

RENOVATION, MODERNISATION & UPRATING OF HYDRO ELECTRIC POWER PROJECTS

In the present scenario of resource constraint and to tide over the shortage of electricity in the country, Renovation & Modernisation, Life Extension and Uprating (RM&U) of the existing old hydro electric power projects is considered the best option, as this is cost effective and quicker to achieve than setting up of green field hydro power projects.

The cost of R&M works ranges from 0.5 Cr. to 1.0 Cr. per MW depending on the R&M activities whereas the cost of R&M, Uprating and Life Extension & Uprating works out about Rs. 1.0 to 2.0 Cr. per MW depending on the size of units. The R&M option of existing old unit is considered a cheaper and faster option because of lesser execution period as well.

In order to augment the hydro generation and improve the availability of existing hydro power projects, Government of India has put emphasis on R&M of various existing hydro electric power projects in the country as detailed below:-

Recognising the benefits of the R&M of hydroelectric power projects, Govt. of India set up a National Committee in 1987 and a Standing Committee in 1998 thereafter and have identified the projects/schemes to be taken up for implementation under R&M. The National Perspective Plan document for R&M of hydro electric power projects in the country was also prepared in C.E.A. during the year 2000, incorporating the status of various projects/schemes already identified for implementation/completion till the end of the XIth Plan, i.e. the year 2011-12.

Under the hydro R&M programme, 65 (15 in Central Sector and 50 in State Sector) hydro electric schemes (13 upto the VIIIth Plan, 20 in the IXth Plan & 32 in the Xth Plan) with an installed capacity of about 10511 MW at a cost of about Rs. 1730 crores have been completed by the end of the Xth Plan (i.e by 31st March 2007) & have accrued a benefit of 2351 MW through Life Extension, Uprating and Restoration. The State-wise lists of these R&M schemes are given at Annex. I , II & III.

For the XIth Plan (2007-12), a total of 62 hydro R&M schemes having an installed capacity of about 11340 MW at an estimated cost of Rs. 4021 Crores are now programmed for implementation to accrue a benefit of about 4392 MW through Life Extension, Uprating and Restoration. Out of 62 schemes, one scheme in the State Sector with an installed capacity of 40 MW at a cost of about Rs. 24 Crs. have been completed in the month of June, 2007 and has accrued a benefit of 50 MW through Life Extension & Uprating and 43 schemes are On-going. On balance 18 schemes the works have yet to take off. The state-wise lists of these R&M schemes are given at Annex. IV (A), IV (B) & IV(C).

Further, 17 nos. of hydro electric schemes having an installed capacity of 2186 MW, which were originally programmed for completion during XIth Plan, have now been shifted to XIIth Plan, as RLA studies could not be completed. or units are running comparatively satisfactorily. After completion of the R&M works of these projects, there will be a benefit of 1936 MW through Life Extension and Uprating at an estimated cost of Rs. 846 Crs. (provisional). The state-wise lists of these R&M schemes are given at Annex V.

Plan-wise summary of hydro R&M projects in the country as on 30.09.2007 is as given below:-

Sl. No	Plan Period	No. of Projects			Install ed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Centr al Sector	State Sector	Total				
1.	UptoVIIIth Plan (Schemes completed)	2	11	13	1282.00	125.57	127.37	429.00 [39.00(U) + 336.00(Res.) +54.00(LE)]
2.	IXth Plan (Schemes completed)	8	12	20	4892.10	597.84	570.1612	1093.03 [339.00(U) + 331.03(Res.) + 423.00(LE)]
3.	Xth Plan (Schemes completed)	5	27	32	4336.6	1016.31	1031.0889 (Till date)	829.08 [123.40(U) + 701.25 (LE) + 4.43(Res.)]
4.	XIth Plan							
	Schemes programmed	9	53	62	11339.60	4021.05	367.6632 (Till date)	4392.45 [257.25(U) + 4105.20(LE) + 30.0(Res.)]
	i. Schemes completed	-	1	1	40.00	30.17	24.16	50.00 [10.00(U) + 40.00(LE)]
	ii. Schemes Ongoing	6	37	43	9956.05	2606.48	343.5032 (Till date)	2899.65 [212.00(U) + 2657.65(LE) + 30.0(Res.)]
	iii. Schemes yet to commence	3	15	18	1343.55	1384.40	-	1442.80 [35.25(U) + 1407.55(LE)]
5.	XIIth Plan							
	Schemes programmed	-	17	17	2186.0	845.93	-	1936.00 [10.0(U) + 1926.00 (LE)]

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

Annex- I

**State wise List of Hydro RM&U Projects completed upto the VIIIth Plan
(Phase I Projects)**

As on 30.09.2007

S. No.	Project, Agency	Inst. Cap. (MW)	Estimate d Cost	Actual Expenditu re	Benefits (MW)	Category	Year of Completion
			(Rs. in Crs.)				
Himachal Pradesh							
1.	Bairasiul, NHPC	3x60	25.98	25.98	18.00 (U)	RM&U	1991-92
2.	Giri, HPSEB	2x30	9.85	7.90	6.00 (U)	RM&U	1995-96
Punjab							
3.	UBDC-I, PSEB	3x15	11.00	8.00	11.00 (Res)	R&M+Res.	1990-92
U.P.							
4.	Rihand, UPJVNL	6x50	1.43	1.43	100.00 (Res)	R&M+Res.	1995-96
Karnataka							
5.	Nagjhari, U-2, KPCL	1x135	11.97	11.32	15.00 (U)	RM&U	1995-96
6.	Shivasamudram, VVNL	6x3+4x6	8.00	8.00	18.00 (LE)	RM&LE (3 MW Units)	N.A.
Kerala							
7.	Sholayar, KSEB	3x18	7.58	7.58	-	R&M	1996-97
Tamil Nadu							
8.	Kadamparai (Units 3&4), TNEB	2x100	23.17	33.69	200.00 (Res)	R&M+Res.	1993-95
9.	Kundah III (Units 1&2), TNEB	2x60	5.45	3.20	-	R&M	1991-92
10.	Moyar, TNEB	3x12	1.62	1.30	36.00 (LE)	RM&LE	1990-91
11.	Sholayar-I, TNEB	2x35	1.40	0.85	-	R&M	1994-95
Meghalaya							
12.	Khandong, U-1, NEEPCO	1x25	0.62	0.62	25.00 (Res)	R&M+Res.	1991-92
Tripura							
13.	Gumti, TSECL	3x5	17.50	17.50	-	R&M	1994-95
	Total	1282.0	125.57	127.37	429.00 [39.0 (U) + 336.0 (Res) + 54.0(LE)]		

Abbreviations: R&M – Renovation & Modernisation; RM&U – Renovation, Modernisation & Uprating,

RM&LE – Renovation, Modernisation & Life Extension

RMU&LE – Renovation, Modernisation, Uprating & Life Extension;

R&M+Res.-Renovation & Modernisation + Restoration;

RM&LE+Res.- Renovation, Modernisation & Life Extension + Restoration;

RM&U+Res. – Renovation, Modernisation & Uprating + Restoration.

MW – Mega Watt; Res – Restoration; U – Uprating; LE – Life Extension
Phase I Projects started in 1987; Phase II Projects started in 1998

**State wise List of Hydro RM&U Projects completed in the IXth Plan
(Phase I Projects & Phase II Projects**)**

As on 30.09.2007

S. No.	Project, Agency	Inst. Cap. (MW)	Estimate d Cost	Actual Expenditure	Benefits (MW)	Category	Year of completion
			(Rs. in Crs.)				
Himachal Pradesh							
1.	Bhakra RB, BBMB	5x132	88.45	90.68	125.00 (U)	RM&U	2000-01
2.	Dehar U-2, BBMB	1x165	10.74	10.74	25.00 (Res)	R&M+Res.	1998-99
3.	**Bairasiul, NHPC	3x66	18.45	18.45	-	R&M	2000-01
4.	Bassi, HPSEB	4x15	5.35	4.3446	-	R&M	2000-01
Jammu & Kashmir							
5.	**Salal St.I, NHPC	3x115	51.50	51.50	-	R&M	2000-01
6.	Chenani, J&KPDC	5x4.66	11.00	11.00	0.93 (Res)	R&M+Res.	2000-01
Punjab							
7.	Ganguwal, U-2, BBMB	1x24.2	18.90	15.00	22.00 (LE)+ 2.20 (Res)	RM&LE+Res.	1997-98
8.	Kotla, U-3, BBMB	1x24.2	18.90	16.90	22.00 (LE)+ 2.20 (Res)	RM&LE+Res.	1998-99
9.	**Ganguwal U-3, BBMB	1x24.2	25.00	43.40	22.00 (LE)+ 2.20 (Res)	RM&LE+Res.	2000-01
10.	**Kotla U-2, BBMB	1x24.2	25.00		22.00 (LE)+ 2.20 (Res)	RM&LE+Res.	2001-02
Uttaranchal							
11.	Chilla U-1, 3&4, UJVNL	3x36	4.25	4.1136	-	R&M	1998-99
12.	Tiloth, UJVNL	3x30	8.02	5.513	6.00 (U)	RM&U	1998-99
Andhra Pradesh							
13.	Lower Sileru, APGENCO	4x115	13.35	9.30	24.00 (Res)	R&M+Res.	2001-02
14.	Srisailam, APGENCO	7x110	16.32	11.40	-	R&M	2001-02

S. No.	Project, Agency	Inst. Cap. (MW)	Estimate d Cost	Actual Expenditure	Benefits (MW)	Category	Year of completion
			(Rs. in Crs.)				
Karnataka							
15.	Sharavathy , U-1 to 8, KPCL	8x89.1	65.00	63.49	178.20 (Res) + 115.20 (U)	RM&U +Res.	1997-98
16.	Sharavathy , U-9&10, KPCL	2x89.1	17.96	14.68	19.10 (Res) + 28.80(U)	RM&U +Res.	1997-98
Orissa							
17.	Hirakud-I, U1&2, OHPC	2x37.5	95.10	95.10	24.00(U) + 75.00(LE)	RMU&LE	1997-98
Gujarat							
18.	Ukai, U-1&3, GSECL	2x75	24.99	24.99	75.00 (Res)	R&M+Res.	1997-98
Maharashtra							
19.	Koyna I&II, MSPGCL	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	3x80	4.65	4.65	-	R&M	1997-98
	Total	4892.10	597.84	570.161 2	1093.03 [339.0(U) + 331.03(Res) +423.0(LE)]		

Abbreviations: R&M – Renovation & Modernisation;
 RM&U – Renovation, Modernisation & Uprating,
 RM&LE – Renovation, Modernisation & Life Extension
 RMU&LE – Renovation, Modernisation, Uprating & Life Extension;
 R&M+Res.-Renovation & Modernisation + Restoration;
 RM&LE+Res.- Renovation, Modernisation & Life Extension + Restoration;
 RM&U+Res. – Renovation, Modernisation & Uprating + Restoration.
 MW – Mega Watt; Res – Restoration; U – Uprating; LE – Life Extension
 Phase I Projects started in 1987; Phase II Projects started in 1998

**State wise List of Hydro RM&U Projects completed in the Xth Plan
(Phase I Projects* & Phase II Projects)**

As on 30.09.2007

S. No	Project, Agency	Inst. Cap. (MW)	Estimate d Cost	Actual Expenditu re	Benefits (MW)	Category	Year of completi on
			(Rs. in Crs.)				
Himachal Pradesh							
1.	Pong, BBMB	6x60	17.70	17.79	36.00 (U)	RM&U	2003-04
Punjab							
2.	Ganguwal, U-1, BBMB	1x29.25	51.28 (incl. IDC 6.28)	81.285	25.89 (LE) +2.10 (Res)	RM&LE+Res.	2006-07
3.	Kotla, U-1, BBMB	1x29.25	51.28 (incl. IDC 6.28)		26.61 (LE) +2.33 (Res)	RM&LE+Res.	2006-07
4.	Shanan Ph.A, PSEB	4x15+1x50 \$	11.35	10.93	-	R&M	2003-04
5.	Shanan, Ph.B, PSEB	4x15+1x50 \$	35.95	13.34 (as on 27.04.07)	60.00 (LE)	RM&LE (LE for 15 MW units + R&M for 50 MW unit)	2006-07
6.	Anandpur Sahib, PSEB	4x33.5	3.68	1.04	-	R&M	2006-07
7.	UBDC I&II, PSEB	3x15 + 3x15.45	7.89	2.44 (as on 31.12.06)	45.00 (LE)	RM&LE (LE for 3x15 MW & R&M for 3x15.45 MW)	2006-07
8.	Mukerian St.I, PSEB	3x15	6.04	4.38 (as on 23.04.07)	-	R&M	2006-07
Uttaranchal							
9.	Chibro, UJVNL	4x60	10.45	10.187	-	R&M	2006-07
Karnataka							
10.	Nagjhari, U-1&3, KPCL	2x135	26.12	21.62	30.00 (U)	RM&U	2002-03
11.	Supa PH, KPCL	2x50	2.64	2.47	-	R&M	2002-03

Annex- III
(Sheet 2/3)

S. No	Project, Agency	Inst. Cap. (MW)	Estimate d Cost	Actual Expenditure	Benefits (MW)	Category	Year of completion
			(Rs. in Crs.)				
12.	Mahatma Gandhi*, VVNL	4x12+4x18	44.66	43.13	19.20 (U) + 120.00 (LE)	RMU&LE	2002-03
13.	Munirabad, VVNL	2x9+1x10.3	3.64	3.53	28.30 (LE)	RM&LE	2002-03
14.	Mani Dam, KPCL	2x4.5	1.00	1.00	-	R&M	2002-03
15.	Shivasamudram, VVNL	6x3+4x6	68.38	73.17	42.00 (LE)	RM&LE	2004-05
16.	Bhadra, Ph.II, KPCL	1x2	3.30	2.51	2.00 (LE)	RM&LE	2005-06
17.	Varahi, KPCL	2x115	2.57	2.66	-	R&M	2006-07
18.	Sharavathy, Ph.A, KPCL	10x103.5	5.22	3.52	-	R&M	2006-07
Kerala							
19.	Neriamangalam*, KSEB	3x15	58.00	53.05 (as on 31.12.06)	45.00 (LE) + 9.00 (U)	RMU&LE	2006-07
20.	Pallivasal, KSEB	3x5+3x7.5	94.00	371.71	37.50 (LE)	RM&LE	2002-03
21.	Sengulam, KSEB	4x12	114.00		48.00 (LE)	RM&LE	2002-03
22.	Panniar, KSEB	2x15	62.00		30.00 (LE)	RM&LE	2002-03
Tamilnadu							
23.	Pykara*, TNEB	3x6.65+1x11+2x14	26.06	20.147	58.95 (LE)	RM&LE	2004-05
24.	Papanasam*, TNEB	4x7	27.05	22.61	4.00 (U) + 28.00 (LE)	RMU&LE	2005-06
Orissa							
25.	Hirakud-I (Sw.yard)*, OHPC	-	9.85	15.88	-	R&M	2006-07
26.	Hirakud-I, U-3&4*, OHPC	2x24	126.14	111.75	16.00(U)+48.00(LE)	RMU&LE	2005-06
West Bengal							
27.	Maithon, U-2*, DVC	1x20	42.08	36.94	20.00(LE) +3.20(U)	RMU&LE	2004-05

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

S. No	Project, Agency	Inst. Cap. (MW)	Estimate d Cost	Actual Expenditure	Benefits (MW)	Category	Year of completion
			(Rs. in Crs.)				
Maharashtra							
28.	Bhira Tail Race, MSPGCL	2x40	1.60	0.70	-	R&M	2003-04
29.	Tillari, MSPGCL	1x60	4.50	4.24	6.0 (U)	RM&U	2004-05
30.	Koyna Gen. Complex, MSPGCL	4x70+4x80 + 4x80	12.00	11.50	-	R&M	2004-05
Meghalaya							
31.	Umium St.I* MeSEB	4x9	81.88	84.21	36.00(LE)	RM&LE	2002-03
32.	Khandong, NEEPCO	2x25	4.00	3.3499	-	R&M	2003-04
	Total	4336.6	1016.31	1031.0889	829.08 [123.40(U) +701.25(LE) + 4.43(Res.)]		

\$ - Installed Capacity of Shanan, Ph.B, at Sl. No. 6 not included in the total, as the same has already been accounted for at Sl. No. 5.

Abbreviations: R&M – Renovation & Modernisation;
RM&U – Renovation, Modernisation & Uprating,
RM&LE – Renovation, Modernisation & Life Extension
RMU&LE – Renovation, Modernisation, Uprating & Life Extension;
R&M+Res.-Renovation & Modernisation + Restoration;
RM&LE+Res.- Renovation, Modernisation & Life Extension + Restoration;
RM&U+Res. – Renovation, Modernisation & Uprating + Restoration.
MW – Mega Watt; Res – Restoration; U – Uprating; LE – Life Extension
Phase I Projects started in 1987; Phase II Projects started in 1998

State wise List of Completed Hydro RM&U Projects programmed for completion in the XIth Plan

As on 30.09.2007

S. No	Project, Agency	Inst. Cap. (MW)	Estimat ed Cost	Actual Expendi t -ure	Benefits (MW)	Category	Completion Schedule
			(Rs. in Crs.)				
Tamil Nadu							
1.	Mettur Dam	4x10	30.17	24.16	10.00 (U) + 40.00 (LE)	RMU&LE	2007-08
	Total	40.00	30.17	24.16	50.00 [10.00 (U) + 40.00 (LE)]		

Abbreviations: R&M – Renovation & Modernisation;
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 RM&LE – Renovation, Modernisation & Life Extension
 RMU&LE – Renovation, Modernisation, Uprating & Life Extension;
 R&M+Res.-Renovation & Modernisation + Restoration;
 RM&LE+Res.- Renovation, Modernisation & Life Extension + Restoration;
 RM&U+Res. – Renovation, Modernisation & Uprating + Restoration.
 MW – Mega Watt; Res – Restoration; U – Uprating; LE – Life Extension
 Phase I Projects started in 1987; Phase II Projects started in 1998

State wise List of Ongoing Hydro RM&U Projects programmed for completion in the XIth Plan (Phase I Projects* & Phase II Projects)

As on 30.09.2007

S. No	Project, Agency	Inst. Cap. (MW)	Estimat ed Cost	Actual Expendi t -ure	Benefits (MW)	Category	Completion Schedule
			(Rs. in Crs.)				
Himachal Pradesh							
1.	Bhakra LB, BBMB	5x108	488.00	-	540.00 (LE) + 90.00 (U)	RMU&LE	2011-12
2.	Dehar, BBMB	6x165	60.00	-	330(LE)	R&M & (LE of U# 3&4)	2009-10
3.	Bassi, HPSEB	4x15	100.00 (Prov.)	Nil	6.0(U)+ 60 (LE)	RMU&LE	2009-10
Jammu & Kashmir							
4.	Salal Ph. II, NHPC	3x115 + 3x115	91.46	-	-	R&M	2010-11
5.	Sumbal Sindh*, J&KPDC	2x11.3	23.49	2.57 (as on 31.03.07)	-	R&M	2008-09
6.	Lower Jhelum*, J&KPDC	3x35	98.02	16.334 (as on 31.03.07)	15.00 (Res.)	R&M+ Res.	2009-10
7.	Chenani, J&KPDC	5x4.66	34.90	0.285 (as on 31.03.07)	23.30 (LE)	RM&LE	2009-10
Rajasthan							
8.	Jawahar Sagar, RRVUNL	3x33	16.55	-	-	R&M	2007-08
9.	Rana Pratap Sagar, RRVUNL	4x43	20.70	-	-	R&M	2007-08
Uttaranchal							
10.	Tanakpur, NHPC	3x31.4	10.00	-	-	R&M	2007-08
11.	Khodri(Ph.A), UJVNL	4x30	5.25	3.268 (As on 30.9.07)	-	R&M	2007-08
12.	Chilla (Ph.A), UJVNL	4x36	23.55	19.595 (As on 30.09.07)	-	R&M	2007-08
13.	Dhakrani, UJVNL	3x11.25	54.00	-	33.75 (LE)	RM&LE	2011-12
14.	Dhalipur, UJVNL	3x17	78.00	-	51.00 (LE)	RM&LE	2011-12
15.	Tiloth, UJVNL	3x30	118.54	-	90 (LE)	RM&LE	2011-12

Annex- IV(B)
(Sheet 2/3)

S. No	Project, Agency	Inst. Cap. (MW)	Estimat ed Cost	Actual Expendit ure	Benefits (MW)	Category	Completion Schedule
			(Rs. in Crs.)				
16.	Kulhal, UJVNL	3x10	29.00	-	30(LE)	RM&LE	2011-12
Uttar Pradesh							
17.	Matatila, UPJVNL	3x10.2	92.35	1.00 (as on 30.06.07)	30.6 (LE)	RM&LE	2010-11
18.	Obra, UPJVNL	3x33	58.80	5.60 (as on 30.06.07)	99.00 (LE)	RM&LE	2010-11
19.	Rihand, UPJVNL	6x50	136.27	17.257 (as on 30.06.07)	300.00 (LE)	RM&LE	2009-10
Andhra Pradesh							
20.	Lower Sileru, APGENCO	4x115	8.75	-	-	R&M	2007-08
21.	Nagarjuna Sagar, APGENCO	1x110+ 7x100.8	48.35	-	-	R&M	2010-11
22.	Upper Sileru, APGENCO	4x60	4.20	-	-	R&M	2007-08
23.	Srisaillam RB, APGENCO	7x110	16.70	-	-	R&M	2007-08
Karnataka							
24.	Nagjhari, U1 to 6, KPCL	3x150 + 3x135 \$	11.03	10.64 (as on 31.08.07)	-	R&M	2009-10
25.	Nagjhari, U-4to6, KPCL	3x135 \$	41.16	52.16 (as on 31.08.07)	45.00 (U)	RM&U	2009-10
26.	Sharavathy Ph.B, KPCL	10x103.5	9.94	7.25 (as on 31.08.07)	-	R&M	2009-10
27.	Supa, KPCL	2x50	1.73	0.56 (as on 31.08.07)	-	R&M	2009-10
28.	Lingnamakki, KPCL	2x27.5	3.81	1.31 (as on 31.08.07)	-	R&M	2008-09
29.	Bhadra, KPCL	2x12	4.47	0.57 (as on 31.08.07)	24(LE)	RM&LE	2009-10
Kerala							

30.	Sabirigiri*, KSEB	6x50	99.86	67.30 (as on 31.03.07)	300.00 (LE) + 35.00(U)	RMU&LE	2008-09
31.	Idamalayar, KSEB	2x37.5	5.00 (Prov.)	-	-	R&M	2011-12
32.	Sholayar, KSEB	3x18	54.00	-	54.00 (LE)	RM&LE	2009-10

S. No	Project, Agency	Inst. Cap. (MW)	Estimat ed Cost	Actual Expendi t -ure	Benefits (MW)	Category	Completion Schedule
			(Rs. in Crs.)				
Tamil Nadu							
33.	Periyar, TNEB	4x35	161.8	-	140.00 (LE) + 28.00(U)	RMU&LE	2009-10
Jharkhand							
34.	Panchet, U-1*, DVC	1x40	44.96	1.175 (as on 31.03.07)	40.00 (LE)	RM&LE	2008-09
Orissa							
35.	Hirakud-I* U5&6, OHPC	2x37.5	92.37	0.1992 (as on 30.9.07)	75.00 (LE)	RM&LE	2010-11
36.	Hirakud-II*, OHPC	3x24	125.52	54.46 (as on 30.9.07)	72.00 (LE)	RM&LE	2009-10
West Bengal							
37.	Jaldhaka St.I*, WBSEB	3x9	52.17	9.53 (as on 31.07.07)	27.00(LE)	RM&LE	2008-09
Maharashtra							
38.	Koyna St.I & II, MSPGCL	4x70 + 4x80	87.50 (Incl. 12.50 for Sw. Yd.)	60.00 (for P.H) & Nil (for Sw. yd.) (as on 30.04.07)	-	R&M	2007-08
39.	Koyna St.III, MSPGCL	4x80	16.65 (Prov.)	2.5 (as on 30.04.07)	320 (LE)	RM & LE	2008-09
40.	Vaitarna, MSPGCL	1x60	7.75	0.14	-	R&M	2011-12
41.	Koyna Dam PH, MSPGCL	2x18	10.00	-	8.00 (U)	RM&U	2011-12
Manipur							
42.	Loktak*, NHPC	3x30 (Derated)	19.13	1.6 (as on 03.07.07)	15.00 (Res)	R&M + Res.	2008-09
Meghalaya							
43.	UmiumSt.II*, MeSEB	2x9	90.46	7.60 (as on 30.06.07)	18.00 (LE)	RM&LE	2011-12

	Total	9956.05	2606.48	343.503 2	2899.65 [212.0(U) + 2657.65 (LE) + 30.0(Res.)		
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\$ - Installed Capacity of Nagjhari (U-4 to 6) at Sl. No. 25 not included in the total, as the same has already been accounted for at Sl. No. 24.

**State wise List of Hydro RM&U Projects programmed for completion in the XIth Plan
but works of which are yet to be taken up for implementation
(Phase I Projects* & Phase II Projects)**

As on 30.09.2007

S.No.	Project, Agency	Inst. Cap. (MW)	Estimated Cost (Rs. in Crs)	Benefits (MW)	Category	Completion Schedule
Himachal Pradesh						
1.	Giri, HPSEB	2x30	8.28 (Prov.)	60.00 (LE)	RM&LE	2011-12
Jammu & Kashmir						
2.	Ganderbal, J&KPDC	2x3+2x4.5	42.80	15.00 (LE)	RM&LE	2008-09
Uttaranchal						
3.	Khatima, UJVNL	3x13.8	91.94	41.40 (LE)	RM&LE	2010-11
4.	Pathri, UJVNL	3x6.8	59.00	20.40 (LE)	RM&LE	2010-11
5.	Ramganga, UJVNL	3x66	37.00	198.0(LE)	RM&LE	2009-10
6.	Chibro, UJVNL	4x60	142.00	240(LE)	RM&LE	2011-12
7.	Khodri(Ph-B), UJVNL	4x30 \$	87.00	120(LE)	RM&LE	2011-12
8.	Chilla(Ph-B), UJVNL	4x36 #	372.23	144(LE)	RM&LE	2011-12
Andhra Pradesh						
9.	Hampi, APGENCO	2x9(St.I) & 2x9(St.II)	25.00	36.00 (LE)	RM&LE	XI th Plan
10.	Machkund *, APGENCO	3x17(St.I) & 3x21.25 (St.II)	124.45	15.25 (U) + 114.75 (LE)	RMU&LE	XI th Plan
11.	Tungabhadra, APGENCO	2x9+2x9	25.00	36(LE)	RM&LE	XI th Plan
Kerala						
12.	Poringal-kuthu*, KSEB	4x8	9.55	32.00 (LE)	RM&LE	XI th Plan
Tamil Nadu						
13.	Sholayar-I, TNEB	2x35	40.6810	14.00(U) + 70.00(LE)	RMU&LE	XI th Plan
Jharkhand						
14.	Subernrekha, JSEB	2x65	31.00	130.00 (LE)	RM&LE	2011-12
West Bengal						
15.	Maithon U1&3, DVC	2x20	49.05	40.00 (LE)	RM&LE	XI th Plan

Annex- IV(C)
(Sheet 2/2)

S.No	Project, Agency	Inst. Cap. (MW)	Estimated Cost (Rs. in Crs)	Benefits (MW)	Category	Completion Schedule
Assam						
16.	Kopili, NEEPCO	2x50 + 2x50	66.42	-	R&M & Refurbishment of Units 1 & 2	2011-12
17.	Khandong, NEEPCO	2x25	5.00 (Prov.)	50.00(LE)	RM&LE	2011-12
Meghalaya						
18.	Kyrdemkulai*, MeSEB	2x30	168.00	60.00 (LE) 6.00 (U)	RMU & LE	XIth Plan
	Total	1343.55	1384.40	1442.80 [35.25 (U) + 1407.55 (LE)]		

\$ - Installed Capacity of Khodri (Ph-B) at Sl. No. 7 not included in the total, as the same has already been accounted for at Sl. No. 11 of Annex. IV (A).

- Installed Capacity of Chilla (Ph-B) at Sl. No. 8 not included in the total, as the same has already been accounted for at Sl. No. 12 of Annex. IV (A).

Abbreviations: R&M – Renovation & Modernisation; RM&U – Renovation, Modernisation & Uprating,

RM&LE – Renovation, Modernisation & Life Extension
 RMU&LE – Renovation, Modernisation, Uprating & Life Extension;
 R&M+Res.-Renovation & Modernisation + Restoration;
 RM&LE+Res.- Renovation, Modernisation & Life Extension + Restoration;
 RM&U+Res. – Renovation, Modernisation & Uprating + Restoration.
 MW – Mega Watt; Res – Restoration; U – Uprating; LE – Life Extension
 Phase I Projects started in 1987; Phase II Projects started in 1998

**State wise List of Hydro RM&U Projects for completion in the XIIth Plan
(Works of which are yet to be taken up for implementation)**

As on 30.09.2007

S.No.	Project, Agency	Inst. Cap. (MW)	Estimated Cost (Rs. in Crs)	Benefits (MW)	Category	Completion Schedule
APGENCO						
1.	Upper Sileru, APGENCO	4x60	10.00 (Provisional)	-	R&M	XIIth Plan
Kerala						
2.	Idukki St.I, KSEB	3x130	130.00 (provisional)	390.00 (LE)	RM&LE	XIIth Plan
3.	Kuttiadi, KSEB	3x25	25.00 (provisional)	75.00 (LE)	RM&LE	XIIth Plan
Tamil Nadu						
4.	Sarkar Pathy, TNEB	1x30	15.00 (provisional)	30.00 (LE)	RM&LE	XIIth Plan
5.	Mettur Tunnel, TNEB	4x50	100 (provisional)	200 (LE)	RM&LE	XIIth Plan
6.	Sholayar II, TNEB	1x25	18.99 (provisional)	25.0 (LE)	RM&LE	XIIth Plan
7.	Aliyar, TNEB	1x60	30.00 (provisional)	60.00 (LE)	RM&LE	XIIth Plan
8.	Kodayar Ph.I, TNEB	1x60	30.00 (provisional)	60.00 (LE)	RM&LE	XIIth Plan
9.	Kodayar PH-II, TNEB	1x40	19.94 (provisional)	40.0(LE)	RM&LE	XIIth Plan
10.	Moyar, TNEB	3x12	18.00 (provisional)	36.00 (LE)	RM&LE	XIIth Plan
11.	Kundah St.I, TNEB	3x20	50.00 (provisional)	60.00 (LE)	RM&LE	XIIth Plan
12.	Kundah St.II, TNEB	5x35	75.00 (provisional)	175.00(LE)	RM&LE	XIIth Plan
13.	Kundah St.III, TNEB	3x60	70.00 (provisional)	180.00(LE)	RM&LE	XIIth Plan
14.	Kundah St.IV, TNEB	2x50	35.00 (provisional)	100.00(LE)	RM&LE	XIIth Plan
15.	Kundah St.V, TNEB	2x20	13.00 (provisional)	20.00 (LE)	RM&LE of Unit-1 & R&M of U-2	XIIth Plan
Madhya Pradesh						
16.	Gandhi Sagar, MPPGCL	5x23	46.00 (provisional)	115.00 (LE) +10.00 (U)	RMU&LE	XIIth Plan

S.No.	Project, Agency	Inst. Cap. (MW)	Estimated Cost (Rs. in Crs)	Benefits (MW)	Category	Completion Schedule
Orissa						
17.	Balimela, OHPC	6x60	160 (Provisional)	360(LE)	RM&LE	XIIth Plan
	Total	2186.00	845.93	1936.00 [10.0(U) + 1926.0(LE)]		

Abbreviations: R&M – Renovation & Modernisation; RM&U – Renovation, Modernisation & Uprating,

RM&LE – Renovation, Modernisation & Life Extension

RMU&LE – Renovation, Modernisation, Uprating & Life Extension;

R&M+Res.-Renovation & Modernisation + Restoration;

RM&LE+Res.- Renovation, Modernisation & Life Extension + Restoration;

RM&U+Res. – Renovation, Modernisation & Uprating + Restoration.

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

Phase I Projects started in 1987; Phase II Projects started in 1998

Abbreviations of Agencies

1. **APGENCO** Andhra Pradesh Generation Corporation
2. **BBMB** Bhakra Beas Management Board
3. **DVC** Damodar Valley Corporation
4. **GSECL** Gujarat State Electricity Corporation Ltd.
5. **HPSEB** Himachal Pradesh State Electricity Board
6. **J&KPDC** Jammu & Kashmir Power Development Corpn.
7. **JSEB** Jharkhand State Electricity Board
8. **KPCL** Karnataka Power Corporation Ltd.
9. **KSEB** Kerala State Electricity Board
10. **MPPGCL** Madhya Pradesh Power Generation Co. Ltd.
11. **MSPGCL** Maharashtra State Power Generation Co. Ltd.
12. **MeSEB** Meghalaya State Electricity Board
13. **NHPC** National Hydro Electric Power Corporation
14. **NEEPCO** North-East Electric Power Corporation
15. **OHPC** Orissa Hydro Power Corporation
16. **PSEB** Punjab State Electricity Board
17. **RRVUNL** Rajasthan Rajya Vidyut Utpadan Nigam Ltd.
18. **TSECL** Tripura State Electricity Corporation Ltd.
19. **TNEB** Tamil Nadu Electricity Board
20. **UPJVNL** Uttar Pradesh Jal Vidyut Nigam Ltd.
21. **UJVNL** Uttaranchal Jal Vidyut Nigam Ltd.
22. **VVNL** Vishveswaraiah Vidyut Nigam Ltd.
23. **WBSEB** West Bengal State Electricity Board