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विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

जल विद्युत अभियांत्रिकी और नवीनीकरण एवं आधुनिकीकरण प्रभाग

Hydro Engineering and R&M Division

जल विद्युत परियोजनाओं का नवीनीकरण एवं आधुनिकीकरण

बारहवीं योजना में पूर्ण एवं अवधि 2017-22 व उसके

उपरान्त का कार्यक्रम तथा यथास्थिति



Renovation & Modernisation of Hydro Power Stations

**Schemes Completed during XII Plan (2012-17) and Status/
Programme for the period 2017-22 & beyond**

QUARTERLY PROGRESS REPORT

(January-March, 2017)

(4th Quarter of 2016-17)

C O N T E N T S

Sl. No.	Particulars	Page No.(s)
1.	Index of Schemes	I-1 to I-3
2.	Background & Plan-wise Summary	B-1 to B-3
Completed Schemes during XII Plan (2012-17)		
3.	Hydro RMU&LE Schemes completed during XII Plan (2012-17)	
3.1	Summary of State-wise & Year-wise Completion of Schemes	XII-1 to XII-2
3.2	Details of Completed Schemes	XII-3 to XII-16
Completion Programmed during 2017-22 and beyond		
4.	Hydro RMU&LE Schemes programmed to be completed during 2017-22 & beyond	
4.1	Summary of State-wise & Year-wise details of Schemes	1 to 3
4.2	Region-wise Description of R&M Schemes	4 to 52
	Northern Region	4 to 28
	Western Region	29 to 31
	Southern Region	32 to 44
	Eastern Region	45 to 49
	North Eastern Region	50 to 52
ANNEXURES		
I	State-wise List of Hydro RMU&LE Schemes completed upto the VIII Plan	A-1
II	State-wise List of Hydro RMU&LE Schemes completed in the IX Plan	A-2 to A-3
III	State-wise List of Hydro RMU&LE Schemes completed in the X Plan	A-4 to A- 6
IV	State-wise List of Hydro RMU&LE Schemes completed during the XI Plan	A-7 to A-8
V	State-wise List of Hydro RMU&LE Schemes completed during the XII Plan	A-9 to A-10
VI	State-wise List of Hydro RMU&LE Schemes programmed for completion during 2017-22	A-11 to A-14
VII	State-wise List of Hydro RMU&LE Schemes programmed for completion beyond 2017-22	A-15 to A-16
VIII	State-wise List of additional hydro projects identified for undertaking RMU&LE works	A-17
Abbreviations of Agencies		A-18

Renovation & Modernisation Schemes of Hydro Power Stations

Schemes Completed during XII Plan (2012-17) and Status/

Programme for the period 2017-22 & beyond

INDEX OF SCHEMES

Programmed for completion during 2017-22

S. No.	State	Name of Scheme in the Sector		Agency	Completion Schedule	Status	Page No.
		Central	State				
Northern Region							
I.	Himachal Pradesh						
1.		Bhakra LB	-	BBMB	2018-19	Under Implementation	4-6
2.		Ganguwal & Kotla	-	BBMB	2017-18	Under Implementation	7
3.		Dehar PH	-	BBMB	2017-18	Under Implementation	8
4.		Baira Siul	-	NHPC	2020-21	Under Implementation	9
5.		-	Bhaba Power House	HPSEB	2021-22	Under Implementation	9-11
6.		-	Giri	HPSEB	2019-20	Under Tendering	12
II.	Jammu & Kashmir						
7.		-	Chenani	J&KSPDC	2017-18	Under Implementation	13
8.		-	Ganderbal	J&KSPDC	2017-18	Under Implementation	14
9.		Salal	-	NHPC	2019-20	Under Implementation	15
III.	Punjab						
10.		-	Mukerin HEP	PSPCL	2019-20	Under Tendering	16
11.		-	Ranjit Sagar Dam	PSPCL	2019-20	Under Tendering	17
12.		-	Shanan HEP	PSPCL	2019-20	Under Tendering	18
13.		-	UBDC St.I & St.II HEP	PSPCL	2019-20	Under Tendering	19
IV.	Uttarakhand						
14.		-	Tiloth	UJVNL	2019-20	Under Implementation	20
15.		-	Dhalipur	UJVNL	2020-21	Under Implementation	21
16.		-	Chilla (Ph-B)	UJVNL	2021-22	Under Tendering	22
17.		-	Kulhal	UJVNL	2020-21	Under Tendering	23
18.		-	Ramganga	UJVNL	2020-21	Under Tendering	24
19.		-	Dhakrani	UJVNL	2020-21	Under Tendering	24
V.	Uttar Pradesh						
20.		-	Obra	UPJVNL	2018-19	Under Implementation	26-27
21.		-	Rihand	UPJVNL	2017-18	Under Implementation	28
Western Region							
VI.	Madhya Pradesh						
22.		-	Gandhi Sagar	MPPGCL	2018-19	Under Implementation	29
23.		-	Bargi	MPPGCL	2021-22	Under Implementation	30
24.		-	Pench	MPPGCL	2021-22	Under Implementation	30
25.		-	Bansagar Ton-I	MPPGCL	2021-22	Under Tendering	30
	Gujarat						
26.		-	Ukai	GSECL	2021-22	Under Implementation	31
27.		-	Kadana PSS	GSECL	2021-22	Under Implementation	31

S. No.	State	Name of Scheme in the Sector		Agency	Completion Schedule	Status	Page No.
		Central	State				
Southern Region							
VII.	Andhra Pradesh						
28.		-	Machkund St.I & St.II	APGENCO	2021-22	Under DPR Preparation/ Finalisation/Approval	32
VIII.	Telangana						
29.		-	Nagarjuna Sagar Phase-II	TSGENCO	2018-19	Under Implementation	33
30.		-	Nagarjuna Sagar Left Canal Power House	TSGENCO	2018-19	Under Implementation	34
IX.	Karnataka						
31.		-	Bhadra River Bed units	KPCL	2017-18	Under Implementation	35-36
32.		-	Nagjhari, U-1 to 6	KPCL	2021-22	Under Implementation	37
33.		-	Nagjhari, U-1 to 3	KPCL	2021-22	Under Tendering	38
34.		-	Shivasamudram	KPCL	2021-22	Under DPR Preparation/ Finalisation/Approval	38
35.		-	MGHE (Mahatma Gandhi HE)	KPCL	2021-22		
X.	Kerala						
36.		-	Sholayar	KSEB	2018-19	Under Implementation	39
37.		-	Idukki 1 st Stage	KSEB	2019-20	Under Implementation	40
38.		-	Kuttiadi	KSEB	2021-22	Under DPR Preparation/ Finalisation/Approval	40
XI.	Tamil Nadu						
39.		-	Sholayar PH-I	TANGEDCO	2018-19	Under Implementation	41
Eastern Region							
XII.	Jharkhand						
40.		Panchet, U-1	-	DVC	2021-22	Under Tendering	45
XIII.	Odisha						
41.		-	Hirakud-I, U5&6	OHPC	2018-19	Under Implementation	46
42.		-	Hirakud-II	OHPC	2017-18	Under Implementation	47
43.		-	Balimela	OHPC	2020-21	Under Implementation	48
XIV.	West Bengal						
44.		Maithon, U1&3	-	DVC	2021-22	Under DPR Preparation/ Finalisation/Approval	49
North Eastern Region							
XV.	Meghalaya						
45.		-	Umiam St.III Kyrdemkulai	MePGCL	2021-22	Under DPR Preparation/ Finalisation/Approval	50-51

Programmed for completion beyond 2017-22

S. No.	State	Name of Scheme in the Sector		Agency	Completion Schedule	Status	Page No.
		Central	State				
Northern Region							
I.	Uttarakhand						
1.		-	Chibro	UJVNL	2023-24	Under DPR Preparation/ Finalisation/Approval	25
2.		-	Khodri	UJVNL	2023-24	Under DPR Preparation/ Finalisation/Approval	25
Southern Region							
II.	Kerala						
3.		-	Idukki 2 nd Stage	KSEB	2022-27	Under RLA Studies	40
III.	Tamil Nadu						
4.		-	Khodyar PH-I	TANGEDCO	2022-27	Under DPR Preparation/ Finalisation/Approval	42
5.		-	Khodyar PH-II	TANGEDCO	2022-27		42
6.		-	Moyar PH	TANGEDCO	2022-27	Under Tendering	43
7.		-	Kundah-I	TANGEDCO	2022-27	Under RLA Studies	43
8.		-	Kundah-II	TANGEDCO	2022-27	Under RLA Studies	43
9.		-	Kundah-III	TANGEDCO	2022-27	Under RLA Studies	43
10.		-	Kundah-IV	TANGEDCO	2022-27	Under RLA Studies	43
11.		-	Kundah-V	TANGEDCO	2022-27	Under RLA Studies	44
12.		-	Mettur Tunnel	TANGEDCO	2022-27	Under RLA Studies	44
13.		-	Sarkarpathy	TANGEDCO	2022-27	Under RLA Studies	44
14.		-	Sholayar-II	TANGEDCO	2022-27	Under RLA Studies	44
15.		-	Suruliyar	TANGEDCO	2022-27	Under RLA Studies	44
North Eastern Region							
IV.	Manipur						
16.		Loktak	-	NHPC	2022-23	Under DPR Preparation/ Finalisation/Approval	52

RENOVATION, MODERNISATION & UPRATING OF HYDRO ELECTRIC POWER PROJECTS

BACKGROUND

For optimization of resources and to tide over the shortage of electricity in the country, Renovation & Modernisation, Upgrading 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, CEA 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 CEA 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.

VIII Plan to XII Plan

Under the hydro R&M programme, 103 (21 in Central Sector and 82 in State Sector) hydro R&M schemes (13 upto the VIII Plan, 20 in the IX Plan, 32 in the X Plan, 18 in the XI Plan & 20 in the XII Plan) with an aggregate installed capacity of 20477 MW at a cost of Rs. 3073 Crores have been completed by the end of the XII Plan (i.e. by 31st March 2017) which have accrued a benefit of 3621 MW through Life Extension, Upgrading and Restoration. The state-wise list of Hydro RM&U schemes completed during VIII, IX, X, XI & XII Plans are given at Annex-I, II, III, IV & V respectively.

During the XII Plan, 20 schemes (2 in Central Sector & 18 in State Sector) with an installed capacity of 4015 MW have been completed till March, 2017 at a cost of about Rs.1051 Crores and have accrued a benefit of 534 MW through Life Extension, Upgrading and Restoration.

During 2017-22

During 2017-22, a total of 45 schemes (7 in Central Sector & 38 in State Sector) having an installed capacity of about 8824 MW are programmed as on date for completion at an estimated cost of about Rs. 5407 Crores and which will accrue benefit of about 3001 MW. The state-wise list of hydro R&M schemes expected for completion during 2017-22 (45 schemes) is given at Annex-VI.

Beyond 2017-22

Beyond 2017-22, a total of 16 schemes (1 in Central Sector & 15 in State Sector) having an installed capacity of about 1836 MW are programmed as on date for completion which will accrue benefit of about 623 MW. The state-wise list of hydro R&M schemes expected for completion beyond 2017-22 is given at Annex-VII.

State-wise list of additional 12 hydro projects having an installed capacity of 2076 MW identified as on 31.03.2017 for undertaking RMU&LE works is given at Annex-VIII.

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

Summary of R&M of Hydro Electric Projects
(As on 31.03.2017)

I Hydro R&M Schemes completed up to 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				
1.	Upto VIII Plan Schemes	2	11	13	1282.00	125.57	127.37	429.00 [54.00(LE) + 39.00(U) + 336.00(Res.)]
2.	IX Plan Schemes	8	12	20	4892.10	597.84	570.16	1093.03 [423.00(LE)+ 339.00(U) + 331.03(Res.)]
3.	X Plan Schemes	5	27	32	4446.60	1016.31	1029.24	829.08 [701.25 (LE) + 123.40(U) + 4.43(Res.)]
4.	XI Plan Schemes	4	14	18	5841.20	412.83	294.84	735 [708 (LE)+ 12 (U)+ 15(Res.)]
5.	XII Plan Schemes	2	18	20	4014.60	1278.03	1051.48	534.40 [476.40 (LE)+ 43 (U)+ 15(Res.)]
	TOTAL	21	82	103	20476.50	3430.58	3073.09	3620.51 [2362.65 (LE)+ 556.40 (U)+ 701.46 (Res.)]

II Hydro R&M Schemes programmed for completion during 2017-22

Sl. No.	Scheme Category	No. of Projects			Installed Capacity (MW)	Estimated Cost (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total				
1.	Programmed	7	38	45	8824.35	5407.03	699.78	3001.15 [2839.20(LE)+ 161.95(U)]
2.	Under Implementation	5	22	27	5924.30	3088.60	663.58	2174.90 [2043.7 (LE)+ 131.20 (U)]
3.	Under Tendering	1	11	12	2279.75	1678.80	30.45	517.75 [505.75 (LE)+ 12 (U)]
4.	Under DPR Preparation/ Finalisation/ Approval	1	5	6	620.95	639.63	5.75	308.50 [289.75 (LE)+ 18.75(U)]

III Hydro R&M Schemes programmed for completion beyond 2017-22

Sl. No.	Scheme Category	No. of Projects			Installed Capacity (MW)	Estimated Cost [#] (Rs. in Crs.)	Actual Expenditure (Rs. in Crs.)	Benefit [@] (MW)
		Central Sector	State Sector	Total				
1.	Programmed	1	15	16	1836.00	762.15	-	623.00 [601(LE) + 22 (U)]
2.	Under Tendering	-	1	1	36.00	67.05	-	42.00 [36 (LE)+ 6 (U)]
2.	Under DPR Preparation/ Finalisation/ Approval	1	4	5	565.00	695.10	-	581.00 [565(LE) + 16 (U)]
3.	Under RLA Studies	-	10	10	1235.00	-	-	-

Abbreviations:

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

Estimated cost of 13 schemes not included in the Estimated Cost and that of 1 scheme partially included as the Estimates of these schemes are yet to be finalized.

@ Benefit of 10 schemes not included as their Scope of Works are yet to be finalized.

STATE-WISE/ YEAR-WISE DETAILS OF R&M SCHEMES OF HYDRO POWER STATIONS COMPLETED DURING XII PLAN (2012-17)

State	<u>Year 2012-13</u>	<u>Year 2013-14</u>	<u>Year 2014-15</u>	<u>Year 2015-16</u>	<u>Year 2016-17</u>
Odisha	Rengali Unit-1, OHPC (1x50)=50MW	*Rengali Unit-2, OHPC, (rescheduled from 2012-13) (1x50)= 50 MW	-	-	-
Andhra Pradesh	-	*Lower Sileru, APGENCO (4x115)=460 MW (rescheduled from 2012-13)	-	*Srisailem RB, APGENCO (7x110)=770 MW (rescheduled from 2013-14)	-
Telangana	Nagarjuna Sagar Ph-I, TSGENCO (1x110+7x100.8)=815.6	-	-	-	-
Kerala	Idamalayar, KSEB(2x37.5)=75 MW	-	*Sabarigiri, KSEB, (1x55)=55 MW (rescheduled from 2012-13)	*Poringalkuthu, KSEB, (4x8)=32MW (rescheduled from 2014-15)	-
Himachal Pradesh	-	*Bassi, HPSEB (4x15)=60 MW (rescheduled from 2012- 13)	-	-	-
Assam	-	-	i)Khandong, NEEPCO(1x25) =25 MW ii) *Kopili, NEEPCO(2x50) = 100 MW (rescheduled from 2013-14)	-	-
Karnataka	-	-	**Supa, KPCL (2x50)=100MW (Unit 1&2) (rescheduled from 2013-14)	-	Sharavaty (Ph B) (10x103.5)=1035MW (Commissioning preponed from 2017-22)
Uttarakhand	-	-	*Pathri, UJVNL (3x6.8)=20.4 MW (rescheduled from 2013-14)	-	*Khatima, UJVNL (3x13.8)=41.4 MW (rescheduled from 2014-15)
Jammu & Kashmir	-	-	*Lower Jhelum, J&KSPDC (3x35)=105 MW (rescheduled from)	-	*Sumbal Sindh, J&KSPDC (2x11.3)=22.6 MW (rescheduled from 2012-13)

State	<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>
Uttar Pradesh	-	-	-	*Matatila, UPJVNL(3x10.2)=30.6 MW	-
Tamil Nadu	-	-	-	*Periyar, TANGEDCO(4x35)=140 MW (resheduled from 2014-15)	-
West Bengal	-	-	-	-	*Jaldhaka St.I, WBSEDCL, (3x9)=27 MW (resheduled from 2012-13)
Total (Original)	1720.20 MW (10 Schemes)	2048.70 MW (6 Schemes)	1009.40 MW (9 Schemes)	1238.35 MW (12 Schemes)	1088.75 MW (8 Schemes)
Total (Actual)	940.60 MW (3 Schemes)	570 MW (3 Schemes)	405.40 MW (6 Schemes)	972.60 MW (4 Schemes)	1126.30 MW (6 Schemes)

* Schemes rescheduled during XII Plan.

** New schemes taken up for completion during XII Plan

HIMACHAL PRADESH - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (HPSEB)										
1.	Bassi 4x15 MW (Original) HPSEB 1970-81 T&G - U-1: AEI, UK T&G - U-2 to 4: BHEL RMU&LE works carried out by M/s VA Tech (Now Andritz Hydro).	124.25 (Rev. cost)	RMU &LE	60 (LE) 6(U)	2013-14	158.26 (upto 08/2016) State Plan= 16.26 Cr. PFC 39.83 Cr. Loan=14 2 Cr.	Agency: PFC / MOP Sanct. under AG&SP: 80.00 Cr. State Plan- 39.83 Cr. 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. Supplementary Scheme: - Retrofitting of 13 nos.11/132 kV, 5.667 MVA, single phase Generator Transformers (GT). - Replacement of 9 nos. 132 KV ABCBs with SF6 Breakers. - Provision of CO ₂ system for Generator protection, Automatic Braking and Jacking System. 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-2. - Replacement/ overhauling of Emulsifier System of Bassi Power House - Prov. No. 400KVA 415 Volts DG Set in 4x16.5MW Bassi Power House. - Commissioning of Air Gap measuring system and Vibration Monitoring System for 4 units of Bassi Power House	- 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-2 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 3 & 1 were handed over to firm for R&M on 9.11.2010 & 07.12.2010 respectively. Unit No. 3 was synchronized on 23.02.2012 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 Supplementary Scheme: - The order for retrofitting of GT was 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. ADDITIONAL WORKS: - All works stand completed. However, Unit-4 was again handed over to M/s. Andritz Hydro on 18.02.13 for replacement of Turbine Shaft & associated equipment. Short circuit characteristics conducted (m/c put on bars on 03.01.14). Unit commissioned in March'14 .	

JAMMU & KASHMIR - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (J&KSPDC)										
2.	Lower Jhelum, 3x35 MW J&KSPDC 1978-79 T&G - BHEL R&M+Res. works carried out by BHEL.	101.30 (Revised)	R&M +Res.	15 (Res.)	2014-15	96.10	Agency: PFC :70% State Govt:30%	Turbine: New Turbine Runner, Guide Vanes, MIV's renovation, Replacement of Governors. 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.	R&M works of Unit #1 & 3 completed. Renovation of underwater parts/ turbine of Unit-2 including replacement of runner of existing capacity, top cover, lower ring and stainless steel guide vanes and other spares completed by JKSPDC under the supervision of BHEL. Other works under execution/tendering are: reconditioning of Rotor Field Coils of Unit-2 with Class "F" Insulation, replacement of stator winding bars with Class F insulated windings, renovation of EOT crane, machining of generator shaft, 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, repair/reconditioning of MIV, replacement of inlet/outlet HP pipes of Unit-2, footbridge system at forebay for effective trash cleaning and discharge measurement system, water level monitoring system with discharge measurement system. 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. All civil works have been completed.	

JAMMU & KASHMIR - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (J&KSPDC)										
3.	Sumbal Sindh (Upper Sindh Stage-I), 2x11.3 MW J&KSPDC 1973-74 T&G - BHEL R&M works carried out by BHEL.	25.00 (Rev.)	R&M	-	2016-17	24.59	Agency: MNRE	Turbine Replacement of Governors, overhauling of MIVs, reconditioning of Turbines. Generator Procurement of Stator Air Coolers Excitation System 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 except the following works: - Reconditioning of 11 KV/ LT switchgear. - Replacement of existing excitation system by latest static excitation system of Unit-1. - Replacement of field instruments. All 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 would increase to 17 MW.

UTTARAKHAND - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (UJVN LTD.)										
4.	Pathri, 3x6.8 MW UJVN LTD. 1955 T - J.M.Voith, Germany G - Siemens, Germany RM&LE works carried out by M/s Andritz Hydro.	113.25 (with IDC) 99.05 (without IDC)	RM&LE	20.4 (LE)	2014-15	108.294 (As on 31.12.2016)	Agency: MNRE Grant- Rs 12.5 Crs PNB loan - Rs 65.00 Crs	Replacement of runner, rehabilitation of generators, new electronic governors, new excitation system. Installation of intake hoisting arrangement, installation of DT gantry crane, 11 kV Circuit Breakers, control protection and instrumentation & Replacement of Switchyard equipment and life extension of units based on RLA studies.	RM&LE works were awarded to M/s Andritz Hydro on 09.03.2010 with a completion schedule of 36 months. 1 st unit i.e. unit no. 3 was given to contractor for reverse engineering on 02.05.2010 which has been completed by the firm. Based on reverse engineering, some addition items such as top cover, Shaft etc. have been included in the scope. LOI for same was placed on 24.05.2011 and unit 3 handed over for RM&LE works on 06.10.2011. Unit 3 was synchronized on 10.10.13 & taken over by UJVN Ltd. on 15.10.13. R&M works common for all three units have been completed. 2 nd unit (Unit no. 1) was successfully commissioned and taken over on 26.04.2014 after R&M. Third unit (Unit no. 2) commissioned and taken over by UJVNL on 31.08.2014 after its successful trial run and commissioning tests.	
5.	Khatima, 3x13.8 MW UJVN LTD. 1955(U-I&2) 1956(U-3) T & G – English Electric, UK RM&LE works carried out by JV of M/s Alstom(India) & M/s PES Engineers.	256.77 (with IDC) 215.83 (without IDC)	RM&LE	41.4 (LE)	2016-17	118.83 Including 17.26 Cr. advance	Agency: PFC	Up-gradation of machines, rehabilitation of Generators, modification of control, protection & instrumentation, Replacement of rotor winding, new electronic governors, new excitation system, new trash rack cleaning machine & LT System, construction of new bypass, enhancement of Nagla escape channel capacity and repair of TRC etc. through UPID.	Board approved the DPR on 11.02.2008. UJVN LTD. 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 03.01.2012 with the completion period of 36 months. One set of new Draft tube gates, 132 kV & 33 kV CTs, PTs & LAs, cables, Isolators and UATs have been supplied. Replacement of LT switchgear, LT cables, contact cable, switchyard equipment of feeder completed. Cable trays laid. Turbine shaft and stator frame refurbished & supplied at site. Stator core assembly completed. Dismantling of generator transformer cables of all three units completed. DCDB, PDBs, UDBs, new 220AH Battery Bank supplied and commissioned at site. Dismantling of LA, CT, PT and isolator of line 2 completed and line energized. Excitation system for all three units, 11 kV and LT switchgear and NG panel supplied. Civil works is being carried out through Deptt. of Irrigation, Uttar Pradesh. Embedded parts of stop log gates of all the units replaced during canal closure. Draft tube cone & DT liner of unit-1 erected. Centering and alignment of runner chamber of U-1 completed. Likely commissioning of unit-1 was Dec, 2014 but due to incidents of breaching of Sharda Canal on 31.08.2014, schedule of its completion got delayed. Stator Lamination, Stator Coil & Oil Header Accessories of unit-2&3, Intake Gates for 2 nos. of Intake Gate Hoists and Spiral Casing Drain Valve of Unit 1 supplied. Restoration of Generator Step-up (GSU) Transformer of Unit-2&3 completed and shall be commissioned with the operation of Unit-2&3 respectively. Supply of Machine no. 1 completed. Erection activities are complete with the completion of dry commissioning of checks also.	

UTTARAKHAND - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
									Unit is ready for commissioning with the availability of water in the Sharda Power Channel. Efforts were made with UPID authorities for release of water. Wet commissioning tests on Unit-1 carried out from 29th March 2015. Trial runs were completed & Unit No. 1 was synchronized with grid on 05.04.2015 and was formally handed over to UJVN Ltd. on 27.05.2015. Unit 2 has been undertaken for RMU on 22.06.2015. Guide Vanes, Bottom Ring & Inner Head Cover of M/c no.2 and shutter vanes & Rotor spider Hub of M/c no.3 supplied in June, 2015. Unit no. 2 has been synchronized to grid on 28.04.2016 and handed over to UJVNL on 21.05.2016. After completion of Canal closure and the settlement of regulation of water in Sharda canal, Unit-3 was handed over to AIL on 03.11.2015 for dismantling, refurbishment and erection. • Rotor building, Stator core building with core flux testing, Runner chamber erection and Draft tube cone & Pivot ring erection completed. • Erection of the remaining 8 no. panels of the trash rack had already been completed during the canal closure. Refurbishment of the reserve bus of 132kV Switchyard completed. • Refurbishment of the main bus of 132kV switch yard completed. Unit 3 has been synchronized with grid on 08.09.2016 and handed over to UJVNL on 25.09.2016.	

UTTAR PRADESH - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (UPJVNL)										
6.	Matatila, 3x10.2 MW UPJVNL 1965 T&G - Hitachi, Japan Digital governor (M/s Andritz Hydro) and Static Excitation System (M/s AMTEC Ltd.)	10.29	RM & LE	30.6 (LE)	2015-16	7.21 (as on 30.06.15)	Own Resources	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 had 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, 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 treatment of power house building walls (sub-merged portion) with water proof cement completed. Refurbishment of DC & AC system, replacement of existing control, protection and monitoring system by Numeric/Static protection, erection of digital governor for unit 3 and renovation of instrumentation system for entire station completed. Supply, erection, testing & commissioning of digital governor (M/s Andritz Hydro) and static excitation system (M/s AMTEC Ltd.) for all units completed. All R&M works completed.	

ANDHRA PRADESH - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (APGENCO)										
7.	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	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.	

ANDHRA PRADESH - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (APGENCO)										
8.	Srisailem R.B. P.H. 7x110 MW APGENCO 1982-87 T&G - BHEL	16.70	R&M	-	2015-16	17.60	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 mulsifyre system. 3. Procurement of motorized valves for cooling water system 4. Procurement of CTs & CVTs. 5. Procurement of 910 KVA, 728 KVA 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 all units 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. 9. Completed.	

TELANGANA - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (TSGENCO)										
9.	Nagarjuna Sagar Phase I works 1x110 + 7x100.8 MW, TSGENCO 1978-85 <u>Unit-1:</u> T&G - BHEL <u>Units 2 to 8:</u> PT - Hitachi, Japan G - MELCO, 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 245 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	

KARNATAKA - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (KPCL)										
10.	Supa 2x50 MW KPCL 1985 T&G - BHEL	3.45	R&M	-	2014-15	3.88 (as on 30.09.14)	Agency PFC/MOP sanctioned under AG&SP 1.40 (For Xth Plan works) Disb: (till 31.12.2007)	1) Modernisation of analog governors with digital. 2) Modernisation of EM relays with Numerical relays.	1) Works completed on 15.10.14. 2) Works completed in 2011-12.	
11.	Sharavathy (Ph B) 10x103.5 MW KPCL 1964-65(U-1&2), 1967-71(U-3 to 8) 1976-77(U-9&10) T - Neyrpic, France (U-1 to 8) G - Hitachi (U-1&2) GE, Canada (U-3 to 8) T&G - BHEL(U-9&10)	31.823 (including temporary panels & SCADA)	R&M	-	2016-17	29.27	Own funds	SCADA	Supply, Erection, Testing & Commissioning of Digital Control System (SCADA) is taken up along with restoration of SGS. Order dated 22.03.2016 placed on M/s ABB India Ltd. Bangalore. Unit 1,2,3,4,5, 9 & 10 commissioned through DCS system located in Generator Hall. Lines SS 1 &2, SB, ST1,2 &3, S-1,3 & 4 lines charged through Bay Control Units located at Bay kiosks. Erection and Commissioning work of centralized DCS system at Control room completed. U 6, 7 & 8 re-commissioned with DCS based SCADA system.	

KERALA - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (KSEB)										
12.	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 was put back into service on 25.01.12. The works on Unit II were completed and Unit commissioned on 26.12.12.	The payback is expected in one year.
13.	Sabarigiri, Rebuilding of Unit 4 1x55 MW (Original) KSEB 1966 T&G - Allis Chalmers, USA	52.2	RMU	5 (U)	2014-15	50.41 (as on 30.06.16)	Own funds	Supply, erection and commissioning of 60 MW generating unit with all accessories and auxiliary equipments, including 3 Nos. Generator Transformers.	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. Unit-4: Order for rebuilding with uprating 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 was completed. Test synchronization was done on 20.06.2013 and the unit was put under trial run of 72 hrs. The stator winding failed on 10.10.13. The rebuilding work of damaged unit was completed on 06.05.14 and the unit is now in operation.	
14.	Poringalkuthu, 4x8 MW KSEB 1957-60 T - Charmilles, Switzerland G - EE, UK	88.63	RMU&LE	32 (LE)+ 4 (U)	2015-16	51.90 (as on 30.06.2016)	Agency: PFC/ REC (to be decided)	Replacement of Turbine & PRV, Governors, stator & rotor windings with Class F insulation, excitation system, control & protection system of generator, feeder & transformer, Generator 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 was approved by the Board. For execution of Electro & Hydro Mechanical works, detailed purchase order and work order was issued to M/s Allonword SSIPL (Shari Saravana Industries Pvt. Ltd.), Madurai consortium on 23.12.2011. As per the work order, the supply and work was to be completed within 36 months (i.e. by 14.01.2015). Unit-1 handed over for R&M on 22.02.13 & commissioned on 14.04.14. Unit 2 R&M works completed and Unit commissioned on 15.08.14. Dismantling of Unit 3 started on 22.08.14 and commissioned on 12.02.15. Unit 4 commissioned on 29.05.15. SCADA implementation also completed.	The payback is expected in two years.

TAMIL NADU - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (TANGEDCO)										
15.	Periyar PH, 4x35 MW (Original) TANGEDCO 1958-65 <u>Unit 1 to 3:</u> T - JM Voith, West Germany G – AEG, W. Germany <u>Unit-4:</u> T - Litostroj Yugoslavia G - Rade Koncar Yugoslavia.	162.06	RMU&LE	140+ (LE) 28 (U)	2015-16	133.68 (upto 31.12.2016)	Agency: PFC: 153.31 Cr	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	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. From 14.07.2011, unit is in service and running at full load of 42 MW. Unit- 2 RM&U works have been completed and unit commissioned on 11.09.2012. Unit-3 was 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 commissioned on 08.01.14. Unit-4 was handed over for RMU works on 05.04.14 and work completed and put on bar on 23.03.16. Unit-4 reached full load of 42MW. The 30 days trial run including 72 hrs. continuous full load test is pending for want of water.	

ODISHA - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (OHPC)										
16.	Rengali Unit-1 HEP 1x50 MW OHPC 1985 T&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.	
17.	Rengali Unit-2 HEP 1x50 MW OHPC 1986 T&G-BHEL	25.2 (approx)	RM&LE	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 was carried out by M/s BHEL from 01.12.12. The unit after completion of R&M work was synchronized on 20.04.2013.	

WEST BENGAL - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
STATE SECTOR (WBSEDCL)										
18.	Jaldhaka St. I 3x9MW , 1967 (U-1&2) 1972 (U-3) Unit-1&2: T -Litostroj, Yugoslavia G-Rade Koncar Yugoslavia Unit-3 T&G - Fuji, Japan	88.62	RM&LE (St-I)	27 (LE)	2016-17	79.97 (as on 30.09.16)	Agency: PFC/MOP disbursed Rs. 1.38 Cr. till 31 Dec. 07 under AG&SP against sanction of 36.52 Cr. which has been foreclosed. REC Rs. 62.03 Cr. (70% of estimated cost of 88.62 Cr., Balance 30% from WBSEDCL 's own resource)	1. <u>Lot-I (General Civil Works):</u> Renovation & repair works for Barrage, Water Intake & forebay, Switchyard, Water Conductor System, Power House Buildings & Yards including equipment foundation etc. and TRC of Stage – I P.H. 2. <u>Lot-II (Hydro Mechanical Work):</u> 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. 3. <u>Lot-III (TG& Auxiliaries):</u> 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. <u>Lot-IV (Electrical System):</u> 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, 110V 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. 5. <u>Lot-V:</u> New addl. Unit of 9 MW 6. <u>Lot-VI (SCADA):</u> Design, supply & installation of SCADA System for entire JHP. St-I & II	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: Synchronized on 30.07.2010 & available. Unit 3: Commissioned on 07.10.2011 & available Unit 1: Commissioned on 08.07.2012 & available. Taking over of units awaited pending miscellaneous. contractual obligations. 4. Lot-IV: System commissioned on 20.04.2010 and taken over. 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 shall be taken up after stabilisation of all four units (including the new 4 th unit). Exclusion of SCADA Package from R&M has been considered by WBSEDCL authority. Further Tendering & implementation of SCADA work shall be taken up subsequently covering both Stage-I & Stage-II as a composite package after stabilization of all 4 units at Stage-I & after installation of Digital Governor/ Numerical relays (Compatible to SCADA) at Stage-II.	Time-overrun factors: i) Prolonged unrest (Bandh, Strike, Agitation etc.) in Darjeeling hills from end- 2007 to early- 2011. ii) Additional works had to be ordered as same not foreseen due to it being R&M work. iii) Delay due to Contractor (M/s Andritz Hydro). Cost –Overrun factors: Time-gap between DPR & LOA placement; Enhancement of Scope of Work during execution.

Assam - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
CENTRAL SECTOR (NEEPCO)										
19.	Khandong 1x25 MW NEEPCO 1984 T&G - BHEL	25.05 (excluding IDC)	RM&LE	25 (LE)	2014-15	29.18 (as on 30.09.14)	Internal Resources	I-Generator 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 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 TGB Coolers, overhauling of unit-1 GT, replacement of defective distance protection scheme of 132kV feeders completed. Assembly of new stator and H.V. test completed. Balance material & equipment from BHEL has been received. R&M work completed on 30.06.2014.	Acidity of water in Kopili reservoir and bad Law and Order situation prevailing at project site were reasons for slow progress in execution of R&M works. Delay also due to delay in supply by BHEL.

Assam - Details of Renovation & Modernisation Schemes of Hydro Power Stations completed in XII Plan

(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
CENTRAL SECTOR (NEEPCO)										
20.	Kopili, 2x50 MW (St.I) NEEPCO 1988 T&G - BHEL	50.22 (Rev.)	R&M & Refurbishment of U-1 &2	-	2014-15	50.92 (as on 30.09.14)	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 was planned to complete entire scheme by May, 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. R&M of Unit-1 has been completed on 24.05.2014 and in Unit-2 on 29.07.14. 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.

STATE-WISE & YEAR-WISE PROGRAMME OF COMPLETION OF R&M SCHEMES OF HYDRO POWER STATIONS DURING 2017-22

As on 31.03.2017

State	<u>Year 2017-18</u>	<u>Year 2018-19</u>	<u>Year 2019-20</u>	<u>Year 2020-21</u>	<u>Year 2021-22</u>
Himachal Pradesh	i) Ganguwal U2 & Kotla U3, BBMB, (1x24.2+1x24.2)=48.4 MW ii) Dehar Power House, BBMB, (1x165)=165 MW	Bhakra LB, BBMB, (5x108)=540 MW	Giri, HPSEB, (2x30)=60 MW	Baira Siul, NHPC, (3x60)=180 MW	Bhaba Power House, HPSEB, (3x40)=120 MW
Jammu & Kashmir	i) Ganderbal, J&KSPDC (2x3+2x4.5)=15 MW ii) Chenani, J&KSPDC (5x4.66)=23.3 MW	-	Salal, NHPC, (6x115)=690 MW	-	-
Punjab	-	-	i) Mukerin St.I, St.II, St.III & St.IV, PSPCL, (3x15+3x15+3x19.5+3x19.5)=207 MW ii) Ranjit Sagar Dam, PSPCL, (4x150)=600 MW iii) Shanan HEP, PSPCL, (1x50+4x15)=110 MW iv) UBDC St.I & St.II, PSPCL, (3x15+3x15.45)=91.35 MW	-	-
Uttarakhand	-	-	Tiloth, UJVNL (3x30)=90 MW,	i) Dhalipur, UJVNL (3x17)=51 MW ii) Kulhal, UJVNL (3x10)=30 MW iii) Ramganga, UJVNL (3x66)=198 MW iv) Dhakrani, UJVNL, (3x11.25)=33.75 MW	Chilla Ph B, UJVNL (4x36)=144 MW
Uttar Pradesh	Rihand, UPJVNL (6x50)=300 MW	Obra, UPJVNL (3x33)=99 MW	-	-	-

State	<u>Year 2017-18</u>	<u>Year 2018-19</u>	<u>Year 2019-20</u>	<u>Year 2020-21</u>	<u>Year 2021-22</u>
Madhya Pradesh	-	Gandhi Sagar, MPPGCL, (5x23)=115 MW	-	-	i) Bargi, MPPGCL, (2x45)=90 MW ii) Pench, MPPGCL, (2x80)=160 MW iii) Bansagar Ton-I, MPPGCL, (3x105)=315 MW
Gujarat	-	-	-	-	i) Ukai, GSECL (4x75)=300 MW ii) Kadana PSS, GSECL (3x60)=180 MW
Andhra Pradesh	-	-	-	-	Machkund St.I & St.II, APGENCO, (3x17+3x21.25)=114.75 MW
Telangana	-	i) Nagarjuna Sagar Ph-II, TSGENCO, (1x110+7x100.8)=815.6 MW ii) Nagarjuna Sagar LCPH, TSGENCO (2x30)=60 MW	-	-	-
Karnataka	Bhadra River Bed Units, KPCL, (2x12)=24 MW	-	-	-	i) Nagjhari U-1 to U-6, KPCL, (5x150+1x135)=885 MW ii) Nagjhari U-1 to U-3, KPCL, (3x150)=450 MW iii) Shivasamudram, KPCL, (6x3+4x6)=42 MW iv) MGHE, KPCL, (4x21.6+4x13.2)=139.2 MW
Kerala	-	Sholayar, KSEB, (3x18)=54 MW	Idukki 1 st Stage, KSEB, (3x130)=390 MW	-	Kuttiadi, KSEB, (3x75)=225 MW
Tamil Nadu	-	Sholayar-I, TANGEDCO (2x35)=70 MW	-	-	

State	<u>Year 2017-18</u>	<u>Year 2018-19</u>	<u>Year 2019-20</u>	<u>Year 2020-21</u>	<u>Year 2021-22</u>
Jharkhand	-	-	-	-	Panchet U-1, DVC, (1x40)=40 MW
Odisha	Hirakud-II, OHPC, (1x24)=24MW	Hirakud-I U5&6, OHPC, (2x37.5)=75 MW	-	Balimela, OHPC, (6x60)=360 MW	-
West Bengal	-	-	-	-	Maithon U 1& 2, DVC, (2x20)=40 MW
Meghalaya	-	-	-	-	Umiam St.III, Kyrdemkulai, MePGCL, (2x30)=60 MW
Total: 8824.35 MW (45 Schemes)	599.70 MW (7 Schemes)	1828.60 MW (8 Schemes)	2238.35 MW (8 Schemes)	852.75 MW (6 Schemes)	3304.95 MW (16 Schemes)

HIMACHAL PRADESH - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING – Under Implementation - CENTRAL SECTOR (BBMB)										
1.	Bhakra LB, BBMB 5x108 MW (Uprated) 1985 5x90 MW (Original) 1960-61 T - Hitachi, Japan G - Metropolitan Vickers, UK	489.77	RMU&LE	540(LE) + 90(U)	2012-13 (Contract ual) 2018-19 (Anticipated)	337.48 cr. (as on 30.11.2016)	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 31.03.2016) PB-126.08 HAR-84.85 HP-6.84 (Till 31.03.2014) 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. Auxiliaries Control & Protection panels, Generator Transformers, Bus Bars with CTs, PTs etc. LAVT cubicle, switchyard equipments, control cables etc.	- The Notification of Award for RM&U works was issued in favour of consortium led by M/s Sumitomo Corporation, Japan (with other members i.e. M/s Hitachi Ltd. Japan and VA Tech Hydro, Gmbh, Austria on 27.10.2007). - Contract agreements for RM&U works (Uprating of generating units from 108 MW to 126 MW) were signed on 02.11.2007 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 Runner crown & Runner Band 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 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 was not achieved in view of the problem faced during commissioning test. The unit after R&M was synchronized on 23.06.13. Cavitation observed in runner and liners after 7550 hours of operation. M/s Hitachi carried requisite repairs and unit again put on operation. Modification of profile of runner blades suggested by M/s Hitachi. Such proposed modification of runner blade profile was not acceptable to BBMB and M/s Hitachi is being pursued to offer new casted runner blades which has not been accepted by M/s Hitachi. Difference in opinion still stands which needs further discussion. Meanwhile, model testing of runner assembly with new runner blade done in Dec'14 and report of same has been accepted. Difference of opinion still stands. M/s Hitachi submitted their Final Settlement proposl by giving two years extended warranty, which has not been accepted. The complete case has been forwarded to CEA for seeking their expert opinion in the matter on 15.05.2015. Meeting was also held with Member (Hydro), CEA. In response to comments/observations of CEA, clarification was sought from Hitachi. The reply of Hitachi has been received. The opinion of CEA, New Delhi was sought and as per their advice, matter referred to Welding Research Institute (WRI), Tiruchirappalli. WRI has opined that they cannot comment as they do not have product expertise. Accordingly, advice was again sought from CEA, New Delhi and the same was received. In the meeting held by BBMB with Consortium, it was mutually agreed that M/s Hitachi would immediately initiate the process for modification of runner profile of Unit No. 2 at site; the unit would be run for a period of about 6,400 hours or till 31st January, 2017, whichever is later (including at least three	

R&M – Renovation & Modernisation, RM&U – Renovation Modernisation & Uprating, RM&LE – Renovation, Modernisation & Life Extension, RMU&LE – Renovation, Modernisation, Uprating & Life Extension, RMU+Res. – Renovation, Modernisation, Uprating+Restoration, RM&LE+Res. – Renovation, Modernisation & Life Extension+Restoration, R&M+ Res. – Renovation & Modernisation+Restoration @ -as per National Perspective Plan

									months of running at high head range). After the successful performance of the post modification runner and other parts of the Unit during test period, the runner modification work and its implementation in other Units would be accepted by BBMB with the approval of Board. As the maximum head achieved was 478.67 feet and the Unit has not operated at high head range (480-512 feet), it was decided jointly by BBMB design and field engineers that joint inspection with M/s. Hitachi not to be carried out as the same has not fulfilled the agreed provisions stipulated in the Minutes of Meeting dated 13.01.2016 and 02.03.2016. However, during Annual Maintenance, the internal inspection by BBMB engineers was carried out on 24.03.2017 and the operation of runner upto 478.67 feet of head was found satisfactory. - Second Unit (Unit 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. Cavitation observed in runner and liners after 3750 hours of operation. Further action to be taken as per Unit No.2. NDT of Generator shaft to be carried out as per recommendations of CPRI, Bangalore and dismantling of the unit is being considered departmentally under supervision of contractor. Based on the report of CPRI, Bangalore, spare new Generator Shaft (as ordered on M/s Andritz Hydro on 08.07.2014) shall be used on Power House Unit no. 5. Delivery period is 12 months from 03.10.2016 (the date of techno-commercial confirmation). The stage witness inspection of shaft (Forged) scheduled w.e.f. 10th April, 2017 to 13th April, 2017 at the works of M/s FRANCHINI ACCIAI Spa, Italy. On 14.10.2016, Purchase Order placed on M/s Andritz Hydro GmbH, Austria for replacement of existing spider, rim and other related parts with supply of new components along with replacement of existing generator shaft with new already ordered Generator Shaft, for Unit no. 5 of Bhakra Left Bank Power House. Completion Period for the entire work is upto 15.03.2018. The Unit is presently under shutdown. 5th Review meeting held at Chandigarh on 15.03.2017. Inspection and Test Plan approved. All the Jigs and Fixtures received at the site. Dismantlement of the Unit No. 5 has been commenced by BBMB. Thrust Head and Upper Bracket has been dismantled. Unit decoupled from Turbine. Rotor Lifting Beam got transported from Neilla Stores to Power House. Rotor shall be removed from the Pit after fitment of Shaft clamping plate on the existing plate by Andritz Hydro. Andritz Hydro is in process of mobilizing their team for the dismantlement of rotor, transportation of the dismantled components (not to be used) and movement of the existing Thrust Head and Brake Track segments to their Prithla works for modification as per new Shaft and Spider. These works are likely to be completed in approx. 1½ months i.e. by mid-May, 2017, prior to receipt of Shaft and Spider components (scheduled to be by end of August, 2017). - Third Unit (Unit 4) The Generator transformer (from M/s CGL) has been received at site. Third unit has been taken up for R&M on 22.11.2013 with completion scheduled on 31.07.2014 Turbine material has been received from Japan. Numerical protection panels from M/s ABB have been received. Final inspection of Aux. Bus Duct, LAVT, NGTR cubicles carried out in mid Dec'13. Stator build up work at service bay is in progress. Final core pressing completed and core	
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									induction test completed. HV test on stator bottom bars and top bars completed on 15.01.14 & 27.01.14 respectively. Turbine shaft free achieved on 14.03.14. Unit commissioning was delayed due to welding defects in Rotor spider and other markings on generator shaft. Repair works carried out on rotor spider & generator shaft. Earlier period of commissioning of this unit was March, 2015. Rotor lowered into generator pit on 20.04.2015. Generator and Turbine Shaft coupling and run-out check completed. The subsequent activities on Unit No. 4 were allowed to start without prejudice to outcome of difference in opinion regarding runner issue and reserve its right to for any kind of claim as per Contract Agreement and the Unit was taken over for operational run on 05.08.2015. Old generator transformer dismantled & new CGL make GT's auxiliaries components assembly work completed. ABB protection panel installation & cable laying completed. Presently, the Unit is running with output of 126 MW. - Fourth Unit (Unit No. 3) Shall be taken on shutdown for RM&U works after final decision regarding runner issue and lowering of rotor of Unit No. 5 in the pit, anticipated to be in third week of Dec. 2017. - Fifth Unit (Unit No. 1) The commencement of RM&U works shall be based on commissioning of fourth unit. RM&U works shall be completed in 2018-19.	
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HIMACHAL PRADESH - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING – Under Implementation- CENTRAL SECTOR (BBMB)										
2.	Ganguwal (Unit-2) BBMB 27.63 MW (Uprated) 1998 24.2 MW (derated) in 2007 Kotla (Unit-3) BBMB 28.12 MW (Uprated) 1998 24.2 MW (derated) in 2004 2x24.2 MW (Original) 1955-56 T -Baldwin G – Westinghouse,USA	14.19	RM& LE	48.4 (LE)	2017-18	0.84	BBMB	Replacement of existing damaged propeller type turbine runners; thrust sleeve & turbine water shaft sleeve (Ganguwal PH only), repair/modification/painting of turbine components and other allied works.	NIT no. 373/PHD(BH-I)-456 was issued on 12.12.2014 for R&M works of hydro turbines of two no. hydro-generating units, having capacity of 24.2 MW, one each at Ganguwal Power House and Kotla Power House, involving replacement of existing damaged propeller type turbine runners; thrust sleeve & turbine water shaft sleeve (GPH only), repair/modification/painting of turbine components and other allied works. Three bidders, i.e. M/s Andritz Hydro Pvt. Ltd., Prithla, Haryana, M/s Voith Hydro Pvt. Ltd., Noida and M/s BHEL satisfied the PQ criteria and submitted their bids till the last date of submission of bids i.e 16.04.2015. Part-I of these bids were opened on 16.04.2015 and after seeking approval of the competent authority, Part-II (Price bids) of techno-commercially suitable bids were opened on 23.09.2015. Purchase proposal approved by Full Board of BBMB in its meeting held on 27.11.2015. LOI issued to M/s BHEL, Chandigarh on 09.12.2015. Purchase order issued on 08.01.2016. Completion schedule is within 80 weeks from the effective date of the contract, i.e. 20.02.2016. BHEL has submitted the CFD carried out by IIT, Guwahati Analysis Report for offered runners on 11.07.2016 for flow profiles. FEM Analysis Report is carried out by IIT, Kharagpur. However, casting of 2 nos. Runner hub and 14 nos. blades have been completed. Material testing of runner hub and all the blades have been completed. Inspection of 1st runner assembly has been carried out an dispatch authorization issued on 30.03.2017. Inspection of 2nd runner has also been carried out.	

HIMACHAL PRADESH - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING – Under Implementation- CENTRAL SECTOR (BBMB)										
3.	Dehar Power House, BBMB (Unit 6) 1x165 MW 1983 T&G - BHEL	19.87	R&M	-	2017-18	15.00	BBMB	Replacement of existing Stator (Complete with Frame, Core, Bars and Air Coolers), Rotor Poles, Pole Keys, Air guides, Temperature Recorders along with other allied items and Erection, Testing & Commissioning.	BBMB made a request to CEA on 19.03.2014 for expert assistance to guide BBMB and facilitate best course of action in view of repeated occurrence of similar faults on Unit No.6. CEA team visited Dehar Power Plant from 13.04.2014 to 15.04.2014, and submitted its report on 16.04.2014, wherein, it recommended that BBMB need to take up immediately with M/s BHEL, without any further delay for replacement of stator to restore Unit No.6 as an interim measure to avoid/minimize loss of generation at Dehar HEP while take up R&M works based on RLA study as a long term measure to improve performance and extend the life of Units at Dehar HEP. NIT No.374 dated 16.01.2015 followed by Corrigendum-I dated 19.02.15, Corrigendum. II Dt. 17.04.2015 and last Corrigendum-III dated 28.04.2015 with date of tender opening on 19.05.2015 issued. PQ document of 3 nos. firms i.e. M/s Alstom, M/s Andritz Hydro, M/s BHEL were approved and they were allowed to download tender documents. Pre-bid meeting held on 09.04.2015. Part-I (Techno-Commercial) opened on dated 19.05.2015 & Price Bid (Part-II) opened on 31.08.2015. Purchase memo no. 196 dated 23.09.2015 was put up for consideration of Purchase Committee in its meeting held on 29.09.2015. Subsequently, Supplementary purchase Memo no. 198 dt. 15.10.15 was considered on 16.10.2015 by Purchase Committee. As per MOM dated 19.10.15, a negotiation meeting held on 26.10.15 with M/s Alstom and Supplementary Purchase memo no.199 dated 02.11.15 considered on 06.11.15 by Purchase Committee. As per MOM dated 10.12.15, Agenda Note sent on 17.11.2015 for approval of Full Board. Full Board in its meeting held on 27.11.2015 approved the proposal. As per MOM dt. 07.12.2015, LOI issued on 09.12.2015. Purchase Order placed on M/s Alstom India Ltd., (now M/s GE Power India Limited) Vadodara on 25.01.2016 and effective date is 26.02.2016 and completion period is 66 weeks from effective date i.e. 01.06.2017. Advance payment released. Inspections of various components of stator of Unit -6 i.e. stator frame, stator core laminations, rotor pole assembly, stator bars have been completed and same have been received at site. Assembly of rotor poles on rotor completed. Installation of stator completed.	

HIMACHAL PRADESH - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING – Under Implementation - CENTRAL SECTOR (NHPC)										
4.	Baira Siul 3x60 MW NHPC 1980-81 T&G - BHEL	341.41(inc luding IDC & Financing charges of 68.35 Cr.)	RM&LE	180 (LE)	2020-21	-	-	- Activities covering main equipment i.e. turbine, generator and C&I equipment and other plant equipment essential for efficient and sustained performance of the units as well as station. - Activities having direct impact on improvement of generation, efficiency, machine availability etc. - Activities which yield up rating benefits because of Generator with Class F insulation, runner with improved profile. - HP-HVOF coating on under water parts of turbine. Adoption of closed circuit cooling system, Cu-Ni tubes for coolers etc. - State of the art equipment such as electronic governors, static excitation system, Numerical relays, on line monitoring devices including silt content in water. - Augmentation of water conductor system and associated Civil/HM works and infrastructure works.	DPR submitted in CERC for approval. DPR submitted in Mar'15 to MoP/ CEA for approval. Design Energy (708.59MU) and E&M (Rs. 201Cr.) cost has been vetted by CEA and CEA submitted report to CERC in Feb 2016. Final hearing in CERC has been conducted on 23.02.2016. CERC in its order dated 03.06.2016 has accorded “in-principle approval” to the R&M proposal at a total cost of Rs. 341.41 cr. Price Bid opened for Main Plant package and LOA awarded to M/s BHEL on 16.08.2016 at Rs. 132.74 Cr. LOA for HM package awarded to “M/s Om Metals Infraprojects Ltd, New Delhi” on 30.11.2016 at Rs. 19.91 crores.	
SCHEMES ONGOING – Under Implementation - STATE SECTOR (HPSEB)										
5.	Bhaba Power House 3x40 MW HPSEBL 1989 T&G - BHEL	76.03 (For the works of rehabilitation of damaged/ burnt eqpts.) Scheme I	R&M	-	2021-22	53.22 (State plan= 6.42 Cr. PFC Loan 46.80 Cr.)	PFC Loan sanctioned Loan=Rs.68.42 Cr. Equity=Rs.7.6 1 Cr.	Works under Re-habilitation of damaged/burnt equipments (Scheme I): Replacement of existing 245 kV Gas Insulated Switchgear, Control and Relay Panels, 22 kV Indoor switchgear, 415 Volt LT Panels, 220 kV EHT Cables, 22 kV HT Cables, Control & Power cables and other associated equipment along with “Safe dismantling/ removing from site of the existing plant & equipment including carriage, stacking at Owner’s store/yard and handing over to the Owner” on Single Responsibility Basis.	Power House under forced shut down since 22.01.2015 due to fire incidence. It was proposed to frame three schemes: - One exclusively for rehabilitation of damaged/ burnt equipment. 2nd for RMU&LE works. 3rd for rehabilitation of Generator of Unit-1 and Renovation & modernization works of Unit-I, II & III and procurement of 2 Nos. forged fabricated Pelton runners amounting to Rs. 77.07 Cr. Submitted for arranging A/A & E/S of competent authority of HPSEBL & tie-up of funds on 21.03.2017 The scheme for Rehabilitation of 3x40 MW Bhaba HEP amounting to Rs.76.07 crore was submitted for A/A and tie-up of funds with funding agencies on 12.06.2015. NOA was issued to M/s Alstom T&D India Ltd. on 09.06.2015 for the Design, Manufacture, Supply of 245 kV Gas Insulated Switchgear, Control and Relay Panels, 22 kV Indoor Switchgear, 415 V LT Panels, 220 kV EHT Cables, 22 kV HT Cables, Control & Power cables. - Dismantling of material from GIS hall completed.	

R&M – Renovation & Modernisation, RM&U – Renovation Modernisation & Uprating, RM&LE – Renovation, Modernisation & Life Extension, RMU&LE – Renovation, Modernisation, Uprating & Life Extension, RMU+Res. – Renovation, Modernisation, Uprating+Restoration, RM&LE+Res. – Renovation, Modernisation & Life Extension+Restoration, R&M+ Res. – Renovation & Modernisation+Restoration @ -as per National Perspective Plan

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
								• Providing & installation of 400 kVA, 22/0 415 kV transformer in place of present 100 kVA, 22/0415 kV transformer for emergency supply from Nathpa Sub-Station. • Overhauling and repair of 120/20 Ton EOT Crane, 5 Ton EOT crane in GIS hall, OTIS lift and allied system, Dehydration plant and Vacuum plant and Ventilation & exhaust system. • Providing emergency drainage system for transformer oil in case of fire. • Repair & refurbishment of Fire Fighting System.	• Dismantling work of damaged LT panels, C&R Panels, 22 kV Switchgear completed. • 220kV, 1x630mm² XLPE cable, 220kV Indoor & outdoor terminations, Link Boxes, Sheath bounding cable, ECC cable, 220kV temperature monitoring system, Cable Trays and Cable slipover type CT have been received at site, installed, tested and commissioned. • 1.1kV Control & Power Cables have been received at site, installed, tested and commissioned. • 22kV, 1x185mm² XLPE Cable & 22kV Terminations Kits have been received at site laid, terminated, tested & commissioned. • The 245 kV Gas Insulated Switchgear, Lightening Arrestors, Wave traps, Capacitive Voltage Transformers, 1.6 MVA, 22/0.415 kV station transformers, Resin Impregnated Bushings, have been received, installed, tested & commissioned. • Epoxy flooring has been completed. • All 24 panels have been placed in the control room & inter panel wiring has been completed. • Completed. • Overhauling of 120/20 Ton and 5 Ton EOT crane completed. • Tender has been floated. • The work of repair & rehabilitation of the fire detection & emulsifier system for the Generator-Transformer and 220KV XLPE system has been awarded to M/s Apex Fire Guard, authorized dealers of M/s Mather & Platt, OEM. The system has been installed, tested & commissioned. Replacement of fire-fighting pipe line/ emergency cooling water system from Kandhar Nallah tank to underground power house has been completed.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
		77.07 Scheme II	RM&LE	120 (LE)	2021-22	Nil		- Providing 50/31.50 MVA, 220/66/6.6 kV Power Transformer along with allied switch gear for connecting to the 66 kV Bus at Nathpa sub-station for catering to the power requirements of the Kinnaur Valley or evacuating the power from the Kinnaur. - Replacement and providing additional surveillance system (CCTV Camera and allied components such as OFC). Civil Works - Providing false ceiling in control room, LT Panel Room and Battery Charger Room of Power House. - Construction of cable trenches in Pot Head yard. Works under RM&LE scheme for Turbine & Generator (Scheme II)	- Proposal to install 50/31.50 MVA, 220/66/6.6 kV Power Transformer has been deferred & existing 10 MVA, 220/22/6.6 kV burnt transformer will have a same capacity of 10 MVA. - Works Completed. - Demolition of damaged portion of slab completed and in the machine hall work of recasting of slab is completed. False ceiling in GIS Hall is completed. - Completed Unit No. 1 was commissioned on 10.07.2016 but due to over speeding, stator winding damaged & machine again stopped on 25.09.2016. Inspection from BHEL Engineers arranged to assess the damages. NOA has been issued to BHEL on 07.12.2016 for rehabilitation on Unit-1. The Rehabilitation work of the Unit has commenced and 10 out of the 12 poles have been taken out of the rotor, out of which 8 pole have been sent to BHEL's factory at Bhopal. These poles have been received at Bhopal on 26.12.2016. The key of one pole is stuck up and efforts are on to withdraw this key after which the balance 4 poles shall be sent to BHEL's works at Bhopal. M/s BHEL have committed to spin the Unit on the bars by 31.05.2017. But during executing of the rehabilitation works of Unit-I, it has been found by BHEL Engineers that the nozzle servomotors of all machines and stator bottom bars & stator core punching of Unit-1 need to be replaced and letter of comfort for same has been issued on 25.03.2017. BHEL have committed to spin the Unit by 22.07.2017. Unit -2 has been commissioned on 21.09.2016. Unit -3 has been commissioned on 20.11.2016.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
SCHEMES ONGOING – Under Tendering - STATE SECTOR (HPSEB)										
6.	Giri, 2x30 MW HPSEBL 1978 T&G - BHEL	139.80 (Revised Cost)	RM&LE	60(LE)	2019-20	Nil	Agency: PFC Rs.38.78 Cr.	Brief description of work proposed to be undertaken are as given below: - Civil works: Repair of power house building & Control Room area and Tail Race Channel. Restoration of Flexible apron, protection works on left bank of upstream side of barrage. Replacement of Spherical roller bearing of spillway gates. Improvement of trash rake, stop logs. Centralized Control of operation of barrage gates from Barrage control room. Mechanical works: Replacement of Guide vanes with stainless steel guide vanes of Unit -1, Overhauling of MIV, Add. Penstock gate in Surge Shaft, Replacement of Governors with modern digital governors, Revamping of Cooling water system, Provision of online discharge measurement and head measurement for both machines. Electrical works: Replacement of 11 KV PILC cable with bus duct, Overhauling of 2x40 MVA, 11/132kV Generator Transformers 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, Replacement of Batteries and battery charging equipment, Aug. of 16/20 MVA, 132/33 kV Transformer into 25/31.5 MVA etc.	Administrative approval and Expenditure sanction of Rs.34.80 Crore given by Board Management vide letter dated 03.10.2012. Revised administrative approval amounting to Rs. 47.8 Crores accorded vide letter dated 01.08.13. Loan of Rs.38.78 Cr. sanctioned by PFC vide letter dated 20.03.13. M/s BHEL had submitted its techno-commercial offers during March, 2014 for such equipments originally supplied by them in Giri HEP. Bid due to rates offered by BHEL above loan amount was found inadequate and hence revised scheme was framed. Revised scheme amounting to Rs.139.80 crore has been framed on the basis of negotiated rates offered by M/s BHEL (OEM) for EM equipments & balance plant items. Scheme submitted to the Board and approved by the HPSEBL vide letter dated 30.12.2015. The funding of revised scheme has been taken up with M/s PFC during Jan'16. Bid specifications for the equipment depicted in the Scheme being prepared. Scheme sent to HPERC for approval & the observations raised by commission have been attended. Additional observations have been raised by HPERC during the Public hearing held on 04.03.2017 which are being replied to. After the approval of HPERC, scheme shall be posed for revised loan.	

JAMMU & KASHMIR - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (J&KSPDC)										
7.	Chenani 5x4.66 MW J&KSPDC 1971-75 T&G - Ganz Mavag, Hungary	39.14 (Rev.)	RM & LE	23.3 (LE)	2017-18	14.66	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. Replacement of existing excitation system with Digital excitation system. 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. Erection of all 4 runners completed. Work on EHG installation in process. Change of stator winding insulation with class -F completed for M/c No. 5, 3 &1. Reconditioning of spherical valve for all machines completed. New 125 kVA DG set installed. Overhauling of BF Valve, construction of trash racks, fencing of tail race, erection of 12 no. isolators and erection, testing & commissioning after rewinding of 5 MVA Transformer in S/yard completed. Replacement of 3 Nos. 132 KV MOCBs with SF6 Breakers, Replacement of water and oil coolers, reconditioning of gates, trash racks, repair of CO ₂ plant completed. Replacement of 5 Nos. air coolers completed. Supply of 2 Nos. 6.6 KV VCB Panel completed & erection of one Panel completed and 2 nd Panel under progress. Replacement of speed governors completed and static excitation system under progress. Inspection of excitation system conducted. 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 forebay tank lining completed. Improvements wooden flumes of water conductor system yet to be done.	

JAMMU & KASHMIR - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEME ONGOING - Under Implementation - STATE SECTOR (J&KSPDC)										
8.	Ganderbal, 2x3 MW+ 2x4.5 MW J&KSPDC 1955 (3 MW m/cs) & 1963 (4.5 MW m/cs) 3 MW m/cs – T&G – Escher Wyss, Switzerland 4.5 MW m/cs – T&G - Ganz Mavag, Hungary	39.30 (Revised)	RM&LE	9 (LE)	2017-18	12.90	Agency: MNRE	Turkey Package for Dismantling, Supply, Installation, Testing and Commissioning of the 1x4.5MW Unit (Generator and Turbine including Spherical Valve), Generator Control Panels & Control Desks of Unit (4.5MW), Electronic Governor, 6.6 KV Instrumentation Transformers (CTs & PTs), Synchronizing Panel, 1.875MVA Single Phase Power Transformer, 33KV Control & Relay Panels, 33KV Instrumentation Transformers (CTs & PTs), 33kV SF6 Breakers, 33kV Isolators, Marshalling Kiosks, Surge Arrestors, 250kVA 3-Phase Servo Controlled Automatic Voltage Regulator, AC/DC Distribution Boards, Power & Control Cables and allied hardware including reconditioning of Penstock, trash racks necessary civil related works 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. The work awarded to M/s Gogoal Hydro Power Pvt. Ltd. On 02.07.2015. Work started and dismantling of unit has been completed. RLA/LE Testing of Penstock has been carried out. Vendor approvals for manufacturer of major equipments like Sync. Generator, Power Transformer, Excitation System, and Control & Power Cables, LT switch Gear, Relay and Control Panels etc. has been accorded and the manufacturing works are under progress. Inspection of various item like Power Transformer, Turbine Parts, Governor system, NGT, CTs PTs and different Panels has been carried out at manufacturers/ sub-vendor sites and process of dispatching of items are under progress.	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.

JAMMU & KASHMIR - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING – Under Implementation - CENTRAL SECTOR (NHPC)										
9.	Salal 6x115 MW NHPC 1987-95 T&G - BHEL	58.01	R&M	-	2019-20	-	-	i) Replacement of runner. Commissioning schedule of Runners are: 1 st Runner: 2016-17 (Installation in Unit-6 completed & Unit boxed-up. 2 nd Runner: 2017-18 (Manufacturing of Runner is in progress). 3 rd & 4 th Runners: 2018-19. 5 th & 6 th Runners: 2019-20. ii) Replacement of old governor with digital governor in 6 units. iii) Replacement of AVR with Digital Voltage Regulator (DVR) in 3 units i.e. Unit No. 4, 5 & 6.	i) Purchase Order placed on M/s Voith Siemens. Model test of runner completed. Drawing for modified Runner approved. Manufacturing of Runner is in progress. 1 st Runner installation in Unit-6 is under progress. 2 nd Runner manufacturing is in progress. ii) Order for Digital Governor placed on M/s Alstom. Material received at site. Digital Governor has been installed and commissioned in Unit-1, 2,3,4 & 6. Installation & commissioning in Unit-5 is under progress. iii) DVR has been installed & commissioned in Unit- 4,5 & 6.	

PUNJAB - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Tendering STATE SECTOR (PSPCL)										
10.	Mukerin HEP, 3x15 MW (St.-1), 3x15 MW (St.-2), 3x19.5 MW (St.-3) & 3x19.5 MW (St.-4) PSPCL 1983 (St.-I), 1988-89 (St.-II), 1989 (St.-III) & (St.-IV) T&G - BHEL	132.47	R&M	-	2019-20	NIL	Funds will be arranged after getting approval of PSERC	1. Replacement of existing Governors of all the six Machines of MPH-1&2 with Modern Digital Technology based Governing System. 2. Replacement of existing Excitation System of all twelve Machines of MPH-1, 2, 3&4 with Static Excitation System alongwith Modern Digital technology based AVR. 3. Replacement of existing Electro-Mechanical Relays with Numerical Relays of all twelve Machines of MPH-1,2,3&4. 4. Replacement of existing conventional DPRs, O/Cs & Directional E/F Relays with Numerical relays of Two Nos. 5. Replacement of existing 3 nos. 630 KVA, 11KV/415 Volt UATs with Dry Type Transformers of similar capacity at MPH-1. 6. Replacement of existing 4 nos. 800 KVA, 11KV/415 Volt UATs at MPH-3 & 4. 7. Capital overhauling along-with replacement of stator core & stator coils and strengthening of Rotor poles with class F insulation of Machine No. 2, 5, 9 & 10. 8. Replacement of existing 11 KV XLPE Aluminum cables of size 1x500 mm² with XLPE Aluminum 1x800 mm² cables from Generator Bus duct to LV side of Generator Transformers of all units at MPH-1 & 2. 9. Procurement of one no. Trash Rack Cleaning Machine at MPH-1. 10. Procurement of 2 sets of Trash Racks for intake bays of Machine No.2&3 at MPH-1 11. Replacement of existing One No. Drainage and One No. Dewatering VT Pumps with submersible Pumps at each Power House. 12. Replacement of existing LT Scheme/panels at MPH-1&2. 13. Replacement of 12 nos. 132 KV Line Circuit Breakers at MPH-1,2,3&4. 14. Replacement of existing Five Nos. 11/132 KV Generator Transformers at MPH-1&2. 15. Capital overhauling of one no. Generator Transformer at MPH 3 and one no. Generator Transformer at MPH-4. 16. Replacement of existing Two Nos. 11/132 KV, 20/25 MVA Generator Transformers with 11/132 KV 25 MVA at MPH-3&4.	1. Administrative approval got accorded from competent authority. Specification under preparation. 2. PO dated 07.12.2016 placed on M/s Flovel Energy Pvt. Ltd., Faridabad. 3. Tender Enquiry dated 14.12.2016 floated. 4. The case being prepared for approval of the competent authority. 5. Tender Enquiry dated 04.08.2016 floated. 6. The case being prepared for approval of the competent authority. 7. WO/PO for M/c No. 10 placed on M/s BHEL. NIT floated for machine no. 2. The cases for M/c No. 5& 9 shall be prepared in due course of time (2017-20) for approval of the competent authority. 8. The case being prepared for approval of the competent authority. 9. The case being prepared for approval of the competent authority. 10. Tenders being re-invited as no Bid received against previous Tender. 11. The case being prepared for approval of the competent authority. 12. The case shall be initiated for approval of the competent authority in due course of time (2017-20). 13. Tender Enquiry dated 28.10.2016 floated. 14. PO being placed on M/s Bharat Bijli Limited. 15. Case under preparation by site office. 16. Tender Enquiry dated 28.10.2016 floated.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
11.	Ranjit Sagar Dam, 4x150 MW PSPCL 2000 T&G - BHEL	42.08	R&M	-	2019-20	Nil	Funds will be arranged after getting approval of PSERC	1. Installation and commissioning of Digital Electro Hydraulic Governor Capable of Restricted Gov mode 2. Procurement of spares of Auto Sequencers. 3. Procurement of spares of AVR 4. Procurement of T&P 5. Replacement of 220 KV Circuit Breakers of 7 nos feeders. 6. Renovation of emulsifier system of Generator Transformer. 7. Capital maintenance of Unit no 2 8. Renovation of AC Plants 9. Providing additional submersible pump for dewatering 10. Capital Maintenance of Unit no 3 11. Up gradation of HP compressors of condenser mode operation 12. Replacement of drainage pumps of unit bay and service bay side-2 nos each. 13. Capital Maintenance of Unit no 4 14. Replacement of flow meters 15. Renovation of drinking water supply system of Power Plant& Switch House Building. 16. Providing RCC Wall with water gate from right bank of tail race to dam. 17. Replacement of Blowers of Ventilation System-5 nos. 18. Renovation of Circle Office and R.E.Office. 19. Construction of Porches over all entry points of Power House Building. 20. Renovation of 5 No. Store Sheds at S&T Store Yard. 21. Renovation of UC fencing around S&T Store Yard & 220 KV Switch yard. 22. Providing Detachable scaffolding set for Power Plant Maintenance.	1. Technical suitability of upgrading existing Governor for incorporating RGM0 is under consideration. Proposed during 2018-19. 2. PO Placed on BHEL. 3. The case shall be initiated for approval of the competent authority in due course of time (2018-19). 4. The case shall be initiated for approval of the competent authority in due course of time (2017-19). 5. PO for 4 no. M/C breakers placed. However, the case for Brks of the feeders shall be initiated for approval of the competent authority in due course of time (2019-20). 6. The case shall be initiated for approval of the competent authority in due course of time (2019-20). 7. Proposed during 2017-18. 8. The case shall be initiated for approval of the competent authority in due course of time (2017-18). 9. Proposed during 2017-18. 10. The case shall be initiated for approval of the competent authority in due course of time (2018-19). 11. -do- (2018-19) 12. -do-(2019-20) 13. -do-(2019-20) 14. -do-(2019-20) 15. -do-(2018-19) 16. -do-(2018-19) 17. -do-(2019-20) 18. -do-(2017-18) 19. -do-(2017-18) 20. -do-(2018-19) 21. -do-(2019-20) 22. -do-(2019-20)	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
12.	Shanan HEP, 4x15 MW+1x50 MW PSPCL 1932(U1 to U4) T - Ganz Mavag, Hungary G – BTH, UK 1982 (U5-extn) T&G - BHEL	40.2	R&M	-	2019-20	Nil	Funds will be arranged after getting approval of PSERC	1. Renovation of water cooling bus of 4x15 MW machines 2. Procurement of one runner for 50 MW machine and two runners for 15 MW machines. 3. Procurement of 07 Nos. 12 MVA GTs & 4 Nos. 19 MVA GTs for 50 MW Machine. 4. Providing CCTV cameras at Shanan PH. 5. Procurement of needles and nozzles of all six machines. 6. Replacement/Retrofitting of 66, 132 KV isolators & L.E with new ones at 132 KV Sub-station. 7. Replacement of 33 KV BOCB with new 66 KV SF ₆ breaker at 132 KV sub-station. 8. Procurement of 2 nos. SAN Container DC Batteries of 400AH Capacity for the replacement of existing DC Batteries 9. Replacement of insulation of existing spare field coils of rotor of 50 MW machine with 'F' class. 10. Replacement of needle control device, deflector shafts of 4x15 MW machines 11. Replacement of existing relay and annunciation panels in control room. 12. Clearance of silt of new reservoir. 13. Restoration of Toe wall and grouted stone pitching on U/S of UHL weir at Brot 14. Painting of Penstocks. 15. Replacement of existing Excitation System of 50 MW M/C with Static Excitation System along with Modern Digital technology based AVR.	1. NIT placed to M/s BHEL to submit the offer. 2. 01 No. new runner of 50MW M/c has been installed on 18.06.2016. 02 Nos. new runner of 15MW M/cs have been installed on M/c No. I&II on 25.10.16 & 26.11.2016 respectively. 3. Letter of Intent dated 24.11.2016 has been placed to M/s Bharat Bijlee Limited, New Delhi for purchase of 04 nos. 19MVA GTs and 07 Nos. 12MVA GTs. 4 Proposal under progress. 5. P.O. dated 15.01.2016 placed to M/s BHEL, material not received till date. 6. Budgetary offer called from reputed firms. 7. Proposal for Construction of foundation work in pipeline 66kV Breakers received in S&T Shanan Store. 8. P.O. dated 11.08.2016 placed on M/s Exide Industries Jalandhar. 9. The case shall be initiated for approval of the competent authority in due course of time (2017-20). 10. NIT invited. 11.The case shall be initiated for approval of the competent authority in due course of time (2017-20). 12. Technical bid for clearance of slit of old reservoir has been opened and price bid will be open shortly. 13. Tender enquiry floated. 14. Tenders for procurement of aluminum paint has been opened. 15. NIT floated by Engineer -in-Chief/ HPs office.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
13.	UBDC St.I & St II HEP, 3x15 MW (St.-I) & 3x15.45 MW (St.-II) PSPCL 1971-73 (St.-I) & 1989-92 (St.-II) <u>St.-I</u> T&G-AEI, UK <u>St.-II</u> T&G-BHEL	21.05	R&M	-	2019-20	Nil	Funds will be arranged after getting approval of PSERC	1. Capital overhauling of Power House No.2 St. I. 2. Replacement of Existing Electro-Mechanical Excitation/AVR system with Digital Static Excitation System of UBDC Stage II Power Houses. 3. R&M of Protection and measurement system by providing new C&R Panels equipped with numerical relays and digital instruments of UBDC Stage I Power Houses. 4. Spare Generator Transformers 20 MVA 11/132 KV. 5. Capital overhauling of UBDC Power House No.3 Stage I. 6. Replacement of Electro Hydraulic Governors with microprocessor based digital governor of UBDC Stage II Power Houses. 7. R & M of dewatering and drainage system of UBDC Stage II Power Houses. 8. Replacement of Protection and measurement system by Electromagnetic relays and instruments with numerical relays and digital instruments of UBDC Stage II Power Houses. 9. R & M of C&R panels of 132 KV O/G feeders at UBDC Power House No.3 Stage I 10. Replacement of Governor Pumps of UBDC Stage I Power Houses	1. The case shall be initiated for approval of the competent authority in due course of time (2017-18). 2. The case shall be initiated for approval of the competent authority in due course of time (2017-18). 3. The case shall be initiated for approval of the competent authority in due course of time (2017-18). 4. PO being placed on M/s BBL. 5. The case shall be initiated for approval of the competent authority in due course of time (2018-19). 6. The case shall be initiated for approval of the competent authority in due course of time (2018-19). 7. The case shall be initiated for approval of the competent authority in due course of time (2018-19). 8. The case shall be initiated for approval of the competent authority in due course of time (2019-20). 9. The case shall be initiated for approval of the competent authority in due course of time (2019-20). 10. The case shall be initiated for approval of the competent authority in due course of time (2019-20).	

UTTARAKHAND - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22
(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (UJVN LTD.)										
14.	Tiloth, 3x30 MW UJVN LTD. 1984 T&G - BHEL	384.66 (with IDC) 327.90 (without IDC)	RM&LE	90(LE)	2019-20	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 UJVN LTD. & 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, 67th 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 UJVN Ltd. Proposal for taking up RMU of Tiloth HEP was approved by UJVN Board in its 68 th meeting held on 27.09.2013. DPR was revised in view of the revised scope of work and approved by UJVN Board on 26.11.13. This included cost of civil works amounting to Rs.77.26 crore on account of restoration work of damages due to natural calamity on 16/17 June 2013. NIT was invited on 05.02.14 and pre-Bid meeting held on 21.05.14. Petition for investment approval submitted. Hearing on investment approval held on 13.10.14 by UERC. • Hon'ble UERC issued order dated 30.07.2015 wherein they have significantly changed the scope of work and have also not approved the RMU project cost. • Review petition with Hon'ble UERC for seeking approval for scope of work as per the DPR was submitted for the investment approval of Hon'ble UERC. The review petition was rejected. • Based on the directives of Hon'ble UERC, fresh estimate and tender document with the scope of works as allowed by Hon'ble UERC was framed on the basis of budgetary offer. • Tender for RMU of Tiloth HEP is being scrapped and fresh tender as per allowed scope of Hon'ble UERC is called. • M/s BHEL, M/s Andritz Hydro and M/s GE (Alstom) India Pvt. Ltd. participated in tendering. • Pre-Bid meeting was held on 01.12.2015. • Part-1 has been opened on dated 21.06.2016. • As per instructions from BoD for appointment of an outside expert, Dr. S.K. Goel has been appointed as the member of evaluation committee. • UJVN Ltd. has intimated Bidder about observation in Techno Commercial Bid (Part-I) and also sought certain clarification on some clauses/ conditions etc. Evaluation report of Part-1 has been prepared and submitted to CPC and report has been approved by CPC. • Price Bid opened on 04.11.2016 and CPC held on 08.11.2016 and approved the Financial Bid report. • Recommendation report has been put up in board meeting held on 12.11.2016 and got approved. • Agreement for carrying out RMU Works of Tiloth HEP for amount 139.9 Cr. has been signed between UJVN Ltd. and M/s Andritz Hydro on 14.12.2016. Start up meeting was held on 02.02.2017 between UJVN Ltd. and Andritz Hydro Pvt. Ltd. (AHPL).Unit-1 handed over to AHPL for Reverse Engineering (RE) on 13.02.2017 and RE works are in progress	

UTTARAKHAND - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (UJVN LTD.)										
15.	Dhalipur, 3x17 MW UJVN LTD. 1965-70 T - Litostraj, Yugo. G - Rade Koncar, Yugo	152.65 (with IDC) 121.84 (without IDC)	RM&LE	51 (LE)	2020-21	NIL	Agency: To be tied up	- Replacement of turbine, 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.	• NIT was floated on 20.02.2014. DPR has been revalidated and approved by UJVN Board in its 72nd meeting held on 26.09.2014 • Tender documents for E&M works prepared and uploaded on e-portal on 12.12.2014. • Pre-Bid meeting held on 25.02.15. • Petition for Investment approval submitted to Hon'ble UERC and has been heard on 17.11.2015. • Approval from Hon'ble UERC received vide order dated 14.09.2016. • Part-1 has been opened on dated 23.09.2016. • As per instructions from BoD for appointment of an outside expert, Shri Arun Kumar from AHEC, IIT Roorkee has been appointed as the member of. evaluation committee. • Evaluation report of Part-1 has been prepared and submitted to CPC and report has been approved by CPC on 17.11.2016. • Price Bid opened on 21.11.2016 and CPC approved the financial bid report vide MoM dated 28.11.2016. • Recommendation report has been put up in board meeting held on 12th Nov. 16 and got approved. • LOI for RMU Works of Dhalipur HEP has been issued to M/s Gogoal Energo Pvt. Limited (JV), New Delhi amounting Rs 78.25 crs on 28.12.2016. • One machine (Unit-8) has been handed over to the Contractor for Reverse Engineering works on 09.03.2017. • Reverse Engineering Works are in progress.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
SCHEMES ONGOING - Under Tendering - STATE SECTOR (UJVN LTD.)										
16.	Chilla (Ph-B), 4x36 MW UJVN LTD. 1980(U-1 to 3) 1981(U-4) T&G – BHEL	490.56 (with IDC) 359.70 (without IDC)	RMU&LE	12 (U) + 144 (LE)	2021-22	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. Complete replacement of switchyard equipment along with Power Transformer, Replacement of 11 kV system, New Excitation, Electronic Governors, control metering & protection system & SCADA HM Works and Civil Works. - Uprating from 4x36 MW i.e. 144 MW to 4x39 i.e. 156 MW.	UJVN LTD. 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 decided not to go ahead with present arrangement. Signing of agreement of Phase II was cancelled on 28.03.2013. Nigam is taking up RMU at its end. Revalidation of DPR done by AHEC, IIT Roorkee and approved by UJVN Board on 26.11.13. Based on same, required changes in specifications were done by the committee constituted by Managing Director, UJVN Ltd. NIT on NCB route for E&M works invited on 05.02.14 and pre-bid meeting held on 20.05.14. Petition submitted for the investment approval to UERC on 04.03.15. Consent of beneficiary UPPCL sought on 02.05.15. Reply on observations submitted to Hon'ble UERC on 14.05.15. Capital Investment approval has been accorded by Hon'ble UERC on 29.01.2016. Based on the directives of Hon'ble UERC, revised Tender Document prepared & NIT floated on 15.10.2016. Pre-Bid meeting was held on 18.11.2016. Pre-Bid queries/clarifications asked by Bidders has been replied. Dates of Bid submission and Bid opening are rescheduled for 17.04.2017 and 24.04.2017 respectively.	

UTTARAKHAND - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Tendering - STATE SECTOR (UJVN LTD.)										
17.	Kulhal, 3x10 MW UJVN LTD. 1975 T&G - BHEL	115.24 (with IDC) 99.31 (without IDC)	RM&LE	30(LE)	2020-21	NIL	Agency: To be tied up.	- Replacement of turbine, new governors, new sets of guide vanes. Repairing of various gates and gantry cranes. - Refurbishment of generators with new F class insulated stator & rotor windings. 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 of Part-I (Techno-Commercial) has been initiated. LOI has been issued to M/s GoGoal-Emico (Consortium) on 04.03.14 after financial approval from UJVN Board. Petition for investment approval submitted to UERC on 22.03.14. Hearing on investment approval held by them on 01.07.2014. Investment approval from Hon'ble UERC declined vide order dt. 13.03.15 with the advice that on account of obsolescence of protection equipment, suitable proposal be mooted for their replacement and those would be considered by the Commission. Reply by UJVNL on Hon'ble UERC decision sent on 24.4.15 to consider according investment approval for RMU works along with protection and safety works costing approx. 33 crores. - UJVNL Board in its 75th meeting held on 27.06.2015 directed to resubmit the proposal of investment for RMU works of Kulhal HEP to Hon'ble UERC for reconsideration. Same was submitted to Hon'ble UERC. - As per decision of 76th Board meeting, review petition for investment approval for RMU was submitted to Hon'ble UERC and was heard on 17.11.2015 & 09.02.2016. - Investment approval from Hon'ble UERC declined vide its order dated 11.02.2016. - Appeal has been filed in the Hon'ble Appellant Tribunal New Delhi. Matter is being heard in the Hon'ble Appellant Tribunal. - Further decision is under consideration.	

UTTARAKHAND - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Tendering - STATE SECTOR (UJVN LTD.)										
18.	Ramganga 3x66 MW UJVN LTD. 1976 T&G-BHEL	455.20 (with IDC) 360.83 (without IDC)	RM&LE	198 (LE)	2020-21	-	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 and life extension of units based on RLA studies.	- DPR for RMU was prepared in-house and was reviewed by AHEC, Roorkee. DPR was approved by UJVN Board on 13.09.2012. Specifications were checked and reviewed by AHEC, IIT, Roorkee, and vetted on 15.04.13. Pre-qualification criteria was approved. Tender for RMU on turnkey basis was uploaded on e-portal on 27.08.2013. Pre-bid meeting held on 10.10.2013 and addendum issued on 26.11.13. Clarifications on pre-bid queries uploaded. Petition for investment approval submitted to UERC on 08.07.13. - Investment approval from Hon'ble UERC declined vide its order dated 12.02.2016. - Appeal has been filed in the Hon'ble Appellant Tribunal New Delhi. Matter is being heard in the Hon'ble Appellant Tribunal. Bid submission date has been re-scheduled for 19.04.17 and opening of Part-I of Bid on 24.04.17.	
19.	Dhakrani, 3x11.25 MW UJVN LTD. 1965-70 T - Litostroj, Yugoslavia. G - Rade Konkar, Yugoslavia.	137.31 (with IDC) 112.89 (without IDC)	RM&LE	33.75 (LE)	2020-21	NIL	Agency: To be tied up	- Replacement of turbine new governors, new sets of guide vanes. Repairing of various gates and gantry cranes. - Refurbishment of generators with new F class insulated stator & rotor windings. 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 was published on 23-11-2011. - Following the decision taken in 67th BoD meeting to cancel KfW loan, proposal for the consideration of UJVN Limited Board was put up for cancellation of Notice Inviting Bids (NIBs) for RMU of Dhakrani and Dhalipur HEPs. Approval accorded for inviting fresh bids on NCB route through domestic funding. - DPR was revised based on present price level. Specifications were reframed. Revised DPR was approved by UJVN Board in its 76th meeting held on 30.09.2015. - Petition for investment approval has been submitted to Hon'ble UERC after approval from board. The hearing was on 07.06.2016 in the Hon'ble UERC. - Hon'ble UERC instructed the UJVNL to consult with the beneficiaries namely UPPCL & HPSEB Ltd. and submit the record of consultation to the Commission. - NIT was floated on 30.08.2016. - Pre bid meeting was held on 27.10.2016. Pre bid queries/clarifications asked by Bidders has been replied. - Date of Bid submission and opening of bids has been rescheduled for 15.06.2017.	

UTTARAKHAND - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations beyond 2017-22

(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
SCHEMES ONGOING - Under DPR Preparation/Finalisation/Approval - STATE SECTOR (UJVN LTD.)										
20.	Chibro 4x60 MW UJVN LTD. 1975 (U-1 to 3) 1976 (U-4) T&G – BHEL	184.88 (with IDC) 180.61 (without IDC)	RM&LE	240(LE)	2023-24	NIL	Agency: To be tied up	- 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 stator and 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 meeting 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 was taken accordingly. • DPR to be revised based on present price level and specifications are to be reframed. • Tenders shall be invited through NCB route. • These projects are proposed to be taken up for tendering after award of R&M works Dhakrani and Chilla HEPs in middle of 2017.	
21.	Khodri (PH-B) 4x30 MW UJVN LTD. 1984 T&G – BHEL	169.63 (with IDC) 165.85 (without IDC)	RM&LE	120(LE)	2023-24	NIL	Agency: To be tied up	- 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		

UTTAR PRADESH - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (UPJVNL)										
22.	Obra 3x33 MW UPJVNL 1970 (U-1&2), 1971 (U-3) U-1: T - AEI, UK G - BHEL U-2&3: T&G - BHEL	58.80	RM&LE	99 (LE)	2018-19	17.19	Own resources proposed	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 - New earthing of Switchyard - Station battery - Supply & replacement of elevator - Air cooler pipeline - Installation RRC for both EOT cranes. - Over hauling of 132kV Isolators (32 sets) - Supply of: Transformer oil dewatering pumps and compressor - Governor oil pumps - Generator air cooler (unit-1) - 1No. ELC & 1 No. LVD machine. - Smoke & Fire detection system SCADA Rehabilitation/Refurbishment of: - Draft tube, spiral casing, runner & its chamber, guide vanes, stay vanes etc. cover assembly. - Stop logs, intake gates & draft tube gates etc. Other works covered in various packages approved by ETF.	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. I UNIT NO. 1 A. <u>WORK COMPLETED</u> 1. Replacement of oil after overhauling of 11/132KV, 37.5 MVA GT& UAT. 2. Control & Protection of Generator, GT& UAT. 3. Rehabilitation of Intake Gate with new vane tyoe pumps. B. <u>WORK UNDER EXECUTION</u> 1. Replacement of stator core & coil. 2. Re-insulation of rotor pole coils with F class insulation. 3. Replacement of dynamic excitation with Static Excitation System. 4. Refurbishment of generator coolers of machines. C. <u>WORK YET TO BE TAKEN UP</u> 1. Replacement of existing manual opening/ closing of priming valves with motorized priming valves. 2. Capital overhauling alongwith replacement of vapors seal, spring mattress support of thrust bearing, brake-jack system, carbon segment gland; inception of HS lube oil system, backwash type cooling water strainer, centralized self-lubricating system, refurbishment of runner, runner chamber, GV & Stay vanes, liner of pivot ring etc. II UNIT NO. 2 A. <u>WORK COMPLETED</u> 1. Replacement of oil after overhauling of GT& UAT. 2. Replacement of stator winding, rotor winding overhang support ring and stator core. 3. Control & Protection of Generator, GT & UAT. B. <u>WORK YET TO BE TAKEN UP</u> 1. Replacement of dynamic excitation with Static Excitation. Supply received at site. 2. Refurbishment of generator coolers of machines. 3. Replacement of existing manual opening/ closing of priming valves with motorized priming valves. 4. Rehabilitation of Intake Gate with new vane type pumps. 5. Capital overhauling alongwith replacement of vapors seal, spring mattress support of thrust bearing, brake-jack system, carbon segment gland; inception of HS lube oil system, backwash type cooling water strainer, centralized self-lubricating system, refurbishment of runner, runner chamber, GV & Stay vanes, liner of pivot ring etc.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
									III UNIT NO.3 A. <u>WORK COMPLETED</u> 1. Replacement of oil after overhauling of GT & UAT. 2. Control & Protection of Generator, GT & UAT. 3. Rehabilitation of intake Gate. 4. Replacement of dynamic excitation with Static Excitation system 5. Capital overhauling alongwith replacement of vapors seal, spring mattress support of thrust bearing, brake-jack system, carbon segment gland; inception of HS lube oil system, backwash type cooling water strainer, centralized self-lubricating system, refurbishment of runner, runner chamber, GV & Stay vanes, liner of pivot ring etc. B. <u>WORK YET TO BE TAKEN UP</u> 1. Replacement of stator core. 2. Replacement of existing manual opening/ closing of priming valves with motorized priming valves. 3. Capital overhauling alongwith replacement of vapors seal, spring mattress support of thrust bearing, brake-jack system, carbon segment gland; inception of HS lube oil system, backwash type cooling water strainer, centralized self-lubricating system, refurbishment of runner, runner chamber, GV & Stay vanes, liner of pivot ring etc.Replacement of Vane type pump of Intake Gate with new one. 4. Replacement of Vane type pump of Intake Gate with new one. IV COMMON WORK A. <u>WORK COMPLETED</u> 1. Replacement of cable of tainter Gate & dam Top Gantry Crane-II ckt. 2. Supply & Replacement of Lightning Arrestors. 3. Refurbishment of Intake gate crane 125/25 T- order placed. 4. Erection of 132kV CTs & PTs. 5. Supply & replacement of 400 KVA Station Transformer. 6. Control & Protection of 6 Nos. 132 kV feeders & 2 Nos. Station. Tr. 7. Supply & replacement od deluge valves amd NRV's of mulsifyree system. 8. Supply & replacement of metering/ measuring instruments. B. <u>WORK UNDER EXECUTION</u> 1. Control and protection system of 2 nos.132KV feeders. 2. Renovation of CO2 Fire extinguishing system of generator of all 3 machines (Centralized Unit). 3. Provision of station supply from Obra HEP 132 KV Bus. C. <u>WORK YET TO BE TAKEN UP</u> 1. Supply & replacement of 132KV Bus Bar. 2. Supply & replacement of Power and Control Cable. 3. Supply, Erection and Commissioning of new elevator. 4. Installation of centralized reconditioning, centrifusing machine for all 3 GTs.	

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
23.	Rihand, 6x50 MW UPJVNL 1962 (U-1to5) 1966 (U-6) T&G - EE, UK	132.20 (Revised)	RM&LE	300 (LE)	2017-18	93.96	Own resources	- Replacement of Stator Core, and Coils insulation with Class F. - Replacement of insulation of field coils with Class F - Replacement of Governors - Replacement of Excitation Equipment, 60 MVA generator transformers by 67.5 MVA Transformers, switchyard equipments, Bus bars and under water parts - New Air Cooler and Ventilation system	I <u>UNIT NO. 1</u> R&M Work completed by M/s BHEL (Commissioned on 16.09.2016). Supply, Erection, Testing & Commissioning of G.T and overhauling of intake gate along with alignment of T-Guide and their hoisting is yet to be taken up. II <u>UNIT NO. 2 & 6</u> R&M Work under progress by M/s BHEL. Supply, Erection, Testing & Commissioning of G.T is yet to be taken up. III <u>UNIT NO. 3</u> R&M work Completed by M/s BHEL. IV <u>UNIT NO. 4 to 5</u> R&M Work completed by M/s BHEL. Supply, Erection, Testing & Commissioning of G.T is yet to be taken up in Unit- 4&5. <u>COMMON WORK</u> A. <u>WORK COMPLETED</u> 1. Supply of Control cable for Switchyard equipment. 2. Erection of 132KV CT & PT. 3. Supply of silicon rubber disc Insulator 4. Supply of power cable for auxiliary equipment 5. Supply & commissioning of 500KVA Unit & Station T/fs (8Nos.). 6. DG Set with new L.T. Breaker Panel. 7. Supply and commissioning of L.T. Breaker. 8. Stringing of copper Conductor for main & reserve bus. 9. Fabrication & supply of Draft Tube gates 3 Set (6 Nos.). 10. Supply of 132KV Isolators for all Units. B. <u>WORK UNDER EXECUTION</u> 1. Commissioning of Draft Tube gates, 3 set (6 Nos.). 2. Commissioning of 132KV Isolators for all Units. C. <u>WORK YET TO BE TAKEN UP</u> 1. Supply of delivery pipe (2 sets) for dewatering pump. 2. SCADA System including Auto Synchronizer & Auto Sequencer. 3. Lifts. 4. Smoke Detection System except in cable gallery. 5. Mulsifire Pipeline. 6. Supply and Commissioning of 132KV Isolators for feeders.	

MADHYA PRADESH - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (MPPGCL)										
24.	Gandhi Sagar, 5x23 MW MPPGCL 1960-66 <u>Units 1,2&3</u> T – JM Voith G – Siemens, WG, <u>Units 4&5</u> T&G – Hitachi, Japan	21.83	R&M	-	2018-19		Agency: GoMP	1. Rewinding of generator with F class insulation from B class. 2. Operation of DG set in Auto Mode so that DG set starts automatically. 3. Procurement, erection & commissioning of 6 nos. each of numerical type distance protection relays & 6 Nos. Directional protection relays for 132 KV outgoing feeders. 4. Procurement, erection, testing & commissioning of 9 Nos. Gang operated 132 KV SF6 Circuit Breakers including dismantling of existing old MOCB installed at outgoing 132 KV feeders. 5. Procurement of 48-volt battery charger along with 24 Nos., 2 volts, 300 Ah battery cell. 6. Procurement, erection & commissioning of new digital governor with RGMO feature including dismantling of existing governor.	1. RLA Study of U-3 completed and found that the condition of the components is satisfactory except the hot spots in core detected in RLA study have been attended but the ELCID test carried out after repair of hot spots does not indicate substantial improvement. E-tender has been issued on GoMP. e-procurement portal. 2. E-tender is under Techno-commercial vetting. 3. Price Bid opened on 29.11.2016. 4. Order has been placed on M/s. Electro Services, Vadodara on 13.04.2016. Drawing approved. DI has been issued on 30.09.2016. The Firm has dispatched the material on 01.10.2016. Material has reached site. 5. Techno-commercial Bid under correspondence with Bidders for clarification and to be submitted for technical vetting shortly. 6. NIT is to be issued by site.	

MADHYA PRADESH - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (MPPGCL)										
25.	Bargi, 2x45 MW MPPGCL 1988 T&G – BHEL	3.12	R&M	-	2021-22	0.36	Agency: GoMP	1. Procurement, erection & commissioning of Digital AVR for replacement of existing AVR under modernization & up-gradation of excitation system. 2. Procurement, erection, testing & commissioning of 4 Nos. 132 KV SF6 Circuit Breakers including dismantling of existing old MOCB installed at outgoing 132 kV feeders. 3. All Existing Electromechanical /Electrostatic Relays to be replaced with numerical relays.	1. Case is administratively approved & technically sanctioned and to be submitted for approval to place order on M/s. BHEL soon. 2. Order has been placed on M/s. Electro Services, Vadodara on 13.04.2016. Drawing approved. The Firm has dispatched the material on 01.10.2016 and reached at site. 3. E-tender for distance protection & backup protection has been opened and under techno commercial vetting.	
26.	Pench, 2x80 MW MPPGCL 1986-87 T&G – BHEL	13.36	R&M	-	2021-22	-	Agency: GoMP	1. Change in insulation class of stator from Class B to Class F. 2. Procurement, erection, testing & commissioning of 4 Nos. 132 kV SF6 Circuit Breakers including dismantling of existing old MOCB installed at outgoing 132 KV feeders.	1. Under Administrative approval process. 2. Order has been placed on M/s. Electro Services, Vadodara on 13.04.2016. Drawing approved. DI has been issued on 30.09.2016. The Firm has dispatched the material on 01.10.2016. Material has reached at sites.	
SCHEMES ONGOING - Under Tendering - STATE SECTOR (MPPGCL)										
27.	Bansagar Tons-I, 3x105 MW MPPGCL 1991-92 T&G – BHEL	4.97	R&M	-	2021-22	-	Agency: GoMP	1. Procurement, erection, testing & commissioning of Duplex type Control & Relay panels fitted with numerical relays. 2. GPS Time Synchronizer, Sequence Event Recorder, Disturbance Event Recorder & Diagnostic Station.	1. Techno-commercial bid is under technical vetting at engineering cell. 2. The item is under procurement process. e-tender has been opened and under technical vetting.	

GUJARAT - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (GSECL)										
28.	Ukai, (U- 1, 2 & 4), 4x75 MW GSECL	-	R&M	-	2021-22	-	Agency:	Supply, erection, commissioning & testing of New Microprocessor based digital Governing System and dismantling of existing governing system.	Supply & Works orders placed to BHEL. 40% material received at site.	
29.	Kadana PSS, 3x60 MW GSECL	-	R&M	-	2021-22	-	Agency:	Replacement of Governing System (Unit 1& 3). Refurbishment of/ upgrading for successful running in pumps mode operation of Unit-1 Replacement of existing AVR excitation system by DVR excitation system of Unit-2.	Material received at site & Unit-1 work started from 27.02.2017. Proposal under process and likely to be completed by 2018. Proposal under process and likely to be completed by 2018.	

ANDHRA PRADESH - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under DPR Preparation/ Finalisation/ Approval - STATE SECTOR (APGENCO)										
30.	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 - Westing House, USA	124.45	RMU & LE	114.75 (LE) + 5.25 (U)	2021-22	-	Agency: Yet to be decided	1. Replacement of runner and refurbishment 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 precede 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. Two signed copies of MOM sent to APGENCO by GOO/OHPC for signing of AP officials and for sending one copy to them. GOO/OHPC proposed in signed MOM to freeze the 20% cost of project less depreciation, calculated as on June, 2012 against APGENCO proposal of payment of 20% cost of the project to be arrived as on the date of payment. Final decision on conclusion of 20% project cost and subsequently the modified agreement is to be taken by higher authorities. Soon after signing of MOM and subsequently the modified agreement, the RMU works will be taken up. A meeting was proposed between principal secretaries of Government of A.P. and Government of Odisha and requested OHPC to intimate suitable convenient dates for conducting a meeting at Hyderabad to resolve the issue. Meeting was postponed. After that a meeting was conduct on 30.07.2016 between OHPC, GRIDCO, OPTCL, SOUTHCO, and APGENCO under the chairmanship of EIC (Electricity) cum—PCEI, Govt. of Odisha to discuss and resolve the issues involved in finalization and signing of the JV agreements between Govt. of AP and Govt. of Odisha including R&M of Machkund. A modified agreement between Govt. Of AP & Govt. of Odisha is to be entered for share of Assets and power generated in this project from 70:30 to 50:50 is under progress. After concluding the modified agreement, the RMU works will be taken up by APGENCO.	Three of Stage-I units each rated at 21.25 MW are proposed to be uprated to 23 MW.

TELANGANA - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING -Under Implementation - STATE SECTOR (TSGENCO)										
31.	Nagarjuna Sagar Phase II works 1x110 + 7x100.8 MW, TSGENCO 1978-85 <u>Unit-1:</u> T&G - BHEL <u>Units 2 to 8:</u> PT - Hitachi, Japan G - MELCO, Japan	22.17	R&M	-	2018-19	14.34	Agency: Internal resources	1. Replacing existing AVR's with latest DVR's alongwith thyristor modules for 7 units at NSPH. 2. Replacement of all L.T. Breakers of all units and SABs of NSPH. 3. Retrofitting of Numerical Relays of Generator Protection Schemes of Units 2 to 8. 4. Overhauling of EOT Cranes and Gantry cranes at NSPH. 5. Procurement of control cables of different sizes for units 1 to 8, common auxiliaries, Switchyard equipments and switchyard marshalling boxes and laying of Power Cables and Control Cables for Penstock Inlet Gates from main control room for NSPH. 6. Procurement of 245 KV Section Breaker for BUS-A, BUS-B at NSPH switchyard, Bus Coupler at 220 KVRs and the related Isolators and accessories, erection, repositioning of PTs etc. at NSPH Switchyard. 7. Servicing and reconditioning/ procurement of new Isolators required for motoring mode operation for 89G, 89M, 189S1 and 189S2 for units-1 to 8. 8. Procurement of 245 KV SF6 Circuit Breakers. 9. Overhaul of stop log gates, penstock gates and seals replacement for draft tube gates for all units at NSPH including trash rack at tail race. 10. Replacement of switchyard equipment that have completed 25 years of service of 220 KV CVTs (10 Nos.), 132 KV CVTs (17 Nos.), 220 KV PTs (5 Nos.), 132 KV PTs (8 Nos.), 220 KV LAs (13 Nos.) and 132 KV LAS (13 Nos.) for NSHES. 11. Procurement of 220 KV CTs (18 Nos.) for units (silicon rubber composite type).	1. Completed. 2. Completed. 3. Completed. 4. Completed. 5. Material procured. Replacement work in progress in stages based on shutdown availability. 6. Feasibility studies are under progress. 7. Completed. 8. Material received & commissioned. 9. Civil Wing called the tenders. i) at intake side, work is awarded and the works completed for 6 units. ii) at tailrace side, trash rack work is completed 10. Material received & commissioned. 11. Completed.	

R&M – Renovation & Modernisation, RM&U – Renovation Modernisation & Uprating, RM&LE – Renovation, Modernisation & Life Extension, RMU&LE – Renovation, Modernisation, Uprating & Life Extension, RMU+Res. – Renovation, Modernisation, Uprating+Restoration, RM&LE+Res. – Renovation, Modernisation & Life Extension+Restoration, R&M+ Res. – Renovation & Modernisation+Restoration @ -as per National Perspective Plan

TELANGANA - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING -Under Implementation - STATE SECTOR (TSGENCO)										
32.	Nagarjuna Sagar Left Canal Power House (NSLCPH) 2x30 MW TSGENCO 1992 T-Boving, UK G-General Electric, UK	30.99	R&M	-	2018-19	2.00	Agency: Internal resources	1. Replacing existing AVR's with latest DVR's along with thyristor modules for 2 units at NSLCPH. 2. Capital overhauls on generator and turbine and its auxiliaries including spares and consumables for all 2 units of NSLCPH. 3. Overhauling of EOT Cranes and gantry cranes at NSLCPH. 4. Modification in design of runner for both the units at Nagarjuna Sagar Left Canal Power House (NSLCPH) for operating at lower heads. 5. Procurement of 245KV and 132KV SF6 Circuit Breakers for both units of NSLCPH and its feeders. 6. Implementation of SCADA for NSLCPH. 7. Providing of latest version of EHG System for 1 Unit at NSLCPH. 8. Cooling water line erections. 9. Overhaul of stop log gates at NSLCPH and trash rack rectification including gantry crane at NSLCPH.	1. Yet to be processed. 2. Unit-1 overhaul started on 14.06.2014 and erection of Unit-1 completed. Unit-2 overhaul yet to be taken up. 3. Fixing of agency is under progress. 4. Yet to be processed. 5. Material received and commissioned. 6. Material delivered and yet to be commissioned. 7. Material received and commissioned. 8. Completed. i) Trash rack rectification workx completed. ii) Stop log gates works yet to be taken up. iii) Gantry crane work yet to be taken up.	

KARNATAKA - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (KPCL)										
33.	Bhadra River Bed units, 2x12 MW KPCL T- Neyrpic, France G- Hitachi, Japan	28.015	R&M	-	2017-18	21.81 crores	MNRE has sanctioned financial assistance of Rs.6.81 crores out of which 6.13 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.	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. Unit 2 commissioned and was synchronized to the grid on 18.02.2016 All works completed except following works which are under progress in Unit 1: - Alignment of Generator and Turbine was checked through laser tracker, as the readings obtained are beyond permissible limits in the Generator upper guide bearing. Concentricity, Perpendicularity, Cylindricity, Parallelism and Surface level checks of Rotor shaft, rotor flange, coupling flange, turbine assembly and runner servomotor cylinder top surface was carried out by M/s Fleurdels Technologies, Bangalore who were commissioned by M/s AHPL. - After completion of unit assembly and boxing up of Unit-1, dry commissioning tests was conducted on 31.05.2016. During pressure test, oil leakage was observed in the shaft coupling flange area. - The components are having non-conformity when alignment readings were taken. Additional scope of work for complete Generator / Turbine alignment & for arresting oil leakage from the coupling flange is being finalized. - Penstock liner bed near penstock sealing area is damaged and the same has to be rectified. Also, it is proposed to explore the possibility of taking up rectification works of damaged portion of penstock liner bed near penstock sealing area using under water technology. - Engineers from M/s AHPL visited Bhadra HEP and inspected the Unit-1 works on 08.09.2016 and conducted detailed study. The firm has submitted offer with detailed scope of work including Supply and Service portion for Unit-1 alignment, arresting oil leakage from shaft coupling area, matching of magnetic Centre Line of Rotor Poles w.r.t existing Stator, along with cost and time implications. Various alternatives to rectify the problem is under review. - Alignment readings obtained for Unit-1 has been furnished to external agency, M/s Mech Engineers & Erectors Pvt Ltd, to offer their solutions on the non-conformity of alignment readings and to furnish offer for rectification work. - M/s. Mitsubishi Hitachi Power Systems vide e-mail intimated that their experts are not available until May 2017 because of current high volume work load. A letter has been addressed to the firm requesting them to submit their quotation for sending experts to Bhadra HEP for study purpose and for advice and the reply from the firm is not yet received. - M/s. Mitsubishi Hitachi Power Systems vide e-mail dated 27.12.2016 furnished offer for sending experts to Bhadra HEP for study purpose and for Technical advice. However, their experts will be available only after May 2017.	

								Refurbishment of Generator Auxiliaries 1. Supply and replacement of existing excitation system with SEE. 2. Replacement of governors. 3. Replacement of electromagnetic relays with digital relays. 4. Replacement of 11 kV switchgear, LAVT & NGT/NGR cubicles.	• The alignment readings obtained for Unit-1 were furnished to other firms viz, M/s Mech Engineers & Erectors Pvt Ltd, M/s Rotodyne Engineering Services Pvt Ltd, Aruna Electrical works, Rajamane & Hegde services to offer their recommendations and to furnish techno-commercial offer for rectification work. • The agencies, M/s Mech Engineers & Erectors Pvt Ltd, M/s Rotodyne Engineering Services Pvt Ltd and M/s GE Power India Limited visited Bhadra HEP and inspected Unit-1 (12MW) • Two agencies, namely, M/s Mech Engineers & Erectors Pvt Ltd, M/s Rotodyne Engineering Services Pvt Ltd have furnished offer for refurbishment of rotor at site. Further, Clarification is sought from the above firms regarding complete scope of supply and rectification work. 1. Work awarded to M/s ABB Ltd. on 21.08.13. SEE Panels, Excitation Transformer supplied in Dec'13. Erection of panels completed & commissioned for Unit-2. 2. Work awarded to M/s Andritz Hydro Ltd. on 12.09.13. Governor panel inspection completed and dispatch clearance issued. Dispatch instructions issued for cables, pressure gauge, temperature gauge and feedback transducers. All the materials received at site & erection work completed and commissioned for Unit-2. 3. Work awarded to M/s Alstom India Ltd. on 24.04.13. Retrofitting of relays completed for both units. Commissioning of relays completed for Unit-2. 4. P.O. dated 19.9.13 placed on M/s Schneider Electric Infrastructure limited. Replacement of 11 kV Switchgear, LAVT panels, NGT/NGR pertaining to Unit-1&2 completed. 11kV switchgear, LAVT, NGT/NGR panels commissioned for Unit-2.	
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KARNATAKA - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (KPCL)										
34.	Nagjhari, U-1 to 6 1x135 MW (being uprated to 150 MW) 6x135 MW (original) KPCL 1982(U-4), 1983(U-5) & 1984(U-6) T&G - BHEL	52.71	RMU of U-6	15 (U)	2021-22	64.49 (upto 31.12.2014)	PFC/ MoP sanctioned under AG & SP	RM&U of 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. Heavy pitting & scouring have been observed in top cover and hence cannot be refurbished. Additional order placed on M/s. BHEL for the supply of new top cover with the delivery period being 10 months. The same has been delivered. Heavy pitting and corrosion observed on critical areas of runner. Additional order placed on M/s. Andritz for refurbishment of runner, and same delivered in July, 14. Rim building has been completed and shrink fitting of rotor spider with generator shaft completed. Refurbishment of poles completed. Guide vane refurbishment completed. Stator lowered into generator pit. Levelling and centering of pivot ring completed. MIV control panel pipe line for isolating seal and main seal completed. Trial assembly of top cover with guide vanes in Turbine pit carried out. Stator instrumentation works completed. Trail assembly of oil sleeve seal ring carried out. Assembly of Top cover completed. Shrink fitting of rotor spider on the generator shaft completed. Generator instruments completed. On 25.11.2015, Unit-6 was successfully synchronized with grid. At 75% full load, water leakage observed in turbine pit from aeration cone. On 26.11.15, load was raised to 150MW and thrust bearing temperatures recorded. Rectification works of runner aeration cone completed. GV cup seal replacement works completed. After completion of aeration cone leakage arresting works and replacement of cup seals, unit was started and synchronized to grid on 25.11.2015. Unit-6 load throw-off test at full load conducted on 29.11.2015 after attending to problems & balance. PG test & 72 Hrs. reliability test were conducted. New online air gap & vibration monitoring system installed & commissioned. Some additional work has been taken up in Unit-5 like replacement of Bus Couplers and ABCBs works completed. Oil coolers dispatched from M/s BHEL works. Erection of oil coolers in Unit-6 is completed & commissioned.	
		16.5	R&M	-			Own funds	1. SCADA.	Scope & work finalization in progress.	

KARNATAKA - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(Amount in Rs. Crores)

SCHEMES ONGOING - Under Tendering - STATE SECTOR (KPCL)										
35.	Nagjhari,U-1 to 3 3x150 MW KPCL 1979 (U-1), 1980 (U-2), 1981 (U-3) T&G - BHEL	51	R&M	-	2021-22	28.46 (as on 30.09.16)	-	R&M of Turbine of unit-1, 2 & 3. Supply of major components spares of turbine like Top cover, Pivot ring, labyrinth, MIV seals, guide vanes, aeration valves, runner, guide apparatus, GV servomotor, regulating ring, rotary valve, shaft coupling bolt etc.	Technical Specification finalised and commercial offer received. BHEL gave offer of Rs.35 Cr. which has been sent to Board and for which financial approval is under process. DPR prepared and submitted to Hon'ble KERC for approval.	
SCHEMES ONGOING - Under DPR Preparation/ Finalisation/ Approval - STATE SECTOR (KPCL)										
36.	Sivasamudram Hydro Power Station 6x3 MW 4x6 MW KPCL 1920-38 T - Boving, UK (U1 to U6) Escher Wyess, Switzerland (U7 to U10) G - GEC, USA	41.05 Cr (Including IDC)	R&M	-	2021-22	-	-	R&M of turbines, 66 kV switchyard, Control and relay panels, Governor & Excitation system, improvements in water conducting system.	DPR has been prepared. The DPR has to put to be Board for approval and onward submission to Hon'ble KERC for approval.	
37.	MGHE (Mahatma Gandhi HE) 4 x 13.2 MW (St.I) 4 x 21.6 MW (St.II) KPCL 1947-52 T - Boving, UK G - BTH, UK(St.I) G - GE, USA(St.II)	74.10	R&M	-	2021-22	-	-	Hydro- Mechanical works Refurbishment works of penstock intake gates & trash racks, replacement of stop log gates and refurbishment of penstocks etc. Turbine and Inlet valve Refurbishment of butterfly valves, over velocity devices installed on penstocks, procurement of spare bearing shells, capital overhauling of turbine components along with the replacement of damaged parts etc. Generator and its auxiliaries Refurbishment of generator components along with air coolers, Fire protection system with non CO ₂ gas system (Clean gas based) for generators, replacement of relays with numerical relays etc. Complete renovation of outdoor 110kV switchyard with all line and unit bays. Replacement of 8 Nos. Generator Transformer. R&M of trolley system for PH approach along with civil and electrical works. The transformer oil draining system along with draining sump, power house safety and firefighting equipments, lighting system. Civil works Repair works of power channel side walls, bed, collapsed abutments and piers of foot bridge and aqueduct cum bridge.	DPR has been prepared and approval of is awaited.	

KERALA - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (KSEB)										
38.	Sholayar, 3x18 MW KSEB 1966-68 T - Litostroj, Yugoslavia G - Rade Koncar, Yugoslavia	Rs.199.55 Cr. (including IDC) Rs. 173 Cr. (excluding IDC)	RM&LE	54 (LE)	2018-19	1.83	Agency: PFC/ REC (to be decided)	Replacement of old machine with new machine. Replacement of Butterfly Valve, Penstock pipes, Turbine & PRV, Governors, Stator & Rotor windings with Class F insulation, Excitation System, Control & Protection, 11 kV panels, LT distribution system, DC Panel, Switchyard equipments and Power Transformers.	Renovation of Generating Equipment: Board approval on Draft DPR proposal was obtained and administrative sanction accorded on 05.01.2011. Tender documents were invited for the E&M part. Tender document sale commenced on 03.06.2013. PQ Bid opened on 24.09.2013. Decided to retender through e-tender as only one bidder qualified. The PQ Bid of re-tender was opened on 06.05.14 and Bid evaluation completed. Prequalified four firms and price bid opened on 27.01.2015. Lowest bidder is M/s FEPL-FUYUAN Consortium, Supply order and work order issued on 30.06.2015. Agreement executed with M/s FEPL-FUYUAN Consortium on 06.07.2015 with the time of completion being 15.04.2018. The existing runner of Unit 3 was dismantled and necessary measurements were taken by the contractor so that detailed engineering can be started. The model test of the turbine conducted afresh at Vattenfall laboratories, Sweden during 29.11.2016 to 09.12.2016. Model test report received and approved on 07.01.2017. Drawing approval in progress. The equipment manufacturing and delivery is in progress. Renovation of Penstock: E-tender for the renovation of Sholayar penstock and allied works were floated on 14.12.2015. The P.Q. bid opened and revoked due to the payment failure of one of the bidders and reopened on 11.05.2016. Price bid opened and LOA issued to L1 bidder i.e. M/s PES engineering Pvt. Ltd., Hyderabad on 31.03.2017.	The payback is expected to be in 4 years.

S. No.	Scheme Description	Estimated Cost	Scheme category	Expected Benefit MW	Completion Schedule	Expenditure incurred	Funding details	Scope of work	Present Status	Remarks
39.	Idukki 1st Stage 3x130 MW KSEB 1975-76 T - Neyrpic, France G - GE, Canada	89.9 (including IDC)	R&M		2019-20	3.6 (Including advance payment)	Agency: yet to be decided	Refurbishing the Main Inlet Valves, Generator Transformers, modernizing the auxiliary systems, replacement of Governing Systems & Excitation Systems with new PLC and Introduction of SCADA control.	DPR approved. Administrative sanction issued by the Board. Pre-qualification Bid opened. Tender evaluation completed Bid opened on 03.09.14. Pre-qualified two firms and Price Bid opened on 03.03.15. The Board decided to go for retender since R&M requirement could not be met by the L1 bidder. The retender was floated on 7.01.16. Pre-Bid meeting was held. PQ bid opened on 21.04.2016. The Single bidder, M/s ALSTOM, participated in the tender. The firm was prequalified and price bid opened on 15.06.16. In the month of August 2016, M/s Alstom (L1 bidder) was taken over by M/s GE Power India Ltd. The work of modernizing the auxiliary system, replacement of switchyard equipment's, replacement of Governing system & Excitation system and Introduction of SCADA control.is awarded to M/s GE Power on 22.09.2016 and agreement executed on 24.09.2016. The period of contract is 42 months. The renovation works of fire fighting system of Generator and Generator Transformers of both of 1 st and 2 nd stage units are also awarded to M/s GE Power. Detailed Engineering is progressing. Drawing approval is in progress. Procurement of equipment already started.	
SCHEMES ONGOING - Under DPR Preparation/ Finalisation/ Approval- STATE SECTOR (KSEB)										
40.	Kuttiadi 3x25 MW KSEB 1972 T&G-Fuji, Japan	Not estimated	RMU&LE	75 (LE)+ 7.5 (U)	2021-22	-	Agency: Yet to be decided.	The scope of work shall be finalized after finalization of the DPR.	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 decided to entrust M/s. AHEC, IIT, Roorkee for conducting RLA study on the generating unit. Final RLA report submitted in October 2013, but it didn't mention about the uprating of the existing units. As it left many components like spiral casing, further RLA study was conducted to explore the possibility of uprating the units and final report submitted to KSEB. They have recommended to provide an independent penstock for Kuttiadi Extension Scheme (1x50 MW) HEP. Draft DPR for R&M is under consideration of the Board. It was decided that the installation of new penstock shall be carried out departmentally without availing the consultancy service of M/s NHPC.	Originally Kuttiadi commissioning in 1972 with 3x25 MW generating units. A 50 MW unit was added to the same penstock in 2001. After this addition, considerable pitting noticed on runners of old machines. Hence old machines now running at derated capacity of 20 MW. A detailed study about the capacity of the new machine is to be conducted.
SCHEMES ONGOING - Under RLA Studies - STATE SECTOR (KSEB)										
41.	Idukki 2nd Stage 3x130 MW KSEB	-	RM&LE	-	2022-27	-	Agency: yet to be decided	Detailed scope of work will arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	

TAMIL NADU - Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (TANGEDCO)										
42.	Sholayar PH-1, 2x35 MW TANGEDCO 1971 T - Litostroj, Yugoslavia G - Rade Koncar, Yugoslavia	120	RMU&LE	70 (LE)+ 14(U)	2018-19	1.388	Agency: Proposal for availing loan has been submitted to 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	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 was obtained. Tender was floated on 19.01.14 and pre-bid meeting held on 19.03.14. The tender was opened on 27.06.14. The price Bid was opened on 14.11.14. After the evaluation of tender, M/s Andritz Hydro Private Limited became the L1 (Lowest) Bidder and High Level Negotiation Meeting was convened on 04.12.14. The Board approved to place orders on M/s Andritz Hydro Private Limited (AHPL), Haryana. LOI was issued. In continuation, Contract Agreement between TANGEDCO and M/s AHPL was signed on 21.07.15. Machine-2 was handed over to M/s. AHPL for carrying out Reverse Engineering works on 23.12.15 and works completed on 23.03.16. The machine was synchronized with Grid and achieved 33 MW of load on 01.04.16 and performance found satisfactorily. Electrical Single Line Diagram of Sholayar PH I received from M/s. AHPL. Overall completion period of 42 months from the zero date comprises of Reverse Engineering, submission of drawings, supply of new materials and completion of unit-wise RMU works. Duration of 12 months for submission of drawings. Reverse Engineering works have been completed. The submission of drawing for approval & supply of materials is under progress. The works common to both units is under taken during this lean period.	

TAMIL NADU - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion beyond 2017-22

(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
SCHEMES ONGOING - Under DPR Preparation/ Finalisation/ Approval - STATE SECTOR (TANGEDCO)										
43.	Kodayar, PH-I, 1x60 MW TANGEDCO 1970 T-Vevey Engg. works, Switzerland G-Alstom, France	80.12	RMU&LE	60 (LE)+ 10 (U)	2022-27	Nil	Agency: To be finalized by TANGEDCO later.	Detailed scope of work will arrived after finalization of specification based on RLA study report.	Contract awarded to M/s MECON Ltd., Ranchi for Rs. 91 lakhs on 22.09.2014 for conducting RLA study and uprating study on Turbine, Generator and other auxiliaries. Preliminary data collection and NDT tests completed by M/s MECON. Basic study report was furnished by M/s MECON. Draft DPR was received from M/s MECON on 21.09.2015. Meeting with the Standing Committee members of TANGEDCO was convened on 17 th and 18 th March, 2016 regarding the RLA study report submitted by M/s MECON, Ranchi. Meeting with M/s Mecon was convened on 06.04.2016 and remarks on Draft DPR were discussed. M/s Mecon have furnished corrected portion (both technical & commercial) on 25.04.2016. The same was communicated to field on 19.05.2016. On receipt of remarks received from field on 29.06.2016, the same was communicated to M/s Mecon on 01.07.16 for incorporating the same in Draft DPR. Final Draft received from M/s Mecon on 22.07.2016. Standing committee meeting convened on 20.09.2016 to finalize final DPR. Remarks communicated to M/s Mecon on 28.09.2016. Final DPR yet to be received. Administrative approval has been accorded on 03.02.2017.	
44.	Kodayar, Ph-II, 1x40 MW TANGEDCO 1971 T - Litostroj, Yugoslavia G - Rade Koncar, Yugoslavia.	-	RMU&LE	40 (LE)+ 6 (U)	2022-27	Nil	Agency: To be finalized by TANGEDCO later.	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	MECON submitted RLA study report in 2006 and proposed to uprate from 40 to 46 MW. It is proposed to take up RMU works of Kodayar PH-II on completion of RMU works of Kodayar PH-I as the water of PH-I is used for PH-II.	

TAMIL NADU - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion beyond 2017-22

(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
SCHEMES ONGOING - Under DPR Preparation/ Finalisation/ Approval - STATE SECTOR (TANGEDCO)										
45.	Moyar PH 3x12 MW TANGEDCO 1952-53 T – Boving, UK G - Metropolitan Vickers, UK	67.05	RMU&LE	36 (LE)+ 6 (U)	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	Tender for RLA studies was floated and opened on 01.03.13. Only one bid i.e. MECON was received. The work for conducting RLA study and uprating study on Turbine, Generator and other auxiliaries for Rs. 82.8 lakhs was awarded to M/s MECON, Ranchi on 17.06.2013. The firm submitted the draft DPR for R&M works. for R&M works. TANGEDCO discussed the technical issues with the firm and the final draft DPR was submitted on 15.11.14 by the firm after incorporating corrections pointed out by TANGEDCO. Further corrections noted and intimated to the firm. Final DPR was received on 07.02.15. Specification is under scrutiny. As per the instruction of CMD/TANGEDCO, a Committee has been formed with 3 engineers under the head of CE/Hydro to study the implementation points of DPR. The Committee submitted the implementation report to CMD/TANGEDCO after detailed study on 26.10.2016. The remarks on the commercial part of tender specification have been communicated to M/s Mecon. The technical part is under scrutiny. Administrative approval has been accorded on 04.06.2016.	
SCHEMES ONGOING - Under RLA Studies - STATE SECTOR (TANGEDCO)										
46.	Kundah-I, 3x20 MW TANGEDCO	-	RM&LE	-	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	
47.	Kundah-II, 5x35 MW TANGEDCO	-	RM&LE	-	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	
48.	Kundah-III, 3x60 MW TANGEDCO	-	RM&LE	-	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	
49.	Kundah-IV, 2x50 MW TANGEDCO	-	RM&LE	-	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	

50.	Kundah-V, 2x20 MW TANGEDCO	-	RM&LE	-	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	
51.	Mettur Tunnel, 4x50 MW TANGEDCO	-	RM&LE	-	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	
52.	Sarkarpathy, 1x30 MW TANGEDCO	-	RMU&LE	-	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	
53.	Sholayar-II, 1x25 MW TANGEDCO	-	RMU&LE	-	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	
54.	Suruliyar, 1x35 MW TANGEDCO	-	RMU&LE	-	2022-27	Nil	Agency: To be finalized by TANGEDCO later on.	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies to be taken up in due course.	

JHARKHAND - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Tendering - CENTRAL SECTOR (DVC)										
55.	Panchet, U-1 1x40 MW DVC 1959 T - NOHAB, Sweden G - AEG, West Germany	48.92	RM & LE	40 (LE)	2021-22	1.99 [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 was prepared by 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. DVC explored the possibilities of uprating in consultation with agencies of repute. Agencies were invited for their budgetary offer for taking up R&M work of the unit. Offers received from M/s Alstom & M/s Andritz were found to be on higher side. Hence, scope of works was revised. Budgetary estimates based on revised scope of works have been received from M/s Alstom, M/s Andritz and M/s Voith. Based on the Budgetary offers further processing is underway regarding tariff benefits from CERC & necessary approvals from DVC Board. NIT is expected to be floated in 2017-18.	

ODISHA - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING – Under Implementation - STATE SECTOR (OHPC)										
56.	Hirakud-I HEP (U5&6), 2x37.5 MW OHPC Ltd. 1962-63 T&G - Hitachi, Japan	158.77	RMU & LE	75 (LE) + 12.2 (U)	2018-19	12.13	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. 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 was scheduled on 25.01.2014. As per decision of OHPC to include life cycle cost analysis in the evaluation process and modify pre-qualification criteria, the previous tender was cancelled. A fresh tender was floated on 22.02.14. Four bidders submitted their Bid on 26.08.14. Evaluation of Part-I (Qualification Bid), Part II (Techno-commercial) and Part III (Price Bid) have been completed. Hon'ble OERC has accorded approval for this R&M work vide order dated 31.03.2014. LOA was issued to M/s Voith Hydro Pvt. Ltd., India on Dt. 17.08.2015. The contract agreement for R&M with new T&G set of Unit-5&6 was signed with M/s Voith Hydro Pvt. Ltd on 16.10.2015. The activity for R&M has commenced. Refurbishment works of Intake gate and draft tube gates of Unit-6 completed. OHPC has engaged M/s WAPCOS Ltd. as consultant for Providing Consultancy services for implementations of the R&M project of U 5 & 6 of HHEP and the agreement was signed on 05.07.2016. Dismantling of Generator and Balance of Plant equipment of Unit No. 6 & Unit No. 5 has been started from 04.08.2016 & 01.12.2016 respectively. The Dismantling of Unit-6 is in advance stage and Unit-5 is in progress. Refurbishment of Intake Gate & Draft tube Gate of U-5&6 is in progress.	

ODISHA - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING – Under Implementation - STATE SECTOR (OHPC)										
57.	Hirakud-II (U-3), (Chiplima) 3x24 MW OHPC Ltd. 1962-64 <u>Unit-3:</u> T - LMZ,USSR G - Electrosila, USSR	65.67	RM&LE	24(LE)	2017-18	10.96	Agency: PFC loan Sanctioned:	Replacement of TG set and associated equipment. New digital microprocessor based governor, DAVR, PLC based C&I system, numerical relays. Refurbishment of Intake gates and draft tube gates.	Unit-3 -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 was floated on 02.04.2013 and six nos. of bidders submitted their bids as on 30.08.2013. As per decision of OHPC to include life cycle cost analysis in the evaluation process and modify pre-qualification criteria, the previous tender was cancelled. A fresh tender was floated on 22.02.14. Three Bidders submitted their Bid on 05.08.14. Evaluation of Part-I (Qualification Bid) has been completed. Evaluation of Part II (Techno-commercial) and Part III (Price bid) has been completed. Hon'ble OERC has accorded in-principle approval for R&M work vide its order dated 31.03.14. LOA was issued to M/s Voith Hydro Pvt. Ltd., India on Dt. 17.08.2015. The contract agreement was signed with M/s Voith Hydro Pvt. Ltd on Dt. 15.10.2015. OHPC has engaged M/s WAPCOS Ltd. as consultant for providing Consultancy services for implementation of the R&M project Unit 3 of CHEP and the agreement was signed on 05.07.2016. The activity for R&M has commenced. Intake Gate and Draft tube gate refurbishment work (Guide grooves & underwater concrete) completed. Dismantling activities completed. Final assembly of the discharge ring segment for welding has been completed. Refurbishment and repair works of Drainage & dewatering pit is in progress and other civil works of Penstock and spiral case are in advanced stage. OHPC has already approved various design drawing/ documents like CFD Analysis. Turbine Design, Generator cross Section D&D System Design Memo of different auxiliaries which are essential for manufacturing of the equipment. Erection works of Excitation system Unit Control Board, Switchgear Cable Trays is under progress. Placement of OPU tank and accumulator tank has been completed. Manufacturing of the Turbine and Generator components in advance stage.	

ODISHA - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING - Under Implementation - STATE SECTOR (OHPC)										
58.	Balimela, 6x60 MW OHPC 1973-77 T - LMZ, USSR G - Electrosila, USSR	382.91	RM&LE	360 (LE)	2020-21	1.70	Agency: Yet to be decided	Replacement of TG set and associated equipment. New digital microprocessor based governor, DAVR, PLC based C&I system, numerical relays. Refurbishment of Intake gates & 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. Tenders floated and last date of submission of Bid was scheduled on 24.01.2014. As per decision of OHPC to include life cycle cost analysis in the evaluation process and modify pre-qualification criteria, the previous tender was cancelled. A fresh tender was floated on 22.02.14. Hon'ble OERC has accorded approval for this R&M work vide order dated 31.03.2014. Five Bidders submitted their Bid which were opened on 25.08.14. Evaluation of Part-I (Qualification Bid) and Part II (Techno-commercial) Bid have been completed. Revised Price Bid of the techno-commercially qualified bidders was opened on 18.03.2016. After evaluation of Price Bids, BOD approved the project cost of Rs. 382.91 Crs which includes the L1 price of Rs. 295 Crs offered by M/s BHEL. The LoA has already been issued to M/s BHEL on 06.06.2016. The contract agreement with M/s BHEL was signed on 21.09.2016. The Effective date of contract is from 05.08.2016. OHPC has engaged M/s WAPCOS Ltd. as consultant for Providing Consultancy services for Implementation of the R&M project of Unit 1 to 6 and the agreement was signed on 30.08.2016. Kick off meeting with M/s BHEL was held on 08.11.2016. Design & drawing submission and review is under process.	

WEST BENGAL - Programme/Status of Renovation and Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES Ongoing - Under DPR Preparation/ Finalisation/ Approval - CENTRAL SECTOR (DVC)										
59.	Maithon, U-1&3, 2x20 MW + 23.2 MW (Unit-2) DVC 1957-58 T - Neyrpic, Alstom France G - Siemens, W.Germany	56.034 Cr.	RM&LE	40 (LE)	2021-22	5.75 Cr. (as on 30.06.2016)	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 was also made to engage alternative suitable agency capable of taking up services by publishing EOI but no suitable agency could be identified. On further persuasion later, NHPC submitted that RLA study was required to establish detailed scope of R&M work. DVC had 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 30.06.16. Contract is going to be closed shortly after completion of minor pending jobs.	DVC has now planned that R&M of these units shall be taken up after observing the performance of Panchet U#1.

MEGHALAYA- Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
SCHEMES ONGOING – Under DPR Preparation/ Finalisation/Approval -STATE SECTOR (MePGCL)										
60.	Umiam Stage-III (Kyredemkulai) 2x30 MW MePGCL 1979 T&G - BHEL	344	RMU & LE	60(LE) +6(U)	2021-22	-	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. Civil & Hydro Mechanical Work - Site Installation - Low Pressure Grouting and lining - Repair of Pressure Tunnel - Steel liner Installation - Recoating of penstock - Repair of trash rack and link tunnel - Repair of intake gate - Repair of trash rack - Repair of radial gate - Investigation and Rehabilitation of Dykes and other related item.	The feasibility study was conducted and completed by JV of TEPSCO & TEPCO, Japan under JETRO grant. IIT Roorkee was engaged as consultant for undertaking head measurement studies and 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.	

MEGHALAYA- Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion during 2017-22

(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
								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 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 wherein it was decided to examine whether R&M can be done through domestic supplier with domestic funding. However Govt. of Meghalaya has expressed its inability to raise funds from domestic sources owing to the need of contributing a substantial amount as matching equity which is not possible due to fund constraints. An updated DPR has been prepared by MePGCL and further action initiated on the same. In this regard, CEA vide its letter dated 28.11.2014 has communicated its observations on MePGCL reference dated 19.11.2014. MOP has agreed to put the proposal back in the rolling plan of JICA funding and forwarded a copy of DPR to Department of Economic Affairs, New Delhi on 02.01.2015. In pursuance of this, MePGCL has submitted a copy of DPR to DEA on 14.01.2015. The preliminary project report of R&M of stage III was submitted on 17.06.2015 for placing it before the screening committee of project in DEA (Department of Economic Affairs). However, this proposal did not materialize. In the recent meeting of our CMD, MeECL with the Chairperson of CEA, it has been discussed about the other source of funding. So it is proposal that the source of funding may be from the PSDF Scheme. In this regard the letter has been written for request on comments on the revised estimate with proposal funding from PSDF Scheme. HE&RM Division, CEA vide letter dated 12.01.2017. has informed MePGCL to directly submit its proposal to NRLDC, the Secretariat handling PSDF proposals, in the prescribed format as per stipulated guidelines and as available on their website.	

MANIPUR - Programme/ Status of Renovation & Modernisation Schemes of Hydro Power Stations for completion beyond 2017-22

(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
SCHEMES ONGOING – Under DPR Preparation/ Finalisation/ Approval - CENTRAL SECTOR (NHPC)										
61.	Loktak 3x35 MW NHPC 1983 T&G - Lanin, USSR (U-1) T&G –BHEL(U-2&3)	260.47	RM&LE	105 (LE)	2022-23	-	-	i) Activities covering main equipment i.e. turbine, generator, generator transformers other plant equipment essential for efficient and sustained performance of the units as well as station. ii) Activities having direct impact on improvement of generation, efficiency, machine availability etc. iii) Activities for Integration of Control, Monitoring & Protection system of Power Plant such as Electronic Governors, Static Excitation System, numerical relays, SCADA. iv) Augmentation of water conductor system and associated Civil/HM works and infrastructure works.	DPR has been prepared. Proposal for R&M has been approved by the Board of Directors. Copy of the Proposal was sent by NHPC to Ministry of Power on 01/03/2016 for advising CEA to examine and vet the proposal. MoP directed CEA vide their Ir. dt. 29.04.2016 to examine the R&M proposals. CEA queries on E&M works received vide letter dated 12.07.2016 and reply of the queries of CEA has submitted on 01.09.2016. CEA team visited Loktak Power Station from 26.09.2016 to 28.09.2016. CEA queries on civil works received vide letter dated 23.08.2016 and reply for the same has been furnished vide letter dated 13.12.2016. Follow up queries for E&M works has been received vide letter dated 19.12.2016 along with approval of design energy. Civil & Hydro-Mechanical (HM) part of DPR is under examination in CWC. BoQ and cost of E&M works is under examination in CEA.	

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

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

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

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

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Himachal Pradesh								
1	Bhakra RB BBMB	CS	5x132	88.45	90.68	125.00 (U)	RM&U	2000-01
2	Dehra U-2 BBMB	CS	1x165	10.74	10.74	25.00 (Res.)	R&M+Res.	1998-99
3	Bairasiul, NHPC	CS	3x66	18.45	18.45	-	R&M	2000-01
4	Bassi, HPSEB	SS	4x15	5.35	4.34	-	R&M	2000-01
Jammu & Kashmir								
5	Salal St.I, NHPC	CS	3x115	51.50	51.50	-	R&M	2000-01
6	Chenani, J&KSPDC	SS	5x4.66	11.00	11.00	0.93 (Res)	R&M+Res.	2000-01
Punjab								
7	Ganguwal, U-2 BBMB	CS	1x24.2	18.90	15.00	22.00 (LE)+ 2.20 (Res)	RM&LE+Res	1997-98
8	Kotla, U-3, BBMB	CS	1x24.2	18.90	16.90	22.00 (LE)+ 2.20 (Res)	RM&LE+Res	1998-99
9	Ganguwal U-3, BBMB	CS	1x24.2	25.00	43.40	22.00 (LE)+ 2.20 (Res)	RM&LE+Res	2000-01
10	Kotla U-2, BBMB	CS	1x24.2	25.00		22.00 (LE)+ 2.20 (Res)	RM&LE+Res	2001-02
Uttarakhand								
11	Chilla U-1, 3& 4, UJVNL	SS	3x36	4.25	4.11	-	R&M	1998-99
12	Tiloth, UJVNL	SS	3x30	8.02	5.51	6.00 (U)	RM&U	1998-99
Andhra Pradesh								
13	Lower Sileru, APGENCO	SS	4x115	13.35	9.30	24.00 (Res)	R&M+Res.	2001-02
14	Srisaillam RB, APGENCO	SS	7x110	16.32	11.40	-	R&M	2001-02
Karnataka								
15	Sharavathy, U-1 to 8, KPCL	SS	8x89.1	65.00	63.49	115.20 (U) +178.20 (Res)	RM&U+Res	1997-98
16	Sharavathy, U-9&10, KPCL	SS	2x89.1	17.96	14.68	28.80(U) +19.10 (Res)	RM&U+Res	1997-98

Annex-II
(Sheet 2/ 2)

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

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

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

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
Himachal Pradesh								
1	Pong, BBMB	CS	6x60	17.70	17.79	36.00(U)	RM&U	2003-04
Punjab								
2	Ganguwal,U-1, BBMB	CS	1x29.25	51.28	81.99	25.89 (LE) +2.10 (Res.)	RM&LE+Res.	2006-07
2	Kotla, U-1, BBMB	CS	1x29.25	51.28		26.61 (LE) +2.33 (Res.)	RM&LE+Res.	2006-07
4	Shanan Ph.A, PSPCL	SS	4x15+ 1x50	11.35	10.93	-	R&M	2003-04
5	Shanan, Ph.B, PSPCL	SS	4x15+ 1x50 \$	35.95	13.34	60.00(LE)	RM&LE(LE for 15 MW units+R&M for 50 MW unit	2006-07
6	Anandpur Sahib, PSPCL	SS	4x33.5	3.68	1.04	-	R&M	2006-07
7	UBDC I&II, PSPCL	SS	3x15+ 3x15.45	7.89	2.44	45.00 (LE)	RM&LE(LE for 3x15MW&R &M for 3x15.45 MW	2006-07
8	Mukerian St.I, PSPCL	SS	3x15	6.04	4.38	-	R&M	2006-07
Uttarakhand								
9	Chibro, UJVNL	SS	4x60	10.45	10.52	-	R&M	2006-07
Karnataka								
10	Nagihari, U-1&3,KPCL	SS	2x135	26.12	21.62	30 (U)	RM&U	2002-03
11	Supa PH, KPCL	SS	2x50	2.64	2.47	-	R&M	2002-03
12	Mahatma Gandhi, VVNL	SS	4x12+ 4x18	44.66	43.13	19.20 (U) +120.00 (LE)	RMU&LE	2002-03
13	Munirabad, VVNL	SS	2x9+ 1x10.3	3.64	3.53	28.30 (LE)	RM&LE	2002-03

Annex- III
(Sheet 2/3)

(Sheet 2 of 3)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs. in Crs.)				
14	Mani Dam, KPCL	SS	2x4.5	1.00	1.00	-	R&M	2002-03
15	Shivasamudram , VVNL	SS	6x3+ 4x6	68.38	73.17	42.00 (LE)	RM&LE	2004-05
16	Bhadra, Ph.II, KPCL	SS	1x2	3.30	2.51	2.00 (LE)	RM&LE	2005-06
17	Varahi, KPCL	SS	2x115	2.57	2.66	-	R&M	2006-07
18	Sharavathy, Ph.A, KPCL	SS	10x103.5	5.22	3.52	-	R&M	2006-07
Kerala								
19	Neriamangalam KSEB	SS	3x15	58.00	53.05	9.00 (U) +45.00(LE)	RMU&LE	2006-07
20	Pallivasal, KSEB	SS	3x5+ 3x7.5	94.00	371.71	37.50 (LE)	RM&LE	2002-03
21	Sengulam, KSEB	SS	4x12	114.00		48.00 (LE)	RM&LE	2002-03
22	Panniar, KSEB	SS	2x15	62.00		30.00 (LE)	RM&LE	2002-03
Tamilnadu								
23	Pykara, TANGEDCO	SS	3x6.65+ 1x11+ 2x14	26.06	20.147	58.95(LE)	RM&LE	2004-05
24	Papanasam, TANGEDCO	SS	4x7	27.05	22.61	4.00 (U) + 28.00 (LE)	RMU&LE	2005-06
Orissa								
25	Hirakud-I (Sw.yard), OHPC	SS		9.85	15.88	-	R&M	2006-07
26	Hirakud-I,U-3&4, OHPC	SS	2x24	126.14	108.86	16.00(U)+ 48.00(LE)	RMU&LE	2005-06
West Bengal								
27	Maithon, U-2, DVC	CS	1x20	42.08	36.94	3.20(U)+ 20.00(LE)	RMU&LE	2004-05
Maharastra								
28	Bhira Tail Race, MSPGCL	SS	2x40	1.60	0.70	-	R&M	2003-04
29	Tillari, MSPGCL	SS	1x60	4.50	4.24	6.0 (U)	RM&U	2004-05

Annex- III
(Sheet 3/3)

(Sheet 5 of 5)

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

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

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

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

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

Annex- IV
(Sheets 2 of 2)

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

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

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

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs . in crs)				
Himachal Pradesh								
1	Bassi, HPSEB	SS	4x15	124.25	158.26	6.0(U)+60(LE)	RMU&LE	2013-14
Jammu & Kashmir								
2	Lower Jhelum, J&KSPDC	SS	3x35	101.3	96.10	15.00(Res)	R&M+ Res.	2014-15
3	Sumbal Sindh, J&KSPDC	SS	2x11.3	25.00	24.59	-	R&M	2016-17
Uttarakhand								
4	Pathri, UJVNL	SS	3x6.8	113.25	108.3	20.40(LE)	RM&LE	2014-15
5	Khatima, UJVNL	SS	3x13.8	256.77	118.83	41.40 (LE)	RM&LE	2016-17
Uttar Pradesh								
6	Matatila, UPJVNL	SS	3x10.2	10.29	7.21	30.6 (LE)	RM&LE	2015-16
Andhra Pradesh								
7	Lower Sileru, APGENCO	SS	4x115	8.75	6.77	-	R&M	2013-14
8	Srisailem RB, APGENCO	SS	7x110	16.70	17.60	-	R&M	2015-16
Telangana								
9	Nagarjuna Sagar Ph-I works, TSGENCO	SS	1x110+7x100.8	33.35	13.90	-	R&M	2012-13
Karnataka								
10	Supa, KPCL	SS	2x50	3.45	3.88	-	R&M	2014-15
11	Sharavathy (Ph B), KPCL	SS	10x103.5	31.82	29.27	-	R&M	2016-17
Kerala								
12	Idamalayar, KSEB	SS	2x37.5	14.50	13.22	-	R&M	2012-13

Annex- V
(Sheet 2 of 2)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs . in crs)				
13	Sabarigiri, U-4 KSEB	SS	1x55	52.20	50.41	5(U)	RM&U	2014-15
14	Poringalkuthu, KSEB	SS	4x8	88.63	51.90	4 (U)+ 32.00 (LE)	RMU&LE	2015-16
Tamil Nadu								
15	Periyar, TANGEDCO	SS	4x35	161.18	133.68	140(LE)+ 28.00(U)	RMU&LE	2015-16
Odisha								
16	Rengali Unit-1 OHPC	SS	1x50	47.50	36.76	50(LE)	RM&LE	2012-13
17	Rengali Unit-2 OHPC	SS	1x50	25.20	20.73	50(LE)	RM&LE	2013-14
West Bengal								
18	Jaldhaka St.I, WBSEDCL	SS	3x9	88.62	79.97	27 (LE)	RM&LE	2016-17
Assam								
19	Khandong, U-1 NEEPCO	CS	1x25	25.05	29.18	25(LE)	RM&LE	2014-15
20	Kopili, NEEPCO	CS	2x50	50.22	50.92	-	R&M	2014-15
	Total		4014.6	1278.03	1051.48	534.40 [43(U)+ 476.40 (LE) + 15 (Res)]		

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

(As on 31.03.2017)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in crs)				
A. Ongoing Schemes – Under Implementation								
Himachal Pradesh								
1	Bhakra LB, BBMB	CS	5x108	489.77	337.48	90.00 (U)+ 540.00(LE)	RMU&LE	2018-19
2	Ganguwal U2& Kotla U3, BBMB	CS	2x24.2	14.19	0.84	48.4 (LE)	RM&LE	2017-18
3	Dehar Power House, BBMB	CS	1x165	19.87	15.00	-	R&M	2017-18
4	Baira Siul, NHPC	CS	3x60	341.41	-	180 (LE)	RM&LE	2020-21
5	Bhaba Power House, HPSEB	SS	3x40	153.10	38.77	120 (LE)	RM&LE	2021-22
Jammu & Kashmir								
6	Salal, NHPC	CS	6x115	58.01	-	-	R&M	2019-20
7	Ganderbal, J&KSPDC	SS	2x3+ 2x4.5	39.30	12.90	9.00 (LE)	RM&LE	2017-18
8	Chenani, J&KSPDC	SS	5x4.66	39.14	14.66	23.30 (LE)	RM&LE	2017-18
Uttarakhand								
9	Tiloth, UJVNL	SS	3x30	384.66	-	90 (LE)	RM&LE	2019-20
10	Dhalipur, UJVNL	SS	3x17	152.65	-	51.00 (LE)	RM&LE	2020-21
Uttar Pradesh								
11	Rihand, UPJVNL	SS	6x50	132.20	93.96	300.00 (LE)	RM&LE	2017-18
12	Obra, UPJVNL	SS	3x33	58.80	17.19	99.00 (LE)	RM&LE	2018-19
Gujarat								
13	Ukai, U-1,2,3,&4 GSECL	SS	4x75	-	-	-	R&M	2021-22
14	Kadana PSS, GSECL	SS	3x60	-	-	-	R&M	2021-22

Sheet 2 of 4)

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in crs)				
Telangana								
15	Nagarjuna Sagar Ph-II works, TSGENCO	SS	1x110+7x100.8	22.17	14.34	-	R&M	2018-19
16	Nagarjuna Sagar Left Canal Power House, TSGENCO	SS	2x30	30.99	2.00	-	R&M	2018-19
Karnataka								
17	Nagjhari,U-1 to 6, KPCL	SS	5x150+1x135	69.21	64.49	15 (U)	RM&U	2021-22
18	Bhadra River Bed units, KPCL	SS	2x12	28.015	21.81	-	R&M	2017-18
Kerala								
19	Sholayar, KSEB	SS	3x18	199.55	-	54.00 (LE)	RM&LE	2018-19
20	Idukki 1 st stage, KSEB	SS	3x130	89.90	3.60	-	R&M	2019-20
Tamil Nadu								
21	Sholayar-I, TANGEDCO	SS	2x35	120.00	1.388	14.00(U) + 70.00 (LE)	RMU&LE	2018-19
Madhya Pradesh								
22	Gandhi Sagar, MPPGCL	SS	5x23	21.83	-	-	R&M	2018-19
23	Bargi, MPPGCL	SS	2x45	3.12	0.36	-	R&M	2021-22
24	Pench, MPPGCL	SS	2x80	13.36	-	-	R&M	2021-22
Odisha								
25	Hirakud-I U5&6, OHPC	SS	2x37.5	158.77	12.13	12.2 (U) + 75.00 (LE)	RMU&LE	2018-19
26	Hirakud-II, OHPC	SS	1x24	65.67	10.96	24.00 (LE)	RM&LE	2017-18
27	Balimela, OHPC	SS	6x60	382.91	1.70	360(LE)	RM&LE	2020-21
	Sub Total (A)		5924.30	3088.60	663.58	2174.90 [131.20(U)+2043.70 (LE)]		

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in crs)				
B. Ongoing Schemes – Under Tendering								
Himachal Pradesh								
28	Giri, HPSEB	SS	2x30	139.8	-	60.00 (LE)	RM&LE	2019-20
Punjab								
29	Mukerin St.I, St.II, St.III & St.IV, PSPCL	SS	3x15, 3x15, 3x19.5 & 3x19.5	132.47	-	-	R&M	2019-20
30	Ranjit Sagar Dam, PSPCL	SS	4x150	42.08	-	-	R&M	2019-20
31	Shanan HEP, PSPCL	SS	1x50+ 4x15	40.20	-	-	R&M	2019-20
32	UBDC St.I & St.II, PSPCL	SS	3x15 & 3x15.45	21.05	-	-	R&M	2019-20
Uttarakhand								
33	Chilla Ph B UJVNL	SS	4x36	490.56	-	12(U) + 144(LE)	RMU&LE	2021-22
34	Kulhal, UJVNL	SS	3x10	115.24	-	30(LE)	RM&LE	2020-21
35	Ramganaga, UJVNL	SS	3x66	455.2	-	198(LE)	RM&LE	2020-21
36	Dhakrani, UJVNL	SS	3x11.25	137.31	-	33.75 (LE)	RM&LE	2020-21
Karnataka								
37	Nagjhari,U-1 to 3, KPCL	SS	3x150	51.00	28.46	-	R&M	2021-22
Madhya Pradesh								
38	Bansagar Ton-I, MPPGCL	SS	3x105	4.97	-	-	R&M	2021-22
Jharkhand								
39	Panchet, U-1 DVC	CS	1x40	48.92	1.99	40(LE)	RM&LE	2021-22
	Sub Total (B)		2279.1	1678.80	30.45	517.75 [12(U)+ 505.75(LE)]		

Annex- VI
(Sheet 4of 4)

(Sheet 4 of 4)								
Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp.	Benefits (MW)	Category	Year of Completion
				(Rs. in crs)				
C. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval								
Andhra Pradesh								
40	Machkund St.I & St.II, APGENCO	SS	3x17+ 3x21.25	124.45	-	5.25 (U) +114.75 (LE)	RMU&LE	2021-22
Karnataka								
41	Shivasamudram, KPCL	SS	6x3+ 4x6	41.05	-	-	R&M	2021-22
42	MGHE, KPCL	SS	4x21.6+ 4x13.2	74.10	-	-	R&M	2021-22
Kerala								
43	Kuttiyadi, KSEB	SS	3x75	-	-	75.00 (LE) + 7.5 (U)	RMU&LE	2021-22
West Bengal								
44	Maithon,U-1&3,DVC	CS	2x20	56.03	5.75	40.00 (LE)	RM&LE	2021-22
Meghalaya								
45	Umium St.III, Kyrdemkulai, MePGCL	SS	2x30	344.00	-	60(LE)+ 6 (U)	RMU&LE	2021-22
	Sub Total (C)		620.95	639.63	5.75	308.50 [18.75(U)+ 289.75 (LE)]		
	Total (A+B+C)		8824.35	5407.03	699.78	3001.15 [161.95(U)+ 2839.20 (LE)]		

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

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

State-wise List of Hydro RMU&LE schemes programmed for completion beyond 2017-22

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost	Actual Exp	Benefits (MW)	Category	Year of Completion
				(Rs. in crs)				
A. Ongoing Schemes – Under Tendering								
1	Moyar PH, TANGEDCO	SS	3x12	67.05	-	36(LE)+6(U)	RMU&LE	2022-27
	Sub Total(A)		36	67.05	-	42.00 [36(LE)+6(U)]		
B. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval								
Uttarakhand								
2	Chibro, UJVNL	SS	4x60	184.88	-	240(LE)	RM&LE	2023-24
3	Khodri PH-II UJVNL	SS	4x30	169.63	-	120(LE)	RM&LE	2023-24
Tamil Nadu								
4	Kodayar Ph.I, TANGEDCO	SS	1x60	80.12	-	60 (LE)+10 (U)	RMU&LE	2022-27
5	Kodayar Ph-II, TANGEDCO	SS	1x40	-	-	40(LE)+6(U)	RMU&LE	2022-27
Manipur								
6	Loktak, NHPC	CS	3x35	260.47	-	105 (LE)	RM&LE	2022-23
	Sub Total(B)		565	695.1	0	581.00 [565(LE)+16(U)]		
C. Ongoing Schemes – Under RLA Studies								
Tamil Nadu								
7	Kundah-I, TANGEDCO	SS	3x20	-	-	-	RM&LE	2022-27
8	Kundah-II, TANGEDCO	SS	5x35	-	-	-	RM&LE	2022-27
9	Kundah-III, TANGEDCO	SS	3x60	-	-	-	RM&LE	2022-27
10	Kundah-IV, TANGEDCO	SS	2x50	-	-	-	RM&LE	2022-27
11	Kundah-V, TANGEDCO	SS	2x20	-	-	-	RM&LE	2022-27
12	Mettur Tunnel, TANGEDCO	SS	4x50	-	-	-	RM&LE	2022-27
13	Sarkarpathy, TANGEDCO	SS	1x30	-	-	-	RM&LE	2022-27
14	Sholayar-II, TANGEDCO	SS	1x25	-	-	-	RM&LE	2022-27

15	Suruliyar, TANGEDCO		1x35	-	-	-	RM&LE	2022-27
Kerala								
16	Idukki 2 nd stage, KSEB	SS	3x130	-	-	-	RM&LE	2022-27
	Sub Total(C)		1235	0	0	-		
	Total (A+B+C)		1836	762.15	0	623.00 [601(LE) +22(U)]		

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 Additional Hydro Projects Identified for Undertaking RMU&LE Works

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Remarks
Himachal Pradesh				
1	Pong, BBMB	CS	6x66	CPRI, Bangalore was hired to prepare scope of work for RLA & R&M studies of Pong machines. Thereafter, RLA study will be conducted and on the basis of RLA study report, it will be decided whether work of RMU is required to be carried out or not.
2	Dehar, BBMB	CS	4x165	BBMB placed a Work Order upon CPRI, Bangalore for firming up scope of RLA Study of various equipment to be under taken by agency selected on open tender basis on Dehar Power House. The Report in this regard has been submitted by CPRI and the detailed scope of RLA study to be undertaken is being perused by the field office. The tender document shall be finalised after receipt of detailed scope of RLA from field office.
Maharashtra				
3	Koyna Stage-III, MSPGCL	SS	4x80	
4	Vaitarana, MSPGCL	SS	1x60	
Andhra Pradesh				
5	Tungabhadra Dam, APGENCO	SS	4x9	
6	Hampi, APGENCO	SS	4x9	
Jharkhand				
7	Sikidiri, JSEB	SS	2x65	
Madhya Pradesh				
8	Rajghat, MPPGCL	SS	3x15	
Assam				
9	Khandong, NEEPCO	SS	2x25	Order has been placed with CPRI for carrying out the survey, investigation work and preparation of DPR after detail survey, investigation and testing of the equipment. The Survey & Investigation works has been carried out by CPRI in the month of March` 2017. The detail work plan will be framed up after submission of the DPR by CPRI.
Uttar Pradesh				
10	Khara, UPJVNL	SS	3x24	
Rajasthan				
11	Rana Pratap Sagar (RPS), RRVUNL	SS	4x43	
12	Jawahar Sagar, RRVUNL	SS	3x33	
Total			2076	

Abbreviations of Agencies

1.	APGENCO	Andhra Pradesh Generation Corporation
2.	BBMB	Bhakra Beas Management Board
3.	DVC	Damodar Valley Corporation
4.	GSECL	Gujarat State Electricity Corporation Ltd.
5.	HPSEB	Himachal Pradesh State Electricity Board
6.	J&KSPDC	Jammu & Kashmir State Power Development Corpn.
7.	JSEB	Jharkhand State Electricity Board.
8.	KPCL	Karnataka Power Corporation Ltd.
9.	KSEB	Kerala State Electricity Board
10.	MSPGCL	Maharashtra State Power Generation Corporation Ltd.
11.	MePGCL	Meghalaya Power Generation Corporation Ltd.
12.	MPPGCL	Madhya Pradesh Power Generation Corporation Ltd.
13.	NEEPCO	North-East Electric Power Corporation
14.	OHPC	Odisha Hydro Power Corporation
15.	PSPCL	Punjab State Power Corporation Ltd.
16.	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Ltd.
17.	TANGEDCO	Tamil Nadu Generation and Distribution Corporation Ltd.
18.	TSGENCO	Telangana State Power Generation Corporation
19.	UPJVNL	Uttar Pradesh Jal Vidyut Nigam Ltd.
20.	UJVNL	Uttarakhand Jal Vidyut Nigam Ltd.
21.	VVNL	Vishwesharayya Vidyut Nigam Ltd.
22.	WBSEDCL	West Bengal State Electricity & Distribution Company Ltd.