भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power

केन्द्रीय विद्युत प्राधिकरण
CENTRAL ELECTRICITY AUTHORITY

जल विद्युत गृहों के निष्पादन का पुनर्विलोकन-2018-19

REVIEW OF PERFORMANCE OF HYDRO POWER STATIONS 2018-19

नई दिल्ली
NEW DELHI
अगस्त, 2019
AUGUST, 2019

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.

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

जल विद्युत गृहों के निष्पादन का पुनर्विलोकन 2018-19

REVIEW OF PERFORMANCE OF HYDRO POWER STATIONS 2018-19

जल परियोजना आयोजन तथा अन्वेषण प्रभाग

HYDRO PROJECT PLANNING & INVESTIGATION DIVISION

नई दिल्ली

NEW DELHI

अगस्त, 2019

August, 2019

(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, राज्य व निजी क्षेत्र में विद्युत उपक्रमों के निकट सहयोग से उनके वार्षिक निष्पादन की समीक्षा के लिए अध्ययन करता है।

वर्ष 2018-19 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 32वीं हैं। इस रिपोर्ट में 45399 मेगावाट की कुल संस्थापित क्षमता वाले 204 जल विद्युत केन्द्रों की 710 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 2018-19 के दौरान जल विद्युत केन्द्रों की औसत प्रचालन उपलब्धता 91.28% थी। प्रणोदित (Forced) और योजनाबद्ध कामबन्दी (Planned Outages) के कारण जल विद्युत इकाइयों की औसत गैर-उपलब्धता क्रमश: 2.87% और 5.85% थी। वर्ष 2018-19 के दौरान जल विद्युत केन्द्रों से उत्पादन 134.894 बिलियन यूनिट था, जो वर्ष 2017-18 के उत्पादन 126.122 बिलियन यूनिट की तुलना में लगभग 7% 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।

(दिनेश चन्द्रा)
सदस्य (जल विद्युत), के0वि0प्रा0

नई दिल्ली
अगस्त, 2019

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 2018-19' is 32nd 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 710 hydro-electric units installed at 204 hydro-electric stations having total installed capacity of 45399 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 2018-19 was 91.28%. The average non-availability of hydro units due to forced and planned outages was 2.87% and 5.85% respectively. The generation from hydro stations during 2018-19 was 134.894 Billion Units, which was about 7% higher compared to the generation of 126.122 BU in the previous year viz 2017-18.

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
August, 2019

(Dinesh Chandra)
Member (Hydro), CEA

प्रस्तावना

किसी भी देश के आर्थिक प्रगति के लिए विद्युत शक्ति महत्वपूर्ण बुनियादी आवश्यकताओं में से एक है। दिनांक 31.03.2019 को देश में कुल प्रतिष्ठापित विद्युत उत्पादन क्षमता 356100 मेगावाट थी जिसमें 25 मेगावाट से ज्यादा प्रतिष्ठापित क्षमता वाले स्टेशनों की जल विद्युत क्षमता 45399 मेगावाट (12.75%) थी।

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 उपक्रमों के साथ सहयोग से जल विद्युत केन्द्रों के निष्पादन में निरंतर सुधार के लिए सघन प्रयास कर रहा है। आगामी वर्षों में सौर एवं पवन स्रोतों से संभावित विशाल ऊर्जा क्षमता वृद्धि के कारण यह आवश्यक है कि मौजूदा जल विद्युत केन्द्रों को ग्रिड सुरक्षा और सुरक्षा के लिए उनके प्रदर्शन और उपलब्धता में सुधार करना चाहिए ताकि पीकिंग और संतुलन शक्ति प्रदान करने के लिए उनका उपयोग किया जा सके।

वर्ष 2018-19 के दौरान देश में 204 जल विद्युत केन्द्रों (710 यूनिटों) के निष्पादन के आधार पर प्रणोदित (2.87%) और योजनाबद्ध कामबन्दी (5.85%) के कारण जल विद्युत इकाइयों की औसत प्रचालन उपलब्धता 91.28% थी। वर्ष 2018-19 के दौरान जल विद्युत केन्द्रों से ऊर्जा उत्पादन 134.894 बिलियन यूनिट था, जो कि पिछले वर्ष (2017-18) के उत्पादन 126.122 बिलियन यूनिट की तुलना में लगभग 7% अधिक था।

जल विद्युत केन्द्रों के संचालन प्रदर्शन को प्रभावित करने वाले कई पहलू हैं जिनमें नियोजित रखरखाव, अनुसूचित/ आंशिक आउटेज, वास्तविक प्रवाह का पैटर्न इत्यादि शामिल हैं। इसलिए प्रणोदित कामबन्दी के कारणों के विस्तृत विश्लेषण करने तथा अत्याधुनिक रखरखाव प्रथाओं को अपनाकर उनके पुनरावृत्ति को कम करने के लिए उपयुक्त उपायों से स्टेशन की परिचालन उपलब्धता में सुधार करने की आवश्यकता है।

जल विद्युत परियोजनाओं के विकास में सुस्त वृद्धि तथा सौर एवं पवन ऊर्जा संसाधनों में बड़ी वृद्धि के कारण हाइड्रो की बढ़ती मांग के चलते इस समीक्षा में मौजूदा जलविद्युत क्षमता को बनाए रखने के लिए आरएम और यू पर अधिक जोर देने की जरूरत पर भी बल दिया गया है।

इस प्रकाशन के लिए आवश्यक अध्ययन श्री राकेश कुमार, निदेशक के सराहनीय मार्गदर्शन के तहत जल परियोजना आयोजन एंव अन्वेषण (एच.पी.पी.&आई.) प्रभाग, के. वि. प्रा. के अधिकारियों की टीम द्वारा किया गया है। के. वि. प्रा. रिपोर्ट की सामग्री और प्रस्तुति में सुधार करने के लिए ठोस प्रयास कर रहा है। इस संबंध में रचनात्मक सुझावों का स्वागत है।

मैं सभी सरकारी एवं निजी क्षेत्र के विद्युत उपक्रमों और विद्युत केंद्र के अधिकारियों का भी पुनर्विलोकन के लिए जरूरी आंकड़े उपलब्ध कराने के लिए हार्दिक धन्यवाद देता हूँ।

(जयदीप सिंह बावा)
मुख्य अभियन्ता, के0वि0प्रा0

नई दिल्ली
अगस्त, 2019

PREFACE

Electric power is one of the most important infrastructure requirements for the overall economic development of the country. As on 31.03.2019, the overall installed generating capacity of the country was 356100 MW and hydro power stations (above 25 MW capacity) with capacity of 45399 MW constituting a share of 12.75% in the total installed capacity.

Central Electricity Authority (CEA) is making concerted efforts for improving the performance of Hydro Power Stations in close co-ordination with respective Hydro Power Generating Utilities in the Central, State & Private Sector through close monitoring of generation performance, analysis of reasons for breakdowns, Renovation & Modernization works etc. In light of huge capacity additions envisaged from Solar and Wind sources of renewable power in the coming years, it is imperative that the existing power stations must improve their performance and availability in order to supply peaking and balancing power for grid safety and security.

Based on an exhaustive analysis of generation performance and operating availability of 204 H.E. Stations comprising 710 units in the country, the average operating availability of hydro-electric stations during the year 2018-19 was 91.28% with average non-availability of hydro units due to forced and planned outages being 2.87% and 5.54% respectively. The generation from hydro stations during 2018-19 was 134.894 Billion Units, which was about 7% higher compared to the generation of 126.122 Billion Units in the previous year (2017-18).

A number of factors influence the operating performance of hydro power stations which include planned maintenance, unscheduled total/partial outages, pattern of actual inflows, etc. There is, thus, need for undertaking detailed analysis of the reasons of forced outages and taking suitable measures to minimize their recurrence and, thereby, improving the operating availability of the station by adopting state-of-the-art maintenance practices.

The Review also emphasizes the need for greater thrust on RM&U for maintaining existing hydro capacity mainly due to sluggish growth in their development of new hydro projects and ever increasing demand for hydro especially due to large capacity addition from Solar and Wind which are source of variable and intermittent power.

Studies for this publication have commendably been carried out by the team of officers in HPP&I Division of CEA under the overall guidance of Shri Rakesh Kumar, Director. 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.

I wish to express my sincere thanks to all the Hydro Power Sector Utilities and Power Station Authorities for making available the necessary data for the review.

New Delhi
August, 2019

(Jaideep Singh Bawa)
Chief Engineer, CEA

आभार

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

मैं निम्नलिखित अधिकारियों का जल विद्युत गृहों के निष्पादन पुनर्विलोकन 2018-19 के प्रकाशन में सहयोग के लिए धन्यवाद देता हूँ।

i) मुख्य अभियन्ता (एच. पी. एम. प्रभाग), के. वि. प्रा. को वर्ष 2018-19 के दौरान प्रचालित यूनिटों के टरबाइन तथा जेनरेटर निर्माताओं के विवरण समय पर उपलब्ध कराने के लिये धन्यवाद देता हूँ।

ii) मुख्य अभियन्ता (एच. ई. & आर. एम. प्रभाग) के. वि. प्रा. का जल विद्युत यूनिटों के नवीनीकरण एंव आधुनिकीकरण एंव उन्नयन पर अध्याय तैयार करने के लिए धन्यवाद देता हूँ।

मैं श्री बलवान कुमार, उप निदेशक, श्री राहुल सिंह, सहायक निदेशक, श्री संजय सिंह, वरिष्ठ प्रबंधक, एन. एच. पी. सी., 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 am grateful to Member (Hydro), CEA and Chief Engineer (HPP&I), CEA, for their valuable suggestions and guidance in preparation of this Review.

I would also like to express my sincere thanks to the following officers in bringing out this Review of Performance of Hydro Power Stations 2018-19.

i) 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 2018-19.

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

I would also like to express my appreciation and thanks to my team of officers comprising Shri Balwan Kumar, Deputy Director, Shri Rahul Singh, Assistant Director, Shri Sanjay Singh, Sr. Manager, NHPC, Mrs. Sandeep Kaur, Engineer, WAPCOS Ltd. and other officers/ officials for their untiring efforts and support in bringing out this Review.

(Rakesh Kumar)
Director, CEA

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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, 2019 there were 710 HE generating units installed in 204 Hydro-Electric Stations with an aggregate installed capacity of 45399.22 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 31.3.2019 in the country vis-à-vis that on 31.3.2018 is given below in **Table S-1.**

TABLE S-1

REGION-WISE SUMMARY OF HYDRO-ELECTRIC STATIONS
(2018-19 VIS-A-VIS 2017-18)

Region	No of Stations as on		No of Units as on		Capacity (MW) as on	
	31.03.19	**31.03.18**	**31.03.19**	**31.03.18**	**31.03.19**	**31.03.18**
Northern	71	73	245	245	19023.27	18969.27
Western	28	28	101	101	7392.00	7392.00
Southern	69	70	246	249	11694.50	11727.70
Eastern	23	23	84	84	5862.45	5862.45
N-Eastern	13	12	34	33	1427.00	1342.00
All India	**204**	**206**	**710**	**712**	**45399.22**	**45293.42**

1.3 The report contains outage data of 204 H.E. Stations (above 25 MW) covering 710 units and having an aggregate installed capacity of 45399.22 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 2009-10 to 2018-19).

1.5 This review covers information in respect of renovation & modernization, uprating and life extension of HE stations in the country for the year 2018-19, achievements during the year 2018-19 and programme for renovation, modernization, life extension and uprating of HE Stations for the year 2019-20.

1.6 The report comprises of ten 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	Miscellaneous Outages of H.E. Units
8	Generation Programme for the year 2019-20
9	Renovation & Modernisation of Hydro-Electric Power Projects
10	Definitions and Abbreviations

2.0 Generation Performance

The generation from the hydro electric power stations in the country during 2018-19 was 134893.61 MU (excluding import from Bhutan), which was about 6.95% higher than the generation during 2017-18 and about 3.76% higher than the generation targets for 2018-19.

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
(2018-19 VIS-A-VIS 2017-18)

Utilities	Installed Capacity (MW) (As on 31.03.2019)	Energy Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2018-19	2017-18	2018-19	2017-18	2018-19	2017-18
CENTRAL SECTOR							
BBMB	2920.30	9425	9360	10186.02	10864.14	8.07	16.07
NHPC LTD	5451.20	24055	23046	24000.96	22549.52	-0.22	-2.15
SJVNLTD	1912.02	8490	8625	8335.92	9222.73	-1.81	6.93
NTPC LTD	800.00	3000	3055	3013.93	3313.62	0.46	8.47
THDC LTD	1400.00	3952	4115	4395.92	4301.27	11.23	4.53
NHDC LTD	1520.00	2446	3100	1920.83	1325.36	-21.47	-57.25
DVC	143.20	205	235	181.15	256.35	-11.63	9.09
NEEPCO LTD	900	4603	3492	3120.56	3203.10	-32.21	-8.27
SUB TOTAL	**15046.72**	**56176**	**55028**	**55155.29**	**55036.09**	-1.82	0.01

Utilities	Installed Capacity (MW) (As on 31.03.2019)	Energy Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2018-19	2017-18	2018-19	2017-18	2018-19	2017-18
PRIVATE SECTOR							
MPCL	86	344	344	320.55	346.29	-6.82	0.67
EPPL	100	330	360	349.39	368.89	5.88	2.47
ADHPL	192	650	700	582.23	683.01	-10.43	-2.43
GBHPPL	70	250	282	288.08	317.63	15.23	12.63
HBPCL	1300	5343	5500	5244.27	5906.58	-1.85	7.39
IA ENERGY	36	125.00	0.00	137.45	79.42	9.96	-
AHPCL	330	1250	1340	1375.31	1382.54	10.02	3.17
JPPVL	400	1700	1800	1932.02	2160.90	13.65	20.05
DLHP	34	36	37	56.44	42.55	56.78	15.00
GIPL	99	400	495	417.40	444.79	4.35	-10.14
TPCL	447	1300	1450	1568.18	1515.88	20.63	4.54
DEPL	96	390.00	459	409.75	406.01	5.06	-11.54
SEPL	97	300.00	400	423.73	73.07	41.24	-81.73
SNEHA KINETIC	96	300.00	0	462.24	370.10	54.08	-
NTPGPL	0	-	200	-	0.00	-	-
SUB TOTAL	**3394**	**12718**	**13367**	**13567.03**	**14097.66**	**6.68**	5.47
STATE SECTOR							
JKSPDC	1110.00	4669	4599	5044.36	5136.89	8.04	11.70
HPPCL	195.00	430	568	527.05	332.12	22.57	-41.53
HPSEB LTD.	372.00	1530	1617	1649.29	1590.86	7.80	-1.62
BVPC	-	20	30	0.00	0.00	-100.00	-
RRVUNL	411.00	535	720	698.40	819.53	30.54	13.82
PSPCL	1051.00	3690	4021	3598.82	4230.51	-2.47	5.21
UPJVNL	501.60	1115	1170	1176.36	1486.69	5.50	27.07
UJVNL	1252.15	4105	4688	4478.76	4526.00	9.10	-3.46
SSNNL	1450.00	2260	4460	594.84	939.47	-73.68	-78.94
GSECL	540.00	730	857	447.97	612.45	-38.63	-28.54
MAHAGENCO	2406	3361	4296	3320.63	3143.16	-1.20	-26.84
MPPGCL	875.00	2280	2625	1607.45	1420.98	-29.50	-45.87
CSPGCL	120.00	225	250	243.08	178.07	8.04	-28.77
APGENCO	1796.75	3109	3505	3038.37	2870.47	-2.27	-18.10
TSGENCO	2405.60	2665	3335	1744.61	1491.98	-34.54	-55.26
KPCL	3572.20	9590	11687	12015.94	7008.65	25.30	-40.03
KSEBL	1856.50	5490	6221	7320.21	5199.26	33.34	-16.42
TANGEDCO	2178.20	3570	4415	5281.59	2919.60	47.94	-33.87

Utilities	Installed Capacity (MW) (As on 31.03.2019)	Energy Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2018-19	2017-18	2018-19	2017-18	2018-19	2017-18
JUUNL	130.00	110	150	101.19	190.38	-8.01	26.92
OHPC	2027.50	5140	5672	6183.77	5555.29	20.31	-2.06
TUL	1200.00	4000	5214	4258.40	4429.33	6.46	-15.05
WBSEDCL	986.00	1250	1596	1537.94	1282.02	23.04	-19.67
APGCL	100.00	300	390	372.72	484.98	24.24	24.35
MePGCL	322.00	932	919	929.53	1140.26	-0.26	24.08
SUB TOTAL	**26958**	**61106**	**73005**	**66171.28**	**56988.95**	**8.27**	**-21.94**
ALL INDIA	**45399.22**	**130000**	**141400**	**134893.61**	**126122.70**	**3.76**	**-10.80**

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 2018-19 is given in **Table S-3 & S-4**. It is seen that there was excess generation as compared to target in State Sector & Private Sector. The overall generation of Central Sector hydro stations remained below the targets.

TABLE S-3

SECTOR-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS (2018-19 VIS-A-VIS 2017-18)

Sector	Installed Capacity (MW) (As on 31.03.2019)	Energy Generation (MU)					
		Target		Actual		Surplus (+)/ Deficit(-)in %	
		2018-19	2017-18	2018-19	2017-18	2018-19	2017-18
Central	15046.72	56176	55028	55155.29	55036.09	-1.82	0.01
State	26958.50	61106	73005	66171.28	56988.95	8.29	-21.94
Private	3394	12718	13367	13567.03	14097.66	6.68	5.47
Total	**45399.22**	**130000**	**141400**	**134893.61**	**126122.70**	**3.76**	**-10.80**

TABLE S-4

REGION-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS (2018-19 VIS-A-VIS 2017-18)

Sector	Installed Capacity (MW) (As on 31.03.2019)	Energy Generation (MU)					
		Target		Actual		Surplus (+)/ Deficit(-)in %	
		2018-19	2017-18	2018-19	2017-18	2018-19	2017-18
Northern	19023.27	70148	71581	72401.41	74734.69	3.21	4.41
Western	7392.00	12638	17075	9759.42	9177.92	-22.78	-46.25
Southern	11694.50	24000	28682	28807.04	19022.26	20.03	-33.68
Eastern	5862.45	16779	18661	18900.31	17521.75	12.64	-6.10
North Eastern	1427.00	6435	5401	5025.42	5666.08	-2190	4.91
Total	**45399.22**	**130000**	**141400**	**134893.61**	**126122.70**	**3.76**	**-10.80**

3.0 Outage Analysis

For outage data analysis during 2018-19, outage data of 204 H.E. Stations (above 25 MW capacity) covering 710 units and having an aggregate installed capacity of 45399.22 MW made available by various utilities have been considered for the purpose of this Review. Region-wise details of these 204 hydro power stations are given below in **Table S-5**.

TABLE S-5

REGION-WISE SUMMARY OF HE STATIONS ANALYSED (2018-19 VIS-A-VIS 2017-18)

Region	No. of Stations		No. of Units		Capacity(MW) as on	
	31.03.19	31.03.18	31.03.19	31.03.18	31.03.19	31.03.18
Northern	71	73	245	245	19023.27	18969.27
Western	28	28	101	101	7392.00	7392.00
Southern	69	70	246	249	11694.50	11727.70
Eastern	23	23	84	84	5862.45	5862.45
North Eastern	13	12	34	33	1427.00	1342.00
All India	**204**	**206**	**710**	**712**	**45399.22**	**45293.42**

3.1 Planned Maintenance

The number of H.E. Stations falling under various ranges of non-availability due to planned maintenance during the year 2018-19 vis-à-vis 2017-18 is summarized below in **Table S-6.**

TABLE S-6

NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES (2018-19 VIS-A-VIS 2017-18)

% Non-Availability due to planned maintenance	2018-19				2017-18			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	116	56.86	30050.17	66.19	129	62.62	27397.77	60.27
>5 to 10	43	21.08	8471.70	18.66	37	17.96	10363.75	22.88
>10 to 15	20	9.80	1913.25	4.21	16	7.77	2852.70	6.30
>15 to 20	12	5.88	1661.40	3.66	12	5.83	2637.40	5.74
>20 to 25	5	2.45	1206.00	2.66	6	2.91	1086.30	2.40
>25 to 30	2	0.98	605.50	1.33	0	0.00	0.00	0.00
above 30	6	2.94	1491.20	3.28	6	2.91	955.50	2.41
Total	**204**	**100**	**45399.22**	**100**	**206**	**100**	**45293.42**	**100**

It could be seen from above that 116 nos. (56.86% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2018-19 as compared to 129 nos. (62.62% of total) during 2017-18.

Non-availability due to planned maintenance was more than 30% at 6 nos. (2.94% of total) H.E. Stations during 2018-19 and which is similar to 2017-18. The details of these stations for 2018-19 is given below in **Table S-7.**

TABLE S-7

H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE FOR THE PERIOD: (2018-19)

Sl. No	Name of Station/ Utility	Capacity (MW)	N.A. due to P.M.*(%)	Remarks
1	Baira Siul/NHPC	180.00	47.88	R&MU works
2	Sholayar/TANGEDCO	70.00	47.55	R&MU works
3	JOG/KPCL	139.20	41.08	R&MU works
4	Hirakud -II (Chiplima)/OHPC	72.00	33.98	R&MU works
5	Balimela/OHPC	510.00	31.58	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, etc. Further, those stations which are having continuously high planned maintenance/forced 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: (2018-19)

Sl. No	Type of Planned maintenance	Average duration at any unit (hrs.)
1	Capital Maintenance	2947.08
2	Annual Maintenance	5061.25
3	Half Yearly Maintenance	127.58
4	Quarterly Maintenance	55.53
5	Monthly Maintenance	335.38
6	Routine Maintenance	151.53
7	Renovation/ Modernisation & Uprating	8305.6
8	Civil Structure	3297.98
9	Turbine	1908.83
10	Generator	1485.03
11	Other Equipment	1485.03
12	Miscellaneous planned maintenance	1544.25

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 2018-19 vis-à-vis 2017-18 is given below in **Table S-9.**

TABLE S–9

DURATION OF PLANNED MAINTENANCE FOR GENERATOR, TURBINE & OTHER EQUIPMENTS (2018-19 vis-à-vis 2017-18)

S. No.	Equipments	Duration			
		Maximum Hours for any unit		Average Hours	
		2018-19	2017-18	2018-19	2017-18
1	Generator	1485.03	4338.83	151.90	213.40
2	Turbine	1908.83	746.00	116.24	45.01
3	Other Equipment	1485.03	2886.17	115.84	81.88
4	Civil Structure	3297.98	2629.97	136.04	154.28

It could be seen that the average hours utilized for carrying out various repairs decreased for generator and civil structure during 2018-19 as compared to 2017-18 while they have increased for turbine and other equipment. 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 2018-19 vis-à-vis 2017-18 is given below in **Table S-10.**

TABLE S–10

FORCED OUTAGES DUE TO GENERATOR, TURBINE & OTHER EQUIPMENT FAULTS
(2018-19 vis-à-vis 2017-18)

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage	
		2018-19	2017-18	During 2018-19	Increase/ Decrease vis-à-vis 2017-18
1	Generator	59109.90	67919.75	31.83	-12.97
2	Turbine	72463.69	42910.29	39.02	68.87
3	Civil Structure	21704.48	27547.61	11.69	-21.21
4	Other Equipment	32428.44	31584.03	17.46	2.67
	Total	**185706.51**	**169961.68**	**100**	**9.26**

It is observed that forced outages in 2018-19 vis-à-vis 2017-18 have increased on account of turbine and other equipment whereas the same have decreased on account of generator and civil structures.

3.3 Operating Availability

The number of H.E. Stations falling under various ranges of operating availability during the year 2018-19 is summarized below in **Table S-11.**

TABLE S-11

OPERATING AVAILABILITY OF H.E. STATIONS
PERIOD: 2018-19

OPERATING AVAILABILITY (%)	NO. OF STATIONS	% OF TOTAL STATIONS	INSTALLED CAPACITY (MW)	% OF TOTAL INSTALLED CAPACITY
≥95%	83	40.29	24022.42	53.04
>90 to 95	45	21.84	8560.1	18.90
>85 to 90	24	11.65	3534.85	7.80
>80 to 85	20	9.71	3576.4	7.90
< 80	32	15.53	5705.45	12.60
Total	**204**	**100**	**45399.22**	**100**

Operating availability of 52 nos. HE stations (25.24% of total HE Stations) was below 85% (9281.85 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 2018-19 is indicated below in **Table S-12.**

TABLE S-12

AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2018-19

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AVAILABILITY
1	Northern	245	19023.27	6.13	1.19	92.68
2	Western	101	7392.00	4.02	1.22	94.76
3	Southern	246	11694.50	5.34	5.72	88.94
4	Eastern	84	5862.45	8.74	4.02	87.24
5	North Eastern	34	1427.00	3.76	5.83	90.41
	All India	**710**	**45399.22**	**5.85**	**2.87**	**91.28**

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

- Generating units installed in Eastern Region accounted for maximum non-availability due to planned maintenance (8.74%) whereas generating units installed in North Eastern Region accounted for the least non-availability due to planned maintenance (3.76%) 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)	%	%	%
2018-19	45399.22	130000	134894	(+)3.76	710	45399.22	5.85	2.87	91.28
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

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 31.03.2019, H.E. Schemes having total installed capacity of 40613.6 MW (27.95%) excluding pumped storage stations of capacity of 4785.60 MW have already been developed and the schemes under construction account for capacity of 10829.5 MW (7.45%), (excluding PSS of 1205 MW). As such, about 64.60% 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 31.03.2019)

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	9809.0	52.91	1885.0	10.17	6846.0	36.93
Punjab	971	971	1096.3	100	206.0	21.22	0.0	0.00
Haryana	64	64	0.0	0	0.0	0.00	0.0	0.00
Rajasthan	496	483	411.0	85.09	0.0	0.00	0.0	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	162.4	24.46
Sub Total(NR)	**53395**	**52263**	**19023.3**	**36.40**	**5516.5**	**10.56**	**27723.2**	**53.05**
WESTERN								
Madhya Pradesh	2243	1970	2235.0	100	400.0	20.30	0.0	0.00
Chhattisgarh	2242	2202	120.0	5.45	0.0	0.00	2082.0	94.55
Gujarat	619	590	550.0	100	0.0	0.00	0.0	0.00
Maharashtra	3769	3314	2647.0	79.87	0.0	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	0.0	0.00	0.0	0.00	55.0	100.00
Sub Total (WR)	**8928**	**8131**	**5552.0**	**68.28**	**400.0**	**4.92**	**2179.0**	**26.80**
SOUTHERN								
Andhra Pradesh	2366	2341	1610.0	68.77	960.0	41.01	0.0	0.00
Telangana	2058	2019	800.0	39.62	0.0	0.00	1219.0	60.38
Karnataka	6602	6459	3644.2	56.42	0.0	0.00	2814.8	43.58
Kerala	3514	3378	1856.5	54.96	100.0	2.96	1421.5	42.08
Tamil Nadu	1918	1693	1778.2	100	0.0	0.00	0.0	0.00
Sub Total (SR)	**16458**	**15890**	**9688.9**	**60.97**	**1060.0**	**6.67**	**5141.1**	**32.35**
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	350.0	53.85	0.0	0.00	300.0	46.15
Nagaland	1574	1452	75.0	5.17	0.0	0.00	1377.0	94.83
Arunachal Pradesh	50328	50064	515.0	1.03	2600.0	5.19	46949.0	93.78
Mizoram	2196	2131	60.0	2.82	0.0	0.00	2071.0	97.18
Sub Total (NER)	**58971**	**58356**	**1427.0**	**2.45**	**2600.0**	**4.46**	**54329.0**	**93.10**
ALL INDIA	**148701**	**145320**	**40613.6**	**27.95**	**10829.5**	**7.45**	**93876.9**	**64.60**

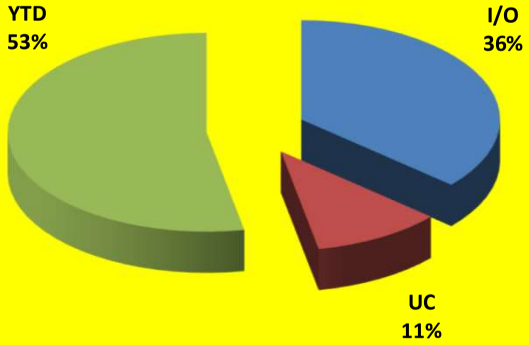
Note:- In addition, 9 PSS of 4785.60 MW capacity are in operation, 3 PSS of 1205 MW capacity are under construction, 1 PSS of 1000 MW capacity is concurred by CEA, 5 PSS of 3820 MW capacity are under S&I and 1 PSS of 660 MW capacity is under held-up list .

REGION-WISE STATUS OF HYDRO-ELECTRIC CAPACITY AS ON 31.03.2019

EXHIBIT 1.1

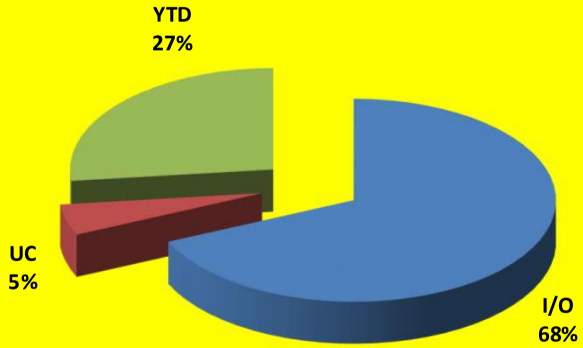
I/O=In Operation UC=Under Construction YTD= Yet to be Developed

NORTHERN REGION



TOTAL ASSESSED (Above 25 MW) : - 52263 MW

WESTERN REGION

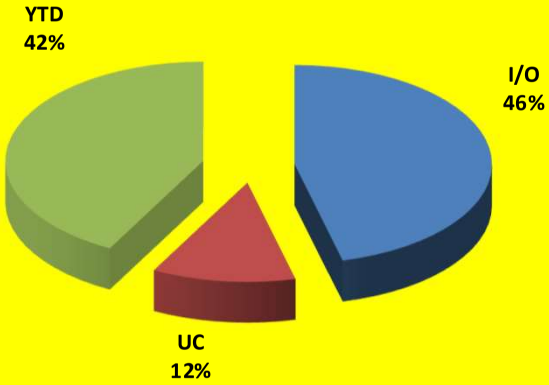


TOTAL ASSESSED (Above 25 MW) : - 8131 MW

SOUTHERN REGION

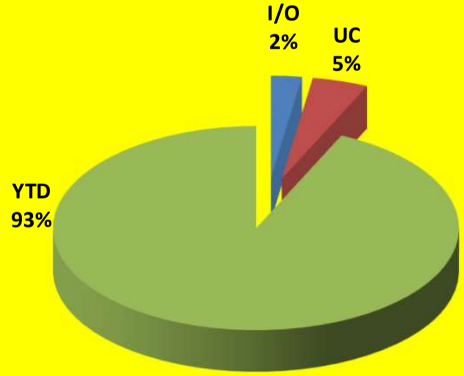
TOTAL ASSESSED (Above 25 MW): - 15890 M

EASTERN REGION



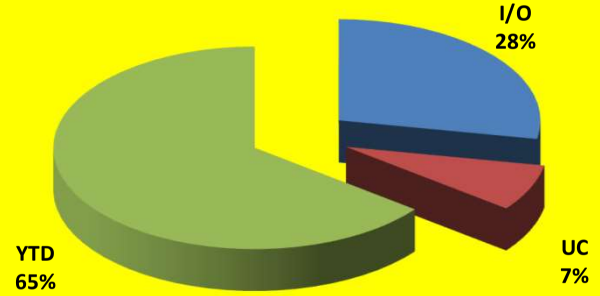
TOTAL ASSESSED (Above 25 MW) : - 10680 MW

NORTH EASTERN



TOTAL ASSESSED (Above 25 MW : - 58356 MW

ALL INDIA



TOTAL ASSESSED (Above 25 MW) : - 145320 MW

EXHIBIT 1.2

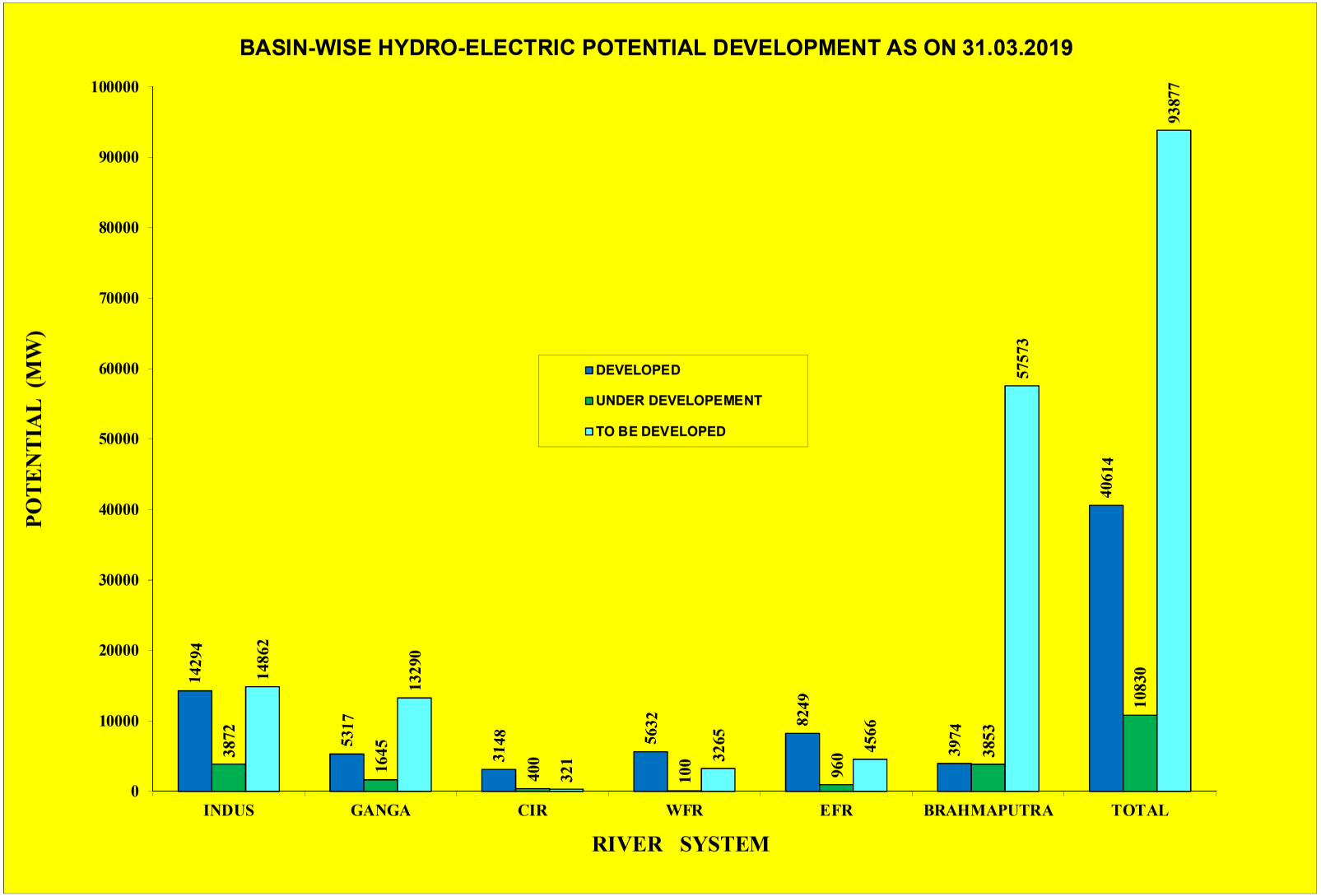

BASIN-WISE HYDRO-ELECTRIC POTENTIAL DEVELOPMENT AS ON 31.03.2019
POTENTIAL (MW)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
DEVELOPED
UNDER DEVELOPEMENT
TO BE DEVELOPED
14294
3872
14862
5317
1645
13290
3148
400
321
5632
100
3265
8249
960
4566
3974
3853
57573
40614
10830
93877
INDUS
GANGA
CIR
WFR
EFR
BRAHMAPUTRA
TOTAL
RIVER SYSTEM

TABLE 1.2

STATUS OF H.E. POTENTIAL DEVELOPMENT - BASIN-WISE

(In terms of Installed Capacity-above 25 MW as on 31.03.2019)

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	14294.3	43.28	3871.5	11.72	14862.2	45.00
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	5631.7	62.60	100.0	1.11	3265.3	36.29
East Flowing Rivers System	14511	13775	8249.0	59.88	960	6.97	4566.1	33.15
Brahmaputra	66065	65400	3974.0	6.08	3853.0	5.89	57573.0	88.03
Total	**148701**	**145320**	**40613.6**	**27.95**	**10829.5**	**7.45**	**93876.9**	**64.60**

Note:- In addition, 9 PSS of 4785.60 MW capacity are in operation, 3 PSS of 1205 MW capacity are under construction, 1PSS of 1000 MW capacity is concurred by CEA, 5 PSS of 3820 MW capacity are under S&I and 1 PSS of 660 MW capacity is under held-up list.

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 45399.22 MW (as on 31.03.2019) from H.E. stations above 25 MW capacity. The maximum unit size now is 250 MW at Koyna Stage-IV under MAHAGENCO, Nathpa Jhakri under SJVNL, Tehri under THDC and Karcham Wangtoo of JSW Energy.

Contribution of electricity generation from Hydro Electric Power Stations has risen from 2.2 BU during 1947 to about 134.9 BU in 2018-19. Hydro generation during 2018-19 was about 8.8 BU (i.e. 7%) more than the generation of 126.1 BU during 2017-18.

1.3 Share of Hydro-electric Installed Capacity & Generation

The installed capacity of Hydro-Electric Stations viz-à-viz 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 12.75% at the end of 2018-19. The generation from hydro stations during the year 2018-19 accounted for 10.84% 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
2018-19*	356100	45399	12.75	1244930	134894	10.84

* Capacity above 25 MW only has been considered.

EXHIBIT 1.3

GROWTH OF INSTALLED CAPACITY (MW) SINCE 1947
HYDRO
THERMAL
NUCLEAR
INSTALLED CAPACITY (MW)
YEAR
0
50000
100000
150000
200000
250000
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
1978-79 640 10833 15207
1979-80 6640 11384 14460 16424
1984-85 10955 18307 27030
1989-90 15651 19194 43764
1991-92 17785 21658 48086
1996-97 22251 21905 61912
1997-98 22251 22479 65073
1998-99 22251 23816 67565
1999-00 26801 25142 71341
2000-01 26801 26269 73628
2001-02 27201 26767 76057
2002-03 27201 29507 78390
2003-04 27201 30936 80457
2004.05 27701 32326 84713
2005-06 33601 34662 88601
2006-07 39001 37002 93775
2007-08 41201 36846 91907
2008-09 41201 93725
2009-10 45601 36863 102454
2010-11 47801 37567 112824
2011-12 47801 38990 131603
2012-13 47801 39491 151530
2013-14 47801 40531 168255
2014-15 57801 41267 188898
2015-16 57801 42783 210675
2016-17 67801 44478 218329
2017-18 67801 45293 222907
2018-19 67801 45399 226513

EXHIBIT 1.4

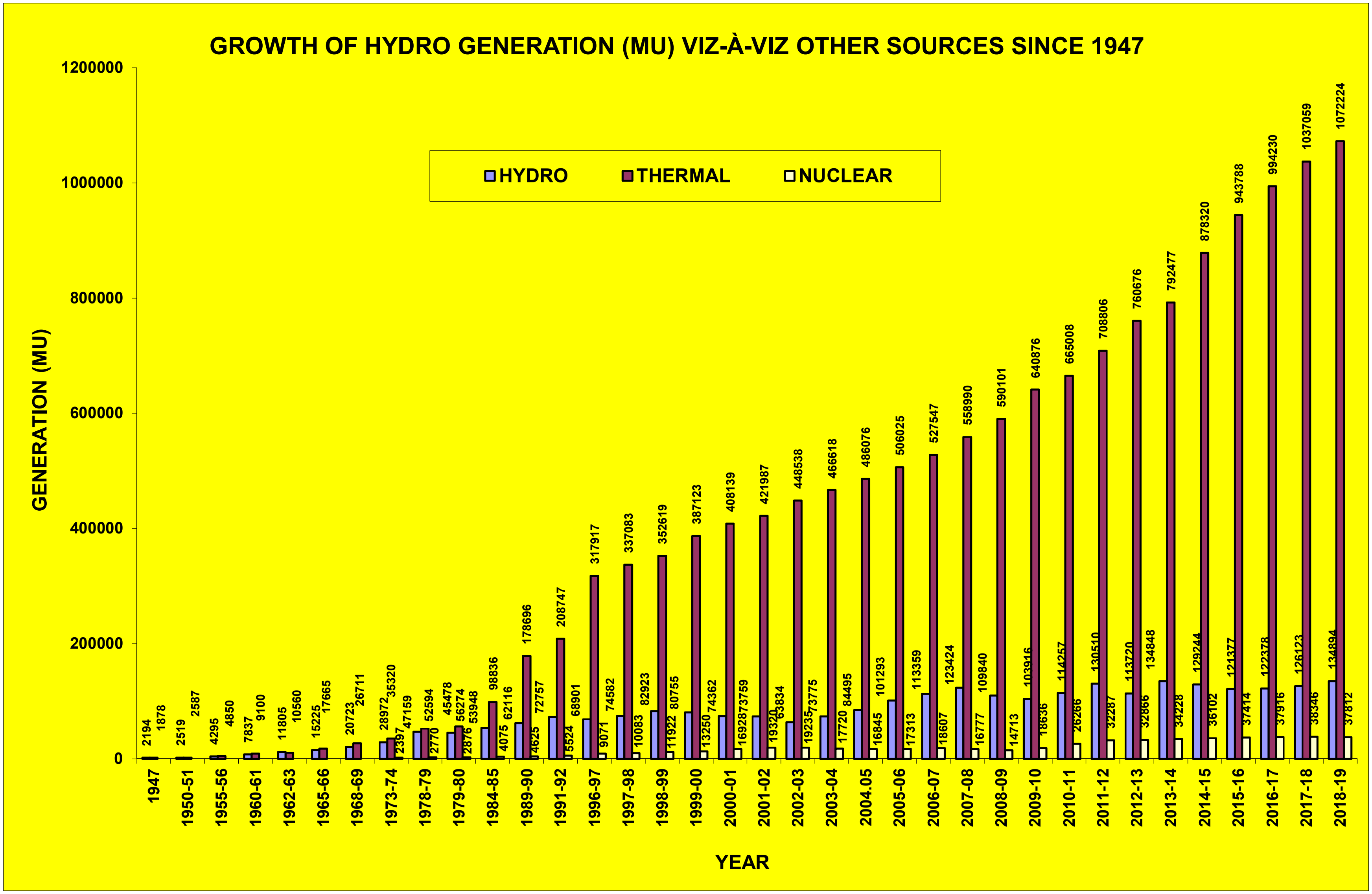
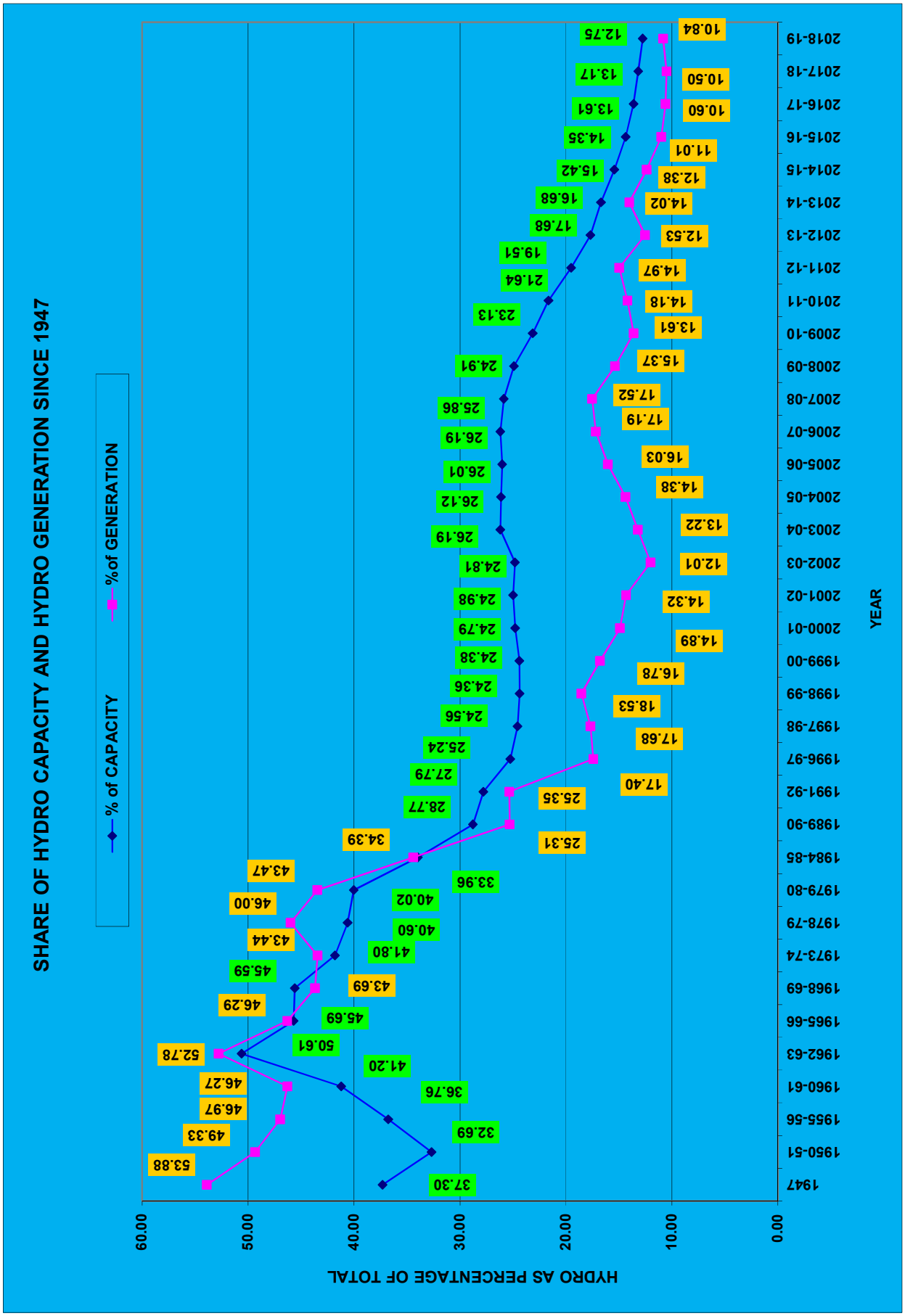

GROWTH OF HYDRO GENERATION (MU) VIZ-À-VIZ OTHER SOURCES SINCE 1947
HYDRO
THERMAL
NUCLEAR
GENERATION (MU)
1200000
1000000
800000
600000
400000
200000
0
1947
1950-51
1955-56
1960-61
1962-63
1965-66
1968-69
1973-74
1978-79
1979-80
1984-85
1989-90
1991-92
1996-97
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
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
2018-19
YEAR

EXHIBIT-1.5


SHARE OF HYDRO CAPACITY AND HYDRO GENERATION SINCE 1947
% of CAPACITY
%of GENERATION
HYDRO AS PERCENTAGE OF TOTAL
YEAR
60.00
50.00
40.00
30.00
20.00
10.00
0.00
1947 37.30 53.88
1950-51 32.69 49.33
1955-56 36.76 46.97
1960-61 41.20 46.27
1962-63 50.61 52.78
1965-66 45.69 46.29
1968-69 43.69 45.59
1973-74 41.80 43.44
1978-79 40.60 46.00
1979-80 40.02 43.47
1984-85 33.96 34.39
1989-90 28.77 25.31
1991-92 27.79 25.35
1996-97 25.24 17.40
1997-98 24.56 17.68
1998-99 24.36 18.53
1999-00 24.38 16.78
2000-01 24.79 14.89
2001-02 24.98 14.32
2002-03 24.81 12.01
2003-04 26.19 13.22
2004-05 26.12 14.38
2005-06 26.01 16.03
2006-07 26.19 17.19
2007-08 25.86 17.52
2008-09 24.91 15.37
2009-10 23.13 13.61
2010-11 21.64 14.18
2011-12 19.51 14.97
2012-13 17.68 12.53
2013-14 16.68 14.02
2014-15 15.42 12.38
2015-16 14.35 11.01
2016-17 13.61 10.60
2017-18 13.17 10.50
2018-19 12.75 10.84

1.4 Monitored Hydro Installed Capacity

For generation performance, the monitored hydro-electric installed capacity in the country as on 31.03.2019 was 45399.22 MW (above 25 MW capacity). Region-wise summary of the hydel installed capacity is given 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 31.03.2019)

S. No.	Region	No. of Units	Installed Capacity (MW)
1.	Northern	245	19023.27
2.	Western	101	7392.00
3.	Southern	246	11694.50
4.	Eastern	84	5862.45
5.	North-Eastern	34	1427.00
Total		**710**	**45399.22**

Capacity-wise grouping of H.E. Stations as on 31.03.2019 is given in **Annex- 1.5**. It is observed that 100 stations with installed capacity above 100 MW constitute more than 85% of the overall hydro capacity.

3 H.E. Generating units having installed capacity of 140 MW were added during the year 2018-19. Details of these units are given in **Annex-1.6**.

Share of hydro installed capacity and hydro generation viz-a-viz total installed capacity and total generation in the country as on 31.03.2019 was 12.75% and 10.84% respectively. These details are indicated in **Exhibits 1.6 and 1.7.** Sector-wise distribution of hydro installed capacity (MW) in Central, Private and State Sectors was 33%, 8% and 59% respectively. Sector-wise distribution of hydro generation (MU) in Central, Private and State sectors was 41%, 10% and 49% respectively. These details are illustrated in **Exhibits 1.8 & 1.9**.

1.5 Hydro Generating Units : Indigenous and imported

As on 31.03.2019, there were 710 hydro generating units in operation at 204 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% of total capacity for both turbines & generators whereas other domestic suppliers together have a meagre share of about 7% 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.

TABLE 1.5

HYDRO GENERATING UNITS INDIGENOUS/IMPORTED FROM VARIOUS COUNTRIES AS ON 31-03-2019

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	42.54	19210.02	42.31	302	42.54	19210.02	42.31
Others	49	6.90	3005.50	6.62	48	6.76	3004.00	6.62
Sub Total	**351**	**49.44**	**22215.52**	**48.93**	**350**	**49.30**	**22214.02**	**48.93**
B-Imported								
USA	9	1.27	351.00	0.77	26	3.66	219.00	0.48
U.K.	63	8.87	1242.10	2.74	58	8.17	3132.00	6.90
France	31	4.37	2179.20	4.80	15	2.11	543.15	1.20
Canada	44	6.20	3132.00	6.90	44	6.20	2804.00	6.18
USSR	26	3.66	2804.00	6.18	26	3.66	1726.00	3.80
Switzerland	21	2.96	790.20	1.74	11	1.55	1676.90	3.69
Japan	76	10.70	6398.20	14.09	74	10.42	5822.20	12.82
Other	89	12.54	6287.00	13.85	106	14.93	7261.95	16.00
Sub Total	**359**	**50.56**	**23183.70**	**51.07**	**360**	**50.70**	**23185.20**	**51.07**
Total	**710**	**100**	**45399.22**	**100**	**710**	**100**	**45399.22**	**100**

EXHIBIT-1.6

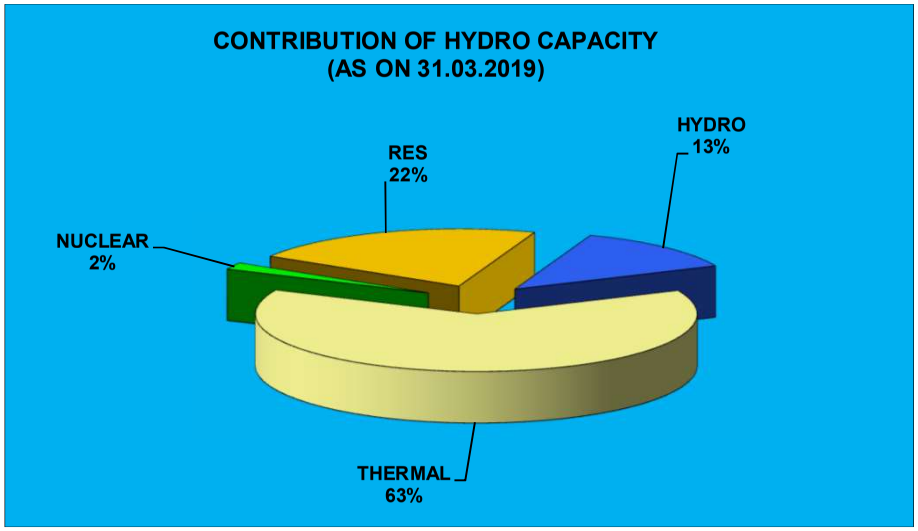


EXHIBIT-1.7

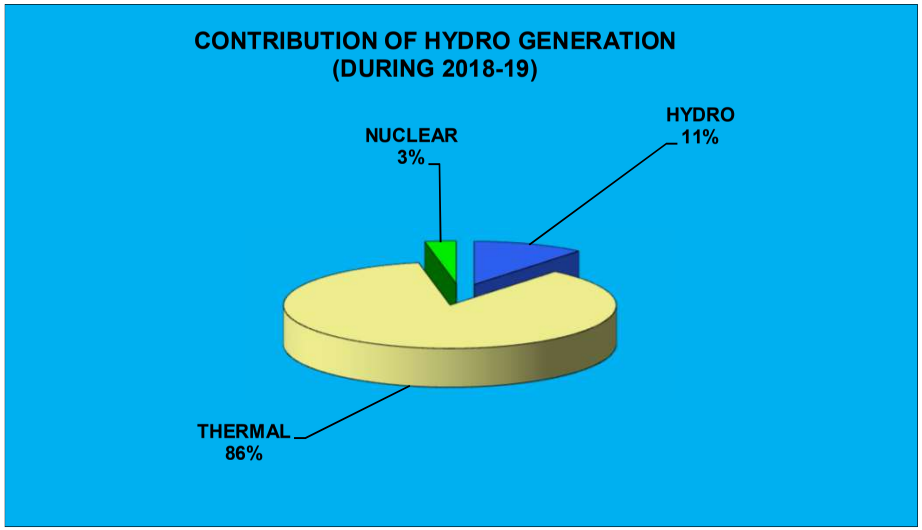


EXHIBIT-1.8

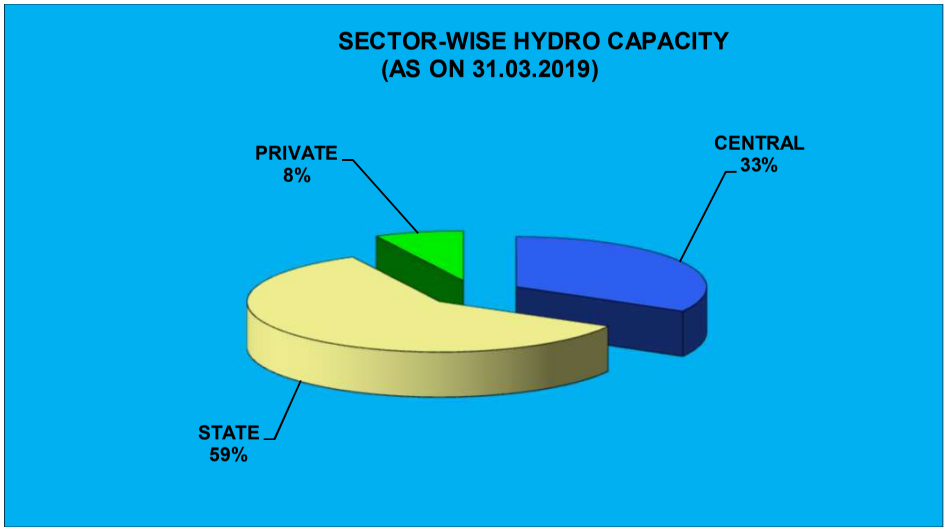
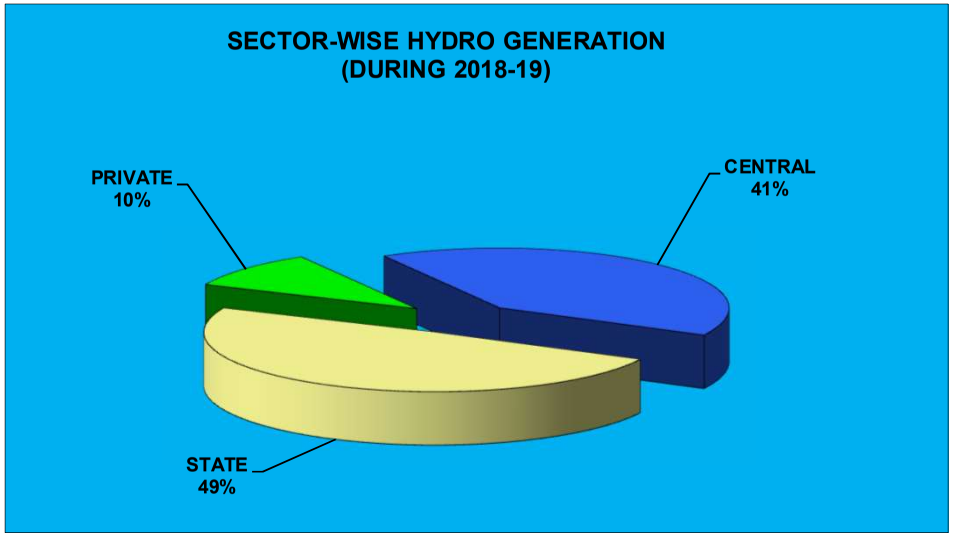


EXHIBIT-1.9



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

(ABOVE 25 MW CAPACITY)

(As on 31.03.2019)

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	71	245	19023	0	0	0.00	71	245	19023.27
WESTERN	16607.21	24	88	5552.00	4	13	1840.00	28	101	7392.00
SOUTHERN	33900.85	67	229	9688.90	3	17	2005.60	70	246	11694.50
EASTERN	19774.46	22	79	4922.45	2	5	940.00	24	84	5862.45
NORTH EASTERN	6059.73	13	34	1427.00	0	0	0.00	13	34	1427.00
TOTAL	**150680.51**	**197**	**675**	**40613.62**	**9**	**35**	**4785.60**	**206**	**710**	**45399.22**

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	159	15046.72
STATE	23	145	501	26958.50
PRIVATE	14	18	50	3394.00
TOTAL	**45**	**204**	**710**	**45399.22**

Categorisation of HE Stations (Installed Capacity)

1. Operation-wise

(As on 31.03.2019)

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	2225.52	17	6553.00	6	1725.00	9	4503.20	1	40.00	42	15046.72
State	15	976.15	49	7395.00	32	6434.65	43	7557.10	7	4595.60	146	26958.50
Private	4	689.00	10	2258.00	3	297.00	0	0.00	1	150.00	18	3394.00
Total (Nos./ MW Capacity)*	**28**	**3890.67**	**76**	**16206.00**	**41**	**8456.65**	**52**	**12060.30**	**9**	**4785.60**	**206**	**45399.22**
% of Total	**14**	**8.75**	**38**	**36.44**	**20.5**	**19.01**	**26**	**27.11**	**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 204 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 31.03.2019)

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	2920.30	9515.00
2	NHPC	20	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	6	16	900.00	4044.04
	SUB-TOTAL CENTRAL	**41**	**159**	**15046.72**	**57256.82**
	PRIVATE SECTOR				
1	MPCL	1	2	86	370.93
2	EPPL	1	2	100	403.00
3	GBHPPL	1	2	70	291.73
4	ADHPL	1	2	192	678.18
5	HBPCL	2	7	1300	5344.06
6	JPPVL	1	4	400	1774.42
7	AHPC	1	4	330	1396.84
8	IAEPL	1	3	36	157.82
9	TPCL	4	15	447	1220.00
10	GIPL	1	2	110	537.81
11	DEPL	1	2	96	459.02
12	DLHP	1	1	34	50.00
13	SKPPPL	1	2	96	431.00

14	SEPL	1	2	97	425.05
	SUB-TOTAL PRIVATE	**18**	**50**	**3394.00**	**13539.86**
	STATE SECTOR				
1	HPSEBL	4	12	372.00	1691.62
2	HPPCL	2	5	295.00	569.03
3	JKSPDCL	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	MAHAGENCO	8	24	2406.00	3938.00
13	APGENCO	8	34	1796.75	5738.00
14	TSGENCO	7	36	2405.60	5045.85
15	KPCL	14	66	3572.20	12981.00
16	KSEB	14	47	1856.50	6458.00
17	TANGEDCO	27	69	2178.20	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	1177.69
	SUB-TOTAL STATE	**145**	**501**	**26958.50**	**79883.83**
	TOTAL	**204**	**710**	**45399.22**	**150680.51**

STATE-WISE/STATION-WISE INSTALLED CAPACITY OF H.E. STATIONS IN THE COUNTRY

(ABOVE 25 MW CAPACITY)

(As on 31.03.2019)

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)	594.00	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**		**2765.00**	**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**		**7248.02**	**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	Integrated Kashang	1	3	(1X65+2X65)	195	245.80	R	2017
18	Sainj	1	2	(2X50)	100	323.23	R(P)	2017
	Total HPPCL	**2**	**5**		**295.00**	**569.03**		

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
	PSPCL							
19	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	**7**	**22**		**777.00**	**2845.65**		
	PRIVATE SECTOR							
	MPCL							
20	Malana	1	2	(2X43)	86.00	370.93	R(P)	2001
	Total MPCL	**1**	**2**		**86.00**	**370.93**		
	GBHPPL							
21	Budhil	1	2	(2X35)	70.00	291.73	R(P)	2012
	Total GBHPPL	**1**	**2**		**70.00**	**291.73**		
	EPPL							
22	Malana-II	1	2	(2X50)	100.00	403.00	R(P)	2011-12
	Total EPPL	**1**	**2**		**100.00**	**403.00**		
	IA ENERGY							
23	Chanju-I	1	3	(3X12)	36.00	157.82	R(P)	2017
	Total IA ENERGY	**1**	**3**		**36.00**	**157.82**		
24	Allain Duhangan	1	2	(2X96)	192.00	678.18	R(P)	2010-11
	Total ADHPL	**1**	**2**		**192.00**	**678.18**		
	HBPCL							
25	Baspa-II	1	3	(3X100)	300.00	1213.00	R(P)	2003
26	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	**26**	**94**		**9809.02**	**36822.20**		
	JAMMU AND KASHMIR							
	CENTRAL SECTOR							
	NHPC							
27	Dulhasti	1	3	(3X130)	390.00	1907.00	R(P)	2007
28	Salal-I & II	1	6	(3X115+3X115)	690.00	3082.00	R	1987-95
29	Uri	1	4	(4X120)	480.00	2587.38	R	1996-1997
30	Uri -II	1	4	(4X60)	240.00	1124.00	R	2013-14
31	Sewa-II	1	3	(3X40)	120.00	533.52	R(P)	2010-11
32	Chutak	1	4	(4X11)	44.00	213.00	R	2012-13
33	Nimoo Bazgo	1	3	(3X15)	45.00	239.00	R(P)	2013
34	Kishenganga	1	3	(3X110)	330.00	1705.62	R(P)	2018
	Total NHPC (J&K)	**8**	**30**		**2339.00**	**11391.52**		
	STATE SECTOR							
	JKSPDC							
35	Baglihar	1	3	(3X150)	450.00	2643.00	R(P)	2008
36	Baglihar II	1	3	(3X150)	450.00	1302.30	R(P)	2015

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
37	Lower Jhelum	1	3	(3X35)	105.00	533.00	R(P)	1978-1979
38	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	**12**	**42**		**3449.00**	**16224.82**		
	PUNJAB							
	CENTRAL SECTOR							
	BBMB							
39	Ganguwal	1	3	(2X24.2)+(1X29.25)	77.65	1358	R	1955-1962
40	Kotla	1	3	(2X24.2)+(1X29.25)	77.65		R	1956-1961
	Total BBMB (Punjab)	**2**	**6**		**155.30**	**1358.00**		
	STATE SECTOR							
	PSPCL							
41	A.P.Sahib I	1	2	(2X33.5)	67.00	909.00	R	1985
42	A.P.Sahib II	1	2	(2X33.5)	67.00		R	1985
43	Mukerian I	1	3	(3X15)	45.00	1206.00	R	1983
44	Mukerian II	1	3	(3X15)	45.00		R	1988-89
45	Mukerian III	1	3	(3X19.5)	58.50		R	1989
46	Mukerian I - IV	1	3	(3X19.5)	58.50		R	1989
47	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							
48	Jawahar Sagar	1	3	(3X33)	99.00	298.00	S	1972-1973
49	Mahi Bajaj I	1	2	(2X25)	50.00	289.00	MP	1986
50	Mahi Bajaj II	1	2	(2X45)	90.00		S	1989
51	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**		
	UTTARAKHAND							
	CENTRAL SECTOR							
	NHPC							
52	Dhauliganga	1	4	(4X70)	280.00	1134.69	R(P)	2005
53	Tanakpur	1	3	(3X31.4)	94.20	452.19	R	1992
	Total NHPC (Uttarakhand)	**2**	**7**		**374.20**	**1586.88**		
	THDC							
54	Tehri	1	4	(4X250)	1000.00	2797.00	MP	2006-2007
55	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**		

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
	STATE SECTOR							
	UJVNL							
56	Chibro (Y.St.II)	1	4	(4X60)	240.00	750.00	R(P)	1975-1976
57	Chilla	1	4	(4X36)	144.00	725.00	R	1980-1981
58	Dhakrani (Y.St.I)	1	3	(3X11.25)	33.75	169.00	R	1965-1970
59	Dhalipur (Y.St.I)	1	3	(3X17)	51.00	192.00	R	1965-1970
60	Khatima	1	3	(3X13.8)	41.40	208.00	R	1955-1956
61	Khodri (Y.St.II)	1	4	(4X30)	120.00	345.00	R(P)	1984
62	Kulhal (Y.St.IV)	1	3	(3X10)	30.00	164.00	R	1975
63	Maneri Bhali-I	1	3	(3X30)	90.00	395.00	R(P)	1984
64	Maneri Bhali-II	1	4	(4X76)	304.00	1566.10	R(P)	2008
65	Ram Ganga	1	3	(3X66)	198.00	334.00	MP	1975-1977
	Total UJVNL	**10**	**34**		**1252.15**	**4848.10**		
	PRIVATE							
	AHPC							
66	Shrinagar	1	4	(4X82.50)	330.00	1396.84	R(P)	2015
.	**JPPVL**							
67	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							
68	Khara	1	3	(3X24)	72.00	385.00	R(P)	1992
69	Matatilla	1	3	(3X10.2)	30.60	123.00	MP	1965
70	Obra	1	3	(3X33)	99.00	279.00	MP	1970-1971
71	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	**71**	**245**		**19023.27**	**74338.26**		
	WESTERN REGION							
	MADHYA PRADESH							
	CENTRAL SECTOR							
	NHDC							
72	Indira Sagar	1	8	(8X125)	1000.00	1980.00	MP	2004-2005
73	Omkareshwar	1	8	(8X65)	520.00	1166.57	MP	2007
	Total NHDC	**2**	**16**		**1520.00**	**3146.57**		

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
	STATE SECTOR							
	MPPGCL							
74	Bansagar Tons-I	1	3	(3X105)	315.00	900.00	R(P)	1991-1992
75	Bansagar Tons-II	1	2	(2X15)	30.00	113.00	R	2002
76	Bansagar Tons-III	1	3	(3X20)	60.00	143.00	MP	2000-2002
77	Bargi	1	2	(2X45)	90.00	508.08	MP	1988
78	Gandhi Sagar	1	5	(5X23)	115.00	420.48	MP	1960-1966
79	Madhikheda	1	3	(3X20)	60.00	74.12	MP	2006-2007
80	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							
	MAHAGENCO							
81	Bhira Tail Race	1	2	(2X40)	80.00	75.00	R(P)	1987-1988
82	Koyna DPH	1	2	(2X18)	36.00	146.00	S	1980-1981
83	Koyna St.I&II	1	8	(4X70)+(4X80)	600.00	3030.00	S	1962-1967
84	Koyna St.III	1	4	(4X80)	320.00		R(P)	1975-1978
85	Koyna IV	1	4	(4X250)	1000.00		S	1999-2000
86	Tillari	1	1	(1X60)	60.00	133.00	R(P)	1986
87	Vaitarna	1	1	(1X60)	60.00	144.00	S	1976
	Total MAHAGENCO	**7**	**22**		**2156.00**	**3528.00**		
	MPPGCL							
88	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**		
	PRIVATE SECTOR							
	DODSON-LINDBLOM HYDRO POWER PVT. LTD. (DLHP)							
89	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.)							
90	Bhira	1	6	(6X25)	150.00	775.00	S	1927-1949
91	Bhivpuri	1	5	(3X24) + (2X1.5)	75.00	220.00	S	1997-1999
92	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**		

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
	CHHATTISGARH							
	STATE SECTOR							
	CSPGCL							
93	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							
94	Ukai	1	4	(4X75)	300.00	1080.00	MP	1974-1976
	Total GSECL	**1**	**4**		**300.00**	**1080.00**		
	SSNNL							
95	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							
96	Lower Sileru	1	4	(4X115)	460.00	1070.00	S	1976-1978
97	N.J.Sagar RBC & Extn.	1	3	(3X30)	90.00	156.00	MP	1983-1990
98	Srisailam RB	1	7	(7X110)	770.00	2900.00	MP	1982-1987
99	Upper sileru I & II	1	4	(4X60)	240.00	529.00	S	1967-1995
100	N.J.Sagar TPD	1	2	(2X25)	50.00	177.00	R(P)	2017
	Total APGENCO	**5**	**20**		**1610.00**	**4832.00**		
	Total Andhra Pradesh	**5**	**20**		**1610.00**	**4832.00**		
	TELANGANA							
	STATE SECTOR							
	TSGENCO							
101	Priyadarshni Jurala	1	6	(6X39)	234.00	404.00	R(P)	2008-2011
102	Pochampad	1	4	(4X9)	36.00	147.00	MP	1987-1988, 2010
103	N.J.Sagar	1	1	(1X110)	110.00		MP	1978-85
104	N.J.Sagar LBC	1	2	(2X30)	60.00	104.00	R	1983
105	Lower Jurala	1	6	(6X40)	240.00	534.43	R(P)	2015-16
106	Pulichinthala	1	4	(4X30)	120.00	219.42	R(P)	2016-17
	Total TSGENCO	**6**	**23**		**800.00**	**1408.85**		
	Total Telangana	**6**	**23**		**800.00**	**1408.85**		

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
	KARNATAKA							
	STATE SECTOR							
	KPCL							
107	Almatti Dam	1	6	(5X55)+(1X15)	290.00	483.00	MP	2004-2005
108	Gerusoppa (Sharavathy Tail Race)	1	4	(4X60)	240.00	622.00	R(P)	2001-2002
109	Ghatprabha	1	2	(2X16)	32.00	131.00	MP	1992
110	Jog (Mahatma Gandhi)	1	8	(4X21.6)+(4X13.2)	139.20	118.00	S	1949-1952
111	Kadra	1	3	(3X50)	150.00	570.00	S	1997-1999
112	Kalinadi	1	6	(3X135)+(3X150)	855.00	3385.00	S	1979-1984
113	Supa DPH	1	2	(2X50)	100.00	542.00	S	1985
114	Kodasali	1	3	(3X40)	120.00	512.00	S	1998-1999
115	Lingnamakki	1	2	(2X27.5)	55.00	254.00	S	1979-1980
116	Munirabad	1	3	(2X9)+(1X10)	28.00	66.00	MP	1962-1965
117	Sharavathy	1	10	(10X103.5)	1035.00	4932.00	S	1965-1977
118	Shivasamudram	1	10	(4X6)+(6X3)	42.00	183.00	R(P)	1922-1934
119	Varahi	1	4	(4X115)	460.00	1060.00	R(P)	1989-2009
120	Bhadra	1	3	(2x12)+(1x2)	26.00	123.00	MP	1965
	Total KPCL	**14**	**66**		**3572.20**	**12981.00**		
	APGENCO							
121	T B Dam	1	4	(4X9)	36.00	236.00	MP	1957-1964
122	Hampi	1	4	(4X9)	36.00		MP	1958-1964
	Total APGENCO (Karnataka)	**2**	**8**		**72.00**	**236.00**		
	Total Karnataka	**16**	**74**		**3644.20**	**13217.00**		
	KERALA							
	STATE SECTOR							
	KSEB							
123	Idamalayar	1	2	(2X37.5)	75.00	380.00	MP	1987
124	Idukki	1	6	(6X130)	780.00	2398.00	MP	1976-1986
125	Kakkad	1	2	(2X25)	50.00	262.00	R(P)	1999
126	Kuttiadi	1	3	(3X25	75.00	323.00	MP	1972
127	Kuttiady Extn.	1	1	(1X50)	50.00		MP	2001
128	Kuttiady Addl.	1	2	(2X50)	100.00		MP	2010
129	Lower Periyar	1	3	(3X60)	180.00	493.00	MP	1997
130	Neriamangalam	1	3	(3X15)	45.00	237.00	R(P)	1961-63
131	Pallivasal	1	6	(3X5)+(3X7.5)	37.50	284.00	S	1948-2001
132	Panniar	1	2	(2X15)	30.00	158.00	S	1963-2001
133	Poringalkuthu	1	4	(4X8)	32.00	170.00	S	1957-1960
134	Sabarigiri	1	6	(6X50)	300.00	1338.00	S	1960-1967
135	Sengulam	1	4	(4X12)	48.00	182.00	S	1954-2001
136	Sholayar	1	3	(3X18)	54.00	233.00	R(P)	1956-1968
	Total KSEB	**14**	**47**		**1856.50**	**6458.00**	S	
	Total Kerala	**14**	**47**		**1856.50**	**6458.00**		

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
	TAMIL NADU							
	STATE SECTOR							
	TANGEDCO							
137	Aliyar	1	1	(1X60)	60.00	175.00	MP	1970
138	Bhawani K Barrage-III	1	2	(2X15)	30.00	90.00	R(P)	2006
139	Bhawani K Barrage-II	1	2	(2X15)	30.00	100.00	R(P)	2013
140	Bhawani K Barrage-I	1	2	(2X15)	30.00	80.00	R(P)	2012
141	Kodayar I	1	1	(1X60)	60.00	165.00	MP	1970
142	Kodayar II	1	1	(1X40)	40.00		MP	1971
143	Kundah I	1	3	(3X20)	60.00	1387.00	S	1960-1964
144	Kundah II	1	5	(5X35)	175.00		S	1960-1965
145	Kundah III	1	3	(3X60)	180.00		S	1965-1978
146	Kundah IV	1	2	(2X50)	100.00		S	1966-1978
147	Kundah V	1	2	(2X20)	40.00		S	1964-1988
148	Lower Mettur I	1	2	(2X15)	30.00	252.00	R(P)	1988
149	Lower Mettur II	1	2	(2X15)	30.00		R(P)	1988
150	Lower Mettur III	1	2	(2X15)	30.00		R(P)	1987-1988
151	Lower Mettur IV	1	2	(2X15)	30.00		R(P)	1988-1999
152	Mettur Dam	1	4	(4X12.5)	50.00	541.00	MP	1937-1946
153	Mettur Tunnel	1	4	(4X50)	200.00		MP	1965-1966
154	Moyar	1	3	(3X12)	36.00	115.00	S	1952-1953
155	Papanasam	1	4	(4X8)	32.00	105.00	MP	1944-1951
156	Parson's Valley	1	1	(1X30)	30.00	53.00	S	2000
157	Periyar	1	4	(3X42)+(1X35)	161.00	409.00	MP	1958-1965
158	Pykara	1	6	(3X7)+(2X13.6)+(1X11)	59.20	274.00	S	1932-2005
159	Pykara Ultimate	1	3	(3X50)	150.00	30.00	S	2005
160	Sarkarpathy	1	1	(1X30)	30.00	162.00	R(P)	1966
161	Sholayar I&II	1	2	(2X35)	70.00	254.00	S	1971
162	Suruliyar	1	1	(1X35)	35.00	79.00	S	1978
	Total TANGEDCO	**26**	**65**		**1778.20**	**4271.00**		
	Total Tamil Nadu	**26**	**65**		**1778.20**	**4271.00**		
	Total SOUTHERN REGION	**67**	**229**		**9688.90**	**30186.85**		
	EASTERN							
	JHARKHAND							
	CENTRAL SECTOR							
	DVC							
163	Panchet	1	1	(1X40)	40.00	237.00	MP	1990
	Total DVC (Jharkhand)	**1**	**1**		**40.00**	**237.00**		

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
	STATE SECTOR							
	JUUNL							
164	Subernarekha I	1	1	(1X65)	65.00	149.00	MP	1977
165	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							
166	Balimela	1	8	(6X60)+(2X75)	510.00	1183.00	MP	1973-1977, 2008
167	Hirakud (Burla)	1	7	(3X37.5)+(2X49.5)+(2X32)	275.50	684.00	MP	1956-1990
168	Hirakud (Chiplima)	1	3	(3X24)	72.00	490.00	R(P)	1962-1964
169	Rengali	1	5	(5X50)	250.00	525.00	MP	1985-1992
170	Upper Indravati	1	4	(4X150)	600.00	1962.00	MP	1999-2001
171	Upper Kolab	1	4	(4X80)	320.00	832.00	MP	1988-1993
	Total OHPC	**6**	**31**		**2027.50**	**5676.00**		
	APGENCO							
172	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**		
	SIKKIM							
	CENTRAL SECTOR							
	NHPC							
173	Rangit	1	3	(3X20)	60.00	338.61	R(P)	2000
174	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)							
175	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.)							
176	Chuzachen	1	2	(2*55)	110.00	537.81	R(P)	2013
	SNEHA KINETIC POWER PROJECTS PVT LTD (SKPPPL)							
177	Dikchu	1	2	(2*48)	96.00	431.00	R	2017
	SHIGA ENERGY PVT LTD (SEPL)							
178	Tashiding	1	2	(2*48.50)	97.00	425.05	R	2017
	DANS ENERGY PVT LTD. (DEPL)							
179	Jorethang Loop	1	2	(2*48)	96.00	459.02	R	2015
	Sub-Total Private Sector (Sikkim)	**4**	**8**		**399.00**	**1852.88**		
	Total SIKKIM	**7**	**20**		**2169.00**	**9978.19**		

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
	WEST BENGAL							
	CENTRAL SECTOR							
	NHPC							
180	Teesta Low Dam-III	1	4	(4X33)	132.00	594.00	R(P)	2013-14
181	Teesta Low Dam-IV	1	4	(4X40)	160.00	719.67	R(P)	2016
	Total NHPC (WB)	**2**	**8**		**292.00**	**1313.67**		
	DVC							
182	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							
183	Jaldhaka I	1	4	(4X9)	36.00	169.60	R(P)	1967-1972, 2012
184	Rammam II	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**	**18539.46**		
	NORTH EASTERN							
	ARUNACHAL PRADESH							
	CENTRAL SECTOR							
	NEEPCO							
	CENTRAL SECTOR							
185	Ranganadi	1	3	(3X135)	405	1509.66	R(P)	2002
186	Pare	1	2	(2X55)	110	506.42	R	2018
	Total NEEPCO (Ar.P)	**2**	**5**		**515**	**2016.08**		
	ASSAM							
	CENTRAL SECTOR							
	NEEPCO							
187	Kopili	1	4	(4X50)	200.00	1186.14	S	1988
188	Khandong	1	2	(2X25)	50.00	363.95	S	1984
	Total NEEPCO (Assam)	**2**	**6**		**250.00**	**1550.09**		
	STATE SECTOR							
	APGCL							
189	Karbi Langpai	1	2	(2X50)	100.00	390.00	R(P)	2007
	Total APGCL	**1**	**2**		**100.00**	**390.00**		
	Total ASSAM	**3**	**8**		**350.00**	**1940.09**		
	MIZORAM							
	CENTRAL SECTOR							
	NEEPCO							
190	Tuirial	1	2	(2X30)	60.00	250.63	S	2017
	Total NEEPCO Mizoram	**1**	**2**		**60.00**	**250.63**		

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
	NAGALAND							
	CENTRAL SECTOR							
	NEEPCO							
191	Doyang	1	3	(3X25)	75.00	227.24	S	2000
	Total NEEPCO Nagaland	**1**	**3**		**75.00**	**227.24**		
	MANIPUR							
	CENTRAL SECTOR							
	NHPC							
192	Loktak	1	3	(3X35)	105.00	448.00	MP	1983
	Total NHPC (Manipur)	**1**	**3**		**105.00**	**448.00**		
	MEGHALAYA							
	STATE SECTOR							
	MePGCL							
193	Kyrdemkulai	1	2	(2X30)	60.00	118.00	R(P)	1979
194	Umium St.I	1	4	(4X9)	36.00	128.00	S	1965
195	New Umtru	1	2	(2X20)	40.00	235.00	R(P)	2017
196	Umium St.IV	1	2	(2X30)	60.00	324.00	R(P)	1992
197	Myntdu St-I	1	3	(3X42)	126.00	372.69	R(P)	2012
	Total MePGCL	**5**	**13**		**322.00**	**1177.69**		
	Total NE REGION	**13**	**34**		**1427.00**	**6059.73**		
	Total	**197**	**675**		**40613.62**	**141168.51**		
	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**		

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
	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**		
	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)	**206**	**710**		**45399.22**	**150680.51**		

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

CAPACITY-WISE GROUPING OF HYDRO-ELECTRIC STATIONS

As on 31.03.2019

STATION CAPACITY	NUMBER OF STATIONS		NUMBER OF UNITS		TOTAL CAPACITY	
RANGE (MW)	**No**	**%**	**No**	**%**	**MW**	**%**
> 25 - 100	104	50.98	273	38.45	5947.15	13.10
>100 - 500	73	35.78	284	40.00	17237.47	37.97
>500 - 1000	23	11.27	125	17.61	17279.60	38.06
>1000	4	1.96	28	3.94	4935.00	10.87
TOTAL	**204**	**100**	**710**	**100**	**45399.22**	**100**

HYDRO GENERATING UNITS ADDED DURING 2018-19

SL. NO.	NAME OF THE STATION	UTILITY	STATE	UNIT NO.	CAPACITY (MW)	DATE OF COMMISSIONING
CENTRAL SECTOR						
1	PARE	NEEPCO	ARUNACHAL PRADESH	1	55.00	28.05.2018
				2	55.00	28.05.2018
STATE SECTOR						
5	PULICHINTHALA	TSGENCO	TELANGANA	4	30.00	08.09.2018
ALL INDIA TOTAL					**140.00**	

CHAPTER-2

GENERATION PERFORMANCE

CHAPTER-2

GENERATION PERFORMANCE

2.1 Generation from hydro-electric power stations (above 25 MW capacity) in the country during 2018-19 was 134.9 BU against the target of 130 BU which was 3.76% more than the target. The generation during 2018-19 was 6.95% higher than the generation in 2017-18i.e. 126.1 BU.

2.2 The month-wise and cumulative generation from hydro stations in the country viz-a-viz 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: 2018-19

Month	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Target	8657	11820	13038	15454	17523	15741	10722	7846	7165	6997	6726	8311
Gen.	7557	10679	13339	15779	18602	17426	12410	8147	7780	7367	7120	8687
Cum. Tar	8657	20477	33515	48969	66492	82233	92955	100801	107966	114963	121689	130000
Cum. Gen.	7557	18236	31575	47354	65956	83382	95792	103939	111719	119086	126206	134894

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

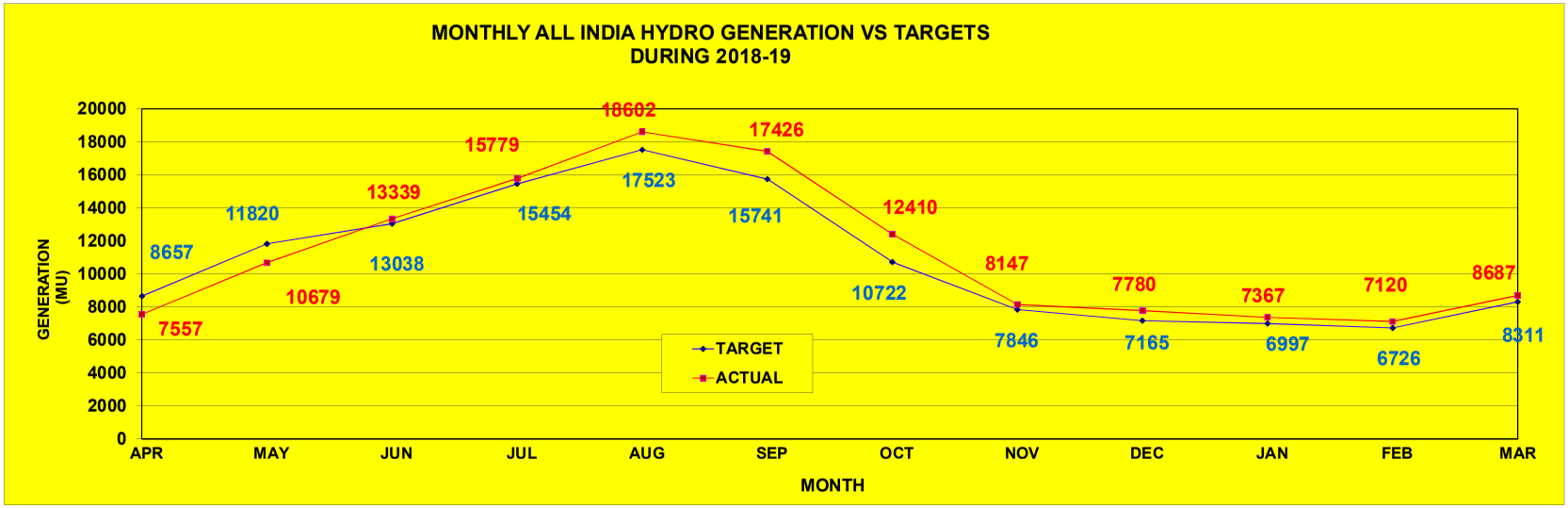
The utility-wise/ sector-wise target of energy generation viz-a-viz actual generation and surplus /shortfall in respect of Hydro-electric stations during 2018-19 & 2017-18 are given below in **Table 2.2.**

TABLE 2.2

UTILITY-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS (2018-19 VIS-A-VIS 2017-18)

Utilities	Installed Capacity (MW) (As on 31.03.2019)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2018-19	2017-18	2018-19	2017-18	2018-19	2017-18
CENTRAL SECTOR							
BBMB	2920.30	9425	9360	10186.02	10864.14	8.07	16.07
NHPC	5451.20	24055	23046	24000.96	22549.52	-0.22	-2.15
SJVNL	1912.02	8490	8625	8335.92	9222.73	-1.81	6.93
NTPC	800.00	3000	3055	3013.93	3313.62	0.46	8.47
THDC	1400.00	3952	4115	4395.92	4301.27	11.23	4.53
NHDC	1520.00	2446	3100	1920.83	1325.36	-21.47	-57.25
DVC	143.20	205	235	181.15	256.35	-11.63	9.09

EXHIBIT- 2.1


MONTHLY ALL INDIA HYDRO GENERATION VS TARGETS
DURING 2018-19
GENERATION (MU)
MONTH
TARGET
ACTUAL
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
8657
11820
13038
15454
17523
15741
10722
7846
7165
6997
6726
8311
7557
10679
13339
15779
18602
17426
12410
8147
7780
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7120
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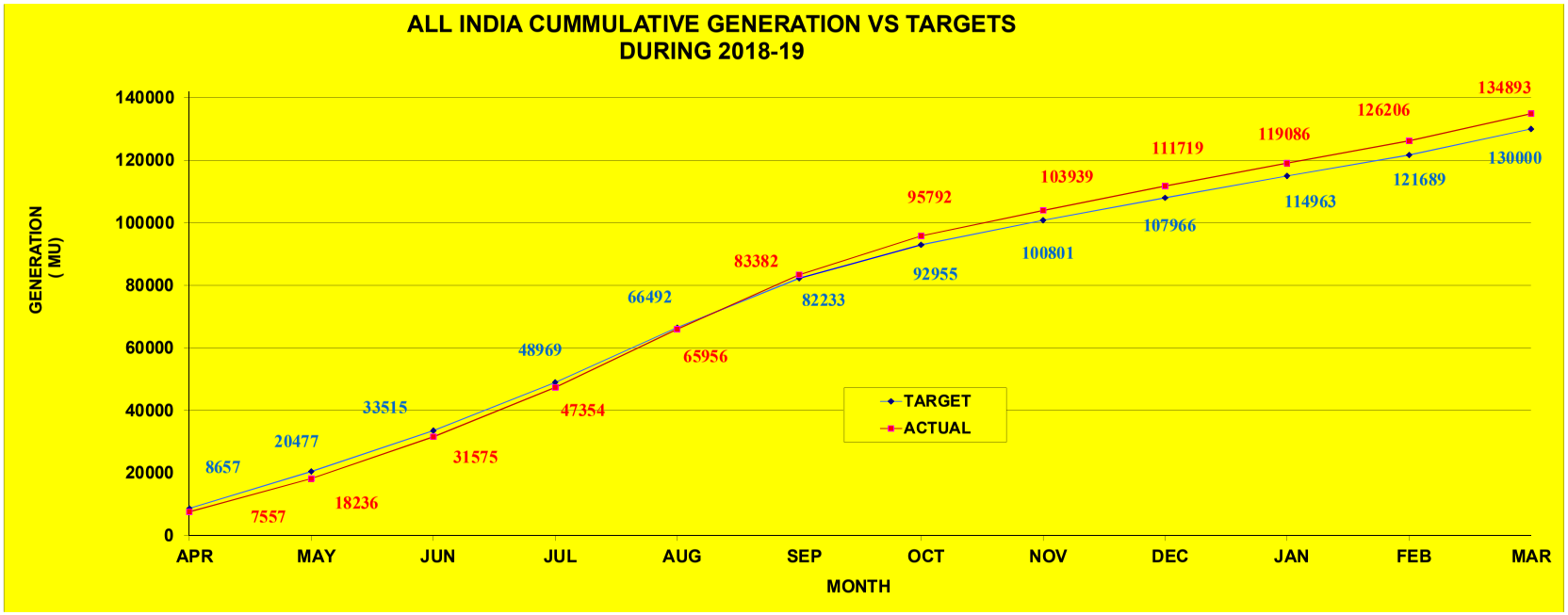

ALL INDIA CUMMULATIVE GENERATION VS TARGETS
DURING 2018-19
GENERATION (MU)
MONTH
TARGET
ACTUAL
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
8657
20477
33515
48969
66492
82233
92955
100801
107966
114963
121689
130000
7557
18236
31575
47354
65956
83382
95792
103939
111719
119086
126206
134893

Utilities	Installed Capacity (MW) (As on 31.03.2019)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2018-19	2017-18	2018-19	2017-18	2018-19	2017-18
NEEPCO	900.00	4603	3492	3120.56	3203.10	-32.21	8.06
SUB-TOTAL	**15046.72**	**56176**	**55028**	**55155.29**	**55036.09**	**-1.82**	**0.01**
PRIVATE SECTOR							
MPCL	86.00	344	344	320.55	346.29	-6.82	0.67
EPPL	100.00	330	360	349.39	368.89	5.88	2.47
ADHPL	192.00	650	700	582.23	683.01	-10.43	-2.43
GBHPPL	70.00	250	282	288.08	317.63	15.23	12.63
HBPCL	1300.00	5343	5500	5244.27	5906.58	-1.85	7.39
IA ENERGY	36.00	125.00	0.00	137.45	79.42	9.96	-
AHPCL	330.00	1250	1340	1375.31	1382.54	10.02	3.17
JPPVL	400.00	1700	1800	1932.02	2160.90	13.65	20.05
DLHP	34.00	36	37	56.44	42.55	56.78	15.00
GIPL	110.00	400	495	417.40	444.79	4.35	-10.14
TPCL	447.00	1300	1450	1568.18	1515.88	20.63	4.54
DEPL	96.00	390.00	459	409.75	406.01	5.06	-11.54
SEPL	97.00	300.00	400	423.73	73.07	41.24	-81.73
SNEHA KINETIC	96.00	300.00	0	462.24	370.10	54.08	-
NTPGPL	0	200	200	0.00	0.00	0.00	0.00
SUB-TOTAL	**3394**	**12718**	**13367**	**13567.03**	**14097.66**	**6.68**	**5.47**
STATE SECTOR							
JKSPDC	1110.00	4669	4599	5044.36	5136.89	8.04	-6.89
HPPCL	295.00	430	568	527.05	332.12	22.57	-78.91
HPSEB LTD.	372.00	1530	1617	1649.29	1590.86	7.80	-15.53
BVPC	0.00	20	30	0.00	0.00	-100.00	-100
RRVUNL	411.00	535	720	698.40	819.53	30.54	36.05
PSPCL	1051.00	3690	4021	3598.82	4230.51	-2.47	-13.09
UPJVNL	501.60	1115	1170	1176.36	1486.69	5.50	1.25
UJVNL	1252.15	4105	4688	4478.76	4526.00	9.10	-10.61
SSNNL	1450.00	2260	4460	594.84	939.47	-73.68	-1.65
GSECL	540.00	730	857	447.97	612.45	-38.63	-12.54
MSPGCL	2406.00	3361	4296	3320.63	3143.16	-1.20	-7.04
MPPGCL	875.00	2280	2625	1607.45	1420.98	-29.50	16.17
CSPGCL	120.00	225	250	243.08	178.07	8.04	-40.86
APGENCO	1796.75	3109	3505	3038.37	2870.47	-2.27	-27.69
TSGENCO	2405.60	2665	3335	1744.61	1491.98	-34.54	-59.13
KPCL	3572.20	9590	11687	12015.94	7008.65	25.30	-41.46

Utilities	Installed Capacity (MW) (As on 31.03.2019)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2018-19	2017-18	2018-19	2017-18	2018-19	2017-18
KSEBL	1856.50	5490	6221	7320.21	5199.26	33.34	-16.42
TANGEDCO	2178.20	3570	4415	5281.59	2919.60	47.94	-33.87
JUUNL	130.00	110	150	101.19	190.38	-8.01	26.92
OHPC	2027.50	5140	5672	6183.77	5555.29	20.31	-2.06
TUL	1200.00	4000	5214	4258.40	4429.33	6.46	-15.05
WBSEDCL	986.00	1250	1596	1537.94	1282.02	23.04	-19.67
APGCL	100.00	300	390	372.72	484.98	24.24	24.35
MePGCL	322.00	932	919	929.53	1140.26	-0.26	24.08
SUB-TOTAL	**26958.50**	**61106**	**73005**	**66171.28**	**56988.95**	**8.29**	**-21.94**
ALL-INDIA	**45399.22**	**130000**	**141400**	**134893.61**	**126122.70**	**3.76**	**-10.80**

During the year 2018-19, overall hydro generation was more than the target in respect of BBMB, NTPC & THDC in Central Sector and EPPL, GBHPPL, IAEPL, AHPCL, JPPVL, DLHP, GIPL, TPCL, DEPL, SEPL and SNEHA KINETIC in Private Sector. As regards generation by State Electricity Boards/Corporations / Departments, hydro generation was more than the target in respect of JKSPDCL, HPPCL, HPSEBL, RRVVNL, UPJVNL, UJVNL, CSPGCL, KPCL, KSEBL, TANGEDCO, OHPC, TUL, WBSEDCL and APGCL.

2.4 Region-wise Performance of H.E. Stations

Region-wise generation performance of hydroelectric stations during 2018-19 is indicated in **Table 2.3.**

TABLE 2.3

GENERATION PERFORMANCE – REGION-WISE (2018-19)

S. No.	Region	Installed Capacity as on 31.03.2019 (MW)	Generation During 2018-19		
			Target (MU)	Actual (MU)	Shortfall (-)/ Surplus (+) Over Target (%)
1	Northern	19023.27	70148	72401.41	3.21
2	Western	7392.00	12638	9759.42	-22.78
3	Southern	11694.50	24000	28807.04	20.03
4	Eastern	5862.45	16779	18900.31	12.64
5	North-Eastern	1427.00	6435.00	5025.42	-21.90
	Total (All India)	**45399.22**	**130000**	**134893.61**	**3.76**

Note: - Includes 4785.60 MW of Pumped Storage Scheme.

- Hydel generation during 2018-19 has exceeded the target in Northern, Southern & Eastern Region whereas it was lower than the target in Western, and North-Eastern Region of the country primarily on account of lower inflows/rainfall in project catchment area**.**
- Hydel generation during 2018-19 was 134894 MU against the target of 130000 MU viz higher in generation by 4893.61 MU (3.76%). However, actual hydel generation during 2018-19 is more than previous year generation of 126.1 BU by 6.95%.

Region-wise generation targets viz-a-viz achievements are indicated at **Exhibit-2.2**.

2.5 Sector-wise generation performance during the year 2018-19 viz-a-viz targets is given in **Table 2.4**.

Generation from H.E. Stations under State Sector & Private Sector has been more than the target. However, the generation in Central sector is significantly lower than the target by 1.82%.

TABLE 2.4

SECTOR-WISE GENERATION PERFORMANCE
PERIOD: 2018-19

Sl. No.	Sector	Installed Capacity as on 31.03.19 (MW)	Generation		
			Target (MU)	Actual (MU)	Shortfall (-) Surplus (+) Over Target (%)
1	Central	15046.72	56176	55155.29	-1.82
2	State	26958.50	61106	66171.28	8.29
3	Private	3394.00	12718	13567.03	6.68
	Total	**45399.22**	**130000**	**134893.61**	**3.76**

2.6 Details of actual generation during 2018-19 for all the hydro stations (above 25 MW capacity) in the country are given in **Annex 2.1**. It is observed that 121 Nos. of stations have exceeded the target level of generation while the generation has been less than targets in case of 83 stations. List of stations where generation exceeded the target during 2018-19 is given in **Table 2.5.**

TABLE 2.5

H.E. STATIONS ACHIEVING HIGHER GENERATION VIS-A-VIS TARGET PERIOD: 2018-19

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	25	12.25	Pong, Sainj, Koyna DPH, Bhandardhara-II, Khopili, Kadra, Supa DPH, Idukki, Bhawani K Barrage- II, Kundah I-V, Mettur Dam, Mettur Tunnel, Moyar, Parson's Valley, Periyar, Pykara Ultimate, Sholayar I, Pulichintla, Balimela, Dikchu, Kopili.
2	140 - 150	8	3.92	Baglihar-II, Jawahar Sagar, Dhalipur, Sabarigiri, Kadamparai PSS, Machkund, Tashiding, Jaldhaka-I
3	130 - 140	8	3.92	Ganguwal, Kotla, R.P. Sagar, Koyna st. I&II, Kodasali, Kakkad, Neriamangalam, Lower Jurala.
4	120 - 130	27	13.23	Sanjay, Chutak, Uri-II, Mukerian I-IV, Matatila, Obra, Dhakrani, Khatima, Madhikhera, Bhivpuri, Bhadra, Kalinadi, Lingnamakki, Sharavathy, Shivasamudram, Varahi, Kuttiyadi & Kuttiyadi addtl., Bhawani K Barrage-I, Sarkarpathy, Rengali, Upper Kolab, Purulia PSS, Karbi Langpi, Kyrdemkulai.
5	110 - 120	31	15.2	Dehar, Giri Bata, Budhil, Nimoo Bazgo, Tehri, Kulhal, Maneri Bhali-I, Maneri Bhali-II, Srinagar, Vishnuprayag, Rajghat, Bhira Tail Race, Vaitarna, Bhira & Bhira PSS, N.J Sagar RBC, Upper Sileru-I&II, Gerusoppa, Ghatprabha, T.B Dam & Hampi, Idamalayar, Lower Periyar, Lower Mettur I-IV, Papanasam, Suruliyar, Upper Indravati, Rammam II
6	100 - 110	35	17.15	Chamera-I, Chamera-II, Kol Dam, Larji, Malana-II, Baspa-II, Chanju-I, Dulhasti,, Salal-I&II, Uri, Lower Jhelum, Upper Sindh II, Rihand, Dhauliganga, Tanakpur, Koteshwar, Chibro, Khodri, Hasdeo Bango, Tillari, Lower Sileru, Sengulam, Sholayar, Priyadarshini Jurala, Rangit, Teesta-V, Teesta-III, Jorethang Loop, Chuzachen, Teesta Low Dam-III, Maithon, Doyang, Loktak, New Umtru.

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

EXHIBIT-2.2

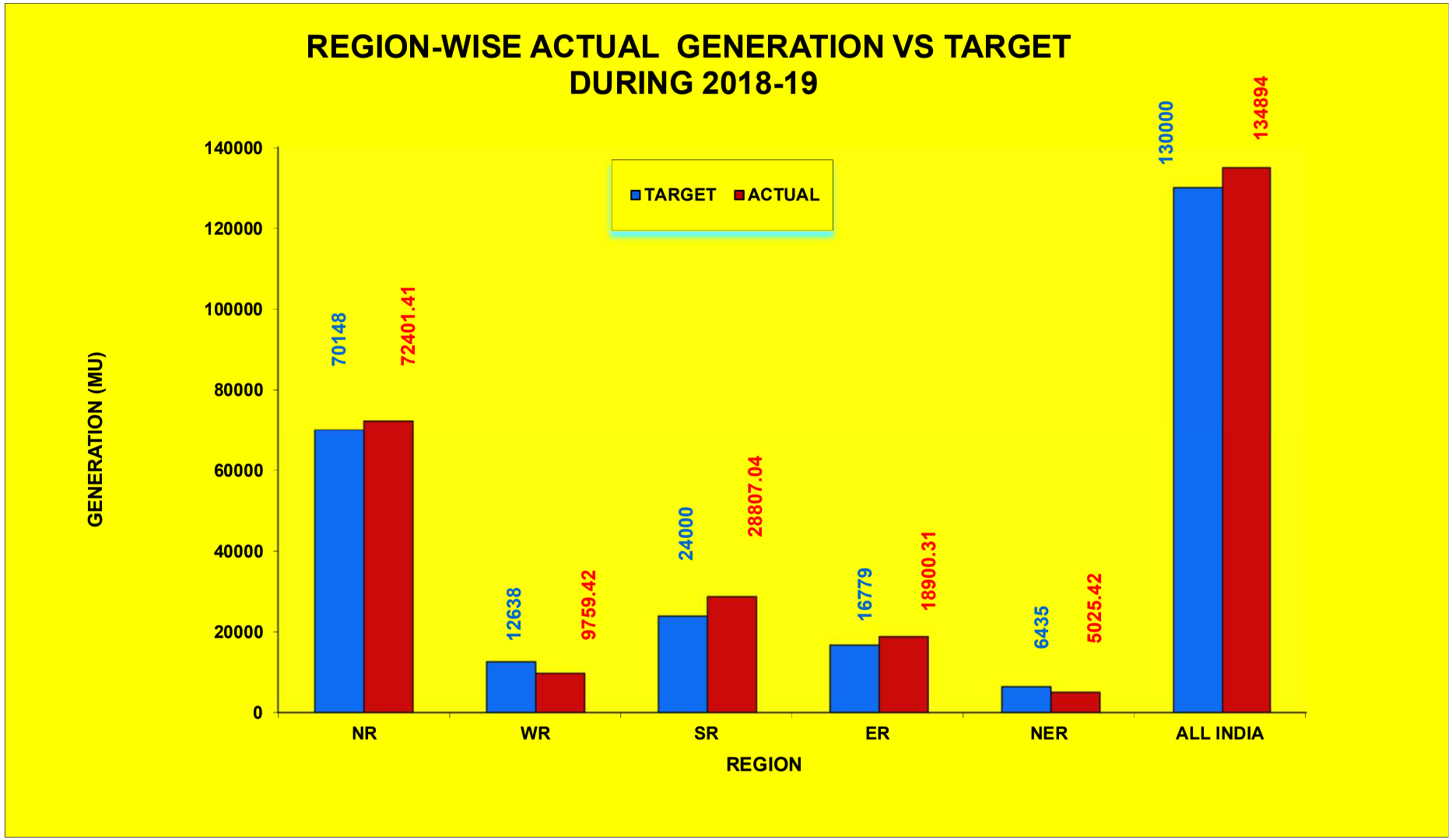

REGION-WISE ACTUAL GENERATION VS TARGET
DURING 2018-19
TARGET
ACTUAL
GENERATION (MU)
140000
120000
100000
80000
60000
40000
20000
0
70148
72401.41
12638
9759.42
24000
28807.04
16779
18900.31
6435
5025.42
130000
134894
NR
WR
SR
ER
NER
ALL INDIA
REGION

TABLE 2.6

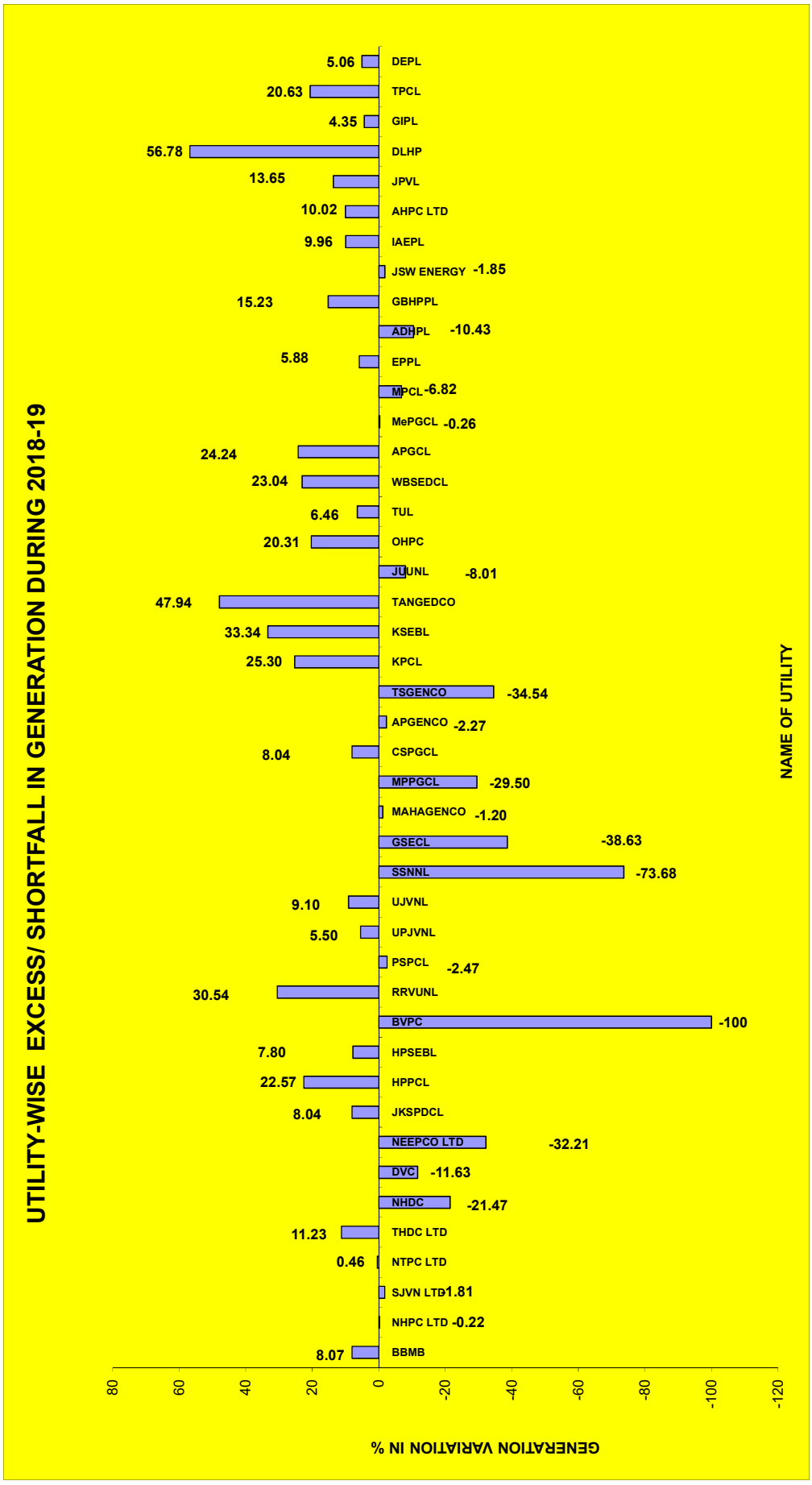
H.E. STATIONS HAVING SHORTFALL IN GENERATION VIS-A-VIS TARGETS
PERIOD: 2018-19

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	30	14.70	Bhakra L&R, Chamera-III, Parbati-III, Nathpa Jhakri, Rampur, Shanan, Karcham Wangtoo, Malana, Baglihar, Ranjit Sagar, Mahi Bajaj-I&II, Khara, Chilla, Ramganga, Koyna St. III, Almatti Dam, Munirabad, Pallivasal, Panniar, Kodayar I&II, N. J Sagar LBC, Subarnarekha I&II, Teesta Low Dam-IV, Myntdu, Umiam St-I, Umiam St. IV .
2	80-90	12	5.88	Bassi, Allain Duhangan, Sewa-II, Kadana PSS, Indira Sagar, Bargi, Gandhi Sagar, Koyna IV, Jog, Srisailam LB, Ranganadi, Pare.
3	70 -80	9	3.92	Baira Siul, Omkareshwar, Bansagar Tons-III, Poriangalkuthu, Bhawani K Barrage-III, Panchet, Hirakud I &II, Tuiriul
4	60 -70	7	2.94	Integrated Kashang, Kishenganga, A.P Sahib I &II, Sardar Sarovar CHPC, Bansagar Tons-I, Khandong.
5	50 -60	5	2.45	Ghatghar PSS, N.J Sagar TPD, Pykara, Pochampad, Srisailam RB
6	40 -50	2	0.98	Ukai, Pench
7	30 -40	3	1.47	Bansagar-Tons II, Aliyar, N.J Sagar PSS
8	10 -30	0	0	-
9	0 -10	4	1.96	Parbati-II, Uhl,-III, Sardar Sarovar RBPH, Kameng

The 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

EXHIBIT 2.3


UTILITY-WISE EXCESS/ SHORTFALL IN GENERATION DURING 2018-19
NAME OF UTILITY
GENERATION VARIATION IN %
5.06 DEPL
20.63 TPCL
4.35 GIPL
56.78 DLHP
13.65 JPVL
10.02 AHPC LTD
9.96 IAEPL
JSW ENERGY -1.85
15.23 GBHPPL
ADHPL -10.43
5.88 EPPL
MPCL -6.82
MePGCL -0.26
24.24 APGCL
23.04 WBSEDCL
6.46 TUL
20.31 OHPC
JUUNL -8.01
47.94 TANGEDCO
33.34 KSEBL
25.30 KPCL
TSGENCO -34.54
APGENCO -2.27
8.04 CSPGCL
MPPGCL -29.50
MAHAGENCO -1.20
GSECL -38.63
SSNNL -73.68
9.10 UJVNL
5.50 UPJVNL
PSPCL -2.47
30.54 RRVUNL
BVPC -100
7.80 HPSEBL
22.57 HPPCL
8.04 JKSPDCL
NEEPCO LTD -32.21
DVC -11.63
NHDC -21.47
11.23 THDC LTD
0.46 NTPC LTD
SJVN LTD 1.81
NHPC LTD -0.22
8.07 BBMB
80 60 40 20 0 -20 -40 -60 -80 -100 -120

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**

TABLE-2.7

REGION-WISE HYDEL GENERATION AND RAINFALL DURING 2014-15 TO 2018-19

Region	**Installed Capacity as on 31.03.2019 (MW)**	**Generation (BU)**				
		2014-15	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Northern	19023.27	65.99	73.11	71.76	74.73	72.40
Western	7392.00	15.66	12.85	17.18	9.18	9.76
Southern	11694.50	31.86	20.98	17.04	19.02	28.81
Eastern	5862.45	12.2	10.24	11.75	17.52	18.90
North Eastern	1427.00	3.54	4.21	4.65	5.67	5.02
Total	**45399.22**	**129.25**	**121.38**	**122.38**	**126.12**	**134.90**
Rainfall		**2014-15 (mm)**	**2015-16 (mm)**	**2016-17 (mm)**	**2017-18 (mm)**	**2018-19 (mm)**
All-India		1044.7	1085.0	1083.1	1127.1	1020.8

It can be observed from the above table that maximum hydro generation of 134.9 BU was achieved during the year 2018-19 as compared previous four years mainly due to better rainfall in the catchment areas of hydro power stations besides increase in installed capacity.

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
NORTHERN REGION					
HIMACHAL PRADESH					
CENTRAL SECTOR					
BBMB					
Bhakra L&R	1379.00	3924.00	4625	4238.19	91.64
Dehar	990.00	3110.00	2900	3226.30	111.25
Pong	396.00	1123.00	1000	1512.56	151.26
Total BBMB-HP	**2765.00**	**8157.00**	**8525**	**8977.05**	**105.30**
NHPC					
Baira Siul	180.00	779.28	500	366.67	73.33
Chamera-I	540.00	1664.56	2400	2484.56	103.52
Chamera-II	300.00	1499.89	1470	1508.02	102.59
Chamera-III	231.00	1108.00	1050	1043.42	99.37
Parbati III	520.00	1977.23	650	608.30	93.58
Parbati II*			200	0.00	0.00
Total NHPC -HP	**1771.00**	**7028.96**	**6270**	**6010.97**	**95.87**
SJVN					
Naptha Jhakri	1500.00	6612.00	6612	6507.15	98.41
Rampur	412.02	1878.08	1878	1828.77	97.38
Total SJVN	**1912.02**	**8490.08**	**8490**	**8335.92**	**98.19**
NTPC					
Kol Dam	800.00	3054.79	3000	3013.93	100.46
Total NTPC	**800.00**	**3054.79**	**3000**	**3013.93**	**100.46**
Total Central-HP	**7248.02**	**26730.83**	**26285**	**26337.87**	**100.20**
STATE SECTOR					
HPPCL					
Integrated Kashang	195.00	245.80	180	118.24	65.69
Sainj	100.00	323.23	250	408.81	163.52
Total HPPCL	**295.00**	**569.03**	**430**	**527.05**	**122.57**
HPSEB LTD					
Bassi	66.00	346.77	300	251.56	83.85
Giri Bata	60.00	240.00	190	214.45	112.87

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Larji	126.00	586.85	560	593.86	106.05
Sanjay	120.00	518.00	480	589.42	122.80
Total HPSEB LTD	**372.00**	**1691.62**	**1530**	**1649.29**	**107.80**
Beas Valley Power. Corp. Ltd. (BVPC)					
Uhl-III*			20	0.00	0.00
Total BVPC	**0.00**	**0.00**	**20**	**0.00**	**0.00**
PSPCL					
Shanan	110.00	585.00	480	472.39	98.41
Total PSPCL-HP	**110.00**	**585.00**	**480**	**472.39**	**98.41**
Total State Sector-HP	**777.00**	**2845.65**	**2460**	**2648.73**	**107.67**
PRIVATE					
Allain Duhangan Hydo Power Ltd.					
Allain Duhangan	192.00	678.18	650	582.23	89.57
Everest Power Private Ltd.					
Malana-II	100.00	403.00	330	349.39	105.88
HBPCL					
Baspa-II	300.00	1213.00	1213	1275.58	105.16
Karcham Wangtoo	1000.00	4131.06	4130	3968.69	96.09
Total HBPCL	**1300.00**	**5344.06**	**5343**	**5244.27**	**98.15**
GBHPPL					
Budhil	70.00	291.73	250	288.08	115.23
IA Energy Pvt. Ltd.					
Chanju I	36.00	157.82	125	137.45	109.96
Malana Power Company Ltd.					
Malana	86.00	370.93	344	320.55	93.18
Total Private-HP	**1784.00**	**7245.72**	**7042**	**6921.97**	**611.98**
Total H.P.	**9809.02**	**36822.20**	**35787**	**35908.57**	**100.34**
JAMMU & KASHMIR					
CENTRAL SECTOR					
NHPC					
Chutak	44.00	213.00	40	48.96	122.40
Dulhasti	390.00	1907.00	2170	2273.38	104.76

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Nimoo Bazgo	45.00	239.00	90	105.55	117.28
Salal-I & II	690.00	3082.00	3380	3412.55	100.96
Sewa-II	120.00	533.52	555	498.32	89.79
Uri	480.00	2587.38	3000	3048.29	101.61
Uri -II	240.00	1124.00	1290	1580.92	122.55
Kishenganga	330.00	1705.62	850	529.25	62.26
Total NHPC -J&K	**2339.00**	**11391.52**	**11375**	**11497.22**	**101.07**
Total Central Sector - J&K	**2339.00**	**11391.52**	**11375**	**11497.22**	**101.07**
STATE SECTOR					
JKSPDC					
Baglihar	450.00	2643.00	2525	2291.15	90.74
Baglihar II	450.00	1302.30	1300	1857.91	142.92
Lower Jhelum	105.00	533.00	554	589.33	106.38
Upper Sindh II	105.00	355.00	290	305.97	105.51
Total JKSPDC	**1110.00**	**4833.30**	**4669**	**5044.36**	**108.04**
Total State Sector-J&K	**1110.00**	**4833.30**	**4669**	**5044.36**	**108.04**
Total Jammu & Kashmir	**3449.00**	**16224.82**	**16044**	**16541.58**	**103.10**
PUNJAB					
CENTRAL SECTOR					
BBMB					
Ganguwal	77.65	1358.00	450	599.37	133.19
Kotla	77.65		450	609.60	135.47
Total BBMB-Punjab	**155.30**	**1358.00**	**900**	**1208.97**	**134.33**
STATE SECTOR					
PSPCL					
A.P.Sahib I & II	134.00	909.00	680	427.78	62.91
Mukerian I - IV	207.00	1206.00	1020	1244.13	121.97
Ranjit Sagar	600.00	1507.00	1510	1454.52	96.33
Total PSPCL	**941.00**	**3622.00**	**3210**	**3126.43**	**97.40**
Total State Sector-Punjab	**941.00**	**3622.00**	**3210**	**3126.43**	**97.40**
Total Punjab	**1096.30**	**4980.00**	**4110**	**4335.40**	**105.48**

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
RAJASTHAN					
STATE SECTOR					
RRVUNL					
Jawahar Sagar	99.00	298.00	170	247.00	145.29
Mahi Bajaj I & II	140.00	289.00	125	117.08	93.66
R.P. Sagar	172.00	459.00	240	334.32	139.30
Total RRVUNL	**411.00**	**1046.00**	**535**	**698.40**	**130.54**
Total State sector-Rajasthan	**411.00**	**1046.00**	**535**	**698.40**	**130.54**
Total Rajasthan	**411.00**	**1046.00**	**535**	**698.40**	**130.54**
UTTAR PRADESH					
STATE SECTOR					
UPJVNL					
Khara	72.00	385.00	300	286.14	95.38
Matatilla	30.60	123.00	75	97.48	129.97
Obra	99.00	279.00	190	231.03	121.59
Rihand	300.00	920.00	550	561.71	102.13
Total UPJVNL	**501.60**	**1707.00**	**1115**	**1176.36**	**105.50**
Total State Sector-UP	**501.60**	**1707.00**	**1115**	**1176.36**	**105.50**
Total Uttar Pradesh	**501.60**	**1707.00**	**1115**	**1176.36**	**105.50**
UTTARAKHAND					
CENTRAL SECTOR					
NHPC					
Dhauliganga	280.00	1134.69	1100	1106.21	100.56
Tanakpur	94.20	452.19	450	452.89	100.64
Total NHPC-UK	**374.20**	**1586.88**	**1550**	**1559.10**	**100.59**
THDC LTD					
Tehri	1000.00	2797.00	2797	3172.08	113.41
Koteshwar	400.00	1155.00	1155	1223.84	105.96
Total THDC LTD	**1400.00**	**3952.00**	**3952**	**4395.92**	**111.23**
Total Central Sector - UK	**1774.20**	**5538.88**	**5502**	**5955.02**	**108.23**

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
STATE SECTOR					
UJVNL					
Chibro (Y.St.II)	240.00	750.00	750	809.53	107.94
Chilla	144.00	725.00	690	632.41	91.65
Dhakrani (Y.St.I)	33.75	169.00	120	147.48	122.90
Dhalipur (Y.St.I)	51.00	192.00	150	219.99	146.66
Khatima	41.40	208.00	180	232.25	129.03
Khodri (Y.St.II)	120.00	345.00	350	369.68	105.62
Kulhal (Y.St.IV)	30.00	164.00	125	146.55	117.24
Maneri Bhali-I	90.00	395.00	390	430.40	110.36
Maneri Bhali-II	304.00	1566.10	1150	1302.34	113.25
Ram Ganga	198.00	334.00	200	188.14	94.07
Total UJVNL	**1252.15**	**4848.10**	**4105**	**4478.76**	**109.10**
Total State Sector-Uttarakhand	**1252.15**	**4848.10**	**4105**	**4478.76**	**109.10**
PRIVATE SECTOR					
AHPC LTD					
Srinagar	330.00	1396.84	1250	1375.31	110.02
Jaiprakash Power Venture Ltd.					
Vishnu Prayag	400.00	1774.42	1700	1932.02	113.65
Total Private Sector - UK	**730.00**	**3171.26**	**2950**	**3307.32**	**112.11**
Total Uttarakhand	**3756.35**	**13558.24**	**12557**	**13741.10**	**109.43**
Total N. REGION	**19023.27**	**74338.26**	**70148**	**72401.41**	**103.21**
WESTERN REGION					
CHHATISGARH					
STATE SECTOR					
CSPGC					
Hasdeo Bango	120.00	245.00	225	243.08	108.04
Total CSPGC	**120.00**	**245.00**	**225**	**243.08**	**108.04**
Total State Sector-Chhatisgarh	**120.00**	**245.00**	**225**	**243.08**	**108.04**
Total Chhatisgarh	**120.00**	**245.00**	**225**	**243.08**	**108.04**

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
GUJARAT					
STATE SECTOR					
GSECL					
Kadana PSS	240.00	518.00	280	237.39	84.78
Ukai	300.00	1080.00	450	210.58	46.80
Total GSECL	**540.00**	**1598.00**	**730**	**447.97**	**61.37**
SSNNL					
Sardar Sarovar CHPH	250.00	213.00	920	594.84	64.66
Sardar Sarovar RBPH	1200.00	3635.00	1340	0.00	0.00
Total SSNNL	**1450.00**	**3848.00**	**2260**	**594.84**	**26.32**
Total State Sector -Gujarat	**1990.00**	**5446.00**	**2990**	**1042.81**	**34.88**
Total Gujarat	**1990.00**	**5446.00**	**2990**	**1042.81**	**34.88**
MADHYA PRADESH					
CENTRAL					
NHDC					
Indira Sagar	1000.00	1980.00	1620	1308.79	80.79
Omkareshwar	520.00	1166.57	826	612.04	74.10
Total NHDC	**1520.00**	**3146.57**	**2446**	**1920.83**	**78.53**
Total Central Sector-MP					
STATE SECTOR					
MPPGCL					
Bansagar Tons-I	315.00	900.00	900	578.35	64.26
Bansagar Tons-II	30.00	113.00	95	37.09	39.04
Bansagar Tons-III	60.00	143.00	110	85.32	77.56
Bargi	90.00	508.08	420	356.19	84.81
Gandhi Sagar	115.00	420.48	300	249.88	83.29
Madhikheda	60.00	74.12	70	88.99	127.13
Rajghat	45.00	87.60	70	80.02	114.31
Total MPPGPCL	**715.00**	**2246.28**	**1965**	**1475.84**	**75.11**
Total State-MP	**715.00**	**2246.28**	**1965**	**1475.84**	**75.11**
Total M.P.	**2235.00**	**5392.85**	**4411**	**3396.67**	**77.00**

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
MAHARASHTRA					
STATE SECTOR					
MAHAGENCO					
Bhira Tail Race	80.00	75.00	85	94.57	111.26
Ghatghar PSS	250.00	146.00	325	192.98	59.38
Koyna DPH	36.00	410.00	90	196.18	217.98
Koyna St.I&II	600.00	3030.00	775	1024.61	132.21
Koyna St.III	320.00		516	480.65	93.15
Koyna IV	1000.00		1320	1066.51	80.80
Tillari	60.00	133.00	110	110.96	100.87
Vaitarna	60.00	144.00	140	154.17	110.12
Total MAHAGENCO	**2406.00**	**3938.00**	**3361**	**3320.63**	**98.80**
MPPGPCL					
Pench	160.00	315.36	315	131.61	41.78
Total MPPGPCL-Maha.	**160.00**	**315.36**	**315**	**131.61**	**41.78**
Total State Sector-Maha.	**2566.00**	**4253.36**	**3676**	**3452.24**	**93.91**
PRIVATE SECTOR					
Dodson-Lindblom Hydro Power Pvt. Ltd. (DLHPPL)					
Bhandardhara - II	34.00	50.00	36	56.44	156.78
Total DLHP	**34.00**	**50.00**	**36**	**56.44**	**156.78**
Tata Power Company Ltd.					
Bhira	150.00	775.00	825	351.02	110.28
Bhira PSS	150.00			558.77	
Bhivpuri	75.00	220.00	250	315.90	126.36
Khopoli	72.00	225.00	225	342.49	152.22
Total TPCL	**447.00**	**1220.00**	**1300**	**1568.18**	**120.63**
Total Private Sector-Maha.	**481.00**	**1270.00**	**1336**	**1624.62**	**121.60**
Total Maharashtra	**3047.00**	**5523.36**	**5012**	**5076.86**	**101.29**
Total Western	**7392.00**	**16607.21**	**12638**	**9759.42**	**77.22**

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
SOUTHERN REGION					
ANDHRA PRADESH					
STATE SECTOR					
APGENCO					
N.J.Sagar TPD	50.00	177.00	90	49.92	55.47
N.J.Sagar RBC	90.00	156.00	90	101.55	112.83
Srisailam RB	770.00	2900.00	945	551.07	58.31
Upper sileru I & II	240.00	529.00	410	476.34	116.18
Lower Sileru	460.00	1070.00	1000	1094.06	109.41
Total APGENCO	**1610.00**	**4832.00**	**2535**	**2272.94**	**89.66**
Total State Sector-AP	**1610.00**	**4832.00**	**2535**	**2272.94**	**89.66**
Total Andhra Pradesh	**1610.00**	**4832.00**	**2535**	**2272.94**	**89.66**
KARNATAKA					
STATE SECTOR					
KPCL					
Almatti Dam	290.00	483.00	425	408.42	96.10
Bhadra	26.00	123.00	45	55.21	122.69
Gerusoppa	240.00	622.00	475	525.67	110.67
Ghatprabha	32.00	131.00	70	80.67	115.24
Jog	139.20	118.00	235	194.44	82.74
Kadra	150.00	570.00	240	375.85	156.60
Kalinadi	855.00	3385.00	2225	2777.85	124.85
Supa DPH	100.00	542.00	350	596.16	170.33
Kodasali	120.00	512.00	250	345.56	138.22
Lingnamakki	55.00	254.00	200	252.53	126.27
Munirabad	28.00	66.00	90	89.42	99.36
Sharavathy	1035.00	4932.00	3790	4786.18	126.28
Shivasamudram	42.00	183.00	225	284.19	126.31
Varahi	460.00	1060.00	970	1243.79	128.23
Total KPCL	**3572.20**	**12981.00**	**9590**	**12015.94**	**125.30**

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
APGENCO					
T.B.Dam & Hampi	72.00	236.00	150	171.75	114.50
Total APGENCO-Karnataka	**72.00**	**236.00**	**150**	**171.75**	**114.50**
Total State Sector-Karnataka	**3644.20**	**13217.00**	**9740**	**12187.69**	**125.13**
Total Karnataka	**3644.20**	**13217.00**	**9740**	**12187.69**	**125.13**
KERALA					
STATE SECTOR					
KSEB Ltd.					
Idamalayar	75.00	380.00	290	345.50	119.14
Idukki	780.00	2398.00	1920	2920.43	152.11
Kakkad	50.00	262.00	170	221.66	130.39
Kuttiadi & Kuttiady Addl.	225.00	323.00	570	693.38	121.65
Lower Periyar	180.00	493.00	460	525.18	114.17
Neriamangalam	45.00	237.00	270	377.85	139.94
Pallivasal	37.50	284.00	190	185.25	97.50
Panniar	30.00	158.00	115	114.59	99.64
Poringalkuthu	32.00	170.00	120	94.60	78.83
Sabarigiri	300.00	1338.00	1075	1516.40	141.06
Sengulam	48.00	182.00	120	122.98	102.48
Sholayar	54.00	233.00	190	202.39	106.52
Total KSEB LTD.	**1856.50**	**6458.00**	**5490**	**7320.21**	**133.34**
Total State Sector-Kerala	**1856.50**	**6458.00**	**5490**	**7320.21**	**133.34**
Total Kerala	**1856.50**	**6458.00**	**5490**	**7320.21**	**133.34**
TAMIL NADU					
STATE SECTOR					
TANGEDCO					
Aliyar	60.00	175.00	140	48.57	34.69
Bhawani K Barrage-III	30.00	90.00	45	34.06	75.69
Bhawani K Barrage-II	30.00	100.00	50	77.16	154.32
Bhawani K Barrage-I	30.00	80.00	55	70.20	127.64
Kadamparai PSS	400.00	77.00	310	434.75	140.24
Kodayar I&II	100.00	165.00	195	194.08	99.53

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Kundah I-V	555.00	1387.00	1060	1608.99	151.79
Lower Mettur I-IV	120.00	252.00	195	220.32	112.98
Mettur Dam	50.00	541.00	80	147.96	184.95
Mettur Tunnel	200.00		230	440.59	191.56
Moyar	36.00	115.00	100	161.99	161.99
Papanasam	32.00	105.00	105	120.91	115.15
Parson's Valley	30.00	53.00	25	45.94	183.76
Periyar	161.00	409.00	360	703.00	195.28
Pykara	59.20	274.00	40	22.05	55.13
Pykara Ultimate	150.00	30.00	250	507.96	203.18
Sarkarpathy	30.00	162.00	105	129.65	123.48
Sholayar I	70.00	254.00	145	220.86	152.32
Suruliyar	35.00	79.00	80	92.55	115.69
Total TANGEDCO	**2178.20**	**4348.00**	**3570**	**5281.59**	**147.94**
Total State Sector-TN	**2178.20**	**4348.00**	**3570**	**5281.59**	**147.94**
Total Tamil Nadu	**2178.20**	**4348.00**	**3570**	**5281.59**	**147.94**
TELANGANA					
STATE SECTOR					
TSGENCO					
Lower Jurala	240.00	534.43	110	153.31	139.37
N.J.Sagar PSS	815.60	2237.00	1120	338.82	30.25
N.J.Sagar LBC	60.00	104.00	55	53.30	96.91
Pochampad	36.00	147.00	60	31.70	52.83
Priyadarshni Jurala	234.00	404.00	160	165.00	103.13
Pulichinthala	120.00	219.42	10	17.30	173.00
Srisailam LB	900.00	1400.00	1150	985.18	85.67
Total TSGENCO	**2405.60**	**5045.85**	**2665**	**1744.61**	**65.46**
Total State Sector-Telangana	**2405.60**	**5045.85**	**2665**	**1744.61**	**65.46**
Total Telangana	**2405.60**	**5045.85**	**2665**	**1744.61**	**65.46**
Total Southern	**11694.50**	**33900.85**	**24000**	**28807.04**	**120.03**

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
EASTERN REGION					
JHARKHAND					
CENTRAL SECTOR					
DVC					
Panchet	80.00	237.00	105	79.79	75.99
Total DVC	**80.00**	**237.00**	**105**	**79.79**	**75.99**
Total Central Sector-Jharkhand	**80.00**	**237.00**	**105**	**79.79**	**75.99**
STATE SECTOR					
JUUNL					
Subernarekha I&II	130.00	149.00	110	101.19	91.99
Total Jharkhand	**130.00**	**149.00**	**110**	**101.19**	**91.99**
Total State Sector-Jharkhand	**130.00**	**149.00**	**110**	**101.19**	**91.99**
Total Jharkhand	**210.00**	**386.00**	**215**	**180.98**	**84.18**
ODISHA					
STATE SECTOR					
OHPC					
Balimela	510.00	1183.00	1110	1732.21	156.05
Hirakud I&II	347.50	1174.00	750	548.58	73.14
Rengali	250.00	525.00	690	837.89	121.43
Upper Indravati	600.00	1962.00	1870	2141.84	114.54
Upper Kolab	320.00	832.00	720	923.25	128.23
Total OHPC	**2027.50**	**5676.00**	**5140**	**6183.77**	**120.31**
APGENCO					
Machkund	114.75	670.00	424	593.68	140.02
Total APGENCO-Odisha	**114.75**	**670.00**	**424**	**593.68**	**140.02**
Total State Sector-Odisha	**2142.25**	**6346.00**	**5564**	**6777.45**	**121.81**
Total Odisha	**2142.25**	**6346.00**	**5564**	**6777.45**	**121.81**
SIKKIM					
CENTRAL SECTOR					
NHPC					
Rangit	60.00	338.61	340	349.09	102.67

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Teesta-V	510.00	2572.70	2670	2701.46	101.18
Total NHPC	**570.00**	**2911.31**	**3010**	**3050.55**	**101.35**
Total Central Sector-Sikkim	**570.00**	**2911.31**	**3010**	**3050.55**	**101.35**
STATE SECTOR					
Teesta Urja Ltd. (TUL)					
Teesta III	1200.00	5214.00	4000	4258.40	106.46
Total TUL	**1200.00**	**5214.00**	**4000**	**4258.40**	**106.46**
Total State Sector-Sikkim	**1200.00**	**5214.00**	**4000**	**4258.40**	**106.46**
PRIVATE SECTOR					
DANS Energy Pvt. Ltd. (DEPL)					
Jorethang Loop	96.00	459.02	390	409.75	105.06
Shiga Energy Pvt. Ltd.(SEPL)					
Tashiding	97.00	425.05	300	423.73	141.24
Gati Infrastructure Pvt. Ltd. (GIPL)					
Chuzachen HEP	110.00	537.81	400	417.40	104.35
Sneha Kinetic					
Dikchu	96.00	431.00	300	462.24	154.08
Total Private-Sikkim	**399.00**	**1852.88**	**1390**	**1713.12**	**123.25**
Total Sikkim	**2169.00**	**9978.19**	**8400**	**9022.07**	**107.41**
WEST BENGAL					
CENTRAL SECTOR					
NHPC					
Teesta Low Dam-III	132.00	594.00	540	572.06	105.94
Teesta Low Dam-IV	160.00	719.67	710	708.45	99.78
Total NHPC	**292.00**	**1313.67**	**1250**	**1280.51**	**102.44**
DVC					
Maithon	63.20	137.00	100	101.36	101.36
Total DVC-WB	**63.20**	**137.00**	**100**	**101.36**	**101.36**
Total Central Sector-WB	**355.20**	**1450.67**	**1350**	**1381.87**	**102.36**
STATE SECTOR					
WBSEDCL					
Jaldhaka I	36.00	169.60	135	197.04	145.96

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Purulia PSS	900.00	1235.00	900	1103.97	122.66
Rammam II	50.00	209.00	215	236.93	110.20
Total WBSEDCL	**986.00**	**1613.60**	**1250**	**1537.94**	**123.04**
Total State Sector -WB	**986.00**	**1613.60**	**1250**	**1537.94**	**123.04**
Total West Bengal	**1341.20**	**3064.27**	**2600**	**2919.81**	**112.30**
Total Eastern	**5862.45**	**19774.46**	**16779**	**18900.31**	**112.64**
NORTH EASTERN REGION					
ARUNACHAL PRADESH					
CENTRAL SECTOR					
NEEPCO					
Ranganadi	405.00	1509.66	1250	1051.85	84.15
Pare	110.00	506.42	402	347.16	86.36
Kameng*			1472	0.00	0.00
Total NEEPCO-Arunachal	**515.00**	**2016.08**	**3124**	**1399.01**	**44.78**
Total Central Sector-Arunachal					
Total Arunachal	**515.00**	**2016.08**	**3124**	**1399.01**	**44.78**
ASSAM					
CENTRAL SECTOR					
NEEPCO					
Kopili	200.00	1186.14	745	1117.82	150.04
Khandong	50.00	363.95	293	203.82	69.56
Total NEEPCO-Aassm	**250.00**	**1550.09**	**1038**	**1321.64**	**127.33**
Total Central Sector-Assam	**250.00**	**1550.09**	**1038**	**1321.64**	**127.33**
STATE SECTOR					
APGCL					
Karbi Langpi	100.00	390.00	300	372.72	124.24
Total APGCL	**100.00**	**390.00**	**300**	**372.72**	**124.24**
Total State Sector-Assam	**100.00**	**390.00**	**300**	**372.72**	**124.24**
Total Assam	**350.00**	**1940.09**	**1338**	**1694.36**	**126.63**

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
NAGALAND					
CENTRAL SECTOR					
NEEPCO					
Doyang	75.00	227.24	227	231.47	101.97
Total NEEPCO-Nagaland	**75.00**	**227.24**	**227**	**231.47**	**101.97**
Total Central Sector-Nagaland	**75.00**	**227.24**	**227**	**231.47**	**101.97**
Total Nagaland	**75.00**	**227.24**	**227**	**231.47**	**101.97**
MANIPUR					
CENTRAL SECTOR					
NHPC					
Loktak	105.00	448.00	600	602.61	100.44
Total NHPC-Manipur	**105.00**	**448.00**	**600**	**602.61**	**100.44**
Total Central Sector-Manipur	**105.00**	**448.00**	**600**	**602.61**	**100.44**
Total Manipur	**105.00**	**448.00**	**600**	**602.61**	**100.44**
MEGHALAYA					
STATE SECTOR					
MePGCL					
Kyrdemkulai	60.00	118.00	112	134.84	120.40
Myntdu	126.00	128.00	380	362.95	95.51
New Umtru	40.00	235.00	170	180.03	105.90
Umium St.I	36.00	324.00	90	85.11	94.57
Umium St.IV	60.00	372.69	180	166.60	92.56
Total MePGCL	**322.00**	**1177.69**	**932**	**929.53**	**99.74**
Total State Sector-Meghalaya	**322.00**	**1177.69**	**932**	**929.53**	**99.74**
Total Meghalaya	**322.00**	**1177.69**	**932**	**929.53**	**99.74**

REGION / UTILITY/ STATION-WISE GENERATION PERFORMANCE OF H.E. STATIONS IN THE COUNTRY DURING THE YEAR 2018-19

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2019	DESIGN ENERGY	2018-19		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
MIZORAM					
CENTRAL SECTOR					
Tuirial	60.00	250.63	214	168.44	78.71
Total NEEPCO-Mizoram	**60.00**	**250.63**	**214**	**168.44**	**78.71**
Total Central Sector-Mizoram	**60.00**	**250.63**	**214**	**168.44**	**78.71**
Total Mizoram	**60.00**	**250.63**	**214**	**168.44**	**78.71**
Total N.Eastern	**1427.00**	**6059.73**	**6435**	**5025.42**	**78.10**
Total All India	**45399.22**	**150680.51**	**130000**	**134893.61**	**103.76**
IMPORT FROM BHUTAN			**5000**	**4406.62**	**88.13**
Total All India (Including Bhutan Imports)	**45399.22**	**150680.51**	**135000**	**139300.23**	**103.19**
*** Stations Targetted but not Commissioned during 2018-19**					

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. The excess water during monsoon period after generation, is stored in these reservoirs which is utilized to augment flows during non-monsoon period. 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 in the interest of power generation while the mmultipurpose storage schemes are operated for more than one purpose with irrigation, water supply, flood control, pisciculture, navigation, etc. as primary objectives and power generation as incidental. Reservoir based schemes afford greater utilization of the available inflows approaching to long term average inflows resulting in greater firm power benefits. These 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 44 H.E. Stations of aggregate installed capacity of 18232.35 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)	594	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)		**4585**				

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	150	TPCL	Maharashtra	Bhira	MP
20	Bhira PSS	150				
Sub-Total (WR)		**4771**				
	Southern Region					
21	Upper Sileru	240	APGENCO	Andhra Pradesh	Sileru	S
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	275.50	OHPC	Odisha	Hirakud	MP
39	Hirakud II	72				
40	Balimela	510	OHPC	Odisha	Balimela	MP
41	Indravati	600	OHPC	Odisha	Indravati	MP
42	Upper Kolab	320	OHPC	Odisha	Upper Kolab	MP
43	Rengali	250	OHPC	Odisha	Rengali	MP
44	Loktak	105	NHPC	Manipur	Loktak	MP
Sub-Total (ER/NER)		**2247.25**				
Total (All India)		**18232.35**				

Salient details of 37 Nos. major reservoirs are indicated in **Annex-3.1**. These stations constitute about 40.16% (31.95% Multipurpose & 8.21% Storage for power only) of the total hydel installed capacity and generated about 33.39% (23.28% Multipurpose & 10.11% Storage for power only) of the total Hydel generation during 2018-19 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)	14505	3728	27167	45399
	Percentage of Total (%)	31.95	8.21	59.84	100
2.	Energy Generation (MU)	31397	13644	89852	134894
	Percentage of Total (%)	23.28	10.11	66.61	100

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 2018-19 vis-à-vis 2017-18 are given at **Exhibit 3.1**. Inflows into the reservoirs and generation during the year 2018-19 vis-à-vis 2017-18 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)	2017-18 (MCM)	2018-19 (MCM)	2018-19 Inflow as % of 2017-18 inflow	10 years Average (MU)	2017-18 (MU)	2018-19 (MU)	2018-19 generation as compared to 2017-18 (%)
1	2	3	4	5	6= (5/4*100)	7	8	9	10= (9/8*100)
Northern Region									
1	Bhakra	17369	17279	16326	94.48	5426	5134	4238	82.55
2	Pong	8843	8805	10096	114.66	1530	1642	1513	92.14
3	Ranjit Sagar	6298	6312	6763	107.14	1614	1803	1455	80.70
4	Chamera-I*	6156	6404	6339	103.27	2380	2344	2485	106.02
5	Tehri	7378	6967	7148	102.59	3190	3081	3172	102.95
6	Ram Ganga	3359	16289	1571	9.64	293	251	188	74.90
7	RP Sagar	4127	3703	0	0.00	360	378	334	88.36
8	Rihand	5119	5302	4841	91.30	528	834	562	67.39
Sub Total (NR)		**58648**	**70796**	**53084**	**74.98**	**15322**	**15467**	**13947**	**90.17**
Western Region									
9	Ukai	7229	2409	2687	111.58	503	304	211	69.41
10	Sardar Sarovar	28585	8822	10480	118.80	2569	377	0	0.00
11	Gandhi Sagar	4220	1746	2085	119.42	266	351	250	71.23
12	Bansagar*	4677	2464	5629	228.43	78	69	85	123.19
13	Pench*	987	556	457	82.09	339	160	132	82.50
14	Indira Sagar	22922	7007	13734	196.00	2486	882	1309	148.41
15	Koyna	3535	3630	4425	121.90	2702	2132	2287	107.27
16	Bhira	907	1041	1087	104.43	850	892	910	102.02
Sub Total (WR)		**73062**	**27676**	**40585**	**146.64**	**9793**	**5166**	**5153**	**99.75**
	Southern Region								
17	Srisailam	18783	13741	2301	97.20	1055	575	551	95.83
18	Upper Sileru*	2199	2368	4373	129.37	436	482	476	98.76

S. No.	STATION	Inflows				Generation			
		10 years Average (MCM)	2017-18 (MCM)	2018-19 (MCM)	2018-19 Inflow as % of 2017-18 inflow	10 years Average (MU)	2017-18 (MU)	2018-19 (MU)	2018-19 generation as compared to 2017-18 (%)
19	Lower Sileru*	3255	3380	16501	120.09	1095	1110	1094	98.56
20	N.J. Sagar	81411	8376	9810	117.12	782	184	339	184.24
21	Sharavathy	4520	3051	5537	181.47	4437	2722	4786	175.83
22	Supa	2668	1973	3234	163.91	2817	1828	3374	184.57
23	Almatti	12367	9348	14171	151.61	444	442	408	92.31
24	Varahi*	491	530	870	164.18	1017	762	1244	163.25
25	Idukki	1581	1683	2300	136.64	2161	1611	2920	181.25
26	Sabarigiri	874	1090	1396	128.11	1184	968	1516	156.61
27	Madupetty	216	328	137	41.68	208	188	185	98.40
28	Idamalayar	1124	218	2035	934.49	306	256	346	135.16
29	Mettur	5156	3158	10635	336.74	338	216	589	272.69
30	Periyar	576	428	1047	244.29	359	287	703	244.95
Sub Total (SR)		**135222**	**49672**	**76311**	**149.95**	**16639**	**11633**	**17504**	**150.47**
Eastern Region									
31	Machkund	1255	1218	1963	161.10	560	468	594	126.94
32	Hirakud	25715	15360	20964	136.49	879	863	549	63.56
33	Balimela	3530	3588	5771	160.87	1073	1477	1732	117.26
34	Indravati	3209	2153	3009	139.75	1874	1746	838	48.00
35	Upper Kolab	1981	1150	1982	172.40	641	707	2142	303.00
36	Rengali	9628	11550	9340	80.87	686	763	923	121.06
Sub Total (ER)		**43318**	**39361**	**41068**	**104.34**	**5712**	**6023**	**6777**	**112.53**
North Eastern Region									
37	Loktak	2242	4342	2522	58.09	571	838	603	71.96
Sub Total (NER)		**2242**	**4342**	**2522**	**58.09**	**571**	**838**	**603**	**71.96**
Total (All India)		**314491**	**187505**	**233570**	**113.90**	**48038**	**39126**	**45041**	**115.12**

* Only 4 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 at Chamera, Bansagar, Koyna, Bhira, Lower Sileru, Almatti, Sabirigiri, Madupetty, Idamalayar, Mettur, Periyar, Rengali and Loktak reservoirs during 2017-18. Month-wise maximum levels of major reservoirs during 2018-19 vis-à-vis 2017-18 are indicated at **Exhibits 3.2** to **Exhibits 3.11**.

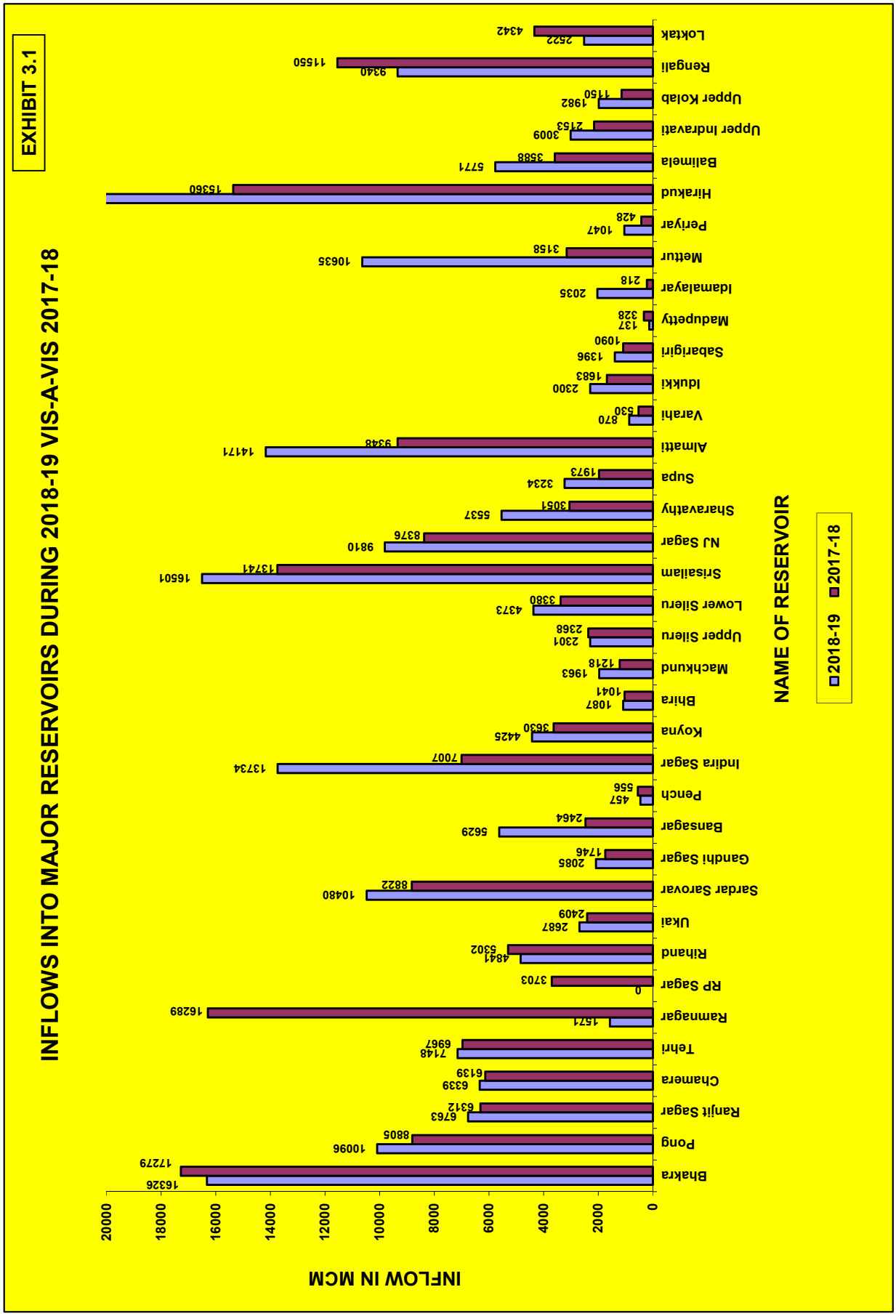


EXHIBIT 3.1
INFLOWS INTO MAJOR RESERVOIRS DURING 2018-19 VIS-A-VIS 2017-18
INFLOW IN MCM
NAME OF RESERVOIR
2018-19
2017-18
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
Bhakra 16326 17279
Pong 10096 8805
Ranjit Sagar 6763 6312
Chamera 6139 6339
Tehri 7148 6967
Ramnagar 1571 16289
RP Sagar 0 3703
Rihand 4841 5302
Ukai 2687 2409
Sardar Sarovar 8822 10480
Gandhi Sagar 2085 1746
Bansagar 2464 5629
Pench 457 556
Indira Sagar 7007 13734
Koyna 4425 3630
Bhira 1087 1041
Machkund 1963 1218
Upper Sileru 2301 2368
Lower Sileru 4373 3380
Srisailam 13741 16501
NJ Sagar 9810 8376
Sharavathy 5537 3051
Supa 3234 1973
Almatti 14171 9348
Varahi 870 530
Idukki 2300 1683
Sabarigiri 1396 1090
Madupetty 137 328
Idamalayar 2035 218
Mettur 10635 3158
Periyar 1047 428
Hirakud 15360
Balimela 5771 3588
Upper Indravati 3009 2153
Upper Kolab 1982 1150
Rengali 9340 11550
Loktak 2522 4342

EXHIBIT 3.2

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

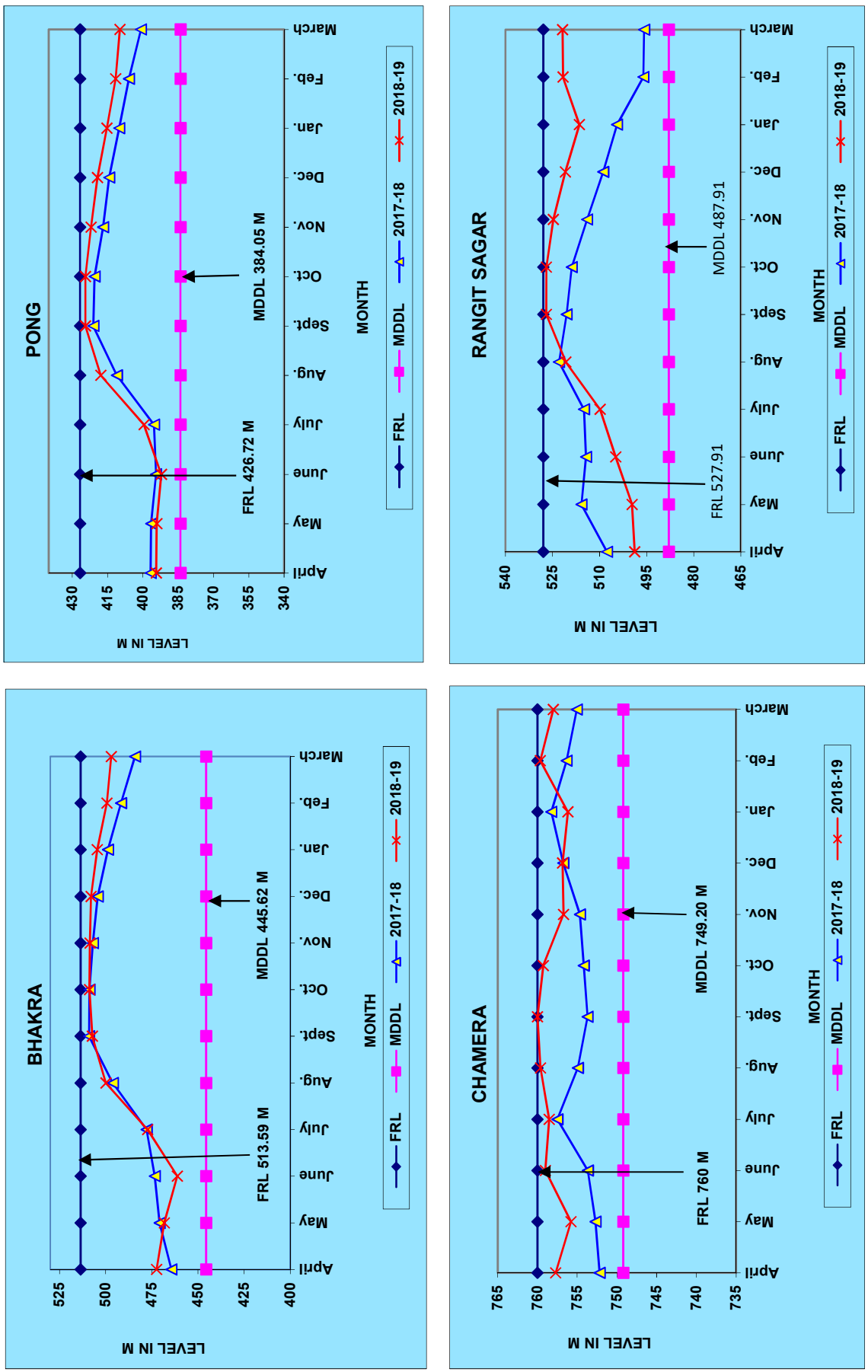
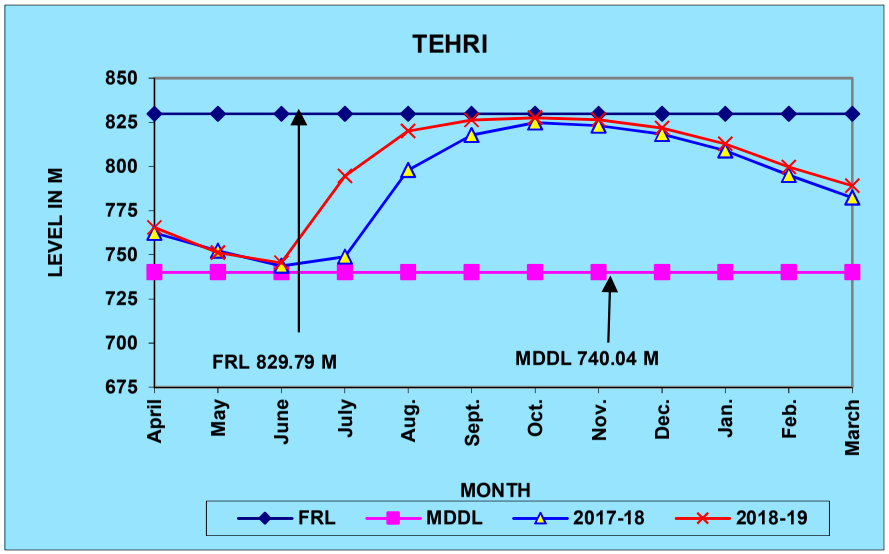
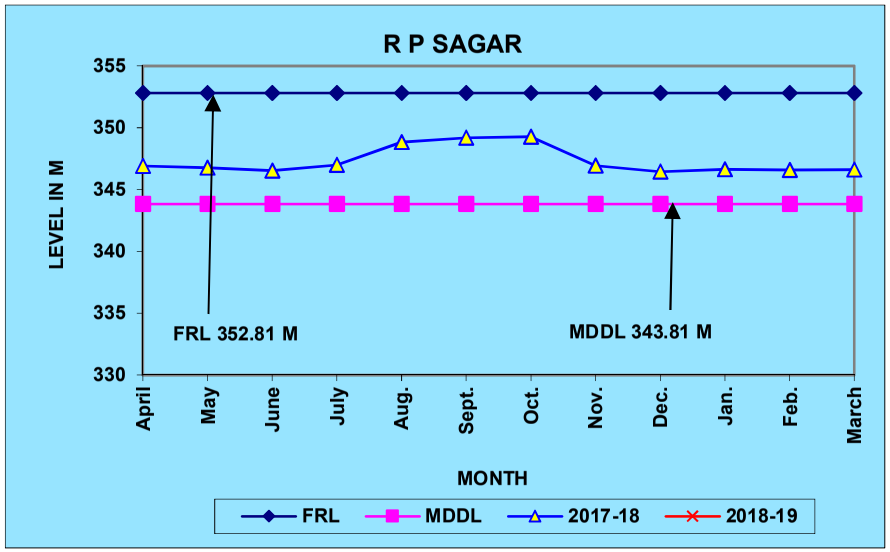
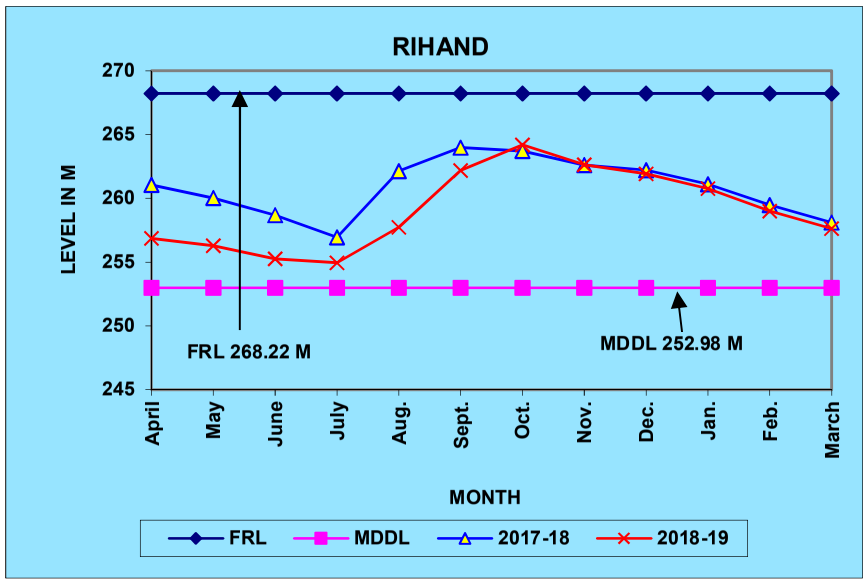


EXHIBIT 3.3

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







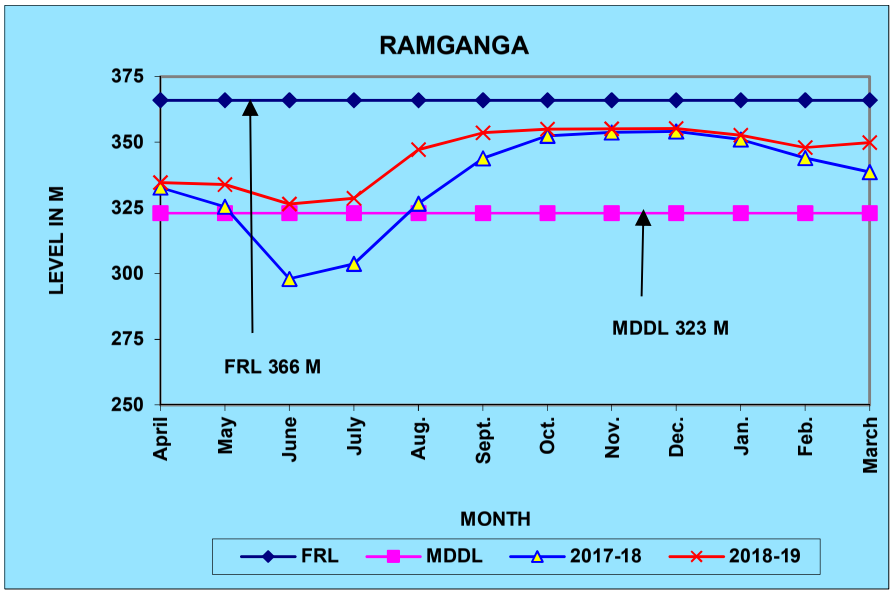
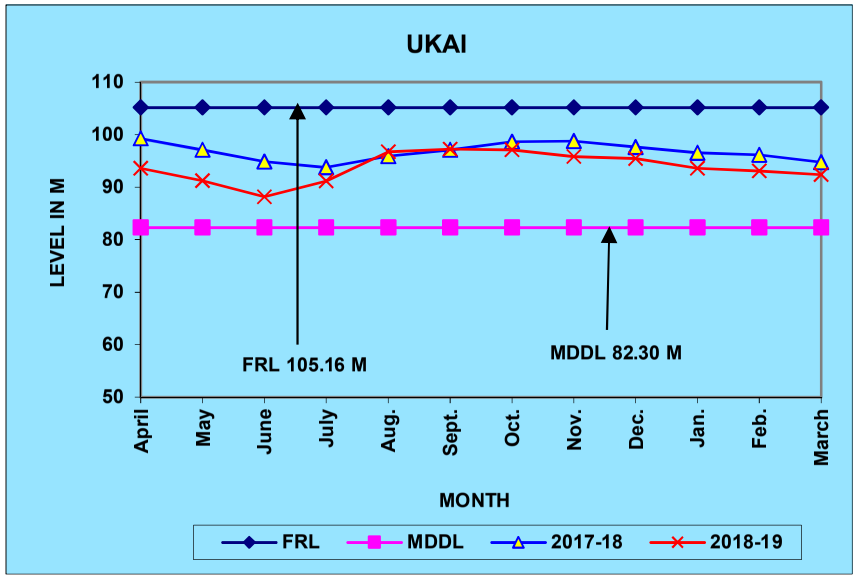
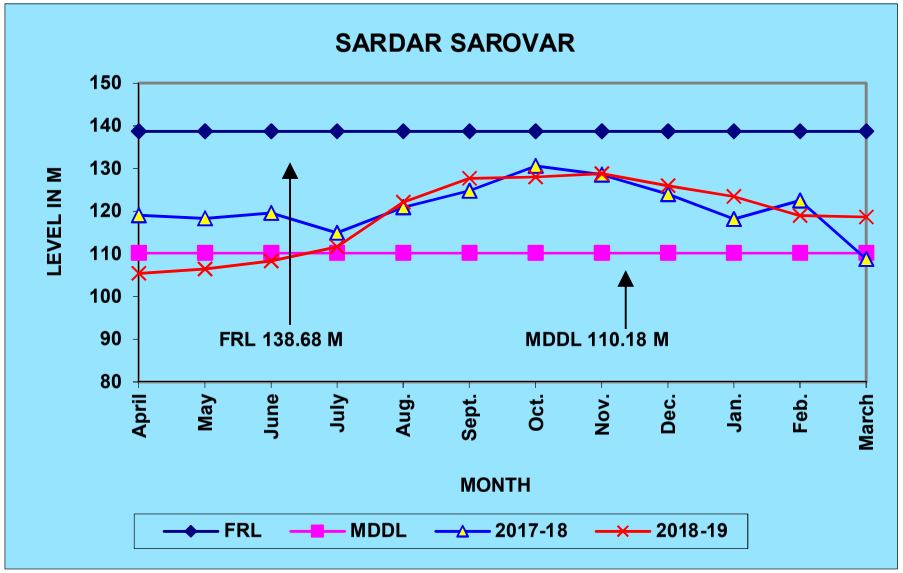
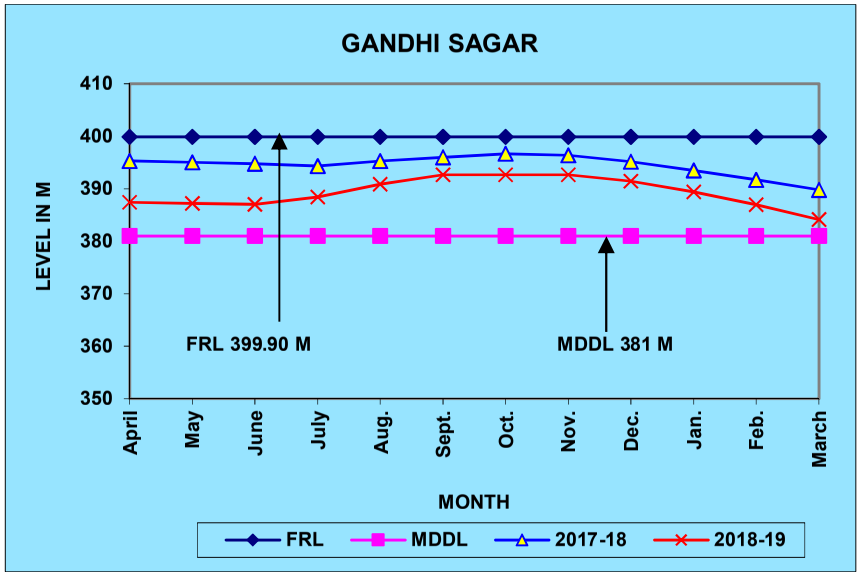


EXHIBIT 3.4

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







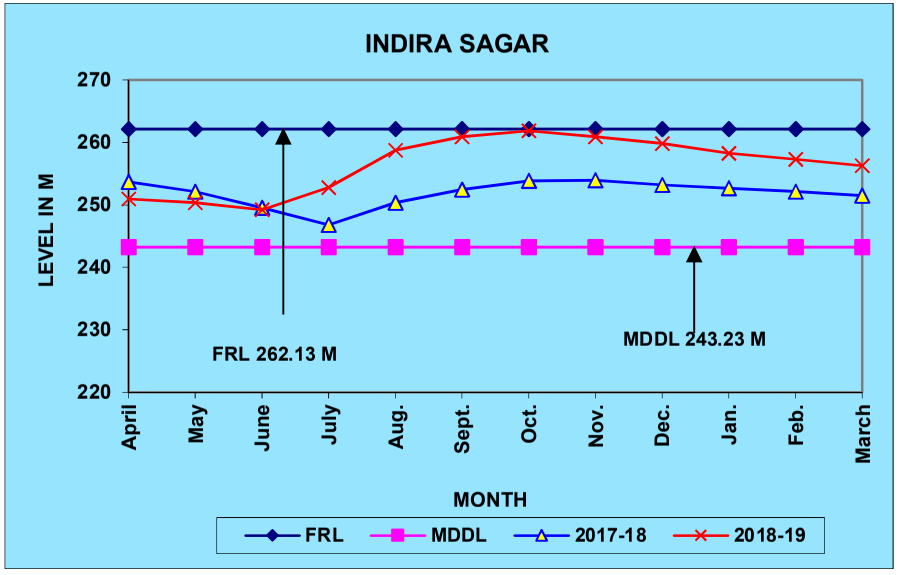


EXHIBIT 3.5

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

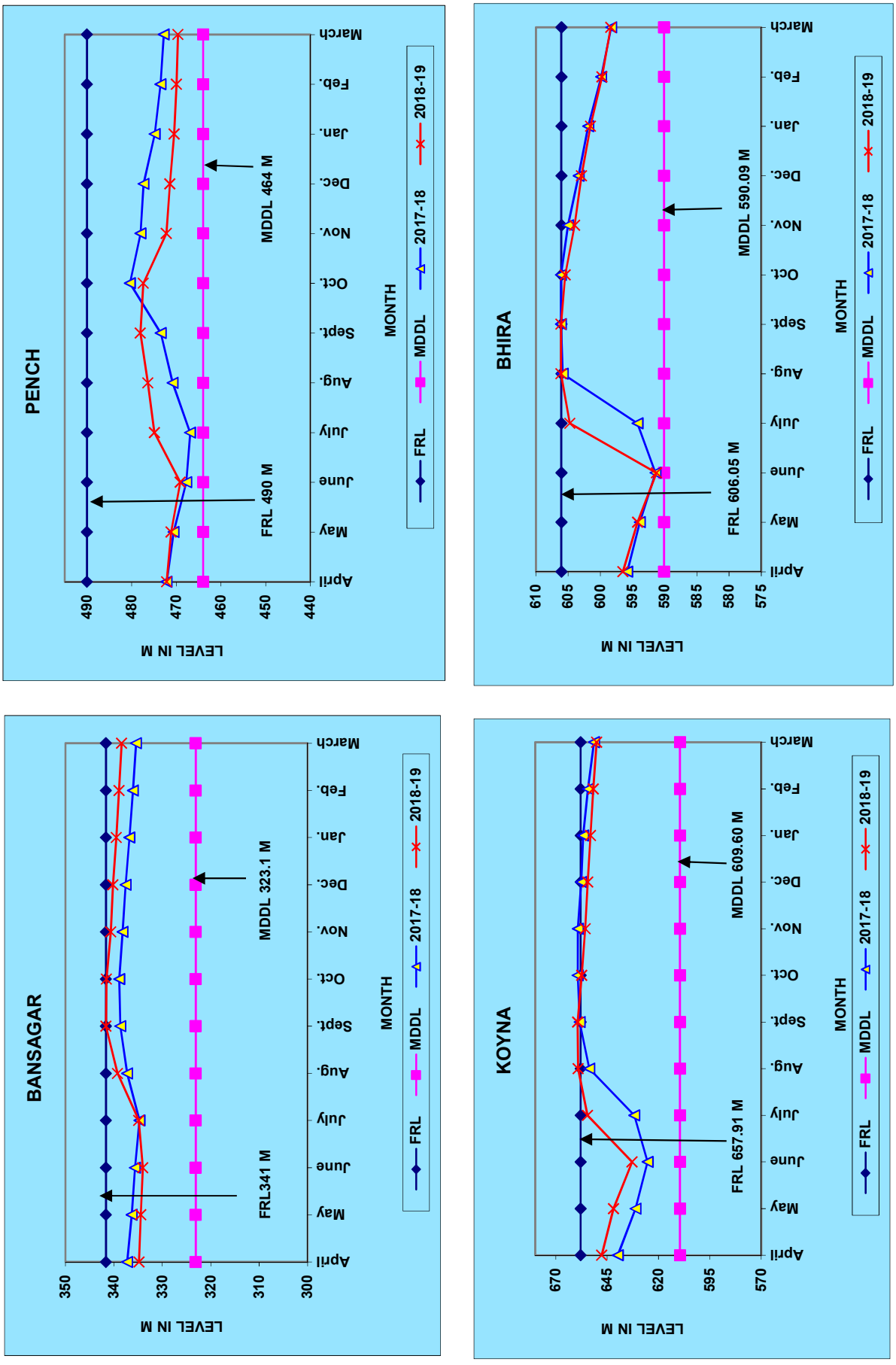
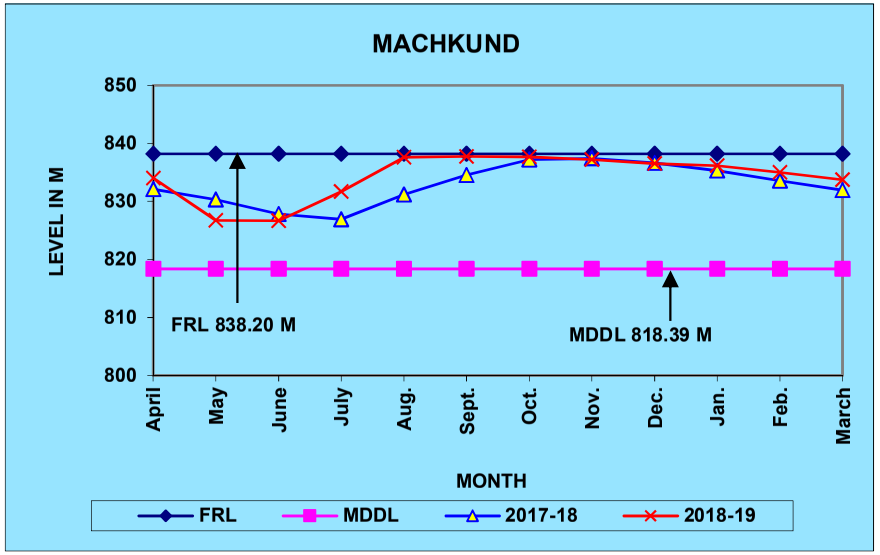
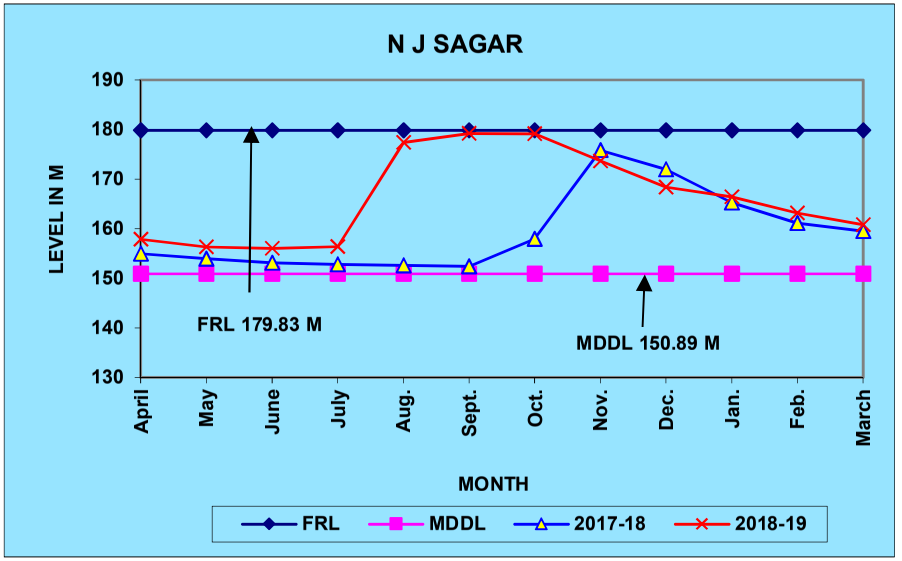
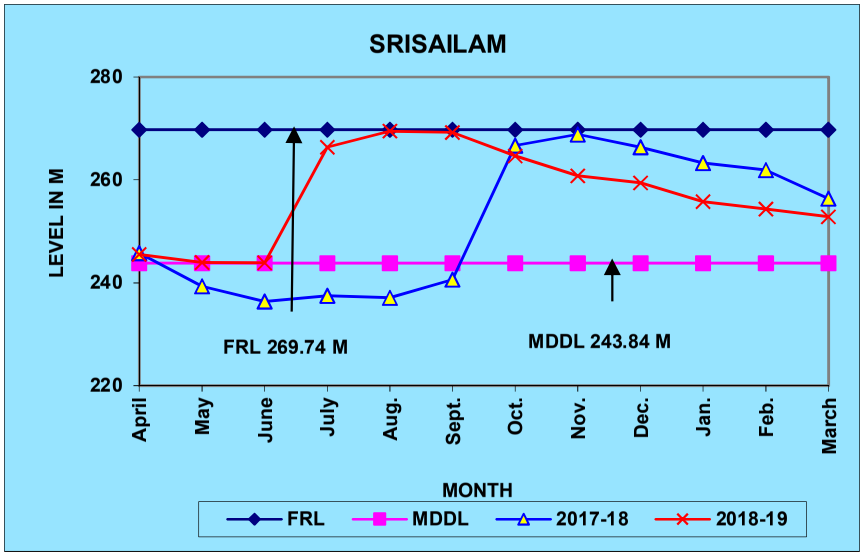


EXHIBIT 3.6

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







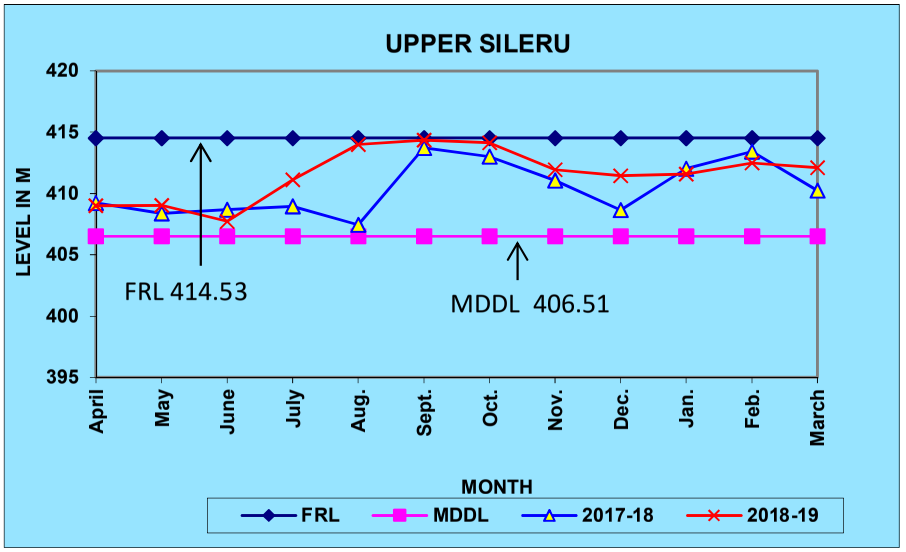
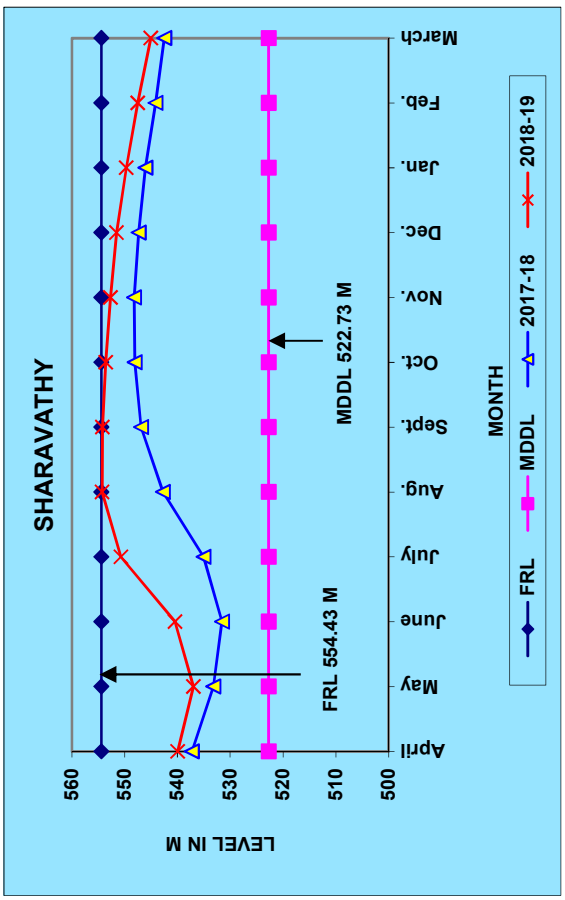
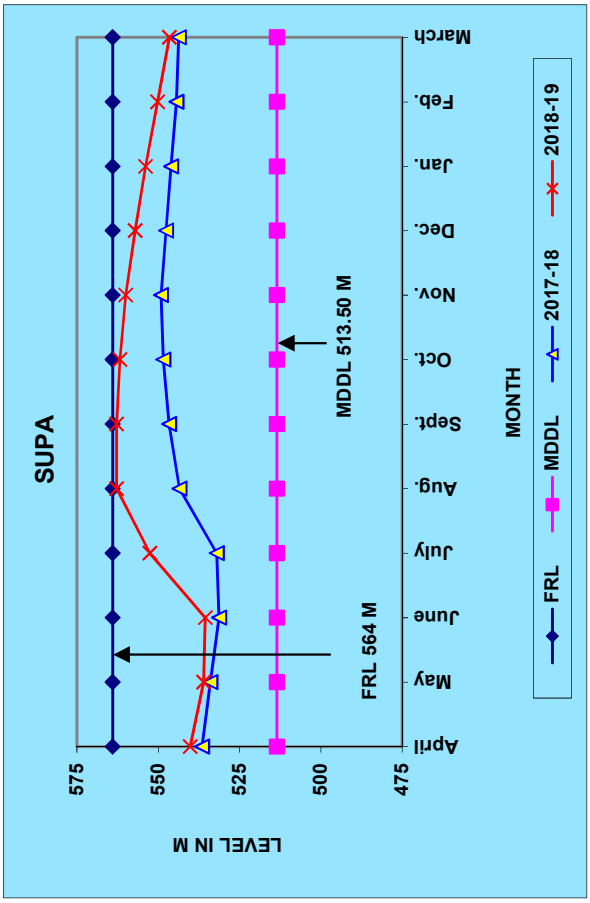
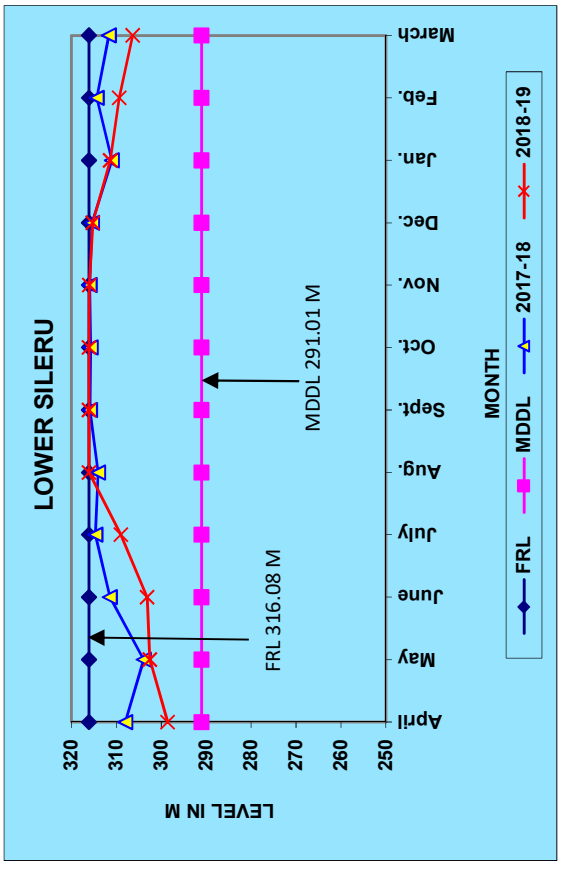


EXHIBIT 3.7

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







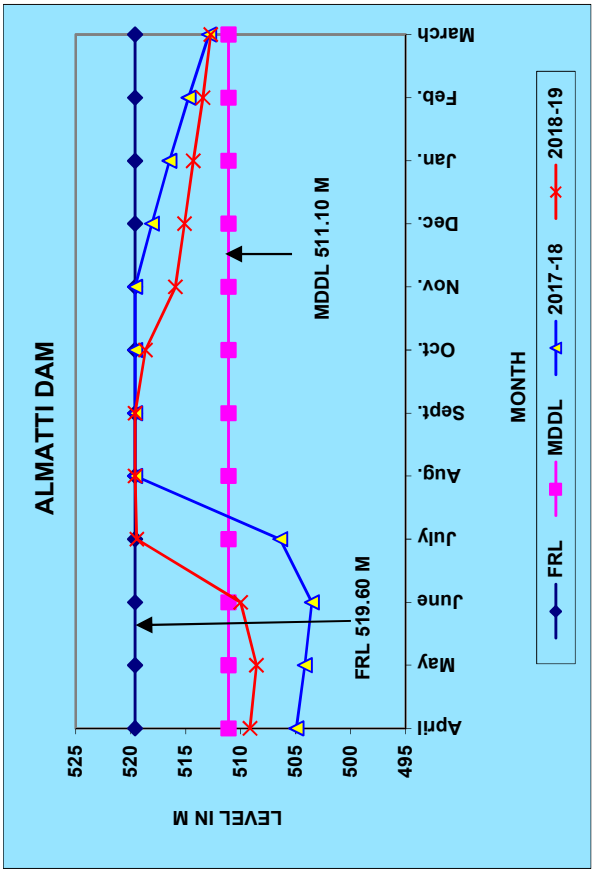
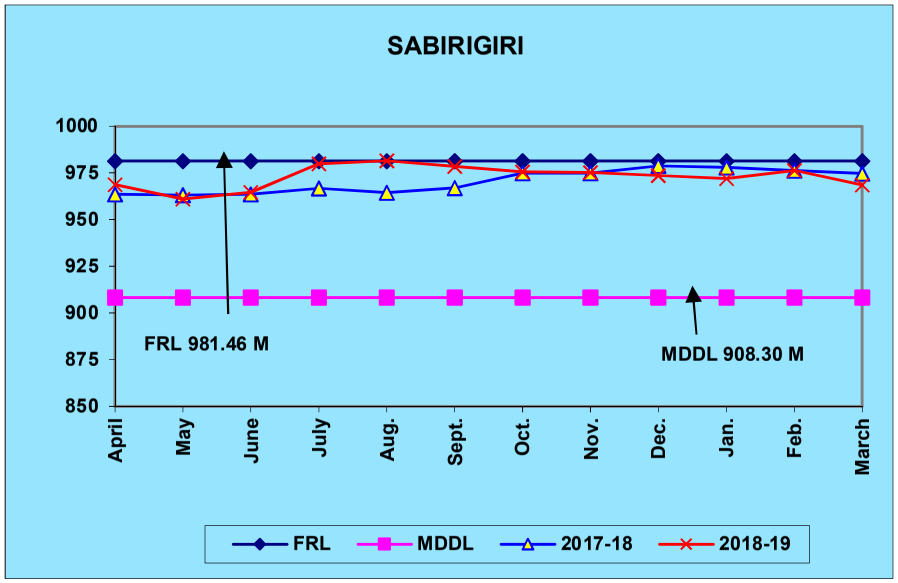
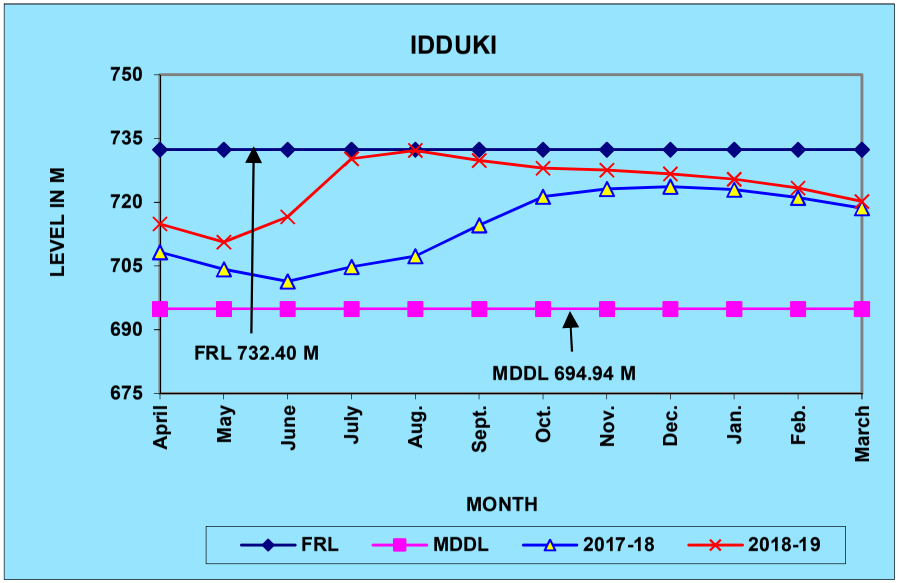
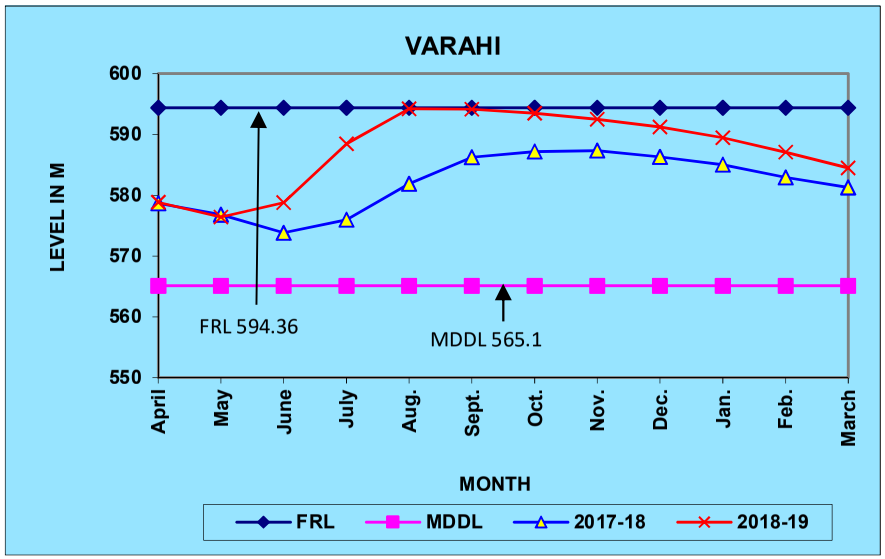


EXHIBIT 3.8

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







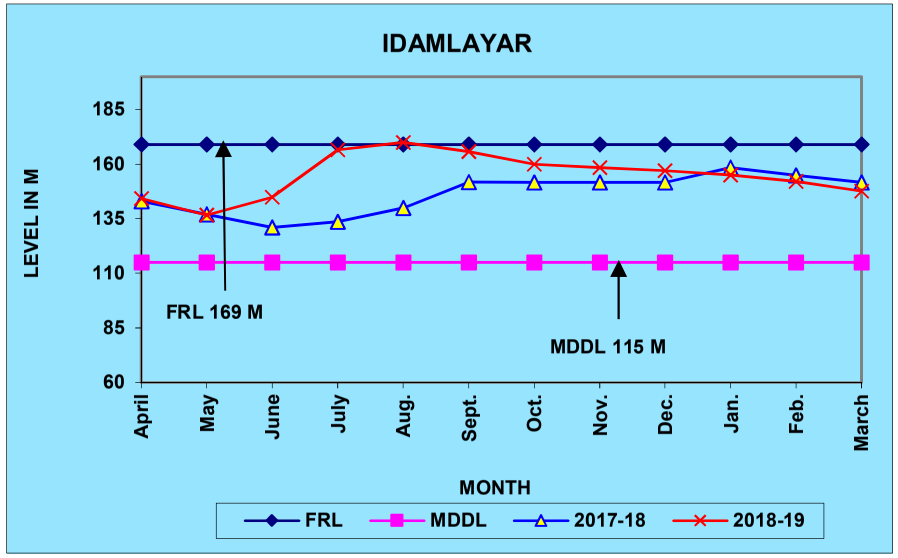
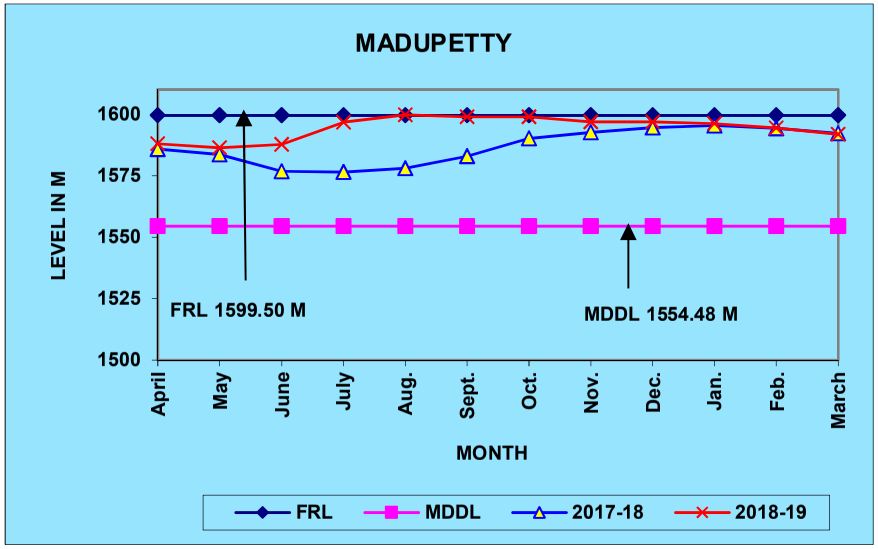
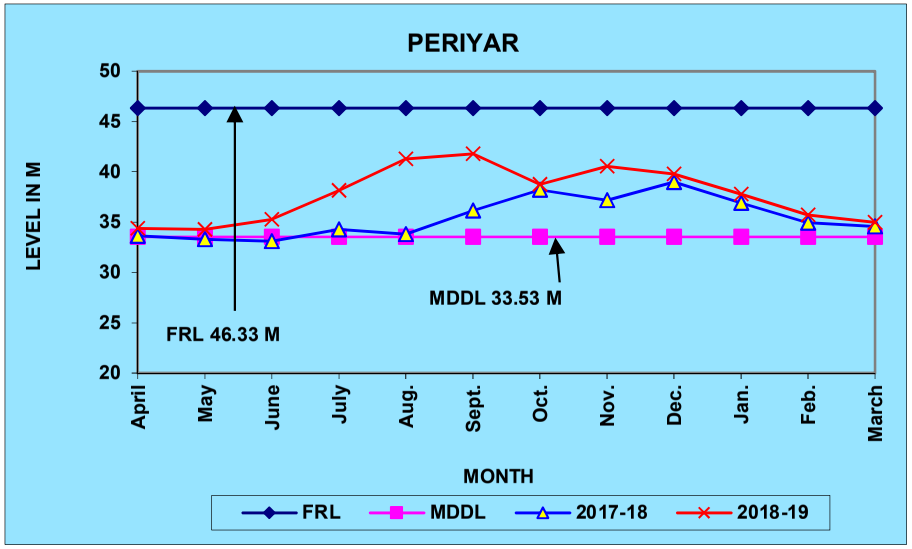
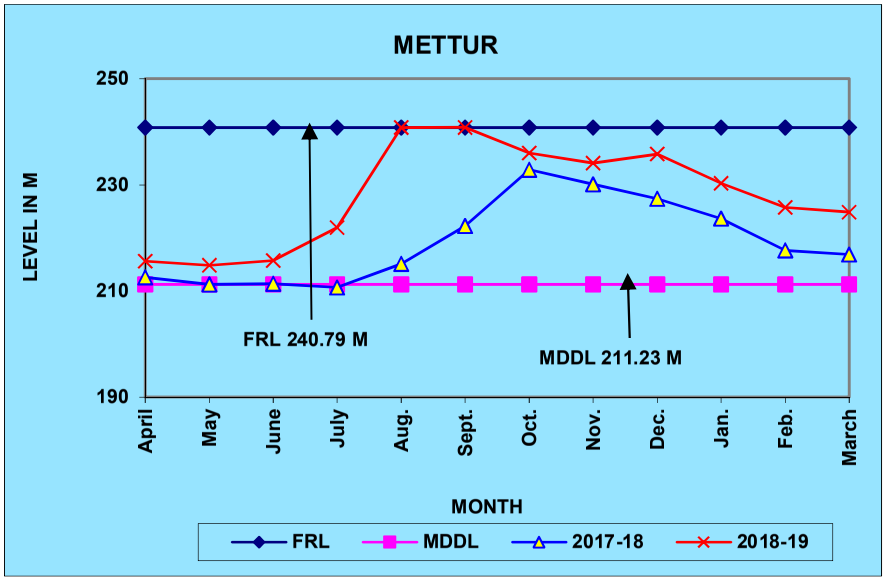


EXHIBIT 3.9

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







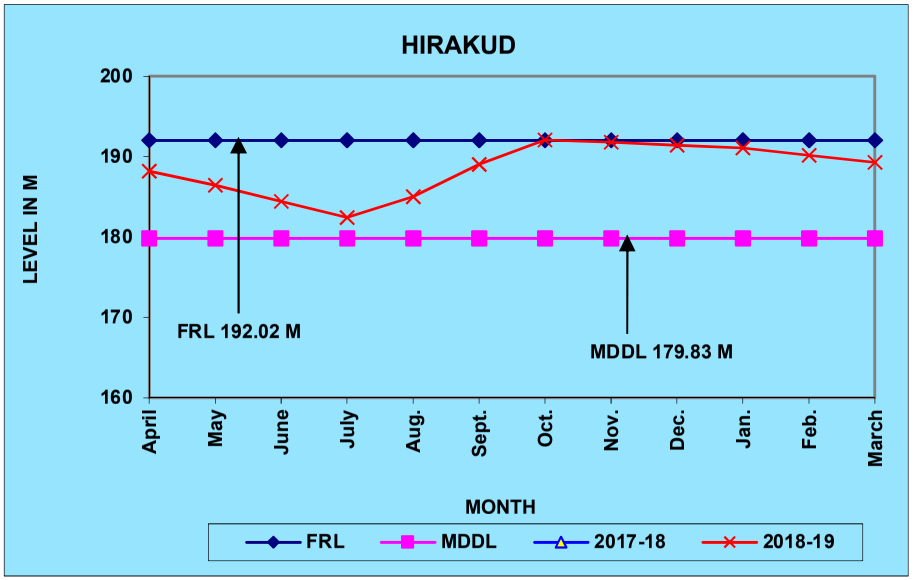
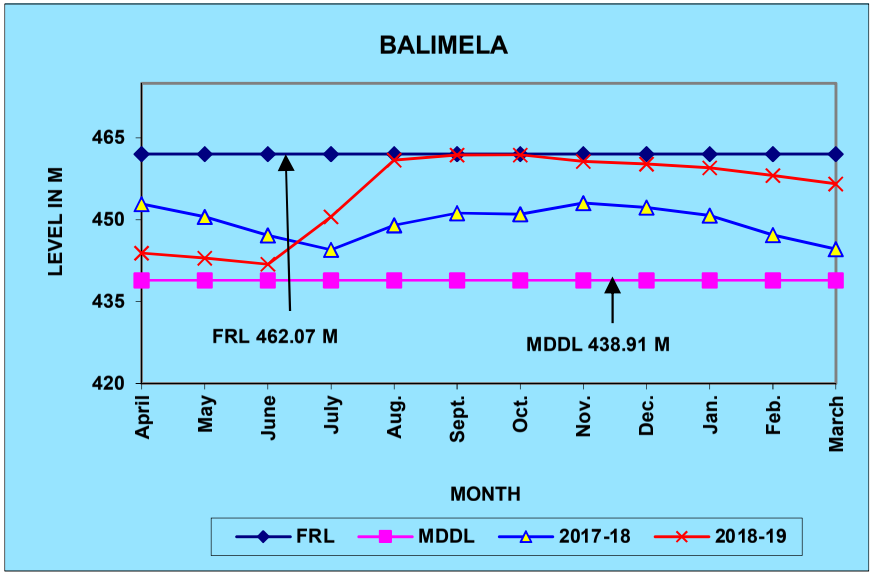
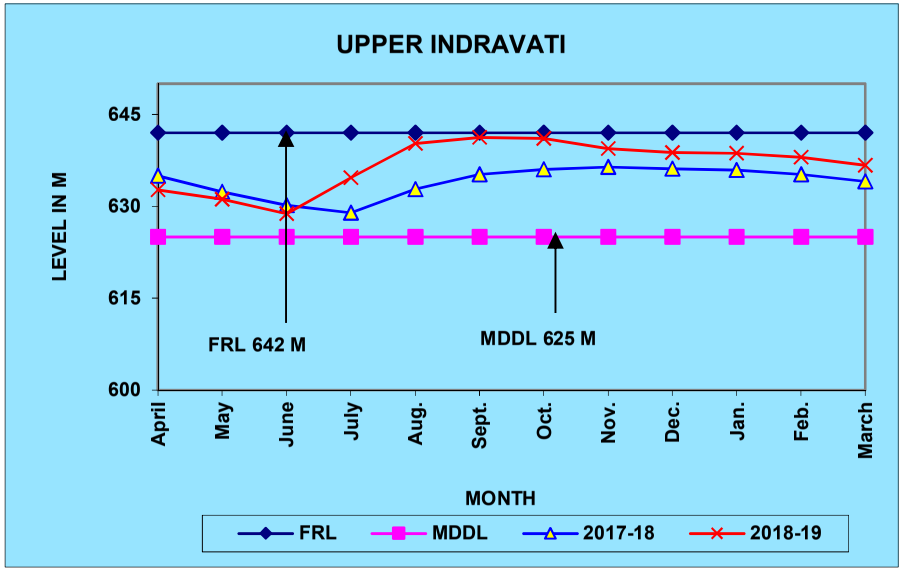
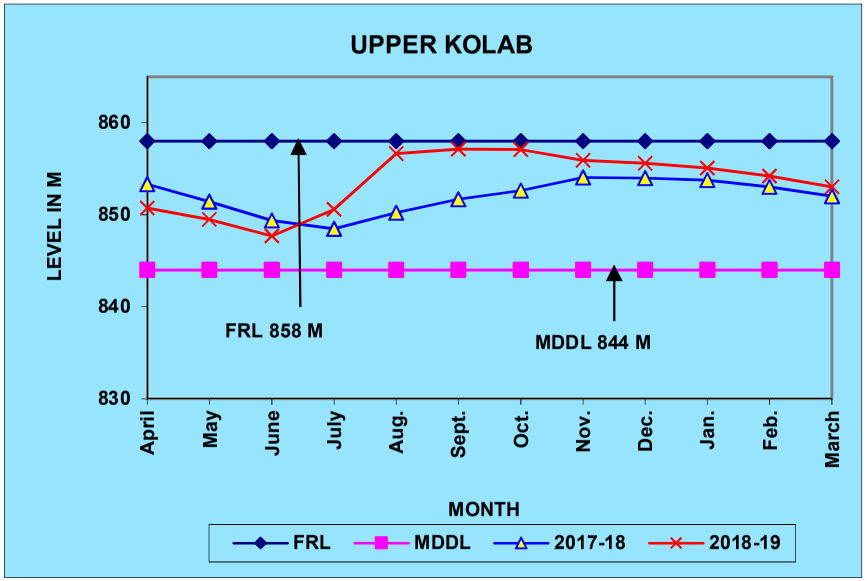


EXHIBIT 3.10

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







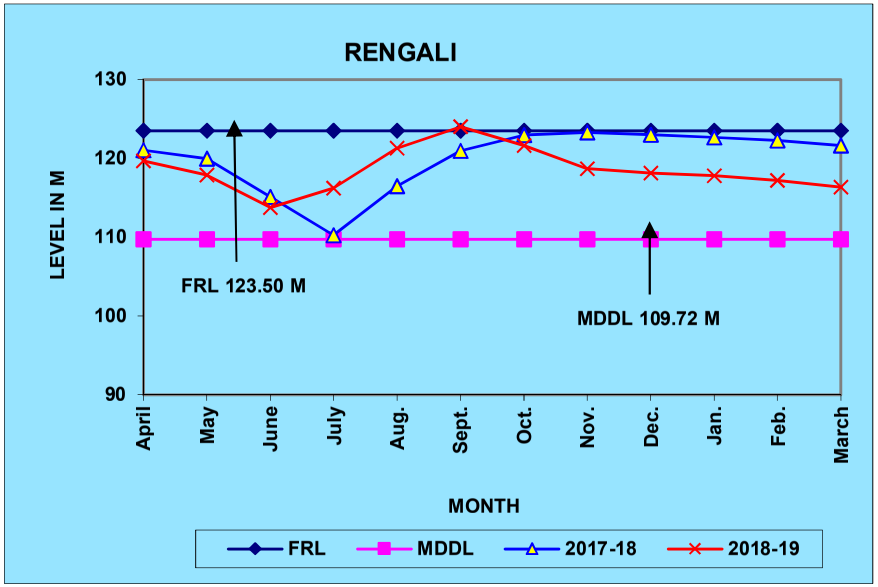
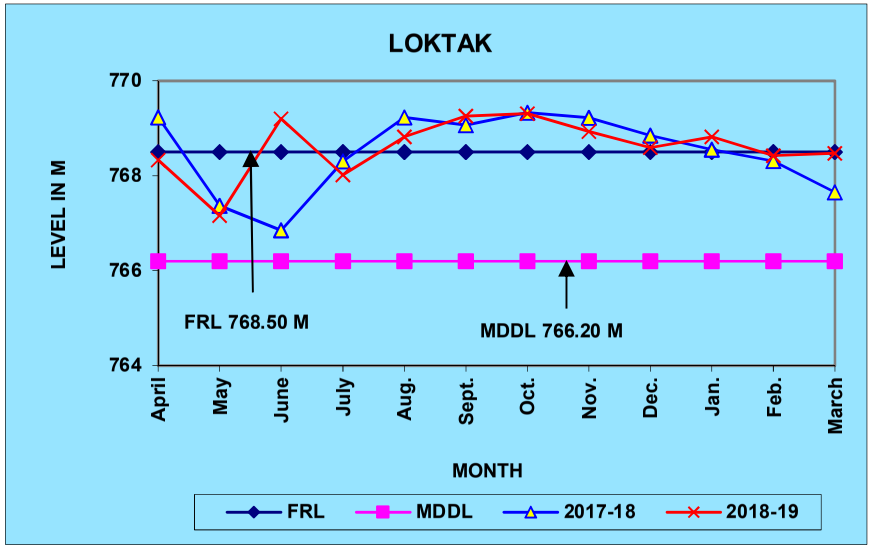


EXHIBIT 3.11

MONTH-WISE 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 25 Nos. out of 44 Nos. reservoir based hydel stations, annual generation during the year 2018-19 was more than the annual generation targets. Generation from 43 H.E. Stations on 37 major reservoirs during the year 2018-19 has been 45041.23 MU, showing increase by 15.12% over the 2017-18 generation of 39126 MU. Station-wise generation of reservoir stations during the year 2018-19 as compared to that of last year 2017-18 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:

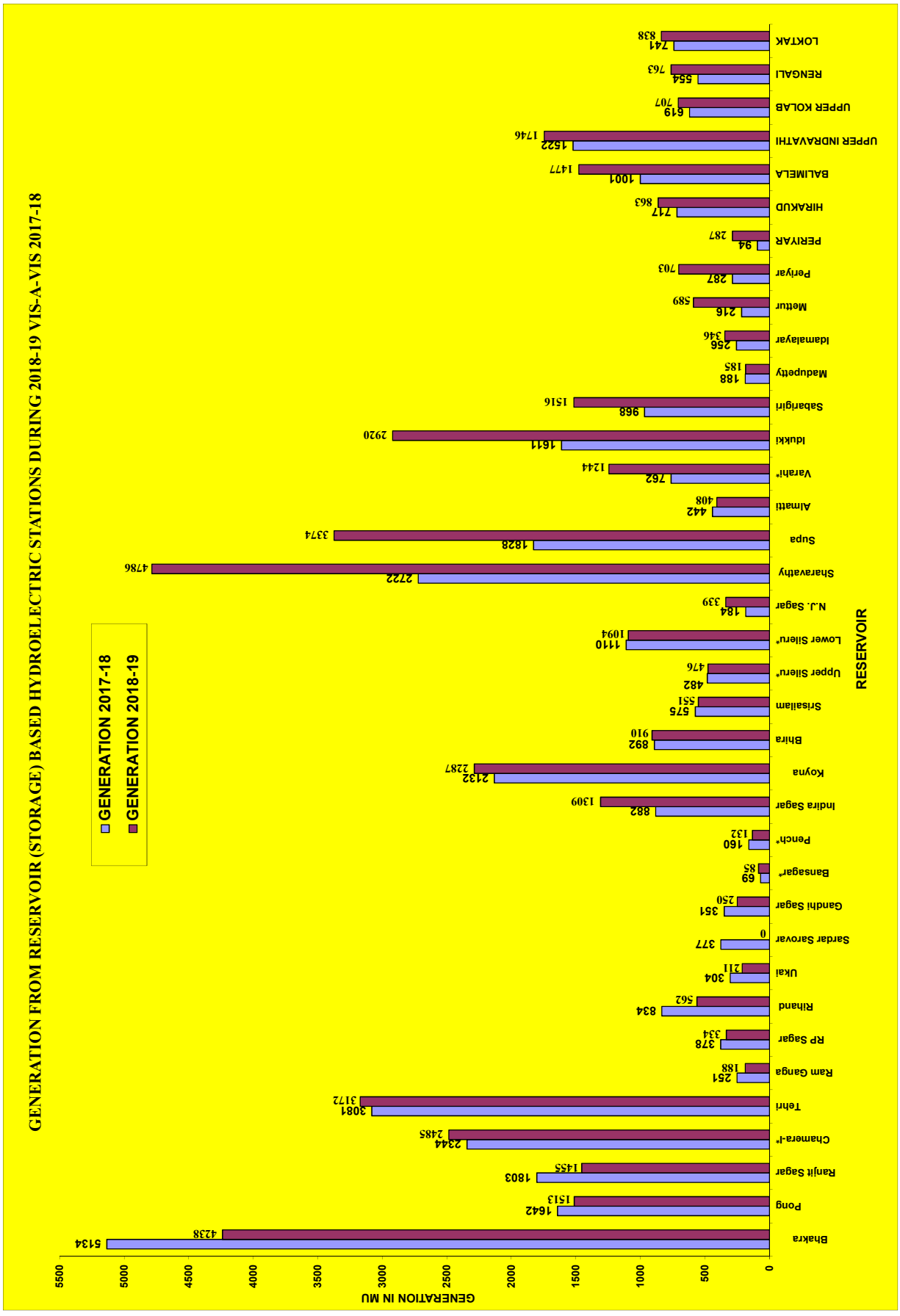
TABLE 3.3

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	14	31.82	Pong, R P Sagar, Sharavathy, Kalinadi, Supa, Varahi, Idukki, Sabirigiri, Mettur Dam, Mettur Tunnel, Periyar, Machkund, Balimela, Upper Kolab
2	110 - 120	7	15.91	Tehri, Bhira & Bhira PSS, Upper Sileru, Idamalayar, Rengali, Upper Rengali
3	100 - 110	4	9.09	Chamera-I, Rihand, Lower Sileru, Loktak
4	Below 100	19	43.18	Bhakra L&R, Ranjit Sagar, Ramganga, Ukai, Sardar Saarovar, Gandh Sagar, Bansagar-III, Pench, Indira Sagar, Koyna DPH , Koyna I&II, Koyna IV, Nagarjun Sagar, Srisailam, Almatti, Madupetty, Hirakud I&II

Generation of major reservoir based H.E. stations during 2018-19 as compared to the generation during last year i.e. 2017-18 is also depicted at **Exhibit-3.12**.

EXHIBIT-3.12


GENERATION FROM RESERVOIR (STORAGE) BASED HYDROELECTRIC STATIONS DURING 2018-19 VIS-A-VIS 2017-18
GENERATION 2017-18
GENERATION 2018-19
GENERATION IN MU
RESERVOIR
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Bhakra 5134 4238
Pong 1642 1513
Ranjit Sagar 1803 1455
Chamera-I* 2344 2485
Tehri 3081 3172
Ram Ganga 251 188
RP Sagar 378 334
Rihand 834 562
Ukai 304 211
Sardar Sarovar 377 0
Gandhi Sagar 351 250
Bansagar* 69 85
Pench* 160 132
Indira Sagar 882 1309
Koyna 2132 2287
Bhira 892 910
Srisailam 575 551
Upper Sileru* 482 476
Lower Sileru* 1110 1094
N.J. Sagar 184 339
Sharavathy 2722 4786
Supa 1828 3374
Almatti 442 408
Varahi* 762 1244
Idukki 1611 2920
Sabarigiri 968 1516
Madupetty 188 185
Idamalayar 256 346
Mettur 216 589
Periyar 287 703
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 31.03.2019	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2018-19			
						GROSS :	LIVE		Max.	DATE	Minimum	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)	(M)		(M)	
NORTHERN REGION												
1	Bhakra	1379.00	3924	513.59	445.62	8321	6516	1729.00	508.80	17.10.18	454.40	02.06.18
a	Bhakra Left	594.00	3924									
b	Bhakra Right	785.00										
2	Pong	396.00	1123	426.72	384.05	8053	6946	1084.00	424.45	01.10.18	389.82	28.06.18
3	Chamera	540.00	1664.56	760.00	749.20		87		760.00	23.09.2018	751.06	12.07.2018
4	Ranjit Sagar	600.00	1507	527.91	487.91	3292	2191	390.00	526.97	30.09.18	495.65	06.04.2018
5	Tehri	1000.00	2797	829.79	740.04	3540	2615	1291.49	827.55	21.10.2018	740.70	22.06.2018
6	Ramganga	198.00	334	366	323	2503.96	2109.25	480.80	355.23	06.12.2018	323.78	01.07.2018
7	Rana Pratap Sagar	172.00	459	352.81	343.83	2901	1569	175.66	280.95	14.10.2018	269.05	27.06.2018
8	Rihand	300.00	920	268.22	252.98	10605	5723	1177.00	264.43	12.09.2018	254.80	12.07.2018
	Sub-Total NR	**4585.00**	**12728.56**				**27756.25**					
WESTERN REGION												
9	Ukai	300.00	1080	105.16	82.30	8515	6615	813.00	97.25	24.09.2018	86.87	07.07.2018
10	Sardar Sarovar	1200.00	3635	138.68	110.18	9460	5760	1817.553	128.79	07.11.2018	104.31	30.04.2018
11	Gandhi Sagar	115.00	420	399.90	381.00	7743	6911	725.00	392.66	30.09.2018	381.32	31.03.2019
12	Bansagar	60.00	143	341.64	323.10		4934		341.64	12.09.2018	333.79	27.06.2018
13	Pench	160.00	315	490.00	464.00		1045		478.05	29.09.2018	467.53	01.07.2018
14	Indira Sagar	1000.00	1980	262.13	243.23	12237	9706	1316.12	261.86	04.10.2018	248.3	02.07.2018
15	Koyna	1636.00	3030	657.91	609.60	2797	2677	3126.00	659.40	21.09.2018	630.17	22.06.2018
a	Koyna-I & II	600.00	3030									
c	Koyna-I & II	1000										
d	Koyna DPH	36										
16	Bhira	300	775	606.05	590.09	523	522	619	606.10	01.09.2018	589.95	22.06.2018
	Sub-Total WR	**4771.00**	**11378.84**				**38170.33**					
SOUTHERN REGION												
17	Upper Sileru	240.00	529	414.53	406.51		88		414.35	29.09.2018	407.06	15.06.2018
18	Lower Sileru	460.00	1070	316.08	291.01		365		316.08	31.08.2018	291.08	15.04.2018
19	Srisailam	770.00	2900	269.74	243.84	8723	7166	1548.00	269.47	28.08.18	243.74	29.05.2018
20	Nagarjuna Sagar	815.60	2237	179.83	150.89	11560	6538	1398.00	179.19	10.09.18	155.72	23.07.2018
21	Sharavathy	1035.00	4932	554.43	522.73	5310	4297	4394.00	554.27	24.08.19	533.79	07.06.2018
22	SUPA	955.00	3927	564.00	513.50	4178	3758	3927.00	562.78	31.08.2018	533.92	08.06.2018
23	Almatti	290.00	483	519.60	511.10	2631.50	2628.00	175.30	519.60	02.08.2018	508.06	13.06.2018

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

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2019	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2018-19			
						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		594.21	31.08.2018	574.30	07.06.2018
25	Idukki	780.00	2398	732.40	694.94	1996	1459	2146.00	732.20	18.08.2018	707.83	27.05.2018
26	Sabirigiri	300.00	1338	981.46	908.30	454	447	764.00	981.54	15.08.2018	950.30	08.06.2018
27	Madupetty	37.50	284	1599.50	1554.48		55.32	77.40	1599.70	15.08.2018	1583.10	07.06.2018
28	Idamalayar	75.00	380	169.00	115.00		1017.80	254.45	169.95	09.08.2018	128.47	07.06.2018
29	Mettur	250.00	541	240.79	211.23	2708.80	2645.20	204.00	240.91	24.07.2018	214.21	23.05.2018
30	Periyar	161.00	409	46.33	33.53	443	299	216	43.34	16.08.2018	34.19	06.05.2018
	Sub-Total SR	**6629.10**	**22488.00**				**31645**					
EASTERN REGION												
31	Machkund	114.75	670	838.20	818.39	970	893	552.00	837.75	30.09.18	823.73	12.07.18
32	Hirakud	347.50	1174	192.02	179.83	4823	4709	372.00	191.88	30.09.2018	182.36	12.07.2018
33	Balimela	510.00	1183	462.07	438.91	3929	2676	898.00	461.9	02.10.18	441.26	26.06.18
34	Upper Indravati	600.00	1962	642.00	625.00	2300	1485.50	1213.14	641.22	26.09.2018	626.88	27.06.2018
35	Upper Kolab	320.00	832	858.00	844.00	1215	935.00	540	857.13	29.09.2018	845.78	08.07.2018
36	Rengali	250.00	525	123.50	109.72	3548	3167.81	275	124.01	10.09.18	111	27.06.2018
	Sub-Total ER	**2142.25**	**6346.00**				**13866**		1.00			
NORTH EASTERN REGION												
37	Loktak	105	448	768.50	766.20	435.91	396.44	250	769.31	23.10.2018	766.72	29.04.2018
	Sub-Total NER	**105**	**448**				396.44					
	Total All India	**18232.35**	**53389.40**				**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 710 generating units installed in 204 Hydro Electric Stations was made available by various organizations. The studies indicate that a total of 424536 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 40 generating units whereas annual maintenance was carried out for 295 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: 2018-19

S. No.	Type of Maintenance	No. of Units	Duration (Hours)	
			Max. for any unit	Average
1	CAPITAL/3 YEARLY MTCE.	40	2947.08	678.9
2	ANNUAL MAINTENANCE	295	5061.25	555.2
3	HALF YEARLY MAINTENANCE	1	127.58	127.58
4	QUARTERLY MAINTENANCE	4	55.53	30.51
5	MONTHLY MAINTENANCE	87	335.38	43.42
6	ROUNTINE MAINTENANCE	24	151.53	38.68
7	RENOVATION/MODERNISATION	23	8305.6	1128.35
8	CIVIL STRUCTURE	120	3297.98	136.04
9	TURBINE	100	1908.83	116.24
10	GENERATOR	58	1485.03	151.9
11	OTHER EQUIPMENTS	88	1485.03	115.84
12	MISCELLANEOUS	171	1544.25	117.31

4.3 There were a total of 2294 outages due to Planned Maintenance during the Year 2018-19, out of which about 69.57% were of duration up to 24 hours, while 17.26% 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: 2018-19

Sl. No.	Duration	Number of Outage	Maintenance % to total number of Outages
1	Less than 6 hours	783	34.13
2	6 to 24 hours	813	35.44
3	1 to 10 days	302	13.16
4	More than 10 days	396	17.26
	Total No. of Outages	**2294**	**100**

4.4 Planned Maintenance age-wise

Planned maintenance carried out for different age groups of hydro generating units during the year 2018-19 is indicated in **Table 4.3**.

TABLE 4.3

PLANNED MAINTENANCE AGE-WISE
PERIOD: 2018-19

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	2018-19	3	140.00	0	0
2	2017-18	16	795.00	7824	489
3	2016-2017	18	1659.00	3312	184
4	2015-2016	17	1516.00	4272	251
5	2010-11 to 2014-15	63	4437.02	37896	602
6	2005-06 to 2009-10	66	7077.00	30480	462
7	2000-01 to 2004-05	74	6741.80	38448	520
8	1989-90 to 1999-2000	86	5769.70	34464	401
9	1978-79 to 1988-89	124	7259.10	71448	576
10	1967-68 to 1977-78	81	5279.75	76872	949
11	Up to 1966-67	162	4724.85	119520	738
	Total	**710**	**45399.22**	**424536**	**598**

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 1977-78 (937 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: 2018-19

Sl. No.	Type of Turbine	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	Bulb	26	684.00	15720	605
2	Francis & Reversible	412	32050.32	217872	529
3	Kaplan	128	4487.00	88392	691
4	Pelton	144	8177.90	102552	712
	Total	**710**	**45399.22**	**424536**	**598**

The average non-availability due to planned maintenance was maximum for Pelton turbine at 712 hrs./unit followed by Kaplan units at 691 hrs./unit, while it was minimum for Francis & Reversible units at 529 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: 2018-19

Name of Supplier	No. of Units		Installed Capacity		Non- Availability due to Planned Maintenance	
	No.	% of total	MW	% of total	Total Hours	Hours/ Unit
A-Indigenous						
BHEL	302	42.54	19210.02	42.31	162792	539
Others	49	6.90	3005.50	6.62	16296	333
Sub Total	**351**	**49.44**	**22215.52**	**48.93**	**179088**	**510**
B-Imported						
USA	9	1.27	351.00	0.77	9480	1053
U.K.	63	8.87	1242.10	2.74	47784	758
France	31	4.37	2179.20	4.80	26304	849
Canada	44	6.20	3132.00	6.90	21168	481
USSR	26	3.66	2804.00	6.18	41688	1603
Switzerland	21	2.96	790.20	1.74	3528	168
Japan	76	10.70	6398.20	14.09	45888	604
Other	89	12.54	6287.00	13.85	49608	557
Sub Total	**359**	**50.56**	**23183.70**	**51.07**	**245448**	**684**
Total	**710**	**100.00**	**45399.22**	**100**	**424536**	**598**

It is observed that during the year 2018-19, average non-availability due to planned maintenance of the units supplied by BHEL was 539 hrs./unit.

Among the imported generating units, the average non-availability due to planned maintenance was the least for units supplied by Switzerland (168 hrs./unit) and was maximum for units supplied by USSR (1603 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: 2018-19

S. No.	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Planned Maintenance
1	Northern	245	19023.27	6.13
2	Western	101	7392.00	4.02
3	Southern	246	11694.50	5.34
4	Eastern	84	5862.45	8.74
5	North Eastern	34	1427.00	3.76
	All India	**710**	**45399.22**	**5.85**

The non-availability of generating unit due to planned maintenance was least in North-Eastern Region (3.76%) followed by Western Region at 4.02%, whereas it was maximum in Eastern Region (8.74 %) followed by Northern Region (6.13%).

The average non-availability of hydro electric units due to planned maintenance during the year 2018-19 was 5.85% as compared to 5.54% during the year 2017-18.

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 2018-19 vis-à-vis 2017-18 is summarized below in **Table 4.7.**

TABLE 4.7

NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2018-19 VIS-A-VIS 2017-18)

% Non-Availability due to planned maintenance	2018-19				2017-18			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	116	56.86	30050.17	66.19	129	62.62	27397.77	60.27
>5 to 10	43	21.08	8471.70	18.66	37	17.96	10363.75	22.88
>10 to 15	20	9.80	1913.25	4.21	16	7.77	2852.70	6.30
>15 to 20	12	5.88	1661.40	3.66	12	5.83	2637.40	5.74
>20 to 25	5	2.45	1206.00	2.66	6	2.91	1086.30	2.40
>25 to 30	2	0.98	605.50	1.33	0	0.00	0.00	0.00
above 30	6	2.94	1491.20	3.28	6	2.91	955.50	2.41
Total	**204**	**100**	**45399.22**	**100**	**200**	100	**44478.42**	**100**

It could be seen from above that 116 nos. (56.86% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2018-19 as compared to 129 nos. (62.62% of total) during 2017-18.

Non-availability due to planned maintenance was more than 30% at 6 nos. (2.94% of total) H.E. Stations during 2018-19 and which is similar to 2017-18. The details of these stations for 2018-19 is given below in **Table 4.8.**

TABLE 4.8

H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE FOR THE PERIOD: (2018-19)

Sl. No	Name of Station/Utility	Capacity (MW)	N.A. due to P.M.* (%)	Reasons
1	Baira Siul/NHPC	180.00	47.88	R&MU works
2	Sholayar/TANGEDCO	70.00	47.55	R&MU works
3	JOG/KPCL	139.20	41.08	R&MU works
4	Hirakud -II (Chiplima)/OHPC	72.00	33.98	R&MU works
5	Balimela/OHPC	510.00	31.58	R&MU works
6	Parbati-III/NHPC	520.00	30.04	R&MU of Shaft and Surge Shaft Repair

*** 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, 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 DVC (1022 hrs./unit).

In case of State Sector, non-availability due to planned maintenance was maximum under OHPC (1975 hrs./unit).

In case of Private Sector, non-availability due to planned maintenance was maximum under GBHPPL (996 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 560 hrs./Unit, 654 hrs./Unit and 159 hrs./Unit respectively.

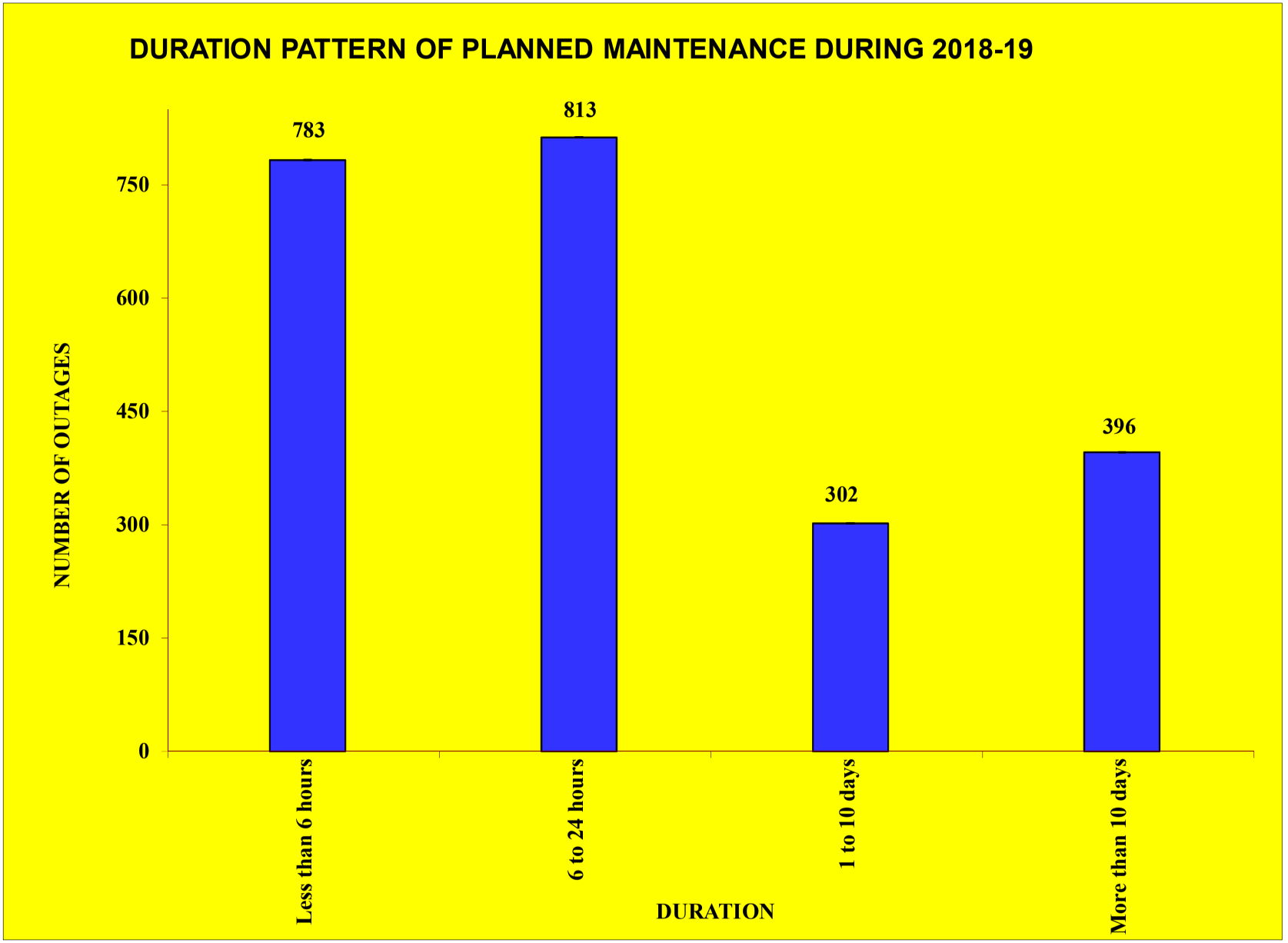
TABLE 4.9

SECTOR-WISE/ UTILITY-WISE PERFORMANCE PLANNED MAINTENANCE
PERIOD: 2018-19

Sl. No.	Organization	No. of Units	Installed Capacity (MW)	Planned Maintenance (Hours)	Planned Maintenance per Unit (Hours)
(A)	**Central Sector**				
1	BBMB	28	2920.30	3048	109
2	DVC	5	143.20	5112	1022
3	NEEPCO.	16	900.00	8472	530
4	NHDC	16	1520.00	4608	288
5	NHPC	70	5451.20	61728	882
6	NTPC LTD.	4	800.00	336	84
7	SJVNL	12	1912.02	1800	150
8	THDC	8	1400.00	3960	495
Sub Total (CS)		**159**	**15046.72**	**89064**	**560**
(B)	**Private Sector**				
1	ADHPL	2	192.00	24	12
2	AHPC (GVK)	4	330.00	0	0
3	DEPL	2	96.00	144	72
4	DLHP	1	34.00	0	0
5	E.P.P.L.	2	100.00	720	360
6	GBHPPL	2	70.00	1992	996
7	GIPL	2	110.00	672	336
8	HBPCL	7	1300.00	2352	336

Sl. No.	Organization	No. of Units	Installed Capacity (MW)	Planned Maintenance (Hours)	Planned Maintenance per Unit (Hours)
9	IAEPL	3	36.00	0	0
10	JPPVL	4	400.00	288	72
11	MPCL	2	86.00	672	336
12	SEPL	2	97.00	24	12
13	SKPPPL	2	96.00	480	240
14	TATA MAH.	15	447.00	576	38.4
Sub Total (Pvt.)		**50**	**3394.00**	**6912**	**159**
(C)	**State Sector**				
1	APGENCO	34	1796.75	2664	78
2	APGPCL	2	100.00	528	264
3	CSPGCL	3	120.00	0	0
4	GSECL	8	540.00	0	0
5	HPPCL	5	295.00	24	5
6	HPSEB	12	372.00	7104	592
7	JKSPDC	12	1110.00	7296	608
8	JSEB	2	130.00	2904	1452
9	KPCL	66	3572.20	61320	929
10	KSEB	47	1856.50	32688	695
11	MAHAGENCO	24	2406.00	10776	449
12	MEECL	13	322.00	3696	284
13	MPPGCL	23	875.00	12696	552
14	OHPC	31	2027.50	61224	1975
15	PSPCL	25	1051.00	21168	847
16	RRVUNL	11	411.00	4320	393
17	SSNNL	11	1450.00	3696	336
18	TNGDCL	69	2178.20	40008	580
19	TSGENCO	36	2405.60	7416	206
20	TUL	6	1200.00	2256	376
21	UJVNL	34	1252.15	33576	988
22	UPJVNL	15	501.60	9960	664
23	WBSEDCL	12	986.00	2208	184
Sub Total (State)		**501**	**26958.50**	**327528**	**654**
All India		**710**	**45399.22**	**424536**	**598**

EXHIBIT-4.1


DURATION PATTERN OF PLANNED MAINTENANCE DURING 2018-19
NUMBER OF OUTAGES
0
150
300
450
600
750
783
813
302
396
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 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
NORTHERN REGION							
BBMB							
1	BHAKRA LEFT HPS	5	126	01/04/2018	12/06/2018	1739.17	RENOVATION/MODERNISATION
2	GANGUWAL HPS	3	24.2	04/03/2019	09/03/2019	127.58	HALF YEARLY MAUINTENANCE
3	KOTLA HPS	1	29.25	04/03/2019	09/03/2019	127.45	ANNUAL MAINTENANCE
E.P.P.L.							
4	MALANA-II HPS	1	50	16/11/2018	01/12/2018	383.98	ANNUAL MAINTENANCE
		2	50	16/11/2018	01/12/2018	383.98	ANNUAL MAINTENANCE
GBHPPL							
5	BUDHIL HPS	1	35	04/12/2018	19/01/2019	1111	ANNUAL MAINTENANCE
		2	35	06/01/2019	13/01/2019	160	SWITCHING EQUIPMENT
		2	35	01/03/2019	31/03/2019	720	ANNUAL MAINTENANCE
HBPCL							
6	BASPA HPS	1	100	21/03/2019	26/03/2019	134	ANNUAL MAINTENANCE
		2	100	08/03/2019	14/03/2019	162	ANNUAL MAINTENANCE
		2	100	01/10/2018	31/10/2018	743.98	ANNUAL MAINTENANCE
		3	100	28/03/2019	31/03/2019	72	TURBINE MISC/GOVERNOR
		3	100	15/03/2019	19/03/2019	112	ANNUAL MAINTENANCE
7	KARCHAM WANGTOO HPS	1	250	01/01/2019	10/01/2019	239.98	ANNUAL MAINTENANCE
		2	250	18/01/2019	02/02/2019	383.98	ANNUAL MAINTENANCE
		3	250	20/02/2019	08/03/2019	407.98	ANNUAL MAINTENANCE
		4	250	30/11/2018	10/12/2018	263.92	ANNUAL MAINTENANCE
HPSEBL							
8	BASSI HPS	2	16.5	01/04/2018	12/05/2018	994	ANNUAL MAINTENANCE
		2	16.5	01/10/2018	31/10/2018	743.98	ANNUAL MAINTENANCE
9	GIRI BATA HPS	1	30	08/06/2018	28/06/2018	488.17	ANNUAL MAINTENANCE
		2	30	17/01/2019	31/01/2019	348.82	ANNUAL MAINTENANCE
10	LARJI HPS	1	42	13/01/2019	15/01/2019	57.42	MISCELLANEOUS
		1	42	25/11/2018	11/01/2019	1135.33	MISCELLANEOUS
		2	42	16/01/2019	06/03/2019	1180.08	ANNUAL MAINTENANCE
		2	42	01/04/2018	07/05/2018	876.25	ANNUAL MAINTENANCE
		2	42	08/03/2019	11/03/2019	60.58	ANNUAL MAINTENANCE
JKSPDC							
11	BAGLIHAR HPS	1	150	01/05/2018	07/05/2018	155.62	CAPITAL/3 YEARLY MTCE.
		1	150	28/01/2019	23/02/2019	624	ANNUAL MAINTENANCE
		2	150	25/02/2019	14/03/2019	396	ANNUAL MAINTENANCE
		2	150	01/04/2018	24/04/2018	552	B.F.VALVE
		3	150	01/04/2018	30/04/2018	696	B.F.VALVE
12	UPPER SINDH-II HPS	3	35	03/05/2018	08/08/2018	2343.67	CAPITAL/3 YEARLY MTCE.
		5	35	20/02/2019	22/02/2019	61	MISCELLANEOUS

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
JPPVL							
13	VISHNU PRAYAG HPS	2	100	04/02/2019	06/02/2019	55.25	ANNUAL MAINTENANCE
		2	100	26/12/2018	28/12/2018	56.4	ANNUAL MAINTENANCE
		4	100	02/08/2018	05/08/2018	79.52	RUNNER REPAIR /REPLACEMENT
		4	100	10/01/2019	12/01/2019	55.52	ANNUAL MAINTENANCE
MPCL							
14	MALANA HPS	1	43	15/01/2019	25/01/2019	245.75	ANNUAL MAINTENANCE
		2	43	03/12/2018	21/12/2018	432.92	ANNUAL MAINTENANCE
NHPC							
15	BAIRA SIUL HPS	2	60	02/09/2018	18/09/2018	384.95	TURBINE MISC/GOVERNOR
		3	60	05/09/2018	10/09/2018	131.22	TURBINE MISC/GOVERNOR
		1	60	15/10/2018	31/03/2019		RENOVATION/MODERNISATION
		2	60	15/10/2019	31/03/2020		RENOVATION/MODERNISATION
		3	60	15/10/2020	31/03/2021		RENOVATION/MODERNISATION
16	CHAMERA- I HPS	1	180	22/10/2018	27/10/2018	131.58	TURBINE MISC/GOVERNOR
		1	180	14/01/2019	20/01/2019	152.7	ANNUAL MAINTENANCE
		2	180	19/02/2019	05/03/2019	329.8	ANNUAL MAINTENANCE
17	CHAMERA- II HPS	1	100	16/12/2018	15/01/2019	732.87	CAPITAL/3 YEARLY MTCE.
		2	100	04/12/2018	13/12/2018	230.17	ANNUAL MAINTENANCE
		3	100	19/11/2018	02/12/2018	306.95	ANNUAL MAINTENANCE
18	CHAMERA-III HPS	1	77	15/11/2018	04/12/2018	456	ANNUAL MAINTENANCE
		1	77	04/12/2018	11/01/2019	914.8	SWITCHING EQUIPMENT
		2	77	17/01/2019	07/02/2019	510.8	CAPITAL/3 YEARLY MTCE.
		3	77	11/01/2019	15/01/2019	92.77	ANNUAL MAINTENANCE
19	CHUTAK HPS	1	11	17/01/2019	20/02/2019	818	ANNUAL MAINTENANCE
		2	11	26/10/2018	23/11/2018	673.83	ANNUAL MAINTENANCE
		3	11	22/12/2018	16/01/2019	597.38	ANNUAL MAINTENANCE
		4	11	24/11/2018	22/12/2018	674.78	ANNUAL MAINTENANCE
20	DHAULI GANGA HPS	1	70	11/10/2018	24/11/2018	1066.6	ANNUAL MAINTENANCE
		2	70	17/11/2018	23/11/2018	151.98	B.F.VALVE
		2	70	24/11/2018	26/11/2018	65.23	TURBINE MISC/GOVERNOR
		2	70	11/10/2018	23/10/2018	302.47	ANNUAL MAINTENANCE
		4	70	01/04/2018	10/04/2018	225	ANNUAL MAINTENANCE
		4	70	09/03/2019	31/03/2019	528	ANNUAL MAINTENANCE
21	DULHASTI HPS	1	130	05/03/2019	15/03/2019	263.87	ANNUAL MAINTENANCE
		1	130	23/07/2018	31/07/2018	207.78	TURBINE MISC/GOVERNOR
		1	130	08/06/2018	11/06/2018	57.95	TURBINE MISC/GOVERNOR
		1	130	02/01/2019	08/01/2019	148.03	B.F.VALVE
		2	130	18/02/2019	03/03/2019	296.57	ANNUAL MAINTENANCE
		2	130	02/01/2019	08/01/2019	148.32	B.F.VALVE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	130	24/03/2019	31/03/2019	154	TURBINE MISC/GOVERNOR
		3	130	08/01/2019	01/02/2019	593.05	ANNUAL MAINTENANCE
		3	130	02/01/2019	07/01/2019	131.93	B.F.VALVE
22	KISHANGANGA HPS	1	110	23/05/2018	28/05/2018	119.32	TURBINE MISC/GOVERNOR
		1	110	01/12/2018	06/12/2018	133.78	B.F.VALVE
		1	110	16/07/2018	19/07/2018	82.2	B.F.VALVE
		1	110	04/06/2018	09/06/2018	107.47	MISCELLANEOUS
		1	110	03/07/2018	07/07/2018	88.28	NEW UNIT RESIDUAL WORKS
		1	110	03/08/2018	03/11/2018	2255.24	INSPECTION AND MAINTENANCE OF TURBINE
		2	110	11/07/2018	22/07/2018	274.08	NEW UNIT RESIDUAL WORKS
		2	110	04/07/2018	09/07/2018	135.78	NEW UNIT RESIDUAL WORKS
		2	110	04/08/2018	16/08/2018	296.93	TURBINE MISC/GOVERNOR
		2	110	21/08/2018	29/08/2018	199.4	AUXILIARY SYSTEM
		2	110	10/11/2018	06/12/2018	610.77	B.F.VALVE
		2	110	09/06/2018	21/06/2018	299.42	MISCELLANEOUS
		2	110	01/06/2018	08/06/2018	171.53	MISCELLANEOUS
		2	110	25/07/2018	28/07/2018	69.32	NEW UNIT RESIDUAL WORKS
		3	110	02/07/2018	15/07/2018	317.03	NEW UNIT RESIDUAL WORKS
		3	110	11/11/2018	28/03/2019	3297.98	B.F.VALVE
		3	110	02/11/2018	07/11/2018	132.7	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		3	110	28/05/2018	01/06/2018	102.62	MISCELLANEOUS
		3	110	01/08/2018	10/08/2018	232.75	TURBINE MISC/GOVERNOR
		3	110	08/06/2018	22/06/2018	336.15	TURBINE MISC/GOVERNOR
23	NIMMO BAZGO HPS	1	15	16/10/2018	26/10/2018	261.75	ANNUAL MAINTENANCE
		2	15	28/10/2018	13/11/2018	388.02	ANNUAL MAINTENANCE
		3	15	10/10/2018	12/10/2018	55.25	GENERATOR INSPECTION/TESTING/MTCE
		3	15	21/09/2018	08/10/2018	430.92	ANNUAL MAINTENANCE
24	PARBATI-III HPS	1	130	01/02/2019	04/02/2019	95.98	ANNUAL MAINTENANCE
		1	130	20/12/2018	01/01/2019	311.98	SURGE SHAFT
		1	130	20/09/2018	29/10/2018	953.52	GENERATOR INSPECTION/TESTING/MTCE
		2	130	01/04/2018	30/04/2018	714.27	CAPITAL/3 YEARLY MTCE.
		2	130	20/12/2018	04/01/2019	377.5	SURGE SHAFT
		2	130	01/03/2019	23/03/2019	551.98	ANNUAL MAINTENANCE
		3	130	01/06/2018	13/06/2018	305.28	GENERATOR INSPECTION/TESTING/MTCE
		3	130	20/12/2018	04/02/2019	1127.98	SURGE SHAFT
		3	130	05/02/2019	23/03/2019	1127.98	ANNUAL MAINTENANCE
25	SALAL HPS	1	115	15/03/2019	31/03/2019	373.35	CAPITAL/3 YEARLY MTCE.
		2	115	23/01/2019	21/02/2019	685.62	CAPITAL/3 YEARLY MTCE.
		3	115	19/11/2018	14/01/2019	1335.18	CAPITAL/3 YEARLY MTCE.
		4	115	29/01/2019	04/02/2019	135.23	RENOVATION/MODERNISATION

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	115	05/11/2018	14/11/2018	222.67	ANNUAL MAINTENANCE
		5	115	09/03/2019	15/03/2019	142.5	RENOVATION/MODERNISATION
		5	115	06/10/2018	17/10/2018	269.33	ANNUAL MAINTENANCE
		6	115	20/02/2019	05/03/2019	305.25	RENOVATION/MODERNISATION
		6	115	21/10/2018	30/10/2018	224	ANNUAL MAINTENANCE
26	SEWA-II HPS	1	40	14/12/2018	22/12/2018	200.68	ANNUAL MAINTENANCE
		2	40	03/12/2018	11/12/2018	201.65	ANNUAL MAINTENANCE
		3	40	15/11/2018	27/11/2018	301.87	ANNUAL MAINTENANCE
27	TANAKPUR HPS	1	31.4	10/05/2018	24/05/2018	347.8	ANNUAL MAINTENANCE
		1	31.4	15/11/2018	14/12/2018	704.95	ANNUAL MAINTENANCE
		2	31.4	01/04/2018	09/05/2018	914.52	CAPITAL MAINTENANCE
		2	31.4	18/12/2018	23/01/2019	864.98	ANNUAL MAINTENANCE
		3	31.4	28/01/2019	23/03/2019	1300.47	ANNUAL MAINTENANCE
		3	31.4	21/08/2018	25/08/2018	99.4	TURBINE MISC/GOVERNOR
28	URI-I HPS	1	120	22/10/2018	05/11/2018	343.1	ANNUAL MAINTENANCE
		2	120	19/11/2018	30/11/2018	271.87	ANNUAL MAINTENANCE
		3	120	01/12/2018	31/12/2018	720.1	CAPITAL/3 YEARLY MTCE.
		4	120	02/01/2019	18/01/2019	389.2	CAPITAL/3 YEARLY MTCE.
29	URI-II HPS	1	60	03/12/2018	20/12/2018	410.43	ANNUAL MAINTENANCE
		2	60	08/01/2019	23/01/2019	366.15	ANNUAL MAINTENANCE
		3	60	12/11/2018	01/12/2018	461.6	ANNUAL MAINTENANCE
		4	60	21/12/2018	05/01/2019	368.32	ANNUAL MAINTENANCE
NTPC Ltd.							
30	KOLDAM	1	200	18/12/2018	21/12/2018	82.62	ANNUAL MAINTENANCE
		2	200	29/01/2019	01/02/2019	82.6	ANNUAL MAINTENANCE
		3	200	19/11/2018	24/11/2018	129.9	ANNUAL MAINTENANCE
		4	200	26/02/2019	01/03/2019	82.07	ANNUAL MAINTENANCE
PSPCL							
31	ANANDPUR SAHIB-I HPS	1	33.5	01/11/2018	07/12/2018	876.15	ANNUAL MAINTENANCE
		2	33.5	06/02/2019	31/03/2019	1262	ANNUAL MAINTENANCE
32	ANANDPUR SAHIB-II HPS	4	33.5	02/11/2018	07/12/2018	862.67	ANNUAL MAINTENANCE
33	MUKERIAN-I HPS	1	15	28/05/2018	26/06/2018	701	ANNUAL MAINTENANCE
		2	15	23/03/2019	31/03/2019	182.5	ANNUAL MAINTENANCE
		2	15	25/04/2018	27/05/2018	769.5	ANNUAL MAINTENANCE
		3	15	01/04/2018	02/05/2018	763.17	ANNUAL MAINTENANCE
34	MUKERIAN-II HPS	4	15	28/05/2018	28/06/2018	749.33	ANNUAL MAINTENANCE
		6	15	01/04/2018	02/05/2018	756.08	ANNUAL MAINTENANCE
35	MUKERIAN-III HPS	7	19.5	29/04/2018	05/06/2018	892.67	ANNUAL MAINTENANCE
		7	19.5	25/03/2019	31/03/2019	135	ANNUAL MAINTENANCE
		8	19.5	02/06/2018	01/07/2018	705.5	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		9	19.5	01/04/2018	06/05/2018	862.08	ANNUAL MAINTENANCE
36	MUKERIAN-IV HPS	10	19.5	23/03/2019	31/03/2019	183.33	ANNUAL MAINTENANCE
		10	19.5	02/06/2018	25/06/2018	557.25	ANNUAL MAINTENANCE
		11	19.5	01/04/2018	11/05/2018	976.17	ANNUAL MAINTENANCE
37	RANJIT SAGAR HPS	1	150	09/07/2018	18/07/2018	220.58	MISCELLANEOUS
		2	150	23/01/2019	06/02/2019	336.25	TURBINE MISC/GOVERNOR
		2	150	25/10/2018	29/11/2018	843	ANNUAL MAINTENANCE
		3	150	10/12/2018	11/01/2019	770	ANNUAL MAINTENANCE
		4	150	11/02/2019	15/03/2019	775.67	ANNUAL MAINTENANCE
38	SHANAN HPS	2	15	13/11/2018	08/12/2018	605.25	ANNUAL MAINTENANCE
		3	15	10/12/2018	10/01/2019	746.08	ANNUAL MAINTENANCE
		3	15	15/04/2018	30/04/2018	375.15	RUNNER REPAIR /REPLACEMENT
		3	15	14/01/2019	31/01/2019	419.23	MISCELLANEOUS
		3	15	01/05/2018	17/05/2018	404.83	RUNNER REPAIR /REPLACEMENT
		3	15	01/02/2019	19/03/2019	1120.75	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		5	50	01/05/2018	14/05/2018	330.5	MONTHLY MAINTENANCE
		5	50	01/04/2018	30/04/2018	719.98	ANNUAL MAINTENANCE
RRVUNL							
39	JAWAHAR SAGAR HPS	1	33	09/04/2018	03/05/2018	583.75	ANNUAL MAINTENANCE
		2	33	01/06/2018	21/06/2018	488.67	ANNUAL MAINTENANCE
		3	33	07/05/2018	31/05/2018	584.17	ANNUAL MAINTENANCE
		3	33	01/06/2018	26/06/2018	608.67	ANNUAL MAINTENANCE
40	R P SAGAR HPS	1	43	02/04/2018	19/04/2018	412.72	ANNUAL MAINTENANCE
		2	43	26/04/2018	29/05/2018	796.75	ANNUAL MAINTENANCE
		3	43	23/06/2018	07/07/2018	340.43	ANNUAL MAINTENANCE
		4	43	30/05/2018	22/06/2018	550.58	ANNUAL MAINTENANCE
SJVNL							
41	NATHPA JHAKRI HPS	1	250	19/12/2018	27/12/2018	208.5	ANNUAL MAINTENANCE
		2	250	29/12/2018	03/01/2019	131.33	ANNUAL MAINTENANCE
		2	250	20/12/2018	27/12/2018	172.5	ANNUAL MAINTENANCE
		3	250	20/11/2018	26/11/2018	157.17	ANNUAL MAINTENANCE
		4	250	12/12/2018	17/12/2018	133.33	ANNUAL MAINTENANCE
		5	250	28/11/2018	03/12/2018	141.67	ANNUAL MAINTENANCE
		6	250	04/12/2018	10/12/2018	144	ANNUAL MAINTENANCE
42	RAMPUR HPS	1	68.67	19/12/2018	21/12/2018	52.67	ANNUAL MAINTENANCE
		1	68.67	12/12/2018	16/12/2018	106.3	ANNUAL MAINTENANCE
		2	68.67	19/12/2018	23/12/2018	106.15	ANNUAL MAINTENANCE
		3	68.67	04/12/2018	10/12/2018	148.33	ANNUAL MAINTENANCE
		4	68.67	25/12/2018	31/12/2018	144.93	ANNUAL MAINTENANCE
		5	68.67	20/11/2018	24/11/2018	119.98	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		6	68.67	01/12/2018	03/12/2018	54.52	ANNUAL MAINTENANCE
		6	68.67	28/11/2018	30/11/2018	71.98	ANNUAL MAINTENANCE
THDC							
43	KOTESHWAR HPS	1	100	02/04/2018	23/04/2018	515	ANNUAL MAINTENANCE
		2	100	22/10/2018	28/11/2018	891.5	ANNUAL MAINTENANCE
		3	100	06/06/2018	21/06/2018	376.58	GENERATOR INSPECTION/TESTING/MTCE
		3	100	18/03/2019	31/03/2019	302	ANNUAL MAINTENANCE
		4	100	25/04/2018	18/05/2018	553.5	ANNUAL MAINTENANCE
44	TEHRI ST-1 HPS	1	250	11/03/2019	30/03/2019	462.83	ANNUAL MAINTENANCE
		1	250	06/04/2018	22/04/2018	376.25	ANNUAL MAINTENANCE
		2	250	22/04/2018	07/05/2018	368	ANNUAL MAINTENANCE
		4	250	01/04/2018	05/04/2018	109.25	ANNUAL MAINTENANCE
UJVNL							
45	CHIBRO (YAMUNA) HPS	1	60	01/04/2018	01/08/2018	2947.08	CAPITAL/3 YEARLY MTCE.
		2	60	22/12/2018	23/01/2019	777.83	CAPITAL/3 YEARLY MTCE.
		3	60	01/04/2018	30/04/2018	717.75	ANNUAL MAINTENANCE
		3	60	31/01/2019	08/03/2019	868.75	CAPITAL/3 YEARLY MTCE.
		4	60	19/11/2018	13/12/2018	577.75	CAPITAL/3 YEARLY MTCE.
46	CHILLA HPS	1	36	05/02/2019	23/02/2019	447.08	ANNUAL MAINTENANCE
		2	36	01/04/2018	25/05/2018	1296.33	CAPITAL/3 YEARLY MTCE.
		4	36	27/11/2018	30/11/2018	78.57	CAPITAL/3 YEARLY MTCE.
47	DHAKRANI HPS	2	11.25	11/12/2018	12/01/2019	773.92	ANNUAL MAINTENANCE
		2	11.25	01/04/2018	11/05/2018	980.25	ANNUAL MAINTENANCE
		3	11.25	14/01/2019	02/02/2019	461.25	ANNUAL MAINTENANCE
48	DHALIPUR HPS	1	17	16/12/2018	15/01/2019	729	ANNUAL MAINTENANCE
		2	17	07/02/2019	28/02/2019	515.98	RENOVATION/MODERNISATION
		2	17	01/04/2018	10/05/2018	954.42	ANNUAL MAINTENANCE
		3	17	21/01/2019	06/02/2019	385.5	ANNUAL MAINTENANCE
49	KHODRI HPS	1	30	04/06/2018	27/07/2018	1256.58	B.F.VALVE
		2	30	14/10/2018	16/10/2018	56.75	TURBINE MISC/GOVERNOR
		2	30	16/11/2018	13/12/2018	649.33	ANNUAL MAINTENANCE
50	KULHAL HPS	3	10	29/12/2018	31/03/2019	2192.5	CAPITAL/3 YEARLY MTCE.
51	MANERI BHALI - I HPS	1	30	22/07/2018	31/08/2018	972.48	ANNUAL MAINTENANCE
		2	30	01/02/2019	22/02/2019	519.25	RENOVATION/MODERNISATION
		2	30	22/07/2018	31/08/2018	972.48	ANNUAL MAINTENANCE
		3	30	22/07/2018	31/08/2018	972.48	ANNUAL MAINTENANCE
52	MANERI BHALI - II HPS	4	76	01/01/2019	31/01/2019	730.15	MISCELLANEOUS
		4	76	10/12/2018	31/12/2018	514.15	MISCELLANEOUS
53	RAMGANGA HPS	1	66	23/09/2018	05/11/2018	1034.83	ANNUAL MAINTENANCE
		2	66	01/09/2018	03/10/2018	784.5	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
UPJVNL							
54	KHARA HPS	1	24	01/01/2019	18/02/2019	1165.58	ANNUAL MAINTENANCE
		2	24	16/04/2018	25/05/2018	934	ANNUAL MAINTENANCE
		2	24	01/03/2019	31/03/2019	708.17	ANNUAL MAINTENANCE
55	MATATILA HPS	1	10.2	01/04/2018	04/05/2018	811.42	CAPITAL/3 YEARLY MTCE.
		2	10.2	21/02/2019	31/03/2019	899	ANNUAL MAINTENANCE
		3	10.2	02/06/2018	04/07/2018	768	ANNUAL MAINTENANCE
56	OBRA HPS	1	33	01/04/2018	16/05/2018	1093.67	STATOR WINDING REOPAIL/CLEANING
		3	33	27/05/2018	29/05/2018	52	MAIN GENERTATOR TRANSFORMER MAINTENANCE
57	RIHAND HPS	2	50	28/08/2018	31/08/2018	69.5	INTAKE STRU/TRASH RACK
		3	50	22/12/2018	29/12/2018	179.08	MISCELLANEOUS
		3	50	30/09/2018	05/10/2018	122.25	STATOR WINDING REOPAIL/CLEANING
		6	50	19/11/2018	31/03/2019	3157	ANNUAL MAINTENANCE
WESTERN REGION							
MAHAGENCO							
58	GHATGHAR PSS HPS	1	125	27/04/2018	13/08/2018	2584.2	CAPITAL/3 YEARLY MTCE.
59	KOYNA DPH HPS	1	18	02/07/2018	19/07/2018	416.75	ANNUAL MAINTENANCE
		2	18	05/01/2019	28/01/2019	563	RENOVATION/MODERNISATION
60	KOYNA-I&II HPS	1	70	19/11/2018	06/02/2019	1908.83	TURBINE MISC/GOVERNOR
		1	70	07/02/2019	01/03/2019	546.8	GENERATOR INSPECTION/TESTING/MTCE
		2	70	04/01/2019	23/02/2019	1204.67	TURBINE
		2	70	19/11/2018	21/11/2018	60.42	INTAKE STRU/TRASH RACK
		3	70	19/11/2018	26/11/2018	175.33	INTAKE STRU/TRASH RACK
		4	70	01/04/2018	04/04/2018	94	CAPITAL/3 YEARLY MTCE.
		5	80	19/11/2018	26/11/2018	171.5	INTAKE STRU/TRASH RACK
		5	80	21/12/2018	23/12/2018	56.75	TURBINE MISC/GOVERNOR
		5	80	13/06/2018	18/06/2018	130.75	CAPITAL/3 YEARLY MTCE.
		6	80	23/03/2019	25/03/2019	50.75	MISCELLANEOUS
		6	80	19/11/2018	26/11/2018	170.33	INTAKE STRU/TRASH RACK
		6	80	26/10/2018	29/10/2018	86.25	ROUTINE MAINTENANCE
		7	80	30/01/2019	06/02/2019	182.33	TURBINE MISC/GOVERNOR
		7	80	19/11/2018	26/11/2018	174.42	INTAKE STRU/TRASH RACK
		8	80	19/11/2018	26/11/2018	174.17	INTAKE STRU/TRASH RACK
		8	80	20/08/2018	23/08/2018	84.83	ROUTINE MAINTENANCE
61	KOYNA-III HPS	2	80	11/01/2019	02/02/2019	529.83	ANNUAL MAINTENANCE
62	KOYNA-IV HPS	2	250	07/08/2018	15/08/2018	184.17	CAPITAL/3 YEARLY MTCE.
		2	250	14/01/2019	22/01/2019	197.28	PRESSURE SHAFT/PENSTOCK
		3	250	26/02/2019	01/03/2019	79.58	MISCELLANEOUS
		4	250	12/06/2018	18/07/2018	870.83	ANNUAL MAINTENANCE
63	TILLARI HPS	1	60	01/07/2018	11/07/2018	240	CAPITAL/3 YEARLY MTCE.

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
MPPGCL							
64	BANSAGAR TONS-I HPS	1	105	01/05/2018	24/06/2018	1315.17	CAPITAL/3 YEARLY MTCE.
		1	105	02/04/2018	30/04/2018	685.48	CAPITAL/3 YEARLY MTCE.
		3	105	18/05/2018	02/07/2018	1091.08	CAPITAL/3 YEARLY MTCE.
65	BANSAGAR-II HPS	1	15	08/04/2018	25/04/2018	413.5	MISCELLANEOUS
		2	15	01/05/2018	04/06/2018	817	MISCELLANEOUS
66	BANSAGAR-III HPS	1	20	08/04/2018	25/04/2018	416	ANNUAL MAINTENANCE
		2	20	26/04/2018	13/05/2018	415.67	ANNUAL MAINTENANCE
		3	20	14/05/2018	31/05/2018	414.75	ANNUAL MAINTENANCE
67	BARGI HPS	1	45	07/05/2018	24/05/2018	419.33	CAPITAL/3 YEARLY MTCE.
		2	45	29/05/2018	16/06/2018	441.42	MISCELLANEOUS
68	GANDHI SAGAR HPS	1	23	01/05/2018	22/05/2018	514.75	ANNUAL MAINTENANCE
		3	23	23/05/2018	13/06/2018	502.33	ANNUAL MAINTENANCE
		4	23	16/04/2018	30/04/2018	342	ANNUAL MAINTENANCE
69	MADHIKHERA HPS	1	20	16/04/2018	29/04/2018	311.92	CAPITAL/3 YEARLY MTCE.
70	PENCH HPS	1	80	01/05/2018	20/05/2018	470.4	MISCELLANEOUS
		2	80	25/05/2018	14/06/2018	486.03	MISCELLANEOUS
71	RAJGHAT HPS	1	15	05/09/2018	30/09/2018	607.23	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		2	15	01/05/2018	14/05/2018	328	MISCELLANEOUS
		2	15	19/06/2018	30/07/2018	993.58	RENOVATION/MODERNISATION
		3	15	15/05/2018	27/07/2018	1762.58	RENOVATION/MODERNISATION
NHDC							
72	INDIRA SAGAR HPS	1	125	25/05/2018	08/06/2018	356	ANNUAL MAINTENANCE
		3	125	12/05/2018	24/05/2018	295	ANNUAL MAINTENANCE
		3	125	01/03/2019	09/03/2019	199.25	ANNUAL MAINTENANCE
		4	125	26/04/2018	11/05/2018	366	ANNUAL MAINTENANCE
		4	125	27/06/2018	30/06/2018	73	ANNUAL MAINTENANCE
		4	125	11/03/2019	20/03/2019	227.5	ANNUAL MAINTENANCE
		7	125	06/04/2018	25/04/2018	466	ANNUAL MAINTENANCE
73	OMKARESHWAR HPS	1	65	14/04/2018	08/05/2018	583.33	ANNUAL MAINTENANCE
		2	65	12/06/2018	22/06/2018	247.5	ANNUAL MAINTENANCE
		3	65	09/05/2018	19/05/2018	243.8	ANNUAL MAINTENANCE
		4	65	01/04/2018	13/04/2018	289.67	ANNUAL MAINTENANCE
		5	65	21/05/2018	31/05/2018	248	ANNUAL MAINTENANCE
		6	65	01/06/2018	11/06/2018	241.77	ANNUAL MAINTENANCE
		7	65	01/03/2019	14/03/2019	321.75	ANNUAL MAINTENANCE
		8	65	16/03/2019	30/03/2019	344.75	ANNUAL MAINTENANCE
SSNNL							
74	S SAROVAR CHPH HPS	1	50	01/04/2018	09/04/2018	209.5	ANNUAL MAINTENANCE
		4	50	10/04/2018	02/05/2018	536.5	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
75	S SAROVAR RBPH HPS	3	200	22/01/2019	11/02/2019	491	ANNUAL MAINTENANCE
		4	200	04/04/2018	24/04/2018	489	ANNUAL MAINTENANCE
TATA MAH.							
76	BHIRA HPS	1	25	13/02/2019	17/02/2019	110.63	ANNUAL MAINTENANCE
		2	25	12/12/2018	21/12/2018	202.27	ANNUAL MAINTENANCE
		3	25	01/02/2019	10/02/2019	217.2	ANNUAL MAINTENANCE
77	BHIRA PSS HPS	1	150	22/12/2018	24/12/2018	55.67	GENERATOR INSPECTION/TESTING/MTCE
SOUTHERN REGION							
APGENCO							
78	HAMPI HPS	4	9	23/02/2019	25/02/2019	51.7	INTAKE STRU/TRASH RACK
79	LOWER SILERU HPS	1	115	16/11/2018	23/11/2018	176.33	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		1	115	14/12/2018	23/12/2018	226.33	MAIN GENERTATOR TRANSFORMER MAINTENANCE
80	SRISAILAM HPS	2	110	12/12/2018	14/12/2018	55.12	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		5	110	17/12/2018	22/12/2018	127.25	MAIN GENERTATOR TRANSFORMER MAINTENANCE
81	T B DAM HPS	1	9	24/06/2018	29/06/2018	116.83	B.F.VALVE
82	UPPER SILERU HPS	1	60	19/11/2018	11/12/2018	532.25	TURBINE MISC/GOVERNOR
		3	60	21/01/2019	24/01/2019	77.67	MISCELLANEOUS
		4	60	29/11/2018	04/12/2018	130.83	MISCELLANEOUS
KPCL							
83	ALMATTI DPH HPS	1	15	05/06/2018	09/06/2018	94.92	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		2	55	01/06/2018	13/06/2018	300.48	ANNUAL MAINTENANCE
		2	55	21/06/2018	23/06/2018	60.65	ANNUAL MAINTENANCE
		3	55	01/06/2018	21/06/2018	491	ANNUAL MAINTENANCE
		4	55	01/06/2018	21/06/2018	491	ANNUAL MAINTENANCE
		5	55	01/06/2018	21/06/2018	491	ANNUAL MAINTENANCE
		6	55	01/06/2018	21/06/2018	491	ANNUAL MAINTENANCE
84	BHADRA HPS	3	12	31/07/2018	04/08/2018	100.67	RENOVATION/MODERNISATION
		3	12	01/04/2018	30/07/2018	2899.17	RENOVATION/MODERNISATION
85	JOG HPS	5	21.6	26/11/2018	29/11/2018	74.08	TURBINE MISC/GOVERNOR
		5	21.6	12/06/2018	14/06/2018	56.92	DESILING CHAMBER
		5	21.6	29/05/2018	31/05/2018	62.65	PRESSURE SHAFT/PENSTOCK
		5	21.6	20/09/2018	29/09/2018	218.83	GENERATOR INSPECTION/TESTING/MTCE
		6	21.6	15/06/2018	17/06/2018	51	DESILING CHAMBER
		6	21.6	26/11/2018	29/11/2018	74.08	TURBINE MISC/GOVERNOR
		6	21.6	20/09/2018	29/09/2018	218.83	HRI/HRC/POWER CHANNEL
		7	21.6	22/11/2018	24/11/2018	54.17	TURBINE MISC/GOVERNOR
		7	21.6	20/09/2018	29/09/2018	218.83	HRI/HRC/POWER CHANNEL
		7	21.6	02/07/2018	06/07/2018	101.67	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		7	21.6	23/10/2018	31/10/2018	203.15	GENERATOR INSPECTION/TESTING/MTCE
		8	21.6	01/12/2018	05/12/2018	113.82	GENERATOR INSPECTION/TESTING/MTCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
86	KADRA HPS	1	50	03/12/2018	25/12/2018	526.33	ANNUAL MAINTENANCE
		2	50	17/02/2019	23/02/2019	146.38	ANNUAL MAINTENANCE
		3	50	01/01/2019	28/01/2019	652.17	MISCELLANEOUS
87	KODASALI HPS	1	40	02/02/2019	14/02/2019	292.83	ANNUAL MAINTENANCE
		3	40	03/12/2018	29/12/2018	631.5	ANNUAL MAINTENANCE
88	LIGANAMAKKI HPS	1	27.5	01/08/2018	31/08/2018	732.33	TURBINE
		1	27.5	07/06/2018	26/06/2018	464.83	MAIN GENERTATOR TRANSFORMER MAINTENANCE
89	SHARAVATHI HPS	1	103.5	12/11/2018	14/11/2018	58.02	PRESSURE SHAFT/PENSTOCK
		1	103.5	19/10/2018	24/10/2018	121.3	GENERATOR INSPECTION/TESTING/MTCE
		1	103.5	01/04/2018	25/05/2018	1309.72	TURBINE MISC/GOVERNOR
		10	103.5	24/10/2018	27/10/2018	85.12	GENERATOR INSPECTION/TESTING/MTCE
		2	103.5	17/10/2018	20/10/2018	69.3	GENERATOR INSPECTION/TESTING/MTCE
		2	103.5	10/07/2018	30/07/2018	486	ANNUAL MAINTENANCE
		2	103.5	08/02/2019	11/02/2019	67.85	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		4	103.5	01/10/2018	06/10/2018	117.8	GENERATOR INSPECTION/TESTING/MTCE
		5	103.5	01/06/2018	22/06/2018	511.52	PRESSURE SHAFT/PENSTOCK
		6	103.5	07/08/2018	10/08/2018	74.05	PRESSURE SHAFT/PENSTOCK
		6	103.5	25/06/2018	27/06/2018	55.77	ROUTINE MAINTENANCE
		8	103.5	04/08/2018	08/08/2018	114.4	ROUTINE MAINTENANCE
		8	103.5	22/11/2018	01/12/2018	225.8	TURBINE MISC/GOVERNOR
90	SIVASAMUNDRUM HPS	5	3	07/04/2018	21/04/2018	335.5	MISCELLANEOUS
		8	6	01/05/2018	05/05/2018	107.83	MISCELLANEOUS
		8	6	05/05/2018	24/05/2018	458.52	MISCELLANEOUS
91	VARAHI HPS	2	115	25/06/2018	30/06/2018	123.65	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		3	115	23/10/2018	25/10/2018	51.9	TURBINE
KSEBL							
92	IDAMALAYAR HPS.	1	37.5	20/06/2018	20/07/2018	724.15	ANNUAL MAINTENANCE
		2	37.5	02/11/2018	28/11/2018	630.73	ANNUAL MAINTENANCE
93	IDUKKI HPS.	1	130	26/06/2018	24/07/2018	683.83	ANNUAL MAINTENANCE
		2	130	16/01/2019	24/01/2019	195.67	ANNUAL MAINTENANCE
		3	130	01/04/2018	11/03/2019	8269	RENOVATION/MODERNISATION
		4	130	11/12/2018	14/12/2018	76.92	ANNUAL MAINTENANCE
		5	130	21/11/2018	10/12/2018	459.42	ANNUAL MAINTENANCE
		6	130	30/10/2018	17/11/2018	436.6	ANNUAL MAINTENANCE
94	KUTTIYADI HPS.	3	25	03/12/2018	28/12/2018	607.43	ANNUAL MAINTENANCE
95	KUTTIYADI ADDL. EXTN.	5	50	14/05/2018	07/06/2018	580.5	ANNUAL MAINTENANCE
		6	50	01/11/2018	15/11/2018	354.77	ANNUAL MAINTENANCE
		6	50	22/10/2018	31/10/2018	230.48	ANNUAL MAINTENANCE
96	KUTTIYADI EXTN. HPS.	4	50	27/10/2018	31/10/2018	99.98	TURBINE MISC/GOVERNOR
		4	50	09/04/2018	12/05/2018	800.05	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
97	LOWER PERIYAR HPS.	1	60	05/02/2019	03/03/2019	629.9	ANNUAL MAINTENANCE
		3	60	04/01/2019	24/01/2019	489.25	ANNUAL MAINTENANCE
98	PALLIVASAL HPS.	1	5	09/05/2018	30/05/2018	511.62	ANNUAL MAINTENANCE
		3	5	04/04/2018	08/05/2018	819.92	ANNUAL MAINTENANCE
99	PANNIAR HPS.	1	15	09/04/2018	02/05/2018	563.82	ANNUAL MAINTENANCE
100	PORINGALKUTTU HPS.	3	8	04/05/2018	05/06/2018	772.33	ANNUAL MAINTENANCE
		3	8	24/01/2019	01/02/2019	209.77	ANNUAL MAINTENANCE
101	SABARIGIRI HPS.	1	50	03/03/2019	26/03/2019	555.23	ANNUAL MAINTENANCE
		2	50	07/02/2019	01/03/2019	530.08	ANNUAL MAINTENANCE
		3	50	27/11/2018	28/01/2019	1497.13	ANNUAL MAINTENANCE
		4	50	09/07/2018	01/12/2018	3463.85	ANNUAL MAINTENANCE
		4	50	01/12/2018	06/12/2018	137.97	ANNUAL MAINTENANCE
		4	50	15/02/2019	18/02/2019	76.83	CAPITAL/3 YEARLY MTCE.
		4	50	12/12/2018	05/02/2019	1319.05	ANNUAL MAINTENANCE
		4	50	07/12/2018	11/12/2018	102.23	ANNUAL MAINTENANCE
		4	50	08/02/2019	15/02/2019	160.78	CAPITAL/3 YEARLY MTCE.
		5	50	22/06/2018	09/07/2018	406.63	ANNUAL MAINTENANCE
		5	50	13/02/2019	15/02/2019	53.68	PRESSURE SHAFT/PENSTOCK
		6	50	13/02/2019	15/02/2019	55.22	PRESSURE SHAFT/PENSTOCK
102	SENGULAM HPS.	2	12	02/04/2018	30/04/2018	684.75	ANNUAL MAINTENANCE
		2	12	03/12/2018	23/12/2018	487.55	ANNUAL MAINTENANCE
		2	12	12/06/2018	18/06/2018	158.57	ANNUAL MAINTENANCE
		3	12	04/02/2019	02/03/2019	633.95	ANNUAL MAINTENANCE
		4	12	01/01/2019	30/01/2019	701.47	ANNUAL MAINTENANCE
		4	12	12/06/2018	18/06/2018	150.82	ROUTINE MAINTENANCE
		4	12	14/05/2018	04/06/2018	508.12	ANNUAL MAINTENANCE
TNGDCL							
103	BHAWANI BARRAGE-II HPS	1	15	27/01/2019	08/03/2019	959.08	CAPITAL/3 YEARLY MTCE.
104	BHAWANI BARRAGE-III	1	15	29/01/2019	26/03/2019	1350.92	ANNUAL MAINTENANCE
		2	15	17/02/2019	26/03/2019	895.67	ANNUAL MAINTENANCE
105	BHAWANI KATTAL	1	15	01/02/2019	19/02/2019	455.98	ANNUAL MAINTENANCE
		2	15	08/03/2019	28/03/2019	470.25	INTAKE STRU/TRASH RACK
		2	15	17/04/2018	06/05/2018	464	ANNUAL MAINTENANCE
106	KADAMPARI HPS.	1	100	25/11/2018	07/12/2018	295.5	TRI/TRC/DRAFT TUBE
		2	100	25/11/2018	07/12/2018	295.5	TRI/TRC/DRAFT TUBE
107	KODAYAR-I HPS.	1	60	07/06/2018	02/08/2018	1356.5	STATOR WINDING REOPAIL/CLEANING
108	KODAYAR-II HPS.	2	40	16/08/2018	17/10/2018	1485.03	STATOR WINDING REOPAIL/CLEANING
109	KUNDAH-III HPS.	10	60	20/05/2018	26/06/2018	895.58	ANNUAL MAINTENANCE
110	KUNDAH-IV HPS.	13	50	02/05/2018	22/05/2018	488	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
111	LOWER METTUR-I	1	15	01/04/2018	09/04/2018	199.5	ANNUAL MAINTENANCE
		1	15	05/06/2018	19/06/2018	333.33	ANNUAL MAINTENANCE
		2	15	16/04/2018	05/05/2018	455.48	ANNUAL MAINTENANCE
		2	15	05/06/2018	19/06/2018	333.33	ANNUAL MAINTENANCE
112	LOWER METTUR-II	3	15	21/05/2018	04/06/2018	335.5	ANNUAL MAINTENANCE
		3	15	02/03/2019	21/03/2019	464.92	ANNUAL MAINTENANCE
		3	15	10/08/2018	23/08/2018	310.33	MISCELLANEOUS
		4	15	10/08/2018	23/08/2018	310.08	MISCELLANEOUS
		4	15	01/04/2018	11/04/2018	257	ANNUAL MAINTENANCE
		4	15	21/05/2018	04/06/2018	335.5	ANNUAL MAINTENANCE
113	LOWER METTUR-III	5	15	01/03/2019	20/03/2019	462.75	ANNUAL MAINTENANCE
		5	15	10/08/2018	23/08/2018	310.83	MISCELLANEOUS
		5	15	23/07/2018	30/07/2018	172.58	MISCELLANEOUS
		5	15	01/04/2018	14/04/2018	324.5	ANNUAL MAINTENANCE
		5	15	01/05/2018	22/05/2018	503.08	ANNUAL MAINTENANCE
		6	15	23/07/2018	30/07/2018	171.75	MISCELLANEOUS
		6	15	10/08/2018	23/08/2018	312.03	MISCELLANEOUS
		6	15	01/05/2018	05/06/2018	850.42	ANNUAL MAINTENANCE
114	METTUR DAM HPS.	2	12.5	17/02/2019	28/02/2019	274.08	ANNUAL MAINTENANCE
115	METTUR TUNNEL HPS.	1	50	01/02/2019	20/02/2019	466	ANNUAL MAINTENANCE
		1	50	02/04/2018	31/05/2018	1426	ANNUAL MAINTENANCE
		2	50	02/04/2018	31/05/2018	1426	ANNUAL MAINTENANCE
		2	50	21/02/2019	12/03/2019	466	ANNUAL MAINTENANCE
		3	50	13/03/2019	31/03/2019	425	ANNUAL MAINTENANCE
		3	50	01/04/2018	31/05/2018	1457	ANNUAL MAINTENANCE
		4	50	02/04/2018	31/05/2018	1426	ANNUAL MAINTENANCE
116	MOYAR HPS	2	12	10/05/2018	03/06/2018	581.25	STATOR WINDING REOPAIL/CLEANING
117	PAPANASAM HPS.	1	8	01/10/2018	03/10/2018	56.08	MISCELLANEOUS
		2	8	01/04/2018	29/04/2018	684.25	ANNUAL MAINTENANCE
118	PARSON`S VALLEY HPS.	1	30	04/06/2018	28/06/2018	582.75	ANNUAL MAINTENANCE
119	PERIYAR HPS.	1	42	10/03/2019	24/03/2019	344	ANNUAL MAINTENANCE
		1	42	01/04/2018	13/04/2018	304	ANNUAL MAINTENANCE
		2	42	01/04/2018	30/04/2018	703	ANNUAL MAINTENANCE
		3	42	20/04/2018	19/05/2018	703.25	ANNUAL MAINTENANCE
		4	35	01/04/2018	29/05/2018	1409	RENOVATION/MODERNISATION
		4	35	05/03/2019	14/03/2019	219	ANNUAL MAINTENANCE
120	PYKARA ULTMATE HPS.	2	50	17/11/2018	20/11/2018	74	MONTHLY MAINTENANCE
		2	50	24/06/2018	30/06/2018	158.4	ANNUAL MAINTENANCE
121	SARKARPATHY HPS.	1	30	02/04/2018	16/05/2018	1062.58	ANNUAL MAINTENANCE
122	SHOLAYAR HPS (TN)	1	35	01/04/2018	10/08/2018	3162.6	RENOVATION/MODERNISATION

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	35	01/04/2018	01/07/2018	2184	RENOVATION/MODERNISATION
		2	35	25/07/2018	27/07/2018	62.28	MISCELLANEOUS
123	SURULIYAR HPS.	1	35	03/01/2019	08/01/2019	126.75	MISCELLANEOUS
		1	35	16/05/2018	24/06/2018	944.68	ANNUAL MAINTENANCE
TSGENCO							
124	LOWER JURALA HPS	2	40	28/05/2018	31/07/2018	1544.25	MISCELLANEOUS
		3	40	01/06/2018	27/07/2018	1363.83	MISCELLANEOUS
125	NAGARJUN SGR HPS	1	110	20/04/2018	08/06/2018	1174.17	ANNUAL MAINTENANCE
		2	100.8	11/07/2018	16/07/2018	119.65	GENERATOR INSPECTION/TESTING/MTCE
		2	100.8	15/03/2019	20/03/2019	112.25	MISCELLANEOUS
		2	100.8	04/01/2019	31/01/2019	663.13	ANNUAL MAINTENANCE
		2	100.8	01/02/2019	09/02/2019	212.17	ANNUAL MAINTENANCE
		3	100.8	20/06/2018	25/07/2018	847.75	ANNUAL MAINTENANCE
		5	100.8	11/02/2019	15/02/2019	102.97	MAIN GENERTATOR TRANSFORMER MAINTENANCE
126	PRIYADARSHNI JURALA HPS	1	39	01/04/2018	26/04/2018	595.5	MISCELLANEOUS
		4	39	08/06/2018	07/07/2018	689.05	MISCELLANEOUS
EASTERN REGION							
APGENCO							
127	MACHKUND HPS	3	17	04/03/2019	07/03/2019	73.08	MISCELLANEOUS
		3	17	13/03/2019	31/03/2019	410.42	MISCELLANEOUS
		3	17	10/01/2019	18/01/2019	186.5	MISCELLANEOUS
		6	21.25	23/10/2018	26/10/2018	64.08	MISCELLANEOUS
DEPL							
128	JORETHANG LOOP	1	48	20/11/2018	24/11/2018	111.08	GENERATOR INSPECTION/TESTING/MTCE
		2	48	26/11/2018	28/11/2018	55.08	GENERATOR INSPECTION/TESTING/MTCE
DVC							
129	MAITHON HPS.	1	20	13/03/2019	26/03/2019	318.5	GENERATOR INSPECTION/TESTING/MTCE
		1	20	10/05/2018	01/06/2018	530.17	ANNUAL MAINTENANCE
		2	23.2	01/06/2018	30/06/2018	709.98	ANNUAL MAINTENANCE
		3	20	01/03/2019	07/03/2019	143.08	MAIN GENERTATOR TRANSFORMER MAINTENANCE
		3	20	03/12/2018	28/02/2019	2100.48	ANNUAL MAINTENANCE
130	PANCHET HPS.	1	40	16/07/2018	04/09/2018	1210.82	RENOVATION/MODERNISATION
GIPL							
131	CHUZACHEN HPS	1	55	04/02/2019	18/02/2019	353.6	ANNUAL MAINTENANCE
		2	55	04/02/2019	18/02/2019	353.95	ANNUAL MAINTENANCE
JUUNL							
132	SUBERNREKHA-I HPS.	1	65	03/05/2018	09/07/2018	1617.98	ANNUAL MAINTENANCE
133	SUBERNREKHA-II HPS.	2	65	03/05/2018	26/06/2018	1305.98	ANNUAL MAINTENANCE
NHPC							
134	RANGIT HPS	1	20	27/01/2019	18/02/2019	543.42	ANNUAL MAINTENANCE

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	20	28/12/2018	26/01/2019	700.42	ANNUAL MAINTENANCE
		3	20	21/02/2019	13/03/2019	494.08	ANNUAL MAINTENANCE
135	TEESTA LOW DAM-III HPS	1	33	26/02/2019	11/03/2019	328.67	ANNUAL MAINTENANCE
		2	33	22/01/2019	03/02/2019	294.02	ANNUAL MAINTENANCE
		3	33	05/02/2019	22/02/2019	431.73	ANNUAL MAINTENANCE
		4	33	07/01/2019	19/01/2019	307.25	ANNUAL MAINTENANCE
		4	33	01/04/2018	14/04/2018	328.4	SWITCHING EQUIPMENT
136	TEESTA LOW DAM-IV HPS	1	40	15/12/2018	03/01/2019	466.67	ANNUAL MAINTENANCE
		2	40	25/02/2019	21/03/2019	586.42	ANNUAL MAINTENANCE
		3	40	07/01/2019	24/01/2019	418.92	ANNUAL MAINTENANCE
		4	40	31/01/2019	16/02/2019	394	ANNUAL MAINTENANCE
137	TEESTA V HPS	2	170	08/12/2018	17/12/2018	232.52	ANNUAL MAINTENANCE
		3	170	19/12/2018	28/12/2018	232.3	ANNUAL MAINTENANCE
OHPC							
138	BALIMELA HPS.	3	60	04/02/2019	08/03/2019	775	ANNUAL MAINTENANCE
		4	60	03/07/2018	31/07/2018	677.4	ANNUAL MAINTENANCE
		5	60	28/08/2018	27/01/2019	3656.2	ANNUAL MAINTENANCE
		6	60	01/04/2018	20/04/2018	476.13	ANNUAL MAINTENANCE
139	RENGALI HPS.	1	50	30/10/2018	11/12/2018	1017.25	ANNUAL MAINTENANCE
		4	50	17/12/2018	28/02/2019	1758.33	ANNUAL MAINTENANCE
		5	50	04/06/2018	19/06/2018	360.67	TURBINE MISC/GOVERNOR
140	UPPER INDRAVATI HPS.	1	150	24/12/2018	23/01/2019	728.08	ANNUAL MAINTENANCE
		2	150	25/01/2019	21/02/2019	656.22	ANNUAL MAINTENANCE
		4	150	22/06/2018	23/08/2018	1487.75	ANNUAL MAINTENANCE
141	UPPER KOLAB HPS.	1	80	26/11/2018	10/12/2018	331.87	BUTTERFLY VALVE INSPECTIN/REPAIR/MTCE
		3	80	26/11/2018	12/12/2018	377.87	BUTTERFLY VALVE INSPECTIN/REPAIR/MTCE
		4	80	26/11/2018	12/12/2018	377.87	BUTTERFLY VALVE INSPECTIN/REPAIR/MTCE
SKPPPL							
142	DIKCHU HPS	1	48	16/02/2019	18/02/2019	71.98	ANNUAL MAINTENANCE
		2	48	16/02/2019	18/02/2019	71.98	ANNUAL MAINTENANCE
		2	48	15/12/2018	31/12/2018	407.98	ANNUAL MAINTENANCE
TUL							
143	TEESTA-III HPS	1	200	19/01/2019	01/02/2019	315.68	ANNUAL MAINTENANCE
		4	200	01/12/2018	13/12/2018	294	ANNUAL MAINTENANCE
		5	200	14/12/2018	27/12/2018	320.67	ANNUAL MAINTENANCE
		5	200	30/12/2018	18/01/2019	454.63	ANNUAL MAINTENANCE
		6	200	21/12/2018	27/12/2018	152.67	ANNUAL MAINTENANCE
		6	200	03/02/2019	06/03/2019	764.3	ANNUAL MAINTENANCE
WBSEDCL							
144	PURULIA PSS HPS.	1	225	18/04/2018	25/04/2018	178.08	CAPITAL/3 YEARLY MTCE.
		2	225	01/05/2018	08/05/2018	176.5	CAPITAL/3 YEARLY MTCE.

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 50 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	225	11/12/2018	17/12/2018	147.17	CAPITAL/3 YEARLY MTCE.
		4	225	02/12/2018	10/12/2018	203.33	CAPITAL/3 YEARLY MTCE.
145	RAMMAM HPS.	1	12.5	03/01/2019	10/01/2019	168	ANNUAL MAINTENANCE
		1	12.5	11/01/2019	18/01/2019	168	ANNUAL MAINTENANCE
		3	12.5	01/02/2019	10/02/2019	216	ANNUAL MAINTENANCE
		4	12.5	05/05/2018	30/05/2018	612.98	PRESSURE SHAFT/PENSTOCK
NORTH EASTERN REGION							
APGPCL							
146	KARBI LANGPI HPS.	1	50	01/04/2018	13/04/2018	293.87	ANNUAL MAINTENANCE
		2	50	01/05/2018	11/05/2018	257.4	ANNUAL MAINTENANCE
MePGCL							
147	MYNTDU(LESHKA) St-1 HPS	1	42	01/02/2019	08/02/2019	183	ANNUAL MAINTENANCE
		2	42	01/04/2018	25/05/2018	1311.7	ANNUAL MAINTENANCE
		2	42	08/02/2019	28/02/2019	488.98	ANNUAL MAINTENANCE
		3	42	18/12/2018	31/12/2018	326.98	ANNUAL MAINTENANCE
		3	42	01/04/2018	14/04/2018	331.25	ANNUAL MAINTENANCE
148	UMIAM HPS ST-I	1	9	08/10/2018	11/10/2018	79	MISCELLANEOUS
		1	9	09/08/2018	11/08/2018	55	MISCELLANEOUS
		1	9	08/05/2018	11/05/2018	76	ROUTINE MAINTENANCE
		2	9	10/07/2018	14/07/2018	98.92	MISCELLANEOUS
		3	9	09/09/2018	21/09/2018	290.5	MISCELLANEOUS
		4	9	09/08/2018	11/08/2018	55	MISCELLANEOUS
149	UMIAM HPS ST-IV	7	30	16/05/2018	26/05/2018	261.55	ANNUAL MAINTENANCE
		8	30	25/03/2019	30/03/2019	141.5	ANNUAL MAINTENANCE
NEEPCO							
150	DOYANG HPS.	1	25	06/04/2018	03/05/2018	658.83	ANNUAL MAINTENANCE
		2	25	04/02/2019	13/02/2019	229	ANNUAL MAINTENANCE
		3	25	05/05/2018	21/05/2018	400.5	ANNUAL MAINTENANCE
151	KHONDONG HPS.	1	25	21/01/2019	06/02/2019	397.98	ANNUAL MAINTENANCE
		2	25	01/04/2018	17/04/2018	400.17	ANNUAL MAINTENANCE
		2	25	15/11/2018	07/12/2018	540.85	ANNUAL MAINTENANCE
152	KOPILI HPS.	1	50	16/04/2018	12/05/2018	635.8	ANNUAL MAINTENANCE
		2	50	20/02/2019	05/03/2019	328.48	ANNUAL MAINTENANCE
		3	50	07/01/2019	12/01/2019	135.22	PRESSURE SHAFT/PENSTOCK
		3	50	01/04/2018	03/04/2018	65.22	ANNUAL MAINTENANCE
		3	50	23/01/2019	17/02/2019	616.75	ANNUAL MAINTENANCE
		4	50	02/01/2019	21/01/2019	472.17	ANNUAL MAINTENANCE
153	RANGANADI HPS.	3	135	03/02/2019	09/02/2019	166	ANNUAL MAINTENANCE
NHPC							
154	LOKTAK HPS.	1	35	06/02/2019	18/02/2019	307.08	CAPITAL/3 YEARLY MTCE.
		2	35	21/02/2019	05/03/2019	305.17	ANNUAL MAINTENANCE
		3	35	07/03/2019	15/03/2019	208.37	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 710 hydro generating units installed in 204 Hydro Electric Power Stations, non-availability of hydro-electric units in the country due to forced outages during the year 2018-19 (excluding miscellaneous outages) was 2.87% as compared to 3.17% during 2017-18.

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

During 2018-19, the generator and turbine faults accounted for 31.83% and 39.02% of the forced outages respectively whereas other equipment & civil structure faults accounted for 17.46% & 11.69% respectively of the forced outages. The summary of forced outages caused due to breakdown of generator, turbine and other equipment during 2018-19 vis-à-vis 2017-18 is given in **Table 5.1** below.

TABLE 5.1

EQUIPMENT/SYSTEM-WISE FORCED OUTAGES
(2018-19 VIS-A-VIS 2017-18)

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage		Increase/ Decrease viz-z-viz 2017-18
		2018-19	2017-18	2018-19	2017-18	
1	Generator	59109.9	67919.75	31.83	39.96	-12.97
2	Turbine	72463.69	42910.29	39.02	25.25	68.87
3	Civil Structure	21704.48	27547.61	11.69	16.21	-21.21
4	Other Equipment	32428.44	31584.03	17.46	18.58	2.67
	Total	**185706.51**	**169961.68**	**100**	**100**	**9.26**

It is observed that forced outages in 2018-19 vis-a-vis 2017-18 have increased on account of turbine whereas the same have decreased on account of generator, civil structures and other equipment.

5.2 FORCED OUTAGE DUE TO GENERATOR COMPONENTS

5.2.1 The major source of forced outage during 2018-19 includes Stator Fault (33.97%), followed by Upper Guide Bearing Fault (19.09%), Thrust Bearing Fault (11.83%) and Excitation System Faults (5.01%) which together accounted for more than the 69% of the forced outages due to generator components. The fault in Miscellaneous Generator Components accounted for another 7.48% of the forced outages.

The details of forced outages due to various generator faults and associated systems under different categories based on their size are given in **Table 5.2** below:

TABLE 5.2

FORCED OUTAGE HOURS DUE TO BREAKDOWN OF GENERATOR COMPONENTS (PERIOD: 2018-19)

Sl. No.	Components of Generator	Unit size up to 50 MW		Unit size above 50 MW & up to 100 MW		Unit size above 100 MW		Total	
1	Stator	1226.50	13.71	***7690.17***	***51.54***	***11165.52***	***32.22***	***20082.19***	***33.97***
2	Rotor	277.13	3.10	1863.52	12.49	590.45	1.70	**2731.10**	**4.62**
3	Excitation System	132.67	1.48	617.15	4.14	2214.40	6.39	**2964.22**	**5.01**
4	Automatic Voltage Regulator	358.17	4.01	775.97	5.20	117.38	0.34	**1251.52**	**2.12**
5	Protection System	52.48	0.59	293.83	1.97	1931.47	5.57	**2277.78**	**3.85**
6	Generator Cooling System	1424.66	15.93	993.87	6.66	97.70	0.28	**2516.23**	**4.26**
7	Thrust Bearing	***4706.25***	***52.62***	1359.05	9.11	928.55	2.68	**6993.85**	**11.83**
8	Upper Guide Bearing	1.30	0.01	18.25	0.12	***11265.23***	***32.51***	**11284.78**	**19.09**
9	Lower Guide Bearing	407.57	4.56	550.03	3.69	1167.18	3.37	**2124.78**	**3.59**
10	Vibration/ Sound / Alignment	0.53	0.01	0.42	0.00	2093.37	6.04	**2094.32**	**3.54**
11	Brake and Jacks	0.00	0.00	0.00	0.00	366.07	1.06	**366.07**	**0.62**
12	Miscellaneous Generator Components	355.75	3.98	757.22	5.08	3310.09	7.84	**4423.06**	**7.48**
	Total	**8943.01**	**100**	**14919.48**	**100**	**35247.41**	**100**	**59109.90**	**100**

From the Table 5.2, it is observed that Thrust Bearing faults (52.62%) constitute the major reason for forced outage in respect unit size up to 50 MW while Stator faults and Upper

Guide Bearing faults were the major contributors of forced outage in respect unit size above 50 MW.

5.3 FORCED OUTAGE DUE TO TURBINE COMPONENTS

5.3.1 Faults in Main Inlet Valve (24.08%), Governing System (15.78%) and Miscellaneous Turbine Components (44.43%) are the major reasons of forced outages on account of turbine components.

The details of forced outages due to various turbine faults and associated systems under different categories based on their size are given in **Table 5.3** below:

TABLE 5.3

FORCED OUTAGE HOURS DUE TO BREAKDOWN OF TURBINE COMPONENTS
PERIOD: 2018-19

Sl. No.	Components of Turbine	Unit size up to 50 MW		Unit size above 50 MW & up to 100 MW		Unit size above 100 MW		Total	
1	Bearing	1075.78	8.15	2633.60	13.94	376.88	0.93	**4086.26**	**5.64**
2	Runner/Underwater Parts	1340.83	10.16	21.42	0.11	469.18	1.16	**1831.43**	**2.53**
3	Main Inlet Valve	141.50	1.07	792.28	4.19	***16516.23***	***40.92***	**17450.01**	**24.08**
4	Governor System	***6029.90***	***45.68***	2877.20	15.22	2527.65	6.26	**11434.75**	**15.78**
5	Guide Vanes	30.45	0.23	84.80	0.45	1485.38	3.68	**1600.63**	**2.21**
6	Shaft Vibration / Alignment/Sound	1920.22	14.55	113.80	0.60	1831.15	4.54	**3865.17**	**5.33**
7	Miscellaneous Turbine Components	2661.05	20.16	12375.37	65.48	17159.02	42.51	**32195.44**	**44.43**
	Total	**13199.73**	**100**	**18898.47**	**100**	**40365.5**	**100**	**72463.70**	**100**

From the Table 5.3, it is observed that Governor System faults (45.68%) constitute the major reason for forced outage in respect unit size up to 50 MW while Main Inlet Valve, Governor System and Bearing faults were the major contributors of forced outage in respect unit size above 50 MW.

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 5.4** below:

TABLE 5.4

FORCED OUTAGES-TURBINE TYPE-WISE
PERIOD: 2018-19

S. No.	Type of Turbine	Number of Units	Installed Capacity MW	Forced Outage Hours	Avg. Forced Outage Hours per Unit
1	Bulb	26	684.00	57.12	2.20
2	Francis & Reversible	412	32050.32	48994.33	118.92
3	Kaplan	128	4487.00	18895.82	147.62
4	Pelton	144	8177.90	4516.43	31.36
	TOTAL	**710**	**45399.22**	**72463.69**	**102.06**

Forced outage rate was observed to be the highest in case of Kaplan turbines (147.62 hrs./unit) followed by Francis & Reversible turbines (118.92 hrs./unit), Pelton turbines (31.36 hrs./unit) and lowest in case of Bulb turbines (2.20 hrs./unit)

5.5 ANALYSIS BASED ON MAKE OF UNITS

The comparative performance of generating units of different makes is indicated in **Table 5.5**. The outage figures in the table relate to faults in turbine and generator only.

TABLE 5.5

FORCED OUTAGES DUE TO FAULT IN TURBINE & GENERATOR (SUPPLIER-WISE) PERIOD: 2018-19

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	19210.02	50662.32	167.76	3rd
2	Others*	49	3005.50	735.96	15.02	1st
	SUB TOTAL	**351**	**22215.52**	**51398.28**	**146.43**	

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
B-Imported						
1	U.S.A	9	351.00	3014.28	334.92	9th
2	U.K	63	1242.10	15062.56	239.09	6th
3	FRANCE	31	2179.20	7916.46	255.37	7th
4	CANADA	44	3132.00	8627.75	196.09	5th
5	SWITZERLAND	21	790.20	8959.95	426.66	10th
6	USSR	26	2804.00	626.20	24.08	2nd
7	JAPAN	76	6398.20	12972.15	170.69	4th
8	Other	89	6287.00	22995.96	258.38	8th
	SUB-TOTAL	**359**	**23183.70**	**80175.31**	**223.33**	
	TOTAL	**710**	**45399.22**	**131573.59**	**185.31**	

* Indigenous supplier like Andriz India, B Fouress Bangalore, Alstom India, VA Tech India, etc.

It is observed that Indigenous units other than BHEL (15.02 hrs./unit) and the imported generating units from USSR (24.08 hrs./unit) are the top two performers.

5.6 ANALYSIS AGE-WISE

Details of forced outages of generating units commissioned during different years are indicated in **Table 5.6**. 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 - 5.6

FORCED OUTAGES DUE TO EQUIPMENT BREAKDOWN (AGE-WISE) PERIOD: 2018-19

S. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Average Annual Non-availability per Unit (Hours)
1	2018-19	3	140.00	4.28	1.43
2	2017-18	16	795.00	2801.67	175.10
3	2016-2017	18	1659.00	457.63	25.42
4	2015-2016	17	1516.00	532.38	31.32
5	2010-11 to 2014-15	63	4437.02	1217.83	19.33
6	2005-06 to 2009-10	66	7077.00	9875.94	149.64
7	2000-01 to 2004-05	74	6741.80	9828.11	132.81
8	1989-90 to 1999-2000	86	5769.70	28775.03	334.59

S. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Average Annual Non-availability per Unit (Hours)
9	1978-79 to 1988-89	124	7259.10	24620.16	198.55
10	1967-68 to 1977-78	81	5279.75	23706.8	292.68
11	Up to 1966-67	162	4724.85	62182.2	383.84
	Total	**710**	**45399.22**	**164002.03**	**230.99**

It is observed that the per unit forced outage rate was relatively higher in older units and was maximum in the case of units commissioned up to 1966-67 (383.84 hrs./unit).

5.7 REGION-WISE PERFORMANCE

The region-wise summary of performance of the hydel generating units is indicated in **Table 5.7**. 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 5.7

FORCED OUTAGES – REGION-WISE
PERIOD: 2018-19

S. No.	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Forced Outages
1	Northern	245	19023.27	1.19
2	Western	101	7392.00	1.22
3	Southern	246	11694.50	5.72
4	Eastern	84	5862.45	4.02
5	North Eastern	34	1427.00	5.83
	All India	**710**	**45399.22**	**2.87**

Performance of hydro generating equipments installed in Northern Region was the best as the non-availability due to forced outages was least (1.19%). The average non-availability of the units in the North Eastern Region (5.83) and in the Southern Region (7.75%) 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 5.8**.

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 5.8

FORCED OUTAGES- BOARD /CORPORATION WISE
PERIOD: 2018-19

S. No.	Organisation	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Average Annual Forced Outage/Unit (Hours)
Central Sector					
1	BBMB	28	2920.3	5202.13	185.79
2	DVC	5	143.2	4004.45	800.89
3	NEEPCO.	16	900	11922.92	745.18
4	NHDC	16	1520	360.18	22.51
5	NHPC	70	5451.2	2783.32	39.76
6	NTPC LTD.	4	800	57.57	14.39
7	SJVNL	12	1912.02	117.77	9.81
8	THDC	8	1400	118.72	14.84
	Sub Total	**159**	**15046.72**	**24567.05**	**154.51**
Private Sector					
1	ADHPL	2	192.00	244.67	122.34
2	AHPC (GVK)	4	330.00	167.23	41.81
3	DEPL	2	96.00	473.03	236.52
4	DLHP	1	34.00	0.50	0.50
5	E.P.P.L.	2	100.00	8.33	4.17
6	GBHPPL	2	70.00	234.00	117.00
7	GIPL	2	110.00	232.58	116.29
8	HBPCL	7	1300.00	118.33	16.90
9	IAEPL	3	36.00	0.00	0.00
10	JPPVL	4	400.00	48.43	12.11
11	MPCL	2	86.00	485.30	242.65
12	SEPL	2	97.00	67.48	33.74
13	SKPPPL	2	96.00	303.85	151.93
14	TATA MAH.	15	447.00	364.68	24.31
	Sub Total	**50**	**3394.00**	**2748.44**	**54.97**
State Sector					
1	APGENCO	34	1796.75	52047.97	1530.82
2	APGPCL	2	100.00	92.78	46.39
3	CSPGCL	3	120.00	260.42	86.81
4	GSECL	8	540.00	68.75	8.59
5	HPPCL	5	295.00	18.28	3.66
6	HPSEB	12	372.00	2409.10	200.76

S. No.	Organisation	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Average Annual Forced Outage/Unit (Hours)
7	JKSPDC	12	1110.00	1514.00	126.17
8	JUUVN	2	130.00	0.00	0.00
9	KPCL	66	3572.20	23915.41	362.35
10	KSEB	46	1856.50	11723.85	249.44
11	MAHAGENCO	24	2406.00	5898.83	245.78
12	MePGCL	13	322.00	956.76	73.60
13	MPPGCL	23	875.00	3119.14	135.61
14	OHPC	31	2027.50	21699.43	699.98
15	PSPCL	25	1051.00	1219.08	48.76
16	RRVUNL	11	411.00	1967.38	178.85
17	SSNNL	11	1450.00	1.47	0.13
18	TNGDCL	69	2178.20	48057.43	696.48
19	TSGENCO	36	2405.60	4480.12	124.45
20	TUL	6	1200.00	261.38	43.56
21	UJVNL	34	1252.15	10078.38	296.42
22	UPJVNL	15	501.60	11922.82	794.85
23	WBSEDCL	12	986.00	1799.02	149.92
	Sub Total	**501**	**26958.50**	**203511.81**	**406.21**
	All India	**710**	**45399.22**	**232997.17**	**328.17**

It is observed that utility-wise, per unit forced outages for generating units was maximum in respect of hydro-electric stations under APGENCO (1530.82 hrs./unit). On the other hand, the hydro generating units of IAEPL and JUUNL etc. have reported nil forced outage operation.

5.9 DURATION OF FORCED OUTAGES

There were total 3797 forced outages/tripping during the year 2018-19. 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 5.9** and **Exhibit 5.1**. It could be seen that about 63.10% of the total forced shutdown were of duration less than 6 hours while 23.44% of outages were of duration varying from 6 to 24 hours and only 3.29% of shutdowns persisted for more than 10 days.

TABLE 5.9

DURATION PATTERN OF FORCED OUTAGES
PERIOD: 2018-19

S. No.	Duration of Hours	Number of Outages	% of Total of Outages
1	Less than 6 hour	2396	63.10
2	6 to 24 hours	890	23.44
3	1 to 10 days	386	10.17
4	More than 10 days	125	3.29
	Total No. of Outages	**3797**	**100**

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 2018-19 vis-à-vis 2017-18 is summarized below in **Table 5.10.**

TABLE 5.10

NON-AVAILABILITY OF HE STATIONS DUE TO FORCED OUTAGES
(2018-19 VIS-A-VIS 2017-18)

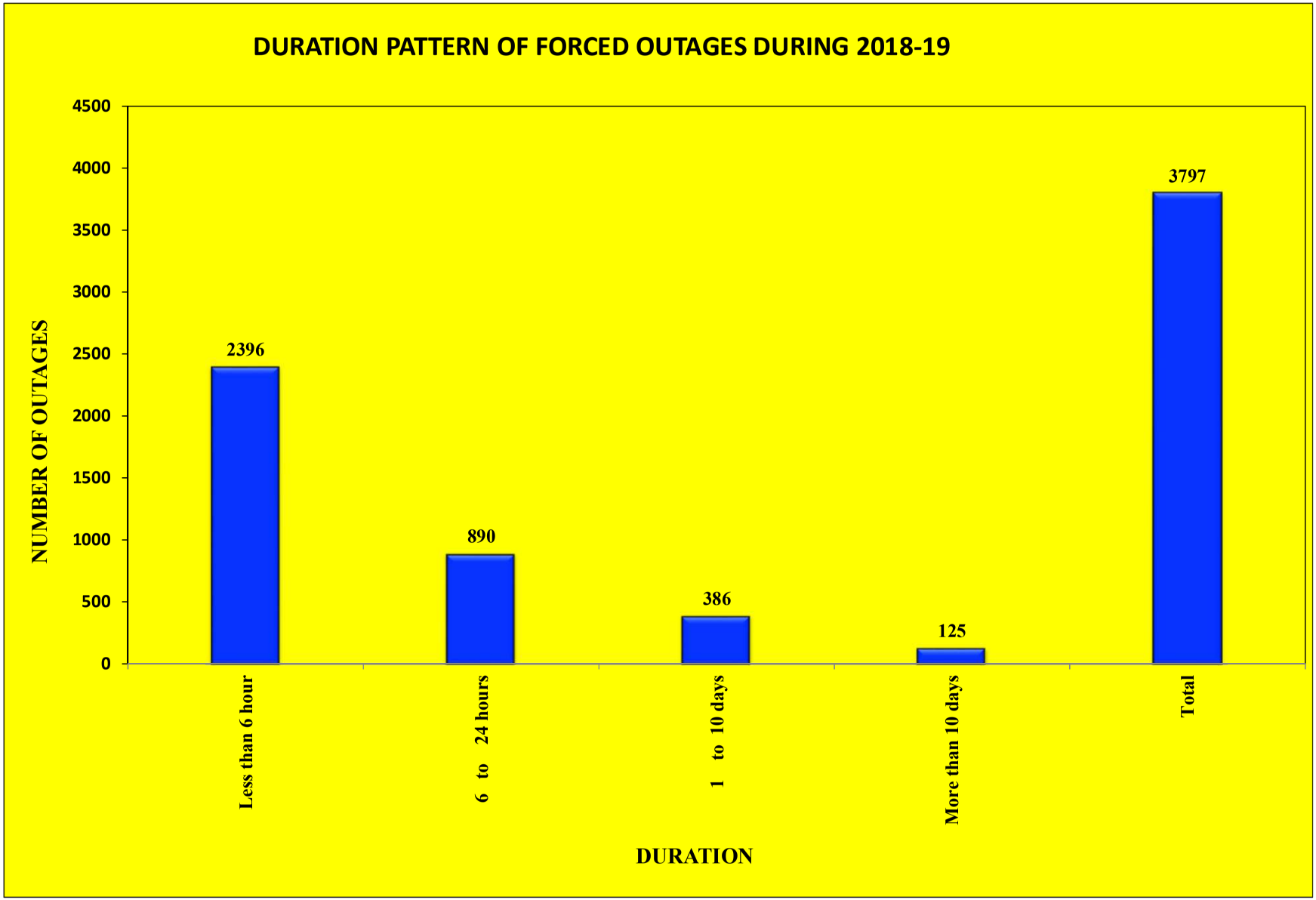
% Non-Availability due to Forced Outages	2018-19				2017-18			
	Stations		Capacity		Stations		Stations	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
0	22	10.78	4036.00	8.89	17	8.25	4206.20	9.29
>0 to 1	102	50.00	28246.52	62.22	106	51.46	24636.95	54.39
>1 to 2	18	8.82	3039.25	6.69	24	11.65	3756.62	8.29
>2 to 3	9	4.41	1069.20	2.36	8	3.88	1741.60	3.85
>3 to 4	5	2.45	1344.00	2.96	5	2.43	816.00	1.80
>4 to 5	7	3.43	854.00	1.88	6	2.91	1730.00	3.82
>5	41	20.10	6810.25	15.00	40	19.42	8406.05	18.56
Total	**204**	**100**	**45399.22**	**100**	**206**	**100**	**45293.42**	**100**

It could be seen from above that there was no forced outage at 22 nos. (10.78% of total) hydro-electric stations during 2018-19 as compared to 17 nos. (8.25% of total) hydro-electric stations during 2017-18.

20.10% of stations had operational availability lower than 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, etc. Further, those stations which are having continuously high planned maintenance/forced 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 2018-19
NUMBER OF OUTAGES
4500
4000
3500
3000
2500
2000
1500
1000
500
0
2396
890
386
125
3797
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 2018-19

(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	1	96	21/08/2018	25/08/2018	101.18	TRIPPING OF TRANSMISSION LINE
		2	96	21/08/2018	25/08/2018	107	TRIPPING OF TRANSMISSION LINE
AHPC (GVK)							
2	SHRINAGAR HPS	4	82.5	28/07/2018	29/07/2018	26.02	INTAKE STRICT./TRASH RACK
BBMB							
3	BHAKRA LEFT HPS	2	126	13/06/2018	16/06/2018	68.8	MISCELLANEOUS
		3	108	04/04/2018	07/04/2018	61.55	GENERATOR FAULTS
		3	108	19/04/2018	20/04/2018	28.08	TRANSFORMER PROTECTION
		3	108	13/01/2019	16/01/2019	83.42	GUIDE VANES
4	DEHAR H P S	2	165	06/09/2018	07/11/2018	1487.77	PROTECTION OPERATION
		4	165	16/06/2018	20/06/2018	110.87	ROTOR EARTH FAULT
5	GANGUWAL HPS	1	29.25	28/07/2018	31/07/2018	70.58	POWER HOUSE MISC.
		1	29.25	26/08/2018	27/08/2018	30.83	POWER HOUSE MISC.
		1	29.25	19/02/2019	21/02/2019	46.5	GENERATOR FAULTS
		2	24.2	01/02/2019	03/02/2019	56.67	SHAFT VIBRS./ALIGNM/SOUND
6	KOTLA HPS	3	24.2	22/03/2019	23/03/2019	27.92	EXCITATION OTHERS
7	PONG H P S	1	66	02/05/2018	28/05/2018	619.3	TRANSFORMER PROTECTION
		3	66	22/05/2018	11/06/2018	472.75	GENRATOR OTHERS
		3	66	20/06/2018	26/06/2018	141.5	EHT/CT/PT
		5	66	09/03/2019	24/03/2019	351.08	GENERATOR FAULTS
		5	66	17/09/2018	26/09/2018	216.73	GENERATOR FAULTS
		6	66	24/12/2018	08/02/2019	1101.32	TRANSFORMER PROTECTION
GBHPPL							
8	BUDHIL HPS	1	35	08/02/2019	09/02/2019	33.7	LINE BREAKER OVER CURRENT/EARTH FAULT
		2	35	11/02/2019	16/02/2019	118.53	GENERATOR FAULTS
		2	35	08/02/2019	09/02/2019	33.7	LINE BREAKER OVER CURRENT/EARTH FAULT
HBPCL							
9	BASPA HPS	1	100	27/07/2018	29/07/2018	33.67	HRI/HRC/SURGF SHAFT PROPS
		2	100	27/07/2018	29/07/2018	33.17	HRI/HRC/SURGF SHAFT PROPS
		3	100	27/07/2018	29/07/2018	33.5	HRI/HRC/SURGF SHAFT PROPS
HPSEB							
10	GIRI BATA HPS	2	30	28/07/2018	29/07/2018	35	HEAVY DOWN POUR/RAIN WATER LEAKAGE/ FLOOD IN RIVER
		2	30	01/07/2018	03/07/2018	62	POWER HOUSE MISC
11	LARJI HPS	2	42	24/07/2018	31/07/2018	179.57	SHEAR PIN BROKEN/FAILURE/REPLACEMENT
12	SANJAY HPS	1	40	18/01/2019	31/03/2019	1714.33	RUNNER/UNDER WATER PARTS
		1	40	24/06/2018	25/06/2018	26.92	TURBINE OTHERS
JKSPDC							
13	BAGLIHAR HPS	1	150	13/08/2018	14/08/2018	28.67	EHG/GOV. FAULTS, MISC.
		1	150	13/06/2018	14/06/2018	25.92	LINE BREAKER /AIR LEAK ABCB/MOCB OIL LEAK
		2	150	13/06/2018	14/06/2018	26.13	LINE BREAKER /AIR LEAK ABCB/MOCB OIL LEAK
		3	150	13/06/2018	14/06/2018	26.2	LINE BREAKER /AIR LEAK ABCB/MOCB OIL LEAK

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
14	LOWER JHELUM HPS	1	35	28/05/2018	31/05/2018	89.23	MISCELLANEOUS
15	UPPER SINDH-II HPS	3	35	13/08/2018	14/08/2018	35.67	EXCITATION OTHERS
		3	35	13/01/2019	31/01/2019	444.48	LGB PADS DAMAGED
		4	35	17/09/2018	19/09/2018	64.65	MISCELLANEOUS
		5	35	09/08/2018	10/08/2018	29.25	LINE BREAKER /AIR LEAK ABCB/MOCB OIL LEAK
		5	35	02/12/2018	03/12/2018	38	LINE BREAKER /AIR LEAK ABCB/MOCB OIL LEAK
		5	35	04/12/2018	15/12/2018	287	LINE BREAKER /AIR LEAK ABCB/MOCB OIL LEAK
MPCL							
16	MALANA HPS	1	43	08/03/2019	19/03/2019	268.98	OTHER (D/T,GUIDE/STAY VANES
		1	43	12/08/2018	17/08/2018	118.87	DESILTING SYSTEM
		2	43	07/03/2019	10/03/2019	60.5	INTAKE STRICT./TRASH RACK
NHPC							
17	CHAMERA- I HPS	3	180	28/08/2018	31/08/2018	80.73	EHG/GOV. FAULTS, MISC.
18	CHAMERA- II HPS	2	100	13/03/2019	16/03/2019	75.22	LINE BREAKER /AIR LEAK ABCB/MOCB OIL LEAK
19	CHAMERA-III HPS	2	77	06/01/2019	11/01/2019	126.9	SWITCHYARD MISC.
		3	77	06/01/2019	11/01/2019	126.6	SWITCHYARD MISC.
20	DHAULI GANGA HPS	1	70	25/11/2018	26/11/2018	27.67	GEN. TRANSF. OIL PUMPS FAIL/SUPPLY FAIL
		1	70	08/06/2018	10/06/2018	45.7	OTHER (D/T,GUIDE/STAY VANES
21	DULHASTI HPS	1	130	19/07/2018	20/07/2018	29.67	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		3	130	09/02/2019	17/02/2019	181.1	TURBINE FAULTS
		3	130	05/02/2019	09/02/2019	107.67	RUNNER/UNDER WATER PARTS
22	KISHANGANGA HPS	1	110	02/03/2019	05/03/2019	74.3	NEEDLE PROBLEM
		1	110	03/11/2018	08/11/2018	126.03	TR. C.W. PUMP FAIL/SUPPLY FAIL/LEAKAGE
		1	110	15/07/2018	16/07/2018	25.07	TURBINE FAULTS
		1	110	23/03/2019	25/03/2019	50.1	NEEDLE PROBLEM
		1	110	19/12/2018	20/12/2018	36.23	NEEDLE PROBLEM
		2	110	17/02/2019	19/02/2019	47.28	UPPER GUIDE BEARING
		3	110	20/09/2018	23/09/2018	71.85	EXCITATION PROBLEMS
		3	15	16/11/2018	19/11/2018	70.67	ROTOR EARTH FAULT
23	PARBATI-III HPS	1	130	10/05/2018	13/05/2018	82.33	PENSTOCK REPAIR WORKS
		1	130	18/09/2018	19/09/2018	28.57	GENERATOR FAULTS
		2	130	15/05/2018	18/05/2018	81.88	ROTOR EARTH FAULT
		2	130	10/05/2018	13/05/2018	82	PENSTOCK REPAIR WORKS
		3	130	01/08/2018	02/08/2018	32.82	SHEAR PIN BROKEN/FAILURE/REPLACEMENT
		3	130	02/05/2018	03/05/2018	34.83	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		4	130	19/04/2018	21/04/2018	47.13	PROTECTION OPERATION
24	TANAKPUR HPS	1	31.4	17/07/2018	19/07/2018	48.83	PROTECTION OPERATION
25	URI-I HPS	2	120	14/06/2018	20/06/2018	142.98	MISCELLANEOUS
26	URI-II HPS	1	60	29/05/2018	30/05/2018	34.73	FOREBAY/RES./INSEPCTION/REPAIR/PROBLEM
		2	60	29/05/2018	30/05/2018	35.22	FOREBAY/RES./INSEPCTION/REPAIR/PROBLEM
		3	60	29/05/2018	30/05/2018	34.32	FOREBAY/RES./INSEPCTION/REPAIR/PROBLEM
		4	60	29/05/2018	30/05/2018	36.63	FOREBAY/RES./INSEPCTION/REPAIR/PROBLEM

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
NTPC Ltd.							
27	KOLDAM	2	200	04/10/2018	05/10/2018	31	OTHER (D/T,GUIDE/STAY VANES
PSPCL							
28	ANANDPUR SAHIB-I HPS	2	33.5	23/04/2018	30/04/2018	181.48	MISCELLANEOUS
29	MUKERIAN-IV HPS	12	19.5	10/06/2018	17/06/2018	165.57	FORCED OUTAGE
30	RANJIT SAGAR HPS	1	150	18/07/2018	23/07/2018	122.08	MISCELLANEOUS
		1	150	24/04/2018	26/04/2018	50.2	THRUST BEARING
		1	150	03/04/2018	23/04/2018	481	MISCELLANEOUS
RRVUNL							
31	MAHI BAJAJ-I HPS	2	25	28/11/2018	01/12/2018	71.33	TRANSFORMER PROTECTION
32	R P SAGAR HPS	1	43	04/05/2018	05/05/2018	32	FORCED OUTAGE
		1	43	09/11/2018	10/11/2018	24.2	COOLING WATER SYSTEM
		2	43	06/08/2018	14/08/2018	190.83	MISCELLANEOUS
SJVNL							
33	NATHPA JHAKRI HPS	4	250	21/12/2018	22/12/2018	29.48	UPPER GUIDE BEARING
THDC							
34	TEHRI ST-1 HPS	2	250	22/07/2018	25/07/2018	62.58	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
UJVNL							
35	CHIBRO (YAMUNA) HPS	1	60	13/01/2019	23/01/2019	249.17	OTHER (D/T,GUIDE/STAY VANES
36	CHILLA HPS	1	36	13/07/2018	18/07/2018	122.13	HEAVY DOWN POUR/RAIN WATER LEAKAGE/ FLOOD IN RIVER
		2	36	13/07/2018	31/07/2018	441.15	HEAVY DOWN POUR/RAIN WATER LEAKAGE/ FLOOD IN RIVER
		3	36	13/07/2018	11/10/2018	2161.75	HEAVY DOWN POUR/RAIN WATER LEAKAGE/ FLOOD IN RIVER
		4	36	13/07/2018	27/11/2018	3290.5	HEAVY DOWN POUR/RAIN WATER LEAKAGE/ FLOOD IN RIVER
37	DHAKRANI HPS	1	11.25	30/11/2018	08/12/2018	199.25	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
38	DHALIPUR HPS	3	17	01/11/2018	30/11/2018	696.32	EHG/GOV. FAULTS, MISC.
		3	17	05/06/2018	08/06/2018	79.75	EHG/GOV. FAULTS, MISC.
39	MANERI BHALI - I HPS	1	30	02/11/2018	03/11/2018	38.08	OTHER (D/T,GUIDE/STAY VANES
		2	30	29/09/2018	01/10/2018	64.08	OTHER (D/T,GUIDE/STAY VANES
		3	30	20/07/2018	22/07/2018	51.42	TURBINE
40	RAMGANGA HPS	1	66	19/05/2018	23/05/2018	99.98	EHG/GOV. FAULTS, MISC.
		1	66	28/11/2018	02/12/2018	95.33	EHG/GOV. FAULTS, MISC.
		2	66	19/05/2018	02/06/2018	328.17	EXCITATION OTHERS
		2	66	01/05/2018	06/05/2018	134	EXCITATION OTHERS
		2	66	06/11/2018	13/11/2018	182.33	EXCITATION OTHERS
UPJVNL							
41	KHARA HPS	2	24	25/05/2018	28/05/2018	71.73	FORCED OUTAGE
		3	24	01/12/2018	31/12/2018	743.98	AUTO. VOLTAGE REGULATOR
		3	24	25/05/2018	04/10/2018	3175.58	LT AC PANELS
		3	24	05/11/2018	30/11/2018	614.15	ROTOR EARTH FAULT
42	MATATILA HPS	2	10.2	24/08/2018	06/09/2018	321.75	AUTO. VOLTAGE REGULATOR
		2	10.2	14/02/2019	21/02/2019	157.67	LINE BREAKER OVER CURRENT/EARTH FAULT
43	OBRA HPS	1	33	25/05/2018	27/05/2018	49.83	AIR PR./OIL PR. PROBLEM
		2	33	29/05/2018	02/06/2018	88.5	GENEATOR TRANSFORMER MISC.

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	33	02/04/2018	12/04/2018	234.5	EXCITATION OTHERS
		3	33	03/06/2018	04/06/2018	32.5	GENEATOR TRANSFORMER MISC.
44	RIHAND HPS	1	50	17/09/2018	31/03/2019	4660	ROTOR EARTH FAULT
		1	50	22/06/2018	25/06/2018	74.33	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		1	50	20/08/2018	05/09/2018	390.83	GUIDE VANES
		2	50	19/09/2018	20/09/2018	27.8	ROTOR EARTH FAULT
		2	50	11/08/2018	17/08/2018	145.25	ROTOR EARTH FAULT
		2	50	23/01/2019	28/01/2019	125.5	OTHER EQUIPMENT FAULTS
		3	50	16/01/2019	19/01/2019	69.37	PROTECTION OPERATION
		3	50	06/08/2018	08/08/2018	51.83	BRAKE AND JACKS
		3	50	01/06/2018	15/06/2018	343.75	WATER CONDCUTOR SYSTEM
		5	50	02/02/2019	04/02/2019	52.17	THRUST BEARING
		5	50	11/01/2019	12/01/2019	24.33	THRUST BEARING
		5	50	09/12/2018	12/12/2018	67	INTAKE STRICT./TRASH RACK
		6	50	27/05/2018	30/05/2018	82.25	THRUST BEARING
		6	50	29/09/2018	30/09/2018	33.83	THRUST BEARING
WESTERN REGION							
CSPGCL							
45	HASDEOBANGO HPS	1	40	28/08/2018	01/09/2018	93.75	OTHER (D/T,GUIDE/STAY VANES
		1	40	16/09/2018	17/09/2018	25.75	AUTO. VOLTAGE REGULATOR
		3	40	23/04/2018	25/04/2018	42.42	MISCELLANEOUS
GSECL							
46	KADANA HPS	1	60	03/10/2018	06/10/2018	68.75	PROTECTION OPERATION
MAHAGENCO							
47	BHIRA TAIL RACE HPS	1	40	05/08/2018	06/08/2018	27.08	LINE BREAKER OVER CURRENT/EARTH FAULT
48	GHATGHAR PSS HPS	1	125	13/09/2018	22/09/2018	216.57	TURBINE OTHERS
		1	125	23/12/2018	25/12/2018	59.25	COOLING WATER SYSTEM
		1	125	02/10/2018	05/10/2018	72	TURBINE OTHERS
		1	125	14/04/2018	27/04/2018	297.25	GENERATOR FAULTS
		2	125	29/06/2018	17/12/2018	4115.13	GENERATOR FAULTS
49	KOYNA-I&II HPS	1	70	01/03/2019	06/03/2019	114.52	THRUST BEARING
		2	70	29/04/2018	30/04/2018	32.58	LOWER GUIDE BEARING
		4	70	03/11/2018	01/12/2018	686.98	GENERATOR FAULTS
		4	70	16/03/2019	18/03/2019	55.67	LOWER GUIDE BEARING
50	KOYNA-III HPS	4	80	06/10/2018	10/10/2018	101.17	COOLING WATER SYSTEM
MPPGCL							
51	BANSAGAR-II HPS	1	15	14/09/2018	04/10/2018	469	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		1	15	28/07/2018	10/09/2018	1064	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
52	BANSAGAR-III HPS	2	20	02/02/2019	08/02/2019	148.48	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
53	GANDHI SAGAR HPS	2	23	13/11/2018	29/11/2018	385.42	EXCITATION PROBLEMS
54	RAJGHAT HPS	1	15	01/03/2019	31/03/2019	720	GENEATOR TRANSFORMER MISC.
		1	15	04/09/2018	05/09/2018	25	GENRATOR OTHERS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
NHDC							
55	INDIRA SAGAR HPS	2	125	10/06/2018	24/06/2018	351.5	GENEATOR TRANSFORMER MISC.
TATA MAH.							
56	BHIRA HPS	5	25	07/03/2019	12/03/2019	98.52	TRANSFORMER PROTECTION
57	BHIVPURI HPS	3	24	13/10/2018	16/10/2018	73.62	MISCELLANEOUS
SOUTHERN REGION							
APGENCO							
58	HAMPI HPS	1	9	30/07/2018	03/08/2018	97.92	EXCITATION OTHERS
		1	9	18/10/2018	19/10/2018	25.92	GUIDE VANES
		1	9	12/11/2018	31/03/2019	3325.67	EXCITATION OTHERS
		2	9	26/12/2018	27/12/2018	30.25	EXCITATION OTHERS
		3	9	30/01/2019	02/02/2019	68.33	T.B.OIL SYSTEM PROBLEM
		3	9	07/12/2018	19/12/2018	294.5	GEN.TRANSFORMER RADIATORS PROBLEM/MTCE.
		3	9	27/01/2019	30/01/2019	82.08	GENEREATOR COOLING SYSTEM
59	LOWER SILERU HPS	3	115	21/07/2018	18/08/2018	676.17	U.G.B.OIL SYSTEM
		3	115	27/10/2018	21/12/2018	1321.75	VIBRATION/SOUND/ ALIGNMENT
		4	115	16/03/2019	31/03/2019	351	RUNNER/UNDER WATER PARTS
60	NAGARJUN SGR RBC HPS	1	30	24/10/2018	25/10/2018	24.5	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		1	30	10/09/2018	11/09/2018	33.67	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		1	30	24/09/2018	10/10/2018	394.75	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		2	30	24/09/2018	31/03/2019	4510.17	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		3	30	24/08/2018	28/08/2018	93.83	EHT/CT/PT
61	SRISAILAM HPS	3	110	31/10/2018	06/11/2018	131	GEN./TR.BREAKER
		4	110	12/11/2018	14/11/2018	51.58	GEN./TR.BREAKER
62	T B DAM HPS	2	9	22/09/2018	31/03/2019	4560	THRUST BEARING
		2	9	10/05/2018	22/05/2018	294	GENEREATOR COOLING SYSTEM
		2	9	19/07/2018	28/07/2018	205.33	OIL PROBLEMS
		3	9	25/04/2018	07/05/2018	287.75	GENEREATOR COOLING SYSTEM
		3	9	07/05/2018	22/05/2018	358.5	EXCITATION OTHERS
		3	9	01/04/2018	04/04/2018	69	EHG/GOV. FAULTS, MISC.
		3	9	25/09/2018	31/03/2019	4465.4	EHG/GOV. FAULTS, MISC.
		3	9	05/08/2018	22/08/2018	427.58	UNIT ALIGNMENT/BALANCING
		3	9	20/07/2018	22/07/2018	39.83	SHAFT VIBRS./ALIGNM/SOUND
		3	9	23/09/2018	25/09/2018	66.58	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		4	9	05/08/2018	08/08/2018	67.83	UNIT ALIGNMENT/BALANCING
		4	9	19/07/2018	21/07/2018	50.1	MISCELLANEOUS
		4	9	15/04/2018	30/04/2018	352.17	MISCELLANEOUS
63	UPPER SILERU HPS	1	60	01/02/2019	31/03/2019	1377	INTAKE STRICT./TRASH RACK
		1	60	16/05/2018	22/05/2018	147	EHT/CT/PT
		2	60	16/05/2018	22/05/2018	147	EHT/CT/PT
		2	60	05/02/2019	26/02/2019	505.92	EHG/GOV. FAULTS, MISC.
		2	60	24/07/2018	26/09/2018	1541.33	GENERATOR FAULTS
		2	60	19/03/2019	20/03/2019	30.83	MISCELLANEOUS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	60	24/05/2018	15/06/2018	539.83	EHT/CT/PT
		4	60	01/04/2018	04/04/2018	89.58	BRAKE AND JACKS
		4	60	24/05/2018	15/06/2018	539.83	EHT/CT/PT
		4	60	20/12/2018	29/12/2018	223.25	BRAKE AND JACKS
		4	60	04/11/2018	07/11/2018	69.3	LINE BREAKER OVER CURRENT/EARTH FAULT
KPCL							
64	ALMATTI DPH HPS	3	55	04/07/2018	07/07/2018	73.5	BUS PROTECTION TRIP
65	BHADRA HPS	3	12	11/08/2018	22/11/2018	2469.93	MISCELLANEOUS
		4	0	14/08/2018	28/08/2018	331.42	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
66	GERUSUPPA HPS	2	60	09/04/2018	13/04/2018	85.88	SHEAR PIN BROKEN/FAILURE/REPLACEMENT
		3	60	28/04/2018	30/04/2018	48	MISCELLANEOUS
67	JOG HPS	7	21.6	02/10/2018	03/10/2018	31.67	EXCITATION OTHERS
68	KADRA HPS	1	50	07/07/2018	12/07/2018	125.08	ROTOR EARTH FAULT
		2	50	17/12/2018	19/12/2018	49.75	LOWER GUIDE BEARING
69	KALINADI HPS	1	135	04/07/2018	22/07/2018	434.77	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		1	135	21/09/2018	06/11/2018	1099.15	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		2	135	03/09/2018	04/09/2018	29.88	LOWER GUIDE BEARING
		2	135	06/09/2018	12/09/2018	138.45	ALIGNMENT
		2	135	23/12/2018	27/12/2018	93.57	VIBRATION/SOUND/ ALIGNMENT
		2	135	20/01/2019	02/02/2019	321.28	VIBRATION/SOUND/ ALIGNMENT
		2	135	08/03/2019	15/03/2019	161.23	VIBRATION/SOUND/ ALIGNMENT
		2	135	04/07/2018	22/07/2018	435.27	OTHER (D/T,GUIDE/STAY VANES
		2	135	04/06/2018	06/06/2018	54.33	OTHER (D/T,GUIDE/STAY VANES
		2	135	03/01/2019	09/01/2019	148.82	OTHER (D/T,GUIDE/STAY VANES
		2	135	11/10/2018	06/11/2018	623.95	OTHER (D/T,GUIDE/STAY VANES
		4	150	10/01/2019	27/01/2019	418.13	OTHER (D/T,GUIDE/STAY VANES
		5	150	20/06/2018	02/10/2018	2494.82	PENSTOCK VIRATION
		6	150	19/09/2018	02/10/2018	324.4	OTHER (D/T,GUIDE/STAY VANES
		6	150	06/04/2018	11/04/2018	109.1	FORCED OUTAGE
70	KALINADI SUPA HPS	1	50	07/04/2018	09/04/2018	114.26	LGB TEMPRATURE HIGH
71	LIGANAMAKKI HPS	1	27.5	01/07/2018	09/07/2018	202.67	OTHER EQUIPMENT FAULTS
		2	27.5	05/05/2018	06/05/2018	27.58	OIL HANDLING SYSTEM
72	SHARAVATHI HPS	4	103.5	01/02/2019	05/02/2019	112.87	THRUST BEARING
73	SIVASAMUNDRUM HPS	10	6	10/05/2018	18/05/2018	189.67	LOWER GUIDE BEARING
		2	3	06/04/2018	11/04/2018	123.87	OTHER (D/T,GUIDE/STAY VANES
		3	3	17/12/2018	21/12/2018	98.17	LINE BREAKER OVER CURRENT/EARTH FAULT
		6	3	05/05/2018	06/05/2018	25.33	LINE BREAKER OVER CURRENT/EARTH FAULT
		9	6	10/05/2018	17/05/2018	167.1	LOWER GUIDE BEARING
74	VARAHI HPS	4	115	04/06/2018	08/06/2018	116.17	TURBINE OTHERS
KSEB							
75	IDAMALAYAR HPS.	2	37.5	14/10/2018	16/10/2018	35.58	EHG/GOV. FAULTS, MISC.
76	IDUKKI HPS.	6	130	07/06/2018	09/06/2018	57.95	FORCED OUTAGE
77	KUTTIYADI HPS.	1	25	18/05/2018	08/06/2018	509.5	MISCELLANEOUS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	25	24/12/2018	26/12/2018	56.9	NEEDLE PROBLEM
		3	25	08/02/2019	28/02/2019	480.67	LINE BREAKER OVER CURRENT/EARTH FAULT
		3	25	29/04/2018	02/05/2018	66.83	EHG/GOV. FAULTS, MISC.
78	KUTTIYADI ADDL. EXTN.	5	50	13/06/2018	15/06/2018	56.32	LOWER GUIDE BEARING
		6	50	23/06/2018	24/06/2018	34	NEEDLE PROBLEM
79	KUTTIYADI EXTN. HPS.	4	50	25/10/2018	27/10/2018	40.07	EHG/GOV. FAULTS, MISC.
80	LOWER PERIYAR HPS.	1	60	19/08/2018	23/08/2018	94.63	MISCELLANEOUS
		1	60	27/09/2018	28/09/2018	32.35	LT AC PANELS
		2	60	19/08/2018	23/09/2018	837.98	MISCELLANEOUS
		3	60	19/08/2018	23/09/2018	836.72	MISCELLANEOUS
81	PORINGALKUTTU HPS.	1	8	05/04/2018	14/06/2018	1682.53	FORCED OUTAGE
		2	8	11/05/2018	25/05/2018	351	DAM/SPILL WAYS
		4	8	11/05/2018	25/05/2018	351	DAM/SPILL WAYS
82	SABARIGIRI HPS.	3	50	12/06/2018	13/06/2018	28.83	EXCITATION OTHERS
		4	50	17/05/2018	23/05/2018	152.93	EXCITATION OTHERS
		6	50	11/02/2019	13/02/2019	38.93	LOWER GUIDE BEARING
		6	50	22/05/2018	22/06/2018	742.5	EHG/GOV. FAULTS, MISC.
		6	50	29/11/2018	01/12/2018	54.6	EHT/L.A.
83	SENGULAM HPS.	1	12	01/04/2018	30/04/2018	719.98	OTHERS
		2	12	01/05/2018	09/05/2018	200.98	LINE BREAKER OVER CURRENT/EARTH FAULT
TNGDCL							
84	ALIYAR HPS.	1	60	30/09/2018	18/12/2018	1903.65	GENERATOR FAULTS
		1	60	21/07/2018	05/09/2018	1095.08	GENERATOR FAULTS
85	BHAWANI KATTAL	1	15	29/03/2019	31/03/2019	35	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		1	15	02/04/2018	16/04/2018	326.92	CLEANING OF TRASH-RACK/GATE
		1	15	20/02/2019	27/03/2019	834.42	INTAKE STRICT./TRASH RACK
		2	15	02/04/2018	16/04/2018	326.92	CLEANING OF TRASH-RACK/GATE
86	KADAMPARI HPS.	1	100	05/07/2018	07/07/2018	39.08	TR. C.W. PUMP FAIL/SUPPLY FAIL/LEAKAGE
		1	100	30/04/2018	04/05/2018	86.58	GENERATOR FAULTS
		1	100	04/06/2018	06/06/2018	47	EHG/GOV. FAULTS, MISC.
		2	100	20/02/2019	22/02/2019	59.67	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		2	100	05/07/2018	07/07/2018	39.92	TR. C.W. PUMP FAIL/SUPPLY FAIL/LEAKAGE
		4	100	01/07/2018	08/07/2018	174.83	TR. C.W. PUMP FAIL/SUPPLY FAIL/LEAKAGE
87	KODAYAR-I HPS.	1	60	22/10/2018	26/10/2018	91.25	GENEREATOR COOLING SYSTEM
		1	60	06/02/2019	07/02/2019	31.92	GENEREATOR COOLING SYSTEM
		1	60	28/12/2018	30/12/2018	42.5	COOLING WATER SYSTEM
		1	60	28/02/2019	31/03/2019	729.08	GENEREATOR COOLING SYSTEM
		1	60	13/10/2018	15/10/2018	50.83	EXCITATION OTHERS
		1	60	04/11/2018	05/11/2018	26.48	THRUST BEARING
		1	60	05/09/2018	07/09/2018	29.92	THRUST BEARING
		1	60	22/05/2018	24/05/2018	45.32	GEN.PROTECTION RELAY OPERATION
		1	60	24/05/2018	25/05/2018	24.78	PROTECTION OPERATION
		1	60	15/05/2018	19/05/2018	105.43	ROTOR EARTH FAULT

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	60	16/12/2018	17/12/2018	28.65	THRUST BEARING
88	KODAYAR-II HPS.	2	40	19/11/2018	22/12/2018	803.93	TURBINE BEARING PADS DAMAGED
		2	40	09/02/2019	31/03/2019	1182.5	GENERATOR FAULTS
		2	40	26/04/2018	27/04/2018	25.25	GEN./TR.BREAKER
89	KUNDAH-I HPS.	1	20	09/04/2018	10/04/2018	30.17	EXCITATION OTHERS
		1	20	15/04/2018	17/04/2018	50.42	EXCITATION OTHERS
90	KUNDAH-II HPS.	4	35	02/05/2018	05/05/2018	78.45	PENSTOCK EXP. JOINT PROBLEM
		6	35	24/06/2018	26/06/2018	56.58	NEEDLE PROBLEM
91	KUNDAH-V HPS.	15	20	25/04/2018	16/06/2018	1247.75	THRUST BEARING
92	METTUR DAM HPS.	4	12.5	28/02/2019	31/03/2019	729.08	GENEREATOR COOLING SYSTEM
93	PAPANASAM HPS.	4	8	02/05/2018	31/05/2018	694.83	PENSTOCK REPAIR WORKS
94	PERIYAR HPS.	2	42	19/06/2018	20/06/2018	35.43	GENERATOR FAULTS
95	PYKARA HPS.	2	7	29/01/2019	31/01/2019	71.98	MISCELLANEOUS
		6	11	01/08/2018	06/08/2018	143.98	MISCELLANEOUS
		6	11	09/09/2018	11/09/2018	57.92	MISCELLANEOUS
		6	11	28/03/2019	30/03/2019	51.75	MISCELLANEOUS
96	SARKARPATHY HPS.	1	30	05/01/2019	06/01/2019	28.92	POWER HOUSE MISC.
		1	30	16/08/2018	19/08/2018	65.3	SWITCHYARD MISC.
97	SHOLAYAR HPS (TN)	1	35	09/10/2018	10/10/2018	27.17	EHG/GOV. FAULTS, MISC.
		1	35	28/02/2019	17/03/2019	404.98	TURBINE BEARING COOLING SYS/OIL COOLER
		1	35	27/02/2019	28/02/2019	32.02	TURBINE BEARING COOLING SYS/OIL COOLER
		1	35	25/01/2019	07/02/2019	309.45	TURBINE BEARING COOLING SYS/OIL COOLER
		2	35	09/10/2018	10/10/2018	27.17	EHG/GOV. FAULTS, MISC.
		2	35	08/08/2018	13/08/2018	124.08	OTHER (D/T,GUIDE/STAY VANES
		2	35	01/09/2018	02/09/2018	25.83	POWER HOUSE MISC.
		2	35	29/10/2018	31/10/2018	55.72	EHG/GOV. FAULTS, MISC.
		2	35	14/08/2018	01/09/2018	446.72	EHG/GOV. FAULTS, MISC.
		2	35	12/10/2018	20/10/2018	192.2	EXCITATION OTHERS
98	SURULIYAR HPS.	1	35	13/07/2018	13/08/2018	749.2	NEEDLE PROBLEM
		1	35	29/03/2019	31/03/2019	40.75	PENSTOCK LEAKAGE
		1	35	26/09/2018	29/09/2018	69.5	NEEDLE PROBLEM
		1	35	04/11/2018	08/11/2018	90	FIRE /CO2 SYSTEM
TSGENCO							
99	NAGARJUN SGR HPS	8	100.8	28/11/2018	05/12/2018	175.42	MISCELLANEOUS
100	NAGARJUN SGR LBC HPS	1	30	29/10/2018	04/11/2018	133.83	GENERATOR FAULTS
		1	30	18/09/2018	19/09/2018	39.42	EHG/GOV. FAULTS, MISC.
		1	30	24/09/2018	15/10/2018	506.08	LOWER GUIDE BEARING
EASTERN REGION							
APGENCO							
101	MACHKUND HPS	1	17	19/09/2018	22/09/2018	74.22	TRANSFORMER PROTECTION
		1	17	27/06/2018	13/07/2018	392.5	TRANSFORMER PROTECTION
		1	17	22/09/2018	01/10/2018	213.75	TRANSFORMER PROTECTION
		1	17	09/11/2018	10/11/2018	30.92	EXCITATION OTHERS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	17	28/05/2018	02/01/2019	5262.83	TRANSFORMER PROTECTION
		2	17	09/01/2019	10/01/2019	24.97	UPPER GUIDE BEARING
		2	17	01/04/2018	10/04/2018	234.42	SHAFT VIBRS./ALIGNM/SOUND
		3	17	12/04/2018	21/04/2018	237.42	UPPER GUIDE BEARING
		3	17	11/11/2018	13/11/2018	53.83	OTHERS
		3	17	23/04/2018	15/06/2018	1290.5	UPPER GUIDE BEARING
		5	21.25	08/03/2019	10/03/2019	56.42	MISCELLANEOUS
		6	21.25	07/06/2018	08/06/2018	34.4	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		6	21.25	11/11/2018	13/11/2018	50.33	OTHERS
DEPL							
102	JORETHANG LOOP	1	48	04/03/2019	13/03/2019	216.6	OTHER (D/T,GUIDE/STAY VANES
		2	48	04/03/2019	13/03/2019	234.43	OTHER (D/T,GUIDE/STAY VANES
DVC							
103	MAITHON HPS.	1	20	26/09/2018	28/09/2018	47.25	EHG/GOV. FAULTS, MISC.
		1	20	17/07/2018	18/07/2018	26.15	TRANSFORMER PROTECTION
		1	20	18/07/2018	21/07/2018	67.17	TRANSFORMER PROTECTION
		1	20	20/08/2018	21/08/2018	26.42	U.A.T
		1	20	21/09/2018	24/09/2018	71.67	OIL PROBLEMS
		3	20	25/10/2018	26/10/2018	30.83	TURBINE
		3	20	21/08/2018	31/08/2018	253.65	INTAKE STRICT./TRASH RACK
		3	20	17/07/2018	18/07/2018	26	TRANSFORMER PROTECTION
		3	20	11/09/2018	12/09/2018	33.67	OIL PROBLEMS
104	PANCHET HPS.	1	40	08/10/2018	01/02/2019	2799.33	EXCITATION OTHERS
		2	40	13/06/2018	22/06/2018	216.32	U.A.T
		2	40	09/07/2018	13/07/2018	98.5	EXCITATION OTHERS
		2	40	28/11/2018	30/11/2018	49.35	MISCELLANEOUS
		2	40	22/11/2018	26/11/2018	90.15	MISCELLANEOUS
GIPL							
105	CHUZACHEN HPS	1	55	26/08/2018	30/08/2018	96.37	OTHER (D/T,GUIDE/STAY VANES
		2	55	28/08/2018	30/08/2018	50.02	INTAKE STRICT./TRASH RACK
		2	55	01/08/2018	02/08/2018	30.97	FORCED OUTAGE
NHPC							
106	RANGIT HPS	2	20	01/04/2018	04/04/2018	70.17	MISCELLANEOUS
		3	20	01/04/2018	04/04/2018	70.15	MISCELLANEOUS
107	TEESTA LOW DAM-III HPS	4	33	15/09/2018	16/09/2018	24.68	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
108	TEESTA LOW DAM-IV HPS	3	40	01/03/2019	07/03/2019	159.1	THRUST BEARING
OHPC							
109	BALIMELA HPS.	4	60	30/09/2018	05/10/2018	118.42	OTHER (D/T,GUIDE/STAY VANES
		5	60	26/08/2018	28/08/2018	56.92	PERMANENT MAG GENERATOR
		7	75	01/04/2018	05/04/2018	115.33	NEEDLE PROBLEM
110	CHIPLIMA HPS	8	24	25/08/2018	01/11/2018	1625.42	GENERATOR FAULTS
		8	24	22/07/2018	25/08/2018	830.27	MISCELLANEOUS
		9	24	22/07/2018	20/08/2018	712.58	MISCELLANEOUS

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
111	HIRAKUD HPS	2	49.5	01/04/2018	13/04/2018	305.67	TURBINE OTHERS
		2	49.5	25/05/2018	02/11/2018	3862.33	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		2	49.5	14/04/2018	15/04/2018	30.83	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		4	32	25/10/2018	06/11/2018	284	INTAKE STRICT./TRASH RACK
		7	37.5	25/10/2018	27/10/2018	52.83	GUIDE VANES
112	RENGALI HPS.	1	50	27/08/2018	29/08/2018	42.83	LOWER GUIDE BEARING
		1	50	14/05/2018	18/05/2018	96	UGB ALIGNMENT/MISC.
		1	50	01/10/2018	05/10/2018	107.58	OIL PROBLEMS
		1	50	30/05/2018	01/06/2018	43.25	MISCELLANEOUS
		2	50	28/07/2018	09/08/2018	293.82	ALIGNMENT
		2	50	02/11/2018	08/11/2018	149.42	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		3	50	27/02/2019	02/03/2019	73.98	EHG/GOV. FAULTS, MISC.
		3	50	07/07/2018	09/08/2018	793.33	GEN./TR.BREAKER
		4	50	02/07/2018	07/07/2018	116.33	LOWER GUIDE BEARING
		4	50	07/11/2018	09/11/2018	48	EHG/GOV. FAULTS, MISC.
113	UPPER INDRAVATI HPS.	1	150	14/10/2018	15/10/2018	30.5	SHEAR PIN BROKEN/FAILURE/REPLACEMENT
		3	150	10/07/2018	03/09/2018	1331.38	PENSTOCK EXP. JOINT PROBLEM
		4	150	21/05/2018	23/05/2018	42.92	GUIDE VANES
		4	150	06/12/2018	20/12/2018	345.33	SHEAR PIN BROKEN/FAILURE/REPLACEMENT
114	UPPER KOLAB HPS.	3	80	28/03/2019	31/03/2019	48.5	GENERATOR FAULTS
		3	80	08/01/2019	09/01/2019	30.8	LGB OIL SYSTEMS PROBLEMBS
		3	80	26/05/2018	01/06/2018	127.62	GENERATOR FAULTS
SEPL							
115	TASHIDING HPS	1	48.5	03/08/2018	04/08/2018	25.85	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
SKPPPL							
116	DIKCHU HPS	1	48	03/09/2018	13/09/2018	241.15	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
TUL							
117	TEESTA-III HPS	1	200	12/06/2018	15/06/2018	79.95	OTHER (D/T,GUIDE/STAY VANES
		1	200	30/07/2018	02/08/2018	61.08	LINE BREAKER OVER CURRENT/EARTH FAULT
		5	200	30/07/2018	03/08/2018	92.92	OTHER EQUIPMENT FAULTS
WBSEDCL							
118	PURULIA PSS HPS.	1	225	30/08/2018	01/09/2018	43.87	LOWER GUIDE BEARING
119	RAMMAM HPS.	1	12.5	17/09/2018	18/09/2018	27.95	SPEED RUNAWAY/OVER /UNDER
		3	12.5	01/04/2018	26/05/2018	1334.58	RUNNER/UNDER WATER PARTS
NORTH EASTERN REGION							
MePGCL							
120	UMIAM HPS ST-I	2	9	01/05/2018	02/05/2018	40	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		3	9	04/04/2018	12/04/2018	185.5	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		4	9	19/04/2018	25/04/2018	151	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		4	9	13/04/2018	18/04/2018	130.5	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		4	9	26/04/2018	30/04/2018	110.98	EHG/GOV. FAULTS, MISC.
121	UMIAM HPS ST-IV	8	30	24/06/2018	25/06/2018	31.07	GENEREATOR COOLING SYSTEM
		8	30	08/06/2018	09/06/2018	24.4	GEN./TR.BREAKER

DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2018-19

(OUTAGE DURATION 24 HOURS AND ABOVE)

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
NEEPCO							
122	DOYANG HPS.	3	25	04/06/2018	16/06/2018	293.42	MISCELLANEOUS
		3	25	24/10/2018	14/11/2018	527.98	EHG/GOV. FAULTS, MISC.
		3	25	31/05/2018	02/06/2018	47.5	TURBINE OTHERS
123	KHONDONG HPS.	1	25	11/12/2018	17/12/2018	143.88	LT AC PANELS
		2	25	08/06/2018	21/06/2018	304.22	MISCELLANEOUS
		2	25	11/12/2018	17/12/2018	157.45	LT AC PANELS
		2	25	05/01/2019	09/01/2019	112.93	HRI/HRC/SURGF SHAFT PROPS
124	KOPILI HPS.	1	50	14/06/2018	16/06/2018	42.08	MISCELLANEOUS
		1	50	22/09/2018	23/09/2018	26.92	MISCELLANEOUS
		2	50	13/06/2018	17/06/2018	105	THRUST BEARING
		2	50	20/11/2018	22/11/2018	71.98	VIBRATION/SOUND/ ALIGNMENT
		2	50	23/11/2018	24/11/2018	42.02	VIBRATION/SOUND/ ALIGNMENT
		2	50	14/05/2018	16/05/2018	51.42	THRUST BEARING
		2	50	01/07/2018	03/07/2018	54.88	MISCELLANEOUS
		2	50	17/08/2018	18/08/2018	26.5	THRUST BEARING
		2	50	03/02/2019	06/02/2019	88.2	GENERATOR FAULTS
		4	50	29/05/2018	29/06/2018	751.07	EXCITATION PROBLEMS
		4	50	25/05/2018	26/05/2018	31.48	UPPER GUIDE BEARING
125	RANGANADI HPS.	1	135	01/07/2018	02/07/2018	32.33	MISCELLANEOUS
		3	135	09/02/2019	28/02/2019	457.98	OTHER (D/T,GUIDE/STAY VANES
126	TUIRIAL HPS	1	30	27/07/2018	02/10/2018	1608.1	TURBINE
		2	30	01/06/2018	09/06/2018	191.05	PROTECTION OPERATION
		2	30	08/10/2018	16/11/2018	946.37	VIBRATION/SOUND/ ALIGNMENT

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 710 Hydro Generating units of 204 HE Stations comprising of 45399.22 MW, operating availability of various units and stations has been computed. During the year 2018-19, the average operating availability of hydro generating units on all India basis was 91.28% as compared to 91.29% during 2017-18.

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**. The station-wise details are also graphically depicted 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 2018-19 is summarized below in **Table 6.1.**

TABLE 6.1

OPERATING AVAILABILITY OF H.E. STATIONS (PERIOD: 2018-19)

Operating Availability (%)	No. of Stations	% of total Stations	Installed Capacity (MW)	% of total Installed Capacity
≥95%	83	40.29	24022.42	53.04
≥90 to 95	45	21.84	8560.1	18.90
≥85 to 90	24	11.65	3534.85	7.80
≥80 to 85	20	9.71	3576.4	7.90
< 80	32	15.53	5705.45	12.60
Total	**204**	**100**	**45399.22**	**100**

6.3 OPERATING AVAILABILITY – REGION-WISE

Region-wise operating availability of hydro-electric units during 2018-19 is indicated in **Table 6.2**.

TABLE 6.2

AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2018-19

Sl. No.	Region	No. of Units	Installed Capacity (MW)	Planned Maintenance %	Forced Outage %	Operating Availability (%)
1	Northern	245	19023.27	6.13	1.19	92.68
2	Western	101	7392.00	4.02	1.22	94.76
3	Southern	246	11694.50	5.34	5.72	88.94
4	Eastern	84	5862.45	8.74	4.02	87.24
5	N- Eastern	34	1427.00	3.76	5.83	90.41
	All India	**710**	**45399.22**	**5.85**	**2.87**	**91.28**

It is seen that the operating availability of hydel generating units during 2018-19 was the highest (94.76%) in Western Region due to relatively lower forced outages. The operating availability was the lowest in case of units in Eastern Region (87.23%) due to high planned maintenance and forced outages.

6.4 OPERATING AVAILABILITY: AGE-WISE

The average operating availability during 2018-19 of hydro units commissioned in various years has been indicated in **Table 6.3**. It is observed that units commissioned during 2015-16 have achieved the operating availability of more than 98%. Operating availability was less than 90% for the units commissioned up to 1977-78 & during 2017-18. Operating availability was more than 90% for all the other years.

TABLE - 6.3

OPERATING AVAILABILITY – AGE-WISE
PERIOD: 2018-19

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Operating Availability (%)
1	2018-2019	3	140.00	100.00
2	2017-2018	16	795.00	85.86
3	2016-2017	18	1659.00	96.14
4	2015-2016	17	1516.00	98.25
5	2010-11 to 2014-15	63	4437.02	92.07
6	2005-06 to 2009-10	66	7077.00	93.56
7	2000-01 to 2004-05	74	6741.80	94.48
8	1989-90 to 1999-2000	86	5769.70	90.47
9	1978-79 to 1988-89	124	7259.10	90.05
10	1967-68 to 1977-78	81	5279.75	86.37
11	Up to 1966-67	162	4724.85	87.32
	Total	**710**	**45399.22**	**91.28**

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 (97.35%) followed by Central Sector (93.32%) and State Sector (89.36%).

TABLE 6.4

SECTOR-WISE OPERATING AVAILABILITY OF UTILITIES FOR PERIOD: 2018-19

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
Central						
1	BBMB	28	2920.30	1.15	1.94	96.91
2	DVC	5	143.20	10.32	11.48	78.20
3	NEEPCO.	17	900.00	3.69	9.11	87.20
4	NHDC	16	1520.00	3.21	0.32	96.47
5	NHPC	70	5451.20	10.42	0.45	89.13
6	NTPC Ltd.	4	800.00	0.96	0.14	98.90
7	SJVNL	12	1912.02	1.83	0.07	98.10
8	THDC	8	1400.00	4.87	0.29	94.84
Sub Total (CS)		**159**	**15046.72**	**5.38**	**1.27**	**93.35**
State						
1	APGENCO	34	1796.75	0.82	8.15	91.03
2	APGPCL	2	100.00	3.01	0.27	96.72
3	CSPGCL	3	120.00	0.00	1.00	99.00
4	GSECL	8	540.00	0.00	0.09	99.91
5	HPPCL	5	295.00	0.06	0.11	99.83
6	HPSEB	12	372.00	6.96	2.76	90.28
7	JKSPDC	12	1110.00	8.45	0.77	90.78
8	JSEB	2	130.00	16.58	0.00	83.42
9	KPCL	66	3572.20	4.22	6.16	89.62
10	KSEB	47	1856.50	13.39	1.88	84.73
11	MAHAGENCO	24	2406.00	5.22	3.16	91.62
12	MPPGCL	23	875.00	7.44	0.72	91.84
13	MePGCL	13	322.00	4.45	0.29	95.26

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
14	OHPC	31	2027.50	18.05	8.11	73.84
15	PSPCL	25	1051.00	9.74	1.18	89.08
16	RRVUNL	11	411.00	4.54	2.60	92.86
17	SSNNL	11	1450.00	3.84	0.00	96.16
18	TNGDCL	69	2178.20	7.10	13.17	79.73
19	TSGENCO	36	2405.60	2.38	0.82	96.80
20	TUL	6	1200.00	4.29	0.55	95.16
21	UJVNL	34	1252.15	11.46	3.20	85.34
22	UPJVNL	15	501.60	7.00	9.90	83.10
23	WBSEDCL	12	986.00	2.09	0.37	97.54
Sub Total (State)		**501**	**26958.50**	**6.56**	**4.08**	**89.36**
Private						
1	ADHPL	2	192.00	0.14	1.23	98.63
2	AHPC (GVK)	4	330.00	0.00	0.07	99.93
3	DEPL	2	96.00	0.82	2.47	96.71
4	DLHP	1	34.00	0.00	0.00	100
5	E.P.P.L.	2	100.00	4.11	0.00	95.89
6	GBHPPL	2	70.00	11.37	0.96	87.67
7	GIPL	2	110.00	3.84	0.96	95.20
8	HBPCL	7	1300.00	3.65	0.13	96.22
9	IAEPL	3	36.00	0.00	0.00	100
10	JPPVL	4	400.00	0.82	0.07	99.11
11	MPCL	2	86.00	3.84	2.74	93.42
12	SEPL	2	97.00	0.14	0.14	99.72
13	SKPPPL	2	96.00	2.74	1.64	95.62
14	TATA MAH.	15	447.00	0.52	0.24	99.24
Sub Total (Pvt.)		**50**	**3394.00**	**2.25**	**0.40**	**97.35**
Grand Total		**710**	**45399.22**	**5.85**	**2.87**	**91.28**

6.6 OPERATING AVAILABILITY BELOW 90%- STATION-WISE

It is observed that 30 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 (2016-17 TO 2018-19)

Sl. No.	Name of the Stations	Name of the Utility	Installed Capacity (MW)	Operating Availability (%)		
				2015-16	2016-17	2017-18
1	BUDHIL HPS	GREENCO	70.00	78.57	89.04	87.16
2	PARBATI-III HPS	NHPC	520.00	68.29	83.36	68.43
3	TANAKPUR HPS	NHPC	94.20	79.04	85.72	83.45
4	RANJIT SAGAR HPS	PSPCL	600.00	78.28	82.40	89.56
5	CHIBRO (YAMUNA) HPS	UJVNL	240.00	86.39	84.03	81.19
6	DHALIPUR HPS	UJVNL	51.00	79.04	78.22	84.27
7	KHODRI HPS	UJVNL	120.00	82.76	76.04	86.91
8	MANERI BHALI - I HPS	UJVNL	90.00	76.61	84.07	75.83
9	RAMGANGA HPS	UJVNL	198.00	89.32	57.03	89.78
10	KHARA HPS	UPJVN	72.00	81.37	78.23	70.91
11	RIHAND HPS	UPJVN	300.00	44.72	57.56	81.36
12	RAJGHAT HPS	MPPGCL	45.00	49.38	34.83	82.83
13	ALMATTI DPH HPS	KPCL	290.00	81.06	87.46	89.98
14	JOG HPS	KPCL	139.20	88.82	66.92	58.81
15	IDAMALAYAR HPS.	KSEBL	75.00	88.35	89.87	89.33
16	IDUKKI HPS.	KSEBL	780.00	89.83	80.77	79.09
17	KUTTIYADI ADDL. EXTN.	KSEBL	100.00	89.64	77.53	79.58
18	PORINGALKUTTU HPS.	KSEBL	32.00	75.21	66.82	84.82
19	SABARIGIRI HPS.	KSEBL	300.00	85.97	84.98	79.81
20	BHAWANI KATTAL	TANGEDCO	30.00	89.27	74.99	83.21
21	PERIYAR HPS.	TANGEDCO	161.00	71.02	78.41	89.55
22	SURULIYAR HPS.	TANGEDCO	35.00	88.93	83.12	75.21
23	MACHKUND HPS	APGECO	114.75	88.71	69.65	64.12
24	PANCHET HPS.	DVC	80.00	56.69	55.24	73.77
25	BALIMELA HPS.	OHPC	510	83.81	74.77	67.7
26	CHIPLIMA HPS	OHPC	72.00	66.94	55.05	53.88
27	HIRAKUD HPS	OHPC	275.50	62.09	62.82	60.79
28	UPPER KOLAB HPS.	OHPC	320.00	88.89	65.25	66.24
29	KHONDONG HPS.	NEEPCO	50.00	78.39	76.81	86.18
30	KOPILI HPS.	NEEPCO	200.00	77.86	76.69	87.70

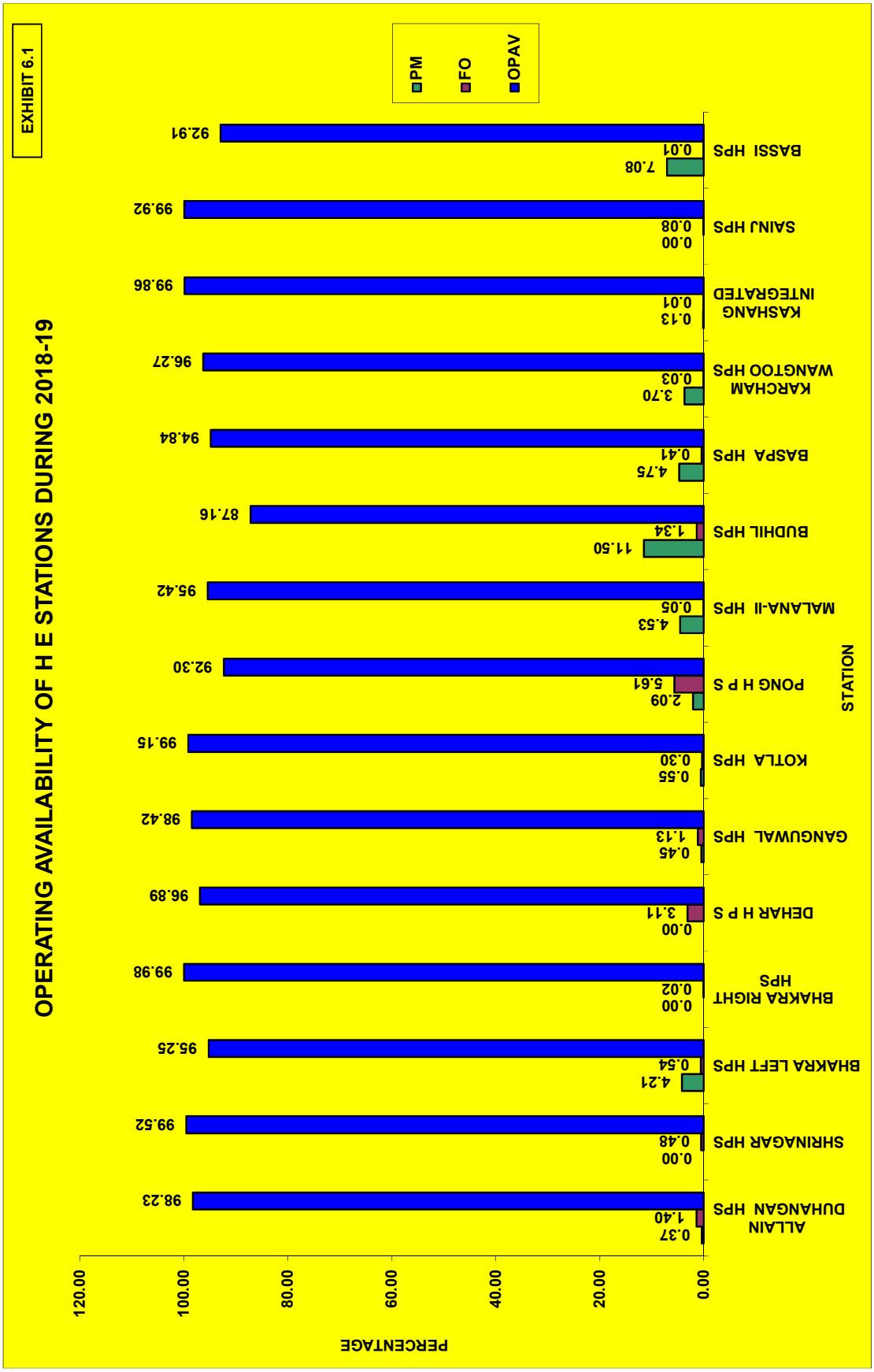


EXHIBIT 6.1
OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
OPAV
FO
PM
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
ALLAIN DUHANGAN HPS
0.37
1.40
98.23
SHRINAGAR HPS
0.00
0.48
99.52
BHAKRA LEFT HPS
4.21
0.54
95.25
BHAKRA RIGHT HPS
0.00
0.02
99.98
DEHAR H P S
0.00
3.11
96.89
GANGUWAL HPS
0.45
1.13
98.42
KOTLA HPS
0.55
0.30
99.15
PONG H P S
2.09
5.61
92.30
MALANA-II HPS
4.53
0.05
95.42
BUDHIL HPS
11.50
1.34
87.16
BASPA HPS
4.75
0.41
94.84
KARCHAM WANGTOO HPS
3.70
0.03
96.27
KASHANG INTEGRATED
0.13
0.01
99.86
SAINJ HPS
0.00
0.08
99.92
BASSI HPS
7.08
0.01
92.91

EXHIBIT 6.2

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
GIRI BATA HPS
4.93
2.19
92.88
LARJI HPS
14.92
1.06
84.02
SANJAY HPS
0.03
6.72
93.25
CHANJU-I HPS
0.00
0.00
100.00
BAGLIHAR HPS
19.02
0.64
80.34
BAGLIHAR II HPS
0.01
0.15
99.84
LOWER JHELUM HPS
0.00
0.66
99.34
UPPER SINDH-II HPS
9.31
4.30
86.39
VISHNU PRAYAG HPS
1.01
0.14
98.85
MALANA HPS
3.97
2.77
93.26
BAIRA SIUL HPS
47.88
0.17
51.95
CHAMERA- I HPS
2.34
0.33
97.33
CHAMERA- II HPS
4.84
0.38
94.78
CHAMERA-III HPS
7.51
1.08
91.41
CHUTAK HPS
7.89
0.00
92.11

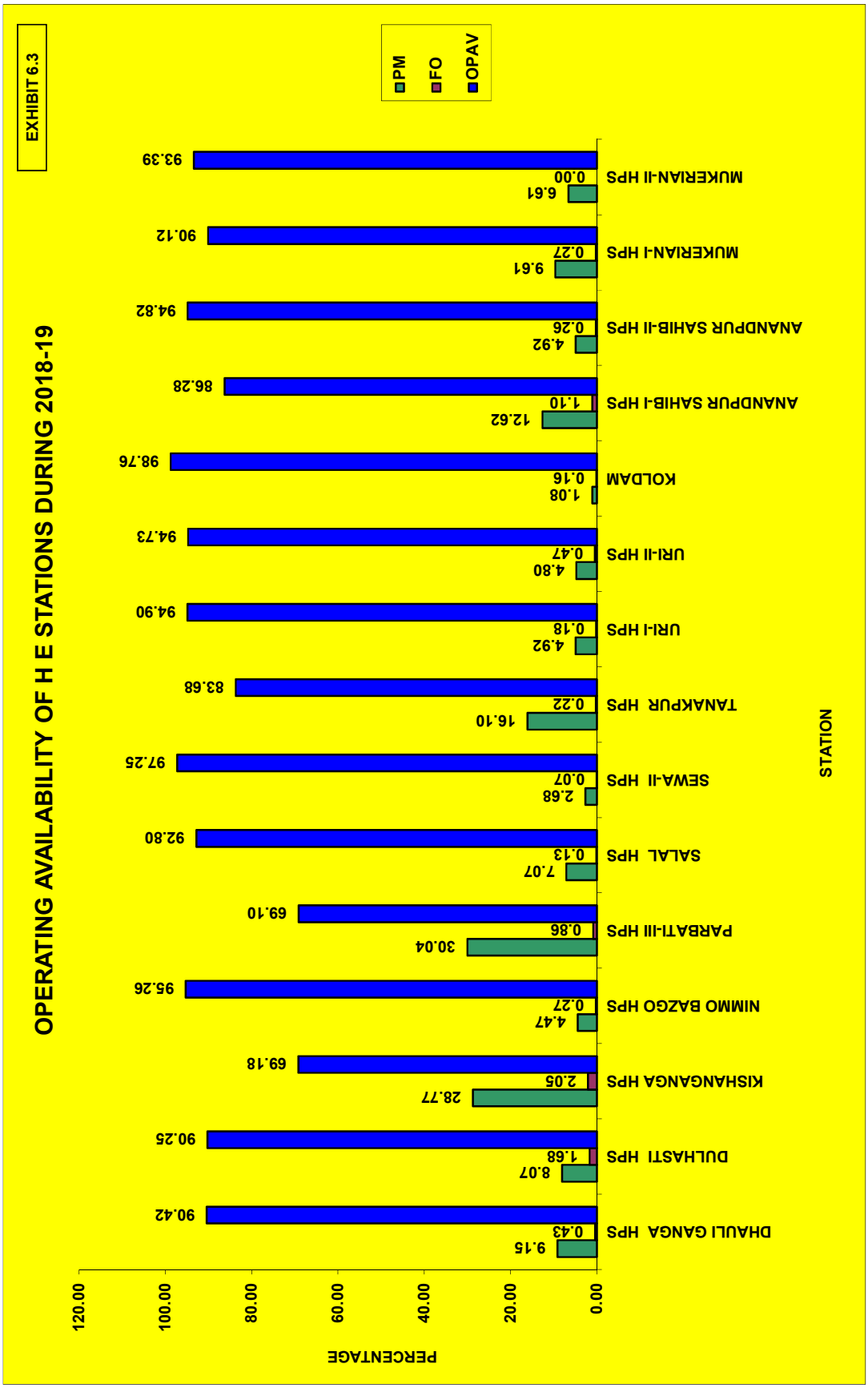


EXHIBIT 6.3
OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
DHAULI GANGA HPS
9.15
0.43
90.42
DULHASTI HPS
8.07
1.68
90.25
KISHANGANGA HPS
28.77
2.05
69.18
NIMMO BAZGO HPS
4.47
0.27
95.26
PARBATI-III HPS
30.04
0.86
69.10
SALAL HPS
7.07
0.13
92.80
SEWA-II HPS
2.68
0.07
97.25
TANAKPUR HPS
16.10
0.22
83.68
URI-I HPS
4.92
0.18
94.90
URI-II HPS
4.80
0.47
94.73
KOLDAM
1.08
0.16
98.76
ANANDPUR SAHIB-I HPS
12.62
1.10
86.28
ANANDPUR SAHIB-II HPS
4.92
0.26
94.82
MUKERIAN-I HPS
9.61
0.27
90.12
MUKERIAN-II HPS
6.61
0.00
93.39

EXHIBIT 6.4

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
MUKERIAN-III HPS
0.11
10.05
89.84
MUKERIAN-IV HPS
0.71
6.85
92.44
RANJIT SAGAR HPS
1.86
8.57
89.57
SHANAN HPS
0.10
21.74
78.16
JAWAHAR SAGAR HPS
0.00
8.62
91.38
MAHI BAJAJ-I HPS
0.56
0.00
99.44
MAHI BAJAJ-II HPS
9.32
0.00
90.68
R P SAGAR HPS
0.74
6.01
93.25
NATHPA JHAKRI HPS
0.15
2.11
97.74
RAMPUR HPS
0.07
1.78
98.15
KOTESHWAR HPS
0.01
7.60
92.39
TEHRI ST-1 HPS
0.33
3.98
95.69
CHIBRO (YAMUNA) HPS
0.83
17.98
81.19
CHILLA HPS
17.33
15.65
67.02
DHAKRANI HPS
0.80
12.13
87.07

EXHIBIT 6.5

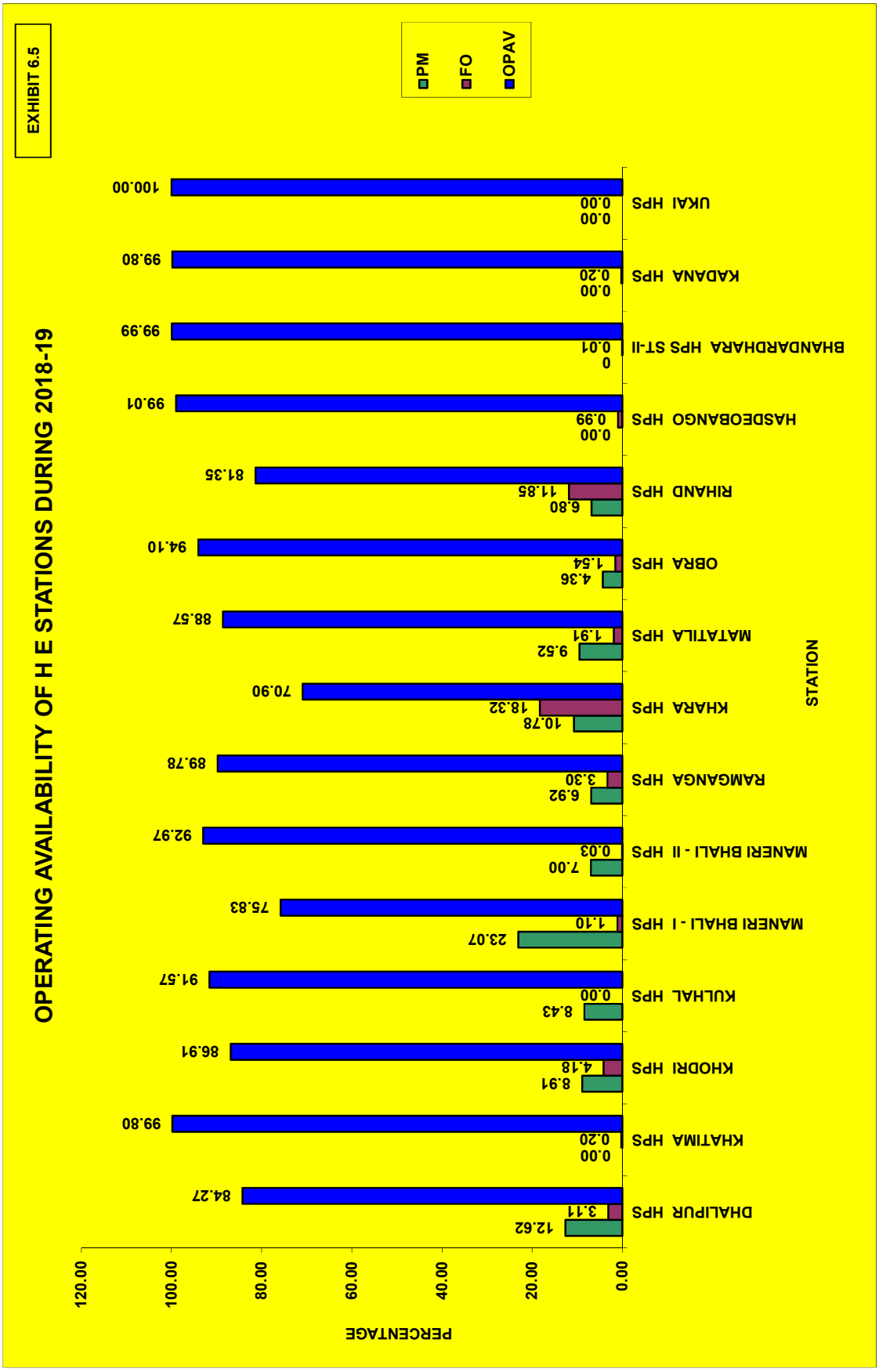

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
DHALIPUR HPS
12.62
3.11
84.27
KHATIMA HPS
0.00
0.20
99.80
KHODRI HPS
8.91
4.18
86.91
KULHAL HPS
8.43
0.00
91.57
MANERI BHALI - I HPS
23.07
1.10
75.83
MANERI BHALI - II HPS
7.00
0.03
92.97
RAMGANGA HPS
6.92
3.30
89.78
KHARA HPS
10.78
18.32
70.90
MATATILA HPS
9.52
1.91
88.57
OBRA HPS
4.36
1.54
94.10
RIHAND HPS
6.80
11.85
81.35
HASDEOBANGO HPS
0.00
0.99
99.01
BHANDARDHARA HPS ST-II
0
0.01
99.99
KADANA HPS
0.00
0.20
99.80
UKAI HPS
0.00
0.00
100.00

EXHIBIT 6.6

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
BHIRA TAIL RACE HPS
0.00
0.25
99.75
GHATGHAR PSS
14.75
27.17
58.08
KOYNA DPH HPS
5.59
0.11
94.30
KOYNA-I&II HPS
7.63
1.22
91.15
KOYNA-III HPS
1.65
0.40
97.95
KOYNA-IV HPS
3.80
0.01
96.19
TILLARI HPS
2.74
0.11
97.15
VAITARNA HPS
0.00
0.04
99.96
BANSAGAR TONS-I HPS
11.84
0.32
87.84
BANSAGAR-II HPS
7.64
8.85
83.51
BANSAGAR-III HPS
4.76
0.63
94.61
BARGI HPS
5.09
0.51
94.40
GANDHI SAGAR HPS
3.11
0.96
95.93
MADHIKHERA HPS
1.55
0.00
98.45
PENCH HPS
5.46
0.08
94.46

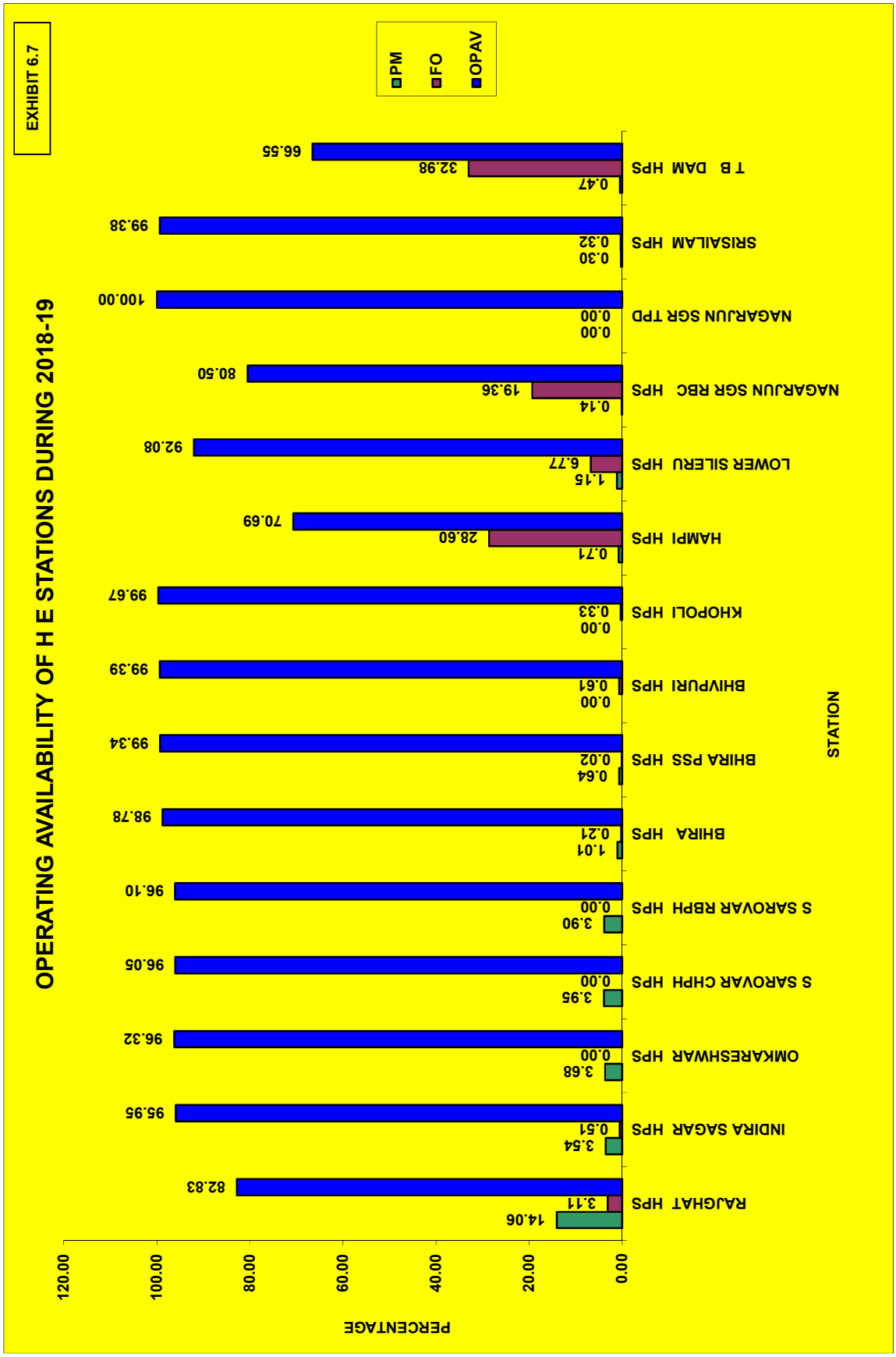


EXHIBIT 6.7
OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
RAJGHAT HPS
14.06
3.11
82.83
INDIRA SAGAR HPS
3.54
0.51
95.95
OMKARESHWAR HPS
3.68
0.00
96.32
S SAROVAR CHPH HPS
3.95
0.00
96.05
S SAROVAR RBPH HPS
3.90
0.00
96.10
BHIRA HPS
1.01
0.21
98.78
BHIRA PSS HPS
0.64
0.02
99.34
BHIVPURI HPS
0.00
0.61
99.39
KHOPOLI HPS
0.00
0.33
99.67
HAMPI HPS
0.71
28.60
70.69
LOWER SILERU HPS
1.15
6.77
92.08
NAGARJUN SGR RBC HPS
0.14
19.36
80.50
NAGARJUN SGR TPD
0.00
0.00
100.00
SRISAILAM HPS
0.30
0.32
99.38
T B DAM HPS
0.47
32.98
66.55

EXHIBIT 6.8

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19

EXHIBIT 6.9

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
0.00
20.00
40.00
60.00
80.00
100.00
120.00
STATION
IDAMALAYAR HPS.
9.15
1.52
89.33
IDUKKI HPS.
20.52
0.39
79.09
KAKKAD HPS.
0.00
0.06
99.94
KUTTIYADI HPS.
3.57
4.41
92.02
KUTTIYADI ADDL. EXTN.
19.46
0.96
79.58
KUTTIYADI EXTN. HPS.
11.11
0.49
88.40
LOWER PERIYAR HPS.
4.67
7.14
88.19
NARIAMANGLAM HPS
0.25
0.13
99.62
PALLIVASAL HPS.
2.03
0.06
97.91
PANNIAR HPS.
3.22
0.06
96.72
PORINGALKUTTU HPS.
2.80
12.37
84.83
SABARIGIRI HPS.
17.44
2.75
79.81
SENGULAM HPS.
10.82
2.76
86.42
SHOLAYAR HPS.
0.00
4.64
95.36
ALIYAR HPS.
0.03
65.36
34.61

EXHIBIT 6.10

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
BHAWANI BARRAGE-II HPS
5.75
0.05
94.20
BHAWANI BARRAGE-III
10.82
48.43
40.75
BHAWANI KATTAL
7.94
8.86
83.20
KADAMPARI HPS.
1.69
38.47
59.84
KODAYAR-I HPS.
16.27
14.53
69.20
KODAYAR-II HPS.
17.23
24.11
58.66
KUNDAH-I HPS.
0.05
0.31
99.64
KUNDAH-II HPS.
0.12
0.44
99.44
KUNDAH-III HPS.
3.44
0.98
95.58
KUNDAH-IV HPS.
2.80
38.06
59.14
KUNDAH-V HPS.
0.00
7.38
92.62
LOWER METTUR-I
9.00
0.00
91.00
LOWER METTUR-II
12.74
0.05
87.21
LOWER METTUR-III
18.52
0.00
81.48
LOWER METTUR-IV
0.14
0.00
99.86

EXHIBIT 6.11

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
METTUR DAM HPS.
1.11
2.15
96.74
METTUR TUNNEL HPS.
0.07
20.54
79.39
MOYAR HPS
0.00
2.22
97.78
PAPANASAM HPS.
2.55
7.75
89.70
PARSON'S VALLEY HPS.
0.00
6.65
93.35
PERIYAR HPS.
0.20
10.25
89.55
PYKARA HPS.
0.70
0.54
98.76
PYKARA ULTMATE HPS.
0.17
1.79
98.04
SARKARPATHY HPS.
1.59
12.13
86.28
SHOLAYAR HPS (TN)
10.37
47.55
42.08
SURULIYAR HPS.
12.08
12.71
75.21
LOWER JURALA HPS
0.07
5.53
94.40
NAGARJUN SGR HPS
0.50
5.43
94.07
NAGARJUN SGR LBC HPS
3.96
0.09
95.95
POCHAMPAD HPS
0.00
0.00
100.00

EXHIBIT 6.12

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
PM
FO
OPAV
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
PRIYADARSHNI JURALA HPS
2.44
6.51
91.05
PULICHINTALA HPS
0.00
0.00
100.00
SRISAILAM LB HPS
0.00
0.00
100.00
MACHKUND HPS
1.71
34.17
64.12
JORETHANG LOOP
1.02
2.70
96.28
MAITHON HPS.
16.51
2.49
81.00
PANCHET HPS.
7.30
18.93
73.77
CHUZACHEN HPS
4.04
1.33
94.63
SUBERNREKHA-I HPS.
0.00
18.47
81.53
SUBERNREKHA-II HPS.
0.00
14.91
85.09
RANGIT HPS
7.02
0.38
92.60
TEESTA LOW DAM-III HPS
5.21
0.21
94.58
TEESTA LOW DAM-IV HPS
6.11
0.55
93.34
TEESTA V HPS
1.77
0.05
98.18
BALIMELA HPS.
31.58
0.72
67.70

EXHIBIT 6.13

OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19

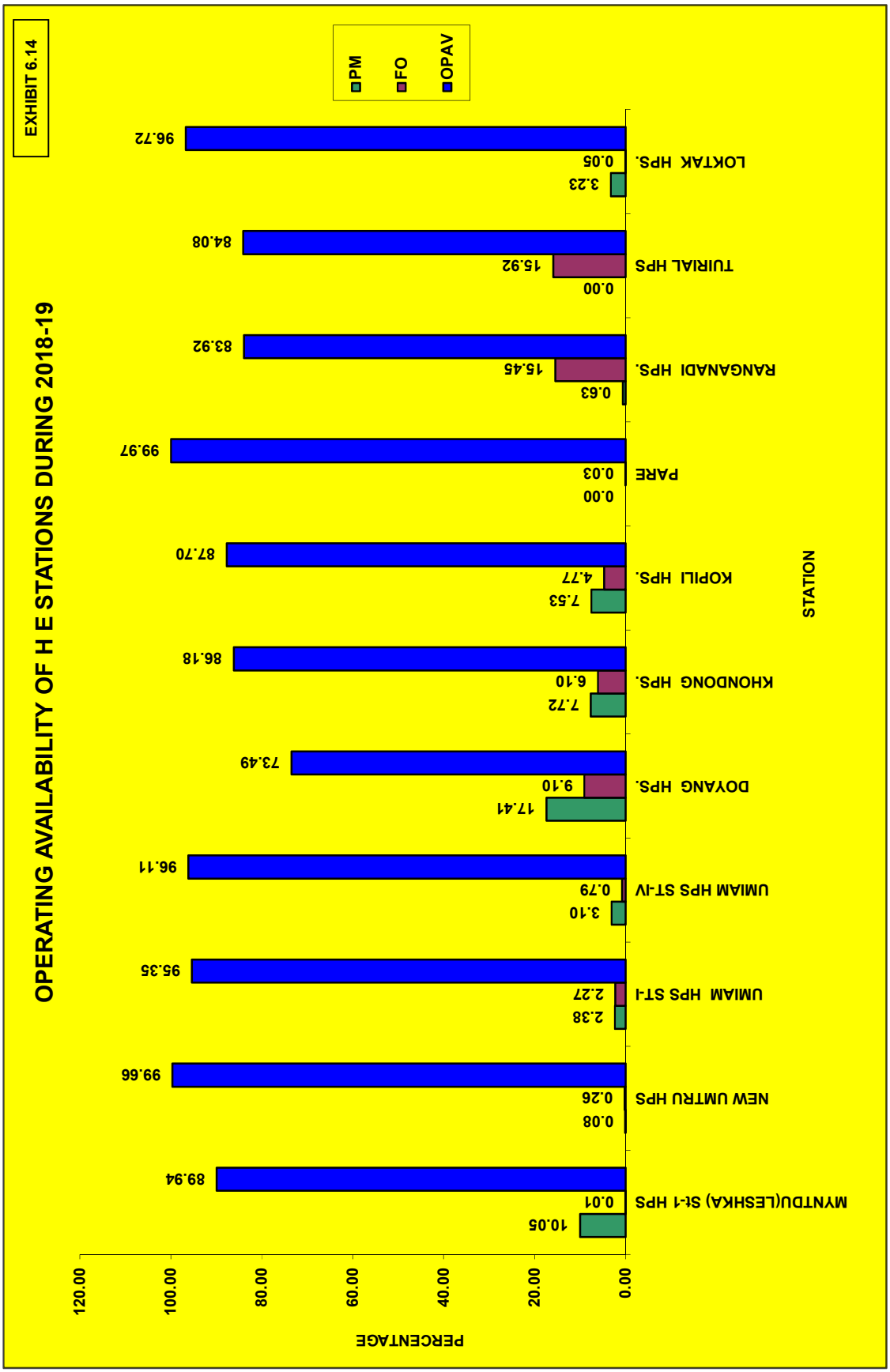


EXHIBIT 6.14
OPERATING AVAILABILITY OF H E STATIONS DURING 2018-19
OPAV
FO
PM
PERCENTAGE
120.00
100.00
80.00
60.00
40.00
20.00
0.00
STATION
MYNTDU(LESHKA) St-1 HPS
0.01
10.05
89.94
NEW UMTRU HPS
0.08
0.26
99.66
UMIAM HPS ST-I
2.38
2.27
95.35
UMIAM HPS ST-IV
3.10
0.79
96.11
DOYANG HPS.
17.41
9.10
73.49
KHONDONG HPS.
7.72
6.10
86.18
KOPILI HPS.
7.53
4.77
87.70
PARE
0.00
0.03
99.97
RANGANADI HPS.
0.63
15.45
83.92
TUIRIAL HPS
0.00
15.92
84.08
LOKTAK HPS.
3.23
0.05
96.72

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

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	0.58	1.34	98.08
		2	96.00	0.16	1.45	98.39
	TOTAL :		**192.00**	**0.37**	**1.40**	**98.23**
	AHPC (GVK)					
2	SHRINAGAR HPS	1	82.50	0.00	0.39	99.61
		2	82.50	0.00	0.48	99.52
		3	82.50	0.00	0.25	99.75
		4	82.50	0.00	0.80	99.20
	TOTAL :		**330.00**	**0.00**	**0.48**	**99.52**
	BBMB					
3	BHAKRA LEFT HPS	1	108.00	0.00	0.00	100.00
		2	126.00	0.00	0.87	99.13
		3	108.00	0.00	1.98	98.02
		4	126.00	0.00	0.00	100.00
		5	126.00	19.85	0.00	80.15
	TOTAL :		**594.00**	**4.21**	**0.54**	**95.25**
4	BHAKRA RIGHT HPS	6	157.00	0.00	0.05	99.95
		7	157.00	0.00	0.02	99.98
		8	157.00	0.00	0.03	99.97
		9	157.00	0.00	0.00	100.00
		10	157.00	0.00	0.02	99.98
	TOTAL :		**785.00**	**0.00**	**0.02**	**99.98**
5	DEHAR H P S	1	165.00	0.00	0.02	99.98
		2	165.00	0.00	17.14	82.86
		3	165.00	0.00	0.06	99.94
		4	165.00	0.00	1.34	98.66
		5	165.00	0.00	0.00	100.00
		6	165.00	0.00	0.09	99.91
	TOTAL :		**990.00**	**0.00**	**3.11**	**96.89**
6	GANGUWAL HPS	1	29.25	0.00	1.93	98.07
		2	24.20	0.00	0.93	99.07
		3	24.20	1.46	0.38	98.16
	TOTAL :		**77.65**	**0.45**	**1.13**	**98.42**
7	KOTLA HPS	1	29.25	1.45	0.17	98.38
		2	24.20	0.00	0.01	99.99

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	24.20	0.00	0.74	99.26
	TOTAL :		**77.65**	**0.55**	**0.30**	**99.15**
8	PONG H P S	1	66.00	0.00	7.07	92.93
		2	66.00	12.51	0.00	87.49
		3	66.00	0.00	7.24	92.76
		4	66.00	0.00	0.27	99.73
		5	66.00	0.00	6.49	93.51
		6	66.00	0.00	12.57	87.43
	TOTAL :		**396.00**	**2.09**	**5.61**	**92.30**
	E.P.P.L.					
9	MALANA-II HPS	1	50.00	4.68	0.08	95.24
		2	50.00	4.38	0.02	95.60
	TOTAL :		**100.00**	**4.53**	**0.05**	**95.42**
	GBHPPL					
10	BUDHIL HPS	1	35.00	12.68	0.58	86.74
		2	35.00	10.32	2.09	87.59
	TOTAL :		**70.00**	**11.50**	**1.34**	**87.16**
	HBPCL					
11	BASPA HPS	1	100.00	1.53	0.38	98.09
		2	100.00	10.34	0.44	89.22
		3	100.00	2.37	0.41	97.22
	TOTAL :		**300.00**	**4.75**	**0.41**	**94.84**
12	KARCHAM WANGTOO HPS	1	250.00	2.74	0.03	97.23
		2	250.00	4.38	0.04	95.58
		3	250.00	4.66	0.02	95.32
		4	250.00	3.01	0.02	96.97
	TOTAL :		**1000.00**	**3.70**	**0.03**	**96.27**
	HPPCL					
13	KASHANG INTEGRATED	1	65.00	0.00	0.03	99.97
		2	65.00	0.39	0.01	99.60
		3	65.00	0.00	0.00	100.00
	TOTAL :		**195.00**	**0.13**	**0.01**	**99.86**
14	SAINJ HPS	1	50.00	0.00	0.14	99.86
		2	50.00	0.00	0.03	99.97
	TOTAL :		**100.00**	**0.00**	**0.08**	**99.92**
	HPSEBL					
15	BASSI HPS	1	16.50	0.00	0.01	99.99
		2	16.50	28.33	0.04	71.63

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	16.50	0.00	0.00	100.00
		4	16.50	0.00	0.00	100.00
	TOTAL :		**66.00**	**7.08**	**0.01**	**92.91**
16	GIRI BATA HPS	1	30.00	5.69	1.48	92.83
		2	30.00	4.18	2.90	92.92
	TOTAL :		**60.00**	**4.93**	**2.19**	**92.88**
17	LARJI HPS	1	42.00	14.94	0.24	84.82
		2	42.00	25.00	2.16	72.84
		3	42.00	4.83	0.78	94.39
	TOTAL :		**126.00**	**14.92**	**1.06**	**84.02**
18	SANJAY HPS	1	40.00	0.00	20.15	79.85
		2	40.00	0.09	0.00	99.91
		3	40.00	0.00	0.00	100.00
	TOTAL :		**120.00**	**0.03**	**6.72**	**93.25**
	IAEPL					
19	CHANJU-I HPS	1	12.00	0.00	0.00	100.00
		2	12.00	0.00	0.00	100.00
		3	12.00	0.00	0.00	100.00
	TOTAL :		**36.00**	**0.00**	**0.00**	**100.00**
	JKSPDC					
20	BAGLIHAR HPS	1	150.00	9.52	1.30	89.18
		2	150.00	10.82	0.31	88.87
		3	150.00	36.71	0.31	62.98
	TOTAL :		**450.00**	**19.02**	**0.64**	**80.34**
21	BAGLIHAR II HPS	1	150.00	0.03	0.30	99.67
		2	150.00	0.00	0.03	99.97
		3	150.00	0.01	0.13	99.86
	TOTAL :		**450.00**	**0.01**	**0.15**	**99.84**
22	LOWER JHELUM HPS	1	35.00	0.00	1.45	98.55
		2	35.00	0.00	0.18	99.82
		3	35.00	0.00	0.35	99.65
	TOTAL :		**105.00**	**0.00**	**0.66**	**99.34**
23	UPPER SINDH-II HPS	3	35.00	26.75	6.57	66.68
		4	35.00	0.00	1.50	98.50
		5	35.00	1.19	4.85	93.96
	TOTAL :		**105.00**	**9.31**	**4.30**	**86.39**
	JPPVL					
24	VISHNU PRAYAG HPS	1	100.00	0.51	0.27	99.22

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	100.00	1.27	0.18	98.55
		3	100.00	0.71	0.10	99.19
		4	100.00	1.54	0.00	98.46
	TOTAL :		**400.00**	**1.01**	**0.14**	**98.85**
	MPCL					
25	MALANA HPS	1	43.00	2.92	4.71	92.37
		2	43.00	5.02	0.83	94.15
	TOTAL :		**86.00**	**3.97**	**2.77**	**93.26**
	NHPC					
26	BAIRA SIUL HPS	1	60.00	45.91	0.12	53.97
		2	60.00	50.32	0.20	49.48
		3	60.00	47.41	0.20	52.39
	TOTAL :		**180.00**	**47.88**	**0.17**	**51.95**
27	CHAMERA- I HPS	1	180.00	3.25	0.04	96.71
		2	180.00	3.76	0.02	96.22
		3	180.00	0.00	0.93	99.07
	TOTAL :		**540.00**	**2.34**	**0.33**	**97.33**
28	CHAMERA- II HPS	1	100.00	8.37	0.16	91.47
		2	100.00	2.66	0.93	96.41
		3	100.00	3.50	0.04	96.46
	TOTAL :		**300.00**	**4.84**	**0.38**	**94.78**
29	CHAMERA-III HPS	1	77.00	15.65	0.07	84.28
		2	77.00	5.83	1.72	92.45
		3	77.00	1.06	1.46	97.48
	TOTAL :		**231.00**	**7.51**	**1.08**	**91.41**
30	CHUTAK HPS	1	11.00	9.34	0.00	90.66
		2	11.00	7.69	0.00	92.31
		3	11.00	6.82	0.00	93.18
		4	11.00	7.70	0.00	92.30
	TOTAL :		**44.00**	**7.89**	**0.00**	**92.11**
31	DHAULI GANGA HPS	1	70.00	12.20	1.07	86.73
		2	70.00	5.93	0.13	93.94
		3	70.00	9.59	0.33	90.08
		4	70.00	8.87	0.19	90.94
	TOTAL :		**280.00**	**9.15**	**0.43**	**90.42**
32	DULHASTI HPS	1	130.00	8.84	0.86	90.30

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	130.00	5.08	0.37	94.55
		3	130.00	10.31	3.82	85.87
	TOTAL :		**390.00**	**8.07**	**1.68**	**90.25**
33	KISHANGANGA HPS	1	110.00	8.14	2.49	89.37
		2	110.00	25.17	1.78	73.05
		3	110.00	52.99	1.87	45.14
	TOTAL :		**330.00**	**28.77**	**2.05**	**69.18**
34	NIMMO BAZGO HPS	1	15.00	3.44	0.00	96.56
		2	15.00	4.43	0.00	95.57
		3	15.00	5.55	0.81	93.64
	TOTAL :		**45.00**	**4.47**	**0.27**	**95.26**
35	PARBATI-III HPS	1	130.00	30.61	0.57	68.82
		2	130.00	20.96	1.43	77.61
		3	130.00	31.43	0.59	67.98
		4	130.00	37.15	0.85	62.00
	TOTAL :		**520.00**	**30.04**	**0.86**	**69.10**
36	SALAL HPS	1	115.00	4.54	0.20	95.26
		2	115.00	7.83	0.04	92.13
		3	115.00	15.24	0.27	84.49
		4	115.00	4.09	0.12	95.79
		5	115.00	4.70	0.11	95.19
		6	115.00	6.04	0.06	93.90
	TOTAL :		**690.00**	**7.07**	**0.13**	**92.80**
37	SEWA-II HPS	1	40.00	2.29	0.00	97.71
		2	40.00	2.30	0.11	97.59
		3	40.00	3.45	0.09	96.46
	TOTAL :		**120.00**	**2.68**	**0.07**	**97.25**
38	TANAKPUR HPS	1	31.40	12.02	0.56	87.42
		2	31.40	20.31	0.05	79.64
		3	31.40	15.98	0.04	83.98
	TOTAL :		**94.20**	**16.10**	**0.22**	**83.68**
39	URI-I HPS	1	120.00	3.92	0.05	96.03
		2	120.00	3.10	0.26	96.64
		3	120.00	8.22	0.24	91.54
		4	120.00	4.44	0.18	95.38
	TOTAL :		**480.00**	**4.92**	**0.18**	**94.90**
40	URI-II HPS	1	60.00	4.98	0.41	94.61
		2	60.00	4.45	0.42	95.13

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	60.00	5.27	0.61	94.12
		4	60.00	4.52	0.43	95.05
	TOTAL :		**240.00**	**4.80**	**0.47**	**94.73**
	NTPC Ltd.					
41	KOLDAM	1	200.00	0.94	0.30	98.76
		2	200.00	0.94	0.35	98.71
		3	200.00	1.48	0.00	98.52
		4	200.00	0.94	0.00	99.06
	TOTAL :		**800.00**	**1.08**	**0.16**	**98.76**
	PSPCL					
42	ANANDPUR SAHIB-I HPS	1	33.50	10.52	0.00	89.48
		2	33.50	14.73	2.19	83.08
	TOTAL :		**67.00**	**12.62**	**1.10**	**86.28**
43	ANANDPUR SAHIB-II HPS	3	33.50	0.00	0.31	99.69
		4	33.50	9.85	0.21	89.94
	TOTAL :		**67.00**	**4.92**	**0.26**	**94.82**
44	MUKERIAN-I HPS	1	15.00	8.69	0.47	90.84
		2	15.00	11.27	0.21	88.52
		3	15.00	8.86	0.13	91.01
	TOTAL :		**45.00**	**9.61**	**0.27**	**90.12**
45	MUKERIAN-II HPS	4	15.00	8.57	0.00	91.43
		5	15.00	2.40	0.00	97.60
		6	15.00	8.85	0.00	91.15
	TOTAL :		**45.00**	**6.61**	**0.00**	**93.39**
46	MUKERIAN-III HPS	7	19.50	12.07	0.09	87.84
		8	19.50	8.19	0.20	91.61
		9	19.50	9.88	0.04	90.08
	TOTAL :		**58.50**	**10.05**	**0.11**	**89.84**
47	MUKERIAN-IV HPS	10	19.50	8.85	0.12	91.03
		11	19.50	11.35	0.09	88.56
		12	19.50	0.34	1.91	97.75
	TOTAL :		**58.50**	**6.85**	**0.71**	**92.44**
48	RANJIT SAGAR HPS	1	150.00	2.62	7.46	89.92
		2	150.00	14.02	0.00	85.98
		3	150.00	8.79	0.00	91.21
		4	150.00	8.86	0.00	91.14
	TOTAL :		**600.00**	**8.57**	**1.86**	**89.57**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
49	SHANAN HPS	1	15.00	0.48	0.35	99.17
		2	15.00	7.57	0.00	92.43
		3	15.00	36.48	0.00	63.52
		4	15.00	1.09	0.00	98.91
		5	50.00	34.15	0.13	65.72
	TOTAL :		**110.00**	**21.74**	**0.10**	**78.16**
	RRVUNL					
50	JAWAHAR SAGAR HPS	1	33.00	6.66	0.00	93.34
		2	33.00	5.58	0.00	94.42
		3	33.00	13.62	0.00	86.38
	TOTAL :		**99.00**	**8.62**	**0.00**	**91.38**
51	MAHI BAJAJ-I HPS	1	25.00	0.00	0.31	99.69
		2	25.00	0.00	0.81	99.19
	TOTAL :		**50.00**	**0.00**	**0.56**	**99.44**
52	MAHI BAJAJ-II HPS	3	45.00	0.00	5.73	94.27
		4	45.00	0.00	12.91	87.09
	TOTAL :		**90.00**	**0.00**	**9.32**	**90.68**
53	R P SAGAR HPS	1	43.00	4.75	0.64	94.61
		2	43.00	9.13	2.32	88.55
		3	43.00	3.89	0.00	96.11
		4	43.00	6.29	0.00	93.71
	TOTAL :		**172.00**	**6.01**	**0.74**	**93.25**
	SJVNL					
54	NATHPA JHAKRI HPS	1	250.00	2.38	0.01	97.61
		2	250.00	3.47	0.04	96.49
		3	250.00	1.79	0.15	98.06
		4	250.00	1.52	0.51	97.97
		5	250.00	1.66	0.05	98.29
		6	250.00	1.85	0.14	98.01
	TOTAL :		**1500.00**	**2.11**	**0.15**	**97.74**
55	RAMPUR HPS	1	68.67	2.12	0.07	97.81
		2	68.67	1.37	0.06	98.57
		3	68.67	1.81	0.08	98.11
		4	68.67	1.78	0.05	98.17
		5	68.67	1.79	0.16	98.05
		6	68.67	1.79	0.01	98.20
	TOTAL :		**412.02**	**1.78**	**0.07**	**98.15**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
	THDC					
56	KOTESHWAR HPS	1	100.00	5.88	0.01	94.11
		2	100.00	10.18	0.00	89.82
		3	100.00	8.02	0.01	91.97
		4	100.00	6.32	0.01	93.67
	TOTAL :		**400.00**	**7.60**	**0.01**	**92.39**
57	TEHRI ST-1 HPS	1	250.00	9.88	0.00	90.12
		2	250.00	4.20	0.98	94.82
		3	250.00	0.21	0.07	99.72
		4	250.00	1.61	0.28	98.11
	TOTAL :		**1000.00**	**3.98**	**0.33**	**95.69**
	UJVNL					
58	CHIBRO (YAMUNA) HPS	1	60.00	37.90	2.93	59.17
		2	60.00	8.88	0.02	91.10
		3	60.00	18.54	0.00	81.46
		4	60.00	6.60	0.39	93.01
	TOTAL :		**240.00**	**17.98**	**0.83**	**81.19**
59	CHILLA HPS	1	36.00	5.10	1.52	93.38
		2	36.00	23.46	5.16	71.38
		3	36.00	0.00	25.01	74.99
		4	36.00	34.05	37.64	28.31
	TOTAL :		**144.00**	**15.65**	**17.33**	**67.02**
60	DHAKRANI HPS	1	11.25	11.10	2.41	86.49
		2	11.25	20.02	0.00	79.98
		3	11.25	5.27	0.00	94.73
	TOTAL :		**33.75**	**12.13**	**0.80**	**87.07**
61	DHALIPUR HPS	1	17.00	8.32	0.01	91.67
		2	17.00	25.14	0.19	74.67
		3	17.00	4.40	9.14	86.46
	TOTAL :		**51.00**	**12.62**	**3.11**	**84.27**
62	KHATIMA HPS	1	13.80	0.00	0.15	99.85
		2	13.80	0.00	0.24	99.76
		3	13.80	0.00	0.21	99.79
	TOTAL :		**41.40**	**0.00**	**0.20**	**99.80**
63	KHODRI HPS	1	30.00	14.79	0.00	85.21
		2	30.00	8.09	16.71	75.20
		3	30.00	12.76	0.00	87.24

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	30.00	0.00	0.00	100.00
	TOTAL :		**120.00**	**8.91**	**4.18**	**86.91**
64	KULHAL HPS	1	10.00	0.00	0.00	100.00
		2	10.00	0.00	0.00	100.00
		3	10.00	25.30	0.00	74.70
	TOTAL :		**30.00**	**8.43**	**0.00**	**91.57**
65	MANERI BHALI - I HPS	1	30.00	41.07	1.25	57.68
		2	30.00	17.03	0.99	81.98
		3	30.00	11.10	1.07	87.83
	TOTAL :		**90.00**	**23.07**	**1.10**	**75.83**
66	MANERI BHALI - II HPS	1	76.00	0.00	0.01	99.99
		2	76.00	0.00	0.04	99.96
		3	76.00	13.79	0.06	86.15
		4	76.00	14.20	0.02	85.78
	TOTAL :		**304.00**	**7.00**	**0.03**	**92.97**
67	RAMGANGA HPS	1	66.00	11.81	2.54	85.65
		2	66.00	8.96	7.36	83.68
		3	66.00	0.00	0.00	100.00
	TOTAL :		**198.00**	**6.92**	**3.30**	**89.78**
	UPJVNL					
68	KHARA HPS	1	24.00	13.31	1.57	85.12
		2	24.00	19.02	1.02	79.96
		3	24.00	0.00	52.36	47.64
	TOTAL :		**72.00**	**10.78**	**18.32**	**70.90**
69	MATATILA HPS	1	10.20	9.26	0.26	90.48
		2	10.20	10.54	5.47	83.99
		3	10.20	8.77	0.00	91.23
	TOTAL :		**30.60**	**9.52**	**1.91**	**88.57**
70	OBRA HPS	1	33.00	12.48	0.57	86.95
		2	33.00	0.00	3.69	96.31
		3	33.00	0.59	0.37	99.04
	TOTAL :		**99.00**	**4.36**	**1.54**	**94.10**
71	RIHAND HPS	1	50.00	0.00	58.78	41.22
		2	50.00	0.86	3.66	95.48
		3	50.00	3.45	5.32	91.23
		4	50.00	0.00	0.18	99.82
		5	50.00	0.16	1.81	98.03

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		6	50.00	36.31	1.33	62.36
	TOTAL :		**300.00**	**6.80**	**11.85**	**81.35**
	WESTERN REGION					
	CSPGCL					
72	HASDEOBANGO HPS	1	40.00	0.00	2.08	97.92
		2	40.00	0.00	0.06	99.94
		3	40.00	0.00	0.84	99.16
	TOTAL :		**120.00**	**0.00**	**0.99**	**99.01**
	DLHP					
73	BHANDARDHARA HPS ST-II	2	34.00	0.00	0.01	99.99
	TOTAL :		**34.00**	**0.00**	**0.01**	**99.99**
	GSECL					
74	KADANA HPS	1	60.00	0.00	0.78	99.22
		2	60.00	0.00	0.00	100.00
		3	60.00	0.00	0.00	100.00
		4	60.00	0.00	0.00	100.00
	TOTAL :		**240.00**	**0.00**	**0.20**	**99.80**
75	UKAI HPS	1	75.00	0.00	0.00	100.00
		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**	**0.00**	**100.00**
	MAHAGENCO					
76	BHIRA TAIL RACE HPS	1	40.00	0.00	0.31	99.69
		2	40.00	0.00	0.18	99.82
	TOTAL :		**80.00**	**0.00**	**0.25**	**99.75**
77	GHATGHAR PSS HPS	1	125.00	29.50	7.36	63.14
		2	125.00	0.00	46.98	53.02
	TOTAL :		**250.00**	**14.75**	**27.17**	**58.08**
78	KOYNA DPH HPS	1	18.00	4.76	0.00	95.24
		2	18.00	6.43	0.22	93.35
	TOTAL :		**36.00**	**5.59**	**0.11**	**94.30**
79	KOYNA-I&II HPS	1	70.00	28.39	1.50	70.11
		2	70.00	14.77	0.37	84.86
		3	70.00	2.28	0.00	97.72
		4	70.00	1.28	8.48	90.24
		5	80.00	4.46	0.03	95.51
		6	80.00	3.86	0.03	96.11

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		7	80.00	4.36	0.03	95.61
		8	80.00	3.64	0.02	96.34
	TOTAL :		**600.00**	**7.63**	**1.22**	**91.15**
80	KOYNA-III HPS	1	80.00	0.27	0.17	99.56
		2	80.00	6.19	0.00	93.81
		3	80.00	0.12	0.08	99.80
		4	80.00	0.04	1.37	98.59
	TOTAL :		**320.00**	**1.65**	**0.40**	**97.95**
81	KOYNA-IV HPS	1	250.00	0.00	0.06	99.94
		2	250.00	4.35	0.00	95.65
		3	250.00	0.91	0.00	99.09
		4	250.00	9.94	0.00	90.06
	TOTAL :		**1000.00**	**3.80**	**0.01**	**96.19**
82	TILLARI HPS	1	60.00	2.74	0.11	97.15
	TOTAL :		**60.00**	**2.74**	**0.11**	**97.15**
83	VAITARNA HPS	1	60.00	0.00	0.04	99.96
	TOTAL :		**60.00**	**0.00**	**0.04**	**99.96**
	MPPGCL					
84	BANSAGAR TONS-I HPS	1	105.00	22.91	0.30	76.79
		2	105.00	0.07	0.53	99.40
		3	105.00	12.53	0.14	87.33
	TOTAL :		**315.00**	**11.84**	**0.32**	**87.84**
85	BANSAGAR-II HPS	1	15.00	5.08	17.60	77.32
		2	15.00	10.20	0.11	89.69
	TOTAL :		**30.00**	**7.64**	**8.85**	**83.51**
86	BANSAGAR-III HPS	1	20.00	4.75	0.08	95.17
		2	20.00	4.78	1.77	93.45
		3	20.00	4.73	0.04	95.23
	TOTAL :		**60.00**	**4.76**	**0.63**	**94.61**
87	BARGI HPS	1	45.00	5.14	0.33	94.53
		2	45.00	5.04	0.69	94.27
	TOTAL :		**90.00**	**5.09**	**0.51**	**94.40**
88	GANDHI SAGAR HPS	1	23.00	5.89	0.24	93.87
		2	23.00	0.00	4.40	95.60
		3	23.00	5.73	0.09	94.18
		4	23.00	3.90	0.00	96.10
		5	23.00	0.00	0.07	99.93
	TOTAL :		**115.00**	**3.11**	**0.96**	**95.93**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
89	MADHIKHERA HPS	1	20.00	4.20	0.00	95.80
		2	20.00	0.44	0.00	99.56
		3	20.00	0.00	0.00	100.00
	TOTAL :		**60.00**	**1.55**	**0.00**	**98.45**
90	PENCH HPS	1	80.00	5.37	0.09	94.54
		2	80.00	5.55	0.07	94.38
	TOTAL :		**160.00**	**5.46**	**0.08**	**94.46**
91	RAJGHAT HPS	1	15.00	6.93	8.85	84.22
		2	15.00	15.09	0.22	84.69
		3	15.00	20.17	0.26	79.57
	TOTAL :		**45.00**	**14.06**	**3.11**	**82.83**
	NHDC					
92	INDIRA SAGAR HPS	1	125.00	4.87	0.00	95.13
		2	125.00	0.31	4.01	95.68
		3	125.00	5.95	0.00	94.05
		4	125.00	7.92	0.01	92.07
		5	125.00	2.95	0.00	97.05
		6	125.00	0.36	0.07	99.57
		7	125.00	5.63	0.01	94.36
		8	125.00	0.31	0.00	99.69
	TOTAL :		**1000.00**	**3.54**	**0.51**	**95.95**
93	OMKARESHWAR HPS	1	65.00	6.74	0.00	93.26
		2	65.00	2.91	0.00	97.09
		3	65.00	2.86	0.00	97.14
		4	65.00	3.39	0.00	96.61
		5	65.00	2.90	0.00	97.10
		6	65.00	2.84	0.00	97.16
		7	65.00	3.75	0.00	96.25
		8	65.00	4.02	0.00	95.98
	TOTAL :		**520.00**	**3.68**	**0.00**	**96.32**
	SSNNL					
94	S SAROVAR CHPH HPS	1	50.00	2.39	0.01	97.60
		2	50.00	0.00	0.00	100.00
		3	50.00	0.00	0.01	99.99
		4	50.00	17.36	0.00	82.64
		5	50.00	0.00	0.00	100.00
	TOTAL :		**250.00**	**3.95**	**0.00**	**96.05**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
95	S SAROVAR RBPH HPS	1	200.00	0.00	0.00	100.00
		2	200.00	0.00	0.00	100.00
		3	200.00	5.61	0.00	94.39
		4	200.00	17.82	0.00	82.18
		5	200.00	0.00	0.00	100.00
		6	200.00	0.00	0.00	100.00
	TOTAL :		**1200.00**	**3.90**	**0.00**	**96.10**
	TATA MAH.					**100.00**
96	BHIRA HPS	1	25.00	1.26	0.09	98.65
		2	25.00	2.31	0.00	97.69
		3	25.00	2.48	0.00	97.52
		4	25.00	0.00	0.00	100.00
		5	25.00	0.00	1.12	98.88
		6	25.00	0.00	0.02	99.98
	TOTAL :		**150.00**	**1.01**	**0.21**	**98.78**
97	BHIRA PSS HPS	1	150.00	0.64	0.02	99.34
	TOTAL :		**150.00**	**0.64**	**0.02**	**99.34**
98	BHIVPURI HPS	1	24.00	0.00	0.75	99.25
		2	24.00	0.00	0.22	99.78
		3	24.00	0.00	0.94	99.06
		4	1.50	0.00	0.00	100.00
		5	1.50	0.00	0.00	100.00
	TOTAL :		**75.00**	**0.00**	**0.61**	**99.39**
99	KHOPOLI HPS	1	24.00	0.00	0.30	99.70
		2	24.00	0.00	0.38	99.62
		3	24.00	0.00	0.32	99.68
	TOTAL :		**72.00**	**0.00**	**0.33**	**99.67**
	SOUTHERN REGION					
	APGENCO					
100	HAMPI HPS	1	9.00	0.05	39.69	60.26
		2	9.00	0.58	69.52	29.90
		3	9.00	1.03	5.12	93.85
		4	9.00	1.18	0.05	98.77
	TOTAL :		**36.00**	**0.71**	**28.60**	**70.69**
101	LOWER SILERU HPS	1	115.00	4.60	0.00	95.40
		2	115.00	0.00	0.00	100.00
		3	115.00	0.00	22.81	77.19

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	115.00	0.00	4.28	95.72
	TOTAL :		**460.00**	**1.15**	**6.77**	**92.08**
102	NAGARJUN SGR RBC HPS	1	30.00	0.00	5.18	94.82
		2	30.00	0.00	51.79	48.21
		3	30.00	0.41	1.10	98.49
	TOTAL :		**90.00**	**0.14**	**19.36**	**80.50**
103	NAGARJUN SGR TPD	1	25.00	0.00	0.00	100.00
		2	25.00	0.00	0.00	100.00
	TOTAL :		**50.00**	**0.00**	**0.00**	**100.00**
104	SRISAILAM HPS	1	110.00	0.00	0.02	99.98
		2	110.00	0.63	0.02	99.35
		3	110.00	0.00	1.52	98.48
		4	110.00	0.00	0.63	99.37
		5	110.00	1.45	0.03	98.52
		6	110.00	0.00	0.02	99.98
		7	110.00	0.00	0.03	99.97
	TOTAL :		**770.00**	**0.30**	**0.32**	**99.38**
105	T B DAM HPS	1	9.00	1.41	0.72	97.87
		2	9.00	0.34	58.38	41.28
		3	9.00	0.11	65.97	33.92
		4	9.00	0.02	6.85	93.13
	TOTAL :		**36.00**	**0.47**	**32.98**	**66.55**
106	UPPER SILERU HPS	1	60.00	6.08	17.67	76.25
		2	60.00	0.42	25.40	74.18
		3	60.00	0.89	6.16	92.95
		4	60.00	1.88	10.52	87.60
	TOTAL :		**240.00**	**2.32**	**14.94**	**82.74**
	KPCL					
107	ALMATTI DPH HPS	1	15.00	1.09	0.15	98.76
		2	55.00	4.28	0.05	95.67
		3	55.00	5.73	0.90	93.37
		4	55.00	29.77	0.11	70.12
		5	55.00	5.67	0.10	94.23
		6	55.00	5.64	0.27	94.09
	TOTAL :		**290.00**	**9.75**	**0.28**	**89.97**
108	BHADRA HPS	1	2.00	100.00	0.00	0.00
		2	12.00	0.09	0.11	99.80

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	12.00	34.24	28.24	37.52
	TOTAL :		**26.00**	**23.54**	**13.09**	**63.37**
109	GERUSUPPA HPS	1	60.00	0.22	0.03	99.75
		2	60.00	0.13	1.09	98.78
		3	60.00	0.17	0.55	99.28
		4	60.00	0.14	0.01	99.85
	TOTAL :		**240.00**	**0.16**	**0.42**	**99.42**
110	GHAT PRABHA HPS	1	16.00	0.00	0.03	99.97
		2	16.00	8.49	0.38	91.13
	TOTAL :		**32.00**	**4.25**	**0.21**	**95.54**
111	JOG HPS	1	13.20	100.00	0.00	0.00
		2	13.20	100.00	0.00	0.00
		3	13.20	100.00	0.00	0.00
		4	13.20	100.00	0.00	0.00
		5	21.60	6.37	0.05	93.58
		6	21.60	4.84	0.25	94.91
		7	21.60	7.73	0.38	91.89
		8	21.60	1.36	0.00	98.64
	TOTAL :		**139.20**	**41.08**	**0.11**	**58.81**
112	KADRA HPS	1	50.00	6.13	17.83	76.04
		2	50.00	1.93	17.82	80.25
		3	50.00	7.76	17.11	75.13
	TOTAL :		**150.00**	**5.27**	**17.59**	**77.14**
113	KALINADI HPS	1	135.00	0.00	20.02	79.98
		2	135.00	0.00	27.75	72.25
		3	135.00	0.00	31.59	68.41
		4	150.00	0.00	5.32	94.68
		5	150.00	0.00	28.81	71.19
		6	150.00	0.00	5.42	94.58
	TOTAL :		**855.00**	**0.00**	**19.47**	**80.53**
114	KALINADI SUPA HPS	1	50.00	0.00	1.53	98.47
		2	50.00	0.01	0.54	99.45
	TOTAL :		**100.00**	**0.01**	**1.03**	**98.96**
115	KODASALI HPS	1	40.00	3.36	14.63	82.01
		2	40.00	0.16	16.53	83.31
		3	40.00	7.42	15.45	77.13
	TOTAL :		**120.00**	**3.65**	**15.54**	**80.81**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
116	LIGANAMAKKI HPS	1	27.50	13.74	2.44	83.82
		2	27.50	0.15	0.75	99.10
	TOTAL :		**55.00**	**6.95**	**1.59**	**91.46**
117	MUNIRABAD HPS	1	9.00	0.13	0.11	99.76
		2	9.00	0.14	0.00	99.86
		3	10.00	0.13	0.01	99.86
	TOTAL :		**28.00**	**0.13**	**0.04**	**99.83**
118	SHARAVATHI HPS	1	103.50	18.04	0.21	81.75
		2	103.50	7.85	0.08	92.07
		3	103.50	1.18	0.22	98.60
		4	103.50	2.84	1.37	95.79
		5	103.50	6.45	0.16	93.39
		6	103.50	2.04	0.10	97.86
		7	103.50	0.95	0.15	98.90
		8	103.50	4.36	0.16	95.48
		9	103.50	0.99	0.55	98.46
		10	103.50	1.73	0.25	98.02
	TOTAL :		**1035.00**	**4.64**	**0.33**	**95.03**
119	SIVASAMUNDRUM HPS	1	3.00	0.00	0.27	99.73
		2	3.00	0.01	1.42	98.57
		3	3.00	0.00	1.48	98.52
		4	3.00	0.00	0.18	99.82
		5	3.00	3.83	0.01	96.16
		6	3.00	0.00	0.34	99.66
		7	6.00	0.12	0.03	99.85
		8	6.00	7.30	0.18	92.52
		9	6.00	0.00	1.91	98.09
		10	6.00	0.04	2.19	97.77
	TOTAL :		**42.00**	**1.34**	**0.88**	**97.78**
120	VARAHI HPS	1	115.00	0.35	0.12	99.53
		2	115.00	1.67	0.13	98.20
		3	115.00	0.76	0.32	98.92
		4	115.00	0.55	1.48	97.97
	TOTAL :		**460.00**	**0.83**	**0.51**	**98.66**
	KSEBL					
121	IDAMALAYAR HPS.	1	37.50	8.90	0.88	90.22
		2	37.50	9.39	2.16	88.45
	TOTAL :		**75.00**	**9.15**	**1.52**	**89.33**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
122	IDUKKI HPS.	1	130.00	9.78	0.28	89.94
		2	130.00	3.50	1.05	95.45
		3	130.00	94.81	0.05	5.14
		4	130.00	1.83	0.31	97.86
		5	130.00	6.44	0.00	93.56
		6	130.00	6.77	0.66	92.57
	TOTAL :		**780.00**	**20.52**	**0.39**	**79.09**
123	KAKKAD HPS.	1	25.00	0.00	0.08	99.92
		2	25.00	0.00	0.03	99.97
	TOTAL :		**50.00**	**0.00**	**0.06**	**99.94**
124	KUTTIYADI HPS.	1	25.00	0.95	6.10	92.95
		2	25.00	1.56	0.82	97.62
		3	25.00	8.20	6.30	85.50
	TOTAL :		**75.00**	**3.57**	**4.41**	**92.02**
125	KUTTIYADI ADDL. EXTN.	5	50.00	31.25	0.82	67.93
		6	50.00	7.67	1.09	91.24
	TOTAL :		**100.00**	**19.46**	**0.96**	**79.58**
126	KUTTIYADI EXTN. HPS.	4	50.00	11.11	0.49	88.40
	TOTAL :		**50.00**	**11.11**	**0.49**	**88.40**
127	LOWER PERIYAR HPS.	1	60.00	7.60	1.68	90.72
		2	60.00	0.46	9.73	89.81
		3	60.00	5.96	10.00	84.04
	TOTAL :		**180.00**	**4.67**	**7.14**	**88.19**
128	NARIAMANGLAM HPS	1	15.00	0.23	0.14	99.63
		2	15.00	0.25	0.00	99.75
		3	15.00	0.26	0.26	99.48
	TOTAL :		**45.00**	**0.25**	**0.13**	**99.62**
129	PALLIVASAL HPS.	1	5.00	5.84	0.00	94.16
		2	5.00	0.00	0.04	99.96
		3	5.00	9.36	0.00	90.64
		4	7.50	0.00	0.29	99.71
		5	7.50	0.04	0.00	99.96
		6	7.50	0.00	0.00	100.00
	TOTAL :		**37.50**	**2.03**	**0.06**	**97.91**
130	PANNIAR HPS.	1	15.00	6.44	0.00	93.56
		2	15.00	0.00	0.12	99.88
	TOTAL :		**30.00**	**3.22**	**0.06**	**96.72**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
131	PORINGALKUTTU HPS.	1	8.00	0.00	19.21	80.79
		2	8.00	0.00	10.80	89.20
		3	8.00	11.21	15.49	73.30
		4	8.00	0.00	4.01	95.99
	TOTAL :		**32.00**	**2.80**	**12.37**	**84.83**
132	SABARIGIRI HPS.	1	50.00	7.57	0.77	91.66
		2	50.00	7.06	0.21	92.73
		3	50.00	18.54	1.61	79.85
		4	50.00	63.16	2.63	34.21
		5	50.00	6.41	0.69	92.90
		6	50.00	1.91	10.57	87.52
	TOTAL :		**300.00**	**17.44**	**2.75**	**79.81**
133	SENGULAM HPS.	1	12.00	1.41	8.42	90.17
		2	12.00	16.97	2.53	80.50
		3	12.00	8.01	0.04	91.95
		4	12.00	16.91	0.05	83.04
	TOTAL :		**48.00**	**10.82**	**2.76**	**86.42**
134	SHOLAYAR HPS.	1	18.00	0.00	0.00	100.00
		2	18.00	0.00	0.00	100.00
		3	18.00	0.00	13.92	86.08
	TOTAL :		**54.00**	**0.00**	**4.64**	**95.36**
	TNGDCL					
135	ALIYAR HPS.	1	60.00	0.03	65.36	34.61
	TOTAL :		**60.00**	**0.03**	**65.36**	**34.61**
136	BHAWANI BARRAGE-II HPS	1	15.00	11.23	0.06	88.71
		2	15.00	0.28	0.04	99.68
	TOTAL :		**30.00**	**5.75**	**0.05**	**94.20**
137	BHAWANI BARRAGE-III	1	15.00	15.42	48.42	36.16
		2	15.00	10.22	48.44	41.34
	TOTAL :		**30.00**	**10.82**	**48.43**	**40.75**
138	BHAWANI KATTAL	1	15.00	5.21	13.98	80.81
		2	15.00	10.66	3.73	85.61
	TOTAL :		**30.00**	**7.94**	**8.86**	**83.20**
139	KADAMPARI HPS.	1	100.00	3.37	2.20	94.43
		2	100.00	3.37	1.18	95.45
		3	100.00	0.00	75.52	24.48
		4	100.00	0.00	74.98	25.02
	TOTAL :		**400.00**	**1.69**	**38.47**	**59.84**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
140	KODAYAR-I HPS.	1	60.00	16.27	14.53	69.20
	TOTAL :		**60.00**	**16.27**	**14.53**	**69.20**
141	KODAYAR-II HPS.	2	40.00	17.23	24.11	58.66
	TOTAL :		**40.00**	**17.23**	**24.11**	**58.66**
142	KUNDAH-I HPS.	1	20.00	0.10	0.92	98.98
		2	20.00	0.04	0.00	99.96
		3	20.00	0.00	0.00	100.00
	TOTAL :		**60.00**	**0.05**	**0.31**	**99.64**
143	KUNDAH-II HPS.	4	35.00	0.42	0.90	98.68
		5	35.00	0.08	0.19	99.73
		6	35.00	0.00	1.01	98.99
		7	35.00	0.08	0.11	99.81
		8	35.00	0.00	0.00	100.00
	TOTAL :		**175.00**	**0.12**	**0.44**	**99.44**
144	KUNDAH-III HPS.	9	60.00	0.08	0.00	99.92
		10	60.00	10.22	0.00	89.78
		11	60.00	0.00	2.93	97.07
	TOTAL :		**180.00**	**3.44**	**0.98**	**95.58**
145	KUNDAH-IV HPS.	12	50.00	0.02	75.79	24.19
		13	50.00	5.57	0.34	94.09
	TOTAL :		**100.00**	**2.80**	**38.06**	**59.14**
146	KUNDAH-V HPS.	14	20.00	0.00	0.49	99.51
		15	20.00	0.00	14.27	85.73
	TOTAL :		**40.00**	**0.00**	**7.38**	**92.62**
147	LOWER METTUR-I	1	15.00	8.99	0.00	91.01
		2	15.00	9.00	0.00	91.00
	TOTAL :		**30.00**	**9.00**	**0.00**	**91.00**
148	LOWER METTUR-II	3	15.00	15.09	0.00	84.91
		4	15.00	10.38	0.10	89.52
	TOTAL :		**30.00**	**12.74**	**0.05**	**87.21**
149	LOWER METTUR-III	5	15.00	21.81	0.00	78.19
		6	15.00	15.24	0.00	84.76
	TOTAL :		**30.00**	**18.52**	**0.00**	**81.48**
150	LOWER METTUR-IV	7	15.00	0.00	0.00	100.00
		8	15.00	0.27	0.00	99.73
	TOTAL :		**30.00**	**0.14**	**0.00**	**99.86**
151	METTUR DAM HPS.	1	12.50	0.59	0.00	99.41
		2	12.50	3.39	0.00	96.61

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	12.50	0.23	0.00	99.77
		4	12.50	0.24	8.60	91.16
	TOTAL :		**50.00**	**1.11**	**2.15**	**96.74**
152	METTUR TUNNEL HPS.	1	50.00	21.82	0.03	78.15
		2	50.00	21.96	0.00	78.04
		3	50.00	22.11	0.14	77.75
		4	50.00	16.28	0.10	83.62
	TOTAL :		**200.00**	**20.54**	**0.07**	**79.39**
153	MOYAR HPS	1	12.00	0.00	0.00	100.00
		2	12.00	6.67	0.00	93.33
		3	12.00	0.00	0.00	100.00
	TOTAL :		**36.00**	**2.22**	**0.00**	**97.78**
154	PAPANASAM HPS.	1	8.00	0.87	22.61	76.52
		2	8.00	8.04	0.16	91.80
		3	8.00	0.64	0.08	99.28
		4	8.00	0.63	8.15	91.22
	TOTAL :		**32.00**	**2.55**	**7.75**	**89.70**
155	PARSON`S VALLEY HPS.	1	30.00	6.65	0.00	93.35
	TOTAL :		**30.00**	**6.65**	**0.00**	**93.35**
156	PERIYAR HPS.	1	42.00	7.61	0.29	92.10
		2	42.00	8.06	0.46	91.48
		3	42.00	8.05	0.02	91.93
		4	35.00	18.68	0.00	81.32
	TOTAL :		**161.00**	**10.25**	**0.20**	**89.55**
157	PYKARA HPS.	1	7.00	0.83	0.47	98.70
		2	7.00	0.80	1.36	97.84
		3	7.00	0.76	0.75	98.49
		4	13.60	0.00	0.00	100.00
		5	13.60	0.81	0.68	98.51
		6	11.00	0.39	1.25	98.36
	TOTAL :		**59.20**	**0.54**	**0.70**	**98.76**
158	PYKARA ULTMATE HPS.	1	50.00	0.98	0.06	98.96
		2	50.00	3.23	0.40	96.37
		3	50.00	1.14	0.05	98.81
	TOTAL :		**150.00**	**1.79**	**0.17**	**98.04**
159	SARKARPATHY HPS.	1	30.00	12.13	1.59	86.28
	TOTAL :		**30.00**	**12.13**	**1.59**	**86.28**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
160	SHOLAYAR HPS (TN)	1	35.00	36.23	9.73	54.04
		2	35.00	58.87	11.01	30.12
	TOTAL :		**70.00**	**47.55**	**10.37**	**42.08**
161	SURULIYAR HPS.	1	35.00	12.71	12.08	75.21
	TOTAL :		**35.00**	**12.71**	**12.08**	**75.21**
	TSGENCO					
162	LOWER JURALA HPS	1	40.00	0.00	0.03	99.97
		2	40.00	17.63	0.03	82.34
		3	40.00	15.57	0.05	84.38
		4	40.00	0.00	0.06	99.94
		5	40.00	0.00	0.25	99.75
		6	40.00	0.00	0.01	99.99
	TOTAL :		**240.00**	**5.53**	**0.07**	**94.40**
163	NAGARJUN SGR HPS	1	110.00	14.03	0.25	85.72
		2	100.80	13.35	0.25	86.40
		3	100.80	10.71	0.25	89.04
		4	100.80	0.71	0.25	99.04
		5	100.80	1.89	0.25	97.86
		6	100.80	0.63	0.25	99.12
		7	100.80	0.64	0.25	99.11
		8	100.80	0.65	2.25	97.10
	TOTAL :		**815.60**	**5.43**	**0.50**	**94.07**
164	NAGARJUN SGR LBC HPS	1	30.00	0.16	7.82	92.02
		2	30.00	0.01	0.10	99.89
	TOTAL :		**60.00**	**0.09**	**3.96**	**95.95**
165	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	0.00	0.00	100.00
	TOTAL :		**36.00**	**0.00**	**0.00**	**100.00**
166	PRIYADARSHNI JURALA HPS	1	39.00	6.80	0.00	93.20
		2	39.00	0.00	0.04	99.96
		3	39.00	0.00	39.02	60.98
		4	39.00	7.87	0.02	92.11
		5	39.00	0.00	0.00	100.00
		6	39.00	0.00	0.00	100.00
	TOTAL :		**234.00**	**2.44**	**6.51**	**91.05**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
167	PULICHINTALA HPS	1	30.00	0.00	0.00	100.00
		2	30.00	0.00	0.00	100.00
		3	30.00	0.00	0.00	100.00
		4	30.00	0.00	0.00	100.00
	TOTAL :		**120.00**	**0.00**	**0.00**	**100.00**
168	SRISAILAM LB 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
		4	150.00	0.00	0.00	100.00
		5	150.00	0.00	0.00	100.00
		6	150.00	0.00	0.00	100.00
	TOTAL :		**900.00**	**0.00**	**0.00**	**100.00**
	EASTERN REGION					
	APGENCO					
169	MACHKUND HPS	1	17.00	0.04	8.44	91.52
		2	17.00	0.00	63.08	36.92
		3	17.00	9.43	18.85	71.72
		4	21.25	0.00	100.00	0.00
		5	21.25	0.58	1.39	98.03
		6	21.25	1.09	10.82	88.09
	TOTAL :		**114.75**	**1.71**	**34.17**	**64.12**
	DEPL					
170	JORETHANG LOOP	1	48.00	1.34	2.55	96.11
		2	48.00	0.70	2.84	96.46
	TOTAL :		**96.00**	**1.02**	**2.70**	**96.28**
	DVC					
171	MAITHON HPS.	1	20.00	13.74	3.22	83.04
		2	23.20	9.01	0.13	90.86
		3	20.00	27.99	4.50	67.51
	TOTAL :		**63.20**	**16.51**	**2.49**	**81.00**
172	PANCHET HPS.	1	40.00	13.82	32.10	54.08
		2	40.00	0.78	5.77	93.45
	TOTAL :		**80.00**	**7.30**	**18.93**	**73.77**
	GIPL					
173	CHUZACHEN HPS	1	55.00	4.04	1.46	94.50
		2	55.00	4.04	1.20	94.76
	TOTAL :		**110.00**	**4.04**	**1.33**	**94.63**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
	JUUNL					
174	SUBERNREKHA-I HPS.	1	65.00	18.47	0.00	81.53
	TOTAL :		**65.00**	**18.47**	**0.00**	**81.53**
175	SUBERNREKHA-II HPS.	2	65.00	14.91	0.00	85.09
	TOTAL :		**65.00**	**14.91**	**0.00**	**85.09**
	NHPC					
176	RANGIT HPS	1	20.00	6.94	0.35	92.71
		2	20.00	8.00	0.21	91.79
		3	20.00	6.12	0.58	93.30
	TOTAL :		**60.00**	**7.02**	**0.38**	**92.60**
177	TEESTA LOW DAM-III HPS	1	33.00	4.20	0.09	95.71
		2	33.00	3.82	0.22	95.96
		3	33.00	5.56	0.04	94.40
		4	33.00	7.26	0.49	92.25
	TOTAL :		**132.00**	**5.21**	**0.21**	**94.58**
178	TEESTA LOW DAM-IV HPS	1	40.00	5.71	0.16	94.13
		2	40.00	6.69	0.03	93.28
		3	40.00	7.54	1.91	90.55
		4	40.00	4.50	0.09	95.41
	TOTAL :		**160.00**	**6.11**	**0.55**	**93.34**
179	TEESTA V HPS	1	170.00	0.00	0.14	99.86
		2	170.00	2.65	0.00	97.35
		3	170.00	2.65	0.01	97.34
	TOTAL :		**510.00**	**1.77**	**0.05**	**98.18**
	OHPC					
180	BALIMELA HPS.	1	60.00	100.00	0.00	0.00
		2	60.00	100.00	0.00	0.00
		3	60.00	9.55	0.22	90.23
		4	60.00	8.36	2.10	89.54
		5	60.00	42.26	0.67	57.07
		6	60.00	6.19	0.14	93.67
		7	75.00	0.88	1.83	97.29
		8	75.00	0.81	0.53	98.66
	TOTAL :		**510.00**	**31.58**	**0.72**	**67.70**
181	CHIPLIMA HPS	8	24.00	0.46	28.11	71.43
		9	24.00	1.47	8.33	90.20
		10	24.00	100.00	0.00	0.00
	TOTAL :		**72.00**	**33.98**	**12.15**	**53.87**

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
182	HIRAKUD HPS	1	49.50	0.00	8.49	91.51
		2	49.50	0.18	48.49	51.33
		3	32.00	0.77	0.32	98.91
		4	32.00	8.79	3.49	87.72
		5	37.50	100.00	0.00	0.00
		6	37.50	100.00	0.00	0.00
		7	37.50	0.33	0.82	98.85
	TOTAL :		**275.50**	**28.41**	**10.79**	**60.80**
183	RENGALI HPS.	1	50.00	12.54	3.46	84.00
		2	50.00	30.34	5.06	64.60
		3	50.00	0.83	9.92	89.25
		4	50.00	20.56	1.88	77.56
		5	50.00	4.89	0.00	95.11
	TOTAL :		**250.00**	**13.83**	**4.06**	**82.11**
184	UPPER INDRAVATI HPS.	1	150.00	9.67	0.67	89.66
		2	150.00	8.51	0.29	91.20
		3.00	150.00	1.19	15.47	83.34
		4	150.00	17.35	4.43	78.22
	TOTAL :		**600.00**	**9.18**	**5.22**	**85.60**
185	UPPER KOLAB HPS.	1	80.00	5.11	0.18	94.71
		2	80.00	0.00	100.00	0.00
		3	80.00	5.10	3.34	91.56
		4	80.00	21.05	0.28	78.67
	TOTAL :		**320.00**	**7.81**	**25.95**	**66.24**
	SEPL					
186	TASHIDING HPS	1	48.50	0.35	0.34	99.31
		2	48.50	0.33	0.43	99.24
	TOTAL :		**97.00**	**0.34**	**0.39**	**99.27**
	SKPPPL					
187	DIKCHU HPS	1	48.00	0.84	3.12	96.04
		2	48.00	5.48	0.34	94.18
	TOTAL :		**96.00**	**3.16**	**1.73**	**95.11**
	TUL					
188	TEESTA-III HPS	1	200.00	3.60	1.61	94.79
		2	200.00	0.00	0.05	99.95
		3	200.00	0.00	0.02	99.98
		4	200.00	3.36	0.05	96.59

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		5	200.00	8.85	1.23	89.92
		6	200.00	10.47	0.02	89.51
	TOTAL :		**1200.00**	**4.38**	**0.50**	**95.12**
	WBSEDCL					
189	JALDHAKA HPS ST-I	1	9.00	0.15	1.67	98.18
		2	9.00	0.06	0.87	99.07
		3	9.00	0.23	0.97	98.80
		4	9.00	0.00	0.00	100.00
	TOTAL :		**36.00**	**0.11**	**0.88**	**99.01**
190	PURULIA PSS HPS.	1	225.00	2.49	0.50	97.01
		2	225.00	2.01	0.00	97.99
		3	225.00	1.88	0.00	98.12
		4	225.00	2.43	0.00	97.57
	TOTAL :		**900.00**	**2.21**	**0.13**	**97.66**
191	RAMMAM HPS.	1	12.50	3.84	0.60	95.56
		2	12.50	0.00	0.12	99.88
		3	12.50	6.46	15.66	77.88
		4	12.50	7.15	0.15	92.70
	TOTAL :		**50.00**	**4.36**	**4.13**	**91.51**
	NORTH EASTERN REGION					
	APGPCL					
192	KARBI LANGPI HPS.	1	50.00	3.35	0.52	96.13
		2	50.00	3.11	0.82	96.07
	TOTAL :		**100.00**	**3.23**	**0.67**	**96.10**
	MeECL					
193	KYRDEMKULAI 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**
194	MYNTDU(LESHKA) St-1 HPS	1	42.00	2.09	0.00	97.91
		2	42.00	20.56	0.03	79.41
		3	42.00	7.51	0.00	92.49
	TOTAL :		**126.00**	**10.05**	**0.01**	**89.94**
195	NEW UMTRU HPS	1	20.00	0.09	0.23	99.68
		2	20.00	0.07	0.29	99.64
	TOTAL :		**40.00**	**0.08**	**0.26**	**99.66**
196	UMIAM HPS ST-I	1	9.00	3.10	0.15	96.75
		2	9.00	1.48	2.25	96.27

OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2018-19

SL. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	9.00	3.65	2.18	94.17
		4	9.00	1.29	4.48	94.23
	TOTAL :		**36.00**	**2.38**	**2.27**	**95.35**
197	UMIAM HPS ST-IV	7	30.00	3.77	0.62	95.61
		8	30.00	2.43	0.97	96.60
	TOTAL :		**60.00**	**3.10**	**0.79**	**96.11**
	NEEPCO.					
198	DOYANG HPS.	1	25.00	7.52	0.95	91.53
		2	25.00	2.61	15.58	81.81
		3	25.00	42.11	10.76	47.13
	TOTAL :		**75.00**	**17.41**	**9.10**	**73.49**
199	KHONDONG HPS.	1	25.00	4.69	4.34	90.97
		2	25.00	10.74	7.87	81.39
	TOTAL :		**50.00**	**7.72**	**6.10**	**86.18**
200	KOPILI HPS.	1	50.00	11.64	1.36	87.00
		2	50.00	3.75	5.55	90.70
		3	50.00	9.33	1.40	89.27
		4	50.00	5.39	10.77	83.84
	TOTAL :		**200.00**	**7.53**	**4.77**	**87.70**
201	PARE	1	55.00	0.00	0.00	100.00
		2	55.00	0.00	0.05	99.95
	TOTAL :		**110.00**	**0.00**	**0.03**	**99.97**
202	RANGANADI HPS.	1	135.00	0.00	15.59	84.41
		2	135.00	0.00	15.39	84.61
		3	135.00	1.89	15.37	82.74
	TOTAL :		**405.00**	**0.63**	**15.45**	**83.92**
203	TUIRIAL HPS	1	30.00	0.00	18.39	81.61
		2	30.00	0.00	13.45	86.55
	TOTAL :		**60.00**	**0.00**	**15.92**	**84.08**
	NHPC					
204	LOKTAK HPS.	1	35.00	3.84	0.13	96.03
		2	35.00	3.48	0.01	96.51
		3	35.00	2.38	0.00	97.62
	TOTAL :		**105.00**	**3.23**	**0.05**	**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, high tailrace level, strikes, etc. constitutes the miscellaneous outages. The station-wise details of miscellaneous non-availability during 2018-19 is given at **Annex-7.1** and summarized below in **Table 7.1.**

TABLE 7.1

MISCELLANEOUS OUTAGES
FOR PERIOD: 2018-19

S. No.	Causes of Miscellaneous Outage	Duration of Outage (Hours)	% of Total Outage
	NOT ASSOCIATED WITH THE EQUIPMENT AND CIVIL STRUCTURE		
1	Water Constraint	199309.82	86.97
2	Grid Constraint	23108.1	10.08
3	Other Miscellaneous	6742.97	2.94
	TOTAL	**229160.89**	**100**

7.2 The overall non-availability on account of miscellaneous outages has been estimated as 3.76%. It was highest (54.04%) in case of HE Stations from GSECL followed by RRVUNL (18.89%), BBMB (15.38%), SJVNL (12.38%), 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 HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	NORTHERN REGION			
	ADHPL			
1	ALLAIN DUHANGAN HPS	1	96.00	0.11
		2	96.00	0.11
	TOTAL :		**192.00**	**0.11**
	AHPC (GVK)			
2	SHRINAGAR HPS	1	82.50	0.10
		2	82.50	0.05
		3	82.50	0.05
		4	82.50	0.05
	TOTAL :		**330.00**	**0.06**
	BBMB			
3	BHAKRA LEFT HPS	1	108.00	5.35
		2	126.00	5.00
		3	108.00	0.00
		4	126.00	6.41
		5	126.00	7.49
	TOTAL :		**594.00**	**4.98**
4	BHAKRA RIGHT HPS	6	157.00	21.38
		7	157.00	5.23
		8	157.00	51.19
		9	157.00	5.85
		10	157.00	5.83
	TOTAL :		**785.00**	**17.89**
5	DEHAR H P S	1	165.00	17.16
		2	165.00	32.01
		3	165.00	6.94
		4	165.00	8.64
		5	165.00	35.68
		6	165.00	10.57
	TOTAL :		**990.00**	**18.50**
6	GANGUWAL HPS	1	29.25	1.17
		2	24.20	0.82
		3	24.20	2.77
	TOTAL :		**77.65**	**1.56**
7	KOTLA HPS	1	29.25	3.20
		2	24.20	1.39

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
				(2/
		3	24.20	1.51
	TOTAL :		**77.65**	**2.11**
8	PONG H P S	1	66.00	34.46
		2	66.00	75.27
		3	66.00	0.00
		4	66.00	9.99
		5	66.00	5.72
		6	66.00	15.86
	TOTAL :		**396.00**	**23.55**
	E.P.P.L.			
9	MALANA-II HPS	1	50.00	0.08
		2	50.00	0.08
	TOTAL :		**100.00**	**0.08**
	GBHPPL			
10	BUDHIL HPS	1	35.00	1.07
		2	35.00	1.07
	TOTAL :		**70.00**	**1.07**
	HBPCL			
11	BASPA HPS	1	100.00	4.51
		2	100.00	0.00
		3	100.00	2.21
	TOTAL :		**300.00**	**2.24**
12	KARCHAM WANGTOO 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**
	HPPCL			
13	KASHANG INTEGRATED	1	65.00	3.29
		2	65.00	1.66
		3	65.00	0.00
	TOTAL :		**195.00**	**1.65**
14	SAINJ HPS	1	50.00	0.00
		2	50.00	0.00
	TOTAL :		**100.00**	**0.00**
	HPSEBL			
15	BASSI HPS	1	16.50	12.49

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	16.50	1.08
		3	16.50	1.74
		4	16.50	13.94
	TOTAL :		**66.00**	**7.31**
16	GIRI BATA HPS	1	30.00	0.02
		2	30.00	0.03
	TOTAL :		**60.00**	**0.02**
17	LARJI HPS	1	42.00	0.00
		2	42.00	1.17
		3	42.00	0.01
	TOTAL :		**126.00**	**0.39**
18	SANJAY HPS	1	40.00	0.01
		2	40.00	0.00
		3	40.00	0.00
	TOTAL :		**120.00**	**0.00**
	IAEPL			
19	CHANJU-I HPS	1	12.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL :		**36.00**	**0.00**
	JKSPDC			
20	BAGLIHAR HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
	TOTAL :		**450.00**	**0.00**
21	BAGLIHAR II HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
	TOTAL :		**450.00**	**0.00**
22	LOWER JHELUM HPS	1	35.00	0.25
		2	35.00	0.00
		3	35.00	0.03
	TOTAL :		**105.00**	**0.10**
23	UPPER SINDH-II HPS	3	35.00	27.88
		4	35.00	51.85
		5	35.00	18.35
	TOTAL :		**105.00**	**32.69**

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	JPPVL			
24	VISHNU PRAYAG HPS	1	100.00	1.21
		2	100.00	1.39
		3	100.00	2.90
		4	100.00	0.76
	TOTAL :		**400.00**	**1.56**
	MPCL			
25	MALANA HPS	1	43.00	0.08
		2	43.00	0.06
	TOTAL :		**86.00**	**0.07**
	NHPC			
26	BAIRA SIUL HPS	1	60.00	11.95
		2	60.00	9.26
		3	60.00	11.04
	TOTAL :		**180.00**	**10.75**
27	CHAMERA- I HPS	1	180.00	9.64
		2	180.00	7.56
		3	180.00	12.57
	TOTAL :		**540.00**	**9.93**
28	CHAMERA- II HPS	1	100.00	8.78
		2	100.00	3.31
		3	100.00	6.63
	TOTAL :		**300.00**	**6.24**
29	CHAMERA-III HPS	1	77.00	5.80
		2	77.00	7.96
		3	77.00	8.27
	TOTAL :		**231.00**	**7.34**
30	CHUTAK HPS	1	11.00	11.27
		2	11.00	19.75
		3	11.00	26.97
		4	11.00	21.95
	TOTAL :		**44.00**	**19.99**
31	DHAULI GANGA HPS	1	70.00	10.31
		2	70.00	12.01
		3	70.00	12.50
		4	70.00	12.80
	TOTAL :		**280.00**	**11.91**

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
32	DULHASTI HPS	1	130.00	3.31
		2	130.00	3.23
		3	130.00	3.29
	TOTAL :		**390.00**	**3.28**
33	KISHANGANGA HPS	1	110.00	0.11
		2	110.00	0.01
		3	110.00	0.00
	TOTAL :		**330.00**	**0.04**
34	NIMMO BAZGO HPS	1	15.00	4.14
		2	15.00	3.88
		3	15.00	27.59
	TOTAL :		**45.00**	**11.87**
35	PARBATI-III HPS	1	130.00	18.20
		2	130.00	8.62
		3	130.00	17.96
		4	130.00	14.10
	TOTAL :		**520.00**	**14.72**
36	SALAL HPS	1	115.00	3.19
		2	115.00	3.45
		3	115.00	1.67
		4	115.00	1.89
		5	115.00	1.95
		6	115.00	3.60
	TOTAL :		**690.00**	**2.63**
37	SEWA-II HPS	1	40.00	11.82
		2	40.00	12.06
		3	40.00	11.97
	TOTAL :		**120.00**	**11.95**
38	TANAKPUR HPS	1	31.40	3.80
		2	31.40	1.59
		3	31.40	6.25
	TOTAL :		**94.20**	**3.88**
39	URI-I HPS	1	120.00	0.00
		2	120.00	1.39
		3	120.00	0.00
		4	120.00	0.11
	TOTAL :		**480.00**	**0.37**
40	URI-II HPS	1	60.00	0.04

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	60.00	0.05
		3	60.00	0.00
		4	60.00	0.40
	TOTAL :		**240.00**	**0.12**
	NTPC Ltd.			
41	KOLDAM	1	200	0
		2	200.00	0.00
		3	200.00	0.00
		4	200.00	0.00
	TOTAL :		**800.00**	**0.00**
	PSPCL			
42	ANANDPUR SAHIB-I HPS	1	33.5	0.09
		2	33.50	0.22
	TOTAL :		**67.00**	**0.15**
43	ANANDPUR SAHIB-II HPS	3	33.50	0.00
		4	33.50	0.00
	TOTAL :		**67.00**	**0.00**
44	MUKERIAN-I HPS	1	15.00	23.62
		2	15.00	13.61
		3	15.00	9.39
	TOTAL :		**45.00**	**15.54**
45	MUKERIAN-II HPS	4	15.00	15.96
		5	15.00	25.79
		6	15.00	6.18
	TOTAL :		**45.00**	**15.98**
46	MUKERIAN-III HPS	7	19.50	12.15
		8	19.50	16.65
		9	19.50	8.73
	TOTAL :		**58.50**	**12.51**
47	MUKERIAN-IV HPS	10	19.50	9.91
		11	19.50	7.76
		12	19.50	23.66
	TOTAL :		**58.50**	**13.78**
48	RANJIT SAGAR HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
		4	150.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL :		**600.00**	**0.00**
49	SHANAN HPS	1	15.00	0.03
		2	15.00	0.00
		3	15.00	0.00
		4	15.00	0.00
		5	50.00	0.00
	TOTAL :		**110.00**	**0.00**
	RRVUNL			
50	JAWAHAR SAGAR HPS	1	33	0
		2	33.00	0.00
		3	33.00	0.00
	TOTAL :		**99.00**	**0.00**
51	MAHI BAJAJ-I HPS	1	25.00	80.95
		2	25.00	64.46
	TOTAL :		**50.00**	**72.71**
52	MAHI BAJAJ-II HPS	3	45.00	7.94
		4	45.00	83.80
	TOTAL :		**90.00**	**45.87**
53	R P SAGAR HPS	1	43.00	0.00
		2	43.00	0.00
		3	43.00	0.00
		4	43.00	0.00
	TOTAL :		**172.00**	**0.00**
	SJVNL			
54	NATHPA JHAKRI HPS	1	250	12.77
		2	250.00	12.09
		3	250.00	14.99
		4	250.00	11.21
		5	250.00	12.40
		6	250.00	12.83
	TOTAL :		**1500.00**	**12.71**
55	RAMPUR HPS	1	68.67	9.04
		2	68.67	12.17
		3	68.67	14.18
		4	68.67	12.04
		5	68.67	12.11
		6	68.67	7.63

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL :		**412.02**	**11.20**
	THDC			
56	KOTESHWAR HPS	1	100	0
		2	100.00	0.00
		3	100.00	0.00
		4	100.00	0.00
	TOTAL :		**400.00**	**0.00**
57	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			
58	CHIBRO (YAMUNA) HPS	1	60	0
		2	60.00	0.00
		3	60.00	0.00
		4	60.00	63.66
	TOTAL :		**240.00**	**15.91**
59	CHILLA HPS	1	36.00	0.57
		2	36.00	2.40
		3	36.00	0.18
		4	36.00	8.87
	TOTAL :		**144.00**	**3.01**
60	DHAKRANI HPS	1	11.25	0.82
		2	11.25	0.04
		3	11.25	0.03
	TOTAL :		**33.75**	**0.30**
61	DHALIPUR HPS	1	17.00	0.00
		2	17.00	0.00
		3	17.00	10.90
	TOTAL :		**51.00**	**3.63**
62	KHATIMA HPS	1	13.80	0.20
		2	13.80	0.49
		3	13.80	0.10
	TOTAL :		**41.40**	**0.26**
63	KHODRI HPS	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		4	30.00	100.00
	TOTAL :		**120.00**	**25.00**
64	KULHAL HPS	1	10.00	0.00
		2	10.00	100.00
		3	10.00	0.00
	TOTAL :		**30.00**	**33.33**
65	MANERI BHALI - I HPS	1	30.00	0.06
		2	30.00	0.01
		3	30.00	0.05
	TOTAL :		**90.00**	**0.04**
66	MANERI BHALI - II HPS	1	76.00	18.72
		2	76.00	6.33
		3	76.00	0.03
		4	76.00	16.58
	TOTAL :		**304.00**	**10.41**
67	RAMGANGA HPS	1	66.00	0.32
		2	66.00	0.27
		3	66.00	1.40
	TOTAL :		**198.00**	**0.66**
	UPJVNL			
68	KHARA HPS	1	24	2.03
		2	24.00	6.33
		3	24.00	7.31
	TOTAL :		**72.00**	**5.22**
69	MATATILA HPS	1	10.20	2.42
		2	10.20	0.51
		3	10.20	0.94
	TOTAL :		**30.60**	**1.29**
70	OBRA HPS	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL :		**99.00**	**0.00**
71	RIHAND HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	1.40
		5	50.00	0.00
		6	50.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL :		**300.00**	**0.23**
	WESTERN REGION			
	CSPGCL			
72	HASDEOBANGO HPS	1	40	0
		2	40.00	0.00
		3	40.00	0.00
	TOTAL :		**120.00**	**0.00**
	DLHP			
73	BHANDARDARA HPS ST-II	2	34	0
	TOTAL :		**34.00**	**0.00**
	GSECL			
74	KADANA HPS	1	60	0
		2	60.00	2.59
		3	60.00	0.00
		4	60.00	0.78
	TOTAL :		**240.00**	**0.84**
75	UKAI HPS	1	75.00	94.12
		2	75.00	98.73
		3	75.00	97.72
		4	75.00	95.83
	TOTAL :		**300.00**	**96.60**
	MAHAGENCO			
76	BHIRA TAIL RACE HPS	1	40	0
		2	40.00	0.00
	TOTAL :		**80.00**	**0.00**
77	GHATGHAR PSS HPS	1	125.00	0.00
		2	125.00	0.00
	TOTAL :		**250.00**	**0.00**
78	KOYNA DPH HPS	1	18.00	0.00
		2	18.00	0.00
	TOTAL :		**36.00**	**0.00**
79	KOYNA-I&II HPS	1	70.00	0.00
		2	70.00	0.00
		3	70.00	0.00
		4	70.00	0.00
		5	80.00	0.00
		6	80.00	0.00
		7	80.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		8	80.00	0.00
	TOTAL :		**600.00**	**0.00**
80	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**
81	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**
82	TILLARI HPS	1	60.00	0.00
	TOTAL :		**60.00**	**0.00**
83	VAITARNA HPS	1	60.00	0.01
	TOTAL :		**60.00**	**0.01**
	MPPGCL			
84	BANSAGAR TONS-I HPS	1	105	0
		2	105.00	0.04
		3	105.00	0.00
	TOTAL :		**315.00**	**0.01**
85	BANSAGAR-II HPS	1	15.00	22.19
		2	15.00	34.39
	TOTAL :		**30.00**	**28.29**
86	BANSAGAR-III HPS	1	20.00	0.06
		2	20.00	0.42
		3	20.00	0.10
	TOTAL :		**60.00**	**0.19**
87	BARGI HPS	1	45.00	0.00
		2	45.00	0.00
	TOTAL :		**90.00**	**0.00**
88	GANDHI SAGAR HPS	1	23.00	0.00
		2	23.00	0.00
		3	23.00	0.84
		4	23.00	0.00
		5	23.00	0.00
	TOTAL :		**115.00**	**0.17**
89	MADHIKHERA HPS	1	20.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	20.00	0.00
		3	20.00	0.00
	TOTAL :		**60.00**	**0.00**
90	PENCH HPS	1	80.00	0.00
		2	80.00	0.00
	TOTAL :		**160.00**	**0.00**
91	RAJGHAT HPS	1	15.00	8.55
		2	15.00	0.03
		3	15.00	0.05
	TOTAL :		**45.00**	**2.87**
	NHDC			
92	INDIRA SAGAR HPS	1	125	0
		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	0.00
		8	125.00	0.00
	TOTAL :		**1000.00**	**0.00**
93	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			
94	S SAROVAR CHPH HPS	1	50	0.01
		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**
95	S SAROVAR RBPH HPS	1	200.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		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.			
96	BHIRA HPS	1	25	0
		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**
97	BHIRA PSS HPS	1	150.00	0.00
	TOTAL :		**150.00**	**0.00**
98	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**
99	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			
100	HAMPI HPS	1	9	0
		2	9.00	0.00
		3	9.00	0.00
		4	9.00	0.00
	TOTAL :		**36.00**	**0.00**
101	LOWER SILERU HPS	1	115.00	0.00
		2	115.00	0.00
		3	115.00	0.00
		4	115.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL :		**460.00**	**0.00**
102	NAGARJUN SGR RBC HPS	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00
	TOTAL :		**90.00**	**0.00**
103	NAGARJUN SGR TPD	1	25.00	0.00
		2	25.00	0.00
	TOTAL :		**50.00**	**0.00**
104	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**
105	T B DAM HPS	1	9.00	0.00
		2	9.00	0.02
		3	9.00	0.01
		4	9.00	0.00
	TOTAL :		**36.00**	**0.01**
106	UPPER SILERU HPS	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
		4	60	0
	TOTAL :		**240.00**	**0.00**
	KPCL			
107	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**
108	BHADRA HPS	1	2.00	0.00
		2	12.00	0.04
		3	12.00	0.00
	TOTAL :		**26.00**	**0.02**

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
109	GERUSUPPA HPS	1	60.00	0.00
		2	60.00	0.45
		3	60.00	0.00
		4	60.00	0.00
	TOTAL :		**240.00**	**0.11**
110	GHAT PRABHA HPS	1	16.00	0.00
		2	16.00	0.00
	TOTAL :		**32.00**	**0.00**
111	JOG HPS	1	13.20	0.00
		2	13.20	0.00
		3	13.20	0.00
		4	13.20	0.00
		5	21.60	0.25
		6	21.60	0.39
		7	21.60	0.39
		8	21.60	0.01
	TOTAL :		**139.20**	**0.16**
112	KADRA HPS	1	50.00	1.97
		2	50.00	1.81
		3	50.00	1.39
	TOTAL :		**150.00**	**1.72**
113	KALINADI HPS	1	135.00	9.29
		2	135.00	12.73
		3	135.00	12.97
		4	150.00	12.40
		5	150.00	7.74
		6	150.00	12.65
	TOTAL :		**855.00**	**11.28**
114	KALINADI SUPA HPS	1	50.00	5.06
		2	50.00	4.86
	TOTAL :		**100.00**	**4.96**
115	KODASALI HPS	1	40.00	1.59
		2	40.00	2.88
		3	40.00	2.23
	TOTAL :		**120.00**	**2.23**
116	LIGANAMAKKI HPS	1	27.50	0.00
		2	27.50	0.00
	TOTAL :		**55.00**	**0.00**

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
117	MUNIRABAD HPS	1	9.00	0.00
		2	9.00	0.00
		3	10.00	0.01
	TOTAL :		**28.00**	**0.00**
118	SHARAVATHI HPS	1	103.50	0.00
		2	103.50	0.00
		3	103.50	0.00
		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	0.00
		10	103.50	0.00
	TOTAL :		**1035.00**	**0.00**
119	SIVASAMUNDRUM HPS	1	3.00	0.04
		2	3.00	0.04
		3	3.00	0.04
		4	3.00	0.04
		5	3.00	0.03
		6	3.00	0.00
		7	6.00	0.03
		8	6.00	4.28
		9	6.00	0.57
		10	6.00	6.50
	TOTAL :		**42.00**	**1.64**
120	VARAHI HPS	1	115.00	0.01
		2	115.00	0.01
		3	115.00	0.01
		4	115.00	0.01
	TOTAL :		**460.00**	**0.01**
	KSEBL			
121	IDAMALAYAR HPS.	1	37.50	1.22
		2	37.50	0.32
	TOTAL :		**75.00**	**0.77**
122	IDUKKI HPS.	1	130.00	0.00
		2	130.00	0.00
		3	130.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		4	130.00	0.00
		5	130.00	0.00
		6	130.00	0.00
	TOTAL :		**780.00**	**0.00**
123	KAKKAD HPS.	1	25.00	1.31
		2	25.00	1.70
	TOTAL :		**50.00**	**1.51**
124	KUTTIYADI HPS.	1	25.00	0.04
		2	25.00	0.12
		3	25.00	0.03
	TOTAL :		**75.00**	**0.06**
125	KUTTIYADI ADDL. EXTN.	5	50.00	0.26
		6	50.00	0.24
	TOTAL :		**100.00**	**0.25**
126	KUTTIYADI EXTN. HPS.	4	50.00	0.12
	TOTAL :		**50.00**	**0.12**
127	LOWER PERIYAR HPS.	1	60.00	0.36
		2	60.00	0.00
		3	60.00	0.00
	TOTAL :		**180.00**	**0.12**
128	NARIAMANGLAM HPS	1	15.00	0.00
		2	15.00	0.00
		3	15.00	0.00
	TOTAL :		**45.00**	**0.00**
129	PALLIVASAL HPS.	1	5.00	0.00
		2	5.00	0.00
		3	5.00	0.00
		4	7.50	0.00
		5	7.50	0.00
		6	7.50	0.00
	TOTAL :		**37.50**	**0.00**
130	PANNIAR HPS.	1	15.00	0.00
		2	15.00	0.00
	TOTAL :		**30.00**	**0.00**
131	PORINGALKUTTU HPS.	1	8.00	0.00
		2	8.00	0.00
		3	8.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		4	8.00	0.77
	TOTAL :		**32.00**	**0.19**
132	SABARIGIRI HPS.	1	50.00	3.68
		2	50.00	6.72
		3	50.00	1.38
		4	50.00	4.02
		5	50.00	3.42
		6	50.00	1.72
	TOTAL :		**300.00**	**3.49**
133	SENGULAM HPS.	1	12.00	1.52
		2	12.00	2.88
		3	12.00	12.64
		4	12.00	12.62
	TOTAL :		**48.00**	**7.42**
134	SHOLAYAR HPS.	1	18.00	0.00
		2	18.00	0.00
		3	18.00	0.00
	TOTAL :		**54.00**	**0.00**
	TNGDCL			
135	ALIYAR HPS.	1	60.00	0.01
	TOTAL :		**60.00**	**0.01**
136	BHAWANI BARRAGE-II HPS	1	15.00	35.44
		2	15.00	31.18
	TOTAL :		**30.00**	**33.31**
137	BHAWANI BARRAGE-III	1	15.00	0.00
		2	15.00	0.00
	TOTAL :		**30.00**	**0.00**
138	BHAWANI KATTAL	1	15.00	0.00
		2	15.00	0.00
	TOTAL :		**30.00**	**0.00**
139	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**
140	KODAYAR-I HPS.	1	60.00	0.03
	TOTAL :		**60.00**	**0.03**

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
141	KODAYAR-II HPS.	2	40.00	0.00
	TOTAL :		**40.00**	**0.00**
142	KUNDAH-I HPS.	1	20.00	0.00
		2	20.00	0.00
		3	20.00	0.00
	TOTAL :		**60.00**	**0.00**
143	KUNDAH-II HPS.	4	35.00	0.00
		5	35.00	0.00
		6	35.00	0.00
		7	35.00	0.00
		8	35.00	0.00
	TOTAL :		**175.00**	**0.00**
144	KUNDAH-III HPS.	9	60.00	0.00
		10	60.00	0.00
		11	60.00	0.00
	TOTAL :		**180.00**	**0.00**
145	KUNDAH-IV HPS.	12	50.00	0.00
		13	50.00	0.00
	TOTAL :		**100.00**	**0.00**
146	KUNDAH-V HPS.	14	20.00	0.00
		15	20.00	0.03
	TOTAL :		**40.00**	**0.02**
147	LOWER METTUR-I	1	15.00	0.00
		2	15.00	0.00
	TOTAL :		**30.00**	**0.00**
148	LOWER METTUR-II	3	15.00	0.00
		4	15.00	0.00
	TOTAL :		**30.00**	**0.00**
149	LOWER METTUR-III	5	15.00	0.03
		6	15.00	0.04
	TOTAL :		**30.00**	**0.04**
150	LOWER METTUR-IV	7	15.00	0.00
		8	15.00	0.00
	TOTAL :		**30.00**	**0.00**
151	METTUR DAM HPS.	1	12.50	0.00
		2	12.50	0.00
		3	12.50	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		4	12.50	0.00
	TOTAL :		**50.00**	**0.00**
152	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**
153	MOYAR HPS	1	12.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL :		**36.00**	**0.00**
154	PAPANASAM HPS.	1	8.00	0.17
		2	8.00	0.10
		3	8.00	0.11
		4	8.00	0.17
	TOTAL :		**32.00**	**0.14**
155	PARSON`S VALLEY HPS.	1	30.00	0.00
	TOTAL :		**30.00**	**0.00**
156	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**
157	PYKARA HPS.	1	7.00	0.00
		2	7.00	0.00
		3	7.00	1.60
		4	13.60	0.00
		5	13.60	0.43
		6	11.00	1.69
	TOTAL :		**59.20**	**0.60**
158	PYKARA ULTMATE HPS.	1	50.00	0.88
		2	50.00	0.02
		3	50.00	0.13
	TOTAL :		**150.00**	**0.34**
159	SARKARPATHY HPS.	1	30.00	0.02
	TOTAL :		**30.00**	**0.02**
160	SHOLAYAR HPS (TN)	1	35.00	0.02
		2	35.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL :		**70.00**	**0.01**
161	SURULIYAR HPS.	1	35.00	0.00
	TOTAL :		**35.00**	**0.00**
	TSGENCO			
162	LOWER JURALA HPS	1	40	0.02
		2	40.00	0.00
		3	40.00	0.07
		4	40.00	0.02
		5	40.00	0.03
		6	40.00	0.12
	TOTAL :		**240.00**	**0.04**
163	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**
164	NAGARJUN SGR LBC HPS	1	30.00	0.04
		2	30.00	0.20
	TOTAL :		**60.00**	**0.12**
165	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**
166	PRIYADARSHNI JURALA HPS	1	39.00	0.00
		2	39.00	0.00
		3	39.00	0.00
		4	39.00	0.00
		5	39.00	0.00
		6	39.00	0.00
	TOTAL :		**234.00**	**0.00**
167	PULICHINTALA HPS	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		4	30.00	0.00
	TOTAL :		**120.00**	**0.00**
168	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			
169	MACHKUND HPS	1	17.00	0.00
		2	17.00	0.00
		3	17.00	0.00
		4	21.25	0
		5	21.25	0.69
		6	21.25	0.00
	TOTAL :		**114.75**	**0.13**
	DEPL			
170	JORETHANG LOOP	1	48.00	1.38
		2	48.00	0.51
	TOTAL :		**96.00**	**0.94**
	DVC			
171	MAITHON HPS.	1	20	0.28
		2	23.20	0.39
		3	20.00	0.10
	TOTAL :		**63.20**	**0.26**
172	PANCHET HPS.	1	40.00	0.10
		2	40.00	0.00
	TOTAL :		**80.00**	**0.05**
	GIPL			
173	CHUZACHEN HPS	1	55.00	11.73
		2	55.00	11.31
	TOTAL :		**110.00**	**11.52**
	JUUNL			
174	SUBERNREKHA-I HPS.	1	65.00	0.00
	TOTAL :		**65.00**	**0.00**
175	SUBERNREKHA-II HPS.	2	65.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL :		**65**	**0**
	NHPC			
176	RANGIT HPS	1	20.00	10.62
		2	20.00	3.54
		3	20	8.47
	TOTAL :		**60.00**	**7.54**
177	TEESTA LOW DAM-III HPS	1	33.00	15.00
		2	33.00	8.59
		3	33.00	8.95
		4	33	6.62
	TOTAL :		**132.00**	**9.79**
178	TEESTA LOW DAM-IV HPS	1	40.00	12.51
		2	40.00	8.98
		3	40.00	9.33
		4	40.00	10.89
	TOTAL :		**160.00**	**10.43**
179	TEESTA V HPS	1	170.00	5.53
		2	170.00	6.03
		3	170.00	11.22
	TOTAL :		**510.00**	**7.59**
	OHPC			
180	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	0
	TOTAL :		**510.00**	**0.00**
181	CHIPLIMA HPS	8	24.00	0.00
		9	24.00	0.00
		10	24.00	0.00
	TOTAL :		**72.00**	**0.00**
182	HIRAKUD HPS	1	49.50	0.00
		2	49.50	0.00
		3	32.00	0.00
		4	32.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		5	37.50	0.00
		6	37.50	0.00
		7	37.50	0.00
	TOTAL :		**275.50**	**0.00**
183	RENGALI 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**
184	UPPER INDRAVATI HPS.	1	150.00	0.00
		2.00	150.00	0.00
		3	150.00	0.00
		4	150.00	0.00
	TOTAL :		**600.00**	**0.00**
185	UPPER KOLAB 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**
	SEPL			
186	TASHIDING HPS	1	48.50	0.23
		2	48.50	0.25
	TOTAL :		**97.00**	**0.24**
	SKPPPL			
187	DIKCHU HPS	1	48.00	0.04
		2	48.00	0.03
	TOTAL :		**96.00**	**0.04**
	TUL			
188	TEESTA-III HPS	1	200.00	0.00
		2	200.00	0.00
		3	200.00	0.00
		4	200	0
		5	200.00	0.00
		6	200.00	0.00
	TOTAL :		**1200.00**	**0.00**
	WBSEDCL			
189	JALDHAKA HPS ST-I	1	9.00	59.58

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	9.00	46.21
		3	9.00	14.58
		4	9	0
	TOTAL :		**36.00**	**30.09**
190	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**
191	RAMMAM HPS.	1	12.50	0.00
		2	12.50	0.00
		3	12.50	0.01
		4	12.50	2.08
	TOTAL :		**50.00**	**0.52**
	NORTH EASTERN REGION			
	APGPCL			
192	KARBI LANGPI HPS.	1	50.00	0.00
		2	50.00	0.00
	TOTAL :		**100**	**0**
	MePGCL			
193	KYRDEMKULAI HPS.	1	30.00	0.00
		2	30.00	0.00
	TOTAL :		**60.00**	**0.00**
194	MYNTDU(LESHKA) St-1 HPS	1	42	1.33
		2	42.00	0.05
		3	42.00	0.00
	TOTAL :		**126.00**	**0.46**
195	NEW UMTRU HPS	1	20.00	1.49
		2	20.00	8.51
	TOTAL :		**40.00**	**5.00**
196	UMIAM HPS ST-I	1	9.00	0.00
		2	9.00	0.00
		3	9.00	2.83
		4	9.00	0.00
	TOTAL :		**36.00**	**0.71**
197	UMIAM HPS ST-IV	7	30.00	0.00
		8	30.00	0.00

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2018-19

SL. NO.	UTILITY/STATION	UNIT NO.	CAPACITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL :		**60.00**	**0.00**
198	DOYANG HPS.	1	25.00	0.00
		2	25.00	0.19
		3	25.00	0.00
	TOTAL :		**75**	**0.06**
199	KHONDONG HPS.	1	25.00	0.03
		2	25.00	0.00
	TOTAL :		**50.00**	**0.01**
200	KOPILI 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**
201	PARE	1	55.00	0.00
		2	55.00	0.00
	TOTAL :		**110.00**	**0.00**
202	RANGANADI HPS.	1	135.00	0.09
		2	135.00	0.08
		3	135.00	0.08
	TOTAL :		**405.00**	**0.08**
203	TUIRIAL HPS	1	30.00	0.00
		2	30.00	0.02
	TOTAL :		**60.00**	**0.01**
	NHPC			
204	LOKTAK HPS.	1	35.00	0.00
		2	35	0.06
		3	35.00	0.00
	TOTAL :		**105.00**	**0.02**

CHAPTER-8

GENERATION PROGRAMME FOR THE YEAR 2019-20

CHAPTER 8

GENERATION PROGRAMME FOR THE YEAR 2019-20

8.1 As on 31.03.2019, 204 HE Stations (of more than 25 MW capacity) having total installed capacity of 45399.22 MW are being monitored in the country. With the addition of new hydro units during 2019-20, the anticipated installed capacity of H.E. Stations in the country is likely to be 47010.22 MW by 31st March, 2020. The overall Generation Programme for H.E. stations for the year 2019-20 has been fixed at 143150 MU comprising 136932 MU from HE Stations in India and 6218 MU import from Bhutan, which is 3849.77 MU more than actual generation during 2018-19 (i.e.139300.23 MU comprising 134893.61 MU from HE Station in India and 4406.62 MU import from Bhutan).

8.2 Region-wise summary of likely installed capacity as on 31.03.2020, Generation targets for 2019-20 and the hydro generation during 2018-19 are given in **Table 7.1** below:

TABLE 8.1

REGION-WISE LIKELY INSTALLED CAPACITY OF HE STATIONS AND HYDRO GENERATION PROGRAMME DURING 2019-20

Sl. No.	Region	Likely Hydro Installed Capacity (as on 31.03.2020) (MW)	Hydro Generation Programme for 2019-20 (MU)	Hydro Generation during 2018-19 (MU)	
				Programme	Actual
1.	Northern	20034.27	71513	70148	72401.41
2.	Western	7392.00	12200	12638	9759.42
3.	Southern	11694.50	27124	24424	28807.04
4.	Eastern	5862.45	19243	16355	18900.31
5.	North-Eastern	2027.00	6852	6435	5025.42
Sub total		**47010.22**	**136932**	**136932**	**134893.61**
6.	Import – from Bhutan		6218	5000	4406.62
Total(Including Import from Bhutan)			**143150**	**135000**	**139300.23**

8.3 While finalizing the Generation Programme for 2019-20 during last quarter of 2018-19, it was anticipated that 14 nos. H.E. units having installed capacity of 1611 MW would be added during the year 2019-20 and last quarter of 2018-19. 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 31.03.2020, targets and actual generation during 2018-19, generation target for 2019-20 are given in **Annex-8.2**.

Annex-8.1

LIKELT HYDRO CAPACITY ADDITION DURING 2019-20 & LAST QUARTER OF 2018-19 CONSIDERED FOR FINALIZATION OF GENERATION PROGRAMME FOR 2019-20

Sl. No	Name of the Project	State/ Organization	Unit No.	Capacity (MW)	Programmed Date of Commissioning
	Central Sector				
1	Parbati II	Himachal Pradesh/ NHPC	U-1 U-2 U-3 U-4	200 200 200 200	Jan. 2019
2	Kameng	Arunachal Pradesh / NEEPCO	U-1 U-2 U-3 U-4	150 150 150 150	Mar. 2019
	Sub-Total (CS)			**1400**	
	State Sector				
3	Uhl-III	Himachal Pradesh/ BVPCL	U-1 U-2 U-3	33.33 33.33 33.33	Mar. 2019
4	Sawra Kuddu	Himachal Pradesh/ HPPCL	U-1 U-2 U-3	37 37 37	Aug. 2019 Sep. 2019 Oct. 2019
	Sub-Total (SS)			**211**	
	Grand Total		**14**	**1611**	

Annex-8.2

SECTOR-WISE PERFORMANCE OF HYDROELECTRIC STATIONS DURING 2018-19 & TARGETS FOR 2019-20

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2020	Generation during 2018-19 (MU)		Generation Programme for 2019-20 (MU)
		Targets	Actual	
A. CENTRAL SECTOR				
BBMB	2920.30	9425	10186.02	9470
NHPC Ltd	6251.20	24055	24000.96	24050
SJVN Ltd	1912.02	8490	8335.92	8550
NTPC Ltd	800.00	3000	3013.93	3000
THDC Ltd	1400.00	3952	4395.92	4160
NHDC Ltd.	1520.00	2446	1920.83	2300
DVC	143.20	205	181.15	210
NEEPCO Ltd.	1500.00	4603	3120.56	4877
Sub Total	**16446.72**	**56176**	**55155.29**	**56617**
B. STATE ELECTRICITY BOARDS/CORPORATIONS				
JKSPDCL	1110.00	4669	5044.36	4815
HPPCL	406.00	430	527.05	716
HPSEBL	372.00	1530	1649.29	1560
BVPC	100.00	20	0.00	200
RRVUNL	411.00	535	698.40	610
PSPCL	1051.00	3690	3598.82	3765
UPJVNL	501.60	1115	1176.36	1100
UJVNL	1252.15	4105	4478.76	4196
SSNNL	1450.00	2260	594.84	1300
GSECL	540.00	730	447.97	677
MAHAGENCO	2406.00	3361	3320.63	3881
MPPGCL	875.00	2280	1607.45	2315
CSPGCL	120.00	225	243.08	250
APGENCO	1796.75	3109	3038.37	3162
TSGENCO	2405.60	2665	1744.61	3041
KPCL	3572.20	9590	12015.94	11497
KSEBL	1856.50	5490	7320.21	6034
TANGEDCO	2178.20	3570	5281.59	3890
JUUNL	130.00	110	101.19	110
OHPC	2027.50	5140	6183.77	5570
TUL	1200.00	4000	4258.40	5213
WBSEDCL	986.00	1250	1537.94	1528

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2020	Generation during 2018-19 (MU)		Generation Programme for 2019-20 (MU)
		Targets	Actual	
APGCL	100.00	300	372.72	390
MePGCL	322.00	932	929.53	985
Sub Total	**27169.50**	**61106**	**66171.28**	**66805**
C. PRIVATE SECTOR				
MPCL	86.00	344	320.55	337
EPPL	100.00	330	349.39	350
ADHPL	192.00	650	582.23	692
GBHPPL	70.00	250	288.08	250
JSW ENERGY	1300.00	5343	5244.27	5381
IAEPL	36.00	125	137.45	157
AHPC LTD	330.00	1250	1375.31	1294
JPVL	400.00	1700	1932.02	1750
DLHP	34.00	36	56.44	36
GIPL	110.00	400	417.40	500
TPCL	447.00	1300	1568.18	1441
DEPL	96.00	390	409.75	437
SEPL	97.00	300	423.73	435
SNEHA KINETIC	96.00	300	462.24	450
Sub Total	**3394**	**12718**	**13567.03**	**13510**
Total All India	**47010.22**	**130000**	**134893.61**	**136932**
Import from Bhutan		**5000**	**4406.62**	**6218**
Total Hydro generation including import from Bhutan		**135000**	**139300.23**	**143150**

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 1987 to formulate strategy on R&M of hydro power projects. Based on the recommendations of the National Committee and subsequent reviews, a programme for Renovation, Modernization and Uprating of Hydro Power Stations was formulated by Central Electricity Authority in which 55 schemes were identified with an aggregate capacity of 9653 MW. The total cost of these schemes were estimated as Rs.1493 Crores with expected benefit 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 benefit 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 along with 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 for IX, X and XI Plans was 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 (21 in Central Sector and 83 in State Sector) hydro electric schemes (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. 9.1, 9.2, 9.3, 9.4 & 9.5** respectively.

9.3.2 Programme during 2017-22:

During 2017-22, an aggregate capacity of 9982.80 MW at 53 Hydro Electric Power Stations (10 in Central Sector and 43 in State Sector) is programmed for R&M which will accrue benefit of about 5171.35 MW through Life Extension and Uprating. Out of the 53 schemes targeted for completion during 2017-22, 2 schemes in Central

Sector (Ganguwal & Kotla and Dehar Power House (Unit-3)) with an aggregate installed capacity of about 213.4 MW have been completed till March, 2019 and have achieved 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-9.6**.

9.3.3 Programme during 2022-27:

During 2022-27, an aggregate capacity of 2788 MW at 25 Hydro Electric Power Station (1 in Central Sector and 24 in State Sector) is programmed for R&M, which will accrue benefit of 2786 MW through Life Extension and Uprating. The State-wise list of hydro R&M schemes expected for completion during 2022-27 is given at **Annex-9.7**.

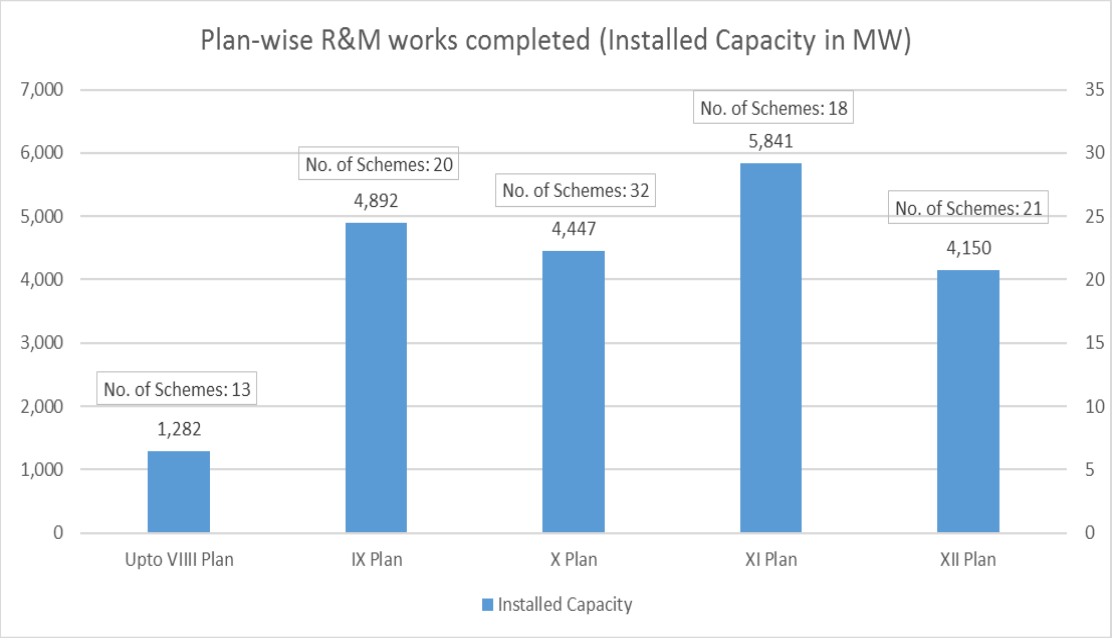
Plan-wise summary of R&M of H.E. Projects starting from VIII Plan is given below:

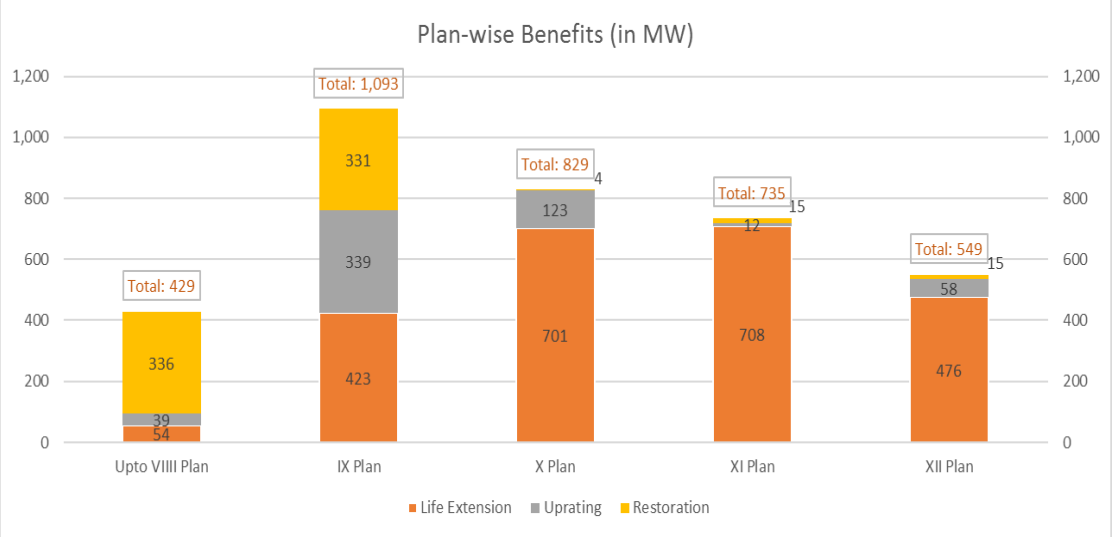
9.4 The State-wise list of additional hydro projects identified for undertaking RMU&LE works is given at **Annex-9.8.**

9.5 Summary of R&M of Hydro Projects (As on 31.03.2019)

I <u>Hydro R&M schemes completed up to XII Plan</u>

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

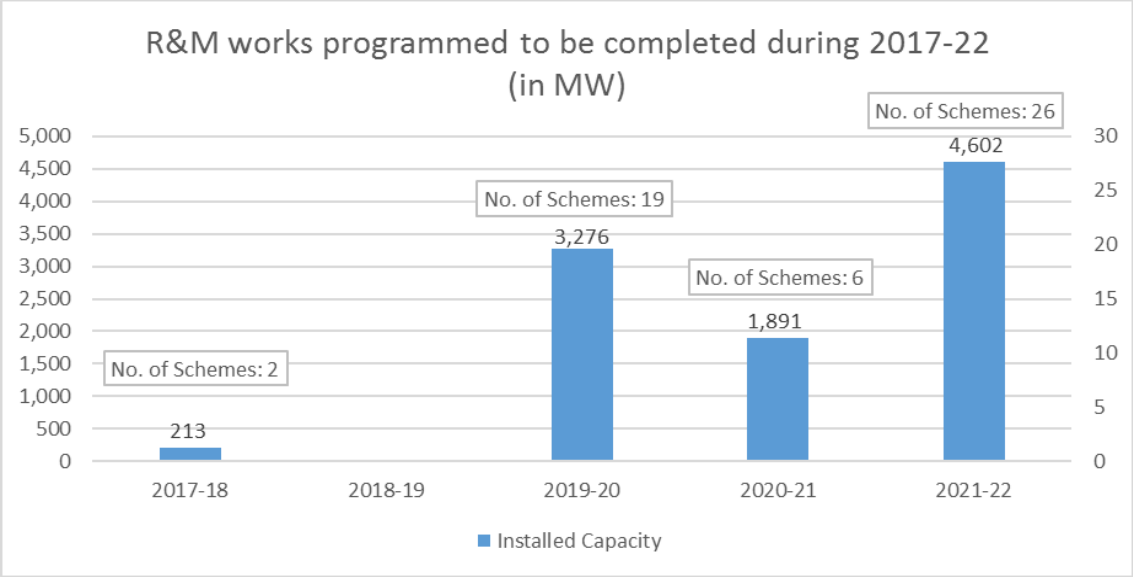




II Programme of R&M works during 2017-22

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	10	43	53	9982.80	6672.18	5171.35 [5021.65(LE) +149.7(U)]
2.	Completed	2	0	2	213.4	25.58 (Actual Cost)	48.4 (LE)

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Estimated Cost (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total			
3.	Under Implementation	4	25	29	5922.1	3464.25	2549.50 [2433.30 (LE) +116.20 (U)]
4.	Under Tendering	2	15	17	2483.10	2579.67	1209.25 [1175.75 (LE) +33.5 (U)]
5.	Under DPR Preparation/ Finalisation/Approval	2	3	5	1364.20	594.20	1364.20 (LE)



III Programme of R&M works 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	24	25	2788	2786 [2728 (LE)+ 58 (U)]
2.	Under Tendering	0	2	2	96	112.00 [96 (LE)+ 16 (U)]
3.	Under DPR Preparation/Finalisation/ Approval	1	7	8	865	907.00 [865 (LE) + 42 (U)]
4.	Under RLA Studies	-	15	15	1827	1767 (LE)

Abbreviations: MW – Mega Watt; Res. – Restoration; U – Uprating; LE – Life Extension
RLA- Residual Life Assessment

9.6 Achievement during the year 2018-19

R&M works of Unit-I of Sholayar Ph-I (2x35MW) Power House of TANGEDCO, Unit-3 of Idukki 1st stage (3x130 MW) & Unit-3 of Sholayar (3x18 MW) of KSEB having an aggregate installed capacity of 183 MW have been completed during the year 2018-19 and accrued a benefit of about 60 MW through Life Extension and Uprating.

9.7 Programme for the year 2019-20

For the year 2019-20, it is programmed to complete following 19 schemes having an installed capacity of 3276.45 MW. On completion of these schemes, there will be a benefit of about 701.50 MW through Life Extension at an estimated cost of about Rs.1384 Crores.

S. No.	Name of Schemes	Capacity under R&M (in MW)	Cost (in Rs. Crores)	Agency
1.	Salal	5x115	58.01	NHPC
2.	Bhaba Power House	3x40	166.17	HPSEB
3.	Chenani,	5x4.66	39.60	J&KSPDC
4.	Ganderbal	2x3+2x4.5	31.57	J&KSPDC
5.	Rihand	6x50	132.20	UPJVNL
6.	Nagarjuna Sagar Ph-II works	1x110+7x100.8	22.17	TSGENCO
7.	Nagarjuna Sagar Left Canal Power House	2x30.6	30.99	TSGENCO
8.	Bhadra River Bed units	2x12	31.05	KPCL
9.	Munirabad Dam Power House	2x9+1x10	4.6	KPCL
10.	Sholayar	3x18	199.55	KSEB
11.	Idukki 1st stage,	3x130	89.90	KSEB
12.	Sholayar-I	2x35	90.44	TANGEDCO
13.	Hirakud-I	2x37.5	158.77	OHPC
14.	Hirakund-II (Chiplima)	1x24	65.67	OHPC
15.	Dehar Power House	1x165	23	BBMB
16.	Mukerin St.I, St.II, St.III & St.IV,	3x15, 3x15, 3x19.5 & 3x19.5	136.07	PSPCL
17.	Shanan HEP,	1x50+4x15	37.81	PSPCL
18.	UBDC St.I & St.II,	3x15+3x15.45	23.55	PSPCL
19.	Anandpur Sahib Hydel Project,	4x33.5	43.11	PSPCL

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

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

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
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

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

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+4x 80+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

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

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	9.58	48.4 (LE)	RM&LE	2017-18
2	Dehar Power House (Unit-3), BBMB (6x165)	CS	1x165	19.87	16.00	-	R&M	2017-18
Sub Total (A)			**213.4**	**34.06**	**25.58**	**48.4 (LE)**		
B. Ongoing Schemes – Under Implementation								
Himachal Pradesh								
3	Salal, NHPC (6x115)	CS	5x115	58.01	51.08	-	R&M	2019-20
4	Bhakra LB, BBMB (5x108)	CS	5x108	489.77	397.08	540.00(LE)+ 90.00 (U)	RMU&LE	2020-21
5	Baira Siul, NHPC (3x60)	CS	3x60	341.41	54.33	180 (LE)	RM&LE	2020-21
6	Pong Power House, HPSEB (6x66)	CS	6x66	-	-	396 (LE)	RM&LE	2020-21
7	Bhaba Power House, HPSEB (3x40)	SS	3x40	166.17@	90.91	120 (LE)	RM&LE	2019-20
Jammu & Kashmir								
8	Chenani, J&KSPDC (5x4.66)	SS	5x4.66	39.60	24.63	23.30 (LE)	RM&LE	2019-20
9	Ganderbal, J&KSPDC (2x3+2x4.5)	SS	2x4.5	31.57	11.33	9.00 (LE)	RM&LE	2019-20
Uttarakhand								
10	Tiloth, UJVNL (3x30)	SS	3x30	384.66	12.83	90 (LE)	RM&LE	2021-22
11	Dhalipur, UJVNL (3x17)	SS	3x17	152.65	11.58	51 (LE)	RM&LE	2021-22
Uttar Pradesh								
12	Rihand, UPJVNL (6x50)	SS	6x50	132.20	105.49	300 (LE)	RM&LE	2019-20
13	Obra, UPJVNL (3x33)	SS	3x33	58.80	35.47	99 (LE)	RM&LE	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
Gujarat								
14	Ukai, GSECL (4x75)	SS	3x75 (U-1,2,&4)	7.3	4.48	-	R&M	2021-22
15	Kadana PSS, GSECL (4x60)	SS	4x60	114.37	6.18	-	R&M	2021-22
Telangana								
16	Nagarjuna Sagar Ph-II works, TSGENCO (1x110+7x100.8)	SS	1x110+7x100.8	22.17	14.34	-	R&M	2019-20
17	Nagarjuna Sagar Left Canal Power House, TSGENCO (2x30.6)	SS	2x30.6	30.99	2.00	-	R&M	2019-20
Karnataka								
18	Bhadra River Bed units, KPCL (2x12)	SS	2x12	31.05	25.25	-	R&M	2019-20
19	Munirabad Dam Power House, KPCL (2x9 + 1x10)	SS	2x9 + 1x10	4.6	-	-	R&M	2019-20
20	Nagjhari KPCL (3x150)	SS	3x150 (U-1 to 3)	222	-	-	R&M	2021-22
21	Shivasamudram, KPCL (6x3+4x6)	SS	6x3+4x6	146.41	-	42 (LE)	RM&LE	2021-22
Kerala								
22	Sholayar, KSEB (3x18)	SS	3x18	199.55	45.24	54 (LE)	RM&LE	2019-20
23	Idukki 1st stage, KSEB (3x130)	SS	3x130	89.90	36.95	-	R&M	2019-20
Tamil Nadu								
24	Sholayar-I, TANGEDCO (2x35)	SS	2x35	90.44	42.17	70 (LE) + 14(U)	RMU&LE	2019-20
Madhya Pradesh								
25	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	21.83	-	-	R&M	2020-21
26	Bargi, MPPGCL (2x45)	SS	2x45	3.12	0.36	-	R&M	2021-22
27	Pench, MPPGCL (2x80)	SS	2x80	13.36	-	-	R&M	2021-22
28	Bansagar Ton-I, MPPGCL (3x105)	SS	3x105	4.97	-	-	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								
29	Hirakud-I OHPC (2x37.5)	SS	2x37.5 (U5&6)	158.77	68.32	75.00 (LE) + 12.2 (U)	RMU&LE	2019-20
30	Hirakud-II (Chiplima), OHPC (3x24)	SS	1x24 (U-3)	65.67	35.01	24.00 (LE)	RM&LE	2019-20
31	Balimela, OHPC (6x60)	SS	6x60	382.91	18.16	360(LE)	RM&LE	2021-22
Sub Total (B)			**5922.10**	**3464.25**	**1093.19**	**2549.50 [2433.30(LE) + 116.20(U)**		
C. Ongoing Schemes – Under Tendering								
Himachal Pradesh								
32	Giri, HPSEB (2x30)	SS	2x30	139.8	-	60.00 (LE)	RM&LE	2020-21
33	Dehar Power House (Unit-3), BBMB (1x165)	CS	1x165	23	-	-	R&M	2019-20
Punjab								
34	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	30.71	-	R&M	2019-20
35	Ranjit Sagar Dam, PSPCL (4x150)	SS	4x150	48.00	1.6	-	R&M	2020-21
36	Shanan HEP, PSPCL (1x50+4x15)	SS	1x50+ 4x15	37.81	19.71	-	R&M	2019-20
37	UBDC St.I & St.II, PSPCL (3x15+3x15.45)	SS	3x15+ 3x15.45	23.55	-	-	R&M	2019-20
38	Anandpur Sahib Hydel Project, PSPCL (4x33.5)	SS	4x33.5	43.11	-	-	R&M	2019-20
Uttarakhand								
39	Chilla Ph B UJVNL (4x36)	SS	4x36	490.56	-	144(LE)+ 12(U)	RMU&LE	2021-22
40	Ramganaga, UJVNL (3x66)	SS	3x66	455.2	-	198(LE)	RM&LE	2021-22
41	Dhakrani, UJVNL (3x11.25)	SS	3x11.25	137.31	-	33.75 (LE)	RM&LE	2021-22

Sl. No	Name of Project, Age 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								
42	Kadra Dam Power House, KPCL (3x50)	SS	3x50	44.47	-	150 (LE)	RM&LE	2021-22
43	Kodasalli Dam Power House, KPCL (3x40)	SS	3x40	50.6	-	120 (LE)	RM&LE	2021-22
44	Linganamakki Dam Power House, KPCL (2x27.5)	SS	2x27.5	56.20	-	55 (LE)	RM&LE	2021-22
45	Gerusoppa Dam Power House (Sharavathy Tail Race), KPCL (4x60)	SS	4x60	59.66	-	240 (LE)	RM&LE	2021-22
Kerala								
46	Kuttiyadi, KSEB (3x25)	SS	3x25	377.41	-	75.00 (LE) + 7.5 (U)	RMU&LE	2021-22
Jharkhand								
47	Panchet, DVC (2x40)	CS	1x40 (U-1)	48.92	2.19	40(LE)+ 8(U)	RMU&LE	2021-22
Meghalaya								
48	Umium St.III, (Kyrdemkulai) MePGCL (2x30)	SS	2x30	408.00	-	60(LE) + 6(U)	RMU&LE	2021-22
Sub Total (C)			**2483.10**	**2579.67**	**54.21**	**1209.25 [1175.75(LE) + 33.5(U)]**		
D. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval								
Karnataka								
49	MGHE, KPCL (4x21.6+4x13.2)	SS	4x21.6+ 4x13.2	97.00	-	139.2 (LE)	RM&LE	2021-22
50	Supa Dam Power House, KPCL (2x50)	SS	2x50	47.91	-	100 (LE)	RM&LE	2021-22
51	Sharavathy Generating Station, KPCL (10x103.5)	SS	10x103.5	196.56	11.07	1035 (LE)	RM&LE	2021-22
West Bengal								
52	Maithon, DVC (2x20+1x23.2)	CS	2x20 (U-1&3)	56.03	7.76	40.00 (LE)	RM&LE	2021-22
Assam								
53	Khandong Power Station, NEEPCO (2x25)	CS	2x25	196.7	12.71	50 (LE)	RM&LE	2021-22
Sub Total (D)			**1364.20**	**594.20**	**31.54**	**1364.20(LE)**		
Total (A+B+C+D)			**9982.80**	**6672.18**	**1204.52**	**5171.35 [5021.65(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								
Jammu & Kashmir								
3	Lower Jehlum HEP, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)+ 27 (U)	RMU&LE	2022-27
4	USHP-II Kangan, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)	RM&LE	2022-27
Uttarakhand								
5	Chibro, UJVNL (4x60)	SS	4x60	184.88	-	240(LE)	RM&LE	2025-26
6	Khodri PH-II UJVNL (4x30)	SS	4x30	169.63	-	120(LE)	RM&LE	2025-26
7	Kulhal, UJVNL (3x10)	SS	3x10	115.24	-	30(LE)	RM&LE	2023-24
Andhra Pradesh								
8	Machkund St.I & St.II, APGENCO (3x17+3x23)	SS	3x17+ 3x23	400	-	120 (LE) + 9 (U)	RMU&LE	2025-26
Tamil Nadu								
9	Kodayar PH-II, TANGEDCO (1x40)	SS	1x40	-	-	40.0(LE)+ 6(U)	RMU&LE	2025-26
Manipur								
10	Loktak, NHPC (3x35)	CS	3x35	236.07	-	105 (LE)	RM&LE	2022-23
Sub Total(B)			**865**	-	-	**907.00 [865(LE)+ 42(U)]**		
C. Ongoing Schemes – Under RLA Studies								
Tamil Nadu								
11	Kundah-I, TANGEDCO (3x20)	SS	3x20	-	-	60 (LE)	RM&LE	2022-27
12	Kundah-II, TANGEDCO (5x35)	SS	5x35	-	-	175 (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
13	Kundah-III, TANGEDCO (3x60)	SS	3x60	-	-	180 (LE)	RM&LE	2022-27
14	Kundah-IV, TANGEDCO (2x50)	SS	2x50	-	-	100 (LE)	RM&LE	2022-27
15	Kundah-V, TANGEDCO (2x20)	SS	2x20	-	-	40 (LE)	RM&LE	2022-27
16	Mettur Tunnel, TANGEDCO (4x50)	SS	4x50	-	-	200 (LE)	RM&LE	2022-27
17	Sarkarpathy, TANGEDCO (1x30)	SS	1x30	-	-	30 (LE)	RM&LE	2022-27
18	Sholayar-II, TANGEDCO (1x25)	SS	1x25	-	-	25 (LE)	RM&LE	2022-27
19	Suruliyar, TANGEDCO (1x35)	SS	1x35	-	-	35 (LE)	RM&LE	2022-27
20	Kadamparai, PH TANGEDCO (4x100)	SS	4x100	-	-	400 (LE)	RM&LE	2022-27
21	Aliyar, TANGEDCO (1x60)	SS	1x60			60 (LE)	RM&LE	2022-27
Kerala								
22	Idukki 2nd stage, KSEB (3x130)	SS	3x130	-	-	390 (LE)	RM&LE	2022-27
Andhra Pradesh								
23	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	100	-	36 (LE)	RM&LE	2025-26
24	Hampi Canal PH, APGENCO (4x9)	SS	4x9	100	-	36 (LE)	RM&LE	2025-26
Meghalaya								
25	Umiam-umtru Stage-IV, MePGCL (2x30)	SS	2x30	-	-	-	R&M	2022-27
Sub Total(C)			**1827**	**-**	**-**	**1767**		
Total (A+B+C)			**2788**	**-**	**-**	**2786 [2728(LE)+ 58(U)]**		

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

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
- 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
		BVPC Limited	Beas Valley Power. Corp. Ltd. (BVPC)
		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
		NEEPCO	North Eastern Electric Power Corporation Limited
2	Meghalaya	MePGCL	Meghalaya Power Generation Corporation Limited