

STATUS OF PUMPED STORAGE DEVELOPMENT IN INDIA
(Installed Capacity above 25 MW)

S.No.	SCHEMES	STATE	INSTALLED CAPACITY		REMARKS
			No. of units x Unit size(MW)	MW	
A. <u>SCHEMES CONSTRUCTED</u>					
a) Working in Pumping Mode					
1	Nagarjuna Sagar	Telangana	7x100.80	705.60	
2	Srisailem LBPH	Telangana	6x150	900	
3	Kadamparai	Tamil Nadu	4x100	400	
4	Bhira	Maharashtra	1x150	150	
5	Ghatgar	Maharashtra	2x125	250	
6	Purulia	West Bengal	4x225	900	
			Sub Total	3305.60	
b) Presently not working in Pumping Mode					
1	Kadana	Gujarat	4x60	240	#
2	Sardar Sarovar Project	Gujarat	6x200	1200	##
			Sub total	1440	
			Grand Total	4745.60	
B. <u>SCHEMES UNDER CONSTRUCTION</u>					
a) Under Active Construction					
1	Tehri St.-II	Uttarakhand	4x250	1000	Likely commissioning by 2022-24 (June.'23)**
2	Kundah (Stage I,II,III&IV)	Tamil Nadu	4x125	500	Likely commissioning by 2023-24 (Apr. 2023)
3	Pinnapuram	Andhra Pradesh	4x240+2x120	1200	Likely commissioning by 2024-25
			Total	2700	
b) On which Construction is held up					
1	Koyna Left Bank	Maharashtra	2x40	80	Likely commissioning by 2025-26*
			Total	80	
			Grand Total	2780	
C. <u>DPR CONCURRED BY CEA</u>					
1	Turga	West Bengal	4x250	1000	EC & FC-I obtained. FC-II is awaited.
			Total	1000	
D. <u>SCHEMES UNDER SURVEY & INVESTIGATION</u>					
	I. Both Reservoirs Existing				
1	Upper Sileru	Andhra Pradesh	9x150	1350	•Both Reservoirs are existing. Upper Reservoir is on Guntwada reservoir which is on Sileru river and Lower Reservoir is on Donkarayi Reservoir(Exisiting Hydro Project) •Target date for preparation of DPR – 06/2022 •Agency- APGENCO
2	Kodayar	Tamil Nadu	4x125	500	•Both Reservoirs are existing. Upper Reservoir is on Kodayar Reservoir and Lower Reservoir is on PWD's Pechiparai reservoir(Existing Hydro Project) •Target date for preparation of DPR – 12/2023 •Agency-TANGEDCO
3	Sharavathy	Karnataka	8x250	2000	•Both Reservoirs are existing. Upper Reservoir is on Talakalale reservoir and Lower Reservoir is on Gerusappa reservoir(Existing Hydro Project) •Target date for preparation of DPR – 06/2022 •Agency-KPCL
	Sub-Total			3850	
	II. One Reservoir Existing & One to be constructed				
1	Upper Indravati	Odisha	4x150	600	•Upper Reservoir is existing on Upper Indravati HEP reservoir (Exisiting Hydro Project) and Lower Reservoir is to be constructed. •Target date for preparation of DPR – 12/2022 •Agency-OHPCL

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2	Upper Kolab	Odisha	2x160	320	•Upper Reservoir is existing on Upper Kolab HEP reservoir (Existing Hydro Project) and Lower Reservoir is to be constructed. •Target date for preparation of DPR – 06/2023 •Agency-OHPCL
3	Balimela	Odisha	2x250	500	•Upper Reservoir is existing on Balimela HEP reservoir (Existing Hydro Project) and Lower Reservoir is to be constructed. •Target date for preparation of DPR – 12/2023 •Agency-OHPCL
4	Saundatti	Karnataka	4x252+2x126	1260	•Upper Reservoir is to be constructed and Lower Reservoir is on RenukaSagar which is existing on Malaprabha river (Existing Irrigation Project) •Target date for preparation of DPR – 06/2022 •Agency-Greenko
5	MP30 Gandhi Sagar	Madhya Pradesh	5x240+2x120	1440	•Upper Reservoir is proposed off the river and Lower Reservoir is existing on Gandhi Sagar which is on Chambal river(Existing Hydro Project) •Target date for preparation of DPR – 06/2022 •Agency-Greenko
6	Gandikota	Andhra Pradesh	4x250	1000	•Upper Reservoir is proposed Off Stream and Lower Reservoir is existing on Gandikota reservoir which is on Penna river (Existing Irrigation Project). •Target date for preparation of DPR – 03/2023 •Agency- NREDCAP
7	OWK	Andhra Pradesh	4x200	800	•Upper Reservoir is proposed Off Stream and Lower Reservoir is existing on Owk reservoir which is on Penna river (Existing Irrigation Project) •Target date for preparation of DPR – 03/2023 •Agency- NREDCAP
8	Chitravathi	Andhra Pradesh	2x250	500	•Upper Reservoir is proposed Off Stream and Lower Reservoir is existing on Chitravathi reservoir (Existing Irrigation Project) •Target date for preparation of DPR – 03/2023 •Agency-NREDCAP
Sub-Total				6420	
III. Both Reservoirs to be constructed					
1	Sillahalla St.-I	Tamil Nadu	4x250	1000	•Both Reservoirs are to be constructed •Target date for preparation of DPR – 06/2022 •Agency-TANGEDCO
2	Warasgaon	Maharashtra	4x300	1200	•Upper Reservoir is proposed on Mose river and Lower Reservoir is proposed on Kal river •Target date for preparation of DPR – 12/2022 •Agency-WRD, Maharashtra
3	Bhawali	Maharashtra	6x250	1500	UR-downstream of Bhawali Dam, LR-Ulhas Target date of Preparation of DPR- 12/23 Agency-JSW Energy
4	Kurukutti	Andhra Pradesh	5x240	1200	•Upper Reservoir is proposed on Minor nallah draining into Boduru Gedda river and Lower Reservoir is proposed on Boduru Gedda river •Target date for preparation of DPR – 03/2023 •Agency-NREDCAP
5	Karrivalasa	Andhra Pradesh	4x250	1000	•Upper Reservoir is proposed on Minor nallah draining into Boduru Gedda river and Lower Reservoir is proposed on Boduru Gedda river •Target date for preparation of DPR – 03/2023 •Agency-NREDCAP
6	Somasila	Andhra Pradesh	4x225	900	•Both Upper & Lower Reservoirs are proposed off stream • Target date for preparation of DPR – 03/2023 •Agency- NREDCAP
7	Yerravaram	Andhra Pradesh	3x400	1200	•Both Upper Reservoir & Lower Reservoirs are proposed on Nallah/Stream flowing into the Thandava reservoir. •Target date for preparation of DPR – 03/2023 •Agency- NREDCAP
Sub-Total				8000	
TOTAL				18270	
E. SCHEMES UNDER PRE-FEASIBILITY (PFR)/ PRELIMINARY INVESTIGATION (PIR) / DETAILED PROJECT REPORT (DPR)					
I. PREPARED					
1	Renukaji	Himachal Pradesh	10x163	1630	Preliminary Report Prepared in Oct 2021 Agency-Himachal Pradesh Power Corporation Ltd.
2	Humbarli	Maharashtra	2 x 200	400	PFR Prepared in Dec-2019 Agency-Water Resource Department (WRD), Maharashtra
3	Ghatghar Stage-II	Maharashtra	1x125	125	PFR Prepared in March-2021 Agency-WRD, Maharashtra
4	Malshej Ghat	Maharashtra	2x350	700	DPR Prepared in May-2010 Agency-THDCL
5	Mutkhel	Maharashtra	1x110	110	PFR Prepared in May-2015 Agency-WRD, Maharashtra
6	Chikaldara	Maharashtra	2x200	400	PFR Prepared in March-2016 Agency-WRD, Maharashtra

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7	Varandghat	Maharashtra	2x400	800	Preliminary Investigation Report prepared in Dec 2016 Agency-WRD, Maharashtra
8	Panshet	Maharashtra	4x400	1600	Preliminary Investigation Report Prepared in March-2017 Agency-WRD, Maharashtra
9	Nive	Maharashtra	4x300	1200	PFR Prepared in August-2015 Agency-WRD, Maharashtra
10	Kodali	Maharashtra	2x110	220	PFR Prepared in April-2014 Agency-WRD, Maharashtra
11	Sinafdar	Bihar	3x115	345	PFR Prepared in July, 2003 Agency-BHPC (through NHPC)
12	Panchgotia	Bihar	3x75	225	PFR Prepared in July 2003 Agency-BHPC (through NHPC)
13	Kopili PSP	Assam	4x80	320	PFR prepared
14	Panyor PSP	Arunachal Pradesh	4x165	660	PFR prepared
SUB-TOTAL				8735	
II. UNDER PREPARATION					
1	Velimalai	Tamil Nadu		200	PFR under preparation Agency-TANGEDCO
2	Bandhu	West Bengal	4x225	900	PFR under preparation Agency-WBSEDCL
3	Sandynalla	Tamilnadu	4x300	1200	PFR under preparation
4	Upper Bhavani	Tamilnadu	4x250	1000	PFR under preparation
5	Sigur	Tamilnadu	4x300	1200	PFR under preparation
6	Sillahalla Stage-II	Tamilnadu	4x250	1000	PFR under preparation
7	Netravathy Stage-I	Karnataka		1500	PFR under preparation
8	Indira Sagar-Omkareshwar	Madhya Pradesh		525.00	PFR under preparation
9	Tekwa-2 (Prampura-	Madhya Pradesh		800.00	PFR under preparation
10	Satpura -2 (Kathotiya-	Madhya Pradesh		1000.00	PFR under preparation
11	Jawahar Sagar	Rajasthan		200	PFR under preparation
12	Thana Plaun	Himachal Pradesh		100	PFR under preparation
13	Sunni PSP /Chera Khad	Himachal Pradesh		500	PFR under preparation
14	Dhurmu PSP	Himachal Pradesh		1600	PFR under preparation
15	Sadda /Taal Khad PSP	Himachal Pradesh		220	PFR under preparation
16	Purthi & Sach Khas PSP	Himachal Pradesh		250	PFR under preparation
SUB-TOTAL				12195	
Total				20930	

*"Project stalled since July, 2015. The current expenditure on the project has already reached to almost original administrative approved cost level. The preparation of draft Expression of Interest for completing the balance Civil, HM and EM works is under process by Govt. of Maharashtra.

**** 1 unit (250 MW) likely during 2022-23 & 3 units (750 MW) during 2023-24**

#Two units of the Kadana Pumped Storage Project were commissioned during 1990 & two units in 1998. Machines operated in generation mode till 2004 and trial for pump mode operation was done during 2004-05. However, operation in pumping mode was not taken up subsequently due to vibration problem in the machines. CKD Blanksko (OEM) was contacted by the project authorities and they submitted their offer for rectification of the problem.

This offer was discussed in a meeting by GSECL and its management decided to rectify the problem on their own (through in house expertise) as the offer of CKD Blanksko was costlier.

The Kadana unit no 3 was identified as the pilot unit for revival of Pump Mode Operation of KHEP. As per the report of vibration analysis of unit no 3, necessary corrections like replacement of both the bearings, alignment and centering of turbine shaft is completed recently. The stop log gates of Kadana Unit no 3 are removed. The protection testing of Kadana Unit no 3 is completed and found OK. The trial run of unit in generation mode is also completed.

Meanwhile, in a meeting, under the chairmanship of Member (Hydro), CEA on 16.08.2021, to discuss operation of Kadana Pumped Storage Project not working in pumping mode, it was deliberated that there are 4 units in Kadana PSP & Rs. 108 Crores /unit has been quoted by OEM for rectification, a total expenditure of about Rs. 450 Crores is required. CE (Hydro), GSECL requested that this fund may be provided by Central Government through some scheme like PSDF, etc.

At present, after attending the bearings, the unit no 3 was run in generation mode. The vibration analysis was carried out by Ex BHEL expert in generation mode and found to be working properly. Now the matter will be taken up with Irrigation Department to take permission for reversible mode trial. Along with it, the systems/control loops for reversible mode operations will be checked for healthiness and further actions will be planned accordingly.

On successful trial of unit no 3 under pump mode, similar corrections/rectification activities will be replicated in other units also.

The matter for revival of one unit through the OEM is also being explored in parallel by GSECL..As per discussion during the Meeting regarding PSP storage held on 12.11.21, the work of exploring the feasibility & timeline for revival of Pump Mode Operation of Kadana HEP is awarded to IIT, Roorkee by GSECL. A team from IIT Roorkee visited Kadana HEP & necessary information was collected by them. The discussion on observations is made with IIT Team during the month of March. The draft feasibility study report from IIT Roorkee was received & as suggested in the report, the RLA study of the civil structures & CFD study is being planned. And also the offer for replacement entire existing machines with new machines is being asked.

Sardar Sarovar Pumped Storage Hydro Electric Project(1200 MW) was commissioned during 2004-06. The Generation of SSHEP is shared between Gujarat (16%), Maharashtra (27%) & Madhya Pradesh (57%) States, as per the Narmada Water Disputes Tribunal (NWDt) Award.

The entire operations of the Project are based on the directives by Narmada Control Authority (NCA) under Ministry of Jal Shakti, Indore and as per Narmada Water Disputes Tribunal (NWDt) award. There was no mention of pump storage operation of the project in NWDt award.

The project was not operating in Pumping mode as the lower reservoir at Garudeshwar weir was not operational and the equipments required to operate it in pumping mode were also not installed. Now, the lower reservoir at Garudeshwar weir has been made operational by Gujarat.

Govt. of M.P. and Maharashtra are of the opinion that pumping in the project is not as per NWDt award. Both the states are ready to participate if water sharing, cost apportionment, power distribution, O&M issues, operational methodology and Legal issues are resolved by NCA taking into consideration the NWDt award in the new scenario of pumping mode operation of the project.

In the meeting held on 31st August, 2021 via video conferencing organised by CEA, representative of SSNNL stated that for operationalization of pumping mode of 6 units of 200 MW of River Bed Power House (RBPH) of Sardar Sarovar Project, an expenditure of Rs. 294/- crore (Rupees Two hundred ninety-four crores only) is required which should be shared among the partner States.

Out of three partner states of M.P. Gujarat and Maharashtra, only M.P. Govt. is not agreeable to pumping mode operation of project. The issue was discussed recently in its 92nd meeting held on 24.8.2021 and Chairman, NCA has directed Member (Power), NCA to thoroughly examine the matter, taking into consideration all the correspondences that have been made between Govt. of Gujarat, Govt. of M.P. and NCA and prepare a detailed report