72.00	2001-2003
	TOTAL TPCL			297.00	
	TOTAL PVT (MAHARASHTRA)			331.00	
	CSPGCL				
	CHHATTISGARH				
1	HASDEOBANGO	(3X40)	S(MP)	120.00	1994-1995
	TOTAL CSPGCL			120.00	
	GSECL				
	GUJARAT				
1	UKAI	(4X75)	S(MP)	300.00	1974-1976
	TOTAL GSECL			300.00	
	MAHAGENCO				
	MAHARASHTRA				
1	BHIRA TAIL RACE	(2X40)	R	80.00	1987-1988
2	KOYNA DPH	(2X18)	S	36.00	1980-1981
3	KOYNA-I&II	(4X70)+(4X80)	S(UG)	600.00	1962-1967

**STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)**

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
4	KOYNA-III	(4X80)	S(UG)	320.00	1975-1978
5	KOYNA-IV	(4X250)	S(UG)	1000.00	1999-2000
6	TILLARI	(1X60)	S	60.00	1986
7	VAITARNA	(1X60)	S(UG)	60.00	1976
	TOTAL MAHAGENCO			2156.00	
	MPPGCL				
	MADHYA PRADESH				
1	BANSAGAR TONS-I	(3X105)	S(MP)	315.00	1991-1992
2	BANSAGAR TONS-II	(2X15)	R	30.00	2002
3	BANSAGAR TONS-III	(3X20)	R	60.00	2000-2002
4	BARGI	(2X45)	S(MP)	90.00	1988
5	GANDHI SAGAR	(5X23)	S(MP)	115.00	1960-1966
6	MADHIKHERA	(3X20)	S	60.00	2006-2007
7	PENCH	(2X80)	S(UG)	160.00	1986-1987
8	RAJGHAT	(3X15)	S	45.00	1999
	TOTAL MPPGCL			875.00	
	SSNNL				
	GUJARAT				
1	S SAROVAR CHPH	(5X50)	R	250.00	2004
	TOTAL SSNNL			250.00	
	TOTAL STATE			3701.00	
	TOTAL WESTERN REGION			5552.00	
	SOUTHERN				
	APGENCO				
	ANDHRA PRADESH				
1	HAMPI	(4X9)	S(MP)	36.00	1958-1964
2	LOWER SILERU	(4X115)	S	460.00	1976-1978
3	MACHKUND	(3X17)+(3X21.25)	S	114.75	1959
4	NAGARJUN SGR RBC	(2X30)	R	60.00	1983-1990
5	NAGARJUN SGR RBC EXTN.	(1X30)	R	30.00	
6	SRISAILAM	(7X110)	S	770.00	1982-1987
7	T B DAM	(4X9)	S	36.00	1957-1964
8	UPPER SILERU -I	(2X60)	S	120.00	1967-1968
9	UPPER SILERU -II	(2X60)	S	120.00	1994-1995
	TOTAL APGENCO			1746.75	
	TELANGANA				
1	PRIYADARSHNI JURALA	(6X39)	R	234.00	2008-2011
2	POCHAMPAD	(3X9)	S(MP)	27.00	1987-1988
3	NAGARJUN SGR	(1X110)	S	110.00	1978
4	NAGARJUN SGR LBC	(2X30)	R	60.00	1983

**STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)**

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
5	LOWER JURALA	(4X40)	R	160.00	2015
	TOTAL TSGENCO			591.00	
	KPCL				
	KARNATAKA				
1	ALMATTI	(5X55)+(1X15)	S	290.00	2004-2005
2	BHADRA	(2X12)+(1X6)+(1X2)+(1X7.2)	S	39.20	1962-1998
3	GERUSOPPA	(4X60)	R	240.00	2001-2002
4	GHAT PRABHA	(2X16)	S(MP)	32.00	1992
5	JOG	(4X21.6)+(4X13.2)	S	139.20	1949-2002
6	KADRA	(3X50)	S	150.00	1997-1999
7	KALINADI	(3X135)+(3X150)	S	855.00	1979-1984
8	KALINADI SUPA	(2X50)	S	100.00	1985
9	KODASALI	(3X40)	S	120.00	1998-1999
10	LINGNAMAKKI	(2X27.5)	S	55.00	1979-1980
11	MUNIRABAD	(2X9)+(1X10)	S(MP)	28.00	1962-1965
12	SHARAVATHY	(10X103.5)	S	1035.00	1965-1977
13	SIVASAMUNDROM	(4X6)+(6X3)	R	42.00	1922-1934
14	VARAHI	(4X115)	S(UG)	460.00	1989-2009
	TOTAL KPCL			3585.40	
	KSEB				
	KERALA				
1	IDAMALAYAR	(2X37.5)	S	75.00	1987
2	IDUKKI	(6X130)	S(UG)	780.00	1976-1986
3	KAKKAD	(2X25)	S	50.00	1999
4	KUTTIYADI & K EXTN	(3X25)+(1X50)	S	125.00	1972-2001
5	KUTTIYADI ADDN EXTN	(2X50)	S	100.00	2010
6	LOWER PERIYAR	(3X60)	R	180.00	1997
7	NERIAMANGLAM	(3X15+1x25)	R	70.00	1961-63, 2008-09
8	PALLIVASAL	(3X5)+(3X7.5)	R	37.50	1948-2001
9	PANNIAR	(2X15)	S	30.00	1963-2001
10	PORINGALKUTTU	(4X8)	R	32.00	1957-1960
11	SABARIGIRI	(6X50)	S	300.00	1960-1967
12	SENGULAM	(4X12)	R	48.00	1954-2001
13	SHOLAYAR	(3X18)	S	54.00	1956-1968
	TOTAL KSEB			1881.50	
	TANGEDCO				
	TAMIL NADU				
1	ALIYAR	(1X60)	S	60.00	1970
2	BHAVANI KAT. BARRAGE	(2X15)	R	30.00	2006
3	BHAVANI KAT. BARRAGE II	(2X15)	R	30.00	2013

**STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)**

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
4	BHAVANI KAT. BARRAGE III	(1X15)	R	30.00	2012
5	KODAYAR -I	(1X60)	S	60.00	1970
6	KODAYAR -II	(1X40)	R	40.00	1971
7	KUNDAH -I	(3X20)	S	60.00	1960-1964
8	KUNDAH -II	(5X35)	S	175.00	1960-1965
9	KUNDAH -III	(3X60)	S	180.00	1965-1978
10	KUNDAH -IV	(2X50)	S	100.00	1966-1978
11	KUNDAH -V	(2X20)	S	40.00	1964-1988
12	LOWER METTUR -I	(2X15)	R	30.00	1988
13	LOWER METTUR -II	(2X15)	R	30.00	1988
14	LOWER METTUR -III	(2X15)	R	30.00	1987-1988
15	LOWER METTUR -IV	(2X15)	R	30.00	1988-1999
16	METTUR DAM	(4X12.5)	S	50.00	1937-1946
17	METTUR TUNNEL	(4X50)	S	200.00	1965-1966
18	MOYAR	(3X12)	R	36.00	1952-1953
19	PAPANASAM	(4X8)	S	32.00	1944-1951
20	PARSON'S VALLEY	(1X30)	S	30.00	2000
21	PERIYAR	(4X35)	S	140.00	1958-1965
22	PYKARA	(3X7)+(2X13.6)+(1X11)	S	59.20	1932-2005
23	PYKARA ULTMATE	(3X50)	S(UG)	150.00	2005
24	SARKARPATHY	(1X30)	R	30.00	1966
25	SHOLAYAR I&II	(2X35) + (1X25)	S	95.00	1971
26	SURULIYAR	(1X35)	R	35.00	1978
	TOTAL TANGEDCO			1782.20	
	TOTAL STATE SECTOR			9586.85	
	TOTAL SOUTHERN REGION			9586.85	
	EASTERN				
	DVC				
	WEST BENGAL				
1	MAITHON	(1X23.2)+(2X20)	S(UG)	63.20	1957-1958
	JHARKHAND				
1	PANCHET	(1X40)	R	40.00	1990
	TOTAL DVC			103.20	
	NHPC				
	WEST BENGAL				
1	TEESTA LOW DAM III	(4X33)	R	132.00	2013-14
2	TEESTA LOW DAM IV	(2X40)	R	80.00	2016
	SUB TOTAL NHPC (WB)			212.00	
	SIKKIM				
1	RANGIT	(3X20)	R	60.00	2000

STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
2	TEESTA V	(3X170)	R(UG)	510.00	2008
	SUB TOTAL NHPC (SIKKIM)			570.00	
	TOTAL NHPC			782.00	
	TOTAL CENTRAL			885.20	
	JUUNL				
	JHARKHAND				
1	SUBERNREKHA -I	(1X65)	S	65.00	1977
2	SUBERNREKHA -II	(1X65)	R	65.00	1980
	TOTAL JUUNL			130.00	
	OHPC				
	ODISHA				
1	BALIMELA	(6X60)+(2X75)	S	510.00	1973-1977
2	HIRAKUD (BURLA)	(3X37.5)+(2X49.5)+(2X32)	S	275.50	1956-1990
3	HIRAKUD (CHIPLIMA)	(3X24)	S	72.00	1962-1964
4	RENGALI	(5X50)	S	250.00	1985-1992
5	UPPER INDRAVATI	(4X150)	S	600.00	1999-2001
6	UPPER KOLAB	(4X80)	S	320.00	1988-1993
	TOTAL OHPC			2027.50	
	WBSEDCL				
	WEST BENGAL				
1	JALDHAKA	(3X9)	R	27.00	1967-1972
2	RAMMAM	(4X12.5)	R	50.00	1995-1996
	TOTAL WBSEDCL			77.00	
	TOTAL STATE			2234.50	
	SIKKIM				
	GIPL (GATI INFRA PRIVATE LTD.)				
1	CHUZACHEN	(2*49.5)	R	99.00	2013
	DEPL (DANS ENERGY PVT LTD.)		R		
1	JORETHANG LOOP	(2*48)		96.00	2015
	TOTAL EASTERN REGION			3314.70	
	NORTH EASTERN				
	NEEPCO				
	ARUNACHAL PRADESH				
1	RANGANADI	(3X135)	R	405	2002
	SUB-TOTAL Ar.P			405	
	ASSAM				
1	KOPILI	(4X50)+(1X25)	S	225.00	1988-2003
2	KHONDONG	(2X25)	S	50.00	1984
	SUB-TOTAL ASSAM			275.00	

STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
	NAGALAND				
1	DOYANG	(3X25)	S	75.00	2000
	SUB-TOTAL NAGALAND			75.00	
	TOTAL NEEPCO			755.00	
	NHPC				
	MANIPUR				
1	LOKTAK	(3X35)	S	105.00	1983
	TOTAL			105.00	
	TOTAL CENTRAL			860.00	
	APGCL				
	ASSAM				
1	KARBI LANGPI	(2X50)	R	100.00	2007
	TOTAL APGCL			100.00	
	MePGCL				
	MEGHALAYA				
1	KYRDEMKULAI	(2X30)	R	60.00	1979
2	UMIAM ST-I	(4X9)	S	36.00	1965
3	UMIAM ST-IV	(2X30)	R	60.00	1992
4	MYNTDU ST-I	(3X42)	R	126.00	2012
	TOTAL MePGCL			282.00	
	TOTAL STATE			382.00	
	TOTAL NE REGION			1242.00	
	TOTAL CONVENTIONAL			37997.82	
	PUMPED STORAGE SCHEMES				
	GUJARAT				
1	KADANA	(4X60)	PSS	240.00	1987-88
2	SARDAR SAROVAR- RBPH	(6X200)	PSS	1200.00	2004-05, 05-06
	MAHARASHTRA				
1	GHATGHAR	(2X125)	PSS	250.00	2008
2	BHIRA PSS	(1X150)	PSS	150.00	1995
	SUB-TOTAL			1840.00	
	SOUTHERN REGION				
	TELANGANA				
1	N.J.SAGAR	(7X100.8)	PSS	705.60	1978-85
2	SRISAILAM LBPH	(6X150)	PSS	900.00	2000-04
	TAMILNADU				
1	KADAMPARAI	(4X100)	PSS	400.00	1987-88
	SUB-TOTAL			2005.60	

**STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY
(ABOVE 25 MW CAPACITY)**

As on 31.03.2016

SL. NO.	UTILITY/STATIONS	NO. OF UNITS X CAPACITY (MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
	EASTERN REGION				
	JHARKHAND				
1	PANCHET	(1X40)	PSS	40.00	1990
	WEST BENGAL				
1	PURULIA	(4X225)	PSS	900.00	2007
	SUB-TOTAL			940.00	
	TOTA- PSS			4785.60	
	TOTAL (CONVENTIONAL+PSS)			42783.42	

Note: 1. Up-rated/Derated Capacities of units have been incorporated.

Abbreviations:-**R- Run of River Type****S- Storage Type****UG- Underground****MP- Multipurpose**

Annex-1.4

CAPACITYWISE GROUPING OF HYDRO - ELECTRIC STATIONS

As on 31.03.2016

STATION CAPACITY RANGE (MW)	NUMBER OF STATIONS	NUMBER OF UNITS	TOTAL CAPACITY (MW)
> 25 - 50	45	128	1643.45
> 50 - 100	53	137	3917.90
>100 - 200	34	117	4823.95
>200 - 300	18	81	4745.50
>300 - 400	12	46	4265.00
>400 - 500	7	27	3117.02
>500 - 600	9	44	4940.00
>600 - 700	0	0	0.00
>700 - 800	4	22	3135.00
>800 - 900	4	26	3470.60
>900 - 1000	5	26	4990.00
>1000 - 1500	3	22	3735.00
TOTAL	194	676	42783.42

HYDRO GENERATING UNITS ADDED DURING 2015-16

NAME OF THE STATION	UTILITY	STATE	UNIT NO.	CAPACITY (MW)	DATE OF COMMISSIONING
CENTRAL SECTOR					
KOL DAM	NTPC	HIMACHAL PRADESH	3	200.00	10.04.2015
			4	200.00	12.06.2015
TEESTA LOW DAM IV	NHPC	WEST BENGAL	1	40.00	14.02.2016
			2	40.00	16.03.2016
STATE SECTOR					
BAGLIHAR II	JKSPDC	JAMMU & KASHMIR	1	150.00	05.09.2015
			2	150.00	29.09.2015
			3	150.00	26.10.2015
LOWER JURALA	TSGENCO	TELANGANA	1	40.00	14.10.2015
			2	40.00	30.09.2015
			3	40.00	04.01.2016
			4	40.00	05.03.2016
PRIVATE SECTOR					
SRINAGAR	AHPC	UTTARAKHAND	1	82.50	10.04.2015
			2	82.50	08.06.2015
			3	82.50	20.04.2015
			4	82.50	03.06.2015
JORETHANG LOOP	DEPL	SIKKIM	1	48.00	22.09.2015
			2	48.00	23.09.2015
ALL INDIA TOTAL				1516.00	

CHAPTER 2

GENERATION PERFORMANCE

CHAPTER 2

GENERATION PERFORMANCE

2.1 Generation from hydro electric power stations (above 25 MW capacity) in the country during 2015-16 was 121376.75 MU against the target of 128000 MU which was 5.17% less than the target.

2.2 Region-wise generation performance of hydro-electric stations during 2015-16 is indicated in **Table 2.1**.

TABLE 2.1
GENERATION PERFORMANCE – REGIONWISE
(2015-16)

S. No.	Region	Installed Capacity as on 31.03.2016 (MW)	Generation During 2015-16		
			Target (MU)	Actual (MU)	Shortfall (-)/ Surplus (+) Over Target (%)
1	Northern	18302.27	64500	73105.18	13.34
2	Western	7392.00	16012	12845.34	(-)19.78
3	Southern	11592.45	31818	20981.67	(-)34.06
4	Eastern	4274.70	11638	10237.87	(-) 12.03
5	North-eastern	1242.00	4032	4206.70	4.33
	Total(All India)	42783.42	128000	121376.75	(-) 5.17

Note: - Includes 4785.60 MW of Pumped Storage Scheme.

Generation during 2015-16 has exceeded the target in Northern and North Eastern Region whereas it was less than the target in Western, Southern and Eastern Region of the country.

Hydel generation during 2015-16 was 121376.75 MU against the target of 128000 MU viz less in generation by 6623.25 MU (5.17%). Actual generation of 121376.75 MU was less than previous year generation of 129243.68 MU by 6.09%. Hydel generation was more than the generation target in Northern and North Eastern by 13.34% & 4.33% respectively, whereas Hydel generation was less than target in Western, Southern and Eastern Region by 19.78%, 34.06% & 12.03% respectively. There was less generation as compared to the target for HE Stations of UPJVNL, EPPL, AHPC & JPVNL in Northern Region, NHDC, SSNNL, GSECL, MAHAGENCO, MPPGCL & TPCL in Western

Region, APGENCO, TSGENCO, KPCL, KSEB & TANGEDCO in Southern Region, DVC, JUUNL, OHPC, WBSEDCL, DEPL & GIPL in Eastern Region.

Month wise generation performance and cumulative generation performance vis-a-vis targets have been shown at **Exhibit-2.1** and are given in **Table 2.2** below.

TABLE 2.2
MONTHWISE & CUMULATIVE GENERATION VIS-À-VIS TARGET IN MU
PERIOD: 2015-16

MONTH	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
TARGET	8878	11181	11867	14540	16467	14897	11435	8220	7684	7354	6974	8503
GEN.	9421	12855	12509	15094	17779	12299	9025	6822	6340	6159	6087	6985
CUM. TARGET	8878	20059	31926	46466	62933	77830	89265	97485	105169	112523	119497	128000
CUM. GEN.	9421	22276	34785	49880	67659	79958	88984	95805	102145	108304	114392	121377

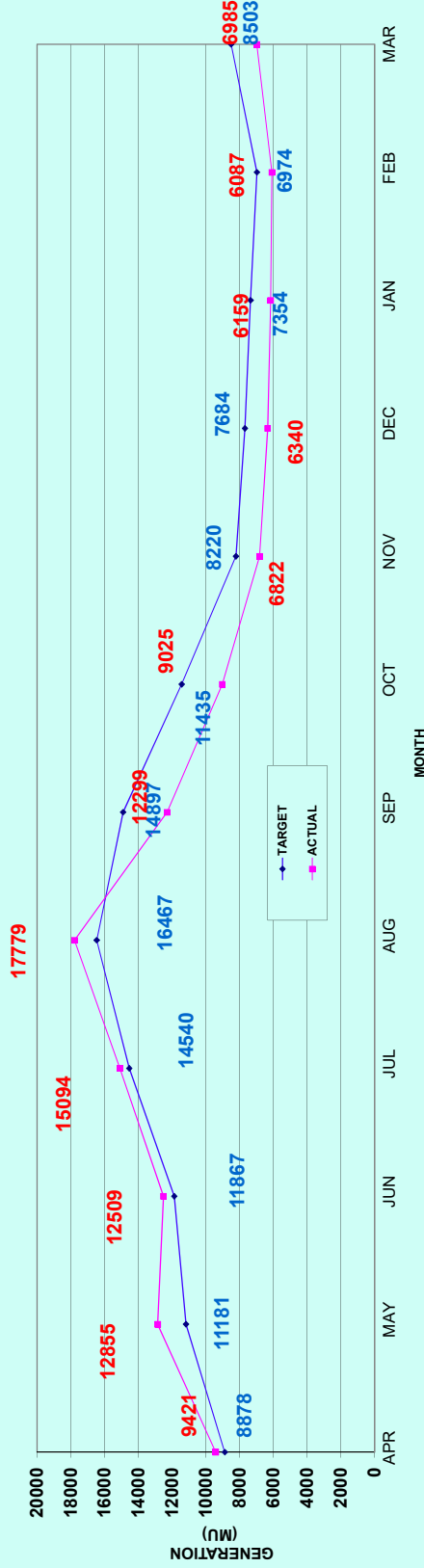
2.3 Sector wise generation performance during the year 2015-16 vis-à-vis targets is given in **Table 2.3**. Generation from H.E. Stations under Central sector was more than the target by 15.86% and State sector and Private sector was less than the target by 20.06% & 8.28% respectively.

TABLE 2.3
SECTORWISE GENERATION PERFORMANCE
PERIOD: 2015-16

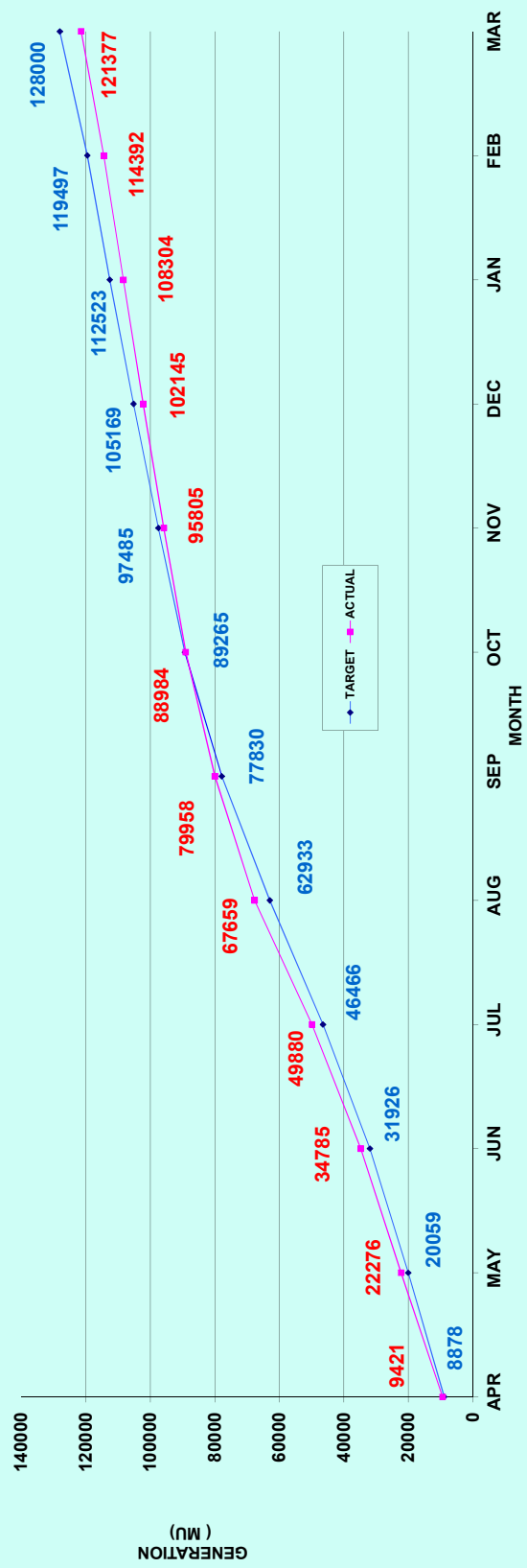
Sl. No.	Sector	Installed Capacity as on 31.03.16 (MW)	Generation		
			Target (MU)	Actual (MU)	Shortfall (-) Surplus (+) Over Target (%)
1	Central	14437.72	48925	56683.15	15.86
2	State	25191.70	66505	53164.06	(-) 20.06
3	Private	3154.00	12570	11529.54	(-) 8.28
	Total	42783.42	128000	121376.75	(-) 5.17

2.4 Generation performance of 31 major reservoir based H.E. Stations vis-à-vis other schemes is given in **Table 2.4**. It could be observed that the 31 major reservoir based

MONTHLY ALL INDIA HYDRO GENERATION VS TARGETS
DURING 2015-16



ALL INDIA CUMMULATIVE GENERATION VS TARGETS
DURING 2015-16



Hydro Stations have generated 16.62% less than the target whereas other stations have generated 2.41% more than the target.

TABLE 2.4
RESERVOIR BASED STATIONS GENERATION PERFORMANCE VIS-À-VIS
OTHER HE STATIONS
PERIOD: 2015-16

S. No.	Type of Scheme	Installed Capacity as on 31.03.2016 (MW)	Generation in 2015-16		
			Target (MU)	Actual (MU)	Shortfall (-) / Surplus (+) Over target (%)
1.	Reservoir Based Schemes (31 Nos.)	19227.85	51025	42544.33	(-) 16.62
2.	Other schemes	23555.57	76975	78832.42	2.41
	Total	42783.42	128000	121376.75	(-) 5.17

2.5 Details of actual generation during 2015-16 for all the hydro stations (Above 25 MW capacity) in the country are given in **Annex 2.1**. List of stations where generation exceeded the target during 2015-16 is given in **Table 2.5**.

TABLE 2.5
H.E. STATIONS ACHIEVING HIGHER GENERATION VIS-A-VIS TARGET
PERIOD: 2015-16

S. No.	Actual Generation as % of Target	Hydro Electro Stations
1	150 & above	Pong, Koldam, R P Sagar, Ramganga, Gandhi Sagar, Koyna I&II and Bhandardara.
2	140 - 150	Jawahar Sagar, Jog.
3	130 - 140	Bhakra L&R, Rampur and Kadana PSS.
4	120 - 130	Uri, Lower Jhelum, Mukerian, Ranjit Sagar, Hasdeo Bango, Koyna DPH, Neriamangalam, Kodayar I&II and Periyar.
5	110 - 120	Dehar, Chamera I, Dulhasti, Salal I &II, Sewa II, Uri II, Nathpa Jhakri, Tehri, Giri Bata, Larji, Budhil, Mahi BajajI&II, Lower Sileru, Suruliyar and Ranganadi.

6	100 - 110	Ganguwal, Kotla, Baira Siul, Chamera II, Chamera III, Nimmo Bazgo, Tanakpur, Koteswar, Bassi, Allain Duhangan, Baspa II, Karcham Wangtoo, Malana, Baglihar, Shanan, Chhibro, Khatima, Khodri, Maneri Bhali I, Maneri Bhali II, Sardar Sarovar CHPH, Bansagar Tons II, Madhikheda, Upper Sileru I&II, Panniar, Poringalkuthu, Sengulam, Aliyar, Kadamparai, Sholayar I&II, Maithon, Rangit, Teesta V, Jaldhaka, Rammam, Teesta Low Dam III, Karbi Langpi, Myntdu, Umiam St. I, Khandong, Kopili and Loktak.
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H.E. Stations where generation was less than the target have been listed in **Table 2.6** below:

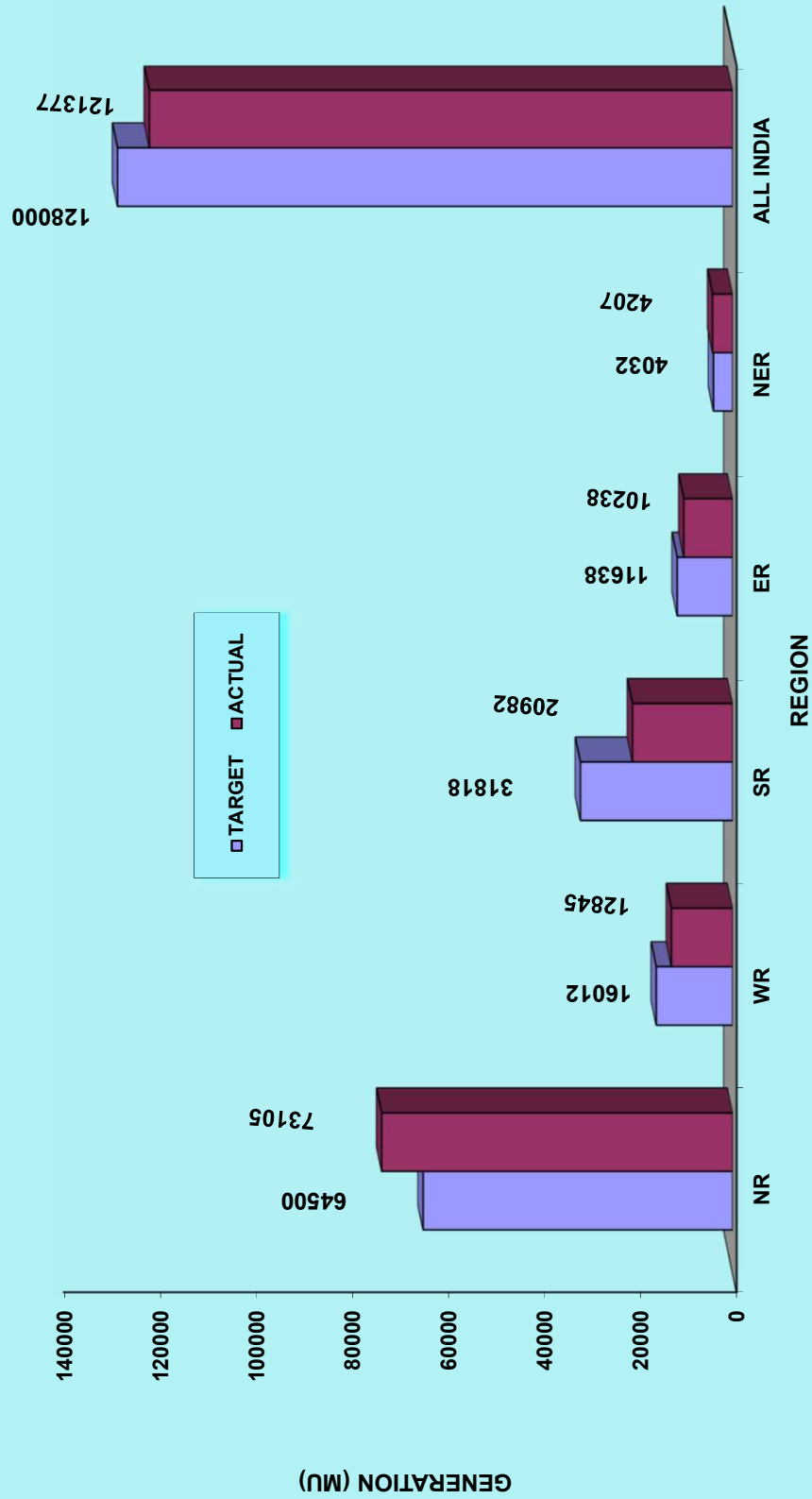
TABLE 2.6

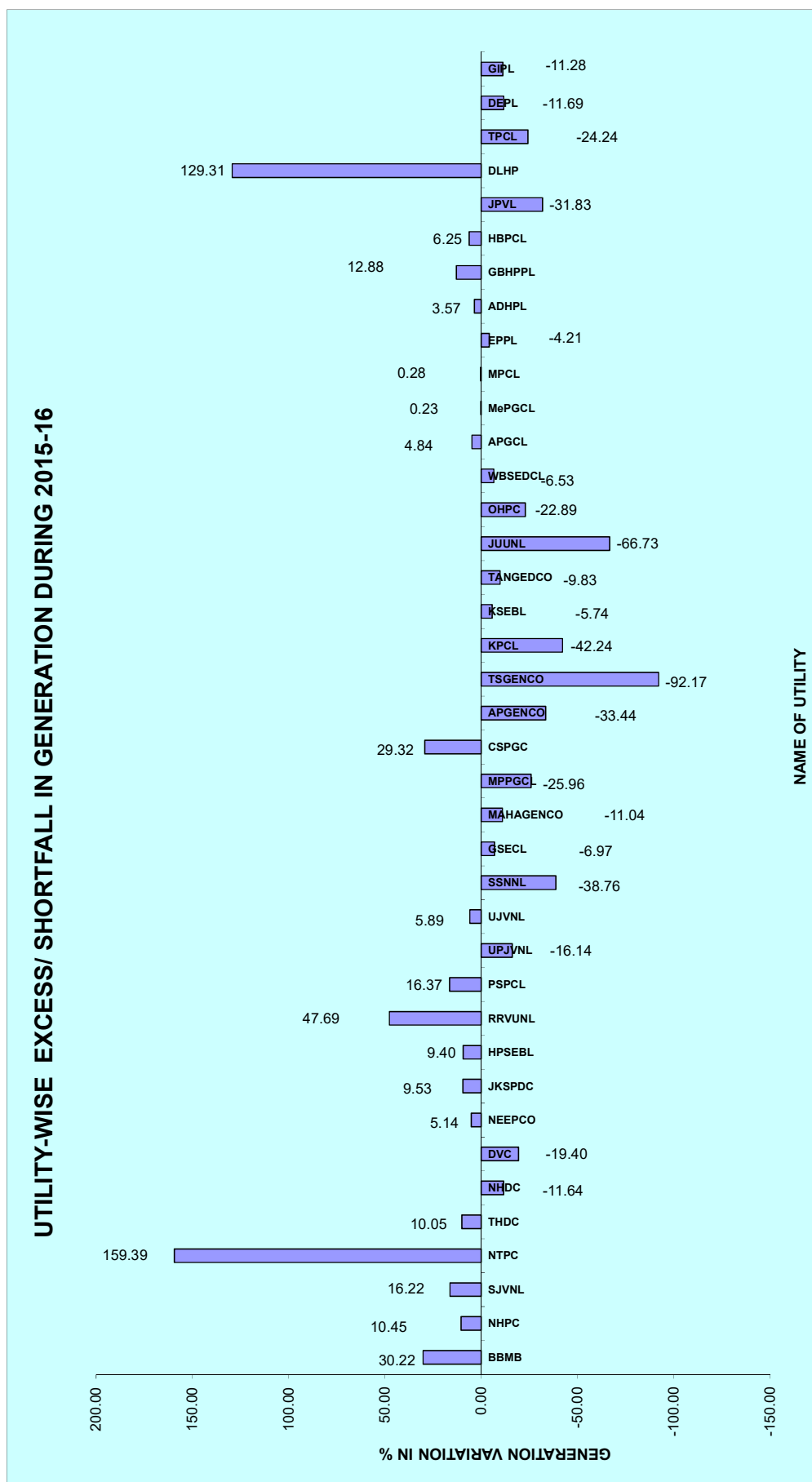
**H.E. STATIONS HAVING SHORTFALL IN GENERATION VIS-A-VIS
TARGETS
PERIOD: 2015-16**

S. No.	Actual Generation as % of Target	Hydro Electro Stations
1	90 -100	Dhauliganga, Parbati III, Malana II, Anandpur Sahib I& II, Khara, Obra, Chilla, Dhakrani, Dhalipur, Kulhal, Pench, Koyna St. III, Khopoli, Machkund, Iddukki, Lower Periyar, Pallivasal, Sholayar, Papanasam, Upper Kolab, Kyrdenkulai and Umiam St. IV
2	80 -90	Upper Sindh, Matatilla, Srinagar, Indira Sagar, Omkareshwar, Bhira Tail Race, Vaitarna, Kakkad, Kuttiadi and Kuttiadi additional Extension, Sabirigiri, Bhawani Kattalai Barrage-I to III, Kundah I-V, Mettur Dam and Tunnel, Rengali, Upper Indravati, Jorethang Loop, Chuzachen and Purulia
3	70 -80	Rihand, Ukai, Bargi, Ghatghar PSS, Bhira, TB Dam and Hampi, Supa DPH, Shivasamudram, Idamalayar, Lower Mettur I-IV and Doyang.
4	60 -70	Chutak, Vishnuprayag, Koyna IV, Bhivpuri, Bhadra, Kalinadi, Munirabad, Varahi, Moyar, Pykara Ultimate, Sarkarpathy and Hirakud I &II.
5	50 -60	Sardar Sarovar RBPH, Gerusoppa, Kadra, Kodalai, Panchet and Balimela.
6	40 -50	Bansagar Tons I, Rajghat, Lingnamakki, Sharavathy, Parson's Valley and Pykara.
7	30 -40	Bansagar Tons III, Tillari, Ghatprabha and Subarnarekha I&II.
8	10 -30	Srisailem RB, Priyadarshani Jurala, Srisailem LB and Almatti Dam.
9	0 -10	Sanjay Vidyut Pariyojna, NJ Sagar RBC, Lower Jurala, NJ Sagar PSS, NJ Sagar LBC, and Pochampad.

2.6 Region wise generation targets vis-à-vis achievements are indicated at **Exhibit-2.2**. The states/utilities showing excess/short-fall in generation over the target are indicated in **Exhibit- 2.3**.

REGIONWISE ACTUAL GENERATION VS TARGET DURING 2015-16





GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
	(MW)	(MU)	(MU)	
NORTHERN REGION				
CENTRAL				
BBMB				
1. Bhakra L&R	1325.00	4455	5892.62	132.27
2. Dehar	990.00	2850	3339.14	117.16
3. Ganguwal	77.65	413	421.93	102.16
4. Kotla	77.65	413	430.45	104.23
5. Pong	396.00	945	1734.76	183.57
Total BBMB	2866.30	9076	11818.90	130.22
NHPC LTD				
1. Baira Siul	180.00	700	745.59	106.51
2. Chamera-I	540.00	2290	2623.70	114.57
3. Chamera-II	300.00	1415	1523.98	107.70
4. Chamera-III	231.00	1032	1043.62	101.13
5. Chutak	44.00	60	36.91	61.52
6. Dhauliganga	280.00	1100	1089.63	99.06
7. Dulhasti	390.00	2100	2361.48	112.45
8. Nimoo Bazgo	45.00	90	90.51	100.57
9. Parbati III	520.00	700	643.00	91.86
10. Salal-I	345.00	3200	3591.36	112.23
11. Salal-II	345.00			
12. Sewa-II	120.00	510	597.07	117.07
13. Tanakpur	94.20	450	452.36	100.52
14. Uri	480.00	2650	3282.97	123.89
15. Uri -II	240.00	1080	1195.55	110.70
Total NHPC LTD	4154.20	17377	19277.73	110.94
SJVN LTD				
1. Naptha Jhakri	1500.00	6550	7313.79	111.66
2. Rampur	412.02	1450	1983.41	136.79
Total SJVN LTD	1912.02	8000	9297.20	116.22
NTPC LTD				
1. Kol Dam	800.00	890	2308.60	259.39
Total NTPC LTD	800.00	890	2308.60	259.39

GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
	(MW)	(MU)	(MU)	
THDC LTD				
1. Tehri	1000.00	2797	3101.00	110.87
2. Koteswar	400.00	1155	1248.05	108.06
Total THDC LTD	1400.00	3952	4349.05	110.05
Total CENTRAL	11132.52	39295	47051.48	119.74
HPSEB LTD				
1. Bassi	60.00	305	315.90	103.57
2. Giri Bata	60.00	170	189.06	111.21
3. Larji	126.00	587	656.85	111.90
4. Sanjay	120.00	0		0.00
Total HPSEB LTD	366.00	1062	1161.81	109.40
PRIVATE				
ALLAIN DUHANGAN POWER LTD.				
1. Allain Duhangan	192.00	700	724.96	103.57
EVEREST POWER PRIVATE LTD.				
1. Malana-II	100.00	370	354.42	95.79
HBPCL				
1. Baspa-II	300.00	1250	1304.50	104.36
2. Karcham Wangtoo	1000.00	4426	4726.32	106.79
Total HBPCL	1300.00	5676	6030.82	106.25
HSPL				
1. Sorang		245	0.00	0.00
GBHPPL				
1. Budhil	70.00	255	287.85	112.88
MALANA POWER COMPANY LTD.				
1. Malana	86.00	341	341.94	100.28
Total Private	1748.00	7587	7739.99	102.02
Total H.P.	2114.00	8649	8901.80	102.92

GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
	(MW)	(MU)	(MU)	
JAMMU & KASHMIR				
JKSPDC				
1. Baglihar	450.00	2800	3000.14	107.15
2. Baglihar II	450.00		55.60	
2. Lower Jhelum	105.00	532	666.21	125.23
3. Upper Sindh II	105.00	302	258.35	85.55
Total JKSPDC	1110.00	3634	3980.30	109.53
PUNJAB				
PSPCL				
1. A.P.Sahib I & II	134.00	720	668.54	92.85
2. Mukerian I - IV	207.00	972	1169.46	120.31
3. Ranjit Sagar	600.00	1509	1957.27	129.71
4. Shanan	110.00	518	532.57	102.81
Total PSPCL	1051.00	3719	4327.84	116.37
RAJASTHAN				
RRVUNL				
1. Jawahar Sagar	99.00	240	349.34	145.56
2. Mahi Bajaj I & II	140.00	140	166.35	118.82
3. R.P. Sagar	172.00	320	518.10	161.91
Total RRVUNL	411.00	700	1033.80	147.69
UTTAR PRADESH				
UPJVNL				
1. Khara	72.00	348	321.06	92.26
2. Matatilla	30.60	92	79.01	85.88
3. Obra	99.00	174	160.09	92.01
4. Rihand	300.00	501	374.92	74.83
Total UPJVNL	501.60	1115	935.08	83.86
UTTARAKHAND				
UJVNL				
1. Chibro (Y.St.II)	240.00	811	813.78	100.34
2. Chilla	144.00	780	753.67	96.62

GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016 (MW)	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
		(MU)	(MU)	
3. Dhakrani (Y.St.I)	33.75	144	136.86	95.04
4. Dhalipur (Y.St.I)	51.00	217	205.06	94.50
5. Khatima	41.40	110	120.45	109.50
6. Khodri (Y.St.II)	120.00	371	375.94	101.33
7. Kulhal (Y.St.IV)	30.00	150	138.98	92.65
8. Maneri Bhali-I	90.00	461	486.53	105.54
9. Maneri Bhali-II	304.00	1174	1229.06	104.69
10. Ram Ganga	198.00	280	502.53	179.48
Total UJVNL	1252.15	4498	4762.86	105.89
AHPC LTD				
1. Srinagar	330.00	1114	901.37	80.91
JAIPRAKASH POWER VENTURE LIMITED				
1. Vishnu Prayag	400.00	1776	1210.65	68.17
Total UTTARAKHAND	1982.15	7388	6874.88	93.05
Total N. REGION	18302.27	64500	73105.18	113.34
WESTERN REGION				
CHHATISGARH				
CSPGC				
1. Hasdeo Bango	120.00	250	323.30	129.32
Total CSPGC	120.00	250	323.30	129.32
GUJARAT				
GSECL				
1. Kadana PSS	240.00	220	289.91	131.78
2. Ukai	300.00	620	491.52	79.28
Total GSECL	540.00	840	781.42	93.03
SSNNL				
1. Sardar Sarovar CHPH	250.00	658	704.55	107.07
2. Sardar Sarovar RBPH	1200.00	2886	1465.88	50.79
Total SSNNL	1450.00	3544	2170.43	61.24
Total Gujarat	1990.00	4384	2951.85	67.33

GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
	(MW)	(MU)	(MU)	
MADHYA PRADESH				
MPPGPCL				
1. Bansagar Tons-I	315.00	1193	574.48	48.15
2 Bansagar Tons-II	30.00	100	107.48	107.48
3 Bansagar Tons-III	60.00	100	39.88	39.88
4. Bargi	90.00	417	328.10	78.68
5. Gandhi Sagar	115.00	239	383.05	160.27
6 Madhikheda	60.00	91	92.16	101.27
7. Pench	160.00	400	378.51	94.63
8. Rajghat	45.00	81	36.94	45.60
Total MPPGPCL	875.00	2621	1940.60	74.04
CENTRAL/ COMMON				
NHDC				
1. Indira Sagar	1000.00	2200	1974.21	89.74
2. Omkareshwar	520.00	1115	955.01	85.65
TOTAL NHDC	1520.00	3315	2929.22	88.36
Total M.P.	2395.00	5936.00	4869.82	82.04
MAHARASHTRA				
MAHAGENCO				
1. Bhira Tail Race	80.00	85	73.87	86.91
2. Ghatghar PSS	250.00	425	301.86	71.03
3. Koyna DPH	36.00	110	136.47	124.06
4. Koyna St.I&II	600.00	788	1239.60	157.31
5. Koyna St.III	320.00	550	534.04	97.10
6. Koyna IV	1000.00	1730	1066.70	61.66
7. Tillari	60.00	124	44.16	35.61
8. Vaitarna	60.00	144	122.62	85.15
Total MAHAGENCO	2406.00	3956	3519.33	88.96
DODSON-LINDBLOM HYDRO POWER PVT LTD (DLHP)				
1. Bhandardhara - II	34.00	36	82.55	229.31
Total DLHP	34.00	36	82.55	229.31

GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
	(MW)	(MU)	(MU)	
TATA POWER COMPANY LIMITED				
1. Bhira	150.00	883	640.34	72.52
2. Bhira PSS	150.00			
3. Bhivpuri	75.00	300	196.92	65.64
4. Khopoli	72.00	267	261.23	97.84
Total TPCL	447.00	1450	1098.49	75.76
Total Maharashtra	2887.00	5442	4700.37	86.37
Total Western	7392.00	16012	12845.34	80.22
SOUTHERN REGION				
ANDHRA PRADESH				
APGENCO				
1. T.B.Dam & Hampi	72.00	179	129.36	72.27
2. Lower Sileru	460.00	1105	1233.14	111.60
3. Machkund	114.75	484	477.47	98.65
4. N.J.Sagar RBC	90.00	150	0.00	0.00
5. N.J.Sagar TPD	-	175	0.00	0.00
6. Srisaillam RB	770.00	1234	206.05	16.70
7. Upper sileru I & II	240.00	446	465.27	104.32
Total APGENCO	1746.75	3773	2511.31	66.56
TELANGANA				
TSGENCO				
1. Lower Jurala	160.00	210	8.98	4.28
2. N.J.Sagar PSS	815.60	1510	88.15	5.84
3. N.J.Sagar LBC	60.00	68	0.00	0.00
4.Pochampad	27.00	68	0.00	0.00
5.Priyadarshni Jurala	234.00	250	30.42	12.17
6.Srisaillam LB	900.00	1500	154.78	10.32
Total TSGENCO	2196.60	3606	282.33	7.83
KARNATAKA				
KPCL				
1. Almatti Dam	290.00	494	145.16	29.38
2. Bhadra	39.20	64	40.08	62.63

GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016 (MW)	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
		(MU)	(MU)	
3. Gerusoppa	240.00	580	303.19	52.27
4. Ghatprabha	32.00	96	31.93	33.26
5. Jog	139.20	225	318.36	141.49
6. Kadra	150.00	379	220.48	58.17
7. Kalinadi	855.00	3000	1948.48	64.95
8. Supa DPH	100.00	447	324.94	72.69
9. Kodalali	120.00	370	203.26	54.94
10. Lingnamakki	55.00	258	118.94	46.10
11. Munirabad	28.00	95	61.83	65.08
12. Sharavathy	1035.00	5341	2664.50	49.89
13. Shivasamudram	42.00	277	216.46	78.14
14. Varahi	460.00	1100	752.39	68.40
Total KPCL	3585.40	12726	7350.01	57.76
KERALA				
KSEB LTD				
1. Idamalayar	75.00	350	273.00	78.00
2. Idukki	780.00	2427	2372.40	97.75
3. Kakkad	50.00	212	184.22	86.90
4. Kuttiadi	125.00	682	578.05	84.76
5. Kuttiadi Adnl. Extn	100.00			
6. Lower Periyar	180.00	560	510.72	91.20
7. Neriamangalam	70.00	271	350.50	129.34
8. Pallivasal	37.50	221	218.69	98.95
9. Panniar	30.00	159	174.30	109.62
10. Poringalkuthu	32.00	146	159.70	109.38
11. Sabarigiri	300.00	1354	1171.17	86.50
12. Sengulam	48.00	149	160.99	108.05
13. Sholayar	54.00	220	210.01	95.46
Total KSEB LTD	1881.50	6751.00	6363.75	94.26
TAMIL NADU				
TANGEDCO				
1. Aliyar	60.00	145	152.96	105.49
2. Bhawani K Barrage-III	30.00	52	5.68	10.92

GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016 (MW)	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
		(MU)	(MU)	
3. Bhawani K Barrage-II	30.00	69	7.03	10.19
4. Bhawani K Barrage-I	30.00	69	156.51	226.83
5. Kadamparai PSS	400.00	400	412.63	103.16
6. Kodayar I&II	100.00	220	278.58	126.63
7. Kundah I-V	555.00	1606	1372.44	85.46
8. Lower Mettur I-IV	120.00	298	223.36	74.95
9. Mettur Dam & Tunnel	250.00	413	341.43	82.67
10. Moyar	36.00	150	103.64	69.09
11. Papanasam	32.00	122	116.57	95.55
12. Parson's Valley	30.00	60	25.63	42.72
13. Periyar	140.00	394	504.79	128.12
14. Pykara	59.20	115	56.89	49.47
15. Pykara Ultimate	150.00	405	280.56	69.27
16. Sarkarpathy	30.00	115	79.28	68.94
17. Sholayar I&II	95.00	249	263.79	105.94
18. Suruliyar	35.00	80	92.50	115.63
Total TANGEDCO	2182.20	4962	4474.27	90.17
Total Southern	11592.45	31818	20981.67	65.94
EASTERN REGION				
DVC				
1. Maithon (WB)	63.20	102	107.54	105.44
2. Panchet	80.00	117	68.97	58.95
Total DVC	143.20	219	176.51	80.60
JHARKHAND				
JUUNL				
1. Subernarekha I&II	130.00	154	51.24	33.27
Total Jharkhand	130.00	154	51.24	33.27
ODISHA				
OHPC				
1. Balimela	510.00	1184	622.01	52.53
2. Hirakud I&II	347.50	986	683.86	69.36
3. Rengali	250.00	700	599.46	85.64

GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016 (MW)	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
		(MU)	(MU)	
4. Upper Indravati	600.00	2047	1760.44	86.00
5. Upper Kolab	320.00	832	767.06	92.19
Total OHPC	2027.50	5749	4432.83	77.11
SIKKIM				
PRIVATE SECTOR				
DANS ENERGY PVT LTD				
1. Jorethang Loop	96.00	85	75.06	88.31
GATI INFRASTRUCTURE PVT LTD				
1. Chuzachen HEP	99.00	475	421.43	88.72
TEESTA URJA LTD				
1. Teesta III		47	0.00	0.00
Total Private (Sikkim)	195.00	607.00	496.49	81.79
NHPC				
1. Rangit	60.00	339	345.27	101.85
2. Teesta-V	510.00	2474	2710.17	109.55
sub-total NHPC	570.00	2813	3055.44	108.62
WEST BENGAL				
WBSEDCL				
1. Jaldhaka I	27.00	158	173.37	109.73
2. Purulia PSS	900.00	1200	1064.56	88.71
3. Ramman II	50.00	238	253.77	106.63
Total WBSEDCL	977.00	1596	1491.70	93.47
NHPC				
1. Teesta Low Dam-III	132.00	500	514.87	102.97
2. Teesta Low Dam-IV	80.00		18.76	-
Total WB	1189.00	2096.00	2025.34	96.63
Total Eastern	4254.70	11638.00	10237.87	87.97
NORTH EASTERN REGION				
ASSAM				
APGCL				
1. Karbi Langpi	100.00	390	408.88	104.84

GENERATION PERFORMANCE OF H. E. STATIONS IN THE COUNTRY DURING THE YEAR 2015-16

REGION	INSTALLED CAPACITY AS ON 31.03.2016	2015-16		% OF ACHIEV. OVER ORG. PROG.
		ORG.	ACHIEV.	
	(MW)	(MU)	(MU)	
MEGHALAYA				
MePGCL				
1. Kyrdemkulai	60.00	130	117.51	90.39
2. Myntdu	126.00	428	444.35	103.82
3. Umium St.I	36.00	109	114.08	104.66
4. Umium St.IV	60.00	192	184.99	96.35
Total MePGCL	282.00	859	860.94	100.23
NEEPCO				
1. Khandong (Assam)	50.00	167	175.05	104.82
2. Kopili (Assam)	225.00	764	781.80	102.33
3. Doyang (Nagaland)	75.00	227	163.14	71.87
4. Ranganadi (Ar.Pr.)	405.00	1125	1280.25	113.80
Total NEEPCO	755.00	2283	2400.24	105.14
NHPC				
1. Loktak (Manipur)	105.00	500	536.64	107.33
Total Central	860.00	2783	2936.89	105.53
Total N.Eastern	1242.00	4032	4206.70	104.33
TOTAL ALL INDIA	42783.42	128000	121376.75	94.83
IMPORT FROM BHUTAN	-	4800	5244.21	109.25
TOTAL ALL INDIA	42783.42	132800	126620.96	95.35
(INCLUDING BHUTAN IMPORTS)				

CHAPTER 3

MAJOR RESERVOIR BASED HE SCHEMES

CHAPTER – 3

MAJOR RESERVOIR BASED H.E.SCHEMES

3.1 Introduction

Some of the hydro-electric schemes are provided with storage reservoirs. Water during monsoon and/or snowmelt period, is collected in these reservoirs. The regulated discharges from reservoirs are utilized for power generation, irrigation and other purposes. Reservoir based schemes are of two types i.e. single purpose and multipurpose. Single purpose schemes are operated only for power generation. Multipurpose storage schemes are operated for more than one purpose such as flood control, irrigation, water supply, pisciculture, navigation, tourist attraction and other recreational facilities besides power generation. Reservoir based schemes afford greater utilization of the available inflows approaching to long term average inflows resulting in greater firm power benefits. Reservoir based schemes are the source of flexible generation and can be operated as base load or peaking station depending upon the requirement of the Grid System.

3.2 Major Reservoir Based Schemes

CEA is presently monitoring 31 major reservoir based 48 H. E. Stations in the country as listed below:

S. No.	H.E. Stations	Installed Capacity (MW)	State	Name of Reservoirs
	Northern Region			
1	Bhakra (L)	540	Himachal Pradesh	Bhakra
2	Bhakra (R)	785		
3	Kotla	77.65	Punjab	
4	Ganguwal	77.65		
5	Pong	396	Himachal Pradesh	Pong
6	Ranjit Sagar	600	Punjab	Ranjit Sagar
7	Tehri	1000	Uttarakhand	Tehri
8	Koteshwar	400		
9	Ram Ganga	198		Ram Ganga
10	Rihand	300	Uttar Pradesh	Rihand
11	Obra	99		

S. No.	H.E. Stations	Installed Capacity (MW)	State	Name of Reservoirs
12	RP Sagar	172	Rajasthan	RP Sagar
13	Jawahar Sagar	99		
	Sub-Total(NR)	4744.3		
	Western Region			
14	Ukai	300	Gujarat	Ukai
15	Sardar Sarovar(RBPH)	1200		Sardar Sarovar
16	Sardar Sarovar(CHPH)	250		
17	Gandhi Sagar	115	Madhya Pradesh	Gandhi Sagar
18	Indira Sagar	1000		Indira Sagar
19	Koyna I-IV and DPH	1956	Maharashtra	Koyna
20	Bhira	150		Bhira
21	Bhira PSS	150		
	Sub-Total(WR)	5121		
	Southern Region			
22	Machkund	114.75	Andhra Pradesh	Machkund
23	Srisaillam RBPH	770		Srisaillam
24	Srisaillam LBPH	900	Telangana	
25	NJ Sagar PSS	815.6		Nagarjuna Sagar
26	NJ SAGAR RBC & Ext.	90	Andhra Pradesh	
27	NJ SAGAR LBC	60	Telangana	
28	Sharavathy	1035	Karnataka	Sharavathy
29	Jog	139.2		
30	Gerusoppa	240		
31	Kalinadi	855	Karnataka	Supa
32	Supa DPH	100		
33	Almatti Dam	290	Karnataka	Almatti Dam
34	Idukki	780	Kerala	Idukki
35	Sabarigiri	300		Sabarigiri
36	Nariamangalam	37.5		Madupetty
37	Pallivasal	70		
38	Sengulam	48		
39	Idamalayar	75		Idamalayar
40	Mettur	370	Tamil Nadu	Mettur
41	Periyar	140		Periyar
	Sub-Total (SR)	7230.05		

S. No.	H.E. Stations	Installed Capacity (MW)	State	Name of Reservoirs
Eastern and N- Eastern Region and				
42	Burla	275.5	Odisha	Burla
43	Chiplima	72		Chiplima
44	Balimela	510		Balimela
45	Indravati	600		Indravati
46	Upper Kolab	320		Upper Kolab
47	Rengali	250		Rengali
48	Loktak	105	Manipur	Loktak
	Sub-Total (ER/NER)	2132.5		
	Total (All India)	19227.85		

Salient details of 31 Nos. reservoirs are indicated in **Annex-3.1**. These schemes constitute about 44.94% of the total hydel installed capacity and generated about 35.05% of the total hydel generation during 2015-16 as briefly indicated in **Table-3.1**.

TABLE - 3.1

CONTRIBUTION BY IMPORTANT RESERVOIR BASED H.E. SCHEMES

	Description	Reservoir Schemes	Other Schemes	Total
1.	Installed Capacity (MW)	19227.85	23555.57	42783.42
2.	Percentage of Total (%)	44.94	55.06	100.00
3.	Energy Generation (MU)	42544.33	78832.42	121376.75
4.	Percentage of Total (%)	35.05	64.95	100.00

3.3 Inflows

Inflows to the reservoirs are primarily dependent on rainfall during monsoon in the catchment area of the reservoirs. However, in case of Bhakra, Pong, Ranjit Sagar and Tehri reservoirs, snow melt in the catchment area during summer also contributes to their inflows. The inflows into the reservoirs during 2015-16 vis-à-vis 2014-15 are given at **Exhibit 3.1**. Inflows into the reservoirs and generation during the year 2015-16 vis-à-vis 2014-15 and 10 years average is given below at **Table-3.2**.

TABLE 3.2

RESERVOIR SCHEMES-INFLOW & ENERGY GENERATION

S No	SCHEME/ REGION	Inflows				Generation			
		10 years Average (MCM)	2014-15 (MCM)	2015-16 (MCM)	2015-16 Inflow as % of 2014-15 inflow	10 years Average (MU)	2014-15 (MU)	2015-16 (MU)	2015-16 generation as compared to 2014-15 (%)
1	2	3	4	5	6= (5/4*100)	7	8	9	10= (9/8*100)
Northern Region									
1	Bhakra	17303	16561	14444	87.22	6439	6121	6745	110.19
2	Pong	8749	7620	8790	115.36	1553	1327	1735	130.69
3	Ranjit Sagar	6329	6720	7389	109.95	1639	1863	1957	105.07
4	Tehri	7184	6830	6987	102.3	3498	4234	4349	102.72
5	Ram Ganga	30839	44906	69442	154.64	293	270	503	186.24
6	RP Sagar	4846	3375	7305	216.43	673	677	867	128.04
7	Rihand	4894	4389	3769	85.88	697	803	535	66.61
Sub Total (NR)		80144	90401	118127	130.67	14792	15296	16691	109.12
Western Region									
8	Ukai	10539	9184	6632	72.2	618	691	492	71.17
9	Sardar Sarovar	26116	19536	6821	34.92	3533	2909	2170	74.6
10	Gandhi Sagar	5013	1579	7969	504.7	290	272	383	140.75
11	Indira Sagar	24075	16449	14833	90.18	2600	2542	1974	77.67
12	Koyna	4293	3686	2137	57.97	3481	3052	2977	97.54
13	Bhira	960	947	547	57.76	884	837	640	76.5
Sub Total (WR)		70996	51382	38938	75.78	11406	10303	8636	83.82
19	Almatti	14345	11631	3293	28.31	488	483	145	30.05
20	Idukki	1732	1787	1142	63.9	2437	2494	2372	95.12
21	Sabarigiri	906	821	1388	169.05	1317	1225	1171	95.63
22	Madupetty	203	173	171	98.9	702	706	730	103.38
23	Idamalayar	1266	1545	965	62.44	350	373	273	73.26
24	Mettur	5874	5841	4058	69.47	801	709	565	79.62

S No	SCHEME/ REGION	Inflows				Generation			
		10 years Average (MCM)	2014-15 (MCM)	2015-16 (MCM)	2015-16 Inflow as % of 2014-15 inflow	10 years Average (MU)	2014-15 (MU)	2015-16 (MU)	2015-16 generation as compared to 2014-15 (%)
1	2	3	4	5	6= (5/4*100)	7	8	9	10= (9/8*100)
25	Periyar	635	671	651	97.01	430	528	505	95.68
Sub Total (SR)		130944	65820	20676	31.41	20635	21122	12247	57.98
Eastern Region									
26	Hirakud	27869	33375	17404	52.15	881	887	684	77.09
27	Balimela	3955	4289	2923	68.15	1170	1339	622	46.45
28	Rengali	3571	11002	7913	71.92	2024	742	537	72.28
29	Upper Indravati	2057	4163	1994	47.89	816	2696	1760	65.29
30	Upper Kolab	10710	1455	1279	87.92	737	734	767	104.44
Sub Total (ER)		48162	54284	31513	58.05	5629	6400	4433	68.28
North Eastern Region									
31	Loktak	2166	8989	2069	23.02	521.6	372	537	144.09
Sub Total (NER)		2166	8989	8989	2069	521.59	521.6	372	537
Total (All India)		331923	270875	211323	78.01	52983	52983	53493	42544

3.4 Reservoir Levels

The maximum reservoir level attained during the year depends on the depleted reservoir level in the preceding year, besides the inflows during the current year. Water level touched FRL only at Madupetty and Loktak reservoirs during 2015-16. Month wise maximum levels of major reservoirs during 2015-16 vis-à-vis 2014-15 are indicated at Exhibits 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8 and 3.9.

3.5 Generation:

Generation from reservoir based H.E. Stations during the year depends on various factors such as water level of the reservoir at the end of the preceding year, inflows during the year, draw down level by the end of the year, availability of generating units etc. In 10 Nos. out of 31 Nos. reservoir based hydel schemes, annual generation during the year 2015-16 was more than the annual generation targets. Generation from 48 H.E. Stations on 31 major reservoirs during the year 2015-16 has been 42544.33 MU showing decrease in 20.47% over the 2014-15 generation of 53492.80 MU. Scheme wise generation of reservoir

schemes during the year 2015-16 compared to that of last year 2014-15 is shown in **Table 3.2** above. The reservoir based schemes have been grouped in terms of percentage achievement of generation over targets in **Table-3.3** below:

TABLE -3.3
GENERATION PERFORMANCE OF MAJOR RESERVOIR BASED SCHEMES

S. No.	% of Actual Generation over Target	Name of the Reservoir Scheme
1	120 & Above	Bhakra, Pong, Ranjit Sagar, R P Sagar, Ramganga, Gandhi Sagar, Periyar.
2	110 - 120	Tehri, Madupetty.
3	100 - 110	Loktak.
4	Below 100	Rihand, Ukai, Sardar Sarovar, Indira Sagar, Koyna, Bhira & Bhira PSS, Machkund, NJ Sagar, Srisaillam, Sharavathy, Supa, Almatti, Idukki, Sabarigiri, Idamalayar, Mettur, Hirakud, Balimela, Rengali, Upper Indravati, Upper Kolab.

Generation of major reservoir based H.E. Schemes during 2015-16 as compared to the generation during last year i.e. 2014-15 is also depicted at **Exhibit-3.10**.

EXHIBIT 3.1

INFLOWS INTO MAJOR RESERVOIRS DURING 2015-16 VIS-A-VIS 2014-15

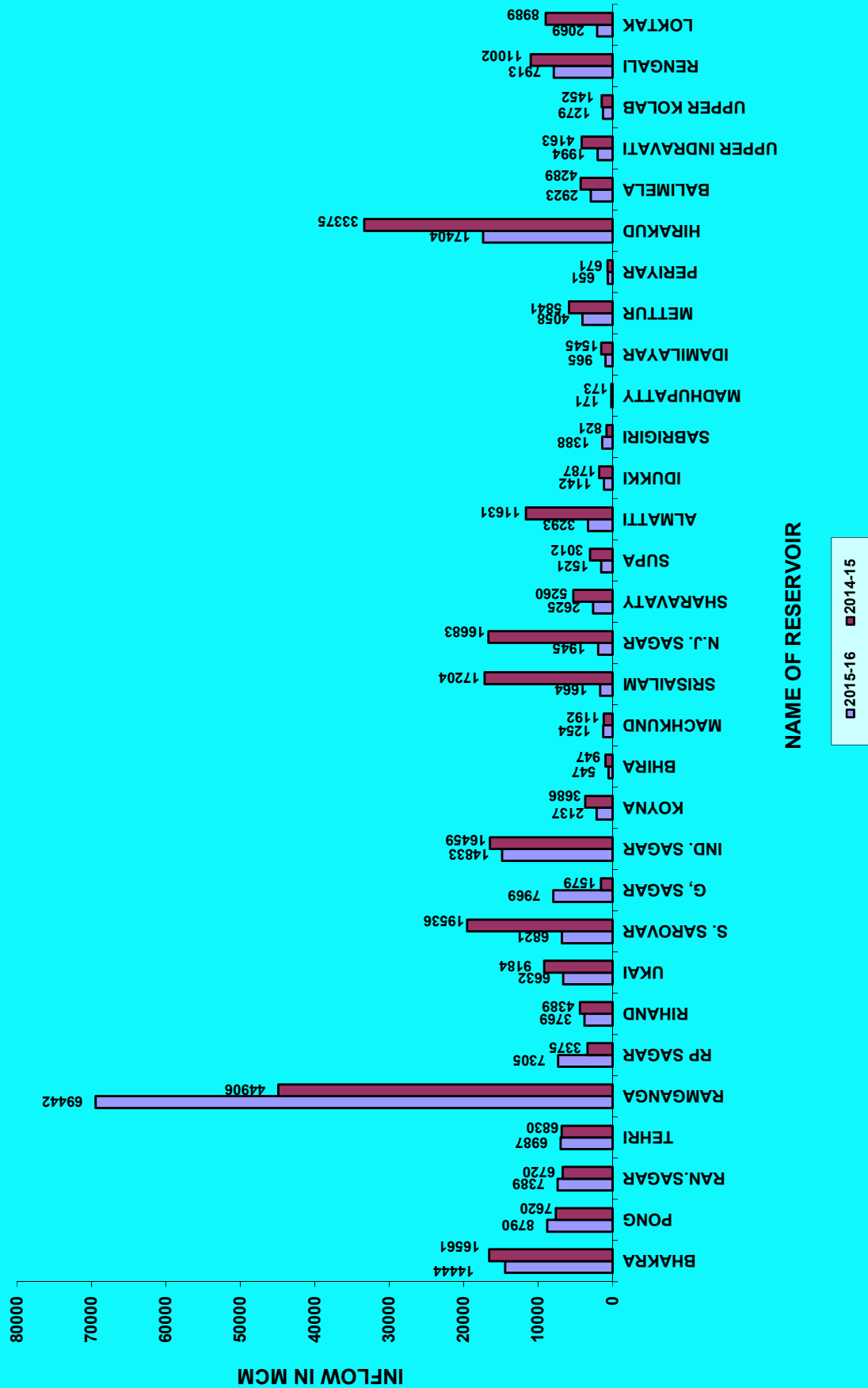


EXHIBIT 3.2

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

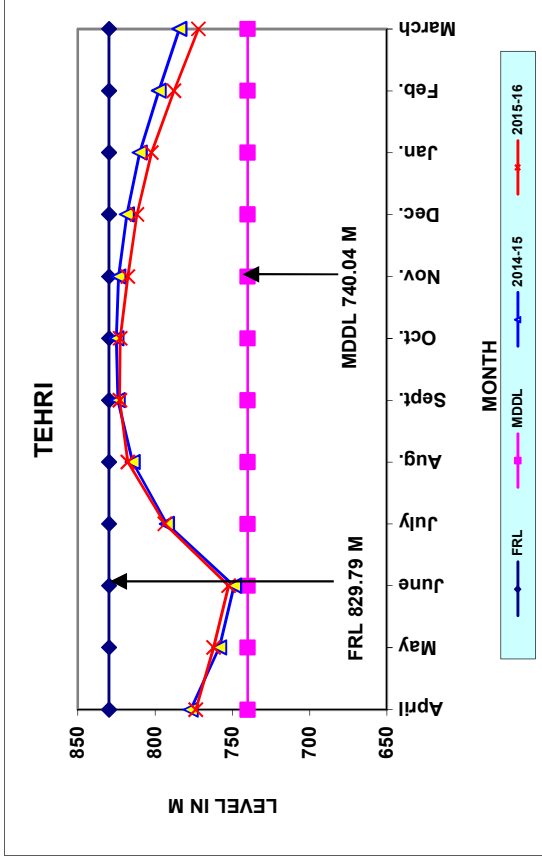
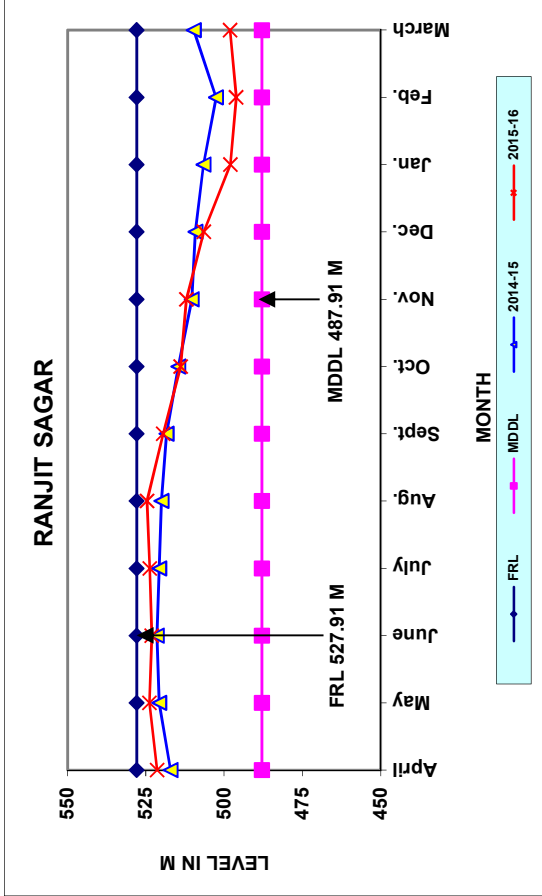
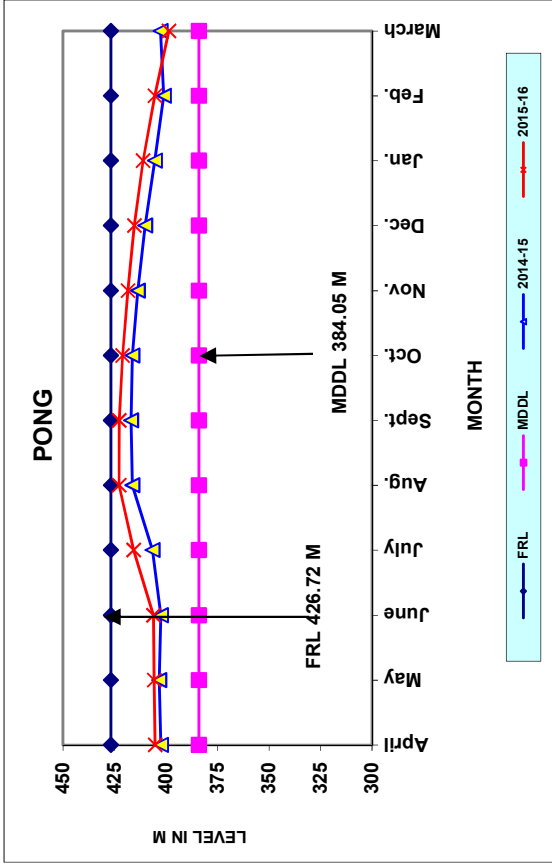
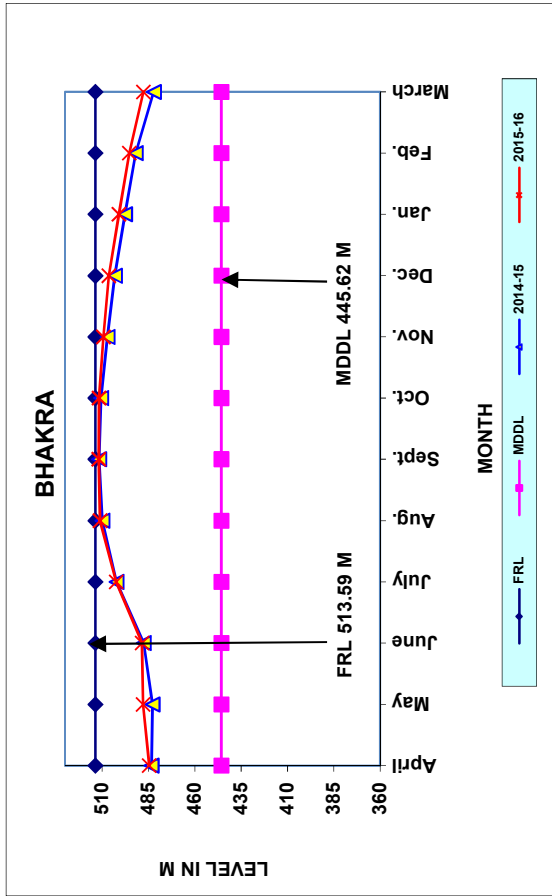


EXHIBIT 3.3

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

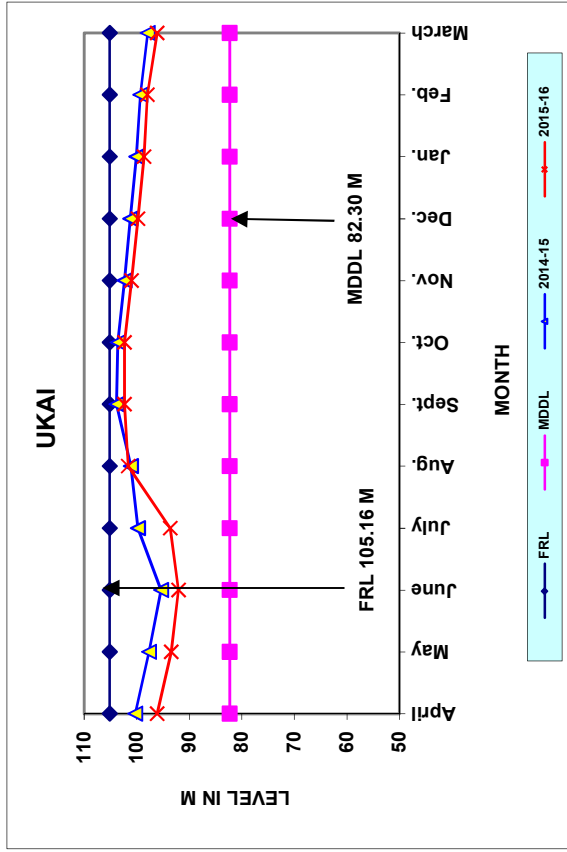
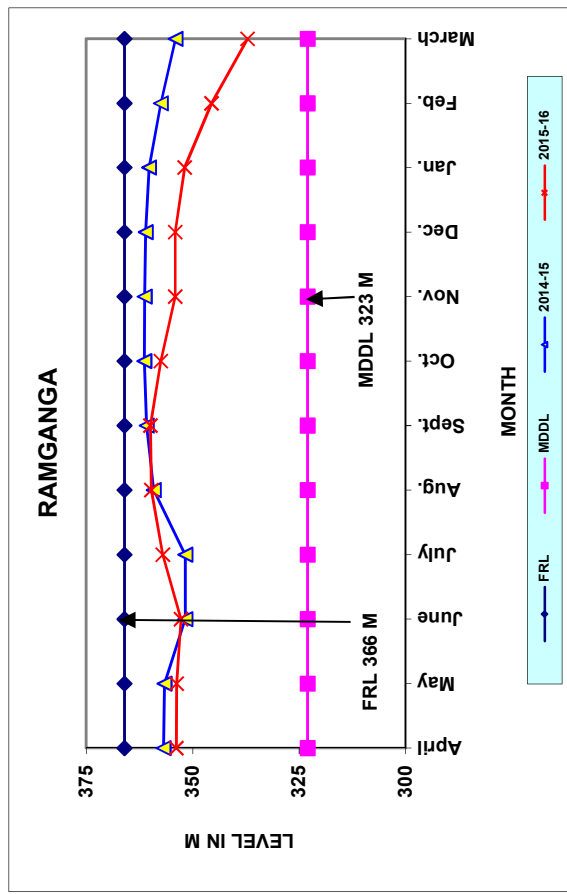
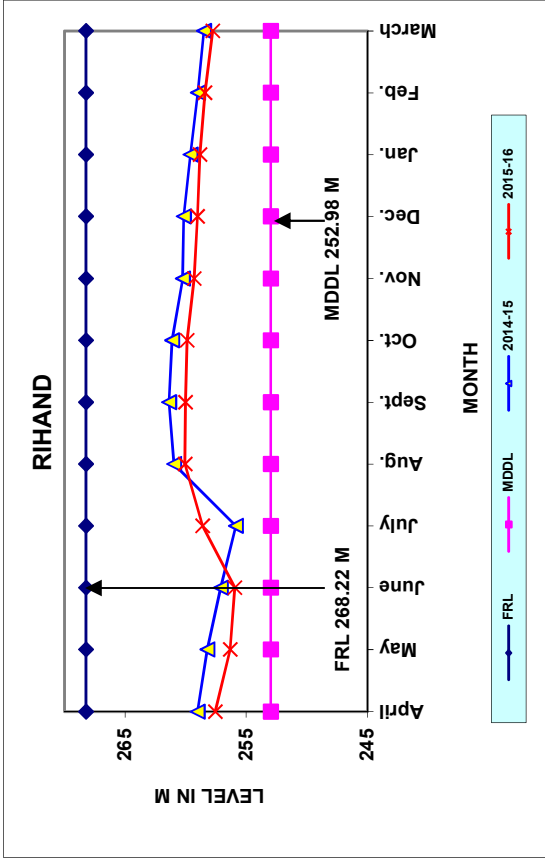
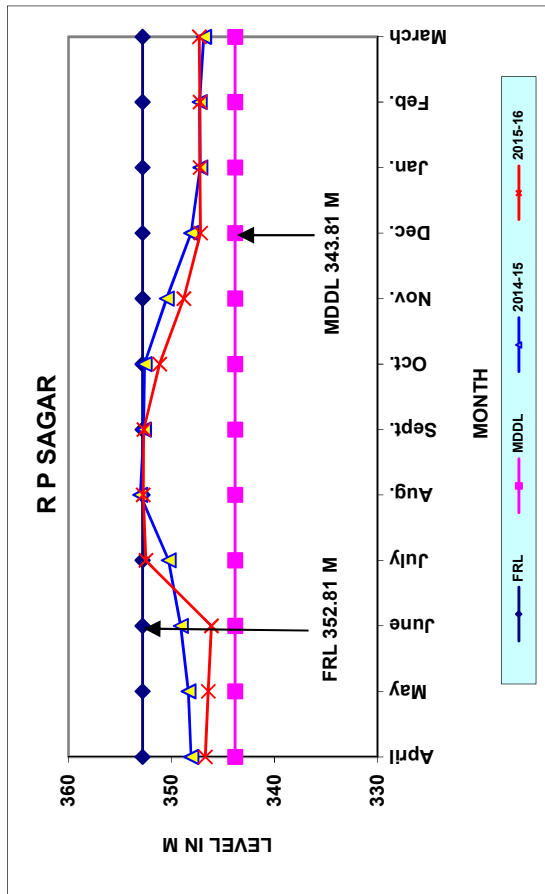


EXHIBIT 3.4

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

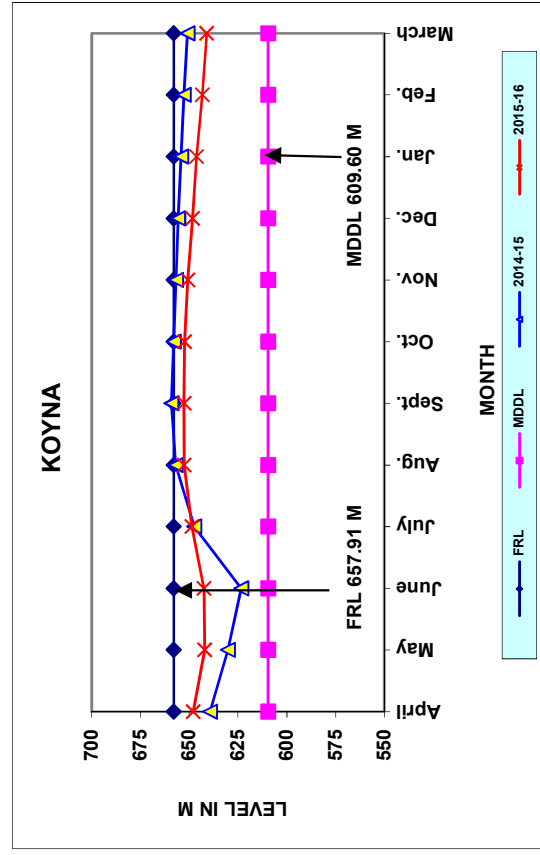
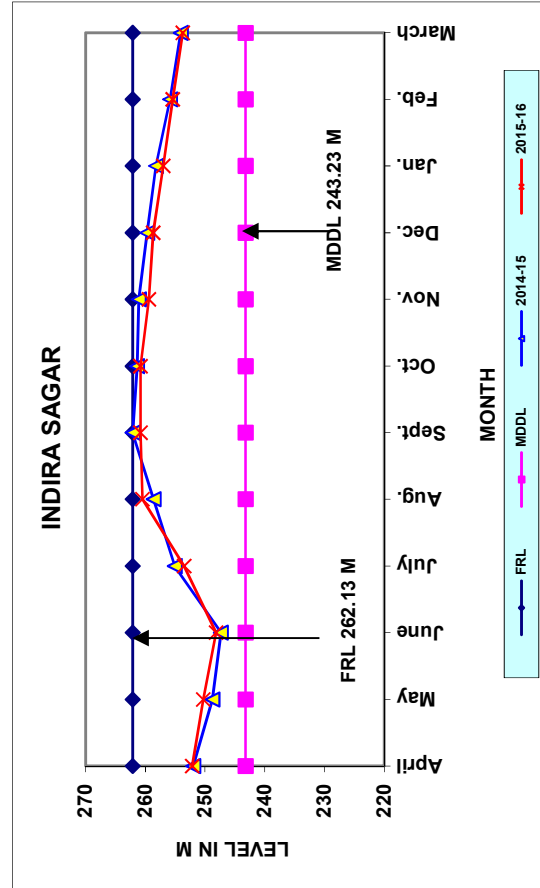
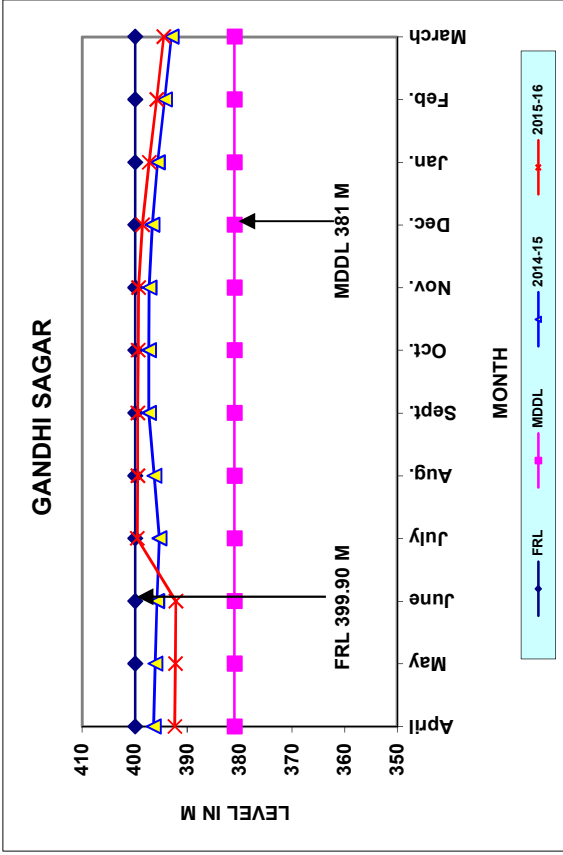
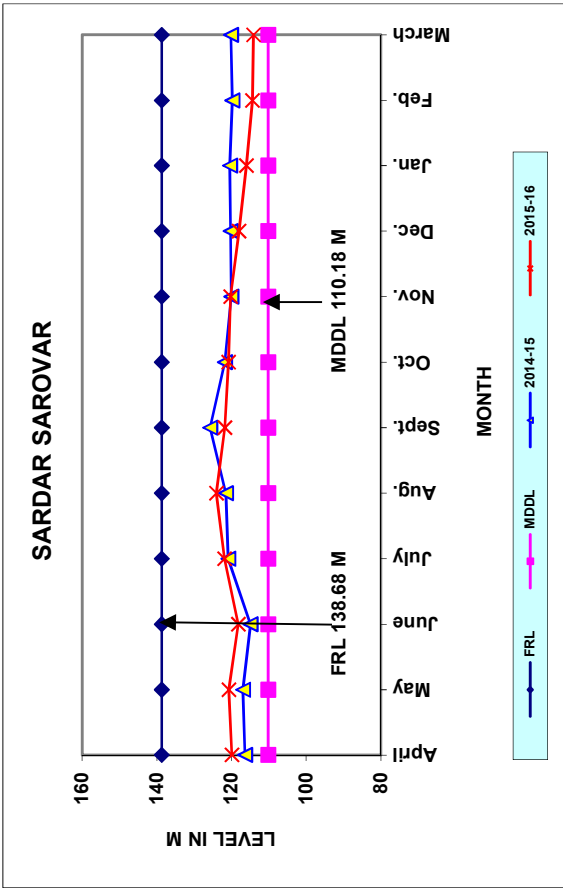


EXHIBIT 3.5

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

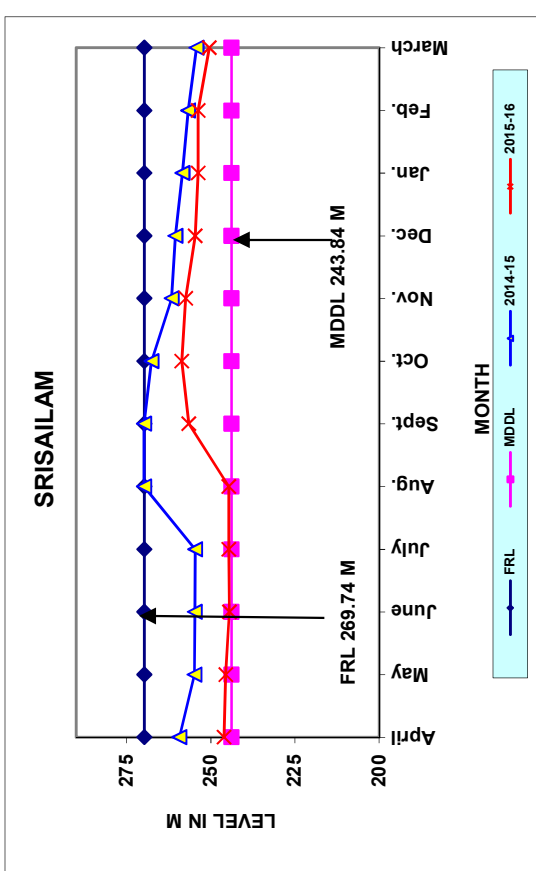
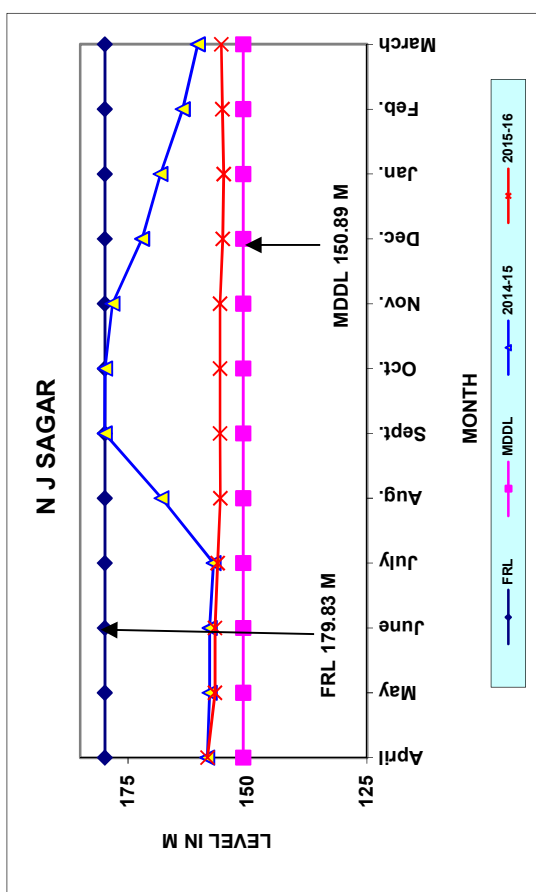
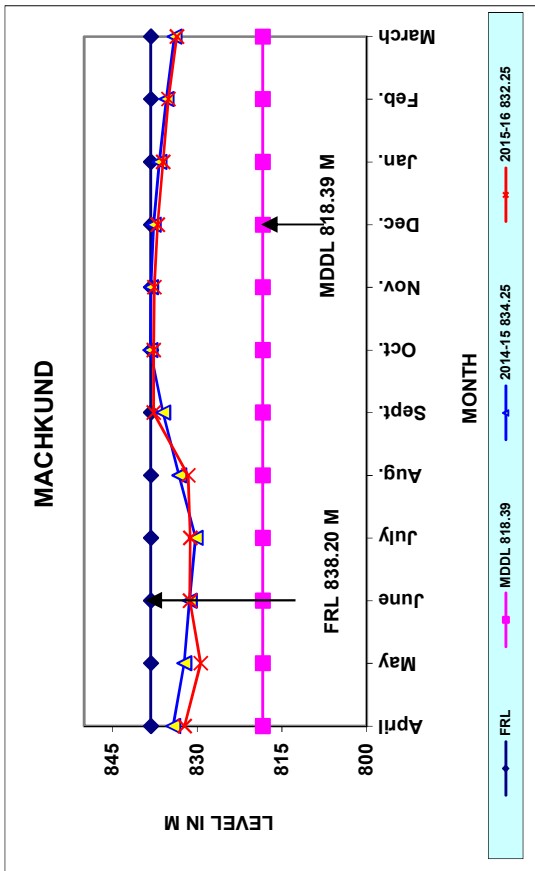
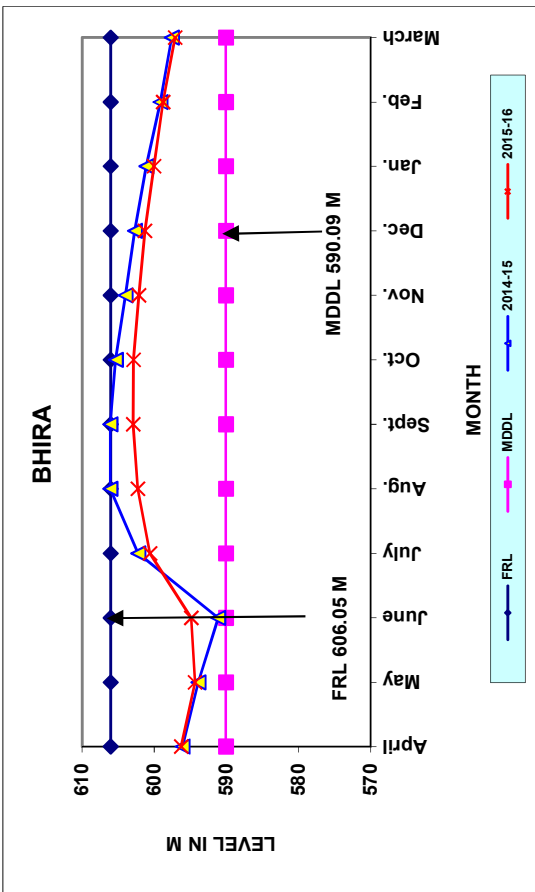


EXHIBIT 3.6

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

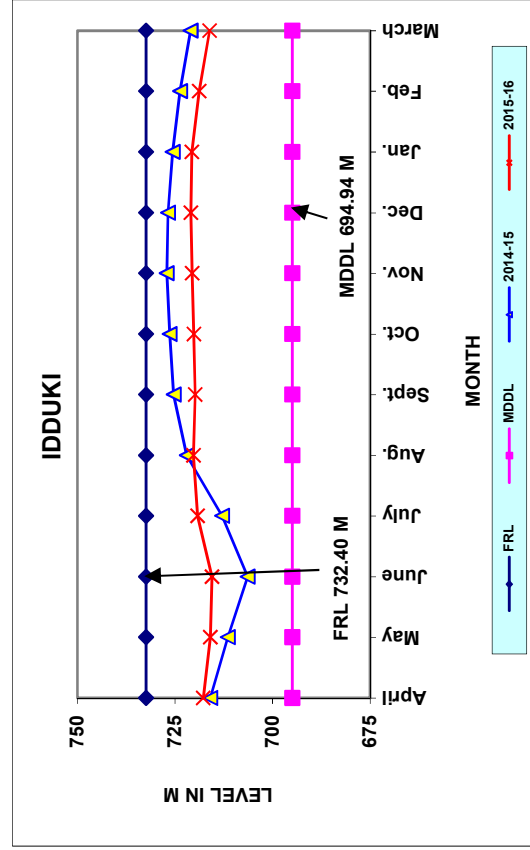
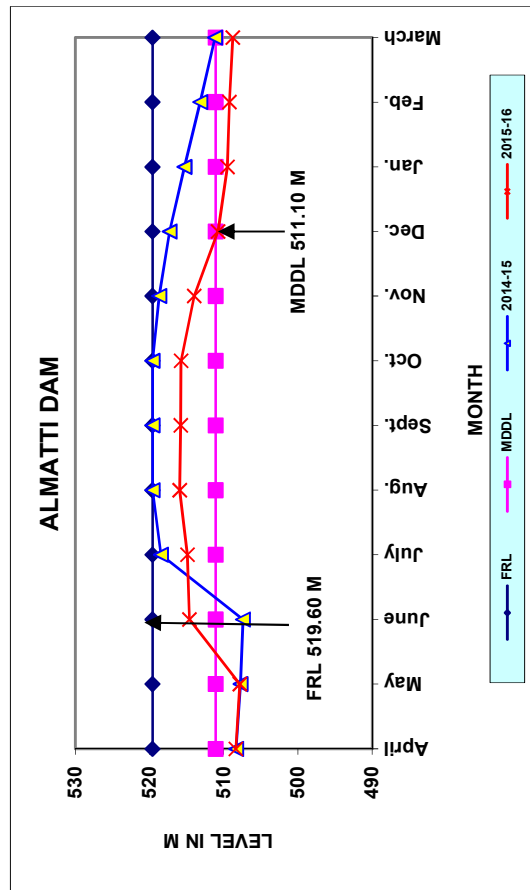
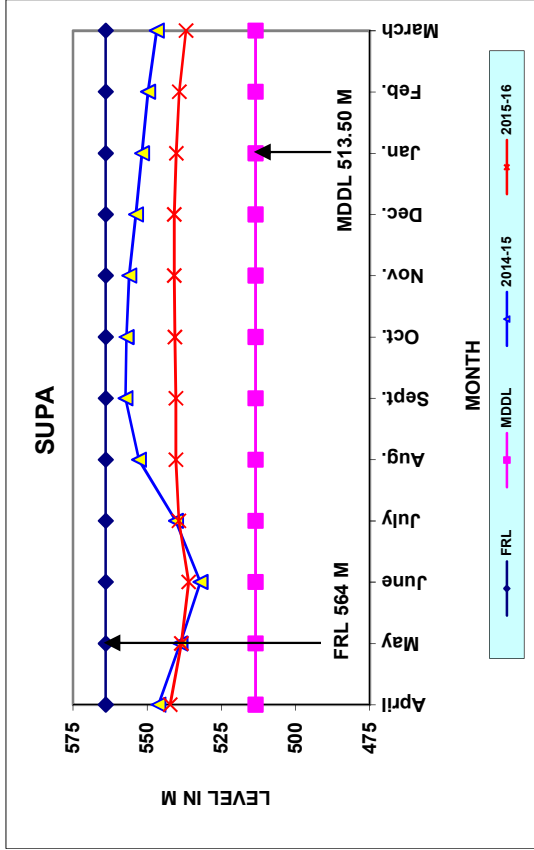
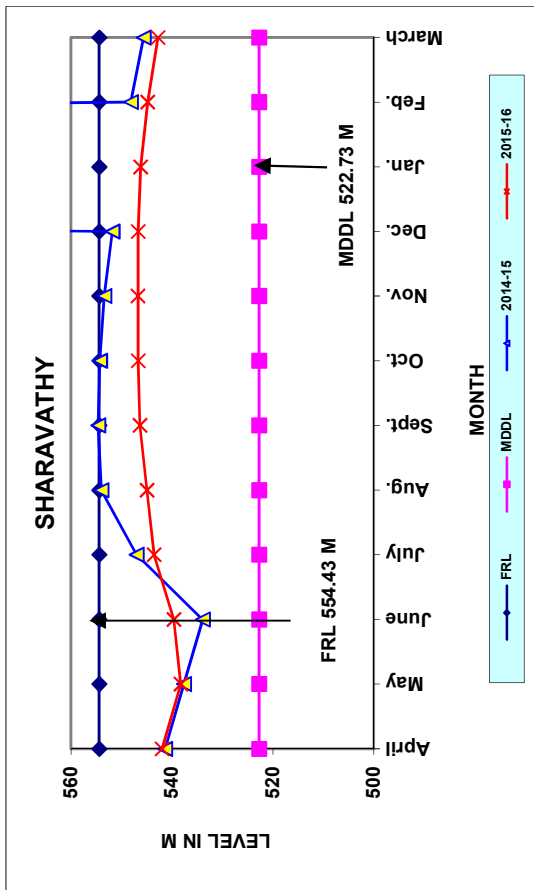


EXHIBIT 3.7

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

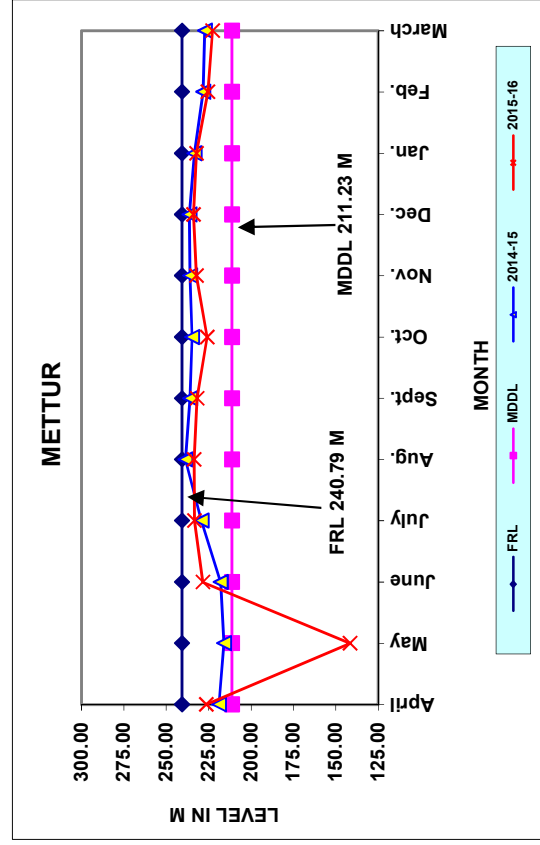
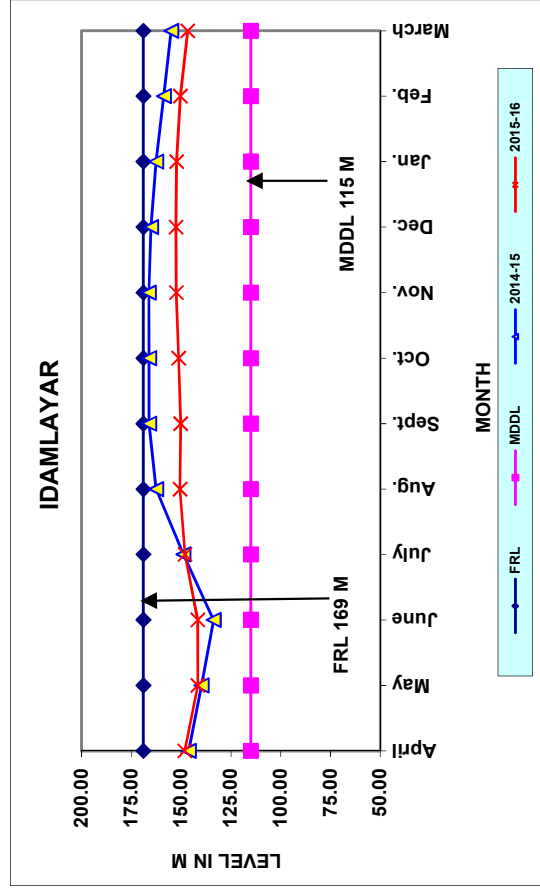
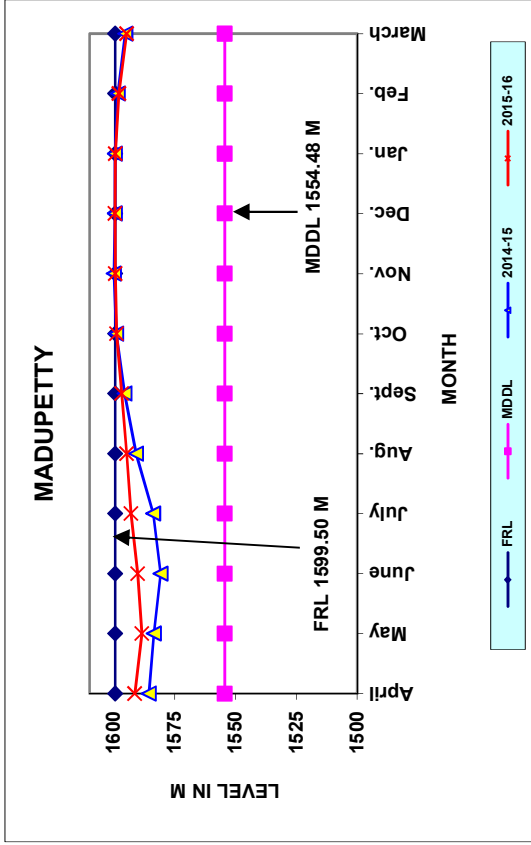
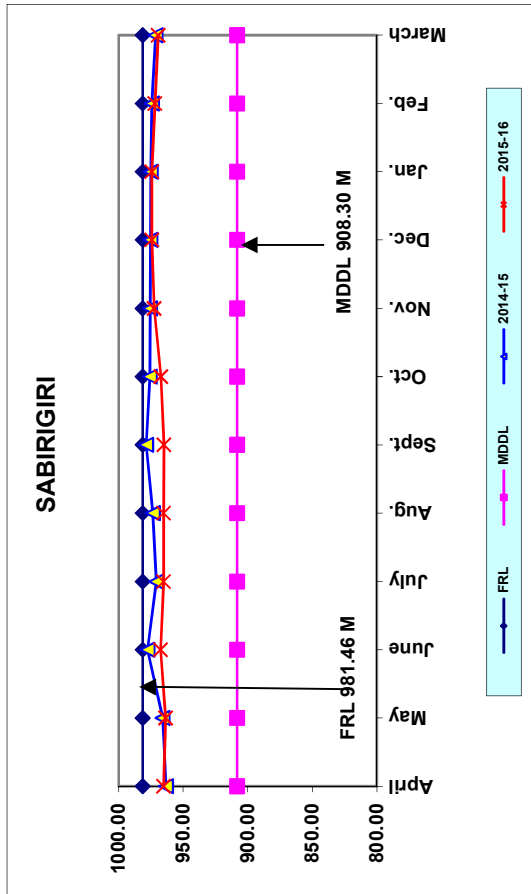


EXHIBIT 3.8

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

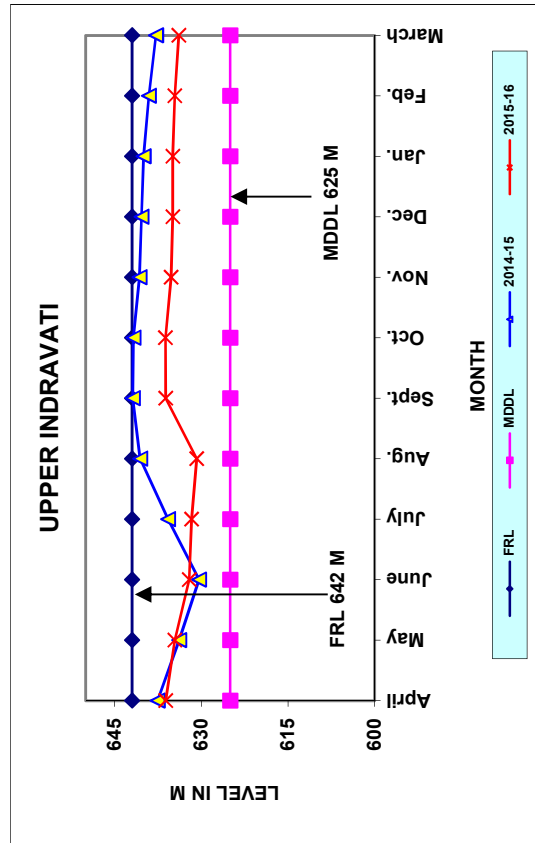
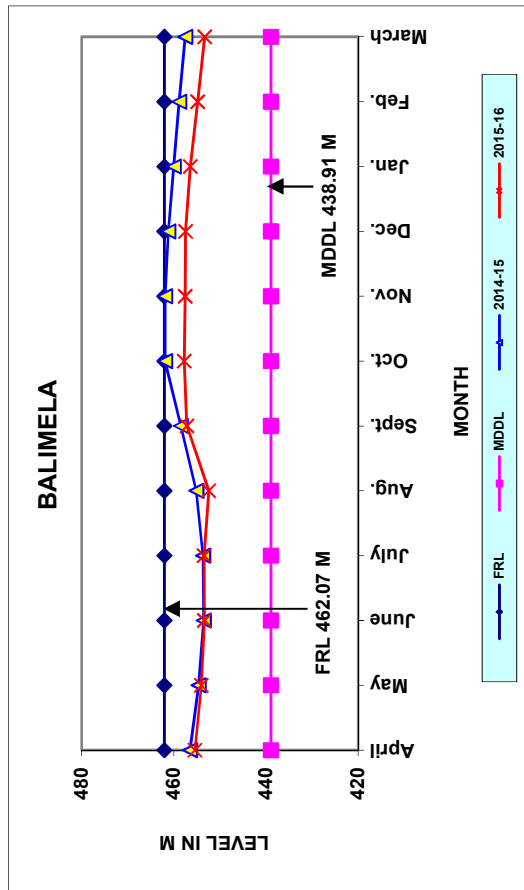
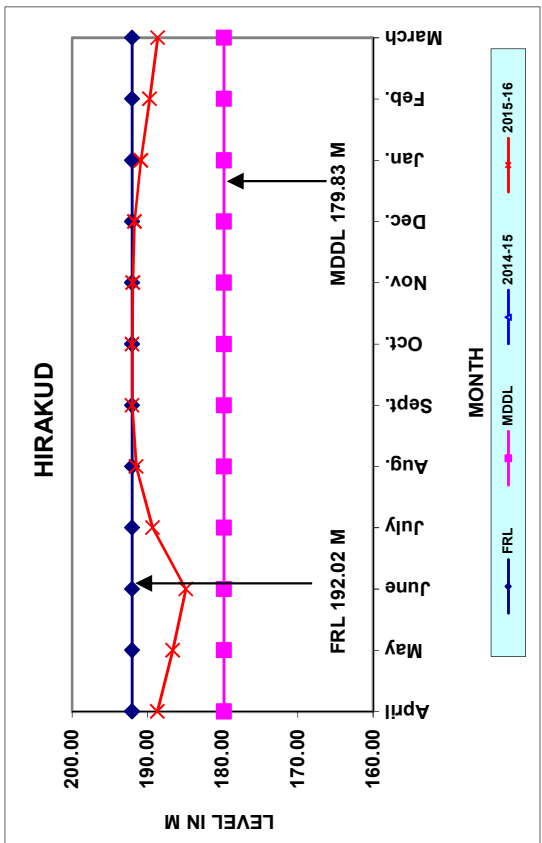
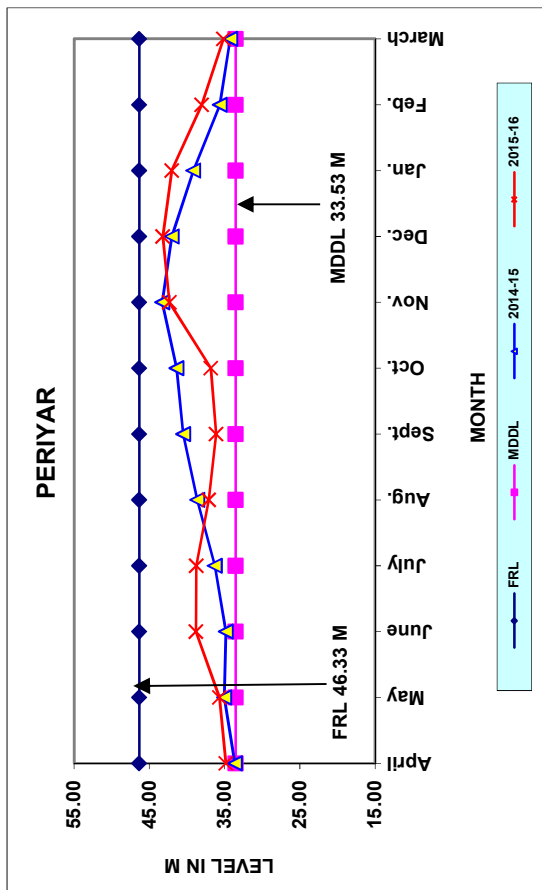
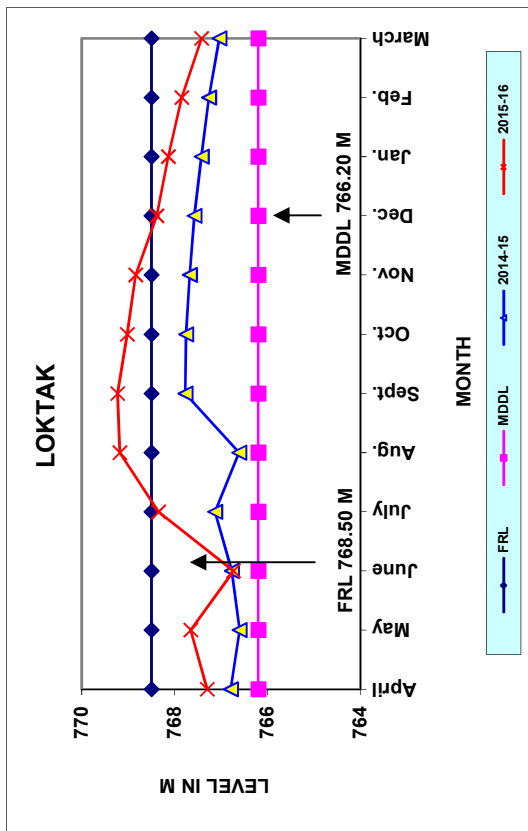
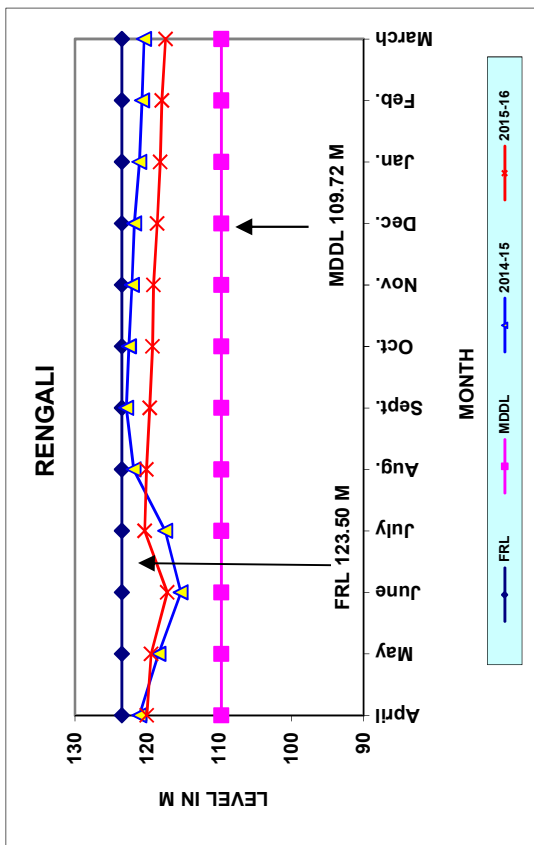
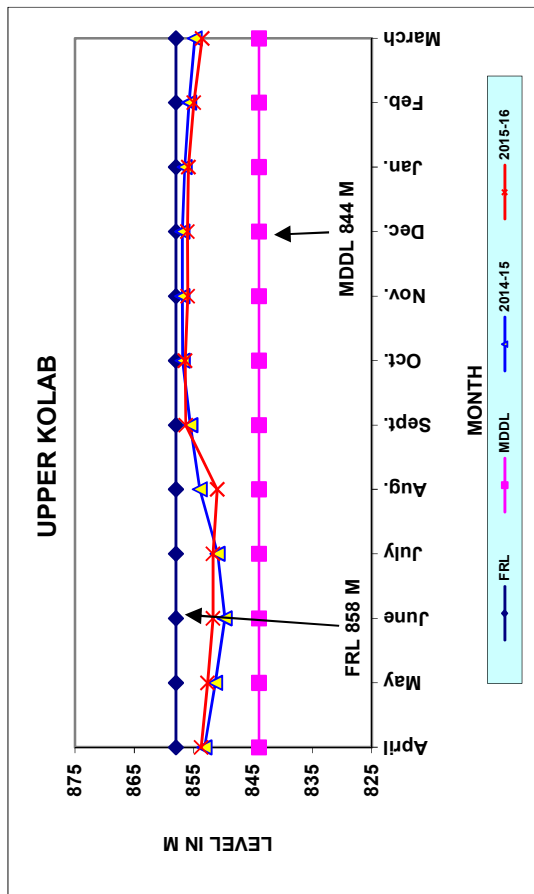
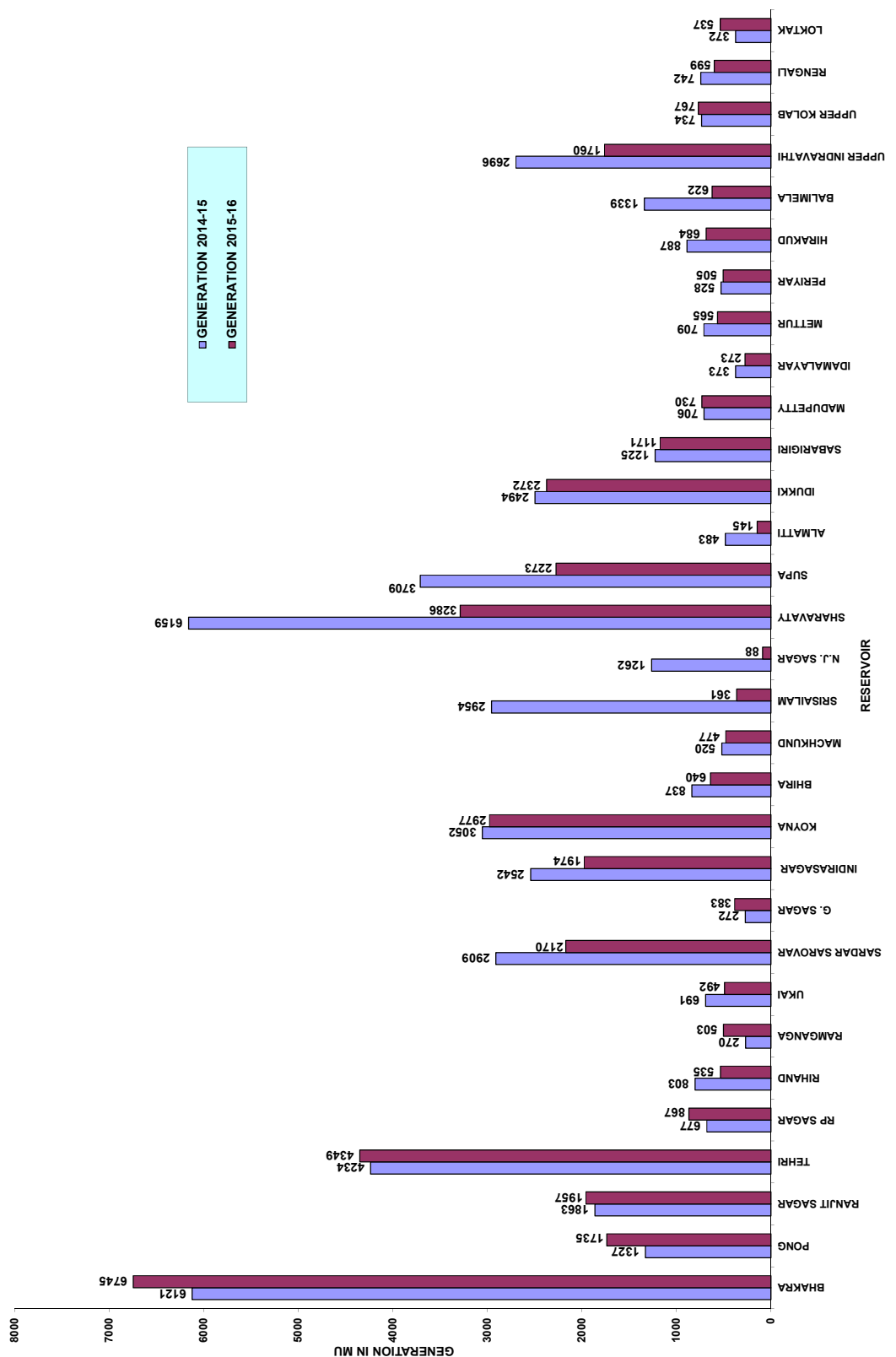


EXHIBIT 3.9

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



GENERATION FROM RESERVOIR BASED HYDROELECTRIC STATIONS DURING 2015-16 VIS-A-VIS 2014-15



SALIENT DATA OF IMPORTANT RESERVOIRS AND ASSOCIATED H.E. STATIONS

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2016	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2015-16			
						GROSS :	LIVE		Max.	DATE	Minimum	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)	(M)	DDMMYYYY	(M)	DDMMYYYY
NORTHERN REGION												
1	BHAKRA	1480.30	5282	513.59	445.62	8321	6516	1729.00	511.83	28.09.2015	480.49	31.03.2016
	a)BHAKRA LEFT	540.00	3924									
	b)BHAKRA RIGHT	785.00										
	c)GANGUWAL	77.65	1358									
	d)KOTLA	77.65										
2	PONG	396.00	1123	426.72	384.05	8053	6946	1084.00	422.78	31.08.2015	396.35	31.03.2016
3	RANJIT SAGAR	600.00	1507	527.91	487.91	3292	2191	390.00	524.62	12.08.2015	495.50	09.02.2016
4	TEHRI	1400.00	3952	829.79	740.04	3540	2615	1291.49	822.85	25.09.2015	741.60	18.06.2015
	a) TEHRI	1000.00	2797									
	b) KOTESHWAR	400.00	1155									
5	RAM GANGA	198.00	334	366	323	2503.96	2109.25	480.80	359.94	09.10.2015	330.13	31.03.2016
6	RP SAGAR	271.00	757	352.81	343.83	2901	1569	175.66	352.75	16.08.2015	345.83	24.06.2015
	a) RP SAGAR	172.00	459									
	b) JAWAHAR SAGAR	99.00	298									
7	RIHAND	399.00	1199	268.22	252.98	10605	5723	1177.00	260.06	31.08.2015	254.84	08.07.2015
	a)RIHAND	300.00	920									
	b)OBRA	99.00	279									
WESTERN REGION												
8	UKAI	300.00	1080	105.16	82.30	8515	6615	813.00	102.31	01.10.2015	90.66	31.05.2015
9	SARDAR SAROVAR	1450.00	3848	138.68	110.18	9460	5760	1817.553	124.05	06.08.2015	113.14	31.03.2016
	SARDAR SARO(CHPH)	250.00	213									
	SARDAR SARO(RBPH)	1200.00	3635									
10	GANDHI SAGAR	115.00	420	399.90	381.00	7743	6911	725.00	399.50	27.07.2015	391.90	23.06.2015
11	INDIRA SAGAR	1000.00	1980	262.13	243.23	12237	9706	1316.12	260.81	05.10.2015	247.39	12.07.2015
12	KOYNA	1956.00	3176	657.91	609.60	2797	2677	3126.00	652.70	23.09.2015	632.60	18.06.2015
	a)KOYNA-I&II	600.00	3030									
	b)KOYNA-III	320.00										
	c)KOYNA -IV	1000										
	d)KOYNA D.P.H.	36	146									
13	BHIRA	300	775	606.05	590.09	523	522	619	602.92	28.09.2015	591.65	16.06.2015
	a)BHIRA	150	775									
	a)BHIRA-PSS	150										

SALIENT DATA OF IMPORTANT RESERVOIRS AND ASSOCIATED H.E. STATIONS

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2016	ANNUAL DESIGN ENERGY	FULL RESER- VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2015-16			
		(MW)	(MU)	(M)	(M)	GROSS : LIVE		(MU)	Max.	DATE	Minimum	DATE
						(MCM)	(MCM)		(M)	DDMMYYYY	(M)	DDMMYYYY
SOUTHERN REGION												
14	MACHKUND	114.75	670.00	838.20	818.39	970	893	552.00	837.72	24.09.2015	828.47	17.05.2015
15	SRISAILAM	1670.00	4300.00	269.74	243.84	8723	7166	1548.00	258.65	19.10.2015	242.29	06.09.2015
	a) SRISAILAM RB	770.00	2900.00									
	b) SRISAILAM LBPH	900.00	1400.00									
16	NAGARJUNA SAGAR	965.60	2497.00	179.83	150.89	11560	6538	1398.00	158.37	01.04.2015	154.44	02.02.2016
	a) NAGARJUNA SAGAR	815.60	2237.00									
	b) NJ. SAGAR RBC	60.00	156.00									
	c) NJ. SAGAR RBC EXT.	30.00										
	d) NJ. SAGAR LBC EXT.	60.00	104.00									
17	SHARAVATHY	1414.20	5672.00	554.43	522.73	5310	4297	4394.00	546.72	06.11.2015	534.42	17.06.2015
	a) SHARAVATHY	1035.00	4932.00									
	b) JOG	139.20	118.00									
	c) GERUSOPPA	240.00	622.00									
18	SUPA	955.00	3927.00	564.00	513.50	4178	3758	3927.00	542.30	01.04.2015	532.18	31.03.2016
	a) KALINADI	855.00	3385.00									
	b) SUPA DPH	100.00	542.00									
19	ALMATTI	290.00	483.00	519.60	511.10	2631.50	2628.00	175.30	515.95	14.08.2015	507.17	01.06.2015
20	IDUKKI	780.00	2398.00	732.40	694.94	1996	1459	2146.00	720.94	15.12.2015	710.28	16.06.2015
21	SABARIGIRI	300.00	1338.00	981.46	908.30	454	447	764.00	974.30	02.01.2016	963.65	04.06.2015
22	MADUPETTY	155.50	703.00	1599.50	1554.48		55.32	77.40	1599.59	09.12.2015	1585.80	18.06.2015
	a) PALLIVASAL	37.50	284.00									
	b) NARIAMANGLAM	70.00	237.00									
	c)SENGULAM	48.00	182.00									
23	IDAMALAYAR	75.00	380.00	169.00	115.00		1017.80	254.45	152.55	21.12.2015	131.44	17.06.2015
24	METTUR	370.00	793.00	240.79	211.23	2708.80	2645.20	204.00	233.63	09.08.2015	221.64	31.03.2016
	a) LOWER METTUR I-IV	120.00	252.00									
	b) METTUR DAM & TUNNEL	250.00	541.00									
25	PERIYAR	140.00	409.00	46.33	33.53	443	299	216	43.22	20.12.2015	33.54	25.03.2016
EASTERN REGION												
26	HIRAKUD	347.50	1174	192.02	179.83	4823	4709	372.00	192.01	01.10.2015	182.80	23.06.2015
	a) BURLA. P.H.	275.50	684									
	b) CHIPLIMA. P.H.	72.00	490									
27	BALIMELA	510.00	1183	462.07	438.91	3929	2676	898.00	457.75	16.10.2015	451.08	31.03.2016
28	UPPER INDRAVATI	600.00	1962	642.00	625.00	2300	1485.50	1213.14	636.20	04.10.2015	629.26	11.08.2015
29	UPPER KOLAB	320.00	832	858.00	844.00	1215	935.00	540	856.44	07.10.2015	850.42	10.08.2015
30	RENGALI	250.00	525	123.50	109.72	3548	3167.81	275	120.33	30.07.2015	113.30	07.07.2015
NORTH EASTERN REGION												
31	LOKTAK	105	448	768.50	766.20	435.91	396.44	250	769.23	11.09.2015	766.25	17.06.2015

CHAPTER 4

PLANNED MAINTENANCE OF THE UNITS

CHAPTER-4

PLANNED MAINTENANCE OF HE UNITS

4.1 For the purpose of studies and analysis of performance in respect of availability of H.E. Stations, outage data of 676 generating units installed in 194 Hydro Electric Stations was made available by various Organizations. The studies indicate that the average non-availability of hydro electric units due to planned maintenance during the year 2015-16 was 7.21% (same as during the previous year). A total of 447240 hours were utilized for carrying out various types of planned maintenance works to facilitate healthy running of generating units. Details of long duration planned outages (50 hours and above) are given in **Annex-4.1**.

4.2 Capital maintenance was carried out for 61 generating units whereas annual maintenance was carried out for 273 generating units out of a total of 676 units analyzed. Analysis of various types of planned maintenance indicates that while most of the planned outages were for periodic maintenance, many of these outages were for carrying out certain repairs/modification works also. The actual duration of periodic maintenance works were quite different for various types of maintenance works. Details of duration of periodic planned maintenance of generator, turbine, auxiliary equipments and civil structures etc. are indicated below in **Table 4.1**.

TABLE 4.1

**DURATION OF PERIODIC PLANNED MAINTENANCE
PERIOD: 2015-16**

S. No.	TYPE OF MAINTENANCE	NO. OF UNITS	DURATION	
			MAX. HOUR FOR ANY UNIT	AVERAGE HOURS
1	CAPITAL/3 YEARLY MTCE.	61	5895.00	906.59
2	ANNUAL MAINTENANCE	273	7591.67	681.67
3	HALF YEARLY MAINTENANCE	5	14.25	10.95
4	QUARTERLY MAINTENANCE	10	783.00	155.39
5	MONTHLY MAINTENANCE	114	823.08	64.62
6	ROUTINE MAINTENANCE	59	2041.60	89.77
7	RENOVATION/MODERNISATION	26	8156.42	917.61
8	UPRATING	0	0.00	0.00
9	CIVIL STRUCTURE	125	2640.75	223.17

S. No.	TYPE OF MAINTENANCE	NO. OF UNITS	DURATION	
			MAX. HOUR FOR ANY UNIT	AVERAGE HOURS
10	TURBINE	100	2171.50	76.48
11	GENERATOR	41	3236.75	211.54
12	OTHER EQUIPMENTS	100	3236.75	84.61
13	MISCELLANEOUS	90	1367.15	45.90

4.3 There were a total of 2238 planned outages during the Year 2015-16, out of which about 67.78% were of duration up to 24 hours, while 18.99% of the planned outages were of duration for more than 10 days. Details giving duration pattern of planned maintenance is indicated in **Table 4.2** and illustrated in **Exhibit 4.1**.

TABLE 4.2
DURATION PATTERN OF PLANNED OUTAGE
PERIOD: 2015-16

SL. NO.	DURATION	NUMBER OF OUTAGES	MAINTENANCE % To TOTAL NUMBER OF OUTAGES
1	Less Than 1 Hour	118	5.27
2	1 To 6 Hours	633	28.28
3	6 To 12 Hours	682	30.47
4	12 To 24 Hours	84	3.75
5	1 To 2 Days	91	4.07
6	2 To 5 Days	128	5.72
7	5 To 10 Days	77	3.44
8	10 To 15 Days	72	3.22
9	15 To 20 Days	79	3.53
10	More than 20 Days	274	12.24
	Total No. of Outages	2238	100

4.4 Planned Maintenance age-wise

Planned maintenance carried out for different age groups of hydro generating units during the year 2015-16 is indicated in **Table 4.3**.

TABLE 4.3
PLANNED MAINTENANCE AGE-WISE
PERIOD: 2015-16

SL. NO.	YEAR OF COMMISSIONING	NO. OF UNITS	INSTALLED CAPACITY (MW)	PLANNED OUTAGE (HOURS)	NON AVAILABILITY PER UNIT (HOURS)
1	2015-2016	17	1516.00	1392	81.88
2	2014-2015	6	736.01	2400	400.00
3	2013-2014	19	1058.01	25752	1355.37
4	2012-2013	14	501.00	9144	653.14
5	2011-2012	11	1423.00	5136	466.91
6	2010-2011	11	690.00	5208	473.45
7	2009-2010	1	39.00	432	432.00
8	2008-2009	8	969.00	4104	513.00
9	2007-2008	23	2443.00	12960	563.48
10	2006-2007	21	2286.00	7392	352.00
11	2005-2006	13	1340.00	12000	923.08
12	2004-2005	13	1115.00	8088	622.15
13	2003-2004	18	2690.00	2400	133.33
14	2002-2003	11	740.60	1992	181.09
15	2001-2002	20	1092.20	7224	361.20
16	2000-2001	13	1129.00	15000	1153.85
17	1989-90 TO 1999-00	87	5775.70	41496	476.97
18	1978-79 TO 1988-89	124	7257.60	85560	690.00
19	1967-68 TO 1977-78	82	5300.25	52608	641.56
20	UP TO 1966-67	164	4682.05	146952	896.05
	TOTAL	676	42783.42	447240	661.60

It is seen that the average non-availability of units due to planned maintenance for units commissioned during 2015-16 was minimum (81.88 hrs./unit) and was maximum in case of units commissioned during 2013-14 (1355.37 hrs. /unit).

4.5 Analysis based on Planned Maintenance of different types of Turbines:

The details regarding non-availability of generating units due to planned maintenance for different types of turbines are indicated in **Table 4.4** given below.

TABLE 4.4

**PLANNED MAINTENANCE-TURBINE TYPE-WISE
PERIOD: 2015-16**

SL. NO.	TYPE OF TURBINE	NUMBER OF UNITS	INSTALLED CAPACITY (MU)	PLANNED OUTAGE (HOURS)	NON-AVAILABILITY PER UNIT (HOURS)
1	BULB	24	604.00	6864	286.00
2	FRANCIS & REVERSIBLE	400	31566.32	282336	705.84
3	KAPLAN	121	4241.20	106536	880.46
4	PELTON	131	6371.90	51504	393.16
	TOTAL	676	42783.42	447240	661.60

The average non-availability due to planned maintenance was maximum for Kaplan turbine at 880.46 hrs./unit, while it was minimum for Bulb units at 286 hrs. /unit followed by Pelton units at 393.16 hrs. /unit.

4.6 Analysis Based on Make of Generating Units:

Non-availability due to planned maintenance has been analyzed for generating units both indigenous and imported based on their make/supplier. The details are given below in **Table 4.5:**

TABLE 4.5

**PLANNED MAINTENANCE-SUPPLIER WISE
PERIOD: - 2015-16**

NAME OF SUPPLIER	NO. OF UNITS	INSTALLED CAPACITY (MW)	NON- AVAILABILITY DUE TO PLANNED MAINTENANCE	
			TOTAL HOURS	HOURS / UNIT
A-Indigenous				
BHEL	290	18541.02	192384	663.39
Others*	24	1087.00	14736	614.00
SUB-TOTAL	314	19628.02	207120	659.62

NAME OF SUPPLIER	NO. OF UNITS	INSTALLED CAPACITY (MW)	NON- AVAILABILITY DUE TO PLANNED MAINTENANCE	
			TOTAL HOURS	HOURS / UNIT
B-Imported				
U.K	64	1257.10	62520	976.88
CANADA	44	3132.00	22680	515.45
SWITZERLAND	22	815.20	8952	406.91
JAPAN	76	6344.20	50880	669.47
FRANCE	33	2186.40	25704	778.91
USSR	26	2804.00	13608	523.38
U.S.A	9	351.00	6936	770.67
Other	88	6265.50	48840	555.00
SUB-TOTAL	362	23155.40	240120	663.31
TOTAL	676	42783.42	447240	661.60

Among indigenous manufacturers, BHEL is the main manufacturer/ supplier of major/medium hydro generating units in the country. During the year 2015-16, average non-availability due to planned maintenance of the units supplied by BHEL was 663.39 hrs./unit which was comparable with the same reflected by imported units.

Among the imported generating units, the average non-availability due to planned maintenance was the least for units supplied by Switzerland (406.91 hrs/unit) and was maximum for units supplied by UK (976.88 hrs./unit).

4.7 Planned Maintenance – Region wise:

Region-wise non-availability of units due to planned maintenance in respect of various hydro power stations is indicated below in **Table 4.6**.

TABLE 4.6
REGION-WISE PLANNED MAINTENANCE
PERIOD: 2015-16

S. NO.	REGION	NO. OF UNITS	INSTALLED CAPACITY (MW)	% NON-AVAILABILITY DUE TO PLANNED MAINTENANCE
1	NORTHERN	234	18302.27	8.70
2	WESTERN	101	7392.00	4.74
3	SOUTHERN	247	11592.45	6.55
4	EASTERN	65	4254.70	7.73
5	NORTH EASTERN	29	1242.00	4.26
	ALL INDIA	676	42783.42	7.21

The non-availability of generating unit due to planned maintenance was least in North-Eastern Region (4.26%) followed by Western Region at 4.74%, whereas it was maximum in Northern Region (8.70 %) and Eastern Region at 7.73%.

4.8 Planned Maintenance – Utility Wise/Sector Wise

Performance of hydro electric units under various utilities in Central Sector, State sector, and Private Sector with respect to non-availability due to planned maintenance is indicated in **Table 4.7**. Among utilities, the average non-availability due to planned maintenance of the generating units was ‘Nil’ in case of hydro stations under AHPC, DEPL, DLHP, GIPL, HBPL, JPPVL, CSPGCL & JUUNL.

In case of Central Sector, non-availability due to planned maintenance was maximum under NHPC (960 hrs./unit).

In case of State Sector, non-availability due to planned maintenance was maximum under UPVJNL (2457.60 hrs./unit).

In case of Private Sector, non-availability due to planned maintenance was maximum under GBHPPL (1140 hrs./unit).

It is also observed that average duration of planned maintenance in respect of H.E. Stations in Central Sector, State Sector and Private Sector is 616.05 hrs./Unit 718.16 hrs./Unit and 187.53 hrs./Unit respectively.

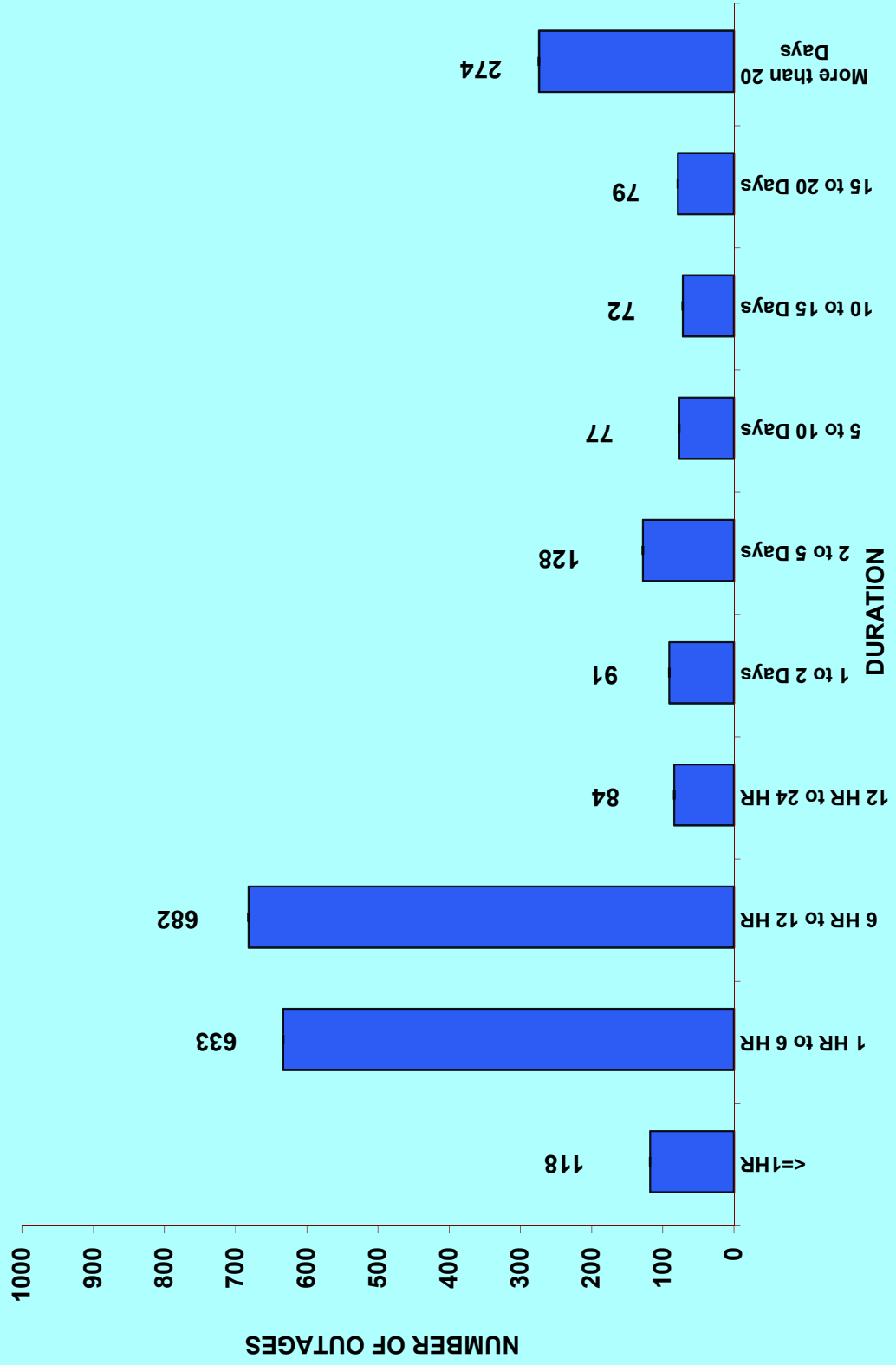
TABLE 4.7

**SECTORWISE/ UTILITYWISE PERFORMANCE PLANNED MAINTENANCE
PERIOD: -2015-16**

Sl. No.	ORGANIZATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (HOURS)	PLANNED MAINTENANCE PER UNIT (HOURS)
(A) CENTRAL SECTOR					
1	BBMB	28	2866.30	13368	477.43
2	DVC	5	143.20	1056	211.20
3	NEEPCO.	13	755.00	3312	254.77
4	NHDC	16	1520.00	4680	292.50
5	NHPC	65	5041.20	62400	960.00
6	NTPC LTD.	4	800.00	2160	540.00
7	SJVNL	12	1912.02	720	60.00
8	THDC	8	1400.00	5328	666.00
SUB TOTAL (CS)		151	14437.72	93024	616.05
(B) PRIVATE SECTOR					
1	ADHPL	2	192.00	1176	588.00
2	AHPC (GVK)	4	330.00	0	0.00
3	DEPL	2	96.00	0	0.00
4	DLHP	1	34.00	0	0.00
5	E.P.P.L.	2	100.00	2016	1008.00
6	GBHPPL	2	70.00	2280	1140.00
7	GIPL	2	99.00	0	0.00
8	HBPCL	7	1300.00	0	0.00
9	JPPVL	4	400.00	0	0.00
10	MPCL	2	86.00	528	264.00
11	TPCL	15	447.00	2064	137.60
SUB TOTAL (PVT)		43	3154.00	8064	187.53
(C) STATE SECTOR					
1	APGENCO	14	1100.00	1104	78.86
2	APGPCL	2	100.00	864	432.00
3	CSPGCL	3	120.00	0	0.00
4	GSECL	8	540.00	6984	873.00
5	HPSEB	12	366.00	3480	290.00
6	JKSPDC	12	1110.00	3336	278.00

Sl. No.	ORGANIZATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (HOURS)	PLANNED MAINTENANCE PER UNIT (HOURS)
7	JUUNL	2	130.00	0	0.00
8	KPCL	76	3657.40	52032	684.63
9	KSEB	48	1881.50	34296	714.50
10	MAHAGENCO	24	2406.00	6792	283.00
11	MePGCL	11	282.00	6816	619.64
12	MPPGCL	23	875.00	10680	464.35
13	OHPC	37	2142.25	38376	1037.19
14	PSPCL	25	1051.00	14616	584.64
15	RRVUNL	11	411.00	12984	1180.36
16	SSNNL	11	1450.00	4944	449.45
17	TANGEDCO	70	2182.20	49752	710.74
18	TSGENCO	33	2656.60	12600	381.82
19	UJVNL	34	1252.15	47256	1389.88
20	UPJVNL	15	501.60	36864	2457.60
21	WBSEDCL	11	977.00	2376	216.00
SUB TOTAL (State)		482	25191.70	346152	718.16
ALL INDIA		676	42783.42	447240	661.60

DURATION PATTERN OF PLANNED MAINTENANCE DURING 2015-16



DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
NORTHERN REGION							
ADHPL							
1	ALLAIN DUHANGAN HPS	1	96	01/12/2015	28/12/2015	647.78	ANNUAL MAINTENANCE
		2	96	01/01/2016	23/01/2016	534.88	ANNUAL MAINTENANCE
BBMB							
2	BHAKRA H P S	4	108	01/04/2015	05/08/2015	3041.67	PLANNED MAINTENANCE
3	GANGUWAL HPS	1	29.25	16/03/2016	18/03/2016	55	PLANNED MAINTENANCE
		1	29.25	17/09/2015	19/09/2015	54.3	RENOVATION/MODERNISATION
		1	29.25	12/12/2015	21/12/2015	225.75	ANNUAL MAINTENANCE
		1	29.25	08/06/2015	11/06/2015	79.17	PLANNED MAINTENANCE
		3	24.2	23/09/2015	26/09/2015	79.75	PLANNED MAINTENANCE
		3	24.2	05/01/2016	10/01/2016	127.58	PLANNED MAINTENANCE
4	KOTLA HPS	1	29.25	15/01/2016	03/02/2016	466.5	ANNUAL MAINTENANCE
		1	29.25	18/05/2015	21/05/2015	78.25	PLANNED MAINTENANCE
		2	24.2	10/09/2015	12/09/2015	54.17	PLANNED MAINTENANCE
		2	24.2	16/11/2015	24/11/2015	201.5	ANNUAL MAINTENANCE
		2	24.2	22/02/2016	25/02/2016	77.58	PLANNED MAINTENANCE
		2	24.2	24/06/2015	28/06/2015	102.58	PLANNED MAINTENANCE
E.P.P.L.							
5	MALANA-II HPS	1	50	18/11/2015	30/12/2015	1031.98	ANNUAL MAINTENANCE
		2	50	18/11/2015	30/12/2015	1031.98	ANNUAL MAINTENANCE
GBHPPL							
6	BUDHIL HPS	1	35	26/12/2015	09/03/2016	1785	ANNUAL MAINTENANCE
		2	35	10/03/2016	31/03/2016	494	ANNUAL MAINTENANCE
HPSEB LTD.							
7	BASSI HPS	1	15	24/02/2016	27/02/2016	88	ANNUAL MAINTENANCE
		2	15	01/05/2015	11/05/2015	263.98	QUATERLY MAINTENANCE
		2	15	24/02/2016	07/03/2016	296.25	ANNUAL MAINTENANCE
		3	15	24/02/2016	28/03/2016	808.67	PLANNED MAINTENANCE
		4	15	24/02/2016	23/03/2016	685.33	PLANNED MAINTENANCE
8	GIRI BATA HPS	1	30	13/01/2016	31/01/2016	444.65	ANNUAL MAINTENANCE
		2	30	01/06/2015	29/06/2015	689.08	ANNUAL MAINTENANCE
9	LARJI HPS	2	42	01/04/2015	05/04/2015	113.75	ANNUAL MAINTENANCE
		3	42	03/07/2015	06/07/2015	81.25	SWITCHING EQUIPMENT
JKSPDC							
10	BAGLIHAR HPS	1	150	20/03/2016	23/03/2016	62.45	ANNUAL MAINTENANCE
		1	150	03/03/2016	11/03/2016	201.2	AUXILIARY SYSTEM
		2	150	01/02/2016	14/03/2016	1025.82	ANNUAL MAINTENANCE
		3	150	15/03/2016	18/03/2016	64.25	AUXILIARY SYSTEM

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	150	01/02/2016	21/02/2016	499.62	ANNUAL MAINTENANCE
11	LOWER JHELMUM HPS	2	35	01/04/2015	04/04/2015	95.5	RENOVATION/MODERNISATION
12	UPPER SINDH-II HPS	3	35	11/04/2015	30/04/2015	470.32	B.F.VALVE
		3	35	01/05/2015	04/05/2015	73.08	B.F.VALVE
		4	35	10/08/2015	10/09/2015	749.33	INTAKE STRU/TRASH RACK
		5	35	03/04/2015	05/04/2015	54.92	INTAKE STRU/TRASH RACK
		5	35	11/04/2015	14/04/2015	73.08	B.F.VALVE
MPCL							
13	MALANA HPS	1	43	02/12/2015	24/12/2015	543.92	ANNUAL MAINTENANCE
NHPC							
14	BAIRA SIUL HPS	1	60	17/11/2015	05/12/2015	435.78	PLANNED MAINTENANCE
		2	60	08/12/2015	29/12/2015	516.92	ANNUAL MAINTENANCE
		3	60	05/01/2016	31/01/2016	643.05	CAPITAL/3 YEARLY MTCE.
15	CHAMERA-I HPS	1	180	18/01/2016	03/02/2016	402.53	ANNUAL MAINTENANCE
		2	180	17/02/2016	07/03/2016	458.73	PLANNED MAINTENANCE
		3	180	05/02/2016	16/02/2016	273.47	ANNUAL MAINTENANCE
16	CHAMERA- II HPS	1	100	31/01/2016	26/02/2016	619.78	CAPITAL/3 YEARLY MTCE.
		2	100	06/11/2015	18/11/2015	297.22	ANNUAL MAINTENANCE
		2	100	22/11/2015	02/12/2015	248	GENERATOR
17	CHAMERA-III HPS	1	77	30/12/2015	15/01/2016	383.27	ANNUAL MAINTENANCE
		2	77	07/12/2015	17/12/2015	226.03	ANNUAL MAINTENANCE
		3	77	19/12/2015	28/12/2015	232.35	ANNUAL MAINTENANCE
18	CHUTAK HPS	1	11	28/03/2016	31/03/2016	60.77	ANNUAL MAINTENANCE
		1	11	01/04/2015	28/06/2015	2131.35	PRESSURE SHAFT/PENSTOCK
		2	11	01/04/2015	28/06/2015	2131.35	PRESSURE SHAFT/PENSTOCK
19	DHAULI GANGA HPS	1	70	24/11/2015	15/12/2015	513.88	ANNUAL MAINTENANCE
		1	70	01/04/2015	24/05/2015	1290.58	OTHER EQUIPMENT
		2	70	28/01/2016	16/02/2016	463.67	ANNUAL MAINTENANCE
		3	70	18/12/2015	26/01/2016	947.27	ANNUAL MAINTENANCE
		4	70	09/01/2016	24/01/2016	372.5	ANNUAL MAINTENANCE
20	DULHASTI HPS	1	130	17/01/2016	31/01/2016	354.03	PLANNED MAINTENANCE
		2	130	31/12/2015	13/01/2016	318.8	ANNUAL MAINTENANCE
		3	130	15/12/2015	28/12/2015	320.07	ANNUAL MAINTENANCE
21	NIMBOO BAZDO HPS	1	15	17/10/2015	10/11/2015	581.08	ANNUAL MAINTENANCE
		2	15	28/09/2015	16/10/2015	442	ANNUAL MAINTENANCE
		3	15	14/11/2015	03/12/2015	460.52	ANNUAL MAINTENANCE
22	PARBATI-III HPS	2	130	15/12/2015	04/02/2016	1233.98	PRESSURE SHAFT/PENSTOCK
		2	130	04/02/2016	07/03/2016	776.17	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	130	12/12/2015	22/02/2016	1734.4	ANNUAL MAINTENANCE
		4	130	15/12/2015	20/02/2016	1625.2	ANNUAL MAINTENANCE
23	SALAL HPS	1	115	03/12/2015	01/01/2016	704.77	ANNUAL MAINTENANCE
		2	115	03/01/2016	23/03/2016	1930.57	ANNUAL MAINTENANCE
		3	115	01/10/2015	12/01/2016	2481.82	PLANNED MAINTENANCE
		4	115	15/10/2015	06/12/2015	1238.08	ANNUAL MAINTENANCE
		5	115	15/11/2015	29/12/2015	1046.13	ANNUAL MAINTENANCE
		6	115	28/12/2015	13/03/2016	1845.33	CAPITAL/3 YEARLY MTCE.
		6	115	01/04/2015	15/04/2015	337.73	CAPITAL/3 YEARLY MTCE.
24	SEWA-II HPS	1	40	07/12/2015	18/12/2015	280.27	ANNUAL MAINTENANCE
		2	40	07/12/2015	18/12/2015	282.43	ANNUAL MAINTENANCE
		3	40	07/12/2015	21/12/2015	355.35	ANNUAL MAINTENANCE
25	TANAKPUR HPS	1	31.4	12/02/2016	31/03/2016	1138.98	CAPITAL/3 YEARLY MTCE.
		2	31.4	01/12/2015	06/01/2016	882.75	ANNUAL MAINTENANCE
		3	31.4	01/04/2015	15/04/2015	355.77	ANNUAL MAINTENANCE
		3	31.4	07/01/2016	11/02/2016	852.93	ANNUAL MAINTENANCE
26	URI-I HPS	1	120	12/10/2015	28/10/2015	387.38	ANNUAL MAINTENANCE
		2	120	14/01/2016	28/02/2016	1094.68	PLANNED MAINTENANCE
		3	120	03/02/2016	18/02/2016	365.85	PLANNED MAINTENANCE
27	URI-II HPS	1	60	01/04/2015	17/06/2015	1850.37	OTHER EQUIPMENT
		2	60	01/04/2015	02/08/2015	2973.7	OTHER EQUIPMENT
		2	60	25/01/2016	08/02/2016	346.37	ANNUAL MAINTENANCE
		3	60	01/04/2015	12/07/2015	2450.08	OTHER EQUIPMENT
		3	60	26/12/2015	09/01/2016	349.15	ANNUAL MAINTENANCE
		4	60	01/04/2015	15/06/2015	1820.52	OTHER EQUIPMENT
		4	60	12/02/2016	02/03/2016	458.92	ANNUAL MAINTENANCE
NTPC Ltd.							
28	KOLDAM	1	200	01/01/2016	02/02/2016	774.63	GENERATOR
		3	200	10/02/2016	31/03/2016	1189.45	GENERATOR
		4	200	16/02/2016	24/02/2016	189.73	GENERATOR
PSPCL							
29	ANANDPUR SAHIB HPS	2	33.5	05/04/2015	30/04/2015	612.5	ANNUAL MAINTENANCE
		3	33.5	05/04/2015	30/04/2015	610.83	ANNUAL MAINTENANCE
30	RANJIT SAGAR HPS	1	150	01/10/2015	30/03/2016	4354.75	ANNUAL MAINTENANCE
		1	150	01/04/2015	12/08/2015	3213.5	ANNUAL MAINTENANCE
		2	150	23/01/2016	30/03/2016	1608.17	ANNUAL MAINTENANCE
		4	150	01/04/2015	21/04/2015	489.75	ANNUAL MAINTENANCE
31	SHANAN HPS	1	15	03/10/2015	28/10/2015	604	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	15	29/10/2015	31/10/2015	62.9	ANNUAL MAINTENANCE
		2	15	01/11/2015	21/11/2015	502.08	ANNUAL MAINTENANCE
		5	50	11/01/2016	31/03/2016	1903	ANNUAL MAINTENANCE
		5	50	21/04/2015	29/04/2015	203.08	ANNUAL MAINTENANCE
		5	50	01/04/2015	20/04/2015	475.75	ANNUAL MAINTENANCE
RRVNL							
32	JAWAHAR SAGAR HPS	1	33	07/05/2015	31/05/2015	590.98	ANNUAL MAINTENANCE
		1	33	01/06/2015	24/06/2015	570.02	ANNUAL MAINTENANCE
		2	33	25/06/2015	11/07/2015	388.67	ANNUAL MAINTENANCE
		3	33	01/04/2015	06/05/2015	856.83	ANNUAL MAINTENANCE
33	MAHI BAJAJ HPS	1	25	09/04/2015	26/07/2015	2587.75	PLANNED MAINTENANCE
		3	45	15/04/2015	03/08/2015	2637.67	ANNUAL MAINTENANCE
		4	45	15/04/2015	02/08/2015	2606.83	ANNUAL MAINTENANCE
34	R P SAGAR HPS	1	43	01/04/2015	25/04/2015	593.18	ANNUAL MAINTENANCE
		2	43	27/04/2015	01/06/2015	844.45	ANNUAL MAINTENANCE
		3	43	03/07/2015	30/07/2015	649.18	ANNUAL MAINTENANCE
		4	43	02/06/2015	02/07/2015	723	ANNUAL MAINTENANCE
SJVNL							
35	RAMPUR HPS	1	68.67	20/12/2015	23/12/2015	68.47	MISCELLANROUS
		2	68.67	23/02/2016	10/03/2016	376.98	ANNUAL MAINTENANCE
		5	68.67	16/01/2016	25/01/2016	228.5	ANNUAL MAINTENANCE
THDC							
36	KOTESHWAR HPS	1	100	01/04/2015	10/04/2015	239.95	ANNUAL MAINTENANCE
		1	100	14/03/2016	31/03/2016	398	ANNUAL MAINTENANCE
		2	100	20/04/2015	24/05/2015	814.68	ANNUAL MAINTENANCE
		3	100	27/05/2015	29/06/2015	797.67	ANNUAL MAINTENANCE
		4	100	28/09/2015	29/10/2015	748.75	PLANNED MAINTENANCE
37	TEHRI ST-1 HPS	1	250	26/03/2016	31/03/2016	110	CAPITAL/3 YEARLY MTCE.
		2	250	06/04/2015	09/05/2015	802.75	ANNUAL MAINTENANCE
		2	250	06/03/2016	19/03/2016	320.25	ANNUAL MAINTENANCE
		3	250	09/05/2015	08/06/2015	733.98	ANNUAL MAINTENANCE
		4	250	18/05/2015	03/06/2015	394.5	ANNUAL MAINTENANCE
UJVNL							
38	CHIBRO (YAMUNA) HPS	1	60	27/11/2015	29/12/2015	766.17	ANNUAL MAINTENANCE
		2	60	02/01/2016	04/02/2016	795.17	ANNUAL MAINTENANCE
		3	60	01/04/2015	04/07/2015	2272.33	CAPITAL/3 YEARLY MTCE.
39	CHILLA HPS	1	36	01/04/2015	27/05/2015	1361.92	CAPITAL/3 YEARLY MTCE.
		2	36	28/11/2015	01/01/2016	800.33	ANNUAL MAINTENANCE
		3	36	21/08/2015	15/09/2015	614.5	PLANNED MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	36	16/01/2016	10/03/2016	1304.17	ANNUAL MAINTENANCE
40	DHAKRANI HPS	1	11.25	09/11/2015	22/01/2016	1768.42	ANNUAL MAINTENANCE
		2	11.25	24/01/2016	12/03/2016	1148.83	ANNUAL MAINTENANCE
		3	11.25	14/03/2016	31/03/2016	395	ANNUAL MAINTENANCE
		3	11.25	01/04/2015	01/05/2015	741.33	CAPITAL/3 YEARLY MTCE.
41	DHALIPUR HPS	2	17	01/04/2015	14/04/2015	327.17	CAPITAL/3 YEARLY MTCE.
		3	17	22/04/2015	14/05/2015	533.75	ANNUAL MAINTENANCE
		3	17	10/01/2016	31/03/2016	1923.25	ANNUAL MAINTENANCE
42	KHATIMA HPS	1	13.8	01/04/2015	12/05/2015	1003.3	RENOVATION/MODERNISATION
43	KHODRI HPS	2	30	08/02/2016	14/02/2016	151.67	TURBINE MISC/GOVERNOR
		3	30	15/02/2016	31/03/2016	1057.33	PLANNED MAINTENANCE
		3	30	19/04/2015	12/05/2015	553.87	PLANNED MAINTENANCE
		4	30	11/03/2016	18/03/2016	172.75	B.F.VALVE
		4	30	09/01/2016	06/02/2016	671.08	ANNUAL MAINTENANCE
44	KULHAL HPS	2	10	17/02/2016	30/03/2016	1010.25	CAPITAL/3 YEARLY MTCE.
		3	10	04/01/2016	16/02/2016	1026.67	ROUTINE MAINTENANCE
45	MANERI BHALI - I HPS	1	30	15/08/2015	07/09/2015	545.08	ANNUAL MAINTENANCE
		2	30	15/08/2015	10/09/2015	625.75	ANNUAL MAINTENANCE
		3	30	15/08/2015	12/09/2015	671.67	ANNUAL MAINTENANCE
		3	30	19/11/2015	17/01/2016	1426.82	ANNUAL MAINTENANCE
46	MANERI BHALI - II HPS	1	76	12/02/2016	31/03/2016	1136.5	CAPITAL/3 YEARLY MTCE.
		2	76	01/04/2015	29/04/2015	684	ANNUAL MAINTENANCE
		2	76	16/11/2015	19/01/2016	1540.67	ANNUAL MAINTENANCE
		3	76	02/02/2016	31/03/2016	1371.83	ANNUAL MAINTENANCE
		3	76	01/04/2015	08/05/2015	900	ANNUAL MAINTENANCE
		4	76	27/02/2016	15/03/2016	411.08	INTAKE STRU/TRASH RACK
		4	76	17/11/2015	02/02/2016	1850.58	ANNUAL MAINTENANCE
47	RAMGANGA HPS	1	66	28/10/2015	14/12/2015	1128	ANNUAL MAINTENANCE
		3	66	01/09/2015	29/09/2015	674.58	ANNUAL MAINTENANCE
UPJVNL							
48	KHARA HPS	1	24	01/11/2015	12/12/2015	987.5	ANNUAL MAINTENANCE
		2	24	16/03/2016	31/03/2016	348.75	ANNUAL MAINTENANCE
		3	24	04/01/2016	04/02/2016	750.25	ANNUAL MAINTENANCE
49	MATATILA HPS	1	10.2	01/10/2015	15/01/2016	2544.17	INTAKE STRU/TRASH RACK
		2	10.2	01/04/2015	20/07/2015	2640.75	INTAKE STRU/TRASH RACK
		3	10.2	01/05/2015	11/05/2015	253.75	RENOVATION/MODERNISATION
		3	10.2	10/04/2015	30/04/2015	493.82	RENOVATION/MODERNISATION
		3	10.2	09/02/2016	29/02/2016	483	PLANNED MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
50	OBRA HPS	1	33	15/12/2015	27/01/2016	1034.25	ANNUAL MAINTENANCE
		1	33	01/02/2016	31/03/2016	1407	PLANNED MAINTENANCE
		1	33	14/04/2015	17/04/2015	77.17	CAPITAL/3 YEARLY MTCE.
		3	33	19/05/2015	07/07/2015	1177	ANNUAL MAINTENANCE
		3	33	01/04/2015	04/04/2015	84.33	CAPITAL/3 YEARLY MTCE.
51	RIHAND HPS	1	50	23/06/2015	24/07/2015	750.5	ANNUAL MAINTENANCE
		3	50	01/04/2015	15/06/2015	1810	RENOVATION/MODERNISATION
		4	50	20/08/2015	26/09/2015	890	ANNUAL MAINTENANCE
		5	50	07/05/2015	21/06/2015	1083.67	ANNUAL MAINTENANCE
WESTERN REGION							
GSECL							
52	KADANA HPS	3	60	01/04/2015	30/06/2015	2171.5	TURBINE MISC/GOVERNOR
53	UKAI HPS	2	75	01/04/2015	07/06/2015	1625.75	PRESSURE SHAFT/PENSTOCK
		4	75	01/04/2015	13/08/2015	3236.75	STATOR
MAHAGENCO							
54	KOYNA-I HPS	1	70	08/02/2016	11/02/2016	72.75	SURGE SHAFT
55	KOYNA-II HPS	2	80	18/05/2015	20/05/2015	55.42	MISCELLANROUS
		3	80	10/04/2015	12/04/2015	56.5	MISCELLANROUS
		4	80	01/05/2015	05/05/2015	108.17	ROUTINE MAINTENANCE
56	KOYNA-III HPS	2	80	29/12/2015	31/03/2016	2224	CAPITAL/3 YEARLY MTCE.
		2	80	06/04/2015	11/04/2015	131.92	B.F.VALVE
		4	80	13/06/2015	26/06/2015	314	ANNUAL MAINTENANCE
57	KOYNA-IV HPS	2	250	20/08/2015	24/09/2015	846.3	ANNUAL MAINTENANCE
58	VAITARNA HPS	1	60	06/02/2016	31/03/2016	1296	CAPITAL/3 YEARLY MTCE.
MPPGCL							
59	BANSAGAR TONS-I HPS	1	105	24/09/2015	09/10/2015	349.5	ANNUAL MAINTENANCE
		2	105	15/05/2015	25/07/2015	1715.42	ANNUAL MAINTENANCE
		3	105	11/07/2015	10/09/2015	1469.33	ANNUAL MAINTENANCE
60	BANSAGAR TONS-II HPS	1	15	23/05/2015	31/05/2015	204.48	ANNUAL MAINTENANCE
		2	15	17/06/2015	22/06/2015	120.67	INTAKE STRU/TRASH RACK
		2	15	08/07/2015	21/07/2015	315.75	ANNUAL MAINTENANCE
61	BANSAGAR TONS-III HPS	2	20	27/05/2015	30/05/2015	84.23	ANNUAL MAINTENANCE
		3	20	09/07/2015	28/07/2015	461.5	ANNUAL MAINTENANCE
62	BARGI HPS	2	45	01/07/2015	06/07/2015	136.83	ANNUAL MAINTENANCE
63	GANDHI SAGAR HPS	3	23	01/06/2015	12/06/2015	278.25	ANNUAL MAINTENANCE
		4	23	10/04/2015	29/04/2015	459.08	ANNUAL MAINTENANCE
64	MADHIKHERA HPS	1	20	07/06/2015	04/07/2015	653	ANNUAL MAINTENANCE
		2	20	17/06/2015	04/07/2015	409.58	ANNUAL MAINTENANCE
		3	20	23/05/2015	07/06/2015	353	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	20	28/03/2016	31/03/2016	60.25	PLANNED MAINTENANCE
65	PENCH HPS	2	80	02/10/2015	09/10/2015	168.17	TURBINE MISC/GOVERNOR
66	RAJGHAT HPS	1	15	13/05/2015	31/08/2015	2653.48	ANNUAL MAINTENANCE
		2	15	18/05/2015	31/05/2015	325.23	ANNUAL MAINTENANCE
		3	15	12/05/2015	31/05/2015	469.98	ANNUAL MAINTENANCE
NHDC							
67	INDIRA SAGAR HPS	1	125	01/03/2016	17/03/2016	392	ANNUAL MAINTENANCE
		2	125	08/04/2015	15/04/2015	190.92	ANNUAL MAINTENANCE
		3	125	04/05/2015	13/05/2015	224	ANNUAL MAINTENANCE
		4	125	01/04/2015	07/04/2015	163	PLANNED MAINTENANCE
		4	125	18/03/2016	28/03/2016	248.5	PLANNED MAINTENANCE
		5	125	25/05/2015	10/06/2015	385.5	ANNUAL MAINTENANCE
		6	125	16/04/2015	01/05/2015	363	PLANNED MAINTENANCE
		7	125	14/05/2015	23/05/2015	223	PLANNED MAINTENANCE
		8	125	11/06/2015	30/06/2015	464.5	PLANNED MAINTENANCE
68	OMKARESHWAR HPS	1	65	26/05/2015	06/06/2015	273	PLANNED MAINTENANCE
		2	65	08/06/2015	22/06/2015	345.38	ANNUAL MAINTENANCE
		3	65	16/04/2015	27/04/2015	268.5	PLANNED MAINTENANCE
		4	65	13/05/2015	24/05/2015	275	ANNUAL MAINTENANCE
		5	65	29/04/2015	11/05/2015	298	ANNUAL MAINTENANCE
		6	65	06/04/2015	14/04/2015	210	ANNUAL MAINTENANCE
		7	65	06/07/2015	15/07/2015	223	ANNUAL MAINTENANCE
		8	65	23/06/2015	04/07/2015	271	ANNUAL MAINTENANCE
SSNNL							
69	S SAROVAR CHPH HPS	1	50	01/03/2016	18/03/2016	416	ANNUAL MAINTENANCE
		2	50	18/03/2016	31/03/2016	302	ANNUAL MAINTENANCE
70	S SAROVAR RBPH HPS	1	200	19/01/2016	08/02/2016	480.75	ANNUAL MAINTENANCE
		1	200	02/09/2015	04/09/2015	55	RENOVATION/MODERNISATION
		2	200	12/02/2016	04/03/2016	504	ANNUAL MAINTENANCE
		3	200	29/05/2015	31/05/2015	55.33	PRESSURE SHAFT/PENSTOCK
		4	200	17/05/2015	22/05/2015	127.67	PRESSURE SHAFT/PENSTOCK
		4	200	09/03/2016	31/03/2016	528	ANNUAL MAINTENANCE
		5	200	01/12/2015	21/12/2015	489.25	ANNUAL MAINTENANCE
		5	200	27/04/2015	02/06/2015	867.5	ANNUAL MAINTENANCE
		6	200	14/05/2015	16/05/2015	58	PRESSURE SHAFT/PENSTOCK
		6	200	06/04/2015	24/04/2015	441.67	ANNUAL MAINTENANCE
		6	200	25/12/2015	31/12/2015	160.57	ANNUAL MAINTENANCE
		6	200	01/01/2016	18/01/2016	426.75	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
TPCL							
71	BHIVPURI HPS	2	24	05/12/2015	17/12/2015	297.42	ANNUAL MAINTENANCE
		3	24	02/01/2016	27/01/2016	583.25	ANNUAL MAINTENANCE
		3	24	27/02/2016	31/03/2016	783	QUATERLY MAINTENANCE
72	KHOPOLI HPS	1	24	15/03/2016	31/03/2016	374.67	ANNUAL MAINTENANCE
SOUTHERN REGION							
APGENCO							
73	UPPER SILERU HPS	2	60	30/11/2015	16/12/2015	392.25	B.F.VALVE
		4	60	01/07/2015	31/07/2015	727.7	CAPITAL/3 YEARLY MTCE.
KPCL							
74	ALMATTI DPH HPS	1	15	20/05/2015	23/05/2015	72.08	ANNUAL MAINTENANCE
		2	55	01/03/2016	23/03/2016	538.67	ANNUAL MAINTENANCE
		2	55	23/02/2016	29/02/2016	157.4	OTHER EQUIPMENT
		2	55	01/06/2015	19/06/2015	442.42	ANNUAL MAINTENANCE
		2	55	19/01/2016	21/01/2016	52.43	ANNUAL MAINTENANCE
		2	55	01/05/2015	31/05/2015	743.98	ANNUAL MAINTENANCE
		3	55	01/05/2015	31/05/2015	743.98	ANNUAL MAINTENANCE
		3	55	22/01/2016	27/01/2016	124.25	ANNUAL MAINTENANCE
		3	55	23/03/2016	31/03/2016	177	ANNUAL MAINTENANCE
		3	55	01/06/2015	19/06/2015	442.42	ANNUAL MAINTENANCE
		3	55	02/03/2016	23/03/2016	503.08	ANNUAL MAINTENANCE
		4	55	01/06/2015	19/06/2015	442.42	ANNUAL MAINTENANCE
		4	55	01/05/2015	31/05/2015	743.98	ANNUAL MAINTENANCE
		4	55	23/03/2016	31/03/2016	181.17	ANNUAL MAINTENANCE
		5	55	28/01/2016	31/01/2016	83.73	ANNUAL MAINTENANCE
		5	55	01/02/2016	05/02/2016	111	ANNUAL MAINTENANCE
		5	55	01/05/2015	31/05/2015	743.98	ANNUAL MAINTENANCE
		5	55	09/04/2015	30/04/2015	516.48	ANNUAL MAINTENANCE
		5	55	01/06/2015	19/06/2015	442.42	ANNUAL MAINTENANCE
		6	55	01/05/2015	31/05/2015	743.98	ANNUAL MAINTENANCE
		6	55	01/02/2016	05/02/2016	111.08	ANNUAL MAINTENANCE
		6	55	12/04/2015	30/04/2015	455.98	ANNUAL MAINTENANCE
		6	55	01/06/2015	29/06/2015	684.75	ANNUAL MAINTENANCE
		6	55	06/04/2015	10/04/2015	95.75	ANNUAL MAINTENANCE
75	BHADRA HPS	4	7.2	01/04/2015	18/02/2016	7773	RENOVATION/MODERNISATION
		4	7.2	18/02/2016	01/03/2016	284.5	RENOVATION/MODERNISATION
76	GERUSUPPA HPS	2	60	02/10/2015	09/10/2015	171.67	ROUTINE MAINTENANCE
77	HAMPI HPS	1	9	30/04/2015	09/06/2015	961.08	ANNUAL MAINTENANCE
		2	9	05/03/2016	18/03/2016	309.5	CAPITAL/3 YEARLY MTCE.

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	9	28/05/2015	07/07/2015	963.83	STATOR
		4	9	19/05/2015	27/05/2015	194.08	STATOR
78	JOG HPS	1	13.2	01/04/2015	03/04/2015	60.5	TURBINE MISC/GOVERNOR
		2	13.2	04/04/2015	17/04/2015	315.42	ANNUAL MAINTENANCE
		5	21.6	27/01/2016	10/02/2016	335	ANNUAL MAINTENANCE
		6	21.6	27/01/2016	31/01/2016	109.82	ANNUAL MAINTENANCE
		6	21.6	05/02/2016	13/02/2016	199.5	ANNUAL MAINTENANCE
		7	21.6	11/08/2015	14/08/2015	68.33	TURBINE
		7	21.6	11/05/2015	14/05/2015	68.33	TURBINE
79	KADRA HPS	1	50	14/12/2015	19/12/2015	128.5	CAPITAL/3 YEARLY MTCE.
		2	50	05/12/2015	19/12/2015	335.75	ANNUAL MAINTENANCE
		2	50	04/09/2015	15/09/2015	267.33	TRI/TRC/DRAFT TUBE
80	KALINADI HPS	1	135	04/06/2015	27/06/2015	542.97	TURBINE MISC/GOVERNOR
		2	135	04/06/2015	27/06/2015	531.43	TURBINE MISC/GOVERNOR
		6	150	01/04/2015	22/01/2016	7122.7	RENOVATION/MODERNISATION
81	KODASALI HPS	1	40	16/04/2015	28/04/2015	292.58	TURBINE MISC/GOVERNOR
		3	40	18/05/2015	28/05/2015	251.25	TURBINE MISC/GOVERNOR
82	LIGANAMAKKI HPS	1	27.5	19/05/2015	24/06/2015	864.92	ANNUAL MAINTENANCE
		2	27.5	25/08/2015	29/08/2015	107.75	TURBINE MISC/GOVERNOR
83	MUNIRABAD HPS	3	10	10/04/2015	18/04/2015	194.25	OTHER EQUIPMENT
84	SHARAVATHI HPS	1	103.5	11/01/2016	14/01/2016	72.45	OTHER EQUIPMENT
		10	103.5	23/04/2015	25/04/2015	59.78	PRESSURE SHAFT/PENSTOCK
		2	103.5	28/04/2015	05/05/2015	177.52	TURBINE MISC/GOVERNOR
		3	103.5	01/01/2016	05/01/2016	103.82	OTHER EQUIPMENT
		5	103.5	06/01/2016	11/01/2016	114.45	OTHER EQUIPMENT
		6	103.5	11/05/2015	13/05/2015	57.03	GENERATOR
		7	103.5	29/08/2015	07/09/2015	230.93	ROUTINE MAINTENANCE
		9	103.5	26/12/2015	31/12/2015	134.17	SWITCHING EQUIPMENT
		9	103.5	16/05/2015	20/05/2015	99.77	OTHER EQUIPMENT
85	SIVASAMUNDRUM HPS	1	3	15/12/2015	17/12/2015	51.25	ANNUAL MAINTENANCE
		10	6	28/05/2015	31/05/2015	72.13	TURBINE MISC/GOVERNOR
		10	6	27/07/2015	31/07/2015	95.45	TURBINE MISC/GOVERNOR
		10	6	24/12/2015	26/12/2015	54.8	ANNUAL MAINTENANCE
		3	3	26/02/2016	29/02/2016	95.98	ANNUAL MAINTENANCE
		7	6	05/12/2015	25/12/2015	482.47	ANNUAL MAINTENANCE
		8	6	08/05/2015	11/05/2015	66.58	OTHER EQUIPMENT
86	T B DAM HPS	1	9	01/04/2015	06/06/2015	1596.58	GENERATOR
		2	9	18/05/2015	27/05/2015	217.25	OTHER EQUIPMENT

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	9	13/10/2015	16/10/2015	72.75	OTHER EQUIPMENT
		3	9	27/07/2015	31/07/2015	110.48	OTHER EQUIPMENT
		3	9	01/04/2015	15/05/2015	1065.67	MISCELLANROUS
		3	9	01/08/2015	24/08/2015	564.17	CAPITAL/3 YEARLY MTCE.
		3	9	18/06/2015	30/06/2015	301.48	MISCELLANROUS
87	VARAHI HPS	3	115	28/05/2015	31/05/2015	83.98	MISCELLANROUS
		3	115	01/06/2015	25/08/2015	2041.6	ROUTINE MAINTENANCE
		4	115	01/05/2015	07/05/2015	167.13	MISCELLANROUS
KSEB LTD.							
88	IDAMALAYAR HPS.	1	37.5	09/06/2015	13/07/2015	824.5	ANNUAL MAINTENANCE
		2	37.5	01/11/2015	30/11/2015	711.05	ANNUAL MAINTENANCE
		2	37.5	27/10/2015	31/10/2015	99	ANNUAL MAINTENANCE
89	IDUKKI HPS.	1	130	15/06/2015	15/07/2015	735.35	PLANNED MAINTENANCE
		2	130	30/07/2015	22/08/2015	565.13	PLANNED MAINTENANCE
		2	130	16/07/2015	24/07/2015	199.7	ANNUAL MAINTENANCE
		3	130	16/10/2015	16/11/2015	761.12	PLANNED MAINTENANCE
		4	130	18/11/2015	14/12/2015	631.25	ANNUAL MAINTENANCE
		5	130	17/09/2015	15/10/2015	675.15	ANNUAL MAINTENANCE
		6	130	18/01/2016	16/02/2016	704.58	ANNUAL MAINTENANCE
90	KAKKAD HPS.	1	25	01/02/2016	31/03/2016	1408.08	ANNUAL MAINTENANCE
		2	25	01/01/2016	29/01/2016	683.12	PLANNED MAINTENANCE
91	KUTTIYADI HPS.	1	25	12/12/2015	20/12/2015	209.17	MONTHLY MAINTENANCE
		1	25	04/01/2016	30/01/2016	629	ANNUAL MAINTENANCE
		2	25	12/12/2015	20/12/2015	209.17	MONTHLY MAINTENANCE
		2	25	08/02/2016	27/02/2016	474.92	ANNUAL MAINTENANCE
		3	25	18/11/2015	23/12/2015	844.83	ANNUAL MAINTENANCE
		4	50	12/12/2015	20/12/2015	209.17	MONTHLY MAINTENANCE
92	KUTTIYADI ADDL. EXTN.	5	50	13/05/2015	06/06/2015	585.03	ANNUAL MAINTENANCE
		6	50	01/04/2015	11/05/2015	968.83	ANNUAL MAINTENANCE
93	LOWER PERIYAR HPS.	2	60	18/02/2016	14/03/2016	592.8	ANNUAL MAINTENANCE
		2	60	07/04/2015	28/04/2015	510.17	ANNUAL MAINTENANCE
94	NARIAMANGLAM HPS	1	15	04/01/2016	31/01/2016	658.65	ANNUAL MAINTENANCE
		2	15	01/04/2015	08/05/2015	892.58	ANNUAL MAINTENANCE
		4	25	01/02/2016	29/02/2016	667.82	ANNUAL MAINTENANCE
95	PALLIVASAL HPS.	2	5	02/02/2016	25/02/2016	561.57	PLANNED MAINTENANCE
		3	5	06/04/2015	29/04/2015	563.45	ANNUAL MAINTENANCE
		4	7.5	15/03/2016	30/03/2016	369.65	ANNUAL MAINTENANCE
		5	7.5	05/01/2016	25/01/2016	486.38	PLANNED MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
96	PANNIAR HPS.	2	15	24/01/2016	29/02/2016	860.98	ANNUAL MAINTENANCE
		2	15	06/04/2015	05/05/2015	710.1	PLANNED MAINTENANCE
97	PORINGALKUTTU HPS.	1	8	01/01/2016	31/01/2016	743.98	ANNUAL MAINTENANCE
		1	8	01/02/2016	29/02/2016	695.98	ANNUAL MAINTENANCE
		1	8	01/12/2015	21/12/2015	491.92	ANNUAL MAINTENANCE
		1	8	01/04/2015	15/04/2015	347.42	ANNUAL MAINTENANCE
		1	8	27/11/2015	30/11/2015	85.48	PRESSURE SHAFT/PENSTOCK
		1	8	18/06/2015	20/06/2015	58.23	MISCELLANROUS
		2	8	10/02/2016	29/02/2016	469.98	ANNUAL MAINTENANCE
		2	8	12/06/2015	15/06/2015	81.38	MISCELLANROUS
		2	8	16/04/2015	20/04/2015	105.05	CAPITAL/3 YEARLY MTCE.
		2	8	03/03/2016	18/03/2016	378.3	ANNUAL MAINTENANCE
		4	8	01/04/2015	26/05/2015	1338.1	RENOVATION/MODERNISATION
98	SABARIGIRI HPS.	1	50	08/09/2015	01/10/2015	569.43	ANNUAL MAINTENANCE
		1	50	11/08/2015	13/08/2015	58.03	ANNUAL MAINTENANCE
		1	50	01/11/2015	15/11/2015	352	ANNUAL MAINTENANCE
		2	50	14/11/2015	14/12/2015	721.85	ANNUAL MAINTENANCE
		3	50	18/04/2015	20/04/2015	55.98	B.F.VALVE
		3	50	05/06/2015	29/06/2015	581.45	ANNUAL MAINTENANCE
		4	50	01/09/2015	20/09/2015	474.77	ANNUAL MAINTENANCE
		4	50	24/08/2015	31/08/2015	182.65	ANNUAL MAINTENANCE
		5	50	01/01/2016	05/01/2016	116.05	ANNUAL MAINTENANCE
		5	50	13/12/2015	31/12/2015	445.98	ANNUAL MAINTENANCE
		6	50	01/07/2015	24/07/2015	563.8	ANNUAL MAINTENANCE
99	SENGULAM HPS.	2	12	12/02/2016	12/03/2016	700.68	ANNUAL MAINTENANCE
		2	12	04/05/2015	26/05/2015	516.03	PLANNED MAINTENANCE
		3	12	01/04/2015	28/04/2015	666.25	ANNUAL MAINTENANCE
		4	12	12/01/2016	06/02/2016	609.92	PLANNED MAINTENANCE
100	SHOLAYAR HPS.	1	18	11/07/2015	25/07/2015	348.83	ANNUAL MAINTENANCE
		2	18	25/05/2015	10/07/2015	1112.7	ANNUAL MAINTENANCE
		3	18	01/08/2015	12/10/2015	1747.03	ANNUAL MAINTENANCE
TANGEDCO							
101	ALIYAR HPS.	1	60	14/05/2015	20/06/2015	887.4	ANNUAL MAINTENANCE
102	BHAWANI BARRAGE-II HPS	2	15	02/09/2015	06/09/2015	95.78	INTAKE STRU/TRASH RACK
		2	15	13/03/2016	31/03/2016	423	CAPITAL/3 YEARLY MTCE.
103	BHAWANI KATTAL	1	15	09/03/2016	26/03/2016	415.42	CAPITAL/3 YEARLY MTCE.
		1	15	28/03/2016	31/03/2016	62.92	CAPITAL/3 YEARLY MTCE.
		2	15	09/03/2016	26/03/2016	415.42	CAPITAL/3 YEARLY MTCE.

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
104	KADAMPARI HPS.	1	100	16/06/2015	11/07/2015	605.82	ANNUAL MAINTENANCE
		3	100	11/09/2015	30/09/2015	471.48	ANNUAL MAINTENANCE
		3	100	01/10/2015	03/10/2015	64.32	ANNUAL MAINTENANCE
105	KODAYAR HPS.	1	60	15/09/2015	21/09/2015	150.27	TURBINE
		1	60	02/05/2015	08/05/2015	141.08	AUXILIARY SYSTEM
		1	60	08/01/2016	12/01/2016	90.08	B.F.VALVE
		1	60	08/11/2015	11/11/2015	75.92	AUXILIARY SYSTEM
		1	60	22/05/2015	27/05/2015	125.17	AUXILIARY SYSTEM
106	KUNDAH HPS.	11	60	31/10/2015	04/11/2015	90.42	PRESSURE SHAFT/PENSTOCK
		11	60	12/05/2015	31/05/2015	460.42	ANNUAL MAINTENANCE
		12	50	01/06/2015	19/06/2015	436.67	ANNUAL MAINTENANCE
		14	20	05/08/2015	08/09/2015	818.33	ANNUAL MAINTENANCE
		2	20	06/12/2015	08/12/2015	50.58	MONTHLY MAINTENANCE
		3	20	08/07/2015	15/07/2015	177.33	ANNUAL MAINTENANCE
		5	35	05/08/2015	17/09/2015	1043.08	ANNUAL MAINTENANCE
		8	35	14/06/2015	22/06/2015	206.83	ANNUAL MAINTENANCE
		9	60	19/07/2015	05/08/2015	415.48	ANNUAL MAINTENANCE
		9	60	15/09/2015	20/09/2015	127.83	TURBINE MISC/GOVERNOR
107	LOWER METTUR HPS.	1	15	28/05/2015	31/05/2015	88.98	CAPITAL/3 YEARLY MTCE.
		1	15	01/04/2015	09/04/2015	205	CAPITAL/3 YEARLY MTCE.
		2	15	16/04/2015	30/04/2015	349.23	CAPITAL/3 YEARLY MTCE.
		2	15	28/05/2015	31/05/2015	88.98	CAPITAL/3 YEARLY MTCE.
		2	15	01/05/2015	05/05/2015	99	CAPITAL/3 YEARLY MTCE.
		3	15	09/05/2015	28/05/2015	457.58	CAPITAL/3 YEARLY MTCE.
		3	15	01/04/2015	20/04/2015	470.25	CAPITAL/3 YEARLY MTCE.
		4	15	01/05/2015	31/05/2015	743.98	CAPITAL/3 YEARLY MTCE.
		4	15	24/04/2015	30/04/2015	154.73	CAPITAL/3 YEARLY MTCE.
		5	15	19/04/2015	30/04/2015	275.98	CAPITAL/3 YEARLY MTCE.
		5	15	01/05/2015	06/05/2015	137.75	CAPITAL/3 YEARLY MTCE.
		5	15	01/04/2015	18/04/2015	430	CAPITAL/3 YEARLY MTCE.
		6	15	19/04/2015	30/04/2015	275.98	CAPITAL/3 YEARLY MTCE.
		6	15	07/05/2015	25/05/2015	439	CAPITAL/3 YEARLY MTCE.
		6	15	01/05/2015	06/05/2015	137.75	CAPITAL/3 YEARLY MTCE.
		7	15	01/04/2015	18/04/2015	412.67	CAPITAL/3 YEARLY MTCE.
		8	15	01/04/2015	18/04/2015	412.67	CAPITAL/3 YEARLY MTCE.
108	METTUR DAM HPS.	1	12.5	01/02/2016	27/02/2016	633.33	ANNUAL MAINTENANCE
		3	12.5	01/03/2016	28/03/2016	657	ANNUAL MAINTENANCE
109	METTUR TUNNEL HPS.	1	50	02/04/2015	11/06/2015	1689.75	CAPITAL/3 YEARLY MTCE.

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	50	01/02/2016	20/02/2016	465.33	CAPITAL/3 YEARLY MTCE.
		2	50	21/02/2016	11/03/2016	465.83	CAPITAL/3 YEARLY MTCE.
		2	50	02/04/2015	11/06/2015	1689.75	CAPITAL/3 YEARLY MTCE.
		3	50	12/03/2016	31/03/2016	448.75	CAPITAL/3 YEARLY MTCE.
		3	50	02/04/2015	11/06/2015	1689.75	CAPITAL/3 YEARLY MTCE.
		4	50	02/04/2015	11/06/2015	1689.75	CAPITAL/3 YEARLY MTCE.
110	MOYAR HPS	1	12	15/12/2015	25/12/2015	235.08	TURBINE
		1	12	25/05/2015	01/06/2015	174.5	ANNUAL MAINTENANCE
		3	12	16/06/2015	07/07/2015	508	TURBINE
		3	12	31/05/2015	12/06/2015	282.5	TURBINE
111	PAPANASAM HPS.	2	8	03/11/2015	13/11/2015	250.83	AUXILIARY SYSTEM
		3	8	03/11/2015	13/11/2015	250.83	AUXILIARY SYSTEM
		3	8	01/04/2015	16/04/2015	376.75	CAPITAL/3 YEARLY MTCE.
		4	8	03/11/2015	13/11/2015	250.83	AUXILIARY SYSTEM
		4	8	18/04/2015	29/05/2015	980.58	CAPITAL/3 YEARLY MTCE.
112	PARSON'S VALLEY HPS.	1	30	14/05/2015	25/05/2015	267.5	ANNUAL MAINTENANCE
113	PERIYAR HPS.	1	35	21/04/2015	20/05/2015	703.67	ANNUAL MAINTENANCE
		1	35	15/03/2016	31/03/2016	373.25	ANNUAL MAINTENANCE
		2	35	01/04/2015	30/04/2015	704.33	ANNUAL MAINTENANCE
114	PYKARA HPS.	3	7	20/09/2015	29/09/2015	219.75	B.F.VALVE
		5	13.6	07/09/2015	01/10/2015	582.33	ANNUAL MAINTENANCE
115	PYKARA ULTMATE HPS.	1	50	13/09/2015	15/09/2015	55.83	MONTHLY MAINTENANCE
		1	50	26/05/2015	18/06/2015	556.4	ANNUAL MAINTENANCE
		1	50	19/12/2015	21/12/2015	55.25	MONTHLY MAINTENANCE
		2	50	29/11/2015	02/12/2015	81.33	MONTHLY MAINTENANCE
		2	50	26/05/2015	18/06/2015	556.4	ANNUAL MAINTENANCE
		3	50	26/05/2015	18/06/2015	556.4	ANNUAL MAINTENANCE
		3	50	22/08/2015	24/08/2015	54.25	MONTHLY MAINTENANCE
116	SARKARPATHY HPS.	1	30	01/07/2015	15/07/2015	352.25	ANNUAL MAINTENANCE
		1	30	29/04/2015	11/05/2015	288.42	ANNUAL MAINTENANCE
	SHOLAYAR HPS.	1	35	10/04/2015	12/06/2015	1524.58	ANNUAL MAINTENANCE
		1	35	21/06/2015	24/06/2015	92.83	AUXILIARY SYSTEM
		2	35	01/02/2016	21/02/2016	497.82	CAPITAL/3 YEARLY MTCE.
		2	35	21/02/2016	29/02/2016	196.98	CAPITAL/3 YEARLY MTCE.
		3	25	10/04/2015	15/05/2015	847.83	ANNUAL MAINTENANCE
117	SURULIYAR HPS.	1	35	11/03/2016	14/03/2016	63.25	MONTHLY MAINTENANCE
		1	35	02/07/2015	11/07/2015	208.67	ROUTINE MAINTENANCE
		1	35	20/09/2015	24/09/2015	83.37	PRESSURE SHAFT/PENSTOCK

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	35	13/08/2015	15/08/2015	51.08	ROUTINE MAINTENANCE
		1	35	04/05/2015	12/06/2015	947.75	ANNUAL MAINTENANCE
		1	35	07/08/2015	11/08/2015	83.08	ROUTINE MAINTENANCE
		1	35	10/09/2015	13/09/2015	63.33	PRESSURE SHAFT/PENSTOCK
TSGENCO							
118	NAGARJUN SGR HPS	1	110	24/06/2015	15/07/2015	524.43	ANNUAL MAINTENANCE
		1	110	16/06/2015	23/06/2015	161.67	ANNUAL MAINTENANCE
		2	100.8	16/06/2015	15/07/2015	700.5	INTAKE STRU/TRASH RACK
		3	100.8	16/06/2015	15/07/2015	700.5	INTAKE STRU/TRASH RACK
		4	100.8	16/06/2015	15/07/2015	700.5	INTAKE STRU/TRASH RACK
		5	100.8	16/06/2015	15/07/2015	700.5	INTAKE STRU/TRASH RACK
		6	100.8	15/07/2015	07/08/2015	548.25	INTAKE STRU/TRASH RACK
		6	100.8	16/06/2015	30/06/2015	342.98	INTAKE STRU/TRASH RACK
		7	100.8	15/07/2015	19/07/2015	88.5	INTAKE STRU/TRASH RACK
		7	100.8	08/06/2015	15/07/2015	894	INTAKE STRU/TRASH RACK
		8	100.8	16/06/2015	15/07/2015	700.5	INTAKE STRU/TRASH RACK
		8	100.8	24/03/2016	31/03/2016	157	ANNUAL MAINTENANCE
119	NAGARJUN SGR LBC HPS	1	30	01/04/2015	04/11/2015	5221.33	CAPITAL/3 YEARLY MTCE.
120	PRIYADARSHNI JURALA HPS	3	39	18/05/2015	27/05/2015	215.17	CAPITAL/3 YEARLY MTCE.
		3	39	18/06/2015	27/06/2015	215.17	CAPITAL/3 YEARLY MTCE.
121	SRISAILAM LB HPS	3	150	29/04/2015	30/05/2015	737.83	MONTHLY MAINTENANCE
EASTERN REGION							
DVC							
122	MAITHON HPS.	2	20	12/06/2015	17/06/2015	116.67	ANNUAL MAINTENANCE
		2	20	01/04/2015	06/04/2015	132.75	ANNUAL MAINTENANCE
123	PANCHET HPS.	2	40	01/05/2015	31/05/2015	743.98	TURBINE
		2	40	21/04/2015	24/04/2015	95.98	INTAKE STRU/TRASH RACK
NHPC							
124	RANGIT HPS	1	20	15/12/2015	15/01/2016	757.83	ANNUAL MAINTENANCE
		2	20	19/02/2016	02/03/2016	298.4	PLANNED MAINTENANCE
		2	20	01/04/2015	25/04/2015	596.9	CAPITAL/3 YEARLY MTCE.
		3	20	19/01/2016	14/02/2016	641.8	ANNUAL MAINTENANCE
125	TEESTA LOW DAM-III HPS	1	33	15/12/2015	28/12/2015	331.98	ANNUAL MAINTENANCE
		2	33	28/12/2015	12/01/2016	364.83	ANNUAL MAINTENANCE
		3	33	28/01/2016	11/02/2016	343.62	ANNUAL MAINTENANCE
		4	33	11/01/2016	28/01/2016	418.52	ANNUAL MAINTENANCE
126	TEESTA V HPS	1	170	19/12/2015	08/01/2016	477.27	PLANNED MAINTENANCE
		2	170	10/01/2016	27/01/2016	418.73	ANNUAL MAINTENANCE
		2	170	13/04/2015	25/04/2015	299.3	OTHER EQUIPMENT

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	170	30/11/2015	18/12/2015	427.25	ANNUAL MAINTENANCE
OHPC							
127	BALIMELA HPS.	2	60	01/01/2016	08/01/2016	187	ANNUAL MAINTENANCE
		2	60	16/12/2015	31/12/2015	376.98	ANNUAL MAINTENANCE
		4	60	15/04/2015	16/05/2015	746.08	MONTHLY MAINTENANCE
		6	60	01/02/2016	11/02/2016	257	ANNUAL MAINTENANCE
		8	75	02/03/2016	27/03/2016	610	ANNUAL MAINTENANCE
128	HIRAKUD HPS	1	49.5	18/04/2015	14/10/2015	4301.5	CAPITAL/3 YEARLY MTCE.
		2	49.5	12/07/2015	14/07/2015	60.92	OTHER EQUIPMENT
		2	49.5	22/05/2015	25/05/2015	74.5	MONTHLY MAINTENANCE
		3	32	02/11/2015	28/11/2015	626.17	ANNUAL MAINTENANCE
		3	32	26/06/2015	29/06/2015	74	MONTHLY MAINTENANCE
		4	32	25/01/2016	22/02/2016	667.67	ANNUAL MAINTENANCE
		4	32	25/06/2015	29/06/2015	98.92	MONTHLY MAINTENANCE
		4	32	29/06/2015	04/07/2015	110.67	B.F.VALVE
		5	37.5	25/02/2016	25/03/2016	697	PLANNED MAINTENANCE
		5	37.5	12/07/2015	14/07/2015	60.92	OTHER EQUIPMENT
		6	37.5	16/10/2015	31/10/2015	374.98	ANNUAL MAINTENANCE
		7	37.5	12/07/2015	14/07/2015	60.92	OTHER EQUIPMENT
		7	37.5	01/04/2015	01/05/2015	738	ANNUAL MAINTENANCE
		8	24	15/06/2015	20/06/2015	120.67	INTAKE STRU/TRASH RACK
		8	24	15/05/2015	25/05/2015	249	ANNUAL MAINTENANCE
		9	24	15/06/2015	28/06/2015	310	INTAKE STRU/TRASH RACK
		9	24	16/12/2015	31/12/2015	375.15	ANNUAL MAINTENANCE
		9	24	01/01/2016	13/01/2016	306.75	ANNUAL MAINTENANCE
129	MACHKUND HPS	1	17	18/05/2015	17/06/2015	722.42	CAPITAL/3 YEARLY MTCE.
		2	17	22/07/2015	25/07/2015	75.08	OTHER EQUIPMENT
		2	17	19/05/2015	24/06/2015	877.83	CAPITAL/3 YEARLY MTCE.
		3	17	19/05/2015	14/06/2015	636.42	CAPITAL/3 YEARLY MTCE.
		4	21.25	19/05/2015	09/06/2015	522.67	CAPITAL/3 YEARLY MTCE.
		5	21.25	19/05/2015	03/07/2015	1098.5	MISCELLANROUS
130	RENGALI HPS.	1	50	29/05/2015	31/05/2015	61.92	MONTHLY MAINTENANCE
		1	50	02/12/2015	11/12/2015	224	MONTHLY MAINTENANCE
		1	50	27/01/2016	31/01/2016	111.9	ANNUAL MAINTENANCE
		2	50	06/01/2016	10/02/2016	852.17	ANNUAL MAINTENANCE
		4	50	02/11/2015	30/11/2015	677.33	ANNUAL MAINTENANCE
		5	50	11/02/2016	16/03/2016	821.3	ANNUAL MAINTENANCE
131	UPPER INDRAVATI HPS.	1	150	01/04/2015	22/04/2015	522.17	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	150	24/04/2015	15/05/2015	509.92	ANNUAL MAINTENANCE
		3	150	23/11/2015	31/03/2016	3086	CAPITAL/3 YEARLY MTCE.
		4	150	20/08/2015	28/08/2015	194.67	QUATERLY MAINTENANCE
132	UPPER KOLAB HPS.	1	80	29/07/2015	31/03/2016	5895	CAPITAL/3 YEARLY MTCE.
WBSEDCL							
133	JALDHAKA HPS ST-I	1	9	12/01/2016	12/02/2016	754.08	ANNUAL MAINTENANCE
		2	9	20/07/2015	22/07/2015	58.42	MISCELLANROUS
		2	9	12/01/2016	12/02/2016	754.08	ANNUAL MAINTENANCE
		2	9	13/08/2015	15/08/2015	52.75	TURBINE MISC/GOVERNOR
		3	9	20/07/2015	22/07/2015	58.73	MISCELLANROUS
134	PURULIA PSS HPS.	1	225	26/10/2015	30/10/2015	105.42	CAPITAL/3 YEARLY MTCE.
		2	225	19/01/2016	23/01/2016	103	CAPITAL/3 YEARLY MTCE.
135	RAMMAM HPS.	1	12.5	01/01/2016	05/01/2016	119.98	ANNUAL MAINTENANCE
		2	12.5	13/02/2016	17/02/2016	119.98	ANNUAL MAINTENANCE
		3	12.5	01/03/2016	05/03/2016	119.98	ANNUAL MAINTENANCE
		4	12.5	25/02/2016	29/02/2016	119.98	ANNUAL MAINTENANCE
NORTH EASTERN REGION							
APGPCL							
136	KARBILANGPI HPS.	1	50	14/03/2016	31/03/2016	407.95	ANNUAL MAINTENANCE
		2	50	24/02/2016	14/03/2016	451.85	ANNUAL MAINTENANCE
MePGCL							
137	MYNTDU(LESHKA) St-1 HPS	1	42	22/03/2016	31/03/2016	208	INTAKE STRU/TRASH RACK
		1	42	28/01/2016	31/01/2016	79	INTAKE STRU/TRASH RACK
		1	42	15/01/2016	17/01/2016	55	INTAKE STRU/TRASH RACK
		2	42	03/02/2016	29/02/2016	639.98	INTAKE STRU/TRASH RACK
		2	42	28/01/2016	31/01/2016	79	INTAKE STRU/TRASH RACK
		2	42	15/01/2016	17/01/2016	55	INTAKE STRU/TRASH RACK
		2	42	01/03/2016	21/03/2016	498	INTAKE STRU/TRASH RACK
		3	42	03/11/2015	30/11/2015	671.98	INTAKE STRU/TRASH RACK
138	UMIAM HPS ST-I	1	9	18/02/2016	24/02/2016	148.75	ANNUAL MAINTENANCE
		2	9	26/02/2016	29/02/2016	86.48	ANNUAL MAINTENANCE
		3	9	01/05/2015	10/06/2015	982.25	RENOVATION/MODERNISATION
		3	9	13/01/2016	24/01/2016	268.5	RENOVATION/MODERNISATION
		3	9	16/03/2016	19/03/2016	79	ANNUAL MAINTENANCE
		4	9	13/01/2016	24/01/2016	268.5	RENOVATION/MODERNISATION
		4	9	01/05/2015	10/06/2015	982.25	RENOVATION/MODERNISATION
		4	9	07/03/2016	14/03/2016	182.48	ANNUAL MAINTENANCE
139	UMIAM HPS ST-IV	7	30	01/12/2015	11/12/2015	256.75	RENOVATION/MODERNISATION
		7	30	03/11/2015	05/11/2015	57	INTAKE STRU/TRASH RACK

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-16**(OUTAGE DURATION 50 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		7	30	14/04/2015	26/04/2015	306.75	ANNUAL MAINTENANCE
		8	30	20/11/2015	30/11/2015	263.9	RENOVATION/MODERNISATION
		8	30	12/12/2015	22/12/2015	245	RENOVATION/MODERNISATION
		8	30	03/11/2015	05/11/2015	57	INTAKE STRU/TRASH RACK
NEEPCO							
140	DOYANG HPS.	1	25	17/04/2015	05/05/2015	451.42	ANNUAL MAINTENANCE
		2	25	12/03/2016	25/03/2016	329.75	ANNUAL MAINTENANCE
		2	25	21/05/2015	11/06/2015	521.5	PLANNED MAINTENANCE
		3	25	15/02/2016	04/03/2016	448.77	ANNUAL MAINTENANCE
141	KHONDONG HPS.	1	25	21/05/2015	28/05/2015	186.97	TRI/TRC/DRAFT TUBE
		1	25	05/03/2016	31/03/2016	624	ANNUAL MAINTENANCE
142	RANGANADI HPS.	1	135	08/01/2016	16/01/2016	185.5	B.F.VALVE
		1	135	01/12/2015	10/12/2015	239.33	ANNUAL MAINTENANCE
		2	135	04/01/2016	12/01/2016	204.5	PLANNED MAINTENANCE
		3	135	01/02/2016	09/02/2016	203.43	ANNUAL MAINTENANCE
NHPC							
143	LOKTAK HPS.	1	35	20/01/2016	07/02/2016	444.58	ANNUAL MAINTENANCE
		2	35	01/04/2015	01/05/2015	739.08	ANNUAL MAINTENANCE
		2	35	01/03/2016	19/03/2016	447.55	ANNUAL MAINTENANCE
		3	35	01/12/2015	10/01/2016	973.23	ANNUAL MAINTENANCE

CHAPTER 5

FORCED OUTAGES OF THE UNITS

CHAPTER-5

FORCED OUTAGES OF HE UNITS

5.1 Based on the analysis carried out for 676 hydro generating units installed in 194 Hydro Electric Power Stations, non-availability of hydro-electric units in the country due to forced outages during the year 2015-16 (excluding the causes not attributable to the power plant) was 4.86% as compared to 4.30% during 2014-15. Unit-wise details of forced outages of duration 24 hours and above are given in **Annex- 5.1**.

5.2 Forced outages of generating units were due to various problems in generating equipments, auxiliary systems, civil structures and also due to external reasons not attributable to the power plant equipment/civil structures etc. The external reasons are non-availability of water, transmission constraints, system disturbances, flood and also due to high silt in the river, etc.

During 2015-16, the generator and turbine faults accounted for 17.18% and 11.82% of the forced outages respectively whereas forced outages due to water constraints accounted for 39.29% of the forced outages. Category wise forced outages of hydro generating units are given in **Table 5.1** below.

TABLE 5.1

**EQUIPMENT/SYSTEM WISE FORCED OUTAGES
FOR PERIOD: 2015-16**

S. No.	CAUSES OF FORCED OUTAGE	DURATION OF OUTAGE (HOURS)	% OF TOTAL FORCED OUTAGE
A	RELATED WITH EQUIPMENT AND CIVIL STRUCTURE		
1	GENERATOR FAULTS	101627.39	17.18
2	TURBINE FAULTS	69945.81	11.82
3	CIVIL STRUCTURE FAULTS	59548.33	10.06
4	OTHER EQUIPMENT FAULTS	63787.49	10.78
	SUB-TOTAL(A):	294909.02	49.84
B	NOT ASSOCIATED WITH THE EQUIPMENT AND CIVIL STRUCTURE		
5	WATER CONSTRAINT	232454.47	39.29
6	SYSTEM CONSTRAINT	48492.05	8.20
7	OTHER MISC	15821.05	2.67
	SUB-TOTAL(B):	296767.57	50.16
	GRAND TOTAL (A+B):	591676.59	100.00

5.3 FORCED OUTAGE DUE TO GENERATOR COMPONENTS

5.3.1 Stator System Fault (32.91%) and Vibration/Sound/ Alignment Fault (32.32%) together accounted for almost 2/3rd of the forced outages due to generator components. The fault in excitation system accounted for another 13.38% of the forced outages.

The details of forced outages due to various generator faults and associated systems are given in **Table 5.2** below:

TABLE 5.2
FORCED OUTAGE HOURS DUE TO BREAK DOWN OF
GENERATOR COMPONENTS
PERIOD: 2015-16

S. No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
1	STATOR	33449.77	32.91
2	ROTOR	2028.38	2.00
3	EXCITATION SYSTEM	13598.38	13.38
4	AUTOMATIC VOLTAGE REGULATOR	2030.52	2.00
5	PROTECTION SYSTEM	3432.53	3.38
6	GENERATOR COOLING SYSTEM	1253.23	1.23
7	THRUST BEARING	3581.63	3.52
8	UPPER GUIDE BEARING	322.36	0.32
9	LOWER GUIDE BEARING	2380.42	2.34
10	VIBRATION/ SOUND / ALIGNMENT	32847.23	32.32
11	BRAKE AND JACKS	760.78	0.75
12	OTHERS	5942.16	5.85
	TOTAL	101627.39	100

5.3.2 Performance of generating units has been analyzed for failure of generator components under different categories based on their unit size. These are listed in **Table 5.3** for unit size up to 50 MW, in **Table 5.4** for unit size above 50 MW & Upto 100 MW and in **Table 5.5** for unit size above 100 MW.

TABLE 5.3

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
(UNIT SIZE UPTO 50 MW)
PERIOD: 2015-16**

S. No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
1	STATOR	161.32	2.82
2	ROTOR	44.25	0.77
3	EXCITATION SYSTEM	1927.15	33.69
4	AUTOMATIC VOLTAGE REGULATOR	163.77	2.86
5	PROTECTION SYSTEM	324.01	5.66
6	GENERATOR COOLING SYSTEM	790.98	13.83
7	THRUST BEARING	28.27	0.49
8	UPPER GUIDE BEARING	18.17	0.32
9	LOWER GUIDE BEARING	249.45	4.36
10	VIBRATION/ SOUND / ALIGNMENT	0.42	0.01
11	BRAKE AND JACKS	3.25	0.06
12	MISCELLANEOUS	2009.16	35.12
	TOTAL	5720.20	100.00

TABLE 5.4

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
(UNIT SIZE ABOVE 50 MW AND UPTO 100 MW)
PERIOD: 2015-16**

S. No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
1	STATOR	1868.23	5.56
2	ROTOR	544.25	1.62
3	EXCITATION SYSTEM	10418.83	31.03
4	AUTOMATIC VOLTAGE REGULATOR	310.22	0.92
5	PROTECTION SYSTEM	206.53	0.62
6	GENERATOR COOLING SYSTEM	143.43	0.43

S. No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
7	THRUST BEARING	133.27	0.40
8	UPPER GUIDE BEARING	53.57	0.16
9	LOWER GUIDE BEARING	22.87	0.07
10	VIBRATION/ SOUND / ALIGNMENT	17585.93	52.38
11	BRAKE AND JACKS	84.63	0.25
12	MISCELLANEOUS	2203.02	6.56
	TOTAL	33574.78	100.00

TABLE 5.5

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
(UNIT SIZE ABOVE 100 MW)
PERIOD: 2015-16**

S. No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	STATOR	31420.22	50.41
2	ROTOR	1439.88	2.31
3	EXCITATION SYSTEM	1252.40	2.01
4	AUTOMATIC VOLTAGE REGULATOR	1556.53	2.50
5	PROTECTION SYSTEM	2901.99	4.66
6	GENERATOR COOLING SYSTEM	318.82	0.51
7	THRUST BEARING	3420.08	5.49
8	UPPER GUIDE BEARING	250.62	0.40
9	LOWER GUIDE BEARING	2108.10	3.38
10	VIBRATION/ SOUND / ALIGNMENT	15260.88	24.48
11	BRAKE AND JACKS	672.90	1.08
12	MISCELLANEOUS	1729.98	2.78
	TOTAL	62332.40	100.00

From the tables above, the major reason for forced outage due to the generator components are summarized below:

UNIT SIZE	MAJOR REASON	% OF TOTAL NO. OF HOURS
Up to 50 MW	MISCELLANEOUS GENERATOR COMPONENT	35.12
50-100 MW	VIBRATION/ SOUND / ALIGNMENT	52.38
Above 100 MW	STATOR	50.41

5.4 FORCED OUTAGE DUE TO TURBINE COMPONENTS

5.4.1 Faults in Turbine bearings (23.10%), Governing System (18.49%) and vibration/sound/ alignment (16.70%) are the major reasons of forced outages on account of turbine components.

The details of forced outages due to various turbine faults and associated system are given in **Table 5.6** below:

TABLE 5.6
FORCED OUTAGE HOURS DUE TO BREAK DOWN OF
TURBINE COMPONENTS
PERIOD: 2015-16

S. No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	16154.19	23.10
2	RUNNER/UNDER WATER PARTS	5451.02	7.79
3	MAIN INLET VALVE	5689.28	8.13
4	GOVERNOR SYSTEM	12931.53	18.49
5	GUIDE VANES	3790.68	5.42
6	SHAFT VIBRATION / ALIGNMENT /SOUND	11681.02	16.70
7	MISCELLANEOUS	14248.10	20.37
	TOTAL	69945.81	100.00

5.4.2 Performance of generating units has been analyzed for failure of various turbine components under different categories based on their unit size. These are listed in **Table 5.7** for unit size up to 50 MW, in **Table 5.8** for unit size above 50 MW & Upto 100 MW and in **Table 5.9** for unit size above 100 MW.

TABLE 5.7

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
(UNIT SIZE UPTO 50 MW)
PERIOD: 2015-16**

S. No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	13860.55	52.83
2	RUNNER/UNDER WATER PARTS	4950.58	18.87
3	MAIN INLET VALVE	250.60	0.96
4	GOVERNOR SYSTEM	1980.50	7.55
5	GUIDE VANES	1264.93	4.82
6	SHAFT VIBRATION /ALIGNMENT /SOUND	560.47	2.14
7	MISCELLANEOUS	3368.00	12.84
	TOTAL	26235.63	100.00

TABLE 5.8

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
(UNIT SIZE ABOVE 50 MW AND UPTO 100 MW)
PERIOD: 2015-16**

S. No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	1095.63	16.00
2	RUNNER/UNDER WATER PARTS	251.07	3.67
3	MAIN INLET VALVE	492.33	7.19
4	GOVERNOR SYSTEM	1931.25	28.21
5	GUIDE VANES	300.28	4.39
6	SHAFT VIBRATION /ALIGNMENT /SOUND	9.87	0.14
7	MISCELLANEOUS	2766.53	40.41
	TOTAL	6846.96	100.00

TABLE 5.9

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
(UNIT SIZE ABOVE 100 MW)
PERIOD: 2015-16**

S. No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	1198.00	3.25
2	RUNNER/UNDER WATER PARTS	249.37	0.68
3	MAIN INLET VALVE	4946.35	13.42
4	GOVERNOR SYSTEM	9019.78	24.47
5	GUIDE VANES	2225.46	6.04
6	SHAFT VIBRATION /ALIGNMENT /SOUND	11110.68	30.14
7	MISCELLANEOUS	8113.57	22.01
	TOTAL	36863.22	100.00

From the tables above, the major reason for forced outage due to the turbine components are summarized below:

UNIT SIZE	MAJOR REASON	% OF TOTAL NO. OF HOURS
Up to 50 MW	BEARING	52.83
50-100 MW	MISCELLANEOUS TURBINE COMPONENTS	40.41
Above 100 MW	SHAFT VIBRATION /ALIGNMENT /SOUND	30.14

5.5 ANALYSIS BASED ON TYPE OF TURBINE:

The analysis of forced outages due to turbine components as per type of turbines is given in **Table 5.10**. Forced outage rate was observed to be the highest in case of Kaplan turbines (145.89 hrs./unit) and lowest in case of Pelton turbines (59.08 hrs./unit)

TABLE 5.10

**FORCED OUTAGES TURBINE TYPE WISE
PERIOD: 2015-16**

S. No.	Type of Turbine	Number of Units	Installed Capacity MW	Forced Outage Hours	Avg. Forced Outage per Unit Hours
1	BULB	24	604.00	1765.38	73.56
2	FRANCIS & REVERSIBLE	400	31566.32	42787.59	106.97
3	KAPLAN	121	4241.20	17652.78	145.89
4	PELTON	131	6371.90	7740.05	59.08
	TOTAL	676	42783.42	69945.81	103.47

5.6 ANALYSIS BASED ON MAKE OF UNITS:

The comparative performance of generating units of different makes is indicated in **Table 5.11**. The outage figures in the table relate to faults in turbine and generator only.

TABLE 5.11

**FORCED OUTAGES DUE TO FAULT IN TURBINE & GENERATOR
(SUPPLIER WISE) PERIOD: 2015-16**

S. No.	NAME OF SUPPLIER/ COUNTRY OF MAKE	NO. OF UNITS	INSTALLED CAPACITY (MW)	TOTAL FORCED OUTAGES (IN HOURS)	AVERAGE FORCED OUTAGES DUE TO GENERATING UNIT (HOURS/UNIT)
A-Indigenous					
1	BHEL	290	18541.02	80250.45	276.73
2	Others	24	1087.00	631.92	26.33
	SUB TOTAL	314	19628.02	80882.36	257.59
B-Imported					
1	U.K	64	1257.10	27099.58	423.43
2	CANADA	44	3132.00	1533.93	34.86
3	SWITZERLAND	22	815.20	4450.45	202.29
4	JAPAN	76	6344.20	21189.55	278.81
5	FRANCE	33	2186.40	4741.92	143.69

S. No.	NAME OF SUPPLIER/ COUNTRY OF MAKE	NO. OF UNITS	INSTALLED CAPACITY (MW)	TOTAL FORCED OUTAGES (IN HOURS)	AVERAGE FORCED OUTAGES DUE TO GENERATING UNIT (HOURS/UNIT)
6	USSR	26	2804.00	18160.70	698.49
7	U.S.A	9	351.00	4895.70	543.97
8	Other	88	6265.50	8619.01	97.94
	SUB-TOTAL	362	23155.40	90690.84	250.53
	TOTAL	676	42783.42	171573.20	253.81

It is observed that Average Forced Outages due to faults in Indigenous generating units of BHEL are quite comparable with that of Imported units. However, among the imported generating units, generating units from Canada (34.86 hrs./unit) followed by units from other countries (96.84 hrs./unit) registered the best performance.

5.7 ANALYSIS AGE-WISE:

Details of forced outages of generating units commissioned during different years are indicated in **Table 5.12**. Forced outages caused by equipment failure i.e. the fault relating to generator, turbine, and auxiliary system equipments have been taken into account for the purpose of computation.

TABLE - 5.12

**FORCED OUTAGES DUE TO EQUIPMENT BREAK DOWN:
(AGE-WISE) PERIOD: 2015-16**

S. NO.	YEAR OF COMMISSIONING	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	NON AVAILABILITY PER UNIT (HOURS)
1	2015-2016	17	1516.00	610.58	35.92
2	2014-2015	6	736.01	752.97	125.50
3	2013-2014	19	1058.01	3975.15	209.22
4	2012-2013	14	501.00	5458.27	389.88
5	2011-2012	11	1423.00	187.37	17.03
6	2010-2011	11	690.00	1121.75	101.98
7	2009-2010	1	39.00	0.42	0.42
8	2008-2009	8	969.00	3183.43	397.93
9	2007-2008	23	2443.00	8774.73	381.51
10	2006-2007	21	2286.00	1166.62	55.55

S. NO.	YEAR OF COMMISSIONING	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	NON AVAILABILITY PER UNIT (HOURS)
11	2005-2006	13	1340.00	2539.03	195.31
12	2004-2005	13	1115.00	105.53	8.12
13	2003-2004	18	2690.00	376.78	20.93
14	2002-2003	11	740.60	7804.55	709.50
15	2001-2002	20	1092.20	1007.75	50.39
16	2000-2001	13	1129.00	633.27	48.71
17	1989-90 TO 1999-00	87	5775.70	46176.76	530.77
18	1978-79 TO 1988-89	124	7257.60	41464.45	334.39
19	1967-68 TO 1977-78	82	5300.25	26350.75	321.35
20	UP TO 1966-67	164	4700.05	83669.45	510.18
	TOTAL	676	42801.42	235359.61	348.17

It is observed that the per unit forced outage rate was maximum in the case of units commissioned during 2002-03 (709.50 hrs./unit).

5.8 REGIONWISE PERFORMANCE:

The region wise summary of performance of the hydel generating units is indicated in **Table 5.13**. For the purpose of computation, all types of forced outages/tripping due to faults in generator, turbine, auxiliary system & other equipments and civil structure faults (excluding misc.) have been included.

TABLE 5.13
FORCED OUTAGES - REGION WISE
PERIOD: 2015-16

S. NO.	REGION	NO. OF UNITS	INSTALLED CAPACITY (MW)	% NON AVAILABILITY DUE TO FORCED OUTAGES
1	NORTHERN	234	18302.27	2.60
2	WESTERN	101	7392.00	2.76
3	SOUTHERN	247	11592.45	6.68
4	EASTERN	65	4254.70	12.02
5	NORTH EASTERN	29	1242.00	8.75
	ALL INDIA	676	42783.42	4.86

Performance of hydro generating equipments installed in Northern Region was the best as the non-availability due to forced outages was least (2.60%). The non-availability of the units installed in the Eastern Region was observed to be on the higher side (12.02%).

5.9 FORCED OUTAGE - UTILITY WISE:

The forced outages of hydro electric units under various Central Sector Utilities, Private Sector and State Power Generation Corporations are indicated in **Table 5.14**.

All types of forced outages/tripping due to problems in generating units, auxiliary equipments and civil structure have been taken into account for the analysis.

Table 5.14
FORCED OUTAGES- BOARD /CORPORATION WISE
PERIOD: 2015-16

S. NO.	ORGANISATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	FORCED OUTAGE PER UNIT (HOURS)
CENTRAL SECTOR					
1	BBMB	28	2866.30	18762.93	670.10
2	DVC	5	143.20	5215.35	1043.07
3	NEEPCO	13	755.00	13229.37	1017.64
4	NHDC	16	1520.00	231.90	14.49
5	NHPC	65	5041.20	11555.54	177.78
6	NTPC LTD.	4	800.00	427.02	106.76
7	SJVNL	12	1912.02	1361.68	113.47
8	THDC	8	1400.00	698.52	87.32
	SUB TOTAL	151	14437.72	51482.30	340.94
PRIVATE SECTOR					
9	ADHPL	2	192.00	88.62	44.31
10	AHPC (GVK)	4	330.00	140.23	35.06
11	DEPL	2	96.00	26.98	13.49
12	DLHP	1	34.00	0.78	0.78
13	E.P.P.L.	2	100.00	53.1	26.55
14	GBHPPL	2	70.00	412.87	206.44

S. NO.	ORGANISATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	FORCED OUTAGE PER UNIT (HOURS)
15	GISL	2	99.00	1095.4	547.70
16	HBPCL	7	1300.00	9.17	1.31
17	JPPVL	4	400.00	0.58	0.15
18	MPCL	2	86.00	2.62	1.31
19	TPCL	15	447.00	867.23	57.82
	SUB TOTAL	43	3154.00	2697.58	62.73
STATE SECTOR					
20	APGENCO	14	1100.00	915.95	65.43
21	APGPCL	2	100.00	368.75	184.38
22	CSPGCL	3	120.00	4075.87	1358.62
23	GSECL	8	540.00	0.00	0.00
24	HPSEB	12	366.00	26789.66	2232.47
25	JKSPDC	12	1110.00	8719.62	726.64
26	JUUNL	2	130.00	6918.58	3459.29
27	KPCL	76	3657.40	35839.16	471.57
28	KSEB	48	1881.50	8652.78	180.27
29	MAHAGENCO	24	2406.00	8824.66	367.69
30	MePGCL	11	282.00	9497.83	863.44
31	MPPGCL	23	875.00	7068.93	307.34
32	OHPC	37	2142.25	48464.45	1309.85
33	PSPCL	25	1051.00	894.35	35.77
34	RRVUNL	11	411.00	4262.10	387.46
35	SSNNL	11	1450.00	150.92	13.72
36	TNGDCL	70	2182.20	21445.83	306.37
37	TSGENCO	33	2656.60	27342.90	828.57
38	UJVNL	34	1252.15	5308.38	156.13
39	UPJVNL	15	501.60	1525.17	101.68
40	WBSEDCL	11	977.00	13662.15	1242.01
	SUB TOTAL	482	25191.70	240728.06	499.44
	ALL INDIA	676	42783.42	294907.94	436.25

It is observed that the per unit forced outages for generating units was maximum in respect of hydro-electric stations under JUUNL (3459.29 hrs./unit). On the other hand, the hydro generating units of DLHP, HBPCCL, MPCL, JPPVL, GSECL, SSNNL etc. have reported relatively minimum/forced outage free operation.

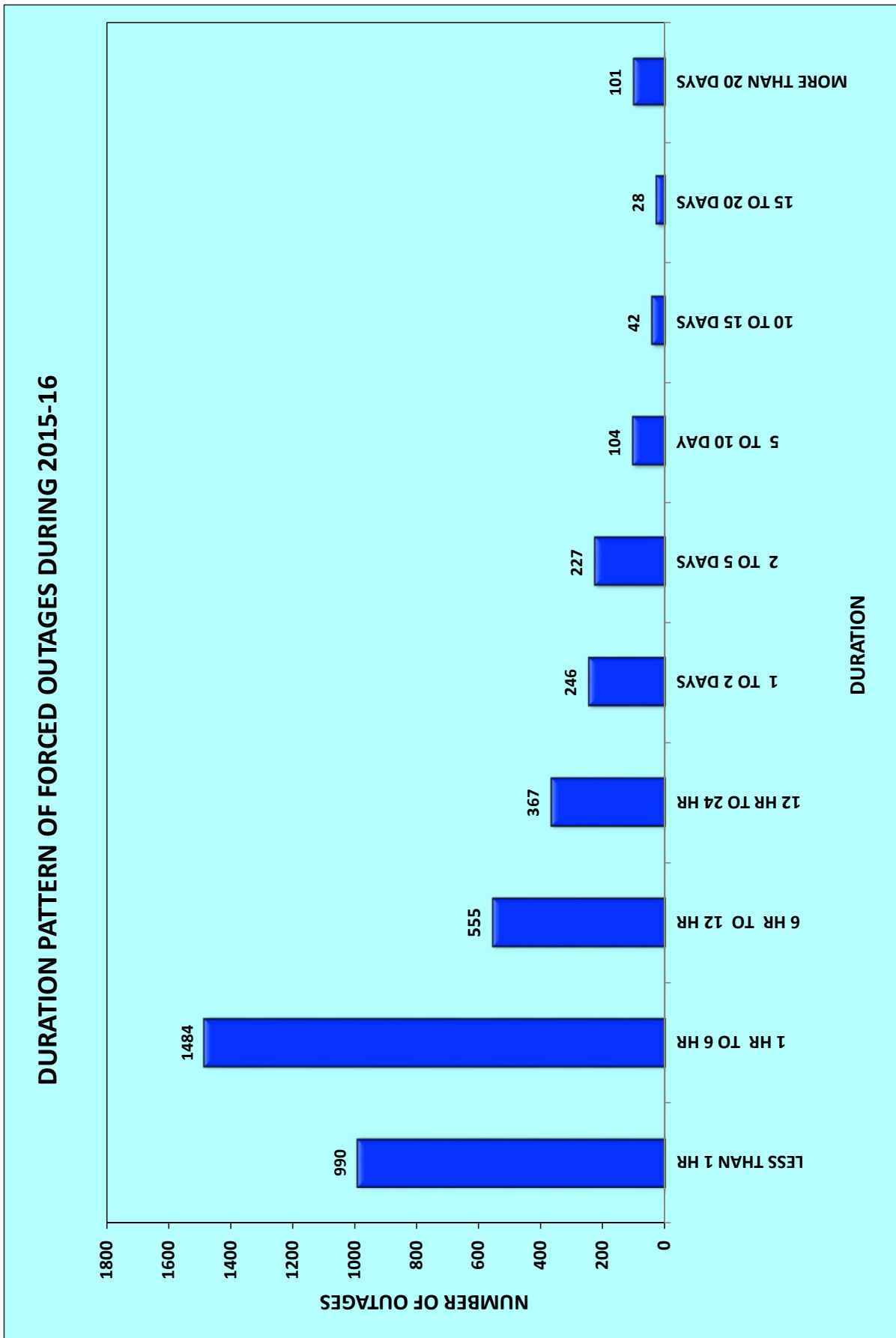
5.10 DURATION OF FORCED OUTAGES:

There were total 4549 forced outages/tripping during the year 2015-16. Duration of individual outage varied widely from a few minutes to the maximum of full year.

The duration pattern of forced outages is indicated in **Table 5.15** and **Exhibit 5.1**. It could be seen that about 81.95% of the total forced shutdown were of duration up to 24 hours while 15.61% of outages were of duration varying from 1 to 20 days and only 2.44% of shutdowns persisted for more than 20 days.

TABLE 5.15
DURATION PATTERN OF FORCED OUTAGES
PERIOD: 2015-16

S. NO.	DURATION IN HOURS	NUMBER OF OUTAGES	% OF TOTAL OUTAGES
1	Less than 1 hour	990	23.89
2	1 to 6 hours	1484	35.81
3	6 to 12 hours	555	13.39
4	12 to 24 hours	367	8.86
5	1 to 2 days	246	5.94
6	2 to 5 days	227	5.48
7	5 to 10 days	104	2.51
8	10 to 15 days	42	1.01
9	15 to 20 days	28	0.68
10	More than 20 days	101	2.44
	TOTAL NO. OF OUTAGES	4144	100



DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
NORTHERN REGION							
AHPC (GVK)							
1	SRINAGAR HPS	1	82.5	24/10/2015	27/10/2015	71.63	FORCED OUTAGE
		1	82.5	16/12/2015	22/01/2016	893.13	FORCED OUTAGE
		1	82.5	26/11/2015	15/12/2015	455.25	FORCED OUTAGE
		1	82.5	02/11/2015	06/11/2015	87.68	FORCED OUTAGE
		2	82.5	22/10/2015	25/10/2015	65.27	FORCED OUTAGE
		2	82.5	21/09/2015	23/09/2015	60.28	FORCED OUTAGE
		2	82.5	13/10/2015	14/10/2015	28.62	FORCED OUTAGE
		2	82.5	20/10/2015	21/10/2015	32.53	FORCED OUTAGE
		3	82.5	01/10/2015	07/10/2015	140.23	PROTECTION OPERATION
		3	82.5	05/11/2015	28/11/2015	567.87	FORCED OUTAGE
		3	82.5	29/09/2015	01/10/2015	46.97	FORCED OUTAGE
		3	82.5	04/01/2016	10/01/2016	149.17	FORCED OUTAGE
		4	82.5	13/01/2016	10/02/2016	664.32	FORCED OUTAGE
		4	82.5	17/10/2015	19/10/2015	40.8	FORCED OUTAGE
		4	82.5	18/09/2015	21/09/2015	59.87	FORCED OUTAGE
BBMB							
2	BHAKRA H P S	3	108	07/07/2015	09/07/2015	58	MISCELLANEOUS
		3	108	17/07/2015	19/07/2015	40.83	MISCELLANEOUS
		7	157	14/09/2015	16/09/2015	58.67	GUIDE VANES
3	DEHAR H P S	1	165	08/07/2015	14/08/2015	893.98	SHAFT VIBRS./ALIGNM/SOUND
		2	165	02/09/2015	05/09/2015	52.57	GOVERNOR SYSTM
		4	165	14/10/2015	17/10/2015	80.17	GUIDE VANES
4	GANGUWAL HPS	1	29.25	21/06/2015	22/06/2015	30.17	EHG/GOV. FAULTS, MISC.
5	PONG H P S	2	66	24/12/2015	27/12/2015	83.58	GENERATOR FAULTS
		4	66	08/02/2016	16/02/2016	189.67	FORCED OUTAGE
		5	66	14/01/2016	16/01/2016	54.83	GENRATOR OTHERS
GBHPPL							
6	BUDHIL HPS	1	35	11/08/2015	25/08/2015	335.75	OTHERS
		2	35	11/08/2015	12/08/2015	36.4	OTHERS
HBPCL							
7	BASPA HPS	1	100	19/02/2016	25/02/2016	155.83	OTHER (D/T,GUIDE/STAY VANES
		2	100	19/02/2016	25/02/2016	155.83	OTHER (D/T,GUIDE/STAY VANES
		3	100	19/02/2016	25/02/2016	155.83	OTHER (D/T,GUIDE/STAY VANES

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
HPSEB LTD.							
8	BASSI HPS	1	15	22/06/2015	24/06/2015	57.92	ROTOR
		1	15	02/07/2015	07/07/2015	129.17	ROTOR
JKSPDC							
9	BAGLIHAR HPS	2	150	21/03/2016	23/03/2016	35.32	SHAFT VIBRS./ALIGNM/SOUND
		3	150	18/03/2016	21/03/2016	65.83	SHAFT VIBRS./ALIGNM/SOUND
10	LOWER JHELM HPS	1	35	24/12/2015	26/12/2015	43.08	OIL PROBLEMS
		1	35	05/03/2016	07/03/2016	53.25	T.B.OIL SYSTEM PROBLEM
		1	35	02/05/2015	05/05/2015	75.5	THRUST BEARING
		2	35	09/06/2015	12/06/2015	67.5	LOWER GUIDE BEARING
		2	35	13/11/2015	14/11/2015	38.33	EHT/L.A.
		3	35	01/06/2015	02/06/2015	27.42	THRUST BEARING
11	UPPER SINDH-II HPS	3	35	04/10/2015	31/10/2015	645.83	HRI/HRC/SURGF SHAFT PROPS
		3	35	17/06/2015	22/06/2015	123.25	GOVERNOR SYSTM
		3	35	01/12/2015	08/12/2015	187.92	HRI/HRC/SURGF SHAFT PROPS
		3	35	01/11/2015	30/11/2015	719.98	HRI/HRC/SURGF SHAFT PROPS
		3	35	16/07/2015	20/07/2015	88.23	MISCELLANEOUS
		3	35	25/07/2015	28/07/2015	84.25	MISCELLANEOUS
		4	35	16/07/2015	20/07/2015	89.57	MISCELLANEOUS
		4	35	19/09/2015	26/09/2015	179.17	ROTOR
		4	35	05/07/2015	07/07/2015	46.5	PROTECTION OPERATION
		4	35	25/07/2015	28/07/2015	87.58	MISCELLANEOUS
		4	35	03/08/2015	04/08/2015	38.27	HRI/HRC/SURGF SHAFT PROPS
		4	35	04/10/2015	31/10/2015	648.23	HRI/HRC/SURGF SHAFT PROPS
		4	35	01/11/2015	30/11/2015	719.98	HRI/HRC/SURGF SHAFT PROPS
		4	35	01/04/2015	06/06/2015	1601	HRI/HRC/SURGF SHAFT PROPS
		5	35	08/09/2015	30/09/2015	541.48	HRI/HRC/SURGF SHAFT PROPS
		5	35	16/07/2015	20/07/2015	92.5	MISCELLANEOUS
		5	35	25/07/2015	28/07/2015	82.5	MISCELLANEOUS
		5	35	01/10/2015	31/10/2015	743.98	HRI/HRC/SURGF SHAFT PROPS
		5	35	01/11/2015	30/11/2015	719.98	HRI/HRC/SURGF SHAFT PROPS
		5	35	01/04/2015	03/04/2015	57.67	MISCELLANEOUS
		5	35	02/08/2015	15/08/2015	305.17	EXCITATION PROBLEMS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
JPPVL							
12	VISHNU PRAYAG HPS	1	100	20/02/2016	11/03/2016	491.88	FORCED OUTAGE
NHPC							
13	BAIRA SIUL HPS	1	60	30/08/2015	01/09/2015	28.88	TURBINE OTHERS
		1	60	27/09/2015	28/09/2015	26.25	TURBINE OTHERS
		1	60	29/08/2015	30/08/2015	25.53	TURBINE OTHERS
		2	60	03/04/2015	08/04/2015	132.53	LOWER GUIDE BEARING
		2	60	19/08/2015	21/08/2015	35.3	TURBINE OTHERS
		3	60	18/04/2015	24/04/2015	155.2	SHAFT VIBRS./ALIGNM/SOUND
14	CHAMERA-I HPS	3	180	05/03/2016	07/03/2016	42.02	FORCED OUTAGE
15	CHAMERA-III HPS	1	77	17/08/2015	19/08/2015	63.67	MISCELLANEOUS
16	CHUTAK HPS	1	11	25/10/2015	29/10/2015	95.32	GENERATOR FAULTS
		1	11	28/06/2015	10/09/2015	1777.47	FORCED OUTAGE
		2	11	28/06/2015	26/08/2015	1420.03	FORCED OUTAGE
		2	11	25/10/2015	04/02/2016	2445.35	OTHER (D/T,GUIDE/STAY VANES
		3	11	28/06/2015	26/08/2015	1398.18	FORCED OUTAGE
		3	11	31/10/2015	12/01/2016	1773.08	OTHER (D/T,GUIDE/STAY VANES
		4	11	28/06/2015	19/08/2015	1232.9	FORCED OUTAGE
		4	11	02/12/2015	17/12/2015	358.98	OTHER (D/T,GUIDE/STAY VANES
		4	11	15/05/2015	18/05/2015	64.45	MISCELLANEOUS
		4	11	08/05/2015	10/05/2015	53.17	MISCELLANEOUS
		4	11	20/05/2015	23/05/2015	72.97	MISCELLANEOUS
		4	11	23/05/2015	25/05/2015	44.45	MISCELLANEOUS
		4	11	17/04/2015	18/04/2015	37.55	MISCELLANEOUS
		4	11	29/04/2015	02/05/2015	69.75	MISCELLANEOUS
17	DHAULI GANGA HPS	1	70	10/07/2015	14/07/2015	79.25	MISCELLANEOUS
		2	70	03/12/2015	05/12/2015	61.92	LT AC PANELS
		2	70	13/04/2015	22/04/2015	220.75	VIBRATION/SOUND/ ALIGNMENT
		2	70	21/08/2015	23/08/2015	38.42	SHAFT SEAL
		3	70	23/04/2015	24/04/2015	26.5	LGB ALIGNMENT/MISC
		3	70	03/12/2015	18/12/2015	364.98	LT AC PANELS
		4	70	01/08/2015	03/08/2015	36.3	MISCELLANEOUS
		4	70	10/04/2015	11/04/2015	25.08	VIBRATION/SOUND/ ALIGNMENT
		4	70	03/12/2015	05/12/2015	61.6	LT AC PANELS
18	DULHASTI HPS	2	130	02/03/2016	03/03/2016	27.65	TURBINE FAULTS
		3	130	11/10/2015	18/10/2015	175.42	MISCELLANEOUS
		3	130	19/10/2015	22/10/2015	79.67	BRAKE AND JACKS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
19	PARBATI-III HPS	2	130	06/05/2015	08/05/2015	52.6	SHAFT VIBRS./ALIGNM/SOUND
		2	130	28/04/2015	30/04/2015	63.5	SHAFT VIBRS./ALIGNM/SOUND
		2	130	01/04/2015	07/04/2015	165.4	OTHER (D/T,GUIDE/STAY VANES
		2	130	30/06/2015	02/07/2015	65.88	ROTOR
		2	130	11/07/2015	13/07/2015	35.85	COOLING WATER SYSTEM
		2	130	18/07/2015	24/07/2015	133.63	COOLING WATER SYSTEM
		2	130	27/08/2015	31/08/2015	103.88	GENERATOR FAULTS
		2	130	18/05/2015	05/06/2015	442.92	LOWER GUIDE BEARING
		3	130	14/08/2015	24/08/2015	240.08	SHEAR PIN
		3	130	03/12/2015	12/12/2015	227.98	HRI/HRC/SURGF SHAFT PROPS
		3	130	18/07/2015	20/07/2015	42.63	COOLING WATER SYSTEM
		3	130	24/02/2016	25/02/2016	34.7	MISCELLANEOUS
		3	130	25/02/2016	27/02/2016	33.98	MISCELLANEOUS
		3	130	25/09/2015	30/09/2015	117.48	U.A.T
		3	130	24/08/2015	28/08/2015	91.63	LGB ALIGNMENT/MISC
		4	130	18/07/2015	20/07/2015	47.63	COOLING WATER SYSTEM
		4	130	03/12/2015	14/12/2015	287.98	HRI/HRC/SURGF SHAFT PROPS
		4	130	24/11/2015	26/11/2015	54.17	POWER HOUSE MISC.
		4	130	21/04/2015	25/04/2015	97.28	OTHER (D/T,GUIDE/STAY VANES
		4	130	22/08/2015	27/08/2015	133.45	ABNORMAL SOUND
20	SALAL HPS	3	115	12/07/2015	14/07/2015	30.25	PENSTOCK
		5	115	01/03/2016	14/03/2016	321.85	STATION SERVICE TRANSFORM
		6	115	27/07/2015	03/08/2015	156.47	SHAFT VIBRS./ALIGNM/SOUND
21	SEWA-II HPS	2	40	20/08/2015	22/08/2015	54.12	NEEDLE PROBLEM
22	TANAKPUR HPS	1	31.4	06/05/2015	10/05/2015	79.55	OTHER (D/T,GUIDE/STAY VANES
		1	31.4	02/07/2015	06/07/2015	88.28	ROTOR
23	URI-II HPS	3	60	15/07/2015	16/07/2015	26.08	MISCELLANEOUS
NTPC Ltd.							
24	KOLDAM	3	200	01/12/2015	18/12/2015	426.25	MISCELLANEOUS
PSPCL							
25	ANANDPUR SAHIB HPS	1	33.5	26/04/2015	28/04/2015	45	GEN./TR.BREAKER
26	MUKERIAN HPS	12	19.5	19/11/2015	20/11/2015	24.3	SHAFT SEAL
		2	15	18/11/2015	25/11/2015	169.48	FORCED OUTAGE
		2	15	17/09/2015	23/09/2015	153.42	ROTOR
		8	19.5	01/04/2015	24/12/2015	6427.83	FORCED OUTAGE
27	RANJIT SAGAR HPS	2	150	02/07/2015	03/07/2015	25	LT AC PANELS
		2	150	15/12/2015	16/12/2015	32.5	MISCELLANEOUS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
28	SHANAN HPS	1	15	21/02/2016	05/03/2016	309.92	FORCED OUTAGE
		3	15	19/06/2015	25/06/2015	160.83	STATION SERVICE TRANSFORM
		3	15	20/05/2015	22/05/2015	49	OTHERS
		4	15	04/08/2015	09/08/2015	122.02	AUTO. VOLTAGE REGULATOR
		5	50	01/05/2015	02/05/2015	24.42	OTHERS
RRVUNL							
29	MAHI BAJAJ HPS	2	25	30/04/2015	23/10/2015	4231.25	GENERATOR FAULTS
		2	25	03/11/2015	04/11/2015	24.33	FORCED OUTAGE
		3	45	01/03/2016	07/03/2016	143.92	FORCED OUTAGE
		3	45	29/02/2016	01/03/2016	34	FORCED OUTAGE
		3	45	27/02/2016	28/02/2016	32.75	FORCED OUTAGE
		3	45	14/02/2016	18/02/2016	85.17	FORCED OUTAGE
		3	45	19/01/2016	06/02/2016	434.83	FORCED OUTAGE
		3	45	07/01/2016	09/01/2016	42.33	FORCED OUTAGE
		3	45	09/12/2015	11/12/2015	44.08	FORCED OUTAGE
		3	45	06/12/2015	09/12/2015	68.17	FORCED OUTAGE
		3	45	02/11/2015	07/11/2015	112.5	FORCED OUTAGE
		3	45	07/11/2015	03/12/2015	616.25	FORCED OUTAGE
		3	45	08/03/2016	16/03/2016	179.08	FORCED OUTAGE
		3	45	17/03/2016	21/03/2016	95.75	FORCED OUTAGE
		3	45	22/03/2016	31/03/2016	210.5	FORCED OUTAGE
		4	45	14/03/2016	18/03/2016	98.67	FORCED OUTAGE
		4	45	11/03/2016	13/03/2016	37.58	FORCED OUTAGE
		4	45	09/03/2016	11/03/2016	44.08	FORCED OUTAGE
		4	45	03/03/2016	05/03/2016	41.08	FORCED OUTAGE
		4	45	28/03/2016	30/03/2016	50.08	FORCED OUTAGE
		4	45	18/12/2015	22/12/2015	97.42	FORCED OUTAGE
		4	45	17/11/2015	23/11/2015	136.5	FORCED OUTAGE
		4	45	16/12/2015	18/12/2015	47.92	FORCED OUTAGE
		4	45	25/02/2016	28/02/2016	93.33	FORCED OUTAGE
SJVN							
30	RAMPUR HPS	1	68.67	13/05/2015	14/05/2015	32.68	FORCED OUTAGE
		1	68.67	01/09/2015	11/09/2015	236.65	MISCELLANEOUS
		1	68.67	09/07/2015	18/07/2015	226.32	MISCELLANEOUS
		1	68.67	25/06/2015	30/06/2015	118.13	MISCELLANEOUS
		1	68.67	10/01/2016	12/01/2016	67	GUIDE VANES
		1	68.67	13/02/2016	18/02/2016	135.25	RUNNER/UNDER WATER PARTS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	68.67	10/01/2016	12/01/2016	45.48	OTHER (D/T, GUIDE/STAY VANES
		4	68.67	07/01/2016	09/01/2016	40.98	OTHER (D/T, GUIDE/STAY VANES
		6	68.67	07/10/2015	13/10/2015	148.75	ABNORMAL SOUND
		6	68.67	14/02/2016	15/02/2016	30.97	GEN./TR.BREAKER
THDC							
31	KOTESHWAR HPS	1	100	22/06/2015	14/07/2015	547.23	MISCELLANEOUS
		1	100	08/08/2015	10/08/2015	39.3	GENERATOR FAULTS
32	TEHRI ST-1 HPS	3	250	15/06/2015	17/06/2015	58.35	GEN./TR.BREAKER
UJVNL							
33	CHIBRO (YAMUNA) HPS	1	60	13/11/2015	15/11/2015	48.58	SHAFT SEAL
		1	60	02/10/2015	04/10/2015	42.58	SHAFT SEAL
		4	60	09/10/2015	10/10/2015	34.33	SHAFT SEAL
34	CHILLA HPS	1	36	01/07/2015	03/07/2015	34.08	MISCELLANEOUS
		1	36	26/06/2015	27/06/2015	36.17	MISCELLANEOUS
		2	36	13/01/2016	15/01/2016	51.92	GOVERNOR SYSTM
		2	36	26/06/2015	27/06/2015	36	MISCELLANEOUS
		2	36	01/07/2015	03/07/2015	34.17	MISCELLANEOUS
		2	36	03/01/2016	05/01/2016	69.83	TURBINE OTHERS
		3	36	01/07/2015	03/07/2015	34.75	MISCELLANEOUS
		3	36	26/06/2015	27/06/2015	37.08	MISCELLANEOUS
		4	36	15/04/2015	20/04/2015	125.75	SHAFT VIBRS./ALIGNM/SOUND
		4	36	01/07/2015	03/07/2015	35.25	MISCELLANEOUS
		4	36	26/06/2015	27/06/2015	37.17	MISCELLANEOUS
35	DHALIPUR HPS	1	17	16/08/2015	17/08/2015	40.33	EHG/GOV. FAULTS, MISC.
		1	17	23/07/2015	24/07/2015	31.67	EHG/GOV. FAULTS, MISC.
		2	17	29/08/2015	31/08/2015	43.92	ROTOR
		2	17	20/02/2016	22/02/2016	52.17	GUIDE VANES
		2	17	14/06/2015	25/06/2015	248.42	GENERATOR FAULTS
36	KHATIMA HPS	1	13.8	03/07/2015	06/07/2015	82.67	GOVERNOR SYSTM
		1	13.8	12/09/2015	15/09/2015	59.95	EHG/GOV. FAULTS, MISC.
		1	13.8	08/06/2015	14/06/2015	138.55	SHAFT SEAL
		3	13.8	01/09/2015	15/10/2015	1056.67	EXCITATION OTHERS
		3	13.8	16/07/2015	22/07/2015	127.43	SHAFT SEAL
37	KHODRI HPS	1	30	21/09/2015	22/09/2015	45.92	SHAFT SEAL
		2	30	21/02/2016	01/03/2016	198.33	FORCED OUTAGE
38	KULHAL HPS	2	10	06/11/2015	08/11/2015	51.83	FORCED OUTAGE
		3	10	24/10/2015	26/10/2015	52.42	FORCED OUTAGE

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
39	MANERI BHALI - I HPS	2	30	21/07/2015	08/08/2015	444	COOLING SYSTEM
		2	30	14/08/2015	15/08/2015	30.5	COOLING SYSTEM
		3	30	18/07/2015	19/07/2015	31.67	COOLING SYSTEM
		3	30	14/08/2015	15/08/2015	31.58	COOLING SYSTEM
		3	30	18/10/2015	19/11/2015	775.42	MISCELLANEOUS
40	MANERI BHALI - II HPS	1	76	08/10/2015	10/10/2015	49.92	PENSTOCK
		2	76	31/01/2016	01/02/2016	30	FORCED OUTAGE
		2	76	30/01/2016	31/01/2016	29.25	FORCED OUTAGE
		2	76	27/01/2016	29/01/2016	47.75	FORCED OUTAGE
		2	76	22/01/2016	23/01/2016	32.75	FORCED OUTAGE
		2	76	17/03/2016	20/03/2016	82.33	LT AC PANELS
		2	76	14/07/2015	18/07/2015	89.53	LGB ALIGNMENT/MISC
		3	76	13/01/2016	16/01/2016	57.25	FORCED OUTAGE
		3	76	05/08/2015	07/08/2015	38.67	PENSTOCK
		3	76	02/06/2015	03/06/2015	24.75	UGB ALIGNMENT/MISC.
		4	76	17/03/2016	20/03/2016	69.53	GEN./TR.BREAKER
41	RAMGANGA HPS	1	66	20/08/2015	29/08/2015	219.73	MISCELLANEOUS
UPJVNL							
42	KHARA HPS	1	24	31/01/2016	06/02/2016	156.32	GEN./TR.BREAKER
		1	24	05/06/2015	07/06/2015	56.75	TRANSFORMER PROTECTION
		2	24	15/12/2015	16/12/2015	30	TRANSFORMER PROTECTION
		3	24	28/07/2015	13/08/2015	399.83	GOVERNOR SYSTEM
		3	24	14/11/2015	15/11/2015	32.42	GEN./TR.BREAKER
		3	24	11/07/2015	12/07/2015	33.5	PERMANENT MAG GENERATOR
43	MATATILA HPS	1	10.2	27/02/2016	29/02/2016	51.92	FORCED OUTAGE
		1	10.2	28/01/2016	07/02/2016	255.92	FORCED OUTAGE
		2	10.2	28/01/2016	07/02/2016	250.75	FORCED OUTAGE
		2	10.2	08/03/2016	31/03/2016	543.67	FORCED OUTAGE
		2	10.2	27/02/2016	29/02/2016	54.75	FORCED OUTAGE
		3	10.2	28/01/2016	07/02/2016	251.42	FORCED OUTAGE
44	OBRA HPS	1	33	15/09/2015	18/09/2015	73.25	EXCITATION OTHERS
		1	33	14/12/2015	15/12/2015	26.17	GENERATOR COOLING SYSTEM
		3	33	22/11/2015	30/11/2015	196.33	EXCITATION OTHERS
		3	33	15/09/2015	18/09/2015	73.25	EXCITATION OTHERS
45	RIHAND HPS	1	50	28/09/2015	03/10/2015	115.92	PROTECTION OPERATION
		4	50	20/01/2016	24/01/2016	86.17	BRAKE AND JACKS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
WESTERN REGION							
CSPGCL							
46	HASDEOBANGO HPS	1	40	18/09/2015	03/03/2016	4011.63	GENERATOR FAULTS
MAHAGENCO							
47	BHIRA TAIL RACE HPS	1	40	28/06/2015	05/07/2015	173.5	MISCELLANEOUS
		1	40	01/05/2015	09/05/2015	211	MISCELLANEOUS
		1	40	28/04/2015	30/04/2015	61.98	MISCELLANEOUS
		1	40	04/02/2016	03/03/2016	678.08	GEN./TR.BREAKER
		1	40	29/11/2015	30/12/2015	754.08	GEN./TR.BREAKER
		2	40	01/05/2015	21/05/2015	482.5	MISCELLANEOUS
48	GHATGHAR PSS HPS	1	125	18/07/2015	21/07/2015	58	SHAFT SEAL
		1	125	11/03/2016	22/03/2016	273	PENSTOCK
		1	125	15/02/2016	01/03/2016	362.5	OTHER (D/T,GUIDE/STAY VANES
		1	125	25/10/2015	27/10/2015	56.33	DC/BATTARY
		1	125	26/06/2015	01/07/2015	138.5	BRAKE AND JACKS
		1	125	01/03/2016	11/03/2016	236.83	PENSTOCK
		2	125	27/06/2015	28/06/2015	35.75	BRAKE AND JACKS
		2	125	01/03/2016	11/03/2016	236.83	PENSTOCK
		2	125	09/02/2016	01/03/2016	500	OTHER (D/T,GUIDE/STAY VANES
49	KOYNA-I HPS	1	70	25/01/2016	28/01/2016	77.67	OIL PROBLEMS
		2	70	25/06/2015	27/06/2015	46.83	LOWER GUIDE BEARING
		2	70	27/05/2015	31/05/2015	106.17	MISCELLANEOUS
		2	70	11/11/2015	10/12/2015	699	SHAFT VIBRS./ALIGNM/SOUND
		3	70	09/01/2016	13/01/2016	99.42	LOWER GUIDE BEARING
		4	70	15/02/2016	17/02/2016	60.67	NEEDLE PROBLEM
		4	70	02/02/2016	04/02/2016	42.92	MISCELLANEOUS
50	KOYNA-II HPS	1	80	22/12/2015	23/12/2015	28.75	GENRATOR OTHERS
		1	80	05/02/2016	06/02/2016	33.25	GENERATOR COOLING SYSTEM
		2	80	22/03/2016	23/03/2016	35.17	OIL PROBLEMS
		3	80	11/11/2015	10/12/2015	699	LGB ALIGNMENT/MISC
		3	80	18/12/2015	24/12/2015	155.17	LGB ALIGNMENT/MISC
		3	80	23/07/2015	25/07/2015	57.67	OIL PROBLEMS
		3	80	01/05/2015	04/05/2015	92.25	MISCELLANEOUS
		4	80	05/02/2016	06/02/2016	24.98	GENRATOR OTHERS
51	KOYNA-III HPS	1	80	10/03/2016	16/03/2016	144.67	STATION SERVICE TRANSFORM
		3	80	29/06/2015	30/06/2015	31	SWITCHYARD MISC.
		3	80	11/03/2016	31/03/2016	466.12	GENERATOR FAULTS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
52	KOYNA-IV HPS	1	250	06/06/2015	28/07/2015	1244.63	AUTO. VOLTAGE REGULATOR
		2	250	06/01/2016	21/01/2016	361.35	SERVO MOTORS
		3	250	04/01/2016	06/01/2016	49.17	T.B.OIL SYSTEM PROBLEM
		3	250	06/01/2016	21/01/2016	370.08	OTHER (D/T,GUIDE/STAY VANES
		4	250	04/01/2016	06/01/2016	49.17	OIL PROBLEMS
MPPGCL							
53	BANSAGAR TONS-I HPS	1	105	09/12/2015	11/12/2015	41.67	TRANSFORMER PROTECTION
		2	105	21/02/2016	29/02/2016	203	BRAKE AND JACKS
		2	105	26/07/2015	01/08/2015	139.42	EHG/GOV. FAULTS, MISC.
		2	105	30/04/2015	03/05/2015	56.25	SERVO MOTORS
		2	105	09/05/2015	11/05/2015	26.08	SHEAR PIN
		2	105	03/05/2015	05/05/2015	44.97	SHEAR PIN
54	BANSAGAR TONS-II HPS	1	15	01/05/2015	23/05/2015	539.5	INTAKE STRICT./TRASH RACK
		1	15	15/06/2015	05/07/2015	482	HRI/HRC/SURGF SHAFT PROPS
		1	15	09/03/2016	12/03/2016	64	SHAFT SEAL
		1	15	01/10/2015	20/12/2015	1923.33	MISCELLANEOUS
		1	15	23/04/2015	30/04/2015	173.82	OTHER (D/T,GUIDE/STAY VANES
55	BANSAGAR TONS-III HPS	1	20	05/08/2015	24/08/2015	461.5	MISCELLANEOUS
		2	20	22/12/2015	27/12/2015	119.08	MISCELLANEOUS
		3	20	19/12/2015	22/12/2015	66.42	MISCELLANEOUS
56	MADHIKHERA HPS	2	20	15/12/2015	18/12/2015	54.58	ROTOR
		2	20	25/07/2015	27/07/2015	44.33	LINE BREAKER
		3	20	25/07/2015	30/07/2015	119.92	LINE BREAKER
57	PENCH HPS	1	80	18/04/2015	22/04/2015	99.5	GENERATOR COOLING SYSTEM
		1	80	01/02/2016	02/02/2016	25.38	GENERATOR COOLING SYSTEM
		2	80	11/12/2015	16/12/2015	123.75	MISCELLANEOUS
		2	80	28/05/2015	30/05/2015	48.2	COOLING SYSTEM
		2	80	04/01/2016	25/01/2016	497.45	GENERATOR FAULTS
58	RAJGHAT HPS	2	15	13/11/2015	20/12/2015	876.88	MISCELLANEOUS
NHDC							
59	INDIRA SAGAR HPS	2	125	06/04/2015	07/04/2015	43	ROTOR
		2	125	26/10/2015	03/11/2015	187.75	GENERATOR FAULTS
SSNNL							
60	S SAROVAR RBPH HPS	4	200	22/05/2015	28/05/2015	140.58	EHG/GOV. FAULTS, MISC.
TATA MAH.							
61	BHIRA HPS	1	25	07/08/2015	09/08/2015	39.48	EXCITATION OTHERS
		2	25	07/08/2015	09/08/2015	39.48	EXCITATION OTHERS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	25	24/03/2016	28/03/2016	95.33	FORCED OUTAGE
		3	25	07/08/2015	09/08/2015	39.48	EXCITATION OTHERS
		4	25	07/08/2015	09/08/2015	39.48	EXCITATION OTHERS
		5	25	07/08/2015	09/08/2015	39.48	EXCITATION OTHERS
		6	25	07/08/2015	09/08/2015	39.48	EXCITATION OTHERS
52	BHIRA PSS HPS	1	150	09/07/2015	15/09/2015	1643.03	GENERATOR FAULTS
63	BHIVPURI HPS	1	24	04/04/2015	06/04/2015	32.83	TRT/TRC/SURGE CHAMBER PROBLEM
		1	24	26/02/2016	29/02/2016	59.88	OTHER (D/T,GUIDE/STAY VANES
		2	24	26/02/2016	29/02/2016	59.88	OTHER (D/T,GUIDE/STAY VANES
		2	24	04/04/2015	06/04/2015	32.83	TRT/TRC/SURGE CHAMBER PROBLEM
		3	24	04/04/2015	06/04/2015	32.83	TRT/TRC/SURGE CHAMBER PROBLEM
64	KHOPOLI HPS	1	24	11/12/2015	14/12/2015	75.95	PROTECTION OPERATION
		3	24	11/12/2015	12/12/2015	26.07	PROTECTION OPERATION
SOUTHERN REGION							
APGENCO							
65	SRISAILAM HPS	1	110	02/02/2016	11/02/2016	222.67	OTHERS
		2	110	02/02/2016	11/02/2016	222.67	OTHERS
66	UPPER SILERU HPS	1	60	13/01/2016	22/01/2016	218.05	FORCED OUTAGE
		1	60	03/03/2016	06/03/2016	77.67	GENERATOR FAULTS
		1	60	03/06/2015	04/06/2015	39.33	EHT/ISOLATOR
		1	60	15/02/2016	16/02/2016	30.4	GEN./TR.BREAKER
		2	60	30/12/2015	07/01/2016	197.55	GEN./TR.BREAKER
		2	60	03/06/2015	04/06/2015	39.33	EHT/ISOLATOR
		3	60	11/01/2016	14/01/2016	86.33	MISCELLANEOUS
KPCL							
67	ALMATTIDPH HPS	1	15	11/07/2015	13/07/2015	50.83	EXCITATION PROBLEMS
		1	15	28/07/2015	30/07/2015	52.33	EXCITATION PROBLEMS
		2	55	30/07/2015	05/08/2015	139.83	EXCITATION PROBLEMS
		3	55	21/07/2015	28/07/2015	177.4	EXCITATION PROBLEMS
		3	55	05/10/2015	08/10/2015	68.75	UPPER GUIDE BEARING
68	BHADRA HPS	1	2	01/10/2015	05/10/2015	96.58	EHG/GOV. FAULTS, MISC.
		1	2	14/01/2016	19/01/2016	128	EXCITATION OTHERS
		1	2	19/01/2016	25/01/2016	136.08	EXCITATION OTHERS
		1	2	13/02/2016	19/02/2016	149	EXCITATION OTHERS
		1	2	24/10/2015	25/10/2015	25	U.A.T
		2	12	22/10/2015	24/10/2015	55.25	EHG/GOV. FAULTS, MISC.
		2	12	27/09/2015	28/09/2015	33.37	U.A.T

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	6	06/01/2016	07/01/2016	31.92	GOVERNOR SYSTM
69	GERUSUPPA HPS	4	60	07/05/2015	25/05/2015	433.43	COOLING SYSTEM
70	GHAT PRABHA HPS	1	16	08/11/2015	10/11/2015	48.83	OTHERS
		1	16	13/03/2016	31/03/2016	414	FORCED OUTAGE
		2	16	08/11/2015	10/11/2015	48.83	OTHERS
		2	16	16/11/2015	18/11/2015	45.75	PROTECTION OPERATION
71	HAMPI HPS	1	9	03/07/2015	07/07/2015	98.75	EXCITATION PROBLEMS
		1	9	19/09/2015	25/09/2015	152.42	EXCITATION PROBLEMS
		1	9	04/09/2015	06/09/2015	41.75	MISCELLANEOUS
		2	9	06/09/2015	08/09/2015	43.58	MISCELLANEOUS
		2	9	15/11/2015	16/11/2015	24.25	MISCELLANEOUS
		3	9	08/10/2015	09/10/2015	25.17	DC/BATTARY
		3	9	03/09/2015	04/09/2015	28.75	MISCELLANEOUS
		4	9	06/07/2015	07/07/2015	25.58	PROTECTION OPERATION
		4	9	08/09/2015	11/09/2015	75.75	MISCELLANEOUS
72	JOG HPS	4	13.2	01/04/2015	03/04/2015	60.5	PROTECTION OPERATION
		7	21.6	14/12/2015	16/12/2015	47.5	GENERATOR FAULTS
		7	21.6	01/12/2015	02/12/2015	36.25	GENERATOR FAULTS
		8	21.6	01/04/2015	24/07/2015	2754.83	GENERATOR FAULTS
		8	21.6	01/12/2015	02/12/2015	36.25	GENERATOR FAULTS
		8	21.6	14/12/2015	16/12/2015	47.5	GENERATOR FAULTS
		8	21.6	01/08/2015	31/08/2015	743.98	OTHER (D/T, GUIDE/STAY VANES
		8	21.6	16/12/2015	17/12/2015	25	GOVERNOR SYSTM
73	KADRA HPS	1	50	24/05/2015	25/05/2015	32	COOLING SYSTEM
		3	50	26/09/2015	30/09/2015	107.98	EHG/GOV. FAULTS, MISC.
		3	50	23/09/2015	25/09/2015	33.5	GENRATOR OTHERS
74	KALINADI HPS	1	135	16/09/2015	18/09/2015	39.87	GEN./TR.BREAKER
		2	135	06/07/2015	07/07/2015	32.5	UPPER GUIDE BEARING
75	KALINADI SUPA HPS	2	50	08/08/2015	10/08/2015	36.02	GENRATOR OTHERS
76	SHARAVATHI HPS	2	103.5	22/11/2015	24/01/2016	1520.05	THRUST BEARING
		2	103.5	15/09/2015	17/09/2015	40.55	EXCITATION OTHERS
		6	103.5	27/07/2015	28/07/2015	24.48	THRUST BEARING
		6	103.5	18/02/2016	29/02/2016	271.4	POWER HOUSE MISC.
		6	103.5	20/01/2016	22/01/2016	54.17	LOWER GUIDE BEARING
		7	103.5	18/02/2016	29/02/2016	271.43	POWER HOUSE MISC.
		7	103.5	01/03/2016	23/03/2016	550.08	POWER HOUSE MISC.

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		8	103.5	01/03/2016	31/03/2016	720	POWER HOUSE MISC.
		8	103.5	18/02/2016	29/02/2016	271.43	POWER HOUSE MISC.
		9	103.5	20/05/2015	21/05/2015	24.75	TRANSFORMER PROTECTION
77	SIVASAMUNDRUM HPS	1	3	02/01/2016	03/01/2016	38.58	SWITCHYARD MISC.
		1	3	21/03/2016	23/03/2016	39.67	PROTECTION OPERATION
		1	3	17/05/2015	18/05/2015	34.25	GUIDE VANES
		1	3	01/04/2015	16/05/2015	1091.58	TURBINE
		10	6	17/05/2015	18/05/2015	27.75	MISCELLANEOUS
		10	6	10/05/2015	12/05/2015	37.78	MISCELLANEOUS
		10	6	05/12/2015	09/12/2015	101.12	SWITCHYARD MISC.
		10	6	01/01/2016	02/01/2016	24.67	GOVERNOR SYSTM
		10	6	01/06/2015	04/06/2015	72.97	MISCELLANEOUS
		2	3	04/03/2016	16/03/2016	288.17	OIL PROBLEMS
		2	3	05/12/2015	09/12/2015	101.63	SWITCHYARD MISC.
		2	3	20/12/2015	23/12/2015	76.5	SWITCHYARD MISC.
		2	3	29/04/2015	05/05/2015	136.08	AUTO. VOLTAGE REGULATOR
		2	3	14/09/2015	15/09/2015	26.42	TURBINE
		3	3	01/01/2016	02/01/2016	27.67	GENERATOR FAULTS
		3	3	03/12/2015	05/12/2015	40.12	EHT/ISOLATOR
		3	3	20/11/2015	24/11/2015	104.05	PENSTOCK
		4	3	29/04/2015	30/04/2015	32.92	GOVERNOR SYSTM
		4	3	07/09/2015	31/03/2016	4920.17	TURBINE
		5	3	28/04/2015	04/05/2015	139.67	SHAFT SEAL
		5	3	04/05/2015	13/06/2015	964.67	SHAFT SEAL
		5	3	25/04/2015	26/04/2015	30.13	POWER HOUSE MISC.
		5	3	24/06/2015	30/06/2015	144.25	TURBINE FAULTS
		5	3	01/07/2015	18/07/2015	406.75	TURBINE FAULTS
		5	3	10/12/2015	14/12/2015	93.82	TURBINE OTHERS
		6	3	21/08/2015	25/08/2015	97	EHT/CT/PT
		6	3	08/09/2015	31/03/2016	4904.83	TURBINE
		6	3	21/07/2015	12/08/2015	526.58	TURBINE
		6	3	04/04/2015	06/04/2015	43	GOVERNOR SYSTM
		6	3	12/08/2015	21/08/2015	211.92	TURBINE FAULTS
		6	3	09/06/2015	21/06/2015	294.32	GOVERNOR SYSTM
		6	3	25/04/2015	26/04/2015	30.35	POWER HOUSE MISC.
		7	6	03/09/2015	04/09/2015	30.33	EHG/GOV. FAULTS, MISC.

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		8	6	20/12/2015	21/12/2015	29.42	SWITCHYARD MISC.
		8	6	26/02/2016	02/03/2016	109.92	SPEED RUNAWAY/OVER /UNDER
		8	6	20/08/2015	22/08/2015	37.62	PROTECTION OPERATION
		8	6	24/09/2015	29/09/2015	123	GENERATOR COOLING SYSTEM
		8	6	09/06/2015	25/06/2015	384.17	GOVERNOR SYSTM
		8	6	10/12/2015	14/12/2015	93.58	PROTECTION OPERATION
		8	6	26/04/2015	29/04/2015	79.67	POWER HOUSE MISC.
		8	6	14/05/2015	27/05/2015	327.15	TURBINE
		9	6	13/01/2016	15/01/2016	49.63	TURBINE OTHERS
		9	6	02/01/2016	03/01/2016	38.53	SWITCHYARD MISC.
		9	6	05/12/2015	09/12/2015	105.95	SWITCHYARD MISC.
78	T B DAM HPS	1	9	10/03/2016	11/03/2016	25.08	MISCELLANEOUS
		2	9	28/11/2015	01/12/2015	58.17	TURBINE
		2	9	23/11/2015	28/11/2015	128.17	HRI/HRC/SURGF SHAFT PROPS
		3	9	24/07/2015	25/07/2015	25.5	POWER HOUSE MISC.
		3	9	11/07/2015	13/07/2015	46.17	MISCELLANEOUS
		3	9	18/03/2016	30/03/2016	289	GENERATOR COOLING SYSTEM
		4	9	05/03/2016	18/03/2016	312.67	GENERATOR COOLING SYSTEM
		4	9	10/07/2015	11/07/2015	25.58	MISCELLANEOUS
79	VARAHI HPS	2	115	25/06/2015	22/08/2015	1392.8	THRUST BEARING
		3	115	18/03/2016	21/03/2016	81.27	TURBINE OTHERS
		3	115	15/03/2016	17/03/2016	63.97	TURBINE OTHERS
		3	115	17/12/2015	14/01/2016	667.98	TURBINE OTHERS
		4	115	23/04/2015	30/04/2015	171.03	ABNORMAL SOUND
		4	115	01/10/2015	16/10/2015	351.13	OTHERS
		4	115	08/05/2015	24/05/2015	392.32	EXCITATION OTHERS
		4	115	19/04/2015	23/04/2015	105.45	ABNORMAL SOUND
KSEB LTD.							
80	IDAMALAYAR HPS.	2	37.5	01/12/2015	10/12/2015	225.75	AUTO. VOLTAGE REGULATOR
		2	37.5	15/09/2015	17/09/2015	40.5	GUIDE VANES
81	IDUKKI HPS.	2	130	28/04/2015	29/04/2015	24.05	GEN./TR.BREAKER
		3	130	28/04/2015	04/05/2015	151.03	GEN./TR.BREAKER
		3	130	12/04/2015	13/04/2015	31.17	FORCED OUTAGE
		3	130	15/01/2016	16/01/2016	29.23	EHG/GOV. FAULTS, MISC.
		5	130	28/04/2015	04/05/2015	149.88	GEN./TR.BREAKER
82	KAKKAD HPS.	1	25	05/05/2015	07/05/2015	65.35	THRUST BEARING

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
83	KUTTIYADI ADDL. EXTN.	5	50	12/06/2015	13/06/2015	33	GENERATOR COOLING SYSTEM
		5	50	09/07/2015	10/07/2015	35.33	PENSTOCK
		5	50	20/06/2015	24/06/2015	105.48	U.A.T
		5	50	20/12/2015	24/12/2015	97.5	PENSTOCK
		5	50	25/12/2015	30/12/2015	115.25	PENSTOCK
		5	50	17/02/2016	19/02/2016	54.4	AUTO. VOLTAGE REGULATOR
		6	50	09/07/2015	10/07/2015	35.33	PENSTOCK
		6	50	25/12/2015	30/12/2015	115.17	PENSTOCK
		6	50	20/12/2015	24/12/2015	99.17	PENSTOCK
84	LOWER PERIYAR HPS.	1	60	15/01/2016	18/01/2016	67.6	FORCED OUTAGE
		1	60	03/01/2016	04/01/2016	41.48	FORCED OUTAGE
		1	60	04/01/2016	06/01/2016	43.48	FORCED OUTAGE
		1	60	19/01/2016	20/01/2016	42.42	FORCED OUTAGE
		1	60	25/01/2016	28/01/2016	68.55	FORCED OUTAGE
85	NARIAMANGLAM HPS	1	15	28/05/2015	30/05/2015	53.98	OTHER (D/T, GUIDE/STAY VANES
		1	15	13/07/2015	16/07/2015	65.87	SPEED RUNAWAY/OVER /UNDER
		2	15	11/07/2015	12/07/2015	40.45	GENERATOR OTHERS
		4	25	08/08/2015	10/08/2015	57.85	OIL PROBLEMS
		4	25	02/07/2015	05/07/2015	80.03	OIL PROBLEMS
		4	25	07/07/2015	25/07/2015	424.23	OIL PROBLEMS
		4	25	01/08/2015	03/08/2015	55.72	OIL PROBLEMS
		4	25	05/08/2015	07/08/2015	48.13	OIL PROBLEMS
		4	25	26/07/2015	31/07/2015	133.25	OIL PROBLEMS
		4	25	20/04/2015	29/04/2015	199.67	GOVERNOR SYSTM
		4	25	08/04/2015	11/04/2015	55.72	GOVERNOR SYSTM
		4	25	03/05/2015	07/05/2015	95.48	GOVERNOR SYSTM
		4	25	12/04/2015	13/04/2015	26.8	GOVERNOR SYSTM
		4	25	01/05/2015	02/05/2015	24.7	GOVERNOR SYSTM
86	PALLIVASAL HPS.	3	5	25/03/2016	31/03/2016	125.53	GOVERNOR SYSTM
87	PORINGALKUTTU HPS.	2	8	24/09/2015	27/09/2015	56.65	EXCITATION OTHERS
		2	8	21/08/2015	24/08/2015	60.43	ABNORMAL SOUND
		2	8	20/08/2015	21/08/2015	34.78	ABNORMAL SOUND
		2	8	28/07/2015	29/07/2015	26.33	DESILTING SYSTEM
		2	8	24/08/2015	31/08/2015	175.5	LGB ALIGNMENT/MISC
		3	8	27/07/2015	28/07/2015	28.57	DESILTING SYSTEM
		4	8	03/03/2016	23/03/2016	481.27	EHG/GOV. FAULTS, MISC.

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	8	05/09/2015	22/09/2015	413.72	EXCITATION OTHERS
88	SABARIGIRI HPS.	1	50	04/05/2015	06/05/2015	57.23	PENSTOCK
		1	50	17/07/2015	19/07/2015	42.75	PROTECTION OPERATION
		1	50	20/05/2015	22/05/2015	57.85	ALIGNMENT
		2	50	04/05/2015	06/05/2015	57.77	PENSTOCK
		3	50	18/07/2015	19/07/2015	24.43	EHG/GOV. FAULTS, MISC.
		3	50	10/01/2016	11/01/2016	28.95	MISCELLANEOUS
		3	50	04/05/2015	07/05/2015	64.12	PENSTOCK
		4	50	04/05/2015	07/05/2015	64.32	PENSTOCK
		4	50	03/06/2015	06/06/2015	62.47	PROTECTION OPERATION
		4	50	14/01/2016	16/01/2016	54.05	NEEDLE PROBLEM
		4	50	07/06/2015	10/06/2015	78.27	NEEDLE PROBLEM
		4	50	17/05/2015	19/05/2015	37.1	LT AC PANELS
		5	50	30/05/2015	31/05/2015	25.88	GOVERNOR SYSTM
		5	50	02/02/2016	06/02/2016	93.85	SHAFT VIBRS./ALIGNM/SOUND
		5	50	13/01/2016	14/01/2016	31.32	SHAFT VIBRS./ALIGNM/SOUND
		6	50	04/05/2015	06/05/2015	59.17	PENSTOCK
89	SENGULAM HPS.	1	12	09/06/2015	12/06/2015	68.3	FORCED OUTAGE
		1	12	14/05/2015	18/05/2015	102.18	PENSTOCK
		2	12	18/08/2015	21/08/2015	67	FORCED OUTAGE
		2	12	15/08/2015	18/08/2015	71.87	SHAFT VIBRS./ALIGNM/SOUND
		2	12	19/03/2016	20/03/2016	26.25	FORCED OUTAGE
90	SHOLAYAR HPS.	1	18	03/03/2016	10/03/2016	186.37	EXCITATION PROBLEMS
		1	18	05/07/2015	09/07/2015	105.67	INTAKE STRICT./TRASH RACK
		2	18	10/02/2016	12/02/2016	58.22	PENSTOCK
		3	18	05/07/2015	09/07/2015	106.08	INTAKE STRICT./TRASH RACK
		3	18	17/02/2016	29/02/2016	290.4	GENERATOR FAULTS
		3	18	08/05/2015	19/05/2015	269.78	OIL PROBLEMS
TNGDCL							
91	ALIYAR HPS.	1	60	17/12/2015	19/12/2015	38.35	OTHER (D/T,GUIDE/STAY VANES
92	BHAWANI BARRAGE-II HPS	1	15	03/12/2015	26/12/2015	561.58	SHEAR PIN
		2	15	29/02/2016	02/03/2016	42.32	SHAFT SEAL
		2	15	02/01/2016	20/01/2016	435.92	SHAFT SEAL
		2	15	23/11/2015	28/11/2015	119.58	TURBINE
93	BHAWANI KATTAL	1	15	11/05/2015	21/05/2015	245.33	SERVO MOTORS
		2	15	29/06/2015	13/07/2015	341.33	SERVO MOTORS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
94	KADAMPARI HPS.	1	100	10/10/2015	22/11/2015	1051.92	GENERATOR FAULTS
		1	100	01/02/2016	02/02/2016	36	GENERATOR FAULTS
		2	100	26/06/2015	30/06/2015	110.23	GENERATOR FAULTS
		4	100	01/04/2015	22/11/2015	5647.58	GENERATOR FAULTS
95	KODAYAR HPS.	1	60	04/06/2015	28/07/2015	1306.52	GENERATOR FAULTS
96	KUNDAH HPS.	11	60	04/07/2015	05/07/2015	37	SWITCHYARD MISC.
		15	20	01/04/2015	15/04/2015	351.5	OTHERS
		15	20	26/04/2015	21/05/2015	617	EHG/GOV. FAULTS, MISC.
		15	20	15/07/2015	21/07/2015	150	OTHER (D/T, GUIDE/STAY VANES
		15	20	15/04/2015	25/04/2015	240.98	OTHER (D/T, GUIDE/STAY VANES
		5	35	18/09/2015	24/09/2015	142.42	PENSTOCK
		7	35	24/07/2015	25/07/2015	24.55	PENSTOCK
		7	35	20/08/2015	22/08/2015	35	EHG/GOV. FAULTS, MISC.
		8	35	14/07/2015	16/07/2015	54.83	PENSTOCK
		9	60	21/04/2015	22/04/2015	29.2	GOVERNOR SYSTM
97	LOWER METTUR HPS.	1	15	01/08/2015	05/08/2015	90.58	GENERATOR FAULTS
		2	15	11/09/2015	30/09/2015	479.82	GENERATOR FAULTS
		2	15	01/07/2015	03/07/2015	61.58	BRAKE AND JACKS
		6	15	04/11/2015	06/11/2015	48.42	BRAKE AND JACKS
98	MOYAR HPS	1	12	08/11/2015	13/11/2015	129.92	GENRATOR OTHERS
		3	12	26/04/2015	28/04/2015	60.5	SHAFT VIBRS./ALIGNM/SOUND
		3	12	28/04/2015	30/04/2015	57.58	SHAFT VIBRS./ALIGNM/SOUND
		3	12	03/09/2015	06/09/2015	79.08	RUNNER/UNDER WATER PARTS
		3	12	28/09/2015	07/10/2015	226.08	RUNNER/UNDER WATER PARTS
		3	12	07/07/2015	09/07/2015	50.17	ALIGNMENT
		3	12	14/07/2015	17/07/2015	81	ALIGNMENT
		3	12	23/07/2015	01/08/2015	216	ALIGNMENT
		3	12	01/04/2015	10/04/2015	230	PADS
		3	12	16/04/2015	25/04/2015	229.23	PADS
99	PAPANASAM HPS.	4	8	23/09/2015	26/09/2015	70.42	BUS PROTECTION TRIP
100	PARSON'S VALLEY HPS.	1	30	15/07/2015	16/07/2015	31.33	AUTO. VOLTAGE REGULATOR
		1	30	20/06/2015	30/06/2015	261.58	OTHERS
		1	30	01/04/2015	03/04/2015	59.17	PADS
		1	30	13/07/2015	14/07/2015	36	AUTO. VOLTAGE REGULATOR
		1	30	01/07/2015	03/07/2015	66	AUTO. VOLTAGE REGULATOR

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
101	PERIYAR HPS.	1	35	16/01/2016	31/01/2016	383.98	GOVERNOR SYSTM
		1	35	16/02/2016	22/02/2016	141.75	GOVERNOR SYSTM
		2	35	07/09/2015	18/09/2015	272.67	ROTOR
		3	35	21/02/2016	28/02/2016	159.07	GENERATOR FAULTS
102	PYKARA HPS.	1	7	13/12/2015	15/12/2015	50.67	PENSTOCK
		2	7	06/10/2015	09/10/2015	68.67	PENSTOCK
		3	7	22/10/2015	25/10/2015	76.17	PENSTOCK
		5	13.6	06/10/2015	09/10/2015	75	PENSTOCK
		5	13.6	22/10/2015	25/10/2015	76.17	PENSTOCK
103	PYKARA ULTMATE HPS.	2	50	18/06/2015	25/07/2015	895.3	OTHER (D/T,GUIDE/STAY VANES
		2	50	05/08/2015	06/08/2015	28.82	ALIGNMENT
		2	50	01/04/2015	25/04/2015	599.98	NEEDLE PROBLEM
		2	50	26/04/2015	26/05/2015	732.25	EXCITATION OTHERS
104	SARKARPATHY HPS.	1	30	29/09/2015	30/09/2015	33.3	PENSTOCK
		1	30	18/03/2016	20/03/2016	42.98	COOLING WATER SYSTEM
105	SHOLAYAR HPS.	1	35	20/09/2015	25/09/2015	129	PENSTOCK
		1	35	12/09/2015	20/09/2015	189.72	PENSTOCK
		1	35	12/08/2015	16/08/2015	106.32	PENSTOCK
		2	35	17/08/2015	20/08/2015	66.58	OTHER (D/T,GUIDE/STAY VANES
		2	35	17/07/2015	20/07/2015	66.58	OTHER (D/T,GUIDE/STAY VANES
		2	35	20/06/2015	30/06/2015	246.92	OTHER (D/T,GUIDE/STAY VANES
106	SURULIYAR HPS.	1	35	24/03/2016	28/03/2016	82.8	PENSTOCK
TSGENCO							
107	LOWER SILERU HPS	2	115	11/02/2016	27/02/2016	380.33	GEN./TR.BREAKER
		2	115	07/04/2015	01/05/2015	575.83	VIBRATION/SOUND/ ALIGNMENT
		3	115	07/04/2015	20/11/2015	5453	VIBRATION/SOUND/ ALIGNMENT
		3	115	05/03/2016	19/03/2016	323.17	PENSTOCK
		4	115	01/02/2016	03/02/2016	66.17	LGB ALIGNMENT/MISC
		4	115	07/04/2015	03/05/2015	623.83	VIBRATION/SOUND/ ALIGNMENT
		4	115	07/08/2015	31/08/2015	586.58	ROTOR
		4	115	30/01/2016	31/01/2016	38.73	SHAFT SEAL
108	NAGARJUN SGR HPS	1	110	20/11/2015	27/11/2015	179.73	PROTECTION OPERATION
		1	110	01/04/2015	10/06/2015	1695.32	INTAKE STRICT./TRASH RACK
		2	100.8	01/04/2015	28/05/2015	1385.17	INTAKE STRICT./TRASH RACK
		3	100.8	01/04/2015	26/05/2015	1336.22	INTAKE STRICT./TRASH RACK
		4	100.8	01/04/2015	26/05/2015	1342.33	INTAKE STRICT./TRASH RACK
		5	100.8	11/01/2016	18/01/2016	180.3	GEN./TR.BREAKER

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
109	SRISAILAM LB HPS	1	150	29/04/2015	30/05/2015	737.83	HRI/HRC/SURGF SHAFT PROPS
		2	150	29/04/2015	30/05/2015	737.83	HRI/HRC/SURGF SHAFT PROPS
		4	150	29/04/2015	30/05/2015	737.83	HRI/HRC/SURGF SHAFT PROPS
		5	150	01/04/2015	02/06/2015	1498.5	PROTECTION OPERATION
		5	150	01/01/2016	05/01/2016	90.6	GEN./TR.BREAKER
		6	150	29/04/2015	30/05/2015	737.83	HRI/HRC/SURGF SHAFT PROPS
EASTERN REGION							
DVC							
110	MAITHON HPS.	1	23.2	23/11/2015	24/11/2015	25	BRAKE AND JACKS
		1	23.2	29/10/2015	30/10/2015	29	BRAKE AND JACKS
		1	23.2	19/01/2016	26/01/2016	168.58	COOLING WATER SYSTEM
		1	23.2	30/05/2015	08/06/2015	210	DRAINAGE DEWATERING SYSTEM
		2	20	16/01/2016	18/01/2016	46.83	MISCELLANEOUS
		2	20	15/10/2015	28/10/2015	305	EHG/GOV. FAULTS, MISC.
		2	20	15/01/2016	16/01/2016	25.33	MISCELLANEOUS
		2	20	06/11/2015	30/11/2015	565.65	EXCITATION OTHERS
		3	20	20/07/2015	30/07/2015	248.72	EHG/GOV. FAULTS, MISC.
		3	20	30/05/2015	31/05/2015	28.98	DRAINAGE DEWATERING SYSTEM
		3	20	16/01/2016	18/01/2016	52.33	MISCELLANEOUS
		3	20	01/06/2015	08/06/2015	181	DRAINAGE DEWATERING SYSTEM
		3	20	04/08/2015	23/08/2015	461.6	EXCITATION PROBLEMS
111	PANCHET HPS.	1	40	04/08/2015	07/08/2015	72.5	EHT/ISOLATOR
		1	40	13/07/2015	26/07/2015	313.5	EHT/CT/PT
		2	40	04/08/2015	08/08/2015	95.68	INTAKE STRICT./TRASH RACK
GISL							
112	CHUZACHEN HPS	1	49.5	30/05/2015	08/06/2015	235.3	INTAKE STRICT./TRASH RACK
		1	49.5	11/06/2015	12/06/2015	32.3	INTAKE STRICT./TRASH RACK
		1	49.5	26/05/2015	29/05/2015	95.7	INTAKE STRICT./TRASH RACK
		2	49.5	08/06/2015	11/06/2015	70.87	INTAKE STRICT./TRASH RACK
		2	49.5	12/06/2015	14/06/2015	36.27	INTAKE STRICT./TRASH RACK
		2	49.5	20/06/2015	24/06/2015	87.95	INTAKE STRICT./TRASH RACK
		2	49.5	01/06/2015	08/06/2015	179.55	INTAKE STRICT./TRASH RACK
JUUNL							
113	SUBERNREKHA HPS.	1	65	09/05/2015	11/05/2015	43.92	GENERATOR FAULTS
NHPC							
114	TEESTA LOW DAM-III HPS	2	33	22/03/2016	31/03/2016	192.03	PROTECTION OPERATION

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
115	TEESTA V HPS	1	170	12/06/2015	14/06/2015	47.87	MISCELLANEOUS
		1	170	28/05/2015	29/05/2015	39.85	MISCELLANEOUS
		1	170	04/12/2015	06/12/2015	41.75	PROTECTION OPERATION
		2	170	28/05/2015	29/05/2015	38.93	MISCELLANEOUS
		2	170	12/06/2015	14/06/2015	47.85	MISCELLANEOUS
		2	170	06/08/2015	08/08/2015	39.57	MISCELLANEOUS
		3	170	27/05/2015	09/06/2015	326.77	TURBINE OTHERS
		3	170	29/09/2015	01/10/2015	40.05	MISCELLANEOUS
OHPC							
116	BALIMELA HPS.	3	60	28/03/2016	31/03/2016	62	OIL PROBLEMS
		3	60	17/11/2015	21/11/2015	97.25	ALIGNMENT
		3	60	26/06/2015	14/11/2015	3383.92	PENSTOCK
		4	60	02/12/2015	03/12/2015	32.22	PENSTOCK
		7	75	26/06/2015	06/11/2015	3182.87	PENSTOCK
117	HIRAKUD HPS	1	49.5	04/11/2015	05/11/2015	32	PENSTOCK
		1	49.5	28/01/2016	16/02/2016	458.5	BRAKE AND JACKS
		1	49.5	10/11/2015	12/11/2015	45.17	PENSTOCK
		1	49.5	18/02/2016	25/02/2016	162.17	EHG/GOV. FAULTS, MISC.
		1	49.5	01/03/2016	02/03/2016	40.92	EHG/GOV. FAULTS, MISC.
		1	49.5	29/10/2015	30/10/2015	25.5	EXCITATION PROBLEMS
		1	49.5	05/03/2016	31/03/2016	606.83	EHG/GOV. FAULTS, MISC.
		2	49.5	30/08/2015	01/09/2015	45.92	GUIDE VANES
		2	49.5	23/09/2015	24/09/2015	34.5	GUIDE VANES
		2	49.5	18/10/2015	30/10/2015	283.5	EXCITATION PROBLEMS
		2	49.5	01/09/2015	12/09/2015	263.75	GUIDE VANES
		2	49.5	10/08/2015	30/08/2015	487.67	OIL PROBLEMS
		2	49.5	10/11/2015	12/11/2015	45.17	PENSTOCK
		3	32	21/10/2015	23/10/2015	55.83	EXCITATION PROBLEMS
		3	32	02/06/2015	05/06/2015	68.08	SHEAR PIN
		3	32	10/09/2015	21/09/2015	273.58	GUIDE VANES
		3	32	21/09/2015	24/09/2015	69.08	MISCELLANEOUS
		3	32	25/10/2015	02/11/2015	192.83	MISCELLANEOUS
		4	32	21/09/2015	22/09/2015	39.5	PENSTOCK
		4	32	22/09/2015	08/10/2015	386.42	MISCELLANEOUS
		4	32	14/07/2015	15/07/2015	35.33	THRUST BEARING
		5	37.5	10/08/2015	14/08/2015	94	GUIDE VANES
		5	37.5	21/06/2015	24/06/2015	65.67	OTHER EQUIPMENT FAULTS

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	37.5	10/11/2015	12/11/2015	45.17	PENSTOCK
		5	37.5	28/10/2015	30/10/2015	48.42	EXCITATION PROBLEMS
		5	37.5	15/09/2015	18/09/2015	67.17	GUIDE VANES
		6	37.5	01/04/2015	16/10/2015	4761	TURBINE OTHERS
		7	37.5	10/08/2015	12/08/2015	62.17	GUIDE VANES
		9	24	23/05/2015	14/06/2015	519.58	TRANSFORMER PROTECTION
118	MACHKUND HPS	1	17	01/04/2015	07/04/2015	153.83	OTHERS
		2	17	09/09/2015	16/09/2015	175.67	PROTECTION OPERATION
		2	17	28/07/2015	31/07/2015	84.48	TRANSFORMER PROTECTION
		2	17	16/09/2015	18/09/2015	44.5	DRAINAGE DEWATERING SYSTEM
		3	17	18/06/2015	27/11/2015	3903.75	GENERATOR FAULTS
		3	17	14/06/2015	15/06/2015	27.75	PROTECTION OPERATION
		3	17	01/04/2015	07/04/2015	164.25	OTHERS
		4	21.25	05/03/2016	10/03/2016	129.33	PENSTOCK
		4	21.25	09/05/2015	10/05/2015	29.42	GOVERNOR SYSTM
		4	21.25	25/09/2015	01/02/2016	3106.67	DRAINAGE DEWATERING SYSTEM
		4	21.25	03/07/2015	04/07/2015	35.58	COOLING WATER SYSTEM
		4	21.25	20/06/2015	22/06/2015	61.25	SHAFT SEAL
		5	21.25	23/09/2015	24/09/2015	25.12	OTHERS
		6	21.25	01/04/2015	10/10/2015	4620.25	U.A.T
		6	21.25	25/11/2015	31/03/2016	3044.42	GENERATOR FAULTS
119	RENGALI HPS.	1	50	28/10/2015	07/11/2015	245.48	EHG/GOV. FAULTS, MISC.
		1	50	10/06/2015	17/06/2015	166	EHG/GOV. FAULTS, MISC.
		2	50	10/06/2015	24/06/2015	343	GEN./TR.BREAKER
		3	50	14/03/2016	15/03/2016	24.33	UPPER GUIDE BEARING
		3	50	10/06/2015	12/06/2015	53.08	MISCELLANEOUS
		3	50	01/08/2015	04/08/2015	83.58	DESILTING SYSTEM
		4	50	10/06/2015	24/06/2015	335	MISCELLANEOUS
		4	50	03/07/2015	07/07/2015	92.92	AUTO. VOLTAGE REGULATOR
		5	50	10/06/2015	13/06/2015	72	MISCELLANEOUS
		5	50	17/05/2015	25/05/2015	187.53	DESILTING SYSTEM
120	UPPER KOLAB HPS.	2	80	20/07/2015	21/07/2015	26.85	GUIDE VANES
		3	80	25/04/2015	20/05/2015	593	GENERATOR FAULTS
		3	80	10/09/2015	11/09/2015	30.75	OIL PROBLEMS
		4	80	06/01/2016	08/01/2016	50.75	THRUST BEARING
		4	80	29/05/2015	30/05/2015	24.58	SHEAR PIN

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	80	25/05/2015	26/05/2015	26.83	PENSTOCK
		4	80	16/04/2015	18/04/2015	42	NEEDLE PROBLEM
WBSEDCL							
121	JALDHAKA HPS ST-I	1	9	01/04/2015	09/08/2015	3134.08	OTHERS
		2	9	16/07/2015	19/07/2015	77.53	MISCELLANEOUS
		2	9	09/07/2015	11/07/2015	44.83	MISCELLANEOUS
		2	9	04/07/2015	08/07/2015	92.42	MISCELLANEOUS
		2	9	30/06/2015	04/07/2015	88.93	MISCELLANEOUS
		2	9	15/05/2015	16/05/2015	25.83	MISCELLANEOUS
		2	9	24/04/2015	25/04/2015	26.92	MISCELLANEOUS
		2	9	05/09/2015	25/09/2015	470.92	MISCELLANEOUS
		2	9	02/09/2015	04/09/2015	39.8	MISCELLANEOUS
		2	9	23/07/2015	26/07/2015	85.47	MISCELLANEOUS
		3	9	27/08/2015	28/08/2015	36.92	MISCELLANEOUS
		3	9	01/07/2015	11/07/2015	254.33	MISCELLANEOUS
		3	9	01/09/2015	04/09/2015	78.58	MISCELLANEOUS
		3	9	23/07/2015	31/07/2015	213.78	MISCELLANEOUS
		3	9	01/06/2015	03/06/2015	44	MISCELLANEOUS
		3	9	15/05/2015	16/05/2015	26.25	MISCELLANEOUS
		3	9	24/04/2015	25/04/2015	26.83	HRI/HRC/SURGF SHAFT PROPS
		3	9	01/08/2015	20/08/2015	468.98	OTHERS
		3	9	11/07/2015	18/07/2015	167.33	SHAFT SEAL
		3	9	20/11/2015	21/11/2015	36.65	MISCELLANEOUS
		3	9	20/08/2015	21/08/2015	26.85	GOVERNOR SYSTM
122	PURULIA PSS HPS.	2	225	01/04/2015	08/12/2015	6043.5	GENERATOR FAULTS
		4	225	12/04/2015	20/06/2015	1658.38	GENERATOR FAULTS
NORTH EASTERN REGION							
MePGCL							
123	KYRDEMKULAI HPS.	2	30	19/02/2016	20/02/2016	37	GUIDE VANES
124	MYNTDU(LESHKA) St-I HPS	1	42	08/04/2015	11/04/2015	81	EHG/GOV. FAULTS, MISC.
125	UMIAM HPS ST-I	2	9	04/01/2016	05/01/2016	34.5	LOWER GUIDE BEARING
		3	9	19/06/2015	20/06/2015	34	OTHER (D/T,GUIDE/STAY VANES
		4	9	19/03/2016	22/03/2016	68.58	OIL PROBLEMS
		4	9	19/06/2015	20/06/2015	34	OTHER (D/T,GUIDE/STAY VANES
126	UMIAM HPS ST-IV	7	30	22/05/2015	23/05/2015	42.75	SERVO MOTORS
		7	30	01/09/2015	02/09/2015	30	THRUST BEARING PADS.
		8	30	02/07/2015	03/07/2015	32.8	EHG/GOV. FAULTS, MISC.

**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2015-2016
(OUTAGE DURATION 24 HOURS AND ABOVE)**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		8	30	09/04/2015	11/04/2015	56.58	VIBRATION/SOUND/ ALIGNMENT
NEEPCO.							
127	KHONDONG HPS.	2	25	20/01/2016	22/01/2016	43.25	ROTOR
128	KOPILI HPS.	1	50	19/06/2015	23/06/2015	80.32	GOVERNOR SYSTM
		1	50	14/02/2016	18/02/2016	103	PENSTOCK
		1	50	25/02/2016	31/03/2016	824.95	MISCELLANEOUS
		1	50	01/09/2015	07/10/2015	870.45	MISCELLANEOUS
		2	50	01/09/2015	07/10/2015	869.23	MISCELLANEOUS
		2	50	25/02/2016	31/03/2016	824.95	MISCELLANEOUS
		2	50	18/11/2015	20/11/2015	47.5	GENRATOR OTHERS
		2	50	02/11/2015	03/11/2015	24.07	COOLING WATER SYSTEM
		2	50	21/11/2015	23/11/2015	47.5	MISCELLANEOUS
		2	50	01/04/2015	10/05/2015	951.48	OTHER (D/T,GUIDE/STAY VANES
		3	50	20/07/2015	25/07/2015	112.98	TURBINE FAULTS
		3	50	25/02/2016	31/03/2016	824.95	MISCELLANEOUS
		3	50	01/09/2015	07/10/2015	869.85	MISCELLANEOUS
		3	50	01/04/2015	18/06/2015	1886.2	MISCELLANEOUS
		3	50	09/02/2016	13/02/2016	92	OTHER (D/T,GUIDE/STAY VANES
		3	50	14/07/2015	16/07/2015	53.47	TURBINE OTHERS
		4	50	25/02/2016	31/03/2016	824.95	MISCELLANEOUS
		4	50	18/01/2016	20/01/2016	46	OTHER (D/T,GUIDE/STAY VANES
		4	50	09/02/2016	13/02/2016	92	OTHER (D/T,GUIDE/STAY VANES
		4	50	08/11/2015	18/11/2015	244.18	FORCED OUTAGE
		4	50	01/09/2015	07/10/2015	868.7	MISCELLANEOUS
		4	50	25/11/2015	28/11/2015	74.33	FORCED OUTAGE
		4	50	01/04/2015	12/07/2015	2462.17	MISCELLANEOUS
		5	25	09/01/2016	14/01/2016	123.75	MISCELLANEOUS
		5	25	10/07/2015	11/07/2015	33.85	TURBINE OTHERS
NHPC							
129	LOKTAK HPS.	3	35	29/02/2016	02/03/2016	43.88	OTHER (D/T,GUIDE/STAY VANES

CHAPTER 6

OPERATING AVAILABILITY OF THE UNITS

CHAPTER-6

OPERATING AVAILABILITY OF HE UNITS

6.1 Based on the analysis of data received from the utilities regarding planned maintenance undertaken and forced outages occurred at 676 Hydro Generating units of 194 HE Stations comprising of 42783.42 MW, operating availability of various units and stations has been computed. During the year 2015-16, the average operating availability of hydro generating units on all India basis was 87.93% as compared to 88.49% during 2014-15.

The station wise/unit wise non-availability due to Planned Maintenance (P.M) and Forced Outages (F.O) and overall operating availability of various H.E. Stations in the country is indicated in **Annex-6.1**. Station wise details are shown in **Exhibits from 6.1 to 6.14**.

6.2 Twenty two H.E. Stations achieved operating availability of more than 99% during 2015-16. The details of these stations are given in **Table 6.1**.

TABLE 6.1

HYDRO-ELECTRIC STATIONS WITH OPERATING AVAILABILITY MORE THAN 99% DURING 2015-16

Sl. No.	NAME OF POWER STATION	UTILITY	CAPACITY (MW)	OPERATING AVAILABILITY (%)
1	BAGLIHAR II	JKSPDC	450	100.00
2	NAGARJUN SGR RBC	APGENCO	60.00	100.00
3	NAGARJUN SGR RBC EXTN	APGENCO	30.00	100.00
4	POCHAMPAD	TSGENCO	27.00	100.00
5	LOWER JURALA	TSGENCO	160	100.00
6	BHANDARDHARA ST-II	DLHP	34.00	99.99
7	KOYNA DPH	MAHAGENCO	36.00	99.97
8	MUKERIAN-II	PSPCL	45.00	99.94
9	TILLARI	MAHAGENCO	60.00	99.94
10	NATHPA JHAKRI	SJVN	1500.00	99.92
11	TEESTA LOW DAM-IV	NHPC	80.00	99.87
12	JORETHANG LOOP	DEPL	96.00	99.85
13	MUKERIAN-IV	PSPCL	58.50	99.79
14	BHAKRA RIGHT	BBMB	785.00	99.78

Sl. No.	NAME OF POWER STATION	UTILITY	CAPACITY (MW)	OPERATING AVAILABILITY (%)
15	BHAWANI BARRAGE III	TANGEDCO	30.00	99.48
16	SUBERNREKHA - I	JUUVN	65.00	99.48
17	PONG	BBMB	396.00	99.37
18	SRISAILAM	APGENCO	770.00	99.28
19	BHIRA	TPCL	150.00	99.22
20	KARCHAM WANGTOO	HBPCL	1000.00	99.17
21	PRIYADARSHNI JURALA	TSGENCO	234.00	99.13
22	BARGI HPS	MPPGCL	90.00	99.03

6.3 OPERATING AVAILABILITY – REGION-WISE

Region-wise operating availability of hydro-electric units during 2015-16 is indicated in **Table 6.2**.

TABLE 6.2
AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2015-16

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE %	FORCED OUTAGE %	OPERATING AVAILABILITY (%)
1	NORTHERN	234	18302.27	8.70	2.60	88.70
2	WESTERN	101	7392.00	4.74	2.76	92.50
3	SOUTHERN	247	11592.45	6.55	6.68	86.77
4	EASTERN	65	4254.70	7.73	12.02	80.25
5	N- EASTERN	29	1242.00	4.26	8.75	86.99
	ALL INDIA	676	42783.42	7.21	4.86	87.93

It is seen that the operating availability of hydel generating units in Western Region was the highest (92.50%). The operating availability was the lowest in case of units in Eastern Region (80.25%), due to high forced outages.

6.4 OPERATING AVAILABILITY: AGE-WISE

The average operating availability during 2015-16 of hydro units commissioned in various years has been indicated in **Table 6.3**. It is observed that units commissioned

during 2003-04 have achieved the highest operating availability of 98.03%. Operating availability was less than 90% for the units commissioned during the period, 2013-14, 2008-09, 2007-08, 2005-06, 2002-03, and those commissioned up to 2000-2001. Operating availability was more than 90% for all the other years.

TABLE - 6.3
OPERATING AVAILABILITY - AGE-WISE
PERIOD: 2015-16

SL. NO	YEAR OF COMMISSIONING	NUMBER OF UNITS	INSTALLED CAPACITY (MW)	OPERATING AVAILABILITY (%)
1	2015-2016	17	1516.00	95.13
2	2014-2015	6	736.01	92.71
3	2013-2014	19	1058.01	70.76
4	2012-2013	14	501.00	90.05
5	2011-2012	11	1423.00	96.48
6	2010-2011	11	690.00	92.02
7	2009-2010	1	39.00	95.08
8	2008-2009	8	969.00	88.16
9	2007-2008	23	2443.00	84.39
10	2006-2007	21	2286.00	94.41
11	2005-2006	13	1340.00	89.00
12	2004-2005	13	1115.00	93.40
13	2003-2004	18	2690.00	98.03
14	2002-2003	11	740.60	88.63
15	2001-2002	20	1092.20	93.16
16	2000-2001	13	1129.00	79.50
17	1989-90 TO 1999-2000	87	5775.70	87.92
18	1978-79 TO 1988-89	124	7257.60	83.81
19	1967-68 TO 1977-78	82	5300.25	86.70
20	UP TO 1966-67	164	4682.05	84.92
	TOTAL	676	42783.42	87.93

6.5 OPERATING AVAILABILITY - UTILITY WISE

Sector wise/State Electricity Board/Power Generating Corporation wise operating availability of HE units is indicated in **Table 6.4**.

It has been observed that operating availability of generating units among the utilities was the highest (99.99%) for DLHP.

6.6 MISCELLANEOUS NON AVAILABILITY

Non-availability of hydel generating units due to reasons other than planned maintenance and forced outages of unit components, auxiliary and other equipments and civil structures has been defined as “Miscellaneous Non availability”. This may be due to shortage of water, high silt content in the river, system disturbance, low system demand, disaster/natural calamity, reserve shutdown, transmission constraints & power evacuation problems, low head or high tailrace level, strikes and other misc. reasons etc. It was highest (50.83%) in case of SJVN.

TABLE 6.4

SECTOR WISE OPERATING AVAILABILITY & MISCELLANEOUS NON-AVILABILITY OF UTILITIES FOR PERIOD: 2015-16

S. NO.	ORGANISATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AVAILABILITY PER UNIT (%)	MISC. NON AVAILABILITY (%)
CENTRAL							
1	BBMB	28	2866.30	7.19	2.50	90.31	7.82
2	DVC	5	143.20	2.94	12.51	84.55	0.00
3	NEEPCO	13	755.00	2.58	10.12	87.30	0.76
4	NHDC	16	1520.00	3.44	0.20	96.36	0.00
5	NHPC	65	5041.20	11.88	1.95	86.17	11.06
6	NTPC Ltd.	4	800.00	6.15	1.16	92.69	7.86
7	SJVNL	12	1912.02	0.29	0.59	99.12	50.83
8	THDC	8	1400.00	7.20	0.59	92.21	0.00
	SUB TOTAL	151	14437.72	7.18	2.05	90.77	12.61
STATE							
1	APGENCO	14	1100.00	0.69	0.88	98.43	8.16
2	APGCL	2	100.00	4.92	0.55	94.53	17.76
3	CSPGCL	3	120.00	0.00	15.39	84.61	0.00
4	GSECL	8	540.00	10.36	0.00	89.64	0.00
5	HPSEB	12	366.00	2.34	32.88	64.78	1.54
6	JKSPDC	12	1110.00	3.35	3.09	93.56	9.36
7	JUUNL	2	130.00	0.00	39.48	60.52	0.00

S. NO.	ORGANISATION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AV. PER UNIT (%)	MISC. NON AVAILABILITY (%)
8	KPCL	76	3657.40	7.82	5.50	86.68	5.24
9	KSEB	48	1881.50	7.88	1.60	90.52	12.54
10	AHAGENCO	24	2406.00	3.23	5.08	91.69	0.01
11	MPPGCL	23	875.00	6.67	2.95	90.38	0.96
12	MePGCL	11	282.00	6.37	11.21	82.42	3.83
13	OHPC	37	2142.25	13.13	10.84	76.03	0.00
14	PSPCL	25	1051.00	17.80	1.64	80.56	5.71
15	RRVUNL	11	411.00	13.81	6.65	79.54	12.67
16	SSNNL	11	1450.00	6.92	0.23	92.85	0.00
17	TANGEDCO	70	2182.20	9.42	7.29	83.29	0.06
18	TSGENCO	33	2656.60	3.93	13.81	82.26	8.21
19	UJVNL	34	1252.15	15.20	2.27	82.53	21.76
20	UPJVNL	15	501.60	33.38	1.26	65.36	0.59
21	WBSEDCL	11	977.00	1.11	20.78	78.11	0.66
	SUB TOTAL	482	25191.70	7.97	6.71	85.32	5.07
PRIVATE							
1	ADHPL	2	192.00	6.76	0.61	92.63	0.00
2	AHPC (GVK)	4	330.00	0.00	9.87	90.13	17.21
3	DEPL	2	96.00	0.00	0.15	99.85	0.00
4	DLHP	1	34.00	0.00	0.01	99.99	0.00
5	E.P.P.L.	2	100.00	11.48	0.00	88.52	14.07
6	GBHPPL	2	70.00	12.98	2.05	84.97	6.42
7	GISL	2	99.00	0.00	6.15	93.85	45.36
8	HBPCL	7	1300.00	0.00	1.40	98.60	0.27
9	JPPVL	4	400.00	0.00	1.37	98.63	21.31
10	MPCL	2	86.00	3.01	0.14	96.85	0.00
11	TPCL	15	447.00	1.26	7.00	91.74	0.00
	SUB TOTAL	43	3154.00	1.32	3.04	95.64	6.63
	GRAND TOTAL	676	42783.42	7.21	4.86	87.93	7.73

EXHIBIT 6.1

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16

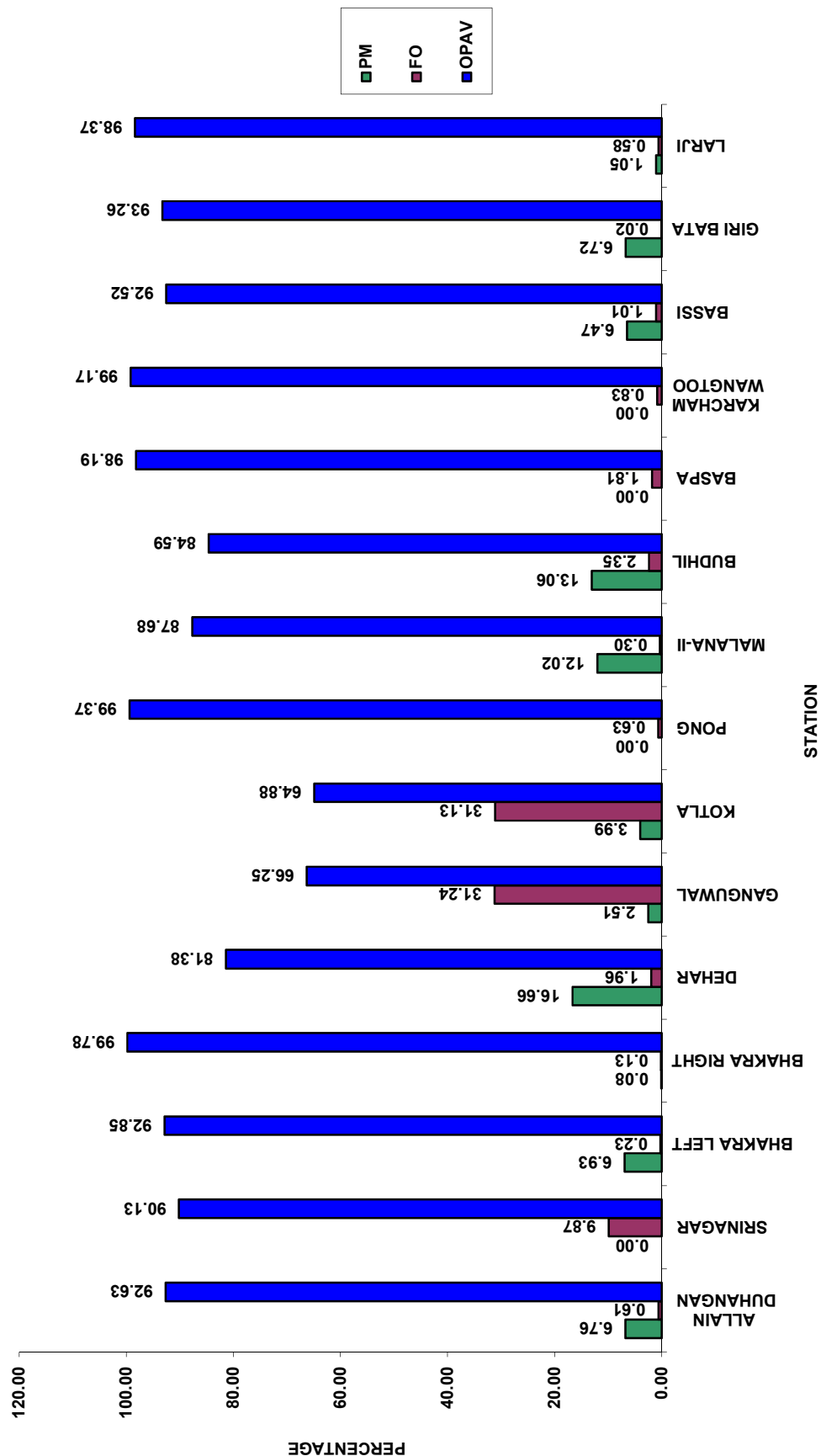


EXHIBIT 6.2

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16

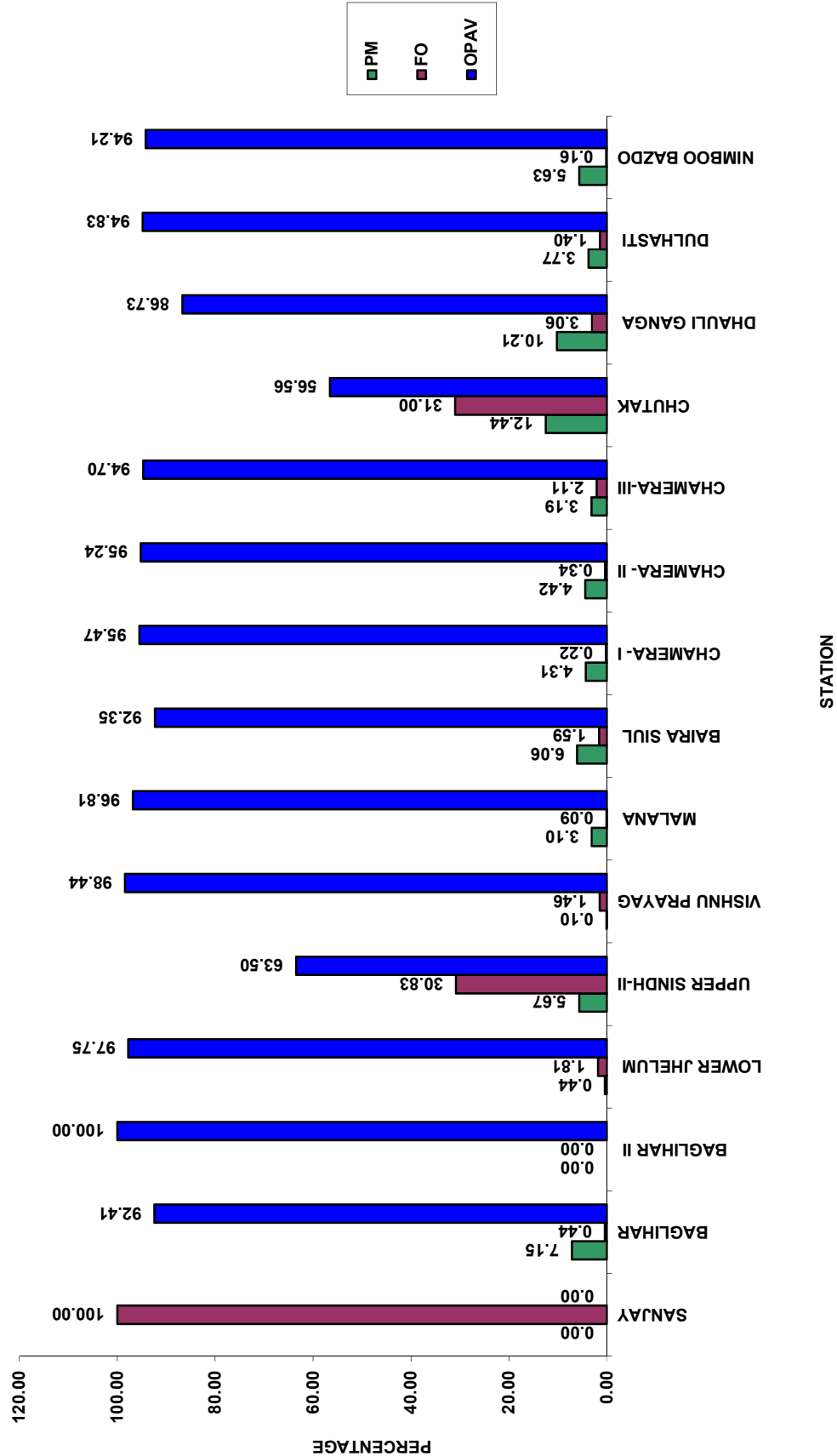


EXHIBIT 6.3

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16

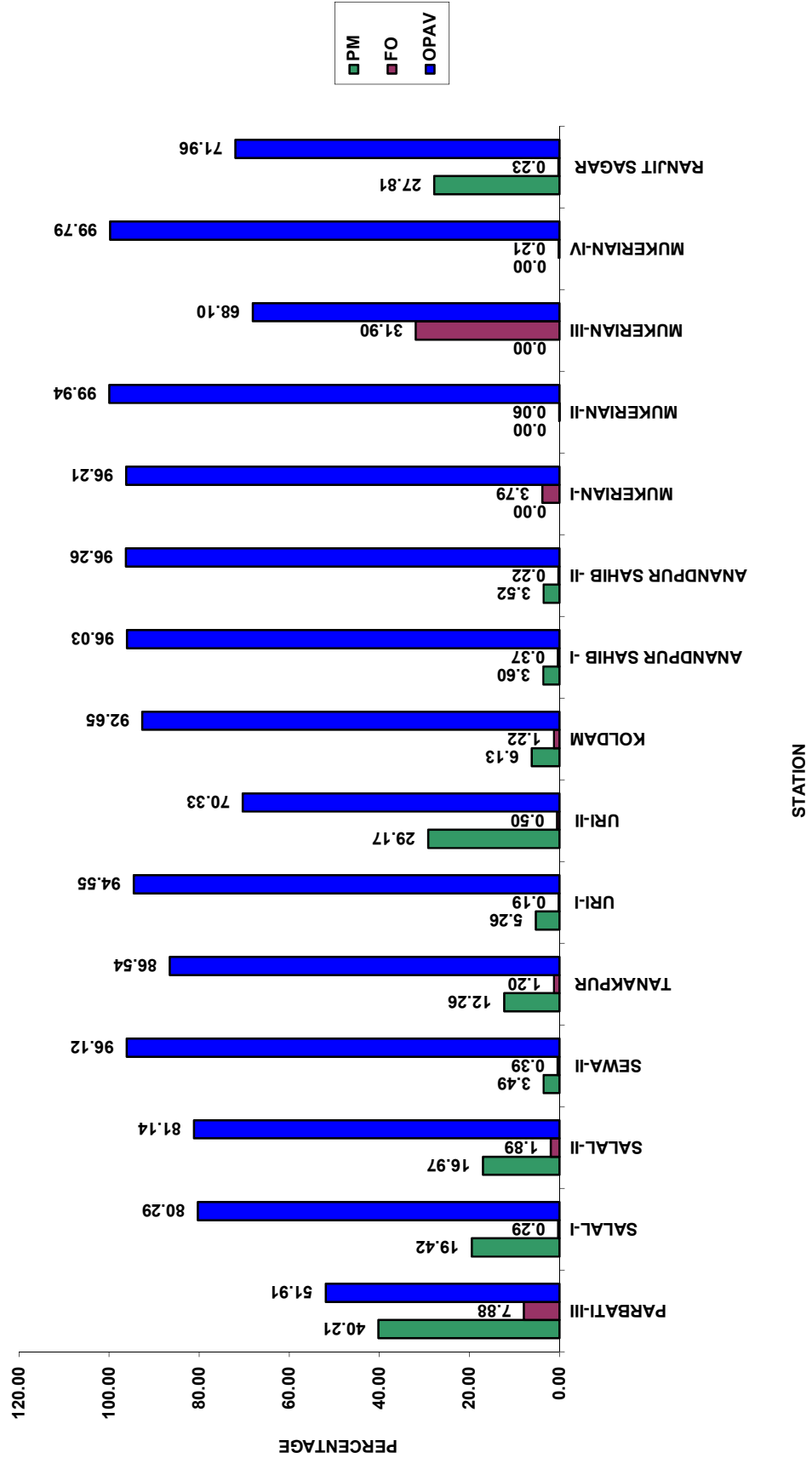


EXHIBIT 6.4

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16

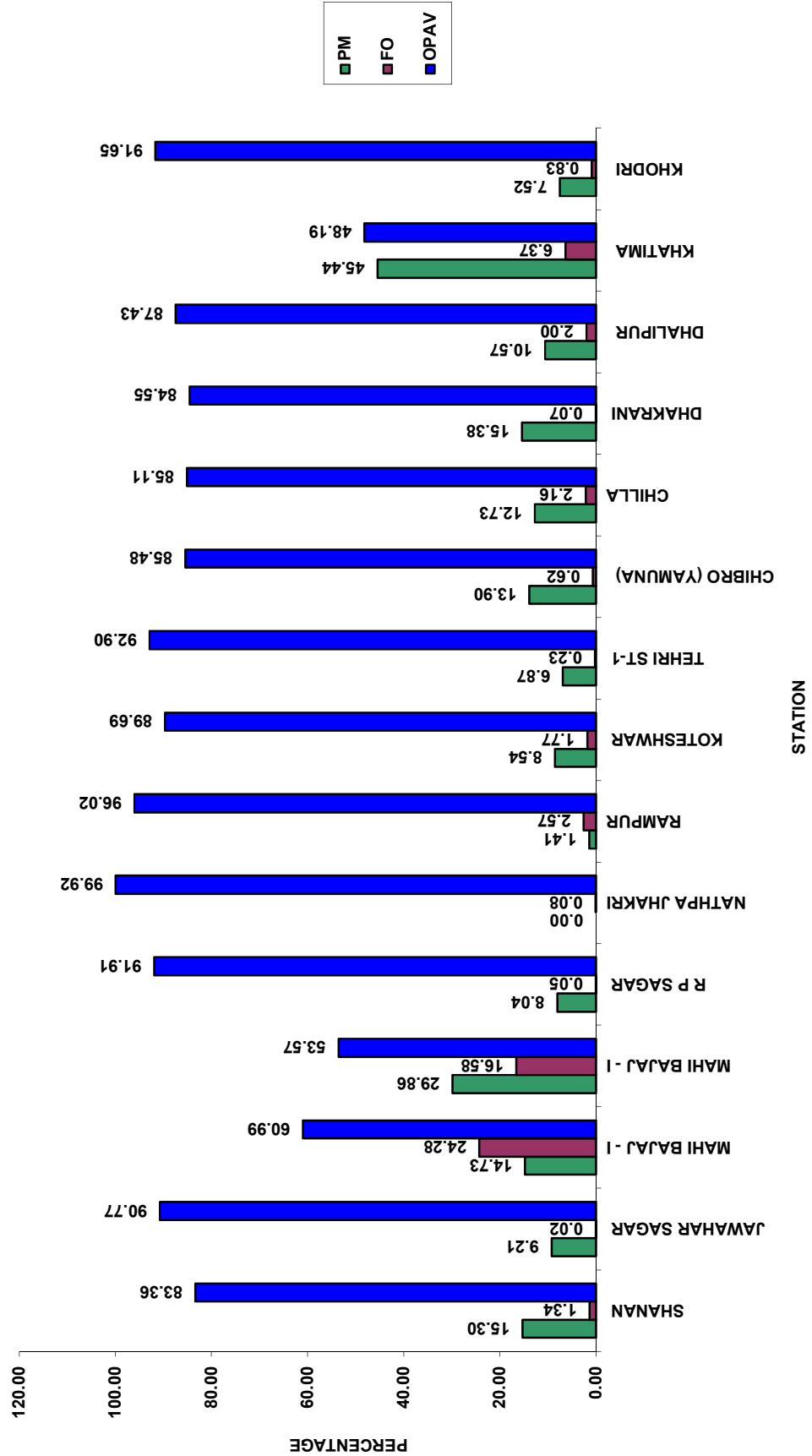


EXHIBIT 6.5

OPERATING AVAILABILITY OF H STATIONS DURING 2015-16

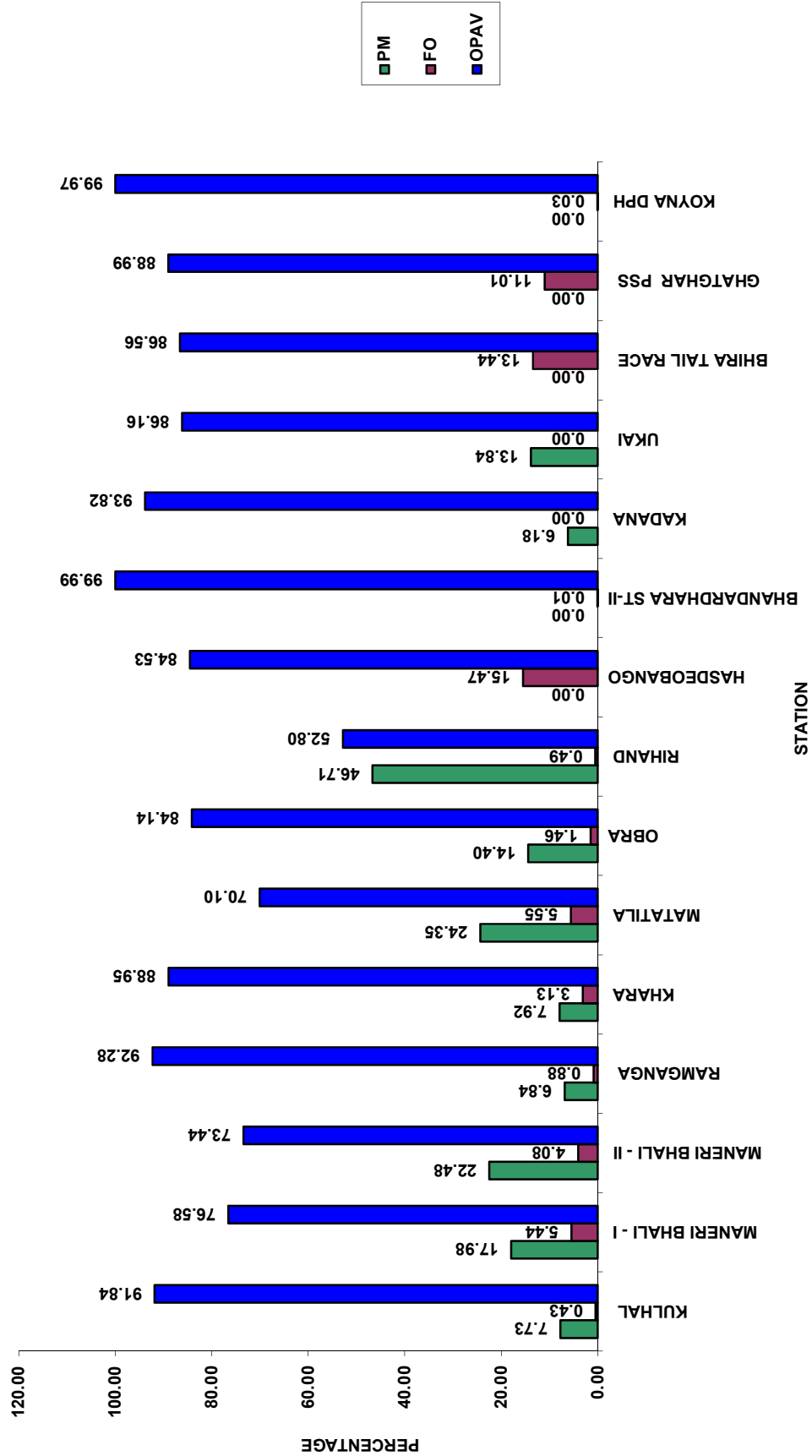


EXHIBIT 6.6

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16

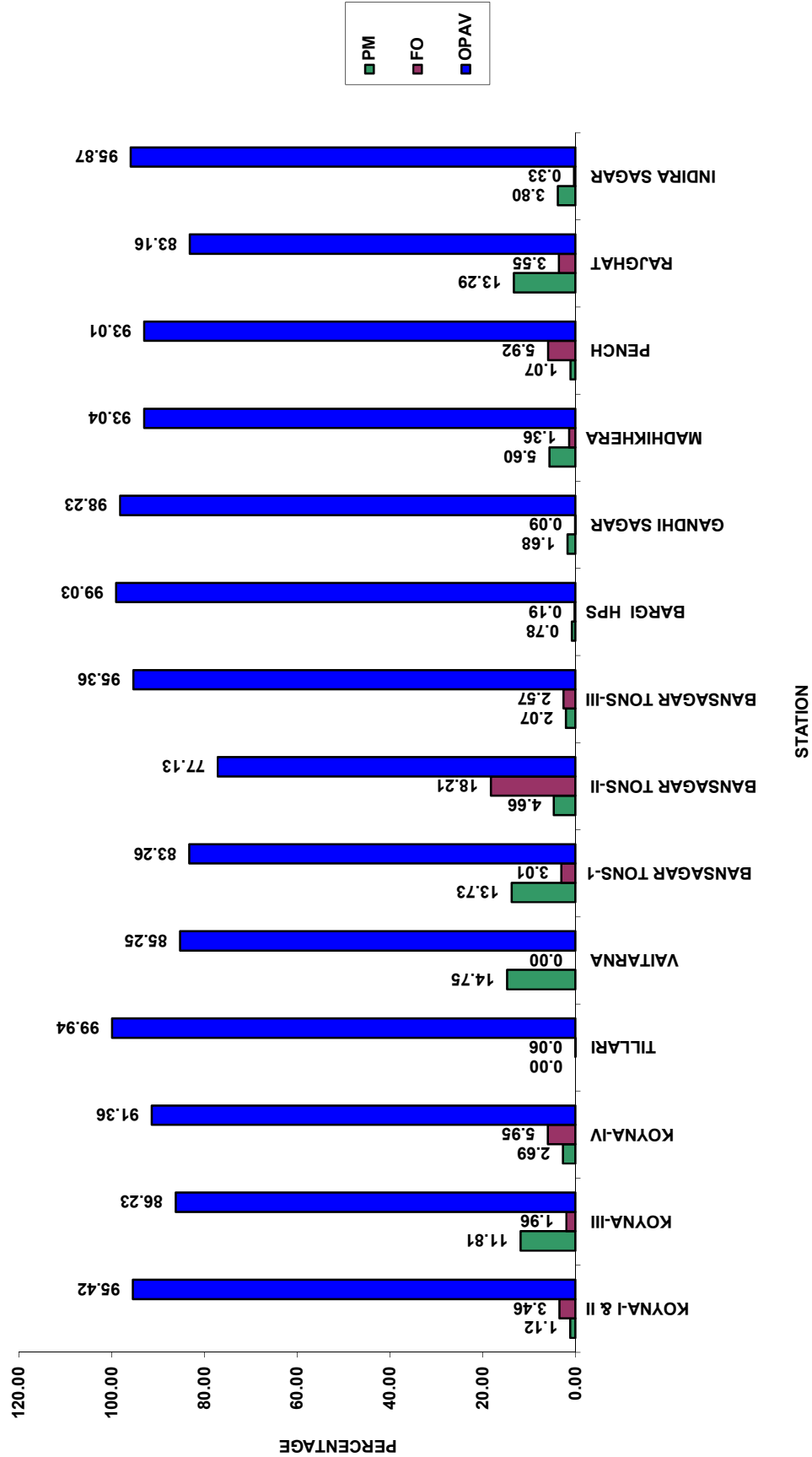
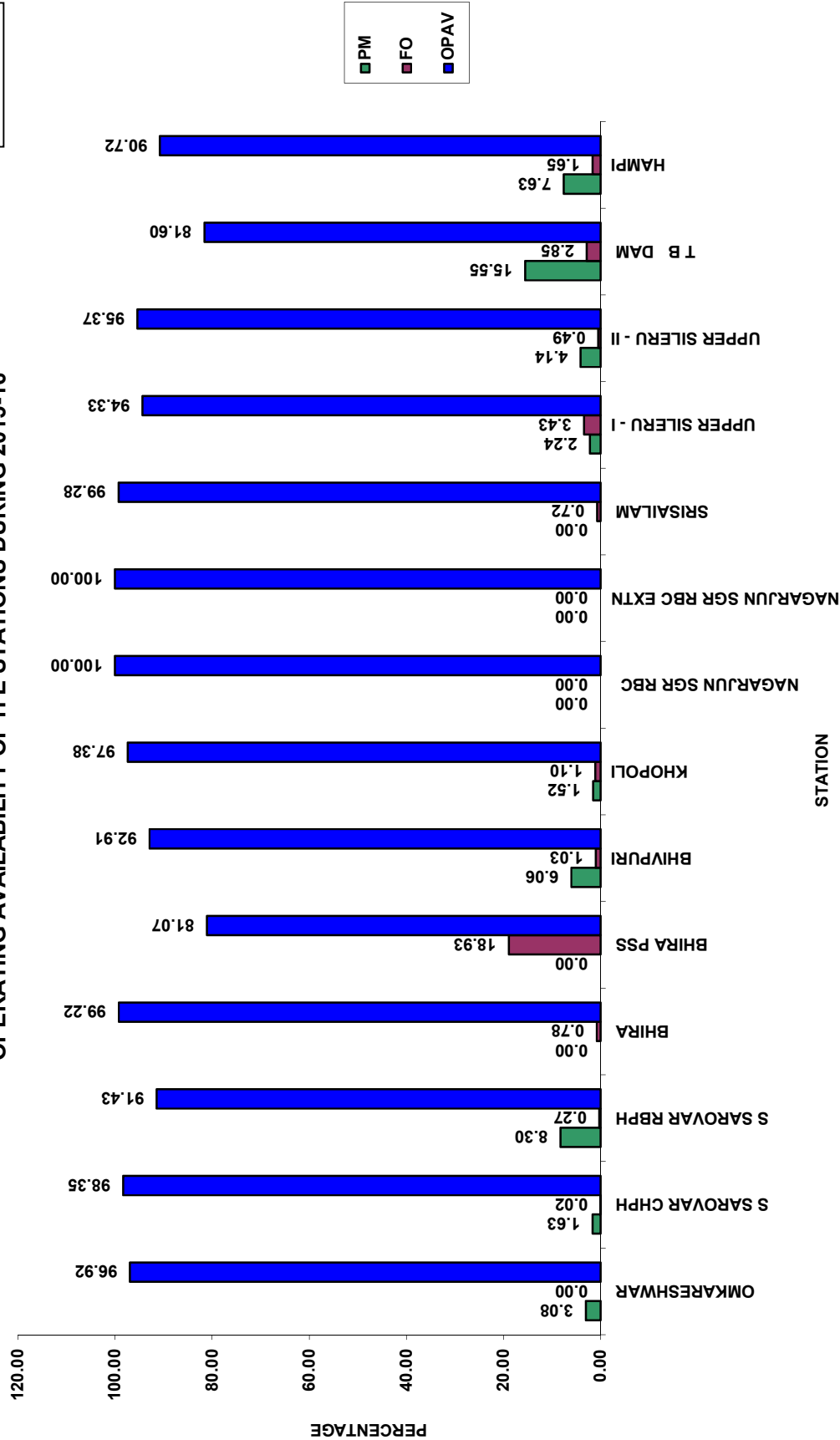


EXHIBIT 6.7

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16



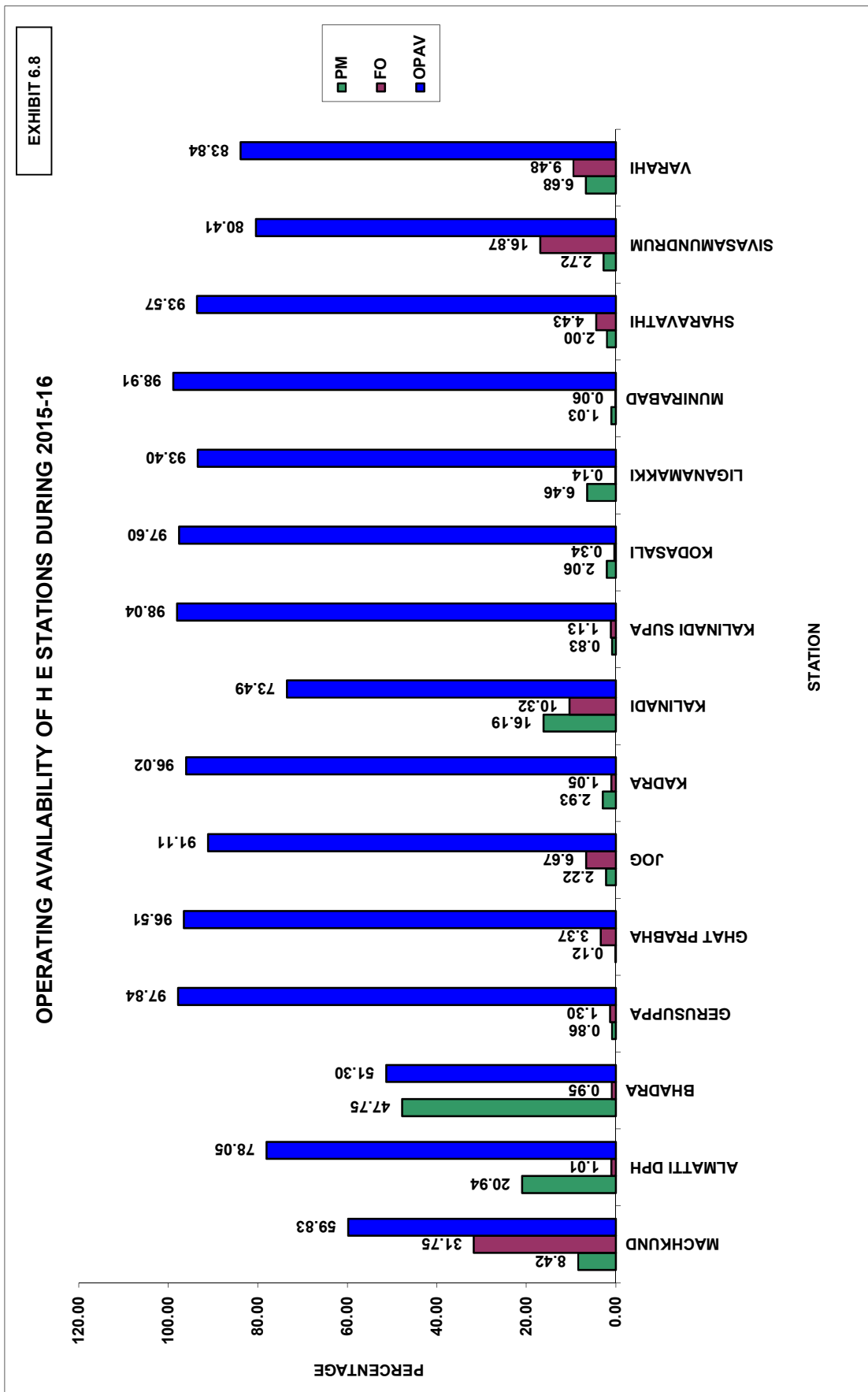


EXHIBIT 6.9

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16

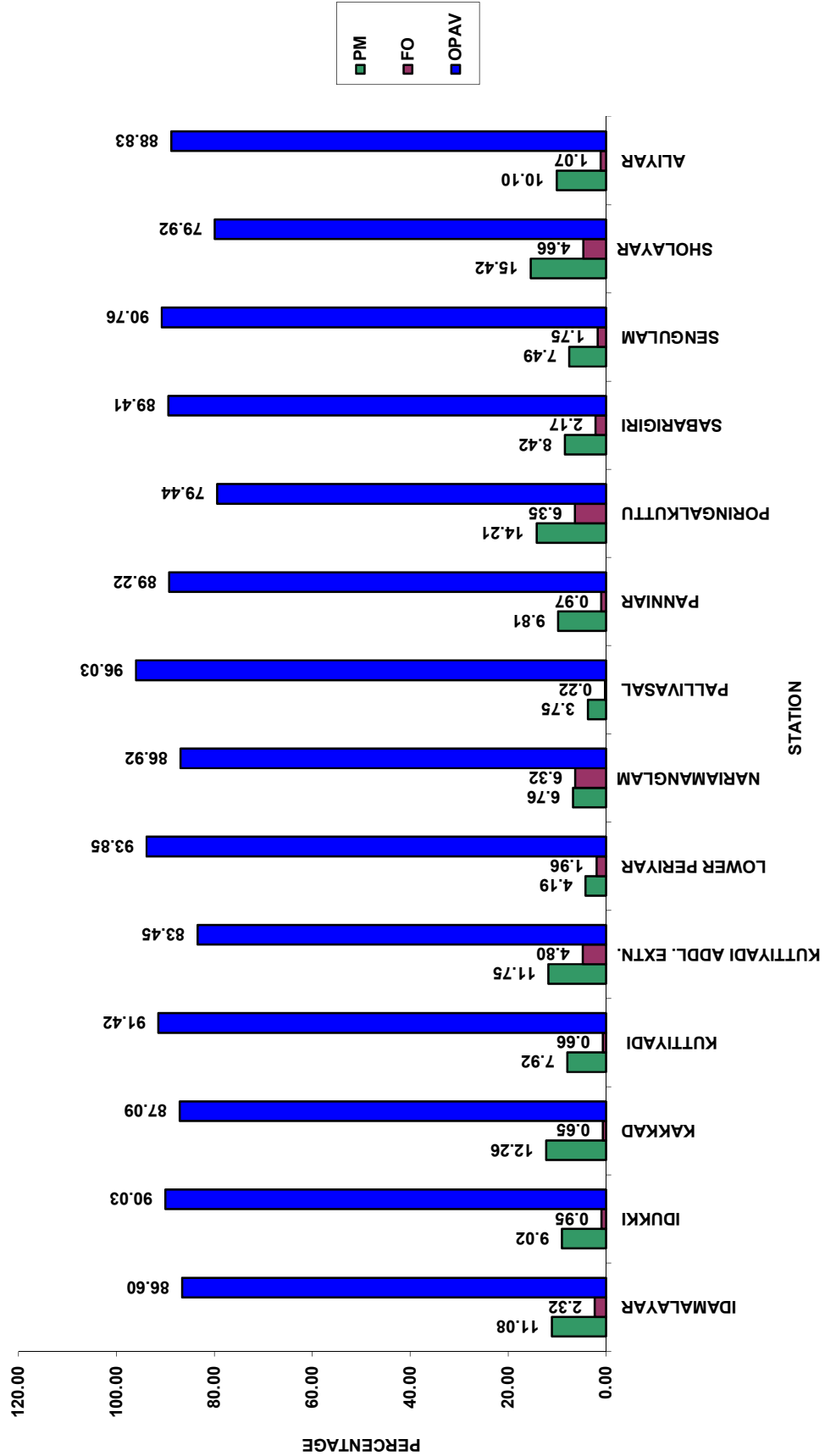


EXHIBIT 6.10

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16

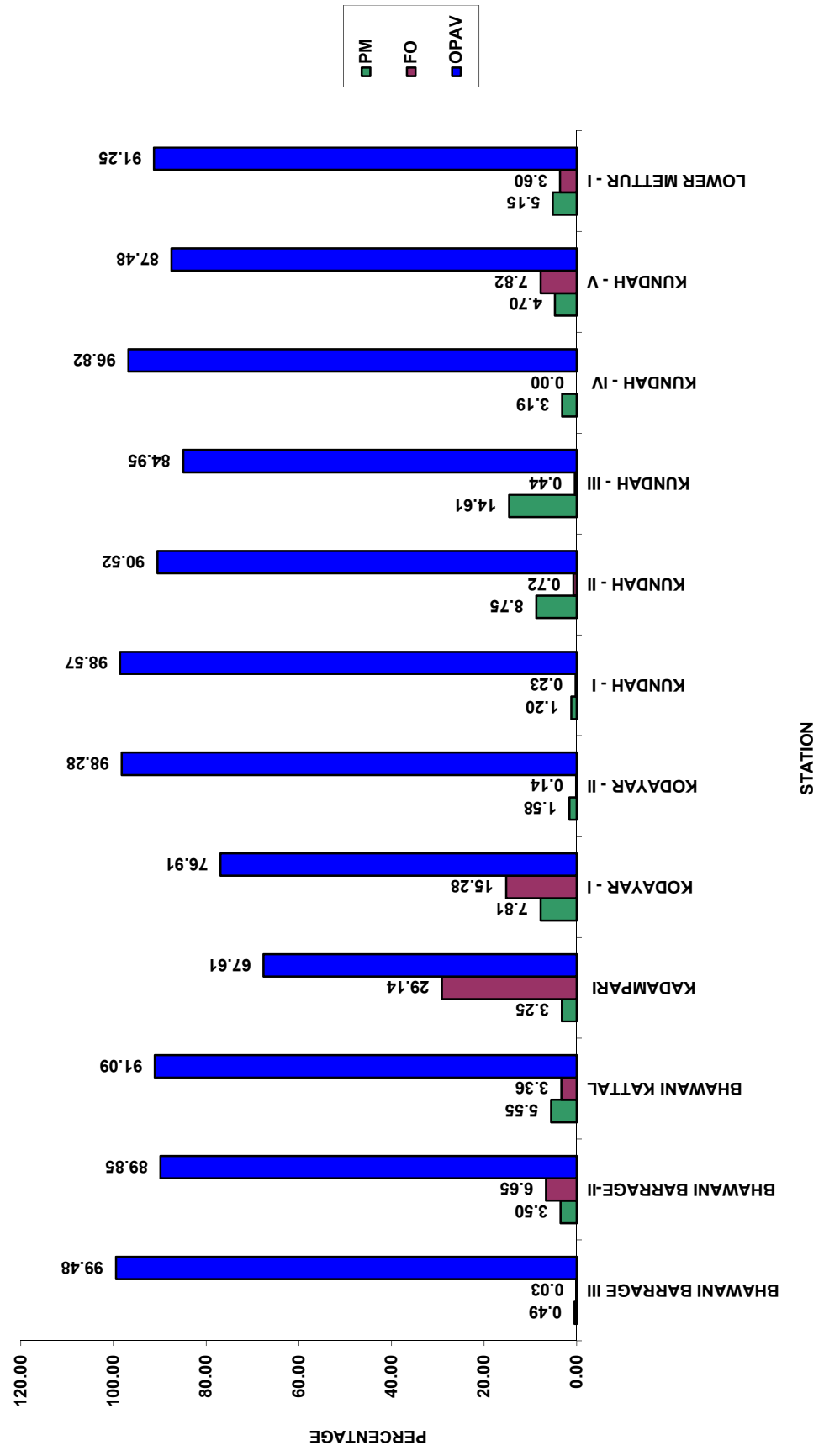


EXHIBIT 6.11

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16

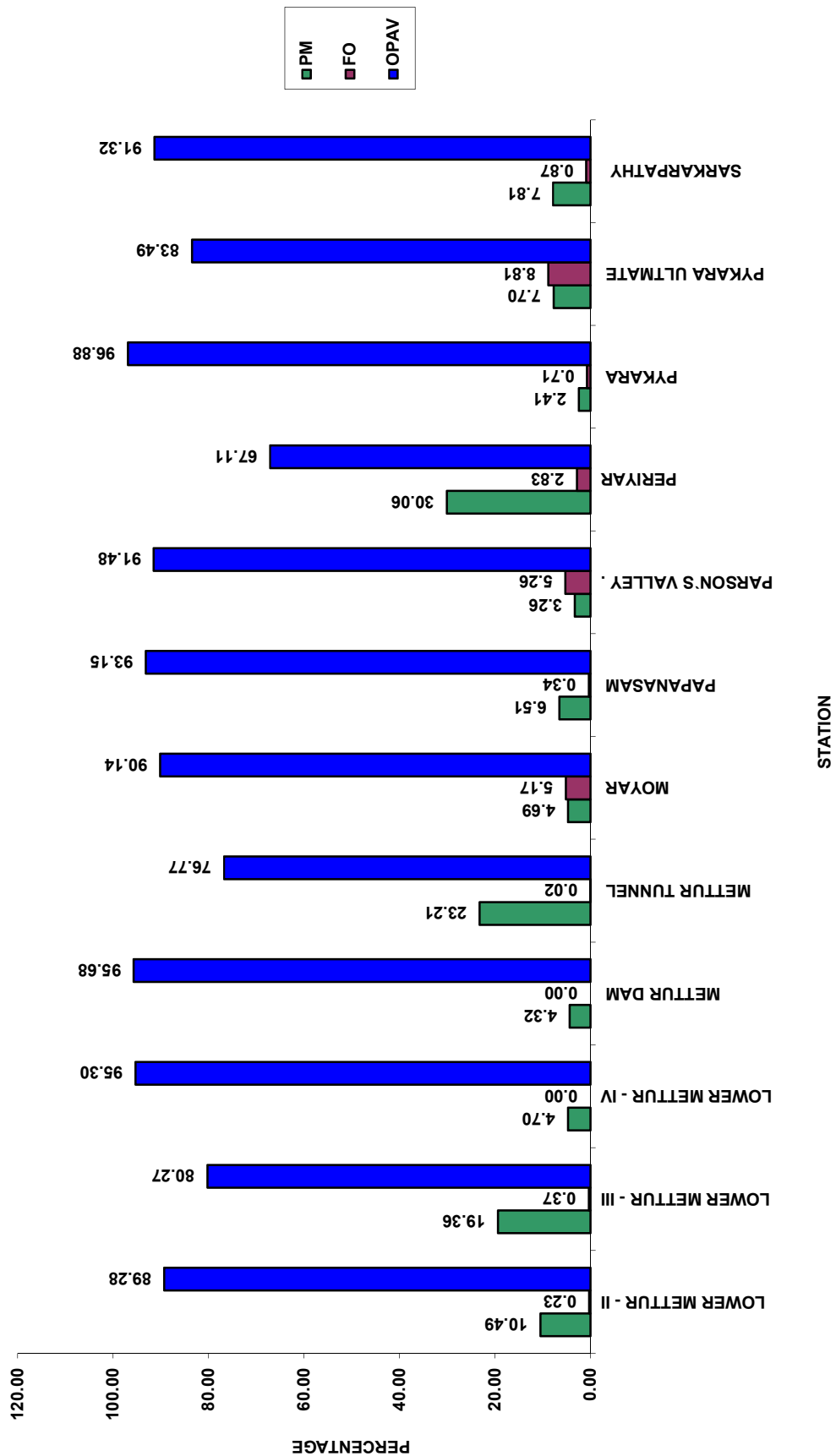


EXHIBIT 6.12

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16

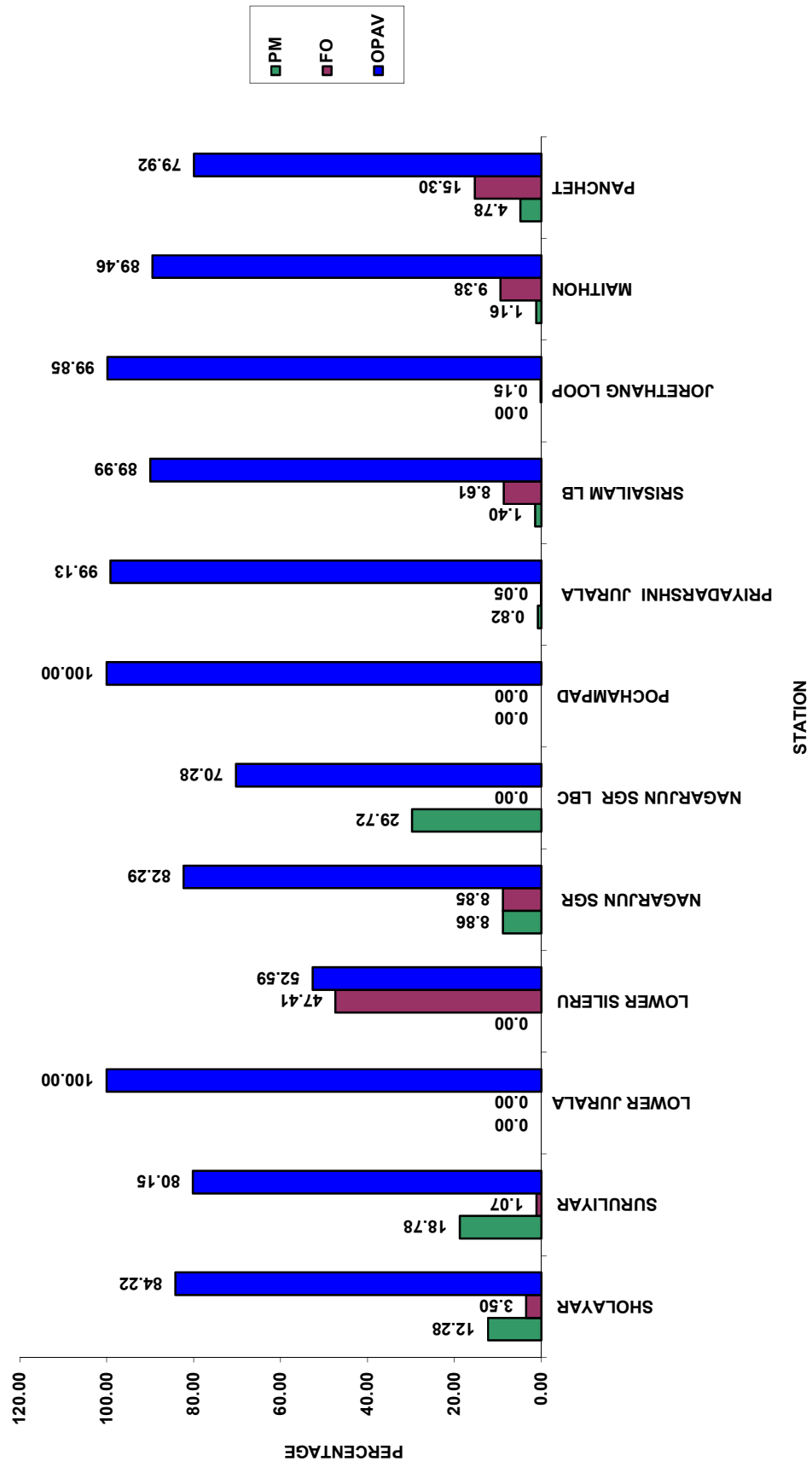
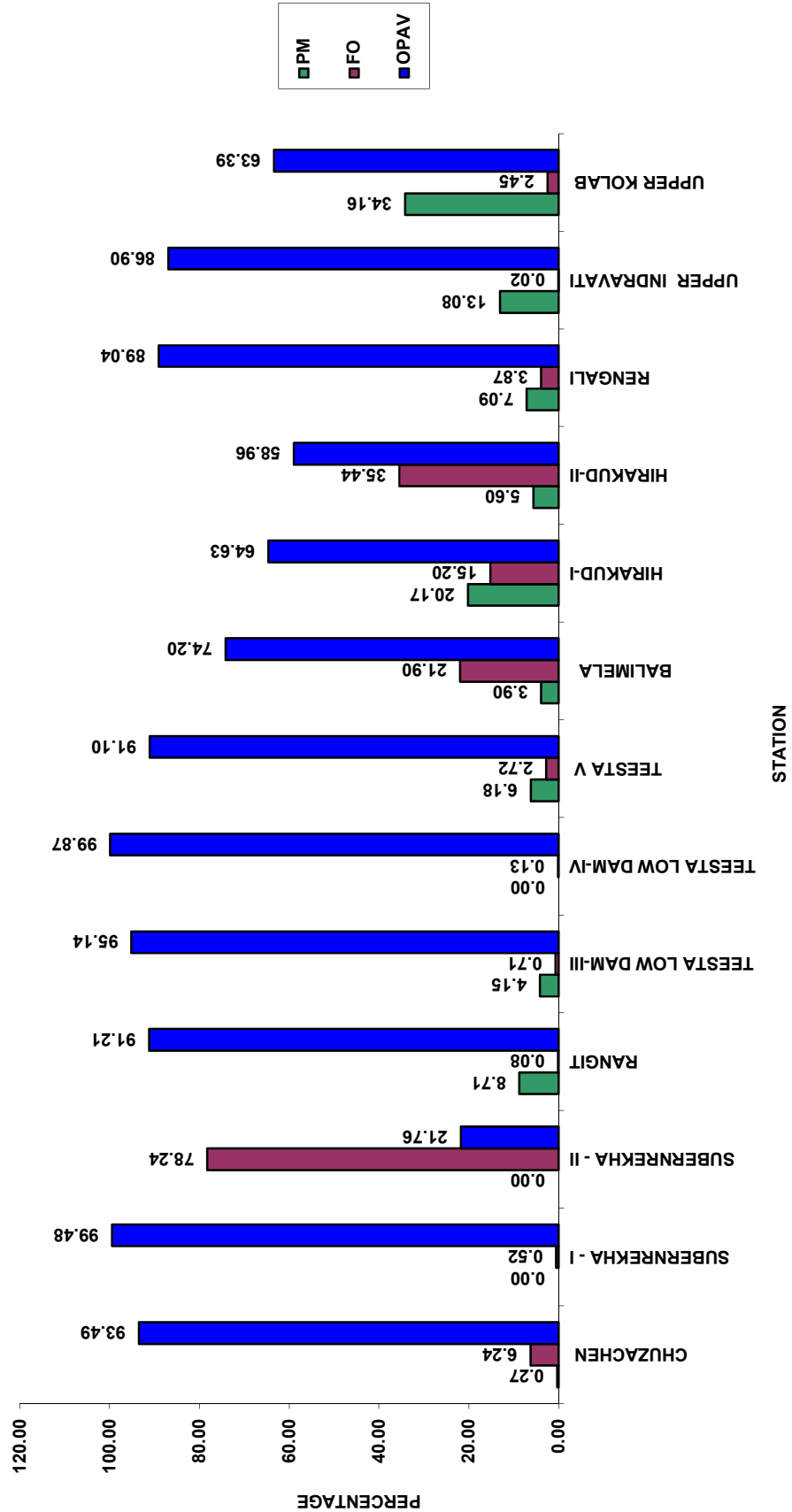
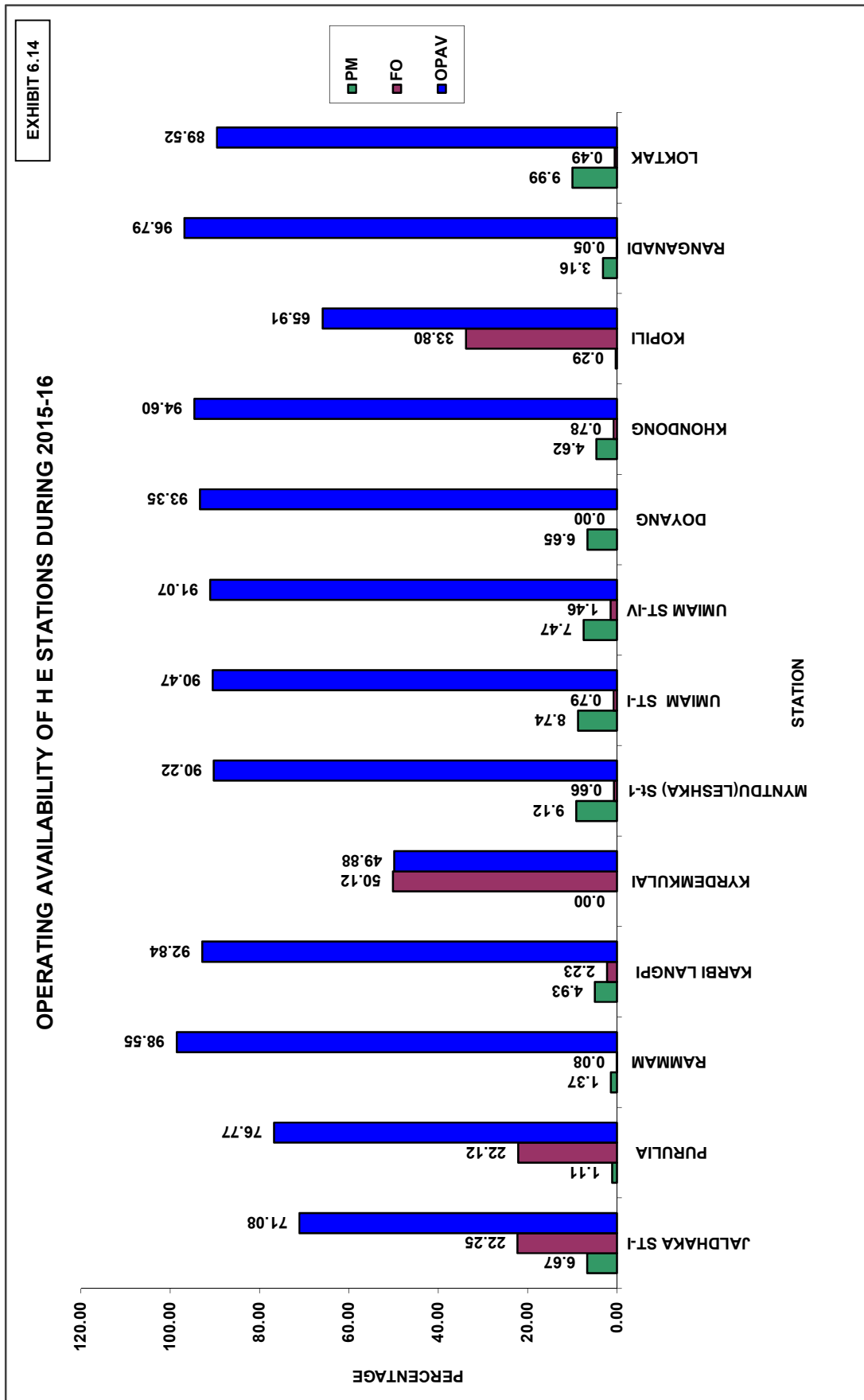


EXHIBIT 6.13

OPERATING AVAILABILITY OF H E STATIONS DURING 2015-16





OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
	NORTHERN REGION						
	ADHPL						
1	ALLAIN DUHANGAN	1	96.00	7.37	0.39	92.23	0.01
		2	96.00	6.15	0.82	93.03	0.00
	TOTAL :		192.00	6.76	0.61	92.63	0.01
	AHPC (GVK)						
2	SRINAGAR	1	82.50	0.00	17.43	82.57	10.39
		2	82.50	0.00	2.36	97.64	17.18
		3	82.50	0.00	10.73	89.27	14.21
		4	82.50	0.00	8.99	91.01	26.67
	TOTAL :		330.00	0.00	9.87	90.13	17.11
	BBMB						
3	BHAKRA LEFT	1	108.00	0.00	0.00	100.00	4.74
		2	108.00	0.00	0.00	100.00	9.18
		3	108.00	0.00	1.13	98.87	7.61
		4	108.00	34.63	0.00	65.37	0.00
		5	108.00	0.00	0.01	99.99	0.00
	TOTAL :		540.00	6.93	0.23	92.85	4.31
4	BHAKRA RIGHT	1	157.00	0.00	0.00	100.00	12.94
		2	157.00	0.00	0.67	99.33	6.77
		3	157.00	0.42	0.00	99.58	15.31
		4	157.00	0.00	0.00	100.00	1.54
		5	157.00	0.00	0.00	100.00	5.79
	TOTAL :		785.00	0.08	0.13	99.78	8.47
5	DEHAR	1	165.00	0.00	10.18	89.82	9.99
		2	165.00	0.00	0.60	99.40	7.27
		3	165.00	0.23	0.06	99.71	11.46
		4	165.00	0.00	0.91	99.09	18.11
		5	165.00	0.00	0.00	100.00	6.35
		6	165.00	99.73	0.00	0.27	0.00
	TOTAL :		990.00	16.66	1.96	81.38	8.86
6	GANGUWAL	1	29.25	4.72	0.38	94.90	0.00
		2	24.20	0.00	99.73	0.27	0.00
		3	24.20	2.36	0.06	97.58	4.15
	TOTAL :		77.65	2.51	31.24	66.25	1.29

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
7	KOTLA	1	29.25	6.47	0.14	93.38	0.00
		2	24.20	4.96	0.00	95.04	0.02
		3	24.20	0.00	99.73	0.27	0.00
	TOTAL :		77.65	3.99	31.13	64.88	0.01
8	PONG	1	66.00	0.00	0.00	100.00	5.58
		2	66.00	0.00	0.95	99.05	7.87
		3	66.00	0.00	0.00	100.00	38.76
		4	66.00	0.00	2.16	97.84	9.82
		5	66.00	0.00	0.69	99.31	5.91
		6	66.00	0.00	0.00	100.00	5.88
	TOTAL :		396.00	0.00	0.63	99.37	12.30
	EPPL						
9	MALANA-II	1	50.00	12.02	0.27	87.71	38.50
		2	50.00	12.02	0.34	87.64	39.06
	TOTAL :		100.00	12.02	0.30	87.68	38.78
	GBHPPL						
10	BUDHIL	1	35.00	20.49	4.06	75.45	8.01
		2	35.00	5.62	0.65	93.73	4.71
	TOTAL :		70.00	13.06	2.35	84.59	6.36
	HBPCL						
11	BASPA	1	100.00	0.00	1.77	98.23	0.23
		2	100.00	0.00	1.80	98.20	0.23
		3	100.00	0.00	1.85	98.15	0.23
	TOTAL :		300.00	0.00	1.81	98.19	0.23
12	KARCHAM WANGTOO	1	250.00	0.00	0.83	99.17	0.24
		2	250.00	0.00	0.85	99.15	0.22
		3	250.00	0.00	0.86	99.14	0.25
		4	250.00	0.00	0.80	99.20	0.22
	TOTAL :		1000.00	0.00	0.83	99.17	0.23
	HPSEB LTD.						
13	BASSI	1	15.00	1.98	2.98	95.03	1.14
		2	15.00	6.54	0.35	93.12	1.62
		3	15.00	9.49	0.38	90.13	0.75
		4	15.00	7.88	0.32	91.80	0.57
	TOTAL :		60.00	6.47	1.01	92.52	1.02

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
14	GIRI BATA	1	30.00	5.33	0.04	94.63	10.16
		2	30.00	8.11	0.00	91.89	7.57
	TOTAL :		60.00	6.72	0.02	93.26	8.87
15	LARJI	1	42.00	0.34	0.58	99.08	0.14
		2	42.00	1.63	0.65	97.71	0.12
		3	42.00	1.17	0.50	98.34	0.14
	TOTAL :		126.00	1.05	0.58	98.37	0.14
16	SANJAY	1	40.00	0.00	100.00	0.00	0.00
		2	40.00	0.00	100.00	0.00	0.00
		3	40.00	0.00	100.00	0.00	0.00
	TOTAL :		120.00	0.00	100.00	0.00	0.00
JKSPDC							
17	BAGLIHAR	1	150.00	3.12	0.04	96.84	0.74
		2	150.00	11.86	0.49	87.65	8.58
		3	150.00	6.47	0.80	92.73	23.43
	TOTAL :		450.00	7.15	0.44	92.41	10.92
18	BAGLIHAR II	1	150.00	0.00	0.00	100.00	0.00
		2	150.00	0.00	0.00	100.00	0.00
		3	150.00	0.00	0.00	100.00	0.00
	TOTAL :		450.00	0.00	0.00	100.00	0.00
19	LOWER JHELM	1	35.00	0.10	2.52	97.38	29.86
		2	35.00	1.17	1.97	96.86	36.89
		3	35.00	0.07	0.95	98.98	31.21
	TOTAL :		105.00	0.44	1.81	97.75	32.65
20	UPPER SINDH-II	3	35.00	6.64	22.01	71.35	15.93
		4	35.00	8.72	40.46	50.82	18.68
		5	35.00	1.64	30.03	68.33	31.31
	TOTAL :		105.00	5.67	30.83	63.50	21.97
JPPVL							
21	VISHNU PRAYAG	1	100.00	0.14	5.62	94.24	21.46
		2	100.00	0.00	0.18	99.82	21.46
		3	100.00	0.13	0.01	99.85	21.49
		4	100.00	0.13	0.03	99.84	21.46
	TOTAL :		400.00	0.10	1.46	98.44	21.47

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
	MPCL						
22	MALANA	1	43.00	6.19	0.13	93.68	0.21
		2	43.00	0.00	0.04	99.96	0.21
	TOTAL :		86.00	3.10	0.09	96.81	0.21
	NHPC						
23	BAIRA SIUL	1	60.00	4.96	0.94	94.10	10.58
		2	60.00	5.88	1.97	92.15	9.56
		3	60.00	7.32	1.86	90.82	8.56
	TOTAL :		180.00	6.06	1.59	92.35	9.57
24	CHAMERA- I	1	180.00	4.58	0.02	95.40	7.51
		2	180.00	5.22	0.14	94.64	6.35
		3	180.00	3.11	0.49	96.40	7.54
	TOTAL :		540.00	4.31	0.22	95.47	7.13
25	CHAMERA- II	1	100.00	7.06	0.04	92.90	11.84
		2	100.00	6.21	0.36	93.43	12.22
		3	100.00	0.00	0.61	99.39	13.13
	TOTAL :		300.00	4.42	0.34	95.24	12.40
26	CHAMERA-III	1	77.00	4.36	2.07	93.57	29.03
		2	77.00	2.57	0.96	96.47	25.65
		3	77.00	2.65	3.29	94.07	24.35
	TOTAL :		231.00	3.19	2.11	94.70	26.34
27	CHUTAK	1	11.00	25.49	21.37	51.34	14.90
		2	11.00	24.26	44.00	21.28	22.38
		3	11.00	0.00	36.12	50.56	30.51
		4	11.00	0.00	22.50	61.50	45.70
	TOTAL :		44.00	12.44	31.00	56.56	28.37
28	DHAULI GANGA	1	70.00	20.55	1.79	77.66	13.20
		2	70.00	5.28	3.84	90.88	10.58
		3	70.00	10.78	4.94	84.28	12.04
		4	70.00	4.24	1.67	94.09	12.13
	TOTAL :		280.00	10.21	3.06	86.73	11.99
29	DULHASTI	1	130.00	4.03	0.31	95.66	9.98
		2	130.00	3.63	0.69	95.69	6.37
		3	130.00	3.64	3.21	93.15	10.36
	TOTAL :		390.00	3.77	1.40	94.83	8.90

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
30	NIMBOO BAZDO	1	15.00	6.62	0.10	93.28	19.77
		2	15.00	5.03	0.02	94.95	16.75
		3	15.00	5.24	0.35	94.41	30.50
	TOTAL :		45.00	5.63	0.16	94.21	22.34
31	PARBATI-III	1	130.00	99.73	0.00	0.27	0.00
		2	130.00	22.88	12.71	64.41	6.59
		3	130.00	19.74	10.35	69.90	7.75
		4	130.00	18.50	8.45	73.05	9.68
	TOTAL :		520.00	40.21	7.88	51.91	6.00
32	SALAL-I	1	115.00	8.02	0.09	91.88	4.90
		2	115.00	21.98	0.27	77.75	0.99
		3	115.00	28.25	0.51	71.23	5.59
	TOTAL :		345.00	19.42	0.29	80.29	3.83
33	SALAL-II	1	115.00	14.09	0.07	85.84	2.00
		2	115.00	11.91	3.68	84.41	5.52
		3	115.00	24.92	1.92	73.16	1.01
	TOTAL :		345.00	16.97	1.89	81.14	2.84
34	SEWA-II	1	40.00	3.19	0.24	96.57	6.92
		2	40.00	3.22	0.77	96.02	7.05
		3	40.00	4.06	0.16	95.78	6.94
	TOTAL :		120.00	3.49	0.39	96.12	6.97
35	TANAKPUR	1	31.40	12.97	2.42	84.62	9.62
		2	31.40	10.05	0.70	89.25	21.40
		3	31.40	13.76	0.47	85.76	19.56
	TOTAL :		94.20	12.26	1.20	86.54	16.86
36	URI-I	1	120.00	4.41	0.04	95.55	3.09
		2	120.00	12.46	0.22	87.32	6.35
		3	120.00	4.16	0.22	95.62	12.34
		4	120.00	0.00	0.30	99.70	9.09
	TOTAL :		480.00	5.26	0.19	94.55	7.72
37	URI-II	1	60.00	21.07	0.80	78.13	14.05
		2	60.00	37.81	0.29	61.90	2.82
		3	60.00	31.87	0.63	67.50	0.53
		4	60.00	25.95	0.28	73.77	5.24
	TOTAL :		240.00	29.17	0.50	70.33	5.66

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
	NTPC Ltd.						
38	KOLDAM	1	200.00	8.82	0.00	91.18	21.87
		2	200.00	0.00	0.00	100.00	3.34
		3	200.00	13.54	4.85	81.61	5.23
		4	200.00	2.16	0.00	97.84	2.25
	TOTAL :		800.00	6.13	1.22	92.65	8.17
	PSPCL						
39	ANANDPUR SAHIB - I	1	33.50	0.21	0.63	99.16	29.37
		2	33.50	6.98	0.11	92.92	31.84
	TOTAL :		67.00	3.60	0.37	96.03	30.61
40	ANANDPUR SAHIB - I	1	33.50	6.95	0.34	92.70	31.82
		2	33.50	0.08	0.09	99.83	28.63
	TOTAL :		67.00	3.52	0.22	96.26	30.23
41	MUKERIAN-I	1	15.00	0.00	0.02	99.98	5.69
		2	15.00	0.00	3.72	96.28	7.56
		3	15.00	0.00	0.05	99.95	0.62
	TOTAL :		45.00	0.00	3.79	96.21	4.62
42	MUKERIAN-II	1	15.00	0.00	0.08	99.92	2.86
		2	15.00	0.00	0.03	99.97	9.71
		3	15.00	0.00	0.06	99.94	2.15
	TOTAL :		45.00	0.00	0.06	99.94	4.91
43	MUKERIAN-III	1	19.50	0.00	0.06	99.94	2.99
		2	19.50	0.00	73.48	26.52	2.69
		3	19.50	0.00	0.07	99.93	5.19
	TOTAL :		58.50	0.00	31.90	68.10	4.71
44	MUKERIAN-IV	1	19.50	0.00	0.07	99.93	3.93
		2	19.50	0.00	0.23	99.77	3.39
		3	19.50	0.00	0.33	99.67	7.51
	TOTAL :		58.50	0.00	0.21	99.79	4.94
45	RANJIT SAGAR	1	150.00	86.43	0.06	13.51	0.00
		2	150.00	18.72	0.65	80.62	0.00
		3	150.00	0.49	0.20	99.31	0.00
		4	150.00	5.60	0.01	94.39	0.00
	TOTAL :		600.00	27.81	0.23	71.96	0.00
46	SHANAN	1	15.00	6.99	3.58	89.44	0.20
		2	15.00	6.49	0.17	93.34	14.67

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		3	15.00	0.10	3.08	96.82	38.64
		4	15.00	0.08	1.84	98.08	26.59
		5	50.00	29.57	0.34	70.09	0.20
	TOTAL :		110.00	15.30	1.34	83.36	11.02
	RRVUNL						
47	JAWAHAR SAGAR	1	33.00	13.27	0.00	86.73	0.00
		2	33.00	4.48	0.05	95.47	0.00
		3	33.00	9.89	0.00	90.11	0.00
	TOTAL :		99.00	9.21	0.02	90.77	0.00
48	MAHI BAJAJ - I	1	25.00	29.46	0.10	70.44	35.61
		2	25.00	0.00	48.46	51.54	12.67
	TOTAL :		50.00	14.73	24.28	60.99	24.14
49	MAHI BAJAJ - I	1	45.00	30.03	24.99	44.98	39.25
		2	45.00	29.68	8.17	62.16	58.92
	TOTAL :		90.00	29.86	16.58	53.57	49.09
50	R P SAGAR	1	43.00	6.75	0.09	93.15	0.00
		2	43.00	9.63	0.09	90.28	0.00
		3	43.00	7.53	0.00	92.47	0.00
		4	43.00	8.23	0.00	91.77	0.00
	TOTAL :		172.00	8.04	0.05	91.91	0.00
	SJVNL						
51	NATHPA JHAKRI	1	250.00	0.00	0.05	99.95	38.04
		2	250.00	0.00	0.27	99.73	45.85
		3	250.00	0.00	0.14	99.86	46.23
		4	250.00	0.00	0.00	100.00	48.11
		5	250.00	0.00	0.00	100.00	46.58
		6	250.00	0.00	0.02	99.98	39.77
	TOTAL :		1500.00	0.00	0.08	99.92	44.10
52	RAMPUR	1	68.67	0.78	9.80	89.42	35.46
		2	68.67	4.29	0.89	94.82	38.72
		3	68.67	0.00	0.33	99.67	48.79
		4	68.67	0.00	1.53	98.47	45.20
		5	68.67	3.00	0.59	96.41	39.92
		6	68.67	0.38	2.29	97.33	36.75
	TOTAL :		412.02	1.41	2.57	96.02	40.81

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
	THDC						
53	KOTESHWAR	1	100.00	7.26	6.99	85.75	0.00
		2	100.00	9.27	0.01	90.71	0.00
		3	100.00	9.08	0.01	90.91	0.00
		4	100.00	8.52	0.06	91.41	0.03
	TOTAL :		400.00	8.54	1.77	89.69	0.01
54	TEHRI ST-1	1	250.00	1.25	0.24	98.50	0.00
		2	250.00	12.78	0.00	87.22	0.00
		3	250.00	8.87	0.66	90.46	0.00
		4	250.00	4.56	0.00	95.44	0.00
	TOTAL :		1000.00	6.87	0.23	92.90	0.00
	UJVNL						
55	CHIBRO (YAMUNA)	1	60.00	8.72	1.28	90.00	33.33
		2	60.00	9.05	0.34	90.61	33.08
		3	60.00	25.92	0.38	73.70	37.96
		4	60.00	11.89	0.49	87.62	30.42
	TOTAL :		240.00	13.90	0.62	85.48	33.70
56	CHILLA	1	36.00	19.95	1.47	78.58	0.44
		2	36.00	9.11	2.76	88.13	0.48
		3	36.00	7.00	1.57	91.44	0.20
		4	36.00	14.85	2.87	82.29	2.66
	TOTAL :		144.00	12.73	2.16	85.11	0.95
57	DHAKRANI	1	11.25	20.13	0.12	79.74	25.88
		2	11.25	13.08	0.08	86.84	14.08
		3	11.25	12.94	0.00	87.06	30.97
	TOTAL :		33.75	15.38	0.07	84.55	23.64
58	DHALIPUR	1	17.00	0.00	1.00	99.00	47.25
		2	17.00	3.72	4.19	92.09	24.40
		3	17.00	27.97	0.80	71.23	11.71
	TOTAL :		51.00	10.57	2.00	87.43	27.79
59	KHATIMA	1	13.80	11.53	5.52	82.95	0.00
		2	13.80	79.05	0.09	20.86	0.00
		3	13.80	45.74	13.51	40.75	8.20
	TOTAL :		41.40	45.44	6.37	48.19	2.73
60	KHODRI	1	30.00	0.04	0.54	99.41	42.27
		2	30.00	2.08	2.26	95.66	55.54

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		3	30.00	18.34	0.00	81.66	31.76
		4	30.00	9.61	0.53	89.87	34.12
	TOTAL :		120.00	7.52	0.83	91.65	40.92
61	KULHAL	1	10.00	0.00	0.11	99.89	44.10
		2	10.00	11.50	0.59	87.91	13.18
		3	10.00	11.69	0.60	87.72	15.90
	TOTAL :		30.00	7.73	0.43	91.84	24.39
62	MANERI BHALI - I	1	30.00	22.73	0.81	76.46	0.00
		2	30.00	7.24	5.49	87.27	0.00
		3	30.00	23.98	10.03	65.99	0.00
	TOTAL :		90.00	17.98	5.44	76.58	0.00
63	MANERI BHALI - II	1	76.00	12.94	2.83	84.24	11.55
		2	76.00	25.33	4.09	70.58	0.47
		3	76.00	25.86	8.00	66.14	3.18
		4	76.00	25.80	1.41	72.79	0.64
	TOTAL :		304.00	22.48	4.08	73.44	3.96
64	RAMGANGA	1	66.00	12.84	2.65	84.51	40.33
		2	66.00	0.00	0.00	100.00	39.59
		3	66.00	7.68	0.00	92.32	38.21
	TOTAL :		198.00	6.84	0.88	92.28	39.38
	UPJVNL						
65	KHARA	1	24.00	11.24	3.07	85.68	7.77
		2	24.00	3.97	0.77	95.26	0.48
		3	24.00	8.54	5.56	85.90	4.80
	TOTAL :		72.00	7.92	3.13	88.95	4.35
66	MATATILA	1	10.20	28.96	3.57	67.46	0.00
		2	10.20	30.06	9.84	60.10	0.00
		3	10.20	14.01	3.23	82.76	0.00
	TOTAL :		30.60	24.35	5.55	70.10	0.00
67	OBRA	1	33.00	28.67	1.13	70.20	0.00
		2	33.00	0.13	0.18	99.68	0.00
		3	33.00	14.39	3.07	82.54	0.00
	TOTAL :		99.00	14.40	1.46	84.14	0.00
68	RIHAND	1	50.00	57.58	1.32	41.11	0.00
		2	50.00	99.73	0.00	0.27	0.00
		3	50.00	20.61	0.21	79.19	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		4	50.00	10.13	0.98	88.89	0.00
		5	50.00	12.34	0.46	87.20	0.00
		6	50.00	79.91	0.00	20.09	0.00
	TOTAL :		300.00	46.71	0.49	52.80	0.00
	WESTERN REGION						
	CSPGCL						
69	HASDEOBANGO	1	40.00	0.00	45.85	54.15	0.00
		2	40.00	0.00	0.05	99.95	0.00
		3	40.00	0.00	0.50	99.50	0.00
	TOTAL :		120.00	0.00	15.47	84.53	0.00
	DLHP						
70	BHANDARDHARA ST-II	2	34.00	0.00	0.01	99.99	0.00
	TOTAL :		34.00	0.00	0.01	99.99	0.00
	GSECL						
71	KADANA	1	60.00	0.00	0.00	100.00	0.00
		2	60.00	0.00	0.00	100.00	0.00
		3	60.00	24.72	0.00	75.28	0.00
		4	60.00	0.00	0.00	100.00	0.00
	TOTAL :		240.00	6.18	0.00	93.82	0.00
72	UKAI	1	75.00	0.00	0.00	100.00	0.00
		2	75.00	18.51	0.00	81.49	0.00
		3	75.00	0.00	0.00	100.00	0.00
		4	75.00	36.85	0.00	63.15	0.00
	TOTAL :		300.00	13.84	0.00	86.16	0.00
	MAHAGENCO						
73	BHIRA TAIL RACE	1	40.00	0.00	21.39	78.61	0.00
		2	40.00	0.00	5.49	94.51	0.00
	TOTAL :		80.00	0.00	13.44	86.56	0.00
74	GHATGHAR PSS	1	125.00	0.00	12.81	87.19	0.00
		2	125.00	0.00	9.22	90.78	0.00
	TOTAL :		250.00	0.00	11.01	88.99	0.00
75	KOYNA DPH	1	18.00	0.00	0.05	99.95	0.00
		2	18.00	0.00	0.02	99.98	0.00
	TOTAL :		36.00	0.00	0.03	99.97	0.00
76	KOYNA-I & II	1	70.00	1.98	1.13	96.89	0.20
		2	70.00	0.32	10.16	89.52	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		3	70.00	0.66	1.44	97.90	0.00
		4	70.00	0.45	1.68	97.87	0.00
		5	80.00	0.56	0.71	98.73	0.00
		6	80.00	1.27	0.56	98.17	0.00
		7	80.00	1.55	11.51	86.93	0.00
		8	80.00	2.01	0.59	97.40	0.00
	TOTAL :		600.00	1.12	3.46	95.42	0.02
77	KOYNA-III	1	80.00	0.50	1.66	97.85	0.00
		2	80.00	42.94	0.14	56.92	0.00
		3	80.00	0.17	5.75	94.08	0.00
		4	80.00	3.61	0.29	96.10	0.00
	TOTAL :		320.00	11.81	1.96	86.23	0.00
78	KOYNA-IV	1	250.00	0.56	14.17	85.27	0.00
		2	250.00	9.92	4.11	85.97	0.00
		3	250.00	0.08	4.77	95.15	0.00
		4	250.00	0.19	0.73	99.08	0.00
	TOTAL :		1000.00	2.69	5.95	91.36	0.00
79	TILLARI	1	60.00	0.00	0.06	99.94	0.00
	TOTAL :		60.00	0.00	0.06	99.94	0.00
80	VAITARNA	1	60.00	14.75	0.00	85.24	0.00
	TOTAL :		60.00	14.75	0.00	85.25	0.00
MPPGCL							
81	BANSAGAR TONS-1	1	105.00	4.44	1.92	93.64	0.00
		2	105.00	20.02	6.34	73.64	0.00
		3	105.00	16.73	0.77	82.51	0.00
	TOTAL :		315.00	13.73	3.01	83.26	0.00
82	BANSAGAR TONS-II	1	15.00	2.90	36.31	60.79	3.42
		2	15.00	6.43	0.11	93.46	26.16
	TOTAL :		30.00	4.66	18.21	77.13	14.79
83	BANSAGAR TONS-III	1	20.00	0.00	5.29	94.71	0.00
		2	20.00	0.97	1.37	97.66	0.00
		3	20.00	5.25	1.05	93.69	0.00
	TOTAL :		60.00	2.07	2.57	95.36	0.00
84	BARGI HPS	1	45.00	0.00	0.05	99.95	0.00
		2	45.00	1.56	0.32	98.12	0.00
	TOTAL :		90.00	0.78	0.19	99.03	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
85	GANDHI SAGAR	1	23.00	0.00	0.05	99.95	0.00
		2	23.00	0.00	0.07	99.93	0.01
		3	23.00	3.17	0.22	96.61	0.00
		4	23.00	5.23	0.06	94.71	0.02
		5	23.00	0.00	0.03	99.97	0.00
	TOTAL :		115.00	1.68	0.09	98.23	0.01
86	MADHIKHERA	1	20.00	7.43	0.00	92.57	0.01
		2	20.00	4.66	2.06	93.28	0.01
		3	20.00	4.70	2.03	93.27	0.00
	TOTAL :		60.00	5.60	1.36	93.04	0.01
87	PENCH	1	80.00	0.00	3.07	96.93	1.10
		2	80.00	2.14	8.78	89.08	0.01
	TOTAL :		160.00	1.07	5.92	93.01	0.56
88	RAJGHAT	1	15.00	30.21	0.07	69.72	20.76
		2	15.00	4.26	10.14	85.60	0.00
		3	15.00	5.42	0.43	94.15	0.16
	TOTAL :		45.00	13.29	3.55	83.16	6.97
	NHDC						
89	INDIRA SAGAR	1	125.00	4.46	0.00	95.54	0.00
		2	125.00	2.33	2.63	95.04	0.00
		3	125.00	2.55	0.00	97.45	0.00
		4	125.00	4.68	0.00	95.32	0.00
		5	125.00	4.39	0.00	95.61	0.00
		6	125.00	4.13	0.00	95.87	0.00
		7	125.00	2.54	0.00	97.46	0.00
		8	125.00	5.29	0.00	94.71	0.00
	TOTAL :		1000.00	3.80	0.33	95.87	0.00
90	OMKARESHWAR	1	65.00	3.11	0.00	96.89	0.00
		2	65.00	3.93	0.00	96.07	0.00
		3	65.00	3.06	0.00	96.94	0.00
		4	65.00	3.13	0.00	96.86	0.00
		5	65.00	3.39	0.00	96.60	0.00
		6	65.00	2.39	0.00	97.61	0.00
		7	65.00	2.54	0.00	97.46	0.00
		8	65.00	3.10	0.00	96.90	0.00
	TOTAL :		520.00	3.08	0.00	96.92	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
	SSNNL						
91	S SAROVAR CHPH	1	50.00	4.74	0.03	95.23	0.00
		2	50.00	3.44	0.00	96.56	0.00
		3	50.00	0.00	0.04	99.96	0.00
		4	50.00	0.00	0.01	99.99	0.00
		5	50.00	0.00	0.04	99.96	0.00
	TOTAL :		250.00	1.63	0.02	98.35	0.00
92	S SAROVAR RBPH	1	200.00	6.64	0.00	93.36	0.00
		2	200.00	6.18	0.00	93.82	0.00
		3	200.00	1.22	0.00	98.78	0.00
		4	200.00	7.85	1.60	90.55	0.00
		5	200.00	15.47	0.00	84.53	0.00
		6	200.00	12.44	0.01	87.56	0.00
	TOTAL :		1200.00	8.30	0.27	91.43	0.00
	TPCL						
93	BHIRA	1	25.00	0.00	0.60	99.40	0.00
		2	25.00	0.00	1.69	98.31	0.00
		3	25.00	0.00	0.61	99.39	0.00
		4	25.00	0.00	0.60	99.40	0.00
		5	25.00	0.00	0.60	99.40	0.00
		6	25.00	0.00	0.60	99.40	0.00
	TOTAL :		150.00	0.00	0.78	99.22	0.00
94	BHIRA PSS	1	150.00	0.00	18.93	81.07	0.00
	TOTAL :		150.00	0.00	18.93	81.07	0.00
95	BHIVPURI	1	24.00	0.00	1.35	98.65	0.00
		2	24.00	3.39	1.29	95.33	0.00
		3	24.00	15.55	0.58	83.86	0.00
		4	1.50	0.00	0.00	100.00	0.00
		5	1.50	0.00	0.00	100.00	0.00
	TOTAL :		75.00	6.06	1.03	92.91	0.00
96	KHOPOLI	1	24.00	4.41	1.56	94.02	0.00
		2	24.00	0.15	0.71	99.15	0.00
		3	24.00	0.00	1.03	98.97	0.00
	TOTAL :		72.00	1.52	1.10	97.38	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
	SOUTHERN REGION						
	APGENCO						
97	NAGARJUN SGR RBC	1	30.00	0.00	0.00	100.00	99.73
		2	30.00	0.00	0.00	100.00	99.73
	TOTAL :		60.00	0.00	0.00	100.00	99.73
98	NAGARJUN SGR RBC EXTN.	1	30.00	0.00	0.00	100.00	99.73
	TOTAL :		30.00	0.00	0.00	100.00	99.73
99	SRISAILAM	1	110.00	0.00	2.53	97.47	0.00
		2	110.00	0.00	2.53	97.47	0.00
		3	110.00	0.00	0.00	100.00	0.00
		4	110.00	0.00	0.00	100.00	0.00
		5	110.00	0.00	0.00	100.00	0.00
		6	110.00	0.00	0.00	100.00	0.00
		7	110.00	0.00	0.00	100.00	0.00
	TOTAL :		770.00	0.00	0.72	99.28	0.00
100	UPPER SILERU - I	1	60.00	0.00	4.16	95.84	0.00
		2	60.00	4.47	2.70	92.84	0.00
	TOTAL :		120.00	2.24	3.43	94.33	0.00
101	UPPER SILERU - II	3	60.00	0.00	0.98	99.02	0.00
		4	60.00	8.28	0.00	91.72	0.00
	TOTAL :		120.00	4.14	0.49	95.37	0.00
102	LOWER SILERU	1	115.00	0.00	97.88	2.12	0.00
		2	115.00	0.00	11.01	88.99	0.00
		3	115.00	0.00	65.76	34.24	0.00
		4	115.00	0.00	14.97	85.03	0.00
	TOTAL :		460.00	0.00	47.41	52.59	0.00
103	T B DAM	1	9.00	18.22	0.93	80.85	0.00
		2	9.00	19.44	2.29	78.27	0.00
		3	9.00	24.11	4.22	71.67	0.00
		4	9.00	0.44	3.97	95.59	0.01
	TOTAL :		36.00	15.55	2.85	81.60	0.00
104	HAMPI	1	9.00	10.99	3.54	85.47	0.26
		2	9.00	3.54	0.97	95.49	0.01
		3	9.00	13.68	0.76	85.56	0.00
		4	9.00	2.33	1.33	96.34	0.00
	TOTAL :		36.00	7.63	1.65	90.72	0.07

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
105	MACHKUND	1	17.00	8.32	2.59	89.10	0.00
		2	17.00	10.87	4.16	84.97	0.00
		3	17.00	14.54	47.17	38.29	0.08
		4	21.25	5.95	39.37	54.68	0.06
		5	21.25	12.55	1.30	86.15	0.24
		6	21.25	0.00	87.64	12.36	0.00
	TOTAL :		114.75	8.42	31.75	59.83	0.07
	KPCL						
106	ALMATTI DPH	1	15.00	0.99	1.61	97.39	0.00
		2	55.00	22.79	1.66	75.55	0.12
		3	55.00	23.33	2.87	73.80	0.01
		4	55.00	16.74	0.28	82.98	0.01
		5	55.00	22.95	0.06	76.99	0.01
		6	55.00	24.33	0.01	75.66	0.00
	TOTAL :		290.00	20.94	1.01	78.05	0.03
107	BHADRA	1	2.00	0.00	6.56	93.44	0.00
		2	12.00	0.50	1.80	97.70	0.00
		3	12.00	99.73	0.00	0.27	0.00
		4	7.20	92.86	0.00	7.14	0.00
		5	6.00	0.06	0.40	99.54	0.00
	TOTAL :		39.20	47.75	0.95	51.30	0.00
108	GERUSUPPA	1	60.00	0.79	0.10	99.11	0.02
		2	60.00	2.12	0.13	97.75	0.02
		3	60.00	0.26	0.01	99.72	0.02
		4	60.00	0.26	4.97	94.77	0.02
	TOTAL :		240.00	0.86	1.30	97.84	0.02
109	GHAT PRABHA	1	16.00	0.00	5.43	94.57	30.82
		2	16.00	0.24	1.30	98.46	25.02
	TOTAL :		32.00	0.12	3.37	96.51	27.92
110	JOG	1	13.20	0.77	0.21	99.02	0.03
		2	13.20	4.25	0.02	95.73	0.01
		3	13.20	0.17	0.02	99.81	0.03
		4	13.20	0.18	0.74	99.08	0.51
		5	21.60	4.29	0.03	95.68	0.03
		6	21.60	3.76	0.19	96.05	0.02

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		7	21.60	2.33	1.07	96.60	0.02
		8	21.60	0.66	41.10	58.24	0.03
	TOTAL :		139.20	2.22	6.67	91.11	0.07
111	KADRA	1	50.00	1.57	0.54	97.89	12.19
		2	50.00	7.23	0.36	92.40	4.40
		3	50.00	0.00	2.24	97.76	6.09
	TOTAL :		150.00	2.93	1.05	96.02	7.56
112	KALINADI	1	135.00	6.20	0.85	92.95	0.09
		2	135.00	6.12	0.64	93.24	0.32
		3	135.00	0.02	0.37	99.61	0.01
		4	150.00	0.06	0.60	99.34	0.01
		5	150.00	0.04	56.52	43.43	0.00
		6	150.00	81.09	0.00	18.91	0.00
	TOTAL :		855.00	16.19	10.32	73.49	0.07
113	KALINADI SUPA	1	50.00	0.50	0.91	98.59	11.71
		2	50.00	1.15	1.35	97.50	9.26
	TOTAL :		100.00	0.83	1.13	98.04	10.48
114	KODASALI	1	40.00	3.33	0.28	96.39	8.17
		2	40.00	0.00	0.26	99.74	8.13
		3	40.00	2.86	0.47	96.67	8.13
	TOTAL :		120.00	2.06	0.34	97.60	8.15
115	LIGANAMAKKI	1	27.50	11.02	0.02	88.96	0.00
		2	27.50	1.91	0.25	97.84	0.00
	TOTAL :		55.00	6.46	0.14	93.40	0.00
116	MUNIRABAD	1	9.00	0.30	0.20	99.50	16.13
		2	9.00	0.05	0.00	99.95	10.01
		3	10.00	2.56	0.00	97.44	14.01
	TOTAL :		28.00	1.03	0.06	98.91	13.41
117	SHARAVATHI	1	103.50	1.90	0.01	98.09	11.30
		2	103.50	2.40	18.03	79.57	11.29
		3	103.50	1.74	0.27	97.99	11.29
		4	103.50	1.06	0.00	98.94	11.29
		5	103.50	2.07	0.00	97.93	11.29
		6	103.50	1.57	4.05	94.38	0.00
		7	103.50	3.80	9.71	86.50	0.00
		8	103.50	1.06	11.50	87.44	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		9	103.50	3.25	0.57	96.18	11.29
		10	103.50	1.15	0.18	98.67	11.29
	TOTAL :		1035.00	2.00	4.43	93.57	7.90
118	SIVASAMUNDRUM	1	3.00	0.64	13.99	85.38	30.00
		2	3.00	0.07	9.70	90.23	26.11
		3	3.00	1.72	9.68	88.61	32.41
		4	3.00	0.29	64.08	35.63	9.92
		5	3.00	0.04	20.51	79.44	24.18
		6	3.00	0.35	77.48	22.17	5.40
		7	6.00	5.65	0.89	93.46	29.06
		8	6.00	0.88	14.15	84.98	22.36
		9	6.00	8.34	2.29	89.37	31.48
		10	6.00	2.65	3.04	94.30	24.13
	TOTAL :		42.00	2.72	16.87	80.41	24.43
119	VARAHI	1	115.00	0.09	0.29	99.61	0.08
		2	115.00	0.12	16.21	83.67	16.00
		3	115.00	24.22	9.39	66.38	10.62
		4	115.00	2.30	12.01	85.68	21.03
	TOTAL :		460.00	6.68	9.48	83.84	11.93
	KSEB						
120	IDAMALAYAR	1	37.50	10.93	1.08	87.98	3.03
		2	37.50	11.23	3.55	85.22	3.27
	TOTAL :		75.00	11.08	2.32	86.60	3.15
121	IDUKKI	1	130.00	9.68	0.17	90.16	0.00
		2	130.00	9.80	0.76	89.44	0.00
		3	130.00	9.49	2.55	87.96	0.00
		4	130.00	7.94	0.13	91.93	0.00
		5	130.00	8.37	1.71	89.92	0.00
		6	130.00	8.81	0.39	90.80	0.00
	TOTAL :		780.00	9.02	0.95	90.03	0.00
122	KAKKAD	1	25.00	16.60	1.18	82.22	18.80
		2	25.00	7.92	0.12	91.96	20.92
	TOTAL :		50.00	12.26	0.65	87.09	19.86
123	KUTTIYADI	1	25.00	10.71	0.58	88.71	0.03
		2	25.00	10.50	0.45	89.05	0.03
		3	25.00	11.05	0.98	87.97	0.02

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		4	50.00	3.68	0.64	95.68	0.05
	TOTAL :		125.00	7.92	0.66	91.42	0.03
124	KUTTIYADI ADDL. EXTN.	5	50.00	9.70	5.89	84.41	0.04
		6	50.00	13.80	3.71	82.49	0.04
	TOTAL :		100.00	11.75	4.80	83.45	0.04
124	LOWER PERIYAR	1	60.00	0.00	5.88	94.12	3.01
		2	60.00	12.56	0.00	87.44	0.81
		3	60.00	0.00	0.00	100.00	3.85
	TOTAL :		180.00	4.19	1.96	93.85	2.56
126	NARIAMANGLAM	1	15.00	7.65	1.46	90.90	15.76
		2	15.00	10.31	0.73	88.96	21.12
		3	15.00	0.23	0.50	99.27	17.96
		4	25.00	8.01	16.08	75.92	3.28
	TOTAL :		70.00	6.76	6.32	86.92	12.92
127	PALLIVASAL	1	5.00	0.00	0.01	99.99	0.22
		2	5.00	6.47	0.13	93.41	0.00
		3	5.00	6.41	1.45	92.13	0.00
		4	7.50	4.38	0.01	95.61	0.00
		5	7.50	5.80	0.01	94.19	0.00
		6	7.50	0.00	0.02	99.98	0.07
	TOTAL :		37.50	3.75	0.22	96.03	0.04
128	PANNIAR	1	15.00	0.89	1.00	98.11	25.23
		2	15.00	18.73	0.95	80.32	21.60
	TOTAL :		30.00	9.81	0.97	89.22	23.42
129	PORINGALKUTTU	1	8.00	27.96	8.70	63.34	12.94
		2	8.00	12.21	4.67	83.12	17.49
		3	8.00	0.72	1.19	98.09	12.64
		4	8.00	15.95	10.82	73.22	5.32
	TOTAL :		32.00	14.21	6.35	79.44	12.10
130	SABARIGIRI	1	50.00	11.98	2.24	85.78	40.09
		2	50.00	8.91	0.99	90.10	63.66
		3	50.00	7.97	1.67	90.36	51.17
		4	50.00	8.07	4.04	87.89	57.76
		5	50.00	6.55	2.94	90.50	55.17
		6	50.00	7.06	1.12	91.82	54.41
	TOTAL :		300.00	8.42	2.17	89.41	53.71

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
131	SENGULAM	1	12.00	0.20	2.79	97.01	18.40
		2	12.00	14.85	3.30	81.85	44.75
		3	12.00	7.68	0.28	92.04	43.69
		4	12.00	7.23	0.62	92.15	22.49
	TOTAL :		48.00	7.49	1.75	90.76	32.33
132	SHOLAYAR	1	18.00	4.50	4.56	90.94	58.98
		2	18.00	13.22	1.14	85.64	52.27
		3	18.00	28.55	8.27	63.18	43.91
	TOTAL :		54.00	15.42	4.66	79.92	51.72
	TANGEDCO						
133	ALIYAR	1	60.00	10.10	1.07	88.83	0.00
	TOTAL :		60.00	10.10	1.07	88.83	0.00
134	BHAWANI BARRAGE III	1	15.00	0.58	0.05	99.37	0.00
		2	15.00	0.40	0.01	99.59	0.00
	TOTAL :		30.00	0.49	0.03	99.48	0.00
135	BHAWANI BARRAGE-II	1	15.00	0.57	6.46	92.97	4.82
		2	15.00	6.42	6.84	86.74	0.00
	TOTAL :		30.00	3.50	6.65	89.85	2.41
136	BHAWANI KATTAL	1	15.00	5.92	2.80	91.27	0.00
		2	15.00	5.18	3.92	90.90	0.00
	TOTAL :		30.00	5.55	3.36	91.09	0.00
137	KADAMPARI	1	100.00	6.90	12.52	80.59	0.00
		2	100.00	0.00	1.39	98.61	0.00
		3	100.00	6.10	38.36	55.54	0.00
		4	100.00	0.00	64.29	35.71	0.00
	TOTAL :		400.00	3.25	29.14	67.61	0.00
138	KODAYAR - I	1	60.00	7.81	15.28	76.91	0.03
	TOTAL :		60.00	7.81	15.28	76.91	0.03
139	KODAYAR - II	1	40.00	1.58	0.14	98.27	0.00
	TOTAL :		40.00	1.58	0.14	98.28	0.00
140	KUNDAH - I	1	20.00	0.33	0.44	99.23	0.00
		2	20.00	0.89	0.12	98.99	0.00
		3	20.00	2.37	0.14	97.49	0.00
	TOTAL :		60.00	1.20	0.23	98.57	0.00
141	KUNDAH - II	1	35.00	0.31	0.27	99.42	0.10
		2	35.00	12.15	1.87	85.97	0.04

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		3	35.00	28.27	0.16	71.57	0.00
		4	35.00	0.44	0.68	98.88	0.00
		5	35.00	2.59	0.64	96.77	0.00
	TOTAL :		175.00	8.75	0.72	90.52	0.03
142	KUNDAH - III	1	60.00	6.64	0.41	92.95	0.00
		2	60.00	30.37	0.09	69.54	0.04
		3	60.00	6.83	0.82	92.35	0.00
	TOTAL :		180.00	14.61	0.44	84.95	0.01
143	KUNDAH - IV	1	50.00	5.73	0.00	94.27	0.00
		2	50.00	0.64	0.00	99.36	0.00
	TOTAL :		100.00	3.19	0.00	96.82	0.00
144	KUNDAH - V	1	20.00	9.40	0.16	90.44	0.23
		2	20.00	0.00	15.48	84.52	0.00
	TOTAL :		40.00	4.70	7.82	87.48	0.12
145	LOWER METTUR - I	1	15.00	4.08	1.03	94.89	0.72
		2	15.00	6.22	6.16	87.62	1.76
	TOTAL :		30.00	5.15	3.60	91.25	1.24
146	LOWER METTUR - II	3	15.00	10.66	0.27	89.07	0.00
		4	15.00	10.32	0.18	89.50	0.00
	TOTAL :		30.00	10.49	0.23	89.28	0.00
147	LOWER METTUR - III	5	15.00	9.61	0.01	90.39	0.12
		6	15.00	9.75	0.73	89.52	0.00
	TOTAL :		30.00	19.36	0.37	80.27	0.06
148	LOWER METTUR - IV	7	15.00	4.70	0.00	95.30	0.00
		8	15.00	4.70	0.00	95.30	0.00
	TOTAL :		30.00	4.70	0.00	95.30	0.00
149	METTUR DAM	1	12.50	7.92	0.00	92.08	0.00
		2	12.50	0.64	0.00	99.36	0.00
		3	12.50	8.16	0.00	91.84	0.00
		4	12.50	0.53	0.00	99.47	0.00
	TOTAL :		50.00	4.32	0.00	95.68	0.00
150	METTUR TUNNEL	1	50.00	24.53	0.02	75.44	0.00
		2	50.00	24.54	0.00	75.46	0.00
		3	50.00	24.54	0.03	75.43	0.00
		4	50.00	19.24	0.02	80.75	0.00
	TOTAL :		200.00	23.21	0.02	76.77	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
151	MOYAR	1	12.00	4.78	1.50	93.72	0.01
		2	12.00	0.11	0.00	99.89	0.02
		3	12.00	9.19	14.00	76.81	0.02
	TOTAL :		36.00	4.69	5.17	90.14	0.01
152	PAPANASAM	1	8.00	0.50	0.41	99.10	0.02
		2	8.00	3.12	0.06	96.82	0.02
		3	8.00	8.08	0.05	91.86	0.02
		4	8.00	14.33	0.85	84.83	0.00
	TOTAL :		32.00	6.51	0.34	93.15	0.01
153	PARSON'S VALLEY	1	30.00	3.26	5.26	91.48	0.00
	TOTAL :		30.00	3.26	5.26	91.48	0.00
154	PERIYAR	1	35.00	12.27	6.33	81.40	0.02
		2	35.00	8.24	3.14	88.62	0.01
		3	35.00	0.02	1.86	98.12	0.11
		4	35.00	99.73	0.00	0.27	0.00
	TOTAL :		140.00	30.06	2.83	67.11	0.04
155	PYKARA	1	7.00	0.99	0.58	98.44	0.00
		2	7.00	0.65	1.22	98.14	0.00
		3	7.00	3.50	0.87	95.63	0.00
		4	13.60	0.10	0.00	99.90	0.00
		5	13.60	7.17	1.72	91.11	0.00
		6	11.00	0.70	0.00	99.30	0.00
	TOTAL :		59.20	2.41	0.71	96.88	0.00
156	PYKARA ULTMATE	1	50.00	8.03	0.27	91.70	0.00
		2	50.00	7.67	25.93	66.40	0.00
		3	50.00	7.41	0.25	92.35	0.00
	TOTAL :		150.00	7.70	8.81	83.49	0.00
157	SARKARPATHY	1	30.00	7.81	0.87	91.32	0.00
	TOTAL :		30.00	7.81	0.87	91.32	0.00
158	SHOLAYAR I&II	1	35.00	18.53	4.92	76.56	0.28
		2	35.00	7.91	4.58	87.51	0.03
		3	25.00	9.65	0.00	90.35	0.00
	TOTAL :		95.00	12.28	3.50	84.22	0.11
159	SURULIYAR	1	35.00	18.78	1.07	80.15	0.00
	TOTAL :		35.00	18.78	1.07	80.15	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
	TSGENCO						
160	LOWER JURALA	1	40.00	0.00	0.00	100.00	0.00
		2	40.00	0.00	0.00	100.00	0.00
		3	40.00	0.00	0.00	100.00	0.00
		4	40.00	0.00	0.00	100.00	0.00
	TOTAL :		160.00	0.00	0.00	100.00	0.00
161	NAGARJUN SGR	1	110.00	7.96	21.35	70.69	0.00
		2	100.80	7.97	15.77	76.26	0.00
		3	100.80	7.97	15.21	76.81	0.00
		4	100.80	7.97	15.28	76.74	0.00
		5	100.80	7.97	2.05	89.97	0.00
		6	100.80	10.15	0.00	89.85	0.00
		7	100.80	11.19	0.00	88.81	0.00
		8	100.80	9.76	0.00	90.24	0.00
	TOTAL :		815.60	8.86	8.85	82.29	0.00
162	NAGARJUN SGR LBC	1	30.00	59.44	0.00	40.56	23.22
		2	30.00	0.00	0.00	100.00	0.00
	TOTAL :		60.00	29.72	0.00	70.28	11.61
163	POCHAMPAD	1	9.00	0.00	0.00	100.00	0.00
		2	9.00	0.00	0.00	100.00	0.00
		3	9.00	0.00	0.00	100.00	0.00
	TOTAL :		27.00	0.00	0.00	100.00	0.00
164	PRIYADARSHNI JURALA	1	39.00	0.00	0.00	100.00	99.24
		2	39.00	0.00	0.23	99.77	96.00
		3	39.00	4.90	0.02	95.08	50.50
		4	39.00	0.00	0.03	99.97	98.99
		5	39.00	0.00	0.02	99.98	98.33
		6	39.00	0.00	0.01	99.99	99.19
	TOTAL :		234.00	0.82	0.05	99.13	90.37
165	SRISAILAM LB	1	150.00	0.00	8.40	91.60	0.00
		2	150.00	0.00	8.40	91.60	0.00
		3	150.00	8.40	0.00	91.60	0.00
		4	150.00	0.00	8.40	91.60	0.00
		5	150.00	0.00	18.09	81.91	0.00
		6	150.00	0.00	8.40	91.60	0.00
	TOTAL :		900.00	1.40	8.61	89.99	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
	EASTERN REGION						
	DEPL						
166	JORETHANG LOOP	1	48.00	0.00	0.21	99.79	0.00
		2	48.00	0.00	0.09	99.91	0.00
	TOTAL :		96.00	0.00	0.15	99.85	0.00
	DVC						
167	MAITHON	1	23.20	0.57	5.37	94.05	0.05
		2	20.00	2.99	11.98	85.02	0.00
		3	20.00	0.02	11.41	88.57	0.00
	TOTAL :		63.20	1.16	9.38	89.46	0.02
168	PANCHET	1	40.00	0.00	4.67	95.33	0.00
		2	40.00	9.56	25.94	64.50	0.00
	TOTAL :		80.00	4.78	15.30	79.92	0.00
	GISL						
169	CHUZACHEN	1	49.50	0.27	6.64	93.09	41.84
		2	49.50	0.26	5.85	93.89	46.60
	TOTAL :		99.00	0.27	6.24	93.49	44.22
	JUUVN						
170	SUBERNREKHA - I	1	65.00	0.00	0.52	99.48	0.00
	TOTAL :		65.00	0.00	0.52	99.48	0.00
171	SUBERNREKHA - II	2	65.00	0.00	78.24	21.76	0.00
	TOTAL :		65.00	0.00	78.24	21.76	0.00
	NHPC						
172	RANGIT	1	20.00	8.63	0.16	91.21	8.59
		2	20.00	10.19	0.05	89.76	7.63
		3	20.00	7.31	0.04	92.66	6.76
	TOTAL :		60.00	8.71	0.08	91.21	7.66
173	TEESTA LOW DAM-III	1	33.00	3.78	0.20	96.02	13.13
		2	33.00	4.15	2.28	93.57	11.92
		3	33.00	3.91	0.20	95.89	10.08
		4	33.00	4.76	0.18	95.06	12.42
	TOTAL :		132.00	4.15	0.71	95.14	11.89
174	TEESTA LOW DAM-IV	1	40.00	0.00	0.24	99.76	1.27
		2	40.00	0.00	0.01	99.99	0.00
	TOTAL :		80.00	0.00	0.13	99.87	0.63

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
175	TEESTA V	1	170.00	5.50	2.05	92.45	30.27
		2	170.00	8.17	1.51	90.32	25.89
		3	170.00	4.86	4.61	90.53	37.31
	TOTAL :		510.00	6.18	2.72	91.10	31.16
	OHPC						
176	BALIMELA	1	60.00	0.00	99.73	0.27	0.00
		2	60.00	7.48	0.35	92.18	0.00
		3	60.00	0.60	40.34	59.06	0.00
		4	60.00	9.37	0.46	90.17	0.00
		5	60.00	1.15	0.00	98.85	0.00
		6	60.00	4.08	0.00	95.92	0.00
		7	75.00	0.47	36.23	63.30	0.00
		8	75.00	7.91	0.00	92.09	0.00
	TOTAL :		510.00	3.90	21.90	74.20	0.00
177	HIRAKUD - I	1	49.50	49.13	16.50	34.37	0.00
		2	49.50	2.22	13.85	83.93	0.00
		3	32.00	8.40	8.12	83.47	0.00
		4	32.00	10.65	5.58	83.76	0.00
		5	37.50	9.04	4.45	86.50	0.00
		6	37.50	45.53	54.20	0.27	0.00
		7	37.50	9.54	1.27	89.18	0.00
	TOTAL :		275.50	20.17	15.20	64.63	0.00
178	HIRAKUD - II	1	24.00	4.65	0.25	95.10	0.00
		2	24.00	12.15	6.35	81.50	0.00
		3	24.00	0.00	99.73	0.27	0.00
	TOTAL :		72.00	5.60	35.44	58.96	0.00
179	RENGALI	1	50.00	5.22	4.88	89.90	0.00
		2	50.00	11.16	4.33	84.51	0.00
		3	50.00	0.78	2.01	97.21	0.00
		4	50.00	8.30	5.14	86.57	0.00
		5	50.00	10.01	3.00	86.99	0.00
	TOTAL :		250.00	7.09	3.87	89.04	0.00
180	UPPER INDRAVATI	1	150.00	6.90	0.00	93.10	0.00
		2	150.00	6.74	0.07	93.19	0.00
		3	150.00	35.67	0.00	64.33	0.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		4	150.00	3.01	0.00	96.99	0.00
	TOTAL :		600.00	13.08	0.02	86.90	0.00
181	UPPER KOLAB	1	80.00	133.67	0.00	-33.67	0.00
		2	80.00	1.24	0.41	98.35	0.00
		3	80.00	0.83	7.10	92.06	0.00
		4	80.00	0.90	2.30	96.80	0.00
	TOTAL :		320.00	34.16	2.45	63.39	0.00
	WBSEDCL						
182	JALDHAKA ST-I	1	9.00	8.92	36.58	54.50	16.95
		2	9.00	10.11	12.73	77.16	12.58
		3	9.00	0.97	17.44	81.59	40.94
	TOTAL :		27.00	6.67	22.25	71.08	23.49
183	PURULIA	1	225.00	1.47	0.10	98.43	0.00
		2	225.00	1.32	69.18	29.49	0.00
		3	225.00	1.25	0.08	98.67	0.00
		4	225.00	0.40	19.11	80.49	0.00
	TOTAL :		900.00	1.11	22.12	76.77	0.00
184	RAMMAM	1	12.50	1.37	0.03	98.60	0.05
		2	12.50	1.37	0.00	98.63	0.00
		3	12.50	1.37	0.15	98.48	0.04
		4	12.50	1.37	0.12	98.51	0.04
	TOTAL :		50.00	1.37	0.08	98.55	0.03
	NORTH EASTERN REGION						
	APGPCL						
185	KARBI LANGPI	1	50.00	4.67	1.88	93.45	25.56
		2	50.00	5.18	2.57	92.25	28.02
	TOTAL :		100.00	4.93	2.23	92.84	26.79
	MePGCL						
186	KYRDEMKULAI	1	30.00	0.00	99.73	0.27	0.00
		2	30.00	0.00	0.52	99.48	0.00
	TOTAL :		60.00	0.00	50.12	49.88	0.00
187	MYNTDU(LESHKA) St-1	1	42.00	4.16	1.22	94.63	4.54
		2	42.00	14.53	0.23	85.24	3.60
		3	42.00	8.68	0.53	90.78	18.73
	TOTAL :		126.00	9.12	0.66	90.22	8.96

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2015-2016

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
188	UMIAM ST-I	1	9.00	1.78	0.30	97.91	0.00
		2	9.00	1.51	0.39	98.10	0.00
		3	9.00	15.23	0.61	84.16	0.00
		4	9.00	16.46	1.86	81.69	0.00
	TOTAL :		36.00	8.74	0.79	90.47	0.00
189	UMIAM ST-IV	7	30.00	7.53	1.33	91.13	0.00
		8	30.00	7.40	1.59	91.01	0.00
	TOTAL :		60.00	7.47	1.46	91.07	0.00
	NEEPCO						
190	DOYANG	1	25.00	5.14	0.00	94.86	0.00
		2	25.00	9.69	0.00	90.31	0.00
		3	25.00	5.11	0.00	94.89	0.00
	TOTAL :		75.00	6.65	0.00	93.35	0.00
191	KHONDONG	1	25.00	9.23	0.43	90.33	0.00
		2	25.00	0.00	1.13	98.87	0.00
	TOTAL :		50.00	4.62	0.78	94.60	0.00
192	KOPILI	1	50.00	0.19	22.07	77.74	10.03
		2	50.00	0.19	32.21	67.60	1.63
		3	50.00	0.47	43.77	55.76	0.00
		4	50.00	0.47	53.01	46.52	0.00
		5	25.00	0.00	2.09	97.91	0.00
	TOTAL :		225.00	0.29	33.80	65.91	2.59
193	RANGANADI	1	135.00	4.84	0.00	95.16	0.00
		2	135.00	2.33	0.16	97.51	0.00
		3	135.00	2.32	0.00	97.68	0.00
	TOTAL :		405.00	3.16	0.05	96.79	0.00
	NHPC						
194	LOKTAK	1	35.00	5.21	0.20	94.59	0.38
		2	35.00	13.62	0.23	86.15	0.62
		3	35.00	11.14	1.02	87.84	0.02
	TOTAL :		105.00	9.99	0.49	89.52	0.34

CHAPTER 7

GENERATION
PROGRAMME FOR THE
YEAR 2016-17

CHAPTER 7

GENERATION PROGRAMME FOR THE YEAR 2016-17

7.1 As on 31.03.2016, 194 HE Stations (of more than 25 MW capacity) having total installed capacity of 42783.42 MW are being monitored in the country. With the addition of new hydro units during 2016-17, the anticipated installed capacity of H.E. Stations in the country would be 44975.42 MW (above 25 MW capacity) by 31st March, 2017. Generation Programme for H.E. stations in the country for the year 2016-17 has been fixed at 139000 MU (including 5000 MU import from Bhutan) which was 12379.04 MU more than actual generation of 126620.96 MU (including 5244.21 MU import from Bhutan during 2015-16).

7.2 Region wise details of likely installed capacity on 31.03.2017, Generation Programme for 2016-17 and actual generation during 2015-16 are given in **Table 7.1** below:

TABLE 7.1

REGION-WISE LIKELY INSTALLED CAPACITY OF HE STATIONS AND HYDRO GENERATION PROGRAMME DURING 2016-17

Sl. No.	Region	Likely Hydro Installed Capacity (as on 31.03.2017) (MW)	Hydro Generation Programme for 2016-17 (MU)	Hydro Generation during 2015-16 (MU)	
				Programme	Actual
1.	Northern	18797.27	70932	64500	73105.18
2.	Western	7392.00	15719	16012	12845.34
3.	Southern	11842.45	29900	31818	20981.67
4.	Eastern	5551.70	13040	11638	10237.87
5.	North-Eastern	1392.00	4409	4032	4206.70
Sub total		44975.42	134000	128000	121376.75
6.	Import – from Bhutan		5000	4800	5244.21
Total(Including Import from Bhutan)			139000	132800	126620.96

7.3 While finalizing the Generation Programme for 2016-17, it was anticipated that 25 H.E. units having installed capacity of 2312 MW will be added during the year. Unit wise details of these units are given in **Annex-7.1**.

7.4 Actual generation during the year 2015-16 from H.E. Stations was 126620.96 MU against the Generation Programme of 132800 MU including import from Bhutan. Sector-wise and Utility-wise details of likely installed Capacity as on 31.03.2017, targets and actual generation during 2015-16, generation target for 2016-17 are given in **Annex-7.2**.

**HYDRO ELECTRIC GENERATING UNITS LIKELY TO BE ADDED
DURING 2016-17**

Sl. No	Name of the Project	State/ Organization	Unit No.	Capacity (MW)	Programmed Date of Commissioning
	Central Sector				
1	Kishenganga	J&K / NHPC Ltd.	U-1 U-2 U-3	110 110 110	Oct 2016 Nov 2016 Nov 2016
2	Teesta Low Dam IV	West Bengal / NHPC Ltd.	U-3 U-4	40 40	May 2016 June 2016
3	Pare	Arunachal Pradesh/ NEEPCO	U-1 U-2	55 55	Nov 2016 Dec 2016
	State Sector				
4	Sainj	HP /HPPCL	U-1 U-2	50 50	Sept 2015 Sept 2015
5	Kashang I	HP /HPPCL	U-1	65	Apr 2016
6	Pulichinthala	Telangana / TSGENCO	U-1 U-2 U-3 U-4	30 30 30 30	July 2016 July 2016 Dec 2016 Dec 2016
7	Lower Jurala	Telangana/ TSGENCO	U-4 U-5 U-6	40 40 40	Apr 2016 Oct 2016 Nov 2016
8	NJ Sagar TPD	AP/ APGENCO	U-1 U-2	25 25	Apr 2016 Dec 2016
9	New Umtru	Meghalaya/ MePGCL	U-1 U-2	20 20	Dec 2016 Dec 2016
10	Teesta III	Sikkim/ Teesta Urja Ltd.	U-1 U-2 U-3 U-4 U-5 U-6	200 200 200 200 200 200	Dec 2016 Dec 2016 Dec 2016 Mar 2017 Mar 2017 Mar 2017
	Private Sector				
11	Tashiding	Sikkim/DEPL	U-1 U-2	48.50 48.50	Dec 2016 Jan 2017
		Total: 2016-17	25	2312	

**SECTORWISE PERFORMANCE OF HYDRO ELECTRIC STATIONS
DURING 2015-16 & TARGETS FOR 2016-17**

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2017	Generation during 2015-16 (MU)		Generation Programmed for 2016-17 (MU)
		Targets	Actual	
A. CENTRAL SECTOR				
BBMB	2866.30	9076	11818.90	9536
SJVN Ltd	1912.02	8000	9297.20	8595
NTPC Ltd	800.00	890	2308.60	2800
THDC Ltd	1400.00	3952	4349.05	4100
NHPC Ltd	5371.20	21190	23403.43	22440
NHDC	1520.00	3315	2929.22	3100
DVC	143.20	219	176.51	240
NEEPCO	865.00	2283	2400.24	2585
Sub Total	14877.72	48925	56683.15	53400
B. STATE ELECTRICITY BOARDS/CORPORATIONS				
HPSEBL	366.00	1062	1161.81	1465
HPPCL	165.00			266
JKSPDCL	1110.00	3634	3980.30	5144
RRVUNL	411.00	700	1033.80	710
PSPCL	1051.00	3719	4327.84	4069
UPJVNL	501.60	1115	935.08	1161
UJVNL	1252.15	4498	4762.86	4700
GSECL	540.00	840	781.42	840
SSNNL	1450.00	3544	2170.43	3263
MPPGCL	875.00	2621	1940.60	2383
MAHAGENCO	2406.00	3956	3519.33	4358
CSPGCL	120.00	250	323.30	260
APGENCO	1796.75	3773	2511.31	3604
TSGENCO	2396.60	3606	282.33	3132
KPCL	3585.40	12726	7350.01	11429
KSEBL	1881.50	6751	6363.75	6834
TANGEDCO	2182.20	4962	4474.27	4901
JUUNL	130.00	154	51.24	154
OHPC	2027.50	5749	4432.83	5621
WBSEDCL	977.00	1596	1491.70	1596
APGCL	100.00	390	408.88	390
MePGCL	322.00	859	860.94	919

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2017	Generation during 2015-16 (MU)		Generation Programmed for 2016-17 (MU)
		Targets	Actual	
TUL*	1200.00	47	0	552
Sub Total	26846.70	66552	53154.06	67199
C. PRIVATE SECTOR				
MPCL(HP)	86.00	341	341.94	341
ADHPL(HP)	192.00	700	724.96	686
GBHPPL(HP)	70.00	255	287.85	282
EPPL (HP)	100.00	370	354.42	370
HBPCL (HP)	1300.00	5676	6030.82	5500
JPPVL (UK)	400.00	1776	1210.65	1776
TPCL (MAHA.)	447.00	1450	1098.49	1450
DLHP(MAHA.)	34.00	36	82.55	65
GIPL(SIKKIM)	99.00	475	421.43	495
AHPC (UK)	330.00	1114	901.37	1396
DEPL (SIKKIM)	96.00	85	75.06	488
Sub Total	3251.00	12523	11529.54	13401
Total All India	44975.42	128000	121376.75	134000
Import from Bhutan		4800	5244.21	5000
Total Hydro generation including import from Bhutan		132800	126620.96	139000

*Teesta Urja is now Govt. of Sikkim Enterprise.

CHAPTER 8

RENOVATION & MODERNISATION OF HYDRO- ELECTRIC STATIONS

CHAPTER – 8

RENOVATION & MODERNISATION OF HYDRO ELECTRIC POWER PROJECTS

8.0 Introduction

Renovation & Modernization (R&M) and uprating wherever feasible of old hydro power plants in the present scenario of resource constraint is considered to be the best option for bridging the gap between the demand and supply of power as R&M schemes are cost effective and quicker than the setting up of green field power plants.

8.1 R&M Phase-I Programme:

Recognising the benefits of the R&M programme, Govt. of India set up a National Committee in 1987 to formulate strategy on R&M of hydro power projects. Based on the recommendations of the National Committee and subsequent reviews, a programme for Renovation, Modernization and Uprating of Hydro Power Stations was formulated by Central Electricity Authority in which 55 schemes were identified with an aggregate capacity of 9653 MW. The total costs of these schemes were estimated as Rs.1493 Crores with expected benefit of 2531 MW.

8.2 R&M Phase-II Programme:

As per the hydro policy of Govt. of India declared in 1998, Renovation & Modernization of Hydro Power Plants was accorded priority. Accordingly, 67 hydro R&M schemes having an aggregate capacity of 10318 MW were identified to be undertaken under Phase-II programme till the end of X Plan to accrue a benefit of 3685 MW at an estimated cost of Rs. 2161 Crores.

8.3 National Perspective Plan:

CEA formulated the National Perspective Plan for hydro power stations in the year 2000 and incorporated R&M proposals under Phase-II programme alongwith the left out schemes as recommended in Phase-I programme of National Committee. The left out schemes were those which were either under implementation or were yet to be implemented. This Perspective Plan was for IX, X and XI Plan with 117 schemes having an aggregate installed capacity of 19370 MW with benefit of 7755MW at an estimated cost of Rs.4654 crores.

8.4 VIII, IX, X and XI Plan Achievements:

Under the hydro R&M programme, 83 (19 in Central Sector and 64 in State Sector) hydro electric schemes (13 upto the VIII Plan, 20 in the IX Plan, 32 in the X Plan and 18 in the XI Plan) with an installed capacity of 15332 MW at a cost of Rs. 2,021 Crores have been completed by the end of the XI Plan (i.e. by 31.03.2012) & have accrued a benefit of 3086 MW through Life Extension, Uprating and Restoration. The state-wise list of hydro R&M schemes completed during the VIII, IX, X Plan & XI Plan is given at Annex. I, II, III & IV respectively.

8.5 XII & XIII Plan Programme:

During XII Plan, a total of 22 hydro R&M schemes (2 in Central Sector and 20 in State Sector) having an installed capacity of about 3042 MW and which will accrue benefit of about 567 MW through uprating, life extension and restoration are expected to be

completed at an estimated cost of about Rs. 1353 Crores. A total of 46 schemes having an installed capacity of about 8792 MW are programmed as on date for implementation during XIII Plan & beyond and which will accrue benefit of about 3647 MW. The state-wise list of hydro R&M schemes expected for completion during XII Plan (22 schemes) and XIII Plan & beyond (46 schemes) is given at Annex-V and Annex-VI respectively. Out of the 22 schemes expected for completion during XII Plan, 2 schemes in Central Sector and 14 schemes in State Sector with an installed capacity of about 2889 MW have been completed till March, 2016 and have accrued a benefit of 466 MW through Upgrading, Life Extension and Restoration.

State-wise list of additional hydro projects identified as on March, 2016 for undertaking RMU&LE works is given at Annex-VII.

Plan-wise summary of R&M of H.E. Projects starting from VIII Plan is given below:

8.6 Summary of R&M of Hydro Projects (As on 31.03.2016)

I Hydro R&M schemes completed up to XI Plan

Sl. No.	Plan Period	No. of Projects			Installed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total				
1.	VIII Plan Schemes completed	2	11	13	1282.00	125.57	127.37	429.00 [39.00(U) + 336.00(Res.) + 54.00(LE)]
2.	IX Plan Schemes completed	8	12	20	4892.10	597.84	570.16	1093.03 [339.00(U) + 331.03(Res.) + 423.00(LE)]
3.	X Plan Schemes completed	5	27	32	4336.60	1016.31	1028.97	829.08 [123.40(U) + 701.25 (LE) + 4.43(Res.)]
4.	XI Plan Schemes completed	4	14	18	4821.20	412.83	294.84	735 [12 (U) + 15 (LE) + 708 (Res.)]

II Candidate Hydro R&M schemes programmed for completion during XII Plan

Sl. No.	Description of Status of Scheme	No. of Projects			Installed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total				
1.	Programmed (Original)	5	40	45	7105.40	5405.85	-	3344.25 [182.05(U) + 3147.20(LE) + 15(Res.)]
	Revised	2	20	22	3041.90	1352.67	1032.96	566.70 [43(U) + 508.70(LE) + 15(Res.)]

Sl. No.	Description of Status of Scheme	No. of Projects			Installed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total				
2.	Completed	2	14	16	2888.6	875.82	784.17	466 [43 (U)+ 408 (LE)+15(Res.)]
3.	Under Implementation	0	6	6	153.30	476.85	248.79	100.70 [100.70(LE)]
4.	Under Tendering	-	-	-	-	-	-	-

III Candidate Hydro R&M schemes to be taken up during the XII Plan and programmed for completion in the XIII Plan & beyond

Sl. No.	Description of Status of Scheme	No. of Projects			Installed Capacity (MW)	Estimated Cost [#] (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total				
1.	Programmed	8	38	*46	8791.50	5837.18	621.77	3647.15 [191.25(U) + 3455.90(LE)]
2.	Under Implementation	4	9	13	3874.00	1536.10	581.88	1389.60 [131.20 (U)+ 1258.40 (LE)]
3.	Under Tendering	2	10	12	2026.75	2997.58	31.55	1215.55 [28.80 (U) + 1186.75 (LE)]
4.	Under DPR Preparation	2	10	12	2045.75	1303.50	8.34	1042 [31.25(U) + 1010.75 (LE)]
5.	Under RLA Studies	-	9	9	845.00	-	-	-

Abbreviations: MW – Mega Watt; Res. – Restoration; U – Uprating; LE – Life Extension

* Out of these 46 schemes, 24 schemes have been rescheduled for completion from XII Plan to XIII Plan & beyond.

Estimated cost of 12 schemes not included in the Estimated Cost as the Estimates of these schemes are yet to be finalized.

8.7 Programme for the year 2015-16

For the year 2015-16, it was programmed to complete following 7 schemes having an installed capacity of 1042.50 MW. On completion of these schemes, benefit of about 258 MW through Life Extension, Restoration and Uprating were expected at an estimated cost of about Rs.369 Crores.

S. No. Name of Scheme (I.C. in MW), Agency

1. Chenani (5x4.66 MW), J&KPDC
2. Sumbal Sindh (2x11.3 MW), J&KPDC

3. Matatila (3x10.2 MW), UPJVNL
4. Srisaillam RB (7x110 MW), APGENCO
5. Bhadra River Bed units (2x12 MW), KPCL
6. Poringalkuthu (4x8 MW), KSEB
7. Periyar (1x35 MW+3x42 MW), TANGEDCO

8.8 Achievement during the year 2015-16

R&M schemes namely Matatila (3x10.2 MW) of UPJVNL, Srisaillam RB (7x110 MW) of APGENCO, Poringalkuthu (4x8 MW) of KSEB and Periyar (1x35 MW+3x42 MW) of TANGEDCO having an aggregate installed capacity of about 973 MW have been completed during the year 2015-16 at an actual cost of about Rs. 209 Crores and accrued benefit of about 235 MW through Life Extension, Upgrading and Restoration.

8.9 Programme for the year 2016-17

For the year 2016-17, it is programmed to complete following 6 schemes having an installed capacity of about 153 MW. On completion of these schemes, there will be a benefit of about 101 MW through Life Extension at an estimated cost of about Rs.477 Crores.

S. No. Name of Scheme (I.C. in MW), Agency

1. Chenani (5x4.66 MW), J&KSPDC
2. Sumbal Sindh (2x11.3 MW), J&KSPDC
3. Ganderbal (2x3 MW+2x4.5 MW), J&KSPDC
4. Khatima (3x13.8 MW), UJVNL
5. Bhadra River Bed units (2x12 MW), KPCL
6. Jaldhaka St.I (3x9 MW), WBSEDCL

State wise List of Hydro RMU&LE schemes completed upto the VIII Plan

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Himachal Pradesh								
1.	Bairasiul, NHPC	CS	3x60	25.98	25.98	18.00 (U)	RM&U	1991-92
2.	Giri, HPSEB	SS	2x30	9.85	7.90	6.00 (U)	RM&U	1995-96
Punjab								
3.	UBDC-I, PSPCL	SS	3x15	11.00	8.00	11.00 (Res)	R&M+Res.	1990-92
Uttar Pradesh								
4.	Rihand, UPJVNL	SS	6x50	1.43	1.43	100.00 (Res)	R&M+Res.	1995-96
Karnataka								
5.	Nagihari, U-2, KPCL	SS	1x135	11.97	11.32	15.00 (U)	RM&U	1995-96
6.	Shivasamudram, VVNL	SS	6x3 + 4x6	8.00	8.00	18.00 (LE)	RM&LE (3 MW Units)	N.A.
Kerala								
7.	Sholayar, KSEB	SS	3x18	7.58	7.58	-	R&M	1996-97
Tamil Nadu								
8.	Kadamparai (Units 3&4), TANGEDCO	SS	2x100	23.17	33.69	200.00 (Res)	R&M+Res.	1993-95
9.	Kundah III (Units 1&2), TANGEDCO	SS	2x60	5.45	3.20	-	R&M	1991-92
10.	Moyar, TANGEDCO	SS	3x12	1.62	1.30	36.00 (LE)	RM&LE	1990-91
11.	Sholayar-I, TANGEDCO	SS	2x35	1.40	0.85	-	R&M	1994-95
Meghalaya								
12.	Khandong, U-1, NEEPCO	CS	1x25	0.62	0.62	25.00 (Res)	R&M+Res.	1991-92
Tripura								
13.	Gumti, TSECL	SS	3x5	17.50	17.50	-	R&M	1994-95
	Total		1282.00	125.57	127.37	429.00 [39.0 (U) + 336.0 (Res) + 54.0(LE)]		

Abbreviations: R&M – Renovation & Modernisation; U – Up-rating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector; SS- State Sector

State wise List of Hydro RMU&LE schemes completed in the IX Plan

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Himachal Pradesh								
1.	Bhakra RB, BBMB	CS	5x132	88.45	90.68	125.00 (U)	RM&U	2000-01
2.	Dehar U-2, BBMB	CS	1x165	10.74	10.74	25.00 (Res.)	R&M+Res.	1998-99
3.	Bairasiul, NHPC	CS	3x66	18.45	18.45	-	R&M	2000-01
4.	Bassi, HPSEB	SS	4x15	5.35	4.3446	-	R&M	2000-01
Jammu & Kashmir								
5.	Salal St.I, NHPC	CS	3x115	51.50	51.50	-	R&M	2000-01
6.	Chenani, J&KSPDC	SS	5x4.66	11.00	11.00	0.93 (Res)	R&M+Res.	2000-01
Punjab								
7.	Ganguwal, U-2, BBMB	CS	1x24.2	18.90	15.00	22.00 (LE)+ 2.20 (Res)	RM&LE+ Res.	1997-98
8.	Kotla, U-3, BBMB	CS	1x24.2	18.90	16.90	22.00 (LE)+ 2.20 (Res)	RM&LE+ Res.	1998-99
9.	Ganguwal U-3, BBMB	CS	1x24.2	25.00	43.40	22.00 (LE)+ 2.20 (Res)	RM&LE+ Res.	2000-01
10	Kotla U-2, BBMB	CS	1x24.2	25.00		22.00 (LE)+ 2.20 (Res)	RM&LE+ Res.	2001-02
Uttarakhand								
11	Chilla U-1, 3& 4, UJVNL	SS	3x36	4.25	4.1136	-	R&M	1998-99
12	Tiloth, UJVNL	SS	3x30	8.02	5.513	6.00 (U)	RM&U	1998-99
Andhra Pradesh								
13	Lower Sileru, APGENCO	SS	4x115	13.35	9.30	24.00 (Res)	R&M+Res.	2001-02
14	Srisaillam, APGENCO	SS	7x110	16.32	11.40	-	R&M	2001-02
Karnataka								
15	Sharavathy, U-1 to 8, KPCL	SS	8x89.1	65.00	63.49	115.20 (U)+ 178.20 (Res)	RM&U +Res.	1997-98
16	Sharavathy, U-9&10, KPCL	SS	2x89.1	17.96	14.68	28.80 (U)+ 19.10 (Res)	RM&U +Res.	1997-98
Orissa								
17	Hirakud-I, U1&2, OHPC	SS	2x37.5	95.10	95.10	75.00(LE)+ 24.00(U)	RMU&LE	1997-98

Annex-8.2
(Sheet 2/ 2)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Gujarat								
18	Ukai, U-1&3, GSECL	SS	2x75	24.99	24.99	75.00 (Res)	R&M+Res.	1997-98
Maharashtra								
19	Koyna I&II, MSPGCL	SS	4x65+ 4x75	74.91	74.91	40.00 (U) + 260.00 (LE)	RM&U of St-I & II & LE of St-I	1999-2000
20	Koyna III, U-10, 11 &12, MSPGCL	SS	3x80	4.65	4.65	-	R&M	1997-98
	Total		4892.10	597.84	570.16	1093.03 [339.0(U) + 331.03(Res) +423.0(LE)]		

Abbreviations: R&M – Renovation & Modernisation; U – Uprating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector; SS- State Sector

State wise List of Hydro RMU&LE schemes completed in the X Plan

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of completion
				(Rs. in Crs.)				
Himachal Pradesh								
1.	Pong, BBMB	CS	6x60	17.70	17.79	36.00 (U)	RM&U	2003-04
Punjab								
2.	Ganguwal,U-1, BBMB	CS	1x29.25	51.28 (incl. IDC 6.28)	81.9935	25.89 (LE) +2.10 (Res)	RM&LE+Res.	2006-07
3.	Kotla, U-1, BBMB	CS	1x29.25	51.28 (incl. IDC 6.28)		26.61 (LE) +2.33 (Res)	RM&LE + Res.	2006-07
4.	Shanan Ph.A, PSPCL	SS	4x15+ 1x50 \$	11.35	10.93	-	R&M	2003-04
5.	Shanan, Ph.B, PSPCL	SS	4x15+ 1x50 \$	35.95	13.34	60.00 (LE)	RM&LE (LE for 15 MW units + R&M for 50 MW unit)	2006-07
6.	Anandpur Sahib, PSPCL	SS	4x33.5	3.68	1.04	-	R&M	2006-07
7.	UBDC I&II, PSPCL	SS	3x15 + 3x15.45	7.89	2.44	45.00 (LE)	RM&LE (LE for 3x15 MW & R&M for 3 x 15.45 MW	2006-07
8.	Mukerian St.I, PSPCL	SS	3x15	6.04	4.38	-	R&M	2006-07
Uttarakhand								
9.	Chibro, UJVNL	SS	4x60	10.45	10.52	-	R&M	2006-07
Karnataka								
10.	Nagjhari, U-1&3, KPCL	SS	2x135	26.12	21.62	30.00 (U)	RM&U	2002-03
11.	Supa PH. KPCL	SS	2x50	2.64	2.47	-	R&M	2002-03

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
12	Mahatma Gandhi, VVNL	SS	4x12+ 4x18	44.66	43.13	19.20 (U) +120.00 (LE)	RMU&LE	2002-03
13	Munirabad, VVNL	SS	2x9+ 1x10.3	3.64	3.53	28.30 (LE)	RM&LE	2002-03
14	Mani Dam, KPCL	SS	2x4.5	1.00	1.00	-	R&M	2002-03
15	Shivasamudram, VVNL	SS	6x3+ 4x6	68.38	73.17	42.00 (LE)	RM&LE	2004-05
16	Bhadra, Ph.II, KPCL	SS	1x2	3.30	2.51	2.00 (LE)	RM&LE	2005-06
17	Varahi, KPCL	SS	2x115	2.57	2.66	-	R&M	2006-07
18	Sharavathy, Ph.A, KPCL	SS	10x103.5	5.22	3.52	-	R&M	2006-07
Kerala								
19	Neriamangalam KSEB	SS	3x15	58.00	53.05	9.00 (U)+ 45.00 (LE)	RMU&LE	2006-07
20	Pallivasal, KSEB	SS	3x5+3x 7.5	94.00	371.71	37.50 (LE)	RM&LE	2002-03
21	Sengulam, KSEB	SS	4x12	114.00		48.00 (LE)	RM&LE	2002-03
22	Panniar, KSEB	SS	2x15	62.00		30.00 (LE)	RM&LE	2002-03
Tamilnadu								
23	Pykara, TANGEDCO	SS	3x6.65+ 1x11+2x 14	26.06	20.147	58.95(LE)	RM&LE	2004-05
24	Papanasam, TANGEDCO	SS	4x7	27.05	22.61	4.00 (U) + 28.00 (LE)	RMU&LE	2005-06
Orissa								
25	Hirakud-I (Sw.yard), OHPC	SS	Switch-yard	9.85	15.88	-	R&M	2006-07
26	Hirakud-I, U-3&4, OHPC	SS	2x24	126.14	108.86	16.00 (U)+ 48.00 (LE)	RMU&LE	2005-06
West Bengal								
27	Maithon, U-2, DVC	CS	1x20	42.08	36.94	3.20 (U)+ 20.00 (LE)	RMU&LE	2004-05

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of completion
				(Rs. in Crs.)				
Maharashtra								
28	Bhira Tail Race, MSPGCL	SS	2x40	1.60	0.70	-	R&M	2003-04
29	Tillari, MSPGCL	SS	1x60	4.50	4.24	6.0 (U)	RM&U	2004-05
30	Koyna Gen. Complex, MSPGCL	SS	4x70+4x80+4x80	12.00	11.50	-	R&M	2004-05
Meghalaya								
31	Umium St.I MePGCL	SS	4x9	81.88	84.21	36.00 (LE)	RM&LE	2002-03
32	Khandong, NEEPCO	CS	2x25	4.00	3.3499	-	R&M	2003-04
	Total		4336.60	1016.31	1028.9704	829.08 [123.40(U) +701.25 (LE) + 4.43(Res.)]		

\$ - Installed Capacity of Shanan Ph.B, at Sl. No. 5 not included in the total, as the same has already been accounted for at Sl. No. 4.

Abbreviations: R&M – Renovation & Modernisation; U – Upgrading; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector; SS- State Sector

State-wise List of Hydro RMU&LE schemes completed in the XI Plan

S. No	Project, Agency	CS/SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Completion Schedule
				(Rs. in Crs.)				
Completed Schemes								
Himachal Pradesh								
1.	Dehar Ph. A BBMB	CS	6x165	11.00	6.936		R&M	2010-11 Completed
2.	Dehar Ph. B BBMB	CS	6x165	49.00	24.454	330 (LE)	RM&LE	2009-10 Completed
Uttarakhand								
3	Tanakpur, NHPC	CS	3x31.4	10.77	11.95	-	R&M	2007-08 Completed
4	Khodri Ph.A UJVNL	SS	4x30	5.25	6.39	-	R&M	2008-09 Completed
5	Chilla Ph.A, UJVNL	SS	4x36	23.55	21.24	-	R&M	2008-09 Completed
Andhra Pradesh								
6	Upper Sileru, APGENCO	SS	4x60	4.20	3.34	-	R&M	2009-10 Completed
Karnataka								
7	Nagjhari, U1 to 6, KPCL	SS	5x150 + 1x135	14.75	15.31	-	R&M	2009-10 Completed
8	Sharavathy Ph.B, KPCL	SS	10x103.5	20.50	11.14	-	R&M	2009-10 Completed
9	Supa, KPCL	SS	2x50	3.45	4.90	-	R&M	2009-10 Completed
10	Bhadra, KPCL	SS	2x12	1.44	0.85	-	R&M	2009-10 Completed
11	Lingnamakki, KPCL	SS	2x27.5	3.81	2.62	-	R&M	2010-11 Completed
Tamil Nadu								
12	Mettur Dam, TANGEDCO	SS	4x10	30.17	24.16	10 (U) + 40 (LE)	RMU&L E	2007-08 Completed
Maharashtra								
13	Koyna St.I & II, MSPGCL	SS	4x70 + 4x80	87.50	81.82	-	R&M	2008-09 Completed
14	Vaitarna, MSPGCL	SS	1x60	16.00	0.14	-	R&M	2009-10 Completed
15	Koyna Dam PH, MSPGCL	SS	2x18	5.78	0.25	-	R&M	2009-10 Completed
16	Koyna St.III, MSPGCL	SS	4x80	16.65	5.79	320 (LE)	RM&LE	2011-12 Completed
Manipur								
17.	Loktak, NHPC	CS	3x30 derated	18.55	17.88	15.00 (Res.)	R&M + Res.	2011-12 Completed

Annex-8.4
(Sheets 2 of 2)

S. No	Project, Agency	CS/SS	Inst. Cap. (MW)	Estimated Cost	Actual Expenditure	Benefits (MW)	Category	Completion Schedule
				(Rs. in Crs.)				
Meghalaya								
18	Umium St.II, MePGCL	SS	2x9	90.46	55.67 (as on 31.03.12)	2(U)+ 18.00 (LE)	RMU&LE	2011-12
	Total		4821.20	412.83	294.84	735 [12.00(U) + 708.00 (LE) + 15.0(Res)]		

**Abbreviations: R&M – Renovation & Modernization; U – Upgrading; LE – Life Extension; Res – Restoration;
MW – Mega Watt; CS-Central Sector; SS- State Sector**

State-wise List of Hydro RMU&LE schemes programmed for completion in the XII Plan
(As on 31.03.2016)

(As on 31.03.2016)								
S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Completed Schemes								
Odisha								
1	Rengali Unit-1 OHPC	SS	1x50	47.50	36.76 (as on 30.06.12)	50(LE)	RM&LE	2012-13
2	Rengali Unit-2 OHPC	SS	1x50	25.2 (approx)	20.73	50(LE)	RM&LE	2013-14
Himachal Pradesh								
3	Bassi, HPSEB	SS	4x15	124.25	158.25 (as on 31.12.15)	6.0(U)+ 60 (LE)	RMU&LE	2013-14
Andhra Pradesh								
4	Lower Sileru, APGENCO	SS	4x115	8.75	6.77	-	R&M	2013-14
5	Srisailem RB, APGENCO	SS	7x110	16.70	16.56	-	R&M	2015-16
Telangana								
6	Nagarjuna Sagar Ph-I, TSGENCO	SS	1x110+ 7x100.8	33.35	13.90 (as on 31.03.2012)	-	R&M	2012-13
Kerala								
7	Idamalayar, KSEB	SS	2x37.5	14.50	13.22 (as on 31.03.13)	-	R&M	2012-13
8	Sabarigiri, KSEB Unit-4	SS	1x55	52.2	50.41 (as on 30.09.15)	5(U)	RM&U	2014-15
9	Poringalkuthu, KSEB	SS	4x8	88.63	51.63 (as on 31.12.15)	4 (U) + 32.00 (LE)	RMU&LE	2015-16
Assam								
10	Khandong, NEEPCO	CS	1x25	25.05	29.18 (as on 30.09.14)	25.00 (LE)	RM&LE	2014-15
11	Kopili, NEEPCO	CS	2x50	50.22	50.92 (as on 30.09.14)	-	R&M & Refurbishme nt of Units 1 & 2	2014-15
Karnataka								
12	Supa, KPCL	SS	2x50	3.45	3.88 (as on 30.09.14)	-	R&M	2014-15
Uttarakhand								
13	Pathri, UJVNL	SS	3x6.8	113.25	107.54	20.40(LE)	RM&LE	2014-15
Jammu & Kashmir								
14	Lower Jhelum, J&KSPDC	SS	3x35	101.30	83.65 (as on 31.12.14)	15.00 (Res.)	R&M+ Res.	2014-15
Uttar Pradesh								
15	Matatila, UPJVNL	SS	3x10.2	10.29	7.09 (as on 31.12.15)	30.6 (LE)	RM&LE	2015-16
Tamil Nadu								
16	Periyar, TANGEDCO	SS	4x35	161.18	133.68	28.00(U)+ 140(LE)	RMU&LE	2015-16
	Sub Total(A)		2888.6	875.82	784.17	466 [43(U)+ 408 (LE)+ 15 (Res)]		

Annex- 8.5
(Sheet 2 of 2)

S. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Ongoing Schemes – Under Implementation								
Jammu & Kashmir								
17	Ganderbal, J&KSPDC	SS	2x3+ 2x4.5	39.30	9.51 (as on 31.12.14)	9.00 (LE)	RM&LE	2016-17
18	Chenani, J&KSPDC	SS	5x4.66	39.14	11.41 (as on 31.03.15)	23.30 (LE)	RM&LE	2016-17
19	Sumbal Sindh, J&KSPDC	SS	2x11.3	25.00	22.46 (as on 31.12.14)	-	R&M	2016-17
Uttarakhand								
20	Khatima, UJVNL	SS	3x13.8	256.77	108.52	41.40 (LE)	RM&LE	2016-17
Karnataka								
21	Bhadra River Bed units, KPCL	SS	2x12	28.015	16.92 (as on 30.09.15)	-	R&M	2016-17
West Bengal								
22	Jaldhaka St.I, WBSEDCL	SS	3x9	88.62	79.97 (as on 31.12.15)	27 (LE)	RM&LE	2016-17
	Sub Total(B)		153.30	476.85	248.79	100.70 [100.7 (LE)]		
	Total (A+B)		3041.90	1352.67	1032.96	566.70 [43(U) + 508.70 (LE) + 15(Res.)]		

Abbreviations: R&M – Renovation & Modernisation; U – Uprating; LE – Life Extension; Res – Restoration;
MW Mega Watt; CS-Central Sector; SS- State Sector

State-wise List of Hydro RMU&LE schemes programmed for completion in the XIII Plan & beyond

(As on 31.03.2016)

S. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Ongoing Schemes – Under Implementation								
Jammu & Kashmir								
1.	**Salal, NHPC	CS	6x115	58.01	-	-	R&M	2018
Uttar Pradesh								
2.	*Rihand, UPJVNL	SS	6x50	132.20 (Rev.)	90.38	300.00 (LE)	RM&LE	2017-18
3.	*Obra, UPJVNL	SS	3x33	58.8	14.77	99.00 (LE)	RM&LE	2017-18
Karnataka								
4.	Nagjhari, U-1 to 6, KPCL	SS	5x150+ 1x135	50.87	64.49 (upto 31.12.14)	15 (U) (Unit-6)	RM&U	XIII Plan
Himachal Pradesh								
5.	*Bhakra LB, BBMB	CS	5x108	489.77	319.47 (as on 29.02.16)	90.00 (U) + 540.00 (LE)	RMU&LE	2018-19
6.	**Ganguwal U2& Kotla U3, BBMB	CS	2x24.2	14.19	0.84	48.4 (LE)	RM&LE	2017-18
7.	*Dehar Power House, BBMB	CS	1x165	39.14	1.52	-	R&M	2017-18
Odisha								
8.	*Hirakud-I U5&6, OHPC	SS	2x37.5	158.77	11.85	12.2 (U) + 75.00 (LE)	RMU&LE	2018-19
9.	*Hirakud-II, OHPC	SS	3x24	161.64	64.42	72.00 (LE)	RM&LE	2017-18
Tamil Nadu								
10.	**Sholayar-I, TANGEDCO	SS	2x35	120	-	14.00 (U) + 70.00 (LE)	RMU&LE	2018-19
Kerala								
11.	*Sholayar, KSEB	SS	3x18	199.55	-	54.00 (LE)	RM&LE	2018-19
Telangana								
12.	**Nagarjuna Sagar Ph-II, TSGENCO	SS	1x110+ 7x100.8	22.17	13.27	-	R&M	2018
13.	**Nagarjuna Sagar Left Canal Power House, TSGENCO	SS	2x30	30.99	0.87	-	R&M	2018
	Sub Total (A)		3874	1536.10	581.88	1389.60 [131.20 (U) + 1258.40 (LE)]		
Ongoing Schemes – Under Tendering								
Himachal Pradesh								
14.	**Baira Siul, NHPC	CS	3x60	360.79	-	180 (LE)	RM&LE	2020
15.	*Giri, HPSEB	SS	2x30	47.80	-	60.00 (LE)	RM&LE	2018-19
Uttarakhand								
16.	*Chilla Ph B, UJVNL	SS	4x36	490.56	-	28.8 (U) + 144 (LE)	RMU&LE	2019-20
17.	*Kulhal, UJVNL	SS	3x10	115.24	-	30 (LE)	RM&LE	2020-21
18.	**Ramganaga	SS	3x66	455.20	-	198 (LE)	RM&LE	2020-21

Annex- 8.6
(Sheet 2 of 3)

S. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
19.	*Tiloth, UJVNL	SS	3x30	384.66	-	90 (LE)	RM&LE	2019-20
20.	*Dhakrani, UJVNL	SS	3x11.25	137.31	-	33.75 (LE)	RM&LE	2020-21
21.	*Dhalipur, UJVNL	SS	3x17	152.65	-	51.00 (LE)	RM&LE	2020-21
Odisha								
22.	*Balimela, OHPC	SS	6x60	664.7	1.15 (as on 31.12.15)	360 (LE)	RM&LE	2020-21
Kerala								
23.	*Idukki 1 st stage, KSEB	SS	3x130	79.45	-	-	R&M	2018-19
Karnataka								
24.	**Nagihari, U-1 to 3, KPCL	SS	3x150	51	28.41 (up to 30.09.15)	-	R&M	XIII Plan
Jharkhand								
25.	*Panchet, U-1, DVC	CS	1x40	58.22	1.99	40.00 (LE)	RM&LE	XIII Plan
	Sub Total (B)		2026.75	2997.58	31.55	1215.55 [28.80(U)+ 1186.75(LE)]		
Ongoing Schemes – Under DPR Preparation/Finalisation/Approval								
Himachal Pradesh								
26.	**Bhaba Power House, HPSEB	SS	3x40	-	-	120 (LE)	RM&LE	XIII Plan
Uttarakhand								
27.	*Chibro, UJVNL	SS	4x60	184.88	-	240 (LE)	RM&LE	2023-24
28.	*Khodri UJVNL	SS	4x30	169.63	-	120 (LE)	RM&LE	2023-24
Meghalaya								
29.	Umium St.III, Kyrdemkulai, MePGCL	SS	2x30	344	-	60 (LE)+ 6 (U)	RMU&LE	XIII Plan
Manipur								
30.	**Loktak, NHPC	CS	3x35	260.47	-	105 (LE)	RM&LE	2022-23
Tamil Nadu								
31.	*Kodayar Ph-II, TANGEDCO	SS	1x40	-	-	4 (U) + 40.0 (LE)	RMU&LE	XIII Plan
32.	**Moyar PH, TANGEDCO	SS	3x12	65.45	-	6 (U) + 36 (LE)	RMU&LE	XIII Plan
33.	*Kodayar Ph.I, TANGEDCO	SS	1x60	78.59	-	10 (U) + 60 (LE)	RMU&LE	XIII Plan
Andhra Pradesh								
34.	*Machkund, APGENCO	SS	3x17 (St.I) & 3x21.25 (St.II)	124.45	-	5.25 (U) + 114.75 (LE)	RMU&LE	XIII Plan
Kerala								
35.	*Kuttiadi, KSEB	SS	3x25	-	-	75.00 (LE)	RM&LE	XIII Plan
West Bengal								
36.	*Maithon, U-1&3, DVC	CS	2x20	56.03	5.75	40.00 (LE)	RMU&LE	XIII Plan
Karnataka								
37.	*Sharavathy (Ph B), KPCL	SS	10x103.5	20	2.59 (upto 31.12.14)	-	R&M	XIII Plan
	Sub Total(C)		2045.75	1303.50	8.34	1042 [31.25(U)+ 1010.75 (LE)]		

S. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Ongoing Schemes – Under RLA Studies								
Tamil Nadu								
38.	**Kundah-I, TANGEDCO	SS	3x20	-	-	-	RM&LE	XIV Plan
39.	**Kundah-II, TANGEDCO	SS	5x35	-	-	-	RM&LE	XIV Plan
40.	**Kundah-III, TANGEDCO	SS	3x60	-	-	-	RM&LE	XIV Plan
41.	**Kundah-IV, TANGEDCO	SS	2x50	-	-	-	RM&LE	XIV Plan
42.	**Kundah-V, TANGEDCO	SS	2x20	-	-	-	RM&LE	XIV Plan
43.	**Mettur Tunnel, TANGEDCO	SS	4x50	-	-	-	RM&LE	XIV Plan
44.	**Sarkarpathy, TANGEDCO	SS	1x30	-	-	-	RM&LE	XIV Plan
45.	**Sholayar-II, TANGEDCO	SS	1x25	-	-	-	RM&LE	XIV Plan
46.	**Suruliyar, TANGEDCO	SS	1x35	-	-	-	RM&LE	XIV Plan
	Sub Total(D)		845	-	-	-		
	Total (A+B+C+D)		8791.50	5837.18	621.77	3647.15 [191.25 (U) +3455.90 (LE)]		

* These 24 schemes have been rescheduled for completion from XII Plan to XIII Plan & beyond.

** These 20 new schemes were taken up during XII Plan.

Abbreviations: R&M – Renovation & Modernisation; U – Uprating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector; SS- State Sector

Annex- 8.7

**STATE-WISE LIST OF ADDITIONAL HYDRO PROJECTS IDENTIFIED AS ON
31.03.2016 FOR UNDERTAKING RMU&LE WORKS**

S. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Remarks
Himachal Pradesh				
1.	Pong, BBMB	CS	6x66	
2.	Dehar, BBMB	CS	4x165	BBMB has placed a Work Order upon M/s CPRI, Bangalore for RLA Study of various equipment for preparation of the “Detailed scope of R&M” to be undertaken on Dehar Power House. The detailed report is awaited.
Maharashtra				
3.	Koyna Stage-III, MSPGCL	SS	4x80	
4.	Vaitarana, MSPGCL	SS	1x60	
Gujarat				
5.	Ukai (U- 1, 2, 3 & 4), GSECL	SS	4x75	
Andhra Pradesh				
6.	Tungabhadra Dam, APGENCO	SS	4x9	
7.	Hampi, APGENCO	SS	4x9	
Jharkhand				
8.	Sikidiri, JSEB	SS	2x65	
Total			1938	

CHAPTER 9

DEFINITIONS AND ABBREVIATIONS

CHAPTER-9

DEFINITIONS AND ABBREVIATIONS

9.1 DEFINITIONS

The definitions of different performance indices and other terms referred to in this review are as under:

a) **Capacity:** Capacity in MW is the installed or Uprated/Derated capacity of the unit.

b) **Forced Outage Non-availability (FO) (%)**

$$= \frac{(Cf1 \times hf1 + Cf2 \times hf2 + \dots + Cfn \times hfn) \times 100}{CxH}$$

Where Cf1, Cf2 Cfn are the capacities in MW of the generating units on forced outage and hf1, hf2 hfn are the duration of each outage in hours during the year. C is the total installed capacity in MW and H is the total period in hours during the year.

c) **Planned Maintenance Non-availability (PM) (%)**

$$= \frac{(Cp1 \times hp1 + Cp2 \times hp2 + \dots + Cpn \times hpn) \times 100}{CxH}$$

Where Cp1, Cp2 Cfn are the capacities in MW of the generating units on planned shutdown and hp1, hp2 are the duration of each shutdown in hours during the year. C is the total installed capacity in MW and H is the total period in hours during the year.

d) **Operating availability (OA) (%) = (100-FO-PM)**

e) **Miscellaneous Non-availability:** Non-availability of generating units due to one or more of the following factors:

- Low reservoir level/poor inflow
- Transmission line faults/constraints
- Excess weeding/silting
- No/reduced system demand
- Low head/too high tail water level

No irrigation demand
Grid disturbance/failure
Reserve shutdown/spinning reserve

- f) **Design Energy:** Means the quantum of energy which could be generated in a 90% dependable year with 95% installed capacity of the generating station.
- g) **Targeted Energy:** Estimated energy generation during the year based on the rainfall data, past records of energy generation etc.
- h) **Full Reservoir Level (FRL):** The level up to which the water could normally be stored in the reservoir for conservation and regulation.
- i) **Minimum Draw Down Level (MDDL):** The minimum level up to which the reservoir could be depleted under normal operating conditions.
- j) **Types of H.E. Scheme:** The H.E. Schemes have been classified into following four categories:

Run-of-river without pondage
Run-of river with pondage
Storage Schemes
Pumped Storage Schemes

9.2 Abbreviations

MW	Mega Watt	(10 ⁶ Watts)
Kwh	Kilo Watt hour (I unit)	(10 ³ Watts-hrs)
MU	Million Units	(10 ⁶ Units)
MCM	Million Cubic Meters	(10 ⁶ Cu.M.)
FRL	Full Reservoir Level	
MDDL	Minimum Draw Down Level	
HRT	Head Race Tunnel	
F.O.	Forced Outage	
P.M.	Planned Maintenance	

Abbreviations of Agencies

Northern Region			
1	Himachal Pradesh	ADHPL	Allain Duhangan Hydro Power Limited
		EPPL	Everest Power Private Limited
		GBHPPL	Greenko Budhil Hydro Power Pvt. Limited
		HBPCL	Himachal Baspa Power Company Limited
		HPSEB Limited	Himachal Pradesh State Electricity Board Limited
		MPCL	Malana Power Company Limited
		NHPC LIMITED	National Hydro Power Corporation Limited
		NTPC LIMITED	National Thermal Power Corporation Limited
		SJVN LIMITED	Satluj Jal Vidyut Nigam Limited
2	Jammu & Kashmir	JKSPDC	J&K State Power Development Corporation.
3	Punjab	BBMB	Bhakra Beas Management Board
		PSPCL	Punjab State Power Corporation Limited
4	Rajasthan	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Limited
5	Uttar Pradesh	UPVUNL	Uttar Pradesh Jal Vidyut Nigam Limited
6	Uttarakhand	THDC	Tehri Hydro Development Corporation
		UJVNL	Uttarakhand Jal Vidyut Nigam Limited
		JPPVL	Jaiprakash Power Pvt. Venture Limited
		AHPC	Alaknanda Hydro Power Company
Western Region			
1	Gujarat	GSECL	Gujarat State Electricity Corporation Limited
		SSNNL	Sardar Sarovar Narmada Nigam Limited
2	Madhya Pradesh	MPPGCL	Madhya Pradesh Power Generation Co. Limited
		NHDC	Narmada Hydroelectric Development Co. Limited
3	Chhatisgarh	CSPGCL	Chhatisgarh State Power Generation Co Limited
4	Maharashtra	DLHPPL	Dodson-Lindblom Hydro Power Private Limited
		MAHAGENCO	Maharashtra State Power Generation Co. Limited
		TPCL	Tata Power Company Limited
Southern Region			
1	Andhra Pradesh	APGENCO	Andhra Pradesh Power Generation Corporation Limited
2	Karnataka	KPCL	Karnataka Power Corporation Limited
3	Kerala	KSEBL	Kerala State Electricity Board Limited
4	Telangana	TSGENCO	Telangana State Power Generation Corporation Limited
5	Tamil Nadu	TANGEDCO	Tamil Nadu Generation & Distribution Co. Limited
Eastern Region			
1	Jharkhand	JUUNL	Jharkhand Urja Utpadan Nigam Limited
		DVC	Damodar Valley Corporation
2	Odisha	OHPC	Odisha Hydro Power Corporation
3	Sikkim	GIPL	Gati Infrastructure Pvt. Limited
		DEPL	Dans Energy Private Limited
4	West Bengal	WBSEDCL	West Bengal State Electricity Distribution Co. Limited
North Eastern Region			
1	Assam	APGCL	Assam Power Generation Co. Limited
2	Meghalaya	MePGCL	Meghalaya Power Generation Corporation Limited