Energy Storage Policy
Best Practices From The States

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U.S. DEPARTMENT OF ENERGY

Sandia National Laboratories

CleanEnergy States Alliance

Celebrating 20 Years of State Leadership

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CESA members—mostly state agencies—include many of the most innovative, successful, and influential public funders of clean energy initiatives in the country.

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Energy Storage Technology Advancement Partnership (ESTAP)

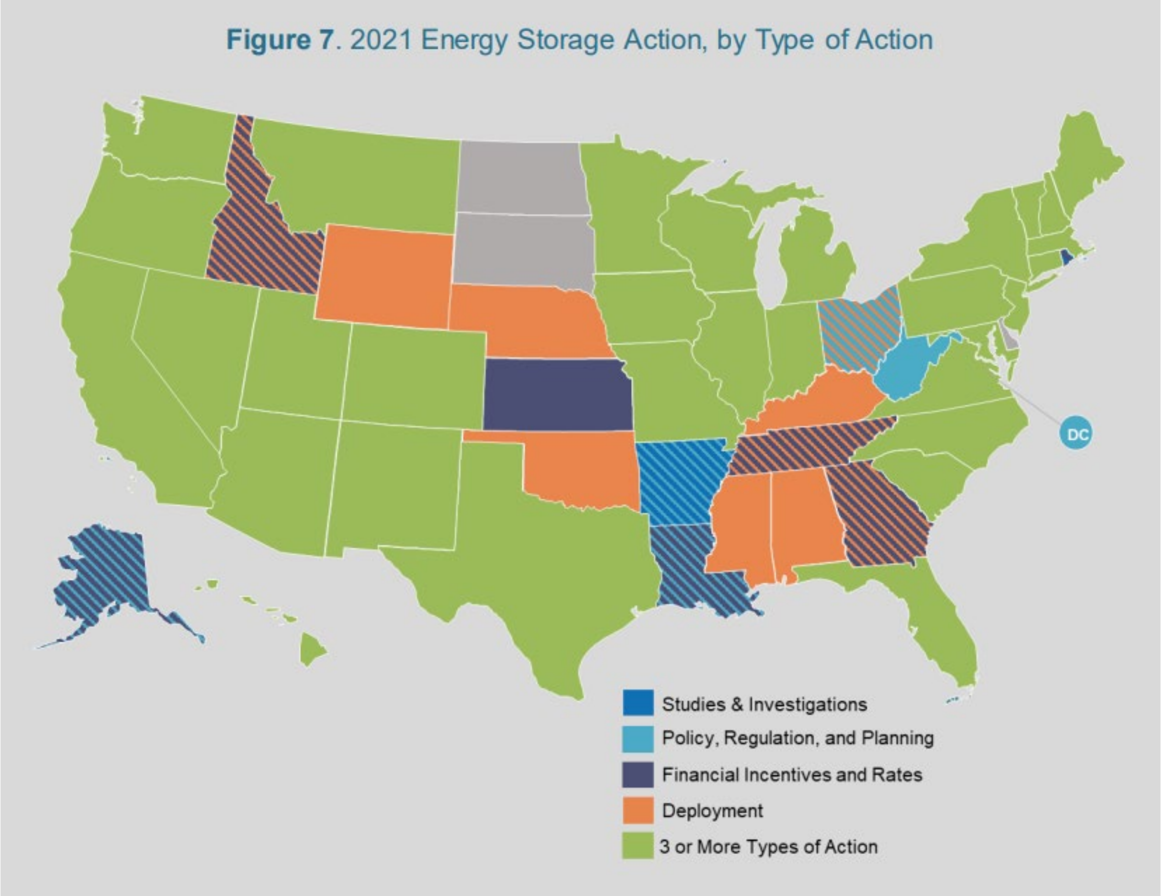
Conducted under contract with Sandia National Laboratories, with funding from US DOE Office of Electricity.

- Facilitate public/private partnerships to support joint federal/state energy storage demonstration project deployment
- Support state energy storage efforts with technical, policy and program assistance
- Disseminate information to stakeholders through webinars, reports, case studies and conference presentations

CESA also has a monthly Energy Storage Working Group meeting for member states interested in energy storage

State Policy Tools

1. Studies and planning
2. Grants (demonstration projects and pilots)
3. Longer-term policy and programs
   a. Utility mandates/procurement targets
      i. Storage procurement targets
      ii. Storage in renewable/clean energy portfolio standards
      iii. Clean peak standards
   b. Rebates
   c. Storage adders in renewables incentive programs
   d. Storage incentives in energy efficiency programs
   e. Tax incentives
   f. Financing/clean energy financial institutions
   g. Market and regulatory reform
   h. Removal of barriers/reduction of soft costs
   i. Technical assistance and resources



Utility Mandates / Procurement Targets

To date, eleven states have set energy storage procurement targets or mandates: California, Oregon, Nevada, Illinois, Virginia, New Jersey, New York, Connecticut, Massachusetts, Maine and Michigan.

Typically, utilities are to procure a defined amount of storage capacity by a target date.

SOME EXAMPLES (not a comprehensive list):

- **CA:** 1,825 MW by 2020 (CEC added 500 MW to the original 1,325)
- **MA:** 1,000 MWh by 2025
- **NJ:** 2,000 MW by 2030 (600 MW by 2021)
- **NY:** 3,000 MW by 2030 (1,500 MW by 2025)
- **OR:** 5 MWh by 2020 (capped at 1% of utility's peak load)

California procurement targets (2013)

Proposed Energy Storage Procurement Targets (in MW)[22]

Storage Grid Domain Point of Interconnection	2014	2016	2018	2020	Total
Southern California Edison					
Transmission	50	65	85	110	310
Distribution	30	40	50	65	185
Customer	10	15	25	35	85
Subtotal SCE	**90**	**120**	**160**	**210**	**580**
Pacific Gas and Electric					
Transmission	50	65	85	110	310
Distribution	30	40	50	65	185
Customer	10	15	25	35	85
Subtotal PG&E	**90**	**120**	**160**	**210**	**580**
San Diego Gas & Electric					
Transmission	10	15	22	33	80
Distribution	7	10	15	23	55
Customer	3	5	8	14	30
Subtotal SDG&E	**20**	**30**	**45**	**70**	**165**
Total - all 3 utilities	**200**	**270**	**365**	**490**	**1,325**

- Utilities may own up to 50% of required storage capacity
- CPUC prioritizes "public sector and low-income customers"

Rebates

Rebates are a form of customer incentive designed to buy down the cost of energy storage. Rebates can work with utility procurement programs, or can be independent of them.

Examples:

CA – Self Generation Incentive Program (SGIP) (re-funded in 2018 at $830 million through 2025)

NY – Market Acceleration Bridge Incentive Program ($350 million)

California SGIP

Summary: Ratepayer funded. Originally conceived in 2001 as a peak load reduction program supporting mainly solar PV; modified in 2011 to focus on greenhouse gas emissions reductions; modified again in 2016 to focus 79% of the program budget on energy storage. Incentives later modified to support state emissions reduction targets. (More about this later.)

Program design: Up-front rebate in a declining block structure, with a 25% equity carve-out, defined geographically by environmentally disadvantaged and low-income communities, and affordable housing. 15% of SGIP budget reserved for residential customers. Equity and resilience budgets target wildfire areas.

Program statistics: Since 2016, SGIP has:

- Disbursed more than $158 million in incentive payments
- Supported more than 828 behind-the-meter battery projects (residential and nonresidential) representing almost 67 MW (defined as average discharge power across two hours). Another $31 million is reserved or pending.

Rebates – Pros and Cons

Pros:

- Gives customers needed assistance in defraying up-front capital and installation costs
- Helps to build markets by providing long-term, financeable structure for developers
- Works for both residential and commercial customers, regardless of tax status or system size
- Gives the state complete control over incentive rates and overall program budget
- Can support low-income communities through adders, carve-outs, and low-cost financing (carve-outs alone are usually not effective)
- Can include requirements to support state goals
- Program statistics are easy to track
- Works well in tandem with utility procurement mandates

Cons:

- Doesn't provide market-based price signals
- Market-building is limited by rebate program budget
- May not provide sufficient utility control over system operations
- May not support state policy goals unless specifically designed with storage dispatch requirements

Storage added to existing renewables programs

It may be easier to add storage into existing programs, than to establish a new storage program.

Examples: Massachusetts, New York, Nevada

Solar Massachusetts Renewable Target (SMART)

Summary: SMART replaced the previous SREC program in 2018. SMART is a declining block tariff program that provides fixed base compensation over a 10- or 20-year term. Offers solar rebates with stackable adders including a storage adder for new batteries connected with new solar PV behind customer meters.

Stackable adders:

- Building Mounted Solar
- Floating Solar
- Solar on a Brownfield
- Solar on an Eligible Landfill
- Canopy Solar
- Agricultural Solar
- Community Shared Solar
- Low Income Property Solar
- Low Income Community Shared Solar
- Public Entity Solar
- **Energy Storage**
- Solar Tracking

Storage as energy efficiency and demand response

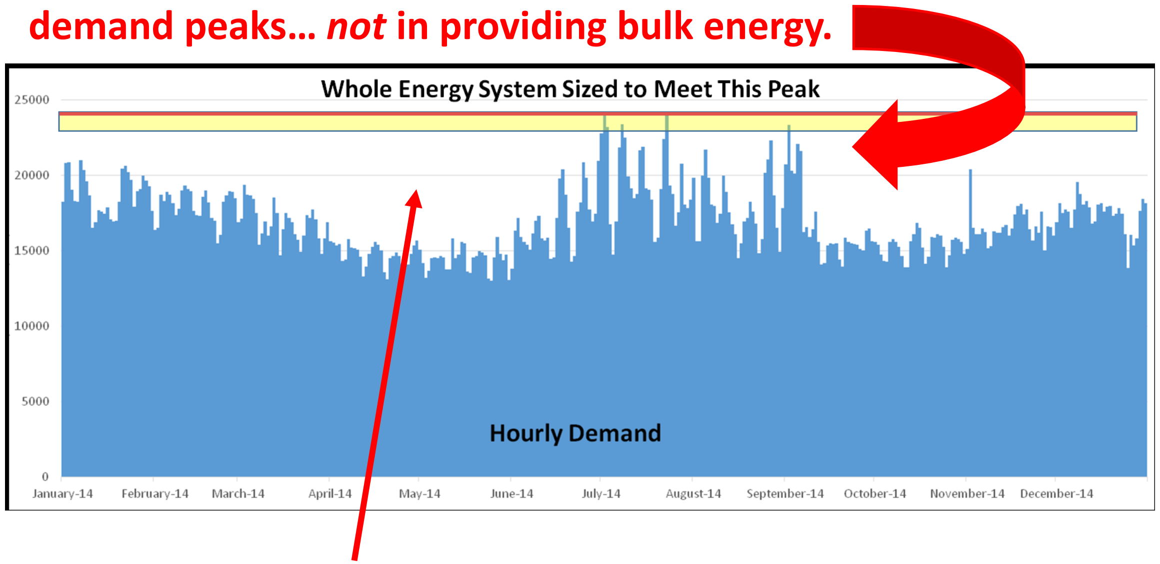
Examples: Massachusetts, Rhode Island, Connecticut, New Hampshire, Vermont, Maine

Massachusetts ConnectedSolutions program:

- Storage incorporated into the state's energy efficiency program as a peak reduction measure
- Customers enter into multi-year contract with utility for BTM storage dispatch at peak demand hours
- Utility compensates customers for storage services
- Lower peak demand saves money for ratepayers
- Developers can finance pipelines of storage projects contracted into ConnectedSolutions, creating virtual power plants

The monetizable value of storage is partly due to the high costs of our oversized grid

The highest value of storage is in providing *capacity* to meet demand peaks… *not* in providing bulk energy.

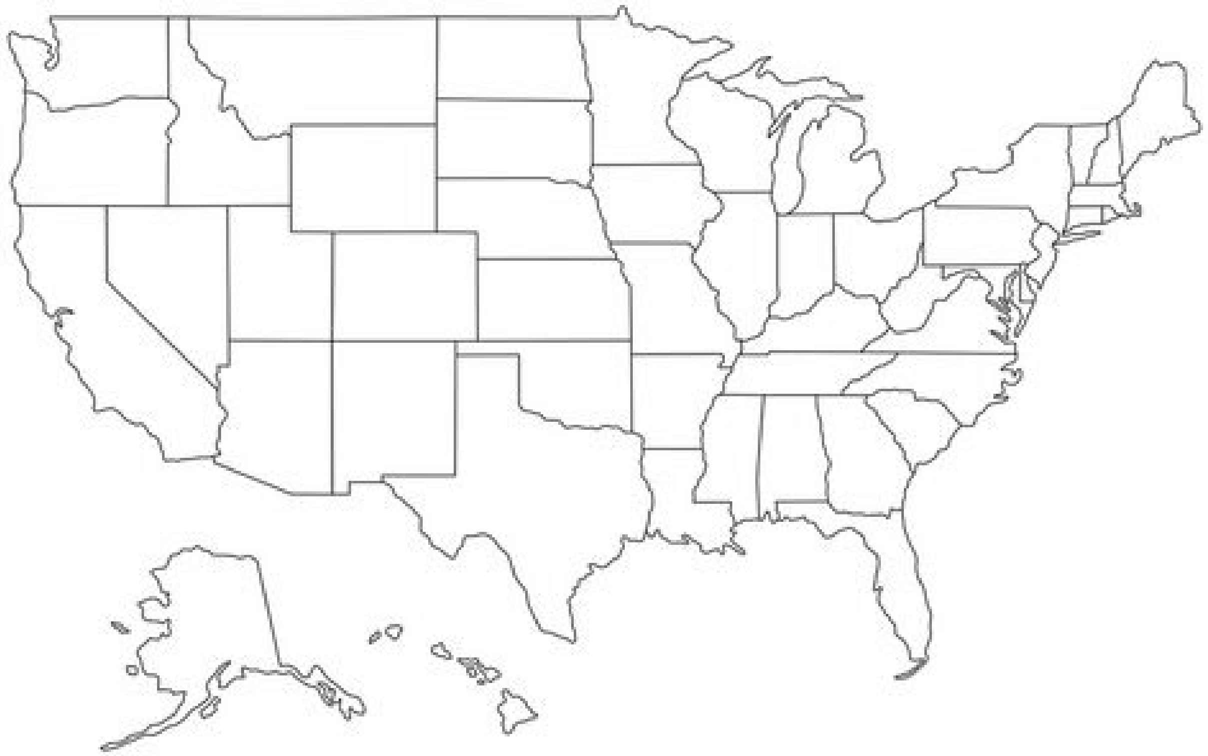


White space = inefficiency in the system

From Massachusetts *State of Charge* report

One size does NOT fit all!

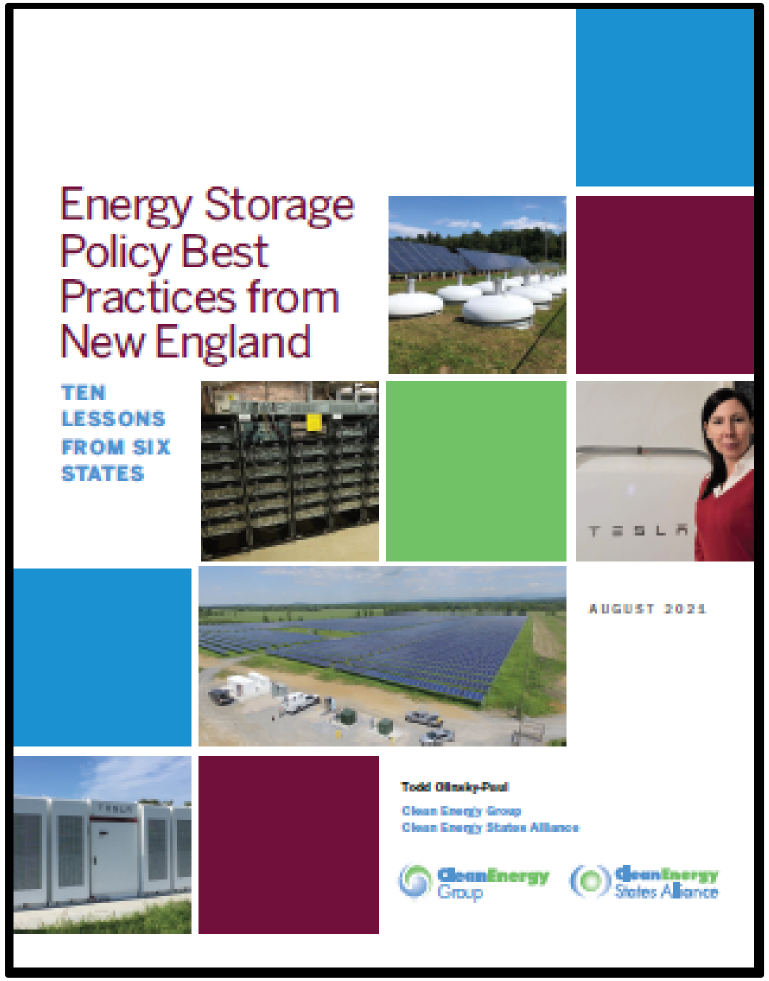
- Each state has unique circumstances and unique needs, even when they exist within the same wholesale market
- One state cannot simply adopt wholesale the policies and programs of another state
- However, best practices are starting to emerge…



Best practices from New England

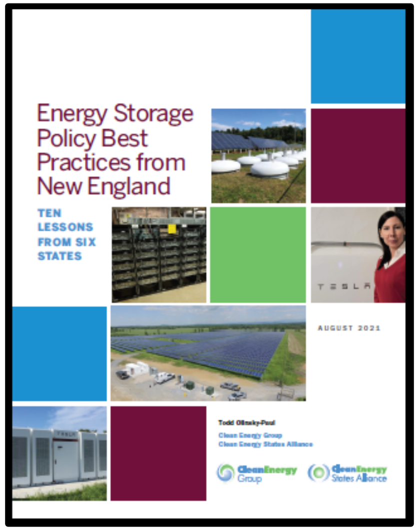
Report from CEG/CESA

“This report is intended to provide state policymakers and regulators with a set of principles and lessons learned …. It does not prescribe a particular suite of energy storage policies, but does provide recommendations that each state should consider as it charts its own course.”



Some best practices from New England:

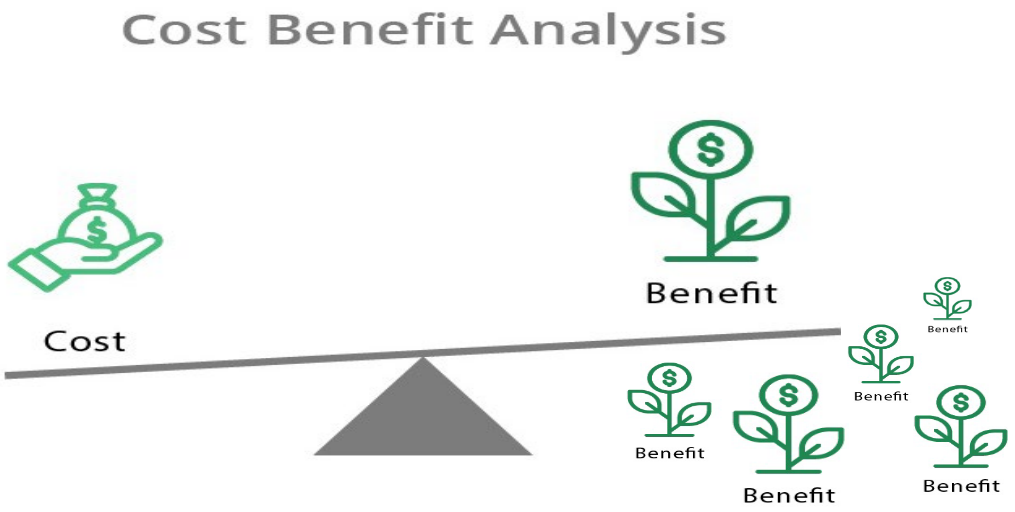
Energy Storage Policy Best Practices from New England: *Ten Lessons from Six States*



1. **Identify benefits of energy storage that are not priced or monetizable in existing markets.**
2. **Establish a monetary value for each storage benefit** and use those values when calculating cost effectiveness and setting incentive rates. Estimated value is better than no value at all.
3. **Create incentives to support storage operations that further state policy goals.** Incentivize storage use, not just storage deployment.
4. **Set ambitious clean energy and/or emissions reduction goals and explicitly include energy storage as an eligible technology.** Define how storage is expected to be deployed and operated to help meet the goals.
5. **Incorporate energy storage into existing clean energy and efficiency programs.**
6. **Incorporate equity considerations into energy storage program design from the start,** not as an afterthought. This should include significant incentive adders for qualifying participants.
7. **Support a wide variety of storage ownership, application, and business models.**
8. **Anticipate and proactively address needed regulatory changes.**
9. **Replicate and improve on successful programs implemented in other states.**
10. **Fund demonstration projects when needed, but do not rely on grants alone to build a market.**

1&2. Identify storage benefits, assign values for BCAs

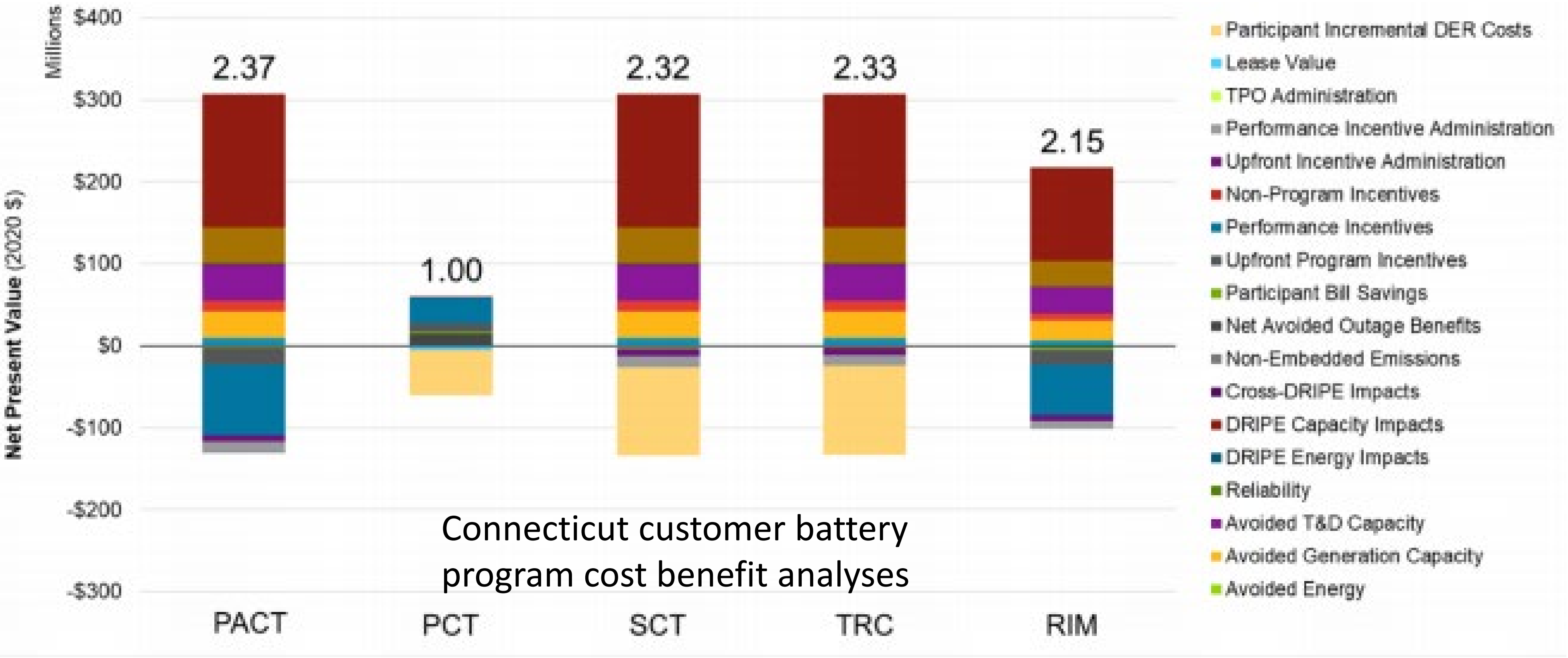
- **<u>Value</u> does not equal <u>price</u>.** What is valuable is not always priced or monetizable in current markets.
  - Examples of (sometimes) monetizable applications: peak demand reduction, frequency regulation, energy arbitrage.
  - Examples of (usually) non-monetizable applications: increased resilience, reduced land use, jobs creation.
- It is important to assign value to storage benefits even if markets for those benefits are absent. **Low or estimated value is better than no value at all.**



Cost-benefit analysis of energy storage often considers all the costs, but only a fraction of the benefits (example: utility IRPs)

Energy storage cost-benefit analysis

Cost-Benefit Tests – Examples from Connecticut



Connecticut customer battery program cost benefit analyses

Note: score on RIM test (far right) indicates no cost shifting

PACT = Program Administrator Cost Test **PCT** = Participant Cost Test **SCT** = Societal Cost Test
TRC = Total Resource Cost Test **RIM** = Ratepayer Impact Measure

Non-energy benefits of distributed storage in MA

	Non-Energy Benefit (2018$)
1) Avoided power outages	
Battery storage helps avoid outages, and all of the costs that come with outages for families, businesses, generators and distribution companies	Residential: **$1.72**/kWh Commercial/Industrial: **$15.64**/kWh
2) Higher property values	
Installing battery storage in buildings increases property values for storage measure participants by: (1) increasing leasable space; (2) increasing thermal comfort; (3) increasing marketability of leasable space; and (4) reducing energy costs	**$5,325/**housing unit for low-income single family participants **$510/**housing unit for owners of multi-family housing
3) Avoided fines	
Increasing battery storage will result in fewer power outages and fewer potential fines for utilities	**$24.8 million** in 2012
4) Avoided collections and terminations	
More battery storage reduces the need for costly new power plants, thereby lowering ratepayer bills, and making it easier for ratepayers to consistently pay their bills on time. This reduces the need for utilities to initiate collections and terminations	Terminations and Reconnections: **$1.85**/year/participant Customer calls: **$0.77**/year/participant
5) Avoided safety-related emergency calls	
Increasing battery storage results in fewer power outages, which reduces the risk of emergencies and the need for utilities to make safety-related	**$10.11**/year/participant
6) Job creation	
More battery storage benefits society at large by creating jobs in manufacturing, research and development, engineering, and installation	**3.3 jobs**/MW **$310,000**/MW
7) Less land used for power plants	
More battery storage reduces the need for peaker plants, which are more land-intensive than storage installations—benefitting society by allowing more land to be used for other purposes	**12.4 acres**/MW

Analysis by Applied Economics Clinic

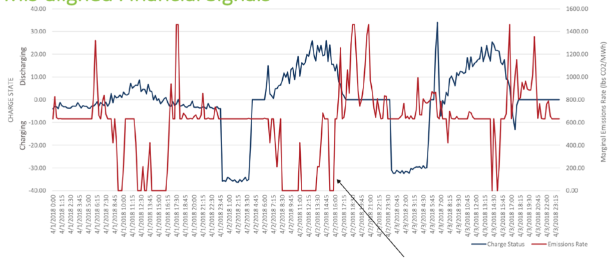
3. Provide meaningful incentives for storage operations

- **Storage is a multi-use tool.** States should use incentives to align storage value stack optimization with state policy goals.
- Incentivize storage ***operations*** – not just storage ***deployment***.

BEFORE

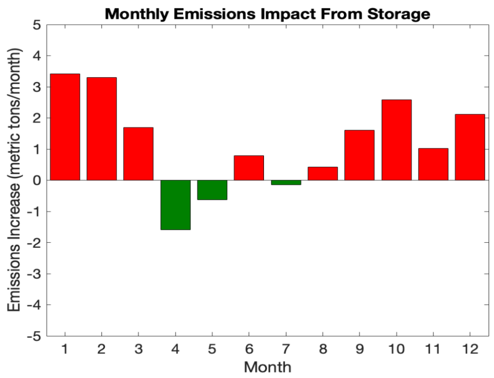
Energy Storage Emissions Drivers

Mis-aligned Financial Signals



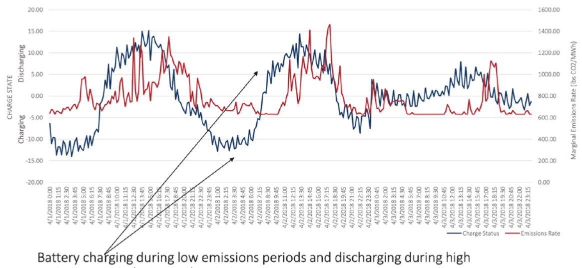
Emissions Mis-aligned Behavior: Battery discharging during low emissions periods.

Without Emissions Co-Optimization



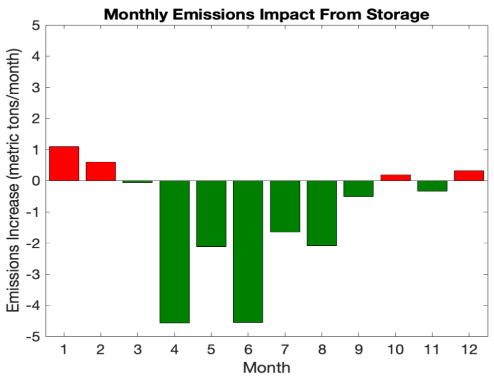
AFTER

Emissions Aligned Operation



Battery charging during low emissions periods and discharging during high emissions periods. Desired emissions outcome.

With Emissions Co-Optimization



Example:

California solved their emissions problem by making 50% of the SGIP battery incentive contingent on batteries charging and discharging *at the right times*.

4&5. Set policy goals, incorporate storage into programs that support these goals

- Not every state will adopt an energy storage target, but most states have clean energy targets. **Storage incentives should support established clean energy targets and other social benefit objectives.**
  - RPS and RES, 100% clean energy targets
  - Emissions reduction targets
  - Clean peak standards
  - Grid modernization goals

- **Storage can be added to existing programs that support state targets.** This is often easier than designing a new program and finding new money.
  - Storage added to solar incentive (MA SMART RI Energy Storage Adder)
  - Storage added to energy efficiency (ConnectedSolutions battery program (MA, RI, CT, ME) and demand response programs (VT, NH)
  - Storage eligibility in RPS (ME, VT)

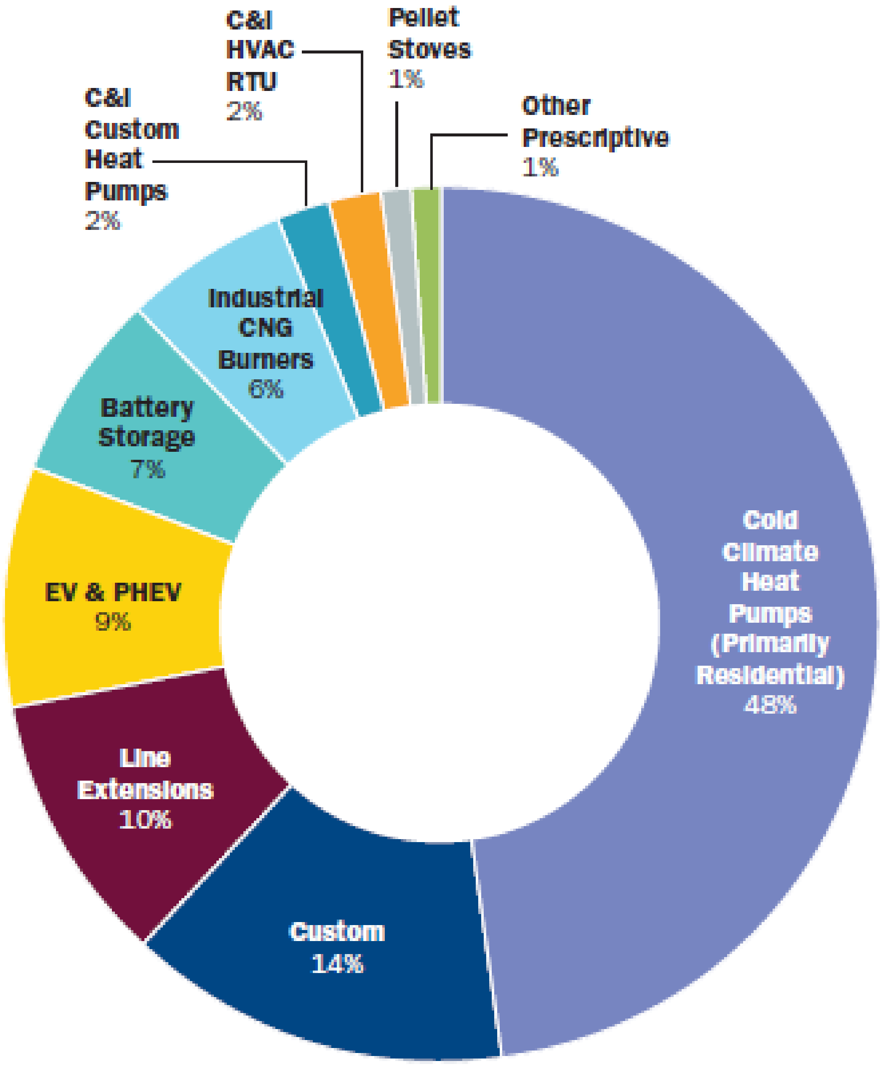
Example:

Vermont added
energy storage as a qualifying resource for its RPS Tier III Program (designed to reduce customer fossil fuel consumption).

In 2020, battery storage accounted for 7 percent of the state's Tier III RPS portfolio.

The state's largest utility, Green Mountain Power, has placed more than 4,800 batteries behind residential customer meters and has a 2-year customer waiting list. The VT PUC recently removed the cap that had previously limited GMP's customer battery program.

Vermont RPS Tier III 2020 Savings Profile



Distributed battery storage now accounts for seven percent of Vermont's RPS Tier III, which is aimed at reducing customer use of fossil fuels.

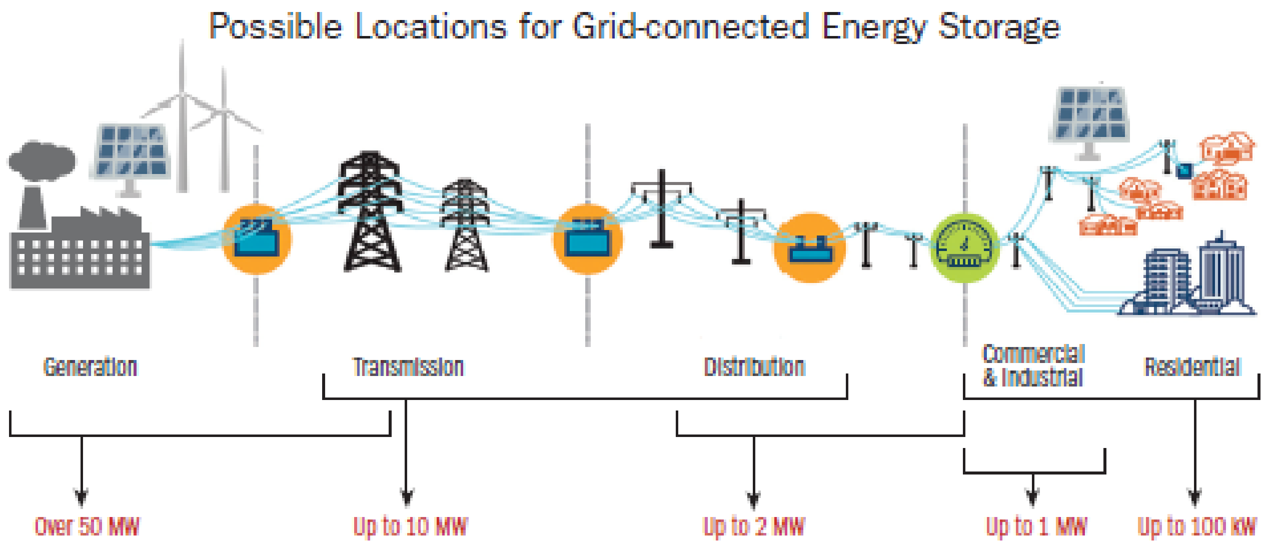
6. Incorporate equity provisions from the start

- Incorporate LMI/equity provisions in programs and policy from the start, not as an afterthought (CT PURA Statewide Electric Storage Program)
- Carve-outs alone are not sufficient; increased incentive rates can be effective (CA SGIP)
- Look for opportunities to provide storage benefits (cost savings and resilience) to facilities serving underserved communities
  - Schools
  - FQHCs
  - Community buildings
  - Multifamily affordable housing
- US DOE Office of Electricity, PNNL and Sandia have an excellent equity storage program (ES4SE)

7. Support a varied and competitive storage market

Storage can offer *locational value:*

- Large/utility scale and small scale/distributed storage
- FOM and BTM placement
- Residential and commercial/industrial customers
- Diverse ownership models (utility owned, merchant owned, customer owned, leasing, PPAs, VPPs)



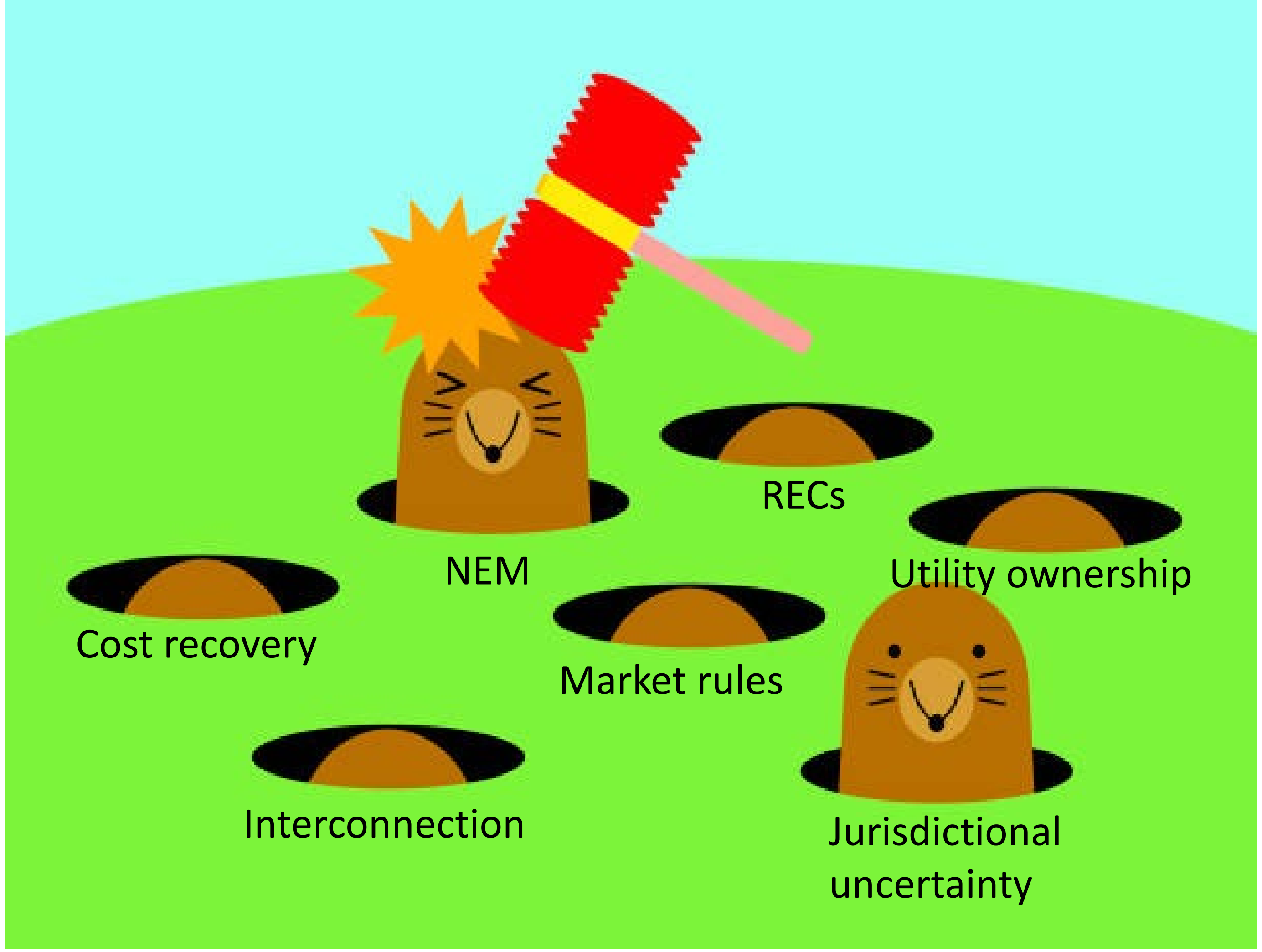
A varied market allows storage resources to flow to where they are most needed

8. Address auto-mechanics (regulatory issues) ahead of time

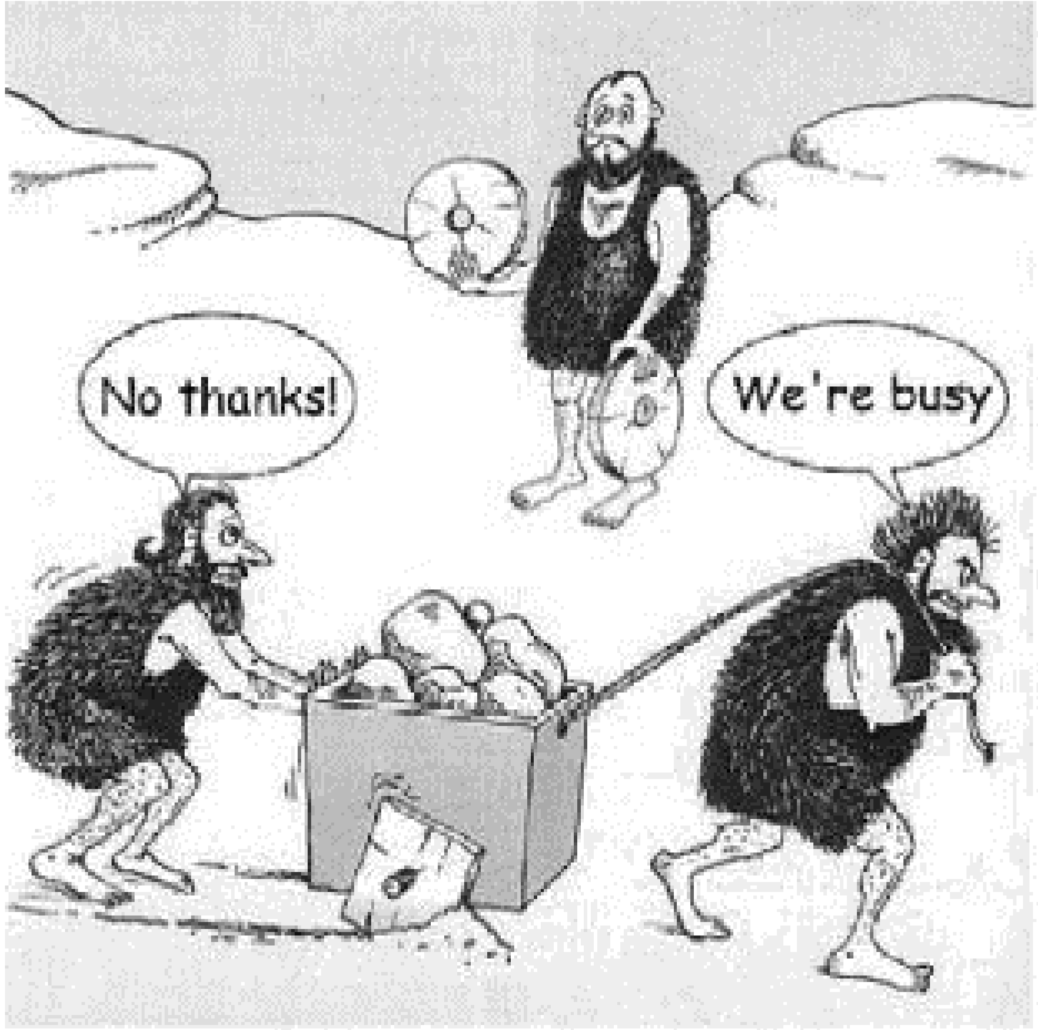
- Regulatory changes will be needed when new policy and programs are adopted
- Issues such as interconnection, metering, NEM rules, REC creation/ownership can derail programs, frustrate users and delay success in meeting policy goals
  - MA - 900 MW SMART applications delayed due to “cluster studies” (hosting capacity)
  - NEM dockets in numerous states
  - Capacity/REC ownership questions
  - Metering requirements
  - Program rule clashes

Did somebody send for a mechanic?

Be proactive – don't play regulatory whack-a-mole!



9. Adopt and improve successful programs implemented in other states.



If it worked in another state, maybe – with a little tweaking – it could work in yours.

Don't reinvent the wheel…

10. *DO* fund demonstration projects as needed, but *DON'T* rely on grants alone to build a market.

MARKETS

- Studies/Roadmaps
- Grants/Demonstration projects
- Longer-term programs
  - Utility procurement targets
  - Rebates/Performance incentives
    - Rebates
    - State tax incentives
    - Storage adder in solar incentive program
    - IRP reform
    - BYOD/VPP programs
    - Storage in EE plan

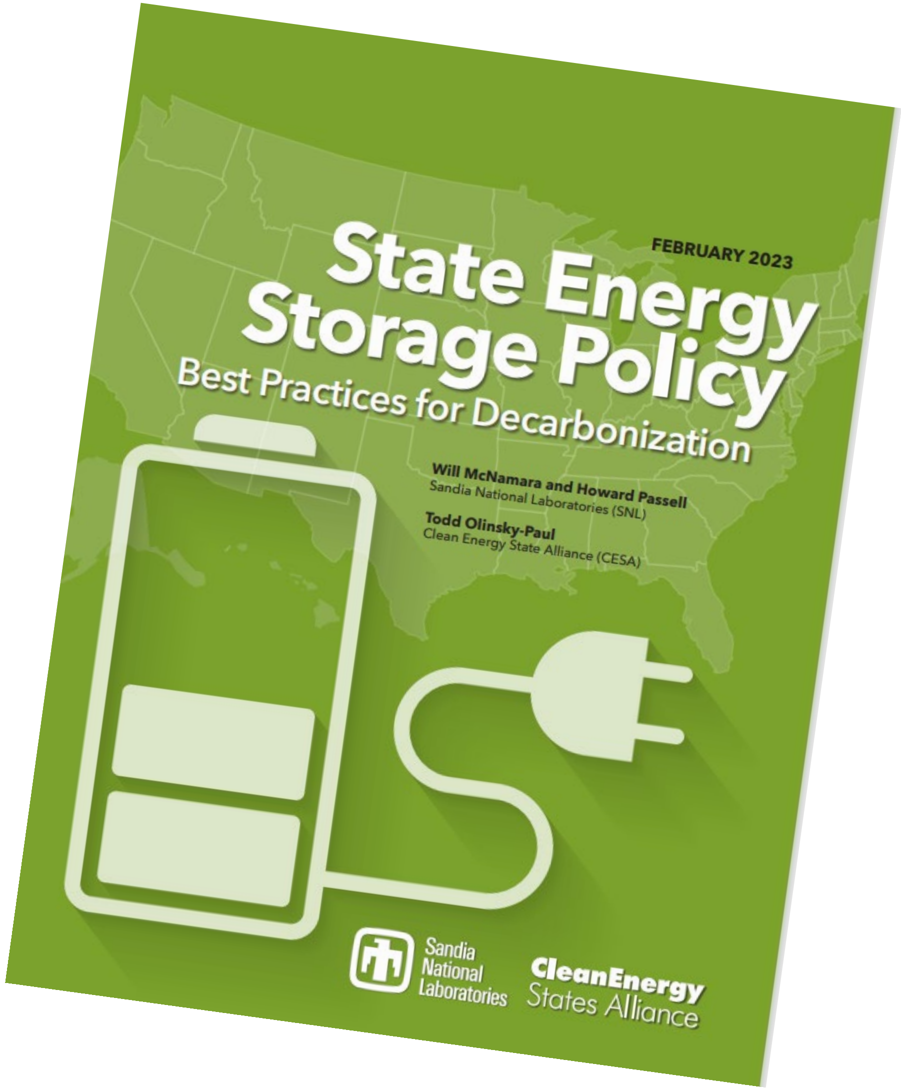
A Moment for Questions

QUESTIONS?

(before we move on…)

State Energy Storage Policy Best Practices for Decarbonization

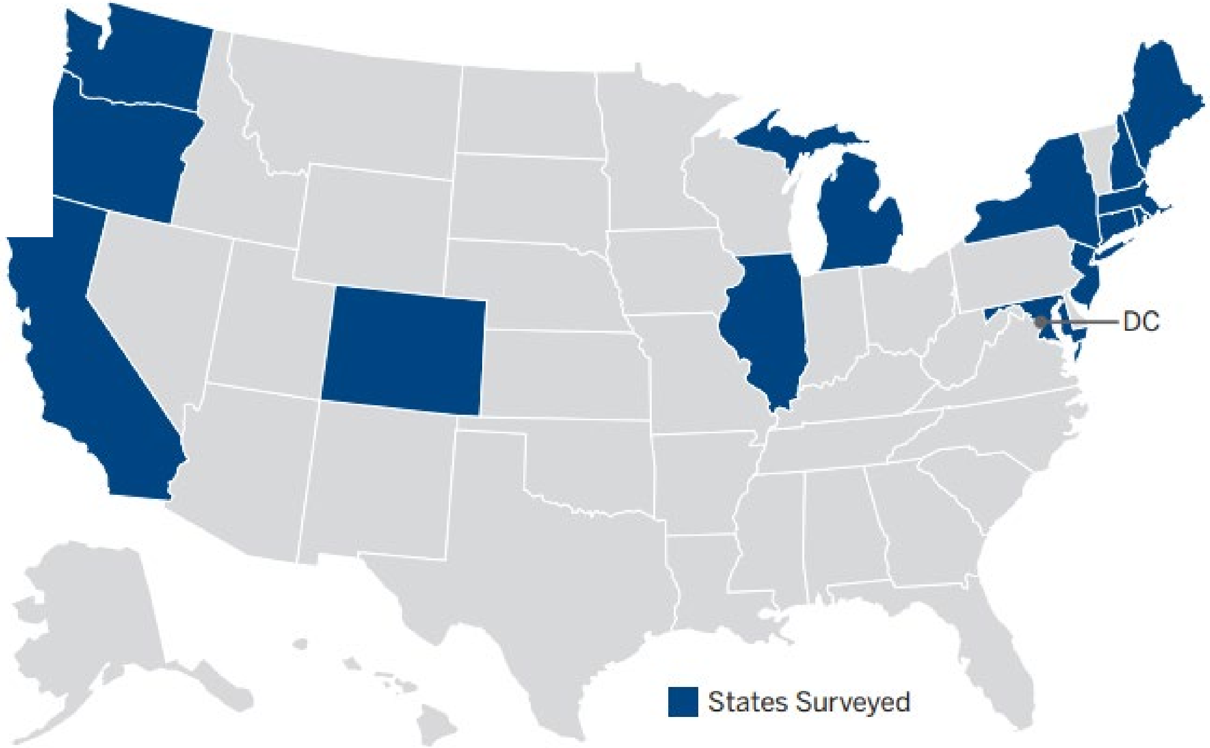
1. States survey
2. Industry survey
3. State case studies



I. THE STATE SURVEY

22 responses from 14 leading decarbonization states plus DC:

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



- Intent:
  - Highlight best practices
  - Explain barriers
  - Underscore the urgent need to expand state energy storage policymaking to support decarbonization
- Respondents represented state utility commissions, state energy offices, and governors’ offices

RESULTS: PRIORITY APPLICATIONS

States seek to maximize the benefits of ES while reducing uncertainty and risk. Respondents identified a number of priority applications:

- Supporting electric reliability and resilience on the distribution grid
- Cost control
  - Enabling electrification
  - Avoiding costly T&D upgrades
  - Increasing flexibility of end-use loads (such as EV charging)
  - 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.
- Exploring different applications and use cases through demonstration projects and programs
- Exploring location-specific benefits, such as resilience and peak cost reductions
- Aggregating BTM storage to serve grid needs through price signals and performance payment mechanisms

RESULTS: KEY POLICY LEVERS 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

DEEP DIVE: INSIGHTS INTO THE TOP FIVE STATE POLICY LEVERS.

1) **Procurement mandates/targets/goals.** Only eleven 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) **Utility ownership of ES.** Largely determined by competitive status of state. Where utilities are allowed to own storage, utility resource planning becomes a priority.
3) **Incentives/tax credits/subsidies.** 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) **State-sanctioned benefit-cost analysis of ES.** 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) **Distribution system modeling for locational values/siting.** 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.

RESULTS: KEY STATE POLICYMAKING CHALLENGES

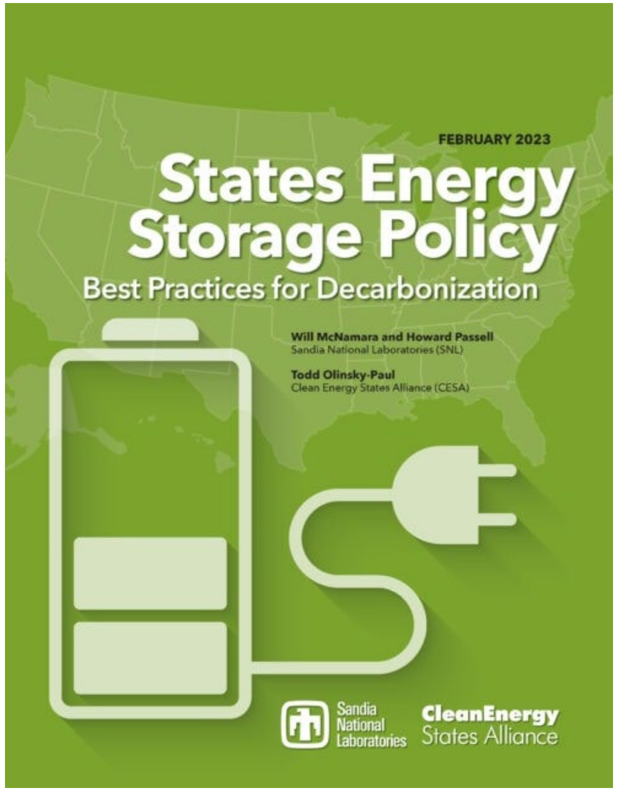
- Lack of bandwidth within the relevant state agencies to develop energy storage policy
- Challenges in tracking or accounting for renewable generation paired with storage
- Determining the level of ownership and control that utilities can (or should) have
- Barriers or uncertainty about where to site 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

2. THE 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
  - **Storage-adjacent 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, to provide 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 and necessary partners in meeting their energy storage procurement goals**
- **Third-party energy storage developers may view electric utilities as competitors or impediments**
- **Market rules and regulations supporting ES ownership diversity, and updated interconnection processes, may help better align private developers and utilities**

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.

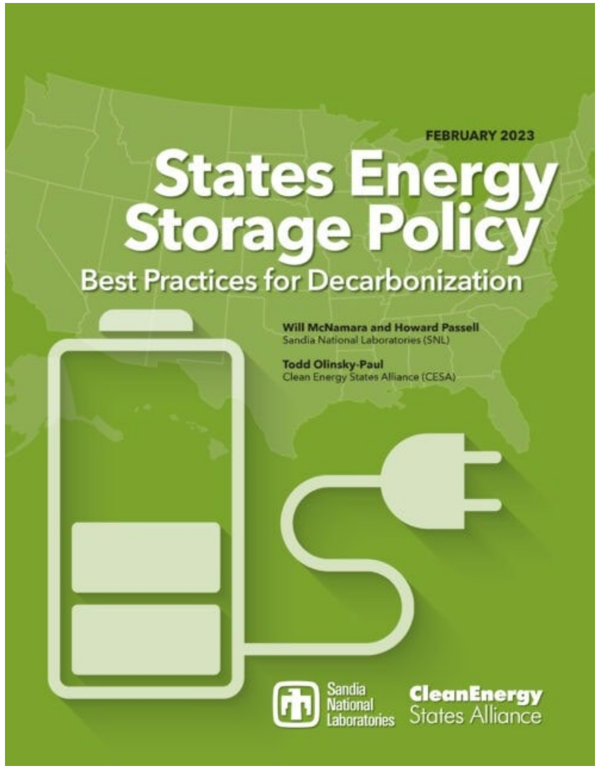
These friction points can frustrate even the best-designed energy storage policies and programs.

3. State Case Studies

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 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

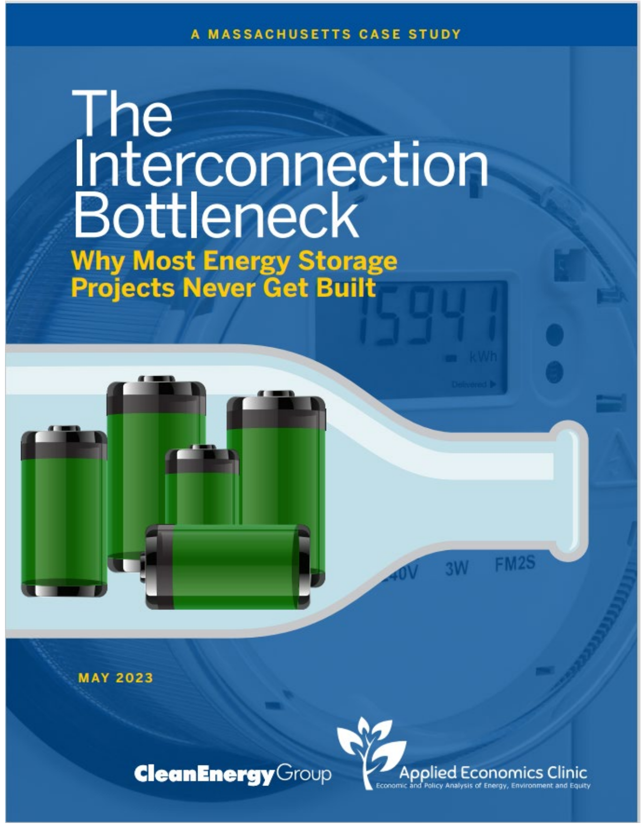
These barriers, and steps states are taking to address them, are explored more fully in the five state case studies in the report.

Grid Interconnection Barriers

Problem: Most proposed storage projects fail to achieve interconnection approval, due to high costs, long interconnection queues, and storage-specific barriers (both on distribution and transmission grids)

Solutions:

- Update and revise interconnection processes to incorporate storage operational characteristics
- Socialize required grid upgrade costs (reform "cost causation" model)
- Plan grid upgrades in a proactive, integrated and system-wide manner



Recent CEG report on interconnection barriers

Equity in Energy Storage Program Development

Problem: How to provide equitable access to energy storage benefits, despite challenges such as high prices, immature markets

Solutions: Integrate equity provisions into state energy storage programs. For example:

- Incentive program adders (CT Energy Storage Solutions program)
- Equity carve-outs (CA SGIP program)
- Community storage (SMUD Storage Shares program)
- Technical assistance for multi-family affordable housing and other low-income community facilities (CEG TAF)
- Deployment grants for underserved and frontline communities (DOE Office of Electricity ES4SE program)

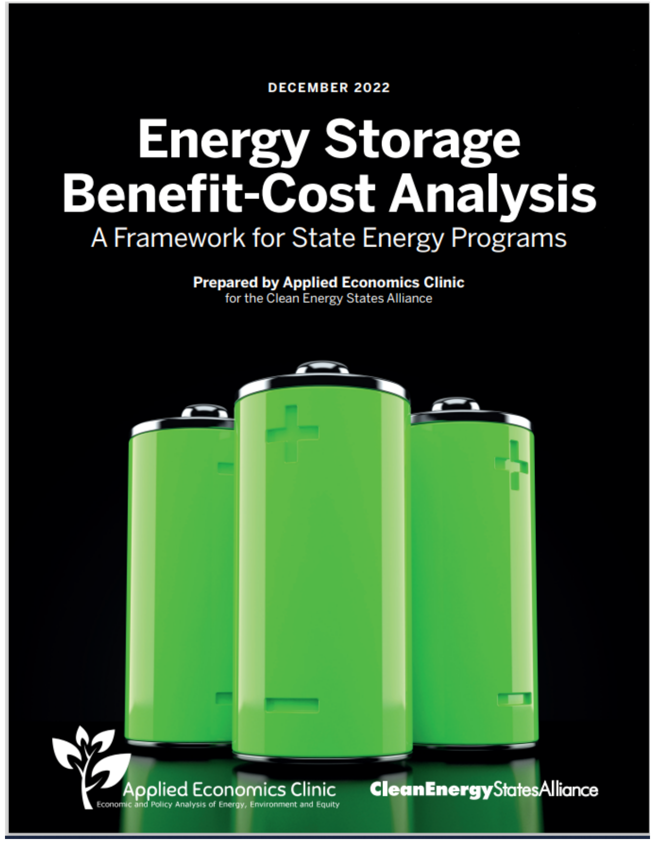
Storage Valuation, Especially Non-Energy and Non-Monetizable Benefits

Problem: markets are immature, lack pricing signals for many storage services

Solution: States fully value storage services even when markets do not; incentives are structured to compensate for immature storage markets

- States incorporate non-energy and non-monetizable benefits into storage cost-benefit analyses, and assign values – any value is better than no value!
  - Non-energy e.g. GHG emissions reductions
  - Non-monetizable e.g. improved energy resilience for critical facilities

- States employ BCA best practices to ensure storage is fairly evaluated for cost-effectiveness (utility IRP cost-effectiveness analyses often leave significant storage benefits off the table) – see CEG framework report on state storage BCA best practices



Harnessing storage to meet state energy and environmental goals, especially distributed storage

Problem: Incentivizing more energy storage deployment does not necessarily result in reduced GHG emissions, increased resilience, increased renewables/electrification, or a modernized grid

Solution: Incentivize storage services/use, not just installation

Examples:

CA SGIP and emissions benefits

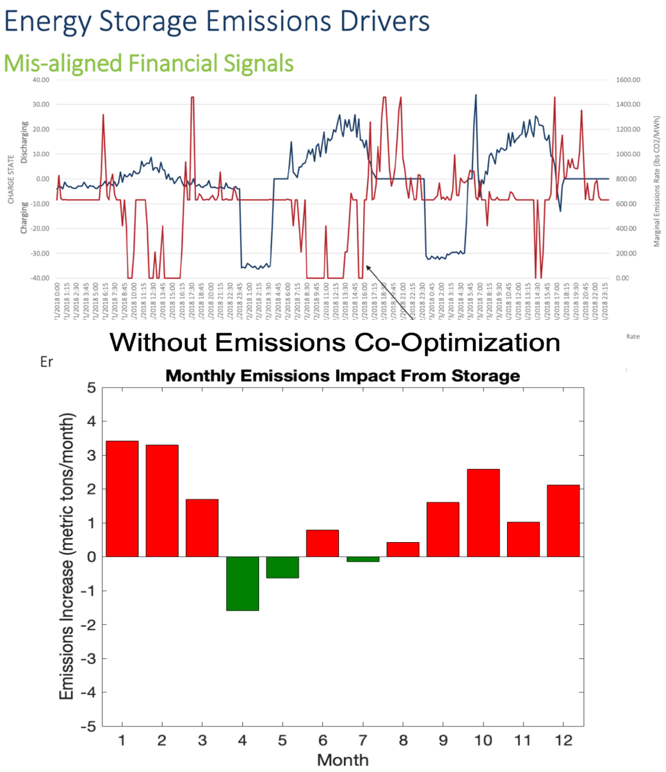
ConnectedSolutions and related program models (MA, CT, RI, VT)

MA Clean Peak Energy Standard

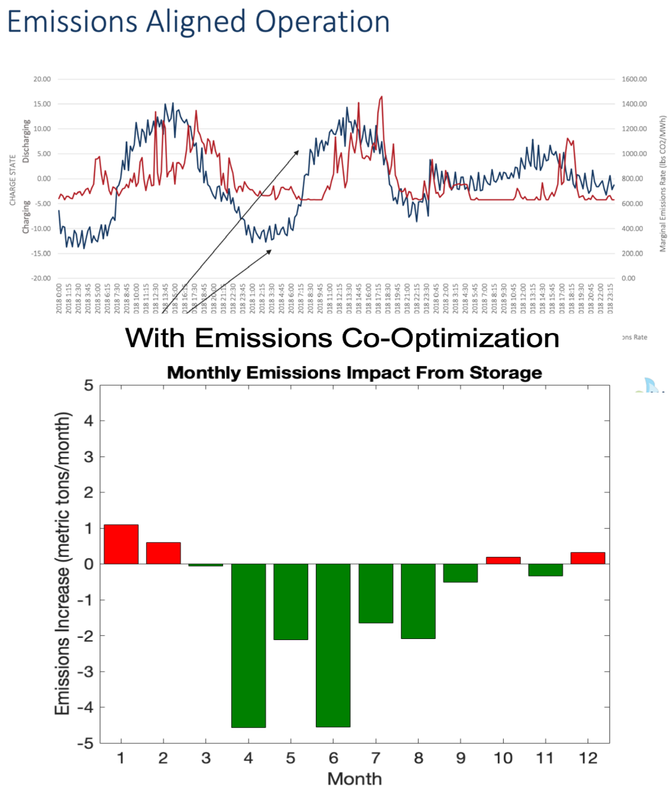
Example: California SGIP (Self Generation Incentive Program)

- When California incentivized battery *deployment only*, it made GHG emissions *worse*.
- California solved their emissions problem by making 50% of the battery incentive contingent on battery *use* (batteries charging and discharging *at the right times)*.

Incentivizing deployment



Incentivizing use



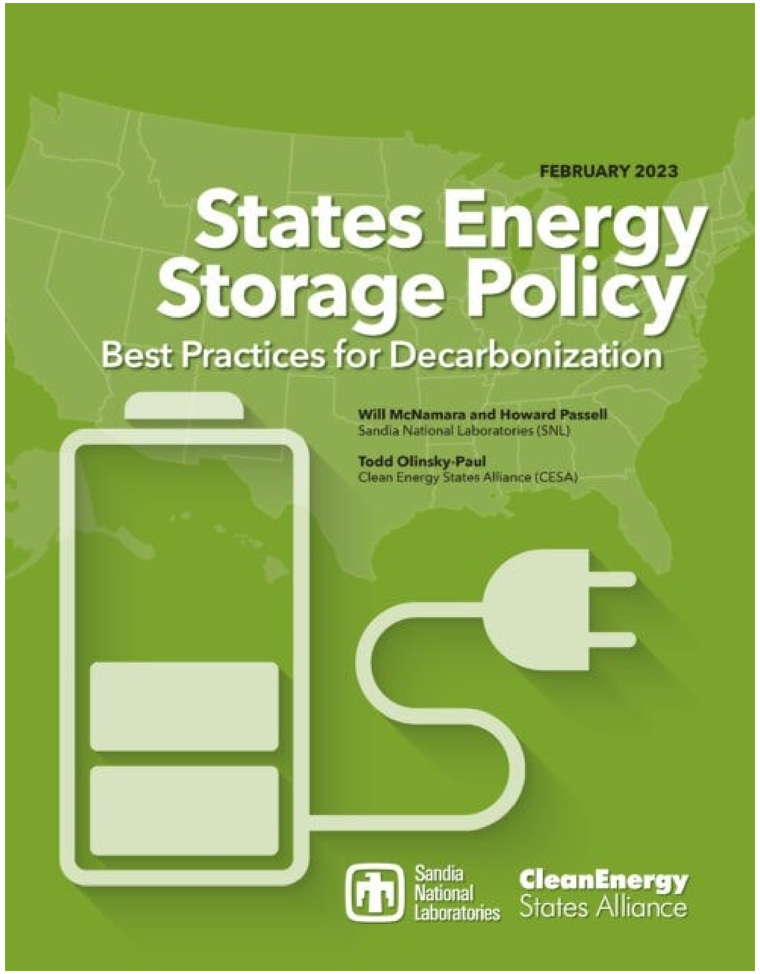
Takeaways: There's good news, and there's bad news

- **The Good News: Energy storage has arrived!**
  - Lots of energy storage in interconnection queues
  - Leading clean energy states are adopting storage targets and incentives
  - Battery demand is exceeding supply

- **The Bad News: Energy storage has arrived!**
  - New technology is challenging legacy systems
    - Interconnection processes
    - Regulatory structures
    - Program structures (NEM, RPS, energy efficiency plans)
    - Wholesale market rules
    - Valuation and cost-effectiveness
  - Storage industry ecosystem needs to develop
    - Raw materials sourcing
    - Reuse and recycling
    - Standardized financing and contracting
    - Permits and standards
    - Insurance, warranties
    - Commoditization of all kinds
  - Huge and immediate need to scale up storage production and deployment

DOWNLOAD THE REPORT

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



More Information: www.cesa.org

Thank You!

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