भारत सरकार/Government of India
विद्युत मंत्रालय/Ministry of Power
केन्द्रीय विद्युत प्राधिकरण/CENTRAL ELECTRICITY AUTHORITY

जल विद्युत गृहों के निष्पादन का पुनर्विलोकन

REVIEW OF PERFORMANCE OF HYDRO POWER STATIONS 2017-18

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

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

FUNCTIONS AND DUTIES OF CEA AS PER SECTION-73 OF ELECTRICITY ACT-2003

The Authority shall perform such functions and duties as the Central Government may prescribe or direct, and in particular to –

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 the 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 provide 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 निष्पादन का

पुनर्विलोकन 2017-18

REVIEW OF PERFORMANCE OF

HYDRO POWER STATIONS 2017-18

जल परियोजना आयोजन तथा अन्वेषण प्रभाग

HYDRO PROJECT PLANNING & INVESTIGATION DIVISION

नई दिल्ली

NEW DELHI

नवम्बर, 2018

NOVEMBER, 2018

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

(PUBLISHED IN FULFILMENT 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 स्त्रोत रहा है। जल विद्युत शक्ति केंद्रों की उपलब्धता में सतत् सुधार के उद्देश्य से केन्द्रीय विद्युत प्राधिकरण (के0वि0प्रा0), केन्द्रीय सार्वजनिक क्षेत्र और राज्य व निजी क्षेत्र में विद्युत उपक्रमों के निकट सहयोग से उनके वार्षिक निष्पादन की समीक्षा के लिए अध्ययन करता है।

वर्ष 2017-18 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 31वीं हैं। इस रिपोर्ट में 45293.42 मेगावाट की कुल प्रतिस्थापित क्षमता वाले 206 जल विद्युत केन्द्रों की 712 जल विद्युत इकाइयों के निष्पादन का व्यापक विश्लेषण किया गया है, जिसके लिए केन्द्रीय, राज्य और निजी क्षेत्रों में ऊर्जा 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 2017-18 के दौरान जल विद्युत केन्द्रों की औसत प्रचालन उपलब्धता 91.29% थी। प्रणोदित (Forced) और योजनाबद्ध कामबन्दी (Planned Outages) के कारण जल विद्युत इकाइयों की औसत गैर-उपलब्धता क्रमश: 3.17% और 5.54% थी। वर्ष 2017-18 के दौरान जल विद्युत केन्द्रों से उत्पादन 126.122 बिलियन यूनिट था, जो वर्ष 2016-17 के उत्पादन 122.377 बिलियन यूनिट की तुलना में लगभग 3% अधिक था।

मुझे विश्वास है कि यह समीक्षा विद्युत केन्द्र प्राधिकारियों को उपयुक्त प्रचालन एंव रखरखाव की (ओ0 एंड एम0) नीति तैयार करके जल विद्युत संयंत्रों की उपलब्धता में और सुधार लाने में उपयोगी मार्गदर्शन प्रदान करेगा। प्रणोदित कामबंदी के कारणों का भी व्यापक विश्लेषण करने की आवश्यकता है ताकि विनिर्माताओं/ओ0 एंड एम0 एजेंसियों द्वारा उचित उपाय किये जायें और इनकी पुनरावृत्ति को कम किया जा सके जिससे प्रचालन उपलब्धता में सुधार किया जा सके।

समीक्षा के लिए कामबन्दी आंकड़े/सूचना उपलब्ध कराने के लिए मैं सभी उर्जा उत्पादन उपक्रमों का हार्दिक धन्यवाद करता हूँ। मैं इस रिपोर्ट के लिए अपेक्षित निविष्ट आंकड़ों का विश्लेषण करने में सूचना प्रोद्योगिकी प्रभाग, के0वि0प्रा0 द्वारा प्रदान किए गए सहयोग के लिए उन्हें धन्यवाद देता हूँ।

(पी. डी. सिवाल)
सदस्य (जल विद्युत), के0वि0प्रा0

नई दिल्ली
नवम्बर, 2018

FOREWORD

Hydro Electric Power has been the most reliable source of renewable energy for the past 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 2017-18' is 31st in the series of such publication by Central Electricity Authority in partial fulfilment of the statutory obligations under Section 73(i) & (j) of the Electricity Act, 2003. The report provides exhaustive analysis of performance of 712 hydro-electric units installed at 206 hydro-electric stations having total installed capacity of 45293.42 MW for which outage data has been provided by generation utilities in Central, State 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 2017-18 was 91.29%. The average non-availability of hydro units due to forced and planned outages was 3.17% and 5.54% respectively. The generation from hydro stations during 2017-18 was 126.122 Billion Units, which was about 3% higher compared to the generation of 122.377 BU in the previous year viz 2016-17.

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 for devising necessary measures by the manufacturers/O&M agencies so as to minimize the recurrence of the same and to improve the operating availability.

I wish to express my sincere thanks to all the power 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, CEA for analysis of the input data required for this report.

New Delhi
November, 2018

(P. D. SIWAL)
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 31.03.2018 को 344002 मेगावाट की कुल प्रतिष्ठापित विद्युत उत्पादन क्षमता में से 45293 मेगावाट (13.17%) (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 उत्पादन तथा उपलब्धता में सुधार अवश्य करना चाहिए।

यह वार्षिक पुनर्वलोकन वर्ष 2017-18 के दौरान देश में जल विद्युत केन्द्रों के निष्पादन का विश्लेषण प्रस्तुत करता है और जिसमें 206 जल विद्युत केन्द्रों पर 712 यूनिटों के निष्पादन और प्रचालन उपलब्धता का विस्तृत विश्लेषण है। कोई भी एक सूचकांक जल विद्युत केन्द्रों के निष्पादन के लिए पर्याप्त रूप से मापक नहीं हो 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 यूनिटों में इस प्रकार के कार्य को हाथ में लेने की संभावनाओं को सुनिश्चित करने में प्रोत्साहित करेगा।

इस प्रकाशन का अध्ययन जल परियोजना आयोजन एंव अन्वेषण (एच0पी0पी0&आई0) प्रभाग, के0 वि0 प्रा0 के निदेशक श्री राकेश कुमार के संपूर्ण मार्गदर्शन में किया गया है।

मैं सभी सरकारी/निजी क्षेत्र के विद्युत 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 युटिलिटीज से अनुरोध करूंगा कि जल विद्युत केन्द्रों के संबंध में माहवार निष्पादन तथा कामबंदी आंकड़े तुरंत तथा नियमित रूप से प्रस्तुत करते रहें ताकि भविष्य में भी विश्लेषण तथा निष्पादन पुनर्वलोकनों 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।

(जयदीप सिंह बावा)
मुख्य अभियन्ता, के0वि0प्रा0

नई दिल्ली
नवम्बर, 2018

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 past more than 100 years in our country. As on 31.03.2018, out of a total installed generating capacity of 344002 MW, hydro capacity was 45293 MW (13.17%) (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 breakdowns, 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 exhaustive analysis of generation performance and operating availability of 206 H.E. Stations comprising 712 units in the country during the year 2017-18. 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 Shri Rakesh Kumar, Director.

I wish to express my sincere thanks to various 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
November, 2018

(Jaideep Singh Bawa)
Chief Engineer, CEA

आभार

मैं निम्नलिखित अधिकारियों का जल विद्युत गृहों के निष्पादन पुनर्विलोकन 2017-18 के प्रकाशन में सहयोग के लिए धन्यवाद देता हूँ।

मुख्य अभियन्ता (एच0पी0एम0 प्रभाग), के0वि0प्रा0 को वर्ष 2017-18 के दौरान प्रचालित यूनिटों के टरबाइन तथा जेनरेटर निर्माताओं के विवरण समय पर उपलब्ध कराने के लिये धन्यवाद देता हूँ।

मुख्य अभियन्ता (एच0ई0&आर0एम0 प्रभाग) के0वि0प्रा0 का जल विद्युत यूनिटों के नवीनीकरण एंव आधुनिकीकरण एंव उन्नयन पर अध्याय तैयार करने के लिए धन्यवाद देता हूँ।

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

मैं श्री बलवान कुमार, उप निदेशक, श्री राहुल सिंह, सहायक निदेशक, श्रीमती संदीप कौर, अभियंता, वाप्कोस लिमिटेड व अन्य अधिकारियों तथा कर्मचारियों का भी इस पुनर्विलोकन के प्रकाशन में सहयोग के लिये धन्यवाद देता हूँ।

(राकेश कुमार)
निदेशक, के0वि0प्रा0

ACKNOWLEDGEMENT

I express my sincere thanks to the following officers in bringing out this Review of Performance of Hydro Power Stations 2017-18.

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 2017-18.

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 Rahul Singh, Assistant Director, Mrs. Sandeep Kaur, Engineer, WAPCOS Ltd. and other officers/officials for their assistance in making it possible to bring out this Review.

(Rakesh Kumar)
Director, CEA

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SUMMARY

SUMMARY

1.0 General

1.1 This review covers the performance of Hydro-Electric (HE) Stations having installed capacity of more than 25 MW. As on 31st March, 2018 there were 712 HE generating units installed in 206 Hydro-Electric Stations with an aggregate installed capacity of 45293.42 MW in operation. Performance of 37 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 31.3.2018 in the country vis-à-vis that on 31.3.2017 is given below in **Table S-1.**

TABLE S-1

REGION-WISE SUMMARY OF HYDRO-ELECTRIC STATIONS
(2017-18 VIS-A-VIS 2016-17)

Region	No of Stations as on		No of Units as on		Capacity (MW) as on	
	31.03.18	**31.03.17**	**31.03.18**	**31.03.17**	**31.03.18**	**31.03.17**
Northern	73	71	245	239	18969.27	18527.27
Western	28	28	101	101	7392.00	7392.00
Southern	70	71	249	252	11727.70	11773.45
Eastern	23	20	84	74	5862.45	5543.70
N-Eastern	12	10	33	29	1342.00	1242.00
All India	**206**	**200**	**712**	**695**	**45293.42**	**44478.42**

1.3 The report contains outage data of 206 H.E. Stations (above 25 MW) covering 712 units and having an aggregate installed capacity of 45293.42 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 2008-09 to 2017-18).

1.5 This review covers information in respect of renovation & modernization, uprating and life extension of HE stations in the country for the year 2017-18, achievements during the year 2017-18 and programme for renovation, modernization, life extension and uprating of HE Stations for the year 2018-19.

1.6 The report comprises of nine chapters as under:

Chapter No.	Particulars
1	Hydro-Electric 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 2018-19
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 2017-18 was 126122.70 MU (excluding import from Bhutan), which was about 3% higher than the generation during 2016-17. However, it was about 10.80% lower than the generation targets for 2017-18.

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 STATIONS (2017-18 VIS-A-VIS 2016-17)

Utilities	Installed Capacity (MW) (As on 31.03.2018)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2017-18	2016-17	2017-18	2016-17	2017-18	2016-17
CENTRAL SECTOR							
BBMB	2866.30	9360	9536	10864.14	10570.00	16.07	10.84
NHPC LTD	5121.20	23046	22440	22549.52	22929.80	-2.15	2.18
SJVNLTD	1912.02	8625	8595	9222.73	9011.06	6.93	4.84
NTPC LTD	800.00	3055	2800	3313.62	3225.16	8.47	15.18
THDC LTD	1400.00	4115	4100	4301.27	4370.87	4.53	6.61
NHDC LTD	1520.00	3100	3100	1325.36	4748.49	-57.25	53.18
DVC	143.20	235	244	256.35	255.54	9.09	4.73
NEEPCO LTD	755.00	3492	2585	3203.10	2793.32	-8.27	8.06
SUB TOTAL	**14517.72**	**55028**	**53400**	**55036.09**	**57904.24**	0.01	**8.43**

Utilities	Installed Capacity (MW) (As on 31.03.2018)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2017-18	2016-17	2017-18	2016-17	2017-18	2016-17
PRIVATE SECTOR							
MPCL	86	344	341	346.29	353.79	0.67	3.75
EPPL	100	360	370	368.89	366.54	2.47	-0.94
ADHPL	192	700	686	683.01	679.12	-2.43	-1
GBHPPL	70	282	282	317.63	261.25	12.63	-7.36
HBPCL	1300	5500	5500	5906.58	5715.04	7.39	3.91
IA ENERGY	36	0.00	0.00	79.42	11.29	-	-
AHPCL	330	1340	1396	1382.54	1280.75	3.17	-8.26
JPPVL	400	1800	1776	2160.90	2042.05	20.05	14.98
DLHP	34	37	65	42.55	47.12	15.00	-27.51
GIPL	99	495	495	444.79	494.75	-10.14	-0.05
TPCL	447	1450	1450	1515.88	1465.46	4.54	1.07
DEPL	96	459	459	406.01	405.63	-11.54	-11.63
SEPL	97	400	29	73.07	-	-81.73	-
SNEHA KINETIC	96	0	-	370.10	-	-	-
NTPGPL	0	200	-	0.00	-	-	-
SUB TOTAL	**3394**	**13367**	**12849**	**14097.66**	**13122.79**	5.47	**2.13**
STATE SECTOR							
JKSPDC	1110.00	4599	5144	5136.89	4789.6	11.70	-6.89
HPPCL	195.00	568	266	332.12	56.09	-41.53	-78.91
HPSEB LTD.	372.00	1617	1465	1590.86	1237.42	-1.62	-15.53
BVPC	-	30	-	0.00	-	-	-
RRVUNL	411.00	720	710	819.53	965.99	13.82	36.05
PSPCL	1051.00	4021	4069	4230.51	3536.34	5.21	-13.09
UPJVNL	501.60	1170	1161	1486.69	1175.56	27.07	1.25
UJVNL	1252.15	4688	4700	4526.00	4201.44	-3.46	-10.61
SSNNL	1450.00	4460	3263	939.47	3209.21	-78.94	-1.65
GSECL	540.00	857	840	612.45	734.67	-28.54	-12.54
MSPGCL	2406	4296	4358	3143.16	4050.98	-26.84	-7.04
MPPGCL	875.00	2625	2383	1420.98	2768.31	-45.87	16.17
CSPGCL	120.00	250	260	178.07	153.76	-28.77	-40.86
APGENCO	1796.75	3505	3604	2870.47	2605.99	-18.10	-27.69
TSGENCO	2306.60	3335	3132	1491.98	1279.99	-55.26	-59.13
KPCL	3585.40	11687	11429	7008.65	6691.09	-40.03	-41.46
KSEBL	1881.50	6221	6834	5199.26	4067.49	-16.42	-40.48
TANGEDCO	2203.20	4415	4901	2919.60	2397.12	-33.87	-51.09

Utilities	Installed Capacity (MW) (As on 31.03.2018)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2017-18	2016-17	2017-18	2016-17	2017-18	2016-17
JUUNL	130.00	150	154	190.38	30.13	26.92	-80.44
OHPC	2027.50	5672	5621	5555.29	4412.89	-2.06	-21.49
TUL	1200.00	5214	552	4429.33	308.42	-15.05	-43.95
WBSEDCL	986.00	1596	1596	1282.02	1560.85	-19.67	-2.2
APGCL	100.00	390	390	484.98	396.59	24.35	1.69
MePGCL	282.00	919	919	1140.26	719.6	24.08	-21.7
SUB TOTAL	**26782.70**	**73005**	**67751**	**56988.95**	**51350.53**	**-21.94**	**-24.21**
ALL INDIA	**45293.42**	**141400**	**134000**	**126122.70**	**122377.56**	**-10.80**	**-8.67**

During the year 2017-18, overall hydro generation was more than the target in respect of BBMB, SJVNL, NTPC, THDC, & DVC in Central Sector and MPCL, EPPL, GBHPPL, HBPCL, AHPCL, JPPVL, DLHP, DEPL & TPCL in Private Sector. As regards generation by State Electricity Boards/Corporations / Departments, hydro generation was more than the target in respect of JKSPDC, RRUVNL, PSPCL, UPJVNL, JUUNL, APGCL and MePGCL.

2.2 Sector-wise and Region Wise Performance of H.E. Stations

Sector-wise and Region-wise generation performance of H.E. Stations during 2017-18 is given in **Table S-3 & S-4**. It is seen that there was excess generation as compared to target in Central Sector & Private Sector. The overall generation of State Sector hydro stations has improved, however, it has remained considerably below the targets.

TABLE S-3

SECTOR-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS (2017-18 VIS-A-VIS 2016-17)

Sector	Installed Capacity (MW) (As on 31.03.2018)	Energy Generation (MU)					
		Target		Actual		Surplus (+)/ Deficit(-)in %	
		2017-18	2016-17	2017-18	2016-17	2017-18	2016-17
Central	14907.72	55028	53400	55036.09	57904.24	0.01	8.43
State	26991.70	73005	67751	56988.95	51350.53	-21.94	-24.21
Private	3394.00	13367	12849	14097.66	13122.79	5.47	2.13
Total	**45293.42**	**141400**	**134000**	**126122.70**	**122377.56**	**-10.80**	**-8.67**

TABLE S-4

REGION-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS
(2017-18 VIS-A-VIS 2016-17)

Sector	Installed Capacity (MW) (As on 31.03.2018)	Energy Generation (MU)					
		Target		Actual		Surplus (+)/ Deficit(-)in %	
		2017-18	2016-17	2017-18	2016-17	2017-18	2016-17
Northern	18969.27	71581	70932	74734.69	71761.09	4.41	1.17
Western	7392.00	17075	15719	9177.92	17178.00	-46.25	9.28
Southern	11727.70	28682	29900	19022.26	17041.68	-33.68	-43.00
Eastern	5862.45	18661	13040	17521.75	11746.21	-6.10	- 9.92
North Eastern	1342.00	5401	4409	5666.08	4650.58	4.91	5.48
Total	**45293.42**	**141400**	**134000**	**126122.70**	**122377.56**	**-10.80**	**-8.67**

3.0 Outage Analysis

For outage data analysis during 2017-18, outage data of 206 H.E. Stations (above 25 MW capacity) covering 712 units and having an aggregate installed capacity of 45293.42 MW made available by various utilities have been considered for the purpose of this Review. Region-wise details of these 206 hydro power stations are given below in **Table S-5**.

TABLE S-5

REGION-WISE SUMMARY OF HE STATIONS ANALYSED
(2017-18 VIS-A-VIS 2016-17)

Region	No. of Stations		No. of Units		Capacity(MW) as on	
	31.03.18	31.03.17	31.03.18	31.03.17	31.03.18	31.03.17
Northern	73	71	245	239	18969.27	18527.27
Western	28	28	101	101	7392.00	7392.00
Southern	70	71	249	252	11727.70	11773.45
Eastern	23	20	84	74	5862.45	5543.70
North Eastern	12	10	33	29	1342.00	1242.00
All India	**206**	**200**	**712**	**695**	**45293.42**	**44478.42**

3.1 Planned Maintenance

The number of H.E. Stations falling under various ranges of non-availability due to planned maintenance during the year 2017-18 vis-à-vis 2016-17 is summarized below in **Table S-6.**

TABLE S-6

NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES (2017-18 VIS-A-VIS 2016-17)

% Non-Availability due to planned maintenance	2017-18				2016-17			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	129	62.62	27397.77	60.27	116	58.00	26069.87	58.61
>5 to 10	37	17.96	10363.75	22.88	44	22.00	8947.20	20.12
>10 to 15	16	7.77	2852.70	6.30	13	6.50	2461.15	5.53
>15 to 20	12	5.83	2637.40	5.74	16	8.00	4241.40	9.54
>20 to 25	6	2.91	1086.30	2.40	3	1.50	1230.00	2.77
>25 to 30	0	0.00	0.00	0.00	2	1.00	681.00	1.53
above 30	6	2.91	955.50	2.41	6	3.00	847.80	1.91
Total	**206**	**100**	**45293.42**	**100**	**200**	100	**44478.42**	**100**

It could be seen from above that 129 nos. (62.62% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2017-18 as compared to 116 nos. (58% of total) during 2016-17.

Non-availability due to planned maintenance was more than 30% at 6 nos. (2.91% of total) H.E. Stations during 2017-18 and which is similar to 2016-17 The details of these stations for 2017-18 is given below in **Table S-7.**

TABLE S-7

H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE FOR THE PERIOD: (2017-18)

Sl. No	Name of Station/ Utility	Capacity (MW)	N.A. due to P.M.*(%)	Remarks
1	Rajghat/MPPGCL	45.00	64.69	Annual Maintenance, Capital Maintenance.
2	Ramganga/UJVNL	198.00	39.49	Annual Maintenance for long period
3	Hirakud-I/OHPC	275.50	34.96	R&MU works
4	Kashang-I/HPPCL	65.00	33.49	Testing/Checking/Adujustment
5	Hirakud-II/OHPC	72.00	33.33	R&MU works
6	Rihand/UPJVNL	300.00	31.79	R&MU and stator winding fault

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

38% of stations had operational availability lower than 95% on account of planned maintenance. These utilities therefore, need to improve their O&M practices to bring down their total outages.

It is observed from above that stations may be having high planned maintenance outages on account of ageing, O&M management issues, undertaking of R&M works, etc. Further, those stations which are having continuously high planned maintenance outages over past few years may be requiring major repair & maintenance works or Renovation & Modernisation (R&M) works for improving the availability, reliability & security of the plant besides providing life extension where the assets have outlived their useful life.

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-8**.

TABLE S-8

AVERAGE DURATION OF VARIOUS TYPES OF PLANNED MAINTENANCE FOR THE PERIOD: (2017-18)

Sl. No	Type of Planned maintenance	Average duration at any unit (Hrs)
1	Capital Maintenance	1270.15
2	Annual Maintenance	606.17
3	Half Yearly Maintenance	151.92
4	Quarterly Maintenance	35.42
5	Monthly Maintenance	40.29
6	Routine Maintenance	23.74
7	Renovation/ Modernisation & Uprating	1432.75
8	Civil Structure	154.28
9	Turbine	45.01
10	Generator	213.40
11	Other Equipment	81.88
12	Miscellaneous planned maintenance	71.52

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.

However, the analysis of outage data indicates there is enough scope of considerable reduction in outage duration of units by adopting best management practices including planning and contract management.

Summary of planned maintenance carried out on various equipments like generators, turbine and other equipments during 2017-18 vis-à-vis 2016-17 is given below in **Table S-9.**

TABLE S–9

DURATION OF PLANNED MAINTENANCE FOR GENERATOR, TURBINE & OTHER EQUIPMENTS (2017-18 vis-à-vis 2016-17)

S. No.	Equipments	Duration			
		Maximum Hours for any unit		Average Hours	
		2017-18	2016-17	2017-18	2016-17
1	Generator	4338.83	2797.15	213.40	146.70
2	Turbine	746.00	2185.75	45.01	78.32
3	Other Equipment	2886.17	2797.15	81.88	139.76
4	Civil Structure	2629.97	2999.13	154.28	197.98

It could be seen that the average hours utilized for carrying out various repairs decreased for turbine, other equipment and civil structure during 2017-18 as compared to 2016-17 while they have increased for generator. However, there has been overall reduction in forced outages.

3.2 Forced Outages

The summary of forced outages caused due to break-down of generator, turbine and other equipment during 2017-18 vis-à-vis 2016-17 is given below in **Table S-10.**

TABLE S–10

FORCED OUTAGES DUE TO GENERATOR, TURBINE & OTHER EQUIPMENT FAULTS
(2017-18 VIS-A-VIS 2016-17)

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage	
		2017-18	2016-17	During 2017-18	Increase/ Decrease vis-à-vis 2016-17
1	Generator	67919.75	73896.94	39.96	-8.09
2	Turbine	42910.29	39328.84	25.25	9.11
3	Civil Structure	27547.61	24769.6	16.21	11.22
4	Other Equipment	31584.03	45861.19	18.58	-31.13
	Total	**169961.68**	**183856.57**	**100**	**-7.56**

It is observed that forced outages in 2017-18 viz-a-viz 2016-17 have increased on account of turbine and civil structures whereas the same have decreased on account of generator and other equipment.

3.3 Operating Availability

The number of H.E. Stations falling under various ranges of operating availability during the year 2017-18 is summarized below in **Table S-11.**

TABLE S-11

OPERATING AVAILABILITY OF H.E. STATIONS
PERIOD: 2017-18

OPERATING AVAILABILITY (%)	NO. OF STATIONS	% OF TOTAL STATIONS	INSTALLED CAPACITY (MW)	% OF TOTAL INSTALLED CAPACITY
≥95%	93	45.15	20551.42	45.37
>90 to 95	46	22.33	12739.75	28.13
>85 to 90	18	8.74	2635.7	5.82
>80 to 85	15	7.28	3051.2	6.74
< 80	34	16.50	6315.35	13.94
Total	**206**	**100**	**45293.42**	**100**

Operating availability of 49 nos. HE stations (23.78% of total HE Stations) was below 85% (9366.55 MW) due to planned maintenance (capital overhauling, R&MU works, annual maintenance etc.) carried out for long duration and forced outages (turbine vibration, repair of runner/underwater parts, fire at cable gallery etc.) in these HE Stations.

Region-wise planned maintenance, forced outages and operating availability of H.E. units for 2017-18 is indicated below in **Table S-12.**

TABLE S-12

AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2017-18

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AVAILABILITY
1	Northern	245	18969.27	6.87	1.92	91.21
2	Western	101	7392.00	3.14	3.01	93.85
3	Southern	249	11727.70	4.71	3.21	92.08
4	Eastern	84	5862.45	6.29	6.54	87.17
5	North Eastern	33	1342.00	3.96	6.72	89.32
	All India	**712**	**45293.42**	**5.54**	**3.17**	**91.29**

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

- Generating units installed in Northern Region accounted for maximum non-availability due to planned maintenance (6.87%) whereas generating units installed in Western Region accounted for the least non-availability due to planned maintenance (3.14%) as indicated in **Table S-12** above**.**

3.4 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			UNITS ANALYSED		PM	FO	OP.AV
	(MW)	TARGET (MU)	ACTUAL (MU)	VARIA-TION (%)	Nos.	CAP (MW)	%	%	%
2017-18	45293.42	141400	126122	(-)10.20	712	45293.42	5.54	3.17	91.29
2016-17	44478.42	134000	122378	(-)7.67	695	44478.42	6.43	3.33	90.24
2015-16	42783.42	128000	121377	(-)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

CHAPTER-1

HYDRO-ELECTRIC POTENTIAL AND DEVELOPMENT

CHAPTER-1

HYDRO-ELECTRIC POTENTIAL AND DEVELOPMENT

1.1 Hydro-electric Potential

Reassessment studies of Hydro Electric 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 31.03.2018, H.E. Schemes having total installed capacity of 40507.8 MW (27.87%) excluding pumped storage stations of capacity of 4785.60 MW have already been developed and the schemes under construction account for capacity of 11113.5 MW (excluding PSS of 1205 MW) (7.65%). As such, about 64.48% identified 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

REGION-WISE/STATE-WISE STATUS OF HYDRO ELECTRIC CAPACITY
(In terms of Installed Capacity-above 25 MW as on 31.03.2018)

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	3449.0	25.47	1935.5	14.29	8158.5	60.24
Himachal Pradesh	18820	18540	9755.0	52.62	1885.0	10.17	6900.0	37.22
Punjab	971	971	1096.3	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	1490.0	8.28	12751.7	70.85
Uttar Pradesh	723	664	501.6	75.54	0.0	0.00	39.0	5.87
Sub Total(NR)	**53395**	**52263**	**18969.3**	**36.30**	**5516.5**	**10.56**	**27777.3**	**53.15**
WESTERN								
Madhya Pradesh	2243	1970	2235.0	100	400.00	20.30	0.00	0.00
Chhattisgarh	2242	2202	120.0	5.45	0.00	0.00	2082.00	94.55
Gujarat	619	590	550.0	100	0.00	0.00	0.00	0.00
Maharashtra	3769	3314	2647.0	79.87	0.00	0.00	667.0	20.13

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	1610.0	68.77	960.0	41.01	0.0	0.00
Telangana	2058	2019	770.0	38.14	30.0	1.49	1219.0	60.38
Karnataka	6602	6459	3657.4	56.62	0.0	0.00	2801.6	43.38
Kerala	3514	3378	1881.5	55.70	100.0	2.96	1396.5	41.34
Tamil Nadu	1918	1693	1803.2	100	0.0	0.00	0.0	0.00
Sub Total (SR)	**16458**	**15890**	**9722.1**	**61.18**	**1090.0**	**6.86**	**5077.9**	**31.96**
EASTERN								
Jharkhand	753	582	170.0	29.21	0.0	0.00	412.0	70.79
Bihar	70	40	0.0	0.00	0.0	0.00	0.0	0.00
Odisha	2999	2981	2142.3	71.86	0.0	0.00	838.8	28.14
West Bengal	2841	2829	441.2	15.60	120.0	4.24	2267.8	80.16
Sikkim	4286	4248	2169.0	51.06	1133.0	26.67	946.0	22.27
Sub Total (ER)	**10949**	**10680**	**4922.5**	**46.09**	**1253.0**	**11.73**	**4504.6**	**42.18**
NORTH EASTERN								
Meghalaya	2394	2298	322.0	14.01	0.0	0.00	1976.0	85.99
Tripura	15	0	0.0	0.00	0.0	0.00	0.0	0.00
Manipur	1784	1761	105.0	5.96	0.0	0.00	1656.0	94.04
Assam	680	65	375.0	57.69	0.0	0.00	275.0	42.31
Nagaland	1574	1452	75.0	5.17	0.0	0.00	1377.0	94.83
Arunachal Pradesh	50328	50064	405.0	0.81	2854.0	5.70	46805.0	93.49
Mizoram	2196	2131	60.0	2.82	0.0	0.00	2071.0	97.18
Sub Total (NER)	**58971**	**58356**	**1342.0**	**2.30**	**2854.0**	**4.89**	**54160.0**	**92.81**
ALL INDIA	**148701**	**145320**	**40507.8**	**27.87**	**11113.5**	**7.65**	**93698.7**	**64.48**

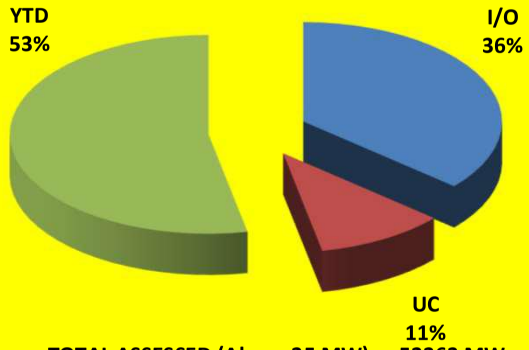
Note:- In addition, 4785.60 MW of PSS are in operation and 1205 MW of PSS are under construction.

REGION-WISE STATUS OF HYDRO ELECTRIC CAPACITY AS ON 31.03.2018

EXHIBIT 1.1

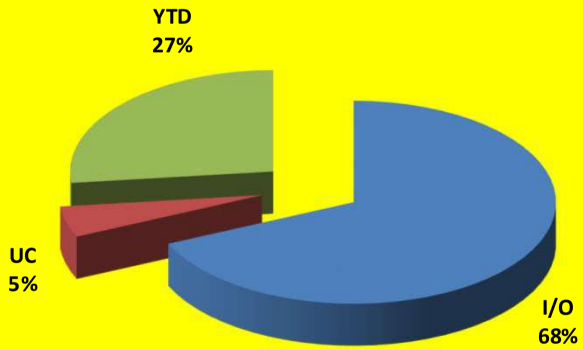
I/O=In Operation UC=Under Construction YTD= Yet to be Developed

NORTHERN REGION



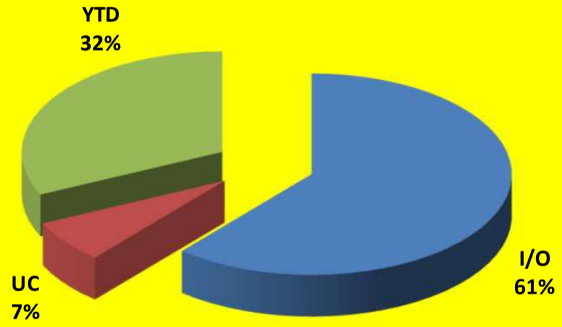
TOTAL ASSESSED (Above 25 MW) : - 52263 MW

WESTERN REGION



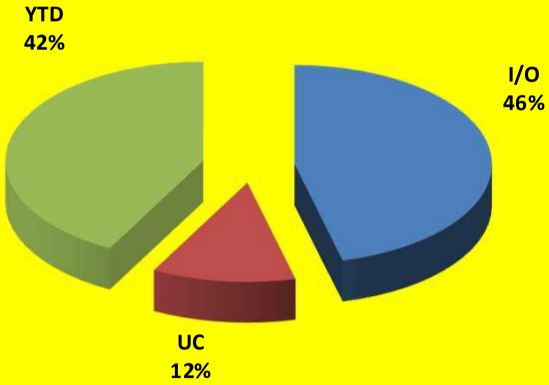
TOTAL ASSESSED (Above 25 MW) : - 8131 MW

SOUTHERN REGION



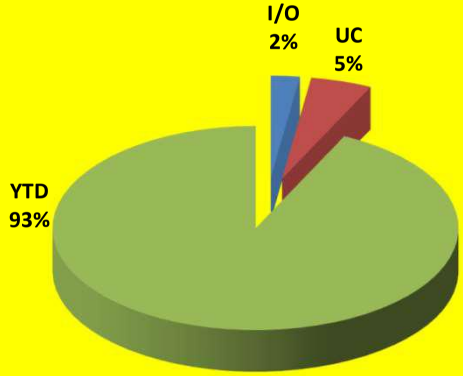
TOTAL ASSESSED (Above 25 MW): - 15890 M

EASTERN REGION



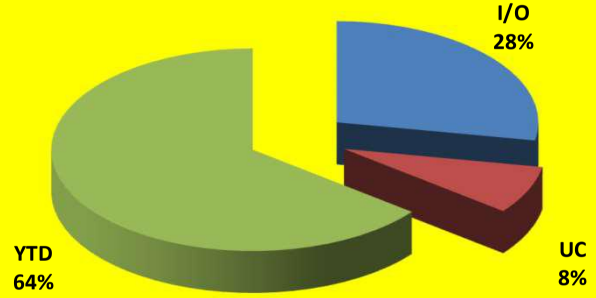
TOTAL ASSESSED (Above 25 MW) : - 10680 MW

NORTH EASTERN



TOTAL ASSESSED (Above 25 MW : - 58356 MW

ALL INDIA



TOTAL ASSESSED (Above 25 MW) : - 145320 MW

EXHIBIT 1.2

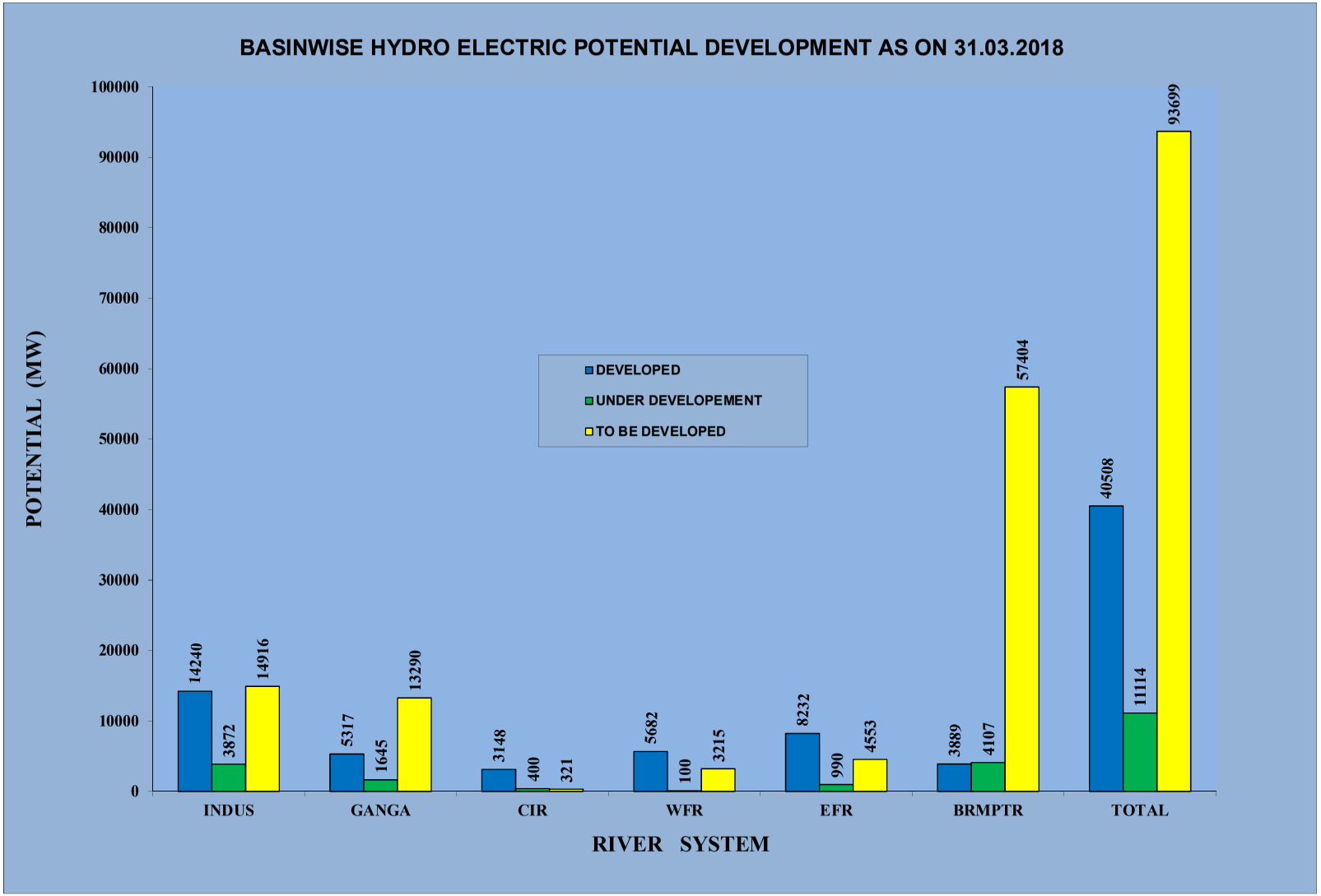

BASINWISE HYDRO ELECTRIC POTENTIAL DEVELOPMENT AS ON 31.03.2018
POTENTIAL (MW)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
DEVELOPED
UNDER DEVELOPEMENT
TO BE DEVELOPED
14240
3872
14916
5317
1645
13290
3148
400
321
5682
100
3215
8232
990
4553
3889
4107
57404
40508
11114
93699
INDUS
GANGA
CIR
WFR
EFR
BRMPTR
TOTAL
RIVER SYSTEM

EXHIBIT 1.3

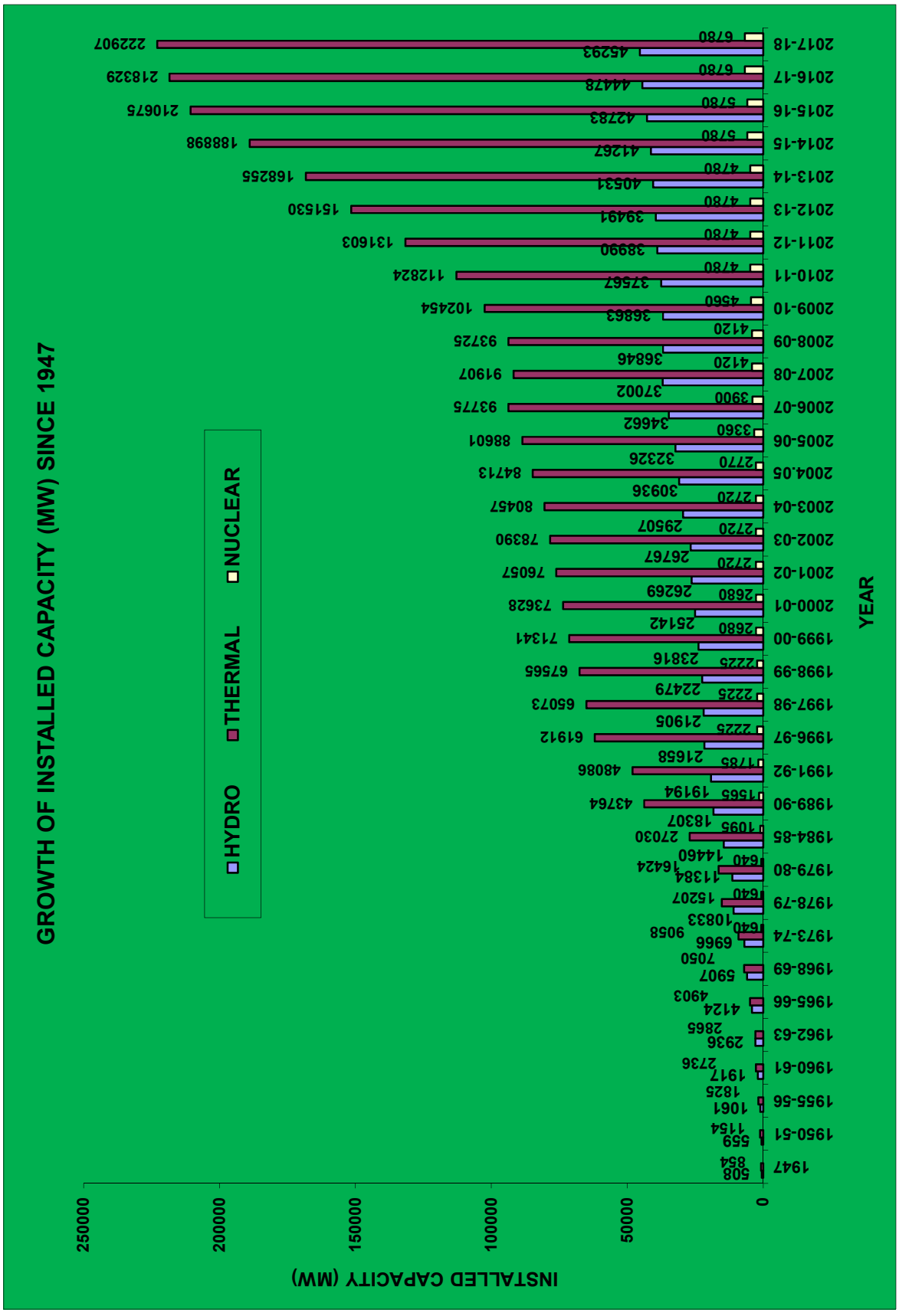

GROWTH OF INSTALLED CAPACITY (MW) SINCE 1947
HYDRO
THERMAL
NUCLEAR
INSTALLED CAPACITY (MW)
YEAR
250000
200000
150000
100000
50000
0
1947 508 854
1950-51 559 1154
1955-56 1061 1825
1960-61 1917 2736
1962-63 2936 2865
1965-66 4124 4903
1968-69 5907 7050
1973-74 6966 9058 640 10833
1978-79 15207 640
1979-80 11384 16424 640 14460
1984-85 27030 1095 18307
1989-90 43764 1565 19194
1991-92 48086 17185 21658
1996-97 61912 2225 21905
1997-98 65073 2225 22479
1998-99 67565 2225 23816
1999-00 71341 2680 25142
2000-01 73628 2680 26269
2001-02 76057 2720 26767
2002-03 78390 2720 29507
2003-04 80457 2720 30936
2004.05 84713 2770 32326
2005-06 88601 3360 34662
2006-07 93775 3900 37002
2007-08 91907 4120 36846
2008-09 93725 4120
2009-10 102454 4560 36863
2010-11 112824 4780 37567
2011-12 131603 4780 38990
2012-13 151530 4780 39491
2013-14 168255 4780 40531
2014-15 188898 5780 41267
2015-16 210675 5780 42783
2016-17 218329 6780 44478
2017-18 222907 6780 45293

EXHIBIT 1.4

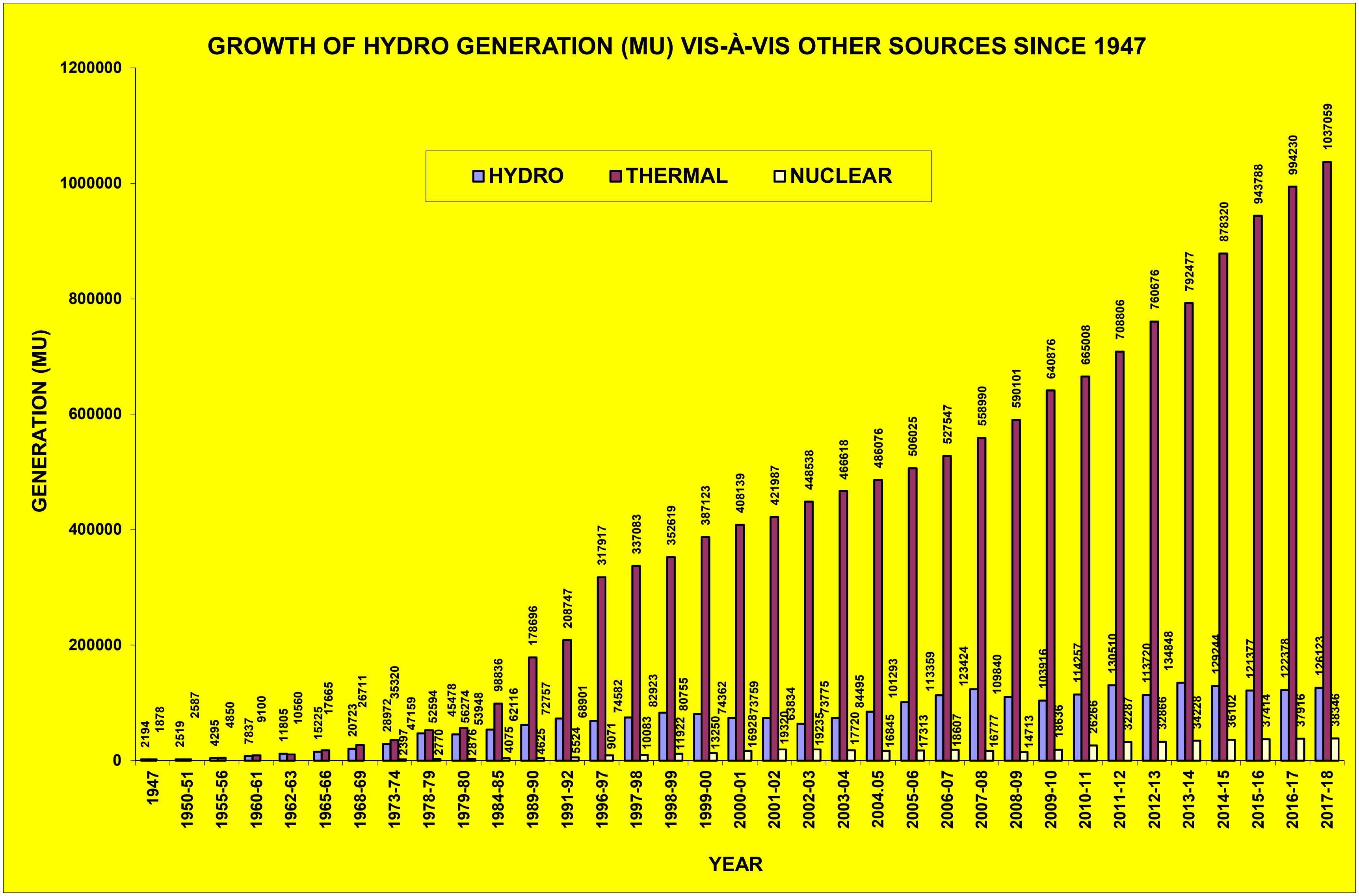

GROWTH OF HYDRO GENERATION (MU) VIS-À-VIS OTHER SOURCES SINCE 1947
HYDRO
THERMAL
NUCLEAR
GENERATION (MU)
YEAR
1200000
1000000
800000
600000
400000
200000
0
1947 2194 1878
1950-51 2519 2587
1955-56 4295 4850
1960-61 7837 9100
1962-63 11805 10560
1965-66 15225 17665
1968-69 20723 26711
1973-74 28972 35320 2397
1978-79 47159 52594 2770
1979-80 45478 56274 2876
1984-85 53948 98836 4075
1989-90 62116 178696 4625
1991-92 72757 208747 5524
1996-97 68901 317917 9071
1997-98 74582 337083 10083
1998-99 82923 352619 11922
1999-00 80755 387123 13250
2000-01 74362 408139 16928
2001-02 73759 421987 19320
2002-03 63834 448538 19235
2003-04 73775 466618 17720
2004.05 84495 486076 16845
2005-06 101293 506025 17313
2006-07 113359 527547 18607
2007-08 123424 558990 16777
2008-09 109840 590101 14713
2009-10 103916 640876 18636
2010-11 114257 665008 26266
2011-12 130510 708806 32287
2012-13 113720 760676 32866
2013-14 134848 792477 34228
2014-15 129244 878320 36102
2015-16 121377 943788 37414
2016-17 122378 994230 37916
2017-18 126123 1037059 38346

EXHIBIT-1.5

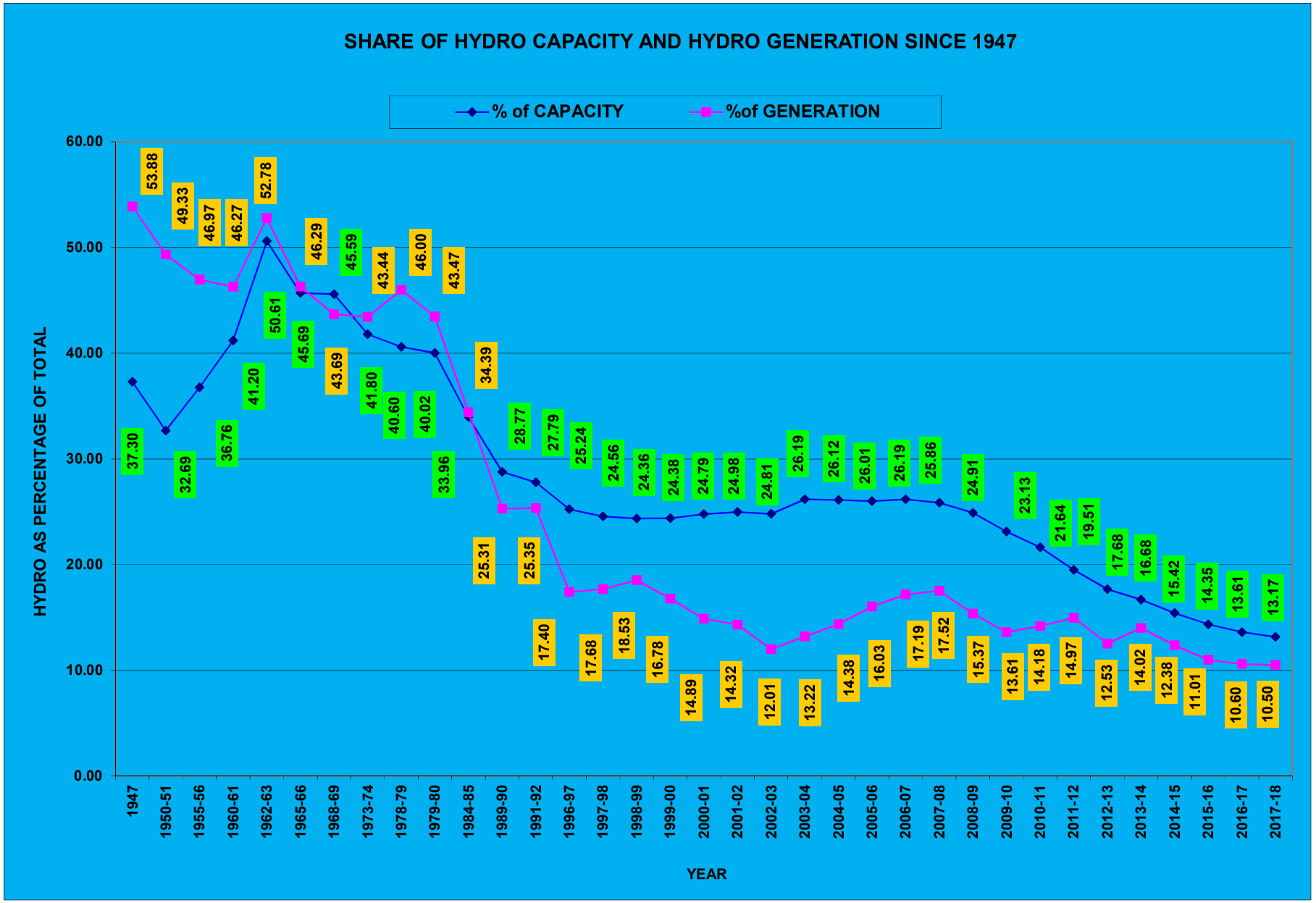

SHARE OF HYDRO CAPACITY AND HYDRO GENERATION SINCE 1947
% of CAPACITY
%of GENERATION
HYDRO AS PERCENTAGE OF TOTAL
YEAR
0.00
10.00
20.00
30.00
40.00
50.00
60.00
1947 1950-51 1955-56 1960-61 1962-63 1965-66 1968-69 1973-74 1978-79 1979-80 1984-85 1989-90 1991-92 1996-97 1997-98 1998-99 1999-00 2000-01 2001-02 2002-03 2003-04 2004-05 2005-06 2006-07 2007-08 2008-09 2009-10 2010-11 2011-12 2012-13 2013-14 2014-15 2015-16 2016-17 2017-18
37.30 32.69 36.76 41.20 50.61 45.69 43.69 41.80 40.60 40.02 33.96 28.77 27.79 25.24 24.56 24.36 24.38 24.79 24.98 24.81 26.19 26.12 26.01 26.19 25.86 24.91 23.13 21.64 19.51 17.68 16.68 15.42 14.35 13.61 13.17
53.88 49.33 46.97 46.27 52.78 46.29 45.59 43.44 46.00 43.47 34.39 25.31 25.35 17.40 17.68 18.53 16.78 14.89 14.32 12.01 13.22 14.38 16.03 17.19 17.52 15.37 13.61 14.18 14.97 12.53 14.02 12.38 11.01 10.60 10.50

TABLE 1.2

STATUS OF H.E. POTENTIAL DEVELOPMENT - BASIN-WISE
(In terms of Installed Capacity-above 25 MW as on 31.03.2018)

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	14240.3	43.12	3871.5	11.72	14916.2	45.16
Ganga	20711	20252	5317.2	26.26	1645.0	8.12	13289.6	65.62
Central Indian River System	4152	3868	3147.5	81.37	400.0	10.34	320.5	8.29
West Flowing Rivers System	9430	8997	5681.7	63.15	100.0	1.11	3215.3	35.74
East Flowing Rivers System	14511	13775	8232.2	59.76	990.0	7.19	4552.9	33.05
Brahmaputra	66065	65400	3889.0	5.95	4107.0	6.28	57404.0	87.77
Total	**148701**	**145320**	**40507.8**	**27.87**	**11113.5**	**7.65**	**93698.7**	**64.48**

Note:- 1. In addition, 4785.60 MW of PSS are in operation and 1205 MW of PSS are 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. station under Tata, has risen to 45293.42 MW (as on 31.03.2018) from H.E. station above 25 MW capacity. The maximum unit size is now 250 MW at Koyna Stage-IV under MAHAGENCO, Nathpa Jhakri under SJVNL, Tehri under THDC and Karcham Wangtoo of HBPCL.

Contribution of electricity generation from Hydro Electric Power Stations has risen from 2.2 BU during 1947 to about 126.1 BU in 2017-18. Hydro generation during 2017-18 was about 3.7 BU more than the generation of 122.4 BU during 2016-17.

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 rose from 37.3% at the end of 1947 to 50.6% during 1962-63. However, thereafter the share of hydro progressively declined and is presently 13.17% at the end of 2017-18. The generation from hydro stations during the year 2017-18 accounted for 10.50% 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
2016-17*	326849	44478	13.61	1154524	122378	10.60
2017-18*	344002	45293	13.17	1201528	126123	10.50

* Capacity above 25 MW only has been considered.

1.4 Monitored Hydro Installed Capacity

For generation performance, the monitored hydro-electric installed capacity in the country as on 30.03.2018 was 45293.42 MW (above 25 MW capacity). Region-wise

summary of the hydel installed capacity is indicated in **Table 1.4**. Region-wise, type-wise and construction-wise categorization of stations is given in **Annex-1.1** while Sector-wise/Utility-wise and station-wise/State-wise details of installed capacity are given in **Annex 1.2 to 1.4**.

TABLE 1.4

REGION-WISE SUMMARY OF HYDRO ELECTRIC INSTALLED CAPACITY
(Above 25 MW capacity as on 31.03.2018)

S. No.	Region	No. of Units	Installed Capacity (MW)
1.	Northern	245	18969.27
2.	Western	101	7392.00
3.	Southern	255	11842.45
4.	Eastern	78	5747.70
5.	North-Eastern	33	1342.00
Total		**712**	**45293.42**

Capacity-wise grouping of H.E. Stations as on 31.03.2018 is given in **Annex- 1.5**. It is observed that 101 stations with installed capacity above 100 MW constitute more than 85% of the overall hydro capacity.

16 H.E. Generating units having installed capacity of 795 MW were added during the year 2017-18. Details of these units are given in **Annex-1.6**. Also, one additional unit of 9 MW of Pochampad HE Station has been reported by APGENCO and installed capacity of Chujachen HEP has been increased by 11 MW.

Share of hydro installed capacity and hydro generation vis-a-vis total installed capacity and total generation in the Country as on 31.03.2018 was 13.17% and 10.50% 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%, 7% and 60% respectively. Sector-wise distribution of hydro generation in Central, Private and State sectors were 44%, 11% and 45% respectively. These details are illustrated in **Exhibits 1.8 & 1.9**.

1.5 Hydro Generating Units : Indigenous and imported

As on 31.03.2018, there were 712 hydro generating units in operation at 206 stations comprising of indigenous and imported units as per details given in **Table 1.5** below. The domestic supplier, BHEL, has a share of about 42.4% of total capacity for both turbines & generators whereas other domestic suppliers together have a meagre share of about 6.39% of total capacity.

Among the imported turbines and generators, Japan, UK and Canada are the top three suppliers of turbines and generators in term of numbers but capacity-wise, Japan, Canada and USSR are the top three suppliers.

EXHIBIT-1.6

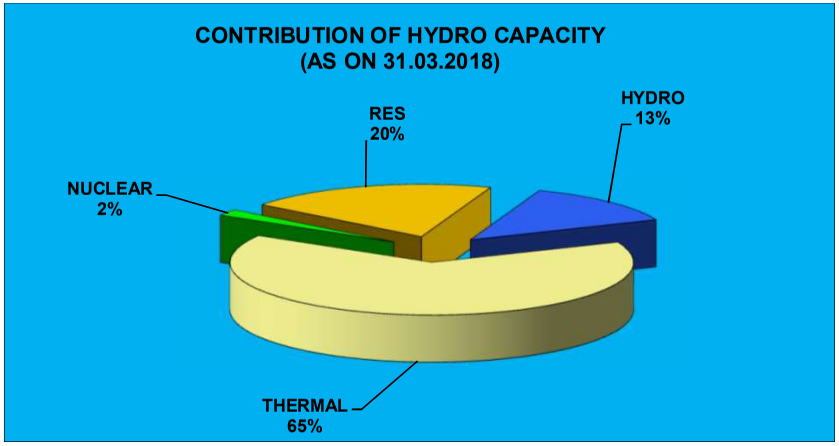


EXHIBIT-1.8

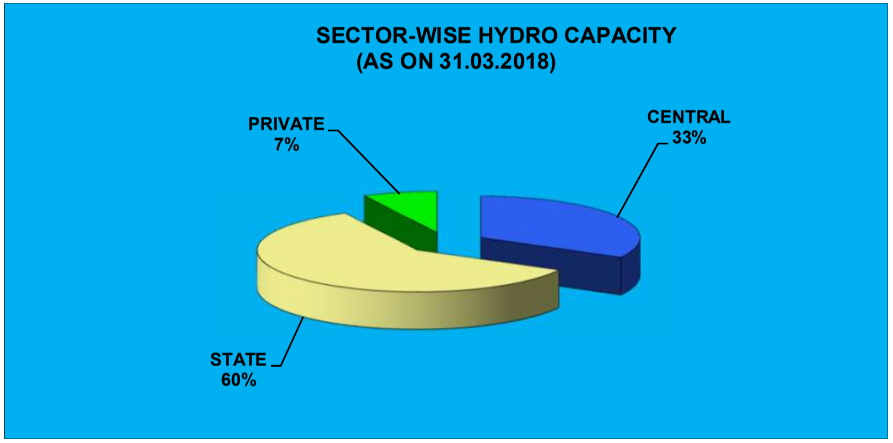


EXHIBIT-1.7

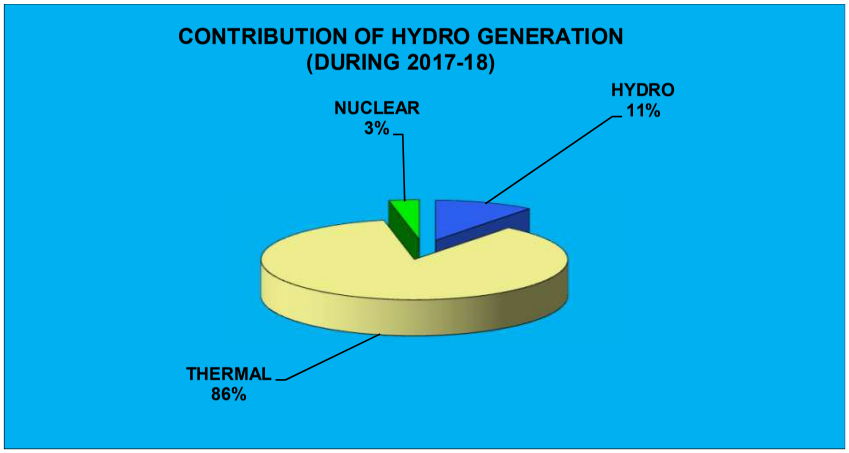


EXHIBIT-1.9

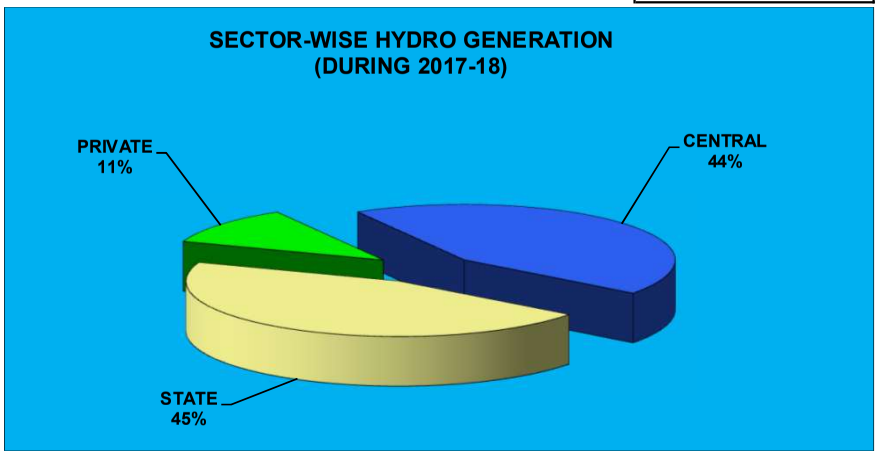


TABLE 1.5

HYDRO GENERATING UNITS INDIGENOUS/IMPORTED FROM VARIOUS COUNTRIES AS ON 31-03-2018

Name of the Country	Turbines supplied				Generators supplied			
	Units		Capacity		Units		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
A-Indigenous								
BHEL	302	42.42	19211.02	42.41	302	42.42	19211.02	42.41
Others*	47	6.60	2895.50	6.39	46	6.46	2894.00	6.39
Sub Total	**349**	**49.02**	**22106.52**	**48.81**	**348**	**48.88**	**22105.02**	**48.80**
B-Imported								
Switzerland	22	3.17	815.20	1.83	12	1.73	244.00	0.55
Canada	44	6.33	3132.00	7.04	44	6.33	3132.00	7.04
U.S.A	9	1.29	351.00	0.79	26	3.74	543.15	1.22
USSR	26	3.74	2804.00	6.30	26	3.74	2804.00	6.30
France	33	4.75	2186.40	4.92	17	2.45	1726.00	3.88
U.K	63	9.06	1242.10	2.79	58	8.35	1622.90	3.65
Japan	76	10.94	6344.20	14.26	74	10.65	5829.40	13.11
Other	90	12.95	6312.00	14.19	107	15.40	7286.95	16.38
Sub Total	**363**	**52.23**	**23186.90**	**52.13**	**364**	**52.37**	**23188.40**	**52.13**
Total	**712**	**100**	**45293.42**	**100**	**712**	**100**	**45293.42**	**100**

REGION-WISE / SECTOR-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY

(ABOVE 25 MW CAPACITY)

(As on 31.03.2018)

REGION	DESIGN ENERGY (MU)	CONVENTIONAL HE STATIONS			PUMPED STORAGE SCHEMES (PSS)			CONVENTIONAL + PUMPED STORAGE SCHEMES (PSS)		
		NO. OF STATIONS	NO. OF UNITS	INSTALLED CAPACITY (MW)	NO. OF STATIONS	NO. OF UNITS	INSTALLED CAPACITY (MW)	NO. OF STATIONS	TOTAL UNITS	TOTAL INSTALLED CAPACITY (MW)
NORTHERN	74338.26	73	245	18969	0	0	0.00	73	245	18969.27
WESTERN	16607.21	24	88	5552	4	13	1840.00	28	101	7392.00
SOUTHERN	33900.85	68	232	9722	3	17	2005.60	71	249	11727.70
EASTERN	19914.39	22	79	4922	2	5	940.00	24	84	5862.45
NORTH EASTERN	5503.31	12	33	1342	0	0	0.00	12	33	1342.00
TOTAL	**150264.02**	**199**	**677**	**40507.82**	**9**	**35**	**4785.60**	**208**	**712**	**45293.42**

NOTE:

Note: Following two Hydro Stations have conventional as well as PSS capacity:

Sl. No.	Station	State/Region	Installed Capacity (MW)	
			Conventional	PSS
1	N J Sagar	Telangana/ Southern	1X110 =110	7X100.8=705.60
2	Panchet	Jharkhand/ Eastern	1X40=40	1X40=40

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

SECTOR	NO. OF UTILITIES	NO. OF STATION	NO. OF UNITS	INSTALLED CAPACITY (MW)
CENTRAL	8	41	158	14907.72
STATE	23	147	504	26991.70
PRIVATE	14	18	50	3394.00
TOTAL	**45**	**206**	**712**	**45293.42**

Categorisation of HE Stations (Installed Capacity)

1. Operation-wise

(As on 31.03.2018)

Sector	RoR		RoR (P)		Storage (S)						Total	
	No.	MW	No.	MW	S(P)		S(MPP)		PSS		No.	MW
					No.	MW	No.	MW	No.	MW		
Central	9	2115.52	17	6553.00	6	1750.00	9	4449.20	1	40.00	42	14907.72
State	16	976.15	48	6905.00	34	6944.65	43	7570.30	7	4595.60	148	26991.70
Private	4	689.00	10	2258.00	3	297.00	0	0.00	1	150.00	18	3394.00
Total (Nos./ MW Capacity)*	**29**	**3780.67**	**75**	**15716.00**	**43**	**8991.65**	**52**	**12019.50**	**9**	**4785.60**	**208**	**45293.42**
% of Total	**14.5**	**8.50**	**37.5**	**35.33**	**21.5**	**20.22**	**26**	**27.02**	**4.5**	**10.76**	**100**	**100**

2. Power House Construction-wise

Sector	Surface		Underground		Total	
	No.	MW	No.	MW	No.	MW
Central	27	7609.52	14	7298.2	**41**	**14907.7**
State	128	19130.7	19	7861	**147**	**26991.7**
Private	11	1236	7	2158	**18**	**3394**
Total (Nos./MW Capacity)*	**166**	**27976.22**	**40**	**17317.20**	**206**	**45293.42**
% of Total	**80.58**	**61.77**	**19.42**	**38.23**	**100**	**100**

* Total number of HE Stations are 206 as NJ Sagar HE Station (Southern Region) is having one Conventional unit and remaining seven units are PSS. Also, one unit of Panchet HE Station (Eastern Region) is Conventional and other unit is PSS.

Abbreviations:

RoR - Run of River type

RoR(P) – Run of River with Pondage

S(P) – Storage (Conventional) for Power Generation purpose only

S(MPP) – Storage (Conventional) for Multipurpose Project

PSS – Pumped Storage Scheme

SECTOR-WISE/UTILITY-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY

(ABOVE 25 MW CAPACITY)

(As on 31.03.2018)

Sl. No.	NAME OF THE SECTOR/ UTILITY	NO. OF STATIONS	NO. OF UNITS	INSTALLED CAPACITY (MW)	DESIGN ENERGY (MU)
	CENTRAL SECTOR				
1	BBMB	6	28	2866.30	9515.00
2	NHPC	21	70	5451.20	24680.34
3	SJVNL	2	12	1912.02	8490.08
4	NTPC	1	4	800.00	3054.79
5	THDC	2	8	1400.00	3952.00
6	NHDC	2	16	1520.00	3146.57
7	DVC	2	5	143.20	374.00
8	NEEPCO	5	15	815.00	3537.62
	SUB TOTAL CENTRAL	**41**	**158**	**14907.72**	**56750.40**
	PRIVATE SECTOR				
1	MPCL	1	2	86	371
2	EPPL	1	2	100	403
3	GBHPPL	1	2	70	292
4	ADHPL	1	2	192	678
5	HBPCL	2	7	1300	5344
6	JPPVL	1	4	400	1774
7	AHPC	1	4	330	1397
8	IAEPL	1	3	36	158
9	TPCL	4	15	447	1220
10	GIPL	1	2	110	538
11	DEPL	1	2	96	459
12	DLHP	1	1	34	50
13	SKPPPL	1	2	96	542

14	SEPL	1	2	97	454
	SUB TOTAL PRIVATE	**18**	**50**	**3394.00**	**13679.79**
	STATE SECTOR				
1	HPSEBL	4	12	372.00	1691.62
2	HPPCL	3	5	295.00	569.03
3	JKSPDC	4	12	1110.00	4833.30
4	PSPCL	8	25	1051.00	4207.00
5	RRVUNL	4	11	411.00	1046.00
6	UPJVNL	4	15	501.60	1707.00
7	UJVNL	10	34	1252.15	4848.10
8	GSECL	2	8	540.00	1598.00
9	SSNNL	2	11	1450.00	3848.00
10	MPPGCL	8	23	875.00	2561.64
11	CSPGC	1	3	120.00	245.00
12	MSPGCL	8	24	2406.00	3938.00
13	APGENCO	10	34	1796.75	5738.00
14	TSGENCO	7	35	2375.60	5045.85
15	KPCL	14	68	3585.40	12981.00
16	KSEB	13	48	1881.50	6458.00
17	TANGEDCO	27	70	2203.20	4348.00
18	JUUNL	2	2	130.00	149.00
19	OHPC	6	31	2027.50	5676.00
20	WBSEDCL	3	12	986.00	1613.60
21	TUL	1	6	1200.00	5214.00
22	APGCL	1	2	100.00	390.00
23	MePGCL	5	13	322.00	1127.69
	SUB TOTAL STATE	**147**	**504**	**26991.70**	**79833.83**
	TOTAL	**206**	**712**	**45293.42**	**150264.02**

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

(As on 31.03.2018)

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
	CONVENTIONAL H.E. STATIONS							
	NORTHERN							
	HIMACHAL PRADESH							
	CENTRAL SECTOR							
	BBMB							
1	Bhakra Right	1	5	(5X108)	540.00	3924.00	S	1960-1961
2	Bhakra Right	1	5	(5X157)	785.00			1966-1968
3	Dehar	1	6	(6X165)	990.00	3110.00	R(P)	1977-1983
4	Pong	1	6	(6X66)	396.00	1123.00	S	1978-1983
	TOTAL BBMB (HP)	**4**	**22**		**2711.00**	**8157.00**		
	NHPC							
5	Baira Siul	1	3	(3X60)	180.00	779.28	R(P)	1980-1981
6	Chamera-I	1	3	(3X180)	540.00	1664.56	S	1994
7	Chamera-II	1	3	(3X100)	300.00	1499.89	R(P)	2003-2004
8	Chamera-III	1	3	(3X77)	231.00	1108.00	R(P)	2012
9	Parbati III	1	4	(4X130)	520.00	1977.23	R(P)	2014
	TOTAL NHPC (HP)	**5**	**16**		**1771.00**	**7028.96**		
	SJVNL							
10	Naptha Jhakri	1	6	(6X250)	1500.00	6612.00	R(P)	2003-2004
11	Rampur	1	6	(6X68.67)	412.02	1878.08	R	2014-15
	TOTAL SJVNL	**2**	**12**		**1912.02**	**8490.08**		
	NTPC LTD.							
12	Koldam	1	4	(4X200)	800.00	3054.79	S	2015
	TOTAL NTPC LTD.	**1**	**4**		**800.00**	**3054.79**		
	TOTAL Central Sector (HP)	**12**	**54**		**7194.02**	**26730.83**		
	STATE SECTOR							
	HPSEBL							
13	Bassi	1	4	(4X16.5)	66.00	346.77	R(P)	1970-1981
14	Giri Bata	1	2	(2X30)	60.00	240.00	R(P)	1978
15	Larji	1	3	(3X42)	126.00	586.85	R(P)	2006
16	Sanjay	1	3	(3X40)	120.00	518.00	R(P)	1989
	TOTAL HPSEBL	**4**	**12**		**372.00**	**1691.62**		
	HPPCL							
17	Kashang I	1	1	(1X65)	65	245.80	R	2017
18	Kashang II & III	1	2	(2X65)	130			2017

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
19	Sainj	1	2	(2X50)	100	323.23	R(P)	2017
	TOTAL HPPCL	**3**	**5**		**295.00**	**569.03**		
	PSPCL							
20	Shanan	1	5	(1X50)+(4X15)	110.00	585.00	R(P)	1932-1982
	TOTAL PSPCL-HP	**1**	**5**		**110.00**	**585.00**		
	TOTAL State Sector	**8**	**22**		**777.00**	**2845.65**		
	PRIVATE SECTOR							
	MPCL							
21	Malana	1	2	(2X43)	86.00	370.93	R(P)	2001
	TOTAL MPCL	**1**	**2**		**86.00**	**370.93**		
	GBHPPL							
22	Budhil	1	2	(2X35)	70.00	291.73	R(P)	2012
	TOTAL GBHPPL	**1**	**2**		**70.00**	**291.73**		
	EPPL							
23	Malana-II	1	2	(2X50)	100.00	403.00	R(P)	2011-12
	TOTAL EPPL	**1**	**2**		**100.00**	**403.00**		
	IA ENERGY							
24	Chanju-I	1	3	(3X12)	36.00	157.82	R(P)	2017
	TOTAL IA ENERGY	**1**	**3**		**36.00**	**157.82**		
25	Allain Duhangan	1	2	(2X96)	192.00	678.18	R(P)	2010-11
	TOTAL ADHPL	**1**	**2**		**192.00**	**678.18**		
	HBPCL							
26	Baspa-II	1	3	(3X100)	300.00	1213.00	R(P)	2003
27	Karcham Wangtoo	1	4	(4X250)	1000.00	4131.06	R(P)	2011-12
	TOTAL HBPCL	**2**	**7**		**1300.00**	**5344.06**		
	TOTAL Pvt.	**7**	**18**		**1784.00**	**7245.72**		
	TOTAL HP	**27**	**94**		**9755.02**	**36822.20**		
	JAMMU AND KASHMIR							
	CENTRAL SECTOR							
	NHPC							
28	Dulhasti	1	3	(3X130)	390.00	1907.00	R(P)	2007
29	Salal-I	1	3	(3X115)	345.00	3082.00	R	1987-95
30	Salal-II	1	3	(3X115)	345.00			
31	Uri	1	4	(4X120)	480.00	2587.38	R	1996-1997
32	Uri -II	1	4	(4X60)	240.00	1124.00	R	2013-14
33	Sewa-II	1	3	(3X40)	120.00	533.52	R(P)	2010-11
34	Chutak	1	4	(4X11)	44.00	213.00	R	2012-13
35	Nimoo Bazgo	1	3	(3X15)	45.00	239.00	R(P)	2013

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
36	Kishenganga	1	3	(3X110)	330.00	1705.62	R(P)	2018
	TOTAL NHPC (J&K)	**9**	**30**		**2339.00**	**11391.52**		
	STATE SECTOR							
	JKSPDC							
37	Baglihar	1	3	(3X150)	450.00	2643.00	R(P)	2008
38	Baglihar II	1	3	(3X150)	450.00	1302.30	R(P)	2015
39	Lower Jhelum	1	3	(3X35)	105.00	533.00	R(P)	1978-1979
40	Upper Sindh II	1	3	(3X35)	105.00	355.00	R(P)	2001-2002
	TOTAL JKSPDC	**4**	**12**		**1110.00**	**4833.30**		
	TOTAL J&K	**13**	**42**		**3449.00**	**16224.82**		
	PUNJAB							
	CENTRAL SECTOR							
	BBMB							
41	Ganguwal	1	3	(2X24.2)+(1X29.25)	77.65	1358	R	1955-1962
42	Kotla	1	3	(2X24.2)+(1X29.25)	77.65		R	1956-1961
	TOTAL BBMB (Punjab)	**2**	**6**		**155.30**	**1358.00**		
	STATE SECTOR							
	PSPCL							
43	A.P.Sahib I	1	2	(2X33.5)	67.00	909.00	R	1985
44	A.P.Sahib II	1	2	(2X33.5)	67.00		R	
45	Mukerian I	1	3	(3X15)	45.00	1206.00	R	1983
46	Mukerian II	1	3	(3X15)	45.00		R	1988-89
47	Mukerian III	1	3	(3X19.5)	58.50		R	1989
48	Mukerian I - IV	1	3	(3X19.5)	58.50		R	1989
49	Ranjit Sagar	1	4	(4X150)	600.00	1507.00	MP	2000
	TOTAL PSPCL	**7**	**20**		**941.00**	**3622.00**		
	TOTAL PUNJAB	**9**	**26**		**1096.30**	**4980.00**		
	RAJASTHAN							
	STATE SECTOR							
	RRVUNL							
50	Jawahar Sagar	1	3	(3X33)	99.00	298.00	S	1972-1973
51	Mahi Bajaj I	1	2	(2X25)	50.00	289.00	MP	1986
52	Mahi Bajaj II	1	2	(2X45)	90.00		S	1989
53	R.P. Sagar	1	4	(4X43)	172.00	459.00	MP	1968
	TOTAL RRVUNL	**4**	**11**		**411.00**	**1046.00**		
	TOTAL Rajasthan	**4**	**11**		**411.00**	**1046.00**		

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
	UTTARAKHAND							
	CENTRAL SECTOR							
	NHPC							
54	Dhauliganga	1	4	(4X70)	280.00	1134.69	R(P)	2005
55	Tanakpur	1	3	(3X31.4)	94.20	452.19	R	1992
	TOTAL NHPC (Uttarakhand)	**2**	**7**		**374.20**	**1586.88**		
	THDC							
56	Tehri	1	4	(4X250)	1000.00	2797.00	MP	2006-2007
57	Koteshwar	1	4	(4X100)	400.00	1155.00	R(P)	2010-12
	TOTAL THDC	**2**	**8**		**1400.00**	**3952.00**		
	TOTAL Central Sector (Uttra.)	**4**	**15**		**1774.20**	**5538.88**		
	STATE SECTOR							
	UJVNL							
58	Chibro (Y.St.II)	1	4	(4X60)	240.00	750.00	R(P)	1975-1976
59	Chilla	1	4	(4X36)	144.00	725.00	R	1980-1981
60	Dhakrani (Y.St.I)	1	3	(3X11.25)	33.75	169.00	R	1965-1970
61	Dhalipur (Y.St.I)	1	3	(3X17)	51.00	192.00	R	1965-1970
62	Khatima	1	3	(3X13.8)	41.40	208.00	R	1955-1956
63	Khodri (Y.St.II)	1	4	(4X30)	120.00	345.00	R(P)	1984
64	Kulhal (Y.St.IV)	1	3	(3X10)	30.00	164.00	R	1975
65	Maneri Bhali-I	1	3	(3X30)	90.00	395.00	R(P)	1984
66	Maneri Bhali-II	1	4	(4X76)	304.00	1566.10	R(P)	2008
67	Ram Ganga	1	3	(3X66)	198.00	334.00	MP	1975-1977
	TOTAL UJVNL	**10**	**34**		**1252.15**	**4848.10**		
	PRIVATE							
	AHPC							
68	Shrinagar	1	4	(4X82.50)	330.00	1396.84	R(P)	2015
.	**JPPVL**							
69	Vishnuprayag	1	4	(4X100)	400.00	1774.42	R	2006
	TOTAL Private (Uttarkhand)	**2**	**8**		**730.00**	**3171.26**		
	TOTAL Uttarakhand	**16**	**57**		**3756.35**	**13558.24**		
	UPJVNL							
	UTTAR PRADESH							
	STATE SCETOR							
	UPJVNL							
70	Khara	1	3	(3X24)	72.00	385.00	R(P)	1992
71	Matatilla	1	3	(3X10.2)	30.60	123.00	MP	1965
72	Obra	1	3	(3X33)	99.00	279.00	MP	1970-1971

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
73	Rihand	1	6	(6X50)	300.00	920.00	MP	1961-1965
	TOTAL UPJVNL	**4**	**15**		**501.60**	**1707.00**		
	TOTAL Uttar Pradesh	**4**	**15**		**501.60**	**1707.00**		
	TOTAL NORTHERN REGION	**73**	**245**		**18969.27**	**74338.26**		
	WESTERN REGION							
	MADHYA PRADESH							
	CENTRAL SECTOR							
	NHDC							
74	Indira Sagar	1	8	(8X125)	1000.00	1980.00	MP	2004-2005
75	Omkareshwar	1	8	(8X65)	520.00	1166.57	MP	2007
	TOTAL NHDC	**2**	**16**		**1520.00**	**3146.57**		
	STATE SECTOR							
	MPPGCL							
76	Bansagar Tons-I	1	3	(3X105)	315.00	900.00	R(P)	1991-1992
77	Bansagar Tons-II	1	2	(2X15)	30.00	113.00	R	2002
78	Bansagar Tons-III	1	3	(3X20)	60.00	143.00	MP	2000-2002
79	Bargi	1	2	(2X45)	90.00	508.08	MP	1988
80	Gandhi Sagar	1	5	(5X23)	115.00	420.48	MP	1960-1966
81	Madhikheda	1	3	(3X20)	60.00	74.12	MP	2006-2007
82	Rajghat	1	3	(3X15)	45.00	87.60	MP	1999
	TOTAL MPPGCL	**7**	**21**		**715.00**	**2246.28**		
	TOTAL MP	**9**	**37**		**2235.00**	**5392.85**		
	MAHARASHTRA							
	STATE SECTOR							
	MSPGCL							
83	Bhira Tail Race	1	2	(2X40)	80.00	75.00	R(P)	1987-1988
84	Koyna DPH	1	2	(2X18)	36.00	146.00	S	1980-1981
85	Koyna St.I&II	1	8	(4X70)+(4X80)	600.00	3030.00	S	1962-1967
86	Koyna St.III	1	4	(4X80)	320.00		R(P)	1975-1978
87	Koyna IV	1	4	(4X250)	1000.00		S	1999-2000
88	Tillari	1	1	(1X60)	60.00	133.00	R(P)	1986
89	Vaitarna	1	1	(1X60)	60.00	144.00	S	1976
	TOTAL MSPGCL	**7**	**22**		**2156.00**	**3528.00**		
	MPPGCL							
90	Pench	1	2	(2X80)	160.00	315.36	S	1986-1987
	TOTAL MPPGCL (Maharashtra)	**1**	**2**		**160.00**	**315.36**		
	TOTAL State Sector	**8**	**24**		**2316.00**	**3843.36**		

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
	PRIVATE SECTOR							
	DODSON-LINDBLOM HYDRO POWER PVT. LTD. (DLHP)							
91	Bhandardhara - II	1	1	(1X34)	34.00	50.00	R(P)	1996
	SUB-TOTAL DLHP	**1**	**1**		**34.00**	**50.00**		
	TATA POWER COMPANY (PVT.)							
92	Bhira	1	6	(6X25)	150.00	775.00	S	1927-1949
93	Bhivpuri	1	5	(3X24) + (2X1.5)	75.00	220.00	S	1997-1999
94	Khopoli	1	3	(3X24)	72.00	225.00	S	2001-2003
	TOTAL TPCL	**3**	**14**		**297.00**	**1220.00**		
	TOTAL Pvt. (Maharshtra)	**4**	**15**		**331.00**	**1270.00**		
	TOTAL Maharshtra	**12**	**39**		**2647.00**	**5113.36**		
	CHHATTISGARH							
	STATE SECTOR							
	CSPGCL							
95	Hasdeobango	1	3	(3X40)	120.00	245.00	MP	1994-1995
	TOTAL CSPGCL	**1**	**3**		**120.00**	**245.00**		
	TOTAL Chhatisgarh	**1**	**3**		**120.00**	**245.00**		
	GUJARAT							
	STATE SECTOR							
	GSECL							
96	Ukai	1	4	(4X75)	300.00	1080.00	MP	1974-1976
	TOTAL GSECL	**1**	**4**		**300.00**	**1080.00**		
	SSNNL							
97	S Sarovar CHPH	1	5	(5X50)	250.00	213.00	R(P)	2004
	TOTAL SSNNL	**1**	**5**		**250.00**	**213.00**		
	TOTAL State Sector (Gujarat)	**2**	**9**		**550.00**	**1293.00**		
	TOTAL Gujarat	**2**	**9**		**550.00**	**1293.00**		
	TOTAL Western Region	**24**	**88**		**5552.00**	**12044.21**		
	SOUTHERN REGION							
	ANDHRA PRADESH							
	STATE SECTOR							
	APGENCO							
98	Lower Sileru	1	4	(4X115)	460.00	1070.00	S	1976-1978
99	N.J.Sagar RBC	1	2	(2X30)	60.00	156.00	MP	1983
100	N.J.Sagar RBC Extn.	1	1	(1X30)	30.00		MP	1990
101	Srisailam RB	1	7	(7X110)	770.00	2900.00	MP	1982-1987
102	Upper sileru I	1	2	(2X60)	120.00	529.00	S	1967-1968
103	Upper sileru II	1	2	(2X60)	120.00		S	1994-1995

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
104	N.J.Sagar TPD	1	2	(2X25)	50.00	177.00	R(P)	2017
	TOTAL APGENCO	**7**	**20**		**1610.00**	**4832.00**		
	TOTAL Andhra Pradesh	**7**	**20**		**1610.00**	**4832.00**		
	TELANGANA							
	STATE SECTOR							
	TSGENCO							
105	Priyadarshni Jurala	1	6	(6X39)	234.00	404.00	R(P)	2008-2011
106	Pochampad	1	4	(4X9)	36.00	147.00	MP	1987-1988, 2010
107	N.J.Sagar	1	1	(1X110)	110.00		MP	1978-85
108	N.J.Sagar LBC	1	2	(2X30)	60.00	104.00	R	1983
109	Lower Jurala	1	6	(6X40)	240.00	534.43	R(P)	2015-16
110	Pulichinthala	1	3	(3X30)	90.00	219.42	R(P)	2016-17
	TOTAL TSGENCO	**6**	**22**		**770.00**	**1408.85**		
	TOTAL Telangana	**6**	**22**		**770.00**	**1408.85**		
	KARNATAKA							
	STATE SECTOR							
	KPCL							
111	Almatti Dam	1	6	(5X55)+(1X15)	290.00	483.00	MP	2004-2005
112	Gerusoppa (Sharavathy Tail Race)	1	4	(4X60)	240.00	622.00	R(P)	2001-2002
113	Ghatprabha	1	2	(2X16)	32.00	131.00	MP	1992
114	Jog (Mahatma Gandhi)	1	8	(4X21.6)+(4X13.2)	139.20	118.00	S	1949-1952
115	Kadra	1	3	(3X50)	150.00	570.00	S	1997-1999
116	Kalinadi	1	6	(3X135)+(3X150)	855.00	3385.00	S	1979-1984
117	Supa DPH	1	2	(2X50)	100.00	542.00	S	1985
118	Kodasali	1	3	(3X40)	120.00	512.00	S	1998-1999
119	Lingnamakki	1	2	(2X27.5)	55.00	254.00	S	1979-1980
120	Munirabad	1	3	(2X9)+(1X10)	28.00	66.00	MP	1962-1965
121	Sharavathy	1	10	(10X103.5)	1035.00	4932.00	S	1965-1977
122	Shivasamudram	1	10	(4X6)+(6X3)	42.00	183.00	R(P)	1922-1934
123	Varahi	1	4	(4X115)	460.00	1060.00	R(P)	1989-2009
124	Bhadra	1	5	(2x12)+(1x2)+(1X7.2)+(1X6)	39.20	123.00	MP	1965
	TOTAL KPCL	**14**	**68**		**3585.40**	**12981.00**		
	APGENCO							
125	T B Dam	1	4	(4X9)	36.00	236.00	MP	1957-1964
126	Hampi	1	4	(4X9)	36.00		MP	1958-1964
	TOTAL APGENCO (Karnataka)	**2**	**8**		**72.00**	**236.00**		
	TOTAL Karnataka	**16**	**76**		**3657.40**	**13217.00**		

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
	KERALA							
	STATE SECTOR							
	KSEBL							
127	Idamalayar	1	2	(2X37.5)	75.00	380.00	MP	1987
128	Idukki	1	6	(6X130)	780.00	2398.00	MP	1976-1986
129	Kakkad	1	2	(2X25)	50.00	262.00	R(P)	1999
130	Kuttiadi & Kuttiady Extn.	1	4	(3X25+1X50)	125.00	323.00	MP	1972 & 2001
131	Kuttiady Addl.	1	2	(2X50)	100.00		MP	2010
132	Lower Periyar	1	3	(3X60)	180.00	493.00	MP	1997
133	Neriamangalam	1	4	(3X15+1X25)	70.00	237.00	R(P)	1961-63
134	Pallivasal	1	6	(3X5)+(3X7.5)	37.50	284.00	S	1948-2001
135	Panniar	1	2	(2X15)	30.00	158.00	S	1963-2001
136	Poringalkuthu	1	4	(4X8)	32.00	170.00	S	1957-1960
137	Sabarigiri	1	6	(6X50)	300.00	1338.00	S	1960-1967
138	Sengulam	1	4	(4X12)	48.00	182.00	S	1954-2001
139	Sholayar	1	3	(3X18)	54.00	233.00	R(P)	1956-1968
	TOTAL KSEB	**13**	**48**		**1881.50**	**6458.00**	S	
	TOTAL Kerala	**13**	**48**		**1881.50**	**6458.00**		
	TAMIL NADU							
	STATE SECTOR							
	TANGEDCO							
140	Aliyar	1	1	(1X60)	60.00	175.00	MP	1970
141	Bhawani K Barrage-III	1	2	(2X15)	30.00	90.00	R(P)	2006
142	Bhawani K Barrage-II	1	2	(2X15)	30.00	100.00	R(P)	2013
143	Bhawani K Barrage-I	1	2	(2X15)	30.00	80.00	R(P)	2012
144	Kodayar I	1	1	(1X60)	60.00	165.00	MP	1970
145	Kodayar II	1	1	(1X40)	40.00		MP	1971
146	Kundah I	1	3	(3X20)	60.00	1387.00	S	1960-1964
147	Kundah II	1	5	(5X35)	175.00		S	1960-1965
148	Kundah III	1	3	(3X60)	180.00		S	1965-1978
149	Kundah IV	1	2	(2X50)	100.00		S	1966-1978
150	Kundah V	1	2	(2X20)	40.00		S	1964-1988
151	Lower Mettur I	1	2	(2X15)	30.00	252.00	R(P)	1988
152	Lower Mettur II	1	2	(2X15)	30.00		R(P)	1988
153	Lower Mettur III	1	2	(2X15)	30.00		R(P)	1987-1988
154	Lower Mettur IV	1	2	(2X15)	30.00		R(P)	1988-1999
155	Mettur Dam	1	4	(4X12.5)	50.00	541.00	MP	1937-1946
156	Mettur Tunnel	1	4	(4X50)	200.00		MP	1965-1966

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
157	Moyar	1	3	(3X12)	36.00	115.00	S	1952-1953
158	Papanasam	1	4	(4X8)	32.00	105.00	MP	1944-1951
159	Parson's Valley	1	1	(1X30)	30.00	53.00	S	2000
160	Periyar	1	4	(3X42)+(1X35)	161.00	409.00	MP	1958-1965
161	Pykara	1	6	(3X7)+(2X13.6)+(1X11)	59.20	274.00	S	1932-2005
162	Pykara Ultimate	1	3	(3X50)	150.00	30.00	S	2005
163	Sarkarpathy	1	1	(1X30)	30.00	162.00	R(P)	1966
164	Sholayar I&II	1	3	(2X35+1X25)	95.00	254.00	S	1971
165	Suruliyar	1	1	(1X35)	35.00	79.00	S	1978
	TOTAL TANGEDCO	**26**	**66**		**1803.20**	**4271.00**		
	TOTAL Tamil Nadu	**26**	**66**		**1803.20**	**4271.00**		
	TOTAL SOUTHERN REGION	**68**	**232**		**9722.10**	**30186.85**		
	EASTERN							
	JHARKHAND							
	CENTRAL SECTOR							
	DVC							
166	Panchet	1	1	(1X40)	40.00	237.00	MP	1990
	TOTAL DVC (Jharkhand)	**1**	**1**		**40.00**	**237.00**		
	STATE SECTOR							
	JUUNL							
167	SUBernarekha I	1	1	(1X65)	65.00	149.00	MP	1977
168	SUBernarekha II	1	1	(1X65)	65.00		R(P)	1980
	TOTAL JUUNL	**2**	**2**		**130.00**	**149.00**		
	TOTAL Jharkhand	**3**	**3**		**170.00**	**386.00**		
	ODISHA							
	STATE SECTOR							
	OHPC							
169	Balimela	1	8	(6X60)+(2X75)	510.00	1183.00	MP	1973-1977, 2008
170	Hirakud (Burla)	1	7	(3X37.5)+(2X49.5)+(2X32)	275.50	684.00	MP	1956-1990
171	Hirakud (Chiplima)	1	3	(3X24)	72.00	490.00	R(P)	1962-1964
172	Rengali	1	5	(5X50)	250.00	525.00	MP	1985-1992
173	Upper Indravati	1	4	(4X150)	600.00	1962.00	MP	1999-2001
174	Upper Kolab	1	4	(4X80)	320.00	832.00	MP	1988-1993
	TOTAL OHPC	**6**	**31**		**2027.50**	**5676.00**		
	APGENCO							
175	Machkund	1	6	(3X17)+(3X21.25)	114.75	670.00	S	1959
	TOTAL APGENCO (Odisha)	**1**	**6**		**114.75**	**670.00**		
	TOTAL Odisha	**7**	**37**		**2142.25**	**6346.00**		

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
	SIKKIM							
	CENTRAL SECTOR							
	NHPC							
176	Rangit	1	3	(3X20)	60.00	338.61	R(P)	2000
177	Teesta-V	1	3	(3X170)	510.00	2572.70	R(P)	2008
	TOTAL NHPC (Sikkim)	**2**	**6**		**570.00**	**2911.31**		
	STATE SECTOR							
	TEESTA URJA LTD. (TUL)							
178	Teesta-III	1	6	(6X200)	1200.00	5214.00	R(P)	2017
	TOTAL TUL	**1**	**6**		**1200.00**	**5214.00**		
	PRIVATE SECTOR							
	GIPL (GATI INFRA PRIVATE LTD.)							
179	Chuzachen	1	2	(2*55)	110.00	537.81	R(P)	2013
	SNEHA KINETIC POWER PROJECTS PVT LTD (SKPPPL)							
180	Dikchu	1	2	(2*48)	96.00	542.00	R	2017
	SHIGA ENERGY PVT LTD (SEPL)							
181	Tashiding	1	2	(2*48.50)	97.00	454.00	R	2017
	DANS ENERGY PVT LTD. (DEPL)							
182	Jorethang Loop	1	2	(2*48)	96.00	459.00	R	2015
	SUB-TOTAL Private Sector (Sikkir	**4**	**8**		**399.00**	**1992.81**		
	TOTAL SIKKIM	**7**	**20**		**2169.00**	**10118.12**		
	WEST BENGAL							
	CENTRAL SECTOR							
	NHPC							
183	Teesta Low Dam-III	1	4	(4X33)	132.00	594.00	R(P)	2013-14
184	Teesta Low Dam-IV	1	4	(4X40)	160.00	719.67	R(P)	2016
	TOTAL NHPC (WB)	**2**	**8**		**292.00**	**1313.67**		
	DVC							
185	Maithon	1	3	(1X23.2)+(2X20)	63.20	137.00	MP	1957-1958
	TOTAL DVC (WB)	**1**	**3**		**63.20**	**137.00**		
	TOTAL CENTRAL (WB)	**3**	**11**		**355.20**	**1450.67**		
	WBSEDCL							
	STATE SECTOR							
186	Jaldhaka I	1	4	(4X9)	36.00	169.60	R(P)	1967-1972, 2012
187	Rammam	1	4	(4X12.5)	50.00	209.00	R	1995-1996
	TOTAL WBSEDCL	**2**	**8**		**86.00**	**378.60**		
	TOTAL West Bengal	**5**	**19**		**441.20**	**1829.27**		
	TOTAL Eastern Region	**22**	**79**		**4922.45**	**18679.39**		

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
	NORTH EASTERN							
	ARUNACHAL PRADESH							
	CENTRAL SECTOR							
	NEEPCO							
	CENTRAL SECTOR							
188	Ranganadi	1	3	(3X135)	405	1509.66	R(P)	2002
	TOTAL NEEPCO (Ar.P)	**1**	**3**		**405**	**1509.66**		
	ASSAM							
	CENTRAL SECTOR							
	NEEPCO							
189	Kopili	1	5	(4X50)+(1X25)	225.00	1186.14	S	1988
190	Khandong	1	2	(2X25)	50.00	363.95	S	1984
	TOTAL NEEPCO (Assam)	**2**	**7**		**275.00**	**1550.09**		
	STATE SECTOR							
	APGCL							
191	Karbi Langpai	1	2	(2X50)	100.00	390.00	R(P)	2007
	TOTAL APGCL	**1**	**2**		**100.00**	**390.00**		
	TOTAL ASSAM	**3**	**9**		**375.00**	**1940.09**		
	MIZORAM							
	CENTRAL SECTOR							
	NEEPCO							
192	Tuirial	1	2	(2X30)	60.00	250.63	S	2017
	TOTAL NEEPCO Mizoram	**1**	**2**		**60.00**	**250.63**		
	NAGALAND							
	CENTRAL SECTOR							
	NEEPCO							
193	Doyang	1	3	(3X25)	75.00	227.24	S	2000
	TOTAL NEEPCO Nagaland	**1**	**3**		**75.00**	**227.24**		
	MANIPUR							
	CENTRAL SECTOR							
	NHPC							
194	Loktak	1	3	(3X35)	105.00	448.00	MP	1983
	TOTAL NHPC (Manipur)	**1**	**3**		**105.00**	**448.00**		

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
	MEGHALAYA							
	STATE SECTOR							
	MePGCL							
195	Kyrdemkulai	1	2	(2X30)	60.00	118.00	R(P)	1979
196	Umium St.I	1	4	(4X9)	36.00	128.00	S	1965
197	New Umtru	1	2	(2X20)	40.00	185.00	R(P)	2017
198	Umium St.IV	1	2	(2X30)	60.00	324.00	R(P)	1992
199	Myntdu St-I	1	3	(3X42)	126.00	372.69	R(P)	2012
	TOTAL MePGCL	**5**	**13**		**322.00**	**1127.69**		
	TOTAL NE REGION	**12**	**33**		**1342.00**	**5503.31**		
	TOTAL (CONVENTIONAL)	**199**	**677**		**40507.82**	**140752.02**		
	PUMPED STORAGE SCHEMES							
	GUJARAT							
	STATE SECTOR							
1	Kadana	1	4	(4X60)	240.00	518.00	PSS	1987-88
2	Sardar Sarovar- RBPH	1	6	(6X200)	1200.00	3635.00	PSS	2004-05, 05-06
	TOTAL GUJARAT	**2**	**10**		**1440.00**	**4153.00**		
	MAHARASHTRA							
	STATE SECTOR							
3	Ghatgarh	1	2	(2X125)	250.00	410.00	PSS	2008
	STATE SECTOR							
4	Bhira PSS	1	1	(1X150)	150.00		PSS	1995
	TOTAL Maharashtra	**2**	**3**		**400.00**	**410.00**		
	TOTAL Western Region	**4**	**13**		**1840.00**	**4563.00**		
	SOUTHERN REGION							
	TELANGANA							
	STATE SECTOR							
5	N J Sagar	1	7	(7X100.8)	705.60	2237.00	PSS	1978-85
6	Srisailam LBPH	1	6	(6X150)	900.00	1400.00	PSS	2000-04
	TOTAL TELANGANA	**2**	**13**		**1605.60**	**3637.00**		
	TAMIL NADU							
7	Kadmparai	1	4	(4X100)	400.00	77.00	PSS	1987-88
	TOTAL TAMIL NADU	**1**	**4**		**400.00**	**77.00**		
	TOTAL SOUTHERN	**3**	**17**		**2005.60**	**3714.00**		

SL. NO.	UTILITY/STATIONS	NO. OF STATIONS	No. of Units	NO. OF UNITS X CAPACITY (MW)	CAPACITY (MW)	DESIGN ENERGY (MU)	TYPE OF STATION	YEAR OF COMMISSIONING
	EASTERN REGION							
	JHARKHAND							
	CENTRAL SECTOR							
8	Panchet	1	1	(1X40)	40.00		PSS	1990
	WEST BENGAL							
	STATE SECTOR							
9	Purulia	1	4	(4X225)	900.00	1235.00	PSS	2007
	SUB-TOTAL	**1**	**4**		**900.00**	**1235.00**		
	TOTAL- PSS	**9**	**35**		**4785.60**	**9512.00**		
	TOTAL (CONVENTIONAL+PSS)	**208**	**712**		**45293.42**	**150264.02**		

NOTE: Following two Hydro Stations have conventional as well as PSS capacity:

Sl. No.	Station	State/Region	Installed Capacity (MW)	
			Conventional	PSS
1	N J Sagar	Telangana/ Southern	1X110 =110	7X100.8=705.60
2	Panchet	Jharkhand/ Eastern	1X40=40	1X40=40

Annex-1.5

CAPACITY-WISE GROUPING OF HYDRO-ELECTRIC STATIONS

As on 31.03.2018

STATION CAPACITY	NUMBER OF STATIONS		NUMBER OF UNITS		TOTAL CAPACITY	
RANGE (MW)	**No**	**%**	**No**	**%**	**MW**	**%**
> 25 - 100	105	50.97	284	39.89	6040.35	13.34
>100 - 500	75	36.41	282	39.61	17782.47	39.26
>500 - 1000	22	10.68	118	16.57	16535.6	36.51
>1000	4	1.94	28	3.93	4935	10.90
TOTAL	**206**	**100**	**712**	**100**	**45293.42**	**100**

HYDRO GENERATING UNITS ADDED DURING 2017-18

SL. NO.	NAME OF THE STATION	UTILITY	STATE	UNIT NO.	CAPACITY (MW)	DATE OF COMMISSIONING
CENTRAL SECTOR						
1	TUIRIAL	NEEPCO	MIZORAM	1	30.00	25.08.2017
				2	30.00	28.11.2017
2	KISHENGANGA	NHPC	JAMMU & KASHMIR	1	110.00	13.03.2018
				2	110.00	21.03.2018
				3	110.00	30.03.2018
STATE SECTOR						
3	NEW UMETRU	MePGCL	MEGHALAYA	1	20.00	22.04.2017
				2	20.00	30.06.2017
4	SAINJ	HPPCL	HIMACHAL PRADESH	1	50.00	04.09.2017
				2	50.00	04.09.2017
5	PULICHINTHALA	TSGENCO	TELANGANA	2	30.00	26.10.2017
				3	30.00	01.11.2017
6	DIKCHU	SNEHA KINETIC	SIKKIM	1	48.00	11.04.2017
				2	48.00	12.04.2017
PRIVATE SECTOR						
7	CHANJU-I	IAEPL	HIMACHAL PRADESH	3	12.00	26.07.2017
8	TASHIDING	SHIGA ENERGY		1	48.50	06.11.2018
				2	48.50	06.11.2018
ALL INDIA TOTAL					**795.00**	

CHAPTER-2

GENERATION PERFORMANCE

CHAPTER-2

GENERATION PERFORMANCE

2.1 Generation from hydro-electric power stations (above 25 MW capacity) in the country during 2017-18 was 126.1 BU against the target of 141.4 BU which was 10.80% less than the target.

2.2 The month-wise and cumulative generation from hydro stations in the country vis-a-vis targets have been shown at **Exhibit-2.1** and are given in **Table 2.1** below.

TABLE 2.1

MONTH-WISE & CUMULATIVE GENERATION VIS-À-VIS TARGET IN MU PERIOD: 2017-18

Month	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Target	9298	12640	14373	16709	18612	17022	12004	8567	7811	7457	7520	9387
Gen.	10185	12418	13667	15454	15559	14101	11183	7364	6898	6612	5682	7000
Cum. Tar	9298	21938	36311	53020	71632	88654	100658	109225	117036	124493	132013	141400
Cum. Gen.	10185	22603	36270	51724	67283	81384	92567	99931	106829	113441	119123	126123

2.3 Utility-wise/ Sector-wise Performance of H.E. Stations

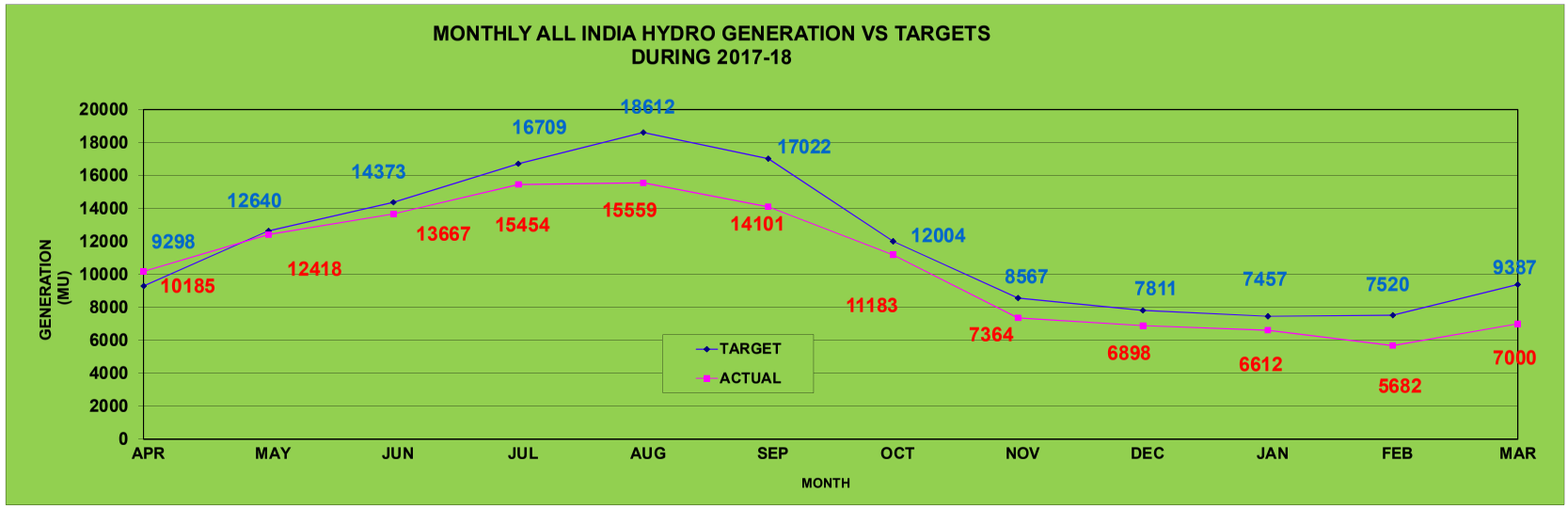
The utility-wise/ sector-wise target of energy generation vis-à-vis actual generation and surplus /shortfall in respect of Hydro Electric stations during 2017-18 & 2016-17 are given below in **Table 2.2.**

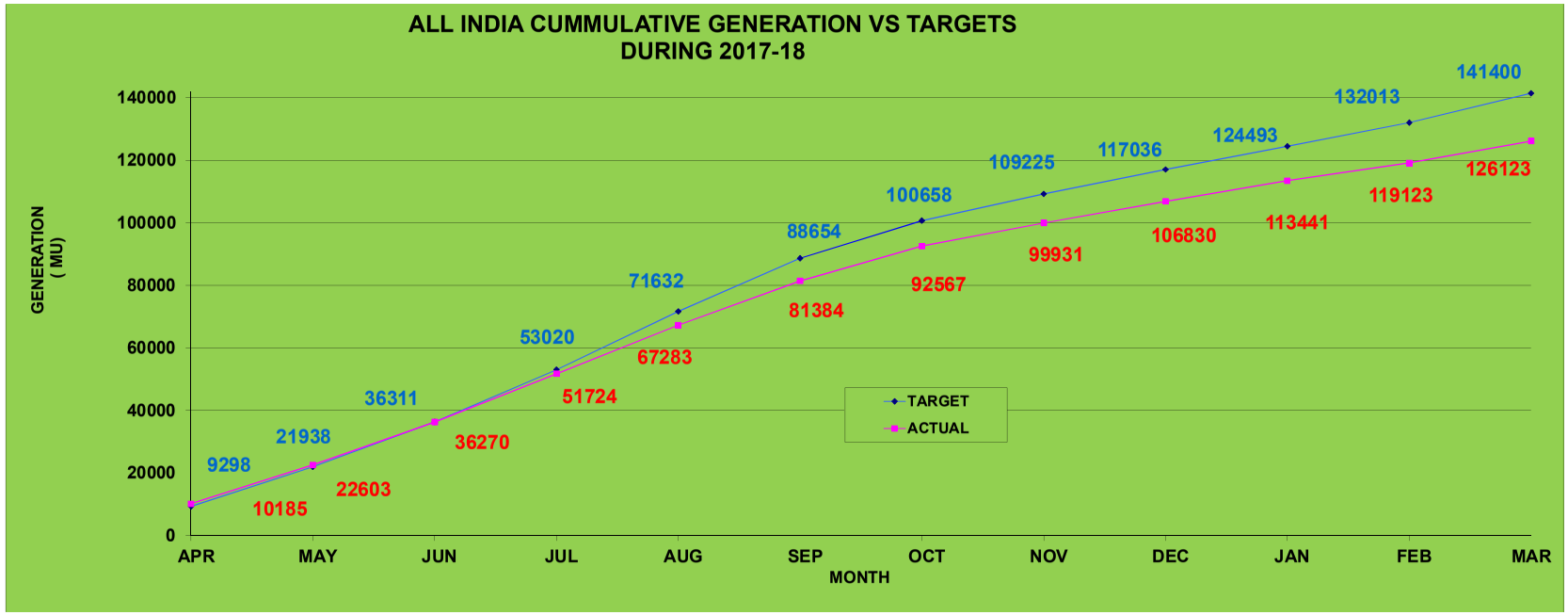
TABLE 2.2

UTILITY-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS (2017-18 VIS-A-VIS 2016-17)

Utilities	Installed Capacity (MW) (As on 31.03.2018)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2017-18	2016-17	2017-18	2016-17	2017-18	2016-17
CENTRAL SECTOR							
BBMB	2866.30	9360	9536	10864.14	10570.00	16.07	10.84
NHPC	5121.20	23046	22440	22549.52	22929.80	-2.15	2.18
SJVNL	1912.02	8625	8595	9222.73	9011.06	6.93	4.84
NTPC LTD	800.00	3055	2800	3313.62	3225.16	8.47	15.18
THDC	1400.00	4115	4100	4301.27	4370.87	4.53	6.61
NHDC	1520.00	3100	3100	1325.36	4748.49	-57.25	53.18
DVC	143.20	235	244	256.35	255.54	9.09	4.73

EXHIBIT- 2.1


MONTHLY ALL INDIA HYDRO GENERATION VS TARGETS
DURING 2017-18
GENERATION (MU)
MONTH
TARGET
ACTUAL
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
9298
12640
14373
16709
18612
17022
12004
8567
7811
7457
7520
9387
10185
12418
13667
15454
15559
14101
11183
7364
6898
6612
5682
7000


ALL INDIA CUMMULATIVE GENERATION VS TARGETS
DURING 2017-18
GENERATION (MU)
MONTH
TARGET
ACTUAL
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
9298
21938
36311
53020
71632
88654
100658
109225
117036
124493
132013
141400
10185
22603
36270
51724
67283
81384
92567
99931
106830
113441
119123
126123

Utilities	Installed Capacity (MW) (As on 31.03.2018)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2017-18	2016-17	2017-18	2016-17	2017-18	2016-17
NEEPCO	755.00	3492	2585	3203.10	2793.32	-8.27	8.06
SUB TOTAL	**14517.72**	**55028**	**53400**	**55036.09**	**57904.24**	0.01	**8.43**
PRIVATE SECTOR							
MPCL	86	344	341	346.29	353.79	0.67	3.75
EPPL	100	360	370	368.89	366.54	2.47	-0.94
ADHPL	192	700	686	683.01	679.12	-2.43	-1
GBHPPL	70	282	282	317.63	261.25	12.63	-7.36
HBPCL	1300	5500	5500	5906.58	5715.04	7.39	3.91
IA ENERGY	36	0.00	0.00	79.42	11.29	-	-
AHPCL	330	1340	1396	1382.54	1280.75	3.17	-8.26
JPPVL	400	1800	1776	2160.90	2042.05	20.05	14.98
DLHP	34	37	65	42.55	47.12	15.00	-27.51
GIPL	99	495	495	444.79	494.75	-10.14	-0.05
TPCL	447	1450	1450	1515.88	1465.46	4.54	1.07
DEPL	96	459	459	406.01	405.63	-11.54	-11.63
SEPL	97	400	29	73.07	-	-81.73	-
SNEHA KINETIC	96	0	-	370.10	-	-	-
NTPGPL	0	200	-	0.00	-	-	-
SUB TOTAL	**3394**	**13367**	**12849**	**14097.66**	**13122.79**	5.47	**2.13**
STATE SECTOR							
JKSPDC	1110.00	4599	5144	5136.89	4789.6	11.70	-6.89
HPPCL	195.00	568	266	332.12	56.09	-41.53	-78.91
HPSEB LTD.	372.00	1617	1465	1590.86	1237.42	-1.62	-15.53
BVPC	-	30	-	0.00	-	-	-100
RRVUNL	411.00	720	710	819.53	965.99	13.82	36.05
PSPCL	1051.00	4021	4069	4230.51	3536.34	5.21	-13.09
UPJVNL	501.60	1170	1161	1486.69	1175.56	27.07	1.25
UJVNL	1252.15	4688	4700	4526.00	4201.44	-3.46	-10.61
SSNNL	1450.00	4460	3263	939.47	3209.21	-78.94	-1.65
GSECL	540.00	857	840	612.45	734.67	-28.54	-12.54
MSPGCL	2406	4296	4358	3143.16	4050.98	-26.84	-7.04
MPPGCL	875.00	2625	2383	1420.98	2768.31	-45.87	16.17
CSPGCL	120.00	250	260	178.07	153.76	-28.77	-40.86
APGENCO	1796.75	3505	3604	2870.47	2605.99	-18.10	-27.69
TSGENCO	2306.60	3335	3132	1491.98	1279.99	-55.26	-59.13
KPCL	3585.40	11687	11429	7008.65	6691.09	-40.03	-41.46

Utilities	Installed Capacity (MW) (As on 31.03.2018)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2017-18	2016-17	2017-18	2016-17	2017-18	2016-17
KSEBL	1881.50	6221	6834	5199.26	4067.49	-16.42	-40.48
TANGEDCO	2203.20	4415	4901	2919.60	2397.12	-33.87	-51.09
JUUNL	130.00	150	154	190.38	30.13	26.92	-80.44
OHPC	2027.50	5672	5621	5555.29	4412.89	-2.06	-21.49
TUL	1200.00	5214	552	4429.33	308.42	-15.05	-43.95
WBSEDCL	986.00	1596	1596	1282.02	1560.85	-19.67	-2.2
APGCL	100.00	390	390	484.98	396.59	24.35	1.69
MePGCL	282.00	919	919	1140.26	719.6	24.08	-21.7
SUB TOTAL	**26782.70**	**73005**	**67751**	**56988.95**	**51350.53**	-21.94	**-24.21**
ALL INDIA	**45293.42**	**141400**	**134000**	**126122.70**	**122377.56**	**10.80**	**-8.67**

During the year 2017-18, overall hydro generation was more than the target in respect of BBMB, SJVNL, NTPC, THDC, & DVC in Central Sector and MPCL, EPPL, GBHPPL, HBPCL, AHPCL, JPPVL, DLHP, DEPL & TPCL in Private Sector. As regards generation by State Electricity Boards/Corporations / Departments, hydro generation was more than the target in respect of JKSPDCL, RRUVNL, PSPCL, UPJVNL, JUUNL, APGCL and MePGCL.

2.4 Region-wise Performance of H.E. Stations

Region-wise generation performance of hydro-electric stations during 2017-18 is indicated in **Table 2.3.**

TABLE 2.3

GENERATION PERFORMANCE – REGION-WISE (2017-18)

S. No.	Region	Installed Capacity as on 31.03.2018 (MW)	Generation During 2017-18		
			Target (MU)	Actual (MU)	Shortfall (-)/ Surplus (+) Over Target (%)
1	Northern	18969.27	71581	74734.69	4.41
2	Western	7392.00	17075	9177.92	-46.25
3	Southern	11727.70	28682	19022.26	-33.68
4	Eastern	5862.45	18661	17521.75	-6.10
5	North-Eastern	1342.00	5401	5666.08	4.91
	Total (All India)	**45293.42**	**141400**	**126122.70**	**-10.80**

Note: - Includes 4785.60 MW of Pumped Storage Scheme.

- Hydel generation during 2017-18 has exceeded the target in Northern and North-Eastern Region whereas it was lower than the target in Western, Southern and Eastern Region of the country primarily on account of lower inflows/rainfall in project catchment area**.**
- Hydel generation during 2017-18 was 126.1 BU against the target of 141.4 BU viz lower in generation by 15.3 BU (10.80%). However, actual hydel generation during 2017-18 is more than previous year generation of 122.4 BU by 3.74%.

Region-wise generation targets vis-à-vis achievements are indicated at **Exhibit-2.2**.

2.5 Sector-wise generation performance during the year 2017-18 vis-à-vis targets is given in **Table 2.4**.

Generation from H.E. Stations under Central Sector & Private Sector has been more than the target. However, the generation in State sector is significantly lower than the target by more than 21.94%.

TABLE 2.4

SECTOR-WISE GENERATION PERFORMANCE
PERIOD: 2017-18

Sl. No.	Sector	Installed Capacity as on 31.03.18 (MW)	Generation		
			Target (MU)	Actual (MU)	Shortfall (-) Surplus (+) Over Target (%)
1	Central	14907.72	55028	55036.09	0.01
2	State	26991.70	73005	56988.95	-21.94
3	Private	3394.00	13367	14097.66	5.47
	Total	**45293.42**	**141400**	**126122.70**	**-10.80**

2.6 Details of actual generation during 2017-18 for all the hydro stations (above 25 MW capacity) in the country are given in **Annex 2.1**. It is observed that 82 Nos. of stations have exceeded the target level of generation while the generation has been less than targets in case of 124 stations. List of stations where generation exceeded the target during 2017-18 is given in **Table 2.5.**

TABLE 2.5

H.E. STATIONS ACHIEVING HIGHER GENERATION VIS-A-VIS TARGET PERIOD: 2017-18

S. No.	Actual Generation as % of Target	Hydro Electric Stations		
		No. of Stations	% of total No. of Stations	Name of the Station
1	150 & above	7	3.4	Pong, Chanju, Obra, Rihand, Lower Jurala, Dikchu, New Umetru
2	140 - 150	1	0.5	Khandong
3	130 - 140	3	1.5	Baglihar-II, Vaitarna, Loktak
4	120 - 130	9	4.4	Vishnu Prayag, Koyna DPH, Priyadharshani Jurala, Subernarekha I&II, Balimela, Kopoli, Karbi Langpi, Doyang
5	110 - 120	23	11.2	Bhakra L&R, Budhil, Upper Sindh-II, Ganguwal, Kotla, Mukerian I-IV, Mahi Bajaj I&II, R.P. Sagar, Kadana, Bhira Tail Race, BandhardharaII, Khopoli, Panchet, Teesta V, Ranganadi, Myntdu, Umium St-I, Umium St-IV
6	100 - 110	39	18.9	Dehar, Chamera-I, II & III, Parbati-III, Nathpa Jhakri, Rampur, Koldam, Bassi, Larji, Malana-II, Baspa-II, Karcham Wangtoo, Malana, Dulhasti, Nimoo Bazgo, Uri-II, Baglihar, Ranjit Sagar, Jawahar Sagar, Dhauliganga, Tanakpur, Tehri, Koteshwar, Chilla, Maneri Bhali-I, Srinagar, Bhira & Bhira PSS, Bhivpuri, Upper Sileru-I&II, Lower Sileru, Lower Periyar, Segulam, Kadamparai PSS, Sholayar I&II, Rengali, Rangit, Kirdemkulai

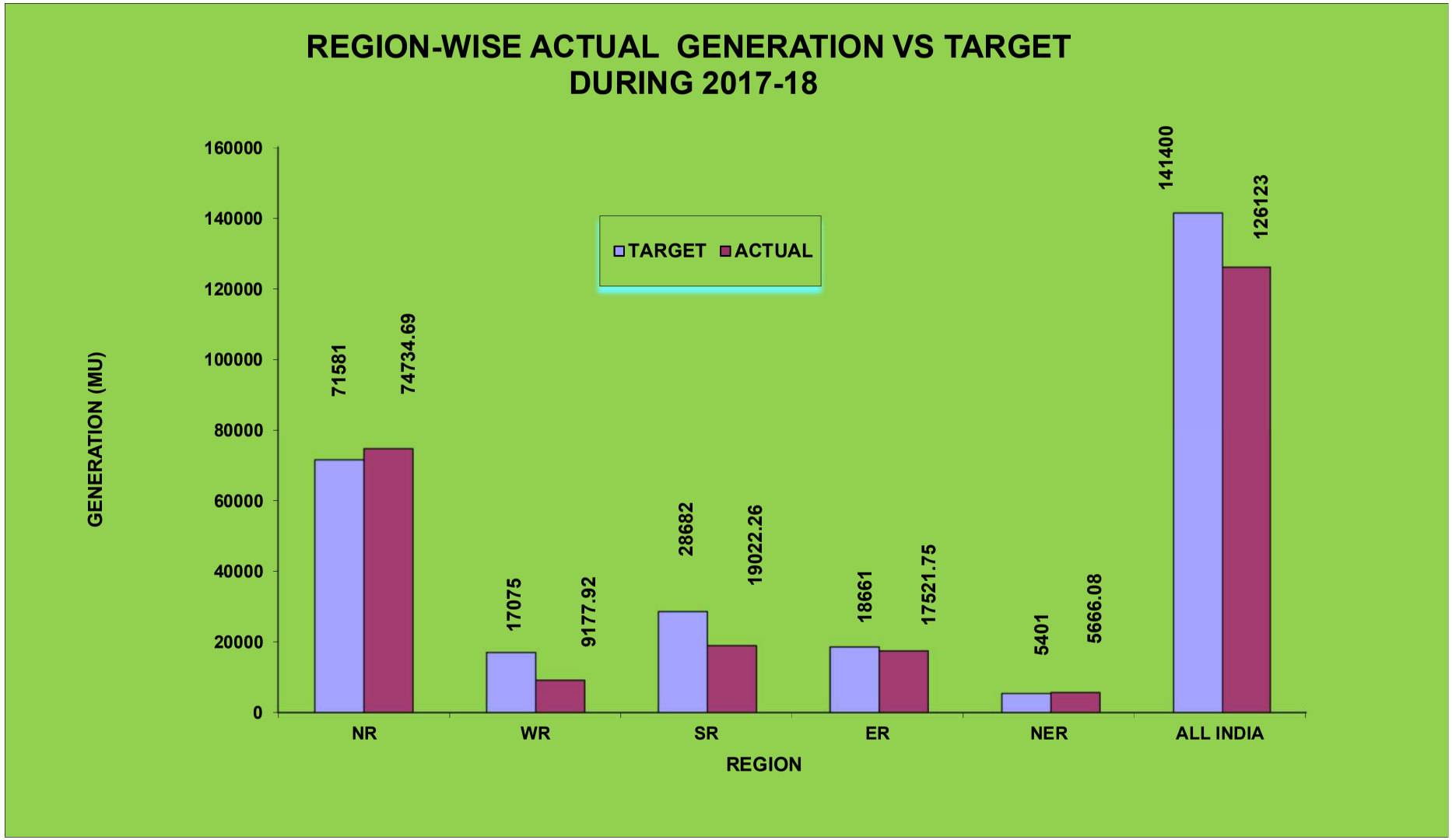
H.E. Stations where generation was lower than the target have been listed in **Table 2.6** below:

TABLE 2.6

H.E. STATIONS HAVING SHORTFALL IN GENERATION VIS-A-VIS TARGETS PERIOD: 2017-18

S. No.	Actual Generation as % of Target	Hydro Electric Stations		
		No. of Stations	% of total No. of Stations	Name of the Station
1	90 -100	24	11.7	Baira Siul, Sanjay, Shanan, Allain Duhangan, Chutak, Salal-I&II, Sewa-II, Chhibro, Dhakrani, Dhalipur, Khatima, Khodri, Maneri Bhali-II, Gandhi Sagar, Koyna I&II, Almatti Dam, Nariyamangalam, Pallivasal, Sholayar, Papanasam, Machkund, Maithon, Jaldhaka I

EXHIBIT-2.2


REGION-WISE ACTUAL GENERATION VS TARGET
DURING 2017-18
GENERATION (MU)
160000
140000
120000
100000
80000
60000
40000
20000
0
TARGET
ACTUAL
71581
74734.69
17075
9177.92
28682
19022.26
18661
17521.75
5401
5666.08
141400
126123
NR
WR
SR
ER
NER
ALL INDIA
REGION

S. No.	Actual Generation as % of Target	Hydro Electric Stations		
		No. of Stations	% of total No. of Stations	Name of the Station
2	80-90	26	12.6	Kashang I-II&II, Giri Bata, Uri, Lower Jhelum, A.P. Sahib I&II, Khara, Matatilla, Kulhal, Ramganga, Rajghat, Koyna-III, Idamalayar, Kuttiadi & Additional Extn., Penniar, Poringalkuthu, Hirakud I&II, Upper Indravati, Upper Kolab, Teesta III, Jorethang Loop, Chujachen, Purulia PSS
3	70 -80	15	7.3	Hasdeo Bango, Supa DPH, Shivasamundrum, Varahi, T B Dam, Hampi, Idukki, Kakkad, Sabirigiri, Bhawani K Barrage-II, Pykara Ultimate, Sarkarpathy, Suruliyar, Teesta Low dam III
4	60 -70	9	4.4	S Sarovar CHPH, Jog, Aliyar, Mettur Tunnel, Moyar, Periyar, Srisailam LB, Teesta Low dam IV, Tuirial
5	50 -60	29	14.1	Ukai, Bansagar Tons I-III, Koyna IV, Tillari, Srisailam RB, Gerusoppa, Ghatprabha, Kadra, Kalinadi, Lingnamakki, Munirabad, Sharavathy, Kodayar I&II, Kundah I-V, Lower Mettur I-IV, Mettur Dam, Parson's Valley, Pochampad, Rammam II
6	40 -50	7	3.4	Sainj, Indira Sagar, Omkareshwar, Pench, N J Sagar RBC & Extn., Kodasali
7	30 -40	2	1.0	Bargi, Ghatghar PSS
8	10 -30	8	3.9	S Sarovar RBPH, Madhikhera, N J Sagar TDP, Bhadra, Bhawani K Barrage-I, N J Sagar PSS, N J Sagar LBC, Tashiding
9	0 -10	4	1.9	Kishenganga, Bhawani K Barrage-III, Pykara, Pulichinthala,

The States/utilities showing excess/shortfall in generation over the target are indicated in **Exhibit- 2.3**.

2.7 Hydro Generation is a function of availability of Water and that of Generating units. Rainfall is the primary source of water, which is highly variable in time and space. However, there could be no direct comparison between the rainfall and the energy generation during these years of data due to different installed capacities. While the rainfall has definite impact on the level of generation, it could also be impacted by the duration of forced and planned outages especially in the case of ROR projects. Region-wise Hydel generation during last five years is given below in **Table 2.7**

EXHIBIT 2.3

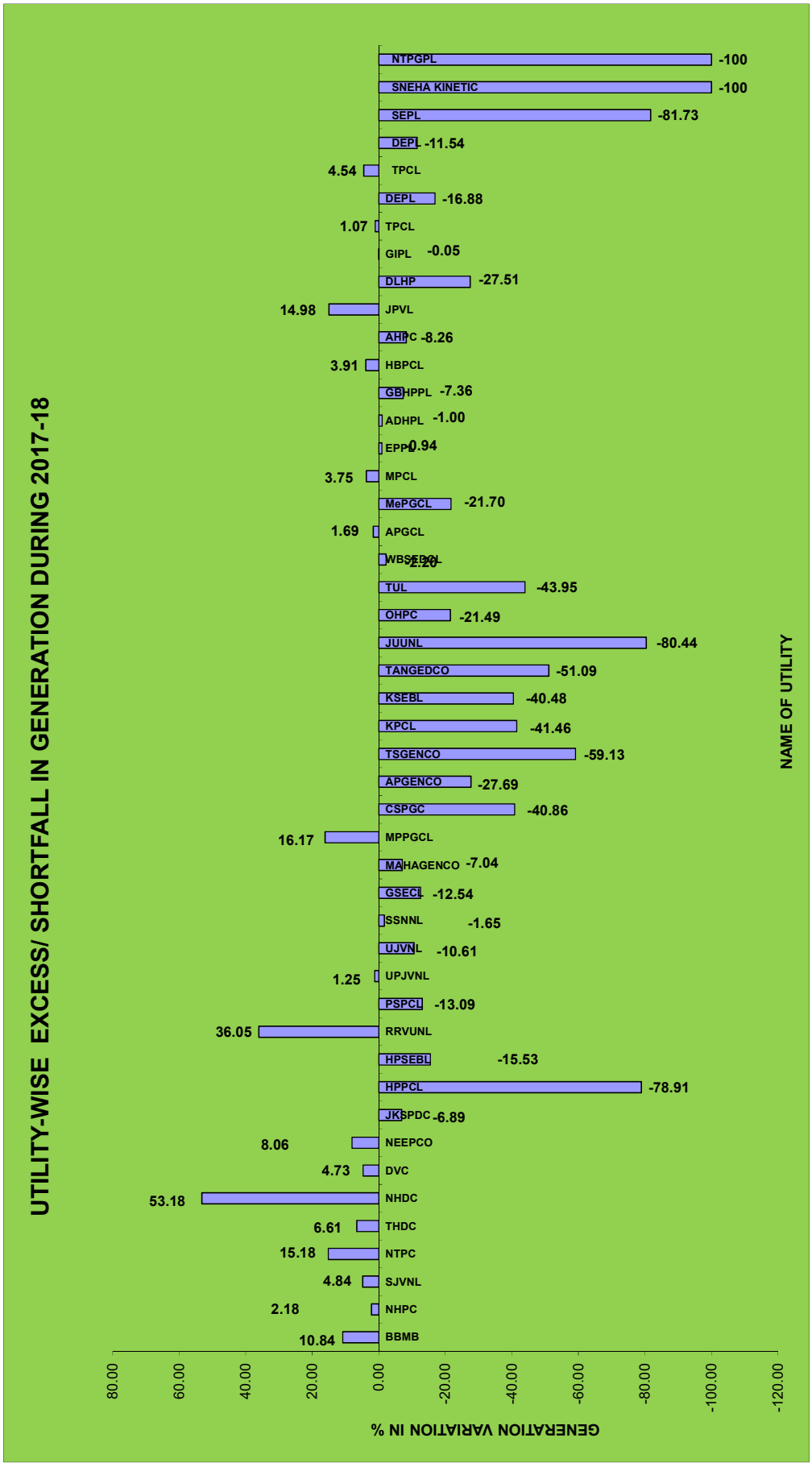

UTILITY-WISE EXCESS/ SHORTFALL IN GENERATION DURING 2017-18
NAME OF UTILITY
GENERATION VARIATION IN %
NTPGPL -100
SNEHA KINETIC -100
SEPL -81.73
DEPL -11.54
4.54 TPCL
DEPL -16.88
1.07 TPCL
GIPL -0.05
DLHP -27.51
14.98 JPVL
AHPC -8.26
3.91 HBPCL
GBHPPL -7.36
ADHPL -1.00
EPPL -0.94
3.75 MPCL
MePGCL -21.70
1.69 APGCL
WBSEDCL -2.20
TUL -43.95
OHPC -21.49
JUUNL -80.44
TANGEDCO -51.09
KSEBL -40.48
KPCL -41.46
TSGENCO -59.13
APGENCO -27.69
CSPGC -40.86
16.17 MPPGCL
MAHAGENCO -7.04
GSECL -12.54
SSNNL -1.65
UJVNL -10.61
1.25 UPJVNL
PSPCL -13.09
36.05 RRVUNL
HPSEBL -15.53
HPPCL -78.91
JKSPDC -6.89
8.06 NEEPCO
4.73 DVC
53.18 NHDC
6.61 THDC
15.18 NTPC
4.84 SJVNL
2.18 NHPC
10.84 BBMB
80.00 60.00 40.00 20.00 0.00 -20.00 -40.00 -60.00 -80.00 -100.00 -120.00

TABLE-2.7

REGION-WISE HYDEL GENERATION AND RAINFALL DURING 2013-14 TO 2017-18

Region	Installed Capacity as on 31.03.2018 (MW)	Generation (BU)				
		2013-14	**2014-15**	**2015-16**	**2016-17**	**2017-18**
Northern	18969.27	63.47	65.993.25	73.11	71.76	74.73
Western	7392.00	22.83	15.657.40	12.85	17.18	9.18
Southern	11727.70	32.83	31.855.11	20.98	17.04	19.02
Eastern	5862.45	11.65	12.195.82	10.24	11.75	17.52
North Eastern	1342.00	4.06	3.542.11	4.21	4.65	5.67
Total	**45293.42**	**134.85**	**129.24**	**121.38**	**122.38**	**126.12**
Rainfall		2013-14 (mm)	2014-15 (mm)	2014-15 (mm)	2016-17 (mm)	2017-18 (mm)
All India		1242.6	1044.7	1085.0	1083.1	1127.1

It can be observed from the above table that maximum hydro generation of 134.85 BU was achieved due to unprecedented rainfall during the year 2013-14. The generation during the year 2014-15 to 2016-17 has been relatively lower due to less rainfall irrespective of higher installed capacity. However, it has increased slightly in 2017-18 due to better rainfall.

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
	NORTHERN	18969.27	74338.26	71581	74734.69	104.41
	WESTERN	7392.00	16607.21	17075	9177.92	53.75
	SOUTHERN	11727.70	33900.85	28682	19022.26	66.32
	EASTERN	5797.45	19914.39	18661	17521.75	93.90
	NORTH EASTERN	1342.00	5503.31	5401	5666.08	104.91
	ALL INDIA	45228.42	150264.02	141400	126122.70	89.20
	IMPORT FROM BHUTAN			5000	4778.33	95.57
	ALL INDIA (INCLUDING IMPORT FROM BHUTAN)	45228.42	150264.02	146400	130901.03	89.41

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
	CENTRAL					
1	BBMB	2866.30	9515.00	9360	10864.14	116.07
2	NHPC LTD	5451.20	24680.34	23046	22549.52	97.85
3	SJVN LTD	1912.02	8490.08	8625	9222.73	106.93
4	NTPC LTD	800.00	3054.79	3055	3313.62	108.47
5	THDC LTD	1400.00	3952.00	4115	4301.27	104.53
6	NHDC LTD	1520.00	3146.57	3100	1325.36	42.75
7	DVC	143.20	374.00	235	256.35	109.09
8	NEEPCO LTD	815.00	3537.62	3492	3203.10	91.73
	TOTAL CENTRAL	**14907.72**	**56750.40**	**55028**	**55036.09**	**100.01**
	STATE					
1	JKSPDCL	1110.00	4833.30	4599	5136.89	111.70
2	HPPCL	295.00	569.03	568	332.12	58.47
3	HPSEBL	372.00	1691.62	1617	1590.86	98.38
4	BVPC	0.00	0.00	30	0.00	0.00
5	RRVUNL	411.00	1046.00	720	819.53	113.82
6	PSPCL	1051.00	4207.00	4021	4230.51	105.21
7	UPJVNL	501.60	1707.00	1170	1486.69	127.07
8	UJVNL	1252.15	4848.10	4688	4526.00	96.54
9	SSNNL	1450.00	3848.00	4460	939.47	21.06
10	GSECL	540.00	1598.00	857	612.45	71.46
11	MAHAGENCO	2406.00	3938.00	4296	3143.16	73.16
12	MPPGCL	875.00	2561.64	2625	1420.98	54.13
13	CSPGCL	120.00	245.00	250	178.07	71.23
14	APGENCO	1796.75	5738.00	3505	2870.47	81.90
15	TSGENCO	2375.60	5045.85	3335	1491.98	44.74
16	KPCL	3585.40	12981.00	11687	7008.65	59.97
17	KSEBL	1881.50	6458.00	6221	5199.26	83.58
18	TANGEDCO	2203.20	4348.00	4415	2919.60	66.13
19	JUUNL	65.00	149.00	150	190.38	126.92
20	OHPC	2027.50	5676.00	5672	5555.29	97.94
21	TUL	1200.00	5214.00	5214	4429.33	84.95

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
22	WBSEDCL	986.00	1613.60	1596	1282.02	80.33
23	APGCL	100.00	390.00	390	484.98	124.35
24	MePGCL	322.00	1127.69	919	1140.26	124.08
	TOTAL STATE	**26926.70**	**79833.83**	**73005**	**56988.95**	**78.06**
	PRIVATE					
1	MPCL	86.00	370.93	344	346.29	100.67
2	EPPL	100.00	403.00	360	368.89	102.47
3	ADHPL	192.00	678.18	700	683.01	97.57
4	GBHPPL	70.00	291.73	282	317.63	112.63
5	JSWHEL	1300.00	5344.06	5500	5906.58	107.39
6	IAEPL @	36.00	157.82	0.00	79.42	0.00
7	AHPC LTD	330.00	1396.84	1340	1382.54	103.17
8	JPVL	400.00	1774.42	1800	2160.90	120.05
9	DLHP	34.00	50.00	37	42.55	115.00
10	GIPL	110.00	537.81	495	444.79	89.86
11	TPCL	447.00	1220.00	1450	1515.88	104.54
12	DEPL	96.00	459.00	459.00	406.01	88.46
13	SEPL	97.00	454.00	400.00	73.07	18.27
14	SNEHA KINETIC	96.00	542.00	0.00	370.10	0.00
15	NTPGPL#	0.00	0.00	200.00	0.00	0.00
	TOTAL PRIVATE	**3394.00**	**13679.79**	**13367**	**14097.66**	**105.47**
	TOTAL ALL INDIA	**45228.42**	**150264.02**	**141400**	**126122.70**	**89.20**
	Note:					
	@ HE Stations under IAEPL and Sneha Kinetic not targetted but commissioned during 2017-18.					
	# HE Station under NTPGCL targetted but not commissioned during 2017-18.					

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
	NORTHERN REGION					
	HIMACHAL PRADESH					
	CENTRAL SECTOR					
	BBMB					
1	Bhakra Left	540.00	3924.00	4650	5134.02	110.41
2	Bhakra Right	785.00				
3	Dehar	990.00	3110.00	2900	3086.24	106.42
4	Pong	396.00	1123.00	950	1641.57	172.80
	Total BBMB-HP	**2711.00**	**8157.00**	**8500**	**9861.83**	**116.02**
	NHPC					
5	Baira Siul	180.00	779.28	690	641.73	93.00
6	Chamera-I	540.00	1664.56	2330	2344.08	100.60
7	Chamera-II	300.00	1499.89	1460	1487.11	101.86
8	Chamera-III	231.00	1108.00	1050	1068.05	101.72
9	Parbati III	520.00	1977.23	680	710.53	104.49
	Total NHPC -HP	**1771.00**	**7028.96**	**6210**	**6251.50**	**100.67**
	SJVN					
10	Naptha Jhakri	1500.00	6612.00	6775	7207.73	106.39
11	Rampur	412.02	1878.08	1850	2015.00	108.92
	Total SJVN	**1912.02**	**8490.08**	**8625**	**9222.73**	**106.93**
	NTPC					
12	Kol Dam	800.00	3054.79	3055	3313.62	108.47
	Total NTPC	**800.00**	**3054.79**	**3055**	**3313.62**	**108.47**
	Total Central-HP	**7194.02**	**26730.83**	**26390.00**	**28649.68**	**108.56**
	STATE SECTOR					
	HPPCL					
13	Kashang I	65.00	245.80	246	197.13	80.13
14	Kashang II & III	130.00				
15	Sainj	100.00	323.23	322	134.99	41.92
	Total HPPCL	**295.00**	**569.03**	**568**	**332.12**	**58.47**
	HPSEB LTD					
16	Bassi	66.00	346.77	310	315.17	101.67
17	Giri Bata	60.00	240.00	200	169.94	84.97
18	Larji	126.00	586.85	587	612.36	104.32

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
19	Sanjay	120.00	518.00	520	493.39	94.88
	Total HPSEB LTD	**372.00**	**1691.62**	**1617.00**	**1590.86**	**98.38**
	Beas Valley Power. Corp. Ltd. (BVPC)					
20	Uhl-III*			30	0.00	0.00
	Total BVPC	**0.00**	**0.00**	**30**	**0.00**	**0.00**
	PSPCL					
21	Shanan	110.00	585.00	519	508.52	97.98
	Total PSPCL-HP	**110.00**	**585.00**	**519**	**508.52**	**97.98**
	Total State Sector-HP	**777.00**	**2845.65**	**2734**	**2431.50**	**88.94**
	PRIVATE					
	Allain Duhangan Hydo Power Ltd.					
22	Allain Duhangan	192.00	678.18	700	683.01	97.57
	Everest Power Private Ltd.					
23	Malana-II	100.00	403.00	360	368.89	102.47
	JSWHEL					
24	Baspa-II	300.00	1213.00	1250	1336.65	106.93
25	Karcham Wangtoo	1000.00	4131.06	4250	4569.93	107.53
	Total JSWHEL	**1300.00**	**5344.06**	**5500**	**5906.58**	**107.39**
	GBHPPL					
26	Budhil	70.00	291.73	282	317.63	112.63
	IA Energy Pvt. Ltd.					
27	Chanju I	36.00	157.82	0	79.42	
	Malana Power Company Ltd.					
28	Malana	86.00	370.93	344	346.29	100.67
	NSL Tidond Power Generation Pvt. Ltd.					
29	Tidong*			200	0.00	
	Total Private-HP	**1784.00**	**7245.72**	**7386**	**7701.82**	**104.28**
	Total H.P.	**9755.02**	**36822.20**	**36510**	**38783.00**	**106.23**
	JAMMU & KASHMIR					
	CENTRAL SECTOR					
	NHPC					
30	Chutak	44.00	213.00	50	45.72	91.44
31	Dulhasti	390.00	1907.00	2200	2343.86	106.54
32	Nimoo Bazgo	45.00	239.00	90	98.83	109.81

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
33	Salal-I	345.00	3082.00	3350	3247.09	96.93
34	Salal-II	345.00				
35	Sewa-II	120.00	533.52	520	506.39	97.38
36	Uri-I	480.00	2587.38	2775	2349.66	84.67
37	Uri-II	240.00	1124.00	1150	1207.44	104.99
38	Kishenganga	330.00	1705.62	592	1.68	0.28
	Total NHPC -J&K	**2339.00**	**11391.52**	**10727**	**9800.67**	**91.36**
	Total Central Sector - J&K	**2339.00**	**11391.52**	**10727**	**9800.67**	**91.36**
	STATE SECTOR					
	JKSPDC					
39	Baglihar	450.00	2643.00	2435	2506.71	102.94
40	Baglihar II	450.00	1302.30	1302	1821.95	139.93
41	Lower Jhelum	105.00	533.00	572	480.99	84.09
42	Upper Sindh II	105.00	355.00	290	327.24	112.84
	Total JKSPDC	**1110.00**	**4833.30**	**4599**	**5136.89**	**111.70**
	Total State Sector-J&K	**1110.00**	**4833.30**	**4599**	**5136.89**	**111.70**
	Total Jammu & Kashmir	**3449.00**	**16224.82**	**15326**	**14937.56**	**97.47**
	PUNJAB					
	CENTRAL SECTOR					
	BBMB					
43	Ganguwal	77.65	1358.00	430	494.09	114.90
44	Kotla	77.65		430	508.22	118.19
	Total BBMB-Punjab	**155.30**	**1358.00**	**860**	**1002.31**	**116.55**
	STATE SECTOR					
	PSPCL					
45	A.P.Sahib I	67.00	909.00	720	647.81	89.97
46	A.P.Sahib II	67.00				
47	Mukerian I	45.00	1206.00	1080	1270.76	117.66
48	Mukerian II	45.00				
49	Mukerian III	58.50				
50	Mukerian IV	58.50				
51	Ranjit Sagar	600.00	1507.00	1702	1803.42	105.96
	Total PSPCL	**941.00**	**3622.00**	**3502**	**3721.99**	**106.28**
	Total State Sector-Punjab	**941.00**	**3622.00**	**3502**	**3721.99**	**106.28**
	Total Punjab	**1096.30**	**4980.00**	**4362**	**4724.30**	**108.31**

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
	RAJASTHAN					
	STATE SECTOR					
	RRVUNL					
52	Jawahar Sagar	99.00	298.00	240	261.10	108.79
53	Mahi Bajaj I	50.00	289.00	160	180.17	112.61
54	Mahi Bajaj II	90.00				
55	R.P. Sagar	172.00	459.00	320	378.26	118.21
	Total RRVUNL	**411.00**	**1046.00**	**720**	**819.53**	**113.82**
	Total State sector-Rajasthan	**411.00**	**1046.00**	**720**	**819.53**	**113.82**
	Total Rajasthan	**411.00**	**1046.00**	**720**	**819.53**	**113.82**
	UTTAR PRADESH					
	STATE SECTOR					
	UPJVNL					
56	Khara	72.00	385.00	320	259.14	80.98
57	Matatilla	30.60	123.00	105	93.81	89.34
58	Obra	99.00	279.00	195	299.96	153.83
59	Rihand	300.00	920.00	550	833.78	151.60
	Total UPJVNL	**501.60**	**1707.00**	**1170**	**1486.69**	**127.07**
	Total State Sector-UP	**501.60**	**1707.00**	**1170**	**1486.69**	**127.07**
	Total Uttar Pradesh	**501.60**	**1707.00**	**1170**	**1486.69**	**127.07**
	UTTARAKHAND					
	CENTRAL SECTOR					
	NHPC					
60	Dhauliganga	280.00	1134.69	1100	1153.16	104.83
61	Tanakpur	94.20	452.19	450	459.74	102.16
	Total NHPC-UK	**374.20**	**1586.88**	**1550**	**1612.90**	**104.06**
	THDC LTD					
62	Tehri	1000.00	2797.00	2930	3080.94	105.15
63	Koteshwar	400.00	1155.00	1185	1220.33	102.98
	Total THDC LTD	**1400.00**	**3952.00**	**4115**	**4301.27**	**104.53**
	Total Central Sector - UK	**1774.20**	**5538.88**	**5665.00**	**5914.17**	**104.40**
	STATE SECTOR					
	UJVNL					
64	Chibro (Y.St.II)	240.00	750.00	831	783.57	94.29
65	Chilla	144.00	725.00	748	811.66	108.51

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
66	Dhakrani (Y.St.I)	33.75	169.00	138	129.68	93.97
67	Dhalipur (Y.St.I)	51.00	192.00	189	186.71	98.79
68	Khatima	41.40	208.00	236	212.60	90.08
69	Khodri (Y.St.II)	120.00	345.00	383	355.75	92.89
70	Kulhal (Y.St.IV)	30.00	164.00	144	123.97	86.09
71	Maneri Bhali-I	90.00	395.00	376	394.77	104.99
72	Maneri Bhali-II	304.00	1566.10	1331	1276.65	95.92
73	Ram Ganga	198.00	334.00	312	250.64	80.33
	Total UJVNL	**1252.15**	**4848.10**	**4688**	**4526.00**	**96.54**
	Total State Sector-Uttarakhand	**1252.15**	**4848.10**	**4688**	**4526.00**	**96.54**
	PRIVATE SECTOR					
	AHPC LTD					
74	Srinagar	330.00	1396.84	1340	1382.54	103.17
	Jaiprakash Power Venture Ltd.					
75	Vishnu Prayag	400.00	1774.42	1800	2160.90	120.05
	Total Private Sector - UK	**730.00**	**3171.26**	**3140**	**3543.44**	**112.85**
	Total Uttarakhand	**3756.35**	**13558.24**	**13493.00**	**13983.61**	**103.64**
	Total N. REGION	**18969.27**	**74338.26**	**71581**	**74734.69**	**104.41**
	WESTERN REGION					
	CHHATISGARH					
	STATE SECTOR					
	CSPGC					
76	Hasdeo Bango	120.00	245.00	250	178.07	71.23
	Total CSPGC	**120.00**	**245.00**	**250**	**178.07**	**71.23**
	Total State Sector-Chhatisgarh	**120.00**	**245.00**	**250**	**178.07**	**71.23**
	Total Chhatisgarh	**120.00**	**245.00**	**250**	**178.07**	**71.23**
	GUJARAT					
	STATE SECTOR					
	GSECL					
77	Kadana PSS	240.00	518.00	280	308.92	110.33
78	Ukai	300.00	1080.00	577	303.53	52.60
	Total GSECL	**540.00**	**1598.00**	**857**	**612.45**	**71.46**
	SSNNL					
79	Sardar Sarovar CHPH	250.00	213.00	808	562.86	69.66

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
80	Sardar Sarovar RBPH	1200.00	3635.00	3652	376.61	10.31
	Total SSNNL	**1450.00**	**3848.00**	**4460**	**939.47**	**21.06**
	Total State Sector -Gujarat	**1990.00**	**5446.00**	**5317**	**1551.92**	**29.19**
	Total Gujarat	**1990.00**	**5446.00**	**5317**	**1551.92**	**29.19**
	MADHYA PRADESH					
	CENTRAL					
	NHDC					
81	Indira Sagar	1000.00	1980.00	2075	881.76	42.49
82	Omkareshwar	520.00	1166.57	1025	443.6	43.28
	Total NHDC	**1520.00**	**3146.57**	**3100**	**1325.36**	**42.75**
	Total Central Sector-MP					
	STATE SECTOR					
	MPPGCL					
83	Bansagar Tons-I	315.00	900.00	1020	545.37	53.47
84	Bansagar Tons-II	30.00	113.00	100	56.12	56.12
85	Bansagar Tons-III	60.00	143.00	120	68.80	57.33
86	Bargi	90.00	508.08	440	159.05	36.15
87	Gandhi Sagar	115.00	420.48	380	351.38	92.47
88	Madhikheda	60.00	74.12	105	22.52	21.45
89	Rajghat	45.00	87.60	70	58.21	83.16
	Total MPPGPCL	**715.00**	**2246.28**	**2235**	**1261.45**	**56.44**
	Total State-MP	**715.00**	**2246.28**	**2235**	**1261.45**	**56.44**
	Total M.P.	**2235.00**	**5392.85**	**5335**	**2586.81**	**48.49**
	MAHARASHTRA					
	STATE SECTOR					
	MAHAGENCO					
90	Bhira Tail Race	80.00	75.00	85	97.15	114.29
91	Ghatghar PSS	250.00	146.00	385	152.83	39.70
92	Koyna DPH	36.00	410.00	110	135.15	122.86
93	Koyna St.I&II	600.00	3030.00	1153	1051.22	91.17
94	Koyna St.III	320.00		588	498.91	84.85
95	Koyna IV	1000.00		1711	945.47	55.26
96	Tillari	60.00	133.00	110	57.81	52.55
97	Vaitarna	60.00	144.00	154	204.62	132.87
	Total MAHAGENCO	**2406.00**	**3938.00**	**4296**	**3143.16**	**73.16**

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
	MPPGPCL					
98	Pench	160.00	315.36	390	159.53	40.91
	Total MPPGPCL-Maha.	**160.00**	**315.36**	**390**	**159.53**	**40.91**
	Total State Sector-Maha.	**2566.00**	**4253.36**	**4686**	**3302.69**	**70.48**
	PRIVATE SECTOR					
	Dodson-Lindblom Hydro Power Pvt. Ltd. (DLHPPL)					
99	Bhandardhara - II	34.00	50.00	37	42.55	115.00
	Total DLHP	**34.00**	**50.00**	**37**	**42.55**	**115.00**
	Tata Power Company Ltd.					
100	Bhira	150.00	775.00	883	341.17	101.05
101	Bhira PSS	150.00			551.13	
102	Bhivpuri	75.00	220.00	297	307.20	103.43
103	Khopoli	72.00	225.00	270	316.38	117.18
	Total TPCL	**447.00**	**1220.00**	**1450**	**1515.88**	**104.54**
	Total Private Sector-Maha.	**481.00**	**1270.00**	**1487**	**1558.43**	**104.80**
	Total Maharashtra	**3047.00**	**5523.36**	**6173**	**4861.12**	**78.75**
	Total Western	**7392.00**	**16607.21**	**17075**	**9177.92**	**53.75**
	SOUTHERN REGION					
	ANDHRA PRADESH					
	STATE SECTOR					
	APGENCO					
104	N.J.Sagar TPD	50.00	177.00	175	42.13	24.07
105	N.J.Sagar RBC	90.00	156.00	131	59.73	45.60
106	Srisailam RB	770.00	2900.00	983	574.95	58.49
107	Upper sileru I	120.00	529.00	455	482.22	105.98
108	Upper sileru II	120.00				
109	Lower Sileru	460.00	1070.00	1105	1109.77	100.43
	Total APGENCO	**1610.00**	**4832.00**	**2849.00**	**2268.80**	**79.63**
	Total State Sector-AP	**1610.00**	**4832.00**	**2849.00**	**2268.80**	**79.63**
	Total Andhra Pradesh	**1610.00**	**4832.00**	**2849.00**	**2268.80**	**79.63**
	KARNATAKA					
	STATE SECTOR					
	KPCL					
110	Almatti Dam	290.00	483.00	486	441.58	90.86
111	Bhadra	39.20	123.00	61	15.69	25.72

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
112	Gerusoppa	240.00	622.00	500	280.89	56.18
113	Ghatprabha	32.00	131.00	84	48.37	57.58
114	Jog	139.20	118.00	282	191.48	67.90
115	Kadra	150.00	570.00	366	192.91	52.71
116	Kalinadi	855.00	3385.00	2791	1537.28	55.08
117	Supa DPH	100.00	542.00	413	290.98	70.46
118	Kodasali	120.00	512.00	344	170.94	49.69
119	Lingnamakki	55.00	254.00	226	125.55	55.55
120	Munirabad	28.00	66.00	92	51.38	55.85
121	Sharavathy	1035.00	4932.00	4737	2722.35	57.47
122	Shivasamudram	42.00	183.00	250	176.81	70.72
123	Varahi	460.00	1060.00	1055	762.44	72.27
	Total KPCL	**3585.40**	**12981.00**	**11687**	**7008.65**	**59.97**
	APGENCO					
124	T.B.Dam					
125	Hampi	72.00	236.00	175	133.97	76.55
	Total APGENCO-Karnataka	**72.00**	**236.00**	**175**	**133.97**	**76.55**
	Total State Sector-Karnataka	**3657.40**	**13217.00**	**11862.00**	**7142.62**	**60.21**
	Total Karnataka	**3657.40**	**13217.00**	**11862.00**	**7142.62**	**60.21**
	KERALA					
	STATE SECTOR					
	KSEB Ltd.					
126	Idamalayar	75.00	380.00	314	256.26	81.61
127	Idukki	780.00	2398.00	2096	1611.06	76.86
128	Kakkad	50.00	262.00	200	159.88	79.94
129	Kuttiadi & Kuttiady Extn.	125.00	323.00	676	601.06	88.91
130	Kuttiady Addl. Extn.	100.00				
131	Lower Periyar	180.00	493.00	500	507.74	101.55
132	Neriamangalam	70.00	237.00	330	310.60	94.12
133	Pallivasal	37.50	284.00	208	188.39	90.57
134	Panniar	30.00	158.00	145	129.47	89.29
135	Poringalkuthu	32.00	170.00	141	116.74	82.79
136	Sabarigiri	300.00	1338.00	1250	968.46	77.48
137	Sengulam	48.00	182.00	143	144.91	101.34

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
138	Sholayar	54.00	233.00	218	204.69	93.89
	Total KSEB LTD.	**1881.50**	**6458.00**	**6221**	**5199.26**	**83.58**
	Total State Sector-Kerala	**1881.50**	**6458.00**	**6221**	**5199.26**	**83.58**
	Total Kerala	**1881.50**	**6458.00**	**6221**	**5199.26**	**83.58**
	TAMIL NADU					
	STATE SECTOR					
	TANGEDCO					
139	Aliyar	60.00	175.00	145	90.08	62.12
140	Bhawani K Barrage-III	30.00	90.00	49	0.00	0.00
141	Bhawani K Barrage-II	30.00	100.00	49	37.62	76.78
142	Bhawani K Barrage-I	30.00	80.00	59	16.96	28.75
143	Kadamparai PSS	400.00	77.00	350	384.36	109.82
144	Kodayar I	60.00	165.00	215	123.98	57.67
145	Kodayar II	40.00				
146	Kundah I	60.00	1387.00	1410	806.23	57.18
147	Kundah II	175.00				
148	Kundah III	180.00				
149	Kundah IV	100.00				
150	Kundah V	40.00				
151	Lower Mettur I	30.00	252.00	235	131.95	56.15
152	Lower Mettur II	30.00				
153	Lower Mettur III	30.00				
154	Lower Mettur IV	30.00				
155	Mettur Dam	50.00	541.00	91	52.24	57.41
156	Mettur Tunnel	200.00		267	163.32	61.17
157	Moyar	36.00	115.00	135	94.40	69.93
158	Papanasam	32.00	105.00	120	115.28	96.07
159	Parson's Valley	30.00	53.00	50	27.11	54.22
160	Periyar	161.00	409.00	450	287.10	63.80
161	Pykara	59.20	274.00	60	0.98	1.63
162	Pykara Ultimate	150.00	30.00	375	274.11	73.10
163	Sarkarpathy	30.00	162.00	115	85.46	74.31
164	Sholayar I&II	95.00	254.00	150	157.73	105.15
165	Suruliyar	35.00	79.00	90	70.69	78.54
	Total TANGEDCO	**2203.20**	**4348.00**	**4415**	**2919.60**	**66.13**

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
	Total State Sector-TN	**2203.20**	**4348.00**	**4415**	**2919.60**	**66.13**
	Total Tamilnadu	**2203.20**	**4348.00**	**4415**	**2919.60**	**66.13**
	TELANGANA					
	STATE SECTOR					
	TSGENCO					
166	Lower Jurala	240.00	534.43	130	205.90	158.38
167	N.J.Sagar PSS	815.60	2237.00	1381	184.49	13.36
168	N.J.Sagar LBC	60.00	104.00	64	12.80	20.00
169	Pochampad	36.00	147.00	69	35.69	51.72
170	Priyadarshni Jurala	234.00	404.00	181	217.40	120.11
171	Pulichinthala	90.00	219.42	160	6.60	4.13
172	Srisailam LB	900.00	1400.00	1350	829.10	61.41
	Total TSGENCO	**2375.60**	**5045.85**	**3335**	**1491.98**	**44.74**
	Total State Sector-Telangana	**2375.60**	**5045.85**	**3335**	**1491.98**	**44.74**
	Total Telangana	**2375.60**	**5045.85**	**3335**	**1491.98**	**44.74**
	Total Southern	**11727.70**	**33900.85**	**28682.00**	**19022.26**	**66.32**
	EASTERN REGION					
	JHARKHAND					
	CENTRAL SECTOR					
	DVC					
173	Panchet	80.00	237.00	120	141.94	118.28
	Total DVC	**80.00**	**237.00**	**120**	**141.94**	**118.28**
	Total Central Sector-Jharkhand	**80.00**	**237.00**	**120**	**141.94**	**118.28**
	STATE SECTOR					
	JUUNL					
174	Subernarekha I	65.00	149.00	150	190.38	126.92
175	Subernarekha II	65.00				
	Total Jharkhand	**65.00**	**149.00**	**150**	**190.38**	**126.92**
	Total State Sector-Jharkhand	**65.00**	**149.00**	**150**	**190.38**	**126.92**
	Total Jharkhand	**145.00**	**386.00**	**270**	**332.32**	**123.08**
	ODISHA					
	STATE SECTOR					
	OHPC					
176	Balimela	510.0	1183.0	1184	1477.19	124.76
177	Hirakud I	347.5	1174.0	992	863.05	87.00

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
178	Hirakud II					
179	Rengali	250.0	525.0	700	762.61	108.94
180	Upper Indravati	600.0	1962.0	1964	1745.57	88.88
181	Upper Kolab	320.0	832.0	832	706.87	84.96
	Total OHPC	**2027.50**	**5676.00**	**5672**	**5555.29**	**97.94**
	APGENCO					
182	Machkund	114.75	670.00	481	467.70	97.23
	Total APGENCO-Odisha	**114.75**	**670.00**	**481**	**467.70**	**97.23**
	Total State Sector-Odisha	**2142.25**	**6346.00**	**6153**	**6022.99**	**97.89**
	Total Odisha	**2142.25**	**6346.00**	**6153**	**6022.99**	**97.89**
	SIKKIM					
	CENTRAL SECTOR					
	NHPC					
183	Rangit	60.00	338.61	340	345.91	101.74
184	Teesta-V	510.00	2572.70	2349	2818.78	120.00
	Total NHPC	**570.00**	**2911.31**	**2689**	**3164.69**	**117.69**
	Total Central Sector-Sikkim	**570.00**	**2911.31**	**2689**	**3164.69**	**117.69**
	STATE SECTOR					
	Teesta Urja Ltd. (TUL)					
185	Teesta III	1200.00	5214.00	5214	4429.33	84.95
	Total TUL	**1200.00**	**5214.00**	**5214**	**4429.33**	**84.95**
	Total State Sector-Sikkim	**1200.00**	**5214.00**	**5214**	**4429.33**	**84.95**
	PRIVATE SECTOR					
	DANS Energy Pvt. Ltd. (DEPL)					
186	Jorethang Loop	96.00	459.00	459	406.01	88.46
	Shiga Energy Pvt. Ltd.(SEPL)					
187	Tashiding	97.00	454.00	400	73.07	18.27
	Gati Infrastructure Pvt. Ltd. (GIPL)					
188	Chuzachen HEP	110.00	537.81	495	444.79	89.86
	Sneha Kinetic					
189	Dikchu	96.00	542.00	0	370.10	
	Total Private-Sikkim	**399.00**	**1992.81**	**1354**	**1293.97**	**95.57**
	Total Sikkim	**2169.00**	**10118.12**	**9257**	**8887.99**	**96.01**

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
	WEST BENGAL					
	CENTRAL SECTOR					
	NHPC					
190	Teesta Low Dam-III	132.00	594.00	550	386.87	70.34
	Teesta Low Dam-IV	160.00	719.67	720	495.15	68.77
	Total NHPC	**292.00**	**1313.67**	**1270**	**882.02**	**69.45**
	DVC					
191	Maithon	63.20	137.00	115	114.41	99.49
	Total DVC-WB	**63.20**	**137.00**	**115**	**114.41**	**99.49**
	Total Central Sector-WB	**355.20**	**1450.67**	**1385**	**996.43**	**71.94**
	STATE SECTOR					
	WBSEDCL					
192	Jaldhaka I	36	169.60	158	145.18	91.89
193	Purulia PSS	900	1235.00	1200	1014.37	84.53
194	Rammam II	50	209.00	238	122.47	51.46
	Total WBSEDCL	**986.00**	**1613.60**	**1596**	**1282.02**	**80.33**
	Total State Sector -WB	**986.00**	**1613.60**	**1596**	**1282.02**	**80.33**
	Total West Bengal	**1341.20**	**3064.27**	**2981**	**2278.45**	**76.43**
	Total Eastern	**5797.45**	**19914.39**	**18661**	**17521.75**	**93.90**
	NORTH EASTERN REGION					
	ARUNACHAL PRADESH					
	CENTRAL SECTOR					
	NEEPCO					
196	Ranganadi	405.00	1509.66	1200	1416.74	118.06
197	Pare*	-	-	222	0.00	0.00
198	Kameng*	-	-	608	0.00	0.00
	Total NEEPCO-Arunachal	**405.00**	**1509.66**	**2030**	**1416.74**	**69.79**
	Total Central Sector-Arunachal	**405.00**	**1509.66**	**2030**	**1416.74**	**69.79**
	Total Arunachal	**405.00**	**1509.66**	**2030**	**1416.74**	**69.79**
	ASSAM					
	CENTRAL SECTOR					
	NEEPCO					
199	Kopili	225.00	1186.14	936	1172.83	125.30
200	Khandong	50.00	363.95	181	260.77	144.07
	Total NEEPCO-Aassm	**275.00**	**1550.09**	**1117**	**1433.60**	**128.34**

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
	Total Central Sector-Assam	**275.00**	**1550.09**	**1117**	**1433.60**	**128.34**
	STATE SECTOR					
	APGCL					
201	Karbi Langpi	100.00	390.00	390	484.98	124.35
	Total APGCL	**100.00**	**390.00**	**390.00**	**484.98**	**124.35**
	Total State Sector-Assam	**100.00**	**390.00**	**390.00**	**484.98**	**124.35**
	Total Assam	**375.00**	**1940.09**	**1507.00**	**1918.58**	**127.31**
	NAGALAND					
	CENTRAL SECTOR					
	NEEPCO					
202	Doyang	75.00	227.24	227	274.39	120.88
	Total NEEPCO-Nagaland	**75.00**	**227.24**	**227.00**	**274.39**	**120.88**
	Total Central Sector-Nagaland	**75.00**	**227.24**	**227.00**	**274.39**	**120.88**
	Total Nagaland	**75.00**	**227.24**	**227.00**	**274.39**	**120.88**
	MANIPUR					
	CENTRAL SECTOR					
	NHPC					
203	Loktak	105.00	448.00	600	837.74	139.62
	Total NHPC-Manipur	**105.00**	**448.00**	**600.00**	**837.74**	**139.62**
	Total Central Sector-Manipur	**105.00**	**448.00**	**600.00**	**837.74**	**139.62**
	Total Manipur	**105.00**	**448.00**	**600.00**	**837.74**	**139.62**
	MEGHALAYA					
	STATE SECTOR					
	MePGCL					
204	Kyrdemkulai	60.00	118.00	130	132.18	101.68
205	Myntdu	126.00	128.00	428	502.47	117.40
206	New Umtru	40.00	185.00	60	159.52	265.87
207	Umium St.I	36.00	324.00	109	128.65	118.03
208	Umium St.IV	60.00	372.69	192	217.44	113.25
	Total MePGCL	**322.00**	**1127.69**	**919.00**	**1140.26**	**124.08**
	Total State Sector-Meghalaya	**322.00**	**1127.69**	**919.00**	**1140.26**	**124.08**
	Total Meghalaya	**322.00**	**1127.69**	**919.00**	**1140.26**	**124.08**

REGION/UTILITY/STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2017-18

SL. NO.	REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2018	DESIGN ENERGY	2017-18		% OF ACTUAL OVER TARGET
				TARGET	ACTUAL	
		MW	MU	MU	MU	
	MIZORAM					
	CENTRAL SECTOR					
209	Tuirial	60.00	250.63	118	78.37	66.42
	Total NEEPCO-Mizoram	**60.00**	**250.63**	**118**	**78.37**	**66.42**
	Total Central Sector-Mizoram	**60.00**	**250.63**	**118.00**	**78.37**	**66.42**
	Total Mizoram	**60.00**	**250.63**	**118.00**	**78.37**	**66.42**
	Total N.Eastern	**1342.00**	**5503.31**	**5401.00**	**5666.08**	**104.91**
	Total All India	**45228.42**	**150264.02**	**141400.00**	**126122.70**	**89.20**
	IMPORT FROM BHUTAN			**5000**	**4778.33**	**95.57**
	Total All India (Including Bhutan Imports)	**45228.42**	**150264.02**	**146400**	**130901.03**	**89.41**
	* Stations Targetted but not Commissioned during 2017-18					

CHAPTER-3

MAJOR RESERVOIR BASED HE STATIONS

CHAPTER – 3

MAJOR RESERVOIR/ STORAGE BASED H.E. STATIONS

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 Stations

CEA is presently monitoring 43 H.E. Stations of aggregating installed capacity of 18178.35 MW in the country on 37 major reservoirs as listed below:

S. No.	H.E. Stations	Installed Capacity (MW)	Utility	State	Reservoirs	
					Name	Multipurpose (MP)/ Storage (S) for Power Only
	Northern Region					
1	Bhakra (L)	540	BBMB	Himachal Pradesh	Bhakra	MP
2	Bhakra (R)	785	BBMB			
3	Pong	396	BBMB		Pong	MP
4	Chamera-I	540	NHPC	Himachal Pradesh	Chamera	S
5	Ranjit Sagar	600	PSPCL	Punjab	Ranjit Sagar	MP
6	Tehri	1000	THDC	Uttarakhand	Tehri	MP
7	Ram Ganga	198	UJVNL	Uttarakhand	Ram Ganga	MP
8	Rihand	300	UPJVNL	Uttar Pradesh	Rihand	MP
9	RP Sagar	172	RRVUNL	Rajasthan	RP Sagar	MP
Sub-Total (NR)		**4531**				

S. No.	H.E. Stations	Installed Capacity (MW)	Utility	State	Reservoirs	
					Name	Multipurpose (MP)/ Storage for Power Only
	Western Region					
10	Ukai	300	GSECL	Gujarat	Ukai	MP
11	Sardar Sarovar (RBPH)	1200	SSNNL	Gujarat	Sardar Sarovar	MP
12	Gandhi Sagar	115	MPPGCL	Madhya Pradesh	Gandhi Sagar	MP
13	Bansagar-III	60	MPPGCL	Madhya Pradesh	Bansagar	MP
14	Indira Sagar	1000	NHDC	Madhya Pradesh	Indira Sagar	MP
15	Koyna-I&II	600	MAHAGENCO	Maharashtra	Koyna	MP
16	Koyna-IV	1000	MAHAGENCO	Maharashtra		
17	Koyna DPH	36	MAHAGENCO	Maharashtra		
18	Pench	160	MPPGCL	Maharashtra	Pench	MP
19	Bhira	300	TPCL	Maharashtra	Bhira	MP
Sub-Total (WR)		**4771**				
	Southern Region					
20	Upper Sileru-I	120	APGENCO	Andhra Pradesh	Sileru	S
21	Upper Sileru-II	120	APGENCO	Andhra Pradesh		
22	Lower Sileru	460	APGENCO	Andhra Pradesh		
23	Srisailam RB	770	APGENCO	Andhra Pradesh	Srisailam	MP
24	NJ Sagar	815.60	TSGENCO	Telangana	Nagarjuna Sagar	MP
25	Sharavathy	1035	KPCL	Karnataka	Sharavathy	**S**
26	Kalinadi	855	KPCL	Karnataka	Supa	**S**
27	Supa DPH	100	KPCL	Karnataka		
28	Almatti	290	KPCL	Karnataka	Almatti	MP
29	Varahi	460	KPCL	Karnataka	Varahi	S
30	Idukki	780	KSEB	Kerala	Idukki	MP
31	Sabarigiri	300	KSEB	Kerala	Sabarigiri	MP
32	Pallivasal	37.50	KSEB	Kerala	Madupetty	S
33	Idamalayar	75	KSEB	Kerala	Idamalayar	MP
34	Mettur Dam	50	TANGEDCO	Tamil Nadu	Mettur	MP

S. No.	H.E. Stations	Installed Capacity (MW)	Utility	State	Reservoirs	
					Name	Multipurpose (MP)/ Storage for Power Only
35	Mettur Tunnel	200	TANGEDCO	Tamil Nadu	Mettur	MP
36	Periyar	161	TANGEDCO	Tamil Nadu	Periyar	MP
Sub-Total (SR)		**6629.10**				
	Eastern and North Eastern Region					
37	Machkund	114.75	APGENCO	Odisha	Machkund	MP
38	Hirakud I&II	347.50	OHPC	Odisha	Hirakud	MP
39	Balimela	510	OHPC	Odisha	Balimela	MP
40	Indravati	600	OHPC	Odisha	Indravati	MP
41	Upper Kolab	320	OHPC	Odisha	Upper Kolab	MP
42	Rengali	250	OHPC	Odisha	Rengali	MP
43	Loktak	105	NHPC	Manipur	Loktak	MP
Sub-Total (ER/NER)		**2247.25**				
Total (All India)		**18178.35**				

Salient details of 37 Nos. major reservoirs are indicated in **Annex-3.1**. These stations constitute about 40.14% (31.91% Multipurpose & 8.23% Storage for power only) of the total hydel installed capacity and generated about 31.02% (23.54% Multipurpose & 7.48% Storage for power only) of the total Hydel generation during 2017-18 as briefly indicated in **Table-3.1.**

TABLE - 3.1

CONTRIBUTION BY IMPORTANT RESERVOIR (STORAGE) BASED H.E. STATIONS

S. No.	Description	Major Reservoir Based Stations		Other Stations	Total
		Multipurpose (MP)	Storage for Power only		
1.	Installed Capacity (MW)	14451	3728	27114	45293
	Percentage of Total (%)	31.91	8.23	59.86	100.00
2.	Energy Generation (MU)	29689	9438	86996	126123
	Percentage of Total (%)	23.54	7.48	68.98	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 the hydro projects in Himalayan Region including Bhakra, Pong, Ranjit Sagar and Tehri projects etc., snow melt in the

catchment area during summer also contributes to their inflows. The inflows into the reservoirs during 2017-8 vis-à-vis 2016-17 are given at **Exhibit 3.1**. Inflows into the reservoirs and generation during the year 2017-18 vis-à-vis 2016-17 and 10 years average is given below at **Table-3.2.**

TABLE 3.2

HYDRO RESERVOIRS (STORAGE TYPE) - INFLOW & ENERGY GENERATION

S. No.	STATION	Inflows				Generation			
		10 years Average (MCM)	2016-17 (MCM)	2017-18 (MCM)	2017-18 Inflow as % of 2016-17 inflow	10 years Average (MU)	2016-17 (MU)	2017-18 (MU)	2017-18 generation as compared to 2016-17 (%)
1	2	3	4	5	6= (5/4*100)	7	8	9	10= (9/8*100)
Northern Region									
1	Bhakra	17369	16021	17279	107.85	5426	5168	5134	99.34
2	Pong	8843	7910	8805	111.31	1530	1370	1642	119.82
3	Ranjit Sagar	6298	5428	6312	116.29	1614	1306	1803	138.09
4	Chamera-I*	6156	5383	6139	114.04	2380	2224	2344	105.40
5	Tehri	7378	7438	6967	93.67	3190	3146	378	12.02
6	Ram Ganga	3359	1353	16289	1203.92	293	181	834	460.65
7	RP Sagar	4127	5598	3703	66.15	360	449	3081	686.18
8	Rihand	5119	8587	5302	61.75	528	567	251	44.20
Sub Total (NR)		**58648**	**57718**	**70796**	**122.66**	**15322**	**14411**	**15467**	**107.33**
Western Region									
9	Ukai	7229	226	2409	1065.72	503	396	304	76.65
10	Sardar Sarovar	28585	28985	8822	30.44	2569	2333	377	16.14
11	Gandhi Sagar	4220	5904	1746	29.58	266	351	351	100.11
12	Bansagar*	4677	9319	2464	26.44	78	53	69	129.81
13	Pench*	987	1111	556	50.08	339	360	160	44.31
14	Indira Sagar	22922	30477	7007	75.19	2486	3321	882	26.55
15	Koyna	3535	3624	3630	100.18	2702	2692	2132	79.19
16	Bhira	907	1054	1041	98.77	850	952	892	93.70
Sub Total (WR)		**73062**	**80700**	**27676**	**46.48**	**9793**	**9885**	**5166**	**52.26**
	Southern Region								
17	Srisailam	18783	49996	13741	27.48	1055	641	575	89.70
18	Upper Sileru*	2199	1659	2368	142.71	436	340	482	141.83

S. No.	STATION	Inflows				Generation			
		10 years Average (MCM)	2016-17 (MCM)	2017-18 (MCM)	2017-18 Inflow as % of 2016-17 inflow	10 years Average (MU)	2016-17 (MU)	2017-18 (MU)	2017-18 generation as compared to 2016-17 (%)
19	Lower Sileru*	3255	2377	3380	142.20	1095	832	1110	133.39
20	N.J. Sagar	81411	66834	8376	12.53	782	186	184	99.19
21	Sharavathy	4520	2154	3051	141.66	4437	2709	2722	100.49
22	Supa	2668	1878	1973	105.05	2817	1584	1828	115.42
23	Almatti	12367	18858	9348	49.57	444	404	442	109.30
24	Varahi*	491	451	530	117.52	1017	741	762	102.89
25	Idukki	1581	807	1683	208.59	2161	1380	1611	116.74
26	Sabarigiri	874	831	1090	131.14	1184	799	968	121.21
27	Madupetty	216	171	328	192.07	208	166	188	113.49
28	Idamalayar	1124	965	218	22.56	306	172	256	148.99
29	Mettur	5156	4058	3158	77.83	338	125	216	172.45
30	Periyar	576	651	428	65.81	359	94	287	305.43
Sub Total (SR)		**135222**	**151690**	**49672**	**32.75**	**16639**	**10173**	**11633**	**114.35**
Eastern Region									
31	Machkund	1255	1264	1218	96.40	560	700	468	66.81
32	Hirakud	25715	17404	15360	88.26	879	717	863	120.37
33	Balimela	3530	2923	3588	122.74	1073	1001	1477	147.57
34	Indravati	3209	1994	2153	108.00	1874	1522	763	50.11
35	Upper Kolab	1981	1279	1150	89.91	641	619	1746	282.00
36	Rengali	9628	7913	11550	145.96	686	554	707	127.59
Sub Total (ER)		**43318**	**34846**	**39361**	**106.84**	**5712**	**5113**	**6023**	**117.80**
North Eastern Region									
37	Loktak	2242	2069	4342	112.96	571	741	838	113.06
Sub Total (NER)		**2242**	**2069**	**4342**	**112.96**	**571**	**741**	**838**	**113.06**
Total (All India)		**314491**	**303796**	**187505**	**61.72**	**48038**	**40896**	**39126**	**95.67**

* Only 3 years average inflows available.

3.4 Reservoir Levels

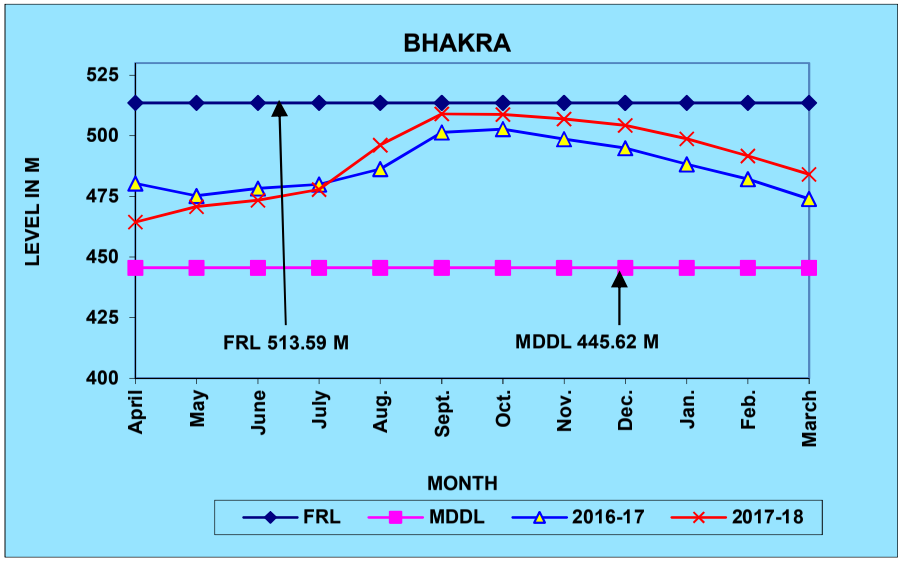
The maximum reservoir level attained during the year depends on the depleted reservoir level in the preceding year, besides the inflows during the current year. Water level touched FRL only at Chamera, Bansagar, Madupetty and Loktak reservoirs during 2017-18. Month-wise maximum levels of major reservoirs during 2017-18 vis-à-vis 2016-17 are indicated at **Exhibits 3.2** to **Exhibits 3.11**.

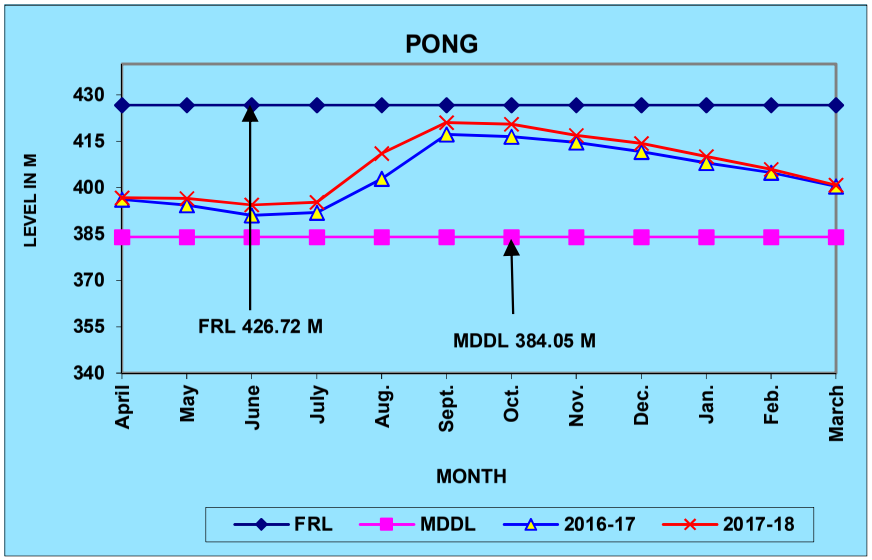
EXHIBIT 3.1

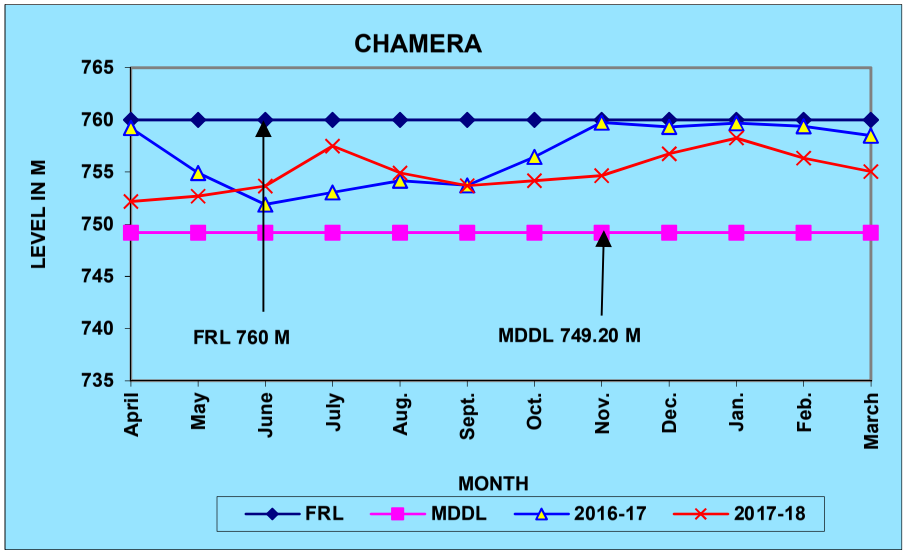
INFLOWS INTO MAJOR RESERVOIRS DURING 2017-18 VIS-A-VIS 2016-17

EXHIBIT 3.2

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







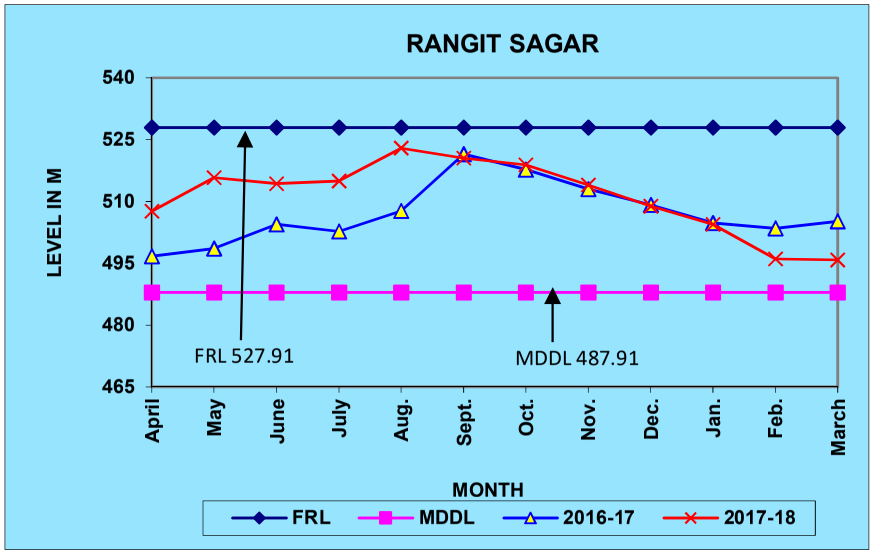
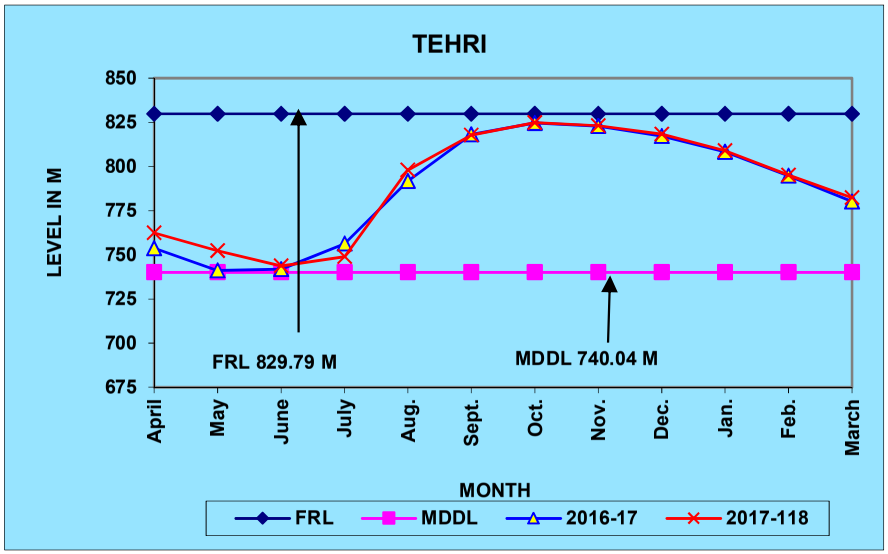
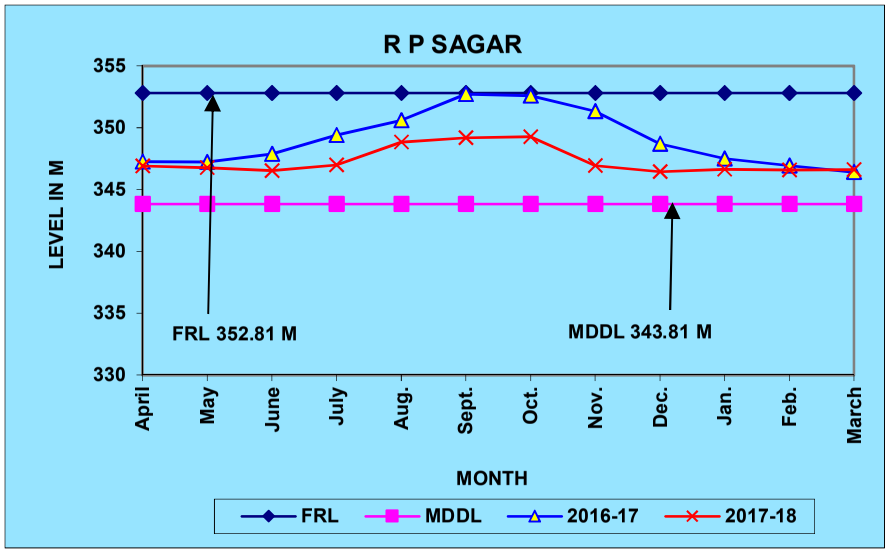
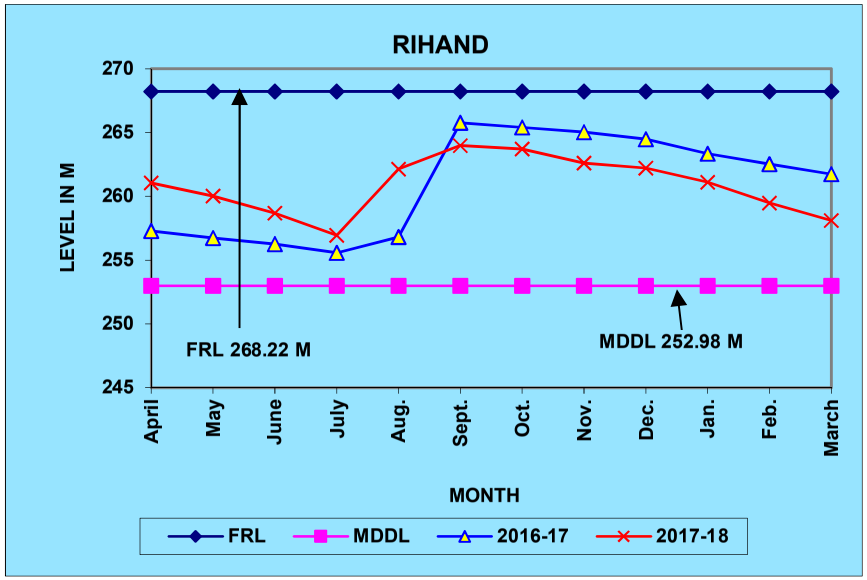


EXHIBIT 3.3

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







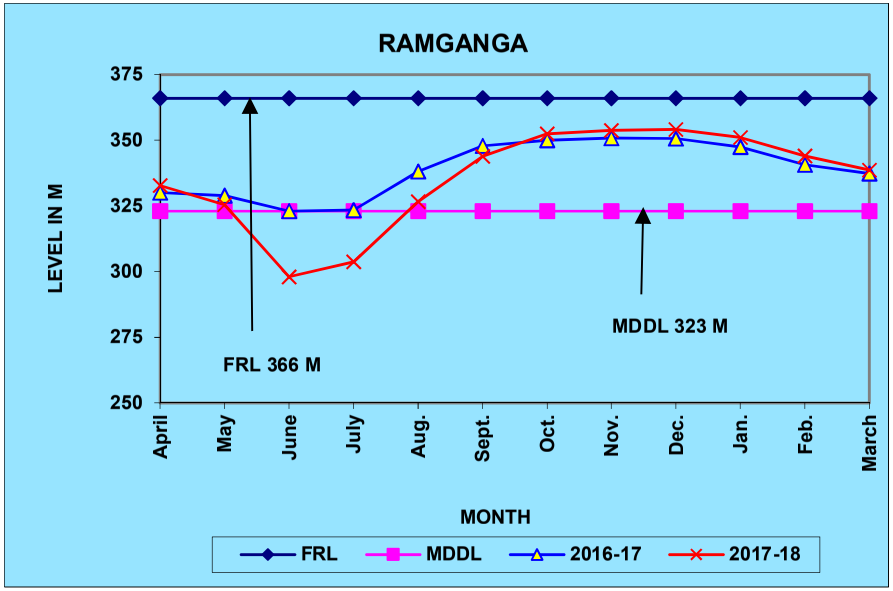
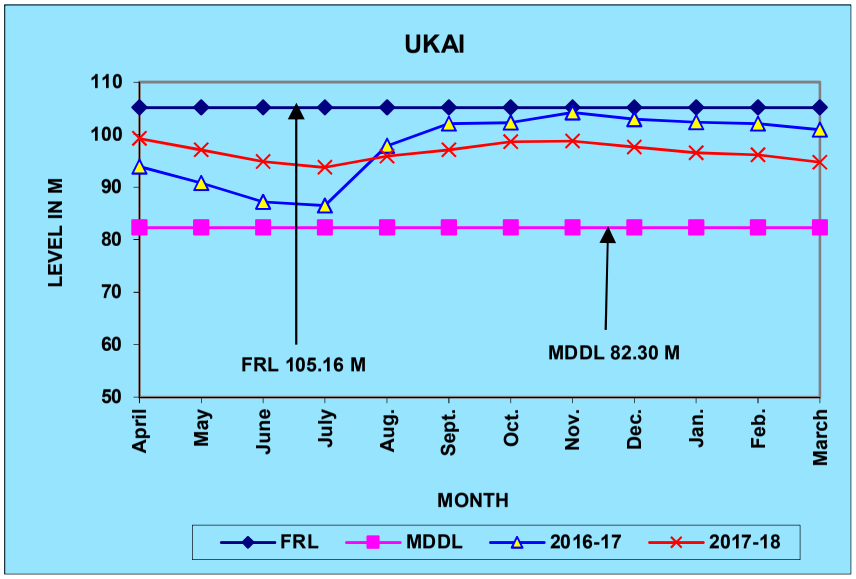
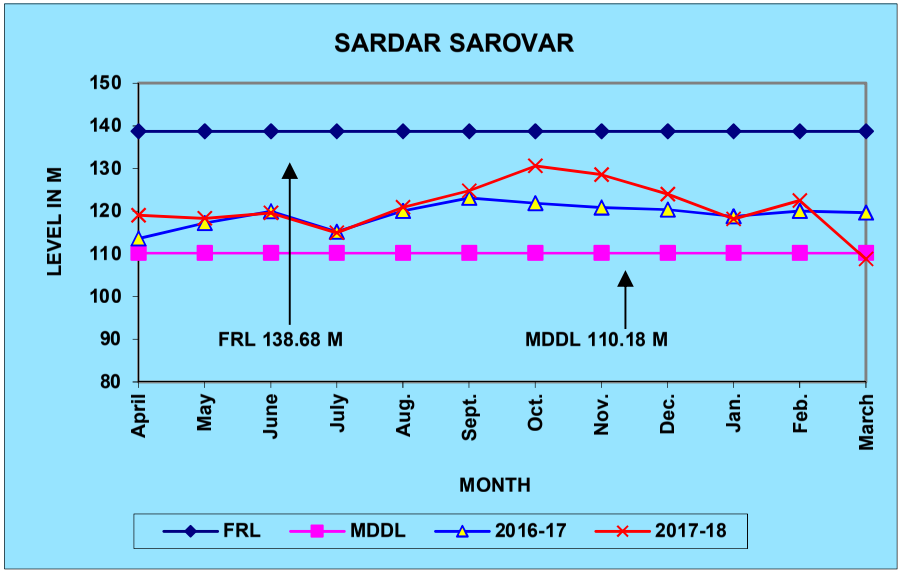
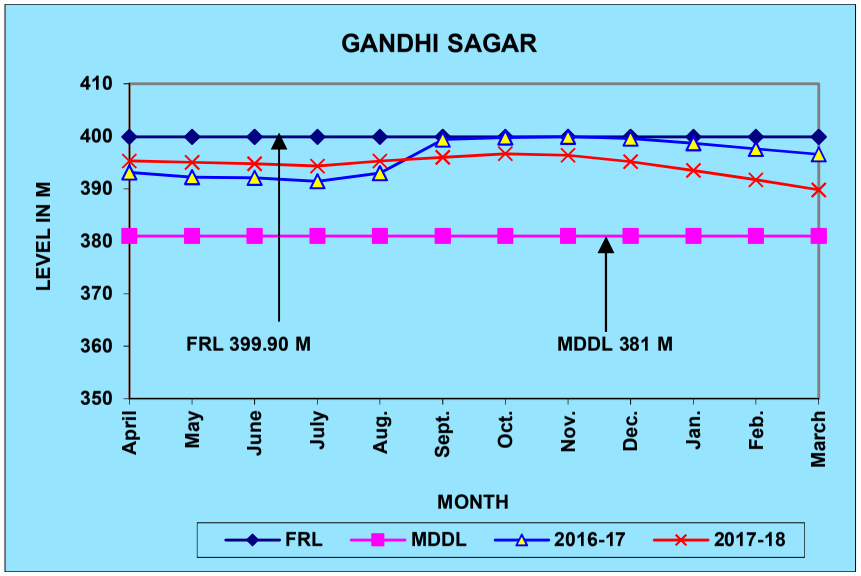


EXHIBIT 3.4

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







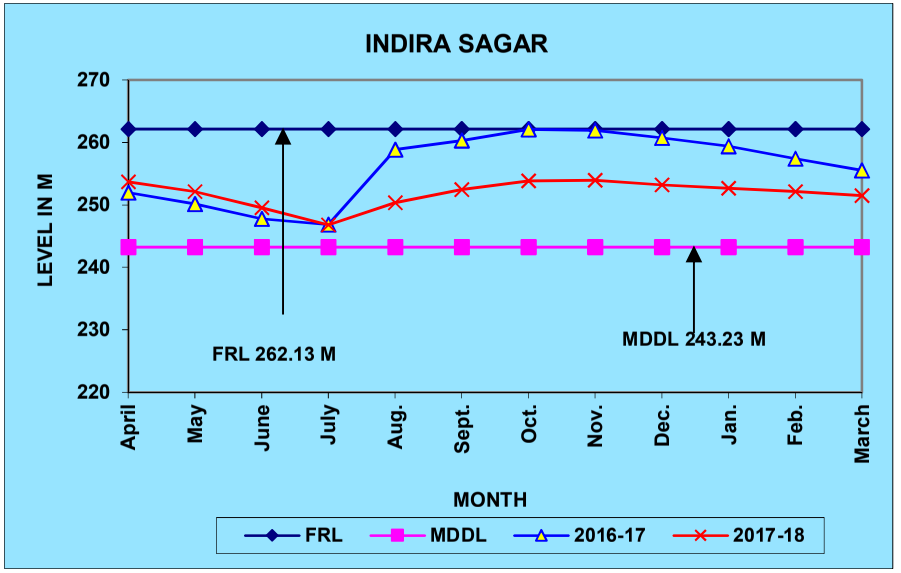
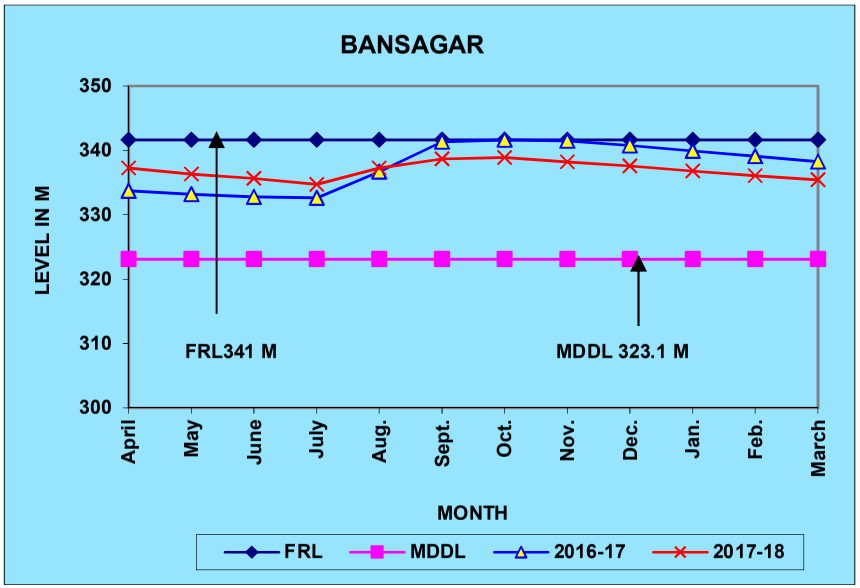
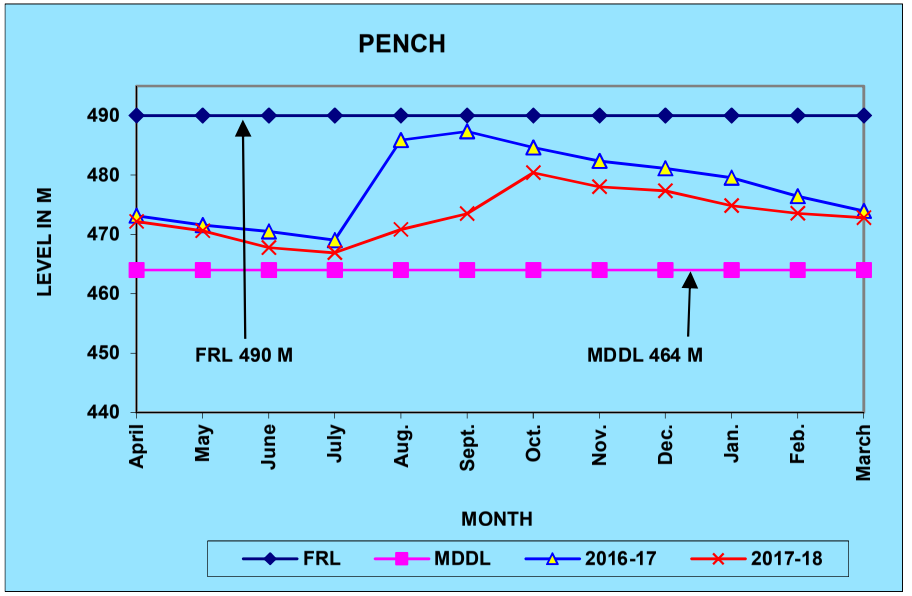
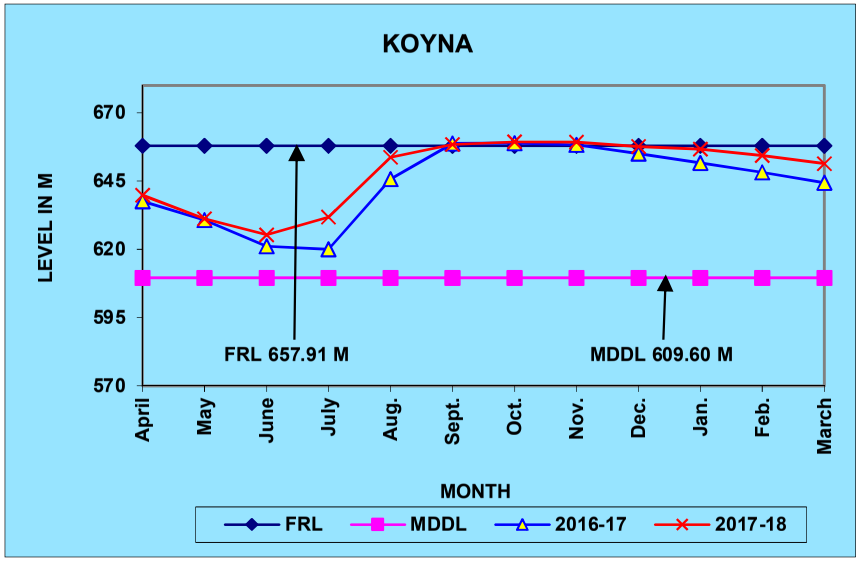


EXHIBIT 3.5

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







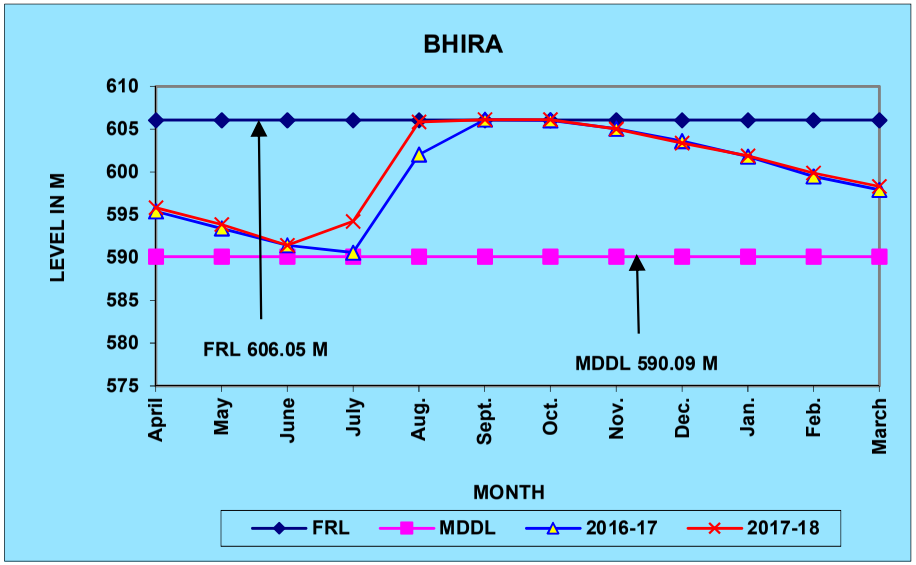
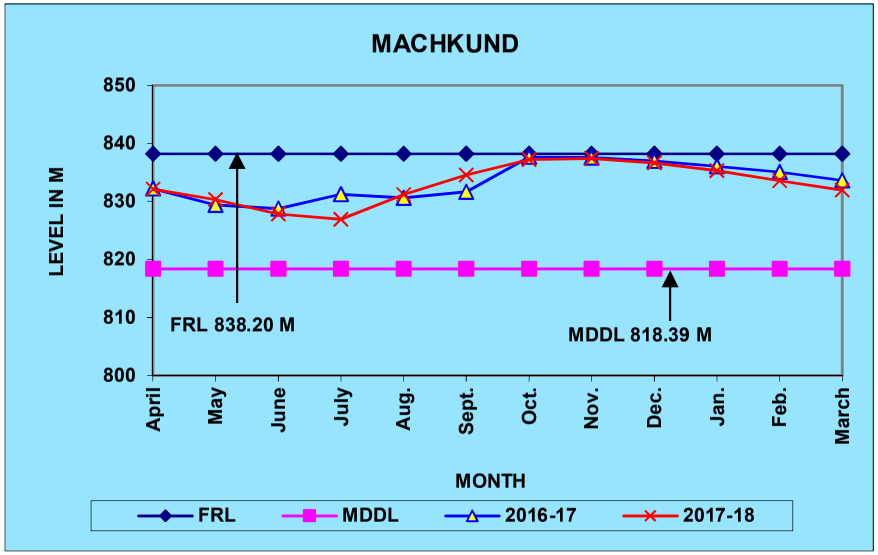
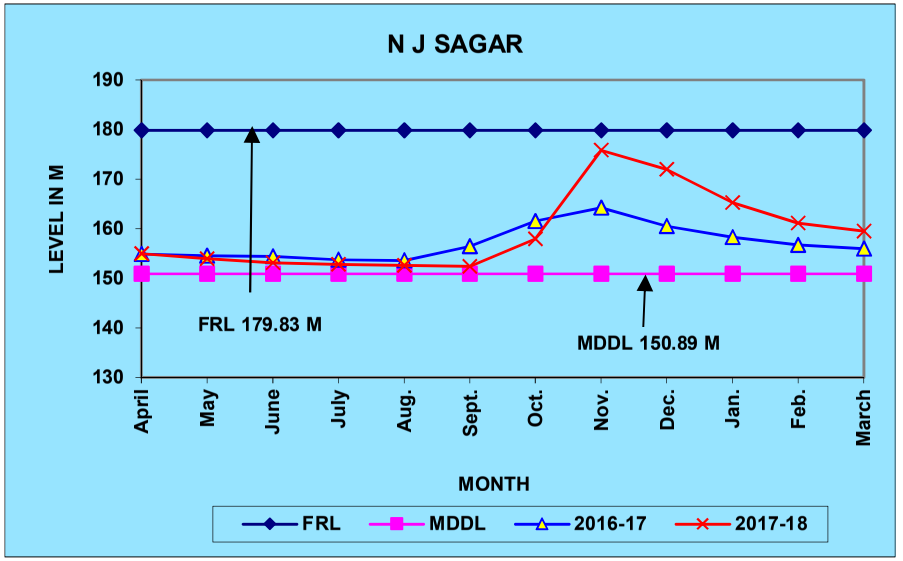
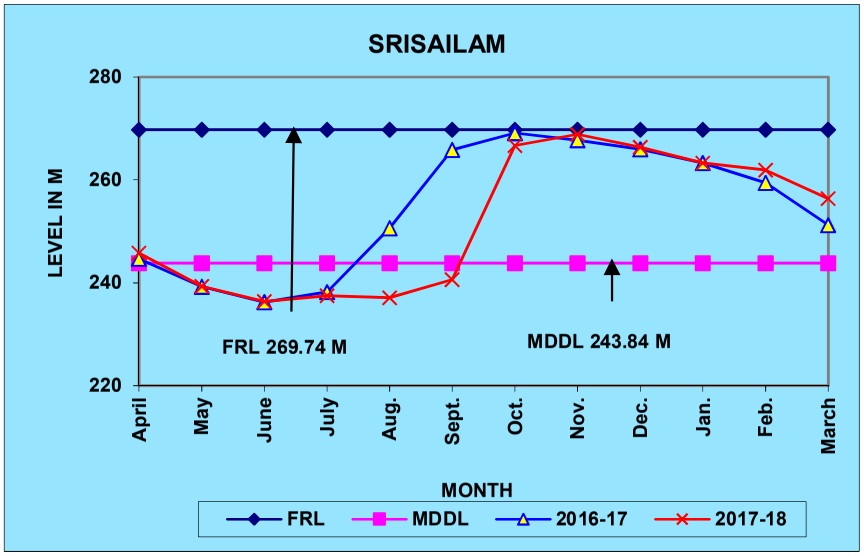


EXHIBIT 3.6

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







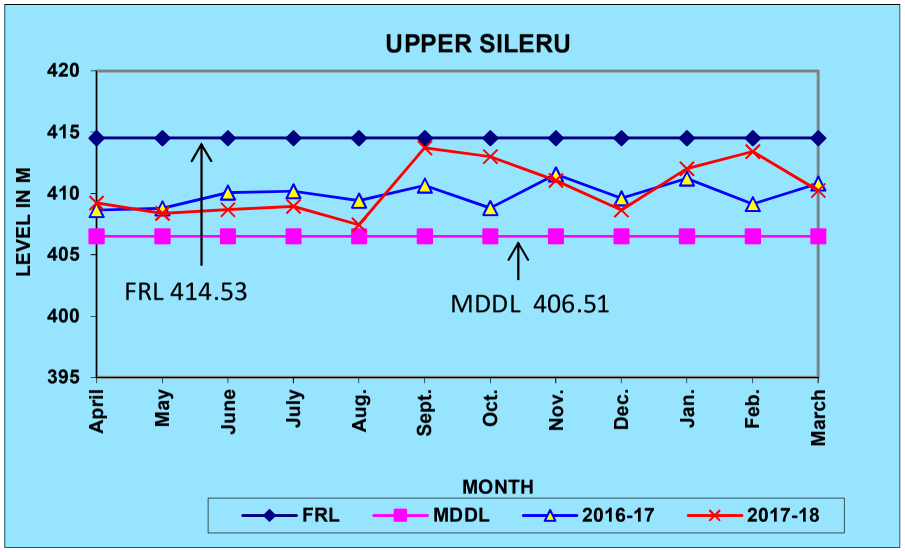
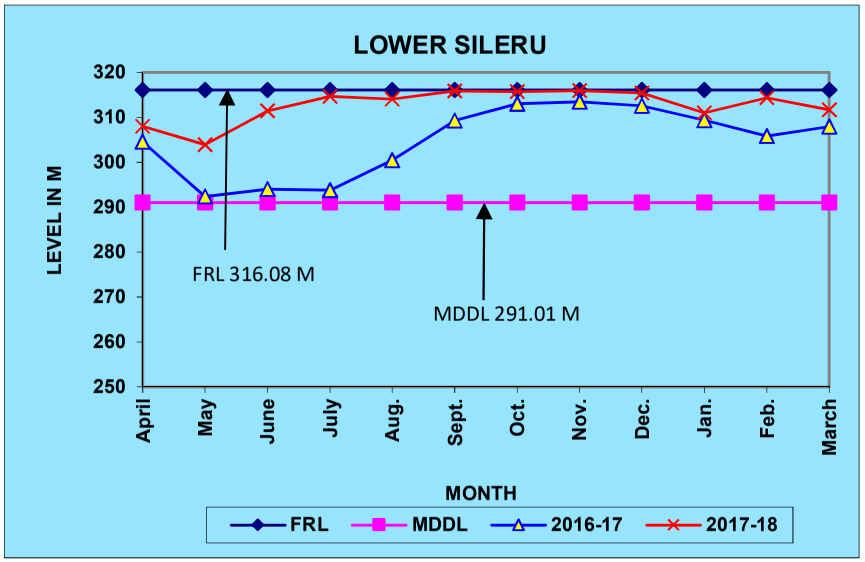
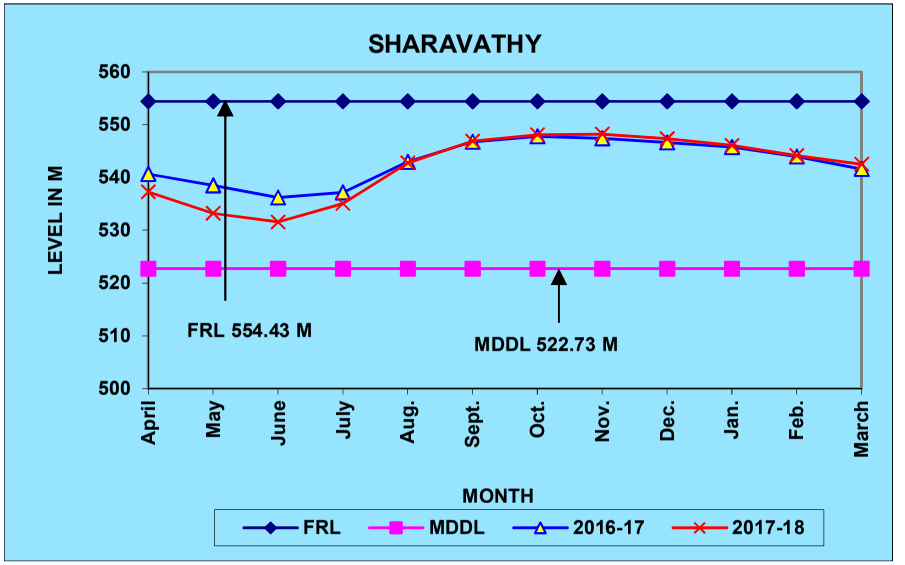
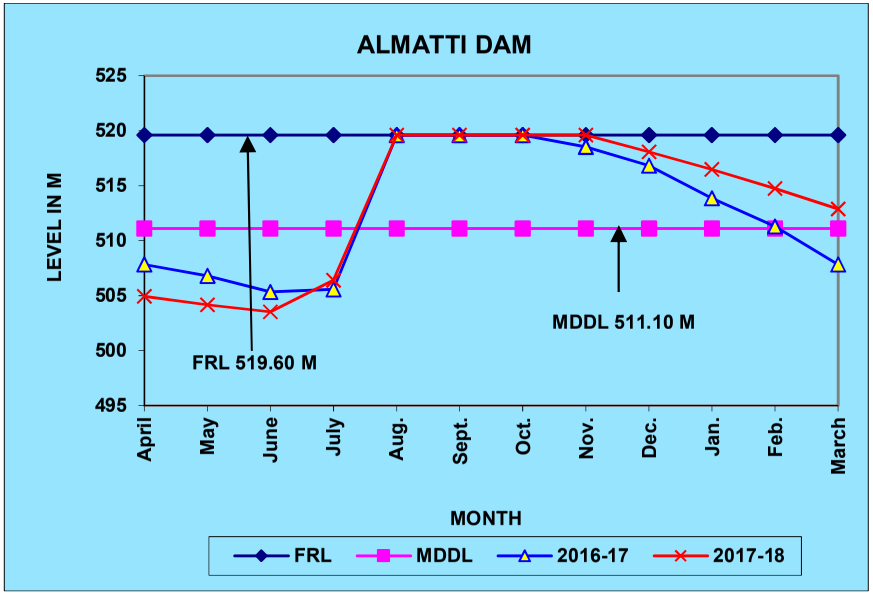


EXHIBIT 3.7

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







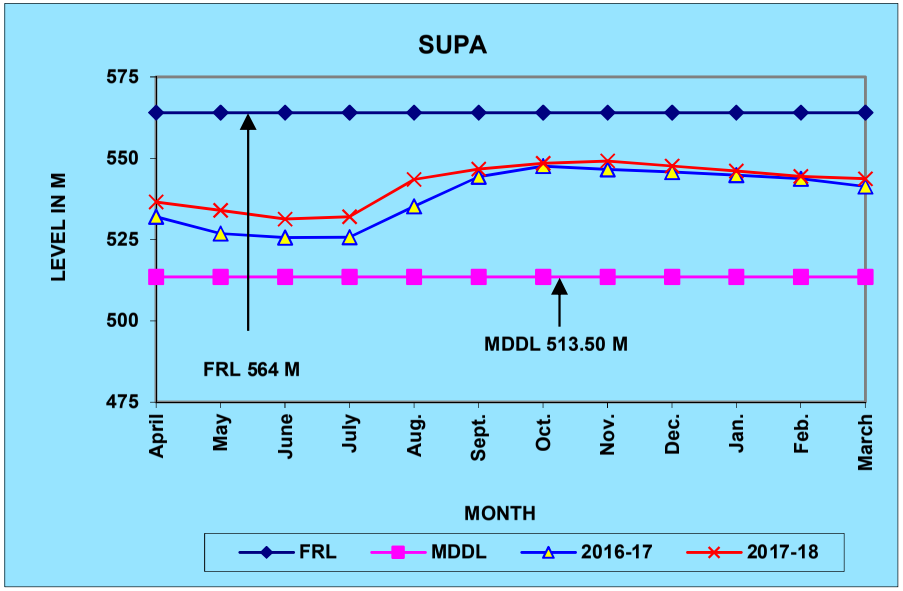
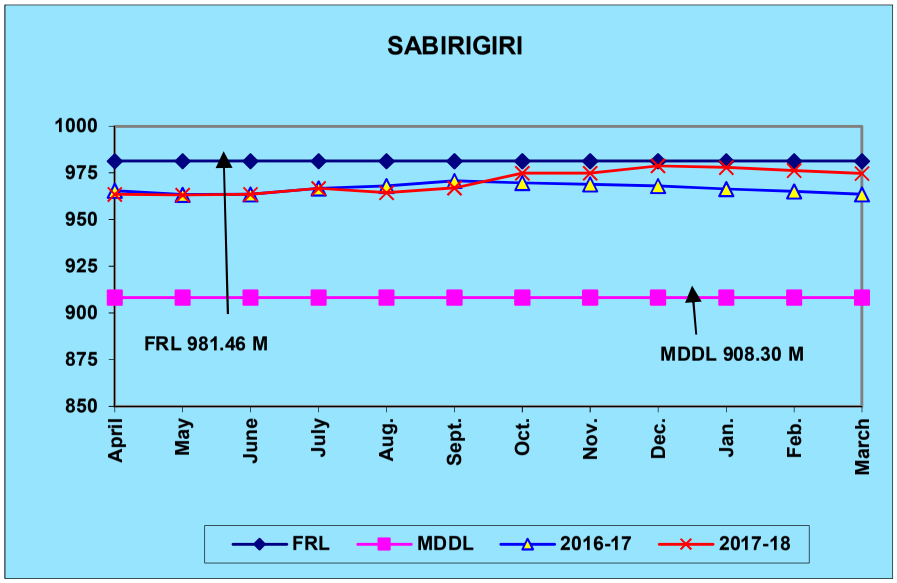
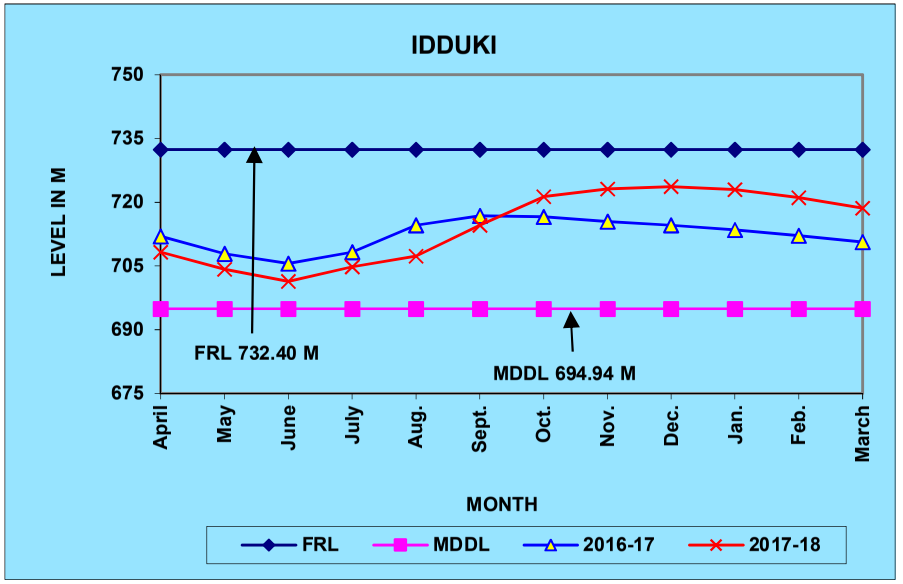
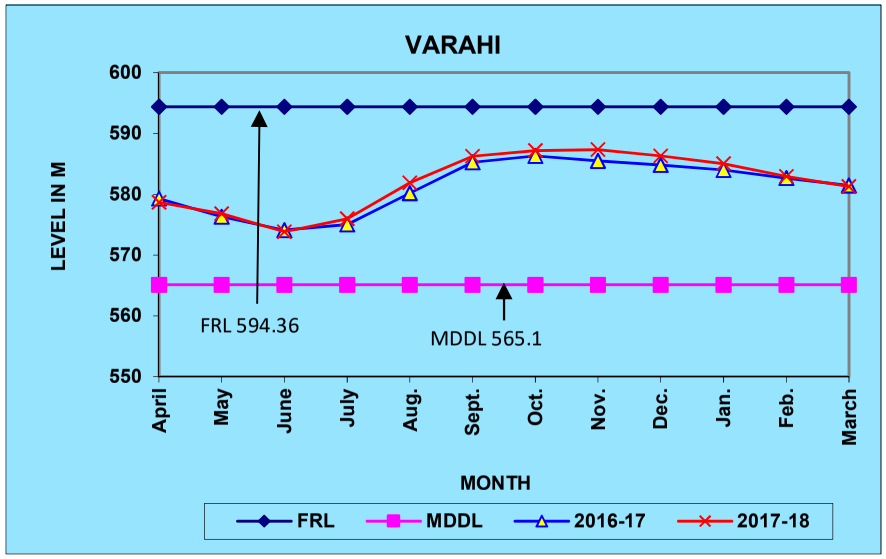


EXHIBIT 3.8

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







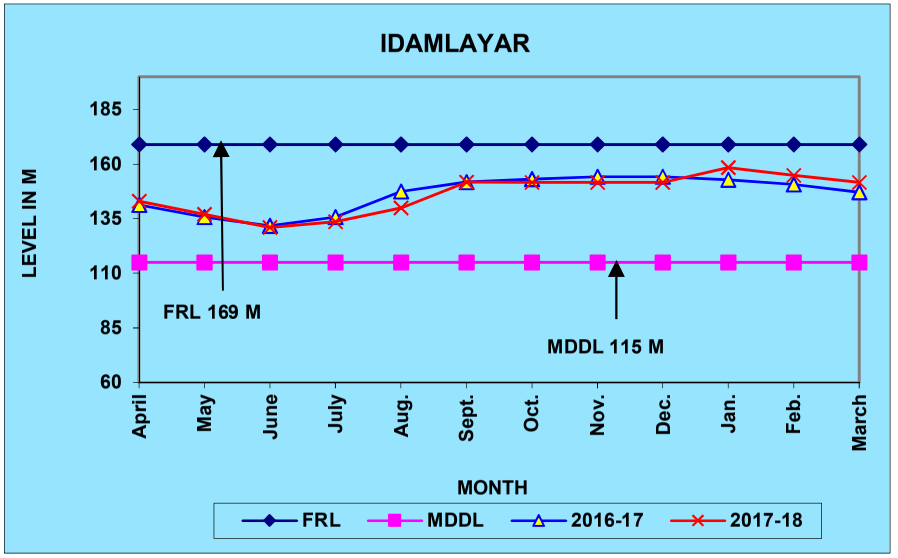
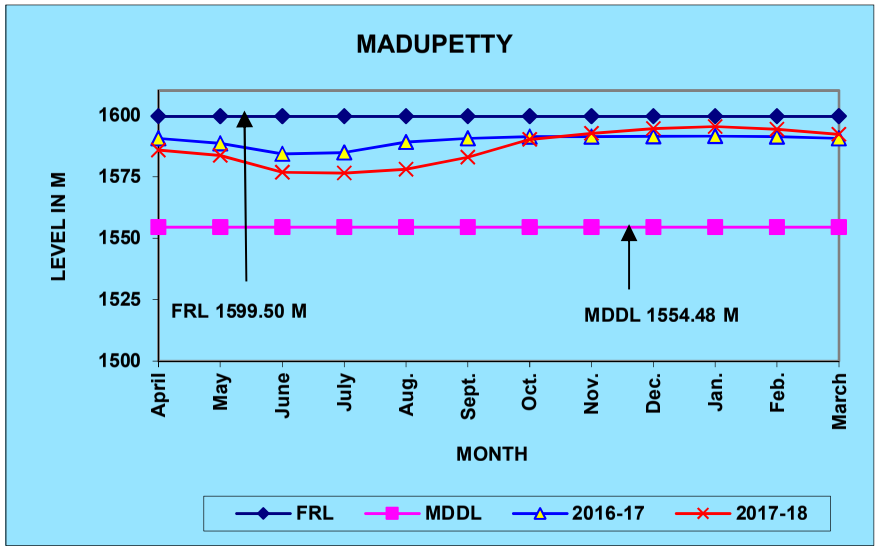
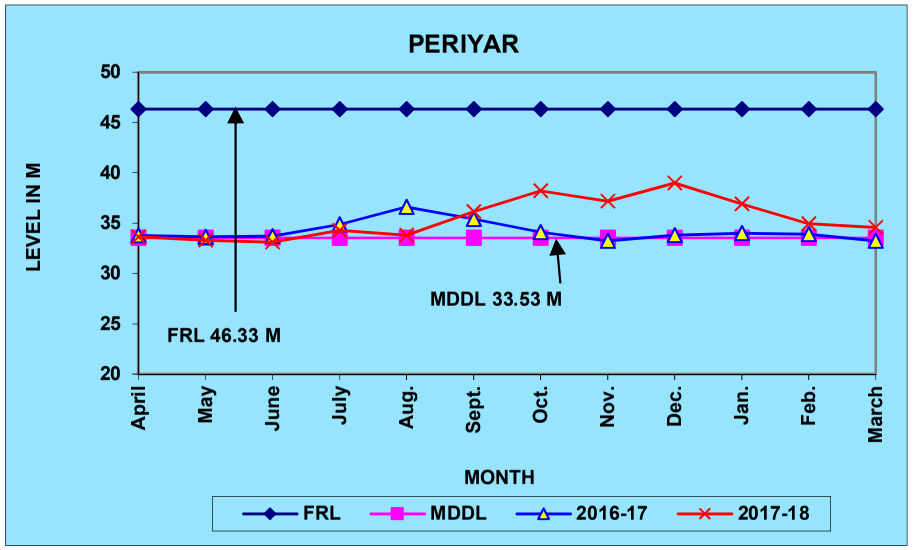
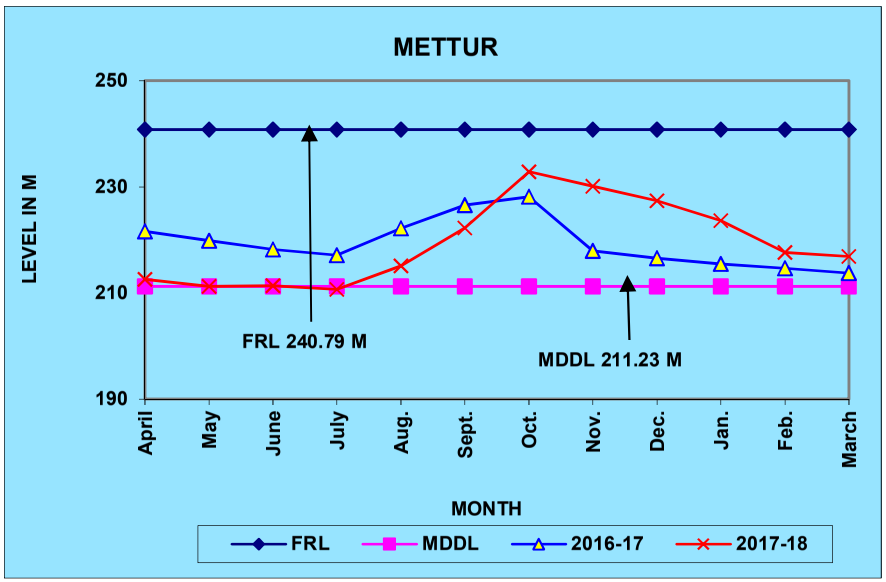


EXHIBIT 3.9

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







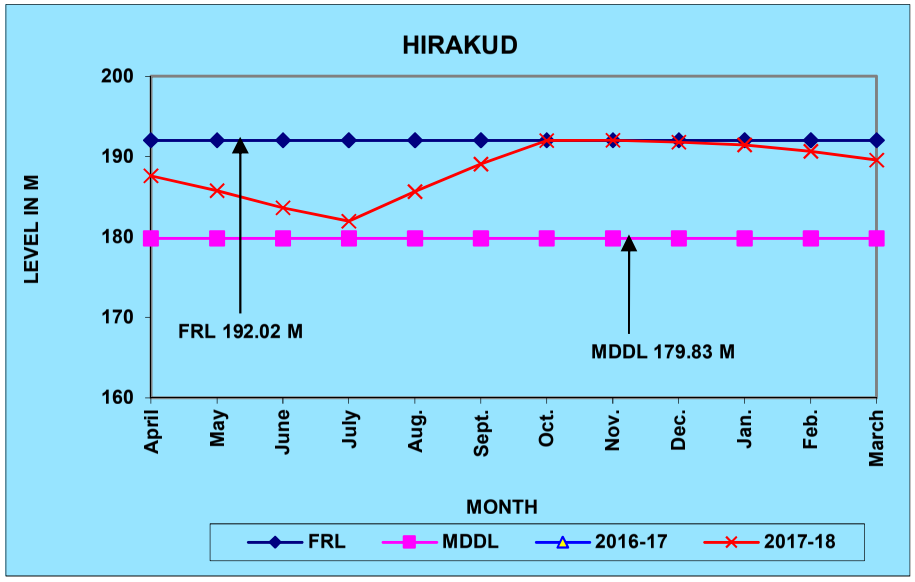
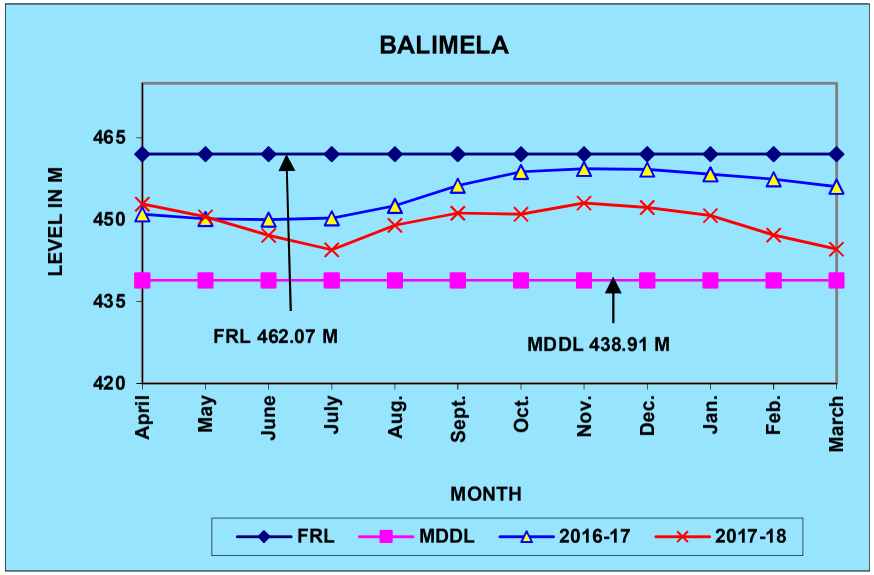
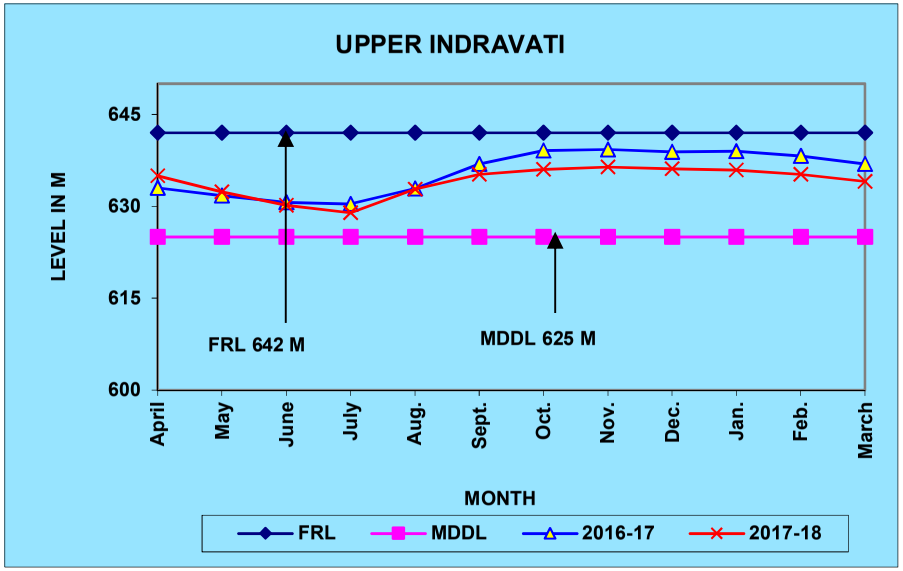
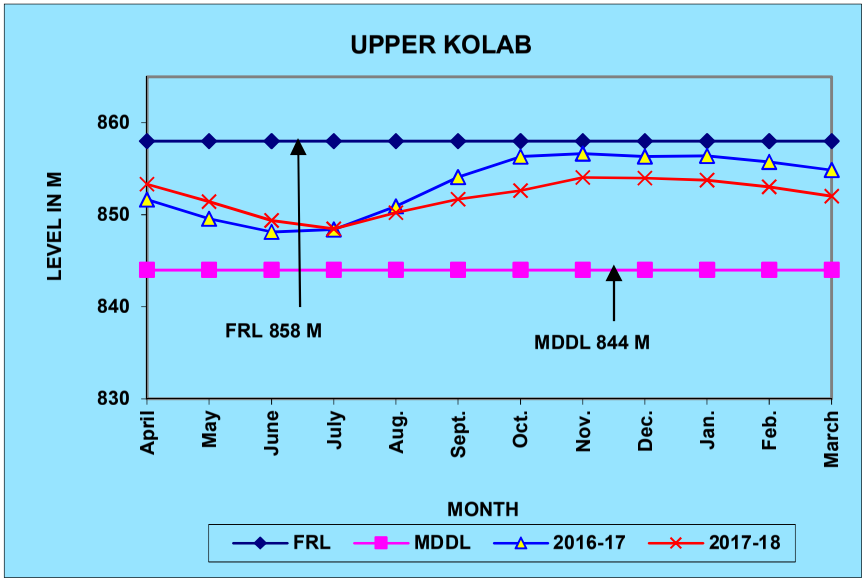


EXHIBIT 3.10

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







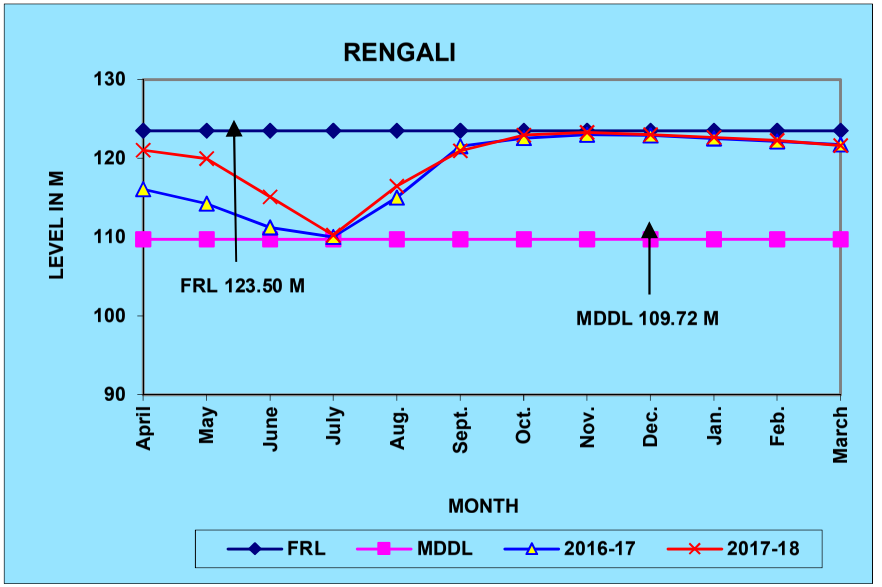
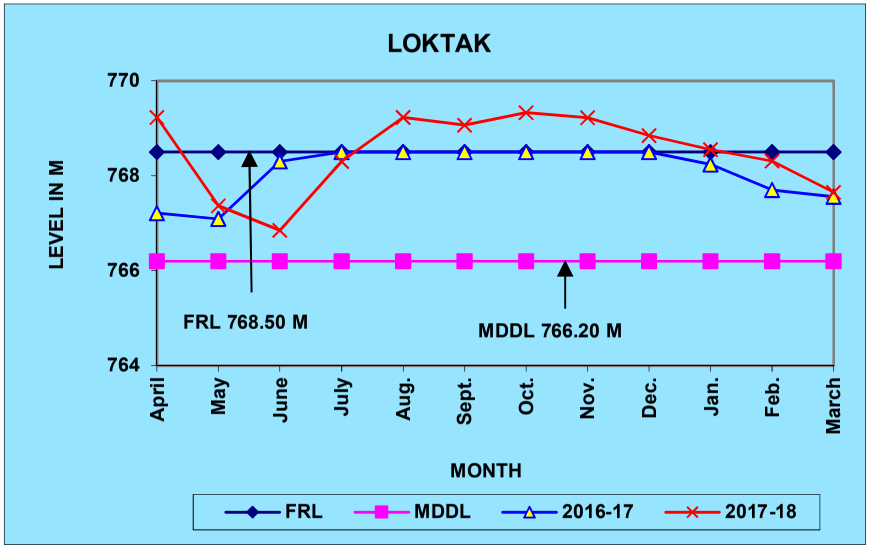


EXHIBIT 3.11

MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



3.5 Generation

Generation from reservoir (storage) based H.E. Stations during the year, apart from priorities of releases for other purposes like irrigation, drinking water etc., 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 13 Nos. out of 37 Nos. reservoir based hydel stations, annual generation during the year 2017-18 was more than the annual generation targets. Generation from 43 H.E. Stations on 37 major reservoirs during the year 2017-18 has been 39126 MU, showing decrease by 4.33% over the 2016-17 generation of 40896 MU. Station-wise generation of reservoir stations during the year 2017-18 as compared to that of last year 2016-17 is shown in **Table 3.2** above. The reservoir based stations 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 STATIONS

S. No.	% of Actual Generation over Target	Reservoir based Stations		
		No.	% of total Reservoir based Stations	Name
1	120 & Above	5	11.6	Pong, Rihand, Koyna DPH, Balimela, Loktak,
2	110 - 120	3	7.0	Bhakra L&R, R P Sagar
3	100 - 110	7	16.3	Chamera-I, Ranjit Sagar, Tehri, Bhira, Upper Sileru I&II, Lower Sileru, Rengali
4	Below 100	28	65.1	Ram Ganga, Ukai, Sardar Sarovar (RBPH), Gandhi Sagar, Bansagar-III, Indira Sagar, Koyna I&II, Koyna III, Koyna IV, Pench, Srisailam RB, N J Sagar, Almatti Dam, Sharavathy, Kalinadi Supa, Varahi, Idukki, Sabirigiri, Idamalayar, Madupetty, Mettur Dam, Mettur Tunnel, Periyar, Machkund, Hirakud I&II, Upper Indiravati, Upper Kolab

Generation of major reservoir based H.E. stations during 2017-18 as compared to the generation during last year i.e. 2016-17 is also depicted at **Exhibit-3.12**.

EXHIBIT-3.12


GENERATION FROM RESERVOIR (STORAGE) BASED HYDROELECTRIC STATIONS DURING 2017-18 VIS-A-VIS 2016-17
GENERATION 2016-17
GENERATION 2017-18
GENERATION IN MU
RESERVOIR
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
Bhakra 5168 5134
Pong 1642 1370
Ranjit Sagar 1803 1306
Chamera 2224 2344
Tehri 3146 3081
Ramganga 181 251
RP Sagar 449 378
Rihand 567 834
Ukai 396 304
Sardar Sarovar 2333 377
Gandhi Sagar 351 351
Bansagar 53 69
Pench 360 160
Indira Sagar 3321 882
Koyna 2692 2132
Bhira 952 892
Machkund 700 468
Upper Sileru 340 482
Lower Sileru 832 1110
Srisailam 641 575
NJ Sagar 186 184
Sharavathy 2722 2709
Supa 1584 1828
Almatti 404 442
Varahi 741 762
Idukki 1380 1611
Sabarigiri 799 968
Madupetty 166 188
Idamalayar 172 256
Mettur 125 216
PERIYAR 94 287
HIRAKUD 717 863
BALIMELA 1001 1477
UPPER INDRAVATHI 1522 1746
UPPER KOLAB 619 707
RENGALI 554 763
LOKTAK 741 838

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

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2018	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2017-18			
						GROSS :	LIVE		Max.	DATE	Minimum	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)	(M)		(M)	
NORTHERN REGION												
1	Bhakra	1325.00	3924	513.59	445.62	8321	6516	1729.00	509.98	31.08.2017	464.39	01.04.2017
a	Bhakra Left	540.00	3924									
b	Bhakra Right	785.00										
2	Pong	396.00	1123	426.72	384.05	8053	6946	1084.00	421.72	08.09.2017	392.25931	20.06.2017
3	Chamera	540.00	1665	760.00	749.20		87		758.93	03.08.2017	750.63	08.09.2017
4	Ranjit Sagar	600.00	1507	527.91	487.91	3292	2191	390.00	523.34	09.08.2017	495.64	09.03.2018
5	Tehri	1000.00	2797	829.79	740.04	3540	2615	1291.49	824.80	30.09.2017	741.05	16.06.2017
6	Ramganga	198.00	334	366	323	2503.96	2109.25	480.80	354.23	26.11.2017	297.18	14.06.2017
7	Rana Pratap Sagar	172.00	459	352.81	343.83	2901	1569	175.66	349.35	29.09.2017	345.95	14.11.2017
8	Rihand	300.00	920	268.22	252.98	10605	5723	1177.00	264.02	02.09.17	256.89	03.07.2017
	Sub-Total NR	**4531.00**					**27756.25**					
WESTERN REGION												
9	Ukai	300.00	1080	105.16	82.30	8515	6615	813.00	99.26	1.4.2017	93.69	31.3.2018
10	Sardar Sarovar	1200.00	3635	138.68	110.18	9460	5760	1817.553	130.75	25.09.2017	105.42	01.04.2018
11	Gandhi Sagar	115.00	420	399.90	381.00	7743	6911	725.00	396.67	26.09.2017	387.43	31.03.2018
12	Bansagar	60.00	143	341.64	323.10		4934		338.97	25.09.2017	334.65	03.07.2017
13	Pench	160.00	315	490.00	464.00		1045		480.4	01.10.2017	466.63	30.06.2017
14	Indira Sagar	1000.00	1980	262.13	243.23	12237	9706	1316.12	253.94	01.11.2017	246.11	30.06.2017
15	Koyna	1636.00	3176	657.91	609.60	2797	2677	3126.00	659.40	21.09.2017	623.38	23.06.2017
a	Koyna-I & II	600.00	3030									
c	Koyna-IV	1000										
d	Koyna DPH	36	146									
16	Bhira	300	775	606.05	590.09	523	522	619	606.09	18.08.17	589.96174	23.06.2017
	Sub-Total WR	**4771.00**					**38170.33**					
SOUTHERN REGION												
17	Upper Sileru	240.00	529	414.53	406.51		88		413.74	1.09.2017	407.33	14.07.2017
18	Lower Sileru	460.00	1070	316.08	291.01		365		313.79	04.11.2016	291.45	21.05.2016
19	Srisailam	770.00	2900	269.74	243.84	8723	7166	1548.00	269.69	12.10.2017	236.16	26.05.2017
20	Nagarjuna Sagar	815.60	2393	179.83	150.89	11560	6538	1398.00	175.87	03.11.17	152.40	28.08.2017
21	Sharavathy	1035.00	4932	554.43	522.73	5310	4297	4394.00	548.40	20.10.2017	531.08	09.06.2017
22	SUPA	955.00	3927	564.00	513.50	4178	3758	3927.00	549.44	24.10.2017	530	22.06.2017
23	Almatti	290.00	483	519.60	511.10	2631.50	2628.00	175.30	519.60	01.08.2017	503.47	07.06.2017

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

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2018	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2017-18			
						GROSS :	LIVE		Max.	DATE	Minimum	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)	(M)		(M)	
24	Varahi	460.00	1060	594.36	565.10		881.50		587.57	22.10.2017	503.47	07.06.2017
25	Idukki	780.00	2398	732.40	694.94	1996	1459	2146.00	723.79	14.11.2017	701.03	23.06.2017
26	Sabirigiri	300.00	1338	981.46	908.30	454	447	764.00	970.95	06.09.2016	963.35	31.03.2017
27	Madupetty	37.50	284	1599.50	1554.48		55.32	77.40	1591.55	23.10.2016	1583.00	08.06.2016
28	Idamalayar	75.00	380	169.00	115.00		1017.80	254.45	161.28	09.11.2017	129.54	24.06.2017
29	Mettur	250.00	541	240.79	211.23	2708.80	2645.20	204.00	234.09	16.10.2017	210.21	21.05.2017
30	Periyar	161.00	409	46.33	33.53	443	299	216	39.71544	04.12.2017	33.10	31.05.2017
	Sub-Total SR	**6629.10**					**31645**					
EASTERN REGION												
31	Machkund	114.75	670	838.20	818.39	970	893	552.00	837.97	14.11.2017	824.64	01.06.2017
32	Hirakud	347.50	684	192.02	179.83	4823	4709	372.00	192.16116	15.10.2017	182.33	04.07.2017
33	Balimela	510.00	1183	462.07	438.91	3929	2676	898.00	453.2	22.10.2017	443.94	31.03.2018
34	Upper Indravati	600.00	1962	642.00	625.00	2300	1485.50	1213.14	635.97	30.09.2017	628.91	20.06.2017
35	Upper Kolab	320.00	832	858.00	844.00	1215	935.00	540	854.1	26.10.2017	848.40	24.03.2017
36	Rengali	250.00	525	123.50	109.72	3548	3167.81	275	123.79	13.10.2017	110.1	03.07.2017
	Sub-Total ER	**2142.25**					**13866**					
NORTH EASTERN REGION												
37	Loktak	105	448	768.50	766.20	435.91	396.44	250	769.60	15-07-2017	766.85	01-06-2017
	Sub-Total NER	**105**					396.44					
	Total All India	**18178.35**					**111834.35**					

CHAPTER-4

PLANNED MAINTENANCE OF HE 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 712 generating units installed in 206 Hydro Electric Stations was made available by various organizations. The studies indicate that a total of 415488 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 It is observed that capital maintenance was carried out for 34 generating units whereas annual maintenance was carried out for 269 generating units. 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. 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: 2017-18

S. No.	Type of Maintenance	Duration (Hours)	
		Max. for any unit	Average
1	Capital Maintenance	7031.45	1270.15
2	Annual Maintenance	3715.70	606.17
3	Half Yearly Maintenance	151.92	151.92
4	Quarterly Maintenance	47.58	35.42
5	Monthly Maintenance	601.00	40.29
6	Routine Maintenance	165.08	23.74
7	Renovation/ Modernization & Uprating	8460.00	1432.75
8	Civil Structure	2629.97	154.28
9	Turbine	746.00	45.01
10	Generator	4338.83	213.40
11	Other Equipment	2886.17	81.88
12	Miscellaneous planned maintenance	2933.68	71.52

4.3 There were a total of 1518 planned outages during the Year 2017-18, out of which about 59.03% were of duration up to 24 hours, while 23.65% of the planned outages were of duration 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: 2017-18

Sl. No.	Duration	Number of Outage	Maintenance % to total number of Outages
1	Less than 6 hours	440	28.99
2	6 to 24 hours	456	30.04
3	1 to 10 days	263	17.33
4	More than 10 days	359	23.65
	Total No. of Outages	**1518**	**100**

4.4 Planned Maintenance age-wise

Planned maintenance carried out for different age groups of hydro generating units during the year 2017-18 is indicated in **Table 4.3**.

TABLE 4.3

PLANNED MAINTENANCE AGE-WISE
PERIOD: 2017-18

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	2017-18	16	795.00	48	3
2	2016-2017	18	1659.00	7056	392
3	2015-2016	17	1516.00	528	31
4	2010-11 to 2014-15	63	4437.02	31224	496
5	2005-06 to 2009-10	66	7077.00	29136	441
6	2000-01 to 2004-05	75	6766.80	26544	354
7	1989-90 to 1999-2000	87	5775.70	55632	639
8	1978-79 to 1988-89	124	7259.10	51840	418
9	1967-68 to 1977-78	82	5304.75	74592	910
10	Up to 1966-67	164	4703.05	138888	847
	Total	**712**	**45293.42**	**415488**	**584**

It is seen that the average non-availability of units due to planned maintenance is relatively higher in case of older units commissioned up to 1967-68 to 1977-18 (910 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: 2017-18

Sl. No.	Type of Turbine	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	Bulb	26	684.00	12384	476
2	Francis & Reversible	412	31936.32	211248	513
3	Kaplan	129	4470.20	109056	845
4	Pelton	145	8202.90	82800	571
	Total	**712**	**45293.42**	**415488**	**584**

The average non-availability due to planned maintenance was maximum for Kaplan turbine at 845 hrs./unit followed by Pelton units at 571 hrs./unit, while it was minimum for Bulb units at 476 hrs./unit.

4.6 Analysis based on Make of Generating Units

About 49% of the installed capacity of Hydro has been sourced from indigenous suppliers with BHEL alone accounting for about 42% of the capacity. The remaining 51% has been imported from various countries like Japan, Canada, UK and France etc. The 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: 2017-18

Name of Supplier	No. of Units		Installed Capacity		Non- Availability due to Planned Maintenanace	
	No.	% of total	MW	% of total	Total Hours	Hours/ Unit
A-Indigenous						
BHEL	302	42.42	19211.02	42.41	182592	605
Others	47	6.60	2895.50	6.39	17424	371
Sub Total	**349**	**49.02**	**22106.52**	**48.81**	**200016**	**573**
B-Imported						
USA	9	1.26	351.00	0.77	6720	747
U.K.	63	8.85	1242.10	2.74	46704	741
France	33	4.63	2186.40	4.83	17592	533
Canada	44	6.18	3132.00	6.91	22824	519
USSR	26	3.65	2804.00	6.19	32736	1259
Switzerland	22	3.09	815.20	1.80	1752	80
Japan	76	10.67	6344.20	14.01	42624	561
Other	90	12.64	6312.00	13.94	44520	495
Sub Total	**363**	**50.98**	**23186.90**	**51.19**	**215472**	**594**
Total	**712**	**100.00**	**45293.42**	**100.00**	**415488**	**584**

It is observed that during the year 2016-17, average non-availability due to planned maintenance of the units supplied by BHEL was 605 hrs./unit.

Among the imported generating units, the average non-availability due to planned maintenance was the least for units supplied by Switzerland (80 hrs./unit) and was maximum for units supplied by USSR (1259 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: 2017-18

S. No.	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Planned Maintenance
1	Northern	245	18969.27	6.87
2	Western	101	7392.00	3.14
3	Southern	249	11727.70	4.71
4	Eastern	84	5862.45	6.29
5	North Eastern	33	1342.00	3.96
	All India	**712**	**45293.42**	**5.54**

The non-availability of generating unit due to planned maintenance was least in North-Western Region (3.14%) followed by North Eastern Region at 3.96%, whereas it was maximum in Northern Region (6.87 %) followed by Eastern Region (6.29%).

The average non-availability of hydro electric units due to planned maintenance during the year 2017-18 was 5.54% as compared to 6.43% during the year 2016-17.

4.8 Planned Maintenance – Station-wise

The number of H.E. Stations falling under various ranges of non-availability due to planned maintenance during the year 2017-18 vis-à-vis 2016-17 is summarized below in **Table 4.7.**

TABLE 4.7

NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2017-18 VIS-A-VIS 2016-17)

% Non-Availability due to planned maintenance	2017-18				2016-17			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	129	62.62	27397.77	60.27	116	58.00	26069.87	58.61
>5 to 10	37	17.96	10363.75	22.88	44	22.00	8947.20	20.12
>10 to 15	16	7.77	2852.70	6.30	13	6.50	2461.15	5.53
>15 to 20	12	5.83	2637.40	5.74	16	8.00	4241.40	9.54
>20 to 25	6	2.91	1086.30	2.40	3	1.50	1230.00	2.77
>25 to 30	0	0.00	0.00	0.00	2	1.00	681.00	1.53
above 30	6	2.91	955.50	2.41	6	3.00	847.80	1.91

Total	**206**	**100**	**45293.42**	**100**	**200**	100	**44478.42**	**100**

It could be seen from above that 129 nos. (62.62% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2017-18 as compared to 116 nos. (58% of total) during 2016-17.

Non-availability due to planned maintenance was more than 30% at 6 nos. (2.91% of total) H.E. Stations during 2017-18 and which is similar to 2017-18. The details of these stations for 2017-18 is given below in **Table 4.8.**

TABLE 4.8

H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE FOR THE PERIOD: (2017-18)

Sl. No	Name of Station/Utility	Capacity (MW)	N.A. due to P.M.* (%)	Reasons
1	Rajghat/MPPGCL	45.00	64.69	Annual Maintenance, Capital Maintenance.
2	Ramganga/UJVNL	198.00	39.49	Annual Maintenance for long period
3	Hirakud-I/OHPC	275.50	34.96	R&MU works
4	Kashang-I/HPPCL	65.00	33.49	Testing/Checking/Adujustment
5	Hirakud-II/OHPC	72.00	33.33	R&MU works
6	Rihand/UPJVNL	300.00	31.79	R&MU and stator winding fault

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

38% of stations had operational availability lower than 95% on account of planned maintenance alone against the normative design/plan annual availability of 95% total during the entire station life. These utilities need to improve their O&M practices to bring down their total outages i.e. planned & forced to less than 5% as per best practices.

It is observed from above that stations may be having high planned maintenance outages on account of ageing, O&M management issues, undertaking of R&M works, etc. Further, those stations which are having continuously high planned maintenance outages over past few years may be requiring major repair & maintenance works or Renovation & Modernisation (R&M) works for improving the availability, reliability & security of the plant besides providing life extension where the assets have outlived their useful life.

4.9 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 4.9**.

In case of Central Sector, non-availability due to planned maintenance was maximum under BBMB (1011.43 hrs./unit).

In case of State Sector, non-availability due to planned maintenance was maximum under UPVJNL (1892.80 hrs./unit).

In case of Private Sector, non-availability due to planned maintenance was maximum under GBHPPL (804 hrs./unit).

It is also observed that the average duration of planned maintenance in respect of H.E. Stations in Central Sector, State Sector and Private Sector is 528.46 hrs./Unit 645 hrs./Unit and 138.24 hrs./Unit respectively.

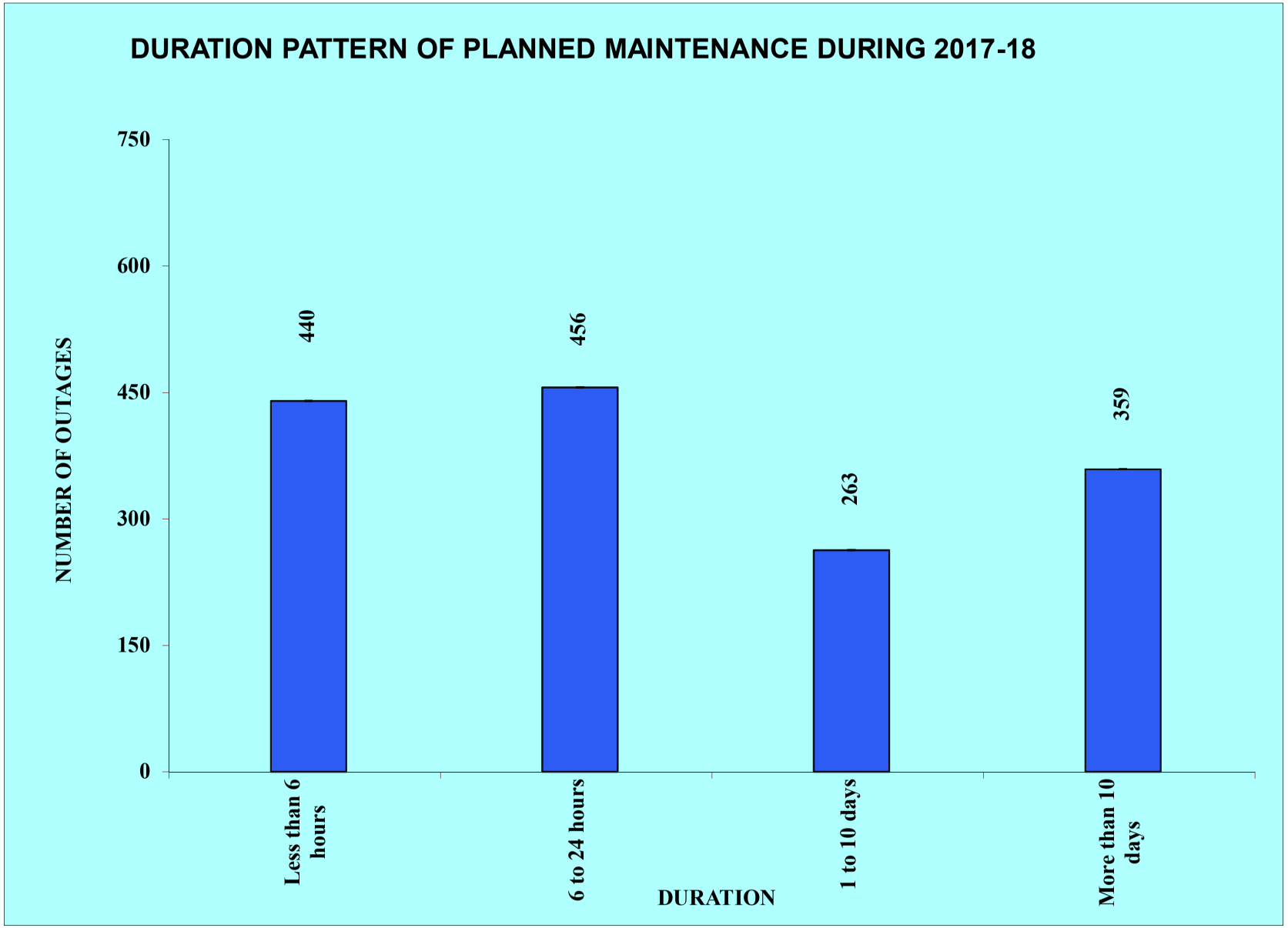
TABLE 4.9

SECTOR-WISE/ UTILITY-WISE PERFORMANCE PLANNED MAINTENANCE
PERIOD: 2017-18

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	28320	1011.43
2	DVC	5	143.20	24	4.80
3	NEEPCO.	15	815.00	8568	571.20
4	NHDC	16	1520.00	4752	297.00
5	NHPC	70	5451.20	35112	501.60
6	NTPC LTD.	4	800.00	552	138.00
7	SJVNL	12	1912.02	1992	166.00
8	THDC	8	1400.00	4176	522.00
Sub Total (CS)		**158**	**14907.72**	**83496**	**528.46**
(B)	**Private Sector**				
1	ADHPL	2	192.00	1104	552.00
2	AHPC (GVK)	4	330.00	0	0.00
3	DEPL	4	193.00	24	6.00
4	DLHP	1	34.00	0	0.00
5	E.P.P.L.	2	100.00	864	432.00
6	GBHPPL	2	70.00	1608	804.00
7	GISL	2	110.00	528	264.00
8	HBPCL	7	1300.00	2208	315.43

Sl. No.	Organization	No. of Units	Installed Capacity (MW)	Planned Maintenance (Hours)	Planned Maintenance per Unit (Hours)
9	IAEPL	3	36.00	24	8.00
10	JPPVL	4	400.00	192	48.00
11	MPCL	2	86.00	0	0.00
12	SKPPPL	2	96.00	24	12.00
13	TATA MAH.	15	447.00	336	22.40
Sub Total (Pvt.)		**50**	**3394.00**	**6912**	**138.24**
(C)	**State Sector**				
1	APGENCO	30	1336.75	1272	42.40
2	APGPCL	2	100.00	24	12.00
3	CSPGCL	3	120.00	48	16.00
4	GSECL	8	540.00	0	0.00
5	HPPCL	5	295.00	3384	676.80
6	HPSEBL	12	372.00	12936	1078.00
7	JKSPDC	12	1110.00	3336	278.00
8	JUUNL	2	130.00	0	0.00
9	KPCL	68	3585.40	50928	748.94
10	KSEBL	48	1881.50	36528	761.00
11	MSPGCL	24	2406.00	1392	58.00
12	MEPGCL	13	322.00	2712	208.62
13	MPPGCL	23	875.00	25104	1091.48
14	OHPC	31	2027.50	46008	1484.13
15	PSPCL	25	1051.00	14616	584.64
16	RRVUNL	11	411.00	4440	403.64
17	SSNNL	11	1450.00	5520	501.82
18	TNGDCL	70	2203.20	38256	546.51
19	TSGENCO	39	2835.60	1032	26.46
20	TUL	6	1200.00	2640	440.00
21	UJVNL	34	1252.15	40632	1195.06
22	UPJVNL	15	501.60	28392	1892.80
23	WBSEDCL	12	986.00	5880	490.00
Sub Total (State)		**504**	**26991.70**	**325080**	**645.00**
All India		**712**	**45293.42**	**415488**	**583.55**

EXHIBIT-4.1


DURATION PATTERN OF PLANNED MAINTENANCE DURING 2017-18
NUMBER OF OUTAGES
750
600
450
300
150
0
440
456
263
359
Less than 6 hours
6 to 24 hours
1 to 10 days
More than 10 days
DURATION

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
NORTHERN REGION							
ADHPL							
1	ALLAIN DUHANGAN HPS	1	96	01/12/2017	23/12/2017	528.27	ANNUAL MAINTENANCE
		2	96	01/01/2018	22/01/2018	514.18	ANNUAL MAINTENANCE
BBMB							
2	BHAKRA H P S	2	108	01/04/2017	07/04/2017	159	ANNUAL MAINTENANCE
		6	157	01/04/2017	17/06/2017	1861.72	CAPITAL/3 YEARLY MTCE.
3	DEHAR H P S	2	165	01/04/2017	06/06/2017	1603.47	CAPITAL/3 YEARLY MTCE.
		6	165	01/04/2017	09/07/2017	2397	RENOVATION/MODERNISATION
4	GANGUWAL HPS	1	29.25	18/12/2017	23/12/2017	126.83	ANNUAL MAINTENANCE
		2	24.2	01/04/2017	23/11/2017	5678.17	RENOVATION/MODERNISATION
		3	24.2	19/04/2017	27/04/2017	202.42	ANNUAL MAINTENANCE
		3	24.2	25/07/2017	28/07/2017	79.17	QUARTERLY MAINTENANCE
		3	24.2	22/01/2018	26/01/2018	103	QUARTERLY MAINTENANCE
5	KOTLA HPS	1	29.25	21/08/2017	23/08/2017	57.3	QUARTERLY MAINTENANCE
		2	24.2	21/02/2018	28/02/2018	178.75	ANNUAL MAINTENANCE
		2	24.2	29/05/2017	01/06/2017	81.75	QUARTERLY MAINTENANCE
		3	24.2	01/04/2017	04/12/2017	5941.72	RENOVATION/MODERNISATION
6	PONG H P S	2	66	23/05/2017	29/05/2017	151.92	HALF YEARLY MAUINTENANCE
		3	66	01/04/2017	05/04/2017	117.08	ANNUAL MAINTENANCE
		4	66	28/04/2017	15/05/2017	415.25	ANNUAL MAINTENANCE
		6	66	03/04/2017	27/04/2017	580.67	ANNUAL MAINTENANCE
		2	35	24/03/2018	29/03/2018	135	RENOVATION/MODERNISATION
		2	35	26/12/2017	08/01/2018	320	ANNUAL MAINTENANCE
		2	35	01/04/2017	26/04/2017	621.28	ANNUAL MAINTENANCE
HBPCL							
9	BASPA HPS	1	100	19/03/2018	24/03/2018	126	ANNUAL MAINTENANCE
		2	100	26/03/2018	31/03/2018	110	ANNUAL MAINTENANCE
		3	100	13/03/2018	17/03/2018	103	ANNUAL MAINTENANCE
10	KARCHAM WANGTOO HPS	1	250	28/12/2017	22/01/2018	595.63	ANNUAL MAINTENANCE
		2	250	01/12/2017	23/12/2017	549.67	ANNUAL MAINTENANCE
		3	250	26/01/2018	18/02/2018	540.9	ANNUAL MAINTENANCE
		4	250	23/10/2017	31/10/2017	192.9	ANNUAL MAINTENANCE
HPPCL							
11	KASHANG INTEGRATED HPS	1	65	11/09/2017	11/01/2018	2933.68	TESTING/CHECKING/ADJUSTMENT
HPSEB							
12	BASSI HPS	1	16.5	07/10/2017	31/12/2017	2048.32	ANNUAL MAINTENANCE
		2	16.5	06/03/2018	31/03/2018	585.42	ANNUAL MAINTENANCE
		3	16.5	08/11/2017	11/03/2018	2960.5	ANNUAL MAINTENANCE
		4	16.5	05/01/2018	28/02/2018	1293.75	ANNUAL MAINTENANCE
13	GIRI BATA HPS	1	30	26/05/2017	31/05/2017	135.48	ANNUAL MAINTENANCE
		1	30	06/12/2017	11/12/2017	116.5	ROUTINE MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	30	12/12/2017	31/12/2017	469.98	ANNUAL MAINTENANCE
14	LARJI HPS	1	42	06/02/2018	14/03/2018	870.33	ANNUAL MAINTENANCE
		1	42	01/04/2017	18/04/2017	429.58	ANNUAL MAINTENANCE
		2	42	16/03/2018	31/03/2018	351	ANNUAL MAINTENANCE
		3	42	24/11/2017	28/01/2018	1565.42	ANNUAL MAINTENANCE
15	SANJAY HPS	1	40	28/01/2018	09/03/2018	974.28	ANNUAL MAINTENANCE
		2	40	19/01/2018	25/02/2018	894.45	ANNUAL MAINTENANCE
		3	40	12/03/2018	20/03/2018	189.08	ANNUAL MAINTENANCE
JKSPDC							
16	BAGLIHAR HPS	1	150	15/02/2018	31/03/2018	1056	CAPITAL/3 YEARLY MTCE.
		2	150	15/02/2018	31/03/2018	1056	B.F.VALVE
		3	150	15/02/2018	31/03/2018	1056	B.F.VALVE
17	LOWER JHELUM HPS	3	35	01/11/2017	08/11/2017	171.58	FIREBAY/RESERVOIR
JPPVL							
18	VISHNU PRAYAG HPS	1	100	18/12/2017	20/12/2017	56.05	ANNUAL MAINTENANCE
		2	100	04/02/2018	07/02/2018	79.92	ANNUAL MAINTENANCE
NHPC							
19	BAIRA SIUL HPS	1	60	02/02/2018	12/03/2018	927.1	ANNUAL MAINTENANCE
		2	60	28/12/2017	26/01/2018	704.62	ANNUAL MAINTENANCE
		3	60	22/11/2017	23/12/2017	745.27	ANNUAL MAINTENANCE
20	CHAMERA- I HPS	1	180	17/12/2017	24/12/2017	174.88	ANNUAL MAINTENANCE
		2	180	04/01/2018	12/01/2018	198.97	ANNUAL MAINTENANCE
		3	180	05/12/2017	14/12/2017	211.02	ANNUAL MAINTENANCE
21	CHAMERA- II HPS	1	100	23/11/2017	02/12/2017	226.7	ANNUAL MAINTENANCE
		2	100	15/11/2017	21/11/2017	152.27	ANNUAL MAINTENANCE
		3	100	05/12/2017	31/12/2017	618.48	CAPITAL/3 YEARLY MTCE.
22	CHAMERA-III HPS	1	77	01/04/2017	06/04/2017	135.25	HRI/HRC/POWER CHANNEL
		1	77	02/01/2018	11/01/2018	211.58	ANNUAL MAINTENANCE
		2	77	13/01/2018	25/01/2018	279.87	ANNUAL MAINTENANCE
		2	77	01/04/2017	06/04/2017	133.1	HRI/HRC/POWER CHANNEL
		3	77	01/04/2017	06/04/2017	136.77	HRI/HRC/POWER CHANNEL
		3	77	27/01/2018	19/02/2018	550.33	CAPITAL/3 YEARLY MTCE.
23	CHUTAK HPS	1	11	19/01/2018	22/02/2018	821.48	ANNUAL MAINTENANCE
		2	11	08/12/2017	05/01/2018	669.13	ANNUAL MAINTENANCE
		3	11	25/10/2017	06/12/2017	1012.4	ANNUAL MAINTENANCE
		4	11	15/04/2017	27/04/2017	305.33	AUXILIARY SYSTEM
24	DHAULI GANGA HPS	1	70	18/11/2017	09/12/2017	510.15	ANNUAL MAINTENANCE
		2	70	12/12/2017	30/12/2017	444.58	ANNUAL MAINTENANCE
		3	70	06/03/2018	25/03/2018	447.68	ANNUAL MAINTENANCE
		4	70	06/03/2018	31/03/2018	584.48	ANNUAL MAINTENANCE
25	DULHASTI HPS	1	130	05/01/2018	18/01/2018	311.15	ANNUAL MAINTENANCE
		2	130	17/12/2017	03/01/2018	414.33	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	130	22/01/2018	08/02/2018	407.32	ANNUAL MAINTENANCE
26	NIMMO BAZGO HPS	1	15	27/10/2017	08/11/2017	310.93	ANNUAL MAINTENANCE
		2	15	23/09/2017	07/10/2017	339.42	ANNUAL MAINTENANCE
27	PARBATI-III HPS	1	130	16/12/2017	16/03/2018	2161.48	CAPITAL/3 YEARLY MTCE.
		1	130	01/04/2017	21/04/2017	498.75	PRESSURE SHAFT/PENSTOCK
		1	130	17/03/2018	27/03/2018	247.47	GENERATOR
		2	130	01/04/2017	02/05/2017	761.28	PRESSURE SHAFT/PENSTOCK
		2	130	26/02/2018	31/03/2018	782	CAPITAL/3 YEARLY MTCE.
		3	130	27/11/2017	16/12/2017	464.53	ANNUAL MAINTENANCE
		4	130	08/11/2017	27/11/2017	464.48	ANNUAL MAINTENANCE
28	SALAL HPS	1	115	28/09/2017	13/10/2017	370.13	ANNUAL MAINTENANCE
		2	115	30/10/2017	16/11/2017	410.78	ANNUAL MAINTENANCE
		3	115	13/11/2017	22/11/2017	228.75	ANNUAL MAINTENANCE
		4	115	02/12/2017	20/01/2018	1178.07	CAPITAL/3 YEARLY MTCE.
		5	115	29/01/2018	10/03/2018	970.18	ANNUAL MAINTENANCE
		6	115	01/04/2017	14/04/2017	330.38	CAPITAL/3 YEARLY MTCE.
		6	115	09/10/2017	23/10/2017	345.57	ANNUAL MAINTENANCE
29	SEWA-II HPS	1	40	15/11/2017	28/11/2017	319.43	ANNUAL MAINTENANCE
		2	40	30/11/2017	12/12/2017	300.55	ANNUAL MAINTENANCE
		3	40	18/12/2017	27/12/2017	226.7	ANNUAL MAINTENANCE
30	TANAKPUR HPS	1	31.4	01/04/2017	19/04/2017	447.97	ANNUAL MAINTENANCE
		2	31.4	29/12/2017	31/03/2018	2194	CAPITAL MAINTENANCE
		3	31.4	15/11/2017	26/12/2017	991.12	ANNUAL MAINTENANCE
31	URI-I HPS	1	120	01/12/2017	27/12/2017	629.8	CAPITAL MAINTENANCE
		2	120	26/12/2017	22/01/2018	653.92	CAPITAL/3 YEARLY MTCE.
		3	120	02/11/2017	18/11/2017	396.25	ANNUAL MAINTENANCE
		4	120	17/11/2017	04/12/2017	419.37	ANNUAL MAINTENANCE
32	URI-II HPS	1	60	15/11/2017	06/12/2017	527.98	ANNUAL MAINTENANCE
		2	60	12/01/2018	24/01/2018	296.68	ANNUAL MAINTENANCE
		3	60	21/12/2017	10/01/2018	490.6	ANNUAL MAINTENANCE
		4	60	08/12/2017	19/12/2017	273	ANNUAL MAINTENANCE
NTPC Ltd.							
33	KOLDAM HPS	1	200	08/03/2018	14/03/2018	147.88	ANNUAL MAINTENANCE
		1	200	16/01/2018	21/01/2018	112.93	ANNUAL MAINTENANCE
		2	200	22/02/2018	24/02/2018	65.12	ANNUAL MAINTENANCE
		3	200	08/03/2018	14/03/2018	159.88	ANNUAL MAINTENANCE
		4	200	22/03/2018	24/03/2018	63.02	ANNUAL MAINTENANCE
PSPCL							
34	ANANDPUR SAHIB HPS	2	33.5	04/04/2017	30/04/2017	637.82	ANNUAL MAINTENANCE
		3	33.5	03/04/2017	28/04/2017	601	MONTHLY MAINTENANCE
35	MUKERIAN HPS	1	15	01/04/2017	14/04/2017	326.17	ANNUAL MAINTENANCE
		10	19.5	01/04/2017	22/07/2017	2701.08	RENOVATION/MODERNISATION

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		11	19.5	26/03/2018	31/03/2018	108.93	ANNUAL MAINTENANCE
		12	19.5	01/04/2017	27/04/2017	627.83	ANNUAL MAINTENANCE
		2	15	16/04/2017	06/05/2017	484	ANNUAL MAINTENANCE
		3	15	09/05/2017	27/05/2017	435.13	ANNUAL MAINTENANCE
		3	15	26/03/2018	31/03/2018	110.63	ANNUAL MAINTENANCE
		4	15	11/05/2017	30/05/2017	465.17	ANNUAL MAINTENANCE
		6	15	26/03/2018	31/03/2018	110.03	ANNUAL MAINTENANCE
		6	15	01/04/2017	16/04/2017	377.42	ANNUAL MAINTENANCE
		7	19.5	12/04/2017	27/05/2017	1087.25	ANNUAL MAINTENANCE
		8	19.5	29/05/2017	14/06/2017	390.77	ANNUAL MAINTENANCE
		9	19.5	25/03/2018	31/03/2018	121.17	ANNUAL MAINTENANCE
		9	19.5	01/04/2017	20/04/2017	474.67	ANNUAL MAINTENANCE
36	RANJIT SAGAR HPS	1	150	20/11/2017	02/01/2018	1029.75	ANNUAL MAINTENANCE
		2	150	08/01/2018	07/02/2018	724.83	ANNUAL MAINTENANCE
		3	150	13/02/2018	30/03/2018	1082.75	ANNUAL MAINTENANCE
		4	150	02/04/2017	10/05/2017	910.52	ANNUAL MAINTENANCE
37	SHANAN HPS	1	15	03/10/2017	27/10/2017	576.33	ANNUAL MAINTENANCE
		2	15	28/10/2017	31/10/2017	85.15	ANNUAL MAINTENANCE
		3	15	03/04/2017	05/04/2017	59.67	RUNNER REPAIR /REPLACEMENT
		4	15	01/01/2018	11/01/2018	251.33	ANNUAL MAINTENANCE
		4	15	03/10/2017	31/10/2017	686.98	ANNUAL MAINTENANCE
		5	50	17/04/2017	24/04/2017	176.75	TESTING/CHECKING/ADJUSTMENT
RRVUNL							
38	JAWAHAR SAGAR HPS	1	33	11/05/2017	24/05/2017	319.25	ANNUAL MAINTENANCE
		2	33	01/06/2017	15/06/2017	343.75	ANNUAL MAINTENANCE
		3	33	11/04/2017	03/05/2017	537	ANNUAL MAINTENANCE
39	MAHI BAJAJ HPS	1	25	01/05/2017	27/07/2017	2087.33	ANNUAL MAINTENANCE
40	R P SAGAR HPS	1	43	01/04/2017	17/04/2017	388.67	ANNUAL MAINTENANCE
		2	43	20/04/2017	04/05/2017	336.68	ANNUAL MAINTENANCE
		3	43	27/05/2017	03/06/2017	172.87	ANNUAL MAINTENANCE
		4	43	12/05/2017	24/05/2017	289	ANNUAL MAINTENANCE
SJVNL							
41	NATHPA JHAKRI HPS	1	250	16/02/2018	21/02/2018	107.98	ANNUAL MAINTENANCE
		2	250	23/02/2018	01/03/2018	139.23	ANNUAL MAINTENANCE
		3	250	06/02/2018	11/02/2018	105.98	ANNUAL MAINTENANCE
		4	250	28/01/2018	02/02/2018	120.75	ANNUAL MAINTENANCE
		5	250	06/01/2018	11/01/2018	141	ANNUAL MAINTENANCE
		6	250	15/01/2018	20/01/2018	102.98	ANNUAL MAINTENANCE
42	RAMPUR HPS	1	68.67	23/02/2018	05/03/2018	234.98	ANNUAL MAINTENANCE
		2	68.67	15/01/2018	23/01/2018	176.9	ANNUAL MAINTENANCE
		3	68.67	06/01/2018	14/01/2018	201	ANNUAL MAINTENANCE
		4	68.67	06/02/2018	11/02/2018	120.98	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	68.67	18/02/2018	21/02/2018	65.48	B.F.VALVE
		5	68.67	28/01/2018	04/02/2018	178.48	ANNUAL MAINTENANCE
		6	68.67	16/02/2018	21/02/2018	121.48	ANNUAL MAINTENANCE
THDC							
43	KOTESHWAR HPS	2	100	23/10/2017	19/11/2017	651.92	ANNUAL MAINTENANCE
		3	100	20/11/2017	14/12/2017	582.25	ANNUAL MAINTENANCE
		4	100	01/04/2017	18/04/2017	423.33	ANNUAL MAINTENANCE
44	TEHRI ST-1 HPS	1	250	17/04/2017	05/05/2017	437	ANNUAL MAINTENANCE
		2	250	01/04/2017	17/04/2017	403.75	ANNUAL MAINTENANCE
		3	250	04/03/2018	19/03/2018	369.5	ANNUAL MAINTENANCE
		3	250	15/05/2017	08/06/2017	587.25	PLANNED MAINTENANCE
		4	250	01/05/2017	21/05/2017	490.25	ANNUAL MAINTENANCE
		4	250	20/03/2018	31/03/2018	255	ANNUAL MAINTENANCE
UJVNL							
45	CHIBRO (YAMUNA) HPS	2	60	01/04/2017	12/06/2017	1749.58	CAPITAL/3 YEARLY MTCE.
		4	60	30/10/2017	23/11/2017	580	ANNUAL MAINTENANCE
46	CHILLA HPS	1	36	03/05/2017	28/05/2017	590.58	ANNUAL MAINTENANCE
		1	36	01/01/2018	04/01/2018	92.08	ANNUAL MAINTENANCE
		2	36	25/01/2018	31/03/2018	1541.83	CAPITAL/3 YEARLY MTCE.
		3	36	08/01/2018	14/02/2018	889.67	ANNUAL MAINTENANCE
		4	36	03/11/2017	09/12/2017	874.5	ANNUAL MAINTENANCE
		4	36	01/04/2017	30/04/2017	719.42	ANNUAL MAINTENANCE
47	DHAKRANI HPS	3	11.25	08/12/2017	20/01/2018	1043.58	ANNUAL MAINTENANCE
		3	11.25	01/04/2017	27/04/2017	640.83	ANNUAL MAINTENANCE
48	DHALIPUR HPS	1	17	01/04/2017	01/05/2017	720.58	CAPITAL/3 YEARLY MTCE.
		2	17	01/04/2017	19/07/2017	2616.33	RENOVATION/MODERNISATION
		2	17	23/01/2018	31/01/2018	205.98	ANNUAL MAINTENANCE
49	KHODRI HPS	1	30	01/04/2017	18/04/2017	422.08	ANNUAL MAINTENANCE
		2	30	01/04/2017	02/08/2017	2954.25	CAPITAL/3 YEARLY MTCE.
		3	30	17/11/2017	12/12/2017	610.75	ANNUAL MAINTENANCE
		4	30	19/12/2017	10/01/2018	534.92	ANNUAL MAINTENANCE
50	KULHAL HPS	1	10	01/04/2017	04/07/2017	2271.75	CAPITAL/3 YEARLY MTCE.
		2	10	01/04/2017	25/04/2017	594.25	ANNUAL MAINTENANCE
		3	10	01/04/2017	26/04/2017	612.25	ANNUAL MAINTENANCE
51	MANERI BHALI - I HPS	1	30	01/08/2017	22/08/2017	523.08	ANNUAL MAINTENANCE
		1	30	01/04/2017	30/06/2017	2183.98	RENOVATION/MODERNISATION
		2	30	01/08/2017	21/08/2017	496.08	ANNUAL MAINTENANCE
		3	30	01/08/2017	21/08/2017	501.42	ANNUAL MAINTENANCE
		3	30	01/04/2017	11/04/2017	241.5	ANNUAL MAINTENANCE
52	MANERI BHALI - II HPS	1	76	01/04/2017	15/04/2017	356.17	ANNUAL MAINTENANCE
53	RAMGANGA HPS	1	66	29/05/2017	18/10/2017	3420.33	ANNUAL MAINTENANCE
		2	66	29/05/2017	23/10/2017	3539.25	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	66	29/05/2017	18/10/2017	3419.08	ANNUAL MAINTENANCE
UPJVNL							
54	KHARA HPS	1	24	10/01/2018	17/02/2018	910.67	ANNUAL MAINTENANCE
		2	24	25/04/2017	05/05/2017	239	ANNUAL MAINTENANCE
		3	24	01/04/2017	25/04/2017	594.92	ANNUAL MAINTENANCE
		3	24	19/02/2018	26/03/2018	832.75	ANNUAL MAINTENANCE
55	OBRA HPS	3	33	25/11/2017	14/12/2017	466.42	TESTING/CHECKING/ADJUSTMENT
56	RIHAND HPS	1	50	01/04/2017	05/05/2017	827	RENOVATION/MODERNISATION
		2	50	01/04/2017	19/03/2018	8460	RENOVATION/MODERNISATION
		3	50	20/04/2017	24/05/2017	837.17	ANNUAL MAINTENANCE
		4	50	01/04/2017	28/09/2017	4338.83	STATOR WINDING REOPAIL/CLEANING
		6	50	01/04/2017	03/07/2017	2243	RENOVATION/MODERNISATION
WESTERN REGION							
MAHAGENCO							
57	KOYNA-II HPS	1	80	12/10/2017	14/10/2017	61.5	PRESSURE SHAFT/PENSTOCK
		2	80	12/10/2017	14/10/2017	61.42	PRESSURE SHAFT/PENSTOCK
58	KOYNA-IV HPS	1	250	01/04/2017	20/04/2017	467.92	ANNUAL MAINTENANCE
59	VAITARNA HPS	1	60	09/11/2017	10/12/2017	751.58	ANNUAL MAINTENANCE
MPPGCL							
60	BANSAGAR TONS-I HPS	2	105	10/04/2017	14/05/2017	820.25	ANNUAL MAINTENANCE
		2	105	26/07/2017	07/08/2017	291.5	PRESSURE SHAFT/PENSTOCK
		3	105	01/06/2017	22/06/2017	523.5	ANNUAL MAINTENANCE
		3	105	26/07/2017	31/07/2017	140.25	PRESSURE SHAFT/PENSTOCK
61	BANSAGAR TONS-II HPS	1	15	14/05/2017	31/05/2017	418.42	ANNUAL MAINTENANCE
		2	15	16/04/2017	10/05/2017	575.83	ANNUAL MAINTENANCE
62	BANSAGAR TONS-III HPS	1	20	30/04/2017	17/05/2017	412.83	ANNUAL MAINTENANCE
		2	20	13/04/2017	03/05/2017	488.33	ANNUAL MAINTENANCE
63	BARGI HPS	1	45	28/06/2017	22/07/2017	583	PLANNED MAINTENANCE
		2	45	25/05/2017	31/05/2017	146.98	CAPITAL/3 YEARLY MTCE.
		2	45	01/06/2017	26/06/2017	613.92	ANNUAL MAINTENANCE
64	GANDHI SAGAR HPS	2	23	01/06/2017	24/06/2017	561.17	ANNUAL MAINTENANCE
		4	23	30/06/2017	14/07/2017	344.83	ANNUAL MAINTENANCE
		5	23	05/05/2017	29/05/2017	578.25	CAPITAL/3 YEARLY MTCE.
65	MADHIKHERA HPS	1	20	16/05/2017	03/06/2017	431.83	ANNUAL MAINTENANCE
		2	20	12/04/2017	27/04/2017	357	ANNUAL MAINTENANCE
		3	20	03/05/2017	18/05/2017	360	CAPITAL/3 YEARLY MTCE.
66	PENCH HPS	1	80	01/06/2017	25/06/2017	578.58	ANNUAL MAINTENANCE
67	RAJGHAT HPS	1	15	01/04/2017	18/01/2018	7031.45	CAPITAL/3 YEARLY MTCE.
		3	15	07/06/2017	22/08/2017	1833.1	SURGE SHAFT TRT MTc./INSPECTION/REPAIR/ MTCE
NHDC							
68	INDIRA SAGAR HPS	2	125	27/03/2018	31/03/2018	87	ANNUAL MAINTENANCE
		3	125	15/06/2017	05/07/2017	490.75	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	125	01/04/2017	08/04/2017	187.5	ANNUAL MAINTENANCE
		5	125	10/04/2017	28/04/2017	441	ANNUAL MAINTENANCE
		5	125	03/03/2018	16/03/2018	314	ANNUAL MAINTENANCE
		6	125	17/03/2018	26/03/2018	225	ANNUAL MAINTENANCE
		6	125	29/04/2017	15/05/2017	393	ANNUAL MAINTENANCE
		7	125	17/05/2017	25/05/2017	204.17	PLANNED MAINTENANCE
		8	125	27/03/2018	31/03/2018	87	ANNUAL MAINTENANCE
		8	125	26/05/2017	14/06/2017	467	ANNUAL MAINTENANCE
69	OMKARESHWAR HPS	1	65	02/05/2017	17/05/2017	367	ANNUAL MAINTENANCE
		2	65	18/05/2017	01/06/2017	333	ANNUAL MAINTENANCE
		3	65	18/04/2017	01/05/2017	319	ANNUAL MAINTENANCE
		4	65	06/04/2017	17/04/2017	273.25	ANNUAL MAINTENANCE
		7	65	16/03/2018	30/03/2018	350.42	ANNUAL MAINTENANCE
		8	65	01/03/2018	14/03/2018	318.58	ANNUAL MAINTENANCE
SSNNL							
70	S SAROVAR CHPH HPS	1	50	20/03/2018	31/03/2018	254.5	ANNUAL MAINTENANCE
		2	50	27/02/2018	19/03/2018	488.5	ANNUAL MAINTENANCE
		2	50	01/04/2017	04/04/2017	82.83	ANNUAL MAINTENANCE
		3	50	16/01/2018	02/02/2018	418	ANNUAL MAINTENANCE
		3	50	27/04/2017	11/05/2017	351	ANNUAL MAINTENANCE
		4	50	15/05/2017	30/05/2017	369.25	ANNUAL MAINTENANCE
		5	50	07/02/2018	21/02/2018	348	ANNUAL MAINTENANCE
		5	50	05/04/2017	21/04/2017	391	ANNUAL MAINTENANCE
71	S SAROVAR RBPH HPS	1	200	01/04/2017	20/04/2017	472.75	ANNUAL MAINTENANCE
		1	200	20/01/2018	09/02/2018	489	ANNUAL MAINTENANCE
		2	200	14/02/2018	06/03/2018	488.75	ANNUAL MAINTENANCE
		3	200	09/03/2018	29/03/2018	487	ANNUAL MAINTENANCE
		5	200	01/12/2017	21/12/2017	493	ANNUAL MAINTENANCE
		6	200	26/12/2017	16/01/2018	513	ANNUAL MAINTENANCE
TATA MAH.							
72	BHIRA HPS	6	25	21/02/2018	28/02/2018	181.87	CAPITAL/3 YEARLY MTCE.
73	BHIRA PSS HPS	1	150	30/01/2018	06/02/2018	165.08	ROUTINE MAINTENANCE
SOUTHERN REGION							
APGENCO							
74	HAMPI HPS	1	9	02/01/2018	08/01/2018	146.67	OTHER EQUIPMENT
75	T B DAM HPS	3	9	07/02/2018	12/02/2018	116.83	GENERATOR
		3	9	24/02/2018	27/02/2018	65.25	TESTING/CHECKING/ADJUSTMENT
		3	9	12/02/2018	16/02/2018	96	TESTING/CHECKING/ADJUSTMENT
76	UPPER SILERU HPS	1	60	14/07/2017	08/08/2017	600.1	B.F.VALVE
		4	60	01/04/2017	08/04/2017	187.25	SWITCHING EQUIPMENT
KPCL							
77	ALMATTI DPH HPS	2	55	01/04/2017	30/04/2017	719.98	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	55	01/05/2017	08/05/2017	191.98	ANNUAL MAINTENANCE
		3	55	01/05/2017	08/05/2017	191.98	ANNUAL MAINTENANCE
		3	55	01/04/2017	30/04/2017	719.98	ANNUAL MAINTENANCE
		4	55	01/04/2017	30/04/2017	719.98	ANNUAL MAINTENANCE
		4	55	01/05/2017	08/05/2017	191.98	ANNUAL MAINTENANCE
		5	55	01/07/2017	04/07/2017	88.5	ANNUAL MAINTENANCE
		5	55	02/06/2017	30/06/2017	681.98	ANNUAL MAINTENANCE
		5	55	01/04/2017	30/04/2017	719.98	ANNUAL MAINTENANCE
		5	55	01/05/2017	08/05/2017	191.98	ANNUAL MAINTENANCE
		5	55	11/05/2017	13/05/2017	51.38	ANNUAL MAINTENANCE
		6	55	06/06/2017	12/06/2017	149.12	ANNUAL MAINTENANCE
		6	55	01/05/2017	08/05/2017	191.98	ANNUAL MAINTENANCE
		6	55	01/04/2017	30/04/2017	719.98	ANNUAL MAINTENANCE
78	BHADRA HPS	1	2	03/10/2017	31/01/2018	2886.17	OTHER EQUIPMENT
		1	2	01/07/2017	31/07/2017	743.98	RENOVATION/MODERNISATION
		5	6	01/06/2017	30/06/2017	719.98	GENERATOR
		5	6	14/10/2017	31/01/2018	2629.97	PRESSURE SHAFT/PENSTOCK
		5	6	01/10/2017	14/10/2017	322	TURBINE MISC/GOVERNOR
79	GHAT PRABHA HPS	1	16	22/05/2017	11/08/2017	1955.75	ANNUAL MAINTENANCE
		2	16	02/06/2017	01/08/2017	1439.5	ANNUAL MAINTENANCE
80	JOG HPS	1	13.2	24/10/2017	31/10/2017	182.98	RENOVATION/MODERNISATION
		1	13.2	01/11/2017	31/12/2017	1463.98	RENOVATION/MODERNISATION
		2	13.2	24/10/2017	31/10/2017	182.9	RENOVATION/MODERNISATION
		2	13.2	10/11/2017	30/11/2017	492.65	RENOVATION/MODERNISATION
		3	13.2	04/09/2017	13/09/2017	207.17	OTHER EQUIPMENT
		3	13.2	24/10/2017	31/10/2017	182.82	RENOVATION/MODERNISATION
		3	13.2	01/11/2017	31/12/2017	1463.98	RENOVATION/MODERNISATION
		4	13.2	01/11/2017	22/11/2017	519.5	RENOVATION/MODERNISATION
		4	13.2	24/10/2017	31/10/2017	182.82	RENOVATION/MODERNISATION
		5	21.6	29/05/2017	31/05/2017	62.65	PRESSURE SHAFT/PENSTOCK
		6	21.6	21/06/2017	27/06/2017	147	TURBINE MISC/GOVERNOR
		6	21.6	14/07/2017	19/07/2017	118.75	TURBINE MISC/GOVERNOR
81	KALINADI HPS	1	135	12/03/2018	29/03/2018	408	TURBINE MISC/GOVERNOR
		1	135	17/11/2017	25/11/2017	193.92	SURGE SHAFT
		2	135	25/10/2017	27/10/2017	54.5	GENERATOR
		2	135	17/11/2017	25/11/2017	193.92	SURGE SHAFT
82	SHARAVATHI HPS	10	103.5	09/12/2017	12/12/2017	79.97	TURBINE MISC/GOVERNOR
		10	103.5	08/02/2018	28/02/2018	486.13	RENOVATION/MODERNISATION
		3	103.5	29/07/2017	31/07/2017	62.12	OTHER EQUIPMENT
		5	103.5	10/06/2017	13/06/2017	68.5	GENERATOR
		5	103.5	01/02/2018	03/02/2018	55.95	PRESSURE SHAFT/PENSTOCK

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	103.5	01/06/2017	10/06/2017	232.38	GENERATOR
		6	103.5	04/08/2017	08/08/2017	104.13	AUXILIARY SYSTEM
		7	103.5	04/12/2017	04/01/2018	746	TURBINE MISC/GOVERNOR
		7	103.5	15/07/2017	28/07/2017	320.52	OTHER EQUIPMENT
		8	103.5	27/01/2018	29/01/2018	55.52	PRESSURE SHAFT/PENSTOCK
		8	103.5	26/10/2017	01/11/2017	143.58	PRESSURE SHAFT/PENSTOCK
		8	103.5	01/06/2017	30/06/2017	719.98	GENERATOR
		8	103.5	01/08/2017	31/08/2017	743.98	GENERATOR
		8	103.5	01/07/2017	31/07/2017	743.98	GENERATOR
		9	103.5	09/12/2017	11/12/2017	52.65	GENERATOR
		9	103.5	19/03/2018	30/03/2018	270.53	OTHER EQUIPMENT
83	VARAHI HPS	1	115	04/08/2017	09/09/2017	855.1	B.F.VALVE
		2	115	04/08/2017	06/09/2017	787.3	B.F.VALVE
KSEB							
84	IDAMALAYAR HPS.	1	37.5	27/06/2017	26/07/2017	704.73	PLANNED MAINTENANCE
		2	37.5	10/10/2017	09/11/2017	720	ANNUAL MAINTENANCE
85	IDUKKI HPS.	1	130	27/06/2017	29/07/2017	784.88	PLANNED MAINTENANCE
		1	130	18/09/2017	22/09/2017	105.8	RENOVATION/MODERNISATION
		1	130	23/01/2018	25/01/2018	59.87	MONTHLY MAINTENANCE
		1	130	06/09/2017	08/09/2017	66.53	RENOVATION/MODERNISATION
		1	130	21/11/2017	25/11/2017	94.58	TURBINE MISC/GOVERNOR
		2	130	08/11/2017	08/12/2017	729.17	PLANNED MAINTENANCE
		4	130	20/12/2017	18/01/2018	711.37	ANNUAL MAINTENANCE
		5	130	01/08/2017	03/08/2017	50.85	MONTHLY MAINTENANCE
		6	130	09/12/2017	11/12/2017	55.12	CAPITAL/3 YEARLY MTCE.
		6	130	04/08/2017	31/08/2017	651.05	ANNUAL MAINTENANCE
86	KAKKAD HPS.	1	25	20/05/2017	10/06/2017	521.12	OTHER EQUIPMENT
		2	25	01/01/2018	31/01/2018	724.35	ANNUAL MAINTENANCE
87	KUTTIYADI HPS.	1	25	13/04/2017	22/04/2017	219	OTHER EQUIPMENT
		1	25	26/02/2018	29/03/2018	749.25	ANNUAL MAINTENANCE
		2	25	03/01/2018	23/02/2018	1234.08	ANNUAL MAINTENANCE
		3	25	04/12/2017	30/12/2017	629.93	ANNUAL MAINTENANCE
		3	25	25/01/2018	28/01/2018	75.25	MONTHLY MAINTENANCE
		3	25	23/02/2018	25/02/2018	51.67	MONTHLY MAINTENANCE
88	KUTTIYADI ADDL. EXTN. HPS	5	50	08/05/2017	05/06/2017	681.12	ANNUAL MAINTENANCE
		6	50	06/04/2017	30/04/2017	585	ANNUAL MAINTENANCE
		6	50	01/11/2017	01/12/2017	724.6	ANNUAL MAINTENANCE
89	LOWER PERIYAR HPS.	1	60	01/04/2017	27/04/2017	637.5	ANNUAL MAINTENANCE
90	NARIAMANGLAM HPS	3	15	02/05/2017	01/06/2017	712.27	ANNUAL MAINTENANCE
91	PALLIVASAL HPS.	1	5	05/11/2017	11/11/2017	138.13	B.F.VALVE
		1	5	16/05/2017	31/05/2017	365.48	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	5	05/11/2017	12/11/2017	159.88	B.F.VALVE
		2	5	01/04/2017	12/04/2017	281.63	ANNUAL MAINTENANCE
		2	5	01/02/2018	28/02/2018	656.85	ANNUAL MAINTENANCE
		3	5	05/11/2017	12/11/2017	162.77	B.F.VALVE
		3	5	20/04/2017	08/05/2017	440.52	ANNUAL MAINTENANCE
		4	7.5	05/11/2017	11/11/2017	137.47	B.F.VALVE
		4	7.5	08/01/2018	31/01/2018	556.75	ANNUAL MAINTENANCE
		5	7.5	02/03/2018	27/03/2018	607.77	ANNUAL MAINTENANCE
		5	7.5	05/11/2017	11/11/2017	138.82	B.F.VALVE
		6	7.5	01/12/2017	29/12/2017	679.3	ANNUAL MAINTENANCE
		6	7.5	05/11/2017	11/11/2017	137.6	B.F.VALVE
92	PANNIAR HPS.	1	15	19/04/2017	18/05/2017	691.6	ANNUAL MAINTENANCE
93	PORINGALKUTTU HPS.	1	8	18/01/2018	21/02/2018	826.32	ANNUAL MAINTENANCE
		2	8	27/05/2017	12/06/2017	396.42	ANNUAL MAINTENANCE
		4	8	19/04/2017	24/05/2017	848	ANNUAL MAINTENANCE
		4	8	26/02/2018	27/03/2018	703.42	ANNUAL MAINTENANCE
94	SABARIGIRI HPS.	1	50	01/11/2017	23/12/2017	1234.17	ANNUAL MAINTENANCE
		2	50	26/12/2017	07/02/2018	1028.85	ANNUAL MAINTENANCE
		3	50	09/03/2018	24/03/2018	366.05	TURBINE MISC/GOVERNOR
		3	50	04/10/2017	13/11/2017	968.05	ANNUAL MAINTENANCE
		4	50	31/05/2017	04/06/2017	91.4	ANNUAL MAINTENANCE
		4	50	11/06/2017	13/07/2017	762.57	ANNUAL MAINTENANCE
		4	50	18/04/2017	22/04/2017	105.85	MONTHLY MAINTENANCE
		5	50	14/07/2017	08/09/2017	1349.12	ANNUAL MAINTENANCE
		6	50	07/02/2018	09/03/2018	726.18	ANNUAL MAINTENANCE
95	SENGULAM HPS.	1	12	01/04/2017	29/04/2017	689.93	ANNUAL MAINTENANCE
		2	12	02/05/2017	06/06/2017	849.77	ANNUAL MAINTENANCE
		3	12	30/12/2017	31/01/2018	760.32	ANNUAL MAINTENANCE
96	SHOLAYAR HPS.	2	18	01/07/2017	06/09/2017	1617.35	ANNUAL MAINTENANCE
TNGDCL							
97	BHAWANI BARRAGE- III HPS	1	15	01/04/2017	03/07/2017	2255.98	CAPITAL/3 YEARLY MTCE.
		2	15	01/04/2017	03/07/2017	2255.98	CAPITAL/3 YEARLY MTCE.
98	BHAWANI KATTAL	1	15	01/02/2018	20/02/2018	464	ANNUAL MAINTENANCE
		1	15	01/04/2017	14/08/2017	3251.7	ANNUAL MAINTENANCE
		2	15	01/04/2017	15/04/2017	352.67	ANNUAL MAINTENANCE
		2	15	26/06/2017	03/07/2017	178	ANNUAL MAINTENANCE
99	KUNDAH HPS.	12	50	24/01/2018	22/02/2018	702.08	ANNUAL MAINTENANCE
		15	20	04/02/2018	08/02/2018	109.08	MONTHLY MAINTENANCE
		6	35	27/06/2017	01/08/2017	848.83	ANNUAL MAINTENANCE
		8	35	21/01/2018	21/03/2018	1426.67	CAPITAL/3 YEARLY MTCE.
		9	60	29/06/2017	20/07/2017	507.08	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
100	LOWER METTUR HPS.	1	15	01/04/2017	19/04/2017	449	ANNUAL MAINTENANCE
		1	15	23/05/2017	10/06/2017	440.08	ANNUAL MAINTENANCE
		2	15	16/04/2017	05/05/2017	464.5	ANNUAL MAINTENANCE
		2	15	23/05/2017	10/06/2017	440.08	ANNUAL MAINTENANCE
		3	15	04/05/2017	22/05/2017	437.17	ANNUAL MAINTENANCE
		3	15	20/07/2017	24/07/2017	119.98	CAPITAL/3 YEARLY MTCE.
		4	15	04/05/2017	22/05/2017	437.17	ANNUAL MAINTENANCE
		4	15	01/04/2017	11/04/2017	256.5	ANNUAL MAINTENANCE
		4	15	19/07/2017	24/07/2017	129.75	CAPITAL/3 YEARLY MTCE.
		7	15	01/04/2017	14/04/2017	329	ANNUAL MAINTENANCE
		8	15	01/04/2017	14/04/2017	329	ANNUAL MAINTENANCE
101	METTUR DAM HPS.	1	12.5	01/02/2018	28/02/2018	652.67	ANNUAL MAINTENANCE
		3	12.5	01/03/2018	28/03/2018	653	ANNUAL MAINTENANCE
102	METTUR TUNNEL HPS.	1	50	01/02/2018	20/02/2018	464.75	CAPITAL/3 YEARLY MTCE.
		1	50	01/04/2017	31/05/2017	1456.5	ANNUAL MAINTENANCE
		1	50	12/06/2017	16/06/2017	100	CAPITAL/3 YEARLY MTCE.
		2	50	21/02/2018	12/03/2018	464.92	ANNUAL MAINTENANCE
		2	50	17/06/2017	24/06/2017	174.17	CAPITAL/3 YEARLY MTCE.
		2	50	04/05/2017	31/05/2017	664.5	ANNUAL MAINTENANCE
		2	50	01/04/2017	30/04/2017	719.98	ANNUAL MAINTENANCE
		3	50	01/04/2017	31/05/2017	1456.5	ANNUAL MAINTENANCE
		3	50	27/06/2017	03/07/2017	147.08	CAPITAL/3 YEARLY MTCE.
		3	50	13/03/2018	31/03/2018	422.75	PLANNED MAINTENANCE
		4	50	04/07/2017	11/07/2017	175	CAPITAL/3 YEARLY MTCE.
		4	50	01/04/2017	31/05/2017	1456.5	ANNUAL MAINTENANCE
103	MOYAR HPS	1	12	10/05/2017	13/05/2017	80.67	STATOR
104	PAPANASAM HPS.	3	8	03/04/2017	29/04/2017	625.42	ANNUAL MAINTENANCE
		4	8	03/05/2017	29/05/2017	623.83	ANNUAL MAINTENANCE
105	PERIYAR HPS.	1	42	15/03/2018	31/03/2018	375.5	ANNUAL MAINTENANCE
		2	42	01/04/2017	18/04/2017	424	ANNUAL MAINTENANCE
		3	42	10/04/2017	09/05/2017	703	ANNUAL MAINTENANCE
		4	35	01/04/2017	24/09/2017	4246.98	CAPITAL/3 YEARLY MTCE.
		4	35	02/03/2018	31/03/2018	696	ANNUAL MAINTENANCE
		4	35	24/09/2017	12/12/2017	1889.83	RENOVATION/MODERNISATION
106	PYKARA ULTMATE HPS.	1	50	28/10/2017	30/10/2017	59.17	PLANNED MAINTENANCE
		2	50	07/10/2017	11/10/2017	98	MONTHLY MAINTENANCE
		3	50	03/06/2017	16/09/2017	2526.08	CAPITAL/3 YEARLY MTCE.
107	SURULIYAR HPS.	1	35	20/12/2017	26/12/2017	140.58	TURBINE
		1	35	02/05/2017	09/06/2017	921.5	ANNUAL MAINTENANCE
TSGENCO							
108	NAGARJUN SGR HPS	6	100.8	01/06/2017	09/07/2017	908.98	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
EASTERN REGION							
GIPL							
109	CHUZACHEN HPS	1	55	06/02/2018	17/02/2018	287.98	ANNUAL MAINTENANCE
		2	55	06/02/2018	17/02/2018	287.98	ANNUAL MAINTENANCE
NHPC							
110	RANGIT HPS	1	20	16/01/2018	05/02/2018	486.58	ANNUAL MAINTENANCE
		2	20	09/02/2018	01/03/2018	479.13	ANNUAL MAINTENANCE
		3	20	19/12/2017	12/01/2018	596.17	ANNUAL MAINTENANCE
111	TEESTA LOW DAM-III HPS	1	33	08/02/2018	18/02/2018	238.1	ANNUAL MAINTENANCE
		1	33	01/04/2017	20/04/2017	475.57	ANNUAL MAINTENANCE
		1	33	30/06/2017	03/07/2017	78.8	INTAKE STRU/TRASH RACK
		2	33	29/01/2018	07/02/2018	215.2	ANNUAL MAINTENANCE
		3	33	17/01/2018	27/01/2018	243.77	ANNUAL MAINTENANCE
		4	33	07/01/2018	16/01/2018	214.82	ANNUAL MAINTENANCE
		4	33	28/03/2018	31/03/2018	60.48	SWITCHING EQUIPMENT
112	TEESTA LOW DAM-IV HPS	1	40	22/01/2018	28/01/2018	154	ANNUAL MAINTENANCE
		2	40	29/01/2018	05/02/2018	165.95	ANNUAL MAINTENANCE
		3	40	06/05/2017	08/05/2017	57.47	TESTING/CHECKING/ADJUSTMENT
		3	40	08/02/2018	23/02/2018	370.22	ANNUAL MAINTENANCE
		3	40	11/04/2017	18/04/2017	179.05	TURBINE MISC/GOVERNOR
		4	40	19/04/2017	26/04/2017	176.62	TURBINE MISC/GOVERNOR
		4	40	10/01/2018	19/01/2018	217.75	ANNUAL MAINTENANCE
113	TEESTA V HPS	1	170	01/12/2017	11/12/2017	224.03	ANNUAL MAINTENANCE
		2	170	13/12/2017	27/12/2017	352.87	PLANNED MAINTENANCE
		3	170	05/01/2018	16/01/2018	280.2	ANNUAL MAINTENANCE
OHPC							
114	BALIMELA HPS.	5	60	22/09/2017	26/09/2017	101.33	MONTHLY MAINTENANCE
		6	60	20/03/2018	31/03/2018	255.5	ANNUAL MAINTENANCE
115	HIRAKUD HPS	1	49.5	01/12/2017	29/12/2017	682.17	ANNUAL MAINTENANCE
		2	49.5	01/04/2017	01/07/2017	2201.67	CAPITAL/3 YEARLY MTCE.
		3	32	02/01/2018	30/01/2018	683.25	ANNUAL MAINTENANCE
		4	32	01/02/2018	28/02/2018	649.25	ANNUAL MAINTENANCE
116	UPPER INDRAVATI HPS.	1	150	01/12/2017	05/01/2018	843	ANNUAL MAINTENANCE
		3	150	08/02/2018	28/02/2018	493.28	ANNUAL MAINTENANCE
TUL							
117	TEESTA-III HPS	1	200	19/01/2018	01/02/2018	315.68	ANNUAL MAINTENANCE
		2	200	07/11/2017	30/11/2017	559.08	ANNUAL MAINTENANCE
		3	200	18/12/2017	27/12/2017	221.75	ANNUAL MAINTENANCE
		4	200	01/12/2017	16/12/2017	368.83	ANNUAL MAINTENANCE
		5	200	30/12/2017	18/01/2018	454.63	ANNUAL MAINTENANCE
		6	200	03/02/2018	06/03/2018	752.3	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-2018

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
WBSEDCL							
118	PURULIA PSS HPS.	1	225	06/08/2017	29/08/2017	564.5	TRI/TRC/DRAFT TUBE
		2	225	06/08/2017	29/08/2017	564.5	TRI/TRC/DRAFT TUBE
119	RAMMAM HPS.	1	12.5	12/12/2017	28/02/2018	1895.98	ANNUAL MAINTENANCE
NORTH EASTERN REGION							
MePGCL							
120	KYRDEMKULAI HPS.	2	30	04/12/2017	07/12/2017	74.25	TESTING/CHECKING/ADJUSTMENT
121	UMIAM HPS ST-I	2	9	01/04/2017	15/04/2017	348.17	MONTHLY MAINTENANCE
		2	9	09/02/2018	13/02/2018	101.75	TESTING/CHECKING/ADJUSTMENT
		3	9	16/10/2017	26/10/2017	246	MONTHLY MAINTENANCE
		3	9	09/02/2018	16/02/2018	170.83	TESTING/CHECKING/ADJUSTMENT
		4	9	16/10/2017	26/10/2017	247	MONTHLY MAINTENANCE
122	UMIAM HPS ST-IV	8	30	01/04/2017	06/04/2017	136	TURBINE
NEEPCO							
123	DOYANG HPS.	2	25	01/04/2017	30/04/2017	708.92	ANNUAL MAINTENANCE
		3	25	04/05/2017	21/05/2017	425.5	ANNUAL MAINTENANCE
124	KHONDONG HPS.	1	25	01/04/2017	27/04/2017	624.42	ANNUAL MAINTENANCE
		1	25	27/12/2017	10/03/2018	1768.72	ANNUAL MAINTENANCE
		2	25	15/02/2018	31/03/2018	1042.93	ANNUAL MAINTENANCE
125	KOPILI HPS.	2	50	01/04/2017	01/06/2017	1483.8	ANNUAL MAINTENANCE
		3	50	15/02/2018	31/03/2018	1056	ANNUAL MAINTENANCE
		4	50	03/01/2018	11/02/2018	947.22	ANNUAL MAINTENANCE
126	RANGANADI HPS.	1	135	01/12/2017	10/12/2017	223.25	ANNUAL MAINTENANCE
		2	135	06/02/2018	14/02/2018	214.12	ANNUAL MAINTENANCE
		3	135	03/01/2018	10/01/2018	188.28	ANNUAL MAINTENANCE
NHPC							
127	LOKTAK HPS.	1	35	15/01/2018	25/01/2018	247.82	ANNUAL MAINTENANCE
		2	35	29/01/2018	07/02/2018	225.47	ANNUAL MAINTENANCE
		3	35	10/02/2018	20/02/2018	248.97	ANNUAL MAINTENANCE

CHAPTER-5

FORCED OUTAGES OF HE UNITS

CHAPTER-5

FORCED OUTAGES OF HE UNITS

5.1 Forced outages of generating units are due to various problems in generating equipments, auxiliary systems, civil structures. Based on the analysis carried out for 712 hydro generating units installed in 206 Hydro Electric Power Stations, non-availability of hydro-electric units in the country due to forced outages during the year 2017-18 (excluding miscellaneous outages) was 3.17% as compared to 3.33% during 2016-17.

Unit-wise details of forced outages of duration 24 hours and above are given in **Annex- 5.1**.

During 2017-18, the generator and turbine faults accounted for 39.96% and 25.25% of the forced outages respectively whereas other equipment & civil structure faults accounted for 18.58% & 16.21% respectively of the forced outages. The summary of forced outages caused due to break-down of generator, turbine and other equipment during 2017-18 vis-à-vis 2016-17 is given in **Table 5.1** below.

TABLE 5.1

EQUIPMENT/SYSTEM-WISE FORCED OUTAGES (2017-18 VIS-A-VIS 2016-17)

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage	
		2017-18	2016-17	During 2017-18	Increase/ Decrease vis-à-vis 2016-17
1	Generator	67919.75	73896.94	39.96	-8.09
2	Turbine	42910.29	39328.84	25.25	9.11
3	Civil Structure	27547.61	24769.6	16.21	11.22
4	Other Equipment	31584.03	45861.19	18.58	-31.13
	Total	**169961.68**	**183856.57**	**100**	**-7.56**

It is observed that forced outages in 2017-18 vis-a-vis 2016-17 have increased on account of turbine and civil structures whereas the same have decreased on account of generator and other equipment.

5.2 FORCED OUTAGE DUE TO GENERATOR COMPONENTS

5.2.1 The major source of forced outage during 2017-18 includes Stator Fault (45.52%), followed by Vibration/Sound/ Alignment Fault (21.37%), Upper Guide Bearing Fault (8.25%) and Protection System Faults (7.62%) which together accounted for more than the 37% of the forced outages due to generator components. The fault in Miscellaneous Generator Components accounted for another 6.47% 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 BREAKDOWN OF GENERATOR COMPONENTS (PERIOD: 2017-18)

S. No.	Components of Generator	Outage Hours	% of Total No. of Hours
1	Stator	30915.62	45.52
2	Rotor	1598.36	2.35
3	Excitation System	877.68	1.29
4	Automatic Voltage Regulator	248.20	0.37
5	Protection System	5172.38	7.62
6	Generator Cooling System	1808.75	2.66
7	Thrust Bearing	1850.67	2.72
8	Upper Guide Bearing	5601.20	8.25
9	Lower Guide Bearing	518.10	0.76
10	Vibration/ Sound / Alignment	14512.47	21.37
11	Brake and Jacks	422.63	0.62
12	Miscellaneous Generator Components	4393.68	6.47
	TOTAL	**67919.75**	**100**

5.2.2 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 & up to 100 MW and in **Table 5.5** for unit size above 100 MW.

TABLE 5.3

FORCED OUTAGE HOURS DUE TO BREAKDOWN OF GENERATOR COMPONENTS (UNIT SIZE UP TO 50 MW) PERIOD: 2017-18

S. No.	Components of Generator	Outage Hours	% of Total No. of Hours
1	Stator	5.33	0.12
2	Rotor	60.50	1.37
3	Excitation System	26.02	0.59
4	Automatic Voltage Regulator	31.87	0.72
5	Protection System	199.65	4.51
6	Generator Cooling System	6.42	0.14
7	Thrust Bearing	11.82	0.27
8	Upper Guide Bearing	5.42	0.12
9	Lower Guide Bearing	124.92	2.82
10	Vibration/ Sound / Alignment	18.27	0.41
11	Brake and Jacks	77.58	1.75
12	Miscellaneous Generator Components	3863.73	87.19
	TOTAL	**4431.52**	**100.00**

TABLE 5.4

FORCED OUTAGE HOURS DUE TO BREAKDOWN OF GENERATOR COMPONENTS (UNIT SIZE ABOVE 50 MW AND UP TO 100 MW) PERIOD: 2017-18

S. No.	Components of Generator	Outage Hours	% of Total No. of Hours
1	Stator	8984.13	78.87
2	Rotor	75.65	0.66
3	Excitation System	103.12	0.91
4	Automatic Voltage Regulator	60.38	0.53
5	Protection System	45.93	0.40
6	Generator Cooling System	114.32	1.00
7	Thrust Bearing	1577.87	13.85
8	Upper Guide Bearing	325.35	2.86

S. No.	Components of Generator	Outage Hours	% of Total No. of Hours
9	Lower Guide Bearing	78.33	0.69
10	Vibration/ Sound / Alignment	0.00	0.00
11	Brake and Jacks	0.70	0.01
12	Miscellaneous Generator Components	25.55	0.22
	TOTAL	**11391.33**	**100.00**

TABLE 5.5

FORCED OUTAGE HOURS DUE TO BREAKDOWN OF GENERATOR COMPONENTS (UNIT SIZE ABOVE 100 MW) PERIOD: 2017-18

S. No.	Components of Generator	Outage Hours	% of Total No. of Hours
1	Stator	21926.15	45.49
2	Rotor	1462.22	3.03
3	Excitation System	748.55	1.55
4	Automatic Voltage Regulator	155.95	0.32
5	Protection System	2492.3	5.17
6	Generator Cooling System	224.04	0.46
7	Thrust Bearing	260.98	0.54
8	Upper Guide Bearing	5270.43	10.93
9	Lower Guide Bearing	314.85	0.65
10	Vibration/ Sound / Alignment	14494.20	30.07
11	Brake and Jacks	344.35	0.71
12	Miscellaneous Generator Components	504.40	1.05
	TOTAL	**48198.42**	**100**

From the tables above, the major reason for forced outage due to the generator components is summarized below unit size-wise:

Unit Size	Major Reasons	% of Total No. of Hours
Up to 50 MW	Miscellaneous Generator Components	87.19
50-100 MW	Stator	78.87
Above 100 MW	Stator	45.49

5.3 FORCED OUTAGE DUE TO TURBINE COMPONENTS

5.3.1 Faults in Main Inlet Valve (36.26%), Governing System (26.21%), Other Runner/Underwater Parts (16.49%) and Miscellaneous Turbine Components (14.50%) 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 BREAKDOWN OF TURBINE COMPONENTS
PERIOD: 2017-18

S. No.	Components of Turbine	Outage Hours	% of Total No. of Hours
1	Bearing	1618.70	3.77
2	Runner/Underwater Parts	7075.70	16.49
3	Main Inlet Valve	15560.16	36.26
4	Governor System	11245.91	26.21
5	Guide Vanes	685.35	1.60
6	Shaft Vibration / Alignment/Sound	503.50	1.17
7	Miscellaneous Turbine Components	6220.96	14.50
	TOTAL	**42910.29**	**100.00**

5.3.2 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 & up to 100 MW and in **Table 5.9** for unit size above 100 MW.

TABLE 5.7

FORCED OUTAGE HOURS DUE TO BREAKDOWN OF TURBINE COMPONENTS (UNIT SIZE UP TO 50 MW)
PERIOD: 2017-18

S. No.	Components of Turbine	Outage Hours	% of Total No. of Hours
1	Bearing	8.45	0.35
2	Runner/Underwater Parts	71.72	2.93
3	Main Inlet Valve	0.00	0.00
4	Governor System	818.28	33.44

S. No.	Components of Turbine	Outage Hours	% of Total No. of Hours
5	Guide Vanes	44.70	1.83
6	Shaft Vibration / Alignment /Sound	2.78	0.11
7	Miscellaneous Turbine Components	1500.92	61.34
	TOTAL	**2446.85**	**100.00**

TABLE 5.8

FORCED OUTAGE HOURS DUE TO BREAKDOWN OF TURBINE COMPONENTS (UNIT SIZE ABOVE 50 MW AND UP TO 100 MW) PERIOD: 2017-18

S. No.	Components of Turbine	Outage Hours	% of Total No. of Hours
1	Bearing	190.23	2.08
2	Runner/Underwater Parts	6836.95	74.60
3	Main Inlet Valve	1216.38	13.27
4	Governor System	280.06	3.06
5	Guide Vanes	31.05	0.34
6	Shaft Vibration / Alignment /Sound	37.70	0.41
7	Miscellaneous Turbine Components	572.02	6.24
	TOTAL	**9164.40**	**100.00**

TABLE 5.9

FORCED OUTAGE HOURS DUE TO BREAKDOWN OF TURBINE COMPONENTS (UNIT SIZE ABOVE 100 MW) PERIOD: 2017-18

S. No.	Components of Turbine	Outage Hours	% of Total No. of Hours
1	Bearing	1420.02	4.54
2	Runner/Underwater Parts	167.03	0.53
3	Main Inlet Valve	14343.78	45.83
4	Governor System	10147.56	32.42
5	Guide Vanes	609.60	1.95
6	Shaft Vibration / Alignment /Sound	463.02	1.48
7	Miscellaneous Turbine Components	4148.03	13.25
	TOTAL	**31299.04**	**100.00**

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

Unit Size	Major Reasons	% of Total No. of Hours
Up to 50 MW	Miscellaneous Turbine Components	61.34
	Governor System	33.44
50-100 MW	Runner/Underwater Parts	74.60
	Main Inlet Valve	13.27
Above 100 MW	Main Inlet Valve	45.83
	Governor System	32.42

5.4 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 Francis & Reversible turbines (81.30 hrs./unit) followed by Kaplan turbines (32.55 hrs./unit), Pelton turbines (34.59 hrs./unit) and lowest in case of Bulb turbines (7.71 hrs./unit)

TABLE 5.10

FORCED OUTAGES-TURBINE TYPE-WISE
PERIOD: 2017-18

S. No.	Type of Turbine	Number of Units	Installed Capacity MW	Forced Outage Hours	Avg. Forced Outage Hours per Unit
1	Bulb	26	684	200.43	7.71
2	Francis & Reversible	412	31936	33496.04	81.30
3	Kaplan	129	4470	4198.98	32.55
4	Pelton	145	8203	5014.84	34.59
	TOTAL	**712**	**45293**	**42910.29**	**60.27**

5.5 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: 2017-18

S. No.	Name of Supplier/ Country of Make	No. of Units	Installed Capacity (MW)	Total No. of Forced Outages Hours)	Average Forced Outages due to Generating Units (Hours/Unit)	Performance Ranking in Term of Lowest Average Outage Hours/Unit
A-Indigenous						
1	BHEL	302	19211	39920.12	132.19	6th
2	Others	47	2896	2055.35	43.73	2nd
	SUB TOTAL	**349**	**22107**	**41975.47**	**120.27**	
B-Imported						
1	U.S.A	9	351	5892.97	654.77	10th
2	U.K	63	1242	16440.07	260.95	8th
3	FRANCE	33	2186	2384.44	72.26	4th
4	CANADA	44	3132	3946.10	89.68	5th
5	USSR	26	2804	13740.67	528.49	9th
6	SWITZERLAND	22	815	520.83	23.67	1st
7	JAPAN	76	6344	4923.06	64.78	3rd
8	Other	90	6312	21006.44	233.40	7th
	SUB-TOTAL	**363**	**23186**	**68854.57**	**189.68**	
	TOTAL	**712**	**45293**	**110830.04**	**155.66**	

It is observed that the imported generating units from Switzerland (23.67 hrs./unit) & Japan (64.78 hrs./unit) and Indigenous units other than BHEL (43.73 hrs./unit) are the top three performers.

5.6 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 BREAKDOWN (AGE-WISE) PERIOD: 2017-18

S. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Non-availability per Unit (Hours)
1	2017-18	16	795	1618.08	101.13
2	2016-2017	18	1659	654.28	36.35
3	2015-2016	17	1516	85.82	5.05
4	2010-11 to 2014-15	63	4437.02	3411.32	54.15
5	2005-06 to 2009-10	66	7077.00	7056.62	106.92
6	2000-01 to 2004-05	75	6766.80	14770.23	196.94
7	1989-90 to 1999-2000	87	5775.7	23151.13	266.1
8	1978-79 to 1988-89	124	7259.1	21768.28	175.55
9	1967-68 to 1977-78	82	5304.75	20887.3	254.72
10	Up to 1966-67	164	4703.05	49011	298.85
	Total	**712**	**45293.42**	**142414.06**	**200.02**

It is observed that the per unit forced outage rate was maximum in the case of units commissioned up to 1966-67 (298.85 hrs./unit).

5.7 REGION-WISE 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: 2017-18

S. No.	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Forced Outages
1	Northern	245	18969.27	1.92
2	Western	101	7392.00	3.01
3	Southern	249	11727.70	3.21
4	Eastern	84	5862.45	6.54
5	North Eastern	33	1342.00	6.72
	All India	**712**	**45293.42**	**3.17**

Performance of hydro generating equipments installed in Northern Region was the best as the non-availability due to forced outages was least (1.92%). The average non-availability of the units in the North Eastern Region (6.72) and in the Eastern Region (6.54%) was observed to be on the higher side.

5.8 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: 2017-18

S. No.	Organisation	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Forced Outage/Unit (Hours)
Central Sector					
1	BBMB	28	2866.30	3503.65	125.13
2	DVC	5	143.20	7842.23	1568.45
3	NEEPCO Ltd.	21	925.00	10185.07	485.00
4	NHDC Ltd.	16	1520.00	59.15	3.70
5	NHPC Ltd.	74	5451.20	2214.50	29.93
6	NTPC LTD.	4	800.00	63.80	15.95
7	SJVN Ltd.	12	1912.02	651.45	54.29
8	THDC Ltd.	8	1400.00	18.55	2.32
	Sub Total	**168**	**15017.72**	**24538.40**	**146.06**
Private Sector					
9	ADHPL	2	192.00	1104	552.00
10	AHPC (GVK)	4	330.00	0	0.00
11	DEPL	4	193.00	24	6.00
12	DLHP	1	34.00	0	0.00
13	E.P.P.L.	2	100.00	864	432.00
14	GBHPPL	2	70.00	1608	804.00
15	GISL	2	110.00	528	264.00
16	HBPCL	7	1300.00	2208	315.43
17	IAEPL	3	36.00	24	8.00
18	JPPVL	4	400.00	192	48.00
19	MPCL	2	86.00	0	0.00
20	SKPPPL	2	96.00	24	12.00
21	TATA MAH.	15	447.00	336	22.40

S. NO.	ORGANISATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	FORCED OUTAGE PER UNIT (HOURS)
	Sub Total	**50**	**3394.00**	**6912**	**138.24**
State Sector					
22	APGENCO	30	1336.75	1272	42.40
23	APGPCL	2	100.00	24	12.00
24	CSPGCL	3	120.00	48	16.00
25	GSECL	8	540.00	0	0.00
26	HPPCL	5	295.00	3384	676.80
27	HPSEB	12	372.00	12936	1078.00
28	JKSPDC	12	1110.00	3336	278.00
29	JUUNL	2	130.00	0	0.00
30	KPCL	68	3585.40	50928	748.94
31	KSEBL	48	1881.50	36528	761.00
32	MSPGCL	24	2406.00	1392	58.00
33	MePGCL	13	322.00	2712	208.62
34	MPPGCL	23	875.00	25104	1091.48
35	OHPC	31	2027.50	46008	1484.13
36	PSPCL	25	1051.00	14616	584.64
37	RRVUNL	11	411.00	4440	403.64
38	SSNNL	11	1450.00	5520	501.82
39	TANGEDCO	70	2203.20	38256	546.51
40	TSGENCO	39	2835.60	1032	26.46
41	TUL	6	1200.00	2640	440.00
42	UJVNL	34	1252.15	40632	1195.06
43	UPJVNL	15	501.60	28392	1892.80
44	WBSEDCL	12	986.00	5880	490.00
	Sub Total	**504**	**26991.70**	**325080**	**645.00**
	All India	**712**	**45293.42**	**415488**	**583.55**

It is observed that the per unit forced outages for generating units was maximum in respect of hydro-electric stations under UPJVNL (1892.80 hrs./unit). On the other hand, the hydro generating units of AHPC, DLHP, MPCL, GSECL and JUUNL etc. have reported nil forced outage operation.

5.9 DURATION OF FORCED OUTAGES

There were total 3436 forced outages/tripping during the year 2017-18. 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 63.56% of the total forced shutdown were of duration less than 6 hours while 20.63% of outages were of duration varying from 6 to 24 hours and only 3.46% of shutdowns persisted for more than 10 days.

TABLE 5.15

DURATION PATTERN OF FORCED OUTAGES
PERIOD: 2017-18

S. No.	Duration of Hours	Number of Outages	% of Total of Outages
1	Less than 6 hour	2184	63.56
2	6 to 24 hours	709	20.63
3	1 to 10 days	424	12.34
4	More than 10 days	119	3.46
	Total No. of Outages	**3436**	**100.00**

5.10 FORCED OUTAGES - STATION-WISE

The number of H.E. Stations falling under various ranges of non-availability due to forced outages during the year 2017-18 vis-à-vis 2016-17 is summarized below in **Table 5.16.**

TABLE 5.16

NON-AVAILABILITY OF HE STATIONS DUE TO FORCED OUTAGES
(2017-18 VIS-A-VIS 2016-17)

% Non-Availability due to Forced Outages	2017-18				2016-17			
	Stations		Capacity		Stations		Stations	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
0	17	8.25	4206.2	9.29	23	11.50	5151.00	11.58
>0 to 1	106	51.46	24636.95	54.39	87	43.50	20248.95	45.53
>1 to 2	24	11.65	3756.62	8.29	29	14.50	6279.70	14.12
>2 to 3	8	3.88	1741.6	3.85	10	5.00	1613.22	3.63
>3 to 4	5	2.43	816	1.80	10	5.00	1603.00	3.60

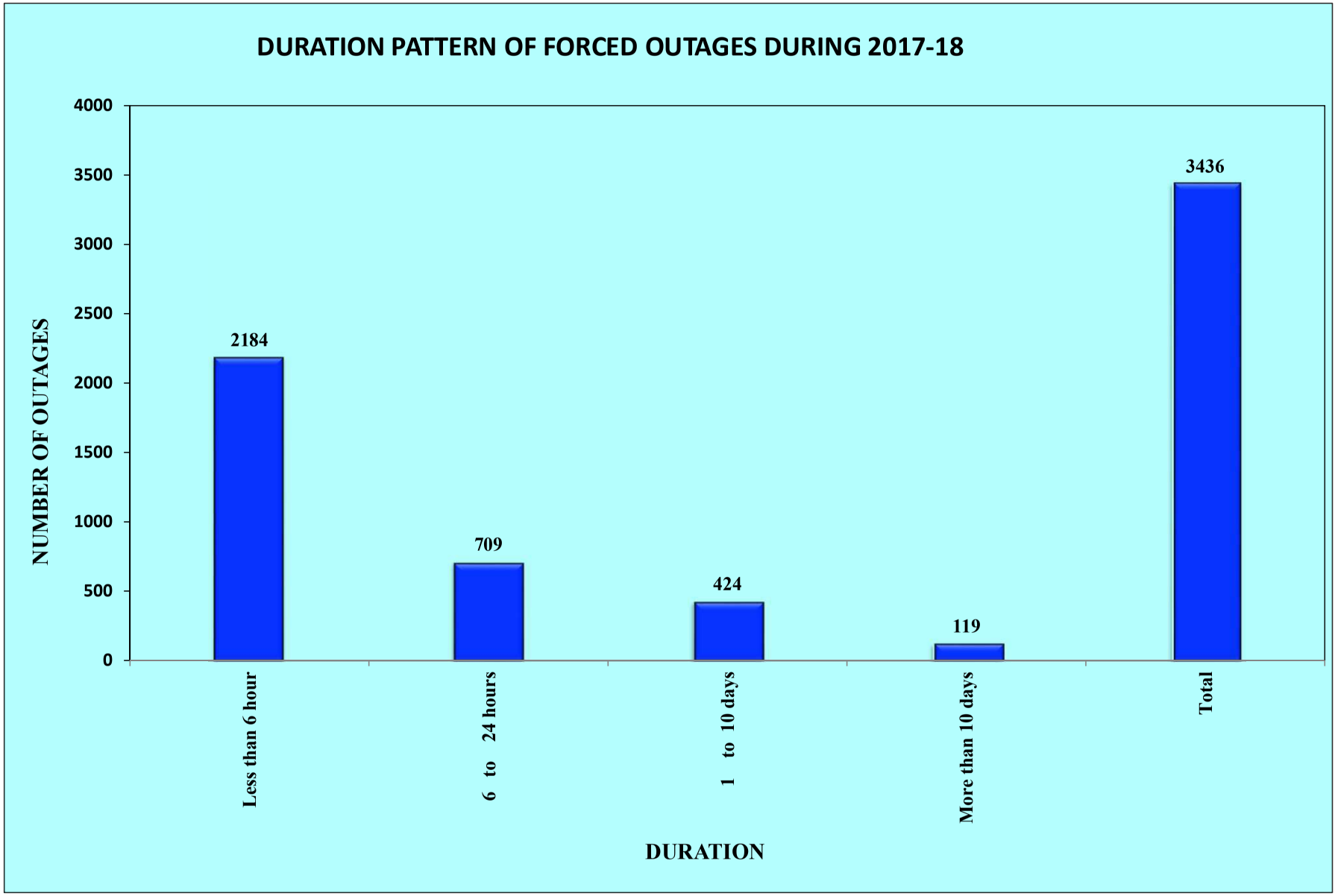
% Non-Availability due to Forced Outages	2017-18				2016-17			
	Stations		Capacity		Stations		Stations	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
>4 to 5	6	2.91	1730	3.82	3	1.50	687.50	1.55
>5	40	19.42	8406.05	18.56	38	19.00	8795.05	19.77
Total	**206**	**100**	**45293.42**	**100**	**200**	**100**	**44478.42**	**100**

It could be seen from above that there was no forced outage at 17 nos. (8.25% of total) hydro-electric stations during 2017-18 as compared to 23 nos. (11.50% of total) hydro-electric stations during 2017-18.

19.42% of stations had operational availability lower then 95% on account of forced outages alone against the normative design/planned annual availability of 95% during the entire station life. These utilities need to improve their O&M practices to bring down their total outages i.e. planned & forced to less then 5% as per best practices.

It is observed from above that stations may be having high forced outages on account of ageing, O&M management issues, undertaking of R&M works, etc. Further, those stations which are having continuously high planned maintenance outages over past few years may be requiring major repair and maintenance works or Renovation & Modernization (R&M) works for improving the availability, reliability & security of the plant besides providing life extension where the assets have outlived their useful life.

EXHIBIT 5.1


DURATION PATTERN OF FORCED OUTAGES DURING 2017-18
NUMBER OF OUTAGES
4000
3500
3000
2500
2000
1500
1000
500
0
2184
709
424
119
3436
Less than 6 hour
6 to 24 hours
1 to 10 days
More than 10 days
Total
DURATION

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-18
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
NORTHERN REGION							
ADHPL							
1	ALLAIN DUHANGAN HPS	2	96	31/01/2018	08/02/2018	189.05	EXCITATION POWER HOUSE MISCS
		2	96	12/08/2017	14/08/2017	56.35	RUNNER/UNDER WATER PARTS
BBMB							
2	DEHAR H P S	5	165	21/04/2017	22/04/2017	44.28	GENERATOR CT PT PROBLEM
3	PONG H P S	1	66	03/01/2018	18/01/2018	364.7	STATOR EARTH FAULT
		1	66	03/10/2017	06/10/2017	65.82	STATOR EARTH FAULT
		1	66	08/11/2017	14/11/2017	150.08	STATOR EARTH FAULT
		2	66	06/06/2017	20/06/2017	330.75	STATOR EARTH FAULT
		2	66	13/08/2017	09/09/2017	644.97	STATOR EARTH FAULT
		2	66	03/10/2017	06/10/2017	65.82	STATOR EARTH FAULT
		2	66	03/01/2018	18/01/2018	364.7	STATOR EARTH FAULT
GBHPPL							
4	BUDHIL HPS	1	35	09/04/2017	12/04/2017	66	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
HPPCL							
5	KASHANG INTEGRATED HPS	1	65	02/05/2017	03/05/2017	27.95	SWITCHYARD MISC.
		1	65	11/07/2017	15/07/2017	109.88	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		2	65	12/07/2017	15/07/2017	86.35	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
6	SAINJ HPS	1	50	03/03/2018	05/03/2018	53.23	U.A.T
HPSEBL							
7	GIRI BATA HPS	2	30	03/05/2017	05/05/2017	54	EXCITATION PROBLEMS
8	SANJAY HPS	2	40	24/10/2017	25/10/2017	28.42	FORCED OUTAGE
		2	40	17/08/2017	18/08/2017	25.33	FORCED OUTAGE
JKSPDC							
9	UPPER SINDH-II HPS	3	35	18/08/2017	19/08/2017	25.58	GENEATOR TRANSFORMER DAMAGED
		3	35	01/09/2017	15/09/2017	338.83	FORCED OUTAGE
		3	35	01/08/2017	02/08/2017	28.17	OIL PROBLEMS
		3	35	20/08/2017	21/08/2017	25.93	EXCITATION PROBLEMS
		4	35	19/06/2017	29/06/2017	242	MISCELLANEOUS
		4	35	18/08/2017	31/08/2017	328.65	FORCED OUTAGE
		4	35	15/08/2017	17/08/2017	46.67	FORCED OUTAGE
		4	35	13/05/2017	14/05/2017	39.92	ROTOR
		5	35	01/08/2017	02/08/2017	27.83	DC/BATTARY
		5	35	18/06/2017	19/06/2017	36.68	ROTOR
		5	35	01/09/2017	02/09/2017	27.83	DC/BATTARY
NHPC							
10	CHUTAK HPS	1	11	07/05/2017	12/05/2017	109.03	FORCED OUTAGE
		4	11	04/12/2017	07/12/2017	71.8	FORCED OUTAGE
11	DULHASTI HPS	1	130	01/08/2017	03/08/2017	60.87	SHAFT SEAL
12	NIMMO BAZGO HPS	2	15	10/06/2017	17/06/2017	179.25	FORCED OUTAGE
13	PARBATI-III HPS	2	130	12/02/2018	13/02/2018	26.03	HRI/HRC/SURGF SHAFT PROPS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-18
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	130	26/05/2017	27/05/2017	24.85	MISCELLANEOUS
		3	130	24/09/2017	25/09/2017	24.73	SHEAR PIN
		4	130	27/04/2017	02/05/2017	129.33	TURBINE FAULTS
14	SALAL HPS	3	115	16/06/2017	19/06/2017	56.42	THRUST BEARING
		5	115	18/03/2018	19/03/2018	33.97	FORCED OUTAGE
		6	115	15/05/2017	18/05/2017	74.25	TURBINE POWER HOUSE MISCS
15	SEWA-II HPS	2	40	06/08/2017	12/08/2017	133.75	DC/BATTARY
		3	40	06/08/2017	12/08/2017	134.5	MISCELLANEOUS
16	TANAKPUR HPS	3	31.4	26/08/2017	27/08/2017	27.92	ROTOR
17	URI-I HPS	2	120	23/09/2017	25/09/2017	43.5	FORCED OUTAGE
18	URI-II HPS	1	60	07/12/2017	25/03/2018	2613.68	SWITCHYARD MISC.
		1	60	07/11/2017	14/11/2017	175.3	POWER HOUSE MISC.
		2	60	03/11/2017	04/11/2017	24.23	FORCED OUTAGE
		2	60	24/12/2017	02/01/2018	204.35	INTAKE STRICT./TRASH RACK
		3	60	12/10/2017	15/10/2017	73.73	FORCED OUTAGE
		4	60	24/12/2017	01/01/2018	202.75	INTAKE STRICT./TRASH RACK
PSPCL							
19	ANANDPUR SAHIB HPS	2	33.5	15/12/2017	20/12/2017	127.33	MISCELLANEOUS
		2	33.5	13/09/2017	16/09/2017	85.08	ROTOR
20	MUKERIAN HPS	1	15	16/11/2017	22/11/2017	146.07	ROTOR
		10	19.5	31/07/2017	01/08/2017	32.67	GENRATOR POWER HOUSE MISCS
		10	19.5	15/08/2017	16/08/2017	25.75	GENRATOR POWER HOUSE MISCS
		12	19.5	28/11/2017	03/12/2017	116.83	U.A.T
		12	19.5	21/08/2017	22/08/2017	35.75	EHG/GOV. FAULTS, MISC.
		5	15	02/03/2018	04/03/2018	29.92	ROTOR
		8	19.5	07/11/2017	09/11/2017	48.33	MISCELLANEOUS
		8	19.5	17/08/2017	18/08/2017	24.42	GOVERNOR SYSTM
		8	19.5	07/12/2017	08/12/2017	25	LT AC PANELS
21	RANJIT SAGAR HPS	1	150	17/06/2017	18/06/2017	37.57	U.A.T
		2	150	27/07/2017	31/07/2017	97.75	FORCED OUTAGE
		3	150	14/07/2017	08/08/2017	586.48	LT AC PANELS
RRVUNL							
22	MAHI BAJAJ HPS	2	25	30/08/2017	31/08/2017	26.17	STATOR EARTH FAULT
23	R P SAGAR HPS	4	43	20/02/2018	22/02/2018	51	BRAKE AND JACKS
SJVNL							
24	NATHPA JHAKRI HPS	6	250	12/09/2017	13/09/2017	27.32	TURBINE FAULTS
25	RAMPUR HPS	2	68.67	10/04/2017	13/04/2017	76.5	EHT/ISOLATOR
		3	68.67	02/03/2018	10/03/2018	179.52	GEN./TR.BREAKER
		3	68.67	10/02/2018	11/02/2018	39.48	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
UJVNL							
26	CHIBRO (YAMUNA) HPS	1	60	07/12/2017	10/12/2017	69.83	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		2	60	06/08/2017	07/08/2017	39.58	SHAFT SEAL

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-18
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
27	CHILLA HPS	1	36	25/01/2018	14/02/2018	472	HRI/HRC/SURGF SHAFT PROPS
		1	36	05/08/2017	06/08/2017	26.83	HRI/HRC/SURGF SHAFT PROPS
		2	36	05/08/2017	06/08/2017	27.08	HRI/HRC/SURGF SHAFT PROPS
		3	36	14/02/2018	15/02/2018	27.75	EXCITATION POWER HOUSE MISCS
		3	36	05/08/2017	06/08/2017	27.83	HRI/HRC/SURGF SHAFT PROPS
		4	36	05/08/2017	06/08/2017	28.17	HRI/HRC/SURGF SHAFT PROPS
		4	36	25/01/2018	14/02/2018	473.83	HRI/HRC/SURGF SHAFT PROPS
28	DHAKRANI HPS	1	11.25	03/10/2017	08/10/2017	120.58	LGB ALIGNMENT/MISC
29	DHALIPUR HPS	1	17	18/08/2017	22/08/2017	108.92	TURBINE FAULTS
30	KHATIMA HPS	3	13.8	10/08/2017	14/08/2017	86.17	EHG/GOV. FAULTS, MISC.
		3	13.8	01/08/2017	05/08/2017	119.98	PROTECTION OPERATION
31	KHODRI HPS	2	30	07/10/2017	08/10/2017	28.07	LT AC PANELS
		2	30	24/08/2017	31/08/2017	165.08	EXCITATION PROBLEMS
		2	30	31/08/2017	05/09/2017	119.83	ROTOR
		2	30	03/11/2017	10/11/2017	171.15	GUIDE VANES
		3	30	23/04/2017	27/04/2017	85.17	GENERATOR FAULTS
32	KULHAL HPS	1	10	13/11/2017	16/11/2017	73.08	BRAKE AND JACKS
		1	10	20/01/2018	25/01/2018	123.12	SWITCHYARD MISC.
		2	10	20/01/2018	25/01/2018	123.12	SWITCHYARD MISC.
		3	10	20/01/2018	25/01/2018	123.12	SWITCHYARD MISC.
33	MANERI BHALI - I HPS	1	30	26/11/2017	30/11/2017	99.17	LINE BREAKER
34	MANERI BHALI - II HPS	2	76	19/08/2017	20/08/2017	29.3	SHAFT SEAL
		2	76	22/04/2017	25/04/2017	66.13	MISCELLANEOUS
		2	76	14/04/2017	17/04/2017	78.15	GENERATOR FAULTS
		3	76	25/08/2017	26/08/2017	27.92	SHAFT SEAL
		4	76	06/08/2017	07/08/2017	24.42	SHAFT SEAL
		4	76	22/05/2017	05/06/2017	349	SHAFT VIBRS./ALIGNM/SOUND
		4	76	23/08/2017	31/08/2017	211.62	GENERATOR FAULTS
35	RAMGANGA HPS	1	66	15/02/2018	24/02/2018	222	ROTOR
UPJVNL							
36	KHARA HPS	1	24	10/08/2017	21/08/2017	255.75	EXCITATION SYSTEM FAILURE
		1	24	02/01/2018	04/01/2018	50.25	LT AC PANELS
		1	24	23/08/2017	17/10/2017	1323.07	EXCITATION SYSTEM FAILURE
		2	24	19/12/2017	21/12/2017	39.2	LT AC PANELS
		2	24	09/01/2018	10/01/2018	32.92	GOVERNOR SYSTM
37	MATATILA HPS	3	10.2	09/05/2017	30/06/2017	1247.67	TURBINE PIT FLOODED
38	OBRA HPS	2	33	09/08/2017	10/08/2017	42.25	EHG/GOV. FAULTS, MISC.
		3	33	29/09/2017	18/10/2017	457.8	FORCED OUTAGE
39	RIHAND HPS	1	50	05/03/2018	10/03/2018	125.25	ROTOR
		1	50	06/06/2017	08/06/2017	44.92	EXCITATION POWER HOUSE MISCS
		1	50	19/05/2017	22/05/2017	71	EHG/GOV. FAULTS, MISC.

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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	50	15/02/2018	18/02/2018	72.75	PENSTOCK
		3	50	02/06/2017	04/06/2017	53.75	BRAKE AND JACKS
		4	50	03/10/2017	04/10/2017	28.42	MISCELLANEOUS
		5	50	27/10/2017	21/03/2018	3491.08	POWER HOUSE MISC
		6	50	08/10/2017	09/10/2017	35.32	SPEED RUNAWAY/OVER /UNDER
		6	50	22/12/2017	01/01/2018	252.67	ROTOR
		6	50	20/01/2018	16/03/2018	1320.25	GENERATOR ROTOR DAMAGED
		6	50	31/08/2017	01/09/2017	30.33	EXCITATION POWER HOUSE MISCS
WESTERN REGION							
MAHAGENCO							
40	BHIRA TAIL RACE HPS	2	40	05/12/2017	06/12/2017	26.78	POWER HOUSE MISCS
41	GHATGHAR PSS HPS	1	125	20/07/2017	05/10/2017	1869	MISCELLANEOUS
		1	125	24/11/2017	26/11/2017	49.92	EHG/GOV. FAULTS, MISC.
		1	125	14/11/2017	21/11/2017	189	EHG/GOV. FAULTS, MISC.
		2	125	03/06/2017	07/06/2017	97.55	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		2	125	27/07/2017	05/10/2017	1701	MISCELLANEOUS
42	KOYNA DPH HPS	1	18	28/11/2017	30/11/2017	62.45	GEN./TR.BREAKER
		2	18	03/11/2017	23/11/2017	476.75	GEN./TR.BREAKER
43	KOYNA-II HPS	2	80	25/04/2017	01/05/2017	155.33	FORCED OUTAGE
44	KOYNA-IV HPS	1	250	03/10/2017	07/10/2017	107	FORCED OUTAGE
45	TILLARI HPS	1	60	11/01/2018	07/03/2018	1333.25	POWER HOUSE MISC.
MPPGCL							
46	BANSAGAR TONS-I HPS	1	105	02/11/2017	21/12/2017	1180	MISCELLANEOUS
		1	105	22/07/2017	31/07/2017	228.5	SHEAR PIN
47	BANSAGAR TONS-II HPS	1	15	14/11/2017	15/11/2017	24.17	MISCELLANEOUS
48	GANDHI SAGAR HPS	1	23	14/07/2017	17/07/2017	74.67	EHG/GOV. FAULTS, MISC.
		2	23	25/06/2017	29/06/2017	92.58	SHEAR PIN
		2	23	29/11/2017	30/11/2017	43.25	POWER HOUSE MISCS
		5	23	14/09/2017	05/12/2017	1979.5	PROTECTION OPERATION
49	PENCH HPS	2	80	26/07/2017	02/08/2017	168	FORCED OUTAGE
		2	80	24/10/2017	31/10/2017	181.73	POWER HOUSE MISCS
NHDC							
50	INDIRA SAGAR HPS	3	125	07/08/2017	08/08/2017	32.23	ROTOR
51	OMKARESHWAR HPS	1	65	21/06/2017	07/07/2017	381.4	FORCED OUTAGE
SSNNL							
52	S SAROVAR CHPH HPS	3	50	30/11/2017	11/12/2017	269.25	ROTOR
TATA MAH.							
53	BHIRA HPS	5	25	16/07/2017	22/07/2017	130.63	EXCITATION POWER HOUSE MISCS
54	BHIVPURI HPS	1	24	01/11/2017	03/11/2017	44.65	FORCED OUTAGE
		1	24	17/08/2017	20/08/2017	84.13	PENSTOCK
		1	24	26/03/2018	27/03/2018	24.43	ROTOR
SOUTHERN REGION							

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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
APGENCO							
55	HAMPI HPS	2	9	27/10/2017	31/10/2017	96.15	POWER HOUSE MISCS
		4	9	06/12/2017	07/12/2017	25.08	SHEAR PIN
56	T B DAM HPS	3	9	21/10/2017	31/10/2017	255.32	GOVERNOR SYSTM
		3	9	02/01/2018	06/01/2018	100.42	TURBINE POWER HOUSE MISCS
		4	9	16/01/2018	18/01/2018	49.33	MISCELLANEOUS
57	UPPER SILERU HPS	1	60	21/03/2018	28/03/2018	188.5	FORCED OUTAGE
		2	60	24/10/2017	30/10/2017	150.27	EXCITATION PROBLEMS
		2	60	17/04/2017	21/04/2017	99.35	FORCED OUTAGE
		4	60	26/03/2018	31/03/2018	110.75	BRAKE AND JACKS
		4	60	21/02/2018	23/03/2018	713.82	FORCED OUTAGE
KPCL							
58	ALMATTI DPH HPS	4	55	15/03/2018	20/03/2018	120.92	GENEREATOR COOLING SYSTEM
59	GERUSUPPA HPS	1	60	28/11/2017	29/11/2017	28.67	MISCELLANEOUS
		4	60	15/02/2018	17/02/2018	56.3	COOLING SYSTEM
		4	60	02/03/2018	04/03/2018	40.57	MISCELLANEOUS
60	JOG HPS	6	21.6	11/05/2017	25/05/2017	334.75	GOVERNOR SYSTM
		8	21.6	01/11/2017	31/12/2017	1463.98	GENERATOR FAULTS
		8	21.6	01/07/2017	31/07/2017	743.98	GENERATOR FAULTS
		8	21.6	01/08/2017	31/08/2017	743.98	GENERATOR FAULTS
		8	21.6	01/09/2017	30/10/2017	1439.98	GENERATOR FAULTS
61	KADRA HPS	1	50	22/05/2017	23/05/2017	47.98	MISCELLANEOUS
62	KALINADI HPS	1	135	29/03/2018	31/03/2018	33.58	LOWER GUIDE BEARING
		1	135	27/02/2018	08/03/2018	222	COOLING WATER SYSTEM
		2	135	01/07/2017	05/07/2017	107.17	MISCELLANEOUS
		3	135	17/05/2017	25/05/2017	188.42	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		3	135	10/03/2018	15/03/2018	122.58	COOLING SYSTEM
		4	150	17/05/2017	15/06/2017	696.5	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		5	150	09/03/2018	12/03/2018	76.33	TURBINE POWER HOUSE MISCS
		5	150	26/05/2017	30/05/2017	95.33	BRAKE AND JACKS
		5	150	12/01/2018	05/02/2018	584.43	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		5	150	07/09/2017	08/09/2017	31.5	EHG/GOV. FAULTS, MISC.
		5	150	07/03/2018	08/03/2018	29.83	ROTOR
		6	150	12/01/2018	05/02/2018	585.53	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
63	SHARAVATHI HPS	6	103.5	12/02/2018	14/02/2018	49.38	PENSTOCK
		7	103.5	30/04/2017	01/05/2017	31.53	PROTECTION OPERATION
64	VARAHI HPS	1	115	26/04/2017	03/05/2017	164.4	TURBINE POWER HOUSE MISCS
		2	115	24/04/2017	04/05/2017	240.98	TURBINE POWER HOUSE MISCS
		2	115	20/12/2017	28/12/2017	204.82	U.G.B.OIL SYSTEM
		3	115	21/06/2017	30/06/2017	225.4	MISCELLANEOUS
		3	115	30/05/2017	31/05/2017	38.98	EXCITATION PROBLEMS

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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	115	02/07/2017	05/07/2017	81.67	MISCELLANEOUS
		4	115	17/07/2017	19/07/2017	54.28	EHT/CT/PT
KSEB							
65	IDUKKI HPS.	1	130	02/10/2017	04/10/2017	58.57	NEEDLE PROBLEM
		1	130	03/05/2017	05/05/2017	61.93	UPPER GUIDE BEARING
		2	130	19/01/2018	22/01/2018	90.27	EXCITATION POWER HOUSE MISCS
		6	130	08/09/2017	12/09/2017	90.57	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
66	KUTTIYADI HPS.	1	25	16/12/2017	18/12/2017	68.58	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		2	25	16/12/2017	18/12/2017	68.58	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		3	25	22/05/2017	26/05/2017	107.12	MISCELLANEOUS
		3	25	20/07/2017	23/07/2017	74.95	FORCED OUTAGE
		4	50	16/12/2017	18/12/2017	68.58	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
67	KUTTIYADI ADDL. EXTN. HPS	5	50	27/06/2017	29/06/2017	42.17	PENSTOCK EXP. JOINT PROBLEM
		6	50	24/09/2017	28/09/2017	106.47	NEEDLE PROBLEM
		6	50	04/07/2017	01/09/2017	1422.52	FORCED OUTAGE
		6	50	01/06/2017	05/06/2017	90.58	PENSTOCK EXP. JOINT PROBLEM
		6	50	27/06/2017	29/06/2017	42.17	PENSTOCK EXP. JOINT PROBLEM
		6	50	20/12/2017	22/12/2017	41.47	NEEDLE PROBLEM
68	LOWER PERIYAR HPS.	3	60	07/04/2017	09/04/2017	44.58	LT AC PANELS
69	NARIAMANGLAM HPS	4	25	27/05/2017	02/06/2017	136.12	SPEED RUNAWAY/OVER /UNDER
70	PALLIVASAL HPS.	1	5	16/11/2017	17/11/2017	24.67	GOVERNOR SYSTM
		6	7.5	02/08/2017	03/08/2017	30.13	RUNNER/UNDER WATER PARTS
71	PORINGALKUTTU HPS.	2	8	27/10/2017	31/03/2018	3720	MISCELLANEOUS
72	SABARIGIRI HPS.	1	50	03/06/2017	12/06/2017	212.77	MISCELLANEOUS
		2	50	12/04/2017	16/04/2017	97.05	GEN./TR.BREAKER
		2	50	10/09/2017	12/09/2017	44.68	NEEDLE PROBLEM
		3	50	03/07/2017	07/07/2017	83.85	FORCED OUTAGE
		3	50	11/08/2017	17/08/2017	147.35	OIL PROBLEMS
73	SENGULAM HPS.	1	12	20/11/2017	22/11/2017	47.42	FORCED OUTAGE
		2	12	19/11/2017	22/11/2017	65.75	OIL HANDLING SYSTEM
		2	12	03/01/2018	04/01/2018	30.38	FORCED OUTAGE
		2	12	11/12/2017	14/12/2017	64.07	EHG/GOV. FAULTS, MISC.
		3	12	22/10/2017	23/10/2017	24.57	TURBINE FAULTS
		4	12	01/09/2017	04/09/2017	51.2	COOLING WATER SYSTEM
		4	12	07/11/2017	11/11/2017	97.25	COOLING WATER SYSTEM
74	SHOLAYAR HPS.	1	18	19/03/2018	21/03/2018	56.3	LGB OIL SYSTEMS PROBLEMBS
		1	18	12/07/2017	22/08/2017	975.07	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
TNGDCL							
75	BHAWANI KATTAL	1	15	18/09/2017	20/09/2017	50.15	GUIDE VANES
		2	15	20/09/2017	23/09/2017	68.25	EHT/L.A.
76	KODAYAR HPS.	1	60	28/11/2017	03/12/2017	122.17	POWER HOUSE MISC (D/T,GUIDE/STAY VANES

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Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	60	14/07/2017	18/07/2017	100.33	RUNNER/UNDER WATER PARTS
		1	60	31/01/2018	03/02/2018	57.22	EHG/GOV. FAULTS, MISC.
		1	60	19/04/2017	20/04/2017	40.62	FORCED OUTAGE
		2	40	23/06/2017	26/06/2017	78.52	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		2	40	08/12/2017	21/12/2017	310.53	UPPER GUIDE BEARING
		2	40	29/03/2018	31/03/2018	36.33	TURBINE POWER HOUSE MISCS
		2	40	16/02/2018	28/03/2018	966.17	THRUST BEARING
77	KUNDAH HPS.	1	20	07/10/2017	09/10/2017	54.92	TRANSFORMER PROTECTION
		10	60	26/02/2018	27/02/2018	29.92	NEEDLE PROBLEM
		11	60	12/06/2017	14/06/2017	51.42	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		11	60	26/02/2018	31/03/2018	792	EHG/GOV. FAULTS, MISC.
		11	60	08/01/2018	09/01/2018	28.17	EHG/GOV. FAULTS, MISC.
		11	60	31/01/2018	23/02/2018	566.68	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		14	20	24/08/2017	27/08/2017	82.5	COOLING SYSTEM
		14	20	18/01/2018	31/03/2018	1719	EHG/GOV. FAULTS, MISC.
		15	20	01/06/2017	05/06/2017	94.67	THRUST BEARING
		3	20	26/07/2017	31/07/2017	130.92	SWITCHYARD MISC.
		5	35	22/05/2017	26/05/2017	96.58	LOWER GUIDE BEARING
		5	35	23/06/2017	24/06/2017	30.42	FORCED OUTAGE
		6	35	02/06/2017	05/06/2017	84.92	PENSTOCK
		6	35	22/08/2017	23/08/2017	36.58	PENSTOCK
		6	35	26/05/2017	28/05/2017	54.75	GOVERNOR SYSTM
		6	35	22/05/2017	25/05/2017	80.5	FORCED OUTAGE
		7	35	05/08/2017	09/08/2017	85.33	PROTECTION OPERATION
		8	35	28/03/2018	30/03/2018	58.92	PENSTOCK
		8	35	24/03/2018	25/03/2018	38.42	TURBINE FAULTS
		8	35	27/08/2017	30/08/2017	81.58	MISCELLANEOUS
78	LOWER METTUR HPS.	1	15	11/09/2017	14/09/2017	67	SERVO MOTORS
		4	15	19/09/2017	21/09/2017	55	FORCED OUTAGE
79	MOYAR HPS	1	12	01/05/2017	03/05/2017	41.58	RUNNER/UNDER WATER PARTS
		2	12	11/07/2017	19/07/2017	194.5	RUNNER/UNDER WATER PARTS
		2	12	25/08/2017	19/09/2017	607.33	GENERATOR FAULTS
		2	12	25/03/2018	30/03/2018	133.67	RUNNER/UNDER WATER PARTS
		3	12	11/12/2017	12/12/2017	29.75	FORCED OUTAGE
80	PAPANASAM HPS.	1	8	01/03/2018	31/03/2018	708.25	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		4	8	28/09/2017	02/10/2017	92.75	TURBINE POWER HOUSE MISCS
81	PARSON`S VALLEY HPS.	1	30	03/11/2017	05/11/2017	51.33	MISCELLANEOUS
82	PYKARA HPS.	1	7	24/04/2017	29/04/2017	119.83	PENSTOCK LEAKAGE
		2	7	21/03/2018	23/03/2018	51.92	PENSTOCK LEAKAGE
		2	7	24/04/2017	29/04/2017	119.92	PENSTOCK LEAKAGE
		3	7	26/12/2017	29/12/2017	80.25	PENSTOCK LEAKAGE

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-18
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	7	29/04/2017	06/05/2017	169.05	TRANSFORMER PROTECTION
		5	13.6	26/12/2017	29/12/2017	80.25	PENSTOCK LEAKAGE
		6	11	06/05/2017	08/05/2017	54.75	PENSTOCK LEAKAGE
		6	11	29/04/2017	03/05/2017	103.25	PENSTOCK LEAKAGE
83	PYKARA ULTMATE HPS.	1	50	28/08/2017	30/08/2017	51.5	NEEDLE PROBLEM
		1	50	08/02/2018	10/02/2018	45.17	COOLING WATER SYSTEM
		3	50	22/09/2017	26/09/2017	105.67	NEEDLE PROBLEM
84	SURULIYAR HPS.	1	35	10/08/2017	14/08/2017	98.42	PENSTOCK
		1	35	18/07/2017	19/07/2017	26.17	EHG/GOV. FAULTS, MISC.
		1	35	08/07/2017	14/07/2017	138.48	EHG/GOV. FAULTS, MISC.
		1	35	23/02/2018	27/02/2018	97.97	PENSTOCK
TSGENCO							
85	NAGARJUN SGR HPS	2	100.8	15/12/2017	18/12/2017	74.17	FORCED OUTAGE
		5	100.8	28/06/2017	26/07/2017	680.1	INTAKE STRICT./TRASH RACK
		7	100.8	17/05/2017	26/06/2017	981.22	FORCED OUTAGE
86	PRIYADARSHNI JURALA HPS	1	39	03/09/2017	04/09/2017	24.82	OIL PROBLEMS
		2	39	02/09/2017	04/09/2017	45.85	SHAFT SEAL
EASTERN REGION							
APGENCO							
87	MACHKUND HPS	1	17	27/10/2017	31/10/2017	103.27	POWER HOUSE MISCS
		1	17	08/09/2017	14/09/2017	149.5	PROTECTION OPERATION
		2	17	27/10/2017	29/10/2017	53.45	POWER HOUSE MISCS
		3	17	01/10/2017	31/10/2017	743.98	EHG/GOV. FAULTS, MISC.
		3	17	01/09/2017	30/09/2017	719.98	EHG/GOV. FAULTS, MISC.
		4	21.25	01/10/2017	31/10/2017	743.98	UPPER GUIDE BEARING
		4	21.25	12/09/2017	30/09/2017	436.07	UPPER GUIDE BEARING
		5	21.25	01/10/2017	31/10/2017	743.98	VIBRATION/SOUND/ ALIGNMENT
		6	21.25	01/10/2017	31/10/2017	743.98	VIBRATION/SOUND/ ALIGNMENT
DVC							
88	PANCHET HPS.	2	40	14/12/2017	15/12/2017	33.42	THRUST BEARING
		2	40	01/10/2017	04/10/2017	61	GEN./TR.BREAKER
		2	40	14/02/2018	23/02/2018	218.5	GEN./TR.BREAKER
		2	40	22/05/2017	31/05/2017	223.15	MISCELLANEOUS
		2	40	08/01/2018	29/01/2018	506	THRUST BEARING
GIPL							
89	CHUZACHEN HPS	1	55	13/08/2017	15/08/2017	37.75	FORCED OUTAGE
		2	55	13/08/2017	14/08/2017	37.57	FORCED OUTAGE
NHPC							
90	RANGIT HPS	3	20	25/04/2017	26/04/2017	30.58	SHAFT VIBRS./ALIGNM/SOUND
91	TEESTA V HPS	2	170	14/08/2017	16/08/2017	43.52	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
OHPC							
92	BALIMELA HPS.	3	60	15/01/2018	18/01/2018	62.92	EHG/GOV. FAULTS, MISC.

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-18
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	60	30/11/2017	01/12/2017	36.32	MISCELLANEOUS
		5	60	05/04/2017	07/04/2017	55.4	PROTECTION OPERATION
		6	60	11/07/2017	12/07/2017	33.37	LINE BREAKER
		6	60	06/04/2017	07/04/2017	28.13	PROTECTION OPERATION
		6	60	21/08/2017	24/08/2017	68.32	EHG/GOV. FAULTS, MISC.
		7	75	01/03/2018	31/03/2018	720	NEEDLE PROBLEM
		7	75	06/04/2017	07/04/2017	31.13	PROTECTION OPERATION
		7	75	16/04/2017	30/09/2017	4014.18	GENERATOR FAULTS
		8	75	06/04/2017	07/04/2017	27.05	PROTECTION OPERATION
		8	75	01/01/2018	04/01/2018	66	MISCELLANEOUS
93	HIRAKUD HPS	1	49.5	23/10/2017	25/10/2017	39.17	MISCELLANEOUS
		1	49.5	16/10/2017	17/10/2017	25.75	EHG/GOV. FAULTS, MISC.
		1	49.5	23/11/2017	24/11/2017	25.5	BRAKE AND JACKS
		2	49.5	21/10/2017	24/10/2017	75.58	DRAINAGE DEWATERING SYSTEM
		2	49.5	08/02/2018	28/02/2018	485.57	TURBINE POWER HOUSE MISCS
		2	49.5	09/09/2017	10/09/2017	38.33	MISCELLANEOUS
		2	49.5	11/09/2017	13/09/2017	64.25	MISCELLANEOUS
		2	49.5	16/09/2017	22/09/2017	145.5	MISCELLANEOUS
		2	49.5	15/11/2017	05/12/2017	473.92	MISCELLANEOUS
		2	49.5	18/12/2017	23/12/2017	129.25	MISCELLANEOUS
		2	49.5	20/08/2017	25/08/2017	114.58	GOVERNOR SYSTM
		2	49.5	16/08/2017	18/08/2017	62.75	GOVERNOR SYSTM
		2	49.5	21/07/2017	22/07/2017	26.67	GOVERNOR SYSTM
		4	32	02/11/2017	14/11/2017	297	EHT/ISOLATOR
		7	37.5	30/08/2017	31/08/2017	28.17	NEEDLE PROBLEM
		7	37.5	01/04/2017	29/08/2017	3619.67	MISCELLANEOUS
		8	24	15/04/2017	26/04/2017	257.75	EHG/GOV. FAULTS, MISC.
		8	24	01/05/2017	31/05/2017	743.98	MISCELLANEOUS
94	RENGALI HPS.	1	50	14/12/2017	16/12/2017	54.17	GOVERNOR SYSTM
		1	50	17/07/2017	20/07/2017	70.13	EHG/GOV. FAULTS, MISC.
		1	50	25/08/2017	11/11/2017	1872.17	GENERATOR FAULTS
		4	50	30/04/2017	02/05/2017	47.67	MISCELLANEOUS
		5	50	13/05/2017	17/02/2018	6726.92	MISCELLANEOUS
		5	50	17/02/2018	23/02/2018	142.95	AUTO. VOLTAGE REGULATOR
95	UPPER INDRAVATI HPS.	1	150	15/07/2017	18/07/2017	78.83	MISCELLANEOUS
		1	150	26/08/2017	27/08/2017	26.22	TURBINE POWER HOUSE MISCS
		1	150	20/09/2017	22/09/2017	53.33	TURBINE POWER HOUSE MISCS
		2	150	19/09/2017	21/09/2017	47.08	TURBINE POWER HOUSE MISCS
96	UPPER KOLAB HPS.	1	80	28/05/2017	31/05/2017	88.48	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		1	80	27/07/2017	29/07/2017	48.83	MISCELLANEOUS
		3	80	19/04/2017	21/10/2017	4448.13	GENERATOR FAULTS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-18
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	80	26/03/2018	29/03/2018	67.33	TURBINE POWER HOUSE MISCS
TUL							
97	TEESTA-III HPS	1	200	16/08/2017	18/08/2017	51.67	FORCED OUTAGE
		1	200	08/08/2017	11/08/2017	67.5	U.A.T
		1	200	11/09/2017	14/09/2017	75.23	EXCITATION POWER HOUSE MISCS
		2	200	16/08/2017	18/08/2017	52.52	FORCED OUTAGE
		3	200	16/08/2017	18/08/2017	47.82	FORCED OUTAGE
		4	200	16/08/2017	18/08/2017	51.92	FORCED OUTAGE
		5	200	16/08/2017	18/08/2017	51.3	FORCED OUTAGE
		6	200	28/12/2017	30/12/2017	45.75	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		6	200	16/08/2017	18/08/2017	51.58	FORCED OUTAGE
WBSEDCL							
98	PURULIA PSS HPS.	1	225	01/01/2018	24/02/2018	1308	FORCED OUTAGE
		2	225	04/07/2017	10/07/2017	141.17	LOWER GUIDE BEARING
NORTH EASTERN REGION							
MePGCL							
99	KYRDEMKULAI HPS.	1	30	09/09/2017	21/12/2017	2466.17	RUNNER/UNDER WATER PARTS
100	MYNTDU(LESHKA) St-1 HPS	1	42	27/10/2017	08/12/2017	1021	MISCELLANEOUS
		1	42	31/05/2017	02/06/2017	39.15	MISCELLANEOUS
101	NEW UMTRU HPS	1	20	19/01/2018	20/01/2018	28.33	POWER HOUSE MISCS
		2	20	27/01/2018	28/01/2018	26.75	MISCELLANEOUS
102	UMIAM HPS ST-I	3	9	12/09/2017	30/09/2017	455.15	POWER HOUSE MISCS
		4	9	11/01/2018	12/01/2018	32.17	GOVERNOR SYSTM
103	UMIAM HPS ST-IV	7	30	14/11/2017	16/11/2017	62.98	THRUST BEARING PADS.
		7	30	20/04/2017	22/04/2017	47.5	DAM/SPILL WAYS
		7	30	17/12/2017	18/12/2017	37.5	SHAFT SEAL
		8	30	20/04/2017	22/04/2017	47.5	DAM/SPILL WAYS
		8	30	17/12/2017	18/12/2017	28.5	SHAFT SEAL
NEEPCO.							
104	DOYANG HPS.	2	25	20/11/2017	31/03/2018	3134.72	TRANSFORMER PROTECTION
		2	25	27/10/2017	29/10/2017	50.65	SHAFT SEAL
105	KHONDONG HPS.	1	25	17/05/2017	24/05/2017	182.03	FORCED OUTAGE
		2	25	17/05/2017	24/05/2017	180.42	FORCED OUTAGE
		2	25	21/10/2017	22/10/2017	30.22	EHG/GOV. FAULTS, MISC.
106	KOPILI HPS.	1	50	27/10/2017	28/10/2017	37.02	LOWER GUIDE BEARING
		1	50	03/12/2017	04/12/2017	25.17	FORCED OUTAGE
		1	50	26/07/2017	28/07/2017	55.45	UPPER GUIDE BEARING
		1	50	28/07/2017	01/08/2017	90.82	U.G.B.OIL SYSTEM
		1	50	19/09/2017	20/09/2017	30.67	GOVERNOR SYSTM
		2	50	01/09/2017	28/09/2017	660.5	VIBRATION/SOUND/ ALIGNMENT
		2	50	23/07/2017	24/07/2017	33.88	SHAFT SEAL
		3	50	15/05/2017	23/05/2017	206.38	TRANSFORMER PROTECTION

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2017-18
(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	50	26/01/2018	28/01/2018	47.6	EHG/GOV. FAULTS, MISC.
		3	50	01/08/2017	03/08/2017	50.2	SHAFT VIBRS./ALIGNM/SOUND
		3	50	02/11/2017	06/11/2017	98.15	PROTECTION OPERATION
		3	50	09/02/2018	10/02/2018	25.42	GENEREATOR COOLING SYSTEM
		3	50	15/09/2017	16/09/2017	41.65	FORCED OUTAGE
		4	50	20/07/2017	22/07/2017	39.4	THRUST BEARING
		4	50	11/03/2018	13/03/2018	47.32	FORCED OUTAGE
		4	50	14/09/2017	15/09/2017	25.98	LT AC PANELS
		4	50	09/11/2017	10/11/2017	25.25	LT AC PANELS
		4	50	15/09/2017	16/09/2017	24.7	UPPER GUIDE BEARING
		4	50	17/02/2018	28/02/2018	281.77	POWER HOUSE MISC (D/T,GUIDE/STAY VANES
		5	25	10/01/2018	12/01/2018	60.95	LGB OIL SYSTEMS PROBLEMBS
		5	25	19/10/2017	24/10/2017	123.5	MISCELLANEOUS
		5	25	01/09/2017	04/09/2017	77.68	MISCELLANEOUS
		5	25	24/06/2017	25/06/2017	24.48	LOWER GUIDE BEARING
		5	25	15/04/2017	17/04/2017	42.73	MISCELLANEOUS
		5	25	25/10/2017	02/12/2017	913.32	LT AC PANELS
107	RANGANADI HPS.	1	135	09/07/2017	10/07/2017	26.43	INTAKE STRICT./TRASH RACK
		1	135	22/01/2018	24/01/2018	64.87	TURBINE FAULTS
		2	135	09/07/2017	11/07/2017	47.72	INTAKE STRICT./TRASH RACK
		3	135	09/07/2017	11/07/2017	44.48	INTAKE STRICT./TRASH RACK
108	TUIRIAL HPS	1	30	26/11/2017	07/12/2017	267.33	STATOR EARTH FAULT

CHAPTER-6

OPERATING AVAILABILITY OF HE 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 at 712 Hydro Generating units of 206 HE Stations comprising of 45293.42 MW, operating availability of various units and stations has been computed. During the year 2017-18, the average operating availability of hydro generating units on all India basis was 91.29% as compared to 90.24% during 2016-17.

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 The number of H.E. Stations falling under various ranges of operating availability during the year 2017-18 is summarized below in **Table 6.1.**

TABLE 6.1

OPERATING AVAILABILITY OF H.E. STATIONS (PERIOD: 2017-18)

Operating Availability (%)	No. of Stations	% of total Stations	Installed Capacity (MW)	% of total Installed Capacity
≥95%	93	45.15	20551.42	45.37
≥90 to 95	45	21.84	12640.75	27.91
≥85 to 90	18	8.74	2635.70	5.82
≥80 to 85	14	6.80	3012.00	6.65
< 80	36	17.48	6453.55	14.25
Total	**206**	**100**	**45293.42**	**100**

6.3 OPERATING AVAILABILITY – REGION-WISE

Region-wise operating availability of hydro-electric units during 2017-18 is indicated in **Table 6.2**.

TABLE 6.2

AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2017-18

Sl. No.	Region	No. of Units	Installed Capacity (MW)	Planned Maintenance %	Forced Outage %	Operating Availability (%)
1	Northern	245	18969.27	6.87	1.92	91.21
2	Western	101	7392.00	3.14	3.01	93.85
3	Southern	249	11727.70	4.71	3.21	92.07
4	Eastern	84	5862.45	6.29	6.54	87.17
5	N- Eastern	33	1342.00	3.96	6.72	89.31
	All India	**712**	**45293.42**	**5.54**	**3.17**	**91.29**

It is seen that the operating availability of hydel generating units in Western Region was the highest (93.85%). The operating availability was the lowest in case of units in Eastern Region (87.17%) due to high planned maintenance and forced outages.

6.4 OPERATING AVAILABILITY: AGE-WISE

The average operating availability during 2017-18 of hydro units commissioned in various years has been indicated in **Table 6.3**. It is observed that units commissioned during 2015-16 and 2017-18 have achieved the operating availability of more than 99%. Operating availability was less than 90% for the units commissioned up to 1977-78 & during 1989-90 to 1999-2000. Operating availability was more than 90% for all the other years.

TABLE - 6.3

OPERATING AVAILABILITY – AGE-WISE
PERIOD: 2017-18

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Operating Availability (%)
1	2017-2018	16	795.00	99.38
2	2016-2017	18	1659.00	93.69
3	2015-2016	17	1516.00	99.56
4	2010-11 to 2014-15	63	4437.02	92.42
5	2005-06 to 2009-10	66	7077.00	92.64
6	2000-01 to 2004-05	75	6766.80	95.15
7	1989-90 to 1999-2000	87	5775.70	88.92
8	1978-79 to 1988-89	124	7259.10	91.93
9	1967-68 to 1977-78	82	5304.75	86.20
10	Up to 1966-67	164	4703.05	84.56
	Total	**712**	**45293.42**	**91.29**

6.5 OPERATING AVAILABILITY – UTILITY-WISE

Sector-wise/State & Private Power Generating Corporation-wise operating availability of HE units is indicated in **Table 6.4**.

It was observed that the operating availability of generating units of Private Sector was the highest (97.20%) followed by Central Sector (92.45%) and State Sector (89.90%).

TABLE 6.4

SECTOR-WISE OPERATING AVAILABILITY OF UTILITIES FOR PERIOD: 2017-18

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
Central						
1	BBMB	28	2866.30	9.10	6.19	84.71
2	DVC	5	143.20	0.04	24.95	75.01
3	NEEPCO	15	815.00	5.10	7.05	87.85
4	NHDC	16	1520.00	3.60	0.21	96.19
5	NHPC	70	5451.20	5.79	0.84	93.37
6	NTPC Ltd.	4	800.00	1.71	0.19	98.10
7	SJVNL	12	1912.02	1.60	0.35	98.05
8	THDC	8	1400.00	6.52	0.06	93.42
Sub Total (CS)		**158**	**14907.72**	**5.39**	**2.16**	**92.45**
State						
1	APGENCO	30	1336.75	0.44	3.54	96.02
2	APGPCL	2	100.00	0.22	0.00	99.78
3	CSPGCL	3	120.00	0.19	0.05	99.76
4	GSECL	8	540.00	0.00	21.94	78.06
5	HPPCL	5	295.00	8.51	1.12	90.37
6	HPSEB	12	372.00	10.87	0.20	88.93
7	JKSPDC	12	1110.00	4.95	0.43	94.62
8	JSEB	2	130.00	0.00	17.53	82.47
9	KPCL	68	3585.40	4.92	2.34	92.74
10	KSEB	48	1881.50	11.75	2.64	85.61
11	MAHAGENCO	24	2406.00	0.86	2.91	96.23
12	MPPGCL	23	875.00	8.23	3.03	88.74
13	MePGCL	13	322.00	2.67	10.18	87.15

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
14	OHPC	31	2027.50	11.75	11.82	76.43
15	PSPCL	25	1051.00	8.45	4.13	87.42
16	RRVUNL	11	411.00	3.93	0.17	95.90
17	SSNNL	11	1450.00	5.57	0.10	94.33
18	TNGDCL	70	2203.20	6.28	4.27	89.45
19	TSGENCO	39	2835.60	0.40	4.79	94.81
20	TUL	6	1200.00	5.08	1.32	93.60
21	UJVNL	34	1252.15	14.86	2.52	82.62
22	UPJVNL	15	501.60	27.23	10.44	62.33
23	WBSEDCL	12	986.00	3.56	3.75	92.69
Sub Total (State)		**504**	**26991.70**	**5.99**	**4.11**	**89.90**
Private						
1	ADHPL	2	192.00	6.30	2.36	91.34
2	AHPC (GVK)	4	330.00	0.00	0.05	99.95
3	DEPL	4	193.00	0.07	0.07	99.86
4	DLHP	1	34.00	0.00	0.01	99.99
5	E.P.P.L.	2	100.00	5.15	0.05	94.80
6	GBHPPL	2	70.00	9.18	0.68	90.14
7	GISL	2	110.00	7.42	0.70	91.88
8	JSWHEL	7	1300.00	4.44	0.01	95.55
9	IAEPL	3	36.00	0.10	0.09	99.81
10	JPPVL	4	400.00	0.71	0.27	99.02
11	MPCL	2	86.00	0.08	0.02	99.90
12	SKPPPL	2	96.00	0.22	0.13	99.65
	TATA MAH.	15	447.00	0.75	0.18	99.07
Sub Total (Pvt.)		**50**	**3394.00**	**2.65**	**0.15**	**97.20**
Grand Total		**712**	**45293.42**	**5.54**	**3.17**	**91.29**

6.6 OPERATING AVAILABILITY BELOW 90%- STATION-WISE

It is observed that 22 nos. of stations had operating availability below 90% continuously for last 3 years. The details of these stations is given below in **Table 6.5.** As normative availability factor for entire useful life of station considered during planning stage is 95%,

the stations/utilities having lower operating availability factor need to improve their O&M practices to bring down the outages as per best practices.

TABLE-6.5

OPERATING AVAILABILITY OF H. E. STATIONS CONTINUOUSLY LESS THAN 90% DURING LAST THREE YEARS (2015-16 TO 2017-18)

Sl. No.	Name of the Stations	Name of the Utility	Installed Capacity (MW)	Operating Availability (%)		
				2015-16	2016-17	2017-18
1	Dehar	BBMB	990.00	81.38	72.00	76.99
2	Ganguwal		77.65	66.25	64.66	77.67
3	Kotla		77.65	64.88	65.40	77.68
4	Salal-II	NHPC	345.00	81.14	81.57	88.50
5	Tanakpur		94.20	86.54	79.04	85.72
6	Uri-II		240.00	70.33	85.56	85.31
7	Ranjit Sagar	PSPCL	600.00	71.96	78.28	82.40
8	Chibro (Yamuna)	UJVNL	240.00	85.48	86.39	84.03
9	Dhalipur		51.00	87.43	79.04	78.22
10	Maneri Bhali - I		90.00	76.58	76.61	84.07
11	Rihand	UPJVNL	300.00	52.80	44.72	57.56
12	Rajghat	MPPGCL	45.00	80.28	49.38	34.83
13	Almatti dph	KPCL	290.00	78.05	81.06	87.46
14	Poringalkuttu	KSEBL	32.00	79.44	75.21	66.82
15	Sabarigiri		300.00	89.41	85.97	84.98
16	Machkund	APGENCO	114.75	59.83	88.71	69.65
17	Panchet	DVC	80.00	79.92	56.69	55.24
18	Balimela	OHPC	510.00	74.20	83.81	74.77
19	Hirakud - I		275.50	65.93	66.94	55.05
20	Hirakud - II		72.00	58.96	62.09	62.82
21	Kyrdemkulai	MePGCL	60.00	49.88	64.73	60.44
22	Kopili	NEEPCO	225.00	65.91	77.86	76.69

EXHIBIT 6.1

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
ALLAIN DUHANGAN HPS
6.40
2.36
91.24
SRINAGAR HPS
0.00
0.05
99.95
BHAKRA LEFT H P S
20.36
0.00
79.64
BHAKRA RIGHT H P S
4.25
0.01
95.74
DEHAR H P S
7.61
15.40
76.99
GANGUWAL HPS
22.28
0.05
77.67
KOTLA HPS
22.31
0.01
77.68
PONG H P S
2.41
6.50
91.09
MALANA-II HPS
5.15
0.05
94.80
BUDHIL HPS
9.53
1.43
89.04
BASPA HPS
1.38
0.00
98.62
KARCHAM WANGTOO HPS
5.36
0.01
94.63
KASHANG-I HPS
33.49
1.85
64.66
KASHANG-II HPS
2.61
1.87
95.52
SAINJ HPS
0.00
0.41
99.59

EXHIBIT 6.2

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18

EXHIBIT 6.3

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
CHUTAK HPS
8.01
0.57
91.42
DHAULI GANGA HPS
5.82
0.26
93.92
DULHASTI HPS
4.34
0.43
95.23
KISHENGANGA HPS
0.00
0.00
100.00
NIMMO BAZGO HPS
2.55
1.35
96.10
PARBATI-III HPS
15.75
0.89
83.36
SALAL-I HPS
3.93
0.61
95.47
SALAL-I HPS
10.75
0.75
88.50
SEWA-II HPS
3.22
1.15
95.63
TANAKPUR HPS
13.92
0.36
85.72
URI-I HPS
5.99
0.30
93.71
URI-II HPS
4.70
9.99
85.31
KOLDAM HPS
1.71
0.19
98.10
ANANDPUR SAHIB-I HPS
3.77
2.02
94.22
ANANDPUR SAHIB-II HPS
3.64
0.29
96.08

EXHIBIT 6.4

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18

EXHIBIT 6.5

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
CHILLA HPS
13.50
4.46
82.04
DHAKRANI HPS
6.41
0.67
92.92
DHALIPUR HPS
18.83
2.95
78.22
KHATIMA HPS
0.00
1.22
98.78
KHODRI HPS
17.43
6.53
76.04
KULHAL HPS
13.24
1.78
84.98
MANERI BHALI-I HPS
15.31
0.62
84.07
MANERI BHALI-II HPS
1.02
2.60
96.38
RAMGANGA HPS
39.49
3.48
57.03
KHARA HPS
9.81
11.96
78.23
MATATILA HPS
0.00
34.80
65.20
OBRA HPS
3.55
1.97
94.48
RIHAND HPS
31.79
10.65
57.56
HASDEOBANGO HPS
0.19
0.05
99.76
BHANDARDHARA HPS ST-II
0.00
0.01
99.99

EXHIBIT 6.6

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
KADANA HPS
0.00
48.08
51.92
UKAI HPS
0.00
1.02
98.98
BHIRA TAIL RACE HPS
0.15
0.15
99.70
GHATGHAR PSS HPS
0.23
22.50
77.27
KOYNA DPH HPS
0.00
3.08
96.92
KOYNA-I & II HPS
0.19
0.33
99.48
KOYNA-III HPS
0.00
0.08
99.92
KOYNA-IV HPS
1.48
0.31
98.21
TILLARI HPS
0.00
15.22
84.78
VAITARNA HPS
8.58
0.40
91.02
BANSAGAR TONS-I HPS
6.91
5.64
87.45
BANSAGAR TONS-II HPS
6.70
0.26
93.04
BANSAGAR TONS-III HPS
3.59
0.01
96.40
BARGI HPS
7.67
0.01
92.32
GANDHI SAGAR HPS
3.43
5.18
91.39

EXHIBIT 6.7

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
MADHIKHERA HPS
4.37
0.01
95.62
PENCH HPS
3.30
2.26
94.44
RAJGHAT HPS
0.48
64.69
34.83
INDIRA SAGAR HPS
4.20
0.06
95.74
OMKARESHWAR HPS
2.81
0.57
96.62
S SAROVAR CHPH HPS
6.23
0.61
93.16
S SAROVAR RBPH HPS
5.61
0.00
94.39
BHIRA HPS
0.35
0.25
99.40
BHIRA PSS HPS
1.88
0.00
98.12
BHIVPURI HPS
0.00
0.62
99.38
KHOPOLI HPS
0.00
0.03
99.97
HAMPI HPS
0.46
10.71
88.83
NAGARJUN SGR TPD HPS
0.15
0.01
99.84
NAGARJUN SGR RBC HPS
0.00
0.00
100.00
NAGARJUN SGR RBC EXTN. HPS
0.43
0.26
99.31

EXHIBIT 6.8

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
SRISAILAM HPS
0.00
0.03
99.97
T B DAM HPS
0.87
1.18
97.95
UPPER SILERU-I HPS
3.43
2.50
94.07
UPPER SILERU-I HPS
1.07
4.85
94.08
ALMATTI DPH HPS
12.11
0.43
87.46
BHADRA HPS
17.17
0.04
82.79
GERUSUPPA HPS
0.39
0.61
99.00
GHAT PRABHA HPS
19.38
0.04
80.58
JOG HPS
19.34
13.74
66.92
KADRA HPS
0.11
0.25
99.64
KALINADI HPS
2.07
5.92
92.01
KALINADI SUPA HPS
0.15
0.01
99.84
KODASALI HPS
0.14
0.05
99.81
LIGANAMAKKI HPS
0.21
0.08
99.71
MUNIRABAD HPS
0.10
0.02
99.88

EXHIBIT 6.9

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18

EXHIBIT 6.10

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
SHOLAYAR HPS.
6.22
37.27
56.51
ALIYAR HPS.
0.00
25.21
74.79
BHAWANI BARRAGE- III HPS
0.03
1.00
98.97
BHAWANI BARRAGE-II HPS
0.01
0.27
99.72
BHAWANI KATTAL
24.24
0.77
74.99
KADAMPARI HPS.
0.00
5.19
94.81
KODAYAR-I HPS.
0.00
5.26
94.74
KODAYAR-II HPS.
0.17
16.43
83.40
KUNDAH-I HPS.
0.48
1.05
98.47
KUNDAH-II HPS.
5.37
1.77
92.86
KUNDAH-III HPS.
2.29
5.80
91.91
KUNDAH-VI HPS.
4.58
0.35
95.08
KUNDAH-V HPS.
0.67
11.13
88.21
LOWER METTUR-I HPS.
10.24
0.41
89.35
LOWER METTUR-II HPS.
7.88
0.41
91.71

EXHIBIT 6.11

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
LOWER METTUR-III HPS.
0.00
0.24
99.76
LOWER METTUR-V HPS.
3.76
0.13
96.12
METTUR DAM HPS.
3.83
0.00
96.17
METTUR TUNNEL HPS.
22.05
0.00
77.95
MOYAR HPS
0.49
13.24
86.27
PAPANASAM HPS.
3.59
2.39
94.02
PARSON'S VALLEY HPS.
0.44
0.75
98.81
PERIYAR HPS.
21.56
0.03
78.41
PYKARA HPS.
0.30
1.28
98.42
PYKARA ULTMATE HPS.
10.21
1.06
88.73
SARKARPATHY HPS.
0.43
0.00
99.57
SHOLAYAR(TN) HPS.
0.27
0.06
99.67
SURULIYAR HPS.
12.12
4.76
83.12
LOWER JURALA HPS
0.10
0.03
99.87
LOWER SILERU HPS
0.00
25.00
75.00

EXHIBIT 6.12

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
NAGARJUN SGR HPS
1.28
2.45
96.27
NAGARJUN SGR LBC HPS
0.22
0.00
99.78
POCHAMPAD HPS
0.11
0.00
99.89
PRIYADARSHNI JURALA HPS
0.00
0.40
99.60
PULICHINTALA HPS
0.14
0.05
99.81
SRISAILAM LB HPS
0.07
0.04
99.89
MACHKUND HPS
0.00
30.35
69.65
JORETHANG LOOP
0.22
0.13
99.65
TASHIDING HPS
0.00
0.00
100.00
MAITHON HPS.
0.16
0.00
99.84
PANCHET HPS.
0.00
44.76
55.24
CHUZACHEN HPS
3.42
0.70
95.88
SUBERNREKHA-I HPS.
0.00
5.95
94.05
SUBERNREKHA-II HPS.
0.00
29.49
70.51
RANGIT HPS
6.00
0.80
93.20

EXHIBIT 6.13
OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
TEESTA LOW DAM-III HPS
4.43
0.11
95.46
TEESTA LOW DAM-IV HPS
3.77
0.24
95.99
TEESTA V HPS
3.26
0.18
96.56
BALIMELA HPS.
16.41
8.82
74.77
HIRAKUD-I HPS
34.96
9.99
55.05
HIRAKUD-II HPS
33.33
3.86
62.82
RENGALI HPS.
5.29
20.53
74.18
UPPER INDRAVATI HPS.
4.05
0.78
95.17
UPPER KOLAB HPS.
0.25
34.50
65.25
DIKCHU HPS
0.22
0.13
99.65
TEESTA-III HPS
5.08
1.32
93.60
JALDHAKA HPS ST-I
0.45
0.02
99.53
PURULIA PSS HPS.
3.24
4.14
92.62

EXHIBIT 6.14

OPERATING AVAILABILITY OF H E STATIONS DURING 2017-18

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
	NORTHERN REGION					
	ADHPL					
1	ALLAIN DUHANGAN HPS	1	96.00	6.50	1.02	92.48
		2	96.00	6.29	3.71	90.00
	TOTAL :		**192.00**	**6.40**	**2.36**	**91.24**
	AHPC (GVK)					
2	SRINAGAR HPS	1	82.50	0.00	0.03	99.97
		2	82.50	0.00	0.08	99.92
		3	82.50	0.00	0.03	99.97
		4	82.50	0.01	0.07	99.92
	TOTAL :		**330.00**	**0.00**	**0.05**	**99.95**
	BBMB					
3	BHAKRA LEFT H P S	1	108.00	0.00	0.00	100.00
		2	108.00	1.82	0.00	98.18
		3	108.00	0.00	0.00	100.00
		4	108.00	0.00	0.00	100.00
		5	108.00	100.00	0.00	0.00
	TOTAL :		**540.00**	**20.36**	**0.00**	**79.64**
4	BHAKRA RIGHT H P S	1	157.00	21.25	0.00	78.75
		2	157.00	0.00	0.00	100.00
		3	157.00	0.00	0.00	100.00
		4	157.00	0.00	0.03	99.97
		5	157.00	0.00	0.04	99.96
	TOTAL :		**785.00**	**4.25**	**0.01**	**95.74**
5	DEHAR H P S	1	165.00	0.00	0.22	99.78
		2	165.00	18.30	0.00	81.70
		3	165.00	0.00	0.29	99.71
		4	165.00	0.00	0.00	100.00
		5	165.00	0.00	91.89	8.11
		6	165.00	27.36	0.01	72.63
	TOTAL :		**990.00**	**7.61**	**15.40**	**76.99**
6	GANGUWAL HPS	1	29.25	1.45	0.07	98.48
		2	24.20	65.36	0.07	34.57
		3	24.20	4.39	0.00	95.61
	TOTAL :		**77.65**	**22.28**	**0.05**	**77.67**
7	KOTLA HPS	1	29.25	0.65	0.02	99.33
		2	24.20	2.97	0.00	97.03

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	24.20	67.83	0.00	32.17
	TOTAL :		**77.65**	**22.31**	**0.01**	**77.68**
8	PONG H P S	1	66.00	0.00	6.63	93.37
		2	66.00	1.73	32.22	66.05
		3	66.00	1.34	0.00	98.66
		4	66.00	4.74	0.16	95.10
		5	66.00	0.00	0.00	100.00
		6	66.00	6.63	0.00	93.37
	TOTAL :		**396.00**	**2.41**	**6.50**	**91.09**
	E.P.P.L.					
9	MALANA-II HPS	1	50.00	5.15	0.06	94.79
		2	50.00	5.16	0.04	94.80
	TOTAL :		**100.00**	**5.15**	**0.05**	**94.80**
	GBHPPL					
10	BUDHIL HPS	1	35.00	6.78	1.88	91.34
		2	35.00	12.29	0.98	86.73
	TOTAL :		**70.00**	**9.53**	**1.43**	**89.04**
	JSW HYDRO ENERGY LIMITED (JSWHEL)					
11	BASPA HPS	1	100.00	1.44	0.00	98.56
		2	100.00	1.53	0.00	98.47
		3	100.00	1.18	0.00	98.82
	TOTAL :		**300.00**	**1.38**	**0.00**	**98.62**
12	KARCHAM WANGTOO HPS	1	250.00	6.80	0.02	93.18
		2	250.00	6.27	0.01	93.72
		3	250.00	6.17	0.00	93.83
		4	250.00	2.20	0.00	97.80
	TOTAL :		**1000.00**	**5.36**	**0.01**	**94.63**
	HPPCL					
13	KASHANG-I HPS	1	65.00	33.49	1.85	64.66
	TOTAL :		**65.00**	**33.49**	**1.85**	**64.66**
14	KASHANG-II HPS	1	65.00	0.00	2.02	97.98
		2	65.00	5.21	1.72	93.07
	TOTAL :		**130.00**	**2.61**	**1.87**	**95.52**
15	SAINJ HPS	1	50.00	0.00	0.70	99.30
		2	50.00	0.00	0.12	99.88
	TOTAL :		**100.00**	**0.00**	**0.41**	**99.59**
	HPSEBL					
16	BASSI HPS	1	16.50	23.50	0.21	76.29

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	16.50	6.96	0.28	92.76
		3	16.50	33.80	0.03	66.17
		4	16.50	14.77	0.07	85.16
	TOTAL :		**66.00**	**19.76**	**0.15**	**80.09**
17	GIRI BATA HPS	1	30.00	3.51	1.38	95.11
		2	30.00	5.41	0.85	93.74
	TOTAL :		**60.00**	**4.46**	**1.11**	**94.43**
18	LARJI HPS	1	42.00	14.84	0.15	85.01
		2	42.00	4.28	0.11	95.61
		3	42.00	17.87	0.17	81.96
	TOTAL :		**126.00**	**12.33**	**0.14**	**87.53**
19	SANJAY HPS	1	40.00	11.12	0.07	88.81
		2	40.00	11.03	0.98	87.99
		3	40.00	2.73	0.52	96.75
	TOTAL :		**120.00**	**8.29**	**0.52**	**91.19**
	IAEPL					
20	CHANJU-I HPS	1	12.00	0.29	0.00	99.71
		2	12.00	0.00	0.26	99.74
		3	12.00	0.00	0.00	100.00
	TOTAL :		**36.00**	**0.10**	**0.09**	**99.81**
	JKSPDC					
21	BAGLIHAR HPS	1	150.00	12.33	0.00	87.67
		2	150.00	12.33	0.00	87.67
		3	150.00	12.33	0.00	87.67
	TOTAL :		**450.00**	**12.33**	**0.00**	**87.67**
22	BAGLIHAR II HPS	1	150.00	0.00	0.00	100.00
		2	150.00	0.00	0.00	100.00
		3	150.00	0.00	0.00	100.00
	TOTAL :		**450.00**	**0.00**	**0.00**	**100.00**
23	LOWER JHELUM HPS	1	35.00	0.00	0.01	99.99
		2	35.00	0.00	0.06	99.94
		3	35.00	1.96	0.00	98.04
	TOTAL :		**105.00**	**0.65**	**0.02**	**99.33**
24	UPPER SINDH-II HPS	3	35.00	0.09	5.65	94.26
		4	35.00	0.24	8.62	91.14
		5	35.00	0.09	1.53	98.38
	TOTAL :		**105.00**	**0.14**	**5.27**	**94.59**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
	JPPVL					
25	VISHNU PRAYAG HPS	1	100.00	0.91	0.16	98.93
		2	100.00	1.05	0.29	98.66
		3	100.00	0.44	0.13	99.43
		4	100.00	0.44	0.48	99.08
	TOTAL :		**400.00**	**0.71**	**0.27**	**99.02**
	MPCL					
26	MALANA HPS	1	43.00	0.14	0.04	99.82
		2	43.00	0.01	0.00	99.99
	TOTAL :		**86.00**	**0.08**	**0.02**	**99.90**
	NHPC					
27	BAIRA SIUL HPS	1	60.00	10.58	0.79	88.63
		2	60.00	8.04	1.27	90.69
		3	60.00	8.51	0.94	90.55
	TOTAL :		**180.00**	**9.04**	**1.00**	**89.96**
28	CHAMERA- I HPS	1	180.00	2.00	0.45	97.55
		2	180.00	2.27	0.46	97.27
		3	180.00	2.41	0.02	97.57
	TOTAL :		**540.00**	**2.23**	**0.31**	**97.46**
29	CHAMERA- II HPS	1	100.00	2.59	0.34	97.07
		2	100.00	1.74	0.02	98.24
		3	100.00	7.12	0.02	92.86
	TOTAL :		**300.00**	**3.81**	**0.13**	**96.06**
30	CHAMERA-III HPS	1	77.00	3.96	0.03	96.01
		2	77.00	4.71	0.15	95.14
		3	77.00	8.43	0.06	91.51
	TOTAL :		**231.00**	**5.70**	**0.08**	**94.22**
31	CHUTAK HPS	1	11.00	9.38	1.28	89.34
		2	11.00	7.64	0.13	92.23
		3	11.00	11.56	0.03	88.41
		4	11.00	3.49	0.85	95.66
	TOTAL :		**44.00**	**8.01**	**0.57**	**91.42**
32	DHAULI GANGA HPS	1	70.00	5.82	0.45	93.73
		2	70.00	5.08	0.14	94.78
		3	70.00	5.20	0.28	94.52
		4	70.00	7.17	0.19	92.64
	TOTAL :		**280.00**	**5.82**	**0.26**	**93.92**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
33	DULHASTI HPS	1	130.00	3.55	0.95	95.50
		2	130.00	4.81	0.07	95.12
		3	130.00	4.65	0.28	95.07
	TOTAL :		**390.00**	**4.34**	**0.43**	**95.23**
34	KISHENGANGA HPS	1	110.00	0.00	0.00	100.00
		2	110.00	0.00	0.00	100.00
		3	110.00	0.00	0.00	100.00
	TOTAL :		**330.00**	**0.00**	**0.00**	**100.00**
35	NIMMO BAZGO HPS	1	15.00	3.63	0.46	95.91
		2	15.00	3.96	3.25	92.79
		3	15.00	0.08	0.33	99.59
	TOTAL :		**45.00**	**2.55**	**1.35**	**96.10**
36	PARBATI-III HPS	1	130.00	33.19	0.04	66.77
		2	130.00	19.06	1.03	79.91
		3	130.00	5.46	0.45	94.09
		4	130.00	5.30	2.06	92.64
	TOTAL :		**520.00**	**15.75**	**0.89**	**83.36**
37	SALAL-I HPS	1	115.00	4.48	0.23	95.29
		2	115.00	4.69	0.26	95.05
		3	115.00	2.61	1.33	96.06
	TOTAL :		**345.00**	**3.93**	**0.61**	**95.47**
38	SALAL-II HPS	1	115.00	13.45	0.71	85.84
		2	115.00	11.08	0.50	88.42
		3	115.00	7.72	1.04	91.24
	TOTAL :		**345.00**	**10.75**	**0.75**	**88.50**
39	SEWA-II HPS	1	40.00	3.65	0.19	96.16
		2	40.00	3.43	1.60	94.97
		3	40.00	2.59	1.64	95.77
	TOTAL :		**120.00**	**3.22**	**1.15**	**95.63**
40	TANAKPUR HPS	1	31.40	5.11	0.17	94.72
		2	31.40	25.32	0.32	74.36
		3	31.40	11.31	0.61	88.08
	TOTAL :		**94.20**	**13.92**	**0.36**	**85.72**
41	URI-I HPS	1	120.00	7.19	0.03	92.78
		2	120.00	7.46	0.88	91.66
		3	120.00	4.52	0.05	95.43
		4	120.00	4.79	0.25	94.96
	TOTAL :		**480.00**	**5.99**	**0.30**	**93.71**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
42	URI-II HPS	1	60.00	6.03	32.32	61.65
		2	60.00	3.77	2.80	93.43
		3	60.00	5.73	1.45	92.82
		4	60.00	3.25	3.38	93.37
	TOTAL :		**240.00**	**4.70**	**9.99**	**85.31**
	NTPC Ltd.					
43	KOLDAM HPS	1	200.00	2.98	0.27	96.75
		2	200.00	1.28	0.22	98.50
		3	200.00	1.85	0.02	98.13
		4	200.00	0.72	0.26	99.02
	TOTAL :		**800.00**	**1.71**	**0.19**	**98.10**
	PSPCL					
44	ANANDPUR SAHIB-I HPS	1	33.50	0.17	0.86	98.97
		2	33.50	7.36	3.17	89.47
	TOTAL :		**67.00**	**3.77**	**2.02**	**94.22**
45	ANANDPUR SAHIB-II HPS	1	33.50	6.86	0.42	92.72
		2	33.50	0.42	0.15	99.43
	TOTAL :		**67.00**	**3.64**	**0.29**	**96.08**
46	MUKERIAN-I HPS	1	15.00	3.72	1.72	94.56
		2	15.00	5.53	0.02	94.45
		3	15.00	6.50	0.02	93.48
	TOTAL :		**45.00**	**5.25**	**0.59**	**94.16**
47	MUKERIAN-II HPS	1	15.00	5.31	0.38	94.31
		2	15.00	0.00	0.52	99.48
		3	15.00	5.84	0.02	94.14
	TOTAL :		**45.00**	**3.72**	**0.31**	**95.98**
48	MUKERIAN-III HPS	1	19.50	12.41	0.28	87.31
		2	19.50	4.46	1.78	93.76
		3	19.50	7.08	0.06	92.86
	TOTAL :		**58.50**	**7.98**	**0.71**	**91.31**
49	MUKERIAN-IV HPS	1	19.50	30.83	0.81	68.36
		2	19.50	1.52	0.24	98.24
		3	19.50	7.17	1.96	90.87
	TOTAL :		**58.50**	**13.17**	**1.00**	**85.82**
50	RANJIT SAGAR HPS	1	150.00	11.76	0.43	87.81
		2	150.00	8.27	1.21	90.52
		3	150.00	12.36	6.80	80.84

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	150.00	10.39	19.17	70.44
	TOTAL :		**600.00**	**10.70**	**6.90**	**82.40**
51	SHANAN HPS	1	15.00	6.69	0.03	93.28
		2	15.00	1.41	0.10	98.49
		3	15.00	1.00	0.06	98.94
		4	15.00	10.88	0.07	89.05
		5	50.00	2.17	0.16	97.67
	TOTAL :		**110.00**	**3.71**	**0.11**	**96.18**
	RRVUNL					
52	JAWAHAR SAGAR HPS	1	33.00	3.64	0.04	96.32
		2	33.00	3.92	0.07	96.01
		3	33.00	6.13	0.03	93.84
	TOTAL :		**99.00**	**4.57**	**0.05**	**95.38**
53	MAHI BAJAJ-I HPS	1	25.00	23.83	0.13	76.04
		2	25.00	0.00	1.17	98.83
	TOTAL :		**50.00**	**11.92**	**0.65**	**87.44**
54	MAHI BAJAJ-II HPS	1	45.00	0.00	0.00	100.00
		2	45.00	0.00	0.00	100.00
	TOTAL :		**90.00**	**0.00**	**0.00**	**100.00**
55	R P SAGAR HPS	1	43.00	4.44	0.00	95.56
		2	43.00	3.84	0.02	96.14
		3	43.00	1.97	0.00	98.03
		4	43.00	3.30	0.64	96.06
	TOTAL :		**172.00**	**3.39**	**0.17**	**96.44**
	SJVNL					
56	NATHPA JHAKRI HPS	1	250.00	1.23	0.12	98.65
		2	250.00	1.90	0.09	98.01
		3	250.00	1.21	0.00	98.79
		4	250.00	1.38	0.14	98.48
		5	250.00	1.61	0.00	98.39
		6	250.00	1.28	0.34	98.38
	TOTAL :		**1500.00**	**1.43**	**0.12**	**98.45**
57	RAMPUR HPS	1	68.67	3.01	2.06	94.93
		2	68.67	2.35	1.27	96.38
		3	68.67	2.29	2.85	94.86
		4	68.67	1.38	0.31	98.31
		5	68.67	2.79	0.29	96.92

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		6	68.67	1.44	0.29	98.27
	TOTAL :		**412.02**	**2.21**	**1.18**	**96.61**
	THDC					
58	KOTESHWAR HPS	1	100.00	0.00	0.03	99.97
		2	100.00	7.44	0.00	92.56
		3	100.00	6.65	0.00	93.35
		4	100.00	4.83	0.00	95.17
	TOTAL :		**400.00**	**4.73**	**0.01**	**95.26**
59	TEHRI ST-1 HPS	1	250.00	5.06	0.12	94.82
		2	250.00	4.68	0.00	95.32
		3	250.00	11.73	0.07	88.20
		4	250.00	9.24	0.14	90.62
	TOTAL :		**1000.00**	**7.68**	**0.08**	**92.24**
	UJVNL					
60	CHIBRO (YAMUNA) HPS	1	60.00	12.01	0.94	87.05
		2	60.00	20.12	0.79	79.09
		3	60.00	22.61	0.40	76.99
		4	60.00	6.75	0.25	93.00
	TOTAL :		**240.00**	**15.37**	**0.60**	**84.03**
61	CHILLA HPS	1	36.00	7.79	7.02	85.19
		2	36.00	17.87	1.35	80.78
		3	36.00	10.16	2.18	87.66
		4	36.00	18.20	7.27	74.53
	TOTAL :		**144.00**	**13.50**	**4.46**	**82.04**
62	DHAKRANI HPS	1	11.25	0.00	1.90	98.10
		2	11.25	0.00	0.01	99.99
		3	11.25	19.23	0.11	80.66
	TOTAL :		**33.75**	**6.41**	**0.67**	**92.92**
63	DHALIPUR HPS	1	17.00	8.23	1.87	89.90
		2	17.00	48.27	0.25	51.48
		3	17.00	0.00	6.75	93.25
	TOTAL :		**51.00**	**18.83**	**2.95**	**78.22**
64	KHATIMA HPS	1	13.80	0.00	0.41	99.59
		2	13.80	0.00	0.67	99.33
		3	13.80	0.00	2.58	97.42
	TOTAL :		**41.40**	**0.00**	**1.22**	**98.78**
65	KHODRI HPS	1	30.00	22.78	0.25	76.97
		2	30.00	33.72	23.91	42.37

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	30.00	6.97	1.92	91.11
		4	30.00	6.24	0.03	93.73
	TOTAL :		**120.00**	**17.43**	**6.53**	**76.04**
66	KULHAL HPS	1	10.00	25.93	2.31	71.76
		2	10.00	6.78	1.55	91.67
		3	10.00	6.99	1.47	91.54
	TOTAL :		**30.00**	**13.24**	**1.78**	**84.98**
67	MANERI BHALI-I HPS	1	30.00	30.90	1.27	67.83
		2	30.00	6.23	0.10	93.67
		3	30.00	8.79	0.50	90.71
	TOTAL :		**90.00**	**15.31**	**0.62**	**84.07**
68	MANERI BHALI-II HPS	1	76.00	4.07	0.67	95.26
		2	76.00	0.00	2.02	97.98
		3	76.00	0.00	0.59	99.41
		4	76.00	0.00	7.12	92.88
	TOTAL :		**304.00**	**1.02**	**2.60**	**96.38**
59	RAMGANGA HPS	1	66.00	39.04	2.71	58.25
		2	66.00	40.40	0.00	59.60
		3	66.00	39.03	7.74	53.23
	TOTAL :		**198.00**	**39.49**	**3.48**	**57.03**
	UPJVNL					
70	KHARA HPS	1	24.00	10.40	26.21	63.39
		2	24.00	2.73	8.87	88.40
		3	24.00	16.30	0.81	82.89
	TOTAL :		**72.00**	**9.81**	**11.96**	**78.23**
71	MATATILA HPS	1	10.20	0.00	33.45	66.55
		2	10.20	0.00	35.26	64.74
		3	10.20	0.00	35.69	64.31
	TOTAL :		**30.60**	**0.00**	**34.80**	**65.20**
72	OBRA HPS	1	33.00	5.32	0.00	94.68
		2	33.00	0.00	0.56	99.44
		3	33.00	5.32	5.36	89.32
	TOTAL :		**99.00**	**3.55**	**1.97**	**94.48**
73	RIHAND HPS	1	50.00	9.44	2.75	87.81
		2	50.00	96.58	0.00	3.42
		3	50.00	9.56	1.52	88.92
		4	50.00	49.53	0.32	50.15
		5	50.00	0.00	39.97	60.03

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		6	50.00	25.62	19.32	55.06
	TOTAL :		**300.00**	**31.79**	**10.65**	**57.56**
	WESTERN REGION					
	CSPGCL					
74	HASDEOBANGO HPS	1	40.00	0.00	0.16	99.84
		2	40.00	0.26	0.00	99.74
		3	40.00	0.29	0.00	99.71
	TOTAL :		**120.00**	**0.19**	**0.05**	**99.76**
	DLHP					
75	BHANDARDHARA HPS ST-II	2	34.00	0.00	0.01	99.99
	TOTAL :		**34.00**	**0.00**	**0.01**	**99.99**
	GSECL					
76	KADANA HPS	1	60.00	0.00	41.89	58.11
		2	60.00	0.00	52.44	47.56
		3	60.00	0.00	39.52	60.48
		4	60.00	0.00	58.46	41.54
	TOTAL :		**240.00**	**0.00**	**48.08**	**51.92**
77	UKAI HPS	1	75.00	0.00	4.09	95.91
		2	75.00	0.00	0.00	100.00
		3	75.00	0.00	0.00	100.00
		4	75.00	0.00	0.00	100.00
	TOTAL :		**300.00**	**0.00**	**1.02**	**98.98**
	MAHAGENCO					
78	BHIRA TAIL RACE HPS	1	40.00	0.29	0.00	99.71
		2	40.00	0.00	0.31	99.69
	TOTAL :		**80.00**	**0.15**	**0.15**	**99.70**
79	GHATGHAR PSS HPS	1	125.00	0.47	24.27	75.26
		2	125.00	0.00	20.73	79.27
	TOTAL :		**250.00**	**0.23**	**22.50**	**77.27**
80	KOYNA DPH HPS	1	18.00	0.00	0.71	99.29
		2	18.00	0.00	5.44	94.56
	TOTAL :		**36.00**	**0.00**	**3.08**	**96.92**
81	KOYNA-I & II HPS	1	70.00	0.00	0.05	99.95
		2	70.00	0.00	0.15	99.85
		3	70.00	0.00	0.00	100.00
		4	70.00	0.00	0.06	99.94
		1	80.00	0.70	0.00	99.30
		2	80.00	0.70	1.91	97.39

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	80.00	0.00	0.15	99.85
		4	80.00	0.00	0.18	99.82
	TOTAL :		**600.00**	**0.19**	**0.33**	**99.48**
82	KOYNA-III HPS	1	80.00	0.00	0.09	99.91
		2	80.00	0.00	0.09	99.91
		3	80.00	0.00	0.07	99.93
		4	80.00	0.00	0.08	99.92
	TOTAL :		**320.00**	**0.00**	**0.08**	**99.92**
76	KOYNA-IV HPS	1	250.00	5.55	1.24	93.21
		2	250.00	0.00	0.00	100.00
		3	250.00	0.35	0.00	99.65
		4	250.00	0.00	0.00	100.00
	TOTAL :		**1000.00**	**1.48**	**0.31**	**98.21**
83	TILLARI HPS	1	60.00	0.00	15.22	84.78
	TOTAL :		**60.00**	**0.00**	**15.22**	84.78
84	VAITARNA HPS	1	60.00	8.58	0.40	91.02
	TOTAL :		**60.00**	**8.58**	**0.40**	**91.02**
	MPPGCL					
85	BANSAGAR TONS-I HPS	1	105.00	0.23	16.51	83.26
		2	105.00	12.69	0.21	87.10
		3	105.00	7.80	0.19	92.01
	TOTAL :		**315.00**	**6.91**	**5.64**	**87.45**
86	BANSAGAR TONS-II HPS	1	15.00	5.96	0.40	93.64
		2	15.00	7.44	0.12	92.44
	TOTAL :		**30.00**	**6.70**	**0.26**	**93.04**
87	BANSAGAR TONS-III HPS	1	20.00	4.71	0.00	95.29
		2	20.00	5.57	0.03	94.40
		3	20.00	0.49	0.00	99.51
	TOTAL :		**60.00**	**3.59**	**0.01**	**96.40**
88	BARGI HPS	1	45.00	6.66	0.02	93.32
		2	45.00	8.69	0.00	91.31
	TOTAL :		**90.00**	**7.67**	**0.01**	**92.32**
89	GANDHI SAGAR HPS	1	23.00	0.00	0.92	99.08
		2	23.00	6.60	1.65	91.75
		3	23.00	0.00	0.51	99.49
		4	23.00	3.94	0.21	95.85
		5	23.00	6.60	22.62	70.78
	TOTAL :		**115.00**	**3.43**	**5.18**	**91.39**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
90	MADHIKHERA HPS	1	20.00	4.93	0.02	95.05
		2	20.00	4.08	0.01	95.91
		3	20.00	4.11	0.00	95.89
	TOTAL :		**60.00**	**4.37**	**0.01**	**95.62**
91	PENCH HPS	1	80.00	6.60	0.26	93.14
		2	80.00	0.00	4.26	95.74
	TOTAL :		**160.00**	**3.30**	**2.26**	**94.44**
92	RAJGHAT HPS	1	15.00	173.14	0.00	-73.14
		2	15.00	0.00	0.67	99.33
		3	15.00	20.93	0.77	78.30
	TOTAL :		**45.00**	**64.69**	**0.48**	**34.83**
	NHDC					
93	INDIRA SAGAR HPS	1	125.00	0.00	0.08	99.92
		2	125.00	1.27	0.00	98.73
		3	125.00	5.60	0.37	94.03
		4	125.00	2.14	0.00	97.86
		5	125.00	8.62	0.02	91.36
		6	125.00	7.05	0.00	92.95
		7	125.00	2.33	0.00	97.67
		8	125.00	6.60	0.00	93.40
	TOTAL :		**1000.00**	**4.20**	**0.06**	**95.74**
94	OMKARESHWAR HPS	1	65.00	4.19	4.42	91.39
		2	65.00	3.80	0.04	96.16
		3	65.00	3.64	0.00	96.36
		4	65.00	3.12	0.05	96.83
		5	65.00	0.02	0.00	99.98
		6	65.00	0.10	0.00	99.90
		7	65.00	4.00	0.00	96.00
		8	65.00	3.64	0.05	96.31
	TOTAL :		**520.00**	**2.81**	**0.57**	**96.62**
	SSNNL					
95	S SAROVAR CHPH HPS	1	50.00	3.18	0.00	96.82
		2	50.00	6.52	0.00	93.48
		3	50.00	8.78	3.07	88.15
		4	50.00	4.22	0.00	95.78
		5	50.00	8.44	0.00	91.56
	TOTAL :		**250.00**	**6.23**	**0.61**	**93.16**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
96	S SAROVAR RBPH HPS	1	200.00	10.98	0.00	89.02
		2	200.00	5.61	0.00	94.39
		3	200.00	5.56	0.00	94.44
		4	200.00	0.00	0.00	100.00
		5	200.00	5.63	0.00	94.37
		6	200.00	5.86	0.00	94.14
	TOTAL :		**1200.00**	**5.61**	**0.00**	**94.39**
	TATA MAH.					
97	BHIRA HPS	1	25.00	0.00	0.00	100.00
		2	25.00	0.00	0.00	100.00
		3	25.00	0.00	0.00	100.00
		4	25.00	0.00	0.00	100.00
		5	25.00	0.00	1.49	98.51
		6	25.00	2.08	0.00	97.92
	TOTAL :		**150.00**	**0.35**	**0.25**	**99.40**
98	BHIRA PSS HPS	1	150.00	1.88	0.00	98.12
	TOTAL :		**150.00**	**1.88**	**0.00**	**98.12**
99	BHIVPURI HPS	1	24.00	0.00	1.86	98.14
		2	24.00	0.00	0.00	100.00
		3	24.00	0.00	0.07	99.93
		4	1.50	0.00	0.00	100.00
		5	1.50	0.00	0.00	100.00
	TOTAL :		**75.00**	**0.00**	**0.62**	**99.38**
100	KHOPOLI HPS	1	24.00	0.00	0.00	100.00
		2	24.00	0.00	0.07	99.93
		3	24.00	0.00	0.00	100.00
	TOTAL :		**72.00**	**0.00**	**0.03**	**99.97**
	SOUTHERN REGION					
	APGENCO					
101	HAMPI HPS	1	9.00	1.75	0.00	98.25
		2	9.00	0.00	42.47	57.53
		3	9.00	0.03	0.03	99.94
		4	9.00	0.04	0.33	99.63
	TOTAL :		**36.00**	**0.46**	**10.71**	**88.83**
102	NAGARJUN SGR TPD HPS	1	25.00	0.00	0.02	99.98
		2	25.00	0.29	0.00	99.71
	TOTAL :		**50.00**	**0.15**	**0.01**	**99.84**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
103	NAGARJUN SGR RBC HPS	1	30.00	0.00	0.00	100.00
		2	30.00	0.00	0.00	100.00
	TOTAL :		60.00	0.00	0.00	100.00
104	NAGARJUN SGR RBC HPS	3	30.00	0.43	0.26	99.31
	TOTAL :		**30.00**	**0.43**	**0.26**	**99.31**
105	SRISAILAM HPS	1	110.00	0.00	0.06	99.94
		2	110.00	0.00	0.00	100.00
		3	110.00	0.00	0.01	99.99
		4	110.00	0.00	0.10	99.90
		5	110.00	0.00	0.00	100.00
		6	110.00	0.00	0.01	99.99
		7	110.00	0.00	0.01	99.99
	TOTAL :		**770.00**	**0.00**	**0.03**	**99.97**
106	T B DAM HPS	1	9.00	0.02	0.00	99.98
		2	9.00	0.00	0.00	100.00
		3	9.00	3.18	4.06	92.76
		4	9.00	0.27	0.66	99.07
	TOTAL :		**36.00**	**0.87**	**1.18**	**97.95**
107	UPPER SILERU-I HPS	1	60.00	6.85	2.15	91.00
		2	60.00	0.00	2.85	97.15
	TOTAL :		**120.00**	**3.43**	**2.50**	**94.07**
108	UPPER SILERU-I HPS	1	60.00	0.00	0.00	100.00
		2	60.00	2.14	9.69	88.17
	TOTAL :		**120.00**	**1.07**	**4.85**	**94.08**
	KPCL					
109	ALMATTI DPH HPS	1	15.00	0.52	0.19	99.29
		2	55.00	10.60	0.10	89.30
		3	55.00	10.45	0.11	89.44
		4	55.00	10.44	1.61	87.95
		5	55.00	19.81	0.22	79.97
		6	55.00	12.42	0.18	87.40
	TOTAL :		**290.00**	**12.11**	**0.43**	**87.46**
110	BHADRA HPS	1	2.00	32.94	0.00	67.06
		2	12.00	11.00	0.10	88.90
		3	12.00	0.00	0.00	100.00
		4	7.20	0.00	0.01	99.99
		5	6.00	41.92	0.07	58.01
	TOTAL :		**39.20**	**17.17**	**0.04**	**82.79**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
111	GERUSUPPA HPS	1	60.00	0.36	0.45	99.19
		2	60.00	0.30	0.37	99.33
		3	60.00	0.59	0.28	99.13
		4	60.00	0.31	1.33	98.36
	TOTAL :		**240.00**	**0.39**	**0.61**	**99.00**
112	GHAT PRABHA HPS	1	16.00	22.33	0.00	77.67
		2	16.00	16.43	0.07	83.50
	TOTAL :		**32.00**	**19.38**	**0.04**	**80.58**
113	JOG HPS	1	13.20	52.32	0.18	47.50
		2	13.20	41.11	0.08	58.81
		3	13.20	54.81	0.12	45.07
		4	13.20	41.66	0.06	58.28
		5	21.60	2.35	0.48	97.17
		6	21.60	4.64	3.88	91.48
		7	21.60	1.59	0.61	97.80
		8	21.60	0.00	83.29	16.71
	TOTAL :		**139.20**	**19.34**	**13.74**	**66.92**
114	KADRA HPS	1	50.00	0.32	0.70	98.98
		2	50.00	0.00	0.01	99.99
		3	50.00	0.00	0.03	99.97
	TOTAL :		**150.00**	**0.11**	**0.25**	**99.64**
115	KALINADI HPS	1	135.00	7.21	3.96	88.83
		2	135.00	3.18	1.64	95.18
		3	135.00	0.54	4.17	95.29
		4	150.00	0.49	8.36	91.15
		5	150.00	0.92	9.67	89.41
		6	150.00	0.54	6.89	92.57
	TOTAL :		**855.00**	**2.07**	**5.92**	**92.01**
116	KALINADI SUPA HPS	1	50.00	0.00	0.02	99.98
		2	50.00	0.29	0.00	99.71
	TOTAL :		**100.00**	**0.15**	**0.01**	**99.84**
117	KODASALI HPS	1	40.00	0.00	0.16	99.84
		2	40.00	0.43	0.00	99.57
		3	40.00	0.00	0.00	100.00
	TOTAL :		**120.00**	**0.14**	**0.05**	**99.81**
118	LIGANAMAKKI HPS	1	27.50	0.28	0.11	99.61
		2	27.50	0.14	0.05	99.81
	TOTAL :		**55.00**	**0.21**	**0.08**	**99.71**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
119	MUNIRABAD HPS	1	9.00	0.29	0.01	99.70
		2	9.00	0.00	0.04	99.96
		3	10.00	0.02	0.00	99.98
	TOTAL :		**28.00**	**0.10**	**0.02**	**99.88**
120	SHARAVATHI HPS	1	103.50	1.91	0.63	97.46
		2	103.50	0.89	1.42	97.69
		3	103.50	1.17	0.29	98.54
		4	103.50	0.19	0.45	99.36
		5	103.50	6.12	0.07	93.81
		6	103.50	1.92	0.72	97.36
		7	103.50	12.70	0.89	86.41
		8	103.50	28.24	0.31	71.45
		9	103.50	3.94	0.32	95.74
		10	103.50	7.27	0.78	91.95
	TOTAL :		**1035.00**	**6.44**	**0.59**	**92.97**
121	SIVASAMUNDRUM HPS	1	3.00	0.31	0.36	99.33
		2	3.00	0.34	0.00	99.66
		3	3.00	0.50	0.00	99.50
		4	3.00	0.00	0.00	100.00
		5	3.00	0.87	0.00	99.13
		6	3.00	0.41	0.00	99.59
		7	6.00	0.44	0.00	99.56
		8	6.00	0.81	0.00	99.19
		9	6.00	0.36	0.00	99.64
		10	6.00	0.43	0.00	99.57
	TOTAL :		**42.00**	**0.47**	**0.03**	**99.50**
122	VARAHI HPS	1	115.00	10.07	2.20	87.73
		2	115.00	9.03	5.37	85.60
		3	115.00	0.07	3.15	96.78
		4	115.00	0.05	1.74	98.21
	TOTAL :		**460.00**	**4.80**	**3.12**	**92.08**
	KSEBL					
123	IDAMALAYAR HPS.	1	37.50	8.85	1.57	89.58
		2	37.50	8.94	0.88	90.18
	TOTAL :		**75.00**	**8.90**	**1.23**	**89.87**
124	IDUKKI HPS.	1	130.00	14.31	1.67	84.02
		2	130.00	8.95	1.32	89.73
		3	130.00	66.97	0.00	33.03

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	130.00	9.20	0.00	90.80
		5	130.00	0.93	0.19	98.88
		6	130.00	10.61	1.25	88.14
	TOTAL :		**780.00**	**18.49**	**0.74**	**80.77**
125	KAKKAD HPS.	1	25.00	6.31	0.13	93.56
		2	25.00	8.41	0.66	90.93
	TOTAL :		**50.00**	**7.36**	**0.39**	**92.25**
126	KUTTIYADI HPS.	1	25.00	11.59	0.99	87.42
		2	25.00	14.60	1.18	84.22
		3	25.00	9.22	2.57	88.21
		4	50.00	0.93	0.91	98.16
	TOTAL :		**125.00**	**7.46**	**1.31**	**91.23**
127	KUTTIYADI ADDL. EXTN. HPS	5	50.00	8.71	0.67	90.62
		6	50.00	15.54	20.00	64.46
	TOTAL :		**100.00**	**12.13**	**10.34**	**77.53**
128	LOWER PERIYAR HPS.	1	60.00	7.28	0.01	92.71
		2	60.00	0.00	0.34	99.66
		3	60.00	0.00	0.53	99.47
	TOTAL :		**180.00**	**2.43**	**0.29**	**97.28**
129	NARIAMANGLAM HPS	1	15.00	0.00	0.00	100.00
		2	15.00	0.00	0.00	100.00
		3	15.00	8.13	0.00	91.87
		4	25.00	0.00	1.60	98.40
	TOTAL :		**70.00**	**1.74**	**0.57**	**97.69**
130	PALLIVASAL HPS.	1	5.00	5.78	0.42	93.80
		2	5.00	12.61	0.26	87.13
		3	5.00	6.92	0.07	93.01
		4	7.50	7.92	0.01	92.07
		5	7.50	8.63	0.02	91.35
		6	7.50	9.33	0.35	90.32
	TOTAL :		**37.50**	**8.55**	**0.18**	**91.27**
131	PANNIAR HPS.	1	15.00	8.09	0.22	91.69
		2	15.00	0.74	0.05	99.21
	TOTAL :		**30.00**	**4.42**	**0.14**	**95.44**
131	PORINGALKUTTU HPS.	1	8.00	9.51	0.24	90.25
		2	8.00	4.53	42.74	52.73
		3	8.00	0.00	57.74	42.26

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	8.00	17.71	0.23	82.06
	TOTAL :		**32.00**	**7.94**	**25.24**	**66.82**
132	SABARIGIRI HPS.	1	50.00	14.58	3.04	82.38
		2	50.00	12.16	1.89	85.95
		3	50.00	16.13	3.15	80.72
		4	50.00	11.09	0.84	88.07
		5	50.00	16.00	0.77	83.23
		6	50.00	9.15	1.38	89.47
	TOTAL :		**300.00**	**13.18**	**1.84**	**84.98**
134	SENGULAM HPS.	1	12.00	8.21	1.54	90.25
		2	12.00	10.16	1.90	87.94
		3	12.00	9.36	0.37	90.27
		4	12.00	0.09	2.07	97.84
	TOTAL :		**48.00**	**6.96**	**1.47**	**91.57**
135	SHOLAYAR HPS.	1	18.00	0.10	11.80	88.10
		2	18.00	18.57	0.01	81.42
		3	18.00	0.00	100.00	0.00
	TOTAL :		**54.00**	**6.22**	**37.27**	**56.51**
	TANGEDCO					
136	ALIYAR HPS.	1	60.00	0.00	25.21	74.79
	TOTAL :		**60.00**	**0.00**	**25.21**	**74.79**
137	BHAWANI BARRAGE- III HPS	1	15.00	0.03	1.55	98.42
		2	15.00	0.02	0.45	99.53
	TOTAL :		**30.00**	**0.03**	**1.00**	**98.97**
138	BHAWANI BARRAGE-II HPS	1	15.00	0.01	0.41	99.58
		2	15.00	0.00	0.14	99.86
	TOTAL :		**30.00**	**0.01**	**0.27**	**99.72**
139	BHAWANI KATTAL	1	15.00	42.42	0.66	56.92
		2	15.00	6.06	0.88	93.06
	TOTAL :		**30.00**	**24.24**	**0.77**	**74.99**
140	KADAMPARI HPS.	1	100.00	0.00	0.00	100.00
		2	100.00	0.00	0.00	100.00
		3	100.00	0.00	20.77	79.23
		4	100.00	0.00	0.00	100.00
	TOTAL :		**400.00**	**0.00**	**5.19**	**94.81**
141	KODAYAR-I HPS.	1	60.00	0.00	5.26	94.74
	TOTAL :		**60.00**	**0.00**	**5.26**	**94.74**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
142	KODAYAR-II HPS.	1	40.00	0.17	16.43	83.40
	TOTAL :		**40.00**	**0.17**	**16.43**	**83.40**
143	KUNDAH-I HPS.	1	20.00	0.48	0.92	98.60
		2	20.00	0.57	0.41	99.02
		3	20.00	0.40	1.82	97.78
	TOTAL :		**60.00**	**0.48**	**1.05**	**98.47**
144	KUNDAH-II HPS.	1	35.00	0.17	0.28	99.55
		2	35.00	0.14	1.89	97.97
		3	35.00	9.86	3.23	86.91
		4	35.00	0.32	1.14	98.54
		5	35.00	16.38	2.29	81.33
	TOTAL :		**175.00**	**5.37**	**1.77**	**92.86**
145	KUNDAH-III HPS.	1	60.00	6.07	0.12	93.81
		2	60.00	0.39	0.49	99.12
		3	60.00	0.40	16.79	82.81
	TOTAL :		**180.00**	**2.29**	**5.80**	**91.91**
146	KUNDAH-VI HPS.	1	50.00	8.50	0.26	91.24
		2	50.00	0.66	0.43	98.91
	TOTAL :		**100.00**	**4.58**	**0.35**	**95.08**
147	KUNDAH-V HPS.	1	20.00	0.09	21.17	78.74
		2	20.00	1.25	1.08	97.67
	TOTAL :		**40.00**	**0.67**	**11.13**	**88.21**
148	LOWER METTUR-I HPS.	1	15.00	10.15	0.80	89.05
		2	15.00	10.33	0.02	89.65
	TOTAL :		**30.00**	**10.24**	**0.41**	**89.35**
149	LOWER METTUR-II HPS.	1	15.00	6.36	0.09	93.55
		2	15.00	9.40	0.73	89.87
	TOTAL :		**30.00**	**7.88**	**0.41**	**91.71**
150	LOWER METTUR-III HPS.	1	15.00	0.00	0.23	99.77
		2	15.00	0.00	0.25	99.75
	TOTAL :		**30.00**	**0.00**	**0.24**	**99.76**
151	LOWER METTUR-V HPS.	1	15.00	3.76	0.00	96.24
		2	15.00	3.76	0.25	95.99
	TOTAL :		**30.00**	**3.76**	**0.13**	**96.12**
152	METTUR DAM HPS.	1	12.50	7.54	0.00	92.46
		2	12.50	0.09	0.00	99.91
		3	12.50	7.64	0.00	92.36

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	12.50	0.07	0.00	99.93
	TOTAL :		**50.00**	**3.83**	**0.00**	**96.17**
153	METTUR TUNNEL HPS.	1	50.00	23.07	0.00	76.93
		2	50.00	23.10	0.00	76.90
		3	50.00	23.41	0.00	76.59
		4	50.00	18.62	0.00	81.38
	TOTAL :		**200.00**	**22.05**	**0.00**	**77.95**
154	MOYAR HPS	1	12.00	0.92	0.67	98.41
		2	12.00	0.15	38.66	61.19
		3	12.00	0.41	0.38	99.21
	TOTAL :		**36.00**	**0.49**	**13.24**	**86.27**
155	PAPANASAM HPS.	1	8.00	0.00	8.38	91.62
		2	8.00	0.00	0.01	99.99
		3	8.00	7.14	0.02	92.84
		4	8.00	7.20	1.14	91.66
	TOTAL :		**32.00**	**3.59**	**2.39**	**94.02**
156	PARSON`S VALLEY HPS.	1	30.00	0.44	0.75	98.81
	TOTAL :		**30.00**	**0.44**	**0.75**	**98.81**
157	PERIYAR HPS.	1	42.00	4.56	0.04	95.40
		2	42.00	4.84	0.04	95.12
		3	42.00	8.03	0.02	91.95
		4	35.00	78.27	0.00	21.73
	TOTAL :		**161.00**	**21.56**	**0.03**	**78.41**
158	PYKARA HPS.	1	7.00	0.00	1.37	98.63
		2	7.00	0.34	1.96	97.70
		3	7.00	0.27	2.85	96.88
		4	13.60	0.19	0.00	99.81
		5	13.60	0.20	0.92	98.88
		6	11.00	0.75	1.80	97.45
	TOTAL :		**59.20**	**0.30**	**1.28**	**98.42**
159	PYKARA ULTMATE HPS.	1	50.00	0.68	1.19	98.13
		2	50.00	1.12	0.09	98.79
		3	50.00	28.84	1.91	69.25
	TOTAL :		**150.00**	**10.21**	**1.06**	**88.73**
160	SARKARPATHY HPS.	1	30.00	0.43	0.00	99.57
	TOTAL :		**30.00**	**0.43**	**0.00**	**99.57**
161	SHOLAYAR(TN) HPS.	1	35.00	0.00	0.16	99.84
		2	35.00	0.43	0.00	99.57

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	25.00	0.43	0.00	99.57
	TOTAL :		**95.00**	**0.27**	**0.06**	**99.67**
162	SURULIYAR HPS.	1	35.00	12.12	4.76	83.12
	TOTAL :		**35.00**	**12.12**	**4.76**	**83.12**
	TSGENCO					
163	LOWER JURALA HPS	1	40.00	0.16	0.00	99.84
		2	40.00	0.00	0.00	100.00
		3	40.00	0.00	0.00	100.00
		4	40.00	0.00	0.16	99.84
		5	40.00	0.00	0.00	100.00
		6	40.00	0.43	0.00	99.57
	TOTAL :		**240.00**	**0.10**	**0.03**	**99.87**
164	LOWER SILERU HPS	1	115.00	0.00	100.00	0.00
		2	115.00	0.00	0.00	100.00
		3	115.00	0.00	0.00	100.00
		4	115.00	0.00	0.00	100.00
	TOTAL :		**460.00**	**0.00**	**25.00**	**75.00**
165	NAGARJUN SGR HPS	1	110.00	0.00	0.00	100.00
		2	100.80	0.00	0.85	99.15
		3	100.80	0.00	0.00	100.00
		4	100.80	0.00	0.00	100.00
		5	100.80	0.00	7.76	92.24
		6	100.80	10.38	0.00	89.62
		7	100.80	0.00	11.20	88.80
		8	100.80	0.00	0.00	100.00
	TOTAL :		**815.60**	**1.28**	**2.45**	**96.27**
166	NAGARJUN SGR LBC HPS	1	30.00	0.00	0.00	100.00
		2	30.00	0.43	0.00	99.57
	TOTAL :		**60.00**	**0.22**	**0.00**	**99.78**
167	POCHAMPAD HPS	1	9.00	0.00	0.00	100.00
		2	9.00	0.00	0.00	100.00
		3	9.00	0.00	0.00	100.00
		4	9.00	0.43	0.00	99.57
	TOTAL :		**36.00**	**0.11**	**0.00**	**99.89**
168	PRIYADARSHNI JURALA HPS	1	39.00	0.00	0.48	99.52
		2	39.00	0.00	0.79	99.21
		3	39.00	0.00	0.18	99.82
		4	39.00	0.00	0.14	99.86

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		5	39.00	0.00	0.53	99.47
		6	39.00	0.00	0.31	99.69
	TOTAL :		**234.00**	**0.00**	**0.40**	**99.60**
169	PULICHINTALA HPS	1	30.00	0.00	0.16	99.84
		2	30.00	0.43	0.00	99.57
		3	30.00	0.00	0.00	100.00
	TOTAL :		**90.00**	**0.14**	**0.05**	**99.81**
170	SRISAILAM LB HPS	1	150.00	0.43	0.00	99.57
		2	150.00	0.00	0.00	100.00
		3	150.00	0.00	0.00	100.00
		4	150.00	0.00	0.26	99.74
		5	150.00	0.00	0.00	100.00
		6	150.00	0.00	0.00	100.00
	TOTAL :		**900.00**	**0.07**	**0.04**	**99.89**
	EASTERN REGION					
	APGENCO					
172	MACHKUND HPS	1	17.00	0.00	3.61	96.39
		2	17.00	0.00	0.72	99.28
		3	17.00	0.00	58.08	41.92
		4	21.25	0.00	55.05	44.95
		5	21.25	0.00	9.02	90.98
		6	21.25	0.00	49.86	50.14
	TOTAL :		**114.75**	**0.00**	**30.35**	**69.65**
	DEPL					
173	JORETHANG LOOP	1	48.00	0.43	0.00	99.57
		2	48.00	0.00	0.26	99.74
	TOTAL :		**96.00**	**0.22**	**0.13**	**99.65**
174	TASHIDING HPS	1	48.50	0.00	0.00	100.00
		2	48.50	0.00	0.00	100.00
	TOTAL :		**97.00**	**0.00**	**0.00**	**100.00**
	DVC					
175	MAITHON HPS.	1	23.20	0.43	0.00	99.57
		2	20.00	0.00	0.00	100.00
		3	20.00	0.00	0.00	100.00
	TOTAL :		**63.20**	**0.16**	**0.00**	**99.84**
176	PANCHET HPS.	1	40.00	0.00	77.63	22.37
		2	40.00	0.00	11.90	88.10
	TOTAL :		**80.00**	**0.00**	**44.76**	**55.24**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
	GIPL					
177	CHUZACHEN HPS	1	55.00	3.41	0.70	95.89
		2	55.00	3.42	0.69	95.89
	TOTAL :		**110.00**	**3.42**	**0.70**	**95.88**
	JUUNL					
178	SUBERNREKHA-I HPS.	1	65.00	0.00	5.95	94.05
	TOTAL :		**65.00**	**0.00**	**5.95**	**94.05**
179	SUBERNREKHA-II HPS.	1	65.00	0.00	29.49	70.51
	TOTAL :		**65.00**	**0.00**	**29.49**	**70.51**
	NHPC					
180	RANGIT HPS	1	20.00	5.73	0.90	93.37
		2	20.00	5.47	0.48	94.05
		3	20.00	6.81	1.01	92.18
	TOTAL :		**60.00**	**6.00**	**0.80**	**93.20**
181	TEESTA LOW DAM-III HPS	1	33.00	9.05	0.16	90.79
		2	33.00	2.46	0.15	97.39
		3	33.00	2.78	0.07	97.15
		4	33.00	3.42	0.07	96.51
	TOTAL :		**132.00**	**4.43**	**0.11**	**95.46**
182	TEESTA LOW DAM-IV HPS	1	40.00	1.77	0.06	98.17
		2	40.00	1.89	0.07	98.04
		3	40.00	6.93	0.20	92.87
		4	40.00	4.50	0.62	94.88
	TOTAL :		**160.00**	**3.77**	**0.24**	**95.99**
183	TEESTA V HPS	1	170.00	2.56	0.01	97.43
		2	170.00	4.03	0.50	95.47
		3	170.00	3.20	0.03	96.77
	TOTAL :		**510.00**	**3.26**	**0.18**	**96.56**
	OHPC					
184	BALIMELA HPS.	1	60.00	100.00	0.00	0.00
		2	60.00	33.24	0.27	66.49
		3	60.00	0.36	1.68	97.96
		4	60.00	0.32	0.54	99.14
		5	60.00	1.89	0.82	97.29
		6	60.00	3.37	1.62	95.01
		7	75.00	0.00	54.67	45.33
		8	75.00	0.23	1.37	98.40
	TOTAL :		**510.00**	**16.41**	**8.82**	**74.77**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
185	HIRAKUD-I HPS	1	49.50	7.79	2.03	90.18
		2	49.50	25.21	19.27	55.52
		3	32.00	7.89	0.08	92.03
		4	32.00	7.58	3.59	88.83
		5	37.50	100.00	0.00	0.00
		6	37.50	100.00	0.00	0.00
		7	37.50	0.09	42.15	57.76
	TOTAL :		**275.50**	**34.96**	**9.99**	**55.05**
186	HIRAKUD-II HPS	1	24.00	0.08	11.52	88.40
		2	24.00	0.04	0.05	99.91
		3	24.00	99.86	0.00	0.14
	TOTAL :		**72.00**	**33.33**	**3.86**	**62.82**
187	RENGALI HPS.	1	50.00	0.31	22.99	76.70
		2	50.00	0.40	0.28	99.32
		3	50.00	0.35	0.10	99.55
		4	50.00	25.42	0.85	73.73
		5	50.00	0.00	78.42	21.58
	TOTAL :		**250.00**	**5.29**	**20.53**	**74.18**
188	UPPER INDRAVATI HPS.	1	150.00	9.66	2.12	88.22
		2	150.00	0.35	0.87	98.78
		3	150.00	5.71	0.00	94.29
		4	150.00	0.48	0.13	99.39
	TOTAL :		**600.00**	**4.05**	**0.78**	**95.17**
189	UPPER KOLAB HPS.	1	80.00	0.26	1.77	97.97
		2	80.00	0.00	84.50	15.50
		3	80.00	0.24	50.78	48.98
		4	80.00	0.48	0.96	98.56
	TOTAL :		**320.00**	**0.25**	**34.50**	**65.25**
	SKPPPL					
190	DIKCHU HPS	1	48.00	0.43	0.00	99.57
		2	48.00	0.00	0.26	99.74
	TOTAL :		**96.00**	**0.22**	**0.13**	**99.65**
	TUL					
191	TEESTA-III HPS	1	200.00	3.60	2.64	93.76
		2	200.00	6.38	0.98	92.64
		3	200.00	2.53	0.81	96.66
		4	200.00	4.21	1.03	94.76
		5	200.00	5.19	1.14	93.67

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		6	200.00	8.59	1.31	90.10
	TOTAL :		**1200.00**	**5.08**	**1.32**	**93.60**
	WBSEDCL					
192	JALDHAKA HPS ST-I	1	9.00	0.49	0.02	99.49
		2	9.00	0.43	0.02	99.55
		3	9.00	0.88	0.04	99.08
		4	9.00	0.00	0.00	100.00
	TOTAL :		**36.00**	**0.45**	**0.02**	**99.53**
193	PURULIA PSS HPS.	1	225.00	6.44	14.93	78.63
		2	225.00	6.44	1.61	91.95
		3	225.00	0.00	0.00	100.00
		4	225.00	0.08	0.02	99.90
	TOTAL :		**900.00**	**3.24**	**4.14**	**92.62**
194	RAMMAM HPS.	1	12.50	21.64	0.00	78.36
		2	12.50	0.00	0.13	99.87
		3	12.50	32.33	0.00	67.67
		4	12.50	0.03	0.06	99.91
	TOTAL :		**50.00**	**13.50**	**0.05**	**86.45**
	NORTH EASTERN REGION					
	APGPCL					
195	KARBI LANGPI HPS.	1	50.00	0.43	0.00	99.57
		2	50.00	0.00	0.00	100.00
	TOTAL :		**100.00**	**0.22**	**0.00**	**99.78**
	MePGCL					
196	KYRDEMKULAI HPS.	1	30.00	0.45	28.76	70.79
		2	30.00	1.08	48.83	50.09
	TOTAL :		**60.00**	**0.76**	**38.80**	**60.44**
197	MYNTDU(LESHKA) St-1 HPS	1	42.00	16.40	12.24	71.36
		2	42.00	0.00	0.08	99.92
		3	42.00	0.00	0.16	99.84
	TOTAL :		**126.00**	**5.47**	**4.16**	**90.37**
198	NEW UMTRU HPS	1	20.00	0.08	17.09	82.83
		2	20.00	0.13	0.31	99.56
	TOTAL :		**40.00**	**0.11**	**8.70**	**91.19**
199	UMIAM HPS ST-I	1	9.00	0.24	0.00	99.76
		2	9.00	5.21	0.04	94.75
		3	9.00	4.80	5.20	90.00

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2017-2018

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	9.00	2.82	0.75	96.43
	TOTAL :		**36.00**	**3.27**	**1.50**	**95.23**
200	UMIAM HPS ST-IV	1	30.00	0.63	2.30	97.07
		2	30.00	1.62	1.15	97.23
	TOTAL :		**60.00**	**1.12**	**1.72**	**97.16**
	NEEPCO.					
201	DOYANG HPS.	1	25.00	0.00	0.49	99.51
		2	25.00	8.09	37.41	54.50
		3	25.00	4.86	0.52	94.62
	TOTAL :		**75.00**	**4.32**	**12.81**	**82.87**
202	KHONDONG HPS.	1	25.00	27.32	2.74	69.94
		2	25.00	12.53	3.78	83.69
	TOTAL :		**50.00**	**19.93**	**3.26**	**76.81**
203	KOPILI HPS.	1	50.00	0.00	15.54	84.46
		2	50.00	16.94	8.61	74.45
		3	50.00	12.33	16.79	70.88
		4	50.00	10.81	16.61	72.58
		5	25.00	0.00	14.48	85.52
	TOTAL :		**225.00**	**8.91**	**14.40**	**76.69**
204	RANGANADI HPS.	1	135.00	2.60	1.22	96.18
		2	135.00	2.50	1.00	96.50
		3	135.00	2.21	9.95	87.84
	TOTAL :		**405.00**	**2.44**	**4.06**	**93.50**
205	TUIRIAL HPS	1	30.00	0.00	3.05	96.95
		2	30.00	0.00	0.00	100.00
	TOTAL :		**60.00**	**0.00**	**1.53**	**98.47**
	NHPC					
206	LOKTAK HPS.	1	35.00	3.29	0.15	96.56
		2	35.00	3.07	0.20	96.73
		3	35.00	3.04	0.10	96.86
	TOTAL :		**105.00**	**3.13**	**0.15**	**96.72**

CHAPTER-7

MISCELLANEOUS OUTAGES OF HE UNITS

CHAPTER-7

MISCELLANEOUS OUTAGES OF HE UNITS

7.1 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, electrical grid disturbance, low system demand, disaster/natural calamity, reserve shutdown, transmission constraints & power evacuation problems, low head or high tailrace level, strikes, etc. constitutes the miscellaneous outages. The station-wise details of miscellaneous non-availability during 2017-18 is given at **Annex-7.1** and summarized below in **Table 7.1.**

TABLE 7.1

MISCELLANEOUS OUTAGES
FOR PERIOD: 2017-18

S. No.	Causes of Miscellaneous Outage	Duration of Outage (Hours)	% of Total Outage
	NOT ASSOCIATED WITH THE EQUIPMENT AND CIVIL STRUCTURE		
1	Water Constraint	368753.25	86.50
2	Grid Constraint	41015.02	9.62
3	Other Miscellaneous	16525.64	3.88
	TOTAL	**426293.90**	**100**

7.2 The miscellaneous outages was highest (43.53%) in case of HE Stations from SJVN followed by GIPL (42.88), GSECL (41.12%), NHPC (34.09%), etc. However, miscellaneous non-availability being beyond the control of utilities, does not have not any impact on the operating availability of HE Stations.

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
	NORTHERN REGION			
	ADHPL			
1	ALLAIN DUHANGAN HPS	1	96.00	1.25
		2	96.00	0.09
	TOTAL :		**192.00**	**0.67**
	AHPC (GVK)			
2	SRINAGAR HPS	1	82.50	0.22
		2	82.50	0.23
		3	82.50	0.23
		4	82.50	0.21
	TOTAL :		**330.00**	**0.22**
	BBMB			
3	BHAKRA LEFT H P S	1	108.00	100.00
		2	108.00	5.02
		3	108.00	4.77
		4	108.00	0.00
		5	108.00	0.00
	TOTAL :		**540.00**	**26.96**
4	BHAKRA RIGHT H P S	1	157.00	0.00
		2	157.00	11.10
		3	157.00	7.20
		4	157.00	0.00
		5	157.00	4.74
	TOTAL :		**785.00**	**4.61**
5	DEHAR H P S	1	165.00	21.54
		2	165.00	5.77
		3	165.00	6.39
		4	165.00	26.30
		5	165.00	0.00
		6	165.00	0.00
	TOTAL :		**990.00**	**10.00**
6	GANGUWAL HPS	1	29.25	0.00
		2	24.20	0.00
		3	24.20	0.00
	TOTAL :		**77.65**	**0.00**
7	KOTLA HPS	1	29.25	0.00
		2	24.20	0.00

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		3	24.20	0.00
	TOTAL :		**77.65**	**0.00**
8	PONG H P S	1	66.00	0.00
		2	66.00	1.71
		3	66.00	1.74
		4	66.00	1.72
		5	66.00	1.71
		6	66.00	1.70
	TOTAL :		**396.00**	**1.43**
	E.P.P.L.			
9	MALANA-II HPS	1	50.00	0.66
		2	50.00	0.53
	TOTAL :		**100.00**	**0.59**
	GBHPPL			
10	BUDHIL HPS	1	35.00	0.00
		2	35.00	0.00
	TOTAL :		**70.00**	**0.00**
	JSW HYDRO ENERGY LIMITED (JSWHEL)			
11	BASPA HPS	1	100.00	0.38
		2	100.00	0.31
		3	100.00	0.40
	TOTAL :		**300.00**	**0.37**
12	KARCHAM WANGTOO HPS	1	250.00	0.00
		2	250.00	0.00
		3	250.00	0.02
		4	250.00	0.02
	TOTAL :		**1000.00**	**0.01**
	HPPCL			
13	KASHANG-I HPS	1	65.00	6.15
	TOTAL :		**65.00**	**6.15**
14	KASHANG-II HPS	1	65.00	16.86
		2	65.00	10.13
	TOTAL :		**130.00**	**13.50**
15	SAINJ HPS	1	50.00	0.00
		2	50.00	0.00
	TOTAL :		**100.00**	**0.00**
	HPSEBL			
16	BASSI HPS	1	16.50	1.13

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		2	16.50	0.15
		3	16.50	0.13
		4	16.50	8.61
	TOTAL :		**66.00**	**2.50**
17	GIRI BATA HPS	1	30.00	0.11
		2	30.00	0.10
	TOTAL :		**60.00**	**0.10**
18	LARJI HPS	1	42.00	0.01
		2	42.00	0.01
		3	42.00	0.05
	TOTAL :		**126.00**	**0.02**
19	SANJAY HPS	1	40.00	79.36
		2	40.00	1.24
		3	40.00	6.79
	TOTAL :		**120.00**	**29.13**
	IAEPL			
20	CHANJU-I HPS	1	12.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL :		**36.00**	**0.00**
	JKSPDC			
21	BAGLIHAR HPS	1	150.00	7.40
		2	150.00	18.36
		3	150.00	3.01
	TOTAL :		**450.00**	**9.59**
22	BAGLIHAR II HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
	TOTAL :		**450.00**	**0.00**
23	LOWER JHELUM HPS	1	35.00	27.37
		2	35.00	14.10
		3	35.00	9.53
	TOTAL :		**105.00**	**17.00**
24	UPPER SINDH-II HPS	3	35.00	0.17
		4	35.00	0.10
		5	35.00	0.50
	TOTAL :		**105.00**	**0.26**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
	JPPVL			
25	VISHNU PRAYAG HPS	1	100.00	0.98
		2	100.00	0.99
		3	100.00	0.96
		4	100.00	0.94
	TOTAL :		**400.00**	**0.97**
	MPCL			
26	MALANA HPS	1	43.00	0.10
		2	43.00	0.10
	TOTAL :		**86.00**	**0.10**
	NHPC			
27	BAIRA SIUL HPS	1	60.00	50.13
		2	60.00	45.63
		3	60.00	42.01
	TOTAL :		**180.00**	**45.92**
28	CHAMERA- I HPS	1	180.00	46.92
		2	180.00	43.38
		3	180.00	51.07
	TOTAL :		**540.00**	**47.12**
29	CHAMERA- II HPS	1	100.00	41.60
		2	100.00	33.34
		3	100.00	42.60
	TOTAL :		**300.00**	**39.18**
30	CHAMERA-III HPS	1	77.00	39.91
		2	77.00	42.95
		3	77.00	39.40
	TOTAL :		**231.00**	**40.75**
31	CHUTAK HPS	1	11.00	47.86
		2	11.00	49.92
		3	11.00	46.49
		4	11.00	37.64
	TOTAL :		**44.00**	**45.48**
32	DHAULI GANGA HPS	1	70.00	36.61
		2	70.00	49.90
		3	70.00	43.64
		4	70.00	45.27
	TOTAL :		**280.00**	**43.86**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
33	DULHASTI HPS	1	130.00	29.40
		2	130.00	24.72
		3	130.00	23.70
	TOTAL :		**390.00**	**25.94**
34	KISHENGANGA HPS	1	110.00	0.00
		2	110.00	0.00
		3	110.00	0.00
	TOTAL :		**330.00**	**0.00**
35	NIMMO BAZGO HPS	1	15.00	18.31
		2	15.00	20.68
		3	15.00	54.23
	TOTAL :		**45.00**	**31.07**
36	PARBATI-III HPS	1	130.00	50.71
		2	130.00	64.28
		3	130.00	76.34
		4	130.00	71.55
	TOTAL :		**520.00**	**65.72**
37	SALAL-I HPS	1	115.00	24.46
		2	115.00	22.11
		3	115.00	15.95
	TOTAL :		**345.00**	**20.84**
38	SALAL-II HPS	1	115.00	25.19
		2	115.00	24.10
		3	115.00	27.21
	TOTAL :		**345.00**	**25.50**
39	SEWA-II HPS	1	40.00	44.29
		2	40.00	45.71
		3	40.00	48.70
	TOTAL :		**120.00**	**46.23**
40	TANAKPUR HPS	1	31.40	12.44
		2	31.40	13.24
		3	31.40	24.97
	TOTAL :		**94.20**	**16.88**
41	URI-I HPS	1	120.00	14.00
		2	120.00	24.15
		3	120.00	5.95
		4	120.00	19.46
	TOTAL :		**480.00**	**15.89**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
42	URI-II HPS	1	60.00	10.80
		2	60.00	23.98
		3	60.00	1.72
		4	60.00	31.38
	TOTAL :		**240.00**	**16.97**
	NTPC Ltd.			
43	KOLDAM HPS	1	200.00	0.00
		2	200.00	0.00
		3	200.00	0.00
		4	200.00	0.00
	TOTAL :		**800.00**	**0.00**
	PSPCL			
44	ANANDPUR SAHIB-I HPS	1	33.50	0.03
		2	33.50	0.00
	TOTAL :		**67.00**	**0.02**
45	ANANDPUR SAHIB-II HPS	1	33.50	0.00
		2	33.50	0.06
	TOTAL :		**67.00**	**0.03**
46	MUKERIAN-I HPS	1	15.00	16.58
		2	15.00	15.71
		3	15.00	4.45
	TOTAL :		**45.00**	**12.25**
47	MUKERIAN-II HPS	1	15.00	6.62
		2	15.00	28.22
		3	15.00	6.56
	TOTAL :		**45.00**	**13.80**
48	MUKERIAN-III HPS	1	19.50	8.13
		2	19.50	16.98
		3	19.50	9.39
	TOTAL :		**58.50**	**11.50**
49	MUKERIAN-IV HPS	1	19.50	2.78
		2	19.50	7.66
		3	19.50	12.73
	TOTAL :		**58.50**	**7.72**
50	RANJIT SAGAR HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		4	150.00	0.00
	TOTAL :		**600.00**	**0.00**
51	SHANAN HPS	1	15.00	0.00
		2	15.00	0.00
		3	15.00	0.09
		4	15.00	0.00
		5	50.00	0.00
	TOTAL :		**110.00**	**0.01**
	RRVUNL			
52	JAWAHAR SAGAR HPS	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL :		**99.00**	**0.00**
53	MAHI BAJAJ-I HPS	1	25.00	43.10
		2	25.00	56.32
	TOTAL :		**50.00**	**49.71**
54	MAHI BAJAJ-II HPS	1	45.00	29.67
		2	45.00	10.71
	TOTAL :		**90.00**	**20.19**
55	R P SAGAR HPS	1	43.00	0.04
		2	43.00	0.00
		3	43.00	0.00
		4	43.00	0.00
	TOTAL :		**172.00**	**0.01**
	SJVNL			
56	NATHPA JHAKRI HPS	1	250.00	46.42
		2	250.00	42.84
		3	250.00	47.82
		4	250.00	39.71
		5	250.00	46.29
		6	250.00	39.63
	TOTAL :		**1500.00**	**43.78**
57	RAMPUR HPS	1	68.67	36.05
		2	68.67	45.49
		3	68.67	45.51
		4	68.67	46.96
		5	68.67	47.05

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		6	68.67	34.80
	TOTAL :		**412.02**	**42.64**
	THDC			
58	KOTESHWAR HPS	1	100.00	0.00
		2	100.00	0.00
		3	100.00	0.00
		4	100.00	0.00
	TOTAL :		**400.00**	**0.00**
59	TEHRI ST-1 HPS	1	250.00	0.00
		2	250.00	0.00
		3	250.00	0.00
		4	250.00	0.00
	TOTAL :		**1000.00**	**0.00**
	UJVNL			
60	CHIBRO (YAMUNA) HPS	1	60.00	19.72
		2	60.00	29.17
		3	60.00	12.58
		4	60.00	24.45
	TOTAL :		**240.00**	**21.48**
61	CHILLA HPS	1	36.00	1.48
		2	36.00	1.00
		3	36.00	2.18
		4	36.00	12.84
	TOTAL :		**144.00**	**4.38**
62	DHAKRANI HPS	1	11.25	30.14
		2	11.25	2.42
		3	11.25	22.87
	TOTAL :		**33.75**	**18.48**
63	DHALIPUR HPS	1	17.00	5.41
		2	17.00	10.42
		3	17.00	32.61
	TOTAL :		**51.00**	**16.15**
64	KHATIMA HPS	1	13.80	0.00
		2	13.80	0.00
		3	13.80	0.00
	TOTAL :		**41.40**	**0.00**
65	KHODRI HPS	1	30.00	15.50
		2	30.00	15.42

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		3	30.00	24.86
		4	30.00	24.08
	TOTAL :		**120.00**	**19.96**
66	KULHAL HPS	1	10.00	20.64
		2	10.00	31.37
		3	10.00	12.88
	TOTAL :		**30.00**	**21.63**
67	MANERI BHALI-I HPS	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00
	TOTAL :		**90.00**	**0.00**
68	MANERI BHALI-II HPS	1	76.00	0.00
		2	76.00	0.31
		3	76.00	0.00
		4	76.00	0.00
	TOTAL :		**304.00**	**0.08**
59	RAMGANGA HPS	1	66.00	0.00
		2	66.00	0.00
		3	66.00	0.00
	TOTAL :		**198.00**	**0.00**
	UPJVNL			
70	KHARA HPS	1	24.00	17.66
		2	24.00	3.58
		3	24.00	19.64
	TOTAL :		**72.00**	**13.63**
71	MATATILA HPS	1	10.20	0.00
		2	10.20	0.00
		3	10.20	0.00
	TOTAL :		**30.60**	**0.00**
72	OBRA HPS	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL :		**99.00**	**0.00**
73	RIHAND HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.49
		4	50.00	1.90
		5	50.00	0.00

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		6	50.00	0.00
	TOTAL :		**300.00**	**0.40**
	WESTERN REGION			
	CSPGCL			
74	HASDEOBANGO HPS	1	40.00	0.00
		2	40.00	0.00
		3	40.00	0.00
	TOTAL :		**120.00**	**0.00**
	DLHP			
75	BHANDARDHARA HPS ST-II	2	34.00	0.00
	TOTAL :		**34.00**	**0.00**
	GSECL			
76	KADANA HPS	1	60.00	20.29
		2	60.00	32.25
		3	60.00	49.59
		4	60.00	24.96
	TOTAL :		**240.00**	**31.77**
77	UKAI HPS	1	75.00	41.55
		2	75.00	54.09
		3	75.00	51.84
		4	75.00	46.92
	TOTAL :		**300.00**	**48.60**
	MAHAGENCO			
78	BHIRA TAIL RACE HPS	1	40.00	0.00
		2	40.00	0.00
	TOTAL :		**80.00**	**0.00**
79	GHATGHAR PSS HPS	1	125.00	0.00
		2	125.00	0.00
	TOTAL :		**250.00**	**0.00**
80	KOYNA DPH HPS	1	18.00	0.19
		2	18.00	0.18
	TOTAL :		**36.00**	**0.18**
81	KOYNA-I & II HPS	1	70.00	0.04
		2	70.00	0.00
		3	70.00	0.00
		4	70.00	0.00
		1	80.00	0.13
		2	80.00	0.00

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		3	80.00	0.00
		4	80.00	0.00
	TOTAL :		**600.00**	**0.02**
82	KOYNA-III HPS	1	80.00	0.00
		2	80.00	0.00
		3	80.00	0.00
		4	80.00	0.00
	TOTAL :		**320.00**	**0.00**
76	KOYNA-IV HPS	1	250.00	0.00
		2	250.00	0.00
		3	250.00	0.00
		4	250.00	0.00
	TOTAL :		**1000.00**	**0.00**
83	TILLARI HPS	1	60.00	0.62
	TOTAL :		**60.00**	**0.62**
84	VAITARNA HPS	1	60.00	0.00
	TOTAL :		**60.00**	**0.00**
	MPPGCL			
85	BANSAGAR TONS-I HPS	1	105.00	0.00
		2	105.00	0.00
		3	105.00	0.00
	TOTAL :		**315.00**	**0.00**
86	BANSAGAR TONS-II HPS	1	15.00	0.00
		2	15.00	0.00
	TOTAL :		**30.00**	**0.00**
87	BANSAGAR TONS-III HPS	1	20.00	0.00
		2	20.00	0.00
		3	20.00	0.00
	TOTAL :		**60.00**	**0.00**
88	BARGI HPS	1	45.00	0.00
		2	45.00	0.00
	TOTAL :		**90.00**	**0.00**
89	GANDHI SAGAR HPS	1	23.00	0.00
		2	23.00	0.00
		3	23.00	0.00
		4	23.00	0.00
		5	23.00	0.00
	TOTAL :		**115.00**	**0.00**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
90	MADHIKHERA HPS	1	20.00	0.00
		2	20.00	0.00
		3	20.00	0.00
	TOTAL :		**60.00**	**0.00**
91	PENCH HPS	1	80.00	0.00
		2	80.00	0.00
	TOTAL :		**160.00**	**0.00**
92	RAJGHAT HPS	1	15.00	0.00
		2	15.00	0.00
		3	15.00	0.10
	TOTAL :		**45.00**	**0.03**
	NHDC			
93	INDIRA SAGAR HPS	1	125.00	0.00
		2	125.00	0.00
		3	125.00	0.00
		4	125.00	0.00
		5	125.00	0.00
		6	125.00	0.00
		7	125.00	0.06
		8	125.00	0.00
	TOTAL :		**1000.00**	**0.01**
94	OMKARESHWAR HPS	1	65.00	0.00
		2	65.00	0.00
		3	65.00	0.00
		4	65.00	0.00
		5	65.00	0.00
		6	65.00	0.00
		7	65.00	0.00
		8	65.00	0.00
	TOTAL :		**520.00**	**0.00**
	SSNNL			
95	S SAROVAR CHPH HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	0.00
		5	50.00	0.00
	TOTAL :		**250.00**	**0.00**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
96	S SAROVAR RBPH HPS	1	200.00	0.00
		2	200.00	0.00
		3	200.00	0.00
		4	200.00	0.00
		5	200.00	0.00
		6	200.00	0.00
	TOTAL :		**1200.00**	**0.00**
	TATA MAH.			
97	BHIRA HPS	1	25.00	0.00
		2	25.00	0.00
		3	25.00	0.00
		4	25.00	0.00
		5	25.00	0.00
		6	25.00	0.00
	TOTAL :		**150.00**	**0.00**
98	BHIRA PSS HPS	1	150.00	0.00
	TOTAL :		**150.00**	**0.00**
99	BHIVPURI HPS	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
		4	1.50	0.00
		5	1.50	0.00
	TOTAL :		**75.00**	**0.00**
100	KHOPOLI HPS	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
	TOTAL :		**72.00**	**0.00**
	SOUTHERN REGION			
	APGENCO			
101	HAMPI HPS	1	9.00	0.04
		2	9.00	0.00
		3	9.00	0.00
		4	9.00	0.10
	TOTAL :		**36.00**	**0.03**
102	NAGARJUN SGR TPD HPS	1	25.00	0.00
		2	25.00	0.00
	TOTAL :		**50.00**	**0.00**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
103	NAGARJUN SGR RBC HPS	1	30.00	72.05
		2	30.00	100.00
	TOTAL :		60.00	100.00
104	NAGARJUN SGR RBC HPS	3	30.00	0.05
	TOTAL :		**30.00**	**0.05**
105	SRISAILAM HPS	1	110.00	0.00
		2	110.00	0.00
		3	110.00	0.00
		4	110.00	0.00
		5	110.00	0.00
		6	110.00	0.00
		7	110.00	0.00
	TOTAL :		**770.00**	**0.00**
106	T B DAM HPS	1	9.00	0.00
		2	9.00	0.00
		3	9.00	0.49
		4	9.00	0.00
	TOTAL :		**36.00**	**0.12**
107	UPPER SILERU-I HPS	1	60.00	0.00
		2	60.00	0.00
	TOTAL :		**120.00**	**0.00**
108	UPPER SILERU-I HPS	1	60.00	0.00
		2	60.00	0.00
	TOTAL :		**120.00**	**0.00**
	KPCL			
109	ALMATTI DPH HPS	1	15.00	0.00
		2	55.00	0.00
		3	55.00	0.00
		4	55.00	0.00
		5	55.00	0.00
		6	55.00	0.00
	TOTAL :		**290.00**	**0.00**
110	BHADRA HPS	1	2.00	0.00
		2	12.00	0.01
		3	12.00	0.00
		4	7.20	0.00
		5	6.00	0.00
	TOTAL :		**39.20**	**0.00**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
111	GERUSUPPA HPS	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
		4	60.00	0.00
	TOTAL :		**240.00**	**0.00**
112	GHAT PRABHA HPS	1	16.00	0.08
		2	16.00	0.04
	TOTAL :		**32.00**	**0.06**
113	JOG HPS	1	13.20	0.01
		2	13.20	0.00
		3	13.20	0.00
		4	13.20	0.01
		5	21.60	0.28
		6	21.60	0.28
		7	21.60	0.27
		8	21.60	0.00
	TOTAL :		**139.20**	**0.13**
114	KADRA HPS	1	50.00	0.04
		2	50.00	0.06
		3	50.00	0.04
	TOTAL :		**150.00**	**0.05**
115	KALINADI HPS	1	135.00	10.72
		2	135.00	17.99
		3	135.00	17.96
		4	150.00	14.96
		5	150.00	7.50
		6	150.00	10.93
	TOTAL :		**855.00**	**13.23**
116	KALINADI SUPA HPS	1	50.00	0.00
		2	50.00	0.00
	TOTAL :		**100.00**	**0.00**
117	KODASALI HPS	1	40.00	0.00
		2	40.00	0.00
		3	40.00	0.00
	TOTAL :		**120.00**	**0.00**
118	LIGANAMAKKI HPS	1	27.50	2.83
		2	27.50	4.66
	TOTAL :		**55.00**	**3.74**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
119	MUNIRABAD HPS	1	9.00	0.01
		2	9.00	0.00
		3	10.00	0.00
	TOTAL :		**28.00**	**0.00**
120	SHARAVATHI HPS	1	103.50	0.00
		2	103.50	0.00
		3	103.50	0.23
		4	103.50	0.00
		5	103.50	0.00
		6	103.50	0.00
		7	103.50	0.00
		8	103.50	0.00
		9	103.50	0.05
		10	103.50	1.21
	TOTAL :		**1035.00**	**0.15**
121	SIVASAMUNDRUM HPS	1	3.00	0.00
		2	3.00	0.00
		3	3.00	0.00
		4	3.00	0.00
		5	3.00	0.00
		6	3.00	0.00
		7	6.00	0.00
		8	6.00	0.00
		9	6.00	0.00
		10	6.00	0.00
	TOTAL :		**42.00**	**0.00**
122	VARAHI HPS	1	115.00	3.50
		2	115.00	5.93
		3	115.00	6.08
		4	115.00	7.02
	TOTAL :		**460.00**	**5.63**
	KSEBL			
123	IDAMALAYAR HPS.	1	37.50	26.40
		2	37.50	29.09
	TOTAL :		**75.00**	**27.75**
124	IDUKKI HPS.	1	130.00	0.00
		2	130.00	0.00
		3	130.00	0.00

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		4	130.00	0.00
		5	130.00	0.25
		6	130.00	0.00
	TOTAL :		**780.00**	**0.04**
125	KAKKAD HPS.	1	25.00	31.09
		2	25.00	31.22
	TOTAL :		**50.00**	**31.15**
126	KUTTIYADI HPS.	1	25.00	0.00
		2	25.00	0.00
		3	25.00	0.00
		4	50.00	0.00
	TOTAL :		**125.00**	**0.00**
127	KUTTIYADI ADDL. EXTN. HPS	5	50.00	0.00
		6	50.00	0.00
	TOTAL :		**100.00**	**0.00**
128	LOWER PERIYAR HPS.	1	60.00	2.48
		2	60.00	4.08
		3	60.00	3.78
	TOTAL :		**180.00**	**3.44**
129	NARIAMANGLAM HPS	1	15.00	17.28
		2	15.00	6.14
		3	15.00	5.71
		4	25.00	6.79
	TOTAL :		**70.00**	**8.67**
130	PALLIVASAL HPS.	1	5.00	0.16
		2	5.00	0.19
		3	5.00	2.55
		4	7.50	4.98
		5	7.50	4.50
		6	7.50	4.96
	TOTAL :		**37.50**	**3.28**
131	PANNIAR HPS.	1	15.00	28.12
		2	15.00	34.97
	TOTAL :		**30.00**	**31.54**
131	PORINGALKUTTU HPS.	1	8.00	0.00
		2	8.00	0.00
		3	8.00	0.00

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		4	8.00	0.00
	TOTAL :		**32.00**	**0.00**
132	SABARIGIRI HPS.	1	50.00	35.92
		2	50.00	47.19
		3	50.00	42.61
		4	50.00	55.65
		5	50.00	26.21
		6	50.00	31.81
	TOTAL :		**300.00**	**39.90**
134	SENGULAM HPS.	1	12.00	40.84
		2	12.00	32.38
		3	12.00	28.05
		4	12.00	44.33
	TOTAL :		**48.00**	**36.40**
135	SHOLAYAR HPS.	1	18.00	0.00
		2	18.00	0.00
		3	18.00	0.00
	TOTAL :		**54.00**	**0.00**
	TANGEDCO			
136	ALIYAR HPS.	1	60.00	0.00
	TOTAL :		**60.00**	**0.00**
137	BHAWANI BARRAGE- III HPS	1	15.00	25.23
		2	15.00	28.65
	TOTAL :		**30.00**	**26.94**
138	BHAWANI BARRAGE-II HPS	1	15.00	26.72
		2	15.00	30.91
	TOTAL :		**30.00**	**28.81**
139	BHAWANI KATTAL	1	15.00	0.01
		2	15.00	0.03
	TOTAL :		**30.00**	**0.02**
140	KADAMPARI HPS.	1	100.00	0.00
		2	100.00	0.00
		3	100.00	0.00
		4	100.00	0.00
	TOTAL :		**400.00**	**0.00**
141	KODAYAR-I HPS.	1	60.00	0.03
	TOTAL :		**60.00**	**0.03**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
142	KODAYAR-II HPS.	1	40.00	0.00
	TOTAL :		**40.00**	**0.00**
143	KUNDAH-I HPS.	1	20.00	0.00
		2	20.00	0.00
		3	20.00	0.00
	TOTAL :		**60.00**	**0.00**
144	KUNDAH-II HPS.	1	35.00	0.00
		2	35.00	0.06
		3	35.00	0.00
		4	35.00	0.00
		5	35.00	0.00
	TOTAL :		**175.00**	**0.01**
145	KUNDAH-III HPS.	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
	TOTAL :		**180.00**	**0.00**
146	KUNDAH-VI HPS.	1	50.00	0.00
		2	50.00	0.00
	TOTAL :		**100.00**	**0.00**
147	KUNDAH-V HPS.	1	20.00	0.00
		2	20.00	0.00
	TOTAL :		**40.00**	**0.00**
148	LOWER METTUR-I HPS.	1	15.00	0.00
		2	15.00	0.00
	TOTAL :		**30.00**	**0.00**
149	LOWER METTUR-II HPS.	1	15.00	0.00
		2	15.00	0.00
	TOTAL :		**30.00**	**0.00**
150	LOWER METTUR-III HPS.	1	15.00	0.00
		2	15.00	0.00
	TOTAL :		**30.00**	**0.00**
151	LOWER METTUR-V HPS.	1	15.00	0.00
		2	15.00	0.00
	TOTAL :		**30.00**	**0.00**
152	METTUR DAM HPS.	1	12.50	0.00
		2	12.50	0.00
		3	12.50	0.00

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		4	12.50	0.00
	TOTAL :		**50.00**	**0.00**
153	METTUR TUNNEL HPS.	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	0.00
	TOTAL :		**200.00**	**0.00**
154	MOYAR HPS	1	12.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL :		**36.00**	**0.00**
155	PAPANASAM HPS.	1	8.00	0.00
		2	8.00	0.00
		3	8.00	0.00
		4	8.00	0.00
	TOTAL :		**32.00**	**0.00**
156	PARSON`S VALLEY HPS.	1	30.00	0.00
	TOTAL :		**30.00**	**0.00**
157	PERIYAR HPS.	1	42.00	0.00
		2	42.00	0.00
		3	42.00	0.00
		4	35.00	0.00
	TOTAL :		**161.00**	**0.00**
158	PYKARA HPS.	1	7.00	0.00
		2	7.00	0.00
		3	7.00	0.00
		4	13.60	0.00
		5	13.60	0.00
		6	11.00	0.00
	TOTAL :		**59.20**	**0.00**
159	PYKARA ULTMATE HPS.	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
	TOTAL :		**150.00**	**0.00**
160	SARKARPATHY HPS.	1	30.00	0.00
	TOTAL :		**30.00**	**0.00**
161	SHOLAYAR(TN) HPS.	1	35.00	0.00
		2	35.00	0.00

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		3	25.00	0.00
	TOTAL :		**95.00**	**0.00**
162	SURULIYAR HPS.	1	35.00	0.00
	TOTAL :		**35.00**	**0.00**
	TSGENCO			
163	LOWER JURALA HPS	1	40.00	0.00
		2	40.00	0.00
		3	40.00	0.00
		4	40.00	0.00
		5	40.00	0.00
		6	40.00	0.00
	TOTAL :		**240.00**	**0.00**
164	LOWER SILERU HPS	1	115.00	0.00
		2	115.00	0.00
		3	115.00	0.00
		4	115.00	0.00
	TOTAL :		**460.00**	**0.00**
165	NAGARJUN SGR HPS	1	110.00	0.00
		2	100.80	0.00
		3	100.80	0.00
		4	100.80	0.00
		5	100.80	0.00
		6	100.80	0.00
		7	100.80	0.00
		8	100.80	0.00
	TOTAL :		**815.60**	**0.00**
166	NAGARJUN SGR LBC HPS	1	30.00	100.00
		2	30.00	0.00
	TOTAL :		**60.00**	**50.00**
167	POCHAMPAD HPS	1	9.00	100.00
		2	9.00	100.00
		3	9.00	100.00
		4	9.00	0.00
	TOTAL :		**36.00**	**75.00**
168	PRIYADARSHNI JURALA HPS	1	39.00	42.36
		2	39.00	43.09
		3	39.00	43.19
		4	39.00	43.23

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		5	39.00	43.04
		6	39.00	43.75
	TOTAL :		**234.00**	**43.11**
169	PULICHINTALA HPS	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00
	TOTAL :		**90.00**	**0.00**
170	SRISAILAM LB HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
		4	150.00	0.00
		5	150.00	0.00
		6	150.00	0.00
	TOTAL :		**900.00**	**0.00**
	EASTERN REGION			
	APGENCO			
172	MACHKUND HPS	1	17.00	0.00
		2	17.00	0.00
		3	17.00	0.00
		4	21.25	0.00
		5	21.25	0.00
		6	21.25	0.00
	TOTAL :		**114.75**	**0.00**
	DEPL			
173	JORETHANG LOOP	1	48.00	0.00
		2	48.00	0.00
	TOTAL :		**96.00**	**0.00**
174	TASHIDING HPS	1	48.50	0.00
		2	48.50	0.00
	TOTAL :		**97.00**	**0.00**
	DVC			
175	MAITHON HPS.	1	23.20	0.00
		2	20.00	0.00
		3	20.00	0.00
	TOTAL :		**63.20**	**0.00**
176	PANCHET HPS.	1	40.00	0.00
		2	40.00	0.05
	TOTAL :		**80.00**	**0.02**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
	GIPL			
177	CHUZACHEN HPS	1	55.00	42.89
		2	55.00	42.87
	TOTAL :		**110.00**	**42.88**
	JUUNL			
178	SUBERNREKHA-I HPS.	1	65.00	0.00
	TOTAL :		**65.00**	**0.00**
179	SUBERNREKHA-II HPS.	1	65.00	0.00
	TOTAL :		**65.00**	**0.00**
	NHPC			
180	RANGIT HPS	1	20.00	18.18
		2	20.00	32.61
		3	20.00	26.29
	TOTAL :		**60.00**	**25.69**
181	TEESTA LOW DAM-III HPS	1	33.00	66.12
		2	33.00	59.42
		3	33.00	57.84
		4	33.00	56.15
	TOTAL :		**132.00**	**59.88**
182	TEESTA LOW DAM-IV HPS	1	40.00	59.31
		2	40.00	52.33
		3	40.00	60.58
		4	40.00	57.05
	TOTAL :		**160.00**	**57.32**
183	TEESTA V HPS	1	170.00	34.85
		2	170.00	34.04
		3	170.00	34.01
	TOTAL :		**510.00**	**34.30**
	OHPC			
184	BALIMELA HPS.	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
		4	60.00	0.00
		5	60.00	0.00
		6	60.00	0.00
		7	75.00	0.00
		8	75.00	0.00
	TOTAL :		**510.00**	**0.00**

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
185	HIRAKUD-I HPS	1	49.50	0.01
		2	49.50	0.02
		3	32.00	0.01
		4	32.00	0.00
		5	37.50	0.00
		6	37.50	0.00
		7	37.50	0.00
	TOTAL :		**275.50**	**0.01**
186	HIRAKUD-II HPS	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
	TOTAL :		**72.00**	**0.00**
187	RENGALI HPS.	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	1.43
		5	50.00	0.00
	TOTAL :		**250.00**	**0.29**
188	UPPER INDRAVATI HPS.	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
		4	150.00	0.00
	TOTAL :		**600.00**	**0.00**
189	UPPER KOLAB HPS.	1	80.00	0.00
		2	80.00	0.16
		3	80.00	0.00
		4	80.00	0.00
	TOTAL :		**320.00**	**0.04**
	SKPPPL			
190	DIKCHU HPS	1	48.00	0.00
		2	48.00	0.00
	TOTAL :		**96.00**	**0.00**
	TUL			
191	TEESTA-III HPS	1	200.00	0.87
		2	200.00	0.89
		3	200.00	0.65
		4	200.00	0.20
		5	200.00	0.87

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		6	200.00	0.74
	TOTAL :		**1200.00**	**0.70**
	WBSEDCL			
192	JALDHAKA HPS ST-I	1	9.00	32.26
		2	9.00	22.15
		3	9.00	3.87
		4	9.00	15.80
	TOTAL :		**36.00**	**18.52**
193	PURULIA PSS HPS.	1	225.00	0.00
		2	225.00	0.00
		3	225.00	0.00
		4	225.00	0.00
	TOTAL :		**900.00**	**0.00**
194	RAMMAM HPS.	1	12.50	48.01
		2	12.50	33.76
		3	12.50	41.18
		4	12.50	32.51
	TOTAL :		**50.00**	**38.86**
	NORTH EASTERN REGION			
	APGPCL			
195	KARBI LANGPI HPS.	1	50.00	0.00
		2	50.00	0.00
	TOTAL :		**100.00**	**0.00**
	MePGCL			
196	KYRDEMKULAI HPS.	1	30.00	0.00
		2	30.00	0.00
	TOTAL :		**60.00**	**0.00**
197	MYNTDU(LESHKA) St-1 HPS	1	42.00	0.00
		2	42.00	0.15
		3	42.00	15.79
	TOTAL :		**126.00**	**5.31**
198	NEW UMTRU HPS	1	20.00	0.00
		2	20.00	0.00
	TOTAL :		**40.00**	**0.00**
199	UMIAM HPS ST-I	1	9.00	0.00
		2	9.00	0.00
		3	9.00	0.00

NON AVAILABILITY OF HYDRO ELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2017-18

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	MISC. NON AVAILABILITY
		4	9.00	0.00
	TOTAL :		**36.00**	**0.00**
200	UMIAM HPS ST-IV	7	30.00	0.00
		8	30.00	0.00
	TOTAL :		**60.00**	**0.00**
	NEEPCO			
201	DOYANG HPS.	1	25.00	0.00
		2	25.00	0.00
		3	25.00	0.00
	TOTAL :		**75.00**	**0.00**
202	KHONDONG HPS.	1	25.00	0.00
		2	25.00	0.00
	TOTAL :		**50.00**	**0.00**
203	KOPILI HPS.	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.34
		4	50.00	0.00
		5	25.00	0.57
	TOTAL :		**225.00**	**0.14**
204	RANGANADI HPS.	1	135.00	0.00
		2	135.00	0.00
		3	135.00	0.00
	TOTAL :		**405.00**	**0.00**
205	TUIRIAL HPS	1	30.00	0.00
		2	30.00	0.00
	TOTAL :		**60.00**	**0.00**
	NHPC			
206	LOKTAK HPS.	1	35.00	0.03
		2	35.00	0.24
		3	35.00	0.36
	TOTAL :		**105.00**	**0.21**

CHAPTER-8

GENERATION PROGRAMME FOR THE YEAR 2018-19

CHAPTER 8

GENERATION PROGRAMME FOR THE YEAR 2018-19

8.1 As on 31.03.2018, 206 HE Stations (of more than 25 MW capacity) having total installed capacity of 45293.42 MW are being monitored in the country. With the addition of new hydro units during 2018-19, the anticipated installed capacity of H.E. Stations in the country would be 47252.42.42 MW (above 25 MW capacity) by 31st March, 2019. The overall Generation Programme for H.E. stations for the year 2018-19 has been fixed at 135000 MU (comprising 130000 MU from HE Stations in India and 5000 MU import from Bhutan), which is 4098.97 MU more than actual generation. The actual hydro generation during the year 2017-18 was 130901.03 MU (126122.70 MU from HE Station in India and 4778.33 MU import from Bhutan).

8.2 Region-wise summary of likely installed capacity on 31.03.2019 considered while fixation of generation targets. Generation Programme for 2018-19 and actual generation during 2017-18 are given in **Table 7.1** below:

TABLE 8.1

REGION-WISE LIKELY INSTALLED CAPACITY OF HE STATIONS AND HYDRO GENERATION PROGRAMME DURING 2018-19

Sl. No.	Region	Likely Hydro Installed Capacity (as on 31.03.2019) (MW)	Hydro Generation Programme for 2018-19 (MU)	Hydro Generation during 2017-18 (MU)	
				Programme	Actual
1.	Northern	20188.27	70148	71581	74734.69
2.	Western	7392	12638	17075	9177.92
3.	Southern	11872.45	24424	28682	19022.26
4.	Eastern	5747.70	16355	18661	17521.75
5.	North-Eastern	2052	6435	5401	5666.08
Sub total		**47252.42**	**130000**	**141400**	**126122.70**
6.	Import – from Bhutan		5000	5000	4778.33
Total(Including Import from Bhutan)			**135000**	**146400**	**130901.03**

8.3 While finalizing the Generation Programme for 2018-19 during last quarter of 2017-18, it was anticipated that 33 nos. H.E. units having installed capacity of 2289 MW will be added during the year 2018-19 & last quarter of 2017-18. Unit-wise details of these units are given in **Annex-8.1**.

8.4 Sector- wise and Utility-wise details of likely installed Capacity as on 31.03.2019, targets and actual generation during 2017-18, generation target for 2018-19 are given in **Annex-8.2**.

Annex-8.1

HYDRO ELECTRIC GENERATING UNITS LIKELY TO BE ADDED DURING 2018-19 & LAST QAURTER OF 2017-18

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	Feb. 2018
2	Parbati II	Himachal Pradesh/ NHPC	U-1 U-2 U-3 U-4	200 200 200 200	Dec. 2018
3	Kameng	Arunachal Pradesh / NEEPCO	U-1 U-2 U-3 U-4	150 150 150 150	Mar. 2018
4	Pare	Arunachal Pradesh/ NEEPCO	U-1 U-2	55 55	Mar. 2018
	Sub-Total (CS)			**1840**	
	State Sector				
5	Uhl-III	Himachal Pradesh /BVPCL	U-1 U-2 U-3	33.33 33.33 33.33	Mar. 2018
6	Vyasi	Uttarakhand/ UJVNL	U-1 U-2	60 60	Mar. 2019
7	Pulichinthala	Telangana / TSGENCO	U-4	30	Aug. 2018
	Sub-Total (SS)			**250**	
	Private Sector				
11	Tidong	Himachal Pradesh /NTPGPL	U-1 U-2	50 50	Mar. 2019
12	Singoli Bhatwari		U-1 U-2 U-3	33 33 33	Mar. 2019
	Sub-Total (PS)			**199**	
	Grand Total		**24**	**2289**	

Annex-8.2

SECTOR-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS DURING 2017-18 & TARGETS FOR 2018-19

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2019	Generation during 2017-18 (MU)		Generation Programmed for 2018-19 (MU)
		Targets	Actual	
A. CENTRAL SECTOR				
BBMB	2866.30	9360	10864.14	9425
NHPC Ltd	6251.20	23046	22549.52	24055
SJVN Ltd	1912.02	8625	9222.73	8490
NTPC Ltd	800.00	3055	3313.62	3000
THDC Ltd	1400.00	4115	4301.27	3952
NHDC Ltd.	1520.00	3100	1325.36	2446
DVC	143.20	235	256.35	205
NEEPCO Ltd.	1525.00	3492	3203.10	4603
Sub Total	**16417.72**	**55028**	**55036.09**	**56176**
B. STATE ELECTRICITY BOARDS/CORPORATIONS				
JKSPDCL	1110.00	4599	5136.89	4669
HPPCL	195.00	568	332.12	430
HPSEBL.	372.00	1617	1590.86	1530
BVPC	100.00	30	0.00	20
RRVUNL	411.00	720	819.53	535
PSPCL	1051.00	4021	4230.51	3690
UPJVNL	501.60	1170	1486.69	1115
UJVNL	1252.15	4688	4526.00	4105
SSNNL	1450.00	4460	939.47	2260
GSECL	540.00	857	612.45	730
MAHAGENCO	2406	4296	3143.16	3361
MPPGCL	875.00	2625	1420.98	2280
CSPGCL	120.00	250	178.07	225
APGENCO	1796.75	3505	2870.47	3109
TSGENCO	2405.60	3335	1491.98	2665
KPCL	3585.40	11687	7008.65	9590
KSEBL	1881.50	6221	5199.26	5490
TANGEDCO	2203.20	4415	2919.60	3570
JUUNL	130.00	150	190.38	110
OHPC	2027.50	5672	5555.29	5140
TUL	1200.00	5214	4429.33	4000
WBSEDCL	986.00	1596	1282.02	1250

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2019	Generation during 2017-18 (MU)		Generation Programmed for 2018-19 (MU)
		Targets	Actual	
APGCL	100.00	390	484.98	300
MePGCL	322.00	919	1140.26	932
Sub Total	**27241.70**	**73005**	**56988.95**	**61106**
C. PRIVATE SECTOR				
MPCL	86	344	346.29	344
EPPL	100	360	368.89	330
ADHPL	192	700	683.01	650
GBHPPL	70	282	317.63	250
JSWHEL	1300	5500	5906.58	5343
IA ENERGY	36	0.00	79.42	125
AHPCL	330	1340	1382.54	1250
JPPVL	400	1800	2160.90	1700
DLHP	34	37	42.55	36
GIPL	110	495	444.79	400
TPCL	447	1450	1515.88	1300
DEPL	96	459	406.01	390
SEPL	97	400	73.07	300
SNEHA KINETIC	96	-	370.10	300
NTPGPL	100	200	0.00	0
L&T UHPL	99	-	-	0
Sub Total	**3593**	**13367**	**14097.66**	**12718**
Total All India	**47252.342**	**141400**	**126122.70**	**130000**
Import from Bhutan		**5000**	**4778.33**	**5000**
Total Hydro generation including import from Bhutan		**146400**	**130901.03**	**135000**

CHAPTER-9

RENOVATION & MODERNISATION OF HYDRO-ELECTRIC STATIONS

CHAPTER – 9

RENOVATION & MODERNISATION (R&M) OF HYDRO ELECTRIC PROJECTS

9.1 R&M Phase-I Programme

Recognising the benefits of the R&M programme, Govt. of India set up a National Committee in the year 1987 to formulate a 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 cost of these schemes were estimated as Rs.1493 Crores with expected benefits of 2531 MW.

9.2 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 benefits of 3685 MW at an estimated cost of Rs. 2161 Crores.

9.3 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.

9.3.1 VIII, IX, X, XI and XII Plan Achievements

Under the hydro R&M programme, 104 hydro electric schemes (21 in Central Sector and 83 in State Sector) (13 upto the VIII Plan, 20 in the IX Plan, 32 in the X Plan,18 in the XI Plan and 21 in XII Plan) with an installed capacity of 20,611 MW at a cost of Rs. 3,138 Crores have been completed by the end of the XII Plan (i.e. by 31.03.2017) & have accrued a benefit of 3,636 MW through Life Extension, Uprating and Restoration.

The State-wise list of hydro R&M schemes completed during the VIII, IX, X, XI & XII Plan is given at **Annex. 8.1, 8.2, 8.3, 8.4 & 8.5** respectively.

9.3.2 Programme during 2017-22

During 2017-22, an aggregate capacity of 9371.80 MW at 50 Hydro Electric Power Station (7 in Central Sector and 43 in State Sector) has been programmed for R&M which will accrue benefit of about 4725.35 MW through Life Extension, Uprating and Restoration. Out of the 50 schemes expected for completion during 2017-22, 2 schemes in Central Sector with an aggregate capacity of about 213.4 MW have been completed till March, 2018 and have accrued a benefit of 48.4 MW through Life Extension. The State-wise list of hydro R&M schemes expected for completion during 2017-22 is given at **Annex-8.6.**

9.3.3 Programme during 2022-27

During 2022-27, an aggregate capacity of 2058 MW at 20 Hydro Electric Power Station (1 in Central Sector and 19 in State Sector) has been programmed for R&M which will accrue benefit of 2089 MW. The state-wise list of hydro R&M schemes expected for completion during 2022-27 is given at **Annex-8.7**.

9.4 The State-wise list of additional hydro projects identified for undertaking RMU&LE works is given at **Annex-8.8.**

9.5 Summary of R&M of Hydro Projects (As on 31.03.2018)

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

I Hydro R&M schemes completed up to XII Plan

Sl. No.	Plan Period	No. of Projects			Installed Capacity (MW)	Actual Expenditure (Rs. in Crs)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Upto VIII Plan Schemes	2	11	13	1282.00	127.37	429.00 [39.00(U) + 54.00LE+ 336.00(Res.)]
2.	IX Plan Schemes	8	12	20	4892.10	570.16	1093.03 [339.00(U)+ 423.00(LE) + 331.03(Res.)]
3.	X Plan Schemes	5	27	32	4446.60	1029.24	829.08 [123.40(U) + 701.25 (LE) + 4.43(Res.)]
4.	XI Plan Schemes	4	14	18	5841.20	294.84	735 [12 (U) + 708 (LE) + 15 (Res.)]
5.	XII Plan Schemes	2	19	21	4149.60	1115.97	549.40 [58 (U)+ 476.40 (LE)+15(Res.)]
6.	Total	21	83	104	20611.50	3137.58	3635.51

II Hydro R&M schemes Programmed for completion during 2017-22

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Estimated Cost (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Programmed	7	43	50	9371.80	6429.78	4725.35 [4575.65(LE) +149.7(U)]
2.	Completed	2	0	2	213.40	34.06 (Actual Cost)	48.4 (LE)
3.	Under Implementation	3	22	25	4719.10	3017.40	2111.50 [1995.30 (LE) +116.20 (U)]
4.	Under Tendering	1	16	17	3023.10	2447.67	1143.25 [1115.75 (LE) +27.5 (U)]
5.	Under DPR Preparation/ Finalisation/Approval	1	5	6	1416.20	930.65	1422.20 [1416.20 (LE)+6 (U)]

III Hydro R&M schemes Programmed for completion during 2022-27

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Benefit (MW)
		Central Sector	State Sector	Total		
1.	Programmed	1	19	20	2058	2089 [2058 (LE)+ 31 (U)]
2.	Under Tendering	0	2	2	96	112.00 [96 (LE)+ 16 (U)]
3.	Under DPR Preparation/ Finalization/ Approval	1	5	6	655	670.00 [655 (LE) + 15 (U)]
4.	Under RLA Studies	-	12	12	1307	1307 (LE)

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

9.6 Achievement during the year 2017-18

R&M schemes namely Ganguwal (Unit-2) & Kotla (Unit-3) (1x24.2+1x24.2) and Dehar Power House of BBMB having an aggregate installed capacity of about 213.40 MW have been completed during the year 2017-18 at an actual cost of about Rs. 25.34 Crores and accrued benefit of about 48.4 MW through Life Extension.

9.7 Programme for the year 2018-19

For the year 2018-19, it is programmed to complete following 10 schemes having an installed capacity of about 1409.10 MW. On completion of these schemes, there will be a benefit of about 494.3 MW through Life Extension at an estimated cost of about Rs.681.64 Crores.

S. No.	Name of Schemes	Capacity under R&M (in MW)	Cost (in Rs. Crores)	Agency
1.	Chenani,	(5x4.66)	39.14	J&KSPDC
2.	Ganderbal	(2x3+2x4.5)	39.50	J&KSPDC
3.	Rihand	(6x50)	132.20	UPJVNL
4.	Nagarjuna Sagar Ph-II works	(1x110+7x100.8)	22.7	TSGENCO
5.	Nagarjuna Sagar Left Canal Power House	(2x30.6)	30.99	TSGENCO
6.	Bhadra River Bed units	(2x12)	28.015	KPCL
7.	Munirabad Dam Power House	(2x9+1x10)	4.6	KPCL
8.	Sholayar	(3x18)	199.55	KSEB
9.	Sholayar-I	(2x35)	120.00	TANGEDCO
10.	Hirakund-II (Chiplima)	(1x24)	65.67	OHPC

Annex- 9.1

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

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Himachal Pradesh								
1	Bairasiul, NHPC	CS	3x60	25.98	25.98	18 (U)	RM&U	1991-92
2	Giri, HPSEB	SS	2x30	9.85	7.90	6 (U)	RM&U	1995-96
Punjab								
3	UBDC-I, PSPCL	SS	3x15	11.00	8.00	11 (Res)	R&M+Res.	1991-92
Uttar Pradesh								
4	Rihand, UPJVNL	SS	6x50	1.43	1.43	100(Res.)	R&M+Res.	1995-96
Karnataka								
5	Nagjhari, U-2, KPCL	SS	1x135	11.97	11.32	15 (U)	RM&U	1995-96
6	Shivasamudram, VVNL	SS	6x3 + 4x6	8.00	8.00	18 (LE)	RM&LE	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(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 (Res)	R&M+Res.	1991-92
Tripura								
13	Gumti, TPGL	SS	3x5	17.50	17.50	-	R&M	1994-95
Total			**1282**	**125.57**	**127.37**	**429 [39 (U) + 336 (Res) + 54(LE)]**		

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

Annex-9.2
(Sheet 1/2)

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

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Himachal Pradesh								
1	Bhakra RB BBMB	CS	5x132	88.45	90.68	125.00 (U)	RM&U	2000-01
2	Dehra 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	4.34	-	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	4.11	-	R&M	1998-99
12	Tiloth, UJVNL	SS	3x30	8.02	5.51	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	Srisailam RB, 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

Annex-9.2
(Sheet 2/ 2)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Orissa								
17	Hirakud-I, U1&2, OHPC	SS	2x37.5	95.10	95.10	24.00(U) +75.00(LE)	RMU&LE	1997-98
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

Annex- 9.3

(Sheet 1/ 3)

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

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
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	81.99	25.89 (LE) +2.10	RM&LE+Res.	2006-07
2	Kotla, U-1, BBMB	CS	1x29.25	51.28		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 3x15MW&R &M for 3x15.45 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 (U)	RM&U	2002-03
11	Supa PH, KPCL	SS	2x50	2.64	2.47	-	R&M	2002-03
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

Annex- 9.3
(Sheet 2/3)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
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	Neriamanga-lam KSEB	SS	3x15	58.00	53.05	9.00 (U) +45.00(LE)	RMU&LE	2006-07
20	Pallivasal, KSEB	SS	3x5+ 3x7.5	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	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		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
Maharastra								
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

Annex- 9.3
(Sheet 3/3)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs. in Crs.)	Actual Exp (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
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(LE)	RM&LE	2002-03
32	Khandong, NEEPCO	CS	2x25	4.00	3.35	-	R&M	2003-04
Total			**4446.60**	**1016.31**	**1029.24**	**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 been accounted for at Sl. No. 4.

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

Annex- 9.4
(Sheets 1 of 2)

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

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs . in crs)	Actual Exp (Rs . in crs)	Benefits (MW)	Category	Year of Completion
Himachal Pradesh								
1	Dehar Ph. A BBMB	CS	6x165	11.00	6.94	-	R&M	2010-11
2	Dehar Ph. B BBMB	CS	6x165	49.00	24.45	330(LE)	RM&LE	2009-10
Uttarakhand								
3	Tanakpur, NHPC	CS	3x31.4	10.77	11.95	-	R&M	2007-08
4	Khodri Ph.A, UJVNL	SS	4x30	5.25	6.39	-	R&M	2008-09
5	Chilla Ph.A, UJVNL	SS	4x36	23.55	21.24	-	R&M	2008-09
Andhra Pradesh								
6	Upper Sileru, APGENCO	SS	4x60	4.20	3.34	-	R&M	2009-10
Karnataka								
7	Nagjhari, U1 to 6, KPCL	SS	5x150 + 1x135	14.75	15.31	-	RM&U	2009-10
8	Sharavathy Ph.B, KPCL	SS	10x103.5	20.50	11.14	-	R&M	2009-10
9	Supa, KPCL	SS	2x50	3.45	4.90	-	R&M	2009-10
10	Bhadra, KPCL	SS	2x12	1.44	0.85	-	R&M	2009-10
11	Lingnamakki, KPCL	SS	2x27.5	3.81	2.62	-	R&M	2010-11
Tamil Nadu								
12	Mettur Dam, TANGEDCO	SS	4x10	30.17	24.16	10 (U) + 40 (LE)	RMU&LE	2007-08
Maharashtra								
13	Koyna St.I&II, MSPGCL	SS	4x70 + 4x80	87.50	81.82	-	R&M	2008-09

Annex- 9.4

(Sheets 2 of 2)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs . in crs)				
14	Vaitarna, MSPGCL	SS	1x60	16.00	0.14	-	R&M	2009-10
15	Koyna Dam PH, MSPGCL	SS	2x18	5.78	0.25	-	R&M	2009-10
16	Koyna St.III, MSPGCL	SS	4x80	16.65	5.79	320 (LE)	RM&LE	2011-12
Manipur								
17	Loktak, NHPC	CS	3x30 derated	18.55	17.88	15.00 (Res.)	R&M + Res.	2011-12
Meghalaya								
18	Umium St.II, MePGCL	SS	2x9	90.46	55.67	2(U)+18.00 (LE)	RMU&LE	2011-12
Total			**5841.2**	**412.83**	**294.84**	**735 [12.00(U) +708.00 (LE)+15.00 (Res)]**		

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

Annex- 9.5
(Sheet 1 of 2)

State-wise list of Hydro RMU&LE schemes completed in the XII Plan

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (No.x.MW)	Est. Cost (Rs . in Crs)	Actual Exp (Rs . in Crs)	Benefits (MW)	Category	Year of Completion
Himachal Pradesh								
1	Bassi, HPSEB	SS	4x15	124.25	158.26	6.0(U)+ 60(LE)	RMU&LE	2013-14
Jammu & Kashmir								
2	Lower Jhelum, J&KSPDC	SS	3x35	101.3	96.10	15.00(Res)	R&M+ Res.	2014-15
3	Sumbal Sindh, J&KSPDC	SS	2x11.3	25.00	24.59	-	R&M	2016-17
Uttarakhand								
4	Pathri, UJVNL	SS	3x6.8	113.25	108.3	20.40(LE)	RM&LE	2014-15
5	Khatima, UJVNL	SS	3x13.8	256.77	118.83	41.40 (LE)	RM&LE	2016-17
Uttar Pradesh								
6	Matatila, UPJVNL	SS	3x10.2	10.29	7.21	30.6 (LE)	RM&LE	2015-16
Andhra Pradesh								
7	Lower Sileru, APGENCO	SS	4x115	8.75	6.77	-	R&M	2013-14
8	Srisailam RB, APGENCO	SS	7x110	16.70	17.60	-	R&M	2015-16
Telangana								
9	Nagarjuna Sagar Ph-I works, TSGENCO	SS	1x110+ 7x100.8	33.35	13.90	-	R&M	2012-13
Karnataka								
10	Supa, KPCL	SS	2x50	3.45	3.88	-	R&M	2014-15
11	Nagjhari,U-1 to 6, KPCL	SS	1x135 (U-6)	69.21	64.49	15 (U)	RM&U	2015-16
12	Sharavathy Genarating Station (Ph B), KPCL	SS	10x103.5	20.00	29.27	-	R&M	2016-17
Kerala								
13	Idamalayar, KSEB	SS	2x37.5	14.50	13.22	-	R&M	2012-13

Annex- 9.5

(Sheet 2 of 2)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (No.x.MW)	Est. Cost (Rs . in Crs)	Actual Exp (Rs . in Crs)	Benefits (MW)	Category	Year of Completion
14	Sabarigiri, U-4 KSEB	SS	1x55	52.20	50.41	5(U)	RM&U	2014-15
15	Poringalkuthu, KSEB	SS	4x8	88.63	51.90	4 (U)+ 32.00 (LE)	RMU&LE	2015-16
Tamil Nadu								
16	Periyar, TANGEDCO	SS	4x35	161.18	133.68	28.00(U)+ 140(LE)	RMU&LE	2015-16
Odisha								
17	Rengali Unit-1 OHPC	SS	1x50	47.50	36.76	50(LE)	RM&LE	2012-13
18	Rengali Unit-2 OHPC	SS	1x50	25.20	20.73	50(LE)	RM&LE	2013-14
West Bengal								
19	Jaldhaka St.I, WBSEDCL	SS	3x9	88.62	79.97	27 (LE)	RM&LE	2016-17
Assam								
20	Khandong NEEPCO	CS	1x25	25.05	29.18	25(LE)	RM&LE	2014-15
21	Kopili, NEEPCO	CS	2x50	50.22	50.92	-	R&M	2014-15
Total			**4149.60**	**1335.42**	**1115.97**	**549.40 [58(U)+ 476.40 (LE) + 15 (Res)]**		

State-wise list of Hydro RMU&LE schemes programmed for completion during 2017-22

Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
A. Completed Schemes								
Himachal Pradesh								
1	Ganguwal (1x29.25+2x24.2) & Kotla (1x29.25+2x24.2), BBMB	CS	1x24.2 (U-2) 1x24.2 (U-3)	14.19	9.34	48.4 (LE)	RM&LE	2017-18
2	Dehar Power House, BBMB (6x165)	CS	1x165	19.87	16.00	-	R&M	2017-18
Sub Total (A)			**213.4**	**34.06**	**25.34**	**48.4 (LE)**		
B. Ongoing Schemes – Under Implementation								
Himachal Pradesh								
3	Bhakra LB, BBMB (5x108)	CS	5x108	489.77	356.12	540.00(LE)+ 90.00 (U)	RMU&LE	2019-20
4	Baira Siul, NHPC (3x60)	CS	3x60	341.41	10.77	180 (LE)	RM&LE	2020-21
5	Bhaba Power House, HPSEB (3x40)	SS	3x40	166.17@	75	120 (LE)	RM&LE	2019-20
Jammu & Kashmir								
6	Salal, NHPC (6x115)	CS	5x115	58.01	41.02	-	R&M	2020-21
7	Chenani, J&KSPDC (5x4.66)	SS	5x4.66	39.14	14.66	23.30 (LE)	RM&LE	2018-19
8	Ganderbal, J&KSPDC (2x3+2x4.5)	SS	2x4.5	39.30	14.66	9.00 (LE)	RM&LE	2018-19
Uttarakhand								
9	Tiloth, UJVNL (3x30)	SS	3x30	384.66	11.5	90 (LE)	RM&LE	2021-22
10	Dhalipur, UJVNL (3x17)	SS	3x17	152.65	3.5	51.00 (LE)	RM&LE	2021-22
Uttar Pradesh								
11	Rihand, UPJVNL (6x50)	SS	6x50	132.20	112.41	300.00 (LE)	RM&LE	2018-19
12	Obra,	SS	3x33	58.80	23.18	99.00 (LE)	RM&LE	2019-20

Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Gujarat								
13	Ukai, GSECL (4x75)	SS	3x75 (U-1,2,&4)	7.3	-	-	R&M	2021-22
14	Kadana PSS, GSECL (4x60)	SS	4x60	7.1	-	-	R&M	2021-22
Telangana								
15	Nagarjuna Sagar Ph-II works, TSGENCO (1x110+7x100.8)	SS	1x110+7x 100.8	22.17	14.34	-	R&M	2018-19
16	Nagarjuna Sagar Left Canal Power House, TSGENCO (2x30.6)	SS	2x30.6	30.99	2.00	-	R&M	2018-19
Karnataka								
17	Bhadra River Bed units, KPCL (2x12)	SS	2x12	28.015	18.4	-	R&M	2018-19
18	Munirabad Dam Power House, KPCL (2x9 + 1x10)	SS	2x9 + 1x10	4.6	-	-	R&M	2018-19
Kerala								
19	Sholayar, KSEB (3x18)	SS	3x18	199.55	24.9	54.00 (LE)	RM&LE	2018-19
20	Idukki 1st stage, KSEB (3x130)	SS	3x130	89.90	10.35	-	R&M	2019-20
Tamil Nadu								
21	Sholayar-I, TANGEDCO (2x35)	SS	2x35	120.00	35.6	70.00 (LE) + 14.00(U)	RMU&LE	2018-19
Madhya Pradesh								
22	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	21.83	-	-	R&M	2020-21
23	Bargi, MPPGCL (2x45)	SS	2x45	3.12	0.36	-	R&M	2021-22
24	Pench, MPPGCL (2x80)	SS	2x80	13.36	-	-	R&M	2021-22

Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Odisha								
25	Hirakud-I OHPC (2x37.5)	SS	2x37.5 (U5&6)	158.77	40.54	75.00 (LE) + 12.2 (U)	RMU&LE	2019-20
26	Hirakud-II (Chiplima), OHPC (3x24)	SS	1x24 (U-3)	65.67	26.18	24.00 (LE)	RM&LE	2018-19
27	Balimela, OHPC (6x60)	SS	6x60	382.91	2.38	360(LE)	RM&LE	2020-21
Sub Total (B)			**4719.1**	**3017.40**	**837.87**	**2111.50 [1955.30(LE) + 116.20(U)**		
C. Ongoing Schemes – Under Tendering								
Himachal Pradesh								
28	Giri, HPSEB (2x30)	SS	2x30	139.8	-	60.00 (LE)	RM&LE	2020-21
Punjab								
29	Mukerin St.I, St.II, St.III & St.IV, PSPCL (3x15, 3x15, 3x19.5&3x19.5)	SS	3x15, 3x15, 3x19.5& 3x19.5	136.07	24.8	-	R&M	2019-20
30	Ranjit Sagar Dam, PSPCL (4x150)	SS	4x150	120.27	-	-	R&M	2020-21
31	Shanan HEP, PSPCL (1x50+4x15)	SS	1x50+ 4x15	37.8	13.57	-	R&M	2019-20
32	UBDC St.I & St.II, PSPCL (3x15+3x15.45)	SS	3x15+ 3x15.45	23.55	-	-	R&M	2019-20
33	Anandpur Sahib Hydel Project, PSPCL (4x33.5)	SS	4x33.5	42.88	-	-	R&M	2019-20
Uttarakhand								
34	Chilla Ph B UJVNL (4x36)	SS	4x36	490.56	-	144(LE)+ 12(U)	RMU&LE	2021-22
35	Ramganaga, UJVNL (3x66)	SS	3x66	455.2	-	198(LE)	RM&LE	2021-22

Sl. No	Name of Project, Age Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Uttarakhand								
36	Dhakrani, UJVNL (3x11.25)	SS	3x11.25	137.31	-	33.75 (LE)	RM&LE	2021-22
Karnataka								
37	Nagjhari KPCL (3x150)	SS	3x150 (U-1 to 3)	222	28.46	-	R&M	2021-22
38	Kadra Dam Power House, KPCL (3x50)	SS	3x50	44.47	-	150 (LE)	RM&LE	2021-22
39	Kodasalli Dam Power House, KPCL (3x40)	SS	3x40	50.6	-	120 (LE)	RM&LE	2021-22
40	Linganamakki Dam Power House, KPCL	SS	2x27.5	56.20	-	55 (LE)	RM&LE	2021-22
41	Gerusoppa Dam Power House, (Sharavathy Tail Race)	SS	4x60	59.66	-	240 (LE)	RM&LE	2021-22
Kerala								
42	Kuttiyadi, KSEB (3x25)	SS	3x25	377.41	-	75.00 (LE) + 7.5 (U)	RMU&LE	2021-22
Madhya Pradesh								
43	Bansagar Ton-I, MPPGCL (3x105)	SS	3x105	4.97	-	-	R&M	2021-22
Jharkhand								
44	Panchet, DVC (2x40)	CS	1x40 (U-1)	48.92	2.19	40(LE)+ 8(U)	RMU&LE	2021-22
Sub Total (C)			**3023.10**	**2447.67**	**69.02**	**1143.25 [1115.75(LE) + 27.5(U)]**		
D. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval								
Karnataka								
45	Shivasamudram, KPCL (6x3+4x6)	SS	6x3+4x6	125.15	-	42 (LE)	RM&LE	2021-22
46	MGHE, KPCL (4x21.6+4x13.2)	SS	4x21.6+ 4x13.2	97.00	-	139.2 (LE)	RM&LE	2021-22

Annex- 9.6

(Sheet 5 of 5)

Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Karnataka								
47	Supa Dam Power House, KPCL (2x50)	SS	2x50	47.91	-	100 (LE)	RM&LE	2021-22
48	Sharavathy Generating Station, KPCL (10x103.5)	SS	10x103.5	196.56	-	1035 (LE)	RM&LE	2021-22
West Bengal								
49	Maithon, DVC (2x20+1x23.2)	CS	2x20 (U-1&3)	56.03	7.76	40.00 (LE)	RM&LE	2021-22
Meghalaya								
50	Umium St.III, (Kyrdemkulai) MePGCL (2x30)	SS	2x30	408.00	-	60(LE) + 6(U)	RMU&LE	2021-22
Sub Total (D)			**1416.20**	**930.65**	**7.76**	**1422.20 [1416.20(LE)+ 6(U)]**		
Total (A+B+C+D)			**9371.80**	**6429.78**	**939.99**	**4725.35 [4575.65(LE) +149.7(U)]**		

@ This cost includes Scheme I only i.e. Rehabilitation of damaged/burnt equipments.

Abbreviations: R&M – Renovation & Modernisation;. U – Uprating; LE – Life Extension; Res – Restoration;

State-wise List of Hydro RMU&LE schemes programmed for completion during 2022-27

Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
A. Ongoing Schemes – Under Tendering								
Tamil Nadu								
1	Moyar PH, TANGEDCO (3x12)	SS	3x12	67.05	-	36(LE)+ 6(U)	RMU&LE	2023-24
2	Kodayar PH-I, TANGEDCO (1x60)	SS	1x60	88.48	-	60 (LE)+ 10 (U)	RMU&LE	2022-24
Sub Total(A)			**96**	**155.53**	**-**	**112.00 [96(LE)+ 16(U)]**		
B. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval								
Uttarakhand								
3	Chibro, UJVNL (4x60)	SS	4x60	184.88	-	240(LE)	RM&LE	2025-26
4	Khodri PH-II UJVNL (4x30)	SS	4x30	169.63	-	120(LE)	RM&LE	2025-26
5	Kulhal, UJVNL (3x10)	SS	3x10	115.24	-	30(LE)	RM&LE	2023-24
Andhra Pradesh								
6	Machkund St.I & St.II, APGENCO (3x17+3x23)	SS	3x17+ 3x23	400	-	120 (LE) + 9 (U)	RMU&LE	2025-26
Tamil Nadu								
7	Kodayar PH-II, TANGEDCO (1x40)	SS	1x40	-	-	40.0(LE)+ 6(U)	RMU&LE	2022-27
Manipur								
8	Loktak, NHPC (3x35)	CS	3x35	236.07	-	105 (LE)	RM&LE	2022-23
Sub Total(B)			**655**	-	-	**670.00 [655(LE)+ 15(U)]**		
C. Ongoing Schemes – Under RLA Studies								
Tamil Nadu								
9	Kundah-I, TANGEDCO (3x20)	SS	3x20	-	-	60 (LE)	RM&LE	2022-27

Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
10	Kundah-II, TANGEDCO (5x35)	SS	5x35	-	-	175 (LE)	RM&LE	2022-27
11	Kundah-III, TANGEDCO (3x60)	SS	3x60	-	-	180 (LE)	RM&LE	2022-27
12	Kundah-IV, TANGEDCO (2x50)	SS	2x50	-	-	100 (LE)	RM&LE	2022-27
13	Kundah-V, TANGEDCO (2x20)	SS	2x20	-	-	40 (LE)	RM&LE	2022-27
14	Mettur Tunnel, TANGEDCO (4x50)	SS	4x50	-	-	200 (LE)	RM&LE	2022-27
15	Sarkarpathy, TANGEDCO (1x30)	SS	1x30	-	-	30 (LE)	RM&LE	2022-27
16	Sholayar-II, TANGEDCO (1x25)	SS	1x25	-	-	25 (LE)	RM&LE	2022-27
17	Suruliyar, TANGEDCO (1x35)	SS	1x35	-	-	35 (LE)	RM&LE	2022-27
Kerala								
18	Idukki 2nd stage, KSEB (3x130)	SS	3x130	-	-	390 (LE)	RM&LE	2022-27
Andhra Pradesh								
19	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	-	-	36 (LE)	RM&LE	2025-26
20	Hampi Canal PH, APGENCO (4x9)	SS	4x9	-	-	36 (LE)	RM&LE	2025-26
Sub Total(C)			**1307**	**-**	**-**	**1307**		
Total (A+B+C)			**2058**	**-**	**-**	**2089.00 [2058(LE)+ 31(U)]**		

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

Annex-9.8

State-wise List of Additional Hydro Projects Identified for Undertaking RMU&LE Works

Sl. No.	Name of Project, Agency	CS/ SS	Inst. Cap. (No. X MW)	Remarks
Himachal Pradesh				
1	Pong, BBMB	CS	6x66	CPRI Bangalore was hired to prepare scope of work for RLA & R&M studies of Pong machines. Final report received from CPRI and sent to Field office on 11.09.17. Comments from field office awaited.
2	Dehar, BBMB	CS	4x165	BBMB placed a Work Order upon M/s CPRI, Bangalore for firmimg up scope of RLA Study of various equipment to be under taken by an open tender basic RLA & R&M studies on Dehar Power House. The Report in this has been submitted by M/s CPRI and the detailed scope of RLA study to be undertaken is being perused by the field office. The tender document shall be finalised after receipt of detailed scope of RLA from field office.
Maharashtra				
3	Koyna Stage-III, MSPGCL	SS	4x80	
4	Vaitarana, MSPGCL	SS	1x60	
Andhra Pradesh				
5	Tungabhadra Dam, APGENCO	SS	4x9	
6	Hampi, APGENCO	SS	4x9	
Jharkhand				
7	Sikidiri, JSEB	SS	2x65	
Madhya Pradesh				
8	Rajghat, MPPGCL	SS	3x15	
Assam				
9	Khandong, NEEPCO	SS	2x25	Draft DPR was submitted by M/s CPRI on June,2017. NEEPCO requested to CPRI to submit comparison in terms of generation benefit (MU) and financial involvement against both options i.e. (i) R&M and increase of output of the machines to the rated capacity by changing new runner profile (ii) R&M and uprating up to 10% of installed capacity by changing runner, turbine shaft, increasing diameter of penstock to 2.85 Mtr. in place of 2.5 Mtr. CPRI has submitted modified draft DPR and it is under examination.
Uttar Pradesh				
10	Khara, UPJVNL	SS	3x24	
Rajasthan				
11	Rana Pratap Sagar (RPS), RRVUNL	SS	4x43	
12	Jawahar Sagar, RRVUNL	SS	3x33	
Total			**2076**	

CHAPTER-10

DEFINITIONS AND ABBREVIATIONS

CHAPTER-10

DEFINITIONS AND ABBREVIATIONS

10.1 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) (%)

$$= \frac{(Cf1 \times hf1 + Cf2 \times hf2 \ldots\ldots\ldots\ldots\ldots\ldots + Cfn \times hfn) \times 100}{C \times H}$$

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

c) Planned Maintenance Non-Availability (PM) (%)

$$= \frac{(Cp1 \times hp1 + Cp2 \times hp2 + \ldots\ldots\ldots\ldots\ldots\ldots + Cpn \times hpn) \times 100}{C \times H}$$

Where Cp1, Cp2 …… Cfn are the capacities in MW of the generating units of the station on planned shutdown and hp1, hp2 …… are the duration of each shutdown in hours during the year. C is the total installed capacity of the station 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: The quantum of energy which could be generated in a 90% dependable year with 95% availability of installed capacity of the generating station.

g) Targeted Energy: Estimated energy generation during the year based on the likely rainfall data, storage position of the reservoirs and past records of energy generation etc.

h) Full Reservoir Level (FRL): The maximum level up to which the water could normally be stored in the reservoir for conservation and regulation for power generation.

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
  - Purely power
  - Multipurpose projects
- Pumped Storage Schemes

10.2 Abbreviations

MW	Mega Watt	(10^6 Watts)
KWH	Kilo Watt hour (1 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
		HPPCL	Himachal Pradesh Power Corporation 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	UPJVNL	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
		MSPGCL	Maharashtra State Power Generating Co. Limited
		TPCL	Tata Power Company Limited
Southern Region			
1	Andhra Pradesh	APGENCO	Andhra Pradesh Power Generation Corporation Ltd.
2	Karnataka	KPCL	Karnataka Power Corporation Limited
3	Kerala	KSEBL	Kerala State Electricity Board Limited

4	Telangana	TSGENCO	Telangana State Power Generation Corporation Ltd.
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
		TUL	Teesta Urja Limited
		SKPPPL	Sneha Kinetic Power Projects Pvt. Limited
		SEPL	Shiga Energy Pvt. 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