भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

जल विद्युत गृहों के निष्पादन का पुनर्विलोकन-2022-23

REVIEW OF PERFORMANCE OF HYDRO POWER STATIONS 2022-23

नई दिल्ली

NEW DELHI

अगस्त 2023

AUGUST, 2023

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.

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Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

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REVIEW OF PERFORMANCE OF HYDRO POWER STATIONS 2022-23

जल परियोजना आयोजन तथा अन्वेषण प्रभाग

HYDRO PROJECT PLANNING & INVESTIGATION DIVISION

नई दिल्ली

NEW DELHI

अगस्त, 2023

August, 2023

(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 2022-23 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 36 वीं हैं। इस रिपोर्ट में 46850.15 मेगावाट की कुल संस्थापित क्षमता वाले 211 जल विद्युत केन्द्रों की 729 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 2022-23 के दौरान जल विद्युत केन्द्रों की औसत प्रचालन उपलब्धता 92.82 % थी। प्रणोदित (Forced) और योजनाबद्ध कामबन्दी (Planned Outages) के कारण जल विद्युत इकाइयों की औसत गैर-उपलब्धता क्रमश: 2.96 % और 4.22 % थी। वर्ष 2022-23 के दौरान जल विद्युत केन्द्रों से उत्पादन 162.09 बिलियन यूनिट था, जो वर्ष 2021-22 के उत्पादन 151.62 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।

नई दिल्ली
अगस्त, 2023

(एम.ए.के.पी. सिंह)
सदस्य (जल विद्युत), के0वि0प्रा0

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 2022-23 is 36th 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 729 hydro-electric units installed at 211 hydro-electric stations having total installed capacity of 46850.15 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 2022-23 was 92.82 %. The average non-availability of hydro units due to forced and planned outages was 2.96 % and 4.22 % respectively. The generation from hydro stations during 2022-23 was 162.09 Billion Units, which was about 7 % higher compared to the generation of 151.62 BU in the previous year viz 2021-22.

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, 2023

(M.A.K.P. Singh)
Member (Hydro), CEA

प्रस्तावना

किसी भी देश के आर्थिक प्रगति के लिए विद्युत शक्ति महत्वपूर्ण बुनियादी आवश्यकताओं में से एक है। दिनांक 31.03.2023 को देश में कुल प्रतिष्ठापित विद्युत उत्पादन क्षमता 416058.89 मेगावाट थी जिसमें 25 मेगावाट से ज्यादा प्रतिष्ठापित क्षमता वाले स्टेशनों की जल विद्युत क्षमता 46850.15 मेगावाट (11.26 %) 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 2022-23 के दौरान देश में 211 जल विद्युत केन्द्रों (729 यूनिटों) के निष्पादन के आधार पर प्रणोदित (2.96%) और योजनाबद्ध कामबन्दी (4.22%) के कारण जल विद्युत इकाइयों की औसत प्रचालन उपलब्धता 92.82% थी। वर्ष 2022-23 के दौरान जल विद्युत केन्द्रों से ऊर्जा उत्पादन 162.09 बिलियन यूनिट था, जो कि पिछले वर्ष (2020-21) के उत्पादन 151.62 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 पुनरावृति 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 बलवान 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 जलविद्युत उपक्रमों के अधिकारियों का भी पुनर्विलोकन के लिए जरूरी आंकड़े उपलब्ध कराने के लिए हार्दिक धन्यवाद देता हूँ।

नई दिल्ली
अगस्त, 2023

(प्रदीप कुमार शुक्ला)
मुख्य अभियन्ता, के0वि0प्रा0

PREFACE

Electric power is one of the most important infrastructure requirements for the overall economic development of the country. As on 31.03.2023, the overall installed generating capacity of the country was 416058.89 MW and hydro power stations (above 25 MW capacity) with capacity of 46850.15 MW constituting a share of 11.26 % 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 211 H.E. Stations comprising 729 units in the country, the average operating availability of hydro-electric stations during the year 2022-23 was 92.82% with average non-availability of hydro units due to forced and planned outages being 2.96 % and 4.22 % respectively. The generation from hydro stations during 2022-23 was 162.09 Billion Units, which was about 7% higher compared to the generation of 151.62 Billion Units in the previous year (2021-22).

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 Balwan 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 for making available the necessary data for the review.

New Delhi
August, 2023

(Pradeep Kumar Shukla)
Chief Engineer, CEA

आभार

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

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

मैं श्रीमती अर्पिता उपाध्याय, उप निदेशक, श्री वैभव कुमार, सहायक निदेशक, श्री नवीन कुलसरी, इंजीनियर, श्रीमती सुनीता भंडारी, डी.ई.ओ व अन्य अधिकारियों तथा कर्मचारियों का भी इस पुनर्विलोकन के प्रकाशन में सहयोग के लिये धन्यवाद देता हूँ।

(बलवान 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 Chief Engineer (HE&TD), 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 Smt. Arpita Upadhyay, Deputy Director, Sh. Vaibhav Kumar, Assistant Director, Sh. Naveen Kulashari, Engineer, Smt. Sunita Bhandari, DEO other officers/ officials for their untiring efforts and support in bringing out this Review.

(Balwan 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, 2023 there were 729 HE generating units installed in 211 Hydro-Electric Stations with an aggregate installed capacity of 46850.15 MW in operation. Performance of 44 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 31.3.2023 in the country vis-à-vis that on 31.3.2022 is given below in **Table S-1.**

TABLE S-1

REGION-WISE SUMMARY OF HYDRO-ELECTRIC STATIONS
(2022-23 VIS-A-VIS 2021-22)

Region	No of Stations as on		No of Units as on		Capacity (MW) as on	
	31.03.23	**31.03.22**	**31.03.23**	**31.03.22**	**31.03.23**	**31.03.22**
Northern	76	75	258	256	19696.25	19576.25
Western	28	28	101	101	7392	7392
Southern	70	70	246	246	11747.15	11739.5
Eastern	23	23	86	86	5988	5987.75
N-Eastern	14	14	38	38	2027.0	2027.0
All India	**211**	**210**	**729**	**727**	**46850.15**	**46722.50**

1.3 The report contains outage data of 211 H.E. Stations (above 25 MW) covering 729 units and having an aggregate installed capacity of 46850.15 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 2012-13 to 2022-23).

1.5 This review covers information in respect of renovation & modernization, uprating and life extension of HE stations in the country for the year 2022-23, achievements during the year 2022-23and programme for renovation, modernization, life extension and uprating of HE Stations for the year 2022-23.

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 2022-23 was 162098.77 MU (excluding import from Bhutan), which was about 7 % higher than the generation during 2021-22 and about 7.59 % higher than the generation targets for 2022-23.

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
(2022-23 VIS-A-VIS 2021-22)

Utilities	Installed Capacity (MW) (As on 31.03.2023)	Energy Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2022-23	2021-22	2022-23	2021-22	2022-23	2021-22
CENTRAL SECTOR							
BBMB	2938.3	9650	9650	10825	9795	12.17	1.50
NHPC LTD	5451.2	25663	26000	24451	24383	-4.72	-6.22
SJVNLTD	1912.02	8865	9111	9130	9049	2.99	-0.68
NTPC LTD	800	3100	3100	3133	3120	1.06	0.65
THDC LTD	1400.00	4162	4160	4540	4289	9.08	3.09
NHDC LTD	1520.00	3265	3900	5443	2645	66.72	-32.17
DVC	143.20	290	215	237	467	-18.41	117.16
NEEPCO LTD	1500.00	6356	4908	5202	4674	-18.15	-4.76
SUB TOTAL	**15664.72**	**61351**	**61044**	**62961**	**58422**	**2.62**	**-4.30**

Utilities	Installed Capacity (MW) (As on 31.03.2023)	Energy Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2022-23	2021-22	2022-23	2021-22	2022-23	2021-22
PRIVATE SECTOR							
MPCL	86.00	336	344	321	315	-4.51	-8.44
EPPL	100.00	348	367	344	346	-1.28	-5.81
ADHPL	192.00	658	676	640	637	-2.71	-5.70
GBHPPL	70.00	293	270	274	251	-6.41	-6.90
JSW ENERGY	1345.00	5431	5431	5637	5564	3.79	2.45
IAEPL	36.00	158	158	140	147	-11.37	-7.25
AHPC LTD	330.00	1310	1310	1514	1422	15.58	8.54
JPVL	400.00	1590	1590	1911	1801	20.18	13.29
DLHP	34.00	36	36	19	34	-46.44	-5.72
GIPL	110.00	537	500	504	514	-6.16	2.84
TPCL	447.00	1470	1470	1569	1590	6.72	8.16
DEPL	96.00	412	408	433	425	5.21	4.09
SEPL	97.00	421	421	446	453	5.92	7.62
SNEHA KINETIC	96.00	460	460	536	481	16.50	4.66
NTPGPL	0.00	50	0	0	0	-	-
HSPPL	100.00	392	39	318	57	-18.80	46.62
L&T	99.00	402	293	466	80	15.91	-72.55
GMR	180	500	273	422	0	-15.70	-100.00
MBPC	113.00	442	256	435	295	-1.62	15.40
SUB TOTAL	**3931.00**	**15246**	**14302**	**15928**	**14413**	**4.48**	**0.78**
STATE SECTOR							
JKSPDCL	1110	4866	4887	5057	5116	3.92	4.69
HPPCL	406	771.50	821	904	650	17.20	-20.88
HPSEBL	372	1628	1603	1779	1769	9.30	10.33
BVPC	0	0	0	0	0	-	-
RRVUNL	411	480	370	967	482	101.55	30.23
PSPCL	1051	3780	3969	3702	3008	-2.06	-24.22
UPJVNL	501.6	1519	1519	974	1403	-35.88	-7.66
UJVNL	1372.15	5035	4612	5177	4987	2.82	8.13
SSNNL	1450	3099	2832	4792	1748	54.64	-38.28
GSECL	540	965	889	1341	874	38.95	-1.74
MAHAGENCO	2406	3963	4109	3941	4079	-0.55	-0.73

Utilities	Installed Capacity (MW) (As on 31.03.2023)	Energy Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2022-23	2021-22	2022-23	2021-22	2022-23	2021-22
MPPGCL	875	2389	2526	2231	2346	-6.62	-7.13
CSPGCL	120	274	280	237	404	-13.37	44.33
APGENCO	1796.75	3600	3636	4485	4037	24.57	11.04
TSGENCO	2405.6	3852	4018	6010	5627	56.02	40.04
KPCL	3617.2	12337	12409	12964	13731	5.08	10.66
KSEBL	1864.15	7414	6505	7989	9317	7.76	43.24
TANGEDCO	2178.2	3913	4483	5966	5212	52.46	16.26
JUUNL	130	110	110	169	302	53.63	174.99
OHPC	2039.80	5363	5959	4919	4512	-8.28	-24.28
TUL	1200	5652	5652	6153	6316	8.86	11.74
WBSEDCL	986	1550	1578	1990	1630	28.36	3.30
APGCL	100	380	380	482	401	26.74	5.56
MePGCL	322	1106	1051	980	842	-11.37	-19.90
SUB TOTAL	**27254.45**	**74046.5**	**74198**	**83209**	**78792**	**12.37**	**6.19**
TOTAL ALL INDIA	**46850.17**	**150643.48**	**149544**	**162099**	**151627**	**7.60**	**1.39**

During the year 2022-23, overall hydro generation was more than the target in respect of BBMB, THDC & DVC in Central Sector and JSW Energy, AHPCL, JPVL, GIPL, TPCL, SEPL, DEPL, HSPPL, MBPC 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, HPSEBL, RRVUNL, UJVNL, CSPGCL, APGENCO, TSGENCO, KPCL, KBSEBL, TANGEDCO, JUUNL, TUL, APGCL, WBSEDCL.

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

Sector-wise and Region-wise generation performance of H.E. Stations during 2022-23 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
(2022-23 VIS-A-VIS 2021-22)

Sector	Installed Capacity (MW) (As on 31.03.2023)	Energy Generation (MU)					
		Target		Actual		Surplus (+)/ Deficit(-)in %	
		2022-23	2021-22	2022-23	2021-22	2022-23	2021-22
Central	15664.72	61368	61044.00	62961.33	61044.00	2.60	-4.30
State	27254.45	74047	74198.00	83209.08	74198.00	12.37	6.19
Private	3931	15246	14302	15928.35	14302	4.48	0.78
Total	**46850.17**	**150661**	**149544**	**162098.76**	**149544**	**7.59**	**1.39**

TABLE S-4

REGION-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS
(2022-23 VIS-A-VIS 2021-22)

Sector	Installed Capacity (MW) (As on 31.03.2023)	Energy Generation (MU)					
		Target		Actual		Surplus (+)/ Deficit(-)in %	
		2022-23	2021-22	2022-23	2021-22	2022-23	2021-22
Northern	19696.25	76243.00	75684	77624.07	73866.02	1.81	-2.40
Western	7392	15461.00	16042	19573.87	13719.74	26.60	-14.48
Southern	11747.15	30511.00	30439	36869.76	37206.43	20.84	22.23
Eastern	5988	20104.00	20540	20888.80	20462.33	3.90	-0.38
North Eastern	2027.0	8342.00	6839	7142.27	6372.81	-14.38	-6.82
Total	**46850.15**	**150661.00**	**149544.00**	**162098.77**	**151627.33**	**7.59**	**1.39**

3.0 Outage Analysis

For outage data analysis during 2022-23, outage data of 211 H.E. Stations (above 25 MW capacity) covering 729 units and having an aggregate installed capacity of 46850.15 MW made available by various utilities have been considered for the purpose of this Review. Region-wise details of these 211 hydro power stations are given below in **Table S-5**.

TABLE S-5

REGION-WISE SUMMARY OF HE STATIONS ANALYSED
(2022-23 VIS-A-VIS 2021-22)

Region	No. of Stations		No. of Units		Capacity(MW) as on	
	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22
Northern	76	75	258	256	19696.25	19576.25
Western	28	28	101	101	7392	7392
Southern	70	70	246	246	11747.15	11739.5
Eastern	23	23	86	86	5988	5987.75
North Eastern	14	14	38	38	2027.0	2027.0
All India	**211**	**210**	**729**	**727**	**46850.15**	**46722.50**

3.1 Planned Maintenance

The number of H.E. Stations falling under various ranges of non-availability due to planned maintenance during the year 2022-23 VIS-A-VIS 2021-22 is summarized below in **Table S-6.**

TABLE S-6

NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2022-23 VIS-A-VIS 2021-22)

% Non-Availability due to planned maintenance	2022-23				2021-22			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	144	68.25	33208.12	70.88	165	78.57	37515.57	80.29
>5 to 10	41	19.43	7882.4	16.82	23	10.95	3814.95	8.17
>10 to 15	14	6.64	2670.65	5.7	12	5.71	3594.20	7.69
>15 to 20	5	2.37	1480	3.16	4	1.90	1087.80	2.33
>20 to 25	3	1.42	1066	2.28	1	0.48	30.00	0.06
>25 to 30	0	0	0	0	1	0.48	50.00	0.11
above 30	4	1.9	543	1.16	4	1.90	630.00	1.35
Total	**211**	**100**	**46850.17**	**100**	**210**	**100**	**46722.52**	**100**

It could be seen from above those 144 nos. (68.25% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2022-23 as compared to 165 nos. (78.57% of total) during 2021-22.

Non-availability due to planned maintenance was more than 30% at 4 nos. (1.90% of total) H.E. Stations during 2022-23 and which was 4 nos. (1.90% of total) in 2021-22 The details of these stations for 2022-23 is given below in **Table S-7.**

TABLE S-7

H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE FOR THE PERIOD: (2022-23)

Sl. No	Name of Station/ Utility	Capacity (MW)	N.A. due to P.M.*(%)	Remarks
1	BANSAGAR TONS-I HPS / MPPGCL	315	42.821	CAPITAL/3 YEARLY MTCE.
2	BHIRA PSS HPS / TATA MAH.	150	55.726	OTHER EQUIPMENT
3	KHONDONG HPS / NEEPCO.	50	100	R AND M WORKS

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

29.12% 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: (2022-23)

Sl. No	Type of Planned maintenance	Average duration at any unit (hrs.)
1	ANNUAL MAINTENANCE	463.79
2	AUXILIARY SYSTEM	8.4
3	CAPITAL/3 YEARLY MTCE.	718.87
4	GENERATOR	79.35
5	INSPECTION /MTCE	45.61
6	MONTHLY MAINTENANCE	81.37
7	OTHER EQUIPMENT	417.9
8	RENOVATION/MODERNISATION	302.73
9	ROUTINE MAINTENANCE	44.59
10	TURBINE	183.14
11	MISCELLANEOUS	340.16

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 2022-23 vis-à-vis 2021-22 is given below in **Table S-9.**

TABLE S–9

DURATION OF PLANNED MAINTENANCE FOR GENERATOR, TURBINE & OTHER EQUIPMENTS (2022-23 VIS-A-VIS 2021-22)

S.No.	Equipments	Duration			
		Maximum Hours for any unit		Average Hours	
		2022-23	2021-22	2022-23	2021-22
1	Generator	1220.43	751.27	79.35	89.13
2	Turbine	408.25	75.82	183.14	15.41
3	Other Equipment	4881.61	684.42	417.9	146.46

It could be seen that the average hours utilized for carrying out various repairs decreased for generator and turbine during 2022-23 as compared to 2021-22.

3.2 Forced Outages

The summary of forced outages caused due to break-down of generator, turbine and other equipment during 2022-23 VIS-A-VIS 2021-22 is given below in **Table S-10.**

TABLE S–10

FORCED OUTAGES DUE TO GENERATOR, TURBINE & OTHER EQUIPMENT FAULTS (2022-23 VIS-A-VIS 2021-22)

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage	
		2022-23	2021-22	2022-23	Increase/ Decrease vis-à-vis 2021-22
1	Generator	35672.87	44588.94	24.81	20
2	Turbine	62310.18	64968.00	43.34	4.09
3	Civil Structure	41510.94	42932.26	28.87	3.31
4	Other Equipment	4273.08	3551.99	2.97	-20.3
	Total	**143767.07**	**156041.19**	**100**	**7.87**

It is observed that forced outages in 2022-23 VIS-A-VIS 2021-22 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 2022-23 is summarized below in **Table S-11.**

TABLE S-11

OPERATING AVAILABILITY OF H.E. STATIONS
PERIOD: 2022-23

OPERATING AVAILABILITY (%)	NO. OF STATIONS	% OF TOTAL STATIONS	INSTALLED CAPACITY (MW)	% OF TOTAL INSTALLED CAPACITY
≥95%	125	59.24	28221.37	60.24
>90 to 95	44	20.85	7669.2	16.37
>85 to 90	14	6.64	2930.6	6.26
>80 to 85	10	4.74	3195	6.82
< 80	18	8.53	4834	10.32
Total	**211**	**100**	**46850.17**	**100**

Operating availability of 28 nos. HE stations (13.27% of total HE Stations) was below 85% (8029 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 2022-23 is indicated below in **Table S-12.**

TABLE S-12

AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2022-23

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AVAILABILITY
1	Northern	258	19696.27	5.14	1.83	93.04
2	Western	101	7392	3.09	4.38	92.52
3	Southern	246	11747.15	3.33	2.11	94.55
4	Eastern	86	5987.75	3.5	2.54	93.96
5	North Eastern	38	2027	8.26	13.32	78.41
	All India	**729**	**46850.17**	**4.22**	**2.96**	**92.82**

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

Generating units installed in Northern Region accounted for maximum non-availability due to planned maintenance (8.26%) whereas generating units installed in Western Region accounted for the least non-availability due to planned maintenance (3.09%) 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)	%	%	%
2022-23	46850.17	150661.00	162098.77	(+) 7.59	729	46850.17	4.22	2.96	92.82
2021-22	46722.50	149544	151627.33	1.39	727	46722.50	3.45	2.88	93.67
2020-21	46209.22	140357	150299.52	(+) 7.08	720	46209.22	4.06	3.27	92.68
2019-20	45699.20	136932	155769	(+) 13.75	712	45699.20	4.12	1.91	93.97
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 31.03.2023, H.E. Schemes having total installed capacity of 42104.55 MW (31.56%) excluding pumped storage stations of capacity of 4745.60 MW have already been developed and the schemes under construction account for capacity of 15023.5 MW (11.26%), (excluding PSS of 1500 MW). As such, about 57.18% 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 31.03.2023)

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	3360.0	27.40	3099.5	25.27	5805.0	47.33
Ladhak	2377	2046	89.0	12.59	0.0	0.00	618.0	87.41
Himachal Pradesh	18820	18540	10263.0	56.07	2490.0	13.60	5552.0	30.33
Punjab	971	971	1096.30	84.28	206.0	15.84	0.0	0.00
Haryana	64	64	0.0	0	0.0	0.00	0.0	0.00
Rajasthan	496	483	411.0	100.00	0.0	0.00	0.0	0.00
Uttarakhand	18175	17998	3975.35	29.49	1571.0	11.65	7935.0	58.86
Uttar Pradesh	723	664	501.60	100.00	0.0	0.00	0.0	0.00
Sub Total(NR)	**53395**	**52263**	**19696.25**	**41.93**	**7366.5**	**15.68**	**19908.4**	**42.38**
WESTERN								
Madhya Pradesh	2243	1970	2235.0	79.28	400.0	14.19	184.0	6.53
Chhattisgarh	2242	2202	120.0	9.15	0.0	0.00	1191.0	90.85
Gujarat	619	590	550.0	100.00	0.0	0.00	0.0	0.00
Maharashtra	3769	3314	2647.0	84.19	0.0	0.00	497.0	15.81

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	0.0	0.00
Sub Total (WR)	**8928**	**8131**	**5552.0**	**70.96**	**400.0**	**5.11**	**1872.0**	**23.93**
SOUTHERN								
Andhra Pradesh	2366	2341	1610.0	62.02	960.0	36.98	26.0	1.00
Telangana	2058	2019	800.0	61.44	0.0	0.00	502.0	38.56
Karnataka	6602	6459	3689.20	83.57	0.0	0.00	725.2	16.43
Kerala	3514	3378	1864.15	75.39	140.0	5.66	468.6	18.95
Tamil Nadu	1918	1693	1778.20	99.61	0.0	0.00	7.0	0.39
Sub Total (SR)	**16458**	**15890**	**9741.55**	**77.50**	**1100.0**	**8.75**	**1728.8**	**13.75**
EASTERN								
Jharkhand	753	582	210.0	70.00	0.0	0.00	90.0	30.00
Bihar	70	40	0.0	0.00	0.0	0.00	130.1	100.00
Odisha	2999	2981	2154.55	76.28	0.0	0.00	670.0	23.72
West Bengal	2841	2829	441.20	54.52	120.0	14.83	248.0	30.65
Sikkim	4286	4248	2282.0	37.71	1037.0	17.14	2732.0	45.15
Sub Total (ER)	**10949**	**10680**	**5087.75**	**50.30**	**1157.0**	**11.44**	**3870.1**	**38.26**
NORTH EASTERN								
Meghalaya	2394	2298	322.0	15.89	0.0	0.00	1704.0	84.11
Tripura	15	0	0.0	0.00	0.0	0.00	0.0	0.00
Manipur	1784	1761	105.0	17.07	0.0	0.00	510.0	82.93
Assam	680	65	350.0	54.43	120.0	18.66	173.0	26.91
Nagaland	1574	1452	75.0	23.08	0.0	0.00	250.0	76.92
Arunachal Pradesh	50328	50064	1115.0	2.21	4880.0	9.68	44399.0	88.10
Mizoram	2196	2131	60.0	3.11	0.0	0.00	1866.7	96.89
Sub Total (NER)	**58971**	**58356**	**2027.0**	**3.62**	**5000.0**	**8.94**	**48902.7**	**87.44**
ALL INDIA	**148701**	**145320**	**42104.55**	**31.56**	**15023.5**	**11.26**	**76282.0**	**57.18**

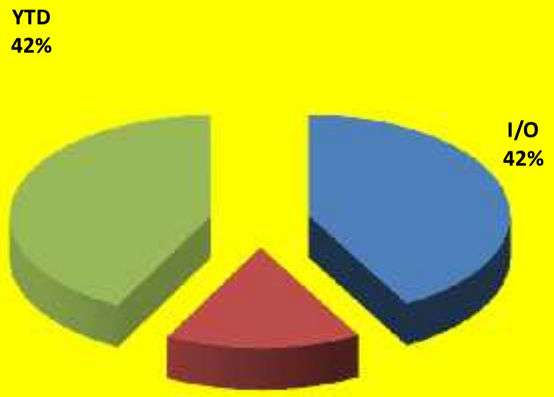
Note:- In addition to above 8 PSS (4745.6 MW) are under operation, 3 PSS (2700 MW) are under active construction, 1 PSS (80 MW) on which construction is held up ,1 PSS (1000 MW) is Concurred by CEA, 24 PSS (29260 MW) are under S&I , 1PSS (1350 MW) is Under Examination & 5 PSS (5320MW) are under S&I Held Up

REGION-WISE STATUS OF HYDRO-ELECTRIC CAPACITY AS ON 31.03.2023

EXHIBIT 1.1

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

NORTHERN REGION

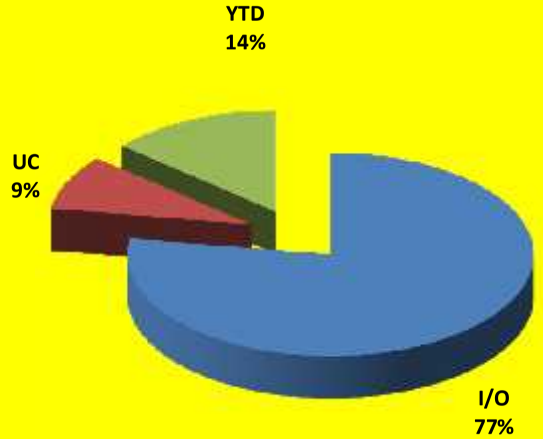


TOTAL ASSESSED (Above 25 MW) : - 52263 MW

WESTERN REGION

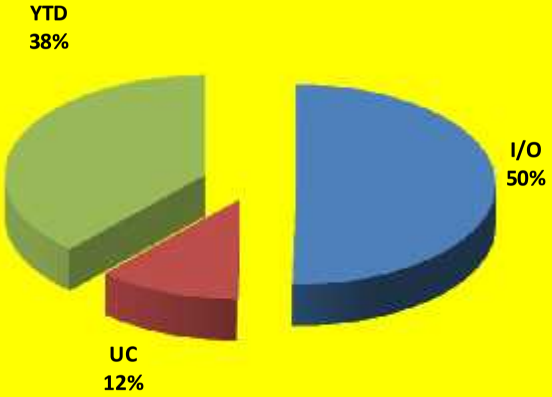
TOTAL ASSESSED (Above 25 MW) : - 8131 MW

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

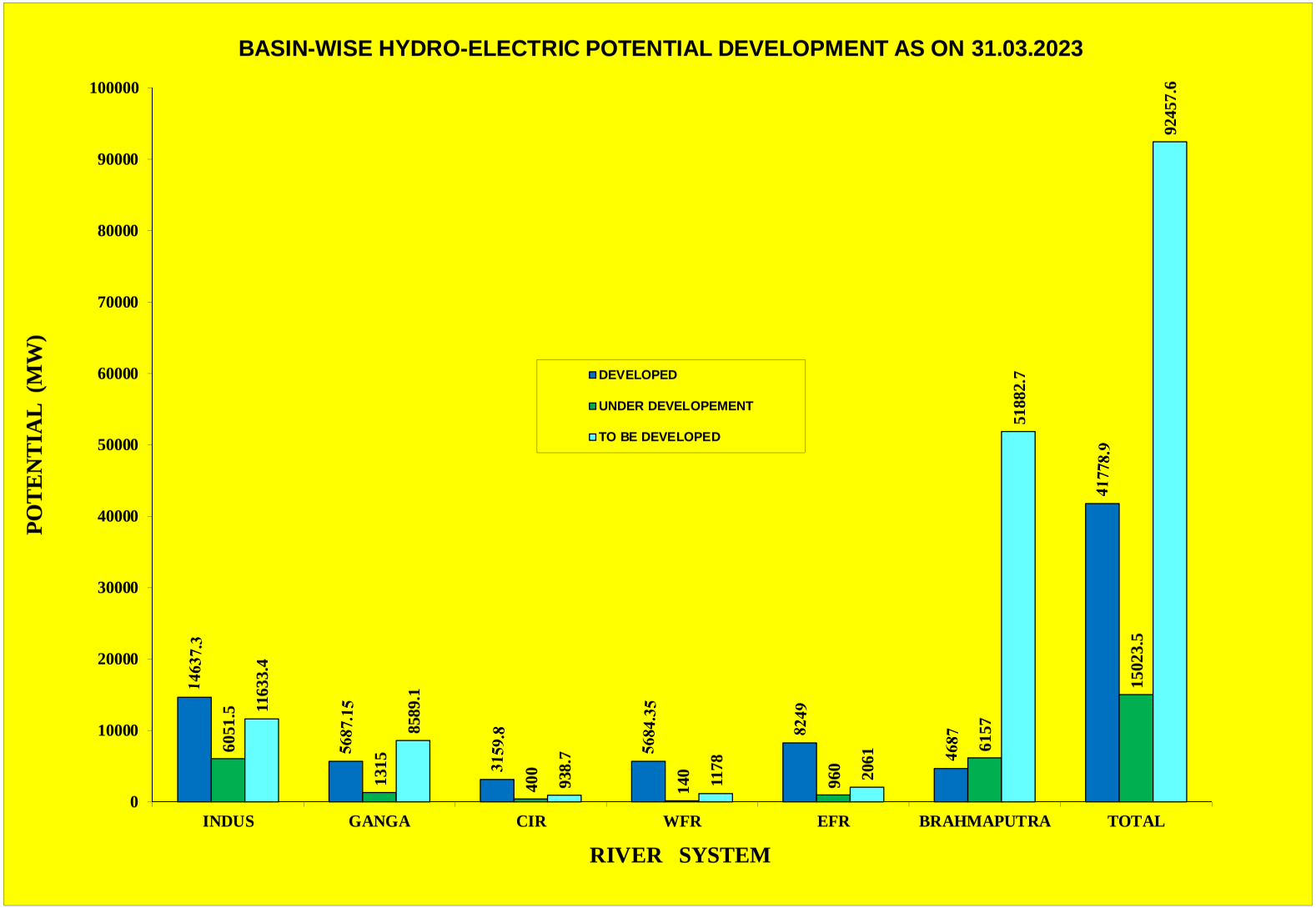

BASIN-WISE HYDRO-ELECTRIC POTENTIAL DEVELOPMENT AS ON 31.03.2023
POTENTIAL (MW)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
DEVELOPED
UNDER DEVELOPEMENT
TO BE DEVELOPED
14637.3
6051.5
11633.4
5687.15
1315
8589.1
3159.8
400
938.7
5684.35
140
1178
8249
960
2061
4687
6157
51882.7
41778.9
15023.5
92457.6
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 31.03.2023)

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	14637.30	45.29	6051.5	18.72	11633.4	35.99
Ganga	20711	20252	5687.15	36.48	1315.0	8.43	8589.10	55.09
Central Indian River System	4152	3868	3159.80	70.24	400.0	8.89	938.7	20.87
West Flowing Rivers System	9430	8997	5684.35	81.18	140.0	2.00	1177.6	16.82
East Flowing Rivers System	14511	13775	8248.95	73.20	960.0	8.52	2060.5	18.28
Brahmaputra	66065	65400	4687.00	7.47	6157.0	9.82	51882.7	82.71
Total	**148701**	**145320**	**42104.55**	**31.56**	**15023.5**	**11.26**	**76282.0**	**57.18**

Note:- In addition to above 8 PSS (4745.6 MW) are under operation, 3 PSS (2700 MW) are under active construction, 1 PSS (80 MW) on which construction is held up ,1 PSS (1000 MW) is Concurred by CEA, 24 PSS (29260 MW) are under S&I , 1PSS (1350 MW) is Under Examination & 5 PSS (5320MW) are under S&I Held Up

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 45699.20 MW (as on 31.03.2020) 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 162.09 BU in 2022-23. Hydro generation during 2022-23 was about 10.49 BU (i.e. 7%) more than the generation of 151.6 BU during 2021-22.

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 11.26% at the end of 2022-23. The generation from hydro stations during the year 2022-23 accounted for 11.46% 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
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
2019-20*	370106.46	45699.2	12.34	1244989.43	155769.12	12.51
2020-21*	382151.22	46209.20	12.09	1225842.14	150299.52	12.26
2021-22*	399496.61	46722.50	11.69	1313453.87	151627.33	11.54
2022-23*	416058.89	46850.15	11.26	1414170.53	162098.77	11.46

* 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
250000
200000
150000
100000
50000
0
1947 508 854
1950-51 559 1154
1955-56 1061 1825
1960-61 1917 2736
1962-63 2936 2865
1965-66 4124 4903
1968-69 5907 7050
1973-74 6966 9058
1978-79 6840 15207
1979-80 11384 16424
1984-85 10833 18307
1989-90 15651 19194 43764
1991-92 17185 21658 48086
1996-97 22250 21905 61912
1997-98 22250 22479 65073
1998-99 22250 23816 67565
1999-00 26800 25142 71341
2000-01 26800 26269 73628
2001-02 27200 26767 76057
2002-03 27200 29507 78390
2003-04 27200 30936 80457
2004.05 27700 32326 84713
2005-06 33600 34662 88601
2006-07 39000 37002 93775
2007-08 41200 36846 91907
2008-09 41200 93725
2009-10 45600 36863 102454
2010-11 47800 37567 112824
2011-12 47800 38990 131603
2012-13 47800 39491 151530
2013-14 47800 40531 168255
2014-15 57800 41267 188898
2015-16 57800 42783 210675
2016-17 67800 44478 218329
2017-18 67800 45293 222907
2018-19 67800 45399 226513
2019-20 67800 45699 231443
2020-21 67800 46209 234728
2021-22 67800 46723 236109
2022-23 67800 46850 237269

EXHIBIT 1.4

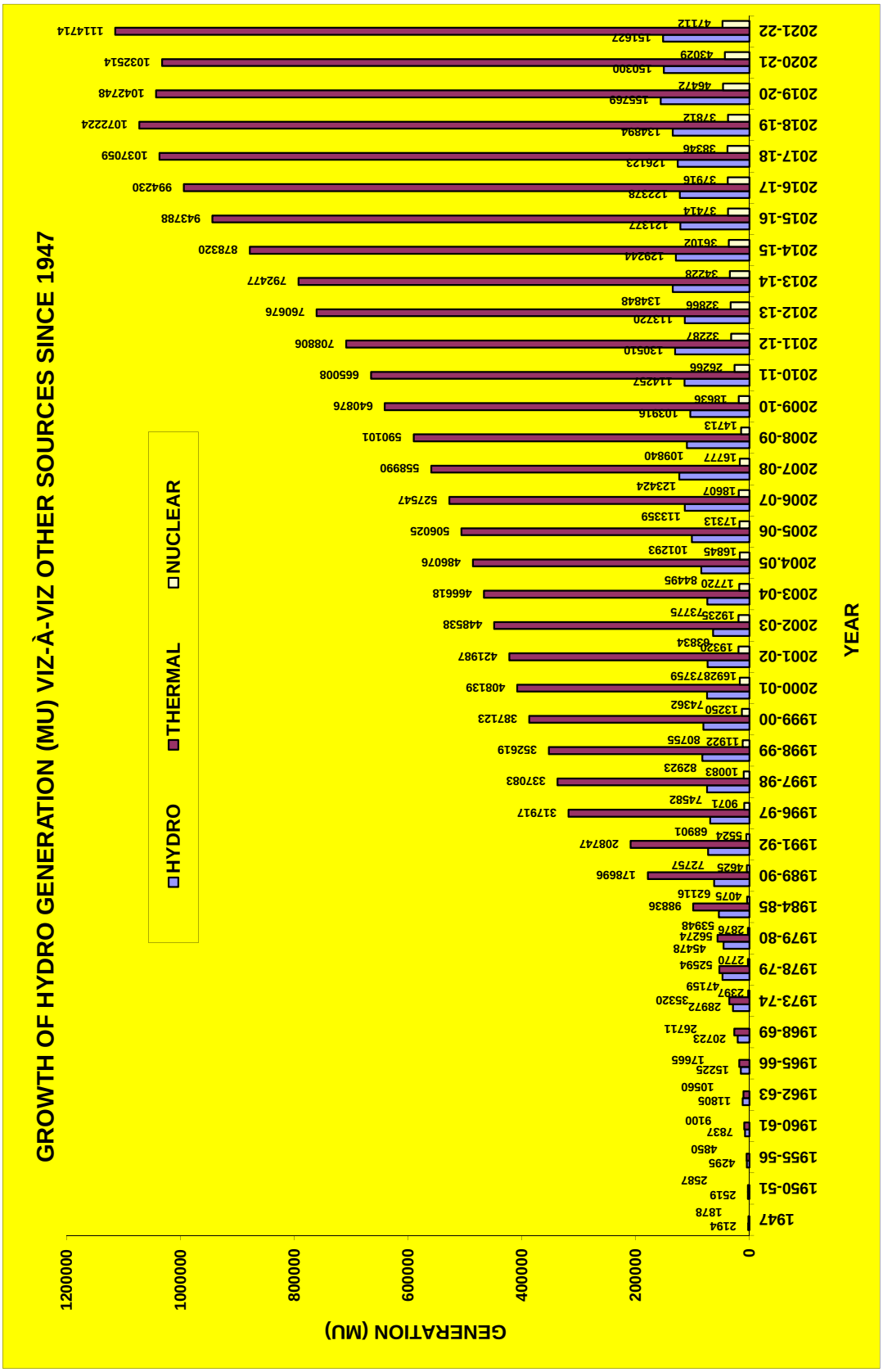
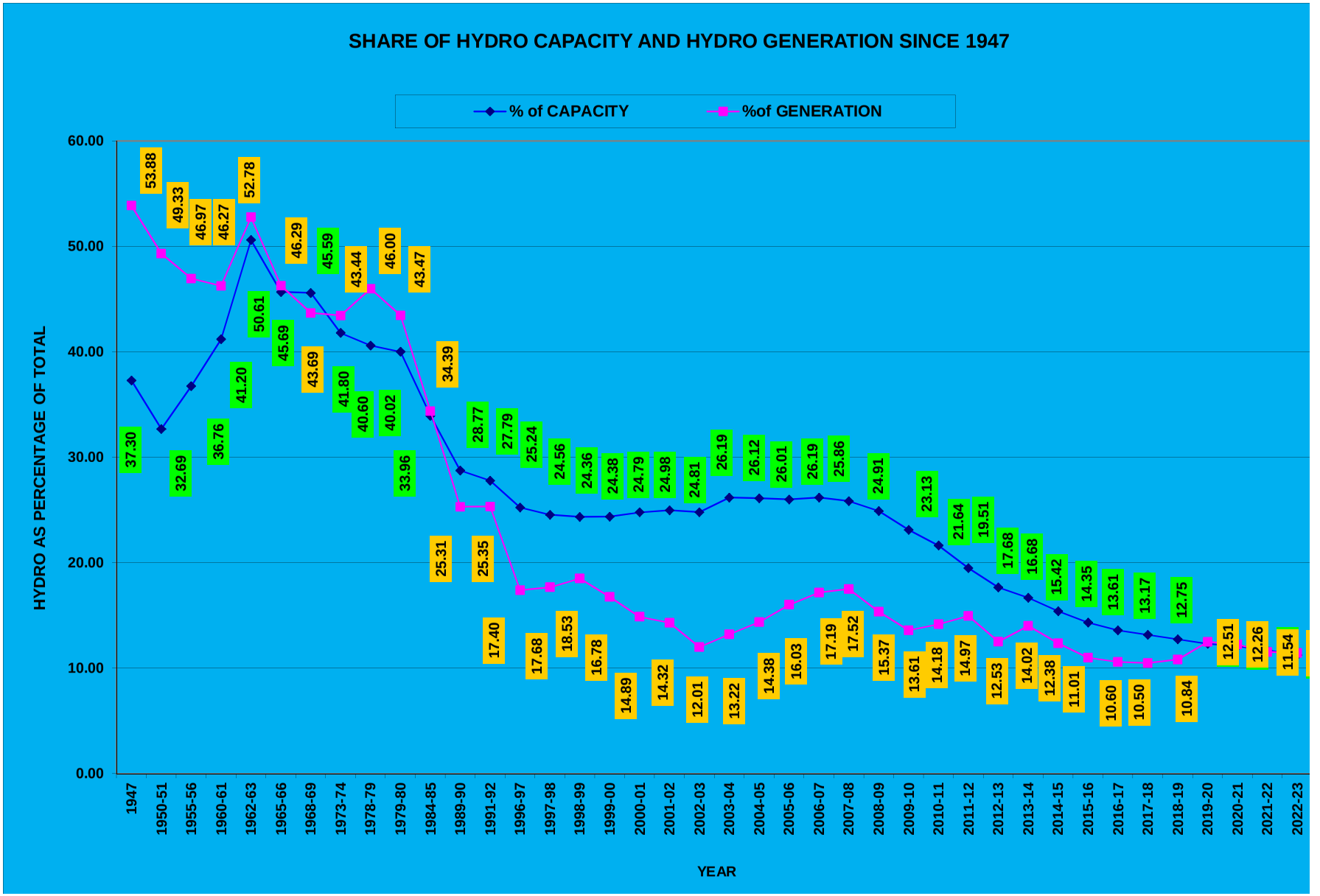

GROWTH OF HYDRO GENERATION (MU) VIZ-À-VIZ OTHER SOURCES SINCE 1947
HYDRO
THERMAL
NUCLEAR
GENERATION (MU)
YEAR
0
200000
400000
600000
800000
1000000
1200000
1947 2194 1878
1950-51 2519 2587
1955-56 4295 4850
1960-61 7837 9100
1962-63 11805 10560
1965-66 15225 17665
1968-69 20723 26711
1973-74 28972 35320 2397 47159
1978-79 2770 52594
1979-80 45478 56274 2876 53948
1984-85 98836 4075 62116
1989-90 46425 72757 178696
1991-92 55241 68901 208747
1996-97 9071 74582 317917
1997-98 100838 29231 337083
1998-99 119221 80755 352619
1999-00 132507 43621 387123
2000-01 169287375 9 408139
2001-02 19320 83834 421987
2002-03 19235 73775 448538
2003-04 17720 84495 466618
2004.05 16845 101293 486076
2005-06 17313 113359 506025
2007-08 16777 109840 558990
2006-07 18607 123424 527547
2008-09 14713 590101
2009-10 18536 103916 640876
2010-11 26266 114257 665008
2011-12 32287 130510 708806
2012-13 32866 113220 134848 760676
2013-14 34228 792477
2014-15 36102 129244 878320
2015-16 37414 121327 943788
2016-17 37916 122328 994230
2017-18 38346 126123 1037059
2018-19 37812 134894 1072224
2019-20 46472 155769 1042748
2020-21 43029 150300 1032514
2021-22 47112 151627 1114714

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 25.31 28.77
1991-92 25.35 27.79
1996-97 17.40 25.24
1997-98 17.68 24.56
1998-99 18.53 24.36
1999-00 16.78 24.38
2000-01 14.89 24.79
2001-02 14.32 24.98
2002-03 12.01 24.81
2003-04 13.22 26.19
2004-05 14.38 26.12
2005-06 16.03 26.01
2006-07 17.19 26.19
2007-08 17.52 25.86
2008-09 15.37 24.91
2009-10 13.61 23.13
2010-11 14.18 21.64
2011-12 14.97 19.51
2012-13 12.53 17.68
2013-14 14.02 16.68
2014-15 12.38 15.42
2015-16 11.01 14.35
2016-17 10.60 13.61
2017-18 10.50 13.17
2018-19 10.84 12.75
2019-20 12.51
2020-21 12.26
2021-22 11.54
2022-23

1.4 Monitored Hydro Installed Capacity

For generation performance, the monitored hydro-electric installed capacity in the country as on 31.03.2023 was 46850.1 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 31.03.2023)

S.No.	Region	No. of Units	Installed Capacity (MW)
1.	Northern	258	19696.25
2.	Western	101	7392
3.	Southern	246	11747.15
4.	Eastern	86	5988
5.	North-Eastern	38	2027.0
Total		**729**	**46850.15**

Capacity-wise grouping of H.E. Stations as on 31.03.2023 is given in **Annex- 1.5**. It is observed that 106 stations with installed capacity above 100 MW constitute more than 50.2% of the overall hydro capacity.

2 H.E. Generating units having installed capacity of 120 MW were added during the year 2022-23. 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 31.03.2023 was 11.26% and 11.46% 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 33.44 %, 8.39% and 58.17% respectively. Sector-wise distribution of hydro generation (MU) in Central, Private and State sectors was 38.84%, 9.83% and 51.33% respectively. These details are illustrated in **Exhibits 1.8 & 1.9**.

1.5 Hydro Generating Units : Indigenous and imported

As on 31.03.2023, there were 729 hydro generating units in operation at 211 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 42.69% of total capacity for both turbines & generators whereas other domestic suppliers together have a meagre share of about 6.88% of total capacity.

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

EXHIBIT-1.6

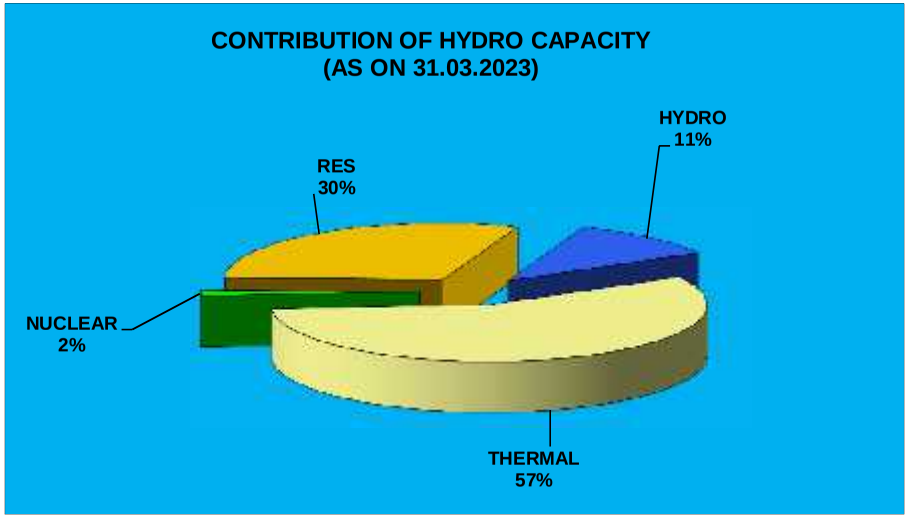


EXHIBIT-1.7

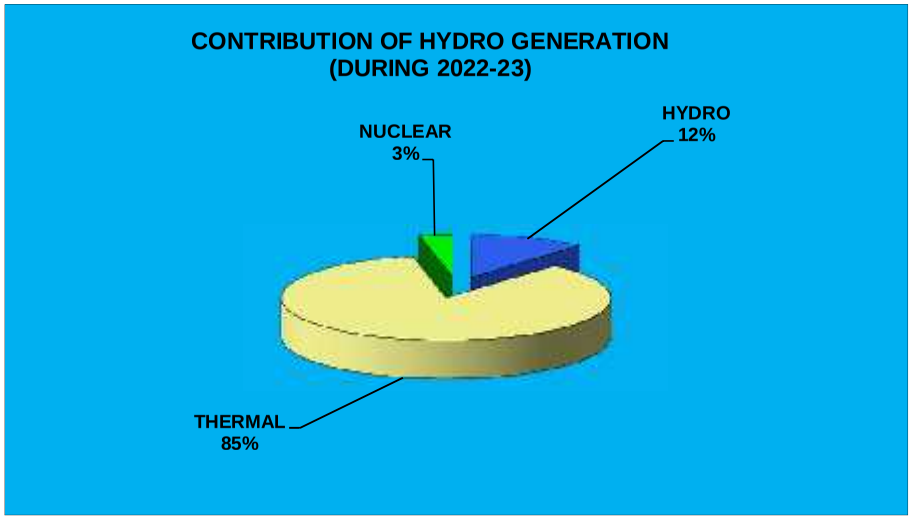


EXHIBIT-1.8

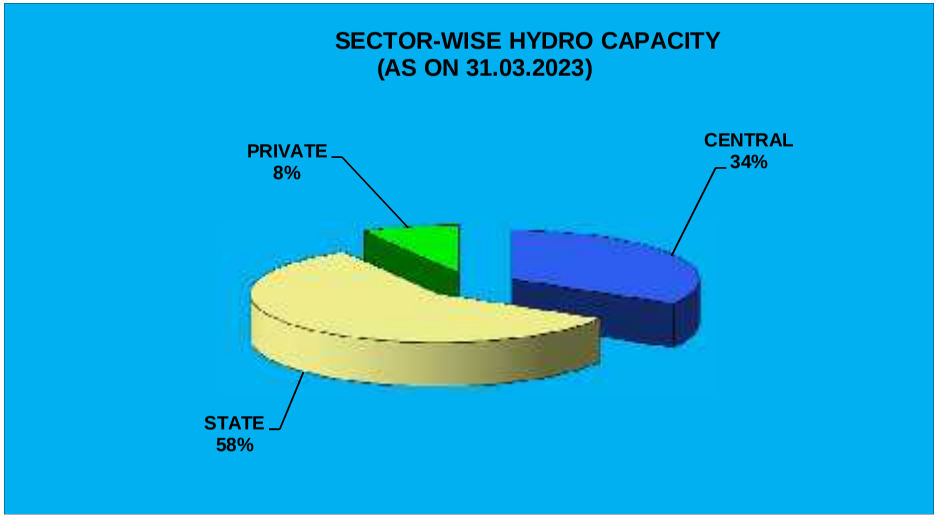


EXHIBIT-1.9

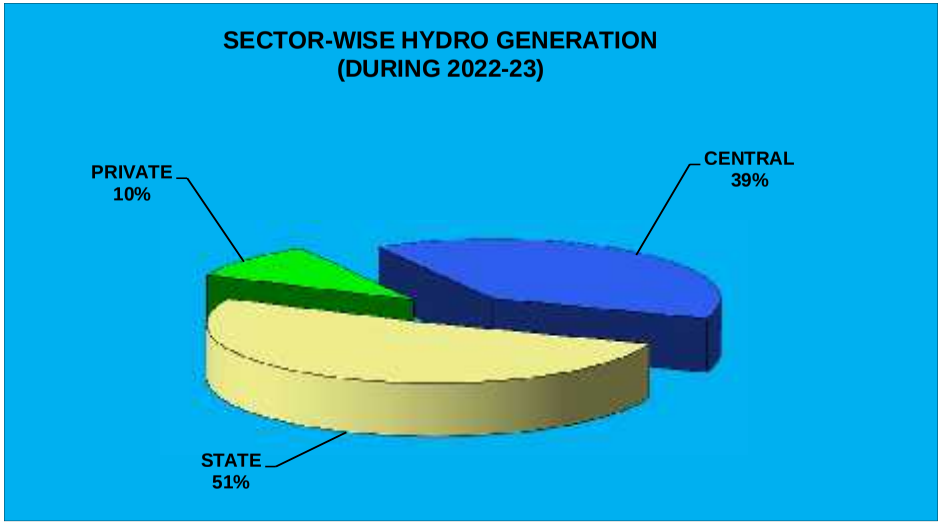


TABLE 1.5

HYDRO GENERATING UNITS INDIGENOUS/IMPORTED FROM VARIOUS COUNTRIES AS ON 31-03-2023

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	312	42.69	20150.30	43.01	312	42.54	20150.30	43.01
Others	54	6.88	3395.50	7.25	54	7.02	3395.50	7.25
Sub Total	**366**	**49.57**	**23545.80**	**50.26**	**366**	**50.21**	**23545.80**	**50.26**
B-Imported								
USA	9	1.24	351.00	0.75	6	0.83	543.15	1.16
U.K.	63	8.67	1242.10	2.66	63	8.67	1676.90	3.59
France	31	4.26	2179.20	4.66	15	2.06	1726	3.69
Canada	44	6.05	3132.00	6.70	44	6.05	3132	6.70
USSR	26	3.58	2804.00	6.00	26	3.58	2804	6.00
Switzerland	21	2.89	790.20	1.69	21	2.89	219	0.47
Japan	76	10.45	6398.20	13.69	76	10.45	5822.20	12.46
Other	93	12.79	6400	13.70	112	15.41	7374.95	15.78
Sub Total	**363**	**49.93**	**23296.70**	**49.86**	**363**	**49.93**	**23298.20**	**49.87**
Total	**729**	**100**	**46850.15**	**100**	**729**	**100**	**46850.15**	**100**

Annex-1.1

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

(ABOVE 25 MW CAPACITY)

(As on 31.03.2023)

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	76865.74	76	258	19696	0	0	0.00	76	258	19696.25
WESTERN	16607.21	24	88	5552.00	4	13	1840.00	28	101	7392.00
SOUTHERN	33900.85	67	229	9742.00	3	17	2006	70	246	11747.60
EASTERN	20204.86	23	82	5088	1	4	900.00	24	86	5987.75
NORTH EASTERN	9412.73	14	38	2027.00	0	0	0.00	14	38	2027.00
TOTAL	**156991.39**	**204**	**695**	**42105**	**8**	**34**	**4745.6**	**211***	**729**	**46850.6**

*** Total number of HE stations are 210 as NJ Sagar HE Station (Sothern Region) is having one conventional unit and remaining seven units are PSS**

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

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	42	163	15664.70
STATE	24	147	506	27254.45
PRIVATE	17	22	60	3931.00
TOTAL	**49**	**211**	**729**	**46850.15**

* Total number of HE stations are 211 as N J Sagar HE Station (Southern region) is having one conventional unit and remaining seven units are PSS

Annex 1.2

Categorisation of HE Stations (Installed Capacity)

1. Operation-wise

(As on 31.03.2023)

Sector	RoR		RoR (P)		Storage (S)						Total*	
					S(P)		S(MPP)		PSS			
	No.	MW	No.	MW	No.	MW	No.	MW	No.	MW	No.	MW
Central	8	2133.50	19	7263.00	6	1725.00	9	4543.20	0	0.00	42	15664.70
State	15	892.15	51	7710.00	32	6487.30	43	7569.40	7	4595.60	148	27254.45
Private	5	892.00	13	2592.00	3	297.00	0	0.00	1	150.00	22	3931.00
Total (Nos./ MW Capacity)*	**28**	**3917.65**	**83**	**17565.00**	**41**	**8509.30**	**52**	**12112.60**	**8**	**4745.60**	**210***	**46850.15**
% of Total	**14**	**8.81**	**41.5**	**39.49**	**20.5**	**19.13**	**26**	**27.23**	**4**	**10.67**	**100**	**100**

2. Power House Construction-wise

Sector	Surface		Underground		Total	
	No.	MW	No.	MW	No.	MW
Central	26	7436.5	16	8228.2	**42**	**15664.7**
State	125	19282.45	20	7972	**147**	**27254.45**
Private	14	1673	8	2258	**22**	**3931**
Total (Nos./MW Capacity)*	**165**	**28391.95**	**44**	**18458.20**	**211**	**46850.15**
% of Total	**78.20**	**60.60**	**21.43**	**39.40**	**100**	**100**

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

Annex 1.3

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

(As on 31.03.2023)

Sl. No.	NAME OF THE SECTOR/ UTILITY	NO. OF STATIONS	NO. OF UNITS	INSTALLED CAPACITY	DESIGN ENERGY (MU)
	CENTRAL SECTOR				
1	BBMB	6	28	2938.30	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	7	20	1500.00	7397.04
	SUB-TOTAL CENTRAL	**42**	**163**	**15664.72**	**60609.82**
	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	1345	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
15	RENEW POWER PVT LTD.	1	3	99	473.00
16	MBPCL	1	2	113	434.00
17	HSPPL	1	2	100	524.00
18	GMR	1	3	180	769.39
	SUB-TOTAL PRIVATE	**22**	**60**	**3931.00**	**15740.25**

	STATE SECTOR				
1	HPSEBL	4	12	372.00	1691.62
2	HPPCL	3	8	406.00	955.03
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	11	36	1372.15	5223.34
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	3617.20	12981.00
16	KSEB	14	47	1864.15	6458.00
17	TANGEDCO	27	69	2178.20	4348.00
18	JUUNL	2	2	130.00	149.00
19	OHPC	6	31	2039.80	5676.00
20	WBSEDCL	3	12	986.00	1610.00
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	**147**	**506**	**27254.45**	**80641.47**
	TOTAL	**211**	**729**	**46850.15**	**156991.54**

Annex 1.4

State-wise/Station-wise Installed Capacity of H.E. Stations in the Country

(Above 25 MW Capacity)

As on 31.03.2023

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
	Conventional H E Stations							
	Northern Region							
	BBMB							
	HIMACHAL PRADESH							
1	Bhakra Left	1	5	MP	(1X108+4X126)	612.00	3924.00	1960 (108 MW) 1961 (486 MW)
2	Bhakra Right	1	5	MP	(5X157)	785.00		1966 (314 MW) 1967 (314 MW) 1968 (157 MW)
3	Dehar	1	6	R(P)	(6X165)	990.00	3110.00	1977 (165 MW) 1978 (165 MW) 1979 (330 MW) 1983 (330 MW)
4	Pong	1	6	MP	(6X66)	396.00	1123.00	1978 (198 MW) 1979 (66 MW) 1982 (66 MW) 1983 (66 MW)
	Sub-Total BBMB (HP)	**4**	**22**			**2783.00**	**8157.00**	
	NHPC							
5	Baira Siul	1	3	R(P)	(3X60)	180.00	779.28	1980 (132 MW) 1981 (66 MW)
6	Chamera-I	1	3	S	(3X180)	540.00	1664.56	1994 (540 MW)
7	Chamera-II	1	3	R(P)	(3X100)	300.00	1499.89	2003 (200 MW) 2004 (100 MW)
8	Chamera-III	1	3	R(P)	(3X77)	231.00	1108.00	2012 (231 MW)
9	Parbati-III	1	4	R(P)	(4X130)	520.00	1977.23	2014 (520 MW)
	Sub-Total HP	**5**	**16**			**1771.00**	**7028.96**	
	SJVNL							
10	Nathpa Jhakri	1	6	R(P)	(6X250)	1500.00	6612.00	2003 (500 MW) 2004 (1000 MW)
11	Rampur	1	6	R	(6X68.67)	412.00	1878.08	2014 (412 MW)
	Total SJVNL	**2**	**12**			**1912.00**	**8490.08**	
	NTPC LTD.							
12	Koldam	1	4	S	(4X200)	800.00	3054.79	2015 (800 MW)
	Total NTPC LTD.	**1**	**4**			**800.00**	**3054.79**	
	Total Central Sector-HP	**12**	**54**			**7266.00**	**26730.83**	
	HPSEBL							
13	Bassi	1	4	R(P)	(4X16.5)	66.00	346.77	1970 (33 MW) 1971 (16.5 MW)
14	Giri Bata	1	2	R(P)	(2X30)	60.00	240.00	1978 (60 MW)
15	Larji'	1	3	R(P)	(3X42)	126.00	586.85	2006 (126 MW)
16	Sanjay	1	3	R(P)	(3X40)	120.00	518.00	1989 (120 MW)
	Total HPSEBL	**4**	**12**			**372.00**	**1691.62**	
	HPPCL							
17	Integrated Kashang	1	3	R (P)	(3X65)	195	245.80	2016 (130 MW)
18	Sainj	1	2	R(P)	(2X50)	100	323.23	2017 (100 MW)
19	Sawara Kuddu	1	3	R	(3X37)	111	386.00	2020 (111 MW)
	Total HPPCL	**3**	**8**			**406.00**	**955.03**	
	PSPCL							
20	Shanan	1	5	R(P)	(1X50)+(4X15)	110.00	585.00	1932 (60 MW) 1982 (50 MW)
	Sub Total PSPCL-HP	**1**	**5**			**110.00**	**585.00**	
	Total State Sector	**8**	**25**			**888.00**	**3231.65**	

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
	Private Sector							
	MPCL							
21	Malana	1	2	R(P)	(2X43)	86.00	370.93	2001 (86 MW)
	Total MPCL	**1**	**2**			**86.00**	**370.93**	
	GBHPPL							
22	Budhil	1	2	R(P)	(2X35)	70.00	291.73	2012 (70 MW)
	Total GBHPPL	**1**	**2**			**70.00**	**291.73**	
	EPPL							
23	Malana-II	1	2	R(P)	(2X50)	100.00	403.00	2011 (100 MW)
	Total EPPL	**1**	**2**			**100.00**	**403.00**	
	IA Energy							
24	Chanju-I	1	3	R(P)	(3X12)	36.00	157.82	2017 (12 MW)
	Total IA Energy	**1**	**3**			**36.00**	**157.82**	
25	Allain Duhangan	1	2	R(P)	(2X96)	192.00	678.18	2010 (192 MW)
	Total ADHPL	**1**	**2**			**192.00**	**678.18**	
	HBPCL							
26	Baspa	1	3	R(P)	(3X100)	300.00	1213.00	2003 (300 MW)
27	Karcham Wangtoo	1	4	R(P)	(4X261.25)	1045.00	4131.06	2011 (1000 MW)
	Total HBPCL	**2**	**7**			**1345.00**	**5344.06**	
	HSPPL							
28	Sorang	1	2	R	(2X50)	100.00	524.00	2021 (100 MW)
	Total HSPPL	**1**	**2**			**100.00**	**524.00**	
	GMR							
29	Bajoli Holi	1	3	R	(3X60)	180.00	769.39	Mar 2022 (180)
	Total GMR	**1**	**3**			**180.00**	**769.39**	
	Total PVT	**9**	**23**			**2109.00**	**8539.11**	
	Total Himachal Pradesh	**29**	**102**			**10263.00**	**38501.59**	
	JAMMU & KASHMIR							
	JKSPDC							
30	Baglihar-I	1	3	R(P)	(3X150)	450.00	2643.00	2008 (450 MW)
31	Baglihar-II	1	3	R(P)	(3X150)	450.00	1302.30	2015 (450 MW)
32	Lower Jhelum	1	3	R(P)	(3X35)	105.00	533.00	1978 (35 MW) 1979 (70 MW)
33	Upper Sindh-II	1	3	R(P)	(3X35)	105.00	355.00	2000 (35 MW) 2001 (35 MW) 2002 (35 MW)
	Total JKSPDC	**4**	**12**			**1110.00**	**4833.30**	
	NHPC							
34	Dulhasti	1	3	R(P)	(3X130)	390.00	1907.00	2007 (390 MW)
35	Salal-I&II	1	6	R	(3X115)	690.00	3082.00	1987 (345 MW) 1993 (115 MW) 1994 (115 MW) 1995 (115 MW)
36	Uri-I	1	4	R	(4X120)	480.00	2587.38	1996 (120 MW) 1997 (360 MW)
37	Uri-II	1	4	R	(4X60)	240.00	1124.00	2013 (180 MW)
38	Sewa-II	1	3	R(P)	(3X40)	120.00	533.52	2010 (120 MW)
39	Keshanganga	1	3	R(P)	(3X110)	330.00	1705.62	2018 (330 MW)
	Sub-Total NHPC	**6**	**23**			**2250.00**	**10939.52**	
	Total Jammu & Kashmir	**10**	**35**			**3360.00**	**15772.82**	
	LADAKH							
	NHPC							
40	Chutak	1	4	R	(4X11)	44.00	213.00	2012 (33 MW) 2013 (11 MW)

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
41	Nimoo Bazgo	1	3	R(P)	(3X15)	45.00	239.00	2013 (45 MW)
	Sub-Total NHPC	**2**	**7**			**89.00**	**452.00**	
	Total Ladakh	**2**	**7**			**89.00**	**452.00**	
	PUNJAB							
	PSPCL							
42	Anandpur Sahib-I	1	2	R	(2X33.5)	67.00	909.00	1985 (67 MW)
43	Anandpur Sahib-I	1	2	R	(2X33.5)	67.00		1985 (67 MW)
44	Mukerian-I	1	3	R	(3X15)	45.00	1206.00	1983 (45 MW)
45	Mukerian-II	1	3	R	(3X15)	45.00		1988 (30 MW) 1989 (15 MW)
46	Mukerian-III	1	3	R	(3X19.5)	58.50		1989 (58.50 MW)
47	Mukerian-IV	1	3	R	(3X19.5)	58.50		1989 (58.50 MW)
48	Ranjit Sagar	1	4	S	(4X150)	600.00	1507.00	2000 (600 MW)
	Total PSPCL	**7**	**20**			**941.00**	**3622.00**	
	BBMB							
49	Ganguwal	1	3	R	(2X24.2)+(1X29.25)	77.65	1358	1955 (48.4 MW) 1962 (29.25 MW)
50	Kotla	1	3	R	(2X24.2)+(1X29.25)	77.65		1956 (48.4 MW) 1961 (29.25 MW)
	Sub-Total BBMB (Punjab)	**2**	**6**			**155.30**	**1358.00**	
	Total Punjab	**9**	**26**			**1096.30**	**4980.00**	
	Rajasthan							
	RRVUNL							
51	Jawahar Sagar	1	3	R(P)	(3X33)	99.00	298.00	1973 (99 MW)
52	Mahi Bajaj-I	1	2	MP	(2X25)	50.00	289.00	1986 (50 MW)
53	Mahi Bajaj-II	1	2	R(P)	(2X45)	90.00		1989 (90 MW)
54	R P Sagar	1	4	MP	(4X43)	172.00	459.00	1968 (129 MW) 1969 (43 MW)
	Total RRVUNL	**4**	**11**			**411.00**	**1046.00**	
	Total Rajasthan	**4**	**11**			**411.00**	**1046.00**	
	UTTARAKHAND							
	NHPC							
55	Dhauli Ganga	1	4	R(P)	(4X70)	280.00	1134.69	2005 (280 MW)
56	Tanakpur	1	3	R	(3X31.4)	94.20	452.19	1992 (94.2 MW)
	Sub-Total NHPC	**2**	**7**			**374.20**	**1586.88**	
	THDC							
57	Tehri St-I	1	4	MP	(4X250)	1000.00	2797.00	2006 (500 MW) 2007 (500 MW)
58	Koteshwar	1	4	R(P)	(4X100)	400.00	1155.00	2011 (200 MW) 2012 (200 MW)
	Total THDC	**2**	**8**			**1400.00**	**3952.00**	
	Sub Total Central	**4**	**15**			**1774.20**	**5538.88**	
	State Sector							
	UJVNL							
59	Chibro (Yamuna)	1	4	R(P)	(4X60)	240.00	750.00	1975 (180 MW) 1976 (60 MW)
60	Chilla	1	4	R	(4X36)	144.00	725.00	1980 (108 MW) 1981 (36 MW)
61	Dhakrani	1	3	R	(3X11.25)	33.75	169.00	1965 (11.25 MW) 1966 (11.25 MW) 1970 (11.25 MW)

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
62	Dhalipur	1	3	R	(3X17)	51.00	192.00	1965 (17 MW) 1966 (17 MW) 1970 (17 MW)
63	Khatima	1	3	R	(3X13.8)	41.40	208.00	1955 (13.8 MW) 1956 (27.6 MW)
64	Khodri	1	4	R(P)	(4X30)	120.00	345.00	1984 (120 MW)
65	Kulhal	1	3	R	(3X10)	30.00	164.00	1975 (30 MW)
66	Maneri Bhali-I	1	3	R(P)	(3X30)	90.00	395.00	1984 (90 MW)
67	Maneri Bhali-II	1	4	R(P)	(4X76)	304.00	1566.10	2008 (304 MW)
68	Ramganga	1	3	MP	(3X66)	198.00	334.00	1975 (66 MW) 1976 (66 MW) 1977 (66 MW)
69	Vyasi	1	2	R(P)	(2x60)	120.00	375.24	22.04.2022 (U-1) 25.05.2022 (U-2)
	Total UJVNL	**11**	**36**			**1372.15**	**5223.34**	
	Private Sector							
	AHPC							
70	Shrinagar	1	4	R(P)	(4X82.50)	330.00	1396.84	2015 (330 MW)
.	**JPPVL**							
71	Vishnu Prayag	1	4	R	(4X100)	400.00	1774.42	2006 (400 MW)
	L&T							
72	Singoli Bhatwari	1	3	R	(3X33)	99.00	473.00	2020 (33 MW)
	Sub Total Private	**3**	**11**			**829.00**	**3644.26**	
	Total Uttarakhand	**18**	**62**			**3975.35**	**14406.48**	
	UPJVNL							
	UTTAR PRADESH							
73	Khara	1	3	R(P)	(3X24)	72.00	385.00	1992 (72 MW)
74	Matatila	1	3	MP	(3X10.2)	30.60	123.00	1965 (30.6 MW)
75	Obra	1	3	MP	(3X33)	99.00	279.00	1970 (66 MW) 1971 (33 MW)
76	Rihand	1	6	MP	(6X50)	300.00	920.00	1962 (250 MW) 1966 (50 MW)
	Total UPJVNL	**4**	**15**			**501.60**	**1707.00**	
	Total Northern Region	**76**	**258**			**19696.25**	**76865.89**	
	Western Region							
	MADHYA PRADESH							
	NHDC							
77	Indira Sagar	1	8	MP	(8X125)	1000.00	1980.00	2004 (875 MW) 2005 (125 MW)
78	Omkareshwar	1	8	MP	(8X65)	520.00	1166.57	2007 (520 MW)
	Sub-Total NHDC	**2**	**16**			**1520.00**	**3146.57**	
	Total Central	**2**	**16**			**1520.00**	**3146.57**	
	MPPGCL							
79	Bansagar Tons-I	1	3	R(P)	(3X105)	315.00	900.00	1991 (105 MW) 1992 (210 MW)
80	Bansagar Tons-III	1	2	R	(2X15)	30.00	113.00	2002 (30 MW)
81	Bansagar Tons-II	1	3	MP	(3X20)	60.00	143.00	2000 (20 MW) 2001 (20 MW) 2002 (20 MW)
82	Bargi	1	2	MP	(2X45)	90.00	508.08	1988 (90 MW)

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
83	Gandhi Sagar	1	5	MP	(5X23)	115.00	420.48	1960 (69 MW) 1963 (23 MW) 1966 (23 MW)
84	Madhikhera	1	3	MP	(3X20)	60.00	74.12	2006 (40 MW) 2007 (20 MW)
85	Rajghat	1	3	MP	(3X15)	45.00	87.60	1999 (45 MW)
	Sub-Total MPPGCL	**7**	**21**			**715.00**	**2246.28**	
	Total Madhya Pradesh	**9**	**37**			**2235.00**	**5392.85**	
	MAHARASHTRA							
	MAHAGENCO							
86	Bhira Tail Race	1	2	R(P)	(2X40)	80.00	75.00	1987 (40 MW) 1988 (40 MW)
87	Koyna DPH	1	2	S	(2X18)	36.00	146.00	1980 (18 MW) 1981 (18 MW)
88	Koyna-I&II	1	8	S	(4X70)+(4X80)	600.00	3030.00	1962 (140 MW) 1963 (140 MW) 1966 (240 MW) 1967 (80 MW)
89	Koyna-III	1	4	R(P)	(4X80)	320.00		1975 (160 MW) 1977 (80 MW) 1978 (80 MW)
90	Koyna-IV	1	4	S	(4X250)	1000.00		1999 (500 MW) 2000 (500 MW)
91	Tillari	1	1	R(P)	(1X60)	60.00	133.00	1986 (60 MW)
92	Vaitarna	1	1	S	(1X60)	60.00	144.00	1976 (60 MW)
	Sub-Total MAHAGENCO	**7**	**22**			**2156.00**	**3528.00**	
	MPPGCL							
93	Pench	1	2	MP	(2X80)	160.00	315.36	1986 (80 MW) 1987 (80 MW)
	Sub-Total MPPGCL	**1**	**2**			**160.00**	**315.36**	
	Total State SECTOR	**8**	**24**			**2316.00**	**3843.36**	
	Private Sector							
	Dodson-Lindblom Hydro Power Pvt. Ltd.(DLHP)							
94	Bhandardhara St-II	1	1	R(P)	(1X34)	34.00	50.00	1996 (34 MW)
	Sub-Total DLHP	**1**	**1**			**34.00**	**50.00**	
	Tata Power Company							
95	Bhira	1	6	S	(6X25)	150.00	775.00	1927 (125 MW) 1949 (25 MW)
96	Bhivpuri	1	5	S	(3X24) + (2X1.5)	75.00	220.00	1997 (3 MW) 1998 (48 MW) 1999 (24 MW)
97	Khopoli	1	3	S	(3X24)	72.00	225.00	2001 (24 MW) 2002 (24 MW) 2003 (24 MW)
	Sub-Total TPCL	**3**	**14**			**297.00**	**1220.00**	
	Total Pvt. (Maharashtra)	**4**	**15**			**331.00**	**1270.00**	
	Total Maharashtra	**12**	**39**			**2647.00**	**5113.36**	
	CHHATISGARG							

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
	CSPGCL							
	State Sector							
98	Hasdeobango	1	3	MP	(3X40)	120.00	245.00	1994 (80 MW) 1995 (40 MW)
	Total CSPGCL	**1**	**3**			**120.00**	**245.00**	
	Total Chhatisgarh	**1**	**3**			**120.00**	**245.00**	
	GUJARAT							
	State Sector							
	GSECL							
99	Ukai	1	4	MP	(4X75)	300.00	1080.00	1974 (150 MW) 1975 (75 MW) 1976 (75 MW)
	Sub-Total GSECL	**1**	**4**			**300.00**	**1080.00**	
	SSNNL							
100	Sardar Sarovar CHPH	1	5	R(P)	(5X50)	250.00	213.00	2004 (250 MW)
	Sub-Total SSNNL	**1**	**5**			**250.00**	**213.00**	
	Total Gujarat	**2**	**9**			**550.00**	**1293.00**	
	Total Western Region	**24**	**88**			**5552.00**	**12044.21**	
	Southern Region							
	ANDHRA PRADESH							
	APGENCO							
	State Sector							
101	Lower Sileru	1	4	S	(4X115)	460.00	1070.00	1976 (230 MW) 1977 (115 MW) 1978 (115 MW)
102	N J Sagar RBC & EXT.	1	3	MP	(3X30)	90.00	156.00	1990 (30 MW) 1992 (60 MW)
103	Srisailam	1	7	MP	(7X110)	770.00	2900.00	1982 (220 MW) 1983 (110 MW) 1984 (110 MW) 1986 (220 MW) 1987 (110 MW)
104	Upper Sileru-I&II	1	4	S	(4X60)	240.00	529.00	1994 (60 MW) 1995 (60 MW)
105	N J Sagar TPD	1	2	R(P)	(2X25)	50.00	177.00	2017 (50 MW)
	Total APGENCO	**5**	**20**			**1610.00**	**4832.00**	
	Total Andhra Pradesh	**5**	**20**			**1610.00**	**4832.00**	
	TELANGANA							
	TSGENCO							
	State Sector							
106	Priyadarshni Jurala	1	6	R(P)	(6X39)	234.00	404.00	2008 (78 MW) 2009 (39 MW) 2010 (78 MW) 2011 (39 MW)
107	Pochampad	1	4	MP	(4X9)	36.00	147.00	1987-1988, 2010
108	N J Sagar	1	1	MP	(1X110)	110.00		1978 (110 MW)
109	N J Sagar LBC	1	2	R	(2X30)	60.00	104.00	1983 (60 MW)

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
110	Lower Jurala	1	6	R(P)	(6X40)	240.00	534.43	2015 (80 MW) 2016 (160 MW)
111	Pulinchinthala	1	4	R(P)	(4X30)	120.00	219.42	2016 (60 MW) 2017 (60 MW)
	Total TSGENCO	**6**	**23**			**800.00**	**1408.85**	
	Total Telangana	**6**	**23**			**800.00**	**1408.85**	
	KARNATAKA							
	KPCL							
	State Sector							
112	Almatti	1	6	MP	(5X55)+(1X15)	290.00	483.00	2004 (70 MW) 2005 (220 MW)
113	Gerusoppa(Sharavathy Tail Race)	1	4	R(P)	(4X60)	240.00	622.00	2001 (180 MW) 2002 (60 MW)
114	Ghat Prabha	1	2	MP	(2X16)	32.00	131.00	1992 (32 MW)
115	Mahatma Gandhi (Jog)	1	8	S	(4X21.6)+(4X13.2)	139.20	118.00	1949 (26.4 MW) 1950 (13.2 MW) 1952 (65 MW) 2001 (13.2 MW) 2002 (21.6 MW)
116	Kadra	1	3	S	(3X50)	150.00	570.00	1997 (50 MW) 1999 (100 MW)
117	Kalinadi (Nagjhari)	1	6	S	(6X150)	900.00	3385.00	1979 (135 MW) 1980 (135 MW) 1981 (135 MW) 1982 (135 MW) 1983 (135 MW)
118	Kalinadi (Supa)	1	2	S	(2X50)	100.00	542.00	1985 (100 MW)
119	Kodasali	1	3	S	(3X40)	120.00	512.00	1998 (40 MW) 1999 (80 MW)
120	Lingnamakki	1	2	S	(2X27.5)	55.00	254.00	1979 (27.5 MW) 1980 (27.5 MW)
121	Munirabad	1	3	MP	(2X9)+(1X10)	28.00	66.00	1962 (18 MW) 1965 (10 MW)
122	Sharavathy	1	10	S	(10X103.5)	1035.00	4932.00	1964 (103.5 MW) 1965 (103.5 MW) 1967 (207 MW) 1968 (311 MW) 1971 (103.5 MW) 1976 (103.5 MW) 1977 (103.5 MW)
123	Sivasamundrum	1	10	R(P)	(4X6)+(6X3)	42.00	183.00	1922 (3 MW) 1923 (3 MW) 1924 (9 MW) 1925 (3 MW) 1928 (18 MW)
124	Varahi	1	4	R(P)	(4X115)	460.00	1060.00	1989 (115 MW) 1990 (115 MW) 2009 (230 MW)
125	Bhadra	1	3	MP	(2x12)+(1x2)	26.00	123.00	1965 (26 MW)
	Total KPCL	**14**	**66**			**3617.20**	**12981.00**	
	APGENCO							

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
126	T B Dam	1	4	MP	(4X9)	36.00	236.00	1957 (18 MW) 1964 (18 MW)
127	Hampi	1	4	MP	(4X9)	36.00		1958 (18 MW) 1964 (18 MW)
	Sub-Total APGENCO	**2**	**8**			**72.00**	**236.00**	
	Total Karnataka	**16**	**74**			**3689.20**	**13217.00**	
	KERALA							
	KSEB							
	State Sector							
128	Idamalayar	1	2	MP	(2X37.5)	75.00	380.00	1987 (75 MW)
129	Idukki	1	6	MP	(6X130)	780.00	2398.00	1976 (390 MW) 1985 (130 MW) 1986 (260 MW)
130	Kakkad	1	2	R(P)	(2X25)	50.00	262.00	1999 (50 MW)
131	Kuttiyadi	1	3	MP	(3X25)	75.00	323.00	1972 (75 MW)
132	Kuttiyadi Extn.	1	1	MP	(1X50)	50.00		2001 (50 MW)
133	Kuttiyadi Additional Extn.	1	2	MP	(2X50)	100.00		2010 (100 MW)
134	Lower Periyar	1	3	R(P)	(3X60)	180.00	493.00	1997 (180 MW)
135	Nariamangalam	1	3	S	(3X17.55)	52.65	237.00	1961 (30 MW) 1963 (15 MW)
136	Pallivasal	1	6	S	(3X5)+(3X7.5)	37.50	284.00	1948 (7.5 MW) 1949 (7.5 MW) 1951 (7.5 MW) 2001 (15 MW)
137	Panniar	1	2	S	(2X15)	30.00	158.00	1963 (15 MW) 2001 (15 MW)
138	Poringalkuttu	1	4	S	(4X8)	32.00	170.00	1957 (8 MW) 1958 (8 MW) 1959 (8 MW) 1960 (8 MW)
139	Sabirigiri	1	6	S	(6X50)	300.00	1338.00	1960 (150 MW) 1967 (150 MW)
140	Sengulam	1	4	S	(4X12)	48.00	182.00	1954 (24 MW) 2001 (24 MW)
141	Sholayar	1	3	S	(3X18)	54.00	233.00	1956 (18 MW) 1968 (36 MW)
	Total KSEB	**14**	**47**			**1864.15**	**6458.00**	
	Total Kerala	**14**	**47**			**1864.15**	**6458.00**	
	TAMILNADU							
	TANGEDCO							
142	Aliyar	1	1	MP	(1X60)	60.00	175.00	1970 (60 MW)
143	Bhavani Kattalai Barrage-I	1	2	R(P)	(2X15)	30.00	90.00	2006 (30 MW)
144	Bhavani Kattalai Barrage-II	1	2	R(P)	(2X15)	30.00	100.00	2013 (30 MW)
145	Bhavani Kattalai Barrage-III	1	2	R(P)	(2X15)	30.00	80.00	2012 (15 MW) 2013 (15 MW)
146	Kodayar-I	1	1	MP	(1X60)	60.00	165.00	1970 (60 MW)
147	Kodayar-I	1	1	MP	(1X40)	40.00		1971 (40 MW)

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
148	Kundah-I	1	3	S	(3X20)	60.00	1387.00	1960 (40 MW) 1964 (20 MW)
149	Kundah-II	1	5	S	(5X35)	175.00		1960 (35 MW) 1961 (105 MW) 1964 (35 MW)
150	Kundah-III	1	3	S	(3X60)	180.00		1965 (120 MW) 1978 (60 MW)
151	Kundah-IV	1	2	S	(2X50)	100.00		1966 (50 MW) 1978 (50 MW)
152	Kundah-V	1	2	S	(2X20)	40.00		1964 (20 MW) 1988 (20 MW)
153	Lower Mettur-I	1	2	R(P)	(2X15)	30.00	252.00	1988 (30 MW)
154	Lower Mettur-II	1	2	R(P)	(2X15)	30.00		1988 (30 MW)
155	Lower Mettur-III	1	2	R(P)	(2X15)	30.00		1987 (15 MW) 1988 (15 MW)
156	Lower Mettur-IV	1	2	R(P)	(2X15)	30.00		1989 (15 MW) 1988 (15 MW)
157	Mettur Dam	1	4	MP	(4X12.5)	50.00	541.00	1937 (25 MW) 1938 (12.5 MW) 1946 (12.5 MW)
158	Mettur Tunnel	1	4	MP	(4X50)	200.00		1965 (50 MW) 1966 (150 MW)
159	Moyar	1	3	S	(3X12)	36.00	115.00	1952 (24 MW) 1953 (12 MW)
160	Papanasam	1	4	MP	(4X8)	32.00	105.00	1944 (16 MW) 1945 (8 MW) 1951 (8 MW)
161	Parson's Valley	1	1	S	(1X30)	30.00	53.00	2000 (30 MW)
162	Periyar	1	4	MP	(3X42)+(1X35)	161.00	409.00	1958 (35 MW) 1959 (70 MW) 1965 (35 MW)
163	Pykara	1	6	S	(3X7)+(2X13.6)+(1X11)	59.20	274.00	1932 (14 MW) 1933 (7 MW) 1939 (11 MW) 1954 (27.2 MW)
164	Pykara Ultimate	1	3	S	(3X50)	150.00	30.00	2005 (150 MW)
165	Sarakarpathy	1	1	R(P)	(1X30)	30.00	162.00	1966 (30 MW)
166	Sholayar-I	1	2	S	(2X35)	70.00	254.00	1971 (70 MW)
167	Suruliyar	1	1	S	(1X35)	35.00	79.00	1978 (35 MW)
	Total TANGEDCO	**26**	**65**			**1778.20**	**4271.00**	
	Total Tamilnadu	**26**	**65**			**1778.20**	**4271.00**	
	Total Southern Region	**67**	**229**			**9741.55**	**30186.85**	
	Eastern Region							
	WEST BENGAL							
	DVC							
168	Maithon	1	3	MP	(1X23.2)+(2X20)	63.20	137.00	1957 (20 MW) 1958 (43.2 MW)
	Sub-Total DVC	**1**	**3**			**63.20**	**137.00**	
	NHPC							
169	Teesta Low Dam-III	1	4	R(P)	(4X33)	132.00	594.00	2013 (132 MW)
170	Teesta Low Dam-IV	1	4	R(P)	(4X40)	160.00	719.67	2016 (120 MW)
	Sub Total NHPC	**2**	**8**			**292.00**	**1313.67**	
	Sub-Total Central	**3**	**11**			**355.20**	**1450.67**	

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
	WBSEDCL							
171	Jaldhaka	1	4	R(P)	(4X9)	36.00	165.00	1967 (18 MW) 1972 (9 MW)
172	Rammam	1	4	R	(4X12.5)	50.00	210.00	1995 (25 MW) 1996 (25 MW)
	Sub-Total WBSEDCL	**2**	**8**			**86.00**	**375.00**	
	Total West Bengal	**5**	**19**			**441.20**	**1825.67**	
	SIKKIM							
	NHPC							
173	Rangit	1	3	R(P)	(3X20)	60.00	338.61	2000 (60 MW)
174	Teesta-V	1	3	R(P)	(3X170)	510.00	2572.70	2008 (510 MW)
	Sub-Total NHPC	**2**	**6**			**570.00**	**2911.31**	
	State Sector							
	Teesta Urja Ltd.							
175	Teesta-III	1	6	R(P)	(6X200)	1200.00	5214.00	2017 (1200 MW)
	Sub-Total TUL	**1**	**6**			**1200.00**	**5214.00**	
	Private							
	GIPL (Gati Infra Pvt. Ltd.)							
176	Chujachen	1	2	R(P)	(2*55)	110.00	537.81	2013 (110 MW)
	Sneha Kinetic Power Projects Pvt. Ltd.(SKPPPL)							
177	Dikchu	1	2	R(P)	(2*48)	96.00	431.00	2017 (96 MW)
	Shiga Energy Pvt. Ltd.(SEPL)							
178	Tashiding	1	2	R(P)	(2*48.50)	97.00	425.05	2017 (97 MW)
	DANS Energy Pvt. Ltd. (DEPL)							
179	Jorethang Loop	1	2	R(P)	(2*48)	96.00	459.02	2015 (96 MW)
	MBPC							
180	Rongnichu	1	2	R	(2X56.5)	113.00	434.00	2021 (113 MW)
	Sub-Total Private	**5**	**10**			**512.00**	**2286.88**	
	Total Sikkim	**8**	**22**			**2282.00**	**10412.19**	
	JAHARKHAND							
181	Panchet	1	2	MP	(2X40)	80.00	237.00	1959 (40 MW)
	Sub-Total DVC	**1**	**2**			**80.00**	**237.00**	
	JUUNL							
182	Subernrekha-I	1	1	MP	(1X65)	65.00	149.00	1977 (65 MW)
183	Subernrekha-II	1	1	R(P)	(1X65)	65.00		1980 (65 MW)
	Total JUUNL	**2**	**2**			**130.00**	**149.00**	
	Total Jharkhand	**3**	**4**			**210.00**	**386.00**	
	ODISHA							
	OHPC							
184	Balimela	1	8	MP	(6X60)+(2X75)	510.00	1183.00	1973 (60 MW) 1974 (120 MW) 1975 (60 MW) 1976 (60 MW)
185	Hirakud (Burla)	1	7	MP	(2X43.65)+(1X37.5) +(2X49.5)+ (2X32)	287.80	684.00	1956 (32 MW) 1957 (81.5 MW) 1958 (49.5 MW)
186	Hirakud (Chiplima)	1	3	R(P)	(3X24)	72.00	490.00	1962 (48 MW) 1964 (24 MW)
187	Rengali	1	5	MP	(5X50)	250.00	525.00	1985 (50 MW) 1986 (50 MW) 1989 (50 MW) 1990 (50 MW)
188	Upper Indravati	1	4	MP	(4X150)	600.00	1962.00	1999 (300 MW) 2000 (150 MW) 2001 (150 MW)
189	Upper Kolab	1	4	MP	(4X80)	320.00	832.00	1988 (160 MW) 1990 (80 MW) 1992 (80 MW)
	Total OHPC	**6**	**31**			**2039.80**	**5676.00**	
	APGENCO							
190	Machkund	1	6	S	(3X17)+(3X21.25)	114.75	670.00	1955 (34 MW) 1956 (17 MW) 1959 (63.75 MW)
	Sub-Total APGENCO	**1**	**6**			**114.75**	**670**	

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
	Total Odisha	**7**	**37**			**2154.55**	**6346**	
	Total Eastern Region	**23**	**82**			**5087.75**	**18969.86**	
	North Eastern Region							
	ARUNACHAL PRADESH							
	NEEPCO							
191	Ranganadi	1	3	R(P)	(3X135)	405.00	1509.66	2002 (405 MW)
192	Pare	1	2	R (P)	(2X55)	110.00	506.42	2018 (110 MW)
193	Kameng	1	4	R (P)	(3X150)	600.00	3353.00	2020 (300 MW)
	Sub-Total NEEPCO Ar.P	**3**	**9**			**1115.00**	**5369.08**	
	Total Arunachal Pradesh	**3**	**9**			**1115.00**	**5369.08**	
	ASSAM							
	NEEPCO							
194	Kopoli	1	4	S	(4X50)	200.00	1186.14	1988 (100 MW) 1996 (50 MW) 1997 (50 MW)
195	Khondong	1	2	S	(2X25)	50.00	363.95	1984 (50 MW)
	Sub-Total NEEPCO Assam	**2**	**6**			**250.00**	**1550.09**	
	APGCL							
196	Karbi Langpi	1	2	R(P)	(2X50)	100.00	390.00	2007 (100 MW)
	Sub-Total APGCL	**1**	**2**			**100.00**	**390.00**	
	Total Assam	**3**	**8**			**350.00**	**1940.09**	
	MIZORAM							
	NEEPCO							
197	Tuirial	1	2	S	(2X30)	60.00	250.63	2017 (60 MW)
	Total NEEPCO Mizoram	**1**	**2**			**60.00**	**250.63**	
	Total Mizoram	**1**	**2**			**60.00**	**250.63**	
	NAGALAND							
	NEEPCO							
198	Doyang	1	3	S	(3X25)	75.00	227.24	2000 (75 MW)
	Total-NEEPCO Nagaland	**1**	**3**			**75.00**	**227.24**	
	Total Nagaland	**1**	**3**			**75.000**	**227.240**	
	MANIPUR							
	NHPC							
199	Loktak	1	3	MP	(3X35)	105.00	448.00	1983 (105 MW)
	Sub-Total NHPC	**1**	**3**			**105.00**	**448.00**	
	Total Manipur	**1**	**3**			**105.000**	**448.000**	
	MEGHALAYA							
	MePGCL							
200	Kyrdemkulai	1	2	R(P)	(2X30)	60.00	118.00	1979 (60 MW)
201	Umiam St. I	1	4	S	(4X9)	36.00	128.00	1965 (36 MW)
202	New Umetru	1	2	R(P)	(2X20)	40.00	235.00	2017 (20 MW)
203	Umiam St. IV	1	2	R(P)	(2X30)	60.00	324.00	1992 (60 MW)
204	Myntdu St-I	1	3	R(P)	(3X42)	126.00	372.69	2011 (84 MW) 2013 (42 MW)
	Total MePGCL	**5**	**13**			**322.00**	**1177.69**	
	Total Mehghalaya	**5**	**13**			**322.00**	**1177.69**	
	Total NE Region	**14**	**38**			**2027.00**	**9412.73**	
	Total	**204**	**695**			**42104.55**	**147479.54**	

Sl No.	Utilities/Stations	No. of Stations	No. of Units	Type of Project	No. of Units X Capacity (MW)	Capacity (MW)	Design Energy (MU)	Year of Commissioning
	Pumped Storage Schemes							
	Western Region							
	GUJARAT							
	State Sector							
	GSECL							
1	Kadana	1	4	PSS	(4X60)	240.00	518.00	1990 (120 MW) 1998 (120 MW)
	SSNNL							
2	Sardar Sarovar RBPH	1	6	PSS	(6X200)	1200.00	3635.00	2005 (800 MW) 2006 (400 MW)
	Total Gujarat	**2**	**10**			**1440.00**	**4153.00**	
	MAHARASHTRA							
	State Sector							
	MAHAGENCO							
3	Ghatgarh	1	2	PSS	(2X125)	250.00	410.00	2008 (250 MW)
	Private Sector							
	Tata Power Company							
4	Bhira	1	1	PSS	(1X150)	150.00		1927 (125 MW) 1949 (25 MW)
	Sub-Total Maharashtra	**2**	**3**			**400.00**	**410.00**	
	Total Western Region	**4**	**13**			**1840.00**	**4563.00**	
	Southern Region							
	TELANGANA							
	State Sector							
	TSGENCO							
5	N J Sagar	1	7	PSS	(7X100.8)	705.60	2237.00	1980 (100.8 MW) 1981 (100.8 MW) 1982 (100.8 MW) 1983 (100.8 MW) 1984 (100.8 MW) 1985 (202 MW)
6	Srisailam LBPG	1	6	PSS	(6X150)	900.00	1400.00	2001 (300 MW) 2002 (450 MW) 2003 (150 MW)
	Sub-Total TELANGANA	**2**	**13**			**1605.60**	**3637.00**	
	TAMIL NADU							
7	Kadamparai	1	4	PSS	(4X100)	400.00	77.00	1987 (100 MW) 1988 (200 MW) 1989 (100 MW)
	Sub-Total TAMIL NADU	**1**	**4**			**400.00**	**77.00**	
	Total Southern Region	**3**	**17**			**2005.60**	**3714.00**	
	Eastern Region							
	JHARKHAND							
	Central Sector							
8	Panchet	1	1	PSS	(1X40)	40.00		1991 (40 MW0
	WEST BENGAL							
	State Sector							
	WBSEDCL							
9	Purulia	1	4	PSS	(4X225)	900.00	1235.00	2007
	Sub-Total	**1**	**4**			**900.00**	**1235.00**	
	Total- PSS	**8**	**34**			**4745.60**	**9512.00**	
	Total (Conventional+PSS)	**211**	**729**			**46850.15**	**156991.54**	

NOTE: Following 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

Annex-1.5

CAPACITY-WISE GROUPING OF HYDRO-ELECTRIC STATIONS

As on 31.03.2023

STATION CAPACITY	NUMBER OF STATIONS		NUMBER OF UNITS		TOTAL CAPACITY	
RANGE (MW)	**No**	**%**	**No**	**%**	**MW**	**%**
> 25 - 100	106	50.20	279	38.30	6243.8	13.30
>100 - 500	78	37.00	297	40.70	18373.2	39.20
>500 - 1000	23	10.90	125	17.20	17297.60	37.00
>1000	4	1.90	28	3.80	4935.00	10.50
TOTAL	**211**	**100**	**729**	**100**	**46850.15**	**100**

HYDRO GENERATING UNITS ADDED DURING 2022-23

SL. NO.	NAME OF THE STATION	UTILITY	STATE	UNIT NO.	CAPACITY (MW)	DATE OF COMMISSIONING
STATE SECTOR						
1	Vyasi	UJVNL	Uttarakhand	1.00	60.00	2022
				1.00	60.00	
ALL INDIA TOTAL					**120**	

CHAPTER-2

GENERATION PERFORMANCE

CHAPTER-2

GENERATION PERFORMANCE

2.1 Generation from hydro-electric power stations (above 25 MW capacity) in the country during 2022-23 was 162.098 BU against the target of 150.66 BU which was 7.59% more than the target. The generation during 2022-23 was 6.90 % higher than the generation in 2021-22 i.e. 151.62 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: 2022-23

Month	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Target	9805.00	12620.00	15796.00	18193.00	20455.00	18136.00	12786.00	9319.00	8314.00	8112.00	7863.00	9262.00
Gen.	11540.96	12880.91	13946.12	19465.11	23404.11	22016.56	16178.67	9880.41	8590.76	8063.15	8358.46	7773.55
Cum. Tar	9805.00	22425.00	38221.00	56414.00	76869.00	95005.00	107791.00	117110.00	125424.00	133536.00	141399.00	150661.00
Cum. Gen.	11540.96	24421.87	38367.99	57833.10	81237.21	103253.77	119432.44	129312.85	137903.61	145966.76	154325.22	162098.77

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

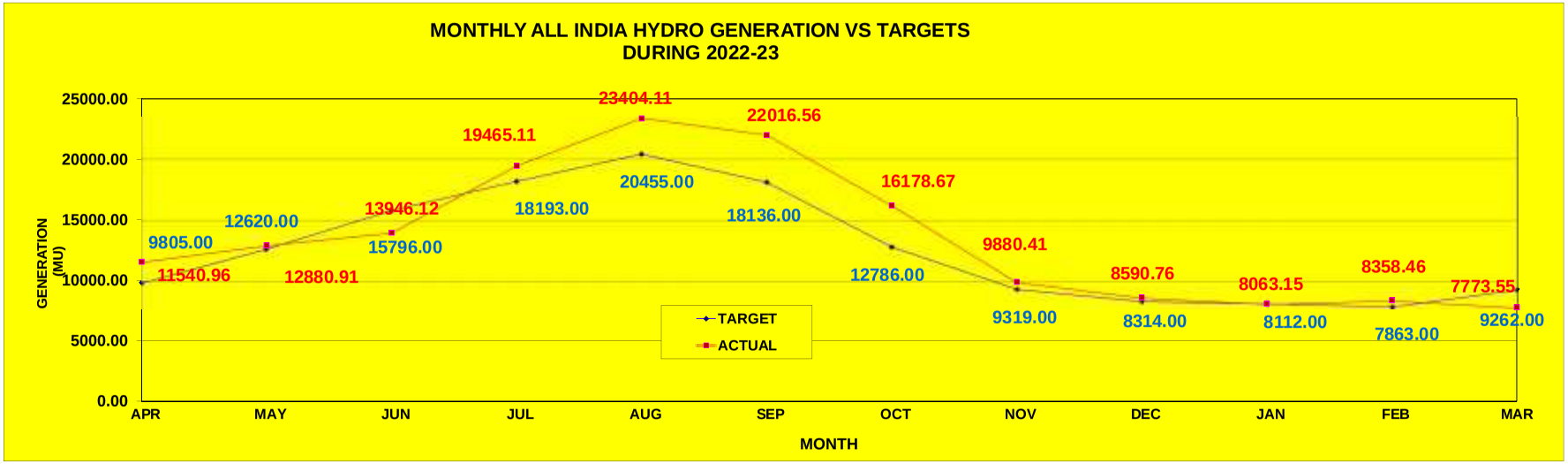
The utility-wise/ sector-wise target of energy generation viz-a-viz actual generation and surplus /shortfall in respect of Hydro-electric stations during 2022-23 & 2021-22 are given below in **Table 2.2.**

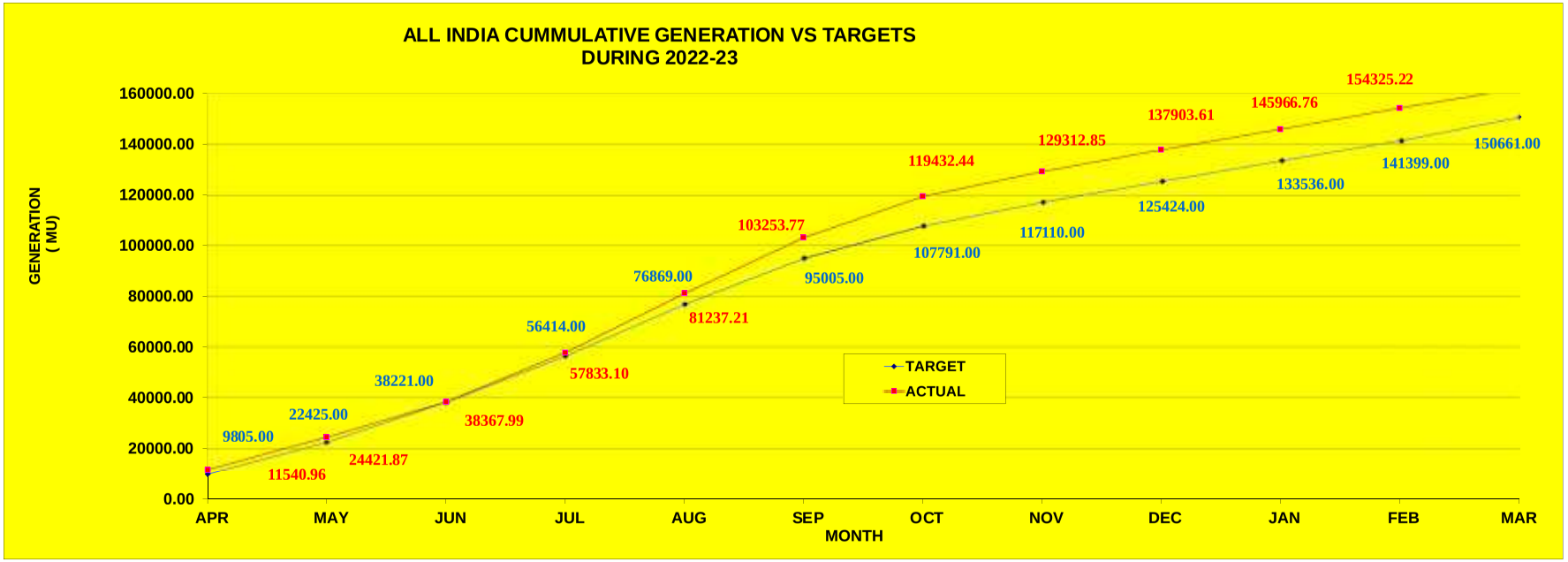
TABLE 2.2

UTILITY-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS (2022-23 VIS-A-VIS 2021-22)

Utilities	Installed Capacity (MW) (As on 31.03.2023)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2022-23	2021-22	2022-23	2021-22	2022-23	2021-22
CENTRAL SECTOR							
BBMB	2938.3	9650	9650	10825	9795	12.17	1.50
NHPC LTD	5451.2	25663	26000	24451	24383	-4.72	-6.22
SJVN LTD	1912.02	8865	9111	9130	9049	2.99	-0.68
NTPC LTD	800	3100	3100	3133	3120	1.06	0.65
THDC LTD	1400.00	4162	4160	4540	4289	9.08	3.09

EXHIBIT- 2.1


MONTHLY ALL INDIA HYDRO GENERATION VS TARGETS
DURING 2022-23
GENERATION (MU)
25000.00
20000.00
15000.00
10000.00
5000.00
0.00
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
MONTH
TARGET
ACTUAL
9805.00
12620.00
15796.00
18193.00
20455.00
18136.00
12786.00
9319.00
8314.00
8112.00
7863.00
9262.00
11540.96
12880.91
13946.12
19465.11
23404.11
22016.56
16178.67
9880.41
8590.76
8063.15
8358.46
7773.55


ALL INDIA CUMMULATIVE GENERATION VS TARGETS
DURING 2022-23
GENERATION (MU)
160000.00
140000.00
120000.00
100000.00
80000.00
60000.00
40000.00
20000.00
0.00
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
MONTH
TARGET
ACTUAL
9805.00
22425.00
38221.00
56414.00
76869.00
95005.00
107791.00
117110.00
125424.00
133536.00
141399.00
150661.00
11540.96
24421.87
38367.99
57833.10
81237.21
103253.77
119432.44
129312.85
137903.61
145966.76
154325.22

Utilities	Installed Capacity (MW) (As on 31.03.2023)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2022-23	2021-22	2022-23	2021-22	2022-23	2021-22
NHDC	1520.00	3265	3900	5443	2645	66.72	-32.17
DVC	143.20	290	215	237	467	-18.41	117.16
NEEPCO LTD	1500.00	6356	4908	5202	4674	-18.15	-4.76
TOTAL CENTRAL	**15664.72**	**61351**	**61044**	**62961**	**58422**	**2.62**	**-4.30**
PRIVATE SECTOR							
MPCL	86.00	336	344	321	315	-4.51	-8.44
EPPL	100.00	348	367	344	346	-1.28	-5.81
ADHPL	192.00	658	676	640	637	-2.71	-5.70
GBHPPL	70.00	293	270	274	251	-6.41	-6.90
JSW ENERGY	1345.00	5431	5431	5637	5564	3.79	2.45
IAEPL	36.00	158	158	140	147	-11.37	-7.25
AHPC LTD	330.00	1310	1310	1514	1422	15.58	8.54
JPVL	400.00	1590	1590	1911	1801	20.18	13.29
DLHP	34.00	36	36	19	34	-46.44	-5.72
GIPL	110.00	537	500	504	514	-6.16	2.84
TPCL	447.00	1470	1470	1569	1590	6.72	8.16
DEPL	96.00	412	408	433	425	5.21	4.09
SEPL	97.00	421	421	446	453	5.92	7.62
SNEHA KINETIC	96.00	460	460	536	481	16.50	4.66
NTPGPL	0.00	50	0	0	0	-	-
HSPPL	100.00	392	39	318	57	-18.80	46.62
L&T	99.00	402	293	466	80	15.91	-72.55
GMR	180	500	273	422	0	-15.70	-100.00
MBPC	113.00	442	256	435	295	-1.62	15.40
TOTAL PRIVATE	**3931.00**	**15246**	**14302**	**15928**	**14413**	**4.48**	**0.78**
STATE SECTOR							
JKSPDCL	1110	4866	4887	5057	5116	3.92	4.69
HPPCL	406	771.50	821	904	650	17.20	-20.88
HPSEBL	372	1628	1603	1779	1769	9.30	10.33
BVPC	0	0	0	0	0	-	-
RRVUNL	411	480	370	967	482	101.55	30.23
PSPCL	1051	3780	3969	3702	3008	-2.06	-24.22
UPJVNL	501.6	1519	1519	974	1403	-35.88	-7.66
UJVNL	1372.15	5035	4612	5177	4987	2.82	8.13

Utilities	Installed Capacity (MW) (As on 31.03.2023)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2022-23	2021-22	2022-23	2021-22	2022-23	2021-22
SSNNL	1450	3099	2832	4792	1748	54.64	-38.28
GSECL	540	965	889	1341	874	38.95	-1.74
MAHAGENCO	2406	3963	4109	3941	4079	-0.55	-0.73
MPPGCL	875	2389	2526	2231	2346	-6.62	-7.13
CSPGCL	120	274	280	237	404	-13.37	44.33
APGENCO	1796.75	3600	3636	4485	4037	24.57	11.04
TSGENCO	2405.6	3852	4018	6010	5627	56.02	40.04
KPCL	3617.2	12337	12409	12964	13731	5.08	10.66
KSEBL	1864.15	7414	6505	7989	9317	7.76	43.24
TANGEDCO	2178.2	3913	4483	5966	5212	52.46	16.26
JUUNL	130	110	110	169	302	53.63	174.99
OHPC	2039.80	5363	5959	4919	4512	-8.28	-24.28
TUL	1200	5652	5652	6153	6316	8.86	11.74
WBSEDCL	986	1550	1578	1990	1630	28.36	3.30
APGCL	100	380	380	482	401	26.74	5.56
MePGCL	322	1106	1051	980	842	-11.37	-19.90
TOTAL STATE	**27254.45**	**74046.5**	**74198**	**83209**	**78792**	**12.37**	**6.19**
TOTAL ALL INDIA	**46850.17**	**150643.48**	**149544**	**162099**	**151627**	**7.60**	**1.39**

During the year 2022-23, overall hydro generation was more than the target in respect of BBMB, THDC & DVC in Central Sector and JSW Energy, AHPCL, JPVL, GIPL, TPCL, SEPL, DEPL, HSPPL, MBPC 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, HPSEBL, RRVUNL, UJVNL, CSPGCL, APGENCO, TSGENCO, KPCL, KBSEBL, TANGEDCO, JUUNL, TUL, APGCL, WBSEDCL.

2.4 Region-wise Performance of H.E. Stations

Region-wise generation performance of hydroelectric stations during 2022-23 is indicated in **Table 2.3.**

TABLE 2.3

GENERATION PERFORMANCE – REGION-WISE
(2022-23)

S. No.	Region	Installed Capacity as on 31.03.2023 (MW)	Generation During 2022-23		
			Target (MU)	Actual (MU)	Shortfall (-)/ Surplus (+) Over Target (%)
1	Northern	19696.25	76243.00	77624.07	1.81
2	Western	7392	15461.00	19573.87	26.60
3	Southern	11747.15	30511.00	36869.76	20.84
4	Eastern	5988	20104.00	20888.80	3.90
5	North-Eastern	2027.0	8342.00	7142.27	-14.38
	Total (All India)	**46850.15**	**150661.00**	**162098.77**	**7.59**

- Hydel generation during 2022-23 has exceeded the target in Northern, Western, Eastern Region, Southern Region whereas it was lower than the target in North-Eastern Region of the country primarily on account of lower inflows/rainfall in project catchment area**.**
- Hydel generation during 2022-23 was 162098.77 MU against the target of 150661.00 MU viz higher in generation by 11437.77 MU (7.59%). However, actual hydel generation during 2022-23 is more than 2021-22 year generation of 151627.33 MU by 6.90%.

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

2.5 Sector-wise generation performance during the year 2022-23 viz-a-viz targets is given in **Table 2.4**.

Generation from H.E. Stations under Central Sector, State Sector & Private Sector has been more than the target.

TABLE 2.4

SECTOR-WISE GENERATION PERFORMANCE
PERIOD: 2022-23

Sl. No.	Sector	Installed Capacity as on 31.03.2023 (MW)	Generation		
			Target (MU)	Actual (MU)	Shortfall (-) Surplus (+) Over Target (%)
1	Central	15664.72	61368	62961.33	2.60
2	State	27254.45	74047	83209.08	12.37
3	Private	3931	15246	15928.35	4.48
	Total	**46850.17**	**150661**	**162098.76**	**7.59**

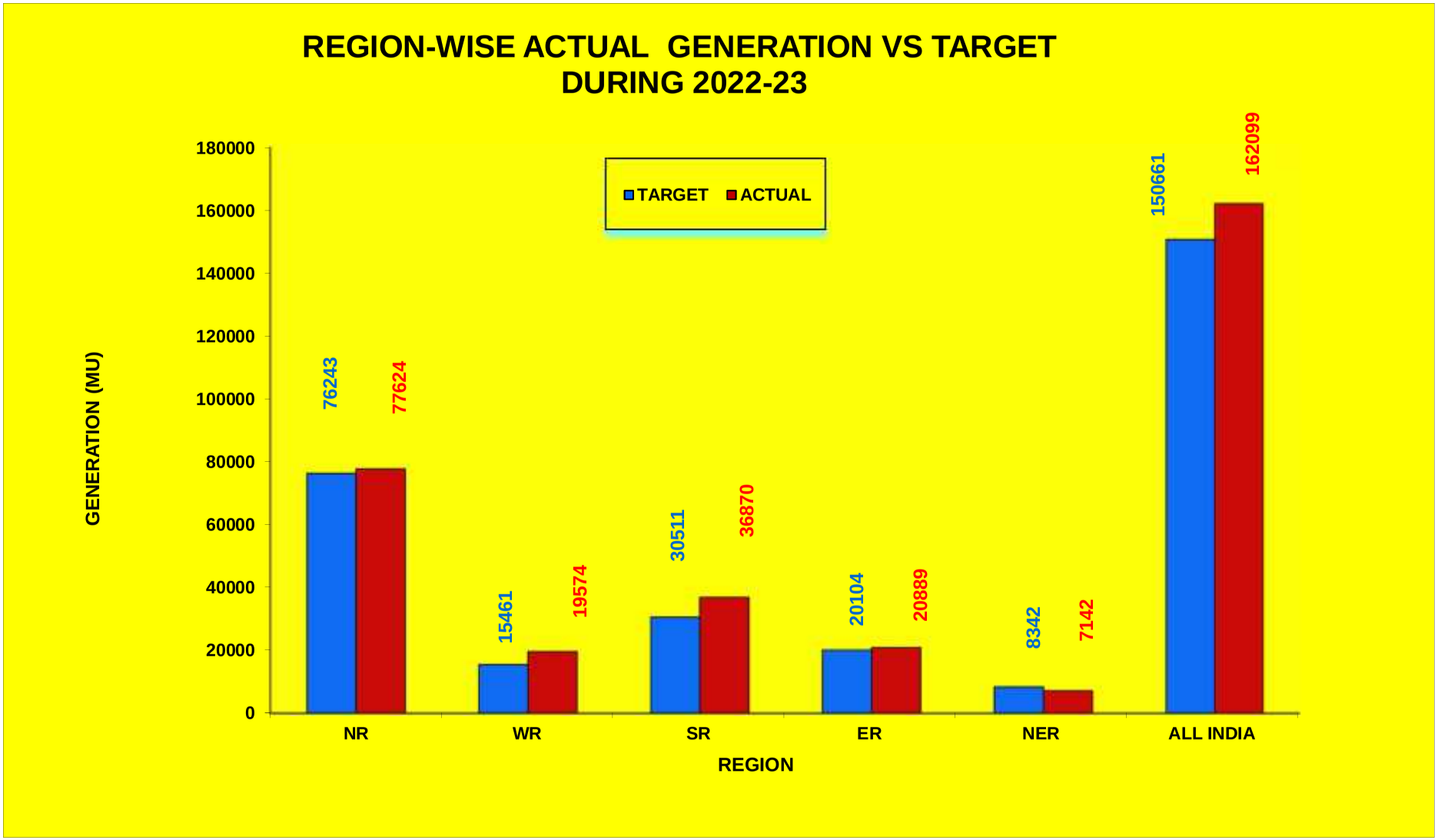
2.6 Details of actual generation during 2022-23 for all the hydro stations (above 25 MW capacity) in the country are given in **Annex 2.1**. It is observed that 101 Nos. of stations have exceeded the target level of generation while the generation has been less than targets in case of 110 stations. List of stations where generation exceeded the target during 2022-23 is given in **Table 2.5.**

TABLE 2.5

H.E. STATIONS ACHIEVING HIGHER GENERATION VIS-A-VIS TARGET
PERIOD: 2022-23

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	34	16.11	MAHI BAJAJ I & II, R.P. SAGAR, UKAI, SARDAR SAROVAR RBPH, INDIRA SAGAR, OMKARESHWAR, BANSAGAR TONS-III, MADHIKHEDA, KOYNA DPH, KOYNA ST.I&II, KOYNA ST.III, KOYNA IV, VAITARNA, PENCH, N.J.SAGAR RBC, SRISAILAM RB, BHADRA, JOG, ALIYAR, BHAWANI K BARRAGE-III, II, I, LOWER METTUR I-IV,

				METTUR DAM, PERIYAR, PYKARA ULTIMATE, N.J.SAGAR PSS, N.J.SAGAR LBC, POCHAMPAD, PULICHINTHALA, SRISAILAM LB, SUBERNAREKHA I&II
2	140 - 150	7	3.31	KASHANG I, JAWAHAR SAGAR, RAM GANGA, RAJGHAT, MUNIRABAD, PARSON'S VALLEY, PRIYADARSHNI JURALA
3	130 - 140	4	1.89	PONG, KUNDAH I-V, LOWER JURALA, PURULIA PSS
4	120 - 130	14	6.6	GIRI BATA, KOTLA, VISHNU PRAYAG, SARDAR SAROVAR CHPH, TILLARI, SHIVASAMUDRAM, T.B.DAM & HAMPI, IDUKKI, LOWER PERIYAR, MOYAR, PAPANASAM, HIRAKUD I&II, KARBI LANGPI, TUIRIAL
5	110 - 120	8	3.79	KAKKAD, PANNIAR, SHOLAYAR I, DIKCHU, JALDHAKA I, RAMMAM II, PARE, RANGANADI
6	100 - 110	34	16.11	CHAMERA-III, PARBATI III, NAPTHA JHAKRI, RAMPUR, KOL DAM, SWARA KUDDU, BASSI, SHANAN, BASPA-II, KARCHAM WANGTOO, URI –II, BAGLIHAR, NIMOO BAZGO, MATATILLA, TEHRI, KOTESHWAR, CHIBRO (Y.ST.II), CHILLA, DHALIPUR (Y.ST.I), KHATIMA, KULHAL (Y.ST.IV), KADANA PSS, BARGI, GANDHI SAGAR, KHOPOLI, N.J.SAGAR TPD, ALMATTI DAM, GERUSOPPA, SHARAVATHY, IDAMALAYAR, KUTTIADI & KUTTIADY ADDL., PALLIVASAL, PYKARA, SARKARPATHY, RANGIT, TEESTA-V, TEESTA III, JORETHANG LOOP, TASHIDING, TEESTA LOW DAM-III, TEESTA LOW DAM-IV, KAMENG, NEW UMTRU, UMIUM ST.I


REGION-WISE ACTUAL GENERATION VS TARGET
DURING 2022-23
GENERATION (MU)
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
TARGET
ACTUAL
76243
77624
15461
19574
30511
36870
20104
20889
8342
7142
150661
162099
NR
WR
SR
ER
NER
ALL INDIA
REGION

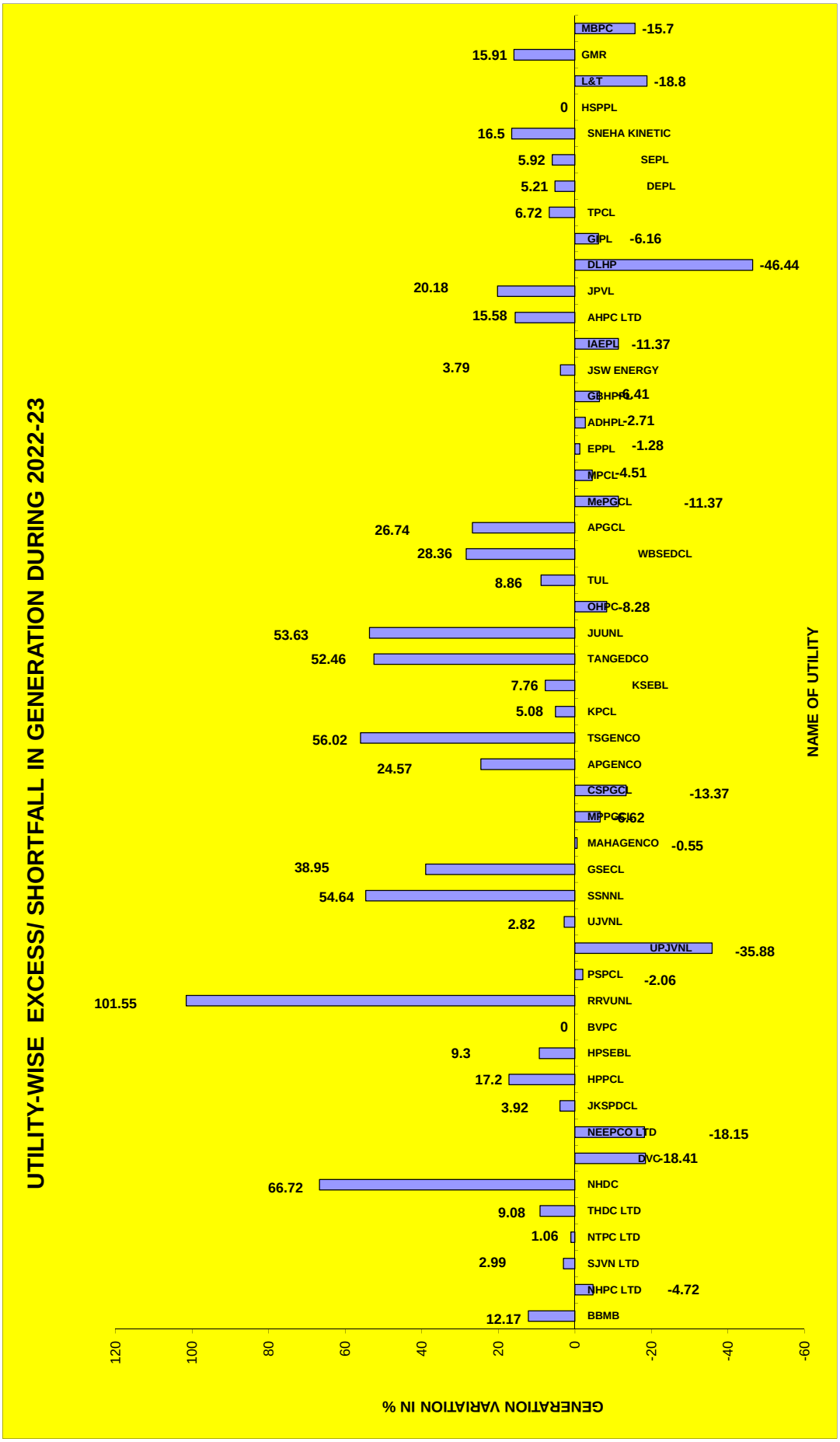
H.E. Stations where generation was lower than the target have been listed in **Table 2.6** below:

TABLE 2.6

H.E. STATIONS HAVING SHORTFALL IN GENERATION VIS-A-VIS TARGETS
PERIOD: 2022-23

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	14.21	DEHAR, BAIRA SIUL, CHAMERA-II, LARJI, ALLAIN DUHANGAN, MALANA-II, BUDHIL, MALANA, DULHASTI, SALAL-I, SEWA-II, URI, LOWER JHELUM, CHUTAK, RANJIT SAGAR, KHARA, DHAKRANI (Y.ST.I), MANERI BHALI-II, VYASI, GHATGHAR PSS, LOWER SILERU, KALINADI, KODASALI, PORINGALKUTHU, SABARIGIRI, PANCHET, CHUZACHEN HEP, RONGNICHU, LOKTAK (MANIPUR), KYRDEMKULAI
2	80-90	20	9.4	CHAMERA-I, CHANJU I, SORANG, BAJOLI HOLI, KISHENGANGA, MANERI BHALI-I, HASDEO BANGO, BANSAGAR TONS-II, BHIRA TAIL RACE, UPPER SILERU I & II, GHATPRABHA, KADRA, LINGNAMAKKI, SENGULAM, BALIMELA, UPPER INDRAVATI, UPPER KOLAB, MACHKUND, DOYANG, UMIUM ST.IV
3	70 -80	5	2.3	A.P.SAHIB I & II, SUPA DPH, SHOLAYAR, RENGALI, MYNTDU
4	60 -70	5	2.3	UPPER SINDH II, BANSAGAR TONS-I, NERIAMANGALAM, KADAMPARAI PSS, MAITHON
5	50 -60	2	0.94	OBRA, BHANDARDHARA - II
6	40 -50	2	0.94	RIHAND, BHIRA
7	30 -40	0	0	
8	10 -30	0	0	
9	0 -10	9	4.2	PARBATI II, UHL-III, TIDONG, PALLIVASAL NEW, THOTTIYAR, SURULIYAR, LOWER SUBANSIRI, KOPILI, KHANDONG

EXHIBIT 2.3


UTILITY-WISE EXCESS/ SHORTFALL IN GENERATION DURING 2022-23
NAME OF UTILITY
GENERATION VARIATION IN %
120
100
80
60
40
20
0
-20
-40
-60
MBPC -15.7
15.91 GMR
L&T -18.8
0 HSPPL
16.5 SNEHA KINETIC
5.92 SEPL
5.21 DEPL
6.72 TPCL
GIPL -6.16
DLHP -46.44
20.18 JPVL
15.58 AHPC LTD
IAEPL -11.37
3.79 JSW ENERGY
GBHPPL -6.41
ADHPL -2.71
EPPL -1.28
MPCL -4.51
MePGCL -11.37
26.74 APGCL
28.36 WBSEDCL
8.86 TUL
OHPC -8.28
53.63 JUUNL
52.46 TANGEDCO
7.76 KSEBL
5.08 KPCL
56.02 TSGENCO
24.57 APGENCO
CSPGCL -13.37
MPPGCL -6.62
MAHAGENCO -0.55
38.95 GSECL
54.64 SSNNL
2.82 UJVNL
UPJVNL -35.88
PSPCL -2.06
101.55 RRVUNL
0 BVPC
9.3 HPSEBL
17.2 HPPCL
3.92 JKSPDCL
NEEPCO LTD -18.15
DVC -18.41
66.72 NHDC
9.08 THDC LTD
1.06 NTPC LTD
2.99 SJVN LTD
NHPC LTD -4.72
12.17 BBMB

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 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 2017-18 TO 2022-23

Region	**Installed Capacity as on 31.03.2023 (MW)**	**Generation (BU)**					
		2017-18	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Northern	19696.25	74.73	72.40	80.55	75.23	73.86	77.62
Western	7392	9.18	9.76	17.81	16.67	13.71	19.57
Southern	11747.15	19.02	28.81	31.75	31.35	37.20	36.86
Eastern	5988	17.52	18.90	20.82	21.17	20.46	20.88
North Eastern	2027.0	5.67	5.02	48.20	58.58	63.72	7.14
Total	**46850.15**	**126.12**	**134.90**	**155.76**	**150.29**	**151.62**	**162.09**
Rainfall		**2017-18 (mm)**	**2018-19 (mm)**	**2019-20 (mm)**	**2020-21 (mm)**	**2021-22 (mm)**	**2022-23 (mm)**
All-India		1127.1	1020.8	968.3			

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
NORTHERN REGION					
HIMACHAL PRADESH					
CENTRAL SECTOR					
BBMB					
Bhakra L&R	1397.00	3924.00	4450.00	5024.75	112.92
Dehar	990.00	3110.00	3050.00	3034.92	99.51
Pong	396.00	1123.00	1150.00	1564.41	136.04
Total BBMB-HP	**2783.00**	**8157.00**	**8650.00**	**9624.08**	**111.26**
NHPC					
Baira Siul	180.00	779.28	650.00	627.94	96.61
Chamera-I	540.00	1664.56	2326.00	1889.11	81.22
Chamera-II	300.00	1499.89	1417.00	1326.77	93.63
Chamera-III	231.00	1108.00	1000.00	1001.94	100.19
Parbati III	520.00	1977.23	628.00	651.9	103.81
Parbati II*			320.00	0	0.00
Total NHPC -HP	**1771.00**	**7028.96**	**6341.00**	**5497.66**	**86.70**
SJVN					
Naptha Jhakri	1500.00	6612.00	6924.84	7132.98	103.01
Rampur	412.02	1878.08	1940.24	1997.5	102.95
Total SJVN	**1912.02**	**8490.08**	**8865.08**	**9130.5**	**102.99**
NTPC					
Kol Dam	800.00	3054.79	3099.90	3132.8	101.06
Total NTPC	**800.00**	**3054.79**	**3099.90**	**3132.81**	**101.06**
Total Central-HP	**7266.02**	**26730.83**	**26955.98**	**27385.03**	**101.59**
STATE SECTOR					
HPPCL					
Kashang I	65.00	245.80	108.00	157.04	145.41
Kashang II & III	130.00				
Sainj	100.00	323.23	353.50	423.09	119.69

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Swara Kuddu	111.00	386.00	310.00	324.03	104.53
Total HPPCL	**406.00**	**955.03**	**771.50**	**904.16**	**117.20**
HPSEB LTD					
Bassi	66.00	346.77	304.00	307.09	101.02
Giri Bata	60.00	240.00	180.00	231.76	128.76
Larji	126.00	586.85	619.00	611.17	98.74
Sanjay	120.00	518.00	525.00	629.33	119.87
Total HPSEB LTD	**372.00**	**1691.62**	**1628.00**	**1779.35**	**109.30**
Beas Valley Power. Corp. Ltd. (BVPC)					
Uhl-III*			0.00	0	0
Total BVPC			0.00	0	0
PSPCL					
Shanan	110.00	585.00	490.00	503.05	102.66
Total PSPCL-HP	**110.00**	**585.00**	**490.00**	**503.05**	**102.66**
Total State Sector-HP	**888.00**	**3231.65**	**2889.50**	**3186.56**	**110.28**
PRIVATE					
Allain Duhangan Power Power Ltd.					
Allain Duhangan	192.00	678.18	658.00	640.14	97.29
Everest Power Private Ltd.					
Malana-II	100.00	403.00	348.00	343.54	98.72
HBPCL					
Baspa-II	300.00	1213.00	1300.00	1351.93	103.99
JSW					
Karcham Wangtoo	1045.00	4131.06	4131.00	4284.87	103.72
GBHPPL					
Budhil	70.00	291.73	293.00	274.22	93.59
IA Energy Pvt. Ltd.					
Chanju I	36.00	157.82	158.00	140.03	88.63
Malana Power Company Ltd.					

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Malana	86.00	370.93	336.00	320.86	95.49
NSL Tidond Power Generation Pvt. Ltd.					
Tidong*			50.00	0	0.00
Himachal Sorang Power Limited (HSPL)					
Sorang	100	524	392.00	318.29	81.20
GMR					
Bajoli Holi	180		500.00	421.51	84.30
Total Private-HP	**2109.00**	**7769.72**	**8166.00**	**8095.39**	99.14
Total H.P.	**10263.02**	**37732.20**	**38011.48**	**38666.98**	**101.72**
JAMMU & KASHMIR					
CENTRAL SECTOR					
NHPC					
Dulhasti	390.00	1907.00	2267.00	2082.93	91.88
Salal-I	345.00	3082.00	3567.00	3240.08	90.83
Salal-II	345.00				
Sewa-II	120.00	533.52	**511.00**	**508.05**	99.42
Uri	480.00	2587.38	2950.00	2861.52	97.00
Uri -II	240.00	1124.00	1570.00	1573.79	100.24
Kishenganga	330.00	1705.62	1685.00	1454.07	86.29
Total NHPC -J&K	**2250.00**	**10939.52**	**12550.00**	**11720.44**	**93.39**
Total Central Sector - J&K	**2250.00**	**10939.52**	**12550.00**	**11720.44**	**93.39**
STATE SECTOR					
JKSPDC					
Baglihar	450.00	2643.00	2536.00	2712.13	106.95
Baglihar II	450.00	1302.30	1302.00	1467.05	112.68
Lower Jhelum	105.00	533.00	614.00	612.45	99.75
Upper Sindh II	105.00	355.00	414.00	265.35	64.09
Total JKSPDC	**1110.00**	**4833.30**	**4866.00**	**5056.98**	**103.92**
Total State Sector-J&K	**1110.00**	**4833.30**	**4866.00**	**5056.98**	**103.92**

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Total Jammu & Kashmir	**3360.00**	**15772.82**	**17416.00**	**16777.42**	**96.33**
LADHAK					
CENTRAL SECTOR					
NHPC					
Chutak	44.00	213.00	174.00	166.8	95.86
Nimoo Bazgo	45.00	239.00	235.00	235.98	100.42
Total Central Sector-Ladhak	**89.00**	**452.00**	**409.00**	**402.78**	**98.48**
Total Ladhak	**89.00**	**452.00**	**409.00**	**402.78**	**98.48**
PUNJAB					
CENTRAL SECTOR					
BBMB					
Ganguwal	77.65	1358.00	500.00	599.02	119.80
Kotla	77.65		500.00	601.62	120.32
Total BBMB-Punjab	**155.30**	**1358.00**	**1000.00**	**1200.64**	**120.06**
STATE SECTOR					
PSPCL					
A.P.Sahib I & II	134.00	909.00	630.00	484.38	76.89
Mukerian I - IV	207.00	1206.00	1080.00	1206.98	111.76
Ranjit Sagar	600.00	1507.00	1580.00	1507.65	95.42
Total PSPCL	**941.00**	**3622.00**	**3290.00**	**3199**	**97.23**
Total State Sector-Punjab	**941.00**	**3622.00**	**3290.00**	**3199.01**	**97.23**
Total Punjab	**1096.30**	**4980.00**	**4290.00**	**4400**	**102.56**
RAJASTHAN					
STATE SECTOR					
RRVUNL					
Jawahar Sagar	99.00	298.00	220.00	315.77	143.53
Mahi Bajaj I & II	140.00	289.00	150.00	242.18	161.45
R.P. Sagar	172.00	459.00	110.00	409.48	372.25
Total RRVUNL	**411.00**	**1046.00**	**480.00**	**967.43**	**201.55**

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Total State sector-Rajasthan	**411.00**	**1046.00**	**480.00**	**967.43**	**201.55**
Total Rajasthan	**411.00**	**1046.00**	**480.00**	**967.43**	**201.55**
UTTAR PRADESH					
STATE SECTOR					
UPJVNL					
Khara	72.00	385.00	334.00	328.57	98.37
Matatilla	30.60	123.00	120.00	126.39	105.33
Obra	99.00	279.00	300.00	160.09	53.36
Rihand	300.00	920.00	765.00	358.99	46.93
Total UPJVNL	**501.60**	**1707.00**	**1519.00**	**974.04**	**64.12**
Total State Sector-UP	**501.60**	**1707.00**	**1519.00**	**974.04**	**64.12**
Total Uttar PradeshTotal Uttar Pradesh	**501.60**	**1707.00**	**1519.00**	**974.04**	**64.12**
UTTARAKHAND					
CENTRAL SECTOR					
NHPC					
Dhauliganga	280.00	1134.69	1149.00	1292.81	112.52
Tanakpur	94.20	452.19	452.00	534.95	118.35
Total NHPC-UK	**374.20**	**1586.88**	**1601.00**	**1828**	114.16
NTPC					
Tapovan Vishnugad			0.00	0	
Total NTPC-UK			**0.00**	**0**	
THDC LTD					
Tehri	1000.00	2797.00	3000.00	3284.82	109.49
Koteshwar	400.00	1155.00	1162.00	1255.15	108.02
Total THDC LTD	**1400.00**	**3952.00**	**4162.00**	**4539.97**	**109.08**
SJVN					
Naitwar Mori			23.06	0	
Total SJVN					

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Total Central Sector - UK	**1774.20**	**5538.88**	**5786.06**	**6367.73**	**110.05**
STATE SECTOR					
UJVNL					
Chibro (Y.St.II)	240.00	750.00	830.00	834.98	100.60
Chilla	144.00	725.00	764.00	809.62	105.97
Dhakrani (Y.St.I)	33.75	169.00	150.00	135.43	90.29
Dhalipur (Y.St.I)	51.00	192.00	190.00	199.76	105.14
Khatima	41.40	208.00	210.00	228.72	108.91
Khodri (Y.St.II)	120.00	345.00	366.00	402.8	110.05
Kulhal (Y.St.IV)	30.00	164.00	140.00	151.74	108.39
Maneri Bhali-I	90.00	395.00	462.00	405.17	87.70
Maneri Bhali-II	304.00	1566.10	1310.00	1290.21	98.49
Ram Ganga	198.00	334.00	260.00	386.91	148.81
Vyasi	120.00		353.00	331.87	94.01
Total UJVNL	**1372.15**	**4848.10**	**5035.00**	**5177.21**	**102.82**
Total State Sector-Uttarakhand	**1372.15**	**4848.10**	**5035.00**	**5177.21**	**102.82**
PRIVATE SECTOR					
AHPC LTD					
Srinagar	330.00	1396.84	1310.00	1514.06	115.58
Jaiprakash Power Venture Ltd.					
Vishnu Prayag	400.00	1774.42	1590.00	1910.82	120.18
L&T					
Singoli Bhatwari	99.00	473	402.00	465.95	115.91
Total Private Sector - UK	**829.00**	**3644.26**	**3302.00**	**3890.83**	**117.83**
Total Uttarakhand	**3975.35**	**14031.24**	**14123.06**	**15435.77**	**109.29**
Total N. REGION	**19696.27**	**75721.26**	**76248.54**	**77624.07**	**101.80**
WESTERN REGION					
CHHATISGARH					
STATE SECTOR					

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
CSPGC					
Hasdeo Bango	120.00	274.00	274.00	237.37	86.63
Total CSPGC	**120.00**	**274.00**	**274.00**	**237.37**	**86.63**
Total State Sector-Chhatisgarh	**120.00**	**274.00**	**274.00**	**237.37**	**86.63**
Total Chhatisgarh	**120.00**	**274.00**	**274.00**	**237.37**	**86.63**
GUJARAT					
STATE SECTOR					
GSECL					
Kadana PSS	240.00	518.00	340.00	363.67	106.96
Ukai	300.00	1080.00	625.00	977.18	156.35
Total GSECL	**540.00**	**1598.00**	**965.00**	**1340.85**	**138.95**
SSNNL					
Sardar Sarovar CHPH	250.00	213.00	986.00	1241.1	125.87
Sardar Sarovar RBPH	1200.00	3635.00	2113.00	3551.19	168.06
Total SSNNL	**1450.00**	**3848.00**	**3099.00**	**4792.29**	**154.64**
Total State Sector -Gujarat	**1990.00**	**5446.00**	**4064.00**	**6133.14**	**150.91**
Total Gujarat	**1990.00**	**5446.00**	**4064.00**	**6133.14**	**150.91**
MADHYA PRADESH					
CENTRAL					
NHDC					
Indira Sagar	1000.00	1980.00	2150.00	3661.11	170.28
Omkareshwar	520.00	1166.57	1115.00	1782.38	159.85
Total NHDC	**1520.00**	**3146.57**	**3265.00**	**5443.49**	**166.72**
Total Central Sector-MP			**3265.00**	**5443**	**166.72**
STATE SECTOR					
MPPGCL					
Bansagar Tons-I	315.00	900.00	1000.00	638.45	63.85
Bansagar Tons-II	30.00	113.00	90.00	75.38	83.76

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Bansagar Tons-III	60.00	143.00	91.00	137.6	151.21
Bargi	90.00	508.08	420.00	429.84	102.34
Gandhi Sagar	115.00	420.48	270.00	288.9	107.00
Madhikheda	60.00	74.12	105.00	169.8	161.71
Rajghat	45.00	87.60	88.00	125.61	142.74
Total MPPGPCL	**715.00**	**2246.28**	**2064.00**	**1865.58**	**90.39**
Total State-MP	**715.00**	**2246.28**	**2064.00**	**1865.58**	**90.39**
SMHPCL(PVT.)					
Maheshwar*			0.00	0	
Total M.P.	**2235.00**	**5392.85**	**5329.00**	**7309**	**137.16**
MAHARASHTRA					
STATE SECTOR					
MAHAGENCO					
Bhira Tail Race	80.00	75.00	85.00	81.35	81.35
Ghatghar PSS	250.00	146.00	384.00	90.24	90.24
Koyna DPH	36.00	410.00	130.00	166.46	166.46
Koyna St.I&II	600.00	3030.00	800.00	1224.06	1224.06
Koyna St.III	320.00		568.00	839.76	839.76
Koyna IV	1000.00		1742.00	1241.28	1241.28
Tillari	60.00	133.00	110.00	126.69	126.69
Vaitarna	60.00	144.00	144.00	171.18	171.18
Total MAHAGENCO	**2406.00**	**3938.00**	**3963.00**	**3941**	**99.45**
MPPGPCL					
Pench	160.00	315.36	325.00	365.2	365.20
Total MPPGPCL-Maha.	**160.00**	**315.36**	**325.00**	**365.20**	**112.37**
Total State Sector-Maha.	**2566.00**	**4253.36**	**4288.00**	**4306.22**	**100.42**
PRIVATE SECTOR					
Dodson-Lindblom Hydro Power Pvt. Ltd. (DLHPPL)					
Bhandardhara - II	34.00	50.00	36.00	19.28	53.56
Total DLHP	**34.00**	**50.00**	**36.00**	**19.28**	53.56

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Tata Power Company Ltd.					
Bhira	150.00	775.00	900.00	401.6	44.62
Bhira PSS	150.00		0.00	537.91	
Bhivpuri	75.00	220.00	285.00	329.74	115.70
Khopoli	72.00	225.00	285.00	299.54	105.10
Total TPCL	**447.00**	**1220.00**	**1470.00**	**1568.79**	**106.72**
Total Private Sector-Maharashtra	**481.00**	**1270.00**	**1506.00**	**1588.07**	**105.45**
Total Maharashtra	**3047.00**	**5523.36**	**5794.00**	**5894.29**	**101.73**
Total Western	**7392.00**	**16636.21**	**15461.00**	**19574**	**126.60**
SOUTHERN REGION					
ANDHRA PRADESH					
STATE SECTOR					
APGENCO					
N.J.Sagar TPD	50.00	177.00	90.00	97.96	108.84
N.J.Sagar RBC	90.00	156.00	128.00	297.84	232.69
Srisailam RB	770.00	2900.00	1047.00	1883.29	179.87
Upper sileru I & II	240.00	529.00	476.00	389.92	81.92
Lower Sileru	460.00	1070.00	1094.00	1078.57	98.59
Total APGENCO	**1610.00**	**4832.00**	**2835.00**	**3747.58**	**132.19**
Total State Sector-AP	**1610.00**	**4832.00**	**2835.00**	**3747.58**	**132.19**
Total Andhra Pradesh	**1610.00**	**4832.00**	**2835.00**	**3747.58**	**132.19**
KARNATAKA					
STATE SECTOR					
KPCL					
Almatti Dam	290.00	483.00	590.00	626.62	106.21
Bhadra	26.00	123.00	50.00	104.7	209.40
Gerusoppa	240.00	622.00	548.00	566.09	103.30

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Ghatprabha	32.00	131.00	100.00	87.22	87.22
Jog	139.20	118.00	350.00	550.98	157.42
Kadra	150.00	570.00	412.00	355.73	86.34
Kalinadi	900.00	3385.00	2984.00	2843.49	95.29
Supa DPH	100.00	542.00	472.00	376.95	79.86
Kodasali	120.00	512.00	380.00	345.25	90.86
Lingnamakki	55.00	254.00	301.00	254.21	84.46
Munirabad	28.00	66.00	82.00	114.94	140.17
Sharavathy	1035.00	4932.00	4800.00	5220.81	108.77
Shivasamudram	42.00	183.00	225.00	285.93	127.08
Varahi	460.00	1060.00	1043.00	1231.12	118.04
Total KPCL	**3617.20**	**12981.00**	**12337.00**	**12964.04**	105.08
APGENCO					
T.B.Dam & Hampi	72.00	236.00	160.00	193.3	120.81
Total APGENCO-Karnataka	**72.00**	**236.00**	**160.00**	**193.30**	**120.81**
Total State Sector-Karnataka	**3689.20**	**13217.00**	**12497.00**	**13157.34**	**105.28**
Total Karnataka	**3689.20**	**13217.00**	**12497.00**	**13157.34**	**105.28**
KERALA					
STATE SECTOR					
KSEB Ltd.					
Idamalayar	75.00	380.00	396.00	409.36	103.37
Idukki	780.00	2398.00	2632.00	3261.77	123.93
Kakkad	50.00	262.00	220.00	243.29	110.59
Kuttiadi & Kuttiady Addl.	225.00	323.00	749.00	787.12	105.09
Lower Periyar	180.00	493.00	530.00	688.74	129.95
Neriamangalam	52.65	237.00	350.00	237.75	67.93
Pallivasal	37.50	284.00	142.00	147.56	103.92
Pallivasal New			30.00	0	0.00

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Panniar	30.00	158.00	176.00	198.96	113.05
Poringalkuthu	32.00	170.00	160.00	157.31	98.32
Sabarigiri	300.00	1338.00	1595.00	1532.33	96.07
Sengulam	48.00	182.00	156.00	126.55	81.12
Sholayar	54.00	233.00	263.00	198.26	75.38
Thottiyar			15.00	0	0.00
Total KSEB LTD.	**1864.15**	**6458.00**	**7414.00**	**7989.00**	**107.76**
Total State Sector-Kerala	**1864.15**	**6458.00**	**7414.00**	**7989.00**	**107.76**
Total Kerala	**1864.15**	**6458.00**	**7414.00**	**7989.00**	**107.76**
TAMIL NADU					
STATE SECTOR					
TANGEDCO					
Aliyar	60.00	175.00	120.00	168.6	168.60
Bhawani K Barrage-III	30.00	90.00	29.00	65.09	224.45
Bhawani K Barrage-II	30.00	100.00	58.00	103.21	177.95
Bhawani K Barrage-I	30.00	80.00	55.00	128.16	233.02
Kadamparai PSS	400.00	77.00	378.00	263.51	69.71
Kodayar I&II	100.00	165.00	60.00	292.43	487.38
Kundah I-V	555.00	1387.00	1215.00	1690.88	139.17
Lower Mettur I-IV	120.00	252.00	197.00	350.82	178.08
Mettur Dam	50.00	541.00	105.00	226.85	216.05
Mettur Tunnel	200.00		259.00	797.06	307.75
Moyar	36.00	115.00	105.00	129.04	122.90
Papanasam	32.00	105.00	100.00	129.42	129.42
Parson's Valley	30.00	53.00	30.00	44.66	148.87
Periyar	161.00	409.00	410.00	661.9	161.44
Pykara	59.20	274.00	35.00	35.33	100.94
Pykara Ultimate	150.00	30.00	305.00	463.51	151.97
Sarkarpathy	30.00	162.00	117.00	117.11	100.09
Sholayar I	70.00	254.00	250.00	298.19	119.28

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Suruliyar	35.00	79.00	85.00	0	0.00
Total TANGEDCO	**2178.20**	**4348.00**	**3913.00**	**5965.77**	**152.46**
Total State Sector-TN	**2178.20**	**4348.00**	**3913.00**	**5965.77**	**152.46**
Total Tamilnadu	**2178.20**	**4348.00**	**3913.00**	**5965.77**	**152.46**
TELANGANA					
STATE SECTOR					
TSGENCO					
Lower Jurala	240.00	534.43	320.00	432.29	135.09
N.J.Sagar PSS	815.60	2237.00	1500.00	2354.94	157.00
N.J.Sagar LBC	60.00	104.00	60.00	139.95	233.25
Pochampad	36.00	147.00	75.00	138.93	185.24
Priyadarshni Jurala	234.00	404.00	320.00	452.87	141.52
Pulichinthala	120.00	219.42	160.00	330.51	206.57
Srisailam LB	900.00	1400.00	1417.00	2160.58	152.48
Total TSGENCO	**2405.60**	**5045.85**	**3852.00**	**6010.07**	**156.02**
Total State Sector-Telangana	**2405.60**	**5045.85**	**3852.00**	**6010.07**	**156.02**
Total Telangana	**2405.60**	**5045.85**	**3852.00**	**6010.07**	**156.02**
Total Southern	**11747.15**	**33900.85**	**30511.00**	**36870**	**120.84**
EASTERN REGION					
JHARKHAND					
CENTRAL SECTOR					
DVC					
Panchet	80.00	237.00	145.00	136.48	94.12
Total DVC	**80.00**	**237.00**	**145.00**	**136.48**	94.12
Total Central Sector-Jharkhand	**80.00**	**237.00**	**145.00**	**136.48**	94.12
STATE SECTOR					
JUUNL					

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Subernarekha I&II	130.00	149.00	110.00	168.99	153.63
Total Jharkhand	**130.00**	**149.00**	**110.00**	**169**	**153.63**
Total State Sector-Jharkhand	**130.00**	**149.00**	**110.00**	**169**	**153.63**
Total Jharkhand	**210.00**	**386.00**	**255.00**	**305**	**119.79**
ODISHA					
STATE SECTOR					
OHPC					
Balimela	510.00	1183.00	1183.00	1004.86	84.94
Hirakud I&II	359.80	1174.00	980.00	1230.87	125.60
Rengali	250.00	525.00	950.00	758.56	79.85
Upper Indravati	600.00	1962.00	1600.00	1380.38	86.27
Upper Kolab	320.00	832.00	650.00	544.41	83.76
Total OHPC	**2039.80**	**5676.00**	**5363.00**	**4919.08**	**91.72**
APGENCO					
Machkund	114.75	670.00	605.00	543.73	89.87
Total APGENCO-Odisha	**114.75**	**670.00**	**605.00**	**543.73**	89.87
Total State Sector-Odisha	**2154.55**	**6346.00**	**5968.00**	**5462.81**	91.54
Total Odisha	**2154.55**	**6346.00**	**5968.00**	**5462.81**	91.54
SIKKIM					
CENTRAL SECTOR					
NHPC					
Rangit	60.00	338.61	318.00	332.36	104.52
Teesta-V	510.00	2572.70	2674.00	2857.79	106.87
Total NHPC	**570.00**	**2911.31**	**2992.00**	**3190.15**	**106.62**
Total Central Sector-Sikkim	**570.00**	**2911.31**	**2992.00**	**3190.15**	**106.62**
STATE SECTOR					

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Sikkim Urja Ltd. (SUL)					
Teesta III	1200.00	5214.00	5652.00	6152.57	108.86
Total TUL	**1200.00**	**5214.00**	**5652.00**	**6152.57**	**108.86**
Total State Sector-Sikkim	**1200.00**	**5214.00**	**5652.00**	**6152.57**	**108.86**
PRIVATE SECTOR					
DANS Energy Pvt. Ltd. (DEPL)					
Jorethang Loop	96.00	459.00	412.00	433.47	105.21
Shiga Energy Pvt. Ltd.(SEPL)					
Tashiding	97.00	425.05	421.00	445.94	105.92
Gati Infrastructure Pvt. Ltd. (GIPL)					
Chuzachen HEP	110.00	537.81	537.00	503.92	93.84
Sneha Kinetic					
Dikchu	96.00	431.00	460.00	535.9	116.50
MBPC					
Rongnichu	113.00	434.00	442.00	434.84	98.38
Total Private-Sikkim	**512.00**	**2286.86**	**2272.00**	**2354**	**103.61**
Total Sikkim	**2282.00**	**10412.17**	**10916.00**	**11696.79**	**107.15**
WEST BENGAL					
CENTRAL SECTOR					
NHPC					
Teesta Low Dam-III	132.00	594.00	550.00	599.42	108.99
Teesta Low Dam-IV	160.00	719.67	720.00	734.62	102.03
Total NHPC	**292.00**	**1313.67**	**1270.00**	**1334.04**	**105.04**
DVC					
Maithon	63.20	137.00	145.00	100.13	69.06
Total DVC-WB	**63.20**	**137.00**	**145.00**	**100.13**	69.06
Total Central Sector-WB	**355.20**	**1450.67**	**1415.00**	**1434.17**	**101.35**

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
STATE SECTOR					
WBSEDCL					
Jaldhaka I	36.00	165.00	140.00	165.86	118.47
Purulia PSS	900.00	1235.00	1200.00	1578.08	131.51
Rammam II	50.00	210.00	210.00	245.62	116.96
Total WBSEDCL	**986.00**	**1610.00**	**1550.00**	**1989.56**	**128.36**
Total State Sector -WB	**986.00**	**1610.00**	**1550.00**	**1989.56**	**128.36**
Total West Bengal	**1341.20**	**3060.67**	**2965.00**	**3423.73**	**115.47**
Total Eastern	**5987.75**	**20204.84**	**20104.00**	**20888.80**	**103.90**
NORTH EASTERN REGION					
ARUNACHAL PRADESH					
CENTRAL SECTOR					
NHPC					
Lower Subansiri			1205.00	0	0.00
Total NHPC-Ar. Pradesh			**1205.00**	**0**	**0**
NEEPCO					
Kameng	600.00	3353.00	2800.00	2912.84	104.03
Pare	110.00	506.42	480.00	531.85	110.80
Ranganadi	405.00	1509.66	1230.00	1376.25	111.89
Total NEEPCO-Arunachal Pradesh	**1115.00**	**5369.08**	**4510.00**	**4821**	**106.89**
Total Central Sector-Arunachal Pradesh			**4510.00**	**4820.94**	**106.89**
Total Arunachal Pradesh	**1115.00**	**5369.08**	**5715.00**	**4820.94**	**84.36**
ASSAM					
CENTRAL SECTOR					
NEEPCO					
Kopili	200.00	1186.14	50.00	0	0
Khandong	50.00	363.95	200.00	0	0.00

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Total NEEPCO-Aassm	**250.00**	**1550.09**	**250.00**	**0.00**	**0.00**
Total Central Sector-Assam	**250.00**	**1550.09**	**250.00**	**0.00**	**0.00**
STATE SECTOR					
APGCL					
Karbi Langpi	100.00	390.00	380.00	481.6	126.74
Total APGCL	**100.00**	**390.00**	**380.00**	**481.60**	**126.74**
Total State Sector-Assam	**100.00**	**390.00**	**380.00**	**481.60**	**126.74**
Total Assam	**350.00**	**1940.09**	**630.00**	**481.60**	**76.44**
NAGALAND					
CENTRAL SECTOR					
NEEPCO					
Doyang	75.00	227.24	221.00	177.37	80.26
Total NEEPCO-Nagaland	**75.00**	**227.24**	**221.00**	**177.37**	**80.26**
Total Central Sector-Nagaland	**75.00**	**227.24**	**221.00**	**177.37**	**80.26**
Total Nagaland	**75.00**	**227.24**	**221.00**	**177.37**	**80.26**
MANIPUR					
CENTRAL SECTOR					
NHPC					
Loktak (Manipur)	105.00	448.00	500.00	477.98	95.60
Total NHPC-Manipur	**105.00**	**448.00**	**500.00**	**477.98**	**95.60**
Total Central Sector-Manipur	**105.00**	**448.00**	**500.00**	**477.98**	**95.60**
Total Manipur	**105.00**	**448.00**	**500.00**	**477.98**	**95.60**
MEGHALAYA					
STATE SECTOR					
MePGCL					

Annex-2.1

REGION/SECTOR/STATION-WISE ACTUAL GENERATION VIS-A-VIS TARGET OF H.E.STATIONS (I. C. ABOVE 25 MW) IN THE COUNTRY DURING THE YEAR 2022-23

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2023 (MW)	DESIGN ENERGY (MU)	2022-23		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Kyrdemkulai	60.00	118.00	139.00	130.61	93.96
Myntdu	126.00	128.00	461.00	359.74	78.03
New Umtru	40.00	235.00	183.00	196.24	107.23
Umium St.I	36.00	324.00	116.00	117.67	101.44
Umium St.IV	60.00	372.69	207.00	175.99	85.02
Total MePGCL	**322.00**	**1177.69**	**1106.00**	**980.25**	**88.63**
Total State Sector-Meghalaya	**322.00**	**1177.69**	**1106.00**	**980.25**	**88.63**
Total Meghalaya	**322.00**	**1177.69**	**1106.00**	**980.25**	**88.63**
MIZORAM					
CENTRAL SECTOR					
Tuirial	60.00	250.63	170.00	204.13	120.08
Total NEEPCO-Mizoram	**60.00**	**250.63**	**170.00**	**204.13**	**120.08**
Total Central Sector-Mizoram	**60.00**	**250.63**	**170.00**	**204.13**	**120.08**
Total Mizoram	**60.00**	**250.63**	**170.00**	**204.13**	**120.08**
Total N.Eastern	**2027.00**	**9412.73**	**8342.00**	**7142.27**	**85.62**
Total All India	**46850.17**	**155875.89**	**150666.54**	**162098.77**	**107.59**
IMPORT FROM BHUTAN			**8000.00**	**6742.40**	**84.28**
Total All India (Including Bhutan Imports)	**46850.17**	**155875.89**	**158666.54**	**168841.17**	**106.41**

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 are 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 18277.65 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)	612	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)		**4603**				

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	30	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)		**4741**				
	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 + NJ Sagar PSS	815.6	TSGENCO	Telangana	Nagarjuna Sagar	MP
25	Sharavathy	1035	KPCL	Karnataka	Sharavathy	S
26	Kalinadi (Nagjhari)	900	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	37.5	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)		**6674.10**				
	Eastern and North Eastern Region					
37	Machkund	114.75	APGENCO	Odisha	Machkund	MP
38	Hirakud I (Burla)	287.8	OHPC	Odisha	Hirakud	MP
39	Hirakud II (Chiplima)	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)		**2259.55**				
Total (All India)		**18277.65**				

Salient details of 37 Nos. Major reservoirs are indicated in **Annex-3.1**. These stations constitute about 33.37% (30.95% Multipurpose & 2.42% Storage for power only) of the total hydel installed capacity and generated about 29.89% (26.44% Multipurpose & 3.45% Storage for power only) of the total Hydel generation during 2022-23 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)	14499.15	1135	31216.02	46850
	Percentage of Total (%)	30.95	2.42	66.63	100
2.	Energy Generation (MU)	42861.04	5597.76	113639.97	162099
	Percentage of Total (%)	26.44	3.45	70.11	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 2022-23 vis-à-vis 2021-22 are given at **Exhibit 3.1**. Inflows into the reservoirs and generation during the year 2022-23 vis-à-vis 2021-22 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)	2021-22 (MCM)	2022-23 (MCM)	2020-21 Inflow as % of 201-20 inflow	10 years Average (MU)	2021-22 (MU)	2022-23 (MU)	2021-22 generation as compared to 2020-21 (%)
1	2	3	4	5	6= (5/4*100)	7	8	9	10= (9/8*100)
Northern Region									
1	Bhakra	17369	15347	15883	97	5467	4358	5025	115
2	Pong	8843	7396	8800	84	1579	1104	1564	142
3	RanjitSagar	6298	5036	6174	82	1715	1163	1508	130
4	Chamera-I*	6156	5197	5244	99	2474	1899	1889	99
5	Tehri	7378	7241	7390	98	3283	3098	3285	106
6	Ram Ganga	3359	26321	583251	5	277	249	387	155
7	RP Sagar	4127	0	0.08231	0	353	83	409	491
8	Rihand	5119	5184	3287	158	547	646	359	56
Sub Total (NR)		**58649**	**71721**	**630028**	**11**	**15695**	**12601**	**14426**	**114**
Western Region									
9	Ukai	7229	9911	17084.79	58	522	655	977	149
10	Sardar Sarovar	28585	13837	42026.2	33	2497	1748	4792	274
11	Gandhi Sagar	4220	4182	7275.4	57	270	212	289	136
12	Bansagar*	4677	4453	6228.81	71	83	135	213	157
13	Pench*	987	848	2990.89	28	316	304	365	120
14	Indira Sagar	22922	3047	42728	7	2536	1717	3661	213
15	Koyna	3535	160	149.089	107	1146	3639	3472	95
16	Bhira	907	893	1258.49	71	626	1025	940	92
Sub Total (WR)		**73062**	**37331**	**119742**	**31**	**7996**	**9436**	**14709**	**156**

	Southern Region								
S. No.	STATION	Inflows				Generation			
		10 years Average (MCM)	2021-22 (MCM)	2022-23 (MCM)	2020-21 Inflow as % of 201-20 inflow	10 years Average (MU)	2021-22 (MU)	2022-23 (MU)	2021-22 generation as compared to 2020-21 (%)
1	2	3	4	5	6= (5/4*100)	7	8	9	10= (9/8*100)
17	Srisailam	18783	31499	45579.0	69	935	1439	1883	131
18	Upper Sileru*	2199	1533	1529.2	100	462	362	390	108
19	Lower Sileru*	3255	1997	3033.7	66	1089	896	1079	120
20	N.J. Sagar	81411	25738	48690.8	53	79	417	396	95
21	Sharavathy	4520	4914	5256.6	93	4384	4994	5221	105
22	Supa	2668	3113	2934.0	106	438	610	377	62
23	Almatti	12367	694	670.6	104	450	500	627	125
24	Varahi*	491	646	690.65	94	1028	1137	1231	108
25	Idukki	1581	2723	2194	124	2223	3710	3262	88
26	Sabarigiri	874	1367	1149	119	1210	2047	1532	75
27	Madupetty	216	117	162	72	197	162	148	91
28	Idamalayar	1124	1433	1593	90	304	377	409	109
29	Mettur	5156	6903	20036.5	34	288	528	1024	194
30	Periyar	576	1024	814.8	126	395	779	662	85
Sub Total (SR)		**135221**	**83701**	**134333.1**	**62**	**13482**	**17958**	**18240**	**102**
Eastern Region									
31	Machkund	1255	1081	1406.35	77	564	719	544	76
32	Hirakud	25715	20631	34112.19	60	845	976	1231	126
33	Balimela	3530	3016	3035.19	99	1223	1062	1005	95
34	Indravati	3209	1402	2277.48	62	1936	1157	1380	119
35	Upper Kolab	1981	910	1337.67	68	717	451	544	121
36	Rengali	9628	14087	8809.75	160	693	866	759	88
Sub Total (ER)		**45318**	**41127**	**50979**	**81**	**5978**	**5231**	**5463**	**104**
North Eastern Region									
37	Loktak	2522	1159	1934	60	580	455	478	105
Sub Total (NER)		2242	2242	1159	1934	60	580	455	478
Total (All India)		**314492**	**235039**	**937016**	**25**	**43731**	**45681**	**53316**	**117**

* Only 4 years average inflows available.

EXHIBIT-3.1

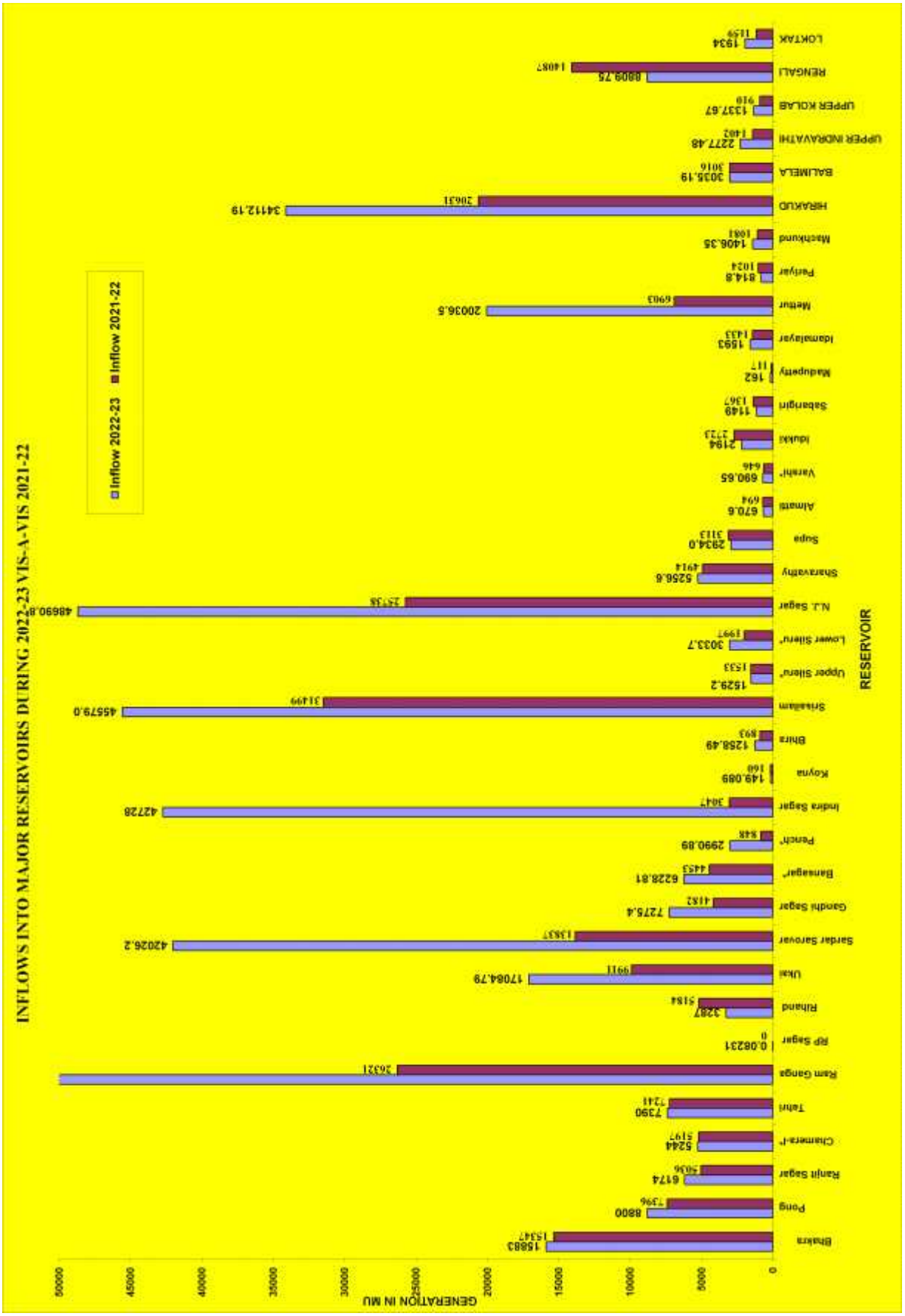
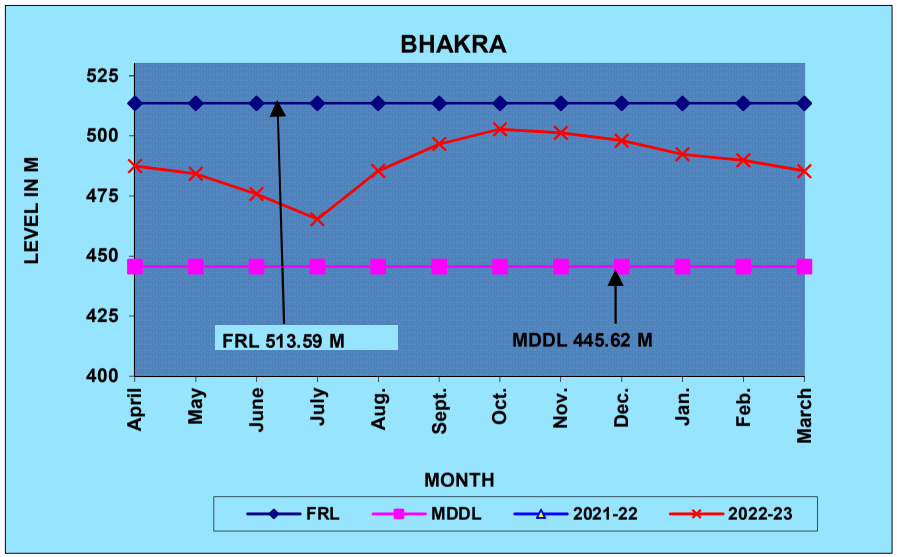
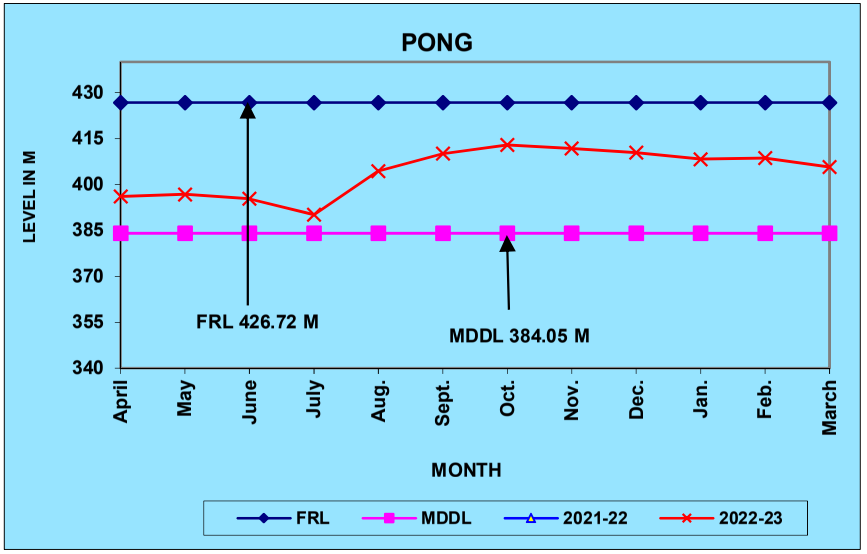
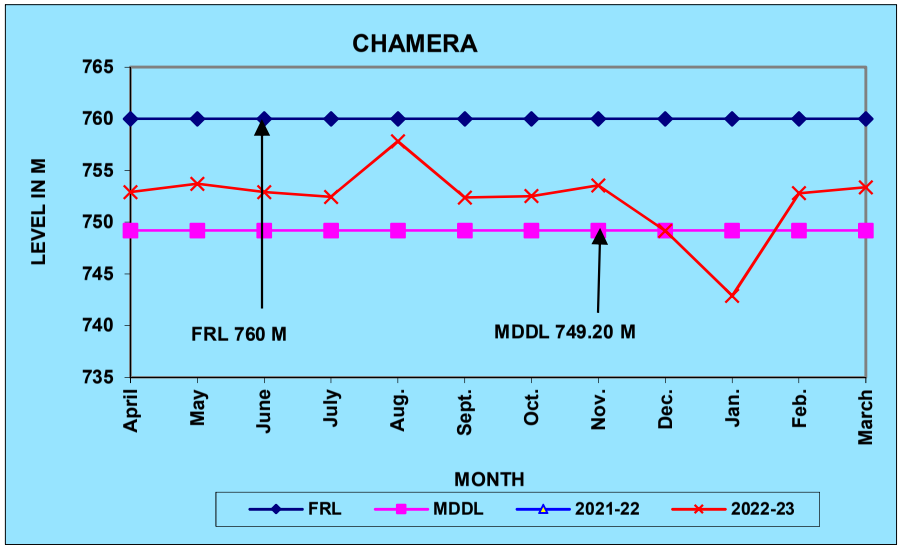

INFLOWS INTO MAJOR RESERVOIRS DURING 2022-23 VIS-A-VIS 2021-22
Inflow 2022-23
Inflow 2021-22
GENERATION IN MU
RESERVOIR
Bhakra
Pong
Ranjit Sagar
Chamera-I
Tehri
Ram Ganga
RP Sagar
Rihand
Ukai
Sardar Sarovar
Gandhi Sagar
Bansagar
Panchet
Indira Sagar
Koyna
Bhira
Srisailam
Upper Sileru
Lower Sileru
N.J. Sagar
Sharavathy
Supa
Almatti
Varahi
Idukki
Sabarigiri
Maduppetty
Idamalayar
Mettur
Periyar
Mactkund
HIRAKUD
BALIMELA
UPPER INDRAVATHI
UPPER KOLAB
RENGALI
LOKTAK

EXHIBIT 3.2

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







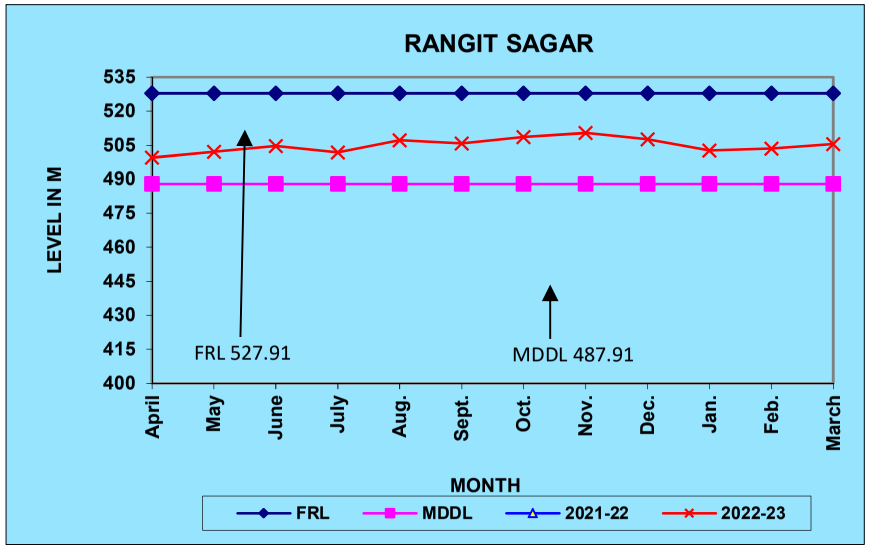
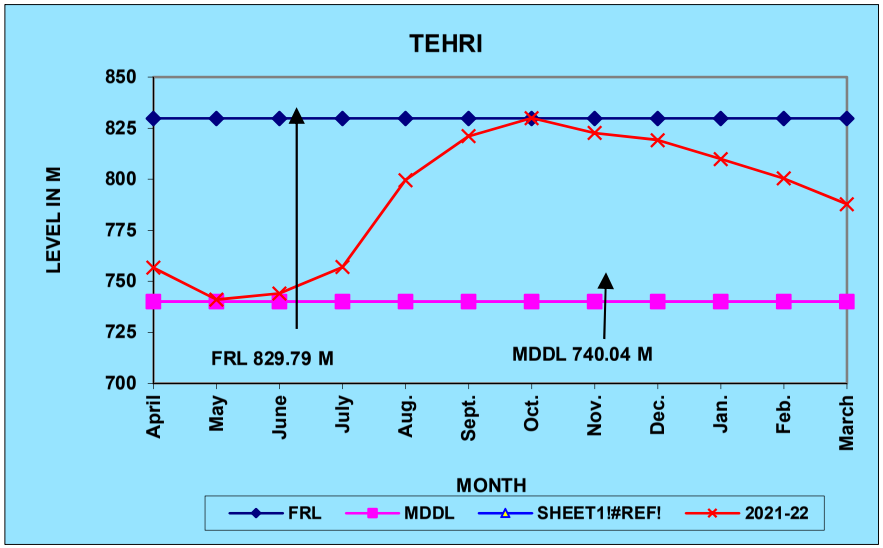
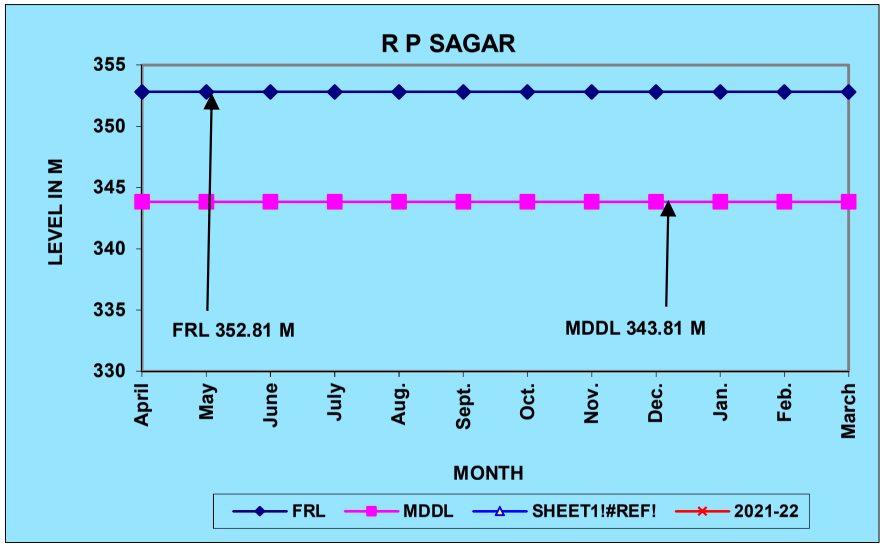
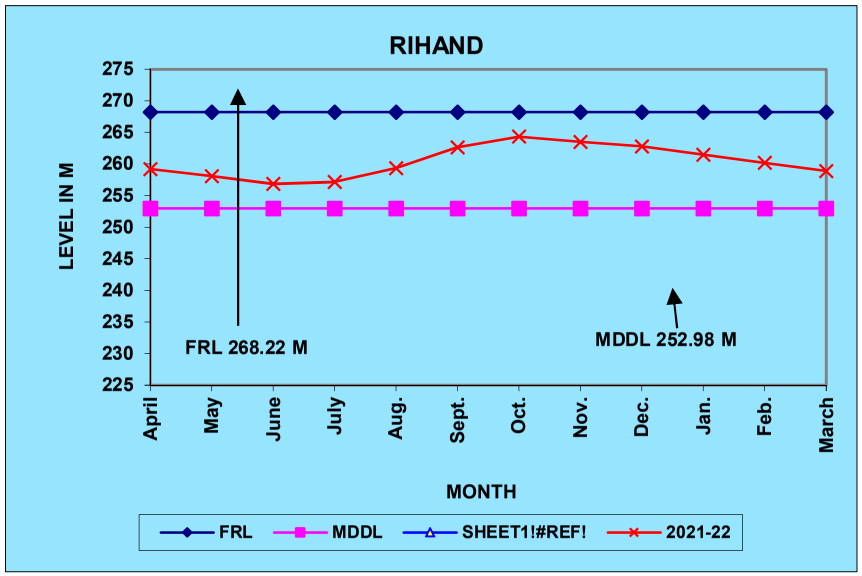


EXHIBIT 3.3

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







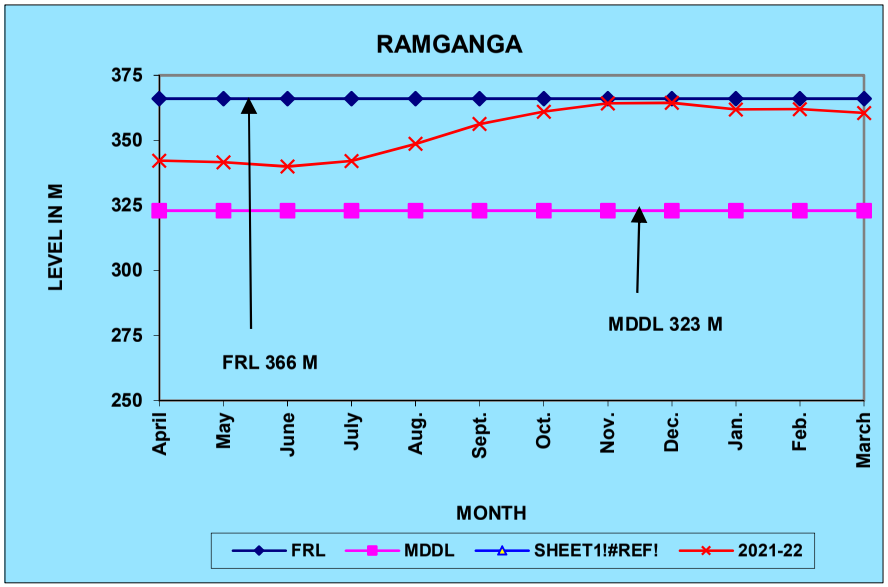
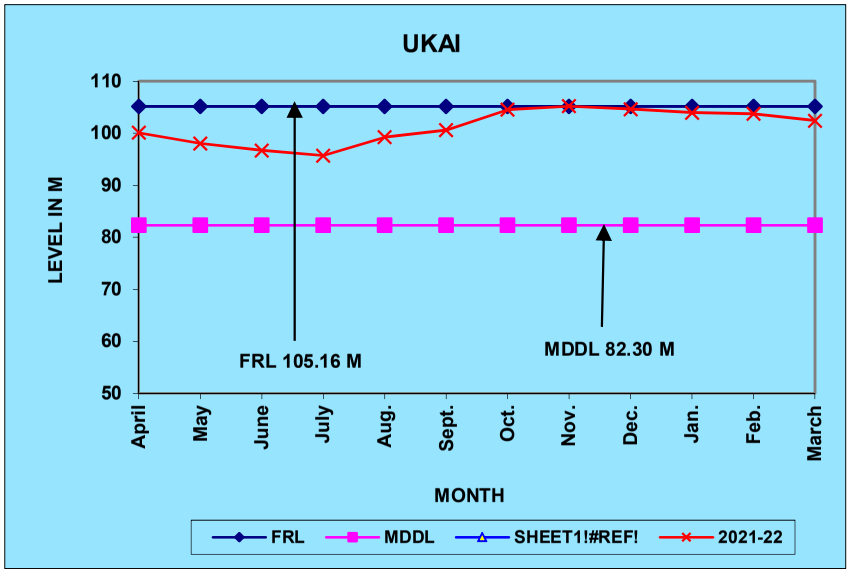
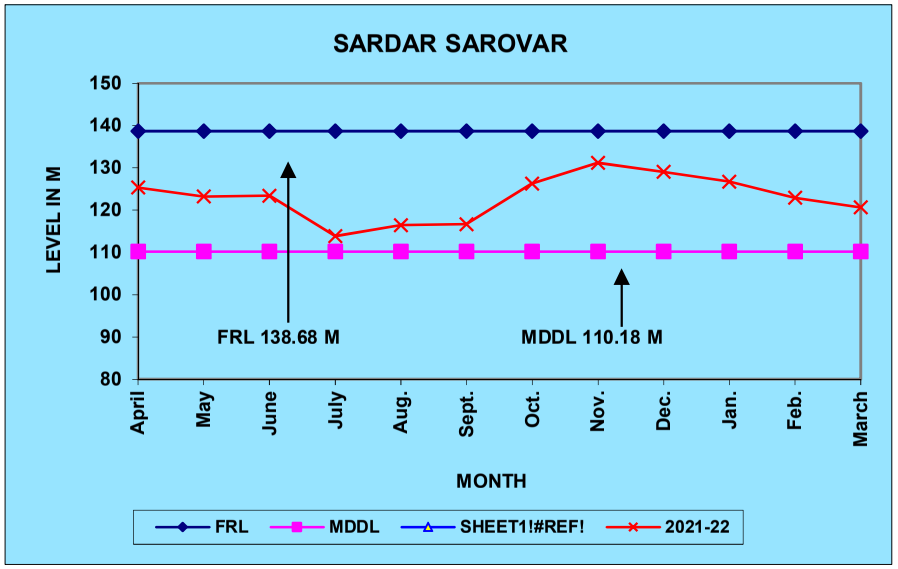
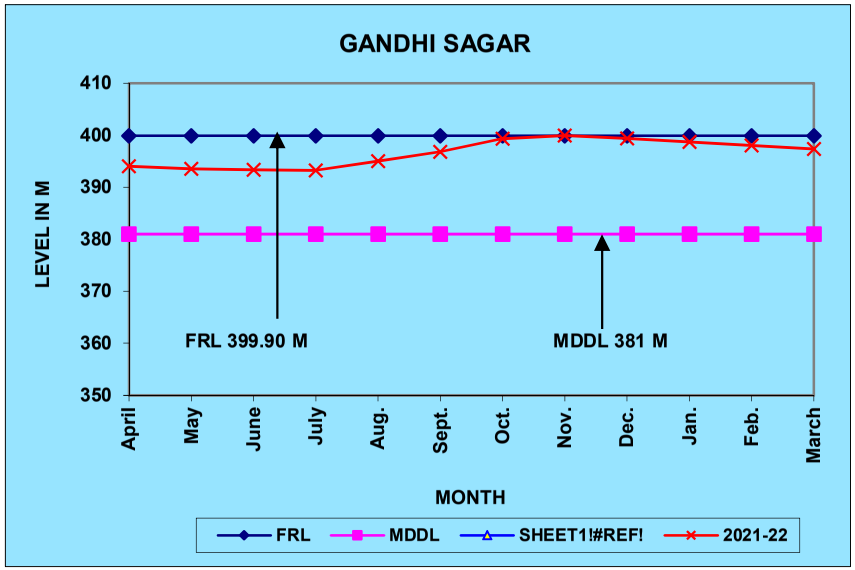


EXHIBIT 3.4

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







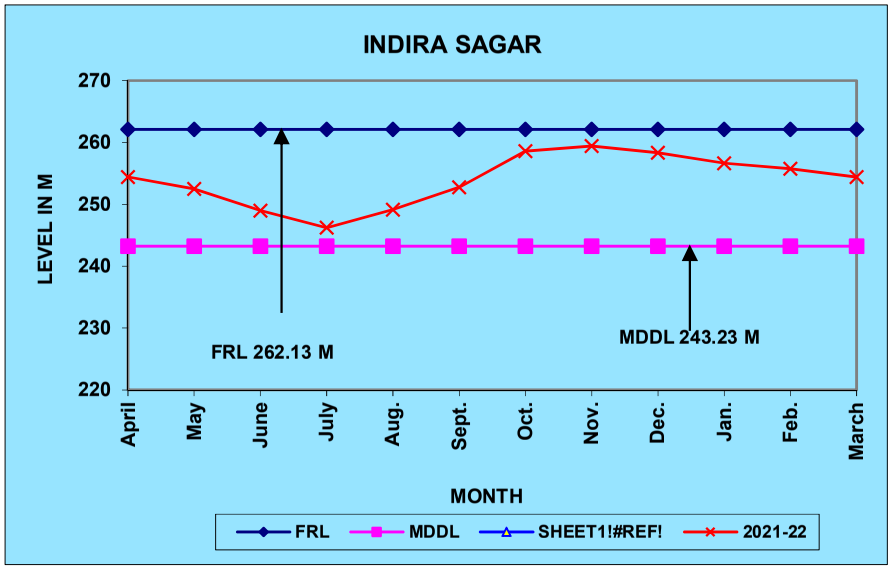
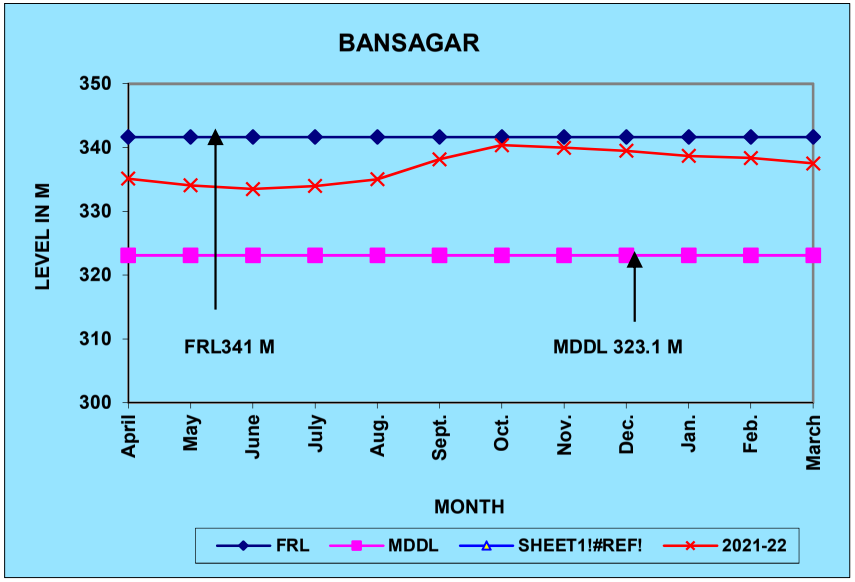
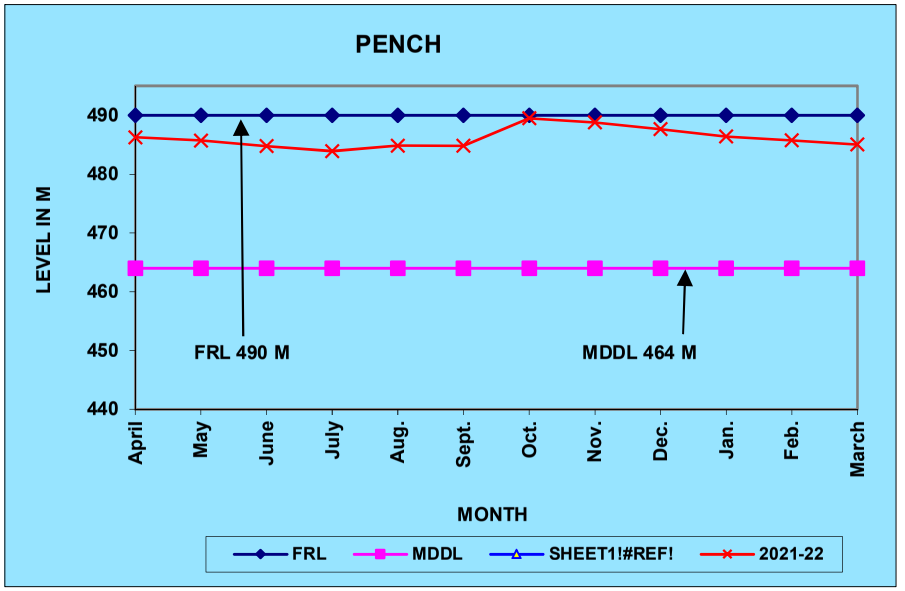
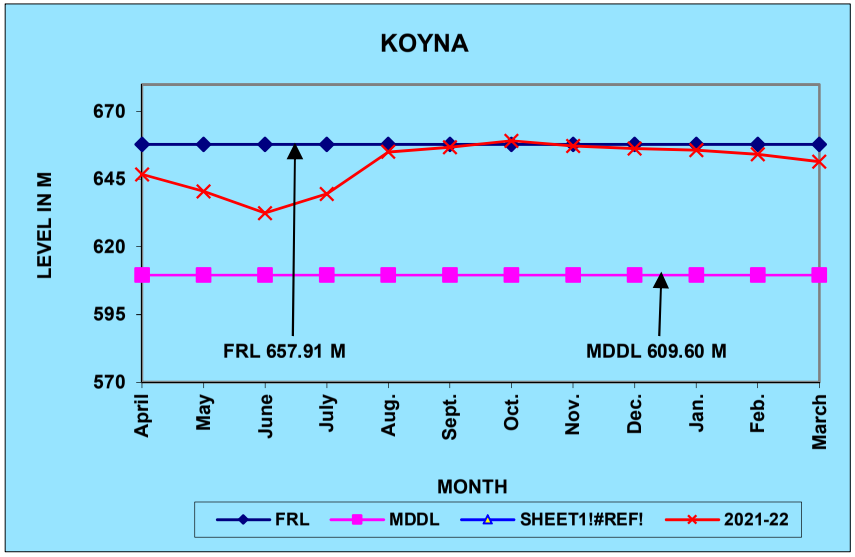


EXHIBIT 3.5

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







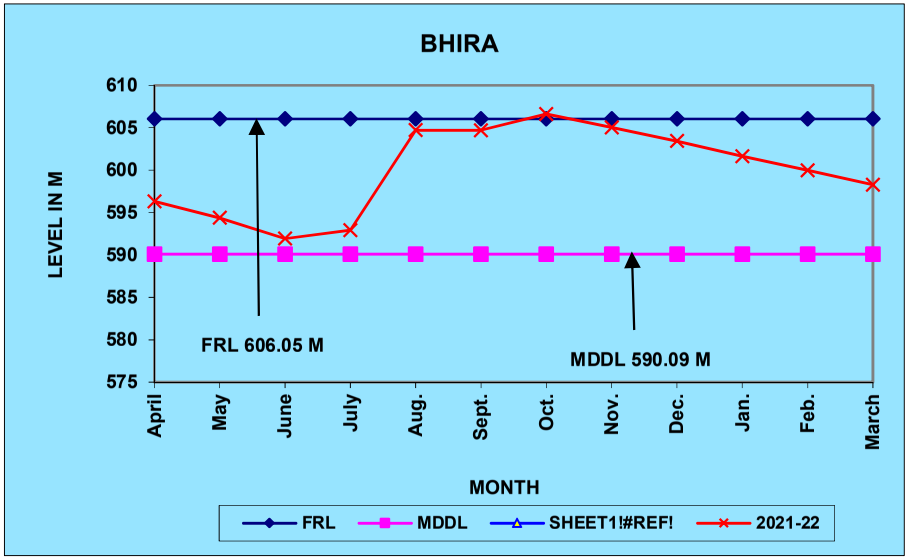
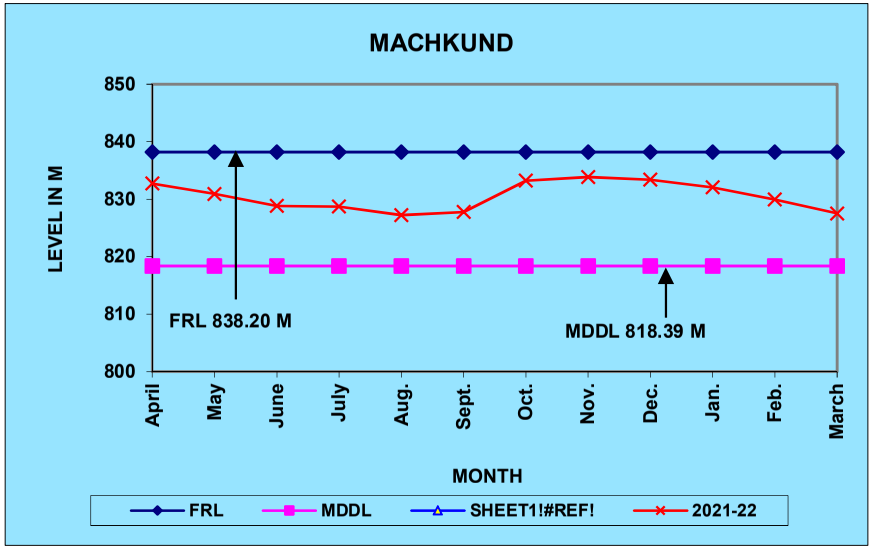
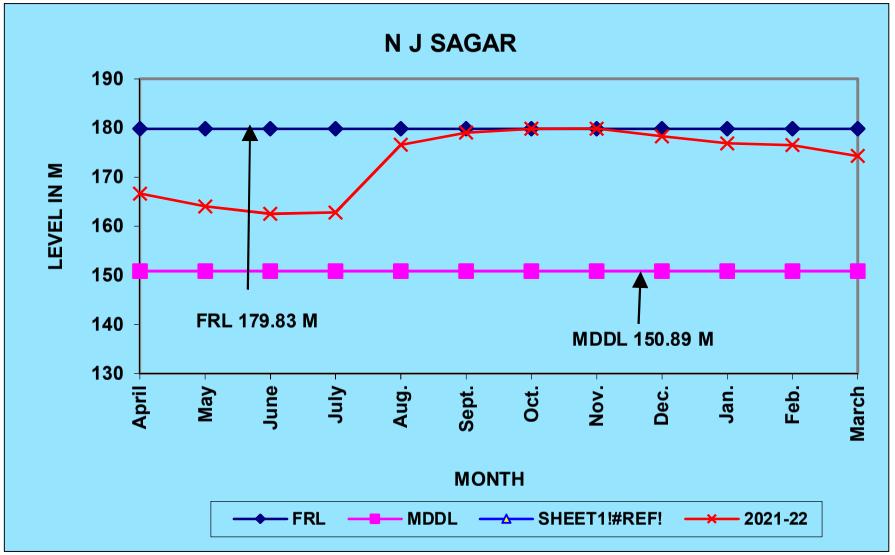
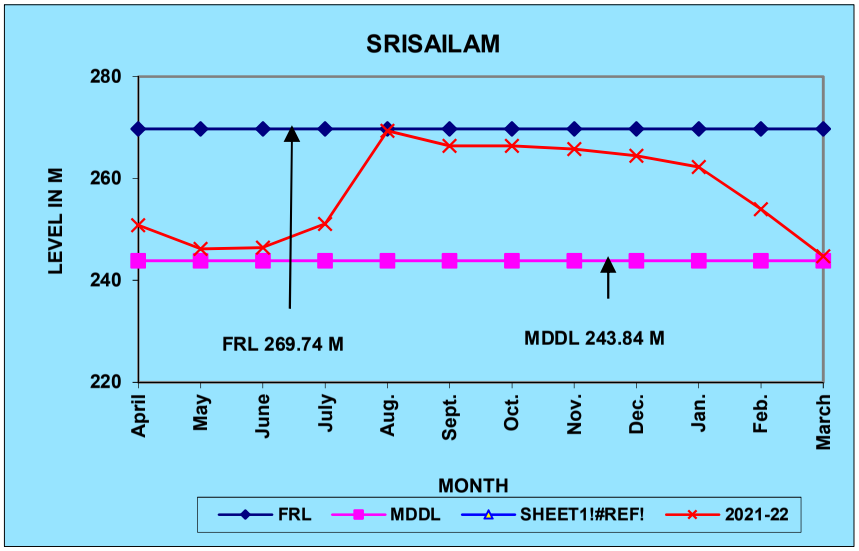


EXHIBIT 3.6

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







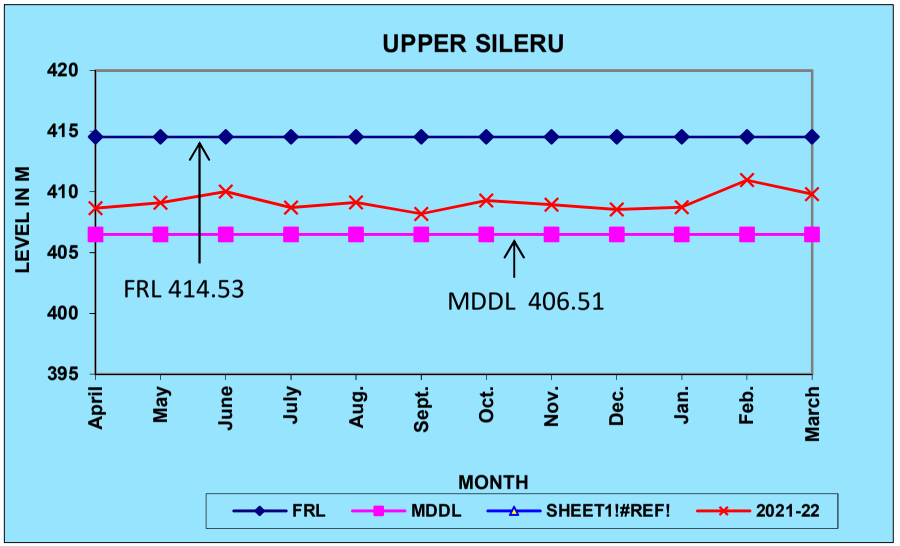
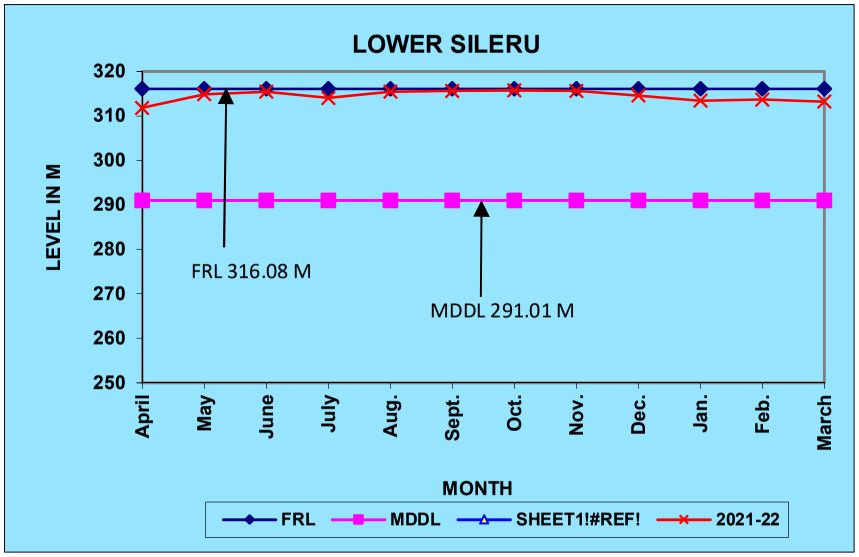
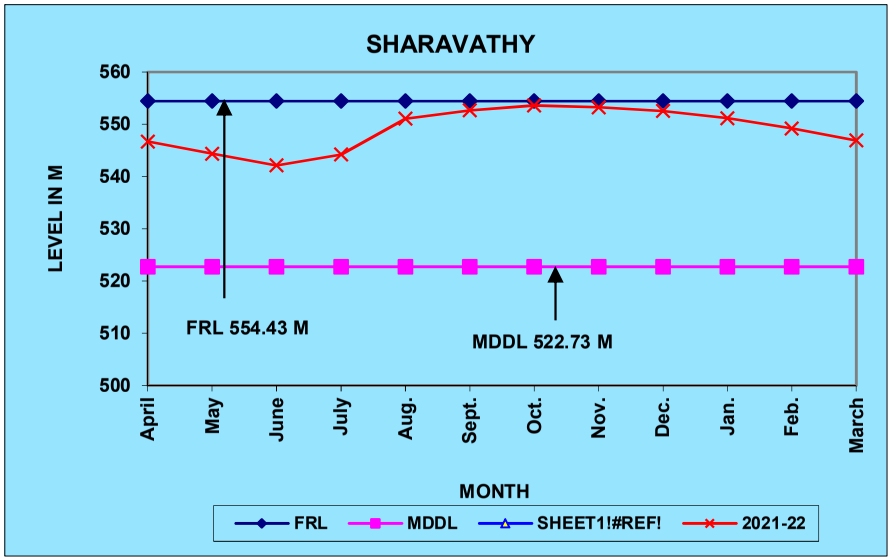
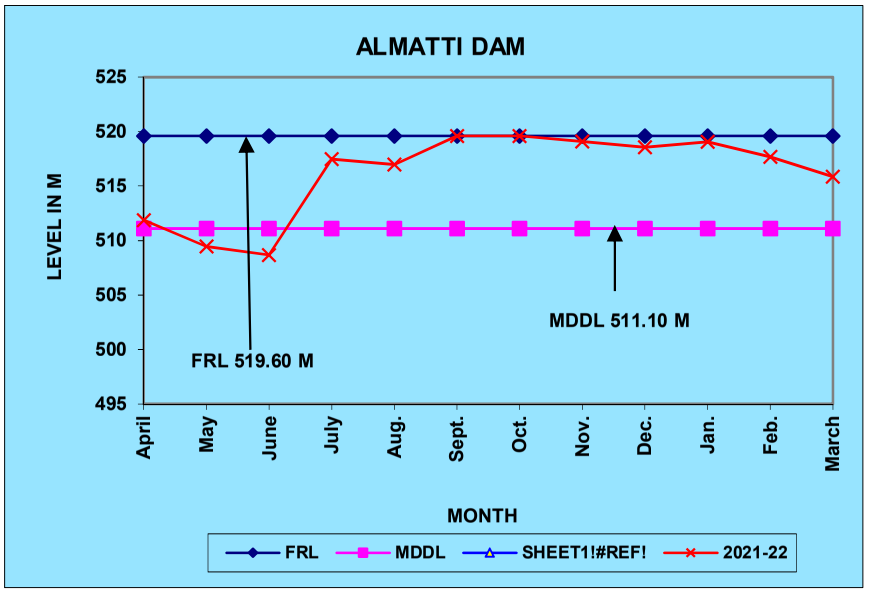


EXHIBIT 3.7

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







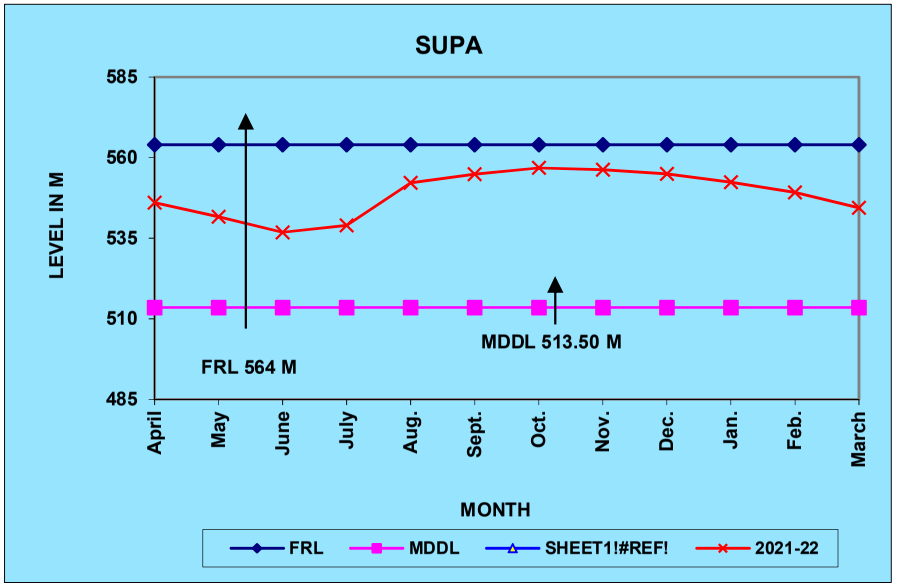
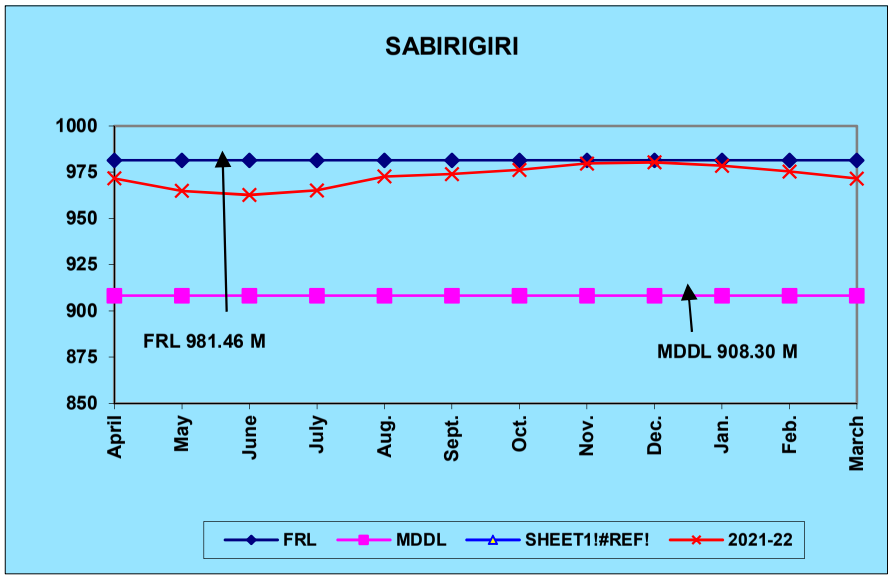
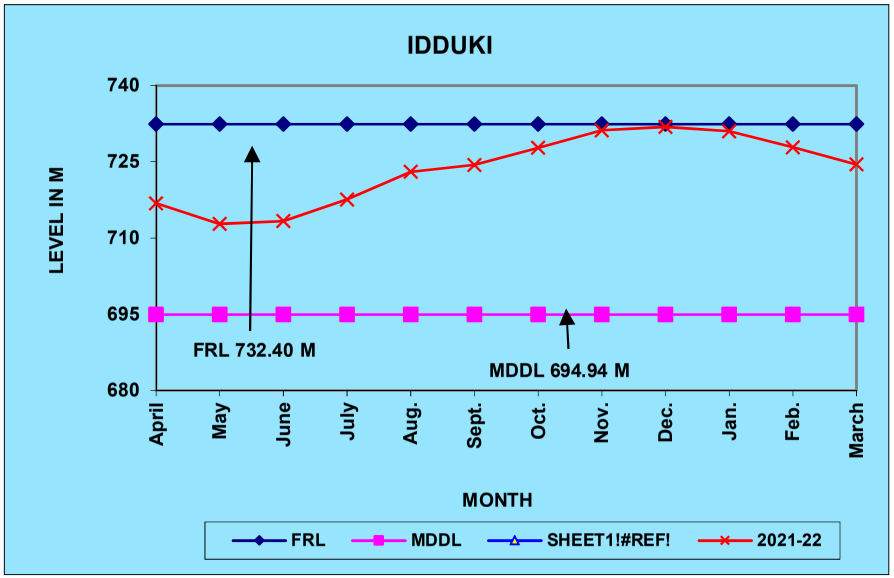
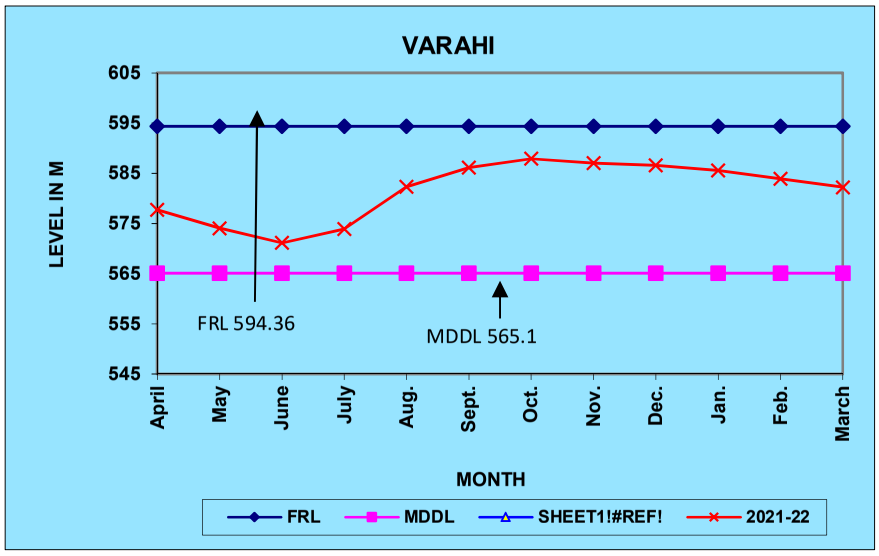


EXHIBIT 3.8

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







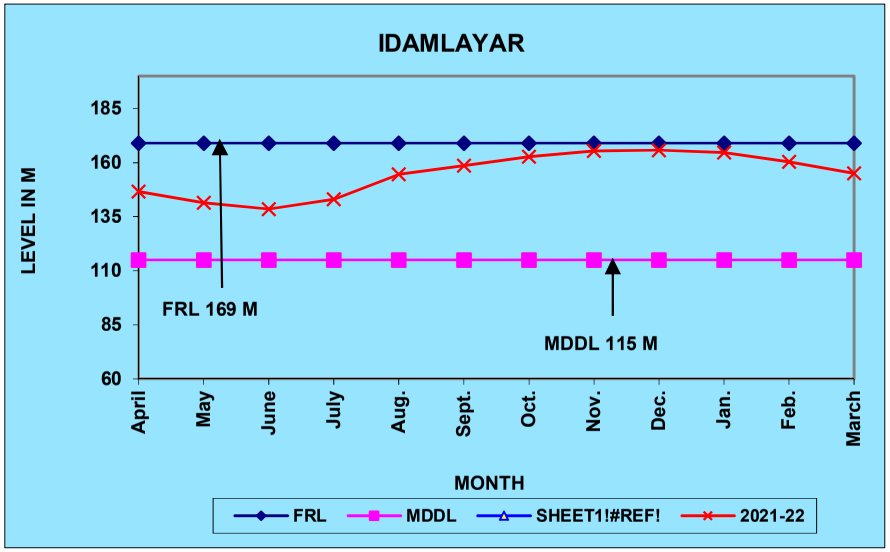
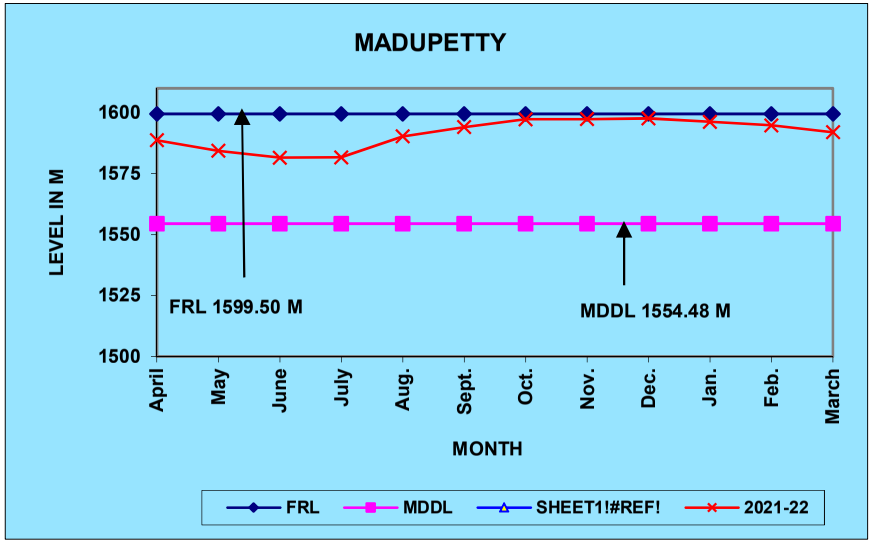
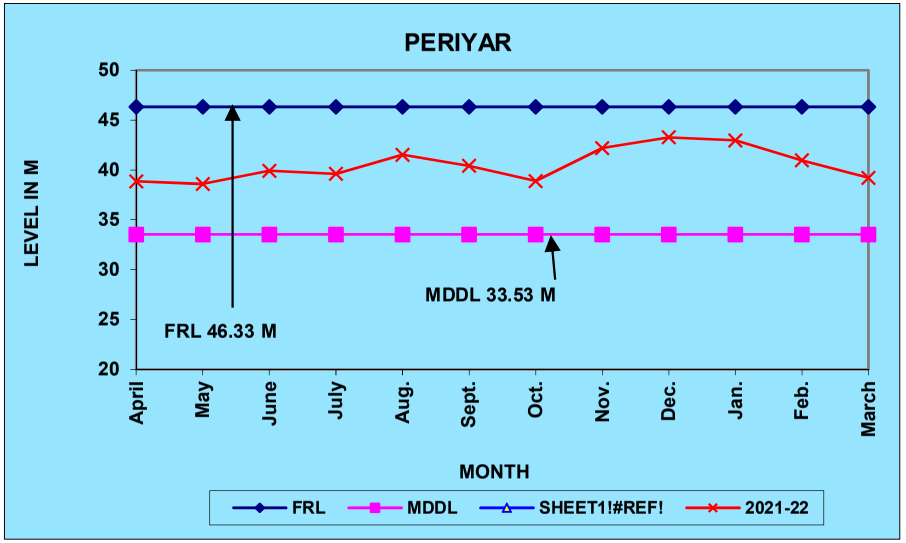
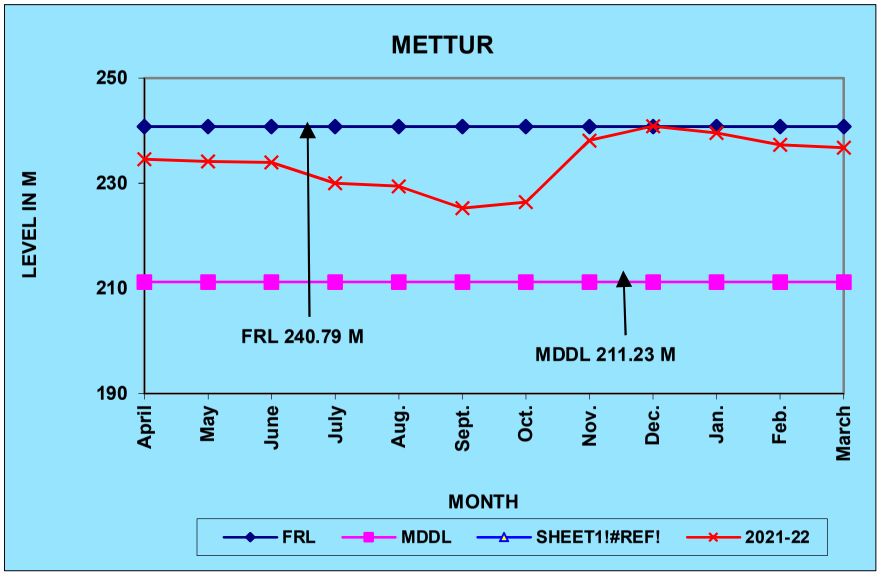


EXHIBIT 3.9

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







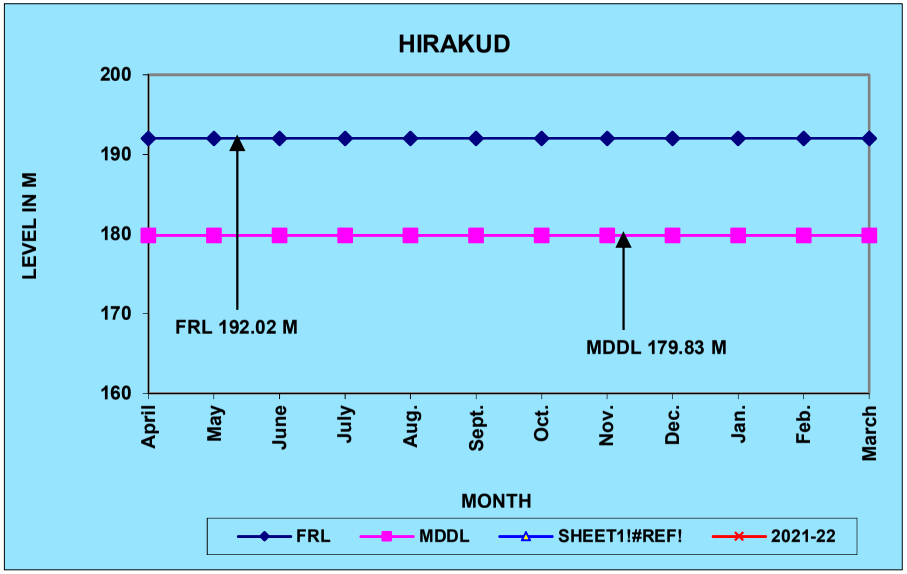
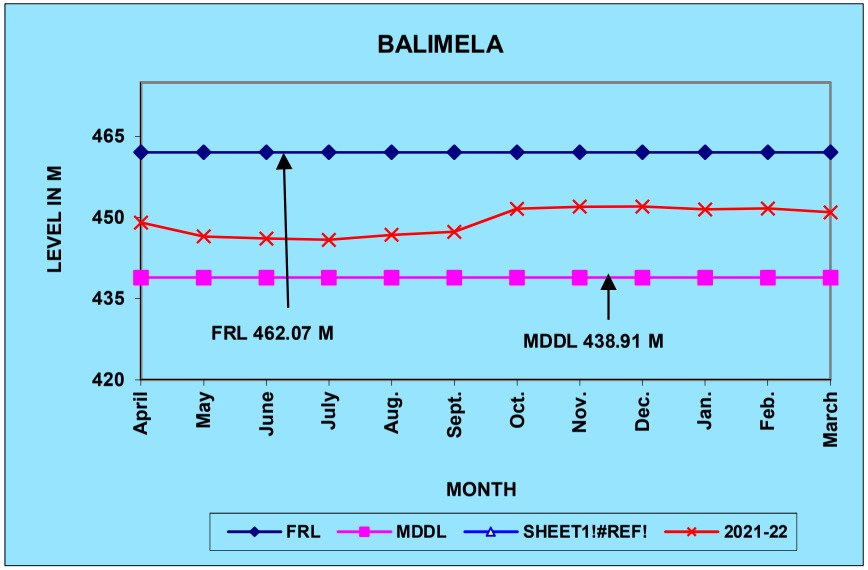
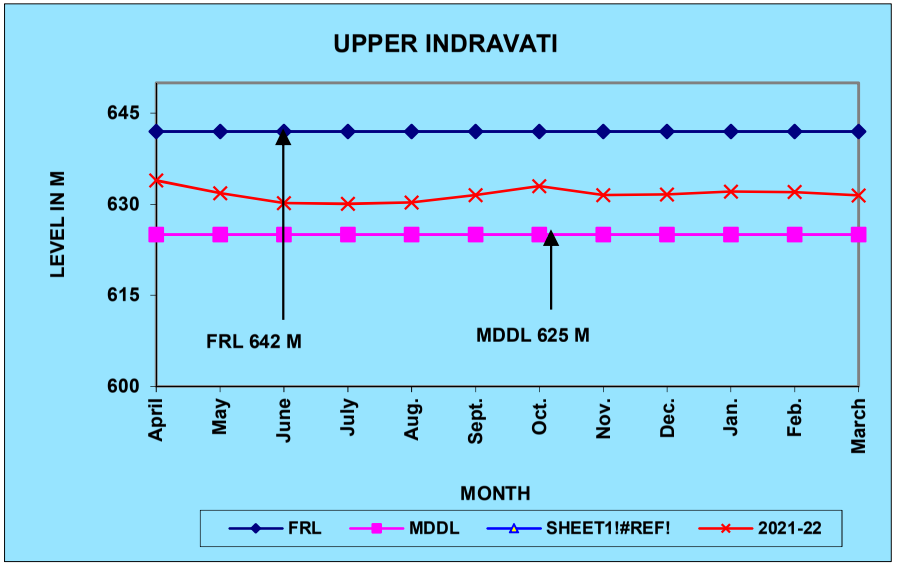
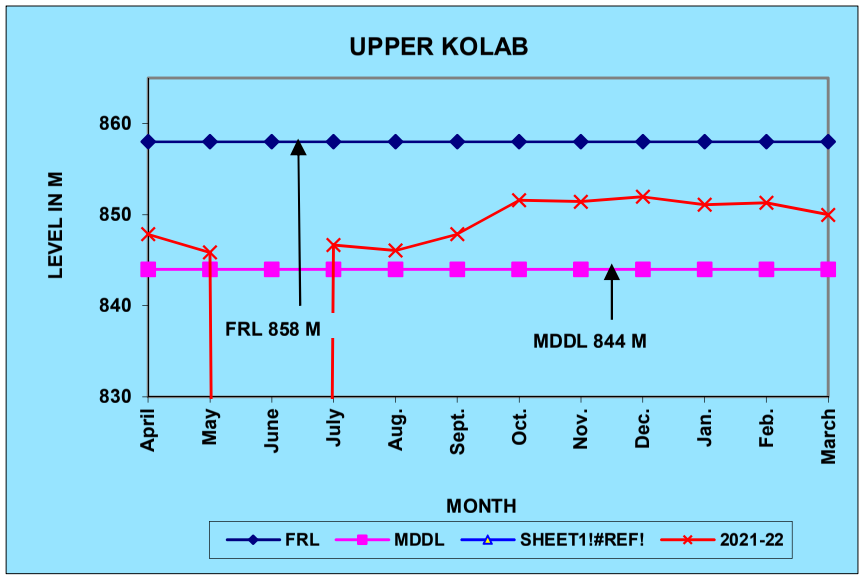


EXHIBIT 3.10

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS







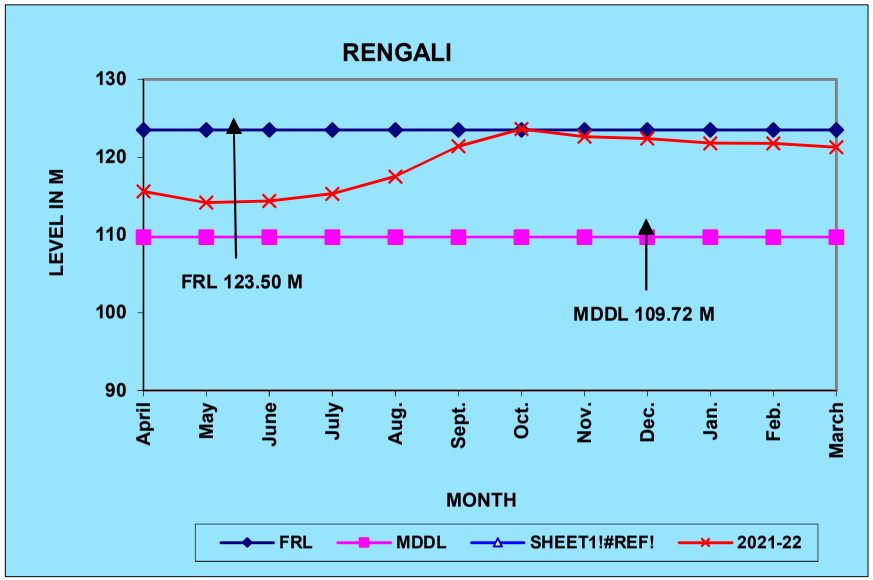


EXHIBIT 3.11

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

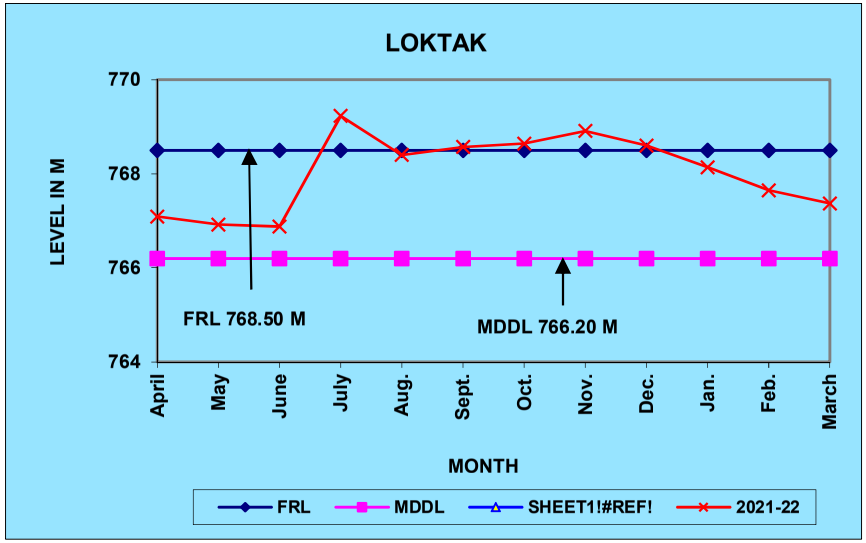
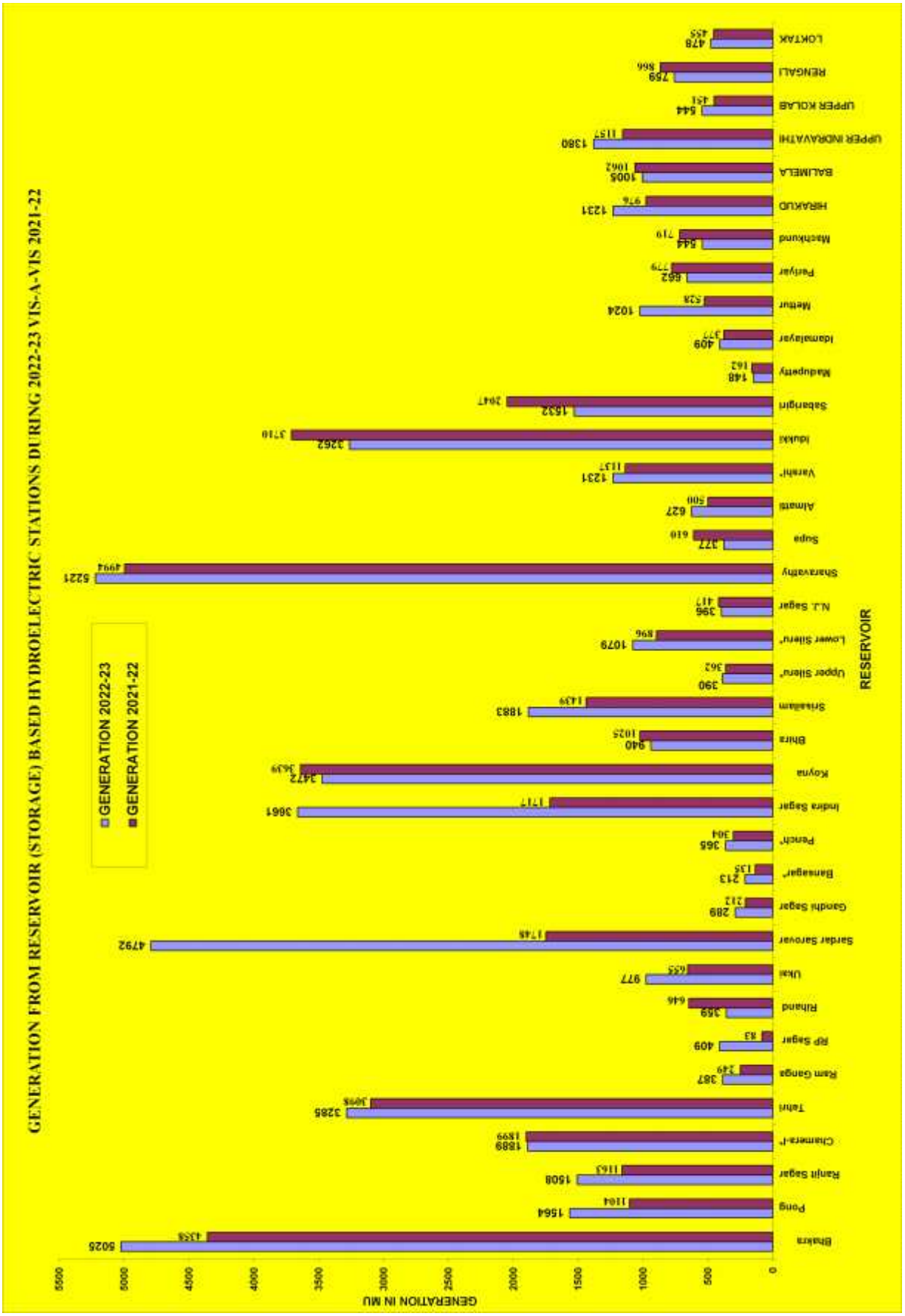


EXHIBIT-3.12


GENERATION FROM RESERVOIR (STORAGE) BASED HYDROELECTRIC STATIONS DURING 2022-23 VIS-A-VIS 2021-22
GENERATION 2022-23
GENERATION 2021-22
GENERATION IN MU
RESERVOIR
Bhakra
Pong
Ranjit Sagar
Chamera-I*
Tehri
Ram Ganga
RP Sagar
Rihand
Ukai
Sardar Sarovar
Gandhi Sagar
Bansagar*
Pench*
Indira Sagar
Koyna
Bhira
Srisailam
Upper Sileru*
Lower Sileru*
N.L. Sagar
Sharavathy
Supa
Almatti
Varahi*
Idukki
Sabarigiri
Maduprty
Idamalayar
Mettur
Periyar
Machkund
HIRAKUD
BALIMELA
UPPER INDRAVATHI
UPPER KOLAB
RENGALI
LOKTAK

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 NJ Sagar, Tehri, Ukai, Gandhi Sagar, Pench, Bhira, Koyna, Sirisailam, Lower Sileru, Sharavathy, Almatti Dam, Sabirigiri, Idukki, Mettur, Rengali, and Loktak reservoirs during 2022-23. Month-wise maximum levels of major reservoirs during 2022-23 vis-à-vis 2021-22 are indicated at **Exhibits 3.2** to **Exhibits 3.11**.

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 27 Nos. out of 44 Nos. reservoir based hydel stations, annual generation during the year 2022-23 was more than the annual generation targets. Generation from 44 H.E. Stations on 37 major reservoirs during the year 2022-23 has been 53316 MU, showing increase by 16.71 % over the 2021-22 generation of 45681 MU. Station-wise generation of reservoir stations during the year 2022-23 as compared to that of last year 2021-22 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	17	38.63	Pong, Ranjit Sagar, Ram Ganga, RP Sagar, Ukai, Sardar Sarovar, Gandhi Sagar, Bansagar, Indira Sagar, Srisailam, Lower Sileru, Almatti, Mettur, Hirakud , Upper Kolab
2	110 - 120	4	9.09	Bhakra, Pench, Indravati
3	100 - 110	6	13.63	Tehri, Upper Sileru, Sharavathy, Varahi, Idamalayar, Loktak

4	Below 100	17	38.63	Chamera-I, Rihand, Koyna, Bhira, N.J. Sagar, Supa, Idukki, Sabarigiri, Madupetty, chamera-I, Machkund, Balimela, Rengali

Generation of major reservoir based H.E. stations during 2022-23 as compared to the generation during last year i.e. 2021-22 is also depicted at **Exhibit-3.12**.

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

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2023	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2022-23			
						GROSS :	LIVE		Max.	DATE	Min	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	510.34	11.10.2022	473.79	29.06.2022
a	Bhakra Left	594.00	3924									
b	Bhakra Right	785.00										
2	Pong	396.00	1123	426.72	384.05	8053	6946	1084.00	422.32	30.09.2022	394.76829	29.06.2022
3	Chamera	540.00	1664.56	760.00	749.20		87		759.77	25.09.2022	749.86	20.01.2023
4	Ranjit Sagar	600.00	1507	527.91	487.91	3292	2191	390.00	524.33	01.10.2022	502.74	29.06.2022
5	Tehri	1000.00	2797	829.79	740.04	3540	2615	1291.49	830.00	12.10.2022	828.55	31.10.2022
6	Ramganga	198.00	334	366	323	2503.96	2109.25	480.8	359.86	10.12.2022	338.02	30.06.2022
7	Rana Pratap Sagar	172.00	459	352.81	343.83	2901	1569	175.66	352.93	10.10.2022	346.89	10.06.2022
8	Rihand	300.00	920	268.22	252.98	10605	5723	1177	261.68	24.10.2022	255.52	30.06.2022, 01.07.2022
	Sub-Total NR	**4585.00**	**12728.56**				**27756.25**					
WESTERN REGION												
9	Ukai	300.00	1080	105.16	82.3	8515	6615	813	105.18	30.10.2022	96.16	30.06.2022, 01.07.2022
10	Sardar Sarovar	1200.00	3635	138.68	110.18	9460	5760	1817.553	138.72	17.09.2022, 12.10.2022	114.13	06.07.2022
11	Gandhi Sagar	115.00	420.48	399.90	381.00	7743.00	6911.00	725.00	400.00	15.10.22	394.83	01.07.22
12	Bansagar	60.00	143	341.64	323.10		4934		341.64	28.09.2022, 01.10.2022	332.74	26.07.2022
13	Pench	160.00	315	490.00	464.00		1045		490	01.10.2022	482.24	17.06.2022
14	Indira Sagar	1000.00	1980	262.13	243.23	12237	9706	1316.12	262.13	08.09.2022	246.98	28.06.2022
15	Koyna	1636.00	3030	657.91	609.60	2797	2677	3126.00	659.57	21.09.2022	621.16	01.07.2022
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	607.26	19.08.2022	589.61	29.06.2022
	Sub-Total WR	**4771.00**	**11378.84**				**38170.33**					
SOUTHERN REGION												
17	Upper Sileru	240.00	529	414.53	406.51		88		411.07	15.11.2022	408.29	19.05.2022
18	Lower Sileru	460.00	1070	316.08	291.01		365		315.21	26.04.2022	304.57	31.03.2023
19	Srisailam	770.00	2900	269.74	243.84	8723.00	7166.00	1548.00	269.82	27.08.2022, 01.09.2022,03.10.2022	245.85	31.03.2023
20	Nagarjuna Sagar	815.60	2237	179.83	150.89	11560	6538	1398.00	167.13	25.09.2022, 02.10.2022,	161.46	13.07.2022

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

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2023	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2022-23			
						GROSS :	LIVE		Max.	DATE	Min	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)	(M)		(M)	
21	Sharavathy	1035.00	4932	554.43	522.73	5310	4297	4394.00	553.87	18.09.2022	533.43	21.06.2022
22	SUPA	955.00	3927	564.00	513.50	4178	3758	3927.00	554.06	25.10.2022	518.3027	20.06.2022
23	Almatti	290.00	483	519.60	511.10	2631.50	2628.00	175.30	519.73	31.08.2022, 01.09.2022, 01.10.2022,01.11.2022	510.51	04.06.2020
24	Varahi	460.00	1060	594.36	565.10		881.50		590.31	19.09.2022	569.16	11.06.2022
25	Idukki	780.00	2398	732.40	694.94	1996	1459	2146.00	728.05	14.09.2022	712.74	17.06.2022
26	Sabirigiri	300.00	1338	981.46	908.30	454	447	764.00	977.38	26.10.2022	950.11	24.06.2022
27	Madupetty	37.50	284	1599.50	1554.48		55.32	77.40	1599.35	30.12.2022	1583.15	30.06.2022
28	Idamalayar	75.00	380	169.00	115.00		1017.80	254.45	165.69	15.09.2022	137.91	15.06.2022
29	Mettur	250.00	541	240.79	211.23	2708.80	2645.20	204.00	241.11	17.07.2022	234.15	11.07.2022
30	Periyar	161.00	409	46.33	33.53	443	299	216	43.28	27.12.022	35.50	31.03.2023
	Sub-Total SR	**6629.10**	**22488.00**				**31645**					
EASTERN REGION												
31	Machkund	114.75	670	838.20	818.39	970.00	893.00	552.00	835.82	31.10.2022, 03.11.2022	819.56	05.07.2022
32	Hirakud	347.50	1174	192.02	179.83	4823.00	4709.00	372.00	192.01	29.09.2022, 01.10.2022	182.76	01.07.2022
33	Balimela	510.00	1183	462.07	438.91	3929	2676	898.00	452.66	29.10.2022	440.14	02.07.2022
34	Upper Indravati	600.00	1962	642.00	625.00	2300	1485.50	1213.14	640.61	01.09.2022	629.52	31.05.2022
35	Upper Kolab	320.00	832	858.00	844.00	1215	935.00	540	856.72	01.11.2022	845.24	14.06.2022
36	Rengali	250.00	525	123.50	109.72	3548	3167.81	275	123.37	22.10.2022	109.92	17.06.2022
	Sub-Total ER	**2142.25**	**6346.00**				**13866**					
NORTH EASTERN REGION												
37	Loktak	105	448	768.50	766.20	435.91	396.44	250	769.29	30.09.2020	766.01	14.04.2020
	Sub-Total NER	**105**	**448**				396.44		768.62	06.07.2022	766.72	26.03.2023
	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 729 generating units installed in 211 Hydro Electric Stations was made available by various organizations. The studies indicate that a total of 269101 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 43 generating units whereas annual maintenance was carried out for 71 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: 2022-23

S.NO	Type of Maintenance	No. of Units	Duration (Hours)	
			Max. for any unit	Average
1	ANNUAL MAINTENANCE	71	1531.58	463.79
2	AUXILIARY SYSTEM	9	11.62	8.4
3	CAPITAL/3 YEARLY MTCE.	43	8760	718.87
4	GENERATOR	31	1220.43	79.35
5	INSPECTION /MTCE	7	273.28	45.61
6	MONTHLY MAINTENANCE	60	3716.29	81.37
7	OTHER EQUIPMENT	14	4881.61	417.9
8	RENOVATION/MODERNISATION	10	1848.33	302.73
9	ROUTINE MAINTENANCE	10	325.58	44.59
10	TURBINE	16	408.25	183.14
11	MISCELLANEOUS	504	7941	340.16

4.3 There were a total of 1316 outages due to Planned Maintenance during the Year 2022-23, out of which about 74.24% were of duration up to 24 hours, while 25.76 % 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: 2022-23

Sl. No.	Duration	Number of Outage	Maintenance % to total number of Outages
1	more than 10 days	339	25.76
2	Less than 6 hour	516	39.21
3	6 to 24 hours	169	12.84
4	1 to 10 days	292	22.19
	Total No. of Outages	**1316**	**100**

4.4 Planned Maintenance age-wise

Planned maintenance carried out for different age groups of hydro generating units during the year 2022-23 is indicated in **Table 4.3**.

TABLE 4.3

PLANNED MAINTENANCE AGE-WISE
PERIOD: 2022-23

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	2022-23	2	120	0	0
2	2021-22	7	393	127	18
3	2020-21	8	510.00	0	0
4	2019-20	2	300.00	0	0
5	2018-19	3	140.00	0	0
6	2017-18	16	795.00	7824	489
7	2016-17	18	1659.00	3312	184

8	2015-16	17	1516.00	4272	251
9	2010-11 to 2014-15	63	4437.02	37896	602
10	2005-06 to 2009-10	66	7077.00	30480	462
11	2000-01 to 2004-05	74	6741.80	38448	520
12	1989-90 to 1999-2000	86	5769.70	34464	401
13	1978-79 to 1988-89	124	7259.10	71448	576
14	1967-68 to 1977-78	81	5279.75	76872	949
15	Up to 1966-67	162	4724.85	119520	738
	Total	**729**	**46850.17**	**456013**	**626**

It is seen that the average non-availability of units due to planned maintenance is relatively higher in case of older units commissioned from 1967-68 to 1977-78 (949 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: 2022-23

Sl. No.	Type of Turbine	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	BULB	26	684	3567	137
2	FRANCIS	421	32948.22	168969	401
3	KAPLAN	133	4399.05	50371	379
4	PELTON	149	8818.9	46194	310
	Total	**729**	**46850.17**	**269101**	**369**

The average non-availability due to planned maintenance was maximum for Francis turbine at 401 hrs. /unit followed by Kaplan units at 379 hrs. /unit, while it was minimum for Bulb units at 137 hrs. /unit.

4.6 Analysis based on Make of Generating Units

About 49.57% of the installed capacity of Hydro has been sourced from indigenous suppliers with BHEL alone accounting for about 42.69% of the capacity. The remaining 49.93 % 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: 2022-23

S. No	Name of Supplier/ Country of Make	No. of Units		Installed Capacity (MW)	Non-Availability due to		
		No.	% of total	MW	% of total	Total Hours	Hours/ Unit
A- Indigenous							
1	BHEL	312	42.69	20150.30	43.01	131990	426
2	Others	54	6.88	3395.50	7.25	38388	446
	SUB TOTAL	**366**	**49.57**	**23545.80**	**50.26**	**170378**	**430**
B- Imported							
3	USA	9	1.24	351.00	0.75	2739	144
4	U.K.	63	8.67	1242.10	2.66	14445	233
5	France	31	4.26	2179.20	4.66	127	12
6	Canada	44	6.05	3132.00	6.70	11843	312
7	USSR	26	3.58	2804.00	6.00	9003	346
8	Switzerland	21	2.89	790.20	1.69	8556	267
9	Japan	76	10.45	6398.20	13.69	30695	415
10	Other	93	12.79	6400	13.70	21315	309
	Sub Total	**363**	**49.93**	**23296.70**	**49.86**	**98723**	**298**
	Total	**729**	**100**	**46850.15**	**100**	**269101**	**728**

It is observed that during the year 2022-23, average non-availability due to planned maintenance of the units supplied by BHEL was 426 hrs. /unit.

Among the imported generating units, the average non-availability due to planned maintenance was the least for units supplied by france (12 hrs. /unit) and was maximum for units supplied by Japan (415 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: 2022-23

S.No	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Planned Maintenance
1	Northern	258	19696.27	5.14
2	Western	101	7392	3.09
3	Southern	246	11747.15	3.33
4	Eastern	86	5987.75	3.5
5	North Eastern	38	2027	8.26
	All India	**729**	**46850.17**	**4.22**

The non-availability of generating unit due to planned maintenance was least in Western Region (3.09%) followed by Southern Region at 3.33 %, whereas it was maximum in North Region (8.26 %) followed by Northern Region (5.14%).

The average non-availability of hydro electric units due to planned maintenance during the year 2022-23 was 4.22% as compared to 3.45% during the year 2021-22.

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 2022-23 vis-à-vis 2021-22 is summarized below in **Table 4.7.**

TABLE 4.7

NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES (2022-23 VIS-A-VIS 2021-22)

% Non-Availability due to planned maintenance	2022-23				2021-22			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	144	68.25	33208.12	70.88	165	78.57	37515.57	80.29
>5 to 10	41	19.43	7882.4	16.82	23	10.95	3814.95	8.17
>10 to 15	14	6.64	2670.65	5.7	12	5.71	3594.20	7.69
>15 to 20	5	2.37	1480	3.16	4	1.90	1087.80	2.33
>20 to 25	3	1.42	1066	2.28	1	0.48	30.00	0.06
>25 to 30	0	0	0	0	1	0.48	50.00	0.11
above 30	4	1.9	543	1.16	4	1.90	630.00	1.35
Total	**211**	**100**	**46850.17**	**100**	**210**	**100**	**46722.52**	**100**

It could be seen from above that 144 nos. (68.25% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2022-23 as compared to 165 nos. (78.57% of total) during 2021-22.

Non-availability due to planned maintenance was more than 30% at 4 nos. (1.90% of total) H.E. Stations during 2022-23 and which was 4 nos. (1.90% of total) in 2021-22 The details of these stations for 2022-23 is given below in **Table 4.8.**

TABLE 4.8

H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE FOR THE PERIOD: (2022-23)

Sl. No	Name of Station/Utility	Capacity (MW)	N.A. due to P.M.* (%)	Reasons
1	BANSAGAR TONS-I HPS / MPPGCL	315	42.821	CAPITAL/3 YEARLY MTCE.
2	BHIRA PSS HPS / TATA MAH.	150	55.726	OTHER EQUIPMENT
3	KHONDONG HPS / NEEPCO.	50	100	R AND M WORKS

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

29.12 % 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 NEEPCO (1276 hrs. /unit).

In case of State Sector, non-availability due to planned maintenance was maximum under MPPGCL (680 hrs. /unit).

In case of Private Sector, non-availability due to planned maintenance was maximum under GMR BHHPL (1560 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 619 hrs. /Unit, 286 hrs. /Unit and 392 hrs. /Unit respectively.

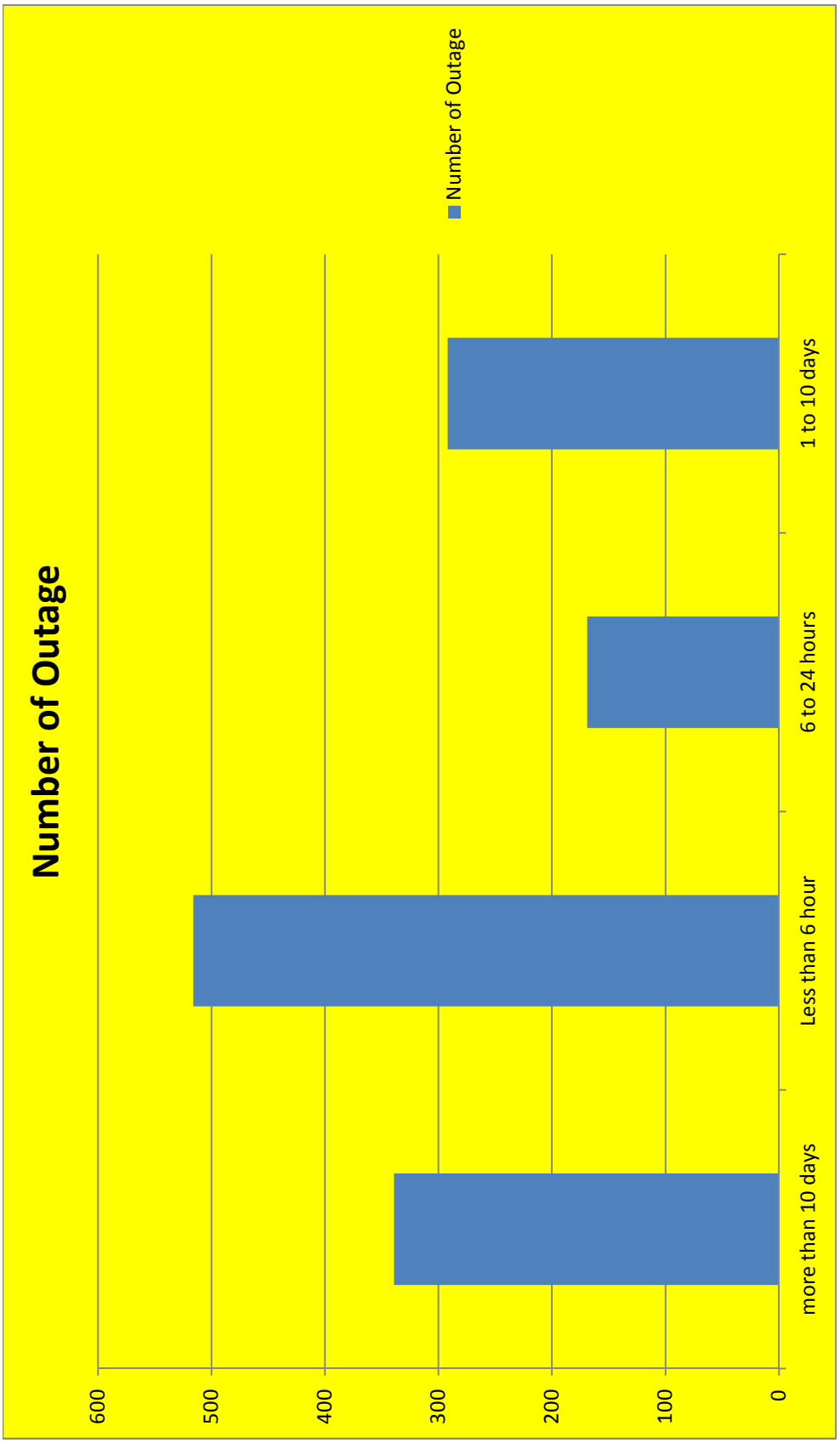
TABLE 4.9

SECTOR-WISE/ UTILITY-WISE PERFORMANCE PLANNED MAINTENANCE PERIOD: 2022-23

Sl. No.	Organization	No. of Units	Installed Capacity (MW)	Planned Maintenance (Hours)	Planned Maintenance per Unit (Hours)
(A)	**Central Sector**				
1	BBMB	28	2938.3	12332	440
2	DVC	5	143.2	66	13
3	NEEPCO.	20	1500	25528	1276
4	NHDC	16	1520	4784	299
5	NHPC	70	5451.2	46335	662
6	NTPC Ltd.	4	800	0	0

7	SJVNL	12	1912.02	2803	234
8	THDC	8	1400	9004	1126
Sub Total (CS)		**163**	**15664.72**	**100852**	**619**
(B)	**Private Sector**				
1	ADHPL	2	192.00	1539	769
2	AHPC (GVK)	4	330.00	0	0
3	DEPL	2	96.00	1073	536
4	DLHP	1	34.00	0	0
5	E.P.P.L.	2	100.00	7	3
6	GBHPPL	2	70.00	1079	539
7	GIPL	2	110.00	1318	659
8	GMR BHHPL	3	180.00	4680	1560
9	HBPCL	7	1345.00	1175	168
10	HSPCL	2	100.00	0	0
11	IAEPL	3	36.00	3837	1279
12	JPPVL	4	400.00	165	41
13	L&T	3	99.00	2208	736
14	MBPC	2	113.00	738	369
15	MPCL	2	86.00	794	397
16	SEPL	2	97.00	0	0
17	SKPPPL	2	96.00	0	0
18	TATA MAH.	15	447.00	4882	325
Sub Total (Pvt.)		**60**	**3931.00**	**23495**	**392**
(C)	**State Sector**				
1	APGCL	2	100.00	79	40
2	APGENCO	34	1796.75	3401	100
3	CSPGCL	3	120.00	0	0
4	GSECL	8	540.00	0	0
5	HPPCL	8	406.00	1882	235
6	HPSEB	12	372.00	5974	498
7	JKSPDC	12	1110.00	4530	377
8	JUUNL	2	130.00	0	0
9	KPCL	66	3617.20	23098	350
10	KSEB	47	1864.15	31802	677
11	MAHAGENCO	24	2406.00	1724	72
12	MeECL	13	322.00	1389	107
13	MPPGCL	23	875.00	15632	680
14	OHPC	31	2039.80	3522	114
15	PSPCL	25	1051.00	9188	368
16	RRVUNL	11	411.00	108	10
17	SSNNL	11	1450.00	360	33

18	TANGEDCO	69	2178.20	12881	187
19	TSGENCO	36	2405.60	620	17
20	TUL	6	1200.00	2961	494
21	UJVNL	36	1372.15	13204	367
22	UPJVNL	15	501.60	6466	431
23	WBSEDCL	12	986.00	5932	494
Sub Total (State)		**506**	**27254.45**	**144753**	**286**
All India		**729**	**46850.17**	**269101**	**369**


Number of Outage
Number of Outage
600
500
400
300
200
100
0
more than 10 days
Less than 6 hour
6 to 24 hours
1 to 10 days

CENTRAL ELECTRICITY AUTHORITY
Hydro WING
Hydro Project Planning & Investigation Division

Annex-4.1

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2022-23

(OUTAGE DURATION 50 HOURS AND ABOVE)

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
Eastern							
OHPC							
1	BALIMELA HPS	1	60.0	04/01/2022	04/30/2022	696.00	RENOVATION/MODERNISATION
GIPL							
2	CHUZACHEN HPS	2	55.0	12/22/2022	02/15/2023	1,316.97	ANNUAL MAINTENANCE
OHPC							
3	HIRAKUD HPS	3	32.0	02/07/2023	02/14/2023	176.31	ANNUAL MAINTENANCE
		4	32.0	11/28/2022	12/23/2022	602.20	ANNUAL MAINTENANCE
WBSEDCL							
4	JALDHAKA HPS ST-I	3	9.0	06/10/2022	06/29/2022	476.58	DRAFT TUBE
		3	9.0	01/17/2023	03/28/2023	1,687.17	ANNUAL MAINTENANCE
		4	9.0	01/17/2023	03/21/2023	1,514.00	ANNUAL MAINTENANCE
DEPL							
5	JORETHANG LOOP	1	48.0	12/01/2022	01/13/2023	1,033.63	ANNUAL MAINTENANCE
DVC							
6	MAITHON HPS	1	20.0	09/02/2022	09/05/2022	66.45	GOVERNOR SYSTEM
WBSEDCL							
7	RAMMAM HPS	1	12.5	11/30/2022	12/02/2022	57.03	ANNUAL MAINTENANCE
		1	12.5	12/30/2022	01/09/2023	255.43	ANNUAL MAINTENANCE
		1	12.5	10/27/2022	11/26/2022	732.23	ANNUAL MAINTENANCE
		2	12.5	01/02/2023	01/24/2023	542.46	ANNUAL MAINTENANCE
		4	12.5	12/02/2022	12/29/2022	652.14	ANNUAL MAINTENANCE
NHPC							
8	RANGIT HPS	1	20.0	01/14/2023	03/02/2023	1,124.62	ANNUAL MAINTENANCE
		1	20.0	04/13/2022	04/15/2022	61.50	TESTING/CHECKING
		2	20.0	01/14/2023	03/01/2023	1,098.37	ANNUAL MAINTENANCE
		2	20.0	06/30/2022	07/02/2022	59.98	PENSTOCK PRESSURE SHAFT
		3	20.0	01/14/2023	03/02/2023	1,107.77	ANNUAL MAINTENANCE
		3	20.0	06/30/2022	07/02/2022	60.07	PENSTOCK PRESSURE SHAFT
MBPC							
9	RONGNICHU HPS	1	56.5	02/14/2023	02/27/2023	310.28	ANNUAL MAINTENANCE
		2	56.5	02/14/2023	02/27/2023	310.28	ANNUAL MAINTENANCE
TUL							

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
10	TEESTA-III HPS	1	200.0	01/12/2023	01/28/2023	395.38	ANNUAL MAINTENANCE
		1	200.0	02/28/2023	03/12/2023	311.98	ANNUAL MAINTENANCE
		2	200.0	01/12/2023	01/28/2023	396.50	ANNUAL MAINTENANCE
		2	200.0	03/13/2023	03/25/2023	296.27	ANNUAL MAINTENANCE
		3	200.0	01/12/2023	02/04/2023	565.35	ANNUAL MAINTENANCE
		4	200.0	12/24/2022	01/11/2023	434.23	ANNUAL MAINTENANCE
		6	200.0	02/04/2023	02/26/2023	514.10	ANNUAL MAINTENANCE
NHPC							
11	TEESTA LOW DAM-III	1	33.0	01/04/2023	02/16/2023	1,024.15	ANNUAL MAINTENANCE
		2	33.0	01/14/2023	02/17/2023	810.58	TESTING/CHECKING
		3	33.0	01/14/2023	02/14/2023	742.12	TESTING/CHECKING
		3	33.0	03/10/2023	03/25/2023	370.03	ANNUAL MAINTENANCE
		4	33.0	02/17/2023	03/07/2023	440.53	ANNUAL MAINTENANCE
		4	33.0	01/14/2023	02/15/2023	759.98	TESTING/CHECKING
12	TEESTA LOW DAM-IV	1	40.0	04/01/2022	04/12/2022	276.05	ANNUAL MAINTENANCE
		1	40.0	01/04/2023	01/20/2023	393.23	ANNUAL MAINTENANCE
		2	40.0	01/27/2023	02/13/2023	419.50	ANNUAL MAINTENANCE
		3	40.0	12/01/2022	12/22/2022	517.00	ANNUAL MAINTENANCE
		4	40.0	02/23/2023	03/18/2023	559.23	ANNUAL MAINTENANCE
13	TEESTA V HPS	1	170.0	01/12/2023	01/24/2023	303.85	ANNUAL MAINTENANCE
		2	170.0	02/21/2023	03/03/2023	234.80	ANNUAL MAINTENANCE
		3	170.0	01/29/2023	02/10/2023	275.37	ANNUAL MAINTENANCE
OHPC							
14	UPPER KOLAB HPS	3	80.0	09/23/2022	12/01/2022	1,651.89	MONTHLY MAINTENANCE
North Eastern							
NEEPCO.							
15	DOYANG HPS	1	25.0	11/01/2022	11/04/2022	88.41	MISCELLANEOUS PLANNED
		1	25.0	11/10/2022	11/30/2022	468.77	ANNUAL MAINTENANCE
		1	25.0	04/05/2022	04/23/2022	444.00	ANNUAL MAINTENANCE
		2	25.0	11/01/2022	11/04/2022	88.83	MISCELLANEOUS PLANNED
		2	25.0	01/09/2023	01/28/2023	469.60	ANNUAL MAINTENANCE
		3	25.0	04/01/2022	04/29/2022	684.50	MISCELLANEOUS PLANNED
		3	25.0	02/06/2023	02/18/2023	304.32	ANNUAL MAINTENANCE
		3	25.0	11/01/2022	11/04/2022	89.07	MISCELLANEOUS PLANNED
16	KAMENG HPS	1	150.0	04/01/2022	05/20/2022	1,198.28	ANNUAL MAINTENANCE
		2	150.0	04/29/2022	05/10/2022	278.83	ANNUAL MAINTENANCE
		2	150.0	12/01/2022	12/27/2022	644.35	ANNUAL MAINTENANCE
		3	150.0	02/15/2023	03/30/2023	1,048.33	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	150.0	01/02/2023	01/11/2023	231.80	ANNUAL MAINTENANCE
17	KHONDONG HPS	1	25.0	04/01/2022	03/31/2023	8,760.00	R AND M / REFURBISHMENT
		2	25.0	04/01/2022	03/31/2023	8,760.00	R AND M / REFURBISHMENT
NHPC							
18	LOKTAK HPS	2	35.0	02/18/2023	02/28/2023	248.37	ANNUAL MAINTENANCE
		3	35.0	01/20/2023	01/30/2023	252.45	ANNUAL MAINTENANCE
MeECL							
19	NEW UMTRU HPS	1	20.0	02/02/2023	02/09/2023	185.50	ANNUAL MAINTENANCE
		2	20.0	02/17/2023	03/06/2023	415.92	ANNUAL MAINTENANCE
NEEPCO.							
20	PARE	1	55.0	02/01/2023	02/13/2023	303.95	ANNUAL MAINTENANCE
		2	55.0	02/21/2023	03/06/2023	323.73	ANNUAL MAINTENANCE
21	RANGANADI HPS	1	135.0	01/23/2023	02/02/2023	244.67	ANNUAL MAINTENANCE
		2	135.0	01/03/2023	01/11/2023	196.75	ANNUAL MAINTENANCE
		3	135.0	12/01/2022	12/11/2022	246.25	ANNUAL MAINTENANCE
22	TUIRIAL HPS	1	30.0	04/25/2022	05/08/2022	324.50	ANNUAL MAINTENANCE
		2	30.0	05/16/2022	05/29/2022	329.00	ANNUAL MAINTENANCE
MeECL							
23	UMIAM HPS ST-I	1	9.0	11/07/2022	12/07/2022	721.42	GENERATOR TRANSFORMER
Northern							
ADHPL							
24	ALLAIN DUHANGAN	1	96.0	02/08/2023	02/13/2023	127.48	MISCELLANEOUS PLANNED
		1	96.0	12/01/2022	12/27/2022	633.02	ANNUAL MAINTENANCE
		2	96.0	01/02/2023	01/25/2023	560.08	ANNUAL MAINTENANCE
PSPCL							
25	ANANDPUR SAHIB-II	4	33.5	01/01/2023	01/27/2023	624.00	ANNUAL MAINTENANCE
JKSPDC							
26	BAGLIHAR HPS	3	150.0	04/01/2022	05/01/2022	737.00	PENSTOCK PRESSURE SHAFT
NHPC							
27	BAIRA SIUL HPS	1	60.0	04/01/2022	04/09/2022	202.75	ANNUAL MAINTENANCE
		1	60.0	01/02/2023	01/21/2023	466.07	ANNUAL MAINTENANCE
		2	60.0	02/22/2023	03/21/2023	651.17	MISCELLANEOUS PLANNED
		2	60.0	12/12/2022	12/28/2022	377.22	ANNUAL MAINTENANCE
		3	60.0	11/14/2022	12/09/2022	612.02	ANNUAL MAINTENANCE
GMR BHHPL							
28	BAJOLI HOLI HPS	1	60.0	01/02/2023	03/02/2023	1,416.00	MISCELLANEOUS PLANNED
		2	60.0	12/23/2022	03/02/2023	1,632.00	MISCELLANEOUS PLANNED
		3	60.0	12/23/2022	03/02/2023	1,632.00	MISCELLANEOUS PLANNED
HBPCL							
29	BASPA HPS	1	100.0	01/11/2023	01/19/2023	201.00	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	100.0	02/24/2023	03/06/2023	243.00	ANNUAL MAINTENANCE
		3	100.0	01/30/2023	02/11/2023	293.00	ANNUAL MAINTENANCE
		3	100.0	03/14/2023	03/17/2023	82.83	UPRATING
HPSEB							
30	BASSI HPS	2	16.5	03/11/2023	03/14/2023	82.00	ANNUAL MAINTENANCE
		3	16.5	01/14/2023	02/09/2023	630.78	ANNUAL MAINTENANCE
BBMB							
31	BHAKRA LEFT HPS	1	108.0	04/01/2022	03/31/2023	8,760.00	RENOVATION/MODERNISATION
		4	126.0	01/26/2023	01/31/2023	144.00	ANNUAL MAINTENANCE
32	BHAKRA RIGHT HPS	8	157.0	10/29/2022	11/26/2022	678.95	ANNUAL MAINTENANCE
		9	157.0	11/28/2022	12/16/2022	434.83	NEW UNIT-UNDER TESTING
GBHPPL							
33	BUDHIL HPS	1	35.0	12/06/2022	01/19/2023	1,078.83	ANNUAL MAINTENANCE
NHPC							
34	CHAMERA-I HPS	1	180.0	01/05/2023	03/07/2023	1,475.07	ANNUAL MAINTENANCE
		2	180.0	03/10/2023	03/27/2023	410.36	ANNUAL MAINTENANCE
		3	180.0	12/07/2022	12/27/2022	486.50	ANNUAL MAINTENANCE
35	CHAMERA-II HPS	1	100.0	11/26/2022	12/10/2022	347.73	ANNUAL MAINTENANCE
		2	100.0	01/20/2023	02/19/2023	730.52	CAPITAL MAINTENANCE
		3	100.0	01/02/2023	01/14/2023	298.18	ANNUAL MAINTENANCE
36	CHAMERA-III HPS	1	77.0	01/28/2023	02/09/2023	305.18	CAPITAL MAINTENANCE
		2	77.0	01/03/2023	01/07/2023	95.10	TESTING/CHECKING
		2	77.0	01/14/2023	01/28/2023	344.45	BUTTERFLY VALVE
		2	77.0	02/12/2023	03/02/2023	436.42	ANNUAL MAINTENANCE
		3	77.0	01/14/2023	01/28/2023	343.43	BUTTERFLY VALVE
IAEPL							
37	CHANJU-I HPS	1	12.0	12/21/2022	01/12/2023	543.25	ANNUAL MAINTENANCE
		1	12.0	12/09/2022	12/21/2022	288.00	PENSTOCK PRESSURE SHAFT
		2	12.0	12/09/2022	12/21/2022	288.00	PRESSURE SHAFT INSPECTION
		2	12.0	01/13/2023	02/19/2023	898.30	ANNUAL MAINTENANCE
		3	12.0	10/03/2022	12/05/2022	1,531.58	ANNUAL MAINTENANCE
		3	12.0	12/09/2022	12/21/2022	288.01	PRESSURE SHAFT INSPECTION
UJVNL							
38	CHILLA HPS	1	36.0	12/21/2022	01/25/2023	840.00	ANNUAL MAINTENANCE
		3	36.0	01/21/2023	02/15/2023	600.00	ANNUAL MAINTENANCE
		4	36.0	11/17/2022	12/16/2022	708.80	ANNUAL MAINTENANCE
NHPC							
39	CHUTAK HPS	1	11.0	01/05/2023	01/23/2023	438.50	ANNUAL MAINTENANCE
		2	11.0	12/12/2022	12/30/2022	441.95	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	11.0	11/01/2022	12/10/2022	938.75	CAPITAL MAINTENANCE
		4	11.0	12/30/2022	01/17/2023	434.77	ANNUAL MAINTENANCE
BBMB							
40	DEHAR HPS	5	165.0	09/10/2022	10/06/2022	637.00	CAPITAL MAINTENANCE
UJVNL							
41	DHAKRANI HPS	1	11.25	12/09/2022	01/27/2023	1,184.87	ANNUAL MAINTENANCE
42	DHALIPUR HPS	1	17.0	08/02/2022	10/26/2022	2,040.00	RENOVATION/MODERNISATION
NHPC							
43	DHAULI GANGA HPS	1	70.0	01/09/2023	01/28/2023	469.52	ANNUAL MAINTENANCE
		1	70.0	04/01/2022	04/04/2022	86.18	ANNUAL MAINTENANCE
		2	70.0	02/01/2023	02/20/2023	464.80	ANNUAL MAINTENANCE
		3	70.0	04/06/2022	04/23/2022	408.67	ANNUAL MAINTENANCE
		4	70.0	02/23/2023	03/12/2023	418.35	ANNUAL MAINTENANCE
44	DULHASTI HPS	1	130.0	02/10/2023	03/21/2023	928.38	MISCELLANEOUS PLANNED
		2	130.0	02/10/2023	03/28/2023	1,114.32	MISCELLANEOUS PLANNED
		3	130.0	02/10/2023	03/18/2023	874.47	MISCELLANEOUS PLANNED
		3	130.0	07/15/2022	07/24/2022	207.37	RUNNER INSPECTION /REPAIR
BBMB							
45	GANGUWAL HPS	1	29.25	11/07/2022	11/14/2022	170.00	HALF YEARLY MAINTENANCE
		2	24.2	11/14/2022	11/19/2022	119.58	HALF YEARLY MAINTENANCE
HPSEB							
46	GIRI BATA HPS	1	30.0	02/28/2023	03/07/2023	179.17	ANNUAL MAINTENANCE
		2	30.0	04/21/2022	05/30/2022	960.00	ANNUAL MAINTENANCE
HBPCL							
47	KARCHAM WANGTOO	4	261.25	12/23/2022	01/05/2023	314.53	ANNUAL MAINTENANCE
UPJVNL							
48	KHARA HPS	1	24.0	12/20/2022	02/08/2023	1,191.25	ANNUAL MAINTENANCE
		3	24.0	02/14/2023	03/12/2023	635.08	ANNUAL MAINTENANCE
UJVNL							
49	KHODRI HPS	1	30.0	01/31/2023	02/10/2023	249.93	ANNUAL MAINTENANCE
		1	30.0	11/06/2022	12/03/2022	650.00	ANNUAL MAINTENANCE
		2	30.0	01/15/2023	02/11/2023	665.75	ANNUAL MAINTENANCE
		3	30.0	12/07/2022	01/06/2023	730.42	EXTENDED CAPITAL
NHPC							
50	KISHANGANGA HPS	1	110.0	11/23/2022	11/30/2022	168.00	MISCELLANEOUS PLANNED
		1	110.0	12/01/2022	01/05/2023	840.00	ANNUAL MAINTENANCE
		2	110.0	01/05/2023	02/14/2023	971.60	ANNUAL MAINTENANCE
		3	110.0	02/20/2023	03/03/2023	269.98	ANNUAL MAINTENANCE
THDC							
51	KOTESHWAR HPS	1	100.0	04/01/2022	02/25/2023	7,941.02	GENERATOR TRANSFORMER

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	100.0	06/06/2022	06/27/2022	523.02	ANNUAL MAINTENANCE
BBMB							
52	KOTLA HPS	3	24.2	11/14/2022	11/19/2022	127.97	HALF YEARLY MAINTENANCE
UJVNL							
53	KULHAL HPS	1	10.0	01/01/2023	03/31/2023	2,159.75	MISCELLANEOUS PLANNED
		2	10.0	12/21/2022	12/31/2022	249.08	ANNUAL MAINTENANCE
		2	10.0	01/01/2023	01/18/2023	412.58	SHUT
		3	10.0	11/18/2022	11/30/2022	301.25	ANNUAL MAINTENANCE
		3	10.0	12/01/2022	12/20/2022	479.92	SCHEDULED ANNUAL
HPSEB							
54	LARJI HPS	1	42.0	03/12/2023	03/28/2023	374.00	ANNUAL MAINTENANCE
MPCL							
55	MALANA HPS	1	43.0	12/02/2022	12/18/2022	400.75	ANNUAL MAINTENANCE
		2	43.0	01/17/2023	02/02/2023	393.30	ANNUAL MAINTENANCE
UJVNL							
56	MANERI BHALI-I HPS	3	30.0	10/17/2022	12/23/2022	1,591.02	R AND M WORKS
SJVNL							
57	NATHPA JHAKRI HPS	1	250.0	02/01/2023	02/09/2023	214.03	ANNUAL MAINTENANCE
		2	250.0	02/21/2023	02/28/2023	184.57	ANNUAL MAINTENANCE
		3	250.0	02/16/2023	02/18/2023	65.98	ANNUAL MAINTENANCE
		3	250.0	01/21/2023	01/30/2023	219.77	ANNUAL MAINTENANCE
		4	250.0	02/11/2023	02/20/2023	222.55	ANNUAL MAINTENANCE
		4	250.0	01/27/2023	01/30/2023	74.28	ANNUAL MAINTENANCE
		5	250.0	03/01/2023	03/07/2023	166.53	ANNUAL MAINTENANCE
		6	250.0	03/11/2023	03/18/2023	187.00	ANNUAL MAINTENANCE
NHPC							
58	NIMMO BAZGO HPS	1	15.0	11/17/2022	12/08/2022	514.13	ANNUAL MAINTENANCE
		2	15.0	01/17/2023	02/05/2023	461.58	ANNUAL MAINTENANCE
		3	15.0	12/17/2022	01/12/2023	635.48	ANNUAL MAINTENANCE
UPJVNL							
59	OBRA HPS	1	33.0	07/18/2022	08/02/2022	348.58	ANNUAL MAINTENANCE
		1	33.0	11/14/2022	11/18/2022	97.08	TESTING/CHECKING
		2	33.0	07/04/2022	07/12/2022	195.25	ANNUAL MAINTENANCE
		2	33.0	11/09/2022	11/18/2022	223.17	TESTING/CHECKING
		3	33.0	06/13/2022	09/27/2022	2,563.00	CAPITAL MAINTENANCE
		3	33.0	11/10/2022	11/17/2022	172.83	TESTING/CHECKING
NHPC							
60	PARBATI-III HPS	1	130.0	09/10/2022	09/18/2022	208.12	TESTING/CHECKING
		2	130.0	11/21/2022	01/02/2023	1,015.95	ANNUAL MAINTENANCE
		3	130.0	01/06/2023	02/25/2023	1,209.17	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	130.0	07/11/2022	07/30/2022	464.15	MISC. SHORT DURATION
		4	130.0	01/02/2023	02/07/2023	865.98	ANNUAL MAINTENANCE
		4	130.0	07/02/2022	07/06/2022	92.43	MISCELLANEOUS PLANNED
BBMB							
61	PONG HPS	2	66.0	10/23/2022	11/03/2022	270.50	OVERHAULING WORKS
		4	66.0	10/27/2022	11/16/2022	482.27	HALF YEARLY MAINTENANCE
		6	66.0	12/08/2022	12/27/2022	450.92	PENSTOCK PRESSURE SHAFT
UJVNL							
62	RAMGANGA HPS	1	66.0	12/14/2022	12/18/2022	99.45	MISC. SHORT DURATION
SJVNL							
63	RAMPUR HPS	1	68.67	02/16/2023	02/18/2023	65.03	BUTTERFLY VALVE
		1	68.67	02/21/2023	02/27/2023	153.60	ANNUAL MAINTENANCE
		2	68.67	02/12/2023	02/19/2023	186.17	ANNUAL MAINTENANCE
		3	68.67	01/27/2023	01/30/2023	72.02	BUTTERFLY VALVE
		3	68.67	03/01/2023	03/07/2023	157.62	ANNUAL MAINTENANCE
		4	68.67	01/21/2023	02/01/2023	281.37	ANNUAL MAINTENANCE
		5	68.67	03/16/2023	03/19/2023	91.98	BUTTERFLY VALVE
		5	68.67	02/02/2023	02/10/2023	194.77	ANNUAL MAINTENANCE
		6	68.67	03/11/2023	03/20/2023	224.18	ANNUAL MAINTENANCE
PSPCL							
64	RANJIT SAGAR HPS	2	150.0	09/21/2022	10/01/2022	257.58	GENERATOR
		2	150.0	10/18/2022	11/29/2022	1,020.25	ANNUAL MAINTENANCE
		2	150.0	01/27/2023	02/03/2023	179.08	DRAFT TUBE
		3	150.0	08/06/2022	01/08/2023	3,716.29	MONTHLY MAINTENANCE
		3	150.0	01/21/2023	02/04/2023	325.58	ROUTINE MAINTENANCE
		4	150.0	11/16/2022	11/19/2022	64.92	MONTHLY MAINTENANCE
		4	150.0	11/28/2022	12/31/2022	792.00	ANNUAL MAINTENANCE
		4	150.0	01/23/2023	02/05/2023	307.33	MONTHLY MAINTENANCE
UPJVNL							
65	RIHAND HPS	3	50.0	06/11/2022	07/20/2022	937.00	ANNUAL MAINTENANCE
RRVUNL							
66	R P SAGAR HPS	3	43.0	02/13/2023	02/16/2023	87.02	INSPECTION /MTCE
HPPCL							
67	SAINJ HPS	2	50.0	04/10/2022	04/15/2022	125.77	ANNUAL MAINTENANCE
NHPC							
68	SALAL HPS	2	115.0	02/26/2023	03/09/2023	279.97	T.R.T/ T.R.C.
		2	115.0	11/23/2022	12/10/2022	409.00	ANNUAL MAINTENANCE
		3	115.0	02/26/2023	03/09/2023	279.88	T.R.T/ T.R.C.
		3	115.0	02/03/2023	02/25/2023	537.38	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	115.0	02/21/2023	03/09/2023	397.37	ANNUAL MAINTENANCE
		5	115.0	02/26/2023	03/09/2023	280.23	T.R.T/ T.R.C.
		5	115.0	12/11/2022	02/09/2023	1,452.42	CAPITAL MAINTENANCE
		6	115.0	02/26/2023	03/09/2023	280.23	T.R.T/ T.R.C.
		6	115.0	11/04/2022	11/21/2022	415.82	ANNUAL MAINTENANCE
HPSEB							
69	SANJAY HPS	1	40.0	01/25/2023	02/14/2023	492.67	ANNUAL MAINTENANCE
		1	40.0	12/07/2022	01/24/2023	1,176.00	ANNUAL MAINTENANCE
		1	40.0	03/06/2023	03/28/2023	536.99	ANNUAL MAINTENANCE
		2	40.0	10/18/2022	12/05/2022	1,175.93	ANNUAL MAINTENANCE
		3	40.0	04/01/2022	04/12/2022	277.50	ANNUAL MAINTENANCE
HPPCL							
70	SAWRA KUDDU HPS	1	37.0	03/13/2023	03/20/2023	174.70	PENSTOCK B.F.VALVE PROBLEM
		1	37.0	12/20/2022	02/09/2023	1,220.43	GENERATOR
		2	37.0	03/13/2023	03/20/2023	168.40	PENSTOCK B.F.VALVE PROBLEM
		3	37.0	03/13/2023	03/21/2023	192.42	PENSTOCK B.F.VALVE PROBLEM
NHPC							
71	SEWA-II HPS	1	40.0	11/25/2022	12/11/2022	404.83	ANNUAL MAINTENANCE
		2	40.0	11/25/2022	12/12/2022	429.90	ANNUAL MAINTENANCE
		3	40.0	11/25/2022	12/09/2022	340.77	ANNUAL MAINTENANCE
		3	40.0	02/11/2023	02/15/2023	100.12	INSPECTION /MTCE
PSPCL							
72	SHANAN HPS	1	15.0	10/26/2022	11/14/2022	462.67	ANNUAL MAINTENANCE
		2	15.0	11/14/2022	12/07/2022	558.33	ANNUAL MAINTENANCE
		3	15.0	12/08/2022	12/30/2022	531.47	ANNUAL MAINTENANCE
L&T							
73	SINGOLI BHATWARI	1	33.0	12/10/2022	01/10/2023	734.80	ANNUAL MAINTENANCE
		2	33.0	01/22/2023	02/20/2023	706.93	ANNUAL MAINTENANCE
		3	33.0	03/01/2023	03/29/2023	679.47	ANNUAL MAINTENANCE
		3	33.0	05/19/2022	05/21/2022	57.47	TURBINE INSPECTION MISC
NHPC							
74	TANAKPUR HPS	1	31.4	02/07/2023	02/12/2023	130.20	RUNNER INSPECTION
		1	31.4	12/04/2022	01/02/2023	704.20	ANNUAL MAINTENANCE
		2	31.4	01/03/2023	02/05/2023	792.22	ANNUAL MAINTENANCE
		3	31.4	02/23/2023	03/27/2023	777.83	ANNUAL MAINTENANCE
THDC							
75	TEHRI ST-1 HPS	1	250.0	04/01/2022	04/13/2022	307.00	ANNUAL MAINTENANCE
		3	250.0	06/09/2022	06/18/2022	233.00	ANNUAL MAINTENANCE
NHPC							

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
76	URI-I HPS	1	120.0	11/14/2022	12/08/2022	579.12	ANNUAL MAINTENANCE
		2	120.0	12/08/2022	12/29/2022	511.37	ANNUAL MAINTENANCE
		3	120.0	12/30/2022	01/25/2023	629.32	CAPITAL MAINTENANCE
		4	120.0	01/27/2023	02/24/2023	673.95	CAPITAL MAINTENANCE
77	URI-II HPS	1	60.0	11/28/2022	12/20/2022	530.92	CAPITAL MAINTENANCE
		2	60.0	12/21/2022	12/31/2022	242.53	ANNUAL MAINTENANCE
		3	60.0	11/14/2022	11/26/2022	294.98	ANNUAL MAINTENANCE
		4	60.0	01/09/2023	01/20/2023	269.52	ANNUAL MAINTENANCE
JPPVL							
78	VISHNU PRAYAG HPS	1	100.0	11/24/2022	11/26/2022	51.67	ANNUAL MAINTENANCE
		4	100.0	12/28/2022	12/30/2022	52.53	ANNUAL MAINTENANCE
Southern							
TANGEDCO							
79	BHAWANI BARRAGE-II	1	15.0	01/29/2023	03/12/2023	1,031.24	MISCELLANEOUS PLANNED
KPCL							
80	GERUSUPPA HPS	2	60.0	01/19/2023	01/31/2023	295.85	ANNUAL MAINTENANCE
		3	60.0	11/18/2022	11/30/2022	291.85	ANNUAL MAINTENANCE
KSEB							
81	IDAMALAYAR HPS	1	37.5	11/08/2022	12/03/2022	609.50	ANNUAL MAINTENANCE
		2	37.5	06/23/2022	07/12/2022	472.08	ANNUAL MAINTENANCE
82	IDUKKI HPS	1	130.0	09/15/2022	10/22/2022	895.47	ANNUAL MAINTENANCE
		2	130.0	11/20/2022	12/29/2022	934.07	MONTHLY MAINTENANCE
		2	130.0	02/09/2023	02/28/2023	468.12	ANNUAL MAINTENANCE
		2	130.0	06/24/2022	06/27/2022	81.68	GENERATOR TRANSFORMER
		3	130.0	10/25/2022	10/28/2022	83.07	MISCELLANEOUS PLANNED
		3	130.0	11/04/2022	11/09/2022	131.00	TESTING/CHECKING
		3	130.0	06/16/2022	07/27/2022	991.10	ANNUAL MAINTENANCE
		4	130.0	12/26/2022	01/17/2023	535.82	ANNUAL MAINTENANCE
		5	130.0	01/18/2023	02/06/2023	468.73	ANNUAL MAINTENANCE
		6	130.0	11/16/2022	12/24/2022	919.12	ANNUAL MAINTENANCE
KPCL							
83	JOG HPS	1	13.2	06/08/2022	06/17/2022	231.42	ANNUAL MAINTENANCE
		1	13.2	11/21/2022	11/23/2022	67.67	SCHEDULED CAPITAL
		2	13.2	06/08/2022	07/04/2022	628.83	TURBINE INSPECTION MISC
		2	13.2	11/21/2022	12/02/2022	264.00	SCHEDULED CAPITAL
		3	13.2	12/12/2022	12/29/2022	408.25	RUNNER INSPECTION /REPAIR
		3	13.2	12/30/2022	01/03/2023	107.42	TESTING/CHECKING
		3	13.2	11/07/2022	11/28/2022	502.42	ANNUAL MAINTENANCE
		4	13.2	11/16/2022	01/06/2023	1,226.35	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	13.2	01/11/2023	01/13/2023	64.93	GOVERNOR SYSTEM
		5	21.6	11/25/2022	12/01/2022	153.32	GENERATOR TRANSFORMER
		7	21.6	03/04/2023	03/24/2023	476.25	GENERATOR
		7	21.6	11/04/2022	11/15/2022	267.26	ANNUAL MAINTENANCE
		7	21.6	01/07/2023	02/03/2023	663.08	PENSTOCK PRESSURE SHAFT
		8	21.6	12/06/2022	12/10/2022	105.92	R AND M / REFURBISHMENT
84	KADRA HPS	1	50.0	10/07/2022	10/21/2022	348.33	R AND M WORKS
		2	50.0	06/16/2022	06/22/2022	166.65	PENSTOCK PRESSURE SHAFT
85	KALINADI HPS	5	150.0	02/15/2023	03/19/2023	760.00	TURBINE INSPECTION MISC
86	KALINADI SUPA HPS	1	50.0	05/18/2022	06/01/2022	335.12	PENSTOCK PRESSURE SHAFT
87	KODASALI HPS	2	40.0	01/30/2023	03/04/2023	796.83	R AND M WORKS
		3	40.0	01/11/2023	01/27/2023	399.92	R AND M WORKS
TANGEDCO							
88	KUNDAH-I HPS	1	20.0	11/20/2022	11/22/2022	61.25	GOVERNOR SYSTEM
		3	20.0	07/11/2022	07/25/2022	356.25	ANNUAL MAINTENANCE
89	KUNDAH-II HPS	4	35.0	07/03/2022	07/05/2022	58.03	PENSTOCK PRESSURE SHAFT
		8	35.0	12/03/2022	12/06/2022	62.02	MONTHLY MAINTENANCE
KSEB							
90	KUTTIYADI ADDL EXTN	1	50.0	11/07/2022	12/06/2022	707.80	ANNUAL MAINTENANCE
		2	50.0	05/11/2022	06/05/2022	617.02	ANNUAL MAINTENANCE
91	KUTTIYADI EXTN HPS	4	50.0	03/19/2023	03/30/2023	273.28	INSPECTION /MTCE
		4	50.0	12/09/2022	02/01/2023	1,289.68	ANNUAL MAINTENANCE
92	KUTTIYADI HPS	1	25.0	02/03/2023	02/23/2023	482.47	ANNUAL MAINTENANCE
		1	25.0	04/13/2022	04/22/2022	213.82	TURBINE INSPECTION MISC
		1	25.0	12/09/2022	12/12/2022	78.30	ANNUAL MAINTENANCE
		2	25.0	04/13/2022	04/22/2022	215.03	TURBINE INSPECTION MISC
		2	25.0	02/25/2023	03/18/2023	511.27	ANNUAL MAINTENANCE
		3	25.0	04/13/2022	04/26/2022	306.60	ANNUAL MAINTENANCE
		3	25.0	10/25/2022	11/02/2022	177.33	RUNNER INSPECTION
KPCL							
93	LIGANAMAKKI HPS	2	27.5	06/16/2022	07/01/2022	366.26	DAM/SPILL GATES
TANGEDCO							
94	LOWER METTUR-III	5	15.0	04/25/2022	05/08/2022	330.00	SCHEDULED ANNUAL
		5	15.0	03/03/2023	03/21/2023	447.75	ANNUAL MAINTENANCE
		6	15.0	04/01/2022	04/14/2022	330.00	ANNUAL MAINTENANCE
		6	15.0	04/25/2022	05/08/2022	330.00	SCHEDULED ANNUAL
95	LOWER METTUR-IV	7	15.0	04/01/2022	04/23/2022	540.25	ANNUAL MAINTENANCE
		8	15.0	04/01/2022	04/23/2022	538.75	ANNUAL MAINTENANCE
KSEB							

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
96	LOWER PERIYAR HPS	1	60.0	01/05/2023	01/18/2023	307.27	BUTTERFLY VALVE
		1	60.0	04/21/2022	06/05/2022	1,084.53	EXTENDED ANNUAL
		1	60.0	02/03/2023	02/23/2023	487.82	ANNUAL MAINTENANCE
		2	60.0	01/05/2023	01/29/2023	580.28	ANNUAL MAINTENANCE
		3	60.0	01/05/2023	01/18/2023	307.68	BUTTERFLY VALVE
TANGEDCO							
97	METTUR DAM HPS	3	12.5	04/01/2022	05/05/2022	832.75	ANNUAL MAINTENANCE
98	METTUR TUNNEL HPS	1	50.0	04/02/2022	05/27/2022	1,334.00	ANNUAL MAINTENANCE
		2	50.0	04/02/2022	06/02/2022	1,472.39	ANNUAL MAINTENANCE
		3	50.0	04/02/2022	06/30/2022	2,145.50	ANNUAL MAINTENANCE
		4	50.0	04/02/2022	05/27/2022	1,314.00	ANNUAL MAINTENANCE
KPCL							
99	MUNIRABAD HPS	1	9.0	04/01/2022	08/03/2022	2,993.82	STATOR WINDING
		1	9.0	08/27/2022	12/13/2022	2,580.77	STATOR WINDING
		2	9.0	12/14/2022	01/03/2023	497.92	SHUT
		2	9.0	05/11/2022	07/27/2022	1,848.33	RENOVATION/MODERNISATION
		3	10.0	05/11/2022	07/17/2022	1,622.46	RENOVATION/MODERNISATION
		3	10.0	11/20/2022	11/22/2022	59.50	GOVERNOR SYSTEM
		3	10.0	01/04/2023	01/17/2023	310.42	R AND M WORKS
TSGENCO							
100	NAGARJUN SGR HPS	4	100.8	05/18/2022	06/11/2022	582.37	ANNUAL MAINTENANCE
APGENCO							
101	NAGARJUN SGR TPD	2	25.0	07/01/2022	08/01/2022	744.00	ANNUAL MAINTENANCE
		2	25.0	06/22/2022	07/01/2022	217.33	ANNUAL MAINTENANCE
KSEB							
102	NARIAMANGLAM HPS	1	17.55	12/01/2022	01/01/2023	748.80	ANNUAL MAINTENANCE
		1	17.55	04/01/2022	05/09/2022	926.89	ANNUAL MAINTENANCE
		3	17.55	01/17/2023	03/25/2023	1,607.45	ANNUAL MAINTENANCE
103	PALLIVASAL HPS	5	7.5	02/01/2023	02/20/2023	463.28	ANNUAL MAINTENANCE
		6	7.5	01/05/2023	01/25/2023	487.27	ANNUAL MAINTENANCE
		6	7.5	02/10/2023	02/19/2023	219.08	DAM/SPILL GATES
104	PANNIAR HPS	1	15.0	03/02/2023	03/23/2023	514.62	ANNUAL MAINTENANCE
		2	15.0	05/12/2022	05/26/2022	352.75	GOVERNOR SYSTEM
		2	15.0	02/03/2023	02/23/2023	499.80	ANNUAL MAINTENANCE
TANGEDCO							
105	PAPANASAM HPS	1	8.0	05/02/2022	05/31/2022	698.75	ANNUAL MAINTENANCE
		2	8.0	04/02/2022	04/28/2022	628.83	ANNUAL MAINTENANCE
KSEB							
106	PORINGALKUTTU HPS	1	8.0	12/30/2022	01/31/2023	768.95	MONTHLY MAINTENANCE

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	8.0	05/10/2022	05/12/2022	66.37	ANNUAL MAINTENANCE
		3	8.0	06/23/2022	06/26/2022	85.13	MISCELLANEOUS PLANNED
		3	8.0	01/10/2023	01/17/2023	167.55	TESTING/CHECKING
		3	8.0	02/13/2023	03/04/2023	464.72	ANNUAL MAINTENANCE
		4	8.0	01/08/2023	02/10/2023	780.37	RESCHEDULED ANNUAL
TANGEDCO							
107	PYKARA ULTMATE HPS	2	50.0	04/01/2022	04/05/2022	116.00	ANNUAL MAINTENANCE
KSEB							
108	SABARIGIRI HPS	3	50.0	02/12/2023	03/06/2023	539.43	ANNUAL MAINTENANCE
		3	50.0	02/03/2023	02/06/2023	67.88	PENSTOCK PRESSURE SHAFT
		4	50.0	02/03/2023	02/06/2023	63.38	PENSTOCK PRESSURE SHAFT
		5	50.0	06/22/2022	06/24/2022	51.83	PENSTOCK PRESSURE SHAFT
		6	50.0	02/04/2023	02/06/2023	61.95	TESTING/CHECKING
KPCL							
109	SHARAVATHI HPS	1	103.5	05/21/2022	05/24/2022	74.90	RENOVATION/MODERNISATION
		1	103.5	09/27/2022	09/30/2022	83.43	MISCELLANEOUS PLANNED
		10	103.5	12/01/2022	12/04/2022	82.83	PENSTOCK PRESSURE SHAFT
		10	103.5	07/01/2022	08/05/2022	847.40	TURBINE INSPECTION MISC
		10	103.5	05/07/2022	05/12/2022	135.43	RENOVATION/MODERNISATION
		2	103.5	09/01/2022	09/03/2022	56.13	GOVERNOR SYSTEM
		2	103.5	05/17/2022	05/20/2022	89.12	RENOVATION/MODERNISATION
		4	103.5	06/01/2022	06/06/2022	128.02	SCHEDULED ANNUAL
		6	103.5	08/16/2022	08/22/2022	148.92	RENOVATION/MODERNISATION
		7	103.5	06/08/2022	06/14/2022	148.18	RENOVATION/MODERNISATION
		8	103.5	02/14/2023	02/20/2023	147.48	PENSTOCK PRESSURE SHAFT
		9	103.5	10/25/2022	10/31/2022	139.50	TURBINE INSPECTION MISC
KSEB							
110	SHOLAYAR HPS	1	18.0	01/27/2023	02/08/2023	292.30	ANNUAL MAINTENANCE
		2	18.0	07/01/2022	07/31/2022	730.87	ANNUAL MAINTENANCE
		3	18.0	05/28/2022	12/23/2022	5,022.22	STATOR REWINDING
APGENCO							
111	T B DAM HPS	1	9.0	04/22/2022	05/02/2022	239.67	BUTTERFLY VALVE
		3	9.0	05/26/2022	08/05/2022	1,717.33	CAPITAL MAINTENANCE
		4	9.0	04/22/2022	05/12/2022	479.08	CAPITAL MAINTENANCE
KPCL							
112	VARAHI HPS	1	115.0	02/20/2023	02/24/2023	103.62	RENOVATION/MODERNISATION
		1	115.0	02/25/2023	02/27/2023	51.17	MISCELLANEOUS PLANNED
		2	115.0	02/10/2023	02/18/2023	192.90	RENOVATION/MODERNISATION
		2	115.0	11/17/2022	11/29/2022	292.82	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	115.0	07/28/2022	08/10/2022	306.53	GENERATOR TRANSFORMER
		3	115.0	03/10/2023	03/15/2023	129.47	RENOVATION/MODERNISATION
		3	115.0	01/09/2023	01/23/2023	336.98	ANNUAL MAINTENANCE
		4	115.0	06/17/2022	06/25/2022	204.65	ANNUAL MAINTENANCE
		4	115.0	03/17/2023	03/21/2023	102.17	RENOVATION/MODERNISATION
Western							
MPPGCL							
113	BANSAGAR-II HPS	1	15.0	05/19/2022	06/04/2022	393.67	ANNUAL MAINTENANCE
114	BANSAGAR TONS-I	1	105.0	04/01/2022	03/31/2023	8,760.00	CAPITAL MAINTENANCE
		2	105.0	07/26/2022	08/09/2022	343.27	ANNUAL MAINTENANCE
		3	105.0	04/01/2022	07/13/2022	2,493.45	CAPITAL MAINTENANCE
115	BARGI HPS	2	45.0	07/09/2022	08/06/2022	678.76	ANNUAL MAINTENANCE
TATA MAH.							
116	BHIRA PSS HPS	1	150.0	04/01/2022	10/21/2022	4,881.61	GENERATOR TRANSFORMER
NHDC							
117	INDIRA SAGAR HPS	1	125.0	12/10/2022	12/14/2022	99.55	MISC. SHORT DURATION
		1	125.0	04/15/2022	04/27/2022	300.72	ANNUAL MAINTENANCE
		2	125.0	05/01/2022	05/11/2022	252.82	ANNUAL MAINTENANCE
		3	125.0	05/14/2022	05/26/2022	300.95	ANNUAL MAINTENANCE
		4	125.0	05/27/2022	06/12/2022	398.53	ANNUAL MAINTENANCE
		6	125.0	04/01/2022	04/12/2022	274.38	ANNUAL MAINTENANCE
		8	125.0	06/13/2022	06/30/2022	421.77	ANNUAL MAINTENANCE
		8	125.0	03/09/2023	03/25/2023	397.27	ANNUAL MAINTENANCE
MAHAGENCO							
118	KOYNA DPH HPS	1	18.0	09/02/2022	10/16/2022	1,079.50	CAPITAL MAINTENANCE
119	KOYNA-I&II HPS	4	70.0	01/20/2023	01/22/2023	57.75	HALF YEARLY MAINTENANCE
120	KOYNA-IV HPS	2	250.0	06/14/2022	07/06/2022	544.00	GOVERNOR SYSTEM
MPPGCL							
121	MADHIKHERA HPS	3	20.0	05/23/2022	06/14/2022	533.50	ANNUAL MAINTENANCE
NHDC							
122	OMKARESHWAR HPS	1	65.0	04/25/2022	05/07/2022	295.30	ANNUAL MAINTENANCE
		2	65.0	05/21/2022	05/28/2022	169.07	ANNUAL MAINTENANCE
		3	65.0	05/23/2022	06/09/2022	403.00	ANNUAL MAINTENANCE
		4	65.0	04/11/2022	04/23/2022	291.62	ANNUAL MAINTENANCE
		5	65.0	04/01/2022	04/09/2022	211.92	ANNUAL MAINTENANCE
		6	65.0	06/09/2022	06/22/2022	321.93	ANNUAL MAINTENANCE
		7	65.0	03/16/2023	03/27/2023	271.67	ANNUAL MAINTENANCE
		8	65.0	03/02/2023	03/15/2023	319.68	ANNUAL MAINTENANCE
MPPGCL							

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
123	PENCH HPS	1	80.0	07/21/2022	10/30/2022	2,428.93	STATOR REWINDING
SSNNL							
124	S SAROVAR RBPH HPS	4	200.0	02/14/2023	03/01/2023	360.33	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 729 hydro generating units installed in 211 Hydro Electric Power Stations, non-availability of hydro-electric units in the country due to forced outages during the year 2022-23 (excluding miscellaneous outages) was 2.96% as compared to 2.88% during 2021-22.

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

During 2022-23, the generator and turbine faults accounted for 24.81% and 43.34% of the forced outages respectively whereas other equipment & civil structure faults accounted for 2.97% & 28.87% respectively of the forced outages. The summary of forced outages caused due to breakdown of generator, turbine and other equipment during 2022-23 vis-à-vis 2021-22 is given in **Table 5.1** below.

TABLE 5.1

EQUIPMENT/SYSTEM-WISE FORCED OUTAGES
(2022-23 VIS-A-VIS 2021-22)

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage		Increase/ Decrease viz-z-viz 2021-22
		2022-23	2021-22	2022-23	2021-22	
1	Generator	35672.87	44588.94	24.81	28.58	20
2	Turbine	62310.18	64968	43.34	41.64	4.09
3	Civil	41510.94	42932.26	28.87	27.51	3.31
4	Other	4273.08	3551.99	2.97	2.28	-20.3
	Total	**143767.07**	**156041.19**	**100**	**100**	**7.87**

It is observed that forced outages in 2022-23 vis-a-vis 2021-22 have decreased on account of turbine and other equipment whereas the same have decreased on account of generator and civil structures.

5.2 FORCED OUTAGE DUE TO GENERATOR COMPONENTS

5.2.1 The major source of forced outage during 2022-23 includes Stator (35.33 %), followed by Protection system (21.6 %), Rotor (13.38 %) and Excitation System (8.29 %) which together accounted for more than the 78.6% of the forced outages due to generator components.

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: 2022-23)

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	AUTOMATIC VOLTAGE REGULATOR	19.95	0.08	0	0	157.83	1.65	**177.78**	**0.5**
2	BRAKE AND JACKS	95.9	0.4	0	0	77.15	0.81	**173.05**	**0.49**
3	EXCITATION SYSTEM	2171.58	8.99	4.57	0.24	781.98	8.17	**2958.13**	**8.29**
4	GENERATOR COOLING SYSTEM	41.06	0.17	1.03	0.05	57.92	0.6	**100.01**	**0.28**
5	LOWER GUIDE BEARING	88.87	0.37	6.89	0.35	22.55	0.24	**118.3**	**0.33**
6	MISCELLANEOUS GENERATOR	719.59	2.98	183.27	9.44	1684.56	17.59	**2587.41**	**7.25**
7	PROTECTION SYSTEM	7414.6	30.7	29.22	1.51	260.17	2.72	**7703.98**	**21.6**
8	ROTOR	880.1	3.64	246	12.68	3647.43	38.09	**4773.53**	**13.38**
9	STATOR	**11091.15**	**45.92**	1434.17	73.9	76.55	0.8	**12601.87**	**35.33**
10	THRUST BEARING	818.88	3.39	6.6	0.34	1730.04	18.07	**2555.52**	**7.16**
11	UPPER GUIDE BEARING	148.97	0.62	0.77	0.04	117.97	1.23	**267.7**	**0.75**
12	VIBRATION/SOUND/ ALIGNMENT	664.97	2.75	28.21	1.45	962.4	10.05	**1655.57**	**4.64**
	Total	**24155.61**	**100**	**1940.71**	**100**	**9576.55**	**100**	**35672.87**	**100**

From the Table 5.2, it is observed that Stator fault (45.92) constitute the major reason for forced outage in respect unit size up to 50 MW 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 Miscellaneous Turbine Components parts (65.94%), Other Faults (14.56%) and Bearing faults (9.67%) 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: 2022-23

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	GOVERNOR SYSTEM	130.86	0.27	13.99	1.14	361.31	2.88	**506.16**	**0.81**
2	MISCELLANEOUS TURBINE COMPONENTS	**33315.61**	**68.64**	629.19	51.22	7142.46	56.92	**41087.26**	**65.94**
3	OTHERS	9006.26	18.56	9.03	0.74	54.13	0.43	**9069.43**	**14.56**
4	BEARING	1387.04	2.86	417.13	33.96	4222.04	33.65	**6026.21**	**9.67**
5	GUIDE VANES	31.51	0.06	72.98	5.94	213.58	1.7	**318.08**	**0.51**
6	RUNNER/UNDER WATER PARTS	3213.83	6.62	0	0	0	0	**3213.83**	**5.16**
7	SHAFT VIBRATION/ALIGNMENT/S	885.15	1.82	81.77	6.66	380.15	3.03	**1347.06**	**2.16**
8	MAIN INLET VALVE	563.57	1.16	4.23	0.34	174.34	1.39	**742.14**	**1.19**
	Total	**48533.84**	**100**	**1228.32**	**100**	**12548.02**	**100**	**62310.18**	**100**

From the Table 5.3, it is observed that Miscellaneous turbine components (68.64%) constitute the major reason for forced outage in respect unit size up to 50 MW while Shaft vibrations/alignment constitute the major contributor of forced outage in respect of 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: 2022-23

S. No.	Type of Turbine	Number of Units	Installed Capacity MW	Forced Outage Hours	Avg. Forced Outage Hours per Unit
1	Bulb	26	684	1224.32	47.09
2	Francis	421	32948.22	42854.08	101.79
3	Kaplan	133	4399.05	3364.93	25.3
4	Pelton	149	8818.9	14866.85	99.78
	TOTAL	**729**	**46850.17**	**62310.18**	**85.47**

Forced outage rate was observed to be the highest in case of Francis turbines (101.79 hrs./unit) followed by Pelton turbines (99.78 hrs./unit) and Bulb turbines (47.09 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: 2022-23

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	312	20150.30	94083.02	303.49	8
2	Others*	54	3395.50	23442.36	272.59	6
	SUB TOTAL	**366**	**23545.80**	**117525.38**	**296.78**	
B-Imported						
3	USA	9	351.00	5049.07	81.44	3
4	U.K.	63	1242.10	9023.87	121.94	4
5	France	31	2179.20	2378.01	216.18	5
6	Canada	44	3132.00	9171.81	286.62	7
7	USSR	26	2804.00	15810.94	832.15	10
8	Switzerland	21	790.20	1255.32	33.03	2
9	Japan	76	6398.20	265.75	10.22	1
10	Other	93	6400	28544.69	413.69	9
	SUB-TOTAL	**363**	**23296.70**	**71499.47**	**216.01**	
	TOTAL	**729**	**46850.15**	**189024.85**	**260.01**	

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

It is observed that Indigenous units others* (272.59 hrs/unit) and the imported generating units from Japan (10.22 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: 2022-23

S. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Average Annual Non-availability per Unit (Hours)
1	2022-23	2	120	0	0
2	2021-22	7	393	50.23	7.18
3	2020-21	8	510	6.30	0.79
4	2019-20	2	300.00	0.00	0.0
5	2018-19	3	140.00	4.28	1.43
6	2017-18	16	795.00	2801.67	175.10
7	2016-17	18	1,659.00	457.63	25.42
8	2015-16	17	1,516.00	532.38	31.32
9	2010-11 to 2014-15	63	4,437.00	1217.83	19.33
10	2005-06 to 2009-10	66	7,077.00	9875.94	149.64
11	2000-01 to 2004-05	74	6,741.80	9828.11	132.81
12	1989-90 to 1999-2000	86	5,769.70	28775.03	334.59
13	1978-79 to 1988-89	124	7,259.10	24620.16	198.55
14	1967-68 to 1977-78	81	5,279.75	23706.8	292.68
15	Up to 1966-67	162	4,724.85	62182.2	383.84
	Total	**729**	**46850.17**	**266461.90**	**365.52**

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 in 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: 2022-23

S.No	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Forced Outages
1	Northern	258	19696.27	1.83
2	Western	101	7392	4.38
3	Southern	246	11747.15	2.11
4	Eastern	86	5987.75	2.54
5	North Eastern	38	2027	13.32
	All India	**729**	**46850.17**	**2.96**

Performance of hydro generating equipment installed in Northern Region was the best as the non-availability due to forced outages was least (1.83%). The average non-availability of the units in the North Eastern Region (13.32) and in the Western Region (4.38%) 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: 2022-23

S. No.	Organization	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Average Annual Forced Outage/Unit (Hours)
Central Sector					
1	BBMB	28	2938.3	244.47	8.73
2	DVC	5	143.2	869.26	173.85
3	NEEPCO.	20	1500	38774.38	1938.72
4	NHDC	16	1520	0	0
5	NHPC	70	5451.2	1757.14	25.1
6	NTPC LTD.	4	800	13388.37	3347.09
7	SJVNL	12	1912.02	164.32	13.69
8	THDC	8	1400	17.42	2.18
	Sub Total	**163**	**15664.72**	**55215.35**	**338.74**

State Sector					
1	APGCL	2	100	272.66	136.33
2	APGENCO	34	1796.75	11987.76	352.58
3	CSPGCL	3	120	0	0
4	GSECL	8	540	163.83	20.48
5	HPPCL	8	406	1069.37	133.67
7	HPSEB	12	372	1136.32	94.69
8	JKSPDC	12	1110	15.67	1.31
9	JUUNL	2	130	0	0
10	KPCL	66	3617.2	17616.51	266.92
11	KSEB	47	1864.15	10956.51	233.12
12	MAHAGENCO	24	2406	8607.1	358.63
13	MePGCL	13	322	4652.08	357.85
14	MPPGCL	23	875	21240.36	923.49
15	OHPC	31	2039.8	353.58	11.41
16	PSPCL	25	1051	1901.13	76.05
17	RRVUNL	11	411	17651.08	1604.64
18	SSNNL	11	1450	3.02	0.27
19	TANGEDCO	69	2178.2	8353.02	121.06
20	TSGENCO	36	2405.6	3926.97	109.08
21	TUL	6	1200	937.62	156.27
22	UJVNL	36	1372.15	1251.77	34.77
23	UPJVNL	15	501.6	523.67	34.91
24	WBSEDCL	12	986	9166.82	763.9
	Sub Total	**506**	**27254.45**	**121786.86**	**240.69**
Private Sector					
1	ADHPL	2	192	785.92	392.96
2	AHPC (GVK)	4	330	0	0
3	DEPL	2	96	174.68	87.34
4	DLHP	1	34	0	0
5	E.P.P.L.	2	100	30.92	15.46
6	GBHPPL	2	70	119.57	59.78
7	GIPL	2	110	30.99	15.49
8	GMR BHHPL	3	180	749.92	249.97

9	HBPCL	7	1345	65.97	9.42
10	HSPCL	2	100	298.52	149.26
11	IAEPL	3	36	0	0
12	JPPVL	4	400	4.13	1.03
13	L&T	3	99	840.08	280.03
14	MBPC	2	113	160.88	80.44
12	MPCL	2	86	0	0
13	SEPL	2	97	0	0
14	SKPPPL	2	96	0	0
15	TATA MAH.	15	447	8761.08	584.07
	Sub Total	**60**	**3931**	**12022.64**	**200.38**
	All India Total	**729**	**46850.17**	**189024.85**	**259.29**

It is observed that utility-wise, per unit forced outages for generating units was maximum in respect of hydro-electric stations under NTPC Ltd (3347.09 hrs./unit). On the other hand, the hydro generating units of NHDC, JUUNL, AHPC (GVK), DLHP, IAEPL, MPCL, SEPL, SKPPL. have reported nil forced outage operation.

5.9 DURATION OF FORCED OUTAGES

There were total 3085 forced outages/tripping during the year 2022-23. 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 40.97% of the total forced shutdown were of duration less than 6 hours while 50.28 % of outages were of duration varying from 6 to 24 hours and only 2.24% of shutdowns persisted for more than 10 days.

TABLE 5.9

DURATION PATTERN OF FORCED OUTAGES
PERIOD: 2022-23

S. No.	Duration of Hours	Number of Outages	% of Total of Outages
1	Less than 6 hour	1264	40.97
2	6 to 24 hours	1551	50.28
3	1 to 10 days	201	6.52
4	More than 10 days	69	2.24
	Total No. of Outages	**3085**	**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 2022-23 vis-à-Vis 2021-22 is summarized below in **Table 5.10.**

TABLE 5.10

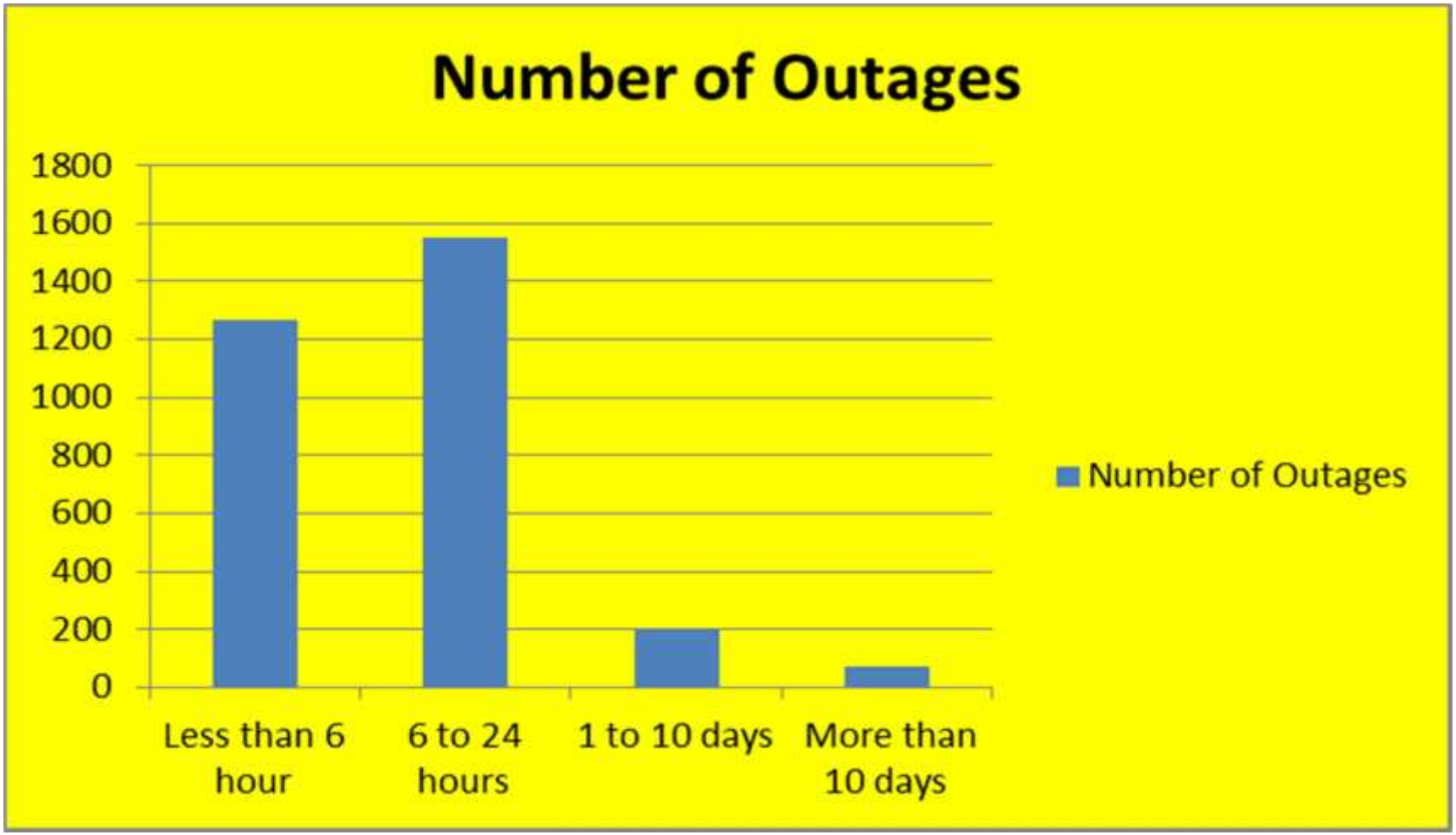
NON-AVAILABILITY OF HE STATIONS DUE TO FORCED OUTAGES (2022-23 VIS-A-VIS 2021-22)

% Non-Availability due to Forced Outages	2022-23				2021-22			
	Stations		Capacity		Stations		Stations	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
0	83	39.34	17,835.35	38.07	128	60.95	22,682.25	48.55
>0 to 1	28	13.27	5,357.25	11.43	17	8.10	6,944.95	14.86
>1 to 2	7	3.32	3,093.00	6.6	3	1.43	606.00	1.30
>2 to 3	3	1.42	905.65	1.93	0	0.00	0.00	0.00
>3 to 4	2	0.95	221.65	0.47	2	0.95	150.00	0.32
>4 to 5	4	1.9	444	0.95	2	0.95	155.30	0.33
>5	84	39.81	18,993.27	40.54	58	27.62	16,184.02	34.64
Total	**211**	**100**	**46850.17**	**100**	**210**	**100**	**46722.52**	**100**

It could be seen from above that there was no forced outage at 83 nos. (39.34% of total) hydro-electric stations during 2022-23 as compared to 128 nos. (60.95 % of total) hydro-electric stations during 2021-22.

39.81 % 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 than 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.


Number of Outages
1800
1600
1400
1200
1000
800
600
400
200
0
Less than 6 hour
6 to 24 hours
1 to 10 days
More than 10 days
Number of Outages

CENTRAL ELECTRICITY AUTHORITY
Hydro WING
Hydro Project Planning & Investigation Division

Annexure 5.1

DETAILS OF LONG DURATION FORCED OUTAGE IN HYDRO-ELECTRIC UNITS DURING: 2022-23

(OUTAGE DURATION 24 HOURS AND ABOVE)

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
Northern							
ADHPL							
1	ALLAIN DUHANGAN HPS	1	96.0	4/26/22, 2:55 PM	5/2/22, 11:06 PM	152.18	ROTOR EARTH FAULT/POLE FAILURE
		1	96.0	5/16/22, 4:26 PM	5/23/22, 7:29 PM	171.05	TRIPPING OF TRANSMISSION LINE
		1	96.0	6/20/22, 9:55 AM	6/25/22, 8:03 PM	130.13	NEEDLE PROBLEM
		2	96.0	5/16/22, 4:26 PM	5/23/22, 7:30 PM	171.07	TRIPPING OF TRANSMISSION LINE
		2	96.0	5/28/22, 7:15 AM	5/29/22, 1:00 PM	29.75	NEEDLE PROBLEM
		2	96.0	6/12/22, 9:13 PM	6/15/22, 6:32 PM	69.32	POLE FAILURE
NHPC							
2	BAIRA SIUL HPS	2	60.0	4/5/22, 4:34 PM	4/6/22, 4:35 PM	24.02	ROTOR EARTH FAULT
		2	60.0	9/1/22, 6:02 AM	9/2/22, 6:00 PM	35.97	G.V.ADJUSTMENT/LIMIT PROB/BUSING/MISC.
GMR BHHPL							
3	BAJOLI HOLI HPS	2	60.0	8/18/22, 12:00 AM	9/15/22, 2:20 PM	686.33	TRANSMISSION CONSTRAINTS
HPSEB							
4	BASSI HPS	2	16.5	4/17/22, 9:15 AM	4/18/22, 5:10 PM	31.92	WATER SHORTAGE DUE TO DROUGHT
		4	16.5	10/19/22, 12:00 AM	10/23/22, 12:01 AM	96.02	WATER SHORTAGE DUE TO DROUGHT
GBHPPL							
5	BUDHIL HPS	1	35.0	1/25/23, 12:00 AM	1/29/23, 11:34 PM	119.57	STATOR EARTH FAULT
NHPC							
6	CHAMERA-I HPS	1	180.0	3/14/23, 6:20 PM	3/17/23, 6:28 PM	72.13	PROTECTION OPERATION
BBMB							
7	DEHAR HPS	4	165.0	8/3/22, 12:00 AM	8/10/22, 5:55 PM	185.92	GEN.TR.BREAKER MECH.PROBLEM
HPSEB							
8	GIRI BATA HPS	2	30.0	6/18/22, 12:00 AM	6/24/22, 9:45 AM	153.76	WATER SHORTAGE DUE TO DROUGHT
HBPCL							
9	KARCHAM WANGTOO HPS	3	261.25	8/23/22, 7:00 PM	8/25/22, 8:33 PM	49.55	TURBINE MISC.
UPJVNL							
10	KHARA HPS	1	24.0	7/3/22, 12:00 AM	7/6/22, 11:15 AM	83.25	A.V.R. PROBLEM

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	24.0	8/9/22, 12:00 AM	8/10/22, 6:50 PM	42.83	GENERATING UNIT SHUT DOWN OTHER REASONS
NTPC Ltd.							
11	KOLDAM	2	200.0	1/5/23, 8:00 AM	1/10/23, 6:28 AM	118.47	COAL SHORTAGE
		3	200.0	5/21/22, 10:05 PM	5/26/22, 8:00 PM	117.92	FURNACE DRAFT ABNORMAL
		3	200.0	1/24/23, 9:31 AM	1/25/23, 5:14 PM	31.72	COAL SHORTAGE
		3	200.0	1/30/23, 7:00 PM	2/9/23, 6:44 AM	227.73	CONSERVATION OF MAIN FUEL/RSD
UJVNL							
12	KULHAL HPS	3	10.0	2/4/23, 9:10 PM	2/15/23, 11:55 PM	266.75	MISCELLANEOUS
		3	10.0	3/6/23, 12:05 PM	3/17/23, 11:55 PM	275.83	MISCELLANEOUS
HPSEB							
13	LARJI HPS	1	42.0	10/14/22, 12:00 AM	10/16/22, 11:59 PM	72.00	WATER SHORTAGE DUE TO DROUGHT
		3	42.0	5/24/22, 12:00 AM	5/26/22, 9:10 AM	57.18	TURBINE BEARING COOLING SYS/OIL COOLER
		3	42.0	5/27/22, 12:00 AM	5/29/22, 11:59 PM	72.00	TURBINE BEARING COOLING SYS/OIL COOLER
RRVUNL							
14	MAHI BAJAJ-I HPS	2	25.0	9/26/22, 3:50 PM	9/29/22, 3:30 PM	71.67	ELECTRICAL FAULT
		2	25.0	10/12/22, 3:45 PM	10/15/22, 12:05 PM	68.33	STATOR EARTH FAULT
UJVNL							
15	MANERI BHALI-II HPS	2	76.0	6/28/22, 12:00 AM	7/1/22, 5:41 AM	77.68	STATOR EARTH FAULT
		3	76.0	8/1/22, 12:58 PM	8/3/22, 10:03 PM	57.08	STATOR EARTH FAULT/COIL BURNT
		4	76.0	8/20/22, 11:30 PM	9/6/22, 3:49 PM	400.31	TURBINE BEARING PROBLEMS
PSPCL							
16	MUKERIAN-II HPS	4	15.0	8/19/22, 9:15 AM	8/20/22, 12:40 PM	27.42	STATOR EARTH FAULT
17	MUKERIAN-III HPS	8	19.5	8/25/22, 11:59 PM	8/27/22, 5:35 PM	41.58	GENEARTOR MISC.
		8	19.5	1/1/23, 2:35 PM	1/11/23, 12:50 PM	238.25	STATOR EARTH FAULT
18	MUKERIAN-IV HPS	12	19.5	2/10/23, 11:10 AM	2/11/23, 1:55 PM	26.75	ABNORMAL SOUND
SJVNL							
19	NATHPA JHAKRI HPS	5	250.0	3/27/23, 3:00 PM	3/29/23, 9:08 PM	54.13	TURBINE PIT FLOODED
UPJVNL							
20	OBRA HPS	1	33.0	8/25/22, 6:25 PM	8/26/22, 11:30 PM	29.08	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		1	33.0	9/23/22, 1:15 PM	10/2/22, 12:40 AM	203.42	OIL HEAD PROBLEM
		1	33.0	11/1/22, 8:50 AM	11/5/22, 11:30 AM	98.67	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		2	33.0	3/10/23, 1:50 PM	3/12/23, 12:40 PM	46.83	MISCELLANEOUS
SJVNL							

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
21	RAMPUR HPS	2	68.67	10/26/22, 4:39 PM	10/29/22, 9:26 PM	76.78	GEN.TR.BREAKER TRIPPED
RRVUNL							
22	R P SAGAR HPS	2	43.0	4/1/22, 12:00 AM	3/31/23, 11:59 PM	8760.00	GENERATOR STATOR DAMAGED
		3	43.0	4/1/22, 12:00 AM	1/21/23, 2:45 PM	7094.75	FLOODING OF POWER HOUSE
		4	43.0	4/1/22, 12:00 AM	6/7/22, 5:20 PM	1625.33	FLOODING OF POWER HOUSE
HPPCL							
23	SAINJ HPS	1	50.0	5/5/22, 12:04 AM	5/6/22, 9:10 PM	45.10	SWITCH YARD/TRIPPING OF TRANSMISSION LINES/BUS BAR
		2	50.0	5/5/22, 12:04 AM	6/14/22, 11:03 AM	970.98	SWITCH YARD/TRIPPING OF TRANSMISSION LINES/BUS BAR
NHPC							
24	SALAL HPS	2	115.0	6/21/22, 11:28 AM	6/27/22, 3:36 PM	148.13	GENEATOR TRANSFORMER DAMAGED
		2	115.0	8/22/22, 1:30 PM	8/24/22, 3:08 PM	49.65	SWITCHYARD MISC./JUMPERS PROBLEM
HPSEB							
25	SANJAY HPS	1	40.0	8/21/22, 9:14 AM	8/29/22, 12:00 AM	182.77	MAIN INLET VALVE
		2	40.0	8/21/22, 9:16 AM	8/29/22, 12:00 AM	182.73	MAIN INLET VALVE
		3	40.0	8/21/22, 9:16 AM	8/29/22, 12:00 AM	182.73	MAIN INLET VALVE
HPPCL							
26	SAWRA KUDDU HPS	1	37.0	5/3/22, 12:15 PM	5/5/22, 5:32 PM	53.28	TURBINE PIT FLOODED
NHPC							
27	SEWA-II HPS	1	40.0	5/7/22, 5:39 PM	5/9/22, 5:15 PM	47.60	BREAKER/ISOLATOR PROBLEM
PSPCL							
28	SHANAN HPS	1	15.0	6/25/22, 11:50 AM	6/26/22, 10:40 PM	34.83	TRASH RACK/INTAKE GATE PROBLEM
		3	15.0	6/2/22, 12:00 AM	6/16/22, 11:25 PM	359.42	NEEDLE SERVOMOTOR PROBLEM
		3	15.0	6/25/22, 11:52 AM	6/26/22, 10:50 PM	34.97	TRASH RACK/INTAKE GATE PROBLEM
		4	15.0	6/25/22, 11:53 AM	6/26/22, 10:55 PM	35.03	TRASH RACK/INTAKE GATE PROBLEM
		5	50.0	6/25/22, 11:45 AM	6/26/22, 11:05 PM	35.33	TRASH RACK/INTAKE GATE PROBLEM
		5	50.0	9/21/22, 6:50 PM	10/21/22, 10:45 PM	723.92	TURBINE BEARING OIL LEAKAGE
L&T							
29	SINGOLI BHATWARI HPS	1	33.0	8/3/22, 12:27 AM	8/5/22, 7:43 PM	67.27	TURBINE MISC. PROBLEMS
		1	33.0	8/20/22, 12:00 AM	8/23/22, 7:20 PM	91.33	MISCELLANEOUS
		1	33.0	9/18/22, 6:23 AM	9/20/22, 12:20 AM	41.95	TURBINE MISC.
		1	33.0	1/15/23, 12:00 AM	1/19/23, 11:23 AM	107.38	GENEATOR TRANSFORMER FES. E/F
		2	33.0	7/2/22, 7:37 PM	7/22/22, 10:32 AM	470.92	GENERATOR EARTH FAULT
HSPCL							

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
30	SORANG HPS	1	50.0	7/28/22, 6:28 PM	8/9/22, 9:52 AM	279.40	GENEARTOR MISC.
NHPC							
31	URI-II HPS	3	60.0	6/28/22, 2:14 PM	7/1/22, 2:52 PM	72.63	GUIDE VANE SERVOMOTOR LEAKAGE
Western							
MPPGCL							
32	BANSAGAR TONS-I HPS	3	105.0	8/9/22, 12:01 AM	1/3/23, 5:25 PM	3545.42	ROTOR EARTH FAULT
33	BARGI HPS	1	45.0	6/4/22, 7:30 PM	6/8/22, 11:00 AM	87.50	GEN.TR.BREAKER MECH.PROBLEM
34	GANDHI SAGAR HPS	2	23.0	4/1/22, 12:00 AM	3/31/23, 11:59 PM	8760.00	POWER HOUSE FLOODED
		3	23.0	4/1/22, 12:00 AM	3/31/23, 11:59 PM	8760.00	POWER HOUSE FLOODED
MAHAGENCO							
35	GHATGHAR PSS HPS	1	125.0	4/1/22, 12:00 AM	4/16/22, 5:55 PM	377.92	STATIC EXCITATION EQUIPMENT PROBLEM
		2	125.0	4/1/22, 12:00 AM	4/11/22, 7:10 PM	259.17	STATIC EXCITATION EQUIPMENT PROBLEM
		2	125.0	6/12/22, 11:45 AM	6/14/22, 12:30 PM	48.75	COOLING WATER PUMP PROBLEM
		2	125.0	7/25/22, 7:00 PM	7/26/22, 11:30 PM	28.50	MAIN INLET VALVE PROBLEM
		2	125.0	7/29/22, 12:00 AM	7/30/22, 9:00 PM	45.00	C.W. PUMP PROBLEM
		2	125.0	8/8/22, 1:05 AM	8/14/22, 9:00 PM	163.92	COOLING WATER PUMP PROBLEM
TATA MAH.							
36	KHOPOLI HPS	2	24.0	4/1/22, 12:00 AM	3/31/23, 11:59 PM	8760.00	NEEDLE PROBLEM
MAHAGENCO							
37	KOYNA-I&II HPS	4	70.0	8/8/22, 12:00 AM	10/4/22, 9:05 AM	1377.08	STATOR EARTH FAULT
		4	70.0	12/2/22, 10:20 AM	12/7/22, 10:00 PM	131.67	NEEDLE PROBLEM
		5	80.0	8/8/22, 12:00 AM	8/9/22, 7:25 PM	43.42	GOVERNING SYSTEM PROBLEM
		8	80.0	8/18/22, 6:50 AM	8/20/22, 5:12 PM	58.37	D.C.SUPPLY FAILURE.
38	KOYNA-IV HPS	1	250.0	7/7/22, 12:00 AM	7/19/22, 6:50 PM	306.83	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
		3	250.0	4/1/22, 12:00 AM	11/25/22, 5:20 PM	5729.33	MIV LEAKAGE
MPPGCL							
39	PENCH HPS	2	80.0	9/21/22, 11:00 AM	9/24/22, 4:57 PM	77.96	MIV SERVO MOTOR [PROBLEM
GSECL							
40	UKAI HPS	4	75.0	7/19/22, 12:00 AM	7/25/22, 7:50 PM	163.83	MISCELLANEOUS
Southern							
KPCL							
41	ALMATTI DPH HPS	1	15.0	7/11/22, 7:12 AM	7/12/22, 3:50 PM	32.62	EXCITATION PROBLEM
		3	55.0	7/11/22, 7:32 AM	7/12/22, 11:45 AM	28.21	T.B. ALIGNMENT/MISC.

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
KSEB							
42	IDUKKI HPS	1	130.0	8/26/22, 2:47 PM	8/29/22, 6:25 PM	75.63	STATOR EARTH FAULT
		1	130.0	10/31/22, 8:46 AM	11/3/22, 10:32 AM	73.77	RSD/LOW SCHEDULE
KPCL							
43	JOG HPS	2	13.2	4/1/22, 12:00 AM	4/30/22, 4:25 PM	712.42	STATOR COIL BURNT
		2	13.2	7/17/22, 12:00 AM	7/19/22, 4:20 PM	64.33	BRAKING SYSTEM PROBLEM
		2	13.2	8/1/22, 12:00 AM	8/2/22, 10:45 AM	34.75	EXCITATION PROBLEM
		3	13.2	1/8/23, 12:00 AM	1/14/23, 12:00 AM	144.00	ELECTRICAL MISCELLANEOUS PROBLEMS
		5	21.6	1/1/23, 12:00 AM	1/2/23, 4:30 PM	40.50	GENEARTOR MISC.
		6	21.6	7/4/22, 10:05 PM	9/29/22, 12:30 PM	2078.42	SPARK MAIN EX. BRUSH/DAMAGE BRUCH HOLDER
		8	21.6	1/7/23, 12:00 AM	3/15/23, 11:30 AM	1619.50	ABNORMAL SOUND
TANGEDCO							
44	KADAMPARI HPS	2	100.0	10/7/22, 12:00 AM	3/1/23, 8:00 PM	3500.00	PENSTOCK LEAKAGE
		3	100.0	4/1/22, 12:00 AM	9/25/22, 8:15 PM	4268.25	RSD/LOW SCHEDULE
KSEB							
45	KAKKAD HPS	1	25.0	6/21/22, 12:00 AM	6/22/22, 6:54 PM	42.90	THRUST BRG. OIL COOLERS PROBLEM /LEAGE
		1	25.0	11/4/22, 3:40 PM	11/6/22, 12:31 AM	32.85	UGB OIL COOLERS PROBLEM
KPCL							
46	KALINADI HPS	1	150.0	8/2/22, 12:51 PM	10/13/22, 3:12 AM	1718.36	TURBINE MISC. PROBLEM
		1	150.0	3/22/23, 5:20 PM	3/28/23, 11:41 PM	150.35	WATER CONDCUTOR SYSTEM
		2	150.0	6/12/22, 10:21 AM	6/13/22, 4:40 PM	30.32	MIV CONTROL PROBLEM
		2	150.0	7/5/22, 12:00 AM	7/28/22, 5:46 PM	569.77	VIBRATION/SOUND/ ALIGNMENT
		2	150.0	9/16/22, 4:29 PM	1/10/23, 12:20 PM	2779.85	TURBINE BEARING PADS DAMAGED
		2	150.0	3/13/23, 6:57 AM	3/29/23, 3:35 PM	392.63	VIBRATION/SOUND/ ALIGNMENT
		3	150.0	6/5/22, 9:25 AM	7/12/22, 9:08 PM	899.72	MIV CONTROL PROBLEM
		3	150.0	7/12/22, 9:43 PM	7/21/22, 4:00 PM	210.28	TURBINE BEARING OIL LEAKAGE
		3	150.0	7/23/22, 9:21 PM	7/24/22, 9:35 PM	24.23	UGB. TEMPERATURE HIGH
		3	150.0	1/14/23, 5:19 PM	1/23/23, 6:36 AM	205.28	MIV LEAKAGE
		4	150.0	6/5/22, 9:41 AM	7/11/22, 6:33 PM	872.87	CT/PT/LA/NUSDUCT/NEUT. GROUNING
		4	150.0	1/4/23, 12:00 AM	2/28/23, 4:03 PM	1336.05	STATOR EARTH FAULT
		5	150.0	11/29/22, 1:48 PM	12/10/22, 10:32 PM	272.73	VIBRATIONS
		5	150.0	1/19/23, 3:33 PM	1/24/23, 11:17 PM	127.73	THRUST BEARING TEMP. HIGH

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		6	150.0	8/24/22, 8:00 PM	8/25/22, 9:06 PM	25.10	DC SUPPLY PROBLEM
		6	150.0	10/17/22, 11:33 AM	10/20/22, 5:47 PM	78.23	THRUST BRG. OIL PUMP FAILTURE
		6	150.0	2/8/23, 11:03 AM	3/17/23, 12:55 PM	889.87	THRUST BEARING TEMP. HIGH
TANGEDCO							
47	KODAYAR-I HPS	1	60.0	5/15/22, 3:30 AM	5/16/22, 4:57 PM	37.45	EXCITATION PROBLEM
48	KUNDAH-I HPS	1	20.0	2/25/23, 7:04 AM	2/27/23, 11:59 PM	64.92	LGB PADS DAMAGED
		2	20.0	7/7/22, 8:32 AM	7/8/22, 7:10 PM	34.63	PENSTOCK LEAKAGE
49	KUNDAH-II HPS	4	35.0	8/9/22, 8:21 AM	8/10/22, 5:46 PM	33.42	PENSTOCK LEAKAGE
		4	35.0	10/9/22, 5:52 PM	10/12/22, 8:21 PM	74.49	TURBINE BEARING PROBLEM
		4	35.0	1/11/23, 7:42 AM	1/12/23, 10:35 AM	26.88	MISCELLANEOUS
		7	35.0	1/8/23, 9:03 AM	1/9/23, 6:05 PM	33.03	MISCELLANEOUS
		8	35.0	6/27/22, 9:24 AM	6/28/22, 9:02 PM	35.63	TURBINE BEARING PROBLEM
50	KUNDAH-III HPS	11	60.0	4/16/22, 10:45 AM	4/21/22, 11:56 PM	133.18	GENERATOR BEARINGS
KSEB							
51	KUTTIYADI HPS	3	25.0	9/27/22, 3:37 PM	9/28/22, 6:22 PM	26.75	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
		3	25.0	1/22/23, 12:00 AM	1/23/23, 5:37 PM	41.62	GOVERNOR OIL COOLING SYSTEM PROBLEM
TSGENCO							
52	LOWER JURALA HPS	2	40.0	8/19/22, 12:00 AM	9/29/22, 11:11 PM	1007.18	TURBINE MISC.
		6	40.0	10/23/22, 10:09 AM	10/31/22, 11:17 AM	193.13	RUNNER CHAMBER REPAIR
53	NAGARJUN SGR HPS	2	100.8	5/27/22, 7:55 PM	6/3/22, 11:31 PM	171.60	POLE DISCREPANCY
		4	100.8	1/21/23, 12:00 AM	1/23/23, 9:55 PM	69.92	GENERATOR TRANSFORMER BUCHOLTZ
		5	100.8	6/17/22, 5:40 PM	6/20/22, 5:50 PM	72.17	BREAKER/ISOLATOR PROBLEM
		5	100.8	8/3/22, 6:58 PM	8/9/22, 10:24 PM	147.43	GENERATOR NEGATIVE PHASE SEQUENCE
		6	100.8	6/13/22, 6:26 AM	6/15/22, 10:41 AM	52.25	BREAKER/ISOLATOR PROBLEM
		6	100.8	1/15/23, 11:30 PM	1/17/23, 12:35 PM	37.08	SWITCHYARD MISCELLANOUS.
		7	100.8	6/15/22, 11:05 AM	6/17/22, 5:21 PM	54.27	BREAKER/ISOLATOR PROBLEM
		8	100.8	5/16/22, 8:00 PM	5/18/22, 7:39 AM	35.65	ROTOR EARTH FAULT/POLE FAILURE
		8	100.8	7/13/22, 2:08 AM	7/16/22, 10:10 AM	80.03	POLE DISCREPANCY
		8	100.8	7/17/22, 12:00 AM	7/21/22, 12:45 PM	108.75	GEN. TRANS DAMAGED
		8	100.8	1/31/23, 8:47 PM	2/5/23, 1:25 PM	112.63	POLE DISCREPANCY
		8	100.8	2/10/23, 10:28 AM	2/13/23, 8:20 PM	81.87	POLE DISCREPANCY
APGENCO							

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
54	NAGARJUN SGR TPD	2	25.0	9/1/22, 12:00 PM	9/8/22, 2:00 AM	158.00	MISCELLANEOUS
KSEB							
55	PORINGALKUTTU HPS	2	8.0	8/27/22, 8:47 AM	9/3/22, 3:34 AM	162.78	OPU PRESSURE PROBLEM
		3	8.0	6/9/22, 6:30 PM	6/10/22, 6:43 PM	24.22	EHT/L.A.
		3	8.0	1/3/23, 5:40 PM	1/8/23, 12:00 AM	102.33	GOVERNING SYSTEM PROBLEM
TSGENCO							
56	PULICHINTALA HPS	1	30.0	10/8/22, 3:46 AM	10/9/22, 2:06 PM	34.33	GENEATOR TRANSFORMER MISC.
		3	30.0	8/12/22, 12:00 AM	8/18/22, 12:00 AM	144.00	SEAL OIL SYSTEM PROBLEM
		4	30.0	9/1/22, 11:56 AM	9/2/22, 4:37 PM	28.68	GENERATOR TRANSFORMER
KSEB							
57	SABARIGIRI HPS	2	50.0	8/6/22, 7:47 AM	8/23/22, 8:55 PM	421.13	STATOR COIL BURNT
		4	50.0	6/16/22, 12:00 AM	6/30/22, 6:08 PM	354.13	VIBRATIONS
		4	50.0	7/1/22, 7:49 PM	7/4/22, 3:53 PM	68.07	VIBRATIONS
		4	50.0	7/6/22, 4:55 PM	7/22/22, 5:24 PM	384.48	VIBRATIONS
		4	50.0	8/3/22, 6:40 PM	8/6/22, 3:07 PM	68.46	MISCELLANEOUS
		4	50.0	8/14/22, 7:29 AM	8/16/22, 6:18 PM	58.83	GENERATOR PROTECTION
		4	50.0	11/12/22, 10:26 PM	11/30/22, 7:52 PM	429.43	VIBRATION/SOUND/ ALIGNMENT
		4	50.0	12/1/22, 10:20 AM	12/10/22, 9:30 PM	227.17	VIBRATION/SOUND/ ALIGNMENT
		4	50.0	1/29/23, 2:33 PM	1/30/23, 8:12 PM	29.65	GOVERNING SYSTEM PROBLEM
		5	50.0	5/14/22, 5:23 PM	5/24/22, 11:12 PM	245.82	THRUST BRG. OIL SYSTEM PROBLEM
		6	50.0	4/1/22, 4:53 PM	1/31/23, 11:52 PM	7326.99	GENERATOR DIFFERENTIALPROTECTION
KPCL							
58	SHARAVATHI HPS	1	103.5	8/8/22, 12:00 AM	8/9/22, 3:19 PM	39.32	GEN. AIR COOLERS LEAKAGE/DAMAGED/REPLACE
		10	103.5	8/21/22, 12:00 AM	8/22/22, 9:11 AM	33.18	AVR PROBLEM/TRIPPED
		2	103.5	6/11/22, 8:06 PM	8/1/22, 2:45 PM	1218.65	TURBINE BEARING TEMP. HIGH
		8	103.5	8/9/22, 2:10 PM	8/10/22, 3:02 PM	24.87	A.V.R. PROBLEM
		9	103.5	8/19/22, 9:54 PM	8/23/22, 6:40 PM	92.77	AVR PROBLEM/TRIPPED
APGENCO							
59	SRISAILAM HPS	3	110.0	10/5/22, 12:35 PM	10/6/22, 9:12 PM	32.62	TRIPPING--EQUIP.DAMAGED
		6	110.0	11/6/22, 7:38 AM	1/6/23, 10:26 AM	1466.80	TRIPPING--EQUIP.DAMAGED
		7	110.0	10/16/22, 2:58 PM	10/17/22, 9:12 PM	30.23	TRIPPING--EQUIP.DAMAGED
		7	110.0	11/16/22, 10:58 PM	11/18/22, 10:58 AM	36.00	TRIPPING--EQUIP.DAMAGED

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
TSGENCO							
60	SRISAILAM LB HPS	5	150.0	10/30/22, 5:30 AM	10/31/22, 7:39 AM	26.15	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
		5	150.0	1/29/23, 6:18 PM	2/1/23, 5:33 PM	71.25	MIV CONTROL PROBLEM
		5	150.0	2/21/23, 12:46 PM	2/25/23, 6:35 PM	101.82	MAIN INLET VALVE PROBLEM
		6	150.0	11/12/22, 9:05 PM	11/19/22, 12:45 PM	159.67	POLE DISCREPANCY
		6	150.0	1/6/23, 9:38 AM	2/16/23, 11:52 AM	986.23	STATOR EARTH FAULT
APGENCO							
61	T B DAM HPS	1	9.0	8/3/22, 8:30 AM	8/7/22, 11:30 AM	99.00	BEARING
		1	9.0	10/18/22, 12:00 AM	10/20/22, 1:05 PM	61.09	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		3	9.0	11/11/22, 5:55 PM	11/23/22, 12:07 PM	282.19	ABNORMAL SOUND
		3	9.0	11/25/22, 12:00 AM	3/6/23, 8:25 PM	2444.42	ABNORMAL SOUND
KPCL							
62	VARAHI HPS	3	115.0	10/9/22, 10:01 AM	10/11/22, 4:29 PM	54.47	BREAKER/ISOLATOR PROBLEM
		3	115.0	12/27/22, 11:25 PM	12/30/22, 5:22 PM	65.95	EXCITATION SYSTEM FAILURE
		4	115.0	3/1/23, 9:35 AM	3/3/23, 3:54 PM	54.32	BREAKER/ISOLATOR PROBLEM
Eastern							
OHPC							
63	BALIMELA HPS	7	75.0	8/18/22, 12:00 PM	8/27/22, 5:30 PM	221.50	RSD/LOW SCHEDULE
WBSEDCL							
64	JALDHAKA HPS ST-I	1	9.0	7/5/22, 1:25 PM	7/7/22, 5:50 PM	52.42	TURBINE BEARING OIL LEAKAGE
		1	9.0	8/13/22, 6:30 PM	8/17/22, 8:40 AM	86.17	FLOODS
		1	9.0	8/31/22, 3:20 PM	9/2/22, 9:35 AM	42.25	FLOODS
		1	9.0	10/25/22, 12:00 AM	3/21/23, 3:30 PM	3543.50	RAW WATER LOW IN INTAKE CANAL
		1	9.0	3/22/23, 10:10 AM	3/23/23, 6:10 PM	32.00	RAW WATER LOW IN INTAKE CANAL
		2	9.0	8/13/22, 6:30 PM	8/17/22, 8:25 AM	85.92	FLOODS
		2	9.0	8/31/22, 3:20 PM	9/2/22, 9:25 AM	42.08	FLOODS
		2	9.0	10/31/22, 12:00 AM	11/9/22, 4:50 PM	232.83	RAW WATER LOW IN INTAKE CANAL
		2	9.0	11/16/22, 2:10 PM	11/22/22, 11:25 AM	141.25	RAW WATER LOW IN INTAKE CANAL
		2	9.0	11/24/22, 11:50 AM	11/27/22, 8:01 PM	80.18	RAW WATER LOW IN INTAKE CANAL
		2	9.0	12/3/22, 12:35 PM	12/22/22, 11:25 PM	466.83	RAW WATER LOW IN INTAKE CANAL
		2	9.0	12/23/22, 10:10 PM	3/21/23, 9:43 AM	2099.55	RAW WATER LOW IN INTAKE CANAL
		3	9.0	8/13/22, 6:31 PM	8/17/22, 8:30 AM	85.98	FLOODS

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	9.0	11/5/22, 6:15 AM	11/9/22, 3:05 PM	104.83	RAW WATER LOW IN INTAKE CANAL
		3	9.0	11/27/22, 8:02 PM	12/3/22, 12:30 PM	136.47	TURBINE BEARING OIL LEVEL LOW/HIGH
		3	9.0	12/24/22, 3:15 PM	1/8/23, 9:25 AM	354.17	RAW WATER LOW IN INTAKE CANAL
		3	9.0	1/12/23, 10:30 AM	1/14/23, 9:20 PM	58.83	RAW WATER NOT AVAILABLE/LOW INTAKE CANAL LEVEL
		4	9.0	6/28/22, 9:00 PM	6/30/22, 10:10 AM	37.17	FLOODS
		4	9.0	12/20/22, 10:20 AM	12/24/22, 12:55 PM	98.58	RAW WATER LOW IN INTAKE CANAL
		4	9.0	1/8/23, 9:05 AM	1/12/23, 10:30 AM	97.42	ROTOR EARTH FAULT
		4	9.0	1/14/23, 9:20 PM	1/17/23, 7:55 AM	58.58	RAW WATER NOT AVAILABLE/LOW INTAKE CANAL LEVEL
DEPL							
65	JORETHANG LOOP	1	48.0	11/17/22, 12:00 AM	11/18/22, 10:30 PM	46.50	GRID MISCELLANEOUS
		1	48.0	2/10/23, 7:30 AM	2/14/23, 5:56 AM	94.44	MAIN DISC SEAL PROBLEM/REPLACEMENT
APGENCO							
66	MACHKUND HPS	1	17.0	4/25/22, 11:25 AM	11/23/22, 5:45 PM	5094.33	MISCELLANEOUS
		1	17.0	2/1/23, 12:00 PM	2/14/23, 3:05 PM	315.08	TRIPPED DUE TO VARIATION IN SPEED
		1	17.0	2/25/23, 12:10 PM	3/1/23, 12:00 PM	95.83	MISCELLANEOUS
		2	17.0	5/17/22, 8:20 AM	5/22/22, 9:40 PM	133.33	MISCELLANEOUS
		2	17.0	2/25/23, 12:10 PM	3/1/23, 12:10 PM	96.00	MISCELLANEOUS
		3	17.0	9/14/22, 4:05 AM	9/16/22, 8:35 PM	64.50	MISCELLANEOUS
		4	21.25	4/12/22, 2:20 PM	4/18/22, 9:20 PM	151.00	MISCELLANEOUS
		4	21.25	5/17/22, 9:10 AM	5/23/22, 2:40 PM	149.50	MISCELLANEOUS
		4	21.25	9/1/22, 12:00 PM	9/28/22, 9:30 PM	657.50	ROTOR MISC. FAULTS
		5	21.25	4/16/22, 11:25 AM	4/17/22, 11:55 AM	24.50	SPARKING TROUBLES
		5	21.25	4/20/22, 8:10 AM	4/23/22, 10:05 AM	73.92	STATOR EARTH FAULT
		5	21.25	5/17/22, 9:10 AM	5/22/22, 11:55 PM	134.75	MISCELLANEOUS
		5	21.25	8/17/22, 5:25 PM	8/20/22, 9:00 PM	75.58	MISCELLANEOUS
		5	21.25	2/25/23, 12:15 PM	3/1/23, 5:35 PM	101.33	MISCELLANEOUS
DVC							
67	MAITHON HPS	1	20.0	11/7/22, 10:00 AM	11/8/22, 6:05 PM	32.08	INTAKE STRUCTURE TROUBLE
		2	23.2	4/21/22, 12:00 PM	4/22/22, 5:48 PM	29.80	TURBINE MISC. PROBLEM
		2	23.2	6/20/22, 7:00 PM	6/23/22, 12:06 PM	65.10	GENEATOR CONTROL PROBLEM
		2	23.2	7/9/22, 12:00 PM	7/12/22, 8:26 PM	80.43	BEARING
		3	20.0	4/19/22, 12:00 PM	5/3/22, 4:37 PM	340.62	INTAKE STRUCTURE TROUBLE

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	20.0	5/3/22, 6:00 PM	5/9/22, 8:02 AM	134.03	INTAKE STRUCTURE TROUBLE
		3	20.0	7/14/22, 12:00 PM	7/19/22, 6:32 PM	126.52	GOVERNING SYSTEM PROBLEM
		3	20.0	11/5/22, 9:50 AM	11/7/22, 5:40 PM	55.83	INTAKE STRUCTURE TROUBLE
TUL							
68	TEESTA-III HPS	3	200.0	4/20/22, 7:58 AM	4/28/22, 9:18 PM	205.33	ELECTRICAL MISCELLANEOUS PROBLEMS
		4	200.0	2/19/23, 1:00 AM	2/21/23, 6:03 AM	53.06	OIL PRESSURE UNIT
		5	200.0	9/22/22, 1:20 PM	10/16/22, 10:03 PM	584.72	GENEATOR TRANSFORMER OIL PROBLEMS/TOPPING
		5	200.0	11/23/22, 12:00 AM	11/24/22, 7:50 PM	43.83	GENERATOR TRANSFORMER
		6	200.0	8/15/22, 4:44 PM	8/16/22, 11:33 PM	30.82	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
NHPC							
69	TEESTA LOW DAM-III HPS	1	33.0	3/3/23, 7:18 PM	3/4/23, 8:34 PM	25.27	BUS BAR PROTECION OPERATED
OHPC							
70	UPPER KOLAB HPS	1	80.0	2/9/23, 9:30 AM	2/10/23, 9:15 PM	35.76	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		4	80.0	8/31/22, 6:45 PM	9/1/22, 8:05 PM	25.33	SHEAR PIN BROKEN/FAILURE/REPLACEMENT
		4	80.0	9/2/22, 6:57 PM	9/3/22, 7:15 PM	24.30	BREAKER/ISOLATOR PROBLEM
North Eastern							
NEEPCO.							
71	DOYANG HPS	2	25.0	5/27/22, 4:25 PM	5/31/22, 2:30 PM	94.08	GENEATOR TRANSFORMER MISC.
		2	25.0	9/12/22, 4:15 PM	9/13/22, 4:18 PM	24.05	MISCELLANEOUS
		3	25.0	10/2/22, 5:06 PM	10/3/22, 5:16 PM	24.17	MISCELLANEOUS
72	KAMENG HPS	2	150.0	4/6/22, 8:05 AM	4/19/22, 11:59 PM	327.92	WATER CONDCUTOR SYSTEM
		2	150.0	6/16/22, 10:51 PM	6/26/22, 1:36 PM	230.75	THRUST BEARING TEMP. HIGH
		2	150.0	6/26/22, 1:44 PM	7/10/22, 11:45 AM	334.02	THRUST BEARING TEMP. HIGH
		3	150.0	4/6/22, 7:49 AM	5/4/22, 3:43 PM	679.90	WATER CONDCUTOR SYSTEM
		3	150.0	9/28/22, 4:06 AM	9/29/22, 3:05 PM	34.98	VIBRATIONS
		4	150.0	4/6/22, 8:05 AM	5/1/22, 7:32 PM	611.45	WATER CONDCUTOR SYSTEM
APGCL							
73	KARBI LANGPI HPS	1	50.0	6/7/22, 12:00 AM	6/11/22, 1:30 PM	109.50	PENSTOCK VIRATION
NEEPCO.							
74	KOPILI HPS	1	50.0	4/1/22, 12:00 AM	3/31/23, 11:59 PM	8760.00	PENSTOCK LEAKAGE
		2	50.0	4/1/22, 12:00 AM	3/31/23, 11:59 PM	8760.00	PENSTOCK LEAKAGE
		3	50.0	4/1/22, 12:00 AM	3/31/23, 11:59 PM	8760.00	PENSTOCK LEAKAGE

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	50.0	4/1/22, 12:00 AM	3/31/23, 11:59 PM	8760.00	PENSTOCK LEAKAGE
MeECL							
75	KYRDEMKULAI HPS	1	30.0	6/9/22, 6:00 PM	7/1/22, 10:00 PM	532.00	RUNNER LABYRING DAMAGED
		1	30.0	9/16/22, 12:00 AM	9/17/22, 1:45 PM	37.75	BEARING
		2	30.0	4/1/22, 12:00 AM	7/21/22, 5:05 PM	2681.08	RUNNER LABYRING DAMAGED
NHPC							
76	LOKTAK HPS	3	35.0	4/7/22, 7:45 PM	4/29/22, 4:23 PM	524.63	THRUST BEARING TEMP. HIGH
		3	35.0	9/21/22, 12:00 AM	9/22/22, 5:07 PM	41.12	UGB OIL SYSTEM PROBLEM
MeECL							
77	NEW UMTRU HPS	1	20.0	6/21/22, 12:00 AM	7/4/22, 11:56 PM	335.93	STATOR EARTH FAULT
NEEPCO.							
78	PARE	1	55.0	12/24/22, 12:00 AM	12/28/22, 4:18 PM	112.30	MISCELLANEOUS
79	RANGANADI HPS	1	135.0	8/21/22, 6:57 PM	8/30/22, 3:33 PM	212.60	GUIDE VANES
		1	135.0	11/20/22, 8:00 AM	11/21/22, 1:20 PM	29.33	MISCELLANEOUS
		2	135.0	5/13/22, 4:41 PM	5/15/22, 5:29 PM	48.80	ROTOR EARTH FAULT
		2	135.0	11/17/22, 8:48 AM	11/18/22, 12:00 PM	27.20	MISCELLANEOUS
		3	135.0	8/9/22, 10:30 AM	8/12/22, 3:39 PM	77.15	BRAKING SYSTEM PROBLEM
		3	135.0	11/11/22, 8:00 AM	11/13/22, 2:59 PM	54.98	MISCELLANEOUS
		3	135.0	12/19/22, 8:15 AM	12/21/22, 1:00 PM	52.75	VIBRATIONS
80	TUIRIAL HPS	1	30.0	9/18/22, 3:15 PM	9/22/22, 5:25 PM	98.17	MISCELLANEOUS
		2	30.0	7/6/22, 12:00 AM	7/12/22, 11:59 PM	168.00	MISCELLANEOUS
MeECL							
81	UMIAM HPS ST-I	1	9.0	9/27/22, 12:00 AM	9/28/22, 7:00 PM	43.00	STATOR EARTH FAULT
		3	9.0	10/10/22, 9:30 AM	10/12/22, 12:00 PM	50.50	COOLING WATER SYSTEM PROBLEM/PIPES REPLACE
82	UMIAM HPS ST-IV	7	30.0	6/6/22, 12:00 AM	7/13/22, 6:45 PM	906.75	STATOR

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 729 Hydro Generating units of 211 HE Stations comprising of 46850.17 MW, operating availability of various units and stations has been computed. During the year 2022-23, the average operating availability of hydro generating units on all India basis was 92.82% as compared to 93.67 % during 2021-22.

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 2022-23 is summarized below in **Table 6.1.**

TABLE 6.1

OPERATING AVAILABILITY OF H.E. STATIONS (PERIOD: 2022-23)

Operating Availability (%)	No. of Stations	% of total Stations	Installed Capacity (MW)	% of total Installed Capacity
>=95%	125	59.24	28221.37	60.24
>=90 to 95	44	20.85	7669.2	16.37
>=85 to 90	14	6.64	2930.6	6.26
>=80 to 85	10	4.74	3195	6.82
<80	18	8.53	4834	10.32
Total	**211**	**100**	**46850.17**	**100**

6.3 OPERATING AVAILABILITY – REGION-WISE

Region-wise operating availability of hydro-electric units during 2022-23 is indicated in **Table 6.2**.

TABLE 6.2

AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2022-23

Sl. No.	Region	No. of Units	Installed Capacity (MW)	Planned Maintenance %	Forced Outage %	Operating Availability (%)
1	Northern	258	19696.27	5.14	1.83	93.04
2	Western	101	7392	3.09	4.38	92.52
3	Southern	246	11747.15	3.33	2.11	94.55
4	Eastern	86	5987.75	3.5	2.54	93.96
5	N- Eastern	38	2027	8.26	13.32	78.41
	All India	**729**	**46850.17**	**4.22**	**2.96**	**92.82**

It is seen that the operating availability of hydel generating units during 2022-23 was the highest (94.55%) in Southern Region due to relatively lower forced outages. The operating availability was the lowest in case of units in North-Eastern Region (78.41%) due to high planned maintenance and forced outages.

6.4 OPERATING AVAILABILITY: AGE-WISE

The average operating availability during 2022-23 of hydro units commissioned in various years has been indicated in **Table 6.3**. It is observed that units commissioned during 2021-22 have achieved the operating availability of more than 92%. Operating availability was more than 90% for all the other years.

TABLE - 6.3

OPERATING AVAILABILITY – AGE-WISE
PERIOD: 2022-23

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Operating Availability (%)
1	2022-23	2	120.00	100
2	2021-22	7	393.00	99.23
3	2020-21	8	510.00	99.97
4	2019-20	2	300.00	100.00
5	2018-19	3	140.00	100.00
6	2017-18	16	795.00	85.86
7	2016-17	18	1659.00	96.14
8	2015-16	17	1516.00	98.25
9	2010-11 to 2014-15	63	4437.00	92.07
10	2005-06 to 2009-10	66	7077.00	93.56
11	2000-01 to 2004-05	74	6741.80	94.48
12	1989-90 to 1999-2000	86	5769.70	90.47
13	1978-79 to 1988-89	124	7259.10	90.05
14	1967-68 to 1977-78	81	5279.75	86.37
	Total	**729**	**46850.17**	**92.82**

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 State Sector was the highest (93.38%) followed by Private Sector (93.24%) and Central Sector (89.07%).

TABLE 6.4

SECTOR-WISE OPERATING AVAILABILITY OF UTILITIES FOR PERIOD: 2022-23

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
Central						
1	BBMB	28	2938.3	5.03	0.1	94.87
2	DVC	5	143.2	0.15	1.98	97.86
3	NEEPCO.	20	1500	14.57	22.13	63.3
4	NHDC	16	1520	3.41	0	96.59
5	NHPC	70	5451.2	7.56	0.29	92.16
6	NTPC Ltd.	4	800	0	38.21	61.79
7	SJVNL	12	1912.02	2.67	0.16	97.18
8	THDC	8	1400	12.85	0.02	87.13
Sub Total (CS)		**163**	**15664.72**	**7.06**	**3.87**	**89.07**
State						
1	APGCL	2	100	0.45	1.56	97.99
2	APGENCO	34	1796.75	1.14	4.02	94.83
3	CSPGCL	3	120	0	0	100
4	GSECL	8	540	0	0.23	99.77
5	HPPCL	8	406	2.69	1.53	95.79
6	HPSEB	12	372	5.68	1.08	93.24
7	JKSPDC	12	1110	4.31	0.01	95.68
8	JUUNL	2	130	0	0	100
9	KPCL	66	3617.2	4	3.05	92.96
10	KSEB	47	1864.15	7.72	2.66	89.61
11	MAHAGENCO	24	2406	0.82	4.09	95.09
12	MeECL	13	322	1.22	4.09	94.69
13	MPPGCL	23	875	7.76	10.54	81.7
14	OHPC	31	2039.8	1.3	0.13	98.57

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
15	PSPCL	25	1051	4.2	0.87	94.94
16	RRVUNL	11	411	0.11	18.32	81.57
17	SSNNL	11	1450	0.37	0	99.62
18	TANGEDCO	69	2178.2	2.13	1.38	96.49
19	TSGENCO	36	2405.6	0.2	1.25	98.56
20	TUL	6	1200	5.63	1.78	92.58
21	UJVNL	36	1372.15	4.21	0.4	95.39
22	UPJVNL	15	501.6	4.92	0.4	94.68
23	WBSEDCL	12	986	5.64	8.72	85.64
Sub Total (State)		**506**	**27254.45**	**3.27**	**2.75**	**93.98**
Private						
1	ADHPL	2	192	8.78	4.49	86.73
2	AHPC (GVK)	4	330	0	0	100
3	DEPL	2	96	6.12	1	92.88
4	DLHP	1	34	0	0	100
5	E.P.P.L.	2	100	0.04	0.18	99.78
6	GBHPPL	2	70	6.16	0.68	93.16
7	GIPL	2	110	7.52	0.18	92.3
8	GMR BHHPL	3	180	17.81	2.85	79.34
9	HBPCL	7	1345	1.92	0.11	97.98
10	HSPCL	2	100	0	1.7	98.3
11	IAEPL	3	36	14.6	0	85.4
12	JPPVL	4	400	0.47	0.01	99.52
13	L&T	3	99	8.4	3.2	88.4
14	MBPC	2	113	4.21	0.92	94.87
15	MPCL	2	86	4.53	0	95.47
16	SEPL	2	97	0	0	100
17	SKPPPL	2	96	0	0	100
18	TATA MAH.	15	447	3.72	6.67	89.62
Sub Total (Pvt.)		**60**	**3931**	**4.47**	**2.29**	**93.24**
Grand Total		**729**	**46850.17**	**4.14**	**2.82**	**93.04**

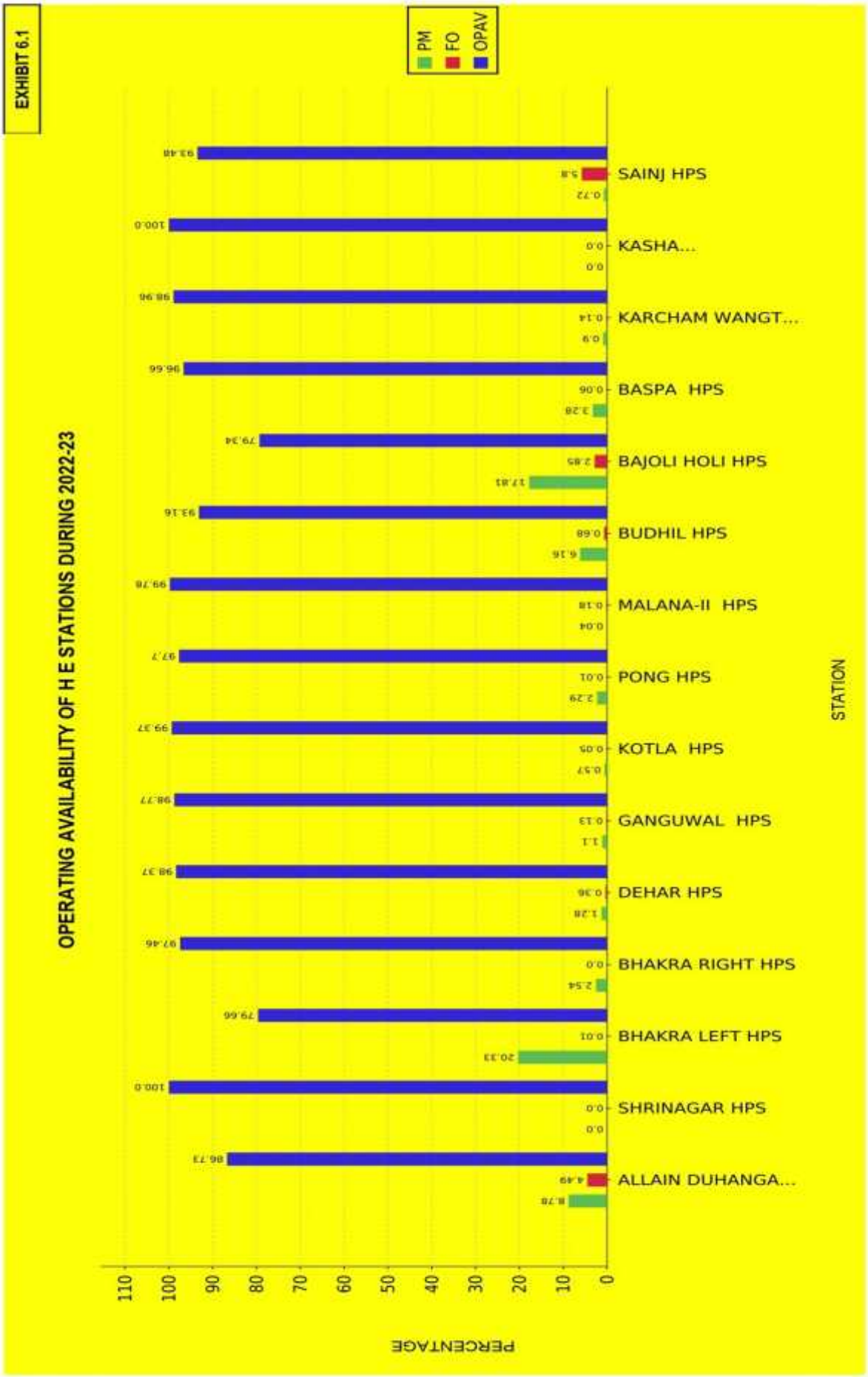
6.6 OPERATING AVAILABILITY BELOW 90%- STATION-WISE

It is observed that 12 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 (2020-21 To 2022-23)

Sl. No.	Name of the Stations	Name of the Utility	Installed Capacity (MW)	Operating Availability (%)		
				2020-21	2021-22	2022-23
1	BHAKRA LEFT HPS	BBMB	594	80	86.64	79.66
2	BHAKRA LEFT HPS	BBMB	612	80	86.64	79.66
3	GANDHI SAGAR HPS	MPPGCL	115	60	59.67	60
4	IDUKKI HPS	KSEB	780	80.23	88.94	88.05
5	KADAMPARI HPS	TANGEDCO	400	32.93	46.31	77.83
6	KAMENG HPS	NEEPCO.	600	84.15	71.92	83.08
7	KHOPOLI HPS	TATA MAH.	72	66.67	66.66	66.67
8	KOPILI HPS	NEEPCO.	200	0	0	0
9	KYRDEMKULAI HPS	MeECL	60	50	50	81.34
10	NARIAMANGLAM HPS	KSEB	45	66.67	66.67	87.03
11	PARBATI-III HPS	NHPC	520	85.35	89.89	88.86
12	R P SAGAR HPS	RRVUNL	172	25	6.32	49.8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OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
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FO
OPAV
SAINJ HPS
KASHA...
KARCHAM WANGT...
BASPA HPS
BAJOLI HOLI HPS
BUDHIL HPS
MALANA-II HPS
PONG HPS
KOTLA HPS
GANGUWAL HPS
DEHAR HPS
BHAKRA RIGHT HPS
BHAKRA LEFT HPS
SHRINAGAR HPS
ALLAIN DUHANGA...
STATION
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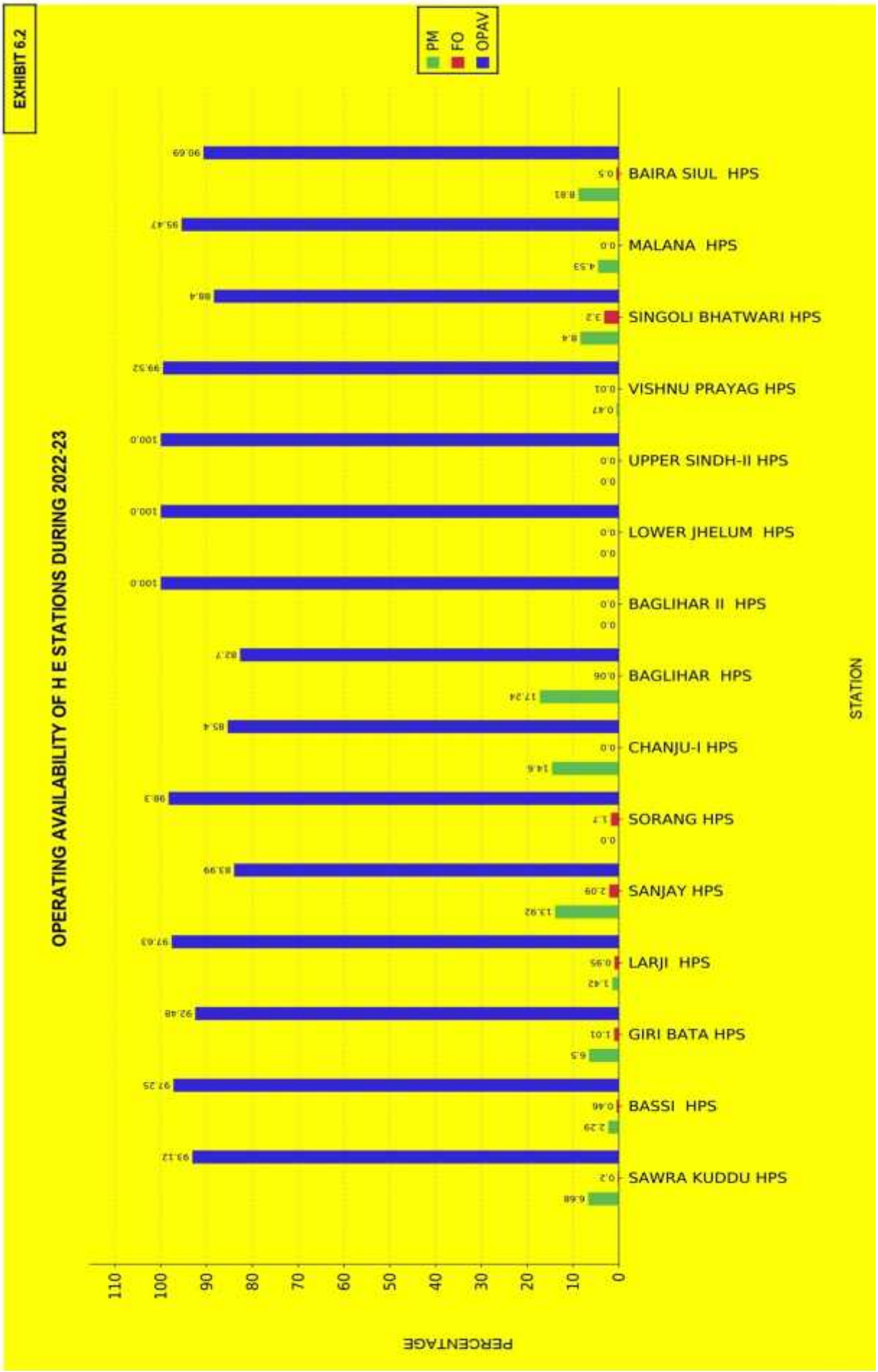
100
90
80
70
60
50
40
30
20
10
0

EXHIBIT 6.2


OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
FO
OPAV
BAIRA SIUL HPS
MALANA HPS
SINGOLI BHATWARI HPS
VISHNU PRAYAG HPS
UPPER SINDH-II HPS
LOWER JHELUM HPS
BAGLIHAR II HPS
BAGLIHAR HPS
CHANJU-I HPS
SORANG HPS
SANJAY HPS
LARJI HPS
GIRI BATA HPS
BASSI HPS
SAWRA KUDDU HPS
STATION
PERCENTAGE
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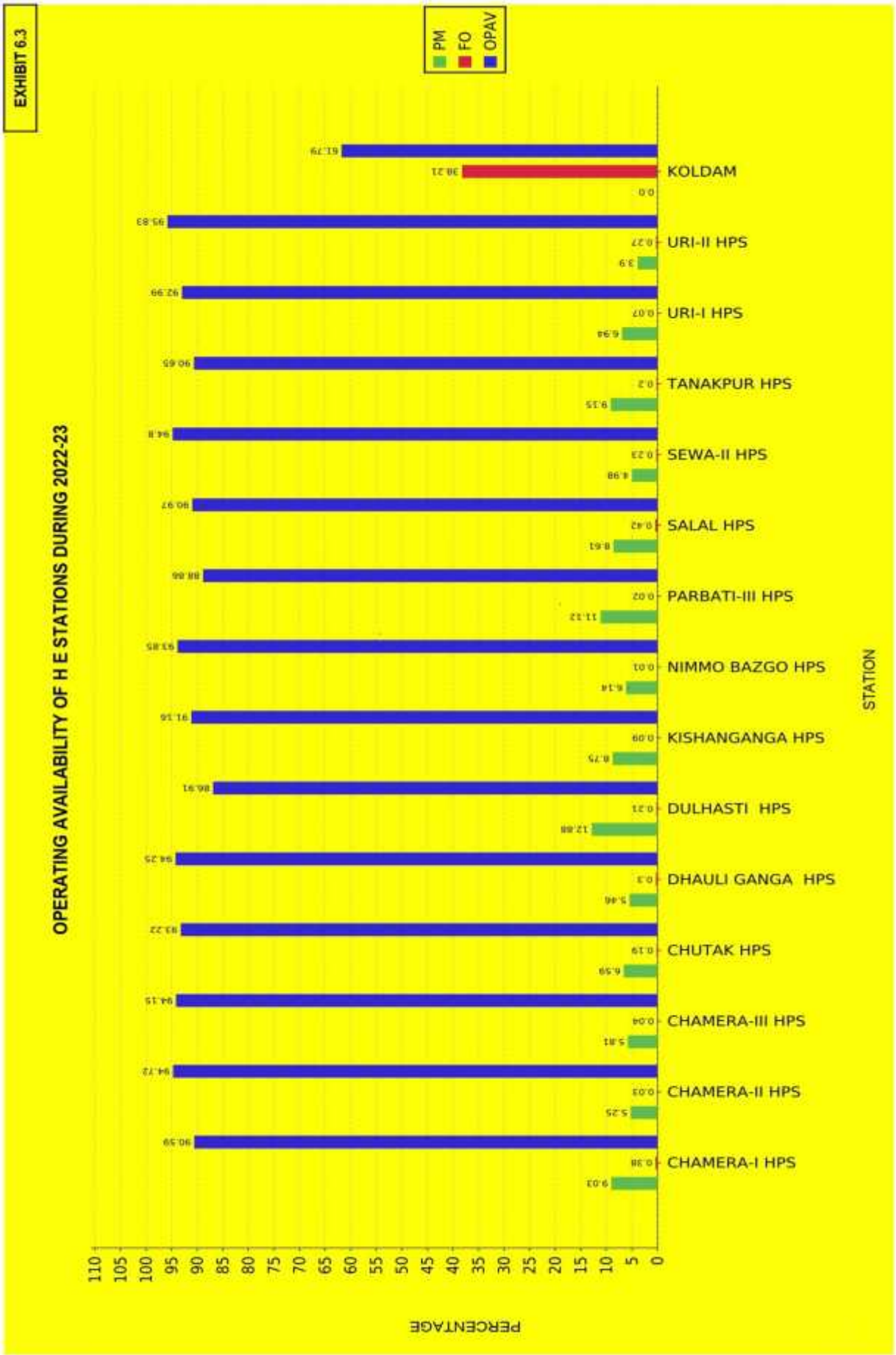
EXHIBIT 6.3
OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
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FO
OPAV
KOLDAM
URI-II HPS
URI-I HPS
TANAKPUR HPS
SEWA-II HPS
SALAL HPS
PARBATI-III HPS
NIMMO BAZGO HPS
KISHANGANGA HPS
DULHASTI HPS
DHAULI GANGA HPS
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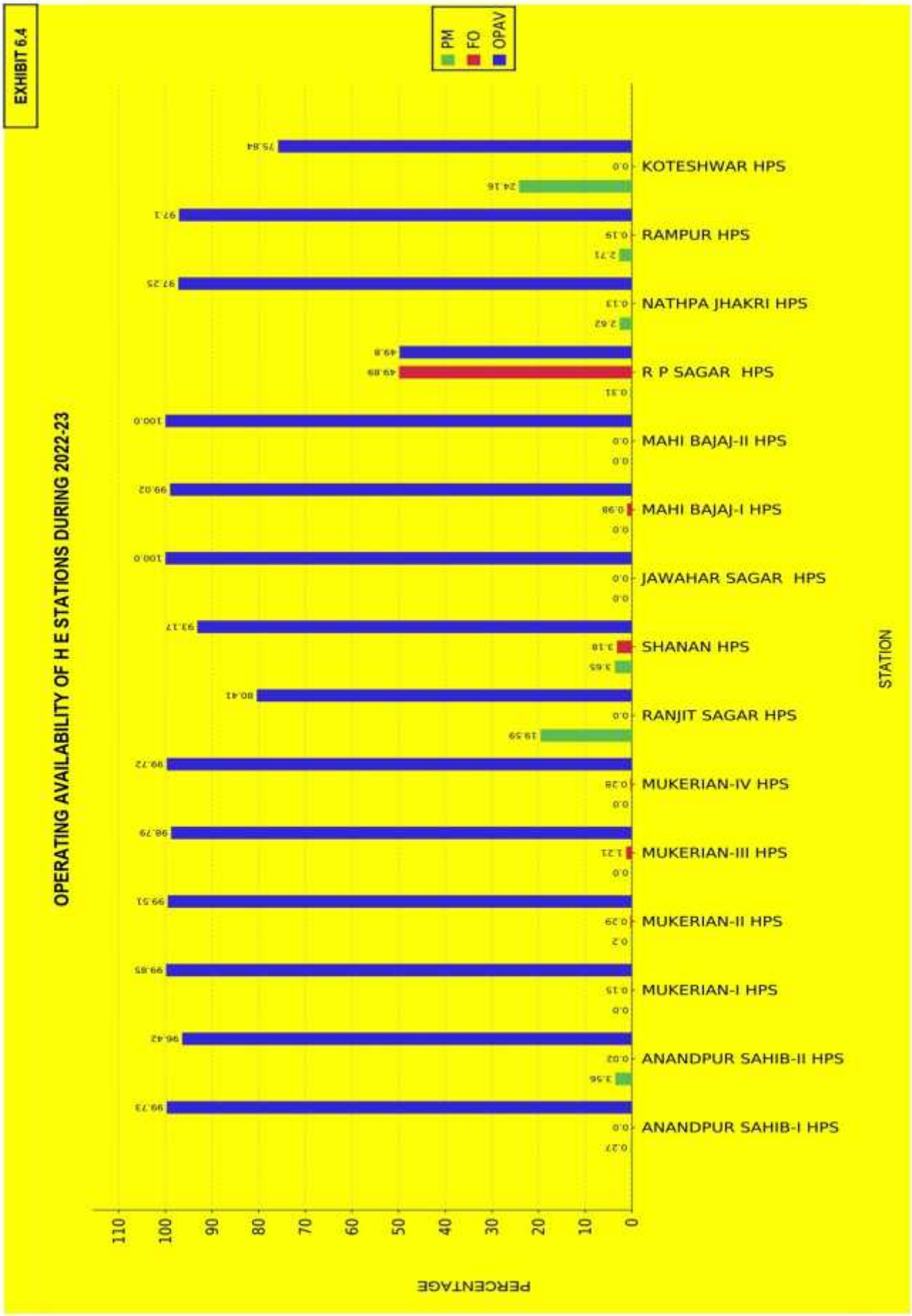
CHAMERA-II HPS
CHAMERA-I HPS
STATION
PERCENTAGE

EXHIBIT 6.4


OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
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OPAV
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RAMPUR HPS
NATHPA JHAKRI HPS
R P SAGAR HPS
MAHI BAJAJ-II HPS
MAHI BAJAJ-I HPS
JAWAHAR SAGAR HPS
SHANAN HPS
RANJIT SAGAR HPS
MUKERIAN-IV HPS
MUKERIAN-III HPS
MUKERIAN-II HPS
MUKERIAN-I HPS
ANANDPUR SAHIB-II HPS
ANANDPUR SAHIB-I HPS
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24.16
97.1
0.19
2.71
97.25
0.13
2.62
49.8
49.89
0.31
100.0
0.0
0.0
99.02
0.98
0.0
100.0
0.0
0.0
93.17
3.18
3.65
80.41
0.0
19.59
99.72
0.28
0.0
98.79
1.21
0.0
99.51
0.29
0.2
99.85
0.15
0.0
96.42
0.02
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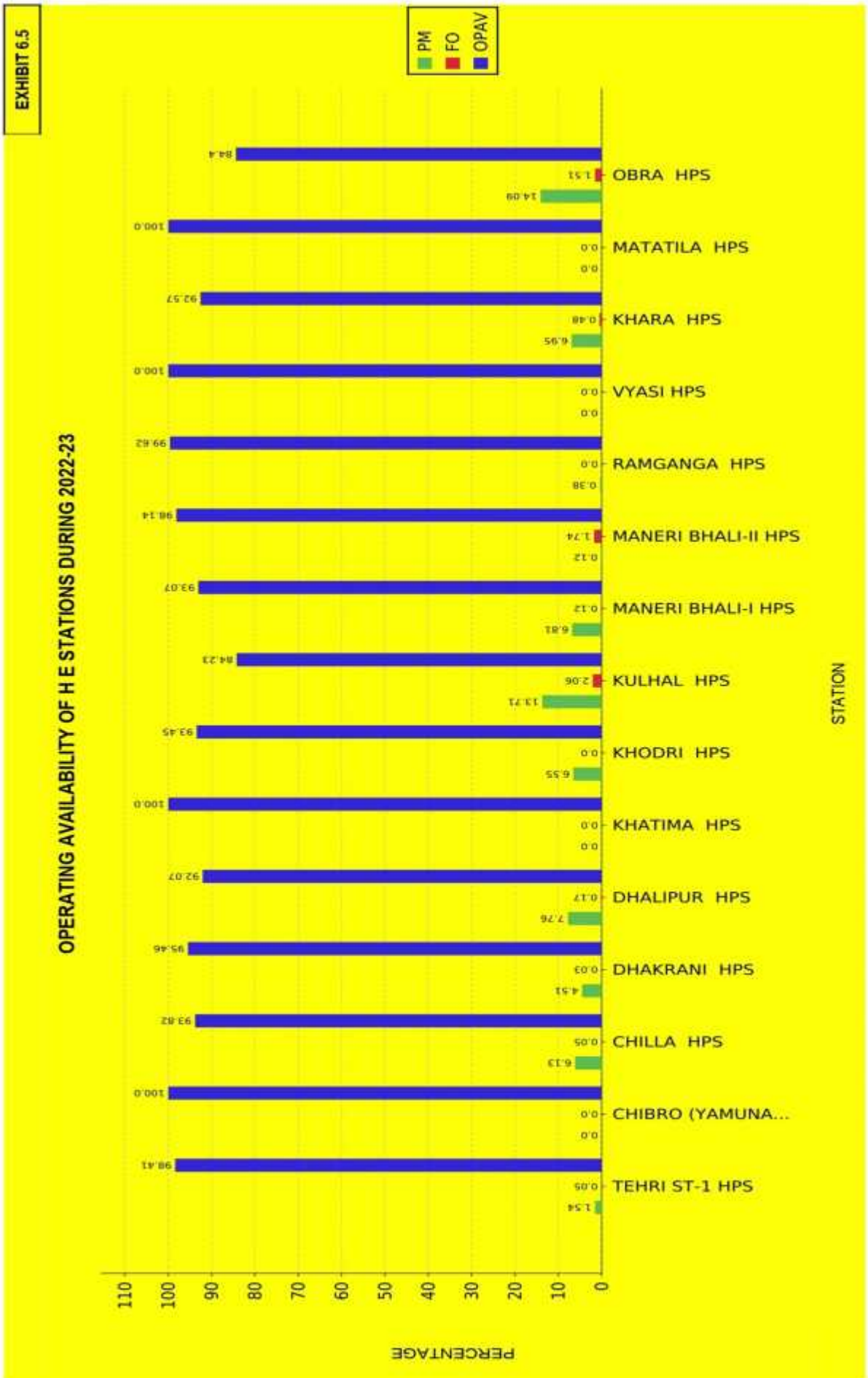
PERCENTAGE
STATION

EXHIBIT 6.5


OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
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OPAV
OBRA HPS
MATATILA HPS
KHARA HPS
VYASI HPS
RAMGANGA HPS
MANERI BHALI-II HPS
MANERI BHALI-I HPS
KULHAL HPS
KHODRI HPS
KHATIMA HPS
DHALIPUR HPS
DHAKRANI HPS
CHILLA HPS
CHIBRO (YAMUNA...
TEHRI ST-1 HPS
STATION
PERCENTAGE
0
10
20
30
40
50
60
70
80
90
100
110

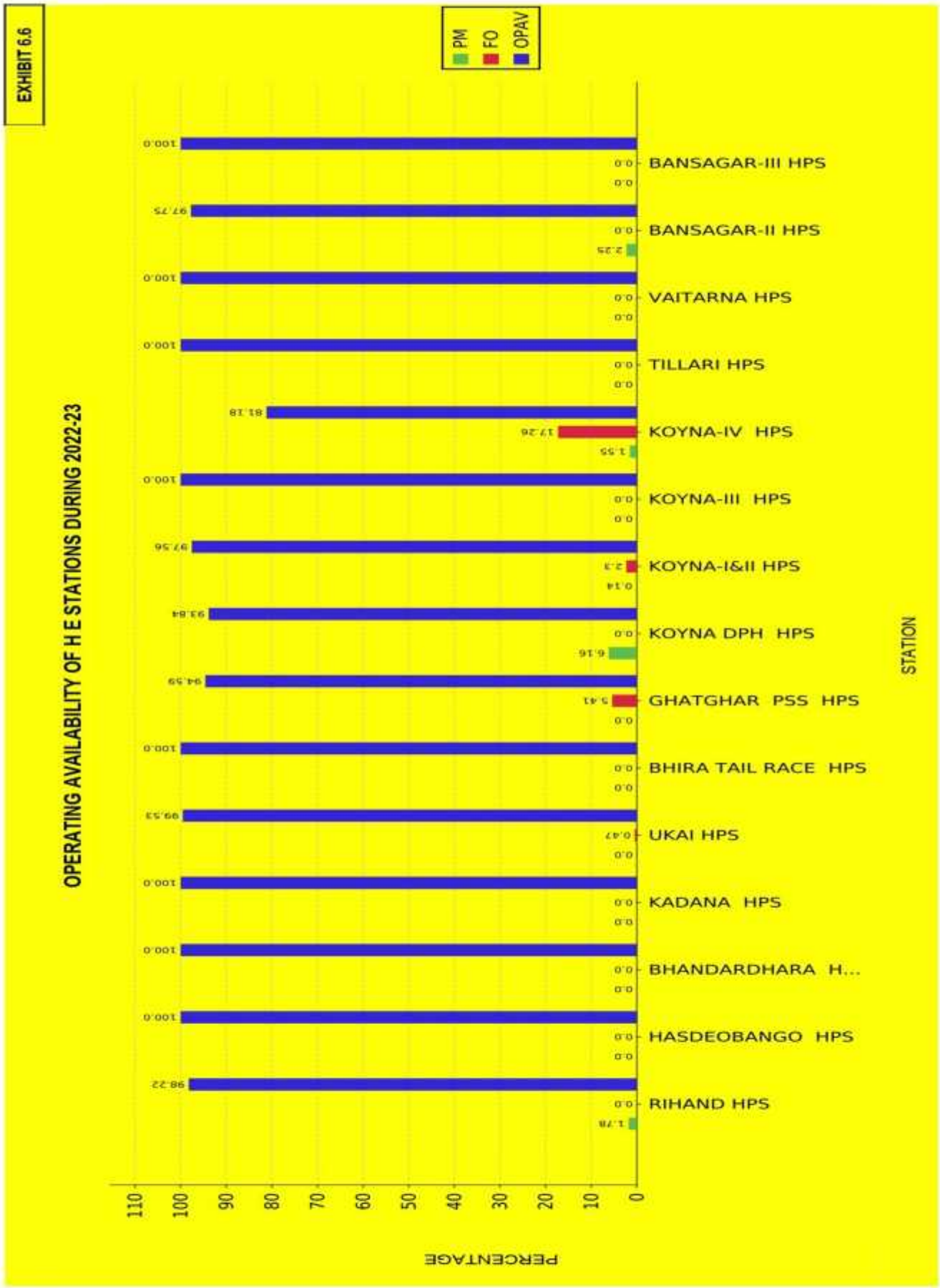
EXHIBIT 6.6
OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
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OPAV
BANSAGAR-III HPS
BANSAGAR-II HPS
VAITARNA HPS
TILLARI HPS
KOYNA-IV HPS
KOYNA-III HPS
KOYNA-I&II HPS
KOYNA DPH HPS
GHATGHAR PSS HPS
BHIRA TAIL RACE HPS
UKAI HPS
KADANA HPS
BHANDARDHARA H...
HASDEOBANGO HPS
RIHAND HPS
100.0
0.0
0.0
97.75
0.0
2.25
100.0
0.0
0.0
100.0
0.0
0.0
81.18
17.26
1.55
100.0
0.0
0.0
97.56
2.3
0.14
93.84
0.0
6.16
94.59
5.41
0.0
100.0
0.0
0.0
99.53
0.47
0.0
100.0
0.0
0.0
100.0
0.0
0.0
100.0
0.0
0.0
98.22
0.0
1.78
110
100
90
80
70
60
50
40
30
20
10
0
PERCENTAGE
STATION

EXHIBIT 6.7

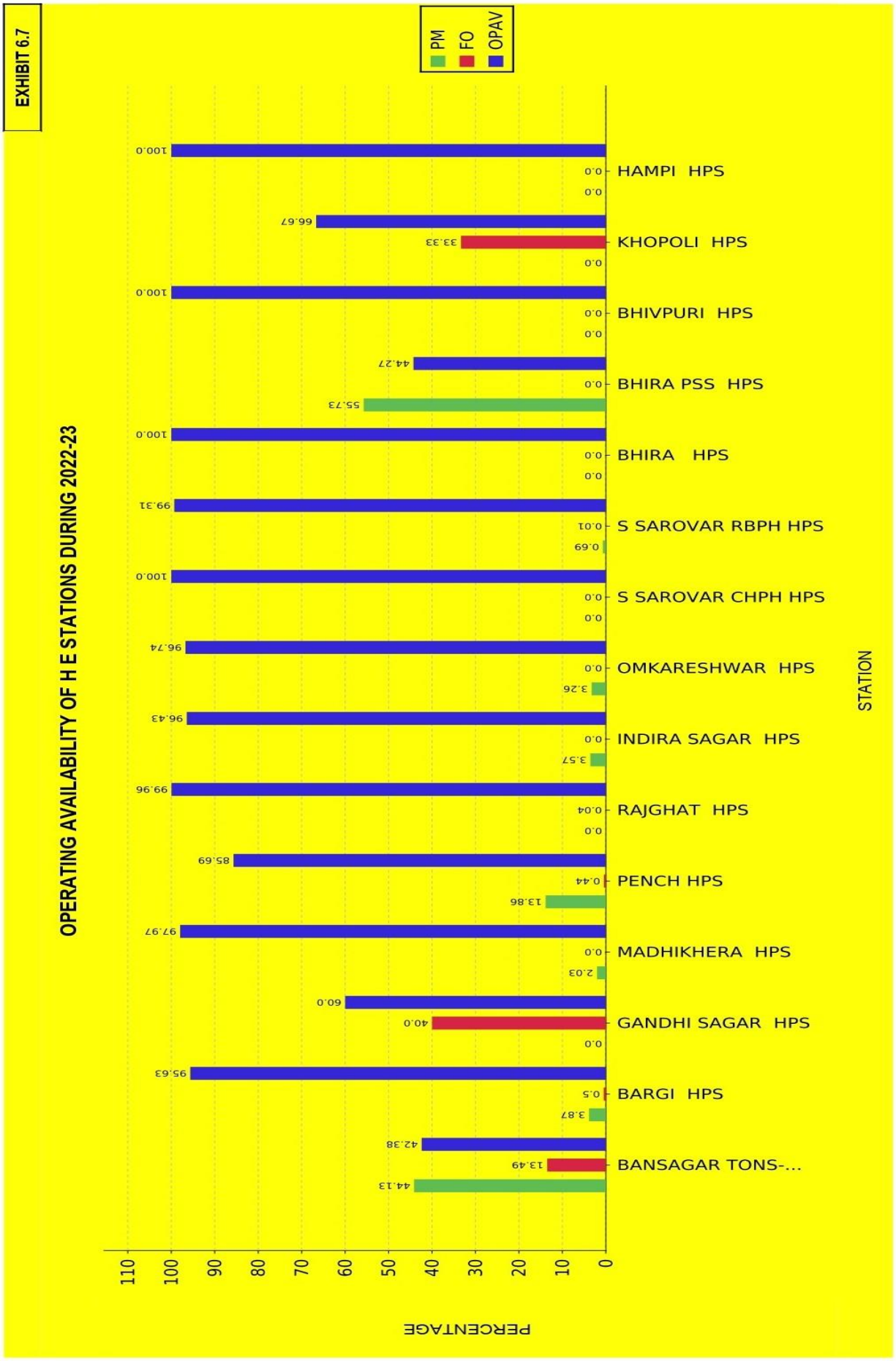

OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
FO
OPAV
PERCENTAGE
STATION
0
10
20
30
40
50
60
70
80
90
100
110
BANSAGAR TONS-...
BARGI HPS
GANDHI SAGAR HPS
MADHIKHERA HPS
PENCH HPS
RAJGHAT HPS
INDIRA SAGAR HPS
OMKARESHWAR HPS
S SAROVAR CHPH HPS
S SAROVAR RBPH HPS
BHIRA HPS
BHIRA PSS HPS
BHIVPURI HPS
KHOPOLI HPS
HAMPI HPS
44.13
13.49
42.38
3.87
0.5
95.63
0.0
40.0
60.0
2.03
0.0
97.97
13.86
0.44
85.69
0.04
0.0
99.96
3.57
0.0
96.43
3.26
0.0
96.74
0.0
0.0
100.0
0.69
0.01
99.31
0.0
0.0
100.0
55.73
0.0
44.27
0.0
0.0
100.0
33.33
66.67
0.0
0.0
100.0

EXHIBIT 6.8

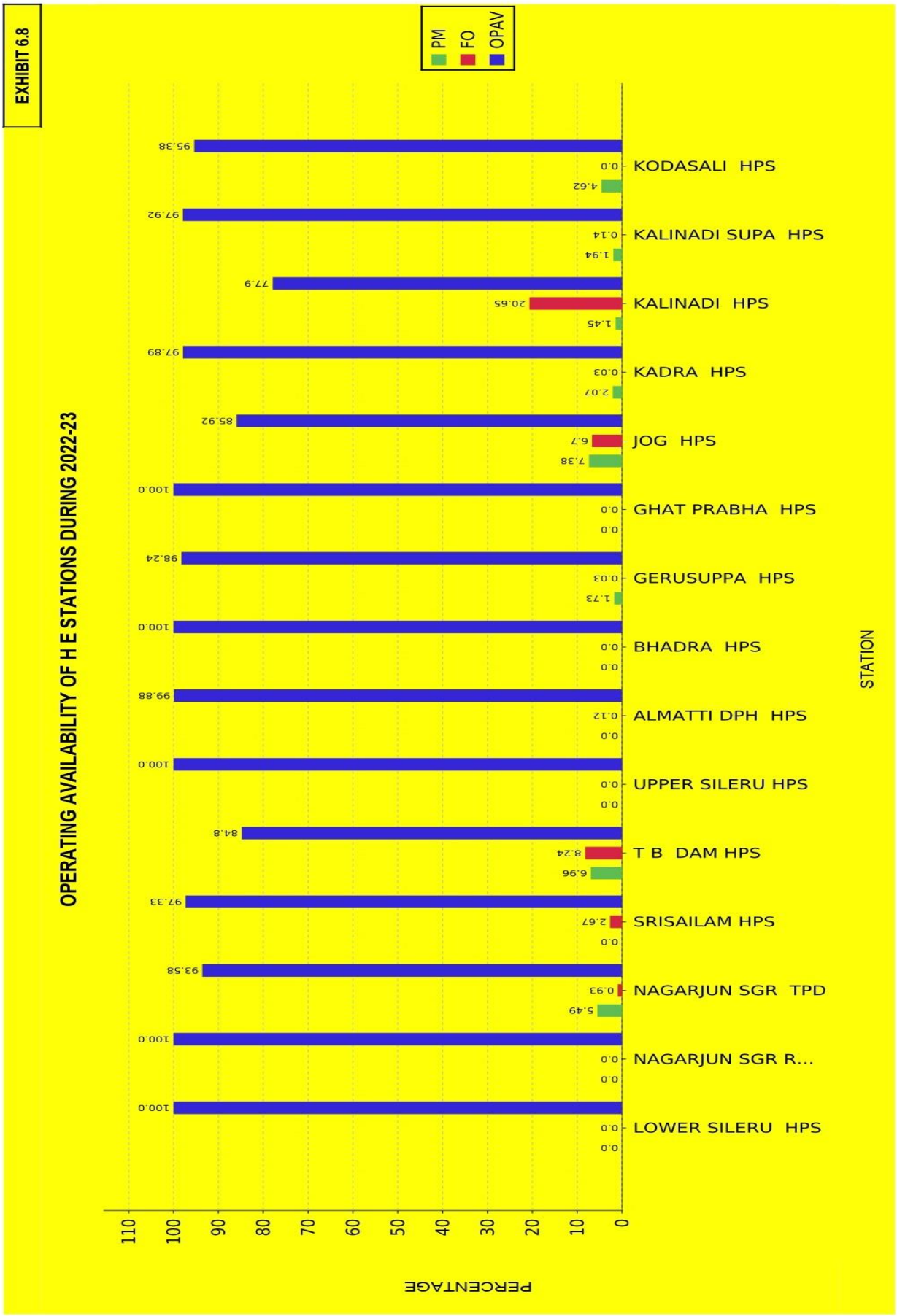
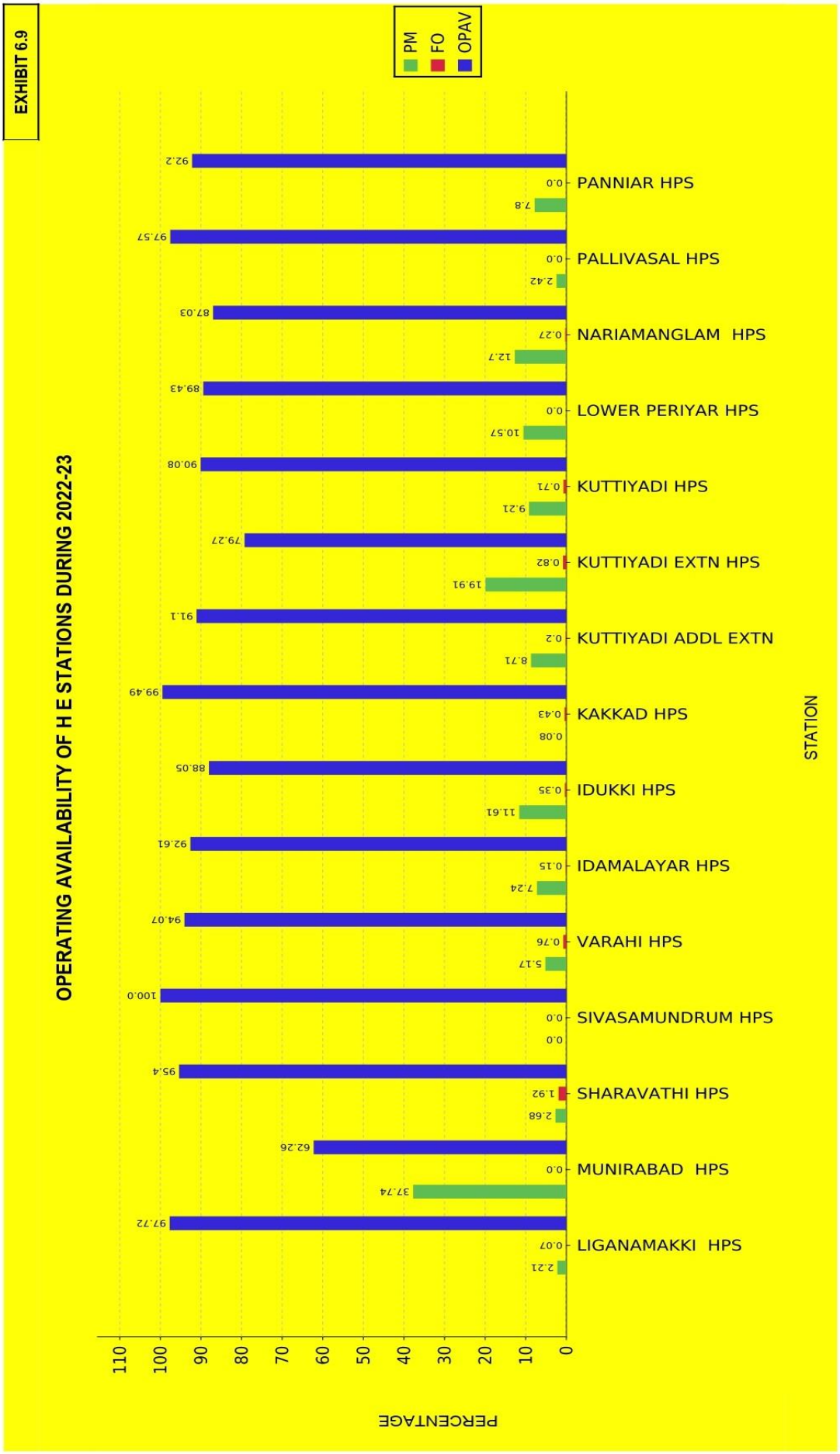

OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
FO
OPAV
KODASALI HPS
95.38
0.0
4.62
KALINADI SUPA HPS
97.92
0.14
1.94
KALINADI HPS
77.9
20.65
1.45
KADRA HPS
97.89
0.03
2.07
JOG HPS
85.92
6.7
7.38
GHAT PRABHA HPS
100.0
0.0
0.0
GERUSUPPA HPS
98.24
0.03
1.73
BHADRA HPS
100.0
0.0
0.0
ALMATTI DPH HPS
99.88
0.12
0.0
UPPER SILERU HPS
100.0
0.0
0.0
T B DAM HPS
84.8
8.24
6.96
SRISAILAM HPS
97.33
2.67
0.0
NAGARJUN SGR TPD
93.58
0.93
5.49
NAGARJUN SGR R...
100.0
0.0
0.0
LOWER SILERU HPS
100.0
0.0
0.0
110
100
90
80
70
60
50
40
30
20
10
0
PERCENTAGE
STATION

EXHIBIT 6.9


OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
FO
OPAV
PERCENTAGE
STATION
110
100
90
80
70
60
50
40
30
20
10
0
PANNIAR HPS
92.2
0.0
7.8
PALLIVASAL HPS
97.57
0.0
2.42
NARIAMANGLAM HPS
87.03
0.27
12.7
LOWER PERIYAR HPS
89.43
0.0
10.57
KUTTIYADI HPS
90.08
0.71
9.21
KUTTIYADI EXTN HPS
79.27
0.82
19.91
KUTTIYADI ADDL EXTN
91.1
0.2
8.71
KAKKAD HPS
99.49
0.43
0.08
IDUKKI HPS
88.05
0.35
11.61
IDAMALAYAR HPS
92.61
0.15
7.24
VARAHI HPS
94.07
0.76
5.17
SIVASAMUNDRUM HPS
100.0
0.0
0.0
SHARAVATHI HPS
95.4
1.92
2.68
MUNIRABAD HPS
62.26
0.0
37.74
LIGANAMAKKI HPS
97.72
0.07
2.21

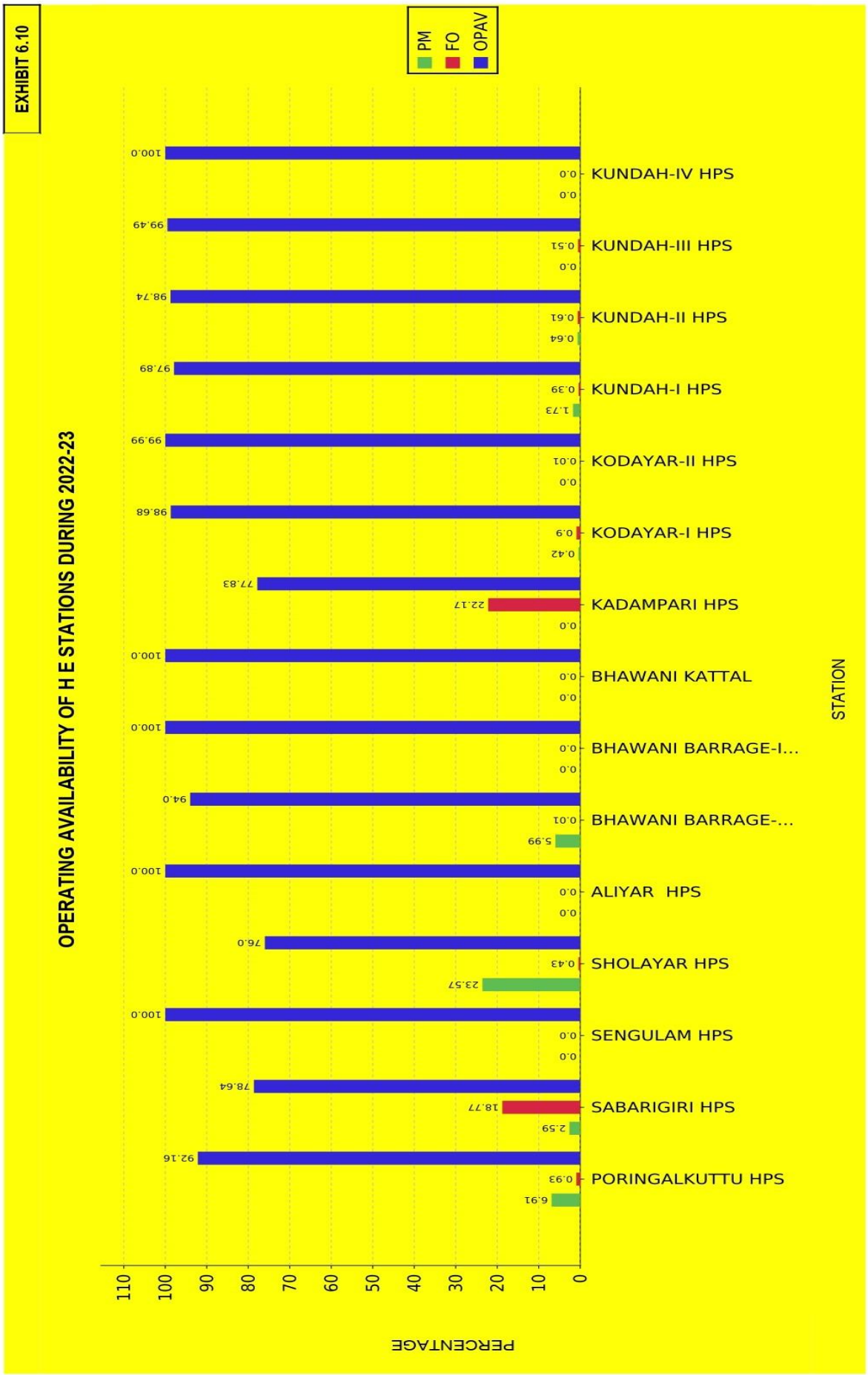


EXHIBIT 6.10
OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
FO
OPAV
KUNDAH-IV HPS
100.0
0.0
0.0
KUNDAH-III HPS
99.49
0.51
0.0
KUNDAH-II HPS
98.74
0.61
0.64
KUNDAH-I HPS
97.89
0.39
1.73
KODAYAR-II HPS
99.99
0.01
0.0
KODAYAR-I HPS
98.68
0.9
0.42
KADAMPARI HPS
77.83
22.17
0.0
BHAWANI KATTAL
100.0
0.0
0.0
BHAWANI BARRAGE-I...
100.0
0.0
0.0
BHAWANI BARRAGE-...
94.0
0.01
5.99
ALIYAR HPS
100.0
0.0
0.0
SHOLAYAR HPS
76.0
0.43
23.57
SENGULAM HPS
100.0
0.0
0.0
SABARIGIRI HPS
78.64
18.77
2.59
PORINGALKUTTU HPS
92.16
0.93
6.91
110
100
90
80
70
60
50
40
30
20
10
0
PERCENTAGE
STATION

EXHIBIT 6.11


OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
FO
OPAV
SHOLAYAR HPS (TN)
SARKARPATHY HPS
PYKARA ULTMATE HPS
PYKARA HPS
PERIYAR HPS
PARSON`S VALLEY HPS
PAPANASAM HPS
MOYAR HPS
METTUR TUNNEL HPS
METTUR DAM HPS
LOWER METTUR-...
LOWER METTUR-III HPS
LOWER METTUR-II HPS
LOWER METTUR-I HPS
KUNDAH-V HPS
100.0
99.56
96.21
82.12
97.62
93.84
91.79
0.0
0.44
3.79
17.88
2.38
6.16
8.21
110
100
90
80
70
60
50
40
30
20
10
0
PERCENTAGE
STATION

EXHIBIT 6.12

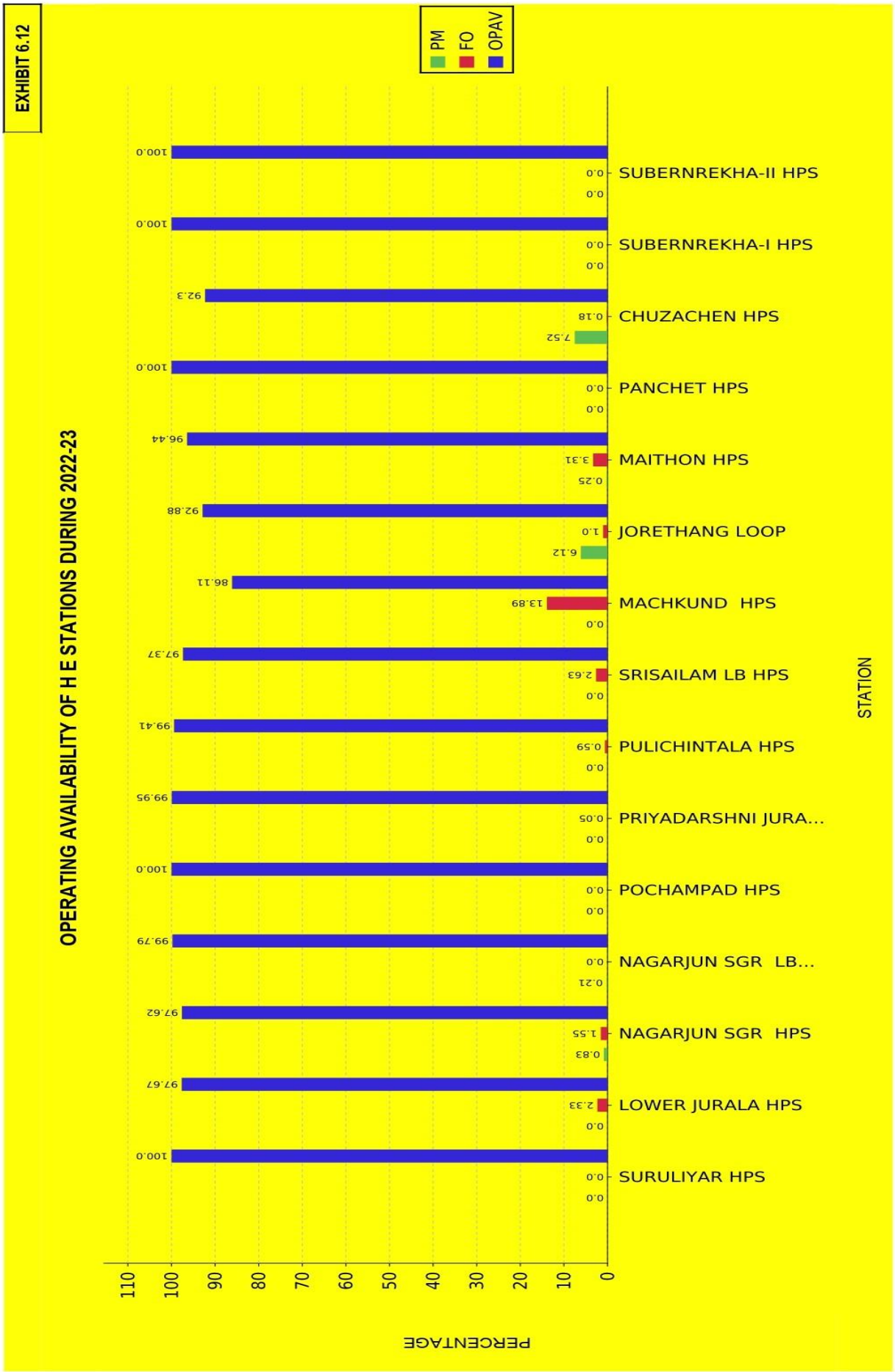

OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
FO
OPAV
SUBERNREKHA-II HPS
SUBERNREKHA-I HPS
CHUZACHEN HPS
PANCHET HPS
MAITHON HPS
JORETHANG LOOP
MACHKUND HPS
SRISAILAM LB HPS
PULICHINTALA HPS
PRIYADARSHNI JURA...
POCHAMPAD HPS
NAGARJUN SGR LB...
NAGARJUN SGR HPS
LOWER JURALA HPS
SURULIYAR HPS
100.0
0.0
0.0
100.0
0.0
0.0
92.3
0.18
7.52
100.0
0.0
0.0
96.44
3.31
0.25
92.88
1.0
6.12
86.11
13.89
0.0
97.37
2.63
0.0
99.41
0.59
0.0
99.95
0.05
0.0
100.0
0.0
0.0
99.79
0.0
0.21
97.62
1.55
0.83
97.67
2.33
0.0
100.0
0.0
0.0
110
100
90
80
70
60
50
40
30
20
10
0
PERCENTAGE
STATION

EXHIBIT 6.13

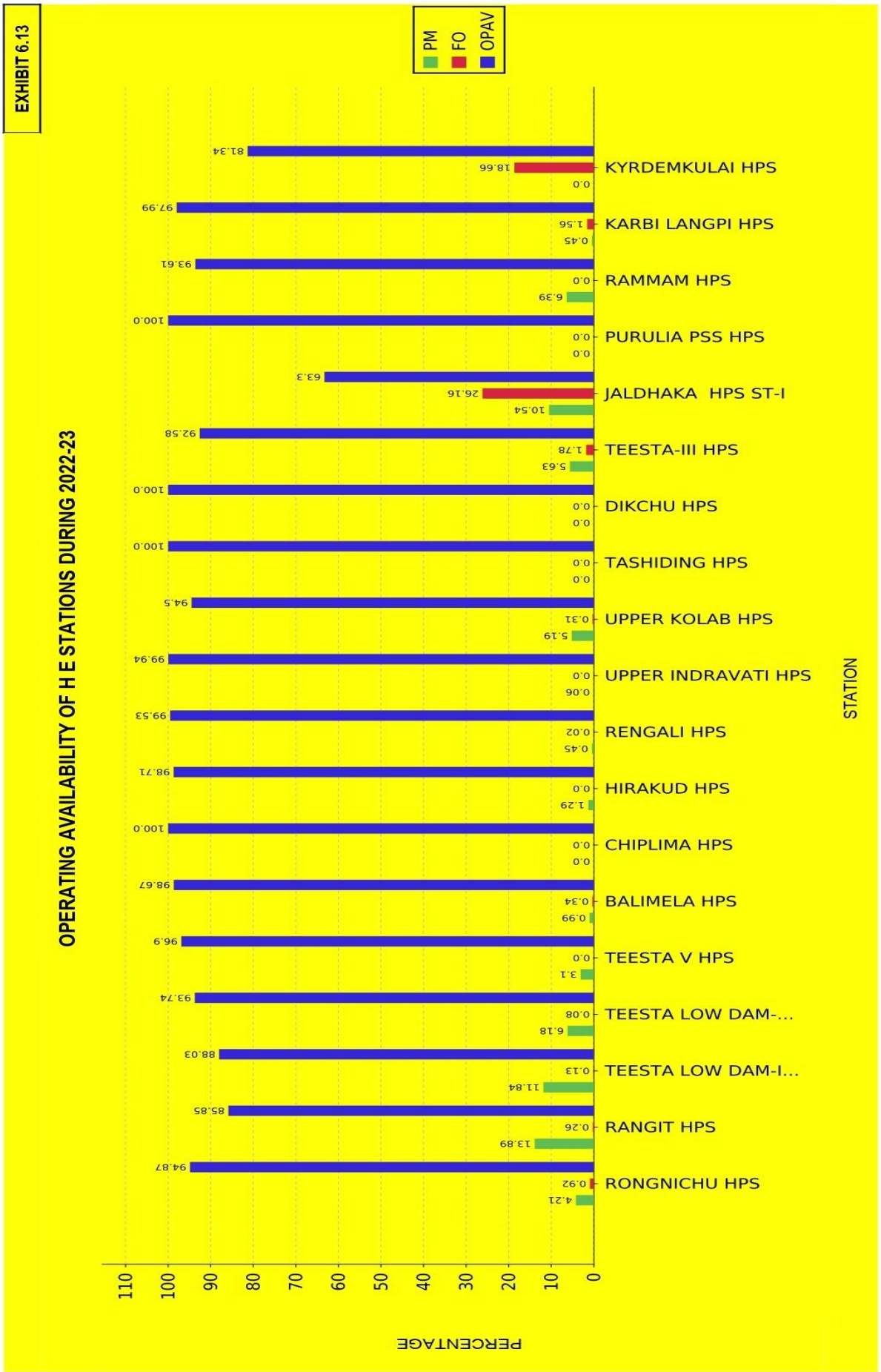

OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
FO
OPAV
PERCENTAGE
STATION
110
100
90
80
70
60
50
40
30
20
10
0
RONGNICHU HPS
94.87
0.92
4.21
RANGIT HPS
85.85
0.26
13.89
TEESTA LOW DAM-I...
88.03
0.13
11.84
TEESTA LOW DAM-...
93.74
0.08
6.18
TEESTA V HPS
96.9
0.0
3.1
BALIMELA HPS
98.67
0.34
0.99
CHIPLIMA HPS
100.0
0.0
0.0
HIRAKUD HPS
98.71
0.0
1.29
RENGALI HPS
99.53
0.45
0.02
UPPER INDRAVATI HPS
99.94
0.0
0.06
UPPER KOLAB HPS
94.5
0.31
5.19
TASHIDING HPS
100.0
0.0
0.0
DIKCHU HPS
100.0
0.0
0.0
TEESTA-III HPS
92.58
1.78
5.63
JALDHAKA HPS ST-I
63.3
26.16
10.54
PURULIA PSS HPS
100.0
0.0
0.0
RAMMAM HPS
93.61
0.0
6.39
KARBI LANGPI HPS
97.99
1.56
0.45
KYRDEMKULAI HPS
81.34
18.66
0.0

EXHIBIT 6.14

OPERATING AVAILABILITY OF H E STATIONS DURING 2022-23
PM
FO
OPAV
PERCENTAGE
STATION
110
100
90
80
70
60
50
40
30
20
10
0
MYNTDU(LESHKA) St...
NEW UMTRU HPS
UMIAM HPS ST-I
UMIAM HPS ST-IV
DOYANG HPS
KAMENG HPS
KHONDONG HPS
KOPILI HPS
PARE
RANGANADI HPS
TUIRIAL HPS
LOKTAK HPS
99.91
0.09
0.0
94.65
1.92
3.43
97.56
0.27
2.17
94.54
5.3
0.16
88.99
0.98
10.04
83.08
7.21
9.71
100.0
0.0
0.0
0.0
100.0
0.0
95.7
0.71
3.58
95.28
2.11
2.62
94.71
1.56
3.73
95.56
2.49
1.95

CENTRAL ELECTRICITY AUTHORITY
Hydro WING
Hydro Project Planning & Investigation Division

Annex 6.1

OPERAING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2022-23

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	Northern					
	ADHPL					
1	**ALLAIN DUHANGAN HPS**	1	96.00	10.39	5.44	84.17
		2	96.00	7.18	3.53	89.29
	TOTAL		**192.00**	**8.78**	**4.49**	**86.73**
	AHPC (GVK)					
2	**SHRINAGAR HPS**	1	82.50	0.00	0.00	100.00
		2	82.50	0.00	0.00	100.00
		3	82.50	0.00	0.00	100.00
		4	82.50	0.00	0.00	100.00
	TOTAL		**330.00**	**0.00**	**0.00**	**100.00**
	BBMB					
3	**BHAKRA LEFT HPS**	1	108.00	100.00	0.00	0.00
		2	126.00	0.00	0.04	99.96
		3	126.00	0.00	0.01	99.99
		4	126.00	1.64	0.01	98.35

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		5	126.00	0.00	0.01	99.99
	TOTAL		**612.00**	**20.33**	**0.01**	**79.66**
4	**BHAKRA RIGHT HPS**	6	157.00	0.00	0.00	100.00
		7	157.00	0.00	0.00	100.00
		8	157.00	7.75	0.00	92.25
		9	157.00	4.96	0.00	95.04
		10	157.00	0.00	0.00	100.00
	TOTAL		**785.00**	**2.54**	**0.00**	**97.46**
5	**DEHAR HPS**	1	165.00	0.00	0.00	100.00
		2	165.00	0.32	0.00	99.68
		3	165.00	0.04	0.02	99.95
		4	165.00	0.03	2.12	97.84
		5	165.00	7.27	0.00	92.73
		6	165.00	0.00	0.00	100.00
	TOTAL		**990.00**	**1.28**	**0.36**	**98.37**
6	**GANGUWAL HPS**	1	29.25	1.94	0.00	98.06
		2	24.20	1.37	0.00	98.63
		3	24.20	0.00	0.40	99.60

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**77.65**	**1.10**	**0.13**	**98.77**
7	**KOTLA HPS**	1	29.25	0.25	0.00	99.75
		2	24.20	0.00	0.00	100.00
		3	24.20	1.46	0.16	98.38
	TOTAL		**77.65**	**0.57**	**0.05**	**99.37**
8	**PONG HPS**	1	66.00	0.00	0.00	100.00
		2	66.00	3.09	0.00	96.91
		3	66.00	0.00	0.03	99.97
		4	66.00	5.51	0.00	94.49
		5	66.00	0.00	0.00	100.00
		6	66.00	5.15	0.00	94.85
	TOTAL		**396.00**	**2.29**	**0.01**	**97.70**
	E.P.P.L.					
9	**MALANA-II HPS**	1	50.00	0.04	0.03	99.93
		2	50.00	0.04	0.33	99.64
	TOTAL		**100.00**	**0.04**	**0.18**	**99.78**
	GBHPPL					
10	**BUDHIL HPS**	1	35.00	12.32	1.36	86.32
		2	35.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**70.00**	**6.16**	**0.68**	**93.16**
	GMR BHHPL					
11	**BAJOLI HOLI HPS**	1	60.00	16.16	0.00	83.84
		2	60.00	18.63	8.09	73.28
		3	60.00	18.63	0.47	80.90
	TOTAL		**180.00**	**17.81**	**2.85**	**79.34**
	HBPCL					
12	**BASPA HPS**	1	100.00	2.76	0.00	97.24
		2	100.00	2.77	0.19	97.04
		3	100.00	4.29	0.00	95.71
	TOTAL		**300.00**	**3.28**	**0.06**	**96.66**
13	**KARCHAM WANGTOO HPS**	1	261.25	0.00	0.00	100.00
		2	261.25	0.00	0.00	100.00
		3	261.25	0.00	0.57	99.43
		4	261.25	3.59	0.00	96.41
	TOTAL		**1045.00**	**0.90**	**0.14**	**98.96**
	HPPCL					
14	**KASHANG INTEGRATED HEP**	1	65.00	0.00	0.00	100.00
		2	65.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	65.00	0.00	0.00	100.00
	TOTAL		**195.00**	**0.00**	**0.00**	**100.00**
15	**SAINJ HPS**	1	50.00	0.00	0.51	99.49
		2	50.00	1.44	11.08	87.48
	TOTAL		**100.00**	**0.72**	**5.80**	**93.48**
16	**SAWRA KUDDU HPS**	1	37.00	15.93	0.61	83.47
		2	37.00	1.92	0.00	98.08
		3	37.00	2.20	0.00	97.80
	TOTAL		**111.00**	**6.68**	**0.20**	**93.12**
	HPSEB					
17	**BASSI HPS**	1	16.50	0.35	0.00	99.65
		2	16.50	0.94	0.64	98.43
		3	16.50	7.59	0.00	92.41
		4	16.50	0.27	1.20	98.53
	TOTAL		**66.00**	**2.29**	**0.46**	**97.25**
18	**GIRI BATA HPS**	1	30.00	2.05	0.27	97.68
		2	30.00	10.96	1.76	87.29
	TOTAL		**60.00**	**6.50**	**1.01**	**92.48**
19	**LARJI HPS**	1	42.00	4.27	1.37	94.36

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	42.00	0.00	0.00	100.00
		3	42.00	0.00	1.48	98.52
	TOTAL		**126.00**	**1.42**	**0.95**	**97.63**
20	**SANJAY HPS**	1	40.00	25.18	2.09	72.73
		2	40.00	13.42	2.09	84.49
		3	40.00	3.17	2.09	94.75
	TOTAL		**120.00**	**13.92**	**2.09**	**83.99**
	HSPCL					
21	**SORANG HPS**	1	50.00	0.00	3.35	96.65
		2	50.00	0.00	0.06	99.94
	TOTAL		**100.00**	**0.00**	**1.70**	**98.30**
	IAEPL					
22	**CHANJU-I HPS**	1	12.00	9.49	0.00	90.51
		2	12.00	13.54	0.00	86.46
		3	12.00	20.77	0.00	79.23
	TOTAL		**36.00**	**14.60**	**0.00**	**85.40**
	JKSPDC					
23	**BAGLIHAR HPS**	1	150.00	21.21	0.14	78.65
		2	150.00	8.93	0.02	91.04

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	150.00	21.56	0.02	78.42
	TOTAL		**450.00**	**17.24**	**0.06**	**82.70**
24	**BAGLIHAR II HPS**	1	150.00	0.00	0.00	100.00
		2	150.00	0.00	0.00	100.00
		3	150.00	0.00	0.00	100.00
	TOTAL		**450.00**	**0.00**	**0.00**	**100.00**
25	**LOWER JHELUM HPS**	1	35.00	0.00	0.00	100.00
		2	35.00	0.00	0.00	100.00
		3	35.00	0.00	0.00	100.00
	TOTAL		**105.00**	**0.00**	**0.00**	**100.00**
26	**UPPER SINDH-II HPS**	3	35.00	0.00	0.00	100.00
		4	35.00	0.00	0.00	100.00
		5	35.00	0.00	0.00	100.00
	TOTAL		**105.00**	**0.00**	**0.00**	**100.00**
	JPPVL					
27	**VISHNU PRAYAG HPS**	1	100.00	0.59	0.01	99.40
		2	100.00	0.69	0.00	99.31
		3	100.00	0.00	0.03	99.97
		4	100.00	0.60	0.00	99.40

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**400.00**	**0.47**	**0.01**	**99.52**
	L&T					
28	**SINGOLI BHATWARI HPS**	1	33.00	8.39	3.93	87.68
		2	33.00	8.07	5.46	86.47
		3	33.00	8.75	0.20	91.05
	TOTAL		**99.00**	**8.40**	**3.20**	**88.40**
	MPCL					
29	**MALANA HPS**	1	43.00	4.57	0.00	95.43
		2	43.00	4.49	0.00	95.51
	TOTAL		**86.00**	**4.53**	**0.00**	**95.47**
	NHPC					
30	**BAIRA SIUL HPS**	1	60.00	7.63	0.09	92.27
		2	60.00	11.81	0.88	87.32
		3	60.00	6.99	0.52	92.49
	TOTAL		**180.00**	**8.81**	**0.50**	**90.69**
31	**CHAMERA-I HPS**	1	180.00	16.84	0.96	82.20
		2	180.00	4.68	0.01	95.31
		3	180.00	5.55	0.17	94.28
	TOTAL		**540.00**	**9.03**	**0.38**	**90.59**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
32	**CHAMERA-II HPS**	1	100.00	4.00	0.05	95.94
		2	100.00	8.34	0.00	91.66
		3	100.00	3.40	0.05	96.55
	TOTAL		**300.00**	**5.25**	**0.03**	**94.72**
33	**CHAMERA-III HPS**	1	77.00	3.48	0.06	96.45
		2	77.00	10.00	0.03	89.97
		3	77.00	3.95	0.03	96.03
	TOTAL		**231.00**	**5.81**	**0.04**	**94.15**
34	**CHUTAK HPS**	1	11.00	5.18	0.16	94.66
		2	11.00	5.21	0.24	94.55
		3	11.00	10.84	0.15	89.00
		4	11.00	5.14	0.19	94.67
	TOTAL		**44.00**	**6.59**	**0.19**	**93.22**
35	**DHAULI GANGA HPS**	1	70.00	6.56	0.07	93.37
		2	70.00	5.52	0.67	93.81
		3	70.00	4.96	0.41	94.63
		4	70.00	4.78	0.03	95.19
	TOTAL		**280.00**	**5.46**	**0.30**	**94.25**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
36	**DULHASTI HPS**	1	130.00	11.41	0.38	88.20
		2	130.00	13.35	0.10	86.55
		3	130.00	13.88	0.16	85.96
	TOTAL		**390.00**	**12.88**	**0.21**	**86.91**
37	**KISHANGANGA HPS**	1	110.00	11.72	0.06	88.22
		2	110.00	11.31	0.13	88.56
		3	110.00	3.21	0.08	96.70
	TOTAL		**330.00**	**8.75**	**0.09**	**91.16**
38	**NIMMO BAZGO HPS**	1	15.00	5.87	0.00	94.13
		2	15.00	5.29	0.00	94.71
		3	15.00	7.25	0.04	92.70
	TOTAL		**45.00**	**6.14**	**0.01**	**93.85**
39	**PARBATI-III HPS**	1	130.00	2.38	0.03	97.59
		2	130.00	12.05	0.01	87.94
		3	130.00	13.80	0.01	86.19
		4	130.00	16.24	0.03	83.73
	TOTAL		**520.00**	**11.12**	**0.02**	**88.86**
40	**SALAL HPS**	1	115.00	0.41	0.04	99.54

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	115.00	8.27	2.29	89.43
		3	115.00	9.33	0.05	90.62
		4	115.00	4.74	0.02	95.24
		5	115.00	20.19	0.04	79.77
		6	115.00	8.73	0.05	91.22
	TOTAL		**690.00**	**8.61**	**0.42**	**90.97**
41	**SEWA-II HPS**	1	40.00	4.62	0.56	94.82
		2	40.00	4.91	0.01	95.08
		3	40.00	5.40	0.11	94.49
	TOTAL		**120.00**	**4.98**	**0.23**	**94.80**
42	**TANAKPUR HPS**	1	31.40	9.53	0.27	90.20
		2	31.40	9.04	0.06	90.90
		3	31.40	8.88	0.27	90.85
	TOTAL		**94.20**	**9.15**	**0.20**	**90.65**
43	**URI-I HPS**	1	120.00	6.64	0.03	93.33
		2	120.00	5.99	0.09	93.91
		3	120.00	7.29	0.03	92.68
		4	120.00	7.84	0.13	92.03

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**480.00**	**6.94**	**0.07**	**92.99**
44	**URI-II HPS**	1	60.00	6.38	0.01	93.60
		2	60.00	2.77	0.11	97.12
		3	60.00	3.37	0.88	95.75
		4	60.00	3.09	0.07	96.85
	TOTAL		**240.00**	**3.90**	**0.27**	**95.83**
	NTPC Ltd.					
45	**KOLDAM**	1	200.00	0.00	37.59	62.41
		2	200.00	0.00	37.57	62.43
		3	200.00	0.00	41.45	58.55
		4	200.00	0.00	36.23	63.77
	TOTAL		**800.00**	**0.00**	**38.21**	**61.79**
	PSPCL					
46	**ANANDPUR SAHIB-I HPS**	1	33.50	0.55	0.00	99.45
		2	33.50	0.00	0.00	100.00
	TOTAL		**67.00**	**0.27**	**0.00**	**99.73**
47	**ANANDPUR SAHIB-II HPS**	3	33.50	0.00	0.02	99.98
		4	33.50	7.12	0.01	92.86
	TOTAL		**67.00**	**3.56**	**0.02**	**96.42**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
48	**MUKERIAN-I HPS**	1	15.00	0.00	0.11	99.89
		2	15.00	0.00	0.14	99.86
		3	15.00	0.01	0.20	99.79
	TOTAL		**45.00**	**0.00**	**0.15**	**99.85**
49	**MUKERIAN-II HPS**	4	15.00	0.00	0.49	99.51
		5	15.00	0.53	0.00	99.47
		6	15.00	0.06	0.38	99.56
	TOTAL		**45.00**	**0.20**	**0.29**	**99.51**
50	**MUKERIAN-III HPS**	7	19.50	0.00	0.21	99.79
		8	19.50	0.00	3.36	96.64
		9	19.50	0.00	0.06	99.94
	TOTAL		**58.50**	**0.00**	**1.21**	**98.79**
51	**MUKERIAN-IV HPS**	10	19.50	0.00	0.02	99.98
		11	19.50	0.00	0.09	99.91
		12	19.50	0.00	0.71	99.29
	TOTAL		**58.50**	**0.00**	**0.28**	**99.72**
52	**RANJIT SAGAR HPS**	1	150.00	1.40	0.00	98.60
		2	150.00	17.18	0.00	82.82

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	150.00	46.37	0.00	53.63
		4	150.00	13.41	0.00	86.59
	TOTAL		**600.00**	**19.59**	**0.00**	**80.41**
53	**SHANAN HPS**	1	15.00	5.34	0.63	94.03
		2	15.00	6.48	0.61	92.91
		3	15.00	6.12	4.90	88.98
		4	15.00	0.10	0.89	99.01
		5	50.00	0.21	8.86	90.93
	TOTAL		**110.00**	**3.65**	**3.18**	**93.17**
	RRVUNL					
54	**JAWAHAR SAGAR HPS**	1	33.00	0.00	0.00	100.00
		2	33.00	0.00	0.00	100.00
		3	33.00	0.00	0.00	100.00
	TOTAL		**99.00**	**0.00**	**0.00**	**100.00**
55	**MAHI BAJAJ-I HPS**	1	25.00	0.00	0.02	99.98
		2	25.00	0.00	1.93	98.07
	TOTAL		**50.00**	**0.00**	**0.98**	**99.02**
56	**MAHI BAJAJ-II HPS**	3	45.00	0.00	0.00	100.00
		4	45.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**90.00**	**0.00**	**0.00**	**100.00**
57	**R P SAGAR HPS**	1	43.00	0.24	0.00	99.76
		2	43.00	0.00	100.00	0.00
		3	43.00	0.99	80.99	18.02
		4	43.00	0.00	18.55	81.45
	TOTAL		**172.00**	**0.31**	**49.89**	**49.80**
	SJVNL					
58	**NATHPA JHAKRI HPS**	1	250.00	2.91	0.00	97.09
		2	250.00	2.11	0.00	97.89
		3	250.00	3.26	0.00	96.74
		4	250.00	3.39	0.02	96.60
		5	250.00	1.91	0.62	97.47
		6	250.00	2.13	0.12	97.75
	TOTAL		**1500.00**	**2.62**	**0.13**	**97.25**
59	**RAMPUR HPS**	1	68.67	2.50	0.02	97.48
		2	68.67	2.13	1.02	96.85
		3	68.67	2.62	0.02	97.36
		4	68.67	3.21	0.02	96.77

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		5	68.67	3.27	0.02	96.70
		6	68.67	2.56	0.01	97.43
	TOTAL		**412.02**	**2.71**	**0.19**	**97.10**
	THDC					
60	**KOTESHWAR HPS**	1	100.00	90.65	0.00	9.35
		2	100.00	0.00	0.00	100.00
		3	100.00	0.00	0.00	100.00
		4	100.00	5.97	0.00	94.03
	TOTAL		**400.00**	**24.16**	**0.00**	**75.84**
61	**TEHRI ST-1 HPS**	1	250.00	3.50	0.00	96.49
		2	250.00	0.00	0.19	99.81
		3	250.00	2.66	0.00	97.34
		4	250.00	0.00	0.00	100.00
	TOTAL		**1000.00**	**1.54**	**0.05**	**98.41**
	UJVNL					
62	**CHIBRO (YAMUNA) HPS**	1	60.00	0.00	0.00	100.00
		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

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**240.00**	**0.00**	**0.00**	**100.00**
63	**CHILLA HPS**	1	36.00	9.59	0.11	90.30
		2	36.00	0.00	0.01	99.99
		3	36.00	6.85	0.02	93.13
		4	36.00	8.09	0.04	91.87
	TOTAL		**144.00**	**6.13**	**0.05**	**93.82**
64	**DHAKRANI HPS**	1	11.25	13.53	0.01	86.46
		2	11.25	0.00	0.03	99.97
		3	11.25	0.00	0.04	99.96
	TOTAL		**33.75**	**4.51**	**0.03**	**95.46**
65	**DHALIPUR HPS**	1	17.00	23.29	0.42	76.29
		2	17.00	0.00	0.05	99.95
		3	17.00	0.00	0.05	99.95
	TOTAL		**51.00**	**7.76**	**0.17**	**92.07**
66	**KHATIMA HPS**	1	13.80	0.00	0.00	100.00
		2	13.80	0.00	0.00	100.00
		3	13.80	0.00	0.00	100.00
	TOTAL		**41.40**	**0.00**	**0.00**	**100.00**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
67	**KHODRI HPS**	1	30.00	10.27	0.00	89.73
		2	30.00	7.60	0.00	92.40
		3	30.00	8.34	0.00	91.66
		4	30.00	0.00	0.00	100.00
	TOTAL		**120.00**	**6.55**	**0.00**	**93.45**
68	**KULHAL HPS**	1	10.00	24.65	0.00	75.35
		2	10.00	7.55	0.00	92.45
		3	10.00	8.92	6.19	84.89
	TOTAL		**30.00**	**13.71**	**2.06**	**84.23**
69	**MANERI BHALI-I HPS**	1	30.00	0.63	0.17	99.20
		2	30.00	1.48	0.10	98.42
		3	30.00	18.32	0.09	81.59
	TOTAL		**90.00**	**6.81**	**0.12**	**93.07**
70	**MANERI BHALI-II HPS**	1	76.00	0.00	0.00	100.00
		2	76.00	0.12	1.31	98.57
		3	76.00	0.27	0.65	99.07
		4	76.00	0.09	4.99	94.92
	TOTAL		**304.00**	**0.12**	**1.74**	**98.14**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
71	**RAMGANGA HPS**	1	66.00	1.14	0.00	98.86
		2	66.00	0.00	0.00	100.00
		3	66.00	0.00	0.00	100.00
	TOTAL		**198.00**	**0.38**	**0.00**	**99.62**
72	**VYASI HPS**	1	60.00	0.00	0.00	100.00
		2	60.00	0.00	0.00	100.00
	TOTAL		**120.00**	**0.00**	**0.00**	**100.00**
	UPJVNL					
73	**KHARA HPS**	1	24.00	13.60	0.95	85.45
		2	24.00	0.00	0.00	100.00
		3	24.00	7.25	0.49	92.26
	TOTAL		**72.00**	**6.95**	**0.48**	**92.57**
74	**MATATILA HPS**	1	10.20	0.00	0.00	100.00
		2	10.20	0.00	0.00	100.00
		3	10.20	0.00	0.00	100.00
	TOTAL		**30.60**	**0.00**	**0.00**	**100.00**
75	**OBRA HPS**	1	33.00	5.68	4.00	90.31
		2	33.00	5.27	0.53	94.20
		3	33.00	31.32	0.00	68.68

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**99.00**	**14.09**	**1.51**	**84.40**
76	**RIHAND HPS**	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
		3	50.00	10.70	0.00	89.30
		4	50.00	0.00	0.00	100.00
		5	50.00	0.00	0.00	100.00
		6	50.00	0.00	0.00	100.00
	TOTAL		**300.00**	**1.78**	**0.00**	**98.22**
	Western					
	CSPGCL					
77	**HASDEOBANGO HPS**	1	40.00	0.00	0.00	100.00
		2	40.00	0.00	0.00	100.00
		3	40.00	0.00	0.00	100.00
	TOTAL		**120.00**	**0.00**	**0.00**	**100.00**
	DLHP					
78	**BHANDARDHARA HPS ST-II**	2	34.00	0.00	0.00	100.00
	TOTAL		**34.00**	**0.00**	**0.00**	**100.00**
	GSECL					
79	**KADANA HPS**	1	60.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		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**	**0.00**	**100.00**
80	**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	1.87	98.13
	TOTAL		**300.00**	**0.00**	**0.47**	**99.53**
	MAHAGENCO					
81	**BHIRA TAIL RACE HPS**	1	40.00	0.00	0.00	100.00
		2	40.00	0.00	0.00	100.00
	TOTAL		**80.00**	**0.00**	**0.00**	**100.00**
82	**GHATGHAR PSS HPS**	1	125.00	0.00	4.31	95.69
		2	125.00	0.00	6.50	93.50
	TOTAL		**250.00**	**0.00**	**5.41**	**94.59**
83	**KOYNA DPH HPS**	1	18.00	12.32	0.00	87.68
		2	18.00	0.00	0.00	100.00
	TOTAL		**36.00**	**6.16**	**0.00**	**93.84**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
84	**KOYNA-I&II HPS**	1	70.00	0.00	0.00	100.00
		2	70.00	0.00	0.00	100.00
		3	70.00	0.00	0.00	100.00
		4	70.00	0.69	17.22	82.08
		5	80.00	0.45	0.50	99.05
		6	80.00	0.00	0.00	100.00
		7	80.00	0.00	0.00	100.00
		8	80.00	0.00	0.67	99.33
	TOTAL		**600.00**	**0.14**	**2.30**	**97.56**
85	**KOYNA-III HPS**	1	80.00	0.00	0.00	100.00
		2	80.00	0.00	0.00	100.00
		3	80.00	0.00	0.00	100.00
		4	80.00	0.00	0.00	100.00
	TOTAL		**320.00**	**0.00**	**0.00**	**100.00**
86	**KOYNA-IV HPS**	1	250.00	0.00	3.50	96.50
		2	250.00	6.21	0.09	93.70
		3	250.00	0.00	65.40	34.60
		4	250.00	0.00	0.06	99.94

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**1000.00**	**1.55**	**17.26**	**81.18**
87	**TILLARI HPS**	1	60.00	0.00	0.00	100.00
	TOTAL		**60.00**	**0.00**	**0.00**	**100.00**
88	**VAITARNA HPS**	1	60.00	0.00	0.00	100.00
	TOTAL		**60.00**	**0.00**	**0.00**	**100.00**
	MPPGCL					
89	**BANSAGAR-II HPS**	1	15.00	4.49	0.00	95.51
		2	15.00	0.00	0.00	100.00
	TOTAL		**30.00**	**2.25**	**0.00**	**97.75**
90	**BANSAGAR-III HPS**	1	20.00	0.00	0.00	100.00
		2	20.00	0.00	0.00	100.00
		3	20.00	0.00	0.00	100.00
	TOTAL		**60.00**	**0.00**	**0.00**	**100.00**
91	**BANSAGAR TONS-I HPS**	1	105.00	100.00	0.00	0.00
		2	105.00	3.92	0.00	96.08
		3	105.00	28.46	40.47	31.06
	TOTAL		**315.00**	**44.13**	**13.49**	**42.38**
92	**BARGI HPS**	1	45.00	0.00	1.00	99.00
		2	45.00	7.75	0.00	92.25

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**90.00**	**3.87**	**0.50**	**95.63**
93	**GANDHI SAGAR HPS**	1	23.00	0.00	0.00	100.00
		2	23.00	0.00	100.00	0.00
		3	23.00	0.00	100.00	0.00
		4	23.00	0.00	0.00	100.00
		5	23.00	0.00	0.00	100.00
	TOTAL		**115.00**	**0.00**	**40.00**	**60.00**
94	**MADHIKHERA HPS**	1	20.00	0.00	0.00	100.00
		2	20.00	0.00	0.00	100.00
		3	20.00	6.09	0.00	93.91
	TOTAL		**60.00**	**2.03**	**0.00**	**97.97**
95	**PENCH HPS**	1	80.00	27.73	0.00	72.27
		2	80.00	0.00	0.89	99.11
	TOTAL		**160.00**	**13.86**	**0.44**	**85.69**
96	**RAJGHAT HPS**	1	15.00	0.00	0.00	100.00
		2	15.00	0.00	0.00	100.00
		3	15.00	0.00	0.11	99.89
	TOTAL		**45.00**	**0.00**	**0.04**	**99.96**
	NHDC					

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
97	**INDIRA SAGAR HPS**	1	125.00	4.90	0.00	95.10
		2	125.00	2.89	0.00	97.11
		3	125.00	3.44	0.00	96.56
		4	125.00	4.55	0.00	95.45
		5	125.00	0.00	0.00	100.00
		6	125.00	3.13	0.00	96.87
		7	125.00	0.28	0.00	99.72
		8	125.00	9.35	0.00	90.65
	TOTAL		**1000.00**	**3.57**	**0.00**	**96.43**
98	**OMKARESHWAR HPS**	1	65.00	3.37	0.00	96.63
		2	65.00	1.93	0.00	98.07
		3	65.00	4.60	0.00	95.40
		4	65.00	3.33	0.00	96.67
		5	65.00	2.42	0.00	97.58
		6	65.00	3.68	0.00	96.32
		7	65.00	3.10	0.00	96.90
		8	65.00	3.65	0.00	96.35
	TOTAL		**520.00**	**3.26**	**0.00**	**96.74**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	SSNNL					
99	**S SAROVAR CHPH HPS**	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
		3	50.00	0.00	0.00	100.00
		4	50.00	0.00	0.00	100.00
		5	50.00	0.00	0.00	100.00
	TOTAL		**250.00**	**0.00**	**0.00**	**100.00**
100	**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	0.00	0.01	99.99
		4	200.00	4.11	0.00	95.89
		5	200.00	0.00	0.03	99.97
		6	200.00	0.00	0.00	100.00
	TOTAL		**1200.00**	**0.69**	**0.01**	**99.31**
	TATA MAH.					
101	**BHIRA HPS**	1	25.00	0.00	0.00	100.00
		2	25.00	0.00	0.00	100.00
		3	25.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	25.00	0.00	0.00	100.00
		5	25.00	0.00	0.00	100.00
		6	25.00	0.00	0.00	100.00
	TOTAL		**150.00**	**0.00**	**0.00**	**100.00**
102	**BHIRA PSS HPS**	1	150.00	55.73	0.00	44.27
	TOTAL		**150.00**	**55.73**	**0.00**	**44.27**
103	**BHIVPURI HPS**	1	24.00	0.00	0.01	99.99
		2	24.00	0.00	0.00	100.00
		3	24.00	0.00	0.00	100.00
		4	1.50	0.00	0.00	100.00
		5	1.50	0.00	0.00	100.00
	TOTAL		**75.00**	**0.00**	**0.00**	**100.00**
104	**KHOPOLI HPS**	1	24.00	0.00	0.00	100.00
		2	24.00	0.00	100.00	0.00
		3	24.00	0.00	0.00	100.00
	TOTAL		**72.00**	**0.00**	**33.33**	**66.67**
	Southern					
	APGENCO					
105	**HAMPI HPS**	1	9.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		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**
106	**LOWER SILERU HPS**	1	115.00	0.00	0.00	100.00
		2	115.00	0.00	0.00	100.00
		3	115.00	0.00	0.00	100.00
		4	115.00	0.00	0.00	100.00
	TOTAL		**460.00**	**0.00**	**0.00**	**100.00**
107	**NAGARJUN SGR RBC HPS**	1	30.00	0.00	0.01	99.99
		2	30.00	0.00	0.00	100.00
		3	30.00	0.00	0.00	100.00
	TOTAL		**90.00**	**0.00**	**0.00**	**100.00**
108	**NAGARJUN SGR TPD**	1	25.00	0.00	0.07	99.93
		2	25.00	10.97	1.80	87.22
	TOTAL		**50.00**	**5.49**	**0.93**	**93.58**
109	**SRISAILAM HPS**	1	110.00	0.00	0.21	99.79
		2	110.00	0.00	0.10	99.90

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	110.00	0.00	0.62	99.38
		4	110.00	0.00	0.06	99.94
		5	110.00	0.00	0.08	99.92
		6	110.00	0.00	16.85	83.15
		7	110.00	0.00	0.76	99.24
	TOTAL		**770.00**	**0.00**	**2.67**	**97.33**
110	**T B DAM HPS**	1	9.00	2.74	1.83	95.44
		2	9.00	0.04	0.01	99.95
		3	9.00	19.60	31.13	49.26
		4	9.00	5.47	0.00	94.53
	TOTAL		**36.00**	**6.96**	**8.24**	**84.80**
111	**UPPER SILERU HPS**	1	60.00	0.00	0.00	100.00
		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**	**0.00**	**100.00**
	KPCL					
112	**ALMATTI DPH HPS**	1	15.00	0.00	0.37	99.63

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	55.00	0.00	0.00	100.00
		3	55.00	0.00	0.32	99.68
		4	55.00	0.00	0.01	99.99
		5	55.00	0.00	0.00	100.00
		6	55.00	0.00	0.00	100.00
	TOTAL		**290.00**	**0.00**	**0.12**	**99.88**
113	**BHADRA HPS**	1	2.00	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		**26.00**	**0.00**	**0.00**	**100.00**
114	**GERUSUPPA HPS**	1	60.00	0.12	0.13	99.75
		2	60.00	3.38	0.00	96.62
		3	60.00	3.33	0.00	96.67
		4	60.00	0.08	0.00	99.92
	TOTAL		**240.00**	**1.73**	**0.03**	**98.24**
115	**GHAT PRABHA HPS**	1	16.00	0.00	0.00	100.00
		2	16.00	0.00	0.00	100.00
	TOTAL		**32.00**	**0.00**	**0.00**	**100.00**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
116	**JOG HPS**	1	13.20	3.41	0.00	96.59
		2	13.20	10.19	9.26	80.54
		3	13.20	11.65	1.64	86.71
		4	13.20	14.74	0.00	85.26
		5	21.60	1.75	0.46	97.79
		6	21.60	0.02	23.73	76.26
		7	21.60	16.06	0.00	83.94
		8	21.60	1.21	18.49	80.30
	TOTAL		**139.20**	**7.38**	**6.70**	**85.92**
117	**KADRA HPS**	1	50.00	3.98	0.10	95.92
		2	50.00	2.25	0.00	97.75
		3	50.00	0.00	0.00	100.00
	TOTAL		**150.00**	**2.07**	**0.03**	**97.89**
118	**KALINADI HPS**	1	150.00	0.00	21.50	78.50
		2	150.00	0.00	43.29	56.71
		3	150.00	0.00	17.07	82.93
		4	150.00	0.00	25.62	74.38
		5	150.00	8.68	4.86	86.46

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		6	150.00	0.00	11.56	88.44
	TOTAL		**900.00**	**1.45**	**20.65**	**77.90**
119	**KALINADI SUPA HPS**	1	50.00	3.83	0.06	96.11
		2	50.00	0.05	0.22	99.72
	TOTAL		**100.00**	**1.94**	**0.14**	**97.92**
120	**KODASALI HPS**	1	40.00	0.00	0.00	100.00
		2	40.00	9.30	0.00	90.70
		3	40.00	4.57	0.00	95.43
	TOTAL		**120.00**	**4.62**	**0.00**	**95.38**
121	**LIGANAMAKKI HPS**	1	27.50	0.12	0.04	99.84
		2	27.50	4.30	0.09	95.60
	TOTAL		**55.00**	**2.21**	**0.07**	**97.72**
122	**MUNIRABAD HPS**	1	9.00	63.64	0.00	36.36
		2	9.00	26.83	0.00	73.17
		3	10.00	22.74	0.00	77.26
	TOTAL		**28.00**	**37.74**	**0.00**	**62.26**
123	**SHARAVATHI HPS**	1	103.50	2.38	1.01	96.62
		2	103.50	1.98	14.32	83.71

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	103.50	0.28	0.19	99.54
		4	103.50	1.87	0.12	98.01
		5	103.50	0.22	0.38	99.40
		6	103.50	2.10	0.09	97.81
		7	103.50	1.97	0.23	97.80
		8	103.50	1.68	0.66	97.66
		9	103.50	1.83	1.46	96.71
		10	103.50	12.47	0.79	86.74
	TOTAL		**1035.00**	**2.68**	**1.92**	**95.40**
124	**SIVASAMUNDRUM HPS**	1	3.00	0.00	0.00	100.00
		2	3.00	0.00	0.00	100.00
		3	3.00	0.00	0.00	100.00
		4	3.00	0.00	0.00	100.00
		5	3.00	0.00	0.00	100.00
		6	3.00	0.00	0.00	100.00
		7	6.00	0.00	0.00	100.00
		8	6.00	0.00	0.00	100.00
		9	6.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		10	6.00	0.00	0.00	100.00
	TOTAL		**42.00**	**0.00**	**0.00**	**100.00**
125	**VARAHI HPS**	1	115.00	2.10	0.55	97.35
		2	115.00	6.03	0.12	93.85
		3	115.00	8.99	1.58	89.43
		4	115.00	3.55	0.79	95.67
	TOTAL		**460.00**	**5.17**	**0.76**	**94.07**
	KSEB					
126	**IDAMALAYAR HPS**	1	37.50	7.40	0.26	92.34
		2	37.50	7.07	0.04	92.89
	TOTAL		**75.00**	**7.24**	**0.15**	**92.61**
127	**IDUKKI HPS**	1	130.00	11.23	1.78	86.99
		2	130.00	17.92	0.01	82.07
		3	130.00	14.77	0.02	85.21
		4	130.00	7.19	0.02	92.79
		5	130.00	6.92	0.00	93.08
		6	130.00	11.61	0.27	88.12
	TOTAL		**780.00**	**11.61**	**0.35**	**88.05**
128	**KAKKAD HPS**	1	25.00	0.16	0.86	98.98

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	25.00	0.00	0.00	100.00
	TOTAL		**50.00**	**0.08**	**0.43**	**99.49**
129	**KUTTIYADI ADDL EXTN**	1	50.00	9.14	0.30	90.56
		2	50.00	8.27	0.09	91.63
	TOTAL		**100.00**	**8.71**	**0.20**	**91.10**
130	**KUTTIYADI EXTN HPS**	4	50.00	19.91	0.82	79.27
	TOTAL		**50.00**	**19.91**	**0.82**	**79.27**
131	**KUTTIYADI HPS**	1	25.00	10.20	0.38	89.42
		2	25.00	9.83	0.31	89.86
		3	25.00	7.59	1.44	90.97
	TOTAL		**75.00**	**9.21**	**0.71**	**90.08**
132	**LOWER PERIYAR HPS**	1	60.00	21.56	0.00	78.44
		2	60.00	6.62	0.00	93.38
		3	60.00	3.51	0.00	96.49
	TOTAL		**180.00**	**10.57**	**0.00**	**89.43**
133	**NARIAMANGLAM HPS**	1	17.55	19.37	0.30	80.33
		2	17.55	0.26	0.29	99.45
		3	17.55	18.47	0.21	81.32
	TOTAL		**52.65**	**12.70**	**0.27**	**87.03**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
134	**PALLIVASAL HPS**	1	5.00	0.00	0.00	100.00
		2	5.00	0.00	0.00	100.00
		3	5.00	0.19	0.00	99.81
		4	7.50	0.16	0.01	99.83
		5	7.50	5.49	0.01	94.51
		6	7.50	8.70	0.00	91.30
	TOTAL		**37.50**	**2.42**	**0.00**	**97.57**
135	**PANNIAR HPS**	1	15.00	5.87	0.00	94.13
		2	15.00	9.73	0.00	90.27
	TOTAL		**30.00**	**7.80**	**0.00**	**92.20**
136	**PORINGALKUTTU HPS**	1	8.00	9.29	0.04	90.67
		2	8.00	0.99	1.95	97.06
		3	8.00	8.19	1.56	90.25
		4	8.00	9.16	0.18	90.65
	TOTAL		**32.00**	**6.91**	**0.93**	**92.16**
137	**SABARIGIRI HPS**	1	50.00	1.06	0.30	98.64
		2	50.00	1.21	4.89	93.90
		3	50.00	7.80	0.40	91.80

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	50.00	2.21	19.67	78.12
		5	50.00	2.01	3.25	94.73
		6	50.00	1.26	84.11	14.63
	TOTAL		**300.00**	**2.59**	**18.77**	**78.64**
138	**SENGULAM 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
		4	12.00	0.00	0.00	100.00
	TOTAL		**48.00**	**0.00**	**0.00**	**100.00**
139	**SHOLAYAR HPS**	1	18.00	4.08	0.25	95.67
		2	18.00	9.29	1.04	89.67
		3	18.00	57.33	0.00	42.67
	TOTAL		**54.00**	**23.57**	**0.43**	**76.00**
	TANGEDCO					
140	**ALIYAR HPS**	1	60.00	0.00	0.00	100.00
	TOTAL		**60.00**	**0.00**	**0.00**	**100.00**
141	**BHAWANI BARRAGE-II HPS**	1	15.00	11.79	0.01	88.20
		2	15.00	0.19	0.01	99.80
	TOTAL		**30.00**	**5.99**	**0.01**	**94.00**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
142	**BHAWANI BARRAGE-III HPS**	1	15.00	0.00	0.00	100.00
		2	15.00	0.00	0.00	100.00
	TOTAL		**30.00**	**0.00**	**0.00**	**100.00**
143	**BHAWANI KATTAL**	1	15.00	0.00	0.00	100.00
		2	15.00	0.00	0.00	100.00
	TOTAL		**30.00**	**0.00**	**0.00**	**100.00**
144	**KADAMPARI HPS**	1	100.00	0.00	0.00	100.00
		2	100.00	0.00	39.95	60.05
		3	100.00	0.00	48.72	51.28
		4	100.00	0.00	0.00	100.00
	TOTAL		**400.00**	**0.00**	**22.17**	**77.83**
145	**KODAYAR-I HPS**	1	60.00	0.42	0.90	98.68
	TOTAL		**60.00**	**0.42**	**0.90**	**98.68**
146	**KODAYAR-II HPS**	2	40.00	0.00	0.01	99.99
	TOTAL		**40.00**	**0.00**	**0.01**	**99.99**
147	**KUNDAH-I HPS**	1	20.00	0.85	0.74	98.40
		2	20.00	0.26	0.42	99.33
		3	20.00	4.07	0.00	95.93
	TOTAL		**60.00**	**1.73**	**0.39**	**97.89**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
148	**KUNDAH-II HPS**	4	35.00	0.70	1.54	97.76
		5	35.00	0.37	0.03	99.60
		6	35.00	0.14	0.43	99.43
		7	35.00	0.23	0.57	99.20
		8	35.00	1.78	0.50	97.72
	TOTAL		**175.00**	**0.64**	**0.61**	**98.74**
149	**KUNDAH-III HPS**	9	60.00	0.00	0.00	100.00
		10	60.00	0.00	0.00	100.00
		11	60.00	0.00	1.52	98.48
	TOTAL		**180.00**	**0.00**	**0.51**	**99.49**
150	**KUNDAH-IV HPS**	12	50.00	0.00	0.00	100.00
		13	50.00	0.00	0.00	100.00
	TOTAL		**100.00**	**0.00**	**0.00**	**100.00**
151	**KUNDAH-V HPS**	14	20.00	0.00	0.00	100.00
		15	20.00	0.00	0.00	100.00
	TOTAL		**40.00**	**0.00**	**0.00**	**100.00**
152	**LOWER METTUR-I HPS**	1	15.00	0.00	0.00	100.00
		2	15.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**30.00**	**0.00**	**0.00**	**100.00**
153	**LOWER METTUR-II HPS**	3	15.00	0.00	0.00	100.00
		4	15.00	0.00	0.00	100.00
	TOTAL		**30.00**	**0.00**	**0.00**	**100.00**
154	**LOWER METTUR-III HPS**	5	15.00	8.88	0.00	91.12
		6	15.00	7.53	0.00	92.47
	TOTAL		**30.00**	**8.21**	**0.00**	**91.79**
155	**LOWER METTUR-IV HPS**	7	15.00	6.17	0.00	93.83
		8	15.00	6.15	0.00	93.85
	TOTAL		**30.00**	**6.16**	**0.00**	**93.84**
156	**METTUR DAM HPS**	1	12.50	0.00	0.00	100.00
		2	12.50	0.00	0.00	100.00
		3	12.50	9.51	0.00	90.49
		4	12.50	0.00	0.00	100.00
	TOTAL		**50.00**	**2.38**	**0.00**	**97.62**
157	**METTUR TUNNEL HPS**	1	50.00	15.23	0.00	84.77
		2	50.00	16.81	0.00	83.19
		3	50.00	24.49	0.00	75.51

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	50.00	15.00	0.00	85.00
	TOTAL		**200.00**	**17.88**	**0.00**	**82.12**
158	**MOYAR 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**
159	**PAPANASAM HPS**	1	8.00	7.98	0.00	92.02
		2	8.00	7.18	0.00	92.82
		3	8.00	0.00	0.00	100.00
		4	8.00	0.00	0.00	100.00
	TOTAL		**32.00**	**3.79**	**0.00**	**96.21**
160	**PARSON`S VALLEY HPS**	1	30.00	0.00	0.00	100.00
	TOTAL		**30.00**	**0.00**	**0.00**	**100.00**
161	**PERIYAR HPS**	1	42.00	0.00	0.00	100.00
		2	42.00	0.00	0.00	100.00
		3	42.00	0.00	0.00	100.00
		4	35.00	0.00	0.00	100.00
	TOTAL		**161.00**	**0.00**	**0.00**	**100.00**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
162	**PYKARA HPS**	1	7.00	0.00	0.00	100.00
		2	7.00	0.00	0.00	100.00
		3	7.00	0.00	0.00	100.00
		4	13.60	0.00	0.00	100.00
		5	13.60	0.00	0.00	100.00
		6	11.00	0.00	0.00	100.00
	TOTAL		**59.20**	**0.00**	**0.00**	**100.00**
163	**PYKARA ULTMATE HPS**	1	50.00	0.00	0.00	100.00
		2	50.00	1.32	0.00	98.68
		3	50.00	0.00	0.00	100.00
	TOTAL		**150.00**	**0.44**	**0.00**	**99.56**
164	**SARKARPATHY HPS**	1	30.00	0.00	0.00	100.00
	TOTAL		**30.00**	**0.00**	**0.00**	**100.00**
165	**SHOLAYAR HPS (TN)**	1	35.00	0.00	0.00	100.00
		2	35.00	0.00	0.00	100.00
	TOTAL		**70.00**	**0.00**	**0.00**	**100.00**
166	**SURULIYAR HPS**	1	35.00	0.00	0.00	100.00
	TOTAL		**35.00**	**0.00**	**0.00**	**100.00**
	TSGENCO					

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
167	**LOWER JURALA HPS**	1	40.00	0.00	0.00	100.00
		2	40.00	0.00	11.50	88.50
		3	40.00	0.00	0.00	100.00
		4	40.00	0.00	0.25	99.75
		5	40.00	0.00	0.00	100.00
		6	40.00	0.00	2.20	97.80
	TOTAL		**240.00**	**0.00**	**2.33**	**97.67**
168	**NAGARJUN SGR HPS**	1	110.00	0.00	0.27	99.73
		2	100.80	0.00	1.96	98.04
		3	100.80	0.00	0.08	99.92
		4	100.80	6.65	0.83	92.52
		5	100.80	0.00	2.51	97.49
		6	100.80	0.00	1.33	98.67
		7	100.80	0.00	0.65	99.35
		8	100.80	0.00	4.78	95.22
	TOTAL		**815.60**	**0.83**	**1.55**	**97.62**
169	**NAGARJUN SGR LBC HPS**	1	30.00	0.43	0.00	99.57
		2	30.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**60.00**	**0.21**	**0.00**	**99.79**
170	**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**
171	**PRIYADARSHNI JURALA HPS**	1	39.00	0.00	0.29	99.71
		2	39.00	0.00	0.00	100.00
		3	39.00	0.00	0.01	99.99
		4	39.00	0.00	0.00	100.00
		5	39.00	0.00	0.00	100.00
		6	39.00	0.00	0.00	100.00
	TOTAL		**234.00**	**0.00**	**0.05**	**99.95**
172	**PULICHINTALA HPS**	1	30.00	0.00	0.39	99.61
		2	30.00	0.00	0.00	100.00
		3	30.00	0.00	1.64	98.36
		4	30.00	0.00	0.33	99.67
	TOTAL		**120.00**	**0.00**	**0.59**	**99.41**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
173	**SRISAILAM LB HPS**	1	150.00	0.00	0.07	99.93
		2	150.00	0.00	0.02	99.98
		3	150.00	0.00	0.03	99.97
		4	150.00	0.00	0.00	100.00
		5	150.00	0.00	2.60	97.40
		6	150.00	0.00	13.08	86.92
	TOTAL		**900.00**	**0.00**	**2.63**	**97.37**
	Eastern					
	APGENCO					
174	**MACHKUND HPS**	1	17.00	0.00	63.23	36.77
		2	17.00	0.00	2.88	97.12
		3	17.00	0.00	0.98	99.02
		4	21.25	0.00	11.17	88.83
		5	21.25	0.00	5.05	94.95
		6	21.25	0.00	0.00	100.00
	TOTAL		**114.75**	**0.00**	**13.89**	**86.11**
	DEPL					
175	**JORETHANG LOOP**	1	48.00	11.80	1.81	86.39
		2	48.00	0.45	0.19	99.36

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**96.00**	**6.12**	**1.00**	**92.88**
	DVC					
176	**MAITHON HPS**	1	20.00	0.76	0.37	98.87
		2	23.20	0.00	2.00	98.00
		3	20.00	0.00	7.55	92.45
	TOTAL		**63.20**	**0.25**	**3.31**	**96.44**
177	**PANCHET HPS**	1	40.00	0.00	0.00	100.00
		2	40.00	0.00	0.00	100.00
	TOTAL		**80.00**	**0.00**	**0.00**	**100.00**
	GIPL					
178	**CHUZACHEN HPS**	1	55.00	0.00	0.13	99.87
		2	55.00	15.05	0.23	84.73
	TOTAL		**110.00**	**7.52**	**0.18**	**92.30**
	JUUNL					
179	**SUBERNREKHA-I HPS**	1	65.00	0.00	0.00	100.00
	TOTAL		**65.00**	**0.00**	**0.00**	**100.00**
180	**SUBERNREKHA-II HPS**	2	65.00	0.00	0.00	100.00
	TOTAL		**65.00**	**0.00**	**0.00**	**100.00**
	MBPC					
181	**RONGNICHU HPS**	1	56.50	4.14	0.44	95.43

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	56.50	4.29	1.40	94.31
	TOTAL		**113.00**	**4.21**	**0.92**	**94.87**
	NHPC					
182	**RANGIT HPS**	1	20.00	14.28	0.10	85.61
		2	20.00	13.58	0.18	86.24
		3	20.00	13.82	0.49	85.69
	TOTAL		**60.00**	**13.89**	**0.26**	**85.85**
183	**TEESTA LOW DAM-III HPS**	1	33.00	11.69	0.43	87.88
		2	33.00	9.25	0.01	90.74
		3	33.00	12.70	0.04	87.26
		4	33.00	13.70	0.05	86.24
	TOTAL		**132.00**	**11.84**	**0.13**	**88.03**
184	**TEESTA LOW DAM-IV HPS**	1	40.00	7.64	0.17	92.19
		2	40.00	4.79	0.04	95.17
		3	40.00	5.90	0.03	94.07
		4	40.00	6.38	0.08	93.54
	TOTAL		**160.00**	**6.18**	**0.08**	**93.74**
185	**TEESTA V HPS**	1	170.00	3.47	0.01	96.53
		2	170.00	2.68	0.00	97.32

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	170.00	3.14	0.01	96.85
	TOTAL		**510.00**	**3.10**	**0.00**	**96.90**
	OHPC					
186	**BALIMELA HPS**	1	60.00	7.95	0.00	92.05
		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
		5	60.00	0.00	0.00	100.00
		6	60.00	0.00	0.00	100.00
		7	75.00	0.00	2.70	97.30
		8	75.00	0.00	0.00	100.00
	TOTAL		**510.00**	**0.99**	**0.34**	**98.67**
187	**CHIPLIMA HPS**	1	24.00	0.00	0.00	100.00
		2	24.00	0.00	0.00	100.00
		3	24.00	0.00	0.00	100.00
	TOTAL		**72.00**	**0.00**	**0.00**	**100.00**
188	**HIRAKUD HPS**	1	49.50	0.00	0.00	100.00
		2	49.50	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	32.00	2.01	0.00	97.99
		4	32.00	6.87	0.00	93.13
		5	43.65	0.00	0.00	100.00
		6	43.65	0.00	0.00	100.00
		7	37.50	0.12	0.00	99.88
	TOTAL		**287.80**	**1.29**	**0.00**	**98.71**
189	**RENGALI HPS**	1	50.00	0.60	0.10	99.30
		2	50.00	0.03	0.00	99.97
		3	50.00	0.61	0.00	99.39
		4	50.00	0.52	0.00	99.48
		5	50.00	0.49	0.00	99.51
	TOTAL		**250.00**	**0.45**	**0.02**	**99.53**
190	**UPPER INDRAVATI HPS**	1	150.00	0.09	0.00	99.91
		2	150.00	0.00	0.00	100.00
		3	150.00	0.06	0.00	99.94
		4	150.00	0.07	0.00	99.93
	TOTAL		**600.00**	**0.06**	**0.00**	**99.94**
191	**UPPER KOLAB HPS**	1	80.00	0.92	0.41	98.67

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	80.00	0.52	0.00	99.48
		3	80.00	18.86	0.00	81.14
		4	80.00	0.47	0.82	98.70
	TOTAL		**320.00**	**5.19**	**0.31**	**94.50**
	SEPL					
192	**TASHIDING HPS**	1	48.50	0.00	0.00	100.00
		2	48.50	0.00	0.00	100.00
	TOTAL		**97.00**	**0.00**	**0.00**	**100.00**
	SKPPPL					
193	**DIKCHU HPS**	1	48.00	0.00	0.00	100.00
		2	48.00	0.00	0.00	100.00
	TOTAL		**96.00**	**0.00**	**0.00**	**100.00**
	TUL					
194	**TEESTA-III HPS**	1	200.00	8.13	0.00	91.87
		2	200.00	7.91	0.00	92.09
		3	200.00	6.85	2.57	90.58
		4	200.00	5.03	0.61	94.36
		5	200.00	0.00	7.18	92.82
		6	200.00	5.89	0.35	93.76

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		**1200.00**	**5.63**	**1.78**	**92.58**
	WBSEDCL					
195	**JALDHAKA HPS ST-I**	1	9.00	0.06	46.81	53.13
		2	9.00	0.05	38.46	61.49
		3	9.00	24.73	11.40	63.87
		4	9.00	17.32	7.97	74.72
	TOTAL		**36.00**	**10.54**	**26.16**	**63.30**
196	**PURULIA PSS HPS**	1	225.00	0.00	0.00	100.00
		2	225.00	0.00	0.00	100.00
		3	225.00	0.00	0.00	100.00
		4	225.00	0.00	0.00	100.00
	TOTAL		**900.00**	**0.00**	**0.00**	**100.00**
197	**RAMMAM HPS**	1	12.50	11.93	0.00	88.07
		2	12.50	6.19	0.00	93.81
		3	12.50	0.00	0.00	100.00
		4	12.50	7.44	0.00	92.56
	TOTAL		**50.00**	**6.39**	**0.00**	**93.61**
	North Eastern					
	APGCL					

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
198	**KARBI LANGPI HPS**	1	50.00	0.77	2.79	96.45
		2	50.00	0.14	0.33	99.54
	TOTAL		**100.00**	**0.45**	**1.56**	**97.99**
	MeECL					
199	**KYRDEMKULAI HPS**	1	30.00	0.00	6.72	93.28
		2	30.00	0.00	30.61	69.39
	TOTAL		**60.00**	**0.00**	**18.66**	**81.34**
200	**MYNTDU(LESHKA) St-1 HPS**	1	42.00	0.00	0.00	100.00
		2	42.00	0.00	0.26	99.74
		3	42.00	0.00	0.00	100.00
	TOTAL		**126.00**	**0.00**	**0.09**	**99.91**
201	**NEW UMTRU HPS**	1	20.00	2.12	3.83	94.05
		2	20.00	4.75	0.00	95.25
	TOTAL		**40.00**	**3.43**	**1.92**	**94.65**
202	**UMIAM HPS ST-I**	1	9.00	8.24	0.50	91.26
		2	9.00	0.00	0.00	100.00
		3	9.00	0.45	0.58	98.98
		4	9.00	0.00	0.00	100.00
	TOTAL		**36.00**	**2.17**	**0.27**	**97.56**

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
203	**UMIAM HPS ST-IV**	7	30.00	0.00	10.35	89.65
		8	30.00	0.31	0.25	99.43
	TOTAL		**60.00**	**0.16**	**5.30**	**94.54**
	NEEPCO.					
204	**DOYANG HPS**	1	25.00	11.43	0.26	88.31
		2	25.00	6.37	1.76	91.86
		3	25.00	12.30	0.91	86.78
	TOTAL		**75.00**	**10.04**	**0.98**	**88.99**
205	**KAMENG HPS**	1	150.00	13.68	0.80	85.52
		2	150.00	10.54	11.45	78.01
		3	150.00	11.97	8.81	79.22
		4	150.00	2.65	7.78	89.57
	TOTAL		**600.00**	**9.71**	**7.21**	**83.08**
206	**KHONDONG HPS**	1	25.00	100.00	0.00	0.00
		2	25.00	100.00	0.00	0.00
	TOTAL		**50.00**	**100.00**	**0.00**	**0.00**
207	**KOPILI HPS**	1	50.00	0.00	100.00	0.00
		2	50.00	0.00	100.00	0.00
		3	50.00	0.00	100.00	0.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	50.00	0.00	100.00	0.00
	TOTAL		**200.00**	**0.00**	**100.00**	**0.00**
208	**PARE**	1	55.00	3.47	1.33	95.20
		2	55.00	3.70	0.09	96.21
	TOTAL		**110.00**	**3.58**	**0.71**	**95.70**
209	**RANGANADI HPS**	1	135.00	2.79	2.87	94.34
		2	135.00	2.25	1.14	96.61
		3	135.00	2.81	2.31	94.88
	TOTAL		**405.00**	**2.62**	**2.11**	**95.28**
210	**TUIRIAL HPS**	1	30.00	3.70	1.16	95.13
		2	30.00	3.76	1.95	94.29
	TOTAL		**60.00**	**3.73**	**1.56**	**94.71**
	NHPC					
211	**LOKTAK HPS**	1	35.00	0.07	0.28	99.65
		2	35.00	2.87	0.34	96.79
		3	35.00	2.91	6.84	90.25
	TOTAL		**105.00**	**1.95**	**2.49**	**95.56**

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 2022-23 is given at **Annex-7.1** and summarized below in **Table 7.1.**

TABLE 7.1

MISCELLANEOUS OUTAGES
FOR PERIOD: 2022-23

S. No.	Causes of Miscellaneous Outage	Duration of Outage (Hours)	% of Total Outage
	NOT ASSOCIATED WITH THE EQUIPMENT AND CIVIL STRUCTURE		
1	Water Constraint	646,936.74	83.11
2	Grid Constraint	83,606.44	10.74
3	Other Miscellaneous	47,875.79	6.15
	TOTAL	**778,418.97**	**100.00**

7.2 The overall non-availability on account of miscellaneous outages has been estimated as 15.88%. It was highest (53.03%) in case of HE Stations from E.P.P.L followed BBMB (30.64%), SJVNL (15.79%), etc. However, miscellaneous non-availability being beyond the control of utilities, does not have not any impact on the operating availability of HE Stations.

CENTRAL ELECTRICITY AUTHORITY
Hydro WING
Hydro Project Planning & Investigation Division

Annex 7.1

NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED MAINTENANACE AND FORCED OUTAGE DURING 2022-23

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	Northern			
	ADHPL			
1	**ALLAIN DUHANGAN HPS**	1	96.00	0.00
		2	96.00	0.00
	TOTAL		**192.00**	**0.00**
	AHPC (GVK)			
2	**SHRINAGAR HPS**	1	82.50	0.00
		2	82.50	0.00
		3	82.50	0.00
		4	82.50	0.00
	TOTAL		**330.00**	**0.00**
	BBMB			
3	**BHAKRA LEFT HPS**	1	108.00	0.00
		2	126.00	0.00
		3	126.00	13.45
		4	126.00	5.52

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		5	126.00	16.13
	TOTAL		**612.00**	**7.02**
4	**BHAKRA RIGHT HPS**	10	157.00	21.32
		6	157.00	10.25
		7	157.00	27.02
		8	157.00	2.47
		9	157.00	11.36
	TOTAL		**785.00**	**14.49**
5	**DEHAR HPS**	1	165.00	32.99
		2	165.00	4.95
		3	165.00	53.78
		4	165.00	14.57
		5	165.00	62.10
		6	165.00	1.56
	TOTAL		**990.00**	**28.32**
6	**GANGUWAL HPS**	1	29.25	2.32
		2	24.20	3.10
		3	24.20	3.24
	TOTAL		**77.65**	**2.89**
7	**KOTLA HPS**	1	29.25	4.80

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	24.20	2.88
		3	24.20	4.27
	TOTAL		**77.65**	**3.99**
8	**PONG HPS**	1	66.00	22.77
		2	66.00	5.95
		3	66.00	1.10
		4	66.00	46.46
		5	66.00	23.08
		6	66.00	17.34
	TOTAL		**396.00**	**19.45**
	E.P.P.L.			
9	**MALANA-II HPS**	1	50.00	54.93
		2	50.00	52.74
	TOTAL		**100.00**	**53.84**
	GBHPPL			
10	**BUDHIL HPS**	1	35.00	0.00
		2	35.00	0.00
	TOTAL		**70.00**	**0.00**
	GMR BHHPL			
11	**BAJOLI HOLI HPS**	1	60.00	20.06

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	60.00	6.04
		3	60.00	5.43
	TOTAL		**180.00**	**10.51**
	HBPCL			
12	**BASPA HPS**	1	100.00	0.18
		2	100.00	0.19
		3	100.00	0.12
	TOTAL		**300.00**	**0.17**
13	**KARCHAM WANGTOO HPS**	1	261.25	0.00
		2	261.25	0.00
		3	261.25	0.00
		4	261.25	0.00
	TOTAL		**1045.00**	**0.00**
	HPPCL			
14	**KASHANG INTEGRATED HEP**	1	65.00	0.00
		2	65.00	100.00
		3	65.00	0.00
	TOTAL		**195.00**	**33.33**
15	**SAINJ HPS**	1	50.00	0.00
		2	50.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL		**100.00**	**0.00**
16	**SAWRA KUDDU HPS**	1	37.00	0.00
		2	37.00	0.00
		3	37.00	0.00
	TOTAL		**111.00**	**0.00**
	HPSEB			
17	**BASSI HPS**	1	16.50	12.33
		2	16.50	37.37
		3	16.50	4.91
		4	16.50	6.89
	TOTAL		**66.00**	**15.38**
18	**GIRI BATA HPS**	1	30.00	22.48
		2	30.00	7.89
	TOTAL		**60.00**	**15.19**
19	**LARJI HPS**	1	42.00	10.24
		2	42.00	33.43
		3	42.00	58.72
	TOTAL		**126.00**	**34.13**
20	**SANJAY HPS**	1	40.00	0.00
		2	40.00	0.27

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		3	40.00	1.20
	TOTAL		**120.00**	**0.49**
	HSPCL			
21	**SORANG HPS**	1	50.00	0.00
		2	50.00	17.55
	TOTAL		**100.00**	**8.77**
	IAEPL			
22	**CHANJU-I HPS**	1	12.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL		**36.00**	**0.00**
	JKSPDC			
23	**BAGLIHAR HPS**	1	150.00	0.41
		2	150.00	17.35
		3	150.00	11.55
	TOTAL		**450.00**	**9.77**
24	**BAGLIHAR II HPS**	1	150.00	0.00
		2	150.00	0.00
		3	150.00	100.00
	TOTAL		**450.00**	**33.33**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
25	**LOWER JHELUM HPS**	1	35.00	0.00
		2	35.00	0.00
		3	35.00	100.00
	TOTAL		**105.00**	**33.33**
26	**UPPER SINDH-II HPS**	3	35.00	0.00
		4	35.00	0.00
		5	35.00	0.00
	TOTAL		**105.00**	**0.00**
	JPPVL			
27	**VISHNU PRAYAG 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**
	L&T			
28	**SINGOLI BHATWARI HPS**	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL		**99.00**	**0.00**
	MPCL			

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
29	**MALANA HPS**	1	43.00	0.00
		2	43.00	0.00
	TOTAL		**86.00**	**0.00**
	NHPC			
30	**BAIRA SIUL HPS**	1	60.00	54.44
		2	60.00	49.30
		3	60.00	41.09
	TOTAL		**180.00**	**48.28**
31	**CHAMERA-I HPS**	1	180.00	41.72
		2	180.00	58.36
		3	180.00	48.46
	TOTAL		**540.00**	**49.52**
32	**CHAMERA-II HPS**	1	100.00	141.67
		2	100.00	33.06
		3	100.00	51.31
	TOTAL		**300.00**	**75.35**
33	**CHAMERA-III HPS**	1	77.00	55.12
		2	77.00	35.95
		3	77.00	36.42
	TOTAL		**231.00**	**42.50**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
34	**CHUTAK HPS**	1	11.00	44.44
		2	11.00	38.14
		3	11.00	32.28
		4	11.00	47.27
	TOTAL		**44.00**	**40.53**
35	**DHAULI GANGA HPS**	1	70.00	36.01
		2	70.00	38.98
		3	70.00	35.85
		4	70.00	45.07
	TOTAL		**280.00**	**38.98**
36	**DULHASTI HPS**	1	130.00	24.19
		2	130.00	19.58
		3	130.00	33.51
	TOTAL		**390.00**	**25.76**
37	**KISHANGANGA HPS**	1	110.00	24.01
		2	110.00	29.95
		3	110.00	42.73
	TOTAL		**330.00**	**32.23**
38	**NIMMO BAZGO HPS**	1	15.00	30.04
		2	15.00	26.32

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		3	15.00	31.48
	TOTAL		**45.00**	**29.28**
39	**PARBATI-III HPS**	1	130.00	61.99
		2	130.00	74.39
		3	130.00	56.43
		4	130.00	75.75
	TOTAL		**520.00**	**67.14**
40	**SALAL HPS**	1	115.00	43.41
		2	115.00	44.07
		3	115.00	26.81
		4	115.00	21.07
		5	115.00	36.42
		6	115.00	31.89
	TOTAL		**690.00**	**33.94**
41	**SEWA-II HPS**	1	40.00	41.22
		2	40.00	51.56
		3	40.00	38.47
	TOTAL		**120.00**	**43.75**
42	**TANAKPUR HPS**	1	31.40	13.01
		2	31.40	14.07

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		3	31.40	11.51
	TOTAL		**94.20**	**12.86**
43	**URI-I HPS**	1	120.00	1.65
		2	120.00	4.87
		3	120.00	0.40
		4	120.00	0.78
	TOTAL		**480.00**	**1.93**
44	**URI-II HPS**	1	60.00	10.22
		2	60.00	22.16
		3	60.00	21.90
		4	60.00	10.29
	TOTAL		**240.00**	**16.14**
	NTPC Ltd.			
45	**KOLDAM**	1	200.00	2.19
		2	200.00	3.80
		3	200.00	1.28
		4	200.00	3.85
	TOTAL		**800.00**	**2.78**
	PSPCL			
46	**ANANDPUR SAHIB-I HPS**	1	33.50	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	33.50	0.08
	TOTAL		**67.00**	**0.04**
47	**ANANDPUR SAHIB-II HPS**	3	33.50	0.00
		4	33.50	0.00
	TOTAL		**67.00**	**0.00**
48	**MUKERIAN-I HPS**	1	15.00	23.14
		2	15.00	20.63
		3	15.00	4.01
	TOTAL		**45.00**	**15.93**
49	**MUKERIAN-II HPS**	4	15.00	4.70
		5	15.00	19.18
		6	15.00	24.05
	TOTAL		**45.00**	**15.98**
50	**MUKERIAN-III HPS**	7	19.50	9.17
		8	19.50	25.14
		9	19.50	5.14
	TOTAL		**58.50**	**13.15**
51	**MUKERIAN-IV HPS**	10	19.50	10.44
		11	19.50	10.84
		12	19.50	11.38

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL		**58.50**	**10.89**
52	**RANJIT SAGAR HPS**	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
		4	150.00	1.22
	TOTAL		**600.00**	**0.30**
53	**SHANAN HPS**	1	15.00	0.00
		2	15.00	0.00
		3	15.00	0.00
		4	15.00	0.00
		5	50.00	0.90
	TOTAL		**110.00**	**0.18**
	RRVUNL			
54	**JAWAHAR SAGAR HPS**	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL		**99.00**	**0.00**
55	**MAHI BAJAJ-I HPS**	1	25.00	16.26
		2	25.00	16.64
	TOTAL		**50.00**	**16.45**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
56	**MAHI BAJAJ-II HPS**	3	45.00	79.10
		4	45.00	63.79
	TOTAL		**90.00**	**71.45**
57	**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			
58	**NATHPA JHAKRI HPS**	1	250.00	37.85
		2	250.00	141.14
		3	250.00	47.76
		4	250.00	42.64
		5	250.00	49.05
		6	250.00	141.58
	TOTAL		**1500.00**	**76.67**
59	**RAMPUR HPS**	1	68.67	31.90
		2	68.67	47.73
		3	68.67	48.99
		4	68.67	50.79

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		5	68.67	47.02
		6	68.67	33.99
	TOTAL		**412.02**	**43.40**
	THDC			
60	**KOTESHWAR HPS**	1	100.00	0.00
		2	100.00	0.00
		3	100.00	0.00
		4	100.00	0.00
	TOTAL		**400.00**	**0.00**
61	**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			
62	**CHIBRO (YAMUNA) HPS**	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
		4	60.00	100.00
	TOTAL		**240.00**	**25.00**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
63	**CHILLA HPS**	1	36.00	1.94
		2	36.00	3.04
		3	36.00	3.86
		4	36.00	3.96
	TOTAL		**144.00**	**3.20**
64	**DHAKRANI HPS**	1	11.25	10.82
		2	11.25	16.35
		3	11.25	13.17
	TOTAL		**33.75**	**13.45**
65	**DHALIPUR HPS**	1	17.00	14.28
		2	17.00	16.66
		3	17.00	3.04
	TOTAL		**51.00**	**11.33**
66	**KHATIMA HPS**	1	13.80	0.00
		2	13.80	0.00
		3	13.80	0.01
	TOTAL		**41.40**	**0.00**
67	**KHODRI HPS**	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		4	30.00	0.00
	TOTAL		**120.00**	**0.00**
68	**KULHAL HPS**	1	10.00	37.33
		2	10.00	14.17
		3	10.00	36.09
	TOTAL		**30.00**	**29.20**
69	**MANERI BHALI-I HPS**	1	30.00	0.28
		2	30.00	20.19
		3	30.00	0.23
	TOTAL		**90.00**	**6.90**
70	**MANERI BHALI-II HPS**	1	76.00	0.00
		2	76.00	0.00
		3	76.00	0.00
		4	76.00	0.00
	TOTAL		**304.00**	**0.00**
71	**RAMGANGA HPS**	1	66.00	5.65
		2	66.00	3.54
		3	66.00	24.77
	TOTAL		**198.00**	**11.32**
72	**VYASI HPS**	1	60.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	60.00	0.00
	TOTAL		**120.00**	**0.00**
	UPJVNL			
73	**KHARA HPS**	1	24.00	3.85
		2	24.00	0.39
		3	24.00	1.41
	TOTAL		**72.00**	**1.88**
74	**MATATILA HPS**	1	10.20	0.00
		2	10.20	0.00
		3	10.20	0.00
	TOTAL		**30.60**	**0.00**
75	**OBRA HPS**	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL		**99.00**	**0.00**
76	**RIHAND 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

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		6	50.00	0.00
	TOTAL		**300.00**	**0.00**
	Western			
	CSPGCL			
77	**HASDEOBANGO HPS**	1	40.00	0.00
		2	40.00	0.00
		3	40.00	0.00
	TOTAL		**120.00**	**0.00**
	DLHP			
78	**BHANDARDHARA HPS ST-II**	2	34.00	0.00
	TOTAL		**34.00**	**0.00**
	GSECL			
79	**KADANA HPS**	1	60.00	1.37
		2	60.00	0.00
		3	60.00	0.00
		4	60.00	0.00
	TOTAL		**240.00**	**0.34**
80	**UKAI HPS**	1	75.00	34.59
		2	75.00	51.18
		3	75.00	51.30

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		4	75.00	42.04
	TOTAL		**300.00**	**44.78**
	MAHAGENCO			
81	**BHIRA TAIL RACE HPS**	1	40.00	0.00
		2	40.00	0.00
	TOTAL		**80.00**	**0.00**
82	**GHATGHAR PSS HPS**	1	125.00	0.00
		2	125.00	8.84
	TOTAL		**250.00**	**4.42**
83	**KOYNA DPH HPS**	1	18.00	0.00
		2	18.00	0.00
	TOTAL		**36.00**	**0.00**
84	**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
		8	80.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL		**600.00**	**0.00**
85	**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**
86	**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**
87	**TILLARI HPS**	1	60.00	0.00
	TOTAL		**60.00**	**0.00**
88	**VAITARNA HPS**	1	60.00	0.00
	TOTAL		**60.00**	**0.00**
	MPPGCL			
89	**BANSAGAR-II HPS**	1	15.00	0.00
		2	15.00	12.84
	TOTAL		**30.00**	**6.42**
90	**BANSAGAR-III HPS**	1	20.00	9.78

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	20.00	9.84
		3	20.00	9.86
	TOTAL		**60.00**	**9.83**
91	**BANSAGAR TONS-I HPS**	1	105.00	0.00
		2	105.00	0.00
		3	105.00	0.08
	TOTAL		**315.00**	**0.03**
92	**BARGI HPS**	1	45.00	0.00
		2	45.00	0.00
	TOTAL		**90.00**	**0.00**
93	**GANDHI SAGAR HPS**	1	23.00	33.11
		2	23.00	0.00
		3	23.00	0.00
		4	23.00	37.53
		5	23.00	34.12
	TOTAL		**115.00**	**20.95**
94	**MADHIKHERA HPS**	1	20.00	14.03
		2	20.00	9.64
		3	20.00	4.46
	TOTAL		**60.00**	**9.37**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
95	**PENCH HPS**	1	80.00	0.55
		2	80.00	0.00
	TOTAL		**160.00**	**0.28**
96	**RAJGHAT HPS**	1	15.00	24.20
		2	15.00	24.66
		3	15.00	10.62
	TOTAL		**45.00**	**19.83**
	NHDC			
97	**INDIRA SAGAR HPS**	1	125.00	3.14
		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**	**0.39**
98	**OMKARESHWAR HPS**	1	65.00	0.00
		2	65.00	0.00
		3	65.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		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			
99	**S SAROVAR CHPH HPS**	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	0.00
		5	50.00	0.00
	TOTAL		**250.00**	**0.00**
100	**S SAROVAR RBPH HPS**	1	200.00	0.00
		2	200.00	0.00
		3	200.00	0.00
		4	200.00	0.00
		5	200.00	0.00
		6	200.00	0.00
	TOTAL		**1200.00**	**0.00**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TATA MAH.			
101	**BHIRA HPS**	1	25.00	0.00
		2	25.00	0.00
		3	25.00	0.00
		4	25.00	0.00
		5	25.00	0.00
		6	25.00	0.00
	TOTAL		**150.00**	**0.00**
102	**BHIRA PSS HPS**	1	150.00	0.00
	TOTAL		**150.00**	**0.00**
103	**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**
104	**KHOPOLI HPS**	1	24.00	0.78
		2	24.00	0.00
		3	24.00	0.00
	TOTAL		**72.00**	**0.26**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	Southern			
	APGENCO			
105	**HAMPI HPS**	1	9.00	0.00
		2	9.00	0.00
		3	9.00	0.00
		4	9.00	0.00
	TOTAL		**36.00**	**0.00**
106	**LOWER SILERU HPS**	1	115.00	0.00
		2	115.00	0.00
		3	115.00	0.00
		4	115.00	0.00
	TOTAL		**460.00**	**0.00**
107	**NAGARJUN SGR RBC HPS**	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00
	TOTAL		**90.00**	**0.00**
108	**NAGARJUN SGR TPD**	1	25.00	0.00
		2	25.00	0.00
	TOTAL		**50.00**	**0.00**
109	**SRISAILAM HPS**	1	110.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		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**
110	**T B DAM HPS**	1	9.00	18.63
		2	9.00	21.35
		3	9.00	0.00
		4	9.00	13.03
	TOTAL		**36.00**	**13.25**
111	**UPPER SILERU HPS**	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
		4	60.00	0.00
	TOTAL		**240.00**	**0.00**
	KPCL			
112	**ALMATTI DPH HPS**	1	15.00	55.02
		2	55.00	36.44

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		3	55.00	32.09
		4	55.00	32.36
		5	55.00	26.26
		6	55.00	39.72
	TOTAL		**290.00**	**36.98**
113	**BHADRA HPS**	1	2.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL		**26.00**	**0.00**
114	**GERUSUPPA HPS**	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
		4	60.00	0.00
	TOTAL		**240.00**	**0.00**
115	**GHAT PRABHA HPS**	1	16.00	58.37
		2	16.00	57.95
	TOTAL		**32.00**	**58.16**
116	**JOG HPS**	1	13.20	0.00
		2	13.20	0.00
		3	13.20	0.32

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		4	13.20	0.29
		5	21.60	0.00
		6	21.60	0.00
		7	21.60	0.00
		8	21.60	0.00
	TOTAL		**139.20**	**0.08**
117	**KADRA HPS**	1	50.00	64.77
		2	50.00	66.29
		3	50.00	68.82
	TOTAL		**150.00**	**66.63**
118	**KALINADI HPS**	1	150.00	27.14
		2	150.00	24.22
		3	150.00	45.11
		4	150.00	121.40
		5	150.00	34.44
		6	150.00	35.03
	TOTAL		**900.00**	**47.89**
119	**KALINADI SUPA HPS**	1	50.00	25.52
		2	50.00	22.63
	TOTAL		**100.00**	**24.08**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
120	**KODASALI HPS**	1	40.00	53.47
		2	40.00	58.84
		3	40.00	62.01
	TOTAL		**120.00**	**58.11**
121	**LIGANAMAKKI HPS**	1	27.50	0.10
		2	27.50	0.00
	TOTAL		**55.00**	**0.05**
122	**MUNIRABAD HPS**	1	9.00	4.28
		2	9.00	1.72
		3	10.00	0.47
	TOTAL		**28.00**	**2.15**
123	**SHARAVATHI HPS**	1	103.50	0.06
		10	103.50	3.18
		2	103.50	0.08
		3	103.50	2.85
		4	103.50	4.36
		5	103.50	4.07
		6	103.50	0.08
		7	103.50	0.03
		8	103.50	2.97

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		9	103.50	1.44
	TOTAL		**1035.00**	**1.91**
124	**SIVASAMUNDRUM HPS**	1	3.00	0.00
		10	6.00	0.00
		2	3.00	0.00
		3	3.00	0.00
		4	3.00	0.00
		5	3.00	0.00
		6	3.00	0.00
		7	6.00	0.00
		8	6.00	0.00
		9	6.00	0.00
	TOTAL		**42.00**	**0.00**
125	**VARAHI HPS**	1	115.00	17.13
		2	115.00	8.49
		3	115.00	6.14
		4	115.00	11.95
	TOTAL		**460.00**	**10.93**
	KSEB			
126	**IDAMALAYAR HPS**	1	37.50	16.58

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	37.50	13.76
	TOTAL		**75.00**	**15.17**
127	**IDUKKI HPS**	1	130.00	0.00
		2	130.00	0.00
		3	130.00	0.00
		4	130.00	0.00
		5	130.00	0.21
		6	130.00	0.00
	TOTAL		**780.00**	**0.04**
128	**KAKKAD HPS**	1	25.00	0.00
		2	25.00	0.00
	TOTAL		**50.00**	**0.00**
129	**KUTTIYADI ADDL EXTN**	1	50.00	1.73
		2	50.00	0.21
	TOTAL		**100.00**	**0.97**
130	**KUTTIYADI EXTN HPS**	4	50.00	0.28
	TOTAL		**50.00**	**0.28**
131	**KUTTIYADI HPS**	1	25.00	0.00
		2	25.00	0.20
		3	25.00	0.15

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL		**75.00**	**0.12**
132	**LOWER PERIYAR HPS**	1	60.00	0.00
		2	60.00	0.92
		3	60.00	3.88
	TOTAL		**180.00**	**1.60**
133	**NARIAMANGLAM HPS**	1	17.55	2.41
		2	17.55	1.44
		3	17.55	0.04
	TOTAL		**52.65**	**1.30**
134	**PALLIVASAL HPS**	1	5.00	0.00
		2	5.00	0.00
		3	5.00	24.72
		4	7.50	24.70
		5	7.50	0.00
		6	7.50	1.54
	TOTAL		**37.50**	**8.49**
135	**PANNIAR HPS**	1	15.00	3.80
		2	15.00	0.00
	TOTAL		**30.00**	**1.90**
136	**PORINGALKUTTU HPS**	1	8.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	8.00	0.01
		3	8.00	0.99
		4	8.00	0.00
	TOTAL		**32.00**	**0.25**
137	**SABARIGIRI HPS**	1	50.00	5.65
		2	50.00	20.84
		3	50.00	12.64
		4	50.00	2.95
		5	50.00	8.68
		6	50.00	2.02
	TOTAL		**300.00**	**8.80**
138	**SENGULAM HPS**	1	12.00	0.00
		2	12.00	100.00
		3	12.00	100.00
		4	12.00	100.00
	TOTAL		**48.00**	**75.00**
139	**SHOLAYAR HPS**	1	18.00	14.51
		2	18.00	0.26
		3	18.00	0.00
	TOTAL		**54.00**	**4.92**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TANGEDCO			
140	**ALIYAR HPS**	1	60.00	0.00
	TOTAL		**60.00**	**0.00**
141	**BHAWANI BARRAGE-II HPS**	1	15.00	25.74
		2	15.00	26.70
	TOTAL		**30.00**	**26.22**
142	**BHAWANI BARRAGE-III HPS**	1	15.00	0.00
		2	15.00	0.00
	TOTAL		**30.00**	**0.00**
143	**BHAWANI KATTAL**	1	15.00	0.00
		2	15.00	0.00
	TOTAL		**30.00**	**0.00**
144	**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**
145	**KODAYAR-I HPS**	1	60.00	0.28
	TOTAL		**60.00**	**0.28**
146	**KODAYAR-II HPS**	2	40.00	25.71

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL		**40.00**	**25.71**
147	**KUNDAH-I HPS**	1	20.00	0.00
		2	20.00	0.00
		3	20.00	0.00
	TOTAL		**60.00**	**0.00**
148	**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	0.14
	TOTAL		**175.00**	**0.03**
149	**KUNDAH-III HPS**	10	60.00	0.00
		11	60.00	0.00
		9	60.00	0.00
	TOTAL		**180.00**	**0.00**
150	**KUNDAH-IV HPS**	12	50.00	0.00
		13	50.00	0.00
	TOTAL		**100.00**	**0.00**
151	**KUNDAH-V HPS**	14	20.00	0.00
		15	20.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL		**40.00**	**0.00**
152	**LOWER METTUR-I HPS**	1	15.00	0.00
		2	15.00	0.00
	TOTAL		**30.00**	**0.00**
153	**LOWER METTUR-II HPS**	3	15.00	0.00
		4	15.00	0.00
	TOTAL		**30.00**	**0.00**
154	**LOWER METTUR-III HPS**	5	15.00	0.00
		6	15.00	0.00
	TOTAL		**30.00**	**0.00**
155	**LOWER METTUR-IV HPS**	7	15.00	0.00
		8	15.00	0.00
	TOTAL		**30.00**	**0.00**
156	**METTUR DAM HPS**	1	12.50	10.84
		2	12.50	65.19
		3	12.50	10.21
		4	12.50	8.22
	TOTAL		**50.00**	**23.61**
157	**METTUR TUNNEL HPS**	1	50.00	6.12
		2	50.00	9.56

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		3	50.00	19.70
		4	50.00	7.51
	TOTAL		**200.00**	**10.72**
158	**MOYAR HPS**	1	12.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL		**36.00**	**0.00**
159	**PAPANASAM HPS**	1	8.00	0.00
		2	8.00	0.00
		3	8.00	0.00
		4	8.00	0.00
	TOTAL		**32.00**	**0.00**
160	**PARSON`S VALLEY HPS**	1	30.00	0.00
	TOTAL		**30.00**	**0.00**
161	**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**
162	**PYKARA HPS**	1	7.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	7.00	0.00
		3	7.00	0.00
		4	13.60	0.00
		5	13.60	0.00
		6	11.00	0.00
	TOTAL		**59.20**	**0.00**
163	**PYKARA ULTMATE HPS**	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
	TOTAL		**150.00**	**0.00**
164	**SARKARPATHY HPS**	1	30.00	0.00
	TOTAL		**30.00**	**0.00**
165	**SHOLAYAR HPS (TN)**	1	35.00	0.00
		2	35.00	0.00
	TOTAL		**70.00**	**0.00**
166	**SURULIYAR HPS**	1	35.00	0.00
	TOTAL		**35.00**	**0.00**
	TSGENCO			
167	**LOWER JURALA HPS**	1	40.00	28.49
		2	40.00	40.27

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		3	40.00	58.40
		4	40.00	28.50
		5	40.00	29.55
		6	40.00	28.49
	TOTAL		**240.00**	**35.62**
168	**NAGARJUN SGR HPS**	1	110.00	13.71
		2	100.80	17.48
		3	100.80	11.79
		4	100.80	9.67
		5	100.80	11.04
		6	100.80	11.74
		7	100.80	16.11
		8	100.80	24.98
	TOTAL		**815.60**	**14.57**
169	**NAGARJUN SGR LBC HPS**	1	30.00	43.55
		2	30.00	35.60
	TOTAL		**60.00**	**39.58**
170	**POCHAMPAD HPS**	1	9.00	44.11
		2	9.00	38.36
		3	9.00	39.73

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		4	9.00	26.57
	TOTAL		**36.00**	**37.19**
171	**PRIYADARSHNI JURALA HPS**	1	39.00	28.22
		2	39.00	28.49
		3	39.00	28.22
		4	39.00	28.49
		5	39.00	30.14
		6	39.00	32.33
	TOTAL		**234.00**	**29.31**
172	**PULICHINTALA HPS**	1	30.00	44.01
		2	30.00	35.25
		3	30.00	35.07
		4	30.00	30.97
	TOTAL		**120.00**	**36.32**
173	**SRISAILAM LB HPS**	1	150.00	36.14
		2	150.00	36.35
		3	150.00	39.91
		4	150.00	100.00
		5	150.00	43.42
		6	150.00	31.42

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL		**900.00**	**47.87**
	Eastern			
	APGENCO			
174	**MACHKUND HPS**	1	17.00	0.00
		2	17.00	0.00
		3	17.00	0.00
		4	21.25	0.00
		5	21.25	0.00
		6	21.25	0.00
	TOTAL		**114.75**	**0.00**
	DEPL			
175	**JORETHANG LOOP**	1	48.00	1.16
		2	48.00	1.14
	TOTAL		**96.00**	**1.15**
	DVC			
176	**MAITHON HPS**	1	20.00	22.33
		2	23.20	11.59
		3	20.00	43.85
	TOTAL		**63.20**	**25.92**
177	**PANCHET HPS**	1	40.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	40.00	0.00
	TOTAL		**80.00**	**0.00**
	GIPL			
178	**CHUZACHEN HPS**	1	55.00	49.07
		2	55.00	31.27
	TOTAL		**110.00**	**40.17**
	JUUNL			
179	**SUBERNREKHA-I HPS**	1	65.00	5.42
	TOTAL		**65.00**	**5.42**
180	**SUBERNREKHA-II HPS**	2	65.00	4.61
	TOTAL		**65.00**	**4.61**
	MBPC			
181	**RONGNICHU HPS**	1	56.50	36.75
		2	56.50	37.65
	TOTAL		**113.00**	**37.20**
	NHPC			
182	**RANGIT HPS**	1	20.00	21.63
		2	20.00	19.57
		3	20.00	26.30
	TOTAL		**60.00**	**22.50**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
183	**TEESTA LOW DAM-III HPS**	1	33.00	141.48
		2	33.00	35.91
		3	33.00	30.22
		4	33.00	20.59
	TOTAL		**132.00**	**57.05**
184	**TEESTA LOW DAM-IV HPS**	1	40.00	45.01
		2	40.00	34.05
		3	40.00	35.03
		4	40.00	34.56
	TOTAL		**160.00**	**37.16**
185	**TEESTA V HPS**	1	170.00	34.42
		2	170.00	35.34
		3	170.00	31.59
	TOTAL		**510.00**	**33.78**
	OHPC			
186	**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

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		6	60.00	0.00
		7	75.00	0.00
		8	75.00	0.00
	TOTAL		**510.00**	**0.00**
187	**CHIPLIMA HPS**	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
	TOTAL		**72.00**	**0.00**
188	**HIRAKUD HPS**	1	49.50	0.00
		2	49.50	0.00
		3	32.00	0.00
		4	32.00	0.00
		5	43.65	0.00
		6	43.65	0.00
		7	37.50	0.00
	TOTAL		**287.80**	**0.00**
189	**RENGALI HPS**	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		5	50.00	0.00
	TOTAL		**250.00**	**0.00**
190	**UPPER INDRAVATI HPS**	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
		4	150.00	0.00
	TOTAL		**600.00**	**0.00**
191	**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			
192	**TASHIDING HPS**	1	48.50	0.00
		2	48.50	0.00
	TOTAL		**97.00**	**0.00**
	SKPPPL			
193	**DIKCHU HPS**	1	48.00	0.00
		2	48.00	0.00
	TOTAL		**96.00**	**0.00**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TUL			
194	**TEESTA-III HPS**	1	200.00	0.07
		2	200.00	0.09
		3	200.00	0.06
		4	200.00	2.09
		5	200.00	1.65
		6	200.00	5.15
	TOTAL		**1200.00**	**1.52**
	WBSEDCL			
195	**JALDHAKA HPS ST-I**	1	9.00	0.05
		2	9.00	0.06
		3	9.00	0.04
		4	9.00	0.07
	TOTAL		**36.00**	**0.06**
196	**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**
197	**RAMMAM HPS**	1	12.50	10.67

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
		2	12.50	4.52
		3	12.50	12.64
		4	12.50	13.36
	TOTAL		**50.00**	**10.30**
	North Eastern			
	APGCL			
198	**KARBI LANGPI HPS**	1	50.00	14.84
		2	50.00	0.52
	TOTAL		**100.00**	**7.68**
	MeECL			
199	**KYRDEMKULAI HPS**	1	30.00	1.52
		2	30.00	60.31
	TOTAL		**60.00**	**30.91**
200	**MYNTDU(LESHKA) St-1 HPS**	1	42.00	0.00
		2	42.00	1.72
		3	42.00	0.00
	TOTAL		**126.00**	**0.57**
201	**NEW UMTRU HPS**	1	20.00	0.42
		2	20.00	1.10
	TOTAL		**40.00**	**0.76**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
202	**UMIAM HPS ST-I**	1	9.00	0.42
		2	9.00	0.00
		3	9.00	1.36
		4	9.00	1.09
	TOTAL		**36.00**	**0.72**
203	**UMIAM HPS ST-IV**	7	30.00	0.00
		8	30.00	0.29
	TOTAL		**60.00**	**0.14**
	NEEPCO.			
204	**DOYANG HPS**	1	25.00	3.96
		2	25.00	4.86
		3	25.00	4.11
	TOTAL		**75.00**	**4.31**
205	**KAMENG HPS**	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
		4	150.00	0.00
	TOTAL		**600.00**	**0.00**
206	**KHONDONG HPS**	1	25.00	0.00
		2	25.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL		**50.00**	**0.00**
207	**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**
208	**PARE**	1	55.00	0.00
		2	55.00	0.00
	TOTAL		**110.00**	**0.00**
209	**RANGANADI HPS**	1	135.00	0.00
		2	135.00	0.56
		3	135.00	0.82
	TOTAL		**405.00**	**0.46**
210	**TUIRIAL HPS**	1	30.00	9.79
		2	30.00	11.53
	TOTAL		**60.00**	**10.66**
	NHPC			
211	**LOKTAK HPS**	1	35.00	47.98
		2	35.00	37.88
		3	35.00	41.70

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON-AVAILABILITY (%)
	TOTAL		**105.00**	**42.52**

CHAPTER-8

GENERATION PROGRAMME FOR THE YEAR 2019-20

CHAPTER 8

GENERATION PROGRAMME FOR THE YEAR 2023-24

8.1 As on 31.03.2023, 211 HE Stations (of more than 25 MW capacity) having total installed capacity of 46850.17 MW are being monitored in the country. With the addition of new hydro units during 2023-24, the anticipated installed capacity of H.E. Stations in the country is likely to be 50010.15 MW by 31st March, 2024. The overall Generation Programme for H.E. stations for the year 2023-24 has been fixed at 164700 MU comprising 156700 MU from HE Stations in India and 8000 MU import from Bhutan, which is 4140.77 MU less than actual generation during 2022-23 (i.e. 168840.77 MU comprising 162098.77 MU from HE Stations in India and 6742 MU import from Bhutan).

8.2 Region-wise summary of likely installed capacity as on 31.03.2024, Generation targets for 2023-24 and the hydro generation during 2022-23 are given in **Table 7.1** below:

TABLE 8.1

REGION-WISE LIKELY INSTALLED CAPACITY OF HE STATIONS AND HYDRO GENERATION PROGRAMME DURING 2023-24

Sl. No.	Region	Likely Hydro Installed Capacity (as on 31.03.2024) (MW)	Hydro Generation Programme for 2023-24 (MU)	Hydro Generation during 2022-23 (MU)	
				Programme	Actual
1.	Northern	20756.25	77797	76243.00	77624.07
2.	Western	7392.00	15491	15461.00	19573.87
3.	Southern	11847.15	31078	30511.00	36869.76
4.	Eastern	5987.75	20178	20104.00	20888.80
5.	North-Eastern	4027.00	12156	8342.00	7142.27
Sub total		**50010.15**	**156700**	**150661.00**	**162098.77**
6.	Import – from Bhutan		8000	8000	6742
Total(Including Import from Bhutan)			**164700**	**158661**	**168840.77**

8.3 While finalizing the Generation Programme for 2023-24 during last quarter of 2022-23 it was anticipated that 22 nos. H.E. units having installed capacity of 3160 MW would be added during the year 2023-24 and last quarter of 2022-23. 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 31.03.2024, targets and actual generation during 2022-23, generation target for 2023-24 are given in **Annex-8.2**.

Annex-8.1

Generation from Hydro Electric Projects likely to be commissioned in 2023-24 and during last quarter of 2022-23

S. No.	Name of Hydro Power Project	Unit No.	Present Likely date of commissioning as per CEA/Utility	I.C (MW)	Generation Target 2021-22	Generation Target 2022-23	Present Capacity Addition Programme during
Central Sector							
1	Lower Subansiri (NHPC-Arunachal Pradesh)	1 to 8	(2 units during Mar'23 and 6 units during 2023-24)	2000	1205	5429	2022-24 (2 units during Mar'23 and 6 units during 2023-24)
2	Parbati-II (NHPC-Himachal Pradesh)	1 to 4	U- 1 to 4 (Mar 2024)	800	320	320	2023-24
3	Naitwar Mori	1&2	U- 1 &2 (Feb, 2023)	60	23	215	2022-23
	Sub Total (Central Sector)			**2860**	**1548**	**5964**	
State Sector							
1	Uhl-III (BVPCL-Himachal Pradesh)	1&2	U- 1 & 2 (Mar, 2024)	100	0	0	2023-24
2	Pallivasal (KSEBL-Kerala)	1&2	U- 1& 2 (Jun 2023)	60	142	0	2023-24
3	Thottiyar (KSEBL-Kerala)	1&2	U- 1 (Mar 2023 & 2 (June 2023)	40	15	0	2023-24
	Sub Total (State Sector)			**200**	**157**	**0**	

Private Sector							
1	Tidong (Statkraft-HP)	1&2	U- 1& 2 (June 2023)	100	50	50	2023-24
	Sub Total (Private Sector)			**100**	**50**	**50**	
	Grand Total			**3160**	**1755**	**6014**	

Annex-8.2

SECTOR-WISE PERFORMANCE OF HYDROELECTRIC STATIONS DURING 2022-2023 & TARGETS FOR 2023-2024

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2024	Generation during 2022-2023 (MU)		Generation Programme for 2023-24 (MU)
		Targets	Actual	
A. CENTRAL SECTOR				
BBMB	2938.30	9650	10825	9700
NHPC Ltd	6251.20	25663	24451	25628
SJVN Ltd	1972.00	8865	9130	9080
NTPC Ltd	800.00	3100	3133	3100
THDC Ltd	1400.00	4162	4540	4160
NHDC Ltd.	1520.00	3265	5443	3265
DVC	143.20	290	237	286
NEEPCO Ltd.	3500.00	6356	5202	10366
Sub Total	**18524.70**	**61351**	**62961**	**65585**
B. STATE ELECTRICITY BOARDS/CORPORATIONS				
JKSPDCL	1110.00	4866	5057	5551
HPPCL	406.00	771.50	904	874
HPSEBL	372.00	1628	1779	1653
BVPC	100.00	0	0	0
RRVUNL	411.00	480	967	672
PSPCL	1051.00	3780	3702	3665
UPJVNL	501.60	1519	974	1324
UJVNL	1372.15	5035	5177	5135
SSNNL	1450.00	3099	4792	3100
GSECL	540.00	965	1341	1051
MAHAGENCO	2406.00	3963	3941	3888
MPPGCL	875.00	2389	2231	2407
CSPGCL	120.00	274	237	274
APGENCO	1796.75	3600	4485	3605
TSGENCO	2405.60	3852	6010	3969
KPCL	3617.20	12337	12964	12242
KSEBL	1964.15	7414	7989	7668
TANGEDCO	2178.20	3913	5966	4220
JUUNL	130.00	110	169	110
OHPC	2039.80	5363	4919	5363
TUL	1200.00	5652	6153	5652
WBSEDCL	986.00	1550	1990	1560
APGCL	100.00	380	482	380

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2024	Generation during 2022-2023 (MU)		Generation Programme for 2023-24 (MU)
		Targets	Actual	
MePGCL	322.00	1106	980	1106
Sub Total	**27454.45**	**74046.5**	**83209**	**75469**
C. PRIVATE SECTOR				
MPCL	86.00	336	321	332
EPPL	100.00	348	344	348
ADHPL	192.00	658	640	653
GBHPPL	70.00	293	274	293
JSW ENERGY	1345.00	5431	5637	5345
IAEPL	36.00	158	140	158
AHPC LTD	180.00	1310	1514	770
JPVL	100.00	1590	1911	402
DLHP	100.00	36	19	50
GIPL	330.00	537	504	1310
TPCL	400.00	1470	1569	1750
DEPL	99.00	412	433	439
SEPL	34.00	421	446	36
SNEHA KINETIC	110.00	460	536	537
NTPGPL	447.00	50	0	1470
HSPPL	96.00	392	318	412
L&T	97.00	402	466	436
GMR	96.00	500	422	463
MBPC	113.00	442	435	442
Sub Total	**4031.00**	**15246**	**15928**	**15646**
Total All India	**50010.15**	**150643.48**	**162099**	**156700**
Import from Bhutan		**8000**	**6742**	**8000**
Total Hydro generation including import from Bhutan		**158661**	**168840.77**	**164700**

CHAPTER-9

RENOVATION & MODERNISATION OF HYDRO-ELECTRIC STATIONS

CHAPTER – 9

9. RENOVATION & MODERNISATION OF HYDRO ELECTRIC POWER 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 alongwith the left out schemes as recommended in Phase-I programme of National Committee. The left out schemes were those which were either under implementation or were yet to be implemented. This Perspective Plan was for IX, X and XI Plan with 117 schemes having an aggregate installed capacity of 19370 MW with benefit of 7755MW at an estimated cost of Rs.4654 Crores.

9.3.1 Achievements during VIII, IX, X, XI, XII Plan and Period 2017-22

The R&M works at 118 (26 in Central and 92 in State Sector) hydro power plants (13 up to the VIII Plan, 20 in the IX Plan, 32 in the X Plan, 18 in the XI Plan, 21 in the XII Plan & 14 during 2017-22) with an aggregate installed capacity of 22634.7 MW had been completed by the end of the year 2017-22 and total a benefit of 4139.56 MW through Life Extension (LE), Uprating (U) and Restoration had been accrued. The State-wise list of Hydro RM&U Schemes completed during VIII, IX, X, XI XII Plans and 2017-22 are given at Annex-I, II, III, IV ,V and VI respectively.

9.3.2 Programme during the period 2022-27

The Renovation, Modernization, Uprating and Life Extension works at 67 Hydro Electric Plants (HEPs) with an aggregate installed capacity of 11935.60 MW is programmed for completion during the year 2022-27 with its break-up as 2641.8 MW through R&M at 13 HEPs, 7377.8 MW through Life Extension at 42 HEPs and 1916 MW through Life Extension and Uprating at 12 HEPs. The 12 HEPs where both Life Extension & Uprating are envisaged, the aggregate installed capacity of 1916 MW shall get uprated after completion of R&M works to 2157.5 MW resulting in additional benefit of installed capacity of 241.5 MW. As such, the revised aggregate installed capacity after completion of RMU&LE works of these 67 projects would be 12177.10 MW. The State-wise list of hydro R&M schemes expected for completion during 2022-27 is given at Annex-VII.

9.3.3 Programme during the period 2027-32

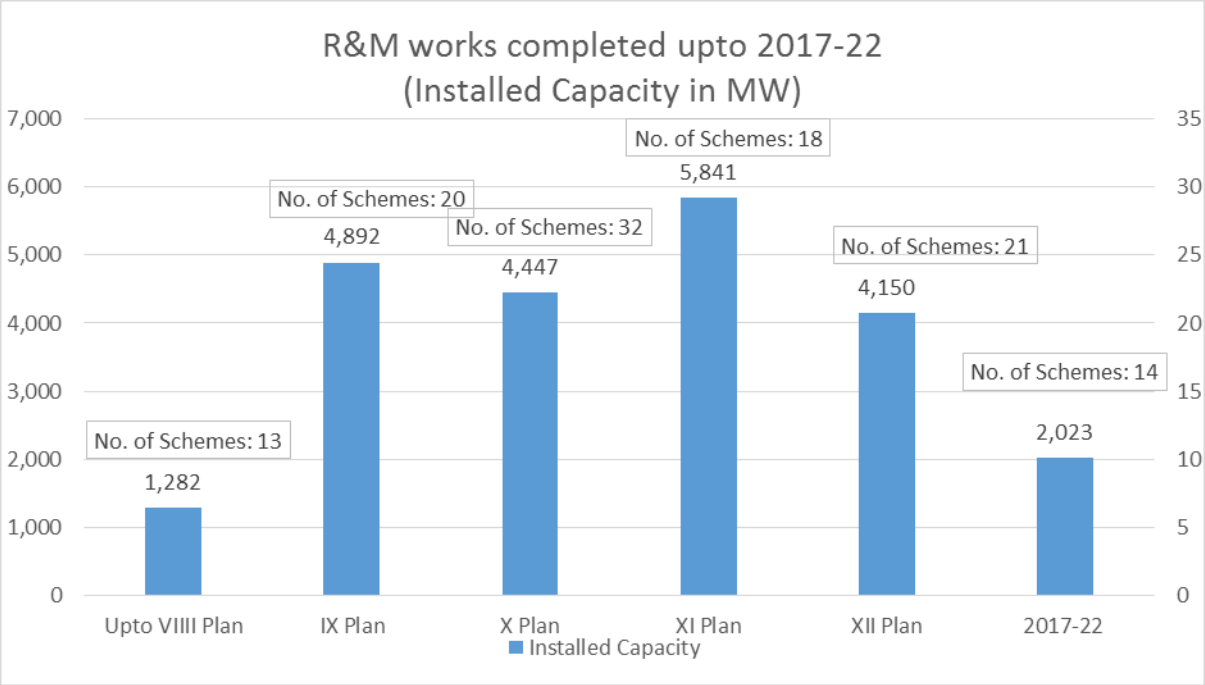
The Renovation, Modernization, Uprating and Life Extension works at 21 Hydro Electric Plants (HEPs) with an aggregate installed capacity of 2879.20 MW is programmed for completion during 2027-32 through Life Extension and Uprating. The State-wise list of hydro R&M schemes expected for completion during 2027-32 is given at Annex-VIII.

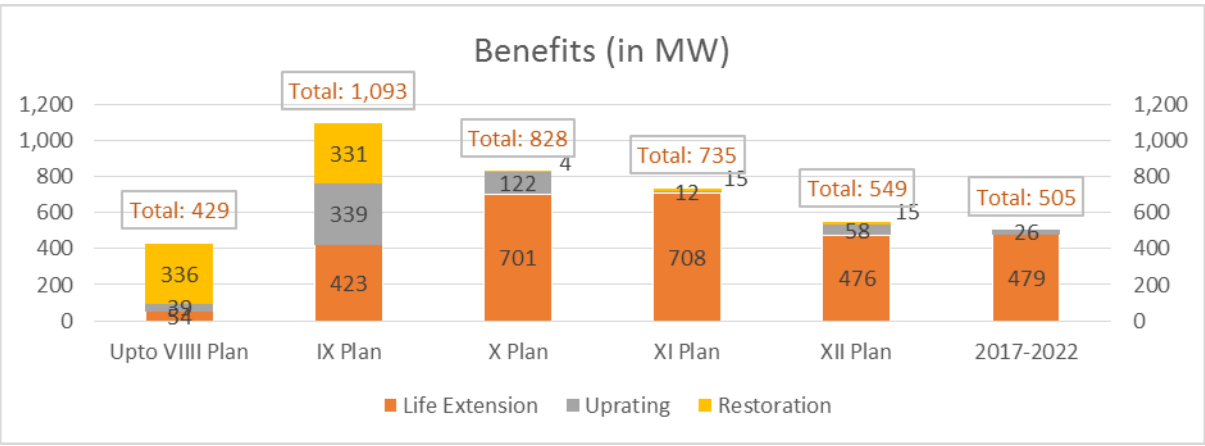
Plan-wise summary of R&M of H.E. Projects starting from VIII Plan is given below:

9.4 Summary of R&M of Hydro Electric Projects (As on 31.03.2023)

I <u>Hydro R&M schemes completed up to 2017-22</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	827.73 [122.05(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	1146.02	549.40 [58 (U)+ 476.40 (LE)+15(Res.)]
6.	2017-2022	5	9	14	2023.2	848.68	505.4 [479.2(LE) + 26.2(U)]
	Total	26	92	118	22634.7	4016.31	4139.56 [596.25 (U)+ 2841.85 (LE)+ 701.46 (Res.)]





II Programme & Completion 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	8	59	67	11935.6	9535.30 [9293.80(LE)+ 241.5(U)]
2.	Completed	0	7	7	1469.8	510 [510 (LE)+ 0(U)]
3.	Under Implementation	4	21	25	3949.75	2505.25 [2367.75(LE)+ 137.5(U)]
4.	Under Tendering	2	4	6	1619	1639 [1619(LE)+ 20(U)]
5.	Under DPR Preparation/ Finalisation/ Approval	0	5	5	790	696 [690(LE)+ 6(U)]
6.	Under RLA Studies	2	22	24	4107.05	4185.05 [4107.05(LE)+ 78(U)]

III Programme of R&M works during 2027-32

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Benefit (MW)
		Central Sector	State Sector	Total		
1.	Programmed	3	18	21	2879.2	2890.03 [2879.2(LE)+ 10.83(U)]
2.	Under Implementation	0	0	0	0	0
3.	Under Tendering	0	0	0	0	0
4.	Under DPR Preparation/Finalisation/ Approval	0	1	1	115	125.83 [115(LE)+ 10.83(U)]
5.	Under RLA Studies	3	17	20	2764.2	2764.2 [2764.2(LE)+ 0(U)]

9.5 Achievement during the year 2022-23

R&M works of the following Seven (7) Schemes with an aggregate installed capacity of about 1469.8 MW have been completed during the year 2022-23 which has resulted in benefit of extension of operational life for installed capacity of 510 MW:

S. No.	Name of Scheme, Utility/Agency	Capacity under R&M (in MW)	Category	Cost (in Rs. Crores)	Benefit (MW)
1	Bhabha Power House, HPSEB	3x40	RM&LE	43.01	120 (LE)
2	Rihand, UPJVNL	6x50	RM&LE	129.55	300 (LE)
3	Tiloth (Maneri Bhali-I), UJVNL	3x30	RM&LE	171.27	90 (LE)
4	Nagarjuna Sagar Ph-II, TSGENCO	1x110+7x100.8	R&M	14.34	-
5	Nagarjuna Sagar Left Canal Power House, TSGENCO	2x30.6	R&M	1.50	-
6	Munirabad Dam Power House, KPCL	2x9+1x10	R&M	2.69	-
7	Linganamakki Dam Power House, KPCL	2x27.5	R&M	2.75	-

Abbreviations:

R&M – Renovation & Modernisation,
RM&U – Renovation Modernisation & Uprating, RM&LE – Renovation, Modernisation & Life Extension,
RMU&LE – Renovation, Modernisation, Uprating & Life Extension,
Res. – Restoration
RLA- Residual Life Assessment

9.6 Programme for the year 2023-24

For the year 2023-24, it is programmed to complete following 07 schemes having an installed capacity of 1770 MW, which will result in benefit of extension of operational life for installed capacity of 930 MW and also increase in installed capacity by 96 MW.

S. No.	Name of Scheme, Utility/Agency	Capacity under R&M (in MW)	Category	Estimate Cost (in Rs. Crores)	Benefit (MW)
1	Bhakra LB, BBMB	5x108	RMU&LE	489.77	540 (LE) + 90(U)
2	Ranjit Sagar Dam, PSPCL	4x150	R&M	92.48	-
3	Dhalipur, UJVNL	3x17	RM&LE	152.65	51(LE)
4	Obra, UPJVNL	3x33	RM&LE	58.80	99 (LE)
5	Gerusoppa Dam Power House, KPCL	4x60	R&M	59.66	-
6	Panchet U-1, DVC	1x40	RMU&LE	121.85	40 (LE) + 6(U)
7	Kopili Power Station, NEEPCO	4x50	RM&LE	1075.19	200 (LE)

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) + 54(LE) + 336(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 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	Dehar U-2 BBMB	CS	1x165	10.74	10.74	25.00 (Res.)	R&M+Res.	1998-99
3	Bairasiul, NHPC	CS	3x66	18.45	18.45	-	R&M	2000-01
4	Bassi, HPSEB	SS	4x15	5.35	4.34	-	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) + 423.0(LE) + 331.03(Res.)]**		

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

Annex- 9.3

(Sheet 1/ 3)

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

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Himachal Pradesh								
1	Pong, BBMB	CS	6x60	17.70	17.79	36.00(U)	RM&U	2003-04
Punjab								
2	Ganguwal,U-1, BBMB	CS	1x29.25	51.28	81.99	25.89 (LE) +2.10	RM&LE+Res.	2006-07
2	Kotla, U-1, BBMB	CS	1x29.25	51.28		2.33 (Res.)	RM&LE+Res.	2006-07
4	Shanan Ph.A, PSPCL	SS	4x15+ 1x50	11.35	10.93	-	R&M	2003-04
5	Shanan, Ph.B, PSPCL	SS	4x15+ 1x50 $	35.95	13.34	60.00(LE)	RM&LE(LE for 15 MW units+R&M for 50 MW unit	2006-07
6	Anandpur Sahib, PSPCL	SS	4x33.5	3.68	1.04	-	R&M	2006-07
7	UBDC I&II, PSPCL	SS	3x15+ 3x15.45	7.89	2.44	45.00 (LE)	RM&LE(LE for 3x15MW&R &M for 3x15.45 MW	2006-07
8	Mukerian St.I, PSPCL	SS	3x15	6.04	4.38	-	R&M	2006-07
Uttarakhand								
9	Chibro, UJVNL	SS	4x60	10.45	10.52	-	R&M	2006-07
Karnataka								
10	Nagjhari, U-1&3,KPCL	SS	2x135	26.12	21.62	30 (U)	RM&U	2002-03
11	Supa PH, KPCL	SS	2x50	2.64	2.47	-	R&M	2002-03
12	Mahatma Gandhi, VVNL	SS	4x12+ 4x18	44.66	43.13	19.20 (U) +120.00 (LE)	RMU&LE	2002-03
13	Munirabad, VVNL	SS	2x9+ 1x10.3	3.64	3.53	28.30 (LE)	RM&LE	2002-03

Annex- 9.3

(Sheet 2/3)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
14	Mani Dam, KPCL	SS	2x4.5	1.00	1.00	-	R&M	2002-03
15	Shivasamudram, VVNL	SS	6x3+ 4x6	68.38	73.17	42.00 (LE)	RM&LE	2004-05
16	Bhadra, Ph.II, KPCL	SS	1x2	3.30	2.51	2.00 (LE)	RM&LE	2005-06
17	Varahi, KPCL	SS	2x115	2.57	2.66	-	R&M	2006-07
18	Sharavathy, Ph.A, KPCL	SS	10x103.5	5.22	3.52	-	R&M	2006-07
Kerala								
19	Neriamanga-lam KSEB	SS	3x15	58.00	53.05	7.65 (U) +45.00(LE)	RMU&LE	2006-07
20	Pallivasal, KSEB	SS	3x5+ 3x7.5	94.00	371.71	37.50 (LE)	RM&LE	2002-03
21	Sengulam, KSEB	SS	4x12	114.00		48.00 (LE)	RM&LE	2002-03
22	Panniar, KSEB	SS	2x15	62.00		30.00 (LE)	RM&LE	2002-03
Tamilnadu								
23	Pykara, TANGEDCO	SS	3x6.65+ 1x11+2x	26.06	20.147	58.95(LE)	RM&LE	2004-05
24	Papanasam, TANGEDCO	SS	4x7	27.05	22.61	4.00 (U) + 28.00 (LE)	RMU&LE	2005-06
Orissa								
25	Hirakud-I (Sw.yard), OHPC	SS		9.85	15.88	-	R&M	2006-07
26	Hirakud-I,U-3&4, OHPC	SS	2x24	126.14	108.86	16.00(U)+ 48.00(LE)	RMU&LE	2005-06
West Bengal								
27	Maithon, U-2, DVC	CS	1x20	42.08	36.94	3.20(U)+ 20.00(LE)	RMU&LE	2004-05
Maharastra								
28	Bhira Tail Race, MSPGCL	SS	2x40	1.60	0.70	-	R&M	2003-04
29	Tillari, MSPGCL	SS	1x60	4.50	4.24	6.0 (U)	RM&U	2004-05

Annex- 9.3

(Sheet 3/3)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs. in Crs.)	Actual Exp (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
30	Koyna Gen. Complex, MSPGCL	SS	4x70+4x80+4x80	12.00	11.50	-	R&M	2004-05
Meghalaya								
31	Umium St.I, MePGCL	SS	4x9	81.88	84.21	36(LE)	RM&LE	2002-03
32	Khandong, NEEPCO	CS	2x25	4.00	3.35	-	R&M	2003-04
Total			**4446.60**	**1016.31**	**1029.24**	**827.73 [122.05(U) +701.25(LE) + 4.43(Res.)]**		

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

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

Annex-9.4

State-wise List of Hydro RMU&LE schemes completed in the XI Plan **(Sheets 1 of 2)**

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	-	R&M	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 (Rs . in crs)	Actual Exp (Rs . in crs)	Benefits (MW)	Category	Year of Completion
14	Vaitarna, MSPGCL	SS	1x60	16.00	0.14	-	R&M	2009-10
15	Koyna Dam PH, MSPGCL	SS	2x18	5.78	0.25	-	R&M	2009-10
16	Koyna St.III, MSPGCL	SS	4x80	16.65	5.79	320 (LE)	RM&LE	2011-12
Manipur								
17	Loktak, NHPC	CS	3x30 derated	18.55	17.88	15.00 (Res.)	R&M + Res.	2011-12
Meghalaya								
18	Umium St.II, MePGCL	SS	2x9	90.46	55.67	2(U)+18.00(LE)	RMU&LE	2011-12
Total			**5841.2**	**412.83**	**294.84**	**735 [12.00(U) +708.00 (LE)+15.00 (Res)]**		

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

Annex-9.5

(Sheet 1 of 2)

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

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (No.x.MW)	Est. Cost (Rs . in Crs)	Actual Exp (Rs . in Crs)	Benefits (MW)	Capacity after RMU&LE (MW)	Category	Year of Completion
Himachal Pradesh									
1	Bassi, HPSEB	SS	4x15	124.25	158.26	6.0(U)+ 60(LE)	66	RMU&LE	2013-14
Jammu & Kashmir									
2	Lower Jhelum, J&KSPDC	SS	3x35	101.3	96.10	15.00(Res)	105	R&M+ Res.	2014-15
3	Sumbal Sindh, J&KSPDC	SS	2x11.3	25.00	24.59	-	22.6	R&M	2016-17
Uttarakhand									
4	Pathri, UJVNL	SS	3x6.8	113.25	108.3	20.40(LE)	20.4	RM&LE	2014-15
5	Khatima, UJVNL	SS	3x13.8	256.77	148.88	41.40 (LE)	41.4	RM&LE	2016-17
Uttar Pradesh									
6	Matatila, UPJVNL	SS	3x10.2	10.29	7.21	30.6 (LE)	30.6	RM&LE	2015-16
Andhra Pradesh									
7	Lower Sileru, APGENCO	SS	4x115	8.75	6.77	-	460	R&M	2013-14
8	Srisailam RB, APGENCO	SS	7x110	16.70	17.60	-	770	R&M	2015-16
Telangana									
9	Nagarjuna Sagar Ph-I works, TSGENCO	SS	1x110+ 7x100.8	33.35	13.90	-	815.6	R&M	2012-13
Karnataka									
10	Supa, KPCL	SS	2x50	3.45	3.88	-	100	R&M	2014-15
11	Nagjhari,U-1 to 6, KPCL	SS	1x135 (U-6)	69.21	64.49	15 (U)	150	RM&U	2015-16
12	Sharavathy Genarating Station (Ph B), KPCL	SS	10x103.5	20.00	29.27	-	1035	R&M	2016-17
Kerala									
13	Idamalayar, KSEB	SS	2x37.5	14.50	13.22	-	75	R&M	2012-13

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(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)	Capacity after RMU&LE	Category	Year of Completion
14	Sabarigiri, U-4 KSEB	SS	1x55	52.20	50.41	5(U)	60	RM&U	2014-15
15	Poringalkuthu, KSEB	SS	4x8	88.63	51.90	4 (U)+ 32.00 (LE)	36	RMU&LE	2015-16
Tamil Nadu									
16	Periyar, TANGEDCO	SS	4x35	161.18	133.68	28.00(U)+ 140(LE)	168	RMU&LE	2015-16
Odisha									
17	Rengali Unit-1 OHPC	SS	1x50	47.50	36.76	50(LE)	50	RM&LE	2012-13
18	Rengali Unit-2 OHPC	SS	1x50	25.20	20.73	50(LE)	50	RM&LE	2013-14
West Bengal									
19	Jaldhaka St.I, WBSEDCL	SS	3x9	88.62	79.97	27 (LE)	27	RM&LE	2016-17
Assam									
20	Khandong, NEEPCO	CS	1x25	25.05	29.18	25(LE)	25	RM&LE	2014-15
21	Kopili, NEEPCO	CS	2x50	50.22	50.92	-	100	R&M	2014-15
Total			**4149.60**	**1335.42**	**1146.02**	**549.40 [58(U)+ 476.40 (LE) + 15 (Res)]**	**4207.6**		

State-wise list of Hydro RMU&LE schemes completed 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)	Capacity after RMU&LE (MW)	Category	Year of Completion
A. COMPLETED SCHEMES IN 2017-22									
Jammu & Kashmir (UT)									
1	Salal, NHPC (6x115)	CS	5x115	58.01	51.08	-	575	R&M	Completed in 2019-20
2	Chenani, J&KSPDC (5x4.66)	SS	5x4.66	34.28	21.84	23.30 (LE)	23.3	RM&LE	Completed in 2021-22
3	Ganderbal, (Unit-3) J&KSPDC (2x3+2x4.5)	SS	1x4.5	18.00	3.26	4.5 (LE)	4.5	RM&LE	Completed in 2021-22
Himachal Pradesh									
4	Ganguwal, BBMB (1x29.25+2x24.2) & Kotla, BBMB (1x29.25+2x24.2)	CS	1x24.2 (U-2) 1x24.2 (U-3)	14.19	9.58	48.4 (LE)	48.4	RM&LE	Completed in 2017-18
5	Dehar Power House (Unit-6), BBMB (6x165)	CS	1x165	19.87	16.00	-	165	R&M	Completed in 2017-18
6	Dehar Power House (Unit-3), BBMB (6x165)	CS	1x165	23.00	18.67	-	165	R&M	Completed in 2021-22
7	Baira Siul, NHPC (3x60)	CS	3x60	341.41	330	180 (LE)	180	RM&LE	Completed in 2021-22
Gujarat									
8	Ukai, GSECL (4x75)	SS	3x75 (U-1,2,&4)	7.30	7.30	-	225	R&M	Completed in 2021-22
Karnataka									
9	Bhadra River Bed units, KPCL (2x12)	SS	2x12	23.55	20.12	-	24	R&M	Completed in 2019-20
Tamil Nadu									
10	Sholayar-I, TANGEDCO (2x35)	SS	2x35	90.44	66.94	70 (LE) + 14(U)	84	RMU&LE	Completed in 2019-20
Kerala									
11	Sholayar, KSEB (3x18)	SS	3x18	199.55	84.26	54 (LE)	54	RM&LE	Completed in 2020-21
12	Idukki 1st stage, KSEB (3x130)	SS	3x130	89.90	65.76	-	390	R&M	Completed in 2020-21
Odisha									
13	Hirakud-I OHPCL (2x37.5)	SS	2x37.5 (U5&6)	158.77	101.83	75.00 (LE) + 12.2 (U)	87.2	RMU&LE	Completed in 2021-22
14	Hirakud-II (Chiplima), OHPCL (3x24)	SS	1x24 (U-3)	65.67	52.04	24.00 (LE)	24	RM&LE	Completed in 2019-20
Sub Total (A)			**2023.20**	**1143.94**	**848.68**	**505.4 [479.2(LE) + 26.2(U)**	**2049.40**		

@ 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;
MW – Mega Watt; CS-Central Sector: SS- State Sector

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)	Capacity after RMU&LE	Category	Year of Completion
A. Completed Schemes									
Himachal Pradesh									
1	Bhabha Power House, HPSEB (3x40)	SS	3x40	90.14	43.01	120 (LE)	120	RM&LE	Completed in 2022-23
Uttar Pradesh									
2	Rihand, UPJVNL (6x50)	SS	6x50	132.20	129.55	300 (LE)	300	RM&LE	Completed in 2022-23
Uttarakhand									
3	Tiloth (Maneri Bhali - I), UJVNL (3x30)	SS	3x30	384.66	171.27	90 (LE)	90	RM&LE	Completed in 2022-23
Telangana									
4	Nagarjuna Sagar Ph-II works, TSGENCO (1x110+7x100.8)	SS	1x110+7x100.8	22.17	14.34	-	815.6	R&M	Completed in 2022-23
5	Nagarjuna Sagar Left Canal Power House, TSGENCO (2x30.6)	SS	2x30.6	29.74	1.50	-	61.2	R&M	Completed in 2022-23
Karnataka									
6	Munirabad Dam Power House, KPCL (2x9 + 1x10)	SS	2x9 + 1x10	4.60	2.69	-	28	R&M	Completed in 2022-23
7	Linganamakki Dam Power House, KPCL (2x27.5)	SS	2x27.5	2.75	2.75	-	55	R&M	Completed in 2022-23
Sub Total(A)			**1469.80**	**666.26**	**365.11**	**510 [510(LE)+ 0(U)]**	**1469.80**		
B. Ongoing Schemes – Under Implementation									
Himachal Pradesh									
8	Bhakra LB, BBMB (5x108)	CS	5x108	489.77	570.38	540.00(LE)+ 90.00 (U)	630	RMU&LE	2023-24
Punjab									
9	Ranjit Sagar Dam, PSPCL (4x150)	SS	4x150	95.48	8.52	-	600	R&M	2023-24
Uttarakhand									
10	Chilla Ph B, UJVNL (4x36)	SS	4x36	490.56	-	144(LE)+ 12(U)	156	RMU&LE	2025-26
11	Dhalipur, UJVNL (3x17)	SS	3x17	152.65	88.54	51 (LE)	51	RM&LE	2023-24
12	Dhakrani, UJVNL (3x11.25)	SS	3x11.25	137.31	6.93	33.75 (LE)	33.75	RM&LE	2025-26
Uttar Pradesh									
13	Obra, UPJVNL (3x33)	SS	3x33	58.8	46.57	99 (LE)	99	RM&LE	2023-24
Telangana									
14	Pochampad HPS Stage -1, TSGENCO (3x9)	SS	3x9	9.655	-	-	27	R&M	2026-27
Andhra Pradesh									
15	Upper Sileru Power House, APGENCO (4x60)	SS	4x60	10.93	4.94	-	240	R&M	2026-27
16	Nagarjunasagar Right Canal Power House, APGENCO (3x30)	SS	3x30	6.4	2.47	-	90	R&M	2025-26
17	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	4.58	0.59	36 (LE)	36	RM&LE	2025-26
18	Hampi Canal PH, APGENCO (4x9)	SS	4x9	-	-	36 (LE)	36	RM&LE	2025-26
Karnataka									
19	Nagjhari (Unit-1 to 3) KPCL (6x150)	SS	3x150 (U-1 to 3)	266.00	43.28	450 (LE)	450	RM&LE	2025-26
20	Shivasamudram, KPCL (6x3+4x6)	SS	6x3+4x6	169.18	11.35	42 (LE)	42	RM&LE	2024-25

21	Kadra Dam Power House, KPCL(3x50)	SS	3x50	44.47	30.82	-	150	R&M	2024-25
22	Kodasalli Dam Power House, KPCL (3x40)	SS	3x40	50.60	12.4	-	120	R&M	2024-25
23	Gerusoppa Dam Power House (Sharavathy Tail Race), KPCL (4x60)	SS	4x60	59.66	2.21	-	240	R&M	2023-24

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)	Capacity after RMU&LE	Category	Year of Completion
Jharkhand									
24	Panchet U-1, DVC (2x40)	CS	1x40 (U-1)	121.85	2.19	40(LE) + 6(U)	46	RMU&LE	2023-24
Tamil Nadu									
25	Moyar PH, TANGEDCO (3x12)	SS	3x12	67.05	71.45	36 (LE)+ 6(U)	42	RMU&LE	2024-25
26	Kodayar PH-I, TANGEDCO (1x60)	SS	1x60	88.48	80.96	60 (LE)+ 10 (U)	70	RMU&LE	2024-25
Kerala									
27	Kuttiyadi, KSEB (3x25)	SS	3x25	377.41	1.68	75.00 (LE) + 7.5 (U)	82.5	RMU&LE	2024-25
28	Sabarigiri (Unit- 6 & Unit 2), KSEB (4x55+2x60)	SS	1x60 +1 x 55	-	-	-	115	R&M	2024-25
Odisha									
29	Balimela, OHPCL (6x60)	SS	6x60	382.91	123.96	360(LE)	360	RM&LE	2024-25
Assam									
30	Kopili Power Station, NEEPCO (4x50)	CS	4x50	1075.19	873.8	200(LE)	200	RM&LE	2023-24
Manipur									
31	Loktak, NHPC (3x35)	CS	3x35	273.59	48.24	105 (LE)	105	RM&LE	2025-26
Meghalaya									
32	Umiam St.III, (Kyrdemkulai) MePGCL (2x30)	SS	2x30	408.00	30.78	60(LE) + 6(U)	66	RMU&LE	2022-27
Sub Total (B)			**3949.75**	**4840.53**	**2062.06**	**2505.25 [2367.75(LE)+ 137.5(U)]**	**4087.25**		
C. Ongoing Schemes – Under Tendering									
Himachal Pradesh									
33	Giri, HPSEB (2x30)	SS	2x30	440.12	-	60.00 (LE)	60	RM&LE	2024-25
Uttarakhand									
34	Ramganaga, UJVNL (3x66)	SS	3x66	455.20	-	198 (LE)	198	RM&LE	2022-27
Gujarat									
35	Kadana PSS, GSECL (4x60)	SS	4x60	750.25	-	240 (LE) + 20 (U)	260	RMU&LE	2025-26
Karnataka									
36	Sharavathy Generating Station, KPCL (10x103.5)	SS	10x103.5	196.56	11.07	1035 (LE)	1035	RM&LE	2025-26
West Bengal									
37	Maithon, DVC (2x20+1x23-U#2)	CS	2x20 (U-1&3)	109.29	7.76	40.00 (LE)	40	RM&LE	2024-25
Assam									
38	Khandong Power Station, NEEPCO (2x23)	CS	2x23	278.63	32.81	46 (LE)	46	RM&LE	2024-25
Sub Total (C)			**1619**	**2230.05**	**51.64**	**1639 [1619(LE)+ 20(U)]**	**1639.00**		

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)	Capacity after RMU&LE	Category	Year of Completion
D. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval									
Uttarakhand									
39	Kulhal, UJVNL (3x10)	SS	3x10	115.24	-	30(LE)	30	RM&LE	2022-27
Madhya Pradesh									
40	Pench, MPPGCL (2x80)	SS	2x80	-	-	160 (LE)	160	RM&LE	2025-26
Karnataka									
41	Supa Dam Power House, KPCL (2x50)	SS	2x50	47.91	10.66	-	100	R&M	2024-25
Tamil Nadu									
42	Kodayar PH-II, TANGEDCO (1x40)	SS	1x40	-	-	40.0(LE)+ 6(U)	46	RMU&LE	2026-27
Andhra Pradesh									
43	Lower Sileru, APGENCO (4x115)	SS	4x115	350.00	1.8	460(LE)	460	RM&LE	2026-27
Sub Total (D)			**790.00**	**513.15**	**12.46**	**696 690(LE)+ 6(U)]**	**796.00**		
E. Ongoing Schemes – Under RLA Studies									
Jammu & Kashmir (UT)									
44	Salal Stage-I, (Unit 1,2 &3) NHPC (3x115)	CS	3x115	-	-	345 (LE)	345	RM&LE	2022-27
Himachal Pradesh									
45	Pong Power House, BBMB (6x66)	CS	6x66	402.00	-	396 (LE) + 54 (U)	450	RMU&LE	2026-27
Punjab									
46	Anandpur Sahib Hydel Project, PSPCL (4x33.5)	SS	4x33.5	-	-	134 (LE)	134	RM&LE	2022-27
47	Mukerian St.I, St.II, St.III & St.IV, PSPCL (3x15, 3x15, 3x19.5& 3x19.5)	SS	3x15, 3x15, 3x19.5& 3x19.5	2.5	-	207 (LE)	207	RM&LE	2022-27
48	Shanan HEP, PSPCL (1x50+ 4x15)	SS	1x50+ 4x15	8.02	-	110 (LE)	110	RM&LE	2022-27
49	UBDC St.I & St.II, PSPCL (3x15+ 3x15.45)	SS	3x15+ 3x15.45	1.71	-	91.35 (LE)	91.35	RM&LE	2022-27
Rajasthan									
50	Rana Pratap Sagar RRVUNL (4x43)	SS	4x43	-	-	172 (LE)	172	RM&LE	2026-27
Madhya Pradesh									
51	Bansagar Ton-I, MPPGCL (3x105)	SS	3x105	-	-	315 (LE)	315	RM&LE	2026-27
52	Bargi, MPPGCL (2x45)	SS	2x45	-	-	90 (LE)	90	RM&LE	2026-27
Karnataka									
53	MGHE, KPCL (4x21.6+ 4x13.2)	SS	4x21.6+ 4x13.2	97.00	0.11	139.2 (LE)	139.2	RM&LE	2026-27
Maharashtra									
54	Vaitarna, MSPGCL (1x60)	SS	1x60	-	-	60 (LE)	60	RM&LE	2026-27
55	Koyna Dam foot (Right Bank), MSPGCL (2x20)	SS	2x20	-	-	40 (LE)	40	RM&LE	2026-27
56	Koyna St-3, MSPGCL (4x80)	SS	4x80	-	-	320 (LE)	320	RM&LE	2026-27
57	Tillari, MSPGCL (1x60)	SS	1x60	-	-	60 (LE)	60	RM&LE	2022-27
58	Bhira Tail Race, MSPGCL (2x40)	SS	2x40	-	-	80 (LE)	80	RM&LE	2022-27
Andhra Pradesh									
59	Machkund St.I & St.II, APGENCO (3x17+ 3x23)	SS	3x17+ 3x23	500.00	-	120 (LE) +9 (U)	129	RMU&LE	2026-27
Kerala									
60	Idukki 2nd stage, KSEB (3x130)	SS	3x130	-	-	390 (LE)	390	RM&LE	2022-27
61	Idamalayar, KSEB (2x37.5)	SS	2x37.5	-	-	75 (LE)	75	RM&LE	2022-27

62	Sabarigiri, (Unit-1,3, & 5) KSEB (4x55+2x60)	SS	3x55 (Unit-1,3, & 5)	-	-	165(LE) + 15 (U)	180	RMU&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)	Capacity after RMU&LE	Category	Year of Completion
Odisha									
63	Hirakud-I (Burla), OHPC Unit # 1, 2 - 49.5 MW (After RM &U) Unit# 3, 4 - 32 MW (After RM & U) Unit#5, 6 - 43.65 MW (After RM & U) Unit#7 - 37.5 MW	SS	1x37.5 (Unit 7)	0.9	-	37.5 (LE)	37.5	RM&LE	2024-25
64	Rengali, OHPC (5x50)	SS	5x50	2.9	-	250 (LE)	250	RM&LE	2024-25
65	Upper Kolab, OHPC (4x80)	SS	4x80	2.4	-	320 (LE)	320	RM&LE	2024-25
Jharkhand									
66	Subernrekha, JUUNL (2x65)	SS	2x65	-	-	130(LE)	130	RM&LE	2022-27
Meghalaya									
67	Umiam-umtru Stage-IV, MePGCL (2x30)	SS	2x30	-	-	60(LE)	60	RM&LE	2022-27
Sub Total (E)			**4107.05**	**1017.43**	**0.11**	**4185.05 [4107.05(LE)+ 78(U)]**	**4185.05**		
Total (A+B+C+D+E)			**11935.60**	**9267.42**	**2491.38**	**9535.30 [9293.80(LE)+ 241.5(U)]**	**12177.10**		

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

State-wise List of Hydro RMU&LE schemes programmed for completion during 2027-32

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)	Capacity after RMU&LE	Category	Completion Target
A.Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval									
1	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	328.4	4.17	115 (LE) + 10.83 (U)	125.83	RMU&LE	2027-28
Sub Total(A)			**115**	**328.4**	**4.17**	**125.83 115 (LE) + 10.83 (U)**	**125.83**		
B. Ongoing Schemes – Under RLA Studies									
Jammu & Kashmir (UT)									
2	Salal Stage-II, (Unit 4,5 &6) NHPC (6x115)	CS	3x115	-	-	345 (LE)	345	RM&LE	2027-32
Himachal Pradesh									
3	Chamera-I, NHPC (3x180)	CS	3x180	-	-	540 (LE)	540	RM&LE	2027-32
Uttarakhand									
4	Tanakpur, NHPC (3x31.4)	CS	3x31.4	-	-	94.2 (LE)	94.2	RM&LE	2027-32
5	Chibro, UJVNL (4x60)	SS	4x60	184.88	-	240 (LE)	240	RM&LE	2027-32
6	Khodri, UJVNL (4x30)	SS	4x30	169.63	-	120 (LE)	120	RM&LE	2027-32
Tamil Nadu									
7	Kundah-I, TANGEDCO (3x20)	SS	3x20	-	-	60 (LE)	60	RM&LE	2027-32
8	Kundah-II, TANGEDCO (5x35)	SS	5x35	-	-	175 (LE)	175	RM&LE	2027-32
9	Kundah-III, TANGEDCO (3x60)	SS	3x60	-	-	180 (LE)	180	RM&LE	2027-32
10	Kundah-IV, TANGEDCO (2x50)	SS	2x50	-	-	100 (LE)	100	RM&LE	2027-32
11	Kundah-V, TANGEDCO (2x20)	SS	2x20	-	-	40 (LE)	40	RM&LE	2027-32
12	Mettur Tunnel, TANGEDCO (4x50)	SS	4x50	-	-	200 (LE)	200	RM&LE	2027-32
13	Sarkarpathy, TANGEDCO (1x30)	SS	1x30	-	-	30 (LE)	30	RM&LE	2027-32
14	Sholayar-II, TANGEDCO (1x25)	SS	1x25	-	-	25 (LE)	25	RM&LE	2027-32
15	Suruliyar, TANGEDCO (1x35)	SS	1x35	-	-	35 (LE)	35	RM&LE	2027-32
16	Kadamparai PH, TANGEDCO (4x100)	SS	4x100	-	-	400 (LE)	400	RM&LE	2027-32
17	Aliyar, TANGEDCO (1x60)	SS	1x60	-	-	60 (LE)	60	RM&LE	2027-32
18	Lower Mettur-I , TANGEDCO (2x15)	SS	2x15	-	-	30 (LE)	30	RM&LE	2027-32
19	Lower Mettur-II , TANGEDCO (2x15)	SS	2x15	-	-	30 (LE)	30	RM&LE	2027-32
20	Lower Mettur-III , TANGEDCO (2x15)	SS	2x15	-	-	30 (LE)	30	RM&LE	2027-32
21	Lower Mettur-IV , TANGEDCO (2x15)	SS	2x15	-	-	30 (LE)	30	RM&LE	2027-32
Sub Total (B)			**2764.20**	**354.51**	**0.00**	**2764.20 [2764.20 (LE)+ 0(U)]**	**2764.20**		
Total (A+B)			**2879.20**	**682.91**	**4.17**	**2890.03 [2879.20 (LE)+ 10.83(U)]**	**2890.03**		

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
		BVPC Limited	Beas Valley Power. Corp. Ltd. (BVPC)
		EPPL	Everest Power Private Limited
		GBHPPL	Greenko Budhil Hydro Power Pvt. Limited
		HBPCL	Himachal Baspa Power Company Limited
		HPPCL	Himachal Pradesh Power Corporation Limited
		HPSEB Limited	Himachal Pradesh State Electricity Board Limited
		HSPCL	Himachal Sorang Power Private Limited
		IAEPL	IA Hydro Energy Pvt Ltd
		JSW	JSW Energy Ltd.
		GMR BHHPL	GMR Bajoli Holi Hydro Power Private Limited
		MPCL	Malana Power Company Limited
		NTPGPL	Tidong Power Generation Private 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