



भारत सरकार
Government of India

विद्युत मंत्रालय
Ministry of Power

केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority

जल विद्युत गृहों के निष्पादन का पुनर्विलोकन-2019-20

REVIEW OF PERFORMANCE OF HYDRO POWER STATIONS 2019-20

नई दिल्ली
NEW DELHI
सितम्बर, 2023
September, 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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पुनर्विलोकन 2019-20

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जल परियोजना आयोजन तथा अन्वेषण प्रभाग
HYDRO PROJECT PLANNING & INVESTIGATION DIVISION

नई दिल्ली
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SUMMARY

SUMMARY

1.0 General

1.1 This review covers the performance of Hydro-Electric (HE) Stations having installed capacity of more than 25 MW. As on 31st March, 2020 there were 712 HE generating units installed in 205 Hydro-Electric Stations with an aggregate installed capacity of 45699.2 MW in operation. Performance of 37 important Reservoir based schemes has also been discussed separately in the report.

1.2 Region-wise summary of the existing HE Stations in operation with installed capacity above 25 MW as on 31.3.2020 in the country vis-à-vis that on 31.3.2019 is given below in **Table S-1**.

TABLE S-1

**REGION-WISE SUMMARY OF HYDRO-ELECTRIC STATIONS
(2019-20 VIS-A-VIS 2018-19)**

Region	No of Stations as on		No of Units as on		Capacity (MW) as on	
	31.03.20	31.03.19	31.03.20	31.03.19	31.03.20	31.03.19
Northern	71	71	245	245	19023.25	19023.25
Western	28	28	101	101	7392.00	7392.00
Southern	69	69	246	246	11694.50	11694.50
Eastern	23	23	84	84	5862.45	5862.45
N-Eastern	14	13	36	34	1727.00	1427.00
All India	205	204	712	710	45699.20	45399.20

1.3 The report contains outage data of 205 H.E. Stations (above 25 MW) covering 712 units and having an aggregate installed capacity of 45699.20 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 2010-11 to 2019-20).

1.5 This review covers information in respect of renovation & modernization, uprating and life extension of HE stations in the country for the year 2019-20, achievements during the year 2019-20 and programme for renovation, modernization, life extension and uprating of HE Stations for the year 2020-21.

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 2020-21
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 2019-20 was 155769 MU (excluding import from Bhutan), which was about 15.48% higher than the generation during 2018-19 and about 13.76% higher than the generation targets for 2018-19.

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

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

TABLE S-2
UTILITY-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS
(2019-20 VIS-A-VIS 2018-19)

Utilities	Installed Capacity (MW) (As on 31.03.2020)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2019-20	2018-19	2019-20	2018-19	2019-20	2018-19
CENTRAL SECTOR							
BBMB	2920.30	9470	9425	12167.2	10186.02	28.48	8.07
NHPC	5451.20	24050	24055	25779.7	24000.96	7.19	-0.22
SJVNL	1912.02	8550	8490	9571.5	8335.92	11.95	-1.81
NTPC	800.00	3000	3000	3449.67	3013.93	14.99	0.46
THDC	1400.00	4160	3952	4244.93	4395.92	2.04	11.23
NHDC	1520.00	2300	2446	4165.6	1920.83	81.11	-21.47
DVC	143.20	210	205	198.47	181.15	-5.49	-11.63

Utilities	Installed Capacity (MW) (As on 31.03.2020)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2019-20	2018-19	2019-20	2018-19	2019-20	2018-19
NEEPCO	1200	4877	4603	3051.71	3120.56	-37.43	-32.21
SUB-TOTAL	15346.70	56617	56176	62628.89	55155.29	10.62	-1.82
PRIVATE SECTOR							
MPCL	86.00	337	344	369.34	320.55	9.89	-6.82
EPPL	100.00	350	360	418.09	349.39	15.49	5.88
ADHPL	192.00	692	700	758.71	582.23	9.73	-10.43
GBHPPL	70.00	250	282	283.58	288.08	13.95	15.23
HBPCL	1300.00	5381	5500	5999.86	5244.27	11.42	-1.85
IA ENERGY	36.00	157.00	0.00	169.75	137.45	7.73	9.96
AHPCL	330.00	1294	1340	1540.01	1375.31	19.09	10.02
JPPVL	400.00	1750	1800	1998.71	1932.02	14.21	13.65
DLHP	34.00	36	37	17.09	56.44	-24.75	56.78
GIPL	110.00	500	495	472.06	417.40	-5.47	4.35
TPCL	447.00	1441	1450	1488.27	1568.18	5.02	20.63
DEPL	96.00	437	459	406.9	409.75	-6.12	5.06
SEPL	97.00	435	400	434.91	423.73	1.92	41.24
SNEHA KINETIC	96.00	450	0	485.19	462.24	7.55	54.08
NTPGPL	0	0	200	0.00	0.00	0	0.00
SUB-TOTAL	3394	13510	13367	14842.47	13567.03	9.86	6.68
STATE SECTOR							
JKSPDC	1110.00	4815	344	5321.2	5044.36	9.61	8.04
HPPCL	295.00	716.00	330	527.42	527.05	-25.93	22.57
HPSEB LTD.	372.00	1760	650	1812.13	1649.29	16.42	7.80
BVPC	0.00	200.00	250	0.00	0.00	-100	-100.00
RRVUNL	411.00	610	5343	606.18	698.40	0.55	30.54
PSPCL	1051.00	3765	125.00	4452.2	3598.82	18.24	-2.47
UPJVNL	501.60	1100	1250	1073.48	1176.36	-0.38	5.50
UJVNL	1252.15	4196	1700	4887.52	4478.76	16.46	9.10
SSNNL	1450.00	1300	36	4177.01	594.84	221.54	-73.68
GSECL	540.00	677	400	1237.67	447.97	84.7	-38.63
MSPGCL	2406.00	3881	1300	4157.94	3320.63	5.97	-1.20
MPPGCL	875.00	2315	390.00	2333.42	1607.45	1.49	-29.50
CSPGCL	120.00	250	300.00	236.79	243.08	-5.18	8.04
APGENCO	1796.75	3162	300.00	3908.14	3038.37	29.42	-2.27
TSGENCO	2405.60	3041	200	4507.04	1744.61	48.27	-34.54
KPCL	3572.20	11497	12718	13789.13	12015.94	20.19	25.30

Utilities	Installed Capacity (MW) (As on 31.03.2020)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2019-20	2018-19	2019-20	2018-19	2019-20	2018-19
KSEBL	1856.50	6034	5490	5454.04	7320.21	-9.54	33.34
TANGEDCO	2178.20	3890	3570	4765.24	5281.59	22.68	47.94
JUUNL	130.00	110	110	36.12	101.19	-67.16	-8.01
OHPC	2027.50	5570	5140	6059.20	6183.77	9.51	20.31
TUL	1200.00	5213	4000	6041.55	4258.40	15.9	6.46
WBSEDCL	986.00	1528	1250	1511.75	1537.94	-2.18	23.04
APGCL	100.00	390	300	384.30	372.72	-1.51	24.24
MePGCL	322.00	985	932	1018.29	929.53	3.97	-0.26
SUB-TOTAL	26958.50	66805	61106	78297.58	66171.28	16.73	8.29
ALL-INDIA	45699.2	136932	130000	155769.12	134893.61	13.7	3.76

During the year 2019-20, overall hydro generation was more than the target in respect of BBMB, NHPC, SJVNL, NTPC, THDC & NHDC in Central Sector and MPCL, EPPL, ADHPL, GBHPPL, HBPC, IAEPL, AHPCL, JPPVL, TPCL, SEPL and SNEHA KINETIC in Private Sector. As regards, generation by State Electricity Boards/Corporations / Departments, hydro generation was more than the target in respect of JKSPDCL, HPSEBL, RRVNL, PSPCL, UJVNL, SSNNL, GSECL, MSPGCL, MPPGCL, APGENCO, TSGENCO, KPCL, TANGEDCO, OHPC, TUL and MePGCL.

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

Sector-wise and Region-wise generation performance of H.E. Stations during 2019-20 is given in **Table S-3 & S-4**. It is seen that there was excess generation as compared to target in all the Sectors i.e. Central Sector, State Sector & Private Sector.

TABLE S-3

SECTOR-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS (2019-20 VIS-A-VIS 2018-19)

Sl. No.	Sector	Installed Capacity as on 31.03.2020 (MW)	Generation		
			Target (MU)	Actual (MU)	Shortfall (-) Surplus (+) Over Target (%)
1	Central	15346.70	56617	62628.89	10.62
2	State	26958.50	66805	78297.76	17.20
3	Private	3394.00	13510	14842.47	9.86
	Total	45699.20	136932	155769.1	13.76

TABLE S-4

**REGION-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS
(2019-20 VIS-A-VIS 2018-19)**

S. No.	Region	Installed Capacity as on 31.03.2020 (MW)	Generation During 2019-2020		
			Target (MU)	Actual (MU)	Shortfall (-)/ Surplus (+) Over Target (%)
1	Northern	19023.27	71513	80556.95	11.22
2	Western	7392.00	12200	17813.79	46.01
3	Southern	11694.50	27124	31754.02	17.06
4	Eastern	5862.45	19243	20823.47	8.21
5	North-Eastern	1727.00	6852	4820.89	-29.64
	Total (All India)	45699.2	136932	155769.1	13.75

3.0 Outage Analysis

For outage data analysis during 2019-20, outage data of 205 H.E. Stations (above 25 MW capacity) covering 712 units and having an aggregate installed capacity of 45699.20 MW made available by various utilities have been considered for the purpose of this Review. Region-wise details of these 205 hydro power stations are given below in **Table S-5**.

TABLE S-5

**REGION-WISE SUMMARY OF HE STATIONS ANALYSED
(2019-20 VIS-A-VIS 2018-19)**

Region	No. of Stations		No. of Units		Capacity(MW) as on	
	31.03.20	31.03.19	31.03.20	31.03.19	31.03.20	31.03.19
Northern	71	71	245	245	19023.25	19023.27
Western	28	28	101	101	7392.00	7392.00
Southern	69	69	246	246	11694.50	11694.50
Eastern	23	23	84	84	5862.45	5862.45
North Eastern	14	13	36	34	1727.00	1427.00
All India	205	204	712	710	45699.20	45399.22

3.1 Planned Maintenance

The number of H.E. Stations falling under various ranges of non-availability due to planned maintenance during the year 2019-20 vis-a-vis 2018-19 is summarized below in **Table S-6**.

TABLE S-6

**NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2019-20 VIS-A-VIS 2018-19)**

% Non-Availability due to planned maintenance	2019-20				2018-19			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	157	76.59	33471.32	73.24	162	79.41	38144.72	83.47
>5 to 10	28	13.66	7615.20	16.66	28	13.73	4118.60	9.01
>10 to 15	8	3.90	2015.00	4.41	5	2.45	987.00	2.16
>15 to 20	4	1.95	1006.00	2.20	5	2.45	1654.20	3.62
>20 to 25	1	0.49	32.00	0.07	0	0.00		
>25 to 30	3	1.46	685.50	1.50	2	0.98	301.50	0.66
above 30	4	1.95	874.20	1.91	2	0.98	193.20	0.42
Total	205	100.00	45699.20	100.00	204	100.00	45399.20	100

It could be seen from above that 157 nos. (76.59% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2019-20 as compared to 162 nos. (79.41% of total) during 2018-19.

Non-availability due to planned maintenance was more than 30% at 4 nos. (1.95% of total) H.E. Stations during 2019-20 and which is similar to 2018-19. The details of these stations for 2018-19 is given below in **Table S-7**.

TABLE S-7

**H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE
FOR THE PERIOD: (2019-20)**

Sl. No	Name of Station/Utility	Capacity (MW)	N.A. due to P.M.* (%)	Reasons
1	BAIRA SIUL HPS / NHPC	180.0	42.069	RENOVATION/MODERNISATION
2	JOG HPS / KPCL	139.2	43.255	RENOVATION/MODERNISATION
3	PYKARA ULTMATE HPS / TANGEDCO	150.0	33.333	ANNUAL MAINTENANCE
4	RANGANADI HPS / NEEPCO.	405.0	30.688	ANNUAL MAINTENANCE

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

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: (2019-20)**

S.NO	Type of Maintenance	No. of Units	Duration (Hours)	
			Max. for any unit	Average
1	ANNUAL MAINTENANCE	57	8784.00	757.42
2	AUXILIARY SYSTEM	8	780.20	463.51
3	B.F.VALVE	11	336.30	62.03
4	CAPITAL/3 YEARLY MTCE.	155	2672.07	560.37
5	FIREBAY/RESERVOIR	3	82.50	33.72
6	GENERATOR	32	1704.50	218.01
7	GENERATOR TRANSFORMER	1	3260.10	3260.10
8	HALF YEARLY MAINTENANCE	2	144.20	124.72
9	MISCELLANEOUS	19	557.45	82.00
10	MONTHLY MAINTENANCE	24	15.75	16.31
11	OTHER EQUIPMENT	3	271.65	131.18
12	PLANNED MAINTENANCE	68	8784.00	346.82
13	PRESSURE SHAFT/PENSTOCK	1	177.00	177.00
14	RENOVATION/MODERNISATION	15	8784.00	5159.39
15	ROUTINE MAINTENANCE	6	17.00	10.07
16	STATOR	2	333.62	193.93
17	SURGE SHAFT	2	1264.83	966.03

18	SWITCHING EQUIPMENT	16	205.58	28.52
19	TRI/TRC/DRAFT TUBE	8	148.17	28.37
20	TURBINE	20	1042.50	96.83
21	TURBINE MISC/GOVERNOR	33	689.38	99.85

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 2019-20 vis-à-vis 2018-19 is given below in **Table S-9**.

TABLE S-9
DURATION OF PLANNED MAINTENANCE FOR GENERATOR,
TURBINE & OTHER EQUIPMENTS
(2019-20 VIS-A-VIS 2018-19)

S. No.	Equipments	Duration			
		Maximum Hours for any unit		Average Hours	
		2019-20	2018-19	2019-20	2018-19
1	Generator	1704.50	1485.03	218.01	151.90
2	Turbine	1042.50	1908.83	96.83	116.24
3	Other Equipment	271.65	1485.03	131.8	115.84

It could be seen that the average hours utilized for carrying out various repairs decreased for generator and civil structure during 2018-19 as compared to 2017-18 while they have increased for turbine and other equipment. However, there has been overall reduction in forced outages.

3.2 Forced Outages

The summary of forced outages caused due to break-down of generator, turbine and other equipment during 2019-20 vis-a-vis 2018-19 is given below in **Table S-10**.

TABLE S-10
FORCED OUTAGES DUE TO GENERATOR, TURBINE & OTHER
EQUIPMENT FAULTS
(2019-20 VIS-A-VIS 2018-19)

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage	
		2019-20	2018-19	During 2019-20	Increase/ Decrease vis-à-vis 2018-19
1	Generator	32491.50	55919.20	32.27	-41.90
2	Turbine	39167.28	22461.68	38.90	74.37
3	Civil Structure	12742.57	15959.78	12.66	-20.16
4	Other Equipment	16290.07	6330.54	16.18	157.33
	Total	100691.42	100671.21	100.00	0.02

It is observed that forced outages in 2019-20 vis-à-vis 2018-19 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 2019-20 is summarized below in **Table S-11**.

TABLE S-11
OPERATING AVAILABILITY OF H.E. STATIONS
PERIOD: 2019-20

OPERATING AVAILABILITY (%)	NO. OF STATIONS	% OF TOTAL STATIONS	INSTALLED CAPACITY (MW)	% OF TOTAL INSTALLED CAPACITY
≥95%	130	63.41	27797.37	60.83
>90 to 95	34	16.59	9150.95	20.02
>85 to 90	14	6.83	3439.20	7.53
>80 to 85	8	3.90	2236.00	4.89
< 80	19	9.27	3075.70	6.73
Total	205	100	45699.22	100

Operating availability of 43 nos. HE stations (20.97% of total HE Stations) was below 85% (8750.90 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 2019-20 is indicated below in **Table S-12**.

TABLE S-12
AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2019-20

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AVAILABILITY
1	Northern	245	19023.27	4.12	0.62	95.26
2	Western	101	7392.00	2.64	0.84	96.53
3	Southern	246	11694.50	3.86	2.60	93.54
4	Eastern	84	5862.45	6.30	2.60	91.09
5	North Eastern	36	1727.00	4.89	7.75	87.35
	All India	712	45699.22	4.12	1.91	93.97

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

- Generating units installed in Eastern Region accounted for maximum non-availability due to planned maintenance (6.30%) whereas generating units installed in Western Region accounted for the least non-availability due to planned maintenance (2.64%) 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)	VARIATION (%)	Nos.	CAP (MW)	%	%	%
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 31.03.2020, H.E. Schemes having total installed capacity of 40913.6 MW (28.15%) excluding pumped storage stations of capacity of 4785.60 MW have already been developed and the schemes under construction account for capacity of 11393.5 MW (7.84%), (excluding PSS of 1205 MW). As such, about 64.01% 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 31.03.2020)

Region/ State	Identified Capacity as per reassessment study (MW)		Capacity Developed		Capacity Under construction		Capacity yet to be developed	
	Total (MW)	Above 25 MW	(MW)	(%)	(MW)	(%)	(MW)	(%)
NORTHERN								
Jammu & Kashmir	14146	13543	3449.0	25.47	2559.5	22.26	5577.5	48.51
Ladhak	2377	2046	89	4.35	0	0	0	0
Himachal Pradesh	18820	18540	9809.0	52.91	2125	11.46	6606	35.63
Punjab	971	971	1096.3	100	206.0	21.22	0.0	0.00
Haryana	64	64	0.0	0	0.0	0.00	0.0	0.00
Rajasthan	496	483	411.0	85.09	0.0	0.00	0.0	0.00
Uttarakhand	18175	17998	3756.4	20.87	1490.0	8.28	12751.7	70.85
Uttar Pradesh	723	664	501.6	75.54	0.0	0.00	162.4	24.46
Sub Total(NR)	53395	52263	19023.3	36.40	6380.5	12.21	26859.2	51.39
WESTERN								
Madhya Pradesh	2243	1970	2235.0	100	400.0	20.30	0.0	0.00
Chhattisgarh	2242	2202	120.0	5.45	0.0	0.00	2082.0	94.55
Gujarat	619	590	550.0	100	0.0	0.00	0.0	0.00
Maharashtra	3769	3314	2647.0	79.87	0.0	0.00	667.0	20.13

Region/ State	Identified Capacity as per reassessment study (MW)		Capacity Developed		Capacity Under construction		Capacity yet to be developed	
	Total (MW)	Above 25 MW	(MW)	(%)	(MW)	(%)	(MW)	(%)
Goa	55	55	0.0	0.00	0.0	0.00	55.0	100.00
Sub Total (WR)	8928	8131	5552.0	68.28	400.0	4.92	2179.0	26.80
SOUTHERN								
Andhra Pradesh	2366	2341	1610.0	68.77	960.0	41.01	0.0	0.00
Telangana	2058	2019	800.0	39.62	0.0	0.00	1219.0	60.38
Karnataka	6602	6459	3644.2	56.42	0.0	0.00	2814.8	43.58
Kerala	3514	3378	1856.5	54.96	100.0	2.96	1421.5	42.08
Tamil Nadu	1918	1693	1778.2	100	0.0	0.00	0.0	0.00
Sub Total (SR)	16458	15890	9688.9	60.97	1060.0	6.67	5141.1	32.35
EASTERN								
Jharkhand	753	582	170.0	29.21	0.0	0.00	412.0	70.79
Bihar	70	40	0.0	0.00	0.0	0.00	0.0	0.00
Odisha	2999	2981	2142.3	71.86	0.0	0.00	838.8	28.14
West Bengal	2841	2829	441.2	15.60	120.0	4.24	2267.8	80.16
Sikkim	4286	4248	2169.0	51.06	1133.0	26.67	946.0	22.27
Sub Total (ER)	10949	10680	4922.5	46.09	1253.0	11.73	4504.6	42.18
NORTH EASTERN								
Meghalaya	2394	2298	322.0	14.01	0.0	0.00	1976.0	85.99
Tripura	15	0	0.0	0.00	0.0	0.00	0.0	0.00
Manipur	1784	1761	105.0	5.96	0.0	0.00	1656.0	94.04
Assam	680	65	350.0	53.85	0.0	0.00	300.0	46.15
Nagaland	1574	1452	75.0	5.17	0.0	0.00	1377.0	94.83
Arunachal Pradesh	50328	50064	815	1.63	2300.0	4.59	46949.0	93.78
Mizoram	2196	2131	60.0	2.82	0.0	0.00	2071.0	97.18
Sub Total (NER)	58971	58356	1727	2.96	2300.0	4.46	54329.0	93.10
ALL INDIA	148701	145320	40913.6	28.1	11393.5	7.84	93876.9	64.01

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

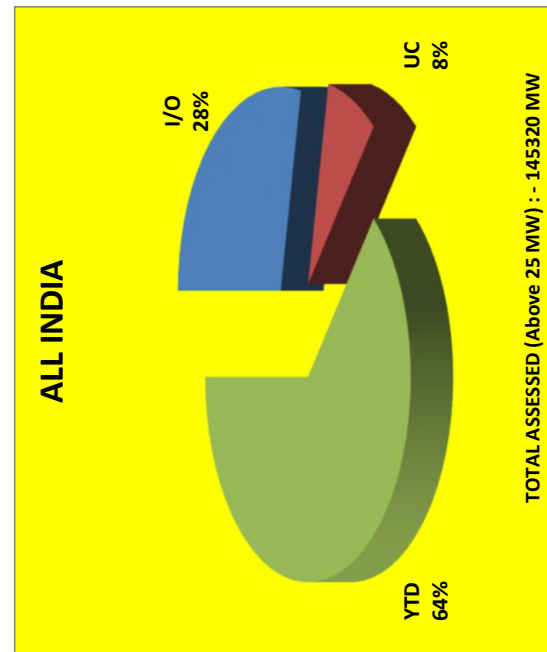
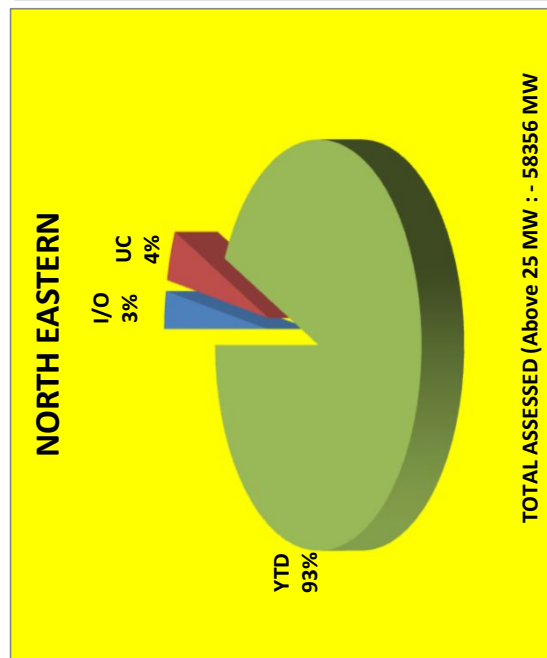
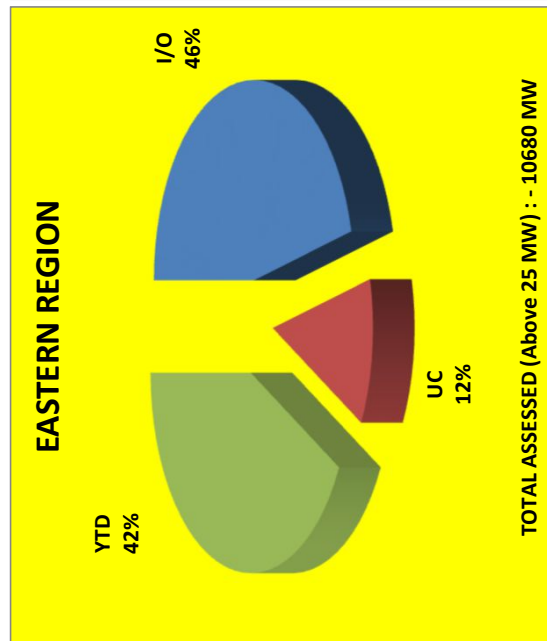
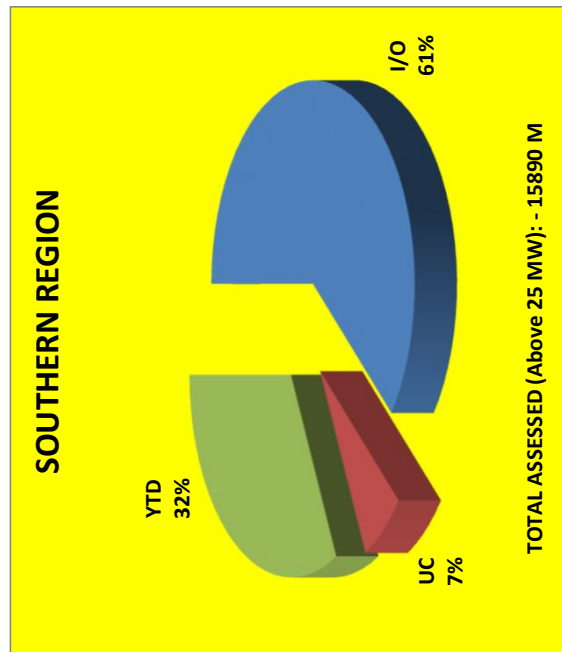
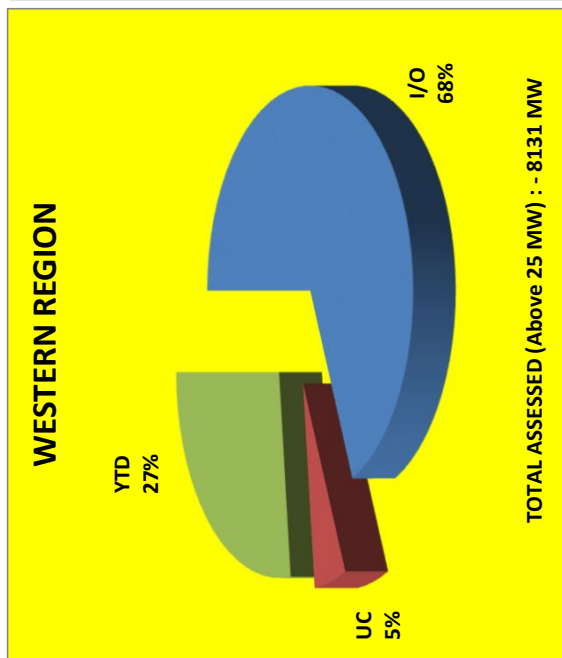
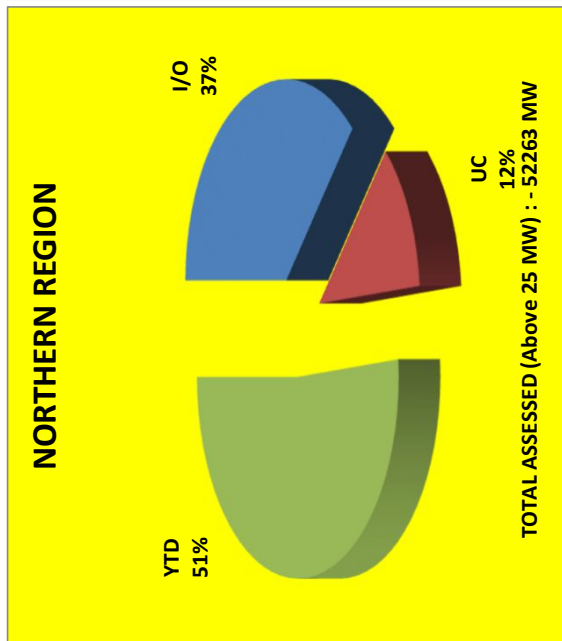
REGION-WISE STATUS OF HYDRO-ELECTRIC CAPACITY AS ON 31.03.2020

EXHIBIT 1.1

YTD= Yet to be Developed

UC=Under Construction

I/O=In Operation



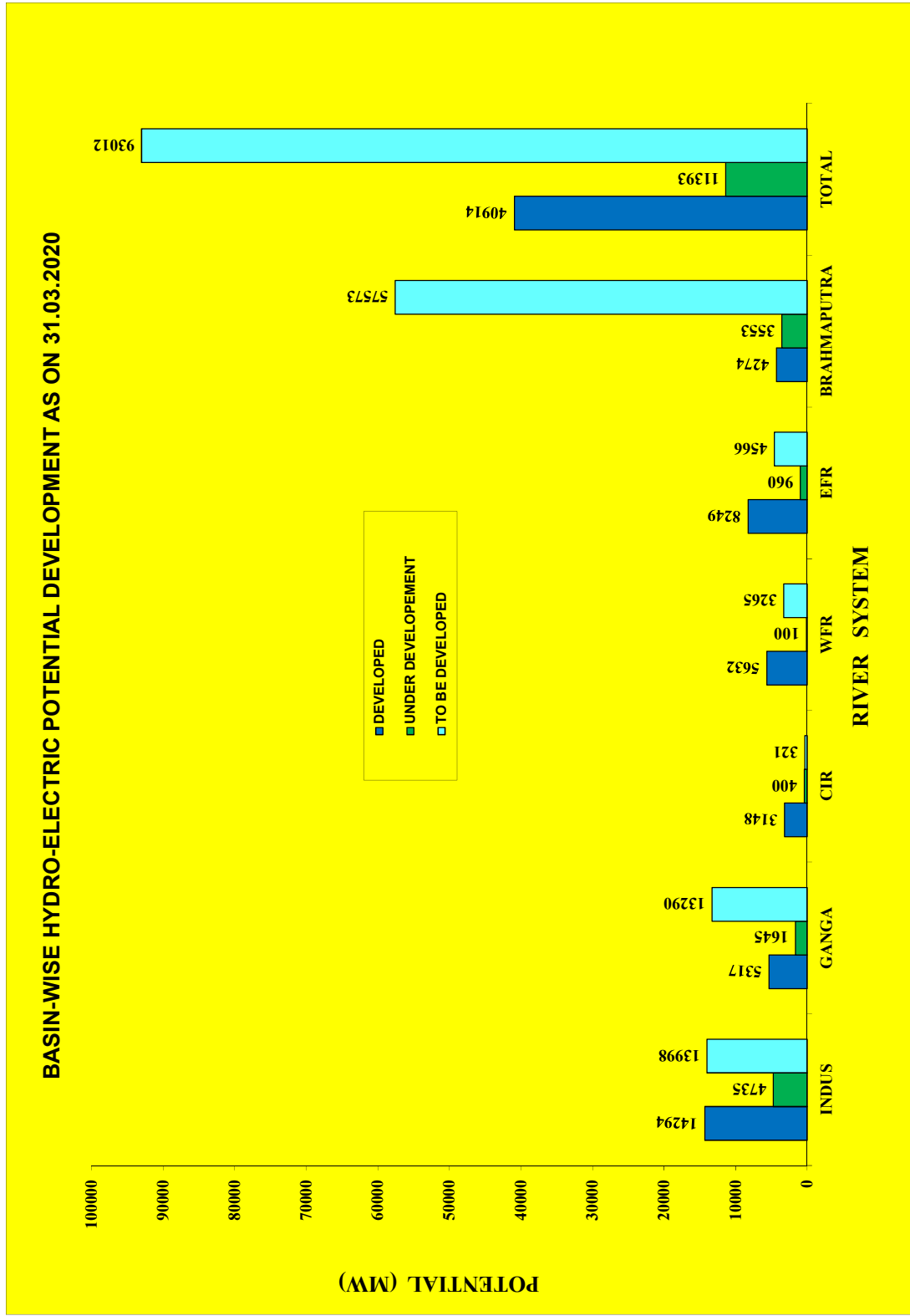


TABLE 1.2

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

(In terms of Installed Capacity-above 25 MW as on 31.03.2020)

River Basin	Identified Capacity as per Reassessment Study (MW)		Capacity Developed		Capacity Under Construction		Capacity Yet to be Developed	
	Total	Above 25	(MW)	(%)	(MW)	(%)	(MW)	(%)
Indus	33832	33028	14294.3	43.28	4735.5	14.34	13998.2	42.38
Ganga	20711	20252	5317.2	26.26	1645	8.12	13289.6	65.62
Central Indian River System	4152	3868	3147.5	81.37	400.0	10.34	320.5	8.29
West Flowing Rivers System	9430	8997	5631.7	62.60	100.0	1.11	3265.3	36.29
East Flowing Rivers System	14511	13775	8249.0	59.88	960	6.97	4566.1	33.15
Brahmaputra	66065	65400	4274	6.54	3553	5.43	57573.0	88.03
Total	148701	145320	40913.6	28.15	11393.5	7.84	93012.9	64.01

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

1.2 Growth of Installed Capacity

A small Hydro-Electric Plant (130 KW) established near Darjeeling in 1897 ushered the beginning of hydro-electric power development in the country. Since then, development of hydro-electric power in the country has made rapid strides. The hydel installed capacity which was only 508 MW in 1947 with 12 H.E. Stations, 51 units and the maximum unit size of 22 MW at Bhira H.E. station under Tata, has risen to 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 155.7 BU in 2019-20. Hydro generation during 2019-20 was about 20.9 BU (i.e. 15.48%) more than the generation of 134.8 BU during 2018-19.

1.3 Share of Hydro-electric Installed Capacity & Generation

The installed capacity of Hydro-Electric Stations viz-à-viz total capacity, the contribution in generation by hydro-electric plants and trend of hydro capacity & generation over the years are indicated in **Table-1.3** and at **Exhibits 1.3, 1.4 and 1.5**. From **Table 1.3**, it may be observed that the overall share of hydro in terms of installed capacity in the country rose from 37.3% at the end of 1947 to 50.6% during 1962-63. However, thereafter, the share of hydro progressively declined and is presently 12.35% at the end of 2019-20. The generation from hydro stations during the year 2019-20 accounted for 12.51% of the total energy generation in the country.

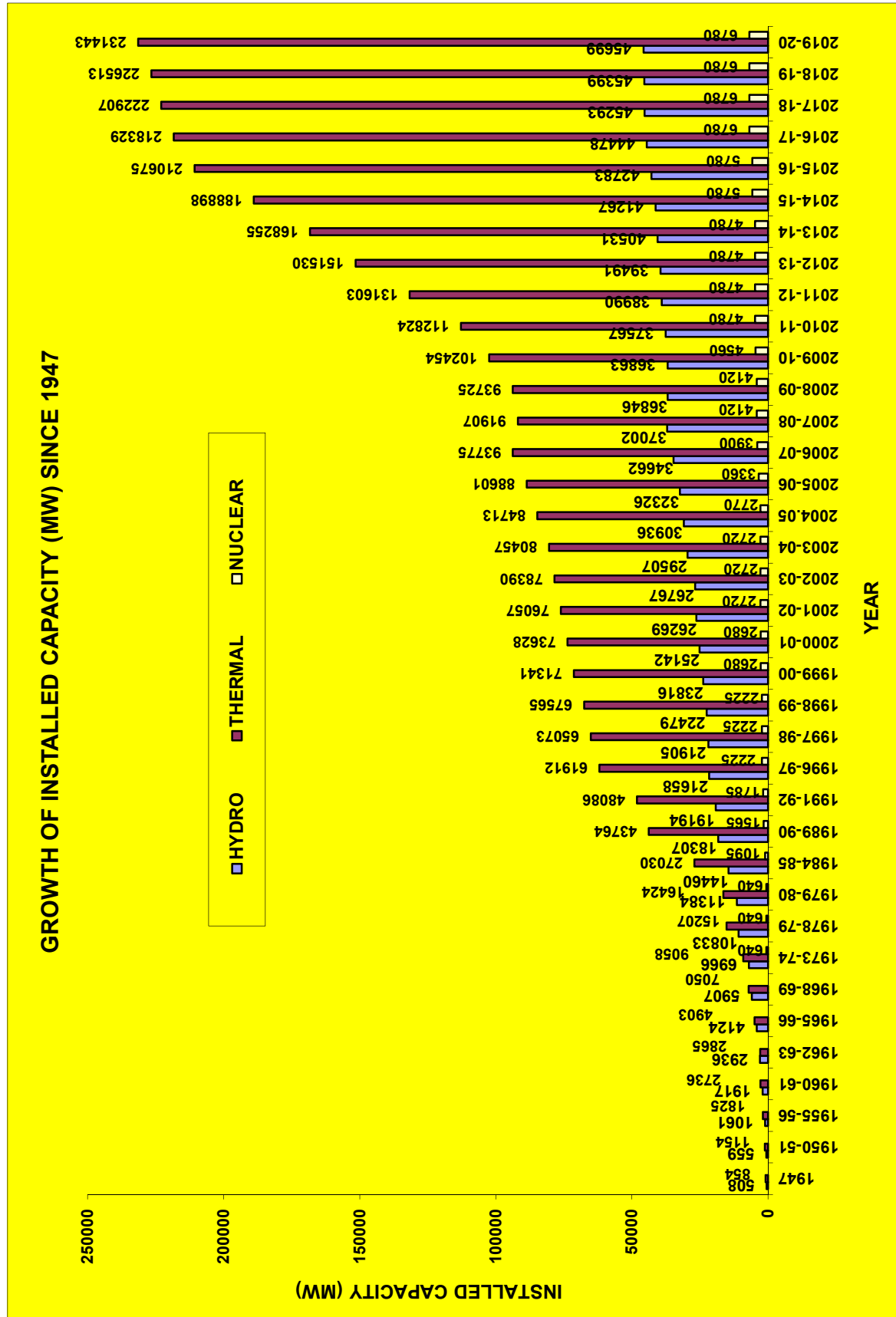
TABLE 1.3

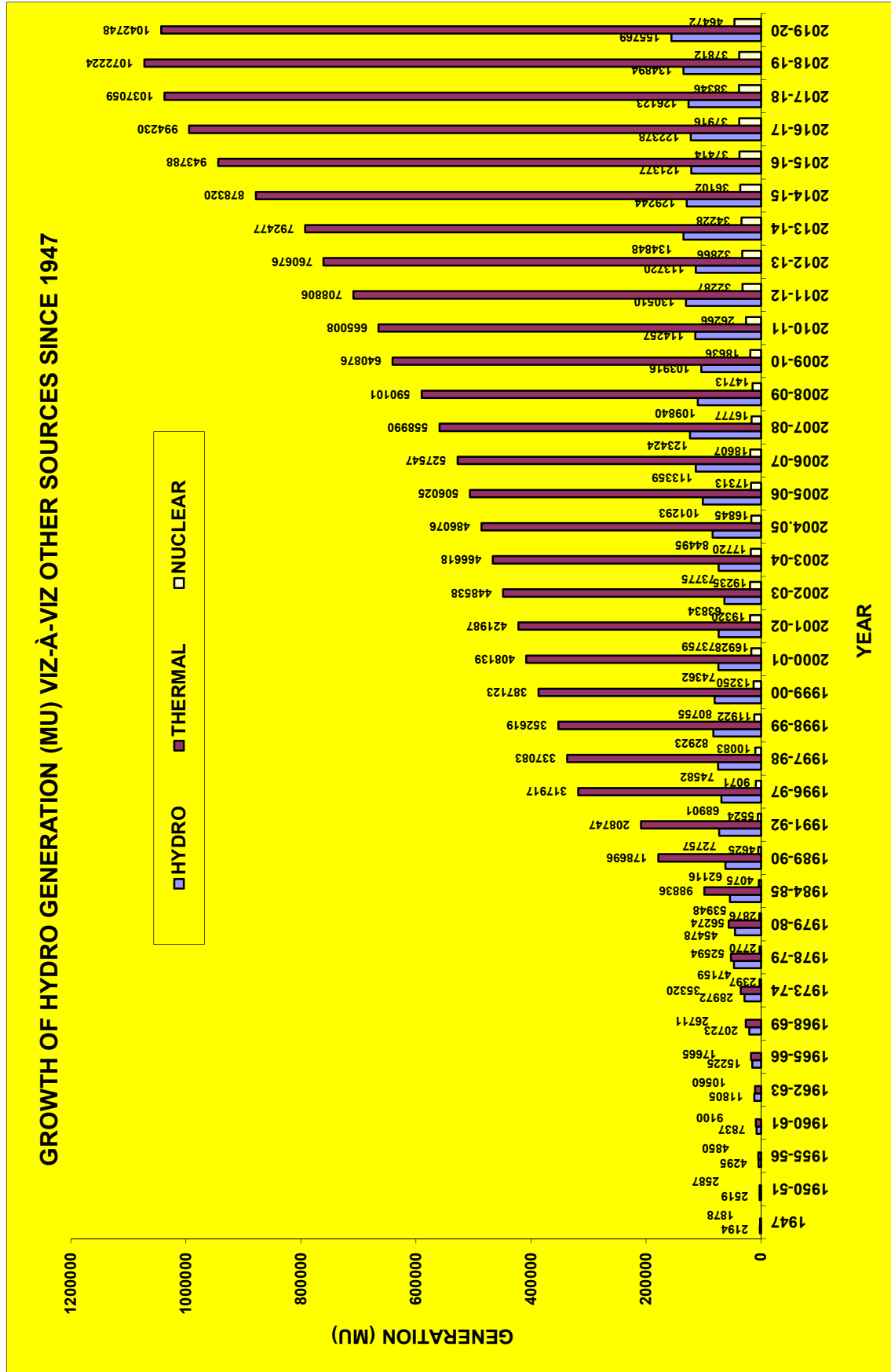
**HYDRO-ELECTRIC CAPACITY & GENERATION
VIS-À-VIS TOTAL CAPACITY & GENERATION**

Year	Installed Capacity			Generation		
	Total (MW)	Hydro (MW)	Hydro as % of Total	Total (MU)	Hydro (MU)	Hydro as % of Total
1947	1362	508	37.30	4072	2194	53.88
1950	1713	560	32.63	5106	2519	49.33
1955-56	2886	1061	36.76	9145	4295	46.97
1960-61	4653	1917	41.20	16937	7837	46.27
1962-63	5801	2936	50.61	22365	11805	52.78
1965-66	9027	4124	45.68	32890	15225	46.29
1968-69	12957	5907	45.59	47434	20723	43.69
1973-74	16664	6966	41.80	66689	28972	43.44
1978-79	26680	10833	40.60	102523	47159	46.00
1979-80	28448	11384	40.02	104627	45478	43.47
1984-85	42585	14460	33.96	156859	53948	34.39
1989-90	63636	18307	28.77	245437	62116	25.31
1991-92	69065	19194	27.79	287028	72757	25.35
1996-97	85795	21658	25.24	395889	68901	17.40
1997-98	89203	21904	24.58	421748	74582	17.68
1998-99	92269	22479	24.10	447464	82923	18.53
1999-00	97837	23857	24.37	481128	80755	16.78
2000-01	101450	25153	24.75	499429	74362	14.89
2001-02	105046	26269	25.01	515066	73759	14.32
2002-03	107877	26767	24.81	531607	63834	12.01
2003-04	112684	29507	26.19	558113	73775	13.22
2004-05	118419	30936	26.12	587416	84495	14.38
2005-06	124287	32326	26.01	624631	101293	16.22
2006-07	132321	34662	26.19	659513	113359	17.19
2007-08	143061	37002	25.86	704469	123424	17.52
2008-09*	147917	36846	24.91	714653	109840	15.37
2009-10*	159398	36863	23.13	763429	103916	13.61
2010-11*	173626	37567	21.64	805532	114257	14.18
2011-12*	199877	38990	19.51	871602	130510	14.97
2012-13*	223344	39491	17.68	907262	113720	12.53
2013-14*	243029	40531	16.68	961552	134848	14.02
2014-15*	267637	41267	15.42	1043665	129244	12.38
2015-16*	302088	42783	14.16	1102578	121377	11.01
2016-17*	326849	44478	13.61	1154524	122378	10.60
2017-18*	344002	45293	13.17	1201528	126123	10.50
2018-19*	356100	45399	12.75	1244930	134894	10.84
2019-20*	370106.46	45699.2	12.34	1244989.43	155769.12	12.51

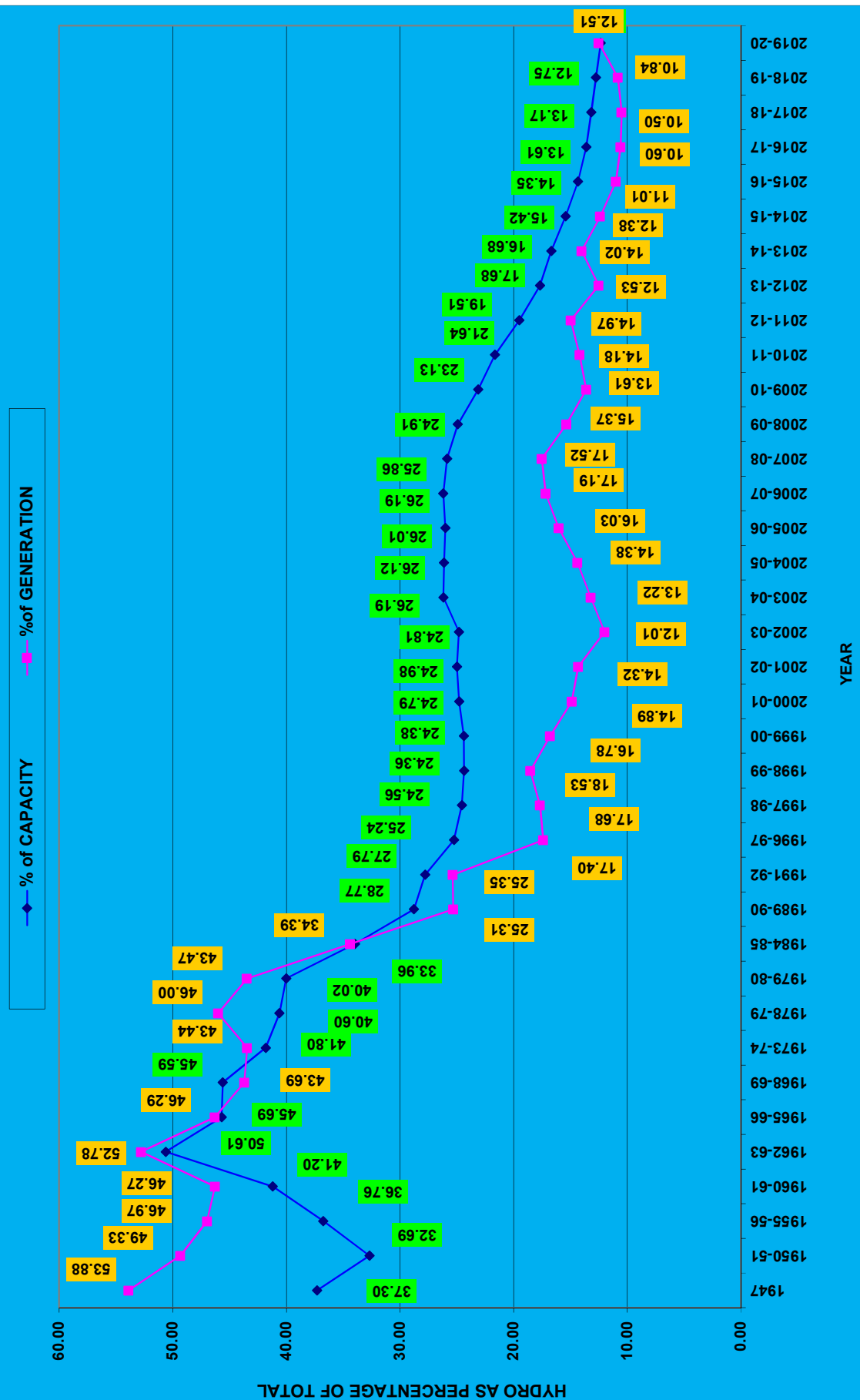
* Capacity above 25 MW only has been considered.

EXHIBIT 1.3





SHARE OF HYDRO CAPACITY AND HYDRO GENERATION SINCE 1947



1.4 Monitored Hydro Installed Capacity

For generation performance, the monitored hydro-electric installed capacity in the country as on 31.03.2020 was 45699.2 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 31.03.2020)

S. No.	Region	No. of Units	Installed Capacity (MW)
1.	Northern	245	19023.25
2.	Western	101	7392.00
3.	Southern	246	11694.50
4.	Eastern	84	5862.45
5.	North-Eastern	36	1727.00
Total		712	45699.20

Capacity-wise grouping of H.E. Stations as on 31.03.2020 is given in **Annex- 1.5**. It is observed that 101 stations with installed capacity above 100 MW constitute more than 85% of the overall hydro capacity.

2 H.E. Generating units having installed capacity of 300 MW were added during the year 2019-20. 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 31.03.2020 was 12.34% and 12.51% 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 33.5%, 7.5% and 59% respectively. Sector-wise distribution of hydro generation (MU) in Central, Private and State sectors was 41%, 9% and 50% respectively. These details are illustrated in **Exhibits 1.8 & 1.9**.

1.5 Hydro Generating Units : Indigenous and imported

As on 31.03.2020, there were 712 hydro generating units in operation at 205 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 42.5% of total capacity for both turbines & generators whereas other domestic suppliers together have a meagre share of about 7% of total capacity.

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

TABLE 1.5

**HYDRO GENERATING UNITS INDIGENOUS/IMPORTED
FROM VARIOUS COUNTRIES AS ON 31-03-2020**

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	304	42.54	19510.02	42.31	302	42.54	19510.02	42.31
Others	49	6.90	3005.50	6.62	48	6.76	3004.00	6.62
Sub Total	353	49.44	22515.52	49.27	350	49.30	22514.02	49.27
B-Imported								
USA	9	1.26	351.00	0.77	26	3.66	219.00	0.48
U.K.	63	8.85	1242.10	2.72	58	8.17	3132.00	6.90
France	31	4.35	2179.20	4.77	15	2.11	543.15	1.20
Canada	44	6.18	3132.00	6.85	44	6.20	2804.00	6.18
USSR	26	3.65	2804.00	6.14	26	3.66	1726.00	3.80
Switzerland	21	2.95	790.20	1.73	11	1.55	1676.90	3.69
Japan	76	10.67	6398.20	14.00	74	10.42	5822.20	12.82
Other	89	12.50	6287.00	13.76	106	14.93	7261.95	16.00
Sub Total	359	50.42	23183.70	51.73	360	50.70	23185.20	51.07
Total	712	100	45699.2	100	710	100	45699.2	100

EXHIBIT-1.6

CONTRIBUTION OF HYDRO CAPACITY
(AS ON 31.03.2020)

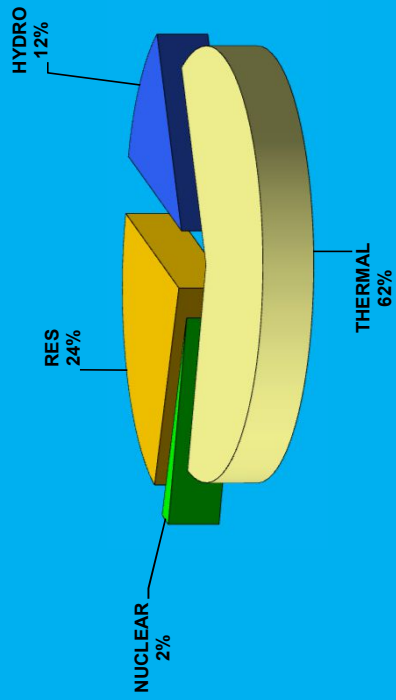


EXHIBIT-1.8

SECTOR-WISE HYDRO CAPACITY
(AS ON 31.03.2020)

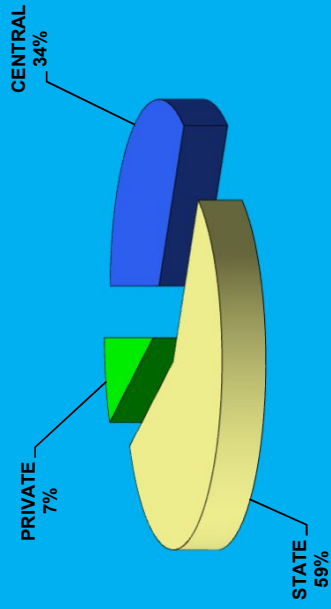


EXHIBIT-1.7

CONTRIBUTION OF HYDRO GENERATION
(DURING 2019-20)

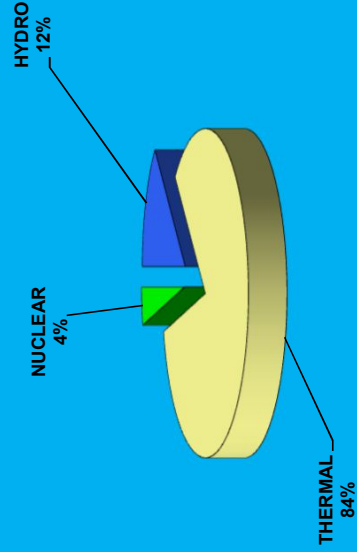
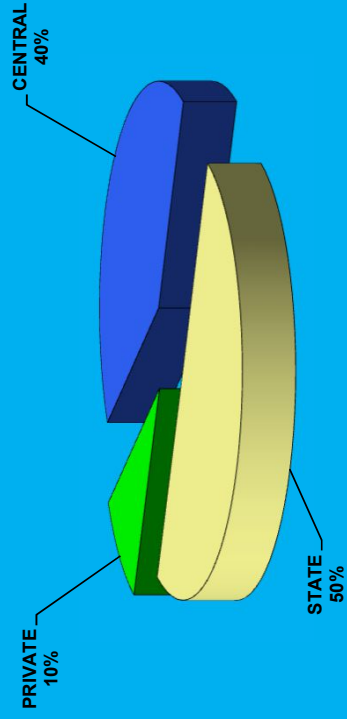


EXHIBIT-1.9

SECTOR-WISE HYDRO GENERATION
(DURING 2019-20)



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

(As on 31.03.2020)

REGION	DESIGN ENERGY (MU)	CONVENTIONAL HE STATIONS			PUMPED STORAGE SCHEMES (PSS)			CONVENTIONAL + PUMPED STORAGE SCHEMES (PSS)		
		NO. OF STATIONS	NO. OF UNITS	INSTALLED CAPACITY (MW)	NO. OF STATIONS	NO. OF UNITS	INSTALLED CAPACITY (MW)	NO. OF STATIONS	TOTAL UNITS	TOTAL INSTALLED CAPACITY (MW)
NORTHERN	74338.26	71	245	19023	0	0	0.00	71	245	19023.25
WESTERN	16607.21	24	88	5552.00	4	13	1840.00	28	101	7392.00
SOUTHERN	33900.85	67	229	9688.90	3	17	2006	70	246	11694.50
EASTERN	19770.86	22	79	4922	2	5	940.00	24	84	5862.45
NORTH EASTERN	9412.73	14	36	1727.00	0	0	0.00	14	36	1727.00
TOTAL	154029.91	198	677	40913.60	9	35	4785.60	205	712	45699.20

NOTE:

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

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

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

SECTOR	NO. OF UTILITIES	NO. OF STATION	NO. OF UNITS	INSTALLED CAPACITY (MW)
CENTRAL	9	42	161	15346.70
STATE	23	145	501	26958.50
PRIVATE	14	18	50	3394.00
TOTAL	46	205	712	45699.20

Categorisation of HE Stations (Installed Capacity)

1. Operation-wise

(As on 31.03.2020)

Sector	RoR		RoR (P)		Storage (S)						Total*	
	No.	MW	No.	MW	S(P)		S(MPP)		PSS		No.	MW
					No.	MW	No.	MW	No.	MW		
Central	8	2115.50	19	6963.00	6	1725.00	9	4503.20	1	40.00	43	15346.70
State	14	781.15	50	7590.00	32	6434.65	43	7557.10	7	4595.60	146	26958.50
Private	1	400.00	13	2547.00	3	297.00	0	0.00	1	150.00	18	3394.00
Total (Nos./MW Capacity)*	23	3296.65	82	17100.00	41	8456.65	52	12060.30	9	4785.60	205	45699.20
% of Total	11.5	7.41	41	38.45	20.5	19.01	26	27.11	4.5	10.76	100	100

2. Power House Construction-wise

Sector	Surface		Underground		Total	
	No.	MW	No.	MW	No.	MW
Central	29	9248.5	13	6098.2	42	15346.7
State	126	17897.5	19	9061	145	26958.5
Private	11	1236	7	2158	18	3394
Total (Nos./MW Capacity)*	166	28382.00	39	17317.20	205	45699.20
% of Total	80.98	62.11	19.02	37.89	100	100

* Total number of HE Stations are 205 as NJ Sagar HE Station (Southern Region) is having one Conventional unit and remaining seven units are PSS. Also, one unit of Panchet HE Station (Eastern Region) is Conventional and other unit is PSS.

Abbreviations:

RoR - Run-of-River type

RoR(P) – Run-of-River with Pondage

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

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

PSS – Pumped Storage Scheme

Annex 1.3

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

(As on 31.03.2020)

Sl. No.	NAME OF THE SECTOR/ UTILITY	NO. OF STATIONS	NO. OF UNITS	INSTALLED CAPACITY	DESIGN ENERGY (MU)
CENTRAL SECTOR					
1	BBMB	6	28	2920.30	9515.00
2	NHPC	20	70	5451.20	24680.34
3	SJVNL	2	12	1912.02	8490.08
4	NTPC	1	4	800.00	3054.79
5	THDC	2	8	1400.00	3952.00
6	NHDC	2	16	1520.00	3146.57
7	DVC	2	5	143.20	260.00
8	NEEPCO	7	18	1200.00	7397.04
	SUB-TOTAL CENTRAL	42	161	15346.72	60495.82
PRIVATE SECTOR					
1	MPCL	1	2	86	370.93
2	EPPL	1	2	100	403.00
3	GBHPPL	1	2	70	291.73
4	ADHPL	1	2	192	678.18
5	HBPCL	2	7	1300	5344.06
6	JPPVL	1	4	400	1774.42
7	AHPC	1	4	330	1396.84
8	IAEPL	1	3	36	157.82
9	TPCL	4	15	447	1220.00
10	GIPL	1	2	110	537.81
11	DEPL	1	2	96	459.02
12	DLHP	1	1	34	50.00

13	SKPPPL	1	2	96	431.00
14	SEPL	1	2	97	425.05
	SUB-TOTAL PRIVATE	18	50	3394.00	13539.86
STATE SECTOR					
1	HPSEBL	4	12	372.00	1691.62
2	HPPCL	2	5	295.00	569.03
3	JKSPDCL	4	12	1110.00	4833.30
4	PSPCL	8	25	1051.00	4207.00
5	RRVUNL	4	11	411.00	1046.00
6	UPJVNL	4	15	501.60	1707.00
7	UJVNL	10	34	1252.15	4848.10
8	GSECL	2	8	540.00	1598.00
9	SSNNL	2	11	1450.00	3848.00
10	MPPGCL	8	23	875.00	2561.64
11	CSPGC	1	3	120.00	245.00
12	MAHAGENCO	8	24	2406.00	3938.00
13	APGENCO	8	34	1796.75	5738.00
14	TSGENCO	7	36	2405.60	5045.85
15	KPCL	14	66	3572.20	12981.00
16	KSEB	14	47	1856.50	6458.00
17	TANGEDCO	27	69	2178.20	4348.00
18	JUUNL	2	2	130.00	149.00
19	OHPC	6	31	2027.50	5676.00
20	WBSEDCL	3	12	986.00	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	145	501	26958.50	79880.23
	TOTAL	205	712	45699.20	153915.91

Annex 1.4

State-wise/Station-wise Installed Capacity of H.E. Stations in the Country
(Above 25 MW Capacity)

As on 31.03.2020

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	(2X108+3X126)	594.00	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 (230 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			2765.00	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			7248.00	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)

SI 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
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)
	Total HPPCL	2	5			295.00	569.03	
	PSPCL							
19	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	7	22			777.00	2845.65	
	Private Sector							
	MPCL							
20	Malana	1	2	R(P)	(2X43)	86.00	370.93	2001 (86 MW)
	Total MPCL	1	2			86.00	370.93	
	GBHPPL							
21	Budhil	1	2	R(P)	(2X35)	70.00	291.73	2012 (70 MW)
	Total GBHPPL	1	2			70.00	291.73	
	EPPL							
22	Malana-II	1	2	R(P)	(2X50)	100.00	403.00	2011 (100 MW)
	Total EPPL	1	2			100.00	403.00	
	IA Energy							
23	Chanju-I	1	3	R(P)	(3X12)	36.00	157.82	2017 (12 MW)
	Total IA Energy	1	3			36.00	157.82	
24	Allain Duhangan	1	2	R(P)	(2X96)	192.00	678.18	2010 (192 MW)
	Total ADHPL	1	2			192.00	678.18	
	HBPCL							
25	Baspa	1	3	R(P)	(3X100)	300.00	1213.00	2003 (300 MW)
26	Karcham Wangtoo	1	4	R(P)	(4X250)	1000.00	4131.06	2011 (1000 MW)
	Total HBPCL	2	7			1300.00	5344.06	
	Total PVT	7	18			1784.00	7245.72	
	Total Himachal Pradesh	26	94			9809.00	36822.20	
	JAMMU & KASHMIR							
	JKSPDC							
27	Baglihar-I	1	3	R(P)	(3X150)	450.00	2643.00	2008 (450 MW)
28	Baglihar-II	1	3	R(P)	(3X150)	450.00	1302.30	2015 (450 MW)
29	Lower Jhelum	1	3	R(P)	(3X35)	105.00	533.00	1978 (35 MW) 1979 (70 MW)
30	Upper Sindh-II	1	3	R(P)	(3X35)	105.00	355.00	2000 (35 MW) 2001 (35 MW) 2002 (35 MW)

SI 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 JKSPDC	4	12			1110.00	4833.30	
	NHPC							
31	Dulhasti	1	3	R(P)	(3X130)	390.00	1907.00	2007 (390 MW)
32	Salal-I&II	1	6	R	(3X115)	690.00	3082.00	1987 (345 MW) 1993 (115 MW) 1994 (115 MW) 1995 (115 MW)
33	Uri-I	1	4	R	(4X120)	480.00	2587.38	1996 (120 MW) 1997 (360 MW)
34	Uri-II	1	4	R	(4X60)	240.00	1124.00	2013 (180 MW)
35	Sewa-II	1	3	R(P)	(3X40)	120.00	533.52	2010 (120 MW)
36	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							
37	Chutak	1	4	R	(4X11)	44.00	213.00	2012 (33 MW) 2013 (11 MW)
38	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							
39	Anandpur Sahib-I	1	2	R	(2X33.5)	67.00	909.00	1985 (67 MW)
40	Anandpur Sahib-I	1	2	R	(2X33.5)	67.00		1985 (67 MW)
41	Mukerian-I	1	3	R	(3X15)	45.00	1206.00	1983 (45 MW)
42	Mukerian-II	1	3	R	(3X15)	45.00		1988 (30 MW) 1989 (15 MW)
43	Mukerian-III	1	3	R	(3X19.5)	58.50		1989 (58.50 MW)
44	Mukerian-IV	1	3	R	(3X19.5)	58.50		1989 (58.50 MW)
45	Ranjit Sagar	1	4	S	(4X150)	600.00	1507.00	2000 (600 MW)
	Total PSPCL	7	20			941.00	3622.00	
	BBMB							
46	Ganguwal	1	3	R	(2X24.2)+(1X29.25)	77.65	1358	1955 (48.4 MW) 1962 (29.25 MW)
47	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							
48	Jawahar Sagar	1	3	R(P)	(3X33)	99.00	298.00	1973 (99 MW)
49	Mahi Bajaj-I	1	2	MP	(2X25)	50.00	780.00	1986 (50 MW)

SI 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
50	Mahi Bajaj-II	1	2	R(P)	(2X45)	90.00	202.00	1989 (90 MW)
51	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							
52	Dhauli Ganga	1	4	R(P)	(4X70)	280.00	1134.69	2005 (280 MW)
53	Tanakpur	1	3	R	(3X31.4)	94.20	452.19	1992 (94.2 MW)
	Sub-Total NHPC	2	7			374.20	1586.88	
	THDC							
54	Tehri St-I	1	4	MP	(4X250)	1000.00	2797.00	2006 (500 MW) 2007 (500 MW)
55	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							
56	Chibro (Yamuna)	1	4	R(P)	(4X60)	240.00	750.00	1975 (180 MW) 1976 (60 MW)
57	Chilla	1	4	R	(4X36)	144.00	725.00	1980 (108 MW) 1981 (36 MW)
58	Dhakrani	1	3	R	(3X11.25)	33.75	169.00	1965 (11.25 MW) 1966 (11.25 MW) 1970 (11.25 MW)
59	Dhalipur	1	3	R	(3X17)	51.00	192.00	1965 (17 MW) 1966 (17 MW) 1970 (17 MW)
60	Khatima	1	3	R	(3X13.8)	41.40	208.00	1955 (13.8 MW) 1956 (27.6 MW)
61	Khodri	1	4	R(P)	(4X30)	120.00	345.00	1984 (120 MW)
62	Kulhal	1	3	R	(3X10)	30.00	164.00	1975 (30 MW)
63	Maneri Bhali-I	1	3	R(P)	(3X30)	90.00	395.00	1984 (90 MW)
64	Maneri Bhali-II	1	4	R(P)	(4X76)	304.00	1566.10	2008 (304 MW)
65	Ramganga	1	3	MP	(3X66)	198.00	334.00	1975 (66 MW) 1976 (66 MW) 1977 (66 MW)
	Total UJVNL	10	34			1252.15	4848.10	
	Private Sector							
	AHPC							
66	Shrinagar	1	4	R(P)	(4X82.50)	330.00	1396.84	2015 (330 MW)
	JPPVL							
67	Vishnu Prayag	1	4	R	(4X100)	400.00	1774.42	2006 (400 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
	Sub Total Private	2	8			730.00	3171.26	
	Total Uttarakhand	16	57			3756.35	13558.24	
	UPJVNL							
	UTTAR PRADESH							
68	Khara	1	3	R(P)	(3X24)	72.00	385.00	1992 (72 MW)
69	Matatila	1	3	MP	(3X10.2)	30.60	123.00	1965 (30.6 MW)
70	Obra	1	3	MP	(3X33)	99.00	279.00	1970 (66 MW) 1971 (33 MW)
71	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	71	245			19023.25	74338.26	
	Western Region							
	MADHYA PRADESH							
	NHDC							
72	Indira Sagar	1	8	MP	(8X125)	1000.00	1980.00	2004 (875 MW) 2005 (125 MW)
73	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							
74	Bansagar Tons-I	1	3	R(P)	(3X105)	315.00	900.00	1991 (105 MW) 1992 (210 MW)
75	Bansagar Tons-III	1	2	R	(2X15)	30.00	113.00	2002 (30 MW)
76	Bansagar Tons-II	1	3	MP	(3X20)	60.00	143.00	2000 (20 MW) 2001 (20 MW) 2002 (20 MW)
77	Bargi	1	2	MP	(2X45)	90.00	508.08	1988 (90 MW)
78	Gandhi Sagar	1	5	MP	(5X23)	115.00	420.48	1960 (69 MW) 1963 (23 MW) 1966 (23 MW)
79	Madhikhera	1	3	MP	(3X20)	60.00	74.12	2006 (40 MW) 2007 (20 MW)
80	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	

SI 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
	MAHARASHTRA							
	MAHAGENCO							
81	Bhira Tail Race	1	2	R(P)	(2X40)	80.00	75.00	1987 (40 MW) 1988 (40 MW)
82	Koyna DPH	1	2	S	(2X18)	36.00	146.00	1980 (18 MW) 1981 (18 MW)
83	Koyna-I&II	1	8	S	(4X70)+(4X80)	600.00	3030.00	1962 (140 MW) 1963 (140 MW) 1966 (240 MW) 1967 (80 MW)
84	Koyna-III	1	4	R(P)	(4X80)	320.00		1975 (160 MW) 1977 (80 MW) 1978 (80 MW)
85	Koyna-IV	1	4	S	(4X250)	1000.00		1999 (500 MW) 2000 (500 MW)
86	Tillari	1	1	R(P)	(1X60)	60.00	133.00	1986 (60 MW)
87	Vaitarna	1	1	S	(1X60)	60.00	144.00	1976 (60 MW)
	Sub-Total MAHAGENCO	7	22			2156.00	3528.00	
	MPPGCL							
88	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)							
89	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							
90	Bhira	1	6	S	(6X25)	150.00	775.00	1927 (125 MW) 1949 (25 MW)
91	Bhivpuri	1	5	S	(3X24) + (2X1.5)	75.00	220.00	1997 (3 MW) 1998 (48 MW) 1999 (24 MW)
92	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	

SI 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 Pvt. (Maharashtra)	4	15			331.00	1270.00	
	Total Maharashtra	12	39			2647.00	5113.36	
	CHHATISGARG							
	CSPGCL							
	State Sector							
93	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							
94	Ukai	1	4	MP	(4X75)	300.00	1080.00	1974 (150 MW)
	Sub-Total GSECL	1	4			300.00	1080.00	
	SSNNL							
95	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							
96	Lower Sileru	1	4	S	(4X115)	460.00	1070.00	1976 (230 MW) 1977 (115 MW) 1978 (115 MW)
97	N J Sagar RBC & EXT.	1	3	MP	(3X30)	90.00	156.00	1990 (30 MW) 1992 (60 MW)
98	Srisaillam	1	7	MP	(7X110)	770.00	2900.00	1982 (220 MW) 1983 (110 MW) 1984 (110 MW) 1986 (220 MW) 1987 (110 MW)
99	Upper Sileru-I&II	1	4	S	(4X60)	240.00	529.00	1994 (60 MW) 1995 (60 MW)
100	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							

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
	State Sector							
101	Priyadarshni Jurala	1	6	R(P)	(6X39)	234.00	404.00	2008 (78 MW) 2009 (39 MW) 2010 (78 MW) 2011 (39 MW)
102	Pochampad	1	4	MP	(4X9)	36.00	147.00	1987-1988, 2010
103	N J Sagar	1	1	MP	(1X110)	110.00		1978 (110 MW)
104	N J Sagar LBC	1	2	R	(2X30)	60.00	104.00	1983 (60 MW)
105	Lower Jurala	1	6	R(P)	(6X40)	240.00	534.43	2015 (80 MW) 2016 (160 MW)
106	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							
107	Almatti	1	6	MP	(5X55)+(1X15)	290.00	483.00	2004 (70 MW) 2005 (220 MW)
108	Gerusoppa(Sharavathy Tail Race)	1	4	R(P)	(4X60)	240.00	622.00	2001 (180 MW) 2002 (60 MW)
109	Ghat Prabha	1	2	MP	(2X16)	32.00	131.00	1992 (32 MW)
110	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)
111	Kadra	1	3	S	(3X50)	150.00	570.00	1997 (50 MW) 1999 (100 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
112	Kalinadi (Nagjhari)	1	6	S	(3X135)+(3X150)	855.00	3385.00	1979 (135 MW) 1980 (135 MW) 1981 (135 MW) 1982 (135 MW) 1983 (135 MW) 1984 (135 MW)
113	Kalinadi (Supa)	1	2	S	(2X50)	100.00	542.00	1985 (100 MW)
114	Kodasali	1	3	S	(3X40)	120.00	512.00	1998 (40 MW) 1999 (80 MW)
115	Lingnamakki	1	2	S	(2X27.5)	55.00	254.00	1979 (27.5 MW) 1980 (27.5 MW)
116	Munirabad	1	3	MP	(2X9)+(1X10)	28.00	66.00	1962 (18 MW) 1965 (10 MW)
117	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)
118	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)~~
119	Varahi	1	4	R(P)	(4X115)	460.00	1060.00	1989 (115 MW) 1990 (115 MW) 2009 (230 MW)
120	Bhadra	1	3	MP	(2x12)+(1x2)	26.00	123.00	1965 (26 MW)
	Total KPCL	14	66			3572.20	12981.00	
	APGENCO							
121	T B Dam	1	4	MP	(4X9)	36.00	236.00	1957 (18 MW) 1964 (18 MW)
122	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			3644.20	13217.00	
	KERALA							
	KSEB							
	State Sector							

SI 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
123	Idamalayar	1	2	MP	(2X37.5)	75.00	380.00	1987 (75 MW)
124	Idukki	1	6	MP	(6X130)	780.00	2398.00	1976 (390 MW) 1985 (130 MW) 1986 (260 MW)
125	Kakkad	1	2	R(P)	(2X25)	50.00	262.00	1999 (50 MW)
126	Kuttiyadi	1	3	MP	(3X25)	75.00	323.00	1972 (75 MW)
127	Kuttiyadi Extn.	1	1	MP	(1X50)	50.00		2001 (50 MW)
128	Kuttiyadi Additional Extn.	1	2	MP	(2X50)	100.00		2010 (100 MW)
129	Lower Periyar	1	3	R(P)	(3X60)	180.00	493.00	1997 (180 MW)
130	Nariamangalam	1	3	S	(3X15)	45.00	237.00	1961 (30 MW) 1963 (15 MW)
131	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)
132	Panniar	1	2	S	(2X15)	30.00	158.00	1963 (15 MW) 2001 (15 MW)
133	Poringalkuttu	1	4	S	(4X8)	32.00	170.00	1957 (8 MW) 1958 (8 MW) 1959 (8 MW) 1960 (8 MW)
134	Sabirigiri	1	6	S	(6X50)	300.00	1338.00	1960 (150 MW) 1967 (150 MW)
135	Sengulam	1	4	S	(4X12)	48.00	182.00	1954 (24 MW) 2001 (24 MW)
136	Sholayar	1	3	S	(3X18)	54.00	233.00	1956 (18 MW) 1968 (36 MW)
	Total KSEB	14	47			1856.50	6458.00	
	Total Kerala	14	47			1856.50	6458.00	
	TAMILNADU							
	TANGEDCO							
137	Aliyar	1	1	MP	(1X60)	60.00	175.00	1970 (60 MW)
138	Bhavani Kattalai Barrage-I	1	2	R(P)	(2X15)	30.00	90.00	2006 (30 MW)
139	Bhavani Kattalai Barrage-II	1	2	R(P)	(2X15)	30.00	100.00	2013 (30 MW)
140	Bhavani Kattalai Barrage-III	1	2	R(P)	(2X15)	30.00	80.00	2012 (15 MW) 2013 (15 MW)
141	Kodayar-I	1	1	MP	(1X60)	60.00	165.00	1970 (60 MW)

SI 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
142	Kodayar-I	1	1	MP	(1X40)	40.00	105.00	1971 (40 MW)
143	Kundah-I	1	3	S	(3X20)	60.00	1387.00	1960 (40 MW) 1964 (20 MW)
144	Kundah-II	1	5	S	(5X35)	175.00		1960 (35 MW) 1961 (105 MW) 1964 (35 MW)
145	Kundah-III	1	3	S	(3X60)	180.00		1965 (120 MW) 1978 (60 MW)
146	Kundah-IV	1	2	S	(2X50)	100.00		1966 (50 MW) 1978 (50 MW)
147	Kundah-V	1	2	S	(2X20)	40.00		1964 (20 MW) 1988 (20 MW)
148	Lower Mettur-I	1	2	R(P)	(2X15)	30.00	252.00	1988 (30 MW)
149	Lower Mettur-II	1	2	R(P)	(2X15)	30.00		1988 (30 MW)
150	Lower Mettur-III	1	2	R(P)	(2X15)	30.00		1987 (15 MW) 1988 (15 MW)
151	Lower Mettur-IV	1	2	R(P)	(2X15)	30.00		1989 (15 MW) 1988 (15 MW)
152	Mettur Dam	1	4	MP	(4X12.5)	50.00	541.00	1937 (25 MW) 1938 (12.5 MW) 1946 (12.5 MW)
153	Mettur Tunnel	1	4	MP	(4X50)	200.00		1965 (50 MW) 1966 (150 MW)
154	Moyar	1	3	S	(3X12)	36.00	115.00	1952 (24 MW) 1953 (12 MW)
155	Papanasam	1	4	MP	(4X8)	32.00	105.00	1944 (16 MW) 1945 (8 MW) 1951 (8 MW)
156	Parson's Valley	1	1	S	(1X30)	30.00	53.00	2000 (30 MW)
157	Periyar	1	4	MP	(3X42)+(1X35)	161.00	409.00	1958 (35 MW) 1959 (70 MW) 1965 (35 MW)
158	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)
159	Pykara Ultimate	1	3	S	(3X50)	150.00	30.00	2005 (150 MW)
160	Sarakarpathy	1	1	R(P)	(1X30)	30.00	162.00	1966 (30 MW)
161	Sholayar-I	1	2	S	(2X35)	70.00	254.00	1971 (70 MW)
162	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	

SI 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 Southern Region	67	229			9688.90	30186.85	
	Eastern Region							
	WEST BENGAL							
	DVC							
163	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							
164	Teesta Low Dam-III	1	4	R(P)	(4X33)	132.00	594.00	2013 (132 MW)
165	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	
	WBSEDCL							
166	Jaldhaka	1	4	R(P)	(4X9)	36.00	165.00	1967 (18 MW) 1972 (9 MW)
167	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							
168	Rangit	1	3	R(P)	(3X20)	60.00	338.61	2000 (60 MW)
169	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.							
170	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.)							
171	Chujachen	1	2	R(P)	(2*55)	110.00	537.81	2013 (110 MW)
	Sneha Kinetic Power Projects Pvt. Ltd.(SKPPPL)							
172	Dikchu	1	2	R(P)	(2*48)	96.00	431.00	2017 (96 MW)
	Shiga Energy Pvt. Ltd.(SEPL)							
173	Tashiding	1	2	R(P)	(2*48.50)	97.00	425.05	2017 (97 MW)
	DANS Energy Pvt. Ltd. (DEPL)							
174	Jorethang Loop	1	2	R(P)	(2*48)	96.00	459.02	2015 (96 MW)
	Sub-Total Private	4	8			399.00	1852.88	
	Total Sikkim	7	20			2169.00	9978.19	
	JAHARKHAND							
175	Panchet	1	1	MP	(1X40)	40.00	237.00	1959 (40 MW)

SI 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
	Sub-Total DVC	1	1			40.00	237.00	
	JUUNL							
176	Subernrekha-I	1	1	MP	(1X65)	65.00	149.00	1977 (65 MW)
177	Subernrekha-II	1	1	R(P)	(1X65)	65.00		1980 (65 MW)
	Total JUUNL	2	2			130.00	149.00	
	Total Jharkhand	3	3			170.00	386.00	
	ODISHA							
	OHPC							
178	Balimela	1	8	MP	(6X60)+(2X75)	510.00	1183.00	1973 (60 MW) 1974 (120 MW) 1975 (60 MW) 1976 (60 MW)
179	Hirakud (Burla)	1	7	MP	(3X37.5)+(2X49.5)+(2X32)	275.50	684.00	1956 (32 MW) 1957 (81.5 MW) 1958 (43.5 MW)
180	Hirakud (Chiplima)	1	3	R(P)	(3X24)	72.00	490.00	1962 (48 MW) 1964 (24 MW)
181	Rengali	1	5	MP	(5X50)	250.00	525.00	1985 (50 MW) 1986 (50 MW) 1989 (50 MW) 1990 (50 MW)
182	Upper Indravati	1	4	MP	(4X150)	600.00	1962.00	1999 (300 MW) 2000 (150 MW) 2001 (150 MW)
183	Upper Kolab	1	4	MP	(4X80)	320.00	832.00	1988 (160 MW) 1990 (80 MW)
	Total OHPC	6	31			2027.50	5676.00	
	APGENCO							
184	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	
	Total Odisha	7	37			2142.25	6346	
	Total Eastern Region	22	79			4922.45	18535.86	
	North Eastern Region							
	ARUNACHAL PRADESH							
	NEEPCO							
185	Ranganadi	1	3	R(P)	(3X135)	405.00	1509.66	2002 (405 MW)
186	Pare	1	2	R (P)	(2X55)	110.00	506.42	2018 (110 MW)
187	Kameng	1	2	R (P)	(2X150)	300.00	3353.00	2020 (300 MW)
	Sub-Total NEEPCO Ar.P	3	7			815.00	5369.08	
	Total Arunachal Pradesh	3	7			815.00	5369.08	
	ASSAM							
	NEEPCO							
188	Kopoli	1	4	S	(4X50)	200.00	1186.14	1988 (100 MW) 1996 (50 MW) 1997 (50 MW)

SI 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
189	Khondong	1	2	S	(2X25)	50.00	363.95	1984 (50 MW)
	Sub-Total NEEPCO Assam	2	6			250.00	1550.09	
	APGCL							
190	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							
191	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							
192	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							
193	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							
194	Kyrdemkulai	1	2	R(P)	(2X30)	60.00	118.00	1979 (60 MW)
195	Umiam St. I	1	4	S	(4X9)	36.00	128.00	1965 (36 MW)
196	New Umetru	1	2	R(P)	(2X20)	40.00	235.00	2017 (20 MW)
197	Umiam St. IV	1	2	R(P)	(2X30)	60.00	324.00	1992 (60 MW)
198	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 Meghalaya	5	13			322.00	1177.69	
	Total NE Region	14	36			1727.00	9412.73	
	Total	198	677			40913.60	144517.91	
	Pumped Storage Schemes							
	Western Region							
	GUJARAT							
	State Sector							
	GSECL							

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
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	Srisailem LBPB	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 MW)
	WEST BENGAL							
	State Sector							

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							
9	Purulia	1	4	PSS	(4X225)	900.00	1235.00	2007
	Sub-Total	1	4			940.00	1235.00	
	Total- PSS	9	35			4785.60	9512.00	
	Total (Conventional+PSS)	207	712			45699.20	154029.91	
	Total TELANGANA	216	747		0.00	50484.80		
	TAMIL NADU							
7	Kadmparai	1	4	(4X100)	400.00	77.00	PSS	1987-88
	Total TAMIL NADU	1	4		400.00	77.00		
	Total SOUTHERN	217	751		400.00	50561.80		
	EASTERN REGION							
	JHARKHAND							
	CENTRAL SECTOR							
8	Panchet	1	1	(1X40)	40.00		PSS	1990
	WEST BENGAL							
	STATE SECTOR							
9	Purulia	1	4	(4X225)	900.00	1235.00	PSS	2007
	Sub-Total	1	4		900.00	1235.00		
	Total- PSS	219	756		1340.00	51796.80		
	Total (CONVENTIONAL+PSS)	219	756		1340.00	51796.80		

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

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

CAPACITY-WISE GROUPING OF HYDRO-ELECTRIC STATIONS**As on 31.03.2020**

STATION CAPACITY	NUMBER OF STATIONS		NUMBER OF UNITS		TOTAL CAPACITY	
RANGE (MW)	No	%	No	%	MW	%
> 25 - 100	104	50.73	273	38.34	5947.15	13.01
>100 - 500	74	36.10	286	40.17	17537.45	38.38
>500 - 1000	23	11.22	125	17.56	17279.60	37.81
>1000	4	1.95	28	3.93	4935.00	10.80
TOTAL	205	100	712	100	45699.2	100

HYDRO GENERATING UNITS ADDED DURING 2019-20

SL. NO.	NAME OF THE STATION	UTILITY	STATE	UNIT NO.	CAPACITY (MW)	DATE OF COMMISSIONING
CENTRAL SECTOR						
1	KAMENG	NEEPCO	ARUNACHAL PRADESH	1	150.00	03.02.2020
				2	150.00	10.02.2020

CHAPTER-2

GENERATION PERFORMANCE

CHAPTER-2

GENERATION PERFORMANCE

2.1 Generation from hydro-electric power stations (above 25 MW capacity) in the country during 2019-20 was 155.7 BU against the target of 136.9 BU which was 13.7% more than the target. The generation during 2019-20 was 15.4% higher than the generation in 2018-19 i.e. 134.9 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: 2019-20

Month	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Target	9539	12983	14178	16389	18622	15687	11419	8242	7363	6971	6925	8614
Gen.	11073	14081	14344	15777	19928	20791	14636	10021	8927	8665	8436	9090
Cum. Tar	9539	22522	36700	53089	71711	87398	98817	107059	114422	121393	128318	136932
Cum. Gen.	11073	25154	39498	55275	75203	95994	110631	120651	129578	138243	146679	155769

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

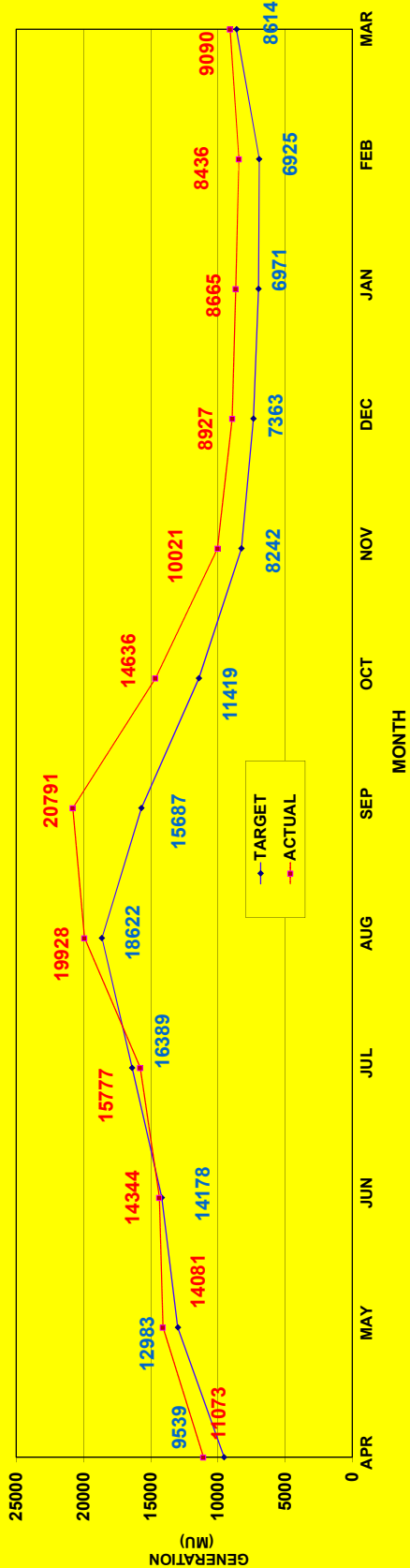
The utility-wise/ sector-wise target of energy generation viz-a-viz actual generation and surplus /shortfall in respect of Hydro-electric stations during 2019-20 & 2018-19 are given below in **Table 2.2**.

TABLE 2.2

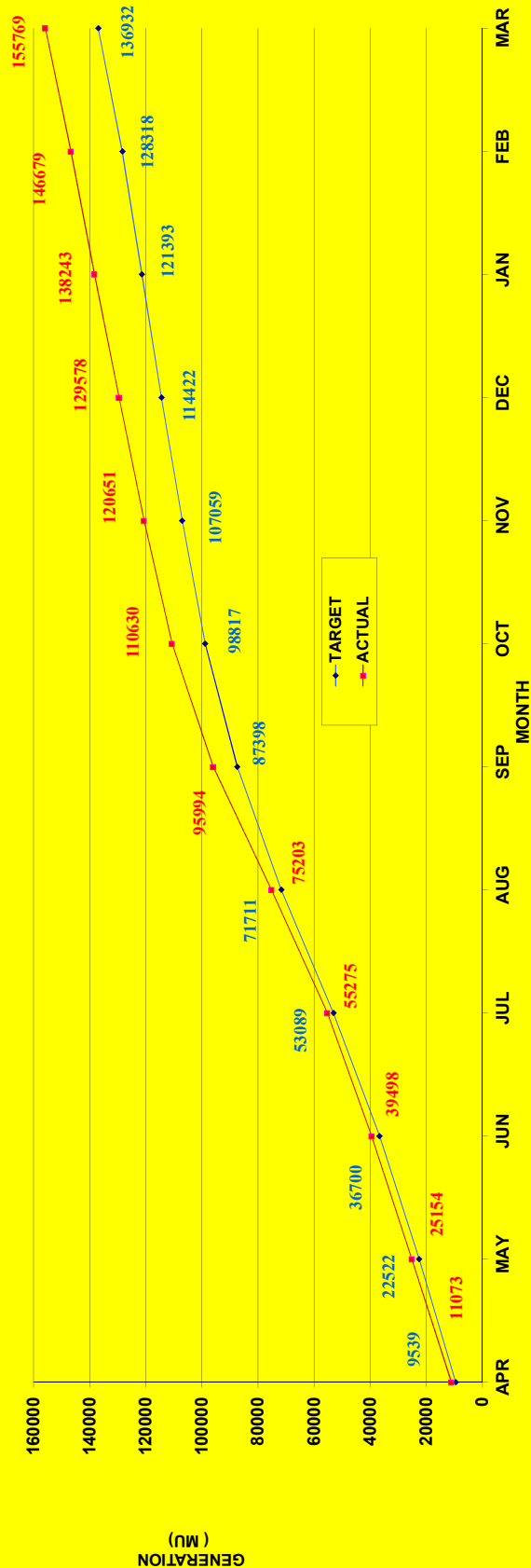
UTILITY-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS (2019-20 VIS-A-VIS 2018-19)

Utilities	Installed Capacity (MW) (As on 31.03.2020)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2019-20	2018-19	2019-20	2018-19	2019-20	2018-19
CENTRAL SECTOR							
BBMB	2920.30	9470	9425	12167.2	10186.02	28.48	8.07
NHPC	5451.20	24050	24055	25779.7	24000.96	7.19	-0.22
SJVNL	1912.02	8550	8490	9571.5	8335.92	11.95	-1.81
NTPC	800.00	3000	3000	3449.67	3013.93	14.99	0.46
THDC	1400.00	4160	3952	4244.93	4395.92	2.04	11.23
NHDC	1520.00	2300	2446	4165.6	1920.83	81.11	-21.47
DVC	143.20	210	205	198.47	181.15	-5.49	-11.63

MONTHLY ALL INDIA HYDRO GENERATION VS TARGETS
DURING 2019-20



ALL INDIA CUMMULATIVE GENERATION VS TARGETS
DURING 2019-20



Utilities	Installed Capacity (MW) (As on 31.03.2020)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2019-20	2018-19	2019-20	2018-19	2019-20	2018-19
NEEPCO	1200	4877	4603	3051.71	3120.56	-37.43	-32.21
SUB-TOTAL	15346.70	56617	56176	62628.89	55155.29	10.62	-1.82
PRIVATE SECTOR							
MPCL	86.00	337	344	369.34	320.55	9.60	-6.82
EPPL	100.00	350	360	418.09	349.39	19.45	5.88
ADHPL	192.00	692	700	758.71	582.23	9.64	-10.43
GBHPPL	70.00	250	282	283.58	288.08	13.43	15.23
HBPCL	1300.00	5381	5500	5999.86	5244.27	11.50	-1.85
IA ENERGY	36.00	157.00	0.00	169.75	137.45	8.12	9.96
AHPCL	330.00	1294	1340	1540.01	1375.31	19.01	10.02
JPPVL	400.00	1750	1800	1998.71	1932.02	14.21	13.65
DLHP	34.00	36	37	17.09	56.44	-52.53	56.78
GIPL	110.00	500	495	472.06	417.40	-5.59	4.35
TPCL	447.00	1441	1450	1488.27	1568.18	3.28	20.63
DEPL	96.00	437	459	406.9	409.75	-6.89	5.06
SEPL	97.00	435	400	434.91	423.73	-0.02	41.24
SNEHA KINETIC	96.00	450	0	485.19	462.24	7.82	54.08
NTPGPL	0	0	200	0.00	0.00	0	0.00
SUB-TOTAL	3394	13510	13367	14842.47	13567.03	9.86	6.68
JKSPDC	1110.00	4815	344	5321.2	5044.36	10.51	8.04
HPPCL	295.00	716.00	330	527.42	527.05	-26.34	22.57
HPSEB LTD.	372.00	1760	650	1812.13	1649.29	16.16	7.80
BVPC	0.00	200.00	250	0.00	0.00	-100	-100.00
RRVUNL	411.00	610	5343	606.18	698.40	-0.63	30.54
PSPCL	1051.00	3765	125.00	4452.2	3598.82	18.25	-2.47
UPJVNL	501.60	1100	1250	1073.48	1176.36	-2.41	5.50
UJVNL	1252.15	4196	1700	4887.52	4478.76	16.48	9.10
SSNNL	1450.00	1300	36	4177.01	594.84	221.31	-73.68
GSECL	540.00	677	400	1237.67	447.97	82.82	-38.63
MSPGCL	2406.00	3881	1300	4157.94	3320.63	7.14	-1.20
MPPGCL	875.00	2315	390.00	2333.42	1607.45	0.80	-29.50
CSPGCL	120.00	250	300.00	236.79	243.08	-5.28	8.04
APGENCO	1796.75	3162	300.00	3908.14	3038.37	23.60	-2.27
TSGENCO	2405.60	3041	200	4507.04	1744.61	48.21	-34.54
KPCL	3572.20	11497	12718	13789.13	12015.94	19.94	25.30

Utilities	Installed Capacity (MW) (As on 31.03.2020)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2019-20	2018-19	2019-20	2018-19	2019-20	2018-19
KSEBL	1856.50	6034	5490	5454.04	7320.21	-9.61	33.34
TANGEDCO	2178.20	3890	3570	4765.24	5281.59	22.50	47.94
JUUNL	130.00	110	110	36.12	101.19	-67.16	-8.01
OHPC	2027.50	5570	5140	6059.20	6183.77	8.78	20.31
TUL	1200.00	5213	4000	6041.55	4258.40	15.89	6.46
WBSEDCL	986.00	1528	1250	1511.75	1537.94	-1.06	23.04
APGCL	100.00	390	300	384.30	372.72	-1.46	24.24
MePGCL	322.00	985	932	1018.29	929.53	3.38	-0.26
SUB-TOTAL	26958.50	66805	61106	78297.58	66171.28	17.20	8.29
ALL-INDIA	45699.2	136932	130000	155769.12	134893.61	13.7	3.76

During the year 2019-20, overall hydro generation was more than the target in respect of BBMB, NHPC, SJVNL, NTPC, THDC & NHDC in Central Sector and MPCL, EPPL, ADHPL, GBHPPL, HBPCL, IAEPL, AHPCL, JPPVL, TPCL 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, PSPCL, UJVNL, SSNNL, GSECL, MSPGCL, MPPGCL, APGENCO, TSGENCO, KPCL, TANGEDCO, OHPC, TUL and MePGCL.

2.4 Region-wise Performance of H.E. Stations

Region-wise generation performance of hydroelectric stations during 2019-20 is indicated in **Table 2.3**.

TABLE 2.3
GENERATION PERFORMANCE – REGION-WISE
(2019-20)

S. No.	Region	Installed Capacity as on 31.03.2020 (MW)	Generation During 2019-2020		
			Target (MU)	Actual (MU)	Shortfall (-)/ Surplus (+) Over Target (%)
1	Northern	19023.27	71513	80556.95	11.22
2	Western	7392.00	12200	17813.79	46.01
3	Southern	11694.50	27124	31754.02	17.06
4	Eastern	5862.45	19243	20823.47	8.21
5	North-Eastern	1727.00	6852	4820.89	-29.64
	Total (All India)	45699.2	136932	155769.1	13.75

Note: - Includes 4785.60 MW of Pumped Storage Scheme.

- Hydel generation during 2019-20 has exceeded the target in Northern, Western, and Southern & Eastern 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 2019-20 was 155769 MU against the target of 136932 MU viz higher in generation by 18837.1 MU (13.7%). However, actual hydel generation during 2019-20 is more than previous year generation of 134.9 BU by 15.4%.

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

2.5 Sector-wise generation performance during the year 2019-20 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: 2019-20

Sl. No.	Sector	Installed Capacity as on 31.03.2020 (MW)	Generation		
			Target (MU)	Actual (MU)	Shortfall (-) Surplus (+) Over Target (%)
1	Central	15346.70	56617	62628.89	9.59
2	State	26958.50	66805	78297.76	17.20
3	Private	3394.00	13510	14842.47	9.86
	Total	45699.20	136932	155769.1	13.76

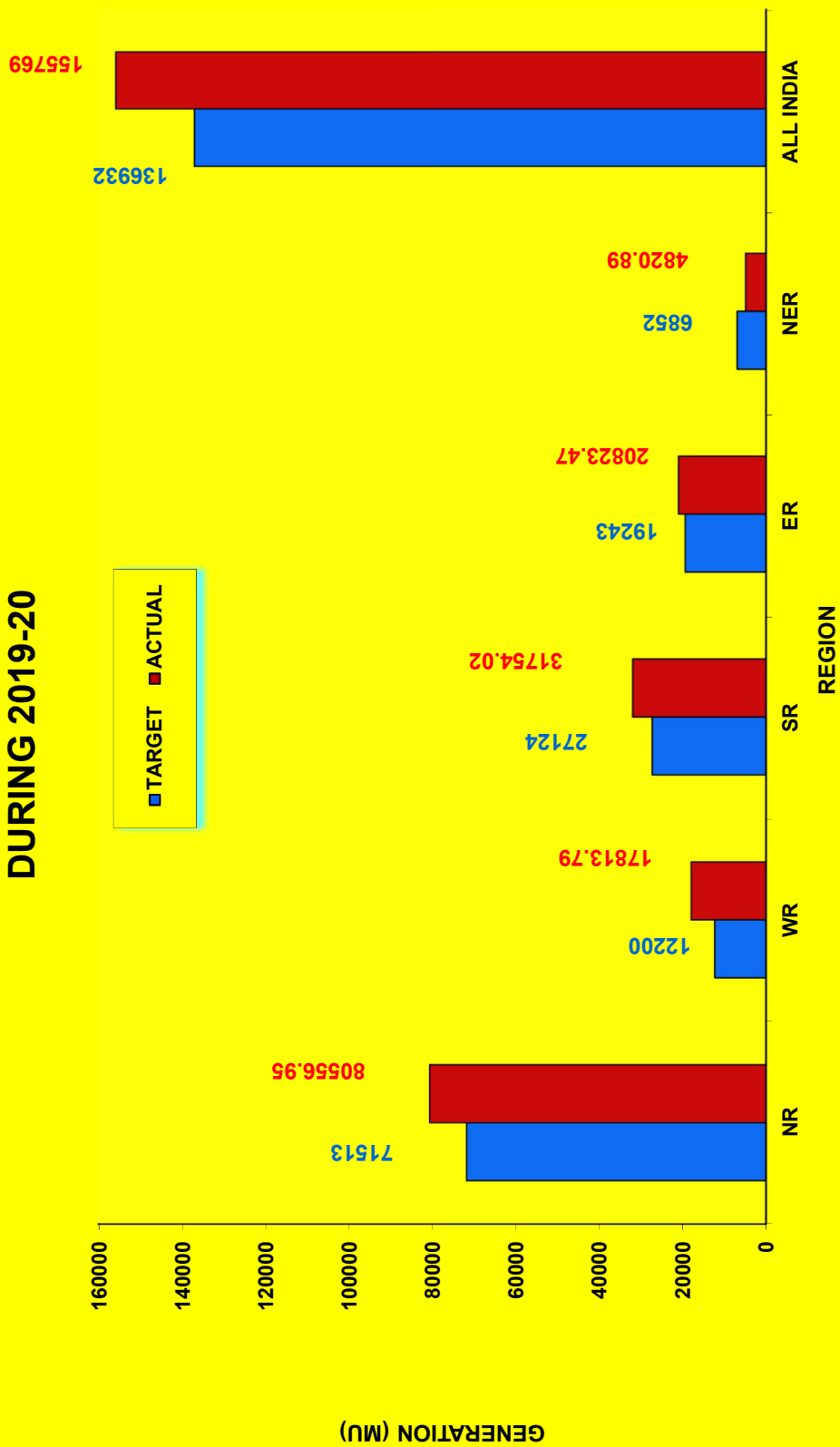
2.6 Details of actual generation during 2019-20 for all the hydro stations (above 25 MW capacity) in the country are given in **Annex 2.1**. It is observed that 137 Nos. of stations have exceeded the target level of generation while the generation has been less than targets in case of 68 stations. List of stations where generation exceeded the target during 2018-19 is given in **Table 2.5**.

TABLE 2.5

**H.E. STATIONS ACHIEVING HIGHER GENERATION VIS-A-VIS TARGET
PERIOD: 2019-20**

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	19	9.75	Dulhasti, Chutak, Jawahar Sagar, Mahi Bajaj I&II, Ukai, Indira Sagar, Omkareshwar, Madhikheda, Koyna St.I&II, Srisaillam RB, Upper sileru I & II, Bhadra, Mettur Dam, Sholayar I, Lower Jurala, N.J.Sagar LBC, Priyadarshni Jurala, Srisaillam LB
2	140 - 150	6	2.92	Baglihar II, Dhalipur (Y.St.I), Almatti Dam, T.B.Dam, Hampi, Mettur Tunnel,
3	130 - 140	16	7.8	Bhakra L&R, Pong, Baira Siul, Uri –II, Ranjit Sagar, Dhakrani (Y.St.I), Bansagar Tons-I, Kalinadi, Kodasali, Kundah I-V, Suruliya, Machkund.
4	120 - 130	24	11.7	Salal-I, Sewa-II, Nimoo Bazgo, Ganguwal ,Kotla, Khara, Dhauliganga, Tanakpur , Chibro (Y.St.II), Chilla, Khodri (Y.St.II), Koyna DPH, Koyna St.III Bhivpuri, Jog, Kadra, Lower Mettur I-IV, Periyar, Pykara Ultimate, Balimela, Umium St.I.
5	110 - 120	37	18.04	Dehar, Chamera-I, Naptha Jhakri, Rampur, Kol Dam, Bassi, Giri Bata, Larji, Sanjay, Shanan, Malana-II, Karcham Wangtoo, Budhil, Uri, Khatima Kulhal (Y.St.IV), Maneri Bhali-I, Srinagar, Vishnu Prayag, Kadana PSS, Sardar Sarovar CHPH, Bhira Tail Race, Bhira PSS, N.J.Sagar RBC, Gerusoppa Supa DPH, Lingnamakki, Sharavathy, Varahi, Bhawani K Barrage-I, N.J.Sagar PSS, Upper Indravati, Upper Kolab, Teesta III, Jaldhaka I, Rammam II, Ranganadi, Myntdu.
6	100 - 110	35	17.07	Chamera-III, Parbati III, Kashang I, Allain Duhangan, Baspa-II, Chanju I, Malana, Lower Jhelum, Mukerian I – IV, Obra, Tehri, Koteswar, Maneri Bhali-II, Bansagar Tons-II, Tillari, Khopoli, Shivasamudram, Neriamaangalam, Sengulam, Sholayar, Bhawani K Barrage-II, Moyar, Papanasam, Sarkarpathy, Panchet, Rangit, Teesta-V, Dikchu, Teesta Low Dam-III, Teesta Low Dam-IV, Pare, Kyrdemkulai.

REGION-WISE ACTUAL GENERATION VS TARGET DURING 2019-20

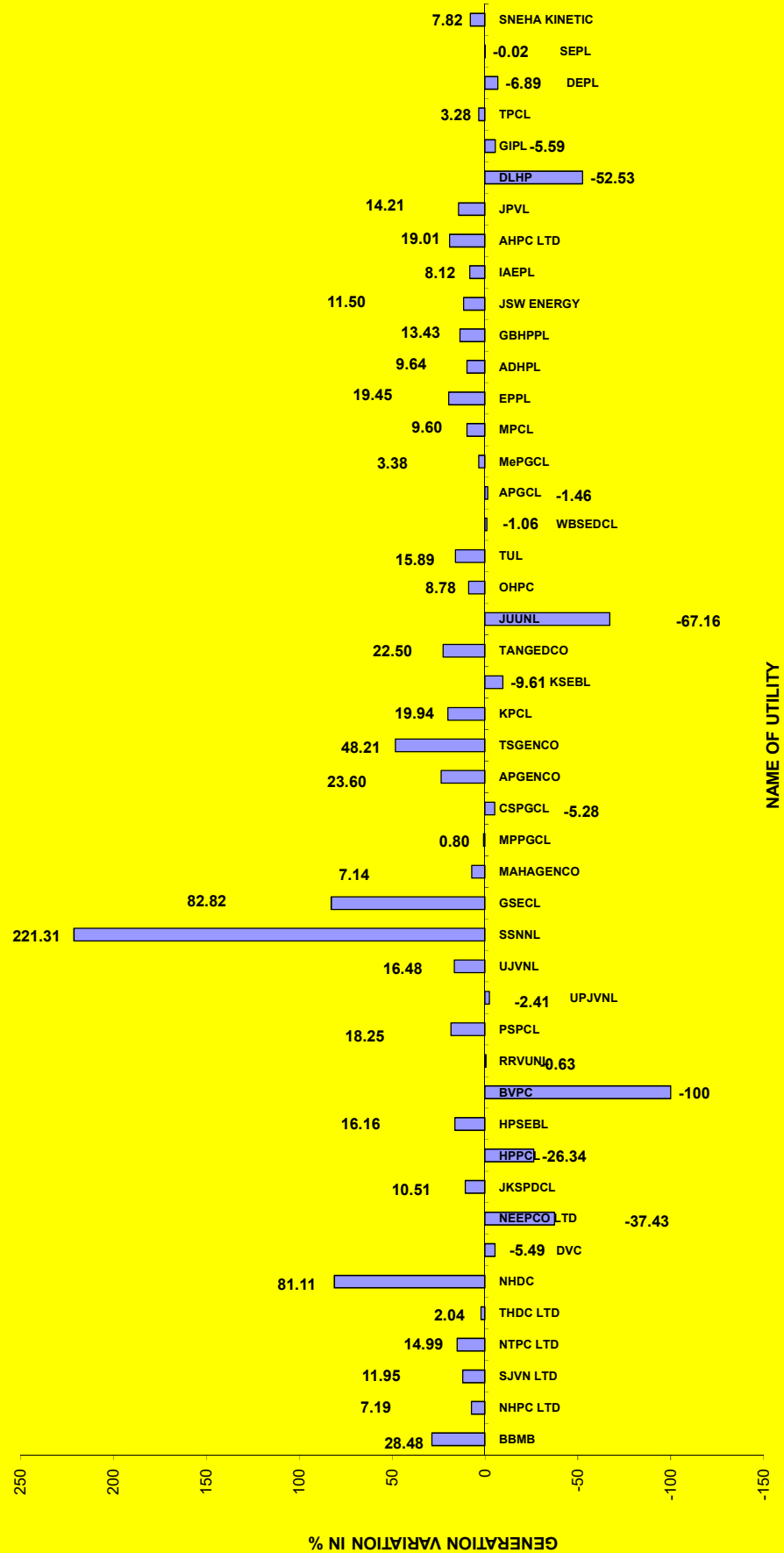


H.E. Stations where generation was lower than the target have been listed in **Table 2.6** below:

TABLE 2.6
H.E. STATIONS HAVING SHORTFALL IN GENERATION VIS-A-VIS TARGETS
PERIOD: 2019-20

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	19	9.27	Sainj, Baglihar, A.P.Sahib I & II, Matatilla, Hasdeo Bango, Koyna IV, Kakkad, Kuttiadi & Kuttiady Addl., Panniar, Sabarigiri, Rengali, Jorethang Loop, Tashiding, Chuzachen, Purulia PSS, Khandong, Karbi Langpi, New Umtru.
2	80-90	13	6.34	Chamera-II, Rihand, Bargi, N.J.Sagar TPD, Lower Sileru, Munirabad, Idamalayar, Idukki, Lower Periyar, Kadamparai PSS, Kodayar I&II, Umium St.IV, Tuirial.
3	70 -80	10	4.87	Upper Sindh II, Bhira, Pallivasal, Poringalkuthu, Pochampad, Hirakud I&II, Maithon, Kopili, Doyang.
4	60 -70	5	2.43	Kishenganga, Ram Ganga, Pench, Ghatprabha, Aliyar.
5	50 -60	2	0.97	Vaitarna, Parson's Valley
6	40 -50	2	0.97	Bhandardhara – II, Pykara
7	30 -40	3	1.47	Ghatghar PSS, Subernarekha I&II
8	10 -30	1	0.48	Gandhi Sagar
9	0 -10	13	6.34	Parbati II*, Swara Kuddu, Uhl-III*, Tidong*, Sorang*, R.P. Sagar, Sardar Sarovar RBPH, Bansagar Tons-III, Rajghat, Maheshwar*, Bhawani K Barrage-III, Pulichinthala, Kameng.

UTILITY-WISE EXCESS/SHORTFALL IN GENERATION DURING 2019-20



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 2015-16 TO 2019-20

Region	Installed Capacity as on 31.03.2020 (MW)	Generation (BU)				
		2015-16	2016-17	2017-18	2018-19	2019-20
Northern	19023.27	73.11	71.76	74.73	72.40	80.55
Western	7392.00	12.85	17.18	9.18	9.76	17.81
Southern	11694.50	20.98	17.04	19.02	28.81	31.75
Eastern	5862.45	10.24	11.75	17.52	18.90	20.82
North Eastern	1727.00	4.21	4.65	5.67	5.02	48.20
Total	45699.2	121.38	122.38	126.12	134.90	155.76
Rainfall	-	2015-16 (mm)	2016-17 (mm)	2017-18 (mm)	2018-19 (mm)	2019-20 (mm)
All-India	-	1085.0	1083.1	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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
NORTHERN	19023.25	74338.26	71513	80556.95	112.65
WESTERN	7392.00	16607.21	12200	17813.79	146.01
SOUTHERN	11694.50	33900.85	27124	31754.02	117.07
EASTERN	5862.45	19770.86	19243	20823.47	108.21
NORTH EASTERN	1727.00	9412.73	6852	4820.89	70.36
ALL INDIA	45699.20	154029.91	136932	155769.12	113.76
IMPORT FROM BHUTAN			6218	5794	93.19
ALL INDIA (INCLUDING IMPORT FROM BHUTAN)	45699.20	154029.91	143150	161563.60	112.86
CENTRAL					
BBMB	2920.30	9515.00	9470	12167.23	128.48
NHPC LTD	5451.2	24680.3	24050	25779.75	107.19
SJVN LTD	1912.00	8490.08	8550	9571.53	111.95

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
NTPC LTD	800.00	3054.79	3000	3449.67	114.99
THDC LTD	1400.00	3952.00	4160	4244.93	102.04
NHDC	1520.00	3146.57	2300	4165.60	181.11
DVC	143.20	374.00	210	198.47	94.51
NEEPCO LTD	1200.00	7397.04	4877	3051.71	62.57
TOTAL CENTRAL	15346.70	60609.82	56617	62628.89	110.62
STATE					
JKSPDCL	1110.00	4833.30	4815	5321.20	110.51
HPPCL	295.00	569.03	716	527.42	73.66
HPSEBL	372.00	1691.62	1560	1812.13	116.16
BVPC	0.00	0.00	200	0.00	0.00
RRVUNL	411.00	1046.00	610	606.18	99.37
PSPCL	1051.00	4207.00	3765	4452.20	118.25
UPJVNL	501.60	1707.00	1100	1073.48	97.59
UJVNL	1252.15	4848.10	4196	4887.52	116.48
SSNNL	1450.00	3848.00	1300	4177.01	321.31
GSECL	540.00	1598.00	677	1237.67	182.82
MAHAGENCO	2406.00	3938.00	3881	4157.94	107.14
MPPGCL	875.00	2561.64	2315	2333.42	100.80
CSPGCL	120.00	245.00	250	236.79	94.72
APGENCO	1796.75	5738.00	3162	3908.14	123.60
TSGENCO	2405.60	5045.85	3041	4507.04	148.21
KPCL	3572.20	12981.00	11497	13789.13	119.94
KSEBL	1856.50	6458.00	6034	5454.04	90.39
TANGEDCO	2178.20	4348.00	3890	4765.24	122.50
JUUNL	130.00	149.00	110	36.12	32.84
OHPC	2027.50	5676.00	5570	6059.20	108.78
TUL	1200.00	5214.00	5213	6041.55	115.89
WBSEDCL	986.00	1610.00	1528	1511.75	98.94

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
APGCL	100.00	390.00	390	384.30	98.54
MePGCL	322.00	1177.69	985	1018.29	103.38
TOTAL STATE	26958.50	79880.23	66805	78297.76	117.20
PRIVATE					
MPCL	86.00	370.93	337	369.34	109.60
EPPL	100.00	403.00	350	418.09	119.45
ADHPL	192.00	678.18	692	758.71	109.64
GBHPPL	70.00	291.73	250	283.58	113.43
JSW ENERGY	1300.00	5344.06	5381	5999.86	111.50
IAEPL	36.00	157.82	157	169.75	108.12
AHPC LTD	330.00	1396.84	1294	1540.01	119.01
JPVL	400.00	1774.42	1750	1998.71	114.21
DLHP	34.00	50.00	36	17.09	47.47
GIPL	110.00	537.81	500	472.06	94.41
TPCL	447.00	1220.00	1441	1488.27	103.28
DEPL	96.00	459.02	437	406.90	93.11
SEPL	97.00	425.05	435	434.91	99.98
SNEHA KINETIC	96.00	431.00	450	485.19	107.82
NTPGPL	0.00	0.00	0	0.00	0.00
HSPL	0.00	0.00	0	0.00	0.00
TOTAL PRIVATE	3394.00	13539.86	13510	14842.47	109.86
TOTAL ALL INDIA	45699.20	154029.91	136932	155769.12	113.76
NORTHERN REGION					
HIMACHAL PRADESH					
CENTRAL SECTOR					
BBMB					
Bhakra L&R	1379.00	3924.00	4500.00	6129.17	136.20
Dehar	990.00	3110.00	2900.00	3390.61	116.92

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Pong	396.00	1123.00	1070.00	1411.17	131.89
Total BBMB-HP	2765.00	8157.00	8470.00	10930.95	129.05
NHPC					
Baira Siul	180.00	779.28	250.00	331.08	132.43
Chamera-I	540.00	1664.56	2350.00	2662.81	113.31
Chamera-II	300.00	1499.89	1470.00	1237.01	84.15
Chamera-III	231.00	1108.00	1050.00	1056.33	100.60
Parbati III	520.00	1977.23	650.00	691.62	106.40
Parbati II*			200.00	0.00	0.00
Total NHPC -HP	1771.00	7028.96	5970	5978.85	100.15
SJVN					
Naptha Jhakri	1500.00	6612.00	6700.00	7447.48	111.16
Rampur	412.00	1878.08	1850.00	2124.05	114.81
Total SJVN	1912.00	8490.08	8550	9571.53	111.95
NTPC					
Kol Dam	800.00	3054.79	3000.00	3449.67	114.99
Total NTPC	800.00	3054.79	3000	3449.67	114.99
Total Central-HP	7248.00	26730.83	25990	29931.00	115.16
STATE SECTOR					
HPPCL					
Integrated Kashang	195.00	245.80	180.00	189.52	105.29
Sainj	100.00	323.23	350.00	337.90	96.54
Swara Kuddu			186.00	0.00	0.00
Total HPPCL	295.00	569.03	716.00	527.42	73.66
HPSEB LTD					
Bassi	66.00	346.77	300.00	331.52	110.51
Giri Bata	60.00	240.00	190.00	225.00	118.42
Larji	126.00	586.85	570.00	670.24	117.59
Sanjay	120.00	518.00	500.00	585.37	117.07

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Total HPSEB LTD	372.00	1691.62	1560	1812.13	116.16
Beas Valley Power. Corp. Ltd. (BVPC)					
Uhl-III*			200.00	0.00	0.00
Total BVPC			200	0.00	0.00
PSPCL					
Shanan	110.00	585.00	485.00	565.00	116.49
Total PSPCL-HP	110.00	585.00	485.00	565.00	116.49
Total State Sector-HP	777.00	2845.65	2961	2904.55	98.09
PRIVATE					
Allain Duhangan Power Power Ltd.					
Allain Duhangan	192.00	678.18	692.00	758.71	109.64
Everest Power Private Ltd.					
Malana-II	100.00	403.00	350.00	418.09	119.45
HBPCL					
Baspa-II	300.00	1213.00	1250.00	1353.33	108.27
Karcham Wangtoo	1000.00	4131.06	4131.00	4646.53	112.48
Total HBPCL	1300.00	5344.06	5381	5999.86	111.50
GBHPPL					
Budhil	70.00	291.73	250.00	283.58	113.43
IA Energy Pvt. Ltd.					#DIV/0!
Chanju I	36.00	157.82	157.00	169.75	108.12
Malana Power Company Ltd.					#DIV/0!
Malana	86.00	370.93	337.00	369.34	109.60
NSL Tidond Power Generation Pvt. Ltd.					#DIV/0!
Tidong*			0.00	0.00	#DIV/0!
Himachal Sorang Power Limited (HSPL)					#DIV/0!
Sorang*			0.00	0.00	#DIV/0!
Total Private-HP	1784.00	7245.72	7167	7999.33	111.61
Total H.P.	9809.00	36822.20	36118	40834.88	113.06

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
JAMMU & KASHMIR					#DIV/0!
CENTRAL SECTOR					#DIV/0!
NHPC					#DIV/0!
Dulhasti	390.00	1907.00	2200.00	2064.97	93.86
Salal-I &II	690.00	3082.00	3300.00	4010.15	121.52
Sewa-II	120.00	533.52	500.00	647.92	129.58
Uri	480.00	2587.38	2900.00	3406.44	117.46
Uri -II	240.00	1124.00	1290.00	1794.35	139.10
Kishenganga	330.00	1705.62	1300.00	849.09	65.31
Total NHPC -J&K	2250.00	10939.52	11490	12772.92	111.17
Total Central Sector - J&K	2250.00	10939.52	11490	12772.92	111.17
STATE SECTOR					
JKSPDC					
Baglihar	450.00	2643.00	2600.00	2579.43	99.21
Baglihar II	450.00	1302.30	1350.00	1918.18	142.09
Lower Jhelum	105.00	533.00	555.00	605.75	109.14
Upper Sindh II	105.00	355.00	310.00	217.84	70.27
Total JKSPDC	1110.00	4833.30	4815	5321.20	110.51
Total State Sector-J&K	1110.00	4833.30	4815	5321.20	110.51
Total Jammu & Kashmir	3360.00	15772.82	16305	18094.12	110.97
LADHAK					
CENTRAL SECTOR					
NHPC					
Chutak	44.00	213.00	50.00	98.12	196.24
Nimoo Bazgo	45.00	239.00	100.00	172.16	172.16
Total Central Sector-Ladhak	89.00	452.00	150.00	270.28	180.19
Total Ladhak	89.00	452.00	150.00	270.28	180.19
PUNJAB					
CENTRAL 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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
BBMB					
Ganguwal	77.65	1358.00	500.00	614.82	122.96
Kotla	77.65		500.00	621.46	124.29
Total BBMB-Punjab	155.30	1358.00	1000	1236.28	123.63
STATE SECTOR					
PSPCL					
A.P.Sahib I & II	134.00	909.00	640.00	603.71	94.33
Mukerian I - IV	207.00	1206.00	1080.00	1184.28	109.66
Ranjit Sagar	600.00	1507.00	1560.00	2099.21	134.56
Total PSPCL	941.00	3622.00	3280	3887.20	118.51
Total State Sector-Punjab	941.00	3622.00	3280	3887.20	118.51
Total Punjab	1096.30	4980.00	4280	5123.48	119.71
RAJASTHAN					
STATE SECTOR					
RRVUNL					
Jawahar Sagar	99.00	298.00	185.00	315.12	170.34
Mahi Bajaj I & II	140.00	289.00	125.00	236.53	189.22
R.P. Sagar	172.00	459.00	300.00	54.53	18.18
Total RRVUNL	411.00	1046.00	610	606.18	99.37
Total State sector-Rajasthan	411.00	1046.00	610	606.18	99.37
Total Rajasthan	411.00	1046.00	610	606.18	99.37
UTTAR PRADESH					
STATE SECTOR					
UPJVNL					
Khara	72.00	385.00	290.00	351.03	121.04
Matatilla	30.60	123.00	75.00	73.36	97.81
Obra	99.00	279.00	185.00	190.59	103.02
Rihand	300.00	920.00	550.00	458.50	83.36
Total UPJVNL	501.60	1707.00	1100	1073.48	97.59

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
			MU	MU	
Total State Sector-UP	501.60	1707.00	1100	1073.48	97.59
Total Uttar Pradesh	501.60	1707.00	1100	1073.48	97.59
UTTARAKHAND					
CENTRAL SECTOR					
NHPC					
Dhauliganga	280.00	1134.69	1100.00	1325.55	120.50
Tanakpur	94.20	452.19	450.00	557.81	123.96
Total NHPC-UK	374.20	1586.88	1550	1883.36	121.51
THDC LTD					
Tehri	1000.00	2797.00	3000.00	3041.74	101.39
Koteshwar	400.00	1155.00	1160.00	1203.19	103.72
Total THDC LTD	1400.00	3952.00	4160	4244.93	102.04
Total Central Sector - UK	1774.20	5538.88	5710	6128.29	107.33
STATE SECTOR					
UJVNL					
Chibro (Y.St.II)	240.00	750.00	803.00	979.66	122.00
Chilla	144.00	725.00	625.00	791.38	126.62
Dhakrani (Y.St.I)	33.75	169.00	130.00	173.80	133.69
Dhalipur (Y.St.I)	51.00	192.00	150.00	224.44	149.63
Khatima	41.40	208.00	209.00	233.24	111.60
Khodri (Y.St.II)	120.00	345.00	355.00	436.42	122.94
Kulhal (Y.St.IV)	30.00	164.00	130.00	153.79	118.30
Maneri Bhali-I	90.00	395.00	300.00	356.85	118.95
Maneri Bhali-II	304.00	1566.10	1269.00	1383.32	109.01
Ram Ganga	198.00	334.00	225.00	154.62	68.72
Total UJVNL	1252.15	4848.10	4196	4887.52	116.48
Total State Sector-Uttarakhand	1252.15	4848.10	4196	4887.52	116.48
PRIVATE SECTOR					
AHPC 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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Srinagar	330.00	1396.84	1294.00	1540.01	119.01
Jaiprakash Power Venture Ltd.					
Vishnu Prayag	400.00	1774.42	1750.00	1998.71	114.21
Total Private Sector - UK	730.00	3171.26	3044	3538.72	116.25
Total Uttarakhand	3756.35	13558.24	12950	14554.53	112.39
Total N. REGION	19023.25	74338.26	71513	80556.95	112.65
WESTERN REGION					
CHHATISGARH					
STATE SECTOR					
CSPGC					
Hasdeo Bango	120.00	245.00	250.00	236.79	94.72
Total CSPGC	120.00	245.00	250	236.79	94.72
Total State Sector-Chhatisgarh	120.00	245.00	250	236.79	94.72
Total Chhatisgarh	120.00	245.00	250	236.79	94.72
GUJARAT					
STATE SECTOR					
GSECL					
Kadana PSS	240.00	518.00	415.00	470.40	113.35
Ukai	300.00	1080.00	262.00	767.27	292.85
Total GSECL	540.00	1598.00	677	1237.67	182.82
SSNNL					
Sardar Sarovar CHPH	250.00	213.00	800.00	933.94	116.74
Sardar Sarovar RBPH	1200.00	3635.00	500.00	3243.07	648.61
Total SSNNL	1450.00	3848.00	1300	4177.01	321.31
Total State Sector -Gujarat	1990.00	5446.00	1977	5414.68	273.88
Total Gujarat	1990.00	5446.00	1977	5414.68	273.88
MADHYA PRADESH					
CENTRAL					
NHDC					

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Indira Sagar	1000.00	1980.00	1528.00	2877.35	188.31
Omkareshwar	520.00	1166.57	772.00	1288.25	166.87
Total NHDC	1520.00	3146.57	2300	4165.60	181.11
Total Central Sector-MP					
STATE SECTOR					
MPPGCL					
Bansagar Tons-I	315.00	900.00	905.00	1245.33	137.61
Bansagar Tons-II	30.00	113.00	92.00	93.76	101.91
Bansagar Tons-III	60.00	143.00	110.00	138.90	126.27
Bargi	90.00	508.08	420.00	377.69	89.93
Gandhi Sagar	115.00	420.48	300.00	33.81	11.27
Madhikheda	60.00	74.12	70.00	140.19	200.27
Rajghat	45.00	87.60	88.00	86.46	98.25
Total MPPGCL	715.00	2246.28	1985	2116.14	106.61
Total State-MP	715.00	2246.28	1985	2116.14	106.61
Total M.P.	2235.00	5392.85	4285	6281.74	146.60
MAHARASHTRA					
STATE SECTOR					
MAHAGENCO					
Bhira Tail Race	80.00	75.00	85.00	95.25	112.06
Ghatghar PSS	250.00	146.00	384.00	136.71	35.60
Koyna DPH	36.00	410.00	123.00	153.84	125.07
Koyna St.I&II	600.00	3030.00	763.00	1236.53	162.06
Koyna St.III	320.00		568.00	708.33	124.71
Koyna IV	1000.00		1704.00	1640.97	96.30
Tillari	60.00	133.00	110.00	112.82	102.56
Vaitarna	60.00	144.00	144.00	73.49	51.03
Total MAHAGENCO	2406.00	3938.00	3881	4157.94	107.14
MPPGPCL					

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Pench	160.00	315.36	330.00	217.28	65.84
Total MPPGPCL-Maha.	160.00	315.36	330	217.28	65.84
Total State Sector-Maha.	2566.00	4253.36	4211	4375.22	103.90
PRIVATE SECTOR					
Dodson-Lindblom Hydro Power Pvt. Ltd. (DLHPPL)					
Bhandardhara - II	34.00	50.00	36.00	17.09	47.47
Total DLHP	34.00	50.00	36	17.09	47.47
Tata Power Company Ltd.					
Bhira	150.00	775.00	445.00	351.50	78.99
Bhira PSS	150.00		441.00	489.85	111.08
Bhivpuri	75.00	220.00	270.00	336.54	124.64
Khopoli	72.00	225.00	285.00	310.38	108.91
Total TPCL	447.00	1220.00	1441	1488.27	103.28
Total Private Sector-Maha.	481.00	1270.00	1477	1505.36	101.92
Total Maharashtra	3047.00	5523.36	5688	5880.58	103.39
Total Western	7392.00	16607.21	12200	17813.79	146.01
SOUTHERN REGION					
ANDHRA PRADESH					
STATE SECTOR					
APGENCO					
N.J.Sagar TPD	50.00	177.00	90.00	78.19	86.88
N.J.Sagar RBC	90.00	156.00	90.00	102.83	114.26
Srisaillam RB	770.00	2900.00	850.00	1339.43	157.58
Upper sileru I & II	240.00	529.00	418.00	641.12	153.38
Lower Sileru	460.00	1070.00	1058.00	851.86	80.52
Total APGENCO	1610.00	4832.00	2506	3013.43	120.25
Total State Sector-AP	1610.00	4832.00	2506	3013.43	120.25
Total Andhra Pradesh	1610.00	4832.00	2506	3013.43	120.25
KARNATAKA					

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
STATE SECTOR					
KPCL					
Almatti Dam	290.00	483.00	447.00	632.46	141.49
Bhadra	26.00	123.00	48.00	74.73	155.69
Gerusoppa	240.00	622.00	518.00	575.34	111.07
Ghatprabha	32.00	131.00	73.00	50.64	69.37
Jog	139.20	118.00	240.00	298.23	124.26
Kadra	150.00	570.00	369.00	475.50	128.86
Kalinadi	855.00	3385.00	2660.00	3666.11	137.82
Supa DPH	100.00	542.00	500.00	584.15	116.83
Kodasali	120.00	512.00	351.00	473.62	134.93
Lingnamakki	55.00	254.00	254.00	298.58	117.55
Munirabad	28.00	66.00	90.00	79.69	88.54
Sharavathy	1035.00	4932.00	4653.00	5136.46	110.39
Shivasamudram	42.00	183.00	245.00	259.98	106.11
Varahi	460.00	1060.00	1049.00	1183.64	112.84
Total KPCL	3572.20	12981.00	11497	13789.13	119.94
APGENCO					
T.B.Dam & Hampi	72.00	236.00	156.00	225.14	144.32
Total APGENCO-Karnataka	72.00	236.00	156	225.14	144.32
Total State Sector-Karnataka	3644.20	13217.00	11653	14014.27	120.26
Total Karnataka	3644.20	13217.00	11653	14014.27	120.26
KERALA					
STATE SECTOR					
KSEB Ltd.					
Idamalayar	75.00	380.00	292.00	260.64	89.26
Idukki	780.00	2398.00	2119.00	1830.42	86.38
Kakkad	50.00	262.00	183.00	176.25	96.31
Kuttiadi & Kuttiady Addl.	225.00	323.00	644.00	591.42	91.84

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Lower Periyar	180.00	493.00	501.00	426.99	85.23
Neriamangalam	45.00	237.00	313.00	314.66	100.53
Pallivasal	37.50	284.00	200.00	141.95	70.98
Panniar	30.00	158.00	138.00	136.70	99.06
Poringalkuthu	32.00	170.00	132.00	95.32	72.21
Sabarigiri	300.00	1338.00	1159.00	1112.58	95.99
Sengulam	48.00	182.00	143.00	150.71	105.39
Sholayar	54.00	233.00	210.00	216.40	103.05
Total KSEB LTD.	1856.50	6458.00	6034.00	5454.04	90.39
Total State Sector-Kerala	1856.50	6458.00	6034	5454.04	90.39
Total Kerala	1856.50	6458.00	6034	5454.04	90.39
TAMIL NADU					
STATE SECTOR					
TANGEDCO					
Aliyar	60.00	175.00	120.00	72.91	60.76
Bhawani K Barrage-III	30.00	90.00	25.00	35.87	143.48
Bhawani K Barrage-II	30.00	100.00	52.00	56.99	109.60
Bhawani K Barrage-I	30.00	80.00	57.00	63.38	111.19
Kadamparai PSS	400.00	77.00	450.00	369.63	82.14
Kodayar I&II	100.00	165.00	200.00	175.13	87.57
Kundah I-V	555.00	1387.00	1150.00	1559.22	135.58
Lower Mettur I-IV	120.00	252.00	195.00	245.18	125.73
Mettur Dam	50.00	541.00	78.00	145.61	186.68
Mettur Tunnel	200.00		262.00	372.03	142.00
Moyar	36.00	115.00	117.00	127.60	109.06
Papanasam	32.00	105.00	105.00	106.63	101.55
Parson's Valley	30.00	53.00	34.00	19.15	56.32
Periyar	161.00	409.00	400.00	502.06	125.52
Pykara	59.20	274.00	40.00	17.90	44.75

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Pykara Ultimate	150.00	30.00	305.00	372.12	122.01
Sarkarpathy	30.00	162.00	110.00	117.94	107.22
Sholayar I	70.00	254.00	105.00	290.39	276.56
Suruliyar	35.00	79.00	85.00	115.50	135.88
Total TANGEDCO	2178.20	4348.00	3890	4765.24	122.50
Total State Sector-TN	2178.20	4348.00	3890	4765.24	122.50
Total Tamilnadu	2178.20	4348.00	3890	4765.24	122.50
TELANGANA					
STATE SECTOR					
TSGENCO					
Lower Jurala	240.00	534.43	138.00	318.39	230.72
N.J.Sagar PSS	815.60	2237.00	1289.00	1512.73	117.36
N.J.Sagar LBC	60.00	104.00	60.00	102.86	171.43
Pochampad	36.00	147.00	67.00	48.61	72.55
Priyadarshni Jurala	234.00	404.00	186.00	321.74	172.98
Pulichinthala	120.00	219.42	12.00	209.67	1747.25
Srisaillam LB	900.00	1400.00	1289.00	1993.04	154.62
Total TSGENCO	2405.60	5045.85	3041	4507.04	148.21
Total State Sector-Telangana	2405.60	5045.85	3041	4507.04	148.21
Total Telangana	2405.60	5045.85	3041	4507.04	148.21
Total Southern	11694.50	33900.85	27124	31754.02	117.07
EASTERN REGION					
JHARKHAND					
CENTRAL SECTOR					
DVC					
Panchet	80.00	237.00	105.00	114.84	109.37
Total DVC	80.00	237.00	105	114.84	109.37
Total Central Sector-Jharkhand	80.00	237.00	105	114.84	109.37
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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
JUUNL					
Subernarekha I&II	130.00	149.00	110.00	36.12	32.84
Total Jharkhand	130.00	149.00	110	36.12	32.84
Total State Sector-Jharkhand	130.00	149.00	110	36.12	32.84
Total Jharkhand	210.00	386.00	215	150.96	70.21
ODISHA					
STATE SECTOR					
OHPC					
Balimela	510.00	1183.00	1185.00	1521.41	128.39
Hirakud I&II	347.50	1174.00	990.00	790.02	79.80
Rengali	250.00	525.00	705.00	665.17	94.35
Upper Indravati	600.00	1962.00	1950.00	2253.48	115.56
Upper Kolab	320.00	832.00	740.00	829.12	112.04
Total OHPC	2027.50	5676.00	5570	6059.20	108.78
APGENCO					
Machkund	114.75	670.00	500.00	669.57	133.91
Total APGENCO-Odisha	114.75	670.00	500	669.57	133.91
Total State Sector-Odisha	2142.25	6346.00	6070	6728.77	110.85
Total Odisha	2142.25	6346.00	6070	6728.77	110.85
SIKKIM					
CENTRAL SECTOR					
NHPC					
Rangit	60.00	338.61	340.00	354.78	104.35
Teesta-V	510.00	2572.70	2680.00	2831.97	105.67
Total NHPC	570.00	2911.31	3020	3186.75	105.52
Total Central Sector-Sikkim	570.00	2911.31	3020	3186.75	105.52
STATE SECTOR					
Teesta Urja Ltd. (TUL)					
Teesta III	1200.00	5214.00	5213.00	6041.55	115.89

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Total TUL	1200.00	5214.00	5213	6041.55	115.89
Total State Sector-Sikkim	1200.00	5214.00	5213	6041.55	115.89
PRIVATE SECTOR					
DANS Energy Pvt. Ltd. (DEPL)					
Jorethang Loop	96.00	459.02	437.00	406.90	93.11
Shiga Energy Pvt. Ltd.(SEPL)					
Tashiding	97.00	425.05	435.00	434.91	99.98
Gati Infrastructure Pvt. Ltd. (GIPL)					#DIV/0!
Chuzachen HEP	110.00	537.81	500.00	472.06	94.41
Sneha Kinetic					
Dikchu	96.00	431.00	450.00	485.19	107.82
Total Private-Sikkim	399.00	1852.88	1822	1799.06	98.74
Total Sikkim	2169.00	9978.19	10055	11027.36	109.67
WEST BENGAL					
CENTRAL SECTOR					
NHPC					
Teesta Low Dam-III	132.00	594.00	550.00	581.82	105.79
Teesta Low Dam-IV	160.00	719.67	720.00	739.18	102.66
Total NHPC	292.00	1313.67	1270	1321.00	104.02
DVC					
Maithon	63.20	137.00	105.00	83.63	79.65
Total DVC-WB	63.20	137.00	105	83.63	79.65
Total Central Sector-WB	355.20	1450.67	1375	1404.63	102.15
STATE SECTOR					
WBSEDCL					
Jaldhaka I	36.00	165.00	158.00	188.97	119.60
Purulia PSS	900.00	1235.00	1150.00	1075.47	93.52
Rammam II	50.00	210.00	220.00	247.31	112.41
Total WBSEDCL	986.00	1610.00	1528	1511.75	98.94

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Total State Sector -WB	986.00	1610.00	1528	1511.75	98.94
Total West Bengal	1341.20	3060.67	2903	2916.38	100.46
Total Eastern	5862.45	19770.86	19243	20823.47	108.21
NORTH EASTERN REGION					
ARUNACHAL PRADESH					
CENTRAL SECTOR					
NEEPCO					
Ranganadi	405.00	1509.66	1100.00	1289.45	117.22
Pare	110.00	506.42	450.00	471.52	104.78
Kameng*	300.00	3353.00	1800.00	25.49	1.42
Total NEEPCO-Arunachal	815.00	5369.08	3350	1786	53.33
Total Central Sector-Arunachal	815.00	5369.08	3350	1786.46	53.33
Total Arunachal	815.00	5369.08	3350	1786.46	53.33
ASSAM					
CENTRAL SECTOR					
NEEPCO					
Kopili	200.00	1186.14	900.00	716.90	79.66
Khandong	50.00	363.95	200.00	190.48	95.24
Total NEEPCO-Aassm	250.00	1550.09	1100	907.38	82.49
Total Central Sector-Assam	250.00	1550.09	1100	907.38	82.49
STATE SECTOR					
APGCL					
Karbi Langpi	100.00	390.00	390.00	384.30	98.54
Total APGCL	100.00	390.00	390	384.30	98.54
Total State Sector-Assam	100.00	390.00	390	384.30	98.54
Total Assam	350.00	1940.09	1490	1291.68	86.69
NAGALAND					
CENTRAL SECTOR					
NEEPCO					
Doyang	75.00	227.24	227.00	180.85	79.67

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Total NEEPCO-Nagaland	75.00	227.24	227	180.85	79.67
Total Central Sector-Nagaland	75.00	227.24	227	180.85	79.67
Total Nagaland	75.00	227.24	227	180.85	79.67
MANIPUR					
CENTRAL SECTOR					
NHPC					
Loktak (Manipur)	105.00	448.00	600.00	366.59	61.10
Total NHPC-Manipur	105.00	448.00	600	366.59	61.10
Total Central Sector-Manipur	105.00	448.00	600	366.59	61.10
Total Manipur	105.00	448.00	600	366.59	61.10
MEGHALAYA					
STATE SECTOR					
MePGCL					
Kyrdemkulai	60.00	118.00	130.00	141.95	109.19
Myntdu	126.00	128.00	380.00	421.67	110.97
New Umtru	40.00	235.00	193.00	181.50	94.04
Umium St.I	36.00	324.00	90.00	108.33	120.37
Umium St.IV	60.00	372.69	192.00	164.84	85.85
Total MePGCL	322.00	1177.69	985.00	1018.29	103.38
Total State Sector-Meghalaya	322.00	1177.69	985	1018.29	103.38
Total Meghalaya	322.00	1177.69	985	1018.29	103.38
MIZORAM					
CENTRAL SECTOR					
Tuirial	60.00	250.63	200.00	177.02	88.51
Total NEEPCO-Mizoram	60.00	250.63	200	177.02	88.51
Total Central Sector-Mizoram	60.00	250.63	200	177.02	88.51
Total Mizoram	60.00	250.63	200	177.02	88.51
Total N.Eastern	1727.00	9412.73	6852	4820.89	70.36
Total All India	45699.20	154029.91	136932.00	155769.12	113.76
IMPORT FROM BHUTAN			6218.00	5794.48	93.19

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 2019-2020**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 31.03.2020	DESIGN ENERGY	2019-2020		% OF ACTUAL OVER TARGET
			TARGET	ACTUAL	
	MW	MU	MU	MU	
Total All India (Including Bhutan Imports)	45699.20	154029.91	143150	161563.60	112.86
* Stations Targetted but not Commissioned during 2018-19					

CHAPTER-3

MAJOR RESERVOIR BASED HE STATIONS

CHAPTER – 3

MAJOR RESERVOIR/ STORAGE BASED H.E. STATIONS

3.1 Introduction

Some of the hydro-electric schemes are provided with storage reservoirs. The excess water during monsoon period after generation is stored in these reservoirs which 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 multipurpose storage schemes are operated for more than one purpose with irrigation, water supply, flood control, pisciculture, navigation, etc. as primary objectives and power generation as incidental. Reservoir based schemes afford greater utilization of the available inflows approaching to long term average inflows resulting in greater firm power benefits. These schemes are the source of flexible generation and can be operated as base load or peaking station depending upon the requirement of the Grid System.

3.2 Major Reservoir Based Stations

CEA is presently monitoring 44 H.E. Stations of aggregate installed capacity of 18232.35 MW in the country on 37 major reservoirs as listed below:

S. No.	H.E. Stations	Installed Capacity (MW)	Utility	State	Reservoirs	
					Name	Multipurpose (MP)/ Storage (S) for Power Only
	Northern Region					
1	Bhakra (L)	594	BBMB	Himachal Pradesh	Bhakra	MP
2	Bhakra (R)	785	BBMB		Pong	MP
3	Pong	396	BBMB			
4	Chamera-I	540	NHPC	Himachal Pradesh	Chamera	S
5	Ranjit Sagar	600	PSPCL	Punjab	Ranjit Sagar	MP
6	Tehri	1000	THDC	Uttarakhand	Tehri	MP
7	Ram Ganga	198	UJVNL	Uttarakhand	Ram Ganga	MP
8	Rihand	300	UPJVNL	Uttar Pradesh	Rihand	MP
9	RP Sagar	172	RRVUNL	Rajasthan	RP Sagar	MP
Sub-Total (NR)		4585				

S. No.	H.E. Stations	Installed Capacity (MW)	Utility	State	Reservoirs	
					Name	Multipurpose (MP)/ Storage for Power Only
	Western Region					
10	Ukai	300	GSECL	Gujarat	Ukai	MP
11	Sardar Sarovar (RBPH)	1200	SSNNL	Gujarat	Sardar Sarovar	MP
12	Gandhi Sagar	115	MPPGCL	Madhya Pradesh	Gandhi Sagar	MP
13	Bansagar-III	60	MPPGCL	Madhya Pradesh	Bansagar	MP
14	Indira Sagar	1000	NHDC	Madhya Pradesh	Indira Sagar	MP
15	Koyna-I&II	600	MAHAGENCO	Maharashtra	Koyna	MP
16	Koyna-IV	1000	MAHAGENCO	Maharashtra		
17	Koyna DPH	36	MAHAGENCO	Maharashtra		
18	Pench	160	MPPGCL	Maharashtra	Pench	MP
19	Bhira	150	TPCL	Maharashtra	Bhira	MP
20	Bhira PSS	150				
Sub-Total (WR)		4771				
	Southern Region					
21	Upper Sileru	240	APGENCO	Andhra Pradesh	Sileru	S
22	Lower Sileru	460	APGENCO	Andhra Pradesh		
23	Srisaillam RB	770	APGENCO	Andhra Pradesh	Srisaillam	MP
24	NJ Sagar	815.60	TSGENCO	Telangana	Nagarjuna Sagar	MP
25	Sharavathy	1035	KPCL	Karnataka	Sharavathy	S
26	Kalinadi	855	KPCL	Karnataka	Supa	S
27	Supa DPH	100	KPCL	Karnataka		
28	Almatti	290	KPCL	Karnataka	Almatti	MP
29	Varahi	460	KPCL	Karnataka	Varahi	S
30	Idukki	780	KSEB	Kerala	Idukki	MP
31	Sabarigiri	300	KSEB	Kerala	Sabarigiri	MP
32	Pallivasal	37.50	KSEB	Kerala	Madupetty	S
33	Idamalayar	75	KSEB	Kerala	Idamalayar	MP
34	Mettur Dam	50	TANGEDCO	Tamil Nadu	Mettur	MP

S. No.	H.E. Stations	Installed Capacity (MW)	Utility	State	Reservoirs	
					Name	Multipurpose (MP)/ Storage for Power Only
35	Mettur Tunnel	200	TANGEDCO	Tamil Nadu	Mettur	MP
36	Periyar	161	TANGEDCO	Tamil Nadu	Periyar	MP
Sub-Total (SR)		6629.10				
Eastern and North Eastern Region						
37	Machkund	114.75	APGENCO	Odisha	Machkund	MP
38	Hirakud I	275.50	OHPC	Odisha	Hirakud	MP
39	Hirakud II	72				
40	Balimela	510	OHPC	Odisha	Balimela	MP
41	Indravati	600	OHPC	Odisha	Indravati	MP
42	Upper Kolab	320	OHPC	Odisha	Upper Kolab	MP
43	Rengali	250	OHPC	Odisha	Rengali	MP
44	Loktak	105	NHPC	Manipur	Loktak	MP
Sub-Total (ER/NER)		2247.25				
Total (All India)		18232.35				

Salient details of 37 Nos. Major reservoirs are indicated in **Annex-3.1**. These stations constitute about 40.16% (31.95% Multipurpose & 8.21% Storage for power only) of the total hydel installed capacity and generated about 34.77% (20.34% Multipurpose & 14.43% Storage for power only) of the total Hydel generation during 2019-20 as briefly indicated in **Table-3.1**.

TABLE - 3.1

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

S. No.	Description	Major Reservoir Based Stations		Other Stations	Total
		Multipurpose (MP)	Storage for Power only		
1.	Installed Capacity (MW)	14505	3728	27467	45699
	Percentage of Total (%)	31.95	8.21	59.84	100
2.	Energy Generation (MU)	31690.5	22480.2	101598.3	155769
	Percentage of Total (%)	20.34	14.43	65.22	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 2019-20 vis-à-vis 2018-19 are given at **Exhibit 3.1**. Inflows into the reservoirs and generation during the year 2018-19 vis-à-vis 2017-18 and 10 years average is given below at **Table-3.2**.

TABLE 3.2
HYDRO RESERVOIRS (STORAGE TYPE) - INFLOW & ENERGY GENERATION

S. No.	STATION	Inflows				Generation			
		10 years Average (MCM)	2018-19 (MCM)	2019-20 (MCM)	2019-20 Inflow as % of 2018-19 inflow	10 years Average (MU)	2018-19 (MU)	2019-20 (MU)	2019-20 generation as compared to 2018-19 (%)
1	2	3	4	5	6= (5/4*100)	7	8	9	10= (9/8*100)
Northern Region									
1	Bhakra	17369	16326	19254.73	117.9	5467	4238	6129.17	145
2	Pong	8843	10096	8810.78	87.3	1579	1513	1411.17	93
3	Ranjit Sagar	6298	6763	7199	106.4	1715	1455	2099.21	144
4	Chamera-I*	6156	6339	6920	109.2	2474	2485	2662.81	107
5	Tehri	7378	7148	6979.6	97.6	3283	3172	3041.74	96
6	Ram Ganga	3359	1571	1395.33	88.8	277	188	154.62	82
7	RP Sagar	4127	0	15891.15	-	353	334	54.53	16
8	Rihand	5119	4841	4623.4	95.5	547	562	458.5	82
Sub Total (NR)		58648	53084	71073.99	133.9	15695	13947	16011.75	115
Western Region									
9	Ukai	7229	2687	18695.79	695.8	522	211	767	364
10	Sardar Sarovar	28585	10480	10480.2	100.0	2497	0	3243	-
11	Gandhi Sagar	4220	2085	19451.27	932.9	270	250	34	14
12	Bansagar*	4677	5629	6320	112.3	83	85	139	163
13	Pench*	987	457	1771	387.5	316	132	217	165
14	Indira Sagar	22922	13734	37753	274.9	2536	1309	2877	220
15	Koyna	3535	4425	2295.37	51.9	1146	2768	3740	135
16	Bhira	907	1087	1568.13	144.3	626	910	841	92
Sub Total (WR)		73062	40584	98334.76	242.3	7996	5665	11858	209
Southern Region									
17	Srisaillam	18783	2301	47184.1	2050.6	935	551	1339	243
18	Upper Sileru*	2199	4373	3019	69.0	462	476	641	135

S. No.	STATION	Inflows				Generation			
		10 years Average (MCM)	2018-19 (MCM)	2019-20 (MCM)	2019-20 Inflow as % of 2018-19 inflow	10 years Average (MU)	2018-19 (MU)	2019-20 (MU)	2019-20 generation as compared to 2018-19 (%)
19	Lower Sileru*	3255	16501	4426.38	26.8	1089	1094	852	78
20	N.J. Sagar	81411	9810	39265	400.3	79	151	181	120
21	Sharavathy	4520	5537	6721	121.4	4384	4786	5136	107
22	Supa	2668	3237	4330.68	133.8	438	596	584	98
23	Almatti	12367	14171	14142.5	99.8	450	408	632	155
24	Varahi*	491	870	763	87.7	1028	1244	1184	95
25	Idukki	1581	2300	1901.37	82.7	2223	2920	1830	63
26	Sabirigiri	874	1396	1246.74	89.3	1210	1516	1113	73
27	Madupetty	216	137	110	80.3	197	185	142	77
28	Idamalayar	1124	2035	862.02	42.4	304	346	261	75
29	Mettur	5156	10635	7348.39	69.1	288	589	518	88
30	Periyar	576	1047	622.13	59.4	395	703	502	71
Sub Total (SR)		135222	74350	131942.29	177.5	12085	15565	14915	96
Eastern Region									
31	Machkund	1255	1963	1692	86.2	564	594	670	113
32	Hirakud	25715	20964	26806.2	127.9	845	549	790	144
33	Balimela	3530	5771	4973.53	86.2	1223	1732	1521	88
34	Indravati	3209	3009	7576.16	251.8	1936	2142	2253	105
35	Upper Kolab	1981	1982	1797.04	90.7	717	923	829	90
36	Rengali	9628	9340	11915.52	127.6	693	838	665	79
Sub Total (ER)		43318	43029	54760.45	127.3	5977	6778	6728	99
North Eastern Region									
37	Loktak	2522	2522	1123	44.5	580	603	367	61
Sub Total (NER)		2242	2522	1123	45	580	603	367	61
Total (All India)		314491	213569	357234.5	167	43732	42557	49881	117

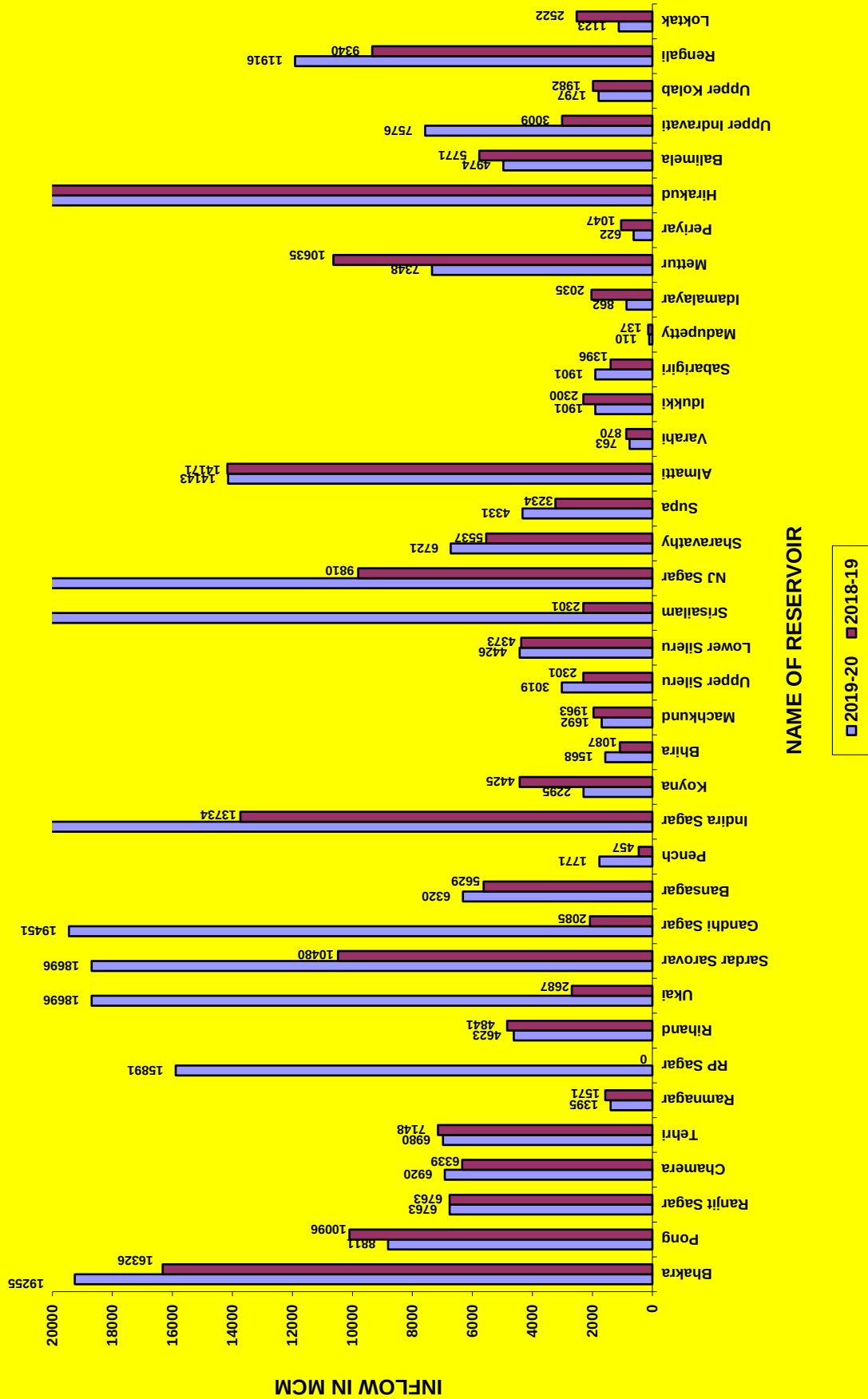
* Only 4 years average inflows available.

3.4 Reservoir Levels

The maximum reservoir level attained during the year depends on the depleted reservoir level in the preceding year, besides the inflows during the current year. Water level touched FRL at Chamera, Bansagar, Koyna, Bhira, Lower Sileru, Almatti, Sabirigiri, Madupetty, Idamalayar, Mettur, Periyar, Rengali and Loktak reservoirs during 2017-18. Month-wise maximum levels of major reservoirs during 2018-19 vis-à-vis 2017-18 are indicated at **Exhibits 3.2** to **Exhibits 3.11**.

EXHIBIT 3.1

INFLOWS INTO MAJOR RESERVOIRS DURING 2019-20 VIS-A-VIS 2018-19



MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

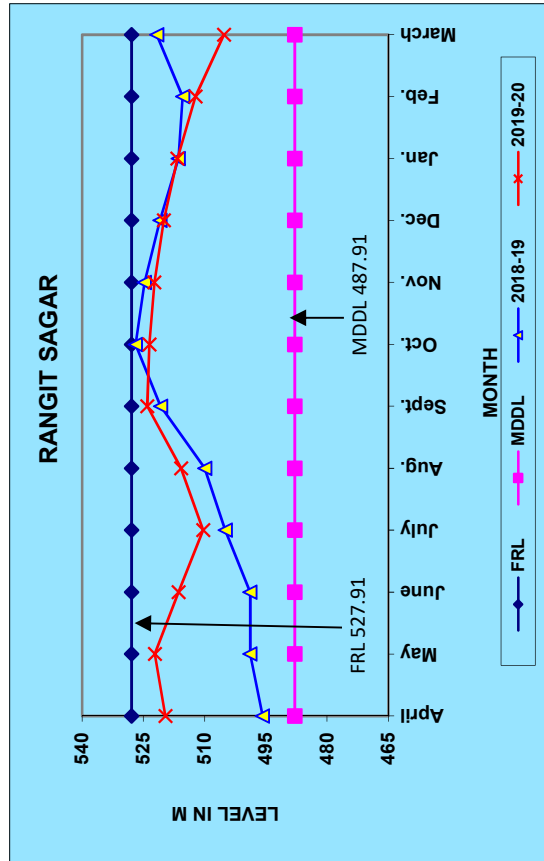
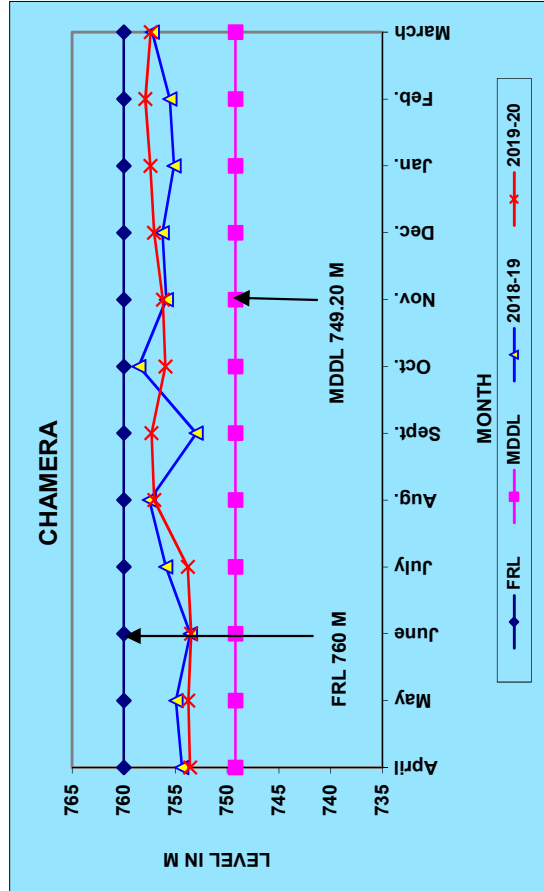
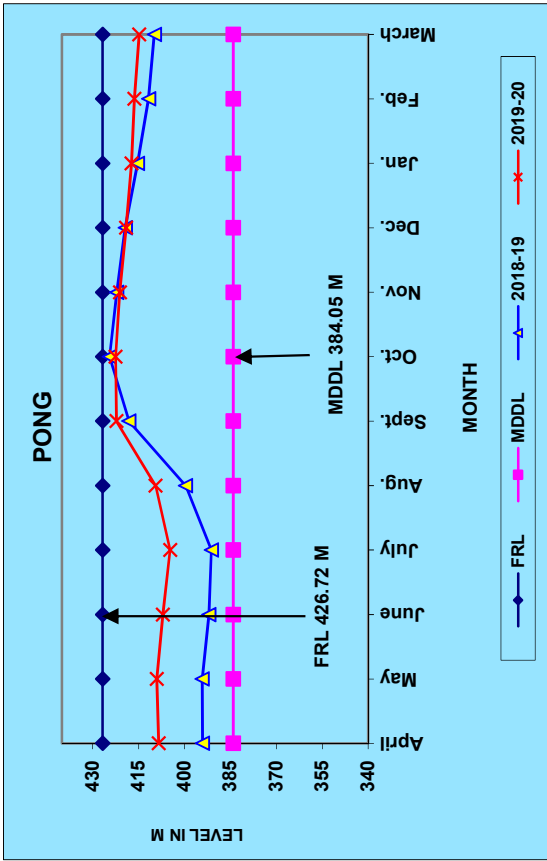
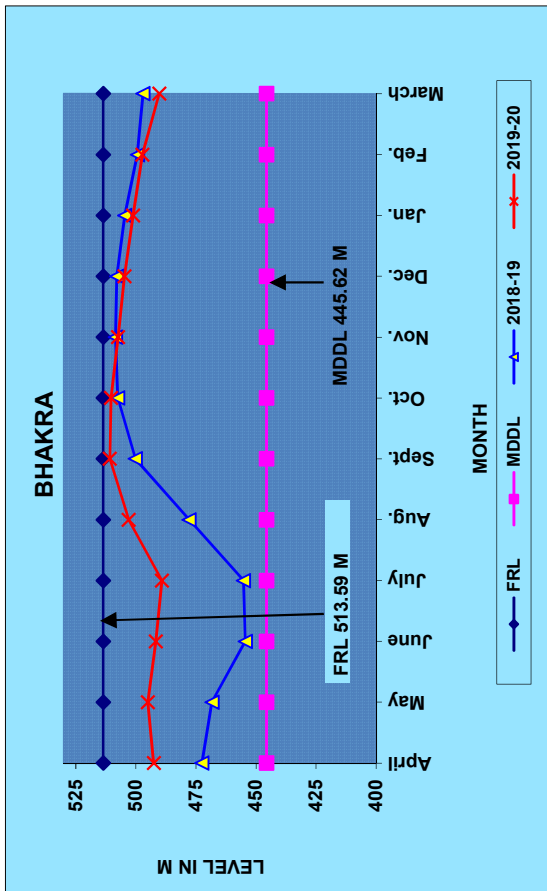
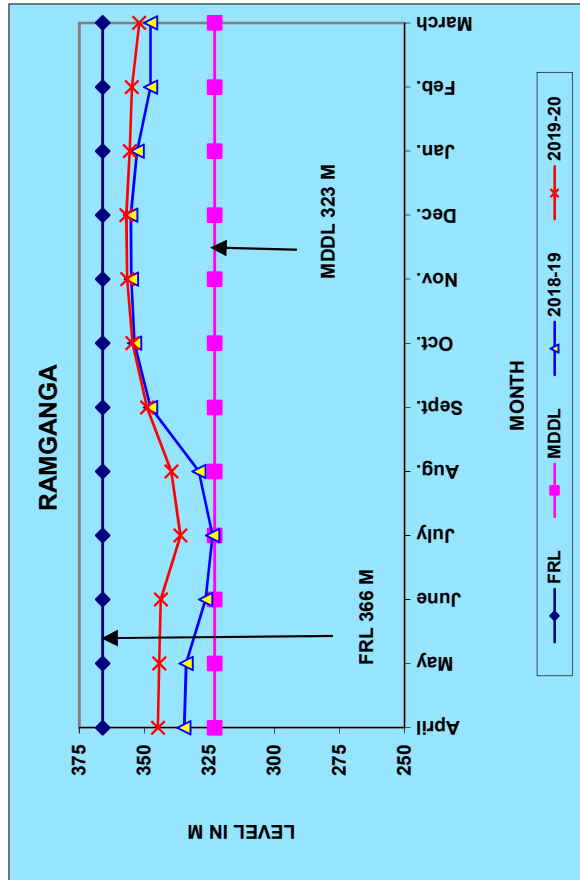
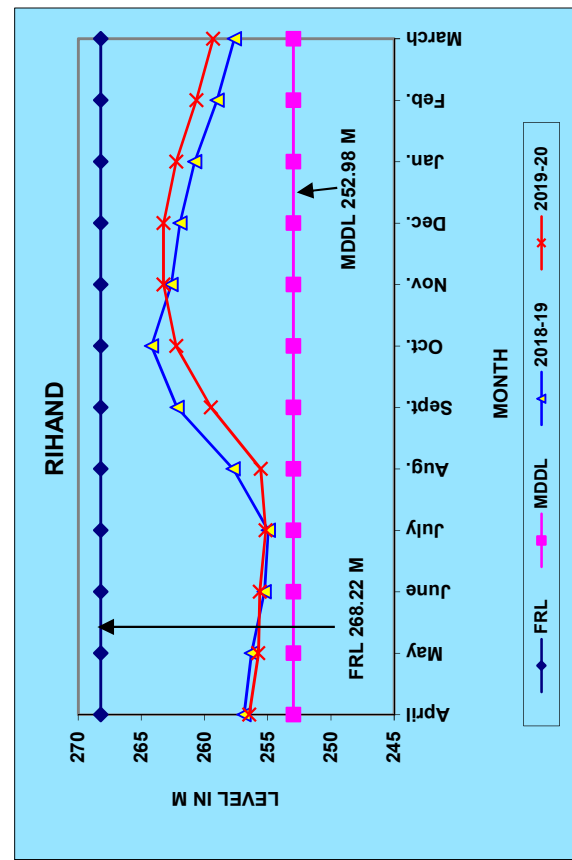
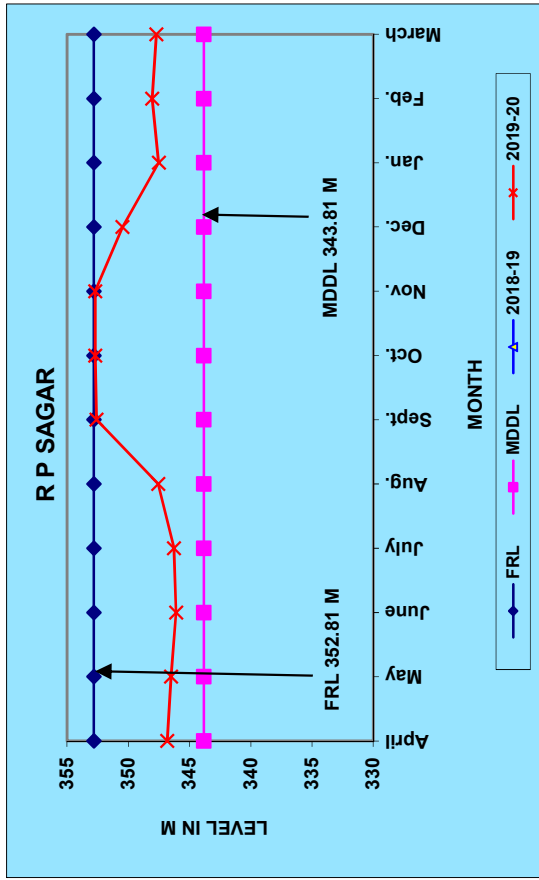
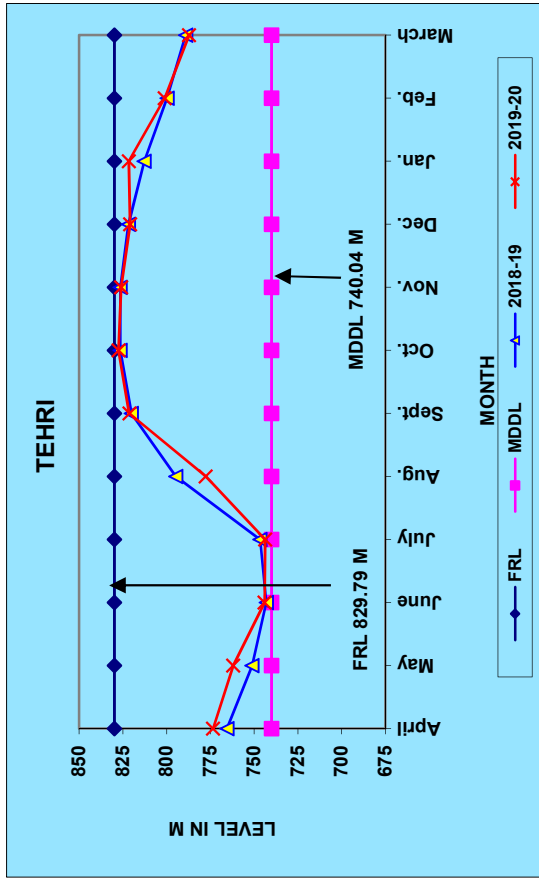


EXHIBIT 3.3

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

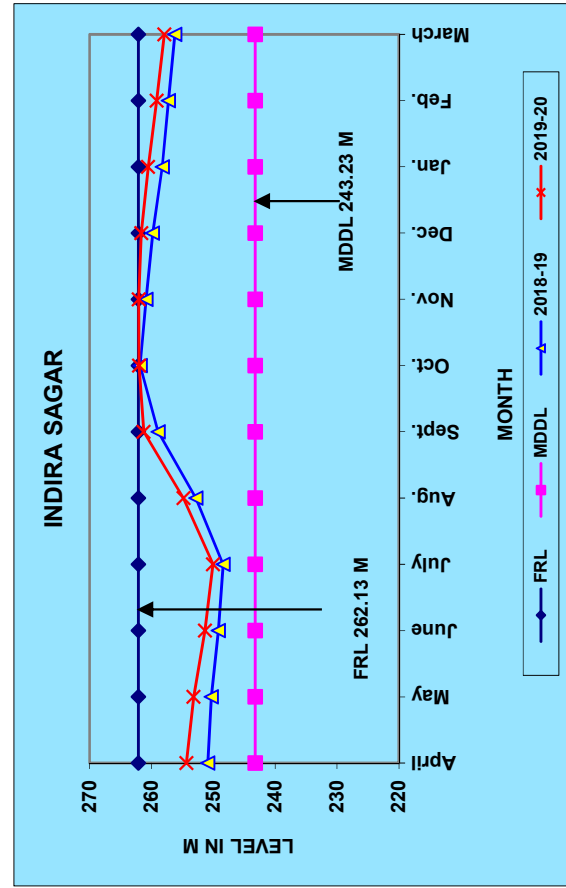
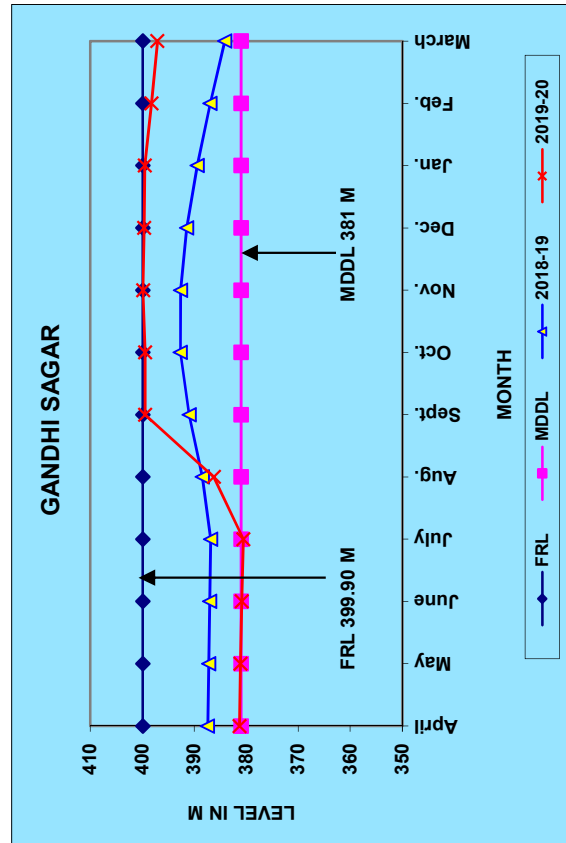
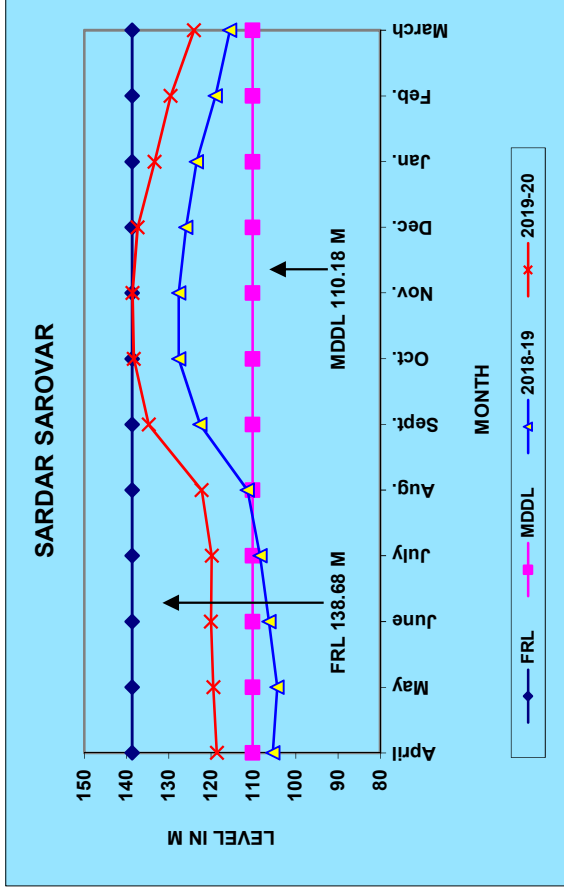
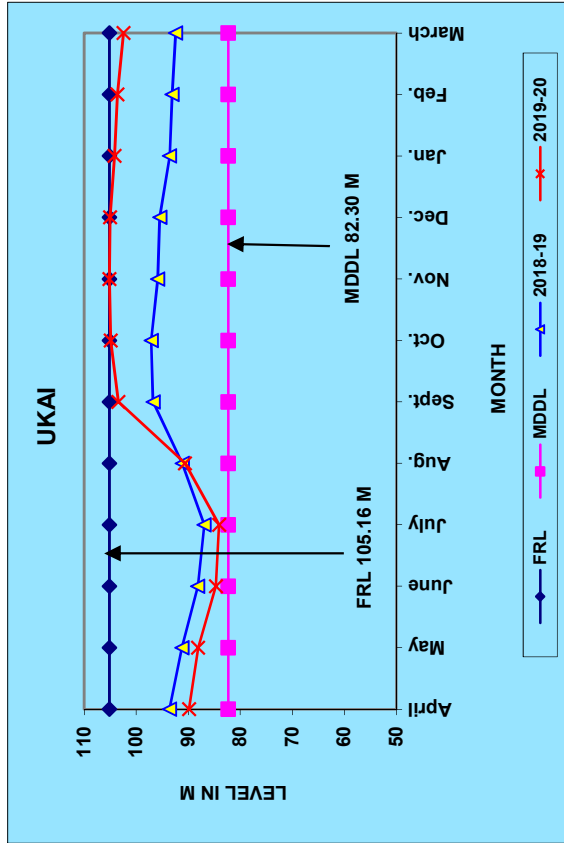
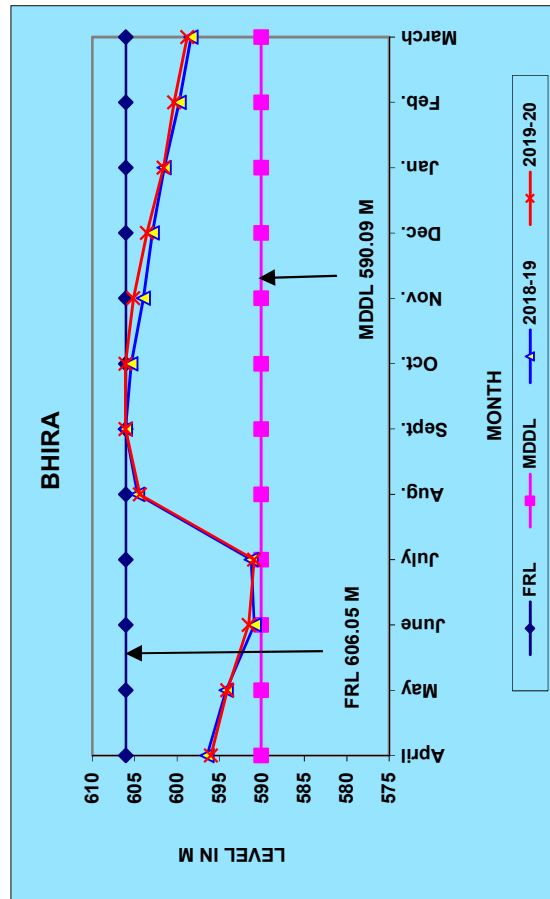
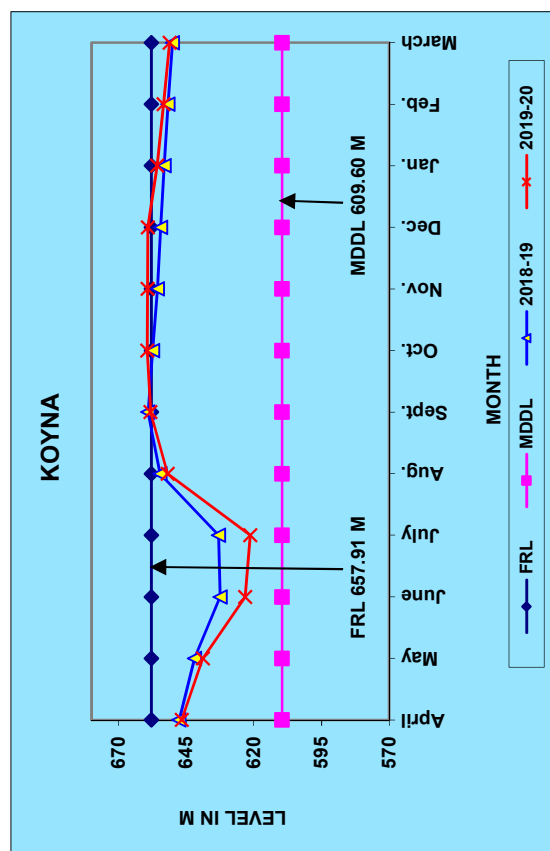
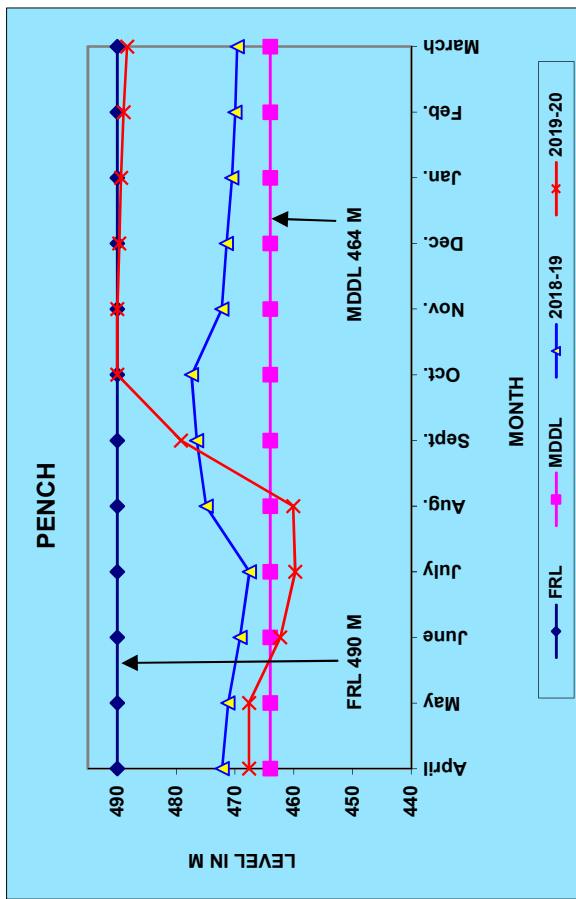
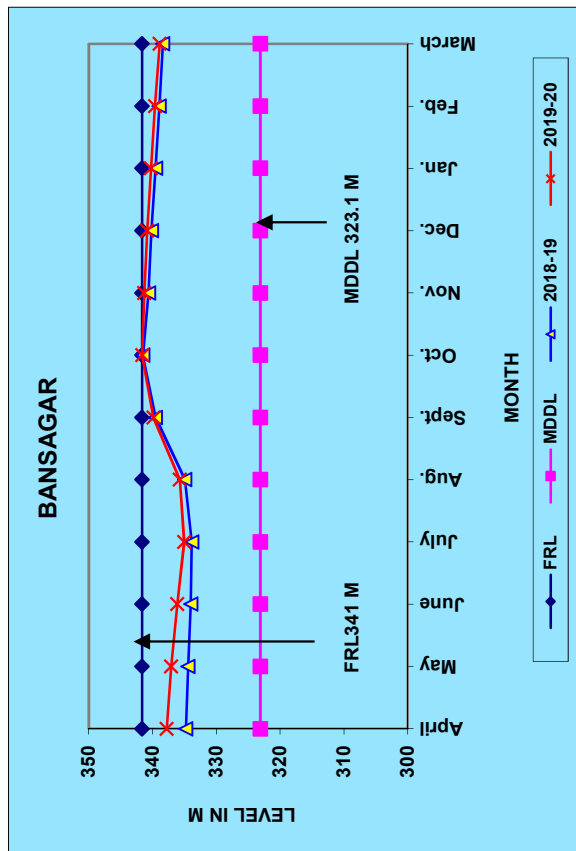
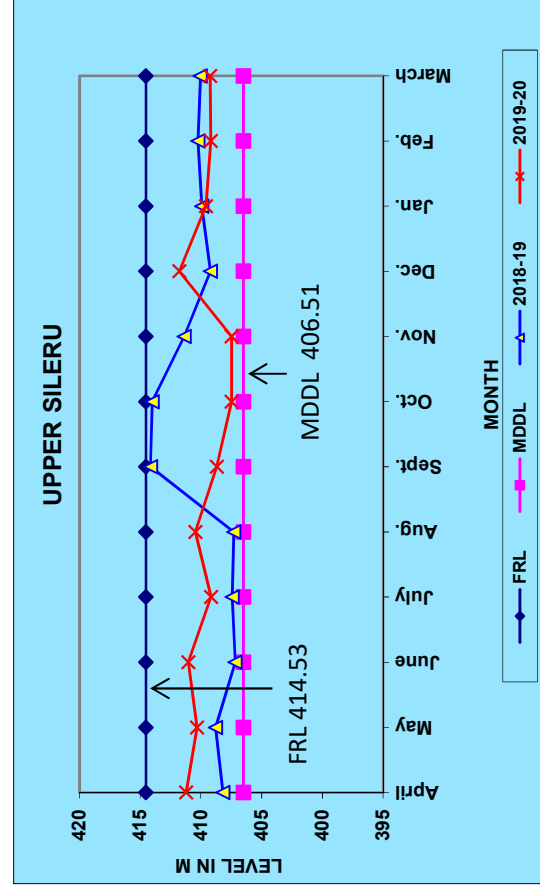
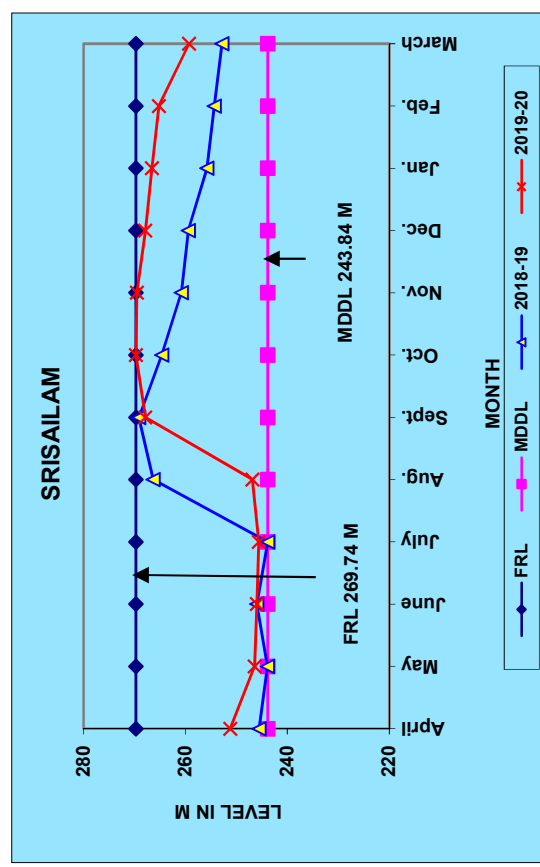
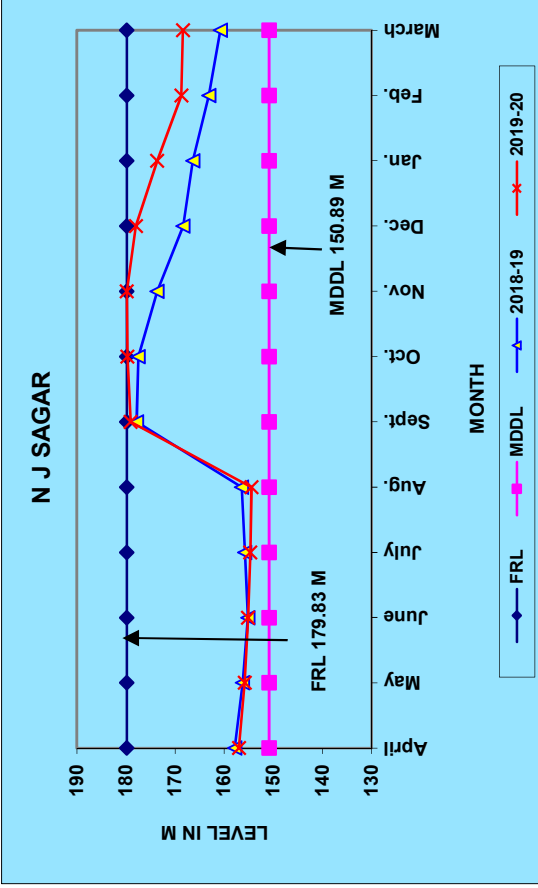
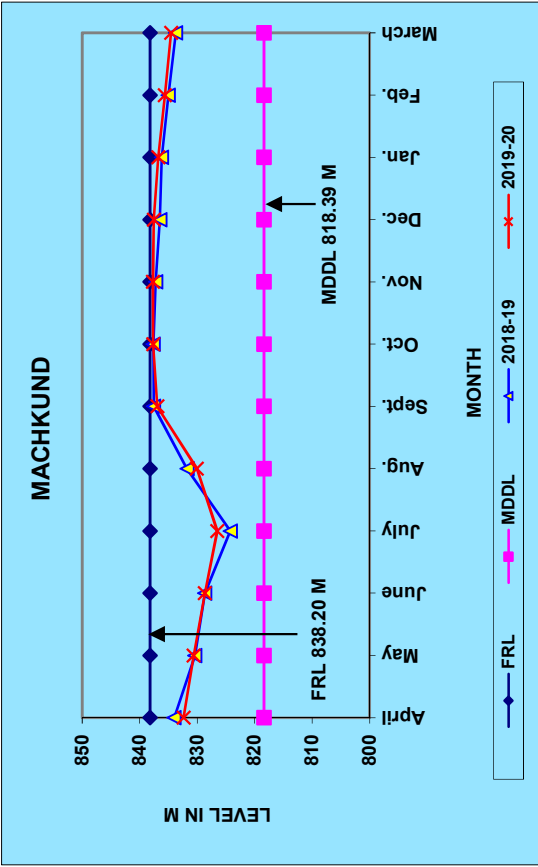


EXHIBIT 3.5

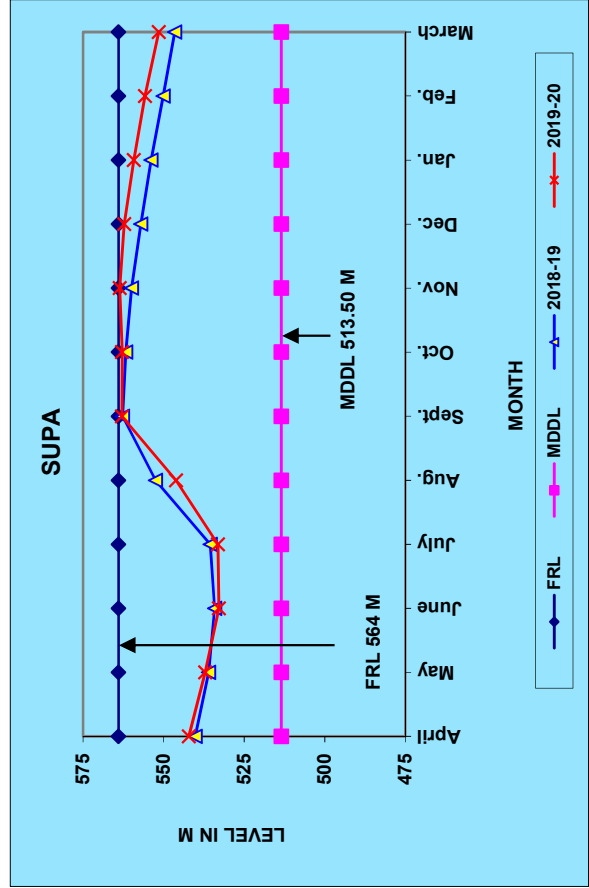
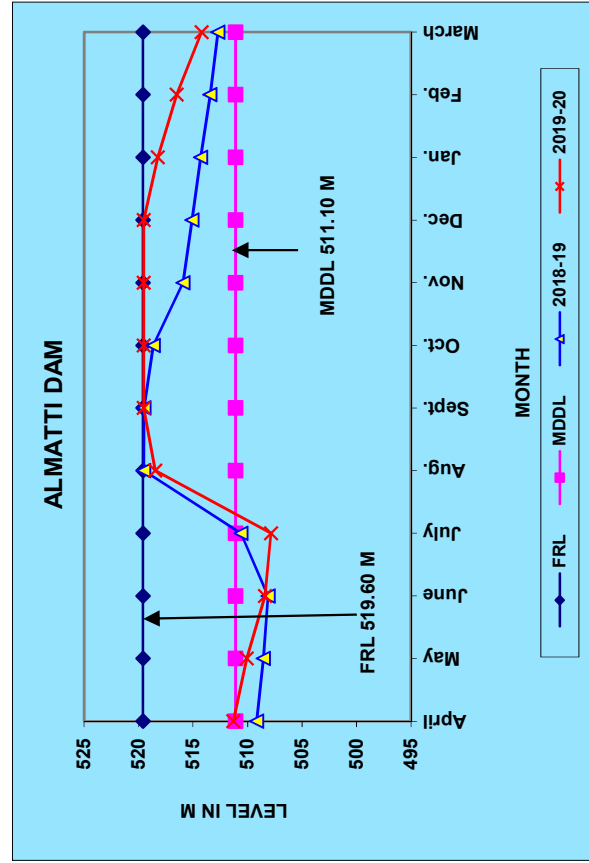
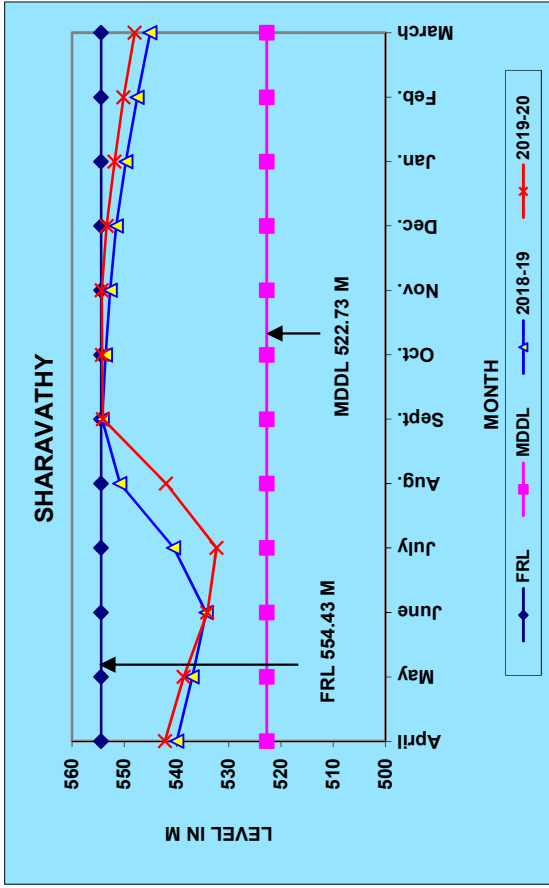
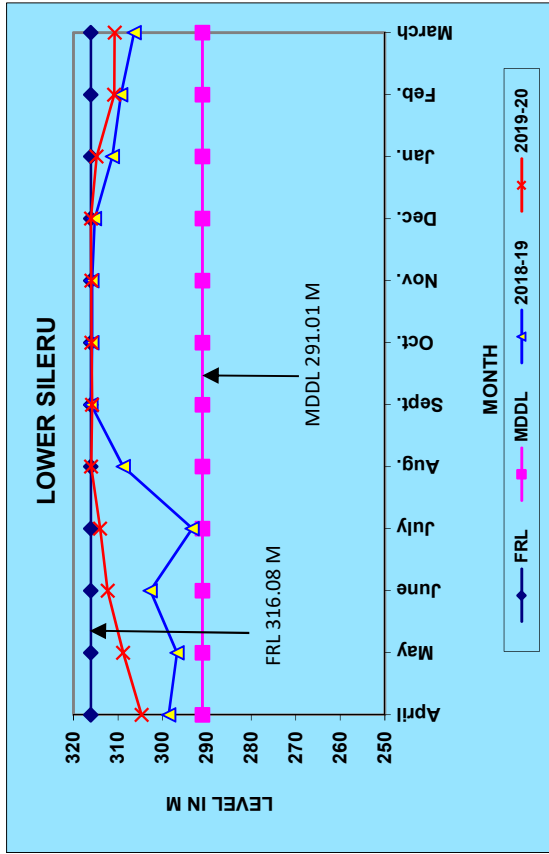
MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



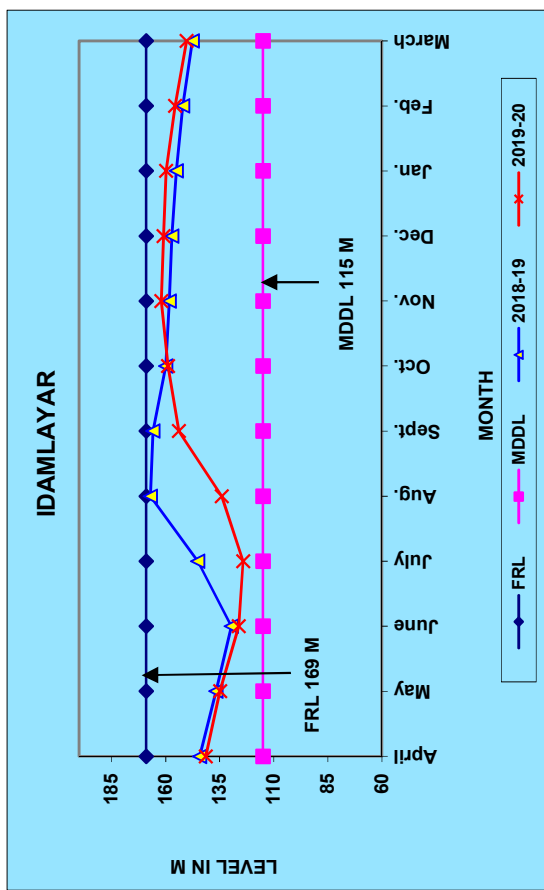
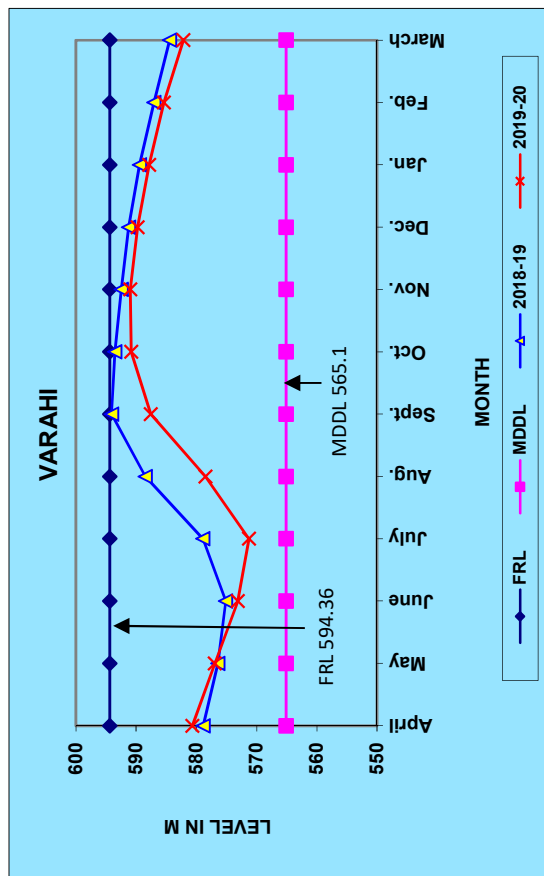
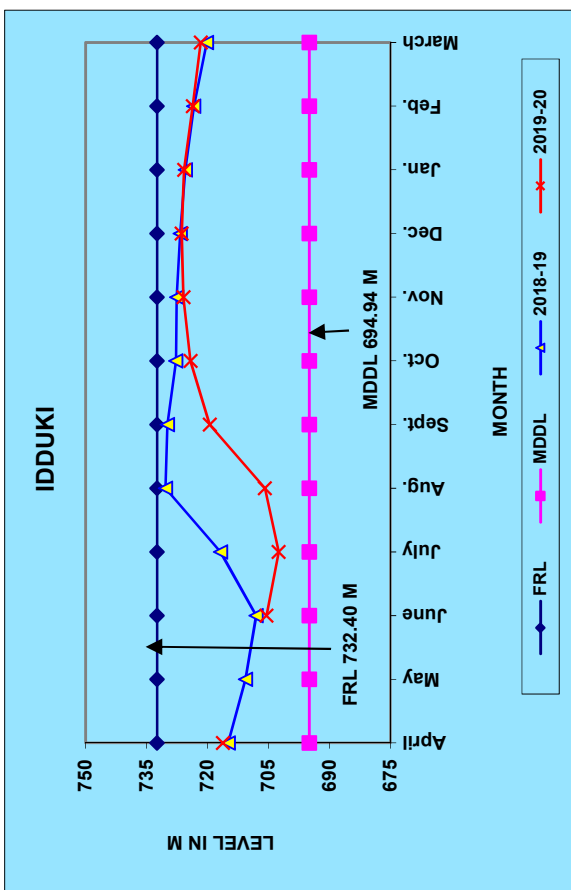
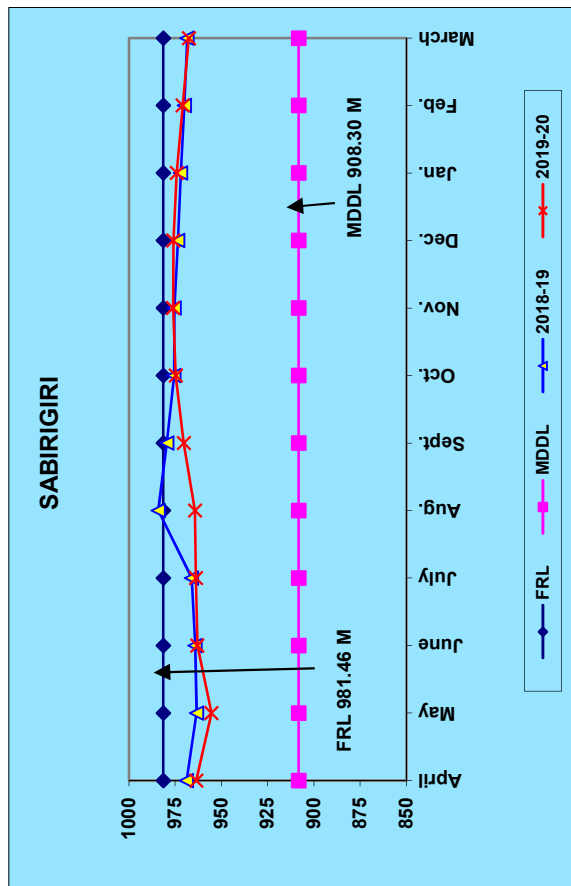
MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



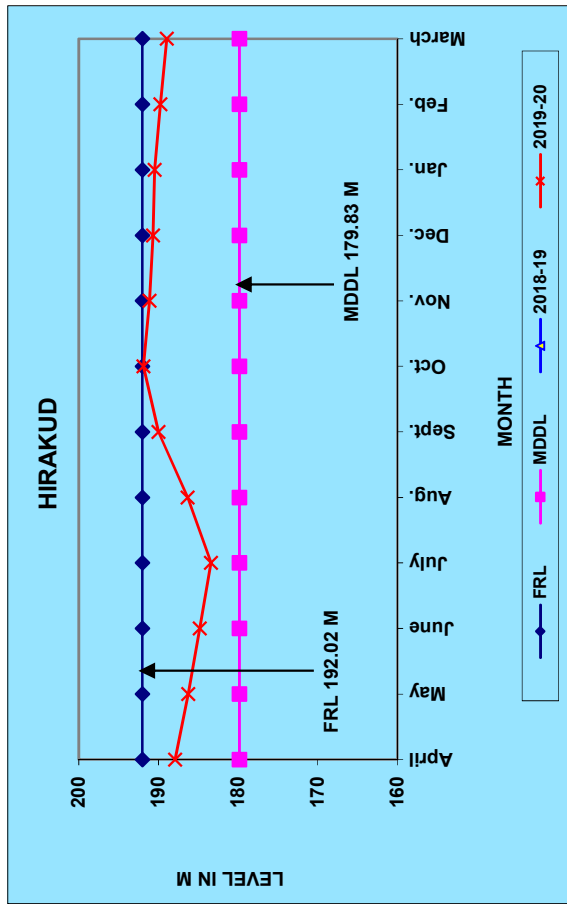
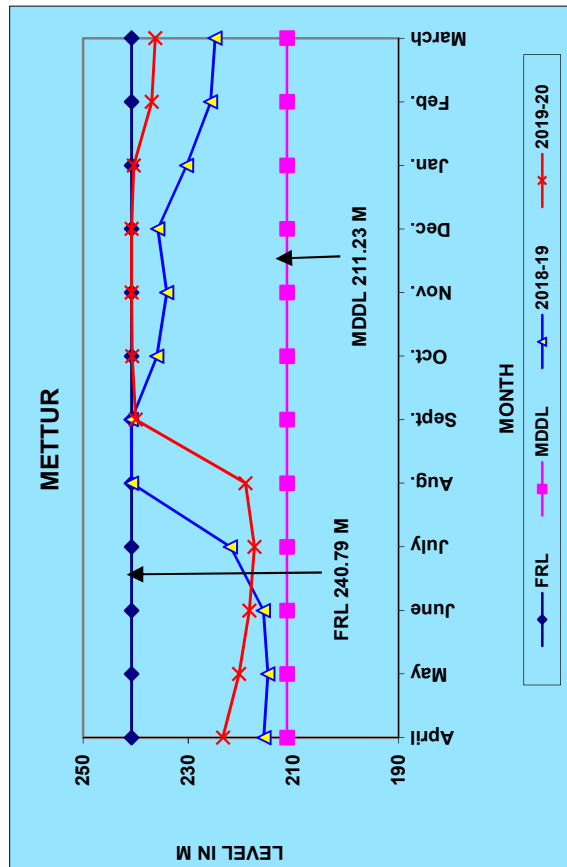
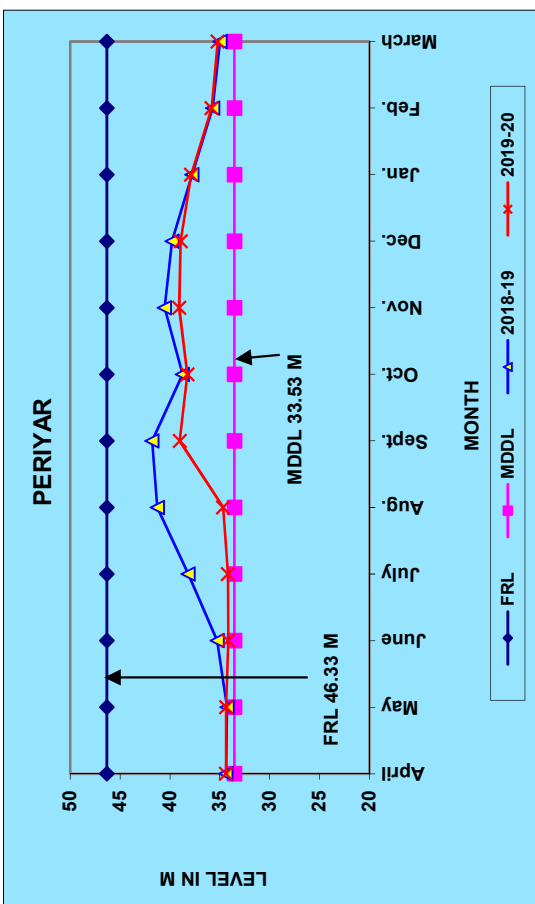
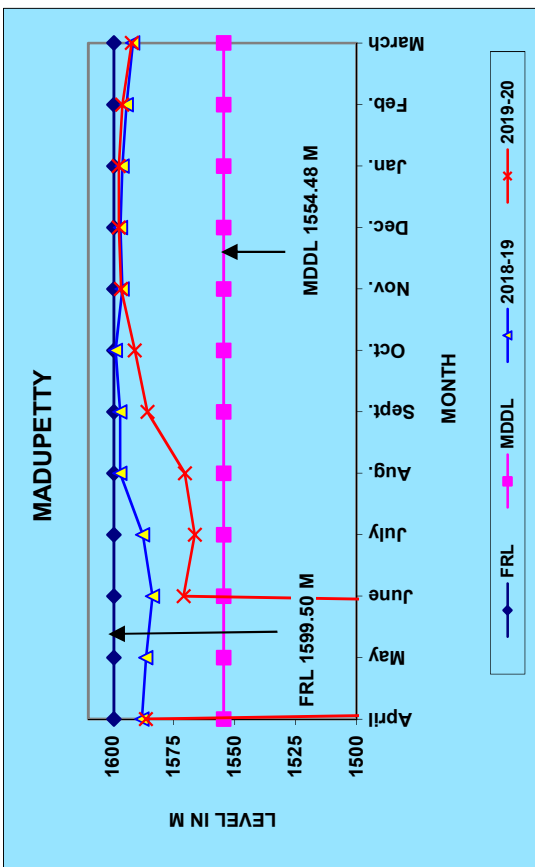
MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



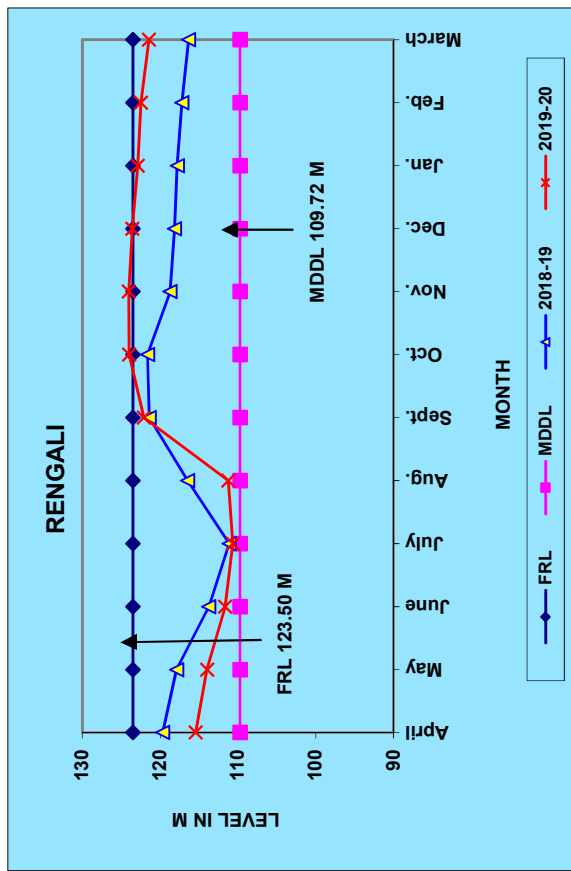
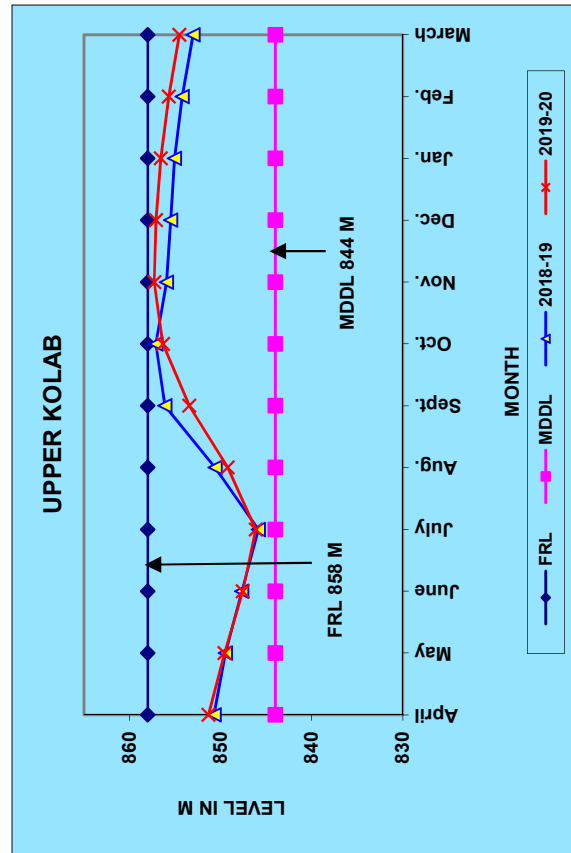
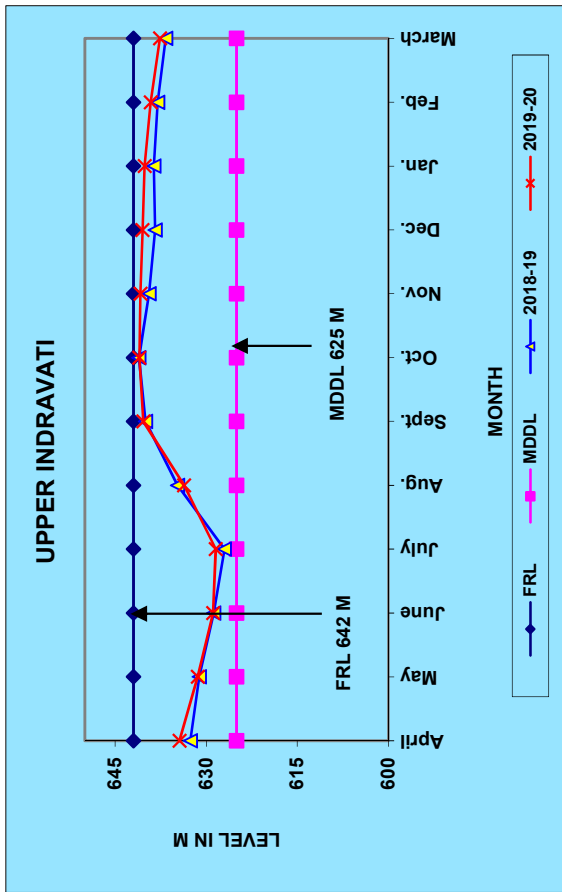
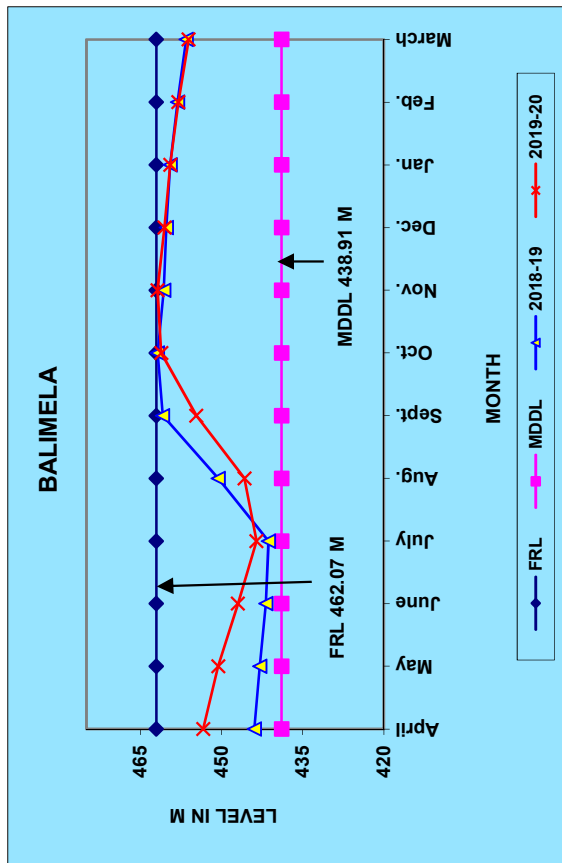
MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



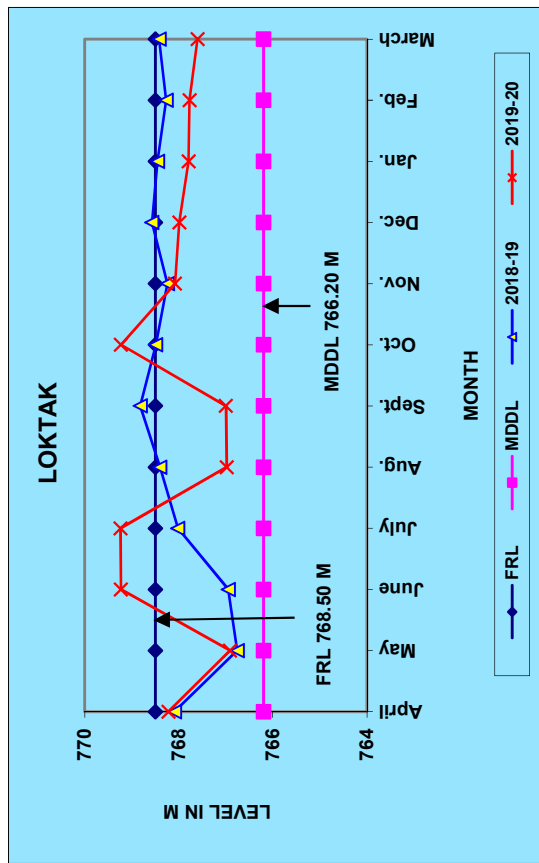
MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



3.5 Generation

Generation from reservoir (storage) based H.E. Stations during the year, apart from priorities of releases for other purposes like irrigation, drinking water etc., depends on various factors such as water level of the reservoir at the end of the preceding year, inflows during the year, draw down level by the end of the year, availability of generating units etc. In 27 Nos. out of 44 Nos. reservoir based hydel stations, annual generation during the year 2019-20 was more than the annual generation targets. Generation from 44 H.E. Stations on 37 major reservoirs during the year 2019-20 has been 50504.71 MU, showing increase by 12.13% over the 2018-19 generation of 45041.23 MU. Station-wise generation of reservoir stations during the year 2019-20 as compared to that of last year 2018-19 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:

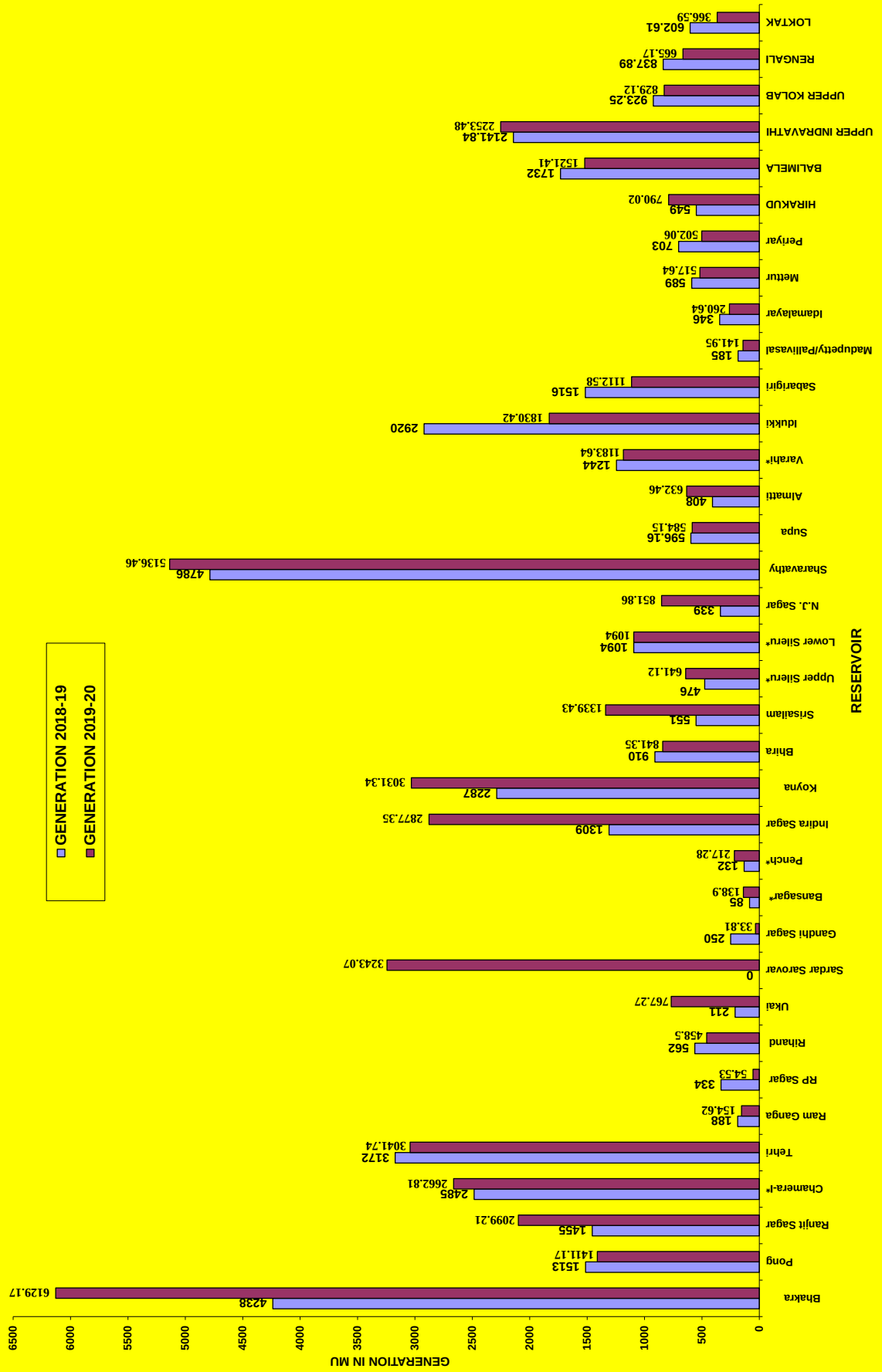
TABLE 3.3

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	18	37.83	Bhakra L&R, Pong, Ranjit Sagar, Ukai, Indira Sagar, Koyna DPH, Koyna St.I&II Srisaillam RB, Upper sileru I & II, Almatti Dam Kalinadi, Mettur, Periyar, Balimela, Machkund, Regali, Mettur Tunnel.
2	110 - 120	8	18.91	Chamera-I, Bhira PSS, Supa DPH, Sharavathy, Varahi, N.J.Sagar PSS, Upper Indravati, Upper Kolab,
3	100 - 110	1	2.07	Tehri.
4	Below 100	17	40.54	R.P. Sagar, Rihand, Ram Ganga, Sardar Sarovar RBPH, Bansagar Tons-III, Gandhi Sagar, Koyna IV, Pench, Bhira, Lower Sileru, Idamalayar, Idukki, Pallivasal, Sabarigiri, Hirakud I&II, Loktak (Manipur).

Generation of major reservoir based H.E. stations during 2019-20 as compared to the generation during last year i.e. 2018-19 is also depicted at **Exhibit-3.12**.

GENERATION FROM RESERVOIR (STORAGE) BASED HYDROELECTRIC STATIONS DURING 2019-20 VIS-A-VIS 2018-19



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

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2019	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2019-20			
						GROSS : LIVE			Max.	DATE	Min	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)				
NORTHERN REGION												
1	Bhakra	1379.00	3924	513.59	445.62	8321	6516	1729.00	512.31	20.08.2019	488.96	25.06.2019
a	Bhakra Left	594.00	3924									
b	Bhakra Right	785.00										
2	Pong	396.00	1123	426.72	384.05	8053	6946	1084.00	423.20	11.09.2019	404.32	06.07.2019
3	Chamera	540.00	1664.56	760.00	749.20		87		759.82	10.09.2019	751.83	13.05.2019
4	Ranjit Sagar	600.00	1507	527.91	487.91	3292	2191	390.00	524.76	26.8.19	503.65	9&10.3.20
5	Tehri	1000.00	2797	829.79	740.04	3540	2615	1291.49	827.85	06.10.2019	741.24	24.06.2019
6	Ramganga	198.00	334	366	323	2503.96	2109.25	480.80	1171.19	4.12.2019	1102.01	03.07.2019
7	Rana Pratap Sagar	172.00	459	352.81	343.83	2901	1569	175.66	353.28	16.09.2019	346.06	31.05.2019
8	Rihand	300.00	920	268.22	252.98	10605	5723	1177.00	863.80	5.11.2019	836.90	04.07.2019
	Sub-Total NR	4585.00	12728.56				27756.25		5436.21		5174.97	
WESTERN REGION												
9	Ukai	300.00	1080	105.16	82.30	8515	6615	813.00	105.16	11.10.2019	275.84	30.06.2019
10	Sardar Sarovar	1200.00	3635	138.68	110.18	9460	5760	1817.553	138.60	01.11.2019	118.64	01.04.2019
11	Gandhi Sagar	115.00	420	399.90	381.00	7743	6911	725.00	1318.80	15.09.2019	1247.57	25.06.2019
12	Bansagar	60.00	143	341.64	323.10		4934		341.65	28.09.2019	334.97	04.07.2019
13	Pench	160.00	315	490.00	464.00		1045		490	01.10.2019, 01.11.2019	458.5	29.06.2019
14	Indira Sagar	1000.00	1980	262.13	243.23	12237	9706	1316.12	262.13	21.09.19, 03.10.19	250.06	01.07.2019
15	Koyna	1636.00	3030	657.91	609.60	2797	2677	3126.00	2163.40	30.09.19, 21.10.19	630.17	22.06.2018
a	Koyna-I & II	600.00	3030									
c	Koyna-I & II	1000										
d	Koyna DPH	36										
16	Bhira	300	775	606.05	590.09	523	522	619	1988.52	11.08.19, 01.09.19, 01.10.19	1935.0394	28.06.2019
	Sub-Total WR	4771.00	11378.84				38170.33					
SOUTHERN REGION												
17	Upper Sileru	240.00	529	414.53	406.51		88		1356.80	30.10.2019	1336.90	01.10.2019
18	Lower Sileru	460.00	1070	316.08	291.01		365		1037.00	12.08.19, 30.09.19, 06.10.19,13.11.19,02 .12.19	1036.10	01.09.19
19	Srisaillam	770.00	2900	269.74	243.84	8723	7166	1548.00	885.00	21.08.19, 22.09.19, 01.10.19	804.10	28.07.19
20	Nagarjuna Sagar	815.60	2237	179.83	150.89	11560	6538	1398.00	590.00	04.08.19, 05.09.19, 21.10.19, 30.11.19	506.70	04.08.19
21	Sharavathy	1035.00	4932	554.43	522.73	5310	4297	4394.00	554.43	18.10.2019	531.41	27.06.2019
22	SUPA	955.00	3927	564.00	513.50	938	3758	3927.00	563.72	27.10.2019	531.34	26.06.2019

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

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2019	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2019-20			
						GROSS : LIVE			Max.	DATE	Min	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)				
23	Almatti	290.00	483	519.60	511.10	2631.50	2628.00	175.30	519.53	24.08.2019	507.85	30.06.2019
24	Varahi	460.00	1060	594.36	565.10		881.50		591.02	28.10.2019	LI	23.06.2019
25	Idukki	780.00	2398	732.40	694.94	1996	1459	2146.00	726.68	20.11.2019	702.55	30.06.19
26	Sabirigiri	300.00	1338	981.46	908.30	454	447	764.00	976.10	08.12.19	963.20	30.04.19
27	Madupetty	37.50	284	1599.50	1554.48		55.32	77.40	1598.05	15.12.2019	1566.30	30.06.2019
28	Idamalayar	75.00	380	169.00	115.00		1017.80	254.45	162.03	04.11.2019	124.12	30.06.2019
29	Mettur	250.00	541	240.79	211.23	2708.80	2645.20	204.00	241.08	09.09.2019	216.14	22.07.2019
30	Periyar	161.00	409	46.33	33.53	443	299	216	131.15	09.09.2019	112.00	29.05.2019, 03.06.2019, 18.07.2019
	Sub-Total SR	6629.10	22488.00				31645					
EASTERN REGION												
31	Machkund	114.75	670	838.20	818.39	970	893	552.00	2749.25	07.09.2019	2710.10	06.07.2019
32	Hirakud	347.50	1174	192.02	179.83	4823	4709	372.00	630	21.09.19, 01.10.19	598.39	27.07.19
33	Balimela	510.00	1183	462.07	438.91	3929	2676	898.00	1515.9	27.10.19	1451.1	25.07.19
34	Upper Indravati	600.00	1962	642.00	625.00	2300	1485.50	1213.14	641.25	06.09.19	628.30	21.06.19
35	Upper Kolab	320.00	832	858.00	844.00	1215	935.00	540	857.3	02.11.20	846.15	01.07.19
36	Rengali	250.00	525	123.50	109.72	3548	3167.81	275	124.27	10.10.19	110.5	27.06.19
	Sub-Total ER	2142.25	6346.00				13866					
NORTH EASTERN REGION												
37	Loktak	105	448	768.50	766.20	435.91	396.44	250	767.87	08.03.2019	764.47	10.03.2019
	Sub-Total NER	105	448				396.44					
	Total All India	18232.35	53389.40				111834.35					

CHAPTER-4

PLANNED MAINTENANCE OF THE UNITS

CHAPTER-4

PLANNED MAINTENANCE OF HE UNITS

4.1 For the purpose of studies and analysis of performance in respect of availability of H.E. Stations, outage data of 712 generating units installed in 205 Hydro Electric Stations was made available by various organizations. The studies indicate that a total of 241354 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 155 generating units whereas annual maintenance was carried out for 57 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: 2019-20

S.NO	Type of Maintenance	No. of Units	Duration (Hours)	
			Max. for any unit	Average
1	ANNUAL MAINTENANCE	57	8784	757.42
2	AUXILIARY SYSTEM	8	780.2	463.51
3	CAPITAL/3 YEARLY MTCE.	155	2672.07	560.37
4	GENERATOR	32	1704.5	218.01
5	HALF YEARLY MAINTENANCE	2	144.2	124.72
6	MONTHLY MAINTENANCE	24	15.75	16.31
7	OTHER EQUIPMENT	3	271.65	131.18
8	RENOVATION/MODERNISATION	15	8784	5159.39
9	ROUTINE MAINTENANCE	6	17	10.07
10	TURBINE	20	1042.5	96.83
11	MISCELLANEOUS	72	8784	1471.80

4.3 There were a total of 675 outages due to Planned Maintenance during the Year 2019-20, out of which about 51.85% were of duration up to 24 hours, while 28.89 % 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: 2019-20**

Sl. No.	Duration	Number of Outage	Maintenance % to total number of Outages
1	more than 10 days	195	28.89
2	Less than 6 hour	184	27.26
3	6 to 24 hours	166	24.59
4	1 to 10 days	130	19.26
	Total No. of Outages	675	100

4.4 Planned Maintenance age-wise

Planned maintenance carried out for different age groups of hydro generating units during the year 2019-20 is indicated in **Table 4.3**.

TABLE 4.3

**PLANNED MAINTENANCE AGE-WISE
PERIOD: 2019-20**

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	2019-20	2	300.00	0	0
2	2018-19	3	140.00	0	0
3	2017-18	16	795.00	7824	489
4	2016-17	18	1659.00	3312	184

5	2015-16	17	1516.00	4272	251
6	2010-11 to 2014-15	63	4437.02	37896	602
7	2005-06 to 2009-10	66	7077.00	30480	462
8	2000-01 to 2004-05	74	6741.80	38448	520
9	1989-90 to 1999-2000	86	5769.70	34464	401
10	1978-79 to 1988-89	124	7259.10	71448	576
11	1967-68 to 1977-78	81	5279.75	76872	949
12	Up to 1966-67	162	4724.85	119520	738
	Total	712	45699.20	241354	291

It is seen that the average non-availability of units due to planned maintenance is relatively higher in case of older units commissioned from 2010-11 to 2014-15 (496 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: 2019-20

Sl. No.	Type of Turbine	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	BULB	26	684.00	4885	188
2	FRANCIS	408	32022.57	135227	331
3	KAPLAN	133	4386.75	34969	263
4	PELTON	145	8605.90	66273	457
	Total	712	45699.20	241354	339

The average non-availability due to planned maintenance was maximum for Pelton turbine at 457 hrs. /unit followed by Francis units at 331 hrs. /unit, while it was minimum for Bulb units at 188 hrs. /unit.

4.6 Analysis based on Make of Generating Units

About 54% of the installed capacity of Hydro has been sourced from indigenous suppliers with BHEL alone accounting for about 43% of the capacity. The remaining 46% 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: 2019-20

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	308.00	43.00	19729.52	43.17	72633.98	235.82
2	Others	77.00	11.00	6316.00	13.82	18545.13	240.85
	SUB TOTAL	385.00	54.00	26045.52	56.99	91179.11	476.67
B- Imported							
3	SWITZERLAND	32.00	4.00	1002.20	2.19	2945.97	92.06
4	JAPAN	74.00	10.00	6168.20	13.50	29454.25	398.03
5	CANADA	38.00	5.00	3395.00	7.43	15834.50	416.70
6	FRANCE	11.00	2.00	429.20	0.94	8436.97	767.00
7	RUSSIAN FEDERATION	26.00	4.00	2804.00	6.14	16700.16	642.31
8	UNITED KINGDOM	62.00	9.00	1588.60	3.48	46737.47	753.83
9	UNITED STATES OF AMERICA	19.00	3.00	1986.00	4.35	2510.83	132.15
10	Others	65.00	9.00	2280.50	4.99	20517.21	315.65
	SUB TOTAL	327.00	46.00	19653.70	43.01	143137.35	3517.73
	TOTAL	712.00	100.00	45699.20	100.00	234316.46	3994.40

It is observed that during the year 2019-20, average non-availability due to planned maintenance of the units supplied by BHEL was 235 hrs. /unit.

Among the imported generating units, the average non-availability due to planned maintenance was the least for units supplied by Switzerland (92 hrs. /unit) and was maximum for units supplied by France (767 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: 2019-20

S.No	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Planned Maintenance
1	Northern	245	19023.27	4.12
2	Western	101	7392.00	2.64
3	Southern	246	11694.50	3.86
4	Eastern	84	5862.45	6.30
5	North Eastern	36	1727.00	4.89
	All India	712	45699.22	4.12

The non-availability of generating unit due to planned maintenance was least in Western Region (2.64%) followed by Southern Region at 3.86 %, whereas it was maximum in Eastern Region (6.30 %) followed by North-Eastern Region (4.89%).

The average non-availability of hydro electric units due to planned maintenance during the year 2019-20 was 4.12% as compared to 5.85% during the year 2018-19.

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 2019-20 vis-à-vis 2018-19 is summarized below in **Table 4.7**.

TABLE 4.7
NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2019-20 VIS-A-VIS 2018-19)

% Non-Availability due to planned maintenance	2019-20				2018-19			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	157	76.59	33471.32	73.24	162	79.41	38144.72	83.47
>5 to 10	28	13.66	7615.20	16.66	28	13.73	4118.60	9.01
>10 to 15	8	3.90	2015.00	4.41	5	2.45	987.00	2.16
>15 to 20	4	1.95	1006.00	2.20	5	2.45	1654.20	3.62
>20 to 25	1	0.49	32.00	0.07	0	0.00		
>25 to 30	3	1.46	685.50	1.50	2	0.98	301.50	0.66
above 30	4	1.95	874.20	1.91	2	0.98	193.20	0.42
Total	205	100.00	45699.20	100.00	204	100.00	45399.20	100

It could be seen from above that 157 nos. (76.59% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2019-20 as compared to 162 nos. (79.41% of total) during 2018-19.

Non-availability due to planned maintenance was more than 30% at 4 nos. (1.95% of total) H.E. Stations during 2019-20 and which was 2 nos. (0.98% of total) in 2018-19. The details of these stations for 2019-20 is given below in **Table 4.8**.

TABLE 4.8

**H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE
FOR THE PERIOD: (2019-20)**

Sl. No	Name of Station/Utility	Capacity (MW)	N.A. due to P.M.* (%)	Reasons
1	BAIRA SIUL HPS / NHPC	180.0	42.069	RENOVATION/MODERNISATION
2	JOG HPS / KPCL	139.2	43.255	RENOVATION/MODERNISATION
3	PYKARA ULTMATE HPS / TANGEDCO	150.0	33.333	ANNUAL MAINTENANCE
4	RANGANADI HPS / NEEPCO.	405.0	30.688	ANNUAL MAINTENANCE

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

33% 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 NHPC (801 hrs. /unit).

In case of State Sector, non-availability due to planned maintenance was maximum under OHPC (927 hrs. /unit).

In case of Private Sector, non-availability due to planned maintenance was maximum under ADHPL (558 hrs. /unit).

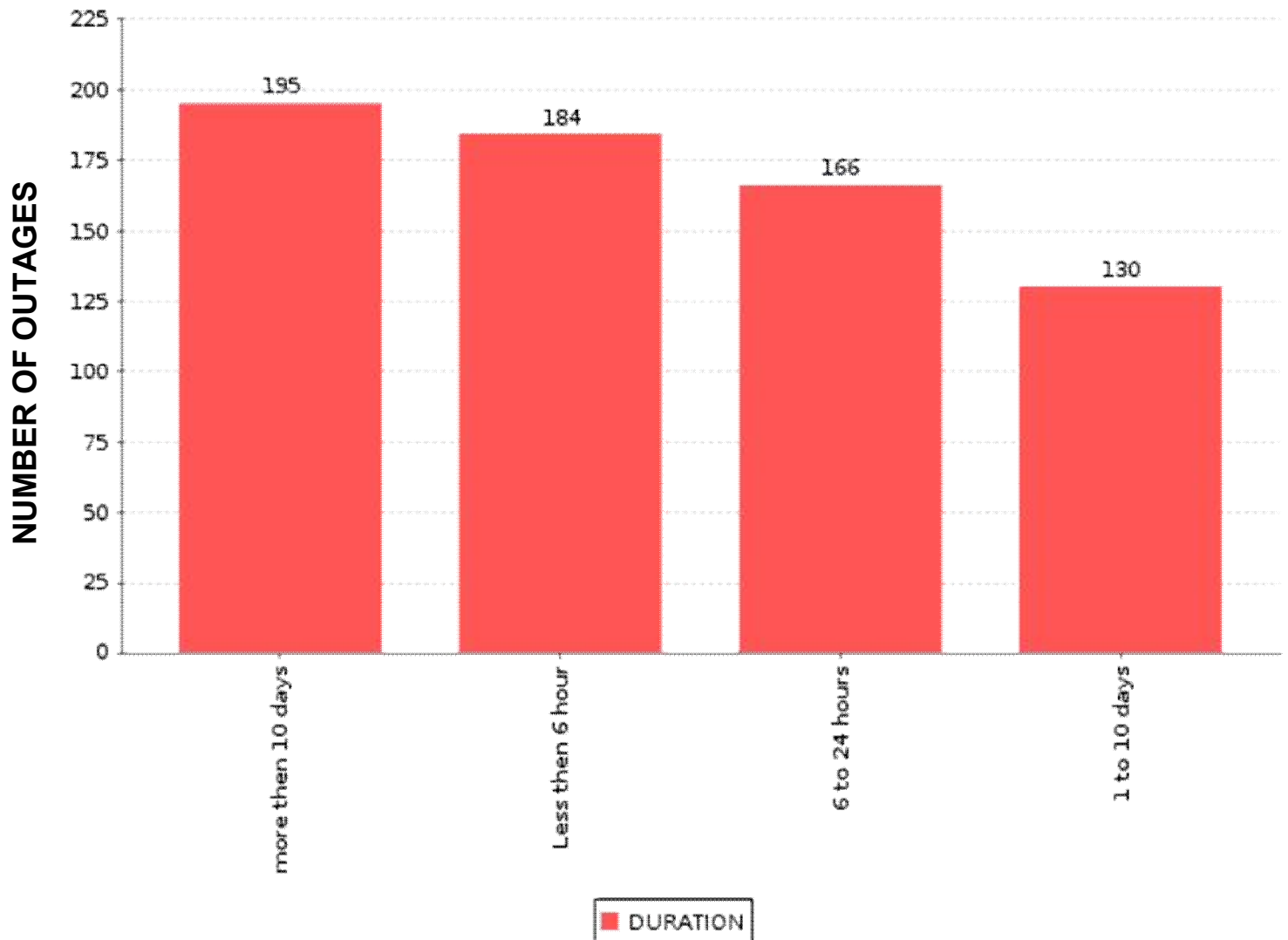
It is also observed that the average duration of planned maintenance in respect of H.E. Stations in Central Sector, State Sector and Private Sector is 536 hrs. /Unit, 299 hrs. /Unit and 108 hrs. /Unit respectively.

TABLE 4.9

**SECTOR-WISE/ UTILITY-WISE PERFORMANCE PLANNED MAINTENANCE
PERIOD: 2019-20**

Sl. No.	Organization	No. of Units	Installed Capacity (MW)	Planned Maintenance (Hours)	Planned Maintenance per Unit (Hours)
(A)	Central Sector				
1	BBMB	28	2920.30	9089	325
2	DVC	5	143.20	0	0
3	NEEPCO.	18	1200.00	10975	610
4	NHDC	16	1520.00	3664	229
5	NHPC	70	5451.20	56043	801
6	NTPC Ltd.	4	800.00	0	0
7	SJVNL	12	1912.02	1845	154
8	THDC	8	1400.00	4695	587
Sub Total (CS)		161	15346.72	86312	536
(B)	Private Sector				
1	ADHPL	2	192.00	1115	558
2	AHPC (GVK)	4	330.00	0	0
3	DEPL	2	96.00	198	99
4	DLHP	1	34.00	0	0
5	E.P.P.L.	2	100.00	0	0
6	GBHPPL	2	70.00	754	377
7	GIPL	2	110.00	658	329
8	HBPCL	7	1300.00	1206	172
9	IAEPL	3	36.00	0	0
10	JPPVL	4	400.00	194	48
11	MPCL	2	86.00	0	0
12	SEPL	2	97.00	0	0
13	SKPPPL	2	96.00	0	0
14	TATA MAH.	15	447.00	1270	85
Sub Total (Pvt.)		50	3394.00	5395	108

(C)	State Sector				
1	APGCL	2	100.00	0	0
2	APGENCO	34	1796.75	2950	87
3	CSPGCL	3	120.00	0	0
4	GSECL	8	540.00	0	0
5	HPPCL	5	295.00	0	0
6	HPSEB	12	372.00	3797	316
7	JKSPDC	12	1110.00	972	81
8	JUUNL	2	130.00	0	0
9	KPCL	66	3572.20	32910	499
10	KSEB	47	1856.50	18436	392
11	MAHAGENCO	24	2406.00	4881	203
12	MeECL	13	322.00	1779	137
13	MPPGCL	23	875.00	5653	246
14	OHPC	31	2027.50	28735	927
15	PSPCL	25	1051.00	6952	278
16	RRVUNL	11	411.00	4049	368
17	SSNNL	11	1450.00	6850	623
18	TANGEDCO	69	2178.20	21068	305
19	TSGENCO	36	2405.60	145	4
20	TUL	6	1200.00	3623	604
21	UJVNL	34	1252.15	2637	78
22	UPJVNL	15	501.60	48	3
23	WBSEDCL	12	986.00	4161	347
Sub Total (State)		501	26958.50	149647	298.7
All India		712	45699.20	241354	339

DURATION PATTERN OF PLANNED MAINTENANCE DURING 2019-20

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2019-20							
(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	04/01/2019	03/31/202	8,784.00	RENOVATION/MODERNISATION
2	BALIMELA HPS	5	60.0	09/25/2019	09/27/201	61.68	DRAFT TUBE
GIPL							
3	CHUZACHEN HPS	1	55.0	02/03/2020	02/16/202	317.45	ANNUAL MAINTENANCE
4	CHUZACHEN HPS	2	55.0	02/03/2020	02/17/202	340.46	ANNUAL MAINTENANCE
OHPC							
5	HIRAKUD HPS	5	43.65	04/01/2019	03/31/202	8,784.00	RENOVATION/MODERNISATION
6	HIRAKUD HPS	6	43.65	04/01/2019	03/31/202	8,784.00	RENOVATION/MODERNISATION
WBSEDCL							
7	JALDHAKA HPS ST-	2	9.0	01/02/2020	02/01/202	726.33	ANNUAL MAINTENANCE
8	JALDHAKA HPS ST-	3	9.0	01/02/2020	03/08/202	1,593.58	ANNUAL MAINTENANCE
9	JALDHAKA HPS ST-	4	9.0	12/18/2019	02/25/202	1,657.50	ANNUAL MAINTENANCE
DEPL							
10	JORETHANG LOOP	2	48.0	04/02/2019	04/10/201	198.13	RUNNER INSPECTION /REPAIR
WBSEDCL							
11	RAMMAM HPS	3	12.5	04/04/2019	04/09/201	120.00	MAINTENANCE OF AUXILIARY
NHPC							
12	RANGIT HPS	1	20.0	11/03/2019	11/05/201	50.45	TURBINE INSPECTION MISC
13	RANGIT HPS	1	20.0	02/17/2020	03/11/202	553.08	ANNUAL MAINTENANCE
14	RANGIT HPS	1	20.0	09/18/2019	09/20/201	54.75	TURBINE INSPECTION MISC
15	RANGIT HPS	2	20.0	01/07/2020	02/13/202	871.60	ANNUAL MAINTENANCE
16	RANGIT HPS	3	20.0	03/11/2020	03/28/202	406.67	ANNUAL MAINTENANCE
TUL							
17	TEESTA-III HPS	1	200.0	11/15/2019	11/25/201	255.93	ANNUAL MAINTENANCE
18	TEESTA-III HPS	1	200.0	02/17/2020	03/21/202	795.38	ANNUAL MAINTENANCE
19	TEESTA-III HPS	2	200.0	01/29/2020	02/12/202	343.90	ANNUAL MAINTENANCE
20	TEESTA-III HPS	2	200.0	11/09/2019	11/14/201	139.45	ANNUAL MAINTENANCE
21	TEESTA-III HPS	3	200.0	12/18/2019	01/16/202	716.35	ANNUAL MAINTENANCE
22	TEESTA-III HPS	4	200.0	02/11/2020	02/18/202	174.53	ANNUAL MAINTENANCE
23	TEESTA-III HPS	4	200.0	11/24/2019	12/07/201	328.07	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACI TY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
24	TEESTA-III HPS	5	200.0	01/15/2020	01/31/202	393.65	ANNUAL MAINTENANCE
25	TEESTA-III HPS	6	200.0	12/06/2019	12/19/201	328.48	ANNUAL MAINTENANCE
NHPC							
26	TEESTA LOW DAM- III	1	33.0	02/19/2020	03/04/202	358.85	ANNUAL MAINTENANCE
27	TEESTA LOW DAM- III	1	33.0	10/10/2019	10/12/201	54.73	GENERATOR
28	TEESTA LOW DAM- III	1	33.0	12/21/2019	12/23/201	60.13	SWITCHING EQUIPMENT
29	TEESTA LOW DAM- III	2	33.0	01/13/2020	01/29/202	382.23	ANNUAL MAINTENANCE
30	TEESTA LOW DAM- III	2	33.0	12/21/2019	12/23/201	60.13	SWITCHING EQUIPMENT
31	TEESTA LOW DAM- III	3	33.0	02/03/2020	02/16/202	329.73	ANNUAL MAINTENANCE
32	TEESTA LOW DAM- III	4	33.0	12/09/2019	12/27/201	451.25	ANNUAL MAINTENANCE
33	TEESTA LOW DAM- IV	1	40.0	01/28/2020	02/19/202	537.10	ANNUAL MAINTENANCE
34	TEESTA LOW DAM- IV	2	40.0	03/16/2020	03/30/202	342.80	ANNUAL MAINTENANCE
35	TEESTA LOW DAM- IV	3	40.0	01/06/2020	01/25/202	464.38	ANNUAL MAINTENANCE
36	TEESTA LOW DAM- IV	3	40.0	04/01/2019	06/11/201	1,704.50	INSPECTION /MTCE
37	TEESTA LOW DAM- IV	4	40.0	02/24/2020	03/12/202	403.55	ANNUAL MAINTENANCE
38	TEESTA V HPS	1	170.0	03/12/2020	03/30/202	439.43	ANNUAL MAINTENANCE
39	TEESTA V HPS	2	170.0	01/28/2020	02/09/202	307.51	ANNUAL MAINTENANCE
40	TEESTA V HPS	3	170.0	01/06/2020	01/23/202	431.38	ANNUAL MAINTENANCE
41	TEESTA V HPS	3	170.0	01/31/2020	02/03/202	90.17	SWITCHING EQUIPMENT
OHPC							
42	UPPER INDRAVATI	4	150.0	06/20/2019	07/19/201	700.67	ANNUAL MAINTENANCE
43	UPPER KOLAB HPS	3	80.0	04/01/2019	04/30/201	696.00	GENERATOR
44	UPPER KOLAB HPS	3	80.0	08/01/2019	08/14/201	333.62	STATOR WINDING
45	UPPER KOLAB HPS	4	80.0	09/01/2019	09/22/201	521.67	CAPITAL MAINTENANCE
North Eastern							
NEEPCO.							
46	DOYANG HPS	1	25.0	02/03/2020	02/16/202	327.63	ANNUAL MAINTENANCE
47	DOYANG HPS	2	25.0	01/14/2020	02/01/202	454.00	ANNUAL MAINTENANCE
48	KOPILI HPS	1	50.0	04/01/2019	04/03/201	65.03	ANNUAL MAINTENANCE
NHPC							
49	LOKTAK HPS	1	35.0	01/20/2020	01/31/202	272.93	ANNUAL MAINTENANCE
50	LOKTAK HPS	2	35.0	02/03/2020	02/12/202	225.10	ANNUAL MAINTENANCE
51	LOKTAK HPS	3	35.0	08/14/2019	09/20/201	888.00	GENERATOR
52	LOKTAK HPS	3	35.0	02/17/2020	02/24/202	177.00	PENSTOCK PRESSURE SHAFT
53	LOKTAK HPS	3	35.0	05/01/2019	05/12/201	271.65	MAIN GENERTATOR
54	LOKTAK HPS	3	35.0	08/07/2019	08/10/201	93.08	GENERATOR
MeECL							
55	MYNTDU(LESHKA)	1	42.0	12/01/2019	01/08/202	913.00	ANNUAL MAINTENANCE
56	MYNTDU(LESHKA)	2	42.0	01/09/2020	01/17/202	204.25	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACI TY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
57	MYNTDU(LESHKA)	3	42.0	02/01/2020	02/29/202	662.00	ANNUAL MAINTENANCE
NEEPCO.							
58	PARE	1	55.0	11/05/2019	11/09/201	93.93	GENERATOR TRANSFORMER
59	RANGANADI HPS	1	135.0	01/03/2020	01/12/202	227.00	ANNUAL MAINTENANCE
60	RANGANADI HPS	1	135.0	02/10/2020	02/19/202	220.95	ANNUAL MAINTENANCE
61	RANGANADI HPS	2	135.0	04/28/2019	05/01/201	63.25	ANNUAL MAINTENANCE
62	RANGANADI HPS	2	135.0	02/10/2020	03/04/202	563.00	ANNUAL MAINTENANCE
63	RANGANADI HPS	3	135.0	04/28/2019	03/21/202	7,866.05	ANNUAL MAINTENANCE
64	RANGANADI HPS	3	135.0	04/01/2019	04/28/201	670.00	ANNUAL MAINTENANCE
65	TUIRIAL HPS	1	30.0	03/02/2020	03/19/202	424.05	ANNUAL MAINTENANCE
Northern							
ADHPL							
66	ALLAIN DUHANGAN	1	96.0	12/02/2019	12/24/201	535.48	ANNUAL MAINTENANCE
67	ALLAIN DUHANGAN	2	96.0	01/02/2020	01/22/202	487.72	ANNUAL MAINTENANCE
JKSPDC							
68	BAGLIHAR HPS	3	150.0	04/01/2019	05/10/201	947.26	CAPITAL MAINTENANCE
NHPC							
69	BAIRA SIUL HPS	1	60.0	04/01/2019	07/06/201	2,319.65	RENOVATION/MODERNISATION
70	BAIRA SIUL HPS	2	60.0	04/01/2019	12/18/201	6,279.45	RENOVATION/MODERNISATION
71	BAIRA SIUL HPS	3	60.0	10/16/2019	10/19/201	83.48	GENERATOR
72	BAIRA SIUL HPS	3	60.0	03/18/2020	03/27/202	231.20	RUNNER INSPECTION /REPAIR
73	BAIRA SIUL HPS	3	60.0	04/01/2019	07/07/201	2,347.02	RENOVATION/MODERNISATION
74	BAIRA SIUL HPS	3	60.0	08/30/2019	09/05/201	159.53	TURBINE INSPECTION MISC
HBPCL							
75	BASPA HPS	1	100.0	02/12/2020	02/20/202	196.83	ANNUAL MAINTENANCE
76	BASPA HPS	2	100.0	02/25/2020	03/05/202	219.50	ANNUAL MAINTENANCE
77	BASPA HPS	3	100.0	03/11/2020	03/20/202	220.50	ANNUAL MAINTENANCE
BBMB							
78	BHAKRA RIGHT HPS	8	157.0	08/12/2019	08/14/201	55.92	TURBINE INSPECTION MISC
GBHPPL							
79	BUDHIL HPS	2	35.0	04/01/2019	04/07/201	158.50	ANNUAL MAINTENANCE
80	BUDHIL HPS	2	35.0	12/05/2019	12/29/201	595.18	ANNUAL MAINTENANCE
NHPC							
81	CHAMERA-I HPS	1	180.0	01/06/2020	01/25/202	447.58	ANNUAL MAINTENANCE
82	CHAMERA-I HPS	2	180.0	01/30/2020	02/20/202	498.85	ANNUAL MAINTENANCE
83	CHAMERA-I HPS	3	180.0	08/31/2019	09/25/201	616.28	GENERATOR
84	CHAMERA-I HPS	3	180.0	12/11/2019	12/30/201	463.37	ANNUAL MAINTENANCE
85	CHAMERA-II HPS	3	100.0	09/08/2019	09/13/201	131.45	GENERATOR
86	CHAMERA-II HPS	3	100.0	09/13/2019	10/01/201	414.37	ANNUAL MAINTENANCE
87	CHAMERA-III HPS	1	77.0	02/08/2020	03/10/202	747.77	CAPITAL/3 YEARLY MTCE.

S.No	STATION	UNIT	CAPACI TY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
88	CHAMERA-III HPS	1	77.0	09/04/2019	09/27/201	563.00	TURBINE INSPECTION MISC
89	CHAMERA-III HPS	2	77.0	02/10/2020	02/22/202	295.82	ANNUAL MAINTENANCE
90	CHAMERA-III HPS	3	77.0	01/17/2020	01/29/202	295.63	ANNUAL MAINTENANCE
UJVNL							
91	CHIBRO (YAMUNA)	1	60.0	06/01/2019	06/29/201	690.75	CAPITAL MAINTENANCE
92	CHIBRO (YAMUNA)	1	60.0	04/01/2019	04/30/201	719.92	CAPITAL MAINTENANCE
93	CHIBRO (YAMUNA)	1	60.0	05/01/2019	05/31/201	743.92	CAPITAL MAINTENANCE
NHPC							
94	CHUTAK HPS	1	11.0	01/18/2020	02/14/202	667.23	SURGE SHAFT HRT MTc.
95	CHUTAK HPS	1	11.0	12/22/2019	01/11/202	483.93	ANNUAL MAINTENANCE
96	CHUTAK HPS	2	11.0	01/12/2020	02/15/202	818.47	ANNUAL MAINTENANCE
97	CHUTAK HPS	3	11.0	11/22/2019	12/20/201	673.57	ANNUAL MAINTENANCE
98	CHUTAK HPS	4	11.0	02/15/2020	03/24/202	913.25	ANNUAL MAINTENANCE
99	DHAULI GANGA HPS	1	70.0	12/16/2019	01/05/202	493.93	ANNUAL MAINTENANCE
100	DHAULI GANGA HPS	2	70.0	01/09/2020	01/25/202	378.42	ANNUAL MAINTENANCE
101	DHAULI GANGA HPS	3	70.0	04/01/2019	04/14/201	324.37	ANNUAL MAINTENANCE
102	DHAULI GANGA HPS	3	70.0	02/14/2020	02/28/202	343.85	ANNUAL MAINTENANCE
103	DHAULI GANGA HPS	4	70.0	01/28/2020	02/13/202	375.00	ANNUAL MAINTENANCE
104	DULHASTI HPS	1	130.0	06/07/2019	06/12/201	118.98	RUNNER REPAIR
105	DULHASTI HPS	1	130.0	12/05/2019	12/27/201	545.72	ANNUAL MAINTENANCE
106	DULHASTI HPS	2	130.0	12/31/2019	01/18/202	450.37	ANNUAL MAINTENANCE
107	DULHASTI HPS	3	130.0	05/05/2019	06/02/201	689.38	TURBINE INSPECTION MISC
108	DULHASTI HPS	3	130.0	01/24/2020	02/03/202	250.18	ANNUAL MAINTENANCE
109	DULHASTI HPS	3	130.0	04/01/2019	04/09/201	206.93	TURBINE INSPECTION MISC
HPSEB							
110	GIRI BATA HPS	1	30.0	05/04/2019	05/06/201	59.75	INSPECTION /MTCE
111	GIRI BATA HPS	1	30.0	05/20/2019	06/14/201	605.00	ANNUAL MAINTENANCE
112	GIRI BATA HPS	2	30.0	12/02/2019	02/29/202	2,126.83	ANNUAL MAINTENANCE
113	GIRI BATA HPS	2	30.0	11/13/2019	11/15/201	54.25	STATOR WINDING
HBPCL							
114	KARCHAM	1	261.25	01/01/2020	01/06/202	137.47	ANNUAL MAINTENANCE
115	KARCHAM	2	261.25	01/11/2020	01/21/202	263.98	ANNUAL MAINTENANCE
116	KARCHAM	3	261.25	01/25/2020	01/31/202	168.00	ANNUAL MAINTENANCE
NHPC							
117	KISHANGANGA HPS	1	110.0	08/21/2019	08/24/201	80.93	MAINTENANCE OF AUXILIARY
118	KISHANGANGA HPS	1	110.0	07/21/2019	07/24/201	69.66	MAINTENANCE OF AUXILIARY
119	KISHANGANGA HPS	1	110.0	08/31/2019	09/02/201	52.70	MAINTENANCE OF AUXILIARY
120	KISHANGANGA HPS	2	110.0	08/24/2019	08/31/201	181.22	MAINTENANCE OF AUXILIARY
121	KISHANGANGA HPS	2	110.0	08/04/2019	08/10/201	121.10	GENERATOR

S.No	STATION	UNIT	CAPACI TY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
122	KISHANGANGA HPS	2	110.0	02/25/2020	02/27/202	63.57	TURBINE INSPECTION MISC
123	KISHANGANGA HPS	2	110.0	07/05/2019	07/08/201	91.93	GENERATOR
124	KISHANGANGA HPS	2	110.0	10/02/2019	11/26/201	1,334.64	GENERATOR
125	KISHANGANGA HPS	2	110.0	04/26/2019	05/06/201	243.32	MAINTENANCE OF AUXILIARY
126	KISHANGANGA HPS	2	110.0	01/21/2020	02/08/202	440.81	ANNUAL MAINTENANCE
127	KISHANGANGA HPS	3	110.0	06/27/2019	07/09/201	301.43	MAINTENANCE OF AUXILIARY
128	KISHANGANGA HPS	3	110.0	09/15/2019	09/17/201	64.12	MAINTENANCE OF AUXILIARY
129	KISHANGANGA HPS	3	110.0	07/28/2019	08/03/201	145.93	MAINTENANCE OF AUXILIARY
130	KISHANGANGA HPS	3	110.0	04/23/2019	05/26/201	780.20	MAINTENANCE OF AUXILIARY
131	KISHANGANGA HPS	3	110.0	01/07/2020	01/20/202	317.56	ANNUAL MAINTENANCE
132	KISHANGANGA HPS	3	110.0	08/21/2019	09/14/201	572.06	MAINTENANCE OF AUXILIARY
133	KISHANGANGA HPS	3	110.0	06/03/2019	06/16/201	324.71	TURBINE INSPECTION MISC
134	KISHANGANGA HPS	3	110.0	04/08/2019	04/15/201	170.53	MAINTENANCE OF AUXILIARY
135	KISHANGANGA HPS	3	110.0	08/13/2019	08/21/201	189.77	MAINTENANCE OF AUXILIARY
136	KISHANGANGA HPS	3	110.0	08/10/2019	08/13/201	74.37	MAINTENANCE OF AUXILIARY
137	KISHANGANGA HPS	3	110.0	07/23/2019	07/26/201	76.56	MAINTENANCE OF AUXILIARY
THDC							
138	KOTESHWAR HPS	1	100.0	04/09/2019	04/30/201	507.00	ANNUAL MAINTENANCE
139	KOTESHWAR HPS	2	100.0	03/02/2020	03/25/202	559.00	ANNUAL MAINTENANCE
140	KOTESHWAR HPS	3	100.0	04/01/2019	04/08/201	184.25	ANNUAL MAINTENANCE
141	KOTESHWAR HPS	4	100.0	10/03/2019	10/24/201	507.50	ANNUAL MAINTENANCE
142	KOTESHWAR HPS	4	100.0	03/02/2020	03/31/202	710.00	ANNUAL MAINTENANCE
BBMB							
143	KOTLA HPS	1	29.25	01/21/2020	01/25/202	105.25	HALF YEARLY MAINTENANCE
144	KOTLA HPS	3	24.2	12/05/2019	12/11/201	144.20	HALF YEARLY MAINTENANCE
UJVNL							
145	KULHAL HPS	3	10.0	05/01/2019	05/21/201	482.67	OVERHAULING WORKS
RRVUNL							
146	MAHI BAJAJ-I HPS	2	25.0	04/30/2019	07/31/201	2,208.00	ANNUAL MAINTENANCE
PSPCL							
147	MUKERIAN-I HPS	2	15.0	04/01/2019	04/25/201	596.25	ANNUAL MAINTENANCE
148	MUKERIAN-I HPS	3	15.0	04/01/2019	04/05/201	111.00	ANNUAL MAINTENANCE
149	MUKERIAN-III HPS	7	19.5	04/01/2019	04/26/201	616.00	ANNUAL MAINTENANCE
150	MUKERIAN-III HPS	8	19.5	05/03/2019	05/23/201	473.17	ANNUAL MAINTENANCE
151	MUKERIAN-III HPS	9	19.5	04/02/2019	04/30/201	676.25	ANNUAL MAINTENANCE
152	MUKERIAN-IV HPS	10	19.5	04/01/2019	04/25/201	598.63	ANNUAL MAINTENANCE
153	MUKERIAN-IV HPS	11	19.5	04/03/2019	04/29/201	629.00	ANNUAL MAINTENANCE
154	MUKERIAN-IV HPS	12	19.5	04/13/2019	05/06/201	555.50	ANNUAL MAINTENANCE
SJVNL							

S.No	STATION	UNIT	CAPACI TY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
155	NATHPA JHAKRI HPS	1	250.0	03/05/2020	03/08/202	95.98	ANNUAL MAINTENANCE
156	NATHPA JHAKRI HPS	2	250.0	01/28/2020	02/03/202	155.37	ANNUAL MAINTENANCE
157	NATHPA JHAKRI HPS	3	250.0	02/27/2020	03/01/202	72.98	ANNUAL MAINTENANCE
158	NATHPA JHAKRI HPS	4	250.0	02/18/2020	02/21/202	96.00	ANNUAL MAINTENANCE
159	NATHPA JHAKRI HPS	5	250.0	02/05/2020	02/14/202	237.58	ANNUAL MAINTENANCE
NHPC							
160	NIMMO BAZGO HPS	1	15.0	11/05/2019	11/25/201	502.90	ANNUAL MAINTENANCE
161	NIMMO BAZGO HPS	2	15.0	11/28/2019	12/14/201	396.60	ANNUAL MAINTENANCE
162	NIMMO BAZGO HPS	3	15.0	12/20/2019	01/27/202	921.45	ANNUAL MAINTENANCE
163	PARBATI-III HPS	1	130.0	11/18/2019	12/20/201	770.42	ANNUAL MAINTENANCE
164	PARBATI-III HPS	2	130.0	12/21/2019	01/24/202	822.25	ANNUAL MAINTENANCE
165	PARBATI-III HPS	3	130.0	11/18/2019	03/08/202	2,672.07	ANNUAL MAINTENANCE
166	PARBATI-III HPS	4	130.0	04/28/2019	05/06/201	205.58	SWITCHING EQUIPMENT
167	PARBATI-III HPS	4	130.0	01/27/2020	03/03/202	871.67	ANNUAL MAINTENANCE
BBMB							
168	PONG HPS	2	66.0	04/01/2019	03/31/202	8,784.00	RENOVATION/MODERNISATION
SJVNL							
169	RAMPUR HPS	1	68.67	02/26/2020	03/04/202	187.75	ANNUAL MAINTENANCE
170	RAMPUR HPS	2	68.67	02/18/2020	02/25/202	177.48	ANNUAL MAINTENANCE
171	RAMPUR HPS	3	68.67	03/05/2020	03/09/202	115.68	ANNUAL MAINTENANCE
172	RAMPUR HPS	4	68.67	01/25/2020	02/01/202	186.88	ANNUAL MAINTENANCE
173	RAMPUR HPS	5	68.67	10/10/2019	10/16/201	162.35	ANNUAL MAINTENANCE
174	RAMPUR HPS	6	68.67	02/05/2020	02/10/202	138.65	ANNUAL MAINTENANCE
PSPCL							
175	RANJIT SAGAR HPS	1	150.0	04/02/2019	04/28/201	621.00	ANNUAL MAINTENANCE
176	RANJIT SAGAR HPS	2	150.0	03/16/2020	03/22/202	148.17	DRAFT TUBE
177	RANJIT SAGAR HPS	4	150.0	11/05/2019	12/20/201	1,086.92	ANNUAL MAINTENANCE
RRVUNL							
178	R P SAGAR HPS	1	43.0	04/05/2019	04/23/201	448.62	ANNUAL MAINTENANCE
179	R P SAGAR HPS	2	43.0	04/24/2019	05/13/201	461.90	ANNUAL MAINTENANCE
180	R P SAGAR HPS	3	43.0	05/16/2019	06/14/201	696.95	ANNUAL MAINTENANCE
181	R P SAGAR HPS	4	43.0	06/23/2019	07/02/201	233.08	ANNUAL MAINTENANCE
NHPC							
182	SALAL HPS	1	115.0	12/16/2019	12/25/201	222.27	ANNUAL MAINTENANCE
183	SALAL HPS	2	115.0	01/03/2020	01/14/202	275.00	ANNUAL MAINTENANCE
184	SALAL HPS	3	115.0	01/18/2020	01/27/202	229.68	ANNUAL MAINTENANCE
185	SALAL HPS	4	115.0	11/15/2019	11/27/201	295.17	ANNUAL MAINTENANCE
186	SALAL HPS	5	115.0	11/30/2019	12/12/201	291.08	ANNUAL MAINTENANCE
187	SALAL HPS	6	115.0	02/01/2020	02/28/202	639.60	CAPITAL MAINTENANCE

S.No	STATION	UNIT	CAPACI TY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
HPSEB							
188	SANJAY HPS	1	40.0	04/01/2019	04/04/201	89.00	RUNNER REPAIR
189	SANJAY HPS	2	40.0	04/05/2019	05/09/201	824.37	ANNUAL MAINTENANCE
NHPC							
190	SEWA-II HPS	1	40.0	11/14/2019	11/28/201	346.20	ANNUAL MAINTENANCE
191	SEWA-II HPS	2	40.0	02/16/2020	02/22/202	138.92	GENERATOR
192	SEWA-II HPS	2	40.0	12/06/2019	12/25/201	458.20	ANNUAL MAINTENANCE
193	SEWA-II HPS	3	40.0	12/30/2019	01/12/202	322.15	ANNUAL MAINTENANCE
PSPCL							
194	SHANAN HPS	1	15.0	10/01/2019	10/29/201	677.67	ANNUAL MAINTENANCE
195	SHANAN HPS	5	50.0	04/01/2019	04/06/201	135.08	ANNUAL MAINTENANCE
NHPC							
196	TANAKPUR HPS	1	31.4	02/10/2020	03/08/202	654.62	ANNUAL MAINTENANCE
197	TANAKPUR HPS	2	31.4	12/18/2019	12/21/201	89.33	ANNUAL MAINTENANCE
198	TANAKPUR HPS	2	31.4	12/31/2019	02/02/202	799.92	ANNUAL MAINTENANCE
199	TANAKPUR HPS	3	31.4	11/15/2019	12/15/201	730.60	ANNUAL MAINTENANCE
200	TANAKPUR HPS	3	31.4	07/14/2019	07/17/201	92.37	GENERATOR
THDC							
201	TEHRI ST-1 HPS	1	250.0	10/09/2019	10/12/201	62.00	GOVERNOR SYSTEM
202	TEHRI ST-1 HPS	2	250.0	05/23/2019	06/04/201	299.58	ANNUAL MAINTENANCE
203	TEHRI ST-1 HPS	3	250.0	04/25/2019	05/20/201	611.00	ANNUAL MAINTENANCE
204	TEHRI ST-1 HPS	4	250.0	04/01/2019	04/24/201	565.00	ANNUAL MAINTENANCE
205	TEHRI ST-1 HPS	4	250.0	03/02/2020	03/28/202	635.50	ANNUAL MAINTENANCE
NHPC							
206	URI-I HPS	1	120.0	01/02/2020	01/16/202	338.87	ANNUAL MAINTENANCE
207	URI-I HPS	2	120.0	12/14/2019	12/31/201	420.13	ANNUAL MAINTENANCE
208	URI-I HPS	3	120.0	02/06/2020	02/12/202	144.57	ANNUAL MAINTENANCE
209	URI-I HPS	4	120.0	02/13/2020	02/27/202	339.75	ANNUAL MAINTENANCE
210	URI-II HPS	1	60.0	12/27/2019	01/07/202	281.93	ANNUAL MAINTENANCE
211	URI-II HPS	2	60.0	01/09/2020	01/18/202	209.62	ANNUAL MAINTENANCE
212	URI-II HPS	3	60.0	02/13/2020	02/19/202	152.98	ANNUAL MAINTENANCE
213	URI-II HPS	4	60.0	02/08/2020	02/12/202	97.77	ANNUAL MAINTENANCE
JPPVL							
214	VISHNU PRAYAG HPS	1	100.0	12/17/2019	12/19/201	57.00	ANNUAL MAINTENANCE
215	VISHNU PRAYAG HPS	2	100.0	01/09/2020	01/11/202	56.63	ANNUAL MAINTENANCE
216	VISHNU PRAYAG HPS	3	100.0	12/26/2019	12/28/201	56.57	ANNUAL MAINTENANCE
Southern							
TANGEDCO							
217	BHAWANI BARRAGE-	1	15.0	01/24/2020	02/11/202	445.02	ANNUAL MAINTENANCE
218	BHAWANI BARRAGE-	1	15.0	04/01/2019	08/14/201	3,260.10	DAM/SPILL GATES

S.No	STATION	UNIT	CAPACI TY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
219	BHAWANI KATTAL	1	15.0	02/03/2020	03/23/202	1,179.67	ANNUAL MAINTENANCE
KPCL							
220	GERUSUPPA HPS	1	60.0	11/29/2019	12/02/201	69.97	TESTING/CHECKING/ADJUSTME
221	GERUSUPPA HPS	3	60.0	12/05/2019	12/15/201	243.07	TESTING/CHECKING/ADJUSTME
KSEB							
222	IDAMALAYAR HPS	1	37.5	07/23/2019	08/16/201	582.00	ANNUAL MAINTENANCE
223	IDUKKI HPS	1	130.0	09/05/2019	09/07/201	50.72	RENOVATION/MODERNISATION
224	IDUKKI HPS	4	130.0	08/08/2019	09/03/201	632.20	ANNUAL MAINTENANCE
225	IDUKKI HPS	4	130.0	12/10/2019	12/21/201	272.42	RENOVATION/MODERNISATION
226	IDUKKI HPS	5	130.0	12/10/2019	01/02/202	554.50	ANNUAL MAINTENANCE
227	IDUKKI HPS	6	130.0	10/21/2019	11/22/201	776.70	ANNUAL MAINTENANCE
228	IDUKKI HPS	6	130.0	12/10/2019	12/28/201	443.95	RENOVATION/MODERNISATION
KPCL							
229	JOG HPS	1	13.2	04/01/2019	03/31/202	8,784.00	RENOVATION/MODERNISATION
230	JOG HPS	2	13.2	04/01/2019	12/23/201	6,403.17	RENOVATION/MODERNISATION
231	JOG HPS	3	13.2	04/01/2019	03/31/202	8,784.00	RENOVATION/MODERNISATION
232	JOG HPS	4	13.2	04/01/2019	12/24/201	6,425.17	RENOVATION/MODERNISATION
233	JOG HPS	5	21.6	07/23/2019	07/26/201	82.50	FOREBAY WORKS
234	JOG HPS	6	21.6	11/06/2019	11/16/201	256.50	BEARING OIL TOPPING
235	KADRA HPS	3	50.0	12/28/2019	01/14/202	405.48	ANNUAL MAINTENANCE
236	KODASALI HPS	2	40.0	12/28/2019	01/03/202	140.00	ANNUAL MAINTENANCE
KSEB							
237	KUTTIYADI ADDL	1	50.0	12/24/2019	01/18/202	615.05	ANNUAL MAINTENANCE
238	KUTTIYADI EXIN HPS	4	50.0	04/24/2019	06/01/201	922.42	ANNUAL MAINTENANCE
239	KUTTIYADI EXIN HPS	4	50.0	03/18/2020	03/26/202	199.58	ANNUAL MAINTENANCE
240	KUTTIYADI HPS	1	25.0	02/18/2020	03/06/202	415.58	ANNUAL MAINTENANCE
241	KUTTIYADI HPS	2	25.0	04/26/2019	05/22/201	642.15	ANNUAL MAINTENANCE
242	KUTTIYADI HPS	2	25.0	01/31/2020	02/15/202	376.28	ANNUAL MAINTENANCE
243	KUTTIYADI HPS	3	25.0	11/04/2019	11/30/201	631.78	ANNUAL MAINTENANCE
TANGEDCO							
244	METTUR DAM HPS	4	12.5	04/01/2019	05/11/201	966.60	ANNUAL MAINTENANCE
TSGENCO							
245	NAGARJUN SGR HPS	3	100.8	01/28/2020	01/31/202	89.42	INSPECTION OF GENERATING
246	NAGARJUN SGR HPS	5	100.8	01/28/2020	01/30/202	55.95	INSPECTION OF GENERATING
APGENCO							
247	NAGARJUN SGR RBC	1	30.0	06/01/2019	06/30/201	719.92	ANNUAL MAINTENANCE
248	NAGARJUN SGR RBC	3	30.0	06/01/2019	06/30/201	719.92	ANNUAL MAINTENANCE
TANGEDCO							
249	PAPANASAM HPS	1	8.0	05/01/2019	06/13/201	1,042.50	RUNNER REPAIR

S.No	STATION	UNIT	CAPACI TY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
250	PAPANASAM HPS	3	8.0	04/01/2019	04/30/201	694.00	ANNUAL MAINTENANCE
251	PAPANASAM HPS	4	8.0	05/01/2019	05/30/201	704.25	ANNUAL MAINTENANCE
252	PERIYAR HPS	2	42.0	04/06/2019	04/30/201	587.27	ANNUAL MAINTENANCE
253	PERIYAR HPS	3	42.0	04/15/2019	07/20/201	2,309.12	ANNUAL MAINTENANCE
KSEB							
254	PORINGALKUTTU	3	8.0	04/01/2019	03/31/202	8,784.00	CAPITAL MAINTENANCE
TANGEDCO							
255	PYKARA ULTMATE	2	50.0	04/01/2019	03/31/202	8,784.00	ANNUAL MAINTENANCE
KSEB							
256	SABARIGIRI HPS	5	50.0	07/01/2019	07/31/201	739.17	ANNUAL MAINTENANCE
257	SABARIGIRI HPS	5	50.0	08/06/2019	08/10/201	92.67	ANNUAL MAINTENANCE
258	SABARIGIRI HPS	5	50.0	08/10/2019	08/14/201	93.25	ANNUAL MAINTENANCE
259	SABARIGIRI HPS	6	50.0	04/24/2019	05/17/201	555.93	ANNUAL MAINTENANCE
TANGEDCO							
260	SURULIYAR HPS	1	35.0	05/02/2019	06/16/201	1,079.25	OVERHAULING WORKS
APGENCO							
261	T B DAM HPS	2	9.0	05/01/2019	06/22/201	1,264.83	SURGE SHAFT HRT MTc.
262	UPPER SILERU HPS	2	60.0	02/04/2020	02/13/202	216.00	INSPECTION /MTCE
KPCL							
263	VARAHI HPS	1	115.0	01/18/2020	01/24/202	151.70	GENERATOR
264	VARAHI HPS	3	115.0	05/13/2019	06/04/201	535.68	TESTING/CHECKING/ADJUSTME
265	VARAHI HPS	4	115.0	06/20/2019	07/13/201	557.45	TESTING/CHECKING/ADJUSTME
Western							
MPPGCL							
266	BANSAGAR-II HPS	1	15.0	04/11/2019	05/19/201	918.00	OVERHAULING WORKS
267	BANSAGAR-III HPS	3	20.0	07/21/2019	07/24/201	83.45	ANNUAL MAINTENANCE
268	BANSAGAR TONS-I	3	105.0	04/05/2019	07/21/201	2,569.13	ANNUAL MAINTENANCE
269	BARGI HPS	1	45.0	04/23/2019	07/18/201	2,081.91	ANNUAL MAINTENANCE
TATA MAH.							
270	BHIRA PSS HPS	1	150.0	01/03/2020	02/06/202	814.00	ANNUAL MAINTENANCE
MAHAGENCO							
271	BHIRA TAIL RACE	2	40.0	04/01/2019	10/21/201	4,880.65	CAPITAL MAINTENANCE
NHDC							
272	INDIRA SAGAR HPS	1	125.0	05/10/2019	05/18/201	201.00	ANNUAL MAINTENANCE
273	INDIRA SAGAR HPS	2	125.0	06/10/2019	06/26/201	394.00	ANNUAL MAINTENANCE
274	INDIRA SAGAR HPS	5	125.0	03/02/2020	03/11/202	226.00	ANNUAL MAINTENANCE
275	INDIRA SAGAR HPS	5	125.0	04/01/2019	04/06/201	137.95	ANNUAL MAINTENANCE
276	INDIRA SAGAR HPS	7	125.0	05/01/2019	05/09/201	201.00	ANNUAL MAINTENANCE
277	INDIRA SAGAR HPS	8	125.0	05/20/2019	06/09/201	490.50	ANNUAL MAINTENANCE
TATA MAH.							
278	KHOPOLI HPS	1	24.0	11/13/2019	12/02/201	456.36	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACITY(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
NHDC							
279	OMKARESHWAR	1	65.0	04/01/2019	04/12/201	254.00	ANNUAL MAINTENANCE
280	OMKARESHWAR	2	65.0	05/14/2019	05/24/201	244.13	ANNUAL MAINTENANCE
281	OMKARESHWAR	3	65.0	04/29/2019	05/13/201	342.82	ANNUAL MAINTENANCE
282	OMKARESHWAR	3	65.0	04/15/2019	04/26/201	270.47	ANNUAL MAINTENANCE
283	OMKARESHWAR	5	65.0	06/10/2019	06/22/201	295.00	ANNUAL MAINTENANCE
284	OMKARESHWAR	6	65.0	06/03/2019	06/08/201	136.77	ANNUAL MAINTENANCE
285	OMKARESHWAR	7	65.0	03/02/2020	03/13/202	271.75	ANNUAL MAINTENANCE
286	OMKARESHWAR	8	65.0	03/16/2020	03/24/202	199.00	ANNUAL MAINTENANCE
SSNNL							
287	S SAROVAR CHPH	1	50.0	03/08/2020	03/18/202	241.50	TURBINE INSPECTION MISC
288	S SAROVAR RBPH	1	200.0	12/02/2019	12/23/201	508.00	ANNUAL MAINTENANCE
289	S SAROVAR RBPH	2	200.0	12/24/2019	01/11/202	437.50	ANNUAL MAINTENANCE
290	S SAROVAR RBPH	3	200.0	01/17/2020	02/06/202	477.50	ANNUAL MAINTENANCE
291	S SAROVAR RBPH	3	200.0	04/01/2019	06/26/201	2,073.50	ANNUAL MAINTENANCE
292	S SAROVAR RBPH	4	200.0	02/11/2020	03/02/202	488.50	ANNUAL MAINTENANCE
293	S SAROVAR RBPH	5	200.0	04/01/2019	06/28/201	2,135.08	ANNUAL MAINTENANCE
294	S SAROVAR RBPH	6	200.0	04/06/2019	04/26/201	488.50	ANNUAL MAINTENANCE

CHAPTER-5

FORCED OUTAGES OF THE UNITS

CHAPTER-5

FORCED OUTAGES OF HE UNITS

5.1 Forced outages of generating units are due to various problems in generating equipments, auxiliary systems, civil structures. Based on the analysis carried out for 710 hydro generating units installed in 204 Hydro Electric Power Stations, non-availability of hydro-electric units in the country due to forced outages during the year 2019-20 (excluding miscellaneous outages) was 1.81% as compared to 2.87% during 2018-19.

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

During 2019-20, the generator and turbine faults accounted for 32.27% and 38.90% of the forced outages respectively whereas other equipment & civil structure faults accounted for 16.18% & 12.66% respectively of the forced outages. The summary of forced outages caused due to breakdown of generator, turbine and other equipment during 2019-20 vis-à-vis 2018-19 is given in **Table 5.1** below.

TABLE 5.1

EQUIPMENT/SYSTEM-WISE FORCED OUTAGES (2019-20 VIS-A-VIS 2018-19)

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage		Increase/ Decrease viz-z-viz 2018-19
		2019-20	2018-19	2019-20	2018-19	
1	Generator	32491.50	55919.20	32.27	55.55	-41.90
2	Turbine	39167.28	22461.68	38.90	22.31	74.37
3	Civil	12742.57	15959.78	12.66	15.85	-20.16
4	Other	16290.07	6330.54	16.18	6.29	157.33
	Total	100691.42	100671.21	100.00	100.00	0.02

It is observed that forced outages in 2019-20 vis-a-vis 2018-19 have increased 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 2019-20 includes Excitation System (43 %), followed by Upper Guide Bearing Fault (19.82 %), Rotor (12.65 %) and Stator (6.76 %) which together accounted for more than the 81% of the forced outages due to generator components. The fault in Miscellaneous Generator Components accounted for another 7.86% of the forced outages.

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

TABLE 5.2
FORCED OUTAGE HOURS DUE TO BREAKDOWN OF
GENERATOR COMPONENTS (PERIOD: 2019-20)

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	86.88	0.27	6.58	0.02			93.47	0.29
2	EXCITATION SYSTEM	13693.37	42.14	120.48	0.37	156.51	0.48	13970.36	43.00
3	GENERATOR COOLING SYSTEM	761.52	2.34	34.87	0.11	52.01	0.16	848.39	2.61
4	LOWER GUIDE BEARING	296.73	0.91	56.18	0.17	21.09	0.06	374.00	1.15
5	MISCELLANEOUS GENERATOR	1848.73	5.69	234.50	0.72	471.72	1.45	2554.95	7.86
6	PROTECTION SYSTEM	222.36	0.68	8.00	0.02	49.16	0.15	279.51	0.86
7	ROTOR	2851.37	8.78	1000.98	3.08	256.65	0.79	4109.00	12.65
8	STATOR	286.53	0.88	51.13	0.16	1858.23	5.72	2195.90	6.76
9	THRUST BEARING	1190.96	3.67	137.87	0.42	18.25	0.06	1347.08	4.15
10	UPPER GUIDE BEARING	3135.62	9.65	85.77	0.26	3218.35	9.91	6439.73	19.82
11	VIBRATION/SOUND/ ALIGNMENT	175.42	0.54	7.70	0.02	96.00	0.30	279.12	0.86
	Total	24549.48	75.56	1744.07	5.37	6197.96	19.08	32491.50	100.00

From the Table 5.2, it is observed that Excitation system 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 Runner/Underwater parts (23.45%), Shaft Vibrations/alignment (12.14%) and Miscellaneous Turbine Components (53.13%) 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: 2019-20

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	962.88	3.60	36.78	1.34	901.39	9.29	1901.05	4.85
2	MISCELLANEOUS TURBINE COMPONENTS	12519.53	46.85	1970.82	71.72	6317.71	65.14	20808.06	53.13
3	OTHERS	496.70	1.86	617.72	22.48	15.02	0.15	1129.43	2.88
4	BEARING	189.39	0.71	17.93	0.65	228.26	2.35	435.58	1.11
5	GUIDE VANES	4.23	0.02	0.47	0.02	30.25	0.31	34.95	0.09
6	RUNNER/UNDERWATER PARTS	9166.50	34.30	0.35	0.01	18.03	0.19	9184.88	23.45
7	SHAFT VIBRATION/ALIGNMENT/S	2875.49	10.76	76.11	2.77	1803.90	18.60	4755.50	12.14
8	MAIN INLET VALVE	506.25	1.89	27.57	1.00	384.00	3.96	917.82	2.34
	Total	26720.97	100.00	2747.75	100.00	9698.55	100.00	39167.28	100.00

From the Table 5.3, it is observed that Runner/Underwater parts (34.3%) 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: 2019-20

S. No.	Type of Turbine	Number of Units	Installed Capacity MW	Forced Outage Hours	Avg. Forced Outage Hours per Unit
1	Bulb	26	684.00	1428.10	54.93
2	Francis	408	32022.57	22978.34	56.32
3	Kaplan	133	4386.75	4449.87	33.46
4	Pelton	145	8605.90	10310.97	71.11
	TOTAL	712	45699.22	39167.28	215.81

Forced outage rate was observed to be the highest in case of Pelton turbines (71.11 hrs./unit) followed by Francis turbines (56.32 hrs./unit), Bulb turbines (54.93 hrs./unit) and lowest in case of Kaplan turbines (33.46 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: 2019-20**

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	308	19729.52	65436.90	212.46	10
2	Others*	77	6316.00	7551.69	98.07	5
	SUB TOTAL	385	26045.52	72988.59	310.53	
B-Imported						
3	CHINA	10	404.00	450.35	45.04	3
4	UNITED KINGDOM	62	1588.60	3599.87	58.06	4
5	JAPAN	74	6168.20	10115.28	136.69	6
6	AUSTRIA	3	85.00	495.48	165.16	7
7	CANADA	38	3395.00	6918.78	182.07	8
8	RUSSIAN FEDERATION	26	2804.00	4987.28	191.82	9
9	UNITED STATES OF AMERICA	19	1986.00	5398.51	284.13	11
10	SLOVAKIA	15	228.75	4325.94	288.40	12
11	FRANCE	11	429.20	3216.45	292.40	13
12	GERMANY	13	370.75	4385.23	337.33	14
13	SWITZERLAND	32	1002.20	14564.28	455.13	15
14	EL SALVADOR	4	62.00	4532.45	1133.11	16
15	SWEDEN	1	40.00			17
16	CZECH REP	4	210.00			17
17	HUNGARY	4	60.00	81.75	20.44	2
18	Other	11	820.00	201.38	18.31	1
	SUB-TOTAL	359	23183.70	80300.34	223.68	
	TOTAL	712	45699.22	136261.61	3918.62	

* Indigenous supplier like Andritz India, B Foursess Bangalore, Atstom India, VA Tech India, etc.

It is observed that Imported units other than above mentioned countries (18.31 hrs./unit) and the imported generating units from Hungary (20.44 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: 2019-20

S. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Average Annual Non-availability per Unit (Hours)
1	2019-20	2	300.00	0.00	0.0
2	2018-19	3	140.00	4.28	1.43
3	2017-18	16	795.00	2801.67	175.10
4	2016-17	18	1,659.00	457.63	25.42
5	2015-16	17	1,516.00	532.38	31.32
6	2010-11 to 2014-15	63	4,437.00	1217.83	19.33
7	2005-06 to 2009-10	66	7,077.00	9875.94	149.64
8	2000-01 to 2004-05	74	6,741.80	9828.11	132.81
9	1989-90 to 1999-2000	86	5,769.70	28775.03	334.59
10	1978-79 to 1988-89	124	7,259.10	24620.16	198.55
11	1967-68 to 1977-78	81	5,279.75	23706.8	292.68
12	Up to 1966-67	162	4,724.85	62182.2	383.84
	Total	712	45699.20	136262	124

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 1989-90 to 1999-2000 (316.72 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: 2019-20

S.No	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Forced Outages
1	Northern	245	19023.27	0.62
2	Western	101	7392	0.84
3	Southern	246	11694.5	2.60
4	Eastern	84	5862.45	2.60
5	North Eastern	36	1727	7.75
	All India	712	45699.22	1.91

Performance of hydro generating equipment installed in Northern Region was the best as the non-availability due to forced outages was least (0.62%). The average non-availability of the units in the North Eastern Region (7.75) and in the Southern Region (2.60%) 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: 2019-20

S. No.	Organization	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Average Annual Forced Outage/Unit (Hours)
Central Sector					
1	BBMB	28	2920.30	1941.98	69.36
2	DVC	5	143.20	3559.32	711.86
3	NEEPCO.	18	1200.00	6572.75	365.15
4	NHDC	16	1520.00	165.72	10.36
5	NHPC	70	5451.20	8945.31	127.79

6	NTPC LTD.	4	800.00	0.00	0.00
7	SJVNL	12	1912.00	3034.52	252.88
8	THDC	8	1400.00	350.13	43.77
	Sub Total	161	15346.70	24569.74	225.88
State Sector					
1	APGCL	2	100.00		
2	APGENCO	34	1796.75	28813.47	847.45
3	CSPGCL	3	120.00	0.00	0.00
4	GSECL	8	540.00	0.00	0.00
5	HPPCL	5	295.00	0.00	0.00
7	HPSEB	12	372.00	28.45	2.37
8	JKSPDC	12	1110.00	8.51	0.71
9	JUUNL	2	130.00	0.00	0.00
10	KPCL	66	3572.20	16750.75	253.80
11	KSEB	47	1856.50	18195.16	387.13
12	MAHAGENCO	24	2406.00	4068.00	169.50
13	MePGCL	13	322.00	16286.78	1252.83
14	MPPGCL	23	875.00	2579.25	112.14
15	OHPC	31	2027.50	4445.40	143.40
16	PSPCL	25	1051.00	390.38	15.62
17	RRVUNL	11	411.00	2435.28	221.39
18	SSNNL	11	1450.00	1665.50	151.41
19	TANGEDCO	69	2178.20	13140.25	190.44
20	TSGENCO	36	2405.60	816.37	22.68
21	TUL	6	1200.00	258.39	43.06
22	UJVNL	34	1252.15	4425.17	130.15
23	UPJVNL	15	501.60	0.00	0.00
24	WBSEDCL	12	986.00	4650.02	387.50
	Sub Total	501	26958.50	118957.12	254.80
Private Sector					
1	ADHPL	2	192.00	707.60	353.80
2	AHPC (GVK)	4	330.00	0.00	0.00
3	DEPL	2	96.00	357.77	178.88
4	DLHP	1	34.00	0.00	0.00
5	E.P.P.L.	2	100.00	84.13	42.07

7	GBHPPL	2	70.00	0.63	0.32
8	GIPL	2	110.00	86.31	43.16
9	HBPCL	7	1300.00	129.17	18.45
10	IAEPL	3	36.00	0.00	0.00
11	JPPVL	4	400.00	121.75	30.44
12	MPCL	2	86.00	0.00	0.00
13	SEPL	2	97.00	0.00	0.00
14	SKPPPL	2	96.00	0.00	0.00
15	TATA MAH.	15	447.00	31.39	2.09
	Sub Total	50	3394.00	1518.75	83.65
	All India Total	712	45699.20	145045.61	205.69

It is observed that utility-wise, per unit forced outages for generating units was maximum in respect of hydro-electric stations under MePGCL (1252.83 hrs./unit). On the other hand, the hydro generating units of NTPC, HPPCL, GSECL, CSPGCL, UPJVNL, AHPC, DLHP, IAEPL, MPCL, SEPL, SKPPL and JUUNL etc. have reported nil forced outage operation.

5.9 DURATION OF FORCED OUTAGES

There were total 3151 forced outages/tripping during the year 2019-20. 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 61.73% of the total forced shutdown were of duration less than 6 hours while 27.58% of outages were of duration varying from 6 to 24 hours and only 2.70% of shutdowns persisted for more than 10 days.

TABLE 5.9

DURATION PATTERN OF FORCED OUTAGES PERIOD: 2019-20

S. No.	Duration of Hours	Number of Outages	% of Total of Outages
1	More than 10 days	85	2.70
2	Less than 6 hour	1945	61.73
3	6 to 24 hours	869	27.58
4	1 to 10 days	252	8.00
	Total No. of Outages	3151	100.00

5.10 FORCED OUTAGES - STATION-WISE

The number of H.E. Stations falling under various ranges of non-availability due to forced outages during the year 2019-20 vis-à-vis 2018-19 is summarized below in **Table 5.10**.

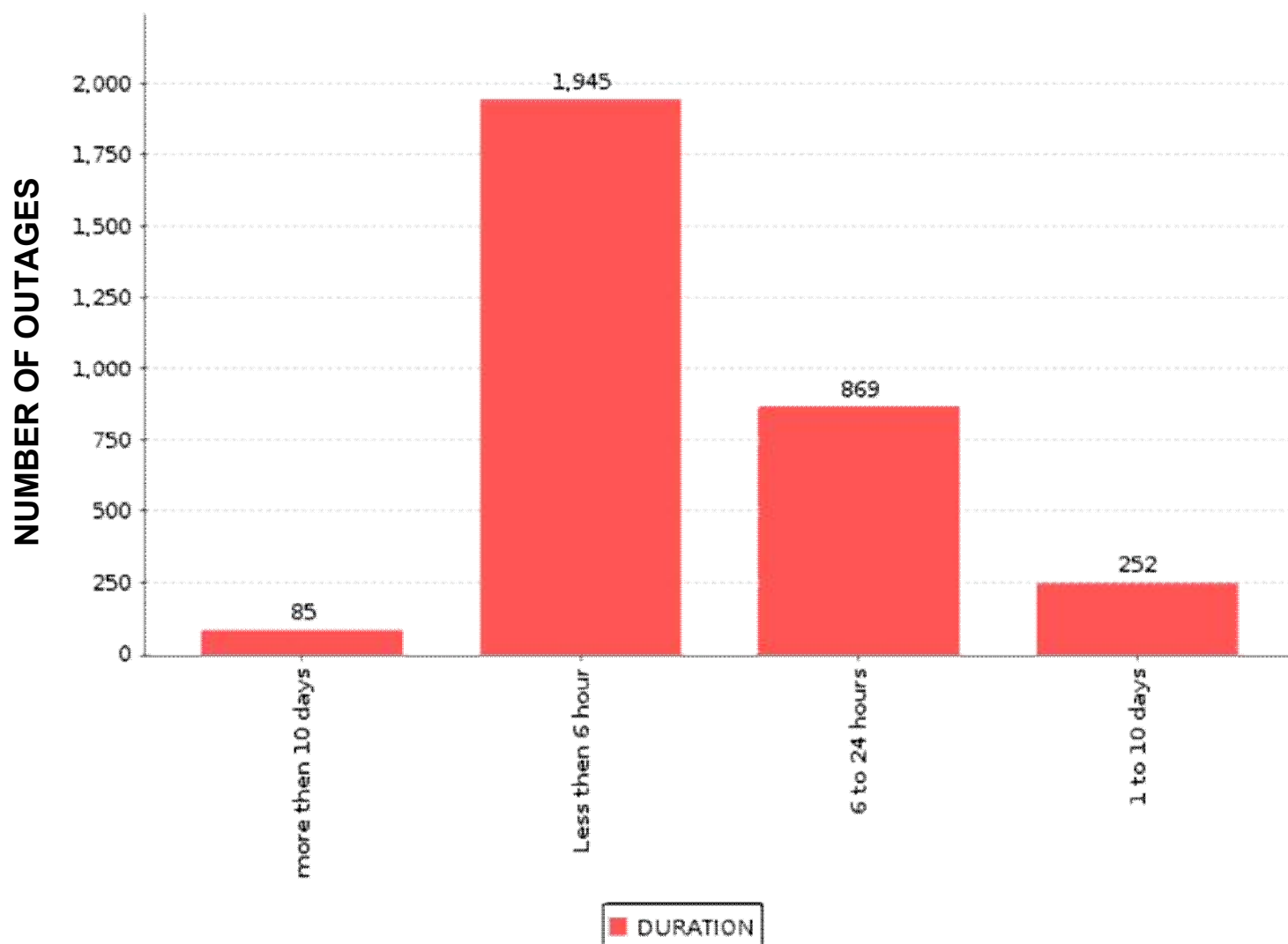
TABLE 5.10
NON-AVAILABILITY OF HE STATIONS DUE TO FORCED OUTAGES
(2019-20 VIS-A-VIS 2018-19)

% Non-Availability due to Forced Outages	2019-20				2018-19			
	Stations		Capacity		Stations		Stations	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
0	111	54.15	22,800.95	49.89	116.00	56.86	24,948.95	54.59
>0 to 1	27	13.17	8,085.75	17.69	26.00	12.75	6,405.85	14.02
>1 to 2	5	2.44	757.30	1.66	5.00	2.45	984.00	2.15
>2 to 3	4	1.95	1,162.00	2.54	2.00	0.98	210.00	0.46
>3 to 4	2	0.98	197.70	0.43	2.00	0.98	400.00	0.88
>4 to 5	2	0.98	168.50	0.37	5.00	2.45	985.50	2.16
>5	54	26.34	12,527.00	27.41	48.00	23.53	11,464.90	25.09
Total	205	100	45,699.20	100	204	100	45,399.20	100

It could be seen from above that there was no forced outage at 111 nos. (54.15% of total) hydro-electric stations during 2019-20 as compared to 116 nos. (56.85% of total) hydro-electric stations during 2019-20.

26.34% 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.

DURATION PATTERN OF FORCED OUTAGES DURING 2019-20

CENTRAL ELECTRICITY AUTHORITY
Hydro WING
Hydro Project Planning & Investigation Division

Annexure 5.1

DETAILS OF LONG DURATION FORCED OUTAGE IN HYDRO-ELECTRIC UNITS DURING: 2019-20

(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	4/13/19, 12:00 PM	4/14/19, 5:00 PM	29.00	NEEDLE PROBLEM
		1	96.0	4/16/19, 11:25 AM	4/17/19, 3:00 PM	27.58	D.C.SUPPLY FAILURE.
		2	96.0	4/5/19, 10:00 AM	4/6/19, 5:00 PM	31.00	GEN.TRANSFORMER COOLING PROBLEM/MTCE.
		2	96.0	9/18/19, 6:38 PM	9/29/19, 12:57 AM	246.32	GENERATOR ROTOR DAMAGED.
		2	96.0	9/29/19, 12:58 AM	9/30/19, 9:49 PM	44.85	NEEDLE PROBLEM
		2	96.0	12/15/19, 12:00 AM	12/18/19, 12:00 AM	72.00	MISCELLANEOUS
		2	96.0	3/12/20, 9:43 PM	3/14/20, 6:30 PM	44.78	NEEDLE PROBLEM
NHPC							
2	BAIRA SIUL HPS	1	60.0	7/25/19, 10:14 AM	7/27/19, 5:06 AM	42.87	DESILTING OF INTAKE CHANNEL.
		1	60.0	7/31/19, 10:48 AM	8/2/19, 11:22 AM	48.57	DESILTING OF INTAKE CHANNEL.
		1	60.0	8/12/19, 5:59 PM	8/13/19, 7:14 PM	25.25	VIBRATIONS
		3	60.0	7/25/19, 9:37 AM	7/27/19, 5:24 AM	43.78	DESILTING OF INTAKE CHANNEL.
		3	60.0	7/31/19, 10:34 AM	8/1/19, 6:46 PM	32.20	DESILTING OF INTAKE CHANNEL.
		3	60.0	3/15/20, 12:00 AM	3/17/20, 12:57 PM	60.95	UPPER GUIDE BEARING MISC.
HBPCL							
3	BASPA HPS	2	100.0	12/30/19, 11:45 AM	1/1/20, 11:00 PM	59.25	EXCITATION SYSTEM FAILURE
NHPC							
4	CHAMERA-III HPS	3	77.0	5/24/19, 8:02 AM	5/25/19, 8:07 PM	36.08	LINE BREAKER FAULT
BBMB							
5	DEHAR HPS	2	165.0	5/27/19, 6:11 AM	5/31/19, 11:59 PM	113.80	STATOR
		2	165.0	6/6/19, 12:00 AM	7/14/19, 1:09 PM	925.15	STATOR EARTH FAULT
NHPC							
6	KISHANGANGA HPS	2	110.0	4/10/19, 9:36 PM	4/12/19, 4:43 PM	43.11	TURBINE BEARING COOLING SYS/OIL COOLER
		2	110.0	7/31/19, 2:22 PM	8/1/19, 5:56 PM	27.56	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
		2	110.0	3/12/20, 12:33 AM	3/15/20, 11:59 PM	95.45	ROTOR EARTH FAULT

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	110.0	3/16/20, 12:00 AM	3/31/20, 11:59 PM	384.00	MAIN INLET VALVE PROBLEM
THDC							
7	KOTESHWAR HPS	3	100.0	1/10/20, 7:15 PM	1/16/20, 12:35 PM	137.33	GENEARTOR MISC.
		4	100.0	12/3/19, 10:00 AM	12/4/19, 12:00 PM	26.00	SWITCH YARD MAINTENANCE
BBMB							
8	KOTLA HPS	3	24.2	5/7/19, 10:34 AM	5/8/19, 2:57 PM	28.38	EXCITATION SYSTEM FAILURE
RRVUNL							
9	MAHI BAJAJ-I HPS	1	25.0	4/1/19, 12:00 AM	4/5/19, 7:25 PM	115.42	TAIL RACE CHANNEL/TUNNEL PROBLEM
		1	25.0	4/11/19, 11:55 PM	4/13/19, 3:55 PM	40.00	MISCELLANEOUS
		1	25.0	4/13/19, 5:25 PM	4/30/19, 11:59 PM	414.57	MISCELLANEOUS
		1	25.0	7/1/19, 12:00 AM	8/10/19, 12:15 PM	972.25	MISCELLANEOUS
		2	25.0	4/5/19, 5:15 PM	4/29/19, 11:59 PM	582.73	TAIL RACE CHANNEL/TUNNEL PROBLEM
E.P.P.L.							
10	MALANA-II HPS	1	50.0	12/4/19, 12:00 AM	12/5/19, 3:43 PM	39.72	TRIPPING OF TRANSMISSION LINE
		2	50.0	12/4/19, 12:00 AM	12/5/19, 3:54 PM	39.90	TRIPPING OF TRANSMISSION LINE
UJVNL							
11	MANERI BHALI-II HPS	4	76.0	4/14/19, 9:05 AM	4/15/19, 12:30 PM	27.42	MISCELLANEOUS
PSPCL							
12	MUKERIAN-II HPS	4	15.0	7/8/19, 5:20 PM	7/14/19, 5:50 AM	132.50	STATOR EARTH FAULT
13	MUKERIAN-IV HPS	10	19.5	5/5/19, 8:10 PM	5/7/19, 7:50 PM	47.67	MISCELLANEOUS
SJVNL							
14	NATHPA JHAKRI HPS	4	250.0	3/1/20, 6:09 AM	3/3/20, 4:32 PM	58.38	GEN.TR.BREAKER TRIPPED
NHPC							
15	PARBATI-III HPS	1	130.0	4/1/19, 12:00 AM	4/7/19, 5:34 PM	161.57	H.R.T. MAINTENANCE
		2	130.0	4/1/19, 12:00 AM	4/5/19, 1:10 PM	109.17	H.R.T. MAINTENANCE
		3	130.0	4/1/19, 12:00 AM	4/7/19, 12:17 PM	156.28	H.R.T. MAINTENANCE
		4	130.0	4/1/19, 12:00 AM	4/8/19, 5:47 PM	185.78	H.R.T. MAINTENANCE
		4	130.0	4/26/19, 4:30 AM	4/27/19, 11:59 PM	43.50	SWITCHYARD MISCELLANOUS.
SJVNL							
16	RAMPUR HPS	3	68.67	3/16/20, 8:15 AM	3/17/20, 11:59 PM	39.73	POWER HOUSE MISC
		6	68.67	10/15/19, 12:00 AM	10/16/19, 4:28 PM	40.47	MAIN DISC SEAL PROBLEM/REPLACEMENT
RRVUNL							
17	R P SAGAR HPS	1	43.0	8/27/19, 8:50 AM	8/30/19, 10:16 PM	85.43	GENEATOR PROTECTION MISC/BACK UP PROT

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	43.0	8/30/19, 10:40 PM	9/1/19, 1:50 PM	39.17	GENERATOR BUS DUCT PROBLEM
		2	43.0	8/30/19, 12:00 AM	9/1/19, 11:00 AM	59.00	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
		2	43.0	9/1/19, 5:10 PM	9/4/19, 10:35 AM	65.42	GENERATOR PROTECTION MALOPERATION
PSPCL							
18	SHANAN HPS	4	15.0	6/15/19, 9:30 PM	6/16/19, 10:15 PM	24.75	AVR PROBLEM/TRIPPED
NHPC							
19	URI-II HPS	1	60.0	4/17/19, 5:01 AM	4/18/19, 6:06 PM	37.08	DESILTING OF INTAKE CHANNEL.
		1	60.0	5/29/19, 5:08 AM	5/30/19, 5:11 PM	36.05	DESILTING OF INTAKE CHANNEL.
		1	60.0	6/28/19, 5:17 AM	6/29/19, 5:45 PM	36.47	DESILTING OF INTAKE CHANNEL.
		2	60.0	4/17/19, 5:03 AM	4/18/19, 5:33 PM	36.50	DESILTING OF INTAKE CHANNEL.
		2	60.0	5/29/19, 5:17 AM	5/30/19, 5:03 PM	35.77	DESILTING OF INTAKE CHANNEL.
		2	60.0	6/28/19, 5:02 AM	6/29/19, 5:12 PM	36.17	DESILTING OF INTAKE CHANNEL.
		3	60.0	4/17/19, 5:03 AM	4/18/19, 5:48 PM	36.75	DESILTING OF INTAKE CHANNEL.
		3	60.0	5/29/19, 5:37 AM	5/30/19, 4:47 PM	35.17	DESILTING OF INTAKE CHANNEL.
		3	60.0	6/28/19, 5:02 AM	6/29/19, 4:47 PM	35.75	DESILTING OF INTAKE CHANNEL.
		4	60.0	4/17/19, 5:01 AM	4/18/19, 5:55 PM	36.90	DESILTING OF INTAKE CHANNEL.
		4	60.0	5/29/19, 5:47 AM	5/30/19, 5:25 PM	35.63	DESILTING OF INTAKE CHANNEL.
		4	60.0	6/28/19, 5:02 AM	6/29/19, 5:22 PM	36.33	DESILTING OF INTAKE CHANNEL.
Western							
MPPGCL							
20	BANSAGAR-II HPS	1	15.0	4/1/19, 12:00 AM	4/11/19, 11:00 AM	251.00	LGB OIL LEAKAGE/LEVEL
21	BANSAGAR TONS-I HPS	1	105.0	6/11/19, 7:20 PM	6/30/19, 11:55 PM	460.58	STATOR EARTH FAULT
		1	105.0	7/21/19, 12:00 AM	8/8/19, 1:00 AM	433.01	ELECTRICAL FAULT
		1	105.0	9/10/19, 11:55 AM	10/10/19, 4:30 PM	724.58	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
22	BARGI HPS	1	45.0	3/6/20, 12:30 AM	3/8/20, 11:30 AM	59.00	MISCELLANEOUS
		2	45.0	1/27/20, 12:30 PM	1/29/20, 4:00 PM	51.50	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
MAHAGENCO							
23	GHATGHAR PSS HPS	1	125.0	8/12/19, 12:50 AM	9/10/19, 11:40 AM	706.83	MIV LEAKAGE
		1	125.0	9/27/19, 12:00 AM	2/8/20, 11:05 PM	3239.08	TURBINE MISC.
		2	125.0	2/24/20, 12:00 AM	2/26/20, 11:35 AM	59.58	MIV LEAKAGE
		2	125.0	3/9/20, 9:30 AM	3/12/20, 12:00 AM	62.50	MIV LEAKAGE
MPPGCL							

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
24	MADHIKHERA HPS	1	20.0	8/10/19, 12:00 AM	8/14/19, 1:56 AM	97.95	IRRIGATION LINK PROJECT
		3	20.0	8/9/19, 12:00 AM	8/14/19, 1:58 AM	121.97	IRRIGATION LINK PROJECT
NHDC							
25	OMKARESHWAR HPS	1	65.0	10/16/19, 12:00 AM	10/17/19, 7:22 PM	43.37	GENERATOR MAINTENANCE WORK
		6	65.0	3/28/20, 6:05 PM	3/29/20, 7:36 PM	25.52	BUS PROTECTION TRIP
SSNNL							
26	S SAROVAR CHPH HPS	2	50.0	3/2/20, 12:00 AM	3/23/20, 8:25 AM	512.42	THRUST BRG. OIL SYSTEM PROBLEM
		3	50.0	1/18/20, 1:00 AM	1/20/20, 5:15 AM	52.25	ROTOR EARTH FAULT
Southern							
TANGEDCO							
27	BHAWANI BARRAGE-II HPS	1	15.0	10/23/19, 7:35 PM	10/25/19, 3:45 PM	44.17	FLOODING OF POWER HOUSE
		2	15.0	10/23/19, 7:37 PM	10/25/19, 3:50 PM	44.22	FLOODING OF POWER HOUSE
28	BHAWANI KATTAL	1	15.0	4/1/19, 12:00 AM	4/21/19, 1:10 PM	493.17	TURBINE SHAFT SEAL WORK/REPLACMEENT
		2	15.0	5/11/19, 5:00 PM	5/30/19, 12:35 PM	451.58	G.V.ADJUSTMENT/LIMIT PROB/BUSING/MISC.
KPCL							
29	GERUSUPPA HPS	2	60.0	12/28/19, 11:06 AM	12/31/19, 3:40 PM	76.57	GENEATOR TRANSFORMER OIL PROBLEMS/TOPPING
30	GHAT PRABHA HPS	1	16.0	8/7/19, 8:05 PM	11/9/19, 5:25 PM	2253.33	POWER HOUSE FLOODED
		1	16.0	2/8/20, 12:00 AM	2/9/20, 8:00 PM	44.00	STATOR EARTH FAULT
		2	16.0	8/6/19, 1:10 PM	10/14/19, 1:07 PM	1655.95	POWER HOUSE FLOODED
APGENCO							
31	HAMPI HPS	1	9.0	5/1/19, 12:00 AM	11/5/19, 12:00 PM	4524.00	EXCITATION SYSTEM FAILURE
		2	9.0	4/1/19, 12:00 AM	12/25/19, 11:20 AM	6443.33	GENEATOR TRANSFORMER OIL PROBLEMS/TOPPING
KSEB							
32	IDAMALAYAR HPS	1	37.5	9/30/19, 12:34 AM	10/6/19, 7:09 PM	162.58	LT AC PANELS/BRKR.SYSTEM FAILURE/PROBLEM
		1	37.5	11/9/19, 5:25 PM	1/11/20, 1:33 AM	1496.13	ROTOR EARTH FAULT/POLE FAILURE
		1	37.5	1/11/20, 4:26 PM	1/16/20, 12:13 PM	115.78	BEARING
		2	37.5	9/30/19, 3:03 AM	10/6/19, 11:40 PM	164.62	LT AC PANELS/BRKR.SYSTEM FAILURE/PROBLEM
		2	37.5	12/3/19, 6:30 PM	12/4/19, 8:58 PM	26.47	GENERATOR CT PT PROBLEM
33	IDUKKI HPS	3	130.0	11/18/19, 6:00 AM	12/18/19, 12:20 AM	714.33	COOLING WATER SYSTEM PROBLEM/PIPES REPLACE
		4	130.0	5/30/19, 7:10 AM	5/31/19, 1:09 PM	29.98	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		4	130.0	7/4/19, 4:40 PM	7/5/19, 8:00 PM	27.33	SYNCHORNISING PROBLEMS
		5	130.0	7/4/19, 5:35 PM	7/5/19, 8:00 PM	26.42	SYNCHORNISING PROBLEMS

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	130.0	7/5/19, 8:00 PM	7/8/19, 4:43 PM	68.72	EXCITATION SYSTEM FAILURE
		6	130.0	10/17/19, 12:00 AM	10/18/19, 4:49 PM	40.82	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
KPCL							
34	JOG HPS	5	21.6	10/7/19, 5:50 PM	10/9/19, 7:40 AM	37.83	SPARKING ACROSS SLIP RING/BRUSHES
		5	21.6	10/22/19, 7:20 AM	10/23/19, 4:20 PM	33.00	PENSTOCK LEAKAGE
		5	21.6	1/3/20, 12:00 AM	1/26/20, 5:10 AM	557.17	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		6	21.6	8/5/19, 6:25 PM	8/9/19, 2:10 PM	91.75	EHT/CT/PT/FAULT /BROBLEM
		6	21.6	10/31/19, 12:00 AM	11/4/19, 7:35 PM	115.58	NEEDLE PROBLEM
		7	21.6	10/20/19, 11:59 PM	10/22/19, 11:25 AM	35.43	PENSTOCK LEAKAGE
		8	21.6	10/20/19, 11:55 PM	10/22/19, 6:20 AM	30.42	PENSTOCK LEAKAGE
TANGEDCO							
35	KADAMPARI HPS	3	100.0	4/1/19, 12:00 AM	3/31/20, 11:59 PM	8784.00	RSD/LOW SCHEDULE
36	KODAYAR-I HPS	1	60.0	4/1/19, 12:00 AM	4/9/19, 11:28 AM	203.47	MIV CONTROL PROBLEM
		1	60.0	4/30/19, 3:20 PM	5/12/19, 12:47 PM	285.45	MIV LEAKAGE
		1	60.0	5/14/19, 8:00 AM	5/18/19, 1:01 PM	101.02	ELECTRICAL FAULT
		1	60.0	6/3/19, 12:55 PM	6/6/19, 4:55 PM	76.00	FOREBAY/RES./INSEPCION/REPAIR/P ROBLEM
		1	60.0	6/25/19, 8:18 AM	6/30/19, 5:26 PM	129.13	COOLING WATER SYSTEM PROBLEM/PIPES REPLACE
		1	60.0	7/1/19, 5:38 PM	7/5/19, 8:38 PM	99.00	CONTROL SYSTEM PROBLEMS
		1	60.0	7/5/19, 10:30 PM	7/16/19, 9:00 PM	262.50	PMG FAILURE /TROUBLE
		1	60.0	10/18/19, 12:30 PM	10/19/19, 5:10 PM	28.67	GEN. AIR COOLERS LEAKAGE/DAMAGED/REPLACE
		1	60.0	12/10/19, 11:55 AM	12/11/19, 5:12 PM	29.28	THRUST BEARING TEMP. HIGH
		1	60.0	1/4/20, 7:30 AM	1/5/20, 8:10 PM	36.67	EHT/ISOLATOR PROBLEMS/MAINT.CHECK
		1	60.0	2/11/20, 3:20 PM	2/12/20, 5:45 PM	26.42	LGB OIL COOLERS PROBLEMBS
		1	60.0	3/14/20, 11:57 AM	3/16/20, 5:15 AM	41.30	THRUST BEARING TEMP. HIGH
		1	60.0	3/28/20, 1:00 PM	3/30/20, 6:01 AM	41.02	THRUST BEARING TEMP. HIGH
KSEB							
37	KUTTIYADI ADDL EXTN	1	50.0	8/9/19, 4:55 PM	9/22/19, 6:18 PM	1057.38	POWER HOUSE FLOODED
		2	50.0	8/9/19, 4:55 PM	9/4/19, 5:49 PM	624.90	POWER HOUSE FLOODED
38	KUTTIYADI EXTN HPS	4	50.0	7/26/19, 12:00 AM	7/29/19, 8:30 PM	92.50	DAMAGE TO TURBINE
		4	50.0	8/10/19, 12:00 AM	11/1/19, 8:36 PM	2012.60	POWER HOUSE FLOODED
		4	50.0	1/23/20, 10:35 AM	1/26/20, 5:20 PM	78.76	VARIOUS MAINTENANCE WORKS
39	KUTTIYADI HPS	1	25.0	4/26/19, 12:15 AM	5/9/19, 5:40 PM	329.42	PENSTOCK LEAKAGE

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	25.0	10/21/19, 12:00 AM	10/23/19, 6:13 PM	66.22	VARIOUS MAINTENANCE WORKS
		2	25.0	10/21/19, 6:40 AM	10/23/19, 6:18 PM	59.63	VARIOUS MAINTENANCE WORKS
		3	25.0	4/26/19, 12:15 AM	5/9/19, 5:14 PM	328.98	MAIN INLET VALVE PROBLEM
		3	25.0	10/21/19, 6:40 AM	10/23/19, 6:22 PM	59.70	VARIOUS MAINTENANCE WORKS
APGENCO							
40	LOWER SILERU HPS	1	115.0	4/1/19, 12:00 AM	7/10/19, 7:00 PM	2419.00	MISCELLANEOUS
		2	115.0	5/1/19, 12:00 AM	5/5/19, 12:00 AM	96.00	T.B. ALIGNMENT/MISC.
		2	115.0	7/26/19, 10:00 AM	8/17/19, 6:00 PM	536.00	UGB ALIGNMENT PROBLEM
		3	115.0	4/4/19, 12:00 PM	7/18/19, 11:59 PM	2531.98	UGB ALIGNMENT PROBLEM
		4	115.0	5/1/19, 12:00 AM	7/10/19, 7:00 PM	1699.00	TURBINE SHAFT SEAL WORK/REPLACMEENT
		4	115.0	7/28/19, 10:00 AM	7/31/19, 7:00 PM	81.00	VIBRATIONS
TANGEDCO							
41	METTUR TUNNEL HPS	3	50.0	9/11/19, 12:00 AM	9/13/19, 12:06 AM	48.10	STATOR EARTH FAULT
TSGENCO							
42	NAGARJUN SGR HPS	2	100.8	10/23/19, 10:25 PM	10/27/19, 11:45 AM	85.33	GENEATOR TRANSFORMER MISC.
		4	100.8	11/30/19, 12:00 AM	12/1/19, 11:35 AM	35.58	GENEATOR TRANSFORMER DAMAGED
APGENCO							
43	NAGARJUN SGR RBC HPS	2	30.0	5/1/19, 12:00 AM	5/31/19, 12:00 AM	720.00	P.C. INTAKE GATES/PROBLEM
		2	30.0	12/1/19, 12:00 AM	12/31/19, 11:55 PM	743.92	TRIPPED DUE TO VARIATION IN SPEED
		3	30.0	12/1/19, 12:00 AM	12/31/19, 11:55 PM	743.92	TRIPPED DUE TO VARIATION IN SPEED
TANGEDCO							
44	PERIYAR HPS	3	42.0	9/18/19, 4:52 PM	9/20/19, 12:07 PM	43.25	STATOR EARTH FAULT
TSGENCO							
45	PRIYADARSHNI JURALA HPS	2	39.0	11/11/19, 6:24 PM	11/26/19, 11:59 PM	365.58	RUNNER BLADE OPERATING MECH. PROBLEM
KSEB							
46	SABARIGIRI HPS	1	50.0	5/30/19, 12:00 AM	5/31/19, 11:40 PM	47.67	COOLING WATER SYSTEM PROBLEM/PIPES REPLACE
		1	50.0	11/1/19, 12:00 AM	11/2/19, 9:25 PM	45.42	PENSTOCK REPAIR WORKS
		1	50.0	3/28/20, 11:00 PM	3/30/20, 6:14 AM	31.23	LINE BREAKER
		2	50.0	11/1/19, 12:00 AM	11/2/19, 9:25 PM	45.42	PENSTOCK REPAIR WORKS
		4	50.0	5/10/19, 8:49 AM	6/8/19, 11:46 AM	698.95	VIBRATIONS
		4	50.0	2/23/20, 12:00 AM	2/26/20, 8:02 PM	92.03	POLE DISCREPANCY
		4	50.0	3/15/20, 12:00 AM	3/16/20, 3:28 PM	39.47	BRAKE JET PROBLEM

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	50.0	5/17/19, 12:00 AM	5/18/19, 2:39 PM	38.65	TRIPPED DUE TO VARIATION IN SPEED
		5	50.0	5/22/19, 12:00 AM	5/23/19, 9:06 AM	33.10	TRIPPED DUE TO VARIATION IN SPEED
47	SHOLAYAR HPS	3	18.0	4/1/19, 12:00 AM	5/21/19, 7:09 PM	1219.15	ROTOR EARTH FAULT
APGENCO							
48	SRISAILAM HPS	4	110.0	2/25/20, 12:00 AM	2/28/20, 12:58 PM	84.97	ROTOR EARTH FAULT
TSGENCO							
49	SRISAILAM LB HPS	6	150.0	11/15/19, 12:00 AM	11/27/19, 6:30 PM	306.50	STATOR EARTH FAULT
TANGEDCO							
50	SURULIYAR HPS	1	35.0	6/19/19, 12:50 PM	6/21/19, 10:18 AM	45.47	PENSTOCK LEAKAGE
		1	35.0	8/20/19, 10:50 AM	8/24/19, 10:20 AM	95.50	PENSTOCK LEAKAGE
APGENCO							
51	T B DAM HPS	1	9.0	8/1/19, 12:00 AM	8/16/19, 6:30 PM	378.50	MISCELLANEOUS
		2	9.0	4/29/19, 10:40 AM	5/1/19, 12:00 AM	37.33	MISCELLANEOUS
		4	9.0	6/4/19, 9:05 AM	6/30/19, 11:59 PM	638.90	MISCELLANEOUS
		4	9.0	12/4/19, 9:25 AM	12/16/19, 8:00 AM	286.58	TURBINE GOVERNING SYS. FAILURE
52	UPPER SILERU HPS	1	60.0	5/1/19, 12:00 AM	6/6/19, 1:35 PM	877.58	MIV SERVO MOTOR [PROBLEM
		2	60.0	4/12/19, 3:00 PM	4/15/19, 8:20 PM	77.33	MISCELLANEOUS
		2	60.0	6/26/19, 10:20 AM	7/5/19, 5:55 PM	223.58	ROTOR MISC. FAULTS
		2	60.0	7/21/19, 6:50 PM	8/12/19, 5:35 PM	526.75	ROTOR EARTH FAULT
		3	60.0	4/1/19, 12:00 AM	5/24/19, 6:45 PM	1290.75	MISCELLANEOUS ELECTRICAL WORKS
		4	60.0	5/24/19, 6:45 AM	5/25/19, 6:45 PM	36.00	BUS COUPLER BREAKER
KPCL							
53	VARAHI HPS	1	115.0	7/24/19, 9:01 AM	7/26/19, 6:28 AM	45.45	MISCELLANEOUS
		1	115.0	7/26/19, 10:05 AM	7/27/19, 5:31 PM	31.43	MISCELLANEOUS
		1	115.0	7/30/19, 2:06 AM	8/1/19, 4:34 AM	50.47	MISCELLANEOUS
		1	115.0	8/5/19, 12:00 AM	8/6/19, 10:09 PM	46.15	STATION SERVICE TRANSFORMER MISC.
		3	115.0	7/13/19, 9:30 AM	7/15/19, 4:37 AM	43.12	MISCELLANEOUS
		3	115.0	8/3/19, 9:37 AM	8/4/19, 6:11 PM	32.57	MISCELLANEOUS
		3	115.0	11/8/19, 10:14 AM	12/23/19, 9:31 PM	1091.28	NEEDLE SERVOMOTOR PROBLEM
		4	115.0	7/14/19, 10:05 AM	7/15/19, 5:35 PM	31.50	MISCELLANEOUS
		4	115.0	7/20/19, 10:26 PM	7/22/19, 4:27 AM	30.02	MISCELLANEOUS
		4	115.0	7/22/19, 7:08 PM	8/23/19, 5:28 AM	754.33	MISCELLANEOUS

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
Eastern							
OHPC							
54	BALIMELA HPS	7	75.0	8/1/19, 12:00 AM	8/2/19, 5:30 PM	41.50	G.V.ADJUSTMENT/LIMIT PROB/BUSING/MISC.
55	CH IPLIMA HPS	2	24.0	8/27/19, 8:00 PM	8/28/19, 8:05 PM	24.08	LUB.OIL SYSTEM PROBLEM
56	HIRAKUD HPS	3	32.0	7/8/19, 11:45 AM	7/11/19, 1:15 PM	73.50	SPEED SENSING DEVICE FAILURE/SPEED RELAY
		3	32.0	7/22/19, 7:50 PM	7/30/19, 7:10 PM	191.33	INTAKE STRU/TRASH RACK INSPECTION/MTc.
		4	32.0	8/1/19, 12:00 AM	8/19/19, 7:05 PM	451.08	INTAKE STRU/TRASH RACK INSPECTION/MTc.
		7	37.5	4/7/19, 4:25 PM	4/27/19, 7:40 PM	483.25	GEN. AIR COOLERS LEAKAGE/DAMAGED/REPLACE
		7	37.5	6/6/19, 9:00 AM	7/17/19, 9:55 AM	984.92	GENERATOR TRANSFORMER FAILURE
		7	37.5	8/5/19, 9:30 AM	8/6/19, 8:30 PM	35.00	SHEAR PIN BROKEN/FAILURE/REPLACEMENT
WBSEDCL							
57	JALDHAKA HPS ST-I	1	9.0	4/20/19, 10:26 AM	5/8/19, 6:10 PM	439.73	MIV SERVO MOTOR [PROBLEM
		1	9.0	5/10/19, 8:55 AM	5/12/19, 6:55 PM	58.00	OPU OIL PUMP/MOTOR TROUBLE FAILURE
		1	9.0	5/21/19, 10:55 PM	5/23/19, 2:45 PM	39.83	OPU OIL PUMP/MOTOR TROUBLE FAILURE
		1	9.0	8/6/19, 2:15 PM	8/7/19, 5:45 PM	27.50	TRIPPED DUE TO VARIATION IN SPEED
		1	9.0	9/6/19, 8:25 AM	2/2/20, 2:55 PM	3582.50	TRIPPING--EQUIP.DAMAGED
		1	9.0	2/19/20, 11:17 AM	2/20/20, 4:25 PM	29.13	EXCITATION SYSTEM FAILURE
		2	9.0	4/9/19, 5:37 PM	4/15/19, 12:35 PM	138.97	VIBRATION/SOUND/ ALIGNMENT
		4	9.0	4/1/19, 12:00 AM	4/2/19, 5:30 PM	41.50	VIBRATIONS
		4	9.0	11/29/19, 9:35 AM	11/30/19, 1:20 PM	27.75	OIL HANDLING SYSTEM PROBLEM
DEPL							
58	JORETHANG LOOP	1	48.0	6/17/19, 2:46 PM	6/24/19, 9:08 AM	162.37	SHEAR PIN BROKEN/FAILURE/REPLACEMENT
		1	48.0	2/23/20, 11:30 PM	2/27/20, 7:15 AM	79.75	MAIN INLET VALVE PROBLEM
		2	48.0	2/23/20, 11:55 PM	2/27/20, 7:15 AM	79.33	MAIN INLET VALVE PROBLEM
APGENCO							
59	MACHKUND HPS	2	17.0	4/1/19, 12:00 AM	4/12/19, 6:20 PM	282.33	TRIPPING--EQUIP.DAMAGED
		4	21.25	5/1/19, 12:00 AM	5/31/19, 11:59 PM	743.98	UGB. TEMPERATURE HIGH
		4	21.25	6/1/19, 12:00 AM	8/30/19, 10:50 PM	2182.83	UGB. TEMPERATURE HIGH
		4	21.25	12/1/19, 12:00 AM	12/15/19, 5:45 PM	353.75	GOVERNOR OIL COOLING SYSTEM PROBLEM
		5	21.25	4/5/19, 4:40 PM	4/6/19, 10:50 PM	30.17	GOVERNOR SLUGGISH/HUNTING /FAIL/TROUBLE
		5	21.25	4/9/19, 11:02 PM	4/11/19, 12:15 AM	25.22	GOVERNOR SLUGGISH/HUNTING /FAIL/TROUBLE
DVC							

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
60	MAITHON HPS	1	20.0	4/13/19, 10:00 AM	4/15/19, 5:35 PM	55.58	POWER HOUSE MISC
		1	20.0	5/9/19, 10:40 AM	5/13/19, 10:21 AM	95.68	INTAKE STRU/TRASH RACK INSPECTION/MTc.
		1	20.0	5/14/19, 10:21 AM	6/26/19, 10:27 AM	1032.10	TURBINE SHAFT SEAL WORK/REPLACMEENT
		1	20.0	7/3/19, 6:10 PM	7/24/19, 11:06 AM	496.92	TURBINE SHAFT SEAL WORK/REPLACMEENT
		1	20.0	7/24/19, 11:06 AM	8/26/19, 1:16 PM	794.17	TURBINE MISC.
		2	23.2	4/27/19, 12:45 PM	5/3/19, 5:30 PM	148.75	GEN. AIR COOLERS CHOKED/CLEANINGSC. / INSPECTION
		2	23.2	5/7/19, 11:00 AM	5/10/19, 11:30 AM	72.50	GEN. AIR COOLERS CHOKED/CLEANINGSC. / INSPECTION
		2	23.2	5/10/19, 11:30 AM	5/15/19, 11:30 AM	120.00	THRUST BRG. COOLING SYSTEM PROBLEM
		3	20.0	4/1/19, 10:20 AM	4/4/19, 5:15 PM	78.92	POWER HOUSE MISC
61	PANCHET HPS	2	40.0	5/6/19, 11:59 PM	5/8/19, 6:04 PM	42.08	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
		2	40.0	5/14/19, 8:15 PM	5/20/19, 11:59 PM	147.73	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
		2	40.0	7/16/19, 9:00 AM	7/20/19, 11:59 PM	110.98	GENEATOR TRANSFORMER MISC.
		2	40.0	7/20/19, 11:59 PM	7/22/19, 6:05 PM	42.08	GEN. AIR COOLERS CHOKED/CLEANINGSC. / INSPECTION
OHPC							
62	RENGALI HPS	1	50.0	7/9/19, 6:00 PM	7/11/19, 6:00 PM	48.00	MISCELLANEOUS
		1	50.0	8/3/19, 10:05 AM	8/9/19, 11:15 AM	145.17	UGB OIL LEAKAGE / LEVELS
		4	50.0	8/25/19, 2:05 PM	8/30/19, 6:00 PM	123.92	THRUST BRG. OIL LEAKAGE/LEVELS
		4	50.0	9/1/19, 12:00 AM	9/4/19, 4:35 PM	88.58	THRUST BRG. OIL LEAKAGE/LEVELS
TUL							
63	TEESTA-III HPS	4	200.0	7/11/19, 10:00 AM	7/15/19, 5:04 AM	91.07	GENEATOR TRANSFORMER /BUSHING OIL LEAKAGE
		5	200.0	11/26/19, 12:00 AM	11/28/19, 6:12 AM	54.20	SYNCHORNISING PROBLEMS
		6	200.0	1/20/20, 12:00 AM	1/21/20, 6:38 PM	42.63	NEEDLE SERVOMOTOR PROBLEM
NHPC							
64	TEESTA LOW DAM-III HPS	1	33.0	7/11/19, 9:20 AM	7/14/19, 6:27 PM	81.12	DESILTING OF INTAKE CHANNEL.
		1	33.0	8/1/19, 9:53 PM	8/3/19, 12:13 AM	26.33	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		1	33.0	8/20/19, 11:32 PM	8/22/19, 7:38 PM	44.10	DESILTING OF INTAKE CHANNEL.
		1	33.0	9/25/19, 12:07 AM	9/26/19, 6:31 PM	42.40	DESILTING OF INTAKE CHANNEL.
		2	33.0	7/12/19, 12:01 AM	7/14/19, 5:58 PM	65.95	DESILTING OF INTAKE CHANNEL.
		2	33.0	8/21/19, 12:02 AM	8/22/19, 7:49 PM	43.78	DESILTING OF INTAKE CHANNEL.
		2	33.0	9/25/19, 2:50 AM	9/26/19, 6:09 PM	39.32	DESILTING OF INTAKE CHANNEL.
		3	33.0	7/12/19, 12:01 AM	7/14/19, 6:40 PM	66.65	DESILTING OF INTAKE CHANNEL.
		3	33.0	7/14/19, 10:00 PM	7/15/19, 11:59 PM	26.00	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	33.0	8/21/19, 3:02 AM	8/22/19, 7:19 PM	40.28	DESILTING OF INTAKE CHANNEL.
		3	33.0	9/25/19, 3:03 AM	9/26/19, 5:44 PM	38.68	DESILTING OF INTAKE CHANNEL.
		3	33.0	12/21/19, 7:16 AM	12/23/19, 7:23 PM	60.12	SWITCH YARD MAINTENANCE
		4	33.0	7/12/19, 12:01 AM	7/14/19, 5:13 PM	65.20	DESILTING OF INTAKE CHANNEL.
		4	33.0	8/21/19, 3:10 AM	8/22/19, 6:54 PM	39.73	DESILTING OF INTAKE CHANNEL.
		4	33.0	9/25/19, 1:40 AM	9/26/19, 5:18 PM	39.63	DESILTING OF INTAKE CHANNEL.
65	TEESTA LOW DAM-IV HPS	1	40.0	6/18/19, 12:03 AM	6/19/19, 8:23 PM	44.33	CLEANING OF TRASH-RACK/GATE.
		1	40.0	7/12/19, 12:12 AM	7/14/19, 7:15 PM	67.05	DESILTING OF INTAKE CHANNEL.
		1	40.0	8/21/19, 12:35 AM	8/23/19, 1:06 AM	48.52	DESILTING OF INTAKE CHANNEL.
		1	40.0	9/25/19, 12:17 AM	9/27/19, 10:22 AM	58.08	DESILTING OF INTAKE CHANNEL.
		2	40.0	6/18/19, 12:24 AM	6/19/19, 7:44 PM	43.33	CLEANING OF TRASH-RACK/GATE.
		2	40.0	7/12/19, 12:26 AM	7/14/19, 6:55 PM	66.48	DESILTING OF INTAKE CHANNEL.
		2	40.0	8/21/19, 12:52 AM	8/23/19, 12:57 AM	48.08	DESILTING OF INTAKE CHANNEL.
		2	40.0	9/25/19, 12:37 AM	9/27/19, 10:14 AM	57.62	DESILTING OF INTAKE CHANNEL.
		3	40.0	6/18/19, 12:31 AM	6/19/19, 7:17 PM	42.77	CLEANING OF TRASH-RACK/GATE.
		3	40.0	7/12/19, 12:17 AM	7/14/19, 6:38 PM	66.35	DESILTING OF INTAKE CHANNEL.
		3	40.0	8/21/19, 12:56 AM	8/23/19, 12:49 AM	47.88	DESILTING OF INTAKE CHANNEL.
		3	40.0	9/25/19, 12:50 AM	9/27/19, 11:00 AM	58.17	DESILTING OF INTAKE CHANNEL.
		4	40.0	6/18/19, 12:04 AM	6/19/19, 8:22 PM	44.30	CLEANING OF TRASH-RACK/GATE.
		4	40.0	7/12/19, 12:05 AM	7/14/19, 9:00 PM	68.92	DESILTING OF INTAKE CHANNEL.
		4	40.0	8/21/19, 12:17 AM	8/23/19, 12:26 AM	48.15	DESILTING OF INTAKE CHANNEL.
		4	40.0	9/25/19, 12:58 AM	9/27/19, 9:49 AM	56.85	DESILTING OF INTAKE CHANNEL.
66	TEESTA V HPS	1	170.0	6/17/19, 3:04 PM	6/18/19, 8:19 PM	29.24	DESILTING OF INTAKE CHANNEL.
		1	170.0	7/14/19, 12:33 AM	7/16/19, 1:16 PM	60.72	DESILTING OF INTAKE CHANNEL.
		1	170.0	8/20/19, 11:49 PM	8/22/19, 12:10 PM	36.35	DESILTING OF INTAKE CHANNEL.
		1	170.0	9/25/19, 12:33 AM	9/26/19, 1:18 AM	24.75	DESILTING OF INTAKE CHANNEL.
		2	170.0	6/17/19, 3:34 PM	6/18/19, 8:48 PM	29.24	DESILTING OF INTAKE CHANNEL.
		2	170.0	7/14/19, 12:17 AM	7/16/19, 12:45 PM	60.47	DESILTING OF INTAKE CHANNEL.
		2	170.0	8/21/19, 12:04 AM	8/22/19, 1:51 PM	37.79	DESILTING OF INTAKE CHANNEL.
		2	170.0	9/25/19, 12:19 AM	9/26/19, 1:50 AM	25.52	DESILTING OF INTAKE CHANNEL.
		3	170.0	6/17/19, 3:49 PM	6/18/19, 7:55 PM	28.09	DESILTING OF INTAKE CHANNEL.

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	170.0	7/14/19, 12:05 AM	7/16/19, 2:35 PM	62.50	DESILTING OF INTAKE CHANNEL.
		3	170.0	8/20/19, 11:34 PM	8/22/19, 12:41 PM	37.11	DESILTING OF INTAKE CHANNEL.
		3	170.0	9/25/19, 12:04 AM	9/26/19, 3:19 AM	27.24	DESILTING OF INTAKE CHANNEL.
		3	170.0	1/29/20, 5:21 PM	1/31/20, 12:00 AM	30.64	GEN./TR.BREAKER
OHPC							
67	UPPER INDRAVATI HPS	1	150.0	7/19/19, 11:10 AM	7/20/19, 5:25 PM	30.25	GUIDE VANES
68	UPPER KOLAB HPS	3	80.0	1/7/20, 12:00 AM	1/31/20, 11:59 PM	599.98	TURBINE BEARING FAILURE
North Eastern							
NEEPCO.							
69	DOYANG HPS	1	25.0	7/6/19, 12:00 AM	7/7/19, 1:52 PM	37.87	MISCELLANEOUS
		2	25.0	7/6/19, 12:00 AM	7/7/19, 2:04 PM	38.07	MISCELLANEOUS
		2	25.0	2/2/20, 12:00 AM	2/3/20, 3:35 PM	39.58	PROTECTION OPERATION
		3	25.0	7/6/19, 12:00 AM	7/7/19, 2:16 PM	38.27	MISCELLANEOUS
		3	25.0	12/1/19, 6:15 PM	12/3/19, 3:59 PM	45.73	GOVERNOR COMPRESSOR/MOTOR PROBLEM
		3	25.0	1/19/20, 12:00 AM	1/23/20, 5:44 PM	113.73	SURGE SHAFT PROBLEM
70	KHONDONG HPS	1	25.0	8/21/19, 12:00 AM	8/22/19, 1:21 PM	37.35	THRUST BEARING TEMP. HIGH
		1	25.0	10/7/19, 11:31 AM	12/31/19, 1:25 PM	2041.90	PENSTOCK LEAKAGE
		2	25.0	4/3/19, 9:00 AM	4/12/19, 10:00 PM	229.00	MIV LEAKAGE
		2	25.0	6/14/19, 7:10 AM	6/15/19, 4:15 PM	33.08	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
		2	25.0	8/26/19, 3:20 AM	8/28/19, 12:41 PM	57.35	THRUST BEARING TEMP. HIGH
		2	25.0	10/7/19, 11:32 AM	12/22/19, 11:18 AM	1823.77	PENSTOCK LEAKAGE
		2	25.0	12/27/19, 10:47 AM	12/28/19, 10:43 PM	35.93	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
71	KOPILI HPS	3	50.0	6/22/19, 12:00 AM	6/29/19, 2:45 PM	182.75	PENSTOCK REPAIR WORKS
		3	50.0	7/22/19, 9:30 AM	7/23/19, 2:54 PM	29.40	TURBINE MISC.
		4	50.0	6/22/19, 12:00 AM	6/29/19, 2:45 PM	182.75	PENSTOCK REPAIR WORKS
MeECL							
72	KYRDEMKULAI HPS	2	30.0	4/1/19, 12:00 AM	3/31/20, 11:59 PM	8784.00	RUNNER LABYRING DAMAGED
NHPC							
73	LOKTAK HPS	1	35.0	6/18/19, 12:00 AM	6/24/19, 3:24 PM	159.40	THRUST BEARING TEMP. HIGH
		3	35.0	4/16/19, 2:02 PM	4/19/19, 11:32 AM	69.50	GENERATOR TRANSFORMER BUCHOLTZ
		3	35.0	4/29/19, 9:35 AM	4/30/19, 11:59 PM	38.42	GENERATOR TRANSFORMER BUCHOLTZ
		3	35.0	8/11/19, 8:58 PM	8/13/19, 11:38 AM	38.67	ROTOR EARTH FAULT

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	35.0	3/26/20, 5:30 PM	3/31/20, 11:59 PM	126.50	GENERATOR TRANSFORMER BUCHOLTZ
MeECL							
74	NEW UMTRU HPS	1	20.0	12/12/19, 6:23 AM	12/13/19, 6:55 AM	24.53	MISCELLANEOUS
		2	20.0	12/11/19, 3:13 PM	2/10/20, 7:00 PM	1467.78	TRIPPING--EQUIP.DAMAGED
NEEPCO.							
75	RANGANADI HPS	1	135.0	4/1/19, 12:00 AM	4/28/19, 10:00 PM	670.00	MAIN DISC SEAL PROBLEM/REPLACEMENT
		1	135.0	8/13/19, 11:30 AM	8/14/19, 1:28 PM	25.97	STATOR
		1	135.0	9/3/19, 12:00 AM	9/4/19, 11:00 AM	35.00	LUBRICATING OIL PUMP/SYSTEM MISC
76	TUIRIAL HPS	1	30.0	7/23/19, 12:00 AM	7/24/19, 7:34 PM	43.57	MISCELLANEOUS
		1	30.0	9/8/19, 12:00 AM	9/9/19, 3:56 PM	39.93	MISCELLANEOUS
		1	30.0	9/15/19, 12:00 AM	9/16/19, 1:01 PM	37.02	MISCELLANEOUS
		1	30.0	9/20/19, 3:01 PM	9/22/19, 3:59 PM	48.97	MISCELLANEOUS
		2	30.0	5/12/19, 12:00 AM	5/14/19, 12:00 AM	48.00	AVR PROBLEM/TRIPPED
		2	30.0	7/21/19, 12:00 AM	7/22/19, 7:02 PM	43.03	MISCELLANEOUS
		2	30.0	9/8/19, 12:00 AM	9/9/19, 4:01 PM	40.02	MISCELLANEOUS
		2	30.0	10/28/19, 12:00 AM	11/12/19, 6:56 PM	378.93	GEN.TRANSFORMER OIL LEAKAGE.
MeECL							
77	UMIAM HPS ST-IV	7	30.0	6/26/19, 8:22 AM	3/1/20, 12:00 AM	5967.63	MISCELLANEOUS

CHAPTER-6

OPERATING AVAILABILITY OF HE UNITS

CHAPTER-6

OPERATING AVAILABILITY OF HE UNITS

6.1 Based on the analysis of data received from the utilities regarding planned maintenance undertaken and forced outages at 712 Hydro Generating units of 205 HE Stations comprising of 45699.20 MW, operating availability of various units and stations has been computed. During the year 2019-20, the average operating availability of hydro generating units on all India basis was 93.97% as compared to 91.28% during 2018-19.

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 2019-20 is summarized below in **Table 6.1**.

TABLE 6.1

OPERATING AVAILABILITY OF H.E. STATIONS (PERIOD: 2019-20)

Operating Availability (%)	No. of Stations	% of total Stations	Installed Capacity (MW)	% of total Installed Capacity
>=95%	130	63.41	27797.35	60.83
>=90 to 95	34	16.59	9150.95	20.02
>=85 to 90	14	6.83	3439.20	7.53
>=80 to 85	8	3.90	2236.00	4.89
<80	19	9.27	3075.70	6.73
Total	205	100.00	45699.20	100.00

6.3 OPERATING AVAILABILITY – REGION-WISE

Region-wise operating availability of hydro-electric units during 2019-20 is indicated in **Table 6.2**.

TABLE 6.2
AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2019-20

Sl. No.	Region	No. of Units	Installed Capacity (MW)	Planned Maintenance	Forced Outage %	Operating Availability (%)
1	Northern	245	19023.27	4.12	0.62	95.26
2	Western	101	7392.00	2.64	0.84	96.53
3	Southern	246	11694.50	3.86	2.60	93.54
4	Eastern	84	5862.45	6.30	2.60	91.09
5	N- Eastern	36	1727.00	4.89	7.75	87.35
	All India	712	45699.22	4.12	1.91	93.97

It is seen that the operating availability of hydel generating units during 2019-20 was the highest (96.53%) in Western Region due to relatively lower forced outages. The operating availability was the lowest in case of units in North-Eastern Region (87.35%) due to high planned maintenance and forced outages.

6.4 OPERATING AVAILABILITY: AGE-WISE

The average operating availability during 2019-20 of hydro units commissioned in various years has been indicated in **Table 6.3**. It is observed that units commissioned during 2018-19 have achieved the operating availability of more than 99%. Operating availability was less than 93% for the units commissioned in 2017-18. Operating availability was more than 90% for all the other years.

TABLE - 6.3
OPERATING AVAILABILITY – AGE-WISE
PERIOD: 2019-20

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Operating Availability (%)
1	2019-20	2	300.00	100.00
2	2018-19	3	140.00	100.00
3	2017-18	16	795.00	85.86
4	2016-17	18	1659.00	96.14
5	2015-16	17	1516.00	98.25
6	2010-11 to 2014-15	63	4437.00	92.07
7	2005-06 to 2009-10	66	7077.00	93.56
8	2000-01 to 2004-05	74	6741.80	94.48
9	1989-90 to 1999-2000	86	5769.70	90.47
10	1978-79 to 1988-89	124	7259.10	90.05
11	1967-68 to 1977-78	81	5279.75	86.37
	Total	712	45699.20	93.97

6.5 OPERATING AVAILABILITY – UTILITY-WISE

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

It was observed that the operating availability of generating units of Private Sector was the highest (98.43%) followed by State Sector (94.12%) and Central Sector (92.09%).

TABLE 6.4

SECTOR-WISE OPERATING AVAILABILITY OF UTILITIES FOR PERIOD: 2019-20

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
Central						
1	BBMB	28	2920.30	4.03	0.45	95.51
2	DVC	5	143.20	0.40	7.70	91.90
3	NEEPCO.	18	1200.00	7.67	4.59	87.74
4	NHDC	16	1520.00	2.61	0.12	97.27
5	NHPC	70	5451.20	9.19	1.34	89.47
6	NTPC Ltd.	4	800.00	0.00	0.00	100.00
7	SJVNL	12	1912.00	1.75	2.88	95.37
8	THDC	8	1400.00	6.68	0.50	92.82
Sub Total (CS)		161	15346.70	6.27	1.63	92.09
State						
1	APGCL	2	100.00	0.00	0.00	100.00
2	APGENCO	34	1796.75	0.99	9.64	89.37
3	CSPGCL	3	120.00	0.00	0.00	100.00
4	GSECL	8	540.00	0.00	0.00	100.00
5	HPPCL	5	295.00	0.00	0.00	100.00
6	HPSEB	12	372.00	3.61	0.02	96.37
7	JKSPDC	12	1110.00	0.92	0.01	99.07
8	JUUNL	2	130.00	0.00	0.00	100.00
9	KPCL	66	3572.20	5.68	1.36	92.96
10	KSEB	47	1856.50	6.02	2.60	91.38
11	MAHAGENCO	24	2406.00	2.32	1.93	95.76
12	MeECL	13	322.00	1.56	14.26	84.18
13	MPPGCL	23	875.00	2.80	1.28	95.93
14	OHPC	31	2027.50	10.73	1.45	87.82

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
15	PSPCL	25	1051.00	3.20	0.14	96.66
16	RRVUNL	11	411.00	4.19	2.52	93.29
17	SSNNL	11	1450.00	8.23	0.58	91.19
18	TANGEDCO	69	2178.20	3.72	1.92	94.36
19	TSGENCO	36	2405.60	0.05	0.26	99.70
20	TUL	6	1200.00	6.87	0.49	92.64
21	UJVNL	34	1252.15	2.33	0.04	97.64
22	UPJVNL	15	501.60	0.04	0.00	99.96
23	WBSEDCL	12	986.00	3.95	4.41	91.64
Sub Total (State)		501	26958.50	3.72	2.16	94.12
Private						
1	ADHPL	2	192.00	6.35	4.03	89.62
2	AHPC (GVK)	4	330.00	0.00	0.00	100.00
3	DEPL	2	96.00	1.13	2.04	96.84
4	DLHP	1	34.00	0.00	0.00	100.00
5	E.P.P.L.	2	100.00	0.00	0.48	99.52
6	GBHPPL	2	70.00	4.29	0.00	95.71
7	GIPL	2	110.00	3.81	0.43	95.76
8	HBPCL	7	1300.00	1.96	0.21	97.83
9	IAEPL	3	36.00	0.00	0.00	100.00
10	JPPVL	4	400.00	0.61	0.29	99.10
11	MPCL	2	86.00	0.00	0.00	100.00
12	SEPL	2	97.00	0.00	0.00	100.00
13	SKPPPL	2	96.00	0.00	0.00	100.00
14	TATA MAH.	15	447.00	0.96	0.02	99.01
Sub Total (Pvt.)		50	3394.00	1.24	0.34	98.43
Grand Total		712	45699.20	4.10	1.91	93.97

6.6 OPERATING AVAILABILITY BELOW 90%- STATION-WISE

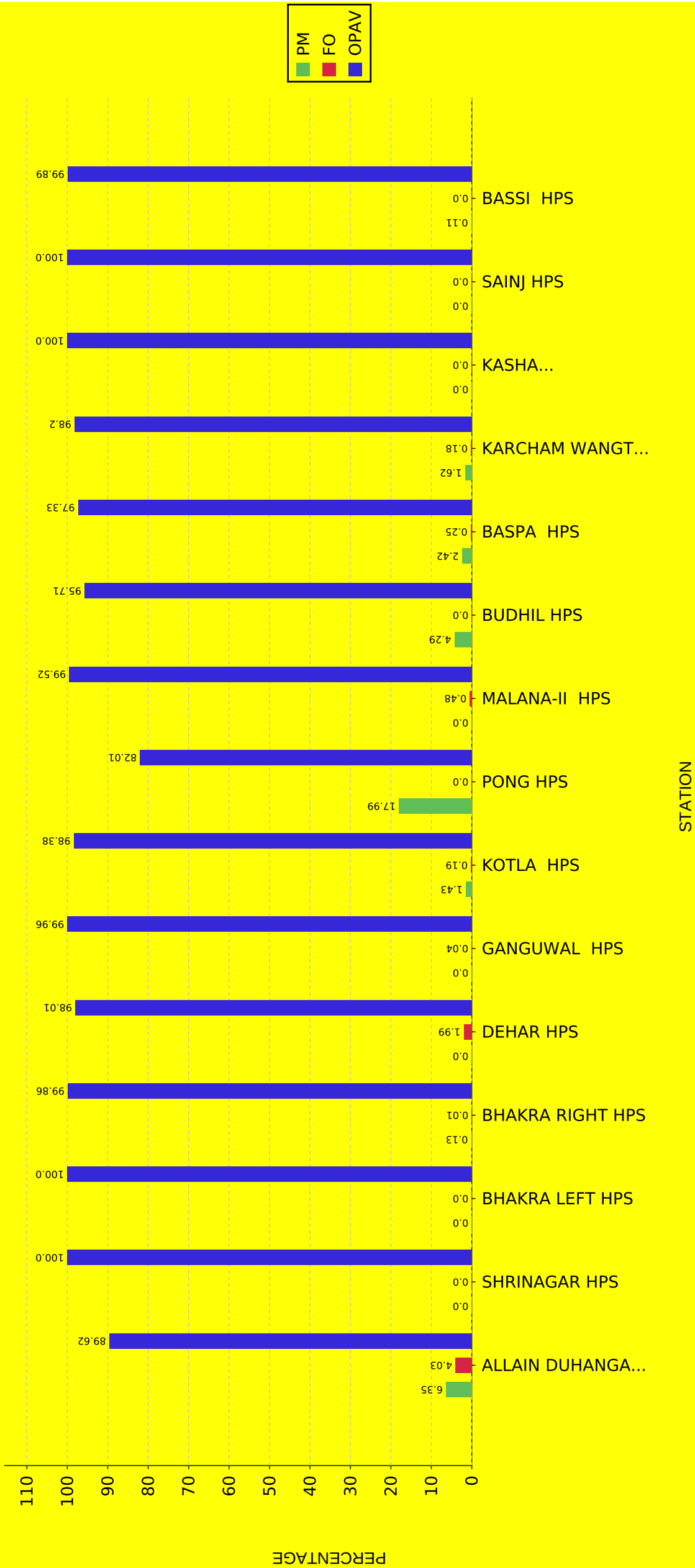
It is observed that 11 nos. of stations had operating availability below 90% continuously for last 3 years. The details of these stations is given below in **Table 6.5**. As normative availability factor for entire useful life of station considered during planning stage is 95%, the stations/utilities 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 (2017-18 To 2019-20)**

Sl. No.	Name of the Stations	Name of the Utility	Installed Capacity (MW)	Operating Availability (%)		
				2017-18	2018-19	2019-20
1	BALIMELA HPS	OHPC	510.00	78.07	87.50	86.92
2	BHAWANI BARRAGE-III HPS	TANGEDCO	30.00	66.58	84.99	81.44
3	BHAWANI KATTAL	TANGEDCO	30.00	75.00	83.37	87.91
4	GHATGHAR PSS HPS	MAHAGENCO	250.00	55.08	57.93	76.84
5	HIRAKUD HPS	OHPC	275.50	54.90	71.43	67.56
6	JOG HPS	KPCL	139.20	84.82	39.61	54.55
7	KHONDONG HPS	NEEPCO.	50.00	83.13	88.71	75.44
8	KYRDEMKULAI HPS	MeECL	60.00	74.53	50.00	50.00
9	PARBATI-III HPS	NHPC	520.00	85.65	74.21	82.33
10	PORINGALKUTTU HPS	KSEB	32.00	77.51	88.69	75.00
11	SURULIYAR HPS	TANGEDCO	35.00	83.54	81.52	85.98

OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



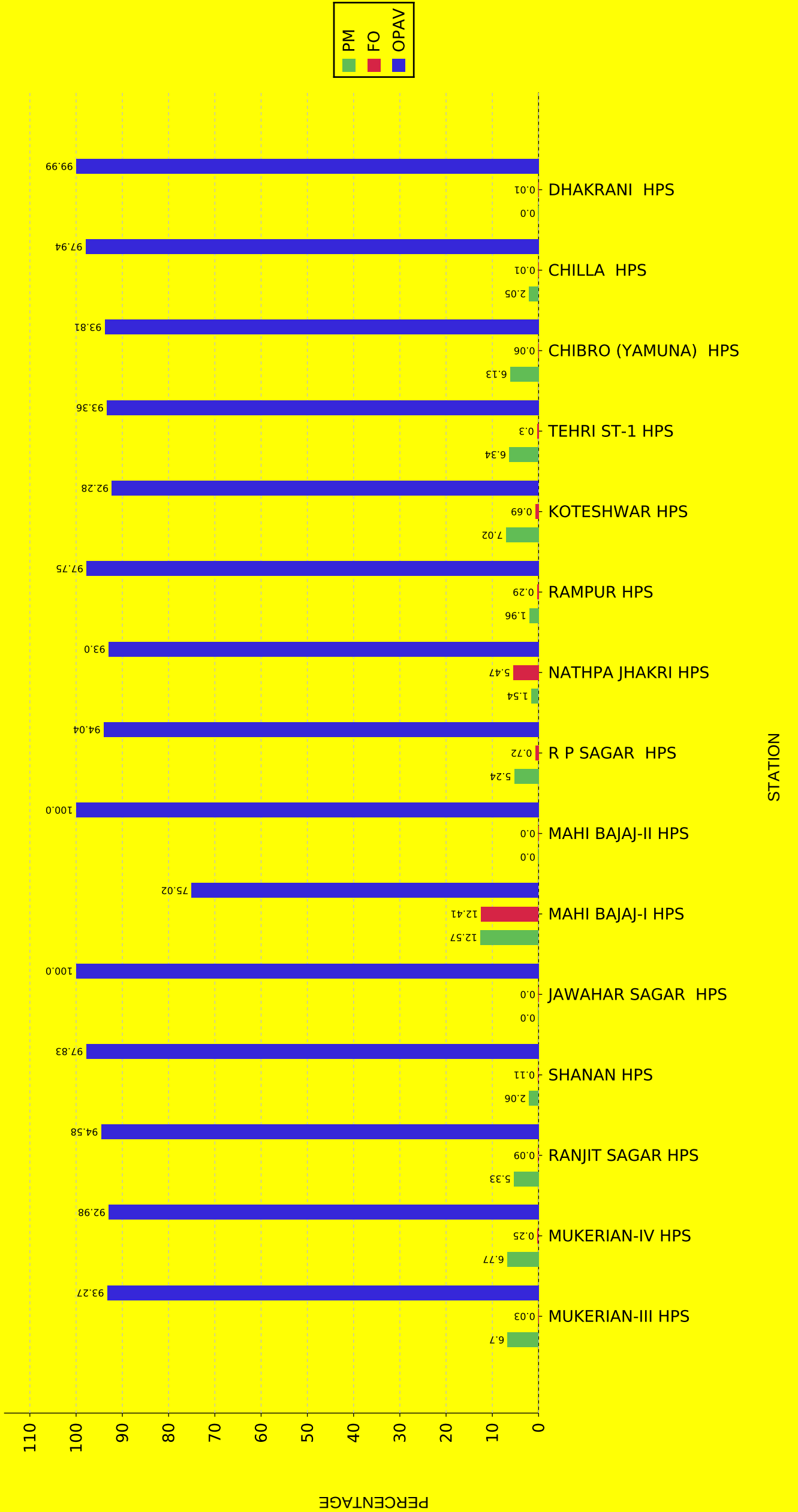
OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



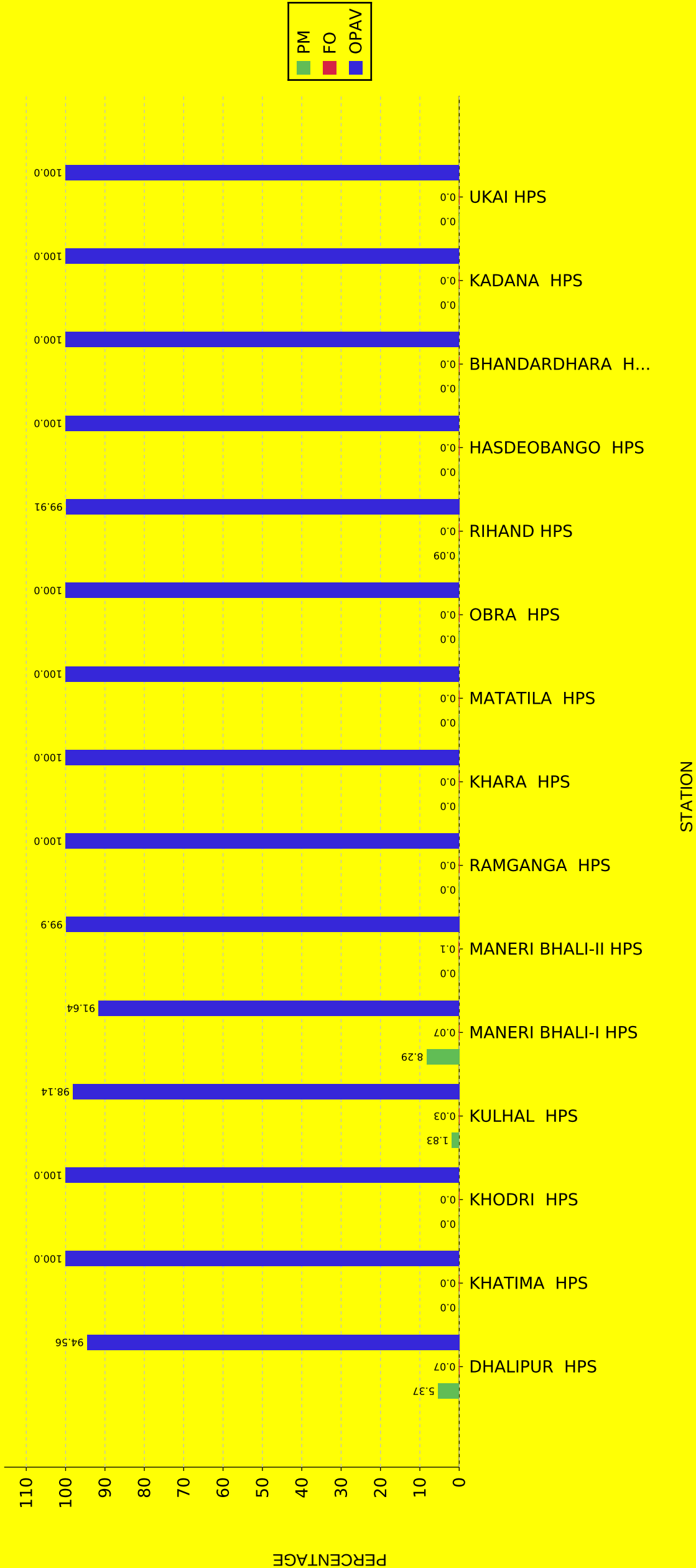
OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



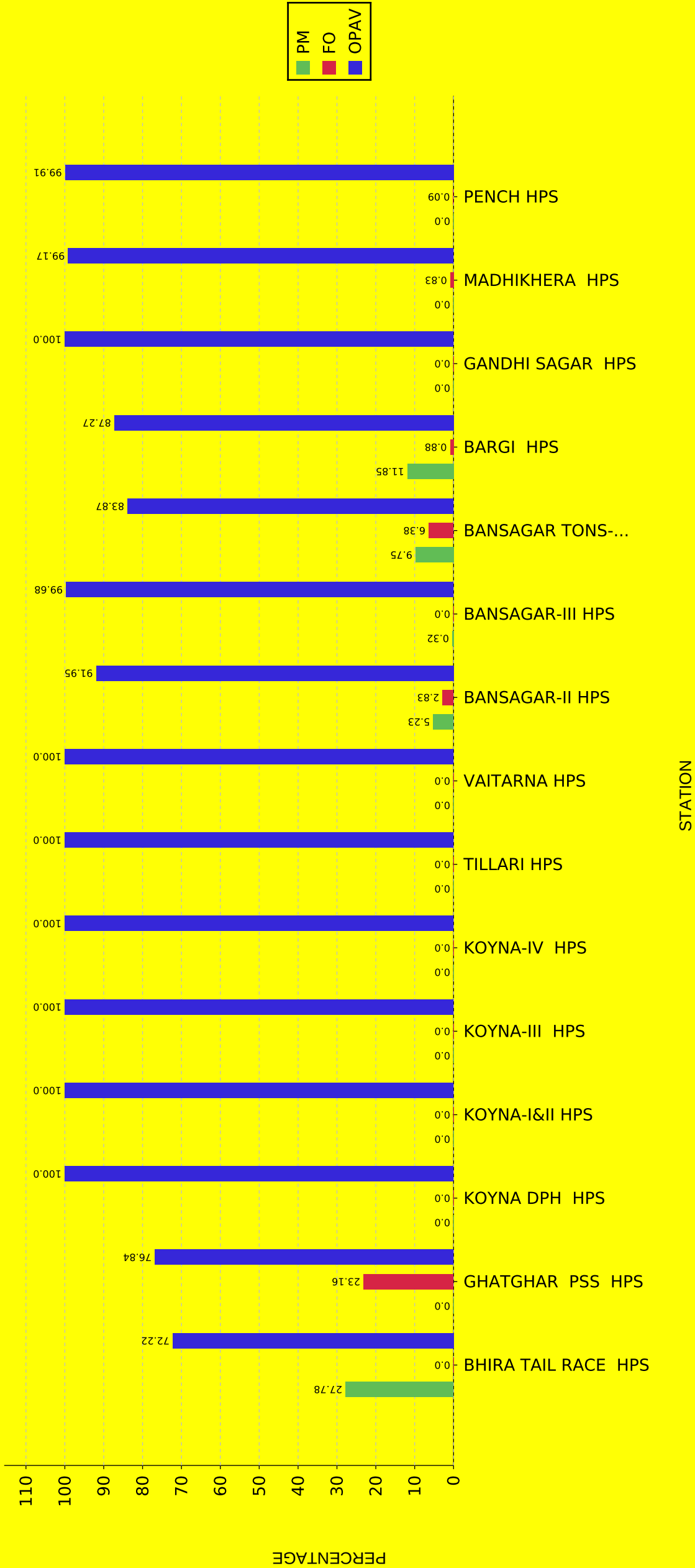
OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



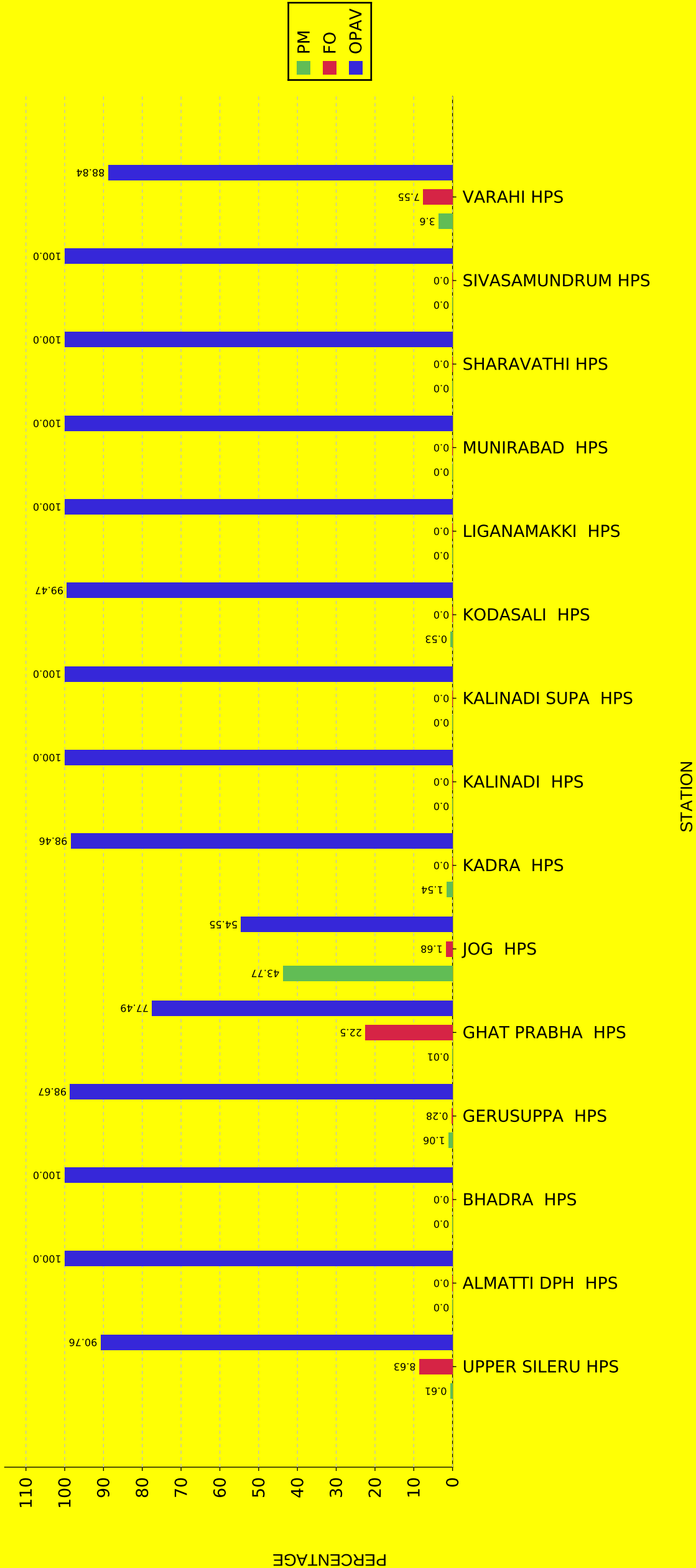
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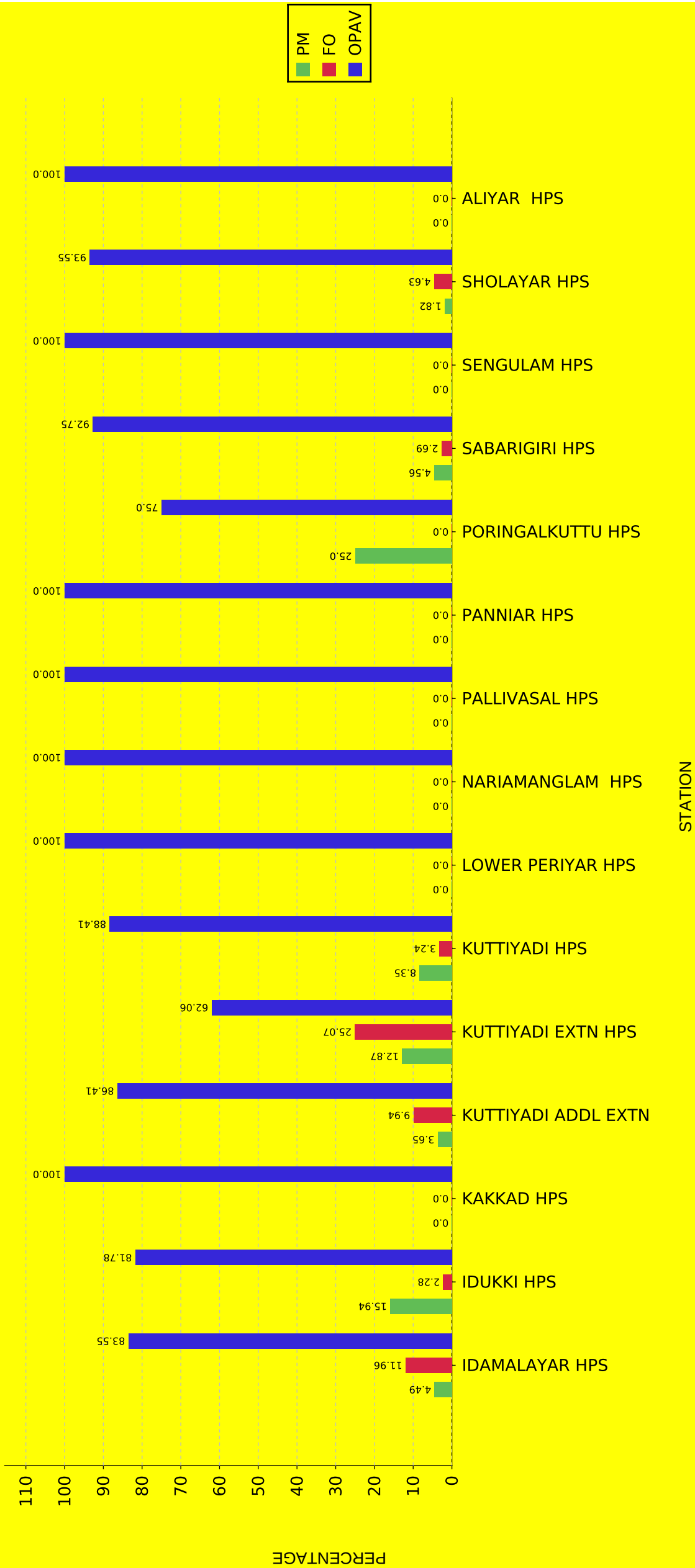
OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



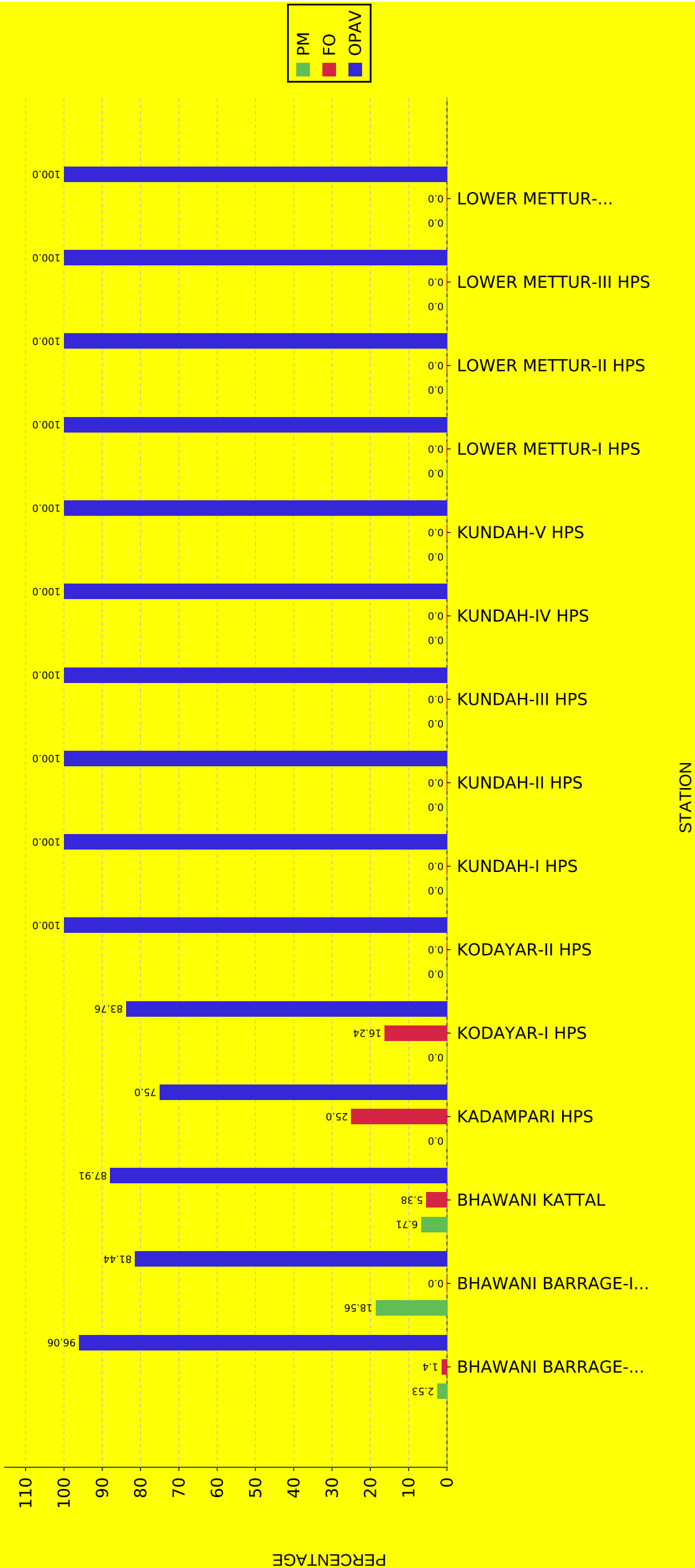
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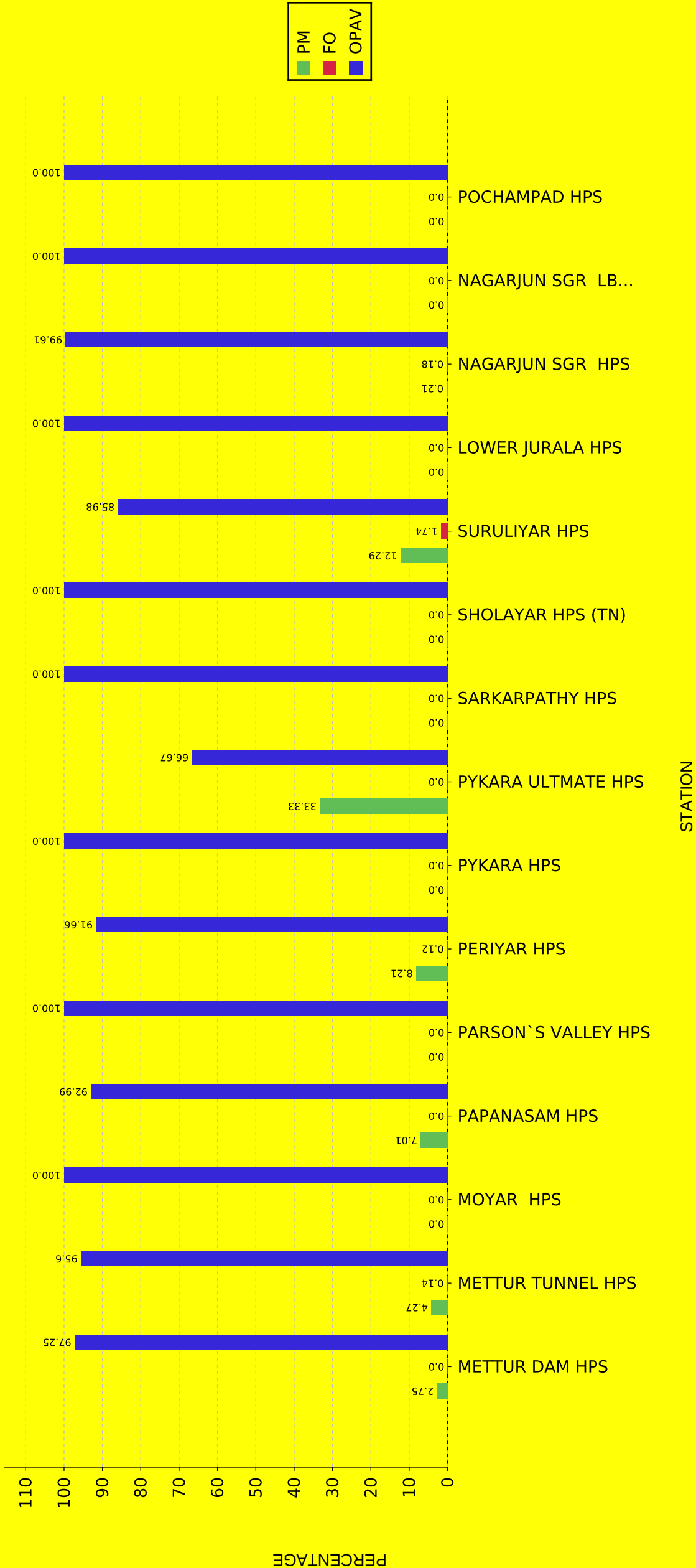
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OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



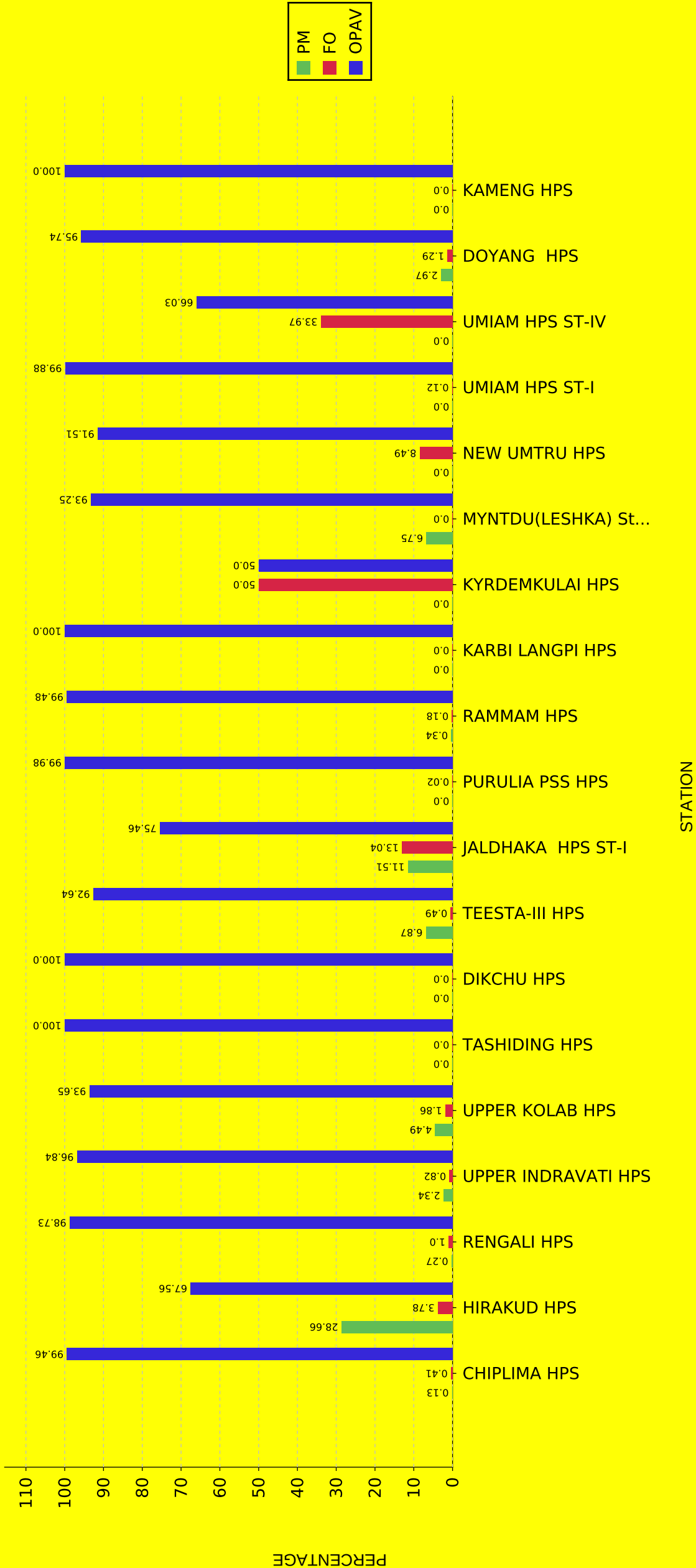
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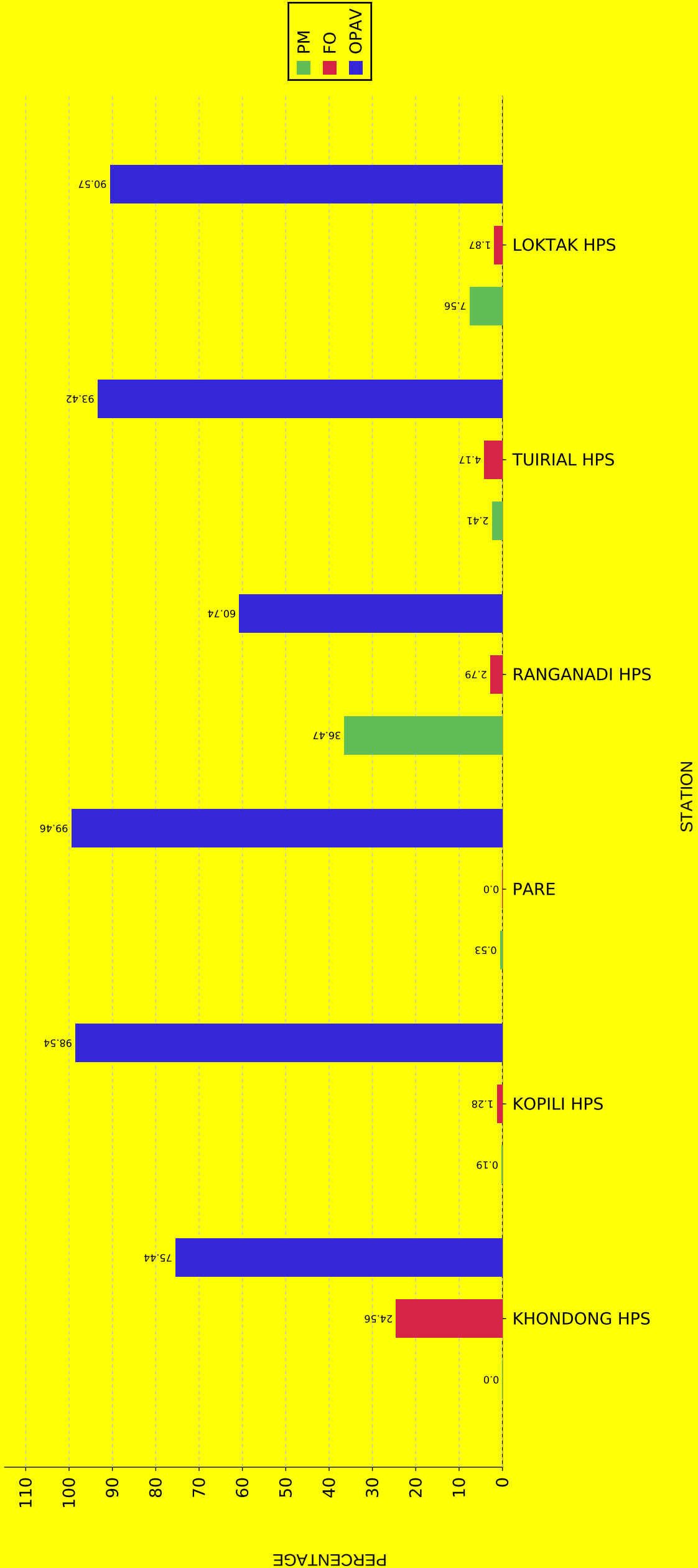
OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



OPERATING AVAILABILITY OF H E STATIONS DURING 2019-20



CENTRAL ELECTRICITY AUTHORITY
Hydro WING
Hydro Project Planning & Investigation Division
Annex 6.1

OPERAING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2019-20						
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	6.57	2.00	91.43
		2	96.00	6.13	6.05	87.82
	TOTAL		192.00	6.35	4.03	89.62
	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	0.00	0.00	100.00
		2	126.00	0.00	0.00	100.00
		3	108.00	0.00	0.00	100.00
		4	126.00	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)
		5	126.00	0.00	0.00	100.00
	TOTAL		594.00	0.00	0.00	100.00
4	BHAKRA RIGHT HPS	6	157.00	0.00	0.00	100.00
		7	157.00	0.00	0.03	99.97
		8	157.00	0.64	0.00	99.36
		9	157.00	0.00	0.03	99.97
		10	157.00	0.00	0.00	100.00
	TOTAL		785.00	0.13	0.01	99.86
5	DEHAR HPS	1	165.00	0.00	0.00	100.00
		2	165.00	0.00	11.83	88.17
		3	165.00	0.00	0.00	100.00
		4	165.00	0.00	0.01	99.99
		5	165.00	0.00	0.04	99.96
		6	165.00	0.00	0.10	99.90
	TOTAL		990.00	0.00	1.99	98.01
6	GANGUWAL HPS	1	29.25	0.00	0.07	99.93
		2	24.20	0.00	0.02	99.98
		3	24.20	0.00	0.03	99.97

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	0.00	0.04	99.96
7	KOTLA HPS	1	29.25	1.20	0.00	98.80
		2	24.20	1.46	0.01	98.53
		3	24.20	1.64	0.56	97.79
	TOTAL		77.65	1.43	0.19	98.38
8	PONG HPS	1	66.00	7.92	0.00	92.08
		2	66.00	100.00	0.00	0.00
		3	66.00	0.00	0.00	100.00
		4	66.00	0.00	0.00	100.00
		5	66.00	0.00	0.00	100.00
		6	66.00	0.00	0.00	100.00
	TOTAL		396.00	17.99	0.00	82.01
	E.P.P.L.					
9	MALANA-II HPS	1	50.00	0.00	0.49	99.51
		2	50.00	0.00	0.47	99.53
	TOTAL		100.00	0.00	0.48	99.52
	GBHPPL					
10	BUDHIL HPS	1	35.00	0.00	0.00	100.00
		2	35.00	8.58	0.00	91.42

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	4.29	0.00	95.71
	HBPCL					
11	BASPA HPS	1	100.00	2.24	0.05	97.71
		2	100.00	2.50	0.69	96.81
		3	100.00	2.51	0.01	97.48
	TOTAL		300.00	2.42	0.25	97.33
12	KARCHAM WANGTOO HPS	1	250.00	1.56	0.18	98.26
		2	250.00	3.01	0.18	96.81
		3	250.00	1.91	0.18	97.91
		4	250.00	0.00	0.18	99.82
	TOTAL		1000.00	1.62	0.18	98.20
	HPPCL					
13	KASHANG INTEGRATED HEP	1	65.00	0.00	0.00	100.00
		2	65.00	0.00	0.00	100.00
		3	65.00	0.00	0.00	100.00
	TOTAL		195.00	0.00	0.00	100.00
14	SAINJ HPS	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
	TOTAL		100.00	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)
	HPSEB					
15	BASSI HPS	1	16.50	0.00	0.00	100.00
		2	16.50	0.00	0.00	100.00
		3	16.50	0.00	0.00	100.00
		4	16.50	0.43	0.00	99.57
	TOTAL		66.00	0.11	0.00	99.89
16	GIRI BATA HPS	1	30.00	7.62	0.06	92.32
		2	30.00	24.89	0.13	74.99
	TOTAL		60.00	16.25	0.09	83.65
17	LARJI 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
	TOTAL		126.00	0.00	0.00	100.00
18	SANJAY HPS	1	40.00	1.01	0.02	98.96
		2	40.00	9.39	0.00	90.61
		3	40.00	0.00	0.00	100.00
	TOTAL		120.00	3.47	0.01	96.52
	IAEPL					
19	CHANJU-I HPS	1	12.00	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	12.00	0.00	0.00	100.00
		3	12.00	0.00	0.00	100.00
	TOTAL		36.00	0.00	0.00	100.00
	JKSPDC					
20	BAGLIHAR HPS	1	150.00	0.00	0.03	99.97
		2	150.00	0.28	0.06	99.66
		3	150.00	10.78	0.01	89.21
	TOTAL		450.00	3.69	0.03	96.28
21	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
22	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
23	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

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		105.00	0.00	0.00	100.00
	JPPVL					
24	VISHNU PRAYAG HPS	1	100.00	0.82	0.28	98.90
		2	100.00	0.86	0.40	98.74
		3	100.00	0.70	0.16	99.14
		4	100.00	0.07	0.31	99.63
	TOTAL		400.00	0.61	0.29	99.10
	MPCL					
25	MALANA HPS	1	43.00	0.00	0.00	100.00
		2	43.00	0.00	0.00	100.00
	TOTAL		86.00	0.00	0.00	100.00
	NHPC					
26	BAIRA SIUL HPS	1	60.00	26.87	1.71	71.42
		2	60.00	73.69	0.46	25.85
		3	60.00	32.33	2.33	65.34
	TOTAL		180.00	44.30	1.50	54.21
27	CHAMERA-I HPS	1	180.00	5.10	0.04	94.86
		2	180.00	5.68	0.18	94.14
		3	180.00	12.29	0.10	87.61

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		540.00	7.69	0.11	92.20
28	CHAMERA-II HPS	1	100.00	0.01	0.76	99.23
		2	100.00	0.01	0.79	99.19
		3	100.00	6.61	0.65	92.74
	TOTAL		300.00	2.21	0.73	97.05
29	CHAMERA-III HPS	1	77.00	15.34	0.72	83.94
		2	77.00	3.87	0.78	95.35
		3	77.00	7.29	1.10	91.61
	TOTAL		231.00	8.83	0.87	90.30
30	CHUTAK HPS	1	11.00	13.11	0.45	86.45
		2	11.00	9.32	0.39	90.29
		3	11.00	7.67	0.42	91.91
		4	11.00	10.40	0.41	89.19
	TOTAL		44.00	10.12	0.42	89.46
31	DHAULI GANGA HPS	1	70.00	5.86	0.86	93.28
		2	70.00	4.31	1.14	94.55
		3	70.00	7.90	0.85	91.25
		4	70.00	4.42	0.83	94.75

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		280.00	5.62	0.92	93.46
32	DULHASTI HPS	1	130.00	7.79	1.12	91.09
		2	130.00	5.44	1.11	93.45
		3	130.00	14.09	1.24	84.66
	TOTAL		390.00	9.11	1.16	89.73
33	KISHANGANGA HPS	1	110.00	5.71	2.06	92.23
		2	110.00	31.28	12.18	56.53
		3	110.00	40.05	1.99	57.95
	TOTAL		330.00	25.68	5.41	68.90
34	NIMMO BAZGO HPS	1	15.00	5.73	0.01	94.27
		2	15.00	4.52	0.03	95.46
		3	15.00	10.49	0.04	89.47
	TOTAL		45.00	6.91	0.03	93.06
35	PARBATI-III HPS	1	130.00	8.77	2.55	88.68
		2	130.00	9.36	1.70	88.94
		3	130.00	30.42	2.43	67.15
		4	130.00	12.26	3.17	84.56
	TOTAL		520.00	15.20	2.46	82.33

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
36	SALAL HPS	1	115.00	2.53	0.23	97.24
		2	115.00	3.13	0.35	96.52
		3	115.00	2.61	0.36	97.03
		4	115.00	3.36	0.45	96.19
		5	115.00	3.31	0.45	96.24
		6	115.00	7.55	0.47	91.99
	TOTAL		690.00	3.75	0.38	95.87
37	SEWA-II HPS	1	40.00	3.94	0.39	95.67
		2	40.00	6.93	0.07	93.00
		3	40.00	3.68	0.07	96.25
	TOTAL		120.00	4.85	0.18	94.97
38	TANAKPUR HPS	1	31.40	7.45	0.37	92.17
		2	31.40	10.12	0.38	89.50
		3	31.40	9.37	0.38	90.25
	TOTAL		94.20	8.98	0.38	90.64
39	URI-I HPS	1	120.00	3.86	0.16	95.98
		2	120.00	4.78	0.47	94.75
		3	120.00	1.67	0.09	98.24

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	120.00	3.87	0.08	96.05
	TOTAL		480.00	3.55	0.20	96.25
40	URI-II HPS	1	60.00	3.29	1.85	94.86
		2	60.00	2.39	1.72	95.90
		3	60.00	1.74	1.56	96.69
		4	60.00	1.11	1.62	97.26
	TOTAL		240.00	2.13	1.69	96.18
	NTPC Ltd.					
41	KOLDAM	1	200.00	0.00	0.00	100.00
		2	200.00	0.00	0.00	100.00
		3	200.00	0.00	0.00	100.00
		4	200.00	0.00	0.00	100.00
	TOTAL		800.00	0.00	0.00	100.00
	PSPCL					
42	ANANDPUR SAHIB-I HPS	1	33.50	0.00	0.00	100.00
		2	33.50	0.00	0.00	100.00
	TOTAL		67.00	0.00	0.00	100.00
43	ANANDPUR SAHIB-II HPS	3	33.50	0.00	0.00	100.00
		4	33.50	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)
	TOTAL		67.00	0.00	0.00	100.00
44	MUKERIAN-I HPS	1	15.00	0.00	0.06	99.94
		2	15.00	6.79	0.00	93.21
		3	15.00	1.26	0.00	98.73
	TOTAL		45.00	2.68	0.02	97.29
45	MUKERIAN-II HPS	4	15.00	0.00	1.53	98.47
		5	15.00	0.00	0.03	99.97
		6	15.00	0.00	0.12	99.88
	TOTAL		45.00	0.00	0.56	99.44
46	MUKERIAN-III HPS	7	19.50	7.01	0.03	92.95
		8	19.50	5.39	0.00	94.61
		9	19.50	7.70	0.06	92.24
	TOTAL		58.50	6.70	0.03	93.27
47	MUKERIAN-IV HPS	10	19.50	6.82	0.54	92.64
		11	19.50	7.16	0.21	92.63
		12	19.50	6.32	0.00	93.68
	TOTAL		58.50	6.77	0.25	92.98
48	RANJIT SAGAR HPS	1	150.00	7.07	0.34	92.59

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	150.00	1.83	0.00	98.17
		3	150.00	0.06	0.02	99.92
		4	150.00	12.37	0.00	87.63
	TOTAL		600.00	5.33	0.09	94.58
49	SHANAN HPS	1	15.00	7.97	0.00	92.03
		2	15.00	0.26	0.04	99.70
		3	15.00	0.20	0.00	99.80
		4	15.00	0.12	0.28	99.60
		5	50.00	1.74	0.25	98.01
	TOTAL		110.00	2.06	0.11	97.83
	RRVUNL					
50	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
51	MAHI BAJAJ-I HPS	1	25.00	0.00	18.19	81.81
		2	25.00	25.14	6.63	68.23
	TOTAL		50.00	12.57	12.41	75.02
52	MAHI BAJAJ-II HPS	3	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)
		4	45.00	0.00	0.00	100.00
	TOTAL		90.00	0.00	0.00	100.00
53	R P SAGAR HPS	1	43.00	5.11	1.42	93.47
		2	43.00	5.26	1.42	93.33
		3	43.00	7.93	0.06	92.00
		4	43.00	2.65	0.00	97.35
	TOTAL		172.00	5.24	0.72	94.04
	SJVNL					
54	NATHPA JHAKRI HPS	1	250.00	1.63	4.37	94.00
		2	250.00	1.77	4.67	93.56
		3	250.00	1.23	5.64	93.13
		4	250.00	1.54	5.22	93.23
		5	250.00	2.70	7.62	89.68
		6	250.00	0.36	5.27	94.37
	TOTAL		1500.00	1.54	5.47	93.00
55	RAMPUR HPS	1	68.67	2.61	0.06	97.34
		2	68.67	2.02	0.04	97.94
		3	68.67	1.32	0.71	97.98

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	68.67	2.39	0.12	97.49
		5	68.67	1.85	0.20	97.95
		6	68.67	1.58	0.64	97.78
	TOTAL		412.02	1.96	0.29	97.75
	THDC					
56	KOTESHWAR HPS	1	100.00	5.77	0.26	93.96
		2	100.00	6.36	0.26	93.37
		3	100.00	2.10	1.80	96.10
		4	100.00	13.86	0.44	85.70
	TOTAL		400.00	7.02	0.69	92.28
57	TEHRI ST-1 HPS	1	250.00	0.82	0.22	98.96
		2	250.00	3.61	0.74	95.65
		3	250.00	7.06	0.18	92.76
		4	250.00	13.86	0.08	86.06
	TOTAL		1000.00	6.34	0.30	93.36
	UJVNL					
58	CHIBRO (YAMUNA) HPS	1	60.00	24.53	0.00	75.47
		2	60.00	0.00	0.22	99.78
		3	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)
		4	60.00	0.00	0.00	100.00
	TOTAL		240.00	6.13	0.06	93.81
59	CHILLA HPS	1	36.00	0.00	0.02	99.98
		2	36.00	0.00	0.04	99.96
		3	36.00	0.00	0.00	100.00
		4	36.00	8.20	0.00	91.80
	TOTAL		144.00	2.05	0.01	97.94
60	DHAKRANI HPS	1	11.25	0.00	0.00	100.00
		2	11.25	0.00	0.00	100.00
		3	11.25	0.00	0.03	99.97
	TOTAL		33.75	0.00	0.01	99.99
61	DHALIPUR HPS	1	17.00	0.00	0.00	100.00
		2	17.00	16.12	0.00	83.88
		3	17.00	0.00	0.20	99.80
	TOTAL		51.00	5.37	0.07	94.56
62	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

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		41.40	0.00	0.00	100.00
63	KHODRI HPS	1	30.00	0.00	0.00	100.00
		2	30.00	0.00	0.00	100.00
		3	30.00	0.00	0.00	100.00
		4	30.00	0.00	0.00	100.00
	TOTAL		120.00	0.00	0.00	100.00
64	KULHAL HPS	1	10.00	0.00	0.08	99.92
		2	10.00	0.00	0.00	100.00
		3	10.00	5.49	0.00	94.51
	TOTAL		30.00	1.83	0.03	98.14
65	MANERI BHALI-I HPS	1	30.00	24.86	0.00	75.14
		2	30.00	0.00	0.21	99.79
		3	30.00	0.00	0.00	100.00
	TOTAL		90.00	8.29	0.07	91.64
66	MANERI BHALI-II HPS	1	76.00	0.00	0.01	99.99
		2	76.00	0.00	0.00	100.00
		3	76.00	0.00	0.05	99.95
		4	76.00	0.00	0.36	99.64

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		304.00	0.00	0.10	99.90
67	RAMGANGA HPS	1	66.00	0.00	0.00	100.00
		2	66.00	0.00	0.00	100.00
		3	66.00	0.00	0.00	100.00
	TOTAL		198.00	0.00	0.00	100.00
	UPJVNL					
68	KHARA 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
69	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
70	OBRA 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
71	RIHAND HPS	1	50.00	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	50.00	0.00	0.00	100.00
		3	50.00	0.00	0.00	100.00
		4	50.00	0.55	0.00	99.45
		5	50.00	0.00	0.00	100.00
		6	50.00	0.00	0.00	100.00
	TOTAL		300.00	0.09	0.00	99.91
	Western					
	CSPGCL					
72	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					
73	BHANDARDHARA HPS ST-II	2	34.00	0.00	0.00	100.00
	TOTAL		34.00	0.00	0.00	100.00
	GSECL					
74	KADANA 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

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	60.00	0.00	0.00	100.00
	TOTAL		240.00	0.00	0.00	100.00
75	UKAI HPS	1	75.00	0.00	0.00	100.00
		2	75.00	0.00	0.00	100.00
		3	75.00	0.00	0.00	100.00
		4	75.00	0.00	0.00	100.00
	TOTAL		300.00	0.00	0.00	100.00
	MAHAGENCO					
76	BHIRA TAIL RACE HPS	1	40.00	0.00	0.00	100.00
		2	40.00	55.56	0.00	44.44
	TOTAL		80.00	27.78	0.00	72.22
77	GHATGHAR PSS HPS	1	125.00	0.00	44.92	55.08
		2	125.00	0.00	1.39	98.61
	TOTAL		250.00	0.00	23.16	76.84
78	KOYNA DPH HPS	1	18.00	0.00	0.00	100.00
		2	18.00	0.00	0.00	100.00
	TOTAL		36.00	0.00	0.00	100.00
79	KOYNA-I&II HPS	1	70.00	0.00	0.00	100.00
		2	70.00	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	70.00	0.00	0.00	100.00
		4	70.00	0.00	0.00	100.00
		5	80.00	0.00	0.00	100.00
		6	80.00	0.00	0.00	100.00
		7	80.00	0.00	0.00	100.00
		8	80.00	0.00	0.00	100.00
	TOTAL		600.00	0.00	0.00	100.00
80	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
81	KOYNA-IV HPS	1	250.00	0.00	0.00	100.00
		2	250.00	0.00	0.00	100.00
		3	250.00	0.00	0.00	100.00
		4	250.00	0.00	0.00	100.00
	TOTAL		1000.00	0.00	0.00	100.00
82	TILLARI 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)
	TOTAL		60.00	0.00	0.00	100.00
83	VAITARNA HPS	1	60.00	0.00	0.00	100.00
	TOTAL		60.00	0.00	0.00	100.00
	MPPGCL					
84	BANSAGAR-II HPS	1	15.00	10.45	3.81	85.74
		2	15.00	0.00	1.85	98.15
	TOTAL		30.00	5.23	2.83	91.95
85	BANSAGAR-III HPS	1	20.00	0.00	0.00	100.00
		2	20.00	0.00	0.00	100.00
		3	20.00	0.95	0.00	99.05
	TOTAL		60.00	0.32	0.00	99.68
86	BANSAGAR TONS-I HPS	1	105.00	0.00	18.60	81.40
		2	105.00	0.00	0.18	99.82
		3	105.00	29.25	0.37	70.38
	TOTAL		315.00	9.75	6.38	83.87
87	BARGI HPS	1	45.00	23.70	0.97	75.33
		2	45.00	0.00	0.78	99.22
	TOTAL		90.00	11.85	0.88	87.27
88	GANDHI SAGAR HPS	1	23.00	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	23.00	0.00	0.00	100.00
		3	23.00	0.00	0.00	100.00
		4	23.00	0.00	0.00	100.00
		5	23.00	0.00	0.00	100.00
	TOTAL		115.00	0.00	0.00	100.00
89	MADHIKHERA HPS	1	20.00	0.00	1.12	98.88
		2	20.00	0.00	0.00	100.00
		3	20.00	0.00	1.39	98.61
	TOTAL		60.00	0.00	0.83	99.17
90	PENCH HPS	1	80.00	0.00	0.11	99.89
		2	80.00	0.00	0.07	99.93
	TOTAL		160.00	0.00	0.09	99.91
91	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	0.12	99.88
	TOTAL		45.00	0.00	0.04	99.96
	NHDC					
92	INDIRA SAGAR HPS	1	125.00	2.29	0.00	97.71
		2	125.00	4.49	0.00	95.51

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	125.00	0.00	0.02	99.98
		4	125.00	0.00	0.00	100.00
		5	125.00	4.14	0.00	95.86
		6	125.00	0.00	0.21	99.79
		7	125.00	2.29	0.00	97.71
		8	125.00	5.58	0.11	94.31
	TOTAL		1000.00	2.35	0.04	97.61
93	OMKARESHWAR HPS	1	65.00	2.89	0.51	96.60
		2	65.00	2.78	0.00	97.22
		3	65.00	6.98	0.24	92.78
		4	65.00	0.00	0.00	100.00
		5	65.00	3.36	0.00	96.64
		6	65.00	1.56	0.29	98.15
		7	65.00	3.09	0.00	96.90
		8	65.00	2.27	0.50	97.23
	TOTAL		520.00	2.87	0.19	96.94
	SSNNL					
94	S SAROVAR CHPH HPS	1	50.00	2.75	0.00	97.25

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	50.00	0.00	5.83	94.17
		3	50.00	0.00	0.59	99.41
		4	50.00	0.00	0.00	100.00
		5	50.00	0.00	0.00	100.00
	TOTAL		250.00	0.55	1.29	98.16
95	S SAROVAR RBPH HPS	1	200.00	11.65	0.00	88.35
		2	200.00	11.65	0.00	88.35
		3	200.00	29.04	0.00	70.96
		4	200.00	5.56	0.00	94.44
		5	200.00	24.31	0.00	75.69
		6	200.00	5.56	0.00	94.44
	TOTAL		1200.00	14.63	0.00	85.37
	TATA MAH.					
96	BHIRA HPS	1	25.00	0.00	0.00	100.00
		2	25.00	0.00	0.00	100.00
		3	25.00	0.00	0.00	100.00
		4	25.00	0.00	0.00	100.00
		5	25.00	0.00	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)
		6	25.00	0.00	0.03	99.97
	TOTAL		150.00	0.00	0.01	99.99
97	BHIRA PSS HPS	1	150.00	9.27	0.02	90.71
	TOTAL		150.00	9.27	0.02	90.71
98	BHIVPURI HPS	1	24.00	0.00	0.11	99.89
		2	24.00	0.00	0.00	100.00
		3	24.00	0.00	0.03	99.97
		4	1.50	0.00	0.00	100.00
		5	1.50	0.00	0.00	100.00
	TOTAL		75.00	0.00	0.03	99.97
99	KHOPOLI HPS	1	24.00	5.20	0.16	94.65
		2	24.00	0.00	0.01	99.99
		3	24.00	0.00	0.00	100.00
	TOTAL		72.00	1.73	0.06	98.21
	Southern					
	APGENCO					
100	HAMPI HPS	1	9.00	0.00	51.50	48.50
		2	9.00	0.00	73.35	26.65
		3	9.00	0.00	0.16	99.84

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	9.00	0.00	0.01	99.99
	TOTAL		36.00	0.00	31.26	68.74
101	LOWER SILERU HPS	1	115.00	0.00	27.54	72.46
		2	115.00	0.00	7.19	92.81
		3	115.00	0.00	28.82	71.18
		4	115.00	0.00	20.26	79.74
	TOTAL		460.00	0.00	20.96	79.04
102	NAGARJUN SGR RBC HPS	1	30.00	8.20	0.11	91.70
		2	30.00	0.00	16.67	83.33
		3	30.00	8.20	8.47	83.34
	TOTAL		90.00	5.46	8.41	86.12
103	NAGARJUN SGR TPD	1	25.00	0.00	0.00	100.00
		2	25.00	0.00	0.00	100.00
	TOTAL		50.00	0.00	0.00	100.00
104	SRISAILAM HPS	1	110.00	0.00	0.00	100.00
		2	110.00	0.00	0.00	100.00
		3	110.00	0.00	0.00	100.00
		4	110.00	0.00	0.97	99.03

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		5	110.00	0.00	0.00	100.00
		6	110.00	0.00	0.00	100.00
		7	110.00	0.00	0.00	100.00
	TOTAL		770.00	0.00	0.14	99.86
105	T B DAM HPS	1	9.00	0.28	4.65	95.07
		2	9.00	14.40	0.43	85.18
		3	9.00	0.04	0.00	99.96
		4	9.00	0.02	10.65	89.33
	TOTAL		36.00	3.68	3.93	92.39
106	UPPER SILERU HPS	1	60.00	0.00	9.99	90.01
		2	60.00	2.46	9.42	88.12
		3	60.00	0.00	14.69	85.31
		4	60.00	0.00	0.41	99.59
	TOTAL		240.00	0.61	8.63	90.76
	KPCL					
107	ALMATTI DPH HPS	1	15.00	0.00	0.00	100.00
		2	55.00	0.00	0.00	100.00
		3	55.00	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	55.00	0.00	0.00	100.00
		5	55.00	0.00	0.00	100.00
		6	55.00	0.00	0.00	100.00
	TOTAL		290.00	0.00	0.00	100.00
108	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
109	GERUSUPPA HPS	1	60.00	0.96	0.01	99.03
		2	60.00	0.29	1.04	98.67
		3	60.00	2.84	0.01	97.15
		4	60.00	0.13	0.05	99.82
	TOTAL		240.00	1.06	0.28	98.67
110	GHAT PRABHA HPS	1	16.00	0.01	26.15	73.84
		2	16.00	0.00	18.85	81.15
	TOTAL		32.00	0.01	22.50	77.49
111	JOG HPS	1	13.20	100.00	0.00	0.00
		2	13.20	72.90	0.31	26.79

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	13.20	100.00	0.00	0.00
		4	13.20	73.16	0.00	26.84
		5	21.60	0.94	8.31	90.75
		6	21.60	2.96	2.78	94.26
		7	21.60	0.00	1.05	98.95
		8	21.60	0.20	0.95	98.84
	TOTAL		139.20	43.77	1.68	54.55
112	KADRA HPS	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
		3	50.00	4.62	0.00	95.38
	TOTAL		150.00	1.54	0.00	98.46
113	KALINADI HPS	1	135.00	0.00	0.00	100.00
		2	135.00	0.00	0.00	100.00
		3	135.00	0.00	0.00	100.00
		4	150.00	0.00	0.00	100.00
		5	150.00	0.00	0.00	100.00
		6	150.00	0.00	0.00	100.00
	TOTAL		855.00	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)
114	KALINADI SUPA HPS	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
	TOTAL		100.00	0.00	0.00	100.00
115	KODASALI HPS	1	40.00	0.00	0.00	100.00
		2	40.00	1.59	0.00	98.41
		3	40.00	0.00	0.00	100.00
	TOTAL		120.00	0.53	0.00	99.47
116	LIGANAMAKKI HPS	1	27.50	0.00	0.00	100.00
		2	27.50	0.00	0.00	100.00
	TOTAL		55.00	0.00	0.00	100.00
117	MUNIRABAD HPS	1	9.00	0.00	0.00	100.00
		2	9.00	0.00	0.00	100.00
		3	10.00	0.00	0.00	100.00
	TOTAL		28.00	0.00	0.00	100.00
118	SHARAVATHI HPS	1	103.50	0.00	0.00	100.00
		2	103.50	0.00	0.00	100.00
		3	103.50	0.00	0.00	100.00
		4	103.50	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)
		5	103.50	0.00	0.00	100.00
		6	103.50	0.00	0.00	100.00
		7	103.50	0.00	0.00	100.00
		8	103.50	0.00	0.00	100.00
		9	103.50	0.00	0.00	100.00
		10	103.50	0.00	0.00	100.00
	TOTAL		1035.00	0.00	0.00	100.00
119	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
		10	6.00	0.00	0.00	100.00
	TOTAL		42.00	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)
120	VARAHI HPS	1	115.00	1.82	4.21	93.97
		2	115.00	0.05	0.48	99.47
		3	115.00	6.10	15.35	78.55
		4	115.00	6.45	10.17	83.38
	TOTAL		460.00	3.60	7.55	88.84
	KSEB					
121	IDAMALAYAR HPS	1	37.50	8.69	20.89	70.42
		2	37.50	0.30	3.02	96.68
	TOTAL		75.00	4.49	11.96	83.55
122	IDUKKI HPS	1	130.00	10.37	0.00	89.63
		2	130.00	50.06	0.08	49.86
		3	130.00	1.36	9.14	89.50
		4	130.00	11.43	1.45	87.11
		5	130.00	7.62	1.79	90.59
		6	130.00	14.82	1.20	83.98
	TOTAL		780.00	15.94	2.28	81.78
123	KAKKAD HPS	1	25.00	0.00	0.00	100.00
		2	25.00	0.00	0.00	100.00
	TOTAL		50.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
124	KUTTIYADI ADDL EXTN	1	50.00	7.09	12.51	80.41
		2	50.00	0.21	7.37	92.42
	TOTAL		100.00	3.65	9.94	86.41
125	KUTTIYADI EXTN HPS	4	50.00	12.87	25.07	62.06
	TOTAL		50.00	12.87	25.07	62.06
126	KUTTIYADI HPS	1	25.00	5.29	4.50	90.20
		2	25.00	12.13	0.68	87.19
		3	25.00	7.64	4.53	87.83
	TOTAL		75.00	8.35	3.24	88.41
127	LOWER PERIYAR 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
	TOTAL		180.00	0.00	0.00	100.00
128	NARIAMANGLAM HPS	1	15.00	0.00	0.00	100.00
		2	15.00	0.00	0.00	100.00
		3	15.00	0.00	0.00	100.00
	TOTAL		45.00	0.00	0.00	100.00
129	PALLIVASAL HPS	1	5.00	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	5.00	0.00	0.00	100.00
		3	5.00	0.00	0.00	100.00
		4	7.50	0.00	0.00	100.00
		5	7.50	0.00	0.00	100.00
		6	7.50	0.00	0.00	100.00
	TOTAL		37.50	0.00	0.00	100.00
130	PANNIAR 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
131	PORINGALKUTTU HPS	1	8.00	0.00	0.00	100.00
		2	8.00	0.00	0.00	100.00
		3	8.00	100.00	0.00	0.00
		4	8.00	0.00	0.00	100.00
	TOTAL		32.00	25.00	0.00	75.00
132	SABARIGIRI HPS	1	50.00	1.12	2.10	96.78
		2	50.00	1.06	1.15	97.79
		3	50.00	0.29	0.05	99.66
		4	50.00	0.24	10.03	89.73

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		5	50.00	17.67	1.86	80.46
		6	50.00	7.00	0.94	92.06
	TOTAL		300.00	4.56	2.69	92.75
133	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
134	SHOLAYAR HPS	1	18.00	0.00	0.00	100.00
		2	18.00	5.46	0.00	94.54
		3	18.00	0.00	13.88	86.12
	TOTAL		54.00	1.82	4.63	93.55
	TANGEDCO					
135	ALIYAR HPS	1	60.00	0.00	0.00	100.00
	TOTAL		60.00	0.00	0.00	100.00
136	BHAWANI BARRAGE-II HPS	1	15.00	5.07	1.51	93.43
		2	15.00	0.00	1.30	98.70
	TOTAL		30.00	2.53	1.40	96.06
137	BHAWANI BARRAGE-III HPS	1	15.00	37.11	0.00	62.89

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	15.00	0.00	0.00	100.00
	TOTAL		30.00	18.56	0.00	81.44
138	BHAWANI KATTAL	1	15.00	13.43	5.61	80.96
		2	15.00	0.00	5.14	94.86
	TOTAL		30.00	6.71	5.38	87.91
139	KADAMPARI HPS	1	100.00	0.00	0.00	100.00
		2	100.00	0.00	0.00	100.00
		3	100.00	0.00	100.00	0.00
		4	100.00	0.00	0.00	100.00
	TOTAL		400.00	0.00	25.00	75.00
140	KODAYAR-I HPS	1	60.00	0.00	16.24	83.76
	TOTAL		60.00	0.00	16.24	83.76
141	KODAYAR-II HPS	2	40.00	0.00	0.00	100.00
	TOTAL		40.00	0.00	0.00	100.00
142	KUNDAH-I 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
143	KUNDAH-II HPS	4	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)
		5	35.00	0.00	0.00	100.00
		6	35.00	0.00	0.00	100.00
		7	35.00	0.00	0.00	100.00
		8	35.00	0.00	0.00	100.00
	TOTAL		175.00	0.00	0.00	100.00
144	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	0.00	100.00
	TOTAL		180.00	0.00	0.00	100.00
145	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
146	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
147	LOWER METTUR-I 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

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
148	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
149	LOWER METTUR-III HPS	5	15.00	0.00	0.00	100.00
		6	15.00	0.00	0.00	100.00
	TOTAL		30.00	0.00	0.00	100.00
150	LOWER METTUR-IV HPS	7	15.00	0.00	0.00	100.00
		8	15.00	0.00	0.00	100.00
	TOTAL		30.00	0.00	0.00	100.00
151	METTUR DAM HPS	1	12.50	0.00	0.00	100.00
		2	12.50	0.00	0.00	100.00
		3	12.50	0.00	0.00	100.00
		4	12.50	11.00	0.00	89.00
	TOTAL		50.00	2.75	0.00	97.25
152	METTUR TUNNEL HPS	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
		3	50.00	16.73	0.55	82.72
		4	50.00	0.34	0.00	99.66

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		200.00	4.27	0.14	95.60
153	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
154	PAPANASAM HPS	1	8.00	11.95	0.00	88.05
		2	8.00	0.08	0.00	99.92
		3	8.00	7.99	0.00	92.01
		4	8.00	8.02	0.00	91.98
	TOTAL		32.00	7.01	0.00	92.99
155	PARSON`S VALLEY HPS	1	30.00	0.00	0.00	100.00
	TOTAL		30.00	0.00	0.00	100.00
156	PERIYAR HPS	1	42.00	-0.12	0.00	100.12
		2	42.00	6.69	0.00	93.31
		3	42.00	26.29	0.49	73.22
		4	35.00	0.00	0.00	100.00
	TOTAL		161.00	8.21	0.12	91.66
157	PYKARA HPS	1	7.00	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	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
158	PYKARA ULTMATE HPS	1	50.00	0.00	0.00	100.00
		2	50.00	100.00	0.00	0.00
		3	50.00	0.00	0.00	100.00
	TOTAL		150.00	33.33	0.00	66.67
159	SARKARPATHY HPS	1	30.00	0.00	0.00	100.00
	TOTAL		30.00	0.00	0.00	100.00
160	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
161	SURULIYAR HPS	1	35.00	12.29	1.74	85.98
	TOTAL		35.00	12.29	1.74	85.98
	TSGENCO					
162	LOWER JURALA HPS	1	40.00	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	40.00	0.00	0.00	100.00
		3	40.00	0.00	0.00	100.00
		4	40.00	0.00	0.01	99.99
		5	40.00	0.00	0.00	100.00
		6	40.00	0.00	0.00	100.00
	TOTAL		240.00	0.00	0.00	100.00
163	NAGARJUN SGR HPS	1	110.00	0.00	0.10	99.90
		2	100.80	0.00	0.97	99.03
		3	100.80	1.02	0.00	98.98
		4	100.80	0.00	0.41	99.59
		5	100.80	0.64	0.00	99.36
		6	100.80	0.00	0.00	100.00
		7	100.80	0.00	0.00	100.00
		8	100.80	0.00	0.00	100.00
	TOTAL		815.60	0.21	0.18	99.61
164	NAGARJUN SGR LBC HPS	1	30.00	0.00	0.00	100.00
		2	30.00	0.00	0.00	100.00
	TOTAL		60.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
165	POCHAMPAD HPS	1	9.00	0.00	0.00	100.00
		2	9.00	0.00	0.00	100.00
		3	9.00	0.00	0.00	100.00
		4	9.00	0.00	0.00	100.00
	TOTAL		36.00	0.00	0.00	100.00
166	PRIYADARSHNI JURALA HPS	1	39.00	0.00	0.00	100.00
		2	39.00	0.00	4.16	95.84
		3	39.00	0.00	0.00	100.00
		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	0.69	99.31
167	PULICHINTALA HPS	1	30.00	0.00	0.00	100.00
		2	30.00	0.00	0.00	100.00
		3	30.00	0.00	0.00	100.00
		4	30.00	0.00	0.00	100.00
	TOTAL		120.00	0.00	0.00	100.00
168	SRISAILAM LB HPS	1	150.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	150.00	0.00	0.00	100.00
		3	150.00	0.00	0.16	99.84
		4	150.00	0.00	0.00	100.00
		5	150.00	0.00	0.00	100.00
		6	150.00	0.00	3.49	96.51
	TOTAL		900.00	0.00	0.61	99.39
	Eastern					
	APGENCO					
169	MACHKUND HPS	1	17.00	0.00	0.11	99.89
		2	17.00	0.00	3.56	96.44
		3	17.00	0.00	0.00	100.00
		4	21.25	0.00	37.38	62.62
		5	21.25	0.00	1.36	98.64
		6	21.25	0.00	0.15	99.85
	TOTAL		114.75	0.00	7.09	92.91
	DEPL					
170	JORETHANG LOOP	1	48.00	0.00	2.96	97.04
		2	48.00	2.26	1.11	96.64
	TOTAL		96.00	1.13	2.04	96.84

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	DVC					
171	MAITHON HPS	1	20.00	2.00	28.43	69.57
		2	23.20	0.00	4.58	95.42
		3	20.00	0.00	1.61	98.39
	TOTAL		63.20	0.67	11.54	87.79
172	PANCHET HPS	1	40.00	0.00	0.00	100.00
		2	40.00	0.00	3.90	96.10
	TOTAL		80.00	0.00	1.95	98.05
	GIPL					
173	CHUZACHEN HPS	1	55.00	3.68	0.48	95.84
		2	55.00	3.93	0.38	95.69
	TOTAL		110.00	3.81	0.43	95.76
	JUUNL					
174	SUBERNREKHA-I HPS	1	65.00	0.00	0.00	100.00
	TOTAL		65.00	0.00	0.00	100.00
175	SUBERNREKHA-II HPS	2	65.00	0.00	0.00	100.00
	TOTAL		65.00	0.00	0.00	100.00
	NHPC					
176	RANGIT HPS	1	20.00	7.71	1.65	90.63
		2	20.00	9.92	0.98	89.10

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	20.00	5.11	1.74	93.15
	TOTAL		60.00	7.58	1.46	90.96
177	TEESTA LOW DAM-III HPS	1	33.00	5.39	2.41	92.20
		2	33.00	5.04	1.93	93.03
		3	33.00	3.75	3.11	93.13
		4	33.00	5.41	2.09	92.50
	TOTAL		132.00	4.90	2.39	92.72
178	TEESTA LOW DAM-IV HPS	1	40.00	6.11	2.76	91.12
		2	40.00	3.90	2.49	93.60
		3	40.00	24.74	2.69	72.57
		4	40.00	4.59	2.94	92.47
	TOTAL		160.00	9.84	2.72	87.44
179	TEESTA V HPS	1	170.00	5.00	2.24	92.76
		2	170.00	3.59	2.18	94.23
		3	170.00	5.94	2.55	91.51
	TOTAL		510.00	4.84	2.32	92.83
	OHPC					
180	BALIMELA HPS	1	60.00	100.00	0.00	0.00
		2	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)
		3	60.00	0.37	0.00	99.63
		4	60.00	0.61	0.26	99.13
		5	60.00	1.00	0.07	98.93
		6	60.00	0.44	0.22	99.34
		7	75.00	0.24	0.54	99.22
		8	75.00	0.34	0.54	99.12
	TOTAL		510.00	12.88	0.20	86.92
181	CHIPLIMA HPS	1	24.00	0.18	0.49	99.34
		2	24.00	0.20	0.75	99.04
		3	24.00	0.00	0.00	100.00
	TOTAL		72.00	0.13	0.41	99.46
182	HIRAKUD HPS	1	49.50	0.00	0.00	100.00
		2	49.50	0.26	0.59	99.15
		3	32.00	0.25	3.39	96.35
		4	32.00	0.00	5.15	94.85
		5	37.50	100.00	0.00	0.00
		6	37.50	100.00	0.00	0.00
		7	37.50	0.13	17.32	82.55

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		275.50	28.66	3.78	67.56
183	RENGALI HPS	1	50.00	0.32	2.20	97.48
		2	50.00	0.00	0.00	100.00
		3	50.00	0.33	0.06	99.61
		4	50.00	0.35	2.52	97.13
		5	50.00	0.32	0.24	99.43
	TOTAL		250.00	0.27	1.00	98.73
184	UPPER INDRAVATI HPS	1	150.00	0.47	1.27	98.25
		2	150.00	0.42	0.73	98.85
		3	150.00	0.41	0.63	98.96
		4	150.00	8.04	0.65	91.31
	TOTAL		600.00	2.34	0.82	96.84
185	UPPER KOLAB HPS	1	80.00	0.21	0.26	99.53
		2	80.00	0.00	0.00	100.00
		3	80.00	11.81	7.00	81.19
		4	80.00	5.94	0.20	93.86
	TOTAL		320.00	4.49	1.86	93.65
	SEPL					
186	TASHIDING HPS	1	48.50	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)
		2	48.50	0.00	0.00	100.00
	TOTAL		97.00	0.00	0.00	100.00
	SKPPPL					
187	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					
188	TEESTA-III HPS	1	200.00	12.15	0.23	87.62
		2	200.00	6.05	0.07	93.88
		3	200.00	8.36	0.02	91.62
		4	200.00	5.72	1.21	93.07
		5	200.00	4.72	0.88	94.39
		6	200.00	4.24	0.53	95.22
	TOTAL		1200.00	6.87	0.49	92.64
	WBSEDCL					
189	JALDHAKA HPS ST-I	1	9.00	0.06	47.90	52.04
		2	9.00	8.49	2.07	89.43
		3	9.00	18.41	0.57	81.02
		4	9.00	19.05	1.62	79.33

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		36.00	11.51	13.04	75.46
190	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	0.06	99.94
		4	225.00	0.00	0.00	100.00
	TOTAL		900.00	0.00	0.02	99.98
191	RAMMAM HPS	1	12.50	0.00	0.21	99.79
		2	12.50	0.00	0.19	99.81
		3	12.50	1.37	0.15	98.48
		4	12.50	0.00	0.15	99.85
	TOTAL		50.00	0.34	0.18	99.48
	North Eastern					
	APGCL					
192	KARBI LANGPI HPS	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
	TOTAL		100.00	0.00	0.00	100.00
	MeECL					
193	KYRDEMKULAI HPS	1	30.00	0.00	0.00	100.00
		2	30.00	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)
	TOTAL		60.00	0.00	50.00	50.00
194	MYNTDU(LESHKA) St-1 HPS	1	42.00	10.39	0.00	89.61
		2	42.00	2.33	0.00	97.67
		3	42.00	7.54	0.00	92.46
	TOTAL		126.00	6.75	0.00	93.25
195	NEW UMTRU HPS	1	20.00	0.00	0.28	99.72
		2	20.00	0.00	16.71	83.29
	TOTAL		40.00	0.00	8.49	91.51
196	UMIAM HPS ST-I	1	9.00	0.00	0.05	99.95
		2	9.00	0.00	0.35	99.65
		3	9.00	0.00	0.02	99.98
		4	9.00	0.00	0.07	99.93
	TOTAL		36.00	0.00	0.12	99.88
197	UMIAM HPS ST-IV	7	30.00	0.00	67.94	32.06
		8	30.00	0.00	0.00	100.00
	TOTAL		60.00	0.00	33.97	66.03
	NEEPCO.					
198	DOYANG HPS	1	25.00	3.73	0.70	95.57
		2	25.00	5.17	0.92	93.91

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	25.00	0.00	2.25	97.75
	TOTAL		75.00	2.97	1.29	95.74
199	KAMENG HPS	1	150.00	0.00	0.00	100.00
		2	150.00	0.00	0.00	100.00
	TOTAL		300.00	0.00	0.00	100.00
200	KHONDONG HPS	1	25.00	0.00	23.90	76.10
		2	25.00	0.00	25.22	74.78
	TOTAL		50.00	0.00	24.56	75.44
201	KOPILI HPS	1	50.00	0.74	0.04	99.22
		2	50.00	0.00	0.01	99.99
		3	50.00	0.00	2.55	97.45
		4	50.00	0.00	2.52	97.48
	TOTAL		200.00	0.19	1.28	98.54
202	PARE	1	55.00	1.07	0.01	98.92
		2	55.00	0.00	0.00	100.00
	TOTAL		110.00	0.53	0.00	99.46
203	RANGANADI HPS	1	135.00	5.10	8.36	86.55
		2	135.00	7.13	0.01	92.86

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	135.00	97.18	0.00	2.82
	TOTAL		405.00	36.47	2.79	60.74
204	TUIRIAL HPS	1	30.00	4.83	2.24	92.94
		2	30.00	0.00	6.10	93.90
	TOTAL		60.00	2.41	4.17	93.42
	NHPC					
205	LOKTAK HPS	1	35.00	3.14	2.16	94.70
		2	35.00	2.87	0.15	96.98
		3	35.00	16.67	3.30	80.03
	TOTAL		105.00	7.56	1.87	90.57

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 2019-20 is given at **Annex-7.1** and summarized below in **Table 7.1**.

TABLE 7.1

MISCELLANEOUS OUTAGES FOR PERIOD: 2019-20

S. No.	Causes of Miscellaneous Outage	Duration of Outage (Hours)	% of Total Outage
	NOT ASSOCIATED WITH THE EQUIPMENT AND CIVIL STRUCTURE		
1	Water Constraint	380,044.32	83.79
2	Grid Constraint	61,723.05	13.61
3	Other Miscellaneous	11,777.99	2.60
	TOTAL	453,545.36	100

7.2 The overall non-availability on account of miscellaneous outages has been estimated as 3.76%. It was highest (54.04%) in case of HE Stations from GSECL followed by RRVUNL (18.89%), BBMB (15.38%), SJVNL (12.38%), etc. However, miscellaneous non-availability being beyond the control of utilities, does not have not any impact on the operating availability of HE Stations.

CENTRAL ELECTRICITY AUTHORITY
Hydro WING
Hydro Project Planning & Investigation Division

Annex 7.1

**NON-AVAILABILITY OF HYDROELECTRIC UNITS DUE TO REASONS OTHER THAN PLANNED
MAINTENANCE AND FORCED OUTAGE DURING 2019-20**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	Northern			
	ADHPL			
1	ALLAIN DUHANGAN HPS	1	96.00	0.15
		2	96.00	0.03
	TOTAL		192.00	0.09
	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	108.00	0.00
		4	126.00	12.92

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		5	126.00	0.00
	TOTAL		594.00	2.58
4	BHAKRA RIGHT HPS	10	157.00	0.00
		6	157.00	0.00
		7	157.00	0.00
		8	157.00	2.66
		9	157.00	0.00
	TOTAL		785.00	0.53
5	DEHAR HPS	1	165.00	0.00
		2	165.00	0.00
		3	165.00	0.00
		4	165.00	0.00
		5	165.00	0.00
		6	165.00	0.00
	TOTAL		990.00	0.00
6	GANGUWAL HPS	1	29.25	2.57
		2	24.20	1.64
		3	24.20	1.45
	TOTAL		77.65	1.89
7	KOTLA HPS	1	29.25	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	24.20	2.76
		3	24.20	1.31
	TOTAL		77.65	1.36
8	PONG HPS	1	66.00	1.66
		2	66.00	0.00
		3	66.00	0.00
		4	66.00	1.75
		5	66.00	0.00
		6	66.00	2.95
	TOTAL		396.00	1.06
	E.P.P.L.			
9	MALANA-II HPS	1	50.00	35.82
		2	50.00	38.25
	TOTAL		100.00	37.03
	GBHPPL			
10	BUDHIL HPS	1	35.00	0.19
		2	35.00	0.00
	TOTAL		70.00	0.10
	HBPCL			
11	BASPA HPS	1	100.00	0.54

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	100.00	0.75
		3	100.00	0.55
	TOTAL		300.00	0.61
12	KARCHAM WANGTOO HPS	1	250.00	0.21
		2	250.00	0.22
		3	250.00	0.22
		4	250.00	0.21
	TOTAL		1000.00	0.21
	HPPCL			
13	KASHANG INTEGRATED HEP	1	65.00	0.00
		2	65.00	100.00
		3	65.00	0.00
	TOTAL		195.00	33.33
14	SAINJ HPS	1	50.00	0.00
		2	50.00	0.00
	TOTAL		100.00	0.00
	HPSEB			
15	BASSI HPS	1	16.50	0.49
		2	16.50	7.62
		3	16.50	2.79

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	16.50	0.63
	TOTAL		66.00	2.88
16	GIRI BATA HPS	1	30.00	0.00
		2	30.00	0.00
	TOTAL		60.00	0.00
17	LARJI HPS	1	42.00	0.00
		2	42.00	0.00
		3	42.00	0.00
	TOTAL		126.00	0.00
18	SANJAY HPS	1	40.00	0.06
		2	40.00	0.07
		3	40.00	0.06
	TOTAL		120.00	0.06
	IAEPL			
19	CHANJU-I HPS	1	12.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL		36.00	0.00
	JKSPDC			
20	BAGLIHAR HPS	1	150.00	1.22

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	150.00	0.00
		3	150.00	0.00
	TOTAL		450.00	0.41
21	BAGLIHAR II HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	100.00
	TOTAL		450.00	33.33
22	LOWER JHELMUM HPS	1	35.00	0.00
		2	35.00	0.00
		3	35.00	100.00
	TOTAL		105.00	33.33
23	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			
24	VISHNU PRAYAG HPS	1	100.00	0.94
		2	100.00	0.74
		3	100.00	0.94
		4	100.00	0.79

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		400.00	0.85
	MPCL			
25	MALANA HPS	1	43.00	0.00
		2	43.00	0.00
	TOTAL		86.00	0.00
	NHPC			
26	BAIRA SIUL HPS	1	60.00	25.81
		2	60.00	8.12
		3	60.00	32.20
	TOTAL		180.00	22.04
27	CHAMERA-I HPS	1	180.00	30.26
		2	180.00	38.59
		3	180.00	36.32
	TOTAL		540.00	35.06
28	CHAMERA-II HPS	1	100.00	0.81
		2	100.00	0.13
		3	100.00	15.44
	TOTAL		300.00	5.46
29	CHAMERA-III HPS	1	77.00	36.10
		2	77.00	42.38

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	77.00	32.79
	TOTAL		231.00	37.09
30	CHUTAK HPS	1	11.00	36.47
		2	11.00	50.72
		3	11.00	26.14
		4	11.00	51.33
	TOTAL		44.00	41.16
31	DHAULI GANGA HPS	1	70.00	34.67
		2	70.00	42.75
		3	70.00	36.82
		4	70.00	43.04
	TOTAL		280.00	39.32
32	DULHASTI HPS	1	130.00	16.45
		2	130.00	16.03
		3	130.00	20.08
	TOTAL		390.00	17.52
33	KISHANGANGA HPS	1	110.00	11.56
		2	110.00	15.72
		3	110.00	20.88
	TOTAL		330.00	16.05

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
34	NIMMO BAZGO HPS	1	15.00	20.97
		2	15.00	29.48
		3	15.00	30.98
	TOTAL		45.00	27.14
35	PARBATI-III HPS	1	130.00	59.83
		2	130.00	62.25
		3	130.00	51.52
		4	130.00	67.74
	TOTAL		520.00	60.33
36	SALAL HPS	1	115.00	30.76
		2	115.00	33.30
		3	115.00	14.16
		4	115.00	29.49
		5	115.00	27.72
		6	115.00	23.06
	TOTAL		690.00	26.41
37	SEWA-II HPS	1	40.00	31.19
		2	40.00	38.59
		3	40.00	31.80
	TOTAL		120.00	33.86

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
38	TANAKPUR HPS	1	31.40	10.27
		2	31.40	8.65
		3	31.40	22.39
	TOTAL		94.20	13.77
39	URI-I HPS	1	120.00	7.69
		2	120.00	15.56
		3	120.00	1.82
		4	120.00	0.92
	TOTAL		480.00	6.50
40	URI-II HPS	1	60.00	11.85
		2	60.00	4.69
		3	60.00	1.48
		4	60.00	4.43
	TOTAL		240.00	5.61
	NTPC Ltd.			
41	KOLDAM	1	200.00	0.00
		2	200.00	0.00
		3	200.00	0.00
		4	200.00	0.00
	TOTAL		800.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	PSPCL			
42	ANANDPUR SAHIB-I HPS	1	33.50	0.00
		2	33.50	0.00
	TOTAL		67.00	0.00
43	ANANDPUR SAHIB-II HPS	3	33.50	0.00
		4	33.50	0.00
	TOTAL		67.00	0.00
44	MUKERIAN-I HPS	1	15.00	14.30
		2	15.00	7.70
		3	15.00	1.83
	TOTAL		45.00	7.94
45	MUKERIAN-II HPS	4	15.00	9.98
		5	15.00	9.38
		6	15.00	15.77
	TOTAL		45.00	11.71
46	MUKERIAN-III HPS	7	19.50	2.53
		8	19.50	6.15
		9	19.50	1.51
	TOTAL		58.50	3.39
47	MUKERIAN-IV HPS	10	19.50	4.75

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		11	19.50	1.97
		12	19.50	6.89
	TOTAL		58.50	4.53
48	RANJIT SAGAR 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
49	SHANAN HPS	1	15.00	0.51
		2	15.00	0.00
		3	15.00	0.00
		4	15.00	0.00
		5	50.00	0.00
	TOTAL		110.00	0.10
	RRVUNL			
50	JAWAHAR SAGAR HPS	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL		99.00	0.00
51	MAHI BAJAJ-I HPS	1	25.00	0.18

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	25.00	0.00
	TOTAL		50.00	0.09
52	MAHI BAJAJ-II HPS	3	45.00	100.00
		4	45.00	0.00
	TOTAL		90.00	50.00
53	R P SAGAR HPS	1	43.00	0.00
		2	43.00	0.00
		3	43.00	0.00
		4	43.00	0.00
	TOTAL		172.00	0.00
	SJVNL			
54	NATHPA JHAKRI HPS	1	250.00	33.94
		2	250.00	130.78
		3	250.00	36.07
		4	250.00	36.08
		5	250.00	36.16
		6	250.00	139.15
	TOTAL		1500.00	68.69
55	RAMPUR HPS	1	68.67	1.96
		2	68.67	2.36

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	68.67	2.47
		4	68.67	3.96
		5	68.67	3.87
		6	68.67	2.09
	TOTAL		412.02	2.78
	THDC			
56	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
57	TEHRI ST-1 HPS	1	250.00	0.00
		2	250.00	0.00
		3	250.00	0.00
		4	250.00	0.00
	TOTAL		1000.00	0.00
	UJVNL			
58	CHIBRO (YAMUNA) HPS	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	60.00	0.00
	TOTAL		240.00	0.00
59	CHILLA HPS	1	36.00	0.00
		2	36.00	0.00
		3	36.00	0.00
		4	36.00	0.00
	TOTAL		144.00	0.00
60	DHAKRANI HPS	1	11.25	0.00
		2	11.25	0.00
		3	11.25	0.00
	TOTAL		33.75	0.00
61	DHALIPUR HPS	1	17.00	0.00
		2	17.00	0.00
		3	17.00	0.00
	TOTAL		51.00	0.00
62	KHATIMA HPS	1	13.80	0.00
		2	13.80	0.00
		3	13.80	0.00
	TOTAL		41.40	0.00
63	KHODRI HPS	1	30.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	30.00	0.00
		3	30.00	0.00
		4	30.00	0.00
	TOTAL		120.00	0.00
64	KULHAL HPS	1	10.00	0.00
		2	10.00	0.00
		3	10.00	0.00
	TOTAL		30.00	0.00
65	MANERI BHALI-I HPS	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00
	TOTAL		90.00	0.00
66	MANERI BHALI-II HPS	1	76.00	0.00
		2	76.00	0.59
		3	76.00	0.00
		4	76.00	0.00
	TOTAL		304.00	0.15
67	RAMGANGA HPS	1	66.00	0.00
		2	66.00	0.00
		3	66.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		198.00	0.00
	UPJVNL			
68	KHARA HPS	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
	TOTAL		72.00	0.00
69	MATATILA HPS	1	10.20	0.00
		2	10.20	0.00
		3	10.20	0.00
	TOTAL		30.60	0.00
70	OBRA HPS	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL		99.00	0.00
71	RIHAND HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	0.00
		5	50.00	0.00
		6	50.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		300.00	0.00
	Western			
	CSPGCL			
72	HASDEOBANGO HPS	1	40.00	0.00
		2	40.00	0.00
		3	40.00	0.00
	TOTAL		120.00	0.00
	DLHP			
73	BHANDARDHARA HPS ST-II	2	34.00	0.00
	TOTAL		34.00	0.00
	GSECL			
74	KADANA 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
75	UKAI HPS	1	75.00	0.00
		2	75.00	0.00
		3	75.00	0.00
		4	75.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		300.00	0.00
	MAHAGENCO			
76	BHIRA TAIL RACE HPS	1	40.00	0.00
		2	40.00	0.00
	TOTAL		80.00	0.00
77	GHATGHAR PSS HPS	1	125.00	0.00
		2	125.00	0.00
	TOTAL		250.00	0.00
78	KOYNA-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
	TOTAL		600.00	0.00
79	KOYNA-III HPS	1	80.00	0.00
		2	80.00	0.00
		3	80.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	80.00	0.00
	TOTAL		320.00	0.00
80	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
81	KOYNA DPH HPS	1	18.00	0.00
		2	18.00	0.00
	TOTAL		36.00	0.00
82	TILLARI HPS	1	60.00	0.00
	TOTAL		60.00	0.00
83	VAITARNA HPS	1	60.00	0.00
	TOTAL		60.00	0.00
	MPPGCL			
84	BANSAGAR-II HPS	1	15.00	15.88
		2	15.00	17.13
	TOTAL		30.00	16.51
85	BANSAGAR-III HPS	1	20.00	19.85
		2	20.00	26.70

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	20.00	25.06
	TOTAL		60.00	23.87
86	BANSAGAR TONS-I HPS	1	105.00	0.00
		2	105.00	0.00
		3	105.00	0.00
	TOTAL		315.00	0.00
87	BARGI HPS	1	45.00	0.31
		2	45.00	4.42
	TOTAL		90.00	2.37
88	GANDHI SAGAR HPS	1	23.00	41.38
		2	23.00	41.38
		3	23.00	0.00
		4	23.00	43.00
		5	23.00	43.00
	TOTAL		115.00	33.75
89	MADHIKHERA HPS	1	20.00	42.94
		2	20.00	40.76
		3	20.00	37.46
	TOTAL		60.00	40.39
90	PENCH HPS	1	80.00	26.64

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	80.00	35.39
	TOTAL		160.00	31.02
91	RAJGHAT HPS	1	15.00	56.02
		2	15.00	40.43
		3	15.00	46.50
	TOTAL		45.00	47.65
	NHDC			
92	INDIRA SAGAR HPS	1	125.00	0.00
		2	125.00	0.00
		3	125.00	0.00
		4	125.00	0.00
		5	125.00	0.00
		6	125.00	0.00
		7	125.00	0.00
		8	125.00	0.00
	TOTAL		1000.00	0.00
93	OMKARESHWAR HPS	1	65.00	0.00
		2	65.00	0.00
		3	65.00	0.00
		4	65.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		5	65.00	0.00
		6	65.00	0.00
		7	65.00	0.00
		8	65.00	0.00
	TOTAL		520.00	0.00
	SSNNL			
94	S SAROVAR CHPH HPS	1	50.00	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
95	S SAROVAR RBPH HPS	1	200.00	0.00
		2	200.00	0.00
		3	200.00	0.00
		4	200.00	0.00
		5	200.00	0.00
		6	200.00	0.00
	TOTAL		1200.00	0.00
	TATA MAH.			

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
96	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
97	BHIRA PSS HPS	1	150.00	0.00
	TOTAL		150.00	0.00
98	BHIVPURI HPS	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
		4	1.50	0.00
		5	1.50	0.00
	TOTAL		75.00	0.00
99	KHOPOLI HPS	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
	TOTAL		72.00	0.00
	Southern			

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	APGENCO			
100	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
101	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
102	NAGARJUN SGR TPD	1	25.00	0.00
		2	25.00	0.00
	TOTAL		50.00	0.00
103	NAGARJUN SGR RBC HPS	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00
	TOTAL		90.00	0.00
104	SRISAILAM HPS	1	110.00	0.00
		2	110.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	110.00	0.00
		4	110.00	0.00
		5	110.00	0.00
		6	110.00	0.00
		7	110.00	0.00
	TOTAL		770.00	0.00
105	T B DAM HPS	1	9.00	0.02
		2	9.00	0.00
		3	9.00	0.02
		4	9.00	0.00
	TOTAL		36.00	0.01
106	UPPER SILERU HPS	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.09
		4	60.00	0.00
	TOTAL		240.00	0.02
	KPCL			
107	ALMATTI DPH HPS	1	15.00	0.00
		2	55.00	0.00
		3	55.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	55.00	0.00
		5	55.00	0.00
		6	55.00	0.00
	TOTAL		290.00	0.00
108	BHADRA HPS	1	2.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL		26.00	0.00
109	GERUSUPPA HPS	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.01
		4	60.00	0.00
	TOTAL		240.00	0.00
110	GHAT PRABHA HPS	1	16.00	46.63
		2	16.00	46.50
	TOTAL		32.00	46.56
111	JOG HPS	1	13.20	0.00
		2	13.20	0.60
		3	13.20	0.00
		4	13.20	0.59

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		5	21.60	6.36
		6	21.60	7.33
		7	21.60	6.34
		8	21.60	4.64
	TOTAL		139.20	3.23
112	KADRA HPS	1	50.00	42.72
		2	50.00	44.43
		3	50.00	44.90
	TOTAL		150.00	44.02
113	KALINADI HPS	1	135.00	0.00
		2	135.00	0.00
		3	135.00	100.00
		4	150.00	100.00
		5	150.00	0.00
		6	150.00	0.00
	TOTAL		855.00	33.33
114	KALINADI SUPA HPS	1	50.00	0.00
		2	50.00	0.00
	TOTAL		100.00	0.00
115	KODASALI HPS	1	40.00	35.19

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	40.00	38.54
		3	40.00	41.06
	TOTAL		120.00	38.26
116	LIGANAMAKKI HPS	1	27.50	0.00
		2	27.50	0.00
	TOTAL		55.00	0.00
117	MUNIRABAD HPS	1	9.00	0.00
		2	9.00	0.00
		3	10.00	0.00
	TOTAL		28.00	0.00
118	SHARAVATHI HPS	1	103.50	0.00
		10	103.50	0.00
		2	103.50	0.00
		3	103.50	0.00
		4	103.50	0.00
		5	103.50	0.00
		6	103.50	0.00
		7	103.50	0.00
		8	103.50	0.00
		9	103.50	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		1035.00	0.00
119	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
120	VARAHI HPS	1	115.00	0.01
		2	115.00	0.14
		3	115.00	0.00
		4	115.00	0.00
	TOTAL		460.00	0.04
	KSEB			
121	IDAMALAYAR HPS	1	37.50	13.41
		2	37.50	27.93

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		75.00	20.67
122	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	0.00
		6	130.00	0.00
	TOTAL		780.00	0.00
123	KAKKAD HPS	1	25.00	0.00
		2	25.00	0.00
	TOTAL		50.00	0.00
124	KUTTIYADI ADDL EXTN	1	50.00	0.00
		2	50.00	0.00
	TOTAL		100.00	0.00
125	KUTTIYADI EXTN HPS	4	50.00	0.00
	TOTAL		50.00	0.00
126	KUTTIYADI HPS	1	25.00	0.00
		2	25.00	0.00
		3	25.00	0.00
	TOTAL		75.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
127	LOWER PERIYAR HPS	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
	TOTAL		180.00	0.00
128	NARIAMANGLAM HPS	1	15.00	0.00
		2	15.00	0.00
		3	15.00	0.00
	TOTAL		45.00	0.00
129	PALLIVASAL HPS	1	5.00	0.00
		2	5.00	0.00
		3	5.00	0.00
		4	7.50	0.00
		5	7.50	0.00
		6	7.50	0.00
	TOTAL		37.50	0.00
130	PANNIAR HPS	1	15.00	0.00
		2	15.00	0.00
	TOTAL		30.00	0.00
131	PORINGALKUTTU HPS	1	8.00	1.04
		2	8.00	0.65

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	8.00	0.00
		4	8.00	1.04
	TOTAL		32.00	0.68
132	SABARIGIRI HPS	1	50.00	0.02
		2	50.00	5.35
		3	50.00	0.00
		4	50.00	2.55
		5	50.00	1.22
		6	50.00	0.59
	TOTAL		300.00	1.62
133	SENGULAM HPS	1	12.00	0.20
		2	12.00	0.20
		3	12.00	100.00
		4	12.00	100.00
	TOTAL		48.00	50.10
134	SHOLAYAR HPS	1	18.00	0.00
		2	18.00	0.00
		3	18.00	0.00
	TOTAL		54.00	0.00
	TANGEDCO			

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
135	ALIYAR HPS	1	60.00	0.00
	TOTAL		60.00	0.00
136	BHAWANI BARRAGE-II HPS	1	15.00	49.31
		2	15.00	56.56
	TOTAL		30.00	52.94
137	BHAWANI BARRAGE-III HPS	1	15.00	0.00
		2	15.00	0.00
	TOTAL		30.00	0.00
138	BHAWANI KATTAL	1	15.00	0.00
		2	15.00	0.00
	TOTAL		30.00	0.00
139	KADAMPARI HPS	1	100.00	0.00
		2	100.00	0.00
		3	100.00	0.00
		4	100.00	0.00
	TOTAL		400.00	0.00
140	KODAYAR-I HPS	1	60.00	0.00
	TOTAL		60.00	0.00
141	KODAYAR-II HPS	2	40.00	0.00
	TOTAL		40.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
142	KUNDAH-I HPS	1	20.00	0.00
		2	20.00	0.00
		3	20.00	0.00
	TOTAL		60.00	0.00
143	KUNDAH-II HPS	4	35.00	0.00
		5	35.00	0.00
		6	35.00	0.00
		7	35.00	0.00
		8	35.00	0.00
	TOTAL		175.00	0.00
144	KUNDAH-III HPS	10	60.00	0.00
		11	60.00	0.00
		9	60.00	0.00
	TOTAL		180.00	0.00
145	KUNDAH-IV HPS	12	50.00	0.00
		13	50.00	0.00
	TOTAL		100.00	0.00
146	KUNDAH-V HPS	14	20.00	0.00
		15	20.00	0.00
	TOTAL		40.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
147	LOWER METTUR-I HPS	1	15.00	0.00
		2	15.00	0.00
	TOTAL		30.00	0.00
148	LOWER METTUR-II HPS	3	15.00	0.00
		4	15.00	0.00
	TOTAL		30.00	0.00
149	LOWER METTUR-III HPS	5	15.00	0.00
		6	15.00	0.00
	TOTAL		30.00	0.00
150	LOWER METTUR-IV HPS	7	15.00	0.00
		8	15.00	0.00
	TOTAL		30.00	0.00
151	METTUR DAM HPS	1	12.50	36.96
		2	12.50	40.99
		3	12.50	31.17
		4	12.50	32.06
	TOTAL		50.00	35.29
152	METTUR TUNNEL HPS	1	50.00	33.35
		2	50.00	35.25
		3	50.00	11.02

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	50.00	26.81
	TOTAL		200.00	26.61
153	MOYAR HPS	1	12.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL		36.00	0.00
154	PAPANASAM HPS	1	8.00	0.00
		2	8.00	0.00
		3	8.00	0.00
		4	8.00	0.00
	TOTAL		32.00	0.00
155	PARSON'S VALLEY HPS	1	30.00	0.00
	TOTAL		30.00	0.00
156	PERIYAR HPS	1	42.00	0.01
		2	42.00	0.01
		3	42.00	0.00
		4	35.00	0.00
	TOTAL		161.00	0.01
157	PYKARA HPS	1	7.00	0.00
		2	7.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		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
158	PYKARA ULTMATE HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
	TOTAL		150.00	0.00
159	SARKARPATHY HPS	1	30.00	0.00
	TOTAL		30.00	0.00
160	SHOLAYAR HPS (TN)	1	35.00	0.00
		2	35.00	0.00
	TOTAL		70.00	0.00
161	SURULIYAR HPS	1	35.00	0.00
	TOTAL		35.00	0.00
	TSGENCO			
162	LOWER JURALA HPS	1	40.00	16.58
		2	40.00	2.73
		3	40.00	0.55

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	40.00	0.97
		5	40.00	31.79
		6	40.00	0.34
	TOTAL		240.00	8.83
163	NAGARJUN SGR HPS	1	110.00	16.12
		2	100.80	14.67
		3	100.80	15.03
		4	100.80	13.23
		5	100.80	15.30
		6	100.80	10.38
		7	100.80	13.66
		8	100.80	10.65
	TOTAL		815.60	13.63
164	NAGARJUN SGR LBC HPS	1	30.00	63.93
		2	30.00	12.84
	TOTAL		60.00	38.39
165	POCHAMPAD HPS	1	9.00	13.11
		2	9.00	19.67
		3	9.00	7.22
		4	9.00	7.10

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		36.00	11.78
166	PRIYADARSHNI JURALA HPS	1	39.00	0.00
		2	39.00	0.00
		3	39.00	1.37
		4	39.00	0.27
		5	39.00	0.00
		6	39.00	0.55
	TOTAL		234.00	0.36
167	PULICHINTALA HPS	1	30.00	20.76
		2	30.00	25.12
		3	30.00	25.85
		4	30.00	3.83
	TOTAL		120.00	18.89
168	SRISAILAM LB HPS	1	150.00	3.55
		2	150.00	4.03
		3	150.00	10.38
		4	150.00	10.11
		5	150.00	9.83
		6	150.00	6.29
	TOTAL		900.00	7.37

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	Eastern			
	APGENCO			
169	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	0.17
		6	21.25	0.00
	TOTAL		114.75	0.03
	DEPL			
170	JORETHANG LOOP	1	48.00	0.15
		2	48.00	0.15
	TOTAL		96.00	0.15
	DVC			
171	MAITHON HPS	1	20.00	10.32
		2	23.20	0.29
		3	20.00	35.25
	TOTAL		63.20	15.29
172	PANCHET HPS	1	40.00	0.82
		2	40.00	3.15

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		80.00	1.98
	GIPL			
173	CHUZACHEN HPS	1	55.00	43.69
		2	55.00	42.54
	TOTAL		110.00	43.12
	JUUNL			
174	SUBERNREKHA-I HPS	1	65.00	0.00
	TOTAL		65.00	0.00
175	SUBERNREKHA-II HPS	2	65.00	0.00
	TOTAL		65.00	0.00
	NHPC			
176	RANGIT HPS	1	20.00	33.69
		2	20.00	16.26
		3	20.00	23.06
	TOTAL		60.00	24.34
177	TEESTA LOW DAM-III HPS	1	33.00	39.30
		2	33.00	42.35
		3	33.00	40.31
		4	33.00	31.61
	TOTAL		132.00	38.39

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
178	TEESTA LOW DAM-IV HPS	1	40.00	39.51
		2	40.00	30.49
		3	40.00	24.13
		4	40.00	33.63
	TOTAL		160.00	31.94
179	TEESTA V HPS	1	170.00	35.65
		2	170.00	23.08
		3	170.00	31.56
	TOTAL		510.00	30.10
	OHPC			
180	BALIMELA HPS	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
		4	60.00	0.00
		5	60.00	0.00
		6	60.00	0.00
		7	75.00	0.00
		8	75.00	0.00
	TOTAL		510.00	0.00
181	CHIMPLIMA HPS	1	24.00	0.01

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	24.00	0.01
		3	24.00	0.00
	TOTAL		72.00	0.00
182	HIRAKUD HPS	1	49.50	0.00
		2	49.50	0.00
		3	32.00	0.00
		4	32.00	0.00
		5	37.50	0.00
		6	37.50	0.00
		7	37.50	0.00
	TOTAL		275.50	0.00
183	RENGALI HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	0.00
		5	50.00	0.00
	TOTAL		250.00	0.00
184	UPPER INDRAVATI HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	150.00	0.00
	TOTAL		600.00	0.00
185	UPPER KOLAB HPS	1	80.00	0.00
		2	80.00	0.00
		3	80.00	0.00
		4	80.00	0.00
	TOTAL		320.00	0.00
	SEPL			
186	TASHIDING HPS	1	48.50	0.00
		2	48.50	0.00
	TOTAL		97.00	0.00
	SKPPPL			
187	DIKCHU HPS	1	48.00	0.00
		2	48.00	0.00
	TOTAL		96.00	0.00
	TUL			
188	TEESTA-III HPS	1	200.00	0.00
		2	200.00	0.00
		3	200.00	0.04
		4	200.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		5	200.00	0.00
		6	200.00	0.00
	TOTAL		1200.00	0.01
	WBSEDCL			
189	JALDHAKA HPS ST-I	1	9.00	5.44
		2	9.00	36.07
		3	9.00	15.10
		4	9.00	11.04
	TOTAL		36.00	16.91
190	PURULIA PSS HPS	1	225.00	0.00
		2	225.00	2.63
		3	225.00	0.51
		4	225.00	0.00
	TOTAL		900.00	0.78
191	RAMMAM HPS	1	12.50	0.08
		2	12.50	0.05
		3	12.50	0.07
		4	12.50	0.06
	TOTAL		50.00	0.07
	North Eastern			

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	APGCL			
192	KARBI LANGPI HPS	1	50.00	0.00
		2	50.00	0.00
	TOTAL		100.00	0.00
	MeECL			
193	KYRDEMKULAI HPS	1	30.00	0.00
		2	30.00	0.00
	TOTAL		60.00	0.00
194	MYNTDU(LESHKA) St-1 HPS	1	42.00	0.00
		2	42.00	0.00
		3	42.00	3.82
	TOTAL		126.00	1.27
195	NEW UMTRU HPS	1	20.00	0.00
		2	20.00	0.00
	TOTAL		40.00	0.00
196	UMIAM HPS ST-I	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

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
197	UMIAM HPS ST-IV	7	30.00	0.00
		8	30.00	0.00
	TOTAL		60.00	0.00
	NEEPCO.			
198	DOYANG HPS	1	25.00	8.96
		2	25.00	12.36
		3	25.00	6.68
	TOTAL		75.00	9.33
199	KAMENG HPS	1	150.00	0.00
		2	150.00	0.00
	TOTAL		300.00	0.00
200	KHONDONG HPS	1	25.00	0.00
		2	25.00	0.06
	TOTAL		50.00	0.03
201	KOPILI HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.34
		4	50.00	0.55
	TOTAL		200.00	0.22
202	PARE	1	55.00	5.42

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	55.00	4.40
	TOTAL		110.00	4.91
203	RANGANADI HPS	1	135.00	0.00
		2	135.00	0.00
		3	135.00	0.00
	TOTAL		405.00	0.00
204	TUIRIAL HPS	1	30.00	9.04
		2	30.00	13.53
	TOTAL		60.00	11.28
	NHPC			
205	LOKTAK HPS	1	35.00	43.14
		2	35.00	45.17
		3	35.00	50.64
	TOTAL		105.00	46.32

CHAPTER-8

GENERATION PROGRAMME FOR THE YEAR 2019-20

CHAPTER 8

GENERATION PROGRAMME FOR THE YEAR 2019-20

8.1 As on 31.03.2020, 205 HE Stations (of more than 25 MW capacity) having total installed capacity of 45699.20 MW are being monitored in the country. With the addition of new hydro units during 2020-21, the anticipated installed capacity of H.E. Stations in the country is likely to be 48119.2 MW by 31st March, 2021. The overall Generation Programme for H.E. stations for the year 2020-21 has been fixed at 147587 MU comprising 140357 MU from HE Stations in India and 7230 MU import from Bhutan, which is 13977 MU less than actual generation during 2019-20 (i.e. 161564 MU comprising 155769 MU from HE Stations in India and 5794.48 MU import from Bhutan).

8.2 Region-wise summary of likely installed capacity as on 31.03.2021, Generation targets for 2020-21 and the hydro generation during 2019-20 are given in **Table 7.1** below:

TABLE 8.1

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

Sl. No.	Region	Likely Hydro Installed Capacity (as on 31.03.2021) (MW)	Hydro Generation Programme for 2020-21 (MU)	Hydro Generation during 2019-20 (MU)	
				Programme	Actual
1.	Northern	21007.25	73243	71513	80556.95
2.	Western	7392.00	14257	12200	17813.79
3.	Southern	11734.5	27293	27124	31754.02
4.	Eastern	5958.45	19192	19243	20823.47
5.	North-Eastern	2027.00	6372	6852	4820.89
Sub total		48119.2	140357	136932	155769
6.	Import – from Bhutan		7230	6218	5794.48
Total(Including Import from Bhutan)			147587	143150	161564

8.3 While finalizing the Generation Programme for 2020-21 during last quarter of 2019-20, it was anticipated that 11 nos. H.E. units having installed capacity of 2420 MW would be added during the year 2020-21 and last quarter of 2019-20. 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 31.03.2021, targets and actual generation during 2019-20, generation target for 2020-21 are given in **Annex-8.2**.

Generation from Hydro Electric Projects likely to be commissioned in 2020-21 and during last quarter of 2019-20

S. No.	Name of Hydro Power Project	Unit No.	Present Likely date of commissioning as per CEA/Utility	I.C (M W)	Generation Target 2019-20	Generation Target 2020-21	Present Capacity Addition Programme during
Central Sector							
1	Parbati-II (NHPC-Himachal Pradesh)	1 to 4	U-1 (Sep., 2020) U-2 (Oct., 2020) U-3 (Nov. 2020) U-4 (Dec., 2020)	800	200	265	2020-21
2	Tapovan Vishnugad (NTPC- Uttarakhand)	1 to 4	U-1 (Sep., 2020) U-2 (Oct., 2020) U-3 (Nov. 2020) U-4 (Jan., 2021)	520	0	427	2020-21
3	Kameng (NEEPCO-Arunachal Pradesh)	1 to 4	3 & 4 (Jun., 2020)	300	1800	2150	2020-21
Sub Total (Central Sector)				1620	2000	2842	
State Sector							
1	Uhl III (BVPCL-HP)	1 to 3	U-1, 2 & 3 (Mar, 2020)	100	200	272	2019-20
2	Sawra Kuddu (HPPCL-HP)	1 to 3	U-1 (Dec., 2019) U-2 (Jan., 2019) U-3 (Jan., 2019)	111	186	270	2019-20
3	Vyasi (UJVNL-Uttarakhand)	1&2	U-1 (March., 2021) U-2 (March 2021)	74	0	0	2020-21

4	Thottiyar	1&3	U-1 (Dec., 2020) U-2 ((Dec., 2020)	40	0	0	2020-21
	Sub Total (State Sector)			325	386	542	
Private Sector							
1	Bajoli Holi (GMR-HP)	1 to 3	U-1 (June, 2020) U-2 (June, 2020) U-3 (June, 2020)	180	0	273	2020-21
2	Singoli Bhatwari (L&T-Uttarakhand)	1 to 3	U-1 (June, 2020) U-2 (June, 2020) U-3 (June, 2020)	99	0	145	2020-21
3	Sorang (HSPCL-HP)	1&2	U-1 (Dec., 2020) U-2 ((Dec., 2020)	100	0	39	2020-21
4	Rongnichu (MBPCL-Sikkim)	1&2	U-1 (Dec., 2020) U-2 ((Dec., 2020)	96	0	22	2020-21
	Sub Total (Private Sector)			475	0	479	
Grand Total				2420	2386	3863	

**SECTOR-WISE PERFORMANCE OF HYDROELECTRIC STATIONS
DURING 2019-2020 & TARGETS FOR 2020-2021**

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2021	Generation during 2019-2020 (MU)		Generation Programme for 2020-21 (MU)
		Targets	Actual	
A. CENTRAL SECTOR				
BBMB	2920.3	9470	12167.23	9600
NHPC Ltd	6251.20	24050	25779.75	24542
SJVN Ltd	1912.00	8550	9571.53	8678
NTPC Ltd	1320.00	3000	3449.67	3482
THDC Ltd	1400.00	4160	4244.93	4160
NHDC Ltd.	1520.00	2300	4165.6	2700
DVC	143.20	210	198.47	206
NEEPCO Ltd.	1500.00	4877	3051.71	4472
Sub Total	16966.70	56617	62628.89	57840
B. STATE ELECTRICITY BOARDS/CORPORATIONS				
JKSPDCL	1110.00	4815	5321.2	4915
HPPCL	406.00	716	527.42	805
HPSEBL	372.00	1760	1812.13	1602
BVPC	100.00	200	0	272
RRVUNL	411.00	610	606.18	340
PSPCL	1051.00	3765	4452.2	3805
UPJVNL	501.60	1100	1073.48	1115
UJVNL	1326.15	4196	4887.52	4410
SSNNL	1450.00	1300	4177.01	3200
GSECL	540.00	677	1237.67	754
MAHAGENCO	2406.00	3881	4157.94	3755
MPPGCL	875.00	2315	2333.42	2092
CSPGCL	120.00	250	236.79	250
APGENCO	1796.75	3162	3908.14	3174
TSGENCO	2405.60	3041	4507.04	3211
KPCL	3572.2	11497	13789.13	11468
KSEBL	1896.5	6034	5454.04	5900
TANGEDCO	2178.2	3890	4765.24	4040
JUUNL	130	110	36.12	110
OHPC	2027.5	5570	6059.2	5372
TUL	1200.00	5213	6041.55	5300
WBSEDCL	986.00	1528	1511.75	1578
APGCL	100.00	390	384.3	380
MePGCL	322.00	985	1018.29	920

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2021	Generation during 2019-2020 (MU)		Generation Programme for 2020-21 (MU)
		Targets	Actual	
Sub Total	27283.50	66805	78297.76	68768
C. PRIVATE SECTOR				
MPCL	86.00	337	369.34	344
EPPL	100.00	350	418.09	367
ADHPL	192.00	692	758.71	692
GBHPPL	70.00	250	283.58	260
HBPCL	1300.00	5381	5999.86	5407
IAEPL	36.00	157	169.75	157
AHPC LTD	330.00	1294	1540.01	1310
JPVL	400.00	1750	1998.71	1438
DLHP	34.00	36	17.09	36
GIPL	110.00	500	472.06	500
TPCL	447.00	1441	1488.27	1470
DEPL	96.00	437	406.9	408
SEPL	97.00	435	434.91	421
SNEHA KINETIC	96.00	450	485.19	460
GMR	180	0	0	273
HSPCL	100	0	0	39
L&T	99	0	0	145
MBPCL	96	0	0	22
Sub Total	3869	13510	14842.47	13749
Total All India	48119.2	136932	155769.12	140357
Import from Bhutan		6218	5794.48	
Total Hydro generation including import from Bhutan		143150	161563.6	

CHAPTER-9

RENOVATION & MODERNISATION OF HYDRO-ELECTRIC STATIONS

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

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

The state-wise list of hydro R&M schemes completed during the VIII, IX, X, XI & XII Plan is given at **Annex 9.1, 9.2, 9.3, 9.4 & 9.5** respectively.

9.3.2 Programme during 2017-22:

During 2017-22, an aggregate capacity of 9982.80 MW at 53 Hydro Electric Power Station (10 in Central Sector and 43 in State Sector) is programmed for R&M which will accrue benefit of about 5171.35 MW through Life Extension and Uprating. Out of the 53 schemes targeted for completion during 2017-22, 2 schemes in Central Sector (Ganguwal & Kotla and Dehar Power House (Unit-3)) with an aggregate installed capacity of about 213.4 MW have been completed till March, 2019 and have achieved a benefit of 48.4 MW through Life Extension. The state - wise list of hydro R&M schemes expected for completion during 2017-22 is given at **Annex 9.6**.

9.3.3 Programme during 2022-27:

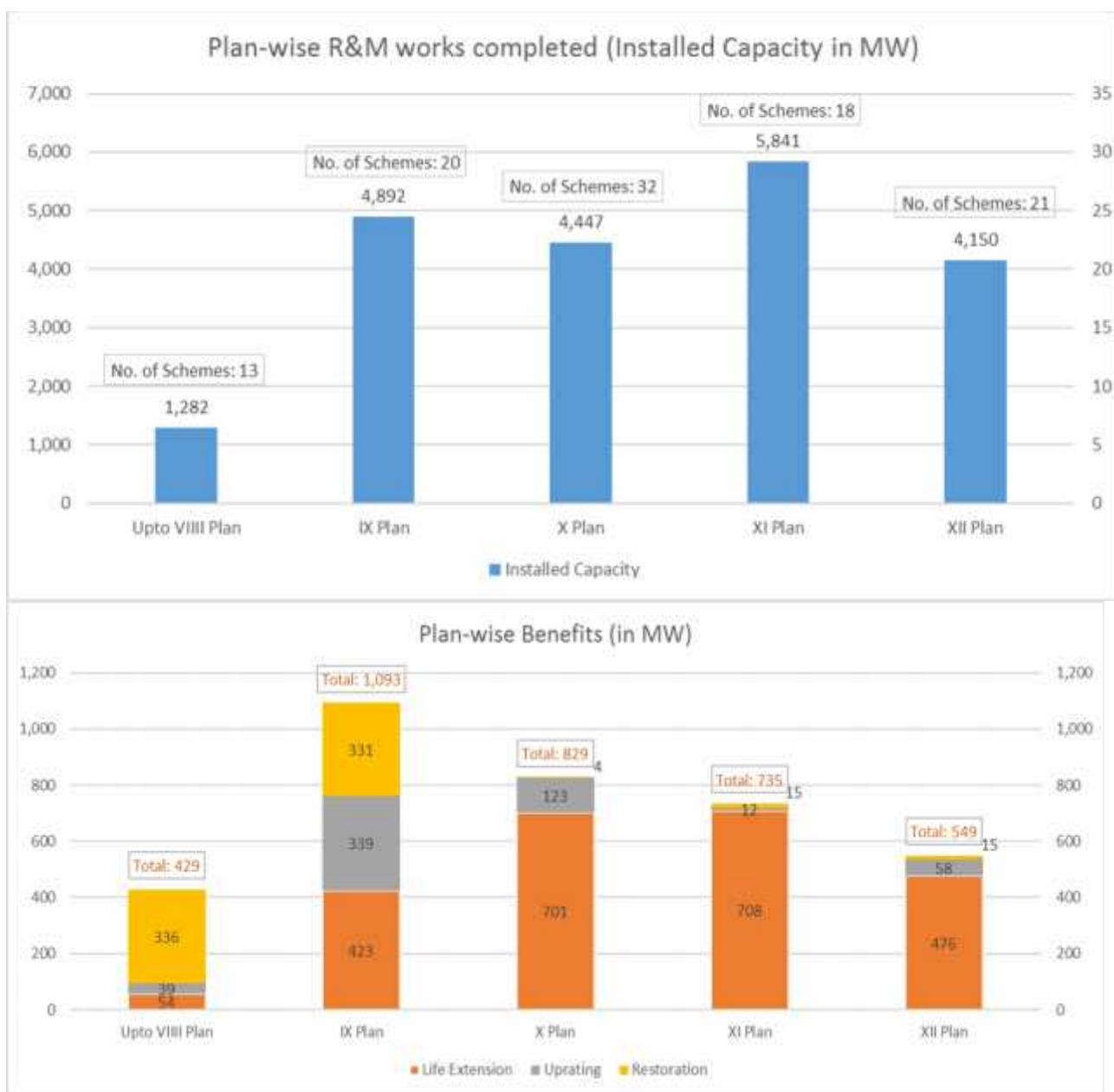
During 2022-27, an aggregate capacity of 2788 MW at 25 Hydro Electric Power Station (1 in Central Sector and 24 in State Sector) is programmed for R&M, which will accrue benefit of 2786 MW through Life Extension and Uprating. The state-wise list of hydro R&M schemes expected for completion during 2022-27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

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

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

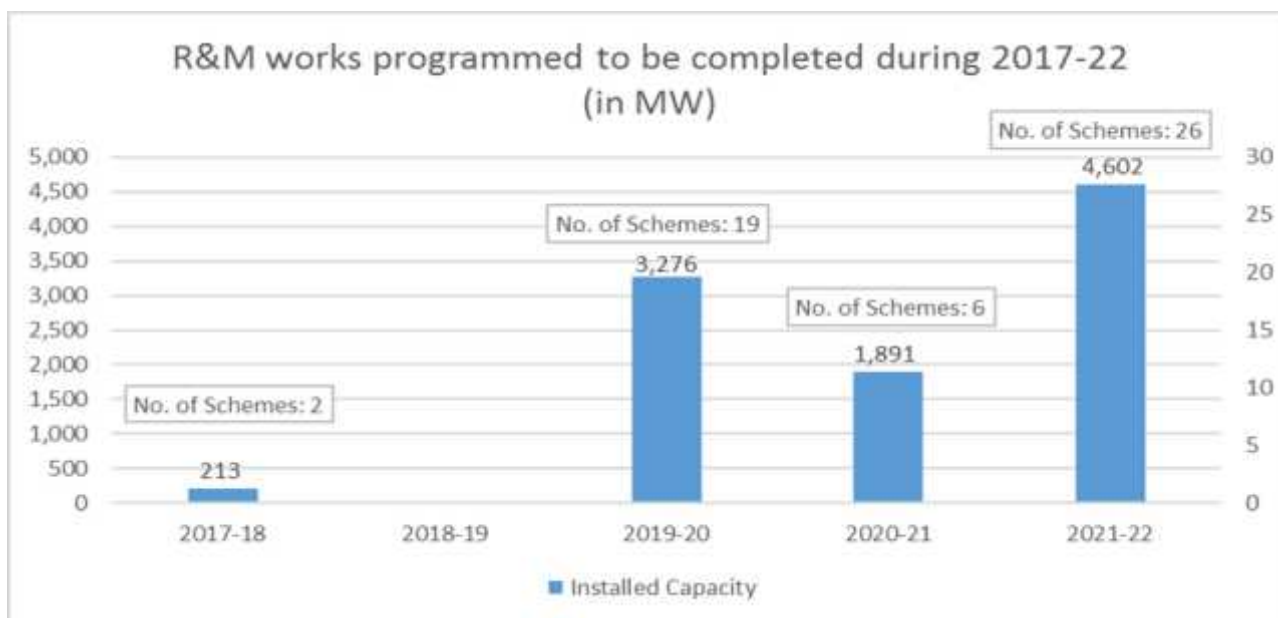
I Hydro R&M schemes completed up to XII Plan

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



II Programme of R&M works during 2017-22

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Estimated Cost (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Programmed	10	43	53	9982.80	6672.18	5171.35 [5021.65(LE) +149.7(U)]
2.	Completed	2	0	2	213.4	25.58 (Actual Cost)	48.4 (LE)
3.	Under Implementation	4	25	29	5922.1	3464.25	2549.50 [2433.30 (LE) +116.20 (U)]
4.	Under Tendering	2	15	17	2483.10	2579.67	1209.25 [1175.75 (LE) +33.5 (U)]
5.	Under DPR Preparation/ Finalisation/Approval	2	3	5	1364.20	594.20	1364.20 (LE)



III Programme of R&M works during 2022-27

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Benefit (MW)
		Central Sector	State Sector	Total		
1.	Programmed	1	24	25	2788	2786 [2728 (LE)+ 58 (U)]
2.	Under Tendering	0	2	2	96	112.00 [96 (LE)+ 16 (U)]
3.	Under DPR Preparation/Finalisation/Approval	1	7	8	865	907.00 [865 (LE) + 42 (U)]
4.	Under RLA Studies	-	15	15	1827	1767 (LE)

Abbreviations:

MW – Mega Watt;

Res. – Restoration;

U – Up-rating;

LE – Life Extension

RLA- Residual Life Assessment

9.5 **Achievement during the year 2018-19**

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

9.6 Programme for the year 2019-20

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

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

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

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Himachal Pradesh								
1	Bairasiul, NHPC	CS	3x60	25.98	25.98	18 (U)	RM&U	1991-92
2	Giri, HPSEB	SS	2x30	9.85	7.90	6 (U)	RM&U	1995-96
Punjab								
3	UBDC-I, PSPCL	SS	3x15	11.00	8.00	11 (Res)	R&M+Res.	1991-92
Uttar Pradesh								
4	Rihand, UPJVNL	SS	6x50	1.43	1.43	100(Res.)	R&M+Res.	1995-96
Karnataka								
5	Nagjhari, U-2, KPCL	SS	1x135	11.97	11.32	15 (U)	RM&U	1995-96
6	Shivasamudram, VVNL	SS	6x3 + 4x6	8.00	8.00	18 (LE)	RM&LE	N.A.
Kerala								
7	Sholayar, KSEB	SS	3x18	7.58	7.58	-	R&M	1996-97
Tamil Nadu								
8	Kadamparai (Units 3&4), TANGEDCO	SS	2x100	23.17	33.69	200(Res.)	R&M+Res.	1993-95
9	Kundah III (Units 1&2), TANGEDCO	SS	2x60	5.45	3.20	-	R&M	1991-92
10	Moyar, TANGEDCO	SS	3x12	1.62	1.30	36.00 (LE)	RM&LE	1990-91
11	Sholayar-I, TANGEDCO	SS	2x35	1.40	0.85	-	R&M	1994-95
Meghalaya								
12	Khandong, U-1, NEEPCO	CS	1x25	0.62	0.62	25 (Res)	R&M+Res.	1991-92
Tripura								
13	Gumti, TPGL	SS	3x5	17.50	17.50	-	R&M	1994-95
Total			1282	125.57	127.37	429 [39 (U) + 336 (Res) + 54(LE)]		

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

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

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Himachal Pradesh								
1	Bhakra RB BBMB	CS	5x132	88.45	90.68	125.00 (U)	RM&U	2000-01
2	Dehra U-2 BBMB	CS	1x165	10.74	10.74	25.00 (Res.)	R&M+Res.	1998-99
3	Bairasiul, NHPC	CS	3x66	18.45	18.45	-	R&M	2000-01
4	Bassi, HPSEB	SS	4x15	5.35	4.34	-	R&M	2000-01
Jammu & Kashmir								
5	Salal St.I, NHPC	CS	3x115	51.50	51.50	-	R&M	2000-01
6	Chenani, J&KSPDC	SS	5x4.66	11.00	11.00	0.93 (Res)	R&M+Res.	2000-01
Punjab								
7	Ganguwal, U-2 BBMB	CS	1x24.2	18.90	15.00	22.00 (LE)+ 2.20 (Res)	RM&LE+Res	1997-98
8	Kotla, U-3, BBMB	CS	1x24.2	18.90	16.90	22.00 (LE)+ 2.20 (Res)	RM&LE+Res	1998-99
9	Ganguwal U-3, BBMB	CS	1x24.2	25.00	43.40	22.00 (LE)+ 2.20 (Res)	RM&LE+Res	2000-01
10	Kotla U-2, BBMB	CS	1x24.2	25.00		22.00 (LE)+ 2.20 (Res)	RM&LE+Res	2001-02
Uttarakhand								
11	Chilla U-1, 3& 4, UJVNL	SS	3x36	4.25	4.11	-	R&M	1998-99
12	Tiloth, UJVNL	SS	3x30	8.02	5.51	6.00 (U)	RM&U	1998-99
Andhra Pradesh								
13	Lower Sileru, APGENCO	SS	4x115	13.35	9.30	24.00 (Res)	R&M+Res.	2001-02
14	Srisailem 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	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Orissa								
17	Hirakud-I, U1&2, OHPC	SS	2x37.5	95.10	95.10	24.00(U) +75.00(LE)	RMU&LE	1997-98
Gujarat								
18	Ukai,U-1&3, GSECL	SS	2x75	24.99	24.99	75.00 (Res.)	R&M+Res.	1997-98
Maharashtra								
19	Koyna I&II, MSPGCL	SS	4x65+ 4x75	74.91	74.91	40.00(U) + 260.00(LE)	RM&U of St-I & II & LE of St-I	1999-2000
20	Koyna III, U-10, 11 &12, MSPGCL	SS	3x80	4.65	4.65	-	R&M	1997-98
Total			4892.10	597.84	570.16	1093.03 [339.0(U) + 331.03(Res.) + 423.0(LE)]		

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

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

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Himachal Pradesh								
1	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	Nagihari, 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

(Sheet 2/3)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
14	Mani Dam, KPCL	SS	2x4.5	1.00	1.00	-	R&M	2002-03
15	Shivasamudram, VVNL	SS	6x3+ 4x6	68.38	73.17	42.00 (LE)	RM&LE	2004-05
16	Bhadra, Ph.II, KPCL	SS	1x2	3.30	2.51	2.00 (LE)	RM&LE	2005-06
17	Varahi, KPCL	SS	2x115	2.57	2.66	-	R&M	2006-07
18	Sharavathy, Ph.A, KPCL	SS	10x103.5	5.22	3.52	-	R&M	2006-07
Kerala								
19	Neriamanga-lam KSEB	SS	3x15	58.00	53.05	9.00 (U) +45.00(LE)	RMU&LE	2006-07
20	Pallivasal, KSEB	SS	3x5+ 3x7.5	94.00	371.71	37.50 (LE)	RM&LE	2002-03
21	Sengulam, KSEB	SS	4x12	114.00		48.00 (LE)	RM&LE	2002-03
22	Panniar, KSEB	SS	2x15	62.00		30.00 (LE)	RM&LE	2002-03
Tamilnadu								
23	Pykara, TANGEDCO	SS	3x6.65+1x11+2x14	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
Maharashtra								
28	Bhira Tail Race, MSPGCL	SS	2x40	1.60	0.70	-	R&M	2003-04
29	Tillari, MSPGCL	SS	1x60	4.50	4.24	6.0 (U)	RM&U	2004-05

(Sheet 3/3)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
30	Koyna Gen. Complex, MSPGCL	SS	4x70+4x80+4x80	12.00	11.50	-	R&M	2004-05
Meghalaya								
31	Umium St.I, MePGCL	SS	4x9	81.88	84.21	36(LE)	RM&LE	2002-03
32	Khandong, NEEPCO	CS	2x25	4.00	3.35	-	R&M	2003-04
Total			4446.60	1016.31	1029.24	829.08 [123.40(U) +701.25(LE) + 4.43(Res.)]		

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

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

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

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

(Sheets 2 of 2)

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

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

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

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

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

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

Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
A. Completed Schemes								
Himachal Pradesh								
1	Ganguwal (1x29.25+2x24.2) & Kotla (1x29.25+2x24.2), BBMB	CS	1x24.2 (U-2) 1x24.2 (U-3)	14.19	9.58	48.4 (LE)	RM&LE	2017-18
2	Dehar Power House (Unit-3), BBMB (6x165)	CS	1x165	19.87	16.00	-	R&M	2017-18
Sub Total (A)			213.4	34.06	25.58	48.4 (LE)		
B. Ongoing Schemes – Under Implementation								
Himachal Pradesh								
3	Salal, NHPC (6x115)	CS	5x115	58.01	51.08	-	R&M	2019-20
4	Bhakra LB, BBMB (5x108)	CS	5x108	489.77	397.08	540.00(LE)+ 90.00 (U)	RMU&LE	2020-21
5	Baira Siul, NHPC (3x60)	CS	3x60	341.41	54.33	180 (LE)	RM&LE	2020-21
6	Pong Power House, HPSEB (6x66)	CS	6x66	-	-	396 (LE)	RM&LE	2020-21
7	Bhaba Power House, HPSEB (3x40)	SS	3x40	166.17@	90.91	120 (LE)	RM&LE	2019-20
Jammu & Kashmir								
8	Chenani, J&KSPDC (5x4.66)	SS	5x4.66	39.60	24.63	23.30 (LE)	RM&LE	2019-20
9	Ganderbal, J&KSPDC (2x3+2x4.5)	SS	2x4.5	31.57	11.33	9.00 (LE)	RM&LE	2019-20
Uttarakhand								
10	Tiloth, UJVNL (3x30)	SS	3x30	384.66	12.83	90 (LE)	RM&LE	2021-22
11	Dhalipur, UJVNL (3x17)	SS	3x17	152.65	11.58	51 (LE)	RM&LE	2021-22
Uttar Pradesh								
12	Rihand, UPJVNL (6x50)	SS	6x50	132.20	105.49	300 (LE)	RM&LE	2019-20
13	Obra, UPJVNL (3x33)	SS	3x33	58.80	35.47	99 (LE)	RM&LE	2021-22

								Annex- VI
								(Sheet 2 of 4)
Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Cost (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Gujarat								
14	Ukai, GSECL (4x75)	SS	3x75 (U-1,2,&4)	7.3	4.48	-	R&M	2021-22
15	Kadana PSS, GSECL (4x60)	SS	4x60	114.37	6.18	-	R&M	2021-22
Telangana								
16	Nagarjuna Sagar Ph-II works, TSGENCO (1x110+7x100.8)	SS	1x110+7x100.8	22.17	14.34	-	R&M	2019-20
17	Nagarjuna Sagar Left Canal Power House, TSGENCO (2x30.6)	SS	2x30.6	30.99	2.00	-	R&M	2019-20
Karnataka								
18	Bhadra River Bed units, KPCL (2x12)	SS	2x12	31.05	25.25	-	R&M	2019-20
19	Munirabad Dam Power House, KPCL (2x9 + 1x10)	SS	2x9 + 1x10	4.6	-	-	R&M	2019-20
20	Nagjhari KPCL (3x150)	SS	3x150 (U-1 to 3)	222	-	-	R&M	2021-22
21	Shivasamudram, KPCL (6x3+4x6)	SS	6x3+4x6	146.41	-	42 (LE)	RM&LE	2021-22
Kerala								
22	Sholayar, KSEB (3x18)	SS	3x18	199.55	45.24	54 (LE)	RM&LE	2019-20
23	Idukki 1 st stage, KSEB (3x130)	SS	3x130	89.90	36.95	-	R&M	2019-20
Tamil Nadu								
24	Sholayar-I, TANGEDCO (2x35)	SS	2x35	90.44	42.17	70 (LE) + 14(U)	RMU&LE	2019-20
Madhya Pradesh								
25	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	21.83	-	-	R&M	2020-21
26	Bargi, MPPGCL (2x45)	SS	2x45	3.12	0.36	-	R&M	2021-22
27	Pench, MPPGCL (2x80)	SS	2x80	13.36	-	-	R&M	2021-22
28	Bansagar Ton-I, MPPGCL (3x105)	SS	3x105	4.97	-	-	R&M	2021-22

								Annex- VI
								(Sheet 3 of 4)
Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Odisha								
29	Hirakud-I OHPC (2x37.5)	SS	2x37.5 (U5&6)	158.77	68.32	75.00 (LE) + 12.2 (U)	RMU&LE	2019-20
30	Hirakud-II (Chiplima), OHPC (3x24)	SS	1x24 (U-3)	65.67	35.01	24.00 (LE)	RM&LE	2019-20
31	Balimela, OHPC (6x60)	SS	6x60	382.91	18.16	360(LE)	RM&LE	2021-22
Sub Total (B)			5922.10	3464.25	1093.19	2549.50 [2433.30(LE) + 116.20(U)]		
C. Ongoing Schemes – Under Tendering								
Himachal Pradesh								
32	Giri, HPSEB (2x30)	SS	2x30	139.8	-	60.00 (LE)	RM&LE	2020-21
33	Dehar Power House (Unit-3), BBMB (1x165)	CS	1x165	23	-	-	R&M	2019-20
Punjab								
34	Mukerin St.I, St.II, St.III & St.IV, PSPCL (3x15, 3x15, 3x19.5&3x19.5)	SS	3x15, 3x15, 3x19.5& 3x19.5	136.07	30.71	-	R&M	2019-20
35	Ranjit Sagar Dam, PSPCL (4x150)	SS	4x150	48.00	1.6	-	R&M	2020-21
36	Shanan HEP, PSPCL (1x50+4x15)	SS	1x50+ 4x15	37.81	19.71	-	R&M	2019-20
37	UBDC St.I & St.II, PSPCL (3x15+3x15.45)	SS	3x15+ 3x15.45	23.55	-	-	R&M	2019-20
38	Anandpur Sahib Hydel Project, PSPCL (4x33.5)	SS	4x33.5	43.11	-	-	R&M	2019-20
Uttarakhand								
39	Chilla Ph B UJVNL (4x36)	SS	4x36	490.56	-	144(LE)+ 12(U)	RMU&LE	2021-22
40	Ramganaga, UJVNL (3x66)	SS	3x66	455.2	-	198(LE)	RM&LE	2021-22
41	Dhakrani, UJVNL (3x11.25)	SS	3x11.25	137.31	-	33.75 (LE)	RM&LE	2021-22

								Annex- VI
								(Sheet 4 of 4)
Sl. No	Name of Project, Age Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Karnataka								
42	Kadra Dam Power House, KPCL (3x50)	SS	3x50	44.47	-	150 (LE)	RM&LE	2021-22
43	Kodasalli Dam Power House, KPCL (3x40)	SS	3x40	50.6	-	120 (LE)	RM&LE	2021-22
44	Linganamakki Dam Power House, KPCL (2x27.5)	SS	2x27.5	56.20	-	55 (LE)	RM&LE	2021-22
45	Gerusoppa Dam Power House (Sharavathy Tail Race), KPCL (4x60)	SS	4x60	59.66	-	240 (LE)	RM&LE	2021-22
Kerala								
46	Kuttiyadi, KSEB (3x25)	SS	3x25	377.41	-	75.00 (LE) + 7.5 (U)	RMU&LE	2021-22
Jharkhand								
47	Panchet, DVC (2x40)	CS	1x40 (U-1)	48.92	2.19	40(LE)+ 8(U)	RMU&LE	2021-22
Meghalaya								
48	Umium St.III, (Kyrdemkulai) MePGCL (2x30)	SS	2x30	408.00	-	60(LE) + 6(U)	RMU&LE	2021-22
Sub Total (C)			2483.10	2579.67	54.21	1209.25 [1175.75(LE) + 33.5(U)]		
D. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval								
Karnataka								
49	MGHE, KPCL (4x21.6+4x13.2)	SS	4x21.6+ 4x13.2	97.00	-	139.2 (LE)	RM&LE	2021-22
50	Supa Dam Power House, KPCL (2x50)	SS	2x50	47.91	-	100 (LE)	RM&LE	2021-22
51	Sharavathy Generating Station, KPCL (10x103.5)	SS	10x103.5	196.56	11.07	1035 (LE)	RM&LE	2021-22
West Bengal								
52	Maithon, DVC (2x20+1x23.2)	CS	2x20 (U-1&3)	56.03	7.76	40.00 (LE)	RM&LE	2021-22
Assam								
53	Khandong Power Station, NEEPCO (2x25)	CS	2x25	196.7	12.71	50 (LE)	RM&LE	2021-22
Sub Total (D)			1364.20	594.20	31.54	1364.20(LE)		
Total (A+B+C+D)			9982.80	6672.18	1204.52	5171.35 [5021.65(LE) +149.7(U)]		

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

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

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

Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
A. Ongoing Schemes – Under Tendering								
Tamil Nadu								
1	Moyar PH, TANGEDCO (3x12)	SS	3x12	67.05	-	36(LE)+ 6(U)	RMU&LE	2023-24
2	Kodayar PH-I, TANGEDCO (1x60)	SS	1x60	88.48	-	60 (LE)+ 10 (U)	RMU&LE	2022-24
Sub Total(A)			96	155.53	-	112.00		
B. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval								
Jammu & Kashmir								
3	Lower Jehlum HEP, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)+ 27 (U)	RMU&LE	2022-27
4	USHP-II Kangan, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)	RM&LE	2022-27
Uttarakhand								
5	Chibro, UJVNL (4x60)	SS	4x60	184.88	-	240(LE)	RM&LE	2025-26
6	Khodri PH-II UJVNL (4x30)	SS	4x30	169.63	-	120(LE)	RM&LE	2025-26
7	Kulhal, UJVNL (3x10)	SS	3x10	115.24	-	30(LE)	RM&LE	2023-24
Andhra Pradesh								
8	Machkund St.I & St.II, APGENCO (3x17+3x23)	SS	3x17+ 3x23	400	-	120 (LE) + 9 (U)	RMU&LE	2025-26
Tamil Nadu								
9	Kodayar PH-II, TANGEDCO (1x40)	SS	1x40	-	-	40.0(LE)+ 6(U)	RMU&LE	2025-26
Manipur								
10	Loktak, NHPC (3x35)	CS	3x35	236.07	-	105 (LE)	RM&LE	2022-23
Sub Total(B)			865	-	-	907.00 [865(LE)+ 42(U)]		
C. Ongoing Schemes – Under RLA Studies								
Tamil Nadu								
11	Kundah-I, TANGEDCO (3x20)	SS	3x20	-	-	60 (LE)	RM&LE	2022-27
12	Kundah-II, TANGEDCO (5x35)	SS	5x35	-	-	175 (LE)	RM&LE	2022-27

(Sheet 2 of 2)								
Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
13	Kundah-III, TANGEDCO (3x60)	SS	3x60	-	-	180 (LE)	RM&LE	2022-27
14	Kundah-IV, TANGEDCO (2x50)	SS	2x50	-	-	100 (LE)	RM&LE	2022-27
15	Kundah-V, TANGEDCO (2x20)	SS	2x20	-	-	40 (LE)	RM&LE	2022-27
16	Mettur Tunnel, TANGEDCO (4x50)	SS	4x50	-	-	200 (LE)	RM&LE	2022-27
17	Sarkarpathy, TANGEDCO (1x30)	SS	1x30	-	-	30 (LE)	RM&LE	2022-27
18	Sholayar-II, TANGEDCO (1x25)	SS	1x25	-	-	25 (LE)	RM&LE	2022-27
19	Suruliyar, TANGEDCO (1x35)	SS	1x35	-	-	35 (LE)	RM&LE	2022-27
20	Kadamparai, PH TANGEDCO (4x100)	SS	4x100	-	-	400 (LE)	RM&LE	2022-27
21	Aliyar, TANGEDCO (1x60)	SS	1x60			60 (LE)	RM&LE	2022-27
Kerala								
22	Idukki 2 nd stage, KSEB (3x130)	SS	3x130	-	-	390 (LE)	RM&LE	2022-27
Andhra Pradesh								
23	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	100	-	36 (LE)	RM&LE	2025-26
24	Hampi Canal PH, APGENCO (4x9)	SS	4x9	100	-	36 (LE)	RM&LE	2025-26
Meghalaya								
25	Umiam-umtru Stage-IV, MePGCL (2x30)	SS	2x30	-	-	-	R&M	2022-27
Sub Total(C)			1827	-	-	1767		
Total (A+B+C)			2788	-	-	2786 [2728 (LE)+ 58(U)]		

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

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

Abbreviations

1	APGENCO	Andhra Pradesh Generation Corporation
2	BBMB	Bhakra Beas Management Board
3	DVC	Damodar Valley Corporation
4	GSECL	Gujarat State Electricity Corporation Ltd.
5	HPSEB	Himachal Pradesh State Electricity Board
6	J&KSPDC	Jammu & Kashmir State Power Development Corpn.
7	JSEB	Jharkhand State Electricity Board.
8	KPCL	Karnataka Power Corporation Ltd.
9	KSEB	Kerala State Electricity Board
10	MSPGCL	Maharashtra State Power Generation Corporation Ltd.
11	MePGCL	Meghalaya Power Generation Corporation Ltd.
12	MPPGCL	Madhya Pradesh Power Generation Corporation Ltd.
13	NEEPCO	North-East Electric Power Corporation
14	OHPC	Odisha Hydro Power Corporation
15	PSPCL	Punjab State Power Corporation Ltd.
16	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Ltd.
17	TANGEDCO	Tamil Nadu Generation and Distribution Corporation Ltd.
18	TSGENCO	Telangana State Power Generation Corporation
19	UPJVNL	Uttar Pradesh Jal Vidyut Nigam Ltd.
20	UJVNL	Uttarakhand Jal Vidyut Nigam Ltd.
21	VVNL	Vishwesharayya Vidyut Nigam Ltd.
22	WBSEDCL	West Bengal State Electricity & Distribution Company Ltd.
23	AVR	Automatic Voltage Regulator
24	BOQ	Bill of Quantity
25	CERC	Central Electricity Regulatory Commission
26	CPRI	Central Power Research Institute
27	DPR	Detailed Project Report
28	DVR	Digital Voltage Regulator
29	JICA	Japan International Co-operation Agency
30	LOA	Letter of Award
31	RLA	Residual Life Assessment

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) (%)

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

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) (%)

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

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

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

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

- Low reservoir level/poor inflow
- Transmission line faults/constraints
- Excess weeding/silting
- No/reduced system demand
- Too high tail water level
- No irrigation demand
- Grid disturbance/failure
- Reserve shutdown/spinning reserve

- f) **Design Energy:** The quantum of energy which could be generated in a 90% dependable year with 95% availability of installed capacity of the generating station.
- g) **Targeted Energy:** Estimated energy generation during the year based on the likely rainfall data, storage position of the reservoirs and past records of energy generation etc.
- h) **Full Reservoir Level (FRL):** The maximum level up to which the water could normally be stored in the reservoir for conservation and regulation for power generation.
- i) **Minimum Draw Down Level (MDDL):** The minimum level up to which the reservoir could be depleted under normal operating conditions.
- j) **Types of H.E. Scheme:** The H.E. Schemes have been classified into following four categories:
- Run-of-River without pondage
 - Run-of River with pondage
 - Storage Schemes
 - Purely power
 - Multipurpose projects
 - Pumped Storage Schemes

10.2 Abbreviations

MW	Mega Watt	(10 ⁶ Watts)
KWH	Kilo Watt hour (1 unit)	(10 ³ Watts-hrs)
MU	Million Units	(10 ⁶ Units)
MCM	Million Cubic Meters	(10 ⁶ Cu.M.)
FRL	Full Reservoir Level	
MDDL	Minimum Draw Down Level	
HRT	Head Race Tunnel	
F.O.	Forced Outage	
P.M.	Planned Maintenance	

Abbreviations of Agencies

Northern Region			
1	Himachal Pradesh	ADHPL	Allain Duhangan Hydro Power Limited
		EPPL	Everest Power Private Limited
		GBHPPL	Greenko Budhil Hydro Power Pvt. Limited
		HBPCL	Himachal Baspa Power Company Limited
		HPSEB Limited	Himachal Pradesh State Electricity Board Limited
		HPPCL	Himachal Pradesh Power Corporation Limited
		BVPC Limited	Beas Valley Power. Corp. Ltd. (BVPC)
		MPCL	Malana Power Company Limited
		NHPC Limited	National Hydro Power Corporation Limited
		NTPC Limited	National Thermal Power Corporation Limited
		SJVN Limited	Satluj Jal Vidyut Nigam Limited
2	Jammu & Kashmir	JKSPDC	J&K State Power Development Corporation.
3	Punjab	BBMB	Bhakra Beas Management Board
		PSPCL	Punjab State Power Corporation Limited
4	Rajasthan	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Limited
5	Uttar Pradesh	UPJVNL	Uttar Pradesh Jal Vidyut Nigam Limited
6	Uttarakhand	THDC	Tehri Hydro Development Corporation
		UJVNL	Uttarakhand Jal Vidyut Nigam Limited
		JPPVL	Jaiprakash Power Pvt. Venture Limited
		AHPC	Alaknanda Hydro Power Company
Western Region			
1	Gujarat	GSECL	Gujarat State Electricity Corporation Limited
		SSNNL	Sardar Sarovar Narmada Nigam Limited
2	Madhya Pradesh	MPPGCL	Madhya Pradesh Power Generation Co. Limited
		NHDC	Narmada Hydroelectric Development Co. Limited
3	Chhatisgarh	CSPGCL	Chhatisgarh State Power Generation Co. Limited
4	Maharashtra	DLHPPL	Dodson-Lindblom Hydro Power Private Limited
		MSPGCL	Maharashtra State Power Generating Co. Limited
		TPCL	Tata Power Company Limited
Southern Region			
1	Andhra Pradesh	APGENCO	Andhra Pradesh Power Generation Corporation Ltd.
2	Karnataka	KPCL	Karnataka Power Corporation Limited

3	Kerala	KSEBL	Kerala State Electricity Board Limited
4	Telangana	TSGENCO	Telangana State Power Generation Corporation Ltd.
5	Tamil Nadu	TANGEDCO	Tamil Nadu Generation & Distribution Co. Limited
Eastern Region			
1	Jharkhand	JUUNL	Jharkhand Urja Utpadan Nigam Limited
		DVC	Damodar Valley Corporation
2	Odisha	OHPC	Odisha Hydro Power Corporation
3	Sikkim	GIPL	Gati Infrastructure Pvt. Limited
		DEPL	Dans Energy Private Limited
		TUL	Teesta Urja Limited
		SKPPPPL	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