

CESA Webinar

The Role of Hydropower in State Clean Energy Policy

September 8, 2020

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CleanEnergy States Alliance



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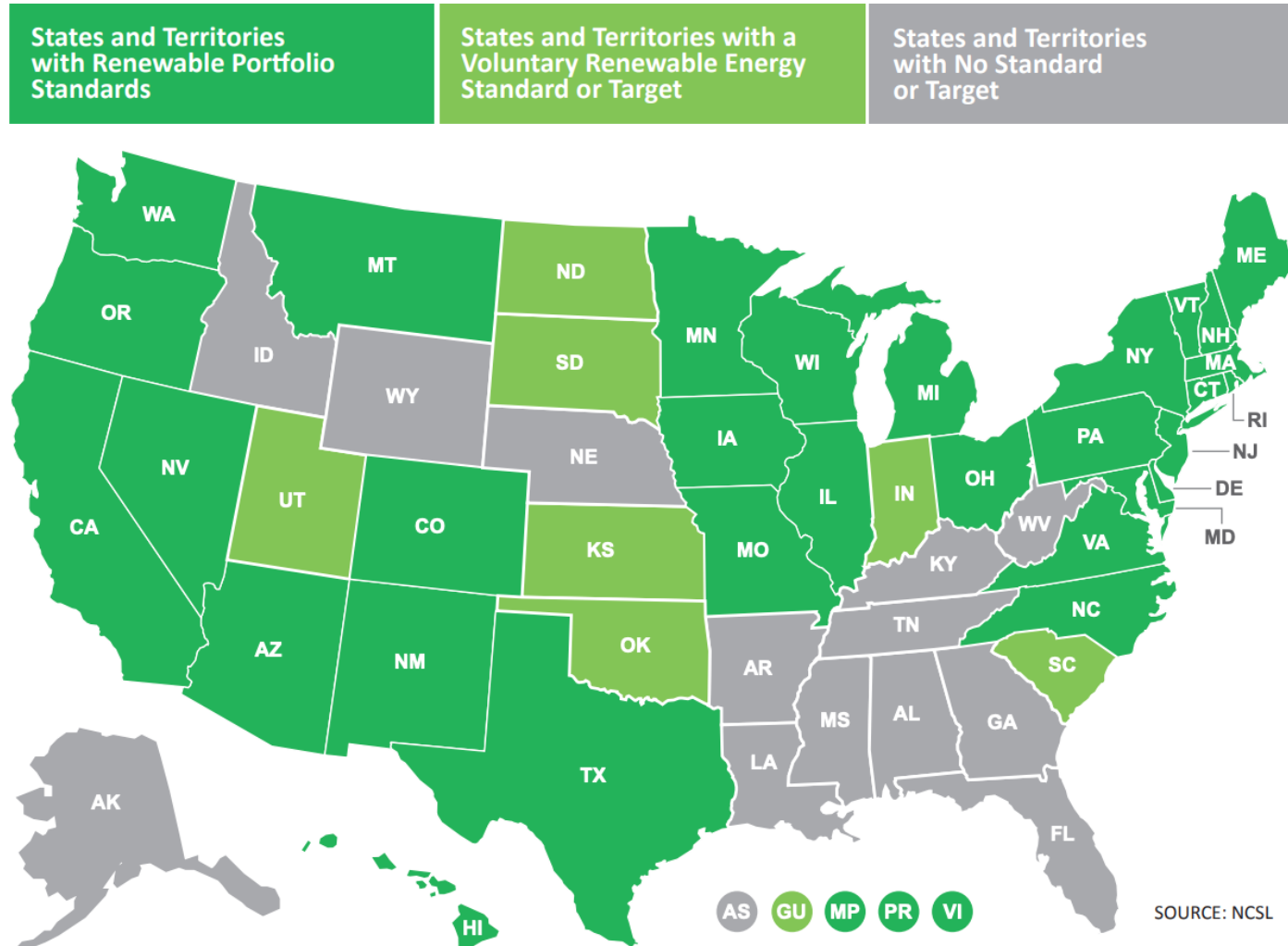
Project Director,
Clean Energy States
Alliance (moderator)



Key Report Findings

- Hydropower is a clean and abundant resource that can help states meet their increasing renewable and clean energy targets
- States are using eligibility criteria such as capacity limits as de-facto environmental safeguards
- While all 30 state RPS programs include hydropower as a qualifying technology, there are significant differences in how states treat hydropower
- Treatment of Pumped Hydro Energy Storage— 5 out of 30 RPS programs consider PHES an eligible technology
- PHES participation in state energy storage policies is indirectly limited by contracting structures, capacity limits, and commissioning dates.

Context for Hydropower's Participation in State RPS Programs





Eligibility Criteria

- Size/Capacity Limit
- In-Service Date
- Impoundments, Run-of-River, Capacity Additions
- Geographic Eligibility
- Environmental Impacts
- Low Impact Hydropower Institute (LIHI) Certification



State Specifics

- Washington State
- Massachusetts Class I
- New Hampshire Class IV
- CT Class I and Canadian Hydropower

New England Hydroelectric Generator Participation in RPS Markets

Prepared for the
Clean Energy States Alliance & Pacific Northwest National Laboratory

Summary of Market Participation

- There are 434 hydro units registered in the NEPOOL GIS as of 7/15/2019.
 - 404 are in New England, representing ~2,250 MW of installed capacity.
 - Remainder are units importing from adjacent control areas (NY, QC, NB), which requires delivery of energy in order to create RECs.
- In 2018, RPS-certified hydro contributed:
 - ~7.4M RECs from New England facilities
 - ~1.1M RECs from importing facilities.
- All units are certified in at least one RPS market.
 - **Certification does not guarantee value, however. Many projects are only qualified for markets that are systemically over-supplied.**

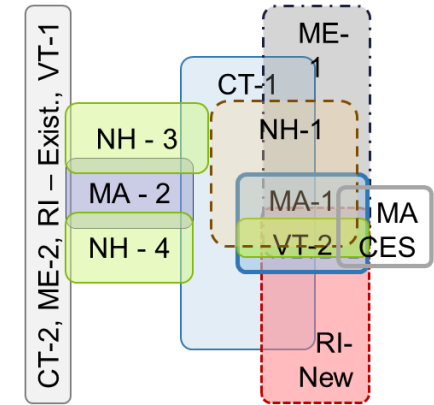
Source: NEPOOL GIS Generators Report and SEA research



Introduction to RPS Policies in New England

- New England's RPS marketplace is complex
- Different policies for different objectives (eligibility requirements vary)
 - Encourage development of "New" supply = RPS obligations generally *increasing*.
 - MA, CT, ME, NH "Class 1"
 - RI "New"
 - VT "Tier 2"
 - NH Class 2 (solar only)
 - Maintain the "Existing" fleet = RPS obligations generally *static*.
 - MA, CT, ME "Class 2"
 - RI "Existing"
 - VT "Tier 1"
 - NH Class 3 (biomass & landfill gas only)
 - NH Class 4 (hydro only)

NE RPS "Eligibility Map"¹



¹ This figure is intended to illustrate the complex interrelationship of partially-overlapping RPS markets throughout New England. The relative sizes of each market are not intended to be represented to scale.

→ opportunity to participate depends on technology, vintage, and other criteria

"New" Market Eligibility	CT-1	ME-1/1A	MA-1	NH-1	RI-"New"	VT-2
Vintage Requirement	7/1/2003+	10/1/2005+	1/1/1998+	1/1/2006+	1/1/1998+	7/1/2015+
Hydro Eligibility	≤ 5 MW, ROR, post-7/1/2003 or FERC re-licensed	< 100 MW	New + incremental hydro < 30 MW; LIHI or equiv. certification	Incremental MWh over historical baseline	< 30 MW	≤ 5 MW; connected to VT T&D system;

"Existing" Market Eligibility	CT-2	ME-1/1A	MA-2	MA CES-E	NH-IV	RI-"Existing"	VT-1
Vintage Requirement	Hydro no longer eligible	Before 10/1/2005	Before 1/1/1998	Before 1/1/2011	Before 1/1/2006	Before 1/1/1998	Before 7/1/2015
Hydro Eligibility		< 100 MW	≤ 7.5 MW	> 30 MW	≤ 5 MW	< 30 MW	Allows large hydro, including HQ imports



Observations on Current RPS Market Dynamics (as of Summer 2020)

“New” Classes

State-Class	Current Status & REC Pricing	Notes
MA-I	Modest Surplus RECs: ~\$40/MWh	Hydro competing with regional wind, solar, etc.
CT-I	Modest Surplus RECs: ~\$40/MWh	New “FERC relicensed” criteria will add to eligible supply
ME-I	Materially Surplus ¹ ~\$2/MWh	Hydro refurbished and operating beyond useful life can qualify;
NH-I	Modest Surplus RECs: ~\$40/MWh	Hydro competing with regional wind, solar, etc.
RI-New	Modest Surplus RECs: ~\$40/MWh	Hydro competing with regional wind, solar, etc.
VT-2	Pricing not available.	Not a liquid market.

“Existing” Classes

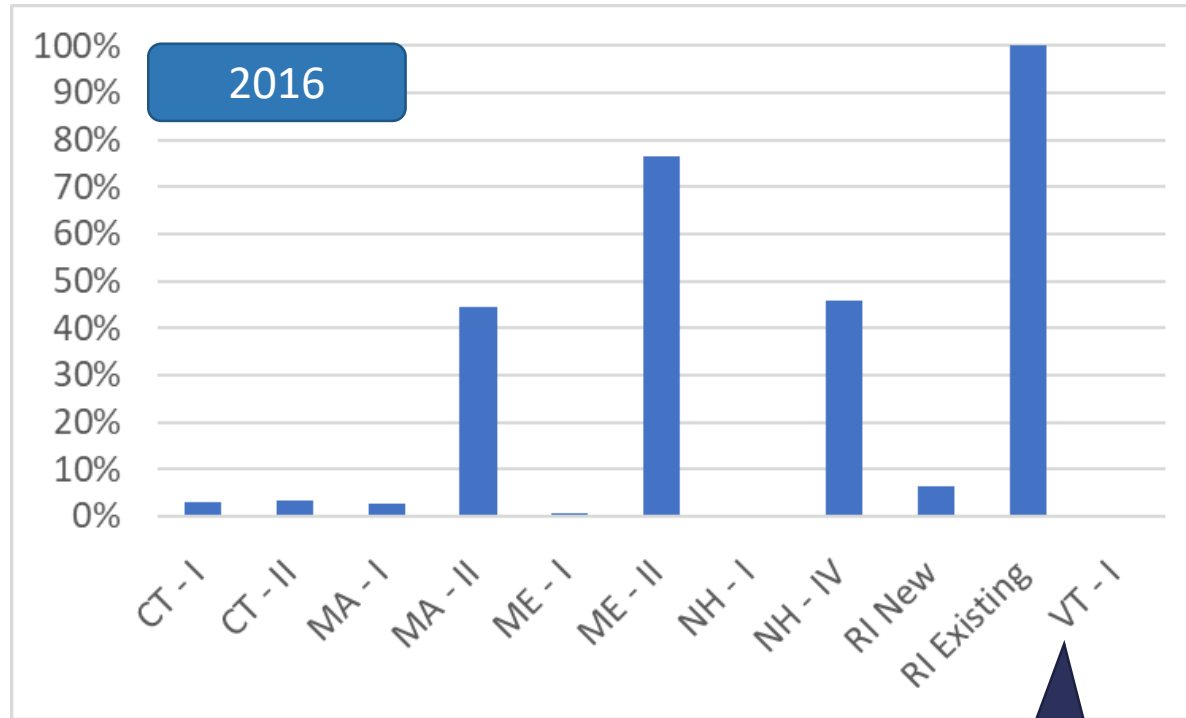
State-Class	Current Status & REC Pricing	Notes
MA-II	Modest Shortage RECs: ~\$17/MWh	Targets adjusted periodically to maintain demand tension
CT-II	N/A	<i>Hydro no longer eligible</i>
ME-II	Systemic surplus; RECs: <\$1/MWh	The most liberal eligibility in New England; surplus RECs cannot be monetized
NH-IV	Short; RECs: ~\$26/MWh	Eligibility details limit supply; Prices near ACP ²
RI- 'Existing'	Systemic surplus; RECs: <\$1/MWh	Liberal eligibility; surplus RECs cannot be monetized
VT-I	Systemic surplus; RECs: utility-controlled supply > demand. No functional “market” at present	Illiquid, and large Canadian hydro eligibility suppresses market value and ability of New England hydro to monetize

1. ME-1 is presently in surplus. Since this summary was created, however, the Maine legislature enacted an RPS target increase that may cause re-converge with the rest of New England Class 1 markets over the next several years.
2. Alternative Compliance Payment

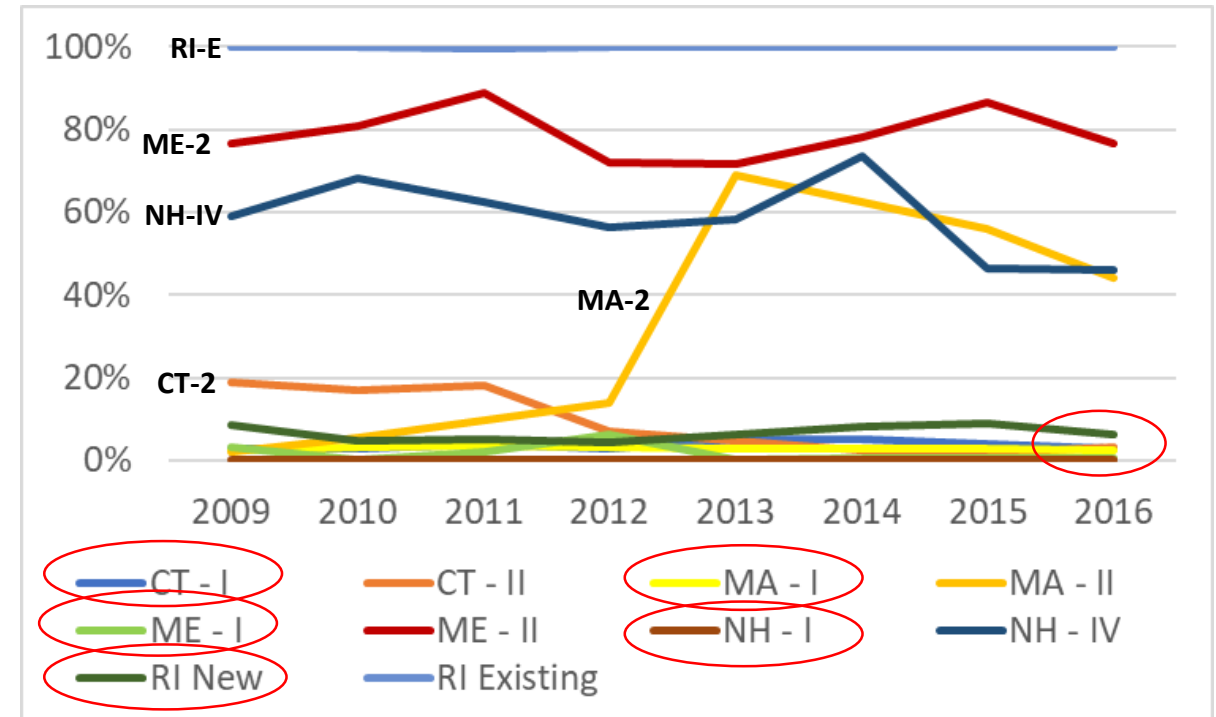


Historical Hydro Contributions to RPS Compliance

Shown as a % of the total RPS obligation.



VT-1 did not commence until 2017.



RPS is an ever-changing landscape

- 2012: Eligible capacity threshold for **MA-1** was increased from 25 to 30 MW, and **MA-2** from 5 to 7.5 MW
- 2017: CT legislature removed hydro eligibility from **CT-2**, leaving only waste-to-energy
- 2017, MA created a Clean Energy Standard (**CES**) and then approved contracts for 9.45 TWh of Canadian hydro over proposed new transmission
 - Supported by MA legislature as a tool to help meet aggressive GHG goals.
- 2018: CT legislature amended **CT-1** eligibility to include FERC-relicensed RoR hydro
 - Usage of relicensed run-of-river hydro RECs limited to 1% of load for each load-serving entity (LSE)
 - Total demand would be equal to around 200-300 GWh/year if every LSE used its maximum eligible quantity
- 2019: New **ME-1** category was created for "Qualified Hydroelectric Output" (QHO)
 - The QHO is defined as output from FERC-licensed hydro generators with a commercial operation date prior to January 1, 2019, that are (1) greater than 25 MW, (2) interconnected to an electric distribution system located in the state, and (3) not located in a critical habitat for Atlantic salmon.
 - The total QHO as a percentage of total electrical output that is eligible for treatment as Class I or Class IA resource ramps up over time, starting at 40% in 2020, increasing at a rate of 10% of total QHO per year (until 100% of QHO is eligible for treatment as a "New" resource in 2026).
- 2020: MA creates another CES category (**CES-E**) for pre-2011 hydro >30MW (nuclear assets also eligible)



Observations and Findings

- Hydro participation in New England RPS markets is as varied as the facilities themselves
- No two RPS markets are the same; the details matter
- Hydro eligibility criteria vary widely by state and by 'class'
- REC price dynamics are complex; most markets cannot be evaluated in isolation
- Policy objectives (and therefore RPS rules and implementation) are subject to change over time
- Changes to supply or demand side will impact REC prices
- Accessibility of REC revenues must be evaluated on a case by case basis
- Additional topics to consider
 - REC market liquidity (i.e. reliable access to transactions of desired quantities)
 - Will current trend towards 100% targets change the landscape again?






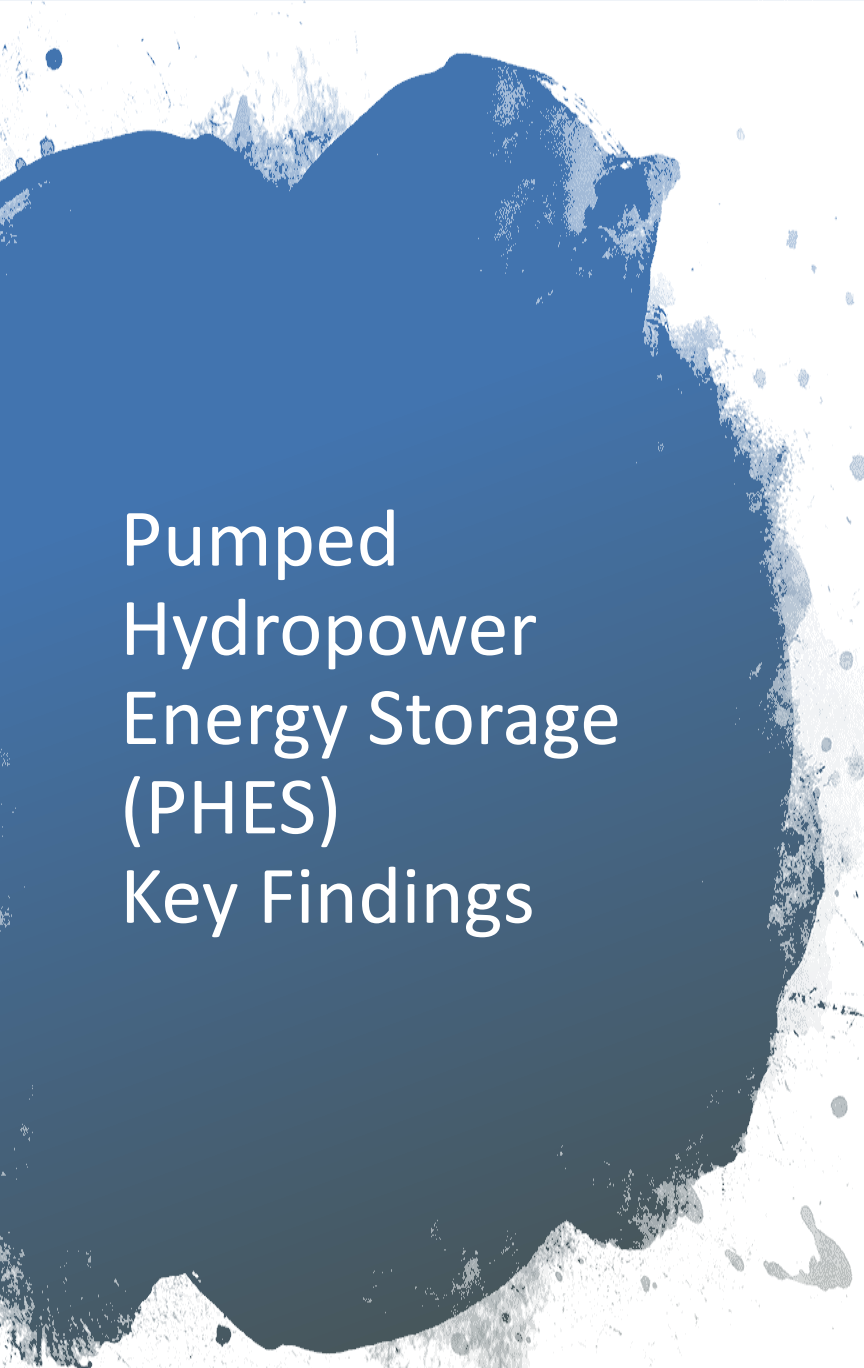
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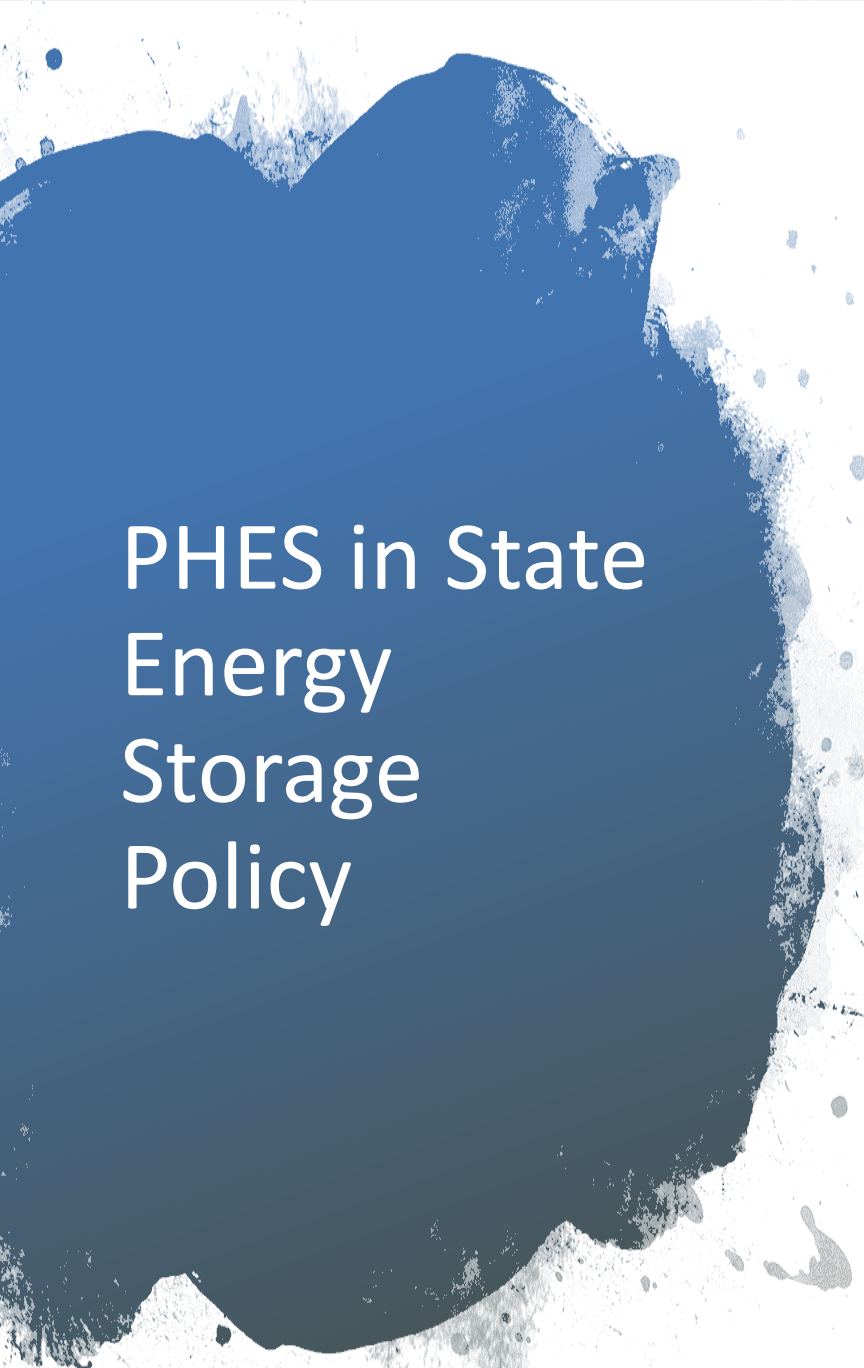


Pumped Hydropower Energy Storage (PHES) Key Findings

- PHES is not an eligible technology in most state RPS programs
- Eligibility criteria in state energy storage policies largely favor batteries
- PHES's participation in energy storage policies is indirectly limited by contracting structures and commissioning dates
- Siting constraints, perceived environmental impacts, long permitting and construction timelines may be barriers to inclusion in state policy

Does PHES Fit in an RPS?

- PHES can facilitate and integrate renewable energy generation
- PHES could be a good complement to variable renewable energy generation and provides reliability and ancillary services to the grid and can defer the need for new transmission
- Does PHES provide the right service— grid flexibility as opposed to grid flexibility?



PHES in State Energy Storage Policy

- California
- Oregon
- Massachusetts
- New Jersey
- New York

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Learn more at www.cesa.org

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