DOE-OE Energy Storage Technology Advancement Partnership (ESTAP) Webinar

State Energy Storage Policy: Best Practices for Decarbonization

March 23, 2023

U.S. DEPARTMENT OF ENERGY

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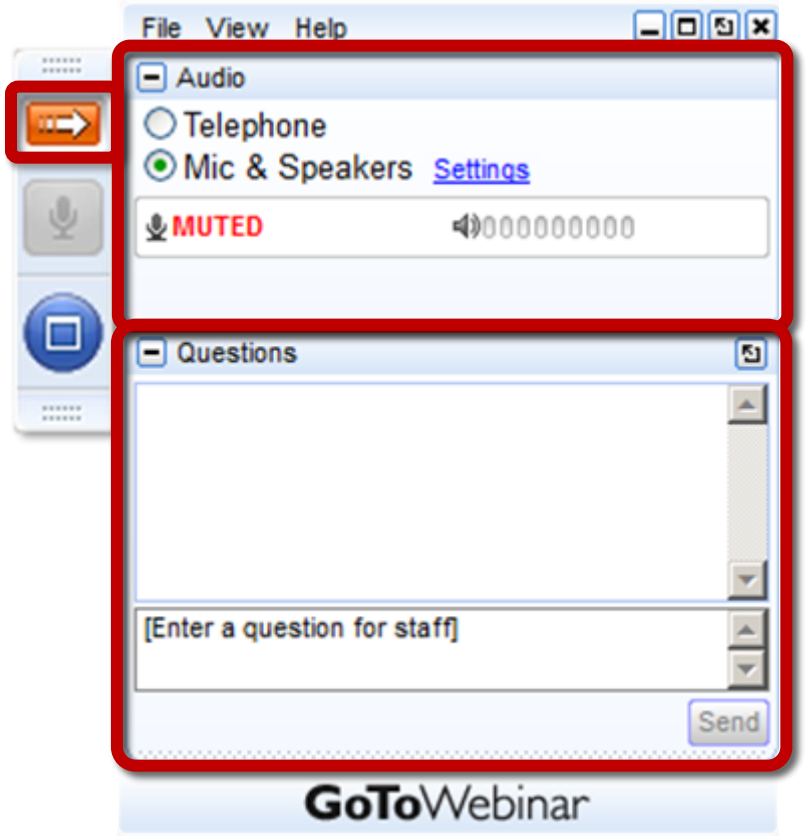

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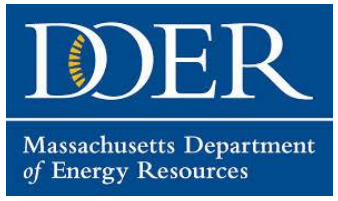
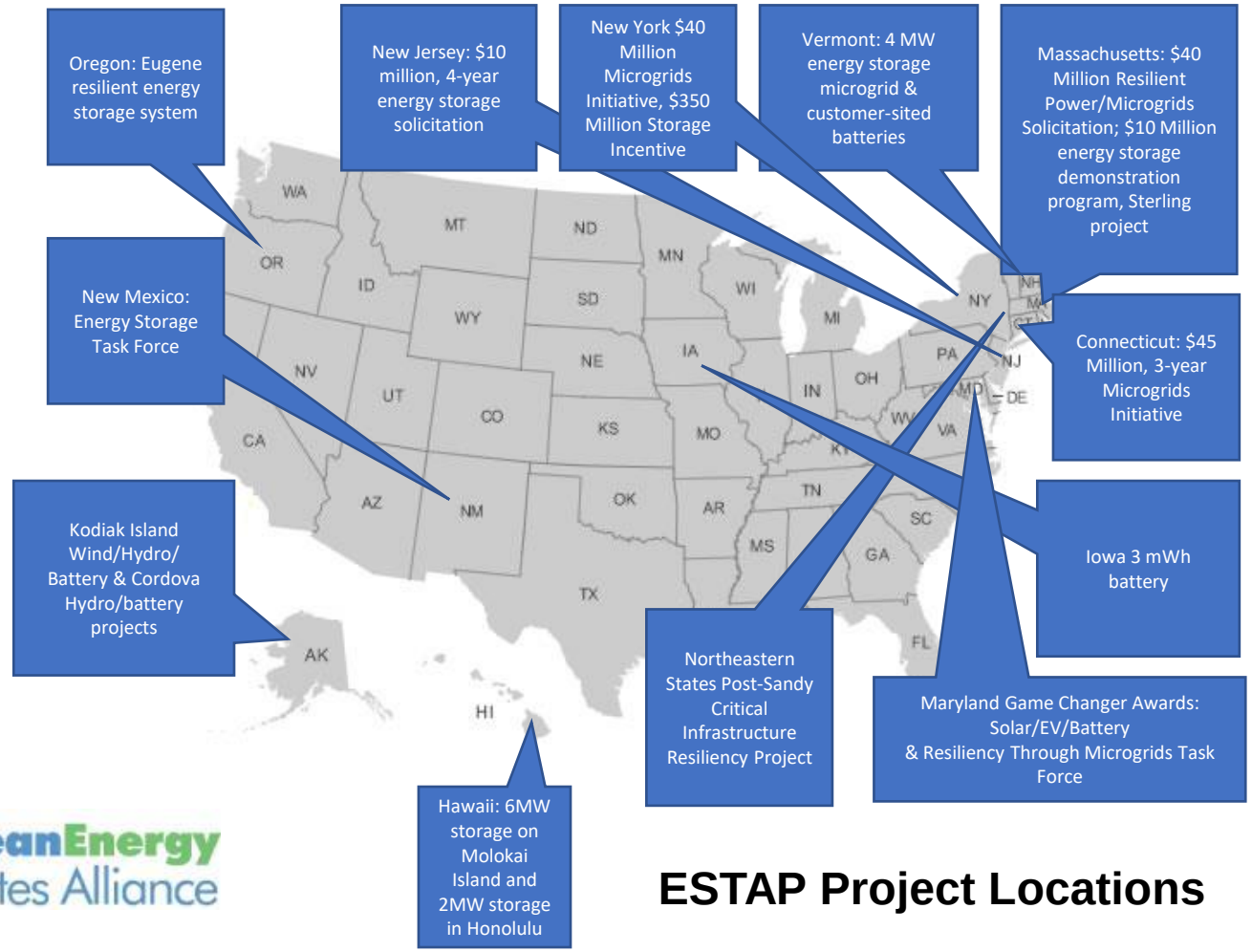


DOE-OE Energy Storage Technology Advancement Partnership

The Energy Storage Technology Advancement Partnership (ESTAP) is a US DOE-OE funded federal/state partnership project conducted under contract with Sandia National Laboratories.

ESTAP Key Activities:

1. Facilitate public/private partnerships to support joint federal/state energy storage demonstration project deployment
2. Disseminate information to stakeholders
   - ESTAP listserv >5,000 members
   - Webinars, conferences, information updates, surveys.
3. Support state energy storage efforts with technical, policy and program assistance



ESTAP Project Locations

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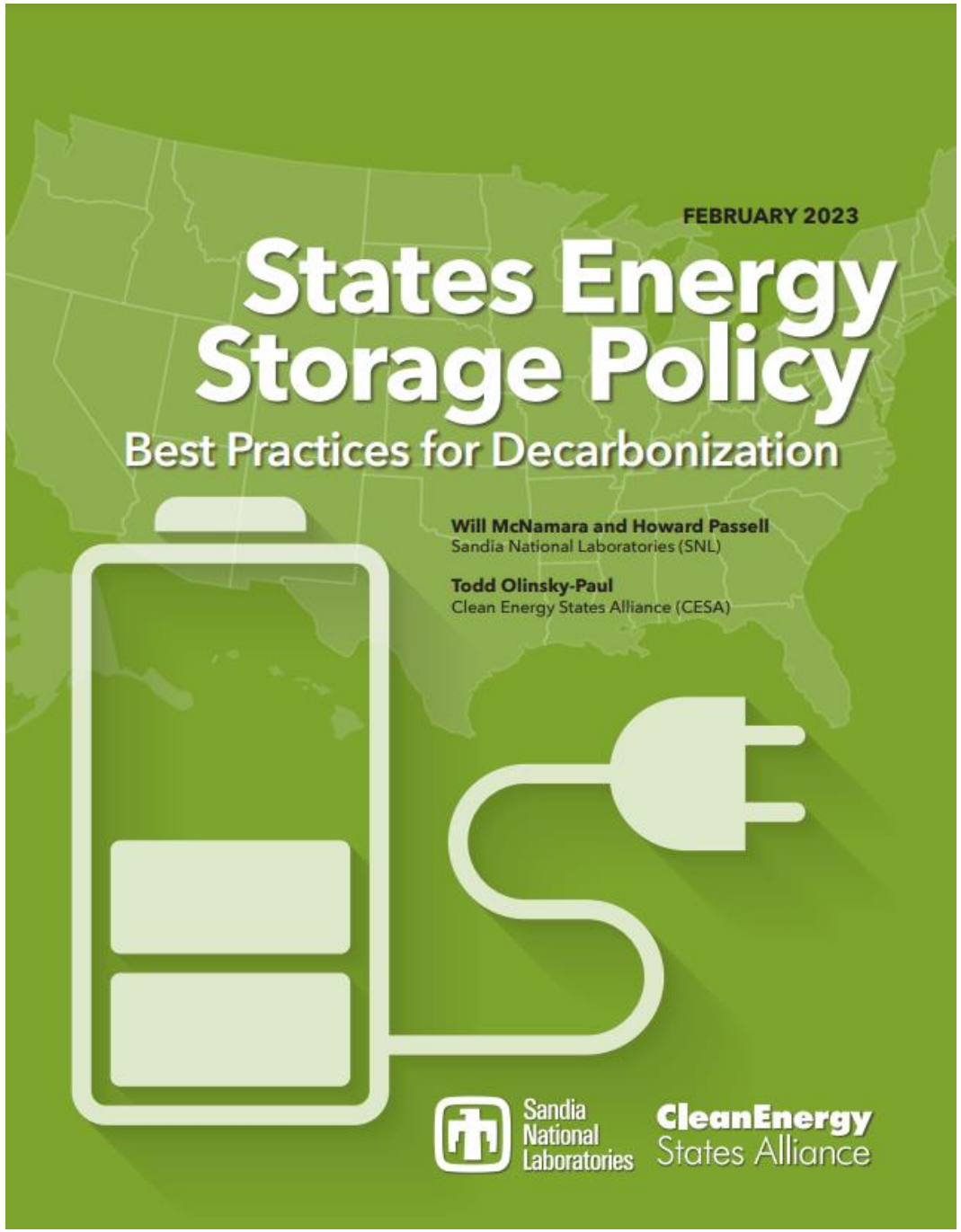
Thank You!

Dr. Imre Gyuk
Director, Energy Storage Research,
U.S. Department of Energy

Waylon Clark
Energy Storage Program Demonstration Team Lead,
Sandia National Laboratories



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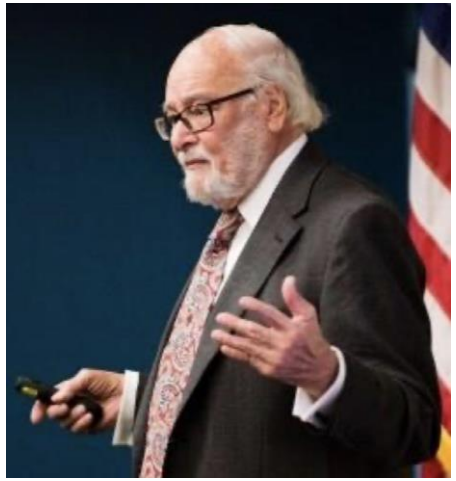
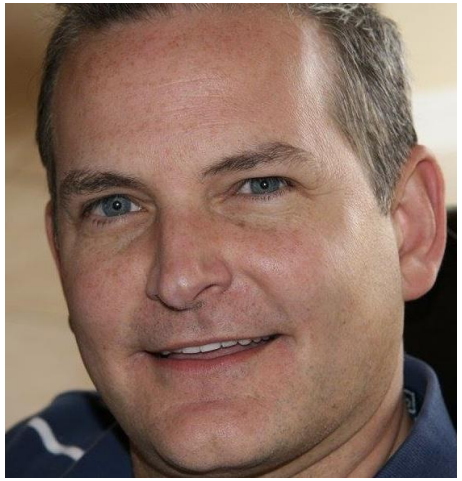
Webinar Speakers



Dr. Imre Gyuk
Director of Energy Storage Research, US Department of Energy Office of Electricity



Will McNamara
Policy Analyst, Sandia National Laboratories

Todd Olinsky-Paul
Senior Project Director, Clean Energy States Alliance

Gabe Epstein
Project Associate, Clean Energy States Alliance

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State Energy Storage Policy Best Practices for Decarbonization

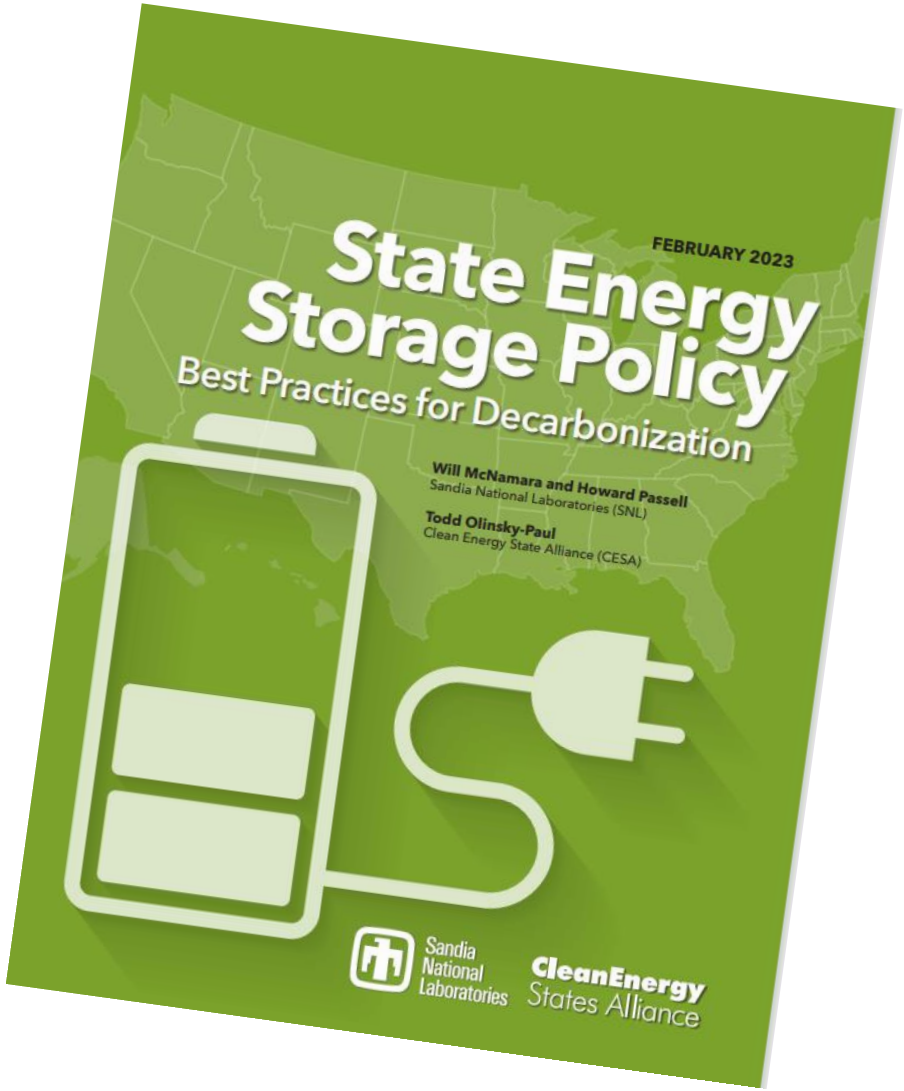
Will McNamara, Policy Analyst
Sandia National Laboratories

Todd Olinsky-Paul, Senior Project Director
Clean Energy States Alliance

(SAND2023-00593O)

I will address the following aspects of the report:

1. Description of State Survey
2. State Survey Results



DESCRIPTION OF THE STATE SURVEY

- The 2022 state survey provides insights into key state energy storage policy priorities and the challenges being encountered by some of the leading decarbonization states.
- Our intent is to: 1) highlight best practices; 2) explain barriers; and 3) underscore the urgent need to expand state energy storage policymaking to support decarbonization in the US.
- The survey comprised 15 questions pertaining to decarbonization and energy storage policies being adopted at the state level.
- Respondents came from state utility commissions, state energy offices, and governors' offices.

THE STATE SURVEY

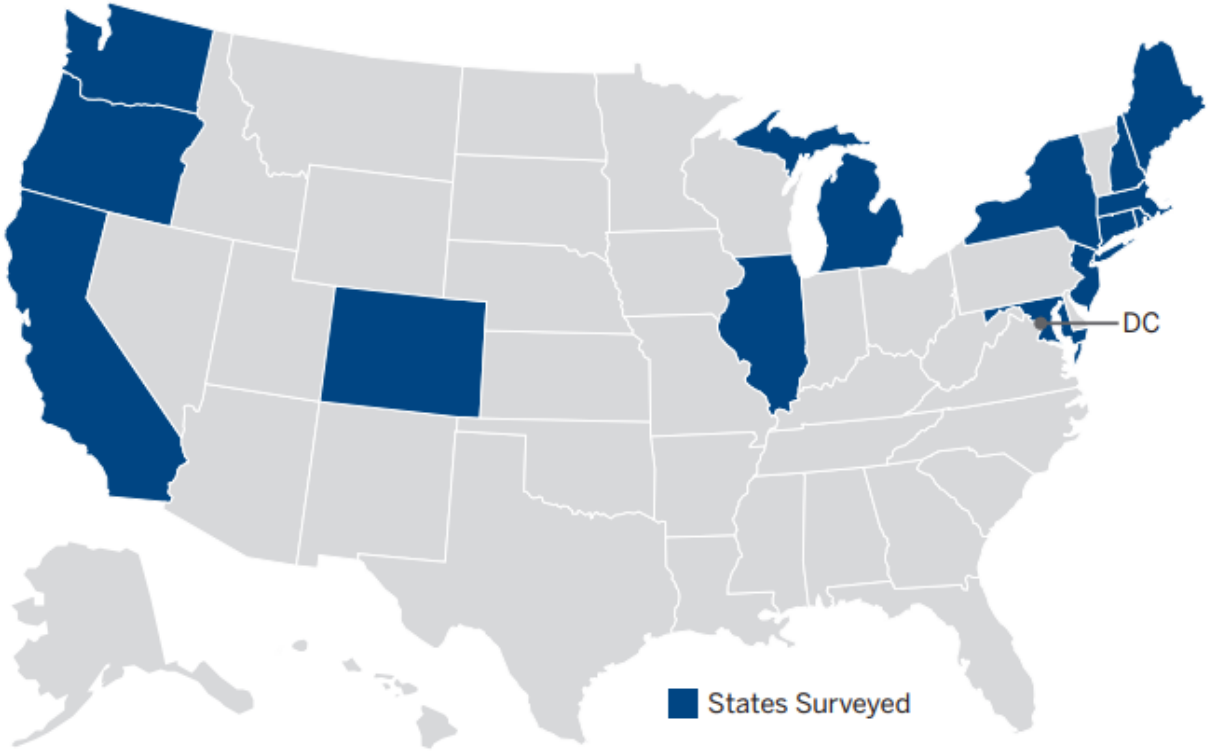
The state survey distribution resulted in 22 responses from 14 states plus the District of Columbia. The following states were represented in the survey responses:

California	Maine	New Hampshire
Colorado	Massachusetts	New York
Connecticut	Maryland	Oregon
District of Columbia	Michigan	Rhode Island
Illinois	New Jersey	Washington

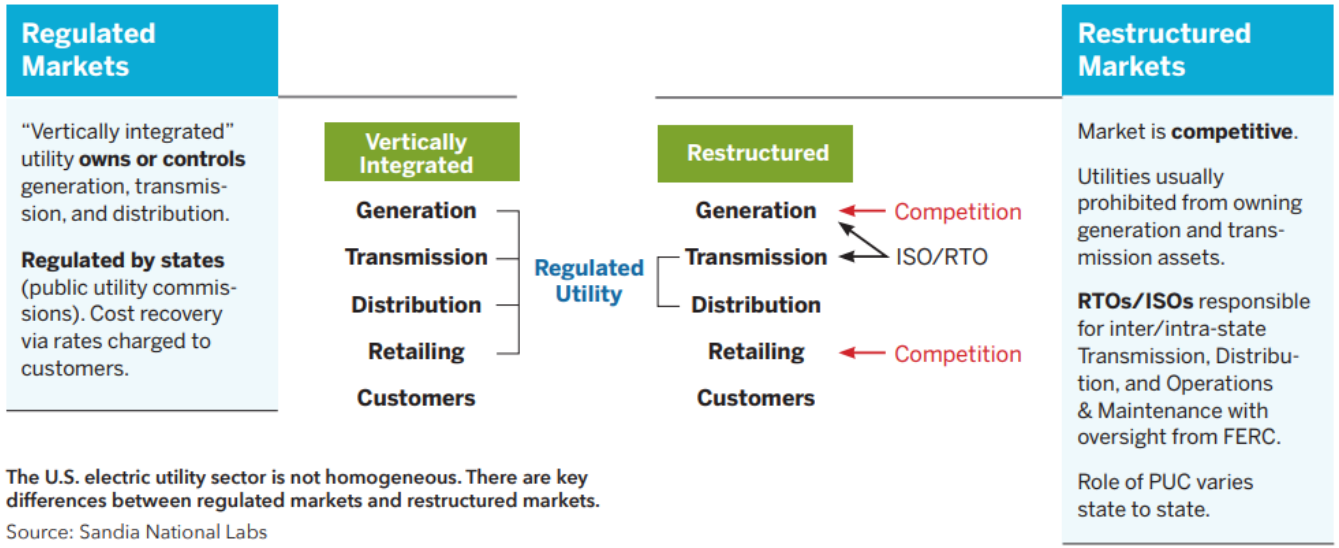
Survey responses reflected a wide range of policymaking: from states that have no substantive ES policy development to states that have numerous and sophisticated polices, some of which have been in place for nearly a decade.

Survey results show a wide variety in state energy storage objectives, scopes, applications, and overall maturity of policies and programs.

Both FTM and BTM storage were considered in the survey questions.



RESPONSES REFLECTED THE DIVERSITY OF THE E&U SECTOR



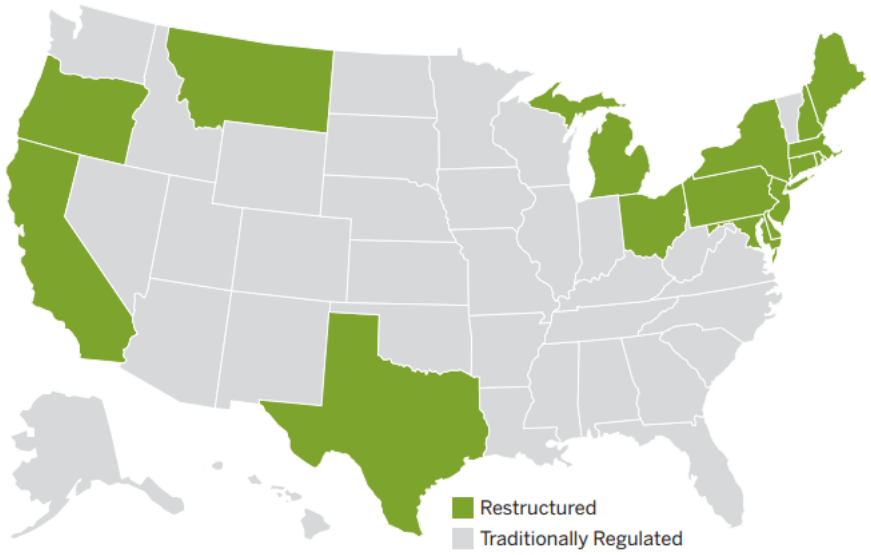
The U.S. electric utility sector is not homogeneous. There are key differences between regulated markets and restructured markets.

Source: Sandia National Labs

Both vertically integrated states (i.e., regulated) and "restructured" states responded to the survey.

Policymaking approaches to ES can be significantly influenced by whether a state is vertically integrated or restructured.

- ✓ In regulated states, policymakers and regulators may view ES primarily as a means to solve grid operational problems at the distribution level.
- ✓ In restructured markets, competitive-market services may tend to drive ES investment considerations.



INVESTMENT CONSIDERATIONS

Considerations driving ES investments vary across states.

Vertically integrated states

- ✓ Utilities driven by cost-recovery concerns.
- ✓ Evaluating integrated resource planning (IRP) requirements to include ES investments by utilities.
- ✓ Adopting energy storage targets or mandates, and/or expanding renewable energy targets to align with storage objectives
- ✓ Incorporating energy storage into distribution system planning and modeling simulations.

Restructured states

- ✓ Considerations for investments in energy storage will tend to be driven toward competitive-market services.
- ✓ For example, how will energy storage generate revenue and provide a return for investors, as opposed to necessary operational services, such as maintaining reliability on the distribution network.
- ✓ Due to the restrictions on utility ownership that are typical in restructured markets, third parties often become the primary owners of energy storage assets (as opposed to utilities.

WITHIN THIS DIVERSITY, WE FOUND COMMONALITIES

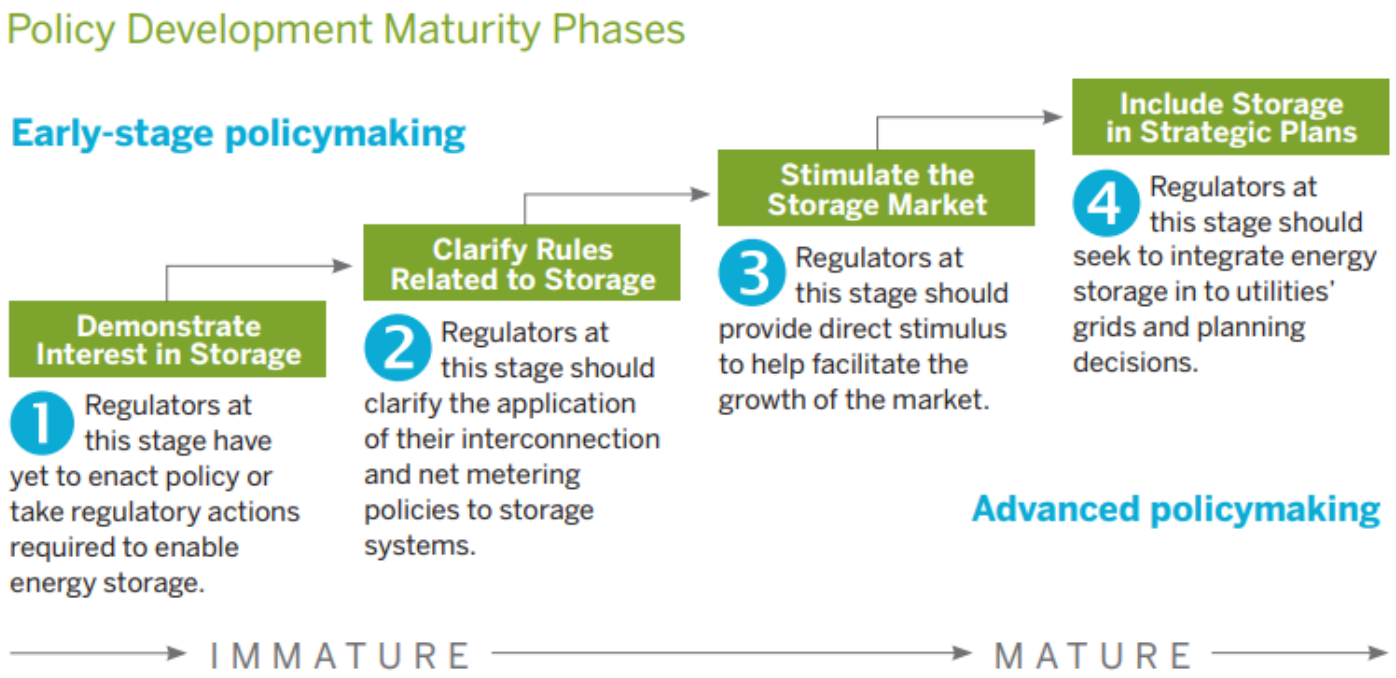
- States are taking different pathways toward ES policymaking.
- And yet, a common denominator is that ES policymaking at the state level is generally intended to create **enabling policies**.
  - ✓ Enabling polices seek to remove the barriers that have prevented ES technologies from being adopted, and pave a pathway for these technologies to be better utilized.

Enabling policies typically have three core objectives:

1. To enable energy storage to access the distribution grid and retail markets
2. To enable energy storage to compete against traditional resources in utility planning and procurements; and
3. To enable appropriate valuation and compensation of energy storage technologies.

DIFFERING LEVELS OF POLICYMAKING "MATURITY"

- We identified a trajectory of policymaking "maturity," from early-stage investigative steps to advanced policymaking with multiple policies adopted.
- This trajectory of state-level policymaking on energy storage is illustrated in an informal 1-4 ranking representing the following maturity levels of policymaking as follows:



1. State is demonstrating early interest in ES
2. State is clarifying its rules related to ES
3. State is developing policies to stimulate the development of an ES marketplace
4. State is taking specific steps to integrate ES into utility grid planning decisions

THE SURVEY RESPONSES REFLECTED THIS SPECTRUM

Survey States: Energy Storage Policymaking Maturity Levels

State	Policymaking Maturity Level	Status of Electric Restructuring
California	4	Restructuring suspended
Colorado	Between 1–2	Vertically integrated; not pursuing restructuring at this time.
Connecticut	4	Restructured
District of Columbia	1	Transition to restructuring has begun
Illinois	Between 1–2	Restructured
Maine	4	Restructured
Maryland	3	Restructured
Massachusetts	Between 2–3	Restructured
Michigan	1	Restructured
New Hampshire	1	Restructured
New Jersey	4	Restructured
New York	4	Restructured
Oregon	3	Vertically integrated; not pursuing restructuring at this time.
Rhode Island	3	Restructured
Washington	Between 1–2	Vertically integrated; not pursuing restructuring at this time.

Based on the Policy Development Maturity Trajectory and specific policy actions that have been undertaken by each state, the surveyed states can be evaluated on their energy storage policymaking maturity.

Source: CESA/Sandia National Laboratories

The states that responded to our survey reflected a wide range of energy storage policy development maturity, which in turn provided a broad range of perspectives to be analyzed.

PRIORITY APPLICATIONS

Survey responses indicated that policymakers and regulators are seeking to maximize the benefits of ES while reducing uncertainty and risk. Toward that end, in determining HOW to use ES, a number of "priority applications" were identified.

- Supporting electric reliability and resilience on the distribution grid.
- Cost control through enabling electrification, avoidance of costly T&D upgrades, increased flexibility of end-use loads (such as EV charging), and peak demand reduction.
- Enabling higher levels of solar PV interconnected with the grid, and the use of solar coupled with storage for interconnection upgrade mitigation.
- Exploration of different applications and use cases through demonstration projects and programs.
- Exploration of location-specific benefits, such as resilience and peak cost reductions.
- Interest in price signals and performance payment mechanisms that can allow BTM storage to be aggregated and dispatched to meet grid needs.

PERSPECTIVES ON BTM VS. FTM & DURATION

Survey responses illuminated valuable perspectives on the key themes of:
1) BTM vs. FTM storage; and 2) Duration expectations

BTM vs. FTM storage

- ✓ At present, BTM storage is primarily installed for energy resilience, while FTM storage is more often linked to decarbonization goals.
- ✓ Most states would ideally like to achieve a mix of FTM and BTM energy storage
- ✓ FTM storage is perceived as being cheaper than BTM storage.
- ✓ Perception that BTM storage is not able to provide grid benefits in many places (requires a mechanism to both receive utility dispatch signals and to be compensated for grid services provided).
- ✓ Some states (MA, CT) are starting to engage BTM storage in providing grid services, but most states have not yet adopted such programs.

Duration expectations

- ✓ LDES does not have a standard definition across states.
- ✓ CA & NY have developed LDES specific policies, but are the exception.
- ✓ Clear market for LDES is not anticipated before 2030
- ✓ Current emphasis is on demonstrating value propositions through pilots.
- ✓ The survey responses pre-dated the Inflation Reduction Act federal subsidies, which are expected to support LDES technology development.

NATIONALLY, POLICY LEVERS FOR ENERGY STORAGE ARE EMERGING

1. Procurement mandates, targets, or goals
2. Ownership models for ES assets
3. Inclusion of ES in utility IRPs
4. Incentives, tax credits, or other subsidies
5. Prioritization of specific use applications for ES technologies
6. State-sanctioned benefit-cost analysis
7. Distribution system modeling for location-specific siting of ES technologies
8. Changes to existing net metering programs to accommodate BTM energy storage
9. Changes to legacy interconnection standards to enable deployment of BTM ES
10. Changes to existing RPS programs to include or specifically carve out ES requirements
11. Use of time-variant electric rates to spur the development of BTM storage technologies
12. Retail rate re-design
13. Equity policies specific to ES technologies

Our survey sought to ascertain:

- *The extent to which these policy issues are being prioritized in the leading decarbonization states;*
- *How they are being applied to help advance decarbonization efforts, and*
- *The extent to which key, preliminary outcomes from state activities can be measured.*

SOME POLICY LEVERS SEEM TO BE PRIORITIZED.

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1. Procurement mandates, targets, or goals for energy storage procurement by regulated utilities
2. Utility ownership of energy storage assets
3. Incentives, tax credits, or other subsidies for energy storage
4. State-sanctioned benefit-cost analysis (BCAs) of energy storage
5. Distribution system modeling for location-specific siting of energy storage technologies

The survey sought to ascertain the extent to which these policy issues are being prioritized in the leading decarbonization states, how they are being applied to help advance decarbonization efforts, and the extent to which key, preliminary outcomes from state activities can be measured.

INSIGHTS INTO THE TOP FIVE POLICY LEVERS.

1. Procurement mandates, targets, or goals for energy storage procurement by regulated utilities
2. Utility ownership of energy storage assets
3. Incentives, tax credits, or other subsidies for energy storage
4. State-sanctioned benefit-cost analysis (BCAs) of energy storage
5. Distribution system modeling for location-specific siting of energy storage technologies

1) Only nine states have adopted a procurement target; it is not an essential approach. Some states have opted to increase deployment through incentives and /or rate design. Specific carve-outs for BTM and LDES are becoming more of a focus.

2) Largely determined by competitive status of state. Where utilities are allowed to own storage, utility resource planning becomes a priority.

3) Perhaps the most effective policy lever—as examples in CA, NY, and MA indicate. State incentives can emphasize deployment goals (e.g., developments in disadvantaged communities).

4) An under-utilized strategy among states. As the need for location-specific siting grows in importance, BCAs that are customized for a state/region will become more necessary.

5) Challenge is a lack of available modeling tools. Sophisticated modeling approaches will need to identify distribution grid needs under various scenarios and evaluate multiple solutions.

KEY POLICYMAKING CHALLENGES IDENTIFIED

- Lack of bandwidth within the relevant state agencies to develop energy storage policy.
- Challenges in tracking or accounting for renewable generation paired with storage.
- Determining the level of ownership and control that utilities can (or should) have
- Barriers or uncertainty about where to site large-scale ES projects.
- Limitations of legacy grid infrastructure (e.g., limited hosting capacity).
- Challenges associated with legacy interconnection standards & permitting processes.
- The perceived high cost of ES technologies + supply chain concerns.
- Uncertainties about the “market readiness” of certain ES technologies.

STATE SURVEY RESULTS: OTHER HIGH LEVEL OBSERVATIONS

- There is general acceptance of the principle that energy storage, particularly of long-duration capabilities, is a necessary tool to achieve decarbonization.

- However, even the most advanced states face significant challenges in bringing energy storage to scale within their decarbonization timeframes.

- Most states, even those that have adopted aggressive decarbonization goals, are still grappling with how to deploy sufficient amounts of energy storage, both FTM and BTM, to achieve these goals.

STATE SURVEY RESULTS: HIGH LEVEL OBSERVATIONS

- States cited diverse reasons for not moving more aggressively to develop energy storage policy and programs, including:

  - ✓ Lack of clarity as to which use cases (i.e., applications) storage is best suited to serve in decarbonization efforts.
  - ✓ A belief, based on modeling, that storage may become more important later in the decarbonization process.
  - ✓ Ongoing assessments of best practices for energy storage policy development.

ACKNOWLEDGEMENTS

Funding provided by US DOE Energy Storage Program managed by Dr. Imre Gyuk of the DOE Office of Electricity.

Contact:

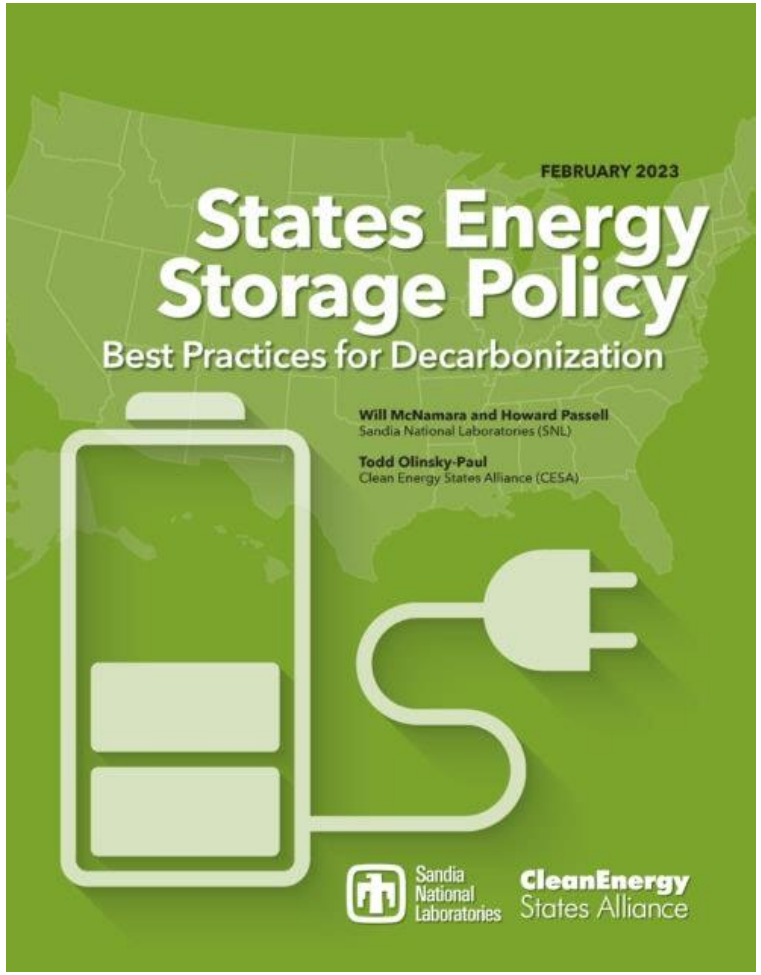
Will McNamara

jwmcnam@sandia.gov

(505) 206-7156

DOWNLOAD THE REPORT

Download the full report:
https://www.cesa.org/resource-library/resource/states-energy-storage-policy-best-practices-for-decarbonization/



THANK YOU

Contacts:

Will McNamara
jwmcnam@sandia.gov
(505) 206-7156

Todd Olinsky-Paul
Todd@cleanegroup.org
(845) 625-8807

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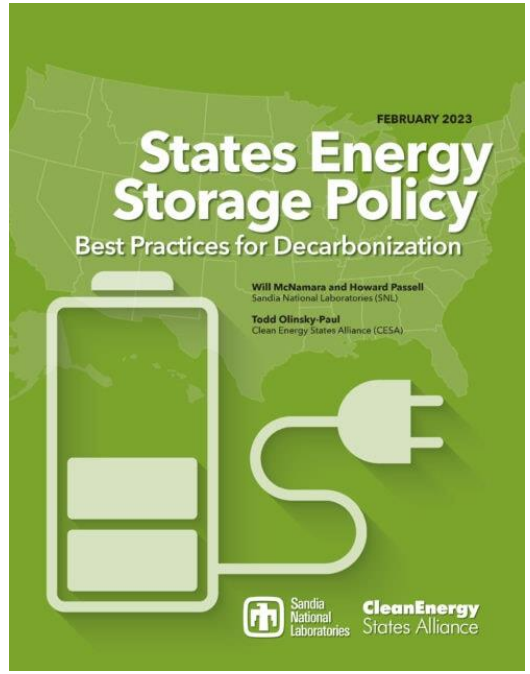
Industry Survey Results and Takeaways from State Case Studies

March 23, 2023

Todd Olinsky-Paul
Senior Project Director
Clean Energy States Alliance



INDUSTRY SURVEY

In addition to the state survey, we also surveyed six energy storage development companies and one industry consultant, to compare their policy priorities with those of the states.

- Enel North America
- Key Capture Energy
- New Leaf Energy (formerly Borrego)
- Nostromo Energy
- Sunrun
- Tesla
- An independent consultant to the energy storage industry

We wanted to find out whether the storage policies most frequently adopted by states were the policies most valued by non-utility energy storage developers.

INDUSTRY SURVEY RESULTS AND TAKEAWAYS

- Industry respondents *unanimously agreed* that state energy storage policies, programs, and regulations are essential to their business
- They affirmed that their companies invest most of their efforts toward building market share in those states that adopt the most favorable energy storage policies
  - **Supportive state policy is essential to build markets!**
- Industry respondents were *nearly unanimous* (6 out of 7) in viewing states with decarbonization goals or policies as generally more welcoming than states without
  - **Related policies and targets, such as decarbonization, are also very important!**
- Industry respondents *unanimously cited* incentives/tax credits as being the single *most* helpful type of state energy storage policy
  - **While markets remain immature, direct incentives are most effective to bridge the energy storage economics gap**

Recommendation: Set supportive clean energy targets and use direct incentives, such as rebates, performance payments and tax credits, as gap funding until markets mature.

INDUSTRY SURVEY RESULTS AND TAKEAWAYS

- Industry respondents were *nearly unanimous* (6 out of 7) in citing utility ownership of energy storage as the *least* helpful policy
  - **Storage developers may view storage-owning utilities as unfair competition**
- Distribution system modeling and changes to solar net metering regulations were also cited by several respondents as being among the *least* helpful state policies
- Asked which energy storage policy types they *most* want to see states adopt, industry respondents gave a range of answers. Most popular:
  - Incentives/tax credits
  - Procurement/RPS requirements
  - Changes to interconnection standards
- While affirming the importance of state policies, two respondents noted that wholesale market policies are also very important, citing Texas as an example of a state that lacks storage policies but is attractive due to wholesale energy market opportunities

COMPARING STATE AND INDUSTRY RESULTS

- State policymakers and storage developers *agreed* that storage procurement mandates/targets and storage incentives/tax credits are among the most helpful state policy types
- State policymakers and storage developers *disagreed* on the value of utility ownership and distribution system modeling

	Helpful / Valuable?			
	Storage procurement targets	Storage incentives / tax credits	Utility ownership of energy storage	Distribution system modeling
State policymakers	✓	✓	✓	✓
Energy storage developers	✓	✓	✗	✗

- **State policymakers tend to view electric utilities as helpful or necessary partners in meeting their energy storage procurement goals**
- **Third-party energy storage developers may view electric utilities as competitors or impediments in the energy storage market**

COMPARING STATE AND INDUSTRY RESULTS

- Additionally, the energy storage developers surveyed identified changes to interconnection standards among the policy types they would *most* like states to adopt
  - **This again points to tensions between utilities and third-party storage developers**

Recommendation: State policymakers and regulators should take a hard look at the points of friction between electric utilities and third-party energy storage developers, such as utility ownership of storage, distribution system modeling, and interconnection standards.

These friction points can frustrate even the best-designed energy storage policies and programs.

STATE CASE STUDIES: COMMON BARRIERS EMERGED

We conducted in-depth case studies, interviewing policymakers from five key states: California, Illinois, Massachusetts, New York, and Oregon

Through the survey and case studies, some common barriers were identified:

- Grid interconnection barriers
- Questions of equity in energy storage program development
- Uncertainties about storage valuation, especially non-energy and non-monetizable benefits
- Difficulties in harnessing storage to meet state energy and environmental goals, especially distributed storage
- Knowledge barriers, especially with regard to future energy needs and future storage capabilities
- Uncertain or divided regulatory authority
- Insufficiently developed markets
- Questions about who should pay for energy storage investments, and how to allocate costs equitably
- Perceived high costs of energy storage
- Uncertainties about how to bring energy storage to scale, especially to provide longer-duration grid services

These barriers, and steps states are taking to address them, are explored more fully through the five state case studies in the report.

DOWNLOAD THE REPORT

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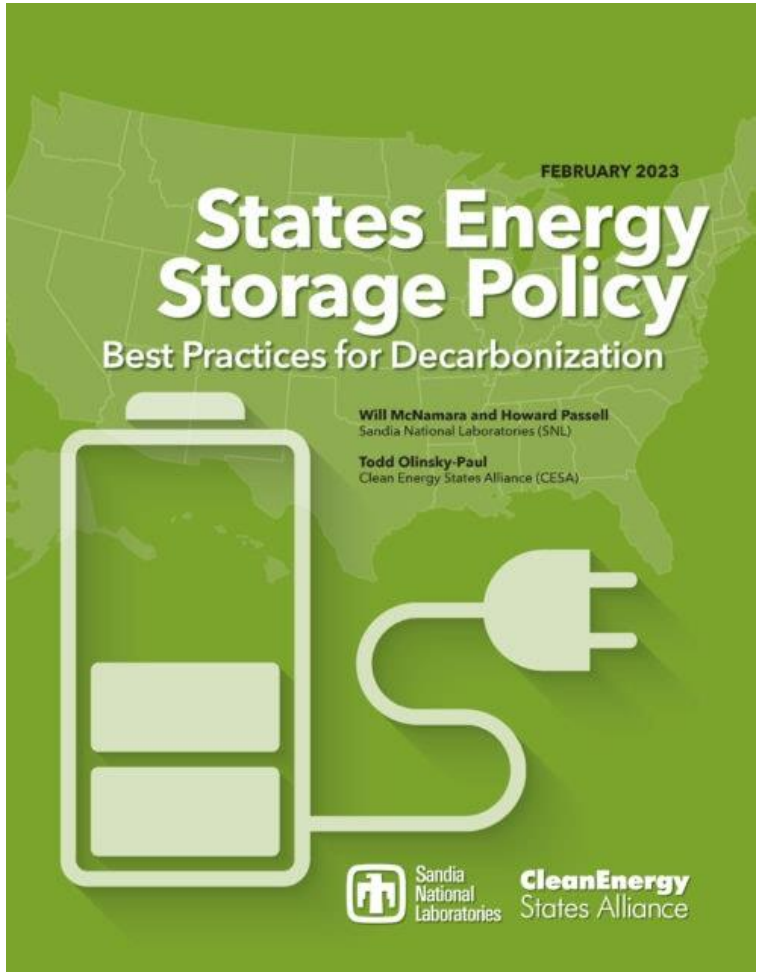

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jwmcnam@sandia.gov
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(845) 625-8807

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Dr. Imre Gyuk
US DOE-OE
imre.gyuk@hq.doe.gov

Waylon Clark
Sandia National Laboratories
wtclark@sandia.gov

Todd Olinsky-Paul
Clean Energy States Alliance
todd@cleanegroup.org

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Upcoming Webinar

Energy Modeling for Decarbonization Planning: Advice and Resources for States

Monday, April 10, 3-4pm ET

Energy modeling can be a powerful tool for state decarbonization planning, but it can also be costly and the results can be prone to misinterpretation. This webinar will provide advice on energy modeling and introduce resources useful to states embarking on decarbonization planning.

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