

# PSH's role in the Clean Energy Transition

Center for Public Utilities - Current Issues Forum

August 2021



# Uncommon Dialogue: U.S. Hydropower: Climate Solution and Conservation Challenge

- **What:** Historic effort to find common ground between hydro industry, river community and environmental organizations.
- **Who:** 9 NHA member organizations: American Rivers, Hydropower Reform Coalition, LIHI, and other river groups and Union of Concerned Scientists, World Wildlife Fund, and other environmental groups
- **Why:** *Common motivation: address the urgent challenge of climate change and its impacts on rivers.*

- ✓ Joint Statement in Oct 2020
- ✓ Plan to work together in 7 areas
- ✓ Joint Congressional request

Los Angeles Times

Newsletter: Can hydropower help solve the climate crisis?  
This \$63-billion plan is banking on it



Mt. Shasta, seen as a backdrop to Shasta Dam in 2018. (Kent Nishimura / Los Angeles Times)



# Current Hydro and PSH fleet

- 102GWS (80 hydro, 22 PSH)
- **41%** of renewable gen;
- **92%** of bulk storage;
- **40%** of blackstart;
- **largest** source of clean flexibility
- Can provide *almost all* grid services

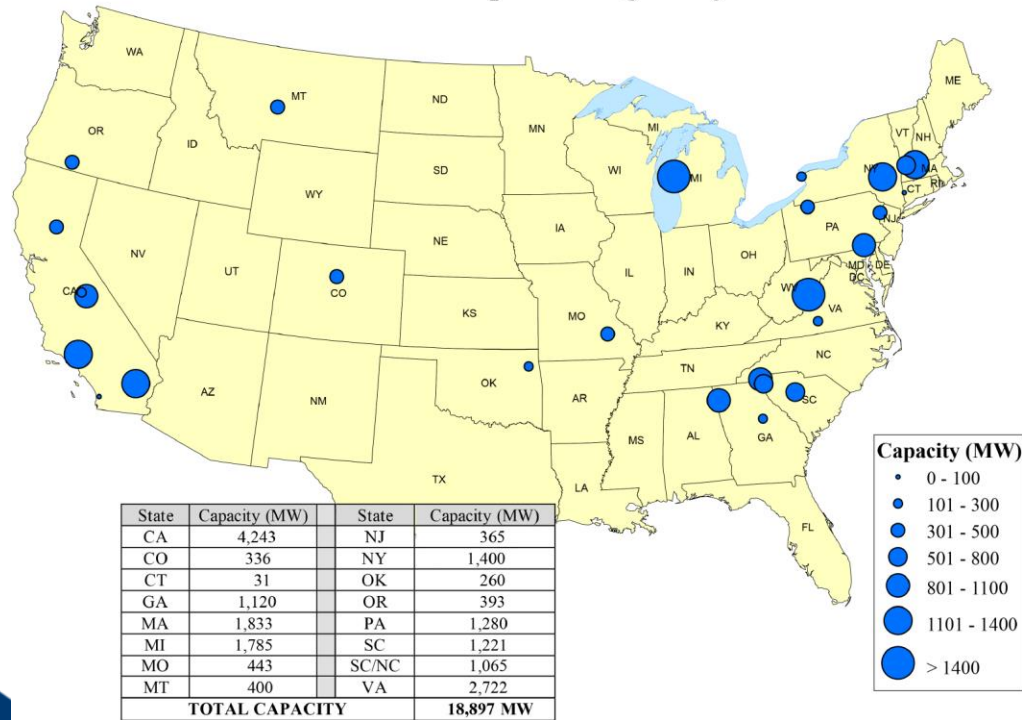
FIGURE 3: RESOURCE CAPABILITIES TO PROVIDE VARIOUS GRID SERVICES

| Product               | Nuclear | Run-of-River Hydro | Pondage Hydro | Pumped Storage | Coal | Combined Cycle | Combustion Turbine | Wind | Solar | Battery Storage | Demand Response | Energy Efficiency |
|-----------------------|---------|--------------------|---------------|----------------|------|----------------|--------------------|------|-------|-----------------|-----------------|-------------------|
| Day-Ahead Energy      | ✓       | ✓                  | ✓             | ✓              | ✓    | ✓              | ○                  | ✓    | ✓     | ○               | ○               | ○                 |
| Real-Time Energy      | ○       | ✓                  | ✓             | ✓              | ✓    | ✓              | ○                  | ✓    | ✓     | ○               | ○               | ○                 |
| Clean Energy          | ✓       | ✓                  | ✓             | ○              | ✗    | ○              | ○                  | ✓    | ✓     | ○               | ○               | ✓                 |
| Regulation            | ✗       | ○                  | ✓             | ✓              | ✓    | ✓              | ○                  | ○    | ○     | ✓               | ○               | ✗                 |
| Spinning Reserves     | ✗       | ○                  | ✓             | ✓              | ✓    | ✓              | ✓                  | ✗    | ✗     | ✓               | ○               | ✗                 |
| Non-Spinning Reserves | ✗       | ✗                  | ✓             | ✓              | ✗    | ✓              | ✓                  | ✗    | ✗     | ✓               | ○               | ✗                 |
| Load-following        | ○       | ○                  | ✓             | ✓              | ○    | ✓              | ✓                  | ○    | ○     | ✓               | ○               | ✗                 |
| Reactive Power        | ✓       | ✓                  | ✓             | ✓              | ✓    | ✓              | ✓                  | ○    | ○     | ✓               | ✗               | ✗                 |
| Black Start           | ✗       | ✓                  | ✓             | ✓              | ○    | ✓              | ✓                  | ✗    | ✗     | ○               | ✗               | ✗                 |
| Resource Adequacy     | ✓       | ✓                  | ✓             | ✓              | ✓    | ✓              | ✓                  | ○    | ○     | ○               | ✓               | ✓                 |

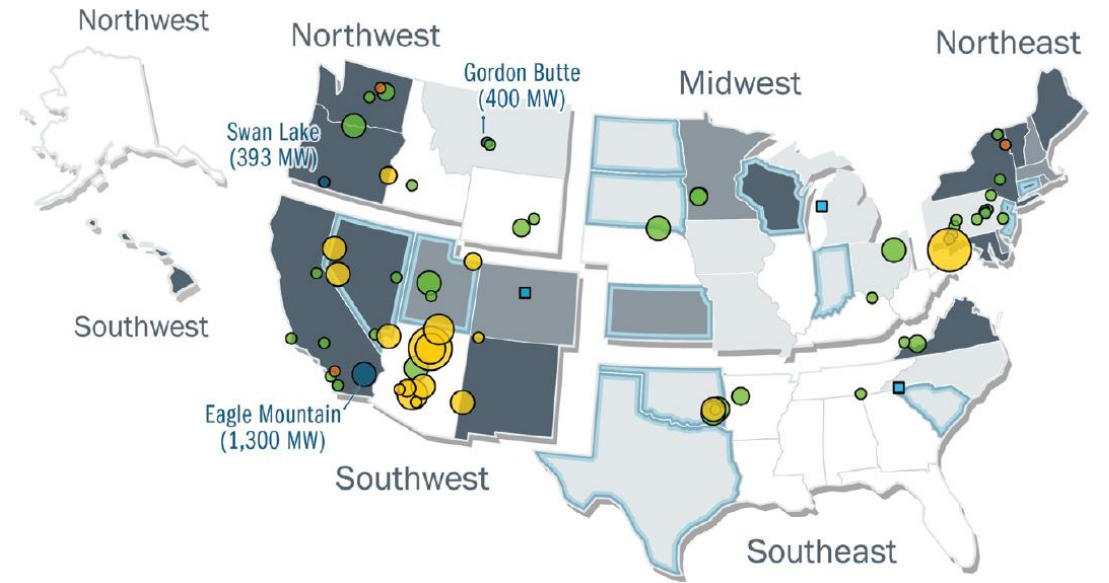
| Technical Capability to Provide Product |               |
|---|---------------|
| ✓                                       | Well-Suited   |
| ○                                       | Neutral       |
| ✗                                       | Poorly-Suited |

# Existing PSH fleet and project pipeline

Licensed Pumped Storage Projects



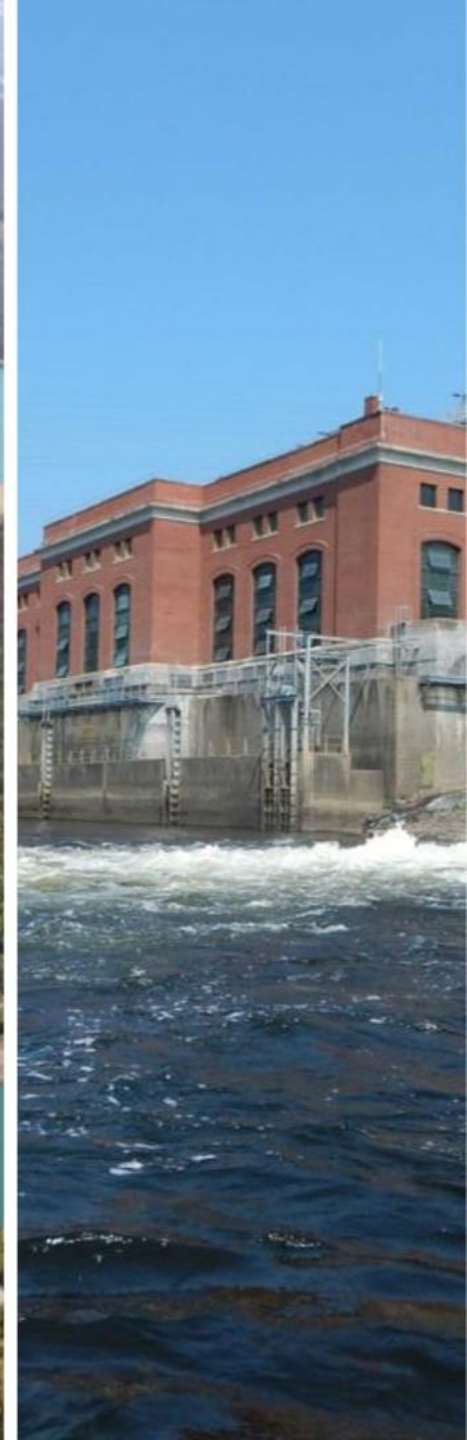
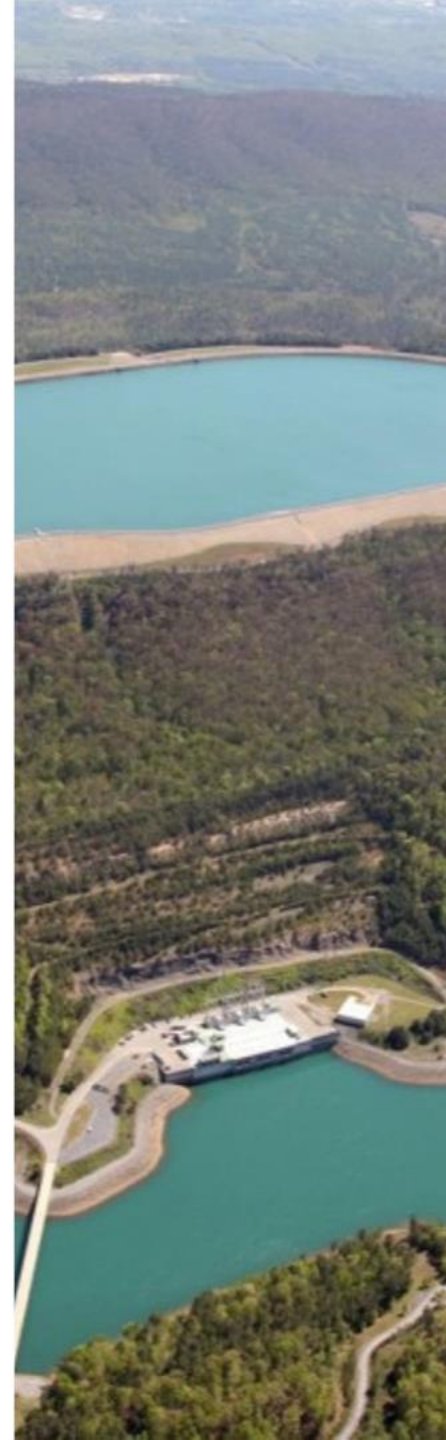
Source: FERC Staff, January 1, 2021



| Renewable Portfolio Standard/Clean Energy Standard/Goal | Stage of PSH Development                   | Project Type (MW)                     |
|---|--|---------------------------------------|
| Light Gray: <20%  | Yellow Circle: Pending Preliminary Permit* | New: Small Circle: ≤500               |
| Dark Gray: ≥20% - <50%                                  | Green Circle: Issued Preliminary Permit*   | Capacity Addition: Small Square: ≤500 |
| Black: ≥50%   | Orange Circle: Pending License**           | Small Circle: ≤1,000                  |
| White: None   | Blue Circle: Issued License**              | Medium Circle: ≤2,000                 |
| Light Blue Box: Renewable Energy Goal Target            | Light Blue Circle: Under Construction      | Large Circle: ≤3,000                  |
|   |  | Very Large Circle: >3,000             |

# Pumped Storage (PSH) value: Enabler of the transition

- Long duration peaking capacity
- Critical balancing services (ramping, operating reserves, regulation)
- Energy arbitrage
- Blackstart
- System support services (inertia, voltage control)
- *Other values*
  - ✓ Reduced curtailments
  - ✓ Lowers system costs
  - ✓ Reduces overall emissions





# PSH Challenges

- Cost/development timelines
- More starts/stops; daytime pumping
- Used out of market to shore up reliability
- Arbitrage model being replaced with grid services?
- Models don't always reflect true PSH value/capability
- Undervalued services



# Policy changes to fully value PSH

- Congress – ITC for ALL storage resources
- State regulators – ensure PSH is modeled correctly in IRPs
- State legislators – Send long-term signals for long duration storage
- RTOs/FERC – Fully value flexibility/reliability services
- FERC – Streamline licensing process for off-river projects

# Questions

Contact: [Cameron@hydro.org](mailto:Cameron@hydro.org)