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Government of India
विद्युत् 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 परियोजना का नवीनीकरण एवं आधुनिकीकरण
अवधि 2017-22 व 2022-27 का कार्यक्रम तथा यथास्थिति



Renovation & Modernisation of Hydro Power Stations

Status/ Programme for the period 2017-22 & 2022-27

QUARTERLY PROGRESS REPORT

(April-June, 2021)

(1st Quarter of 2021-22)

C O N T E N T S

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Renovation & Modernisation (R&M) Schemes of Hydro Power Stations

Programme for the period 2017-22 & 2022-27

INDEX OF SCHEMES

Programmed for completion during 2017-22

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		Central	State				
Northern Region							
I.	Himachal Pradesh						
1.		Ganguwal & Kotla	-	BBMB	2017-18	Completed	1
2.		Dehar PH	-	BBMB	2017-18	Completed	1
3.		Bhakra LB	-	BBMB	2021-22	Under Implementation	1-5
4.		Bhakra RB	-	BBMB	2021-22	Under Implementation	5
5.		Dehar PH	-	BBMB	2021-22	Under Implementation	5-6
6.		Ganguwal & Kotla	-	BBMB	2021-22	Under Implementation	6
7.		Baira Siul	-	NHPC	2021-22	Under Implementation	6-8
8.		-	Bhabha Power House	HPSEB	2021-22	Under Implementation	8-11
II.	Jammu & Kashmir						
9.		Salal	-	NHPC	2019-20	Completed	12
10.		-	Chenani	J&KSPDC	2021-22	Completed	12-13
11.		-	Ganderbal	J&KSPDC	2021-22	Completed	13-14
III.	Punjab						
12.		-	Mukerian HEP	PSPCL	2021-22	Under Implementation	15-19
13.		-	Shanan HEP	PSPCL	2021-22	Under Implementation	19-21
IV.	Uttar Pradesh						
14.		-	Rihand	UPJVNL	2021-22	Under Implementation	22-23
15.		-	Obra	UPJVNL	2021-22	Under Implementation	23-25

S. No.	State	Name of Scheme in the Sector		Agency	Completion Schedule	Remarks	Page No.
		Central	State				
Western Region							
V.	Madhya Pradesh						
16.		-	Bargi	MPPGCL	2021-22	Under Implementation	26-27
17.		-	Pench	MPPGCL	2021-22	Under Implementation	27-28
18.		-	Bansagar Ton-I	MPPGCL	2021-22	Under Implementation	28-29
VI	Gujarat						
19.		-	Ukai	GSECL	2021-22	Under Implementation	30
20.		-	Kadana PSS	GSECL	2021-22	Under Implementation	31
Southern Region							
VII.	Telangana						
21.		-	Nagarjuna Sagar Phase-II	TSGENCO	2021-22	Under Implementation	32-33
22.		-	Nagarjuna Sagar Left Canal Power House	TSGENCO	2021-22	Under Implementation	34
VIII	Karnataka						
23.		-	Bhadra River Bed units	KPCL	2019-20	Completed	35
24.		-	Munirabad Dam Power House	KPCL	2021-22	Under Implementation	35-36
IX.	Kerala						
25.		-	Sholayar	KSEB	2020-21	Completed	37-38
26.		-	Idukki 1 st Stage	KSEB	2020-21	Completed	38-39
27.		-	Kuttiyadi	KSEB	2021-22	Under Implementation	39-41
X.	Tamil Nadu						
28.		-	Sholayar PH-I	TANGEDCO	2019-20	Completed	42
XI.	Odisha						
29.		-	Hirakud-I, U5&6	OHPC	2021-22	Under Implementation	43-44
30.		-	Hirakud-II (Chiplima)	OHPC	2021-22	Under Implementation	44-45
31.		-	Balimela	OHPC	2021-22	Under Implementation	45-46

Programmed for completion during 2022-27

S. No.	State	Name of Scheme in the Sector		Agency	Completion Schedule	Remarks	Page No.
		Central	State				
Northern Region							
I. Himachal Pradesh							
1.		Pong PH	-	BBMB	2022-23	Under Implementation	47-48
2.		-	Giri	HPSEB	2023-24	Under Tendering	48
II. Punjab							
3.		-	Ranjit Sagar Dam	PSPCL	2022-23	Under Implementation	49-52
4.		-	UBDC St.I & St.II HEP	PSPCL	2022-23	Under Implementation	52-54
5.		-	Anandpur Sahib Hydel Project,	PSPCL	2022-23	Under Implementation	54-57
III. Jammu & Kashmir							
6.		-	Lower Jehlum HEP	J&KSPDC	2022-27	Under DPR Preparation/ Finalisation/Approval	58
IV. Uttarakhand							
7.		-	Chilla (Ph-B)	UJVNL	2024-25	Under Implementation	59
8.		-	Tiloth	UJVNL	2021-22	Under Implementation	59-60
9.		-	Dhalipur	UJVNL	2021-22	Under Implementation	60
10.		-	Ramganga	UJVNL	2022-27	Under Tendering	61
11.		-	Dhakrani	UJVNL	2022-27	Under Tendering	61
12.		-	Kulhal	UJVNL	2023-24	Under DPR Preparation/ Finalisation/Approval	61-62
Western Region							
V. Madhya Pradesh							
13.		-	Gandhi Sagar	MPPGCL	2022-23	Under Implementation	63-65
Southern Region							
VI. Kerala							
14.		-	Idukki 2 nd Stage	KSEB	2022-27	Under RLA Studies	66
VII. Andhra Pradesh							
15.		-	Machkund St.I & St.II	APGENCO	2025-26	Under RLA Studies	67
16.		-	Tungabhadra HE (J) Dam	APGENCO	2025-26	Under RLA Studies	68
17.		-	Hampi Canal PH	APGENCO	2025-26	Under RLA Studies	68
18.		-	Lower Sileru	APGENCO	2025-26	Under RLA Studies	68

S. No.	State	Name of Scheme in the Sector		Agency	Completion Schedule	Remarks	Page No.
		Central	State				
VIII.	Tamil Nadu						
19.		-	Moyar PH	TANGEDCO	2023-24	Under Implementation	69
20.		-	Kodayar PH-I	TANGEDCO	2023-24	Under Implementation	69
21.		-	Kodayar PH-II	TANGEDCO	2026-27	Under DPR Preparation/ Finalisation/Approval	70
22.		-	Kundah-I	TANGEDCO	2022-27	Under RLA Studies	70-72
23.		-	Kundah-II				
24.		-	Kundah-III				
25.		-	Kundah-IV				
26.		-	Kundah-V				
27.		-	Mettur Tunnel				
28.		-	Sarkarpathy				
29.		-	Sholayar-II				
30.		-	Suruliyar				
31.		-	Kadamparai PH,				
32.		-	Aliyar				
IX.	Karnataka						
33.		-	Nagjhari, U-1 to U-3	KPCL	2021-22	Under Implementation	73
34.		-	Shivasamudram	KPCL	2021-22	Under Implementation	74
35.		-	Kadra Dam Power House	KPCL	2021-22	Under Implementation	74-75
36.		-	Kodasalli Dam Power House	KPCL	2021-22	Under Tendering	75-76
37.		-	Gerusoppa Dam Power House	KPCL	2021-22	Under Tendering	76

S. No.	State	Name of Scheme in the Sector		Agency	Completion Schedule	Remarks	Page No.
		Central	State				
38.		-	Linganamakki Dam Power House	KPCL	2021-22	Under Tendering	76-77
39.		-	Supa Dam Power House	KPCL	2022-27	Under DPR Preparation/ Finalisation/Approval	77-78
40.		-	Sharavathy Generating Station	KPCL	2022-27	Under DPR Preparation/ Finalisation/Approval	78-79
41.		-	MGHE (Mahatma Gandhi HE)	KPCL	2021-22	Under DPR Preparation/ Finalisation/Approval	79-80
North Eastern Region							
X.	Manipur						
42.		Loktak	-	NHPC	2023-24	Under Implementation	81
XI.	Assam						
43.		Khandong Power Station	-	NEEPCO	2024-25	Under DPR Preparation/ Finalisation/Approval	82
44.		Kopili Power Station		NEEPCO	2023-24	Under DPR Preparation/ Finalisation/Approval	83
XII.	Meghalaya						
45.		-	Umiam St.III Kyrdemkulai	MePGCL	2022-27	Under Tendering	84-85
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Eastern Region							
XIII.	West Bengal						
47.		Maithon, U1&3	-	DVC	2024-25	Under DPR Preparation/ Finalisation/Approval	87
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48.		-	Subernrekha	JUUNL	2022-27	Under RLA Studies	88
49.		Panchet, U-1	-	DVC	2023-24	Under Tendering	88

**Background
&
Plan-wise Summary**

RENOVATION, MODERNISATION & UPRATING OF HYDRO ELECTRIC POWER PROJECTS

BACKGROUND

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

Recognizing the benefits of R&M of hydroelectric power projects, Govt. of India set up a National Committee in 1987 and a Standing Committee in 1998 and thereafter had identified the projects/ schemes to be taken up for implementation under R&M. The National Perspective Plan document for R&M of hydroelectric power projects in the country was also prepared in CEA during the year 2000. The status of various projects/schemes already identified for implementation/completion till the end of XI Plan, i.e. March, 2012 has been incorporated in the National Perspective Plan.

VIII Plan to XII Plan

The R&M works at 104 (21 in Central and 83 in State Sector) hydro power plants (13 up to the VIII Plan, 20 in the IX Plan, 32 in the X Plan, 18 in the XI Plan & 21 in the XII Plan) with an aggregate installed capacity of 20611 MW have been completed by the end of the XII Plan, total benefit of 3636 MW through Life Extension, Uprating and Restoration has been accrued. The state-wise list of Hydro RM&U Schemes completed during VIII, IX, X, XI and XII Plans are given at Annex-I, II, III, IV & V respectively.

During 2017-22

The Renovation, Modernization, Uprating and Life Extension works at 31 Hydro Electric Plants (HEPs) with an aggregate capacity of 6425.8 MW is programmed for completion during 2017-22 with the breakup as 4452.60 MW through R&M at 17 HEPs, 1213.2 MW through Life Extension at 10 HEPs and 760 MW through Life Extension & Uprating at 4 HEPs. The 4 HEPs where both Life Extension & Uprating are envisaged, the aggregate capacity of 760 MW shall be uprated to 883.7 MW resulting in additional benefit of 123.7 MW. As such, the revised aggregate capacity after RMU&LE works of these 31 projects will be 6549.5 MW.

Out of these 31 schemes, nine (9) schemes with an aggregate installed capacity of about 1354.2 MW have been completed till June, 2021 which includes 1154 MW through R&M, 130.2 MW through Life Extension and 84 MW (70+14 MW) through LE & Uprating. The state-wise list of hydro R&M schemes expected for completion during 2017-22 is given at Annex-VI.

During 2022-27

The Renovation, Modernization, Uprating and Life Extension works at 49 Hydro Electric Plants (HEPs) with an aggregate capacity of 7543.3 MW is programmed for completion during 2022-27 with the breakup as 1450.35 MW through R&M at 6 HEPs, 5027.95 MW through Life Extension at 34 HEPs and 1065 MW through Life Extension & Uprating at 9 HEPs. The 9 HEPs where both Life Extension & Uprating are envisaged, the aggregate capacity of 1065 MW shall be uprated to 1147 MW resulting in additional benefit of 82 MW. As such, the revised aggregate capacity after RMU&LE works of these 49 projects will be 7625.3 MW. The state-wise list of hydro R&M schemes expected for completion during 2022-27 is given at Annex-VII.

जल विद्युत परियोजनाओं का नवीनीकरण, आधुनिकीकरण और उन्नयन

पृष्ठभूमि

संसाधनों के इष्टतम उपयोग, कुशल संचालन, बेहतर उपलब्धता सुनिश्चित करने के साथ-साथ देश में क्षमता वृद्धि (उन्नयन) करने के लिए मौजूदा पूर्वस्थापित जल विद्युत परियोजनाओं का नवीनीकरण और आधुनिकीकरण, तथा उन्नयन और जीवन विस्तार (आरएमयू एंड एलई) को एक लागत प्रभावी विकल्प माना जाता है।

जलविद्युत परियोजनाओं के नवीनीकरण और आधुनिकीकरण के लाभों को समझते हुए, भारत सरकार ने 1987 में एक राष्ट्रीय समिति और 1998 में एक स्थायी समिति का गठन किया था। इसके उपरान्त आर एंड एम के तहत कार्यान्वयन आरंभ करने के लिए परियोजनाओं/योजनाओं को चिह्नित किया था। वर्ष 2000 के दौरान केंद्रीय विद्युत प्राधिकरण में देश में जलविद्युत परियोजनाओं के नवीनीकरण और आधुनिकीकरण के लिए राष्ट्रीय परिप्रेक्ष्य योजना दस्तावेज भी तैयार किया गया था। ग्यारहवीं योजना के अंत, अर्थात् मार्च, 2012 तक कार्यान्वयन/पूरी करने के लिए पूर्व में चिह्नित विभिन्न परियोजनाओं/योजनाओं की स्थिति को राष्ट्रीय परिप्रेक्ष्य योजना में शामिल किया गया है।

आठवीं योजना से बारहवीं योजना तक

12वीं योजना के अंत तक 104 (21 केंद्रीय और 83 राज्य क्षेत्र में) जल विद्युत संयंत्रों (आठवीं योजना तक 13, नौवीं योजना में 20, दसवीं योजना में 32, ग्यारहवीं योजना में 18 और बारहवीं योजना में 21) जिनकी कुल स्थापित क्षमता 20611 मेगावाट थी में नवीनीकरण और आधुनिकीकरण का कार्य पूरा किया गया है, जिसके फलस्वरूप जीवन विस्तार, उन्नयन और पुनरुद्धार के माध्यम से 3636 मेगावाट का लाभ हुआ है। आठवीं, नौवीं, दसवीं, ग्यारहवीं और बारहवीं योजनाओं के दौरान पूरी की गई जल विद्युत आरएमयू एंड यू स्कीमों की राज्यवार सूची क्रमशः अनुलग्नक- I, II, III, IV और V में दी गई है।

2017-22 के दौरान

2017-22 के दौरान, 6425.8 मेगावाट की कुल क्षमता के साथ 31 हाइड्रो इलेक्ट्रिक प्लांट्स (HEPs) पर नवीनीकरण, आधुनिकीकरण, उन्नयन और जीवन विस्तार का काम पूरा करने के लिए कार्यक्रम बनाया गया है, जिसमें से 17 हाइड्रो इलेक्ट्रिक प्लांट्स में 4452.6 MW की क्षमता नवीनीकरण एवं आधुनिकीकरण के माध्यम से, 10 हाइड्रो इलेक्ट्रिक प्लांट्स में 1213.2 MW की क्षमता जीवन विस्तार के माध्यम से, 4 हाइड्रो इलेक्ट्रिक प्लांट्स में 760MW की क्षमता के जीवन विस्तार और उन्नयन का कार्य किया जाएगा। जिन 4 हाइड्रो इलेक्ट्रिक प्लांट्स में जीवन विस्तार और उन्नयन दोनों की परिकल्पना की गई है, उनमें 760 MW की कुल क्षमता 883.7 MW तक होगी, जिसके परिणामस्वरूप 123.7 MW अतिरिक्त लाभ होगा। जिसके कारण, इन 31 परियोजनाओं के आरएमयू एंड एलई कार्यों के बाद संशोधित कुल क्षमता 6549.5 मेगावाट होगी।

इन 31 योजनाओं में से, 9 स्कीमों की कुल स्थापित क्षमता 1326.4 मेगावाट की है, जो जून, 2021 तक हो चुकी है, जिसमें आरएमयू के माध्यम से 1154 मेगावाट, जीवन विस्तार के माध्यम से 130.2 मेगावाट और जीवन विस्तार और उन्नयन के माध्यम से 84 मेगावाट (70 + 14MW) शामिल हैं। 2017-22 के दौरान पूरी की जाने वाली जल विद्युत आर एंड एम स्कीमों की राज्यवार सूची अनुलग्नक-VI में दी गई है।

2022-27 के दौरान

2022-27 के दौरान, 7543.3 मेगावाट की कुल क्षमता के साथ 49 हाइड्रो इलेक्ट्रिक प्लांट्स (HEPs) पर नवीनीकरण, आधुनिकीकरण, उत्थान और जीवन विस्तार का काम पूरा करने के लिए कार्यक्रम बनाया गया है, जिसमें से 6 हाइड्रो इलेक्ट्रिक प्लांट्स में 1450.35 MW की क्षमता नवीनीकरण एवं आधुनिकीकरण के माध्यम से, 34 हाइड्रो इलेक्ट्रिक प्लांट्स में 5027.95 MW की क्षमता जीवन विस्तार के माध्यम से, 9 हाइड्रो इलेक्ट्रिक प्लांट्स 1065 MW की क्षमता जीवन विस्तार और उन्नयन के माध्यम से कार्य किया जाएगा। जिन 9 हाइड्रो इलेक्ट्रिक प्लांट्स में जीवन विस्तार और उन्नयन दोनों की परिकल्पना की गई है, उनमें 1065 MW की कुल क्षमता 1147 MW तक होगी, जिसके परिणामस्वरूप 82 MW अतिरिक्त लाभ होगा। जिसके कारण, इन 49 परियोजनाओं के आरएमयू एंड एलई कार्यों के बाद संशोधित कुल क्षमता 7625.3 मेगावाट होगी। 2022-27 के दौरान पूरी की जाने वाली जल विद्युत आर एंड एम स्कीमों की राज्यवार सूची अनुलग्नक-VII में दी गई है।

Summary of R&M of Hydro Electric Projects

(As on 30.06.2021)

I Hydro R&M schemes completed up to XII Plan

Sl. No.	Plan Period	No. of Projects			Installed Capacity (MW)	Actual Expenditure (Rs. in Crs)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Upto VIII Plan Schemes	2	11	13	1282.00	127.37	429.00 [39.00(U) + 54.00LE+ 336.00(Res.)]
2.	IX Plan Schemes	8	12	20	4892.10	570.16	1093.03 [339.00(U)+ 423.00(LE) + 331.03(Res.)]
3.	X Plan Schemes	5	27	32	4446.60	1029.24	829.08 [123.40(U) + 701.25 (LE) + 4.43(Res.)]
4.	XI Plan Schemes	4	14	18	5841.20	294.84	735 [12 (U) + 708 (LE) + 15 (Res.)]
5.	XII Plan Schemes	2	19	21	4149.60	1115.97	549.40 [58 (U)+ 476.40 (LE)+15(Res.)]
	Total	21	83	104	20611.50	3137.58	3635.51 [571.40 (U)+ 2362.65 (LE)+ 701.46 (Res.)]

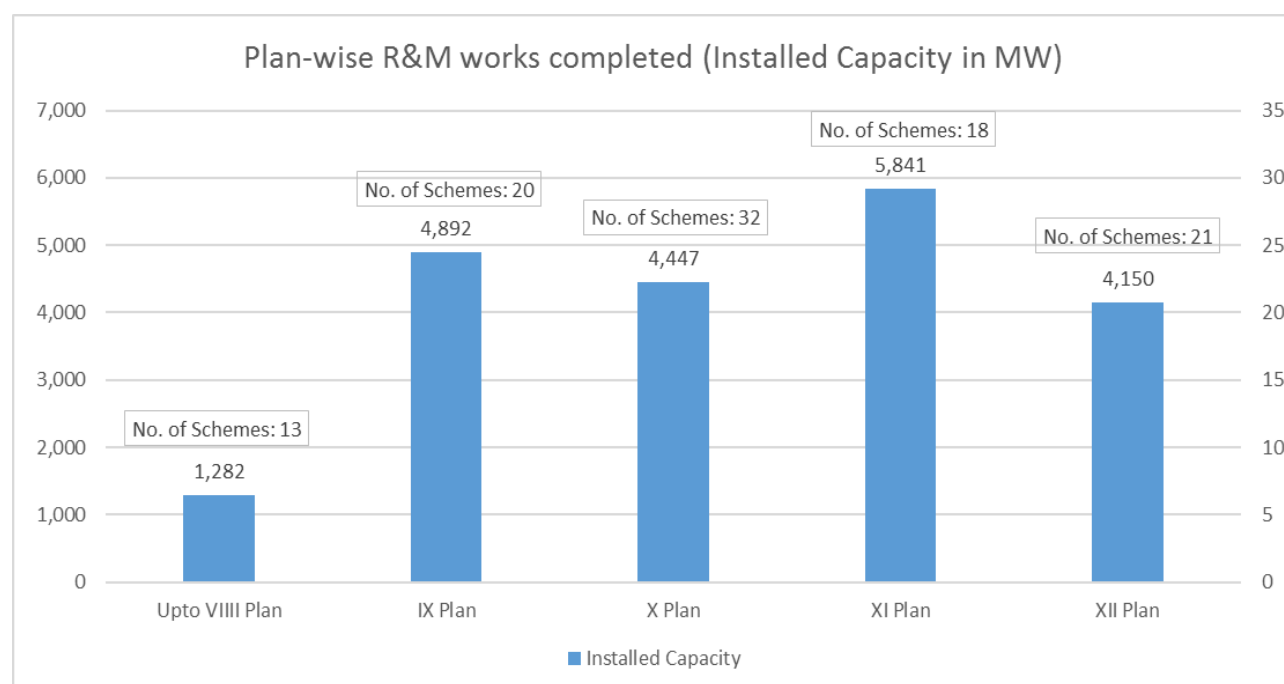
Abbreviations:

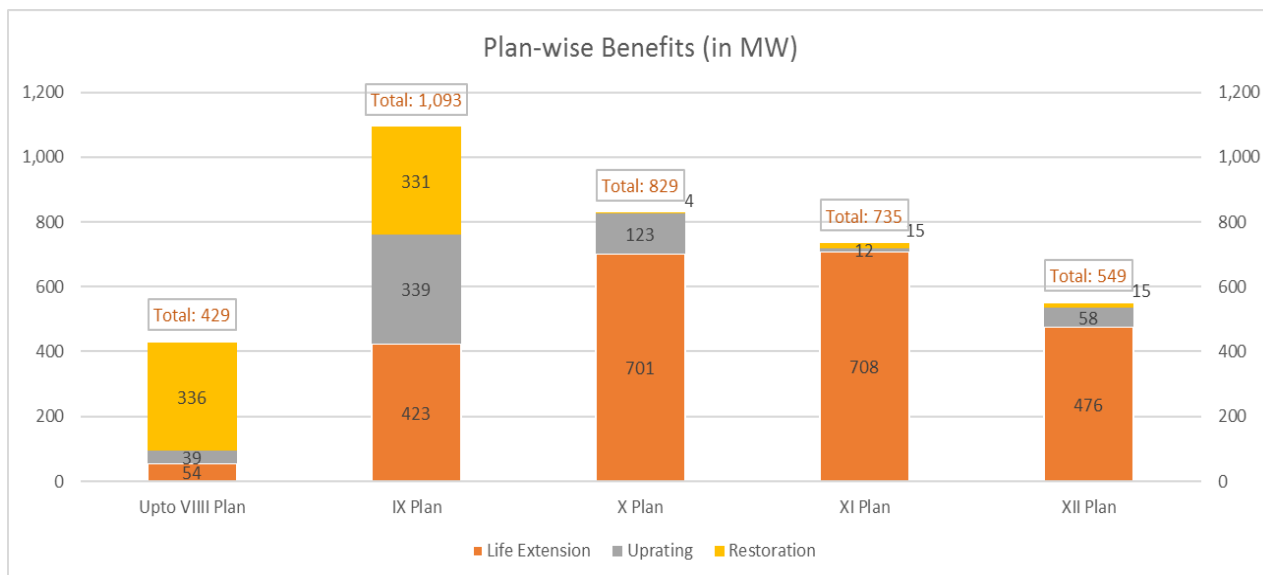
MW – Mega Watt;

Res. – Restoration;

U – Uprating;

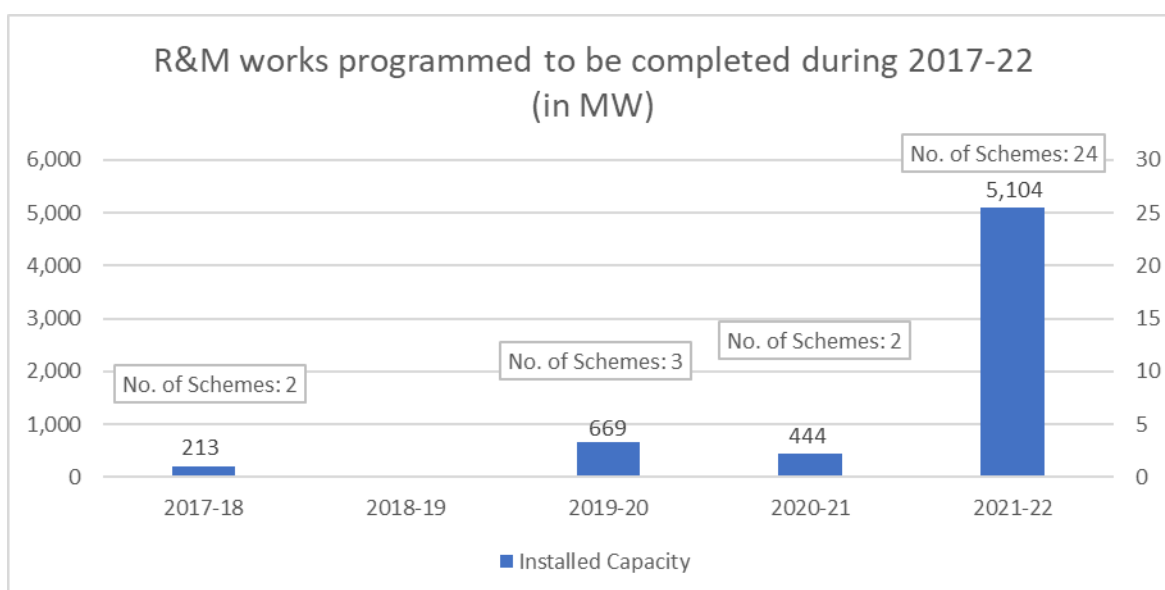
LE – Life Extension;





II Programme of R&M works during 2017-22

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Estimated Cost (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Programmed	8	23	31	6425.8	2963.68	2096.9 [1973.20(LE) + 123.7(U)]
2.	Completed	3	6	9	1354.2	337.72 (Actual Cost)	214.2 [200.2(LE) + 14(U)]
3.	Under Implementation	5	17	22	5071.6	2415.59	1882.7 [1773(LE) + 109.70(U)]



III Programme of R&M works during 2022-27

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Benefit (MW)
		Central Sector	State Sector	Total		
1.	Programmed	6	43	49	7543.3	6174.95 [6092.95(LE)+ 82(U)]
2.	Under Implementation	2	11	13	2314.35	952 [924(LE)+ 28(U)]
3.	Under Tendering	1	8	9	956.75	968.75 [956.75LE)+ 12(U)]
4.	Under DPR Preparation/Finalisation/Approval	3	6	9	1735.2	1768.2 1735.20(LE)+ 33(U)]
5.	Under RLA Studies	0	18	18	2537	2486 [2477(LE)+ 9(U)]

Abbreviations:

MW – Mega Watt; Res. – Restoration; U – Upgrading;
LE – Life Extension; RLA- Residual Life Assessment

**Year-wise & State-wise Summary of
Original & Anticipated Completion
Schedule of R&M Schemes at Hydro
Power Stations
(During 2017-22)**

Year-wise & State-wise Summary of Original & Anticipated Completion Schedule of R&M Schemes at Hydro Power Stations During 2017-22

<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>
<u>Himachal Pradesh:</u> i)Ganguwal U2 & Kotla U3, BBMB, (1x24.2+1x24.2)=48.4 MW (Completed in 2017-18) ii) Dehar Power House(U-6), BBMB, (1x165)=165 MW (Completed in 2017-18)	<u>Jammu & Kashmir:</u> i) Ganderbal, J&KSPDC (2x3+2x4.5)=9 MW (2020-21) ii) Chenani, J&KSPDC (5x4.66)=23.3 MW (2020-21) <u>Kerala:</u> Sholayar, KSEB, (3x18)=54MW (2020-21) <u>Tamil Nadu:</u> Sholayar-I, TANGEDCO (2x35)=70 MW (Completed in 2019-20) <u>Telangana:</u> i) Nagarjuna Sagar Ph-II, TSGENCO, (1x110+7x100.8)=8 15.6 MW (2020-21) ii) Nagarjuna Sagar LCPH, TSGENCO (2x30.6)=61.2 MW (2020-21) <u>Karnataka:</u> i) Bhadra River Bed Units, KPCL, (2x12)=24 MW (Completed in 2019-20) ii) Munirabad Dam Power House, KPCL (2x9 + 1x10) = 28 MW (2020-21) <u>Odisha:</u> Hirakud-II, OHPC, (1x24)=24MW (2020-21)	<u>Himachal Pradesh:</u> i) Bhakra LB, BBMB, (5x108)=540 MW (2021-22) ii)Bhaba Power House, HPSEB, (3x40)=120 MW (2020-21) iii) Dehar Power House (U-3), BBMB, (1x165)=165 MW (2020-21) <u>Uttar Pradesh:</u> i) Rihand, UPJVNL (6x50)= 300MW (2020-21) <u>Kerala:</u> Idukki 1st Stage, KSEB, (3x130)=390 MW (2020-21) <u>Odisha:</u> Hirakud-I, OHPC, (2x37.5) =75 MW (2021-22) <u>Punjab:</u> i) Mukerin St.I, St.II, St.III & St.IV, PSPCL, (3x15+3x15+ 3x19.5+3x19.5) = 207 MW (2020-21) ii) Shanan HEP, PSPCL, (1x50+4x15)= 110 MW, (2021-22) iii) UBDC St.I &St.II, PSPCL, (3x15+3x15.45) =91.35 MW (2022-23)	<u>Himachal Pradesh:</u> i)Baira Siul, NHPC, (3x60)=180 MW (2020-21) ii)Giri, HPSEB, (2x30)=60 MW (2020-21) <u>Jammu & Kashmir:</u> Salal ,NHPC, (5x115) =575 MW (Completed in 2019-20) <u>Punjab:</u> Ranjit Sagar Dam, PSPCL, (4x150)=600 MW, (2022-23) <u>Madhya Pradesh:</u> Gandhi Sagar, MPPGCL, (5x23)=115 MW (2022-23) <u>Odisha</u> Balimela, OHPC, (6x60)=360 MW (2021-22)	<u>Uttarakhand:</u> i) Chilla Ph B, UJVNL (4x36)=144 MW (2024-25) ii) Ramganga, UJVNL (3x66)=198 MW (2021-22) iii) Dhakrani, UJVNL, (3x11.25)=33.75 MW, (2021-22) iv) Dhalipur , UJVNL (3x17=51MW) (2021-22) v)Tiloth, UJVNL (3x30)=90 MW (2021-22) <u>Uttar Pradesh:</u> Obra, UPJVNL (3x33)=99 MW (2021-22) <u>Madhya Pradesh:</u> i) Bargi, MPPGCL, (2x45)=90 MW (2020-21) ii) Pench, MPPGCL, (2x80)=160 MW, (2021-22) iii) Bansagar Ton-I, MPPGCL, (3x105)=315 MW (2021-22) <u>Gujarat:</u> i) Ukai, GSECL (3x75)=225MW (2021-22)

Year-wise & State-wise Summary of Original & Anticipated Completion Schedule of R&M Schemes at Hydro Power Stations During 2017-22

		iv) Anandpur Sahib Hydel Project, PSPCL, (4x33.5) = 134 MW (2022-23)		ii) Kadana PSS, GSECL (4x60)=240 MW (2021-22) <u>Kerala:</u> Kuttiadi, KSEB, (3x25)=75 MW (2021-22) <u>Karnataka:</u> i) Nagjhari U-1 to U-3, KPCL, (3x150)=450 MW, (2021-22) ii) Shivasamudram, KPCL, (6x3+4x6))=42 MW, (2021-22) iii) MGHE, KPCL, (4x21.6+4x13.2)=139.2 MW (2021-22) iv) Kadra Dam Power House, KPCL (3x50) =150 MW (2021-22) v) Kodalalli Dam Power House, KPCL (3x40)=120 MW (2021-22) vi) Supa Dam Power House, KPCL (2x50)=100 MW (2021-22) vii) Linganamakki Dam Power House, KPCL (2x27.5) =55 MW (2021-22) viii) Gerusoppa Dam Power House, KPCL (4x60) =240 MW (2021-22)
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Year-wise & State-wise Summary of Original & Anticipated Completion Schedule of R&M Schemes at Hydro Power Stations During 2017-22

				ix) Sharavathy Generating Station, KPCL 10x103.5)=1035 MW (2021-22) <u>Jharkhand:</u> Panchet U-1, DVC, (1x40)=40 MW (2021-22) <u>West Bengal:</u> Maithon U 1& 2, DVC, (2x20)=40 MW (2022-23) <u>Meghalaya:</u> Umiam St.III (Kyrdekulai), MePGCL, (2x30)=60 MW (2021-22) <u>Assam:</u> Khandong Power Station, NEEPCO (2x25)=50 MW (2024-25)
213.40 MW (2 Schemes)	1109.10 MW (9 Schemes)	2132.35 MW (10 Schemes)	1890 MW (6 Schemes)	4241.95 MW (25 Schemes)

* Seven (7) no. of schemes namely UBDC St.I &St.II, Anandpur Sahib Hydel Project, Ranjit Sagar Dam, Gandhi Sagar, Chilla Ph B, Maithon U 1& 2 and Khandong Power Station shifted to 2022-27.

* Two (2) no. of schemes namely Bhakra RB and Ganguwal & Kotla Power House added later in 2017-22.

**State-wise Status of R&M Schemes
(During 2017-22)**

**State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power
Stations for completion during 2017-22**

NORTHERN REGION

HIMACHAL PRADESH

(Amount in Rs. Crores)

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A - SCHEMES COMPLETED				
1.	Ganguwal (U-2), 1x29.25+2x2 4.2 MW BBMB 1962 (U1, 1955 (U2&3)) Kotla (U-3), 1x29.25+2x2 4.2 MW BBMB 1961 (U1) 1956 (U-2&3) RM& LE 2017-18	24.2 (LE) 14.19 9.58 24.2 (LE) (Cost included in above)	- 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.	- Ganguwal Power House Unit-2 has been commissioned on 23.11.2017. - Kotla Power House Unit-3 commissioned on 04.12.2017.
2.	Dehar Power House, 1x165 MW BBMB (Unit 6) 1983 R&M 2017-18	- 19.87 16.00	Replacement of: - Stator (Complete with Frame, Core, Bars and Air Coolers), - Rotor Poles, Pole Keys, Air guides, Temperature Recorders along with other allied items.	Dehar Power House Unit-6 has been commissioned on 01.11.2017.
B - SCHEMES ONGOING – Under Implementation				
3.	Bhakra LB, 5x108 MW BBMB 1985 5x90 MW(Original) 1960-61 RMU&LE 2016-17 2021-22	540(LE)+ 90(U) 489.77 550.55	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	- Works awarded to 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 were signed on 02.11.2007 at a total cost of Rs. 489.77 Crores (including Rs. 29.57 Crores towards replacement of turbine & generator shafts). <u>Unit 2</u> - Works started from. 26.4.2010, with scheduled completion period of 210 days. The unit was synchronized on 23.06.13.

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			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.	- Regarding localized cavitation, the modification of runner blade profile through solid piece welding carried out at the site by 10th June, 2016. - Unit was taken on shutdown for the joint inspection of modified runner on 20.11.17 after 2203 hours of operation at high head range (Total 9187.15 hours) by M/s Hitachi and BBMB. "No cavitation" has been observed on the modified portion at the leading edge of crown side of all the 17 nos. blades. The modification of runner has been found successful and has been approved by Board on 19.11.2018. BBMB issued TOC to consortium on 29.11.2018. <u>Unit 5</u> - Based on CPRI report, it has been decided that spare new Generator Shaft shall be used on Power House Unit no. 5. - Order placed on M/s Andritz Hydro GmbH, Austria on 14.10.2016 for replacement of existing spider, rim and other related parts along with replacement of existing generator shaft with new Generator Shaft. - The box up completed on 04.06.2018 after various activities viz assembly of LGB, UGB, TGB & Thrust bearing and other related works. Machine put on continuous load run for 72 hours on 12.06.2018. Unit commissioned on 15.06.2018. - M/s. Hitachi, Japan proposed to modify the runner blade profile of Unit-5 through solid piece welding as done in Unit-2 w.e.f. 01.03.2020, but due to recent COVID-19 situation, Japanese Nationals could not be allowed to visit India as per GOI guidelines. <u>Unit 4</u> BBMB along with M/s Hitachi carried out inspection (after completion of 11,200 hours of operation) on 22nd September, 2017 and observed cavitation on leading edge area of the runner almost the same. M/s Hitachi recommended to

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				carry out unrestricted operation of the machine upto September, 2018 without cavitation repair. M/s Hitachi has completed the work for Modification of runner blade profile through solid piece welding on 18.05.2019. Unit is running with output of 126 MW. BBMB issued TOC of the Unit-4 to the consortium on 23.07.2019. <u>Unit 3</u> Unit taken on shutdown for RM&U works on 01.04. 2019. The dispatch authorization of Runner & turbine component and Generator component has been issued to the consortium. Work of Stator Assembly of Unit No. 3 in the service bay started on 22nd January, 2019. Stator frame segments joined and Final welding of sole plates with the stator frame completed. The work of dovetail bar completed on 11.03.2019 and core flux test of stator core completed successfully on 08.04.2019. The placement of bottom bars to the stator slots has been started on 25.04.2019 and completed on 05.05.2019. The HV test on bottom bars carried out successfully on 13.05.2019 and on Top bars on 25.05.2019. The work of stator terminal assembly completed on 23.07.2019. The Turbine runner along with shaft has been taken out from the pit on 17.05.2019. The High voltage test of complete stator winding carried out on 24.07.2019. The work of busduct, erection of UCB Panel and static excitation system is in progress. Shaft decoupled from the runner on 29.05.2019. The NDT of turbine shaft carried out successfully by 13.06.2019. The work of positioning of new guide vanes to their respective location completed on 23.08.2019. Final lowering of shaft with new runner into the pit carried out on 06.09.2019. The other allied parts viz. O-ring, head cover etc. have been lowered/ placed and aligned successfully. Shaft free activities

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				achieved on 30.09.2019. The lower bracket has been lowered into pit on dated 04.10.2019. The stator has been lowered into pit on dated 21.10.2019. The Impedance and HV testing of Rotor Poles has been completed successfully on dated 26.06.2020. The work of upper bracket assembly completed on 09.07.2020 & lowering has been completed on 12.08.2020. The work of rotor lowering completed on 29.07.2020. Final assembly of spider cover completed on 17.08.2020. Floor segment trial assembly, thrust pad assembly and thrust collar assembly completed on 19.08.2020. The assembly inside pit has been completed on 14.09.2020. The uncoupled run out checks, radial displacement & coupling gaps and upper bracket alignment of the rotor has been completed on 30.09.2020. Coupling of generator shaft with turbine shaft is ready and will be done after arrival of Japanese nationals at site. The work of LAVT, NGT & NGR, UCB panel erection, cabling & interfacing and pre commissioning checks is under progress. Coupling of generator shaft with turbine shaft is ready. The Japanese Nationals arrived at site on 26.03.2021. Final measurement of runner gap, coupling of turbine shaft with generator shaft alongwith shaft locking were completed 21.04.2021. But due to rapid increase of Covid cases, Japanese officials demobilized to Japan on 30.04.2021. Further, they are taking up work at site via VC and commissioning the turbine part of the unit viz painting of servomotor pipes and draft tube man doors completed on 09.06.2021 and related activities are under progress. UGB cooler pressure and leak test with piping completed on 11.06.2021. As such, commissioning of the unit has been extended further due to recent Covid-19 situation.

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				Unit 1 The commencement of RM&U works shall be based on commissioning of Unit-3. Works delayed due to COVID-19 situation. Unit shall be taken for shutdown after the completion of RM&U works of Unit-3. The build-up of stator for Unit-1 has been allowed to site. The work of stator stacking completed on 13.3.2021 and work of stator winding started on 15.03.2021 and is under progress. Keeping in view the current COVID-19 scenario, RM&U works are expected to be completed in 2021-22.
4.	Bhakra RB, 5x157 MW BBMB R&M 2021-22	- 20.80 -	Up gradation of existing Russian static excitation system for Unit no. 6, 7&8. Up gradation of existing Russian Generator and Generator T/F protection with Numerical IEC 61850 protocol compliant Protection for unit no. 6 to 10. Up gradation of existing governor with microprocessor based Digital Type Electro Hydraulic Governors with SCADA compatibility for Unit no. 6 to 10.	NIT Floated on dated 29.5.2019. Part-I opened on 08.11.2019. Clarification asked from firms on 17.12.2019. Price Bid opened and E-reverse auction carried out on 28.05.2020. Purchase Order issued to M/s. Voith Hydro on 06.10.2020. The firm has resubmitted the revised drawings and are under scrutiny. PO issued to M/s. GE T&D, Chandigarh on 29.08.2019. The drawings have been approved on 23.07.2020. Inspection through VC completed. Firm submitted test and inspection report on 30.06.2021 and which is under scrutiny. PO has been issued to M/s. ABB India Ltd. on 16.06.2020. Firms representative has visited the site for preparation of drawing. Drawings have been prepared/ submitted by the firm and are under evaluation. ABB's representative has visited site on 22.03.2021 for finalization of drawings. Hydraulic drawings are yet to be submitted.
5.	Dehar Power House, 1x165 MW BBMB (Unit 3) 1979 T&G - BHEL R&M	- 23 8.67	Replacement of existing Stator of Unit-3, Slapper with a new one of latest design complete with Frame, Core, Bars and Air Coolers. Oil coolers, Rotor field pole assemblies, Air guides. Rotor Braking & Jacking system, Temperature Recorders along	Purchase Order issued to BHEL, Chandigarh on 04.06.2018. Advance payment released. QAP approved. Dispatch authorization issued for stator frame, stator bars, brake assembly air coolers, stator laminations. Inspection of wound rotor poles and auto synchronizer conducted. Stator frame and core

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
	2021-22		with other allied items.	building completed. Stator bars installation completed. Testing and commissioning work in progress at site.
6.	Ganguwal & Kotla Power House BBMB 4x24.2 MW 1955-56 R&M 2021-22	- 3.12 -	Upgradation of existing Governors with Microprocessor based Digital Type Electro Hydraulic Governors with SCADA compatibility for 4x24.2 MW Ganguwal & Kotla Power House.	P.O No. 734/PHD/BH-I/467 dated 16.06.2020 has been issued. Electrical drawings have been prepared/ submitted by the M/s ABB Ltd. and are under evaluation. Hydraulic drawings are yet to be submitted.
7.	Baira Siul, NHPC 3x60 MW 1980-81 RM&LE 2021-22	180 (LE) 341.41 295.69	- 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.	CERC accorded “in-principle approval” on 03.06.2016 for Life Extension. LoA for Main Plant package awarded to M/s BHEL on 16.08.2016 at Rs. 132.74 Cr. LoA for HM package awarded to “M/s Om Metals Infra projects Ltd, New Delhi” on 30.11.2016 at Rs. 19.91 crores. LoA for Switchyard Equipment awarded to M/s GE. Related civil works like equipment foundation, trench etc. also awarded. LoA for Civil Package(Dam & HRT) awarded to “M/s Alpha Pacific Systems Pvt. Ltd., New Delhi.” at Rs. 10.79 crores. LoA for Bhaledh Weir(Civil works) awarded to “M/s Starcon Infra Project(I) Pvt. Ltd., Delhi.” at Rs. 17.72 crores. Status of Works 1. Complete Shutdown of Power House has been taken w.e.f. 15.10.2018 for a period of 6 months which was further extended upto 15.06.2019 due to hindrances during the scheduled shutdown period. All works suffered due to heavy rainfall and snowfall during Feb-March’2019 leading to landslides, frequent blockage of roads and disruption of power supply etc. During shutdown period works of common auxiliary system and other works of water conductor system completed.

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				2. After completion of all essential HM/Civil works required for commissioning of Unit-1&3, filling of HRT was started with Siul wier on 11.06.2019 but had to be stopped due to leakage in BFV's which was rectified and dry run of Unit-1 started on 29.06.2019. Unit-1&3 synchronized with the grid on 06.07.19 and 07.07.19 respectively after completion of common works. 3. Unit#2 commissioned on 18.12.2019 and COD declared w.e.f. 00:00 Hrs of 29.12.2019 after R&M. Unit#1 commissioned on 27.10.2020 and COD declared w.e.f. 00:00 Hrs of 07.11.2020 after R&M. Civil Works HRT repair, Dam spillway& Pier Repair, Dam Toe wall, Upstream protection of Dam face, TRC work, Bhalehdh Feeder tunnel works, Trench work in Bhalehdh nala and Diversion tunnel works completed. M25 concreting cladding on exposed rock below apron is in progress. HM Works a) Erection of HRT intake gate and DT service (except ballast) & emergency gate completed. Rope drum Hoist of spillway Radial gate, 25T capacity gantry crane for spillway stoplog, Rope drum Hoist of existing intake gate TRC gate and knife edge valve at Siul Adit and 7.5 T capacity monorail hoist (except control panel) completed. b) Erection of Sill beam of Radial gate & Stoplog, Erection work of Rope drum hoist of draft tube & PRV gate and Internal work of all Penstocks completed. c) Erection of 2nd stage embedded parts of DT gate service and intake gate of Bhalehdh weir is completed. d) Cable laying and erection of main

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				distribution board/ feeder pillar of HM's equipments at Dam site completed. e) Testing of main distribution board and 380 KVA DG set, installation of radar type water level indicator at dam site and tail pool and remote control system for operation of Radial gate is in progress. E&M Works a) Switch Yard: Installation & testing of switchyard equipments completed. b) Testing of cable connections of various panels of Power House is in progress. Dowelling of upper bracket, erection and welding of Firefighting pipe lines, erection of new SSB-2 panel & new transformer is in progress. c) Unit#3: Shutdown has been taken up for RMU from 27.11.2020. Dismantling work completed. Erection work is in progress (90% completed).
8.	Bhabha Power House, 3x40 MW HPSEBL 1989 T&G - BHEL RM&LE <u>2017-18</u> <u>2021-22</u>	- 76.03 81.13 (For the works of rehabilitation of damaged/burnt eqpts.)	- 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. - Providing & installation of 400 kVA, 22/415 kV transformer in place of present 100 kVA, 22/415 kV transformer for emergency supply from Nathpa Sub-Station.	- The power house was under forced shut down since 22.01.2015 due to fire incidence. The repair & rehabilitation works completed by M/s Alstom. - Unit-1 commissioned on 10.07.2016. - Unit-2 commissioned on 21.09.2016. - Unit-3 commissioned on 20.11.2016. - Order for supply, erection, testing & commissioning of 10 MVA, 220/22 kV, Station Transformer, additional 22 kV VCB panel and associated power & control cables placed on M/s GE T&D India Ltd., Noida on 31.01.2019.

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
	3x40 MW RM&LE 2021-22	120 (LE) 90.14 33.66	- 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. - 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). <u>Civil Works</u> - Providing false ceiling in control room, LT Panel Room and Battery Charger Room of Power House. - Construction of cable trenches in Pot head yard. - Rehabilitation of Generator of Unit-1. - Replacement of Electro-Hydraulic Transducer (EHT) with handle, Main Distribution Valve (MDV) spool & sleeve assy., Pilot needle & sleeve assy., Duplex filter element only (inner & outer sleeve), Solenoid valve (Size 10) of MIV Hydro Control Panel	Unit No.1 was earlier commissioned on 10.07.2016 but due to over speeding, stator winding was damaged & machine again stopped on 25.09.2016. Rehabilitation works completed by M/s BHEL and Unitre-commissioned on 04.12.2017 but tripped on 28.01.2018 due to internal fault. The machine has been re-commissioned on 09.03.2018 after rectification of fault by BHEL.

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			(HCP), Pilot operating main distributing valve type for MIV HCP, NRV of PP Set, Nozzle Servomotors & Drain Pipe Lines Route of Decompression Valve & Seal Valve of MIV. - Replacement of three (3) nos. Digital governors including oil pumping unit, pressure tank & sump tank, valves & piping to form an individual pressure system for each governor complete in all respects. - Replacement of three (3) nos. Static Excitation and Digital AVR systems complete with accessories, equipment, devices, instruments, cabling and wiring etc. including all services, labour, tools and tackles in all respects. - Replacement of Unit Control Boards and providing control & monitoring system (DCS based SCADA) complete with accessories, equipment, devices, instruments, cabling and wiring etc. including all services, labour, tools and tackles in all respects. - Supply, laying, termination of all associated power and control cables for the above systems. - Supply of 2 nos. Forged Fabricated Pelton Runners	- During execution of the rehabilitation works of Unit-1, it was found by M/s BHEL Engineers that the Nozzle servomotors of all machines need to be replaced and same has been awarded on 28.03.2017. The Nozzle Servomotors of all Units commissioned. - Replacement of EHT with handle, MDV spool & sleeve assy., Pilot needle & sleeve assembly, Duplex filter element only (inner & outer sleeve). Unit-I&III, replacement of Solenoid valve (Size 10) of MIV HCP, Pilot operating main distribution valve for MIV HCP and NRV of PP Set have been completed. - The work for re-routing of pipe for decompression valve of the three Units has been completed. - Static excitation panel received at site. Execution of work under progress. - The work of dismantling & replacement of existing excitation system, Unit Control board, Electro-Hydraulic Governor, Power & Control cables and Providing Control & Monitoring (SCADA) system awarded to M/s GE Power India Ltd. on 19.07.2018. Execution of work under progress. - The tender for the purchase of two nos. forged runners has been

S. No.	Scheme / Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			(Spares Without coating) having 21 buckets suitable for single runner turbine with two jets developing 41240 KW (55282 HP) at a rated net head of 887.20 mtr and design discharge of 5.67 cumecs per unit.	awarded on M/s Voith Hydro Pvt. Ltd. on 04.07.2019.The runners have been received in Feb., 2021. One runner installed during March, 2021 and second runner kept as spare.

**State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power
Stations for completion during 2017-22**

NORTHERN REGION

JAMMU & KASHMIR

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A.- SCHEMES COMPLETED				
9.	Salal 6x115 MW NHPC 1987-95 T&G – BHEL R&M 2019-20	- 58.01 51.08	i) Replacement of Runners. 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) Order placed on M/s Voith Siemens. Runner installed & commissioned in all units. Unit-6 - 14.04.2017 Unit-4 - 20.01.2018 Unit-5 - 10.03.2018 Unit-3 - 30.01.2019 Unit-2 - 20.02.2019 Unit-1 - 05.04.2019 ii) Order placed on M/s Alstom (GE). Digital Governor has been installed and commissioned in all 6 Units. Unit-1–26.12.2016 Unit-2 –05.04.2016 Unit-3–15.01.2016 Unit-4–22.01.2016 Unit-5–19.02.2017 Unit-6–04.04.2016 iii) Order placed on M/s BHEL.DVR has been installed and commissioned in Unit- 4, 5& 6. Unit-4 – 06.12.2015 Unit-5 – 15.12.2015 Unit-6 – 04.04.2016
10.	Chenani, 5x4.66 MW J&KSPDC 1971-75 T&G - Ganz Mavag, Hungary RMU&LE <u>2015-16</u> <u>2021-22</u>	23.3 (LE) 34.28 (Rev.) 21.84	Turbine Procurement of 4 nos. Runners and re-conditioning of spherical valves, replacement of Governors, Overhauling of BF valves, Penstock, Saddle Blocks Replacement of 2 sets of bearing with water cooled thord on bearings. 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.	Erection of all four runners completed by Ms. Andritz Hydro Ltd. Completed. Change of stator winding insulation with class -F completed for Machine no. 5, 3 & 1 and New 125 kVA DG set installed. Commissioning of 12 nos. isolators and rewinding of 5 MVA Transformer completed. Replacement of Static excitation system completed.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			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.	Retrofitting of numerical relays and protection completed. Replacement of 3 Nos. 132 kV MOCBs with SF6 Breakers completed. Refurbishment of 3 Transformers completed and 3 remaining are to be completed by Dec'19. Replacement of water and oil coolers, reconditioning of gates, trash racks and repair of CO₂ plant completed. Replacement of 5 nos. air coolers completed. Erection of 2 nos. 6.6 kV VCB Panel completed. Procurement of major spares completed. Construction of trash racks and fencing of tail race completed. River channelization works, Nallah retaining works and improvement work of water conductor system completed. It was decided to construct RCC aqueduct instead of wooden flume, thus increasing the price for which contractor was reluctant to execute the works. The work stands completed. Desilting of forebay completed and forebay tank lining completed. All the five no. of machines ready for generation up to optimum level subject to availability of full discharge in forebay.
11.	Ganderbal (Unit – 3) 1x4.5 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 Movag, Hungary	4.5 (LE) 18 (Revised) 3.2	Turnkey 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),	Repairs of Units I & II completed to provide generation during execution works of units III & IV. The works awarded to M/s Gogoal Hydro Power Pvt. Ltd. On 02.07.2015. The installation of all electro mechanical works stand completed. Machine has been completed on 10.11.2020 and put to test run for 4 hours on a restricted load of 2.5 MW due to non-availability of required system voltage of 33kV. However, commercial operation of unit is not possible owing to breach of Sindh Extension Canal which occurred on 01.12.2019 and yet to be completed.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
	RM&LE <u>2016-17</u> 2021-22		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.	

**State-wise Programme/Status of Renovation and Modernisation Schemes of Hydro Power
Stations for completion during 2017-22**

NORTHERN REGION

PUNJAB

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
B - SCHEMES ONGOING - Under Implementation				
12.	Mukerian HEP, 3x15 MW (St.-I), 3x15 MW (St.-II), 3x19.5 MW (St.-III) & 3x19.5 MW (St.-IV) PSPCL 1983 (St.-I), 1988-89 (St.-II), 1989 (St.-III) & (St.-IV) T&G - BHEL R&M <u>2019-20</u> 2021-22	- 136.07 47.46	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 along with Modern Digital technology based AVR. 3. Replacement of existing Electro-Magnetic 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.	1. PO dated 28.01.2019 placed on M/s Voith Hydro Pvt. Ltd. Total delivery period is 12 months. 3 no. operationally complete sets received at site. All the material received at site and payment made. Commissioning of 3 no. sets completed and balance 3 will be commissioned during lean period. 2. M/s Flovel Energy Pvt. Ltd., Faridabad has commissioned all twelve sets of Static Excitation system. 3. Work order issued to M/s Siemens and commissioned at all units. 4. Case planned in 2012-22. 5. Order placed on M/s ABB on 06.12.2017. Firm offered one transformer for inspection but it was rejected as sub vendors of winding and core were not approved vendors as per PO. Again, firm offered for inspection of same on 28.01.2020. 1 no. transformer after short circuit test received at site. 2 no. transformers offered by the firm for inspection on 09.10.2020. All transformers (3 Nos.) received at site. Commissioning pending. 6. PO dt. 09.03. placed on M/s Power Star, Solan against TE dt. 27.05.2020 for 3 no. 630 KVA UATs. Delivery period is

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			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 one no. Unit and one no. Service Air Compressors at each Power House.	within 4 months from the date of PO. 7. Works of Machine no. 10 completed by M/s BHEL. PO amounting to Rs 20.94 cr placed on M/s BHEL for Machine no. 2. Delivery period is 9 months from payment of 10% advance. Material being received at site. Work of stator building done at site. Work is under progress at site. Proposal under preparation for machine no. 5 & 9. 8. As per desired by PSERC, case has been withheld. 9. Proposal dropped. 10. PO amounting to Rs. 34.08 Lakh placed on M/s Pilot Engineering Works, Ludhiana on 03.08.2018. Material received and commissioned at site. 11. PO issued to M/s SK Sales for dewatering Pumps on 28.01.2019. Inspection carried out at manufacturer's works. PO dt. 18.03.2021 issued to M/s Hydraulic Engineering Company, Solan against TE dt. 26.02.2020 for pumps of RSD, UBDC & MHP. Delivery period is 5 months from the date of PO. Drawings submitted by the firm have been approved. 12. PO dated 29.06.2021 issued to M/s General Engg. Co. Ludhiana against tender dated 08.07.2020. Delivery period is 5 months from the date of PO.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			13. Replacement of existing LT panels at MPH-1&2. 14. Replacement of 12 nos. 132 KV Line Circuit Breakers at MPH-1,2,3&4. 15. Replacement of existing 5 Nos. 11/132 KV, 20 MVA Generator Transformers at MPH-1&2. 16. Capital overhauling of one no. Generator Transformer at MPH 3 and one no. Generator Transformer at MPH-4. 17. Replacement of Two nos. of 11KV Vacuum Circuit Breakers at MPH-3 and Four Nos. 11kV VCB at MPH-4. 18. Replacement of oil and Air cooler for Machine 7,8,10 & 11 at MPH 3&4. 19. Replacement of tubular poles with rail poles of 11KV	13. Case planned in 2022-23. 14. Order placed on M/s CG Power and Industrial Solutions Ltd, Gurugram on 09.10.2018. All the breakers received at site. 15. GTs commissioned by M/s Bharat Bijli Limited, New Delhi (2 at UBDC and 2 at MHP). Two bids received from M/s BBL, New Delhi and M/s T&R, Gurgaon for 3 nos. 20MVA GTs (2 nos. for MHP and 1 no. for UBDC) dropped due to high rates. Fresh TE floated on 19.05.2020 and opened on 31.08.2020. Price bid of following 2 no. bidders were opened: i) M/s BBL, Delhi ii) M/s T&R India Ltd. Ahmedabad Purchase proposal put up to WTDs. Tender dropped due to high rates. Fresh TE 269 dt. 01.03.2021 floated with extended due date as 12.07.2021. 16. Proposal dropped. 17. 6 Nos. 11kV VCBs received from TS organization of PSPCL. 18. PO placed on M/s Lord Vishvakarma Heat Exchangers, Haridwar for air coolers & M/s Patel Heat Exchangers, Ahmedabad for oil coolers. Drawings submitted by M/s Lord Vishavkarma Heat Exchangers approved. Drawings submitted by M/s Patel Heat Exchangers approved. Material received at site. 19. Proposal dropped.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			Auxiliary line. 20. Replacement of existing 2 Nos. 11/132 KV, 20/25 MVA Generator Transformers with 11/132 KV 25 MVA at MPH-3&4. 21. Providing Toilets at all the Bye-Pass gates of all Power Houses of MHP. 22. Renovation of water supply system of residential colony at Unchi Bassi MHP. 23. Treatment of expansion joint of power house building & duct portion at PH-I, Talwara. 24. Procurement of 4 Nos. Battery charger for PH-3&4 of MHP. 25. Replacement of existing Governors at PH-3&4 of MHP. 26. Capital overhauling of Electric Overhead Traveling (EOT) crane at PH-1, 2, 3&4 of MHP. 27. Replacement of 3 nos. existing 25MVA GTs of M/c no. 8, 10, &11 of MP. 28. Replacement of existing Cooling Water System at PH-1 to 4 of MHP.	20. Order for Rs. 9.09 Cr. was placed on M/s BBL, New Delhi for supply of 3 nos. GTs on 28.03.2018. GTs commissioned at site. 21. NIT under preparation 22. Work completed. 23. WO Dt 18.03.2021 placed upon M/s SK Sales Co. Jalandhar. Work of expansion joint of 2 nos. Machines (M/c-1&2) has been completed and work of expansion joint of machine No.-3 shall be completed during forthcoming lean period. 24. TE dt. 10.11.2020 opened on 23.02.2021. Tenders of following 3 no. bidders are under technical and commercial evaluation: i) M/s Dynamic Edge Solutions Panchkula (Dealer of M/s Chloride Power System and Solution Limited Ltd. Kolkata (OEM)). ii) M/s Statcon Energias Pvt. Ltd. Noida iii) M/s Servilink Engineers Pvt. Ltd. Vadodra Gujrat. 25. Case planned in 2021-22. 26. Case planned in 2021-22. 27. Case planned in 2021-22. 28. Case planned in 2021-22.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			29. Replacement of existing 8/4/4MVA, 132/33/11kV Transformer with 5 MVA, 132/11kV Transformer at PH-4 of MHP. 30. Procurement of 1 Nos. 400AH Capacity Tubular type Lead Acid DC batteries Banks for PH-1 of MHP. 31. Installing CCTV at MPH-2,3,4 Talwara.	29. Case planned in 2021-22. 30. Case planned in 2021-22. 31. Administrative approval accorded on 29.06.2021. Draft specification under preparation.
13.	Shanan HEP, 4x15 MW+1x50 MW PSPCL 1932(U1 to U4) T - Ganz Mavag, Hungary G – BTH, UK 1982 (U5-extn) T&G - BHEL R&M <u>2019-20</u> <u>2021-22</u>	- 37.81 20.21	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 for 4x15 MW machine & 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 SF6 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. Re-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	1. Proposal under preparation. 2. All runners commissioned by M/s Flovel Energy Pvt. Ltd., Faridabad. 3. All GTs commissioned by M/s BBL. 4. Tender dated 05.05.2021 floated. Bid opening date is 20.07.2021 5. Nozzles supplied by BHEL. Work completed. 6. Tender Enquiry floated on 16.08.2019. Dropped due to poor response. Tender dated 24.03.2021 has been opened and is under evaluation. 7. Work Completed. 8. Batteries commissioned. 9. Work completed. 10. Case is under preparation.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			MW machines. 11. Replacement of existing relay and annunciation panels in control room. 12. Clearance of silt of new reservoir. Restoration of Toe wall and grouted stone pitching on U/S of UHL weir at Barot. 13. Painting of Penstocks. 14. Procurement of 1 no fully forged Runner for 50 MW M/c. 15. Replacement of existing DC motors & rotary gear pumps with new DC motors & triple screw pumps for bearings of 4x15 M.W machines. 16. Procurement of 132, 66 & 11 KV CTs/PTs & Erection 17. Providing Real time online discharge measuring system to release 15 % to 20 %water as per NGT order 18. Replacement of 4x15 MW machine excitation system 19. Procurement of 1 no runner for 50 MW machine along with HVOF coating. 20. Procurement of 2 nos. runner for 15 MW machines along with HVOF coating. 21. Replacement of G40 governor with new OPU. 22. Replacement of old spherical valve alongwith its servomotor of 1x50 MW machine with	11. Case is under preparation. 12. Work of desilting has been completed. 13. Order has been issued to M/s Shalimar Paint Ltd. Parvanu (HP) for procurement of aluminum paint and material received at site. Tender for supply of labour for painting work is under process. 14. Material has been received. Commissioning under process. 15. TE dated 19.03.2018 was floated which has been dropped due to non-qualification of bidders. Revised TE under process at the site office. 16. Erection pending - delayed due to Covid 19 Pandemic 17. Approval has been accorded. Tendering under process. 18. Case under preparation by site office. 19. Case under preparation by site office. 20. Case under preparation by site office. 21. Case under preparation by site office. 22. Case under preparation by site office.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			new one. 23. Replacement of old 02 nos. 630KVA, 11/440V station transformers with new one. 24. Modernisation & Renovation of 50 MW cooling system. 25. Renovation & Modernisation of fire fighting system of Power House. 26. Replacement of B- class insulation of stator winding of 1x50MW m/c with F-class. 27. Replacement of existing spherical valves along with Hydraulic Control Unit of spherical valve of 4x15MW machine. 28. Replacement of under water parts of all machines. 29. Replacement of stator air coolers, TGB,LGB,UGB and thrust bearing oil coolers of 1x50MW machine with new ones. 30. Renovation & Modernisation of House Generator set. 31. Procurement of spare sets of needles & nozzles for all machines. 32. Procurement of 1no. New Hydraulic Butterfly Valve (PPV) along with Erection, Testing & Commissioning for 50MW Unit of Shanan Power House, PSPCL Joginder Nagar.	23. Case under preparation by site office. 24. Case under preparation by site office. 25. Case under preparation by site office. 26. Case under preparation by site office. 27. Case under preparation by site office. 28. Case under preparation by site office. 29. Case under preparation by site office. 30. Case under preparation by site office. 31. Case under preparation by site office. 32. Case under preparation by site office.

**State-wise Programme/Status of Renovation and Modernisation Schemes of Hydro Power
Stations for completion during 2017-22**

NORTHERN REGION

UTTAR PRADESH

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A- SCHEMES ONGOING - Under Implementation				
14.	Rihand, 6x50 MW UPJVNL 1962 (U-1to5) 1966 (U-6) T&G - EE, UK RM&LE <u>2017-18</u> <u>2021-22</u>	300 (LE) 132.20 (Revised) 109.17	- 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.	Works of all six units completed by M/s BHEL (Units Commissioned on: U-1: 16.09.2016, U-2: 14.02.2018, U-3: 15.06.2015, U-4: 04.08.2014, U-5: 23.04.2011 and U-6: 31.05.2017). Over hauling of intake gate along with alignment of T-Guide and their hoisting completed in Unit- 2, 3 & 4 and is yet to be taken up in Unit-1, 5 & 6. <u>COMMON WORKS</u> <u>A. WORKS 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 5. Auxiliary equipment. 6. Supply & Commissioning of 500kVA Unit& Station T/fs (8 no.) 7. DG Set with new L.T. Breaker Panel. 8. Supply & Commissioning of L.T. Panel. 9. Breaker, stringing of copper Conductor for main & reserve bus. 10. Commissioning of Draft Tube gates 3 set (6 Nos.). 11. Smoke Detection System. 12. Commissioning of 132kV Isolators for all Units. 13. Emulsifire pipeline. <u>B. WORKS UNDER EXECUTION</u> 1. Nil. <u>C. WORKS YET TO BE TAKEN UP</u> 1. Supply of delivery pipe (2 sets) for dewatering pump. (Not required). 2. SCADA System including Auto Synchronizer & Auto Sequencer. (Implementation of SCADA has been held back for the time being as the management prioritized the upgradation of the plant in totality or availing optimum efficiency). 3. Tender finalization for Lifts is in progress.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				4. Supply and Commissioning of 132kV Isolators for feeders. Material supplied. Installation work is in progress.
15.	Obra, 3x33 MW UPJVNL 1970 (U-1&2), 1971 (U-3) T&G - BHEL RM&LE <u>2017-18</u> 2021-22	99 (LE) 58.80 43.98	- Replacement of Stator coil, core & rotor pole etc. (Unit#1,2 & 3). - Replacement of rotor spider arm (Unit# 1&3). - Replacement of digital governor (Unit#1,2 & 3). - Supply of Gov. oil pump (Unit#1,2 & 3). - Supply & installation of Static Excitation System (Unit#1,2 & 3). - Supply of Gen. air coolers (Unit#1). - Rehabilitation of Intake gate of Units - Rehabilitation of stop logs, draft tube gates. - Refurbishment of draft tube gate crane. - New earthing of Switchyard - Station battery. - Replacement of 132KV Breakers. - Overhauling of 132KV Isolator (32 Set). - Supply of replacement of 132KV CT&PT. - Replacement of numeric relay panels of Units & Feeders. - Replacement of station battery - Installation of Radio Remote Control of both EOI cranes. - Smoke Fire detection system. - Supply of dewatering pumps, air compressor. - Supply & replacement of Elevator (1 No.). - Supply of 1 No. Electrostatic Liquid Cleaner (ELC) & 1 No. Low Vacuum Dehydration (LVDH) Machine. - SCADA - Other works covered in various packages approved by ETF.	<u>UNIT NO. 1</u> A. <u>WORKS 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 type pumps. 4. Replacement of stator core & coil. 5. Re-insulation of rotor pole coils with F class insulation. 6. Replacement of dynamic excitation with Static Excitation System. 7. Replacement of generator coolers. B. <u>WORK UNDER EXECUTION</u> 1. NIL. C. <u>WORKS YET TO BE TAKEN UP</u> 1. Capital overhauling along with replacement of vapours 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. Price bid opened on 03.10.2018. LOI issued to firm. This machine is scheduled after completion of similar works of Unit - 3. <u>UNIT NO. 2</u> A. <u>WORKS COMPLETED</u> 1. Replacement of oil after overhauling of GT& UAT. 2. Replacement of stator winding, rotor winding, rotor pole winding, overhang support ring and stator core. 3. Control & Protection of Generator, GT & UAT. 4. Rehabilitation of Intake Gate with new vane type pumps. 5. Replacement of Dynamic excitation with static Excitation system. 6. Refurbishment of generator coolers.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				B. <u>WORK UNDER EXECUTION</u> 1. NIL. C. <u>WORK YET TO BE TAKEN UP</u> Capital overhauling along with replacement of vapours 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. Price bid opened on 03.10.2018. LOI issued to firm. The machine is scheduled for works, after completion of works of Unit 1 & Unit -3. <u>UNIT NO. 3</u> A. <u>WORKS 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 Vane type pump of Intake Gate with new one. 5. Replacement of dynamic excitation with Static Excitation system. B. <u>WORKS UNDER EXECUTION</u> Capital O/H of machine is under progress. 1. Replacement of stator core and stator coils. Generator stator and rotor works completed. 2. Capital overhauling along with replacement of vapours 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. Price bid opened on 03.10.2018. LOI issued. Repaired material received at site. Erection work is in progress. Turbine side assembly works have been completed below generator. Renovation works viz. HS lube oil system, backwash type cooling

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				water strainer, double acting brakes etc. being taken up and expected to be completed soon. COMMON WORKS A. <u>WORKS COMPLETED</u> 1. Replacement of cable of tainter Gate & dam Top Gantry Crane-II ckt. 2. Supply & Replacement of Lightning Arrestors. 3. Erection of 132kV CTs & PTs by 0.2 accuracy class CTs & PTs. 4. Supply & replacement of 11/0.4kV 400 kVA Station Transformer. 5. Control & Protection of 6 Nos. 132 kV feeders & 2 Nos. Station. Tr. 6. Supply & replacement of deluge valves and NRV's of mulsifier system. 7. Supply & replacement of metering/ measuring instruments. 8. Refurbishment of Intake gate crane 125/25 T(order placed). 9. Renovation of CO₂ Fire extinguishing system of generator of all 3 machines (Centralized Unit) completed. B. <u>WORKS UNDER EXECUTION</u> 1. Control and protection system of 2 nos.132KV feeders. Supply & installation of C&P panel is completed. Tendering process for Procurement process for remaining items initiated. 2. Provision of station supply from Obra HEP 132 KV Bus. C. <u>WORKS YET TO BE TAKEN UP</u> 1. Supply, Erection and Commissioning of new elevator. Tendering process initiated. 2. SCADA system.

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

WESTERN REGION

MADHYAPRADESH

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A- SCHEMES ONGOING - Under Implementation				
16.	Bargi, 2x45 MW MPPGCL 1988 T&G – BHEL R&M <u>2020-21</u> <u>2021-22</u>	- 7.98 2.42	- Supply, erection, testing and commissioning of 4 Nos. SF6 Circuit Breakers - Procurement, erection & commissioning of DVR for replacement of existing AVR under modernization & up-gradation of excitation system. - Procurement, erection & commissioning of Digital Governors with RGMO facility & replacement of existing Governors. - Supply, erection, testing and commissioning of 1 No. 250 KVA DG Set. - Supply, erection, testing & commissioning of C&R Panel Duplex type with Numeric Relays for GT, Generator, UAT, ICT, Station transformer & Switch Gear. - Supply, Installation, Testing & commissioning of 220V 300 Ah Battery-1 no. - Supply, installation, testing & commissioning of 132/33 kV 20 MVA Transformer – 1 no. - Capital Overhauling of Unit 1 & 2. - All existing electro-mechanical/ electrostatic relays to be replaced with numerical relays - Procurement, erection & commissioning of one CT, PT and CVT.	- Completed. - Order placed on M/s BHEL and Commissioned in Unit-1 in May, 2019. In Unit-2 to be commissioned soon. - Order placed on M/s BHEL and Commissioned in Unit-1 in May, 2019. In Unit-2 to be commissioned soon. - DPR is prepared. - Under administrative approval process. NIT to be issued. - Order has been placed. - Proposal has been dropped. - Budgetary offer for RLA study has been invited. - Case is under process. - Procurement is under process.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			11. Supply, Erection & Commissioning of 132 kV 0.2s Current transformers - 24 Nos.	11. Procurement is under process.
17.	Pench 2x80 MW MPPGCL 1986-87 T&G – BHEL R&M 2021-22	- 13.36 0.36	1. Change in insulation class of stator from Class B to Class F of Unit-2. 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. Supply & Installation of 2 Nos. Power System stabilizer (PSS). 4. Supply of PC based Control System for 2 Nos. EHG-40 Governors. 5. Supply of 250 KVA DG Set. 6. Supply of 1 Nos. Pressure Reducer Valve. 7. Supply of 1 Nos. Governing Oil Pumps with Control Valve & Motor. 8. Supply & installation of 1 Nos., 300AH 220V Battery Set. 9. Supply & installation of 1 Nos., 300AH 220V Battery Charger. 10. Supply of 24 Nos. 132kV/800 Amps Isolators. 11. Supply of 6 Nos., 800A, 415V MCB. 12. Supply, Erection, Testing, Commissioning & Integration.	1. The complete case has been clubbed with RLA and letter for obtaining budgetary for RLA from OEM M/s BHEL has been sent and after reply of the same estimate will be prepared. 2. Completed by M/s. Electro Services, Vadodara. 3. Budgetary offer is awaited from BHEL, Bhopal. 4. Budgetary offer is awaited from BHEL, Bhopal. 5. DPR Prepared. 6. DPR Prepared. 7. DPR Prepared. 8. Order placed to M/s Exide Ind., Nagpur on 29.07.2020. 9. Case is under process. 10. DPR Prepared. 11. DPR Prepared. 12. Order has been placed on M/s Synergy Solutions, Faridabad on 28.06.2019.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			13. Supply, Erection, Testing & Commissioning. 14. Supply of 27 Nos. 132KV/ 0.2s AC Current Transformers. 15. Supply of 1 Nos. Drainage/ Submersible Water Pumps with Control Panels. 16. Replacement of Existing Co2 Fire protection. 17. Supply & Installation 48V, 300AH Battery Set. 18. Supply of 1 Nos. Dewatering Pumps with Control Panels. 19. Supply of 12 Nos. Numerical Protection Relay for 800 A, 415V MCB. 20. Supply of 1 No. Thermo vision Camera. 21. Supply, Erection, Testing & Commissioning.	13. Completed. 14. Case has been sent for Approval to Jabalpur (Head Quarter). 15. Enquiry vide no. 68-2020/976 dated 25.09.2020 issued. 16. Tender will be uploaded shortly 17. Order No. 07-08/P-IV/T-3316/Battery/Exide/1904/Jabalpur/ Dated 29.07.2020, placed to M/s. Exide Industries Nagpur. 18. DPR Prepared. 19. DPR Prepared. 20. DPR Prepared. 21. Order placed vide order No. 91-84/P&W/T-2019_MPPGC_1805/2727 dated 09.12.2019.
18.	Bansagar Tons-I, 3x105 MW MPPGCL 1991-92 T&G – BHEL R&M 2021-22	- 14.16 9.77	1.Capital Overhauling of Unit#3. 2.Procurement of 220kV CVT. 3.Procurement of 7 nos. 220kV wave trap for carrier communication & protection, auto reclosure, alternate data channel etc. 4.Capital Overhauling of Unit#2. 5.Capital Overhauling of Unit#1. 6.RLA of Unit No. 1,2 & 3.	1. Order has been placed to OEM M/s BHEL on 14.08.2020 amounting to Rs. 220550166/-. COH work started from dtd. 13.12.2020 2. Order placed on M/s. Siemens. CVT of feeders and Main Bus I& II have been replaced. 3. Order has been placed on M/s. GE (T&D) India Ltd, Mumbai on 21.05.2018 for an amount of Rs. 19.82 Lakhs. Works completed. 4. DPR prepared. 5. Order has been placed to OEM M/s BHEL on 14.08.2020. 6. DPR prepared for Unit 1,2 & 3. Budgetary offer is awaited for

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			7. Supply, Erection, Testing & Commissioning of 220 V, 300 AH Battery and charger-2 Nos. 8. Supply, erection, Testing & Commissioning of 1 No. 20MVA 220/33 kV Power Transformer and 1 No. 2.5MVA 33/0.4 kV Station Transformer. 9. Replacement of existing Generator Protection & Transformer Protection Electro-Mechanical with Numerical relays, Sequence Event Recorder, Disturbance Event Recorder & Diagnostic Station. 10. Supply, Erection, Testing & Commissioning of 1 No. 500kVA DG set. 11. Supply, erection, testing and commissioning of 220 kV Feeders – Carrier Protection & Auto re-closure feature and PLCC cabinets for Rewa 1&2 and Kotar	Unit – 3. 7. Order for two battery sets has been placed. Drawing approved. 8. Order has been placed for Station Transformer and Power Transformer is under techno-commercial stage. 9. Order has been placed on M/s. Scope T&M Pvt. Ltd, Mumbai in January, 2018. Drawing is tentatively approved. 10. Order placed on 26.03.2020. Drawing approved. Room for new DG set is under construction. DG set will be commissioned after completion of room. 11. Installation of C&R panel with numerical relays was completed by M/s. Scope T&M Pvt. Ltd, Mumbai. Installation of Carrier communication equipments completed by M/s Puncom.

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

WESTERN REGION

GUJARAT

(Amount in Rs. Crores)

[illegible]

**State-wise Programme/Status of Renovation and Modernisation Schemes of Hydro Power
Stations for completion during 2017-22**

SOUTHERN REGION

TELANGANA

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A- SCHEMES ONGOING -Under Implementation				
21.	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 MG - MELCO, Japan R&M <u>2018-19</u> <u>2021-22</u>	- 22.17 14.34	1. Replacing existing AVR's with latest DVRs 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 of NSPH	1. Completed (BHEL) 2. Completed (ABB Ltd.) 3. Completed (ABB Ltd.) 4. Completed (WMI) 5. Necessary defective cables identified and replaced with new cables 6. Not feasible for Nagarjuna Sagar Power House Switch Yard due to space constraint. 7. Completed (GR Power Switchgear) 8. Completed (CGI, Alstom and Siemens) 9. i) Overhauling of stoplog gates: Out of 18 elements reconditioning of one element

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			including trash rack at tail race.	completed and for remaining 17 elements, enquiry has been floated and is under progress.
				ii) Penstock gates seals replacement will be taken up after overhauling of stoplog gates is completed.
				iii) Trash rack rectification works at tail race and reservoir side completed.
				iv) Draft gates seals replacement completed for 8 Nos. gates whereas for other 2 Nos., the seals material was not received.
			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.	10. Completed (LA's: Lamco & PT's: Toshiba)
			11. Procurement of 220 KV CTs (18 Nos.) for units (silicon rubber composite type).	11. Completed (Siemens)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
22.	Nagarjuna Sagar Left Canal Power House (NSLCPH),2 x30.6 MW TSGENCO 1992 T-Boving, UK G-General Electric, UK R&M <u>2018-19</u> 2021-22	- 30.99 2.00	1.Replacing existing AVR's with latest DVRs along with thyristor modules for 2 units. 2.Capital overhauls on generator and turbine and its auxiliaries including spares and consumables for all 2 units. 3.Overhauling of EOT Cranes and gantry cranes. 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 132KV SF6 Circuit Breakers for both units and its feeders. 6.Implementation of SCADA. 7.Providing of latest version of EHG System for 1 Unit. 8.Cooling water line erections. 9.Overhaul of stop log gates at NSLCPH and trash rack rectification including gantry crane.	1. Yet to be processed. It is proposed to postpone the work of replacing existing AVR's with latest DVRs along with thyristor modules for Unit-2 in to the R&M (2022-27) 2. Unit-1overhauling completed. Unit found normal and taken into service on 20.11.17.It is proposed to postpone the capital overhaul of Unit-2 into R&M works as the unit running hours are less and there is no major problem in Turbine & Generator. 3. Work order issued (LOI). 4. Not feasible. 5. Completed (Siemens) 6. Completed (ABB) 7. Completed (BHEL) 8. Completed. 9. Trash rack rectification works completed. Gantry crane works and reconditioning of stop log gates is yet to be taken up. Approval for estimate sanction is under process.

**State-wise Programme/Status of Renovation and Modernisation Schemes of Hydro Power Stations
for completion during 2017-22**

SOUTHERN REGION

KARNATAKA

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A- SCHEMES COMPLETED				
23.	Bhadra River Bed units, 2x12 MW KPCL 1963 T- Neyrpic, France G- Hitachi, Japan R&M 2019-20	- 23.55 20.12	A. 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. Replacement of 11 kV switchgear, LAVT & NGT/NGR cubicles, 11 kV cables. B. Replacement/ Refurbishment of Turbine and associated equipments 1. Replacement of BF valve, TGB, Guide vanes, Rubber hub, Top cover, Vacuum brake valve, Air compressor system, 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 signed with M/s Andritz Hydro Pvt. Ltd. on 21.09.2012. - Unit-2 commissioned and synchronized on 18.02.2016. - Unit-1&2 taken in to service on 30.01.2019 and 31.01.2019 respectively as per KNNL requirement. - Units 1&2 are under shutdown as per the requirement of Karnataka Niravari Nigama Ltd (KNNL). The units will be taken in to service depending on water availability. Unit-2 synchronised on 10.08.2019 and Unit-1 will be taken in to service after completion of penstock liner works from civil department. R&M works completed and both units commissioned.
B- SCHEMES ONGOING - Under Implementation				
24.	Munirabad Dam Power House, 2x9 MW (U-1&2) 10 MW (U-3) KPCL 1962(U-1&2) 1965 (U-3) T-HitachiLtd, Japan G- U-1&2: Hitachi U-3: VoestAlpine, Austria	- 4.60 2.20	Generator protection and DCS based SCADA system for Unit 1,2&3.	Contract agreement was signed with M/s ABB India Ltd. on 04.05.2018. PO placed on M/s ABB India Ltd., on 26.03.2018 for Rs. 4.87 crore. Supply of DCS Panels, Control, Metering & Protection Panels, Cables, ACDB DCDB is completed. Manufacturing clearance accorded for all field instruments. The firm is addressed to take up erection work at site.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
	R&M <u>2018-19</u> <u>2021-22</u>		2nos. 11kV Tee-off cubical of Units 1&2 and 11kV Gescom UAT switchgear cubicle.	WO Placed on L1 bidder M/s Amar Raja power systems Ltd., Tirupati at a total cost of Rs. 7119395.00. Drawings approved. Erection works to be taken up.

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

SOUTHERN REGION

KERALA

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A- SCHEMES COMPLETED				
25.	Sholayar, 3x18 MW KSEB 1966-68 T-Litostroj, Yugoslavia G- RadeKoncar , Yugoslavia RM&LE <u>2017-18</u> <u>2020-21</u>	54 (LE) 199.55 84.26	Replacement of old machine with new machine (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 Equipments: Order placed on M/s FEPL-FUYUAN on 06.07.2015. Model test of the turbine conducted. Governor system remote control panels erected in control room. 11kV control room completed. Boxing up of Generator completed. Generator & Turbine alignment done. SCADA panels erected. Thrust Upper Guide Bearing (UGB)&Lower Guide Bearing (LGB) setting completed. Field Acceptance test of Control & Relay panel completed. Inspection of one Generator done. Drainage and dewatering system of all machine completed. MIV & Guide Vanes stroking checked. Pre commissioning of Governing system done. Panel loop testing completed. Compressor Airline work completed. Relay testing before mechanical spinning completed. Mechanical spinning done and Balancing completed. Trial run of Unit-3 completed on 16.03.2019 & in service and taken over on 18.09.2019. Unit-2 handed over to Contractor for R&M works on 01.04.2019. Trial run of Unit-2 completed on 29.12.2019 and taken over on 19.01.2020. Unit-1 handed over to Contractor for R&M works on 20.01.2020. Trial run of Unit-1 completed on 19.09.2020. Renovation completed on 05.10.2020 Unit 1, Unit 2 and Unit 3 commissioned after renovation. MIV: Erection completed. Renovation of Penstock: Penstock and allied works awarded to M/s PES

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				Engineering Pvt. Ltd., Hyderabad on 31.03.2017. Penstock works completed for Unit-3 on 21.12.2018, Unit-2 on 24.10.2019 and Unit-1 on 26.08.2020.
26.	Idukki 1st Stage, 3x130 MW KSEB 1975-76 T - Neyrpic, France G - GE, Canada R&M 2018-19 2020-21	- 89.9 64.64	Refurbishing the Main Inlet Valves. Modernizing the auxiliary systems, replacement of Governing Systems & Excitation Systems with new one. Introduction of SCADA control.	The work of modernizing the auxiliary system, replacement of switchyard equipment's, replacement of Governing system, Excitation system, Introduction of SCADA was awarded to M/s GE Power. Control room equipment such as GPS Clock server, engineering stations, large screen display erection and commissioning works completed. Erection of 11kV bus duct completed. Protection panel replacement of LPII completed. Replacement of P7 & P15 panels completed. MCC-A section replacement work completed. Cross bus conductor replacement work completed. Bus bar protection panel, MCC-B section replacement and SCADA integration works are under progress. Dismantling of old cables at power house and 220 kV switchyard is in progress. Unit-3 Handed over to M/s GE Power on 17.06.2017. Mechanical spinning over. Unit-3 commissioned on 16.03.2019. Unit-2 Unit-2 was commissioned on 20.01.2020. Due to failure of excitation transformer, the machine was again shutdown from 20.01.2020. Stator winding replaced and short circuit and open circuit test completed satisfactorily. Unit commissioned on 27.12.2020. Unit-1 Dismantling completed. Positioning of all the panels completed.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				Installation of OPU sump tank completed. OPU erection & piping work completed. Pre-commissioning testing of Exciter system completed. Rotor Poles dismantled and inspection of 8 nos. of refurbished rotor poles at sub vendor's works completed. Erection of rotor poles completed. Governor auto test, electrical over speed, SCADA sequence test completed. Machine spinning conducted and reached upto 150 RPM. 1 hour test run completed and found all parameters within limits. MIV opening/ closing time adjustment completed. Insulation test of generator/ bus bar/ transformer completed. 11 kV breaker additional tripping wiring for OC/SC test wiring completed. 220 kV switchyard shorting with Kundah conductor for SC test completed. Protection panel replacement work completed. The unit was synchronized on 14.07.2020 Supply of hollow shaft cooling water pump motor by M/s GEPIL is pending. 220 kV switchyard work is pending. Procurement of one no. MIV The manufacturing of MIV completed by M/s HBHC, China. Unit –I MIV installation completed. Renovation work of fire fighting system of Generator and Generator Transformers of 1st and 2nd stage. Completed (M/s GE Power).

B.- SCHEMES ONGOING - Under Implementation

27.	Kuttiyadi, 3x25 MW KSEB 1972 T&G-Fuji, Japan	75 (LE)+ 7.5 (U) 377.41 -	Inspection and rectification of Trash rack. Butterfly valve operation to be made electrically and mechanically with remote. New penstock, MIV replacement with PLC	The Board decided to entrust M/s. AHEC, IIT Roorkee for conducting RLA study on the generating unit. RLA report submitted in October 2013 didn't mention about the uprating of the existing units. Further RLA study was conducted to explore
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S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
	RMU&LE 2021-22		controls. PMG replacement with SSG. Pelton turbine runner's replacement. Replacing Generators, Static excitation with AVR. Replacing Cooling water system. Replacement of DG set. Integrated SCADA, New fire protection system, Store and AC system modification of switchyard. New 11 kV switch gear	the possibility of uprating the units and final report submitted to KSEB. DPR approved on 14.06.2017. E&M works were retendered with Provisional Acceptance Certificate (PAC) of Rs. 156.20 Crore on 27.11.2018. Pre-qualification bids were opened on 08.04.2019 and financial bids of the prequalified bidders were opened on 09.07.2019. LoA issued to L1 bidder i.e. M/s BHEL on 07.09.2019 with a contract amount of Rs. 89,82,39,005/-. Detailed Work order issued on 10.12.2019. Agreement executed on 13.12.2019. Kick off meeting conducted on 14.01.2020. BHEL officials and KSEBL Engineer started verification of old drawings, actual dimensions of the machine that has to be uprated. KSEBL insisted for model testing of turbines and letter sent to M/s BHEL. BHEL officials started taking measurements of essential parts of machines. They insist that the measurements of nozzle and distributor joint, Thread pitch of M35 bolts, Turbine guide bearing, Nozzle servomotor and distributor joint, deflector rod, MIV outlet joint and outlet pipe etc. can be done only after dismantling the machine (Unit#1). This matter is discussed with Chief Engineer (Generation and PED) and decided to discuss in power poison meeting how to achieve the same with minimum generation loss. Verifications of drawings for new platform static excitation equipment's are in progress. Data collection works from field for input of closed storage is under progress. Verification of documents send by M/s. BHEL for assurance plan and Generator package are under progress. Verification of documents of QAP for water based fire protection system

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				is in progress. Verification of drawing for loading and foundation under progress. Verifications of drawings sectional arrangements of generator, control panel boards of RTU for butterfly valve house, foundation details are under progress. Verification of design memorandum of generator design and station lighting system are under progress. Data collected from field for runner dismantling is almost completed. Verification of Main single line diagram, CT PT calculation for unit protection and metering core are under progress. Model test procedure approved. Plate material approved with suitable modification suggested, levelling of area for closed store shed and open store shed completed. Located the concrete blocks got buried under debris & soil for doing the load test on EOT crane are arranged. Measurements for reverse engineering has taken from Unit#3 machine after availing shutdown. Model test on runner completed during 27th October to 31st October, 2020. Reverse Engineering completed. Vendor list approved. Model test reports approved on 29.03.2021. Engineering drawings/ design calculation documents submitted by BHEL have been verified and are in the advanced stage of finalization and approval.

**State-wise Programme/Status of Renovation and Modernisation Schemes of Hydro Power
Stations for completion during 2017-22**

SOUTHERN REGION

TAMIL NADU

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A- SCHEMES COMPLETED				
28.	Sholayar PH-1, 2x35 MW TANGEDCO 1971 T - Litostroj, Yugoslavia G - Rade Koncar, Yugoslavia RMU&LE 2019-20	70 (LE)+ 14(U) 90.44 66.94	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 Transformers, 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.	Contract Agreement signed with M/s Andritz Hydro Private Limited (AHPL), Haryana on 21.07.15. <u>Works Completed</u> Reverse Engineering works of Machine-2 completed. The machine was synchronized after Reverse Engineering and achieved 33 MW of load on 01.04.16 with satisfactory performance. The works of Unit-I completed and commercial operation commenced on 29.10.2018. Unit-II handed over to M/s. AHPL on 12.11.2018 and works completed. Unit-II synchronized with grid on 23.07.2019 and taken over from agency on 03.09.2019.

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

EASTERN REGION

ODISHA

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A - SCHEMES ONGOING –Under Implementation				
29.	Hirakud-I HEP Burla (U5&6), 2x37.5 MW OHPC Ltd. 1962-63 T&G.o - Hitachi, Japan RMU & LE <u>2017-18</u> 2021-22	75 (LE)+ 12.2 (U) 158.77 97.82	Replacement of i) The Turbine & Generator with new ones except the embedded parts. ii) The auxiliaries of the Unit including the common auxiliaries. iii) Existing Governor with micro-processor based Digital Governor. iv) Exciter and AVR with Static Excitation System. v) New Thrust bearing pads self-lubricated PTFE Type. vi) C&I system. vii) Protection system by state of the art Numerical Relays. iii) New 55 MVA, 11/132 kV Generator Transformer. ix) Power and control cable with FRLS type cable. x) Architectural works including interior decoration of Power House. xi) Refurbishment of Intake gates and Draft Tube gates.	The contract agreement signed with M/s Voith Hydro Pvt. Ltd on 16.10.2015. OHPC engaged M/s WAPCOS Ltd. as consultant. <u>Completed works (Unit 6):</u> - Refurbishment of Draft Tube gates. - Dismantling of Generator, Turbine and Auxiliaries. - Drainage & Dewatering Pump installation. - HV test on stator winding. - Concreting of Turbine HPU area. - By pass valve replacement. - Bus duct & GT installation. - Sand blasting and painting of intake gate. - Ultrasonic test & DP test on existing stay vanes - Core magnetization. - Stator building completed and stator lowered. - Refurbishment of intake gate. - Refurbishment of spiral case and discharge ring. - Rotor assembly. - Penstock repair works - Tower assembly of Turbine shaft, Runner and inner head cover and lowering of tower assembly - Installation of Guide Vane with lower bush and outer head cover. - Lowering of Generator shaft, thrust block and lower bracket. - Installation of new D&D pumps - Run out of generator <u>Works under progress (Unit 6):</u> - Piping work of cooling water, compressed air system and Governor HPU Work - Commissioning date –

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				28.07.2021 <u>Completed works (Unit 5):</u> - Refurbishment of Draft Tube gates. - Refurbishment of intake gate and lowered. - Dismantling of Generator, Turbine and Auxiliaries. - By pass valve replacement. - Sand blasting and painting of intake gate. - Drainage & Dewatering Pumps installation - Bus duct & GT installation. - Ultrasonic test & DP test on existing stay vanes. - Core magnetization. - Stator and rotor Building. - Refurbishment of spiral case, sand blasting and painting of stay ring and turbine pit lines <u>Works under progress (Unit 5):</u> - Pre assembly of Generator shaft, thrust block and lower bracket at generator floor - Piping work of cooling water, compressed air system and Governor HPU Work - Sandblasting of penstock - Commissioning date – 27.08.2021
30.	Hirakud-II (U-3) (Chiplima), 3x24 MW OHPC Ltd. 1964 Unit-1&2 T-JM Voith, Germany G-Hitachi, Japan Unit-3 T-LMZ, USSR G- Electrosila, USSR RM&LE	24(LE) 65.67 48.01	Replacement of i) The Turbine & Generator with new ones except the embedded parts. ii) The auxiliaries of the Unit including the common auxiliaries. iii) Existing Governor with micro-processor based Digital Governor. iv) Exciter and AVR with Static Excitation System. v) New Thrust bearing pads self-lubricated PTFE Type. vi) C&I system. vii) Protection system by state of the art Numerical Relays. iii) New 30 MVA, 11/132 kV Generator Transformer. ix) Power and Control cable with FRLS type cable. x) Architectural works including	The Contract Agreement was signed with M/s Voith Hydro Pvt. Ltd. on 15.10.2015. OHPC engaged M/s WAPCOS Ltd. as consultant. <u>Works Completed:</u> - Erection of Turbine. - Erection of Generator. - Erection of all auxiliaries. - Mechanical spinning of the unit carried out on 18.09.2019. - Unit was test synchronized on 07.11.2019. Trial run of the unit started on 21.01.2020 and completed on 01.04.2020. The performance of the machine was observed during this period. The Unit was

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
	<u>2017-18</u> <u>2021-22</u>		interior decoration. Refurbishment of Intake gates and Draft Tube gates.	provisionally taken over w.e.f. 18.05.2020 with list of major and minor defects. <u>Works under progress:</u> - Performance Guarantee test of the unit completed on 05.11.2020. - Architectural work is in progress. - Rectification of some defects is in progress.
31.	Balimela, 6x60 MW OHPC 1973-77 T-LMZ, USSR G- Electrosila, USSR RM&LE <u>2019-20</u> <u>2021-22</u>	360(LE) 382.91 79.42	Replacement of i) The Turbine & Generator with new ones except the water conductor system. ii) The auxiliaries of the Units including the common auxiliaries. iii) Existing Governors with micro-processor based Digital Governor. iv) Exciter and AVR with Static Excitation System. v) New Thrust bearing pads self-lubricated PTFE Type. vi) C&I system. vii) Protection system by state of the art Numerical Relays. viii) Replacement, 11/220 kV Generator Transformer, Bus Duct system. ix) New Station Auxiliary Transformer. x) Control Power cable with FRLS type cable. xi) Architectural works including interior decoration of Power House. xii) Extension of 1No. 220kV bay in Switchyard. Refurbishment of Intake gates, Draft Tube gates and civil works.	Contract Agreement signed with M/s BHEL on 21.09.2016. M/s BHEL took over the units on 18.12.2017. OHPC engaged M/s WAPCOS Ltd. as consultant. <u>Works Completed:</u> - Dismantling work of Unit-1&2 completed. - Refurbishment work of spiral casing stay ring & stay vanes including DT gate of Unit-1&2 completed. - Turbine Runner & shaft Assembly, Installation of Guide Apparatus, Servomotor and TGB Housing of both Unit-1&2 completed - Assembly of Stator & Rotor, Installation of Generator lower bracket. Installation of brake jacks and lowering of stator & rotor of Unit 2 completed. - Stator & rotor assembly of Unit-1 and lowering of rotor completed. - Refurbishment of penstocks of both Unit 1&2 completed. - Concreting Back filling of all foundations of Towers, equipments and station Transformer at 220kV Switchyard Extension bay - Installation of IDV/PRV of Unit 1&2 completed. - Installation of combined

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
				Bearing of Unit 2 with Run out checking of Unit is completed. - Erection of 20 MVA Station transformer except PRV. Mounting Arrangement completed. - Installation of SRV & BFV of Unit 1&2 completed - Installation of GT of Unit 1&2 completed. - All mechanical works of Unit-2 completed. The trial mechanical spinning upto rated speed of unit-2 was conducted on 16.04.2021. <u>Works under progress:</u> - Boxing up of Unit-1 - Installation of Cooling water system, pipe line installation of governing system, instrumentation work of turbine and generator, minor works pertaining to maintenance and operation of seal of SRV and remaining works of draft tube gate. The following common works: - D&D system and firefighting pipeline work - Extension and erection of compressed air system. - Balance civil works (viz. cable trench work) inside 220 kV Switchyard Bay Extension and Erection of Comprhirakudessed air system.

**State-wise Status of R&M Schemes
(During 2022-27)**

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations during 2022-27

NORTHERN REGION

HIMACHAL PRADESH

(Amount in Rs. Crores)

S. No.	Scheme / Category/ Completion Schedule	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES ONGOING – Under Implementation				
1.	Pong Power House, BBMB 6x66 MW 1977-83 T&G-BHEL RM&LE 2022-23	396 (LE) 142.25 -	Unit-2 Replacement of complete wound Stator issued to M/s. BHEL on dated 07.09.2018 and unit handed over to M/s. BHEL on dated 14.02.2019. Scope: – Complete stator – Cooling pipes and coolers – Temp. recorder – New HS lub. system Replacement of complete wound stator for Unit No. 1, 4, 5 & 6. Replacement of Six Unit Transformers of 67 MVA. Replacement of old Six Analog Governors with new Microprocessor based ones (Unit No. 1, 2, 4, 5&6). Replacement of old Semi-static excitation system of 6 units. Upgradation of existing Generator Protection with Latest Numerical IEC 61850 protocol compliant Generator	Work completed Replacement of Stator of Unit-3 completed and Work Order for replacement of Complete Wound Stator for Unit-2 has been issued to M/s BHEL on 07.09.2018 and Unit handed over to M/s BHEL on 14.02.2019. Work completed in April, 2020. Committee constituted on 23.10.2019 to study and explore the possibility of uprating of machines alongwith excitation system and transformers has submitted the report. M/s WAPCOS has been asked to furnish the budgetary quotation for carrying out the feasibility study of uprating of Pong unit. Unit Transformers (6nos.) of 67 MVA each replaced by 75 MVA in July, 2016. (Unit-2&5: M/s. Alstom, Unit-1&4: Ms/ BHEL and Unit-3&6:Ms/ABB). The commissioning work of Governor replacement completed. NIT for replacement of Old Semi Static Excitation System published. Technical bid opened on dated 30.07.2019. Existing NIT dropped. Being clubbed with RM&U works of uprating of 1,4,5&6 units. Material received at site. Erection, Testing & Commissioning of 2 units out

S. No.	Scheme / Category/ Completion Schedule	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			protection for Unit No. 1, 2, 4, 5 & 6.	of 5 completed by the firm. Work of remaining units will be done as per availability of shut down.
B- SCHEMES ONGOING – Under Tendering				
2.	Giri, 2x30 MW HPSEBL 1978 T&G - BHEL RM&LE 2023-24	60(LE) 139.80 Nil	Brief description of work proposed to be undertaken are as given below: - 1. 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. Strengthening of civil works at 132 kV Switchyard. 2. 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. 3. 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 system, Aug. of 16/20 MVA, 132/33 kV Transformer into 25/31.5 MVA etc.	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 equipment's& balance plant items. Revised administrative approval for Rs. 139.80 Cr. accorded on 30.12.2015. HPERC has accorded 'in principle' approval on 23.05.2017. M/s PFC has funded the scheme on dated 18.05.2020 and the preparation of tender documents for execution of said scheme is under process. Revised scheme has been prepared to cover the scope of additional items which were not covered in earlier schemes.

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations during 2022-27

NORTHERN REGION

PUNJAB

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES ONGOING - Under Implementation				
3.	Ranjit Sagar Dam, 4x150 MW PSPCL 2000 T&G – BHEL R&M 2022-23	 - 82.16 0.93	1. Installation and commissioning of Digital Electro Hydraulic Governor capable of Restricted Governing Operation Mode (RGMO). Procurement of 2 no. high pressure compressors. 2. Replacement of existing old Auto Sequencers& AVR with Unit Control System compatible with SCADA. 3. Replacement of 220 KV Circuit Breakers of 7 nos. feeders. 4. R&M of emulsifier system of Generator Transformer and CO₂ system. 5. Capital maintenance of Unit 2. 6. Installation & Commissioning of 8 Nos Microprocessor based scroll type compressor Water cooled Chilling Machine-AC Plants. 7. Providing additional portable dewatering pump set.	1. PO placed on M/s BHEL on 04.12.2018. Material received at site. The combined inspection of received material was carried out on 12.06.2020. Payment against supply of material has been released. Old Governors of unit no. 3 & 4 have been replaced. However response of new EHG capable of RGMO enabled governors is not uniform and speed setter command is very slow, abnormal delay is happening while synchronizing units. Matter has already been taken with M/s BHEL regarding rectifying the problem. Other two Units i.e 1 & 2 may be handed over for EHG's replacement, once unit no. 3 & 4 are fully ok and after paddy season. 2. Administrative approval accorded. Technical specification of this work is under preparation by site office. 3. Case under preparation. 4. T.E has been floated on 03.06.2021. 5. Case under preparation. 6. Tender dropped due to poor response from the firms. WO issued for dismantling of spare AC Plant at GNDTP Bathinda and reinstallation at RSPP. Work under progress. 7. Due date of Tender Enquiry extended upto 18.12.2019 due to poor response. No bids received. Retendering under process.

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			8. Capital Maintenance of Unit 3. 9. Up-gradation of HP compressors of condenser mode operation. 10. Replacement of drainage pumps of unit bay 2 nos. 11. Capital Maintenance of Unit-1. (Replacement of runner disc to be carried out) 12. Replacement of flow meters. 13. Replacement of drainage pumps of service bay side-2 nos. 14. Construction of Porches over all entry points of Power House Building. 15. Providing Detachable scaffolding set for Power Plant Maintenance. 16. Condenser mode of operation of 4 no. units	8. Rescheduled for 2023-25. 9. PO dated 29.06.2021 issued to M/s General Engineering Company against TE dt. 08.07.2020. Delivery period is 5 months from the date of PO. 10. PO dt. 18.03.2021 amounting to Rs.1.195 Cr. issued to M/s Hydraulic Engineering Company, Solan against TE dt. 26.02.2020 for pumps of RSD, UBDC & MHP. Delivery period is 5 months from the date of PO. 11. PO placed on M/s BHEL on 30.07.2019 for runner disc replacement. Work completed; only minor work is pending. 12. Part-II of one no. firm i.e JPS Engineer against T.E dated 07.12.2020 has been opened on dated 31.03.2021 & technical evaluation is under process 13. Case under preparation. 14. Case under preparation. 15. Case under preparation. 16. Work order dated 27.08.2014 issued on BHEL. BHEL Bhopal inspected the machines and opined that the volume of air in the blown down receiver is on the lower side and the pressure being maintained is on the higher side causing excessive drop during synchronous mode operation and water pressure being depressed more than required. As such air mixed with water is being released in the tail race. BHEL suggested that the capacity of air compressors and required

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			17. Replacement of defective fire alarm panel other accessories (work being executed by site). 18. Repair of Single phase 13.8 KV/220/$\sqrt{3}$ KV, 62.5 MVA, Generator Transformer make NGEF, S No. 6800000152, YOM-1996 of unit no.2 (W-phase) damaged at RSD HEP Shahpurkandi. 19. Procurement of 11/0.415kV, 1250kVA, Dry type Station Service Transformers. 20. Replacement of valves of Power House. 21. Design, Manufacturing, Testing, Supply, Delivery & Commissioning under firm's supervision for 2 nos. Tubular Battery Banks of 220 V, 2000 AH in SAN Containers. 22. Procurement and commissioning of numerical Distance Protection Relays (16 nos.).	volume and pressure applied for water depression is required to be analyzed. BHEL also pointed out that proper nipping/bedding of guide vanes should be ensured which maybe the root cause of water being released to tail race. Further, BHEL Engineers again visited and recommended replacement of magnetic float level indicators. Order placed on M/s BHEL for replacement of Magnetic float level indicators. 17. Bids received from following firms are under evaluation: - i) Modern Agencies, Chandigarh ii) Fire Envo Safety Engineers, Chandigarh iii) Ceasefire Ludhiana. PO issued to M/s Modern Agencies, Chandigarh in 07.02.2019. Work completed. 18. Repaired and yet to be Commissioned. 19. PO dt. 20.04.2021 issued to M/S AMES IMPEX GUJARAT, against TE dated 11.10.19. Delivery period is 8 months from the date of PO. 20. Tender Enquiry with due date of opening 16.04.2019 dropped. Case file will be submitted shortly after getting fresh budgetary offer. 21. Batteries commissioned successfully by M/s Exide Ltd, Delhi at Rs. 78.321 Lacs. 22. Work completed by M/s. GE T&D India Ltd.

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			23. Procurement of 4 nos. Magnetic Float Level Indicators with switching contacts. 24. Modernization and Renovation of RSD Elevator/ lift. 25. Replacement of existing old Auto Sequencers & AVR with Unit control system compatible to SCADA application 26. Overhauling of 3 nos. GTs out of 12 nos. 27. Overhauling of semi gantry crane and EOT Crane. 28. Design, manufacturing, testing supply, supervision of erection & commissioning of 1 no. 62.5MVA, 13.8/220/√3 kV single phase GT. 29. Bus Bar Protection Scheme as recommended by CPRI in audit.	23. Work completed. (BHEL). 24. Work completed by M/s Kone at Rs. 20 Lakhs. 25. Case for administrative approval under process. 26. The work to be executed departmentally from Grid Construction Division, Amritsar. 27. Case under preparation. 28. T.E dt. 21.11.2019 was floated. Price bid of one no. firm i.e BHEL has been opened on dated 24.02.2021 & Purchase Proposal is under process. 29. Case under preparation.
4.	UBDC St.I& St II HEP, 3x15 MW (St.-I) & 3x15.45 MW (St.-II) PSPCL 1971-73 (St.-I) & 1989-92 (St.-II) St. I T&G-AEI, UK St.-II T&G-BHEL R&M 2022-23	- 23.55 5.56	1. Replacement of existing Electro-Mechanical Excitation/AVR system with Digital Static Excitation System of UBDC Stage II Power House. 2. 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 House. 3. Spare Generator Transformer 20 MVA, 11/132 KV.	1. PO issued to M/s ABB on 29.01.2019. Material received and commissioned at site. 2. PO dated 25.09.2019 amounting to Rs 2.17 Cr. placed on M/s GE T&D India Ltd. Material received and commissioned at site. 3. 2 nos. bids received from M/s BBL, New Delhi and M/s T&R, Gurgaon for 3 nos. 20MVA GTs (2 nos. for MHP and 1 no. for UBDC) dropped due to high rates, Fresh Tender dated 19.05.2020 floated and opened on 31.08.2020. Tenders of following two bidders were opened: i) M/s BBL,

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			Delhi ii) M/s T&R India Ltd. Ahmadabad. TE dropped due high rates. Fresh TE dt. 01.03.2021 floated with extended due date as 12.07.2021. 4. Capital overhauling of UBDC Power House No.3 Stage I. 5. Replacement of Electro Hydraulic Governors with microprocessor based digital governor of UBDC Stage II Power Houses. 6. R&M of dewatering and drainage system of UBDC Stage II Power Houses. 7. R&M of Protection and measurement system by Electromagnetic relays and instruments with numerical relays and digital instruments of UBDC Stage II Power Houses. 8. R & M of C&R panels of 132 KV O/G feeders at UBDC Power House No.3 Stage I. 9. Replacement of Governor Pumps of UBDC Stage I Power Houses. 10. Replacement of 6 no. 11kV/415 V 300kVA oil type transformers to dry type transformer for Stage-I UBDC Power Houses. 11. RLA and RMU Study of UBDC Stage I Power House and preparation of DPR, Technical Specs and commercial Specs	4. Changed to RMU and will be initiated after RMU study in 2nd plan 2022-23. 5. PO dated 10.07.2019 amounting to Rs 2.02 Cr. placed on M/s ABB. Material received and commissioned at site. 6. PO dt. 18.03.2021 amounting to Rs.1.195 Cr. issued to M/s Hydraulic Engineering Company, Solan against TE No. 259 dt. 26.02.2020 for pumps of RSD, UBDC & MHP. Delivery period is 5 months from the date of PO. Drawings submitted by the firm has been approved. 7. Proposal to be processed in 2022-23. 8. UBDC Project office has requested various firms to submit Budgetary offer. The case shall be processed for administrative approval on receipt of Budgetary offer. 9. Case under preparation for administrative approval. 10. PO is being placed on M/s Ames Impex Gujrat against TE dated 09.10.2019 for supply of Dry type transformers for RSD, ASHP & UBDC. 11. UBDC Project office has requested M/S BHEL and AHEC Rorkee to submit budgatory offer for RMU and RLA study. The case shall be processed after receipt of

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			12. Renovation, Modernisation and Up rating of underwater parts and associated equipments UBDC Power House No.2 Stage I 15 MW Unit as per RLA and RMU study. 13. R&M of Electrical overhead cranes & all the mechanical auxiliaries including Intake, Draft, Bye pass gates etc.	Budgetary offer. 12. Case Planned in 2022-23. 13. Case Planned in 2022-23.
5.	Anandpur Sahib Hydel Project – I&II, 4x33.5 MW PSPCL 1985-86 T&G – BHEL R&M 2022-23	- 31.65 0.85	1. Replacement of existing 4 nos. 220 volts 400 AH batteries of ASHP-I at Ganguwal and ASHP-II at Nakkian. 2. Procurement of 50 nos. Stator Air Coolers.	1. PO issued to M/s Exide on 29.11.2018 for 2 nos. of battery bank. The batteries has been commissioned. For remaining 2 battery banks, Techno-Economic Appraisal Committee/ hydel Projects decided to process the case under revenue head. Administrative approval accorded on 11.11.2020. TE dt. 25.02.2021 opened on 30.04.2021 and following 3 nos. firms have participated:- i) M/S Panacea Alloys Pvt. Ltd. Pune, Maharasrta. ii) M/s Aajco Energy Pvt. Ltd. Kolhapur, Maharastra. iii) M/S Exide Industries Ltd. Kolkatta, West Bengal and technical evaluation is under process 2. LoI issued to M/s S.K Sales Company, Jalandhar for 4 nos. and M/s Hari Om Enterprises, Haridwar for 16 nos, on 07.01.2018. 20 no. stator air coolers have been received, installed and commissioned at site. Tender Enquiry dated 26.02.2020 was dropped on 03.12.2020. The revised T.E. dated 31.12.2020 opened on 16.04.2021. the following 3 no. firms have participated:- i) M/S Omeel Coils Surat, Gujarat. ii) M/S Lord Vishwakarma Heat Exchangers Pvt. Ltd. Hardwar. iii) M/S Laxmi Engineering Industries Pvt. Ltd. Bhopal. and the case file is under

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			3. Design, Manufacturing, Testing, Supply, Erection & Commissioning (Renewal & replacement) of Centralised and decentralized Distributed Control System (DCS) based SCADA system, Microprocessor based Digital Excitation including Digital AVR, Digital Governing System, Digital Numeric Relays conforming to IEC 61850 for Nakian & Ganguwal P.H at ASHP. 4. Replacement of existing 4 no. compressor (2 No. at each Power House) with new unit compressors. 5. Renovation and Modernization (R&M) of BHEL make Generating units of 4x33.5 MW at ASHP. 6. Renovation and modernization of emulsifier system of Generator Transformer of Ganguwal & Nakkian of ASHP. 7. Renovation and modernization of Existing LT Scheme/panels for Ganguwal & Nakkian of ASHP. 8. Renovation and modernization of Existing conventional DPRs, O/C & Directional E/F Relays with Numerical relays of outgoing 2 nos 132KV Circuits at Ganguwal & Incoming 2 nos. and outgoing 3 nos. 132 kV Circuits at Nakkian of ASHP.	consideration of PPC/HPs for opening of Price bid and accordingly the price bid will be opened shortly. 3.Team of OEM i.e. M/s BHEL visited the site for study of site and explore the possibility of uprating of unit capacity, BHEL has submitted its offer on 15.10.2019. The discussions with BHEL team had been held on 22.10.2019 & 24.12.2019. BHEL has submitted revised offer Case file is under consideration of CMD, PSPCL. 4.Case under preparation by site office and The possibility of reuse of spare unit compressor of GNDTP Bathinda is being explored. 5.Team of OEM i.e. M/s BHEL visited the site for study and to explore the possibility of uprating of unit capacity. BHEL has submitted its offer on 15.10.19. The discussions with BHEL team had been held on 22.10.2019 & 24.12.2019. BHEL has been asked to submit revised offer. Case file is under consideration of CMD, PSPCL. 6.The same is being studied. Case for Administrative approval shall be initiated accordingly. 7.Case under preparation 8.DPRs installed by procuring from PSTCL. Case for administrative approval of DPRs & O/C & Directional E/F is under Process.

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
			9. Replacement of OPU (Oil Pressure Unit) for 4x 33.5 MW machines of ASHP. 10.Replacement of existing 6 nos. 500/ 630 kVA 11/0.4 kV (3 nos. installed at each power house) oil cooled with Dry Type transformers. 11.Replacement of existing 4 nos. Service Compressor (2 nos. at each Power House no. I&II) with new Service Compressors. 12.Procurement of T&P articles for Ganguwal and Nakkian Power House. 13.Capital overhauling of Electric Overhead Traveling (EOT) crane at PH-1&2 of ASHP. 14.Replacement of existing 24 thrust bearing oil coolers along with accessories of Ganguwal & Nakkain Power House. 15.Procurement of Two Centrifugal Turbine Oil Filtration/Dehydration sets (one for each power house i.e. (Ganguwal & Nakkian). 16.Procurement of Two Transformer oil filtration sets (one for each power house i.e., Ganguwal&Nakkian) of 3000 ltr/hr capacity. 17. Provision of one 200 kVA capacity Diesel Generator (DG) set (Silent type) for Ganguwal Power House Including Room. 18.Renewal & Replacement (R&R) of two 220V DC battery charger/set for Ganguwal&Nakkian power Houses. 19. Replacement of 4 oil coolers along with accessories for GT 11/132 KV 40 MVA of Ganguwal & Nakkian Power House.	9.This work is being processed as a part of R&M of units. 10. PO issued to M/S AMES IMPEX GUJARAT. The Ordered quantity shall be supplied within 8 months from the date of issue of PO. 11. Case is under administrative approval. 12. Deleted. 13. Case under preparation by site office. 14. Case under preparation by site office. 15. Case under preparation by site office. 16. Case under preparation by site office. 17. Case under preparation by site office. 18. Case under preparation by site office. 19. T.E dated 04.05.2021 was opened on 18.06.2021 and the following 3 no. firms are qualified:- i) M/S Hydrotherm

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW) / Estimated Cost/ Expenditure	Scope of work	Present Status
				Technology Delhi ii) Laxmi Engineering Bhopal iii) S K Sales Jalandhar and technical evaluation is under process.

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations during 2022-27

NORTHERN REGION

JAMMU & KASHMIR

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES ONGOING - Under DPR Preparation/Finalisation/Approval				
6.	Lower Jehlum HEP, 3x35 MW J&KSPDC 1978-1979 T&G – BHEL RMU&LE 2022-27	105(LE) + 27(U) - NIL	Detailed scope of work will be arrived after Preparation of DPR.	DPR to be prepared in due course.

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations during 2022-27

NORTHERN REGION

UTTARAKHAND

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A - SCHEMES ONGOING - Under Implementation				
7.	Chilla (Ph-B), 4x36 MW UJVN LTD. 1980(U-1 to 3) 1981(U-4) T&G – BHEL RMU&LE 2024-25	144 (LE) + 12 (U) 490.56 NIL	-Replacement of existing Kaplan turbine and their complete auxiliaries, refurbishment of existing generators. Complete replacement of switchyard equipment along with Power Transformer, Replacement of 11 kV system, New Excitation system, New Electronic Governors, new control metering & protection system & SCADA, HM Works and Civil Works. -Upgrading from 4x36 MW i.e. 144 MW to 4x39 i.e. 156 MW.	• DPR prepared by M/s SNC Lavlin and approved by the Board. However, GoU cancelled signing of agreement. Revalidation of DPR was done by AHEC, IIT Roorkee and approved by UJVN Board on 26.11.13. Required changes in specifications were done by the committee. • Capital Investment approval accorded by UERC on 29.01.2016. Revised Tender floated. • Tender cancelled after BoD order dated 31.12.2018. • New tender uploaded on 09.01.2019 and Pre-bid meeting held on 11.02.2019. • Techno-commercial Bid opened on 30.05.2019. • Price bid opened on 22.08.2019. • BoD accorded financial approval of Rs. 212 Cr. including insurance, freight and duties & taxes for award of contract. • LOI issued to L-1 bidder M/s BHEL on 30.10.2019 & UJVN Ltd., received acceptance letter from M/s BHEL on 07.11.2019. • Agreement between M/s BHEL and UJVN Ltd signed on 22.01.2020. • Reverse engineering works has been started from 01.02.2020&stands completed.
8.	Tiloth, 3x30 MW UJVN LTD. 1984 T&G – BHEL RM&LE <u>2019-20</u> <u>2022-23</u>	90(LE) 162.9 128.44	-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 class F insulated stator & rotor winding. New SEE, Replacement of ABCBs by SF6 breakers, 11 kV Switchgear. Installation of numerical type protection system.	Agreement for Rs.139.9 Cr. signed with M/s Andritz Hydro Pvt. Ltd (AHPL) on 14.12.2016. <u>Works Completed</u> Reverse Engineering works of Unit-I completed on 14.07.2017. Unit-I handed over to M/s Andritz on 12.12.2018 for RM&LE works. It has been successfully synchronized with grid at a load of 3 MW on 21.03.2020. All parameters were found ok. After successful 72 hour trial run, Unit has been taken over by UJVNL for further

			-Civil works of barrage, power channel, power station & Tail race channel.	commercial operation. <u>Works Under Progress</u> Design, Engineering and Manufacturing works are in progress. • RMU of machine no. 3 under progress. • Dismantling of MIV of machine No. 2 started on 04.03.2021 and completed on 13.03.2021. • Bulk Head installation completed on 16.03.2021. • Installation of refurbished MIV of machine no. 3 completed on 25.03.2021. • MIV of machine No. 2 transported to M/s AHPL works, Prithla for refurbishment on 13.04.2021. • RMU works of machine no. 3 (2nd unit under RMU) completed and machine boxed up on 18.06.2021. Machine successfully test synchronized with grid on 30.06.2021. 82.5% work completed.
9.	Dhalipur, 3x17 MW UJVN LTD. 1965-70 T - Litostroj, Yugo. G - Rade Koncar, Yugo RM&LE <u>2020-21</u> <u>2022-23</u>	51 (LE) 152.65 46.74	-Replacement of turbine, new governors, new sets of guide vanes. Repairing of various gates and gantry cranes. -Refurbishment of generators with new stator core and new class F insulated stator & rotor winding. New SEE, Replacement of 11 kV Switchgear. Installation of numerical type protection system. -Civil works of power channel, power station & Tail race channel.	Order placed on M/s Gogoal Energo Pvt. Limited (GEPL), New Delhi for Rs 78.25 Crs. on 28.12.2016. <u>Work Completed</u> Reverse Engineering Works for Unit-B completed on 19.07.2017. Order for optional items and extra items placed on M/s GEPL on 20.06.2018& 29.09.2018. Computational Fluid Dynamics (CFD)analysis for Turbine has been witnessed and approved. <u>Work Under Progress</u> Design and Engineering works are in progress. Unit-B handed over on 11.02.2019after shutdown for RM&LE works. Supply of hydro-mechanical and electro-mechanical equipments completed. Dismantling and refurbishment work, supply and erection work completed. Commissioning and synchronization of Unit-B have been successfully completed. Supply related to Unit-A and Unit-C is under progress 65% work completed.

B - SCHEMES ONGOING - Under Tendering

10.	Ramganga, 3x66 MW UJVN LTD. 1976 T&G-BHEL RM&LE <u>2017-18</u> <u>2022-27</u>	198 (LE) 455.20 NIL	-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 was prepared in-house and was reviewed by AHEC, IIT Roorkee. Specifications were vetted by AHEC. Tender on turnkey basis floated on e-portal. • Tender has been scrapped as UERC declined Investment approval on 12.02.2016. • Appeal has been filed in the Appellant Tribunal, New Delhi.
11.	Dhakrani, 3x11.25MW UJVN LTD. 1965-70 T - Litostroj, Yugoslavia. G - Rade Konkar, Yugoslavia RM&LE <u>2020-21</u> <u>2025-26</u>	33.75 (LE) 137.31 NIL	-Replacement of turbine, new governors, new sets of guide vanes. Repairing of various gates and gantry cranes. -Refurbishment of generators with new class F 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	• Decision was taken to cancel KfW loan. Approval accorded for inviting fresh bids on National Competitive Bidding (NCB) route through domestic funding. • DPR was revised based on present price level and Specifications were reframed. Revised DPR was approved by Board on 30.09.2015. • UERC accorded approval on 27.06.2017. • Financial approval accorded by CPC on 16.11.2017. BoD directed to put up the proposal again with modifications. Revised e-tender uploaded on e-portal on 16.09.2019. E-tender has been extended on 18.11.2019. Due to CORONA pandemic E-Tender extended on dated 27.06.2020 on e-procurement portal. Last date for submission of bid on website is 15.07.2020 & opening date of bid on website is 20.07.2020. Part-I of bid opened. • AHEC IIT Roorkee has been engaged as an external agency for techno-commercial bid evaluation. • Technical & Financial bid has been opened and bid evaluation work completed. • After recommendation of CPC dated 08.02.2021 and CoD dated 11.02.2021, agenda has been submitted to BoD for approval. • LOI has been issued to M/s Flovel on 25.06.2021

C- SCHEMES ONGOING - Under DPR Preparation/Finalisation/Approval

12.	Kulhal, 3x10 MW UJVN LTD. 1975 T&G - BHEL RM&LE <u>2022-27</u>	30(LE) 115.24 NIL	-Replacement of turbine, new governors, new sets of guide vanes. Repairing of various gates and gantry cranes. -Refurbishment of generators with new stator core and new class F insulated stator & rotor windings. New SEE, Replacement of 11 kV	• LoI issued to M/s Gogoal-Emico (Consortium) on 04.03.2014. UERC declined approval vide order dt. 13.03.2015 with the advice that on account of obsolescence of protection equipment, suitable proposal be mooted. UJVNL approached commission with suitable modifications. However,
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			Switchgear. Installation of numerical type protection system. -Civil works of barrage, power channel, power station & Tail race channel	UERC declined Investment approval vide order dated 11.02.2016 due to better availability of the machines. • Appeal has been filed in the Appellant Tribunal New Delhi. • Reply related to Kulhal power house as required by Hon'ble Appellant Tribunal New Delhi submitted on 29.02.2020
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State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations during 2022-27

WESTERN REGION

MADHYAPRADESH

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES ONGOING - Under Implementation				
13.	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 R&M 2022-23	- 200 4.97	Unit-3 Rewinding of generator with class F insulation from class B. Common Works: 1. 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. 2. Supply, Testing	All the units with associated auxiliaries' system submerged on 14.09.2019 due to over flooding in its catchment area. The RLA studies carried out by M/s WAPCOS in unit no. 1 & 5. The selection of these units was made due to Unit 1,2 & 3 of same design and Unit 4 & 5 also being of same design. As per the RLA studies the condition of machines was found good but the revival of the units may not be sustained performance due to prolonged age of more than 50 years therefore WAPCOS recommended for R&M of the units in phased manner i.e. the revival of some unit and R&M of other. As such unit-5 is synchronized on 10.09.2020 & unit no. 1 synchronized on 31.10.2020. The DPR & tender document preparation etc. for the R&M works is being taken up soon. Order for DPR preparation is placed on to M/s WAPCOS. The DPR is under finalization. RLA Study of Unit-3 completed and found that the condition of the components is satisfactory except hot spots detected in core. Electromagnetic Core Imperfection Detection (ELCID) test carried out after repair of hot spots did not indicate substantial improvement. Re-Tender is to be issued soon. 1. Order has been placed on M/s. Electro Services, Vadodara on 13.04.2016. All breakers commissioned. 2. Under approval stage.

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			12. Supply, Installation Testing & commissioning of 132/33 kV 20MVA Transformer-1 no. 13. Supply, erection, Testing & Commissioning Microprocessor based digital static excitation system for unit 1 to 5. 14. Procurement, erection, testing & commissioning of 4 Nos. 132 KV SF6 Circuit Breakers. 15. Supply, Installation & commissioning of 12 no. PLCC cabinet & 1 No. Level meter.	12. DPR is to be prepared 13. Shall be covered in the R&M of the units. 14. Completed. 15. Under estimation.

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations for completion during 2022-27

SOUTHERN REGION

KERALA

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES ONGOING - Under RLA Studies				
14.	Idukki 2nd Stage, 3x130 MW KSEB RM&LE 2022-27	390 (LE) - -	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies is proposed.

**State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power
Stations for completion during 2022-27**

SOUTHERN REGION

ANDHRA PRADESH

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES ONGOING - Under RLA Studies				
15.	Machkund, 3x17 MW (St.-I) & 3x23 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 RMU&LE 2025-26	120 (LE)+ 9 (St.-I)(U) 500 (approx.) -	Replacement of entire equipment except concrete embedded parts of Hydro system and water conductor system. Note: Three units of Stage-I each rated at 17 MW are proposed to be uprated to 20 MW.	The Govt. of AP (APGENCO)& Govt. of Odisha(OHPC) mutually agreed for carrying out RM&U by sharing the costs & benefits in the ratio of 50:50.Modified agreement was entered on 23.10.2020 by both APGENCO and OHPC officials. The Project Administration Committee (PAC) consists of Chairman and Directors of OHPC and APGENCO shall have full powers in both administrative and financial matters with regard to R&M of the project. The PAC meeting is yet to be convened. M/s Voith Hydro Pvt. Ltd. inspected the Units from 12.11.2018 to 14.11.2018 and submitted their budgetary offer along with detailed scope of works. Offer submitted by M/s Voith was found to be on higher side. Revised offer received from M/s Voith. The DPR was prepared with the revised offer of M/s Voith Hydro and submitted to APGENCO management for getting approval from OHPC/ Odisha Government. APGENCO Management exploring the necessity to carry out the RLA studies for assessment of condition of main equipment including concrete structures or only concrete structures in view of complete replacement of turbine generator units. In Machkund HEP, Stage-I Units were running at derated capacity of 16 MW and Stage –II Units were running at derated capacity of 21 MW against their original capacity of 17 MW and 23 MW respectively.

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
16.	Tungabhadra HE(J) Scheme, (4x9 MW) APGENCO 1957-64 Unit-1&2 T-Escherways, Zurich G- Browin Bovert, Switzerland Unit-3&4 T- Hitachi, Japan G- Toshiba,Japan RM&LE 2025-26	36 (LE) 175 -	Replacement of entire equipment except concrete embedded parts of Hydro system and water conductor system.	Tender floated for carrying out RLA Study on one Unit of TB Dam Power House & one Unit of Hampi power house. M/s Andritz Hydro Pvt. Ltd. inspected units from 22.11.2018 to 23.11.2018 for assessment of scope of works and submitted budgetary offer along with detailed scope of works on 27.03.2019. DPR will be prepared after obtaining budget Sanction from TB Board. The expenditure will be measured in the ratio of 80:20 equity amount between AP and Karnataka. The letter was addressed to Principal Sectary to Government. AP vide 10.11.2019 for the consent towards meeting 80% share of R&M expenditure of TBHES. The letter was addressed to M/s KPTCL also vide dated: 18.11.2019 for arranging consent from Karnataka for their concurrence towards meeting 20% share of R&M expenditure of TBHES.
17.	Hampi Canal PH, (4x9 MW) APGENCO 1958-64 Unit-1&2 T-Charmilles, Switzerland G- Browin Bovert,Switzerland Unit-3&4 T- Hitachi, Japan G- Toshiba,Japan RM&LE 2025-26	36 (LE) 175 -		
18.	Lower Sileru, (4x115 MW) APGENCO RM&LE 2022-27	- 350 -	Residual Life assessment (RLA) studies/ Life Extension study on civil structures, penstocks, Hydro Mechanical, Control & Protection equipment of all four units (4x115 MW) of LSHEP and preparation of detailed Project Report (DPR) for Renovation, Modernisation & Upgrading of all four units of LSHEP.	The 175 th board meeting of APGENCO approved to conduct the RLA/LE studies and Preparation of DPR for R, M & U of all four units (4x115 MW) of LSHEP. Work has been awarded to M/s MECON for Rs 1.8 Crore to carry out RLA. Works is yet to commence.

**State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power
Stations for completion during 2022-27**

SOUTHERN REGION

TAMILNADU

(Amount in Rs. Crores)

S. No.	Scheme/ Category Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A - SCHEMES ONGOING - Under Implementation				
19.	Moyar PH, 3x12 MW TANGEDCO 1952-53 T – Boving,UK G -Metropolitan Vickers,UK RMU&LE 2023-24	36 (LE)+ 6 (U) 67.05 Nil	Planning, design, model testing, engineering, manufacture, procurement/ supply of new components and spares at site, painting including penstock (internal and external), insurance, dismantling, capital repairs, erection, testing and commissioning of 3 nos. hydro generating units including P.G. Test in any one of the units. Associated technological, civil, mechanical, electrical works as required with new TG set from 3x12MW to 3x14 MW and Plant, Equipment & facilities.	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. MECON submitted final DPR for works on 07.02.15. Administrative approval accorded on 04.06.2016. Techno-commercial Bid opened on 15.02.2019. TANGEDCO Board in its 91 st Meeting held on 22.11.2019 for Placing Orders on L1 tenderer M/s. Andritz Hydro Private Limited, New Delhi and Letter of Intent (LOI) has been issued on 28.11.2019. Contract agreement has been executed on 14.01.2020. Unit-2 handed over to M/s. AHPL for Reverse Engineering works on 27.01.2020 & completed on 02.12.2020. Supply of Material for RMU work is initiated. Drawing submission by M/s AHPL and approval by TANGEDCO is under progress.
20.	Kodayar PH-I, 1x60 MW TANGEDCO 1970 T-Vevey Engg. works, Switzerland G-Alstom, France RMU&LE 2023-24	60 (LE)+ 10 (U) 88.48 Nil	Planning, design, CFD/model testing, engineering with RE, manufacture, procurement/ supply of new components and spares at site, painting-penstock, insurance dismantling, capital repairs, erection, testing and commissioning of P.G. Test. Associated technological, civil, mechanical, electrical works as required with new TG set from 1x60MW to 1x70MW and Plant, Equipment & facilities.	Contract was 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. They have completed the study and furnished the final DPR. Administrative approval accorded on 03.02.2017. Techno-commercial Price-Bid opened on 05.09.2019. The BLTC in its 314 th Meeting held on 18.11.2019 approved and recommended the proposal for placing works contract order on the L1 tenderer i.e. BHEL, New Delhi to TANGEDCO Board. The proposal was approved by TANGEDCO board on 26.02.2020. Letter of Intent issued to M/s BHEL on 09.03.2020. Agreement has been executed on 22.10.2020. Reverse Engineering Works has commenced from 11.02.2021.

S. No.	Scheme/ Category Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
B - SCHEMES ONGOING – Under DPR Preparation/ Finalisation/ Approval				
21.	Kodayar PH-II, 1x40 MW TANGEDCO 1971 T-Yugoslavia G- Yugoslavia. RMU&LE 2026-27	40 (LE)+ 6 (U) - Nil	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.	M/s 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.
C – SCHEMES ONGOING – Under RLA Studies				
22.	Kundah-I, 3x20 MW TANGEDCO 1960-64 RM&LE 2022-27	60 (LE) - Nil	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.
23.	Kundah-II, 5x35 MW TANGEDCO 1960-65 RM&LE 2022-27	175 (LE) - Nil	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.
24.	Kundah-III, 3x60 MW TANGEDCO 1965-78 RM&LE 2022-27	180 (LE) - Nil	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.

S. No.	Scheme/ Category Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
25.	Kundah-IV, 2x50 MW TANGEDCO 1966-78 RM&LE 2022-27	100 (LE) - NIL	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.
26.	Kundah-V, 2x20 MW TANGEDCO 1964-88 RM&LE 2022-27	40 (LE) - NIL	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.
27.	Mettur Tunnel, 4x50 MW TANGEDCO 1965-66 RM&LE 2022-27	200 (LE) - NIL	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.
28.	Sarkarpathy, 1x30 MW TANGEDCO 1966 RM&LE 2022-27	30 (LE) - NIL	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.
29.	Sholayar-II, 1x25 MW TANGEDCO 1971 RM&LE 2022-27	25 (LE) - NIL	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.
30.	Suruliyar, 1x35 MW TANGEDCO 1978 RM&LE 2022-27	35 (LE) - NIL	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.

S. No.	Scheme/ Category Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
31.	Kadamparai PH, 4x100 MW TANGEDCO 1987-89 RM&LE 2022-27	400 (LE) - NIL	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.
32.	Aliyar 1x60 MW TANGEDCO 1970 RM&LE 2022-27	60 (LE) - NIL	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.

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations for completion during 2022-27

SOUTHERN REGION

KARNATAKA

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
A - SCHEMES ONGOING - Under Implementation				
33.	Nagjhari, U-1 to 3, 3x150 MW KPCL 1979 (U-1), 1980 (U-2), 1981 (U-3) T&G - BHEL RM&LE 2023-24	450 (LE) 222 13.108	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, spare guide vanes, runner & shaft etc. Replacement of Generator gauge panel, Brake & Jack assembly, oil coolers, Thrust collar, unit auxiliary panels, Generator coupling bolts, HS lubrication system, LEB ring. Replacement of 6 nos. of Unit Auxiliary Panels (UAPs) and retrofitting of 4 nos. breakers, replacement of electro-mechanical relays by numerical relays in 5 incomers, bus coupler & 4 nos. outgoing feeders in common auxiliary panel. SCADA System which includes erection & commissioning of Auto sequencer, installation of Dynamic disturbance recorder, online vibration monitoring system planned in phased manner, fire protection system, Commissioning of Thermo signaling devices in addition to RTD's, replacement of hydraulically operated valves by electrically operated Solenoids.	- Order placed on M/s BHEL on 24.02.2018 for Rs. 99.25 Crores (Excluding taxes, freight and insurance) for Turbine, MIV, Governor & its accessories for Units 1, 2&3. Part material received at site. Unit-2 will be handed over for R&M works, once all the materials of the unit are received at site. - The proposal of implementing new design generator rotor of M/s BHEL for units 1, 2 & 3 is under review. - Order placed on M/s Balaji Electro Controls Pvt. Ltd. on 19.05.2018. - Erection and commissioning works of UAPs for all Units completed. Erection and Commissioning of panels, retrofit of equipment's in CAP completed. Work will be taken as per DPR after completion of R&M works of Unit-1, 2& 3.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			protective painting of switch yard structures. • Relays and control panels - replacement of numerical relays of control panels, GT panel, auto synchronous panel. • SCADA - New SCADA System is to be implemented. • Excitation system - Replacement of excitation system, digital voltage regulator.	has been accorded for the sanction of grant from PSDF. Detailed order issued to M/s APPSIL on 21.05.2021 and entered into agreement on 17.06.2021. Engineering work is in progress. Preparation of Estimate and technical specification to avail administrative approval to issue NIT is in progress. Contract agreement signed with M/s ABB India Ltd. on 27.06.2018. Erection & commissioning of panels of all units and PSS tuning completed.
36.	Kodasalli Dam Power House, (3x40MW) KPCL 1998-1999 T&G - BHEL RM&LE 2022-23	120 (LE) 50.60 1.47	• Turbine - Replacement of runner cones, guide vane servo motor, pressure oil supply valves, cooling water supply valves, refurbishment of top/bottom surface of pivot rings, turbine top cover, runner blades, blade seals, runner chamber, draft tube, turbine guide bearing. Cleaning & painting of inside surfaces of underwater parts. • Generator - Replacement of air coolers, cleaning of stator winding, stator core & frame assembly, tightening of wages, rotor pole assembly, break pad assembly, replacement of UAP, ACDB and CAP. • 220kV Switchyard - Replacement of breakers, protective painting of switch yard structures.	KERC accorded approval. M/s BHEL furnished Techno-commercial offer for Turbine and Generator works. Consent of all State distribution companies have been obtained. Presently, works were deferred as the units are running smoothly with regular routine preventive & annual maintenance works. <u>LTAC Panels: UAP, ACDB and CAP:</u> Word order dated 21.12.2020 is placed on L1 bidder M/s Lotus power gear. After furnishing of comments on preliminary drawings, revised drawing submitted by the firm are under review. Financial bid for procurement of breaker opened and FO obtained. Approval has been accorded for the sanction of grant from PSDF. Detailed order issued to M/s APPSIL on 21.05.2021 and entered into agreement on 17.06.2021. Engineering work is in progress.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			Relay and control panels& DCS based SCADA system.	accessories are in good condition. Requested for Execution of some of the works & procurement of spares from site itself. Contract Agreement signed with M/s ABB Limited for Rs. 2,45,97,408/- on 23.01.2018. Supply of Plant SCADA, DCS for Unit & common auxiliaries, Network & metering panel, Line & Bus coupler C&R Panel, ACDB & DCDB, UPS System, Modular desk, Cables, GPS, LVS, energy meter & EMS etc., completed. Erection & commissioning of panels for Bus coupler & line (4 nos. and U#2) is completed. Unit-1 could not be taken up due to COVID-19. Unit-1 work will be planned based on availability of Unit clearance.
C - SCHEMES ONGOING – Under DPR Preparation/ Finalisation/ Approval				
39.	Supa Dam Power House, (2x50MW) KPCL 1985 T&G - BHEL RM&LE 2023-24	100 (LE) 47.91 2.2	Electro-mechanical Works: Turbine - Refurbishment of underwater turbine components. Generator and its auxiliaries- Replacement of air coolers, flow meters for cooling water system. Inspection of Stator & Rotor. • UAP & CAP • 110kV Switchyard, Replacement of breakers, Station 11 kV UAT switch gear panels. • SCADA -All instrumentation and field devices of E&M equipment, New annunciation system for units, auto & manual synchronizer and temperature recorder at machine hall, etc. • Other systems: New smoke	KERC accorded approval. Consent of all State distribution companies have been obtained. Electro-mechanical works will be taken up later. • Order placed on M/s Balaji Electro Controls Pvt. Ltd. on 19.05.2018. Erection& commissioning of all UAP's and CAP's completed. Work will be taken up in phased manner.

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			detectors & MVWS system for cable ducts, new battery charger with battery bank, overhaul/Reconditioning GT(spare), Renovation of emulsifier system of Unit 1 & 2, etc. • Auxiliary & Colony Power Supply- Providing auxiliary supply for power house and extending power supply to Ganeshgudi colony from Supa Power House. Civil works: • Protection to upstream reservoir left and right banks (Left bank), Improvement to eroded portion below gabions at left and right bank downstream, providing shotcrete to hillock portion at Left bank upstream side of Supa Dam, etc.	Order placed on M/s RR Durafabs Pvt Ltd., Hyderabad, at a cost of Rs. 3.15 crores. Drawings approval, Inspection of equipments& issue of dispatch clearance is in progress. 5MVA, 110/11kV Power Transformer received at site. Control and Power cable laying is completed. Retrofit of relays, panel meters, energy meters, indicating lamps and control switches in C&R panel completed. CEI, GoK accorded approval for charging of transformer bay. Transformer bay test charged on 10.03.2021 and load tested on 26.03.2021. Civil works are under progress.
40.	Sharavathy Generating Station, (10x103.5MW) KPCL 1964-77 T- U:1-8 - Neyrpic, France, U:9-10- BHEL, G- U:1&2-Hitachi, Japan, U:3to8 –GE Co, USA, U:9&10- BHEL, RM&LE 2023-24	1035 (LE) 196.56 11.07	Electro-mechanical works: Overhauling of all spherical valves. NDT tests on turbine components and R&M works. Replacement of instruments compatible to SCADA, etc. Generator and associated components: General checking and replacement of air coolers/ tubes. R&M of SEE. Other works: Up-rating/ redesign of NGT to suit up-rated capacity. Providing 2x115 MVA transformer for Unit-9 & 10. Hydro-mechanical Works:	KERC accorded approval. Consent of all state distribution companies have been obtained. Order was placed for overhauling of Spherical valves for Unit-4, 7 & 8. Other electro-mechanical works will be taken up later. GT of Unit-10 commissioned on 28.02.2018 and GT of Unit-9 commissioned on 30.03.2018. Preparation of bid documents

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			Overhauling of tunnel Stop log gates, Gates and gantry crane of surge shaft, R&M of BF valves, Civil structure (rails) for movement of gantry crane, cleaning and painting of internal and exterior surfaces of all penstocks, etc. Civil Works: Under water scanning, plugging, Drilling, grouting to Talakalale Dam, Improvements and Asphalting to roads, etc.	and technical specification is in final stage
41.	MGHE (Mahatma Gandhi HE), 4x13.2 MW (St.I) 4x21.6 MW (St.II) KPCL 1947-52 T - Boving, UK G - BTH, UK(St.I) G - GE, USA(St.II) RM&LE 2023-24	139.2 (LE) 97 7.75	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 he replacement of damaged parts etc. Generator and its Auxiliaries Refurbishment of generator components along with air coolers, Fire protection system with non CO₂ gas system (Clean gas based) for generators, replacement of relays with numerical relays etc. 110kV switchyard Complete renovation of outdoor with all line and unit bays. 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.	DPR sent to KERC & all ESCOM's on 24.12.2018.KERC accorded approval. Consent of all State distribution companies have been obtained. Electro mechanical works will be taken up at a later date. Work order on M/s CPRI has been placed to conduct RLA studies on Generators. Order placed on M/s GE T&D India LTD. at a cost of Rs. 8.63 crores towards supply portion, Rs. 2.77 crores towards erection & Commissioning, Rs, 87,40,00/- towards Civil works. At Stage-I, major materials inspected and dispatch clearance issued. Dismantling works completed. Civil tower foundation works completed and erection of structures is completed for phase 1. Erection, Testing and commissioning of switchyard equipments completed for

S. No.	Scheme/ Category/ Completion Schedule (Original/ Anticipated)	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			Replacement of 8 Nos. Generator Transformer.	phase-1. Supply of switchyard equipment's for phase-2 completed. Dismantling of switchyard structures and equipments of phase-2 completed. Civil works for tower foundation completed. Erection of structures and all switch gear equipments completed. Bus-1 charged on 30.03.2021. Linking of phase 1&2 110kV Bus was completed and charged on 01/04/2021. In the first phase replacement of 1st stage 4x16.5MVA GTs taken up. Contract agreement signed with M/s Toshiba on 22.11.2018 and supply to be completed by August, 2019. All GT's reached at site. Erection and Commissioning of GT-1 &GT-3completed.

**State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power
Stations for completion during 2022-27**

NORTH EASTERN REGION

MANIPUR(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES ONGOING – Under Implementation				
42.	Loktak, 3x35 MW NHPC USSR 1983 LMZ T-LMZ G-Leningrade, (U-1) T&G – BHEL(U-2&3) RM&LE 2023-24	105 (LE) 273.59 13.83	i) Activities covering main equipments i.e. turbine, generator, generator transformers, other plant equipments essential for life extension of the units as well as station. ii) Activities required for ensuring efficient and sustained performance of unit as well as station. iii) Implementation of Control, Monitoring & Protection system of Power Plant such as Electronic Governors, Static Excitation System, numerical relays, SCADA. iv) Refurbishment of water conductor system and associated Civil/HM works including infrastructure works.	Petition filed in CERC on 08.08.2018 at total Estimated Cost of Rs. 273.59 crores including IDC & FC (Price Level: Sep'17).Petition on the appeal filed by respondent state Assam (APDCL) was heard in CERC on 27.02.2019. CERC has approved the proposal of R&M of Loktak Power Station on 24.07.2019. a) E&M: Three out of four E&M Packages i.e. Bus Duct, EOT Crane and DG Set are awarded. DG set received at power station. However, tender of EM-1 (Main) Package got cancelled on 08.12.2020 due to abnormally high price quoted by L-1 bidder. Reformation of EM-1(Main) package in sub packages completed. Thereafter, EM-1 (Main) package is divided into 13 sub packages out of which tender of 6 sub packages are in advanced stage of finalization. b) Civil: Three out of five Civil packages i.e. “Restoration of Drainage system & Slope Protection at By-Pass Tunnel Area & Penstock area”, “Construction of vertical bored cast-in-situ pile work at bye pass tunnel area” and “Civil works of Ithai barrage and power channel” are awarded and work is in progress. Tendering of remaining two civil packages i.e. “Civil works of power house complex including valve house, surge shaft and tail pool” and “Under water concrete repair and restoration at barrage, intake structures, emergency gate” will be initiated in September, 2021 as per revised shutdown schedule of generating units owing to cancellation of EM-1 package. c) HM: HM Package has been awarded and work is in progress. d) Misc. & Infrastructure works: LOA for dredging of Khordak channel awarded on 09.06.2021.

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations for completion during 2022-27

NORTH EASTERN REGION

ASSAM

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES ONGOING – Under DPR Preparation/ Finalisation/Approval				
43.	Khandong Power Station, 2x23 MW NEEPCO T&G- BHEL 1984-85 RM&LE 2024-25	46 (LE) 203.33 2.01	i) Activities covering main equipment i.e. Turbine, Generator, GTs and other plant equipment for efficient and sustained performance of the units as well as states. ii) Activities for integration of control, monitoring and protection system of power plant such as Electronic/ Digital Governors, SCADA SAS etc. iii) Renovation of Switchyard with capacity enhancement along with replacement of instrument transformers of higher accuracy class, PI, LA, SST etc. iv) Activities having direct impact on improvement of generator/turbine efficiency, machine availability etc.	1. DPR from CPRI, Bangalore received in the month of June'2018. Financial aspects and leveled tariff finalized and submitted to Management for approval. 2. Communications are being made to beneficiary states of the Power Station to obtain their consent for RM&LE proposal. Already four beneficiary states consented for the proposal. 3. Some BoP items like DG set, Firefighting system, Penstock Protection BFV, etc. procured and installed under R&M budget. 4. Detail engineering on the finalized scope of the works is in progress. 5. DPR has been submitted to CEA. 6. Petition for R&M proposal has been filed before CERC. 7. Consent on DPR & proposed Tariff of Khandong R&M obtained from all the beneficiary states of NER. 8. Machine resize and design energy review has been approved by CEA Scheme is rescheduled for completion in 2024-25 considering the purpose for extension of normative life of hydro to 40 years.

S. No.	Scheme/ Category/ Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
44.	Kopili Power Station, 4x50MW NEEPCO T&G- BHEL 1988 RM&LE 2023-24	200 (LE) 1117.07 132.97	i) Activities covering repair/rectification of tunnel, PPV, replacement of both the penstocks along with related civil works, stability study of civil structures, refurbishment of intake gate, dam etc. ii) Activities covering main equipment i.e. Turbine, generator, GTs, other plant equipment for efficient and sustained performance of the units as well as the station. iii) Activities for integration of Control, monitoring and protection system of power plant such as Electronic/digital Governors, SCADA, SAS etc. iv) Renovation of SY equipment along with replacement of instrument transformers of higher accuracy class, PI, LA SST & SAT etc. v) Activities having direct impact on improvement generator/turbine efficiency, machine availability etc. vi) Implementation of AGC in all the units.	i) <u>CEA/CWC has cleared Cost Estimate of renovation and Modernisation for Rs 824.12 Crs. at Jan 2021 PL excluding IDC and FC.</u> ii) 1 st 750 KVA supplied DG sets successfully commissioned and in service. iii) Erection & Installation of UAB & SSB panels completed, commissioning pending. iv) RLA studies of underwater parts completed v) Integrity test of embedded & exposed parts of spiral casing completed. vi) Works related to Rain watering dewatering system, DT drainage & dewatering system along with MIV hall flood water dewatering system in progress. vii) Order for supply of EM equipment's concerned with power house awarded to M/s ANDRITZ and their personnel are at site for collection of data related to reverse engineering. viii) Order for supply of 5 nos. of 65 MVA Generator Transformers awarded to M/s BHEL. ix) Order for supply of 2 nos. of Butterfly Valves awarded to M/s BHEL. x) Order for 03 nos. of MIV placed to M/s VOITH. xi) 01 no. of damaged MIV send to M/s VOITH for repairing and modernisation, expected delivery after repairing is Sep' 21. xii) Order for Overhauling of 150/25 T main Power House EOT cranes Placed. xiii) Order for over hauling 40 T EOT Crane at valve House & 17 T DT crane placed. xiv) Order for supply of UAT placed. xv) Order for supply of both Power & Control cables placed. xvi) Order for supply of LP compressed air system placed. Petition to CERC submitted in the month of August, 2020 for obtaining approval of the Reconstruction, R & M proposal.

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations for completion during 2022-27

NORTH EASTERN REGION

MEGHALAYA

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
C – SCHEMES ONGOING – Under Tendering				
45.	Umiam Stage-III, (Kyredemku lai) 2x30 MW MePGCL 1979 T&G - BHEL RMU & LE 2022-27	60(LE) +6(U) 408 1.20	Mech. Equipments (Turbine & its auxiliaries): - Replacement of Runners, head cover & bottom ring, facing & wearing rings. Guide vanes, guide vane servomotor & gate operating mechanism. Guide bearings, coolers & bearing housing, turbine shaft, shaft seal & sealing box. Upper draft tube & draft tube liner. Inlet valve along with its servomotor & by-pass valve. Governor and turbine control system, oil pressure supply system, compressed air supply system, cooling water supply, drainage & dewatering system, auxiliary machine control etc. - Refurbishment of spiral case and stay ring, penstock & by-pass valve etc. Elec. Equipments (Generator & its auxiliaries): - Replacement of stator cores, stator windings & neutral leads. Rotor spoke & rim, rotor winding & excitation leads & rotor pole, Shaft, thrust & guide collars, thrust runner, coupling bolts & coupling cover. Thrust bearing pads. Segment type upper & lower guide bearings and oil coolers. Brake ring & brake/jack system, air cooler, current transformers, fire protection system, instruments & relays, terminal boxes on control cubicle, all cables, AC excitation system, digital AVR & excitation cubicle, excitation transformer etc.	The feasibility study was conducted and completed by JV of TEPSCO & TEPCO, Japan under JETRO grant and IIT Roorkee submitted head measurement studies. An updated DPR as per CEA's recommendation was prepared by MePGCL and posed the scheme for JICA funding through MoP. The Department of Economic Affairs vide letter dated 20.10.2016 requested to confirm the 20 percent Counterpart Funding of the state and also provide the debt sustainability confirmation/ self-certification in respect of the 10 percent loan component of the external assistance of 80 percent of the project cost. The JICA study team, visited Shillong from 2nd to 7th October, 2017, as part of the "Preparatory Survey". After completion of the preparatory study, Minutes of Discussion signed among MePGCL, MoP and JICA. Bids opened on the 28.01.2019. Only two firms submitted their proposal, i.e M/s Tokyo Electric Power Services Co. Ltd. in JV with Nippon Koei Co. Ltd and M/s Integral S.A. in JV with Rodic Consultant Pvt. Ltd. The Technical Evaluation Report was prepared and the same was approved by the Board on 20.03.2019. Contract Agreement was signed on 26.08.2020. Concurrence of Contract Agreement approved by JICA on 08.12.2020 and LOA issued to M/s Integral S.A. in JV with Rodic Consultant Pvt. Ltd on 11.12.2020. Bid document for E&M package prepared and under scrutiny by JICA.

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
			- 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. 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.	Preparation of Bid document for Civil & Hydro mechanical works is in progress.

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES ONGOING - Under RLA Studies				
46.	Umiam-Umtru Stage-IV, 2x30MW MePGCL, 1992 T&G-BHEL R&M 2022-27	- - -	Detailed scope of works will be arrived after finalization of specifications based on RLA study report.	EOI for RLA studies has been approved and put up for approval of Board of Director.

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations for completion during 2022-27

EASTERN REGION

WEST BENGAL

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit (MW)/ Estimated Cost/ Expenditure	Scope of work	Present Status
SCHEMES Ongoing - Under DPR Preparation/ Finalisation/ Approval				
47.	Maithon U-1&3, 2x20 MW + 1x23.2 MW DVC 1957-58 T - Neyrpic, France G - Siemens, W.Germany RM&LE 2024-25	40 (LE) 56.034 7.76	1. Scope to be prepared based on DPR. 2. Replacement/ refurbishment of the Governing System & Unit control cum protection system of Units- 1,2&3. 3. Renovation work of 132/33 kV Switchyard.	Work order for RLA study, uprating study, preparation of DPR, specification etc. placed on M/s MECON on 11.04.2019. RLA study of Unit-1 completed in October'19 and of Unit-3 on 06.01.2020. - Review of DPR by CEA for R&M/ RM&U work is under progress for techno-economic clearance. - After obtaining techno-economic clearance from CEA, NIT for R&M/RM&U will be published. Work order placed on M/s ABB India Ltd. On 08.08.2019. All the supply under scope of Unit Control system reached MHS site. Detail Engineering: 100% Completed DVC has completed the work of renovation of Maithon switchyard at a cost of Rs 6.98 Crs.

State-wise Programme/ Status of Renovation and Modernisation Schemes of Hydro Power Stations for completion during 2022-27

EASTERN REGION

JHARKHAND

(Amount in Rs. Crores)

S. No.	Scheme/ Category/ Completion Target	Expected Benefit(MW)/ Estimate d Cost/ Expendit ure	Scope of work	Present Status
A - SCHEMES ONGOING - Under RLA Studies				
48.	Subernrekha, 2x65 MW JUUNL 1977-80 RM&LE 2022-27	130(LE)	Detailed scope of work will be arrived after finalization of specification based on RLA study report.	RLA studies is proposed.
B - SCHEMES ONGOING - Under Tendering				
49.	Panchet U-1, 2x40 MW DVC 1959 T - NOHAB, Sweden G - AEG, West Germany RMU & LE 2023-24	40 (LE) +6(U) 48.92 2.19	To be prepared based on DPR.	<u>UNIT-1</u> Order for RLA study including uprating, preparation of DPR and specifications placed on M/s Mecon on 11.05.2018. Walk down survey done. Non-Destructive Testing (NDT) completed on 25.08.2018. Revised RLA study submitted on 27.12.2018. Final DPR submitted on 21.05.2019. M/s Mecon submitted technical specifications. Technical acceptance awarded by CEA. • NIT for RM&U issued on 24-03-2021. • Three firms i.e.M/s. BHEL, M/s. Andritz and M/s. Voith have participated in the bidding process. • Techno-commercial bid opening date is scheduled on 20.07.2021.

ANNEXURES

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

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

Abbreviations: R&M – Renovation & Modernisation; U – 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) + 423.0(LE) + 331.03(Res.)]		

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

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

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

Annex- III
(Sheet 2/3)

(Sheet 2 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	Neriamanga-lam 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+2x	26.06	20.147	58.95(LE)	RM&LE	2004-05
24	Papanasam, TANGEDCO	SS	4x7	27.05	22.61	4.00 (U) + 28.00 (LE)	RMU&LE	2005-06
Orissa								
25	Hirakud-I (Sw.yard), OHPC	SS		9.85	15.88	-	R&M	2006-07
26	Hirakud-I,U-3&4, OHPC	SS	2x24	126.14	108.86	16.00(U)+ 48.00(LE)	RMU&LE	2005-06
West Bengal								
27	Maithon, U-2, DVC	CS	1x20	42.08	36.94	3.20(U)+ 20.00(LE)	RMU&LE	2004-05
Maharashtra								
28	Bhira Tail Race, MSPGCL	SS	2x40	1.60	0.70	-	R&M	2003-04
29	Tillari, MSPGCL	SS	1x60	4.50	4.24	6.0 (U)	RM&U	2004-05

Annex- III
(Sheet 3/3)

Sheet 5/5

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. (No.x.MW)	Est. Cost	Actual Exp	Benefits (MW)	Capacity after RMU&LE (MW)	Category	Year of Completion
				(Rs . in Crs)					
Himachal Pradesh									
1	Bassi, HPSEB	SS	4x15	124.25	158.26	6.0(U)+ 60(LE)	66	RMU&LE	2013-14
Jammu & Kashmir									
2	Lower Jhelum, J&KSPDC	SS	3x35	101.3	96.10	15.00(Res)	105	R&M+ Res.	2014-15
3	Sumbal Sindh, J&KSPDC	SS	2x11.3	25.00	24.59	-	22.6	R&M	2016-17
Uttarakhand									
4	Pathri, UJVNL	SS	3x6.8	113.25	108.3	20.40(LE)	20.4	RM&LE	2014-15
5	Khatima, UJVNL	SS	3x13.8	256.77	118.83	41.40 (LE)	41.4	RM&LE	2016-17
Uttar Pradesh									
6	Matatila, UPJVNL	SS	3x10.2	10.29	7.21	30.6 (LE)	30.6	RM&LE	2015-16
Andhra Pradesh									
7	Lower Sileru, APGENCO	SS	4x115	8.75	6.77	-	460	R&M	2013-14
8	Srisaillam RB, APGENCO	SS	7x110	16.70	17.60	-	770	R&M	2015-16
Telangana									
9	Nagarjuna Sagar Ph-I works, TSGENCO	SS	1x110+ 7x100.8	33.35	13.90	-	815.6	R&M	2012-13
Karnataka									
10	Supa, KPCL	SS	2x50	3.45	3.88	-	100	R&M	2014-15
11	Nagjhari,U-1 to 6, KPCL	SS	1x135 (U-6)	69.21	64.49	15 (U)	150	RM&U	2015-16
12	Sharavathy Genarating Station (Ph B), KPCL	SS	10x103.5	20.00	29.27	-	1035	R&M	2016-17
Kerala									
13	Idamalayar, KSEB	SS	2x37.5	14.50	13.22	-	75	R&M	2012-13

Annex- V
(Sheet 2 of 2)

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

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

Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE (MW)	Category	Year of Completion	
				(Rs. in Crs.)					Original	Anticipated
A. Completed Schemes										
Himachal Pradesh										
1	Ganguwal (1x29.25+2x24.2) & Kotla (1x29.25+2x24.2), BBMB	CS	1x24.2 (U-2) 1x24.2 (U-3)	14.19	9.58	48.4 (LE)	48.4	RM&LE	Completed in 2017-18	
2	Dehar Power House (Unit-6), BBMB (6x165)	CS	1x165	19.87	16.00	-	165	R&M	Completed in 2017-18	
Jammu & Kashmir (UT)										
3	Salal, NHPC (6x115)	CS	5x115	58.01	51.08	-	575	R&M	Completed in 2019-20	
4	Chenani, J&KSPDC (5x4.66)	SS	5x4.66	34.28	21.84	23.30 (LE)	23.3	RM&LE	Completed in 2021-22	
5	Ganderbal, J&KSPDC (2x3+2x4.5)	SS	1x4.5	18.00	3.26	4.5 (LE)	4.5	RM&LE	Completed in 2021-22	
Karnataka										
6	Bhadra River Bed units, KPCL (2x12)	SS	2x12	23.55	20.12	-	24	R&M	Completed in 2019-20	
Kerala										
7	Sholayar, KSEB (3x18)	SS	3x18	199.55	84.26	54 (LE)	54	RM&LE	Completed in 2020-21	
8	Idukki 1 st stage, KSEB (3x130)	SS	3x130	89.90	64.64	-	390	R&M	Completed in 2020-21	
Tamil Nadu										
9	Sholayar-I, TANGEDCO (2x35)	SS	2x35	90.44	66.94	70 (LE) + 14(U)	84	RMU&LE	Completed in 2019-20	
Sub Total (A)			1354.20	547.79	337.72	214.2 [200.20(LE) + 14(U)]	1368.20			
B. Ongoing Schemes – Under Implementation										
Himachal Pradesh										
10	Bhakra LB, BBMB (5x108)	CS	5x108	489.77	550.55	540.00(LE)+ 90.00 (U)	630	RMU&LE	2016-17	2021-22
11	Bhakra RB, BBMB (5x157)	CS	5x157	20.80	-	-	785	R&M	2021-22	2021-22
12	Dehar Power House (Unit-3), BBMB (1x165)	CS	1x165	23.00	8.67	-	165	R&M	2019-20	2021-22
13	Ganguwal & Kotla Power House, BBMB (4x24.2)	CS	4x24.2	3.12	-	-	96.8	R&M	2020-21	2021-22
14	Baira Siul, NHPC (3x60)	CS	3x60	341.41	295.69	180 (LE)	180	RM&LE	2020-21	2021-22
15	Bhabha Power House, HPSEB (3x40)	SS	3x40	76.03	81.13	120 (LE)	120	RM&LE	2017-18	2021-22
Punjab										
16	Mukerian St.I, St.II, St.III & St.IV, PSPCL (3x15, 3x15, 3x19.5&3x19.5)	SS	3x15, 3x15, 3x19.5& 3x19.5	136.07	47.46	-	207	R&M	2019-20	2021-22
17	Shanan HEP, PSPCL (1x50+4x15)	SS	1x50+ 4x15	37.81	20.21	-	110	R&M	2019-20	2021-22

(Sheet 2 of 2)										
Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No. x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE (MW)	Category	Year of Completion	
				(Rs. in Crs.)					Original	Anticipated
Uttar Pradesh										
18	Rihand, UPJVN (6x50)	SS	6x50	132.20	109.17	300 (LE)	300	RM&LE	2017-18	2021-22
19	Obra, UPJVN (3x33)	SS	3x33	58.80	43.98	99 (LE)	99	RM&LE	2017-18	2021-22
Madhya Pradesh										
20	Bargi, MPPGCL (2x45)	SS	2x45	7.98	2.42	-	90	R&M	2020-21	2021-22
21	Pench, MPPGCL (2x80)	SS	2x80	13.36	0.36	-	160	R&M	2021-22	2021-22
22	Bansagar Ton-I, MPPGCL (3x105)	SS	3x105	14.16	9.77	-	315	R&M	2021-22	2021-22
Gujarat										
23	Ukai, GSECL (4x75)	SS	3x75 (U-1,2,&4)	7.30	7.30	-	225	R&M	2021-22	2021-22
24	Kadana PSS, GSECL (4x60)	SS	4x60	11.26	6.18	-	240	R&M	2021-22	2021-22
Telangana										
25	Nagarjuna Sagar Ph-II works, TSGENCO (1x110+7x100.8)	SS	1x110+7x100.8	22.17	14.34	-	815.6	R&M	2018-19	2021-22
26	Nagarjuna Sagar Left Canal Power House, TSGENCO (2x30.6)	SS	2x30.6	30.99	2.00	-	61.2	R&M	2018-19	2021-22
Karnataka										
27	Munirabad Dam Power House, KPCL (2x9 + 1x10)	SS	2x9 + 1x10	4.60	2.20	-	28	R&M	2018-19	2021-22
Kerala										
28	Kuttiyadi, KSEB (3x25)	SS	3x25	377.41	-	75.00 (LE) + 7.5 (U)	82.5	RMU&LE	2021-22	2021-22
Odisha										
29	Hirakud-I OHPC (2x37.5)	SS	2x37.5 (U5&6)	158.77	97.82	75.00 (LE) + 12.2 (U)	87.2	RMU&LE	2017-18	2021-22
30	Hirakud-II (Chiplima), OHPC (3x24)	SS	1x24 (U-3)	65.67	48.01	24.00 (LE)	24	RM&LE	2017-18	2021-22
31	Balimela, OHPC (6x60)	SS	6x60	382.91	79.42	360(LE)	360	RM&LE	2019-20	2021-22
Sub Total (B)			5071.60	1882.02	867.46	1882.7 [1773(LE) + 109.70(U)]	3601.30			
Total (A+B)			6425.80	2429.81	1205.18	2096.9 [1973.20(LE) +123.7(U)]	4969.50			

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

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

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

Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE	Category	Completion Target
				(Rs. in Crs.)					
A. Ongoing Schemes – Under Implementation									
Himachal Pradesh									
1	Pong Power House, BBMB (6x66)	CS	6x66	142.25	-	396 (LE)	396	RM&LE	2022-23
Punjab									
2	Ranjit Sagar Dam, PSPCL	SS	4x150	82.16	0.93	-	600	R&M	2022-23
3	UBDC St.I & St.II, PSPCL (3x15+3x15.45)	SS	3x15+ 3x15.45	23.55	5.56	-	91.35	R&M	2022-23
4	Anandpur Sahib Hydel Project, PSPCL (4x33.5)	SS	4x33.5	31.65	0.85	-	134	R&M	2022-23
Uttarakhand									
5	Chilla Ph B UJVNL (4x36)	SS	4x36	490.56	-	144(LE)+ 12(U)	156	RMU&LE	2024-25
6	Tiloth, UJVNL (3x30)	SS	3x30	162.9	128.44	90 (LE)	90	RM&LE	2022-23
7	Dhalipur, UJVNL (3x17)	SS	3x17	152.65	46.74	51 (LE)	51	RM&LE	2022-23
Madhya Pradesh									
8	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	200	4.97	-	115	R&M	2022-23
Tamil Nadu									
9	Moyar PH, TANGEDCO (3x12)	SS	3x12	67.05	-	36(LE)+ 6(U)	42	RMU&LE	2023-24
10	Kodayar PH-I, TANGEDCO (1x60)	SS	1x60	88.48	-	60 (LE)+ 10 (U)	70	RMU&LE	2023-24
Karnataka									
11	Nagihari KPCL (3x150)	SS	3x150 (U-1 to 3)	222.00	13.108	-	450	R&M	2023-24
12	Shivasamudram, KPCL (6x3+4x6)	SS	6x3+4x6	169.18	14.01	42 (LE)	42	RM&LE	2023-24
Manipur									
13	Loktak, NHPC (3x35)	CS	3x35	273.59	13.83	105 (LE)	105	RM&LE	2023-24
Sub Total(A)			2314.35	1832.43	214.61	952 [924(LE)+28(U)]	2237.35		
B. Ongoing Schemes – Under Tendering									
Himachal Pradesh									
14	Giri, HPSEB (2x30)	SS	2x30	139.80	-	60.00 (LE)	60	RM&LE	2023-24
Uttarakhand									
15	Ramganaga, UJVNL (3x66)	SS	3x66	455.20	-	198(LE)	198	RM&LE	2022-27
16	Dhakrani, UJVNL (3x11.25)	SS	3x11.25	137.31	-	33.75 (LE)	33.75	RM&LE	2025-26

(Sheet 2 of 3)									
Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost (Rs. in Crs.)	Actual Exp.	Benefits (MW)	Capacity after RMU&LE	Category	Year of Completion
Karnataka									
19	Kadra Dam Power House, KPCL (2x50)	SS	3x50	44.47	1.72	150 (LE)	150	RM&LE	2022-23
20	Kodasalli Dam Power House, KPCL (3x40)	SS	3x40	50.60	1.47	120 (LE)	120	RM&LE	2022-23
21	Gerusoppa Dam Power House (Sharavathy Tail Race), KPCL (4x60)	SS	4x60	59.66	2.21	240 (LE)	240	RM&LE	2023-24
22	Linganamakki Dam Power House, KPCL (2x27.5)	SS	2x27.5	56.20	1.85	55 (LE)	55	RM&LE	2023-24
Meghalaya									
17	Umium St.III, (Kyrdemkulai) MePGCL (2x30)	SS	2x30	408.00	-	60(LE) + 6(U)	66	RMU&LE	2022-27
Jharkhand									
18	Panchet, DVC (2x40)	CS	1x40 (U-1)	48.92	2.19	40(LE)+ 6(U)	46	RMU&LE	2023-24
Sub Total(B)			956.75	1400.16	9.44	968.75 [956.75(LE)+ 12(U)]	968.75		
C. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval									
Jammu & Kashmir									
23	Lower Jehlum HEP, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)+ 27 (U)	132	RMU&LE	2022-27
Uttarakhand									
24	Kulhal, UJVNL (3x10)	SS	3x10	115.24	-	30(LE)	30	RM&LE	2022-27
Tamil Nadu									
25	Kodayar PH-II, TANGEDCO (1x40)	SS	1x40	-	-	40.0(LE)+ 6(U)	46	RMU&LE	2026-27
Karnataka									
26	MGHE, KPCL (4x21.6+4x13.2)	SS	4x21.6+ 4x13.2	97.00	7.75	139.2 (LE)	139.2	RM&LE	2023-24
27	Supa Dam Power House, KPCL (2x50)	SS	2x50	47.91	2.2	100 (LE)	100	RM&LE	2023-24
28	Sharavathy Generating Station, KPCL (10x103.5)	SS	10x103.5	196.56	11.07	1035 (LE)	1035	RM&LE	2023-24
West Bengal									
29	Maithon, DVC (2x20+1x23.2)	CS	2x20 (U-1&3)	56.03	7.76	40.00 (LE)	40	RM&LE	2024-25
Assam									
30	Khandong Power Station, NEEPCO	CS	2x23	207.00	21.43	46 (LE)	46	RM&LE	2024-25
31	Kopili Power Station, NEEPCO (4x50)	CS	4x50	1117.00	48.54	200(LE)	200	RM&LE	2023-24
Sub Total(C)			1735.20	1836.74	98.75	1768.2 1735.20(LE)+ 33(U)]	1768.20		
D. Ongoing Schemes – Under RLA Studies									
Jharkhand									
32	Subernrekha, JUUNL (2x65)	SS	2x65	-	-	130(LE)	130	RM&LE	2022-27

Annex- VII
(Sheet 3 of 3)

(Sheet 3 of 3)										
Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE	Category	Year of Completion	
				(Rs. in Crs.)						
33	Kundah-I, TANGEDCO (3x20)	SS	3x20		-	-	60 (LE)	60	RM&LE	2022-27
34	Kundah-II, TANGEDCO (5x35)	SS	5x35		-	-	175 (LE)	175	RM&LE	2022-27
35	Kundah-III, TANGEDCO (3x60)	SS	3x60		-	-	180 (LE)	180	RM&LE	2022-27
36	Kundah-IV, TANGEDCO (2x50)	SS	2x50		-	-	100 (LE)	100	RM&LE	2022-27
37	Kundah-V, TANGEDCO (2x20)	SS	2x20		-	-	40 (LE)	40	RM&LE	2022-27
38	Mettur Tunnel, TANGEDCO (4x50)	SS	4x50		-	-	200 (LE)	200	RM&LE	2022-27
39	Sarkarpathy, TANGEDCO (1x30)	SS	1x30		-	-	30 (LE)	30	RM&LE	2022-27
40	Sholayar-II, TANGEDCO (1x25)	SS	1x25		-	-	25 (LE)	25	RM&LE	2022-27
41	Suruliyar, TANGEDCO (1x35)	SS	1x35		-	-	35 (LE)	35	RM&LE	2022-27
42	Kadamparai, PH TANGEDCO (4x100)	SS	4x100		-	-	400 (LE)	400	RM&LE	2022-27
43	Aliyar, TANGEDCO (1x60)	SS	1x60		-	-	60 (LE)	60	RM&LE	2022-27
Kerala										
44	Idukki 2 nd stage, KSEB (3x130)	SS	3x130		-	-	390 (LE)	390	RM&LE	2022-27
Andhra Pradesh										
45	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM&LE	2025-26	
46	Hampi Canal PH, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM&LE	2025-26	
47	Machkund St.I & St.II, APGENCO (3x17+3x23)	SS	3x17+ 3x23	500.00	-	120 (LE) +9 (U)	129	RMU&LE	2025-26	
48	Lower Sileru, APGENCO (4x115 MW)	SS	4x115	1.80	-	460(LE)	460	RMU&LE	2022-27	
Meghalaya										
49	Umiyam-umtru Stage-IV, MePGCL (2x30)	SS	2x30	-	-	-	60	R&M	2022-27	
Sub Total(D)			2537.00	851.80	0.00	2486 [2477(LE)+9(U)]	2546.00			
Total (A+B+C+D)			7543.30	5921.13	322.80	6174.95 [6092.95(LE)+ 82(U)]	7520.30			

Abbreviations: R&M – Renovation & Modernisation; U – Uprating; LE – Life Extension; Res – Restoration;

MW – Mega Watt; CS-Central Sector; SS- State Sector

Abbreviations

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.
23	AVR	Automatic Voltage Regulator
24	BOQ	Bill of Quantity
25	CERC	Central Electricity Regulatory Commission
26	CPRI	Central Power Research Institute
27	DPR	Detailed Project Report
28	DVR	Digital Voltage Regulator
29	JICA	Japan International Co-operation Agency
30	LOA	Letter of Award
31	RLA	Residual Life Assessment

