

**MINISTRY OF POWER**  
**CENTRAL ELECTRICITY AUTHORITY**

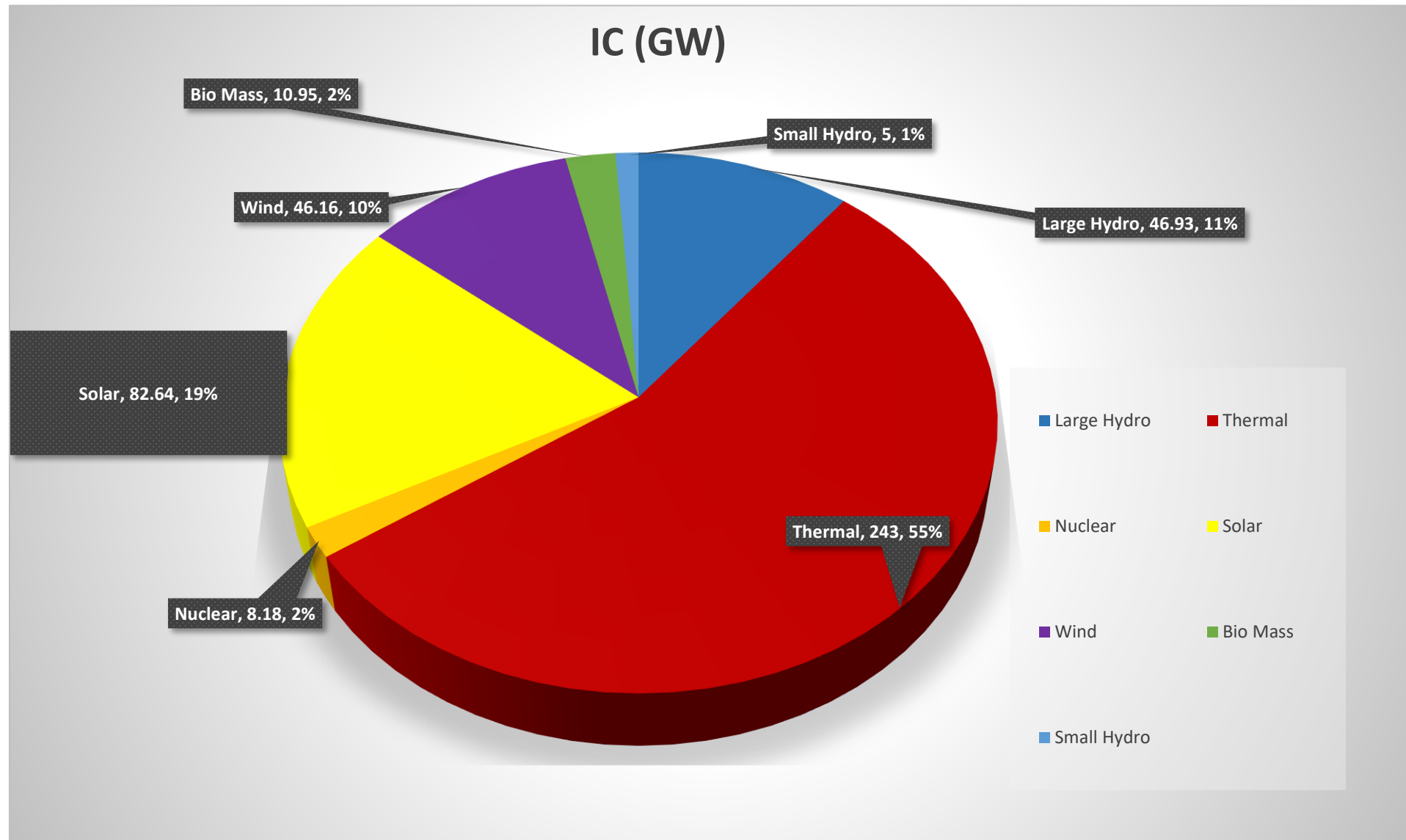
**-PSPs (including Off Stream Closed Loop ) in  
India-  
An Overview**

**Sharvan Kumar**  
**Chief Engineer**

## Scheme of Presentation

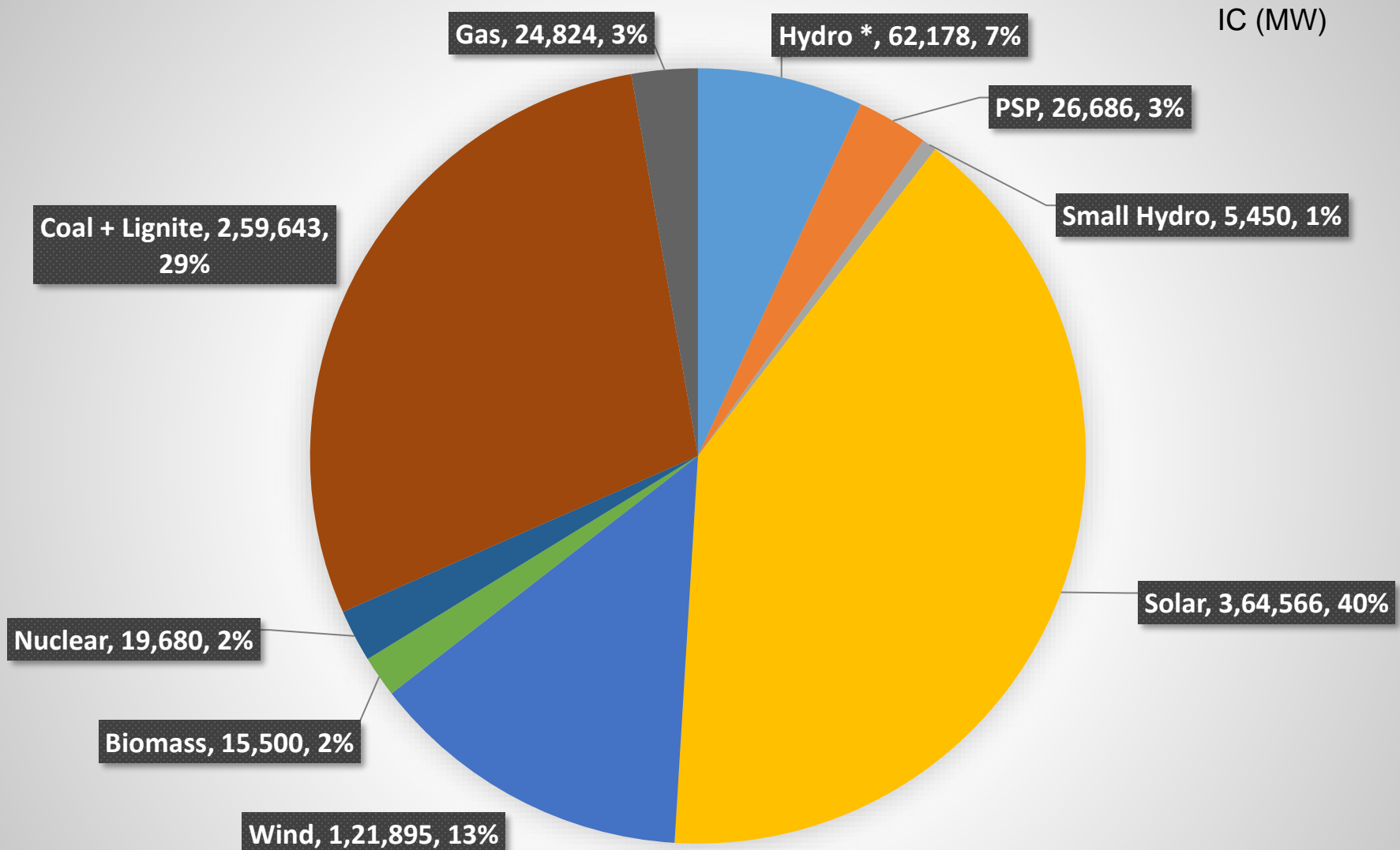
- Present Power Scenario in the country
- Projected Scenario by March, 2032 (as per NEP)
- Storage Requirement (as per NEP)
- Advantages of PSP over Battery Storage
- Need for PSPs
- Types of PSPs
- Status of Development of PSPs in Country
- Tentative PSP Capacity Addition (by March, 2032)
- Initiatives to boost development of PSPs
- Statutory clearances required for PSPs
- Guidelines for PSPs- DPR preparation

# Present Power Scenario in the country



**443 GW** (Peak demand of 250 GW met on 30.05.24) (RE 41% Th 57%)

# Projected Installed Capacity by Mar 2032



• **9,00 GW** as on 31.03.2032

(RE 64% Th 34%)

## Storage Requirement (as per NEP)

- As per CEA National Electricity Plan (Generation), the PSP and BESS has been projected as under

YEAR	PSP (GW/GWh)	BESS (GW/GWh)	TOTAL (GW/GWh)
<b>2026-27</b>	<b>7.45/47.65</b>	8.68/34.72	<b>16.13/82.37</b>
<b>2029-30</b>	<b>18.9/128.1</b>	41.6/208.2	<b>60.6/336.4</b>
<b>2031/32</b>	<b>26.6/175.1</b>	47.2/236.2	<b>73.9/411.4</b>

- If the cost of BESS doesn't come down as expected, more capacity addition of PSP is required

## Advantages of PSP over Battery Storage

	PSP	Battery Storage
<b>Life</b>	Civil structures: 100 years E&M: 40 years, extended upto 100 years with R&M	~4000 cycles (~10 – 12 years)
<b>Replacement</b>	No replacement required during project life	Requires replacement every 10-12 years with current technology.
<b>Resource availability</b>	Natural resource, abundantly available in India	To be imported Key minerals concentrated in South America, China, Congo
<b>Critical equipment dependence</b>	Manufacturing - based in India	Manufacturing concentrated in China, Japan, Korea
<b>Commodity Price Risk</b>	Minimal – mature and well-developed supply chain	High, multiple competing uses
<b>Storage/ Discharge duration</b>	6-12 Hrs No technology limitation	~3 Hrs
<b>Cost (Rs/kWh)</b>	~7 to 8	~10 to 11
<b>Env. hazard</b>	Negligible	High
<b>Bankability</b>	Matured technology	Developing technology

## Need for PSPs

- Energy Transition -
  - 50% installed capacity from non-fossil fuel sources by 2030
  - Net Zero Emission target by Year 2070
- Integration of VREs for Grid Stability & Security
- Off taking large amount of energy during off-peak hours and providing additional capacity to meet the peak loads
- Ramping support, faster start-up and shutdown, spinning reserves

## Types of PSPs

- As per Guidelines for Formulation of DPRs of PSPs published by CEA
  - Off-stream Closed Loop PSPs
    - Both Reservoirs not on any perennial River/Stream/Nallah
    - Rain water yield to be released as it is to downstream
  - Off-stream Open Loop PSPs
    - One Reservoir not on any perennial River/Stream/Nallah
    - Rain water yield to be released as it is to downstream
  - On-stream PSPs (conventional)



# Status of Development of Pumped Storage Projects in Country

	<b>Nos.</b>	<b>Capacity (GW)</b>
<b>Status</b>		
<b>PSP Potential</b>	<b>156\$</b>	<b>176</b>
<b>Projects In-operation</b>	<b>8#</b>	<b>4.7</b>
<b>Projects under construction</b>	<b>4</b>	<b>4</b>
<b>Projects allotted by States for development</b>		
<b>(i)</b> Projects concurred by CEA and yet to be taken up for construction	<b>1</b>	<b>1</b>
<b>(ii)</b> Projects under Survey & Investigation	<b>44*</b>	<b>60</b>
<b>TOTAL under development</b>	<b>49</b>	<b>65</b>

\$ 90 sites off-stream    \* 30 sites off-stream close loop

# Sardar Sarovar PSP (1200 MW) & Kadana PSP (240 MW) are not operational

## PSPs at S&I stage

### State Wise

States	No. of PSPs	Capacity(MW)
Andhra Pradesh	18	20470
Maharashtra	10	16800
Uttar Pradesh	4	8340
Odisha	3	1420
Rajasthan	3	5560
Karnataka	3	3900
Madhya Pradesh	2	2560
Tamil Nadu	1	1000
<b>TOTAL ALL INDIA</b>	<b>44</b>	<b>60,050</b>

### Sector Wise

Sector	No. of PSPs	Capacity (MW)
Central	2	2440 ( 4%)
State	9	8890 (15%)
Private	35	48720 (81%)
<b>Total</b>	<b>44</b>	<b>60,050</b>

## Tentative PSP Capacity Addition (By March, 2032)

Year	Capacity Addition (MW)	Cumulative Capacity (MW)
Till date	4745	4745
2024-25	2700	7445
2025-26	-	7445
2026-27	8380	15825
2027-28	3080	18905
2028-29	1350	20255
2029-30	3300	23555
2030-31	16095	39650
2031-32	30230	69880
<b>Total</b>	<b>70 GW</b>	

**Tentative investment required: Rs. 4,00,000 crores**

Ministry of Power issued Guidelines to promote development of PSPs in the country on 10<sup>th</sup> April, 2023. The main initiatives may be categorized as under:

- Administrative initiatives
- Financial initiatives
- Regulatory initiatives

## Administrative Initiatives to boost development of PSPs

- **Reduction in time line for concurrence of PSPs** from 150 days to
  - 50 days- projects awarded under TBCB, projects developed as IREP, merchant and captive plants
  - 90 days- Other PSPs.
- Single Window Clearance Cell
- Further simplification of DPR appraisal process
- Rationalization of Environmental Clearances for PSPs
  - Standalone PSPs categorized as a separate category under River Valley and Hydroelectric Projects
  - OSCL PSPs: specific ToR: 1 season data
  - OSOL PSPs: specific ToR: 2 season data
  - PSPs meeting certain criteria: B2 category- EIA & Pub. hearing not required

## Administrative Initiatives to boost development of PSPs (Contd..)

- Defining transparent procedure for allotment of project sites as under
  - On nomination basis to CPSUs and State PSUs
  - Allotment through competitive bidding
  - Allotment through Tariff Based Competitive Bidding (TBCB)
  - Self - identified off-stream Pumped Storage Projects
    - First come First serve basis
    - Online Portal
    - Performance based BG
    - Proposed- **Swiss challenge method**
- Cancellation of allocation of project if construction doesn't start within a period of 2 (+1) years from the date of allotment.

## Financial Initiatives to boost development of PSPs

- Budgetary Support for Enabling Infrastructure (Roads, Flood Moderation)
  - Proposed to include ATS, Ropeway, Railway siding, communication system
- Waiver of ISTS charges (full, if work awarded upto 30<sup>th</sup> June 2025)
- Exemption from Free Power obligation/ water cess/ upfront royalty/ Local Area Development Fund
- Avoidance of double taxation on power supplied by PSPs
- Financing by PFC, REC, IREDA at par with other RE projects for: 20-25 years.
  - VGF (way forward)

## Regulatory Initiatives to boost development of PSPs

- Energy Storage Obligation
- Monetization of Ancillary services
- PSPs to be allowed to participate in the proposed high price segment of the day ahead market (HP-DAM)
- Unutilized contracted capacity be transferred to other interested entities and gains made shall be in the ratio of 50:50.



## Statutory clearances required for PSPs

- Allotment/ Water allocation by States
- Concurrence of DPR by CEA in consultation with GSI, CWC, CSMRS
- Environment Clearance by MoEF&CC
- Forest Clearance by MoEF&CC
- Wildlife Clearance by Wildlife Board
- R&R Plan by MoTA in case of displacement of tribal families

## Guidelines for PSPs- DPR preparation

- In-principle allotment/ MoU/ MoA/ consent of State Government
- Approval of ToR by MoEF&CC.
- Project Developer to approach CEA within a month.
- Carry out topographical survey & geological surface mapping of the project
- Prepare layout of the project and detailed investigation plans
- Submission of proposal to CEA for concurrence with checklist for documents required for examination of various aspects of DPRs

**THANK YOU**