

जल विद्युत गृहों के कार्य निष्पादन का पुनर्विलोकन

REVIEW OF PERFORMANCE OF HYDRO POWER STATIONS 2011-12

भारत सरकार विद्युत
मंत्रालय



Government of India
Ministry of Power

केन्द्रीय
विद्युत
प्राधिकरण



CENTRAL
ELECTRICITY
AUTHORITY

विद्युत अधिनियम, 2003 की धारा 73 (आई) व (जे) के तहत के0वि0प्रा0 के सांविधिक दायित्व का निर्वहन करते हुए प्रकाशित
(PUBLISHED IN FULFILLMENT OF CEA'S OBLIGATION UNDER SECTION 73 (i) & (j) OF THE ELECTRICITY ACT, 2003)

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- 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;
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- 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;
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- m) Advise any State Government, licensees or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in coordination with any other Government, licensee or the generating company owning or having the control of another electricity system;
- n) Advise the Appropriate Government and the Appropriate Commission on all technical matters relating to generation, transmission and distribution of electricity; and
- o) Discharge such other functions as may be provided under this Act.

केन्द्रीय विद्युत प्राधिकरण
CENTRAL ELECTRICITY AUTHORITY

जल विद्युत केन्द्रों के कार्य निष्पादन का पुनर्विलोकन
REVIEW OF PERFORMANCE OF
HYDRO POWER STATIONS 2011-12



जल विद्युत आयोजना एवं अन्वेषण प्रभाग
HYDRO PLANNING & INVESTIGATION DIVISION

नई दिल्ली
NEW DELHI
जनवरी, 2013
JANUARY-2013

विद्युत अधिनियम, 2003 की धारा 73 (आई) व (जे) के तहत के0वि0प्रा0 के सांविधिक दायित्व का निर्वहन करते हुए प्रकाशित
IN FULFILLMENT OF CEA'S OBLIGATION UNDER SECTION 73 (i) & (j) OF THE ELECTRICITY ACT, 2003



प्राक्कथन

जल विद्युत शक्ति हमारे देश में पिछले 100 वर्षों से नवीनीकरण ऊर्जा का सबसे विश्वसनीय स्रोत रहा है। जल विद्युत शक्ति केन्द्रों की उपलब्धता में सतत् सुधार की खोज में केन्द्रीय विद्युत प्राधिकरण (के.वि.प्रा.) केन्द्रीय पी.सी.यू., राज्य विद्युत बोर्डों और राज्य व निजी क्षेत्र में विद्युत यूटिलिटियों के निकट सहयोग से उनके वार्षिक निष्पादन की समीक्षा के लिए अध्ययन करता है।

वर्ष 2011-12 के दौरान जल विद्युत शक्ति केन्द्रों के निष्पादन की समीक्षा संबंधी रिपोर्ट विद्युत अधिनियम, 2003 के खंड 73 (आई) और (जे) के तहत सांविधिक बाध्यताओं को आंशिक रूप से पूरा करने में केन्द्रीय विद्युत प्राधिकरण द्वारा किए गए ऐसे प्रकाशनों की श्रंखला में 25वीं हैं। इस रिपोर्ट में 38990.40 मे.वा. की कुल अधिष्ठापित क्षमता वाले 177 जल विद्युत केन्द्रों पर अधिष्ठापित 620 जल विद्युत इकाइयों के निष्पादन के व्यापक विश्लेषण का प्रावधान है, जिसके लिए केन्द्रीय, राज्य और निजी क्षेत्रों में उत्पादन यूटिलिटियों द्वारा कामबंदी आंकड़े उपलब्ध कराए गए हैं।

प्रचालन उपलब्धता संबंधी सूचना पर्याप्त और विश्वसनीय विद्युत आपूर्ति सुनिश्चित करने में काफी महत्वपूर्ण है। अध्ययनों के अनुसार वर्ष 2011-12 के दौरान जल विद्युत केन्द्रों की औसत प्रचालन उपलब्धता 88.09% थी। प्रणोदित और योजनाबद्ध कामबंदी के कारण जल विद्युत इकाइयों की औसत गैर-उपलब्धता क्रमशः 4.48% और 7.43% थी। वर्ष 2011-12 के दौरान जल विद्युत केन्द्रों से उत्पादन 130.510 बिलियन यूनिट था, जो 112.050 बिलियन यूनिट के उत्पादन लक्ष्य से 16.47% ज्यादा था।

मुझे विश्वास है कि यह समीक्षा उपयुक्त ओ.एंड.एम.कार्य नीति तैयार करके जल विद्युत संयंत्रों की उपलब्धता में और सुधार लाने में विद्युत केन्द्र प्राधिकारियों को उपयोगी मार्गदर्शन प्रदान करेगा। प्रणोदित कामबंदी के कारणों का भी व्यापक विश्लेषण करने की आवश्यकता है और विनिर्माताओं / ओ.एंड.एम. एजेंसियों द्वारा उपाय करने की भी आवश्यकता है ताकि इनकी पुनरावृत्ति को कम किया जा सके तथा प्रचालन उपलब्धता में सुधार किया जा सके।

समीक्षा के लिए कामबंदी आंकड़े/सूचना उपलब्ध कराने के लिए मैं सभी उत्पादन यूटिलिटियों का हार्दिक धन्यवाद करता हूँ। मैं इस रिपोर्ट के लिए अपेक्षित निविष्टि आंकड़ों का विश्लेषण करने में वयाम टैक लिमिटेड द्वारा प्रदान किए गए सहयोग के लिए उनको धन्यवाद देता हूँ।



FOREWORD

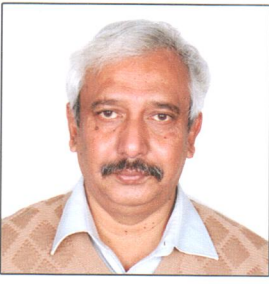
Hydro Electric Power has been the most reliable source of renewable energy for the last over 100 years in our country. In the quest for continuous improvement of availability of Hydro Power Stations, Central Electricity Authority (CEA) carries out studies to review their annual performance in close co-operation with Central PSUs, State Electricity Boards and Power Utilities in State and Private Sector.

The report on Review of Performance of Hydro Power Stations during the year 2011-12 is twenty fifth in the series of such publication by Central Electricity Authority in partial fulfillment of the statutory obligations under Section 73(i)&(j) of the Electricity Act, 2003. The report provides exhaustive analysis of performance of 620 hydro electric units installed at 177 hydro electric stations having total installed capacity of 38990.40 MW for which outage data has been provided by generation utilities in State, Central and Private sectors.

The information on operation availability is of vital importance in ensuring adequate and reliable power supply. According to the studies, the average operating availability of hydroelectric stations during the year 2011-12 was 88.09%. The average non-availability of hydro units due to forced and planned outages was 4.48% and 7.43% respectively. The generation from hydro stations during 2011-12 was 130.510 Billion Units which was 16.47% more than the generation target of 112.050 Billion Units.

I am confident that the review would provide useful guidance to power station authorities in making further improvement in the availability of hydel plants by chalking out suitable O&M strategies. There is also a need to undertake detailed analysis of the reasons of forced outages and to devise measures by the manufactures/O&M agencies so as to curtail the recurrence of the same and to improve the operating availability.

I wish to express my sincere thanks to all the generating utilities for providing outage data/information for the review. I would also like to put on record the co-operation extended by Vayam Tech limited in undertaking the analysis of the input data required for this report.



प्रस्तावना

किसी भी देश के विकास के लिए विद्युत शक्ति अति महत्वपूर्ण बुनियादी आधार है। हमारे देश में 100 वर्षों से अधिक समय जल विद्युत सबसे अधिक विश्वसनीय नवीकरणीय ऊर्जा का स्रोत है। दिनांक 31.03.2012 के अनुसार 199877 मेगावाट की कुल प्रतिष्ठापित क्षमता में से 38990.40 मेगावाट (19.51%) (25 मेगावाट से ज्यादा स्टेशन प्रतिष्ठापित क्षमता) की जल विद्युत क्षमता है।

केन्द्रीय विद्युत प्राधिकरण, उत्पादन निष्पादन के कड़े प्रबोधन, ब्रेक डाउन के कारणों का विश्लेषण, नवीनीकरण तथा आधुनिकीकरण आदि के विश्लेषण द्वारा यूटिलिटीज के सहयोग से जल विद्युत केन्द्रों के निष्पादन में सुधार के लिए संगठित प्रयास कर रहा है। यह स्पष्ट है कि विद्यमान विद्युत केन्द्रों को विद्युत की कमी को कम करने के लिए तथा विश्वसनीय आपूर्ति करने के लिए अपने निष्पादन तथा उपलब्धता में सुधार अवश्य करना चाहिए।

यह वार्षिक पुनर्वलोकन वर्ष 2011-12 के दौरान देश में जल- विद्युत केन्द्रों के कार्य निष्पादन का विश्लेषण करता है तथा 177 जल- विद्युत केन्द्रों पर 620 यूनितों के निष्पादन का विस्तृत विश्लेषण करता है। कोई भी एक सूचकांक जल - विद्युत केन्द्रों के कार्य निष्पादन के लिए पर्याप्त रूप से मापक यूनित प्रदान नहीं कर सकता। जल- विद्युत केन्द्रों के निष्पादन को योजनाबद्ध अनुरक्षण, गैर-निधारित पूर्ण / आंशिक कामबंदी, अंतर्प्रवाह की वास्तविक प्रवृत्ति आदि जैसे घटक प्रभावित करते हैं। अनुरक्षण में अद्यतन -पद्धति अपनाने की आवश्यकता है ताकि परिहार्य कामबन्दियों का निराकरण किया जा सके।

आर एम एंड यू विषय से संबंधित अध्याय, आर एम एंड यू तथा उन्नयन के लाभों का विस्तार से उल्लेख करता है तथा यूटिलिटीज को अपने प्रचालनाधीन पुरानी यूनितों पर इस प्रकार के कार्य हाथ में लेने की संभावनाओं को प्रोत्साहित करेगा।

इस प्रकाशन का अध्ययन के.वि.प्रा.के जल-विद्युत आयोजन एवं अन्वेषण प्रभाग (एच.पी.एण्ड आई) प्रभाग के निदेशक श्री जानकी प्रसाद के संपूर्ण मार्गदर्शन में किया गया है।

मैं सभी यूटिलिटीज से दृढतापूर्वक अनुरोध करूंगा कि जल - विद्युत केन्द्रों के संबंध में माहवार निष्पादन तथा कामबंदी आंकड़े तुरंत तथा नियमित रूप से प्रस्तुत करें ताकि भाविष्य में भी निष्पादन पुनर्वलोकनों का विश्लेषण तथा समय से प्रकाशन हो सके।

केन्द्रीय विद्युत प्राधिकरण इस रिपोर्ट की विषयवस्तु तथा प्रस्तुतिकरण में सुधार के लिए संयुक्त प्रयास कर रहा है। इस संबंध में रचनात्मक सुझावों का स्वागत है तथा यह हमारे लिए महत्वपूर्ण होंगे।



PREFACE

Electric power is the most important infrastructure required for the development of any country. Hydel Power is the most reliable source of renewable energy for the last more than 100 years in our country. As on 31.03.2012, out of a total installed generating capacity of 199877 MW, hydro capacity was 38990.40 MW (19.51%) (Above 25 MW station installed capacity).

Central Electricity Authority is making concerted efforts for improving the performance of Hydro Power Stations in cooperation with the utilities through close monitoring of generation performance, analysis of causes for break downs, Renovation & Modernization etc. It is imperative that the existing power stations must improve their performance and availability to reduce power shortage and deliver reliable supply.

This Annual Review provides an analysis of performance of Hydro Power Stations in the country during the year 2011-12 and provides an exhaustive analysis of performance of 620 units at 177 H.E. Stations. No single operating index can adequately provide a measuring unit for performance of Hydro Power Stations. The factors that influence the performance of hydro power stations are planned maintenance, unscheduled total/partial outages, pattern of actual inflows, etc. There is a need to adopt state-of-the art practices in maintenance so that avoidable outages could be obviated.

The chapter on RM&U enumerates the advantages of RM&U and would motivate utilities to explore the possibilities of undertaking such works on older units under operation with them.

Studies for this publication have been carried out in Hydro Planning & Investigation (HP&I) Division of CEA under the overall guidance of Shri Janki Prasad, Director(HP&I).

I wish to express my sincere thanks to various State Electricity Boards, Public Sector/Private Sector Enterprises and Power Station Authorities for furnishing the necessary data.

I would strongly urge all utilities to readily and regularly continue to furnish month wise performance & outage data in respect of all Hydro Electric Power Stations for analysis & timely publishing of performance reviews in future also.

CEA has been making concerted efforts to improve the contents and presentation of the report. Constructive suggestions in this regard are welcome and will be appreciated.

आभार

मैं निम्नलिखित अधिकारियों का जल विद्युत गृहों के कार्य का निष्पादन पुनर्विलोकन 2011-12 के प्रकाशन में सहयोग के लिए धन्यवाद देता हूँ ।

मुख्य अभियन्ता (जल विद्युत निष्पादन प्रबोधन प्रभाग), के० वि० प्रा० को वर्ष 2011-12 के दौरान यूनियों के प्रचालन के लिए टरबाइन तथा जेनरेटर निर्माताओं के विवरण समय पर उपलब्ध कराने के लिये धन्यवाद देता हूँ ।

श्री एस डी दुबे, मुख्य अभियन्ता (एच०ई०एंड० आर०एम० प्रभाग) , के० वि० प्रा० का जल विद्युत यूनियों के नवीनीकरण एवं आधुनिकीकरण एवं उन्नयन पर अध्याय तैयार करने के लिए धन्यवाद देता हूँ ।

मैं अध्यक्ष, के०वि०प्रा० तथा मुख्य अभियन्ता (एच.पी.एण्ड आई) का इस पुनर्विलोकन के निर्माण में उनके अमूल्य सूझावों तथा मार्ग निर्देशन के लिये आभारी हूँ ।

मैं सर्वश्री बलवान कुमार, सहायक निदेशक -1, भीम देव नेगी, वरिष्ठ अभियन्ता, एस जे वी एन एल व अन्य अधिकारियों तथा कर्मचारियों का भी इस पुनर्विलोकन के प्रकाशन में सहयोग के लिये धन्यवाद देता हूँ ।



(जानकी प्रसाद)

निदेशक (एच०पी० एण्ड आई०) , के० वि० प्रा०

ACKNOWLEDGEMENTS

I express my sincere thanks to the following officers in bringing out this Review of Performance of HE Stations 2011-12.

Chief Engineer (HPM), CEA for timely supplying the details of turbine and generator manufacturers, date of commissioning and type of turbine etc. for the units commissioned during the year 2011-12.

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

I am grateful to Chairperson, CEA and Chief Engineer (HP&I), CEA, for their valuable suggestions and guidance in preparation of this Review.

I also express my thanks to S/Shri Balwan Kumar, Asstt. Director-I, Bhim Dev Negi, Sr. Engineer, SJVNL and other officers/officials for their assistance in making it possible to bring out this Review.



(Janki Prasad)
Director (HP&I), CEA

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CHAPTER 1

HYDRO POWER POTENTIAL AND DEVELOPMENT

CHAPTER-1

HYDRO-ELECTRIC POWER POTENTIAL AND DEVELOPMENT

1.1 Hydro-electric Potential

Reassessment studies of Hydro Electric Power 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. The hydro potential of 84044 MW at 60% load factor when fully developed would result in an installed capacity of about 150,000 MW on the basis of probable average load factor. The total energy potential is assessed as 600 billion units per year. As on 31.03.12, H.E. Schemes having total installed capacity of 34204.80 MW (23.54%) excluding pumped storage stations of capacity of 4785.60 MW have already been developed and the schemes under development account for capacity of 12252 MW (8.43%). Region wise/state wise and basin wise summary of the status of Hydro Electric Capacity and Potential development in the country are indicated in Tables 1.1, and 1.2 respectively as well as shown in **Exhibits 1.1 and 1.2**. It would be observed that about 68.03% in terms of Installed Capacity is yet to be harnessed.

TABLE 1.1

REGIONWISE/STATEWISE STATUS OF HYDRO ELECTRIC CAPACITY (In terms of Installed Capacity-above 25 MW)

As on 31.03.12

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	2340.0	17.28	1109.0	8.19	10094.0	74.53
Himachal Pradesh	18820	18540	7293.0	39.34	3583.0	19.33	7664.0	41.34
Punjab	971	971	1206.3	100.00	0.0	0.00	0.0	0.00
Haryana	64	64	0.0	0.00	0.0	0.00	64.0	100.00
Rajasthan	496	483	411.0	85.09	0.0	0.00	72.0	14.91
Uttarakhand	18175	17998	3426.4	19.04	1025.0	5.70	13546.7	75.27
Uttar Pradesh	723	664	501.6	75.54	0.0	0.00	162.4	24.46
Sub Total(NR)	53395	52263	15178.3	29.04	5717.0	10.94	31367.8	60.02
WESTERN								
Madhya Pradesh	2243	1970	2395.0	100.00	400.0	20.30	0.0	0.00
Chhattisgarh	2242	2202	120.0	5.45	0.0	0.00	2082.0	94.55
Gujarat	619	590	550.0	93.22	0.0	0.00	40.0	6.78
Maharashtra	3769	3314	2487.0	75.05	0.0	0.00	827.0	24.95

Goa	55	55	0.0	0.00	0.0	0.00	55.0	100.00
Sub Total(WR)	8928	8131	5552.0	68.28	400.0	4.92	2179.0	26.80
SOUTHERN								
Andhra Pradesh	4424	4360	2177.8	49.95	410.0	9.40	1772.3	40.65
Karnataka	6602	6459	3585.4	55.51	0.0	0.00	2873.6	44.49
Kerala	3514	3378	1881.5	55.70	100.0	2.96	1396.5	41.34
Tamilnadu	1918	1693	1722.2	100.00	60.0	3.54	0.0	0.00
Sub Total(SR)	16458	15890	9366.9	58.95	570.0	3.59	5953.2	37.46
EASTERN								
Jharkhand	753	582	233.2	40.07	0.0	0.00	348.8	59.93
Bihar	70	40	0.0		0.0	0.00	40.0	100.00
Odisha	2999	2981	2027.5	68.01	0.0	0.00	953.5	31.99
West Bengal	2841	2829	77.0	2.72	292.0	10.32	2460.0	86.96
Sikkim	4286	4248	570.0	13.42	2421.0	56.99	1257.0	29.59
A& Nicobar	0	0	0.0				0.0	
Sub Total(ER)	10949	10680	2907.7	27.23	2713.0	25.40	5059.3	47.37
NORTH EASTERN								
Meghalaya	2394	2298	240.0	10.44	82.0	3.57	1976.0	85.99
Tripura	15	0	0.0		0.0		0.0	
Manipur	1784	1761	105.0	5.96	0.0	0.00	1656.0	94.04
Assam	680	650	375.0	57.69	0.0	0.00	275.0	42.31
Nagaland	1574	1452	75.0	5.17	0.0	0.00	1377.0	94.83
Arunachal Pd	50328	50064	405.0	0.81	2710.0	5.41	46949.0	93.78
Mizoram	2196	2131	0.0	0.00	60.0	2.82	2071.0	97.18
Sub Total(NER)	58971	58356	1200.0	2.06	2852.0	4.89	54304.0	93.06
ALL INDIA	148701	145320	34204.8	23.54	12252.0	8.43	98863.2	68.03

Note:- In addition to above 4785.60 MW PSS are under operation and 1080 MW PSS are under construction.

TABLE 1.2

BASINWISE STATUS OF H.E. POTENTIAL DEVELOPMENT-BASINWISE
(In terms of Installed Capacity-above 25 MW)

(AS ON 31.03.2012)

River Basin	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								
Indus	33832	33028	10779.3	32.64	4581.0	13.87	17667.7	53.49
Ganga	20711	20252	4987.2	24.63	1136.0	5.61	14128.6	69.76
Central Indian River System	4152	3868	3147.5	81.37	400.0	10.34	320.5	8.29
West Flowing Rivers System	9430	8997	5660.7	62.92	100.0	1.11	3236.3	35.97

East Flowing Rivers System	14511	13775	7783.2	56.50	470.0	3.41	5521.9	40.09
Brahmaputra	66065	65400	1847.0	2.82	5565.0	8.51	57988.0	86.67
Total	148701	145320	34204.8	23.54	12252.0	8.43	98863.2	68.03

Note:- In addition to above 4785.60 MW PSS are under operation and 1080 MW PSS are under construction.

1.2 Growth of Installed Capacity

A small Hydro-Electric Plant (130 kW) established near Darjeeling in 1897 ushered the beginning of hydro-electric power development in the country. Since then, development of hydro-electric power in the country has made rapid strides. The hydel installed capacity which was only 508 MW in 1947 with 12 H.E.Stations, 51 units and the maximum unit size of 22 MW at Bhira H.E.Project under Tata's, has risen to 38990.40 MW (does not includes station capacity 25 MW and below). The maximum unit size is now 250 MW at Koyna Stage-IV under MAHAGENCO, Nathpa Jhakri under SJVNL, Tehri under THDC and Karcham Wangtoo of JKHPCL.

Contribution of electricity generation from Hydro Electric Power Stations has risen from 2194 MU during 1947 to 130509.52 MU in 2011-12. Generation during 2011-12 was 16252.16 MU more than the generation of 114257.36 MU during 2010-11. Conventional Hydro Electric Stations of run-of-river type, single purpose hydro electric stations with storage, multipurpose projects as well as pumped storage projects have been executed through-out the country.

1.3 Share of Hydro-electric Installed Capacity & Generation.

The installed capacity of Hydro-Electric Stations vis-à-vis total capacity, the contribution in generation by hydro electric plants and trend of hydro capacity & generation over the years are indicated in **Table-1.3** and at **Exhibits 1.3, 1.4 and 1.5**. From **Table 1.3**, it may be observed that the overall share of hydro in terms of installed capacity in the country has been on the decline from 50.61% at the end of 1962-63 to 19.51% at the end of 2011-12.

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

Year	Installed Capacity			Generation		
	Total (MW)	Hydro (MW)	Hydro as % of Total	Total (MU)	Hydro (MU)	Hydro as % of Total
1947	1362	508	37.30	4072	2194	53.88
1950	1713	560	32.63	5106	2519	49.33
1955-56	2886	1061	36.76	9145	4295	46.97
1960-61	4653	1917	41.20	16937	7837	46.27
1962-63	5801	2936	50.61	22365	11805	52.78

1965-66	9027	4124	45.68	32890	15225	46.29
1968-69	12957	5907	45.59	47434	20723	43.69
1973-74	16664	6966	41.80	66689	28972	43.44
1978-79	26680	10833	40.60	102523	47159	46.00
1979-80	28448	11384	40.02	104627	45478	43.47
1984-85	42585	14460	33.96	156859	53948	34.39
1989-90	63636	18307	28.77	245437	62116	25.31
1991-92	69065	19194	27.79	287028	72757	25.35
1996-97	85795	21658	25.24	395889	68901	17.40
1997-98	89203	21904	24.58	421748	74582	17.68
1998-99	92269	22479	24.10	447464	82923	18.53
1999-00	97837	23857	24.37	481128	80755	16.78
2000-01	101450	25153	24.75	499429	74362	14.89
2001-02	105046	26269	25.01	515066	73759	14.32
2002-03	107877	26767	24.81	531607	63834	12.01
2003-04	112684	29507	26.19	558113	73775	13.22
2004-05	118419	30936	26.12	587416	84495	14.38
2005-06	124287	32326	26.01	624631	101293	16.22
2006-07	132321	34662	26.19	659513	113359	17.19
2007-08	143061	37002	25.86	704469	123424	17.52
2008-09*	147917	36846	24.91	714653	109840	15.37
2009-10*	159398	36863	23.13	763429	103916	13.61
2010-11*	173626	37567	21.64	805532	114257	14.18
2011-12*	199877	38990	19.51	871602	130510	14.97

*During 2008-09, 2009-10, 2010-11& 2011-12 the station capacity of HEP above 25 MW has been considered.

1.4 Monitored Hydro Installed Capacity

For generation performance, the monitored hydro-electric installed capacity in the country as on 31st March, 2012 was 38990.40 MW. This includes stations with total station capacity above 25 MW only. Region-wise summary of the hydel installed capacity is indicated in Table 1.4. Regionwise, Sector wise/Utility wise and station-wise details of installed capacity are given in Annex 1.1, 1.2 & 1.3 respectively.

TABLE 1.4
REGIONWISE SUMMARY OF HYDRO ELECTRIC INSTALLED CAPACITY
(Above 25 MW capacity as on 31.03.2012)

S.No.	Region	Installed Capacity(MW)
1.	Northern	15178.25
2.	Western	7392.00
3.	Southern	11372.45
4.	Eastern	3847.70
5.	North - Eastern	1200.00
Total		38990.40

Station capacity wise grouping of H.E. Stations as on 31st March,12 is given in **Annex- 1.4**.

Eleven H.E. Generating units having installed capacity of 1423 MW was added during the year 2011-12. Details of these units are given in **Annex-1.5**.

Share of hydro installed capacity and hydro generation vis-a-vis total installed capacity and total generation in the Country as on 31.03.2012 was 19.51% and 14.97% respectively. These details are indicated in Exhibits 1.6 and 1.7. Sector-wise distribution of hydro installed capacity in Central, Private and State Sectors were 30.65%, 6.56% and 62.78% respectively. Sector wise contribution of hydro generation in central, private and state sectors were 38.83%, 6.75% and 54.42% respectively. These details are illustrated in **Exhibits 1.8 & 1.9**.

1.5.1 Hydro Generating Units : Indigenous and imported

As on 31.03.2012, there were 620 hydro generating units in operation comprising of indigenous and imported units, with total installed capacity of 38990.40 MW (Stations with I.C. more than 25 MW) at 177 stations. The details of 620 hydro units with total installed capacity of 38990.40 MW indigenous and imported turbine and generators are given at table 1.5 below. Among the imported Turbine generator sets, it is observed that Japan, UK and Canada have supplied largest number of sets but capacity-wise, Japan, Canada, Russia and France are the largest suppliers.

TABLE 1.5

HYDRO GENERATING UNITS INDIGENOUS/IMPORTED FROM VARIOUS COUNTRIES AS ON 31-03-2012

Name of Country	Turbines supplied		Generators supplied	
	Numbers	Capacity (MW)	Numbers	Capacity (MW)
A-Indigenous				
BHEL	263	16153.00	260	16033.00
Others	4	87.00	6	205.50
Sub Total	267	16240.00	266	16238.50
B-Imported				
CANADA	44	3132.00	44	3132.00
FRANCE	33	2186.40	17	1726.00
JAPAN	77	6544.20	75	6029.40
SWITZERLAND	21	790.20	11	219.00
U.K.	64	1257.10	59	1637.90
U.S.A.	9	351.00	26	543.15
USSR	26	2804.00	26	2804.00
OTHERS	79	5685.50	96	6660.45
SUB-TOTAL	353	22750.40	354	22751.90
TOTAL	620	38990.40	620	38990.40

Details of imported hydro generating sets commissioned during 2011-12 are given below in Table 1.6.

TABLE-1.6

IMPORTED GENERATING SETS COMMISSIONED DURING 2011-12

S.NO	STATION	STATE	COUNTRY OF IMPORT	UNIT NO.	CAPACITY (MW)
1	KARCHAM WANGTOO	HP	GERMANY	1	250
				2	250
				3	250
				4	250
2	MALANA-II	HP	CHINA	1	50
				2	50
3	PRIYADARSHNI JURALA	AP	CHINA	6	39
			TOTAL	7	1139

The details of region-wise/utility-wise indigenous and imported turbine and generators are given at Table 1.7 and 1.8.

TABLE 1.7
REGIONWISE/UTILITY WISE HYDRO GENERATING UNITS- INDIGENOUS & IMPORTED TURBINES

AS ON 31-3-2012

REGION/STATE/ ORGANISATION	INDIGENOUS				IMPORTED								TOTAL	
	BHEL		OTHERS		UK		JAPAN		USA		OTHERS			
	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW
<u>NORTHERN REGION</u>														
B.B.M.B.	16	1482.80	0	0.00	0	0.00	7	598.50	0	0.00	5	785.00	28	2866.30
N.H.P.C. (NR)	15	1102.20	0	0.00	0	0.00	0	0.00	0	0.00	17	1990.00	32	3092.20
UJVNL	25	1126.00	0	0.00	3	41.40	0	0.00	0	0.00	6	84.75	34	1252.15
JKSPDC	6	210.00	0	0.00	0	0.00	0	0.00	0	0.00	3	450.00	9	660.00
P.S.E.B.	21	991.00	0	0.00	0	0.00	0	0.00	0	0.00	4	60.00	25	1051.00
H.P.S.E.B.	11	351.00	0	0.00	1	15.00	0	0.00	0	0.00	0	0.00	12	366.00
RRVUNL	4	140.00	0	0.00	0	0.00	0	0.00	0	0.00	7	271.00	11	411.00
UPJVNL	6	171.00	0	0.00	6	300.00	3	30.60	0	0.00	0	0.00	15	501.60
THDC	4	400.00	0	0.00	0	0.00	0	0.00	0	0.00	4	1000.00	8	1400.00
SJVNL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	1500.00	6	1500.00
JHPL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	300.00	3	300.00
MPCL	2	86.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	86.00
JPVL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	400.00	4	400.00
JKHPCL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	1000.00	4	1000.00
EPPL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00	2	100.00
ADHPL	2	192.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	192.00
TOTAL (N.R.)	112	6252.00	0	0.00	10	356.40	10	629.10	0	0.00	65	7940.75	197	15178.25
<u>WESTERN REGION</u>														
CSPGCL	3	120.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	120.00
GSECL	6	420.00	0	0.00	0	0.00	0	0.00	0	0.00	2	120.00	8	540.00
MPPGCL	18	760.00	0	0.00	0	0.00	2	46.00	0	0.00	3	69.00	23	875.00
MAHAGENCO	9	960.00	0	0.00	0	0.00	2	250.00	0	0.00	13	1196.00	24	2406.00
TATA HYDRO	0	0.00	2	3.00	6	150.00	0	0.00	0	0.00	7	294.00	15	447.00
SSNNL	6	450.00	0	0.00	0	0.00	5	1000.00	0	0.00	0	0.00	11	1450.00
NHDC	8	1000.00	0	0.00	0	0.00	0	0.00	0	0.00	8	520.00	16	1520.00
DLHP	1	34.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	34.00
TOTAL (W.R.)	51	3744.00	2	3.00	6	150.00	9	1296.00	0	0.00	33	2199.00	101	7392.00
<u>SOUTHERN REGION</u>														
APGENCO	16	1263.00	0	0.00	5	150.00	17	1641.60	3	51.00	16	677.75	57	3783.35
T.N.E.B.	6	450.00	0	0.00	12	218.00	9	150.00	0	0.00	39	1304.20	66	2122.20
KERALA S.E.B.	10	430.00	0	0.00	11	102.50	5	105.00	6	300.00	16	944.00	48	1881.50
KPCL	30	2224.00	0	0.00	18	181.20	6	455.00	0	0.00	14	725.20	68	3585.40
TOTAL (S.R.)	62	4367.00	0	0.00	46	651.70	37	2351.60	9	351.00	85	3651.15	239	11372.45
<u>EASTERN REGION</u>														
D.V.C.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	5	143.20	5	143.20
N.H.P.C. (ER)	3	60.00	0	0.00	0	0.00	3	510.00	0	0.00	0	0.00	6	570.00
OHPC	9	570.00	0	0.00	2	99.00	7	712.50	0	0.00	13	646.00	31	2027.50
WBSEPDC	4	50.00	0	0.00	0	0.00	5	909.00	0	0.00	2	18.00	11	977.00
JSEB	2	130.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	130.00
TOTAL (E.R.)	18	810.00	0	0.00	2	99.00	15	2131.50	0	0.00	20	807.20	55	3847.70
<u>N-EASTERN REGION</u>														
N.H.P.C. (N-ER)	3	105.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	105.00
NEEPCO	13	755.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	13	755.00
APGCL	0	0.00	0	0.00	0	0.00	2	100.00	0	0.00	0	0.00	2	100.00
MeSEB	4	120.00	2	84.00	0	0.00	4	36.00	0	0.00	0	0.00	8	240.00
TOTAL (N-E.R.)	20	980.00	2	84.00	0	0.00	6	136.00	0	0.00	0	0.00	28	1200.00
Total (All India)	263	16153.00	4	87.00	64	1257.10	77	6544.20	9	351.00	203	14598.10	620	38990.40

TABLE 1.8
REGIONWISE/UTILITY WISE HYDRO GENERATING UNITS-INDIGENOUS & IMPORTED GENERATORS

AS ON 31-03-2012

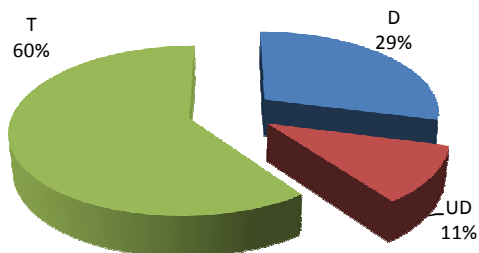
REGION/STATE/ ORGANISATION	INDIGENOUS				IMPORTED								TOTAL	
	BHEL		OTHERS		UK		JAPAN		USA		OTHERS			
	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW	No.of Units	Cap. MW
NORTHERN REGION														
B.B.M.B.	16	1482.80	0	0.00	5	540.00	2	58.50	0	0.00	5	785.00	28	2866.30
N.H.P.C. (NR)	15	1102.20	0	0.00	0	0.00	0	0.00	0	0.00	17	1990.00	32	3092.20
UJVNL	25	1126.00	0	0.00	3	41.40	0	0.00	0	0.00	6	84.75	34	1252.15
JKSPDC	6	210.00	0	0.00	0	0.00	0	0.00	0	0.00	3	450.00	9	660.00
P.S.E.B.	21	991.00	0	0.00	4	60.00	0	0.00	0	0.00	0	0.00	25	1051.00
H.P.S.E.B.	11	351.00	0	0.00	1	15.00	0	0.00	0	0.00	0	0.00	12	366.00
RRVUNL	4	140.00	0	0.00	0	0.00	0	0.00	0	0.00	7	271.00	11	411.00
UPHPC	6	171.00	0	0.00	6	300.00	3	30.60	0	0.00	0	0.00	15	501.60
THDC	4	400.00	0	0.00	0	0.00	0	0.00	0	0.00	4	1000.00	8	1400.00
SJVNL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	1500.00	6	1500.00
JHPL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	300.00	3	300.00
MPCL	2	86.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	86.00
JPVL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	400.00	4	400.00
JKHPCL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	1000.00	4	1000.00
EPPL	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00	2	100.00
ADHPL	2	192.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	192.00
TOTAL (N.R.)	112	6252.00	0	0.00	19	956.40	5	89.10	0	0.00	61	7880.75	197	15178.25
WESTERN REGION														
CSPGCL	3	120.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	120.00
GSECL	6	420.00	0	0.00	0	0.00	0	0.00	0	0.00	2	120.00	8	540.00
MPPGCL	18	760.00	0	0.00	0	0.00	2	46.00	0	0.00	3	69.00	23	875.00
MAHAGENCO	9	960.00	0	0.00	0	0.00	2	250.00	0	0.00	13	1261.00	24	2406.00
TATA HYDRO	0	0.00	1	1.50	0	0.00	0	0.00	0	0.00	14	445.50	15	447.00
SSNNL	6	450.00	0	0.00	0	0.00	5	1000.00	0	0.00	0	0.00	11	1450.00
NHDC	8	1000.00	0	0.00	0	0.00	0	0.00	0	0.00	8	520.00	16	1520.00
DLHP	1	34.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	34.00
TOTAL (W.R.)	51	3744.00	1	1.50	0	0.00	9	1296.00	0	0.00	40	2415.50	101	7392.00
SOUTHERN REGION														
APGENCO	15	1257.00	0	0.00	5	150.00	15	1623.60	6	114.75	16	638.00	57	3783.35
T.N.E.B.	6	450.00	0	0.00	18	277.20	9	150.00	0	0.00	33	1245.00	66	2122.20
KERALA S.E.B.	9	405.00	1	25.00	11	102.50	5	105.00	6	300.00	16	944.00	48	1881.50
KPCL	29	2135.00	2	95.00	4	52.80	11	498.20	14	128.40	8	676.00	68	3585.40
TOTAL (S.R.)	59	4247.00	3	120.00	38	582.50	40	2376.80	26	543.15	73	3503.00	239	11372.45
EASTERN REGION														
D.V.C.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	5	143.20	5	143.20
N.H.P.C. (ER)	3	60.00	0	0.00	0	0.00	3	510.00	0	0.00	0	0.00	6	570.00
OHPC	9	570.00	0	0.00	2	99.00	7	712.50	0	0.00	13	646.00	31	2027.50
WBSEPCDC	4	50.00	0	0.00	0	0.00	5	909.00	0	0.00	2	18.00	11	977.00
JSEB	2	130.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	130.00
TOTAL (E.R.)	18	810.00	0	0.00	2	99.00	15	2131.50	0	0.00	20	807.20	55	3847.70
N-EASTERN REGION														
N.H.P.C. (N-ER)	3	105.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	105.00
NEEPCO	13	755.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	13	755.00
APGCL	0	0.00	0	0.00	0	0.00	2	100.00	0	0.00	0	0.00	2	100.00
MeSEB	4	120.00	2	84.00	0	0.00	4	36.00	0	0.00	0	0.00	10	240.00
TOTAL (N-E.R.)	20	980.00	2	84.00	0	0.00	6	136.00	0	0.00	0	0.00	28	1200.00
Total (All India)	260	16033.00	6	205.50	59	1637.90	75	6029.40	26	543.15	194	14606.45	620	38990.40

(REGIONWISE STATUS OF HYDRO ELECTRIC CAPACITY AS ON 31.03.2012)

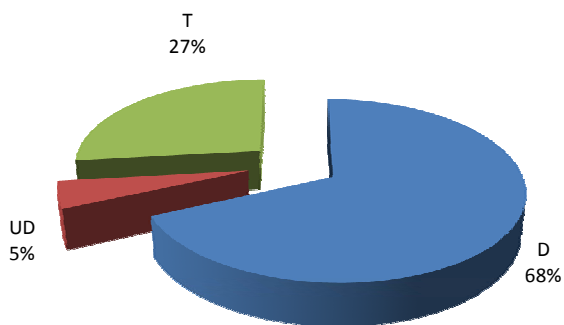
D=DEVELOPED

U= UNDER DEVELOPMENT

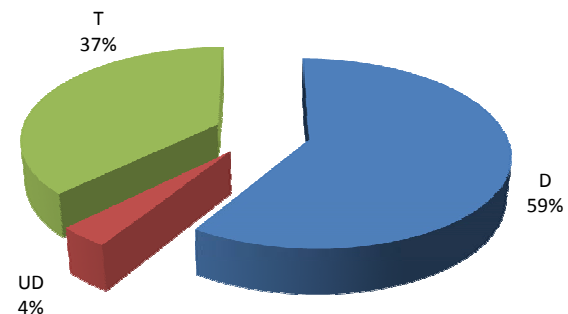
T= YET TO BE DEVELOPED

NORTHERN REGION

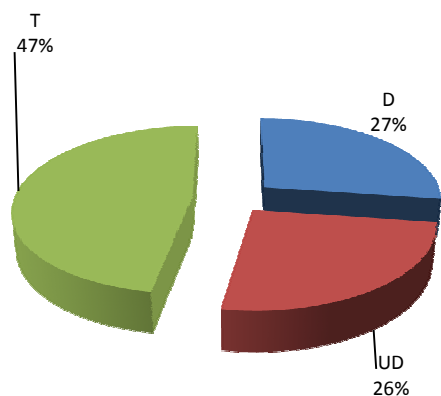
TOTAL ASSESSED(Above 25 MW) : - 52263 MW

WESTERN REGION

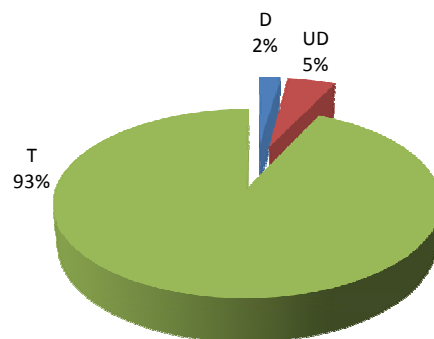
TOTAL ASSESSED (Above 25 MW) : - 8131 MW

SOUTHERN REGION

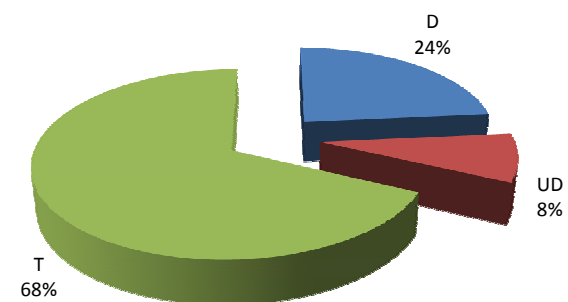
TOTAL ASSESSED (Above 25 MW) : - 15890 MW

EASTERN REGION

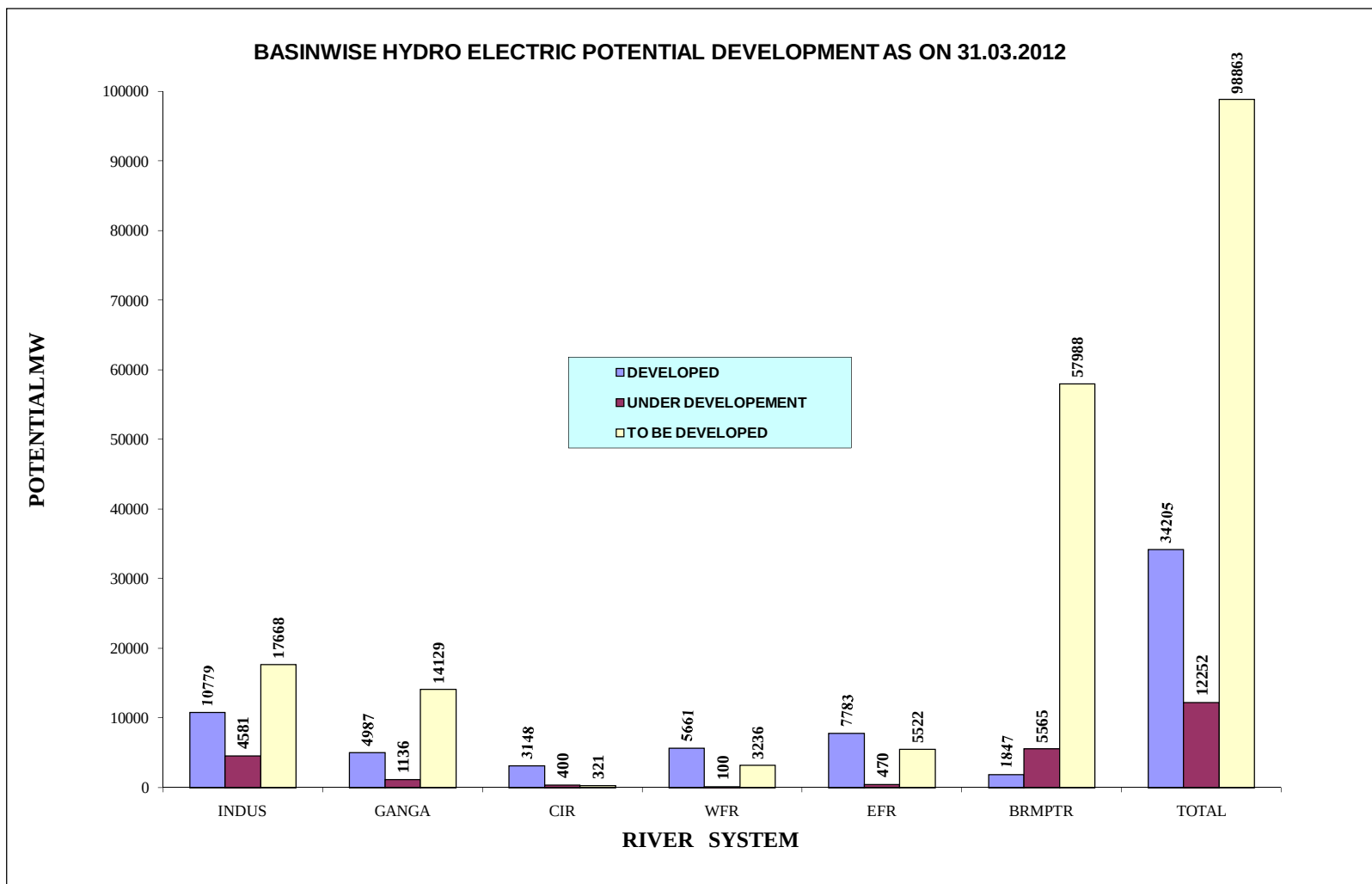
TOTAL ASSESSED (Above 25 MW) : - 10680 MW

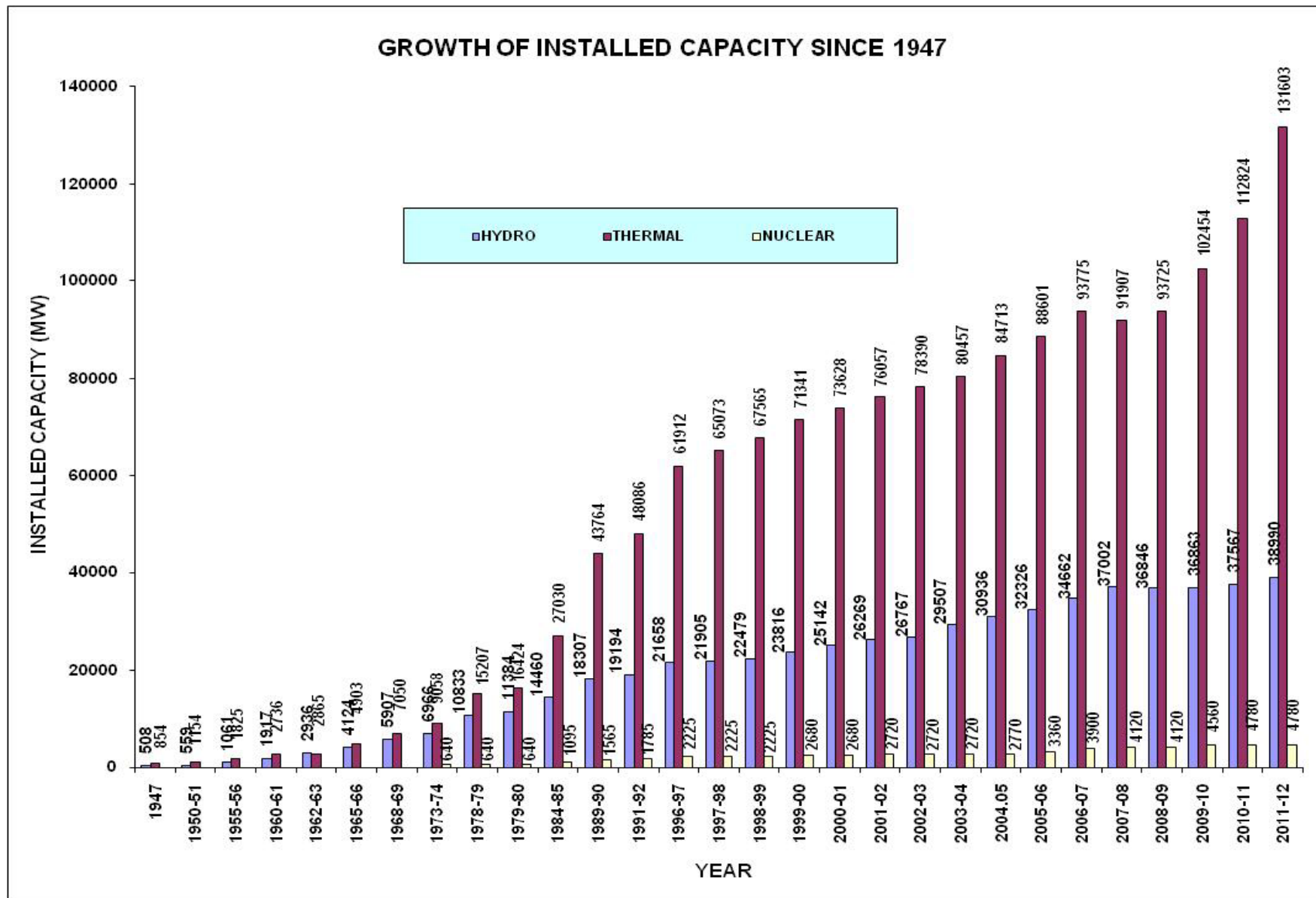
NORTH EASTERN

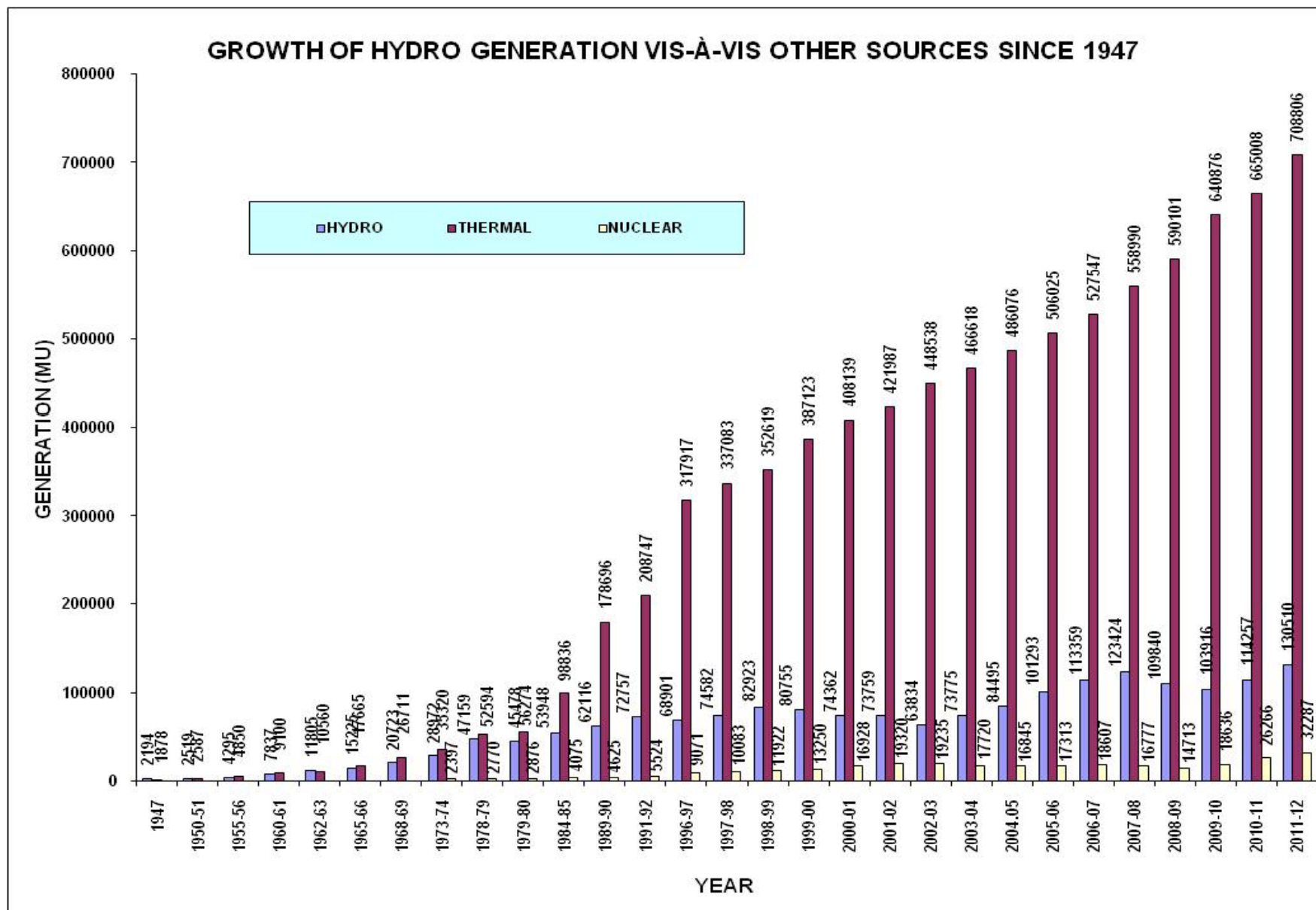
TOTAL ASSESSED (Above 25 MW) : - 58356 MW

ALL INDIA

TOTAL ASSESSED (Above 25 MW) : - 145320 MW







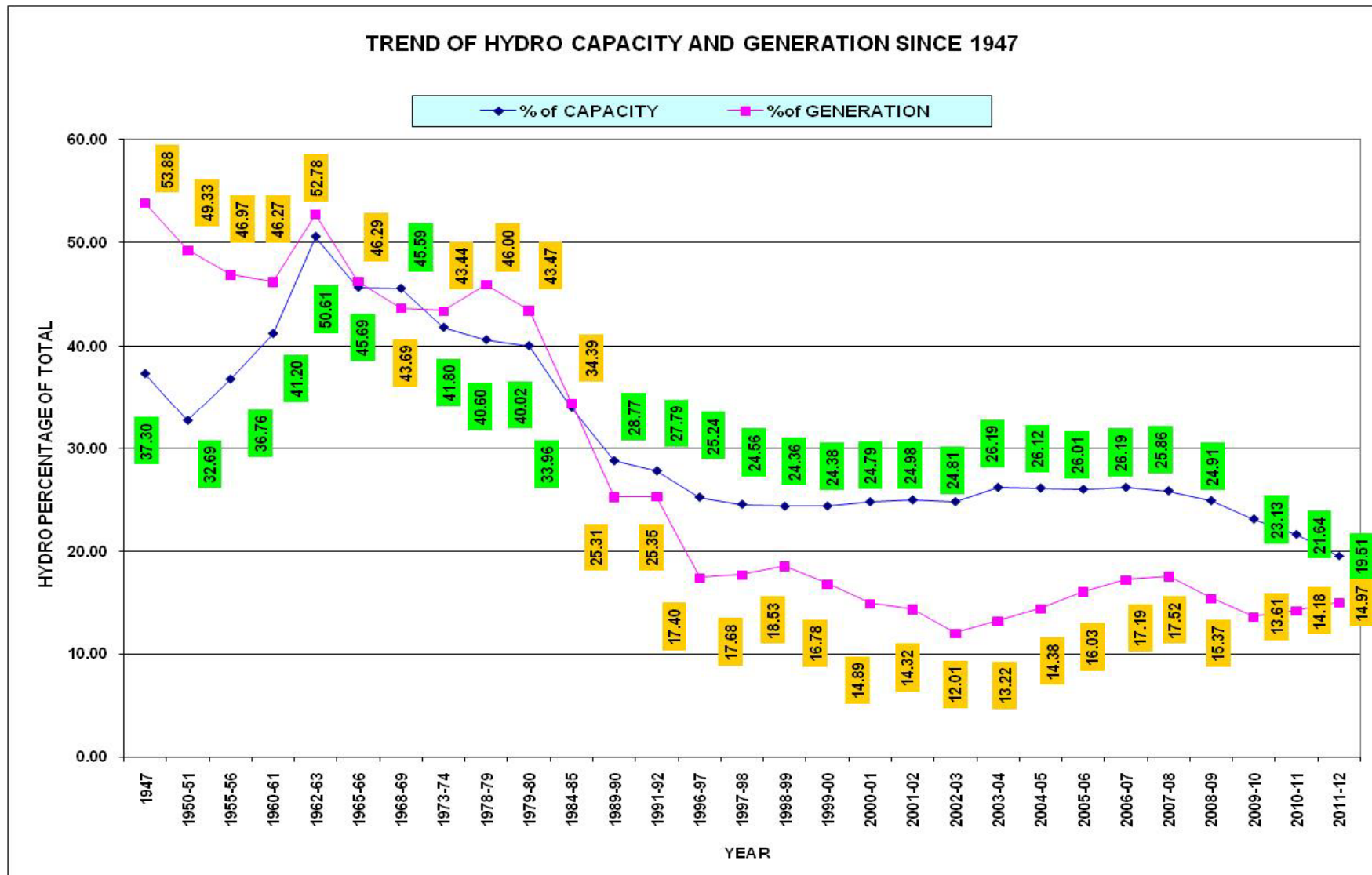
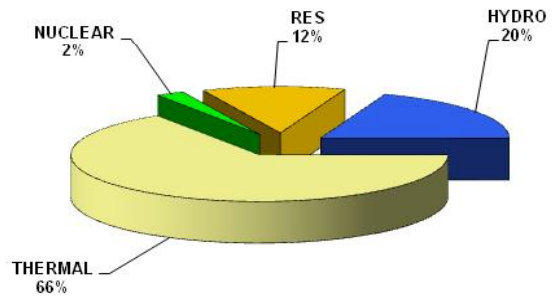
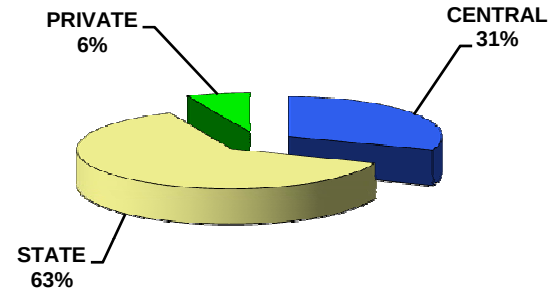
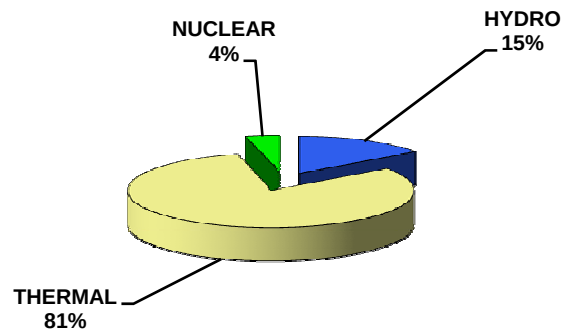
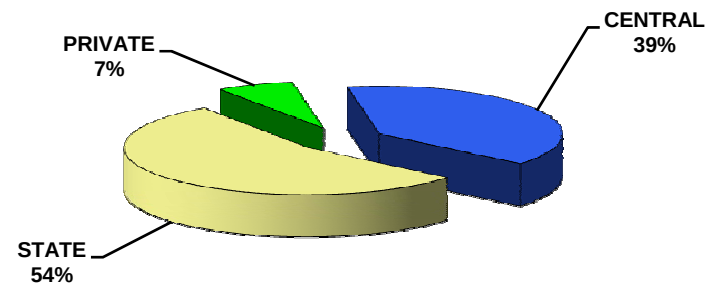


EXHIBIT-1.6**CONTRIBUTION OF HYDRO CAPACITY
(AS ON 31.03.2012)****EXHIBIT-1.8****SECTORWISE HYDRO CAPACITY
(AS ON 31.03.2012)****EXHIBIT-1.7****CONTRIBUTION OF HYDRO GENERATION
(DURING 2011-12)****EXHIBIT-1.9****SECTORWISE HYDRO GENERATION
(DURING 2011-12)**

**REGION-WISE INSTALLED CAPACITY OF HE STATIONS
(ABOVE 25MW CAPACITY)**

			AS ON 31.03.2012
REGION/ SECTOR/ UTILITY/ STATION <u>REGION</u>	NO.OF STATIONS	NO.OF UNITS	CAPACITY (MW)
NORTHERN	57	197	15178.25
WESTERN	29	101	7392.00
SOUTHERN	65	239	11372.45
EASTERN	16	55	3847.70
NORTH EASTERN	10	28	1200.00
ALL INDIA (TOTAL)	177	620	38990.40

**SECTOR/UTILITYWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)**

As on 31-03-2012

SECTOR/UTILITY	NO. OF STATIONS	NO. OF UNITS	CAPACITY (MW)
1 CENTRAL			
BBMB	6	28	2866.30
DVC	2	5	143.20
NEEPCO.	4	13	755.00
NHDC	2	16	1520.00
NHPC	13	41	3767.20
SJVNL	1	6	1500.00
THDC	2	8	1400.00
SUB-TOTAL (CENTRAL)	30	117	11951.70
2 PRIVATE			
DLHP	1	1	34.00
JHPL	1	3	300.00
JPPVL	1	4	400.00
JKHPL	1	4	1000.00
MPCL	1	2	86.00
EPPL	1	2	100.00
TATA MAH.	4	15	447.00
ADHPL	1	2	192.00
SUB-TOTAL (PRIVATE)	11	33	2559.00

**SECTOR/UTILITYWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)**

As on 31-03-2012

SECTOR/UTILITY	NO. OF STATIONS	NO. OF UNITS	CAPACITY (MW)
3 STATE ELECTRICITY BOARDS/DEPARTMENTS			
APGENCO	13	57	3783.35
APGPCL	1	2	100.00
CSPGCL	1	3	120.00
GSECL	2	8	540.00
HPSEB LTD.	4	12	366.00
JKPDC	3	9	660.00
JSEB	2	2	130.00
KPCL	14	68	3585.40
KSEB	13	48	1881.50
MAHAGENCO	9	24	2406.00
MeECL	4	10	240.00
MPPGCL	8	23	875.00
OHPC	7	31	2027.50
PSPCL	7	25	1051.00
RRVUNL	4	11	411.00
SSNNL	2	11	1450.00
TANGEDCO	25	66	2122.20
UJVNL	10	34	1252.15
UPJVNL	4	15	501.60
WBSIEDCL	3	11	977.00
SUB-TOTAL (STATE)	136	470	24479.70
ALL INDIA (TOTAL)	177	620	38990.40

**STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)**

As on 31.03.2012

SL. NO.	BOARD/CORPORATIONS /STATIONS	NO. OF UNITS *CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
<u>NORTHERN</u>					
<u>BBMB</u>					
<u>PUNJAB</u>					
1	BHAKRA HPS LEFT	(5X108)	S(MP)	540.00	1960-1961
2	BHAKRA HPS RIGHT	(5X157)	S(MP)	785.00	1966-1968
3	DEHAR HPS	(6X165)	R	990.00	1977-1983
4	GANGUWAL HPS	(2X24.2) + (1X29.25)	R	77.65	1955-1962
5	KOTLA HPS	(2X24.2) + (1X29.25)	R	77.65	1956-1961
6	PONG HPS	(6X66)	S(MP)	396.00	1978-1983
TOTAL BBMB				2866.30	
<u>NHPC</u>					
<u>HIMACHAL PRADESH</u>					
1	BAIRA SIUL HPS	(3X66)	R	198.00	1980-1981
2	CHAMERA- I HPS	(3X180)	R(UG)	540.00	1994
3	CHAMERA- II HPS	(3X100)	R(UG)	300.00	2003-2004
SUB-TOTAL HIMACHAL PRADESH				1038.00	
<u>JAMMU AND KASHMIR</u>					
1	DULHASTI HPS	(3X130)	R(UG)	390.00	2007
2	SALAL HPS-I	(3X115)	R	345.00	1987
3	SALAL HPS-II	(3X115)	R	345.00	1993-95
4	URI-I HPS	(4X120)	R(UG)	480.00	1996-1997
5	SEWA-II	(3X40)	R	120.00	2010-11
SUB-TOTAL JAMMU AND KASHMIR				1680.00	
<u>UTTARAKHAND</u>					
1	DHAULI GANGA HPS	(4X70)	R(UG)	280.00	2005
2	TANAKPUR HPS	(3X31.4)	R	94.20	1992
SUB-TOTAL UTTARAKHAND				374.20	
TOTAL NHPC				3092.20	
<u>SJVNL</u>					
<u>HIMACHAL PRADESH</u>					
1	NATHPA JHAKRI HPS	(6X250)	R(UG)	1500.00	2003-2004
TOTAL SJVNL				1500.00	
<u>THDC</u>					
<u>UTTARAKHAND</u>					
1	TEHRI ST-1 HPS	(4X250)	S(UG)	1000.00	2006-2007
2	KOTESHWAR	(4X100)	R	400.00	2010-12
TOTAL THDC				1400.00	
TOTAL CENTRAL				8858.50	
<u>PRIVATE</u>					
<u>HIMACHAL PRADESH</u>					
<u>JHPL</u>					
1	BASPA HPS	(3X100)	R(UG)	300.00	2003
TOTAL JHPL				300.00	
<u>MPCL</u>					
1	MALANA HPS	(2X43)	R	86.00	2001
TOTAL MPCL				86.00	

**STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)**

As on 31.03.2012

SL. NO.	BOARD/CORPORATIONS /STATIONS	NO. OF UNITS *CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
EPPL					
1	MALANA- II HPS	(2X50)	R	100.00	2011-12
TOTAL EPPL				100.00	
JAYPEE KARCHAM HYDRO POWER LTD.					
1	Karcham Wangtoo	4*250	R	1000.00	2011-12
TOTAL JAYPEE KARCHAM HYDRO POWER LTD.				1000.00	
ADHPL					
1	ALLAIN DUHANGAN (Pvt.)	2X96	R	192.00	2010-11
TOTAL ADHPL				192.00	
JPPVL					
UTTARAKHAND					
1	VISHNU PRAYAG HPS	(4X100)	R(UG)	400.00	2006
TOTAL JPPVL				400.00	
TOTAL PVT				2078.00	
HPSEB					
1	BASSI HPS	(4X15)	R	60.00	1970-1981
2	GIRI BATA HPS	(2X30)	R	60.00	1978
3	LARJI HPS	(3X42)	R	126.00	2006
4	SANJAY HPS	(3X40)	R(UG)	120.00	1989
TOTAL HPSEB				366.00	
JKPDC					
JAMMU AND KASHMIR					
1	BAGLIHAR HPS	(3X150)	R	450.00	2008
2	LOWER JHELMUM HPS	(3X35)	R	105.00	1978-1979
3	UPPER SINDH-II HPS	(3X35)	R	105.00	2001-2002
TOTAL JKPDC				660.00	
PSEB					
PUNJAB					
1	ANANDPUR SAHIB HPS-I&II	(4X33.5)	R	134.00	1985
2	MUKERIAN HPS-I	(3X15)	R	45.00	1983
3	MUKERIAN HPS-II	(3X15)	R	45.00	1988-89
4	MUKERIAN HPS-III	(3X19.5)	R	58.50	1989
5	MUKERIAN HPS-IV	(3X19.5)	R	58.50	1989
6	RANJIT SAGAR HPS	(4X150)	S(MP)	600.00	2000
7	SHANAN HPS	(1X50)+(4X15)	R	110.00	1932-1982
TOTAL PSEB				1051.00	
RRVUNL					
RAJASTHAN					
1	JAWAHAR SAGAR HPS	(3X33)	S	99.00	1972-1973
2	MAHI BAJAJ HPS-I	(2X25)	R	50.00	1986
3	MAHI BAJAJ HPS-II	(2X45)	R	90.00	1989
4	R P SAGAR HPS	(4X43)	S(MP)	172.00	1968
TOTAL RRVUNL				411.00	

**STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)**

As on 31.03.2012					
SL. NO.	BOARD/CORPORATIONS /STATIONS	NO. OF UNITS *CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
<u>UJVNL</u>					
<u>UTTARAKHAND</u>					
1	CHIBRO (YAMUNA) HPS	(4X60)	R(UG)	240.00	1975-1976
2	CHILLA HPS	(4X36)	R	144.00	1980-1981
3	DHAKRANI HPS	(3X11.25)	R	33.75	1965-1970
4	DHALIPUR HPS	(3X17)	R	51.00	1965-1970
5	KHATIMA HPS	(3X13.8)	R	41.40	1955-1956
6	KHODRI HPS	(4X30)	R(UG)	120.00	1984
7	KULHAL HPS	(3X10)	R	30.00	1975
8	MANERI BHALI - I HPS	(3X30)	R	90.00	1984
9	MANERI BHALI - II HPS	(4X76)	R	304.00	2008
10	RAMGANGA HPS	(3X66)	S(MP)	198.00	1975-1977
TOTAL UJVNL				1252.15	
<u>UPJVNL</u>					
<u>UTTAR PRADESH</u>					
1	KHARA HPS	(3X24)	R	72.00	1992
2	MATATILLA HPS	(3X10.2)	R	30.60	1965
3	OBRA HPS	(3X33)	R	99.00	1970-1971
4	RIHAND HPS	(6X50)	S	300.00	1961-1965
TOTAL UPJVNL				501.60	
TOTAL STATE SECTOR				4241.75	
TOTAL NORTHERN REGION				15178.25	
<u>WESTERN</u>					
<u>NHDC</u>					
<u>MADHYA PRADESH</u>					
1	INDIRA SAGAR HPS	(8X125)	S(MP)	1000.00	2004-2005
2	OMKARESHWAR HPS	(8X65)	R	520.00	2007
TOTAL NHDC				1520.00	
TOTAL CENTRAL				1520.00	
<u>DODSON-LINDBLOM HYDRO POWER PVT. LTD. (DLHP)</u>					
<u>MAHARASHTRA</u>					
1	BHANDARDHARA HPS ST-II	(1X34)	R	34.00	1996
TOTAL DLHP				34.00	
<u>TATA POWER COMPANY (PVT.)</u>					
<u>MAHARASHTRA</u>					
1	BHIRA HPS	(6X25)	S	150.00	1927-1949
2	BHIRA PSS HPS	(1X150)	PS	150.00	1995
3	BHIVPURI HPS	(3X24) + (2X1.5)	S	75.00	1997-1999
4	KHOPOLI HPS	(3X24)	S	72.00	2001-2003
TOTAL TATA MAH.				447.00	
TOTAL PVT				481.00	
<u>CSPGCL</u>					
<u>CHHATTISGARH</u>					
1	HASDEOBANGO HPS	(3X40)	S(MP)	120.00	1994-1995
TOTAL CSPGCL				120.00	

**STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)**

As on 31.03.2012

SL. NO.	BOARD/CORPORATIONS /STATIONS	NO. OF UNITS *CAPACITY(MW)	TYPE OF STATION	CAPACITY (Mw)	YEAR OF COMMISSIONING
GSECL					
GUJARAT					
1	KADANA PSS HPS	(4X60)	PS	240.00	1990-1998
2	UKAI HPS	(4X75)	S(MP)	300.00	1974-1976
TOTAL GSECL				540.00	
MAHAGENCO					
MAHARASHTRA					
1	BHIRA TAIL RACE HPS	(2X40)	R	80.00	1987-1988
2	GHATGHAR PSS HPS	(2X125)	PS(UG)	250.00	2008
3	KOYNA DPH HPS	(2X18)	S	36.00	1980-1981
4	KOYNA-I HPS	(4X70)	S(UG)	280.00	1962-1963
5	KOYNA-II HPS	(4X80)	S(UG)	320.00	1966-1967
6	KOYNA-III HPS	(4X80)	S(UG)	320.00	1975-1978
7	KOYNA-IV HPS	(4X250)	S(UG)	1000.00	1999-2000
8	TILLARI HPS	(1X60)	S	60.00	1986
9	VAITARNA HPS	(1X60)	S(UG)	60.00	1976
TOTAL MAHAGENCO				2406.00	
MPPGCL					
MADHYA PRADESH					
1	BANSAGAR TONS-1 HPS	(3X105)	R	315.00	1991-1992
2	BANSAGAR TONS-II HPS	(2X15)	R	30.00	2002
3	BANSAGAR TONS-III HPS	(3X20)	S(MP)	60.00	2000-2002
4	BARGI HPS	(2X45)	S(MP)	90.00	1988
5	GANDHI SAGAR HPS	(5X23)	S(MP)	115.00	1960-1966
6	MADHIKHERA HPS	(3X20)	S	60.00	2006-2007
7	PENCH HPS	(2X80)	S(UG)	160.00	1986-1987
8	RAJGHAT HPS	(3X15)	S	45.00	1999
TOTAL MPPGCL				875.00	
SSNNL					
GUJARAT					
1	S SAROVAR CHPH HPS	(5X50)	R	250.00	2004
2	S SAROVAR RBPH HPS	(6X200)	PS	1200.00	2005-2006
TOTAL SSNNL				1450.00	
TOTAL STATE				5391.00	
TOTAL WESTERN REGION				7392.00	
SOUTHERN					
APGENCO					
ANDHRA PRADESH					
1	HAMPI HPS	(4X9)	S(MP)	36.00	1958-1964
2	LOWER SILERU HPS	(4X115)	S	460.00	1976-1978
3	MACHKUND HPS	(3X17)+(3X21.25)	S	114.75	1959
4	NAGARJUN SGR HPS	(1X110)+(7X100.8)	PS	815.60	1978-1985
5	NAGARJUN SGR LBC HPS	(2X30)	R	60.00	1983
6	NAGARJUN SGR RBC & EXTN. HPS	(3X30)	R	90.00	1983-1990
7	POCHAMPAD HPS	(3X9)	S(MP)	27.00	1987-1988
8	PRIYADARSHNI JURALA HPS	(6X39)	R	234.00	2008-2011
9	SRISAILAM HPS	(7X110)	S	770.00	1982-1987
10	SRISAILAM LB HPS	(6X150)	PS(UG)	900.00	2001-2003

**STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)**

As on 31.03.2012

SL. NO.	BOARD/CORPORATIONS /STATIONS	NO. OF UNITS *CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
11	T B DAM HPS	(4X9)	S	36.00	1957-1964
12	UPPER SILERU HPS -I	(2X60)	S	120.00	1967-1968
13	UPPER SILERU HPS -II	(2X60)	S	120.00	1994-1995
TOTAL APGENCO				3783.35	

KPCL**KARNATAKA**

1	ALMATTI DPH HPS	(5X55)+(1X15)	S	290.00	2004-2005
2	BHADRA HPS	(2X12)+(1X6)+(1X2)+(1X7.2)	S	39.20	1962-1998
3	GERUSUPPA HPS	(4X60)	R	240.00	2001-2002
4	GHAT PRABHA HPS	(2X16)	S(MP)	32.00	1992
5	JOG HPS	(4X21.6)+(4X13.2)	S	139.20	1949-2002
6	KADRA HPS	(3X50)	S	150.00	1997-1999
7	KALINADI HPS	(3X135)+(3X150)	S	855.00	1979-1984
8	KALINADI SUPA HPS	(2X50)	S	100.00	1985
9	KODASALI HPS	(3X40)	S	120.00	1998-1999
10	LIGANAMAKKI HPS	(2X27.5)	S	55.00	1979-1980
11	MUNIRABAD HPS	(2X9)+(1X10)	S(MP)	28.00	1962-1965
12	SHARAVATHY HPS	(10X103.5)	S	1035.00	1965-1977
13	SIVASAMUNDRUM HPS	(4X6)+(6X3)	R	42.00	1922-1934
14	VARAHI HPS	(4X115)	S(UG)	460.00	1989-2009
TOTAL KPCL				3585.40	

KSEB**KERALA**

1	IDAMALAYAR HPS	(2X37.5)	S	75.00	1987
2	IDUKKI HPS	(6X130)	S(UG)	780.00	1976-1986
3	KAKKAD HPS	(2X25)	S	50.00	1999
4	KUTTIYADI & K. EXTN. HPS	(3X25)+(1X50)	S	125.00	1972-2001
5	KUTTIYADI ADDN. EXTN. HPS	(2X50)	S	100.00	2010
6	LOWER PERIYAR HPS	(3X60)	R	180.00	1997
7	NARIAMANGLAM HPS	(3X15+1X25)	R	70.00	1961-63, 2008-09
8	PALLIVASAL HPS	(3X5)+(3X7.5)	R	37.50	1948-2001
9	PANNIAR HPS	(2X15)	S	30.00	1963-2001
10	PORINGALKUTTU HPS	(4X8)	R	32.00	1957-1960
11	SABARIGIRI HPS	(6X50)	S	300.00	1960-1967
12	SENGULAM HPS	(4X12)	R	48.00	1954-2001
13	SHOLAYAR HPS	(3X18)	S	54.00	1956-1968
TOTAL KSEB				1881.50	

TNEB**TAMIL NADU**

1	ALIYAR HPS	(1X60)	S	60.00	1970
2	BHAWANI KATTAL	(2X15)	R	30.00	2006
3	KADAMPARI HPS	(4X100)	PS(UG)	400.00	1987-1989
4	KODAYAR HPS -I	(1X60)	S	60.00	1970
5	KODAYAR HPS -II	(1X40)	R	40.00	1971
6	KUNDAH HPS-I	(3X20)	S	60.00	1960-1964

**STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)**

As on 31.03.2012					
SL. NO.	BOARD/CORPORATIONS /STATIONS	NO. OF UNITS *CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
7	KUNDAH HPS-II	(5X35)	S	175.00	1960-1965
8	KUNDAH HPS-III	(3X60)	S	180.00	1965-1978
9	KUNDAH HPS-IV	(2X50)	S	100.00	1966-1978
10	KUNDAH HPS-V	(2X20)	S	40.00	1964-1988
11	LOWER METTUR HPS-I	(2X15)	R	30.00	1988
12	LOWER METTUR HPS-II	(2X15)	R	30.00	1988
13	LOWER METTUR HPS-III	(2X15)	R	30.00	1987-1988
14	LOWER METTUR HPS-IV	(2X15)	R	30.00	1988-1999
15	METTUR DAM HPS.	(4X12.5)	S	50.00	1937-1946
16	METTUR TUNNEL HPS.	(4X50)	S	200.00	1965-1966
17	MOYAR HPS	(3X12)	R	36.00	1952-1953
18	PAPANASAM HPS	(4X8)	S	32.00	1944-1951
19	PARSON`S VALLEY HPS	(1X30)	S	30.00	2000
20	PERIYAR HPS	(4X35)	S	140.00	1958-1965
21	PYKARA HPS	(3X7)+(2X13.6)+(1X11)	S	59.20	1932-2005
22	PYKARA ULTMATE HPS	(3X50)	S(UG)	150.00	2005
23	SARKARPATHY HPS	(1X30)	R	30.00	1966
24	SHOLAYAR I&II HPS	(2X35) + (1X25)	S	95.00	1971
25	SURULIYAR HPS	(1X35)	R	35.00	1978
TOTAL TNEB				2122.20	
TOTAL STATE SECTOR				11372.45	
TOTAL SOUTHERN REGION				11372.45	
<u>EASTERN</u>					
<u>DVC</u>					
<u>JHARKHAND</u>					
1	MAITHON HPS	(1X23.2) + (2X20)	S(UG)	63.20	1957-1958
2	PANCHET PSS HPS	(2X40)	PS	80.00	1959-1990
TOTAL DVC				143.20	
<u>NHPC</u>					
<u>SIKKIM</u>					
1	RANGIT HPS	(3X20)	R	60.00	2000
2	TEESTA V HPS	(3X170)	R(UG)	510.00	2008
TOTAL NHPC				570.00	
TOTAL CENTRAL				713.20	
<u>JSEB</u>					
<u>JHARKHAND</u>					
1	SUBERNREKHA HPS-I	(1X65)	S	65.00	1977
2	SUBERNREKHA HPS-II	(1X65)	R	65.00	1980
TOTAL JSEB				130.00	
<u>OHPC</u>					
<u>ODISHA</u>					
1	BALIMELA HPS-I	(6X60)	S	360.00	1973
2	BALIMELA HPS-II	(2X75)	S	150.00	1977
3	HIRAKUD HPS(BURLA)	(3X37.5) + (2X49.5) + (2X32)	S	275.50	1956-1990
4	HIRAKUD HPS (CHILPIMA)	(3X24)	S	72.00	1962-1964
5	RENGALI HPS	(5X50)	S	250.00	1985-1992
6	UPPER INDRAVATI HPS	(4X150)	S	600.00	1999-2001
7	UPPER KOLAB HPS	(4X80)	S	320.00	1988-1993
TOTAL OHPC				2027.50	

**STATIONWISE INSTALLED CAPACITY OF H.E. STATIONS
(ABOVE 25 MW CAPACITY)**

As on 31.03.2012

SL. NO.	BOARD/CORPORATIONS /STATIONS	NO. OF UNITS *CAPACITY(MW)	TYPE OF STATION	CAPACITY (MW)	YEAR OF COMMISSIONING
WBSEDCL					
WEST BENGAL					
1	JALDHAKA HPS ST-I	(3X9)	R	27.00	1967-1972
2	PURULIA PSS HPS	(4X225)	PS	900.00	2007
3	RAMMAM HPS	(4X12.5)	R	50.00	1995-1996
TOTAL WBSEDCL				977.00	
TOTAL STATE				3134.50	
TOTAL EASTERN REGION				3847.70	
NORTH EASTERN					
NEEPCO					
ARUNACHAL PRADESH					
1	RANGANADI HPS	(3X135)	R	405	2002
SUB-TOTAL ARUNACHAL PRADESH				405	
ASSAM					
1	KOPILI HPS	(1X25) + (4X50)	S	225.00	1988-2003
SUB-TOTAL ASSAM				225.00	
MEGHALAYA					
1	KHONDONG HPS	(2X25)	S	50.00	1984
SUB-TOTAL MEGHALAYA				50.00	
NAGALAND					
1	DOYANG HPS	(3X25)	S	75.00	2000
SUB-TOTAL NAGALAND				75.00	
TOTAL NEEPCO				755.00	
NHPC					
MANIPUR					
1	LOKTAK HPS	(3X35)	S	105.00	1983
TOTAL				105.00	
TOTAL CENTRAL				860.00	
APGPCL					
ASSAM					
1	KARBI LANGPI HPS	(2X50)	R	100.00	2007
TOTAL APGPCL				100.00	
MeECL					
MEGHALAYA					
1	KYRDEMKULAI HPS	(2X30)	R	60.00	1979
2	UMIAM HPS ST-I	(4X9)	S	36.00	1965
3	UMIAM HPS ST-IV	(2X30)	R	60.00	1992
4	MYNTDU HPS ST-I	(2X42)	R	84.00	2012
TOTAL MEGEB				240.00	
TOTAL STATE				340.00	
TOTAL NORTH EASTERN REGION				1200.00	
TOTAL ALL INDIA				38990.40	

Note:- Up-rated/De-rated Capacities of units have been incorporated.

Abbreviations:-

R- Run of River Type

UG- Underground

S-Storage Type

MP- Multipurpose

PS- Pumped Storage

CAPACITYWISE GROUPING OF HYDRO - ELECTRIC STATIONS

AS ON 31.03.2012			
Station Cap. Range (MW)	Number of stations	Number of units	Total capacity (MW)
> 25 - 50	41	121	1464.45
> 50 - 100	47	120	3552.90
>100 - 200	33	114	4707.95
>200 - 300	17	78	4554.50
>300 - 400	13	52	4675.00
>400 - 500	5	18	2195.00
>500 - 600	6	27	3310.00
>600 - 700	0	0	0.00
>700 - 800	4	24	3190.00
>800 - 900	3	18	2615.60
>900 - 1000	5	26	4990.00
>1000 - 1500	3	22	3735.00
Total	177	620	38990.40

HYDRO GENERATING UNITS ADDED DURING 2011-12

Station	State	Unit No.	Capacity (MW)	Date of commissioning
<u>NORTHERN REGION</u>				
<u>CENTRAL SECTOR</u>				
1. Koteswar (THDC)	Uttarakhand	3	100	25.01.2012
		4	100	22.03.2012
SUB TOTAL(CENTRAL SECTOR)			200	
<u>PRIVATE SECTOR</u>				
1. Karcham Wangtoo(JKHPCL)	HP	1	250	24.05.2011
		2	250	21.06.2011
		3	250	08.09.2011
		4	250	13.09.2011
2. Malana-II (EPPL)	HP	1	50	06.08.2011
		2	50	14.08.2011
SUB TOTAL(PVT. SECTOR)			1100	
<u>SOUTHERN REGION</u>				
<u>STATE SECTOR</u>				
1. Priyadarshni Jurala (APGENCO)	A.P	6	39	09.06.2011
2. Myntdu (Leshka) (MeECL)	Meghalaya	1	42	23.11.2011
		2	42	31.03.2012
SUB TOTAL(STATE SECTOR)			123	
ALL INDIA TOTAL			1423	

CHAPTER 2

GENERATION PERFORMANCE

CHAPTER 2

GENERATION PERFORMANCE

2.1 Generation from hydro electric power stations (above 25 MW Installed Capacity) in the country during 2011-12 was 130509.52 MU, against the target of 112050 MU which was 16.47% more than the target.

2.2 Region-wise generation performance of hydro electric stations during 2011-12 is indicated in Table 2.1.

TABLE 2.1

GENERATION PERFORMANCE - REGIONWISE (2011-12)

S. No.	Region	Installed Capacity as on 31.03.12 (MW)	Generation During 2011-12		
			Target (MU)	Actual (MU)	Shortfall(-)/ Surplus (+) Over Target (%)
1	Northern	15178.25	53474	64293.77	20.23
2	Western	7392.00	14645	19247.59	31.43
3	Southern	11372.45	30493	33637.93	10.31
4	Eastern	3847.70	9306	9551.99	2.64
5	North-eastern	1200.00	4132	3778.24	(-)8.56
	Total(All India)	38990.40	112050	130509.52	16.47

Generation during 2011-12 has exceeded the target in Northern, Western, Southern and Eastern Region whereas it was less than the target in North-Eastern Region of the country.

Hydel generation during 2011-12 was 130509.52 MU against the target of 112050 MU viz surplus in generation by 18459.52 MU (16.47%). Actual generation of 130509.52 MU was also more than previous year's generation of 114257.36 MU by 14.22%. Hydel generation was more than the generation target in Northern, Western, Southern and Eastern by 20.23%, 31.43%, 10.31% and 2.64% respectively. Whereas Hydel generation was less than target in North Eastern Region by 8.56%. There was less generation as compared to the target of HE Stations of EPPL & ADPL IN Northern Region, APGENCO in Southern Region, OHPC in Eastern Region and NEEPCO & MeECL in North-Eastern Region.

Month wise generation performance and cumulative generation performance vis-a-vis targets have been shown at **Exhibit-2.1** and are given in Table 2.2 below.

TABLE 2.2

**MONTHWISE & CUMULATIVE GENERATION VIS-À-VIS TARGET IN MU
PERIOD: 2011-12**

MONTH	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
TARGET	7522	8944	9445	11832	13569	12747	10476	8356	7465	7193	6646	7857
GEN.	8835	11482	11885	14147	16004	17744	11893	8188	7302	7265	7208	8556
CUM. TARGET	7522	16466	25911	37743	51312	64059	74534	82891	90355	97548	104193	112050
CUM. GEN.	8835	20317	32202	46349	62353	80097	91990	100178	107481	114746	121954	130510

2.3 Sector wise generation performance during the year 2011-12 Vis-à-vis targets is given in Table 2.3. Generation from H.E. Stations under Central, State and Private Sector was more than the target by 18.47%, 14.66 and 20.15% respectively.

TABLE 2.3

**SECTORWISE GENERATION PERFORMANCE
PERIOD: 2011-12**

Sl. No.	Sector	Installed Capacity as on 31.03.12 (MW)	Generation		
			Target (MU)	Actual (MU)	Shortfall(-) Surplus(+) Over Target (%)
1	Central	11951.70	42779	50681.76	18.47
2	State	24479.70	61942	71021.74	14.66
3	Private	2559.00	7329	8806.02	20.15
	Total	38990.40	112050	130509.52	16.47

2.4 Generation performance of 31 major reservoir based H.E. Stations vis-à-vis other schemes is given in Table 2.4. It could be observed that the 31 major reservoir based Hydro Stations have generated 21.05% more than the targets. Generation from other Stations was also 12.93% more than the targets.

TABLE 2.4

**RESERVOIR BASED STATIONS GENERATION PERFORMANCE VIS-À-VIS
OTHER HE STATIONS
PERIOD: 2011-12**

Sl No.	Type of Scheme	Installed Capacity as on 31.03.12 (MW)	Generation in 2011-12		
			Target (MU)	Actual (MU)	Shortfall (-) / Surplus (+) Over target (%)
1.	Reservoir Based Schemes (31 Nos.)	19227.85	48897	59190.36	21.05
2.	Other schemes	19762.55	63153	71319.16	12.93
	Total	38990.40	112050	130509.52	16.47

2.5 Details of actual generation during 2011-12 for all the hydro stations (Above 25 MW capacities) in the country are given in **Annex 2.1**. List of stations where generation exceeded the targets during 2011-12 is given in Table 2.5.

TABLE 2.5

**H.E. STATIONS ACHIEVING HIGHER GENERATION VIS-A-VIS TARGETS
PERIOD: 2011-12**

S. No.	Actual Generation as % of Generation Target	Hydro Electro Stations
1	150 & above	Pong, Chamera-I, Karcham Wangtoo, R.P.Sagar, Jawahar Sagar, Mahi Bajaj-I&II, Rihand, Odra, Ram Ganga, Kadana PSS, Madhikhera, Bansagar Tons-I, Rajghat, Hasdeo Bango, Koyna St. I&II, Bandardhara-II, Kalinadi, Kodalali, Shivasamudram, Mettur Dam & Tunnel, Kodayar I&II, Subernarekha I&II, Maithon, Panchet, Rengali.
2	140 - 150	Tehri, Matatilla, Sardar Sarovar RBPH, Indira Sagar, Omkareshwar, Gandhi Sagar, Koyna St.III, Koyna DPH, Kadra.
3	130 - 140	Koteshwar, Mukerian I-IV, Pench, Bansagar Tons III, Supa DPH, Lingnamakki, Idukki, Idamalayar, Lower Mettur I-IV.
4	120 - 130	Bhakra L&R, Kotla, Larji, Ranjit Sagar, Vishnu Prayag, Bhira Tail Race, Bhadra, Munirabad, Kuttiyadi & Kuttiyadi Additional Extension, Suruliyar, Aliyar, Bhawani Kattalai Barrage I, Kopili.

5	110 - 120	Tanakpur, Dulhasti, Nathpa Jhakri, Baspa II, Baglihar, AP Sahib I&II, Khara, Chhibro, Chilla, Bargi, Tillari, Bhira & Bhira PSS, Khopoli, Sharavathy, Varahi, Sabarigiri, Poringalkuthu, Panniar, Periyar, Rammam II, Purulia PSS, Karbi Langpi, Loktak.
6	100 - 110	Ganguwal, Dehar, Baira Siul, Salal I&II, Chamera-II, Uri, Dhauliganga, Sewa II, Giri Bata, Sanjay, Malana, Lower Jhelum, Upper Sindh II, Khatima, Dhakrani, Dhalipur, Kulhal, Khodri, Maneri Bhalli I, Maneri Bhalli II, Vaitarna, TB Dam & Hampi, Upper Sileru I&II, Ghatprabha, Gerusoppa, Almatti Dam, Nariamangalam, Pallivasal, Lower Periyar, Kakkad, Pykara, Moyar, Kadamparai PSS, Hirakud I&II, Rangit, Teesta V, Doyang.

H.E. Stations where generation was less than the targets have been listed in Table 2.6 below:

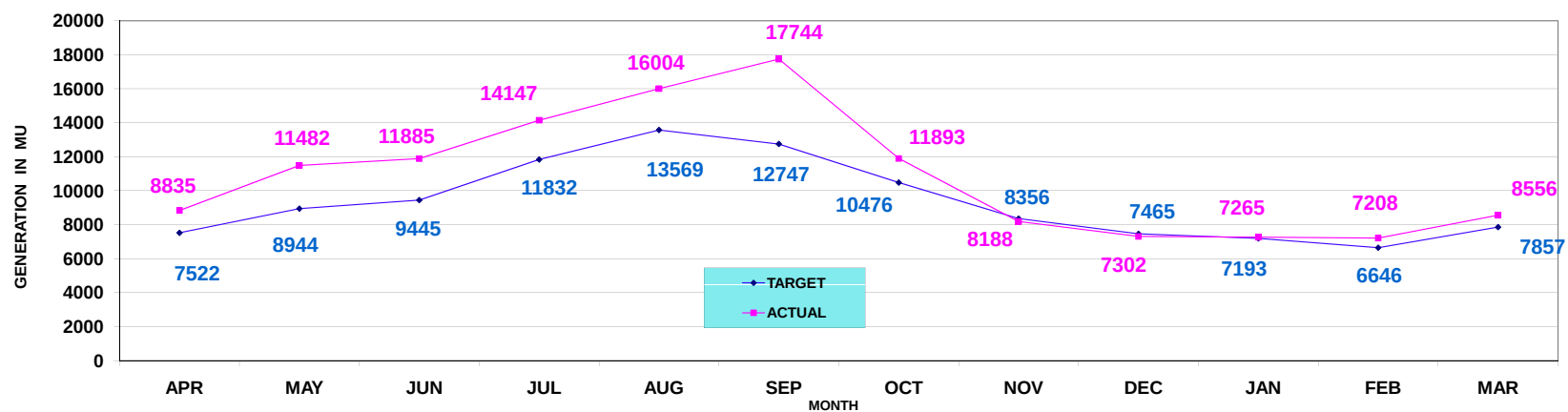
TABLE 2.6

**H.E.STATIONS HAVING SHORTFALL IN GENERATION VIS-A-VIS TARGETS
PERIOD: 2011-12**

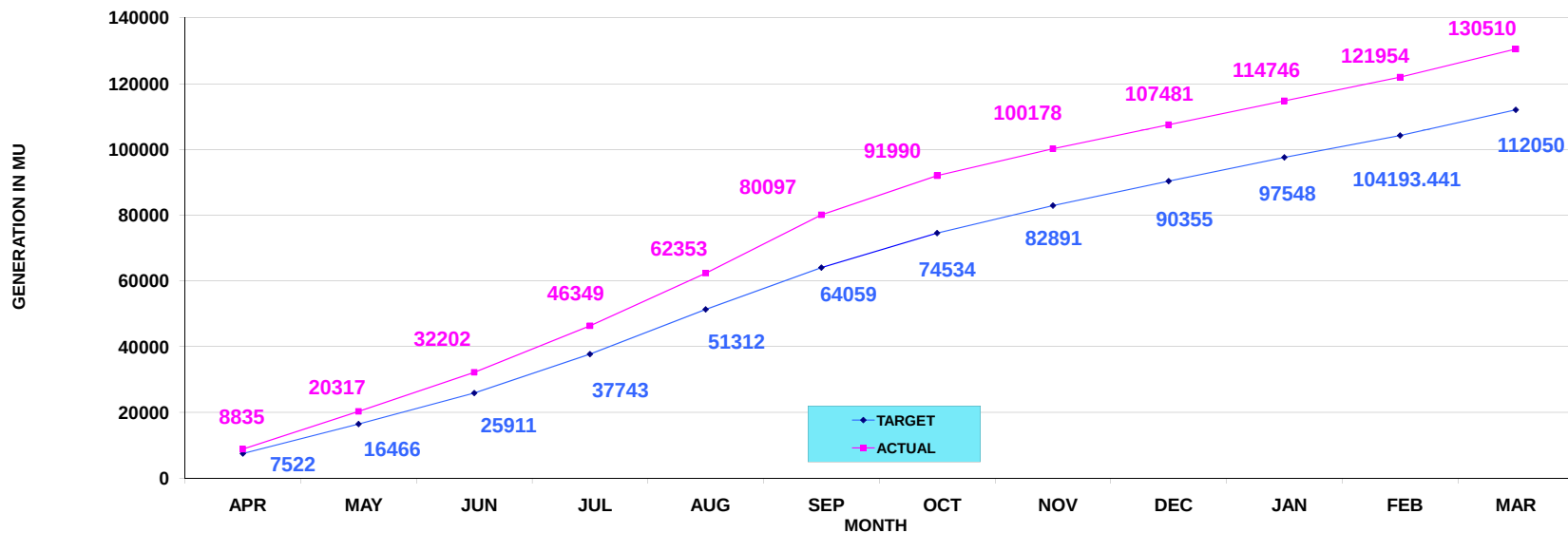
S. No.	Actual Generation as % of Generation Target	Hydro Electro Stations
1	90 -100	Allain Duhangan, Shanan, Sardar Sarovar CHPH, Ukai, Koyna St. IV, Ghatghar PSS, Machkund, Lower Sileru, Sholayar, Sengulam, Kundah I-V, Papanasam, Sholayar I&II, Pykara Ultimate, Umiam St. I, Umiam St. IV.
2	80 -90	Bhivpuri, N.J.Sagar LBC, Srisaillam RB, Pochampad, Jog, Parson's Valley, Balimela, Upper Kolab, Kyrdemkulai, Khandong.
3	70 -80	Bassi, N.J.Sagar PSS, N.J.Sagar RBC, Sarkarpathy, Upper Indravati.
4	60 -70	Bansagar Tons II, Srisaillam LB, Priyadarshni Jurala, Ranganadi.
5	50 -60	Jaldhaka I.
6	40 -50	
7	30 -40	Malana II.
8	10 -30	
9	0 -10	

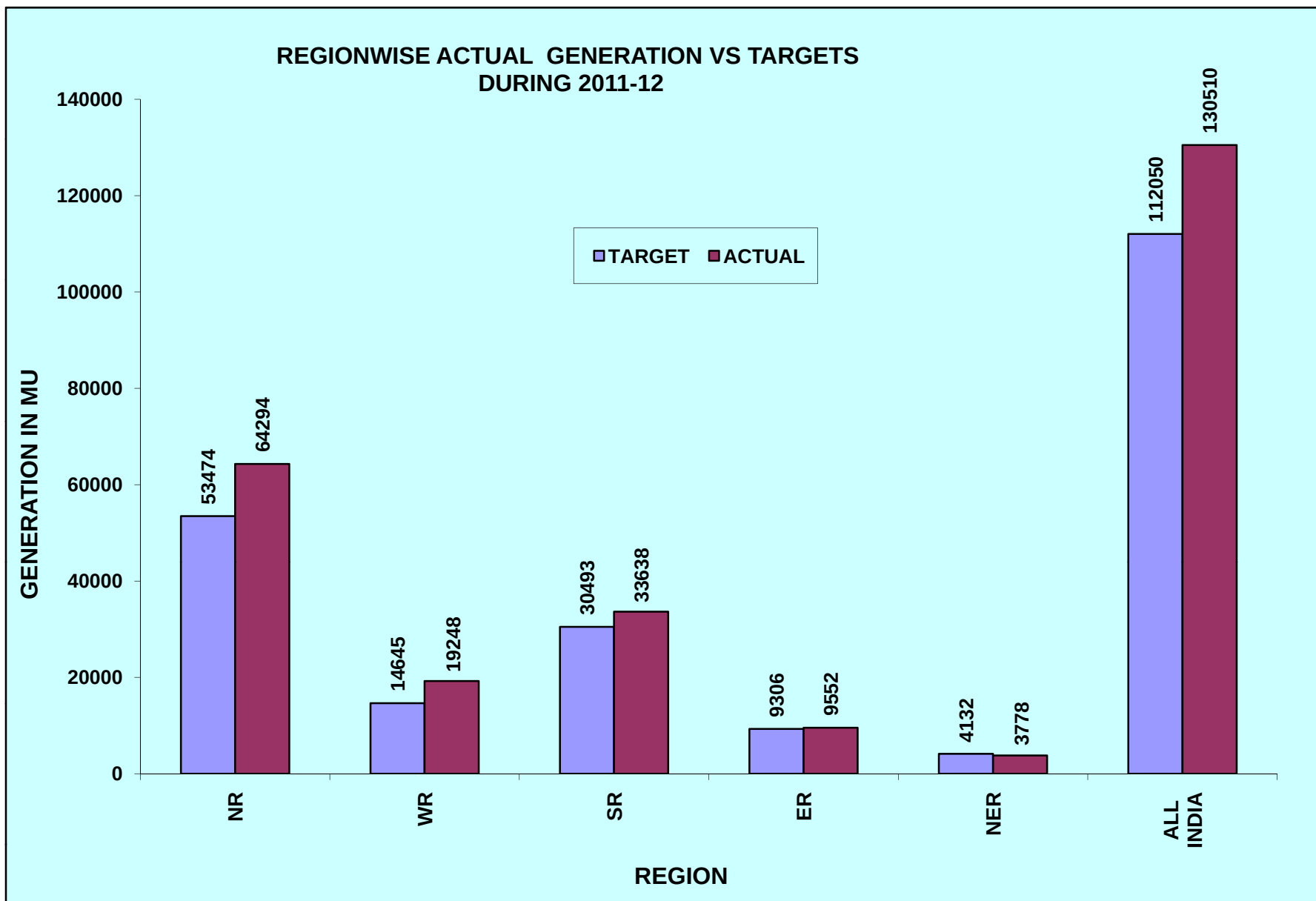
2.6 Region wise generation targets vis-à-vis achievements are indicated at **Exhibit-2.2**. The states/utilities showing excess/short-fall in generation over the targets are indicated in **Exhibit- 2.3**.

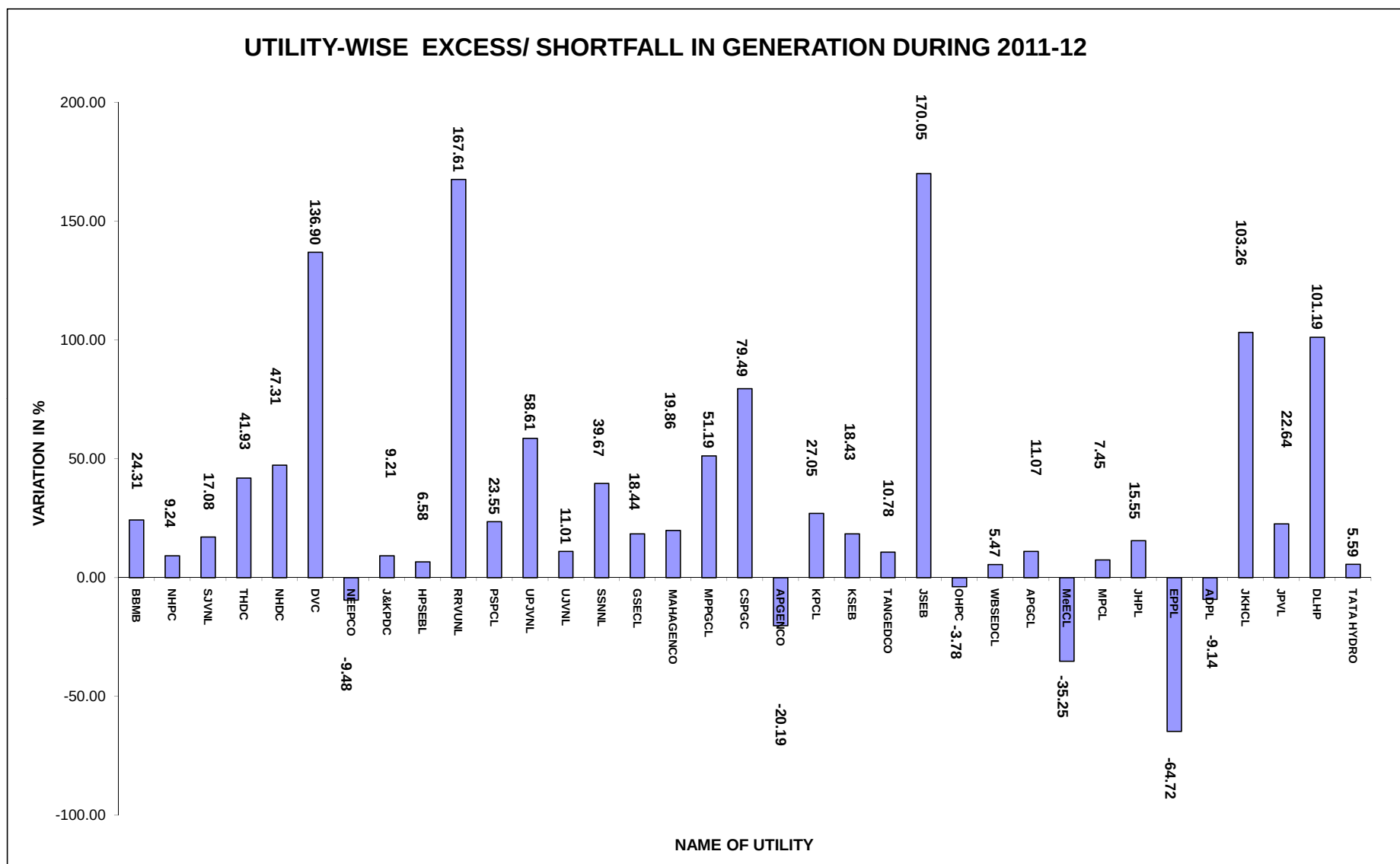
**MONTHLY ALL INDIA HYDRO GENERATION VS TARGETS
DURING 2011-12**



**ALL INDIA CUMMULATIVE GENERATION VS TARGETS
DURING 2011-12**







**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2011-12**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED	2011-12		ACTUAL AS % OF TARGET
			CAPACITY AS ON 31.03.2012 (MW)	TARGET (MU)	ACTUAL (MU)	
<u>NORTHERN REGION</u>						
<u>CENTRAL</u>						
<u>BBMB</u>						
1	Bhakra L & R	5*108+5*157	1325.00	4900	6198.51	126.50
2	Ganguwal	1*29.25+2.24.2	77.65	500	534.4	106.88
3	Kotla	1*29.25+2.24.3	77.65	500	618.77	123.75
4	Dehar	6*165	990.00	3000	3254.9	108.50
5	Pong	6*66	396.00	1123	1852.88	164.99
Total BBMB			2866.30	10023	12459.46	124.31
<u>NHPC</u>						
1	Baira Siul	3*66	198.00	679	730.6	107.60
2	Salal-I	3*115	345.00	3000	3219	107.30
3	Salal-II	3*115	345.00			
4	Tanakpur	3*31.4	94.20	443	487.6	110.07
5	Chamera-I	3*180	540.00	1544	2659.3	172.23
6	Chamera-II	3*100	300.00	1471	1521.7	103.45
7	Chamera-III		-	218	-	-
8	Uri	4*120	480.00	2587	2704.4	104.54
9	Uri-II		-	265	-	-
10	Dhauliganga	4*70	280.00	1081	1156.8	107.01
11	Dulhasti	3*130	390.00	1870	2198.7	117.58
12	Sewa-III	3*40	120.00	521	561.9	107.85
13	Chutak		-	50	-	-
14	Nimboo Bazgo		-	64	-	-
Total NHPC			3092.20	13793	15240.00	110.49
<u>SJVNL</u>						
1	Nathpa Jhakri	6*250	1500.00	6500	7610.32	117.08
<u>THDC</u>						
1	Tehri	4*250	1000.00	2797	3983.67	142.43
2	Koteshwar	4*100	400.00	438	607.63	138.73
Total Central			8858.50	33551	39901.08	118.93
<u>HPSEB LTD</u>						
1	Giri Bata	2*30	60.00	200	214.86	107.43
2	Bassi	4*15	60.00	200	155.43	77.72
3	Sanjay	3*40	120.00	580	590.08	101.74
4	Larji	3*42	126.00	575	696.93	121.21
Total HPSEB LTD			366.00	1555	1657.30	106.58
<u>PRIVATE</u>						
<u>MALANA POWER COMPANY LTD.</u>						
1	Malana	2*43	86.00	350	376.06	107.45
<u>JAIPRAKASH HYDRO POWER LTD.</u>						
1	Baspa-II	3*100	300.00	1213	1401.58	115.55
<u>EVEREST POWER COMPANY LTD.</u>						
1	Malana-II	2*50	100.00	208	73.38	35.28
<u>ALLAIN DUHANGAN POWER LTD.</u>						
1	Allain Duhangan	2*96	192.00	678	616.01	90.86
<u>JAYPEE KARCHAM HYDRO POWER CORPORATION LTD.</u>						
1	Karcham Wangtoo	4*250	1000.00	1237	2514.36	203.26
<u>LANCO GREEN POWER PVT. LTD.</u>						
1	Budhil			57	-	-
Total Private			1678.00	3743	4981.39	133.09
Total HP			2044.00	5298	6638.69	125.31
<u>JAMMU & KASHMIR</u>						
<u>J&KSPDC</u>						
1	Lower Jhelum	3*35	105	450	483.67	107.48
2	Upper Sindh II	3*35	105	306	310.54	101.48
3	Baglihar	3*150	450	2536	2800.86	110.44
Total J&KSPDC			660	3292	3595.07	109.21
Total J & K			660	3292	3595.07	109.21
<u>RAJASTHAN</u>						
<u>RRVUNL</u>						
1	R P Sagar	4*43	172	127	363.55	286.26
2	Jawahar Sagar	3*33	99	100	277.53	277.53
3	Mahi Bajaj I & II	2*25+2*45	140	80	180.49	225.61
Total RRVUNL			411	307	821.57	267.61
Total Rajasthan			411	307	821.57	267.61

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2011-12**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY AS ON 31.03.2012 (MW)	2011-12		ACTUAL AS % OF TARGET
			TARGET (MU)	ACTUAL (MU)		
<u>PUNJAB</u>						
<u>PSPCL</u>						
1	Shanan	4*15+1*50	110.00	525	517.36	98.54
2	Mukerian I-IV	6*15+6*19.5	207.00	1000	1357.76	135.78
3	A P Sahib I & II	4*33.5	134.00	720	823.96	114.44
4	Ranjit Sagar	4*150	600.00	1500	1927.77	128.52
Total PSPCL			1051.00	3745	4626.85	123.55
Total Punjab			1051.00	3745	4626.85	123.55
<u>UTTAR PRADESH</u>						
<u>UPJVNL</u>						
1	Rihand	6*50	300.00	350	632.99	180.85
2	Obra	3*33	99.00	100	243.9	243.90
3	Matatilla	3*10.2	30.60	108	152.82	141.50
4	Khara	3*24	72.00	327	373.96	114.36
Total UPJVNL			501.60	885	1403.67	158.61
Total UP			501.60	885	1403.67	158.61
<u>UTTRAKHAND</u>						
<u>UJVNL</u>						
1	Khatima	3*13.8	41.40	160	164.02	102.51
2	Ram Ganga	3*66	198.00	265	416.43	157.14
3	Dhakrani (Y.St.I)	3*11.25	33.75	150	152.74	101.83
4	Dhalipur (Y.St.I)	3*17	51.00	225	229.59	102.04
5	Kulhal (Y.St.IV)	3*10	30.00	155	157.84	101.83
6	Chibro (Y.St.II)	4*60	240.00	756	848.97	112.30
7	Chilla	4*36	144.00	770	910.08	118.19
8	Khodri (Y.St.II)	4*30	120.00	360	382.84	106.34
9	Maneri Bhali-I	3*30	90.00	480	516.12	107.53
10	Maneri Bhali-II	4*76	304.00	1300	1351.34	103.95
Total UJVNL			1252.15	4621	5129.97	111.01
<u>PRIVATE</u>						
<u>JPVL</u>						
1	Vishnu Prayag	4*100	400.00	1775	2176.87	122.64
Total Uttrakhand			1652.15	6396	7306.84	114.24
Total Northern Region			15178.25	53474	64293.77	120.23
<u>WESTERN REGION</u>						
<u>GUJARAT</u>						
<u>SSNNL</u>						
1	Sardar Sarovar CHPH	5*50	250.00	528	502.71	95.21
2	Sardar Sarovar RBPH	6*200	1200.00	2500	3726.62	149.06
Total SSNNL			1450.00	3028	4229.33	139.67
<u>GSECL</u>						
1	Ukai	4*75	300	466	457.57	98.19
2	Kadana PSS	4*60	240	150	272.05	181.37
Total GSECL			540	616	729.62	118.44
Total Gujarat			1990.00	3644.00	4958.95	136.09
<u>MADHYA PRADESH</u>						
<u>NHDC</u>						
1	Indira Sagar	8*125	1000.00	2200	3286.35	149.38
2	Omkareshwar	8*65	520.00	965	1376.02	142.59
Total NHDC			1520.00	3165	4662.37	147.31

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2011-12**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY AS ON 31.03.2012 (MW)	2011-12		ACTUAL AS % OF TARGET
			TARGET (MU)	ACTUAL (MU)		
<u>MPGPCL</u>						
1	Gandhi Sagar	5*23	115.00	200	293.73	146.87
2	Pench	2*80	160.00	315	440.21	139.75
3	Bargi	2*45	90.00	450	534.04	118.68
4	Madhikhera	3*20	60.00	50	165.87	331.74
5	Bansagar Tons-I	3*105	315.00	800	1371.06	171.38
6	Bansagar Tons-II	2*15	30.00	88	54.98	62.48
7	Bansagar Tons-III	3*20	60.00	80	107.67	134.59
8	Rajghat	3*15	45.00	50	106.16	212.32
Total MPGPCL			875.00	2033	3073.72	151.19
<u>SMHPCL(Pvt.)</u>						
1	Maheshwar			290		
Total M P			2395.00	5488.00	7736.09	140.96
<u>CHHATISGARH</u>						
<u>CSPGC</u>						
1	Hasdeo Bango		120	175	314.11	179.49
Total CSPGC			120	175	314.11	179.49
Total Chattisgarh			120	175	314.11	179.49
<u>MAHARASHTRA</u>						
<u>MAHAGENCO</u>						
1	Koyna St.I&II	4*70+4*80	600.00	784	1292.90	164.91
2	Koyna St.III	4*80	320.00	517	727.18	140.65
3	Koyna IV	4*250	1000.00	1750	1736.86	99.25
4	Koyna DPH	2*18	36.00	90	128.47	142.74
5	Vaitarna & DAM PH.	1*60	60.00	144	158.30	109.93
6	Tillari	1*60	60.00	115	126.51	110.01
7	Bhira Tail Race	2*40	80.00	80	103.27	129.09
8	Ghatghar PSS		250.00	350	317.19	90.63
Total MAHAGENCO			2406.00	3830	4590.68	119.86
<u>DLHP</u>						
1	Bhandardhara-II	1*34	34	58	116.69	201.19
Total DLHP			34	58	116.69	201.19
<u>TATA HYDRO</u>						
1	Bhira	6*25	150.00	893	1008.08	112.89
2	Bhira PSS	1*150	150.00			
3	Bhivpuri	3*24+2*1.5	75.00	307	247.28	80.55
4	Khopoli	3*24	72.00	250	275.71	110.28
Total Tata			447.00	1450	1531.07	105.59
Total Maharashtra			2887.00	5338	6238.44	116.87
Total Western Region			7392.00	14645	19247.59	131.43
<u>SOUTHERN REGION</u>						
<u>ANDHRA PRADESH</u>						
<u>APGENCO</u>						
1	Machkund	3*17+3*21.25	114.75	512	485.33	94.79
2	T.B.Dam & Hampi	8*9	72.00	178	187.05	105.08
3	Upper sileru I & II	4*60	240.00	400	415.46	103.87
4	Lower Sileru	4*115	460.00	1050	1032.83	98.36
5	N.J.Sagar PSS	1*110+7*100.8	815.60	1550	1129.25	72.85
6	N.J.Sagar RBC	3*30	90.00	200	156.06	78.03
7	N.J.Sagar LBC	2*30	60.00	80	68.80	86.00
8	N.J.Sagar TDP		0.00	15	-	
9	Srisaillam	7*110	770.00	2159	1219.16	56.47
10	Pochampad	1*27	27.00	100	88.21	88.21
11	Srisaillam LB	6*150	900.00	1439	1381.68	96.02
12	Priyadarshni Jurala	6*39	234.00	300	207.22	69.07
Total APGENCO			3783.35	7983	6371.05	79.81
Total A P			3783.35	7983	6371.05	79.81

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2011-12**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED CAPACITY AS ON 31.03.2012 (MW)	2011-12		ACTUAL AS % OF TARGET
			TARGET (MU)	ACTUAL (MU)		
<u>KARNATAKA</u>						
<u>KPCL</u>						
1	Sharavathy	10*103.5	1035.00	4800	5707.82	118.91
2	Kalinadi	3*135+3*150	855.00	2400	3671.74	152.99
3	Supa DPH	2*50	100.00	400	553.98	138.50
4	Bhadra	1*2+2*12+1*7.2+1*6	39.20	60	73.5	122.50
5	Lingnamakki	2*27.5	55.00	231	306.4	132.64
6	Varahi	4*115	460.00	1000	1125.98	112.60
7	Ghatprabha	2*16	32.00	100	100.91	100.91
8	Kadra	3*50	150.00	338	487.71	144.29
9	Kodasali	3*40	120.00	300	455.52	151.84
10	Gerusoppa	4*60	240.00	550	582.59	105.93
11	Amatti Dam	1*15+5*55	290.00	500	521.15	104.23
12	Jog	4*13.2+4*21.6	139.20	283	236.73	83.65
13	Shivasamudram	6*3+4*6	42.00	182	335.65	184.42
14	Munirabad	2*9+1*10	28.00	78	98	125.64
Total KPCL			3585.40	11222	14257.68	127.05
Total Karnataka			3585.40	11222	14257.68	127.05
<u>KERALA</u>						
<u>KSEB</u>						
1	Idukki	6*130	780.00	2300	3044.41	132.37
2	Sabarigiri	6*50	300.00	1300	1434.25	110.33
3	Kuttiadi & Extn.	3*25+1*50	125.00	626	774.73	123.76
4	Kuttiadi Additional Extn.	2*50	100.00			
5	Sholayar	3*18	54.00	238	220.36	92.59
6	Sengulam	4*12	48.00	166	162.27	97.75
7	Nariamangalam & Extn.	3*15+1*25	70.00	350	360.56	103.02
8	Pallivasal	3*5+3*7.5	37.50	229	231.66	101.16
9	Poringalkuthu	4*8	32.00	160	184.76	115.48
10	Panniar	2*15	30.00	146	165.85	113.60
11	Idamalayar	2*37.5	75.00	263	348.98	132.69
12	Lower Periyar	3*60	180.00	590	648.62	109.94
13	Kakkad	2*25	50.00	225	231.53	102.90
Total Kerala			1881.50	6593	7807.98	118.43
<u>TAMIL NADU</u>						
<u>TANGEDCO</u>						
1	Pykara	3*7+1*11+2*13.6	59.20	39	41.63	106.74
2	Moyar	3*12	36.00	120	131.65	109.71
3	Kundah I - V	3*20+5*35+3*60 +2*50+2*20	555.00	1387	1356.15	97.78
4	Parson's Valley	1*30	30.00	44	35.89	81.57
5	Suruliyar	1*35	35.00	91	115.57	127.00
6	Aliyar	1*60	60.00	150	183.09	122.06
7	Mettur Dam & Tunnel	4*12.5+4*50	250.00	408	623.89	152.91
8	Lower Mettur I - IV	8*15	120.00	294	403.25	137.16
9	Periyar	4*35	140.00	455	537.47	118.13
10	Papansam	4*8	32.00	130	122.36	94.12
11	Sarkarpathy	1*30	30.00	141	109.57	77.71
12	Sholayar I & II	2*35+1*25	95.00	300	278.61	92.87
13	Kodayar I & II	1*60+1*40	100.00	154	296.66	192.64
14	Kadamparai PSS	4*100	400.00	484	510.53	105.48
15	Pykara Ultimate	3*50	150.00	361	356.95	98.88
16	Bhawani Kattalai Barrage-I	2*15	30.00	80	97.95	122.44
17	Bhawani Kattalai Barrage-II		-	44	-	-
18	Bhawani Kattalai Barrage-III		-	13	-	-
Total TANGEDCO			2122.20	4695	5201.22	110.78
Total Southern Region			11372.45	30493	33637.93	110.31

**GENERATION PERFORMANCE OF H.E.STATIONS IN THE COUNTRY
DURING THE YEAR 2011-12**

S. NO.	STATION	NO. OF UNITS* UNIT SIZE (MW)	INSTALLED	2011-12		ACTUAL AS % OF TARGET
			CAPACITY AS ON 31.03.2012 (MW)	TARGET (MU)	ACTUAL (MU)	
<u>EASTERN REGION</u>						
<u>JHARKHAND</u>						
<u>JSEB</u>						
1	Subernarekha I & II	2*65	130.00	100	270.05	270.05
	Total Jharkhand		130.00	100	270.05	270.05
<u>DVC</u>						
1	Maithon (WB)	2*20+1*23.2	63.20	61	121.95	199.92
2	Panchet	2*40	80.00	64	174.17	272.14
	Total DVC		143.20	125	296.12	236.90
<u>ODISHA</u>						
<u>OHPC</u>						
1	Balimela	6*60+2*75	510.00	1183	1047.29	88.53
2	Hirakud I & II	2*49.5+2*32+3*37.5+3*24	347.50	1000	1025.63	102.56
3	Rengali	5*50	250.00	450	873.31	194.07
4	Upper Kolab	4*80	320.00	750	604.24	80.57
5	Upper Indravati	4*150	600.00	1800	1436.86	79.83
	Total OHPC		2027.50	5183	4987.33	96.22
	Total Odisha		2027.50	5183	4987.33	96.22
<u>WEST BENGAL</u>						
<u>WBSEDCL</u>						
1	Jaldhaka I	3*9	27.00	160	84.25	52.66
2	Ramman II	4*12.5	50.00	202	227.18	112.47
3	Purulia PSS	4*225	900.00	660	766.46	116.13
	Total WBSEDCL		977.00	1022	1077.89	105.47
<u>NHPC</u>						
1	Teesta Low Dam-III		-	19	-	-
	Total W B		977.00	1041	1077.89	103.54
<u>SIKKIM</u>						
<u>NHPC</u>						
1	Rangit (Sikkim)	3*20	60.00	333	352.60	105.89
2	Teesta-V (Sikkim)	3*170	510.00	2511	2568.00	102.27
	Sub total NHPC (Sikkim)		570.00	2844	2920.60	102.69
<u>PRIVATE SECTOR</u>						
<u>GATI INVESTMENTS PVT LTD</u>						
1	Chuzachen HEPP(Sikkim)			13		
	Total Eastern Region		3847.70	9306	9551.99	102.64
<u>NORTH EASTERN REGION</u>						
<u>CENTRAL SECTOR</u>						
<u>NEEPCO</u>						
1	Khandong (Assam)	3*25	75	210.48	178.79	84.94
2	Kopili (Assam)	4*50	200	789.52	992.06	125.65
3	Doyang (Nagaland)	3*25	75	227	228.84	100.81
4	Ranganadi (ArunachalPPradesh)	3*135	405	1400	978.4	69.89
	Total NEEPCO		755	2627	2378.09	90.52
<u>NHPC</u>						
1	Loktak (Manipur)		105	448	523.5	116.85
	Total NHPC		105	448	523.5	116.85
	Total Central Sector (NER)		860	3075	2901.59	94.36
<u>ASSAM</u>						
<u>APGCL</u>						
1	Karbi Langpi	2*50	100.00	415	460.94	111.07
	Total APGCL		100.00	415	460.94	111.07
	Total Assam		100.00	415	460.94	111.07
<u>MEGHALAYA</u>						
<u>MeECL</u>						
1	Kyrdemkulai	2*30	60.00	150	132.62	88.41
2	Umium St.I	2*9+2*9	36.00	107	98.96	92.49
3	Umium St.IV	2*30	60.00	203	184.13	90.70
4	Myntdu	2*42	84.00	182	0	
	Total MeECL		240.00	642	415.71	64.75
	Total Meghalaya		240.00	642	415.71	64.75
	Total North Eastern Region		1200.00	4132	3778.24	91.44
	TOTAL ALL INDIA		38990.40	112050	130509.52	116.47
	IMPORT FROM BHUTAN			5586	5284.51	94.60
	TOTAL ALL INDIA INCLUDING BHUTAN IMPORTS		38990.40	117636	135794.03	115.44

CHAPTER 3

MAJOR RESERVOIR BASED HE SCHEMES

CHAPTER - 3

MAJOR RESERVOIR BASED H.E.SCHEMES

3.1 Introduction

Some of the hydro electric schemes are provided with regulating storage reservoirs. Water during monsoon and/or snowmelt period, is collected in these reservoirs. The regulated discharges from reservoirs are utilized for power generation, irrigation and other purposes. Reservoir based schemes are of two types i.e. single purpose and multipurpose. Single purpose schemes are operated only for power generation. Multipurpose storage schemes are operated for more than one purpose such as flood control, irrigation, water supply, pisciculture, navigation, tourist attraction and other recreational facilities besides power generation. Reservoir based schemes afford greater utilization of the available inflows approaching to long term average inflows resulting in greater firm power benefits. Reservoir based schemes are ideally suited to provide much needed peaking support to the system.

3.2 Major Reservoir Based Schemes

CEA is presently monitoring 31 reservoirs based H. E. Schemes in the country as listed below.

S. No.	Name of Reservoir	H.E. Stations	Installed Capacity (MW)	State
Northern Region				
1	Bhakra	Bhakra (L)	540.00	Himachal Pradesh
		Bhakra (R)	785.00	Himachal Pradesh
		Kotla	77.65	Punjab
		Ganguwal	77.65	Punjab
2	Pong	Pong	396.00	Himachal Pradesh
3	Ranjit Sagar	Ranjit Sagar	600.00	Punjab
4	Tehri	Tehri	1000.00	Uttarakhand
		Koteshwar	400.00	
5	Ram Ganga	Ram Ganga	198.00	Uttarakhand
6	Rihand	Rihand	300.00	Uttar Pradesh
		Obra	99.00	Uttar Pradesh
7	R.P.Sagar	R.P.Sagar	172.00	Rajasthan
		Jawahar Sagar	99.00	Rajasthan
	Sub-Total(NR)		4744.30	

Western Region				
8	Ukai	Ukai	300.00	Gujarat
9	Sardar Sarovar	Sardar Sarovar (RBPH)	1200.00	Gujarat
		Sardar Sarovar (CHPH)	250.00	Gujarat
10	Gandhi Sagar	Gandhi Sagar	115.00	Madhya Pradesh
11	Indira Sagar	Indira Sagar	1000.00	Madhya Pradesh
12	Koyna	Koyna I-IV and DPH	1956.00	Maharashtra
13	Bhira	Bhira	150.00	Maharashtra
		Bhira PSS	150.00	Maharashtra
	Sub-TOTAL (WR)		5121.00	
Southern Region				
14	Machkund	Machkund	114.75	Andhra Pradesh
15	Srisaillam	Srisaillam RBPH	770.00	Andhra Pradesh
		Srisaillam LBPH	900.00	Andhra Pradesh
16	Nagarjuna Sagar	Nagarjuna Sagar PSS	815.60	Andhra Pradesh
		NJ.SAGAR RBC & Ext.	90.00	Andhra Pradesh
		NJ.SAGAR LBC	60.00	Andhra Pradesh
17	Sharavathy	Sharavathy	1035.00	Karnataka
		Jog	139.20	Karnataka
		Gerusoppa	240.00	Karnataka
18	Supa & Kalinadi	Kalinadi	855.00	Karnataka
		Supa DPH	100.00	Karnataka
19	Almatti Dam	Almatti Dam	290.00	Karnataka
20	Idukki	Idukki	780.00	Kerala
21	Sabarigiri	Sabarigiri	300.00	Kerala
22	Madhupatty	Madhupatty	155.50	Kerala
23	Idamalayar	Idamalayar	75.00	Kerala
24	Mettur	Mettur	370.00	Tamil Nadu
25	Periyar	Periyar	140.00	Tamil Nadu
	Sub-Total (SR)		7230.05	

Eastern Region				
26	Hirakud	Burla	275.50	Odisha
		Chiplima	72.00	Odisha
27	Balimela	Balimela	510.00	Odisha
28	Upper Indravati	Indravati	600.00	Odisha
29	Upper Kolab	Upper Kolab	320.00	Odisha
30	Rengali	Rengali	250.00	Odisha
31	Loktak	Loktak	105.00	Manipur
	Sub-Total(ER/NER)		2132.50	
	Total(All India)		19227.85	

Salient features of 31 Nos. reservoirs based H.E. Schemes are indicated in **Annex-3.1**. These schemes constitute about 49.31% of the total hydel installed capacity and generated about 45.35% of the total hydel generation during 2011-12 as briefly indicated in Table-3.1.

TABLE - 3.1

CONTRIBUTION BY IMPORTANT RESERVOIR BASED H.E. SCHEMES

	Description	Reservoir Schemes	Other Schemes	Total
1.	Installed Capacity (MW)	19227.85	19762.55	38990.40
2.	Percentage of Total (%)	49.31	50.69	100
3.	Energy Generation (MU)	59190.36	71319.16	130509.52
4.	Percentage of Total (%)	45.35	54.65	100.00

3.3 Inflows

Inflows to the reservoirs are primarily dependent on rainfall during monsoon in the catchment area of the reservoirs. In case of Bhakra, Pong, Ranjit Sagar and Tehri reservoirs, however, snow melt in the catchment area during summer also contributes to their inflows. The inflows into the reservoirs during 2011-12 vis-à-vis 2010-11 are given at **Exhibit 3.1**. Inflows into the reservoirs and generation during the year 2011-12 vis-a-vis 2010-11 is given below at Table-3.2.

TABLE 3.2

RESERVOIR SCHEMES-INFLOW & ENERGY GENERATION

S No	SCHEME/ Region	Inflows			Generation		
		2010-11 (MCM)	2011-12 (MCM)	2011-12 Inflow as % of 2010-11 inflow 5= (4/3*100)	2010-11 (MU)	2011-12 (MU)	2011-12 generati on as compared to 2010- 11 (%) 8= (7/6*100)
1	2	3	4		6	7	
	Northern Region						
1	Bhakra	21026.06	19033.60	90.52	6614.14	7351.68	111.15
2	Pong	9409.38	9842.98	104.61	1346.28	1852.88	137.63
3	Ranjit Sagar	6713.40	7027.91	104.68	1733.39	1927.77	111.21
4	Tehri	6971.68	8694.28	124.71	3116.03	4591.3	147.34
5	Ram Ganga	2629.68	78056.02	2968.27	325.62	416.43	127.89
6	R.P.Sagar	1595.46	3474.58	217.78	320.88	641.08	199.79
7	Rihand	2306.59	8533.75	369.97	279.92	876.89	313.26
	Sub Total(NR)	50652.25	134663.12	265.86	13736.26	17658.03	128.55
	Western Region						
8	Ukai	138.90	8294.38	5971.48	457.35	457.57	100.05
9	Sardar Sarovar	18385.00	35701.00	194.19	3588.78	4229.33	117.85
10	Gandhi Sagar	752.21	5342.30	710.21	89.47	293.73	328.30
11	Indira Sagar	15427.93	31290.00	202.81	2197.77	3286.35	149.53
12	Koyna	3242.62	3959.89	122.12	3789.27	3885.41	102.54
13	Bhira	760.00	1066.00	140.26	875.34	1008.08	115.16
	Sub Total(WR)	38706.66	85653.57	221.29	10997.98	13160.47	119.66
	Southern Region						
14	Machkund	1344.13	786.40	58.51	585.46	485.33	82.90
15	Srisaillam	28934.00	8822.25	30.49	3827.31	2600.84	67.95
16	N.J. Sagar	17424.48	8673.16	49.78	1717.76	1354.11	78.83
17	Sharavathy	4707.17	5637.65	119.77	5330.22	6527.14	122.46
18	Supa	2417.52	3669.79	151.80	2564.56	4225.72	164.77

19	Almatti	12229.37	16194.33	132.42	540.30	521.15	96.46
20	Idukki	1731.40	1851.43	106.93	2258.69	3044.41	134.79
21	Sabarigiri	855.71	875.14	102.27	1372.93	1434.25	104.47
22	Madhupatty	180.69	175.54	97.15	776.73	754.49	97.14
23	Idamalayar	1481.82	1563.52	105.51	376.87	348.98	92.60
24	Mettur	5572.55	6150.46	110.37	623.51	1027.14	164.74
25	Periyar	604.18	679.18	112.41	432.02	537.47	124.41
Sub Total(SR)		77483.01	55078.85	71.09	20406.36	22861.03	112.03
Eastern Region							
26	Hirakud	21244.24	33436.43	157.39	702.89	1025.63	145.92
27	Balimela	4678.21	2512.36	53.70	1284.64	1047.29	81.52
28	Upper Indravati	2304.81	1558.50	67.62	1598.7	1436.86	89.88
29	Upper Kolab	1412.60	748.75	53.01	616.2	604.24	98.06
30	Rengali	3484.68	18991.32	544.99	270.23	873.31	323.17
Sub Total(ER)		33124.52	57247.36	172.82	4472.66	4987.33	111.51
North Eastern Region							
31	Loktak	904.40	753.70	83.34	603.89	523.50	86.69
Sub Total(NER)		904.40	753.70	83.34	603.89	523.50	86.69
Total (All India)		200870.85	333396.60	165.98	50217.15	59190.36	117.87

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 F.R.L only at Koyna, Bhira, Almatti Dam, Madhupatty, Hirakud, Rengali and Loktak reservoirs during 2011-12. Month wise maximum levels of major reservoirs during 2011-12 vis-à-vis 2010-11 are indicated at **Exhibits 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8 and 3.9.**

3.5 Generation :

Generation from reservoir based H.E. Stations during the year 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 24 Nos. out of 31 Nos. reservoir based hydel schemes, annual generation during the year 2011-12 was more than the annual generation targets. The reservoir based schemes have been grouped in terms of percentage achievement of generation over targets in Table-3.3 below.

TABLE -3.3

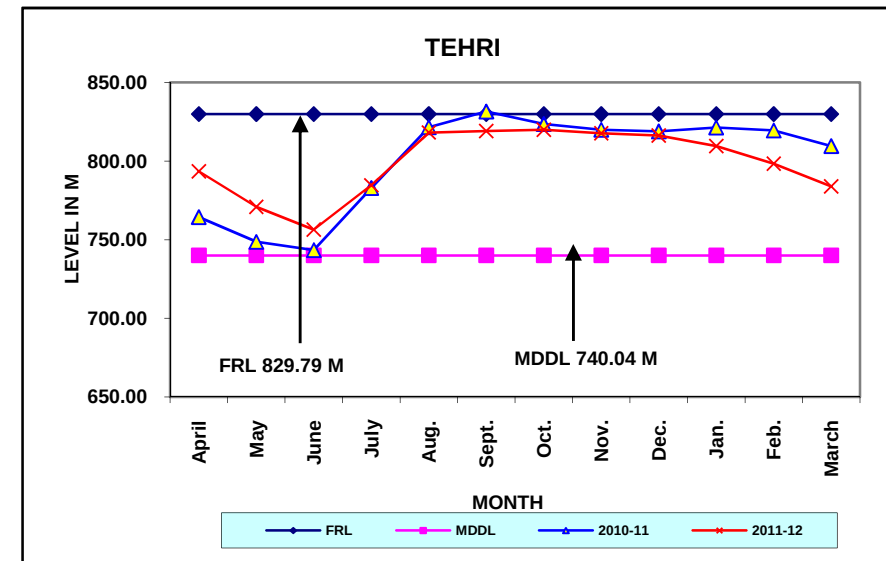
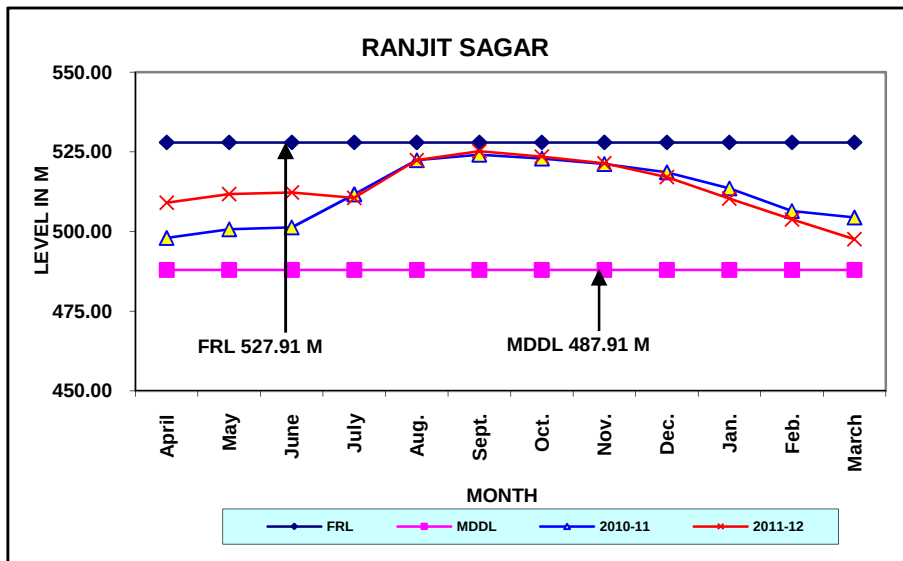
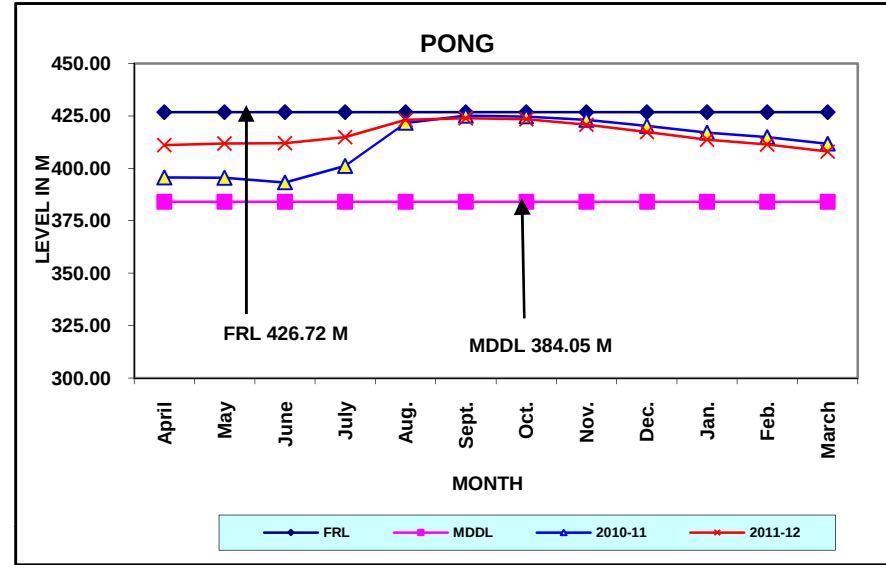
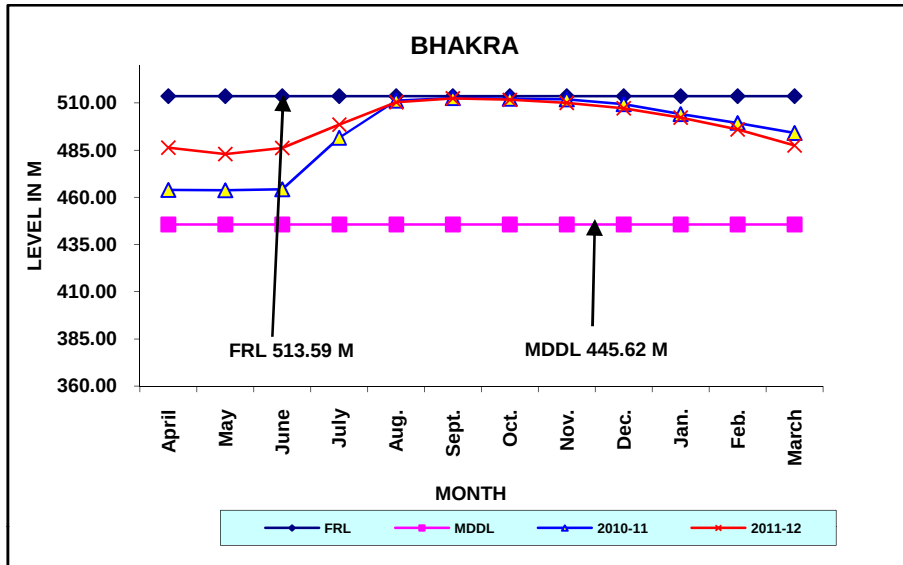
GENERATION PERFORMANCE OF MAJOR RESERVOIR BASED SCHEMES

S. No.	% of actual generation over target	Name of the Reservoir Scheme
1	120 & Above	Bhakra, Pong, Tehri, R P Sagar, Ranjit Sagar, Rihand, Ramganga, Sardar Sarovar, Indira Sagar, Gandhi Sagar, Koyna, Supa, Idukki, Idamalayar, Mettur, Rengali.
2	110 - 120	Bhira, Sharavathy, Sabarigiri, Periyar, Loktak.
3	100 - 110	Almatti, Madhupatty, Hirakud,
4	Below 100	Ukai, Machkund, NJ Sagar, Srisaillam, Balimela, Upper Indravati, Upper Kolab.

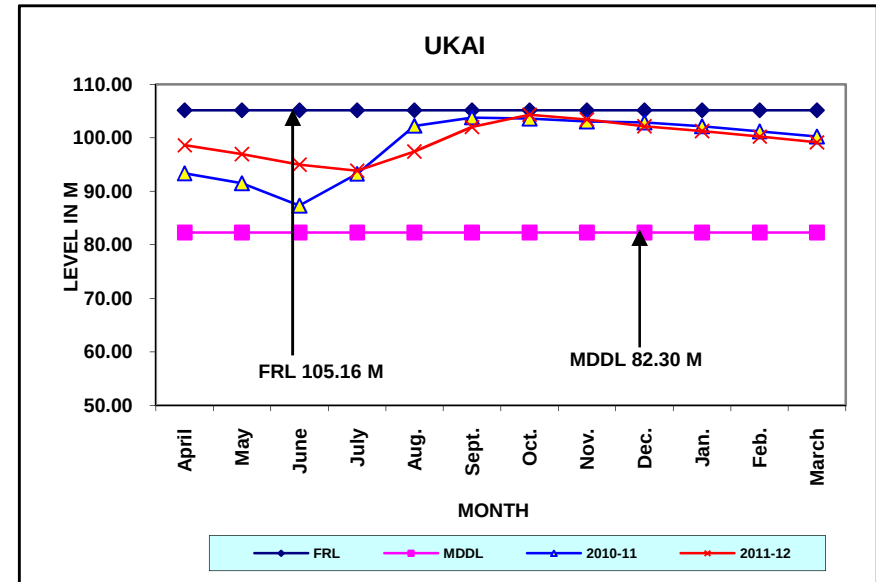
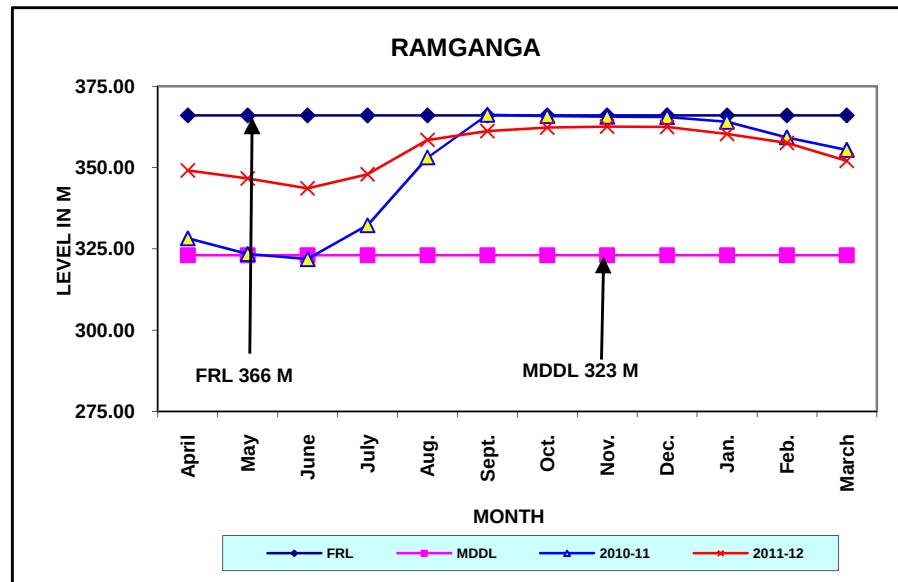
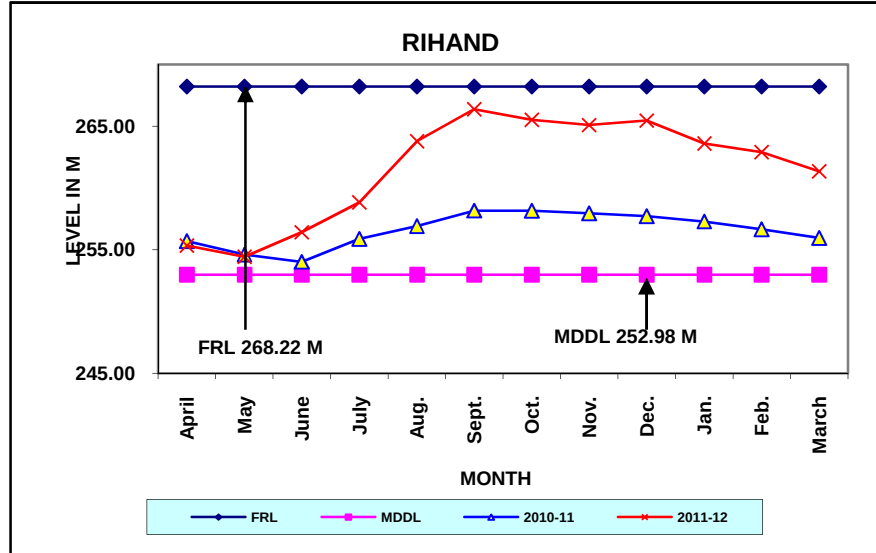
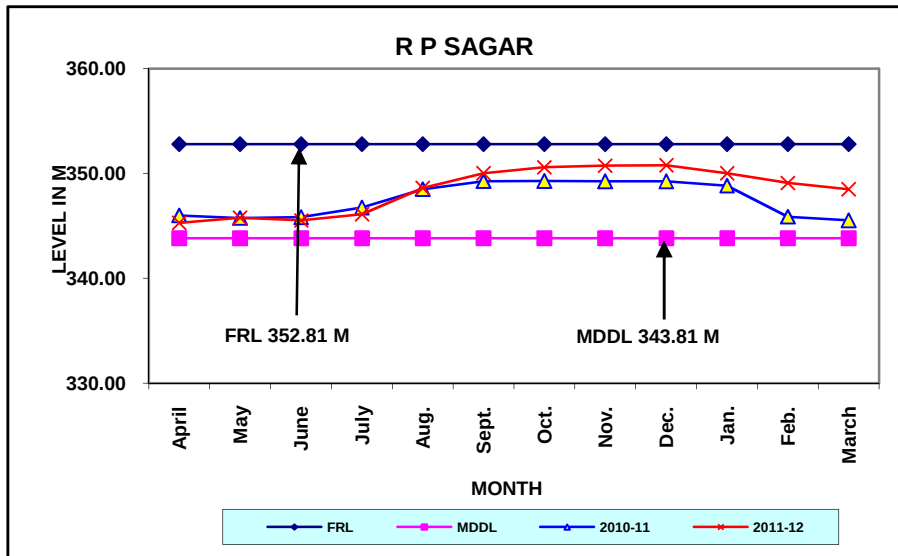
Generation from 31 major reservoir schemes during the year 2011-12 has been 59190.36 MU showing increase of 17.87% over the 2010-11 generation of 50217.15 MU. Scheme wise generation of reservoir schemes during the year 2011-12 compared to that of last year 2010-11 is shown in Table 3.2 above.

Generation of major reservoir based H.E. Schemes during 2011-12 as compared to the generation during last year i.e. 2010-11 is also depicted at **Exhibit-3.10**.

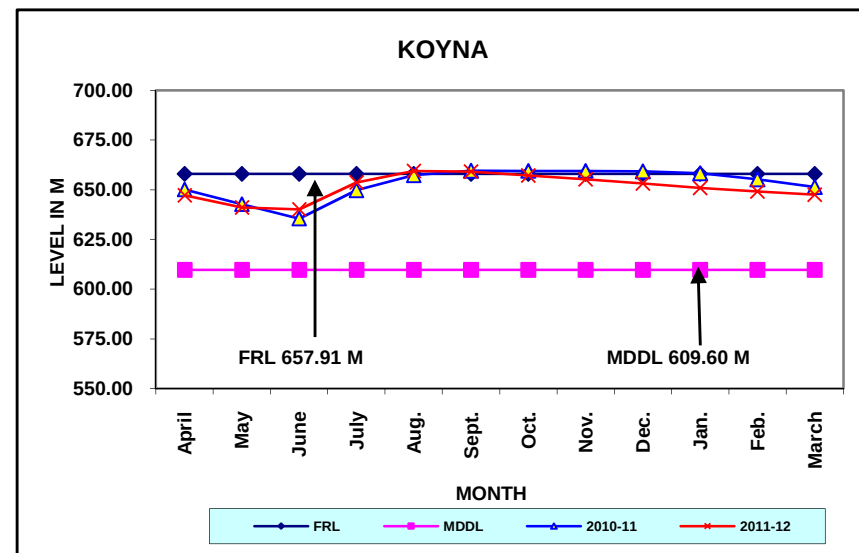
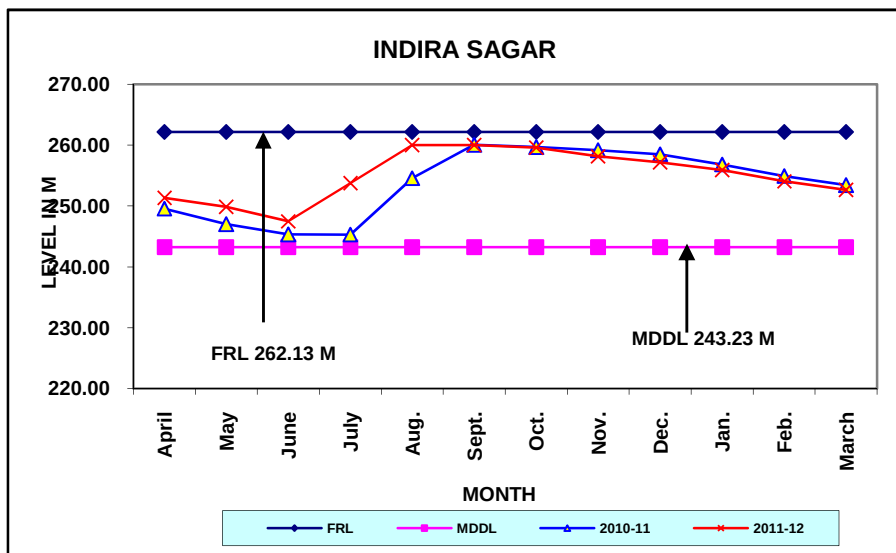
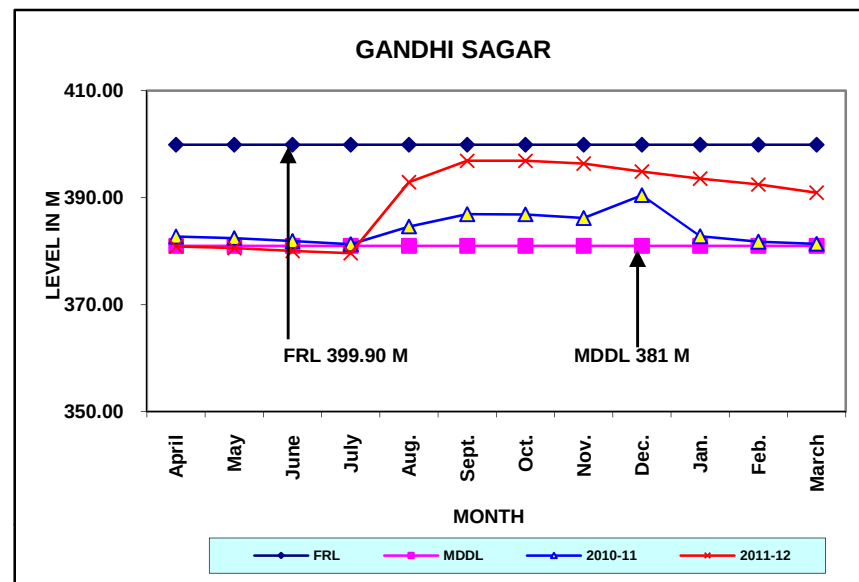
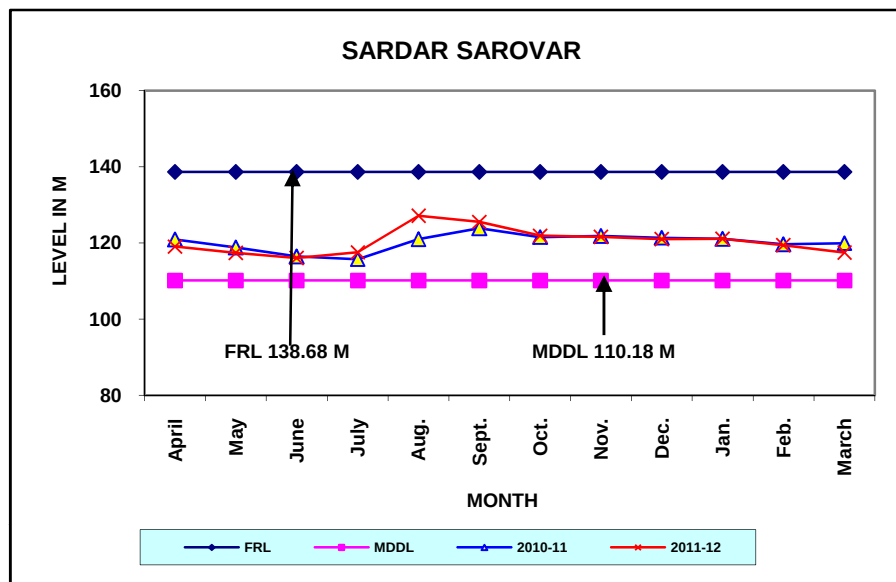
MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



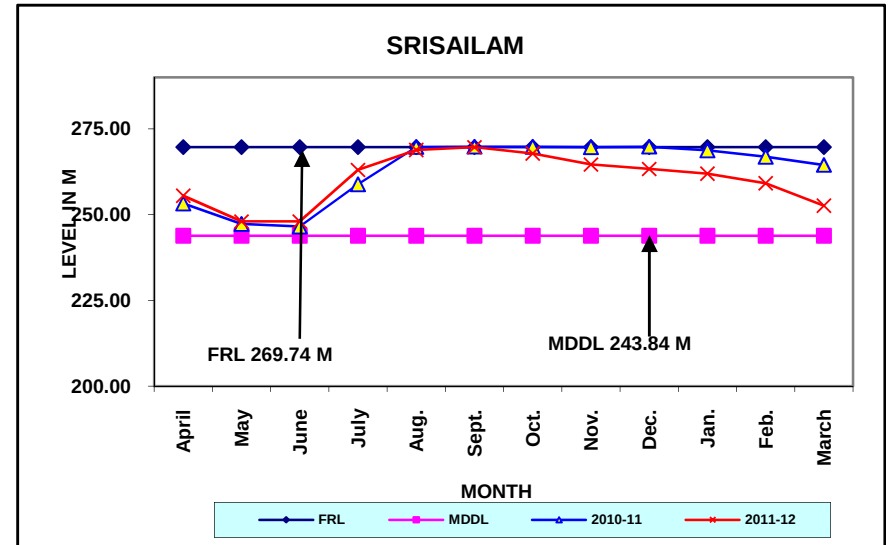
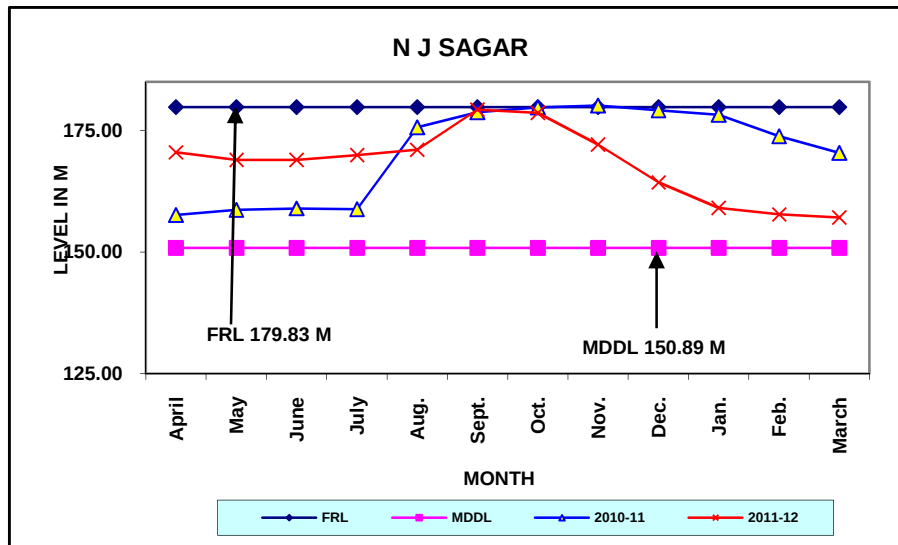
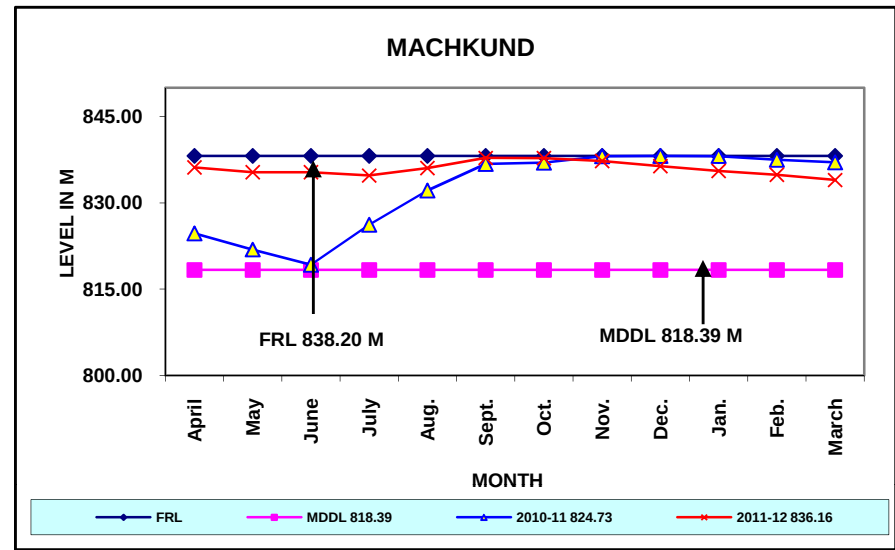
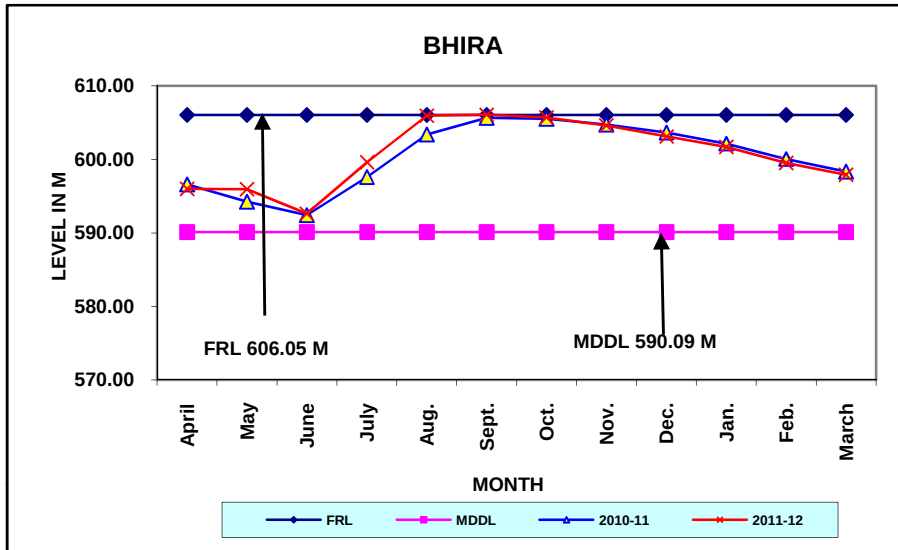
MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



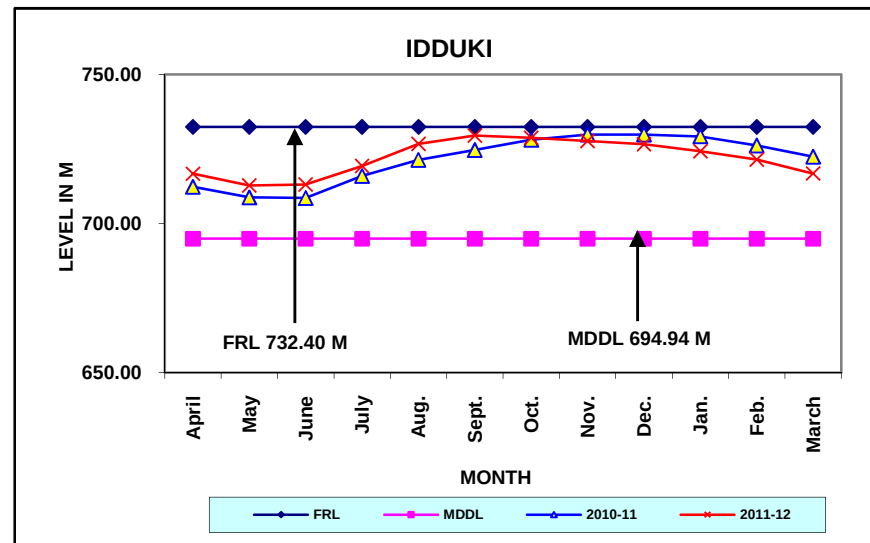
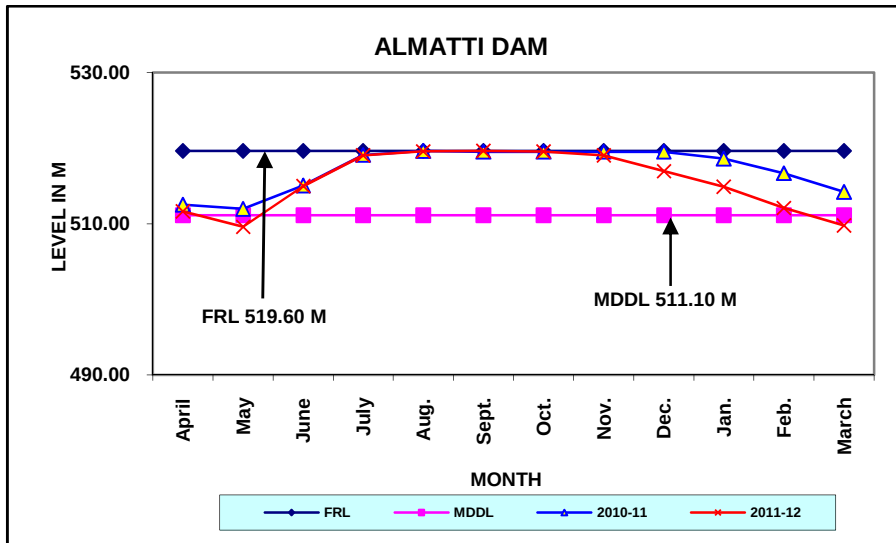
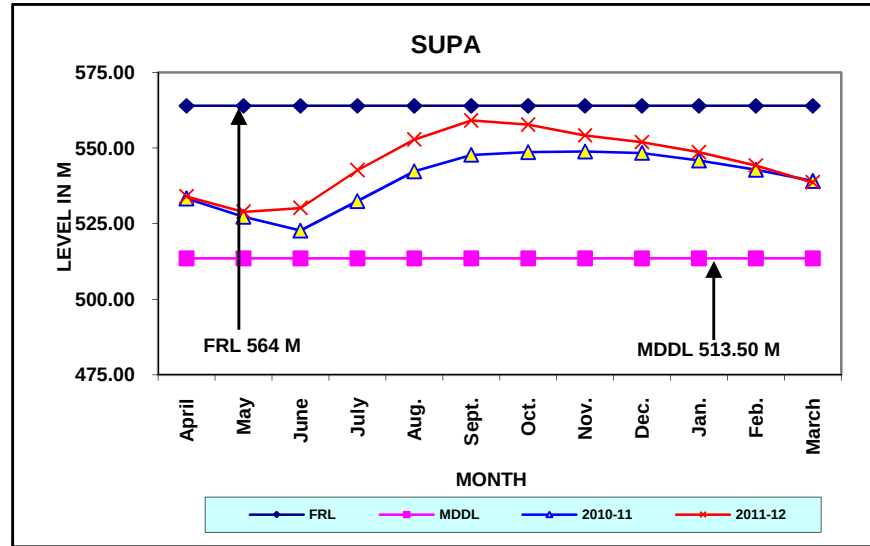
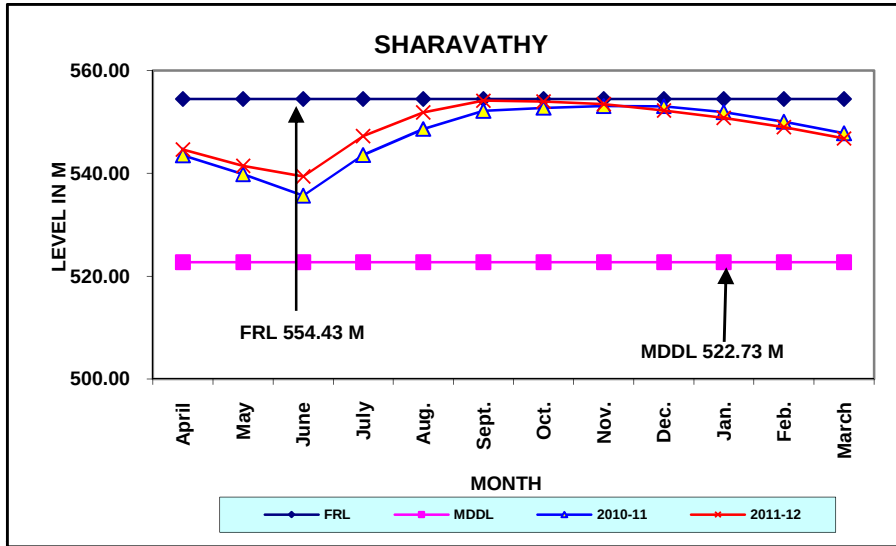
MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



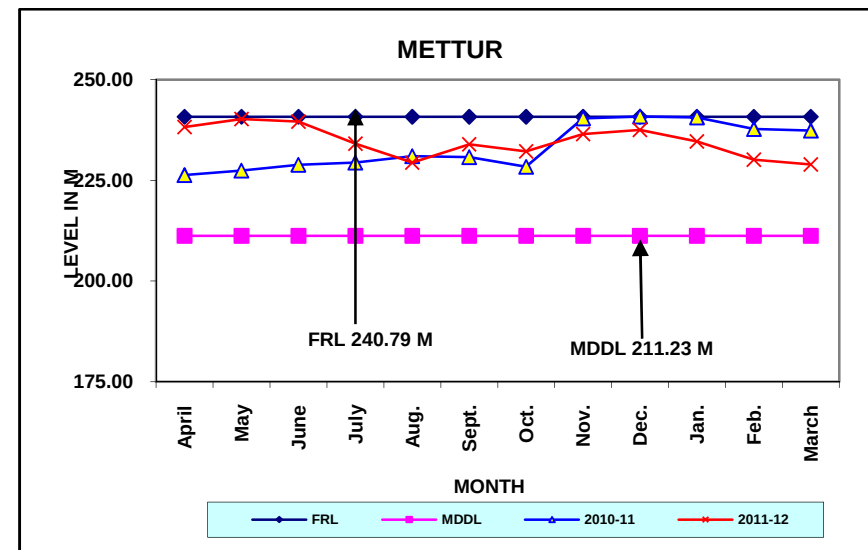
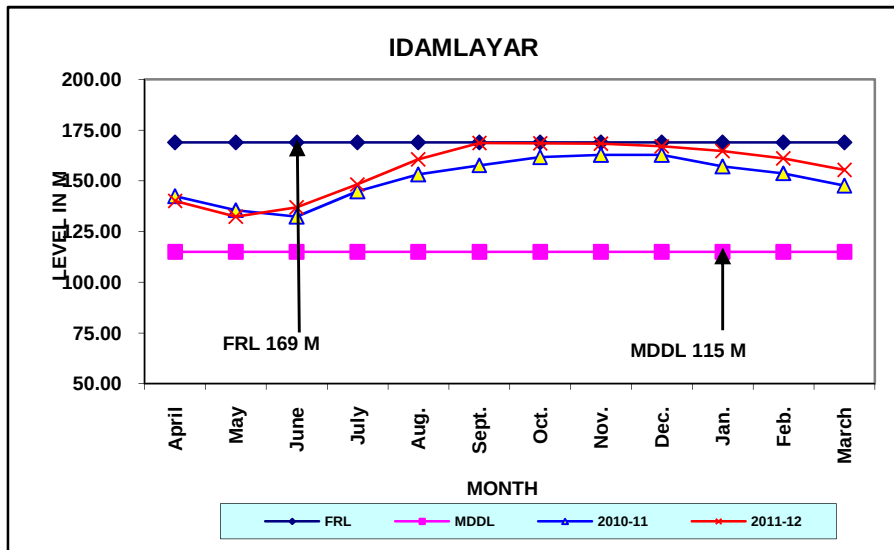
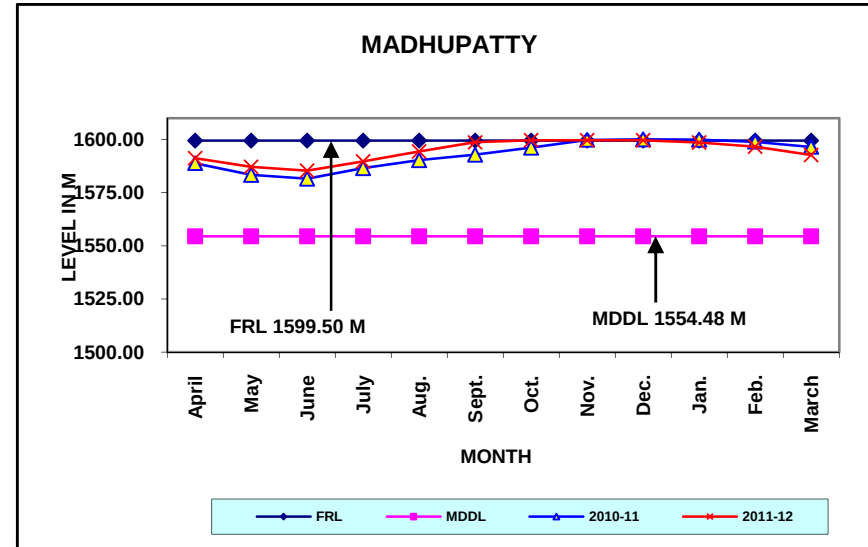
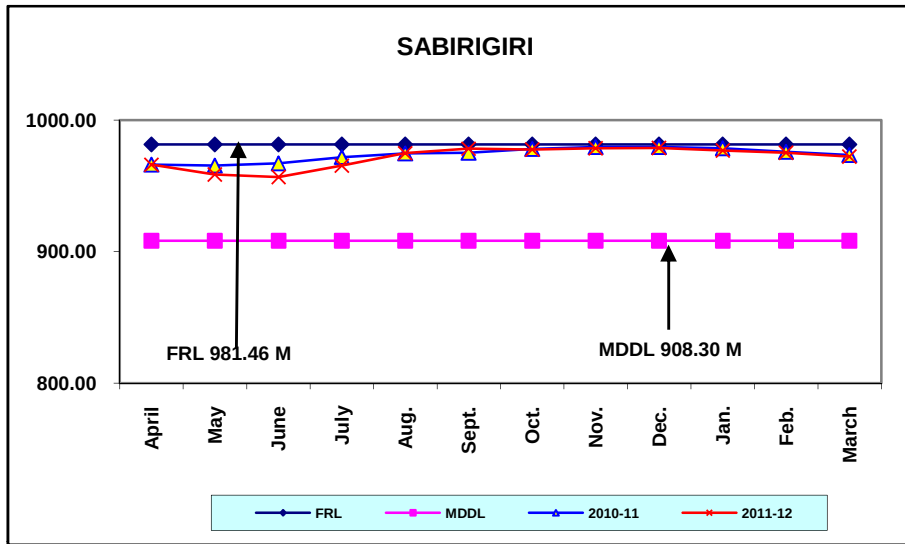
MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



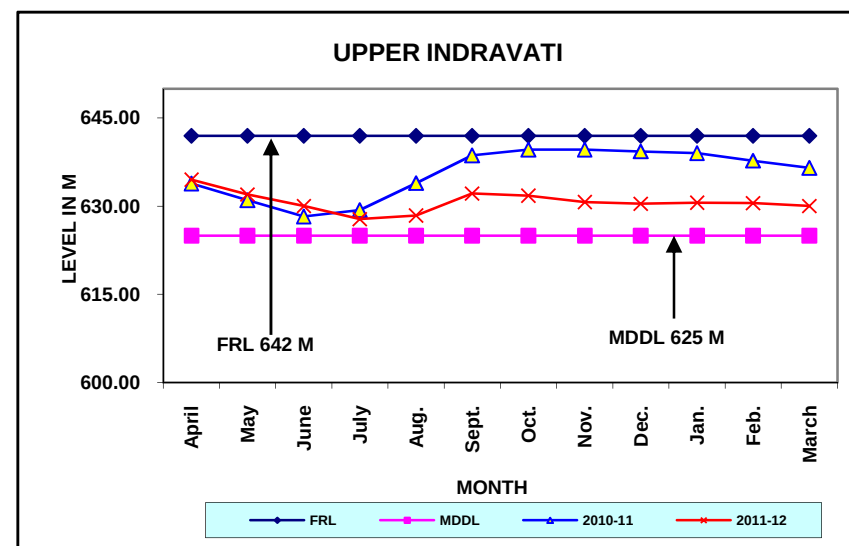
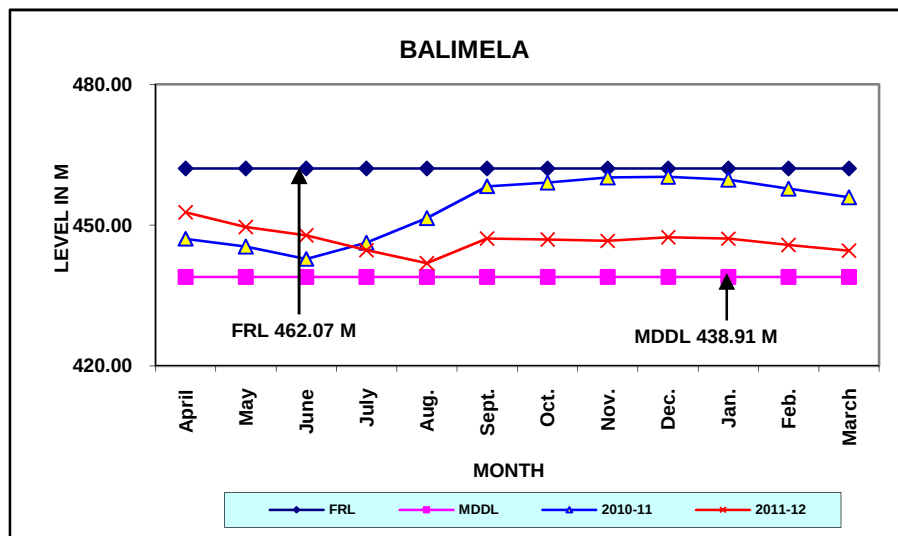
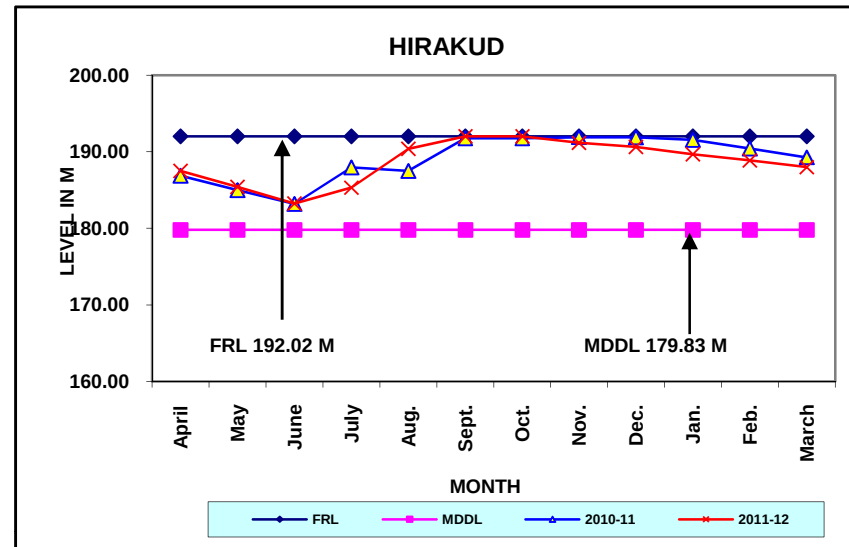
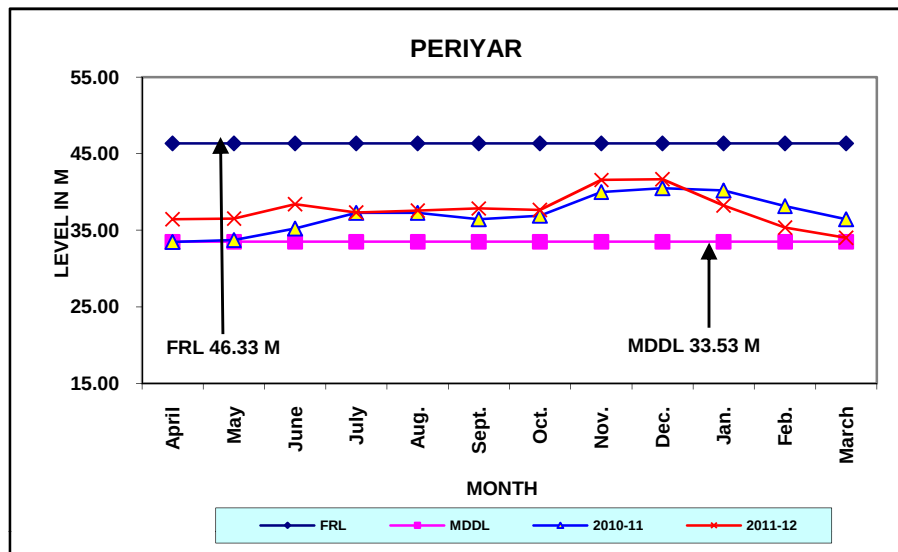
MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



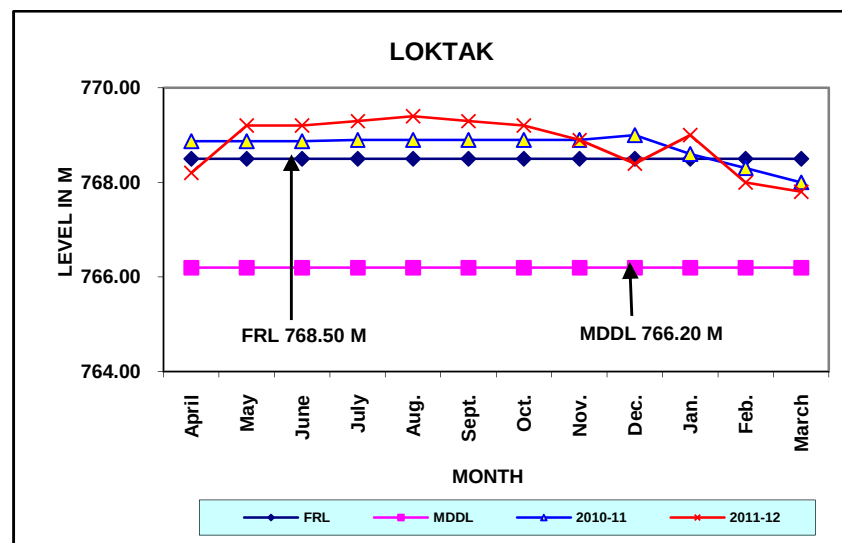
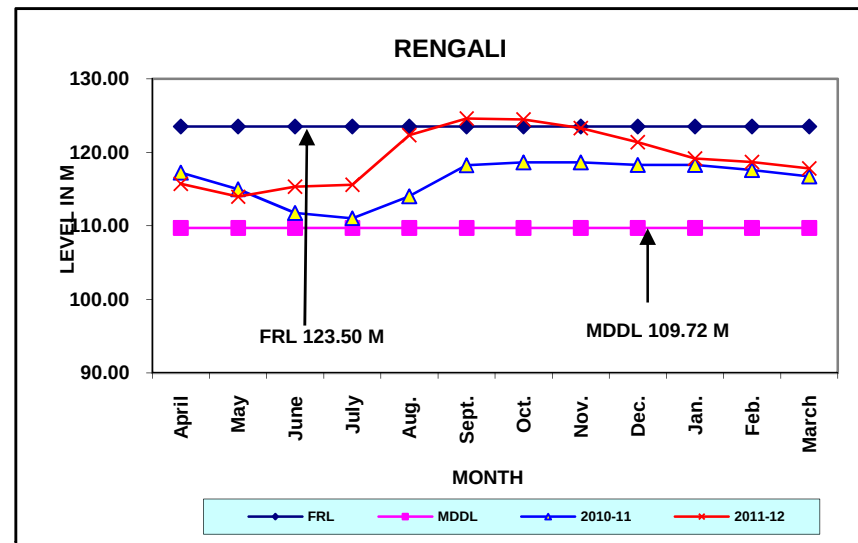
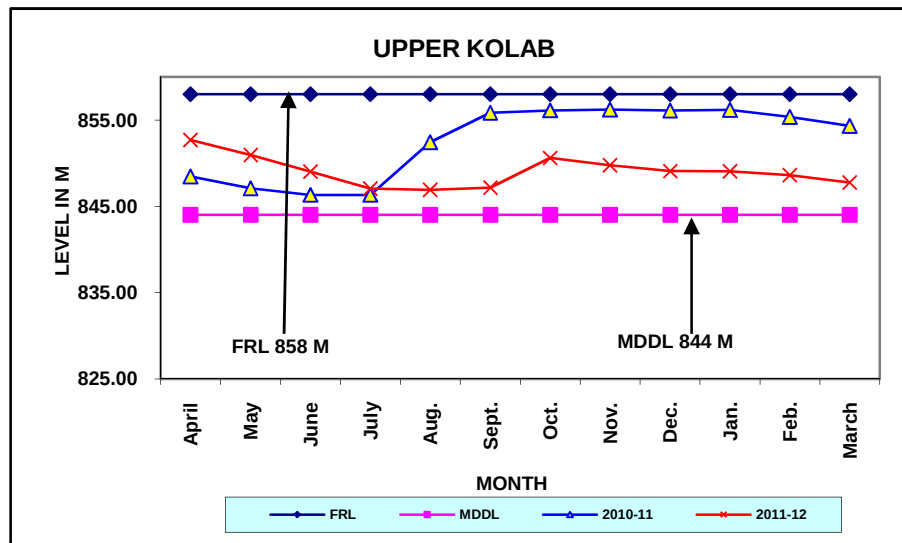
MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



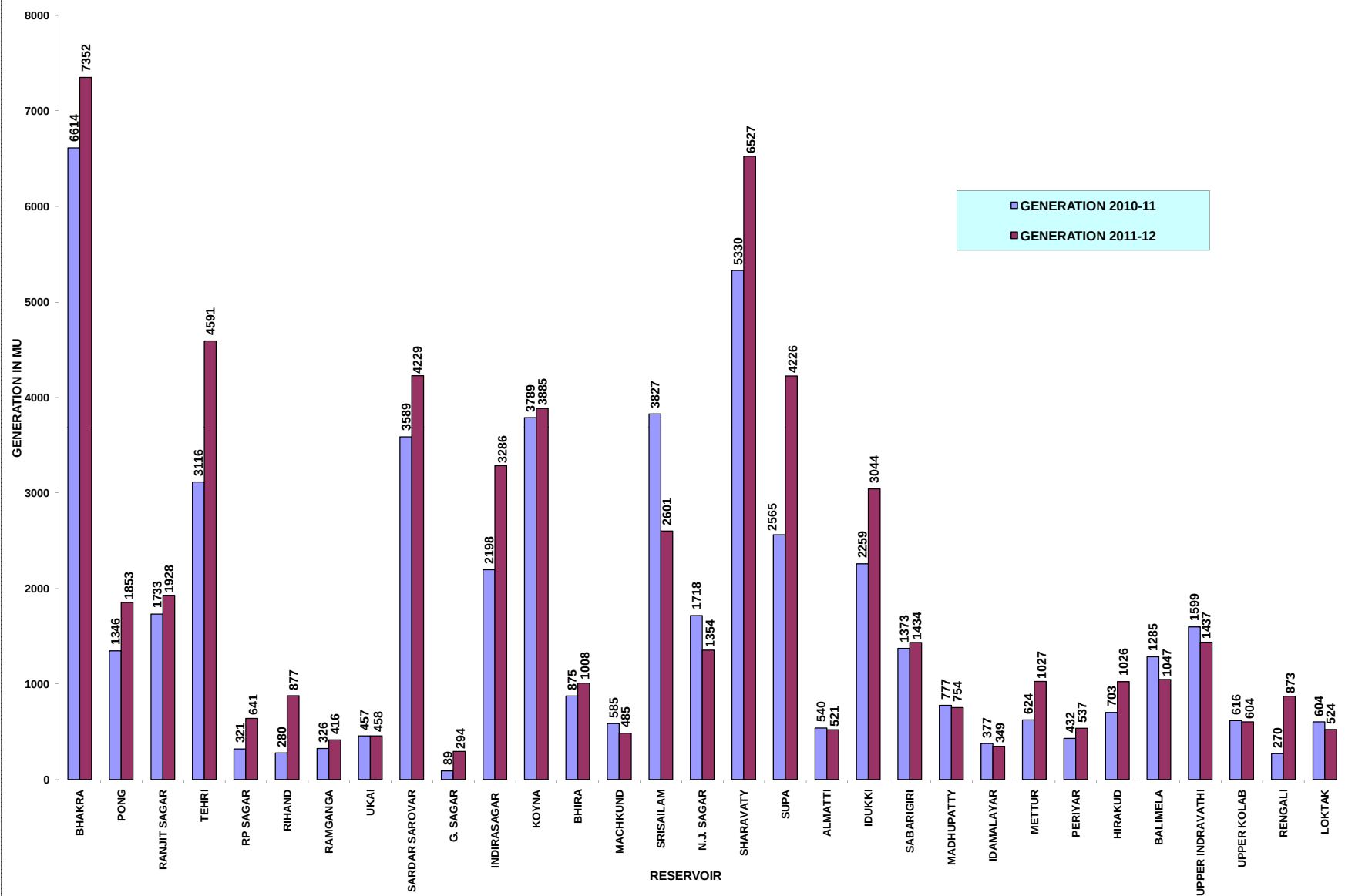
MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



MONTHWISE MAXIMUM LEVEL OF IMPORTANT RESERVOIRS



GENERATION FROM RESERVOIR BASED HYDROELECTRIC STATIONS DURING 2011-12 VIS-A-VIS 2010-11



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

S. No	NAME OF RESERVOIR AND ASSOCIATED H.E. STATIONS	INSTALLED CAPACITY AS ON 31.03.2012	ANNUAL DESIGN ENERGY	FULL RESER-VOIR LEVEL	MINIMUM DRAW DOWN LEVEL	RESERVOIR		ENERGY CONTENT AT	LEVELS ATTAINED DURING 2011-12			
						CAP. AT						
						FRL						
						GROSS :	LIVE	FRL	MINIMUM	DATE	MAX.	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)	(M)	dd.mm.yyyy	(M)	dd.mm.yyyy
NORTHERN REGION												
1	BHAKRA	1480.30	5282	513.59	445.62	8321	6516	1729.00	477.15	31.03.2012	512.37	17.09.2011
	a)BHAKRA LEFT	540.00	3924									
	b)BHAKRA RIGHT	785.00										
	c)GANGUWAL	77.65	1358									
	d)KOTLA	77.65										
2	PONG	396.00	1123	426.72	384.05	8053	6946	1084.00	403.37	31.03.2012	423.85	21.09.2011
3	RANJIT SAGAR	600.00	1507	527.91	487.91	3292	2191	390.00	495.50	31.03.2012	525.16	17.09.2011
4	TEHRI	1400.00	3952	829.79	740.04	3540	2615	1291.49	740.55	11.06.2011	819.85	05.10.2011
	a) TEHRI	1000.00	2797									
	b) KOTESHWAR	400.00	1155									
5	RAM GANGA	198.00	334	366	323	2504	2109.25	480.80	340.00	22.06.2011	362.55	24.11.2011
6	R. P. SAGAR	271.00	757	352.81	343.83	2901	1569	175.66	344.81	09.06.2011	350.79	07.12.2011
	a) R.P. SAGAR	172.00	459									
	b) JAWAHAR SAGAR	99.00	298									
7	RIHAND	399.00	1199	268.22	252.98	10605	5723	1177.00	254.02	19.06.2011	266.37	25.09.2011
	a)RIHAND	300.00	920									
	b)OBRA	99.00	279									
WESTERN REGION												
8	UKAI	300.00	1080	105.16	82.30	8515	6615	813.00	93.81	30.06.2011	104.30	01.10.2011
9	SARDAR SAROVAR	1450.00	3848	138.68	110.18	9460	5760	1817.553	112.77	01.07.2011	127.11	28.08.2011
	SARDAR SARO(CHPH)	250.00	213									
	SARDAR SARO(RBPH)	1200.00	3635									
10	GANDHI SAGAR	115.00	420	399.90	381.00	7743	6911	725.00	379.45	30.06.2011	396.82	30.09.2011
11	INDIRA SAGAR	1000.00	1980	262.13	243.23	12237	9706	1316.12	244.22	08.07.2011	259.98	26.09.2011
12	KOYNA	1956.00	3176	657.91	609.60	2797	2677	3126.00	633.37	10.06.2011	659.22	29.08.2011
	a)KOYNA-I&II	600.00	3030									
	b)KOYNA-III	320.00										
	c)KOYNA -IV	1000										
	d)KOYNA D.P.H.	36	146									
13	BHIRA	300	775	606.05	590.09	523	522	619	590.93	11.06.2011	606.10	02.09.2011
	a)BHIRA	150	775									
	a)BHIRA-PSS	150										

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

S. No	NAME OF RESERVOIR	INSTALLED	ANNUAL	FULL	MINIMUM	RESERVOIR		ENERGY	LEVELS ATTAINED DURING 2011-12			
	AND ASSOCIATED H.E.	CAPACITY	DESIGN	RESER-	DRAW	CAP. AT		CONTENT				
	STATIONS	AS ON	ENERGY	VOIR	DOWN	FRL		AT				
		31.03.2012		LEVEL	LEVEL	GROSS: LIVE		FRL	MINIMUM	DATE	MAX.	DATE
		(MW)	(MU)	(M)	(M)	(MCM)	(MCM)	(MU)	(M)	dd.mm.yyyy	(M)	dd.mm.yyyy
SOUTHERN REGION												
14	MACHKUND	114.75	670	838.20	818.39	970	893	552.00	832.70	01.06.2011	837.65	14.09.2011
15	SRISAILAM	1670.00	4300	269.74	243.84	8723	7166	1548.00	244.45	22.07.2011	269.66	03.09.2011
	a) SRISAILAM RB	770.00	2900									
	b) SRISAILAM LBPH	900.00	1400									
16	NAGARJUNA SAGAR	965.60	2497	179.83	150.89	11560	6538	1398.00	156.91	01.03.2012	179.22	22.09.2011
	a) NAGARJUNA SAGAR	815.60	2237									
	b) NJ. SAGAR RBC	60.00	156									
	c) NJ. SAGAR RBC EXT.	30.00										
	d) NJ. SAGAR LBC EXT.	60.00	104									
17	SHARAVATHY	1414.20	5672	554.43	522.73	5310	4297	4394.00	535.90	10.06.2011	554.03	20.09.2011
	a) SHARAVATHY	1035.00	4932									
	b) JOG	139.20	118									
	c) GERUSUPA	240.00	622									
18	SUPA	955.00	3927	564.00	513.50	4178	3758	3927.00	524.15	02.06.2011	559.15	19.09.2011
	a) KALINADI	855.00	3385									
	b) SUPA DPH	100.00	542									
19	ALMATTI	290.00	483	519.60	511.10	2631.5	2628	175.30	508.18	31.03.2012	519.60	14.09.2011
20	IDUKKI	780.00	2398	732.40	694.94	1996	1459	2146.00	706.50	30.05.2011	729.58	21.09.2011
21	SABARAGIRI	300.00	1338	981.46	908.30	454	447	764.00	946.01	01.06.2011	978.76	05.12.2011
22	MADHUPATTY	155.50	703	1599.50	1554.48		55.32	77.40	1581.25	31.05.2011	1599.59	15.10.2011
	a) PALLIVASAL	37.50	284									
	b) NARIAMANGLAM	70.00	237									
	c) SENGULAM	48.00	182									
23	IDAMALAYAR	75.00	380	169.00	115.00		1017.8	254.45	123.86	29.05.2011	168.68	25.09.2011
24	METTUR	370.00	793	240.79	211.23	2708.8	2645.2	204.00	227.79	08.08.2011	240.20	13.05.2011
	a) LOWER METTUR I-IV	120.00	252									
	b) METTUR DAM & TUNNEL	250.00	541									
25	PERIYAR	140.00	409	46.33	33.53	443	299	216.00	33.45	21.03.2012	41.65	02.12.2011
EASTERN REGION												
26	HIRAKUD	347.50	1174	192.02	179.83	4823	4709	372.00	181.08	16.07.2011	192.02	30.09.2011
	a) BURLA. P.H.	275.50										
	b) CHIPLIMA. P.H.	72.00										
27	BALIMELA	510.00	1183	462.07	438.91	3929	2676	898.00	440.38	19.08.2011	452.72	01.04.2011
28	UPPER INDRAVATI	600.00	1962	642.00	625.00	2300	1485.50	1213.14	626.06	01.08.2011	634.51	01.04.2011
29	UPPER KOLAB	320.00	832	858.00	844.00	1215	935.00	540.00	845.66	12.08.2011	852.66	01.04.2011
30	RENGALI	250.00	525	123.50	109.72	3548	3167.81	275.00	110.14	17.06.2011	124.60	25.09.2011
NORTH EASTERN REGION												
31	LOKTAK	105	448	768.50	766.20	435.91	396.44	250	766.50	02.05.2011	769.40	27.08.2011

CHAPTER 4

PLANNED MAINTENANCE OF HE UNITS

CHAPTER-4

PLANNED MAINTENANCE OF HE UNITS

4.1 For purpose of studies and analysis of performance in respect of availability of H.E.Stations, outage data of 620 generating units installed in 177 Hydro Electric Stations (38990.40 MW) was made available by various Organizations. The studies indicate that the average non-availability of hydro electric units due to planned maintenance during the year 2011-12 was 7.43% as compared to 7.23% during the previous year. A total of 437348 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 Capital maintenance was carried out on 16 generating units whereas annual maintenance was carried out on 249 generating units out of a total of 620 units analyzed. Analysis of various types of planned maintenance indicates that while most of the planned outages were carried out for periodic maintenance, many of these outages were utilized for carrying out certain repairs/modification works also. The actual duration of periodic maintenance works were quite different for various types of maintenance works. Details of duration of periodic planned maintenance of generator, turbine, auxiliary equipments and civil structures etc. are indicated below (Table 4.1).

TABLE 4.1

**DURATION OF PERIODIC PLANNED MAINTENANCE
PERIOD: 2011-12**

S.No.	TYPE OF MAINTENANCE	NO. OF UNITS	DURATION	
			MAX. HOUR FOR ANY UNIT	AVERAGE HOURS
1	CAPITAL/3 YEARLY MTCE.	16	7031.98	1418.30
2	ANNUAL MAINTENANCE	249	4075.33	773.30
3	HALF YEARLY MAINTENANCE	3	34.17	23.50
4	QUARTERLY MAINTENANCE	13	507.25	98.14
5	MONTHLY MAINTENANCE	140	3930.50	111.28
6	ROUTINE MAINTENANCE	32	3697.25	186.27
7	RENOVATION/MODERNISATION	39	8759.97	549.97
8	UPRATING	0	0.00	0.00

9	CIVIL STRUCTURE	123	4357.77	138.71
10	TURBINE	101	5301.22	123.39
11	GENERATOR	49	517.15	36.34
12	OTHER EQUIPMENTS	88	2747.00	79.02
13	MISCELLANEOUS	186	2576.55	144.08

4.3 There were a total of 2754 planned outages during the Year 2011-12, out of which 2003 outages (about 72.73%) were of up to 12 hours of duration, 382 (13.87%) were of duration varying from 12 hours to 10 days and 369 outages (13.40%) 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: 2011-12

SL.NO.	DURATION	NUMBER OF OUTAGES	MAINTENANCE % TO TOTAL NUMBER OF OUTAGES
1	Less Than 1 Hour	233	8.46
2	1 To 6 Hours	904	32.82
3	6 To 12 Hours	866	31.45
4	12 To 24 Hours	90	3.27
5	1 To 2 Days	79	2.87
6	2 To 5 Days	103	3.74
7	5 To 10 Days	110	3.99
8	10 To 15 Days	61	2.21
9	15 To 20 Days	63	2.29
10	More than 20 Days	245	8.90
	Total No. of Outages	2754	100.00

4.4 Planned Maintenance age-wise

Planned maintenance carried out for different age groups of hydro generating units during the year 2011-12 is indicated in Table 4.3. It is seen that the average non-availability of units due to planned maintenance for units commissioned during 2009-10 was nil and was maximum in case of units commissioned during 1967-68 to 1977-78 (880.68 Hrs/unit).

TABLE 4.3
PLANNED MAINTENANCE AGE-WISE
PERIOD: 2011-12

SL. NO.	YEAR OF COMMISSIONING	NO. OF UNITS	INSTALLED CAPACITY (MW)	PLANNED OUTAGE (HOURS)	NON AVAILABILITY PER UNIT (HOURS)
1	2011-12	11	1423	4392	399.27
2	2010-11	11	690	6216	565.09
3	2009-10	1	39	0	0.00
4	2008-09	8	969	792	99.00
5	2007-08	23	2443	12288	534.26
6	2006-07	21	2286	13800	657.14
7	2005-06	13	1340	7416	570.46
8	2004-05	13	1115	6552	504.00
9	2003-04	18	2690	4867	270.38
10	2002-03	11	740.60	3073	279.36
11	2001-02	20	1092.20	8304	415.20
12	2000-01	13	1129	7440	572.31
13	1989-90 To 1999-00	87	5775.70	65184	749.24
14	1978-79 To 1988-89	124	7275.60	87624	706.65
15	1967-68 To 1977-78	82	5300.25	72216	880.68
16	Upto 1966-67	164	4682.05	137184	836.49
	TOTAL	620	38990.40	437348	705.40

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 below:

The planned maintenance required by Bulb turbines was 535.50 Hrs/unit. The planned maintenance required by Francis and Reversible type was 737.70 Hrs/unit which is maximum amongst all other types of turbine.

The planned maintenance required by Kaplan turbines was 685.98 Hrs/unit followed by Pelton turbines (654.29 Hrs/unit).

TABLE 4.4

**PLANNED MAINTENANCE-TURBINE TYPE-WISE
PERIOD: 2011-12**

SL NO	TYPE OF TURBINE	NUMBER OF UNITS	INSTALLED CAPACITY (MU)	PLANNED OUTAGE (HOURS)	NON- AVAILABILITY PER UNIT (HOURS)
1	BULB	16	384	8568	535.50
2	FRANCIS AND REVERSIBLE	359	28245.3	264835	737.70
3	KAPLAN	115	4029.2	78888	685.98
4	PELTON	130	6331.9	85057	654.29
	TOTAL	620	38990.4	437348	705.40

4.6 Analysis Based on Make of Generating Units:

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 (Table 4.5):

TABLE 4.5

**PLANNED MAINTENANCE-SUPPLIER WISE
PERIOD: - 2011-12**

NAME OF SUPPLIER	NO. OF UNITS	INSTALLED CAPACITY (MW)	NON- AVAILABILITY DUE TO PLANNED MAINTENANCE	
			TOTAL HOURS	HOURS / UNIT
A-Indigenous				
BHEL	262	16128	193536	738.69
Others*	4	87	0	0.00
SUB-TOTAL	266	16215	193536	727.58
B-Imported				
CANADA	44	3132	34512	784.36
U.K	64	1257.10	49968	780.75
SWITZERLAND	22	815.20	6792	308.73
FRANCE	33	2186.40	28752	871.27
JAPAN	77	6544.20	63480	824.42

U.S.A	9	351	3936	437.33
USSR	26	2804	7104	273.23
Other	79	5685.50	49268	623.65
SUB-TOTAL	354	22775.40	243812	688.73
TOTAL	620	38990.40	437348	705.40

*Small size units only

Among indigenous manufacturers, BHEL is the main manufacturer/supplier of major/medium hydro generating units in the country. During the year 2011-12, non-availability due to planned maintenance of the units supplied by BHEL was 738.69 hrs/unit.

Among the imported generating units, non-availability due to planned maintenance was the least for units supplied by USSR (273.23 hrs/unit) and was maximum for units supplied by France (871.27 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 (Table 4.6).

TABLE 4.6
REGION-WISE PLANNED MAINTENANCE
PERIOD: 2011-12

S.NO.	REGION	NO. OF UNITS	INSTALLED CAPACITY (MW)	% NON-AVAILABILITY DUE TO PLANNED MAINTENANCE
1	NORTHERN	197	15178.25	8.72
2	WESTERN	101	7392.00	7.58
3	SOUTHERN	239	11372.45	6.50
4	EASTERN	55	3847.70	5.32
5	NORTH EASTERN	28	1200.00	5.87
	ALL INDIA	620	38990.4	7.43

Non-availability of generating unit due to planned maintenance was least in Eastern Region (5.32 %), whereas it was maximum in Northern Region (8.72 %).

4.8 Planned Maintenance - Board/ Corporation wise

Performance of hydro electric units under various utilities i.e. Central Sectors, State Electricity Boards, Corporations and Private Sector with respect to non-availability due to planned maintenance is indicated in Table 4.7. Among utilities, planned maintenance of the generating units was nil in case of hydro stations under ADHPL, DLHP, JKHPCL, MPCL & APGPCL and maximum under RRVUNL (2365.09 Hrs/unit).

In case of Central Sector, non-availability due to planned maintenance was maximum under BBMB (846.86 hrs/unit).

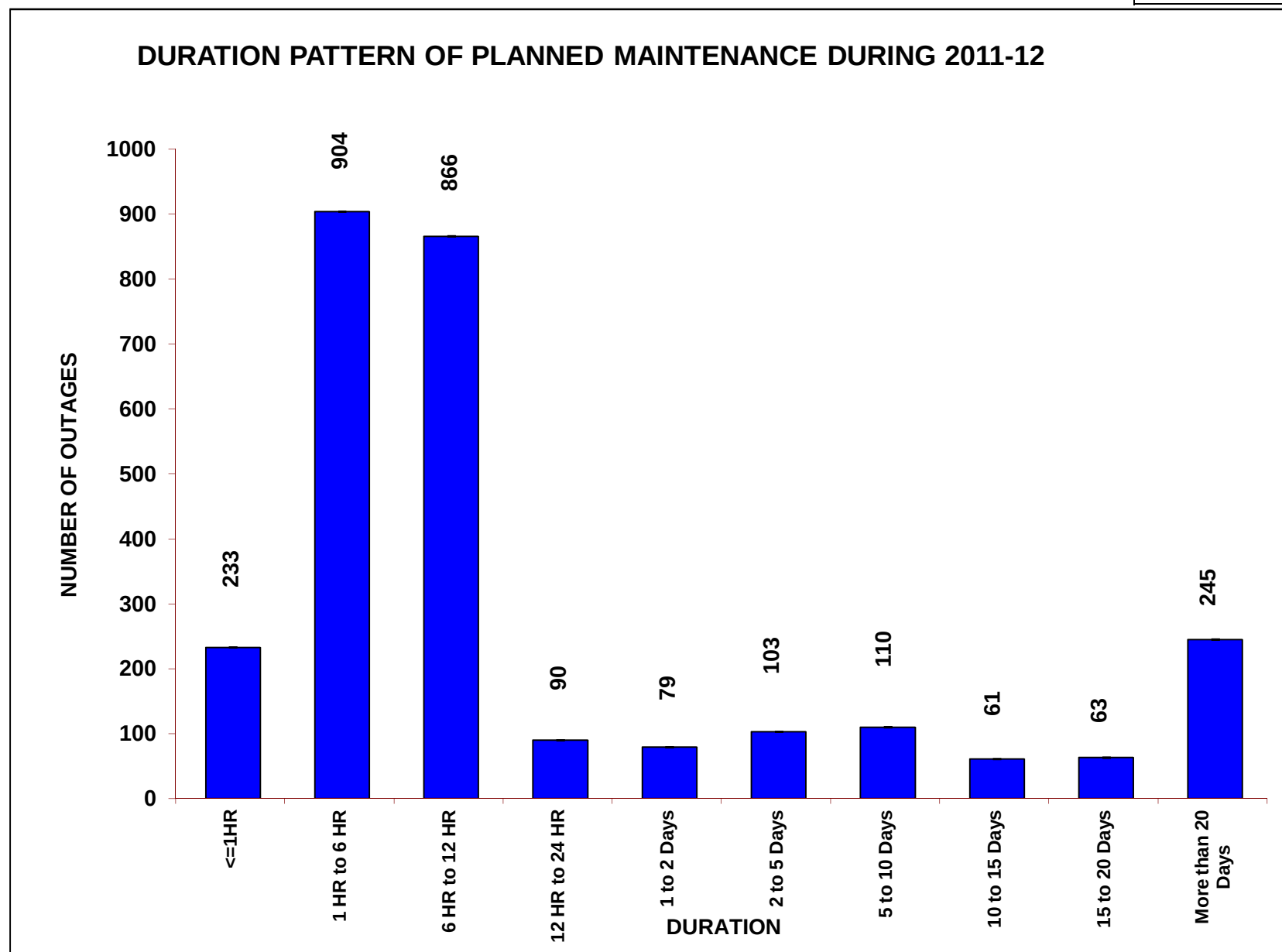
In case of Private Sector, non-availability due to planned maintenance was maximum under EPPL (2196 hrs/unit).

Table 4.7

**SECTORWISE/ UTILITYWISE PERFORMANCE PLANNED MAINTENANCE
PERIOD:-2011-12**

Sl. No.	ORGANIZATION	NUMBER OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (HOURS)	PLANNED MAINTENANCE PER UNIT (HOURS)
(A)	CENTRAL SECTOR				
1	BBMB	28	2866.30	23712	846.86
2	DVC	5	143.20	2160	432.00
3	NEEPCO	13	755	9216	708.92
4	NHDC	16	1520	3888	243.00
5	NHPC	41	3767.20	28008	683.12
6	SJVNL	6	1500	19	3.17
7	THDC	8	1400	2472	309.00
	SUB TOTAL (CS)	117	11951.70	69475	593.80
(B)	PRIVATE SECTOR				
1	ADHPL	2	192	0	0.00
2	DLHP	1	34	0	0.00
3	EPPL	2	100	4392	2196
4	JHPL	3	300	1	0.33
5	JKHPCL	4	1000	0	0.00
6	JPPVL	4	400	432	108.00
7	MPCL	2	86	0	0.00
8	TATA	15	447	264	17.60
	SUB TOTAL (PVT)	33	2559	5089	154.21

(C)	STATE SECTOR				
1	APGENCO	57	3783.35	13296	233.26
2	APGPCL	2	100	0	0.00
3	CSPGCL	3	120	168	56.00
4	GSECL	8	540	360	45.00
5	HPSEB Ltd.	12	366	33720	2810.00
6	JKPDC	9	660	264	29.33
7	JSEB	2	130	1032	516.00
8	KPCL	68	3585.40	46776	687.88
9	KSEB	48	1881.50	37752	786.50
10	MAHAGENCO	24	2406	18024	751.00
11	MeECL	10	240	14040	1404.00
12	MPPGCL	23	875	12072	524.87
13	OHPC	31	2027.50	23568	760.26
14	PSPCL	25	1051	22968	918.72
15	RRVUNL	11	411	26016	2365.09
16	SSNNL	11	1450	6432	584.73
17	TANGEDCO	66	2122.20	35640	540.00
18	UJVNL	34	1252.15	27528	809.65
19	UPJVNL	15	501.6	26688	1779.20
20	WBSEDCL	11	977	16440	1494.55
	SUB TOTAL (State)	470	24479.70	362784	771.88
	ALL INDIA	620	38990.40	437348	705.40



**DETAILS OF LONG DURATION PLANNED OUTAGES IN HYDRO ELECTRIC STATIONS OF
DURATION 50 HOURS AND ABOVE DURING 2011-12**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>NORTHERN REGION</u>							
<u>BBMB</u>							
1	BHAKRA H P S LEFT	4	108	03/06/2011	06/06/2011	75.42	TURBINE MISC/GOVERNOR
2	BHAKRA H P S RIGHT	3	157	21/04/2011	05/05/2011	349.5	PLANNED MAINTENANCE
		5	157	13/06/2011	16/06/2011	83.03	TURBINE MISC/GOVERNOR
3	DEHAR H P S	1	165	01/05/2011	14/06/2011	1073.45	PLANNED MAINTENANCE
		1	165	10/08/2011	13/08/2011	74.07	ROUTINE MAINTENANCE
		2	165	27/08/2011	30/08/2011	76.63	ROUTINE MAINTENANCE
		2	165	21/06/2011	18/07/2011	645.38	MISCELLANROUS
		2	165	01/05/2011	19/06/2011	1195.98	PLANNED MAINTENANCE
		2	165	01/04/2011	01/05/2011	720	PLANNED MAINTENANCE
		4	165	01/03/2012	31/03/2012	709.5	CAPITAL/3 YEARLY MTCE.
		6	165	23/07/2011	30/07/2011	166.42	ROUTINE MAINTENANCE
4	GANGUWAL HPS	1	29.25	10/10/2011	13/10/2011	81.5	ANNUAL MAINTENANCE
		1	29.25	02/05/2011	08/05/2011	157.25	PLANNED MAINTENANCE
		2	24.2	06/02/2012	10/02/2012	99.23	PLANNED MAINTENANCE
		3	24.2	25/04/2011	30/04/2011	122.25	PLANNED MAINTENANCE
		3	24.2	21/09/2011	23/09/2011	56.83	PLANNED MAINTENANCE
		3	24.2	20/02/2012	25/02/2012	128.17	ANNUAL MAINTENANCE
5	KOTLA HPS	2	24.2	01/03/2012	03/03/2012	53.08	PLANNED MAINTENANCE
		3	24.2	05/09/2011	09/09/2011	105.08	PLANNED MAINTENANCE
		3	24.2	17/06/2011	19/06/2011	53.08	PLANNED MAINTENANCE
		3	24.2	12/03/2012	16/03/2012	108.83	PLANNED MAINTENANCE
<u>E.P.P.L.</u>							
6	MALANA-II HPS	1	50	01/10/2011	31/03/2012	4357.77	PRESSURE SHAFT/PENSTOCK
<u>HPSEBL</u>							
7	BASSI HPS	1	15	01/07/2011	31/03/2012	6576	CAPITAL/3 YEARLY MTCE.
		1	15	01/04/2011	19/04/2011	455.98	CAPITAL/3 YEARLY MTCE.

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
8	GIRI BATA HPS	2	15	01/07/2011	31/03/2012	6576	CAPITAL/3 YEARLY MTCE.
		2	15	01/04/2011	19/04/2011	432	CAPITAL/3 YEARLY MTCE.
		3	15	01/04/2011	19/04/2011	432	CAPITAL/3 YEARLY MTCE.
		3	15	01/07/2011	10/09/2011	1704	CAPITAL/3 YEARLY MTCE.
		3	15	01/03/2012	31/03/2012	720	MONTHLY MAINTENANCE
		3	15	26/12/2011	21/02/2012	1382	MONTHLY MAINTENANCE
		4	15	01/04/2011	20/04/2011	477.08	CAPITAL/3 YEARLY MTCE.
		4	15	01/03/2012	31/03/2012	720	MONTHLY MAINTENANCE
		1	30	09/05/2011	26/05/2011	412	TRI/TRC/DRAFT TUBE
		1	30	01/04/2011	15/04/2011	342	ANNUAL MAINTENANCE
		1	30	23/01/2012	31/03/2012	1623	ANNUAL MAINTENANCE
		2	30	01/04/2011	26/04/2011	600	ANNUAL MAINTENANCE
		2	30	10/05/2011	26/05/2011	392.42	TRI/TRC/DRAFT TUBE
		9	LARJI HPS	1	42	01/04/2011	13/04/2011
1	42	01/12/2011		19/02/2012	1935	ANNUAL MAINTENANCE	
2	42	01/03/2012		31/03/2012	720	ANNUAL MAINTENANCE	
2	42	15/11/2011		19/02/2012	2306.5	ANNUAL MAINTENANCE	
3	42	01/01/2012		09/01/2012	204.67	ANNUAL MAINTENANCE	
10	SANJAY HPS	1	40	01/12/2011	31/03/2012	2904	ANNUAL MAINTENANCE
1		40	01/04/2011	01/05/2011	720	ANNUAL MAINTENANCE	
3		40	04/11/2011	19/01/2012	1833.33	ANNUAL MAINTENANCE	
<u>JKPDC</u>							
11	BAGLIHAR HPS	1	150	01/04/2011	07/04/2011	161.23	ANNUAL MAINTENANCE
12	UPPER SINDH-II HPS	4	35	10/06/2011	15/06/2011	121.45	MISCELLANROUS
<u>JPPVL</u>							
13	VISHNU PRAYAG HPS	1	100	11/10/2011	16/10/2011	125.85	TURBINE
		2	100	07/11/2011	12/11/2011	123.77	ANNUAL MAINTENANCE
		3	100	02/01/2012	06/01/2012	103.02	ANNUAL MAINTENANCE
		4	100	12/12/2011	16/12/2011	98.58	ANNUAL MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>NHPC</u>							
14	BAIRA SIUL HPS	1	66	26/11/2011	14/12/2011	453	ANNUAL MAINTENANCE
		2	66	23/09/2011	14/10/2011	518.97	CAPITAL/3 YEARLY MTCE.
		3	66	01/02/2012	22/02/2012	527.98	PLANNED MAINTENANCE
15	CHAMERA- I HPS	1	180	09/12/2011	15/01/2012	901.43	ANNUAL MAINTENANCE
		2	180	09/12/2011	15/01/2012	904.52	ANNUAL MAINTENANCE
		3	180	05/12/2011	03/02/2012	1448.43	ANNUAL MAINTENANCE
16	CHAMERA- II HPS	1	100	20/02/2012	26/02/2012	144.07	PLANNED MAINTENANCE
		2	100	27/02/2012	05/03/2012	167.97	ANNUAL MAINTENANCE
		3	100	13/10/2011	20/10/2011	180.97	ANNUAL MAINTENANCE
		3	100	06/04/2011	28/04/2011	525.18	ANNUAL MAINTENANCE
17	DHAULI GANGA HPS	1	70	16/12/2011	05/01/2012	492.5	PLANNED MAINTENANCE
		2	70	02/02/2012	20/02/2012	447.5	ANNUAL MAINTENANCE
		3	70	16/01/2012	27/01/2012	278.5	PLANNED MAINTENANCE
		4	70	03/03/2012	28/03/2012	612	PLANNED MAINTENANCE
18	DULHASTI HPS	1	130	01/02/2012	13/02/2012	310.27	ANNUAL MAINTENANCE
		2	130	14/02/2012	02/03/2012	425.58	ANNUAL MAINTENANCE
		3	130	14/02/2012	02/03/2012	425.58	ANNUAL MAINTENANCE
19	SALAL HPS-I	2	115	03/02/2012	03/03/2012	704.57	ANNUAL MAINTENANCE
		3	115	17/10/2011	09/02/2012	2760.5	CAPITAL/3 YEARLY MTCE.
20	SALAL HPS-II	1	115	05/11/2011	18/12/2011	1051	PLANNED MAINTENANCE
		2	115	05/01/2012	09/02/2012	849.28	PLANNED MAINTENANCE
		3	115	03/12/2011	10/01/2012	913	PLANNED MAINTENANCE
		3	115	01/04/2011	01/05/2011	741.63	CAPITAL/3 YEARLY MTCE.
21	SEWA-II HPS	1	40	21/11/2011	12/01/2012	1266.67	PLANNED MAINTENANCE
		2	40	21/11/2011	25/12/2011	838.93	PLANNED MAINTENANCE
		3	40	01/01/2012	06/01/2012	141.18	ANNUAL MAINTENANCE
		3	40	21/11/2011	25/12/2011	836.22	PLANNED MAINTENANCE
22	TANAKPUR HPS	1	31.4	01/04/2011	04/04/2011	88.75	ANNUAL MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
23	URI-I HPS	1	31.4	11/01/2012	09/02/2012	697.2	ANNUAL MAINTENANCE
		2	31.4	05/12/2011	05/01/2012	746.22	ANNUAL MAINTENANCE
		3	31.4	15/02/2012	30/03/2012	1058.65	ANNUAL MAINTENANCE
		3	120	13/10/2011	03/11/2011	520.32	ANNUAL MAINTENANCE
<u>PSPCL</u>							
24	ANANDPUR SAHIB HPS	1	33.5	17/11/2011	20/12/2011	780.08	ANNUAL MAINTENANCE
		1	33.5	01/01/2012	26/01/2012	601.67	ANNUAL MAINTENANCE
		2	33.5	19/10/2011	17/11/2011	698.42	ANNUAL MAINTENANCE
		3	33.5	10/10/2011	11/11/2011	776.92	ANNUAL MAINTENANCE
		4	33.5	13/11/2011	11/12/2011	683	ANNUAL MAINTENANCE
25	MUKERIAN HPS-I	1	15	01/04/2011	22/04/2011	517.17	ANNUAL MAINTENANCE
		2	15	22/04/2011	12/07/2011	1945.73	ANNUAL MAINTENANCE
		3	15	14/05/2011	02/08/2011	1935.6	ANNUAL MAINTENANCE
26	MUKERIAN HPS-II	1	15	21/04/2011	08/05/2011	427.97	ANNUAL MAINTENANCE
		2	15	01/04/2011	19/04/2011	452.67	ANNUAL MAINTENANCE
		2	15	24/05/2011	27/05/2011	66.4	MONTHLY MAINTENANCE
27	MUKERIAN HPS-III	3	19.5	01/04/2011	19/04/2011	450	ANNUAL MAINTENANCE
28	MUKERIAN HPS-IV	3	19.5	19/04/2011	13/05/2011	596.25	MISCELLANROUS
29	RANJIT SAGAR HPS	1	150	01/04/2011	25/04/2011	590	ANNUAL MAINTENANCE
		1	150	09/03/2012	31/03/2012	516.45	ANNUAL MAINTENANCE
		2	150	01/02/2012	31/03/2012	1405.75	ANNUAL MAINTENANCE
		3	150	01/12/2011	06/12/2011	135.75	ANNUAL MAINTENANCE
		4	150	12/12/2011	31/03/2012	2627.33	ANNUAL MAINTENANCE
30	SHANAN HPS	1	15	22/10/2011	29/11/2011	904	ANNUAL MAINTENANCE
		2	15	01/01/2012	05/01/2012	111	ANNUAL MAINTENANCE
		3	15	16/11/2011	10/12/2011	579.17	ANNUAL MAINTENANCE
		4	15	21/01/2012	17/02/2012	652.75	ANNUAL MAINTENANCE
		5	50	03/08/2011	07/08/2011	97.88	TURBINE
		5	50	05/04/2011	14/04/2011	217.5	TURBINE
		5	50	15/08/2011	19/03/2012	5203.33	TURBINE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
RRVUNL							
31	JAWAHAR SAGAR HPS	1	33	01/04/2011	29/04/2011	681.42	ANNUAL MAINTENANCE
		2	33	02/06/2011	14/10/2011	3225.03	ANNUAL MAINTENANCE
		3	33	02/05/2011	04/09/2011	3006	ANNUAL MAINTENANCE
32	MAHI BAJAJ HPS-I	1	25	01/06/2011	23/08/2011	2002.08	ANNUAL MAINTENANCE
		1	25	03/05/2011	31/05/2011	695.82	ANNUAL MAINTENANCE
		2	25	01/06/2011	23/08/2011	2002.58	ANNUAL MAINTENANCE
33	MAHI BAJAJ HPS-II	1	45	19/04/2011	05/10/2011	4075.33	ANNUAL MAINTENANCE
		2	45	01/06/2011	30/06/2011	719.98	ANNUAL MAINTENANCE
34	R P SAGAR HPS	1	43	01/04/2011	20/04/2011	468.77	ANNUAL MAINTENANCE
		3	43	21/04/2011	29/05/2011	919.67	ANNUAL MAINTENANCE
		4	43	01/04/2011	29/04/2011	685	ANNUAL MAINTENANCE
THDC							
35	KOTESHWAR HPS	1	100	12/07/2011	31/07/2011	461.83	GENERATOR
36	TEHRI ST-1 HPS	1	250	02/06/2011	26/06/2011	585.5	CAPITAL/3 YEARLY MTCE.
		2	250	11/03/2012	25/03/2012	342.58	ANNUAL MAINTENANCE
		3	250	04/04/2011	29/04/2011	589.5	PLANNED MAINTENANCE
		3	250	27/03/2012	31/03/2012	86	PLANNED MAINTENANCE
		4	250	21/06/2011	04/07/2011	323.17	PLANNED MAINTENANCE
UJVNL							
37	CHIBRO (YAMUNA) HPS	1	60	22/12/2011	10/02/2012	1191.75	ANNUAL MAINTENANCE
38	CHILLA HPS	1	36	15/12/2011	01/02/2012	1154.4	ANNUAL MAINTENANCE
		2	36	05/02/2012	13/03/2012	896.58	ANNUAL MAINTENANCE
		3	36	18/03/2012	31/03/2012	303.25	ANNUAL MAINTENANCE
		4	36	03/11/2011	15/12/2011	1010.75	ANNUAL MAINTENANCE
39	DHAKRANI HPS	3	11.25	17/11/2011	02/01/2012	1105.42	ANNUAL MAINTENANCE
		3	11.25	01/04/2011	09/04/2011	210.25	ANNUAL MAINTENANCE
40	DHALIPUR HPS	2	17	16/11/2011	31/12/2011	1081.92	ANNUAL MAINTENANCE
41	KHATIMA HPS	1	13.8	14/11/2011	02/01/2012	1174.15	ANNUAL MAINTENANCE
		2	13.8	21/02/2012	31/03/2012	924.5	ANNUAL MAINTENANCE
		2	13.8	01/04/2011	10/05/2011	945.75	ANNUAL MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
42	KHODRI HPS	3	13.8	09/01/2012	18/02/2012	959.48	ANNUAL MAINTENANCE
		2	30	14/12/2011	23/01/2012	971.33	ANNUAL MAINTENANCE
		3	30	28/03/2012	31/03/2012	59.83	PLANNED MAINTENANCE
43	KULHAL HPS	4	30	01/04/2011	15/04/2011	354.25	ANNUAL MAINTENANCE
		2	10	08/12/2011	23/01/2012	1108.5	ANNUAL MAINTENANCE
		2	10	01/04/2011	13/04/2011	298.25	ANNUAL MAINTENANCE
44	MANERI BHALI - I HPS	2	30	26/08/2011	08/10/2011	1018.08	ANNUAL MAINTENANCE
		3	30	29/11/2011	29/03/2012	2910.75	ANNUAL MAINTENANCE
		3	30	08/08/2011	24/08/2011	394.58	ANNUAL MAINTENANCE
45	MANERI BHALI - II HPS	1	76	01/04/2011	24/04/2011	563.08	PLANNED MAINTENANCE
		1	76	01/12/2011	31/03/2012	2894.25	ANNUAL MAINTENANCE
		2	76	07/11/2011	05/01/2012	1419.67	ANNUAL MAINTENANCE
46	RAMGANGA HPS	3	76	28/03/2012	31/03/2012	62	ANNUAL MAINTENANCE
		4	76	12/01/2012	21/03/2012	1658.83	ANNUAL MAINTENANCE
		4	76	01/04/2011	11/05/2011	973.33	ANNUAL MAINTENANCE
		1	66	16/07/2011	11/08/2011	622.23	ANNUAL MAINTENANCE
		2	66	11/08/2011	18/08/2011	175.8	PLANNED MAINTENANCE
		3	66	27/06/2011	11/08/2011	1090.23	ANNUAL MAINTENANCE
<u>UPJVNL</u>							
47	MATATILA HPS	1	10.2	01/04/2011	16/07/2011	2563.33	ANNUAL MAINTENANCE
		1	10.2	20/03/2012	31/03/2012	246.67	PAINTING OTHERS
		2	10.2	19/03/2012	31/03/2012	277.17	RENOVATION/MODERNISATION
48	OBRA HPS	1	33	18/11/2011	02/12/2011	343.97	SWITCHING EQUIPMENT
		2	33	01/04/2011	31/05/2011	1463.98	MISCELLANROUS
49	RIHAND HPS	1	50	31/05/2011	29/06/2011	698.58	INTAKE STRU/TRASH RACK
		2	50	01/07/2011	31/07/2011	710.25	ANNUAL MAINTENANCE
		6	50	18/04/2011	28/05/2011	962.58	ANNUAL MAINTENANCE
<u>WESTERN REGION</u>							
<u>CSPGCL</u>							
50	HASDEOBANGO HPS	1	40	03/05/2011	07/05/2011	95.42	MISCELLANROUS
<u>GSECL</u>							
51	KADANA HPS	1	60	01/07/2011	08/07/2011	186	CAPITAL/3 YEARLY MTCE.

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>MAHAGENCO</u>							
52	BHIRA TAIL RACE HPS	2	40	10/06/2011	30/06/2011	488.03	RENOVATION/MODERNISATION
53	KOYNA DPH HPS	1	18	07/09/2011	18/02/2012	3930.5	MONTHLY MAINTENANCE
54	KOYNA-I HPS	4	70	07/07/2011	20/07/2011	300.95	TURBINE
55	KOYNA-II HPS	1	80	10/03/2012	27/03/2012	412.58	MISCELLANROUS
		3	80	03/03/2012	05/03/2012	61.25	MISCELLANROUS
56	KOYNA-III HPS	1	80	15/03/2012	25/03/2012	244.25	ANNUAL MAINTENANCE
		2	80	13/05/2011	26/05/2011	315.5	ANNUAL MAINTENANCE
		4	80	24/02/2012	27/02/2012	82	MISCELLANROUS
57	KOYNA-IV HPS	1	250	08/02/2012	14/02/2012	147.45	MISCELLANROUS
		2	250	04/08/2011	19/09/2011	1087.1	MISCELLANROUS
58	TILLARI HPS	1	60	30/05/2011	23/06/2011	585.75	ANNUAL MAINTENANCE
59	VAITARNA HPS	1	60	10/11/2011	10/12/2011	731.5	ANNUAL MAINTENANCE
<u>MPPGCL</u>							
60	BANSAGAR TONS-1 HPS	1	105	12/06/2011	19/06/2011	165	MISCELLANROUS
		1	105	02/05/2011	29/05/2011	660.17	ANNUAL MAINTENANCE
		2	105	03/07/2011	18/07/2011	362	ANNUAL MAINTENANCE
		2	105	01/02/2012	29/02/2012	672	MISCELLANROUS
		3	105	22/07/2011	30/07/2011	198	ANNUAL MAINTENANCE
		3	105	24/12/2011	31/03/2012	2345.83	ANNUAL MAINTENANCE
		3	105	07/06/2011	22/06/2011	351.83	MISCELLANROUS
61	BANSAGAR TONS-II HPS	1	15	26/04/2011	28/04/2011	54.42	INTAKE STRU/TRASH RACK
		1	15	01/07/2011	05/07/2011	106	ANNUAL MAINTENANCE
		2	15	03/06/2011	17/06/2011	343.33	ANNUAL MAINTENANCE
		2	15	26/04/2011	28/04/2011	54.42	INTAKE STRU/TRASH RACK
62	BANSAGAR TONS-III HPS	1	20	17/05/2011	30/05/2011	318.5	MISCELLANROUS
		2	20	01/06/2011	13/06/2011	306.5	ANNUAL MAINTENANCE
		3	20	14/06/2011	27/06/2011	317	ANNUAL MAINTENANCE
63	BARGI HPS	1	45	01/06/2011	11/06/2011	245.75	ANNUAL MAINTENANCE
		2	45	12/06/2011	17/06/2011	142.42	ANNUAL MAINTENANCE
64	GANDHI SAGAR HPS	3	23	01/04/2011	29/04/2011	681.25	ANNUAL MAINTENANCE
		5	23	02/05/2011	21/05/2011	462	ANNUAL MAINTENANCE
65	MADHIKHERA HPS	1	20	19/06/2011	24/06/2011	128.75	ANNUAL MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
66	PENCH HPS	2	20	07/06/2011	19/06/2011	284.5	ANNUAL MAINTENANCE
		3	20	14/12/2011	16/12/2011	59.92	MISCELLANROUS
		1	80	12/05/2011	04/06/2011	538.8	ANNUAL MAINTENANCE
		2	80	15/04/2011	11/05/2011	637.08	ANNUAL MAINTENANCE
67	RAJGHAT HPS	1	15	14/05/2011	18/07/2011	1549.83	ANNUAL MAINTENANCE
		2	15	01/09/2011	06/09/2011	132.67	SURGE SHAFT
		2	15	09/06/2011	26/06/2011	416.58	ANNUAL MAINTENANCE
		3	15	17/06/2011	03/07/2011	379.5	ANNUAL MAINTENANCE
		3	15	11/02/2012	13/02/2012	51.33	MISCELLANROUS
		3	15	14/07/2011	19/07/2011	137.58	ANNUAL MAINTENANCE
<u>NHDC</u>							
68	INDIRA SAGAR HPS	1	125	24/03/2012	31/03/2012	168	ANNUAL MAINTENANCE
		1	125	18/06/2011	06/07/2011	420	ANNUAL MAINTENANCE
		3	125	05/03/2012	13/03/2012	192	ANNUAL MAINTENANCE
		3	125	03/06/2011	20/06/2011	408	PLANNED MAINTENANCE
		4	125	14/03/2012	20/03/2012	165	ANNUAL MAINTENANCE
		4	125	02/04/2011	13/04/2011	259	PLANNED MAINTENANCE
		6	125	26/02/2012	02/03/2012	120	PLANNED MAINTENANCE
		7	125	03/05/2011	08/05/2011	120	ANNUAL MAINTENANCE
69	OMKARESHWAR HPS	8	125	19/05/2011	24/05/2011	143.98	PLANNED MAINTENANCE
		1	65	14/07/2011	22/07/2011	200	PLANNED MAINTENANCE
		2	65	22/06/2011	01/07/2011	225.5	PLANNED MAINTENANCE
		3	65	04/07/2011	13/07/2011	220.95	ANNUAL MAINTENANCE
		4	65	27/02/2012	09/03/2012	271.5	PLANNED MAINTENANCE
		5	65	05/06/2011	17/06/2011	290.68	ANNUAL MAINTENANCE
		6	65	02/06/2011	12/06/2011	241.5	PLANNED MAINTENANCE
		7	65	17/06/2011	27/06/2011	242.12	ANNUAL MAINTENANCE
70	S SAROVAR CHPH HPS	8	65	13/03/2012	23/03/2012	243.67	PLANNED MAINTENANCE
		1	50	27/04/2011	30/04/2011	81.07	MISCELLANROUS
		1	50	03/11/2011	18/11/2011	366	ANNUAL MAINTENANCE
		2	50	28/11/2011	14/12/2011	391.58	ANNUAL MAINTENANCE
<u>SSNNL</u>							

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
71	S SAROVAR RBPH HPS	3	50	17/12/2011	30/12/2011	315.42	ANNUAL MAINTENANCE
		4	50	01/04/2011	15/04/2011	353.83	ANNUAL MAINTENANCE
		4	50	11/01/2012	01/02/2012	516.17	ANNUAL MAINTENANCE
		5	50	08/02/2012	23/02/2012	360.42	ANNUAL MAINTENANCE
		1	200	20/01/2012	07/02/2012	441	ANNUAL MAINTENANCE
		2	200	28/11/2011	17/12/2011	458.25	ANNUAL MAINTENANCE
		3	200	01/11/2011	22/11/2011	504.3	ANNUAL MAINTENANCE
		4	200	02/01/2012	12/01/2012	249	ANNUAL MAINTENANCE
		4	200	23/12/2011	31/12/2011	207.48	ANNUAL MAINTENANCE
		5	200	25/05/2011	31/05/2011	157.98	ANNUAL MAINTENANCE
		5	200	15/03/2012	31/03/2012	384	ANNUAL MAINTENANCE
		5	200	01/06/2011	19/06/2011	447.67	ANNUAL MAINTENANCE
		6	200	01/05/2011	03/05/2011	57.5	ANNUAL MAINTENANCE
		6	200	16/02/2012	07/03/2012	482.42	PLANNED MAINTENANCE
		6	200	01/06/2011	05/06/2011	106	RENOVATION/MODERNISATION
		6	200	01/04/2011	30/04/2011	719.98	RENOVATION/MODERNISATION
<u>TATA</u>							
72	BHIRA HPS	1	25	02/01/2012	06/01/2012	99.33	ANNUAL MAINTENANCE
		2	25	24/12/2011	31/12/2011	170.42	ANNUAL MAINTENANCE
<u>SOUTHERN REGION</u>							
<u>APGENCO</u>							
73	HAMPI HPS	2	9	09/12/2011	20/12/2011	265.42	MISCELLANROUS
		2	9	10/02/2012	13/02/2012	88.42	CAPITAL/3 YEARLY MTCE.
		3	9	21/02/2012	24/02/2012	73.08	MISCELLANROUS
		4	9	24/02/2012	01/03/2012	144.5	MISCELLANROUS
74	MACHKUND HPS	6	21.25	01/04/2011	30/04/2011	718.77	TRI/TRC/DRAFT TUBE
75	NAGARJUN SGR HPS	1	110	15/12/2011	21/01/2012	884.17	MISCELLANROUS
		2	100.8	01/04/2011	13/04/2011	308.25	MISCELLANROUS
		3	100.8	05/12/2011	30/12/2011	607.67	MISCELLANROUS
		4	100.8	02/01/2012	09/01/2012	168.58	CAPITAL/3 YEARLY MTCE.
		4	100.8	16/05/2011	25/07/2011	1675.67	MISCELLANROUS
		5	100.8	01/05/2011	09/05/2011	213.5	MISCELLANROUS

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
76	SRISAILAM HPS	5	100.8	18/04/2011	30/04/2011	302.32	MISCELLANROUS
		1	110	16/06/2011	19/07/2011	795.22	ANNUAL MAINTENANCE
		2	110	16/06/2011	18/07/2011	773.92	ANNUAL MAINTENANCE
		5	110	16/06/2011	18/07/2011	773.45	ANNUAL MAINTENANCE
77	SRISAILAM LB HPS	6	110	14/10/2011	19/10/2011	123.63	MISCELLANROUS
		1	150	16/05/2011	15/06/2011	724.55	MISCELLANROUS
		2	150	11/05/2011	15/06/2011	850.53	MISCELLANROUS
		3	150	16/05/2011	15/06/2011	725.05	MISCELLANROUS
		4	150	16/05/2011	15/06/2011	737.58	MISCELLANROUS
		4	150	22/11/2011	25/11/2011	75.15	STATOR
		5	150	16/05/2011	15/06/2011	725.05	MISCELLANROUS
		6	150	16/05/2011	15/06/2011	722.8	MISCELLANROUS
78	T B DAM HPS	2	9	08/02/2012	10/02/2012	52.67	MISCELLANROUS
		2	9	01/04/2011	30/04/2011	708	TURBINE
KPCL							
79	ALMATTI DPH HPS	1	15	07/05/2011	31/05/2011	574.25	ANNUAL MAINTENANCE
		2	55	26/03/2012	29/03/2012	78	ANNUAL MAINTENANCE
		2	55	01/06/2011	09/06/2011	205	ANNUAL MAINTENANCE
		2	55	01/05/2011	31/05/2011	743.98	ANNUAL MAINTENANCE
		2	55	21/02/2012	25/02/2012	98.55	ANNUAL MAINTENANCE
		3	55	27/02/2012	29/02/2012	61.32	ANNUAL MAINTENANCE
		3	55	13/02/2012	17/02/2012	98.08	ANNUAL MAINTENANCE
		3	55	01/06/2011	09/06/2011	205	ANNUAL MAINTENANCE
		3	55	08/03/2012	13/03/2012	122.48	ANNUAL MAINTENANCE
		3	55	01/05/2011	31/05/2011	743.98	ANNUAL MAINTENANCE
		4	55	01/03/2012	13/03/2012	279.9	ANNUAL MAINTENANCE
		4	55	01/05/2011	31/05/2011	743.98	ANNUAL MAINTENANCE
		4	55	27/04/2011	30/04/2011	84.9	ANNUAL MAINTENANCE
		5	55	08/03/2012	13/03/2012	122.48	ANNUAL MAINTENANCE
		5	55	18/06/2011	21/06/2011	75.42	ANNUAL MAINTENANCE
		5	55	07/05/2011	31/05/2011	584.9	ANNUAL MAINTENANCE
		5	55	15/02/2012	18/02/2012	74	ANNUAL MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
80	BHADRA HPS	6	55	21/04/2011	30/04/2011	229.4	ANNUAL MAINTENANCE
		6	55	01/05/2011	31/05/2011	743.98	ANNUAL MAINTENANCE
		6	55	01/03/2012	16/03/2012	372.08	ANNUAL MAINTENANCE
		6	55	22/02/2012	24/02/2012	52.17	ANNUAL MAINTENANCE
		6	55	27/02/2012	29/02/2012	61.23	ANNUAL MAINTENANCE
		3	12	01/05/2011	31/05/2011	743.98	RENOVATION/MODERNISATION
		3	12	01/04/2011	30/04/2011	719.98	RENOVATION/MODERNISATION
		4	7.2	01/04/2011	30/04/2011	719.98	RENOVATION/MODERNISATION
		5	6	01/04/2011	17/04/2011	403.38	MISCELLANROUS
		5	6	21/04/2011	25/04/2011	95.27	MISCELLANROUS
81	GERUSUPPA HPS	2	60	14/04/2011	20/04/2011	152.68	MISCELLANROUS
82	GHAT PRABHA HPS	1	16	01/06/2011	05/08/2011	1580	ANNUAL MAINTENANCE
		2	16	01/06/2011	05/08/2011	1578.75	ANNUAL MAINTENANCE
83	JOG HPS	1	13.2	03/05/2011	09/05/2011	142.58	OTHER EQUIPMENT
		1	13.2	20/02/2012	22/02/2012	53.5	GENERATOR
		2	13.2	25/07/2011	28/07/2011	78.5	OTHER EQUIPMENT
		3	13.2	12/03/2012	14/03/2012	57.25	PRESSURE SHAFT/PENSTOCK
		3	13.2	25/01/2012	28/01/2012	70.17	TURBINE MISC/GOVERNOR
		4	13.2	09/05/2011	12/05/2011	78.25	OTHER EQUIPMENT
		4	13.2	07/10/2011	10/10/2011	68.58	MISCELLANROUS
		4	13.2	12/03/2012	14/03/2012	57.25	PRESSURE SHAFT/PENSTOCK
		5	21.6	04/01/2012	13/01/2012	224.42	TURBINE MISC/GOVERNOR
		6	21.6	27/01/2012	30/01/2012	67.08	TURBINE MISC/GOVERNOR
		7	21.6	18/07/2011	31/07/2011	323.65	OTHER EQUIPMENT
		7	21.6	23/01/2012	27/01/2012	97	OTHER EQUIPMENT
84	KALINADI HPS	1	135	22/07/2011	28/07/2011	132.53	MISCELLANROUS
		2	135	22/07/2011	29/07/2011	163.07	MISCELLANROUS
		3	135	12/08/2011	18/08/2011	164.25	PLANNED MAINTENANCE
		5	150	28/10/2011	31/03/2012	3697.25	ROUTINE MAINTENANCE
		6	150	28/10/2011	18/11/2011	490.27	ROUTINE MAINTENANCE
85	MUNIRABAD HPS	1	9	16/05/2011	20/05/2011	97.67	ANNUAL MAINTENANCE
		1	9	01/05/2011	04/05/2011	87.33	ANNUAL MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
86	SHARAVATHI HPS	1	9	26/04/2011	30/04/2011	104.82	SWITCHING EQUIPMENT
		2	9	21/06/2011	23/06/2011	54.08	ANNUAL MAINTENANCE
		2	9	12/05/2011	16/05/2011	93.33	ANNUAL MAINTENANCE
		2	9	19/04/2011	26/04/2011	172	SWITCHING EQUIPMENT
		3	10	21/06/2011	23/06/2011	54.08	ANNUAL MAINTENANCE
		3	10	19/04/2011	26/04/2011	172	SWITCHING EQUIPMENT
		3	10	01/06/2011	13/06/2011	290	ANNUAL MAINTENANCE
		3	10	11/05/2011	25/05/2011	338.75	ANNUAL MAINTENANCE
		1	103.5	20/08/2011	28/08/2011	203.55	RENOVATION/MODERNISATION
		10	103.5	01/12/2011	04/12/2011	89.68	RENOVATION/MODERNISATION
		2	103.5	16/07/2011	03/08/2011	433.48	RENOVATION/MODERNISATION
		3	103.5	07/08/2011	17/08/2011	236.78	PLANNED MAINTENANCE
		4	103.5	11/06/2011	28/06/2011	404.63	ROUTINE MAINTENANCE
		5	103.5	30/12/2011	04/01/2012	130.85	GENERATOR
		5	103.5	11/04/2011	18/04/2011	164.02	MISCELLANROUS
		5	103.5	01/04/2011	10/04/2011	235.03	RENOVATION/MODERNISATION
		7	103.5	15/12/2011	22/12/2011	166.15	ANNUAL MAINTENANCE
		8	103.5	05/12/2011	13/12/2011	192.37	ANNUAL MAINTENANCE
		9	103.5	09/01/2012	20/01/2012	270.55	ANNUAL MAINTENANCE
87	VARAHI HPS	9	103.5	29/06/2011	07/07/2011	187.42	CAPITAL/3 YEARLY MTCE.
		1	115	17/01/2012	20/01/2012	68.98	MISCELLANROUS
		1	115	02/05/2011	03/08/2011	2242.03	PLANNED MAINTENANCE
		2	115	20/01/2012	23/01/2012	74.8	MISCELLANROUS
		2	115	02/05/2011	16/10/2011	4023.75	PLANNED MAINTENANCE
		4	115	19/12/2011	29/12/2011	242.18	MISCELLANROUS
		4	115	04/10/2011	19/10/2011	380.07	MISCELLANROUS
<u>KSEB</u>							
88	IDAMALAYAR HPS.	1	37.5	31/05/2011	23/01/2012	5691.88	RENOVATION/MODERNISATION
89	IDUKKI HPS.	1	130	15/07/2011	28/08/2011	1058.4	ANNUAL MAINTENANCE
		1	130	09/07/2011	11/07/2011	55.7	MONTHLY MAINTENANCE
		2	130	28/08/2011	22/09/2011	610.62	ANNUAL MAINTENANCE
		3	130	23/09/2011	30/09/2011	173.67	TURBINE MISC/GOVERNOR

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	130	03/06/2011	26/07/2011	1280.93	ANNUAL MAINTENANCE
		4	130	09/08/2011	12/08/2011	81.73	CAPITAL/3 YEARLY MTCE.
		4	130	31/10/2011	26/11/2011	645.5	PLANNED MAINTENANCE
		6	130	27/01/2012	14/02/2012	454.05	PLANNED MAINTENANCE
		1	25	31/12/2011	29/01/2012	692.1	ANNUAL MAINTENANCE
90	KAKKAD HPS.	2	25	01/02/2012	29/02/2012	685.65	ANNUAL MAINTENANCE
91	KUTTIYADI HPS.	1	25	02/01/2012	27/01/2012	605.2	PLANNED MAINTENANCE
		2	25	01/02/2012	27/02/2012	630.33	ANNUAL MAINTENANCE
92	KUTTIYADI ADDL. EXTN.	4	50	02/06/2011	26/06/2011	580.18	ANNUAL MAINTENANCE
		5	50	10/12/2011	12/12/2011	54.17	MISCELLANROUS
		5	50	02/11/2011	05/11/2011	65.65	MISCELLANROUS
		5	50	23/07/2011	01/11/2011	2429.6	MISCELLANROUS
		6	50	14/07/2011	23/07/2011	207.68	MISCELLANROUS
93	LOWER PERIYAR HPS.	1	60	01/04/2011	28/04/2011	662.5	ANNUAL MAINTENANCE
		2	60	03/02/2012	25/02/2012	538.27	PLANNED MAINTENANCE
		3	60	03/01/2012	27/01/2012	593.93	ANNUAL MAINTENANCE
94	NARIAMANGLAM HPS	1	15	02/01/2012	01/02/2012	727.7	ANNUAL MAINTENANCE
		2	15	01/04/2011	30/04/2011	710.48	ANNUAL MAINTENANCE
		2	15	01/05/2011	04/05/2011	89.28	ANNUAL MAINTENANCE
		2	15	10/02/2012	08/03/2012	654.32	ANNUAL MAINTENANCE
		3	15	09/05/2011	31/05/2011	542.98	ANNUAL MAINTENANCE
95	PALLIVASAL HPS.	1	5	09/05/2011	31/05/2011	530.7	ANNUAL MAINTENANCE
		2	5	01/02/2012	09/03/2012	897.13	ANNUAL MAINTENANCE
		2	5	22/09/2011	29/09/2011	179.48	MISCELLANROUS
		3	5	02/11/2011	04/12/2011	774.2	ANNUAL MAINTENANCE
		4	7.5	04/04/2011	30/04/2011	636.9	ANNUAL MAINTENANCE
		4	7.5	01/05/2011	04/05/2011	88.97	MONTHLY MAINTENANCE
		6	7.5	06/01/2012	31/01/2012	609.5	ANNUAL MAINTENANCE
96	PANNIAR HPS.	1	15	01/05/2011	06/05/2011	137.42	ANNUAL MAINTENANCE
		1	15	01/04/2011	30/04/2011	716.68	ANNUAL MAINTENANCE
		1	15	31/01/2012	01/03/2012	715.97	ANNUAL MAINTENANCE
		2	15	10/05/2011	19/05/2011	223.53	MONTHLY MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
97	Poringalkuttu HPS.	1	8	16/01/2012	10/02/2012	617.92	ANNUAL MAINTENANCE
		1	8	01/04/2011	06/04/2011	132.17	ANNUAL MAINTENANCE
		2	8	21/01/2012	27/01/2012	150.25	ROUTINE MAINTENANCE
		2	8	07/04/2011	30/04/2011	565.65	ANNUAL MAINTENANCE
		2	8	01/12/2011	12/01/2012	1017.35	ANNUAL MAINTENANCE
		2	8	01/05/2011	05/05/2011	115.85	ANNUAL MAINTENANCE
		3	8	26/09/2011	10/10/2011	344.05	ROUTINE MAINTENANCE
98	SABARIGIRI HPS.	1	50	02/06/2011	12/07/2011	969.05	ANNUAL MAINTENANCE
		2	50	22/03/2012	31/03/2012	196.1	HRI/HRC/POWER CHANNEL
		2	50	14/07/2011	01/09/2011	1181.25	ANNUAL MAINTENANCE
		3	50	05/02/2012	07/03/2012	752.87	ANNUAL MAINTENANCE
		5	50	01/09/2011	06/09/2011	136.13	ANNUAL MAINTENANCE
		6	50	01/01/2012	30/01/2012	706.52	ANNUAL MAINTENANCE
99	SENGULAM HPS.	2	12	01/05/2011	07/05/2011	161.82	ANNUAL MAINTENANCE
		2	12	01/04/2011	30/04/2011	711.48	ANNUAL MAINTENANCE
		2	12	06/07/2011	13/07/2011	178.17	MONTHLY MAINTENANCE
		3	12	11/11/2011	18/11/2011	178.2	MONTHLY MAINTENANCE
		3	12	01/06/2011	08/06/2011	186.72	ANNUAL MAINTENANCE
		3	12	10/05/2011	31/05/2011	519.4	ANNUAL MAINTENANCE
		4	12	25/08/2011	28/08/2011	78.98	MONTHLY MAINTENANCE
100	SHOLAYAR HPS.	3	18	01/04/2011	12/05/2011	1001.27	ANNUAL MAINTENANCE
		3	18	16/05/2011	14/06/2011	697.13	MONTHLY MAINTENANCE
TANGEDCO							
101	ALIYAR HPS.	1	60	05/05/2011	25/05/2011	479.5	ANNUAL MAINTENANCE
102	BHAWANI KATTAL	1	15	14/08/2011	23/10/2011	1669.72	INTAKE STRU/TRASH RACK
103	KADAMPARI HPS.	1	100	08/06/2011	10/06/2011	53.33	ANNUAL MAINTENANCE
		2	100	14/03/2012	18/03/2012	105.58	OTHER EQUIPMENT
		2	100	20/09/2011	24/09/2011	106.5	ROUTINE MAINTENANCE
		3	100	01/11/2011	05/11/2011	100.67	STATOR
104	KODAYAR HPS-I	1	60	02/02/2012	21/02/2012	435.67	OTHER EQUIPMENT
105	KODAYAR HPS-II	1	40	09/02/2012	21/02/2012	295.33	OTHER EQUIPMENT

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
106	KUNDAH HPS-I	1	20	29/05/2011	10/06/2011	287.75	ANNUAL MAINTENANCE
		3	20	26/07/2011	04/08/2011	221.58	ANNUAL MAINTENANCE
107	KUNDAH HPS-II	1	35	01/06/2011	10/06/2011	204.03	QUATERLY MAINTENANCE
		4	35	02/07/2011	10/07/2011	203.02	QUATERLY MAINTENANCE
		4	35	10/01/2012	12/01/2012	62.48	MONTHLY MAINTENANCE
		5	35	26/09/2011	30/09/2011	114.55	MONTHLY MAINTENANCE
108	KUNDAH HPS-III	1	60	27/05/2011	03/06/2011	164.58	ANNUAL MAINTENANCE
		1	60	13/02/2012	22/02/2012	223.08	ANNUAL MAINTENANCE
		2	60	26/11/2011	09/12/2011	325.13	ANNUAL MAINTENANCE
		3	60	01/09/2011	03/09/2011	63.25	AUXILIARY SYSTEM
		3	60	22/01/2012	01/02/2012	243.92	ANNUAL MAINTENANCE
109	KUNDAH HPS-IV	1	50	26/09/2011	02/10/2011	162	ANNUAL MAINTENANCE
		2	50	11/05/2011	23/05/2011	297.92	ANNUAL MAINTENANCE
110	KUNDAH HPS-V	1	20	21/05/2011	25/05/2011	107.48	ANNUAL MAINTENANCE
		1	20	10/04/2011	25/04/2011	375.48	ANNUAL MAINTENANCE
		1	20	26/10/2011	29/10/2011	85.83	QUATERLY MAINTENANCE
		2	20	18/12/2011	21/12/2011	83.83	QUATERLY MAINTENANCE
111	LOWER METTUR HPS-I	1	15	12/03/2012	31/03/2012	447.5	ANNUAL MAINTENANCE
		1	15	06/05/2011	25/05/2011	464.08	ANNUAL MAINTENANCE
112	LOWER METTUR HPS-II	1	15	16/04/2011	30/04/2011	350.73	ANNUAL MAINTENANCE
		1	15	01/05/2011	06/05/2011	120.5	ANNUAL MAINTENANCE
		1	15	29/01/2012	31/03/2012	1475.17	TURBINE
113	LOWER METTUR HPS-III	1	15	01/04/2011	13/04/2011	311.98	ANNUAL MAINTENANCE
		1	15	21/02/2012	31/03/2012	925	ANNUAL MAINTENANCE
		2	15	21/03/2012	31/03/2012	229	ANNUAL MAINTENANCE
114	LOWER METTUR HPS-IV	1	15	21/03/2012	31/03/2012	229	ANNUAL MAINTENANCE
		1	15	01/03/2012	20/03/2012	458.83	ANNUAL MAINTENANCE
		2	15	01/03/2012	20/03/2012	458.83	ANNUAL MAINTENANCE
115	METTUR DAM HPS.	1	12.5	01/02/2012	27/02/2012	640.83	ANNUAL MAINTENANCE
		3	12.5	01/03/2012	28/03/2012	656	ANNUAL MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
116	METTUR TUNNEL HPS.	1	50	01/02/2012	20/02/2012	464.33	ANNUAL MAINTENANCE
		2	50	21/02/2012	31/03/2012	926.75	ANNUAL MAINTENANCE
		3	50	12/03/2012	31/03/2012	447	ANNUAL MAINTENANCE
117	MOYAR HPS	2	12	04/12/2011	25/12/2011	517.15	GENERATOR
		3	12	03/05/2011	25/05/2011	542.82	MONTHLY MAINTENANCE
		3	12	03/09/2011	10/09/2011	177.92	TURBINE
118	PAPANASAM HPS.	1	8	12/03/2012	31/03/2012	446	ANNUAL MAINTENANCE
		1	8	18/10/2011	22/10/2011	103.25	NEW UNIT RESIDUAL WORKS
		2	8	14/03/2012	18/03/2012	99.17	PRESSURE SHAFT/PENSTOCK
		2	8	18/10/2011	22/10/2011	103.25	NEW UNIT RESIDUAL WORKS
		3	8	20/04/2011	09/05/2011	460.92	ANNUAL MAINTENANCE
		4	8	11/05/2011	30/05/2011	460.5	ANNUAL MAINTENANCE
119	PARSON`S VALLEY HPS.	1	30	20/04/2011	25/04/2011	134.48	ANNUAL MAINTENANCE
		1	30	25/06/2011	15/08/2011	1240.27	ANNUAL MAINTENANCE
		1	30	26/04/2011	12/05/2011	403.5	ANNUAL MAINTENANCE
120	PERIYAR HPS.	1	35	08/08/2011	13/08/2011	125.68	MISCELLANROUS
		1	35	03/06/2011	19/06/2011	383.35	MISCELLANROUS
		1	35	01/04/2011	31/05/2011	1457	RENOVATION/MODERNISATION
		2	35	14/08/2011	14/09/2011	749	MISCELLANROUS
		2	35	01/02/2012	29/02/2012	695.98	ANNUAL MAINTENANCE
		2	35	29/04/2011	31/05/2011	774.75	ANNUAL MAINTENANCE
		3	35	22/11/2011	25/11/2011	74.57	MISCELLANROUS
		3	35	21/03/2012	31/03/2012	230.25	ANNUAL MAINTENANCE
		3	35	26/04/2011	31/05/2011	840.25	ANNUAL MAINTENANCE
		4	35	09/04/2011	31/05/2011	1254.75	ANNUAL MAINTENANCE
121	PYKARA HPS.	1	7	05/07/2011	15/07/2011	251.75	MISCELLANROUS
		1	7	26/04/2011	05/05/2011	234.17	ANNUAL MAINTENANCE
		1	7	18/04/2011	25/04/2011	183.57	ANNUAL MAINTENANCE
		2	7	08/07/2011	15/07/2011	169.67	MISCELLANROUS
		6	11	29/08/2011	19/09/2011	507.25	QUATERLY MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
122	PYKARA ULTMATE HPS.	1	50	17/04/2011	07/05/2011	482.25	ANNUAL MAINTENANCE
		2	50	09/12/2011	16/12/2011	168	MONTHLY MAINTENANCE
		3	50	29/05/2011	11/06/2011	313.75	ANNUAL MAINTENANCE
123	SARKARPATHY HPS.	1	30	18/04/2011	30/04/2011	301.73	ANNUAL MAINTENANCE
		1	30	01/05/2011	31/05/2011	743.98	ANNUAL MAINTENANCE
	SHOLAYAR HPS.	1	35	09/03/2012	31/03/2012	514.67	OTHER EQUIPMENT
		1	35	01/05/2011	07/05/2011	164	ANNUAL MAINTENANCE
		1	35	01/04/2011	30/04/2011	709.98	ANNUAL MAINTENANCE
		2	35	01/04/2011	30/04/2011	707.98	ANNUAL MAINTENANCE
		2	35	08/05/2011	31/05/2011	564.65	ANNUAL MAINTENANCE
		2	35	01/06/2011	06/06/2011	141	ANNUAL MAINTENANCE
		3	25	01/04/2011	30/04/2011	707.98	ANNUAL MAINTENANCE
		3	25	24/05/2011	31/05/2011	181.07	AUXILIARY SYSTEM
		3	25	01/05/2011	12/05/2011	282	ANNUAL MAINTENANCE
		124	SURULIYAR HPS.	1	35	07/05/2011	26/05/2011
1	35			08/08/2011	12/08/2011	94.33	MISCELLANROUS
1	35			02/10/2011	05/10/2011	83.67	MISCELLANROUS
<u>EASTERN REGION</u>							
<u>DVC</u>							
125	MAITHON HPS.	1	23.2	17/05/2011	08/06/2011	531.42	ANNUAL MAINTENANCE
		3	20	21/06/2011	24/06/2011	69	ANNUAL MAINTENANCE
		3	20	16/12/2011	01/02/2012	1135.25	ANNUAL MAINTENANCE
		3	20	16/06/2011	20/06/2011	102.42	ANNUAL MAINTENANCE
126	PANCHET HPS.	2	40	15/02/2012	29/02/2012	336	MISCELLANROUS
<u>JSEB</u>							
127	SUBERNREKHA HPS-I	1	65	01/04/2011	14/04/2011	324	MISCELLANROUS
		1	65	02/06/2011	07/06/2011	120	TURBINE
		1	65	01/05/2011	04/05/2011	72	TURBINE
128	SUBERNREKHA HPS-II	1	65	01/06/2011	06/06/2011	120	TURBINE
		1	65	01/04/2011	14/04/2011	324	MISCELLANROUS
		1	65	01/05/2011	04/05/2011	72	TURBINE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>NHPC</u>							
129	RANGIT HPS	1	20	11/01/2012	06/02/2012	644.75	PLANNED MAINTENANCE
		2	20	06/12/2011	05/01/2012	733.33	ANNUAL MAINTENANCE
		3	20	27/02/2012	20/03/2012	547.67	ANNUAL MAINTENANCE
130	TEESTA V HPS	3	170	17/01/2012	06/02/2012	497.38	ANNUAL MAINTENANCE
<u>OHPC</u>							
131	BALIMELA HPS-I	4	60	01/06/2011	24/06/2011	569.83	ANNUAL MAINTENANCE
		4	60	17/05/2011	31/05/2011	351.98	ANNUAL MAINTENANCE
		5	60	26/05/2011	28/05/2011	56	MONTHLY MAINTENANCE
132	BALIMELA HPS-II	2	75	31/01/2012	31/03/2012	1432	MONTHLY MAINTENANCE
133	HIRAKUD HPS (BURLA)	1	49.5	09/05/2011	11/05/2011	53	SWITCHING EQUIPMENT
		2	49.5	01/06/2011	29/09/2011	2896	ANNUAL MAINTENANCE
		2	49.5	01/04/2011	30/04/2011	719.98	ANNUAL MAINTENANCE
		3	32	14/06/2011	28/11/2011	4016	INTAKE STRU/TRASH RACK
		6	37.5	01/04/2011	30/04/2011	719.98	ANNUAL MAINTENANCE
		6	37.5	12/05/2011	19/05/2011	177.23	SWITCHING EQUIPMENT
134	HIRAKUD HPS (CHILIMA)	3	24	01/06/2011	07/06/2011	152.5	ANNUAL MAINTENANCE
		3	24	23/05/2011	31/05/2011	207.98	ANNUAL MAINTENANCE
135	RENGALI HPS.	1	50	01/06/2011	31/03/2012	7296	RENOVATION/MODERNISATION
		1	50	01/04/2011	30/04/2011	719.98	RENOVATION/MODERNISATION
		1	50	01/05/2011	31/05/2011	743.98	RENOVATION/MODERNISATION
		2	50	11/10/2011	19/10/2011	198	MONTHLY MAINTENANCE
		2	50	01/06/2011	23/06/2011	545.17	ANNUAL MAINTENANCE
		2	50	24/05/2011	31/05/2011	183.98	ANNUAL MAINTENANCE
		3	50	06/08/2011	10/08/2011	98.33	MONTHLY MAINTENANCE
		4	50	02/03/2012	22/03/2012	498.58	ANNUAL MAINTENANCE
136	UPPER INDRAVATI HPS.	1	150	06/05/2011	24/05/2011	434	ANNUAL MAINTENANCE
137	UPPER KOLAB HPS.	2	80	20/06/2011	06/07/2011	392.25	ANNUAL MAINTENANCE
		3	80	02/01/2012	19/01/2012	417	ANNUAL MAINTENANCE
		4	80	02/11/2011	28/11/2011	637.7	ANNUAL MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>WBSEDCL</u>							
138	JALDHAKA HPS ST-I	3	9	01/04/2011	07/10/2011	4552.5	PLANNED MAINTENANCE
139	PURULIA PSS HPS.	2	225	05/02/2012	14/02/2012	209.95	MISCELLANROUS
		2	225	11/10/2011	21/10/2011	239.72	MISCELLANROUS
		3	225	03/01/2012	16/01/2012	312.83	MISCELLANROUS
140	RAMMAM HPS.	1	12.5	04/01/2012	22/01/2012	433.15	PRESSURE SHAFT/PENSTOCK
		1	12.5	06/12/2011	16/12/2011	246.53	ANNUAL MAINTENANCE
		2	12.5	19/03/2012	31/03/2012	278.25	ANNUAL MAINTENANCE
		2	12.5	04/01/2012	22/01/2012	436.98	PRESSURE SHAFT/PENSTOCK
		2	12.5	01/02/2012	03/02/2012	51.67	ANNUAL MAINTENANCE
		3	12.5	31/01/2012	06/02/2012	151.95	ANNUAL MAINTENANCE
		4	12.5	22/10/2011	16/11/2011	604.67	TURBINE
		4	12.5	15/10/2011	21/10/2011	147.35	TURBINE
<u>NORTH EASTERN REGION</u>							
<u>MeECL</u>							
141	KYRDEMKULAI HPS.	1	30	05/04/2011	07/04/2011	64	TURBINE
		2	30	05/04/2011	07/05/2011	788.18	TURBINE
142	UMIAM HPS ST-I	1	9	12/04/2011	04/08/2011	2747	OTHER EQUIPMENT
		1	9	05/03/2012	13/03/2012	199.5	NEW UNIT RESIDUAL WORKS
		4	9	02/11/2011	22/11/2011	481.5	OTHER EQUIPMENT
		4	9	20/03/2012	28/03/2012	199.5	OTHER EQUIPMENT
143	UMIAM HPS ST-IV	7	30	01/02/2012	17/02/2012	401.25	RENOVATION/MODERNISATION
		8	30	06/06/2011	06/07/2011	740.82	TURBINE MISC/GOVERNOR
<u>NEEPCO.</u>							
144	DOYANG HPS.	1	25	16/11/2011	04/12/2011	448	ANNUAL MAINTENANCE
		2	25	15/03/2012	31/03/2012	384	ANNUAL MAINTENANCE
		3	25	16/01/2012	01/02/2012	404.17	ANNUAL MAINTENANCE
145	KHONDONG HPS.	1	25	24/09/2011	24/10/2011	727.27	TRI/TRC/DRAFT TUBE
		1	25	08/02/2012	28/03/2012	1193.2	ANNUAL MAINTENANCE
		2	25	15/03/2012	31/03/2012	384	ANNUAL MAINTENANCE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
146	KOPILI HPS.	2	50	14/03/2012	31/03/2012	408	ANNUAL MAINTENANCE
		3	50	14/11/2011	31/03/2012	3312	ANNUAL MAINTENANCE
		4	50	23/04/2011	25/04/2011	51	PLANNED MAINTENANCE
		5	25	01/12/2011	09/01/2012	951	ANNUAL MAINTENANCE
147	RANGANADI HPS.	1	135	01/12/2011	22/12/2011	506.95	ANNUAL MAINTENANCE
		2	135	03/01/2012	11/01/2012	212	ANNUAL MAINTENANCE
		3	135	01/02/2012	13/02/2012	310.02	ANNUAL MAINTENANCE
<u>NHPC</u>							
148	LOKTAK HPS.	1	35	01/04/2011	20/04/2011	476.82	PLANNED MAINTENANCE
		3	35	26/08/2011	29/08/2011	92.48	TRI/TRC/DRAFT TUBE

CHAPTER 5

FORCED OUTAGE OF HE UNITS

CHAPTER-5

FORCED OUTAGES OF HE UNITS

5.1 Based on the analysis carried out for 620 generating units installed in 177 Hydro Electric Power Stations, non-availability of hydro-electric units in the country due to forced outages during the year 2011-12 (excluding the causes not attributable to the power plant) was 4.48% as compared to 3.94% during 2010-11. Unit-wise details of forced outages of duration 24 hours and above are given in Annex- 5.1.

5.2 Forced outages of generating units were due to various problems in generating equipments, auxiliary systems, civil structures and also due to external reasons not attributable to the power plant equipment/civil structures etc. The external reasons are non-availability of water, transmission constraints, system disturbances, flood and also due to high silt in the river, etc.

The forced outages have been analysed component wise. The generator and turbine faults accounted for 17.65% and 20.77% respectively whereas forced outages due to system constraints accounted for 1.5% of total forced outages. Category wise forced outages of Hydro Electric Generating units are given in Table 5.1 below.

TABLE 5.1

EQUIPMENT/SYSTEM WISE FORCED OUTAGES FOR PERIOD: 2011-12

S.No.	CAUSES OF FORCED OUTAGE	DURATION OF OUTAGE (HOURS)	% OF TOTAL FORCED OUTAGE
A	RELATED WITH EQUIPMENT AND CIVIL STRUCTURE		
1	GENERATOR FAULTS	56749.08	17.65
2	TURBINE FAULTS	66786.58	20.77
3	CIVIL STRUCTURE FAULTS	36075.02	11.22
4	OTHER EQUIPMENT FAULTS	39125.40	12.17
	SUB-TOTAL:	198736.08	61.80
B	NOT ASSOCIATED WITH THE EQUIPMENT AND CIVIL		
5	WATER CONSTRAINT	98853.96	30.74
6	SYSTEM CONSTRAINT	4813.86	1.50
7	OTHER MISC	19168.35	5.96
	SUB-TOTAL:	122836.17	38.20
	GRAND TOTAL (A+B):	321572.25	100.00

5.3 FORCED OUTAGE DUE TO GENERATOR COMPONENTS

Among the forced outages of various generator components, outage due to fault in stator was 30.39% followed by rotor faults 19.33%, other faults 15.36% and thrust bearing faults accounted for 14.46%.

The details of forced outages due to various generator faults and associated systems are given in table 5.2 below:

TABLE 5.2

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
PERIOD: 2011-12**

S.No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
1	STATOR	17247.10	30.39
2	ROTOR	10969.83	19.33
3	EXCITATION SYSTEM	2895.70	5.10
4	AUTOMATIC VOLTAGE REGULATOR	533.42	0.94
5	PROTECTION SYSTEM	1626.12	2.87
6	GENERATOR COOLING SYSTEM	168.53	0.30
7	THRUST BEARING	8205.50	14.46
8	UPPER GUIDE BEARING	3841.37	6.77
9	LOWER GUIDE BEARING	2480.82	4.37
10	VIBRATION/ SOUND / ALIGNMENT	4.15	0.01
11	BRAKE AND JACKS	58.16	0.10
12	OTHERS	8718.38	15.36
	TOTAL	56749.08	100.00

Performance of generating units under different category as per their unit size has been analyzed for failure of generator components. These are listed in Table 5.3 for unit size up to 50 MW, in Table 5.4 for unit size above 50 MW & Upto 100 MW and in Table 5.5 for unit size above 100 MW.

TABLE 5.3

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
(UNIT SIZE UPTO 50 MW)
PERIOD: 2011-12**

S.No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
1	STATOR	1284.27	7.82
2	ROTOR	8827.13	53.78
3	EXCITATION SYSTEM	1738.45	10.59
4	AUTOMATIC VOLTAGE REGULATOR	419.20	2.55
5	PROTECTION SYSTEM	443.74	2.70
6	GENERATOR COOLING SYSTEM	90.73	0.55
7	THRUST BEARING	869.60	5.30
8	UPPER GUIDE BEARING	0.00	0.00
9	LOWER GUIDE BEARING	2068.37	12.6
10	VIBRATION/ SOUND / ALIGNMENT	0.00	0.00
11	BRAKE AND JACKS	14.43	0.09
12	OTHERS	657.27	4.00
	TOTAL	16413.18	100.00

TABLE 5.4

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
(UNIT SIZE ABOVE 50 MW AND UPTO 100 MW)
PERIOD: 2011-12**

S.No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% of TOTAL NO. OF HOURS
1	STATOR	6855.28	62.06
2	ROTOR	278.27	2.52
3	EXCITATION SYSTEM	173.87	1.57
4	AUTOMATIC VOLTAGE REGULATOR	79.32	0.72
5	PROTECTION SYSTEM	80.27	0.73
6	GENERATOR COOLING SYSTEM	9.78	0.09
7	THRUST BEARING	1765.43	15.98

8	UPPER GUIDE BEARING	1245.53	11.28
9	LOWER GUIDE BEARING	324.23	2.94
10	VIBRATION/ SOUND / ALIGNMENT	0.00	0.00
11	BRAKE AND JACKS	10.83	0.10
12	OTHERS	222.83	2.02
	TOTAL	11045.65	100.00

TABLE 5.5

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF GENERATOR COMPONENTS
(UNIT SIZE ABOVE 100 MW)
PERIOD: 2011-12**

S.No.	COMPONENT OF GENERATOR	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	STATOR	9107.55	31.09
2	ROTOR	1864.43	6.37
3	EXCITATION SYSTEM	983.38	3.36
4	AUTOMATIC VOLTAGE REGULAR	34.90	0.12
5	PROTECTION SYSTEM	1102.12	3.76
6	GENERATOR COOLING SYSTEM	68.02	0.23
7	THRUST BEARING	5570.47	19.02
8	UPPER GUIDE BEARING	2595.83	8.86
9	LOWER GUIDE BEARING	88.22	0.30
10	VIBRATION/ SOUND / ALIGNMENT	4.15	0.01
11	BRAKE AND JACKS	32.90	0.11
12	OTHERS	7838.29	26.76
	TOTAL	29290.26	100.00

From the tables above, it is observed that forced outage due to Generator Rotor faults was 53.78%, highest amongst the generator faults for unit size Upto 50 MW and Generator Stator fault was 62.06% highest amongst the generator faults for unit size above 50 MW and Upto 100 MW. In unit size above 100 MW, forced outages due to problems of Stator fault accounted for 31.09%.

5.4 FORCED OUTAGE DUE TO TURBINE COMPONENTS

Out of various forced outages of turbine components, maximum forced outage of 46.33% was due to problems in Governor System. As far as component wise outages are concerned, 20.78% was due to miscellaneous faults followed by 14.05% due to Shaft Vibration/Alignment/Sound and 10.20% due to Problem in Main Inlet Valves etc. The forced outage due to problems in Runner/Under Water Parts was the least at 1.87% as can be seen in Table 5.6.

TABLE 5.6

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
PERIOD: 2011-12**

S.No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	1879.89	2.81
2	RUNNER/UNDER WATER PARTS	1251.50	1.87
3	MAIN INLET VALVE	6810.05	10.20
4	GOVERNOR SYSTEM	30942.62	46.33
5	GUIDE VANES	2641.25	3.95
6	SHAFT VIBRATION / ALIGNMENT /SOUND	9385.93	14.05
7	MISCELLANEOUS	13875.34	20.78
	TOTAL	66786.58	100.00

Performance of generating units under different category as per their unit size has been analyzed for failure of various turbine components. These are listed in Table 5.7 for unit size up to 50 MW, in Table 5.8 for unit size above 50 MW & Upto 100 MW and in Table 5.9 for unit size above 100 MW.

TABLE 5.7

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
(UNIT SIZE UPTO 50 MW)
PERIOD: 2011-12**

S.No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	588.32	8.77
2	RUNNER/UNDER WATER PARTS	69.13	1.03
3	MAIN INLET VALVE	32.65	0.49
4	GOVERNOR SYSTEM	3782.65	56.39
5	GUIDE VANES	1815.35	27.06
6	SHAFT VIBRS./ALIGNM/SOUND	25.00	0.37

7	MISCELLANEOUS	394.52	5.88
	TOTAL	6707.62	100.00

TABLE 5.8

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
(UNIT SIZE ABOVE 50 MW AND UPTO 100 MW)
PERIOD: 2011-12**

S.No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	536.42	7.24
2	RUNNER/UNDER WATER PARTS	85.08	1.15
3	MAIN INLET VALVE	164.87	2.22
4	GOVERNOR SYSTEM	1439.58	19.43
5	GUIDE VANES	409.10	5.52
6	SHAFT VIBRATION /ALIGNMENT /SOUND	2.62	0.04
7	MISCELLANEOUS	4772.38	64.40
	TOTAL	7410.05	100.00

TABLE 5.9

**FORCED OUTAGE HOURS DUE TO BREAK DOWN OF TURBINE COMPONENTS
(UNIT SIZE ABOVE 100 MW)
PERIOD: 2011-12**

S.No.	COMPONENT OF TURBINE	OUTAGE HOURS	% OF TOTAL NO. OF HOURS
1	BEARING	755.15	1.43
2	RUNNER/UNDER WATER PARTS	1097.28	2.08
3	MAIN INLET VALVE	6612.54	12.55
4	GOVERNOR SYSTEM	25720.39	48.83
5	GUIDE VANES	416.80	0.79
6	SHAFT VIBRATION /ALIGNMENT /SOUND	9358.32	17.77
7	MISCELLANEOUS	8708.44	16.53
	TOTAL	52668.91	100.00

Details of long duration forced outages (above 24 hrs) are given in Annex-5.1.

5.5 ANALYSIS BASED ON TYPE OF TURBINE:

The analysis of forced outages caused by turbine components as per type of turbines is given in Table 5.10. Forced outage rate was observed to be the highest in case of Bulb turbines (1123.50 Hrs/unit) and lowest in case of Kaplan turbines (416.56 hrs/unit)

TABLE 5.10
FORCED OUTAGES TURBINE TYPE WISE
PERIOD: 2011-12

S.No.	Type of Turbine	Number of Units	Installed Capacity MW	Forced Outage Hours	Avg. Forced Outage per Unit Hours
1	BULB	16	384.00	17976	1123.50
2	FRANCIS AND REVERSIBLE	359	28245.30	186096	518.37
3	KAPLAN	115	4029.20	47904	416.56
4	PELTON	130	6331.90	58214	447.80
	TOTAL	620	38990.40	310190	500.31

5.6 ANALYSIS BASED ON MAKE OF UNITS:

The comparative performance of generating units of different makes is indicated in Table 5.11. The outage figures in the table relate to faults in turbine and generator only. Generating units from Canada (154.91 Hours/unit) followed by units from France (239.27 Hours/unit) registered the best performance. Average forced outage for BHEL units was 409.43 Hrs/unit as against 572.81 Hrs/unit for imported units.

TABLE 5.11
FORCED OUTAGES DUE TO FAULT IN TURBINE & GENERATOR
(SUPPLIER WISE)PERIOD: 2011-12

S.No.	NAME OF SUPPLIER/ COUNTRY OF MAKE	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED FAULT IN TOTAL HOURS	OUTAGES DUE TO GENERATING UNIT AVERAGE HOURS/UNIT
A-Indigenous					
1	BHEL	262	16128	107270	409.43
2	Others	4	87	144	36.00
	SUB TOTAL	266	16215	107414	403.81

B-Imported					
1	CANADA	44	3132	6816	154.91
2	U.K	64	1257.10	44688	698.25
3	SWITZERLAND	22	815.20	9312	423.27
4	FRANCE	33	2186.40	7896	239.27
5	JAPAN	77	6544.20	32760	425.45
6	U.S.A	9	351	15288	1698.67
7	USSR	26	2804	21336	820.62
8	Other	79	5685.50	64680	818.73
	SUB TOTAL	354	22775.40	202776	572.81
	Total	620	38990.40	310190	500.31

5.7 ANALYSIS AGE-WISE:

Details of forced outages of generating units commissioned during different years are indicated in Table 5.12. Forced outages caused by equipment failure i.e. the fault relating to generator, turbine and auxiliary system equipments have been taken into account for the purpose of computation. Per unit forced outage rate in respect of generating units commissioned during 2009-10 was observed to be the least (0 Hrs/unit) and was maximum in the case of unit commissioned during 1967-68 to 1977-78(975.51 Hrs/unit)

TABLE - 5.12

**FORCED OUTAGES DUE TO EQUIPMENT BREAK DOWN:
(AGE-WISE)PERIOD: 2011-12**

S.NO.	YEAR OF COMMISSIONING	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	NON AVAILABILITY PER UNIT (HOURS)
1	2011-2012	11	1423	96	8.73
2	2010-2011	11	690	878	79.82
3	2009-2010	1	39	0	0.00
4	2008-2009	8	969	7056	882.00
5	2007-2008	23	2443	19992	869.22
6	2006-2007	21	2286	6072	289.14
7	2005-2006	13	1340	1032	79.38
8	2004-2005	13	1115	1440	110.77
9	2003-2004	18	2690	2760	153.33
10	2002-2003	11	740.60	6696	608.73
11	2001-2002	20	1092.20	7248	362.40
12	2000-2001	13	1129	648	49.85

13	1989-90 To 1999-00	87	5775.70	20568	236.41
14	1978-79 To 1988-89	124	7275.60	56232	453.48
15	1967-68 To 1977-78	82	5300.25	79992	975.51
16	UP TO 1966-67	164	4682.05	99480	606.59
	TOTAL	620	38990.40	310190	500.31

5.8 REGIONWISE PERFORMANCE:

The region wise summary of performance of the hydel generating units is indicated in table 5.13. For the purpose of computation, all types of forced outages/tripping due to faults in generator, turbine, auxiliary system & other equipments and civil structure faults (excluding misc.) have been included. Performance of hydro generating equipments installed in Western Region was the best as the non-availability due to forced outages was the least (3.07%). The non-availability of the units installed in the Eastern Region was observed to be on the higher side (7.87%).

TABLE 5.13

FORCED OUTAGES - REGION WISE PERIOD: 2011-12

S.NO.	REGION	NO. OF UNITS	INSTALLED CAPACITY (MW)	% NON AVAILABILITY DUE TO FORCED OUTAGES
1	NORTHERN	197	15178.25	3.64
2	WESTERN	101	7392.00	3.07
3	SOUTHERN	239	11372.45	5.49
4	EASTERN	55	3847.70	7.87
5	NORTH EASTERN	28	1200.00	3.44
	ALL INDIA	620	38990.40	4.48

5.9 FORCED OUTAGE - UTILITY WISE:

The forced outages of hydro electric units under various Central Sector Utilities, Private Sector and State Electricity Boards/Power Generation Corporations are indicated in Table 5.14.

All types of forced outages/tripping due to problems in generating units, auxiliary equipments, civil structure and misc. (viz non-availability of water, system disturbances, etc) have been taken into account for the analysis. Per unit forced outages for generating units under DLHP, MPCL & JKHPCL was nil and THDC (6 Hr/unit) followed by JHPL &

CSPGCL(8 Hr/unit) was least. It was maximum in respect of hydro electric stations under UJVNL (2421.18 Hr/unit).

Table 5.14

**FORCED OUTAGES- BOARD /CORPORATION WISE
PERIOD: -2011-12**

S.NO.	ORGANISATION	NO. OF UNITS	INSTALLED CAPACITY (MW)	FORCED OUTAGE (HOURS)	FORCED OUTAGE PER UNIT (HOURS)
CENTRAL SECTOR					
1	BBMB	28	2866.30	3168	113.14
2	DVC	5	143.20	2304	460.80
3	NEEPCO.	13	755	3192	245.54
4	NHDC	16	1520	192	12.00
5	NHPC	41	3767.20	6624	161.56
6	SJVNL	6	1500	960	160.00
7	THDC	8	1400	48	6.00
	SUB TOTAL	117	11951.70	16488	140.92
PRIVATE SECTOR					
8	ADHPL	2	192	14	7.00
9	DLHP	1	34	0	0.00
10	EPPL	2	100	48	24.00
11	JHPL	3	300	24	8.00
12	JKHPCL	4	1000	0	0.00
13	JPPVL	4	400	96	24.00
14	MPCL	2	86	0	0.00
15	TATA	15	447	480	32.00
	SUB TOTAL	33	2559	662	20.06
STATE SECTOR					
16	APGENCO	57	3783.35	60216	1056.42
17	APGPCL	2	100	1224	612.00
18	CSPGCL	3	120	24	8.00
19	GSECL	8	540	5136	642.00
20	HPSEB	12	366	2832	236.00
21	JKPDC	9	660	1416	157.33
22	JSEB	2	130	672	336.00
23	KPCL	68	3585.40	35808	526.59
24	KSEB	48	1881.50	21960	457.50
25	MAHAGENCO	24	2406	5520	230.00

26	MeECL	10	240	9408	940.80
27	MPPGCL	23	875	5424	235.83
28	OHPC	31	2027.50	32928	1062.19
29	PSPCL	25	1051	2472	98.88
30	RRVUNL	11	411	3192	290.18
31	SSNNL	11	1450	1440	130.91
32	TANGEDCO	66	2122.20	16656	252.36
33	UJVNL	34	1252.15	82320	2421.18
34	UPJVNL	15	501.60	1224	81.60
35	WBSEDCL	11	977	3168	288.00
	SUB TOTAL	470	24479.70	293040	623.49
	ALL INDIA	620	38990.40	310190	500.31

5.10 DURATION OF FORCED OUTAGES:

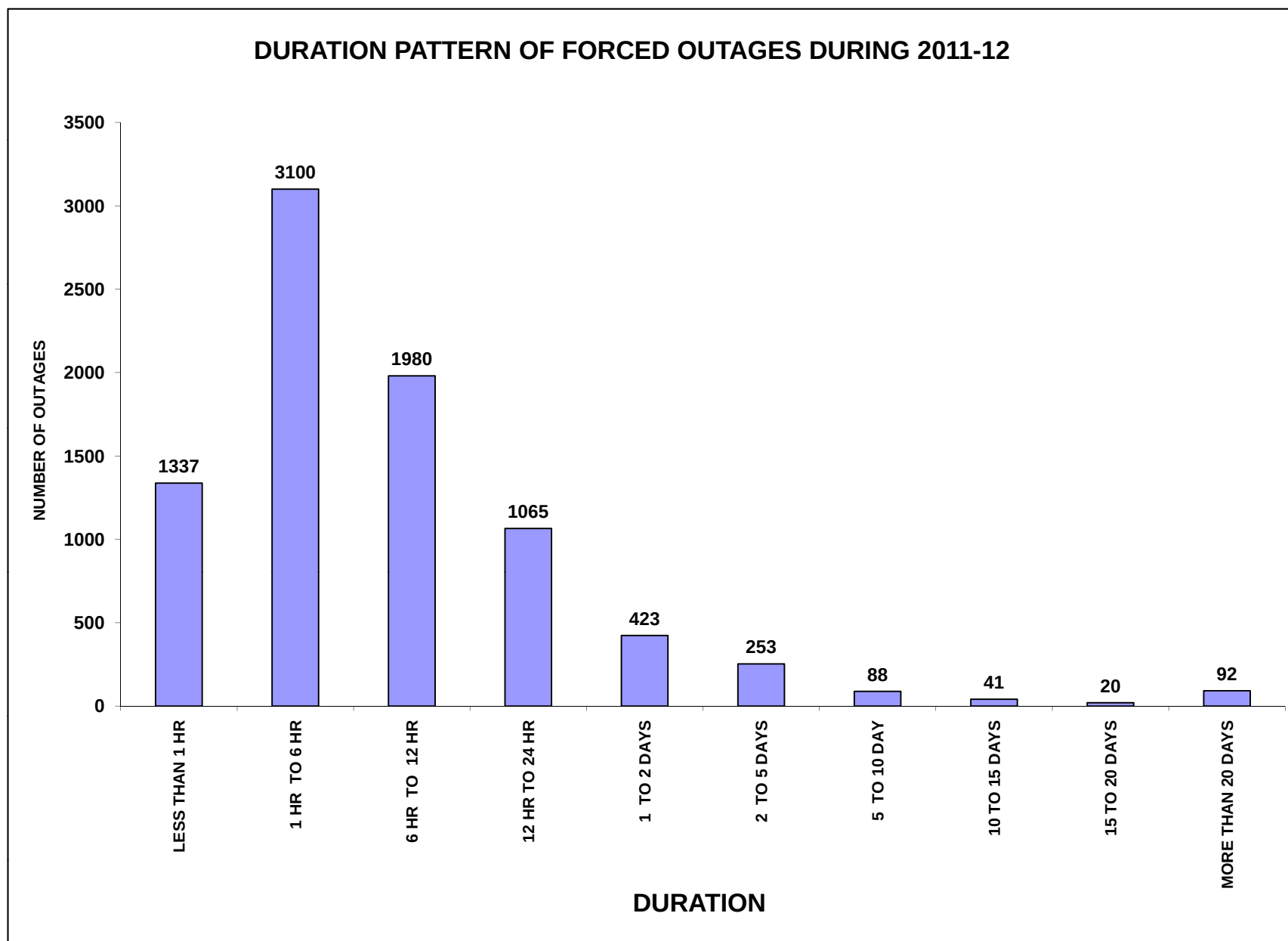
There were total 8399 forced outages/tripping during the year 2011-12. Duration of individual outage varied widely from a few minutes to the maximum of full year.

The duration pattern of forced outages is indicated in Table 5.15 and Exhibit 5.1. It could be seen that about 89.08% of the total forced shutdown were of duration Upto 24 hours.

9.82% of outages were of duration varying from 1 to 20 days and only 1.1% of shutdowns were for more than 20 days.

TABLE 5.15
DURATION PATTERN OF FORCED OUTAGES

S.NO.	DURATION IN HOURS	NUMBER OF OUTAGES	% OF TOTAL OUTAGES
1	Less than 1 hour	1337	15.92
2	1 TO 6 hours	3100	36.91
3	6 TO 12 hours	1980	23.57
4	12 TO 24 hours	1065	12.68
5	1 TO 2 days	423	5.04
6	2 TO 5 days	253	3.01
7	5 TO 10 days	88	1.05
8	10 TO 15 days	41	0.49
9	15 TO 20 days	20	0.24
10	More than 20 days	92	1.10
	TOTAL NO. OF OUTAGES	8399	100.00



**DETAILS OF LONG DURATION FORCED OUTAGES IN HYDRO ELECTRIC UNITS
(OUTAGE DURATION 24 HOURS AND ABOVE) DURING 2011-12**

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
<u>NORTHERN REGION</u>							
<u>BBMB</u>							
1	BHAKRA H P S RIGHT	2	157	05/05/2011	09/05/2011	108.12	GEN./TR.BREAKER
2	DEHAR H P S	2	165	28/07/2011	09/08/2011	301.9	TURBINE FAULTS
		4	165	17/04/2011	18/04/2011	26.48	EHT/CT/PT
		4	165	25/04/2011	09/08/2011	2539.18	GENERATOR FAULTS
		6	165	03/10/2011	05/10/2011	32.9	GUIDE VANES
3	GANGUWAL HPS	2	24.2	17/08/2011	18/08/2011	37	SHAFT SEAL
4	KOTLA HPS	2	24.2	22/06/2011	23/06/2011	28.55	SHAFT SEAL
<u>E.P.P.L.</u>							
5	MALANA-II HPS	2	50	09/09/2011	10/09/2011	28.27	EHT/CT/PT
<u>HPSEB</u>							
6	BASSI HPS	4	15	01/08/2011	31/08/2011	720.42	COOLING WATER SYSTEM
7	LARJI HPS	1	42	16/08/2011	17/08/2011	27.67	MISCELLANEOUS
		2	42	16/08/2011	17/08/2011	27.75	MISCELLANEOUS
		2	42	17/09/2011	29/10/2011	1000.25	SWITCHYARD MISC.
		2	42	02/08/2011	08/08/2011	148.75	MISCELLANEOUS
		3	42	16/08/2011	17/08/2011	27.83	MISCELLANEOUS
8	SANJAY HPS	1	40	10/10/2011	21/10/2011	274.33	EHG/GOV. FAULTS, MISC.
		2	40	12/01/2012	15/01/2012	70	SHAFT VIBRS./ALIGNM/SOUND
		2	40	09/04/2011	16/04/2011	171.67	OTHER (D/T, GUIDE/STAY VANES
		2	40	28/06/2011	29/06/2011	24.17	GOVERNOR SYSTM
		3	40	09/04/2011	16/04/2011	172.5	OTHER (D/T, GUIDE/STAY VANES
<u>JKPDC</u>							
9	BAGLIHAR HPS	2	150	16/04/2011	06/05/2011	461.67	COOLING WATER SYSTEM
		3	150	19/10/2011	27/10/2011	188.82	OTHERS
10	LOWER JHELM HPS	1	35	19/10/2011	20/10/2011	25	OTHER (D/T, GUIDE/STAY VANES
		2	35	18/10/2011	19/10/2011	29	EXCITATION PROBLEMS
		3	35	22/04/2011	20/05/2011	676.23	OTHERS
<u>NHPC</u>							
11	BAIRA SIUL HPS	2	66	07/07/2011	08/07/2011	45	RUNNER/UNDER WATER PARTS
12	CHAMERA- I HPS	3	180	19/02/2012	22/02/2012	79.15	OTHER (D/T, GUIDE/STAY VANES

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
13	CHAMERA- II HPS	3	100	10/01/2012	11/01/2012	32.5	FORCED OUTAGE
14	DHAULI GANGA HPS	1	70	31/07/2011	01/08/2011	35.32	FORCED OUTAGE
		1	70	15/02/2012	23/02/2012	189.75	PROTECTION OPERATION
		1	70	17/06/2011	18/06/2011	26.08	FORCED OUTAGE
		2	70	17/06/2011	18/06/2011	26.25	FORCED OUTAGE
		2	70	31/07/2011	01/08/2011	35	FORCED OUTAGE
		2	70	06/04/2011	09/04/2011	76.33	MISCELLANEOUS
		3	70	17/06/2011	18/06/2011	26.33	FORCED OUTAGE
		3	70	31/07/2011	01/08/2011	35.25	FORCED OUTAGE
		4	70	17/06/2011	18/06/2011	26.25	FORCED OUTAGE
		4	70	31/07/2011	01/08/2011	35.5	FORCED OUTAGE
15	DULHASTI HPS	3	130	26/08/2011	29/08/2011	78.48	EHG/GOV. FAULTS, MISC.
16	SALAL HPS-II	2	115	24/08/2011	25/08/2011	44.9	THRUST BEARING
		3	115	11/05/2011	13/05/2011	70.63	THRUST BEARING
17	SEWA-II HPS	2	40	18/06/2011	15/07/2011	669.43	RUNNER/UNDER WATER PARTS
18	TANAKPUR HPS	1	31.4	14/07/2011	16/07/2011	38.2	FORCED OUTAGE
		1	31.4	24/07/2011	26/07/2011	35.9	ROTOR
		1	31.4	10/02/2012	15/02/2012	115.72	FORCED OUTAGE
		1	31.4	05/05/2011	13/05/2011	183.52	BUS PROTECTION TRIP
		1	31.4	30/05/2011	03/06/2011	89.38	ROTOR
		1	31.4	11/07/2011	12/07/2011	26.75	FORCED OUTAGE
		1	31.4	15/11/2011	18/11/2011	83.52	FORCED OUTAGE
		1	31.4	16/08/2011	17/08/2011	36.82	FORCED OUTAGE
		2	31.4	28/10/2011	14/11/2011	409.4	FORCED OUTAGE
		2	31.4	16/08/2011	17/08/2011	42.42	FORCED OUTAGE
		3	31.4	29/12/2011	01/01/2012	69.62	FORCED OUTAGE
		3	31.4	16/08/2011	17/08/2011	37.23	FORCED OUTAGE
19	URI-I HPS	4	120	05/04/2011	07/04/2011	57.6	FORCED OUTAGE
		4	120	12/04/2011	13/04/2011	28.83	MISCELLANEOUS
PSPCL							
20	ANANDPUR SAHIB HPS	2	33.5	20/12/2011	27/12/2011	181.75	MISCELLANEOUS
21	MUKERIAN HPS-I	1	15	22/09/2011	24/09/2011	59.58	FORCED OUTAGE
		2	15	21/09/2011	24/09/2011	66.58	FORCED OUTAGE
		2	15	12/10/2011	14/10/2011	38.67	OTHERS
		3	15	25/12/2011	06/01/2012	287.47	VIBRATION/SOUND/ ALIGNMENT

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
22	MUKERIAN HPS-II	3	15	20/09/2011	25/09/2011	123.92	FORCED OUTAGE
		3	15	11/10/2011	13/10/2011	45.67	OTHERS
		3	15	16/08/2011	20/08/2011	88.17	INTAKE STRICT./TRASH RACK
		1	15	09/05/2011	21/05/2011	290.33	TRANSFORMER PROTECTION
		2	15	22/09/2011	23/09/2011	28.67	FORCED OUTAGE
		3	15	03/08/2011	04/08/2011	24.58	ROTOR
		3	15	24/08/2011	28/08/2011	105.17	COOLING WATER SYSTEM
		3	15	11/10/2011	14/10/2011	67.67	OTHERS
23	MUKERIAN HPS-III	3	15	20/09/2011	24/09/2011	84.83	FORCED OUTAGE
		1	19.5	23/09/2011	24/09/2011	31.22	FORCED OUTAGE
		1	19.5	13/10/2011	14/10/2011	28.72	OTHERS
		2	19.5	21/09/2011	24/09/2011	65.97	FORCED OUTAGE
		3	19.5	11/10/2011	13/10/2011	45	OTHERS
24	MUKERIAN HPS-IV	3	19.5	16/11/2011	19/11/2011	70.5	GOVERNOR SYSTM
		1	19.5	28/09/2011	29/09/2011	35.92	OTHERS
		1	19.5	22/09/2011	24/09/2011	49.7	FORCED OUTAGE
		2	19.5	23/02/2012	27/02/2012	86.33	FORCED OUTAGE
		2	19.5	13/10/2011	14/10/2011	33.08	OTHERS
		3	19.5	21/09/2011	24/09/2011	56.3	FORCED OUTAGE
		5	50	24/05/2011	29/05/2011	126.5	RUNNER/UNDER WATER PARTS
25	SHANAN HPS						
RRVUNL							
26	MAHI BAJAJ HPS-II	1	45	01/12/2011	02/12/2011	36.33	FORCED OUTAGE
		1	45	09/02/2012	18/02/2012	203.25	FORCED OUTAGE
		1	45	30/01/2012	01/02/2012	41.25	FORCED OUTAGE
		1	45	28/01/2012	30/01/2012	37.75	FORCED OUTAGE
		1	45	04/02/2012	06/02/2012	37.75	FORCED OUTAGE
		1	45	28/12/2011	30/12/2011	41.08	FORCED OUTAGE
		1	45	20/01/2012	25/01/2012	116.17	FORCED OUTAGE
		1	45	04/01/2012	10/01/2012	139.83	FORCED OUTAGE
		1	45	04/12/2011	05/12/2011	34.67	FORCED OUTAGE
		2	45	22/09/2011	23/09/2011	29.5	EHG/GOV. FAULTS, MISC.
		2	45	01/02/2012	11/02/2012	237.42	FORCED OUTAGE
		2	45	26/12/2011	02/01/2012	159.33	FORCED OUTAGE
		2	45	22/12/2011	24/12/2011	48.33	FORCED OUTAGE
		2	45	03/10/2011	01/12/2011	1416	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
SJVN		2	45	18/01/2012	23/01/2012	107	FORCED OUTAGE
		2	45	07/01/2012	18/01/2012	260.58	FORCED OUTAGE
		2	45	15/02/2012	20/02/2012	112.08	FORCED OUTAGE
		2	45	02/01/2012	05/01/2012	63.5	FORCED OUTAGE
SJVN							
27	NATHPA JHAKRI HPS	1	250	16/08/2011	17/08/2011	32.5	FORCED OUTAGE
		1	250	25/04/2011	26/04/2011	24.15	TURBINE
		1	250	25/07/2011	27/07/2011	59.92	FORCED OUTAGE
		1	250	24/04/2011	25/04/2011	33.98	GEN./TR.BREAKER
		2	250	16/08/2011	17/08/2011	32.45	FORCED OUTAGE
		2	250	25/07/2011	27/07/2011	59.67	FORCED OUTAGE
		2	250	16/04/2011	18/04/2011	52.9	GEN./TR.BREAKER
		3	250	25/07/2011	27/07/2011	59.48	FORCED OUTAGE
		3	250	16/08/2011	17/08/2011	32.45	FORCED OUTAGE
		3	250	04/04/2011	05/04/2011	42.6	OTHER (D/T, GUIDE/STAY VANES
		4	250	25/07/2011	27/07/2011	59.32	FORCED OUTAGE
		4	250	16/08/2011	17/08/2011	32.43	FORCED OUTAGE
		5	250	25/07/2011	27/07/2011	59.12	FORCED OUTAGE
		5	250	16/08/2011	17/08/2011	32.4	FORCED OUTAGE
		5	250	20/04/2011	21/04/2011	43.37	GEN./TR.BREAKER
		6	250	16/08/2011	17/08/2011	32.4	FORCED OUTAGE
		6	250	25/07/2011	27/07/2011	58.95	FORCED OUTAGE
		6	250	02/04/2011	13/04/2011	255.68	GEN./TR.BREAKER
		6	250	20/11/2011	24/11/2011	95.95	GEN./TR.BREAKER
UJVNL							
28	CHIBRO (YAMUNA) HPS	1	60	03/04/2011	04/04/2011	27.67	FORCED OUTAGE
		1	60	15/08/2011	18/08/2011	68.58	FORCED OUTAGE
		1	60	20/08/2011	21/08/2011	25.25	FORCED OUTAGE
		1	60	25/09/2011	26/09/2011	30.92	FORCED OUTAGE
		1	60	29/10/2011	02/11/2011	85.55	FORCED OUTAGE
		1	60	10/04/2011	15/04/2011	103.42	FORCED OUTAGE
		1	60	08/08/2011	09/08/2011	25.42	FORCED OUTAGE
		1	60	13/02/2012	15/02/2012	42	FORCED OUTAGE
		1	60	16/04/2011	01/05/2011	350	FORCED OUTAGE
		1	60	01/04/2011	02/04/2011	31.58	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
29	CHILLA HPS	1	60	28/09/2011	04/10/2011	146.33	FORCED OUTAGE
		2	60	12/02/2012	13/02/2012	27.58	FORCED OUTAGE
		2	60	10/02/2012	11/02/2012	30.67	FORCED OUTAGE
		2	60	05/10/2011	07/10/2011	45.5	FORCED OUTAGE
		2	60	08/08/2011	09/08/2011	25.17	FORCED OUTAGE
		2	60	07/10/2011	20/12/2011	1780.92	FORCED OUTAGE
		2	60	20/08/2011	21/08/2011	24.92	FORCED OUTAGE
		2	60	15/08/2011	18/08/2011	67.83	FORCED OUTAGE
		2	60	08/05/2011	09/05/2011	27	FORCED OUTAGE
		2	60	02/06/2011	03/06/2011	29.92	FORCED OUTAGE
		2	60	08/04/2011	10/04/2011	33.25	FORCED OUTAGE
		2	60	04/04/2011	08/04/2011	101.08	FORCED OUTAGE
		3	60	24/10/2011	29/10/2011	108.67	FORCED OUTAGE
		3	60	19/10/2011	24/10/2011	116.25	FORCED OUTAGE
		3	60	16/02/2012	31/03/2012	1045.83	FORCED OUTAGE
		3	60	08/08/2011	09/08/2011	25	FORCED OUTAGE
		3	60	20/08/2011	21/08/2011	26	FORCED OUTAGE
		3	60	15/08/2011	18/08/2011	67.83	FORCED OUTAGE
		3	60	27/08/2011	28/08/2011	26.8	FORCED OUTAGE
		3	60	14/04/2011	16/04/2011	36	FORCED OUTAGE
		4	60	29/06/2011	30/06/2011	30.83	FORCED OUTAGE
		4	60	08/08/2011	09/08/2011	25.17	FORCED OUTAGE
		4	60	02/10/2011	03/10/2011	30.25	FORCED OUTAGE
		4	60	15/08/2011	18/08/2011	68.42	FORCED OUTAGE
		4	60	20/08/2011	21/08/2011	25.25	FORCED OUTAGE
		1	36	24/07/2011	26/07/2011	49.67	SHAFT SEAL
		1	36	16/08/2011	18/08/2011	61.08	FORCED OUTAGE
		1	36	01/02/2012	03/02/2012	45.92	FORCED OUTAGE
		2	36	16/08/2011	18/08/2011	55.83	FORCED OUTAGE
		3	36	16/08/2011	18/08/2011	56.67	FORCED OUTAGE
		4	36	16/08/2011	18/08/2011	61.25	FORCED OUTAGE
		4	36	31/01/2012	01/02/2012	33.83	FORCED OUTAGE
		4	36	12/08/2011	15/08/2011	80.67	COOLING WATER SYSTEM
		4	36	03/10/2011	05/10/2011	49.42	SHAFT SEAL

Sl. No.	STATION		UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
30	DHAKRANI	HPS	1	11.25	10/05/2011	11/05/2011	36.17	FORCED OUTAGE
			1	11.25	14/02/2012	21/02/2012	167.08	FORCED OUTAGE
			1	11.25	01/02/2012	06/02/2012	107.08	FORCED OUTAGE
			1	11.25	28/12/2011	05/01/2012	192.17	FORCED OUTAGE
			1	11.25	21/02/2012	31/03/2012	923.75	FORCED OUTAGE
			1	11.25	06/02/2012	08/02/2012	44.92	FORCED OUTAGE
			1	11.25	18/12/2011	19/12/2011	32.75	FORCED OUTAGE
			1	11.25	12/02/2012	14/02/2012	36.67	FORCED OUTAGE
			1	11.25	11/02/2012	12/02/2012	30	FORCED OUTAGE
			1	11.25	26/01/2012	27/01/2012	31.55	FORCED OUTAGE
			1	11.25	05/01/2012	07/01/2012	44.25	FORCED OUTAGE
			1	11.25	21/12/2011	24/12/2011	65.5	FORCED OUTAGE
			1	11.25	22/01/2012	24/01/2012	34.83	FORCED OUTAGE
			1	11.25	12/01/2012	13/01/2012	29.92	FORCED OUTAGE
			1	11.25	10/01/2012	11/01/2012	24.25	FORCED OUTAGE
			1	11.25	16/11/2011	17/11/2011	24.08	FORCED OUTAGE
			1	11.25	07/10/2011	09/10/2011	47.42	FORCED OUTAGE
			1	11.25	01/11/2011	06/11/2011	126	FORCED OUTAGE
			1	11.25	08/11/2011	16/11/2011	192.75	FORCED OUTAGE
			1	11.25	12/10/2011	13/10/2011	42.25	FORCED OUTAGE
			1	11.25	09/09/2011	11/09/2011	55.25	FORCED OUTAGE
			1	11.25	08/08/2011	09/08/2011	25.33	FORCED OUTAGE
			1	11.25	16/08/2011	18/08/2011	60.42	FORCED OUTAGE
			1	11.25	09/04/2011	13/04/2011	86.25	FORCED OUTAGE
			1	11.25	30/05/2011	31/05/2011	24.92	FORCED OUTAGE
			1	11.25	23/05/2011	25/05/2011	55.83	FORCED OUTAGE
			1	11.25	09/06/2011	11/06/2011	49.83	FORCED OUTAGE
			1	11.25	08/06/2011	09/06/2011	26.13	FORCED OUTAGE
			1	11.25	05/06/2011	06/06/2011	29.5	FORCED OUTAGE
			1	11.25	21/04/2011	23/04/2011	50.83	FORCED OUTAGE
			1	11.25	24/12/2011	28/12/2011	98.75	FORCED OUTAGE
			1	11.25	19/04/2011	20/04/2011	30.75	FORCED OUTAGE
			1	11.25	14/05/2011	16/05/2011	53	FORCED OUTAGE
			1	11.25	02/05/2011	04/05/2011	39.92	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
31	DHALIPUR HPS	1	11.25	30/04/2011	01/05/2011	35.75	FORCED OUTAGE
		1	11.25	03/06/2011	05/06/2011	28.67	FORCED OUTAGE
		1	11.25	20/08/2011	21/08/2011	24.92	FORCED OUTAGE
		1	11.25	27/08/2011	28/08/2011	30.25	FORCED OUTAGE
		2	11.25	11/03/2012	18/03/2012	168.42	FORCED OUTAGE
		2	11.25	27/02/2012	06/03/2012	183.33	FORCED OUTAGE
		2	11.25	08/04/2011	11/04/2011	70.58	FORCED OUTAGE
		2	11.25	06/04/2011	07/04/2011	24.17	FORCED OUTAGE
		2	11.25	20/04/2011	22/04/2011	45.42	FORCED OUTAGE
		2	11.25	08/05/2011	09/05/2011	38.5	FORCED OUTAGE
		2	11.25	20/08/2011	21/08/2011	24.83	FORCED OUTAGE
		2	11.25	27/08/2011	28/08/2011	30	FORCED OUTAGE
		2	11.25	16/08/2011	18/08/2011	60.17	FORCED OUTAGE
		2	11.25	25/10/2011	01/11/2011	161.5	FORCED OUTAGE
		2	11.25	23/10/2011	25/10/2011	35.83	FORCED OUTAGE
		2	11.25	02/01/2012	19/02/2012	1142.08	FORCED OUTAGE
		3	11.25	28/04/2011	30/04/2011	54.33	FORCED OUTAGE
		3	11.25	11/05/2011	13/05/2011	42.25	FORCED OUTAGE
		3	11.25	23/04/2011	27/04/2011	100	FORCED OUTAGE
		3	11.25	20/08/2011	21/08/2011	24.58	FORCED OUTAGE
		3	11.25	27/08/2011	28/08/2011	29.58	FORCED OUTAGE
		3	11.25	11/04/2011	19/04/2011	180.75	FORCED OUTAGE
		3	11.25	16/08/2011	18/08/2011	61	FORCED OUTAGE
		3	11.25	19/02/2012	22/02/2012	64.75	FORCED OUTAGE
		3	11.25	26/02/2012	27/02/2012	26.58	FORCED OUTAGE
		3	11.25	29/03/2012	31/03/2012	37.67	FORCED OUTAGE
		3	11.25	08/08/2011	09/08/2011	25.42	FORCED OUTAGE
		1	17	30/12/2011	05/01/2012	145.75	FORCED OUTAGE
		1	17	21/12/2011	24/12/2011	65.58	FORCED OUTAGE
		1	17	13/01/2012	15/01/2012	37.58	FORCED OUTAGE
		1	17	22/01/2012	24/01/2012	35.5	FORCED OUTAGE
		1	17	05/01/2012	07/01/2012	40.58	FORCED OUTAGE
		1	17	24/12/2011	27/12/2011	65.25	FORCED OUTAGE
		1	17	26/01/2012	27/01/2012	31.58	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	17	11/02/2012	14/02/2012	69	FORCED OUTAGE
		1	17	26/02/2012	31/03/2012	805.08	FORCED OUTAGE
		1	17	14/02/2012	21/02/2012	167.08	FORCED OUTAGE
		1	17	01/02/2012	06/02/2012	107.5	FORCED OUTAGE
		1	17	06/02/2012	08/02/2012	45.08	FORCED OUTAGE
		1	17	09/06/2011	11/06/2011	50.33	FORCED OUTAGE
		1	17	08/04/2011	09/04/2011	27.17	FORCED OUTAGE
		1	17	08/06/2011	09/06/2011	32.2	FORCED OUTAGE
		1	17	12/05/2011	13/05/2011	33.92	FORCED OUTAGE
		1	17	20/08/2011	21/08/2011	26.08	FORCED OUTAGE
		1	17	27/08/2011	28/08/2011	29.75	FORCED OUTAGE
		1	17	16/08/2011	18/08/2011	61.17	FORCED OUTAGE
		1	17	08/08/2011	09/08/2011	25.58	FORCED OUTAGE
		1	17	25/10/2011	07/11/2011	308.75	FORCED OUTAGE
		1	17	23/10/2011	25/10/2011	36	FORCED OUTAGE
		1	17	08/11/2011	16/11/2011	191.42	FORCED OUTAGE
		2	17	23/05/2011	25/05/2011	55.83	FORCED OUTAGE
		2	17	28/02/2012	04/03/2012	123.17	FORCED OUTAGE
		2	17	31/12/2011	03/01/2012	78.92	FORCED OUTAGE
		2	17	27/08/2011	28/08/2011	30	FORCED OUTAGE
		2	17	16/08/2011	18/08/2011	60.33	FORCED OUTAGE
		2	17	20/08/2011	21/08/2011	24.67	FORCED OUTAGE
		2	17	02/05/2011	04/05/2011	39.83	FORCED OUTAGE
		2	17	14/05/2011	16/05/2011	52.83	FORCED OUTAGE
		2	17	06/04/2011	08/04/2011	49.42	FORCED OUTAGE
		2	17	09/04/2011	11/04/2011	42.83	FORCED OUTAGE
		2	17	30/05/2011	31/05/2011	24.67	FORCED OUTAGE
		2	17	10/03/2012	15/03/2012	129.67	FORCED OUTAGE
		2	17	28/04/2011	01/05/2011	75.75	FORCED OUTAGE
		2	17	10/05/2011	12/05/2011	56.75	FORCED OUTAGE
		2	17	11/04/2011	13/04/2011	44.42	FORCED OUTAGE
		3	17	15/03/2012	18/03/2012	71.5	FORCED OUTAGE
		3	17	29/12/2011	30/12/2011	42.42	FORCED OUTAGE
		3	17	04/01/2012	28/02/2012	1323.42	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
32	KHATIMA HPS	3	17	27/08/2011	28/08/2011	29.83	FORCED OUTAGE
		3	17	08/08/2011	09/08/2011	25.33	FORCED OUTAGE
		3	17	16/08/2011	18/08/2011	60.08	FORCED OUTAGE
		3	17	20/08/2011	21/08/2011	24.92	FORCED OUTAGE
		3	17	03/06/2011	05/06/2011	28.08	FORCED OUTAGE
		1	13.8	16/08/2011	17/08/2011	42.58	HRI/HRC/SURGF SHAFT PROPS
		1	13.8	07/11/2011	08/11/2011	35.25	FORCED OUTAGE
		1	13.8	09/11/2011	14/11/2011	117.25	FORCED OUTAGE
		1	13.8	18/10/2011	06/11/2011	469.17	FORCED OUTAGE
		2	13.8	04/01/2012	06/01/2012	48.75	FORCED OUTAGE
		2	13.8	06/01/2012	07/01/2012	24.42	FORCED OUTAGE
		2	13.8	07/01/2012	09/01/2012	42.67	FORCED OUTAGE
		2	13.8	16/02/2012	21/02/2012	116.33	FORCED OUTAGE
		2	13.8	20/10/2011	06/11/2011	405.92	HRI/HRC/SURGF SHAFT PROPS
		2	13.8	16/08/2011	17/08/2011	40.42	HRI/HRC/SURGF SHAFT PROPS
		3	13.8	19/02/2012	21/02/2012	45.08	FORCED OUTAGE
		3	13.8	02/01/2012	04/01/2012	50.58	FORCED OUTAGE
		3	13.8	08/07/2011	10/07/2011	50.92	TURBINE
		3	13.8	01/08/2011	04/08/2011	70.92	PADS
		3	13.8	11/03/2012	12/03/2012	35.33	FORCED OUTAGE
		3	13.8	16/08/2011	17/08/2011	42.25	HRI/HRC/SURGF SHAFT PROPS
		3	13.8	12/03/2012	13/03/2012	29.17	FORCED OUTAGE
		3	13.8	23/02/2012	07/03/2012	313.25	FORCED OUTAGE
		3	13.8	20/10/2011	09/11/2011	482.92	HRI/HRC/SURGF SHAFT PROPS
33	KHODRI HPS	1	30	10/10/2011	13/10/2011	67.42	FORCED OUTAGE
		1	30	15/10/2011	18/10/2011	70.33	FORCED OUTAGE
		1	30	06/01/2012	07/01/2012	32.83	FORCED OUTAGE
		1	30	15/12/2011	17/12/2011	30.25	FORCED OUTAGE
		1	30	07/01/2012	12/01/2012	114.58	FORCED OUTAGE
		1	30	04/01/2012	05/01/2012	24.67	FORCED OUTAGE
		1	30	29/12/2011	04/01/2012	133.5	FORCED OUTAGE
		1	30	13/02/2012	14/02/2012	33	FORCED OUTAGE
		1	30	28/02/2012	01/03/2012	40.75	FORCED OUTAGE
		1	30	02/03/2012	04/03/2012	41.75	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		1	30	27/01/2012	29/01/2012	42.92	FORCED OUTAGE
		1	30	04/02/2012	09/02/2012	111.58	FORCED OUTAGE
		1	30	29/01/2012	03/02/2012	103.42	FORCED OUTAGE
		1	30	18/03/2012	19/03/2012	27.75	FORCED OUTAGE
		1	30	18/10/2011	19/10/2011	32	FORCED OUTAGE
		1	30	29/10/2011	13/12/2011	1069.67	FORCED OUTAGE
		1	30	30/09/2011	03/10/2011	74.42	FORCED OUTAGE
		1	30	20/08/2011	21/08/2011	25.08	FORCED OUTAGE
		1	30	08/08/2011	09/08/2011	25.33	FORCED OUTAGE
		1	30	21/05/2011	22/05/2011	28.33	FORCED OUTAGE
		1	30	05/06/2011	06/06/2011	29.58	FORCED OUTAGE
		1	30	15/08/2011	18/08/2011	67.92	FORCED OUTAGE
		1	30	27/05/2011	28/05/2011	28.58	FORCED OUTAGE
		1	30	01/05/2011	06/05/2011	135	FORCED OUTAGE
		1	30	12/06/2011	13/06/2011	39.58	FORCED OUTAGE
		1	30	17/06/2011	19/06/2011	37.42	FORCED OUTAGE
		1	30	16/04/2011	18/04/2011	35.08	FORCED OUTAGE
		1	30	10/05/2011	12/05/2011	63.42	FORCED OUTAGE
		1	30	18/04/2011	19/04/2011	24.83	FORCED OUTAGE
		1	30	26/04/2011	28/04/2011	63.42	FORCED OUTAGE
		1	30	07/04/2011	09/04/2011	33	FORCED OUTAGE
		1	30	24/06/2011	26/06/2011	58.58	FORCED OUTAGE
		1	30	04/04/2011	05/04/2011	30.83	FORCED OUTAGE
		1	30	11/04/2011	12/04/2011	26.92	FORCED OUTAGE
		2	30	14/06/2011	16/06/2011	27.92	FORCED OUTAGE
		2	30	14/05/2011	15/05/2011	41.67	FORCED OUTAGE
		2	30	20/04/2011	21/04/2011	28.08	FORCED OUTAGE
		2	30	19/05/2011	20/05/2011	31	FORCED OUTAGE
		2	30	10/06/2011	11/06/2011	24.42	FORCED OUTAGE
		2	30	28/04/2011	01/05/2011	57.67	FORCED OUTAGE
		2	30	19/06/2011	21/06/2011	33	FORCED OUTAGE
		2	30	24/04/2011	26/04/2011	33.83	FORCED OUTAGE
		2	30	22/04/2011	23/04/2011	27.75	FORCED OUTAGE
		2	30	29/06/2011	01/07/2011	54.33	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	30	28/05/2011	30/05/2011	29.25	FORCED OUTAGE
		2	30	15/08/2011	18/08/2011	68.5	FORCED OUTAGE
		2	30	21/06/2011	23/06/2011	45	FORCED OUTAGE
		2	30	03/06/2011	04/06/2011	28.25	FORCED OUTAGE
		2	30	26/01/2012	27/01/2012	25.17	FORCED OUTAGE
		2	30	08/08/2011	09/08/2011	25.08	FORCED OUTAGE
		2	30	20/08/2011	21/08/2011	25.33	FORCED OUTAGE
		2	30	19/11/2011	21/11/2011	32	FORCED OUTAGE
		2	30	09/10/2011	10/10/2011	25.33	FORCED OUTAGE
		2	30	01/12/2011	03/12/2011	31.08	FORCED OUTAGE
		2	30	02/10/2011	04/10/2011	44.5	FORCED OUTAGE
		2	30	25/11/2011	27/11/2011	32.33	FORCED OUTAGE
		2	30	19/10/2011	30/10/2011	247.92	FORCED OUTAGE
		2	30	04/03/2012	05/03/2012	41.5	FORCED OUTAGE
		2	30	14/02/2012	15/02/2012	27.92	FORCED OUTAGE
		2	30	09/02/2012	10/02/2012	28.42	FORCED OUTAGE
		2	30	16/03/2012	18/03/2012	39.75	FORCED OUTAGE
		2	30	10/03/2012	11/03/2012	29.33	FORCED OUTAGE
		2	30	07/03/2012	09/03/2012	26.58	FORCED OUTAGE
		2	30	03/04/2011	04/04/2011	24.58	FORCED OUTAGE
		3	30	25/04/2011	26/04/2011	28.67	FORCED OUTAGE
		3	30	24/12/2011	25/12/2011	25.75	FORCED OUTAGE
		3	30	28/04/2011	30/04/2011	32.25	FORCED OUTAGE
		3	30	06/06/2011	07/06/2011	33.58	FORCED OUTAGE
		3	30	20/04/2011	21/04/2011	27.5	FORCED OUTAGE
		3	30	25/05/2011	27/05/2011	30.17	FORCED OUTAGE
		3	30	08/05/2011	09/05/2011	41.58	FORCED OUTAGE
		3	30	18/05/2011	19/05/2011	27.83	FORCED OUTAGE
		3	30	04/06/2011	05/06/2011	45.5	FORCED OUTAGE
		3	30	08/08/2011	09/08/2011	25.1	FORCED OUTAGE
		3	30	01/11/2011	02/11/2011	28	FORCED OUTAGE
		3	30	20/08/2011	21/08/2011	25.33	FORCED OUTAGE
		3	30	15/08/2011	18/08/2011	67.83	FORCED OUTAGE
		3	30	20/11/2011	22/11/2011	37	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		3	30	25/10/2011	28/10/2011	64.25	FORCED OUTAGE
		3	30	29/10/2011	31/10/2011	53.08	FORCED OUTAGE
		3	30	12/11/2011	14/11/2011	43.08	FORCED OUTAGE
		3	30	25/09/2011	26/09/2011	30.92	FORCED OUTAGE
		3	30	28/09/2011	30/09/2011	39.42	FORCED OUTAGE
		3	30	02/10/2011	03/10/2011	30.25	FORCED OUTAGE
		3	30	01/12/2011	02/12/2011	29.42	FORCED OUTAGE
		3	30	02/12/2011	04/12/2011	30.67	FORCED OUTAGE
		3	30	19/10/2011	24/10/2011	122.42	FORCED OUTAGE
		3	30	17/01/2012	18/01/2012	28.42	FORCED OUTAGE
		3	30	22/12/2011	24/12/2011	33.25	FORCED OUTAGE
		3	30	11/12/2011	13/12/2011	39.25	FORCED OUTAGE
		3	30	22/02/2012	28/02/2012	151.08	FORCED OUTAGE
		3	30	26/12/2011	28/12/2011	32.42	FORCED OUTAGE
		3	30	23/05/2011	24/05/2011	26.75	FORCED OUTAGE
		4	30	24/10/2011	25/10/2011	25.83	FORCED OUTAGE
		4	30	12/12/2011	13/12/2011	29.92	FORCED OUTAGE
		4	30	14/10/2011	15/10/2011	45.58	FORCED OUTAGE
		4	30	18/11/2011	20/11/2011	29.42	FORCED OUTAGE
		4	30	16/12/2011	19/12/2011	71.08	FORCED OUTAGE
		4	30	10/12/2011	12/12/2011	31.25	FORCED OUTAGE
		4	30	23/01/2012	28/03/2012	1550.42	FORCED OUTAGE
		4	30	23/12/2011	25/12/2011	32.25	FORCED OUTAGE
		4	30	19/12/2011	23/12/2011	80.08	FORCED OUTAGE
		4	30	29/03/2012	31/03/2012	24.25	FORCED OUTAGE
		4	30	01/06/2011	03/06/2011	53.25	FORCED OUTAGE
		4	30	23/05/2011	25/05/2011	46.67	FORCED OUTAGE
		4	30	26/04/2011	28/04/2011	64.75	FORCED OUTAGE
		4	30	16/04/2011	20/04/2011	89.92	FORCED OUTAGE
		4	30	21/04/2011	22/04/2011	40.42	FORCED OUTAGE
		4	30	07/06/2011	09/06/2011	41.92	FORCED OUTAGE
		4	30	30/04/2011	01/05/2011	44	FORCED OUTAGE
		4	30	15/05/2011	18/05/2011	59.25	FORCED OUTAGE
		4	30	12/05/2011	14/05/2011	34.5	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
34	KULHAL HPS	4	30	08/05/2011	10/05/2011	45.42	FORCED OUTAGE
		4	30	20/08/2011	21/08/2011	26	FORCED OUTAGE
		4	30	15/08/2011	18/08/2011	68.25	FORCED OUTAGE
		4	30	28/10/2011	29/10/2011	25.25	FORCED OUTAGE
		4	30	08/08/2011	09/08/2011	25.25	FORCED OUTAGE
		4	30	01/09/2011	02/09/2011	25.25	FORCED OUTAGE
		4	30	04/10/2011	07/10/2011	81.08	FORCED OUTAGE
		1	10	07/04/2011	10/04/2011	55.67	FORCED OUTAGE
		1	10	16/03/2012	18/03/2012	43.25	FORCED OUTAGE
		1	10	11/04/2011	20/04/2011	209	FORCED OUTAGE
		1	10	10/04/2011	11/04/2011	33.08	FORCED OUTAGE
		1	10	23/05/2011	25/05/2011	59.25	FORCED OUTAGE
		1	10	10/05/2011	13/05/2011	79.5	FORCED OUTAGE
		1	10	05/06/2011	06/06/2011	28.75	FORCED OUTAGE
		1	10	30/11/2011	01/12/2011	29.75	FORCED OUTAGE
		1	10	25/10/2011	26/10/2011	27.25	FORCED OUTAGE
		1	10	25/11/2011	27/11/2011	31.5	FORCED OUTAGE
		1	10	08/11/2011	09/11/2011	29.5	FORCED OUTAGE
		1	10	19/11/2011	25/11/2011	131.75	FORCED OUTAGE
		1	10	31/10/2011	04/11/2011	99.92	FORCED OUTAGE
		1	10	05/12/2011	07/12/2011	34.25	FORCED OUTAGE
		1	10	22/01/2012	06/03/2012	1062.25	FORCED OUTAGE
		1	10	29/12/2011	02/01/2012	94.75	FORCED OUTAGE
		1	10	28/12/2011	29/12/2011	27.5	FORCED OUTAGE
		1	10	06/01/2012	07/01/2012	40	FORCED OUTAGE
		1	10	12/03/2012	16/03/2012	94	FORCED OUTAGE
		1	10	06/04/2011	07/04/2011	31	FORCED OUTAGE
		2	10	24/02/2012	26/02/2012	45	FORCED OUTAGE
		2	10	28/02/2012	05/03/2012	139	FORCED OUTAGE
		2	10	24/10/2011	25/10/2011	36.75	FORCED OUTAGE
		2	10	27/10/2011	31/10/2011	88	FORCED OUTAGE
		2	10	26/02/2012	28/02/2012	44.75	FORCED OUTAGE
		2	10	11/03/2012	12/03/2012	24.08	FORCED OUTAGE
		2	10	01/02/2012	02/02/2012	24.25	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
35	MANERI BHALI - I HPS	2	10	04/02/2012	05/02/2012	36.58	FORCED OUTAGE
		3	10	09/06/2011	11/06/2011	47.25	FORCED OUTAGE
		3	10	06/03/2012	31/03/2012	581.08	FORCED OUTAGE
		3	10	14/05/2011	16/05/2011	62.5	FORCED OUTAGE
		3	10	07/05/2011	10/05/2011	50.25	FORCED OUTAGE
		3	10	12/06/2011	13/06/2011	25	FORCED OUTAGE
		3	10	03/06/2011	05/06/2011	38.25	FORCED OUTAGE
		3	10	08/08/2011	09/08/2011	24.58	FORCED OUTAGE
		3	10	16/08/2011	18/08/2011	45	FORCED OUTAGE
		3	10	09/11/2011	19/11/2011	245.25	FORCED OUTAGE
		3	10	04/11/2011	08/11/2011	102	FORCED OUTAGE
		3	10	25/11/2011	26/11/2011	31	FORCED OUTAGE
		3	10	26/11/2011	30/11/2011	90	FORCED OUTAGE
		3	10	06/12/2011	08/12/2011	43.33	FORCED OUTAGE
		3	10	01/12/2011	06/12/2011	117	FORCED OUTAGE
		3	10	14/02/2012	21/02/2012	168.42	FORCED OUTAGE
		3	10	03/01/2012	05/01/2012	48	FORCED OUTAGE
		3	10	25/01/2012	27/01/2012	48.5	FORCED OUTAGE
		3	10	07/02/2012	09/02/2012	40.25	FORCED OUTAGE
		3	10	09/02/2012	11/02/2012	46.5	FORCED OUTAGE
		3	10	05/02/2012	07/02/2012	31.5	FORCED OUTAGE
		3	10	11/02/2012	14/02/2012	59	FORCED OUTAGE
		3	10	20/04/2011	04/05/2011	338	FORCED OUTAGE
		1	30	15/03/2012	26/03/2012	257.58	DAM/SPILL WAYS
		1	30	15/08/2011	17/08/2011	39.83	FORCED OUTAGE
		1	30	22/04/2011	23/04/2011	29.33	FORCED OUTAGE
		1	30	19/11/2011	21/11/2011	38.17	FORCED OUTAGE
		2	30	29/03/2012	30/03/2012	31.25	FORCED OUTAGE
		2	30	15/03/2012	27/03/2012	299.67	DAM/SPILL WAYS
		2	30	03/04/2011	04/04/2011	25.65	GEN./TR.BREAKER
		2	30	28/07/2011	07/08/2011	242.42	ALIGNMENT
		2	30	17/11/2011	19/11/2011	43.67	FORCED OUTAGE
		2	30	23/04/2011	25/04/2011	52.25	FORCED OUTAGE
		2	30	15/08/2011	17/08/2011	48.5	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
36	MANERI BHALI - II HPS	2	30	21/11/2011	23/11/2011	49.33	FORCED OUTAGE
		3	30	20/04/2011	22/04/2011	51.83	FORCED OUTAGE
		3	30	10/11/2011	12/11/2011	40.17	FORCED OUTAGE
		3	30	23/11/2011	29/11/2011	145.23	FORCED OUTAGE
		3	30	25/06/2011	27/06/2011	35.08	SHAFT SEAL
		3	30	14/07/2011	17/07/2011	84.75	OTHER (D/T, GUIDE/STAY VANES
		1	76	09/10/2011	10/10/2011	26.17	FORCED OUTAGE
		1	76	16/08/2011	17/08/2011	31	FORCED OUTAGE
		1	76	21/11/2011	28/11/2011	174.75	FORCED OUTAGE
		1	76	08/11/2011	12/11/2011	93.83	FORCED OUTAGE
		1	76	12/11/2011	18/11/2011	134.58	FORCED OUTAGE
		1	76	10/10/2011	19/10/2011	204.63	FORCED OUTAGE
		1	76	21/10/2011	07/11/2011	417.33	FORCED OUTAGE
		1	76	20/06/2011	24/06/2011	88.17	SHAFT VIBRS./ALIGNM/SOUND
		1	76	21/08/2011	28/08/2011	171.08	SHAFT VIBRS./ALIGNM/SOUND
		1	76	08/08/2011	10/08/2011	57.5	SHAFT VIBRS./ALIGNM/SOUND
		1	76	06/09/2011	07/09/2011	33.42	SHAFT VIBRS./ALIGNM/SOUND
		1	76	22/09/2011	23/09/2011	31.78	SHAFT VIBRS./ALIGNM/SOUND
		1	76	06/08/2011	07/08/2011	25.33	TURBINE
		1	76	25/06/2011	03/07/2011	196.42	VIBRATION/SOUND/ ALIGNMENT
		2	76	24/04/2011	25/04/2011	28.67	FORCED OUTAGE
		2	76	11/09/2011	13/09/2011	62.5	SHAFT SEAL
		2	76	16/08/2011	17/08/2011	31.58	FORCED OUTAGE
		3	76	17/08/2011	18/08/2011	30.05	SHAFT VIBRS./ALIGNM/SOUND
		3	76	03/04/2011	04/04/2011	28.08	FORCED OUTAGE
		3	76	27/05/2011	08/06/2011	294.83	FORCED OUTAGE
		3	76	16/08/2011	17/08/2011	31.25	FORCED OUTAGE
		3	76	28/11/2011	30/11/2011	55.83	FORCED OUTAGE
		3	76	21/10/2011	27/10/2011	139.08	FORCED OUTAGE
		3	76	02/11/2011	07/11/2011	121.42	FORCED OUTAGE
		3	76	18/11/2011	21/11/2011	68.48	FORCED OUTAGE
		3	76	07/01/2012	10/01/2012	74.65	FORCED OUTAGE
		3	76	11/01/2012	12/01/2012	34.08	FORCED OUTAGE
		3	76	04/02/2012	09/02/2012	117.92	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
37	RAMGANGA HPS	3	76	27/01/2012	04/02/2012	183.42	FORCED OUTAGE
		3	76	09/02/2012	26/02/2012	400	FORCED OUTAGE
		3	76	24/01/2012	27/01/2012	68.75	FORCED OUTAGE
		3	76	22/03/2012	23/03/2012	32.83	FORCED OUTAGE
		3	76	01/03/2012	06/03/2012	106.5	FORCED OUTAGE
		3	76	26/02/2012	01/03/2012	105.08	FORCED OUTAGE
		3	76	26/03/2012	28/03/2012	34.82	FORCED OUTAGE
		3	76	06/03/2012	19/03/2012	294.5	FORCED OUTAGE
		3	76	12/01/2012	14/01/2012	45.33	LT AC PANELS
		4	76	03/08/2011	05/08/2011	50.58	TURBINE
		4	76	10/01/2012	12/01/2012	47.82	FORCED OUTAGE
		4	76	05/01/2012	06/01/2012	33.33	FORCED OUTAGE
		4	76	27/10/2011	02/11/2011	145.67	FORCED OUTAGE
		4	76	16/08/2011	17/08/2011	31.58	FORCED OUTAGE
		4	76	03/09/2011	05/09/2011	55.17	SHAFT SEAL
		1	66	22/06/2011	16/07/2011	577.97	FORCED OUTAGE
		1	66	12/06/2011	22/06/2011	239.83	FORCED OUTAGE
		1	66	21/08/2011	21/09/2011	743.23	FORCED OUTAGE
		1	66	11/08/2011	17/08/2011	156.77	FORCED OUTAGE
		1	66	21/09/2011	24/10/2011	783.5	FORCED OUTAGE
		1	66	05/12/2011	06/12/2011	31	FORCED OUTAGE
		1	66	25/10/2011	08/11/2011	334.5	FORCED OUTAGE
		1	66	09/12/2011	19/12/2011	220	FORCED OUTAGE
		1	66	09/01/2012	25/01/2012	383.98	FORCED OUTAGE
		1	66	10/11/2011	05/12/2011	592.02	FORCED OUTAGE
		2	66	08/01/2012	15/01/2012	178	FORCED OUTAGE
		2	66	15/01/2012	23/01/2012	178.57	FORCED OUTAGE
		2	66	04/12/2011	19/12/2011	363	FORCED OUTAGE
		2	66	24/10/2011	29/11/2011	857.58	FORCED OUTAGE
		2	66	13/09/2011	16/09/2011	64.68	FORCED OUTAGE
		2	66	18/09/2011	24/10/2011	848.98	FORCED OUTAGE
		2	66	06/09/2011	09/09/2011	65.98	FORCED OUTAGE
		2	66	21/06/2011	11/08/2011	1221.07	FORCED OUTAGE
		2	66	02/04/2011	25/05/2011	1279.48	FORCED OUTAGE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	66	25/01/2012	29/01/2012	108.08	EHG/GOV. FAULTS, MISC.
		3	66	19/09/2011	25/10/2011	874	FORCED OUTAGE
		3	66	11/08/2011	17/08/2011	149.77	FORCED OUTAGE
		3	66	06/09/2011	08/09/2011	48.5	FORCED OUTAGE
		3	66	30/11/2011	15/12/2011	360.52	FORCED OUTAGE
		3	66	22/06/2011	26/06/2011	109.98	FORCED OUTAGE
		3	66	08/11/2011	25/11/2011	397.6	FORCED OUTAGE
		3	66	10/01/2012	16/01/2012	146.75	FORCED OUTAGE
		3	66	18/01/2012	22/01/2012	80.57	FORCED OUTAGE
		3	66	26/10/2011	08/11/2011	302.42	FORCED OUTAGE
UPJVNL							
38	KHARA HPS	1	24	20/04/2011	01/05/2011	242.55	OTHERS
		2	24	24/04/2011	27/04/2011	80.45	OTHERS
39	MATATILA HPS	1	10.2	12/12/2011	16/12/2011	103.92	DESILTING SYSTEM
		1	10.2	04/10/2011	08/10/2011	100.92	AUTO. VOLTAGE REGULATOR
		1	10.2	08/12/2011	09/12/2011	25	EHG/GOV. FAULTS, MISC.
		2	10.2	12/12/2011	16/12/2011	103.92	DESILTING SYSTEM
		3	10.2	12/12/2011	16/12/2011	103.92	DESILTING SYSTEM
40	OBRA HPS	1	33	06/08/2011	18/08/2011	291.95	EHG/GOV. FAULTS, MISC.
41	RIHAND HPS	6	50	16/12/2011	21/12/2011	125.58	STATION SERVICE TRANSFORM
WESTERN REGION							
GSECL							
42	UKAI HPS	4	75	27/08/2011	11/09/2011	360.67	GENERATOR FAULTS
MAHAGENCO							
43	KOYNA-I HPS	1	70	20/04/2011	22/04/2011	59.17	UPPER GUIDE BEARING
		1	70	09/11/2011	12/11/2011	85.25	BUS COUPLER BREAKER
44	KOYNA-II HPS	3	80	24/11/2011	28/11/2011	105.83	BUS COUPLER BREAKER
45	KOYNA-III HPS	3	80	30/04/2011	08/05/2011	189.17	ROTOR
		3	80	13/04/2011	14/04/2011	24.08	ROTOR
46	KOYNA-IV HPS	1	250	30/06/2011	22/12/2011	4195.65	OTHERS
		2	250	07/10/2011	16/10/2011	232.5	SERVO MOTORS
		3	250	22/05/2011	24/05/2011	36.47	EHG/GOV. FAULTS, MISC.
		3	250	07/01/2012	21/01/2012	336.72	OTHERS
		3	250	13/07/2011	14/07/2011	30.82	OTHERS

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
MPPGCL							
47	BANSAGAR TONS-1 HPS	1	105	25/08/2011	28/08/2011	67	OTHERS
		1	105	20/07/2011	21/07/2011	25	OTHERS
		1	105	14/07/2011	16/07/2011	48.17	OTHERS
		1	105	03/01/2012	08/01/2012	131.42	OTHERS
		1	105	15/10/2011	16/10/2011	36	OTHERS
		1	105	07/04/2011	15/04/2011	187.67	OTHERS
		2	105	21/10/2011	23/10/2011	39.58	OTHERS
		2	105	12/01/2012	17/01/2012	133.17	OTHERS
		3	105	04/08/2011	21/08/2011	401.75	OTHERS
		3	105	23/09/2011	24/09/2011	24.33	OTHERS
48	BANSAGAR TONS-II HPS	1	15	01/01/2012	08/01/2012	168.42	OTHERS
49	BARGI HPS	1	45	17/05/2011	31/05/2011	352.98	GOVERNOR SYSTM
		2	45	04/06/2011	07/06/2011	82.7	LT AC PANELS
50	GANDHI SAGAR HPS	1	23	01/05/2011	02/05/2011	33.92	GEN./TR.BREAKER
		1	23	26/04/2011	30/04/2011	93.33	GEN./TR.BREAKER
		3	23	09/10/2011	11/10/2011	50.58	OTHERS
		3	23	26/09/2011	30/09/2011	100.98	OTHERS
51	MADHIKHERA HPS	1	20	19/10/2011	22/10/2011	74.92	ROTOR
		2	20	15/09/2011	16/09/2011	25	UPPER GUIDE BEARING
		2	20	13/01/2012	18/01/2012	132.75	OTHERS
		2	20	24/07/2011	25/07/2011	28.5	PROTECTION OPERATION
		3	20	16/09/2011	05/11/2011	1199.75	UPPER GUIDE BEARING
		3	20	04/02/2012	05/02/2012	26.28	OTHERS
		3	20	12/07/2011	13/07/2011	25.92	PROTECTION OPERATION
52	PENCH HPS	1	80	04/06/2011	05/06/2011	37.82	ROTOR
		2	80	03/09/2011	05/09/2011	50.13	EHG/GOV. FAULTS, MISC.
53	RAJGHAT HPS	1	15	25/09/2011	27/09/2011	54	DC/BATTARY
		1	15	21/12/2011	22/12/2011	27.5	OTHERS
		1	15	15/12/2011	17/12/2011	40.83	OTHERS
		2	15	09/02/2012	10/02/2012	31	EXCITATION OTHERS
		3	15	24/08/2011	15/10/2011	1243.42	EXCITATION OTHERS

Sl. No.	STATION		UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS	
<u>NHDC</u>									
54	INDIRA SAGAR	HPS	1	125	25/07/2011	26/07/2011	38.48	FORCED OUTAGE	
			1	125	21/07/2011	23/07/2011	29.5	MISCELLANEOUS	
			1	125	18/10/2011	22/10/2011	103	FORCED OUTAGE	
<u>SSNNL</u>									
55	S SAROVAR	CHPH HPS	3	50	07/04/2011	06/06/2011	1444	ROTOR	
<u>TATA MAH.</u>									
56	BHIRA	HPS	1	25	10/04/2011	11/04/2011	29.5	TRT/TRC/SURGE CHAMBER PROBLEM	
			2	25	10/04/2011	11/04/2011	29.5	TRT/TRC/SURGE CHAMBER PROBLEM	
			3	25	10/04/2011	11/04/2011	29.5	TRT/TRC/SURGE CHAMBER PROBLEM	
			4	25	10/04/2011	11/04/2011	29.5	TRT/TRC/SURGE CHAMBER PROBLEM	
			5	25	10/04/2011	11/04/2011	29.5	TRT/TRC/SURGE CHAMBER PROBLEM	
			6	25	10/04/2011	11/04/2011	29.5	TRT/TRC/SURGE CHAMBER PROBLEM	
57	BHIVPURI	HPS	1	24	11/07/2011	13/07/2011	36.58	MISCELLANEOUS	
			4	1.5	01/04/2011	04/04/2011	71.58	EXCITATION OTHERS	
			4	1.5	08/07/2011	11/07/2011	88.57	PENSTOCK	
<u>SOUTHERN REGION</u>									
<u>APGENCO</u>									
58	HAMPI	HPS	1	9	01/04/2011	30/04/2011	719.98	THRUST BEARING PADS.	
			1	9	01/05/2011	25/07/2011	2057	LOWER GUIDE BEARING	
			2	9	14/02/2012	15/02/2012	24.58	ABNORMAL SOUND	
			3	9	01/07/2011	18/07/2011	425.58	GEN./TR.BREAKER	
			3	9	27/06/2011	30/06/2011	73	GEN./TR.BREAKER	
			4	9	01/07/2011	19/07/2011	451.67	GEN./TR.BREAKER	
			4	9	27/06/2011	30/06/2011	72.83	GEN./TR.BREAKER	
59	LOWER SILERU	HPS	1	115	20/07/2011	22/07/2011	49.75	OIL PROBLEMS	
			1	115	29/06/2011	30/06/2011	31.58	EHT/L.A.	
			2	115	04/05/2011	05/05/2011	29.58	EXCITATION OTHERS	
			2	115	12/05/2011	04/06/2011	557.5	EXCITATION OTHERS	
			2	115	22/08/2011	26/08/2011	96.75	PROTECTION OPERATION	
			3	115	08/09/2011	16/09/2011	194.58	MISCELLANEOUS	
			4	115	25/07/2011	07/08/2011	324.92	GENERATOR FAULTS	
60	MACHKUND	HPS	2	17	29/05/2011	31/05/2011	53.48	EHG/GOV. FAULTS, MISC.	
			2	17	01/04/2011	30/04/2011	719.98	OTHERS	
			2	17	08/03/2012	11/03/2012	75.58	TRANSFORMER PROTECTION	

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	17	01/06/2011	30/09/2011	2920.27	OTHERS
		2	17	10/12/2011	05/03/2012	2074	UPPER GUIDE BEARING
		3	17	12/11/2011	13/11/2011	40.58	THRUST BEARING
		3	17	24/03/2012	31/03/2012	155.92	MISCELLANEOUS
		3	17	16/01/2012	27/01/2012	266.08	U.G.B.OIL SYSTEM
		3	17	16/09/2011	18/09/2011	49.08	U.G.B.OIL SYSTEM
		3	17	29/05/2011	31/05/2011	48.92	EHG/GOV. FAULTS, MISC.
		4	21.25	20/05/2011	31/05/2011	279.32	OTHER (D/T, GUIDE/STAY VANES
		5	21.25	01/04/2011	30/04/2011	719.98	SHAFT VIBRS./ALIGNM/SOUND
		6	21.25	14/03/2012	18/03/2012	92.33	GENERATOR FAULTS
		6	21.25	18/06/2011	08/07/2011	478.75	ABNORMAL SOUND
		6	21.25	01/05/2011	10/06/2011	978.42	SHAFT SEAL
61	NAGARJUN SGR HPS	2	100.8	29/08/2011	30/08/2011	29.5	POWER HOUSE MISC.
		4	100.8	06/11/2011	10/11/2011	107.33	OTHERS
62	NAGARJUN SGR LBC HPS	1	30	10/04/2011	11/04/2011	34.13	SPEED RUNAWAY/OVER /UNDER
		1	30	03/04/2011	06/04/2011	73.25	GENERATOR FAULTS
		2	30	01/09/2011	03/09/2011	39.33	ROTOR
63	PRIYADARSHNI JURALA HPS	1	39	01/04/2011	31/03/2012	8760	FORCED OUTAGE
		2	39	01/04/2011	16/11/2011	5505.92	GENERATOR FAULTS
		6	39	31/07/2011	02/08/2011	40.47	GOVERNOR SYSTM
64	SRISAILAM HPS	3	110	01/04/2011	30/04/2011	719.98	OTHER (D/T, GUIDE/STAY VANES
		3	110	01/05/2011	21/07/2011	1956.62	OTHER (D/T, GUIDE/STAY VANES
		4	110	01/05/2011	18/07/2011	1887.03	OTHER (D/T, GUIDE/STAY VANES
		4	110	22/02/2012	25/02/2012	84.92	SHAFT SEAL
		6	110	01/05/2011	18/07/2011	1890.17	SHAFT SEAL
		6	110	01/04/2011	30/04/2011	719.98	OTHER (D/T, GUIDE/STAY VANES
		7	110	25/05/2011	22/07/2011	1401.18	SHAFT SEAL
65	SRISAILAM LB HPS	2	150	29/07/2011	30/07/2011	26	EHT/ISOLATOR
		5	150	23/07/2011	26/07/2011	79.58	GEN./TR.BREAKER
66	T B DAM HPS	1	9	22/07/2011	29/07/2011	155.75	BUS PROTECTION TRIP
		3	9	01/05/2011	12/07/2011	1738	SERVO MOTORS
		3	9	05/09/2011	08/09/2011	71.33	OTHERS
		4	9	13/06/2011	12/07/2011	697	GEN./TR.BREAKER

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
67	UPPER SILERU HPS-I	2	60	03/05/2011	10/05/2011	177.25	EXCITATION OTHERS
KPCL							
68	BHADRA HPS	1	2	19/01/2012	20/01/2012	30.45	COOLING SYSTEM
		2	12	02/05/2011	04/05/2011	41.55	EHT/ISOLATOR
		5	6	10/07/2011	14/07/2011	90.5	PROTECTION OPERATION
69	GERUSUPPA HPS	3	60	28/01/2012	30/01/2012	44.15	OTHER (D/T, GUIDE/STAY VANES
		4	60	04/10/2011	14/10/2011	240.75	PROTECTION OPERATION
70	GHAT PRABHA HPS	1	16	14/08/2011	15/08/2011	25	MISCELLANEOUS
71	JOG HPS	1	13.2	06/04/2011	30/04/2011	579.73	MISCELLANEOUS
		1	13.2	01/05/2011	03/05/2011	64.75	MISCELLANEOUS
		1	13.2	16/07/2011	31/07/2011	365.32	MISCELLANEOUS
		1	13.2	01/06/2011	11/07/2011	970.42	MISCELLANEOUS
		1	13.2	11/07/2011	16/07/2011	113	MISCELLANEOUS
		1	13.2	09/05/2011	31/05/2011	536.65	MISCELLANEOUS
		1	13.2	01/08/2011	25/01/2012	4265	HRI/HRC/SURGF SHAFT PROPS
		2	13.2	13/04/2011	30/04/2011	422.73	NEEDLE PROBLEM
		3	13.2	17/07/2011	31/07/2011	351.57	HRI/HRC/SURGF SHAFT PROPS
		3	13.2	01/08/2011	03/10/2011	1531.92	HRI/HRC/SURGF SHAFT PROPS
		4	13.2	01/08/2011	03/10/2011	1531.92	HRI/HRC/SURGF SHAFT PROPS
		4	13.2	17/07/2011	31/07/2011	351.57	HRI/HRC/SURGF SHAFT PROPS
		5	21.6	01/08/2011	03/10/2011	1531.92	HRI/HRC/SURGF SHAFT PROPS
		5	21.6	29/07/2011	31/07/2011	58.98	HRI/HRC/SURGF SHAFT PROPS
		5	21.6	17/07/2011	28/07/2011	271.22	HRI/HRC/SURGF SHAFT PROPS
		6	21.6	01/08/2011	03/10/2011	1531.92	HRI/HRC/SURGF SHAFT PROPS
		6	21.6	12/01/2012	13/01/2012	26.33	LT AC PANELS
		6	21.6	17/07/2011	31/07/2011	351.57	HRI/HRC/SURGF SHAFT PROPS
		7	21.6	17/07/2011	18/07/2011	27.92	HRI/HRC/SURGF SHAFT PROPS
		7	21.6	01/08/2011	14/01/2012	4003	HRI/HRC/SURGF SHAFT PROPS
		8	21.6	17/07/2011	31/07/2011	351.57	HRI/HRC/SURGF SHAFT PROPS
		8	21.6	01/08/2011	31/03/2012	5832	HRI/HRC/SURGF SHAFT PROPS
72	KALINADI HPS	5	150	17/07/2011	18/07/2011	26.1	EHG/GOV. FAULTS, MISC.
		5	150	01/05/2011	24/05/2011	569.6	GOVERNOR SYSTEM
		5	150	20/10/2011	21/10/2011	24.17	EHG/GOV. FAULTS, MISC.

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
73	KALINADI SUPA HPS	1	50	06/08/2011	08/08/2011	48.25	DRAINAGE DEWATERING SYSTEM
		2	50	11/02/2012	13/02/2012	50	OTHERS
74	LIGANAMAKKI HPS	2	27.5	13/10/2011	15/10/2011	54.08	OTHER (D/T, GUIDE/STAY VANES
75	SHARAVATHI HPS	10	103.5	03/08/2011	05/08/2011	55.03	UPPER GUIDE BEARING
		10	103.5	21/02/2012	22/02/2012	24.92	TURBINE FAULTS
		7	103.5	22/04/2011	23/04/2011	39.28	EXCITATION PROBLEMS
		8	103.5	03/03/2012	04/03/2012	44.77	PROTECTION OPERATION
		9	103.5	31/10/2011	02/11/2011	26.08	COOLING WATER SYSTEM
		9	103.5	16/07/2011	19/07/2011	69.67	SPEED RUNAWAY/OVER /UNDER
		9	103.5	28/10/2011	30/10/2011	54.43	PROTECTION OPERATION
76	SIVASAMUNDRUM HPS	1	3	01/05/2011	07/05/2011	154.7	AUTO. VOLTAGE REGULATOR
		1	3	26/04/2011	29/04/2011	87.57	AUTO. VOLTAGE REGULATOR
		2	3	15/04/2011	26/04/2011	268.67	PROTECTION OPERATION
		3	3	04/06/2011	11/06/2011	169.42	GENERATOR FAULTS
		6	3	01/03/2012	02/03/2012	41.33	TURBINE FAULTS
		7	6	11/01/2012	18/01/2012	176.17	OIL PROBLEMS
		8	6	27/12/2011	28/12/2011	26.43	EHT/CT/PT
77	VARAHI HPS	1	115	18/03/2012	19/03/2012	43.65	OTHERS
		2	115	18/02/2012	20/02/2012	43.05	PROTECTION OPERATION
		2	115	07/02/2012	17/02/2012	236.85	GENERATOR FAULTS
		2	115	04/01/2012	07/01/2012	71.5	ROTOR
		3	115	17/03/2012	19/03/2012	46.5	OTHERS
		3	115	23/01/2012	25/01/2012	30.17	FORCED OUTAGE
		3	115	03/12/2011	15/12/2011	292.48	OTHERS
		3	115	20/09/2011	23/09/2011	80.3	OTHERS
		3	115	20/10/2011	21/10/2011	28.47	THRUST BEARING PADS.
		4	115	09/01/2012	12/01/2012	73.23	OTHERS
		4	115	01/05/2011	02/05/2011	32.88	TURBINE FAULTS
		4	115	29/04/2011	30/04/2011	30.48	TURBINE FAULTS
		4	115	27/04/2011	29/04/2011	35.58	THRUST BEARING PADS.
		4	115	29/03/2012	30/03/2012	29.67	THRUST BEARING

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
KSEB							
78	IDAMALAYAR HPS.	2	37.5	08/02/2012	09/02/2012	31.62	COOLING WATER SYSTEM
		2	37.5	15/06/2011	21/06/2011	150.35	SHAFT SEAL
		2	37.5	03/08/2011	04/08/2011	32.13	SHAFT SEAL
		2	37.5	04/01/2012	06/01/2012	56.2	THRUST BEARING
		2	37.5	10/02/2012	14/02/2012	106.88	LOWER GUIDE BEARING
79	IDUKKI HPS.	1	130	27/03/2012	28/03/2012	40.87	MISCELLANEOUS
		4	130	27/11/2011	11/01/2012	1085.37	TRANSFORMER PROTECTION
		4	130	20/06/2011	23/06/2011	70.07	MISCELLANEOUS
		5	130	20/06/2011	24/10/2011	3006.4	EHT/L.A.
		6	130	20/06/2011	22/06/2011	46.62	MISCELLANEOUS
80	KAKKAD HPS.	1	25	04/12/2011	05/12/2011	24.62	SHAFT SEAL
81	KUTTIYADI HPS.	1	25	08/11/2011	09/11/2011	32.22	EHG/GOV. FAULTS, MISC.
		2	25	22/06/2011	06/07/2011	342.77	MISCELLANEOUS
		2	25	04/04/2011	28/04/2011	580.32	COOLING WATER SYSTEM
		4	50	24/01/2012	25/01/2012	32.67	OTHER (D/T, GUIDE/STAY VANES
82	KUTTIYADI ADDL. EXTN.	5	50	08/07/2011	14/07/2011	140.72	GENERATOR FAULTS
83	NARIAMANGLAM HPS	1	15	04/04/2011	05/04/2011	33	TURBINE OTHERS
		1	15	05/02/2012	09/02/2012	98.07	MISCELLANEOUS
		1	15	27/03/2012	31/03/2012	87.08	FORCED OUTAGE
		3	15	26/11/2011	28/11/2011	42.12	OTHER (D/T, GUIDE/STAY VANES
		4	25	07/06/2011	08/06/2011	24.02	OIL PROBLEMS
		4	25	26/08/2011	04/09/2011	194.83	SHAFT SEAL
		4	25	06/09/2011	23/02/2012	4077.48	SHAFT SEAL
84	PALLIVASAL HPS.	2	5	18/01/2012	20/01/2012	59.65	EHG/GOV. FAULTS, MISC.
		5	7.5	10/07/2011	11/07/2011	26.53	OTHERS
		5	7.5	02/05/2011	05/05/2011	73.33	LINE BREAKER
85	PANNIAR HPS.	2	15	11/11/2011	12/11/2011	36.13	FORCED OUTAGE
		2	15	05/06/2011	09/06/2011	98.82	DC/BATTARY
86	PORINGALKUTTU HPS.	1	8	07/11/2011	17/11/2011	239.28	EHG/GOV. FAULTS, MISC.
		1	8	05/11/2011	07/11/2011	46.2	EHG/GOV. FAULTS, MISC.
		3	8	01/04/2011	03/04/2011	42.77	GENERATOR FAULTS
		4	8	25/08/2011	26/08/2011	27.45	EXCITATION PROBLEMS
		4	8	31/07/2011	03/08/2011	67.08	TURBINE

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
87	SABARIGIRI HPS.	1	50	12/02/2012	13/02/2012	29.45	MISCELLANEOUS
88	SHOLAYAR HPS.	3	18	05/02/2012	31/03/2012	1301.52	THRUST BEARING
TANGEDCO							
89	BHAWANI KATTAL	1	15	23/12/2011	28/02/2012	1613	EHG/GOV. FAULTS, MISC.
		2	15	21/08/2011	15/10/2011	1314	EHG/GOV. FAULTS, MISC.
90	KUNDAH HPS-II	1	35	11/03/2012	17/03/2012	154.15	THRUST BEARING
91	KUNDAH HPS-III	3	60	05/06/2011	06/06/2011	26.67	SERVO MOTORS
		3	60	13/10/2011	23/10/2011	256.5	PERMANENT MAG GENERATOR
92	KUNDAH HPS-V	2	20	05/03/2012	07/03/2012	53.25	EHG/GOV. FAULTS, MISC.
93	LOWER METTUR HPS-I	2	15	02/10/2011	13/10/2011	262.5	GENERATOR FAULTS
94	LOWER METTUR HPS-II	2	15	03/08/2011	20/08/2011	419.17	GENERATOR FAULTS
95	MOYAR HPS	1	12	22/02/2012	10/03/2012	418.45	U.A.T
		2	12	26/12/2011	05/01/2012	259.75	GENERATOR FAULTS
		3	12	04/10/2011	06/10/2011	53.7	DESILTING SYSTEM
96	PARSON`S VALLEY HPS.	1	30	19/08/2011	22/08/2011	75.4	EHG/GOV. FAULTS, MISC.
97	PERIYAR HPS.	1	35	16/11/2011	24/11/2011	183.08	MISCELLANEOUS
		1	35	11/02/2012	15/02/2012	88.2	GOVERNOR SYSTM
		1	35	16/02/2012	23/02/2012	167.63	GOVERNOR SYSTM
		3	35	08/03/2012	09/03/2012	29.25	EHG/GOV. FAULTS, MISC.
98	PYKARA HPS.	1	7	22/08/2011	23/08/2011	24.83	GOVERNOR SYSTM
		1	7	08/05/2011	09/05/2011	32.52	PENSTOCK
		1	7	15/05/2011	16/05/2011	29.92	PENSTOCK
		2	7	21/10/2011	22/10/2011	31.5	EHG/GOV. FAULTS, MISC.
		2	7	20/07/2011	21/07/2011	28.58	PENSTOCK
		3	7	20/06/2011	22/06/2011	52.67	PENSTOCK
		3	7	23/05/2011	24/05/2011	27.92	PENSTOCK
		3	7	17/11/2011	20/11/2011	67	PENSTOCK
		3	7	26/04/2011	28/04/2011	49.58	PENSTOCK
		5	13.6	22/08/2011	23/08/2011	24.83	EHG/GOV. FAULTS, MISC.
		5	13.6	17/11/2011	20/11/2011	67	PENSTOCK
		5	13.6	20/06/2011	22/06/2011	52.67	PENSTOCK
		5	13.6	26/04/2011	28/04/2011	49.58	PENSTOCK
		6	11	03/01/2012	05/01/2012	52.83	PENSTOCK
		6	11	06/07/2011	08/07/2011	41.58	PENSTOCK

Sl. No.	STATION		UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
99	PYKARA ULTMATE HPS.	1	50	21/02/2012	23/02/2012	56.42	OIL PROBLEMS	
		2	50	12/11/2011	13/11/2011	31.75	DESILTING SYSTEM	
		2	50	01/01/2012	02/01/2012	31.92	PROTECTION OPERATION	
		2	50	06/08/2011	08/08/2011	50	THRUST BEARING	
	SHOLAYAR HPS.	1	35	11/09/2011	12/09/2011	25.47	MISCELLANEOUS	
		1	35	10/09/2011	11/09/2011	27.58	GOVERNOR SYSTM	
		1	35	01/12/2011	18/01/2012	1168.83	GENERATOR FAULTS	
		2	35	28/07/2011	04/08/2011	174.33	GUIDE VANES	
		2	35	05/08/2011	06/08/2011	38.35	EHG/GOV. FAULTS, MISC.	
		3	25	16/12/2011	18/12/2011	45.67	DRAINAGE DEWATERING SYSTEM	
EASTERN REGION								
DVC								
100	MAITHON HPS.	1	23.2	25/06/2011	29/06/2011	101.13	EHT/CT/PT	
		1	23.2	01/12/2011	03/12/2011	54.73	TRT/TRC/SURGE CHAMBER PROBLEM	
		2	20	01/02/2012	31/03/2012	1408.32	TRANSFORMER PROTECTION	
		2	20	01/04/2011	02/04/2011	24.02	MISCELLANEOUS	
		3	20	24/06/2011	26/06/2011	40.57	BUS COUPLER BREAKER	
		3	20	29/06/2011	05/07/2011	137.92	OIL PROBLEMS	
		3	20	14/02/2012	22/02/2012	194.25	THRUST BEARING	
101	PANCHET HPS.	1	40	03/03/2012	11/03/2012	197.03	LGB ALIGNMENT/MISC	
		2	40	19/06/2011	21/06/2011	45.83	GENRATOR OTHERS	
JSEB								
102	SUBERNREKHA HPS-I	1	65	01/09/2011	04/09/2011	81.17	EHG/GOV. FAULTS, MISC.	
		1	65	08/06/2011	12/06/2011	91	OTHERS	
		1	65	01/07/2011	02/07/2011	25.42	OTHERS	
103	SUBERNREKHA HPS-II	1	65	09/08/2011	16/08/2011	166.83	LT AC PANELS	
		1	65	14/10/2011	22/10/2011	181.17	OTHERS	
		1	65	09/06/2011	12/06/2011	81.25	OTHERS	
		1	65	05/09/2011	07/09/2011	35	OTHERS	
NHPC								
104	TEESTA V HPS	1	170	22/09/2011	26/09/2011	103.27	FORCED OUTAGE	
		1	170	15/03/2012	17/03/2012	43.65	FORCED OUTAGE	
		1	170	08/06/2011	09/06/2011	34.05	FORCED OUTAGE	
		1	170	30/07/2011	01/08/2011	38.7	FORCED OUTAGE	
		1	170	04/09/2011	05/09/2011	41.68	FORCED OUTAGE	

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	170	22/09/2011	26/09/2011	102.73	FORCED OUTAGE
		2	170	08/06/2011	09/06/2011	33.83	FORCED OUTAGE
		2	170	30/07/2011	01/08/2011	38.67	FORCED OUTAGE
		2	170	04/09/2011	05/09/2011	41.33	FORCED OUTAGE
		3	170	15/03/2012	18/03/2012	68.62	FORCED OUTAGE
		3	170	22/09/2011	26/09/2011	102.33	FORCED OUTAGE
		3	170	30/07/2011	01/08/2011	38.35	FORCED OUTAGE
		3	170	04/05/2011	16/05/2011	306.3	FORCED OUTAGE
		3	170	08/06/2011	09/06/2011	33.12	FORCED OUTAGE
		3	170	03/09/2011	05/09/2011	54.18	PROTECTION OPERATION
QHPC							
105	BALIMELA HPS-I	1	60	01/09/2011	31/03/2012	5088	THRUST BEARING
		3	60	01/10/2011	31/03/2012	4368	EHG/GOV. FAULTS, MISC.
		5	60	01/10/2011	31/03/2012	4368	EHG/GOV. FAULTS, MISC.
106	BALIMELA HPS-II	2	75	23/08/2011	24/08/2011	31.52	DESILTING SYSTEM
107	HIRAKUD HPS (BURLA)	1	49.5	14/10/2011	19/10/2011	115.25	EHG/GOV. FAULTS, MISC.
		1	49.5	19/10/2011	31/03/2012	3917	EHG/GOV. FAULTS, MISC.
		1	49.5	02/08/2011	08/08/2011	146.83	MISCELLANEOUS
		1	49.5	06/05/2011	09/05/2011	65	MISCELLANEOUS
		4	32	25/10/2011	27/10/2011	49.75	LINE BREAKER
		4	32	28/08/2011	31/08/2011	77.9	GEN./TR.BREAKER
		5	37.5	27/10/2011	21/03/2012	3499	PENSTOCK
		7	37.5	01/10/2011	31/03/2012	4368	GEN./TR.BREAKER
108	HIRAKUD HPS (CHILIMA)	3	24	01/01/2012	31/03/2012	2160	EHG/GOV. FAULTS, MISC.
109	UPPER INDRAVATI HPS.	1	150	27/05/2011	30/05/2011	72.57	MISCELLANEOUS
WBSEDCL							
110	JALDHAKA HPS ST-I	2	9	24/07/2011	30/07/2011	157.17	TURBINE OTHERS
111	PURULIA PSS HPS.	1	225	16/04/2011	18/04/2011	39.5	OTHERS
		1	225	16/03/2012	19/03/2012	75	OTHERS
		1	225	10/09/2011	15/09/2011	120	OTHERS
		1	225	03/08/2011	07/08/2011	106	OTHERS
		1	225	02/05/2011	03/05/2011	28.5	OTHERS
		1	225	10/04/2011	11/04/2011	28.5	OTHERS

Sl. No.	STATION	UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
		2	225	10/08/2011	12/08/2011	52	OTHERS
		2	225	24/04/2011	25/04/2011	31	OTHERS
		2	225	16/04/2011	18/04/2011	39.5	OTHERS
		3	225	05/09/2011	22/09/2011	408	OTHERS
		3	225	15/08/2011	18/08/2011	72.55	OTHERS
		3	225	02/02/2012	05/02/2012	72	OTHERS
		3	225	23/04/2011	25/04/2011	38	OTHERS
		3	225	15/05/2011	17/05/2011	38	OTHERS
		4	225	16/04/2011	18/04/2011	39.5	OTHERS
		4	225	27/04/2011	28/04/2011	25.5	OTHERS
		4	225	09/05/2011	11/05/2011	39.5	OTHERS
		4	225	02/09/2011	27/09/2011	600	OTHERS
		4	225	02/09/2011	27/09/2011	600	OTHERS
112	RAMMAM HPS.	3	12.5	24/12/2011	31/12/2011	179.78	EXCITATION PROBLEMS
		3	12.5	13/06/2011	14/06/2011	34.33	MISCELLANEOUS
		4	12.5	22/07/2011	23/07/2011	34.93	RUNNER/UNDER WATER PARTS
		4	12.5	02/09/2011	03/09/2011	31.4	THRUST BEARING
		4	12.5	09/03/2012	31/03/2012	517.5	MISCELLANEOUS
<u>NORTH EASTERN REGION</u>							
<u>APGPCL</u>							
113	KARBI LANGPI HPS.	2	50	05/04/2011	22/05/2011	1124.37	FORCED OUTAGE
		2	50	03/04/2011	05/04/2011	66.93	AUTO. VOLTAGE REGULATOR
<u>MeECL</u>							
114	KYRDEM KULAI HPS.	1	30	07/05/2011	10/05/2011	80	MISCELLANEOUS
		1	30	22/09/2011	27/09/2011	121.5	SHEAR PIN
		1	30	02/07/2011	05/07/2011	65	GEN./TR.BREAKER
		1	30	10/01/2012	14/01/2012	98	MISCELLANEOUS
		1	30	30/05/2011	01/06/2011	39.75	GEN./TR.BREAKER
		2	30	06/12/2011	11/12/2011	123	MISCELLANEOUS
115	UMIAM HPS ST-I	1	9	16/03/2012	19/03/2012	66	MISCELLANEOUS
116	UMIAM HPS ST-IV	8	30	05/01/2012	06/01/2012	25	SHEAR PIN
<u>NEEPCO.</u>							
117	DOYANG HPS.	1	25	01/08/2011	23/08/2011	528.13	MISCELLANEOUS
118	KHONDONG HPS.	2	25	06/05/2011	07/05/2011	24.87	GEN./TR.BREAKER
		2	25	27/05/2011	28/05/2011	31.88	SERVO MOTORS

Sl. No.	STATION		UNIT	CAPACITY (MW)	DATE OF OUTAGE	DATE OF RETURN	OUTAGE HOURS	REASONS
119	KOPILI	HPS.	1	50	25/06/2011	05/07/2011	247.13	PENSTOCK
			1	50	28/09/2011	29/09/2011	30.72	GUIDE VANES
			1	50	10/11/2011	11/11/2011	32	STATION SERVICE TRANSFORM
			2	50	21/12/2011	23/12/2011	55.9	MISCELLANEOUS
			2	50	10/06/2011	06/07/2011	641.3	OTHER (D/T, GUIDE/STAY VANES
			2	50	28/04/2011	10/05/2011	294.2	FORCED OUTAGE
			2	50	28/09/2011	29/09/2011	30.52	MISCELLANEOUS
			2	50	14/02/2012	16/02/2012	64	MISCELLANEOUS
			2	50	10/11/2011	11/11/2011	32	STATION SERVICE TRANSFORM
			3	50	13/06/2011	14/06/2011	40.03	MISCELLANEOUS
			3	50	02/09/2011	03/09/2011	35.73	COOLING WATER SYSTEM
			3	50	23/05/2011	24/05/2011	41.25	COOLING WATER SYSTEM
			4	50	07/12/2011	08/12/2011	34.47	OTHER (D/T, GUIDE/STAY VANES
			4	50	23/05/2011	16/06/2011	592.25	OTHER (D/T, GUIDE/STAY VANES
			4	50	02/09/2011	05/09/2011	51.28	MISCELLANEOUS
			4	50	21/02/2012	01/03/2012	211.37	MISCELLANEOUS
			5	25	06/04/2011	07/04/2011	27.22	POWER HOUSE MISC.
			5	25	07/02/2012	09/02/2012	45.02	TURBINE FAULTS
			5	25	21/02/2012	25/02/2012	93.02	GUIDE VANES
			5	25	05/11/2011	07/11/2011	50.5	SERVO MOTORS
NHPC								
120	LOKTAK	HPS.	1	35	28/04/2011	29/04/2011	26	FORCED OUTAGE

CHAPTER 6

OPERATING AVAILABILITY OF HE UNITS

CHAPTER-6

OPERATING AVAILABILITY OF HE UNITS

6.1 On the basis of planned maintenance undertaken and forced outages caused at 620 Hydro Electric Generating units of 177 HE Stations comprising of 38990.40 MW for which data has been received & analyzed, operating availability of various units and stations has been computed. During the year 2011-12, the average availability of generating units on all India basis was 88.09% as compared to 88.83% during 2010-11. Station wise/unit wise details of operating availability are indicated in Annex. 6.1.

6.2 Eighteen H.E. Stations achieved operating availability of more than 99%. The details of these stations are given in Table 6.1.

TABLE 6.1

HYDRO-ELECTRIC POWER STATIONS WHICH PROVIDED HIGHEST OPERATING AVAILABILITY DURING 2011-12

Sl. No.	NAME OF POWER STATION	UTILITY	CAPACITY (MW)	% OPERATING AVAILABILITY OF STATION
1	KARCHAM WANGTOO HPS	JKHPCL	1000	100
2	UPPER SILERU-II HPS	APGENCO	120	100
3	BHIRA PSS HPS	TATA MAH.	75	100
4	MYNTDU ST-I HPS	MeECL	84	100
5	MALANA HPS	MPCL	86	99.98
6	BASPA HPS	JHPL	300	99.97
7	POCHAMPAD HPS	APGENCO	27	99.96
8	BHANDARDHARA HPS ST-II	DLHP	34	99.96
9	PONG H P S	BBMB	396	99.94
10	NAGARJUN SGR RBC HPS	APGENCO	90	99.92
11	GHATGHAR PSS HPS	MAHAGENCO	250	99.85
12	BHIVPURI HPS	TATA MAH.	75	99.85
13	ALLAIN DUHANGAN HPS	ADHPL	192	99.84
14	NATHPA JHAKRI H P S	SJVNL	1500	99.72
15	KODASALI HPS	KPCL	120	99.67
16	KADRA HPS	KPCL	150	99.52
17	UPPER SINDH-II HPS	JKPDC	105	99.25
18	LIGANAMAKKI HPS	KPCL	55	99.14

6.3 OPERATING AVAILABILITY - REGIONWISE

Region wise operating availability of hydro-electric units during 2011-12 is indicated in Table 6.2. It would be seen that the operating availability of hydel generating units in North Eastern Region was the highest (90.69%). This was mainly due to comparatively less planned maintenance and forced outages.

The operating availability was the lowest in case of units in Eastern Region (86.81%).

The station wise/unit wise non-availability due to Planned Maintenance (P.M) and Forced Outages (F.O) and overall operating availability of various H.E. Stations in the country is indicated in Annex-6.1. Station wise details are shown in Exhibits from 6.1 to 6.14.

TABLE 6.2
AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2011-12

SL. No.	REGION	NO.OF UNITS	INSTALLED CAPACITY MW	PLANNED MAINTENANCE %	FORCED OUTAGE %	OPERATING AVAILABILITY
1	NORTHERN	197	15178.25	8.72	3.64	87.64
2	WESTERN	101	7392.00	7.58	3.07	89.35
3	SOUTHERN	239	11372.45	6.50	5.49	88.01
4	EASTERN	55	3847.70	5.32	7.87	86.81
5	NORTH EASTERN	28	1200.00	5.87	3.44	90.69
	ALL INDIA	620	38990.40	7.43	4.48	88.09

6.4 OPERATING AVAILABILITY: AGE-WISE

The average operating availability during 2011-12 of hydro units commissioned in various years has been indicated in Table 6.3. It is seen that units commissioned during 2011-12 have achieved the highest operating availability of 98.21%. Operating availability was less than 90% for the units commissioned during the period 2007-08, 1989-90 to 1999-00, 1978-79 to 1988-89, 1967-68 TO 1977-78 and those commissioned up to 1966-67. Operating availability was more than 90% for all the other years.

TABLE - 6.3

**OPERATING AVAILABILITY - AGE-WISE
PERIOD: 2011-12**

SL. NO	YEAR OF COMMISSIONING	NUMBER OF UNITS	INSTALLED CAPACITY (MW)	OPERATING AVAILABILITY
1	2011-2012	11	1423.00	98.21
2	2010-2011	11	690.00	94.39
3	2009-2010	1	39.00	100.00
4	2008-2009	8	969.00	93.97
5	2007-2008	23	2443.00	87.62
6	2006-2007	21	2286.00	92.80
7	2005-2006	13	1340.00	92.88
8	2004-2005	13	1115.00	94.81
9	2003-2004	18	2690.00	96.41
10	2002-2003	11	740.60	92.15
11	2001-2002	20	1092.20	94.44
12	2000-2001	13	1129.00	91.10
13	1989-90 TO 1999-00	87	5775.70	83.52
14	1978-79 TO 1988-89	124	7275.60	86.81
15	1967-68 TO 1977-78	82	5300.25	83.39
16	UP TO 1966-67	164	4682.05	83.00
	TOTAL	620	38990.40	88.09

6.5 OPERATING AVAILABILITY - UTILITY WISE

Sector wise/State Electricity Board/Power Generating Corporation wise operating availability of HE units is indicated in Table 6.4.

It has been observed that operating availability of generating units among the utilities was the highest 100% for JKHPCL.

6.6 MISCELLANEOUS NON AVAILABILITY

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, system disturbance, low system demand, disaster/natural calamity, reserve shutdown, transmission constraints & power evacuation problems, low head or high tailrace level, strikes and other misc. reasons etc. It was highest i.e. 46.72%) in case of SJVNL.

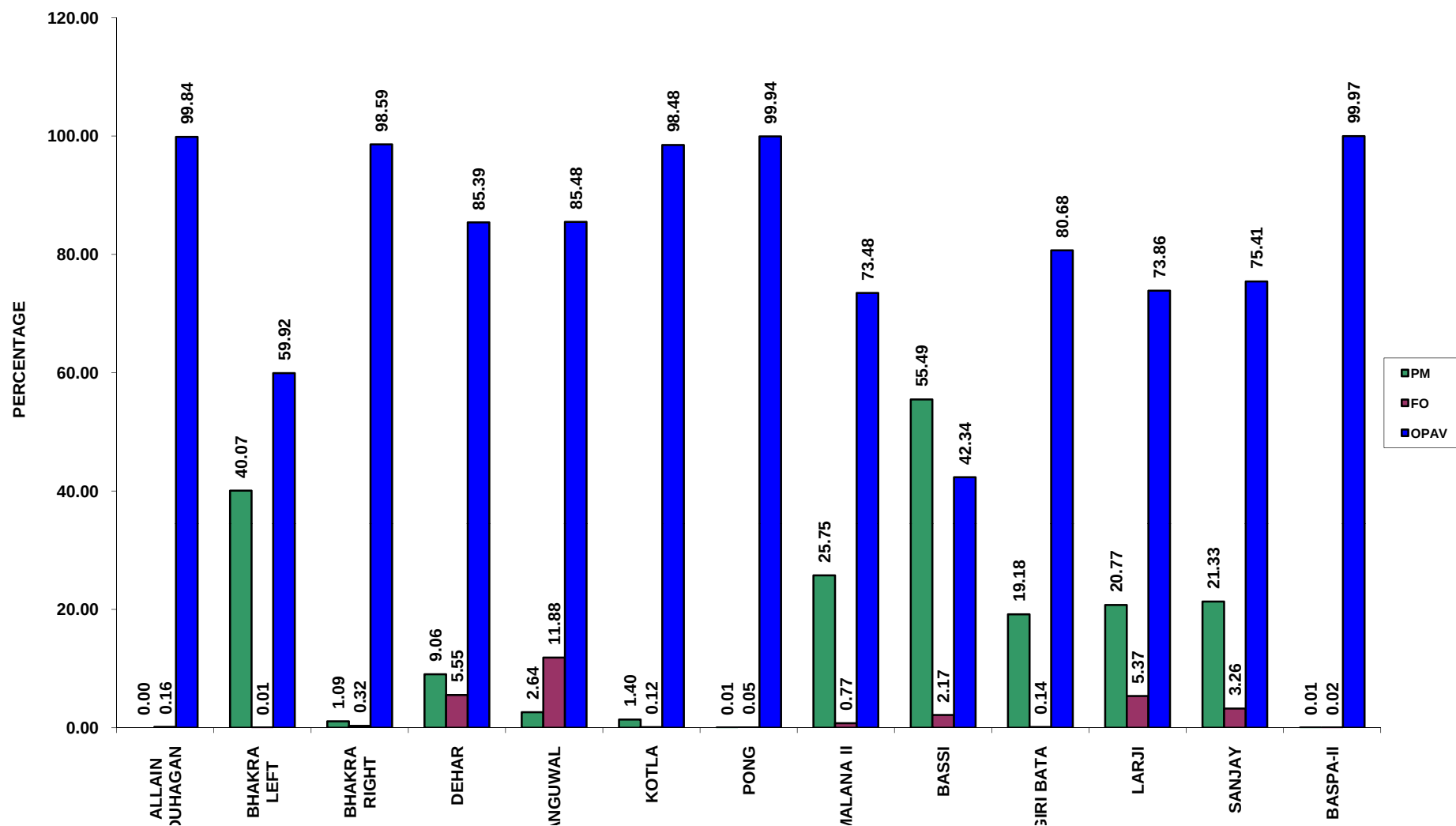
TABLE 6.4

**SECTOR WISE OPERATING AVAILABILITY & MISCELLANEOUS
NON-AVILABILITY OF BOARDS / CORPORATIONS FOR PERIOD: 2011-12**

S. NO.	ORGANISATION	NO.OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE OF (%)	OPERATING AV. PER UNIT (%)	MISC. NON AVAILABILITY (%)
CENTRAL							
1	BBMB	28	2866.30	11.01	2.32	86.67	10.46
2	DVC	5	143.20	4.10	4.16	91.74	0.04
3	NEEPCO.	13	755.00	6.54	2.90	90.56	0.07
4	NHDC	16	1520.00	2.78	0.18	97.04	0.00
5	NHPC	41	3767.20	8.06	1.93	90.01	3.48
6	SJVNL	6	1500.00	0.04	0.24	99.72	46.72
7	THDC	8	1400.00	4.47	0.10	95.43	0.00
	SUB TOTAL	117	11951.70	6.52	1.66	91.82	9.47
STATE							
8	APGENCO	57	3783.35	4.22	7.93	87.85	2.47
9	APGPCL	2	100.00	0.00	6.97	93.03	24.59
10	CSPGCL	3	120.00	0.64	1.82	97.54	0.00
11	GSECL	8	540.00	0.46	8.12	91.42	0.00
12	HPSEB	12	366.00	26.15	3.04	70.81	0.19
13	JKPDC	9	660.00	0.45	2.19	97.36	0.95
14	JSEB	2	130.00	5.87	3.83	90.30	20.36
15	KPCL	68	3585.40	8.17	3.02	88.81	7.27
16	KSEB	48	1881.50	9.05	7.27	83.68	4.62
17	MAHAGENCO	24	2406.00	13.57	5.96	80.47	0.00
18	MeECL	10	240.00	7.93	4.57	87.50	0.00
19	MPPGCL	23	875.00	9.26	2.95	87.79	0.03
20	OHPC	31	2027.50	6.94	10.11	82.95	0.81
21	PSPCL	25	1051.00	14.30	0.53	85.17	3.45
22	RRVUNL	11	411.00	27.02	3.98	69.00	8.45
23	SSNNL	11	1450.00	7.36	0.57	92.07	0.00

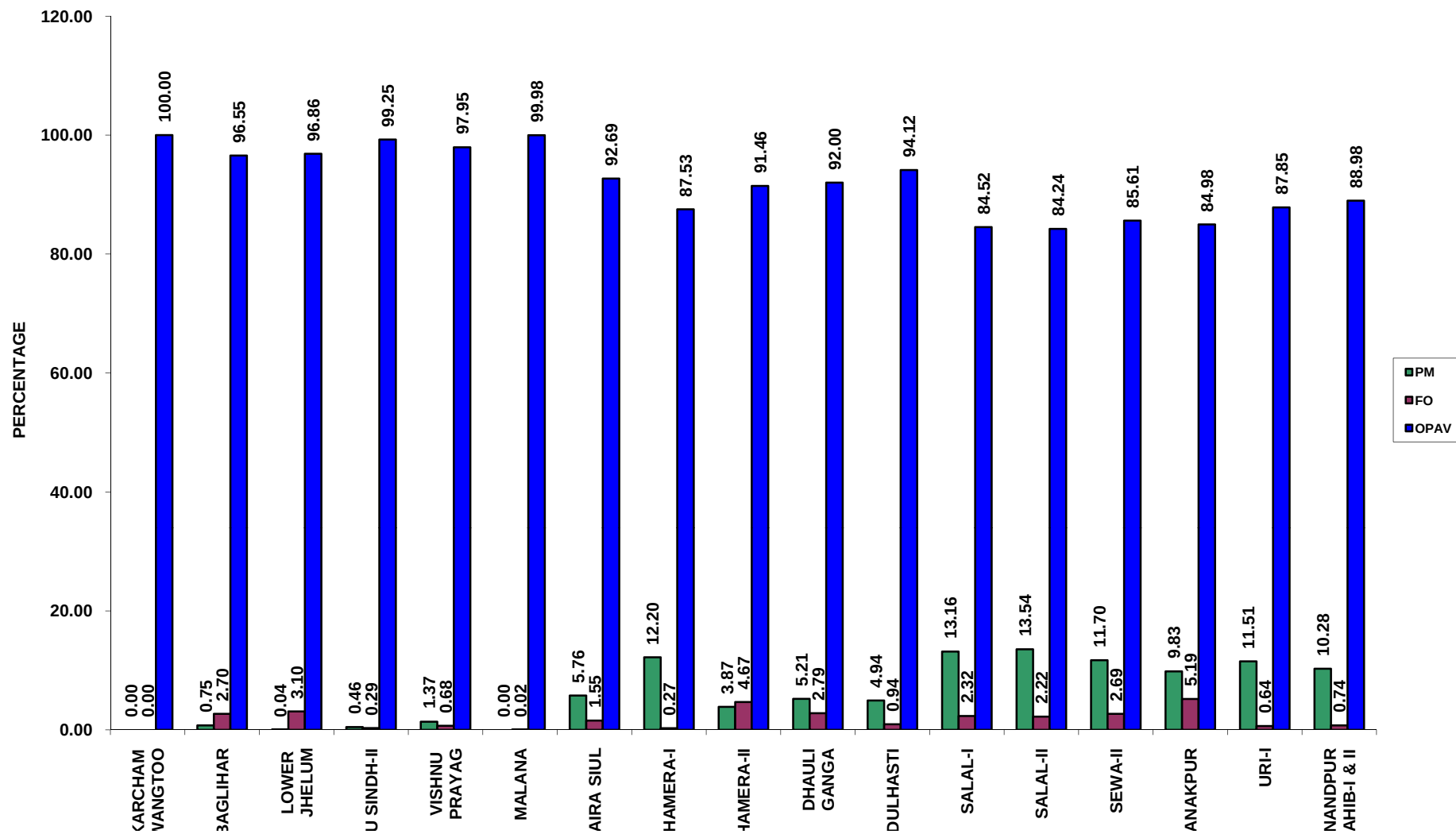
24	TANGEDCO	66	2122.20	5.48	3.72	90.80	0.05
25	UJVNL	34	1252.15	10.61	29.55	59.84	0.21
26	UPJVNL	15	501.60	26.78	0.67	72.55	0.00
27	WBSEDCL	11	977.00	3.75	5.26	90.99	1.26
	SUB TOTAL	470	24479.70	8.53	6.32	85.15	2.46
PVT							
28	ADHPL	2	192	0.00	0.16	99.84	0.00
29	DLHP	1	34	0.00	0.04	99.96	0.00
30	EPPL	2	100	25.75	0.77	73.47	0.96
31	JHPL	3	300	0.01	0.02	99.97	0.27
32	JKHPCL	4	1000	0.00	0.00	100.00	0.00
33	JPPVL	4	400	1.23	0.27	98.50	0.00
34	MPCL	2	86	0.00	0.02	99.98	0.00
35	TATA	15	447	0.17	0.22	99.61	0.00
	SUB TOTAL	33	2559	1.20	0.10	98.70	0.18
	ALL INDIA TOTAL	620	38990.40	7.43	4.48	88.09	4.57

OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12



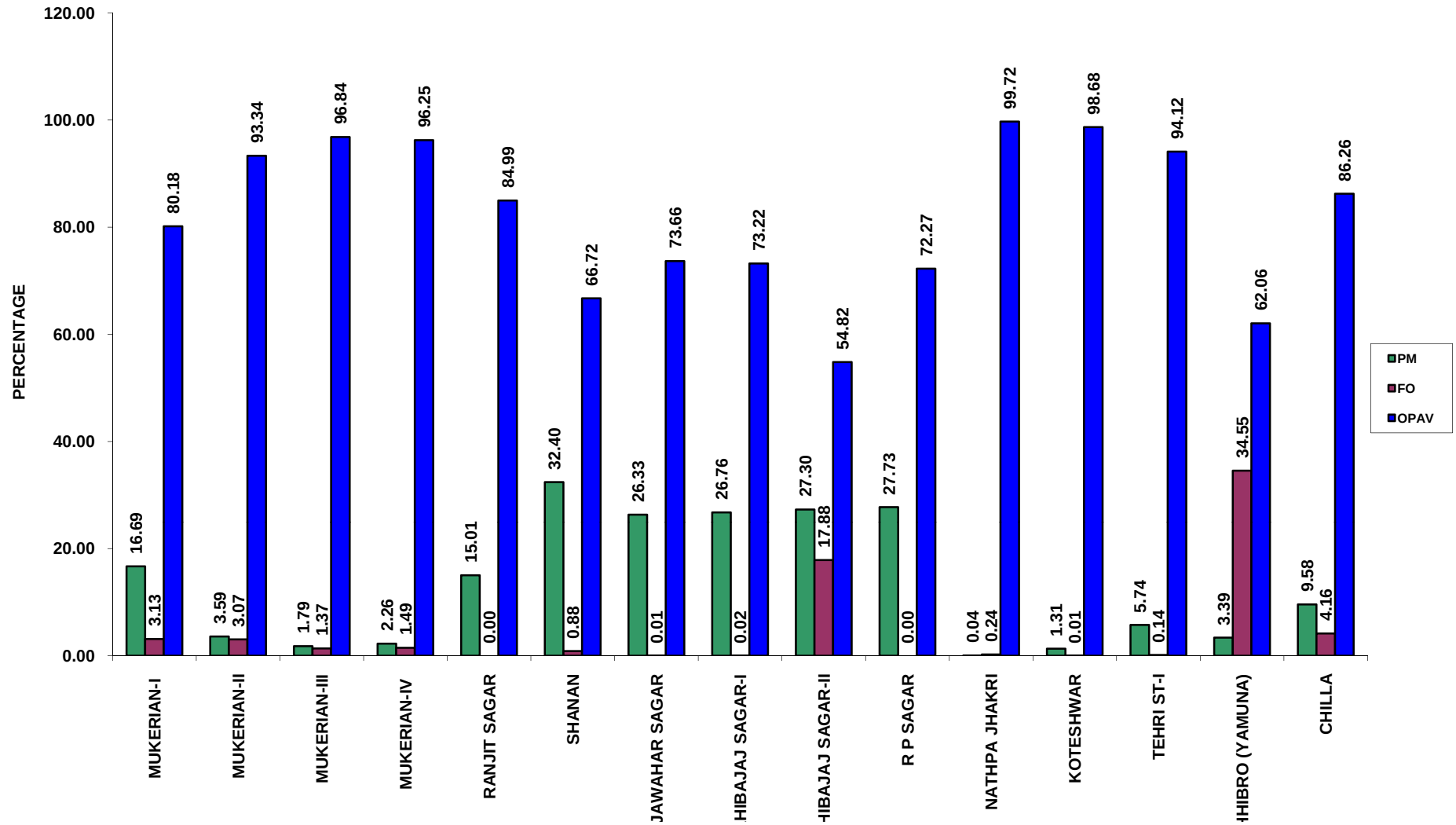
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.2



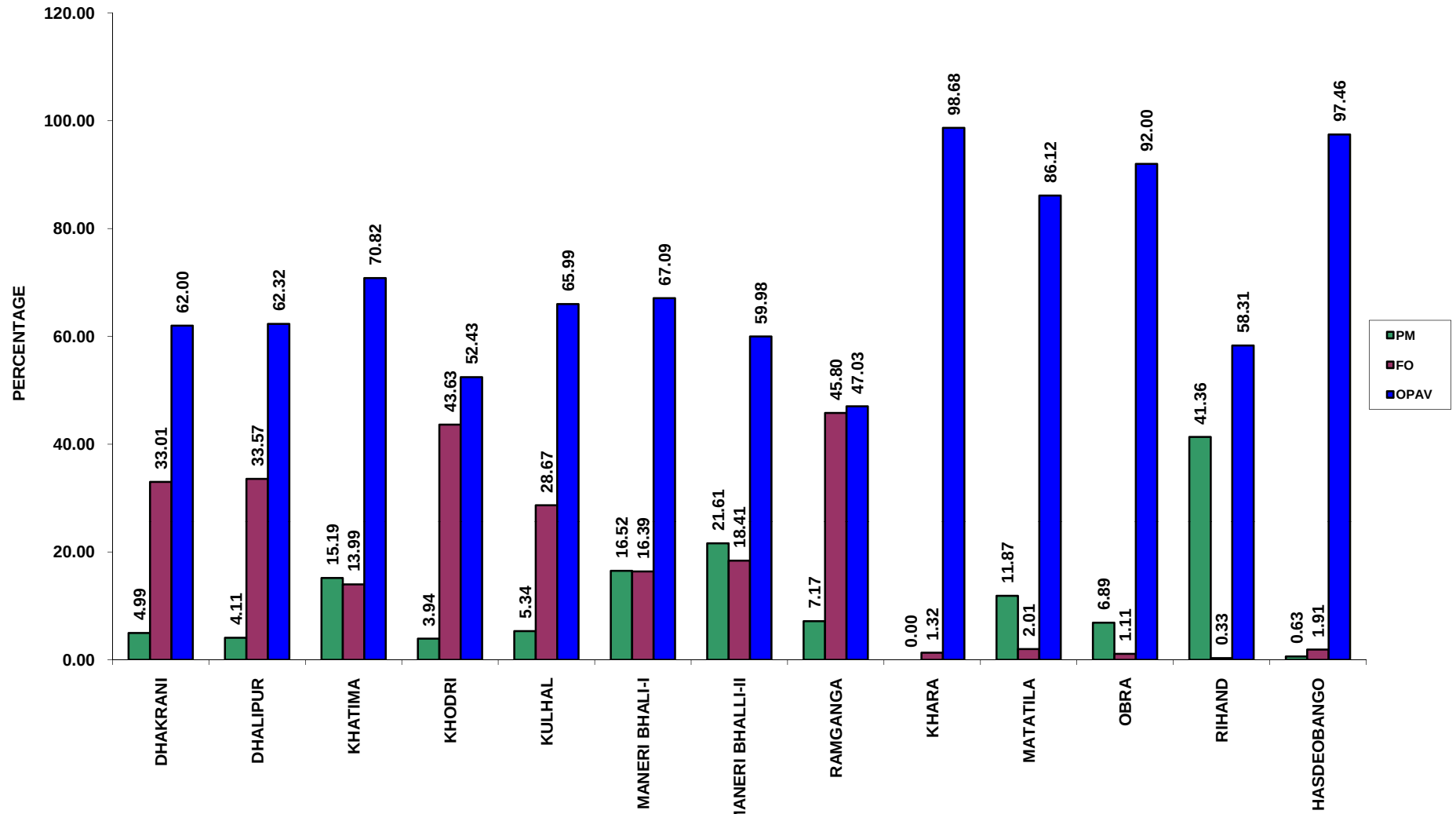
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.3



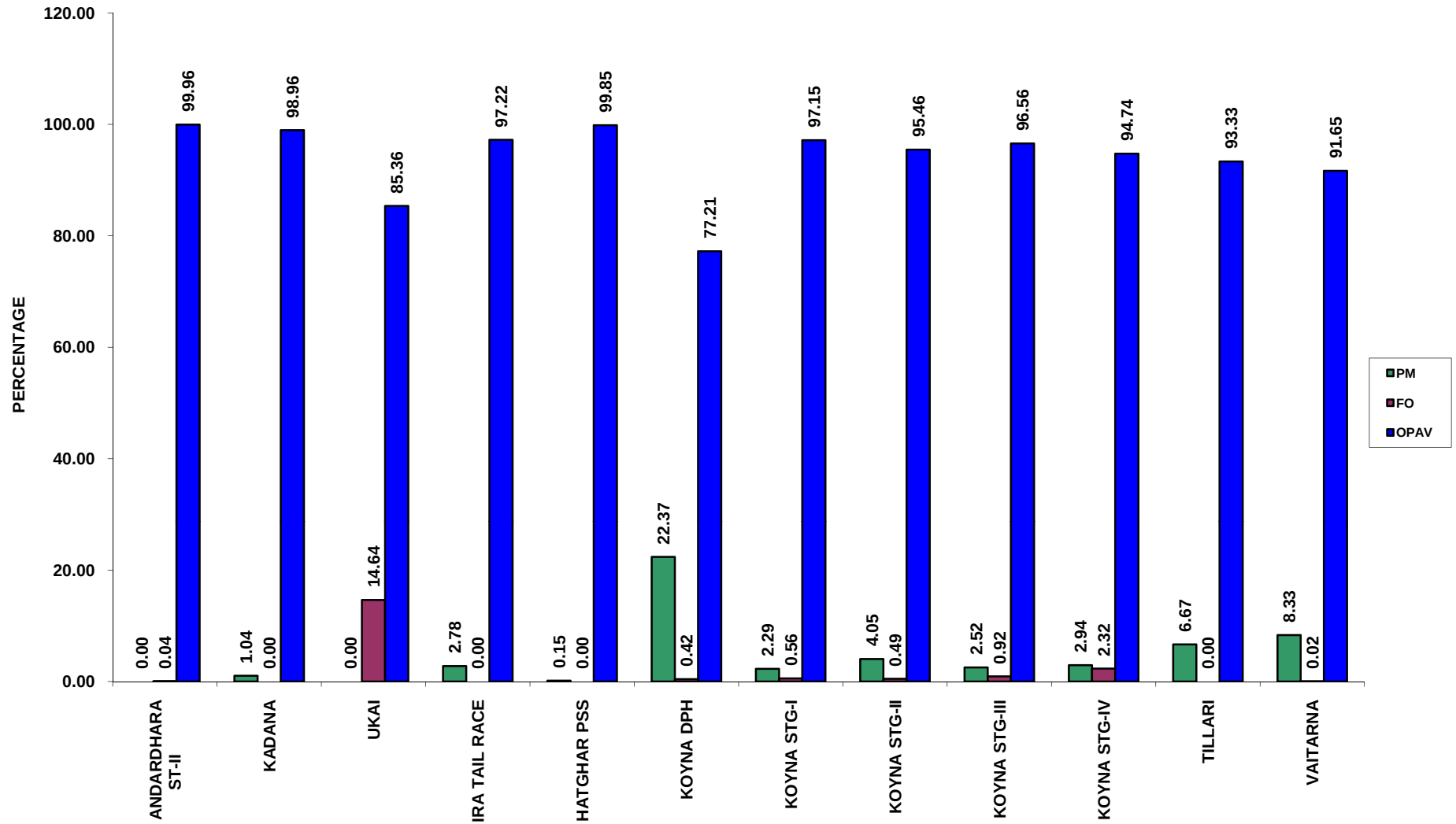
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.4



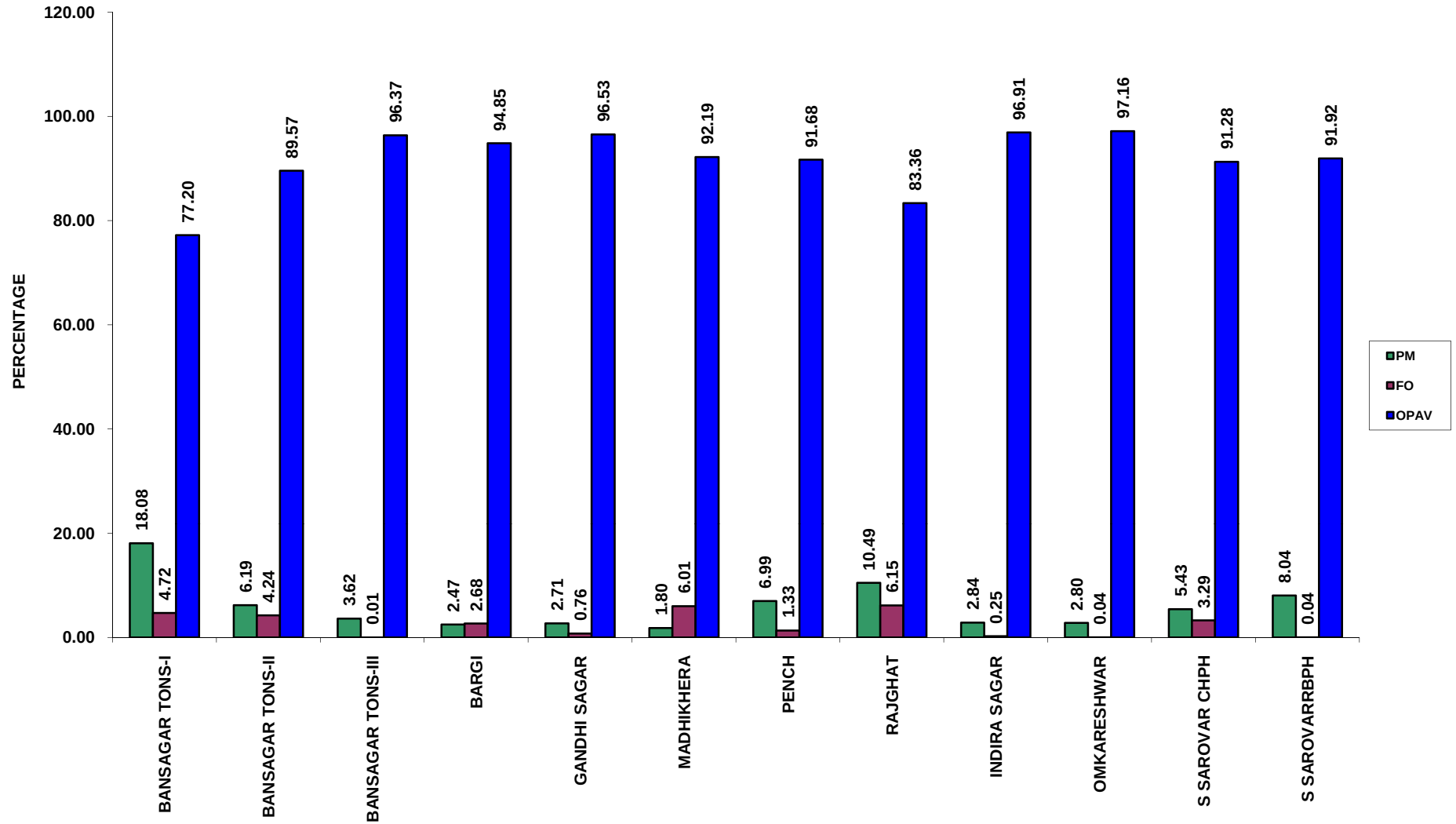
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.5



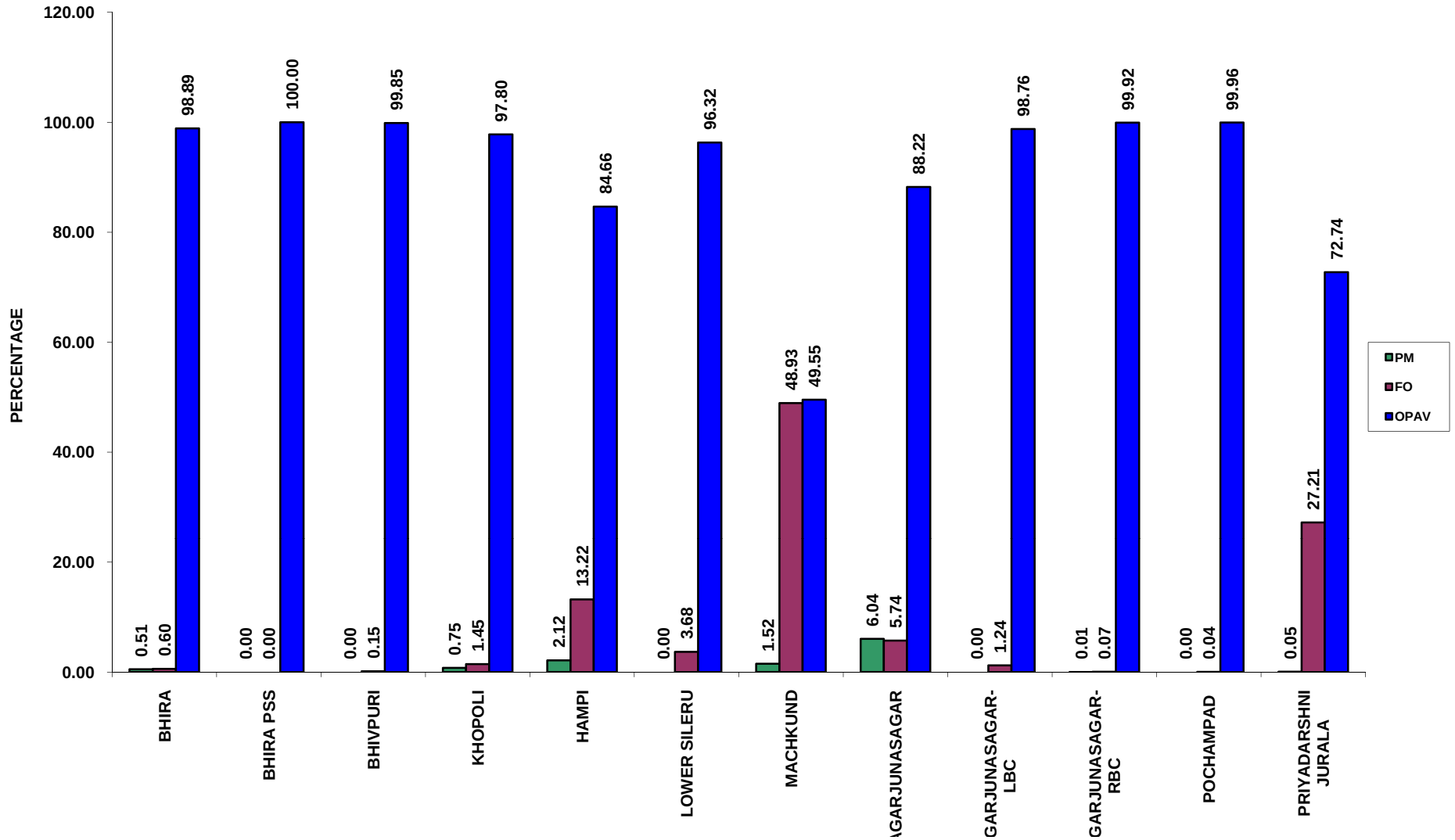
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.6



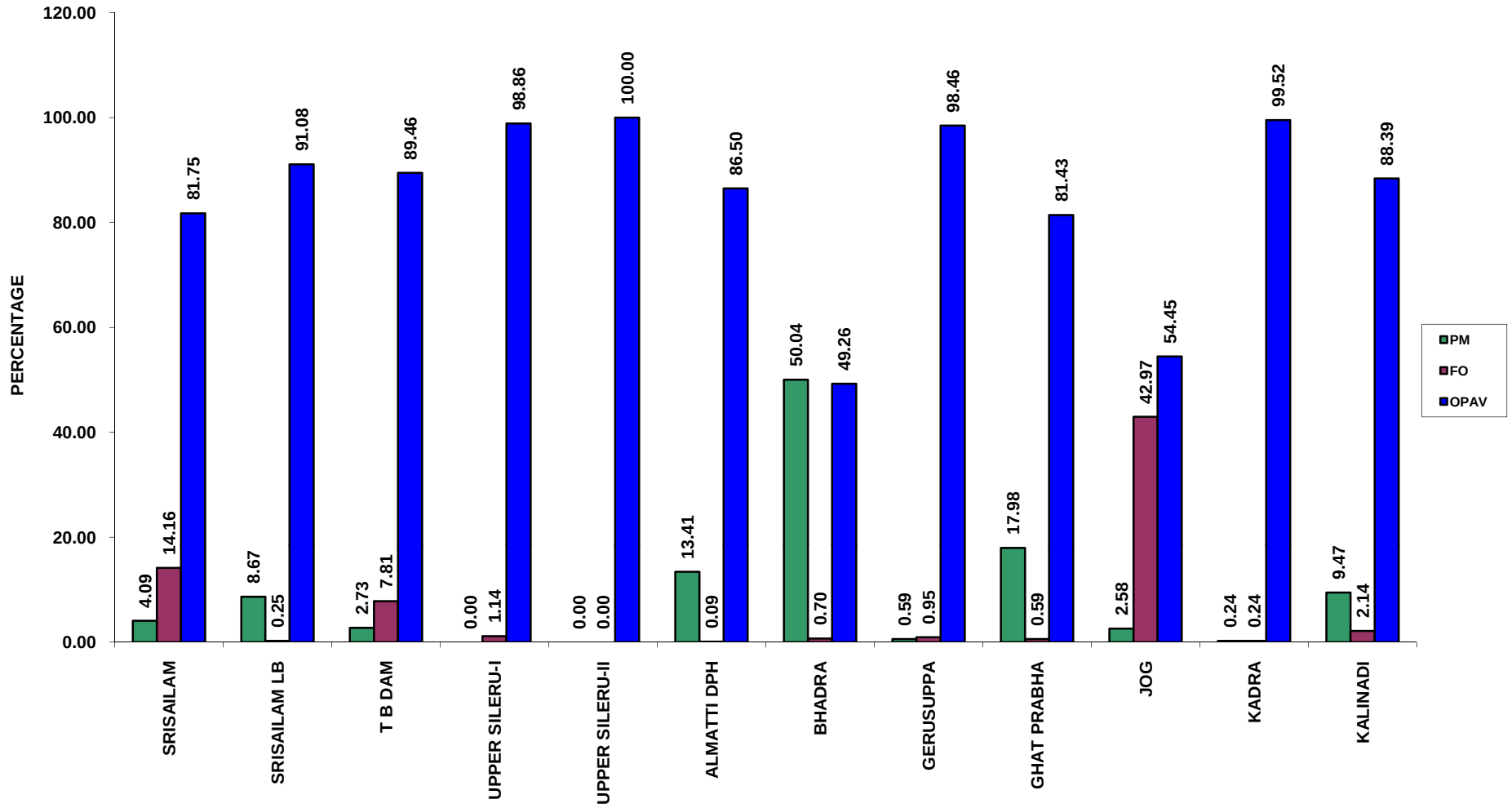
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.7



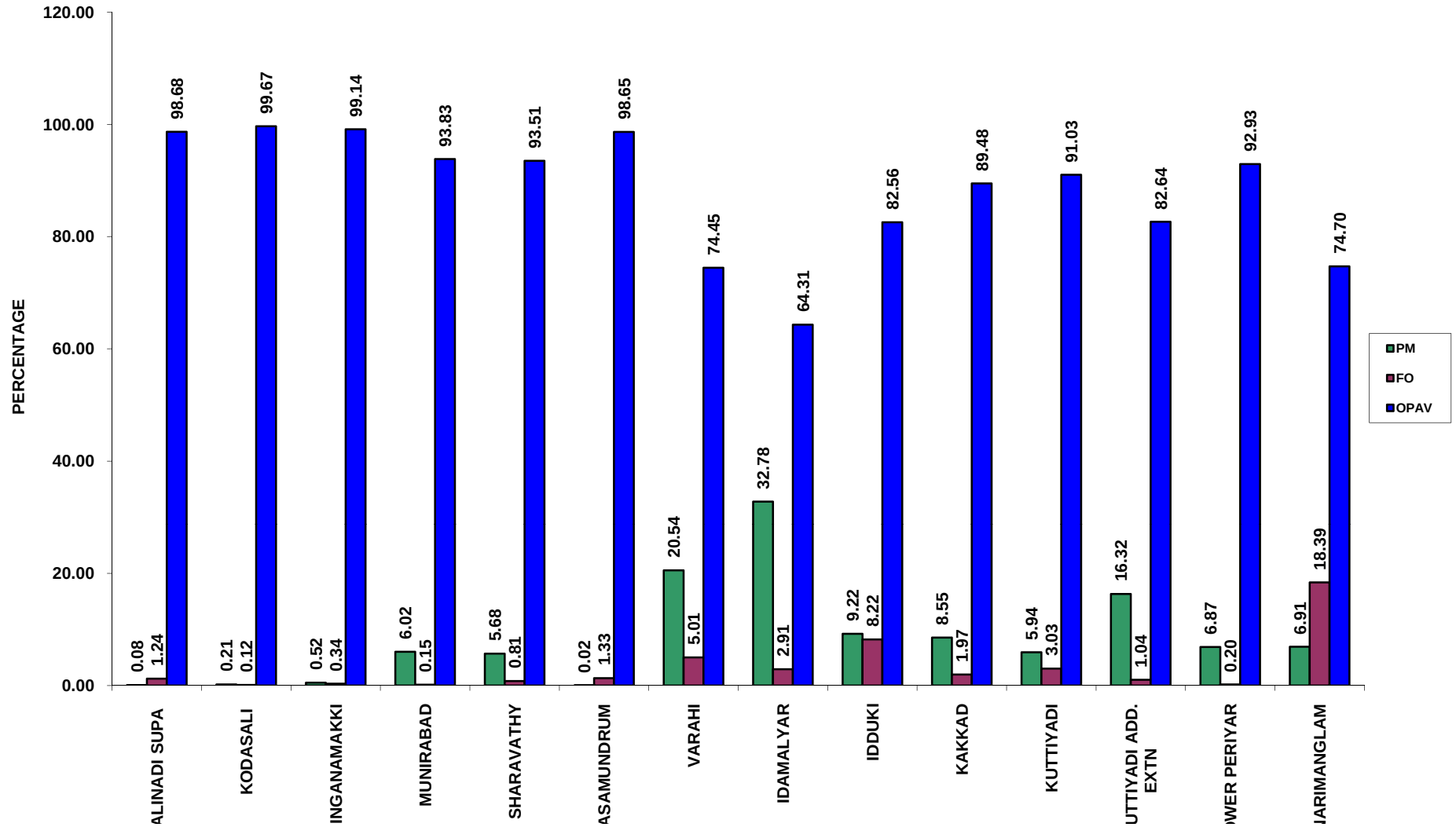
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.8



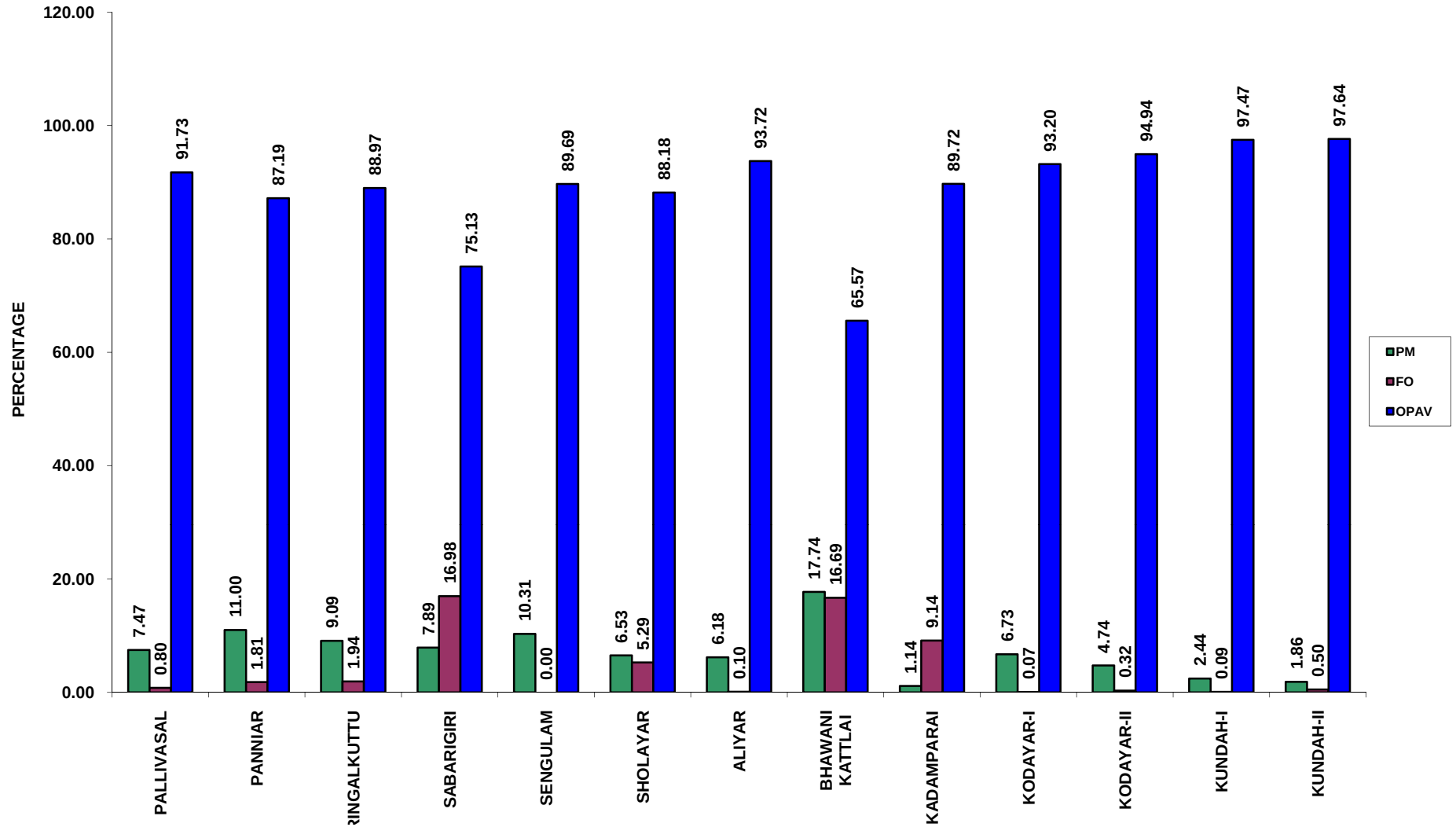
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.9



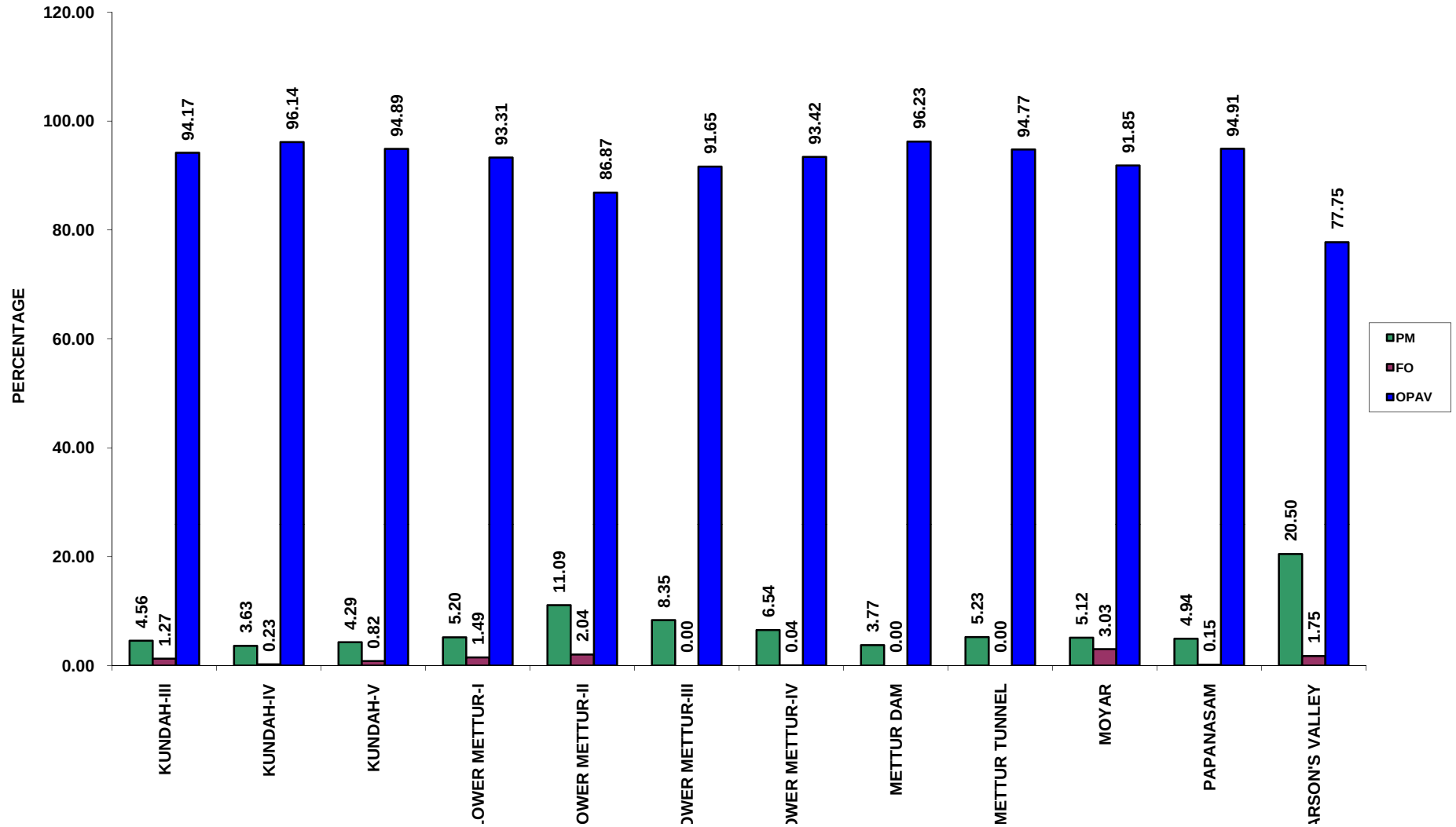
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.10



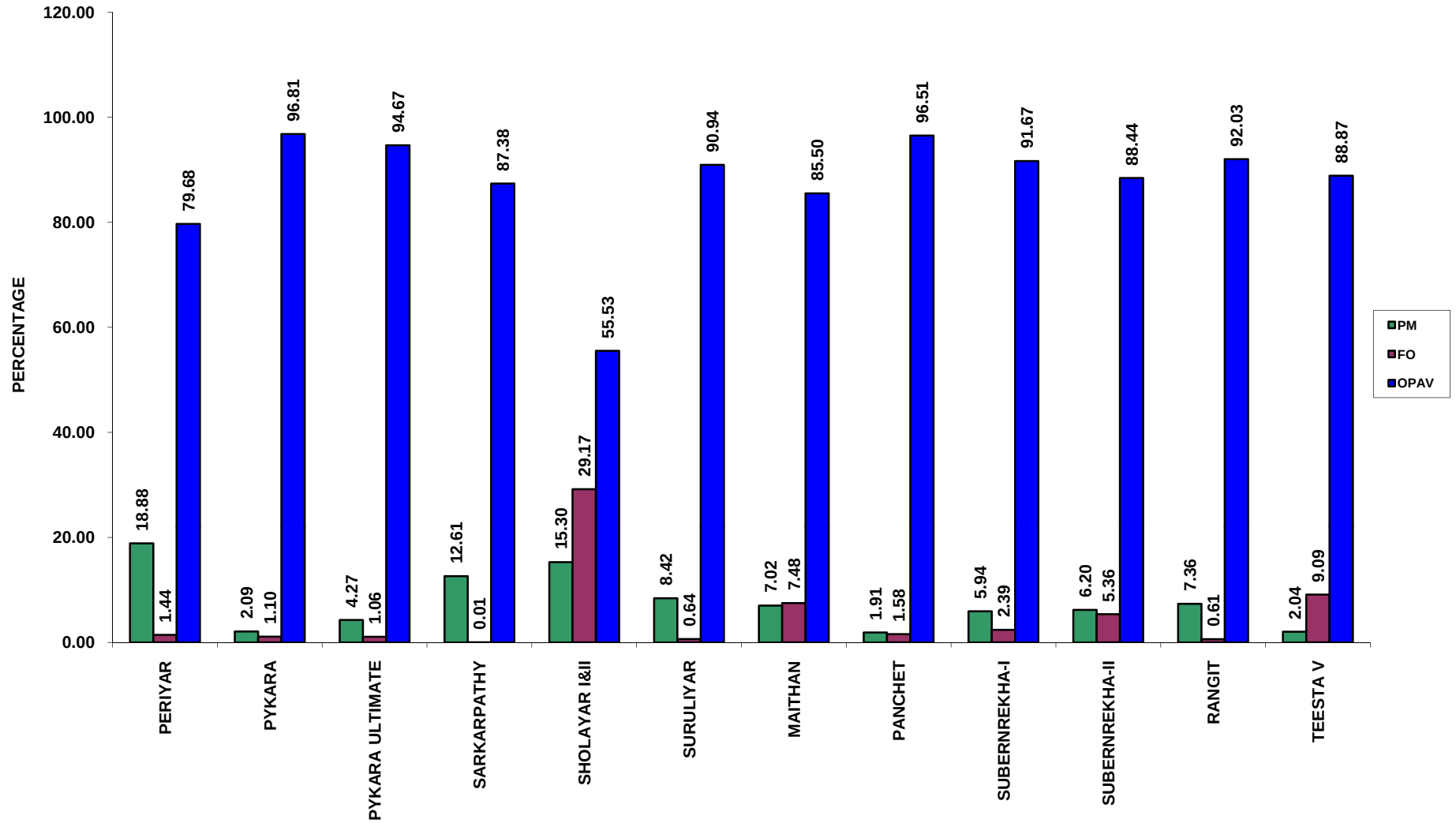
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.11



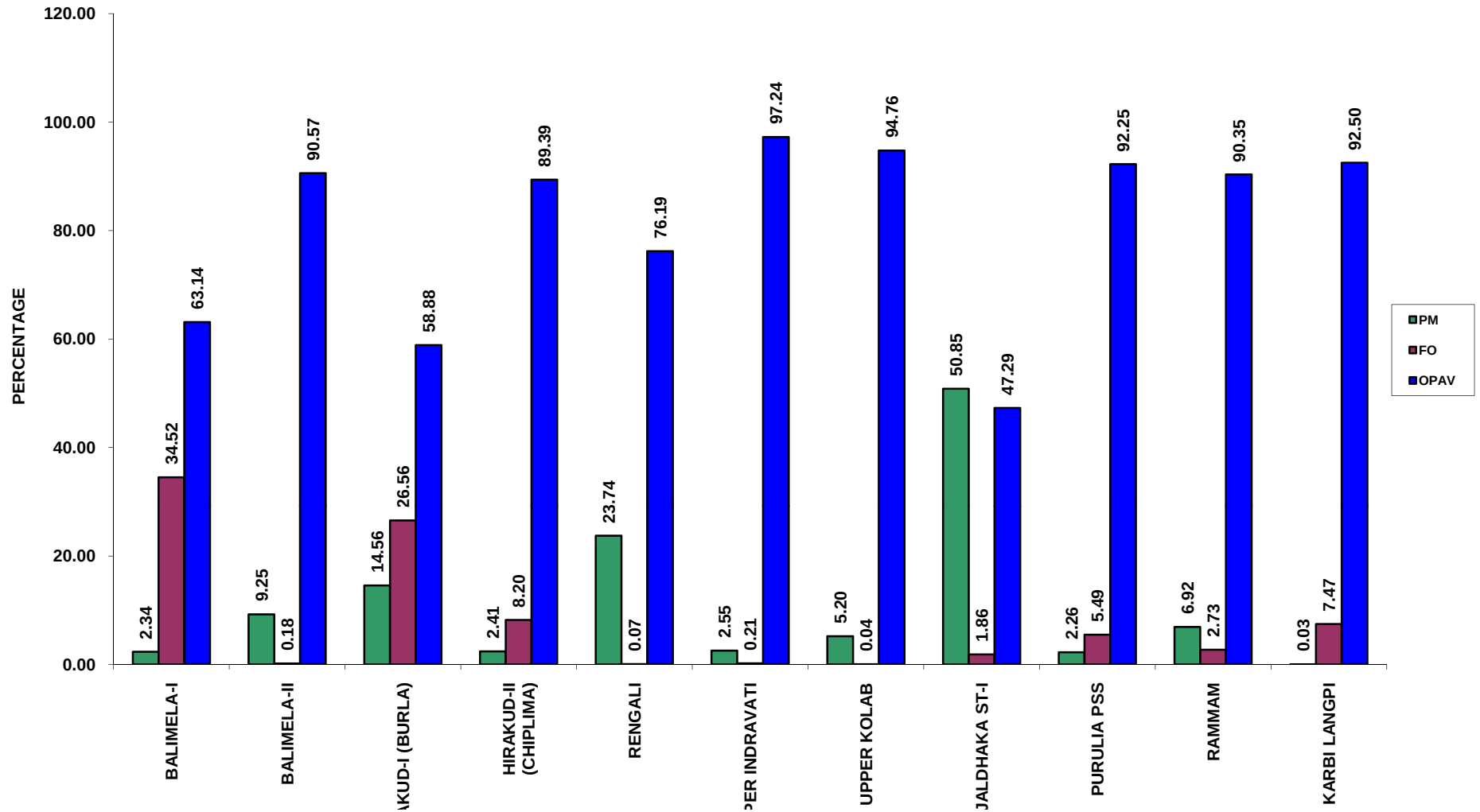
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.12



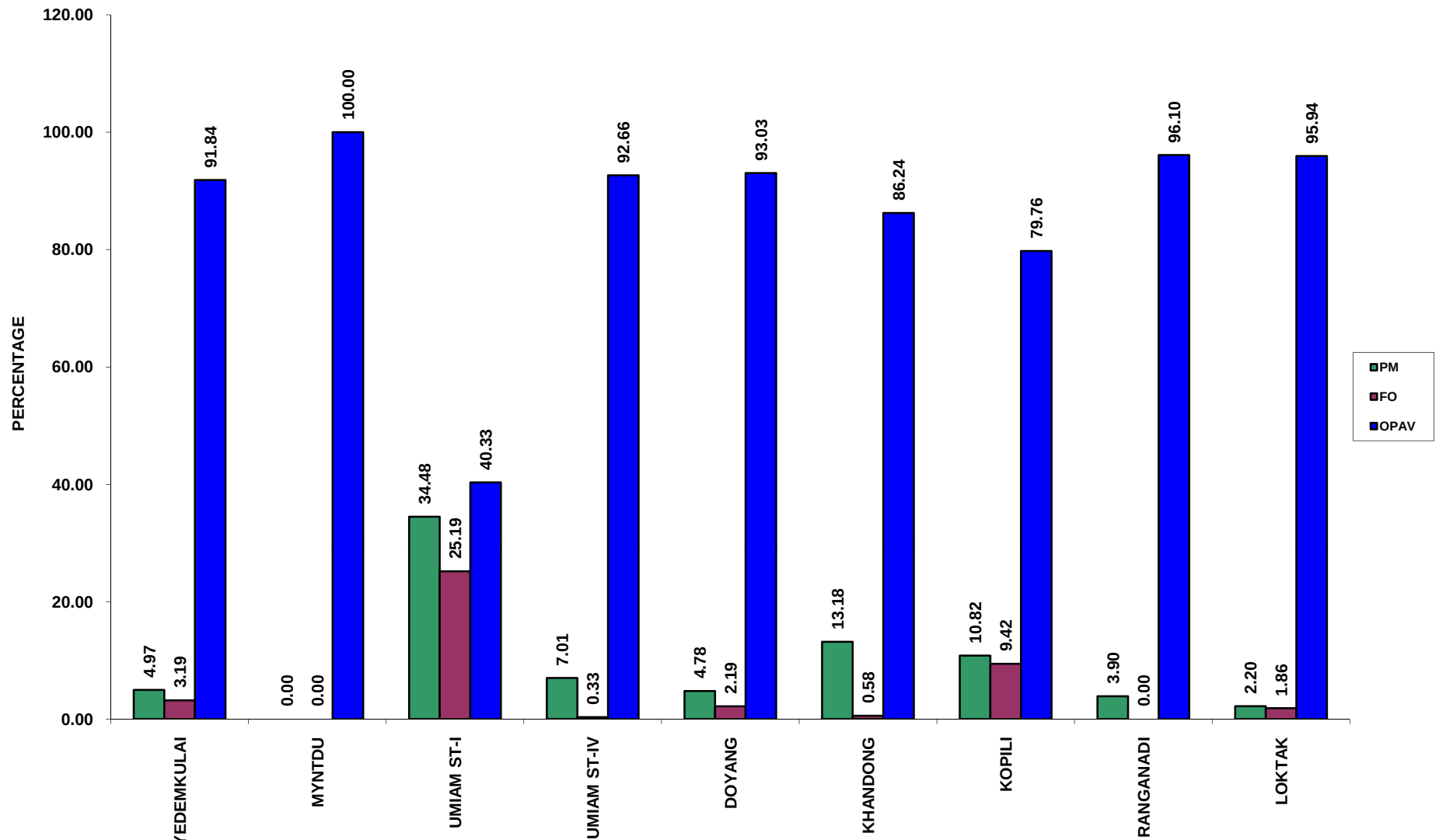
OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.13



OPERATING AVAILABILITY OF H E STATIONS DURING 2011-12

EXHIBIT 6.14



OPERATING AVAILABILITY OF HYDRO ELECTRIC UNITS DURING 2011-2012

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
NORTHERN REGION							
<u>ADHPL</u>							
1	ALLAIN DUHANGAN HPS	1	96	0.00	0.13	99.87	0.04
		2	96	0.00	0.18	99.82	0.29
	TOTAL :		192	0.00	0.16	99.84	0.16
<u>BBMB</u>							
2	BHAKRA H P S LEFT	1	108	0.00	0.03	99.97	4.73
		2	108	99.73	0.00	0.27	0.00
		3	108	0.00	0.02	99.98	5.54
		4	108	0.91	0.00	99.09	4.44
		5	108	99.73	0.00	0.27	0.00
	TOTAL :		540	40.07	0.01	59.92	2.94
3	BHAKRA H P S RIGHT	1	157	0.00	0.17	99.83	5.10
		2	157	0.00	1.23	98.77	6.81
		3	157	4.52	0.05	95.43	3.88
		4	157	0.00	0.08	99.92	4.45
		5	157	0.95	0.08	98.97	8.92
	TOTAL :		785	1.09	0.32	98.59	5.83
4	DEHAR H P S	1	165	13.50	0.00	86.50	9.57
		2	165	30.49	3.44	66.07	38.32
		3	165	0.00	0.06	99.94	5.20
		4	165	8.08	29.24	62.68	0.59
		5	165	0.20	0.03	99.77	45.44
		6	165	2.08	0.52	97.40	32.01
	TOTAL :		990	9.06	5.55	85.39	21.86
5	GANGUWAL HPS	1	29.25	3.09	0.01	96.90	0.00
		2	24.2	1.24	38.10	60.66	2.97
		3	24.2	3.50	0.00	96.50	0.00
	TOTAL :		77.65	2.64	11.88	85.48	0.93
6	KOTLA HPS	1	29.25	0.38	0.00	99.62	3.18
		2	24.2	0.60	0.33	99.07	3.49
		3	24.2	3.41	0.07	96.52	1.15
	TOTAL :		77.65	1.40	0.12	98.48	2.64
7	PONG H P S	1	66	0.00	0.00	100.00	5.52
		2	66	0.00	0.00	100.00	6.08
		3	66	0.00	0.00	100.00	6.69
		4	66	0.07	0.00	99.93	3.09
		5	66	0.00	0.15	99.85	5.72
		6	66	0.00	0.15	99.85	5.50
	TOTAL :		396	0.01	0.05	99.94	5.43

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
<u>E.P.P.L</u>							
8	MALANA-II HPS	1	50	49.91	0.63	49.46	1.57
		2	50	1.60	0.91	97.49	3.24
	TOTAL :		100	25.75	0.77	73.48	2.41
<u>HPSEB</u>							
9	BASSI HPS	1	15	80.05	0.00	19.95	0.00
		2	15	79.78	0.00	20.22	0.00
		3	15	48.38	0.00	51.62	1.39
		4	15	13.75	8.66	77.59	2.67
	TOTAL :		60	55.49	2.17	42.34	1.01
10	GIRI BATA HPS	1	30	27.06	0.13	72.81	0.90
		2	30	11.30	0.16	88.54	1.24
	TOTAL :		60	19.18	0.14	80.68	1.07
11	LARJI HPS	1	42	25.52	1.09	73.39	0.20
		2	42	34.45	13.96	51.59	0.13
		3	42	2.33	1.07	96.60	0.37
	TOTAL :		126	20.77	5.37	73.86	0.23
12	SANJAY HPS	1	40	41.58	3.77	54.65	0.42
		2	40	1.23	3.39	95.38	0.05
		3	40	21.19	2.62	76.19	0.09
	TOTAL :		120	21.33	3.26	75.41	0.19
<u>JHPL</u>							
13	BASPA HPS	1	100	0.01	0.06	99.93	0.18
		2	100	0.00	0.00	100.00	0.08
		3	100	0.00	0.01	99.99	0.15
	TOTAL :		300	0.01	0.02	99.97	0.14
<u>JKHPCL</u>							
14	KARCHAM WANGTOO HPS	1	250	0.00	0.00	100.00	0.00
		2	250	0.00	0.00	100.00	0.00
		3	250	0.00	0.00	100.00	0.00
		4	250	0.00	0.00	100.00	0.00
	TOTAL :		1000	0.00	0.00	100.00	0.00
<u>JKPDC</u>							
15	BAGLIHAR HPS	1	150	1.85	0.24	97.91	3.76
		2	150	0.27	5.55	94.18	0.70
		3	150	0.13	2.30	97.57	0.27
	TOTAL :		450	0.75	2.70	96.55	1.58

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
16	LOWER JHELUM HPS	1	35	0.01	0.40	99.59	1.68
		2	35	0.05	0.88	99.07	1.69
		3	35	0.07	8.03	91.90	0.30
	TOTAL :		105	0.04	3.10	96.86	1.22
17	UPPER SINDH-II HPS	3	35	0.00	0.11	99.89	0.55
		4	35	1.38	0.40	98.22	0.25
		5	35	0.00	0.36	99.64	0.12
	TOTAL :		105	0.46	0.29	99.25	0.31
	<u>JPPVL</u>						
18	VISHNU PRAYAG HPS	1	100	1.49	0.59	97.92	0.2
		2	100	1.47	0.65	97.88	0.1
		3	100	1.38	0.72	97.90	0.08
		4	100	1.15	0.77	98.08	0.08
	TOTAL :		400	1.37	0.68	97.95	0.11
	<u>MPCL</u>						
19	MALANA HPS	1	43	0.00	0.03	99.97	0.06
		2	43	0.00	0.00	100.00	0.05
	TOTAL :		86	0.00	0.02	99.98	0.06
	<u>NHPC</u>						
20	BAIRA SIUL HPS	1	66	5.29	1.76	92.95	0.48
		2	66	5.91	2.13	91.96	0.02
		3	66	6.07	0.75	93.18	0.02
	TOTAL :		198	5.76	1.55	92.69	0.17
21	CHAMERA- I HPS	1	180	10.26	0.04	89.70	0.00
		2	180	10.30	0.24	89.46	0.00
		3	180	16.62	1.04	82.34	0.00
	TOTAL :		540	12.20	0.27	87.53	0.00
22	CHAMERA- II HPS	1	100	1.65	3.72	94.63	1.63
		2	100	1.91	5.60	92.49	1.67
		3	100	8.04	4.67	87.29	2.05
	TOTAL :		300	3.87	4.67	91.46	1.78
23	DHAULI GANGA HPS	1	70	5.61	4.10	90.29	0.03
		2	70	5.09	3.08	91.83	0.12
		3	70	3.17	1.71	95.12	0.03
		4	70	6.97	2.27	90.76	0.00
	TOTAL :		280	5.21	2.79	92.00	0.04
24	DULHASTI HPS	1	130	4.06	0.85	95.09	0.03
		2	130	5.38	0.46	94.16	0.00
		3	130	5.38	1.51	93.11	0.03
	TOTAL :		390	4.94	0.94	94.12	0.02
25	SALAL HPS-I	1	115	0.00	3.09	96.91	20.24
		2	115	8.04	3.05	88.91	0.89
		3	115	31.43	0.83	67.74	0.09
	TOTAL :		345	13.16	2.32	84.52	7.07
26	SALAL HPS-II	1	115	12.11	2.79	85.10	1.66
		2	115	9.69	2.06	88.25	2.07

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		3	115	18.84	1.82	79.34	2.94
	TOTAL :		345	13.54	2.22	84.24	2.22
27	SEWA-II HPS	1	40	14.42	0.23	85.35	0.06
		2	40	9.55	7.75	82.70	0.03
		3	40	11.13	0.09	88.78	0.03
	TOTAL :		120	11.70	2.69	85.61	0.04
28	TANAKPUR HPS	1	31.4	8.95	7.70	83.35	4.79
		2	31.4	8.50	5.75	85.75	6.55
		3	31.4	12.05	2.11	85.84	13.37
	TOTAL :		94.2	9.83	5.19	84.98	8.24
29	URI-I HPS	1	120	0.02	0.70	99.28	0.15
		2	120	0.02	0.28	99.70	0.00
		3	120	6.32	0.19	93.49	0.00
		4	120	39.68	1.37	58.95	0.08
	TOTAL :		480	11.51	0.64	87.85	0.06
	<u>PSPCL</u>						
30	ANANDPUR SAHIB HPS-I	1	33.5	15.91	0.19	83.90	0.70
		2	33.5	8.23	2.69	89.08	1.68
	TOTAL :		67.00	12.06	1.44	86.49	1.19
31	ANANDPUR SAHIB HPS-II	1	33.5	8.95	0.06	90.99	3.21
		2	33.5	8.04	0.03	91.93	9.74
	TOTAL :		67.00	8.50	0.05	91.46	6.48
32	MUKERIAN HPS-I	1	15	5.89	1.01	93.10	7.66
		2	15	22.15	2.02	75.83	6.85
		3	15	22.04	6.35	71.61	9.36
	TOTAL :		45	16.69	3.13	80.18	7.96
33	MUKERIAN HPS-II	1	15	4.87	3.98	91.15	6.61
		2	15	5.91	1.31	92.78	5.84
		3	15	0.00	3.93	96.07	32.03
	TOTAL :		45	3.59	3.07	93.34	14.83
34	MUKERIAN HPS-III	1	19.5	0.00	0.90	99.10	27.93
		2	19.5	0.00	1.45	98.55	28.03
		3	19.5	5.38	1.76	92.86	7.66
	TOTAL :		58.5	1.79	1.37	96.84	21.21
35	MUKERIAN HPS-IV	1	19.5	0.00	1.32	98.68	13.11
		2	19.5	0.00	2.06	97.94	28.13
		3	19.5	6.79	1.09	92.12	8.80
	TOTAL :		58.5	2.26	1.49	96.25	16.68

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
36	RANJIT SAGAR HPS	1	150	12.60	0.00	87.40	0.00
		2	150	16.00	0.00	84.00	0.00
		3	150	1.55	0.00	98.45	0.00
		4	150	29.91	0.00	70.09	0.00
	TOTAL :		600	15.01	0.00	84.99	0.00
37	SHANAN HPS	1	15	11.09	0.41	88.50	0.00
		2	15	1.34	0.42	98.24	0.00
		3	15	7.23	0.21	92.56	0.00
		4	15	7.59	0.29	92.12	0.00
		5	50	63.10	1.54	35.36	0.00
	TOTAL :		110	32.40	0.88	66.72	0.00
	<u>RRVUNL</u>						
38	JAWAHAR SAGAR HPS	1	33	7.87	0.02	92.11	0.00
		2	33	36.76	0.01	63.23	0.00
		3	33	34.34	0.00	65.66	0.00
	TOTAL :		99	26.33	0.01	73.66	0.00
39	MAHI BAJAJ HPS-I	1	25	30.71	0.00	69.29	40.15
		2	25	22.80	0.05	77.15	41.29
	TOTAL :		50	26.76	0.02	73.22	40.72
40	MAHI BAJAJ HPS-II	1	45	46.39	7.89	45.72	22.57
		2	45	8.20	27.87	63.93	16.35
	TOTAL :		90	27.30	17.88	54.82	19.46
41	R P SAGAR HPS	1	43	5.34	0.00	94.66	0.00
		2	43	87.33	0.00	12.67	0.00
		3	43	10.47	0.00	89.53	0.00
		4	43	7.80	0.00	92.20	0.00
	TOTAL :		172	27.73	0.00	72.27	0.00
	<u>SIVNL</u>						
42	NATHPA JHAKRI HPS	1	250	0.03	0.27	99.70	45.50
		2	250	0.03	0.00	99.97	42.64
		3	250	0.03	0.03	99.94	40.18
		4	250	0.04	0.00	99.96	41.87
		5	250	0.05	0.01	99.94	36.92
		6	250	0.05	1.13	98.82	36.79
	TOTAL :		1500	0.04	0.24	99.72	40.65
	<u>THDC</u>						
43	KOTESHWAR HPS	1	100	5.26	0.04	94.70	0.00
		2	100	0.00	0.00	100.00	0.00
		3	100	0.00	0.00	100.00	0.00
		4	100	0.00	0.00	100.00	0.00
	TOTAL :		400	1.31	0.01	98.68	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
44	TEHRI ST-1 HPS	1	250	9.90	0.61	89.49	0.08
		2	250	7.15	0.78	92.07	0.03
		3	250	10.45	0.22	89.34	0.18
		4	250	6.31	1.40	92.29	0.21
	TOTAL :		1000	8.45	0.75	90.80	0.13
	<u>UJVNL</u>						
45	CHIBRO (YAMUNA) HPS	1	60	13.57	24.10	62.33	0.00
		2	60	0.00	46.56	53.44	0.00
		3	60	0.00	36.81	63.19	0.00
		4	60	0.00	30.74	69.26	0.00
	TOTAL :		240	3.39	34.55	62.06	0.00
46	CHILLA HPS	1	36	13.14	3.52	83.34	0.10
		2	36	10.21	2.36	87.43	0.13
		3	36	3.45	2.82	93.73	0.14
		4	36	11.51	7.95	80.54	1.02
	TOTAL :		144	9.58	4.16	86.26	0.35
47	DHAKRANI HPS	1	11.25	0.00	51.01	48.99	0.00
		2	11.25	0.00	38.20	61.80	0.00
		3	11.25	14.98	9.82	75.20	0.00
	TOTAL :		33.75	4.99	33.01	62.00	0.00
48	DHALIPUR HPS	1	17	0.00	47.12	52.88	0.00
		2	17	12.32	23.22	64.46	0.00
		3	17	0.00	30.37	69.63	0.00
	TOTAL :		51	4.11	33.57	62.32	0.00
49	KHATIMA HPS	1	13.8	13.37	8.61	78.02	0.11
		2	13.8	21.29	13.41	65.30	0.10
		3	13.8	10.92	19.94	69.14	0.09
	TOTAL :		41.4	15.19	13.99	70.82	0.10
50	KHODRI HPS	1	30	0.00	50.00	50.00	0.00
		2	30	11.06	38.03	50.91	0.00
		3	30	0.68	40.51	58.81	0.00
		4	30	4.03	45.99	49.98	0.00
	TOTAL :		120	3.94	43.63	52.43	0.00
51	KULHAL HPS	1	10	0.00	40.23	59.77	0.00
		2	10	16.01	8.77	75.22	0.00
		3	10	0.00	37.00	63.00	0.00
	TOTAL :		30	5.34	28.67	65.99	0.00
52	MANERI BHALI - I HPS	1	30	0.00	28.15	71.85	0.16
		2	30	11.59	13.93	74.48	0.10
		3	30	37.98	7.10	54.92	0.04
	TOTAL :		90	16.52	16.39	67.09	0.10

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
53	MANERI BHALI - II HPS	1	76	39.36	22.78	37.86	0.02
		2	76	16.42	5.36	78.22	0.03
		3	76	0.71	35.33	63.96	0.03
		4	76	29.97	10.19	59.84	0.03
	TOTAL :		304	21.61	18.41	59.98	0.03
54	RAMGANGA HPS	1	66	7.08	47.18	45.74	0.00
		2	66	2.00	60.07	37.93	0.02
		3	66	12.41	30.15	57.44	0.01
	TOTAL :		198	7.17	45.80	47.03	0.01
	<u>UPJVNL</u>						
55	KHARA HPS	1	24	0.00	2.76	97.24	0.00
		2	24	0.00	0.93	99.07	0.00
		3	24	0.00	0.27	99.73	0.00
	TOTAL :		72	0.00	1.32	98.68	0.00
56	MATATILA HPS	1	10.2	32.05	2.88	65.07	0.00
		2	10.2	3.21	1.73	95.06	0.00
		3	10.2	0.37	1.41	98.22	0.00
	TOTAL :		30.6	11.87	2.01	86.12	0.00
57	OBRA HPS	1	33	3.92	3.32	92.76	0.00
		2	33	16.67	0.00	83.33	0.00
		3	33	0.08	0.01	99.91	0.00
	TOTAL :		99	6.89	1.11	92.00	0.00
58	RIHAND HPS	1	50	8.04	0.10	91.86	0.00
		2	50	8.24	0.31	91.45	0.00
		3	50	27.39	0.05	72.56	0.00
		4	50	99.73	0.00	0.27	0.00
		5	50	93.72	0.00	6.28	0.00
		6	50	11.05	1.52	87.43	0.00
	TOTAL :		300	41.36	0.33	58.31	0.00
	<u>WESTERN REGION</u>						
	<u>CSPGCL</u>						
59	HASDEOBANGO HPS	1	40	1.89	5.46	92.65	0.00
		2	40	0.00	0.27	99.73	0.00
		3	40	0.00	0.00	100.00	0.00
	TOTAL :		120	0.63	1.91	97.46	0.00
	<u>DLHP</u>						
60	BHANDARDHARA HPS ST-II	2	34	0.00	0.04	99.96	0.00
	TOTAL :		34	0.00	0.04	99.96	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
<u>GSECL</u>							
61	KADANA HPS	1	60	2.12	0.00	97.88	0.00
		2	60	0.00	0.00	100.00	0.00
		3	60	0.00	0.00	100.00	0.00
		4	60	2.03	0.00	97.97	0.00
	TOTAL :		240	1.04	0.00	98.96	0.00
62	UKAI HPS	1	75	0.01	0.06	99.93	0.00
		2	75	0.00	54.32	45.68	0.00
		3	75	0.00	0.07	99.93	0.00
		4	75	0.00	4.11	95.89	0.00
	TOTAL :		300	0.00	14.64	85.36	0.00
<u>MAHAGENCO</u>							
63	BHIRA TAIL RACE HPS	1	40	0.00	0.00	100.00	0.00
		2	40	5.56	0.00	94.44	0.00
	TOTAL :		80	2.78	0.00	97.22	0.00
64	GHATGHAR PSS HPS	1	125	0.30	0.00	99.70	0.00
		2	125	0.00	0.00	100.00	0.00
	TOTAL :		250	0.15	0.00	99.85	0.00
65	KOYNA DPH HPS	1	18	44.75	0.44	54.81	0.00
		2	18	0.00	0.40	99.60	0.00
	TOTAL :		36	22.37	0.42	77.21	0.00
66	KOYNA-I HPS	1	70	1.67	1.66	96.67	0.00
		2	70	1.44	0.27	98.29	0.00
		3	70	1.33	0.32	98.35	0.00
		4	70	4.72	0.00	95.28	0.00
	TOTAL :		280	2.29	0.56	97.15	0.00
67	KOYNA-II HPS	1	80	5.76	0.23	94.01	0.00
		2	80	7.32	0.18	92.50	0.00
		3	80	1.80	1.37	96.83	0.00
		4	80	1.31	0.17	98.52	0.00
	TOTAL :		320	4.05	0.49	95.46	0.00
68	KOYNA-III HPS	1	80	3.36	0.19	96.45	0.00
		2	80	4.27	0.13	95.60	0.00
		3	80	0.77	2.81	96.42	0.00
		4	80	1.68	0.54	97.78	0.00
	TOTAL :		320	2.52	0.92	96.56	0.00
69	KOYNA-IV HPS	1	250	3.60	0.33	96.07	0.00
		2	250	0.57	3.16	96.27	0.00
		3	250	1.29	4.23	94.48	0.00
		4	250	6.29	1.59	92.12	0.00
	TOTAL :		1000	2.94	2.32	94.74	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
70	TILLARI HPS	1	60	6.67	0.00	93.33	0.00
	TOTAL :		60	6.67	0.00	93.33	0.00
71	VAITARNA HPS	1	60	8.33	0.02	91.65	0.00
	TOTAL :		60	8.33	0.02	91.65	0.00
	<u>MPPGCL</u>						
72	BANSAGAR TONS-I HPS	1	105	9.49	6.43	84.08	0.00
		2	105	11.77	2.38	85.85	0.00
		3	105	32.97	5.35	61.68	0.00
	TOTAL :		315	18.08	4.72	77.20	0.00
73	BANSAGAR TONS-II HPS	1	15	4.97	5.43	89.60	0.00
		2	15	7.42	3.04	89.54	0.37
	TOTAL :		30	6.19	4.24	89.57	0.18
74	BANSAGAR TONS-III HPS	1	20	3.63	0.00	96.37	0.00
		2	20	3.64	0.00	96.36	0.00
		3	20	3.61	0.04	96.35	0.00
	TOTAL :		60	3.62	0.01	96.37	0.00
75	BARGI HPS	1	45	3.18	4.16	92.66	0.11
		2	45	1.76	1.20	97.04	0.11
	TOTAL :		90	2.47	2.68	94.85	0.11
96	GANDHI SAGAR HPS	1	23	0.01	1.86	98.13	0.00
		2	23	0.01	0.01	99.98	0.00
		3	23	8.25	1.88	89.87	0.00
		4	23	0.00	0.02	99.98	0.00
		5	23	5.26	0.00	94.74	0.00
	TOTAL :		115	2.71	0.76	96.53	0.00
77	MADHIKHERA HPS	1	20	1.47	1.04	97.49	0.00
		2	20	3.24	2.70	94.06	0.27
		3	20	0.68	14.30	85.02	0.01
	TOTAL :		60	1.80	6.01	92.19	0.09
78	PENCH HPS	1	80	6.43	1.30	92.27	0.00
		2	80	7.54	1.37	91.09	0.00
	TOTAL :		160	6.99	1.33	91.68	0.00
79	RAJGHAT HPS	1	15	17.64	2.30	80.06	1.42
		2	15	6.98	0.83	92.19	0.02
		3	15	6.86	15.31	77.83	0.26
	TOTAL :		45	10.49	6.15	83.36	0.57

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
<u>NHDC</u>							
80	INDIRA SAGAR HPS	1	125	6.69	1.98	91.33	0.00
		2	125	0.00	0.03	99.97	0.00
		3	125	6.83	0.00	93.17	0.00
		4	125	4.83	0.00	95.17	0.03
		5	125	0.00	0.00	100.00	0.00
		6	125	1.37	0.00	98.63	0.00
		7	125	1.37	0.00	98.63	0.00
		8	125	1.64	0.00	98.36	0.00
TOTAL :			1000	2.84	0.25	96.91	0.00
81	OMKARESHWAR HPS	1	65	2.28	0.00	97.72	0.00
		2	65	2.57	0.00	97.43	0.00
		3	65	2.52	0.15	97.33	0.00
		4	65	3.16	0.00	96.84	0.00
		5	65	3.31	0.13	96.56	0.00
		6	65	2.75	0.00	97.25	0.00
		7	65	3.02	0.01	96.97	0.00
		8	65	2.77	0.00	97.23	0.00
TOTAL :			520	2.80	0.04	97.16	0.00
<u>SSNNL</u>							
82	S SAROVAR CHPH HPS	1	50	5.09	0.00	94.91	0.03
		2	50	4.46	0.00	95.54	0.00
		3	50	3.59	16.44	79.97	0.03
		4	50	9.90	0.01	90.09	0.02
		5	50	4.10	0.00	95.90	0.03
TOTAL :			250	5.43	3.29	91.28	0.02
83	S SAROVAR RBPH HPS	1	200	5.08	0.00	94.92	0.00
		2	200	5.24	0.08	94.68	0.00
		3	200	5.74	0.00	94.26	0.00
		4	200	5.29	0.05	94.66	0.00
		5	200	11.37	0.03	88.60	0.00
		6	200	15.55	0.10	84.35	0.00
TOTAL :			1200	8.04	0.04	91.92	0.00
<u>TATA MAH.</u>							
84	BHIRA HPS	1	25	1.13	0.57	98.30	0.00
		2	25	1.94	0.57	97.49	0.00
		3	25	0.00	0.72	99.28	0.00
		4	25	0.00	0.58	99.42	0.00
		5	25	0.00	0.57	99.43	0.00
		6	25	0.00	0.57	99.43	0.00
TOTAL :			150	0.51	0.60	98.89	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
85	BHIRA PSS HPS	1	150	0.00	0.00	100.00	0.00
	TOTAL :		150	0.00	0.00	100.00	0.00
86	BHIVPURI HPS	1	24	0.00	0.42	99.58	0.00
		2	24	0.00	0.00	100.00	0.00
		3	24	0.00	0.00	100.00	0.00
		4	1.5	0.00	1.98	98.02	0.00
		5	1.5	0.00	0.14	99.86	0.00
	TOTAL :		75	0.00	0.15	99.85	0.00
87	KHOPOLI HPS	1	24	0.75	1.41	97.84	0.00
		2	24	0.75	1.47	97.78	0.00
		3	24	0.75	1.47	97.78	0.00
	TOTAL :		72	0.75	1.45	97.80	0.00
	<u>SOUTHERN REGION</u>						
	<u>APGENCO</u>						
88	HAMPI HPS	1	9	0.06	31.81	68.13	0.00
		2	9	4.69	8.99	86.32	0.00
		3	9	1.39	5.88	92.73	0.00
		4	9	2.31	6.22	91.47	0.00
	TOTAL :		36	2.12	13.22	84.66	0.00
89	LOWER SILERU HPS	1	115	0.00	0.93	99.07	0.00
		2	115	0.00	7.78	92.22	0.00
		3	115	0.00	2.22	97.78	0.00
		4	115	0.00	3.77	96.23	0.00
	TOTAL :		460	0.00	3.68	96.32	0.00
90	MACHKUND HPS	1	17	0.00	1.16	98.84	0.00
		2	17	0.00	66.99	33.01	0.00
		3	17	0.00	6.51	93.49	0.00
		4	21.25	0.00	86.27	13.73	0.00
		5	21.25	0.00	99.73	0.27	0.00
		6	21.25	8.22	18.49	73.29	0.00
	TOTAL :		114.75	1.52	48.93	49.55	0.00
91	NAGARJUN SGR HPS	1	110	10.07	0.02	89.91	0.00
		2	100.8	3.71	0.34	95.95	0.00
		3	100.8	7.12	0.13	92.75	0.00
		4	100.8	21.00	1.31	77.69	0.00
		5	100.8	5.87	44.33	49.80	0.00
		6	100.8	0.00	0.10	99.90	0.00
		7	100.8	0.21	0.11	99.68	0.00
		8	100.8	0.00	0.12	99.88	0.00
	TOTAL :		815.6	6.04	5.74	88.22	0.00
92	NAGARJUN SGR LBC HPS	1	30	0.00	1.91	98.09	0.00
		2	30	0.00	0.57	99.43	0.00
	TOTAL :		60	0.00	1.24	98.76	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
93	NAGARJUN SGR RBC HPS	1	30	0.00	0.03	99.97	0.00
		2	30	0.00	0.06	99.94	0.00
		3	30	0.03	0.12	99.85	0.03
	TOTAL :		90	0.01	0.07	99.92	0.01
94	POCHAMPAD HPS	1	9	0.00	0.06	99.94	0.02
		2	9	0.00	0.00	100.00	0.07
		3	9	0.00	0.06	99.94	0.01
	TOTAL :		27	0.00	0.04	99.96	0.03
95	PRIYADARSHNI JURALA HPS	1	39	0.00	99.73	0.27	0.00
		2	39	0.00	62.68	37.32	37.03
		3	39	0.07	0.02	99.91	53.90
		4	39	0.12	0.28	99.60	51.64
		5	39	0.06	0.03	99.91	51.94
		6	39	0.07	0.50	99.43	45.77
	TOTAL :		234	0.05	27.21	72.74	40.05
96	SRISAILAM HPS	1	110	9.11	0.01	90.88	0.00
		2	110	8.88	0.00	91.12	0.00
		3	110	0.11	30.47	69.42	0.00
		4	110	0.13	22.53	77.34	0.00
		5	110	8.86	0.09	91.05	0.00
		6	110	1.46	29.98	68.56	0.00
		7	110	0.09	16.02	83.89	0.00
	TOTAL :		770	4.09	14.16	81.75	0.00
97	SRISAILAM LB HPS	1	150	8.25	0.00	91.75	0.00
		2	150	9.68	0.30	90.02	0.00
		3	150	8.25	0.20	91.55	0.00
		4	150	9.25	0.00	90.75	0.00
		5	150	8.37	0.91	90.72	0.00
		6	150	8.23	0.09	91.68	0.00
	TOTAL :		900	8.67	0.25	91.08	0.00
98	T B DAM HPS	1	9	0.87	2.06	97.07	0.00
		2	9	9.07	0.43	90.50	0.00
		3	9	0.83	20.80	78.37	0.00
		4	9	0.13	7.96	91.91	0.00
	TOTAL :		36	2.73	7.81	89.46	0.00
99	UPPER SILERU HPS-I	1	60	0.00	0.00	100.00	0.00
		2	60	0.00	2.28	97.72	0.00
	TOTAL :		120	0.00	1.14	98.86	0.00
100	UPPER SILERU HPS-II	1	60	0.00	0.00	100.00	0.00
		2	60	0.00	0.00	100.00	0.00
	TOTAL :		120	0.00	0.00	100.00	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
<u>KPCL</u>							
101	ALMATTIDPH HPS	1	15	6.77	0.23	93.00	0.00
		2	55	13.44	0.02	86.54	0.00
		3	55	14.85	0.15	85.00	0.00
		4	55	13.28	0.04	86.68	0.00
		5	55	10.47	0.04	89.49	0.00
		6	55	16.83	0.14	83.03	0.00
	TOTAL :		290	13.41	0.09	86.50	0.00
102	BHADRA HPS	1	2	0.44	1.65	97.91	0.08
		2	12	0.51	1.26	98.23	0.17
		3	12	99.73	0.00	0.27	0.00
		4	7.2	99.73	0.00	0.27	0.00
		5	6	6.66	1.51	91.83	0.10
	TOTAL :		39.2	50.04	0.70	49.26	0.07
103	GERUSUPPA HPS	1	60	0.14	0.35	99.51	0.00
		2	60	1.88	0.04	98.08	0.00
		3	60	0.27	0.68	99.05	0.01
		4	60	0.09	2.74	97.17	0.00
	TOTAL :		240	0.59	0.95	98.46	0.00
104	GHAT PRABHA HPS	1	16	17.99	0.56	81.45	30.32
		2	16	17.97	0.62	81.41	31.45
	TOTAL :		32	17.98	0.59	81.43	30.88
105	JOG HPS	1	13.2	2.73	78.49	18.78	0.01
		2	13.2	1.31	71.21	27.48	3.12
		3	13.2	2.46	21.44	76.10	0.15
		4	13.2	2.60	21.44	75.96	0.10
		5	21.6	3.93	21.20	74.87	0.17
		6	21.6	1.67	21.74	76.59	0.31
		7	21.6	5.13	45.89	48.98	0.09
		8	21.6	0.35	70.40	29.25	0.07
	TOTAL :		139.2	2.58	42.97	54.45	0.42
106	KADRA HPS	1	50	8.11	0.08	91.81	68.17
		2	50	0.48	0.45	99.07	70.61
		3	50	0.56	0.10	99.34	65.16
	TOTAL :		150	3.06	0.21	96.73	67.98
107	KALINADI HPS	1	135	1.84	0.46	97.70	0.08
		2	135	2.01	0.39	97.60	0.00
		3	135	2.02	0.66	97.32	0.08
		4	150	0.35	0.62	99.03	0.00
		5	150	42.30	9.06	48.64	0.00
		6	150	6.05	1.19	92.76	0.00
	TOTAL :		855	9.47	2.14	88.39	0.03

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
108	KALINADI SUPA HPS	1	50	0.15	1.06	98.79	23.71
		2	50	0.00	1.42	98.58	28.67
		TOTAL :	100	0.08	1.24	98.68	26.19
109	KODASALI HPS	1	40	0.90	0.06	99.04	53.50
		2	40	4.76	0.07	95.17	68.33
		3	40	13.65	0.10	86.25	59.48
		TOTAL :	120	6.44	0.08	93.48	60.44
110	LIGANAMAKKI HPS	1	27.5	0.62	0.02	99.36	0.07
		2	27.5	0.43	0.66	98.91	0.09
		TOTAL :	55	0.52	0.34	99.14	0.08
111	MUNIRABAD HPS	1	9	3.96	0.08	95.96	9.17
		2	9	3.84	0.04	96.12	0.09
		3	10	9.85	0.30	89.85	0.15
		TOTAL :	28	6.02	0.15	93.83	3.03
112	SHARAVATHI HPS	1	103.5	3.03	0.59	96.38	0.01
		2	103.5	5.38	0.13	94.49	0.00
		3	103.5	3.30	0.10	96.60	0.00
		4	103.5	5.16	0.38	94.46	0.01
		5	103.5	7.33	0.99	91.68	0.01
		6	103.5	18.85	0.50	80.65	0.01
		7	103.5	2.41	0.73	96.86	0.01
		8	103.5	2.86	0.97	96.17	0.24
		9	103.5	6.83	2.58	90.59	0.08
		10	103.5	1.70	1.18	97.12	0.02
		TOTAL :	1035	5.68	0.81	93.51	0.04
113	SIVASAMUNDRUM HPS	1	3	0.00	2.90	97.10	9.17
		2	3	0.03	3.31	96.66	3.55
		3	3	0.01	2.18	97.81	0.78
		4	3	0.02	0.32	99.66	0.36
		5	3	0.02	0.34	99.64	0.69
		6	3	0.04	1.19	98.77	0.47
		7	6	0.02	2.14	97.84	0.39
		8	6	0.02	1.05	98.93	0.32
		9	6	0.06	0.59	99.35	0.63
		10	6	0.01	0.41	99.58	1.31
		TOTAL :	42	0.02	1.33	98.65	1.45
114	VARAHI HPS	1	115	27.11	2.13	70.76	0.11
		2	115	46.74	7.20	46.06	0.07
		3	115	0.68	7.54	91.78	2.27
		4	115	7.64	3.17	89.19	2.08
		TOTAL :	460	20.54	5.01	74.45	1.13

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
<u>KSEB</u>							
115	IDAMALAYAR HPS.	1	37.5	64.88	0.79	34.33	0.37
		2	37.5	0.68	5.03	94.29	0.89
	TOTAL :		75	32.78	2.91	64.31	0.63
116	IDUKKI HPS.	1	130	14.18	0.76	85.06	0.06
		2	130	7.76	0.29	91.95	0.05
		3	130	17.18	0.24	82.58	0.00
		4	130	9.52	13.20	77.28	0.00
		5	130	0.56	34.29	65.15	0.04
		6	130	6.11	0.55	93.34	0.08
	TOTAL :		780	9.22	8.22	82.56	0.04
117	KAKKAD HPS.	1	25	8.51	1.62	89.87	7.12
		2	25	8.60	2.32	89.08	8.83
	TOTAL :		50	8.55	1.97	89.48	7.98
118	KUTTIYADI HPS.	1	25	7.56	1.15	91.29	0.94
		2	25	7.50	10.76	81.74	0.82
		3	25	0.69	0.53	98.78	0.37
		4	50	6.99	1.35	91.66	0.42
	TOTAL :		125	5.94	3.03	91.03	0.60
119	KUTTIYADI ADDL. EXTN.	5	50	29.60	1.85	68.55	0.00
		6	50	3.03	0.23	96.74	0.00
	TOTAL :		100	16.32	1.04	82.64	0.00
120	LOWER PERIYAR HPS.	1	60	7.72	0.11	92.17	2.06
		2	60	6.13	0.48	93.39	1.16
		3	60	6.76	0.01	93.23	1.12
	TOTAL :		180	6.87	0.20	92.93	1.45
121	NARIAMANGLAM HPS	1	15	8.45	2.63	88.92	0.01
		2	15	16.88	0.28	82.84	0.01
		3	15	6.46	0.93	92.61	0.00
		4	25	0.28	49.19	50.53	0.25
	TOTAL :		70	6.91	18.39	74.70	0.09
122	PALLIVASAL HPS.	1	5	6.50	0.34	93.16	0.02
		2	5	12.82	1.41	85.77	0.01
		3	5	9.28	0.91	89.81	0.00
		4	7.5	9.26	0.31	90.43	0.01
		5	7.5	1.10	1.58	97.32	0.02
		6	7.5	7.92	0.33	91.75	0.01
	TOTAL :		37.5	7.47	0.80	91.73	0.01
123	PANNIAR HPS.	1	15	18.44	0.97	80.59	16.69
		2	15	3.56	2.65	93.79	16.68
	TOTAL :		30	11.00	1.81	87.19	16.69

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
124	PORINGALKUTTU HPS.	1	8	9.65	3.81	86.54	0.22
		2	8	21.44	0.63	77.93	0.25
		3	8	4.41	0.65	94.94	0.05
		4	8	0.85	2.68	96.47	0.12
	TOTAL :		32	9.09	1.94	88.97	0.16
125	SABARIGIRI HPS.	1	50	11.70	0.97	87.33	13.97
		2	50	16.01	0.32	83.67	49.59
		3	50	9.15	0.11	90.74	3.56
		4	50	0.00	99.73	0.27	0.00
		5	50	2.02	0.40	97.58	6.51
		6	50	8.47	0.36	91.17	2.99
	TOTAL :		300	7.89	16.98	75.13	12.77
126	SENGULAM HPS.	1	12	0.67	0.01	99.32	12.81
		2	12	12.16	0.00	87.84	22.43
		3	12	10.62	0.00	89.38	18.70
		4	12	17.80	0.00	82.20	13.62
	TOTAL :		48	10.31	0.00	89.69	16.89
127	SHOLAYAR HPS.	1	18	0.07	0.65	99.28	38.75
		2	18	0.15	0.24	99.61	39.17
		3	18	19.37	14.98	65.65	42.13
	TOTAL :		54	6.53	5.29	88.18	40.02
	<u>TNGDCL</u>						
128	ALIYAR HPS.	1	60	6.18	0.10	93.72	0.00
	TOTAL :		60	6.18	0.10	93.72	0.00
129	BHAWANI KATTAL	1	15	19.17	18.37	62.46	0.00
		2	15	16.31	15.00	68.69	0.01
	TOTAL :		30	17.74	16.69	65.57	0.00
130	KADAMPARI HPS.	1	100	0.61	36.25	63.14	0.00
		2	100	2.41	0.26	97.33	0.00
		3	100	1.53	0.00	98.47	0.00
		4	100	0.00	0.05	99.95	0.00
	TOTAL :		400	1.14	9.14	89.72	0.00
131	KODAYAR HPS-I	1	60	6.73	0.07	93.20	1.61
	TOTAL :		60	6.73	0.07	93.20	1.61
132	KODAYAR HPS-II	1	40	4.74	0.32	94.94	0.00
	TOTAL :		40	4.74	0.32	94.94	0.00
133	KUNDAH HPS-I	1	20	3.67	0.19	96.14	0.00
		2	20	0.67	0.08	99.25	0.00
		3	20	2.98	0.00	97.02	0.00
	TOTAL :		60	2.44	0.09	97.47	0.00
134	KUNDAH HPS-II	1	35	2.98	1.88	95.14	0.00
		2	35	0.13	0.34	99.53	0.00
		3	35	0.16	0.24	99.60	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
		4	35	3.57	0.02	96.41	0.37
		5	35	2.45	0.03	97.52	0.00
	TOTAL :		175	1.86	0.50	97.64	0.07
135	KUNDAH HPS-III	1	60	4.97	0.17	94.86	0.00
		2	60	4.49	0.14	95.37	0.00
		3	60	4.23	3.50	92.27	0.01
	TOTAL :		180	4.56	1.27	94.17	0.00
136	KUNDAH HPS-IV	1	50	3.01	0.33	96.66	0.00
		2	50	4.24	0.13	95.63	0.00
	TOTAL :		100	3.63	0.23	96.14	0.00
137	KUNDAH HPS-V	1	20	6.93	0.97	92.10	0.00
		2	20	1.65	0.66	97.69	0.00
	TOTAL :		40	4.29	0.82	94.89	0.00
138	LOWER METTUR HPS-I	1	15	10.38	0.00	89.62	0.00
		2	15	0.02	2.99	96.99	0.00
	TOTAL :		30	5.20	1.49	93.31	0.00
139	LOWER METTUR HPS-II	1	15	22.18	0.02	77.80	0.00
		2	15	0.01	4.78	95.21	0.00
	TOTAL :		30	11.09	2.40	86.51	0.00
140	LOWER METTUR HPS-III	1	15	14.08	0.00	85.92	0.00
		2	15	2.61	0.00	97.39	0.00
	TOTAL :		30	8.35	0.00	91.65	0.00
141	LOWER METTUR HPS-IV	1	15	7.83	0.09	92.08	0.00
		2	15	5.25	0.00	94.75	0.00
	TOTAL :		30	6.54	0.04	93.42	0.00
142	METTUR DAM HPS.	1	12.5	7.48	0.00	92.52	0.00
		2	12.5	0.00	0.00	100.00	0.00
		3	12.5	7.55	0.00	92.45	0.00
		4	12.5	0.06	0.00	99.94	0.00
	TOTAL :		50	3.77	0.00	96.23	0.00
143	METTUR TUNNEL HPS.	1	50	5.29	0.00	94.71	0.00
		2	50	10.55	0.00	89.45	0.00
		3	50	5.09	0.00	94.91	0.00
		4	50	0.00	0.00	100.00	0.00
	TOTAL :		200	5.23	0.00	94.77	0.00
144	MOYAR HPS	1	12	0.28	4.81	94.91	0.17
		2	12	6.74	3.26	90.00	0.28
		3	12	8.34	1.00	90.66	0.17
	TOTAL :		36	5.12	3.03	91.85	0.21
145	PAPANASAM HPS.	1	8	6.31	0.18	93.51	0.02
		2	8	2.65	0.14	97.21	0.02
		3	8	5.47	0.19	94.34	0.02
		4	8	5.33	0.09	94.58	0.02
	TOTAL :		32	4.94	0.15	94.91	0.02

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
146	PARSON'S VALLEY HPS.	1	30	20.50	1.75	77.75	0.00
	TOTAL :		30	20.50	1.75	77.75	0.00
147	PERIYAR HPS.	1	35	22.54	5.35	72.11	0.00
		2	35	25.67	0.00	74.33	0.00
		3	35	13.04	0.42	86.54	0.00
		4	35	14.28	0.00	85.72	0.00
	TOTAL :		140	18.88	1.44	79.68	0.00
148	PYKARA HPS.	1	7	7.98	1.14	90.88	0.00
		2	7	2.26	0.68	97.06	0.00
		3	7	0.45	2.65	96.90	0.07
		4	13.6	0.00	0.00	100.00	0.00
		5	13.6	0.28	2.52	97.20	0.00
		6	11	6.19	1.07	92.74	0.00
	TOTAL :		59.2	2.09	1.10	96.81	0.01
149	PYKARA ULTMATE HPS.	1	50	5.70	1.12	93.18	0.00
		2	50	2.84	1.98	95.18	0.00
		3	50	4.28	0.08	95.64	0.00
	TOTAL :		150	4.27	1.06	94.67	0.00
150	SARKARPATHY HPS.	1	30	12.61	0.01	87.38	0.07
	TOTAL :		30	12.61	0.01	87.38	0.07
	SHOLAYAR HPS.	1	35	15.88	14.15	69.97	0.00
		2	35	16.09	64.51	19.40	0.00
		3	25	13.38	0.73	85.89	0.00
	TOTAL :		95	15.30	29.17	55.53	0.00
151	SURULIYAR HPS.	1	35	8.42	0.64	90.94	0.00
	TOTAL :		35	8.42	0.64	90.94	0.00
	<u>EASTERN REGION</u>						
	<u>DVC</u>						
152	MAITHON HPS.	1	23.2	6.05	2.32	91.63	0.01
		2	20	0.00	16.31	83.69	0.00
		3	20	15.16	4.64	80.20	0.34
	TOTAL :		63.2	7.02	7.48	85.50	0.11
153	PANCHET HPS.	1	40	0.00	2.44	97.56	0.00
		2	40	3.83	0.72	95.45	0.00
	TOTAL :		80	1.91	1.58	96.51	0.00
	<u>JSEB</u>						
154	SUBERNREKHA HPS-I	1	65	5.94	2.39	91.67	22.23
	TOTAL :		65	5.94	2.39	91.67	22.23
155	SUBERNREKHA HPS-II	1	65	6.20	5.36	88.44	19.18
	TOTAL :		65	6.20	5.36	88.44	19.18
	<u>NHPC</u>						
156	RANGIT HPS	1	20	7.40	0.50	92.10	0.00
		2	20	8.40	0.71	90.89	0.00
		3	20	6.29	0.63	93.08	0.01
	TOTAL :		60	7.36	0.61	92.03	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
157	TEESTA V HPS	1	170	0.27	6.96	92.77	18.52
		2	170	0.08	7.41	92.51	23.18
		3	170	5.75	12.91	81.34	25.68
	TOTAL :		510	2.04	9.09	88.87	22.46
	<u>OHPC</u>						
158	BALIMELA HPS-I	1	60	0.33	57.92	41.75	0.00
		2	60	0.83	0.00	99.17	0.00
		3	60	0.40	49.73	49.87	0.00
		4	60	10.57	49.73	39.70	0.00
		5	60	0.91	49.73	49.36	0.00
		6	60	0.97	0.00	99.03	0.00
	TOTAL :		360	2.34	34.52	63.14	0.00
159	BALIMELA HPS-II	1	75	1.64	0.00	98.36	0.00
		2	75	16.86	0.36	82.78	0.00
	TOTAL :		150	9.25	0.18	90.57	0.00
160	HIRAKUD HPS (BURLA)	1	49.5	0.96	49.06	49.98	0.00
		2	49.5	41.17	0.00	58.83	33.06
		3	32	46.03	0.00	53.97	0.00
		4	32	1.23	2.41	96.36	0.00
		5	37.5	0.00	77.68	22.32	0.00
		6	37.5	10.80	0.60	88.60	0.00
		7	37.5	0.21	50.06	49.73	0.00
	TOTAL :		275.5	14.56	26.56	58.88	5.94
161	HIRAKUD HPS (CHILIMA)	1	24	0.62	0.00	99.38	0.00
		2	24	0.98	0.00	99.02	0.00
		3	24	5.64	24.61	69.75	0.00
	TOTAL :		72	2.41	8.20	89.39	0.00
162	RENGALI HPS.	1	50	99.73	0.00	0.27	0.00
		2	50	10.99	0.05	88.96	0.00
		3	50	1.38	0.09	98.53	0.00
		4	50	6.11	0.19	93.70	0.00
		5	50	0.49	0.03	99.48	0.00
	TOTAL :		250	23.74	0.07	76.19	0.00
163	UPPER INDRAVATI HPS.	1	150	6.63	0.83	92.54	0.00
		2	150	1.64	0.00	98.36	0.00
		3	150	1.01	0.00	98.99	0.00
		4	150	0.92	0.00	99.08	0.00
	TOTAL :		600	2.55	0.21	97.24	0.00
164	UPPER KOLAB HPS.	1	80	1.01	0.08	98.91	0.00
		2	80	5.65	0.00	94.35	0.00
		3	80	5.67	0.09	94.24	0.00
		4	80	8.49	0.00	91.51	0.00
	TOTAL :		320	5.20	0.04	94.76	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M.) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
<u>WBSEDCL</u>							
165	JALDHAKA HPS ST-I	1	9	99.73	0.00	0.27	0.00
		2	9	0.21	5.04	94.75	15.10
		3	9	52.62	0.53	46.85	10.53
	TOTAL :		27	50.85	1.86	47.29	8.54
166	PURULIA PSS HPS.	1	225	0.13	4.88	94.99	0.00
		2	225	5.30	1.65	93.05	0.00
		3	225	3.60	7.36	89.04	0.00
		4	225	0.00	8.07	91.93	0.00
	TOTAL :		900	2.26	5.49	92.25	0.00
167	RAMMAM HPS.	1	12.5	8.26	0.35	91.39	10.47
		2	12.5	8.77	0.33	90.90	20.20
		3	12.5	1.76	2.91	95.33	2.38
		4	12.5	8.89	7.32	83.79	46.74
	TOTAL :		50	6.92	2.73	90.35	19.95
<u>NORTH EASTERN REGION</u>							
<u>APGPCL</u>							
168	KARBILANGPI HPS.	1	50	0.05	0.97	98.98	33.35
		2	50	0.00	13.98	86.02	26.71
	TOTAL :		100	0.03	7.47	92.50	30.03
<u>MeECL</u>							
169	KYRDEM KULAI HPS.	1	30	0.97	4.76	94.27	0.00
		2	30	8.97	1.61	89.42	0.00
	TOTAL :		60	4.97	3.19	91.84	0.00
170	MYNTDU(LESHKA) St-1 HPS	1	42	0.00	0.00	100.00	0.00
		2	42	0.00	0.00	100.00	0.00
	TOTAL :		84	0.00	0.00	100.00	0.00
171	UMIAM HPS ST-I	1	9	33.54	0.99	65.47	0.00
		2	9	96.61	0.00	3.39	0.00
		3	9	0.00	99.73	0.27	0.00
		4	9	7.75	0.04	92.21	0.00
	TOTAL :		36	34.48	25.19	40.33	0.00
172	UMIAM HPS ST-IV	7	30	4.63	0.08	95.29	0.00
		8	30	9.39	0.59	90.02	0.00
	TOTAL :		60	7.01	0.33	92.66	0.00
<u>NEEPCO</u>							
173	DOYANG HPS.	1	25	5.10	6.04	88.86	0.00
		2	25	4.37	0.25	95.38	0.00
		3	25	4.88	0.26	94.86	0.00
	TOTAL :		75	4.78	2.19	93.03	0.00
174	KHONDONG HPS.	1	25	21.86	0.35	77.79	0.00
		2	25	4.49	0.81	94.70	0.00
	TOTAL :		50	13.18	0.58	86.24	0.00

S. NO.	STATION/ CORPORATION	UNIT NO.	CAPACITY (MW)	PLANNED MAINTENANCE (P.M) (%)	FORCED OUTAGE (F.O.) (%)	OPERATING AVAILABILITY (100-FO-PM) (%)	MISC. NON AVAILABILITY (%)
175	KOPILI HPS.	1	50	0.00	16.11	83.89	0.00
		2	50	4.64	12.95	82.41	1.09
		3	50	38.05	1.63	60.32	0.00
		4	50	0.58	10.18	89.24	0.00
		5	25	10.83	3.01	86.16	0.00
	TOTAL :		225	10.82	9.42	79.76	0.24
176	RANGANADI HPS.	1	135	5.77	0.00	94.23	0.00
		2	135	2.41	0.00	97.59	0.00
		3	135	3.53	0.00	96.47	0.00
	TOTAL :		405	3.90	0.00	96.10	0.00
	<u>NHPC</u>						
177	LOKTAK HPS.	1	35	5.48	0.59	93.93	0.00
		2	35	0.01	3.39	96.60	0.01
		3	35	1.12	1.60	97.28	0.01
	TOTAL :		105	2.20	1.86	95.94	0.00

CHAPTER 7

GENERATION PROGRAMME FOR THE YEAR 2012-13

CHAPTER 7

GENERATION PROGRAMME FOR THE YEAR 2012-13

7.1 As on 31.3.2012, 177 HE Stations (of more than 25 MW capacity) having total installed capacity of 38990.40 MW are being monitored in the country. With the addition of new hydro units during 2012-13, the anticipated installed capacity of HE Stations in the country would be 41583.40 MW (HE station capacity above 25 MW) by 31st March, 2013. Generation Programme for HE stations in the country for the year 2012-13 has been fixed at 127525 MU (including 5480 MU import from Bhutan) which was 8269.03 MU less than actual generation of 135794.03 MU (including 5284.51 MU import from Bhutan during 2011-12).

7.2 Region wise details of likely installed capacity on 31.03.2013, Generation Programme for 2012-13 and actual generation during 2011-12 are given in Table 7.1 below:

TABLE 7.1

REGIONWISE LIKELY INSTALLED CAPACITY OF HE STATIONS AND GENERATION PROGRAMME DURING 2012-13

Sl. No.	Region	Likely Installed Capacity on 31.03.2013 (MW)	Generation Programme for 2012-13 (MU)	Generation during 2011-12 (MU)	
				Programme	Actual
1.	Northern	16528.25	60243	53474	64293.77
2.	Western	7392.00	15159	14645	19247.59
3.	Southern	11662.45	32362	30493	33637.93
4.	Eastern	4758.70	10081	9306	9551.99
5.	N-Eastern	1242.00	4200	4132	3778.24
Sub total		41583.40	122045	112050	130509.52
6.	Import - from Bhutan	-	5480	5586	5284.51
Total		41583.40	127525	117636	135794.03

7.3 While finalizing the Generation Programme for 2012-13, it was anticipated that 48 H.E. units having installed capacity of 2593 MW will be added during the year. Unit wise details of these units are given in Annex-7.1.

7.4 Actual generation during the year 2011-12 from HE Stations was 135794.03 MU against the Generation Programme of 117636 MU including import from Bhutan. Sector wise, Utility wise details of likely installed Capacity as on 31.03.2013, targets and actual generation during 2011-12, generation target for 2012-13 are given in Annex-7.2.

HYDRO ELECTRIC GENERATING UNITS LIKELY TO BE ADDED DURING 2012-13

Sl. No	Name of the Project	State/ Organization	Unit No.	Capacity (MW)	Programmed date of Commissioning
	Central Sector				
1	Chamera-III 3x77= 77 MW	Himachal Pradesh / NHPC	U-1 U-2 U-3	77 77 77	2012-13 2012-13 2012-13
2	Parbati-III 4x130=520 MW	Himachal Pradesh / NHPC	U-1 U-2 U-3 U-4	130 130 130 130	2012-13 2012-13 2012-13 2012-13
3	Uri-II 4x60= 240 MW	Jammu & Kashmir / NHPC	U-1 U-2 U-3 U-4	60 60 60 60	2012-13 2012-13 2012-13 2012-13
4	Chutak 4x11=44 MW	Jammu & Kashmir / NHPC	U-1 U-2 U-3 U-4	11 11 11 11	2012-13 2012-13 2012-13 2012-13
5	Nimmo Bazgo 3x15=45 MW	Jammu & Kashmir / NHPC	U-1 U-2 U-3	15 15 15	2012-13 2012-13 2012-13
6	Teesta Low Dam-III 4x33=132 MW	Best Bengal/NHPC	U-1 U-2 U-3 U-4	33 33 33 33	2012-13 2012-13 2012-13 2012-13
7	Teesta Low Dam-IV 4x40=160 M	Best Bengal/NHPC	U-1 U-2	40 40	2012-13 2012-13
	State Sector				
8	UHL-III 3x33.33=100 MW	Himachal Pradesh / HPSEBL	U-1 U-2 U-3	33.33 33.33 33.33	2012-13 2012-13 2012-13
9	Bhawani Kattalai Barrage-II 2x15=30 MW	Tamilnadu / TANGEDCO	U-1 U-2	15 15	2012-13 2012-13
10	Bhawani Kattalai Barrage-III 2x15=30 MW	Tamilnadu / TANGEDCO	U-1 U-2	15 15	2012-13 2012-13
11	N J Sagar TDP 2x25=50 MW	AP/APGENCO	U-1 U-2	25 25	2012-13 2012-13

Sl. No	Name of the Project	State/ Organization	Unit No.	Capacity (MW)	Programmed date of Commissioning
12	Lower Jurala 6x40=240 MW	AP/APGENCO	U-1 U-2 U-3	40 40 40	2012-13 2012-13 2012-13
13	Pulichintala 4x30=120 MW	AP/APGENCO	U-1 U-2	30 30	2012-13 2012-13
14	Myntdu 3x42=126 MW	Meghalaya / MeECL	U-3	42	2012-13
	Private Sector				
15	Budhil 2x35= 70 MW	Himachal Pradesh / LANCO	U-1 U-2	35 35	2012-13 2012-13
16	Sorang 2x50=100 MW	Himachal Pradesh / HSPL	U-1 U-2	50 50	2012-13 2012-13
17	Teesta-III 6x200=1200 MW	SIKKIM/SIKKIM URJA LTD.	U-1 U-2 U-3	200 200 200	2012-13 2012-13 2012-13
18	Chuzachen 2x49.5=99 MW	SIKKIM/GIL	U-1 U-2	49.50 49.50	2012-13 2012-13
		Total:2012-13	48	2593 MW	

**SECTORWISE PERFORMANCE OF HYDRO ELECTRIC STATIONS
DURING 2011-12 & TARGETS FOR 2012-13**

SECTOR/STATE	Installed Capacity on 31.03.2013	Generation during 2011-12(MU)		Generation Programmed for 2012-13 (MU)
		Targets	Actual	
A.CENTRAL SECTOR				
BBMB	2866.30	10023	12459.46	10023
NHPC	5059.20	17104	18684.10	19117
SJVNL	1500.00	6500	7610.32	6500
THDC	1400.00	3235	4591.30	3942
NHDC	1520.00	3165	4662.37	3384
DVC	143.20	125	296.12	256
NEEPCO	755.00	2627	2378.09	2698
Sub Total	13243.70	42779	50681.76	45920
B.STATE ELECTRICITY BOARDS/CORPORATIONS				
J&KPDC	660.00	3292	3595.07	3423.00
HPSEBL	466.00	1555	1657.30	1708.00
RRVUNL	411.00	307	821.57	545.00
PSPCL	1051.00	3745	4626.85	3852.00
UPJVNL	501.60	885	1403.67	885.00
UJVNL	1252.15	4621	5129.97	4604.00
SSNNL	1450.00	3028	4229.33	3141.00
GSECL	540.00	616	729.62	616.00
MAHAGENCO	2406.00	3830	4590.68	3874.00
MPPGCL	875.00	2033	3073.72	2389.00
CSPGC	120.00	175	314.11	250.00
APGENCO	4013.35	7983	6371.05	8187.00
KPCL	3585.40	11222	14257.68	12205.00
KSEB	1881.50	6593	7807.98	6909.00
TANGENCO	2182.20	4695	5201.22	5061.00
JSEB	130.00	100	270.05	160.00
OHPC	2027.50	5183	4987.33	5497.00
WBSDECL	977.00	1022	1077.89	1069.00
APGCL	100.00	415	460.94	425.00
MeECL	282.00	642	415.71	629.00
Sub Total	24911.70	61942	71021.74	65429.00

C.PRIVATE SECTOR				
MPCL (HP)	86.00	350	376.06	350.00
JPHL (HP)	300.00	1213	1401.58	1213.00
ADHL (HP)	192.00	678	616.01	750.00
LGPL (HP)	70.00	57	-	277.00
EPPL (HP)	100.00	208	73.38	400.00
JKHCL (HP)	1000.00	1237	2514.36	4426.00
JPVL (UTTARAKHAND)	400.00	1775	2176.87	1775.00
HSPL (HP)	100.00	-	-	0.00
SMHPCL (MP)	400.00*	290	-	-
TATA HYDRO	447.00	1450	1531.07	1450.00
DLHP (MAH.)	34.00	58	116.69	55.00
GI Ltd. (SIKKIM)	99.00	13	-	0.00
SIKKIM URJA LTD	600	-	-	0.00
Sub Total	3428.00	7329	8806.02	10696.00
Total All India	41583.40	112050	130509.52	122045.00
Import from Bhutan		5586	5284.51	5480.00
Total Hydro generation including import from Bhutan		117636	135794.03	127525.00

Note:- Hydro schemes above 25 MW has been considered.

* The capacity of 400 MW in respect of Maheshwar HPS of SMHPCL is not included in the total Installed Capacity as on 31.03.2012 as no target was fixed for 2012-13.

CHAPTER 8

RENOVATION & MODERNISATION OF HYDRO-ELECTRIC POWER STATIONS

CHAPTER – 8

RENOVATION & MODERNISATION OF HYDRO ELECTRIC POWER PROJECTS

8.0 Introduction

Renovation & Modernisation (R&M) and uprating wherever feasible of old hydro power plants in the present scenario of resource constraint is considered to be the best option for bridging the gap between the demand and supply of power as R&M schemes are cost effective and quicker than the setting up of green field power plants.

8.1 R&M Phase-I Programme:

Recognizing 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 was estimated as Rs.1493 Crores with expected benefit of 2531 MW.

8.2 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.

8.3 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.

8.4 VIII, IX, X and XI Plan Achievements:

Under the hydro R&M programme, 83 (19 in Central Sector and 64 in State Sector) hydro electric schemes (13 upto the VIII Plan, 20 in the IX Plan, 32 in the X Plan and 18 in the XI Plan) with an installed capacity of 15332 MW at a cost of Rs.2,021 Crores have been completed by the end of the XI Plan (i.e. by 31.03.2012) & have accrued a benefit of 3086 MW through Life Extension, Uprating and Restoration. The state-wise list of

hydro R&M schemes completed during the VIII, IX, X Plan & XI Plan is given at **Annex. 8.1, 8.2, 8.3 & 8.4** respectively.

8.5 XII Plan Programme:

During XII Plan a total of 43 hydro R&M schemes (5 in Central Sector and 38 in State Sector) having an installed capacity of about 6668 MW at an estimated cost of about Rs.4433 Crores which will accrue benefit of about 3773 MW through uprating, life extension and restoration are planned for implementation. One scheme of MeECL namely Umium St.III (Kyrdekulai) is programmed to be taken up in XII plan and will accrue benefit of 66 MW (6 MW uprating & 60 MW-LE) during XIII plan. The state-wise list of these 43 hydro R&M schemes is given at **Annex-8.5**

8.6 Summary of R&M of Hydro Projects (As on 30.03.2012)

I Hydro R&M schemes completed up to XI Plan

Sl. No	Plan Period	No. of Projects			Installed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total				
1.	VIIIth Plan Schemes completed	2	11	13	1282.00	125.57	127.37	429.00 [39.00(U) + 336.00(Res.) + 54.00(LE)]
2.	IX Plan Schemes completed	8	12	20	4892.10	597.84	570.16	1093.03 [339.00(U) + 331.03(Res.) + 423.00(LE)]
3.	X Plan Schemes completed	5	27	32	4336.60	1016.31	1028.97	829.08 [123.40(U) + 701.25 (LE) + 4.43(Res.)]
4.	XI Plan Schemes completed	4	14	18	4821.20	412.83	294.84	735 [12 (U) + 15 (LE) + 708 (Res.)]

II Candidate Hydro R&M schemes for XII Plan

Sl. No	Plan Period	No. of Projects			Installed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total				
a)	Programmed	5	38	43	6667.75	4433.67	994.72	3773.25 [266.05(U) + 3492.20(LE) + 15.00(Res.)]
a)	Ongoing	4	16	20	4683	1932	966	1977.00 [208.00(U) + 1754.00(LE) + 15.0(Res.)]
b)	Under Tendering	1	14	15	1340.75	2189.41	28.73	1377.55 [42.80(U) + 1334.75(LE)]
c)	Under DPR Finalisation	-	5	5	304	252	0.04	319.00 [15.25(U) + 303.75(LE)]
d)	Under RLA Studies	-	3	3	340.00	59.94	-	100.00 [100.00(LE)]

Note: Installed capacity, Benefit & cost figures are rounded to nearest zero.

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

8.7 Programme for the year 2011-12

For the year 2011-12, it is programmed to complete following 5 schemes having an installed capacity of 1425 MW. On completion of these schemes, there will be a benefit of 126 MW through Life Extension, Uprating and Restoration at an estimated cost of about Rs.226 Crores.

S.No. Name of Scheme (I.C. in MW), Agency

1. Bassi (4x15), HPSEB
2. Nagarjuna Sagar (1x110+7x100.8), APGENCO
3. Lower Sileru (4x115), APGENCO
4. Nagjhari U 4 to 6 (3x135), KPCL
5. Loktak (3x30), NHPC

8.8 Achievement during the year 2011-12

Loktak Hydro R&M scheme of NHPC, Koyna St.III of MSPGCL and Umium St.II of MeECL having an aggregate installed capacity of about 428 MW have been completed during the year 2011-12 at an actual cost of Rs.79.34 Crores and accrued benefit of 355 MW through Life Extension, Uprating and Restoration. Koyna St.III and Umium St.II were earlier planned for completion in XII plan but got completed in 2011-12. Remaining 4 schemes namely Bassi, Nagarjuna Sagar, Lower Sileru, Nagjhari have been shifted to XII plan.

8.9 Other Misc. works undertaken/completed in 2012-13.

Renovation and Modernisation of Varzob HE project in Tajakistan-Vetting of Bills by CEA in respect of E&M equipments supplied by BHEL : Bills Var/001 to Var/013 totalling about Rs 30 Crs have been verified and comments/observations sent to MEA.

8.10 Programme for the year 2012-13

For the year 2012-13, it is programmed to complete following 10 schemes having an installed capacity of 2731.20 MW. On completion of these schemes, there will be a benefit of 163 MW through Life Extension, Uprating and Restoration at an estimated cost of about Rs.554 Crores.

S.No. Name of Scheme (I.C. in MW), Agency

1. Bassi (4x16.5), HPSEB
2. Sumbal Sindh (2x11.3), J&KPDC
3. Lower Jhelum (3x35), J&KPDC
4. Srisaillam RB (7x110), APGENCO
5. Lower Sileru (4x115), APGENCO
6. Nagarjuna Sagar (1x110+7x100.8), APGENCO
7. Sabirigiri(4x55+2x60), KSEB
8. Idamalayar (2x37.5), KSEB

9. Jaldhaka St.I (3x9), WBSEB
10. Rengali (1x50), OHPC

8.11 Performance of Generating Units after R&M:

The performance of generating units of various hydro power stations after completion of their R&M works is being monitored. The unit-wise performance details of such projects obtained from various power utilities regarding output (MW), forced outage and availability of the machine indicates that the generating units have been able to generate the rated outputs satisfactorily after R&M.

State wise List of Hydro RM&U 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	18.00 (U)	RM&U	1991-92
2.	Giri, HPSEB	SS	2x30	9.85	7.90	6.00 (U)	RM&U	1995-96
Punjab								
3.	UBDC-I, PSEB	SS	3x15	11.00	8.00	11.00 (Res)	R&M+Res.	1990-92
Uttar Pradesh								
4.	Rihand, UPJVNL	SS	6x50	1.43	1.43	100.00 (Res)	R&M+Res.	1995-96
Karnataka								
5.	Nagjhari, U-2, KPCL	SS	1x135	11.97	11.32	15.00 (U)	RM&U	1995-96
6.	Shivasamudram, VVNL	SS	6x3 + 4x6	8.00	8.00	18.00 (LE)	RM&LE (3 MW Units)	N.A.
Kerala								
7.	Sholayar, KSEB	SS	3x18	7.58	7.58	-	R&M	1996-97
Tamil Nadu								
8.	Kadamparai (Units 3&4), TNEB	SS	2x100	23.17	33.69	200.00 (Res)	R&M+Res.	1993-95
9.	Kundah III (Units 1&2), TNEB	SS	2x60	5.45	3.20	-	R&M	1991-92
10.	Moyar, TNEB	SS	3x12	1.62	1.30	36.00 (LE)	RM&LE	1990-91
11.	Sholayar-I, TNEB	SS	2x35	1.40	0.85	-	R&M	1994-95
Meghalaya								
12.	Khandong, U-1, NEEPCO	CS	1x25	0.62	0.62	25.00 (Res)	R&M+Res.	1991-92
Tripura								
13.	Gumti, TSECL	SS	3x5	17.50	17.50	-	R&M	1994-95
	Total		1282.00	125.57	127.37	429.00 [39.0 (U) + 336.0 (Res) + 54.0(LE)]		

State wise List of Hydro RM&U schemes completed in the IX Plan

S. 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.	Dehar U-2, BBMB	CS	1x165	10.74	10.74	25.00 (Res.)	R&M+Res.	1998-99
3.	Bairasiul, NHPC	CS	3x66	18.45	18.45	-	R&M	2000-01
4.	Bassi, HPSEB	SS	4x15	5.35	4.3446	-	R&M	2000-01
Jammu & Kashmir								
5.	Salal St.I, NHPC	CS	3x115	51.50	51.50	-	R&M	2000-01
6.	Chenani, J&KPDC	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	4.1136	-	R&M	1998-99
12	Tiloth, UJVNL	SS	3x30	8.02	5.513	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, 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	178.20 (Res) + 115.20 (U)	RM&U +Res.	1997-98
16	Sharavathy, U-9&10, KPCL	SS	2x89.1	17.96	14.68	19.10 (Res) + 28.80(U)	RM&U +Res.	1997-98
Orissa								
17	Hirakud-I, U1&2, OHPC	SS	2x37.5	95.10	95.10	24.00(U) + 75.00(LE)	RMU&LE	1997-98

Annex-8.2
(Sheet 2/ 2)

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

State wise List of Hydro RM&U schemes completed in the X Plan

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of completion
				(Rs. in Cr.)				
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 (incl. IDC 6.28)	81.9935	25.89 (LE) +2.10 (Res)	RM& LE+ Res.	2006-07
3.	Kotla, U-1, BBMB	CS	1x29.25	51.28 (incl. IDC 6.28)		26.61 (LE) +2.33 (Res)	RM&LE + Res.	2006-07
4.	Shanan Ph.A, PSEB	SS	4x15+ 1x50 \$	11.35	10.93	-	R&M	2003-04
5.	Shanan, Ph.B, PSEB	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, PSEB	SS	4x33.5	3.68	1.04	-	R&M	2006-07
7.	UBDC I&II, PSEB	SS	3x15 + 3x15.45	7.89	2.44	45.00 (LE)	RM&LE (LE for 3x15 MW & R&M for 3 x 15.45 MW	2006-07
8.	Mukerian St.I, PSEB	SS	3x15	6.04	4.38	-	R&M	2006-07
Uttarakhand								
9.	Chhibro, UJVNL	SS	4x60	10.45	10.52	-	R&M	2006-07
Karnataka								
10.	Nagjhari, U-1&3, KPCL	SS	2x135	26.12	21.62	30.00 (U)	RM&U	2002-03
11.	Supa PH, KPCL	SS	2x50	2.64	2.47	-	R&M	2002-03

Annex- 8.3
(Sheet 2/3)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
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
14	Mani Dam, KPCL	SS	2x4.5	1.00	1.00	-	R&M	2002-03
15	Shivasamudra m, VVNL	SS	6x3+ 4x6	68.38	73.17	42.00 (LE)	RM&LE	2004-05
16	Bhadra, Ph.II, KPCL	SS	1x2	3.30	2.51	2.00 (LE)	RM&LE	2005-06
17	Varahi, KPCL	SS	2x115	2.57	2.66	-	R&M	2006-07
18	Sharavathy, Ph.A, KPCL	SS	10x103.5	5.22	3.52	-	R&M	2006-07
Kerala								
19	Neriamanga- lam KSEB	SS	3x15	58.00	53.05	45.00 (LE) + 9.00 (U)	RMU&LE	2006-07
20	Pallivasal, KSEB	SS	3x5+3x 7.5	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, TNEB	SS	3x6.65+ 1x11+2x 14	26.06	20.147	58.95(LE)	RM&LE	2004-05
24	Papanasam, TNEB	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	20.00(LE) +3.20(U)	RMU&LE	2004-05

Annex- 8.3
(Sheet 3/3)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of completion
				(Rs. in Crs.)				
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
30	Koyna Gen. Complex, MSPGCL	SS	4x70+4x80+4x80	12.00	11.50	-	R&M	2004-05
Meghalaya								
31	Umium St.I MeSEB	SS	4x9	81.88	84.21	36.00 (LE)	RM&LE	2002-03
32	Khandong, NEEPCO	CS	2x25	4.00	3.3499	-	R&M	2003-04
	Total		4336.60	1016.31	1028.9704	829.08 [123.40(U) +701.25 (LE) + 4.43(Res.)]		

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

State-wise List of Hydro RM&U schemes completed in the XI Plan

S. No	Project, Agency	CS/SS	Inst. Cap. (MW)	Estimated Cost	Actual Expenditure	Benefits (MW)	Category	Completion Schedule
				(Rs. in Crs.)				
Completed Schemes								
Himachal Pradesh								
1.	Dehar Ph. A BBMB	CS	6x165	11.00	6.936		R&M	2010-11 Completed
2.	Dehar Ph. B BBMB	CS	6x165	49.00	24.454	330 (LE)	RM&LE	2009-10 Completed
Uttarakhand								
3	Tanakpur, NHPC	CS	3x31.4	10.77	11.95	-	R&M	2007-08 Completed
4	Khodri Ph.A UJVNL	SS	4x30	5.25	6.39	-	R&M	2008-09 Completed
5	Chilla Ph.A, UJVNL	SS	4x36	23.55	21.24	-	R&M	2008-09 Completed
Andhra Pradesh								
6	Upper Sileru, APGENCO	SS	4x60	4.20	3.34	-	R&M	2009-10 Completed
Karnataka								
7	Nagjhari, U1 to 6, KPCL	SS	5x150 + 1x135	14.75	15.31	-	R&M	2009-10 Completed
8	Sharavathy Ph.B, KPCL	SS	10x103.5	20.50	11.14	-	R&M	2009-10 Completed
9	Supa, KPCL	SS	2x50	3.45	4.90	-	R&M	2009-10 Completed
10	Bhadra, KPCL	SS	2x12	1.44	0.85	-	R&M	2009-10 Completed
11	Lingnamakki, KPCL	SS	2x27.5	3.81	2.62	-	R&M	2010-11 Completed
Tamil Nadu								
12	Mettur Dam, TNEB	SS	4x10	30.17	24.16	10 (U) + 40 (LE)	RMU&LE	2007-08 Completed
Maharashtra								
13	Koyna St.I & II, MSPGCL	SS	4x70 + 4x80	87.50	81.82	-	R&M	2008-09 Completed
14	Vaitarna, MSPGCL	SS	1x60	16.00	0.14	-	R&M	2009-10 Completed
15	Koyna Dam PH, MSPGCL	SS	2x18	5.78	0.25	-	R&M	2009-10 Completed
16	Koyna St.III, MSPGCL	SS	4x80	16.65	5.79	320 (LE)	RM&LE	2011-12 Completed

Manipur								
17.	Loktak, NHPC	CS	3x30 derated	18.55	17.88	15.00 (Res.)	R&M + Res.	2011-12 Complete d
Meghalaya								
18	Umium St.II , MeSEB	SS	2x9	90.46	55.67 (as on 31.03.1 2)	2(U)+ 18.00 (LE)	RM&LE	2011-12
	Total		4821.20	412.83	294.84	735 [12.00(U) + 708.00 (LE) + 15.0(Res)]		

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

State-wise List of Hydro RM&U schemes programmed for completion in the XII Plan

As on 31.03.2012

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Ongoing Schemes – Under implementation								
Himachal Pradesh								
1	Bhakra LB, BBMB	CS	5x108	489.77	222.15 (as on 31.03.12)	540.00 (LE) + 90.00 (U)	RMU&LE	2014-15
2	Bassi, HPSEB	SS	3x16.5+ 1x15	119.83	109.97 (as on 31.03.12)	6.0(U)+ 60 (LE)	RMU&LE	2012-13
Jammu & Kashmir								
3	Chenani, J&KPDC	SS	5x4.66	39.14	3.98 (as on 31.03.12)	23.30 (LE)	RM&LE	2013-14
4	Sumbal Sindh, J&KPDC	SS	2x11.3	34.17	18.89 (as on 31.03.12)	-	R&M	2012-13
5	Lower Jhelum, J&KPDC	SS	3x35	101.30	78.25 (as on 31.03.12)	15.00 (Res.)	R&M+ Res.	2012-13
Uttar Pradesh								
6	Obra, UPJVNL	SS	3x33	43.14	12.7 (as on 31.03.12)	99.00 (LE)	RM&LE	2015-16
7	Rihand, UPJVNL	SS	6x50	132.20 (Rev.)	62.62 (as on 31.03.12)	300.00 (LE)	RM&LE	2015-16
Uttarakhand								
8	Pathri, UJVNL	SS	3x6.8	92.82	13.8 (as on 31.03.12)	20.40 (LE)	RM&LE	2013-14
Andhra Pradesh								
9	Srisaillam RB, APGENCO	SS	7x110	16.70	13.36 (as on 31.03.12)	-	R&M	2012-13
10	Lower Sileru, APGENCO	SS	4x115	8.75	6.66 (as on 31.03.12)	-	R&M	2012-13
11	Nagarjuna Sagar, APGENCO	SS	1x110+ 7x100.8	33.35	13.90 (as on 31.03.12)	-	R&M	2012-13

Karnataka								
12	Nagjhari, U-4to6, KPCL	SS	2x150+ 1x135	45.22	51.99 (as on 31.03.12)	45.00 (U)	RM&U	2013-14
Kerala								
13	Sabirigiri, KSEB	SS	5x55+ 1x60	104.36	96.95 (as on 31.03.12)	300.00 (LE) + 35.00(U)	RMU&LE	2012-13
14	Idamalayar, KSEB	SS	2x37.5	11.70	5.45 (as on 31.03.12)	-	R&M	2012-13
15	Poringal- kuthu,KSEB	SS	4x8	96.10	2.34 (as on 31.03.12)	32.00 (LE)+ 4 (U)	RM&LE	2015-16
Tamil Nadu								
16	Periyar,TNEB	SS	3x35+ 1x42	161.18	114.28 (as on 31.03.12)	140.00 (LE) + 28.00(U)	RMU&LE	2013-14
West Bengal								
17	Maithon, U-1&3, DVC	CS	2x20	49.05	3.76 (as on 31.03.12)	40.00 (LE)	RM&LE	2016-17
18	Jaldhaka St.I, WBSEB	SS	3x9	88.62	74.28 (as on 31.03.12)	27.00(LE)	RM&LE	2012-13
Orissa								
19	Rengali OHPC	SS	1x50	47.50	14.67 (as on 31.03.12)	50(LE)	RM&LE	2012-13
20	Hirakud-II, OHPC	SS	3x24	125.52	58.73 (as on 31.03.12)	72.00 (LE)	RM&LE	2014-15
Assam								
21	Kopili, NEEPCO	CS	2x50 + 2x50	66.42	9.25 (as on 31.03.12)	-	R&M & Refurbishme nt of Units 1 & 2	2013-14
22	Khandong, NEEPCO	CS	2x25	25.05	10.15 (as on 31.03.12)	50.00 (LE)	RM&LE	2014-15
	Sub Total(A)		4683	1932	966	1977		
Ongoing Schemes – Under Tendering								
Jammu & Kashmir								
23	Ganderbal, J&KPDC	SS	2x3+ 2x4.5	21.95	8.23 (as on 31.03.12)	9.00 (LE)	RM&LE	2016-17
Uttar Pradesh								
24	Matatila, UPJVNL	SS	3x10.2	10.29	1.00 (as on 31.03.12)	30.6 (LE)	RM&LE	2013-14

Uttarakhand								
25	Khatima, UJVNL	SS	3x13.8	256.76	17.26 (as on 31.03.12)	41.40 (LE)	RM&LE	2014-15
26	Chilla Ph B UJVNL	SS	4x36	472.00	-	28.8(U) + 144(LE)	RMU&LE	2015-16
27	Dhakrani, UJVNL	SS	3x11.25	113.18	-	33.75 (LE)	RM&LE	2015-16
28	Dhalipur, UJVNL	SS	3x17	113.71	-	51.00 (LE)	RM&LE	2015-16
29	Tiloth, UJVNL	SS	3x30	163.75	-	90 (LE)	RM&LE	2015-16
30	Kulhal, UJVNL	SS	3x10	115.44	-	30(LE)	RM&LE	2015-16
31	Chibro, UJVNL	SS	4x60	201.25	-	240(LE)	RM&LE	2015-16
32	Khodri UJVNL	SS	4x30	165.85	-	120(LE)	RM&LE	2015-16
Tamil Nadu								
33	Sholayar-I, TNEB	SS	2x35	40.68	-	14.00(U) + 70.00 (LE)	RMU&LE	2016-17
Jharkhand								
34	Panchet, U-1, DVC	CS	1x40	58.22	1.99 (as on 31.03.12)	40.00 (LE)	RM&LE	2016-17
Orissa								
35	Hirakud-I U5&6, OHPC	SS	2x37.5	296.83	0.25 (as on 31.03.12)	75.00 (LE)	RM&LE	2014-15
36	Balimela, OHPC	SS	6x60	160	-	360(LE)	RM&LE	2016-17
	Sub Total(B)		1340.75	2189.91	28.73	1377.55		
Ongoing Schemes – Under DPR Preparation/Finalisation								
Himachal Pradesh								
37	Giri, HPSEB	SS	2x30	48.48	-	60.00 (LE)	RM&LE	2014-15
Andhra Pradesh								
38	Machkund , APGENCO	SS	3x17 (St.I) & 3x21.25 (St.II)	124.45	-	15.25 (U) + 114.75 (LE)	RMU&LE	2016-17
Kerala								
39	Sholayar, KSEB	SS	3x18	54.00	0.044 (as on 31.12.10)	54.00 (LE)	RM&LE	2016-17
40	Kuttiadi, KSEB	SS	3x25	25.00	-	75.00 (LE)	RM&LE	2016-17
	Sub Total(C)		304	252	0.044	319		

Ongoing Schemes – Under RLA Studies								
Andhra Pradesh								
41	Upper Sileru, APGENCO	SS	4x60	10.00	-	-	R&M	2016-17
Tamil Nadu								
42	Kodayar Ph.I, TNEB	SS	1x60	30.00	-	60.00 (LE)	RM&LE	2015-16
43	Kodayar PH-II, TNEB	SS	1x40	19.94	-	40.0(LE)	RM&LE	2015-16
	Sub Total(D)		340	59.94	-	100.00		
	Total (A+B+C+D)		6667.75	4433.67	994.72	3773.25 [266.05(U) + 3492.20(LE) + 15(Res.)]		

CHAPTER 9

DEFINITIONS AND ABBREVIATIONS

CHAPTER-9

DEFINITIONS AND ABBREVIATIONS

9.1 DEFINITIONS

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

1. **Capacity:** Capacity in MW is the installed or Up-rated/Derated capacity of the unit.

2. **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 on forced outage and hf1, hf2 hfn are the duration of each outage in hours during the year. C is the total installed capacity in MW and H is the total period in hours during the year

3. **Planned Maintenance Non-availability (PM) (%)**

$$= \frac{(Cp1 \times hp1 + Cp2 \times hf2 + \dots + Cpn \times hpn) \times 100}{CxH}$$

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

4. **Operating availability (OFA) (%) = (100-FO-PM)**

5. **Miscellaneous Non-availability:** Non-availability of generating units due to one or more of the following factors:

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

- 6. Design Energy:** Means the quantum of energy which could be generated in a 90% dependable year with 95% installed capacity of the generating station.
- 7. Targeted Energy:** Estimated energy generation during the year based on the rainfall data, past records of energy generation etc.
- 8. FRL-Full Reservoir Level:** The level up to which the water could normally be stored in the reservoir for conservation and regulation.
- 9. MDDL-Minimum Draw Down Level:** The minimum level up to which the reservoir could be depleted under normal operating conditions.
- 10. 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
Pumped Storage Schemes

11. Average PLF (%):

$$= \frac{\text{Energy Generated (GWH)}}{\text{Installed Capacity (MW)} \times 8760(\text{Total hours of year})} \times 100$$

9.2 Abbreviations

MW	Mega Watt	(10 ⁶ Watts)
Kwh	Kilo Watt hour (I 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	

Abbreviations of Agencies

Northern Region

1 Himachal Pradesh

HPSEB Ltd.	HPSEB Ltd.
NHPC Ltd.	NHPC Ltd.
SJVN Ltd.	SJVN Ltd
MPCL	Malana Power Company Ltd.
JHPL	Jaiprakash Hydro Power Ltd.
EPPL	Everest Power Private Ltd.
ADHPL	Allain Duhangan Hydro Power Ltd.
LGPPPL	Lanco Green Power Pvt. Ltd.

2	Jammu & Kashmir	JKSPDCL	Jammu & Kashmir State Power Development Corporation Limited.
3	Punjab	PSPCL	Punjab State Power Corporation Ltd.
4	Rajasthan	BBMB	Bhakra Beas Management Board
5	Uttar Pradesh	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Ltd.
		UPVUNL	Uttar Pradesh Jal Vidyut Nigam Ltd.
6	Uttarakhand	THDCL	Tehri Hydro Development Corporation Ltd.
		UJVNL	Uttarakhand Jal Vidyut Nigam Ltd.
		JPVL	Jaiprakash Power Venture Ltd.
<u>Western Region</u>			
1	Gujarat	GSECL	Gujarat State Electricity Corporation Ltd.
		SSNNL	Sardar Sarovar Narmada Nigam Ltd.
2	Madhya Pradesh	MPPGCL	Madhya Pradesh Power Generation Co. Ltd.
		NHDC	Narmada Hydroelectric Development Corp. Ltd.
3	Chhatisgarh	CSPGCL	Chhatisgarh State Power Generation Co Ltd.
4	Maharashtra	MAHAGENCO	Maharashtra State Power Generation Co. Ltd.
		DLHP	Dodson-Lindblom Hydro Power Pvt Ltd.
		TATA	Tata Power Company
<u>Southern Region</u>			
1	Andhra Pradesh	APGENCO	Andhra Pradesh Generation Corporation.
2	Karnataka	KPCL	Karnataka Power Corporation Ltd.
3	Kerala	KSEB	Kerala State Electricity Board
4	Tamil Nadu	TANGEDCO	Tamil Nadu Generation & Distribution Corp. Ltd
<u>Eastern Region</u>			
1	Jharkhand	JSEB	Jharkhand State Electricity Board
		DVC	Damodar Valley Corporation
2	Odisha	OHPC	Odisha Hydro Power Corporation
3	West Bengal	WBSEDCL	West Bengal State Electricity Distribution Co. Ltd.
<u>North Eastern Region</u>			
1	Assam	APGCL	Assam Power Generation Co. Ltd.
2	Meghalaya	MeECL	Meghalaya Energy Corporation Limited
		NEEPCO	North-Eastern Electric Power Corporation Ltd.