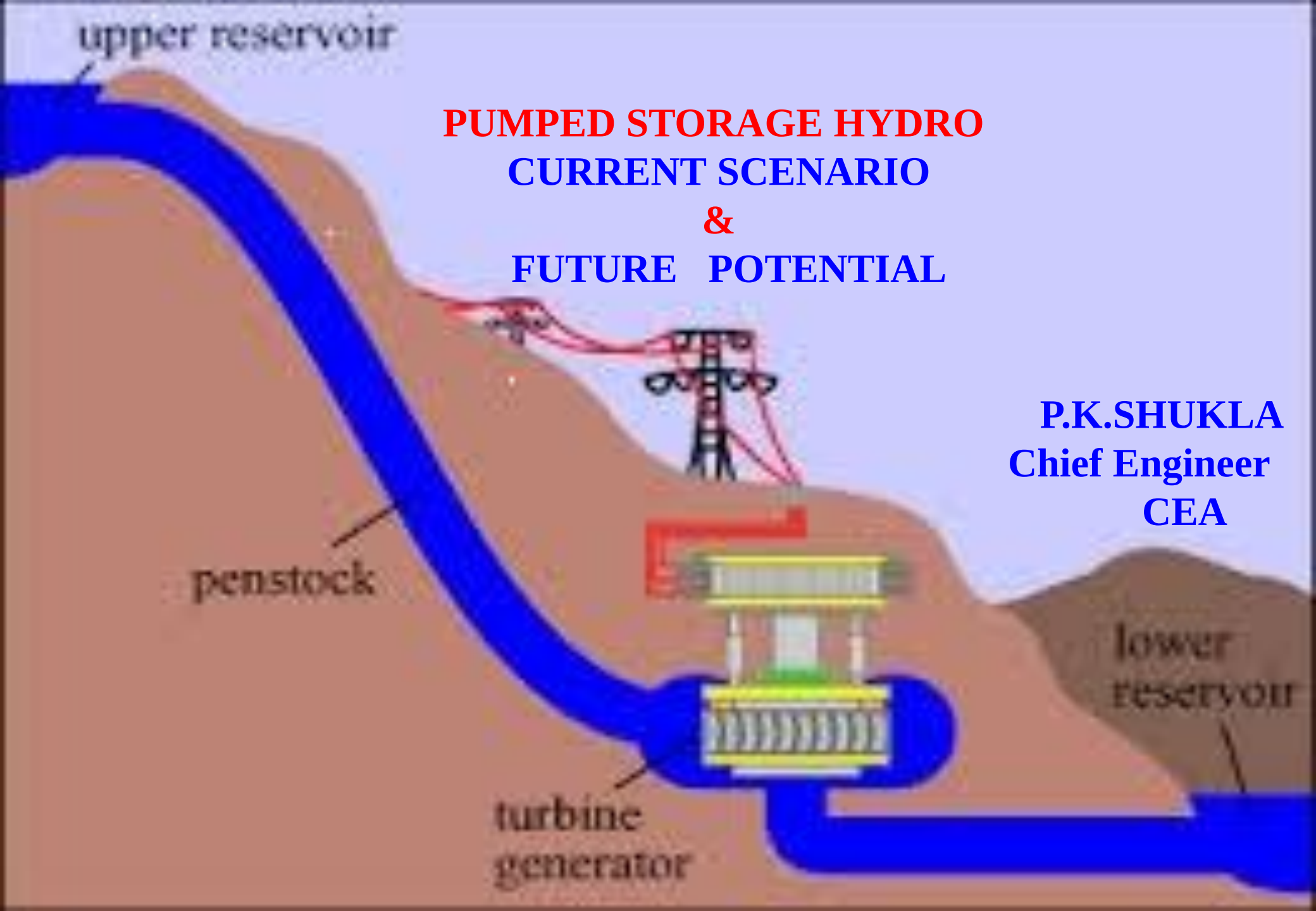

PUMPED STORAGE HYDRO
CURRENT SCENARIO
&
FUTURE POTENTIAL

P.K.SHUKLA
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TYPE OF HYDRO PROJECTS

- **Run of the river Projects**

  SCHEMES WITH VERY LITTLE OR NO STORAGE

- **Storage Projects**

  SCHEMES WITH RESERVOIR TO STORE EXCESS WATER IN MONSOON MONTHS

  With in the year/ Over the year storage

- **Pumped Storage Projects**

Pumped Storage Hydro-Electric Projects

- SCHEME WITH TWO RESERVOIRS ,UPPER & LOWER, WATER FLOWS FROM UPPER RESERVOIR TO LOWER RESERVOIR DURING GENERATION AND VICE VERSA DURING PUMPING
- ENERGY TO BE SUPPLIED FOR ENERGY PRODUCTION

First Pumped Storage Project in India

In India the first pumped storage plant was taken up at Nagarjunasagar in Andhra Pradesh in the year 1970 with an installed capacity of 700 MW(Revised-705.6 MW). The Project got commissioned during 1980-85.*

***The project is not working in pumping mode as the tail pool dam construction took a long time and still not functional.**

Status of Pumped Storage Potential

- **Identified Sites** — **63 nos.**
- **Probable Installed capacity** — **96,524 MW**

Region	Probable Installed Capacity (MW)	Capacity Developed (MW)	Capacity under Construction (MW)
Northern	13065(7 Nos.)	0	1000(1 Nos.)
Western	39684(29 Nos.)	1840(4 Nos.)	80(1 Nos.)
Southern	17750(10 Nos.)	2005.6(3 Nos.)	0
Eastern	9125(7 Nos.)	940(2 Nos.)	0
North Eastern	16900(10 Nos.)	0	0
Total	96524(63 Nos.)	4785.6(9 Nos.)*	1080(2 Nos.)

*In addition 2 Nos. of schemes namely Paithan(12 MW) and Ujjaini(12 MW) in Aurangabad and Solapur in Maharashtra are under operation.

Western region has the largest potential (about 41% of the total) for development of pumped storage plants. This is mainly due to the topographical features with steep gradients of the rivers originating from the Western Ghats.

Pumped Storage Hydro-Electric Potential and its Status of Development in the Country -

Northern Region

State	Probable Installed Capacity (MW)	Capacity Developed (MW)	Capacity under Construction (MW)
Jammu & Kasmir	1650(1Nos.)	0	0
Himachal Pradesh	3600(2 Nos.)	0	0
Uttarakhand	4035(2 Nos.)		1000(1 Nos.)
Rajasthan	3780(2Nos.)	0	0
Total	13065(7Nos.)	0	1000(1 Nos.)

Pumped Storage Hydro-Electric Potential and its Status of Development in the Country -

Western Region

State	Probable Installed Capacity (MW)	Capacity Developed (MW)	Capacity under Construction (MW)
Madhya Pradesh	6150 (4Nos.)	0	0
Chhattisgarh	5000(3 Nos.)		
Maharashtra	27094(20Nos.)	400(2 Nos.)	80(1 Nos.)
Gujrat	1440(2 Nos.)	1440(2 Nos.)	0
Total	39684(29Nos.)	1840(4 Nos.)*	80(1 Nos.)

*In addition 2 Nos. of schemes namely Paithan(12 MW) and Ujjaini(12 MW) in Aurangabad and Solapur in Maharashtra are under operation.

Pumped Storage Hydro-Electric Potential and its Status of Development in the Country -

Southern Region

State	Probable Installed Capacity (MW)	Capacity Developed (MW)	Capacity under Construction (MW)
Andhra Pradesh & Telangana	2350(2 Nos.)	1605.6(2 Nos.)	0
Karnataka	7900(4 Nos.)	0	0
Kerala	4400(2 Nos.)	0	0
Tamil Nadu	3100(2 Nos.)	400(1 Nos.)	0
Total	13065(10Nos.)	2005.6(3 Nos.)	0

Pumped Storage Hydro-Electric Potential and its Status of Development in the Country -

Eastern Region

State	Probable Installed Capacity (MW)	Capacity Developed (MW)	Capacity under Construction (MW)
Jharkhand	2800(1 Nos.)	0	0
Odisha	2500(1Nos.)	0	0
West Bengal	3825(4 Nos.)	940(2 Nos.)	0
Total	9125(6 Nos.)	940(2 Nos.)	0

Pumped Storage Hydro-Electric Potential and its Status of Development in the Country -

North Eastern Region

State	Probable Installed Capacity (MW)	Capacity Developed (MW)	Capacity under Construction (MW)
Manipur	4350(2 Nos.)	0	0
Assam	2100(1 Nos.)	0	0
Mizoram	10450(7 Nos.)	0	0
Total	16900(10 Nos.)	0	0

Pumped storage Schemes Potential

- **The potential of 96524 MW (63 schemes) has been identified on main rivers and their tributaries during the reassessment studies carried out by CEA in 1978-87.**
- **It does not include the pumped storage schemes on small streams /Nallah.**
- **It does not include the schemes that could be taken up on the existing reservoir schemes in operation, where pumped storage plant could be set up by constructing another reservoir upstream or downstream.**

Pumped storage plants in operation

- **At present 9 pumped storage schemes with aggregate installed capacity of 4785.6 MW are in operation in the country.**

- **Out of these, only 5 No. of plants with aggregate installed capacity of 2600 MW are being operated in Pumping mode.**

Pumped storage plants in operation in Pumping Mode

S. No.	Name of Project	State	Installed Capacity(MW)
1.	Kadamparai	Tamil Nadu	4x 100=400
2.	Bhira	Maharashtra	1x150=150
3	Srisailam LBPH	Telangana	6x150=900
4	Purulia PSS	West Bengal	4x225=900
5.	Ghatghar	Maharashtra	2x125=250
		TOTAL	2600

Pumped storage plants not operating in Pumping Mode

S. No.	Name of Project	State	I.C. (MW)	Reasons for not working in pumping mode	Present Status
1.	Kadana St. I&II	Gujarat	2x60+ 2x60 =240	Due to vibration problem	BHEL has been asked to study and rectify the problem
2.	Nagarjuna Sagar	Telangana	7x100.80 = 705.60 (Revised)	Tail pool dam not yet operational	Telangana and Andhra Pradesh to take action for making tail pool dam operational
3.	Sardar Sarovar	Gujarat	6x200 =1200	Tail pool dam under construction	Likely to be completed by Nov'2017
4.	Panchet Hill	DVC	1x40=40	Tail pool dam not constructed	Acquisition of land for lower reservoir yet to be done
		Total	2185.6		

States/Regions taking up Pumped Storage Hydro Projects Development

Southern Region

Tamil Nadu

- **Tamil Nadu has prepared DPR of Kundah PSS (500 MW) . The Development of the project is held up due to non-resolution of Inter-State Aspects**

Karnataka

- **State has identified 3 pumped storage schemes on existing projects namely Sharavathy(450 MW),Varahi(700 MW), Kali(600 MW) as the execution on these projects would be easier instead of planning pumped storage schemes afresh. The S&I on these schemes are likely to be taken up soon.**

Southern Region

Kerala

- **3 schemes namely Sholayar I (810 MW), Sholayar II (390 MW) and Pringalkuthu(80 MW) have been identified by State Govt on existing conventional schemes, however S&I/implementation could not be taken up in view of non-availability of Forest clearance.**

Western Region-Maharashtra

- **One scheme namely Kodali(220 MW) is under S&I/DPR stage by State Govt. .**
- **DPR of Malshej Ghat(700 MW) have been prepared by THDC for which implementation agreement to be signed with State Govt.**
- **The work of S&I and preparation of DPR for Humbarli PSS (400 MW) is likely to be awarded shortly.**

Eastern Region-West Bengal

- **S&I of Turga PSS(1000 MW) is completed and DPR has been prepared/concurred by CEA. The project is likely to be taken up for development after obtaining necessary clearances from Central/State Govts.**
- **S&I on Bandhu PSS (900 MW) is in progress.**

TENTATIVE LIST OF PUMPED STORAGE SCHEMES IDENTIFIED FOR BENEFITS DURING 13th PLAN AND BEYOND

S.No.	Name of Project	State	I.C. (MW)	Agency	Present Status
1	Tehri PSS	Uttarakhand	1000	THDC	Under Construction
2	Koyna Left Bank	Maharashtra	80	GoMWRD	Under Construction
3	Kundah PSS	Tamil Nadu	500	TNEB	DPR Returned by CEA due to non-resolution of interstate aspects
4	Turga PSS	West Bengal	1000	WBSEDCL	DPR concurred by CEA
5	Malshej Ghat	Maharashtra	700	NPCIL &THDC	IA yet to be signed with State Govt.
6	Humbarli	Maharashtra	400	NPCIL &THDC	Detailed Project Report to be prepared. Permission for S&I from MoEF

S.No.	Name of Project	State	I.C. (MW)	Agency	Present Status
7	Kodali		220	GoMWRD	Project economical investigation Report submitted to Government by WRD
8	Sholayar I	Kerala	810	KSEB	Yet to be taken up under S&I.
9	Sholayar II	Kerala	390	KSEB	Yet to be taken up under S&I.
10	Poringal Kuthu	Kerala	80	KSEB	Yet to be taken up under S&I.
11	Kali	Karnataka	600	KPCL	S&I likely to start soon
12	Sharavathy	Karnataka	450	KPCL	S&I likely to start soon
13	Varahi	Karnataka	700	KPCL	S&I likely to start soon
	Total		6930		

Way Forward

- **Like any other hydro scheme, Pumped storage schemes are generally environmental friendly. The configuration of pumped storage schemes generally provide for underground location of the power house, avoiding disruption of scenery and minimizing the aesthetic impacts of the new structure.**
- **However, land acquisition is a big problem for the pumped storage schemes. Panchet Hill is an example, where lot of problem is being faced for acquisition of land for lower reservoir. State Govts. Should help the developers in land acquisition.**

Way Forward

- **Some of the identified schemes, particularly, in Western Region are located in areas which have been declared as Wild Life Sanctuaries.**
- **The State/Central Governments are required to take necessary action to de-notify the areas required for development of pumped storage schemes involving Wild Life Sanctuaries .**
- **In case, it is possible to locate a pumped storage scheme where upper / lower reservoir is already existing / under construction, it would be more cost effective and easily implementable.**
- **Water and water Power is state subject. State Govts. Should be encouraged to allocate the identified pumped storage schemes to prospective developers for implementation.**


Thankyou!
केविप्रा
cea