

RENOVATION, MODERNISATION & UPRATING OF HYDRO ELECTRIC POWER PROJECTS

For optimization of resources and to tide over the shortage of electricity in the country, Renovation & Modernisation, Uprating and Life Extension (RMU&LE) of the existing old hydro electric power projects is considered a cost effective option to ensure efficiency, better availability and also to augment capacity addition.

Recognising the benefits of R&M of hydro electric power projects, Govt. of India set up a National Committee in 1987 and a Standing Committee in 1998 thereafter and had 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 XI Plan, i.e. March, 2012.

Under the hydro R&M programme, 65 (15 in Central and 50 in State Sector) hydro R&M schemes (13 upto the VIII Plan, 20 in the IX Plan & 32 in the X Plan) with an aggregate installed capacity of 10511 MW at a cost of Rs. 1726 crores have been completed by the end of the X Plan (i.e by 31st March 2007) & have accrued a benefit of 2351 MW through Life Extension, Uprating and Restoration. The state-wise list of Hydro RM&U schemes completed during VIII, IX & X Plans are given at Annex.-I, II & III respectively.

During the XI Plan, 21 schemes with an installed capacity of 6173 MW at an estimated cost of Rs.530 crore were planned to accrue benefit of about 826 MW. Out of these, 17 schemes (4 in central sector & 13 in state sector) with an installed capacity of 4803 MW were completed till March, 2012 at a cost of about Rs.239 Crore and have accrued a benefit of 715 MW through Life Extension, Uprating and Restoration. In addition, one scheme namely Umium St-II (18 MW) of MePGCL, scheduled during XII Plan, was completed during 2011-12. Thus, during XI Plan, a total of 18 hydro R&M schemes (4 in central sector & 14 in state sector) with an installed capacity of about 4821 MW have been completed at a cost of about Rs.295 Crore and have accrued a benefit of 735 MW through Life Extension, Uprating and Restoration. The state-wise list of these 18 hydro R&M schemes is given at Annex.-IV. The remaining 4 schemes of XI Plan namely Bassi (64.5 MW) in HP, Lower Sileru (460 MW) in AP, Nagarjuna Sagar (815.6 MW) in AP and Nagjhari Units 4-6 (435 MW) in Karnataka are now programmed to be completed in XII Plan.

During XII Plan, a total of 37 hydro R&M schemes (5 in Central Sector and 32 in State Sector) having an installed capacity of about 6878 MW and which will accrue benefit of about 2237 MW through uprating, life extension and restoration are expected to be completed at an estimated cost of about Rs. 3233 Crores. A total of 13 schemes are programmed to be taken up in XII Plan and will accrue benefit of 1528 MW during XIII Plan. The state-wise list of hydro R&M schemes expected for completion during XII Plan (37 schemes) and XIII Plan (13 schemes) is given at Annex.-V and Annex.-VI respectively. Out of the 37 schemes expected for completion during XII Plan, 5 schemes in State sector with an installed capacity of about 1451 MW have been completed till September, 2013 and have accrued a benefit of 100 MW through Life Extension.

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

Summary of R&M of Hydro Projects

(As on 30.09.2013)

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.	VIII 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 programmed for completion during 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 (Original)	5	40	45	6877.90	3233.13	1165.26	2236.70 [173(U) + 2048.70(LE) + 15(Res.)]
	Revised	5	32	37				
b)	Completed	-	5	5	1450.60	129.30	91.38	100 [100 (LE)]
c)	Under implementation	3	17	20	2616.30	1913.61	989.53	1520.70 [133.00(U) + 15.0(Res.)+ 1372.70(LE)]
d)	Under Tendering	1	8	9	2306	1044.19	78.60	501 [40(U) + 461(LE)]
e)	Under DPR Preparation/ Finalisation and Approval	1	2	3	505	146.03	5.75	115 (LE)

Abbreviations:

MW – Mega Watt;

Res. – Restoration;

U – Uprating;

LE – Life Extension

III Candidate Hydro R&M schemes to be taken up during XII Plan and programmed for completion in XIII 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	-	13	*13	1487.50	2631.80	0.84	1527.55 [40.95(U) + 1487.50(LE)]
b)	Under Tendering	-	7	7	816.75	1498.65	-	845.55 [28.80(U + 816.75(LE))]
c)	Under DPR Preparation	-	4	4	574.75	1133.15	0.84	586 [11.25(U) + 574.75 (LE)]
d)	Under RLA Studies	-	2	2	96	-	-	96 [96(LE)]

Abbreviations:

MW – Mega Watt;

Res. – Restoration;

U – Upgrading;

LE – Life Extension

* Out of these 13 schemes, 10 schemes have been rescheduled for completion from XII Plan to XIII Plan.

XII PLAN COMPLETION PROGRAMME – STATE-WISE/ YEAR-WISE STATUS OF R&M OF HYDRO SCHEMES

(As on 30.09.2013)

State	Year 2012-13	Year 2013-14	Year 2014-15	Year 2015-16	Year 2016-2017
I-Schemes Completed					
Odisha	Rengali Unit-1, OHPC (1x50)= 50 MW	*Rengali Unit-2, OHPC, (rescheduled from 2012-13) (1x50)= 50 MW	-	-	-
Andhra Pradesh	Nagarjuna Sagar, APGENCO (1x110+ 7x100.8)=815.6 MW	2. *Lower Sileru, APGENCO (4x115)=460 MW (rescheduled from 2012-13)	-	-	-
Kerela	Idamalayar, KSEB (2x37.5)=75 MW	-	-	-	-
Sub Total I (Completed Schemes)	940.60 (3 Schemes)	510 (2 Schemes)	-	-	-
II-Schemes Ongoing					
Himachal Pradesh	-	*Bassi, HPSEB (4x16.5)=66 MW (rescheduled from 2012-13)		1. *Giri, HPSEB (2x30)=60 MW (rescheduled from 2014-15) 2. * Bhakra LB, BBMB, (2x126+3x108)=576 MW (rescheduled from 2014-15)	-
Jammu & Kashmir	-	2.*Lower Jhelum, J&KPDC (3x35)=105 MW (rescheduled from 2012-13) 3.*Sumbal Sindh, J&KPDC (2x11.3)=22.6 MW (rescheduled from 2012-13)	1.*Chenani, J&KPDC (5x4.66)=23.30 MW (rescheduled from 2013-14) 2. * Ganderbal, J&KPDC (2x3+2x4.5)=15 MW (rescheduled from 2016-17)	-	-
Uttar Pradesh	-	-	-	1. Obra, UPJVNL (3x33)=99 MW 2. Rihand, UPJVNL (6x50)=300 MW 3. Matatila, UPJVNL (3x10.2)=30.6 MW	-
Uttarakhand	-		*Pathri, UJVNL (3x6.8)=20.4 MW (rescheduled from 2013-14)		1. *Tiloth, UJVNL (3x30 MW)=90 MW (rescheduled from 2015-16) 2. *Khatima, UJVNL (3x13.8)=41.4 MW (rescheduled from 2014-15)

<u>State</u>	<u>Year 2012-13</u>	<u>Year 2013-14</u>	<u>Year 2014-15</u>	<u>Year 2015-16</u>	<u>Year 2016-2017</u>
Andhra Pradesh	-	*Srisailem RB, APGENCO (7x110)=770 MW (rescheduled from 2012-13)	-	-	
Karnataka	-	**Supa (2x50)=100 MW (Unit 1&2)	1.Sharavathy (Ph B), KPCL (10x103.5)=1035 MW 2. *Nagjhari, U-1 to 6, KPCL (6x135)=810 MW (rescheduled from 2013-14) 3.Bhadra River Bed units, KPCL (Unit 1&2) (2x12)=24 MW	-	-
Kerala	-	*Sabarigiri, KSEB, (1x60)=60 MW (rescheduled from 2012-13)	Poringal-kuthu, KSEB, (4x8)=32 MW	**Idukki 1 st stage, KSEB (3x130)=390 MW -	1. Sholayar, KSEB (3x18)=54 MW 2. Kuttiyadi, KSEB (3x25)=75 MW
Tamil Nadu	-	-	Periyar, TANGEDCO (2x35+2x42)=154 MW	-	Sholayar-I, TANGEDCO (2x35)=70 MW
West Bengal	-		*Jaldhaka St.I, WBSEB, (3x9)=27 MW (rescheduled from 2012-13)	-	Maithon, U-1&3, DVC (2X20)=40 MW
Odisha	-	-	-	1.* Hirakud-II, OHPC, (3x24)=72 MW (rescheduled from 2014- 15)	*Hirakud-I U5&6, OHPC, (2x37.5)=75 MW (rescheduled from 2014-15)
Assam	-	Kopili, NEEPCO (2x50) = 100 MW	Khandong, NEEPCO (2x25)=50 MW	-	-
Jharkhand	-	-	-	-	Panchet, U-1, DVC (1x40)=40 MW

Sub Total II (Ongoing Schemes) (Original)	559.60 (4 Schemes)	2054.70 MW (8 Schemes)	2083.40 MW (10 Schemes)	1238.35 MW (12 Schemes)	768.75 MW (8 Schemes)
Revised	0	1223.60 MW (7 Schemes)	2190.7 MW (10 Scheme)	1527.60 (7 schemes)	485.4 (8 Schemes)
Total (I+II) MW (Original)	2731.20 MW (10 Schemes)	2054.70 MW (8 Schemes)	2083.40 MW (10 Schemes)	1238.35 MW (12 Schemes)	768.75 MW (8 Schemes)
Revised	940.60 MW (3 Schemes)	1733.6 MW (9 Schemes)	2190.7 MW (10 Schemes)	1527.60 (7 Schemes)	485.4 (8 Schemes)

*** Schemes rescheduled during XII Plan.**

**** New schemes taken up for completion during XII Plan.**

HIMACHAL PRADESH - XIIth Plan Programme/Status of Renovation And Modernisation of Hydro Power Schemes
(Amount in Rs Crores)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING – Under implementation - STATE SECTOR (HPSEB)										
1.	Bassi 4x16.5 MW(Uprated) 4x15 MW (Original) HPSEB 1970-81 T&G - U-1: AEI, UK T&G - U-2 to 4: BHEL	119.83 (Rev. cost)	RMU &LE	60 (LE) 6(UR)	2013-14	155.33 (as on 31.07.13)	Agency: PFC / MOP Sanct. under AG&SP: 80.00. State Plan- 39.83 Disb: 10.161	Renovation, modernization, life extension and uprating of the units. Rewinding of generators with Class F insulation for their uprating from 15 MW to 16.5 MW each. Replacement of existing runners with high efficiency runner and governor. Replacement of existing XLPE cables to cater uprated load. Provision of SCADA. Construction of additional TRC for unit 1, improvement of water conductor system, dredging of silt accumulated in reservoir etc. ADDITIONAL WORKS: - Retrofitting of 13 nos.11/132 kV, 5.667 MVA, single phase Generator transformers. - Replacement of 9 nos. 132 KV ABCBs with SF6 Breakers. - Provision of CO ₂ system for Generator protection, automatic Breaking and Jacking system. FURTHER ADDITIONAL WORKS: - Replacement/machining of thrust collar of Units # 1&2. - Machining of generator shafts of Units#1&2. - Replacement of pole end plates along with pole assembly components of 5 Nos. poles of Unit-II.	- LOI for RMU&LE works has been awarded to M/s. VA Tech on 21.3.2007 at a contractual value of Rs.70 Crores. - Unit-4 commissioned on 29.3.2010 and running at uprated capacity of 16.5 MW after completion of retrofitting of generator transformer. - Unit-3 handed over on 02.09.2008 and RM&U works completed. While conducting pre-commissioning tests, the stator coils got damaged during OCC (open circuit characteristic) test on 17.6.2011. The machine has been re-commissioned and synchronized with grid on 4.8.2011. - Civil work related to modifications in tail race and construction of new cooling water sump have been completed - Unit 2 & 1 were handed over to firm for R&M on 9.11.2010 & 07.12.2010 respectively. Unit No. 2 was synchronized on 31.12.2011 and unit No.1 has been synchronized on 30.08.2012 and date of C.O.D. is 05.09.2012 at 16.20 Hrs. on 16.50 MW ADDITIONAL WORKS: - The order for retrofitting of GT has been placed on M/s Aditya Vidyut Appliances, Maharashtra on 27.11.2009. All the transformers have been retrofitted and received at site and its installation completed. - Work completed. - Work completed. FURTHER ADDITIONAL WORKS: - All works stand completed. However, Unit-4 has been again handed over to M/s. Andritz Hydro on 18.02.13 for replacement of Turbine Shaft & associated equipment. At present, the firm has dismantled the thrust collar top bracket roller & turbine shaft and the work has been held up due to non-availability of TGB and humidity protection cover. Unit's commissioning is expected by Feb'13.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING – Under implementation - CENTRAL SECTOR (BBMB)										
2.	Bhakra LB, BBMB 2x126+3x108 MW (Uprated) 1985 5x90 MW (Original) 1960-61 T - Hitachi, Japan G - Metropolitan Vickers, UK	489.77	RMU& LE	540(LE) + 90(UR)	2012-13 (Contract ual) 2015-16 (Anticipated)	238.53 (as on 31.08.13)	Agency: REC: For Punjab(PB), HAR, HP PFC: for RAJ Sanctioned Loan: RAJ:73.74 PB-245.43 HAR-177.84 HP:9.498 Disb.:(till 31.12.2012) PB-90.58 HAR-63.51 HP-2.58 (Till 31.03.2013 Raj- 35.55)	Turbine Replacement of runners, guide vanes, guide vane operating mechanism, GV pads, turbine shaft sleeve and coupling cover, head cover, shaft sealing box. Governor oil pr. Motor pump, aeration pipe, instrument panel etc. Generator Replacement of stator winding, stator core and frame assembly, rotor pole assembly, thrust collar, air coolers, thrust bearing pads, upper and lower guide bearings, upper and lower bracket, braking system, generator temp. monitoring panel, excitation system, slip ring, NGT etc. Aux. Control & protection panels, generator transformers, bus bars with CTs, PTs etc. LAVT cubicle, switchyard equipments, control cables etc.	- Contract agreements for RM&U works (Uprating of generating units from 108 MW to 126 MW) were signed on 21.11.2007 at a total cost of Rs. 489.77 Crores. This cost also includes Rs. 29.57 Crores towards the cost for replacement of turbine & generator shafts. But as per assessment of M/s. Hitachi, the condition of the shafts does not warrant replacement and BBMB has decided to retain the old shafts. The effective date of contract agreement/Zero date is 02.01.2008. The RM&U works for all the five units were to be completed in 59 months i.e. by 02.12.2012. - Model Testing of runner conducted at the works of M/s. Hitachi, Japan in June,2008 and acceptance has been given by BBMB. - First Unit (Unit 2) RM&U works on first unit (Unit 2) started w.e.f. 26.4.2010, with scheduled completion period of 210 days i.e. upto 21st November, 2010. Due to design and quality issues in Lower and Upper Brackets, mismatching of Bus Duct sections, in-adept handling of site issues and non-deputing of Project Manager, etc by M/s Andritz, completion of RM&U of the first Unit has got delayed. Further progress was hampered due to failure in four attempts of Spinning carried out on 10.07.2011, 01.08.2011, 05.10.2011 and 07.10.2011. The earlier informed schedule of commissioning in January, 2013 has not been achieved in view of the problem faced during commissioning test. The unit after R&M has been synchronized on 23.06.13. - 2nd Unit i.e. Unit no. 5 was under shut down for RM&U works since 11.4.2011 with scheduled completion by 6th November, 2011. Mechanical run was successfully carried out on 28.08.13 and unit synchronized on 07.09.2013. - Third Unit (Unit 4) Due to delay in the commissioning of the first and second units, work on the third Unit has not been taken in hand. The Generator transformer (from M/s CGL) has been received at site. Third unit shall be taken up for R&M in mid November'13 with seven months completion schedule. Turbine material has been received from Japan. Numerical protection panels from M/s ABB have been received. All three segments of stator frame have been shifted to power house & are under process of cleaning. Inspection of stator bars, thrust bearing oil coolers, lower & upper Bracket, internal components of brake jack shall be carried out in October, 2013. - Due to delay in the commissioning of the first and second units by M/s Andritz, the revised overall schedule for the remaining units is likely to be as under: a) 3rd Unit (Unit No.4) June, 2014 b) 4th Unit (Unit No.3) February, 2015 c) 5th Unit (Unit No. 1) October, 2015	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING – Under Tendering -- STATE SECTOR (HPSEB)										
3.	Giri, 2x30 MW HPSEB 1978 T&G - BHEL	47.80	RM&LE	60(LE)	2015-16	Nil	Agency: PFC	Brief description of work proposed to be undertaken are as given below:- Civil works: Protection works on left bank of upstream side of barrage, Repair of power house building and Strengthening of cable tunnel. etc. Mechanical works: Replacement of Guide vanes with stainless steel guide vanes of Unit -I, Overhauling of MIV, Replacement of Governors with modern digital hydraulic governors, Revamping of Cooling water system, Provision of online discharge measurement and head measurement for both machines. Electrical works: Replacement of 11 KV PILCA cable with solid bus duct, Overhauling of 2x40 MVA, 11/132kV generator transformer and Unit auxiliary transformers, Replacement of Control and Protection panels, Replacement of rotor field windings with class "F" Insulation and complete Overhauling of Generators, Replacement of semi-static exciter system by static excitation system. Replacement of ABCBs with SF6 breakers, Replacement of 33 kV MOCB with SF6 breaker or VCBs, Replacement of Batteries and battery charging equipment, etc.	Administrative approval and Expenditure sanction of Rs.34.80 Crore given by Board Management vide letter dated 03.10.2012. Loan sanctioned by PFC vide letter dated 20.03.13. Agreement with PFC to be tied up shortly. Proposed to be awarded to BHEL which may take further 3 months. Completion period is about 2 years from date of award of work.	

JAMMU & KASHMIR - XIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs. Crores)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II – SCHEMES ONGOING - Under implementation - STATE SECTOR (J&KPDC)										
4.	Chenani 5x4.66 MW J&K PDC 1971-75 T&G - Ganz Mavag, Hungary	34.94 (Rev.)	RM & LE	23.3 (LE)	2014-15	7.09 (as on 30.09.13)	Agency: PFC / NRE & State equity	Turbine: Procurement of 4 nos. Runners and re-conditioning of spherical valves, replacement of Governors, Overhauling of BF valves, Penstock, Saddle Blocks Generator Change of Stator Windings with Class F insulation, Generator Cooling system, new 125 KVA DG set Protection Replacement of D.C. System, 6.6 /132 KV switchyard equipments, spares for Generating units etc. Auxiliary System Procurement and Re-conditioning of Gate & Gearings, Repairing of CO2 Plants and Trash Rack Civil Improvement/restoration in water conductor system, construction of retaining walls/breast walls and toe walls of service road, Desilting of Forebay, Channelization of River, Nallah Training Works.	Work of replacement of Runners and governors awarded to Ms. Andritz Hydro Ltd. 4 no. runners received and coating with high velocity oxy fluid completed. Work on EHG installation in process. Change of stator winding insulation completed for M/c No.5&1. Reconditioning of spherical valve for machine no.5 completed and for balance 4 nos. under progress. New 125 kVA DG set installed. Overhauling of BF Valve, construction of trash racks, fencing of tail race, erection of 12 no. isolators and rewinding of 5 MVA Transformer in s/yard under progress. Replacement of MoCBs with SF6 breakers, Replacement of water and oil coolers, reconditioning of gates, trash racks, repair of CO ₂ plant completed. Remaining works are still to be awarded. River channelization works, Nallah retaining works completed. 25% of improvement of water conductor system work completed. Alternate proposals in place of replacement of damaged wooden flume members being worked out. Desilting of forebay completed and 95% of forebay tank lining completed. Balance to be completed during shutdown.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II – SCHEMES ONGOING - Under implementation - STATE SECTOR (J&KPDC)										
5.	Sumbal Sindh (Upper Sindh Stage-I), 2x11.3 MW J&KPDC 1973-74 T&G - BHEL	45.92 (Rev.)	R&M	-	2013-14	25.14 (as on 30.09.13)	Agency: PFC / MOP Sanct. under AG&SP : 16.00 Disb: Nil (till 31.12.2007)	Turbine Replacement of Governors, overhauling of MIVs, reconditioning of Turbines. Generator Procurement of Stator Air Coolers Protection System Replacement of MOCBs by SF6 Breakers. D.C. System, 11 KV & LT Switchgears etc. New 11 KV cables and procurement of a new 200 KVA Servo Voltage Stabilizer. Auxiliary System Replacement of Cooling Water System, Gate Valves and Non Return valves, re-orientation of power communication lines. Civil Civil works in headrace channel/Sumbal Power Canal, construction/strengthening of damaged Sumbal Spillway, Escape channel, protection work of various Nallahs, etc.	All E&M works planned under this scheme have been completed by BHEL except some additional works like re-conditioning of LT switchgear, replacement of MOCBs and ABCBs by SF6 Breakers, extension of 11 kV line, replacement of existing excitation system by static excitation and modification of pump housings. Major civil works have been completed.	Due to canal capacity restriction between BR-I & BR-II (9 km), only 14 MW generation was possible against installed capacity of 22.6 MW. After R&M, firm generation shall increase to 17 MW.

S. N.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II – SCHEMES ONGOING - Under implementation - STATE SECTOR (J&KPDC)										
6.	Lower Jhelum, 3x35 MW J&KPDC 1978-79 BHEL (T&G)	126.41 (Revised)	R&M +Res.	15 (Res.)	2013-14	83.65 (as on 30.09.13)	Agency: PFC :70% State Govt:30%	Turbine: New Turbine Runner, Guide Vanes, MIV's renovation, Replacement of Governor. Generator: Stator and Rotor windings with class F insulation Protection: D.C. controls of protection system, cooler nests of transformer Auxiliary System Auxiliary supply & illumination system, Communication & fire fighting system, renovation of crane, procurement of DG set, battery banks and battery charger. New trash rack system etc. Civil Water conductor, log boom structure on river Jhelum near Sheri Barrage, Cross Drainage works, approach/service roads along water conductor. De-silting of BR & forebay, escape and spill channels, base facilities like colony, water supply, sanitary building etc.	RMU of units # 1 & 3 completed. Work of replacement of under water parts of unit II was completed by M/s. BHEL. Other works under execution/tendering are reconditioning of Rotor Field Coils of Unit-2 with Class "F" Insulation, procurement and installation of fire fighting system, illumination inside Power House, Replacement of 250 KVA Auxiliary Transformers, Procurement/Installation of equipment for remote/auto operation of penstock gates of forebay, Procurement/Installation of equipment for remote/auto operation of dewatering pumps, reconditioning of penstock gates, replacement of inlet/outlet HP pipes of unit-II, reconditioning of spare 2 no. servo motors of MIV, replacement of all obsolete induction motors by new motor with higher capacities and reversible starters of gates at barrage, escape channel, forebay etc. Restoration of log boom structure at sheri-baramulla upstream of head regulator, stabilization/renovation of canal & pillway, desilting of Balancing power house building, renovation of canal inspection road, restoration of suspension bridge at preenia have been completed. Other civil works are under progress.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II- SCHEME ONGOING - Under Implementation - STATE SECTOR (J&KPDC)										
7.	Ganderbal, 2x3 MW+ 2x4.5 MW J&KPDC 1955 (3 MW m/cs) & 1963 (4.5 MW m/cs) 3 MW m/cs – T&G - Escherwyss, Germany 4.5 MW m/cs – T&G - Ganz Mavag, Hungary	34.65 (Revised)	RM&LE	9 (LE)	2014-15	9.51 (as on 30.09.13)	Agency: I. PFC/ MOP Sanct. under AG&SP: 24.00 Disb: Nil II. MNES Sanctioned: 10.00 Disb: 0.55 (till 31.12.2007)	Turbine: Replacement of existing Turbine by modern Horizontal Turbines, existing MIVs by new MIVs, Governors by Electronic Governors, overhauling of hydro-mechanical equipment i.e. Butterfly valve, penstock, PRVs, MIVs, Oil Pressure Pants, H.P. Compressors. General: Replacement of existing generators with new generators with class F insulation and with Static Excitation System, replacement of Generator Transformers, ACR, Fire Protection System, Protection System, Replacement of existing switchgear, MOCBs/OCBs with VCBs or SF6 breakers, replacement of control and power cables, CTs & PTs etc., 110 Volt 300 AH Battery bank Auxiliary System Cooling water system, DC Distribution Unit Control Board, Re-conditioning of Trash rack etc. Civil Works Improvement in Head Works, remodeling of Ganderbal Power Canal, construction of desilting basin, improvement and remodeling of cross drainage works, construction of catch water drains, breast walls etc.	Repairs of units I & II completed to provide generation during execution of RM&U works of units III & IV. J&KPDC have informed that four bids have been received for the work of dismantling of existing 2x4.5 MW units and installation of new 2x4.5 MW unit including transformer, switchgear, MIV etc. but two firms could not qualify due to non submission of requisite documents. Hence tendering process was cancelled and fresh bids were invited. Financial pre check and evaluation under progress. Erection works of 11 kV feeder alongwith substation is under progress. Overhauling of hydro-mechanical equipment i.e. Butterfly Valve, Penstock, PRV's MIV's Oil Pressure Parts, HP Compressors and Gates is under progress. Major Civil works completed & balance works expected to be completed by December, 2013.	Due to upcoming New Ganderbal HEP (93 MW) (NGHEP), only 9 MW generation will be possible post NGHEP. As such, 2x4.5 MW machines are being replaced & after RM&U power house shall generate 9 MW.

UTTARAKHAND - XIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs. Crores)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Implementation - STATE SECTOR (UJVNL)										
8.	Pathri, 3x6.8 MW UJVNL 1955 T - J.M.Voith, Germany G - Siemens, Germany	92.86 (without IDC) 105.62 (with IDC)	RM&LE	20.4 (LE)	2014-15	42.19 (As on 30.06.2013)	Agency: MNRE Grant- Rs 12.5 Crs PNB loan - Rs 65.00 Crs	Replacement of runner, rehabilitation of generators, installation of intake hoisting arrangement, installation of DT gantry crane, 11 kV Circuit Breakers, control protection and instrumentation, governors, pumps and life extension of units based on RLA studies. Replacement of Switchyard equipment, instrumentation, governors, pumps and life extension of units based on RLA studies.	UJVNL informed that the RM&LE works were awarded to M/s Andritz Hydro on 09.03.2010 with a completion schedule of 36 months. Ist unit i.e. unit no. 3 was given to contractor for reverse engineering on 02.05.2010 and which have since been completed by the firm. Based on reverse engineering some addition items such as top cover, Shaft etc. have been included in the scope and LOI for same was placed on 24.05.2011. Presently, detail drawings of stator winding, transformer, electrical single line diagram, drainage & dewatering system, turbine components, earthing details, SEE etc have been approved by UJVNL. The Ist unit i.e. unit-3 was handed over for RM&LE works on 06.10.2011. R&M works common for all three units have been completed. Mechanical spinning of the unit-3 was done on 08.10.2013 and is likely to be commissioned by October, 2013. The likely commissioning of IInd unit and of IIIrd unit which were handed over for RM&U in April'2013 & May'2013 is by May & June, 2014.	
9.	Khatima, 3x13.8 MW UJVNL 1955(U-I&2) 1956(U-3) T & G – English Electric, UK	215.83 (without IDC) 256.77 (with IDC)	RM&LE	41.4 (LE)	2016-17	19.52 (as on 30.06.2013) Including 17.26 Cr. advance	Agency: PFC	Upgradation of machines, rehabilitation of Generators, modification of control, protection & instrumentation, construction of new bypass, enhancement of Nagla escape channel capacity and repair of TRC etc. through UPID.	UJVNL informed that Board has approved the DPR on 11.02.2008. UJVNL decided to complete the Electro Mechanical (E&M) works for which tenders were invited on 25.02.2011. Five firms participated & prebid held on 16.03.2011 & 27.04.2011. Contract for Electro-mechanical & Hydro mechanical works signed with JV of M/s Alstom (India) & M/s PES Engineers Pvt. Ltd. on 3.1.12 with the completion period of 36 months. Repair & refurbishment of EOT crane has been completed on 17.08.2012. RMU works of Unit-1 started on 01.10.2012. Unit has been completely dismantled & reverse engg. Report submitted by executing agency. Based on condition of components, some additional components are being considered for replacement. Turbine shaft taken to the works of M/s AIL and found OK. Certain components of turbine are to be replaced which were found unrepairable after dismantling & order for same is likely to be placed by 15.11.2013. One set of new Draft tube gates, 132 kV & 33 kV CTs, PTs & LAs, cables, Isolators and UATs have been supplied. Civil works is being carried out through Deptt. of Irrigation, Uttar Pradesh. Likely commissioning of unit-1 by March, 2015 & remaining units by Dec., 2015 & Sep, 2016.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Tendering - STATE SECTOR (UJVNL)										
10.	Tiloth, 3x30 MW UJVNL 1984 T&G - BHEL	122.73 (without IDC) 126.23 (with IDC)	RM&LE	90(LE)	2016-17	NIL	Agency: To be tied up	-Refurbishment of turbine, three nos. new runners & one spare runner, new sets of guide vanes. Repairing of various gates and gantry cranes. -Refurbishment of generators with new F class insulated stator & rotor winding. New SEE, Replacement of ABCBs by SF6 breakers, 11 kV Switchgear. Installation of numerical type protection system. -Civil works of barrage, power channel, power station & Tail race channel	Under an agreement signed with KfW, Germany, a grant of 1.61 Million Euro for carrying out feasibility studies, preparation of DPRs and technical specifications was to be given. The contract agreement was signed on 5.3.2008 between UJVNL & Lahmeyer International GmbH, Germany for the above works for about Rs.4.00 Crs. plus 2.00 Million Euro. Final DPRs alongwith Project Design Documents of all six schemes and draft technical specifications of Dhakrani & Kulhal were submitted by the consultant. Subsequently KfW funding was withdrawn in meeting at DEA, New Delhi on 10.10.2012. Board in its, 67 th BoD accorded approval for cancellation of KfW funding. Specifications have been prepared afresh on the basis of past experience of other ongoing RMU projects of UJVNL Ltd. DPR is being revised in view of the revised scope of works. Approval of pre-qualification criteria by competent authority is under process. Proposal for taking up RMU of Tiloth HEP has been considered by UJVNL Board in its 68 th meeting held on 27.09.2013 and action shall accordingly be initiated.	

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S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Tendering - STATE SECTOR (UJVNL)										
11.	Chilla (Ph-B), 4x36 MW UJVNL 1980(U-1 to 3) 1981(U-4) T&G – BHEL	337.00	RMU&LE	28.8 (U) + 144 (LE)	2018-19	NIL	Agency: To be decided.	- Replacement of existing Kaplan turbine with propeller turbine and their complete auxiliaries, refurbishment of existing generators, enhancement of plant discharge capacity. - Uprating from 4x36 MW i.e. 144 MW to 4x43.2 i.e. 172.8 MW.	UJVNL informed that under phase I, DPR has been prepared by M/s SNC Lavlin which has been approved by the Board. The Financial tie up was done on EDC line of credit for this scheme and agreement was to be signed between GoU and Canadian Commercial Corporation (CCC). Under Phase II, Order was to be placed on M/s SNC Lavlin for execution of RM&U works. The approval of revised recommendation regarding phase II agreement was submitted to GoU in November, 2012. GoU has decided not to go ahead with present arrangement. Signing of agreement of Phase II has been cancelled on 28.03.2013. Nigam is initiating action for taking up RMU at its end. Revalidation of DPR is to be done by AHEC, IIT Roorkee and based on same, required changes in specifications are proposed to be taken up under the committee constituted by Managing Director, UJVNL Ltd.	
12.	Dhakrani, 3x11.25 MW UJVNL 1965-70 T - Litostroj, Yugo. G - Rade Konkar, Yugo.	113.18 (without IDC) 116.41 (with IDC)	RM&LE	33.75 (LE)	2017-18	NIL	Agency: To be decided	-Refurbishment of turbine, new runner blades, new governors, new sets of guide vanes. Repairing of various gates and gantry cranes. -Refurbishment of generators with new F class insulated stator & rotor winding. New SEE, Replacement of ABCBs by SF6 breakers, 11 kV Switchgear. Installation of numerical type protection system. -Civil works of barrage, power channel, power station & Tail race channel	- NIT has been published on 23-11-2011. - Following the decision taken in 67th BoD meeting to cancel KfW loan, proposal for the consideration of UJVNL Limited Board has been put up for cancellation of Notice Inviting Bids (NIBs) for RMU of Dhakrani and Dhalipur HEPs and accord approval for inviting fresh bids on NCB route through domestic funding. - RMU of various projects is to be taken up in phased manner.	
13.	Dhalipur, 3x17 MW UJVNL 1965-70 T - Litostroj, Yugo. G - Rade Konkar, Yugo	113.71 (without IDC) 116.81 (with IDC)	RM&LE	51 (LE)	2017-18	NIL	Agency: To be decided	-Refurbishment of turbine, three nos. new runners & one spare runner, new sets of guide vanes. Repairing of various gates and gantry cranes. -Refurbishment of generators with new F class insulated stator & rotor winding. New SEE, Replacement of ABCBs by SF6 breakers, 11 kV Switchgear. Installation of numerical type protection system. -Civil works of power channel, power station & Tail race channel.		

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Tendering - STATE SECTOR (UJVNL)										
14.	Kulhal, 3x10 MW UJVNL 1975 T&G - BHEL	115.44 (without IDC) 118.72 (with IDC)	RM&LE	30(LE)	2017-18	NIL	Agency: To be decided	-Refurbishment of turbine, new runner blades, new governors, new sets of guide vanes. Repairing of various gates and gantry cranes. -Refurbishment of generators with new F class insulated stator & rotor winding. New SEE, Replacement of ABCBs by SF6 breakers, 11 kV Switchgear. Installation of numerical type protection system. -Civil works of barrage, power channel, power station & Tail race channel	• Tender was floated on 25-03-2011. • Techno commercial portion of the Bids were opened on 30.03.2012. In compliance with decision of UJVN Board in its 67th meeting dated 07.08.2013, KfW funding has been cancelled. UJVN Board in its 68th meeting held on 27.09.2013 decided to proceed with evaluation of old bids already received rather than going for re-tendering. Evaluation under progress.	
15.	Chibro 4x60 MW UJVNL 1975 (U-1 to 3) 1976 (U-4) T&G – BHEL	180.61 (without IDC) 184.88 (with IDC)	RM&LE	240(LE)	2019-20	NIL	Agency: To be decided	-Refurbishment of turbine, four nos. new runners & one spare runner, new sets of guide vanes. Repairing of various gates and gantry cranes. Major overhauling of EOT crane. Replacement of trash rack & provision of trash cleaning mechanism -Refurbishment of generators with new F class insulated rotor winding. Replacement of 220 kV oil filled cable by XLPE cable. Replacement of ageing parts of 220 kV & 33 kV Switchyard, 220 kV ABCBs by SF6 circuit breakers, 11 kV Switchgear. Installation of numerical type protection system. -Civil works of Dam, HRT, Surge tank, Power Station	• Board in its 67th BoD has accorded approval for cancellation of KfW funding. KfW funding has already been withdrawn for these projects as per decision taken in meeting in DEA on 10.10.2012 and confirmed by JS, DEA vide letter 18.10.2012. Further action shall be taken accordingly. • RMU of various projects is to be taken in phased manner.	
16.	Khodri 4x30 MW UJVNL 1984 T&G – BHEL	165.85 (without IDC) 169.63 (with IDC)	RM&LE	120(LE)	2019-20	NIL	Agency: To be decided	-Refurbishment of turbine, four nos. new runners & one spare runner, new sets of guide vanes. Repairing of various gates and gantry cranes. -Refurbishment of generators with new F class insulated stator & rotor winding. Replacement of ABCBs by SF6 breakers, 11 kV Switchgear. Installation of numerical type protection system. -Civil works of power station, HRT, TRC & surge shaft		

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Tendering - STATE SECTOR (UJVNL)										
17.	Ramganga 3x66 MW UJVNL 1976 T&G-BHEL	360.83 (without IDC) 455.20 (with IDC)	RM&LE	198 (LE)	2017-18	-	To be decided	Replacement of runner, rehabilitation of generators, installation of intake hoisting arrangement, installation of DT gantry crane, 11 kV Circuit Breakers, control protection and replacement of Switchyard equipment, instrumentation, governors, pumps.	DPR for RMU has been prepared in house and same has been reviewed by AHEC, Roorkee. DPR has been approved by UJVNL Board on 13.09.2012. Specifications have been proposed and have been got reviewed from AHEC, IIT, Roorkee. Pre-qualification criteria has been approved. Tender for RMU on turnkey basis has been uploaded on e-portal on 27.08.2013. Pre-bid meeting held on 10.10.2013. and contract is scheduled to be awarded by Dec, 2013.	

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(Amount in Rs. Crs.)

S. No	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under implementation - STATE SECTOR (UPJVNL)										
18.	Obra 3x33 MW UPJVNL 1970 (U-1&2), 1971 (U3) <u>U-1:</u> T - AEI, UK G - BHEL <u>U-2&3:</u> T&G - BHEL	43.14	RM&LE	99 (LE)	2015-16	14.84 (as on 30.09.13)	Own resources	Replacement of: - Stator cores, Stator & Rotor Coils with class F insulation - Spider arms of Generator Rotors - Stator water coolers, cooling water system etc. - Existing Governors & Excitation System - Existing Control, Metering & Instrumentation Protection System - Existing 132 KV CB/CT/PT & LA <u>Rehabilitation/Refurbishment of:</u> - Draft tube, spiral casing, runner & its chamber, guide vanes, stay vanes etc. cover assembly. - Stop logs, intake gates & draft tube gates etc. <u>SCADA</u>	The R&M scheme has been appraised by CEA for an estimated cost of Rs. 58.80 crores. On account of high offer of BHEL (OEM) and present satisfactorily running of m/cs, Nigam decided for completion of only essential R&M works through Pvt. Contractors. UPJVNL have revised the estimated cost to 43.14 Crs. The following works have been completed. i) Replacement of stator winding with class F insulation of m/c. no.3 completed ii) Governor (3 nos.) replaced & commissioned. iii) Supply, erection, testing & commissioning of 132 KV circuit breakers. iv) Replacement of stator & rotor ple winding, overhang support ring & stator core, control & protection of Generator, GT & UAT ,oil of GT & UAT for unit 2 completed. v) One set of Generator air cooler procured & commissioned. vi) Re-tubing of thrust bearing cooler of all 3 m/c completed vii) Replacement of spider arm of m/c. no. 3 & m/c no. 1 completed. viii) Replacement of Governor oil pumps. ix) Replacement of underwater Ms pipeline in intake gate by SS pipeline. x) Replacement of existing transformer oil of GT & UAT for unit 2 & 3 completed. xi) Replacement of draft tube gates of nit 3 completed. xii) Replacement of cable of tainter gate and Dam top Ganty crane. Refurbishment of intake gate crane, replacement of control & protection system of 8 nos. 132 kV feeders & 2 nos. station transformers is under progress. Replacement of stator core & coil, replacement of dynamic excitation with static excitation system, Refurbishment of generator coolers of machines, Replacement of control & protection of generator, GT & UAT (unit 1&3), supply & replacement of 132 kV Bus Bar, metering instruments, station transformers, 132 kV CTs & PTs, lightning arrestors, renovation of fire extinguishing system & new elevator for power house are yet to be taken up. R&M works of unit 3 are under progress and likely to be completed by Dec' 14. R&M works of unit 1 & unit 2 are likely to be completed by May, 2014 & Dec' 2015 respectively.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under implementation - STATE SECTOR (UPJVNL)										
19.	Rihand, 6x50 MW UPJVNL 1962 (U-1to5) 1966 (U-6) T&G - EE, UK	132.20 (Revised)	RM&LE	300 (LE)	2015-16	76.95 (as on 30.09.13)	Own resources	- Replacement of stator core, stator & Rotor coils insulation with Class F. - Replacement of insulation of field coils with Class F - Replacement of Governors - Replacement of excitation equipment, 67.5 MVA generating transformers by 75 MVA transformers, switchyard equipments, Bus bars and under water parts - New Air Cooler and Ventilation system	Works completed: - Re-insulation of field pole of m/c No.6 - One set of generator air cooler was procured and commissioned. Another set of generator air cooler was modified and commissioned. - Supply & Commissioning of 132 kV, 33 KV CTs & PTs, CBs, 11kV switchgear and XLPE cable for switchyard completed. - 12 Nos. governor oil pumps commissioned. A.C. Plant (2x40T) commissioned. - Supply & work of battery, charger & DCDB completed. Supply order of copper bus bar completed. 500kVA transformer (8 Nos.) commissioned. One No. GT supplied by EMCO has been commissioned. - Repair works of various gates completed. - Repair & overhauling of 100/20MT Dam Top Gantry Crane and EOT crane, reservoir water level sensor - 132kV SF6 Breakers, emergency trip unit for 132kV breakers. - Overhauling of intake gate along with alignment of T-guide and their hoisting for unit-4 & 3 completed. - R&M works of unit no. 5 completed & M/c commissioned on 16.04.2011. - Electronic part of 6 governors received and HMC of 2 units received. - SEE of all units received. One unit commissioned. - Water leakage from penstock expansion joint of unit 5 arrested by filling semi-viscous fluid on required pressure. - Erection of 132 kV CT, PT and 500 kVA unit transformers. - Supply of control cable for switchyard equipment, silicon rubber disc insulator, power cable for auxiliary equipment. Works under Progress - R&M of m/c – unit no.4 was re-commissioned on 11.12.2005 and was running on full load till 15.11.2006 when it's stator & rotor windings got damaged due to D.C. failure. Order for Turbine, Generator & associated aux. placed on BHEL. R&M works now expected to be completed by December, 2013. - R&M of Unit No. 1, 2, 3 and 6 shall be taken up subsequently and expected to be completed by Jan'15, Aug'14, May'14 & July'15 respectively.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Implementation - STATE SECTOR (UPJVNL)										
20.	Matatila, 3x10.2 MW UPJVNL 1965 T - Hitachi, Japan G - Toshiba, Japan	10.29	RM & LE	30.6 (LE)	2015-16	1.47 (as on 30.09.13)	Own Resources proposed	Replacement of: 1. Governors 2. Static Excitation System 3. Control Protection & Metric(ng) System for all three M/Cs 4. Repair of Generator air cooler including re-tubing. Generator Stator Cooler, cooling water supply and return header 5. Ventilation fans 6. Refurbishment of DC & AC System 7. Supply & erection of 4 Nos. 25 HP Electric Submersible Dewatering Pump 8. Procurement and erection of 2 Nos. 500 PSI Air compressor for Governing & braking system 9. Procurement of 1 No. Electrostatic liquid cleaner & 1 No. Low vacuum dehydration unit 10. 5 Nos. 300 KVA, 11/0.4 KV Transformer for UAT & Station supply 11. G.C. sheets of roof of Power house building including tarfelting. Rehabilitation Refurbishment of: 12. Generator Air Coolers including retubing 13. Power House building's submerged walls with water proof cement and provision of smoke/fire detection system.	RLA studies done by BHEL (for E&M works) and AHEC, IIT Roorkee (for civil works). DPR for RM&LE works has been prepared and submitted to Board for approval with only need based R&M works. Board approval received. Repair of Generator Air Coolers, smoke fire detection system, replacement of UATs and SATs, replacement of stator cooling water supply and return header for unit 1 and 3, erection of 4 nos. 25 HP submersible dewatering pumps, erection of 2 nos. 500 PSI air compressor for governing & braking system and replacement of power house building ventilation fans completed. Replacement of stator cooling water supply & return header for unit 2 and treatment of power house building's walls (submerged portion) by water proof cement is under progress. Erection of digital governor & static excitation system, renovation of instrumentation system, refurbishment of DC & AC system, replacement of existing control, protection and monitoring system by Numeric/Static protection is yet to be taken up. 1 st , 2 nd & 3 rd unit's works are likely to be completed by Mar'16, Mar'14 and Mar'15 respectively.	

ANDHRA PRADESH - XIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
I - SCHEMES COMPLETED - STATE SECTOR (APGENCO)										
21.	Nagarjuna Sagar Ph.I 1x110 + 7x100.8 MW, APGENCO 1978-85 Unit-1: BHEL (T&G) Units 2 to 8: T - Hitachi, Japan G - MIT, Japan	33.35	R&M	-	2012-13	13.90 (as on 31.03.2012)	Agency: PFC / MOP Sanct. under AG&SP: 26.68 Disb: 3.98 (till 31.12.07)	1. Capital overhaul of units 2. Provision of Public address system. 3. Replacement of static excitation system of unit -1. 4. Renovation of generator components like insulation material, pole coils, carbon brushes, brake pads etc 5. Replacement of turbine components i.e guide vane housing/bushes etc 6. Self lubricating bushes. 7. Provision of ventilation system. 8. Procurement of 220 KV SF6 Breakers and other switchyard equipments 9. Replacement of governor of U-1. 10. Unit automation works.	1. Completed. 2. Completed 3. Completed 4. Completed 5. Completed. 6. Completed. 7. Completed 8. Completed 9. Completed 10. Completed	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
I - SCHEMES COMPLETED - STATE SECTOR (APGENCO)										
22.	Lower Sileru, 4x115 MW APGENCO 1976-78 <u>Units 1&2:</u> T - LMW, USSR & G – Electrosila, USSR <u>Units 3&4:</u> T&G - BHEL	8.75	R&M		2013-14	6.77 (as on 30.09.13)	Agency: PFC / MOP Sanct. under AG&SP : 7.00 Disb :6.8 (till 31.03.13)	1. Procurement of Alarm and annunciation panels, Auto synchronizer panels 2. Renovation of protection system of units & feeders, Replacement of ABCB's, Procurement of 0.2 Class Bus PTs 3. Repair/ Replacement of cooling water pumps gen. transformer, control panels, compressor control panels and dewatering control panels and dewatering pumps 4. Repair of Shut Off Rotary Valves, 25 Ton Gantry Crane, Draft tube gates. 5. Retubing of stator air coolers and oil coolers 6. Temperature scanners 7. 220V Lead acid battery set along with battery charger 8. Replacement of D.C. Distribution board and procurement of A.C. emergency board 9. Renovation works on Unit no. I & IV 10. Renovation of HP & LP compressor systems 11. Repair of 42.5 MVA TELK make single ph. GT 12. Renovation of Excitation System 13. Repair & rehabilitation of thrust bearing pads 14. Capital overhaul of Unit 2 15. Procurement of 4 nos., 1 MVA UATs 16. Supply of Static Excitation System spares for all units (except unit-3) 17. Generator numerical protection relays for all units	All activities under 1 to 17 have been completed.	

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Implementation - STATE SECTOR (APGENCO)										
23.	Srisailem R.B. 7x110 MW APGENCO 1982-87 <u>U-1 to 7:</u> T&G - BHEL	16.70	R&M	-	2013-14	6.74 (as on 31.03.2012)	Agency: PFC / MOP Sanct. under AG&SP: 13.36 Disb.:6.74 (till 31.03.13)	1. Capital overhaul work of all the seven units 2. ERW pipes for mulsifire system. 3. Procurement of motorized valves for cooling water system 4. Procurement of CTs & CVTs. 5. Procurement of dry type excitation transformer 6. Procurement of normal & anti fog type Insulators 7. Procurement of 6 KL transformer oil filtration plant 8. Procurement of 20 KM ACSR conductor 9. Automation of generation unit through SCADA and DCS for single push button operation	1. Completed. 2. Completed. 3. Completed 4. Completed. 5. Completed 6. Completed. 7. Completed 8. Completed Balance works 9. Material received at site. Automation works of units shall be taken up in a phased manner based on availability of LC on units after Nov'2013.	

ANDHRA PRADESH - XIIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

II- SCHEMES ONGOING -Under DPR Approval - STATE SECTOR (APGENCO)										
24.	Machkund, 3x17 MW (St.-I) & 3x21.25 MW (St.-II) APGENCO 1955-56 (St.-I) & 1959 (St.-II) St.-I: T - M.Smith, USA G - W.House,USA St.-II: T - J.M.Voith, W. Germany G - BBC, Germany	124.45	RMU & LE	114.75 (LE) + 5.25 (UR)	XIII Plan	-	Agency: Yet to be decided	1. Replacement of runner and refurbishing out of associated equipment, 2. Digital speed governor, 3. Replacement of generator components and excitation system, 4. Replacement of existing breakers and switchyard equipments, 5. Reconditioning of MIVs. 6. Replacement of Protection & Control equipment. 7. Replacement of turbine and other auxiliary equipment	The draft modified supplementary agreement was prepared according to the decisions arrived in the meeting dated 28.4.2010. APGENCO Board accorded approval and directed to obtain the views/remarks of Chief Engineer (Inter-State), I&CAD, Andhra Pradesh. CE, I&CAD has informed the clauses of inter-state agreement on irrigation and stated that the same may be considered as view of irrigation department. There are no objections from irrigation wing to carry out R&M works on Machkund units and the first clause of inter-state agreement on irrigation specified the right to use Machkund water for power development. The draft modified agreement was then sent to Energy department, Govt. of Odisha for approval to proceed further on RM&U works. High level meeting was held between officials of Odisha and A.P. on 27 th & 28 th May 2013 to resolve the various issues pertaining to Machkund HES. The OHPC has proposed modifications on certain clauses on Modified Agreement and the same was agreed to by GOAP/APGENCO. After signing of minutes of the meeting dated 27.05.2013, the signing of draft modified agreement will be initiated to proceed further on R&M works.	Three of the six units each rated at 21.25 MW are proposed to be uprated to 23 MW.

KARNATAKA - XIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Implementation - STATE SECTOR (KPCL)										
25.	Bhadra River bed units, KPCL 2x12 MW (Unit-1&2)	28.015	R&M	-	2014-15	4.848 crores (as on 30.09.2013)	MNRE has sanctioned financial assistance of Rs.6.81 crores out of which 1.70 crores has been received. Balance requirement to be met from own funds.	Replacement/Refurbishment of Turbine & associated equipment as below: Refurbishment of Turbine & Auxiliaries 1) Replacement of BF valve, TGB, Guide vanes, Rubber hub, Top cover, Vacuum break valve, Air compressor system, 11 kV cables, CW Pipelines Gov oil pipes, Brake pads, Rotor lead etc. 2) Refurbishment of Guide vane servo motor, Runner servo motor, Turbine shaft, Runner cross head, pivot ring etc. Refurbishment of Generator & Auxiliaries 1. Supply and replacement of stator with epoxy coils. 2. Supply and replacement of exciters with SEE. 3. Replacement of governors. 4. Replacement of electromagnetic relays with digital relays.	Contract agreement executed by M/s Andritz Hydro Pvt. Ltd. on 10.12.2009 for R&M works. Contract Agreement for addl. Works executed on 21.09.2012 A. Dismantling, cleaning & pressure testing of generator air coolers completed. Generator Dismantled including removal of LGB, Stator, rotor from pit. B. CW pipelines for governor oil cooler & generator bearing coolers received. C. Drawings for BF valve finalized. D. Despatch clearance for 11 kV XLPE cables. CW Piping and cyclone separator. Erection completed. E. Turbine-Drawings under finalization. F. Refurbishment and testing of pivot ring & DP test of welded portion completed. G. Pr. testing of stator oil cooler tubes, OPU coolers completed. H. Turbine shaft & rotor Turbine leads arrangement drg. Finalized. Turbine shaft seal drg. approved. 2 nos. Turbine shafts received at site after refurbishment. I. Supply of governor oil pipes, bearing oil pipes and supply of level switches, relay starters for automation of drainage dewatering system received. Tenders were floated for following works: 1. To be reviewed whether required or not. 2. Work awarded to M/s ABB Ltd. 3. Work awarded to M/s Andritz Hydro Ltd. 4. Work awarded to M/s Alstom Ltd.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
26.	Supa 2x50 MW, KPCL 1985 (unit 1&2) T&G-BHEL	3.45	R&M	-	2013-14	3.88 (as on 31.03.13)	Agency PFC/MOP sanctioned under AG&SP 1.40 (For Xth Plan works) Disb:ref* (till 31.12.2007)	1) Modernisation of analog governors with digital. 2) Modernisation of EM relays with Numerical relays.	1) Two numbers of EHG cubicles, governor instruments, EHT tester, Transducers, cables are received at site. HMC has been dispatched and installation works to be taken up. 2) Works completed.	
II - SCHEMES ONGOING - Under Tendering - STATE SECTOR (KPCL)										
27.	Nagjhari,U-1 to 6 3x150 MW (uprated from 135 MW) 3x135 MW (being uprated to 150 MW) 6x135 MW (original) KPCL 1982(U-4), 1983(U-5) & 1984(U-6) T&G - BHEL	17.29	RMU of U-6	15 (UR)	2014-15	11.29 (upto 30.09.2013)	Own funds	RM&U of Unit-6	All units commissioned except Unit#6. Unit-6 taken for RMU from 21.12.2012. Dismantling of U#6 completed. NDT tests of components completed. Crack observed in turbine shaft in shaft sleeve area. Delay is due to observation of small cracks on the turbine shaft after opening of the unit which needs refurbishment. Additional order placed on M/s. BHEL for refurbishment of turbine shaft. Refurbished shaft is programmed to be delivered during December 2013. Heavy pitting & scouring have been observed in top cover and hence cannot be refurbished. Additional order is being placed on M/s. BHEL for the supply of new top cover with the delivery period being 10 months. New top cover is expected by August 2014. Heavy pitting and corrosion observed on critical areas of runner. Additional order is being placed on M/s. Andritz for refurbishment of runner. Shrink fitting or rotor spider on to generator shaft completed. Rim building has been completed and kept ready for shrink fitting with spider and shaft assembly. Poles are under refurbishment. Unit-6 is expected to be put back to grid by December 2014.	
		16.5	R&M	-	2014-15	0.6 (Upto 30.09.2013)	Own funds	1. SCADA. 2. Conducting model studies of turbine.	1. Tenders for Item-2 to be floated in 2013-14. 2. Detailed study to be taken up.	
28.	Sharavathy (Ph B) 10x103.5 MW KPCL	20	R&M	-	2014-15	2.59 (upto 30.06.2013)	Own funds	1. SCADA	Tender to be floated in 2013-14.	

KERALA - XIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
I - SCHEMES COMPLETED - STATE SECTOR (KSEB)										
29.	Idamalayar, 2x37.5 MW KSEB 1987 T&G-BHEL	14.50	R&M	--	2012-13	13.22 (as on 31.03.13)	Agency: Own funds	Replacement of semi-static excitation system & electro-mechanical governor. Procurement of high pressure oil system for the thrust bearing, Replacement of air cooler, valves & TGB cooler.	Order for R&M works had been placed on OEM i.e. BHEL in Nov., 2008 with a completion schedule of 24 months. Unit I handed over to BHEL on 30.5.2011. The unit has been put back into service on 25.01.12. The works on Unit II have been completed and Unit commissioned on 26.12.12.	The payback is expected in one year.
II - SCHEMES ONGOING - Under Implementation - STATE SECTOR (KSEB)										
30.	Sabarigiri, Rebuilding of unit 4 1x60MW (uprated) 1x55 MW (Original) KSEB 1966 T&G - Allis Chalmers, USA	52.2	RMU&LE	5 (UR)	2013-14	49.79 (as on 30.06.13)	Own funds	Supply, erection and commissioning of 60 MW generating unit with all accessories.	The RMU&LE work of Six units were completed by M/s. Andritz Hydro in 2008-09. Due to accident during May, 2008, Unit 4 got completely damaged. <u>Unit-4:</u> Order for rebuilding placed on M/s. PDL Power Systems, Bangalore on 16.11.2009 at contractual value of Rs. 52.20 Crs. Procurement of all required material including imported equipment from KEM, China has been completed. All the erection works are over. Test synchronization was done on 20.06.2013 and the unit was put under trial run of 72 hrs. Introducing SCADA is in progress and is 90% completed.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Implementation - STATE SECTOR (KSEB)										
31.	Poringalkuthu, KSEB 4x8 MW 1957-60 T - Charmiles, Geneva G - EE, UK	88.63	RM&LE	32 (LE)+ 4 (UR)	2014-15	2.34 (as on 30.09.13)	Agency: Own fund	Replacement of Turbine & PRV, Governors, stator & rotor windings with Class F insulation, excitation system, control & protection system of generator, feeder & transformer, LT Distribution system, 11 kV panels, DC panel, battery & battery charger, refurbishment of BFV & MIV, replacement of switchyard equipments i.e. BOCBs and CTs & PTs etc.	DPR has been approved by the Board. For execution of Electro& Hydro Mechanical works, detailed purchase order and work order has been issued to M/s Allonword SSIPL consortium (Shari Saravana Industries Pvt. Ltd.), Madurai on 23.12.2011. As per the work order, the supply and work will be completed within 36 months (i.e. by 14.01.2015). Unit-1 handed over for R&M on 22.02.13. Concreting of spiral casing of unit-I completed on 25.09.2013. Some additional works to be taken up and its completion expected by April' 2014. 2 nd , 3 rd & 4 th units completion expected by Jan'15. Rectification & strengthening work of penstock & allied works awarded and the same is expected to be completed by January, 2015.	The payback is expected in two years.
II - SCHEMES ONGOING - Under Tendering - STATE SECTOR (KSEB)										
32.	Sholayar, KSEB 3x18 MW 1966-68 T - Litostroj, Yugo G - Rade Konkar, Yugo	199	RM&LE	54 (LE)	2016-17	-	Agency: Own funds	Replacement of Butterfly valve, penstock pipes, turbine & PRV, Governors, stator & rotor windings with Class F insulation, excitation system, control & protection, 11 kV panels etc.	Board approval on Draft DPR proposal obtained and administrative sanction accorded on 5.1.2011. Tender documents invited for the E&M part. Tender document sale commenced on 03.06.2013. PQ bid opened on 24.09.2013. Tender evaluation in progress and award of work expected by Jan'14.	The payback is expected in the 6 th year.
II - SCHEMES ONGOING - Under DPR Preparation- STATE SECTOR (KSEB)										
33.	Kuttiyadi, KSEB 3x25 MW 1972 T&G-Fuji, Japan	Not estimated	RM&LE	75 (LE)	2016-17	-	Agency: Yet to be decided.	The scope of work is to be finalized after conducting RLA studies.	JBIC had carried out feasibility studies for R&M works through EPDC and had submitted the report. The Board vide sanction dated 01.03.2012 has decided to entrust M/s. AHEC, IIT, Roorkee for conducting RLA study on the generating unit. Final RLA report will be submitted after CFD analysis.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
34.	Idukki 1st Stage (3x130 MW)	90	R&M		2015-16	Nil	Agency: yet to be decided	Refurbishing the main inlet valves, Generator Transformers, modernizing the auxiliary systems, governing systems, the excitation systems, new PLC and SCADA systems.	DPR prepared and is under Board's scrutiny.	Preparation of DPR, other preliminary works and purchases are scheduled to be completed before April, 2014. Renovation works schedule is as follows: Unit 1: 04/2014 to 03/2015 Unit 2: 04/2015 to 09/2015 Unit 3: 10/2015 to 03/2016

TAMIL NADU - XII PLAN Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Implementation - STATE SECTOR (TANGEDCO)										
35.	Periyar, 2x42+2x35MW (uprated) 4x35 MW (Original) TANGEDCO 1958-65 <u>Unit 1 to 3:</u> T&G - Voith, W. Germany <u>Unit-4:</u> T - Litostroj Yugo G - Rade Konkar, Yugo.	161.18	RMU&LE	140 (LE) 28 (UR)	2014-15	126.14 (as on 30.09.2013)	Agency: PFC	Replacement of stator core & winding, rotor winding, poles, Excitation system, Governing system, Runner, guide vanes, Cooling water & De-watering systems, Generator Transformers, Generator protection, LT switch gear, lubrication system, 11 KV LAVT, Neutral Grounding Transformer, Annunciation system, power and control cable, UAT, fire fighting system for generator, yard, cable gallery yard, Refurbishment of turbine inlet valves and Butterfly valves, Air admission system, brake & jack and bearings	The work of RMU&LE is being done by M/s. Andritz Hydro. RMU&LE works of Unit- 1 which was originally supplied by M/s. Voith has been completed. RMU&LE work of Unit-1 commenced on 6.3.2009 and completed on 15.11.2010. During performance testing, cooling water choking problem was observed and the same was rectified. Now, unit is in service and running at full load of 42 MW. Unit No. 2 RM&U works have been completed and unit commissioned on 11.09.2012. Unit-3 has been handed over to M/s Andritz Hydro on 11.09.2012 for RMU works. The truck carrying some of the materials of critical requirement met with an accident on 03.06.2013 and hence the delay. Erection works completed and unit expected to be commissioned by end of November, 2013. Unit No.4 shall be taken up subsequently with a completion schedule of 9-10 months. Material has been received at site for unit 4.	
II - SCHEMES ONGOING - Under Tendering - STATE SECTOR (TANGEDCO)										
36.	Sholayar Ph-1, 2x35 MW TANGEDCO 1971 T - Litostroj, Yugoslavia G - Rade Konkar, Yugoslavia	40.681 (Year 2002 base level)	RMU&LE	70 (LE) 14(UR)	2016-17	Nil	Agency: To be finalized	Replacement of stator core winding, rotor winding, poles, Excitation system, Governing System, Runner, guide vanes, cooling water & dewatering systems, generator transformers, generator protection, LT switchgear, lubrication system, 11 KV LAVT, NGT, Annunciation system, power & control cables, UAT, fire fighting system for generator, yard & cable gallery and Refurbishment of turbine inlet valves and BF valves, Air admission system, brake & jack and bearings.	It has been decided in the full Board Meeting of TNEB to take up the RMU of Sholayar PH-I after the ongoing RMU of Periyar PH. Revised administrative approval has been obtained. Now, the tender specification approval is in process.	

TAMIL NADU - XIII PLAN Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under RLA - STATE SECTOR (TANGEDCO)										
37.	Kodayar, Ph-I, 1x60 MW TANGEDCO 1970 T-Vevey Engg. works, France G-Alsthom, France	-	RM&LE	60 (LE)	XIII Plan	-	Agency: Yet to be decided	Detailed scope of work after RLA studies.	Revised administrative approval has been obtained. R&M work of scheme shall be finalized after completion of RLA studies. Now, the Tender Specification approval in is process. Award of RLA studies expected by end of 2013-14 and completion of RLA studies expected by Jan-Feb 2015. The R&M work completion is likely in XIII Plan.	
38.	Kodayar, Ph-II, 1x40 MW TANGEDCO 1971 T-Litostroj, Yugo G-Rade Konkar, Yugo.	-	RM&LE	40 (LE)	XIII Plan	-	Agency: Yet to be decided	Detailed scope of work to be finalised.	MECON submitted RLA study report in 2006. As M/c is running well, R&M works are now proposed to be taken in XIII Plan.	
39.	Moyar PH 3x12 MW TANGEDCO	-	RM&LE	36 (LE)	XIII Plan	-	As above	Detailed scope of work after RLA studies.	Tender for RLA studies was floated and opened on 01.03.13. Only one bid i.e. MECON was received. The work award for RLA study to M/s MECON, Ranchi has been placed on 17.06.2013 and study report is expected by March, 2014.	

JHARKHAND - XIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Tendering - CENTRAL SECTOR (DVC)										
40.	Panchet, U-1 1x40 MW DVC, Jharkhand 1959 Turbine: NOHAB, Sweden Generator: AEG, West Germany	58.22	RM & LE	40 (LE)	2016-17	1.99 (till 31.03.12) [NHPC - 1.44 MECON - 0.55]	Own funds	Refurbishment of turbine, turbine shaft journal, runner blade servomotor, penstock, spiral casing wicket gates, regulating ring stay vane & shaft seal. Replacement of governor and governor oil pumping system, HP/LP compressed air system, & generator air coolers. Rewinding of Generator, refurbishment of exciter collector rings, brush gears, bus duct disconnecting switch, generator grounding system etc. Refurbishment of generator Guide bearing upper and lower bracket Generator rotor shaft and journal, Braking and jacking system, Replacement of Control and Protection system, Fire fighting system, Refurbishment of Ventilation and air conditioning Drainage and Dewatering system, cooling water system, EOT Crane etc. Refurbishment of switchyard equipments and Hydro-mechanical equipments.	After RLA study, DPR has been prepared by M/s NHPC. NHPC was requested to take up consultancy job for R&M work as per their earlier composite offer. In absence of positive response from NHPC, Ph.II work could not be taken up. Attempt was also made by DVC to engage alternative agency capable of taking up consultancy services by publishing 'Expression of Interest'. However, no suitable agency could be identified through this EOI.	

ODISHA - XIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
I - SCHEMES COMPLETED - STATE SECTOR (OHPC)										
41.	Rengali Unit-1 HEP 1x50 MW OHPC (1985-92) T-BHEL G-BHEL	47.50	RM&LE	50(LE)	2012-13	36.76 (as on 30.06.12)	Agency: Own resources	Replacement of Stator winding, Rotor Pole Coils, runner hub, digital governor, DAVR, relays with instrument & cables, repair of gates.	R&M work completed and unit synchronized to grid on 31.05.2012 at 23:27 Hrs.	
42.	Rengali Unit-2 HEP 50 MW OHPC 1986 T&G-BHEL	25.2 (approx)	R&M	50(LE)	2013-14	20.73	Own funds	Replacement of existing damaged runner by new one, replacement of excitation and governing system with digital AVR and microprocessor based governor and other associated works.	The R&M work is being carried out by M/s BHEL from 01.12.12 The unit after completion of R&M work was synchronized on 20.04.2013.	
II - SCHEMES ONGOING - Under Tendering - STATE SECTOR (OHPC)										
43.	Hirakud II, (Chiplima) 3x24 MW OHPC 1962-64 <u>Unit-1&2:</u> T - Voith, W. Germany, G - Hitachi, Japan <u>Unit-3:</u> T - LMW,USSR, G - Electrocilla, USSR	192.47 (95.97 for U-1 & II and 96.5 for U-III)	RM&LE	72(LE)	2015-16	58.97 (for Unit 1 & 2) (till 30.06.09) + 0.36 (for unit 3 till 30.09.13)	Agency: PFC loan Sanctioned: 26.68 (for U-I&II) and 23.64 (for U-III) Disb:26.68 (for U-1 & II) and Nil (for U-III) (till 30.09.08)	Stator winding of Unit I & II; Replacement of Rotor Pole Coils in all units; Refurbishment of turbine parts; Provision of SEE, Electronic governors for all units; 33 kV & 132 KV switchgears, 132/33 KV, 20 MVA transformer etc.	Unit-I-R&M works were completed on 29.7.98 Unit II -R&M works were completed on 27.3.2008. Unit III-After conducting the RLA studies in July, 2004, OHPC engaged MECON as consultant for implementation of R&M works. M/s. MECON prepared the Draft Tender Specification but later on backed out from the consultancy contract. The final DPR has been submitted by M/s MECON Ltd. The DPR has been approved by Board of Directors of OHPC. The tender floated on 02.04.2013 and tendering process going on. Six nos. of bidders have submitted their bids as on last date of submission of tender i.e. 30.08.2013. Evaluation of Part-I (Eligibility criteria) is in process. The proposal for R&M has already been filed before Hon'ble OERC for according in- principle approval.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Tendering - STATE SECTOR (OHPC)										
44.	Hirakud-I (U5&6) 2x37.5 MW OHPC 1962-63 T&G - Hitachi, Japan	326	RMU	75 (LE) + 11 (UR)	2016-17	3.16 (till 30.09.13)	Agency: Yet to be decided	Replacement of new TG set and associated equipment with new digital microprocessor based governor, DAVR, PLC based C&I system, numerical relays. Refurbishment of Intake and Draft Tube Gates.	RLA studies were made by M/s TATA Power Co. Ltd. OHPC invited Expression of Interest (EOI) for engagement of consultant for starting the process of RMU&LE works from concept to commissioning. NHPC showed interest but quoted high price for consultancy services. OHPC then decided to complete the work utilizing their own resources for tendering etc. Draft DPR prepared and approved by Board on 15.11.2010. The DPR was approved by Project Approval Committee, Govt. of Orissa on 20.10.11. The techno-commercial bid was opened on 22.05.12. and M/s Marubeni Corporation was found qualified. After approval of BOD of OHPC, the price bid of M/s Marubeni was opened. The negotiated price offer approved by Board of Directors of OHPC was filed before OERC for approval. However, this was rejected by OERC. After directive of Hon'ble OERC to go for installation of new units, the Tender (ICB) floated on 07.08.2013. The date of submission of bid is scheduled on 20.11.2013.	

ODISHA - XIII Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING –Under DPR Preparation STATE SECTOR (OHPC)										
45.	Balimela, 6x60 MW OHPC 1973-77 T - LMW, USSR G - ElectroSila, USSR	664.7	RM&LE	360 (LE)	2017-18	0.8412 (till 30.09.13)	Agency: Yet to be decided	Replacement of new TG set and associated equipment with new digital microprocessor based governor, DAVR, PLC based C&I system, numerical relays. Refurbishment of Intake gates and draft tube gates and civil works.	The final DPR was submitted by M/s MECON Ltd. The DPR was approved for R&M with replacement by new TG by BOD of OHPC on 12 th Nov, 2012. The DPR was approved by project approval committee, Govt. of Odisha, and ICB was floated for R&M (with new TG) on 07.08.2013. Tendering process is going on and last date of submission of bid is scheduled on 19.11.2013. The proposal for R&M has already been filed before OERC for according in-principle approval.	

WEST BENGAL - XIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES Ongoing - Under Tendering - CENTRAL SECTOR (DVC)										
46.	Maithon, U-1&3, 2x20 MW DVC, West Bengal Commissioned Oct. 1957 and March 1958 respectively Neyrpic, Alstom France (T) & Siemens, W.Germany	56.034 Cr.	RM & LE	40 (LE)	2016-17	5.75 Cr.	Agency: DVC for Switchyard work	1. Refurbishment of runners, Replacement of Governor, Guide vanes & guide vane bushes. Re-babbiting of turbine & generator bearings. Replacement of generator winding, Excitation system, control & protection & synchronization panels (including relays), Generator transformers, 33kV power cables, LT Power & Control cables, all CTs/PTs & isolators in Gen. Aux. panels., all pumps and motors of aux. system, different coolers, refurbishment of cranes and intake gates and auxiliaries etc. 2. Renovation work of 132/33 kV Switchyard.	NHPC was approached for their service as Consultant for the R&M job. But no response was obtainable from them. Attempt as also made to energy alternative suitable agency capable of taking up services by publishing EOI but no suitable agency could be identified. On further persuasion of late, NHPC has submitted that RLA study is required to establish detailed scope of R&M work. DVC has consented to this and requested NHPC to forward its offer for consultancy services for the RLA study but NHPC did not respond. DVC has taken up work of renovation of Maithon switchyard at an estimated cost of Rs 6.98 Crs and Rs. 5.75 Crs. incurred as on 30.09.2013. Supply: 92.27%, Electrical: 93.17% & Civil: 41.2% have been completed and commissioning is delayed due to non-availability of shutdown.	

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II - SCHEMES ONGOING - Under Implementation - STATE SECTOR (WBSEDCL)										
47.	Jaldhaka St. I 3x9MW , 1967 (U-I&2) 1972 (U-3) Unit-1&2: T -Litostroj, Yugoslavia G-R.Koncar:Yugoslavia Unit-3 T&G - Fuji, Japan	88.62	RM&LE (St-I)	27 (LE)	2014-15	76.04 (as on 30.09.13)	Agency: <u>PFC/MOP</u> disbursed Rs. 1.38 Cr. till 31 Dec. 07 under AG&SP against sanction of 36.52 Cr. which has been foreclosed. <u>REC</u> Rs. 62.03 Cr. Disbursed Rs. 28.17 Cr. Till 31.3.2010	1. Renovation & repair works for Barrage, Water Intake & Water Conductor System, Power House Buildings & Yards including equipment foundation etc. and TRC of Stage – I P.H.(Lot I) 2. R&M of all spillway gates, intake gate, emergency intake gates & trash rack. Installation of stoplog gates & operating mechanism. Draft Tube & valves related to Stage-I P.H.(Lot II) 3. R&M of Turbines/Generators & Aux. of units incl. instruments, cooling water system, Air conditioning & fire fighting etc. along with associated civil works related to Stage-I P.H.(Lot III) 4. Design, Manufacturing, supply & erection, testing & commissioning of new electrical equipments consisting of 66 KV C&R panel, 11 KV control desk relay panel, 11 KV Switchgear, Battery, D.C. Board, A.C. Board, Cables, illumination, UPS, D.G. sets, Transformers along with associated civil works related to Stage-I P.H. (Lot IV) 5. New addl. Unit of 9 MW (Lot V) 6. Design, supply & installation of SCADA System for entire JHP.Set-I(Lot VI)	1. Lot-I: Major part of work completed. Balance works are in progress. 2. Lot-II: All the works have been completed on 29.05.2007 and taken over. 3. Lot-III: Unit 2: Commissioned on 30.07.2010 & available. Unit 1: Commissioned on 08.07.2012 & available. Unit 3: Commissioned on 07.10.2011 & available. Taking over of units awaited pending misc. contractual obligations. 4. Lot-IV: All work completed on 20.04.2010. 5. Lot-V:Not in R&M scope 6. Lot-VI: Tender invited earlier in April 2009 for the said package has been cancelled on 04.09.2012 due to paucity of bidders & retendering following revision of tender document to be made.	WBSEDCL informed that completion schedule depends upon the present political situation of Darjeeling Hills. Major packages under R&M is almost on the verge of completion except SCADA package.

Assam - XIIth Plan Programme/Status of Renovation and Modernisation of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II – SCHEMES ONGOING – Under Implementation - CENTRAL SECTOR (NEEPCO)										
48.	Kopili, 2x50 MW (St.I) NEEPCO 1988 T&G - BHEL	50.22 (Rev.)	R&M & Refurbishment of U-1 &2	-	2013-14	29.19 (as on 31.03.13)	Internal Resources	TURBINE of Units – 1 & 2 – One new runner as spare, Replacement of top cover & pivot ring with SS liner for Unit-1, – Overhauling of Turbine section – Governors, Piston rings of MIV, bushes of guide vanes, all seals of PRV, Turbine Discharge Measurement device, flow relay / Limit switches. GENERATOR Unit -1 & 2 – Re-insulation of stator windings and Rotor windings. Re-Varnishing & Building of punching of stator, Replacement of PMG, AVR, seals of all bearings, Stator Air cooler, header pipe lines including supply of Gate valves, Slip Rings etc. Incorporation of brake Dust Collector, carbon dust collector, brake jack assembly etc. On line Monitoring System for Vibration, Labyrinth Clearance, Bearing Temperature Measurement. GT & PROTECTION SYS – Replacement of oil coolers, cooler valves, reducer valves, Diff. Pressure gauges etc. – Replacement of relays for protection of Generator & Feeders, Control & Relay panel of 220kV/11kV 3x20 MVA Transformers. SWITCHYARD – Replacement of MOCB with SF6 CBs. AUXILIARIES – Replacement of pumps of cooling Water, Drainage & De-watering system etc, Battery Bank, Cables. Procurement of One set of DT & PRV Gates	Orders for most of the electro mechanical equipments etc. have been placed on OEM i.e. BHEL. Considering long delivery period (16 to 24 months) of BHEL for manufacture and supply of items, it has been planned to complete entire scheme by March, 2014. Most of the items have been received at site. Replacement of oil coolers, installation of 20 MVA Generator transformer, replacement of MoCB completed. Balance material and equipment from BHEL has been received. Erection works shall be taken up during lean hydro season w.e.f. Nov'2013 and planned for completion by March'2014. MOU signed with PGCIL for installation of a new 132/33 KV SST in Kopili Switchyard and works completed. 4 sets of SF6 220kV CB and one set of 132kV CB procured and replacement carried out.	Acidity of water in Kopili reservoir and bad Law and Order situation prevailing at project site are reasons for slow progress in execution of R&M works

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
II – SCHEMES ONGOING – Under Implementation - CENTRAL SECTOR (NEEPCO)										
49.	Khandong 2x25 MW	25.05 (excluding IDC)	RM&LE	50 (LE)	2014-15	16.34 (as on 31.03.13)	Internal Resources	I-Generator Unit I and II Replacement of stator with improved design, low loss core material along with new set of stator windings. Re-insulation of rotor pole windings, replacement of rotor pole keys. Incorporation of brake dust collector system & carbon dust collector. Replacement of all generator air coolers, LGB & UGB oil coolers with low pH value of water resistive material, oil level switches of all bearing housing. Incorporation of digital type flow meters in the return side of cooling water system of all types of coolers II-Turbine Unit I and II Rectification of top covers, Replacement of MS guide vanes with SS guide vanes, Repairing and HVOF coatings of runner. Replacement of vortex pipes attached with upper cone with SS pipes, existing shear pin failure detecting device with new system, existing MIV/Bypass valve control cabinet with new solenoid valve type control cabinet. Replacement of turbine discharge measuring device with new set. Overhauling of guide vane servo motors. Overhauling of MIV, building up of eroded areas of valve body, door disc, MIV servo motors and by-pass valves including supply of necessary spares. Replacement of TGB coolers. Incorporation of Online vibration monitoring system, air gap measurement III-GENERATOR TRANSFORMERS Overhauling of the GTs, Replacement of oil coolers. Replacement of all NRVs and all types of valves. Procurement of two nos. of spare limbs. IV- Control System Replacement of defective distance protection scheme of 132 kV feeders.	Considering long delivery schedule of BHEL, orders have already been placed with BHEL for all major items. Most of the items have been received at site. Replacement of spring matters, replacement of TGB Coolers, overhauling of unit-1 GT, replacement of defective distance protection scheme of 132kV feeders completed. Assembly of stator and H.V. test completed. Balance material & equipment from BHEL has been received. Erection works shall be taken up during lean hydro season w.e.f. Nov'2013. Unit-I planned for completion by March'2014.	Acidity of water in Kopili reservoir and bad Law and Order situation prevailing at project site are reasons for slow progress in execution of R&M works. Delay also due to supply by BHEL.

MEGHALAYA- XIIIth Plan Programme/Status Of Renovation And Modernisation Of Hydro Power Schemes

(Amount in Rs.Crs.)

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
III - SCHEMES – Under DPR preparation -STATE SECTOR (MePGCL)										
50.	Umiam Stage-III Kyredemkulai 2x30 MW MePGCL 1979 T&G - BHEL	344	RM U & LE	6(UR) + 60(LE)	XIII Plan	-	Agency: Yet to be decided.	Mech. Equipments (Turbine & its auxiliaries) : - Replacement of runners, head cover & bottom ring, facing & wearing rings. Guide vanes, guide vane servomotor & gate operating mechanism. Guide bearings, coolers & bearing housing, turbine shaft, shaft seal & sealing box. Upper draft tube & draft tube liner. Inlet valve along with its servomotor & by pass valve. Governor and turbine control system, oil pressure supply system, compressed air supply system, cooling water supply, drainage & dewatering system, auxiliary machine control etc. - Refurbishment of spiral case and stay ring, penstock & by-pass valve etc. Elec. Equipments (Generator & its auxiliaries): - Replacement of stator cores, stator windings & neutral leads. Rotor spoke & rim, rotor winding & excitation leads & rotor pole, Shaft, thrust & guide collars, thrust runner, coupling bolts & coupling cover. Thrust bearing pads. Segment type upper & lower guide bearings and oil coolers. Brake ring & brake/jack system, air cooler, current transformers, fire protection system, instruments & relays, terminal boxes on control cubicle, all cables, AC excitation system, digital AVR & excitation cubicle, excitation transformer etc. - Refurbishment of upper & lower bearing brackets, top cover, hood and air housing - Replacement of 11 KV metal enclosed cubicles & unit auxiliary transformers, station battery bank & charger etc. - Replacement of generator transformer & instruments, station service transformers, control and protection boards etc. - Replacement of motorized disconnecting switches, CTs, PTs, conductors & accessories for 132 KV switchyard. - Replacement of 12 KV power cables, 600 V power cables, control cables, paint etc.	The feasibility study was conducted and completed by JV of TEPSCO & TEPCO, Japan under JETRO grant. IIT Roorkee, have been engaged as consultant for undertaking head measurement studies which have been completed The DPR was revised as per CEA's recommendation. The revised DPR was submitted to the state govt. and the same was forwarded to the Ministry of Finance, Deptt. of Economic Affairs, Japan-II Section vide letter No. PLR. 74/92 Pt.II/487 dated 09.01.12. The Concept Paper regarding Preliminary Project Report (PPR) was submitted to the State Govt. vide letter No. MTN/2006/216 (Pt-II)/14 Dt. 20th March, 2012. The clarification sought by CEA was submitted to the State Govt. vide letter no. MTN/2006/21628 dated 15th December, 2012. The points raised by the Director, Ministry of DONER was submitted to the State Govt. vide letter no. MTN/2006/216 dated 17th December, 2012. The latest observation raised by the MoP vide letter no. 15/13/2012-HL dated 21.05.2013 was discussed on 17.09.2013 in the office of Joint Secretary, MoP (Hydro), Govt. of India.	

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.	Nagihari, U-2, KPCL	SS	1x135	11.97	11.32	15.00 (U)	RM&U	1995-96
6.	Shivasamudra m, 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), TANGEDCO	SS	2x100	23.17	33.69	200.00 (Res)	R&M+Res.	1993-95
9.	Kundah III (Units 1&2), TANGEDCO	SS	2x60	5.45	3.20	-	R&M	1991-92
10.	Moyar, TANGEDCO	SS	3x12	1.62	1.30	36.00 (LE)	RM&LE	1990-91
11.	Sholayar-I, TANGEDCO	SS	2x35	1.40	0.85	-	R&M	1994-95
Meghalaya								
12.	Khandong, U-1, NEEPCO	CS	1x25	0.62	0.62	25.00 (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)]		

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

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-II
(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)]		

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

State wise List of Hydro 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 Crs.)				
Himachal Pradesh								
1.	Pong, BBMB	CS	6x60	17.70	17.79	36.00 (U)	RM&U	2003-04
Punjab								
2.	Ganguwal,U-1, BBMB	CS	1x29.25	51.28 (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.	Chibro, UJVNL	SS	4x60	10.45	10.52	-	R&M	2006-07
Karnataka								
10.	Nagjhari, U-1&3, KPCL	SS	2x135	26.12	21.62	30.00 (U)	RM&U	2002-03
11.	Supa PH, KPCL	SS	2x50	2.64	2.47	-	R&M	2002-03

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	Neriamangalam 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, TANGEDCO	SS	3x6.65+ 1x11+2x 14	26.06	20.147	58.95(LE)	RM&LE	2004-05
24	Papanasam, TANGEDCO	SS	4x7	27.05	22.61	4.00 (U) + 28.00 (LE)	RMU&LE	2005-06
Orissa								
25	Hirakud-I (Sw.yard), OHPC	SS		9.85	15.88	-	R&M	2006-07
26	Hirakud-I, U-3&4, OHPC	SS	2x24	126.14	108.86	16.00(U)+ 48.00(LE)	RMU&LE	2005-06
West Bengal								
27	Maithon, U-2, DVC	CS	1x20	42.08	36.94	20.00(LE) +3.20(U)	RMU&LE	2004-05

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.

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

State-wise List of Hydro 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, TANGEDCO	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 Completed

S. No	Project, Agency	CS/SS	Inst. Cap. (MW)	Estimated Cost	Actual Expenditure	Benefits (MW)	Category	Completion Schedule
				(Rs. in Crs.)				
Meghalaya								
18	Umium St.II , MeSEB	SS	2x9	90.46	55.67 (as on 31.03.12)	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 & Modernisation;. U – Upgrading; 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 30.09.2013

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Completed Schemes								
Odisha								
1	Rengali Unit-1 OHPC	SS	1x50	47.50	36.76 (as on 30.06.12)	50(LE)	RM&LE	2012-13
2	Rengali Unit-2 OHPC	SS	1x50	25.2 (approx)	20.73	50(LE)	R&M	2013-14
Andhra Pradesh								
3	Nagarjuna Sagar, APGENCO	SS	1x110+ 7x100.8	33.35	13.90 (as on 31.03.2012)	-	R&M	2012-13
4	Idamalayar, KSEB	SS	2x37.5	14.50	13.22 (as on 31.03.13)	-	R&M	2012-13
5	Lower Sileru, APGENCO	SS	4x115	8.75	6.77 (as on 30.09.13)	-	R&M	2013-14
	Sub Total(A)		1450.60	129.30	91.38	100 (LE)		
Ongoing Schemes – Under implementation								
Himachal Pradesh								
6	Bhakra LB, BBMB	CS	2x126+3x108	489.77	238.53 (as on 31.08.13)	540.00 (LE) + 90.00 (U)	RMU&LE	2015-16
7	Bassi, HPSEB	SS	4x16.5	119.83	155.33 (as on 31.07.13)	6.0(U)+ 60 (LE)	RMU&LE	2013-14
Jammu & Kashmir								
8	Ganderbal, J&KSPDC	SS	2x3+ 2x4.5	34.65	9.51 (as on 30.09.13)	9.00 (LE)	RM&LE	2014-15
9	Chenani, J&KSPDC	SS	5x4.66	34.94	7.09 (as on 30.09.13)	23.30 (LE)	RM&LE	2014-15
10	Sumbal Sindh, J&KSPDC	SS	2x11.3	45.92	25.14 (as on 30.09.13)	-	R&M	2013-14
11	Lower Jhelum, J&KSPDC	SS	3x35	126.41	83.65 (as on 30.09.13)	15.00 (Res.)	R&M+ Res.	2013-14
Uttar Pradesh								
12	Matatila, UPJVNL	SS	3x10.2	10.29	1.47 (as on 30.09.13)	30.6 (LE)	RM&LE	2015-16
13	Obra, UPJVNL	SS	3x33	43.14	14.84 (as on 30.09.13)	99.00 (LE)	RM&LE	2015-16
14	Rihand, UPJVNL	SS	6x50	132.20 (Rev.)	76.95 (as on 30.09.13)	300.00 (LE)	RM&LE	2015-16

Annex- V
(Sheet 2 of 3)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Uttarakhand								
15	Pathri, UJVNL	SS	3x6.8	105.62	42.19 (as on 30.06.13)	20.40 (LE)	RM&LE	2014-15
16	Khatima, UJVNL	SS	3x13.8	256.77	19.52 (as on 30.06.13)	41.40 (LE)	RM&LE	2016-17
Andhra Pradesh								
17	Srisailem RB, APGENCO	SS	7x110	16.70	6.74 (as on 31.03.12)	-	R&M	2013-14
Karnataka								
18	Bhadra River bed units, KPCL	SS	2x12	28.015	4.848 (as on 30.09.13)	-	R&M	2014-15
19	Supa, KPCL	SS	2x50	3.45	3.88	-	R&M	2013-14
Kerala								
20	Sabirigiri, KSEB Unit-4	SS	1x60	52.2	49.79 (as on 30.06.13)	5(UR)	RMU&LE	2013-14
21	Poringal-kuthu,KSEB	SS	4x8	88.63	2.34 (as on 30.09.13)	32.00 (LE)+ 4 (U)	RM&LE	2014-15
Tamil Nadu								
22	Periyar, TANGEDCO	SS	2x42+ 2x35	161.18	126.14 (as on 30.09.13)	140.00 (LE) + 28.00(U)	RMU&LE	2014-15
West Bengal								
23	Jaldhaka St.I, WBSEB	SS	3x9	88.62	76.04 (as on 30.09.13)	27.00(LE)	RM&LE	2014-15
Assam								
24	Kopili, NEEPCO	CS	2x50	50.22	29.19 (as on 31.03.13)	-	R&M & Refurbishm ent of Units 1 & 2	2013-14
25	Khandong, NEEPCO	CS	2x25	25.05	16.34 (as on 31.03.13)	50.00 (LE)	RM&LE	2014-15
	Sub Total(B)		2616.30	1913.61	989.53	1520.70 [133(U)+ 15(Res.)+ 1372.70 (LE)]		
Ongoing Schemes – Under Tendering								
Himachal Pradesh								
26	Giri, HPSEB	SS	2x30	47.80	-	60.00 (LE)	RM&LE	2015-16
Uttarakhand								
27	Tiloth, UJVNL	SS	3x30	126.23	-	90 (LE)	RM&LE	2016-17
Karnataka								
28	Nagjhari, U-1 to 6, KPCL	SS	6x135	33.79	11.89 (upto 30.09.13)	-	R&M	2014-15

Annex- V
(Sheet 3 of 3)

S. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Prov.)	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
29	Sharavathy (Ph B), KPCL	SS	10x103.5	20	2.59 (upto 30.06.13)	-	R&M	2014-15
Tamil Nadu								
30	Sholayar-I, TANGEDCO	SS	2x35	40.68	-	14.00(U) + 70.00 (LE)	RMU&LE	2016-17
Jharkhand								
31	Panchet, U-1, DVC	CS	1x40	58.22	1.99 (as on 31.03.12)	40.00 (LE)	RM&LE	2016-17
Odisha								
32	Hirakud-I U5&6, OHPC	SS	2x37.5	326	3.16 (as on 30.06.13)	75.00 (LE)+ 11 (UR)	RM&LE	2016-17
33	Hirakud-II, OHPC	SS	3x24	192.47	58.97 (as on 30.09.13)	72.00 (LE)	RM&LE	2015-16
Kerala								
34	Sholayar, KSEB	SS	3x18	199	-	54.00 (LE)	RM&LE	2016-17
	Sub Total(C)		2306	1044.19	78.60	501 [40(U)+ 461(LE)]		
Ongoing Schemes – Under DPR Preparation/Finalisation/Approval								
Kerala								
35	Kuttiadi, KSEB	SS	3x25	Not estimated	-	75.00 (LE)	RM&LE	2016-17
36	Idukki, KSEB		3x130	90	Nil	-	R&M	2015-16
West Bengal								
37	Maithon, U-1&3, DVC	CS	2x20	56.03	5.75	40.00 (LE)	RM&LE	2016-17
	Sub Total(D)		505	146.03	5.75	115 (LE)		
	Total (A+B+C+D)		6877.90	3233.13	1165.26	2236.70 [173(U) + 2048.70 (LE) + 15(Res.)]		

Abbreviations: R&M – Renovation & Modernisation; U – Up-rating; 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 XIII Plan

As on 30.09.2013

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 Tendering								
Uttarakhand								
1	*Chilla Ph B UJVNL	SS	4x36	337.00	-	28.8(U) + 144(LE)	RMU&LE	2018-19
2	*Dhakrani, UJVNL	SS	3x11.25	116.41	-	33.75 (LE)	RM&LE	2017-18
3	*Dhalipur, UJVNL	SS	3x17	116.81	-	51.00 (LE)	RM&LE	2017-18
4	*Kulhal, UJVNL	SS	3x10	118.72	-	30(LE)	RM&LE	2017-18
5	*Chibro, UJVNL	SS	4x60	184.88	-	240(LE)	RM&LE	2019-20
6	*Khodri UJVNL	SS	4x30	169.63	-	120(LE)	RM&LE	2019-20
7	Ramganaga		3x66	455.20	-	198(LE)	RM&LE	2017-18
	Sub Total(A)		816.75	1498.65	-	845.55 [28.80(U)+ 816.75 (LE)]		
Ongoing Schemes – Under DPR Preparation/Finalisation/Approval								
Odisha								
8	*Balimela, OHPC	SS	6x60	664.7	0.84 (as on 30.09.13)	360(LE)	RM&LE	2017-18
Meghalaya								
9	Umium St.III, Kyrdemkulai, MePGCL	SS	2x30	344	-	60(LE)+6 (UR)	RMU&LE	XIII Plan
Tamil Nadu								
10	*Kodayar Ph-II, TANGEDCO	SS	1x40	-	-	40.0(LE)	RM&LE	XIII Plan
Andhra Pradesh								
11	*Machkund, APGENCO	SS	3x17 (St.I) & 3x21.25 (St.II)	124.45	-	5.25 (U) + 114.75 (LE)	RMU&LE	XIII Plan
	Sub Total(B)		574.75	1133.15	0.84	586 [11.25 (U)+574.75 (LE)]		
Ongoing Schemes – Under RLA Studies								
Tamil Nadu								
12	*Kodayar Ph.I, TANGEDCO	SS	1x60	-	-	60.00 (LE)	RM&LE	XIII Plan
13	Moyar PH, TANGEDCO	SS	3x12	-	-	36(LE)	RM&LE	XIII Plan
	Sub Total(C)		96	-	-	96 (LE)		
	Total (A+B+C)		1487.50	2631.80	0.84	1527.55 [40.95 (U) +1487.50 (LE)]		

* These 10 schemes have been rescheduled for completion from XII Plan to XIII Plan.

Abbreviations of Agencies

1.	APGENCO	Andhra Pradesh Generation Corporation
2.	BBMB	Bhakra Beas Management Board
3.	DVC	Damodar Valley Corporation
4.	HPSEB	Himachal Pradesh State Electricity Board
5.	J&KSPDC	Jammu & Kashmir State Power Development Corpn.
6.	KPCL	Karnataka Power Corporation Ltd.
7.	KSEB	Kerala State Electricity Board
8.	MePGCL	Meghalaya Power Generation Corporation Ltd.
9.	NEEPCO	North-East Electric Power Corporation
10.	OHPC	Odisha Hydro Power Corporation
11.	TANGEDCO	Tamilnadu Generation and Distribution Corporation Ltd.
12.	UPJVNL	Uttar Pradesh Jal Vidyut Nigam Ltd.
13.	UJVNL	Uttarakhand Jal Vidyut Nigam Ltd.
14.	WBSEDCL	West Bengal State Electricity & Dist. Co. Ltd.