



भारत सरकार
Government of India

विद्युत मंत्रालय
Ministry of Power

केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority

जल विद्युत गृहों के निष्पादन का पुनर्विलोकन-2020-21

REVIEW OF PERFORMANCE OF HYDRO POWER STATIONS 2020-21

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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HYDRO POWER STATIONS 2020-21

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

नई दिल्ली
NEW DELHI
सितम्बर, 2023
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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, 2021 there were 720 HE generating units installed in 209 Hydro-Electric Stations with an aggregate installed capacity of 46209.20 MW in operation. Performance of 44 important Reservoir based schemes has also been discussed separately in the report.

1.2 Region-wise summary of the existing HE Stations in operation with installed capacity above 25 MW as on 31.3.2021 in the country vis-à-vis that on 31.3.2020 is given below in **Table S-1**.

TABLE S-1

**REGION-WISE SUMMARY OF HYDRO-ELECTRIC STATIONS
(2020-21 VIS-A-VIS 2019-20)**

Region	No of Stations as on		No of Units as on		Capacity (MW) as on	
	31.03.21	31.03.20	31.03.21	31.03.20	31.03.21	31.03.20
Northern	73	71	251	245	19233.27	19023.25
Western	28	28	101	101	7392	7392.00
Southern	70	70	247	246	11694.5	11694.50
Eastern	24	24	85	84	5862.45	5862.45
N-Eastern	14	14	36	36	2027	1727.00
All India	209	207	720	712	46209.22	45699.20

1.3 The report contains outage data of 209 H.E. Stations (above 25 MW) covering 720 units and having an aggregate installed capacity of 46209.20 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 2020-21).

1.5 This review covers information in respect of renovation & modernization, uprating and life extension of HE stations in the country for the year 2020-21, achievements during the year 2020-21 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 2019-20
9	Renovation & Modernisation of Hydro-Electric Power Projects
10	Definitions and Abbreviations

2.0 Generation Performance

The generation from the hydro electric power stations in the country during 2020-21 was 150299.52 MU (excluding import from Bhutan), which was about 3.5 % lower than the generation during 2019-20 and about 7.08 % higher than the generation targets for 2020-21.

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
(2020-21 VIS-A-VIS 2019-20)

Utilities	Installed Capacity (MW) (As on 31.03.2021)	Energy Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2020-21	2019-20	2020-21	2019-20	2020-21	2019-20
CENTRAL SECTOR							
BBMB	2920.2	9600.00	9470	11478	12167.23	19.56	28.48
NHPC LTD	5451.1	24542	24050	24084.69	25779.75	-1.86	7.19
SJVNLTD	1912.2	8678	8550	9094.35	9571.53	4.80	11.95
NTPC LTD	800	3482	3000	3221.41	3449.67	-7.48	14.99
THDC LTD	1400	4160	4160	4261.72	4244.93	2.45	2.04
NHDC LTD	1520	2700	2300	4236.17	4165.6	56.90	81.11
DVC	143.2	206	210	365.47	198.47	77.41	-5.49
NEEPCO LTD	1500	4472	4877	3881.89	3051.71	-13.20	-37.43
SUB TOTAL	15646.72	57840	56617	60623.7	62628.89	4.81	10.62

Utilities	Installed Capacity (MW) (As on 31.03.2021)	Energy Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2020-21	2019-20	2020-21	2019-20	2020-21	2019-20
PRIVATE SECTOR							
MPCL	86	157	337	334.88	369.34	113.30	9.60
EPPL	100	367	350	370.47	418.09	0.95	19.45
ADHPL	192	692	692	640.53	758.71	-7.44	9.64
GBHPPL	70	260	250	275.95	283.58	6.13	13.43
JSW ENERGY	1300	5407	5381	5672.61	5999.86	4.91	11.50
IAEPL	36	273	157	159.35	169.75	-41.63	8.12
AHPC LTD	330	1310	1294	1438	1540.01	9.77	19.01
JPVL	400	1438	1750	1778.42	1998.71	23.67	14.21
DLHP	34	36	36	34.29	17.09	-4.75	-52.53
GIPL	110	500	500	488.37	472.06	-2.33	-5.59
TPCL	447	1470	1441	1524.7	1488.27	3.72	3.28
DEPL	96	408	437	399.92	406.9	-1.98	-6.89
SEPL	97	421	435	369.75	434.91	-12.17	-0.02
SNEHA KINETIC	96	460	450	458.95	485.19	-0.23	7.82
NTPGPL	0	344	0	0	0	0.00	0.00
HSPPL	0	0	0	0	0	0.00	0.00
L&T	99	145	0	0	0	0.00	0.00
GMR	0	39	0	0	0	0.00	0.00
MBPC	0	22	0	0	0	0.00	0.00
SUB TOTAL	3493	13749	13510	13946.19	14842.47	1.43	9.86
STATE SECTOR							
JKSPDCL	1110	4915	4815	4940.83	5321.2	0.53	10.51
HPPCL	406	805	716	437.76	527.42	-45.62	-26.34
HPSEBL	372	1602	1560	1564.35	1812.13	-2.35	16.16
BVPC	0	272	200	0	0	-100.00	-100.00
RRVUNL	411	340	610	469.63	606.18	38.13	-0.63
PSPCL	1051	3805	3765	3951	4452.2	3.84	18.25
UPJVNL	501.6	1115	1100	1572.35	1073.48	41.02	-2.41
UJVNL	1252.15	4410	4196	4487.97	4887.52	1.77	16.48
SSNNL	1450	3200	1300	3245.24	4177.01	1.41	221.31
GSECL	540	754	677	988.12	1237.67	31.05	82.82
MAHAGENCO	2406	3755	3881	3574.57	4157.94	-4.81	7.14
MPPGCL	875	2092	2315	2656.06	2333.42	26.96	0.80
CSPGCL	120	250	250	419.19	236.79	67.68	-5.28

Utilities	Installed Capacity (MW) (As on 31.03.2021)	Energy Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2020-21	2019-20	2020-21	2019-20	2020-21	2019-20
APGENCO	1796.75	3174	3162	4129.94	3908.14	30.12	23.60
TSGENCO	2405.6	3211	3041	3645.38	4507.04	13.53	48.21
KPCL	3572.2	11468	11497	12403.59	13789.13	8.16	19.94
KSEBL	1856.5	5900	6034	6628.39	5454.04	12.35	-9.61
TANGEDCO	2178.2	4040	3890	5212.71	4765.24	29.03	22.50
JUUNL	130	110	110	50	36.12	-54.55	-67.16
OHPC	2027.5	5372	5570	6193.91	6059.2	15.30	8.78
TUL	1200	5300	5213	6043.98	6041.55	14.04	15.89
WBSEDCL	986	1578	1528	1759.64	1511.75	11.51	-1.06
APGCL	100	380	390	203.03	384.3	-46.57	-1.46
MePGCL	322	920	985	1151.99	1018.29	25.22	3.38
SUB TOTAL	27069.5	68768	66805	75729.63	78297.76	10.12	17.20
ALL INDIA	46209.22	140357	136932	150299.52	155769.12	7.08	13.76

During the year 2020-21, overall hydro generation was more than the target in respect of BBMB, NHPC Ltd, SJVNL, NTPC, THDC, & NHDC LTD in Central Sector and MPCL, EPPL, ADHPL, GBHPPL, JSW ENERGY, IAEPL, AHPCL, JPVL, TPCL & 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, MPPGCL, MAHAGENCO, GSECL, 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 2020-21 is given in **Table S-3 & S-4**. It is seen that there was excess generation as compared to target in State Sector & Private Sector. The overall generation of Central Sector hydro stations remained below the targets.

TABLE S-3

**SECTOR-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS
(2020-21 VIS-A-VIS 2019-20)**

Sector	Installed Capacity (MW) (As on 31.03.2021)	Energy Generation (MU)					
		Target		Actual		Surplus (+)/ Deficit(-)in %	
		2020-21	2019-20	2020-21	2019-20	2020-21	2019-20
Central	15646.72	57840.00	56617	60623.70	62628.89	4.81	9.59
State	27069.50	68768.00	66805	75729.63	78297.76	10.12	17.20
Private	3493.00	13749.00	13510	13946.19	14842.47	1.43	9.86
Total	46209.22	140357.00	136932	150299.52	155769.1	7.08	13.76

TABLE S-4

**REGION-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS
(2020-21 VIS-A-VIS 2019-20)**

Sector	Installed Capacity (MW) (As on 31.03.2021)	Energy Generation (MU)					
		Target		Actual		Surplus (+)/ Deficit(-)in %	
		2020-21	2019-20	2020-21	2019-20	2020-21	2019-20
Northern	19233.27	73243	71513	75233.86	80556.95	2.72	11.22
Western	7392	14257	12200	16678.34	17813.79	16.98	46.01
Southern	11694.5	27293	27124	31353.95	31754.02	14.88	17.06
Eastern	5862.45	19192	19243	21174.84	20823.47	10.33	8.21
North Eastern	2027	6372	6852	5858.53	4820.89	-8.06	-29.64
Total	46209.22	140357	136932	150299.52	155769.1	7.08	13.75

3.0 Outage Analysis

For outage data analysis during 2020-21, outage data of 209 H.E. Stations (above 25 MW capacity) covering 720 units and having an aggregate installed capacity of 46209.22MW made available by various utilities have been considered for the purpose of this Review. Region-wise details of these 209 hydro power stations are given below in **Table S-5**.

TABLE S-5

**REGION-WISE SUMMARY OF HE STATIONS ANALYSED
(2020-21 VIS-A-VIS 2019-20)**

Region	No. of Stations		No. of Units		Capacity(MW) as on	
	2020-21	2019-20	2020-21	2019-20	2020-21	2019-20
Northern	73	71	251	245	19233.27	19023.25
Western	28	28	101	101	7392	7392.00
Southern	70	70	247	246	11694.5	11694.50
Eastern	24	24	85	84	5862.45	5862.45
North Eastern	14	14	36	36	2027	1727.00
All India	209	207	720	712	46209.22	45699.20

3.1 Planned Maintenance

The number of H.E. Stations falling under various ranges of non-availability due to planned maintenance during the year 2020-21 vis-à-vis 2019-20 is summarized below in **Table S-6**.

TABLE S-6

**NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2020-21 VIS-A-VIS 2019-20)**

% Non-Availability due to planned maintenance	2020-21				2019-20			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	158	76.33	34696.37	75.09	157	76.59	33471.32	73.24
>5 to 10	27	12.08	6465.20	13.99	28	13.66	7615.20	16.66
>10 to 15	9	4.35	1530.15	3.31	8	3.90	2015.00	4.41
>15 to 20	4	1.93	1550	3.35	4	1.95	1006.00	2.20
>20 to 25	1	0.48	304	0.66	1	0.49	32.00	0.07
>25 to 30	5	2.42	938.50	2.06	3	1.46	685.50	1.50
above 30	5	2.42	725	1.57	4	1.95	874.20	1.91
Total	209	100.00	46209.22	100.00	205	100.00	45699.20	100.00

It could be seen from above that 158 nos. (76.33% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2020-21 as compared to 157 nos. (76.59% of total) during 2019-20.

Non-availability due to planned maintenance was more than 30% at 5 nos. (2.42% of total) H.E. Stations during 2020-21 and which is similar to 2019-20. The details of these stations for 2020-21 is given below in **Table S-7**.

TABLE S-7
H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE
FOR THE PERIOD: (2020-21)

Sl. No	Name of Station/ Utility	Capacity (MW)	N.A. due to P.M.*(%)	Remarks
1	CHAMERA-II HPS / NHPC	300.0	38.517	GENERATOR
2	KHONDONG HPS / NEEPCO.	50.0	60.167	ANNUAL MAINTENANCE
3	NARIAMANGLAM HPS / KSEB	52.65	33.333	ANNUAL MAINTENANCE
4	PYKARA ULTIMATE HPS / TANGEDCO	150.0	33.333	ANNUAL MAINTENANCE

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

23.68% of stations had operational availability lower than 95% on account of planned maintenance. These utilities, therefore, need to improve their O&M practices to bring down their total outages.

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

The duration of various types of periodic planned maintenance varied considerably from station to station. Details of average time taken for various types of maintenance are given in **Table S-8**.

TABLE S-8

**AVERAGE DURATION OF VARIOUS TYPES OF PLANNED
MAINTENANCE FOR THE PERIOD: (2020-21)**

Sl. No	Type of Planned maintenance	Average duration at any unit (hrs.)
1	ANNUAL MAINTENANCE	814.85
2	AUXILIARY SYSTEM	28.1
3	CAPITAL/3 YEARLY MTCE.	578.04
4	GENERATOR	819.55
5	INSPECTION /MTCE	11.7
6	MONTHLY MAINTENANCE	68.63
7	OTHER EQUIPMENT	552.64
8	RENOVATION/MODERNISATION	2953.03
9	ROUTINE MAINTENANCE	11.4
10	TURBINE	426.28
11	MISCELLANEOUS	390.55

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 2020-21 vis-à-vis 2019-20 is given below in **Table S-9**.

TABLE S-9

**DURATION OF PLANNED MAINTENANCE FOR GENERATOR,
TURBINE & OTHER EQUIPMENTS
(2020-21 vis-à-vis 2019-20)**

S. No.	Equipments	Duration			
		Maximum Hours for any unit		Average Hours	
		2020-21	2019-20	2020-21	2019-20
1	Generator	5271.93	1704.50	819.55	218.01
2	Turbine	4313.53	1042.50	426.28	96.83
3	Other Equipment	2167.62	271.65	552.64	131.18

It could be seen that the average hours utilized for carrying out various repairs increased for generator and turbine during 2020-21 as compared to 2019-20.

3.2 Forced Outages

The summary of forced outages caused due to break-down of generator, turbine and other equipment during 2020-21 vis-à-vis 2019-20 is given below in **Table S-10**.

TABLE S-10

**FORCED OUTAGES DUE TO GENERATOR, TURBINE & OTHER
EQUIPMENT FAULTS
(2020-21 vis-à-vis 2019-20)**

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage	
		2020-21	2019-20	During 2020-21	Increase/ Decrease vis-à-vis 2019-20
1	Generator	29383.71	23707.50	16.92	-23.94
2	Turbine	77437.71	39167.28	44.60	-97.71
3	Civil Structure	45016.77	12578.78	25.92	-257.88
4	Other Equipment	21805.83	16290.07	12.56	-33.86
	Total	173644.02	91743.63	100.00	-89.27

It is observed that forced outages in 2020-21 vis-à-vis 2019-20 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 2020-21 is summarized below in **Table S-11**.

TABLE S-11
OPERATING AVAILABILITY OF H.E. STATIONS
PERIOD: 2020-21

OPERATING AVAILABILITY (%)	NO. OF STATIONS	% OF TOTAL STATIONS	INSTALLED CAPACITY (MW)	% OF TOTAL INSTALLED CAPACITY
≥95%	137	66.18	30471.37	65.94
>90 to 95	29	13.04	7826.80	16.94
>85 to 90	13	6.28	1932.55	4.18
>80 to 85	8	3.86	2504.00	5.42
< 80	22	10.63	3474.50	7.52
Total	209	100.00	46209.22	100.00

Operating availability of 30 nos. HE stations (14.49% of total HE Stations) was below 85% (5978.5 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 2020-21 is indicated below in **Table S-12**

TABLE S-12
AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2020-21

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AVAILABILITY
1	Northern	251	19233.27	5.55	1.66	92.79
2	Western	101	7392	0.97	4.57	94.46
3	Southern	246	11694.5	2.73	3.15	94.12
4	Eastern	84	5862.45	5.63	1.74	92.63
5	North Eastern	38	2027	7.8	14.86	77.34
	All India	720	46209.22	4.06	3.27	92.68

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

Generating units installed in North Eastern Region accounted for maximum non-availability due to planned maintenance (7.8%) whereas generating units installed in Western Region accounted for the least non-availability due to planned maintenance (0.97%) as indicated in **Table S-12** above.

3.4 General Overview

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

OVERVIEW

YEAR	INSTALLED CAPACITY	GENERATION			UNITS ANALYSED		PM	FO	OP.AV
	(MW)	TARGET (MU)	ACTUAL (MU)	VARIA- TION (%)	Nos.	CAP (MW)	%	%	%
2020-21	46209.22	140357	150299.52	(+)7.08	720	46209.22	4.06	3.27	92.68
2019-20	45699.20	136932	155769	(+)13.75	712	45699.20	4.12	1.91	93.97
2018-19	45399.22	130000	134894	(+)3.76	710	45399.22	5.85	2.87	91.28
2017-18	45293.42	141400	126122	(-)10.20	712	45293.42	5.54	3.17	91.29
2016-17	44478.42	134000	122378	(-)7.67	695	44478.42	6.43	3.33	90.24
2015-16	42783.42	128000	121377	(-)5.17	676	42783.42	7.21	4.86	87.93
2014-15	41262.42	124267	129244	(+)3.98	659	41262.42	7.21	4.30	88.49
2013-14	40531.41	122263	134848	(+)10.29	653	40531.41	5.97	5.55	88.48
2012-13	39491.40	122045	113720	(-)6.82	634	39491.40	7.56	3.27	89.17
2011-12	38990.40	112050	130510	(+)16.47	620	38990.40	7.43	4.48	88.09
2010-11	37567.40	111352	114257	(+)2.61	609	37567.40	7.23	3.94	88.83
2009-10	36863.40	115468	103916	(-)10.00	589	36203.40	6.19	2.90	90.91

CHAPTER-1

HYDRO-ELECTRIC POTENTIAL AND DEVELOPMENT

CHAPTER-1

HYDRO-ELECTRIC POTENTIAL AND DEVELOPMENT

1.1 Hydro-electric Potential

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

As on 31.03.2021, H.E. Schemes having total installed capacity of 41423.6 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 11093.5 MW (7.63%), (excluding PSS of 1580 MW). As such, about 63.86% 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 31.03.2021)

Region/ State	Identified Capacity as per reassessment study (MW)		Capacity Developed		Capacity Under construction		Capacity yet to be developed	
	Total (MW)	Above 25 MW	(MW)	(%)	(MW)	(%)	(MW)	(%)
NORTHERN								
Jammu & Kashmir	14146	13543	3360.0	29.05	2559.50	22.13	5647.5	48.82
Ladhak	2377	2046	89.0	4.35	0.00	0.00	1957.0	95.65
Himachal Pradesh	18820	18540	9920.0	53.71	2224.00	12.04	6326.0	34.25
Punjab	971	971	1096.3	100	206.00	21.22	0.0	0.00
Haryana	64	64	0.0	0	0.00	0.00	0.0	0.00
Rajasthan	496	483	411.0	85.09	0.00	0.00	0.0	0.00
Uttarakhand	18175	17998	3855.4	21.42	1391.00	7.73	12751.7	70.85
Uttar Pradesh	723	664	501.6	75.54	0.00	0.00	162.4	24.46
Sub Total(NR)	53395	52263	19233.3	36.80	6380.5	12.2	26649.3	50.99
WESTERN								
Madhya Pradesh	2243	1970	2235.0	100	400.00	20.30	0.0	0.00
Chhattisgarh	2242	2202	120.0	5.45	0.00	0.00	2082.0	94.55
Gujarat	619	590	550.0	100	0.00	0.00	0.0	0.00
Maharashtra	3769	3314	2647.0	79.87	0.00	0.00	667.0	20.13

Region/ State	Identified Capacity as per reassessment study (MW)		Capacity Developed		Capacity Under construction		Capacity yet to be developed	
	Total (MW)	Above 25 MW	(MW)	(%)	(MW)	(%)	(MW)	(%)
Goa	55	55	0.0	0.00	0.00	0.00	55.0	100.00
Sub Total (WR)	8928	8131	5552.0	68.28	400.00	4.92	2179.0	26.80
SOUTHERN								
Andhra Pradesh	2366	2341	1610.0	49.37	960.00	29.44	691.0	21.19
Telangana	2058	2019	800.0	72.79	0.00	0.00	299.0	27.21
Karnataka	6602	6459	3644.2	56.42	0.00	0.00	2814.8	43.58
Kerala	3514	3378	1856.5	54.96	100.00	2.96	1421.5	42.08
Tamil Nadu	1918	1693	1778.2	100	0.00	0.00	0.0	0.00
Sub Total (SR)	16458	15890	9688.9	60.97	1060.00	6.67	5141.1	32.35
EASTERN								
Jharkhand	753	582	170.0	29.21	0.0	0.0	412.0	70.79
Bihar	70	40	0.0	0.00	0.0	0.0	0.0	0.00
Odisha	2999	2981	2142.3	71.86	0.0	0.0	838.8	28.14
West Bengal	2841	2829	441.2	15.60	120.0	4.2	2267.8	80.16
Sikkim	4286	4248	2169.0	51.06	1133.0	26.7	946.0	22.27
Sub Total (ER)	10949	10680	4922.5	46.09	1253.0	11.7	4504.6	42.18
NORTH EASTERN								
Meghalaya	2394	2298	322.0	14.01	0.00	0.00	1976.0	85.99
Tripura	15	0	0.0	0.00	0.00	0.00	0.0	0.00
Manipur	1784	1761	105.0	5.96	0.00	0.00	1656.0	94.04
Assam	680	65	350.0	53.85	0.00	0.00	300.0	46.15
Nagaland	1574	1452	75.0	5.17	0.00	0.00	1377.0	94.83
Arunachal Pradesh	50328	50064	1115.0	2.23	2000.00	3.99	46949.0	93.78
Mizoram	2196	2131	60.0	2.82	0.00	0.00	2071.0	97.18
Sub Total (NER)	58971	58356	2027.0	3.47	2000.00	3.43	54329.0	93.10
ALL INDIA	148701	145320	41423.6	28.51	11093.50	7.63	92802.9	63.86

Note:- In addition, 9 PSS of 4785.60 MW capacity are in operation, 3 PSS of 1580 MW capacity are under construction, 1 PSS of 1000 MW capacity is concurred by CEA, 8 PSS of 7530 MW capacity are under S&I and 1 PSS of 660 MW capacity is under held-up list .

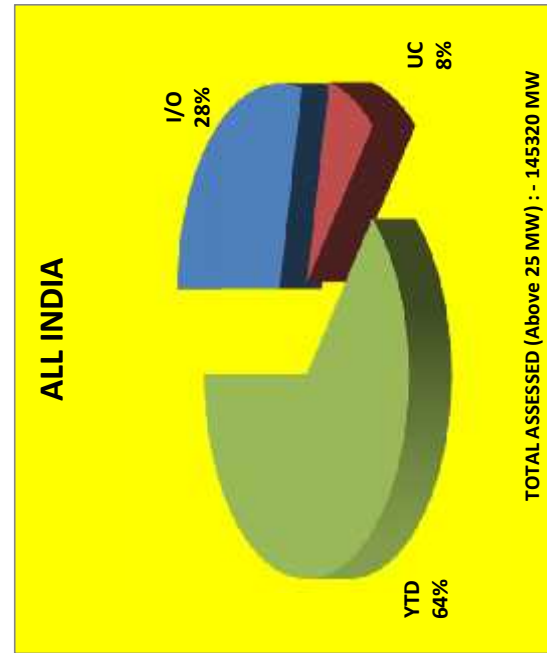
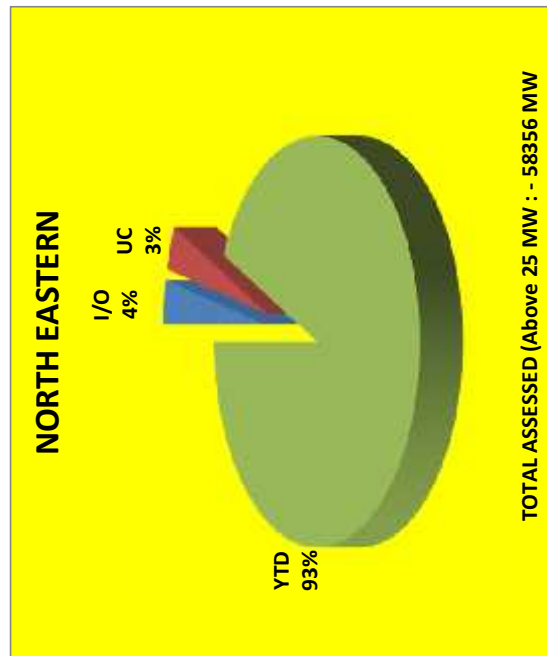
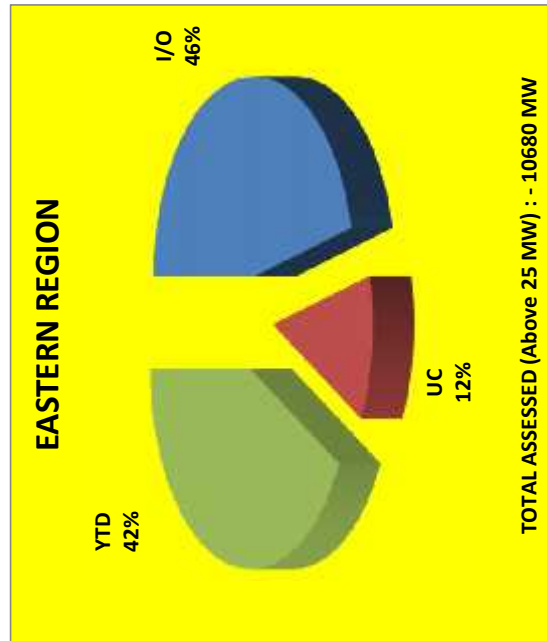
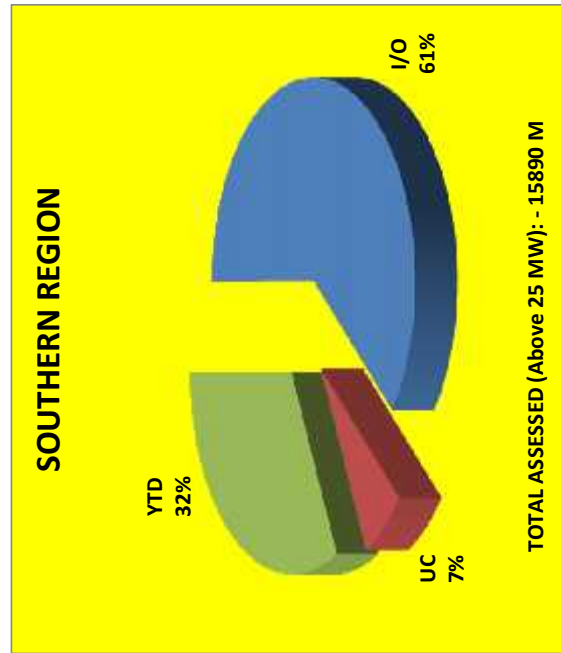
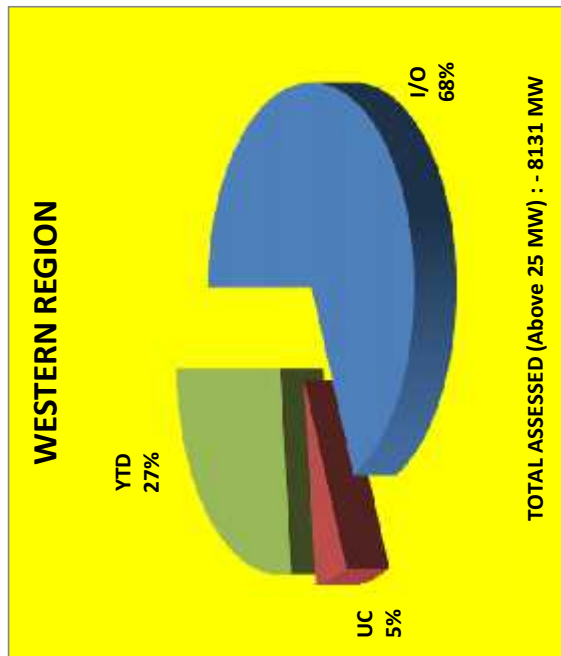
REGION-WISE STATUS OF HYDRO-ELECTRIC CAPACITY AS ON 31.03.2021

EXHIBIT 1.1

I/O=In Operation

UC=Under Construction

YTD= Yet to be Developed



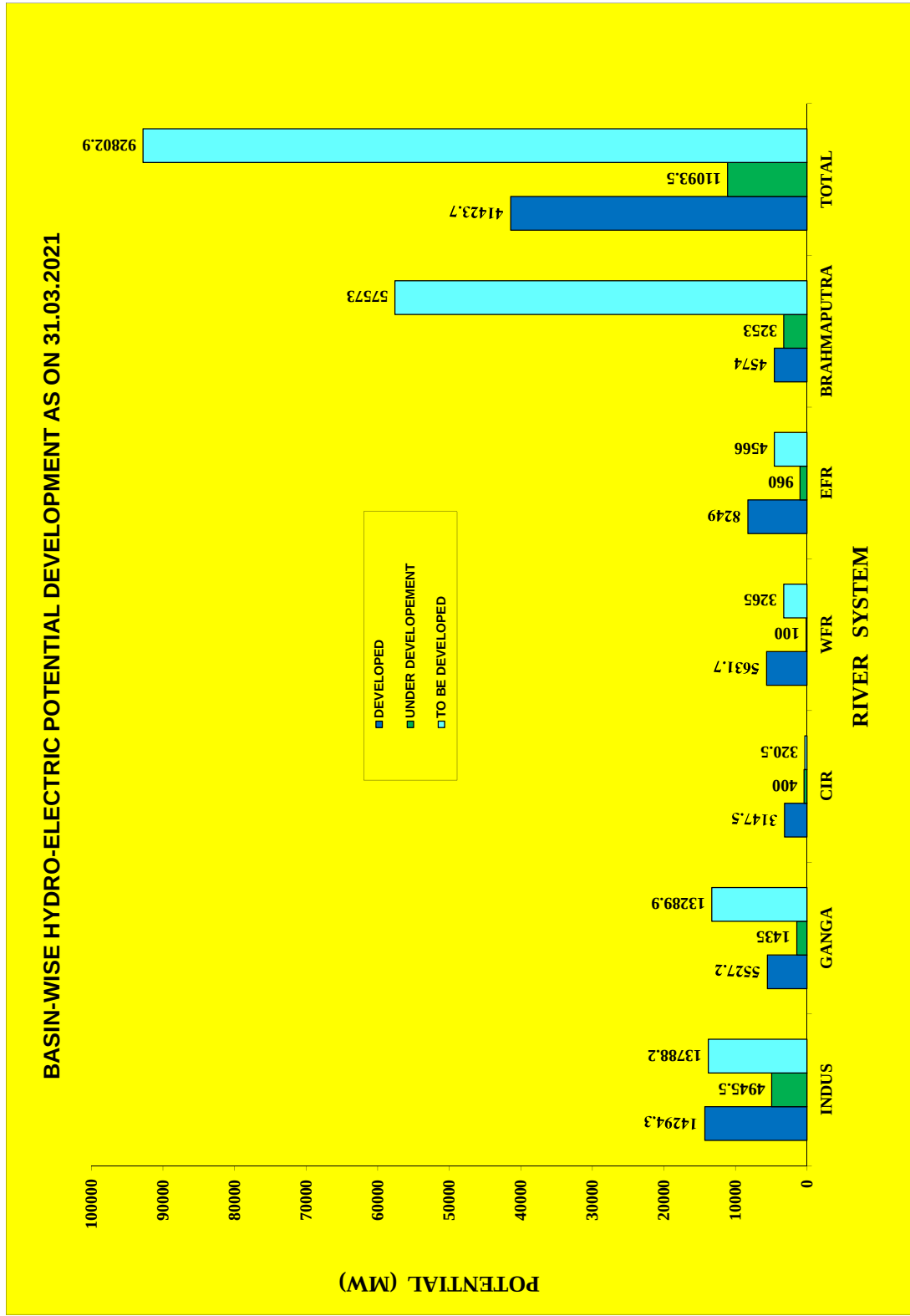


TABLE 1.2
STATUS OF H.E. POTENTIAL DEVELOPMENT - BASIN-WISE
(In terms of Installed Capacity-above 25 MW as on 31.03.2021)

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	4945.5	14.97	13788.2	41.75
Ganga	20711	20252	5527.2	27.29	1435.0	7.09	13289.9	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	960.0	6.97	4566.1	33.15
Brahmaputra	66065	65400	4574.0	6.99	3253.0	4.97	57573.0	88.03
Total	148701	145320	41423.6	28.51	11093.5	7.63	92802.9	63.86

Note:- In addition, 9 PSS of 4785.60 MW capacity are in operation, 3 PSS of 1580 MW capacity are under construction, 1 PSS of 1000 MW capacity is concurred by CEA, 8 PSS of 7530 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 46209.20 MW (as on 31.03.2021) 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 150.3 BU in 2020-21. Hydro generation during 2020-21 was about 5.46 BU (i.e. 3.5%) less than the generation of 155.76 BU during 2019-20.

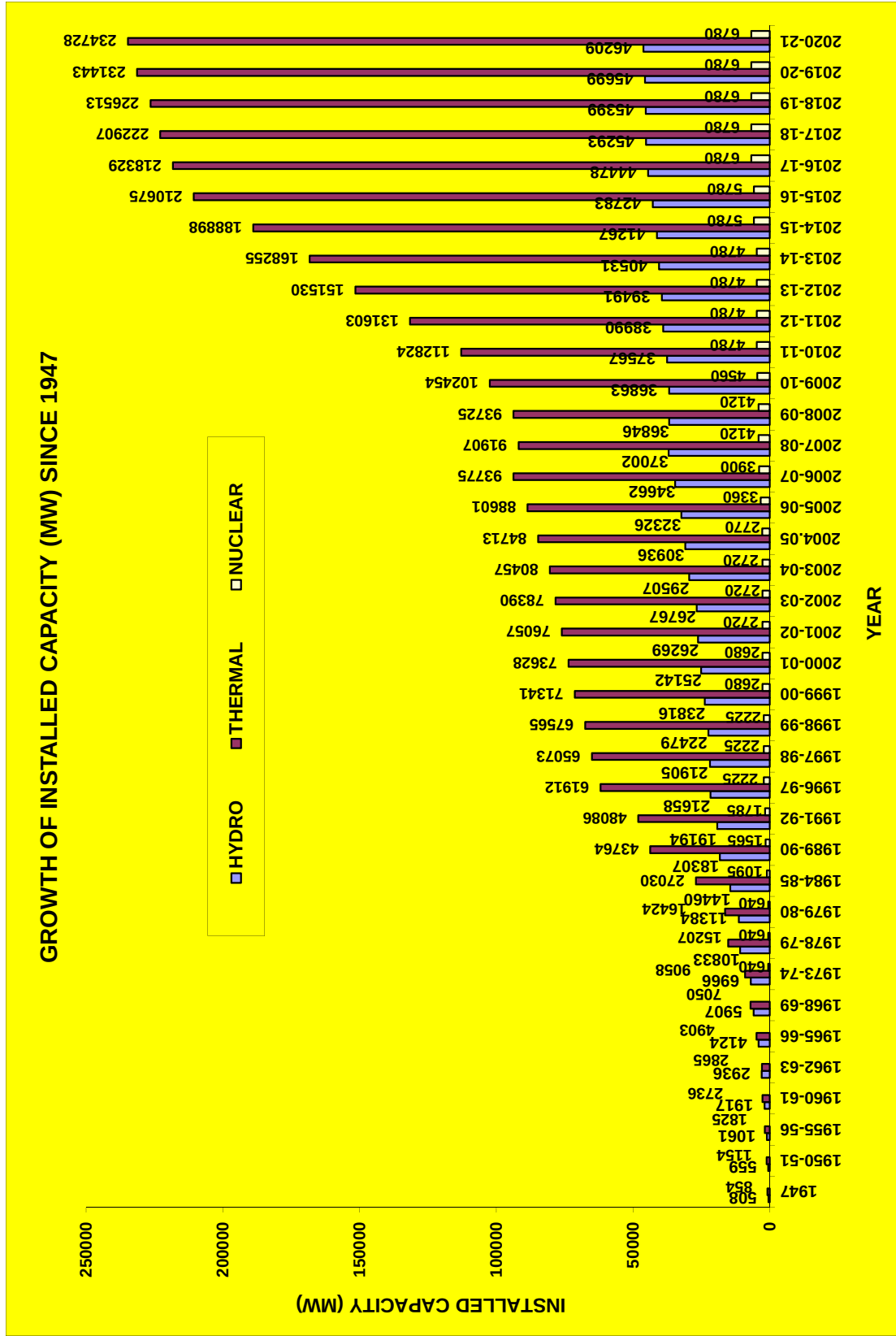
1.3 Share of Hydro-electric Installed Capacity & Generation

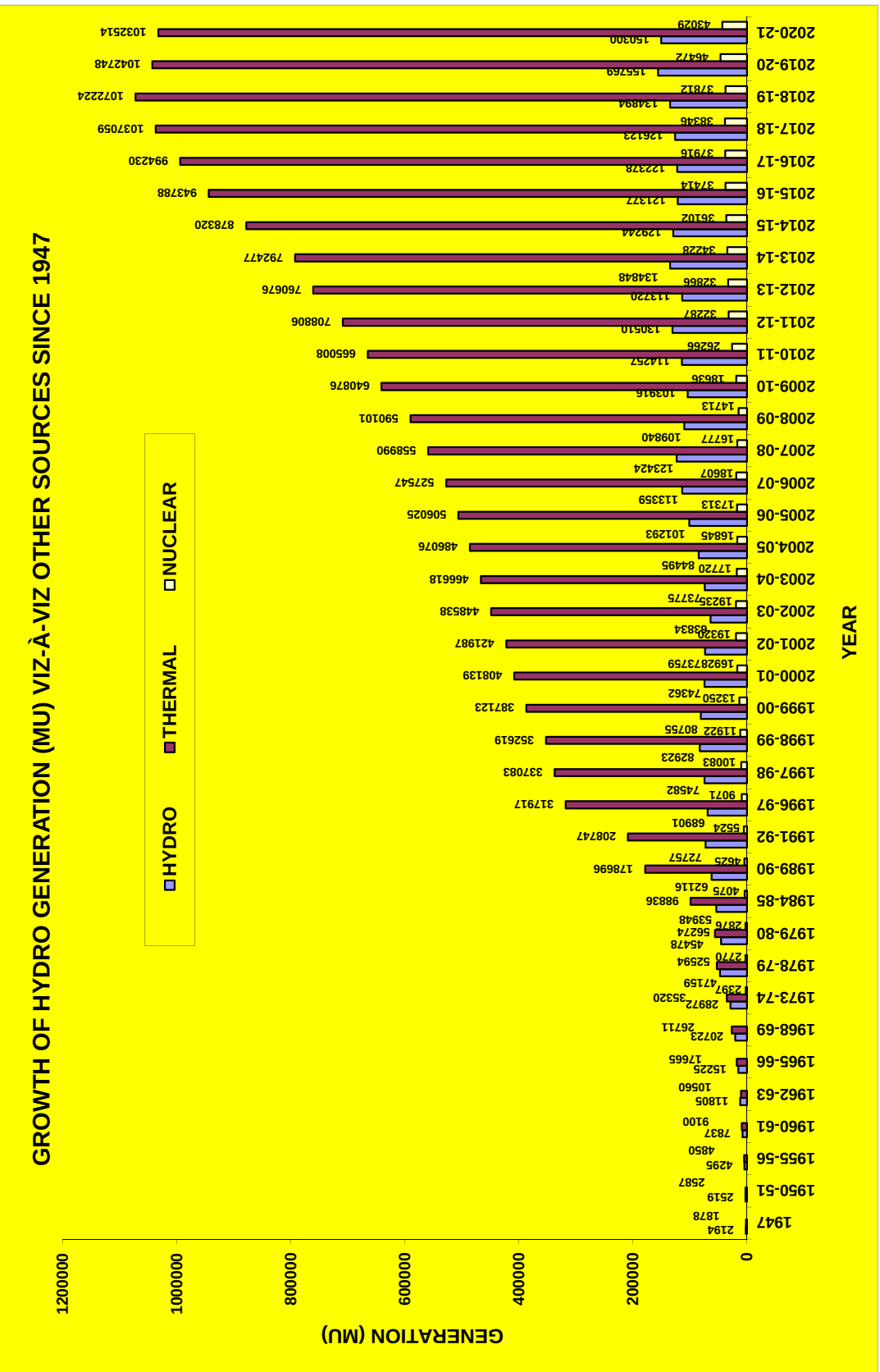
The installed capacity of Hydro-Electric Stations viz-à-viz total capacity, the contribution in generation by hydro-electric plants and trend of hydro capacity & generation over the years are indicated in **Table-1.3** and at **Exhibits 1.3, 1.4 and 1.5**. From **Table 1.3**, it may be observed that 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 12.09 % at the end of 2020-21. The generation from hydro stations during the year 2020-21 accounted for 12.26 % of the total energy generation in the country.

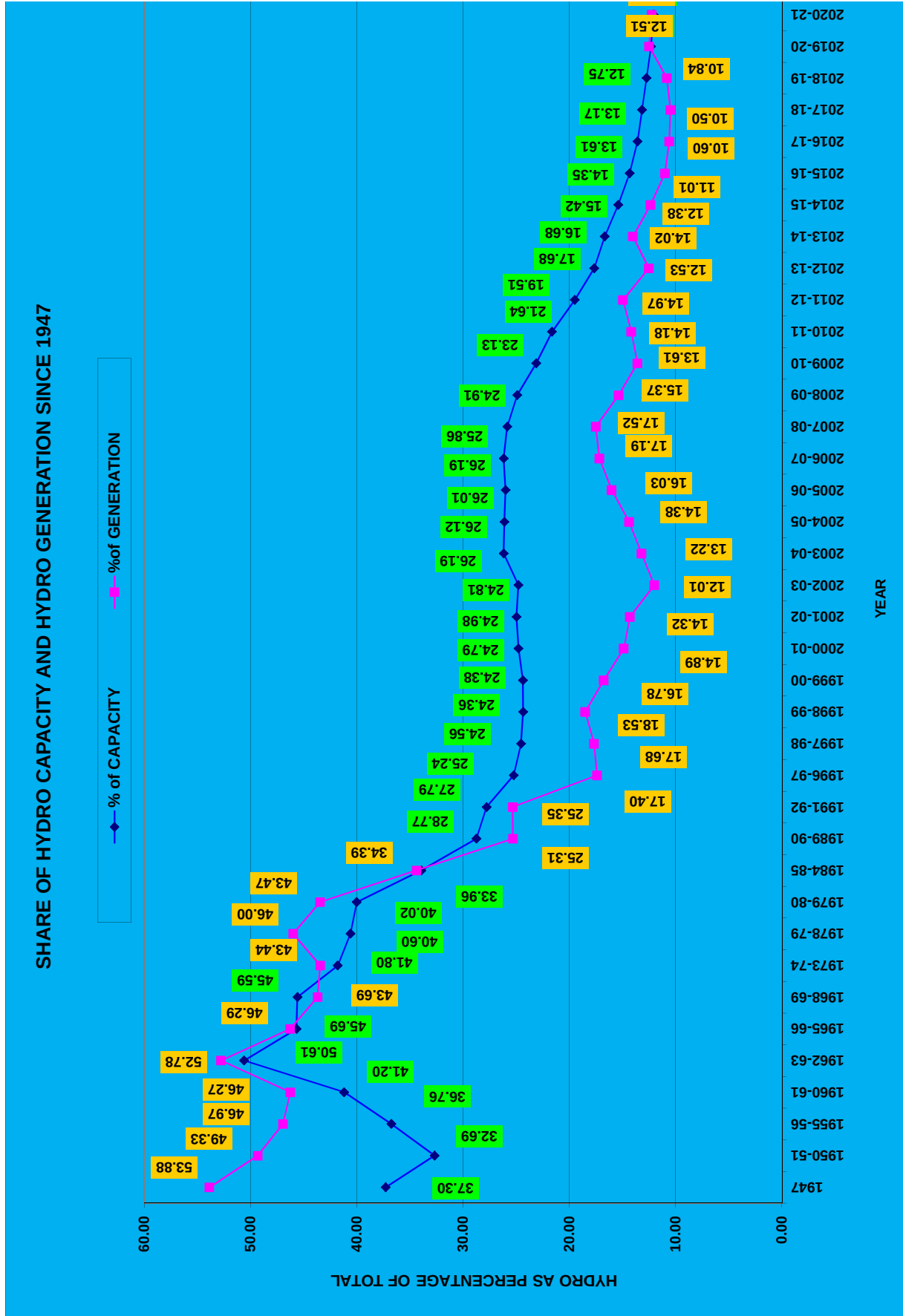
TABLE 1.3
HYDRO-ELECTRIC CAPACITY & GENERATION
VIS-À-VIS TOTAL CAPACITY & GENERATION

Year	Installed Capacity			Generation		
	Total (MW)	Hydro (MW)	Hydro as % of Total	Total (MU)	Hydro (MU)	Hydro as % of Total
1950	1713	560	32.63	5106	2519	49.33
1955-56	2886	1061	36.76	9145	4295	46.97
1960-61	4653	1917	41.20	16937	7837	46.27
1962-63	5801	2936	50.61	22365	11805	52.78
1965-66	9027	4124	45.68	32890	15225	46.29
1968-69	12957	5907	45.59	47434	20723	43.69
1973-74	16664	6966	41.80	66689	28972	43.44
1978-79	26680	10833	40.60	102523	47159	46.00
1979-80	28448	11384	40.02	104627	45478	43.47
1984-85	42585	14460	33.96	156859	53948	34.39
1989-90	63636	18307	28.77	245437	62116	25.31
1991-92	69065	19194	27.79	287028	72757	25.35
1996-97	85795	21658	25.24	395889	68901	17.40
1997-98	89203	21904	24.58	421748	74582	17.68
1998-99	92269	22479	24.10	447464	82923	18.53
1999-00	97837	23857	24.37	481128	80755	16.78
2000-01	101450	25153	24.75	499429	74362	14.89
2001-02	105046	26269	25.01	515066	73759	14.32
2002-03	107877	26767	24.81	531607	63834	12.01
2003-04	112684	29507	26.19	558113	73775	13.22
2004-05	118419	30936	26.12	587416	84495	14.38
2005-06	124287	32326	26.01	624631	101293	16.22
2006-07	132321	34662	26.19	659513	113359	17.19
2007-08	143061	37002	25.86	704469	123424	17.52
2008-09*	147917	36846	24.91	714653	109840	15.37
2009-10*	159398	36863	23.13	763429	103916	13.61
2010-11*	173626	37567	21.64	805532	114257	14.18
2011-12*	199877	38990	19.51	871602	130510	14.97
2012-13*	223344	39491	17.68	907262	113720	12.53
2013-14*	243029	40531	16.68	961552	134848	14.02
2014-15*	267637	41267	15.42	1043665	129244	12.38
2015-16*	302088	42783	14.16	1102578	121377	11.01
2016-17*	326849	44478	13.61	1154524	122378	10.60
2017-18*	344002	45293	13.17	1201528	126123	10.50
2018-19*	356100	45399	12.75	1244930	134894	10.84
2019-20*	370106.46	45699.2	12.34	1244989.43	155769.12	12.51
2020-21*	382151.22	46209.20	12.09	1225842	150299.52	12.26

* Capacity above 25 MW only has been considered.







1.4 Monitored Hydro Installed Capacity

For generation performance, the monitored hydro-electric installed capacity in the country as on 31.03.2021 was 46209.22 MW (above 25 MW capacity). Region-wise summary of the hydel installed capacity is given in **Table 1.4**. Region-wise, type-wise and construction-wise categorization of stations is given in **Annex-1.1** while Sector-wise/Utility-wise and Station-wise/State-wise details of installed capacity are given in **Annex 1.2 to 1.4**.

TABLE 1.4

**REGION-WISE SUMMARY OF HYDRO-ELECTRIC INSTALLED CAPACITY
(Above 25 MW capacity as on 31.03.2021)**

S. No.	Region	No. of Units	Installed Capacity (MW)
1.	Northern	251	19233.27
2.	Western	101	7392
3.	Southern	247	11694.5
4.	Eastern	85	5862.45
5.	North-Eastern	36	2027
Total		720	46209.22

Capacity-wise grouping of H.E. Stations as on 31.03.2021 is given in **Annex- 1.5**. It is observed that 106 stations with installed capacity above 100 MW constitute more than 50.72% of the overall hydro capacity.

8 H.E. Generating units having installed capacity of 510 MW were added during the year 2020-21. 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 31.03.2021 was 12.09% and 12.26% 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 33.86%, 7.56% and 58.58% respectively. Sector-wise distribution of hydro generation (MU) in Central, Private and State sectors was 40%, 9% and 51% respectively. These details are illustrated in **Exhibits 1.8 & 1.9**.

1.5 Hydro Generating Units : Indigenous and imported

As on 31.03.2021, there were 720 hydro generating units in operation at 209 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 42.87% of total capacity for both turbines & generators whereas other domestic suppliers together have a meagre share of about 6.96% of total capacity.

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

EXHIBIT-1.6

CONTRIBUTION OF HYDRO CAPACITY
(AS ON 31.03.2021)

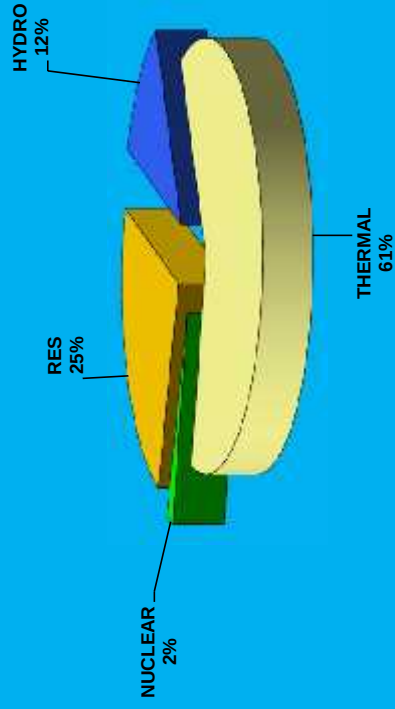


EXHIBIT-1.8

SECTOR-WISE HYDRO CAPACITY
(AS ON 31.03.2021)

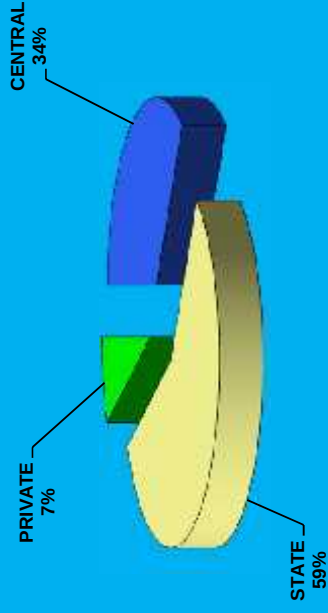


EXHIBIT-1.7

CONTRIBUTION OF HYDRO GENERATION
(DURING 2020-21)

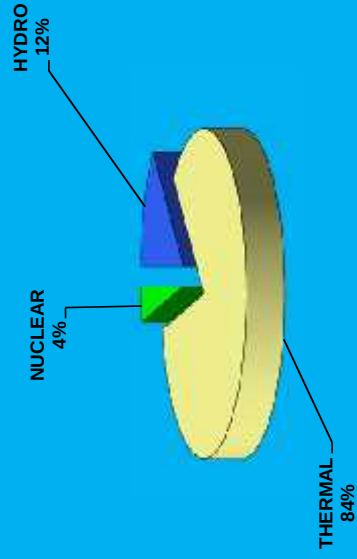


EXHIBIT-1.9

SECTOR-WISE HYDRO GENERATION
(DURING 2020-21)

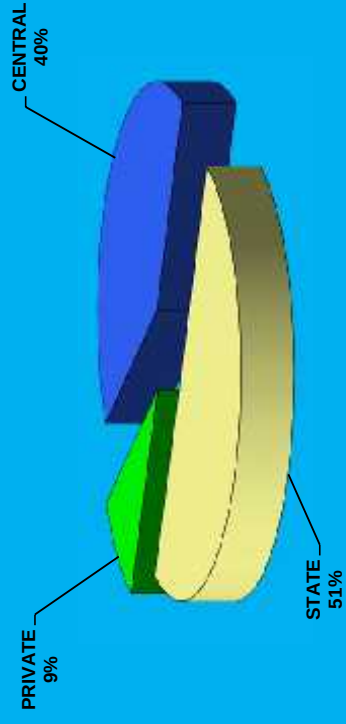


TABLE 1.5

**HYDRO GENERATING UNITS INDIGENOUS/IMPORTED
FROM VARIOUS COUNTRIES AS ON 31-03-2021**

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	308	42.69	19810.02	42.87	308	42.54	19810.02	42.87
Others	51	6.88	3215.50	6.96	51	7.02	3214	6.96
Sub Total	359	49.57	23025.50	49.83	359	49.86	23024	49.83
B-Imported								
USA	9	1.25	351.00	0.76	26	3.61	543.15	1.18
U.K.	63	8.75	1242.10	2.69	63	8.75	1676.90	3.63
France	31	4.31	2179.20	4.72	15	2.08	1726	3.74
Canada	44	6.17	3132.00	6.78	44	6.11	3132	6.78
USSR	26	3.61	2804.00	6.07	26	3.61	2804	6.07
Switzerland	21	2.94	790.20	1.71	21	2.92	219	0.47
Japan	76	10.56	6398.20	13.85	76	10.56	5822.20	12.60
Other	91	12.64	6287.00	13.61	108	15	7261.95	15.72
Sub Total	361	50.14	23183.70	50.17	379	52.64	23185.20	50.17
Total	720	100	46209.20	100	720	100	46209.2	100

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

(As on 31.03.2021)

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	75197.26	73	251	19233	0	0	0.00	73	251	19233.25
WESTERN	16607.21	24	88	5552.00	4	13	1840.00	28	101	7392.00
SOUTHERN	33900.85	67	229	9688.00	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	38	2027.00	0	0	0.00	14	38	2027.00
TOTAL	154888.91	200	685	41422.7	9	35	4785.6	209	720	46209.2

NOTE:

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

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

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

SECTOR	NO. OF UTILITIES	NO. OF STATION	NO. OF UNITS	INSTALLED CAPACITY (MW)
CENTRAL	8	42	163	15646.70
STATE	23	148	504	27069.50
PRIVATE	15	19	53	3493.00
TOTAL	46	209	720	46209.20

Categorisation of HE Stations (Installed Capacity)**1. Operation-wise****(As on 31.03.2021)**

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	7263.00	6	1725.00	9	4503.20	1	40.00	43	15646.70
State	15	892.15	50	7590.00	32	6434.65	43	7557.10	7	4595.60	147	27069.50
Private	2	499.00	13	2547.00	3	297.00	0	0.00	1	150.00	19	3493.00
Total (Nos./ MW Capacity)*	25	3506.65	82	17400.00	41	8456.65	52	12060.30	9	4785.60	209	46209.20
% of Total	12.5	7.88	41	39.12	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	9548.5	13	6098.2	42	15646.7
State	126	17897.5	20	9172	146	27069.5
Private	12	1335	7	2158	19	3493
Total (Nos./MW Capacity)*	167	28781.00	40	17428.20	207	46209.20
% of Total	80.68	62.28	19.32	37.72	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

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

(As on 31.03.2021)

Sl. No.	NAME OF THE SECTOR/ UTILITY	NO. OF STATIONS	NO. OF UNITS	INSTALLED CAPACITY (MW)	DESIGN ENERGY (MU)
CENTRAL SECTOR					
1	BBMB	6	28	2920.30	9515.00
2	NHPC	20	70	5451.20	24680.34
3	SJVNL	2	12	1912.02	8490.08
4	NTPC	1	4	800.00	3054.79
5	THDC	2	8	1400.00	3952.00
6	NHDC	2	16	1520.00	3146.57
7	DVC	3	5	143.20	374.00
8	NEEPCO	7	20	1500.00	7397.04
	SUB-TOTAL CENTRAL	43	163	15646.72	60609.82
PRIVATE SECTOR					
1	MPCL	1	2	86	370.93
2	EPPL	1	2	100	403.00
3	GBHPPL	1	2	70	291.73
4	ADHPL	1	2	192	678.18
5	HBPCL	2	7	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
15	L&T	1	3	99	473.00
	SUB-TOTAL PRIVATE	19	53	3493.00	14012.86
STATE SECTOR					
1	HPSEBL	4	12	372.00	1691.62
2	HPPCL	3	8	406.00	955.03
3	JKSPDCL	4	12	1110.00	4833.30
4	PSPCL	8	25	1051.00	4207.00
5	RRVUNL	4	11	411.00	1046.00
6	UPJVNL	4	15	501.60	1707.00
7	UJVNL	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	8	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	147	504	27069.50	80266.23
	TOTAL	209	720	46209.20	154888.91

Annex 1.4

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

As on 31.03.2021

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)
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 (66 MW)
14	Giri Bata	1	2	R(P)	(2X30)	60.00	240.00	1978 (60 MW)
15	Larji'	1	3	R(P)	(3X42)	126.00	586.85	2006 (126 MW)
16	Sanjay	1	3	R(P)	(3X40)	120.00	518.00	1989 (120 MW)
Total HPSEBL		4	12			372.00	1691.62	
HPPCL								
17	Integrated Kashang	1	3	R (P)	(3X65)	195	245.80	2016 (120 MW)
18	Sainj	1	2	R(P)	(2X50)	100	323.23	2017 (100 MW)
19	Sawara Kuddu	1	3	R	(3X37)	111	386.00	2020 (111 MW)
Total HPPCL		3	8			406.00	955.03	
PSPCL								
20	Shanan	1	5	R(P)	(1X50)+(4X15)	110.00	585.00	1932 (60 MW) 1982 (50 MW)
Sub Total PSPCL-HP		1	5			110.00	585.00	
Total State Sector		8	25			888.00	3231.65	

Sl No.	Units/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
	Conventional H E Stations							
	Private Sector							
	MPCL							
21	Malana	1	2	R(P)	(2X43)	86.00	370.93	2001 (86 MW)
	Total MPCL	1	2			86.00	370.93	
	GBHPPL							
22	Budhil	1	2	R(P)	(2X35)	70.00	291.73	2012 (70 MW)
	Total GBHPPL	1	2			70.00	291.73	
	EPPL							
23	Malana-II	1	2	R(P)	(2X50)	100.00	403.00	2011 (100 MW)
	Total EPPL	1	2			100.00	403.00	
	IA Energy							
24	Chanju-I	1	3	R(P)	(3X12)	36.00	157.82	2017 (12 MW)
	Total IA Energy	1	3			36.00	157.82	
25	Allain Duhangan	1	2	R(P)	(2X96)	192.00	678.18	2010 (192 MW)
	Total ADHPL	1	2			192.00	678.18	
	HBPCL							
26	Baspa	1	3	R(P)	(3X100)	300.00	1213.00	2003 (300 MW)
27	Karcham Wangtoo	1	4	R(P)	(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	27	97			9920.00	37208.20	
	JAMMU & KASHMIR							
	JKSPDC							
28	Baglihar-I	1	3	R(P)	(3X150)	450.00	2643.00	2008 (450 MW)
29	Baglihar-II	1	3	R(P)	(3X150)	450.00	1302.30	2015 (450 MW)
30	Lower Jhelum	1	3	R(P)	(3X35)	105.00	533.00	1978 (35 MW) 1979 (70 MW)
31	Upper Sindh-II	1	3	R(P)	(3X35)	105.00	355.00	2000 (35 MW) 2001 (35 MW) 2002 (35 MW)
	Total JKSPDC	4	12			1110.00	4833.30	
	NHPC							
32	Dulhasti	1	3	R(P)	(3X130)	390.00	1907.00	2007 (390 MW)
33	Salal-I&II	1	6	R	(3X115)	690.00	3082.00	1987 (345 MW) 1993 (115 MW) 1994 (115 MW) 1995 (115 MW)
34	Uri-I	1	4	R	(4X120)	480.00	2587.38	1996 (120 MW) 1997 (360 MW)
35	Uri-II	1	4	R	(4X60)	240.00	1124.00	2013 (180 MW)
36	Sewa-II	1	3	R(P)	(3X40)	120.00	533.52	2010 (120 MW)
37	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							
38	Chutak	1	4	R	(4X11)	44.00	213.00	2012 (33 MW) 2013 (11 MW)

Sl No.	Units/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
	Conventional H E Stations							
39	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							
40	Anandpur Sahib-I	1	2	R	(2X33.5)	67.00	909.00	1985 (67 MW)
41	Anandpur Sahib-I	1	2	R	(2X33.5)	67.00		1985 (67 MW)
42	Mukerian-I	1	3	R	(3X15)	45.00	1206.00	1983 (45 MW)
43	Mukerian-II	1	3	R	(3X15)	45.00		1988 (30 MW) 1989 (15 MW)
44	Mukerian-III	1	3	R	(3X19.5)	58.50		1989 (58.50 MW)
45	Mukerian-IV	1	3	R	(3X19.5)	58.50		1989 (58.50 MW)
46	Ranjit Sagar	1	4	S	(4X150)	600.00	1507.00	2000 (600 MW)
	Total PSPCL	7	20			941.00	3622.00	
	BBMB							
47	Ganguwal	1	3	R	(2X24.2)+(1X 29.25)	77.65	1358	1955 (48.4 MW) 1962 (29.25 MW)
48	Kotla	1	3	R	(2X24.2)+(1X 29.25)	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							
49	Jawahar Sagar	1	3	R(P)	(3X33)	99.00	298.00	1973 (99 MW)
50	Mahi Bajaj-I	1	2	MP	(2X25)	50.00	289.00	1986 (50 MW)
51	Mahi Bajaj-II	1	2	R(P)	(2X45)	90.00		1989 (90 MW)
52	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							
53	Dhaul Ganga	1	4	R(P)	(4X70)	280.00	1134.69	2005 (280 MW)
54	Tanakpur	1	3	R	(3X31.4)	94.20	452.19	1992 (94.2 MW)
	Sub-Total NHPC	2	7			374.20	1586.88	
	THDC							
55	Tehri St-I	1	4	MP	(4X250)	1000.00	2797.00	2006 (500 MW) 2007 (500 MW)
56	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							
57	Chibro (Yamuna)	1	4	R(P)	(4X60)	240.00	750.00	1975 (180 MW) 1976 (60 MW)
58	Chilla	1	4	R	(4X36)	144.00	725.00	1980 (108 MW) 1981 (36 MW)
59	Dhakrani	1	3	R	(3X11.25)	33.75	169.00	1965 (11.25 MW) 1966 (11.25 MW) 1970 (11.25 MW)

Sl No.	Names/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
	Conventional H E Stations							
60	Dhalipur	1	3	R	(3X17)	51.00	192.00	1965 (17 MW) 1966 (17 MW) 1970 (17 MW)
61	Khatima	1	3	R	(3X13.8)	41.40	208.00	1955 (13.8 MW) 1956 (27.6 MW)
62	Khodri	1	4	R(P)	(4X30)	120.00	345.00	1984 (120 MW)
63	Kulhal	1	3	R	(3X10)	30.00	164.00	1975 (30 MW)
64	Maneri Bhali-I	1	3	R(P)	(3X30)	90.00	395.00	1984 (90 MW)
65	Maneri Bhali-II	1	4	R(P)	(4X76)	304.00	1566.10	2008 (304 MW)
66	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							
67	Shrinagar	1	4	R(P)	(4X82.50)	330.00	1396.84	2015 (330 MW)
	JPPVL							
68	Vishnu Prayag	1	4	R	(4X100)	400.00	1774.42	2006 (400 MW)
	L&T							
69	Singoli Bhatwari	1	3	R	(3X33)	99.00	473.00	2020 (33 MW)
	Sub Total Private	3	11			829.00	3644.26	
	Total Uttarakhand	17	60			3855.35	14031.24	
	UPJVNL							
	UTTAR PRADESH							
70	Khara	1	3	R(P)	(3X24)	72.00	385.00	1992 (72 MW)
71	Matatila	1	3	MP	(3X10.2)	30.60	123.00	1965 (30.6 MW)
72	Obra	1	3	MP	(3X33)	99.00	279.00	1970 (66 MW) 1971 (33 MW)
73	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	73	251			19233.25	75197.26	
	Western Region							
	MADHYA PRADESH							
	NHDC							
74	Indira Sagar	1	8	MP	(8X125)	1000.00	1980.00	2004 (875 MW) 2005 (125 MW)
75	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							
76	Bansagar Tons-I	1	3	R(P)	(3X105)	315.00	900.00	1991 (105 MW) 1992 (210 MW)
77	Bansagar Tons-III	1	2	R	(2X15)	30.00	113.00	2002 (30 MW)
78	Bansagar Tons-II	1	3	MP	(3X20)	60.00	143.00	2000 (20 MW) 2001 (20 MW) 2002 (20 MW)
79	Bargi	1	2	MP	(2X45)	90.00	508.08	1988 (90 MW)
80	Gandhi Sagar	1	5	MP	(5X23)	115.00	420.48	1960 (69 MW) 1963 (23 MW) 1966 (23 MW)
81	Madhikhera	1	3	MP	(3X20)	60.00	74.12	2006 (40 MW) 2007 (20 MW)
82	Rajghat	1	3	MP	(3X15)	45.00	87.60	1999 (45 MW)

Sl No.	Units/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
Conventional H E Stations								
	Sub-Total MPPGCL	7	21			715.00	2246.28	
	Total Madhya Pradesh	9	37			2235.00	5392.85	
MAHARASHTRA								
MAHAGENCO								
83	Bhira Tail Race	1	2	R(P)	(2X40)	80.00	75.00	1987 (40 MW) 1988 (40 MW)
84	Koyna DPH	1	2	S	(2X18)	36.00	146.00	1980 (18 MW) 1981 (18 MW)
85	Koyna-I&II	1	8	S	(4X70)+(4X80)	600.00	3030.00	1962 (140 MW) 1963 (140 MW) 1966 (240 MW) 1967 (80 MW)
86	Koyna-III	1	4	R(P)	(4X80)	320.00		1975 (160 MW) 1977 (80 MW) 1978 (80 MW)
87	Koyna-IV	1	4	S	(4X250)	1000.00		1999 (500 MW) 2000 (500 MW)
88	Tillari	1	1	R(P)	(1X60)	60.00	133.00	1986 (60 MW)
89	Vaitarna	1	1	S	(1X60)	60.00	144.00	1976 (60 MW)
	Sub-Total MAHAGENCO	7	22			2156.00	3528.00	
MPPGCL								
90	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)								
91	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								
92	Bhira	1	6	S	(6X25)	150.00	775.00	1927 (125 MW) 1949 (25 MW)
93	Bhivpuri	1	5	S	3X24) + (2X1.5	75.00	220.00	1997 (3 MW) 1998 (48 MW) 1999 (24 MW)
94	Khopoli	1	3	S	(3X24)	72.00	225.00	2001 (24 MW) 2002 (24 MW) 2003 (24 MW)
	Sub-Total TPCL	3	14			297.00	1220.00	
	Total Pvt. (Maharashtra)	4	15			331.00	1270.00	
	Total Maharashtra	12	39			2647.00	5113.36	
CHHATISGARG								
CSPGCL								
State Sector								
95	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								
96	Ukai	1	4	MP	(4X75)	300.00	1080.00	1974 (150 MW)

Sl No.	Units/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
	Conventional H E Stations							
	Sub-Total GSECL	1	4			300.00	1080.00	
	SSNNL							
97	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							
98	Lower Sileru	1	4	S	(4X115)	460.00	1070.00	1976 (230 MW) 1977 (115 MW) 1978 (115 MW)
99	N J Sagar RBC & EXT.	1	3	MP	(3X30)	90.00	156.00	1990 (30 MW) 1992 (60 MW)
100	Srisaillam	1	7	MP	(7X110)	770.00	2900.00	1982 (220 MW) 1983 (110 MW) 1984 (110 MW) 1986 (220 MW)
101	Upper Sileru-I&II	1	4	S	(4X60)	240.00	529.00	1994 (60 MW) 1995 (60 MW)
102	N J Sagar TPD	1	2	R(P)	(2X25)	50.00	177.00	2017 (50 MW)
	Total APGENCO	5	20			1610.00	4832.00	
	Total Andhra Pradesh	5	20			1610.00	4832.00	
	TELANGANA							
	TSGENCO							
	State Sector							
103	Priyadarshni Jurala	1	6	R(P)	(6X39)	234.00	404.00	2008 (78 MW) 2009 (39 MW) 2010 (78 MW) 2011 (39 MW)
104	Pochampad	1	4	MP	(4X9)	36.00	147.00	1987-1988, 2010
105	N J Sagar	1	1	MP	(1X110)	110.00		1978 (110 MW)
106	N J Sagar LBC	1	2	R	(2X30)	60.00	104.00	1983 (60 MW)
107	Lower Jurala	1	6	R(P)	(6X40)	240.00	534.43	2015 (80 MW) 2016 (160 MW)
108	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							
109	Almatti	1	6	MP	(5X55)+(1X15)	290.00	483.00	2004 (70 MW) 2005 (220 MW)
110	Gerusoppa(Sharavathy Tail Race)	1	4	R(P)	(4X60)	240.00	622.00	2001 (180 MW) 2002 (60 MW)
111	Ghat Prabha	1	2	MP	(2X16)	32.00	131.00	1992 (32 MW)
112	Mahatma Gandhi (Jog)	1	8	S	X21.6)+(4X13.	139.20	118.00	1949 (26.4 MW) 1950 (13.2 MW) 1952 (65 MW) 2001 (13.2 MW)

Sl. No.	Units/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
Conventional H E Stations								
113	Kadra	1	3	S	(3X50)	150.00	570.00	1997 (50 MW) 1999 (100 MW)
114	Kalinadi (Nagbhari)	1	6	S	3X135)+(3X150)	855.00	3385.00	1979 (135 MW) 1980 (135 MW) 1981 (135 MW) 1982 (135 MW)
115	Kalinadi (Supa)	1	2	S	(2X50)	100.00	542.00	1985 (100 MW)
116	Kodasali	1	3	S	(3X40)	120.00	512.00	1998 (40 MW) 1999 (80 MW)

Sl No.	Units/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
Conventional H E Stations								
117	Lingnamakki	1	2	S	(2X27.5)	55.00	254.00	1979 (27.5 MW) 1980 (27.5 MW)
118	Munirabad	1	3	MP	(2X9)+(1X10)	28.00	66.00	1962 (18 MW) 1965 (10 MW)
119	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)
120	Sivasamundrum	1	10	R(P)	(4X6)+(6X3)	42.00	183.00	1922 (3 MW) 1923 (3 MW) 1924 (9 MW) 1925 (3 MW)
121	Varahi	1	4	R(P)	(4X115)	460.00	1060.00	1989 (115 MW) 1990 (115 MW) 2009 (230 MW)
122	Bhadra	1	3	MP	(2x12)+(1x2)	26.00	123.00	1965 (26 MW)
	Total KPCL	14	66			3572.20	12981.00	
APGENCO								
123	T B Dam	1	4	MP	(4X9)	36.00	236.00	1957 (18 MW) 1964 (18 MW)
124	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								
125	Idamalayar	1	2	MP	(2X37.5)	75.00	380.00	1987 (75 MW)
126	Idukki	1	6	MP	(6X130)	780.00	2398.00	1976 (390 MW) 1985 (130 MW) 1986 (260 MW)
127	Kakkad	1	2	R(P)	(2X25)	50.00	262.00	1999 (50 MW)
128	Kuttiyadi	1	3	MP	(3X25)	75.00	323.00	1972 (75 MW)
129	Kuttiyadi Extn.	1	1	MP	(1X50)	50.00		2001 (50 MW)
130	Kuttiyadi Additional Extn.	1	2	MP	(2X50)	100.00		2010 (100 MW)
131	Lower Periyar	1	3	R(P)	(3X60)	180.00	493.00	1997 (180 MW)
132	Nariamangalam	1	3	S	(3X15)	45.00	237.00	1961 (30 MW) 1963 (15 MW)
133	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)
134	Panniar	1	2	S	(2X15)	30.00	158.00	1963 (15 MW) 2001 (15 MW)
135	Poringalkuttu	1	4	S	(4X8)	32.00	170.00	1957 (8 MW) 1958 (8 MW) 1959 (8 MW) 1960 (8 MW)
136	Sabirigiri	1	6	S	(6X50)	300.00	1338.00	1960 (150 MW) 1967 (150 MW)
137	Sengulam	1	4	S	(4X12)	48.00	182.00	1954 (24 MW) 2001 (24 MW)
138	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								
139	Aliyar	1	1	MP	(1X60)	60.00	175.00	1970 (60 MW)
140	Bhavani Kattalai Barrage-I	1	2	R(P)	(2X15)	30.00	90.00	2006 (30 MW)

Sl. No.	Units/Stations	No. of Stations	Units	Type of Project	Capacity(m W)	(MW)	Energy (MU)	Year of Commissioning
Conventional H E Stations								
141	Bhavani Kattalai Barrage-II	1	2	R(P)	(2X15)	30.00	100.00	2013 (30 MW)
142	Bhavani Kattalai Barrage-III	1	2	R(P)	(2X15)	30.00	80.00	2012 (15 MW) 2013 (15 MW)
143	Kodayar-I	1	1	MP	(1X60)	60.00	165.00	1970 (60 MW)
144	Kodayar-I	1	1	MP	(1X40)	40.00		1971 (40 MW)
145	Kundah-I	1	3	S	(3X20)	60.00	1387.00	1960 (40 MW) 1964 (20 MW)
146	Kundah-II	1	5	S	(5X35)	175.00		1960 (35 MW) 1961 (105 MW) 1964 (35 MW)
147	Kundah-III	1	3	S	(3X60)	180.00		1965 (120 MW) 1978 (60 MW)

Sl No.	Names/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
	Conventional H E Stations							
148	Kundah-IV	1	2	S	(2X50)	100.00		1966 (50 MW) 1978 (50 MW)
149	Kundah-V	1	2	S	(2X20)	40.00		1964 (20 MW) 1988 (20 MW)
150	Lower Mettur-I	1	2	R(P)	(2X15)	30.00	252.00	1988 (30 MW)
151	Lower Mettur-II	1	2	R(P)	(2X15)	30.00		1988 (30 MW)
152	Lower Mettur-III	1	2	R(P)	(2X15)	30.00		1987 (15 MW) 1988 (15 MW)
153	Lower Mettur-IV	1	2	R(P)	(2X15)	30.00		1989 (15 MW) 1988 (15 MW)
154	Mettur Dam	1	4	MP	(4X12.5)	50.00	541.00	1937 (25 MW) 1938 (12.5 MW) 1946 (12.5 MW)
155	Mettur Tunnel	1	4	MP	(4X50)	200.00		1965 (50 MW) 1966 (150 MW)
156	Moyar	1	3	S	(3X12)	36.00	115.00	1952 (24 MW) 1953 (12 MW)
157	Papanasam	1	4	MP	(4X8)	32.00	105.00	1944 (16 MW) 1945 (8 MW) 1951 (8 MW)
158	Parson's Valley	1	1	S	(1X30)	30.00	53.00	2000 (30 MW)
159	Periyar	1	4	MP	(3X42)+(1X35)	161.00	409.00	1958 (35 MW) 1959 (70 MW) 1965 (35 MW)
160	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)
161	Pykara Ultimate	1	3	S	(3X50)	150.00	30.00	2005 (150 MW)
162	Sarakarpathy	1	1	R(P)	(1X30)	30.00	162.00	1966 (30 MW)
163	Sholayar-I	1	2	S	(2X35)	70.00	254.00	1971 (70 MW)
164	Suruliyar	1	1	S	(1X35)	35.00	79.00	1978 (35 MW)
	Total TANGEDCO	26	65			1778.20	4271.00	
	Total Tamilnadu	26	65			1778.20	4271.00	
	Total Southern Region	67	229			9688.90	30186.85	
	Eastern Region							
	WEST BENGAL							
	DVC							
165	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							
166	Teesta Low Dam-III	1	4	R(P)	(4X33)	132.00	594.00	2013 (132 MW)
167	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							
168	Jaldhaka	1	4	R(P)	(4X9)	36.00	165.00	1967 (18 MW) 1972 (9 MW)
169	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							
170	Rangit	1	3	R(P)	(3X20)	60.00	338.61	2000 (60 MW)

Sl No.	Units/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
	Conventional H E Stations							
171	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.							
172	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.)							
173	Chujachen	1	2	R(P)	(2*55)	110.00	537.81	2013 (110 MW)
	Sneha Kinetic Power Projects Pvt. Ltd.(SKPPPL)							
174	Dikchu	1	2	R(P)	(2*48)	96.00	431.00	2017 (96 MW)
	Shiga Energy Pvt. Ltd.(SEPL)							
175	Tashiding	1	2	R(P)	(2*48.50)	97.00	425.05	2017 (97 MW)
	DANS Energy Pvt. Ltd. (DEPL)							
176	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							
177	Panchet	1	1	MP	(1X40)	40.00	237.00	1959 (40 MW)
	Sub-Total DVC	1	1			40.00	237.00	
	JUUNL							
178	Subernrekha-I	1	1	MP	(1X65)	65.00	149.00	1977 (65 MW)
179	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							
180	Balimela	1	8	MP	(6X60)+(2X75)	510.00	1183.00	1973 (60 MW) 1974 (120 MW) 1975 (60 MW)
181	Hirakud (Burla)	1	7	MP	(3X37.5)+(2X49.5)+(2X32)	275.50	684.00	1956 (32 MW) 1957 (81.5 MW)
182	Hirakud (Chiplima)	1	3	R(P)	(3X24)	72.00	490.00	1962 (48 MW) 1964 (24 MW)
183	Rengali	1	5	MP	(5X50)	250.00	525.00	1985 (50 MW) 1986 (50 MW) 1989 (50 MW)
184	Upper Indravati	1	4	MP	(4X150)	600.00	1962.00	1999 (300 MW) 2000 (150 MW) 2001 (150 MW)
185	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							
186	Machkund	1	6	S	(3X17)+(3X21.2)	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							

Sl No.	Units/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
	Conventional H E Stations							
	NEEPCO							
187	Ranganadi	1	3	R(P)	(3X135)	405.00	1509.66	2002 (405 MW)
188	Pare	1	2	R (P)	(2X55)	110.00	506.42	2018 (110 MW)
189	Kameng	1	2	R (P)	(2X150)	600.00	3353.00	2020 (300 MW)
	Sub-Total NEEPCO Ar.P	3	7			1115.00	5369.08	
	Total Arunachal Pradesh	3	7			1115.00	5369.08	
	ASSAM							
	NEEPCO							
190	Kopoli	1	4	S	(4X50)	200.00	1186.14	1988 (100 MW) 1996 (50 MW) 1997 (50 MW)
191	Khondong	1	2	S	(2X25)	50.00	363.95	1984 (50 MW)
	Sub-Total NEEPCO Assam	2	6			250.00	1550.09	
	APGCL							
192	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							
193	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							
194	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							
195	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							
196	Kyrdemkulai	1	2	R(P)	(2X30)	60.00	118.00	1979 (60 MW)
197	Umiam St. I	1	4	S	(4X9)	36.00	128.00	1965 (36 MW)
198	New Umetru	1	2	R(P)	(2X20)	40.00	235.00	2017 (20 MW)
199	Umiam St. IV	1	2	R(P)	(2X30)	60.00	324.00	1992 (60 MW)
200	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			2027.00	9412.73	
	Total	200	683			41423.60	145376.91	
	Pumped Storage Schemes							

Sl No.	Unit/ies/Stations	No. of Stations	Units	Type of Project	Capacity(MW)	(MW)	Energy (MU)	Year of Commissioning
	Conventional H E Stations							
	Western Region							
	GUJARAT							
	State Sector							
	GSECL							
1	Kadana	1	4	PSS	(4X60)	240.00	518.00	1990 (120 MW) 1998 (120 MW)
	SSNNL							
2	Sardar Sarovar RBPH	1	6	PSS	(6X200)	1200.00	3635.00	2005 (800 MW) 2006 (400 MW)
	Total Gujarat	2	10			1440.00	4153.00	
	MAHARASHTRA							
	State Sector							
	MAHAGENCO							
3	Ghatgarh	1	2	PSS	(2X125)	250.00	410.00	2008 (250 MW)
	Private Sector							
	Tata Power Company							
4	Bhira	1	1	PSS	(1X150)	150.00		1927 (125 MW) 1949 (25 MW)
	Sub-Total Maharashtra	2	3			400.00	410.00	
	Total Western Region	4	13			1840.00	4563.00	
	Southern Region							
	TELANGANA							
	State Sector							
	TSGENCO							
5	N J Sagar	1	7	PSS	(7X100.8)	705.60	2237.00	1980 (100.8 MW) 1981 (100.8 MW) 1982 (100.8 MW) 1983 (100.8 MW) 1984 (100.8 MW) 1985 (202 MW)
6	Srisaillam LBPG	1	6	PSS	(6X150)	900.00	1400.00	2001 (300 MW) 2002 (450 MW) 2003 (150 MW)
	Sub-Total TELANGANA	2	13			1605.60	3637.00	
	TAMIL NADU							
7	Kadamparai	1	4	PSS	(4X100)	400.00	77.00	1987 (100 MW) 1988 (200 MW) 1989 (100 MW)
	Sub-Total TAMIL NADU	1	4			400.00	77.00	
	Total Southern Region	3	17			2005.60	3714.00	
	Eastern Region							
	JHARKHAND							
	Central Sector							
8	Panchet	1	1	PSS	(1X40)	40.00		1991 (40 MW)
	WEST BENGAL							
	State Sector							
	WBSDDL							
9	Purulia	1	4	PSS	(4X225)	900.00	1235.00	
	Sub-Total	1	5			940.00	1235.00	
	Total- PSS	9	36			4785.60	9512.00	
	Total (Conventional+PSS)	209	720			46209.20	154888.91	

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 31.03.2021**

STATION CAPACITY	NUMBER OF STATIONS		NUMBER OF UNITS		TOTAL CAPACITY	
RANGE (MW)	No	%	No	%	MW	%
> 25 - 100	106	50.72	277	38.47	6046.15	13.08
>100 - 500	75	35.89	290	40.28	17948.45	38.84
>500 - 1000	24	11.48	125	17.36	17279.60	37.39
>1000	4	1.91	28	3.89	4935.00	10.68
TOTAL	209	100.00	720	100	46209.2	100

HYDRO GENERATING UNITS ADDED DURING 2020-21

SL. NO.	NAME OF THE STATION	UTILITY	STATE	UNIT NO.	CAPACITY (MW)	DATE OF COMMISSIONING
CENTRAL SECTOR						
1	KAMENG	NEEPCO	Arunachal Pradesh	1	150	2020
				1	150	2020
			TOTAL (A)		300	
STATE SECTOR						
2	SAWARA KUDDU	HPPCL	HIMACHAL PRADESH	1	37	2020
				1	37	2020
				1	37	2020
			TOTAL (B)		111	
PRIVATE SECTOR						
3	SINGOLI BHATWARI	L&T	UTTARAKHAND	1	33	2020
				1	33	2020
				1	33	2020
			TOTAL (C)		99	
			TOTAL (A+B+C)		510	

CHAPTER-2

GENERATION PERFORMANCE

CHAPTER-2

GENERATION PERFORMANCE

2.1 Generation from hydro-electric power stations (above 25 MW capacity) in the country during 2020-21 was 150.29 BU against the target of 140.35 BU which was 7.08% more than the target. The generation during 2020-21 was 3.51% lower than the generation in 2019-20 i.e. 155.76 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: 2020-21

Month	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Target	9716	12943	14197	16300	19033	16832	11985	8499	7703	7364	7047	8738
Gen.	10121	14026	17016	17922	18950	18890	13143	8417	8159	7963	7316	8375
Cum. Tar	9716	22659	36856	53156	72189	89021	101006	109505	117208	124572	131619	140357
Cum. Gen.	10121	24148	41163	59085.77	78035.65	96926.09	110069.33	118486	126644.93	134608.37	141924.63	150300

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

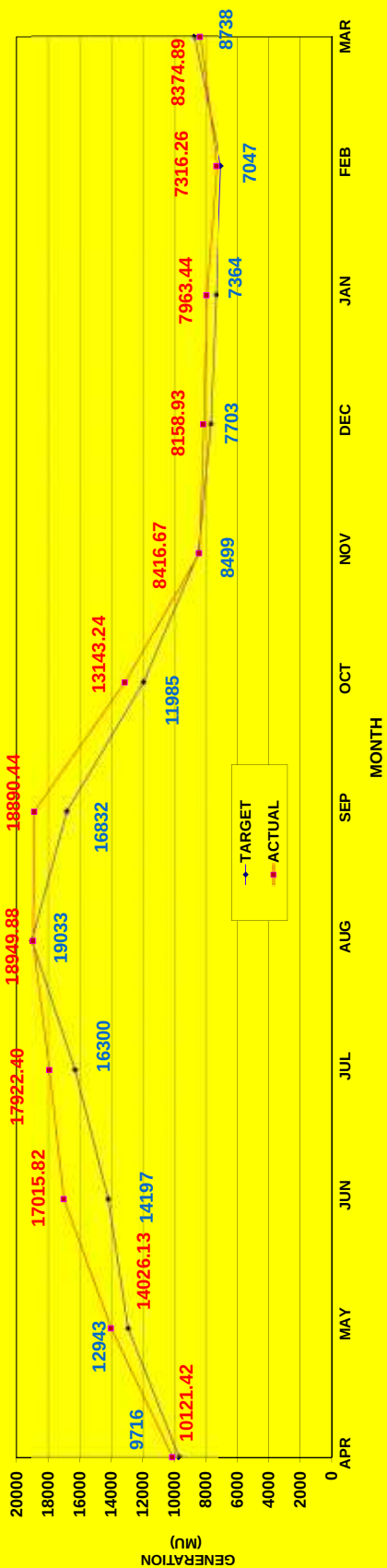
The utility-wise/ sector-wise target of energy generation viz-a-viz actual generation and surplus /shortfall in respect of Hydro-electric stations during 2020-21 & 2019-20 are given below in **Table 2.2**.

TABLE 2.2

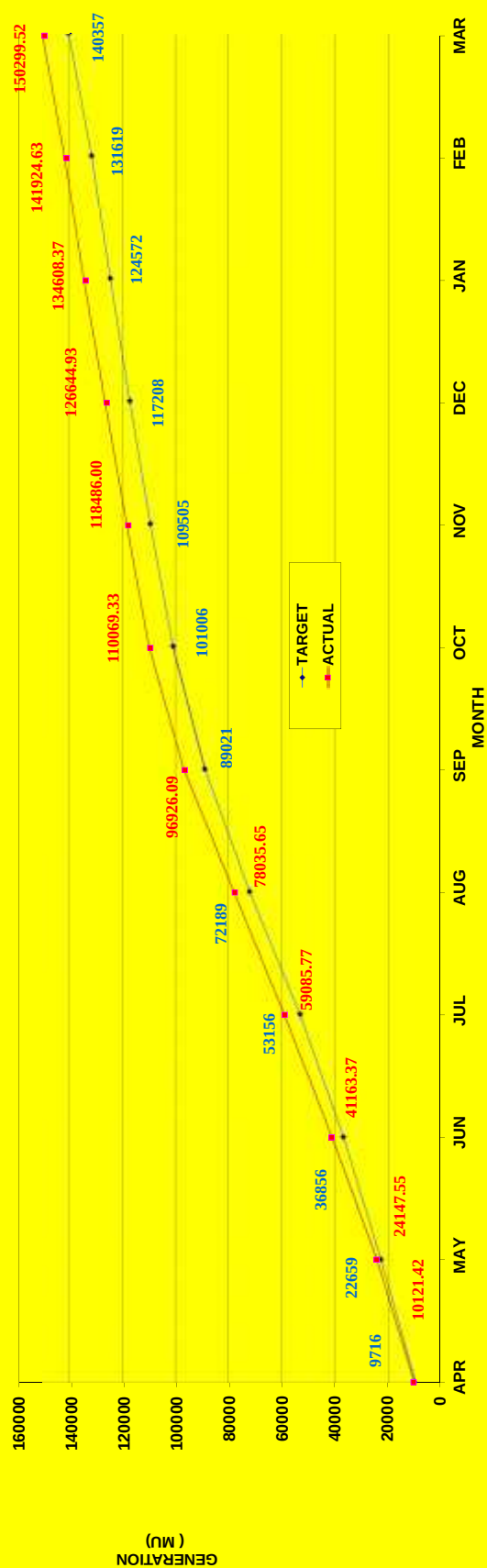
UTILITY-WISE PERFORMANCE OF HYDRO ELECTRIC STATIONS (2020-21 VIS-A-VIS 2020-21)

Utilities	Installed Capacity (MW) (As on 31.03.2021)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2020-21	2019-20	2020-21	2019-20	2020-21	2019-20
CENTRAL SECTOR							
BBMB	292.....0.2	9600.00	9470	11478	12167.23	19.56	28.48
NHPC LTD	5451.1	24542	24050	24084.69	25779.75	-1.86	7.19
SJVN LTD	1912.2	8678	8550	9094.35	9571.53	4.80	11.95
NTPC LTD	800	3482	3000	3221.41	3449.67	-7.48	14.99
THDC LTD	1400	4160	4160	4261.72	4244.93	2.45	2.04

MONTHLY ALL INDIA HYDRO GENERATION VS TARGETS
DURING 2020-21



ALL INDIA CUMMULATIVE GENERATION VS TARGETS
DURING 2020-21



Utilities	Installed Capacity (MW) (As on 31.03.2021)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2020-21	2019-20	2020-21	2019-20	2020-21	2019-20
NHDC	1520	2700	2300	4236.17	4165.6	56.90	81.11
DVC	143.2	206	210	365.47	198.47	77.41	-5.49
NEEPCO LTD	1500	4472	4877	3881.89	3051.71	-13.20	-37.43
TOTAL CENTRAL	15646.72	57840	56617	60623.7	62628.89	4.81	10.62
PRIVATE SECTOR							
MPCL	86	157	337	334.88	369.34	113.30	9.60
EPPL	100	367	350	370.47	418.09	0.95	19.45
ADHPL	192	692	692	640.53	758.71	-7.44	9.64
GBHPPL	70	260	250	275.95	283.58	6.13	13.43
JSW ENERGY	1300	5407	5381	5672.61	5999.86	4.91	11.50
IAEPL	36	273	157	159.35	169.75	-41.63	8.12
AHPC LTD	330	1310	1294	1438	1540.01	9.77	19.01
JPVL	400	1438	1750	1778.42	1998.71	23.67	14.21
DLHP	34	36	36	34.29	17.09	-4.75	-52.53
GIPL	110	500	500	488.37	472.06	-2.33	-5.59
TPCL	447	1470	1441	1524.7	1488.27	3.72	3.28
DEPL	96	408	437	399.92	406.9	-1.98	-6.89
SEPL	97	421	435	369.75	434.91	-12.17	-0.02
SNEHA KINETIC	96	460	450	458.95	485.19	-0.23	7.82
NTPGPL	0	344	0	0	0	0.00	0.00
HSPPL	0	0	0	0	0	0.00	0.00
L&T	99	145	0	0	0	0.00	0.00
GMR	0	39	0	0	0	0.00	0.00
MBPC	0	22	0	0	0	0.00	0.00
TOTAL PRIVATE	3493	13749	13510	13946.19	14842.47	1.43	9.86
STATE SECTOR							
JKSPDCL	1110	4915	4815	4940.83	5321.2	0.53	10.51
HPPCL	406	805	716	437.76	527.42	-45.62	-26.34
HPSEBL	372	1602	1560	1564.35	1812.13	-2.35	16.16
BVPC	0	272	200	0	0	-100.00	-100.00
RRVUNL	411	340	610	469.63	606.18	38.13	-0.63
PSPCL	1051	3805	3765	3951	4452.2	3.84	18.25
UPJVNL	501.6	1115	1100	1572.35	1073.48	41.02	-2.41
UJVNL	1252.15	4410	4196	4487.97	4887.52	1.77	16.48

Utilities	Installed Capacity (MW) (As on 31.03.2021)	Generation					
		Target (MU)		Actual (MU)		Surplus (+)/ Shortfall (-) in %	
		2020-21	2019-20	2020-21	2019-20	2020-21	2019-20
SSNNL	1450	3200	1300	3245.24	4177.01	1.41	221.31
GSECL	540	754	677	988.12	1237.67	31.05	82.82
MAHAGENCO	2406	3755	3881	3574.57	4157.94	-4.81	7.14
MPPGCL	875	2092	2315	2656.06	2333.42	26.96	0.80
CSPGCL	120	250	250	419.19	236.79	67.68	-5.28
APGENCO	1796.75	3174	3162	4129.94	3908.14	30.12	23.60
TSGENCO	2405.6	3211	3041	3645.38	4507.04	13.53	48.21
KPCL	3572.2	11468	11497	12403.59	13789.13	8.16	19.94
KSEBL	1856.5	5900	6034	6628.39	5454.04	12.35	-9.61
TANGEDCO	2178.2	4040	3890	5212.71	4765.24	29.03	22.50
JUUNL	130	110	110	50	36.12	-54.55	-67.16
OHPC	2027.5	5372	5570	6193.91	6059.2	15.30	8.78
TUL	1200	5300	5213	6043.98	6041.55	14.04	15.89
WBSEDCL	986	1578	1528	1759.64	1511.75	11.51	-1.06
APGCL	100	380	390	203.03	384.3	-46.57	-1.46
MePGCL	322	920	985	1151.99	1018.29	25.22	3.38
TOTAL STATE	27069.5	68768	66805	75729.63	78297.76	10.12	17.20
TOTAL ALL INDIA	46209.22	140357	136932	150299.52	155769.12	7.08	13.76

During the year 2020-21, 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 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 2020-21 is indicated in **Table 2.3**.

TABLE 2.3
GENERATION PERFORMANCE – REGION-WISE
(2020-21)

S. No.	Region	Installed Capacity as on 31.03.2021 (MW)	Generation During 2020-21		
			Target (MU)	Actual (MU)	Shortfall (-)/ Surplus (+) Over Target (%)
1	Northern	19233.27	73243	75233.86	2.72
2	Western	7392	14257	16678.34	16.98
3	Southern	11694.5	27293	31353.95	14.88
4	Eastern	5862.45	19192	21174.84	10.33
5	North-Eastern	2027	6372	5858.53	-8.06
	Total (All India)	46209.22	140357	150299.52	7.08

- Hydel generation during 2020-21 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 2020-21 was 150299 MU against the target of 140357 MU viz higher in generation by 9942.52 MU (7.08%). However, actual hydel generation during 2020-21 is less than previous year generation of 155769.1 MU by 3.51%.

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

2.5 Sector-wise generation performance during the year 2020-21 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: 2020-21**

Sl. No.	Sector	Installed Capacity as on 31.03.2021 (MW)	Generation		
			Target (MU)	Actual (MU)	Shortfall (-) Surplus (+) Over Target (%)
1	Central	15646.72	57840.00	60623.70	4.81
2	State	27069.50	68768.00	75729.63	10.12
3	Private	3493.00	13749.00	13946.19	1.43
	Total	46209.22	140357.00	150299.52	7.08

2.6 Details of actual generation during 2020-21 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 2020-21 is given in **Table 2.5**.

TABLE 2.5

**H.E. STATIONS ACHIEVING HIGHER GENERATION VIS-A-VIS TARGET
PERIOD: 2020-21**

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	24	11.94	Pong, Obra, Hasdeo Bango, Ukai, Indira Sagar, Omkareshwar, Gandhi Sagar, Koyna St.I&II, ,N.J.Sagar RBC, Ghatprabha, Jog, Bhawani K Barrage-III, Bhawani K Barrage-I, Bhawani K Barrage-II, Parson's Valley, Sholayar I, Lower Jurala, , N.J.Sagar LBC, Pochampad, Priyadarshni, Pulichinthala, Panchet, Maithon, Purulia PSS, Umiu St-I

2	140 - 150	12	5.97	Baira Siul, Nimoo Bazgo, Mahi Bajaj I & II, Matatilla, Rihand, Bansagar Tons-II, Upper sileru I & II, Kodayar I&II, Lower Mettur I-IV, Rengali, Kyrdemkulai, New Umtru
3	130 - 140	15	7.4	Chutak, Koyna DPH, Almatti Dam, Kundah I-V, Papanasam, Periyar, Suruliyar, Balimela, Machkund. Bansagar Tons-I, Kundah I-V, Papanasam, Periyar, Suruliyar, Balimela, Machkund
4	120 - 130	17	8.45	Sainj, Ganguwal ,Kotla, Mukerian I – IV, Jawahar Sagar, Vishnu Prayag, Sardar Sarovar CHPH, Bansagar Tons-III, Madhikheda, Rajghat, Pench, Lower Sileru, Munirabad, Idukki, Kuttiadi & Kuttiady Addl., Mettur Dam, Jaldhaka I
5	110 - 120	19	9.45	Bhakra L&R, Uri –II, Dhakrani (Y.St.I), Ram Ganga, Bhira Tail Race, Bhadra, Kalinadi, T.B.Dam & Hampi, Sholayar, Mettur Tunnel, Pykara Ultimate, Sarkarpathy, Hirakud I&II, Upper Kolab, Teesta III, Rammam II, Ranganadi, Pare, Myntdu
6	100 - 110	44	21.89	Dehar, Naptha Jhakri, Rampur, Kol Dam, Bassi, Malana-II, Baspa-II, Karcham Wangtoo, Budhil, Malana, Dulhasti, Salal-I, Uri, Baglihar, Lower Jhelum, Khara, Dhauliganga, Tanakpur, Tehri, Koteswar, Chibro (Y.St.II), Khatima, Khodri (Y.St.II), Kulhal (Y.St.IV), Maneri Bhali-I, Maneri Bhali-II, Srinagar, Kadana PSS, Bargi, Koyna St.III, Bhivpuri, Kadra, Supa DPH, Kodalali, Lingnamakki, Varahi, , Kakkad, Lower Periyar, Sabarigiri, Moyar, Teesta-V, Purulia, Loktak, Umium St-IV

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

REGION-WISE ACTUAL GENERATION VS TARGET DURING 2020-21

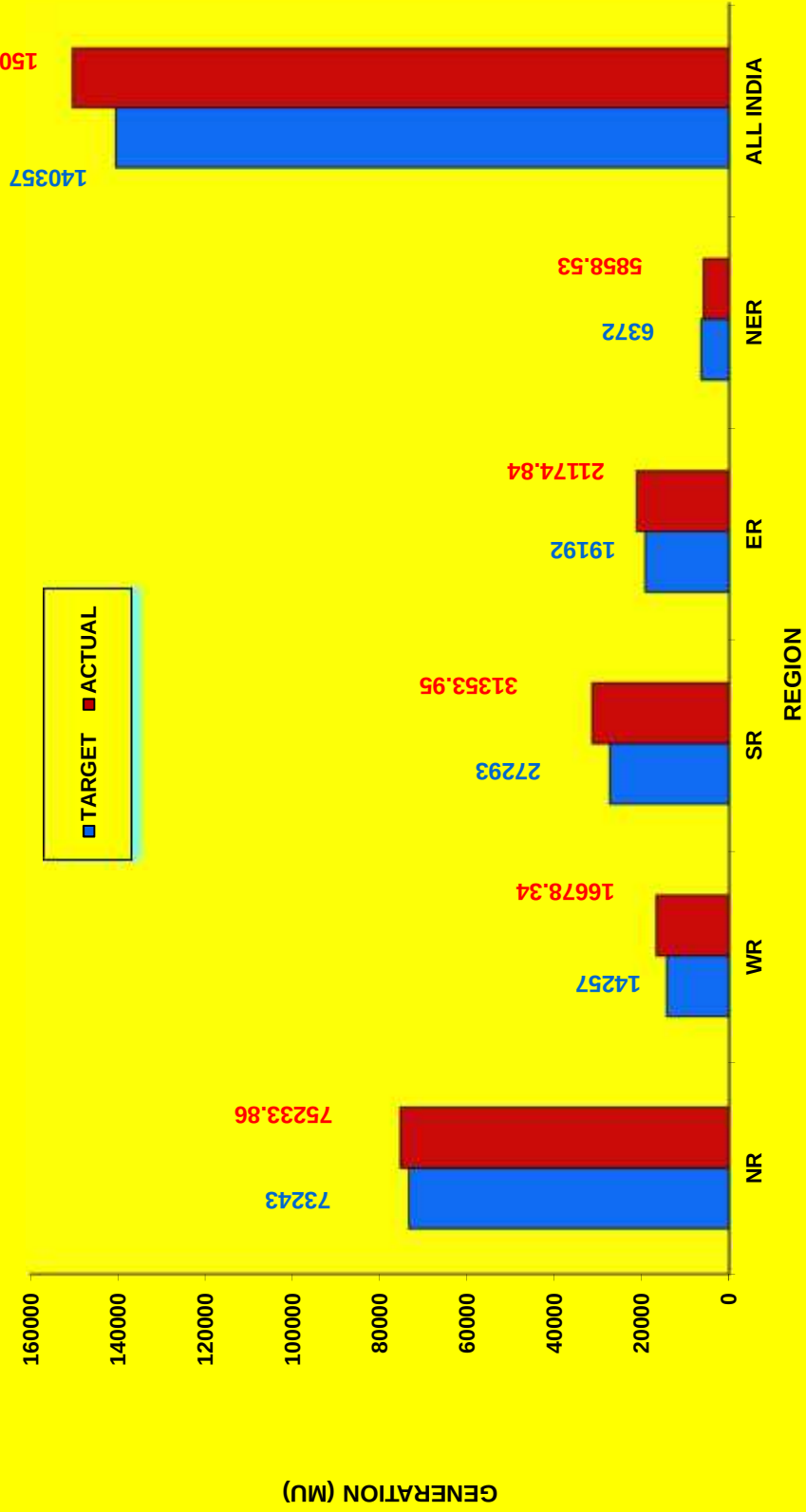


TABLE 2.6

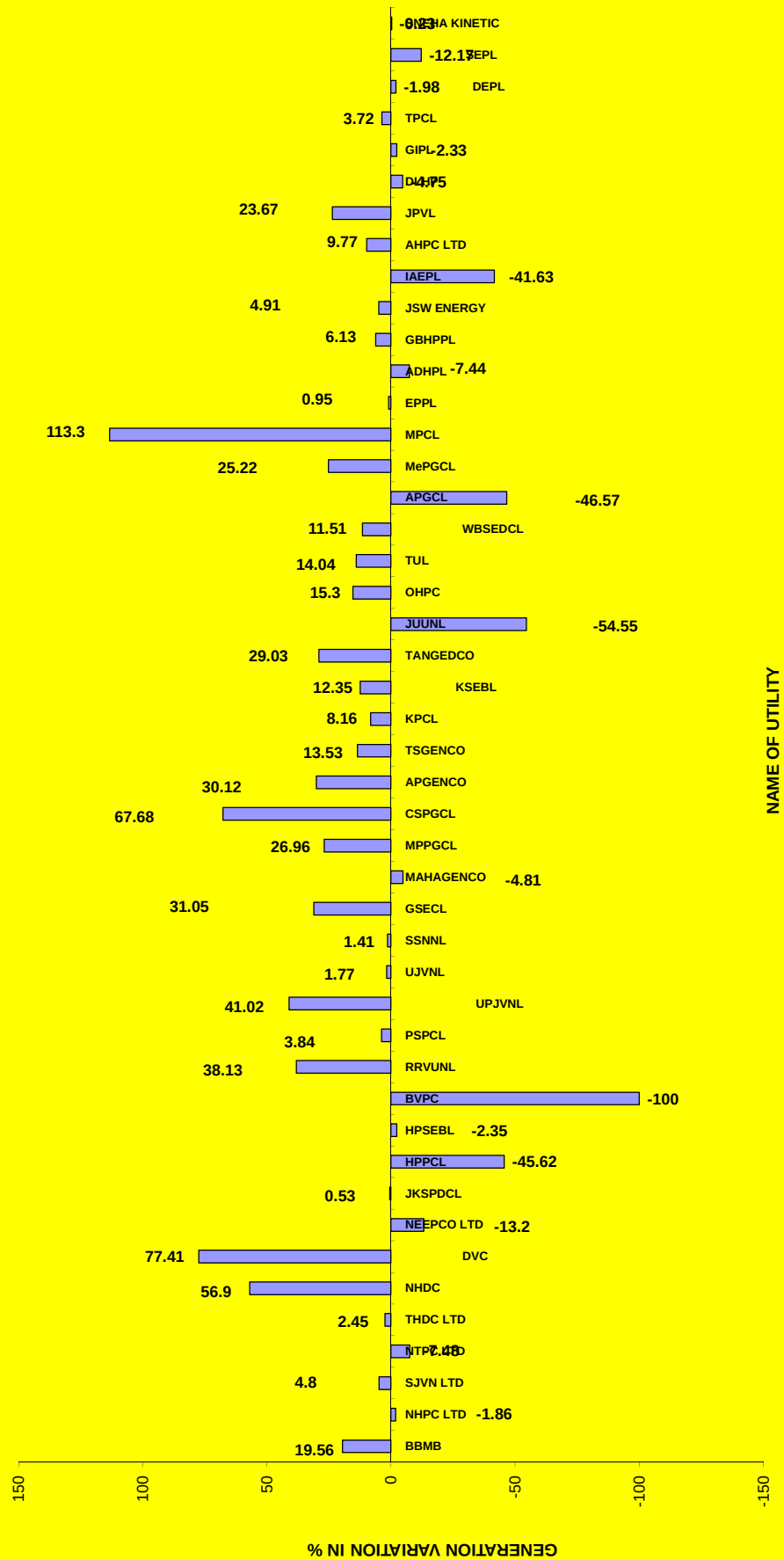
**H.E. STATIONS HAVING SHORTFALL IN GENERATION VIS-A-VIS TARGETS
PERIOD: 2020-21**

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	29	14.42	Chamera-III, Parbati III, Chamera-I, Giri Bata, Larji, Sanjay, Shanan, Allain Duhangan, Tidong, Baglihar II, Ranjit Sagar, Chilla, Dhalipur (Y.St.I), Sagar, Sardar Sarovar RBPH, Tillari, Bhandardhara – II, Khopoli, Gerusoppa, Sharavathy, Idamalayar, Aliyar, Kadamparai PSS, N.J.Sagar PSS, Jorethang Loop, Chuzachen, Dikchu, Teesta Low Dam-III, Teesta Low Dam-IV, Doyang.
2	80-90	8	3.98	Upper Sindh II, A.P.Sahib I & II, Neriamangalam, Sengulam, Srisailam LB, Upper Indravati, Rangit, Tashiding,
3	70 -80	7	3.48	Sewa-II, Kishenganga, Koyna IV, Bhira, Pallivasal, Kameng, Tuirial.
4	60 -70	3	1.49	Chamera-II, Ghatghar PSS, N.J.Sagar TPD
5	50 -60	1	0.49	Karbi Langpi
6	40 -50	1	0.49	Subernarekha I&II
7	30 -40	1	0.49	Khandong,
8	10 -30	1	0.49	Vaitarna
9	0 -10	14	6.9	Parbati II*, Kishang, Swara Kuddu, Uhl-III*, Chanju-I, Sorang, Bajoli Holi, R.P. Sagar, Tapovan Vishnugad, Singoli Bhatwari, Maheshwar*, Pykara, Rongnichu, Kopili

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

UTILITY-WISE EXCESS/ SHORTFALL IN GENERATION DURING 2020-21



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 2020-21

Region	Installed Capacity as on 31.03.2021 (MW)	Generation (BU)					2020-21
		2015-16	2016-17	2017-18	2018-19	2019-20	
Northern	19233.27	73.11	71.76	74.73	72.40	80.55	75.23
Western	7392	12.85	17.18	9.18	9.76	17.81	16.67
Southern	11694.5	20.98	17.04	19.02	28.81	31.75	31.35
Eastern	5862.45	10.24	11.75	17.52	18.90	20.82	21.17
North Eastern	2027	4.21	4.65	5.67	5.02	48.20	5.858
Total	46209.22	121.38	122.38	126.12	134.90	155.76	150.29
Rainfall		2015-16 (mm)	2016-17 (mm)	2017-18 (mm)	2018-19 (mm)	2019-20 (mm)	2020-21 (mm)
All-India		1085.0	1083.1	1127.1	1020.8	968.3	

It can be observed from the above table that maximum hydro generation of 155.7 BU was achieved during the year 2019-20 as compared previous four years mainly due to better rainfall in the catchment areas of hydro power stations besides increase in installed capacity.

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
NORTHERN REGION					
HIMACHAL PRADESH					
CENTRAL SECTOR					
BBMB					
Bhakra L&R	1379.00	3924.00	4550.00	5435.99	119.47
Dehar	990.00	3110.00	2950.00	2993.31	101.47
Pong	396.00	1123.00	1100.00	1775.60	161.42
Total BBMB-HP	2765.00	8157.00	8600.00	10204.90	118.66
NHPC					
Baira Siul	180.00	779.28	310.00	457.60	147.61
Chamera-I	540.00	1664.56	2450.00	2264.85	92.44
Chamera-II	300.00	1499.89	1000.00	684.60	68.46
Chamera-III	231.00	1108.00	1050.00	995.88	94.85
Parbati III	520.00	1977.23	675.00	616.91	91.39
Parbati II*			265.00	0.00	0.00
Total NHPC -HP	1771.00	7028.96	5750	5019.84	87.30
SJVN					
Naptha Jhakri	1500.00	6612.00	6800.00	7099.00	104.40
Rampur	412.00	1878.08	1878.00	1995.35	106.25
Naitwar Mori	60.00				
Total SJVN	1972.00	8490.08	8678	9094.35	104.80
NTPC					
Kol Dam	800.00	3054.79	3055.00	3221.41	105.45
Total NTPC	800.00	3054.79	3055	3221.41	105.45
Total Central-HP	7308.00	26730.83	26083	27540.50	105.59
STATE SECTOR					
HPPCL					
Kashang I	65.00	245.80	185.00	12.98	7.02
Kashang II & III	130.00				
Sainj	100.00	323.23	350.00	424.78	121.37
Swara Kuddu	111.00	386.00	270.00	0.00	0.00
Total HPPCL	406.00	955.03	805.00	437.76	54.38

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
HPSEB LTD					
Bassi	66.00	346.77	302.00	308.98	102.31
Giri Bata	60.00	240.00	181.00	164.75	91.02
Larji	126.00	586.85	619.00	616.31	99.57
Sanjay	120.00	518.00	500.00	474.31	94.86
Total HPSEB LTD	372.00	1691.62	1602	1564.35	97.65
Beas Valley Power. Corp. Ltd. (BVPC)					
Uhl-III*			272.00	0.00	0.00
Total BVPC			272	0.00	0.00
PSPCL					
Shanan	110.00	585.00	485.00	477.07	98.36
Total PSPCL-HP	110.00	585.00	485.00	477.07	98.36
Total State Sector-HP	888.00	3231.65	3164	2479.18	78.36
PRIVATE					
Allain Duhangan Power Power Ltd.					
Allain Duhangan	192.00	678.18	692.00	640.53	92.56
Everest Power Private Ltd.					
Malana-II	100.00	403.00	367.00	370.47	100.95
HBPCL					
Baspa-II	300.00	1213.00	1276.00	1311.17	102.76
Karcham Wangtoo	1045.00	4131.06	4131.00	4361.44	105.58
Total HBPCL	1345.00	5344.06	5407	5672.61	104.91
GBHPPL					
Budhil	70.00	291.73	260.00	275.95	106.13
IA Energy Pvt. Ltd.					
Chanju I	36.00	157.82	273.00	0.00	0.00
Malana Power Company Ltd.					
Malana	86.00	370.93	157.00	159.35	101.50
NSL Tidond Power Generation Pvt. Ltd.					
Tidong*			344.00	334.88	97.35

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Himachal Sorang Power Limited (HSPL)					
Sorang	100	524	0.00	0.00	0.00
GMR					
Bajoli Holi			39.00	0.00	0.00
Total Private-HP	1929.00	7769.72	7539	7454	98.87
Total H.P.	10125.00	37732.20	36786	37473.47	101.87
JAMMU & KASHMIR					
CENTRAL SECTOR					
NHPC					
Dulhasti	390.00	1907.00	2200.00	2329.62	105.89
Salal-I	345.00	3082.00	3500.00	3632.16	103.78
Salal-II	345.00				
Sewa-II	120.00	533.52	500.00	376.14	75.23
Uri	480.00	2587.38	2900.00	2986.37	102.98
Uri -II	240.00	1124.00	1420.00	1626.07	114.51
Kishenganga	330.00	1705.62	1500.00	1111.49	74.10
Total NHPC -J&K	2250.00	10939.52	12020	12061.85	100.35
Total Central Sector - J&K	2250.00	10939.52	12020	12061.85	100.35
STATE SECTOR					
JKSPDC					
Baglihar	450.00	2643.00	2600.00	2657.85	102.23
Baglihar II	450.00	1302.30	1450.00	1446.95	99.79
Lower Jhelum	105.00	533.00	555.00	561.23	101.12
Upper Sindh II	105.00	355.00	310.00	274.80	88.65
Total JKSPDC	1110.00	4833.30	4915	4940.83	100.53
Total State Sector-J&K	1110.00	4833.30	4915	4940.83	100.53
Total Jammu & Kashmir	3360.00	15772.82	16935	17002.68	100.40
LADHAK					
CENTRAL SECTOR					
NHPC					
Chutak	44.00	213.00	120.00	158.57	132.14
Nimoo Bazgo	45.00	239.00	150.00	217.64	145.09
Total Central Sector-Ladhak	89.00	452.00	270.00	376.21	139.34

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Total Ladhak	89.00	452.00	270.00	376.21	139.34
PUNJAB					
CENTRAL SECTOR					
BBMB					
Ganguwal	77.65	1358.00	500.00	635.64	127.13
Kotla	77.65		500.00	637.46	127.49
Total BBMB-Punjab	155.30	1358.00	1000	1273.10	127.31
STATE SECTOR					
PSPCL					
A.P.Sahib I & II	134.00	909.00	640.00	573.91	89.67
Mukerian I - IV	207.00	1206.00	1120.00	1401.13	125.10
Ranjit Sagar	600.00	1507.00	1560.00	1498.89	96.08
Total PSPCL	941.00	3622.00	3320	3473.93	104.64
Total State Sector-Punjab	941.00	3622.00	3320	3473.93	104.64
Total Punjab	1096.30	4980.00	4320	4747.03	109.88
RAJASTHAN					
STATE SECTOR					
RRVUNL					
Jawahar Sagar	99.00	298.00	200.00	257.18	128.59
Mahi Bajaj I & II	140.00	289.00	140.00	202.37	144.55
R.P. Sagar	172.00	459.00	0.00	10.08	0.00
Total RRVUNL	411.00	1046.00	340	469.63	138.13
Total State sector-Rajasthan	411.00	1046.00	340	469.63	138.13
Total Rajasthan	411.00	1046.00	340	469.63	138.13
UTTAR PRADESH					
STATE SECTOR					
UPJVNL					
Khara	72.00	385.00	300.00	325.46	108.49
Matatilla	30.60	123.00	80.00	116.81	146.01
Obra	99.00	279.00	185.00	338.87	183.17
Rihand	300.00	920.00	550.00	791.21	143.86
Total UPJVNL	501.60	1707.00	1115	1572.35	141.02
Total State Sector-UP	501.60	1707.00	1115	1572.35	141.02
Total Uttar Pradesh	501.60	1707.00	1115	1572.35	141.02

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 CURRENT YEAR 2021-2022

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
UTTARAKHAND					
CENTRAL SECTOR					
NHPC					
Dhauliganga	280.00	1134.69	1135.00	1153.23	101.61
Tanakpur	94.20	452.19	452.00	473.15	104.68
Total NHPC-UK	374.20	1586.88	1587	1626	102.48
NTPC					
Tapovan Vishnugad			427.00	0.00	0.00
Total NTPC-UK			427	0	0.00
THDC LTD					
Tehri	1000.00	2797.00	3000.00	3040.27	101.34
Koteshwar	400.00	1155.00	1160.00	1221.45	105.30
Total THDC LTD	1400.00	3952.00	4160	4261.72	102.45
Total Central Sector - UK	1774.20	5538.88	5747	5888.10	102.46
STATE SECTOR					
UJVNL					
Chibro (Y.St.II)	240.00	750.00	817.00	821.63	100.57
Chilla	144.00	725.00	750.00	733.08	97.74
Dhakrani (Y.St.I)	33.75	169.00	135.00	152.66	113.08
Dhalipur (Y.St.I)	51.00	192.00	185.00	174.05	94.08
Khatima	41.40	208.00	210.00	218.80	104.19
Khodri (Y.St.II)	120.00	345.00	355.00	375.46	105.76
Kulhal (Y.St.IV)	30.00	164.00	130.00	133.39	102.61
Maneri Bhali-I	90.00	395.00	325.00	329.23	101.30
Maneri Bhali-II	304.00	1566.10	1278.00	1288.89	100.85
Ram Ganga	198.00	334.00	225.00	260.78	115.90
VYASI HPS					
Total UJVNL	1252.15	4848.10	4410	4487.97	101.77
Total State Sector-Uttarakhand	1252.15	4848.10	4410	4487.97	101.77
PRIVATE SECTOR					
AHPC LTD					
Srinagar	330.00	1396.84	1310.00	1438.00	109.77
Jaiprakash Power Venture Ltd.					
Vishnu Prayag	400.00	1774.42	1438.00	1778.42	123.67
L&T					
Singoli Bhatwari	99.00	473	145.00	0.00	0.00
Total Private Sector - UK	829.00	3644.26	2893	3216	111.18
Total Uttarakhand	3855.35	14031.24	13477	13592	100.86
Total N. REGION	19438.25	75721.26	73243	75233.86	102.72

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
WESTERN REGION					
CHHATISGARH					
STATE SECTOR					
CSPGC					
Hasdeo Bango	120.00	245.00	250.00	419.19	167.68
Total CSPGC	120.00	245.00	250	419.19	167.68
Total State Sector-Chhatisgarh	120.00	245.00	250	419.19	167.68
Total Chhatisgarh	120.00	245.00	250	419.19	167.68
GUJARAT					
STATE SECTOR					
GSECL					
Kadana PSS	240.00	518.00	329.00	337.06	102.45
Ukai	300.00	1080.00	425.00	651.06	153.19
Total GSECL	540.00	1598.00	754.00	988.12	131.05
SSNNL					
Sardar Sarovar CHPH	250.00	213.00	900.00	1086.96	120.77
Sardar Sarovar RBPH	1200.00	3635.00	2300.00	2158.28	93.84
Total SSNNL	1450.00	3848.00	3200	3245.24	101.41
Total State Sector -Gujarat	1990.00	5446.00	3954	4233.36	107.07
Total Gujarat	1990.00	5446.00	3954	4233.36	107.07
MADHYA PRADESH					
CENTRAL					
NHDC					
Indira Sagar	1000.00	1980.00	1775.00	2793.62	157.39
Omkareshwar	520.00	1166.57	925.00	1442.55	155.95
Total NHDC	1520.00	3146.57	2700	4236.17	156.90
Total Central Sector-MP			2700	4236	156.90
STATE SECTOR					
MPPGCL					
Bansagar Tons-I	315.00	900.00	905.00	1184.19	130.85
Bansagar Tons-II	30.00	113.00	75.00	111.67	148.89
Bansagar Tons-III	60.00	143.00	110.00	135.63	123.30
Bargi	90.00	508.08	420.00	434.13	103.36
Gandhi Sagar	115.00	420.48	70.00	148.38	211.97
Madhikheda	60.00	74.12	94.00	118.18	125.72
Rajghat	45.00	87.60	88.00	108.98	123.84
Total MPPGCL	715.00	2246.28	1762	2241.16	127.19
Total State-MP	715.00	2246.28	1762	2241.16	127.19

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
SMHPCL(PVT.)					
Maheshwar*			0.00	0.00	0.00
Total M.P.	2235.00	5392.85	4462	6477	145.17
MAHARASHTRA					
STATE SECTOR					
MAHAGENCO					
Bhira Tail Race	80.00	75.00	85.00	97.33	114.51
Ghatghar PSS	250.00	146.00	256.00	155.32	60.67
Koyna DPH	36.00	410.00	120.00	165.41	137.84
Koyna St.I&II	600.00	3030.00	765.00	1226.22	160.29
Koyna St.III	320.00		568.00	585.21	103.03
Koyna IV	1000.00		1707.00	1195.78	70.05
Tillari	60.00	133.00	110.00	106.54	96.85
Vaitarna	60.00	144.00	144.00	42.76	29.69
Total MAHAGENCO	2406.00	3938.00	3755	3574.57	95.19
MPPGPCL					
Pench	160.00	315.36	330.00	414.90	125.73
Total MPPGPCL-Maha.	160.00	315.36	330	414.90	125.73
Total State Sector-Maha.	2566.00	4253.36	4085	3989.47	97.66
PRIVATE SECTOR					
Dodson-Lindblom Hydro Power Pvt. Ltd. (DLHPPL)					
Bhandardhara - II	34.00	50.00	36.00	34.29	95.25
Total DLHP	34.00	50.00	36	34.29	95.25
Tata Power Company Ltd.					
Bhira	150.00	775.00	452.00	358.87	79.40
Bhira PSS	150.00		448.00	585.97	130.80
Bhivpuri	75.00	220.00	285.00	299.70	105.16
Khopoli	72.00	225.00	285.00	280.16	98.30
Total TPCL	447.00	1220.00	1470	1524.70	103.72
Total Private Sector-Maharashtra	481.00	1270.00	1506	1558.99	103.52
Total Maharashtra	3047.00	5523.36	5591	5548.46	99.24
Total Western	7392.00	16607.21	14257	16678	116.98
SOUTHERN REGION					
ANDHRA PRADESH					
STATE SECTOR					
APGENCO					
N.J.Sagar TPD	50.00	177.00	90.00	54.69	60.77

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
N.J.Sagar RBC	90.00	156.00	100.00	155.55	155.55
Srisailem RB	770.00	2900.00	850.00	1157.26	136.15
Upper sileru I & II	240.00	529.00	420.00	620.05	147.63
Lower Sileru	460.00	1070.00	1058.00	1292.57	122.17
Total APGENCO	1610.00	4832.00	2518	3280.12	130.27
Total State Sector-AP	1610.00	4832.00	2518	3280.12	130.27
Total Andhra Pradesh	1610.00	4832.00	2518	3280.12	130.27
KARNATAKA					
STATE SECTOR					
KPCL					
Almatti Dam	290.00	483.00	466.00	643.69	138.13
Bhadra	26.00	123.00	48.00	56.73	118.19
Gerusoppa	240.00	622.00	531.00	480.56	90.50
Ghatprabha	32.00	131.00	65.00	110.12	169.42
Jog	139.20	118.00	240.00	373.80	155.75
Kadra	150.00	570.00	374.00	410.34	109.72
Kalinadi	900.00	3385.00	2721.00	3147.22	115.66
Supa DPH	100.00	542.00	429.00	443.53	103.39
Kodasali	120.00	512.00	351.00	382.99	109.11
Lingnamakki	55.00	254.00	254.00	255.53	100.60
Munirabad	28.00	66.00	81.00	102.10	126.05
Sharavathy	1035.00	4932.00	4653.00	4582.71	98.49
Shivasamudram	42.00	183.00	240.00	321.13	133.80
Varahi	460.00	1060.00	1015.00	1093.14	107.70
Total KPCL	3617.20	12981.00	11468	12403.59	108.16
APGENCO					
T.B.Dam & Hampi	72.00	236.00	156.00	183.76	117.79
Total APGENCO-Karnataka	72.00	236.00	156	183.76	117.79
Total State Sector-Karnataka	3689.20	13217.00	11624	12587.35	108.29
Total Karnataka	3689.20	13217.00	11624	12587.35	108.29
KERALA					
STATE SECTOR					
KSEB Ltd.					
Idamalayar	75.00	380.00	292.00	289.99	99.31
Idukki	780.00	2398.00	2071.00	2530.15	122.17
Kakkad	50.00	262.00	183.00	184.86	101.02

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Kuttiadi & Kuttiady Addl.	225.00	323.00	582.00	748.06	128.53
Lower Periyar	180.00	493.00	501.00	537.99	107.38
Neriamangalam	45.00	237.00	325.00	284.74	87.61
Pallivasal	37.50	284.00	180.00	134.27	74.59
Panniar	30.00	158.00	138.00	181.26	131.35
Poringalkuthu	32.00	170.00	116.00	153.46	132.29
Sabarigiri	300.00	1338.00	1159.00	1227.64	105.92
Sengulam	48.00	182.00	143.00	117.53	82.19
Sholayar	54.00	233.00	210.00	238.44	113.54
Total KSEB LTD.	1856.50	6458.00	5900.00	6628.39	112.35
Total State Sector-Kerala	1856.50	6458.00	5900	6628.39	112.35
Total Kerala	1856.50	6458.00	5900	6628.39	112.35
TAMIL NADU					
STATE SECTOR					
TANGEDCO					
Aliyar	60.00	175.00	120.00	119.21	99.34
Bhawani K Barrage-III	30.00	90.00	40.00	60.95	152.38
Bhawani K Barrage-II	30.00	100.00	52.00	81.23	156.21
Bhawani K Barrage-I	30.00	80.00	57.00	101.70	178.42
Kadamparai PSS	400.00	77.00	378.00	353.71	93.57
Kodayar I&II	100.00	165.00	200.00	293.26	146.63
Kundah I-V	555.00	1387.00	1231.00	1721.44	139.84
Lower Mettur I-IV	120.00	252.00	195.00	290.49	148.97
Mettur Dam	50.00	541.00	110.00	133.80	121.64
Mettur Tunnel	200.00		290.00	337.16	116.26
Moyar	36.00	115.00	110.00	112.23	102.03
Papanasam	32.00	105.00	100.00	131.83	131.83
Parson's Valley	30.00	53.00	30.00	50.88	169.60
Periyar	161.00	409.00	410.00	548.03	133.67
Pykara	59.20	274.00	35.00	0.04	0.11
Pykara Ultimate	150.00	30.00	305.00	337.94	110.80
Sarkarpathy	30.00	162.00	117.00	137.29	117.34
Sholayar I	70.00	254.00	175.00	290.42	165.95
Suruliyar	35.00	79.00	85.00	111.10	130.71
Total TANGEDCO	2178.20	4348.00	4040	5212.71	129.03
Total State Sector-TN	2178.20	4348.00	4040	5212.71	129.03
Total Tamilnadu	2178.20	4348.00	4040	5212.71	129.03

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
TELANGANA					
STATE SECTOR					
TSGENCO					
Lower Jurala	240.00	534.43	175.00	403.31	230.46
N.J.Sagar PSS	815.60	2237.00	1290.00	1248.73	96.80
N.J.Sagar LBC	60.00	104.00	60.00	101.21	168.68
Pochampad	36.00	147.00	50.00	91.02	182.04
Priyadarshni Jurala	234.00	404.00	186.00	368.29	198.01
Pulichinthala	120.00	219.42	50.00	201.38	402.76
Srisailem LB	900.00	1400.00	1400.00	1231.44	87.96
Total TSGENCO	2405.60	5045.85	3211	3645.38	113.53
Total State Sector-Telangana	2405.60	5045.85	3211	3645.38	113.53
Total Telangana	2405.60	5045.85	3211	3645.38	113.53
Total Southern	11739.50	33900.85	27293	31353.95	114.88
EASTERN REGION					
JHARKHAND					
CENTRAL SECTOR					
DVC					
Panchet	80.00	237.00	105.00	173.09	164.85
Total DVC	80.00	237.00	105	173.09	164.85
Total Central Sector-Jharkhand	80.00	237.00	105	173.09	164.85
STATE SECTOR					
JUUNL					
Subernarekha I&II	130.00	149.00	110.00	50.00	45.45
Total Jharkhand	130.00	149.00	110	50.00	45.45
Total State Sector-Jharkhand	130.00	149.00	110	50.00	45.45
Total Jharkhand	210.00	386.00	215	223.09	103.76
ODISHA					
STATE SECTOR					
OHPC					
Balimela	510.00	1183.00	1210.00	1656.07	136.87
Hirakud I&II	347.50	1174.00	795.00	952.93	119.87
Rengali	250.00	525.00	689.00	1014.76	147.28
Upper Indravati	600.00	1962.00	1962.00	1757.33	89.57
Upper Kolab	320.00	832.00	716.00	812.82	113.52
Total OHPC	2027.50	5676.00	5372	6193.91	115.30

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
APGENCO					
Machkund	114.75	670.00	500.00	666.06	133.21
Total APGENCO-Odisha	114.75	670.00	500	666.06	133.21
Total State Sector-Odisha	2142.25	6346.00	5872	6859.97	116.83
Total Odisha	2142.25	6346.00	5872	6859.97	116.83
SIKKIM					
CENTRAL SECTOR					
NHPC					
Rangit	60.00	338.61	345.00	288.70	83.68
Teesta-V	510.00	2572.70	2700.00	2829.83	104.81
Total NHPC	570.00	2911.31	3045.00	3118.53	102.41
Total Central Sector-Sikkim	570.00	2911.31	3045	3118.53	102.41
STATE SECTOR					
Teesta Urja Ltd. (TUL)					
Teesta III	1200.00	5214.00	5300.00	6043.98	114.04
Total TUL	1200.00	5214.00	5300	6043.98	114.04
Total State Sector-Sikkim	1200.00	5214.00	5300	6043.98	114.04
PRIVATE SECTOR					
DANS Energy Pvt. Ltd. (DEPL)					
Jorethang Loop	96.00	459.00	408.00	399.92	98.02
Shiga Energy Pvt. Ltd.(SEPL)					
Tashiding	97.00	425.05	421.00	369.75	87.83
Gati Infrastructure Pvt. Ltd. (GIPL)					
Chuzachen HEP	110.00	537.81	500.00	488.37	97.67
Sneha Kinetic					
Dikchu	96.00	431.00	460.00	458.95	99.77
MBPC					
Rongnichu	113.00	434.00	22.00	0.00	0.00
Total Private-Sikkim	512.00	2286.86	1811	1717	94.81
Total Sikkim	2282.00	10412.17	10156	10879.50	107.12
WEST BENGAL					
CENTRAL SECTOR					
NHPC					
Teesta Low Dam-III	132.00	594.00	550.00	541.28	98.41
Teesta Low Dam-IV	160.00	719.67	720.00	718.98	99.86
Total NHPC	292.00	1313.67	1270	1260.26	99.23

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
DVC					
Maithon	63.20	137.00	101.00	192.38	190.48
Total DVC-WB	63.20	137.00	101	192.38	190.48
Total Central Sector-WB	355.20	1450.67	1371	1452.64	105.95
STATE SECTOR					
WBSSEDCL					
Jaldhaka I	36.00	165.00	158.00	201.48	127.52
Purulia PSS	900.00	1235.00	1200.00	1303.44	108.62
Rammam II	50.00	210.00	220.00	254.72	115.78
Total WBSSEDCL	986.00	1610.00	1578	1759.64	111.51
Total State Sector -WB	986.00	1610.00	1578	1759.64	111.51
Total West Bengal	1341.20	3060.67	2949	3212.28	108.93
Total Eastern	5975.45	20204.84	19192	21174.84	110.33
NORTH EASTERN REGION					
ARUNACHAL PRADESH					
CENTRAL SECTOR					
NEEPCO					
Ranganadi	405.00	1509.66	1255.00	1399.27	111.50
Pare	110.00	506.42	460.00	522.32	113.55
Kameng	600.00	3353.00	2150.00	1529.75	71.15
Total NEEPCO-Arunachal Pradesh	1115.00	5369.08	3865	3451	89.30
NHPC					
Subansiri Lower					
Total NHPC					
Total Central Sector-Arunachal Pradesh			3865	3451.34	89.30
Total Arunachal Pradesh	1115.00	5369.08	3865	3451.34	89.30
ASSAM					
CENTRAL SECTOR					
NEEPCO					
Kopili	200.00	1186.14	0.00	0.00	0.00
Khandong	50.00	363.95	179.00	67.84	37.90
Total NEEPCO-Aassm	250.00	1550.09	179	67.84	37.90
Total Central Sector-Assam	250.00	1550.09	179	67.84	37.90
STATE SECTOR					
APGCL					
Karbi Langpi	100.00	390.00	380.00	203.03	53.43

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Total APGCL	100.00	390.00	380	203.03	53.43

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Total State Sector-Assam	100.00	390.00	380	203.03	53.43
Total Assam	350.00	1940.09	559	270.87	48.46
NAGALAND					
CENTRAL SECTOR					
NEEPCO					
Doyang	75.00	227.24	218.00	203.86	93.51
Total NEEPCO-Nagaland	75.00	227.24	218.00	203.86	93.51
Total Central Sector-Nagaland	75.00	227.24	218.00	203.86	93.51
Total Nagaland	75.00	227.24	218	203.86	93.51
MANIPUR					
CENTRAL SECTOR					
NHPC					
Loktak (Manipur)	105.00	448.00	600.00	621.62	103.60
Total NHPC-Manipur	105.00	448.00	600	621.62	103.60
Total Central Sector-Manipur	105.00	448.00	600	621.62	103.60
Total Manipur	105.00	448.00	600	621.62	103.60
MEGHALAYA					
STATE SECTOR					
MePGCL					
Kyrdemkulai	60.00	118.00	112.00	163.72	146.18
Myntdu	126.00	128.00	380.00	420.62	110.69
New Umtru	40.00	235.00	164.00	229.79	140.12
Umium St.I	36.00	324.00	90.00	149.54	166.16
Umium St.IV	60.00	372.69	174.00	188.32	108.23
Total MePGCL	322.00	1177.69	920.00	1151.99	125.22
Total State Sector-Meghalaya	322.00	1177.69	920	1151.99	125.22
Total Meghalaya	322.00	1177.69	920	1151.99	125.22
MIZORAM					
CENTRAL SECTOR					
Tuirial	60.00	250.63	210.00	158.85	75.64
Total NEEPCO-Mizoram	60.00	250.63	210	158.85	75.64
Total Central Sector-Mizoram	60.00	250.63	210	158.85	75.64
Total Mizoram	60.00	250.63	210	158.85	75.64
Total N.Eastern	2027.00	9412.73	6372	5858.53	91.94
Total All India	46572.20	155846.89	140357	150299.52	107
IMPORT FROM BHUTAN			7230.00	8765.50	121.24

**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 CURRENT YEAR 2021-2022**

REGION/ UTILITY/ STATION	INSTALLED CAPACITY AS ON 30.09.2021 (MW)	DESIGN ENERGY (MU)	2020-2021		
			TARGET	ACTUAL	% OF ACTUAL OVER TARGET
Total All India (Including Bhutan Imports)	46572.20	155846.89	147587	159065.02	107.78

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 39.44% (31.38% Multipurpose & 8.06% Storage for power only) of the total hydel installed capacity and generated about 32.8% (23.87% Multipurpose & 8.93% Storage for power only) of the total Hydel generation during 2020-21 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	27976.85	46209.2
	Percentage of Total (%)	31.38	8.06	60.54	100
2.	Energy Generation (MU)	35878	13432	100989.52	150299.52
	Percentage of Total (%)	23.87	8.93	67.19	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

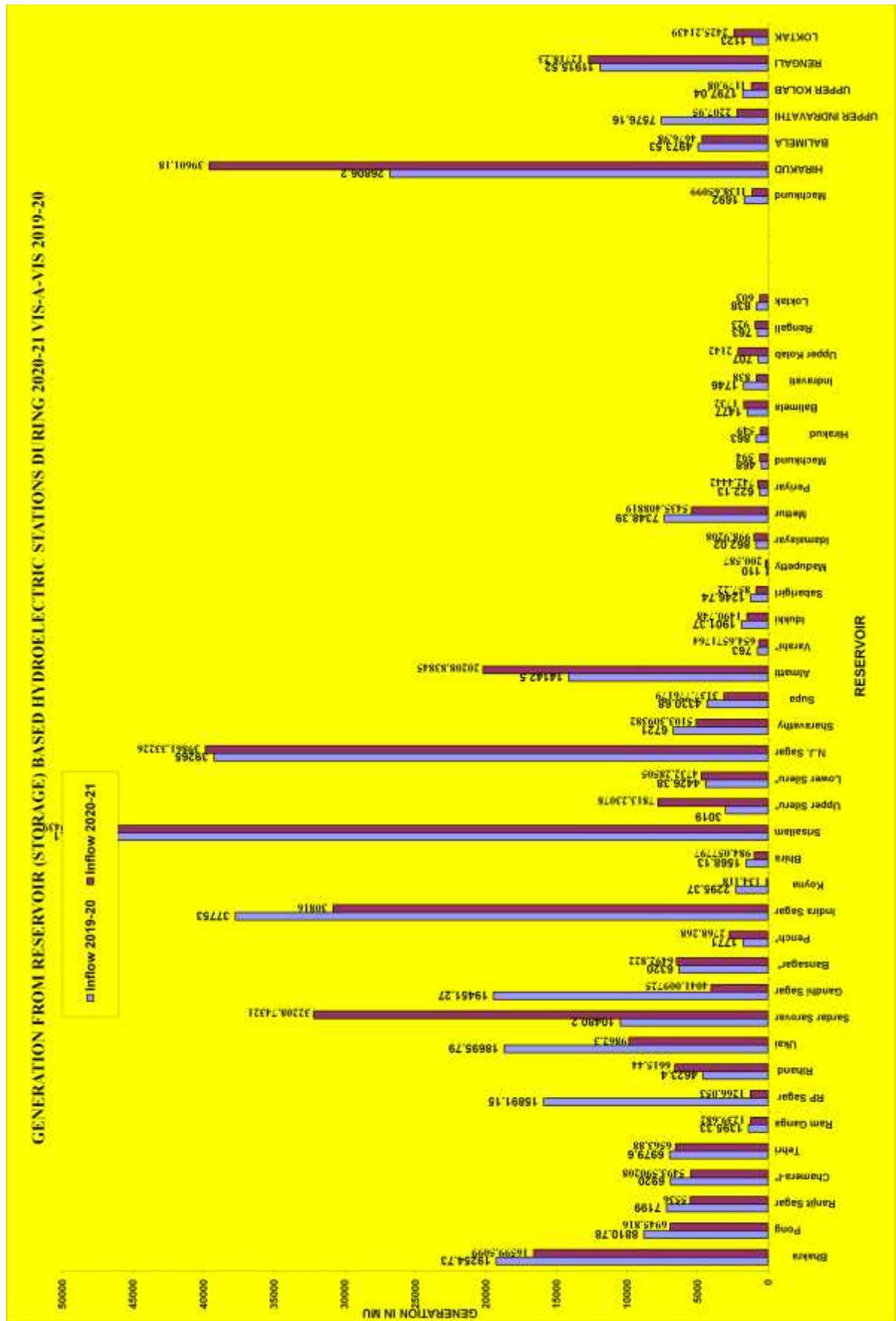
Region including Bhakra, Pong, Ranjit Sagar and Tehri projects etc., snow melt in the catchment area during summer also contributes to their inflows. The inflows into the reservoirs during 2020-21 vis-à-vis 2019-20 are given at **Exhibit 3.1**. Inflows into the reservoirs and generation during the year 2020-21 vis-à-vis 2019-20 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)	2019-20 (MCM)	2020-21 (MCM)	2020-21 Inflow as % of 201-20 inflow	10 years Average (MU)	2019-20 (MU)	2020-21 (MU)	2020-21 generation as compared to 2019-20 (%)
1	2	3	4	5	6= (5/4*100)	7	8	9	10= (9/8*100)
Northern Region									
1	Bhakra	17369	19255	16600	116	5467	6129	5436	113
2	Pong	8843	8811	6946	127	1579	1411	1776	79
3	Ranjit Sagar	6298	7199	5536	130	1715	2099	1499	140
4	Chamera-I*	6156	6920	5494	126	2474	2663	2265	118
5	Tehri	7378	6980	6564	106	3283	3042	3040	100
6	Ram Ganga	3359	1395	1240	113	277	155	261	59
7	RP Sagar	4127	15891	1266	1255	353	55	10	541
8	Rihand	5119	4623	6615	70	547	459	791	58
Sub Total (NR)		58649	71074	50260	141	15695	16012	15078	106
Western Region									
9	Ukai	7229	18696	9862	190	522	767	651	118
10	Sardar Sarovar	28585	10480	32209	33	2497	3243	3245	100
11	Gandhi Sagar	4220	19451	4041	481	270	34	148	23
12	Bansagar*	4677	6320	6493	97	83	139	136	102
13	Pench*	987	1771	2768	64	316	217	415	52
14	Indira Sagar	22922	37753	30816	123	2536	2877	2794	103
15	Koyana	3535	2295	134	1711	1146	3740	3173	118
16	Bhira	907	1568	984	159	626	841	945	89
Sub Total (WR)		73062	98335	87307	113	7996	11858	11506	103

Southern Region									
S. No.	STATION	Inflows				Generation			
		10 years Average (MCM)	2019-20 (MCM)	2020-21 (MCM)	2020-21 Inflow as % of 201-20 inflow	10 years Average (MU)	2019-20 (MU)	2020-21 (MU)	2020-21 generation as compared to 2019-20 (%)
1	2	3	4	5	6= (5/4*100)	7	8	9	10= (9/8*100)
17	Srisaillam	18783	47184	46722	101	935	1339	1157	116
18	Upper Sileru*	2199	3019	7813	39	462	641	620	103
19	Lower Sileru*	3255	4426	4732	94	1089	852	1293	66
20	N.J. Sagar	81411	39265	39861	99	79	181	210	86
21	Sharavathy	4520	6721	5103	132	4384	5136	4583	112
22	Supa	2668	4331	3138	138	438	584	444	132
23	Almatti	12367	14143	20209	70	450	632	644	98
24	Varahi*	491	763	655	117	1028	1184	1093	108
25	Idukki	1581	1901	1491	128	2223	1830	2530	72
26	Sabarigiri	874	1247	857	145	1210	1113	1228	91
27	Madupetty	216	110	201	55	197	142	134	106
28	Idamalayar	1124	862	999	86	304	261	290	90
29	Mettur	5156	7348	5435	135	288	518	471	110
30	Periyar	576	622	742	84	395	502	548	92
Sub Total (SR)		135221	131942	137959	96	13482	14915	15244	98
Eastern Region									
31	Machkund	1255	1692	1139	149	564	670	666	101
32	Hirakud	25715	26806	39601	68	845	790	953	83
33	Balimela	3530	4974	4677	106	1223	1521	1656	92
34	Indravati	3209	7576	2208	343	1936	2253	1757	128
35	Upper Kolab	1981	1797	1179	152	717	829	813	102
36	Rengali	9628	11916	12718	94	693	665	1015	66
Sub Total (ER)		45318	54760	61522	89	5978	6728	6860	98
North Eastern Region									
37	Loktak	2522	1123	2425	46	580	367	622	59
Sub Total (NER)		2242	1123	2425	46	580	367	622	59
Total (All India)		314492	357235	339473	105	43731	49881	49310	101

* Only 4 years average inflows available.



MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

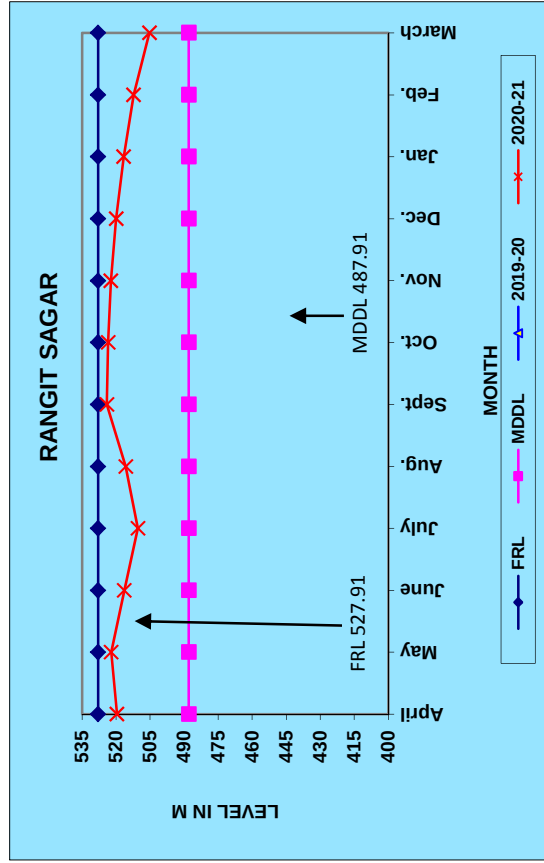
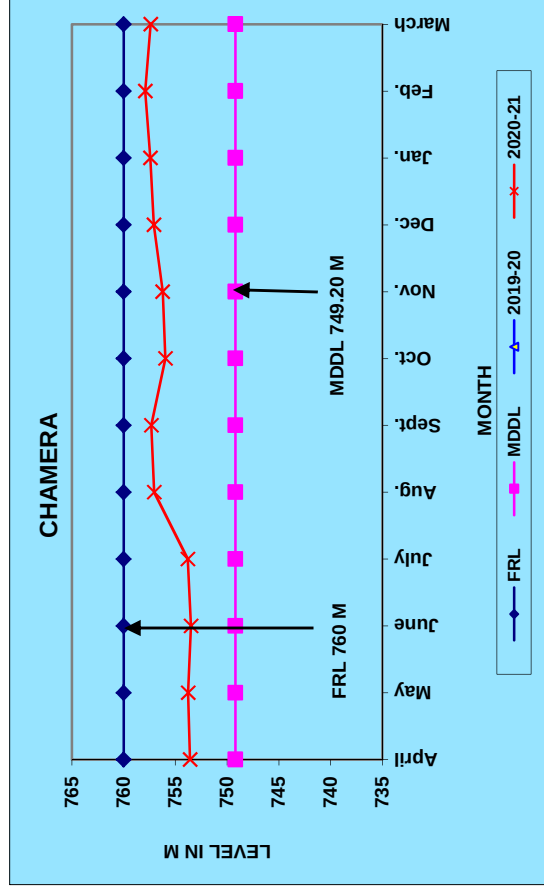
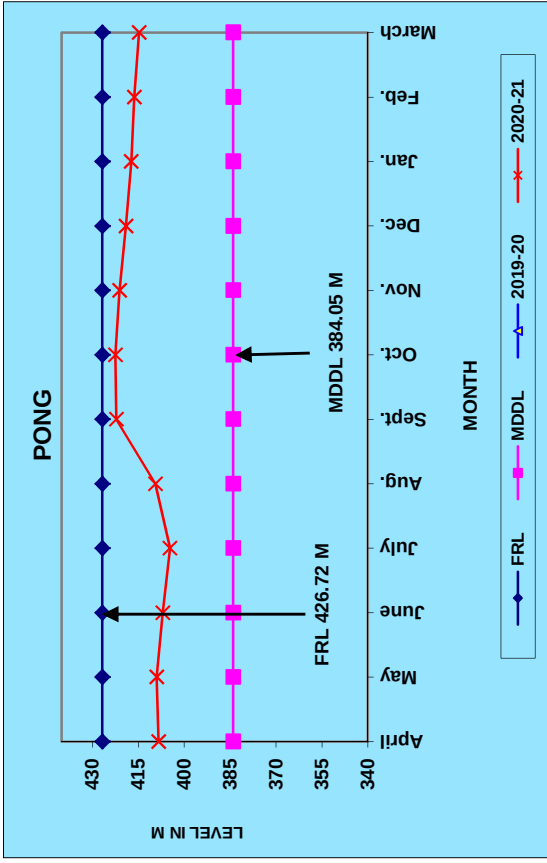
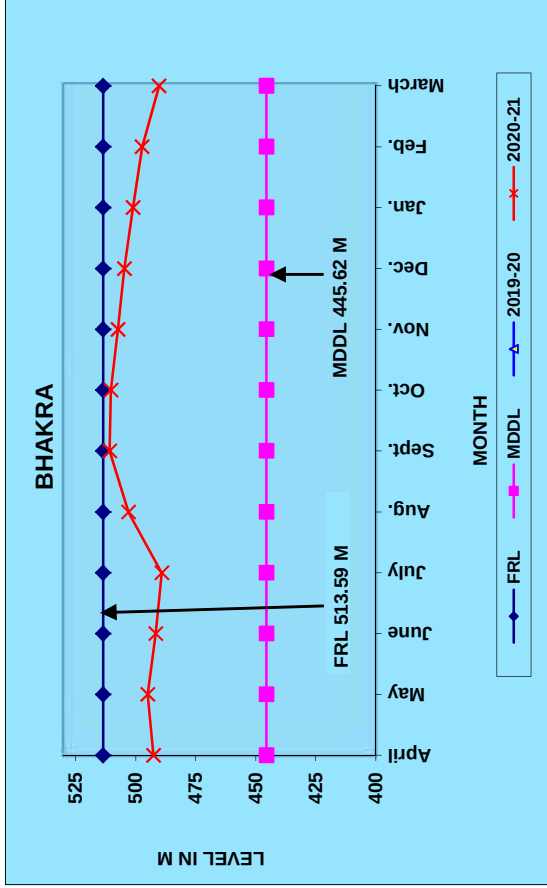
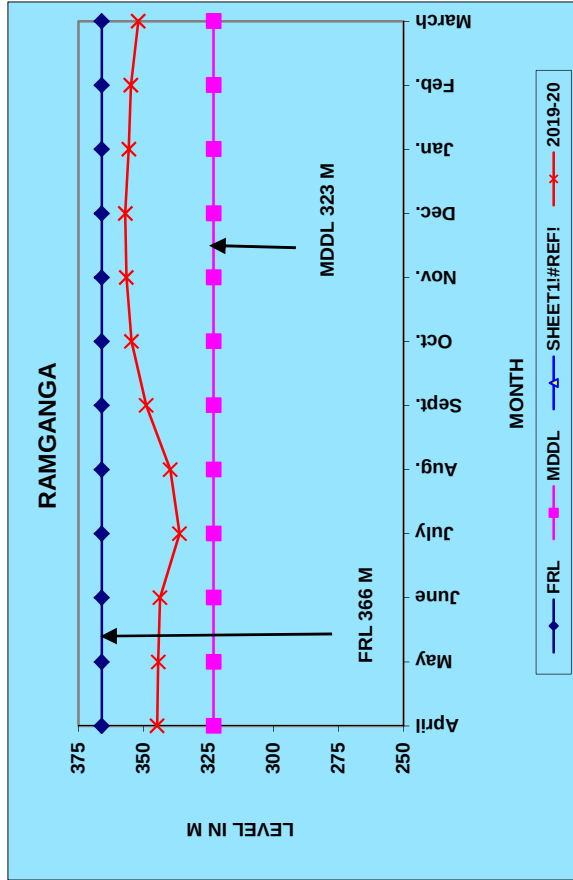
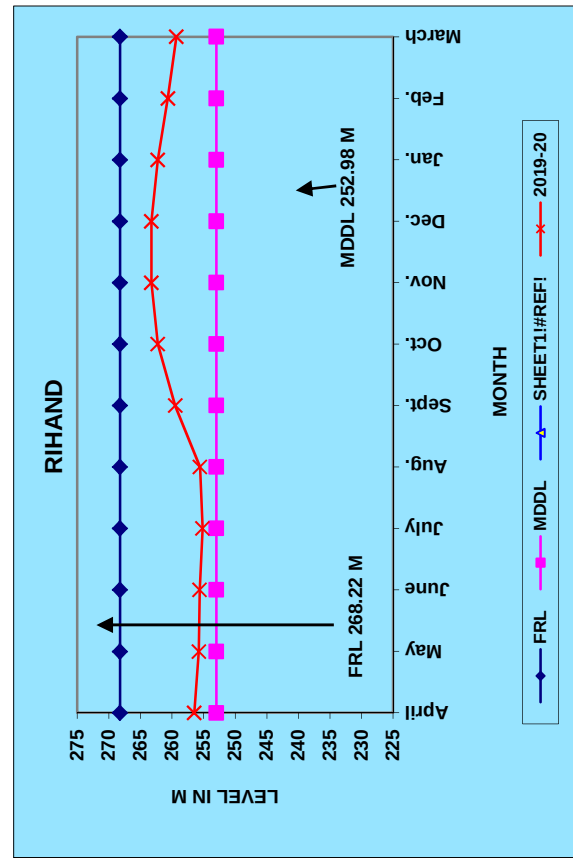
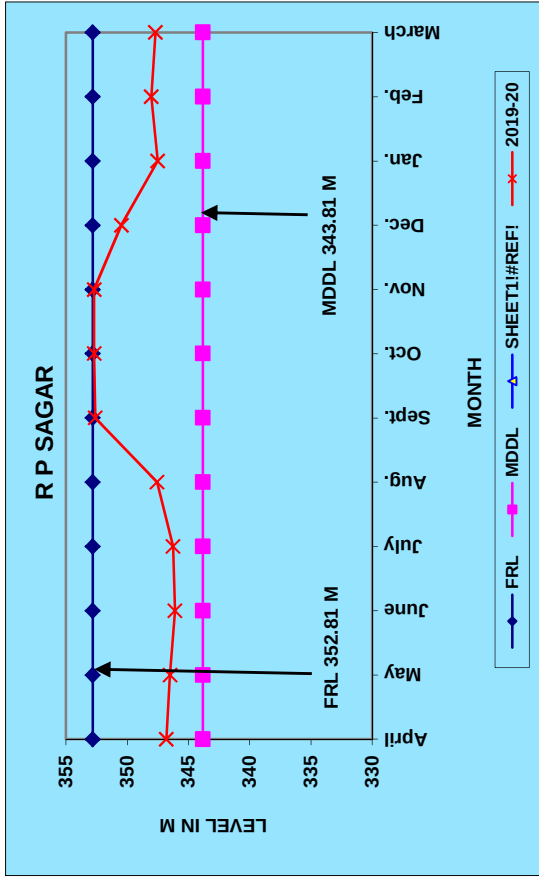
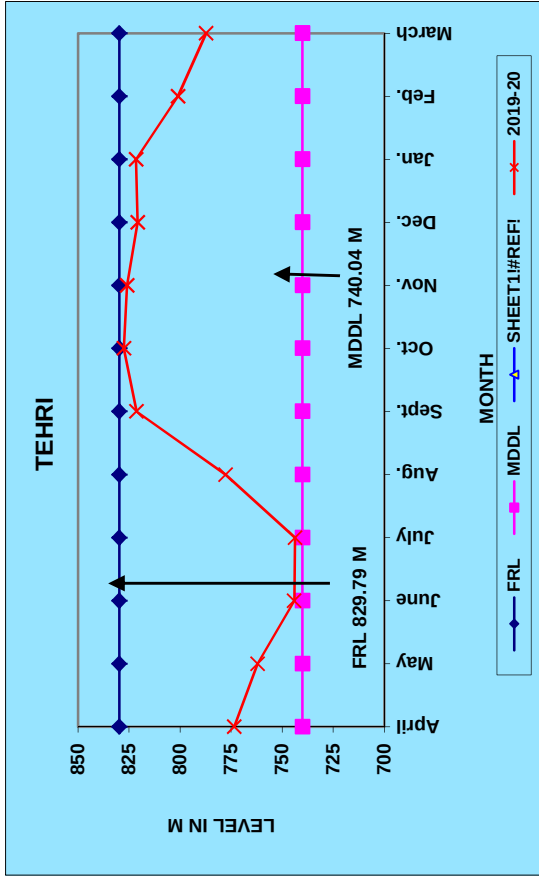


EXHIBIT 3.3

MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS

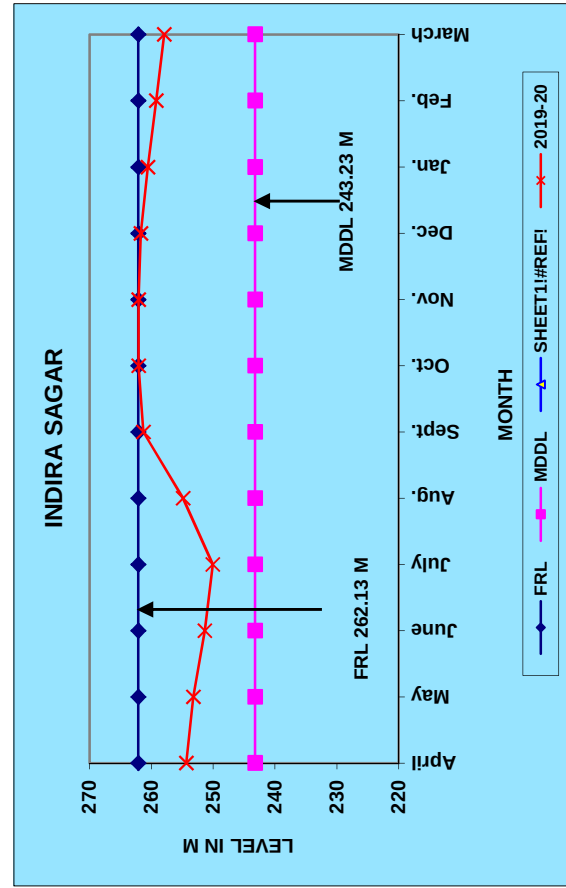
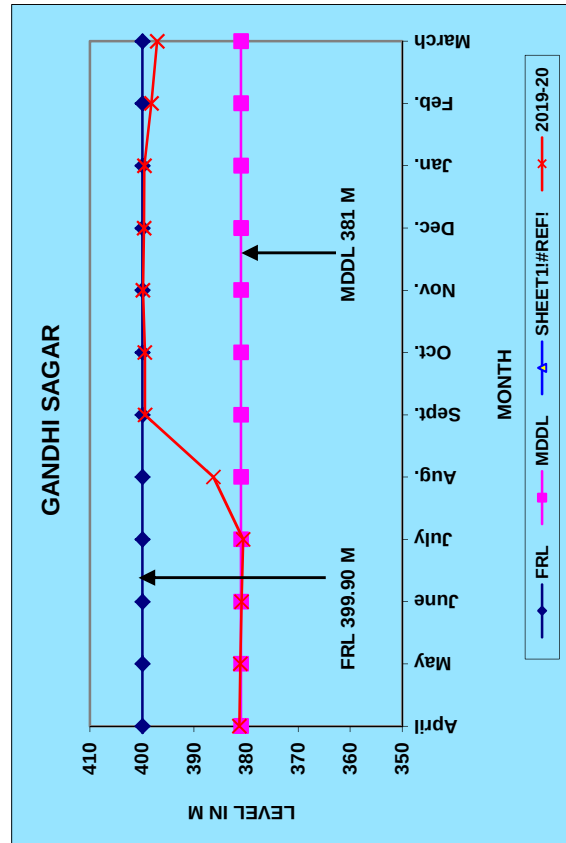
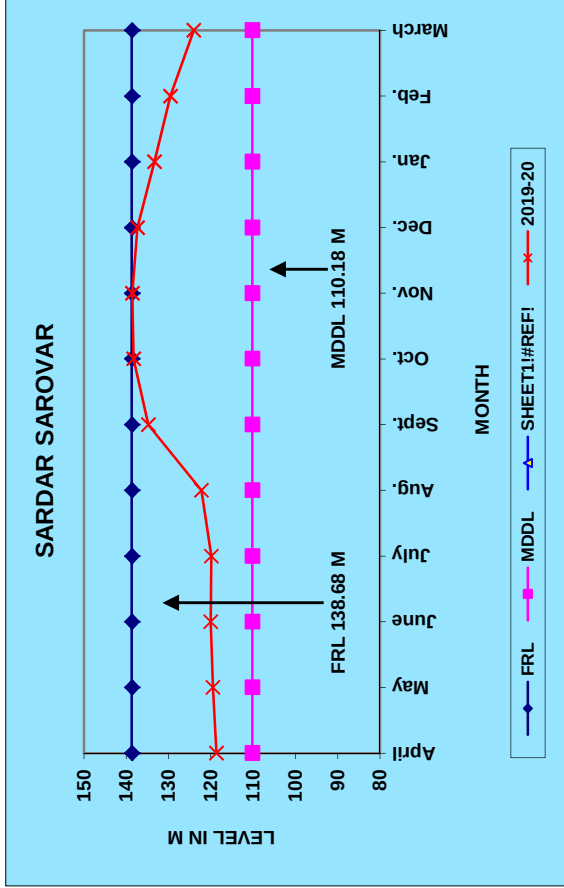
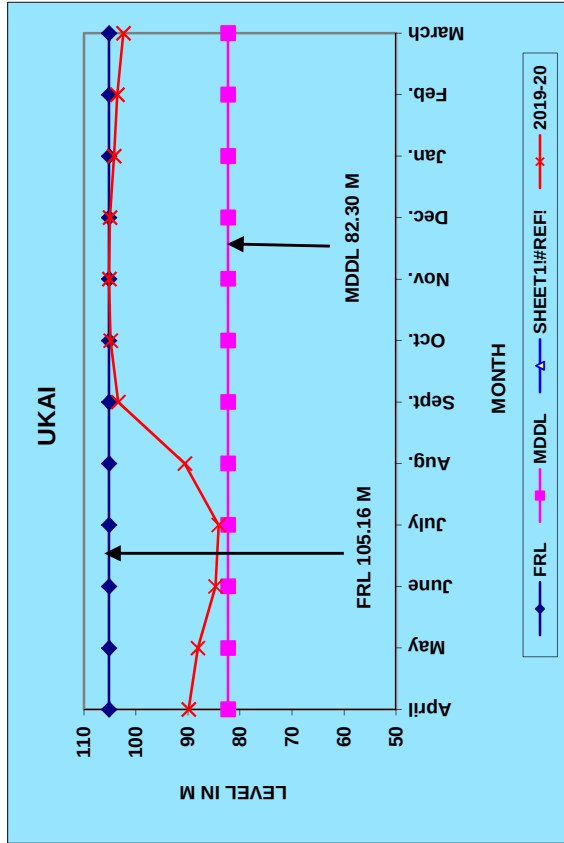
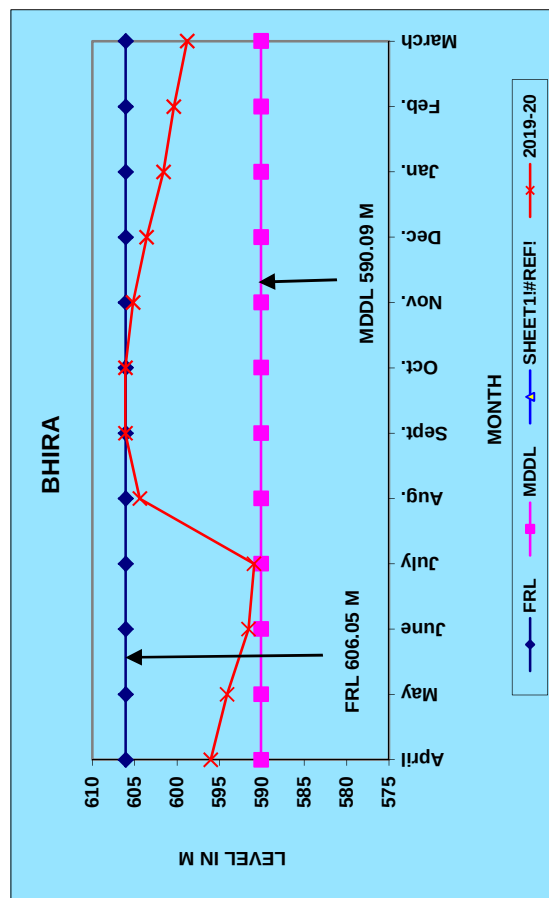
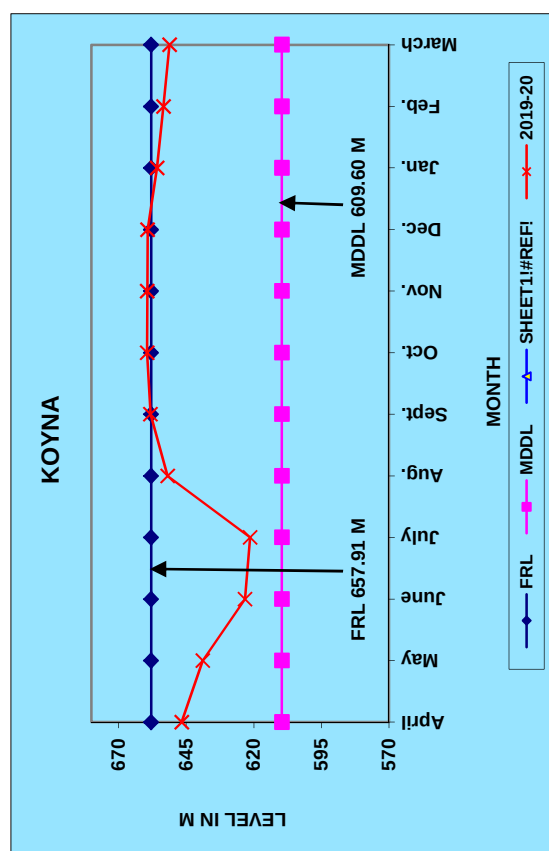
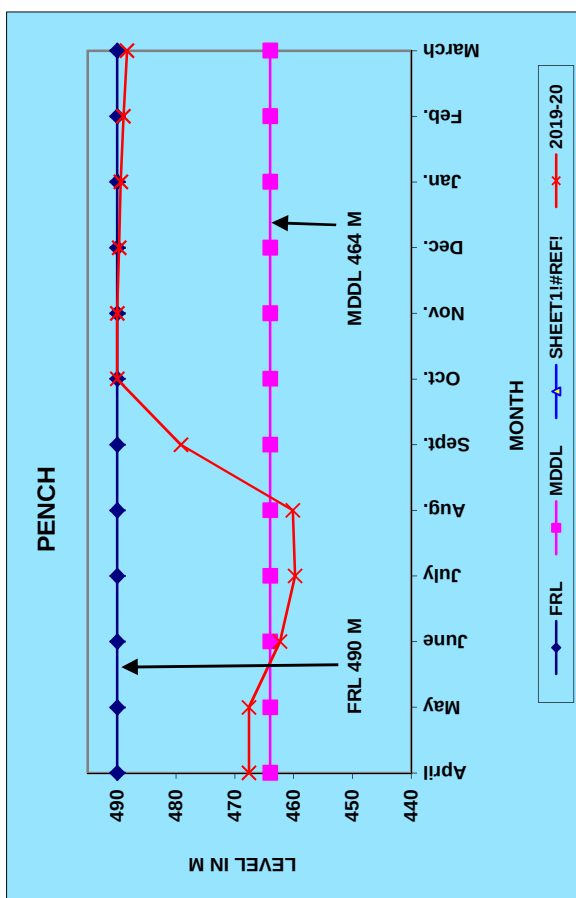
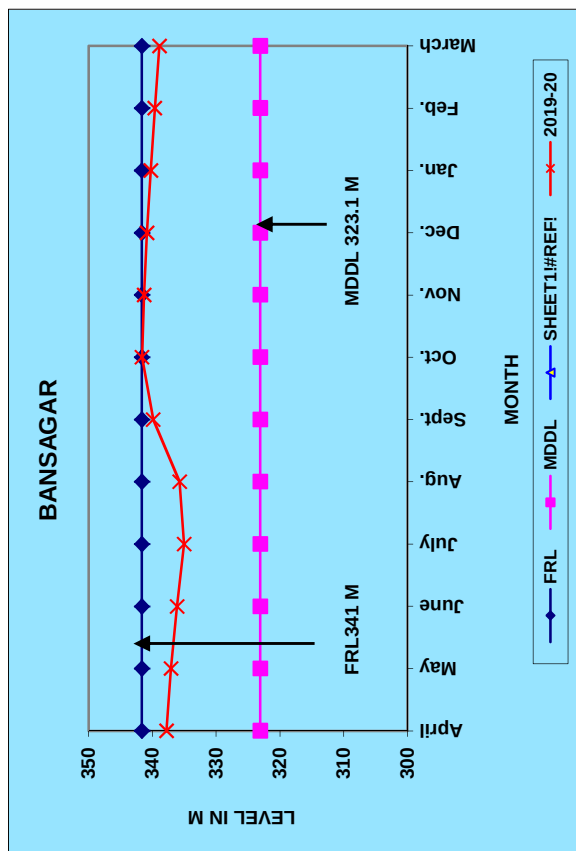
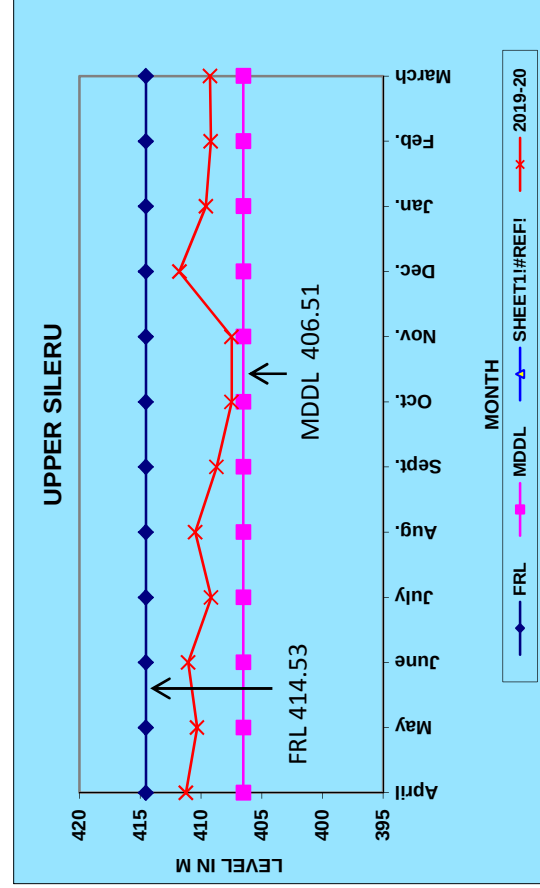
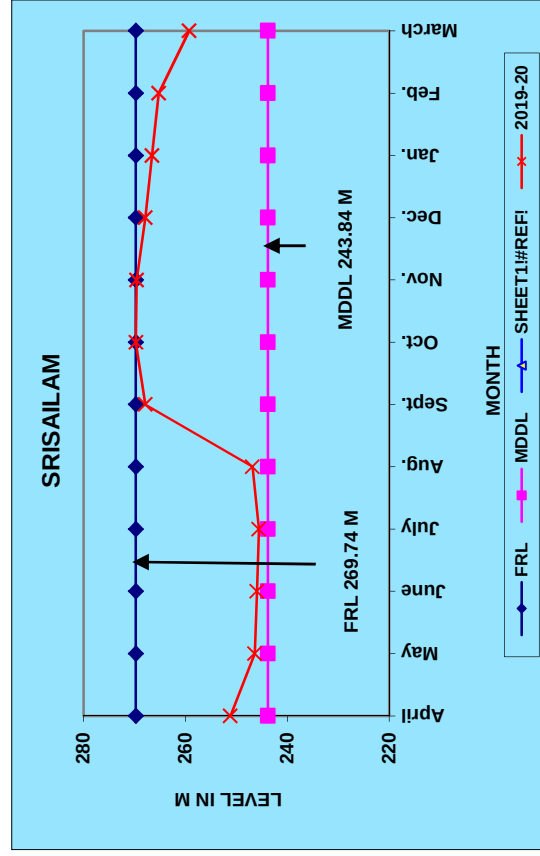
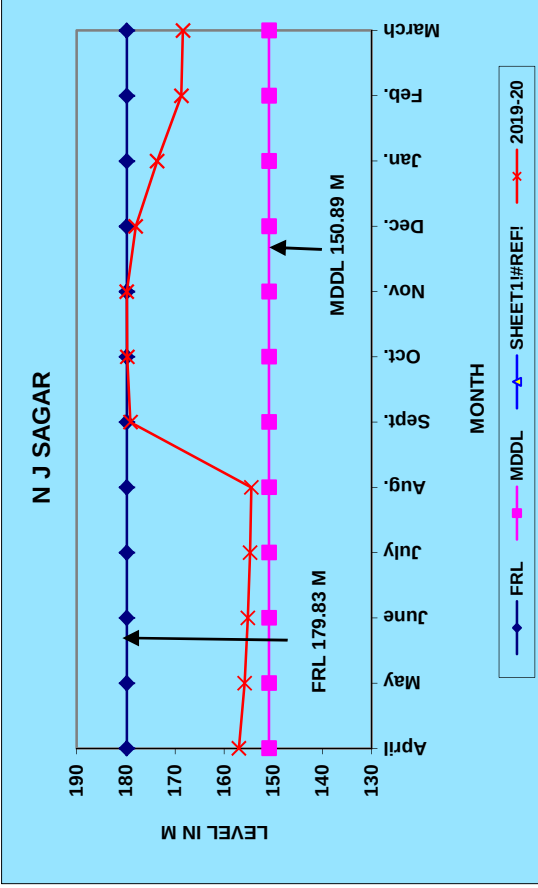
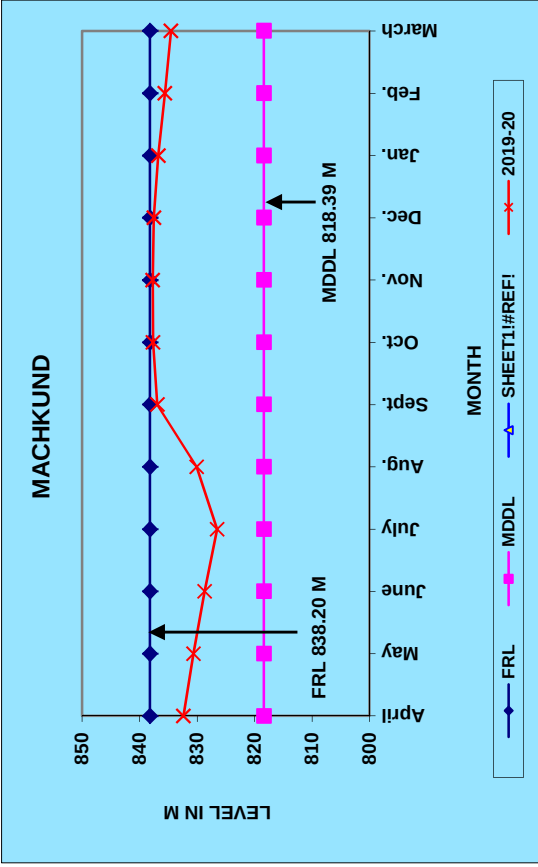


EXHIBIT 3.5

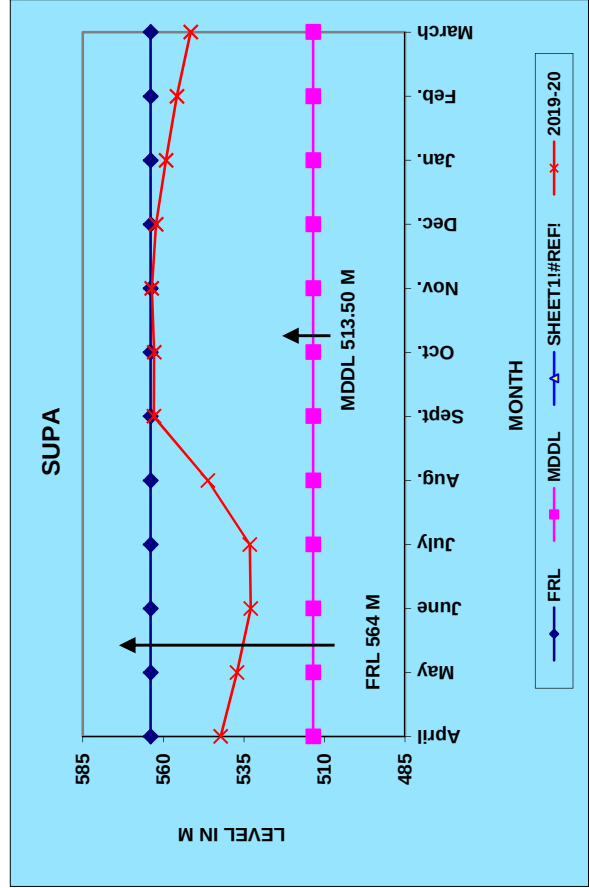
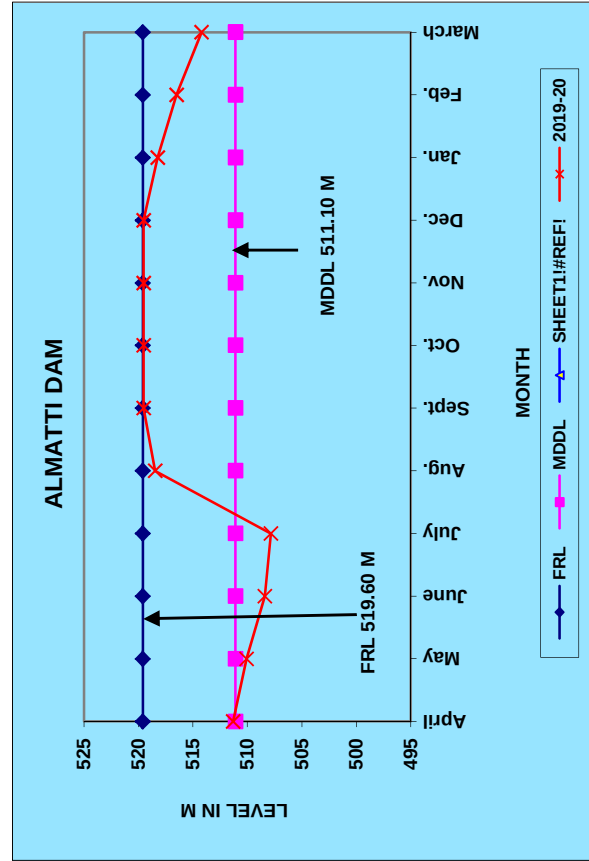
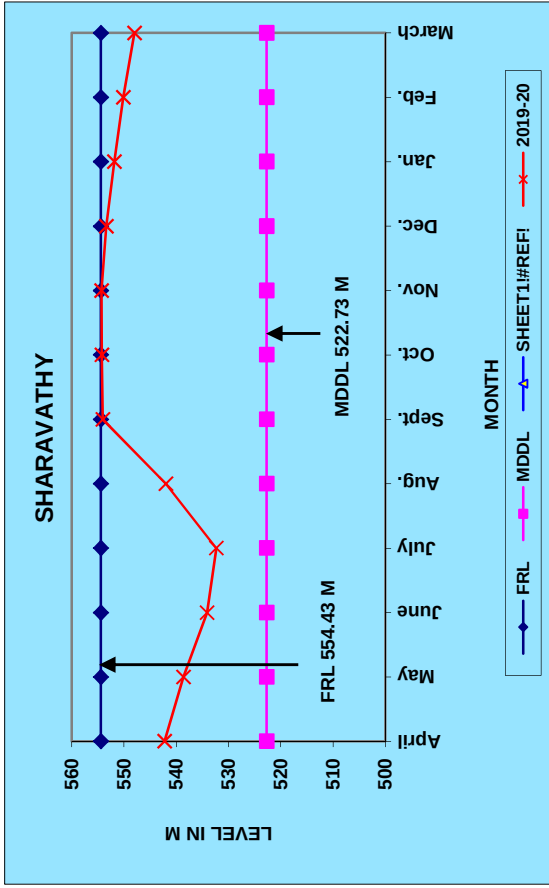
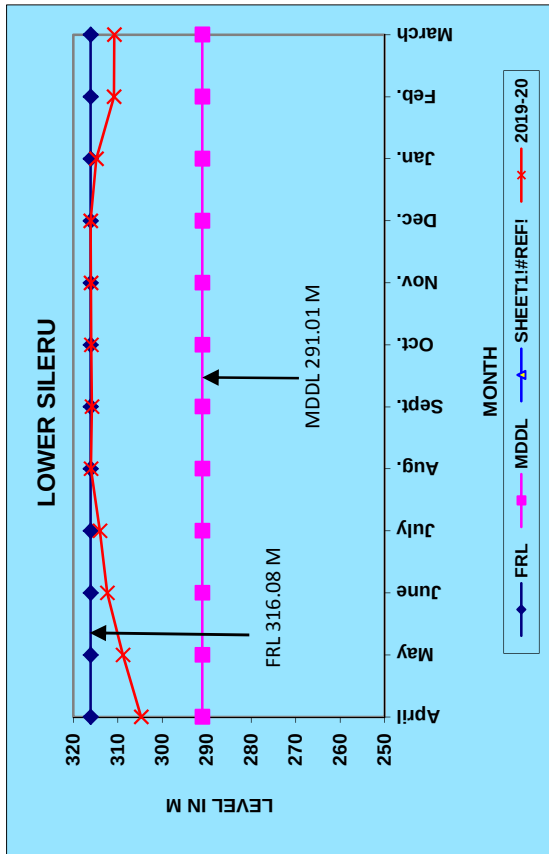
MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



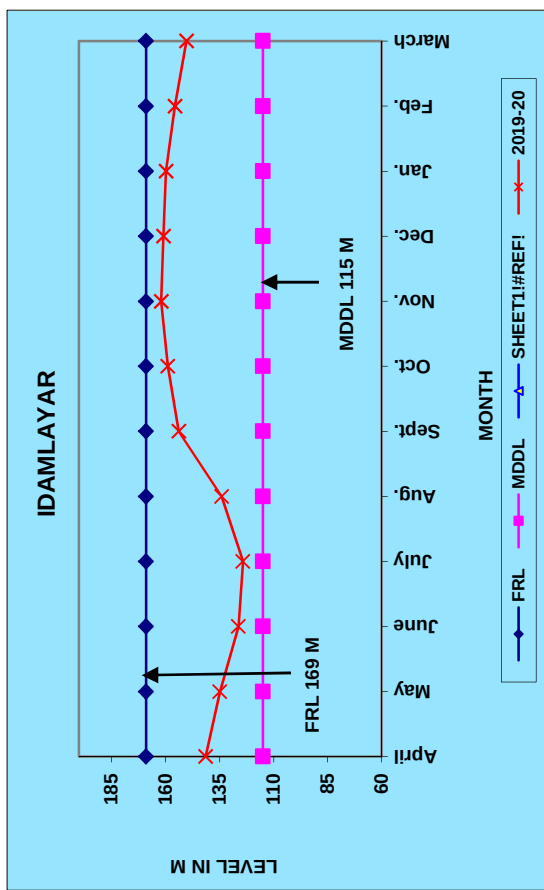
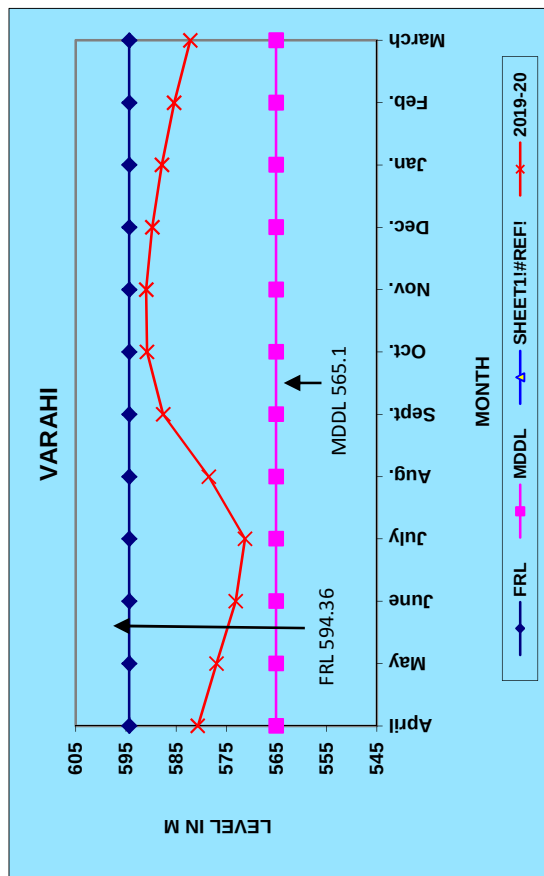
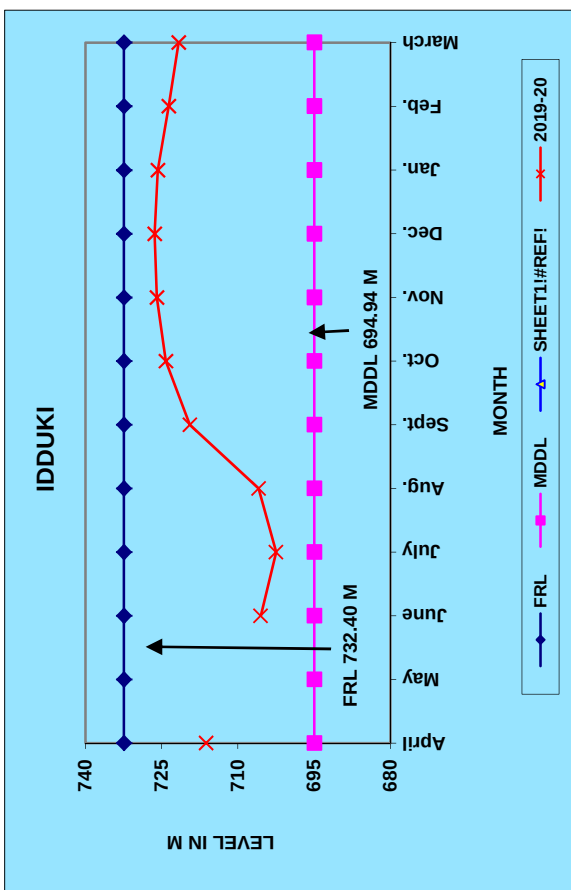
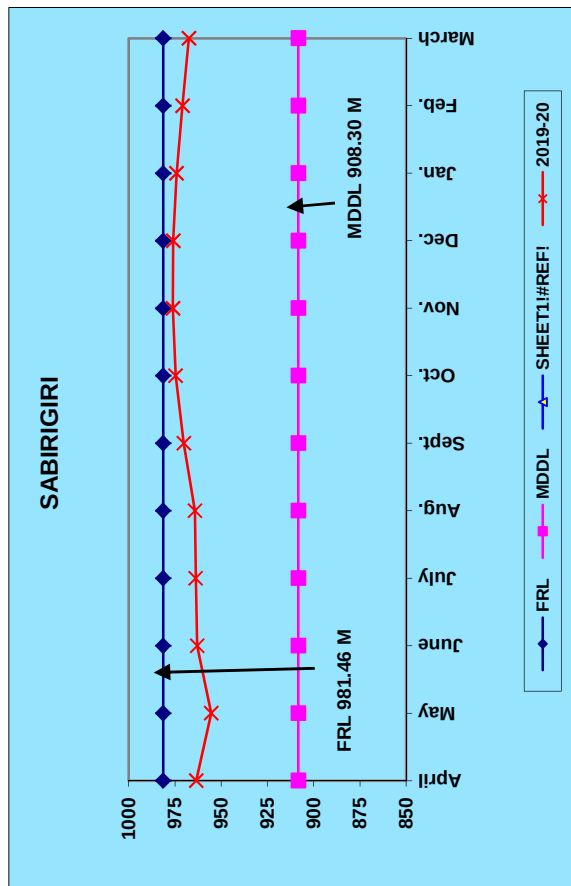
MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



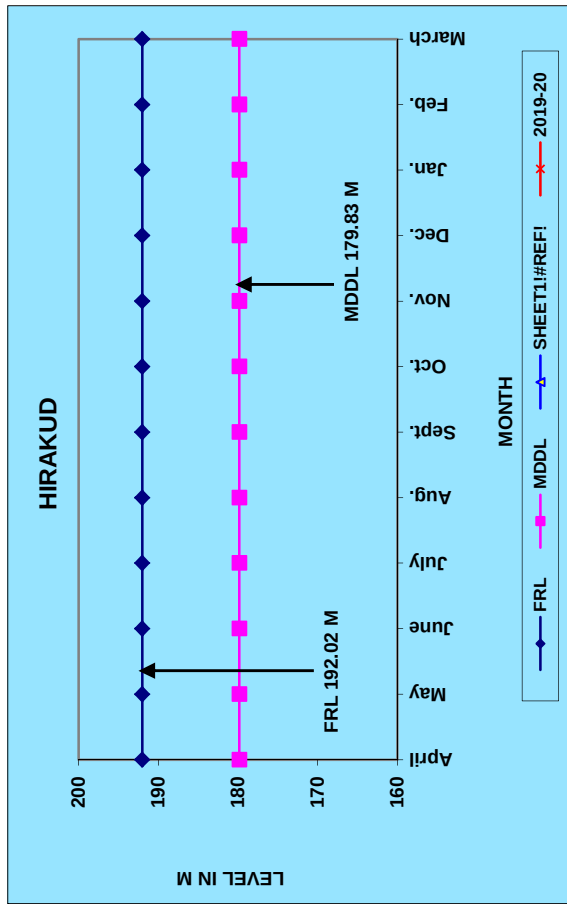
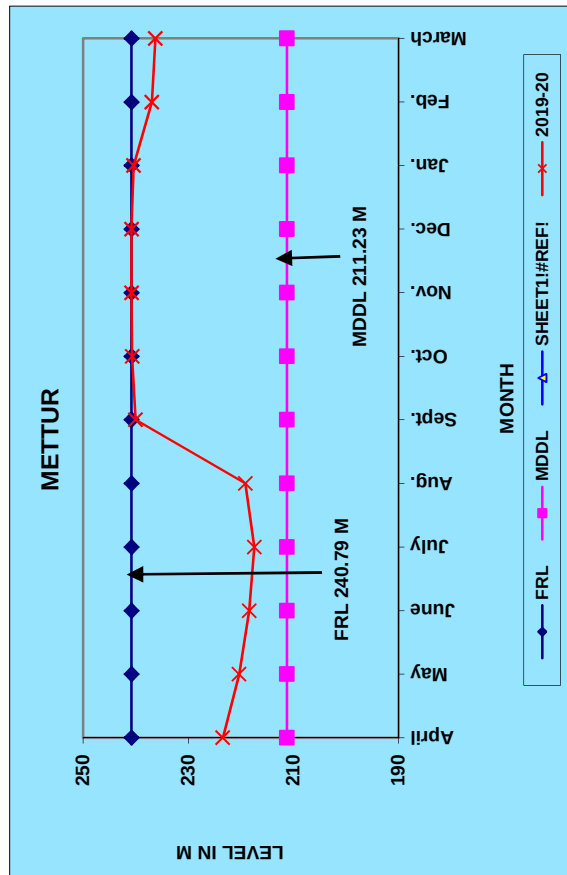
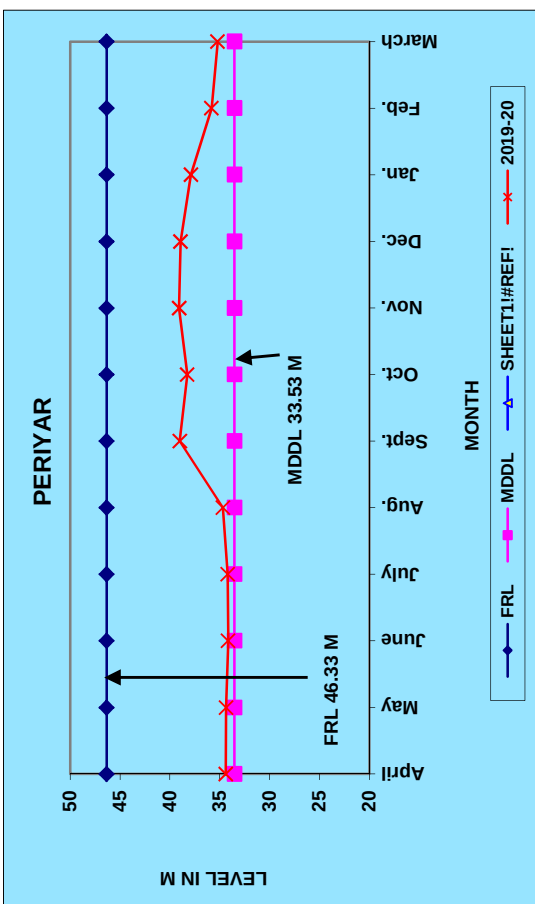
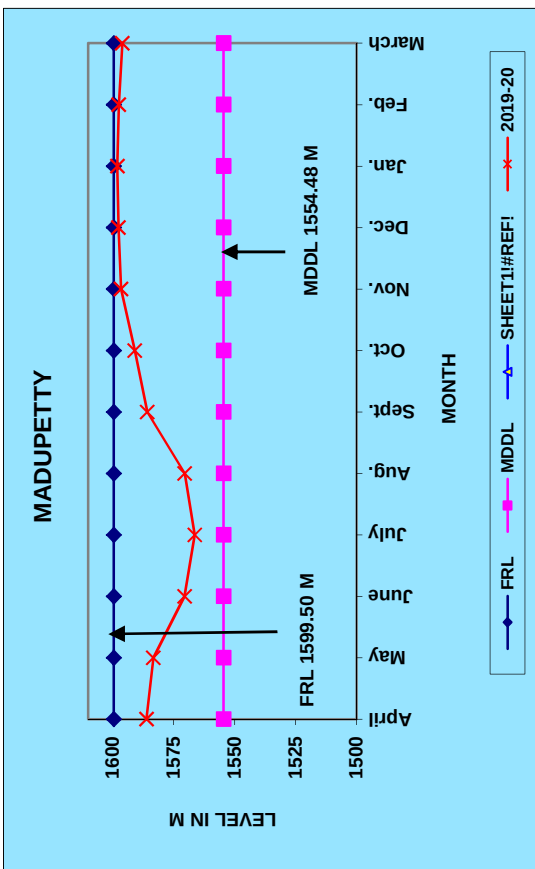
MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



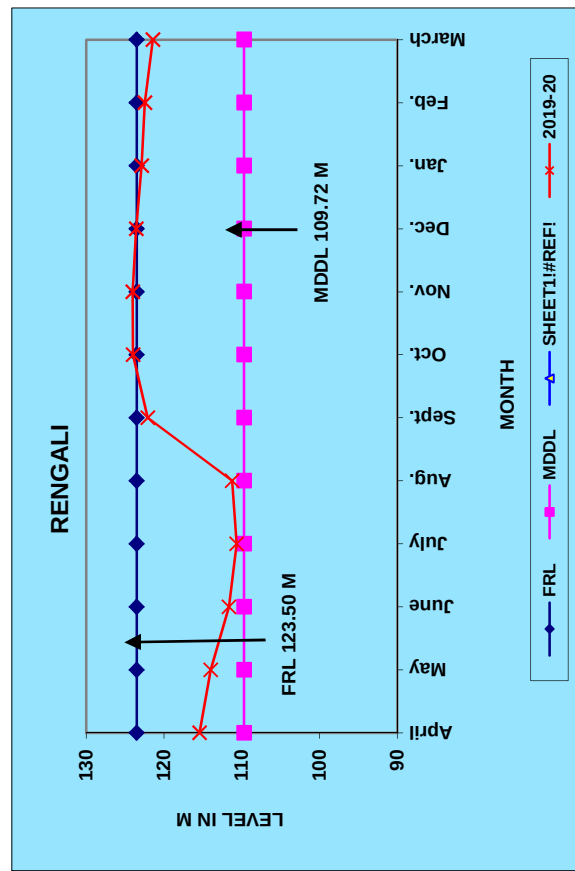
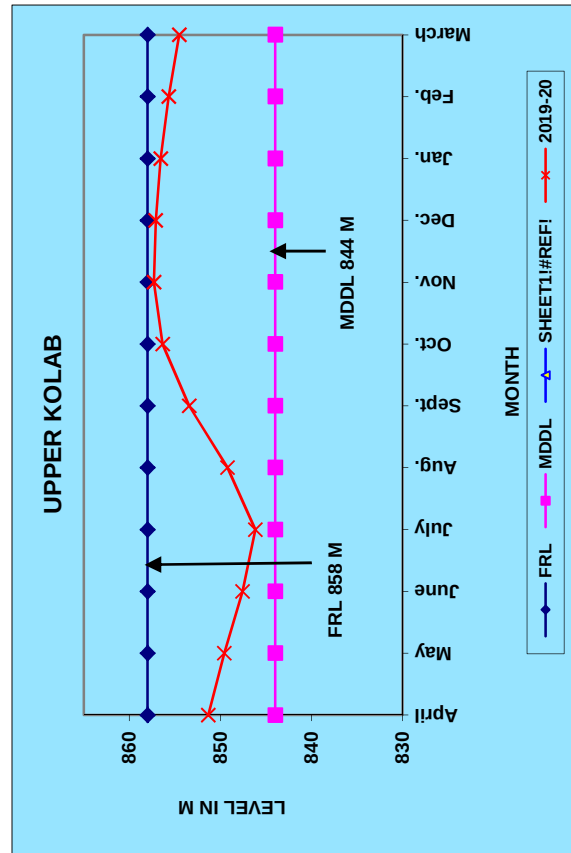
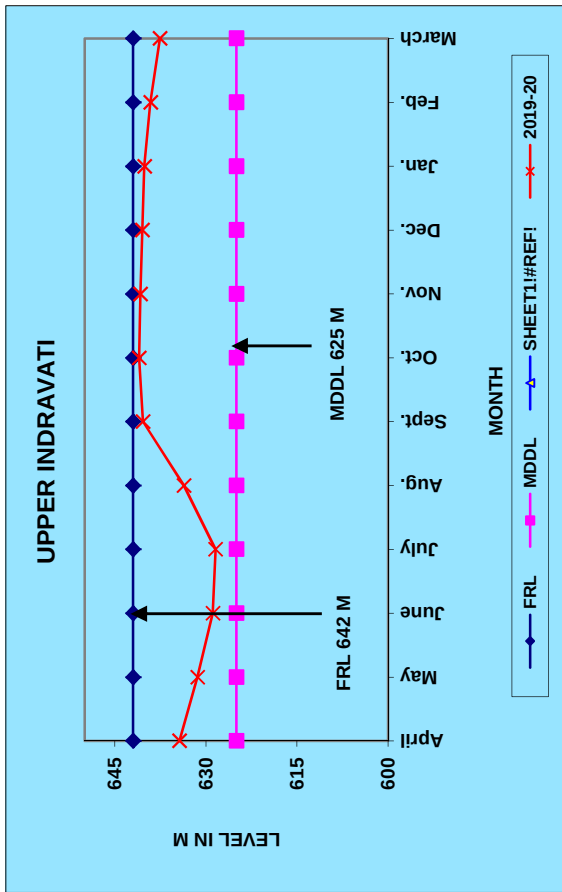
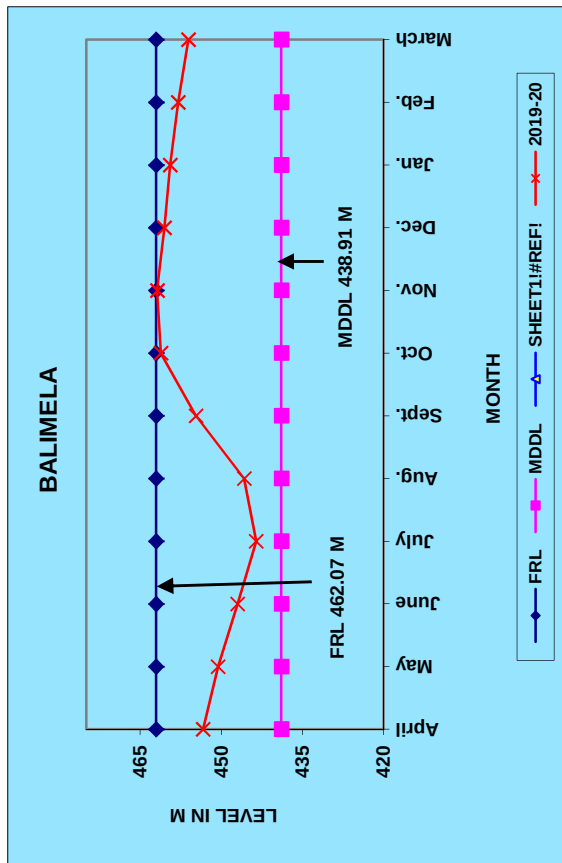
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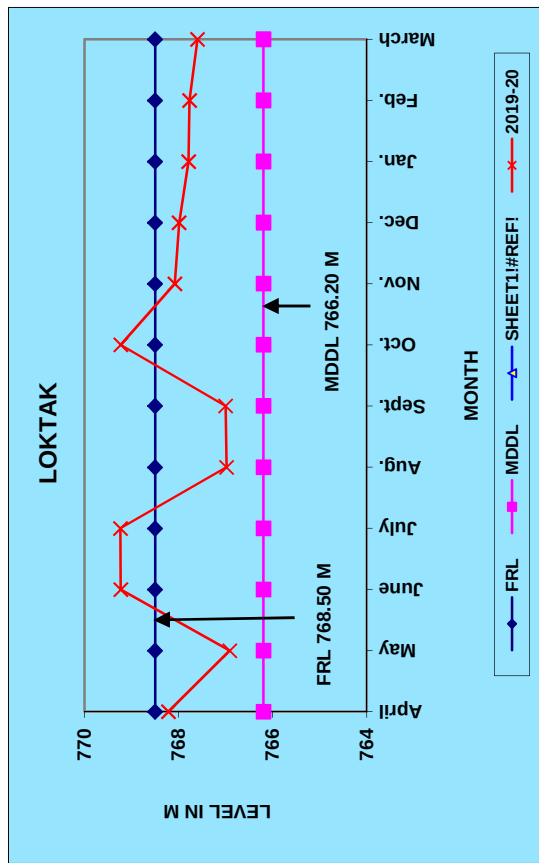
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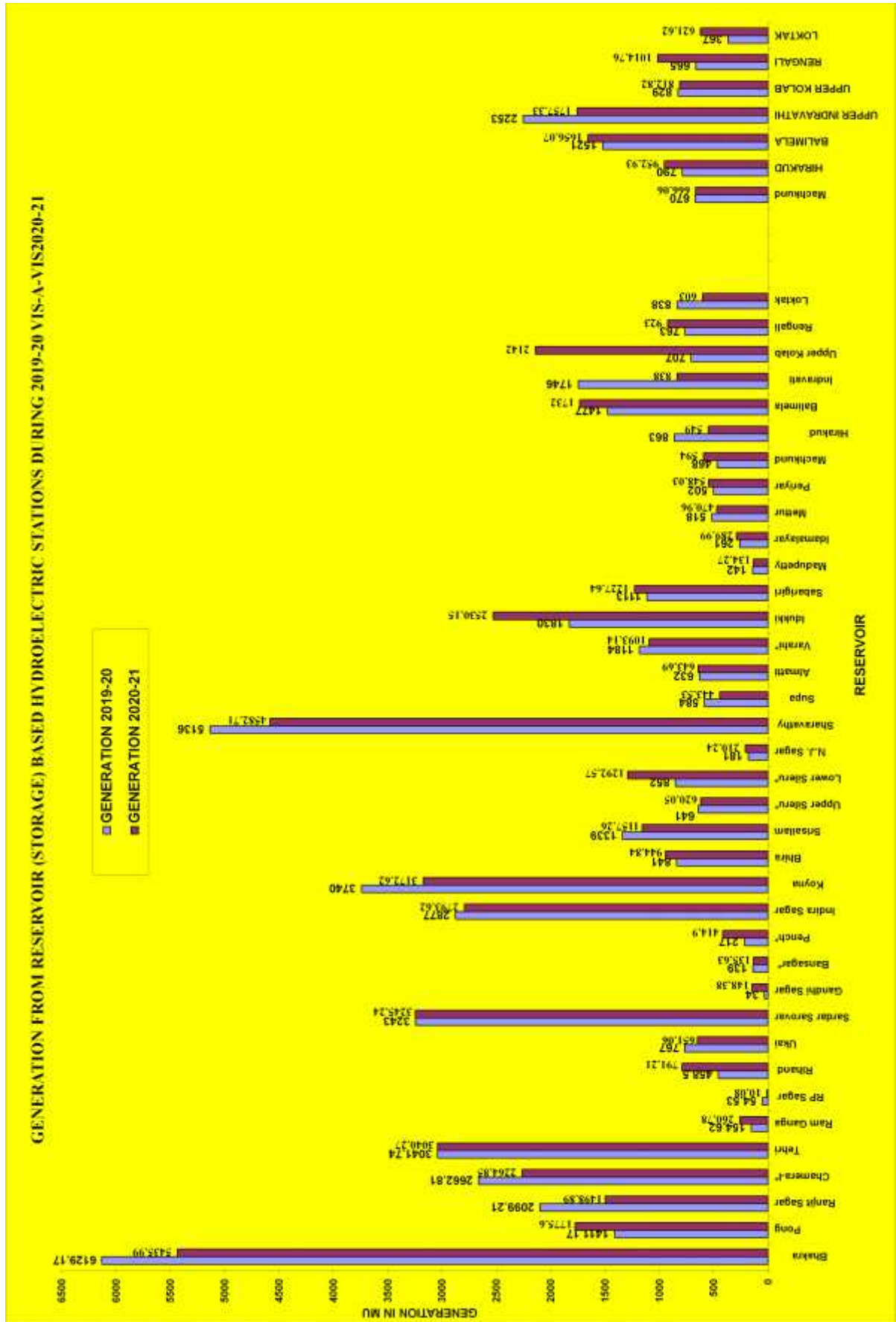


MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



MONTH-WISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS





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 2020-21 vis-à-vis 2019-20 are indicated at **Exhibits 3.2** to **Exhibits 3.11**.

3.5 Generation

Generation from reservoir (storage) based H.E. Stations during the year, apart from priorities of releases for other purposes like irrigation, drinking water etc., depends on various factors such as water level of the reservoir at the end of the preceding year, inflows during the year, draw down level by the end of the year, availability of generating units etc. In 23 Nos. out of 44 Nos. reservoir based hydel stations, annual generation during the year 2020-21 was more than the annual generation targets. Generation from 44 H.E. Stations on 37 major reservoirs during the year 2020-21 has been 49310 MU, showing decrease by 9.8 % over the 2019-20 generation of 49881 MU. Station-wise generation of reservoir stations during the year 2020-21 as compared to that of last year 2019-20 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	4	1.3	Ranjit Sagar, R P Sagar, Supa, Indravati
2	110 - 120	6	28.5	Bhakra, Chamera-I, Ukai, Koyna, Srisaillam, Sharavathy
3	100 - 110	10	37.8	Tehri, Sardar Sarovar, Bansagar, Indira Sagar, Upper Sileru, Varahi, Madupetty, Mettur, Machkund, Upper Kolab

4	Below 100	18	32.18	Pong, Rihand, Ram Ganga, Gandhi Sagar, Pench, Bhira, Lower Sileru, N.J. Sagar, Almatti, Idukki, Sabarigiri, Idamalayar, Periyar, Hirakud I&II, Balimela, Rengali, Loktak
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Generation of major reservoir based H.E. stations during 2020-21 as compared to the generation during last year i.e. 2019-20 is also depicted at **Exhibit-3.12**.

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

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2021	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2020-21			
						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	506.80	09.09.2020	468.45	31.03.2021
a	Bhakra Left	594.00	3924									
b	Bhakra Right	785.00										
2	Pong	396.00	1123	426.72	384.05	8053	6946	1084.00	424.45	01.10.18	389.82	28.06.18
3	Chamera	540.00	1664.56	760.00	749.20		87		759.96	20.07.2020	751.21	20.02.2021
4	Ranjit Sagar	600.00	1507	527.91	487.91	3292	2191	390.00	516.16	16 & 17.09.20	493.12	28.01.21
5	Tehri	1000.00	2797	829.79	740.04	3540	2615	1291.49	827.84	16.10.2020	744.44	24.06.2020
6	Ramganga	198.00	334	366	323	2503.96	2109.25	480.80	359.16	13.11.2020	342.14	31.03.2021
7	Rana Pratap Sagar	172.00	459	352.81	343.83	2901	1569	175.66	281.59	01.10.2020	270.09	01.07.2020
8	Rihand	300.00	920	268.22	252.98	10605	5723	1177.00	264.57	12.10.2020	256.00	17.06.2020
	Sub-Total NR	4585.00	12728.56				27756.25					
WESTERN REGION												
9	Ukai	300.00	1080	105.16	82.30	8515	6615	813.00	105.16	01.10.2020	97.07	30.06.2020
10	Sardar Sarovar	1200.00	3635	138.68	110.18	9460	5760	1817.553	138.68	17.09.2020	119.29	08.04.2020
11	Gandhi Sagar	115.00	420	399.90	381.00	7743	6911	725.00	399.53	04.10.20	394.00	31.01.21
12	Bansagar	60.00	143	341.64	323.10		4934		341.52	01.10.2020	335.17	31.03.2021
13	Pench	160.00	315	490.00	464.00		1045		489.99	12.10.2020	486.16	12.06.2020
14	Indira Sagar	1000.00	1980	262.13	243.23	12237	9706	1316.12	262.13	08.10.2020	248.56	05.07.2020
15	Koyna	1636.00	3030	657.91	609.60	2797	2677	3126.00	659.43	30.09.2020	634.06	01.07.2020
a	Koyna-I & II	600.00	3030									
c	Koyna-I & II	1000										
d	Koyna DPH	36										
16	Bhira	300	775	606.05	590.09	523	522	619	606.12	01.09.2020	591.71	03.07.2020
	Sub-Total WR	4771.00	11378.84				38170.33					
SOUTHERN REGION												
17	Upper Sileru	240.00	529	414.53	406.51		88		413.73	16.08.2020	407.97	17.04.2020
18	Lower Sileru	460.00	1070	316.08	291.01		365		316.07	10.10.2020	304.89	04.04.2020
19	Srisaillam	770.00	2900	269.74	243.84	8723	7166	1548.00	269.74	01.11.2020	247.16	26.06.2020
20	Nagarjuna Sagar	815.60	2237	179.83	150.89	11560	6538	1398.00	179.88	27.9.20, 27.10.20,	161.52	20.07.2020
21	Sharavathy	1035.00	4932	554.43	522.73	5310	4297	4394.00	553.56	2020 & 18.10.	534.80	01.07.2020
22	SUPA	955.00	3927	564.00	513.50	4178	3758	3927.00	558.93	29.09.2020, 30.09.2020	527.56003	03.07.2020
23	Almatti	290.00	483	519.60	511.10	2631.50	2628.00	175.30	519.60	31.08.2020,01.09.2020,01.	509.40	04.06.2020

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

S. No	NAME OF RESERVOIR AND ASSOCIATED HE STATIONS	INSTALLED CAPACITY AS ON 31.03.2021	ANNUAL DESIGN ENERGY	FULL RESERVOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR CAPACITY AT FRL		ENERGY CONTENT AT FRL	LEVELS ATTAINED DURING 2020-21			
						GROSS : LIVE			Max.	DATE	Min	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)	(M)		(M)	
24	Varahi	460.00	1060	594.36	565.10		881.50		589.20	17th to 20th	571.74	13.06.2020
25	Idukki	780.00	2398	732.40	694.94	1996	1459	2146.00	731.20	26.10.2020	709.71	02.07.2020
26	Sabirigiri	300.00	1338	981.46	908.30	454	447	764.00	979.03	23.10.2020	938.07	11.06.2020
27	Madupetty	37.50	284	1599.50	1554.48		55.32	77.40	1598.30	11.12.2020	1567.60	30.06.2020
28	Idamalayar	75.00	380	169.00	115.00		1017.80	254.45	164.74	20.10.2020	128.41	29.06.2020
29	Mettur	250.00	541	240.79	211.23	2708.80	2645.20	204.00	106.78	25.12.2020	64.00	01.08.2020
30	Periyar	161.00	409	46.33	33.53	443	299	216	41.75	13.08.2020	34.19	01.07.2020
	Sub-Total SR	6629.10	22488.00				31645					
<u>EASTERN REGION</u>												
31	Machkund	114.75	670	838.20	818.39	970	893	552.00	838.06	01.10.2020	828.79	13.06.2020
32	Hirakud	347.50	1174	192.02	179.83	4823	4709	372.00	192.01	01.10.2020	182.76	10.07.2020
33	Balimela	510.00	1183	462.07	438.91	3929	2676	898.00	458.39	24.10.2020	444.77	03.08.2020
34	Upper Indravati	600.00	1962	642.00	625.00	2300	1485.50	1213.14	638.38	20.10.2020	630.58	03.08.2020
35	Upper Kolab	320.00	832	858.00	844.00	1215	935.00	540	851.37	27.09.2020	847.57	04.08.2020
36	Rengali	250.00	525	123.50	109.72	3548	3167.81	275	123.9	02.09.2020	111.2	19.06.2020
	Sub-Total ER	2142.25	6346.00				13866					
<u>NORTH EASTERN REGION</u>												
37	Loktak	105	448	768.50	766.20	435.91	396.44	250	769.29	30.09.2020	766.01	14.04.2020
	Sub-Total NER	105	448				396.44					
	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 720 generating units installed in 209 Hydro Electric Stations was made available by various organizations. The studies indicate that a total of 253756 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 87 generating units whereas annual maintenance was carried out for 73 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: 2020-21

S.NO	Type of Maintenance	No. of Units	Duration (Hours)	
			Max. for any unit	Average
1	ANNUAL MAINTENANCE	73	8760	814.85
2	AUXILIARY SYSTEM	7	46.88	28.1
3	CAPITAL/3 YEARLY MTCE.	87	7748.5	578.04
4	GENERATOR	21	5271.93	819.55
5	INSPECTION /MTCE	1	11.7	11.7
6	MONTHLY MAINTENANCE	20	1058.92	68.63
7	OTHER EQUIPMENT	4	2167.62	552.64
8	RENOVATION/MODERNISATION	14	8760	2953.03
9	ROUTINE MAINTENANCE	4	32.12	11.4
10	TURBINE	19	4313.53	426.28
11	MISCELLANEOUS	53	1273.83	390.55

4.3 There were a total of 614 outages due to Planned Maintenance during the Year 2020-21, out of which about 28.01% were of duration up to 24 hours, while 30.94 % 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: 2020-21**

Sl. No.	Duration	Number of Outage	Maintenance % to total number of Outages
1	more than 10 days	190	30.94
2	Less than 6 hour	112	18.24
3	6 to 24 hours	172	28.01
4	1 to 10 days	140	22.80
	Total No. of Outages	614	100

4.4 Planned Maintenance age-wise

Planned maintenance carried out for different age groups of hydro generating units during the year 2020-21 is indicated in **Table 4.3**.

TABLE 4.3

**PLANNED MAINTENANCE AGE-WISE
PERIOD: 2020-21**

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	2020-21	8	510.00	0	0
2	2019-20	2	300.00	0	0
3	2018-19	3	140.00	0	0
4	2017-18	16	795.00	7824	489
5	2016-17	18	1659.00	3312	184
6	2015-16	17	1516.00	4272	251
7	2010-11 to 2014-15	63	4437.02	37896	602

8	2005-06 to 2009-10	66	7077.00	30480	462
9	2000-01 to 2004-05	74	6741.80	38448	520
10	1989-90 to 1999-2000	86	5769.70	34464	401
11	1978-79 to 1988-89	124	7259.10	71448	576
12	1967-68 to 1977-78	81	5279.75	76872	949
13	Up to 1966-67	162	4724.85	119520	738
	Total	720	46209.2	253756	352

It is seen that the average non-availability of units due to planned maintenance is relatively higher in case of older units commissioned from 1967-68 to 1977-78 (949 hrs. /unit).

4.5 Analysis based on Planned Maintenance of different types of Turbines

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

TABLE 4.4

**PLANNED MAINTENANCE-TURBINE TYPE-WISE
PERIOD: 2020-21**

Sl. No.	Type of Turbine	No. of Units	Installed Capacity (MW)	Planned Outages (Hours)	Non-Availability Per Unit (Hours)
1	BULB	26	684.00	400	15
2	FRANCIS	416	32532.57	170414	410
3	KAPLAN	133	4386.75	43282	325
4	PELTON	145	8605.90	39659	274
	Total	720	46209.22	253756	352

The average non-availability due to planned maintenance was maximum for Francis turbine at 410 hrs. /unit followed by Kaplan units at 325 hrs. /unit, while it was minimum for Bulb units at 15 hrs. /unit.

4.6 Analysis based on Make of Generating Units

About 49.57% of the installed capacity of Hydro has been sourced from indigenous suppliers with BHEL alone accounting for about 42.69% of the capacity. The remaining 50.14% 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: 2020-21

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	42.69	19810.02	42.87	124996	403
2	Others	51	6.88	3215.50	6.96	19018	229
	SUB TOTAL	359	49.57	23025.50	49.83	144014	366
B- Imported							
3	SWITZERLAND	21	2.94	790.20	1.71	9763	92
4	JAPAN	76	10.56	6398.20	13.85	32285	436
5	CANADA	44	6.17	3132.00	6.78	24068	633
6	FRANCE	31	4.31	2179.20	4.72	802	73
7	RUSSIAN FEDERATION	26	3.61	2804.00	6.07	9877	380
8	UNITED KINGDOM	63	8.75	1242.10	2.69	20522	331
9	UNITED STATES OF AMERICA	9	1.25	351.00	0.76	3950	208
10	Others	91	12.64	6287.00	13.61	8475	130
	SUB TOTAL	361	50.14	23183.70	50.17	109742	336
	TOTAL	720	100.00	46209.22	100	253756	352

It is observed that during the year 2020-21, average non-availability due to planned maintenance of the units supplied by BHEL was 403 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 Canada (633 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: 2020-21

S.No	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Planned Maintenance
1	Northern	251	19233.27	5.55
2	Western	101	7392	0.97
3	Southern	247	11694.5	2.73
4	Eastern	85	5862.45	5.63
5	North Eastern	36	2027	7.80
	All India	720	46209.22	4.06

The non-availability of generating unit due to planned maintenance was least in Western Region (0.97%) followed by Southern Region at (2.73 %), whereas it was maximum in North Eastern Region (7.80 %) followed by Eastern Region (5.63%).

The average non-availability of hydro electric units due to planned maintenance during the year 2020-21 was 4.06% as compared to 4.12% during the year 2019-20.

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 2020-21 vis-à-vis 2019-20 is summarized below in **Table 4.7**.

TABLE 4.7
NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2020-21 VIS-A-VIS 2019-20)

% Non-Availability due to planned maintenance	2020-21				2019-20			
	Stations		Capacity		Stations		Capacity	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
≤ 5	158	76.33	34696.37	75.09	157	76.59	33471.32	73.24
>5 to 10	27	12.08	6465.20	13.99	28	13.66	7615.20	16.66
>10 to 15	9	4.35	1530.15	3.31	8	3.90	2015.00	4.41
>15 to 20	4	1.93	1550	3.35	4	1.95	1006.00	2.20
>20 to 25	1	0.48	304	0.66	1	0.49	32.00	0.07
>25 to 30	5	2.42	938.50	2.06	3	1.46	685.50	1.50
above 30	5	2.42	725	1.57	4	1.95	874.20	1.91
Total	209	100.00	46209.22	100.00	205	100.00	45699.20	100.00

It could be seen from above that 158 nos. (76.33% of total) hydro-electric stations had non-availability factor less than or equal to 5% due to planned maintenance during 2020-21 as compared to 157 nos. (76.59% of total) during 2019-20.

Non-availability due to planned maintenance was more than 30% at 5 nos. (2.42% of total) H.E. Stations during 2020-21 and which was 4 nos. (1.95% of total) in 2019-20. The details of these stations for 2020-21 is given below in **Table 4.8**.

TABLE 4.8
H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE
FOR THE PERIOD: (2020-21)

Sl. No	Name of Station/Utility	Capacity (MW)	N.A. due to P.M.* (%)	Reasons
1	CHAMERA-II HPS / NHPC	300.0	38.517	GENERATOR
2	KHONDONG HPS / NEEPCO.	50.0	60.167	ANNUAL MAINTENANCE
3	NARIAMANGLAM HPS / KSEB	52.65	33.333	ANNUAL MAINTENANCE
4	PYKARA ULTMATE HPS / TANGEDCO	150.0	33.333	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 NEEPCO (1098 hrs. /unit).

In case of State Sector, non-availability due to planned maintenance was maximum under UJVNL (1082 hrs. /unit).

In case of Private Sector, non-availability due to planned maintenance was maximum under DEPL (840 hrs. /unit).

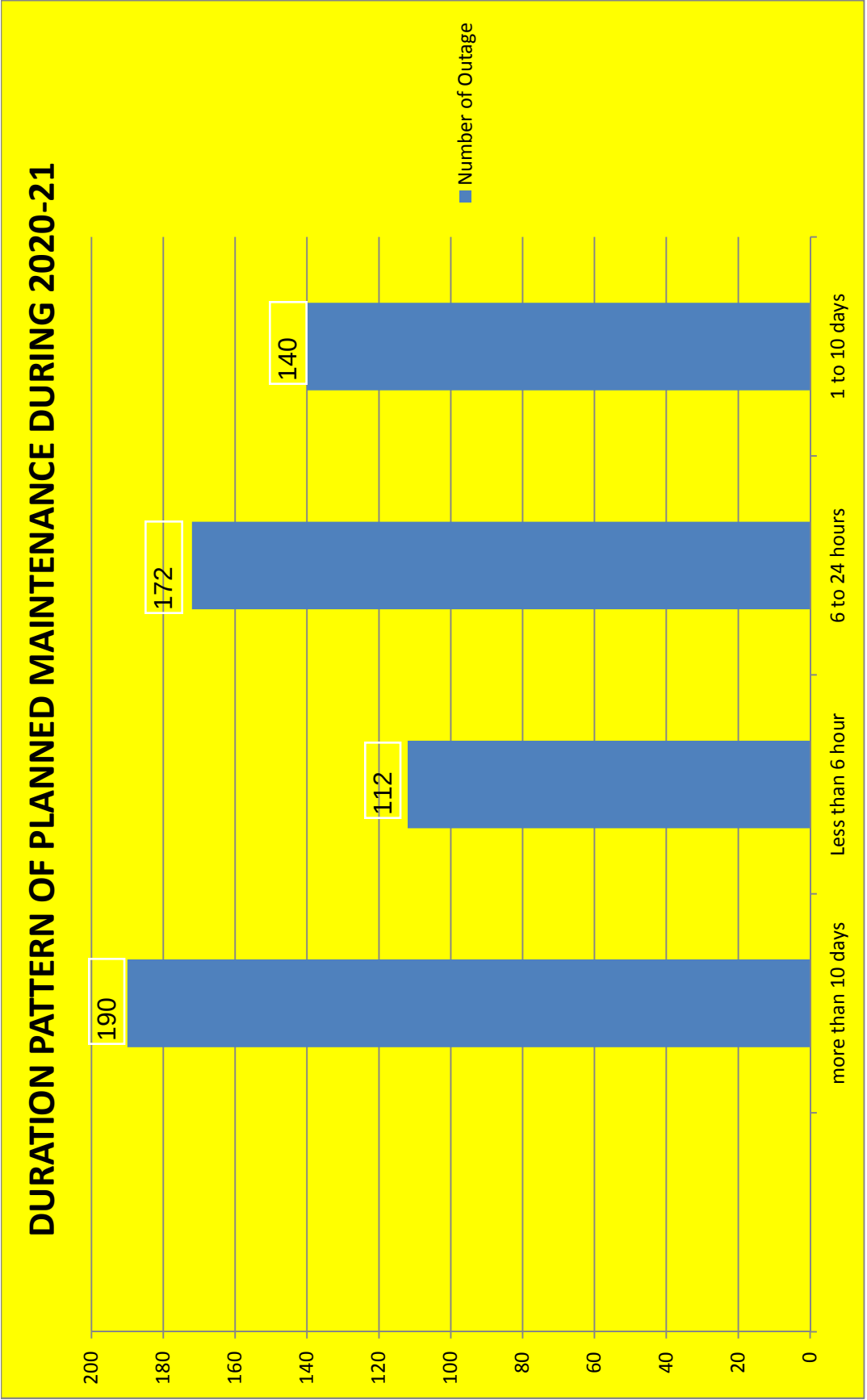
It is also observed that the average duration of planned maintenance in respect of H.E. Stations in Central Sector, State Sector and Private Sector is 646 hrs. /Unit, 279 hrs. /Unit and 147 hrs. /Unit respectively.

TABLE 4.9

**SECTOR-WISE/ UTILITY-WISE PERFORMANCE PLANNED MAINTENANCE
PERIOD: 2020-21**

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	12501	446
2	DVC	5	143.20	336	67
3	NEEPCO.	20	1500.00	21970	1098
4	NHDC	16	1520.00	4832	302
5	NHPC	70	5451.20	60197	860
6	NTPC Ltd.	4	800.00	1217	304
7	SJVNL	12	1912.02	2148	179
8	THDC	8	1400.00	2020	252
	Sub Total (CS)	163	15646.72	105219	646
(B)	Private Sector				
1	ADHPL	2	192.00	1099	549
2	AHPC (GVK)	4	330.00	75	19
3	DEPL	2	96.00	1679	840
4	DLHP	1	34.00	0	0
5	E.P.P.L.	2	100.00	0	0
6	GBHPPL	2	70.00	1143	572
7	GIPL	2	110.00	1210	605
8	HBPCL	7	1300.00	2026	289
9	IAEPL	3	36.00	0	0
10	JPPVL	4	400.00	25	6
11	L&T	3	99	0	0
12	MPCL	2	86	0	0
13	SEPL	2	97	548	274
14	SKPPPL	2	96	0	0

15	TATA MAH.	15	447	0	0
Sub Total (Pvt.)		53	3493	7806	147
(C)	State Sector				
1	APGCL	2	100	0	0
2	APGENCO	34	1796.75	3074	90
3	CSPGCL	3	120.00	0	0
4	GSECL	8	540.00	0	0
5	HPPCL	8	406.00	939	117
6	HPSEB	12	372.00	6802	567
7	JKSPDC	12	1110.00	0	0
8	JUUNL	2	130.00	0	0
9	KPCL	66	3572.20	9921	150
10	KSEB	47	1856.50	32172	684
11	MAHAGENCO	24	2406.00	0	0
12	MeECL	13	322.00	0	0
13	MPPGCL	23	875.00	328	14
14	OHPC	31	2027.50	26280	848
15	PSPCL	25	1051.00	2459	98
16	RRVUNL	11	411.00	2080	189
17	SSNNL	11	1450.00	3444	313
18	TANGEDCO	69	2178.20	13606	197
19	TSGENCO	36	2405.60	193	5
20	TUL	6	1200.00	2646	441
21	UJVNL	34	1252.15	36788	1082
22	UPJVNL	15	501.60	0	0
23	WBSEDCL	12	986.00	0	0
Sub Total (State)		504	27069.50	140732	279
All India		720	46209.22	253756	352



CENTRAL ELECTRICITY AUTHORITY
Hydro WING
Hydro Project Planning & Investigation Division

Annex-4.1

DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO - ELECTRIC UNITS DURING 2020-21

(OUTAGE DURATION 50 HOURS AND ABOVE)

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
Eastern							
OHPC							
1	BALIMELA HPS	1	60.0	04/01/2020	03/31/2021	8,760.00	RENOVATION/MODERNISATION
GIPL							
2	CHUZACHEN HPS	1	55.0	02/01/2021	02/25/2021	587.29	ANNUAL MAINTENANCE
		2	55.0	01/31/2021	02/26/2021	622.93	ANNUAL MAINTENANCE
OHPC							
3	HIRAKUD HPS	5	43.65	04/01/2020	03/31/2021	8,760.00	RENOVATION/MODERNISATION
		6	43.65	04/01/2020	03/31/2021	8,760.00	RENOVATION/MODERNISATION
DEPL							
4	JORETHANG LOOP	1	48.0	04/01/2020	04/11/2020	254.28	ANNUAL MAINTENANCE
		1	48.0	02/16/2021	02/22/2021	151.25	ANNUAL MAINTENANCE
		2	48.0	12/01/2020	01/23/2021	1,273.83	RUNNER REPAIR
APGENCO							
5	MACHKUND HPS	4	21.25	05/15/2020	05/18/2020	76.50	MISCELLANEOUS PLANNED
DVC							
6	MAITHON HPS	2	23.2	02/12/2021	02/26/2021	336.17	ANNUAL MAINTENANCE
NHPC							
7	RANGIT HPS	1	20.0	02/24/2021	03/23/2021	662.02	ANNUAL MAINTENANCE
		1	20.0	12/18/2020	12/23/2020	138.18	BUTTERFLY VALVE
		1	20.0	08/17/2020	09/03/2020	425.63	SWITCHING EQUIPMENT
		2	20.0	07/24/2020	07/26/2020	67.43	TURBINE INSPECTION MISC
		2	20.0	12/18/2020	01/23/2021	888.00	ANNUAL MAINTENANCE
		3	20.0	01/23/2021	02/22/2021	715.10	ANNUAL MAINTENANCE
		3	20.0	12/18/2020	12/23/2020	138.50	BUTTERFLY VALVE
SEPL							
8	TASHIDING HPS	1	48.5	11/24/2020	11/30/2020	167.92	MONTHLY MAINTENANCE
		2	48.5	11/24/2020	11/30/2020	167.92	MONTHLY MAINTENANCE
TUL							
9	TEESTA-III HPS	1	200.0	03/07/2021	03/21/2021	354.42	ANNUAL MAINTENANCE
		2	200.0	02/07/2021	03/07/2021	678.75	ANNUAL MAINTENANCE
		3	200.0	12/01/2020	12/12/2020	269.10	ANNUAL MAINTENANCE
		4	200.0	12/14/2020	01/01/2021	422.18	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	200.0	01/21/2021	02/01/2021	272.03	ANNUAL MAINTENANCE
		6	200.0	04/27/2020	05/01/2020	102.89	RUNNER REPAIR
		6	200.0	01/05/2021	01/18/2021	334.03	ANNUAL MAINTENANCE
NHPC							
10	TEESTA LOW DAM-III	1	33.0	06/03/2020	06/05/2020	64.48	SWITCHING EQUIPMENT
		2	33.0	03/03/2021	03/18/2021	380.33	ANNUAL MAINTENANCE
		2	33.0	05/29/2020	06/06/2020	209.45	SWITCHING EQUIPMENT
		3	33.0	01/04/2021	01/19/2021	357.93	ANNUAL MAINTENANCE
		3	33.0	06/03/2020	06/05/2020	64.17	SWITCHING EQUIPMENT
		4	33.0	06/03/2020	06/05/2020	64.17	SWITCHING EQUIPMENT
		4	33.0	02/10/2021	03/01/2021	449.65	ANNUAL MAINTENANCE
11	TEESTA LOW DAM-IV	1	40.0	03/05/2021	03/31/2021	620.37	ANNUAL MAINTENANCE
		2	40.0	02/12/2021	02/28/2021	393.28	ANNUAL MAINTENANCE
		3	40.0	11/03/2020	11/11/2020	211.63	SWITCHING EQUIPMENT
		3	40.0	01/22/2021	02/09/2021	431.87	ANNUAL MAINTENANCE
		4	40.0	11/03/2020	11/08/2020	140.12	SWITCHING EQUIPMENT
		4	40.0	01/04/2021	01/21/2021	419.67	ANNUAL MAINTENANCE
12	TEESTA V HPS	1	170.0	02/20/2021	03/13/2021	512.22	ANNUAL MAINTENANCE
		2	170.0	02/05/2021	02/19/2021	360.00	ANNUAL MAINTENANCE
		3	170.0	03/15/2021	03/23/2021	208.86	ANNUAL MAINTENANCE
North Eastern							
NEEPCO.							
13	DOYANG HPS	3	25.0	04/01/2020	02/17/2021	7,748.50	ANNUAL MAINTENANCE
14	KAMENG HPS	1	150.0	02/06/2021	02/21/2021	373.35	ANNUAL MAINTENANCE
		2	150.0	03/02/2021	03/09/2021	180.75	ANNUAL MAINTENANCE
15	KHONDONG HPS	1	25.0	04/01/2020	11/05/2020	5,246.62	ANNUAL MAINTENANCE
		2	25.0	04/01/2020	11/07/2020	5,294.65	ANNUAL MAINTENANCE
NHPC							
16	LOKTAK HPS	1	35.0	01/27/2021	02/03/2021	181.90	ANNUAL MAINTENANCE
		2	35.0	01/11/2021	01/22/2021	277.23	ANNUAL MAINTENANCE
		3	35.0	04/01/2020	06/30/2020	2,167.62	MAIN GENERTATOR
		3	35.0	02/06/2021	02/14/2021	197.12	ANNUAL MAINTENANCE
NEEPCO.							
17	PARE	1	55.0	01/04/2021	01/25/2021	508.53	ANNUAL MAINTENANCE
		2	55.0	02/05/2021	02/19/2021	344.70	ANNUAL MAINTENANCE
		2	55.0	04/01/2020	05/24/2020	1,285.27	ANNUAL MAINTENANCE
18	RANGANADI HPS	1	135.0	01/04/2021	01/12/2021	207.00	ANNUAL MAINTENANCE
		2	135.0	02/01/2021	02/14/2021	319.58	ANNUAL MAINTENANCE
		3	135.0	02/22/2021	03/02/2021	198.25	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
19	TUIRIAL HPS	2	30.0	07/08/2020	07/17/2020	227.63	ANNUAL MAINTENANCE
Northern							
ADHPL							
20	ALLAIN DUHANGAN	1	96.0	12/01/2020	12/23/2020	535.75	ANNUAL MAINTENANCE
		2	96.0	01/16/2021	02/07/2021	526.48	ANNUAL MAINTENANCE
NHPC							
21	BAIRA SIUL HPS	1	60.0	04/01/2020	10/27/2020	5,034.72	RENOVATION/MODERNISATION
		2	60.0	08/18/2020	12/21/2020	3,004.55	GENERATOR
		3	60.0	06/29/2020	07/03/2020	95.85	TURBINE INSPECTION MISC
		3	60.0	08/19/2020	08/25/2020	156.37	TURBINE INSPECTION MISC
		3	60.0	05/17/2020	05/24/2020	168.00	TURBINE INSPECTION MISC
HBPCL							
22	BASPA HPS	1	100.0	01/05/2021	01/12/2021	171.00	ANNUAL MAINTENANCE
		1	100.0	03/04/2021	03/07/2021	76.00	ANNUAL MAINTENANCE
		2	100.0	02/21/2021	02/26/2021	124.42	ANNUAL MAINTENANCE
		2	100.0	03/04/2021	03/07/2021	76.00	ANNUAL MAINTENANCE
		3	100.0	03/04/2021	03/07/2021	76.00	ANNUAL MAINTENANCE
		3	100.0	02/09/2021	02/17/2021	193.75	ANNUAL MAINTENANCE
BBMB							
23	BHAKRA LEFT HPS	3	126.0	04/01/2020	03/31/2021	8,760.00	UPRATING
GBHPPL							
24	BUDHIL HPS	1	35.0	12/01/2020	12/21/2020	480.17	ANNUAL MAINTENANCE
		2	35.0	12/21/2020	01/17/2021	663.27	ANNUAL MAINTENANCE
NHPC							
25	CHAMERA-I HPS	1	180.0	12/16/2020	12/26/2020	250.57	ANNUAL MAINTENANCE
		2	180.0	02/15/2021	03/23/2021	867.58	ANNUAL MAINTENANCE
		3	180.0	01/04/2021	01/13/2021	220.67	ANNUAL MAINTENANCE
		3	180.0	07/19/2020	07/26/2020	171.67	GENERATOR
26	CHAMERA-II HPS	1	100.0	04/01/2020	10/19/2020	4,825.17	GENERATOR
		2	100.0	04/01/2020	11/06/2020	5,271.93	GENERATOR
		3	100.0	01/29/2021	03/01/2021	749.10	CAPITAL MAINTENANCE
27	CHAMERA-III HPS	1	77.0	12/20/2020	01/04/2021	380.25	ANNUAL MAINTENANCE
		2	77.0	12/20/2020	12/30/2020	249.35	ANNUAL MAINTENANCE
		2	77.0	08/18/2020	08/24/2020	158.78	GENERATOR
		3	77.0	07/05/2020	07/08/2020	72.73	TURBINE INSPECTION MISC
		3	77.0	01/14/2021	02/11/2021	670.92	CAPITAL MAINTENANCE
UJVNL							
28	CHIBRO (YAMUNA)	1	60.0	01/01/2021	01/07/2021	167.92	ANNUAL MAINTENANCE
		1	60.0	12/01/2020	12/31/2020	743.92	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	60.0	03/01/2021	03/25/2021	599.92	ANNUAL MAINTENANCE
		2	60.0	02/24/2021	02/28/2021	119.92	ANNUAL MAINTENANCE
		3	60.0	04/01/2020	04/29/2020	674.80	CAPITAL MAINTENANCE
29	CHILLA HPS	1	36.0	02/11/2021	02/28/2021	431.92	ANNUAL MAINTENANCE
		1	36.0	03/01/2021	03/19/2021	448.08	ANNUAL MAINTENANCE
		2	36.0	11/17/2020	12/27/2020	983.92	ANNUAL MAINTENANCE
		3	36.0	05/01/2020	08/11/2020	2,471.92	ANNUAL MAINTENANCE
		3	36.0	04/01/2020	04/30/2020	718.92	ANNUAL MAINTENANCE
		3	36.0	02/01/2021	02/16/2021	366.83	ANNUAL MAINTENANCE
		4	36.0	01/01/2021	02/19/2021	1,171.78	ANNUAL MAINTENANCE
NHPC							
30	CHUTAK HPS	1	11.0	02/08/2021	03/05/2021	596.75	SURGE SHAFT HRT MTc.
		2	11.0	02/08/2021	03/06/2021	625.47	ANNUAL MAINTENANCE
		3	11.0	10/30/2020	12/05/2020	873.10	ANNUAL MAINTENANCE
BBMB							
31	DEHAR HPS	2	165.0	06/22/2020	10/27/2020	3,059.05	CAPITAL MAINTENANCE
UJVNL							
32	DHAKRANI HPS	1	11.25	12/01/2020	12/16/2020	377.92	ANNUAL MAINTENANCE
		1	11.25	03/12/2021	03/20/2021	198.58	ANNUAL MAINTENANCE
		2	11.25	12/23/2020	12/31/2020	178.00	ANNUAL MAINTENANCE
		2	11.25	01/01/2021	03/27/2021	2,056.83	ANNUAL MAINTENANCE
		3	11.25	03/01/2021	03/11/2021	259.75	ANNUAL MAINTENANCE
NHPC							
33	DHAULI GANGA HPS	1	70.0	02/08/2021	03/08/2021	692.33	ANNUAL MAINTENANCE
		2	70.0	02/08/2021	03/11/2021	766.50	ANNUAL MAINTENANCE
		3	70.0	08/20/2020	08/23/2020	72.58	TURBINE INSPECTION MISC
		3	70.0	02/08/2021	03/09/2021	716.02	ANNUAL MAINTENANCE
		3	70.0	08/07/2020	08/10/2020	62.47	TURBINE INSPECTION MISC
		4	70.0	02/08/2021	03/06/2021	629.62	ANNUAL MAINTENANCE
34	DULHASTI HPS	1	130.0	12/19/2020	12/31/2020	268.38	ANNUAL MAINTENANCE
		2	130.0	12/04/2020	12/18/2020	340.55	ANNUAL MAINTENANCE
		3	130.0	01/03/2021	01/17/2021	359.67	ANNUAL MAINTENANCE
HPSEB							
35	GIRI BATA HPS	1	30.0	10/12/2020	10/14/2020	61.50	INSPECTION /MTCE
		1	30.0	11/24/2020	01/25/2021	1,494.50	ANNUAL MAINTENANCE
		2	30.0	03/26/2021	03/31/2021	134.92	ANNUAL MAINTENANCE
		2	30.0	04/01/2020	07/29/2020	2,875.00	ANNUAL MAINTENANCE
RRVUNL							
36	JAWAHAR SAGAR HPS	1	33.0	04/01/2020	06/26/2020	2,080.18	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
HBPCL							
37	KARCHAM WANGTOO	1	261.25	03/07/2021	03/19/2021	303.50	ANNUAL MAINTENANCE
		2	261.25	12/16/2020	01/04/2021	462.33	ANNUAL MAINTENANCE
		3	261.25	01/24/2021	02/06/2021	319.50	ANNUAL MAINTENANCE
		4	261.25	02/16/2021	02/25/2021	223.42	ANNUAL MAINTENANCE
UJVNL							
38	KHATIMA HPS	1	13.8	12/01/2020	02/25/2021	2,080.38	ANNUAL MAINTENANCE
		1	13.8	03/02/2021	03/31/2021	698.20	ANNUAL MAINTENANCE
		2	13.8	12/01/2020	01/10/2021	960.00	MISCELLANEOUS PLANNED
39	KHODRI HPS	4	30.0	04/01/2020	08/25/2020	3,527.33	MISCELLANEOUS PLANNED
		4	30.0	12/01/2020	01/25/2021	1,340.33	MISCELLANEOUS PLANNED
NHPC							
40	KISHANGANGA HPS	1	110.0	04/01/2020	09/27/2020	4,313.53	RUNNER INSPECTION /REPAIR
		1	110.0	11/17/2020	11/20/2020	80.31	TURBINE INSPECTION MISC
		2	110.0	04/01/2020	05/01/2020	738.12	GENERATOR
		2	110.0	01/11/2021	02/03/2021	558.96	ANNUAL MAINTENANCE
		2	110.0	05/25/2020	06/05/2020	285.96	TURBINE INSPECTION MISC
		3	110.0	02/22/2021	03/12/2021	419.93	RUNNER INSPECTION /REPAIR
		3	110.0	02/08/2021	02/22/2021	350.00	ANNUAL MAINTENANCE
		3	110.0	04/01/2020	04/27/2020	640.23	RUNNER INSPECTION /REPAIR
NTPC Ltd.							
41	KOLDAM	1	200.0	12/08/2020	12/14/2020	138.00	ANNUAL MAINTENANCE
		2	200.0	12/14/2020	12/18/2020	92.92	ANNUAL MAINTENANCE
		3	200.0	04/01/2020	05/02/2020	767.59	ANNUAL MAINTENANCE
		3	200.0	02/02/2021	02/06/2021	107.08	ANNUAL MAINTENANCE
		4	200.0	02/08/2021	02/12/2021	110.92	ANNUAL MAINTENANCE
THDC							
42	KOTESHWAR HPS	1	100.0	10/05/2020	10/26/2020	509.00	ANNUAL MAINTENANCE
		3	100.0	10/28/2020	11/12/2020	364.50	ANNUAL MAINTENANCE
		4	100.0	03/05/2021	03/26/2021	505.00	ANNUAL MAINTENANCE
UJVNL							
43	MANERI BHALI-II HPS	1	76.0	11/01/2020	01/06/2021	1,605.58	ANNUAL MAINTENANCE
		1	76.0	04/01/2020	06/18/2020	1,895.25	ANNUAL MAINTENANCE
		2	76.0	11/17/2020	01/17/2021	1,468.58	ANNUAL MAINTENANCE
		3	76.0	01/27/2021	03/13/2021	1,090.50	ANNUAL MAINTENANCE
		4	76.0	01/16/2021	03/13/2021	1,358.25	ANNUAL MAINTENANCE
		4	76.0	04/01/2020	05/21/2020	1,201.83	ANNUAL MAINTENANCE
		4	76.0	10/28/2020	10/31/2020	85.92	ANNUAL MAINTENANCE
SJVNL							

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
44	NATHPA JHAKRI HPS	1	250.0	01/04/2021	01/11/2021	165.90	ANNUAL MAINTENANCE
		1	250.0	02/14/2021	02/17/2021	64.97	ANNUAL MAINTENANCE
		2	250.0	02/11/2021	02/17/2021	159.87	ANNUAL MAINTENANCE
		3	250.0	01/13/2021	01/20/2021	172.80	ANNUAL MAINTENANCE
		4	250.0	02/01/2021	02/08/2021	180.10	ANNUAL MAINTENANCE
		5	250.0	01/23/2021	01/29/2021	165.20	ANNUAL MAINTENANCE
NHPC							
45	NIMMO BAZGO HPS	1	15.0	11/25/2020	12/16/2020	516.17	ANNUAL MAINTENANCE
		2	15.0	12/21/2020	01/07/2021	410.83	ANNUAL MAINTENANCE
		3	15.0	01/10/2021	01/24/2021	338.65	ANNUAL MAINTENANCE
46	PARBATI-III HPS	1	130.0	08/14/2020	08/30/2020	387.02	TURBINE INSPECTION MISC
		1	130.0	07/31/2020	08/08/2020	209.15	GENERATOR
		1	130.0	12/11/2020	01/11/2021	754.98	ANNUAL MAINTENANCE
		2	130.0	08/13/2020	09/13/2020	762.43	SWITCHING EQUIPMENT
		2	130.0	11/05/2020	01/29/2021	2,040.15	ANNUAL MAINTENANCE
		4	130.0	01/27/2021	03/05/2021	887.23	ANNUAL MAINTENANCE
BBMB							
47	PONG HPS	2	66.0	04/01/2020	04/27/2020	637.00	RENOVATION/MODERNISATION
UJVNL							
48	RAMGANGA HPS	3	66.0	04/01/2020	02/07/2021	7,505.00	ANNUAL MAINTENANCE
SJVNL							
49	RAMPUR HPS	1	68.67	02/15/2021	02/24/2021	229.70	ANNUAL MAINTENANCE
		2	68.67	02/11/2021	02/20/2021	232.00	ANNUAL MAINTENANCE
		3	68.67	01/29/2021	02/03/2021	120.47	ANNUAL MAINTENANCE
		4	68.67	01/23/2021	01/28/2021	130.25	ANNUAL MAINTENANCE
		5	68.67	01/13/2021	01/19/2021	155.25	ANNUAL MAINTENANCE
		6	68.67	01/05/2021	01/11/2021	155.98	ANNUAL MAINTENANCE
PSPCL							
50	RANJIT SAGAR HPS	3	150.0	10/14/2020	12/18/2020	1,568.17	GOVERNOR SYSTEM
		4	150.0	01/08/2021	02/07/2021	739.25	ANNUAL MAINTENANCE
HPPCL							
51	SAINJ HPS	1	50.0	04/01/2020	04/07/2020	157.22	ANNUAL MAINTENANCE
		1	50.0	01/15/2021	02/11/2021	647.55	ANNUAL MAINTENANCE
		1	50.0	01/05/2021	01/10/2021	134.50	ANNUAL MAINTENANCE
NHPC							
52	SALAL HPS	1	115.0	11/26/2020	12/15/2020	449.08	ANNUAL MAINTENANCE
		2	115.0	01/29/2021	02/11/2021	321.03	ANNUAL MAINTENANCE
		3	115.0	01/15/2021	01/28/2021	323.85	ANNUAL MAINTENANCE
		4	115.0	12/16/2020	12/30/2020	346.78	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	115.0	02/12/2021	02/24/2021	296.85	ANNUAL MAINTENANCE
		6	115.0	01/01/2021	01/14/2021	318.42	ANNUAL MAINTENANCE
HPSEB							
53	SANJAY HPS	2	40.0	03/15/2021	03/30/2021	355.93	ANNUAL MAINTENANCE
		3	40.0	02/22/2021	03/05/2021	259.09	RUNNER REPAIR
		3	40.0	12/03/2020	02/06/2021	1,575.92	RENOVATION/MODERNISATION
PSPCL							
54	SHANAN HPS	4	15.0	04/15/2020	04/21/2020	147.17	ANNUAL MAINTENANCE
NHPC							
55	TANAKPUR HPS	2	31.4	11/15/2020	11/20/2020	116.07	SWITCHING EQUIPMENT
THDC							
56	TEHRI ST-1 HPS	2	250.0	02/22/2021	03/18/2021	584.50	ANNUAL MAINTENANCE
NHPC							
57	URI-I HPS	1	120.0	11/25/2020	12/08/2020	318.47	ANNUAL MAINTENANCE
		2	120.0	11/05/2020	11/21/2020	390.43	ANNUAL MAINTENANCE
		3	120.0	12/14/2020	01/09/2021	626.00	ANNUAL MAINTENANCE
		3	120.0	07/31/2020	09/06/2020	905.05	GENERATOR
		4	120.0	01/15/2021	02/13/2021	701.73	CAPITAL MAINTENANCE
58	URI-II HPS	1	60.0	10/12/2020	10/24/2020	292.85	ANNUAL MAINTENANCE
		2	60.0	10/25/2020	11/13/2020	457.35	CAPITAL MAINTENANCE
		3	60.0	11/16/2020	11/25/2020	216.62	ANNUAL MAINTENANCE
		4	60.0	11/26/2020	12/02/2020	145.27	ANNUAL MAINTENANCE
Southern							
TANGEDCO							
59	ALIYAR HPS	1	60.0	05/18/2020	06/06/2020	465.75	MONTHLY MAINTENANCE
KPCL							
60	ALMATTI DPH HPS	1	15.0	04/21/2020	05/22/2020	733.17	ANNUAL MAINTENANCE
		6	55.0	05/12/2020	06/23/2020	997.67	ANNUAL MAINTENANCE
TANGEDCO							
61	BHAWANI KATTAL	2	15.0	04/01/2020	04/17/2020	400.42	ANNUAL MAINTENANCE
KPCL							
62	GERUSUPPA HPS	2	60.0	12/21/2020	01/04/2021	338.03	ANNUAL MAINTENANCE
		3	60.0	12/01/2020	12/21/2020	483.47	ANNUAL MAINTENANCE
APGENCO							
63	HAMPI HPS	1	9.0	03/01/2021	03/09/2021	184.00	MISCELLANEOUS PLANNED
		1	9.0	02/22/2021	03/01/2021	170.00	MISCELLANEOUS PLANNED
		1	9.0	02/03/2021	02/16/2021	313.75	MISCELLANEOUS PLANNED
KSEB							
64	IDAMALAYAR HPS	1	37.5	07/10/2020	07/17/2020	175.50	ANNUAL MAINTENANCE
		1	37.5	11/20/2020	12/16/2020	636.12	ANNUAL MAINTENANCE
		2	37.5	07/07/2020	07/31/2020	577.65	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
65	IDUKKI HPS	1	130.0	07/15/2020	07/25/2020	256.13	R AND M WORKS
		2	130.0	08/01/2020	12/28/2020	3,587.78	RENOVATION/MODERNISATION
		3	130.0	09/22/2020	10/27/2020	851.15	ANNUAL MAINTENANCE
		4	130.0	10/26/2020	01/04/2021	1,693.18	ANNUAL MAINTENANCE
		5	130.0	01/06/2021	01/30/2021	581.12	ANNUAL MAINTENANCE
		6	130.0	04/01/2020	05/30/2020	1,433.08	INSPECTION OF GENERATING
KPCL							
66	JOG HPS	1	13.2	04/01/2020	04/09/2020	207.17	RENOVATION/MODERNISATION
		3	13.2	04/01/2020	09/09/2020	3,875.50	RENOVATION/MODERNISATION
67	KADRA HPS	3	50.0	12/09/2020	12/28/2020	465.08	OVERHAULING WORKS
68	KODASALI HPS	2	40.0	01/20/2021	02/04/2021	365.48	OVERHAULING WORKS
		3	40.0	11/04/2020	12/06/2020	765.00	OVERHAULING WORKS
TANGEDCO							
69	KUNDAH-I HPS	1	20.0	01/25/2021	01/31/2021	153.42	MONTHLY MAINTENANCE
		1	20.0	02/01/2021	02/20/2021	468.42	MONTHLY MAINTENANCE
KSEB							
70	KUTTIYADI ADDL EXTN	1	50.0	12/07/2020	01/02/2021	643.23	ANNUAL MAINTENANCE
		2	50.0	05/12/2020	06/06/2020	610.73	ANNUAL MAINTENANCE
71	KUTTIYADI HPS	1	25.0	03/04/2021	03/25/2021	512.07	ANNUAL MAINTENANCE
		2	25.0	02/01/2021	02/28/2021	663.50	ANNUAL MAINTENANCE
		3	25.0	10/27/2020	12/05/2020	947.20	ANNUAL MAINTENANCE
APGENCO							
72	LOWER SILERU HPS	1	115.0	08/25/2020	09/01/2020	171.67	MISCELLANEOUS PLANNED
		1	115.0	09/01/2020	09/16/2020	359.67	MISCELLANEOUS PLANNED
		3	115.0	08/10/2020	08/14/2020	99.67	MISCELLANEOUS PLANNED
TANGEDCO							
73	METTUR DAM HPS	3	12.5	02/04/2021	02/07/2021	77.84	ANNUAL MAINTENANCE
APGENCO							
74	NAGARJUN SGR RBC	3	30.0	04/01/2020	05/06/2020	839.50	MISCELLANEOUS PLANNED
		3	30.0	06/08/2020	06/24/2020	381.50	ANNUAL MAINTENANCE
KSEB							
75	NARIAMANGLAM HPS	1	17.55	04/01/2020	03/31/2021	8,760.00	ANNUAL MAINTENANCE
TANGEDCO							
76	PAPANASAM HPS	1	8.0	04/01/2020	04/30/2020	697.43	ANNUAL MAINTENANCE
		1	8.0	10/21/2020	10/23/2020	58.25	PENSTOCK PRESSURE SHAFT
		2	8.0	06/01/2020	06/06/2020	133.00	ANNUAL MAINTENANCE
		2	8.0	05/02/2020	05/30/2020	674.17	ANNUAL MAINTENANCE
		3	8.0	06/01/2020	06/06/2020	133.00	ANNUAL MAINTENANCE
		4	8.0	06/01/2020	06/06/2020	133.00	ANNUAL MAINTENANCE
KSEB							

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
77	PORINGALKUTTU HPS	3	8.0	04/01/2020	01/01/2021	6,607.05	CAPITAL MAINTENANCE
TSGENCO							
78	PULICHINTALA HPS	4	30.0	08/22/2020	08/28/2020	160.87	RUNNER INSPECTION /REPAIR
TANGEDCO							
79	PYKARA ULTMATE HPS	2	50.0	04/01/2020	03/31/2021	8,760.00	ANNUAL MAINTENANCE
KSEB							
80	SABARIGIRI HPS	1	50.0	01/19/2021	02/07/2021	464.15	ANNUAL MAINTENANCE
		2	50.0	07/07/2020	08/05/2020	698.18	ANNUAL MAINTENANCE
		3	50.0	06/04/2020	07/04/2020	731.03	ANNUAL MAINTENANCE
		5	50.0	02/13/2021	03/14/2021	710.87	ANNUAL MAINTENANCE
TANGEDCO							
81	SARKARPATHY HPS	1	30.0	06/10/2020	07/24/2020	1,058.92	MONTHLY MAINTENANCE
82	SURULIYAR HPS	1	35.0	07/21/2020	07/24/2020	68.33	MISCELLANEOUS PLANNED
		1	35.0	04/10/2020	04/13/2020	72.83	MISCELLANEOUS PLANNED
		1	35.0	08/04/2020	08/09/2020	113.50	MISCELLANEOUS PLANNED
		1	35.0	10/26/2020	10/28/2020	55.50	MISCELLANEOUS PLANNED
		1	35.0	02/20/2021	02/23/2021	81.92	MISCELLANEOUS PLANNED
APGENCO							
83	T B DAM HPS	1	9.0	04/08/2020	04/22/2020	335.50	GENERATOR
KPCL							
84	VARAHI HPS	1	115.0	06/06/2020	06/14/2020	214.03	ANNUAL MAINTENANCE
		2	115.0	06/23/2020	06/28/2020	132.94	ANNUAL MAINTENANCE
		4	115.0	12/30/2020	02/19/2021	1,233.67	ANNUAL MAINTENANCE
Western							
NHDC							
85	INDIRA SAGAR HPS	1	125.0	04/24/2020	04/30/2020	153.10	ANNUAL MAINTENANCE
		1	125.0	03/01/2021	03/16/2021	376.77	ANNUAL MAINTENANCE
		2	125.0	03/17/2021	03/29/2021	297.70	ANNUAL MAINTENANCE
		2	125.0	05/01/2020	05/07/2020	152.98	ANNUAL MAINTENANCE
		3	125.0	05/09/2020	05/17/2020	200.77	ANNUAL MAINTENANCE
		4	125.0	06/16/2020	06/30/2020	345.00	ANNUAL MAINTENANCE
		6	125.0	04/01/2020	04/13/2020	310.28	ANNUAL MAINTENANCE
		7	125.0	05/19/2020	05/26/2020	176.52	ANNUAL MAINTENANCE
		8	125.0	05/28/2020	06/05/2020	200.33	ANNUAL MAINTENANCE
86	OMKARESHWAR HPS	1	65.0	06/08/2020	06/18/2020	246.35	ANNUAL MAINTENANCE
		2	65.0	06/18/2020	06/24/2020	149.55	ANNUAL MAINTENANCE
		2	65.0	05/18/2020	05/23/2020	124.18	ANNUAL MAINTENANCE
		3	65.0	05/25/2020	05/30/2020	131.83	ANNUAL MAINTENANCE
		3	65.0	06/24/2020	07/01/2020	163.33	ANNUAL MAINTENANCE

S.No	STATION	UNIT	CAPACIT Y(MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		4	65.0	07/02/2020	07/09/2020	171.90	ANNUAL MAINTENANCE
		4	65.0	05/12/2020	05/16/2020	102.67	ANNUAL MAINTENANCE
		5	65.0	06/01/2020	06/06/2020	126.02	ANNUAL MAINTENANCE
		5	65.0	07/10/2020	07/16/2020	146.90	ANNUAL MAINTENANCE
		6	65.0	07/16/2020	07/23/2020	172.67	ANNUAL MAINTENANCE
		6	65.0	05/05/2020	05/11/2020	150.00	ANNUAL MAINTENANCE
		7	65.0	03/01/2021	03/15/2021	333.35	ANNUAL MAINTENANCE
		8	65.0	07/23/2020	07/30/2020	174.10	ANNUAL MAINTENANCE
		8	65.0	03/15/2021	03/27/2021	289.40	ANNUAL MAINTENANCE
MPPGCL							
87	PENCH HPS	1	80.0	06/07/2020	06/20/2020	327.68	ANNUAL MAINTENANCE
SSNNL							
88	S SAROVAR CHPH HPS	2	50.0	08/11/2020	08/26/2020	365.92	RUNNER INSPECTION
		3	50.0	11/23/2020	12/05/2020	291.65	RUNNER INSPECTION
		3	50.0	05/11/2020	05/25/2020	343.42	ANNUAL MAINTENANCE
		4	50.0	05/29/2020	06/09/2020	281.00	ANNUAL MAINTENANCE
89	S SAROVAR RBPH HPS	1	200.0	12/01/2020	12/21/2020	489.00	ANNUAL MAINTENANCE
		2	200.0	12/25/2020	01/15/2021	522.50	ANNUAL MAINTENANCE
		3	200.0	01/16/2021	02/05/2021	489.08	ANNUAL MAINTENANCE
		6	200.0	05/19/2020	06/15/2020	648.00	ANNUAL MAINTENANCE

CHAPTER-5

FORCED OUTAGES OF HE UNITS

CHAPTER-5

FORCED OUTAGES OF HE UNITS

5.1 Forced outages of generating units are due to various problems in generating equipments, auxiliary systems, civil structures. Based on the analysis carried out for 720 hydro generating units installed in 209 Hydro Electric Power Stations, non-availability of hydro-electric units in the country due to forced outages during the year 2020-21 (excluding miscellaneous outages) was 3.27% as compared to 1.91% during 2019-20.

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

During 2020-21, the generator and turbine faults accounted for 16.92% and 44.60% of the forced outages respectively whereas other equipment & civil structure faults accounted for 12.56% & 25.92% respectively of the forced outages. The summary of forced outages caused due to breakdown of generator, turbine and other equipment during 2020-21 vis-à-vis 2019-20 is given in **Table 5.1** below.

TABLE 5.1

EQUIPMENT/SYSTEM-WISE FORCED OUTAGES (2020-21 VIS-A-VIS 2019-20)

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage		Increase/ Decrease viz-z-viz 2019-20
		2020-21	2019-20	2020-21	2019-20	
1	Generator	29383.71	23707.50	16.92	25.84	-23.94
2	Turbine	77437.71	39167.28	44.60	42.69	-97.71
3	Civil	45016.77	12578.78	25.92	13.71	-257.88
4	Other	21805.83	16290.07	12.56	17.76	-33.86
	Total	173644.02	91743.63	100.00	100.00	-89.27

It is observed that forced outages in 2020-21 vis-a-vis 2019-20 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 2020-21 includes Stator (39.37 %), followed by Rotor Fault (29.23 %), Miscellaneous Generator (19.53 %) and Lower Guide Bearing (4.81 %) which together accounted for more than the 92.94% of the forced outages due to generator components.

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

TABLE 5.2
FORCED OUTAGE HOURS DUE TO BREAKDOWN OF
GENERATOR COMPONENTS (PERIOD: 2020-21)

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	63.58	1.06	0	0	0	0	63.58	0.22
2	BRAKE AND JACKS	1.02	0.02	1.45	0.01	0	0	2.47	0.01
3	EXCITATION SYSTEM	137.77	2.29	15.17	0.08	422.42	10.13	575.36	1.96
4	GENERATOR COOLING SYSTEM	441.92	7.35	9.6	0.05	21.3	0.51	472.82	1.61
5	LOWER GUIDE BEARING	37.17	0.62	0	0	1377.43	33.02	1414.6	4.81
6	MISCELLANEOUS GENERATOR	2435.5	40.52	1971.25	10.27	1331.96	31.93	5738.71	19.53
7	PROTECTION SYSTEM	39.73	0.66	14.57	0.08	50.07	1.2	104.37	0.36
8	ROTOR	1395.61	23.22	6344.73	33.04	847.06	20.3	8587.41	29.23
9	STATOR	1347.08	22.41	10192.67	53.08	27.75	0.67	11567.5	39.37
10	THRUST BEARING	48.23	0.8	425.35	2.22	6.33	0.15	479.92	1.63
11	UPPER GUIDE BEARING	53.25	0.89	200.67	1.05	80.13	1.92	334.04	1.14
12	VIBRATION/SOUND /ALIGNMENT	9.58	0.16	25.92	0.13	7.43	0.18	42.93	0.15
	Total	6010.45	100	19201.3	100	4171.89	100	29383.71	100

From the Table 5.2, it is observed that Miscellaneous Generator (40.52%) constitute the major reason for forced outage in respect unit size up to 50 MW the major contributors of forced outage in respect unit size above 50 MW.

5.3 FORCED OUTAGE DUE TO TURBINE COMPONENTS

5.3.1 Faults in Miscellaneous Turbine Components parts (45.88%), Other Faults (34.05%) and Runner/underwater parts (12.23%) 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: 2020-21

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	1408.23	2.13	78.33	11.78	1871.08	17.56	3357.65	4.34
2	MISCELLANEOUS TURBINE COMPONENTS	27465.31	41.54	308.73	46.42	7751.2	72.75	35525.25	45.88
3	OTHERS	26336.42	39.83	10.92	1.64	19.43	0.18	26366.77	34.05
4	BEARING	185.88	0.28	23.9	3.59	878.36	8.24	1088.14	1.41
5	GUIDE VANES	0	0	3.72	0.56	0.72	0.01	4.43	0.01
6	RUNNER/UNDERWATER PARTS	9429.47	14.26	0	0	39.15	0.37	9468.62	12.23
7	SHAFT VIBRATION/ALIGNMENT/S	1282.6	1.94	64.13	9.64	90.12	0.85	1436.86	1.86
8	MAIN INLET VALVE	9.65	0.01	175.42	26.37	4.93	0.05	190	0.25
	Total	66117.56	100	665.15	100	10655	100	77437.71	100

From the Table 5.3, it is observed that Miscellaneous Turbine Components parts (41.54%) 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: 2020-21

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	68.77	2.64
2	Francis	416	32532.57	65724.47	157.99
3	Kaplan	133	4386.75	1560.10	11.73
4	Pelton	145	8605.90	10084.38	69.55
	TOTAL	720	46209.22	77437.71	107.55

Forced outage rate was observed to be the highest in case of Francis turbines (157.99 hrs./unit) followed by Pelton turbines (69.55 hrs./unit), Kaplan turbines (11.73 hrs./unit) and lowest in case of Bulb turbines (2.64 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: 2020-21**

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	19810.02	82860.61	267.29	6
2	Others*	51	3215.50	30868.12	371.91	8
	SUB TOTAL	359	23025.50	113728.73	289.39	
B-Imported						
3	USA	9	351.00	1572.63	82.77	2
4	U.K.	63	1242.10	13734.46	221.52	5
5	France	31	2179.20	2015.36	183.21	4
6	Canada	44	3132.00	3283.25	86.40	3
7	USSR	26	2804.00	230.07	8.85	1
8	Switzerland	21	790.20	13173.95	411.69	9
9	Japan	76	6398.20	22453.36	303.42	7
10	Other	91	6287.00	34153.43	525.44	10
	SUB-TOTAL	361	23183.70	90616.50	277.11	
	TOTAL	720	46209.20	204345.23	283.81	

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

It is observed that Performance Ranking in Term of Lowest Average Outage Hours/Unit is best with Imported by country such as USSR, USA & Canada.

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: 2020-21

S. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Forced Outage (Hours)	Average Annual Non-availability per Unit (Hours)
1	2020-21	8	510	6.30	0.79
2	2019-20	2	300.00	0.00	0.0
3	2018-19	3	140.00	4.28	1.43
4	2017-18	16	795.00	2801.67	175.10
5	2016-17	18	1,659.00	457.63	25.42
6	2015-16	17	1,516.00	532.38	31.32
7	2010-11 to 2014-15	63	4,437.00	1217.83	19.33
8	2005-06 to 2009-10	66	7,077.00	9875.94	149.64
9	2000-01 to 2004-05	74	6,741.80	9828.11	132.81
10	1989-90 to 1999-2000	86	5,769.70	28775.03	334.59
11	1978-79 to 1988-89	124	7,259.10	24620.16	198.55
12	1967-68 to 1977-78	81	5,279.75	23706.8	292.68
13	Up to 1966-67	162	4,724.85	62182.2	383.84
	Total	720	46209.22	204345.23	283.81

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

5.7 REGION-WISE PERFORMANCE

The region-wise summary of performance of the hydel generating units is indicated in **Table 5.7**. For the purpose of computation, all types of forced outages/tripping due to faults in generator, turbine, auxiliary system & other equipments and civil structure faults (excluding misc.) have been included

TABLE 5.7
FORCED OUTAGES – REGION-WISE
PERIOD: 2020-21

S.No	Region	No. of Units	Installed Capacity (MW)	% Non-availability due to Forced Outages
1	Northern	251	19233.27	1.66
2	Western	101	7392	4.57
3	Southern	247	11694.5	3.15
4	Eastern	85	5862.45	1.74
5	North Eastern	36	2027	14.86
	All India	720	46209.22	3.27

Performance of hydro generating equipment installed in Northern Region was the best as the non-availability due to forced outages was least (1.66%). The average non-availability of the units in the North Eastern Region (14.86) and in the Western Region (4.57%) 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: 2020-21

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	3240.17	115.72
2	DVC	5	143.20	1625.23	325.05
3	NEEPCO.	20	1500.00	38502.60	1925.13
4	NHDC	16	1520.00	270.42	16.90
5	NHPC	70	5451.20	5702.65	81.47
6	NTPC LTD.	4	800.00	85.33	21.33
7	SJVNL	12	1912.02	248.98	20.75
8	THDC	8	1400.00	2.12	0.26
	Sub Total	163	15646.72	49677.49	304.77
State Sector					
1	APGCL	2	100	0.00	0.00
2	APGENCO	34	1796.75	14844.75	436.61
3	CSPGCL	3	120.00	0.00	0.00
4	GSECL	8	540.00	0.00	0.00
5	HPPCL	8	406.00	0.00	0.00
7	HPSEB	12	372.00	159.40	13.28
8	JKSPDC	12	1110.00	0.00	0.00
9	JUUNL	2	130.00	0.00	0.00
10	KPCL	66	3572.20	7874.23	119.31

11	KSEB	47	1856.50	3102.09	66
12	MAHAGENCO	24	2406.00	10445.88	435.25
13	MePGCL	13	322.00	8760.00	673.85
14	MPPGCL	23	875.00	18114.71	787.60
15	OHPC	31	2027.50	0.00	0.00
16	PSPCL	25	1051.00	31.75	1.27
17	RRVUNL	11	411.00	27720.00	2520.00
18	SSNNL	11	1450.00	1057.95	96.18
19	TANGEDCO	69	2178.20	31051.90	450.03
20	TSGENCO	36	2405.60	17917.85	497.72
21	TUL	6	1200.00	424.41	70.74
22	UJVNL	34	1252.15	569.53	16.75
23	UPJVNL	15	501.60	0.00	0.00
24	WBSEDCL	12	986.00	0.00	0.00
	Sub Total	504	27069.50	142074.46	281.89
Private Sector					
1	ADHPL	2	192.00	583.78	291.89
2	AHPC (GVK)	4	330.00	6.42	1.60
3	DEPL	2	96.00	376.93	188.46
4	DLHP	1	34.00	0.00	0.00
5	E.P.P.L.	2	100.00	106.50	53.25
6	GBHPPL	2	70.00	573.73	286.87
7	GIPL	2	110.00	70.22	35.11
8	HBPCL	7	1300.00	90.00	12.86
9	IAEPL	3	36.00	0.00	0.00
10	JPPVL	4	400.00	109.15	27.29
11	L&T	3	99.00	0.00	0.00
12	MPCL	2	86.00	0.00	0.00
13	SEPL	2	97.00	143.33	71.67
14	SKPPPL	2	96.00	0.00	0.00
15	TATA MAH.	15	447.00	10533.22	702.21
	Sub Total	53	3493	12593.27	237.61
	All India Total	720	46209.22	204345.23	283.81

It is observed that utility-wise, per unit forced outages for generating units was maximum in respect of hydro-electric stations under RRUVNL (2520 hrs./unit). On the other hand, the hydro generating units of APGCL, HPPCL, GSECL, CSPGCL, JKSPDC, OHPC, UPJVNL, WBSEDCL, DLHP, IAEPL, MPCL, L&T, SKPPL and JUUNL etc. have reported nil forced outage operation.

5.9 DURATION OF FORCED OUTAGES

There were total 1605 forced outages/tripping during the year 2020-21. 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 62.49% of the total forced shutdown were of duration less than 6 hours while 21% of outages were of duration varying from 6 to 24 hours and only 3.93% of shutdowns persisted for more than 10 days.

TABLE 5.9
DURATION PATTERN OF FORCED OUTAGES
PERIOD: 2020-21

S. No.	Duration of Hours	Number of Outages	% of Total of Outages
1	More than 10 days	63	3.93
2	Less than 6 hour	1003	62.49
3	6 to 24 hours	337	21
4	1 to 10 days	202	12.59
	Total No. of Outages	1605	100

5.10 FORCED OUTAGES - STATION-WISE

The number of H.E. Stations falling under various ranges of non-availability due to forced outages during the year 2020-21 vis-à-vis 2019-20 is summarized below in **Table 5.10**.

TABLE 5.10

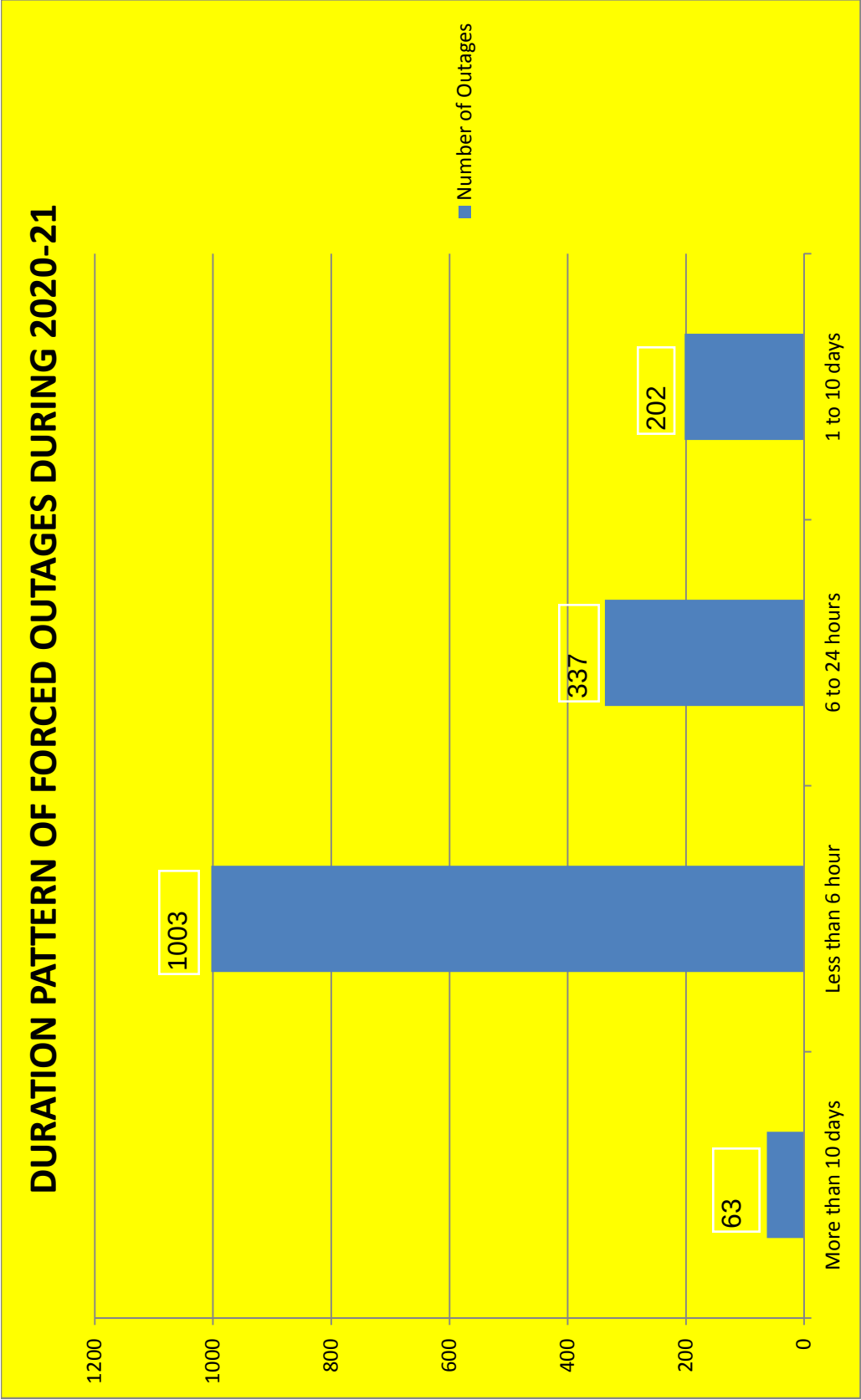
**NON-AVAILABILITY OF HE STATIONS DUE TO FORCED OUTAGES
(2020-21 VIS-A-VIS 2019-20)**

% Non-Availability due to Forced Outages	2020-21				2019-20			
	Stations		Capacity		Stations		Stations	
	No.	% of Total	MW	% of Total	No.	% of Total	MW	% of Total
0	124	59.90	21588.70	46.72	110	53.66	22,800.95	49.89
>0 to 1	14	5.80	4101.30	8.88	27	13.17	8,085.75	17.69
>1 to 2	3	1.45	975	2.11	6	2.93	757.30	1.66
>2 to 3	1	0.48	75	0.16	4	1.95	1,162.00	2.54
>3 to 4	4	1.93	1212.20	2.62	2	0.98	197.70	0.43
>4 to 5	4	1.93	1004	2.17	2	0.98	168.50	0.37
>5	59	28.50	17253.02	37.34	54	26.34	12,527.00	27.41
Total	209	100	46209.22	100	205	100	45699.22	100

It could be seen from above that there was no forced outage at 124 nos. (59.90% of total) hydro-electric stations during 2020-21 as compared to 110 nos. (53.66% of total) hydro-electric stations during 2019-20.

28.50% 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.



CENTRAL ELECTRICITY AUTHORITY
Hydro WING
Hydro Project Planning & Investigation Division

Annexure 5.1

DETAILS OF LONG DURATION FORCED OUTAGE IN HYDRO-ELECTRIC UNITS DURING: 2020-21

(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	8/21/20, 7:30 PM	8/22/20, 7:52 PM	24.37	TRIPPING OF TRANSMISSION LINE
		2	96.0	4/1/20, 11:05 AM	4/5/20, 9:00 AM	93.92	MAIN INLET VALVE
		2	96.0	4/14/20, 7:10 PM	4/18/20, 9:00 AM	85.83	GEN.TRANSFORMER COOLING PROBLEM/MTCE.
		2	96.0	8/21/20, 7:30 PM	8/22/20, 7:55 PM	24.42	TRIPPING OF TRANSMISSION LINE
		2	96.0	9/24/20, 8:16 AM	9/25/20, 5:15 PM	32.98	NEEDLE PROBLEM
		2	96.0	2/25/21, 11:00 AM	2/26/21, 6:29 PM	31.48	NEEDLE PROBLEM
NHPC							
2	BAIRA SIUL HPS	1	60.0	3/20/21, 8:48 AM	3/22/21, 6:45 AM	45.95	ROTOR EARTH FAULT
GBHPPL							
3	BUDHIL HPS	1	35.0	12/23/20, 12:00 AM	1/15/21, 9:00 PM	573.00	MIV LEAKAGE
UJVNL							
4	CHILLA HPS	1	36.0	10/22/20, 12:00 AM	10/24/20, 11:55 PM	71.92	TURBINE MISC.
		1	36.0	1/11/21, 12:55 PM	1/13/21, 5:45 PM	52.83	MISCELLANEOUS
		2	36.0	10/20/20, 2:28 PM	10/21/20, 7:05 PM	28.62	TURBINE MISC. PROBLEM
		3	36.0	1/5/21, 11:05 AM	1/8/21, 12:10 AM	61.08	MISCELLANEOUS
BBMB							
5	DEHAR HPS	1	165.0	11/13/20, 5:57 AM	11/17/20, 1:48 PM	103.85	GEN.TR.BREAKER MECH.PROBLEM
UJVNL							
6	DHAKRANI HPS	1	11.25	4/14/20, 12:00 AM	4/15/20, 11:55 PM	47.92	MISCELLANEOUS
BBMB							
7	GANGUWAL HPS	2	24.2	5/25/20, 7:15 PM	9/28/20, 1:55 PM	3018.67	DC SYSTEM FAILURE/LEAKAGE/EARTH FAULT
HPSEB							
8	GIRI BATA HPS	1	30.0	1/26/21, 2:00 PM	1/31/21, 3:30 PM	121.50	MISCELLANEOUS
RRVUNL							
9	JAWAHAR SAGAR HPS	2	33.0	4/1/20, 12:00 AM	5/31/20, 12:00 AM	1440.00	CABLE FAULTS
UJVNL							

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
10	KHATIMA HPS	1	13.8	7/24/20, 2:00 PM	7/26/20, 11:55 PM	57.92	MISCELLANEOUS
NHPC							
11	KISHANGANGA HPS	2	110.0	5/23/20, 3:41 PM	5/24/20, 11:59 PM	32.31	TURBINE BEARING PROBLEMS
		2	110.0	2/3/21, 6:26 PM	2/6/21, 8:48 PM	74.38	UGB. TEMPERATURE HIGH
NTPC Ltd.							
12	KOLDAM	2	200.0	5/17/20, 10:15 PM	5/18/20, 11:55 PM	25.67	GENEATOR TRANSFORMER MISC.
		4	200.0	5/11/20, 6:15 AM	5/13/20, 5:55 PM	59.67	GENEARTOR MISC.
BBMB							
13	KOTLA HPS	1	29.25	7/27/20, 8:01 AM	7/29/20, 5:38 PM	57.62	GENEATOR TRANSFORMER OIL PROBLEMS/TOPPING
E.P.P.L.							
14	MALANA-II HPS	2	50.0	10/3/20, 7:06 PM	10/7/20, 12:44 PM	89.63	ROTOR EARTH FAULT
UJVNL							
15	MANERI BHALI-II HPS	1	76.0	7/6/20, 4:15 PM	7/7/20, 6:10 PM	25.92	T.B. ALIGNMENT/MISC.
		3	76.0	6/23/20, 9:05 AM	6/24/20, 6:55 PM	33.83	MISCELLANEOUS
		4	76.0	5/22/20, 6:15 AM	5/29/20, 6:15 PM	180.00	MISCELLANEOUS
SVJNL							
16	NATHPA JHAKRI HPS	4	250.0	4/22/20, 12:00 AM	4/23/20, 11:52 AM	35.87	TURBINE BEARING PROBLEMS
		4	250.0	4/23/20, 12:15 PM	4/24/20, 4:08 PM	27.88	TURBINE SHAFT SEAL WORK/REPLACMEENT
17	RAMPUR HPS	2	68.67	12/11/20, 5:44 PM	12/13/20, 10:45 PM	53.02	GENERATING UNIT SHUT DOWN OTHER REASONS
		6	68.67	4/1/20, 5:15 PM	4/3/20, 7:20 PM	50.08	ROTOR EARTH FAULT
PSPCL							
18	RANJIT SAGAR HPS	4	150.0	4/22/20, 8:30 AM	4/23/20, 4:15 PM	31.75	EXCT. FAIL/LOSS OF EXCITATION /MISC. PROB.
RRVUNL							
19	R P SAGAR HPS	1	43.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	FLOODING OF POWER HOUSE
		3	43.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	FLOODING OF POWER HOUSE
		4	43.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	FLOODING OF POWER HOUSE
NHPC							
20	SALAL HPS	1	115.0	8/21/20, 2:05 PM	8/22/20, 2:20 PM	24.25	DESILTING OF INTAKE CHANNEL.
21	TANAKPUR HPS	1	31.4	7/29/20, 10:08 AM	7/30/20, 10:35 AM	24.45	DESILTING OF INTAKE CHANNEL.
		2	31.4	7/29/20, 10:10 AM	7/30/20, 10:37 AM	24.45	DESILTING OF INTAKE CHANNEL.
		2	31.4	11/27/20, 4:52 AM	11/28/20, 2:04 PM	33.20	ROTOR EARTH FAULT
		2	31.4	11/28/20, 3:38 PM	11/30/20, 1:37 AM	33.98	ROTOR EARTH FAULT
		2	31.4	11/30/20, 10:40 AM	12/3/20, 5:12 PM	78.53	ROTOR EARTH FAULT

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	31.4	1/3/21, 9:45 AM	1/6/21, 10:19 PM	84.57	ROTOR EARTH FAULT
		3	31.4	7/29/20, 10:16 AM	7/30/20, 10:23 AM	24.12	DESILTING OF INTAKE CHANNEL.
22	URI-II HPS	1	60.0	6/28/20, 5:49 AM	6/29/20, 2:26 PM	32.62	DESILTING OF INTAKE CHANNEL.
		2	60.0	6/28/20, 5:09 AM	6/29/20, 1:51 PM	32.70	DESILTING OF INTAKE CHANNEL.
		3	60.0	6/28/20, 5:09 AM	6/29/20, 2:12 PM	33.05	DESILTING OF INTAKE CHANNEL.
		4	60.0	6/28/20, 5:21 AM	6/29/20, 2:01 PM	32.67	DESILTING OF INTAKE CHANNEL.
		4	60.0	12/21/20, 4:28 AM	12/22/20, 12:34 PM	32.10	ELECTRICAL FAULT
JPPVL							
23	VISHNU PRAYAG HPS	4	100.0	8/4/20, 12:47 PM	8/6/20, 2:28 PM	49.68	POLE DISCREPANCY
Western							
MPPGCL							
24	BANSAGAR TONS-I HPS	3	105.0	4/1/20, 12:00 AM	4/25/20, 6:42 PM	594.72	GENERTOR
TATA MAH.							
25	BHIRA HPS	4	25.0	2/25/21, 9:13 PM	3/13/21, 3:07 PM	377.90	STATOR EARTH FAULT
26	BHIVPURI HPS	2	24.0	12/11/20, 5:26 PM	2/7/21, 8:45 PM	1395.32	TRIPPING--EQUIP.DAMAGED
MPPGCL							
27	GANDHI SAGAR HPS	2	23.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	POWER HOUSE FLOODED
		3	23.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	POWER HOUSE FLOODED
MAHAGENCO							
28	GHATGHAR PSS HPS	1	125.0	4/1/20, 12:00 AM	9/3/20, 2:35 PM	3734.58	MIV LEAKAGE
		1	125.0	9/9/20, 12:00 PM	9/11/20, 11:30 AM	47.50	CONTROL SYSTEM PROBLEMS
		1	125.0	9/30/20, 6:05 PM	11/1/20, 3:12 PM	765.12	TURBINE BEARING TEMP. HIGH
		2	125.0	4/1/20, 12:00 AM	9/3/20, 2:35 PM	3734.58	MIV LEAKAGE
		2	125.0	9/9/20, 12:00 AM	9/11/20, 11:30 AM	59.50	CONTROL SYSTEM PROBLEMS
		2	125.0	10/6/20, 3:40 PM	10/8/20, 11:45 AM	44.08	CONTROL SYSTEM PROBLEMS
NHDC							
29	INDIRA SAGAR HPS	2	125.0	11/12/20, 10:00 AM	11/13/20, 7:45 PM	33.75	SWITCH YARD MAINTENANCE
		3	125.0	11/18/20, 6:00 PM	11/19/20, 6:38 PM	24.63	SWITCHYARD MISCELLANOUS.
		6	125.0	11/26/20, 10:00 AM	11/30/20, 7:00 PM	105.00	G.V.ADJUSTMENT/LIMIT PROB/BUSING/MISC.
TATA MAH.							
30	KHOPOLI HPS	2	24.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	NEEDLE PROBLEM
NHDC							

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
31	OMKARESHWAR HPS	4	65.0	10/15/20, 1:00 PM	10/18/20, 7:17 AM	66.28	UNIT AUXILIARY SUPPLY FAILURE
SSNNL							
32	S SAROVAR CHPH HPS	1	50.0	7/6/20, 12:00 AM	8/1/20, 6:36 PM	642.60	RUNNER
		2	50.0	11/13/20, 12:00 AM	11/20/20, 6:40 PM	186.67	ROTOR EARTH FAULT
		2	50.0	1/1/21, 12:00 AM	1/4/21, 10:21 PM	94.35	ROTOR EARTH FAULT
33	S SAROVAR RBPH HPS	6	200.0	8/25/20, 12:00 AM	8/30/20, 1:20 AM	121.33	EXCITATION SYSTEM FAILURE
MAHAGENCO							
34	VAITARNA HPS	1	60.0	8/27/20, 12:00 AM	9/5/20, 7:14 PM	235.23	THRUST BEARING TEMP. HIGH
		1	60.0	9/24/20, 12:00 AM	9/25/20, 9:52 PM	45.87	GEN./TR.BREAKER
		1	60.0	10/5/20, 12:00 AM	12/14/20, 2:20 PM	1694.33	GENEATOR TRANSFORMER MISC.
		1	60.0	2/8/21, 7:00 AM	2/11/21, 9:00 AM	74.00	MAIN INLET VALVE PROBLEM
Southern							
TANGEDCO							
35	ALIYAR HPS	1	60.0	1/1/21, 9:15 AM	3/1/21, 11:55 PM	1430.67	STATOR
KPCL							
36	GERUSUPPA HPS	1	60.0	5/9/20, 8:30 PM	5/11/20, 5:33 AM	33.05	GOVERNOR SLUGGISH/HUNTING /FAIL/TROUBLE
APGENCO							
37	HAMPI HPS	1	9.0	12/30/20, 10:40 AM	1/1/21, 12:00 PM	49.33	MISCELLANEOUS
		1	9.0	1/1/21, 12:00 PM	1/2/21, 1:00 PM	25.00	MISCELLANEOUS
		3	9.0	2/14/21, 1:45 AM	2/15/21, 5:15 PM	39.50	MISCELLANEOUS
KSEB							
38	IDAMALAYAR HPS	2	37.5	5/6/20, 4:28 PM	5/7/20, 10:05 PM	29.62	GENERATOR MAINTENANCE WORK
39	IDUKKI HPS	1	130.0	8/11/20, 8:40 AM	8/12/20, 6:56 PM	34.27	VARIOUS MAINTENANCE WORKS
		1	130.0	10/23/20, 8:35 AM	10/24/20, 11:44 PM	39.15	RUNNER
		2	130.0	1/18/21, 10:00 AM	1/19/21, 5:42 PM	31.70	TRIPPING--EQUIP.DAMAGED
		2	130.0	1/20/21, 3:51 PM	1/26/21, 6:10 PM	146.32	EXCT. FAIL/LOSS OF EXCITATION /MISC. PROB.
		3	130.0	11/15/20, 6:15 PM	12/3/20, 6:04 PM	431.82	ROTOR MISC. FAULTS
		4	130.0	8/14/20, 12:00 AM	8/15/20, 2:27 PM	38.45	MISCELLANEOUS
		4	130.0	2/5/21, 10:55 PM	2/18/21, 5:00 PM	306.08	UNIT AUXILIARY SUPPLY FAILURE
		5	130.0	6/8/20, 12:10 AM	6/9/20, 5:26 PM	41.27	OIL LEAKAGE PROBLEM OPU/SUM/SYSTEM
		5	130.0	7/23/20, 12:00 AM	7/24/20, 5:24 PM	41.40	VARIOUS MAINTENANCE WORKS
		5	130.0	8/7/20, 10:03 AM	8/8/20, 7:19 PM	33.27	VARIOUS MAINTENANCE WORKS

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	130.0	8/16/20, 8:45 AM	8/17/20, 10:16 AM	25.52	EXCT. FAIL/LOSS OF EXCITATION /MISC. PROB.
		6	130.0	7/26/20, 8:14 AM	7/27/20, 6:36 PM	34.37	GENEATOR TRANSFORMER MISC.
		6	130.0	9/11/20, 10:00 AM	9/12/20, 4:51 PM	30.86	EXCITATION SYSTEM FAILURE
KPCL							
40	JOG HPS	1	13.2	6/10/20, 9:50 AM	6/11/20, 3:30 PM	29.67	DEFLECTOR MECH. PROBLEM/OIL LEAKAGE
		1	13.2	8/1/20, 12:00 AM	8/3/20, 3:25 PM	63.42	EXCITATION CABLES PROBLEMS
		1	13.2	3/12/21, 9:50 AM	3/13/21, 4:05 PM	30.26	DEFLECTOR MECH. PROBLEM/OIL LEAKAGE
		2	13.2	5/12/20, 11:55 PM	5/30/20, 9:55 AM	418.00	GENEREATOR COOLING SYSTEM
		2	13.2	6/12/20, 9:45 AM	6/13/20, 12:20 PM	26.58	TURBINE CONTROL PROBLEMS
		2	13.2	9/12/20, 2:10 AM	9/16/20, 4:25 PM	110.25	MAIN EXCITER/APLIDYNE PROBLEM
		5	21.6	4/30/20, 12:00 AM	5/1/20, 9:30 AM	33.50	OIL HEAD PROBLEM
		5	21.6	9/20/20, 11:00 AM	9/22/20, 1:50 PM	50.83	STATOR EARTH FAULT
		6	21.6	5/24/20, 10:30 AM	5/26/20, 11:15 AM	48.75	RUNNER CHAMBER REPAIR
TANGEDCO							
41	KADAMPARI HPS	1	100.0	8/25/20, 11:45 PM	8/31/20, 11:55 PM	144.17	ROTOR MISC. FAULTS
		1	100.0	9/1/20, 12:00 AM	3/31/21, 11:55 PM	5087.92	ROTOR MISC. FAULTS
		2	100.0	5/30/20, 7:30 PM	5/31/20, 11:55 PM	28.42	STATOR EARTH FAULT
		2	100.0	6/1/20, 12:00 AM	6/30/20, 11:55 PM	719.92	STATOR EARTH FAULT
		3	100.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	RSD/LOW SCHEDULE
		4	100.0	4/1/20, 12:00 AM	3/31/21, 11:55 PM	8759.92	STATOR EARTH FAULT
42	KODAYAR-I HPS	1	60.0	4/1/20, 12:00 AM	4/3/20, 7:30 AM	55.50	THRUST BEARING TEMP. HIGH
		1	60.0	4/22/20, 1:00 PM	4/25/20, 6:01 AM	65.02	CLEANING OF BEARING COOLERS.
		1	60.0	5/6/20, 2:47 PM	5/8/20, 5:41 PM	50.90	CLEANING OF BEARING COOLERS.
		1	60.0	5/21/20, 5:50 PM	7/2/20, 12:31 AM	990.68	ROTOR EARTH FAULT
		1	60.0	9/5/20, 11:05 AM	9/11/20, 6:31 PM	151.43	UGB COOLING SYSTEM PROBLEM
		1	60.0	10/17/20, 9:45 AM	10/21/20, 5:31 PM	103.77	ELECTRICAL FAULT
43	KUNDAH-I HPS	1	20.0	1/3/21, 2:15 PM	1/6/21, 7:25 PM	77.17	GOVERNING SYSTEM PROBLEM
		2	20.0	2/3/21, 5:15 PM	2/5/21, 12:25 PM	43.17	DEFLECTOR MECH. PROBLEM/OIL LEAKAGE
		3	20.0	4/12/20, 8:40 AM	4/14/20, 2:00 PM	53.33	MISCELLANEOUS
44	KUNDAH-II HPS	5	35.0	8/4/20, 12:55 PM	8/6/20, 3:45 PM	50.83	WATER CONDCTOR SYSTEM
KSEB							
45	KUTTIYADI ADDL EXTN	2	50.0	6/22/20, 2:15 PM	6/24/20, 1:15 PM	47.00	WATER CONDCTOR SYSTEM

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
46	KUTTIYADI EXTN HPS	4	50.0	11/7/20, 12:35 AM	11/9/20, 7:48 AM	55.22	MISCELLANEOUS
		4	50.0	3/14/21, 8:00 AM	3/15/21, 6:28 PM	34.47	MISCELLANEOUS
47	KUTTIYADI HPS	2	25.0	10/27/20, 12:05 AM	11/5/20, 1:23 PM	229.30	MISCELLANEOUS
		2	25.0	12/25/20, 12:00 PM	12/29/20, 4:40 PM	100.67	GENEATOR TRANSFORMER OIL PROBLEMS/TOPPING
APGENCO							
48	LOWER SILERU HPS	4	115.0	7/4/20, 9:40 AM	7/31/20, 11:15 AM	649.58	MISCELLANEOUS
TANGEDCO							
49	METTUR TUNNEL HPS	2	50.0	8/22/20, 12:00 AM	8/26/20, 10:50 PM	118.83	STATOR EARTH FAULT
		2	50.0	9/14/20, 12:40 PM	9/18/20, 7:30 PM	102.83	STATOR EARTH FAULT
50	MOYAR HPS	2	12.0	4/1/20, 12:00 AM	5/14/20, 12:00 PM	1044.00	STATOR EARTH FAULT
		2	12.0	5/15/20, 11:30 AM	6/10/20, 2:10 PM	626.67	ROTOR EARTH FAULT
KPCL							
51	MUNIRABAD HPS	1	9.0	4/1/20, 12:00 AM	12/31/20, 4:20 PM	6592.33	GENEATOR TRANSFORMER /BUSHING OIL LEAKAGE
		1	9.0	1/1/21, 12:00 AM	1/2/21, 11:55 AM	35.92	GENEATOR TRANSFORMER /BUSHING OIL LEAKAGE
TSGENCO							
52	NAGARJUN SGR HPS	2	100.8	4/1/20, 12:00 AM	6/10/20, 11:59 PM	1703.98	GOVERNOR OIL COOLING SYSTEM PROBLEM
		2	100.8	7/13/20, 9:06 PM	7/17/20, 6:35 PM	93.48	SWITCHYARD MISCELLANOUS.
		4	100.8	7/11/20, 12:00 AM	8/1/20, 11:29 AM	515.48	GENERATOR TRANSFORMER BUCHOLTZ
		4	100.8	10/19/20, 11:59 PM	3/21/21, 12:29 PM	3660.50	PENSTOCK GATE PROBLEM
		5	100.8	9/18/20, 8:12 AM	9/20/20, 12:15 AM	40.05	GENERATOR TRANSFORMER FAILURE
		5	100.8	10/10/20, 9:16 PM	10/14/20, 1:09 AM	75.88	GENERATOR TRANSFORMER FAILURE
		6	100.8	7/12/20, 7:23 PM	7/14/20, 6:15 PM	46.87	GENERATOR TRANSFORMER DIFFERENTIAL
		7	100.8	7/31/20, 11:09 AM	8/7/20, 1:32 PM	170.38	COOLING WATER DELIVERY VALVES PROBLEM
		7	100.8	1/24/21, 10:45 PM	2/5/21, 11:59 PM	289.23	LGB OIL SYSTEMS PROBLEMBS
53	NAGARJUN SGR LBC HPS	1	30.0	9/3/20, 4:00 PM	10/3/20, 10:00 AM	714.00	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		2	30.0	8/30/20, 4:45 PM	9/2/20, 5:25 PM	72.67	ROTOR EARTH FAULT
APGENCO							
54	NAGARJUN SGR RBC HPS	1	30.0	4/1/20, 12:00 PM	5/15/20, 1:30 AM	1045.50	TRIPPING--EQUIP.DAMAGED
		2	30.0	4/1/20, 12:00 PM	9/11/20, 5:00 AM	3905.00	MISCELLANEOUS
55	NAGARJUN SGR TPD	1	25.0	7/4/20, 10:00 AM	9/1/20, 12:00 PM	1418.00	TRIPPING--EQUIP.DAMAGED
TSGENCO							
56	PRIYADARSHNI JURALA HPS	1	39.0	8/7/20, 5:00 PM	8/10/20, 6:00 AM	61.00	TURBINE MISC.

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		5	39.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	REVERSE POWER RELAY OPERATION
57	PULICHINTALA HPS	4	30.0	8/29/20, 11:40 AM	11/2/20, 11:59 PM	1572.32	GENERATOR TRANSFORMER FAILURE
TANGEDCO							
58	PYKARA HPS	1	7.0	5/12/20, 12:15 PM	5/15/20, 12:35 PM	72.33	PENSTOCK AIR VALVE PROBLEM
		1	7.0	2/3/21, 10:45 AM	2/5/21, 11:10 AM	48.42	PENSTOCK AIR VALVE PROBLEM
		2	7.0	5/12/20, 12:15 PM	5/15/20, 12:35 PM	72.33	PENSTOCK AIR VALVE PROBLEM
		2	7.0	5/22/20, 8:00 AM	5/24/20, 1:30 PM	53.50	PENSTOCK AIR VALVE PROBLEM
		2	7.0	6/21/20, 9:30 AM	6/29/20, 2:00 PM	196.50	PENSTOCK AIR VALVE PROBLEM
		3	7.0	4/15/20, 9:10 AM	4/18/20, 5:00 PM	79.83	PENSTOCK AIR VALVE PROBLEM
		3	7.0	6/10/20, 8:40 AM	6/16/20, 5:45 PM	153.08	PENSTOCK AIR VALVE PROBLEM
		3	7.0	2/16/21, 9:45 AM	2/18/21, 10:30 AM	48.75	PENSTOCK EXP. JOINT PROBLEM
		5	13.6	4/15/20, 9:10 AM	4/18/20, 5:00 PM	79.83	PENSTOCK AIR VALVE PROBLEM
		5	13.6	6/10/20, 8:40 AM	6/16/20, 5:45 PM	153.08	PENSTOCK AIR VALVE PROBLEM
		5	13.6	2/16/21, 9:45 AM	2/18/21, 10:30 AM	48.75	PENSTOCK AIR VALVE PROBLEM
		6	11.0	11/18/20, 8:00 AM	11/20/20, 1:10 PM	53.17	PENSTOCK AIR VALVE PROBLEM
		6	11.0	2/1/21, 12:00 AM	3/31/21, 11:55 PM	1415.92	PENSTOCK AIR VALVE PROBLEM
KSEB							
59	SABARIGIRI HPS	1	50.0	7/20/20, 6:12 PM	7/21/20, 6:20 PM	24.13	ROTOR EARTH FAULT
		2	50.0	9/10/20, 9:57 AM	9/11/20, 10:32 AM	24.58	UPPER GUIDE BEARING MISC.
		4	50.0	6/19/20, 12:00 AM	7/1/20, 12:00 AM	288.00	VIBRATIONS
APGENCO							
60	SRISAILAM HPS	1	110.0	10/13/20, 12:00 PM	11/1/20, 12:00 PM	456.00	TRIPPING--EQUIP.DAMAGED
		1	110.0	11/1/20, 12:00 PM	11/5/20, 12:00 PM	96.00	MISCELLANEOUS
		3	110.0	9/18/20, 8:57 PM	9/22/20, 4:06 PM	91.15	MISCELLANEOUS
TSGENCO							
61	SRISAILAM LB HPS	6	150.0	2/20/21, 8:23 AM	2/24/21, 4:30 PM	104.12	ELECTRICAL FAULT
KPCL							
62	VARAHI HPS	1	115.0	3/20/21, 2:38 PM	3/26/21, 4:16 PM	145.63	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
Eastern							
DEPL							
63	JORETHANG LOOP	1	48.0	10/25/20, 6:00 AM	10/26/20, 2:40 PM	32.67	DAM RESIDUAL WORKS
		1	48.0	11/9/20, 8:50 AM	11/10/20, 4:11 PM	31.35	TURBINE SHAFT SEAL WORK/REPLACMEENT

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	48.0	10/25/20, 5:27 AM	10/26/20, 8:09 PM	38.70	DAM RESIDUAL WORKS
		2	48.0	11/5/20, 8:50 AM	11/6/20, 5:24 PM	32.57	TURBINE SHAFT SEAL WORK/REPLACMEENT
		2	48.0	2/23/21, 12:06 AM	2/25/21, 5:54 AM	53.80	MIV LEAKAGE
APGENCO							
64	MACHKUND HPS	2	17.0	4/26/20, 5:58 AM	4/27/20, 8:50 AM	26.87	TRIPPING--EQUIP.DAMAGED
		2	17.0	8/25/20, 6:25 AM	9/1/20, 12:00 PM	173.58	TRIPPING--EQUIP.DAMAGED
		3	17.0	8/27/20, 9:50 PM	8/29/20, 12:10 PM	38.33	MISCELLANEOUS
		3	17.0	8/31/20, 3:55 AM	9/1/20, 11:00 AM	31.08	MISCELLANEOUS
		3	17.0	9/1/20, 12:00 PM	9/6/20, 12:40 PM	120.67	MISCELLANEOUS
		3	17.0	9/9/20, 10:20 AM	9/10/20, 10:40 AM	24.33	TRIPPING--EQUIP.DAMAGED
		3	17.0	9/26/20, 11:25 AM	9/30/20, 11:45 AM	96.33	TRIPPING--EQUIP.DAMAGED
		3	17.0	10/1/20, 10:55 AM	10/12/20, 8:35 PM	273.67	TRIPPING--EQUIP.DAMAGED
		3	17.0	3/4/21, 9:00 PM	3/8/21, 11:10 AM	86.17	TRIPPING--EQUIP.DAMAGED
		3	17.0	3/18/21, 3:05 PM	3/19/21, 9:45 PM	30.67	TRIPPING--EQUIP.DAMAGED
		4	21.25	6/1/20, 12:00 AM	6/4/20, 11:02 PM	95.03	TRIPPING--EQUIP.DAMAGED
		4	21.25	7/28/20, 3:15 PM	8/1/20, 12:00 PM	92.75	TRIPPING--EQUIP.DAMAGED
		4	21.25	8/3/20, 8:05 AM	8/14/20, 2:30 PM	270.42	WATER WALL TUBE LEAKAGE
		4	21.25	10/20/20, 11:25 PM	11/1/20, 12:00 PM	276.58	TRIPPING--EQUIP.DAMAGED
		4	21.25	11/1/20, 12:00 PM	12/21/20, 7:50 PM	1207.83	TRIPPING--EQUIP.DAMAGED
		4	21.25	1/20/21, 10:02 AM	1/25/21, 7:15 PM	129.22	TRIPPING OF CURR. TRANSF.
		5	21.25	4/1/20, 12:00 PM	7/30/20, 8:05 PM	2888.08	MISCELLANEOUS
		5	21.25	8/3/20, 5:50 PM	8/30/20, 8:35 PM	650.75	MISCELLANEOUS
		5	21.25	3/13/21, 3:15 PM	3/16/21, 7:25 PM	76.17	TRIPPING--EQUIP.DAMAGED
		5	21.25	3/16/21, 8:15 PM	3/18/21, 5:50 PM	45.58	TRIPPING--EQUIP.DAMAGED
DVC							
65	MAITHON HPS	1	20.0	2/27/21, 11:59 PM	3/8/21, 6:20 PM	210.33	GENEATOR TRANSFORMER OIL PROBLEMS/TOPPING
		2	23.2	2/4/21, 10:45 AM	2/7/21, 5:45 PM	79.00	GENERATOR MAINTENANCE WORK
		3	20.0	1/11/21, 11:30 AM	1/23/21, 6:38 PM	295.13	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
66	PANCHET HPS	1	40.0	6/16/20, 12:00 AM	6/17/20, 5:22 PM	41.37	GENERATING UNIT SHUT DOWN OTHER REASONS
		2	40.0	5/5/20, 12:00 AM	6/15/20, 3:10 PM	999.17	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
NHPC							
67	RANGIT HPS	1	20.0	7/21/20, 10:35 PM	7/23/20, 3:49 PM	41.23	DESILTING OF INTAKE CHANNEL.

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	20.0	7/12/20, 4:45 PM	7/13/20, 5:08 PM	24.38	RUNNER AIR ADMISSION VALVE PROBLEM
		2	20.0	7/21/20, 10:32 PM	7/23/20, 4:01 PM	41.48	DESILTING OF INTAKE CHANNEL.
		2	20.0	3/16/21, 6:30 PM	3/18/21, 5:45 PM	47.25	GOVERN.SYSTEM TROUB/EQPT. FAIL/EHG FAULT
		3	20.0	7/21/20, 10:30 PM	7/23/20, 4:00 PM	41.50	DESILTING OF INTAKE CHANNEL.
		3	20.0	1/15/21, 6:25 PM	1/18/21, 7:18 PM	72.88	TURBINE BEARING TEMP. HIGH
SEPL							
68	TASHIDING HPS	1	48.5	8/5/20, 9:30 PM	8/8/20, 11:50 AM	62.33	DAM RESIDUAL WORKS
		2	48.5	8/5/20, 9:40 PM	8/8/20, 10:30 AM	60.83	DAM RESIDUAL WORKS
TUL							
69	TEESTA-III HPS	3	200.0	4/13/20, 10:00 AM	4/15/20, 5:30 PM	55.50	MIV SERVO MOTOR [PROBLEM
		3	200.0	9/13/20, 6:06 PM	9/25/20, 12:08 PM	282.03	BUS BAR PROTECION OPERATED
NHPC							
70	TEESTA LOW DAM-III HPS	1	33.0	6/18/20, 9:22 PM	6/20/20, 6:24 PM	45.03	DESILTING OF INTAKE CHANNEL.
		1	33.0	6/26/20, 7:02 AM	6/27/20, 2:11 PM	31.15	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		1	33.0	7/21/20, 11:24 AM	7/24/20, 4:19 PM	76.92	DESILTING OF INTAKE CHANNEL.
		1	33.0	8/6/20, 1:47 AM	8/8/20, 6:19 PM	64.53	DESILTING OF INTAKE CHANNEL.
		1	33.0	9/18/20, 9:13 PM	9/20/20, 5:22 PM	44.15	DESILTING OF INTAKE CHANNEL.
		2	33.0	6/19/20, 2:07 AM	6/20/20, 4:32 PM	38.42	DESILTING OF INTAKE CHANNEL.
		2	33.0	7/21/20, 11:24 AM	7/24/20, 5:33 PM	78.15	DESILTING OF INTAKE CHANNEL.
		2	33.0	8/6/20, 1:23 AM	8/8/20, 5:55 PM	64.53	DESILTING OF INTAKE CHANNEL.
		2	33.0	9/18/20, 9:35 PM	9/20/20, 8:48 PM	47.22	DESILTING OF INTAKE CHANNEL.
		3	33.0	6/19/20, 12:03 AM	6/20/20, 6:21 PM	42.30	DESILTING OF INTAKE CHANNEL.
		3	33.0	7/5/20, 8:25 PM	7/6/20, 10:02 PM	25.62	TURBINE SHAFT SEAL LEAK/BOLTS BROKEN
		3	33.0	7/21/20, 11:27 AM	7/24/20, 5:45 PM	78.30	DESILTING OF INTAKE CHANNEL.
		3	33.0	8/6/20, 1:50 AM	8/8/20, 5:30 PM	63.67	DESILTING OF INTAKE CHANNEL.
		3	33.0	9/18/20, 11:58 PM	9/20/20, 4:54 PM	40.93	DESILTING OF INTAKE CHANNEL.
		4	33.0	6/19/20, 3:00 AM	6/20/20, 7:25 PM	40.42	DESILTING OF INTAKE CHANNEL.
		4	33.0	7/21/20, 11:27 AM	7/24/20, 4:54 PM	77.45	DESILTING OF INTAKE CHANNEL.
		4	33.0	8/6/20, 1:41 AM	8/8/20, 4:45 PM	63.07	DESILTING OF INTAKE CHANNEL.
		4	33.0	9/18/20, 11:58 PM	9/20/20, 5:24 PM	41.43	DESILTING OF INTAKE CHANNEL.
71	TEESTA LOW DAM-IV HPS	1	40.0	6/18/20, 11:22 PM	6/20/20, 10:32 PM	47.17	DESILTING OF INTAKE CHANNEL.
		1	40.0	7/21/20, 11:19 PM	7/24/20, 6:30 PM	67.18	DESILTING OF INTAKE CHANNEL.

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	40.0	8/6/20, 6:09 AM	8/8/20, 6:41 PM	60.53	DESILTING OF INTAKE CHANNEL.
		1	40.0	9/19/20, 12:01 AM	9/21/20, 8:11 PM	68.17	DESILTING OF INTAKE CHANNEL.
		2	40.0	6/18/20, 11:58 PM	6/20/20, 9:36 PM	45.63	DESILTING OF INTAKE CHANNEL.
		2	40.0	7/21/20, 11:35 PM	7/24/20, 5:33 PM	65.97	DESILTING OF INTAKE CHANNEL.
		2	40.0	8/6/20, 6:19 AM	8/8/20, 5:53 PM	59.57	DESILTING OF INTAKE CHANNEL.
		2	40.0	9/19/20, 12:10 AM	9/21/20, 7:28 PM	67.30	DESILTING OF INTAKE CHANNEL.
		3	40.0	6/18/20, 11:37 PM	6/20/20, 9:22 PM	45.75	DESILTING OF INTAKE CHANNEL.
		3	40.0	7/21/20, 11:52 PM	7/24/20, 5:53 PM	66.02	DESILTING OF INTAKE CHANNEL.
		3	40.0	8/6/20, 6:14 AM	8/8/20, 5:43 PM	59.48	DESILTING OF INTAKE CHANNEL.
		3	40.0	9/19/20, 12:09 AM	9/21/20, 7:48 PM	67.65	DESILTING OF INTAKE CHANNEL.
		4	40.0	6/18/20, 11:54 PM	6/20/20, 9:38 PM	45.73	DESILTING OF INTAKE CHANNEL.
		4	40.0	7/21/20, 11:58 PM	7/24/20, 4:30 PM	64.53	DESILTING OF INTAKE CHANNEL.
		4	40.0	8/6/20, 6:05 AM	8/8/20, 6:18 PM	60.22	DESILTING OF INTAKE CHANNEL.
		4	40.0	9/19/20, 12:01 AM	9/21/20, 8:11 PM	68.17	DESILTING OF INTAKE CHANNEL.
72	TEESTA V HPS	1	170.0	7/10/20, 8:36 PM	7/11/20, 11:23 PM	26.79	DESILTING OF INTAKE CHANNEL.
		2	170.0	6/17/20, 10:05 PM	6/18/20, 11:53 PM	25.80	DESILTING OF INTAKE CHANNEL.
		2	170.0	7/10/20, 8:51 PM	7/11/20, 11:07 PM	26.27	DESILTING OF INTAKE CHANNEL.
		3	170.0	7/10/20, 9:04 PM	7/11/20, 11:48 PM	26.72	DESILTING OF INTAKE CHANNEL.
North Eastern							
NEEPCO.							
73	KAMENG HPS	1	150.0	4/1/20, 12:00 AM	5/15/20, 4:09 PM	1072.15	LGB TEMPRATURE HIGH
		1	150.0	5/18/20, 12:00 AM	5/19/20, 6:23 PM	42.38	MISCELLANEOUS
		1	150.0	6/2/20, 12:00 AM	6/3/20, 7:53 PM	43.88	MISCELLANEOUS
		1	150.0	6/13/20, 10:38 PM	6/17/20, 4:26 PM	89.80	MISCELLANEOUS
		1	150.0	8/29/20, 9:06 AM	9/6/20, 1:26 AM	184.33	MISCELLANEOUS
		1	150.0	9/6/20, 8:44 PM	9/16/20, 10:06 PM	241.37	MISCELLANEOUS
		1	150.0	2/4/21, 6:13 PM	2/6/21, 12:00 AM	29.78	VIBRATIONS
		2	150.0	4/1/20, 12:00 AM	4/16/20, 7:28 PM	379.47	MISCELLANEOUS
		2	150.0	11/3/20, 12:30 PM	11/5/20, 1:47 PM	49.28	UAT MISC.
		2	150.0	11/18/20, 8:08 AM	11/20/20, 2:21 PM	54.22	MISCELLANEOUS
		2	150.0	11/23/20, 12:00 AM	12/10/20, 11:48 PM	431.80	GENEATOR TRANSFORMER MISC.

S.NO	STATION	UNIT	CAPACITY(MW)	DATE OD OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
74	KHONDONG HPS	1	25.0	1/26/21, 4:44 PM	2/7/21, 3:08 PM	286.40	GEN./TR.BREAKER
75	KOPILI HPS	1	50.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	PENSTOCK LEAKAGE
		2	50.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	PENSTOCK LEAKAGE
		3	50.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	PENSTOCK LEAKAGE
		4	50.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	PENSTOCK LEAKAGE
MeECL							
76	KYRDEMKULAI HPS	2	30.0	4/1/20, 12:00 AM	3/31/21, 11:59 PM	8760.00	RUNNER LABYRING DAMAGED
NEEPCO.							
77	RANGANADI HPS	3	135.0	10/25/20, 3:53 PM	11/8/20, 11:55 PM	344.03	ROTOR EARTH FAULT
		3	135.0	3/12/21, 9:00 AM	3/13/21, 9:08 PM	36.13	ABNORMAL SOUND
78	TUIRIAL HPS	1	30.0	3/9/21, 12:00 AM	3/10/21, 3:15 PM	39.25	AVR PROBLEM/TRIPPED

CHAPTER-6

OPERATING AVAILABILITY OF HE UNITS

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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 720 Hydro Generating units of 209 HE Stations comprising of 46209.22 MW, operating availability of various units and stations has been computed. During the year 2020-21, the average operating availability of hydro generating units on all India basis was 92.68% as compared to 93.97% during 2019-20.

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 2020-21 is summarized below in **Table 6.1**.

TABLE 6.1

OPERATING AVAILABILITY OF H.E. STATIONS (PERIOD: 2020-21)

Operating Availability (%)	No. of Stations	% of total Stations	Installed Capacity (MW)	% of total Installed Capacity
>=95%	137	66.18	30471.37	65.94
>=90 to 95	29	13.04	7826.80	16.94
>=85 to 90	13	6.28	1932.55	4.18
>=80 to 85	8	3.86	2504.00	5.42
<80	22	10.63	3474.50	7.52
Total	209	100.00	46209.22	100.00

6.3 OPERATING AVAILABILITY – REGION-WISE

Region-wise operating availability of hydro-electric units during 2020-21 is indicated in **Table 6.2**.

TABLE 6.2
AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2020-21

Sl. No.	Region	No. of Units	Installed Capacity (MW)	Planned Maintenance	Forced Outage %	Operating Availability (%)
1	Northern	251	19233.27	5.55	1.66	92.79
2	Western	101	7392	0.97	4.57	94.46
3	Southern	246	11694.5	2.73	3.15	94.12
4	Eastern	84	5862.45	5.63	1.74	92.63
5	N- Eastern	38	2027	7.8	14.86	77.34
	All India	720	46209.22	4.06	3.27	92.68

It is seen that the operating availability of hydel generating units during 2020-21 was the highest (94.46%) in Western Region due to relatively lower forced outages. The operating availability was the lowest in case of units in North-Eastern Region (77.34%) due to high planned maintenance and forced outages.

6.4 OPERATING AVAILABILITY: AGE-WISE

The average operating availability during 2020-21 of hydro units commissioned in various years has been indicated in **Table 6.3**. It is observed that units commissioned during 2020-21 have achieved the operating availability of more than 93%. Operating availability was more than 90% for all the other years.

TABLE - 6.3
OPERATING AVAILABILITY – AGE-WISE
PERIOD: 2020-21

Sl. No.	Year of Commissioning	No. of Units	Installed Capacity (MW)	Operating Availability (%)
1	2020-21	8	510	99.97
2	2019-20	2	300.00	100.00
3	2018-19	3	140.00	100.00
4	2017-18	16	795.00	85.86
5	2016-17	18	1659.00	96.14
6	2015-16	17	1516.00	98.25
7	2010-11 to 2014-15	63	4437.00	92.07
8	2005-06 to 2009-10	66	7077.00	93.56
9	2000-01 to 2004-05	74	6741.80	94.48
10	1989-90 to 1999-2000	86	5769.70	90.47
11	1978-79 to 1988-89	124	7259.10	90.05
12	1967-68 to 1977-78	81	5279.75	86.37
13	Up to 1966-67	162	4724.85	87.32
	Total	720	46209.22	92.68

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 (95.43%) followed by State Sector (93.57%) and Central Sector (89.04%).

TABLE 6.4

SECTOR-WISE OPERATING AVAILABILITY OF UTILITIES FOR PERIOD: 2020-21

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
Central						
1	BBMB	28	2920.30	5.10	1.32	93.58
2	DVC	5	143.20	0.77	3.71	95.52
3	NEEPCO.	20	1500.00	13.69	23.98	62.33
4	NHDC	16	1520.00	3.45	0.19	96.36
5	NHPC	70	5451.20	9.82	0.93	89.25
6	NTPC Ltd.	4	800.00	3.47	0.24	96.28
7	SJVNL	12	1912.02	2.04	0.24	97.72
8	THDC	8	1400.00	2.88	0.00	97.12
Sub Total (CS)		163	15646.72	7.45	3.52	89.04
State						
1	APGCL	2	100.00	0.00	0.00	100.00
2	APGENCO	34	1796.75	1.03	4.98	93.98
3	CSPGCL	3	120.00	0.00	0.00	100.00
4	GSECL	8	540.00	0.00	0.00	100.00
5	HPPCL	8	406.00	1.79	0.00	98.21
6	HPSEB	12	372.00	6.47	0.15	93.38
7	JKSPDC	12	1110.00	0.00	0.00	100.00
8	JUUNL	2	130.00	0.00	0.00	100.00
9	KPCL	66	3572.20	1.72	1.36	96.92
10	KSEB	47	1856.50	7.81	0.75	91.43
11	MAHAGENCO	24	2406.00	0.00	4.97	95.03
12	MeECL	13	322.00	0.00	7.69	92.31
13	MPPGCL	23	875.00	0.16	8.99	90.85
14	OHPC	31	2027.50	9.68	0.00	90.32

S. No.	Organization	No. of Units	Installed Capacity	Planned Maintenance	Forced Outage	Operating Availability per Unit
			(MW)	(%)	(%)	(%)
15	PSPCL	25	1051	1.12	0.01	98.86
16	RRVUNL	11	411	2.16	28.77	69.07
17	SSNNL	11	1450	3.57	1.1	95.33
18	TANGEDCO	69	2178.2	2.25	5.14	92.61
19	TSGENCO	36	2405.6	0.06	5.68	94.26
20	TUL	6	1200	5.03	0.81	94.16
21	UJVNL	34	1252.15	12.35	0.19	87.46
22	UPJVNL	15	501.6	0	0	100
23	WBSEDCL	12	986	0	0	100
Sub Total (State)		504	27069.5	3.2	3.23	93.57
Private						
1	ADHPL	2	192.00	6.27	3.33	90.40
2	AHPC (GVK)	4	330.00	0.21	0.02	99.77
3	DEPL	2	96.00	9.59	2.15	88.26
4	DLHP	1	34.00	0.00	0.00	100.00
5	E.P.P.L.	2	100.00	0.00	0.61	99.39
6	GBHPPL	2	70.00	6.53	3.27	90.20
7	GIPL	2	110.00	6.91	0.40	92.69
8	HBPCL	7	1300.00	3.30	0.15	96.55
9	IAEPL	3	36.00	0.00	0.00	100.00
10	JPPVL	4	400.00	0.07	0.31	99.62
11	MPCL	3	99.00	0.00	0.00	100.00
12	SEPL	2	86.00	0.00	0.00	100.00
13	SKPPPL	2	97.00	3.13	0.82	96.05
14	TATA MAH.	2	96.00	0.00	0.00	100.00
Sub Total (Pvt.)		53	3493.00	1.75	2.82	95.43
Grand Total		720	46209.22	4.06	3.27	92.68

6.6 OPERATING AVAILABILITY BELOW 90%- STATION-WISE

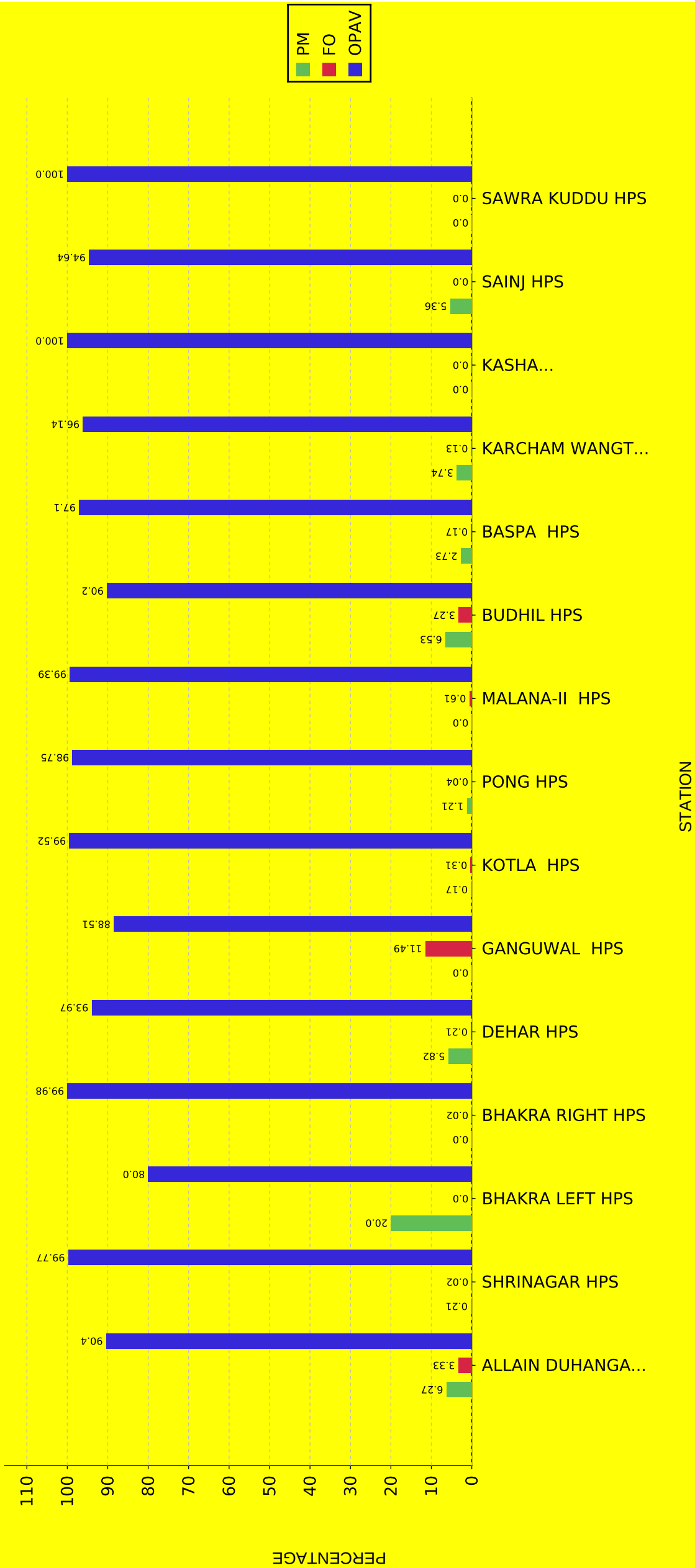
It is observed that 10 nos. of stations had operating availability below 90% continuously for last 3 years. The details of these stations is given below in **Table 6.5**. As normative availability factor for entire useful life of station considered during planning stage is 95%, the stations/utilities 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 (2018-19 To 2020-21)**

Sl. No.	Name of the Stations	Name of the Utility	Installed Capacity (MW)	Operating Availability (%)		
				2018-19	2019-20	2020-21
1	BALIMELA HPS	OHPC	510.00	67.7	78.07	87.5
2	GHATGHAR PSS HPS	MAHAGENCO	250.00	58.08	55.08	57.93
3	HIRAKUD HPS	OHPC	275.50	60.8	54.9	71.43
4	IDUKKI HPS	KSEB	780.00	79.09	81.78	79.64
5	KHONDONG HPS	NEEPCO.	50.00	86.18	83.13	88.71
6	KISHANGANGA HPS	NHPC	330.00	69.18	68.9	65.53
7	KODAYAR-I HPS	TANGEDCO	60.00	69.2	83.76	80.4
8	KYRDEMKULAI HPS	MeECL	60.00	50	74.53	50
9	PARBATI-III HPS	NHPC	520.00	69.1	85.65	74.21
10	PORINGALKUTTU HPS	KSEB	32.00	81.14	77.51	88.69

OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



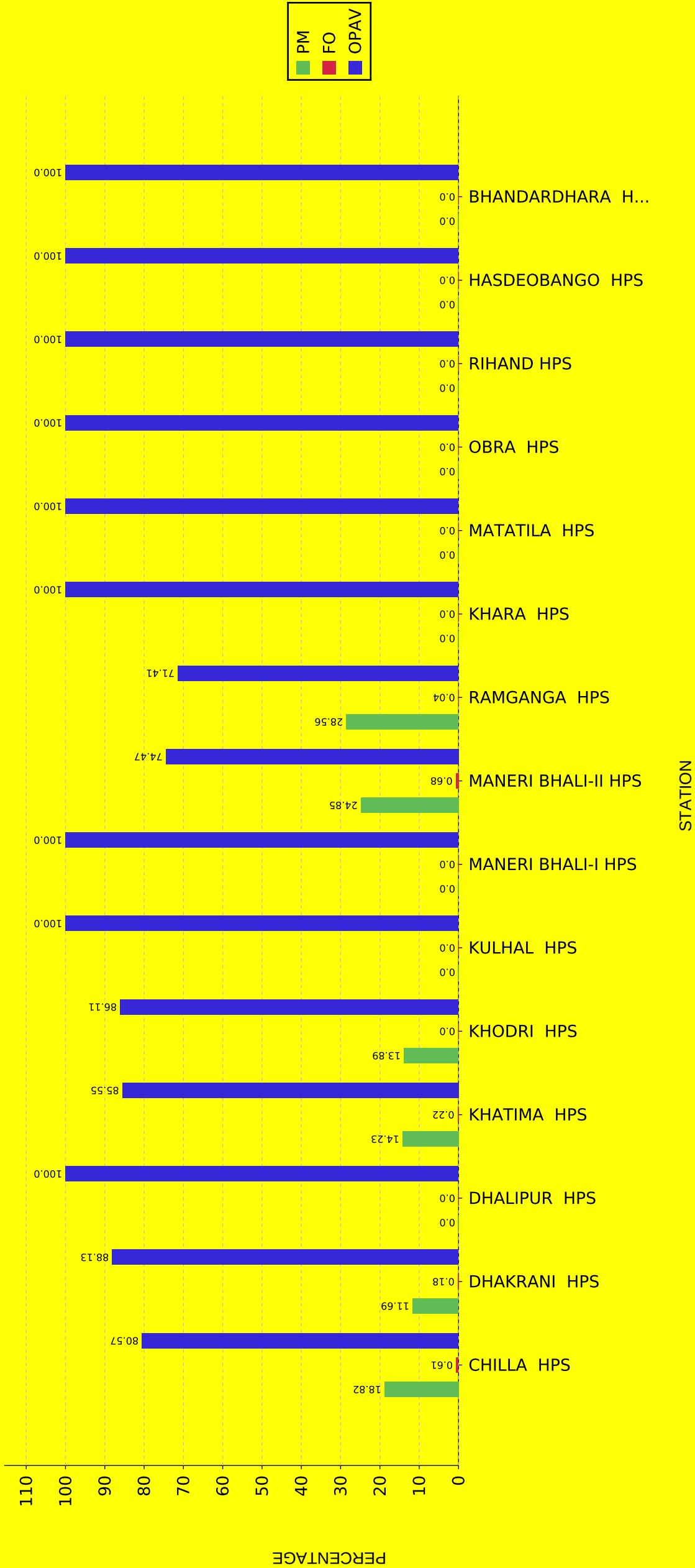
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



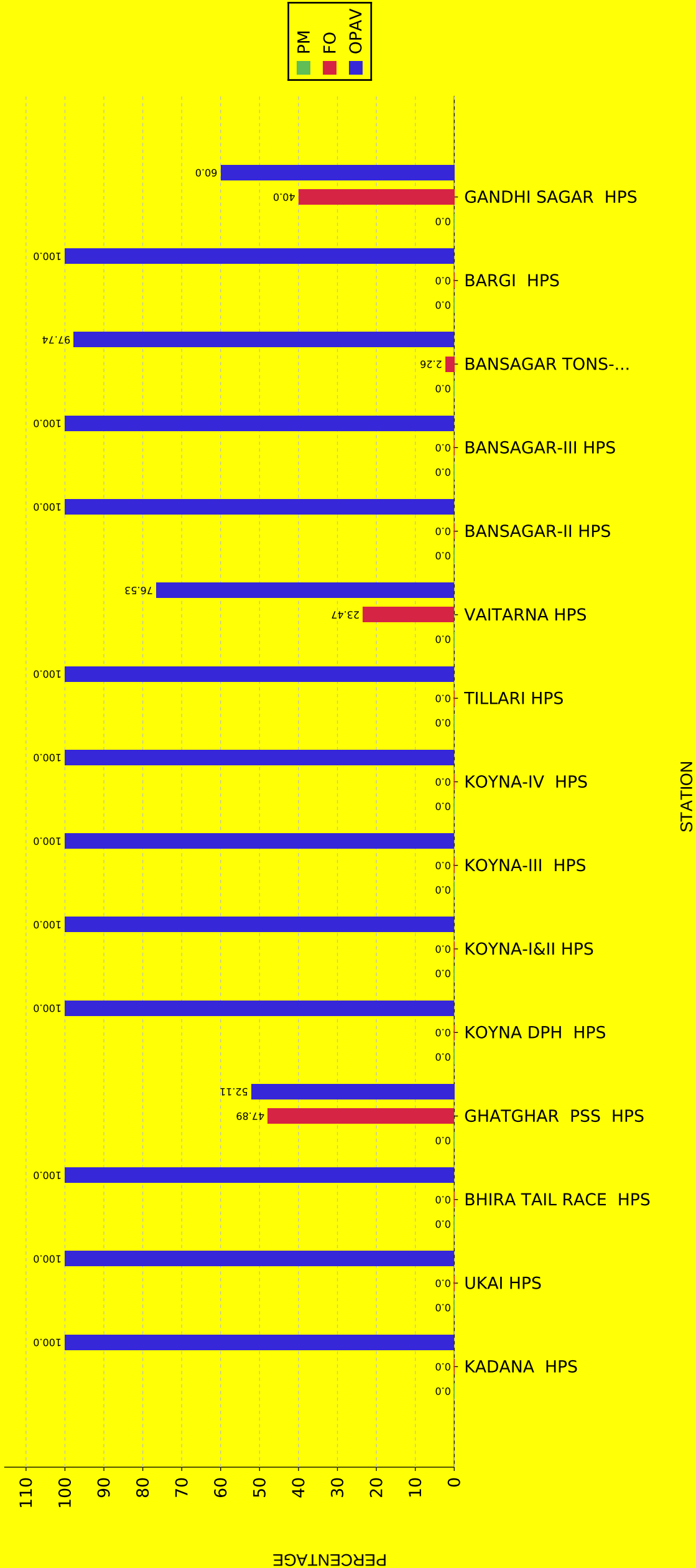
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



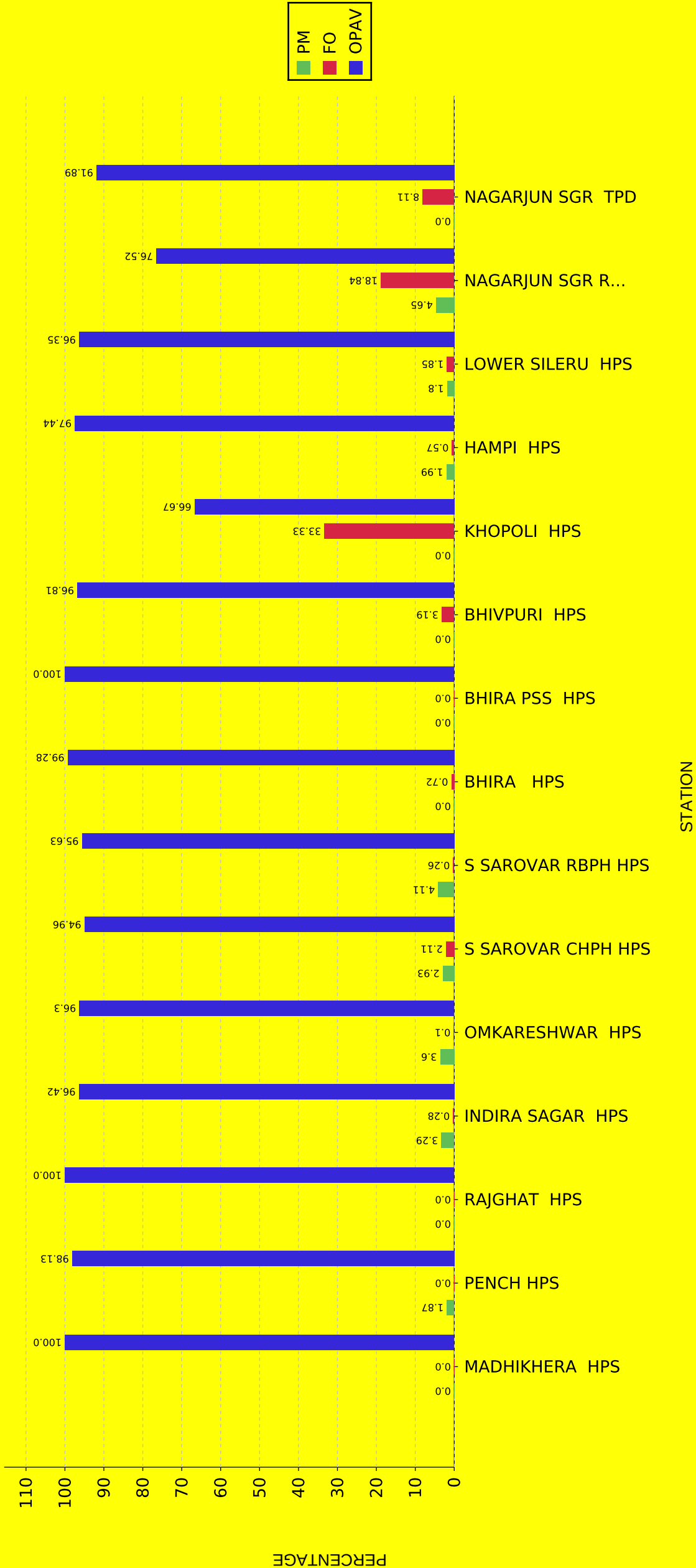
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



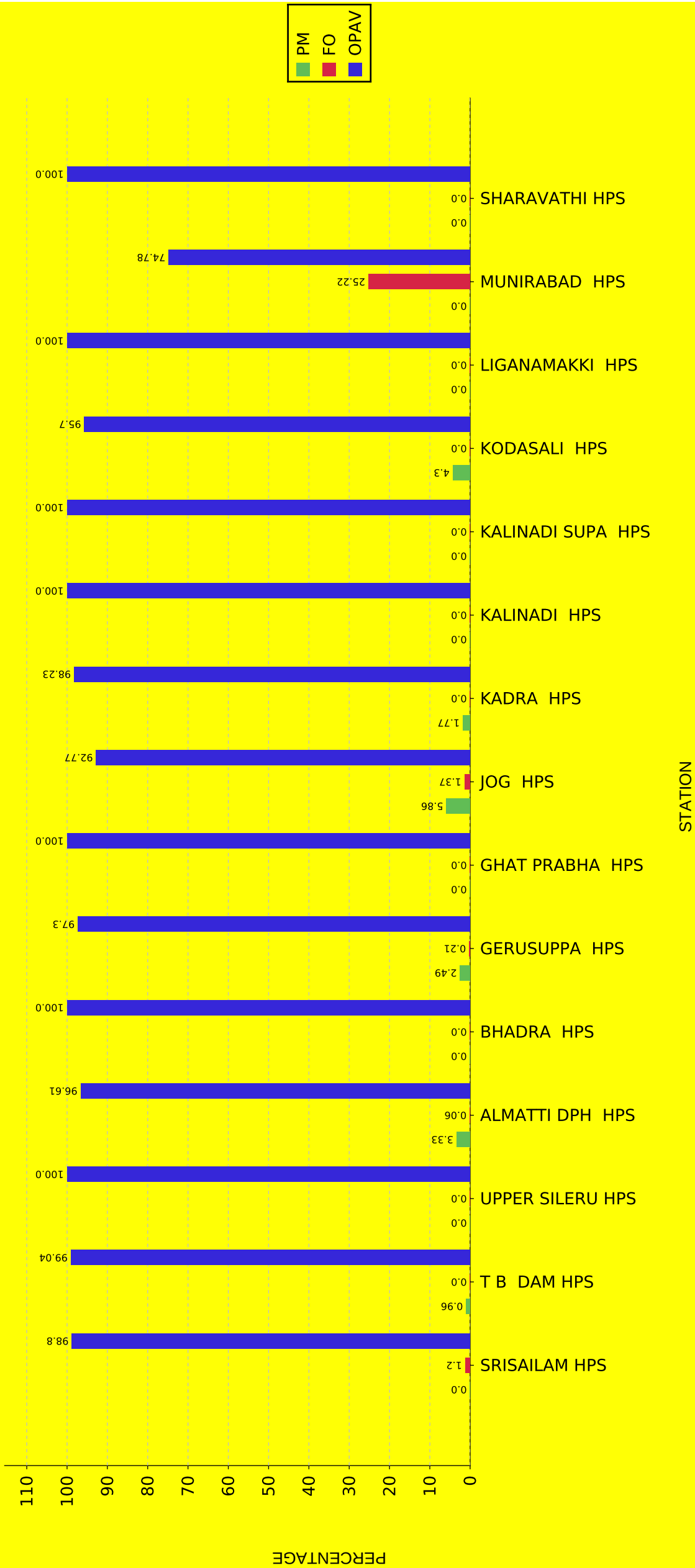
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



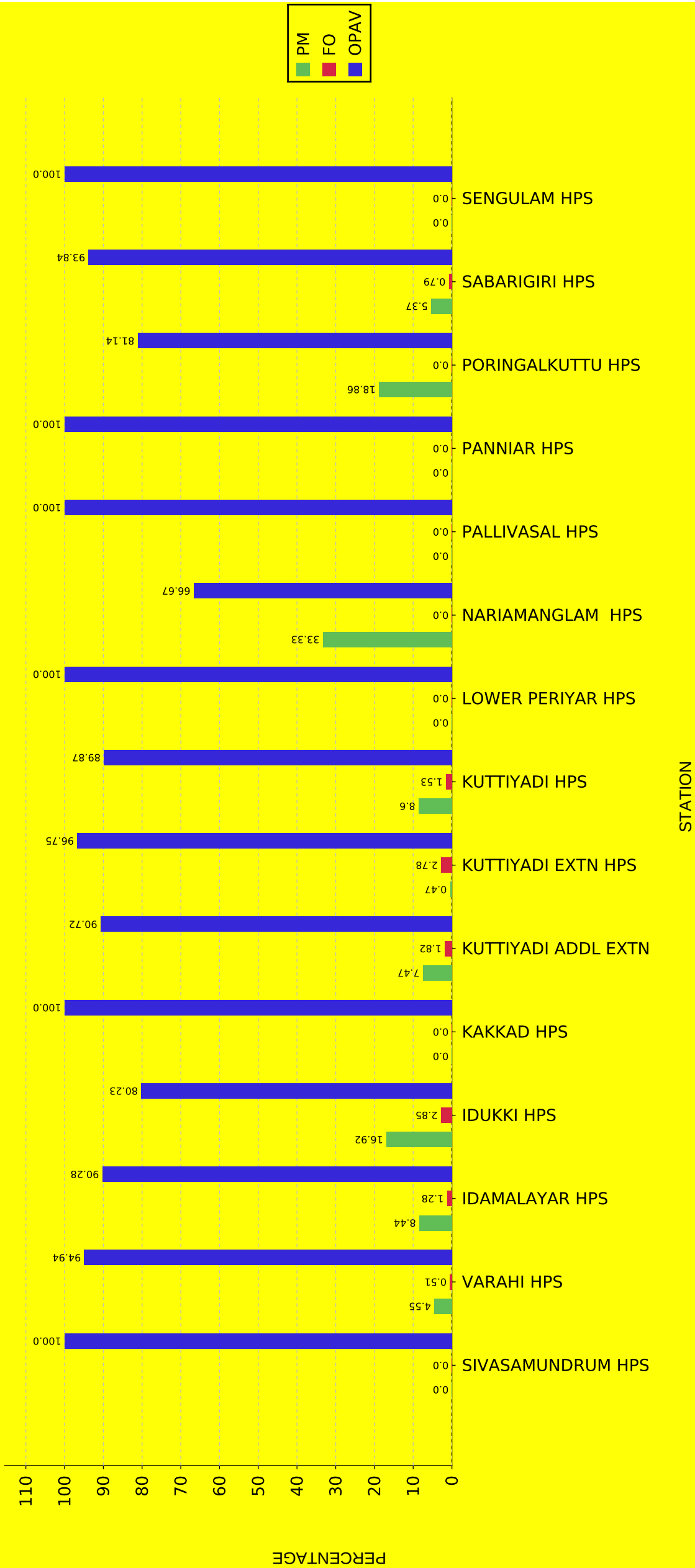
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



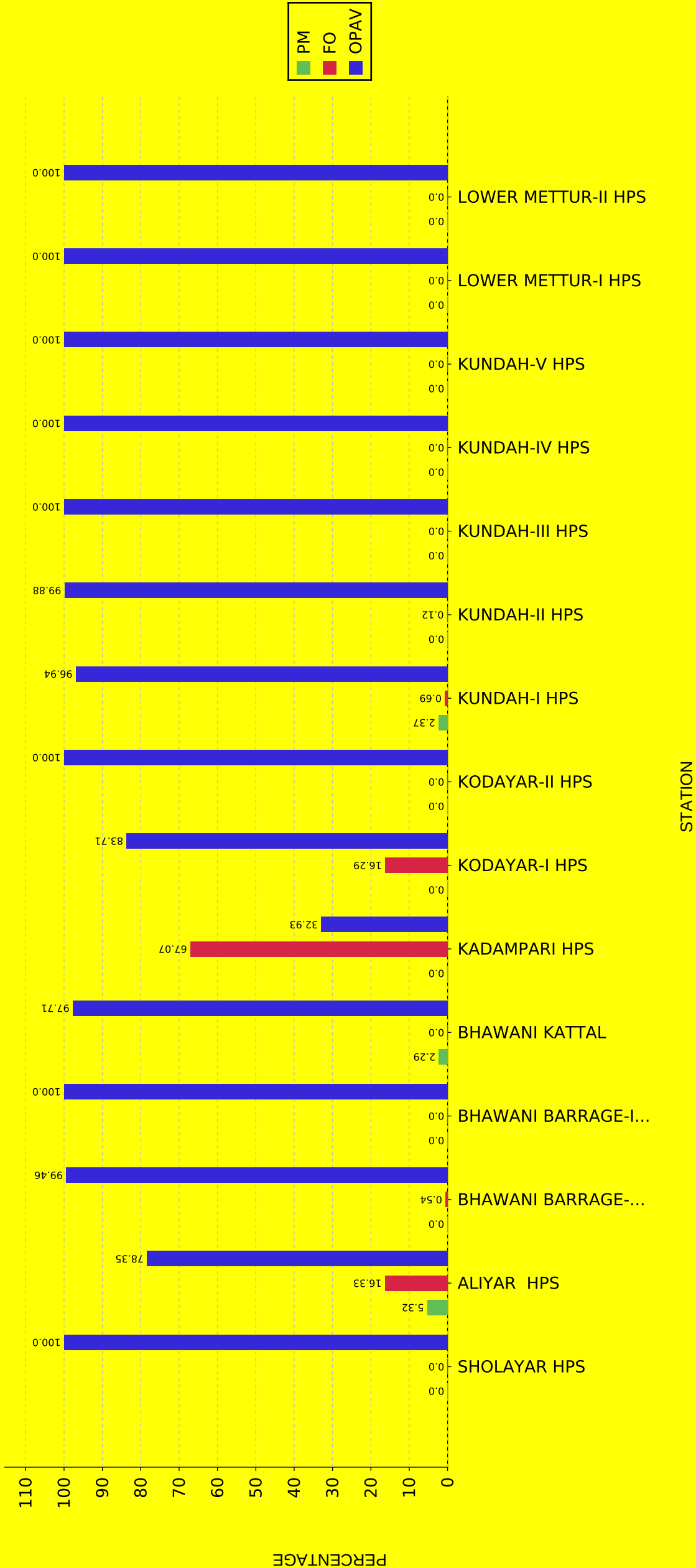
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



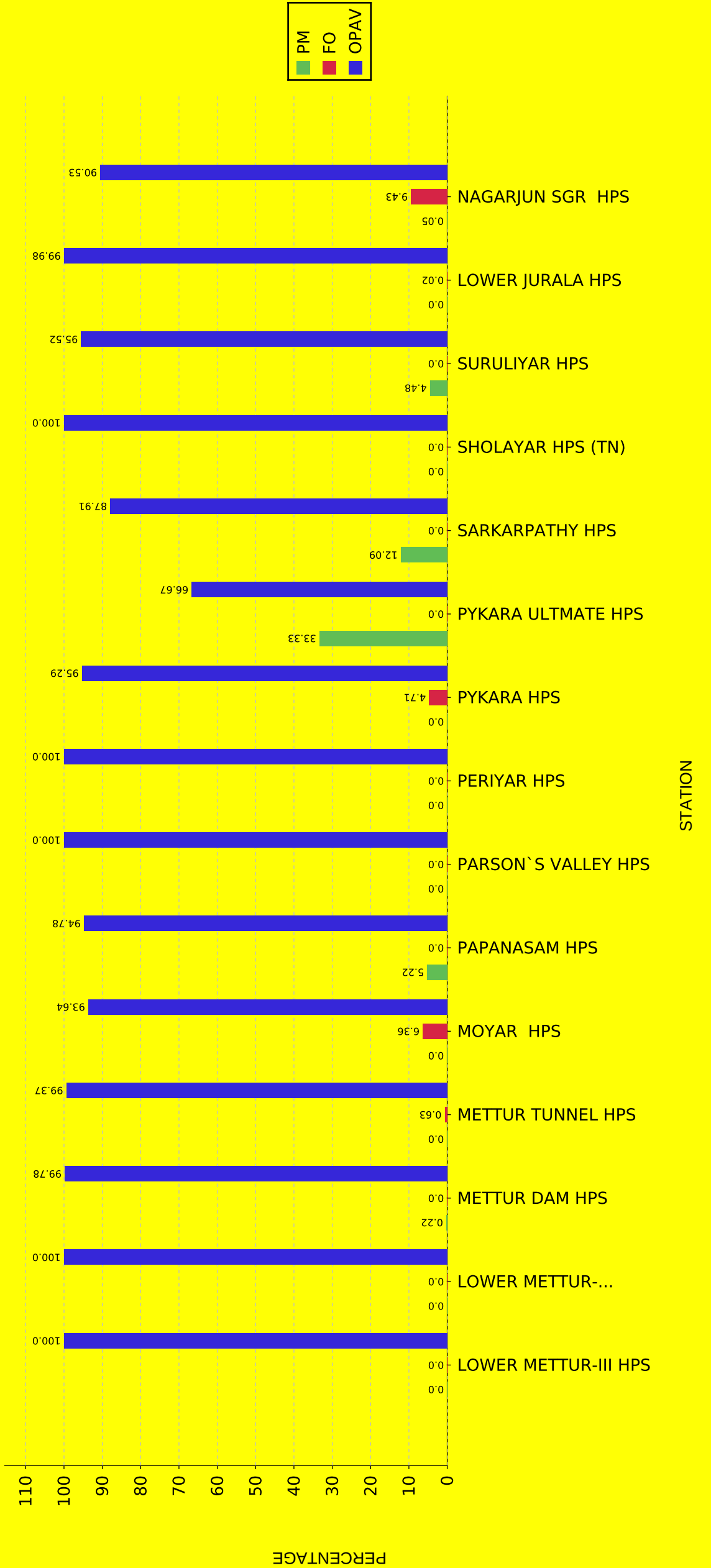
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



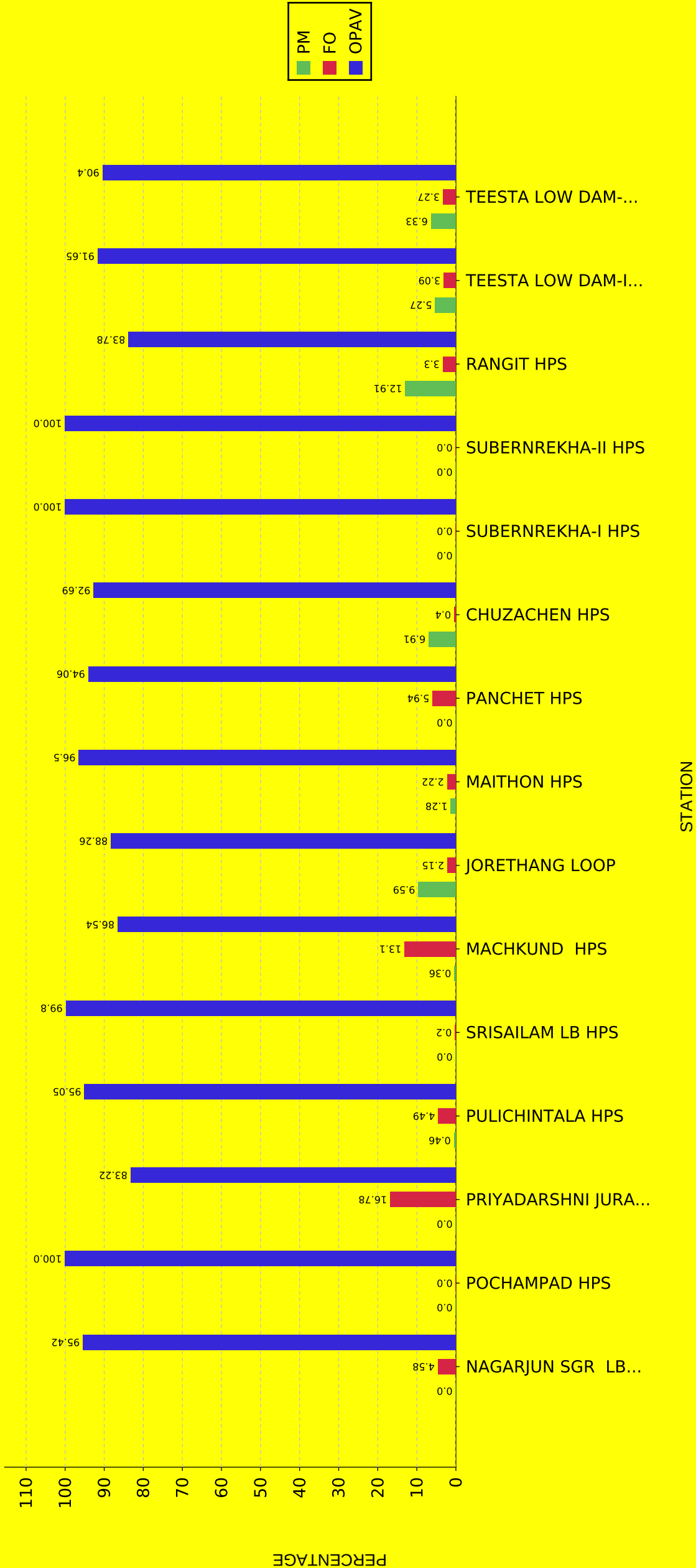
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



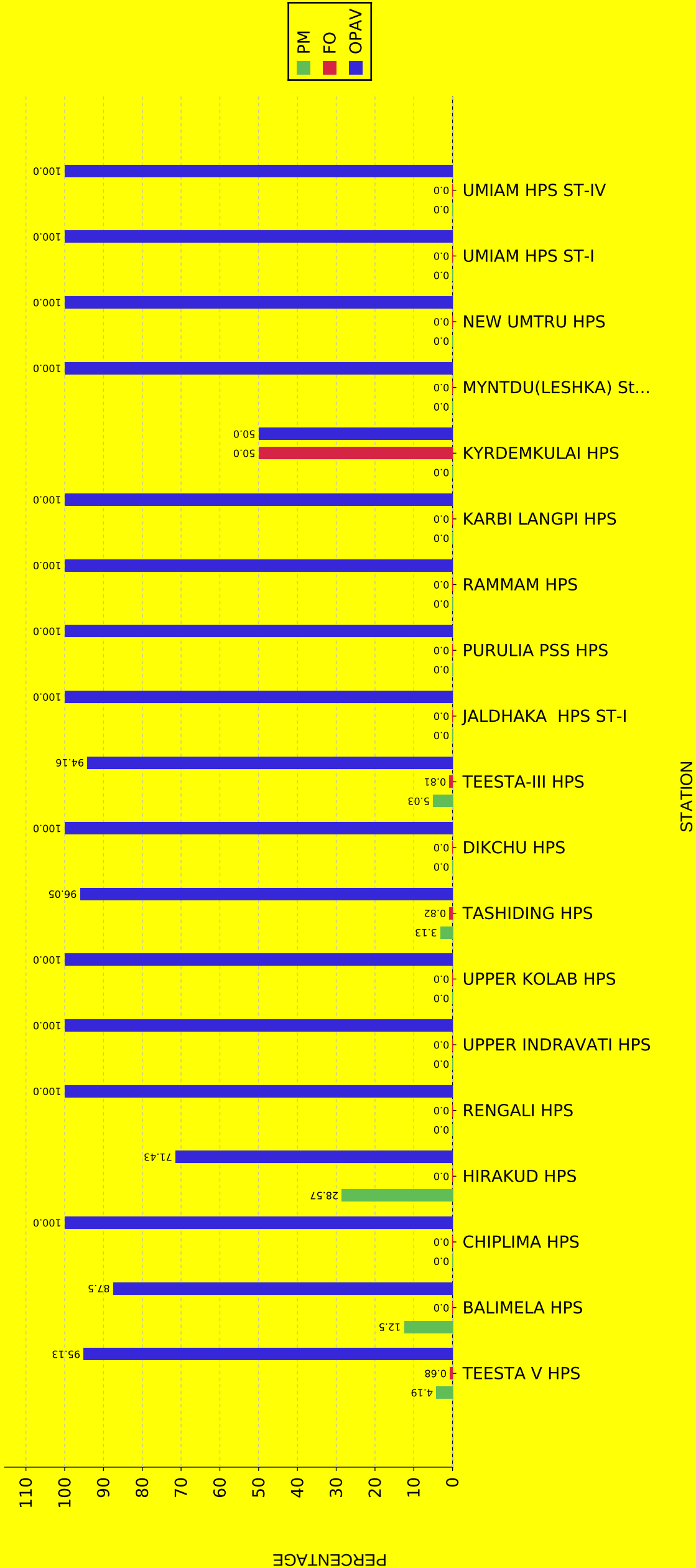
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



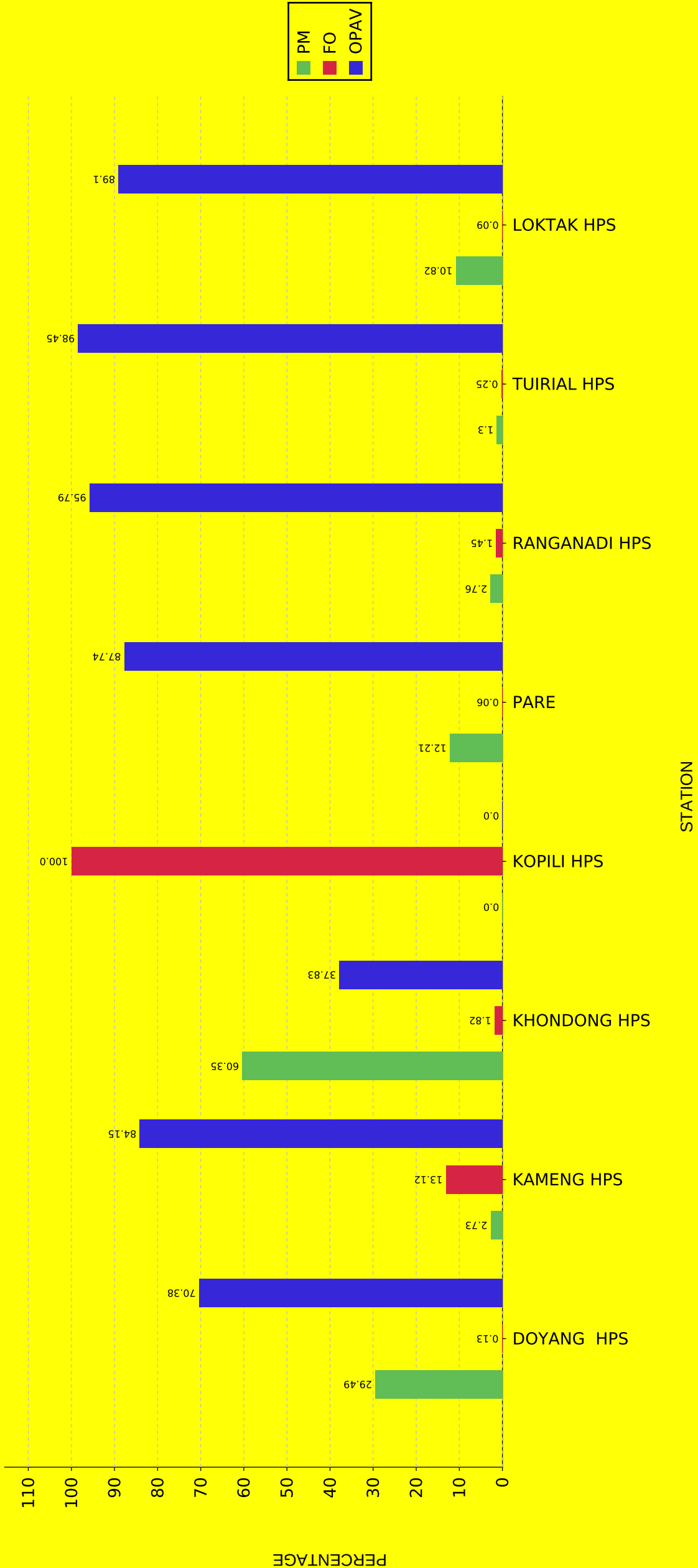
OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



OPERATING AVAILABILITY OF H E STATIONS DURING 2020-21



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

OPERAING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2020-21						
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	6.30	2.44	91.25
		2	96.00	6.24	4.22	89.54
	TOTAL		192.00	6.27	3.33	90.40
	AHPC (GVK)					
2	SHRINAGAR HPS	1	82.50	0.21	0.00	99.79
		2	82.50	0.21	0.07	99.71
		3	82.50	0.21	0.00	99.79
		4	82.50	0.21	0.00	99.79
	TOTAL		330.00	0.21	0.02	99.77
	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	100.00	0.00	0.00
		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	20.00	0.00	80.00
4	BHAKRA RIGHT HPS	6	157.00	0.00	0.00	100.00
		7	157.00	0.00	0.00	100.00
		8	157.00	0.00	0.00	100.00
		9	157.00	0.00	0.00	100.00
		10	157.00	0.00	0.10	99.90
	TOTAL		785.00	0.00	0.02	99.98
5	DEHAR HPS	1	165.00	0.00	1.20	98.80
		2	165.00	34.92	0.03	65.05
		3	165.00	0.00	0.00	100.00
		4	165.00	0.00	0.00	100.00
		5	165.00	0.00	0.03	99.97
		6	165.00	0.00	0.00	100.00
	TOTAL		990.00	5.82	0.21	93.97
6	GANGUWAL HPS	1	29.25	0.00	0.01	99.99
		2	24.20	0.00	34.46	65.54
		3	24.20	0.00	0.01	99.99

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	11.49	88.51
7	KOTLA HPS	1	29.25	0.08	0.94	98.98
		2	24.20	0.43	0.00	99.57
		3	24.20	0.00	0.00	100.00
	TOTAL		77.65	0.17	0.31	99.52
8	PONG HPS	1	66.00	0.00	0.00	100.00
		2	66.00	7.27	0.00	92.73
		3	66.00	0.00	0.00	100.00
		4	66.00	0.00	0.18	99.82
		5	66.00	0.00	0.00	100.00
		6	66.00	0.00	0.03	99.97
	TOTAL		396.00	1.21	0.04	98.75
	E.P.P.L.					
9	MALANA-II HPS	1	50.00	0.00	0.08	99.92
		2	50.00	0.00	1.13	98.87
	TOTAL		100.00	0.00	0.61	99.39
	GBHPPL					
10	BUDHIL HPS	1	35.00	5.48	6.55	87.97
		2	35.00	7.57	0.00	92.43

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		70.00	6.53	3.27	90.20
	HBPCL					
11	BASPA HPS	1	100.00	2.82	0.18	97.01
		2	100.00	2.29	0.18	97.54
		3	100.00	3.08	0.17	96.75
	TOTAL		300.00	2.73	0.17	97.10
12	KARCHAM WANGTOO HPS	1	250.00	3.46	0.16	96.37
		2	250.00	5.28	0.17	94.55
		3	250.00	3.65	0.00	96.35
		4	250.00	2.55	0.18	97.27
	TOTAL		1000.00	3.74	0.13	96.14
	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	10.72	0.00	89.28
		2	50.00	0.00	0.00	100.00
	TOTAL		100.00	5.36	0.00	94.64

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
15	SAWRA KUDDU HPS	1	37.00	0.00	0.00	100.00
		2	37.00	0.00	0.00	100.00
		3	37.00	0.00	0.00	100.00
	TOTAL		111.00	0.00	0.00	100.00
	HPSEB					
16	BASSI HPS	1	16.50	0.00	0.16	99.84
		2	16.50	0.00	0.00	100.00
		3	16.50	0.00	0.19	99.81
		4	16.50	0.00	0.00	100.00
	TOTAL		66.00	0.00	0.09	99.91
17	GIRI BATA HPS	1	30.00	17.76	1.39	80.85
		2	30.00	34.75	0.00	65.25
	TOTAL		60.00	26.26	0.69	73.05
18	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
19	SANJAY HPS	1	40.00	0.00	0.00	100.00
		2	40.00	4.06	0.08	95.86

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	40.00	21.07	0.00	78.93
	TOTAL		120.00	8.38	0.03	91.60
	IAEPL					
20	CHANJU-I HPS	1	12.00	0.00	0.00	100.00
		2	12.00	0.00	0.00	100.00
		3	12.00	0.00	0.00	100.00
	TOTAL		36.00	0.00	0.00	100.00
	JKSPDC					
21	BAGLIHAR 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	BAGLIHAR II HPS	1	150.00	0.00	0.00	100.00
		2	150.00	0.00	0.00	100.00
		3	150.00	0.00	0.00	100.00
	TOTAL		450.00	0.00	0.00	100.00
23	LOWER JHELUM HPS	1	35.00	0.00	0.00	100.00
		2	35.00	0.00	0.00	100.00
		3	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
24	UPPER SINDH-II HPS	3	35.00	0.00	0.00	100.00
		4	35.00	0.00	0.00	100.00
		5	35.00	0.00	0.00	100.00
	TOTAL		105.00	0.00	0.00	100.00
	JPPVL					
25	VISHNU PRAYAG HPS	1	100.00	0.00	0.22	99.78
		2	100.00	0.14	0.08	99.78
		3	100.00	0.15	0.10	99.76
		4	100.00	0.00	0.84	99.16
	TOTAL		400.00	0.07	0.31	99.62
	L&T					
26	SINGOLI BHATWARI 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
	MPCL					
27	MALANA HPS	1	43.00	0.00	0.00	100.00
		2	43.00	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		86.00	0.00	0.00	100.00
	NHPC					
28	BAIRA SIUL HPS	1	60.00	59.06	0.87	40.07
		2	60.00	34.63	1.51	63.86
		3	60.00	6.20	1.43	92.38
	TOTAL		180.00	33.30	1.27	65.44
29	CHAMERA-I HPS	1	180.00	2.99	0.25	96.76
		2	180.00	9.97	0.22	89.81
		3	180.00	4.51	0.31	95.18
	TOTAL		540.00	5.82	0.26	93.92
30	CHAMERA-II HPS	1	100.00	55.37	0.06	44.57
		2	100.00	60.92	0.02	39.06
		3	100.00	8.60	0.46	90.94
	TOTAL		300.00	41.63	0.18	58.19
31	CHAMERA-III HPS	1	77.00	4.36	0.29	95.35
		2	77.00	4.68	0.49	94.83
		3	77.00	8.55	0.02	91.43
	TOTAL		231.00	5.86	0.27	93.87
32	CHUTAK HPS	1	11.00	6.81	0.39	92.80

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	11.00	7.14	0.49	92.37
		3	11.00	9.97	0.41	89.63
		4	11.00	0.00	0.41	99.59
	TOTAL		44.00	5.98	0.42	93.60
33	DHAULI GANGA HPS	1	70.00	7.91	0.52	91.57
		2	70.00	8.75	0.47	90.78
		3	70.00	9.75	0.70	89.55
		4	70.00	7.41	0.50	92.09
	TOTAL		280.00	8.45	0.55	91.00
34	DULHASTI HPS	1	130.00	3.23	0.66	96.11
		2	130.00	4.16	0.82	95.02
		3	130.00	4.15	0.92	94.93
	TOTAL		390.00	3.85	0.80	95.35
35	KISHANGANGA HPS	1	110.00	50.16	0.31	49.53
		2	110.00	18.07	2.08	79.85
		3	110.00	16.10	1.17	82.73
	TOTAL		330.00	28.11	1.19	70.70
36	NIMMO BAZGO HPS	1	15.00	5.96	0.00	94.04

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	4.71	0.01	95.28
		3	15.00	3.89	0.06	96.05
	TOTAL		45.00	4.85	0.02	95.12
37	PARBATI-III HPS	1	130.00	15.42	0.49	84.08
		2	130.00	31.99	0.05	67.95
		3	130.00	0.00	0.33	99.67
		4	130.00	10.13	0.18	89.69
	TOTAL		520.00	14.39	0.27	85.35
38	SALAL HPS	1	115.00	5.13	0.41	94.47
		2	115.00	3.67	0.38	95.94
		3	115.00	3.70	0.47	95.83
		4	115.00	3.96	0.29	95.75
		5	115.00	3.39	0.21	96.41
		6	115.00	3.63	0.25	96.11
	TOTAL		690.00	3.91	0.33	95.75
39	SEWA-II HPS	1	40.00	0.08	0.01	99.91
		2	40.00	0.07	0.01	99.92
		3	40.00	0.06	0.00	99.94

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		120.00	0.07	0.01	99.92
40	TANAKPUR HPS	1	31.40	0.00	0.84	99.16
		2	31.40	1.37	3.87	94.76
		3	31.40	0.02	0.96	99.01
	TOTAL		94.20	0.46	1.89	97.65
41	URI-I HPS	1	120.00	3.64	0.04	96.33
		2	120.00	4.46	0.08	95.46
		3	120.00	17.48	0.24	82.28
		4	120.00	8.01	0.14	91.85
	TOTAL		480.00	8.40	0.12	91.48
42	URI-II HPS	1	60.00	3.34	0.50	96.16
		2	60.00	5.22	0.47	94.31
		3	60.00	2.47	0.51	97.01
		4	60.00	1.78	0.88	97.33
	TOTAL		240.00	3.20	0.59	96.20
	NTPC Ltd.					
43	KOLDAM	1	200.00	1.58	0.00	98.42
		2	200.00	1.06	0.29	98.65
		3	200.00	9.98	0.00	90.02

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		4	200.00	1.27	0.68	98.05
	TOTAL		800.00	3.47	0.24	96.28
	PSPCL					
44	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
45	ANANDPUR SAHIB-II HPS	3	33.50	0.00	0.00	100.00
		4	33.50	0.00	0.00	100.00
	TOTAL		67.00	0.00	0.00	100.00
46	MUKERIAN-I 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
47	MUKERIAN-II HPS	4	15.00	0.00	0.00	100.00
		5	15.00	0.00	0.00	100.00
		6	15.00	0.00	0.00	100.00
	TOTAL		45.00	0.00	0.00	100.00
48	MUKERIAN-III HPS	7	19.50	0.00	0.00	100.00
		8	19.50	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)
		9	19.50	0.00	0.00	100.00
	TOTAL		58.50	0.00	0.00	100.00
49	MUKERIAN-IV HPS	10	19.50	0.00	0.00	100.00
		11	19.50	0.00	0.00	100.00
		12	19.50	0.00	0.00	100.00
	TOTAL		58.50	0.00	0.00	100.00
50	RANJIT SAGAR HPS	1	150.00	0.00	0.00	100.00
		2	150.00	0.00	0.00	100.00
		3	150.00	17.90	0.00	82.10
		4	150.00	8.44	0.36	91.20
	TOTAL		600.00	6.59	0.09	93.32
51	SHANAN 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
		4	15.00	1.73	0.00	98.27
		5	50.00	0.00	0.00	100.00
	TOTAL		110.00	0.35	0.00	99.65
	RRVUNL					
52	JAWAHAR SAGAR HPS	1	33.00	23.75	0.00	76.25

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	33.00	0.00	16.44	83.56
		3	33.00	0.00	0.00	100.00
	TOTAL		99.00	7.92	5.48	86.61
53	MAHI BAJAJ-I 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
54	MAHI BAJAJ-II HPS	3	45.00	0.00	0.00	100.00
		4	45.00	0.00	0.00	100.00
	TOTAL		90.00	0.00	0.00	100.00
55	R P SAGAR HPS	1	43.00	0.00	100.00	0.00
		2	43.00	0.00	0.00	100.00
		3	43.00	0.00	100.00	0.00
		4	43.00	0.00	100.00	0.00
	TOTAL		172.00	0.00	75.00	25.00
	SJVNL					
56	NATHPA JHAKRI HPS	1	250.00	2.64	0.03	97.33
		2	250.00	1.82	0.02	98.16
		3	250.00	2.41	0.03	97.56
		4	250.00	2.06	1.01	96.94

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		5	250.00	2.23	0.06	97.71
		6	250.00	0.45	0.01	99.54
	TOTAL		1500.00	1.93	0.19	97.87
57	RAMPUR HPS	1	68.67	2.62	0.09	97.29
		2	68.67	2.65	0.74	96.62
		3	68.67	1.87	0.10	98.03
		4	68.67	1.98	0.04	97.97
		5	68.67	1.77	0.04	98.19
		6	68.67	2.02	0.67	97.30
	TOTAL		412.02	2.15	0.28	97.57
	THDC					
58	KOTESHWAR HPS	1	100.00	5.81	0.00	94.19
		2	100.00	0.63	0.01	99.36
		3	100.00	4.16	0.00	95.84
		4	100.00	5.76	0.01	94.22
	TOTAL		400.00	4.09	0.01	95.90
59	TEHRI ST-1 HPS	1	250.00	0.00	0.00	100.00
		2	250.00	6.69	0.00	93.31

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	250.00	0.00	0.00	100.00
		4	250.00	0.00	0.00	100.00
	TOTAL		1000.00	1.67	0.00	98.33
	UJVNL					
60	CHIBRO (YAMUNA) HPS	1	60.00	10.41	0.00	89.59
		2	60.00	8.22	0.00	91.78
		3	60.00	7.70	0.00	92.30
		4	60.00	0.00	0.00	100.00
	TOTAL		240.00	6.58	0.00	93.42
61	CHILLA HPS	1	36.00	10.05	1.42	88.53
		2	36.00	11.23	0.33	88.44
		3	36.00	40.61	0.70	58.69
		4	36.00	13.38	0.00	86.62
	TOTAL		144.00	18.82	0.61	80.57
62	DHAKRANI HPS	1	11.25	6.58	0.55	92.87
		2	11.25	25.51	0.00	74.49
		3	11.25	2.97	0.00	97.03
	TOTAL		33.75	11.69	0.18	88.13
63	DHALIPUR HPS	1	17.00	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	17.00	0.00	0.00	100.00
		3	17.00	0.00	0.00	100.00
	TOTAL		51.00	0.00	0.00	100.00
64	KHATIMA HPS	1	13.80	31.72	0.66	67.62
		2	13.80	10.96	0.00	89.04
		3	13.80	0.00	0.00	100.00
	TOTAL		41.40	14.23	0.22	85.55
65	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	55.57	0.00	44.43
	TOTAL		120.00	13.89	0.00	86.11
66	KULHAL HPS	1	10.00	0.00	0.00	100.00
		2	10.00	0.00	0.00	100.00
		3	10.00	0.00	0.00	100.00
	TOTAL		30.00	0.00	0.00	100.00
67	MANERI BHALI-I HPS	1	30.00	0.00	0.00	100.00
		2	30.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	30.00	0.00	0.00	100.00
	TOTAL		90.00	0.00	0.00	100.00
68	MANERI BHALI-II HPS	1	76.00	39.96	0.30	59.74
		2	76.00	16.76	0.00	83.24
		3	76.00	12.45	0.39	87.17
		4	76.00	30.21	2.05	67.74
	TOTAL		304.00	24.85	0.68	74.47
69	RAMGANGA HPS	1	66.00	0.00	0.00	100.00
		2	66.00	0.00	0.11	99.89
		3	66.00	85.67	0.00	14.33
	TOTAL		198.00	28.56	0.04	71.41
	UPJVNL					
70	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
71	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

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		30.60	0.00	0.00	100.00
72	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
73	RIHAND HPS	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
		3	50.00	0.00	0.00	100.00
		4	50.00	0.00	0.00	100.00
		5	50.00	0.00	0.00	100.00
		6	50.00	0.00	0.00	100.00
	TOTAL		300.00	0.00	0.00	100.00
	Western					
	CSPGCL					
74	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					

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
75	BHANDARDHARA HPS ST-II	2	34.00	0.00	0.00	100.00
	TOTAL		34.00	0.00	0.00	100.00
	GSECL					
76	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
		4	60.00	0.00	0.00	100.00
	TOTAL		240.00	0.00	0.00	100.00
77	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					
78	BHIRA TAIL RACE HPS	1	40.00	0.00	0.00	100.00
		2	40.00	0.00	0.00	100.00
	TOTAL		80.00	0.00	0.00	100.00
79	GHATGHAR PSS HPS	1	125.00	0.00	51.96	48.04
		2	125.00	0.00	43.81	56.19

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		250.00	0.00	47.89	52.11
80	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
81	KOYNA-I&II HPS	1	70.00	0.00	0.00	100.00
		2	70.00	0.00	0.00	100.00
		3	70.00	0.00	0.00	100.00
		4	70.00	0.00	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
82	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

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
83	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
84	TILLARI HPS	1	60.00	0.00	0.00	100.00
	TOTAL		60.00	0.00	0.00	100.00
85	VAITARNA HPS	1	60.00	0.00	23.47	76.53
	TOTAL		60.00	0.00	23.47	76.53
	MPPGCL					
86	BANSAGAR-II 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
87	BANSAGAR-III HPS	1	20.00	0.00	0.00	100.00
		2	20.00	0.00	0.00	100.00
		3	20.00	0.00	0.00	100.00
	TOTAL		60.00	0.00	0.00	100.00
88	BANSAGAR TONS-I HPS	1	105.00	0.00	0.00	100.00
		2	105.00	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	105.00	0.00	6.79	93.21
	TOTAL		315.00	0.00	2.26	97.74
89	BARGI HPS	1	45.00	0.00	0.00	100.00
		2	45.00	0.00	0.00	100.00
	TOTAL		90.00	0.00	0.00	100.00
90	GANDHI SAGAR HPS	1	23.00	0.00	0.00	100.00
		2	23.00	0.00	100.00	0.00
		3	23.00	0.00	100.00	0.00
		4	23.00	0.00	0.00	100.00
		5	23.00	0.00	0.00	100.00
	TOTAL		115.00	0.00	40.00	60.00
91	MADHIKHERA 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
92	PENCH HPS	1	80.00	3.74	0.00	96.26
		2	80.00	0.00	0.00	100.00
	TOTAL		160.00	1.87	0.00	98.13

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
93	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	0.00	100.00
	TOTAL		45.00	0.00	0.00	100.00
	NHDC					
94	INDIRA SAGAR HPS	1	125.00	6.05	0.23	93.72
		2	125.00	5.14	0.39	94.47
		3	125.00	2.29	0.28	97.43
		4	125.00	4.34	0.00	95.66
		5	125.00	0.33	0.00	99.67
		6	125.00	3.54	1.38	95.08
		7	125.00	2.23	0.00	97.77
		8	125.00	2.43	0.00	97.57
	TOTAL		1000.00	3.29	0.28	96.42
95	OMKARESHWAR HPS	1	65.00	3.28	0.00	96.72
		2	65.00	3.12	0.01	96.86
		3	65.00	3.37	0.03	96.60
		4	65.00	3.13	0.76	96.11

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		5	65.00	3.12	0.02	96.87
		6	65.00	3.68	0.00	96.32
		7	65.00	3.81	0.00	96.19
		8	65.00	5.29	0.00	94.71
	TOTAL		520.00	3.60	0.10	96.30
	SSNNL					
96	S SAROVAR CHPH HPS	1	50.00	0.00	7.34	92.66
		2	50.00	4.18	3.21	92.61
		3	50.00	7.25	0.00	92.75
		4	50.00	3.21	0.00	96.79
		5	50.00	0.00	0.00	100.00
	TOTAL		250.00	2.93	2.11	94.96
97	S SAROVAR RBPH HPS	1	200.00	5.74	0.00	94.26
		2	200.00	5.96	0.00	94.04
		3	200.00	5.58	0.00	94.42
		4	200.00	0.00	0.00	100.00
		5	200.00	0.00	0.15	99.85
		6	200.00	7.40	1.39	91.22

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		1200.00	4.11	0.26	95.63
	TATA MAH.					
98	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	4.31	95.69
		5	25.00	0.00	0.00	100.00
		6	25.00	0.00	0.00	100.00
	TOTAL		150.00	0.00	0.72	99.28
99	BHIRA PSS HPS	1	150.00	0.00	0.00	100.00
	TOTAL		150.00	0.00	0.00	100.00
100	BHIVPURI HPS	1	24.00	0.00	0.00	100.00
		2	24.00	0.00	15.93	84.07
		3	24.00	0.00	0.00	100.00
		4	1.50	0.00	0.00	100.00
		5	1.50	0.00	0.00	100.00
	TOTAL		75.00	0.00	3.19	96.81
101	KHOPOLI HPS	1	24.00	0.00	0.00	100.00
		2	24.00	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)
		3	24.00	0.00	0.00	100.00
	TOTAL		72.00	0.00	33.33	66.67
	Southern					
	APGENCO					
102	HAMPI HPS	1	9.00	7.62	1.17	91.20
		2	9.00	0.00	0.36	99.64
		3	9.00	0.35	0.73	98.92
		4	9.00	0.00	0.03	99.97
	TOTAL		36.00	1.99	0.57	97.44
103	LOWER SILERU HPS	1	115.00	6.07	0.00	93.93
		2	115.00	0.00	0.00	100.00
		3	115.00	1.14	0.00	98.86
		4	115.00	0.00	7.42	92.58
	TOTAL		460.00	1.80	1.85	96.35
104	NAGARJUN SGR RBC HPS	1	30.00	0.00	11.93	88.07
		2	30.00	0.00	44.58	55.42
		3	30.00	13.94	0.00	86.06
	TOTAL		90.00	4.65	18.84	76.52
105	NAGARJUN SGR TPD	1	25.00	0.00	16.20	83.80

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	25.00	0.00	0.01	99.99
	TOTAL		50.00	0.00	8.11	91.89
106	SRISAILAM HPS	1	110.00	0.00	6.59	93.41
		2	110.00	0.00	0.19	99.81
		3	110.00	0.00	1.26	98.74
		4	110.00	0.00	0.04	99.96
		5	110.00	0.00	0.10	99.90
		6	110.00	0.00	0.13	99.87
		7	110.00	0.00	0.09	99.91
	TOTAL		770.00	0.00	1.20	98.80
107	T B DAM HPS	1	9.00	3.83	0.00	96.17
		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	0.96	0.00	99.04
108	UPPER SILERU HPS	1	60.00	0.00	0.00	100.00
		2	60.00	0.00	0.00	100.00
		3	60.00	0.00	0.00	100.00

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
	KPCL					
109	ALMATTI DPH HPS	1	15.00	8.43	0.00	91.57
		2	55.00	0.00	0.00	100.00
		3	55.00	0.00	0.00	100.00
		4	55.00	0.00	0.00	100.00
		5	55.00	0.00	0.00	100.00
		6	55.00	11.55	0.34	88.11
	TOTAL		290.00	3.33	0.06	96.61
110	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
111	GERUSUPPA HPS	1	60.00	0.18	0.42	99.40
		2	60.00	3.97	0.29	95.74
		3	60.00	5.63	0.13	94.24
		4	60.00	0.20	0.00	99.80
	TOTAL		240.00	2.49	0.21	97.30

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
112	GHAT PRABHA HPS	1	16.00	0.00	0.00	100.00
		2	16.00	0.00	0.00	100.00
	TOTAL		32.00	0.00	0.00	100.00
113	JOG HPS	1	13.20	2.36	1.87	95.76
		2	13.20	0.27	6.52	93.20
		3	13.20	44.24	0.40	55.36
		4	13.20	0.00	0.64	99.36
		5	21.60	0.00	0.96	99.04
		6	21.60	0.00	0.59	99.41
		7	21.60	0.00	0.00	100.00
		8	21.60	0.00	0.00	100.00
	TOTAL		139.20	5.86	1.37	92.77
114	KADRA HPS	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
		3	50.00	5.31	0.00	94.69
	TOTAL		150.00	1.77	0.00	98.23
115	KALINADI HPS	1	135.00	0.00	0.00	100.00
		2	135.00	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	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
116	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
117	KODASALI HPS	1	40.00	0.00	0.00	100.00
		2	40.00	4.17	0.00	95.83
		3	40.00	8.73	0.00	91.27
	TOTAL		120.00	4.30	0.00	95.70
118	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
119	MUNIRABAD HPS	1	9.00	0.00	75.66	24.34
		2	9.00	0.00	0.00	100.00
		3	10.00	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		28.00	0.00	25.22	74.78
120	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
		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
121	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

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		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
122	VARAHI HPS	1	115.00	2.44	1.81	95.75
		2	115.00	1.67	0.10	98.24
		3	115.00	0.00	0.14	99.86
		4	115.00	14.08	0.01	85.91
	TOTAL		460.00	4.55	0.51	94.94
	KSEB					
123	IDAMALAYAR HPS	1	37.50	9.59	0.84	89.58
		2	37.50	7.29	1.73	90.98
	TOTAL		75.00	8.44	1.28	90.28
124	IDUKKI HPS	1	130.00	4.05	1.19	94.76
		2	130.00	41.28	2.42	56.30
		3	130.00	11.14	5.31	83.55
		4	130.00	20.19	4.26	75.55

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		5	130.00	7.81	1.94	90.25
		6	130.00	17.07	1.96	80.97
	TOTAL		780.00	16.92	2.85	80.23
125	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
126	KUTTIYADI ADDL EXTN	1	50.00	7.69	1.70	90.61
		2	50.00	7.25	1.93	90.83
	TOTAL		100.00	7.47	1.82	90.72
127	KUTTIYADI EXTN HPS	4	50.00	0.47	2.78	96.75
	TOTAL		50.00	0.47	2.78	96.75
128	KUTTIYADI HPS	1	25.00	6.27	0.12	93.61
		2	25.00	8.13	4.12	87.75
		3	25.00	11.39	0.36	88.24
	TOTAL		75.00	8.60	1.53	89.87
129	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

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
130	NARIAMANGLAM HPS	1	15.00	100.00	0.00	0.00
		2	15.00	0.00	0.00	100.00
		3	15.00	0.00	0.00	100.00
	TOTAL		45.00	33.33	0.00	66.67
131	PALLIVASAL HPS	1	5.00	0.00	0.00	100.00
		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
132	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
133	PORINGALKUTTU HPS	1	8.00	0.00	0.00	100.00
		2	8.00	0.00	0.00	100.00
		3	8.00	75.42	0.00	24.58
		4	8.00	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		32.00	18.86	0.00	81.14
134	SABARIGIRI HPS	1	50.00	5.57	0.37	94.06
		2	50.00	8.57	0.53	90.90
		3	50.00	8.91	0.34	90.75
		4	50.00	0.71	3.31	95.98
		5	50.00	8.39	0.20	91.41
		6	50.00	0.07	0.00	99.93
	TOTAL		300.00	5.37	0.79	93.84
135	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
136	SHOLAYAR HPS	1	18.00	0.00	0.00	100.00
		2	18.00	0.00	0.00	100.00
		3	18.00	0.00	0.00	100.00
	TOTAL		54.00	0.00	0.00	100.00
	TANGEDCO					
137	ALIYAR HPS	1	60.00	5.32	16.33	78.35

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	5.32	16.33	78.35
138	BHAWANI BARRAGE-II HPS	1	15.00	0.00	0.71	99.29
		2	15.00	0.00	0.37	99.63
	TOTAL		30.00	0.00	0.54	99.46
139	BHAWANI BARRAGE-III HPS	1	15.00	0.00	0.00	100.00
		2	15.00	0.00	0.00	100.00
	TOTAL		30.00	0.00	0.00	100.00
140	BHAWANI KATTAL	1	15.00	0.00	0.00	100.00
		2	15.00	4.57	0.00	95.43
	TOTAL		30.00	2.29	0.00	97.71
141	KADAMPARI HPS	1	100.00	0.00	59.73	40.27
		2	100.00	0.00	8.54	91.46
		3	100.00	0.00	100.00	0.00
		4	100.00	0.00	100.00	0.00
	TOTAL		400.00	0.00	67.07	32.93
142	KODAYAR-I HPS	1	60.00	0.00	16.29	83.71
	TOTAL		60.00	0.00	16.29	83.71
143	KODAYAR-II HPS	2	40.00	0.00	0.00	100.00
	TOTAL		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)
144	KUNDAH-I HPS	1	20.00	7.10	0.97	91.93
		2	20.00	0.00	0.49	99.51
		3	20.00	0.00	0.61	99.39
	TOTAL		60.00	2.37	0.69	96.94
145	KUNDAH-II HPS	4	35.00	0.00	0.00	100.00
		5	35.00	0.00	0.58	99.42
		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	0.12	99.88
146	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
147	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
148	KUNDAH-V HPS	14	20.00	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)
		15	20.00	0.00	0.00	100.00
	TOTAL		40.00	0.00	0.00	100.00
149	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
150	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
151	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
152	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
153	METTUR DAM HPS	1	12.50	0.00	0.00	100.00
		2	12.50	0.00	0.00	100.00
		3	12.50	0.89	0.00	99.11
		4	12.50	0.00	0.00	100.00
	TOTAL		50.00	0.22	0.00	99.78

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
154	METTUR TUNNEL HPS	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	2.53	97.47
		3	50.00	0.00	0.00	100.00
		4	50.00	0.00	0.00	100.00
	TOTAL		200.00	0.00	0.63	99.37
155	MOYAR HPS	1	12.00	0.00	0.00	100.00
		2	12.00	0.00	19.07	80.93
		3	12.00	0.00	0.00	100.00
	TOTAL		36.00	0.00	6.36	93.64
156	PAPANASAM HPS	1	8.00	8.63	0.00	91.37
		2	8.00	9.21	0.00	90.79
		3	8.00	1.52	0.00	98.48
		4	8.00	1.52	0.00	98.48
	TOTAL		32.00	5.22	0.00	94.78
157	PARSON`S VALLEY HPS	1	30.00	0.00	0.00	100.00
	TOTAL		30.00	0.00	0.00	100.00
158	PERIYAR HPS	1	42.00	0.00	0.00	100.00
		2	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)
		3	42.00	0.00	0.00	100.00
		4	35.00	0.00	0.00	100.00
	TOTAL		161.00	0.00	0.00	100.00
159	PYKARA HPS	1	7.00	0.00	1.38	98.62
		2	7.00	0.00	3.68	96.32
		3	7.00	0.00	3.22	96.78
		4	13.60	0.00	0.00	100.00
		5	13.60	0.00	3.22	96.78
		6	11.00	0.00	16.77	83.23
	TOTAL		59.20	0.00	4.71	95.29
160	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
161	SARKARPATHY HPS	1	30.00	12.09	0.00	87.91
	TOTAL		30.00	12.09	0.00	87.91
162	SHOLAYAR HPS (TN)	1	35.00	0.00	0.00	100.00
		2	35.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		70.00	0.00	0.00	100.00
163	SURULIYAR HPS	1	35.00	4.48	0.00	95.52
	TOTAL		35.00	4.48	0.00	95.52
	TSGENCO					
164	LOWER JURALA HPS	1	40.00	0.00	0.09	99.91
		2	40.00	0.00	0.03	99.97
		3	40.00	0.00	0.00	100.00
		4	40.00	0.00	0.00	100.00
		5	40.00	0.00	0.00	100.00
		6	40.00	0.00	0.00	100.00
	TOTAL		240.00	0.00	0.02	99.98
165	NAGARJUN SGR HPS	1	110.00	0.00	0.07	99.93
		2	100.80	0.00	20.52	79.48
		3	100.80	0.00	0.00	100.00
		4	100.80	0.37	47.67	51.96
		5	100.80	0.00	1.34	98.66
		6	100.80	0.00	0.56	99.44
		7	100.80	0.00	5.25	94.75

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		8	100.80	0.00	0.00	100.00
	TOTAL		815.60	0.05	9.43	90.53
166	NAGARJUN SGR LBC HPS	1	30.00	0.00	8.15	91.85
		2	30.00	0.00	1.01	98.99
	TOTAL		60.00	0.00	4.58	95.42
167	POCHAMPAD HPS	1	9.00	0.00	0.00	100.00
		2	9.00	0.00	0.00	100.00
		3	9.00	0.00	0.00	100.00
		4	9.00	0.00	0.00	100.00
	TOTAL		36.00	0.00	0.00	100.00
168	PRIYADARSHNI JURALA HPS	1	39.00	0.00	0.70	99.30
		2	39.00	0.00	0.00	100.00
		3	39.00	0.00	0.00	100.00
		4	39.00	0.00	0.00	100.00
		5	39.00	0.00	100.00	0.00
		6	39.00	0.00	0.00	100.00
	TOTAL		234.00	0.00	16.78	83.22
169	PULICHINTALA HPS	1	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)
		2	30.00	0.00	0.01	99.99
		3	30.00	0.00	0.00	100.00
		4	30.00	1.84	17.95	80.21
	TOTAL		120.00	0.46	4.49	95.05
170	SRISAILAM LB HPS	1	150.00	0.00	0.00	100.00
		2	150.00	0.00	0.00	100.00
		3	150.00	0.00	0.00	100.00
		4	150.00	0.00	0.00	100.00
		5	150.00	0.00	0.00	100.00
		6	150.00	0.00	1.19	98.81
	TOTAL		900.00	0.00	0.20	99.80
	Eastern					
	APGENCO					
171	MACHKUND HPS	1	17.00	1.28	0.00	98.72
		2	17.00	0.00	3.03	96.97
		3	17.00	0.00	9.00	91.00
		4	21.25	0.87	24.33	74.79
		5	21.25	0.00	42.25	57.75

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		6	21.25	0.00	0.00	100.00
	TOTAL		114.75	0.36	13.10	86.54
	DEPL					
172	JORETHANG LOOP	1	48.00	4.63	1.72	93.65
		2	48.00	14.54	2.58	82.88
	TOTAL		96.00	9.59	2.15	88.26
	DVC					
173	MAITHON HPS	1	20.00	0.00	2.40	97.60
		2	23.20	3.84	0.90	95.26
		3	20.00	0.00	3.37	96.63
	TOTAL		63.20	1.28	2.22	96.50
174	PANCHET HPS	1	40.00	0.00	0.47	99.53
		2	40.00	0.00	11.41	88.59
	TOTAL		80.00	0.00	5.94	94.06
	GIPL					
175	CHUZACHEN HPS	1	55.00	6.70	0.48	92.81
		2	55.00	7.11	0.32	92.57
	TOTAL		110.00	6.91	0.40	92.69
	JUUNL					
176	SUBERNREKHA-I HPS	1	65.00	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	TOTAL		65.00	0.00	0.00	100.00
177	SUBERNREKHA-II HPS	2	65.00	0.00	0.00	100.00
	TOTAL		65.00	0.00	0.00	100.00
	NHPC					
178	RANGIT HPS	1	20.00	14.47	2.66	82.87
		2	20.00	12.99	4.01	83.01
		3	20.00	11.29	3.25	85.46
	TOTAL		60.00	12.91	3.30	83.78
179	TEESTA LOW DAM-III HPS	1	33.00	1.78	3.35	94.87
		2	33.00	7.56	2.91	89.53
		3	33.00	5.23	3.20	91.58
		4	33.00	6.50	2.89	90.61
	TOTAL		132.00	5.27	3.09	91.65
180	TEESTA LOW DAM-IV HPS	1	40.00	7.08	3.62	89.30
		2	40.00	4.49	3.22	92.30
		3	40.00	7.35	3.16	89.50
		4	40.00	6.39	3.10	90.51
	TOTAL		160.00	6.33	3.27	90.40
181	TEESTA V HPS	1	170.00	5.85	0.68	93.48

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	170.00	4.31	0.69	95.00
		3	170.00	2.43	0.67	96.90
	TOTAL		510.00	4.19	0.68	95.13
	OHPC					
182	BALIMELA HPS	1	60.00	100.00	0.00	0.00
		2	60.00	0.00	0.00	100.00
		3	60.00	0.00	0.00	100.00
		4	60.00	0.00	0.00	100.00
		5	60.00	0.00	0.00	100.00
		6	60.00	0.00	0.00	100.00
		7	75.00	0.00	0.00	100.00
		8	75.00	0.00	0.00	100.00
	TOTAL		510.00	12.50	0.00	87.50
183	CHIPLIMA HPS	1	24.00	0.00	0.00	100.00
		2	24.00	0.00	0.00	100.00
		3	24.00	0.00	0.00	100.00
	TOTAL		72.00	0.00	0.00	100.00
184	HIRAKUD HPS	1	49.50	0.00	0.00	100.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		2	49.50	0.00	0.00	100.00
		3	32.00	0.00	0.00	100.00
		4	32.00	0.00	0.00	100.00
		5	37.50	100.00	0.00	0.00
		6	37.50	100.00	0.00	0.00
		7	37.50	0.00	0.00	100.00
	TOTAL		275.50	28.57	0.00	71.43
185	RENGALI HPS	1	50.00	0.00	0.00	100.00
		2	50.00	0.00	0.00	100.00
		3	50.00	0.00	0.00	100.00
		4	50.00	0.00	0.00	100.00
		5	50.00	0.00	0.00	100.00
	TOTAL		250.00	0.00	0.00	100.00
186	UPPER INDRAVATI HPS	1	150.00	0.00	0.00	100.00
		2	150.00	0.00	0.00	100.00
		3	150.00	0.00	0.00	100.00
		4	150.00	0.00	0.00	100.00
	TOTAL		600.00	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)
187	UPPER KOLAB 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
	SEPL					
188	TASHIDING HPS	1	48.50	3.16	0.88	95.96
		2	48.50	3.10	0.76	96.14
	TOTAL		97.00	3.13	0.82	96.05
	SKPPPL					
189	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					
190	TEESTA-III HPS	1	200.00	4.76	0.15	95.09
		2	200.00	8.26	0.26	91.48
		3	200.00	3.43	3.99	92.58
		4	200.00	5.00	0.16	94.83
		5	200.00	3.53	0.14	96.34

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		6	200.00	5.22	0.15	94.63
	TOTAL		1200.00	5.03	0.81	94.16
	WBSEDCL					
191	JALDHAKA HPS ST-I	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
192	PURULIA PSS HPS	1	225.00	0.00	0.00	100.00
		2	225.00	0.00	0.00	100.00
		3	225.00	0.00	0.00	100.00
		4	225.00	0.00	0.00	100.00
	TOTAL		900.00	0.00	0.00	100.00
193	RAMMAM 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	0.00	0.00	100.00
	TOTAL		50.00	0.00	0.00	100.00
	North Eastern					

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
	APGCL					
194	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					
195	KYRDEMKULAI HPS	1	30.00	0.00	0.00	100.00
		2	30.00	0.00	100.00	0.00
	TOTAL		60.00	0.00	50.00	50.00
196	MYNTDU(LESHKA) St-1 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
197	NEW UMTRU HPS	1	20.00	0.00	0.00	100.00
		2	20.00	0.00	0.00	100.00
	TOTAL		40.00	0.00	0.00	100.00
198	UMIAM HPS ST-I	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

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	0.00	0.00	100.00
199	UMIAM HPS ST-IV	7	30.00	0.00	0.00	100.00
		8	30.00	0.00	0.00	100.00
	TOTAL		60.00	0.00	0.00	100.00
	NEEPCO.					
200	DOYANG HPS	1	25.00	0.00	0.07	99.93
		2	25.00	0.02	0.03	99.95
		3	25.00	88.45	0.29	11.26
	TOTAL		75.00	29.49	0.13	70.38
201	KAMENG HPS	1	150.00	4.26	19.85	75.89
		2	150.00	2.08	10.60	87.32
		3	150.00	0.00	0.00	100.00
		4	150.00	0.00	0.54	99.46
	TOTAL		600.00	2.73	13.12	84.15
202	KHONDONG HPS	1	25.00	60.10	3.35	36.55
		2	25.00	60.59	0.29	39.12
	TOTAL		50.00	60.35	1.82	37.83
203	KOPILI HPS	1	50.00	0.00	100.00	0.00
		2	50.00	0.00	100.00	0.00

S.No.	STATION / CORPORATION	UNIT No.	INSTALLED CAPAPCITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O) (%)	OPERATING AVAILABILITY (100-FO-PM)
		3	50.00	0.00	100.00	0.00
		4	50.00	0.00	100.00	0.00
	TOTAL		200.00	0.00	100.00	0.00
204	PARE	1	55.00	5.81	0.06	94.13
		2	55.00	18.61	0.05	81.34
	TOTAL		110.00	12.21	0.06	87.74
205	RANGANADI HPS	1	135.00	2.36	0.00	97.64
		2	135.00	3.65	0.00	96.35
		3	135.00	2.26	4.36	93.38
	TOTAL		405.00	2.76	1.45	95.79
206	TUIRIAL HPS	1	30.00	0.00	0.48	99.52
		2	30.00	2.60	0.02	97.38
	TOTAL		60.00	1.30	0.25	98.45
	NHPC					
207	LOKTAK HPS	1	35.00	2.08	0.08	97.84
		2	35.00	3.22	0.15	96.64
		3	35.00	27.15	0.03	72.81
	TOTAL		105.00	10.82	0.09	89.10

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 2020-21 is given at **Annex-7.1** and summarized below in **Table 7.1**.

TABLE 7.1

MISCELLANEOUS OUTAGES FOR PERIOD: 2020-21

S. No.	Causes of Miscellaneous Outage	Duration of Outage (Hours)	% of Total Outage
	NOT ASSOCIATED WITH THE EQUIPMENT AND CIVIL STRUCTURE		
1	Water Constraint	489,024.94	82.38
2	Grid Constraint	40,042.49	6.75
3	Other Miscellaneous	64,553.73	10.87
	TOTAL	593,621.16	100.00

7.2 The overall non-availability on account of miscellaneous outages has been estimated as 15.57%. It was highest (64.44%) in case of HE Stations from SJVNL followed by EPPL (51.18%), NHPC (32.73%), 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 2020-21**

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	Northern			
	ADHPL			
1	ALLAIN DUHANGAN HPS	1	96.00	2.97
		2	96.00	3.22
	TOTAL		192.00	3.10
	AHPC (GVK)			
2	SHRINAGAR HPS	1	82.50	0.02
		2	82.50	0.00
		3	82.50	0.00
		4	82.50	0.03
	TOTAL		330.00	0.01
	BBMB			
3	BHAKRA LEFT HPS	1	108.00	1.37
		2	126.00	19.05
		3	108.00	0.00
		4	126.00	8.90

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		5	126.00	2.84
	TOTAL		594.00	6.43
4	BHAKRA RIGHT HPS	10	157.00	0.00
		6	157.00	6.31
		7	157.00	0.55
		8	157.00	10.63
		9	157.00	2.30
	TOTAL		785.00	3.96
5	DEHAR HPS	1	165.00	0.00
		2	165.00	9.86
		3	165.00	3.01
		4	165.00	15.19
		5	165.00	21.69
		6	165.00	0.00
	TOTAL		990.00	8.29
6	GANGUWAL HPS	1	29.25	0.00
		2	24.20	0.44
		3	24.20	0.00
	TOTAL		77.65	0.15
7	KOTLA HPS	1	29.25	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	24.20	0.43
		3	24.20	0.00
	TOTAL		77.65	0.14
8	PONG HPS	1	66.00	1.10
		2	66.00	2.08
		3	66.00	20.34
		4	66.00	48.68
		5	66.00	18.07
		6	66.00	35.40
	TOTAL		396.00	20.95
	E.P.P.L.			
9	MALANA-II HPS	1	50.00	52.11
		2	50.00	50.26
	TOTAL		100.00	51.18
	GBHPPL			
10	BUDHIL HPS	1	35.00	0.00
		2	35.00	0.00
	TOTAL		70.00	0.00
	HBPCL			
11	BASPA HPS	1	100.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	100.00	0.00
		3	100.00	0.00
	TOTAL		300.00	0.00
12	KARCHAM WANGTOO HPS	1	250.00	0.00
		2	250.00	0.00
		3	250.00	0.00
		4	250.00	0.00
	TOTAL		1000.00	0.00
	HPPCL			
13	KASHANG INTEGRATED 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
15	SAWRA KUDDU HPS	1	37.00	0.00
		2	37.00	0.00
		3	37.00	0.00
	TOTAL		111.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	HPSEB			
16	BASSI HPS	1	16.50	0.00
		2	16.50	0.00
		3	16.50	0.00
		4	16.50	0.00
	TOTAL		66.00	0.00
17	GIRI BATA HPS	1	30.00	0.00
		2	30.00	0.00
	TOTAL		60.00	0.00
18	LARJI HPS	1	42.00	0.27
		2	42.00	0.00
		3	42.00	0.00
	TOTAL		126.00	0.09
19	SANJAY HPS	1	40.00	2.97
		2	40.00	0.65
		3	40.00	0.06
	TOTAL		120.00	1.23
	IAEPL			
20	CHANJU-I HPS	1	12.00	0.00
		2	12.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	12.00	0.00
	TOTAL		36.00	0.00
	JKSPDC			
21	BAGLIHAR HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
	TOTAL		450.00	0.00
22	BAGLIHAR II HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	100.00
	TOTAL		450.00	33.33
23	LOWER JHELM HPS	1	35.00	0.00
		2	35.00	0.00
		3	35.00	100.00
	TOTAL		105.00	33.33
24	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			

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
25	VISHNU PRAYAG HPS	1	100.00	0.00
		2	100.00	0.00
		3	100.00	0.00
		4	100.00	0.00
	TOTAL		400.00	0.00
	L&T			
26	SINGOLI BHATWARI HPS	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL		99.00	0.00
	MPCL			
27	MALANA HPS	1	43.00	0.00
		2	43.00	0.00
	TOTAL		86.00	0.00
	NHPC			
28	BAIRA SIUL HPS	1	60.00	26.43
		2	60.00	22.89
		3	60.00	17.63
	TOTAL		180.00	22.32
29	CHAMERA-I HPS	1	180.00	45.39

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	180.00	51.46
		3	180.00	37.46
	TOTAL		540.00	44.77
30	CHAMERA-II HPS	1	100.00	34.65
		2	100.00	30.95
		3	100.00	28.25
	TOTAL		300.00	31.28
31	CHAMERA-III HPS	1	77.00	47.02
		2	77.00	44.94
		3	77.00	42.06
	TOTAL		231.00	44.67
32	CHUTAK HPS	1	11.00	39.53
		2	11.00	36.93
		3	11.00	36.86
		4	11.00	43.02
	TOTAL		44.00	39.08
33	DHAULI GANGA HPS	1	70.00	38.53
		2	70.00	44.29
		3	70.00	41.60
		4	70.00	49.91

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		280.00	43.58
34	DULHASTI HPS	1	130.00	24.39
		2	130.00	28.38
		3	130.00	26.51
	TOTAL		390.00	26.43
35	KISHANGANGA HPS	1	110.00	38.75
		2	110.00	23.49
		3	110.00	22.07
	TOTAL		330.00	28.10
36	NIMMO BAZGO HPS	1	15.00	19.26
		2	15.00	26.39
		3	15.00	29.54
	TOTAL		45.00	25.06
37	PARBATI-III HPS	1	130.00	66.22
		2	130.00	53.60
		3	130.00	75.76
		4	130.00	65.07
	TOTAL		520.00	65.16
38	SALAL HPS	1	115.00	32.17
		2	115.00	38.20

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	115.00	32.13
		4	115.00	32.98
		5	115.00	39.49
		6	115.00	23.89
	TOTAL		690.00	33.14
39	SEWA-II HPS	1	40.00	11.44
		2	40.00	16.82
		3	40.00	11.63
	TOTAL		120.00	13.30
40	TANAKPUR HPS	1	31.40	14.09
		2	31.40	7.50
		3	31.40	4.66
	TOTAL		94.20	8.75
41	URI-I HPS	1	120.00	3.74
		2	120.00	10.42
		3	120.00	1.64
		4	120.00	0.47
	TOTAL		480.00	4.07
42	URI-II HPS	1	60.00	14.08
		2	60.00	12.80

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	60.00	13.10
		4	60.00	15.85
	TOTAL		240.00	13.96
	NTPC Ltd.			
43	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
	PSPCL			
44	ANANDPUR SAHIB-I HPS	1	33.50	0.00
		2	33.50	0.00
	TOTAL		67.00	0.00
45	ANANDPUR SAHIB-II HPS	3	33.50	0.00
		4	33.50	0.00
	TOTAL		67.00	0.00
46	MUKERIAN-I HPS	1	15.00	0.00
		2	15.00	0.00
		3	15.00	0.00
	TOTAL		45.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
47	MUKERIAN-II HPS	4	15.00	0.00
		5	15.00	0.00
		6	15.00	0.00
	TOTAL		45.00	0.00
48	MUKERIAN-III HPS	7	19.50	0.00
		8	19.50	0.00
		9	19.50	0.00
	TOTAL		58.50	0.00
49	MUKERIAN-IV HPS	10	19.50	0.00
		11	19.50	0.00
		12	19.50	0.00
	TOTAL		58.50	0.00
50	RANJIT SAGAR HPS	1	150.00	54.17
		2	150.00	0.00
		3	150.00	0.00
		4	150.00	0.00
	TOTAL		600.00	13.54
51	SHANAN HPS	1	15.00	0.00
		2	15.00	0.00
		3	15.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	15.00	0.00
		5	50.00	0.00
	TOTAL		110.00	0.00
	RRVUNL			
52	JAWAHAR SAGAR HPS	1	33.00	0.00
		2	33.00	0.00
		3	33.00	0.00
	TOTAL		99.00	0.00
53	MAHI BAJAJ-I HPS	1	25.00	0.00
		2	25.00	0.00
	TOTAL		50.00	0.00
54	MAHI BAJAJ-II HPS	3	45.00	100.00
		4	45.00	0.00
	TOTAL		90.00	50.00
55	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			

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
56	NATHPA JHAKRI HPS	1	250.00	39.22
		2	250.00	142.68
		3	250.00	46.57
		4	250.00	43.93
		5	250.00	48.13
		6	250.00	137.74
	TOTAL		1500.00	76.38
57	RAMPUR HPS	1	68.67	18.02
		2	68.67	20.75
		3	68.67	22.46
		4	68.67	22.43
		5	68.67	22.90
		6	68.67	19.31
	TOTAL		412.02	20.98
	THDC			
58	KOTESHWAR HPS	1	100.00	0.00
		2	100.00	0.00
		3	100.00	0.00
		4	100.00	0.00
	TOTAL		400.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
59	TEHRI ST-1 HPS	1	250.00	0.62
		2	250.00	0.55
		3	250.00	0.00
		4	250.00	0.00
	TOTAL		1000.00	0.29
	UJVNL			
60	CHIBRO (YAMUNA) HPS	1	60.00	7.40
		2	60.00	2.25
		3	60.00	6.55
		4	60.00	9.03
	TOTAL		240.00	6.31
61	CHILLA HPS	1	36.00	4.28
		2	36.00	10.07
		3	36.00	2.48
		4	36.00	1.64
	TOTAL		144.00	4.62
62	DHAKRANI HPS	1	11.25	0.00
		2	11.25	0.00
		3	11.25	0.00
	TOTAL		33.75	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
63	DHALIPUR HPS	1	17.00	0.00
		2	17.00	0.00
		3	17.00	0.00
	TOTAL		51.00	0.00
64	KHATIMA HPS	1	13.80	0.00
		2	13.80	0.00
		3	13.80	0.00
	TOTAL		41.40	0.00
65	KHODRI HPS	1	30.00	16.16
		2	30.00	0.55
		3	30.00	7.67
		4	30.00	1.37
	TOTAL		120.00	6.44
66	KULHAL HPS	1	10.00	0.00
		2	10.00	36.97
		3	10.00	8.75
	TOTAL		30.00	15.24
67	MANERI BHALI-I HPS	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		90.00	0.00
68	MANERI BHALI-II HPS	1	76.00	0.00
		2	76.00	0.00
		3	76.00	0.00
		4	76.00	0.00
	TOTAL		304.00	0.00
69	RAMGANGA HPS	1	66.00	26.43
		2	66.00	35.47
		3	66.00	0.00
	TOTAL		198.00	20.63
	UPJVNL			
70	KHARA HPS	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
	TOTAL		72.00	0.00
71	MATATILA HPS	1	10.20	0.00
		2	10.20	0.00
		3	10.20	0.00
	TOTAL		30.60	0.00
72	OBRA HPS	1	33.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	33.00	0.00
		3	33.00	0.00
	TOTAL		99.00	0.00
73	RIHAND HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	0.00
		5	50.00	0.00
		6	50.00	0.00
	TOTAL		300.00	0.00
	Western			
	CSPGCL			
74	HASDEOBANGO HPS	1	40.00	0.00
		2	40.00	0.00
		3	40.00	0.00
	TOTAL		120.00	0.00
	DLHP			
75	BHANDARDHARA HPS ST-II	2	34.00	0.00
	TOTAL		34.00	0.00
	GSECL			

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
76	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
77	UKAI HPS	1	75.00	0.00
		2	75.00	0.00
		3	75.00	0.00
		4	75.00	0.00
	TOTAL		300.00	0.00
	MAHAGENCO			
78	BHIRA TAIL RACE HPS	1	40.00	0.00
		2	40.00	0.00
	TOTAL		80.00	0.00
79	GHATGHAR PSS HPS	1	125.00	0.00
		2	125.00	0.00
	TOTAL		250.00	0.00
80	KOYNA DPH HPS	1	18.00	0.00
		2	18.00	0.00
	TOTAL		36.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
81	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
82	KOYNA-III HPS	1	80.00	0.00
		2	80.00	0.00
		3	80.00	0.00
		4	80.00	0.00
	TOTAL		320.00	0.00
83	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
84	TILLARI HPS	1	60.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		60.00	0.00
85	VAITARNA HPS	1	60.00	37.43
	TOTAL		60.00	37.43
	MPPGCL			
86	BANSAGAR-II HPS	1	15.00	0.00
		2	15.00	0.00
	TOTAL		30.00	0.00
87	BANSAGAR-III HPS	1	20.00	100.00
		2	20.00	100.00
		3	20.00	100.00
	TOTAL		60.00	100.00
88	BANSAGAR TONS-I HPS	1	105.00	0.00
		2	105.00	0.00
		3	105.00	0.00
	TOTAL		315.00	0.00
89	BARGI HPS	1	45.00	0.00
		2	45.00	0.00
	TOTAL		90.00	0.00
90	GANDHI SAGAR HPS	1	23.00	100.00
		2	23.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	23.00	0.00
		4	23.00	100.00
		5	23.00	100.00
	TOTAL		115.00	60.00
91	MADHIKHERA HPS	1	20.00	0.00
		2	20.00	0.00
		3	20.00	0.00
	TOTAL		60.00	0.00
92	PENCH HPS	1	80.00	0.00
		2	80.00	0.00
	TOTAL		160.00	0.00
93	RAJGHAT HPS	1	15.00	0.00
		2	15.00	0.00
		3	15.00	0.00
	TOTAL		45.00	0.00
	NHDC			
94	INDIRA SAGAR HPS	1	125.00	0.00
		2	125.00	0.00
		3	125.00	0.00
		4	125.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		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
95	OMKARESHWAR HPS	1	65.00	0.00
		2	65.00	0.00
		3	65.00	0.00
		4	65.00	0.00
		5	65.00	0.00
		6	65.00	0.00
		7	65.00	0.00
		8	65.00	0.00
	TOTAL		520.00	0.00
	SSNNL			
96	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

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		250.00	0.00
97	S SAROVAR RBPH HPS	1	200.00	1.95
		2	200.00	1.88
		3	200.00	1.88
		4	200.00	1.87
		5	200.00	99.07
		6	200.00	0.68
	TOTAL		1200.00	17.89
	TATA MAH.			
98	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
99	BHIRA PSS HPS	1	150.00	0.00
	TOTAL		150.00	0.00
100	BHIVPURI HPS	1	24.00	0.00
		2	24.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	24.00	0.00
		4	1.50	0.00
		5	1.50	0.00
	TOTAL		75.00	0.00
101	KHOPOLI HPS	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
	TOTAL		72.00	0.00
	Southern			
	APGENCO			
102	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
103	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

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
104	NAGARJUN SGR RBC HPS	1	30.00	0.00
		2	30.00	0.00
		3	30.00	0.00
	TOTAL		90.00	0.00
105	NAGARJUN SGR TPD	1	25.00	0.00
		2	25.00	0.00
	TOTAL		50.00	0.00
106	SRISAILAM HPS	1	110.00	0.00
		2	110.00	0.00
		3	110.00	0.00
		4	110.00	0.00
		5	110.00	0.00
		6	110.00	0.00
		7	110.00	0.00
	TOTAL		770.00	0.00
107	T B DAM 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

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
108	UPPER SILERU HPS	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
		4	60.00	0.00
	TOTAL		240.00	0.00
	KPCL			
109	ALMATTI DPH HPS	1	15.00	0.00
		2	55.00	0.00
		3	55.00	0.00
		4	55.00	0.00
		5	55.00	0.00
		6	55.00	0.00
	TOTAL		290.00	0.00
110	BHADRA HPS	1	2.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL		26.00	0.00
111	GERUSUPPA HPS	1	60.00	0.07
		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	0.02
112	GHAT PRABHA HPS	1	16.00	50.31
		2	16.00	45.35
	TOTAL		32.00	47.83
113	JOG HPS	1	13.20	0.18
		2	13.20	18.81
		3	13.20	0.01
		4	13.20	0.86
		5	21.60	4.46
		6	21.60	0.28
		7	21.60	6.08
		8	21.60	0.00
	TOTAL		139.20	3.83
114	KADRA HPS	1	50.00	68.11
		2	50.00	66.06
		3	50.00	61.65
	TOTAL		150.00	65.28
115	KALINADI HPS	1	135.00	0.00
		2	135.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		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
116	KALINADI SUPA HPS	1	50.00	0.00
		2	50.00	0.00
	TOTAL		100.00	0.00
117	KODASALI HPS	1	40.00	53.54
		2	40.00	58.49
		3	40.00	54.08
	TOTAL		120.00	55.37
118	LIGANAMAKKI HPS	1	27.50	0.00
		2	27.50	0.00
	TOTAL		55.00	0.00
119	MUNIRABAD HPS	1	9.00	0.00
		2	9.00	37.18
		3	10.00	0.00
	TOTAL		28.00	12.39
120	SHARAVATHI HPS	1	103.50	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		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
	TOTAL		1035.00	0.00
121	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

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		42.00	0.00
122	VARAHI HPS	1	115.00	0.01
		2	115.00	0.04
		3	115.00	0.00
		4	115.00	0.00
	TOTAL		460.00	0.01
	KSEB			
123	IDAMALAYAR HPS	1	37.50	20.89
		2	37.50	18.07
	TOTAL		75.00	19.48
124	IDUKKI HPS	1	130.00	0.49
		2	130.00	0.00
		3	130.00	6.50
		4	130.00	0.00
		5	130.00	0.00
		6	130.00	1.81
	TOTAL		780.00	1.47
125	KAKKAD HPS	1	25.00	0.00
		2	25.00	0.00
	TOTAL		50.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
126	KUTTIYADI ADDL EXTN	1	50.00	0.00
		2	50.00	0.01
	TOTAL		100.00	0.01
127	KUTTIYADI EXTN HPS	4	50.00	0.01
	TOTAL		50.00	0.01
128	KUTTIYADI HPS	1	25.00	3.70
		2	25.00	0.00
		3	25.00	0.00
	TOTAL		75.00	1.23
129	LOWER PERIYAR HPS	1	60.00	0.00
		2	60.00	0.00
		3	60.00	0.00
	TOTAL		180.00	0.00
130	NARIAMANGLAM HPS	1	15.00	0.00
		2	15.00	0.00
		3	15.00	0.00
	TOTAL		45.00	0.00
131	PALLIVASAL HPS	1	5.00	0.00
		2	5.00	0.00
		3	5.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	7.50	0.00
		5	7.50	0.00
		6	7.50	0.00
	TOTAL		37.50	0.00
132	PANNIAR HPS	1	15.00	0.00
		2	15.00	0.00
	TOTAL		30.00	0.00
133	PORINGALKUTTU 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
134	SABARIGIRI HPS	1	50.00	8.34
		2	50.00	7.16
		3	50.00	1.78
		4	50.00	2.46
		5	50.00	4.72
		6	50.00	4.64
	TOTAL		300.00	4.85
135	SENGULAM HPS	1	12.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	12.00	100.00
		3	12.00	100.00
		4	12.00	100.00
	TOTAL		48.00	75.00
136	SHOLAYAR HPS	1	18.00	0.00
		2	18.00	0.00
		3	18.00	0.00
	TOTAL		54.00	0.00
	TANGEDCO			
137	ALIYAR HPS	1	60.00	0.00
	TOTAL		60.00	0.00
138	BHAWANI BARRAGE-II HPS	1	15.00	42.93
		2	15.00	50.07
	TOTAL		30.00	46.50
139	BHAWANI BARRAGE-III HPS	1	15.00	0.00
		2	15.00	0.00
	TOTAL		30.00	0.00
140	BHAWANI KATTAL	1	15.00	0.00
		2	15.00	0.00
	TOTAL		30.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
141	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
142	KODAYAR-I HPS	1	60.00	0.00
	TOTAL		60.00	0.00
143	KODAYAR-II HPS	2	40.00	0.00
	TOTAL		40.00	0.00
144	KUNDAH-I HPS	1	20.00	0.00
		2	20.00	0.00
		3	20.00	0.00
	TOTAL		60.00	0.00
145	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
146	KUNDAH-III HPS	10	60.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		11	60.00	0.00
		9	60.00	0.00
	TOTAL		180.00	0.00
147	KUNDAH-IV HPS	12	50.00	0.00
		13	50.00	0.00
	TOTAL		100.00	0.00
148	KUNDAH-V HPS	14	20.00	0.00
		15	20.00	0.00
	TOTAL		40.00	0.00
149	LOWER METTUR-I HPS	1	15.00	0.00
		2	15.00	0.00
	TOTAL		30.00	0.00
150	LOWER METTUR-II HPS	3	15.00	0.00
		4	15.00	0.00
	TOTAL		30.00	0.00
151	LOWER METTUR-III HPS	5	15.00	0.00
		6	15.00	0.00
	TOTAL		30.00	0.00
152	LOWER METTUR-IV HPS	7	15.00	0.00
		8	15.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		30.00	0.00
153	METTUR DAM HPS	1	12.50	72.13
		2	12.50	61.58
		3	12.50	26.49
		4	12.50	52.30
	TOTAL		50.00	53.13
154	METTUR TUNNEL HPS	1	50.00	11.30
		2	50.00	7.13
		3	50.00	30.69
		4	50.00	21.64
	TOTAL		200.00	17.69
155	MOYAR HPS	1	12.00	0.00
		2	12.00	0.00
		3	12.00	0.00
	TOTAL		36.00	0.00
156	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

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
157	PARSON'S VALLEY HPS	1	30.00	0.00
	TOTAL		30.00	0.00
158	PERIYAR HPS	1	42.00	0.00
		2	42.00	0.00
		3	42.00	0.00
		4	35.00	0.00
	TOTAL		161.00	0.00
159	PYKARA HPS	1	7.00	0.00
		2	7.00	0.00
		3	7.00	0.00
		4	13.60	0.00
		5	13.60	0.00
		6	11.00	0.00
	TOTAL		59.20	0.00
160	PYKARA ULTMATE HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
	TOTAL		150.00	0.00
161	SARKARPATHY HPS	1	30.00	0.00
	TOTAL		30.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
162	SHOLAYAR HPS (TN)	1	35.00	0.00
		2	35.00	0.00
	TOTAL		70.00	0.00
163	SURULIYAR HPS	1	35.00	0.00
	TOTAL		35.00	0.00
	TSGENCO			
164	LOWER JURALA HPS	1	40.00	35.87
		2	40.00	34.79
		3	40.00	41.08
		4	40.00	49.05
		5	40.00	61.64
		6	40.00	32.05
	TOTAL		240.00	42.41
165	NAGARJUN SGR HPS	1	110.00	48.90
		2	100.80	23.01
		3	100.80	40.08
		4	100.80	25.76
		5	100.80	36.14
		6	100.80	43.78
		7	100.80	47.25

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		8	100.80	0.00
	TOTAL		815.60	33.12
166	NAGARJUN SGR LBC HPS	1	30.00	44.38
		2	30.00	45.75
	TOTAL		60.00	45.07
167	POCHAMPAD HPS	1	9.00	44.93
		2	9.00	53.97
		3	9.00	50.14
		4	9.00	74.52
	TOTAL		36.00	55.89
168	PRIYADARSHNI JURALA HPS	1	39.00	31.15
		2	39.00	31.23
		3	39.00	35.35
		4	39.00	33.70
		5	39.00	0.00
		6	39.00	32.60
	TOTAL		234.00	27.34
169	PULICHINTALA HPS	1	30.00	66.85
		2	30.00	45.20
		3	30.00	50.26

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		4	30.00	56.71
	TOTAL		120.00	54.76
170	SRISAILAM LB HPS	1	150.00	40.46
		2	150.00	43.98
		3	150.00	27.94
		4	150.00	27.67
		5	150.00	58.77
		6	150.00	70.55
	TOTAL		900.00	44.90
	Eastern			
	APGENCO			
171	MACHKUND HPS	1	17.00	0.00
		2	17.00	0.00
		3	17.00	0.00
		4	21.25	0.00
		5	21.25	0.00
		6	21.25	0.00
	TOTAL		114.75	0.00
	DEPL			
172	JORETHANG LOOP	1	48.00	3.04

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		2	48.00	3.37
	TOTAL		96.00	3.21
	DVC			
173	MAITHON HPS	1	20.00	52.28
		2	23.20	0.82
		3	20.00	6.53
	TOTAL		63.20	19.88
174	PANCHET HPS	1	40.00	9.29
		2	40.00	0.00
	TOTAL		80.00	4.65
	GIPL			
175	CHUZACHEN HPS	1	55.00	42.30
		2	55.00	43.11
	TOTAL		110.00	42.70
	JUUNL			
176	SUBERNREKHA-I HPS	1	65.00	0.00
	TOTAL		65.00	0.00
177	SUBERNREKHA-II HPS	2	65.00	0.00
	TOTAL		65.00	0.00
	NHPC			

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
178	RANGIT HPS	1	20.00	28.88
		2	20.00	28.76
		3	20.00	26.51
	TOTAL		60.00	28.05
179	TEESTA LOW DAM-III HPS	1	33.00	50.76
		2	33.00	40.67
		3	33.00	45.52
		4	33.00	29.15
	TOTAL		132.00	41.53
180	TEESTA LOW DAM-IV HPS	1	40.00	36.50
		2	40.00	34.32
		3	40.00	33.39
		4	40.00	38.93
	TOTAL		160.00	35.79
181	TEESTA V HPS	1	170.00	26.22
		2	170.00	28.86
		3	170.00	40.95
	TOTAL		510.00	32.01
	OHPC			
182	BALIMELA HPS	1	60.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		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
183	CHIJIMA HPS	1	24.00	0.00
		2	24.00	0.00
		3	24.00	0.00
	TOTAL		72.00	0.00
184	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

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
185	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
186	UPPER INDRAVATI HPS	1	150.00	0.00
		2	150.00	0.00
		3	150.00	0.00
		4	150.00	0.00
	TOTAL		600.00	0.00
187	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			
188	TASHIDING HPS	1	48.50	0.00
		2	48.50	0.00
	TOTAL		97.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	SKPPPL			
189	DIKCHU HPS	1	48.00	0.00
		2	48.00	0.00
	TOTAL		96.00	0.00
	TUL			
190	TEESTA-III HPS	1	200.00	0.01
		2	200.00	0.16
		3	200.00	0.03
		4	200.00	0.03
		5	200.00	0.04
		6	200.00	0.01
	TOTAL		1200.00	0.04
	WBSEDCL			
191	JALDHAKA 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
192	PURULIA PSS HPS	1	225.00	0.00
		2	225.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
		3	225.00	0.00
		4	225.00	0.00
	TOTAL		900.00	0.00
193	RAMMAM HPS	1	12.50	0.00
		2	12.50	0.00
		3	12.50	0.00
		4	12.50	0.00
	TOTAL		50.00	0.00
	North Eastern			
	APGCL			
194	KARBI LANGPI HPS	1	50.00	0.00
		2	50.00	0.00
	TOTAL		100.00	0.00
	MeECL			
195	KYRDEMKULAI HPS	1	30.00	0.00
		2	30.00	0.00
	TOTAL		60.00	0.00
196	MYNTDU(LESHKA) St-1 HPS	1	42.00	0.00
		2	42.00	0.00
		3	42.00	0.00

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPACITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	TOTAL		126.00	0.00
197	NEW UMTRU HPS	1	20.00	0.00
		2	20.00	0.00
	TOTAL		40.00	0.00
198	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
199	UMIAM HPS ST-IV	7	30.00	0.00
		8	30.00	0.00
	TOTAL		60.00	0.00
	NEEPCO.			
200	DOYANG HPS	1	25.00	4.12
		2	25.00	3.62
		3	25.00	0.00
	TOTAL		75.00	2.58
201	KAMENG HPS	1	150.00	2.63
		2	150.00	13.88
		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	7.10
202	KHONDONG HPS	1	25.00	0.00
		2	25.00	0.00
	TOTAL		50.00	0.00
203	KOPI LI HPS	1	50.00	0.00
		2	50.00	0.00
		3	50.00	0.00
		4	50.00	0.00
	TOTAL		200.00	0.00
204	PARE	1	55.00	0.00
		2	55.00	0.00
	TOTAL		110.00	0.00
205	RANGANADI HPS	1	135.00	0.00
		2	135.00	0.27
		3	135.00	0.47
	TOTAL		405.00	0.25
206	TUIRIAL HPS	1	30.00	10.60
		2	30.00	11.69
	TOTAL		60.00	11.14

SL.No.	UTILITY/STATION	UNIT No.	INSTALLED CAPAPCITY (MW)	MISCELLANEOUS NON- AVAILABILITY (%)
	NHPC			
207	LOKTAK HPS	1	35.00	26.24
		2	35.00	26.43
		3	35.00	10.61
	TOTAL		105.00	21.09

CHAPTER-8

GENERATION PROGRAMME FOR THE YEAR 2020-21

CHAPTER 8

GENERATION PROGRAMME FOR THE YEAR 2020-21

8.1 As on 31.03.2021, 209 HE Stations (of more than 25 MW capacity) having total installed capacity of 46209.22 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 48005 MW by 31st March, 2022. The overall Generation Programme for H.E. stations for the year 2021-22 has been fixed at 156774 MU comprising 149544 MU from HE Stations in India and 7230 MU import from Bhutan, which is 2291.02 MU less than actual generation during 2020-21 (i.e.159065.02 MU comprising 150299.52 MU from HE Stations in India and 8765.50 MU import from Bhutan).

8.2 Region-wise summary of likely installed capacity as on 31.03.2021, Generation targets for 2021-22 and the hydro generation during 2020-21 are given in Table 7.1 below:

TABLE 8.1

REGION-WISE LIKELY INSTALLED CAPACITY OF HE STATIONS AND HYDRO GENERATION PROGRAMME DURING 2020-21

Sl. No.	Region	Likely Hydro Installed Capacity (as on 31.03.2022) (MW)	Hydro Generation Programme for 2021-22 (MU)	Hydro Generation during 2020-21 (MU)	
				Programme	Actual
1.	Northern	20893	75685	73243.00	75233.86
2.	Western	7392	16042	14257.00	16678.34
3.	Southern	11735	30439	27293.00	31353.95
4.	Eastern	5958	20540	19192.00	21174.84
5.	North-Eastern	2027	6838	6372.00	5858.53
Sub total		48005	149544	140357.00	150299.52
6.	Import – from Bhutan		7230	7230	8765.50
Total(Including Import from Bhutan)			156774	147587	159065.02

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 2020-21, generation target for 2021-22 are given in **Annex-8.2**.

**Generation from Hydro Electric Projects likely to be commissioned in
2021-22 and during last quarter of 2020-21**

S. No.	Name of Hydro Power Project	Unit No.	Present Likely date of commissioning as per CEA/Utility	I.C (M W)	Generation on Target 2020-21	Generation Target 2021-22	Present Capacity Addition Programme during
Central Sector							
1	Parbati-II (NHPC-Himachal Pradesh)	1 to 4	U- 1 to 4 (Mar 2022)	800	265	450	2021-22
2	Tapovan Vishnugad (NTPC- Uttarakhand)	1 to 4	U- 1 to 4 (Dec 2021)	520	427	0	2021-22
3	Kameng (NEEPCO-Arunachal Pradesh)	3 to 4	U- 3 & 4 (Mar., 2021)	300	2150	2600	2020-21
4	Naitwar Mori	1 to 2	U- 1 & 2 (Dec, 2021)	60	0	30	2021-22
Sub Total (Central Sector)				1680	2842	3080	
State Sector							
1	Sawra Kuddu (HPPCL-HP)	1 to 3	U- 1 to 3 (Mar 2021)	111	186	270	2020-21
2	Thottiyar	1&2	U- 1 to 2 (Mar 2022)	40	0	0	2021-22
	Sub Total (State Sector)			151	186	270	

Private Sector							
1	Bajoli Holi (GMR-HP)	1 to 3	U- 1 to 3 (Dec 2021)	180	273	273	2021-22
2	Singoli Bhatwari (L&T-Uttarakhand)	1 to 3	U- 1 to 3 (Dec 2020)	99	145	270	2020-21
3	Sorang(HSPCL-HP)	1&2	U- 1 to 2 (Dec 2021)	100	39	39	2021-22
4	Rongnichu (MBPCL-Sikkim)	1&2	U- 1 to 3 (Mar 2021)	96	22	256	2020-21
	Sub Total (Private Sector)			475	479	838	
Grand Total				2306	3507	4188	

**SECTOR-WISE PERFORMANCE OF HYDROELECTRIC STATIONS
DURING 2020-2021 & TARGETS FOR 2021-2022**

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2022	Generation during 2020-2021 (MU)		Generation Programme for 2021-22 (MU)
		Targets	Actual	
A. CENTRAL SECTOR				
BBMB	2938.3	9600.00	11478	9650
NHPC Ltd	5451.2	24542	24084.69	26000
SJVN Ltd	1912.02	8678	9094.35	9111
NTPC Ltd	800	3482	3221.41	3100
THDC Ltd	1400	4160	4261.72	4160
NHDC Ltd.	1520	2700	4236.17	3900
DVC	143.2	206	365.47	215
NEEPCO Ltd.	1500	4472	3881.89	4908
Sub Total	15664.72	57840	60623.7	61044
B. STATE ELECTRICITY BOARDS/CORPORATIONS				
JKSPDCL	1110	4915	4940.83	4887
HPPCL	406	805	437.76	821
HPSEBL	372	1602	1564.35	1603
BVPC	0	272	0	0
RRVUNL	411	340	469.63	370
PSPCL	1051	3805	3951	3969
UPJVNL	501.6	1115	1572.35	1519
UJVNL	1252.15	4410	4487.97	4612
SSNNL	1450	3200	3245.24	2832
GSECL	540	754	988.12	889
MAHAGENCO	2406	3755	3574.57	4109
MPPGCL	875	2092	2656.06	2526
CSPGCL	120	250	419.19	280
APGENCO	1796.75	3174	4129.94	3636
TSGENCO	2405.6	3211	3645.38	4018
KPCL	3617.2	11468	12403.59	12409
KSEBL	1856.5	5900	6628.39	6505
TANGEDCO	2178.2	4040	5212.71	4483
JUUNL	130	110	50	110
OHPC	2039.80	5372	6193.91	5959
TUL	1200	5300	6043.98	5652
WBSEDCL	986	1578	1759.64	1578
APGCL	100	380	203.03	380
MePGCL	322	920	1151.99	1050
Sub Total	27126.80	68768	75729.63	74197

SECTOR/ UTILITY	Likely Hydro Installed Capacity as on 31.03.2022	Generation during 2020-2021 (MU)		Generation Programme for 2021-22 (MU)
		Targets	Actual	
C. PRIVATE SECTOR				
MPCL	86.00	157	334.88	344
EPPL	100.00	367	370.47	368
ADHPL	192.00	692	640.53	676
GBHPPL	70.00	260	275.95	270
JSW ENERGY	1345.00	5407	5672.61	5431
IAEPL	36.00	273	159.35	158
AHPC LTD	330.00	1310	1438	273
JPVL	400.00	1438	1778.42	39
DLHP	34.00	36	34.29	0
GIPL	110.00	500	488.37	1310
TPCL	447.00	1470	1524.7	1590
DEPL	96.00	408	399.92	293
SEPL	97.00	421	369.75	36
SNEHA KINETIC	96.00	460	458.95	500
NTPGPL	0.00	344	0	1470
HSPPL	100.00	0	0	408
L&T	99.00	145	0	421
GMR	180	39	0	460
MBPC	113.00	22	0	256
Sub Total	3931.00	13749	13946.19	14303
Total All India	46722.52	140357	150299.52	149544
Import from Bhutan		7230	8765.50	
Total Hydro generation including import from Bhutan		147587	159065.02	

CHAPTER-9

RENOVATION & MODERNISATION OF HYDRO-ELECTRIC STATIONS

9. RENOVATION & MODERNISATION OF HYDRO ELECTRIC POWER PROJECTS

9.1 R&M Phase-I Programme

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

9.2 R&M Phase-II Programme

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

9.3 National Perspective Plan

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

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

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. I, II, III, IV & V respectively.

9.3.2 Programme during the period 2017-22

The Renovation, Modernization, Uprating and Life Extension works at 31 Hydro Electric Plants (HEPs) with an aggregate capacity of 6430.3 MW is programmed for completion during 2017-22 with the breakup as 4452.60 MW through R&M at 17 HEPs, 1217.7 MW through Life Extension at 10 HEPs and 760 MW through Life Extension & Uprating at 4 HEPs. The 4 HEPs where both Life Extension & Uprating are envisaged, the aggregate capacity of 760 MW shall be uprated to 883.7 MW resulting in additional benefit of 123.7 MW. As such, the revised aggregate capacity after RMU&LE works of these 31 projects will be 6554 MW.

Out of these 31 schemes, seven (7) schemes with an aggregate installed capacity of about 1326.4 MW have been completed till March, 2021 which includes 1154 MW through R&M, 102.4 MW through Life Extension and 84 MW (70+14 MW) through LE & Uprating. The state-wise list of hydro R&M schemes expected for completion during 2017-22 is given at Annex-VI.

9.3.3 Programme during the period 2022-27

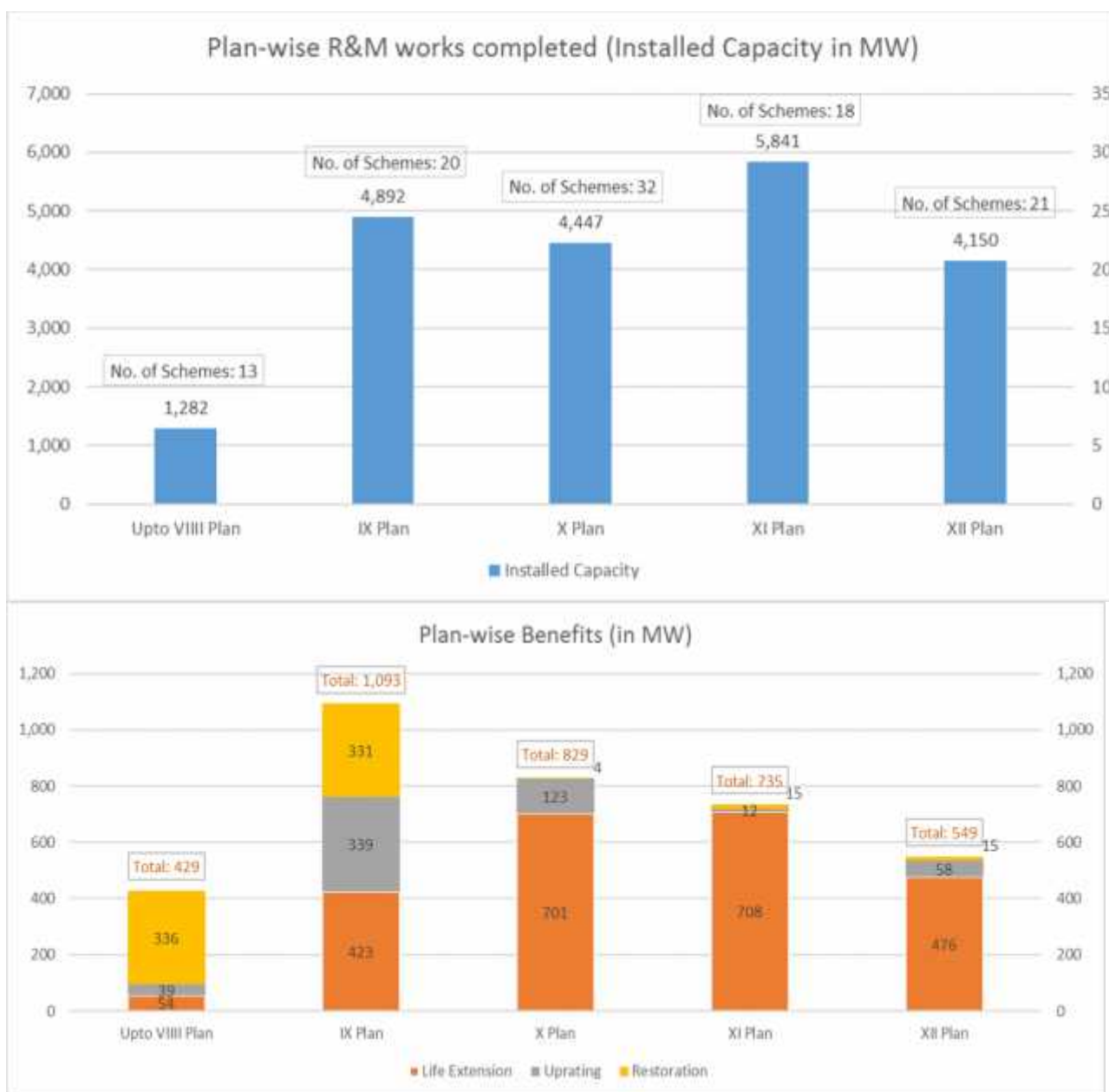
The Renovation, Modernization, Upgrading and Life Extension works at 49 Hydro Electric Plants (HEPs) with an aggregate capacity of 7547.3 MW is programmed for completion during 2022-27 with the breakup as 1450.35 MW through R&M at 6 HEPs, 5031.95 MW through Life Extension at 34 HEPs and 1065 MW through Life Extension & Upgrading at 9 HEPs. The 9 HEPs where both Life Extension & Upgrading are envisaged, the aggregate capacity of 1065 MW shall be upgraded to 1147 MW resulting in additional benefit of 82 MW. As such, the revised aggregate capacity after RMU&LE works of these 49 projects will be 7629.3 MW. The state-wise list of hydro R&M schemes expected for completion during 2022-27 is given at Annex-VII.

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

9.4 Summary of R&M of Hydro Electric Projects (As on 31.03.2021)

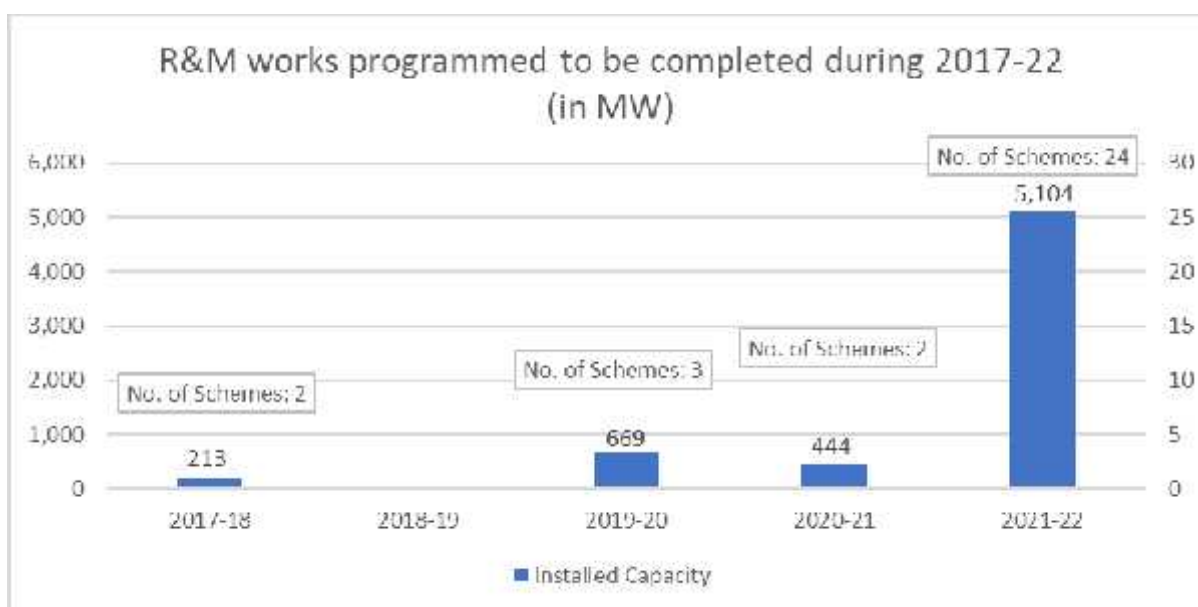
I Hydro R&M schemes completed up to XII Plan

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	8	23	31	6430.30	2982.27	2101.40 [1977.70(LE) +123.7(U)]
2.	Completed	3	4	7	1326.40	292.12 (Actual Cost)	186.40 [172.40(LE) + 14(U)]
3.	Under Implementation	5	19	24	5103.9	2486.76	2101.40 [1977.70(LE) +123.7(U)]



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	6	43	49	7547.3	6178.95 [6096.95(LE)+82(U)]
2.	Under Implementation	1	11	12	2209.35	847 [819(LE)+28(U)]
3.	Under Tendering	2	8	10	1061.75	1073.75 [1061.75(LE)+12(U)]
4.	Under DPR Preparation/Finalisation/Approval	3	6	9	1739.2	1772.20 1739.20(LE)+33(U)]
5.	Under RLA Studies	0	18	18	2537	2486 [2477(LE)+9(U)]

Abbreviations:

MW – Mega Watt;

Res. – Restoration;

U – Upgrading;

LE – Life Extension

RLA- Residual Life Assessment

9.5 Achievement during the year 2020-21

R&M works of Sholayar (3x18 MW) of KSEB and Idukki 1st stage (3x130 MW) of KSEB having an aggregate installed capacity of 444 MW have been completed during the year 2020-21 and accrued a benefit of about 54 MW through Life Extension.

9.6 Programme for the year 2021-22

For the year 2021-22, it is programmed to complete following 24 schemes having an installed capacity of 5103.90 MW. On completion of these schemes, there will be a benefit of about 1805.03 MW through Life Extension and 109.7 MW through Upgrading.

S. No.	Name of Schemes	Capacity under R&M (in MW)	Cost (in Rs. Crores)	Agency
1.	Ganguwal & Kotla Power House	4x24.2	3.12	BBMB
2.	Bhakra LB	5x108	489.77	BBMB
3.	Bhakra RB	5x157	20.80	BBMB
4.	Baira Siul	3x60	341.41	NHPC
5.	Bhabha Power House	3x40	76.03	HPSEB
6.	Dehar Power House (Unit-3)	1x165	23.00	BBMB
7.	Chenani	5x4.66	39.60	J&KSPDC
8.	Ganderbal	2x4.5	31.57	J&KSPDC
9.	Mukerian St.I, St.II, St.III & St.IV,	3x15, 3x15, 3x19.5& 3x19.5	136.07	PSPCL
10.	Shanan HEP	1x50+ 4x15	37.81	PSPCL
11.	Rihand	6x50	132.20	UPJVNL
12.	Obra	3x33	58.80	UPJVNL
13.	Ukai	3x75 (U-1,2,&4)	7.30	GSECL
14.	Kadana PSS	4x60	11.26	GSECL
15.	Nagarjuna Sagar Ph-II works	1x110+7x100.8	22.17	TSGENCO
16.	Nagarjuna Sagar Left Canal Power House	2x30.6	30.99	TSGENCO
17.	Munirabad Dam Power House	2x9 + 1x10	4.60	KPCL
18.	Kuttiyadi,	3x25	377.41	KSEB
19.	Bargi,	2x45	7.98	MPPGCL
20.	Pench,	2x80	13.36	MPPGCL
21.	Bansagar Ton-I	3x105	14.16	MPPGCL
22.	Hirakud-I	2x37.5 (U5&6)	158.77	OHPC
23.	Hirakud-II (Chiplima)	1x24 (U-3)	65.67	OHPC
24.	Balimela	6x60	382.91	OHPC

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) + 54(LE) + 336(Res)]		

Abbreviations: R&M – Renovation & Modernisation; U – Upgrading; LE – Life Extension; storations; 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	Srisaillam RB, APGENCO	SS	7x110	16.32	11.40	-	R&M	2001-02
Karnataka								
15	Sharavathy, U-1 to 8, KPCL	SS	8x89.1	65.00	63.49	115.20 (U) +178.20 (Res)	RM&U+Res	1997-98
16	Sharavathy, U-9&10, KPCL	SS	2x89.1	17.96	14.68	28.80(U) +19.10 (Res)	RM&U+Res	1997-98

Annex-II
(Sheet 2/ 2)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Orissa								
17	Hirakud-I, U1&2, OHPC	SS	2x37.5	95.10	95.10	24.00(U) +75.00(LE)	RMU&LE	1997-98
Gujarat								
18	Ukai,U-1&3, GSECL	SS	2x75	24.99	24.99	75.00 (Res.)	R&M+Res.	1997-98
Maharashtra								
19	Koyna I&II, MSPGCL	SS	4x65+ 4x75	74.91	74.91	40.00(U) + 260.00(LE)	RM&U of St-I & II & LE of St-I	1999-2000
20	Koyna III, U-10, 11 &12, MSPGCL	SS	3x80	4.65	4.65	-	R&M	1997-98
Total			4892.10	597.84	570.16	1093.03 [339.0(U) + 423.0(LE) + 331.03(Res.)]		

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

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	Nagjhari, U-1&3,KPCL	SS	2x135	26.12	21.62	30 (U)	RM&U	2002-03
11	Supa PH, KPCL	SS	2x50	2.64	2.47	-	R&M	2002-03
12	Mahatma Gandhi, VVNL	SS	4x12+ 4x18	44.66	43.13	19.20 (U) +120.00 (LE)	RMU&LE	2002-03
13	Munirabad, VVNL	SS	2x9+ 1x10.3	3.64	3.53	28.30 (LE)	RM&LE	2002-03

**Annex- III
(Sheet 2/3)**

(Sheet 2/3)								
Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
14	Mani Dam, KPCL	SS	2x4.5	1.00	1.00	-	R&M	2002-03
15	Shivasamudram , VVNL	SS	6x3+ 4x6	68.38	73.17	42.00 (LE)	RM&LE	2004-05
16	Bhadra, Ph.II, KPCL	SS	1x2	3.30	2.51	2.00 (LE)	RM&LE	2005-06
17	Varahi, KPCL	SS	2x115	2.57	2.66	-	R&M	2006-07
18	Sharavathy, Ph.A, KPCL	SS	10x103.5	5.22	3.52	-	R&M	2006-07
Kerala								
19	Neriamangalam 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

**Annex- III
(Sheet 3/3)**

(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 Shanani, Ph.B, at Sl. No. 5 not included in the total, as the same has been accounted for at Sl. No. 4.

Modernisation; U – Upgrading; LE – Life Extension;

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

Annex- IV
(Sheets 2 of 2)

(SHEET 2 OF 2)

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

tion & Modernisation;. U – Uprating; LE – Life Extension;
ation; 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	Actual Exp	Benefits (MW)	Capacity after RMU&LE (MW)	Category	Year of Completion
				(Rs . in Crs)					
Himachal Pradesh									
1	Bassi, HPSEB	SS	4x15	124.25	158.26	6.0(U)+ 60(LE)	66	RMU&LE	2013-14
Jammu & Kashmir									
2	Lower Jhelum, J&KSPDC	SS	3x35	101.3	96.10	15.00(Res)	105	R&M+ Res.	2014-15
3	Sumbal Sindh, J&KSPDC	SS	2x11.3	25.00	24.59	-	22.6	R&M	2016-17
Uttarakhand									
4	Pathri, UJVNL	SS	3x6.8	113.25	108.3	20.40(LE)	20.4	RM&LE	2014-15
5	Khatima, UJVNL	SS	3x13.8	256.77	118.83	41.40 (LE)	41.4	RM&LE	2016-17
Uttar Pradesh									
6	Matatila, UPJVNL	SS	3x10.2	10.29	7.21	30.6 (LE)	30.6	RM&LE	2015-16
Andhra Pradesh									
7	Lower Sileru, APGENCO	SS	4x115	8.75	6.77	-	460	R&M	2013-14
8	Srisailem RB, APGENCO	SS	7x110	16.70	17.60	-	770	R&M	2015-16
Telangana									
9	Nagarjuna Sagar Ph-I works, TSGENCO	SS	1x110+ 7x100.8	33.35	13.90	-	815.6	R&M	2012-13
Karnataka									
10	Supa, KPCL	SS	2x50	3.45	3.88	-	100	R&M	2014-15
11	Nagjhari, U-1 to 6, KPCL	SS	1x135 (U-6)	69.21	64.49	15 (U)	150	RM&U	2015-16
12	Sharavathy Genarating Station (Ph B), KPCL	SS	10x103.5	20.00	29.27	-	1035	R&M	2016-17
Kerala									
13	Idamalayar, KSEB	SS	2x37.5	14.50	13.22	-	75	R&M	2012-13

(Sheet 2 of 2)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (No.x.MW)	Est. Cost	Actual Exp	Benefits (MW)	Capacity after RMU&LE	Category	Year of Completion
				(Rs . in Crs)					
14	Sabarigiri, U-4 KSEB	SS	1x55	52.20	50.41	5(U)	60	RM&U	2014-15
15	Poringalkuthu, KSEB	SS	4x8	88.63	51.90	4 (U)+ 32.00 (LE)	36	RMU&LE	2015-16
Tamil Nadu									
16	Periyar, TANGEDCO	SS	4x35	161.18	133.68	28.00(U)+ 140(LE)	168	RMU&LE	2015-16
Odisha									
17	Rengali Unit-1 OHPC	SS	1x50	47.50	36.76	50(LE)	50	RM&LE	2012-13
18	Rengali Unit-2 OHPC	SS	1x50	25.20	20.73	50(LE)	50	RM&LE	2013-14
West Bengal									
19	Jaldhaka St.I, WBSEDCL	SS	3x9	88.62	79.97	27 (LE)	27	RM&LE	2016-17
Assam									
20	Khandong, NEEPCO	CS	1x25	25.05	29.18	25(LE)	25	RM&LE	2014-15
21	Kopili, NEEPCO	CS	2x50	50.22	50.92	-	100	R&M	2014-15
Total			4149.60	1335.42	1115.97	549.40 [58(U)+ 476.40 (LE) + 15 (Res)]	4207.6		

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 Exp.	Benefits (MW)	Capacity after RMU&LE (MW)	Category	Year of Completion	
				(Rs. in Crs.)					Original	Anticipated
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)	48.4	RM&LE	Completed in 2017-18	
2	Dehar Power House (Unit-6), BBMB (6x165)	CS	1x165	19.87	16.00	-	165	R&M	Completed in 2017-18	
3	Salal, NHPC (6x115)	CS	5x115	58.01	51.08	-	575	R&M	Completed in 2019-20	
Tamil Nadu										
4	Sholayar-I, TANGEDCO (2x35)	SS	2x35	90.44	66.94	70 (LE) + 14(U)	84	RMU&LE	Completed in 2019-20	
Karnataka										
5	Bhadra River Bed units, KPCL (2x12)	SS	2x12	23.55	20.12	-	24	R&M	Completed in 2019-20	
Kerala										
6	Sholayar, KSEB (3x18)	SS	3x18	199.55	84.26	54 (LE)	54	RM&LE	Completed in 2020-21	
7	Idukki 1 st stage, KSEB (3x130)	SS	3x130	89.90	63.44	-	390	R&M	Completed in 2020-21	
Sub Total (A)			1326.40	495.51	311.42	186.40 [172.40(LE) + 14(U)]	1340.40			
B. Ongoing Schemes – Under Implementation										
Himachal Pradesh										
8	Ganguwal & Kotla Power House, BBMB (4x24.2)	CS	4x24.2	3.12	-	-	96.8	R&M	2020-21	2021-22
9	Bhakra LB, BBMB (5x108)	CS	5x108	489.77	548.29	540.00(LE)+ 90.00 (U)	630	RMU&LE	2016-17	2021-22
10	Bhakra RB, BBMB (5x157)	CS	5x157	20.8	-	-	785	R&M	2021-22	2021-22
11	Baira Siul, NHPC (3x60)	CS	3x60	341.41	153.89	180 (LE)	180	RM&LE	2020-21	2021-22
12	Bhabha Power House, HPSEB (3x40)	SS	3x40	76.03	81.13	120 (LE)	120	RM&LE	2017-18	2021-22
13	Dehar Power House (Unit-3), BBMB (1x165)	CS	1x165	23.00	8.67	-	165	R&M	2019-20	2021-22
Jammu & Kashmir										
14	Chenani, J&KSPDC (5x4.66)	SS	5x4.66	39.60	26.22	23.30 (LE)	23.3	RM&LE	2015-16	2021-22
15	Ganderbal, J&KSPDC (2x3+2x4.5)	SS	2x4.5	31.57	11.33	9.00 (LE)	9	RM&LE	2016-17	2021-22
Punjab										
16	Mukerian St.I, St.II, St.III & St.IV, PSPCL (3x15, 3x15, 3x19.5&3x19.5)	SS	3x15, 3x15, 3x19.5& 3x19.5	136.07	47.46	-	207	R&M	2019-20	2021-22
17	Shanan HEP, PSPCL (1x50+4x15)	SS	1x50+ 4x15	37.81	20.16	-	110	R&M	2019-20	2021-22

Annex- VI

(Sheet 2 of 3)

(Sheet 2 of 3)

Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE (MW)	Category	Year of Completion	
				(Rs. in Crs.)					Original	Anticipated
Uttar Pradesh										
18	Rihand, UPJVNL (6x50)	SS	6x50	132.20	105.65	300 (LE)	300	RM&LE	2017-18	2021-22
19	Obra, UPJVNL (3x33)	SS	3x33	58.80	43.58	99 (LE)	99	RM&LE	2017-18	2021-22
Gujarat										
20	Ukai, GSECL (4x75)	SS	3x75 (U-1,2,&4)	7.30	7.3	-	225	R&M	2021-22	2021-22
21	Kadana PSS, GSECL (4x60)	SS	4x60	11.26	6.18	-	240	R&M	2021-22	2021-22
Telangana										
22	Nagarjuna Sagar Ph-II works, TSGENCO (1x110+7x100.8)	SS	1x110+7x100.8	22.17	14.34	-	815.6	R&M	2018-19	2021-22
23	Nagarjuna Sagar Left Canal Power House, TSGENCO (2x30.6)	SS	2x30.6	30.99	2.00	-	61.2	R&M	2018-19	2021-22
Karnataka										
24	Munirabad Dam Power House, KPCL (2x9 + 1x10)	SS	2x9 + 1x10	4.60	2.2	-	28	R&M	2018-19	2021-22
Kerala										
25	Kuttiyadi, KSEB (3x25)	SS	3x25	377.41	-	75.00 (LE) + 7.5 (U)	82.5	RMU&LE	2021-22	2021-22
Madhya Pradesh										
26	Bargi, MPPGCL (2x45)	SS	2x45	7.98	2.42	-	90	R&M	2020-21	2021-22
27	Pench, MPPGCL (2x80)	SS	2x80	13.36	0.36	-	160	R&M	2021-22	2021-22
28	Bansagar Ton-I, MPPGCL (3x105)	SS	3x105	14.16	9.77	-	315	R&M	2021-22	2021-22
Odisha										
29	Hirakud-I OHPC (2x37.5)	SS	2x37.5 (U5&6)	158.77	97.62	75.00 (LE) + 12.2 (U)	87.2	RMU&LE	2017-18	2021-22
30	Hirakud-II (Chiplima), OHPC (3x24)	SS	1x24 (U-3)	65.67	47.96	24.00 (LE)	24	RM&LE	2017-18	2021-22
31	Balimela, OHPC (6x60)	SS	6x60	382.91	77.36	360(LE)	360	RM&LE	2019-20	2021-22
Sub Total (B)			5103.90	2486.76	1313.89	1915 [1805.30(LE) + 109.70(U)]	5213.60			
Total (A+B)			6430.30	2982.27	1625.31	2101.40 [1977.70(LE) +123.7(U)]	6554.00			

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

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

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

Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE	Category	Year of Completion
				(Rs. in Crs.)					
A. Ongoing Schemes – Under Implementation									
Himachal Pradesh									
1	Pong Power House, BBMB (6x66)	CS	6x66	142.25	-	396 (LE)	396	RM&LE	2022-23
Madhya Pradesh									
2	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	200	4.97	-	115	R&M	2022-23
Punjab									
3	Ranjit Sagar Dam, PSPCL	SS	4x150	82.16	0.93	-	600	R&M	2022-23
4	UBDC St.I & St.II, PSPCL (3x15+3x15.45)	SS	3x15+ 3x15.45	23.55	5.56	-	91.35	R&M	2022-23
5	Anandpur Sahib Hydel Project, PSPCL (4x33.5)	SS	4x33.5	31.65	0.85	-	134	R&M	2022-23
Uttarakhand									
6	Chilla Ph B UJVNL (4x36)	SS	4x36	490.56	-	144(LE)+ 12(U)	156	RMU&LE	2024-25
7	Tiloth, UJVNL (3x30)	SS	3x30	162.9	112.82	90 (LE)	90	RM&LE	2022-23
8	Dhalipur, UJVNL (3x17)	SS	3x17	152.65	43.98	51 (LE)	51	RM&LE	2022-23
Tamil Nadu									
9	Moyar PH, TANGEDCO (3x12)	SS	3x12	67.05	-	36(LE)+ 6(U)	42	RMU&LE	2023-24
10	Kodayar PH-I, TANGEDCO (1x60)	SS	1x60	88.48	-	60 (LE)+ 10 (U)	70	RMU&LE	2023-24
Karnataka									
11	Nagjhari KPCL (3x150)	SS	3x150 (U-1 to 3)	222.00	13.108	-	450	R&M	2023-24
12	Shivasamudram, KPCL (6x3+4x6)	SS	6x3+4x6	169.18	14.01	42 (LE)	42	RM&LE	2023-24
Sub Total(A)			2209.35	1832.43	196.23	847 [819(LE)+28(U)]	2237.35		
B. Ongoing Schemes – Under Tendering									
Himachal Pradesh									
13	Giri, HPSEB (2x30)	SS	2x30	139.80	-	60.00 (LE)	60	RM&LE	2023-24
Uttarakhand									
14	Ramganaga, UJVNL (3x66)	SS	3x66	455.20	-	198(LE)	198	RM&LE	2022-27
15	Dhakrani, UJVNL (3x11.25)	SS	3x11.25	137.31	-	33.75 (LE)	33.75	RM&LE	2025-26
Manipur									
16	Loktak, NHPC (3x35)	CS	3x35	273.59	-	105 (LE)	105	RM&LE	2023-24

(Sheet 2 of 3)									
Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE	Category	Year of Completion
				(Rs. in Crs.)					
Meghalaya									
17	Umium St.III, (Kyrdekmlulai) MePGCL (2x30)	SS	2x30	408.00	-	60(LE) + 6(U)	66	RMU&LE	2022-27
Jharkhand									
18	Panchet, DVC (2x40)	CS	1x40 (U-1)	48.92	2.19	40(LE)+ 6(U)	46	RMU&LE	2023-24
Karnataka									
19	Kadra Dam Power House, KPCL (3x50)	SS	3x50	44.47	1.72	150 (LE)	150	RM&LE	2022-23
20	Kodasalli Dam Power House, KPCL (3x40)	SS	3x40	50.60	1.47	120 (LE)	120	RM&LE	2022-23
21	Gerusoppa Dam Power House (Sharavathy Tail Race), KPCL (4x60)	SS	4x60	59.66	2.21	240 (LE)	240	RM&LE	2023-24
22	Linganamakki Dam Power House, KPCL (2x27.5)	SS	2x27.5	56.20	1.85	55 (LE)	55	RM&LE	2023-24
Sub Total(B)			1061.75	1673.75	9.44	1073.75 [1061.75LE]+ 12(U)]	1073.75		
C. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval									
Jammu & Kashmir									
23	Lower Jehlum HEP, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)+ 27 (U)	132	RMU&LE	2022-27
Uttarakhand									
24	Kulhal, UJVNL (3x10)	SS	3x10	115.24	-	30(LE)	30	RM&LE	2022-27
Tamil Nadu									
25	Kodayar PH-II, TANGEDCO (1x40)	SS	1x40	-	-	40.0(LE)+ 6(U)	46	RMU&LE	2026-27
Karnataka									
26	MGHE, KPCL (4x21.6+4x13.2)	SS	4x21.6+ 4x13.2	97.00	7.75	139.2 (LE)	139.2	RM&LE	2023-24
27	Supa Dam Power House, KPCL (2x50)	SS	2x50	47.91	2.2	100 (LE)	100	RM&LE	2023-24
28	Sharavathy Generating Station, KPCL (10x103.5)	SS	10x103.5	196.56	11.07	1035 (LE)	1035	RM&LE	2023-24
West Bengal									
29	Maithon, DVC (2x20+1x23.2)	CS	2x20 (U-1&3)	56.03	7.76	40.00 (LE)	40	RM&LE	2024-25
Assam									
30	Khandong Power Station, NEEPCO	CS	2x25	207.00	21.43	50 (LE)	50	RM&LE	2024-25
31	Kopili Power Station, NEEPCO (4x50)	CS	4x50	1117.00	48.54	200(LE)	200	RM&LE	2023-24
Sub Total(C)			1739.20	1836.74	98.75	1772.20 1739.20(LE)+ 33(U)]	1772.20		
D. Ongoing Schemes – Under RLA Studies									
Jharkhand									
32	Subernrekha, JUUNL (2x65)	SS	2x65	-	-	130(LE)	130	RM&LE	2022-27

(Sheet 3 of 3)									
Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE	Category	Year of Completion
				(Rs. in Crs.)					
33	Kundah-I, TANGEDCO (3x20)	SS	3x20	-	-	60 (LE)	60	RM&LE	2022-27
34	Kundah-II, TANGEDCO (5x35)	SS	5x35	-	-	175 (LE)	175	RM&LE	2022-27
35	Kundah-III, TANGEDCO (3x60)	SS	3x60	-	-	180 (LE)	180	RM&LE	2022-27
36	Kundah-IV, TANGEDCO (2x50)	SS	2x50	-	-	100 (LE)	100	RM&LE	2022-27
37	Kundah-V, TANGEDCO (2x20)	SS	2x20	-	-	40 (LE)	40	RM&LE	2022-27
38	Mettur Tunnel, TANGEDCO (4x50)	SS	4x50	-	-	200 (LE)	200	RM&LE	2022-27
39	Sarkarpathy, TANGEDCO (1x30)	SS	1x30	-	-	30 (LE)	30	RM&LE	2022-27
40	Sholayar-II, TANGEDCO (1x25)	SS	1x25	-	-	25 (LE)	25	RM&LE	2022-27
41	Suruliyar, TANGEDCO (1x35)	SS	1x35	-	-	35 (LE)	35	RM&LE	2022-27
42	Kadamparai, PH TANGEDCO (4x100)	SS	4x100	-	-	400 (LE)	400	RM&LE	2022-27
43	Aliyar, TANGEDCO (1x60)	SS	1x60	-	-	60 (LE)	60	RM&LE	2022-27
Kerala									
44	Idukki 2 nd stage, KSEB (3x130)	SS	3x130	-	-	390 (LE)	390	RM&LE	2022-27
Andhra Pradesh									
45	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM&LE	2025-26
46	Hampi Canal PH, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM&LE	2025-26
47	Machkund St.I & St.II, APGENCO (3x17+3x23)	SS	3x17+ 3x23	500.00	-	120 (LE) +9 (U)	129	RMU&LE	2025-26
48	Lower Sileru, APGENCO (4x115 MW)	SS	4x115	1.80	-	460(LE)	460	RMU&LE	2022-27
Meghalaya									
49	Umiam-umtru Stage-IV, MePGCL (2x30)	SS	2x30	-	-	-	60	R&M	2022-27
Sub Total(D)			2537.00	851.80	0.00	2486 [2477(LE)+9(U)]	2546.00		
Total (A+B+C+D)			7547.30	6194.72	304.42	6178.95 [6096.95(LE)+ 82(U)]	7629.30		

m; U – Uprating; LE – Life Extension; Res – Restoration;
/ – Mega Watt; CS-Central Sector; SS- State Sector

CHAPTER-10

DEFINITIONS AND ABBREVIATIONS

CHAPTER-10

DEFINITIONS AND ABBREVIATIONS

10.1 DEFINITIONS

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

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

b) Forced Outage Non-Availability (FO) (%)

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

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
		BVPC Limited	Beas Valley Power. Corp. Ltd. (BVPC)
		EPPL	Everest Power Private Limited
		GBHPPL	Greenko Budhil Hydro Power Pvt. Limited
		HBPCL	Himachal Baspa Power Company Limited
		HPPCL	Himachal Pradesh Power Corporation Limited
		HPSEB Limited	Himachal Pradesh State Electricity Board Limited
		HSPCL	Himachal Sorang Power Private Limited
		IAEPL	IA Hydro Energy Pvt Ltd
		JSW	JSW Energy Ltd.
		GMR BHHPL	GMR Bajoli Holi Hydro Power Private Limited
		MPCL	Malana Power Company Limited
		NTPGPL	Tidong Power Generation Private Limited
		NHPC Limited	National Hydro Power Corporation Limited
		NTPC Limited	National Thermal Power Corporation Limited
		SJVN Limited	Satluj Jal Vidyut Nigam Limited
2	Jammu & Kashmir	JKSPDC	J&K State Power Development Corporation.
3	Punjab	BBMB	Bhakra Beas Management Board
		PSPCL	Punjab State Power Corporation Limited
4	Rajasthan	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Limited
5	Uttar Pradesh	UPJVNL	Uttar Pradesh Jal Vidyut Nigam Limited
6	Uttarakhand	THDC	Tehri Hydro Development Corporation
		UJVNL	Uttarakhand Jal Vidyut Nigam Limited
		JPPVL	Jaiprakash Power Pvt. Venture Limited
		AHPC	Alaknanda Hydro Power Company
Western Region			
1	Gujarat	GSECL	Gujarat State Electricity Corporation Limited
		SSNNL	Sardar Sarovar Narmada Nigam Limited
2	Madhya Pradesh	MPPGCL	Madhya Pradesh Power Generation Co. Limited
		NHDC	Narmada Hydroelectric Development Co. Limited
3	Chhatisgarh	CSPGCL	Chhatisgarh State Power Generation Co. Limited
4	Maharashtra	DLHPPL	Dodson-Lindblom Hydro Power Private Limited

		MSPGCL	Maharashtra State Power Generating Co. Limited
		TPCL	Tata Power Company Limited
Southern Region			
1	Andhra Pradesh	APGENCO	Andhra Pradesh Power Generation Corporation Ltd.
2	Karnataka	KPCL	Karnataka Power Corporation Limited
3	Kerala	KSEBL	Kerala State Electricity Board Limited
4	Telangana	TSGENCO	Telangana State Power Generation Corporation Ltd.
5	Tamil Nadu	TANGEDCO	Tamil Nadu Generation & Distribution Co. Limited
Eastern Region			
1	Jharkhand	JUUNL	Jharkhand Urja Utpadan Nigam Limited
		DVC	Damodar Valley Corporation
2	Odisha	OHPC	Odisha Hydro Power Corporation
3	Sikkim	GIPL	Gati Infrastructure Pvt. Limited
		DEPL	Dans Energy Private Limited
		TUL	Teesta Urja Limited
		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