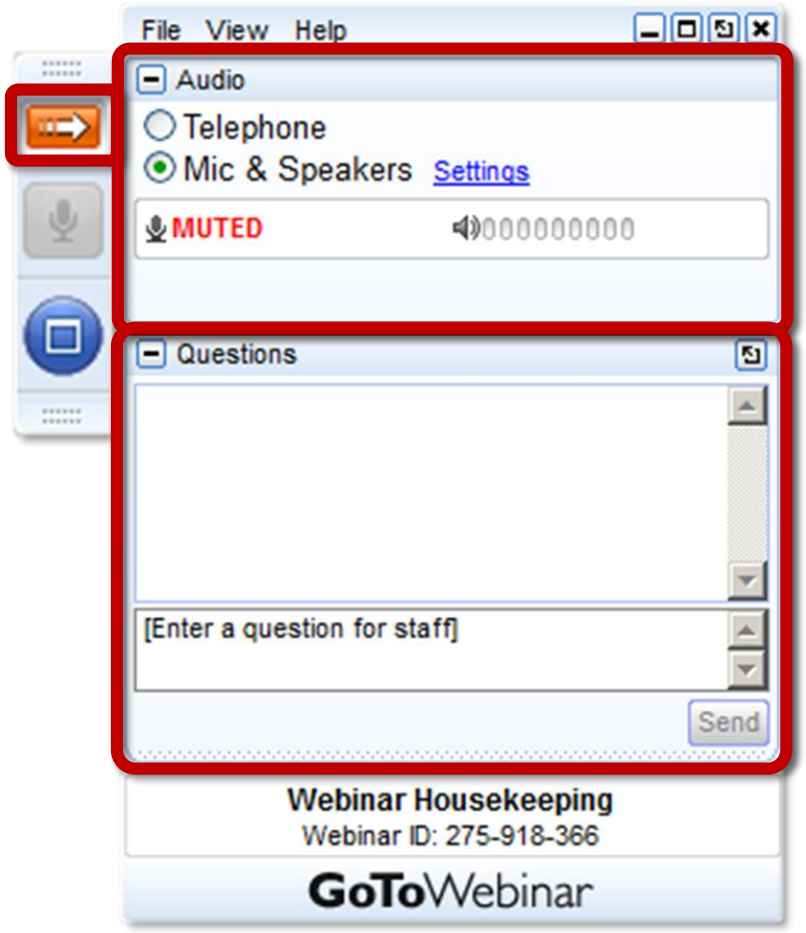
2018 State Leadership in Clean Energy Awards Webinar Series

Building Markets: Energy Storage in Massachusetts and Offshore Wind in Rhode Island

August 9, 2018

CleanEnergy States Alliance

Housekeeping



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DOER Massachusetts Department of Energy Resources

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State Leadership in Clean Energy Awards

- Established in 2008, CESA's State Leadership in Clean Energy Awards recognize state programs that are most effectively accelerating adoption of clean energy technologies
- CESA-member organizations from across the U.S. submit nominations for the awards
- Entries are judged based on public benefits and results, cost effectiveness, leadership and innovation, and replicability
- Winners are chosen by an independent panel of distinguished judges
- Read more at www.cesa.org/projects/state-leadership-in-clean-energy/

2018 Award Winners

State Leadership in Clean Energy AWARDS

- Connecticut Green Bank for its **"Solar for All" Partnership**
- Massachusetts Clean Energy Center and the Massachusetts Department of Energy Resources for the **Advancing Commonwealth Energy Storage (ACES) Program**
- New York State Energy Research and Development Authority (NYSERDA) for the **Clean Energy Communities Program**
- Oregon Department of Energy for the **Renewable Energy Development Grant Program**
- Rhode Island Office of Energy Resources for the **Block Island Offshore Wind Farm**
- Xcel Energy Renewable Development Fund for the **MPRB Solar Demonstration Project**

Learn more about the winning programs at:
http://bit.ly/SLICE-2018

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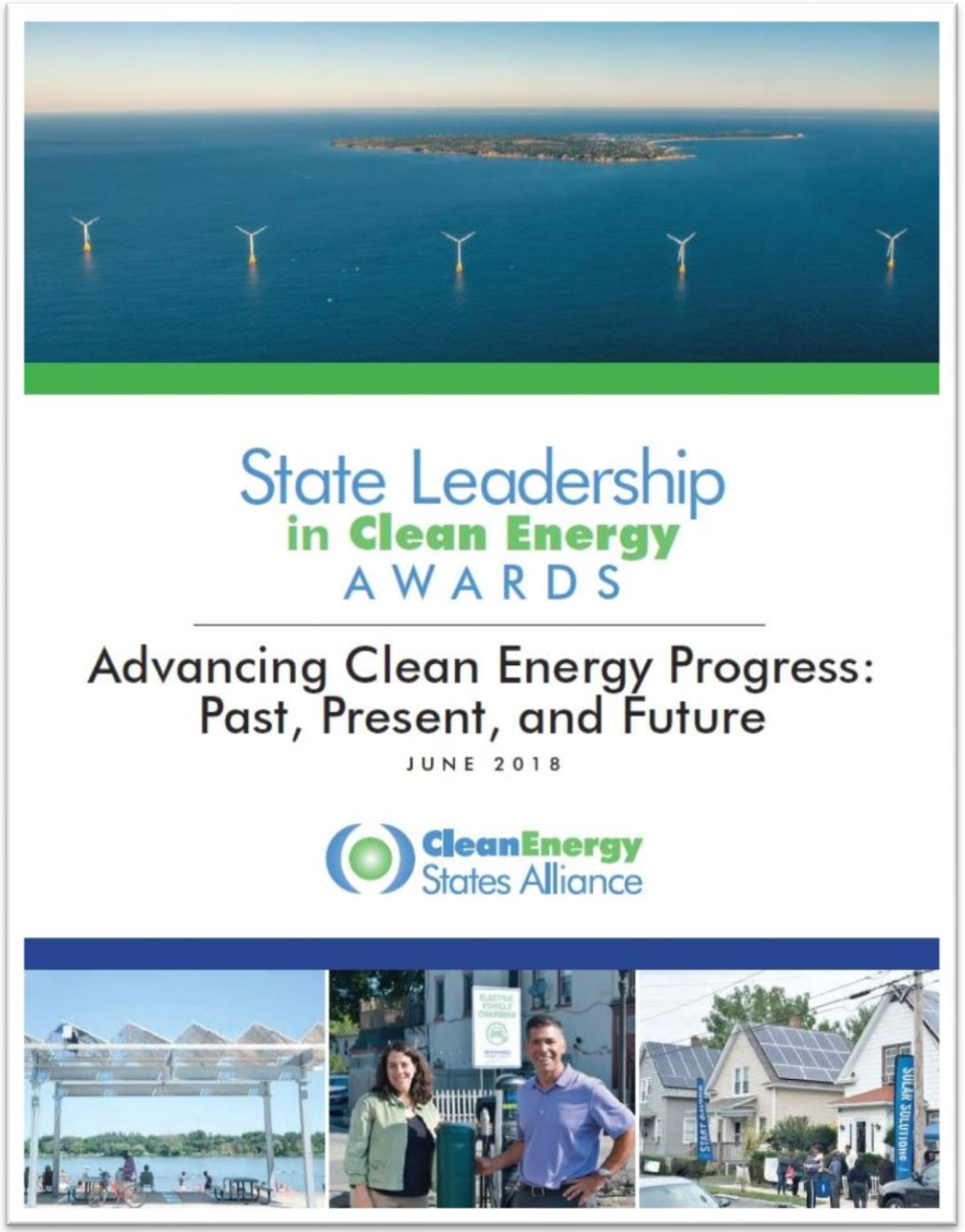
Advancing Clean Energy Progress: Past, Present, and Future

This report presents case studies of the six recipients of the 2018 State Leadership in Clean Energy Awards.

http://bit.ly/2018-SLICE



2018 State Leadership in Clean Energy Webinar Series

- State Programs for Clean Energy in Local Jurisdictions: Examples from New York and Oregon (7/11)
- Expanding Solar PV Finance and Markets in Connecticut and Minnesota (8/2)
- Building Markets: Energy Storage in Massachusetts and Offshore Wind in Rhode Island (8/9)

View webinar recordings at: www.cesa.org/webinars

Building Markets: Energy Storage in Massachusetts and Offshore Wind in Rhode Island

Webinar Speakers

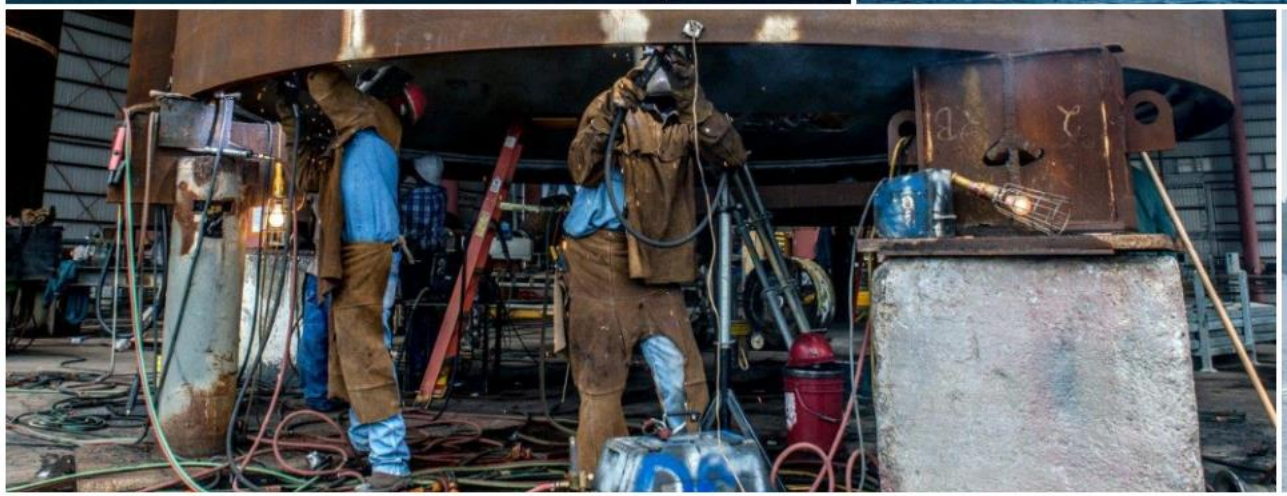
Chris Kearns
Interdepartmental Manager and Legislative Liaison, Rhode Island Office of Energy Resources

Kavita Ravi
Director of Emerging Markets, Massachusetts Clean Energy Center

Galen Nelson
Senior Director, Innovation and Industry Support, Massachusetts Clean Energy Center

Val Stori
Project Director, Clean Energy States Alliance

Todd Olinsky-Paul
Project Director, Clean Energy States Alliance




spliethoff

Energy Storage in Massachusetts

August 9, 2018

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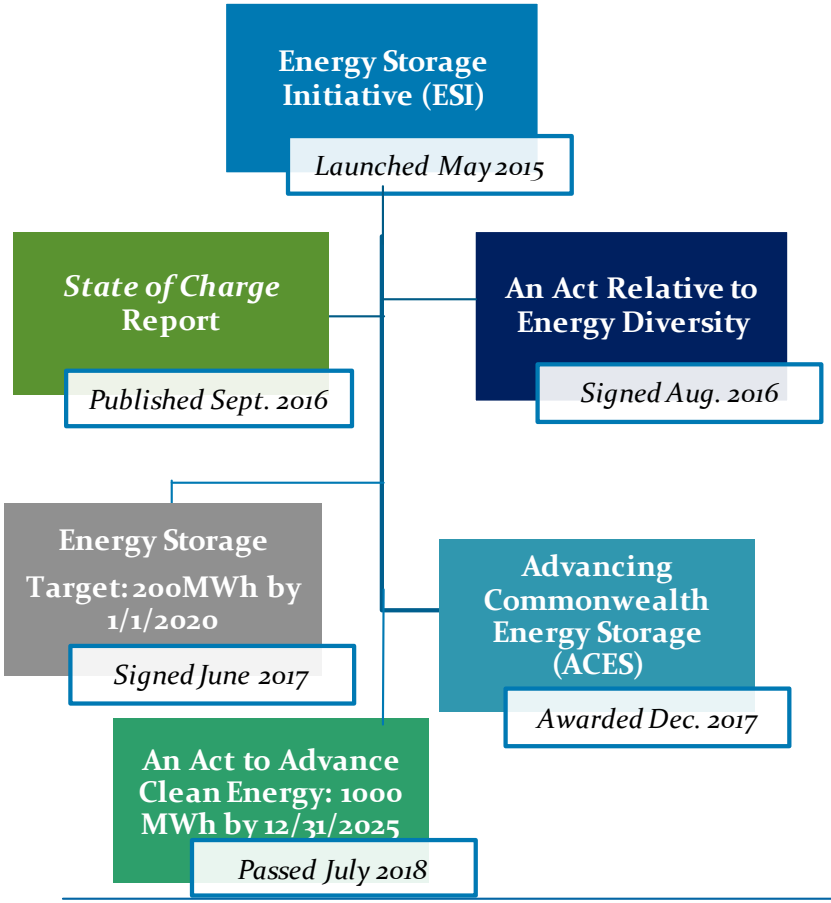
Energy Storage Initiative and Actions



Energy Storage Initiative (ESI)

- Aims to find the most cost efficient and effective way to help transform the Commonwealth energy market
  - Market expansion, valuation of storage benefits
  - Policy recommendations and development
  - Technology development

State of Charge Study and ACES

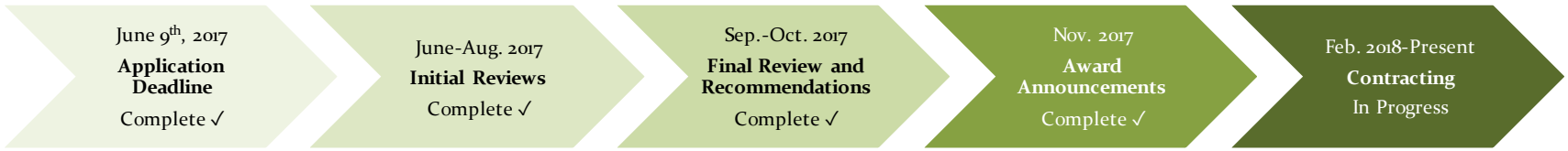
State of Charge Study

- DOER and MassCEC released the *State of Charge* study to analyze the potential benefits of incorporating energy storage technologies into Massachusetts' energy portfolio.
  - Energy storage can potentially provide $800 million in system benefits to Massachusetts ratepayers
  - Recommends policies to promote development of 600 MW advanced energy storage in Massachusetts by 2025

Advancing Commonwealth Energy Storage (ACES) Demonstration Projects

The ACES program is funding **energy storage demonstration projects** that pilot **innovative, broadly replicable use cases/business models** with multiple value streams in order to prime Massachusetts for increased commercialization/deployment of storage technologies.

The Baker Administration originally allocated $10 million but increased it to $20 million in December 2017.



Relevant Programs/Incentives on the Horizon

Community Clean Energy Resiliency Initiative (CCERI)

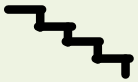
CCERI is a grant program to protect communities from energy service interruptions caused by severe climate events.

- Focus on critical infrastructure, technical assistance, resiliency
- $40 million in allocated funds; three rounds of grants to date

SMART Program

Massachusetts Department of Energy Resources (DOER)'s solar incentive program, with storage adder. Currently in DPU docket process, expect summer 2018.

Applies to electric distribution companies and owners of solar tariff generation units



Covers 1,600MW declining block program

Offers 10- or 20-year fixed-price terms depending on unit capacity

Adder based on relative size and duration of storage

MassCEC Community Microgrid Program

Funded 14 microgrid feasibility studies in 12 communities around the state

- Anticipate most projects will include storage

State-Level Energy Storage Mandates across the U.S.

California Mandate

- 1,300 MW by 2025

Oregon Mandate

- 5 MW by 2020

Massachusetts Target

- 600 MW by 2025 (SOC recommendation)
- 200 MWh by 2020 (2017 DOER Target), including qualifying ACES projects
- 1000 MWh by Dec. 31, 2025 (2018 Legislation)

New York Target

- 1,500 MW by 2025

Advancing Commonwealth Energy Storage (ACES)

ACES RFP – **Objectives**

Legend: *Required by RFP* | *Considered, but not required by RFP*

Grants
- Original $10,000,000: 10-15 awards, between $100,000 and $1,250,000

Cost Share
- Awards will cover 50% of project costs, applicants must provide at least 50% cost share

Technology
- Diversity of technologies (from Energy Diversity Bill) encouraged to apply
- Minimum of 65% round-trip efficiency

Use Cases
- Projects demonstrate one or more broadly applicable and replicable use cases

IOU and MLP Territories
- Projects in investor-owned utility or municipal light plant territories
- At least 50% of funds to projects partnered with IOUs

Distribution-Scale
- A majority of funds awarded to distribution-scale projects

Host Site
- Projects in Massachusetts

Business Models
- Projects pilot innovative, broadly replicable business models with multiple value streams

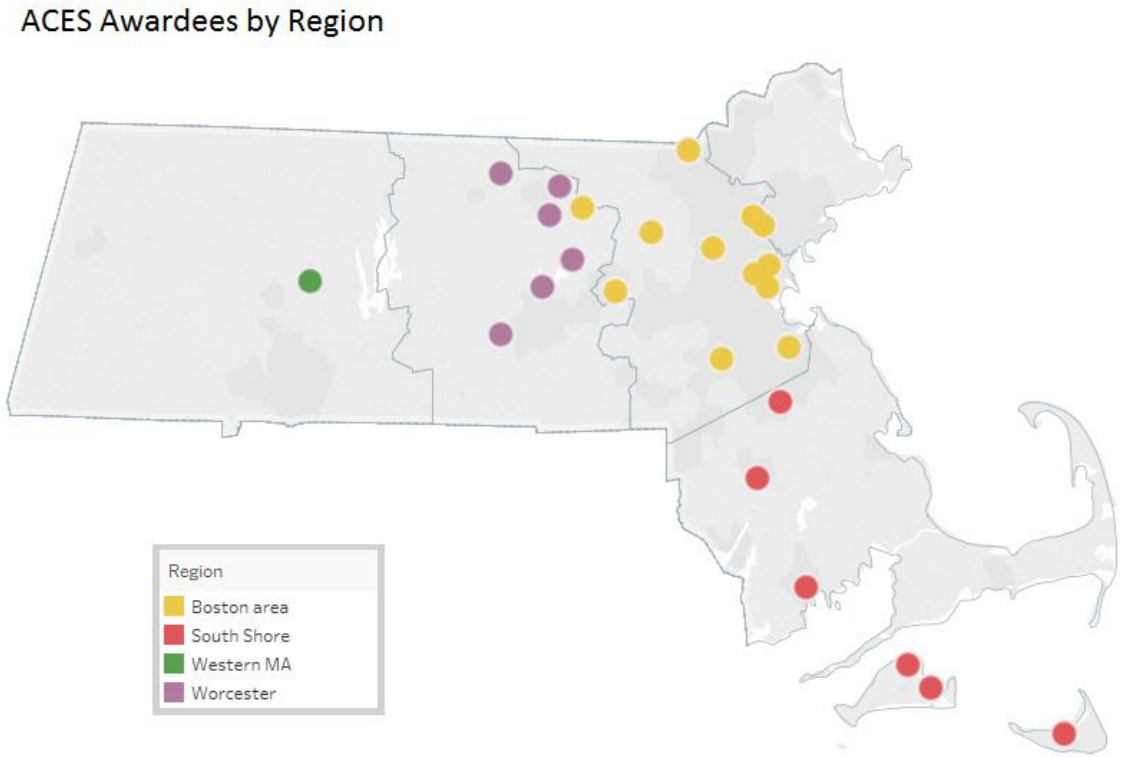
Multiple/Drivers Benefits
- Projects with multiple and diverse benefits/value streams (monetizable and non-monetizable) to ratepayers, utility, and/or bulk power system

Complementary Technologies
- Projects with complementary clean energy technologies (i.e., solar PV, wind, demand management, etc.)

Geographic Diversity
- Geographic diversity of host sites

Local Challenges
- Projects that address specific local energy challenges in Massachusetts

Advancing Commonwealth Energy Storage (ACES) by numbers



Projects with locations to be determined are not mapped

26

Proposals selected for award

9

Use cases – 8 from *State of Charge*, one new use case

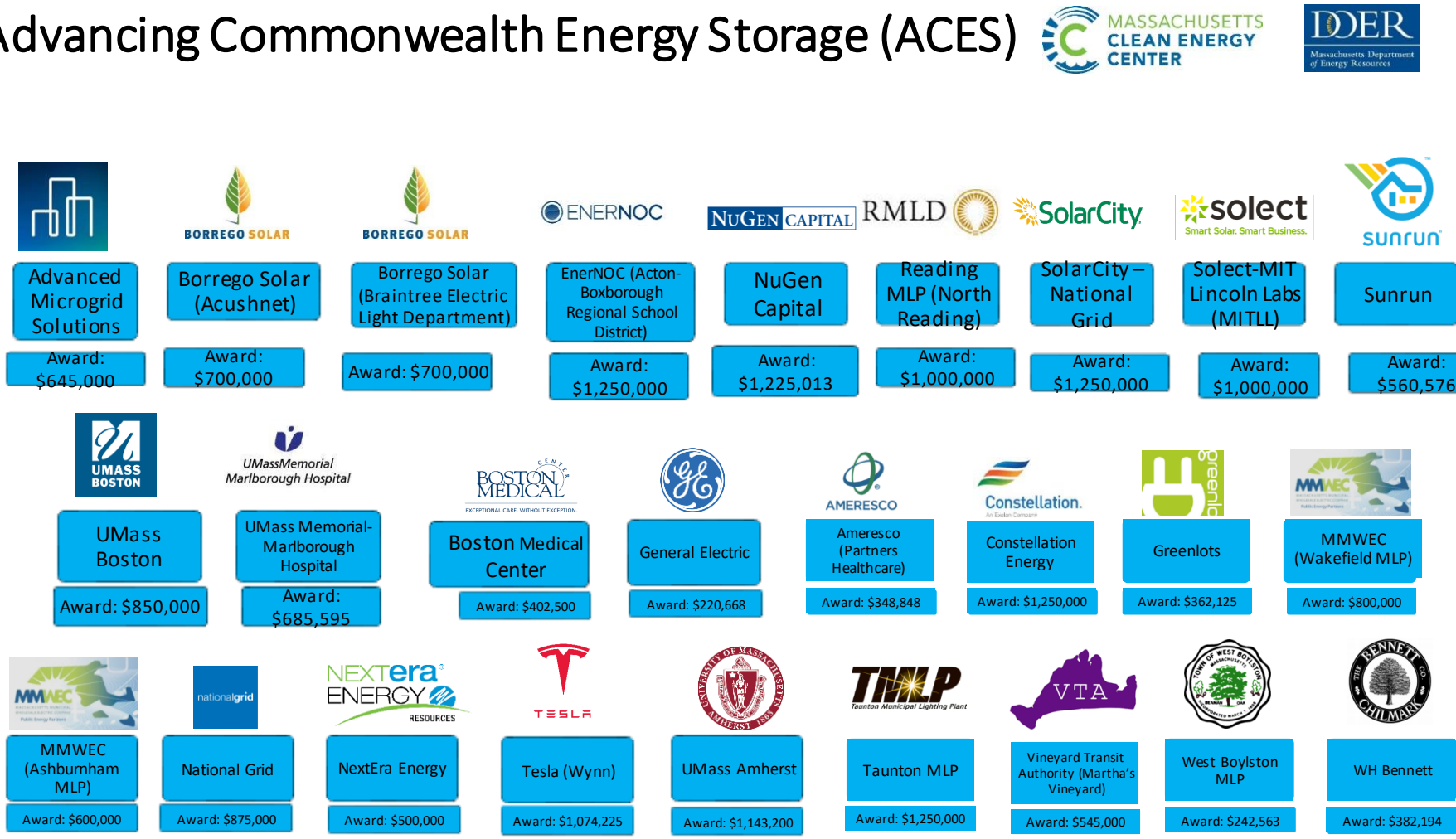
32 MW/83 MWh

Energy storage proposed

$20 MM/$31 MM

Grant funding request / Cost share leveraged

Advancing Commonwealth Energy Storage (ACES)



Advancing Commonwealth Energy Storage (ACES)

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DOER Massachusetts Department of Energy Resources

Host Site Types

Utility

8 sites

Commercial

9 sites

Education

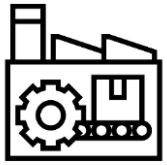
3 sites

Hospital

2 sites

Residential

2 sites



Manufacturing

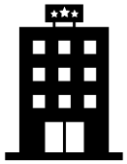
1 site

Agriculture

1 site

Transit

1 site



Hotel

1 site

DOD

1 site

Biotech

1 site

"Utility" icon created by Georgiana Ionescu from Noun Project, "Commercial" icon created by Maxim Kulikov from the Noun Project, "Education" icon created by Rockicon from the Noun Project, "Hospital" icon created by iconsphere from the Noun Project, "Residential" icon created by Marco Livolsi from the Noun Project, "Manufacturing" icon created by Eucalyp from the Noun Project, "Agriculture" icon created by anbileru adaleru from the Noun Project, "Transit" icon created by Jens Tärning from the Noun Project, "Hotel" icon created by Adrien Coquet from the Noun Project, "DOD" icon created by Kimmi Studio from the Noun Project, "Biotech" icon created by Atif Arshad from the Noun Project

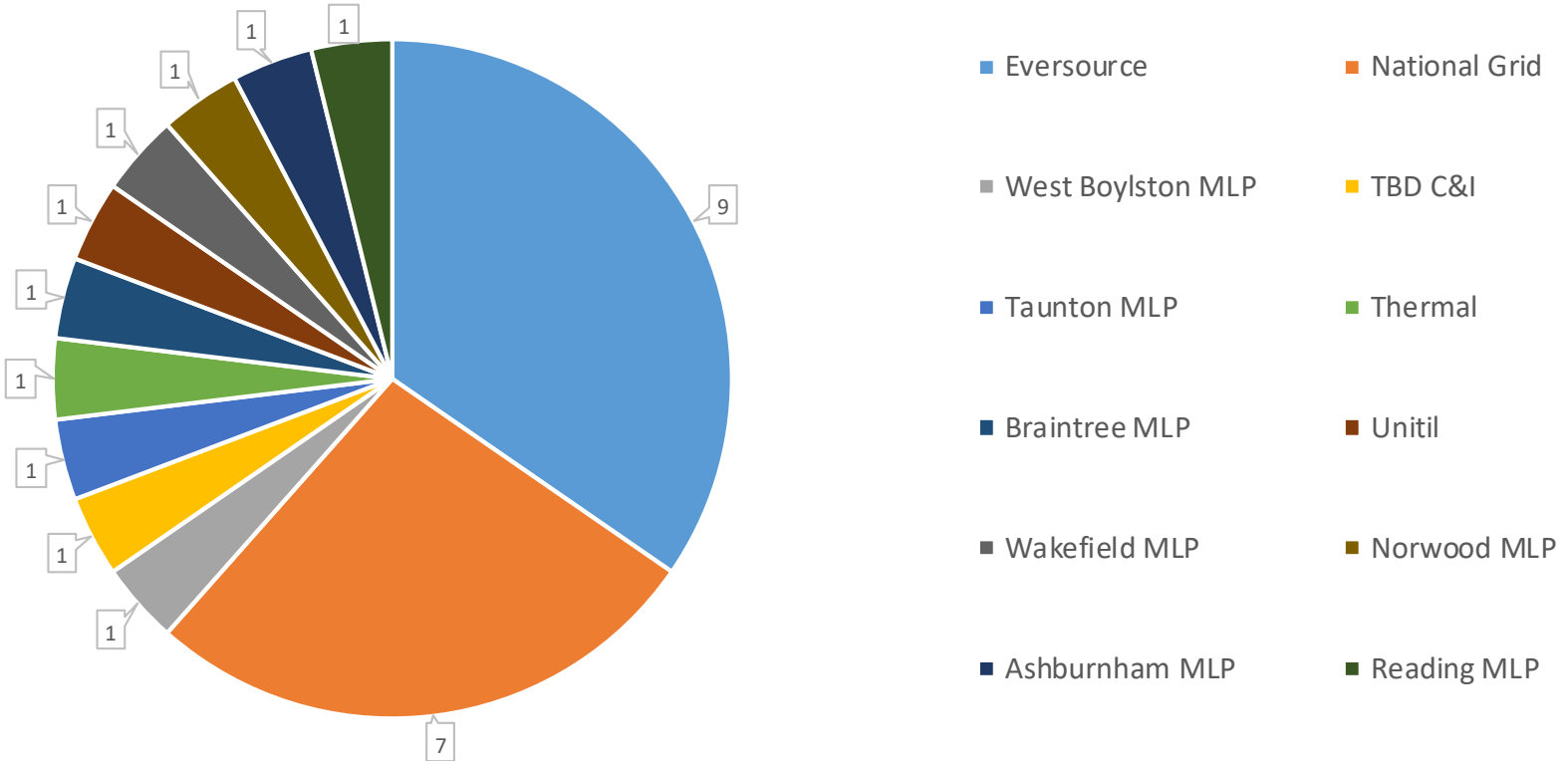
Advancing Commonwealth Energy Storage (ACES)

Overview: **Coverage of *State of Charge* Use Cases**

		Up to $20 MM	Number of Awards
Investor Owned Utility (IOU) Grid Mod Asset: Distributed Storage at Utility Substations		✓	1
Municipal Light Plant (MLP) Asset		✓	5
Load Serving Entity (LSE)/Competitive Electricity Supplier Portfolio Optimization		✓	1
Behind the Meter	C&I Solar Plus Storage	✓	6
	~~Residential Storage~~		
	Residential Storage Dispatched by Utility	✓	2
Merchant	~~Alternative Technology Regulation Resource~~		
	Storage + Solar	✓	4
	Stand-alone Storage or Co-Located with Traditional Generation Plant	✓	2
Resiliency/Microgrid		✓	3
NEW USE CASE: Transit/Transportation		✓	2
Total Use Cases		**9**	**26**

Advancing Commonwealth Energy Storage (ACES)

Utility



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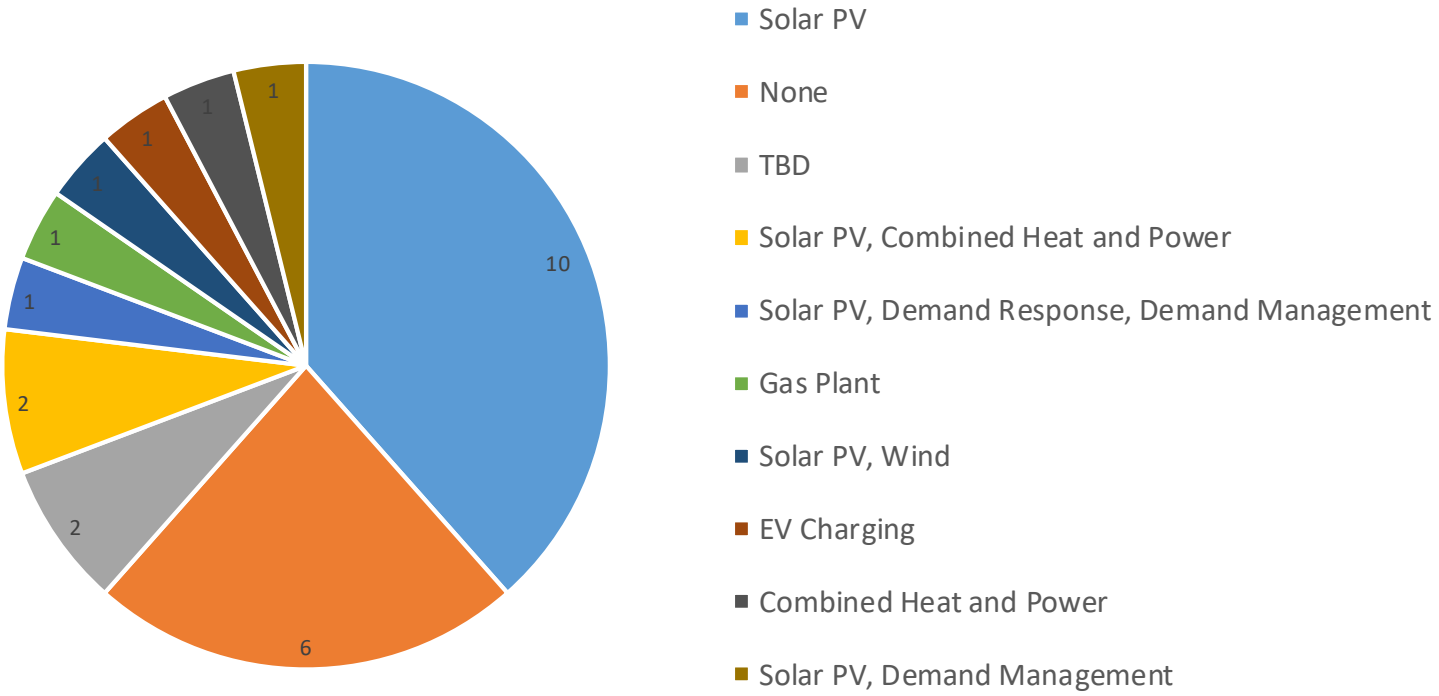
Complementary Technologies



Advancing Commonwealth Energy Storage (ACES)

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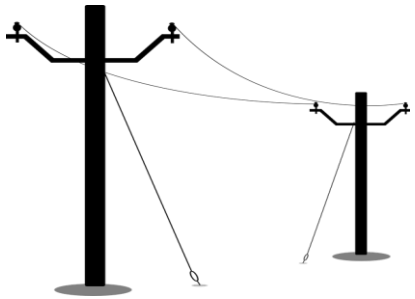
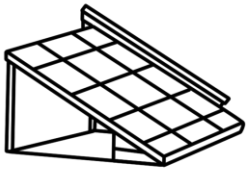
DOER Massachusetts Department of Energy Resources

Non-Monetizable Benefits

- Backup Power/Emergency Power for Critical Loads
- Increased Grid Resiliency
- Congestion Relief
- Transmission and Distributed Cost Reduction
- GHG Emission Reduction
- Renewable Integration





Advancing Commonwealth Energy Storage (ACES)

Leadership and Innovation

Massachusetts is one of a handful of states to integrate energy storage into long-term energy planning

Value Stacking and Business Model Demonstration

Non-monetizable, System Benefits

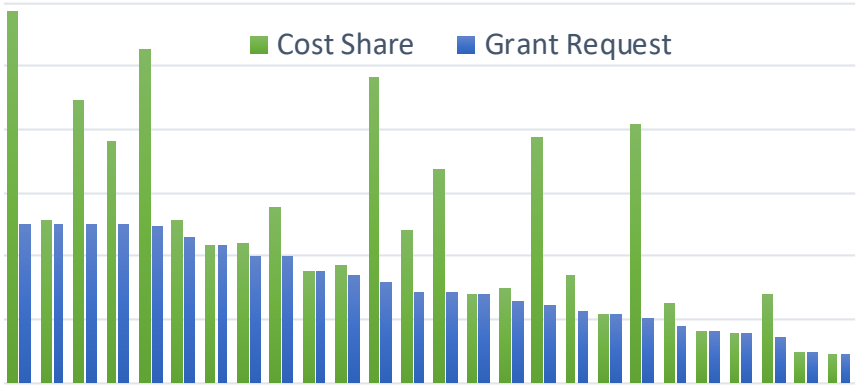
Fuel Growth

Advancing Commonwealth Energy Storage (ACES)

Cost Effectiveness

Business Models

14



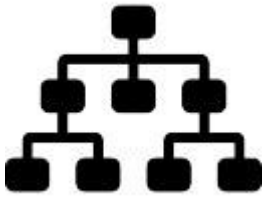
ACES projects demonstrate innovative business models that can help with broader adoption and cost declines.

Applications had a 50% cost-share requirement

Advancing Commonwealth Energy Storage (ACES)

Replicability

On a project scale, broad replicability was a critical primary selection criterion of selected projects in order to prime Massachusetts for ***increased commercialization*** *and* ***deployment of storage technologies***



On a programmatic scale, ***ACES itself is a replicable*** *as it was built using a well-understood and widely-used grant program funding structure*

Advancing Commonwealth Energy Storage (ACES)

Public Benefits and Results

Educate *customers, utilities, consumers, policy makers and a variety of industry stakeholders on the benefits of energy storage*

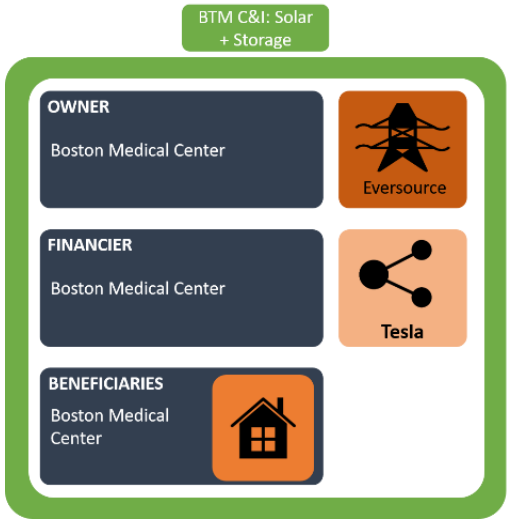
Help ***de-risk investments*** *in energy storage projects in the future*

Inform how storage systems can achieve ***non-monetizable benefits***

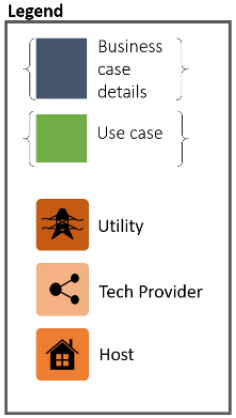
The Program's results will ***inform policy recommendations*** *for the industry and the state.*

Advancing Commonwealth Energy Storage (ACES)

Example ACES Awards



Boston Medical Center



BOSTON MEDICAL CENTER
EXCEPTIONAL CARE. WITHOUT EXCEPTION.

Award: $402,500

Use Case:	BTM C&I
Technology:	Li-on Battery
Capacity:	520kW/1044kWh
Host Site Type:	Hospital
Location:	Boston
Benefits:	• Demand charge reduction • ISO-NE capacity tag reduction and frequency regulation • Critical equipment support, resiliency and backup power through voltage support • Support of low income communities • Upgrade deferral • Wholesale market costs reduction, grid congestion relief • GHG reduction

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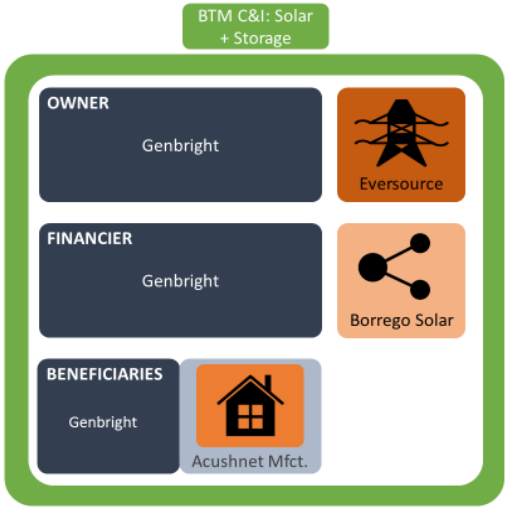
Example ACES Awards



Borrego Acushnet

BORREGO SOLAR

Award: $700,000

Use Case:	Behind-the-meter C&I
Technology:	Li-on battery
Capacity:	1500kW/3000kWh
Host Site Type:	Manufacturing
Location:	New Bedford
Benefits:	• Demand Charge Reduction • Power factor correction • Cap. Tag. Reduction • ISO-NE Reserves • ISO-NE Frequency Regulation • Co-Gen Optimization • Reduced Cost of Capital

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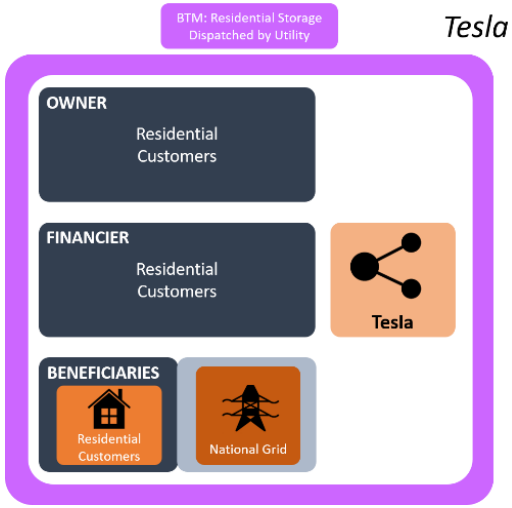
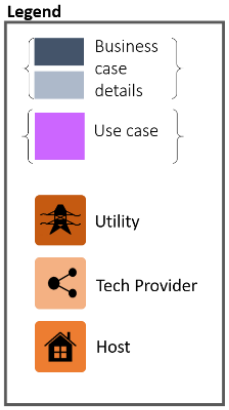
Example ACES Awards



Tesla (Solar City) – National Grid

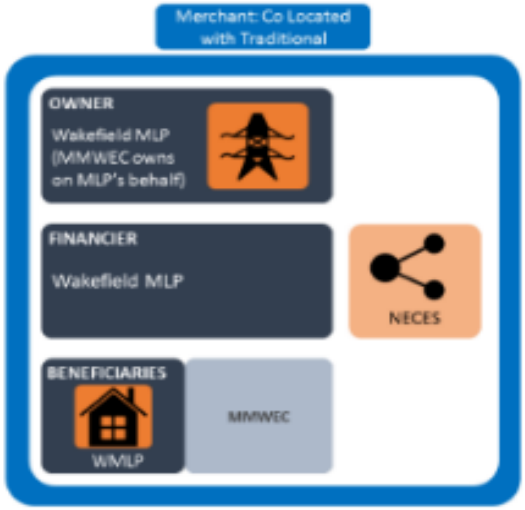


Award: $1,000,000

Use Case:	BTM – Residential Aggregated Storage Dispatched by Utility
Technology:	Li-on battery
Capacity:	5KW/13.2kWh
Host Site Type:	Multiple Residential Sites
Location:	Nantucket
Benefits:	• Customer backup power • ITC if solar • Increased renewable integration • Utility benefits including capacity and transmission savings • Congestion relief on Nantucket

Advancing Commonwealth Energy Storage (ACES)

Example ACES Awards



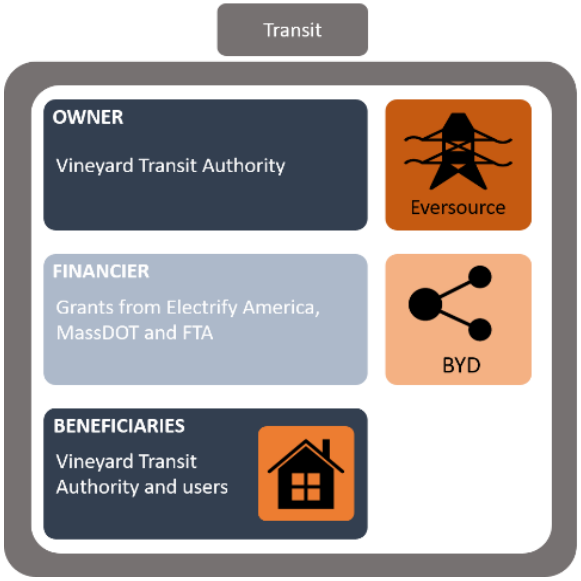
Award: $800,000

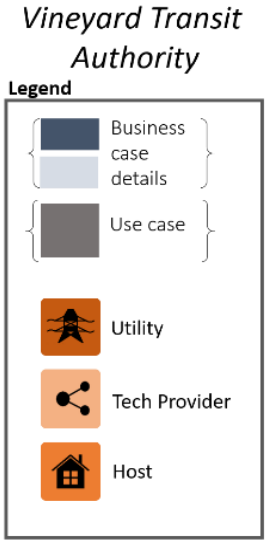
Use Case: Merchant co-located with Traditional Generation Plant

Technology:	Li-on Battery
Capacity:	3,000kW/5,000kWh
Host Site Type:	Utility
Location:	Wakefield
Benefits:	• ISO-NE capacity and transmission savings • Energy arbitrage • NEMA congestion relief in winter peak periods • Overall NEMA price reduction (energy/capacity)

Advancing Commonwealth Energy Storage (ACES)

Example ACES Awards





Award: $545,000

Use Case:	**Transit**
Technology:	Li-on battery
Capacity:	500kW/1400kWh
Host Site Type:	Transit site
Location:	Martha's Vineyard
Benefits:	• Fuel savings (diesel to electricity) • Solar+storage powering EV charging • Operational flexibility • Service resiliency • Distribution system efficiency • GHG reductions • Health benefits

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