

# State Energy Storage Policy

**Vermont House Committee on Energy & Technology  
April 5, 2017**

**Todd Olinsky-Paul  
Project Director  
Clean Energy States Alliance  
Clean Energy Group**



# Agenda for this presentation:

- Introduction to Clean Energy States Alliance (CESA) and Energy Storage Technology Advancement Partnership (ESTAP)
- Introduction to Clean Energy Group (CEG) and the Resilient Power Project
- State policy landscape for storage
- Policy Resources
- Questions

# Clean Energy States Alliance (CESA)

[www.cesa.org](http://www.cesa.org)



**Department of Commerce**  
Innovation is in our nature.



# Energy Storage Technology Advancement Partnership (ESTAP)

- Conducted by CESA
- Under contract with Sandia National Laboratories, with funding from US DOE-OE

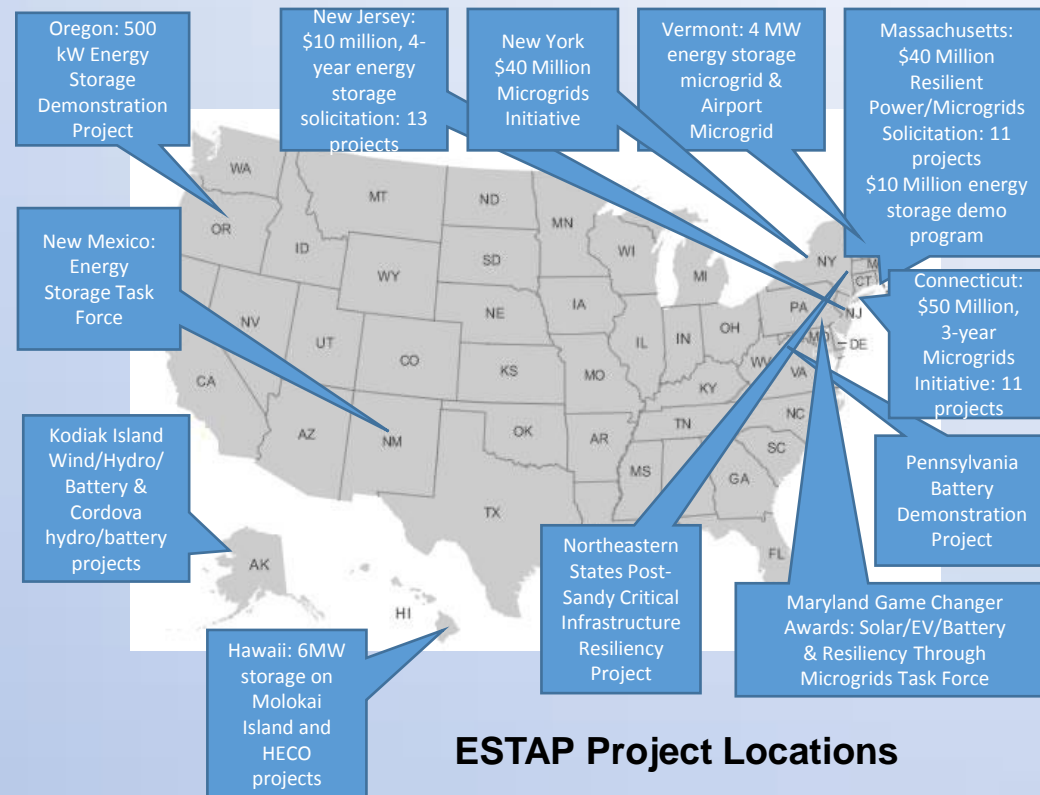
## ESTAP Key Activities:

### 1. Disseminate information to stakeholders

- ESTAP listserv >3,000 members
- Webinars, conferences, information updates, surveys.

### 2. Facilitate public/private partnerships to support joint federal/state energy storage demonstration project deployment

### 3. Support state energy storage efforts with technical, policy and program assistance



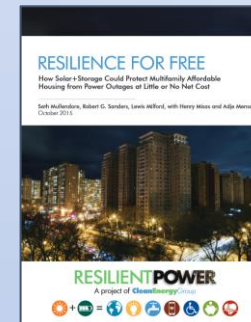
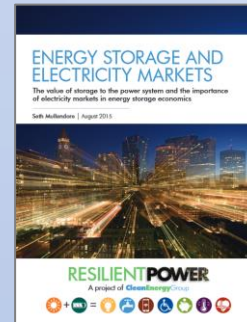
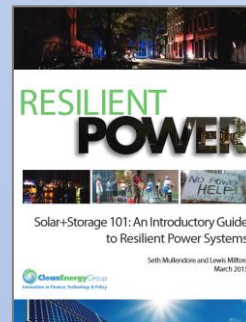
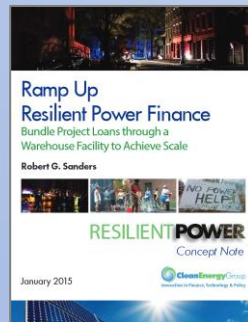
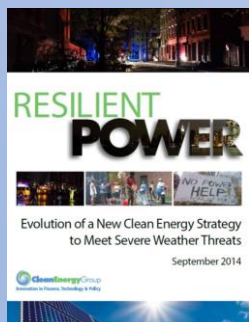
ESTAP Project Locations



# Clean Energy Group (CEG) [www.cleanegroup.org](http://www.cleanegroup.org)

## Resilient Power Project

- Increase public/private investment in clean, resilient power systems
- Engage city officials to develop resilient power policies/programs
- Protect low-income and vulnerable communities
- Focus on affordable housing and critical public facilities
- Advocate for state and federal supportive policies and programs
- Technical assistance for pre-development costs to help agencies/project developers get deals done
- See [www.resilient-power.org](http://www.resilient-power.org) for reports, newsletters, webinar recordings



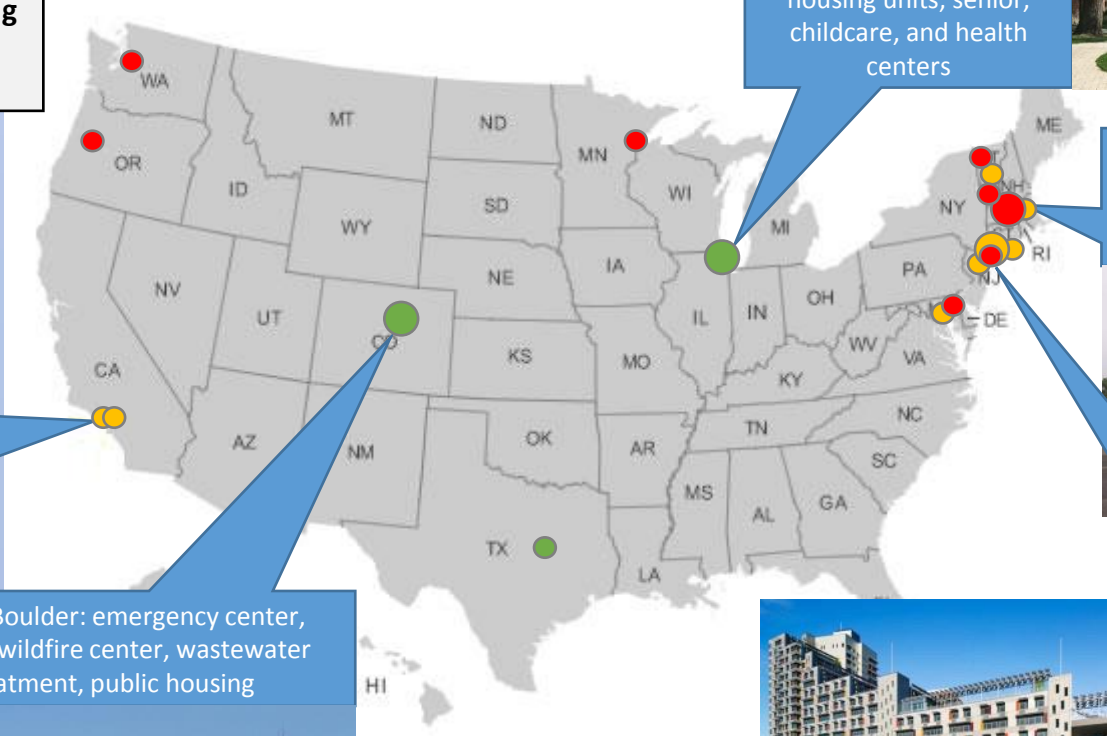
[www.cleanegroup.org](http://www.cleanegroup.org)

[www.resilient-power.org](http://www.resilient-power.org)



# CEG Resilient Power Project: Supporting More than 50 Projects

- Affordable Housing
- Critical Facilities
- Both



California Multifamily Affordable Housing: AB 693 150,000 units



Chicago Housing Authority: 1,900 public housing units; senior, childcare, and health centers

Massachusetts Community Clean Energy Resiliency Initiative: 11 communities, 28 projects



City of Boulder: emergency center, shelter, wildfire center, wastewater treatment, public housing



New York/New Jersey: 9 multifamily affordable housing projects, community shelter

# The Landscape for Storage: a patchwork quilt of markets, regulations, utility programs and state incentives

## Washington

Grid modernization grants

## California

- ES capacity mandate – 1.3 GW by 2020
- SGIP incentive

## New York

NY Prize microgrid grants

## ISO-NE

Utility capacity and Transmission cost savings

## Northeastern Resilient Power Programs

MA, NJ, NY, CT

## Oregon

ES capacity mandate  
ES valuation study

California ISO (CAISO)

Southwest Power Pool (SPP)

Midcontinent ISO (MISO)

New York ISO (NYISO)

New England ISO (ISO-NE)

PJM

Electric Reliability Council of Texas (ERCOT)

## Massachusetts

ES grants, incentives  
ES policy suite  
Utility procurement

## PJM wholesale frequency regulation market

- Premium for fast response resources
- Lowered barriers to entry for distributed resources

## Behind the meter benefits:

- Demand charge management
- Solar self-consumption (High electricity prices/NEM caps/low NEM rates/TOU rates)
- Resiliency

## Hawaii

Net metering cap

# New England States Storage Policy/Programs

## New York:

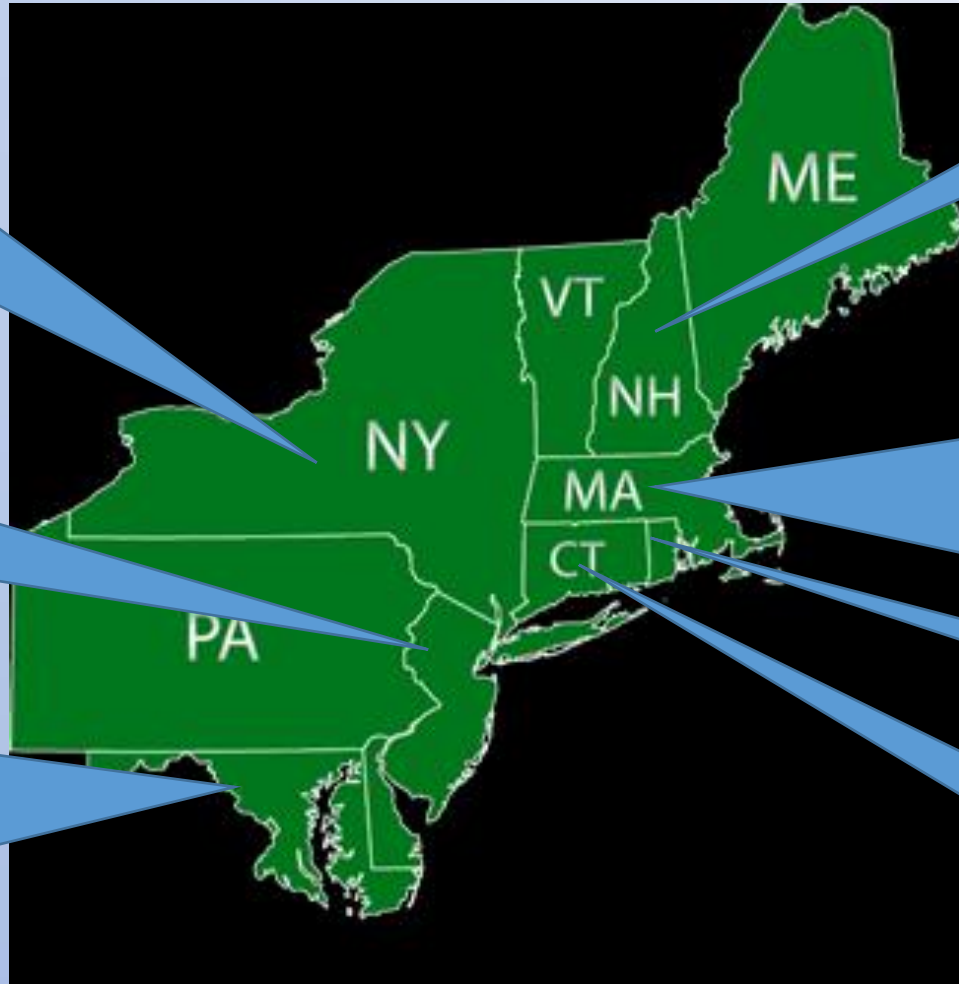
- Microgrids Grants
- Green Bank finance
- REV Grid Modernization

## New Jersey:

- Storage Grants
- Storage Rebates

## Maryland:

- Game Changer Grants
- Microgrids study
- Proposed ES study, tax incentives, solar+storage grants



## New Hampshire:

- Grid Modernization

## Massachusetts:

- Resiliency Grants
- Storage Grants
- Integration of Storage into existing incentive programs
- Utility procurement
- ES study
- Grid modernization

## Rhode Island:

- Microgrids Program

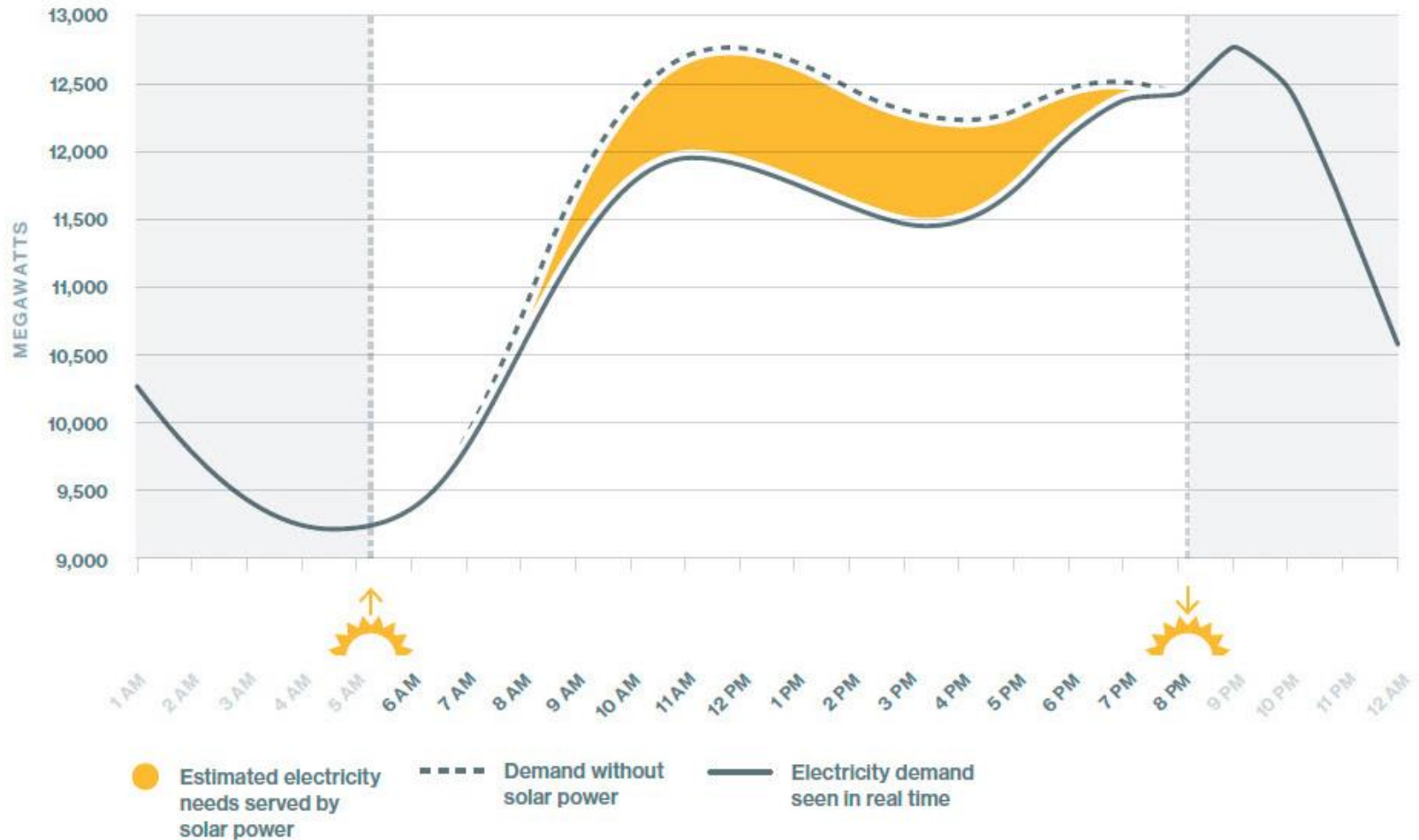
## Connecticut:

- Microgrids Grants
- Tri-State Storage RFP
- DR & ES RFP

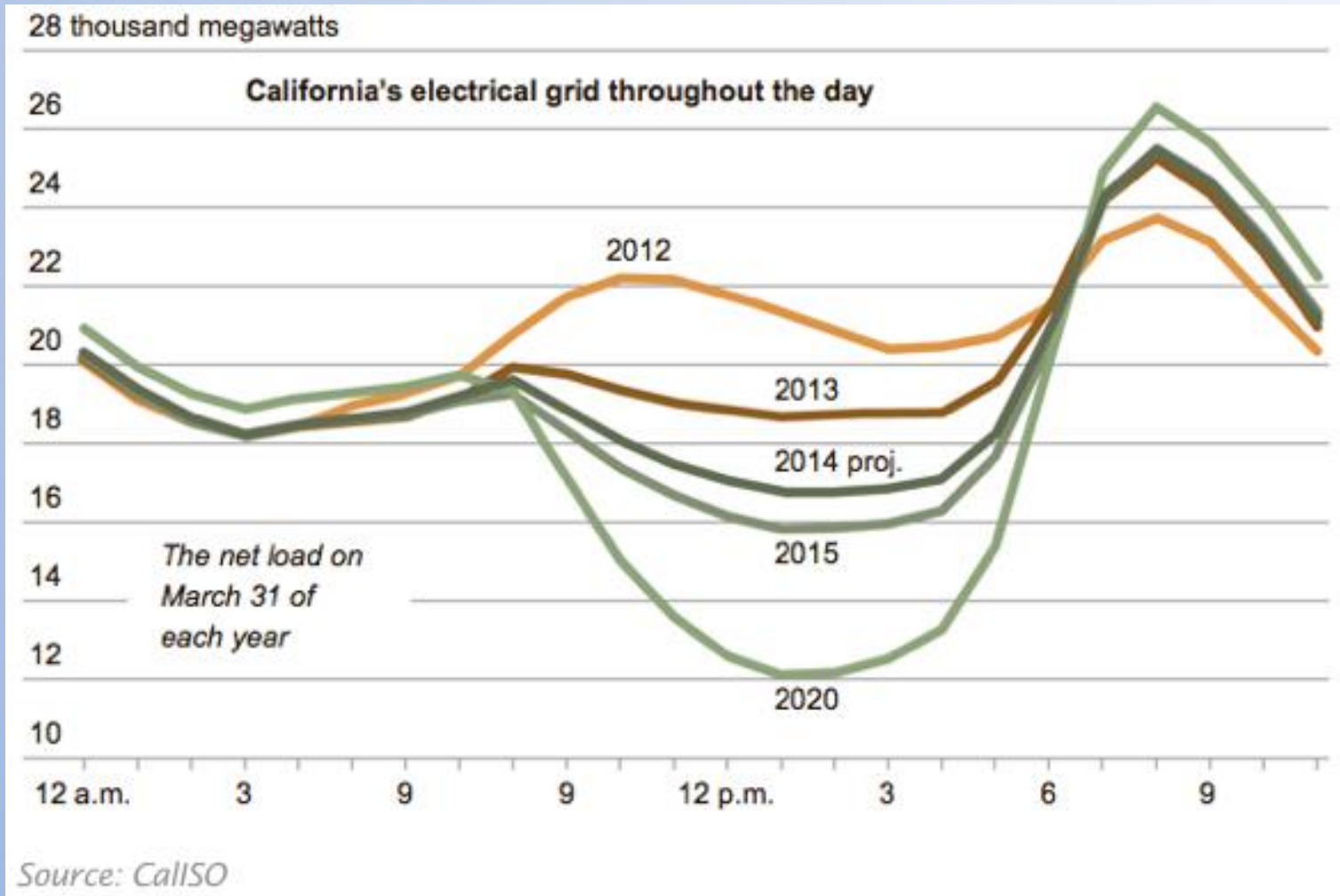


# ISO-New England: Does this curve look familiar?

Solar Power's Effect on Regional Electricity Demand  
May 23, 2015

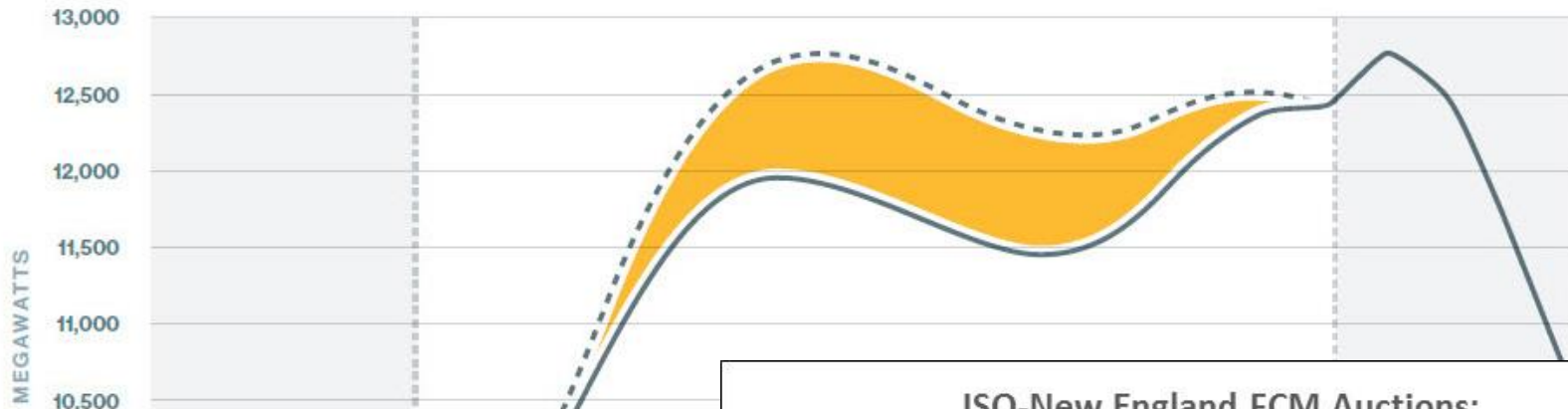


# California "Duck" Curve



# ISO-New England: Does this curve look familiar?

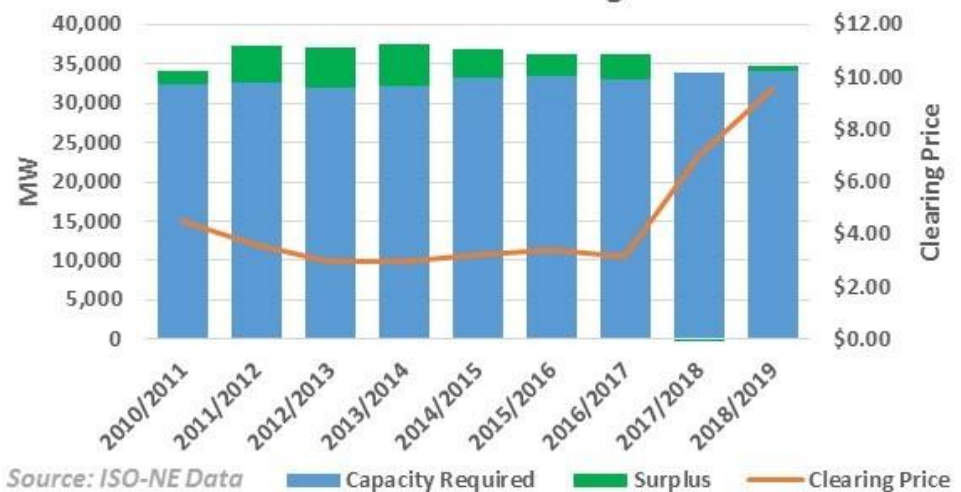
Solar Power's Effect on Regional Electricity Demand  
May 23, 2015



SMLD Capacity Clearing Price, ISO-NE.

Year	Price (\$/kW-Month)
2010-2011	\$4.254
2011-2012	\$3.119
2012-2013	\$2.535
2013-2014	\$2.516
2014-2015	\$2.855
2015-2016	\$3.129
2016-2017	\$3.150
2017-2018	\$7.025
2018-2019	\$9.551

ISO-New England FCM Auctions:  
MW Procured & Clearing Prices



Source: ISO-NE Data

Capacity Required Surplus Clearing Price

# Vermont: GMP Microgrid, Rutland (Stafford Hill)

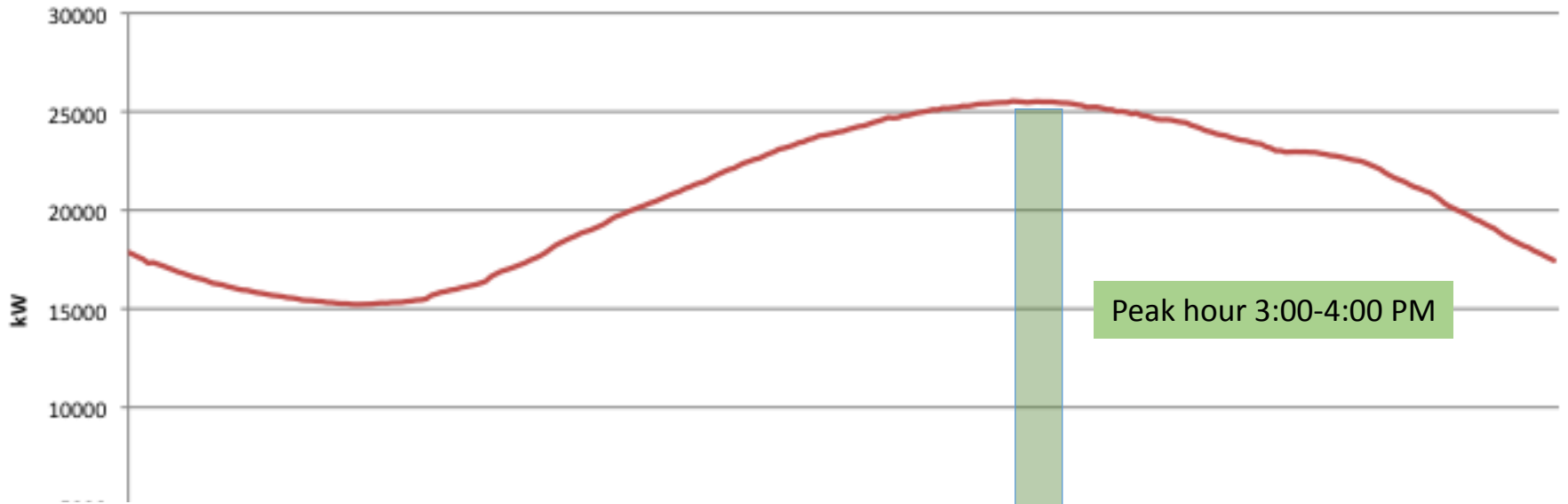


- 4 MW batteries (lithium ion and lead acid) + 2 MW PV microgrid
- Sited on closed landfill (brownfield redevelopment)
- Provides resilient power for school (public shelter)
- Project partners: Green Mountain Power, Dynapower, VT DPS, DOE, Sandia, CESA

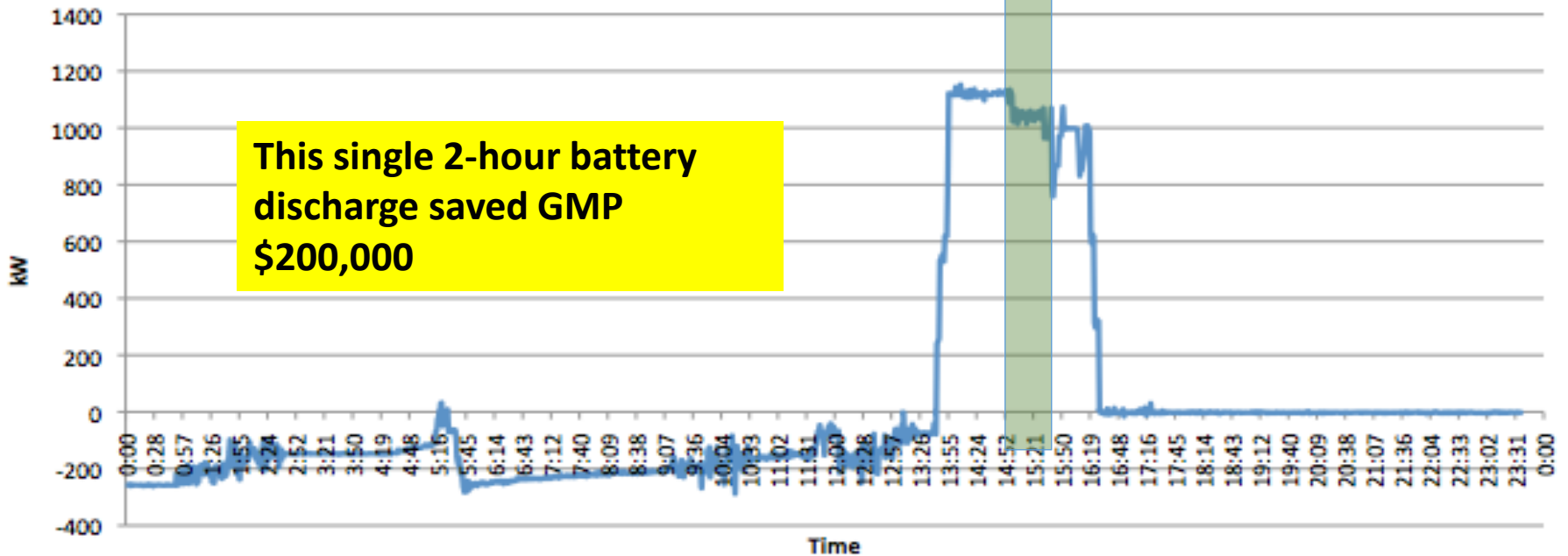
- Funding: \$40K VT DPS, \$250K DOE-OE
- Total cost: \$12 M
- Payback < 7 years via utility capacity and transmission cost reductions
- Follow-on projects:
  - 14 LMI high-efficiency modular homes equipped with resilient power solar+storage (rural mobile home replacement project)
  - Burlington Electric Dept solar+storage microgrid at Burlington Airport



# Actual Load, ISO-NE, August 12, 2016



# Total Battery Output, kW - August 12, 2016



# Sterling, MA 2MW/3MWh Solar+Storage Microgrid



**Project partners:** SMLD, DOER, DOE-OE, SNL, CESA

**Project funding:** State CCERI grant, US DOE grant

**Project timeline:** Groundbreaking in October 2016, commissioning by end of year

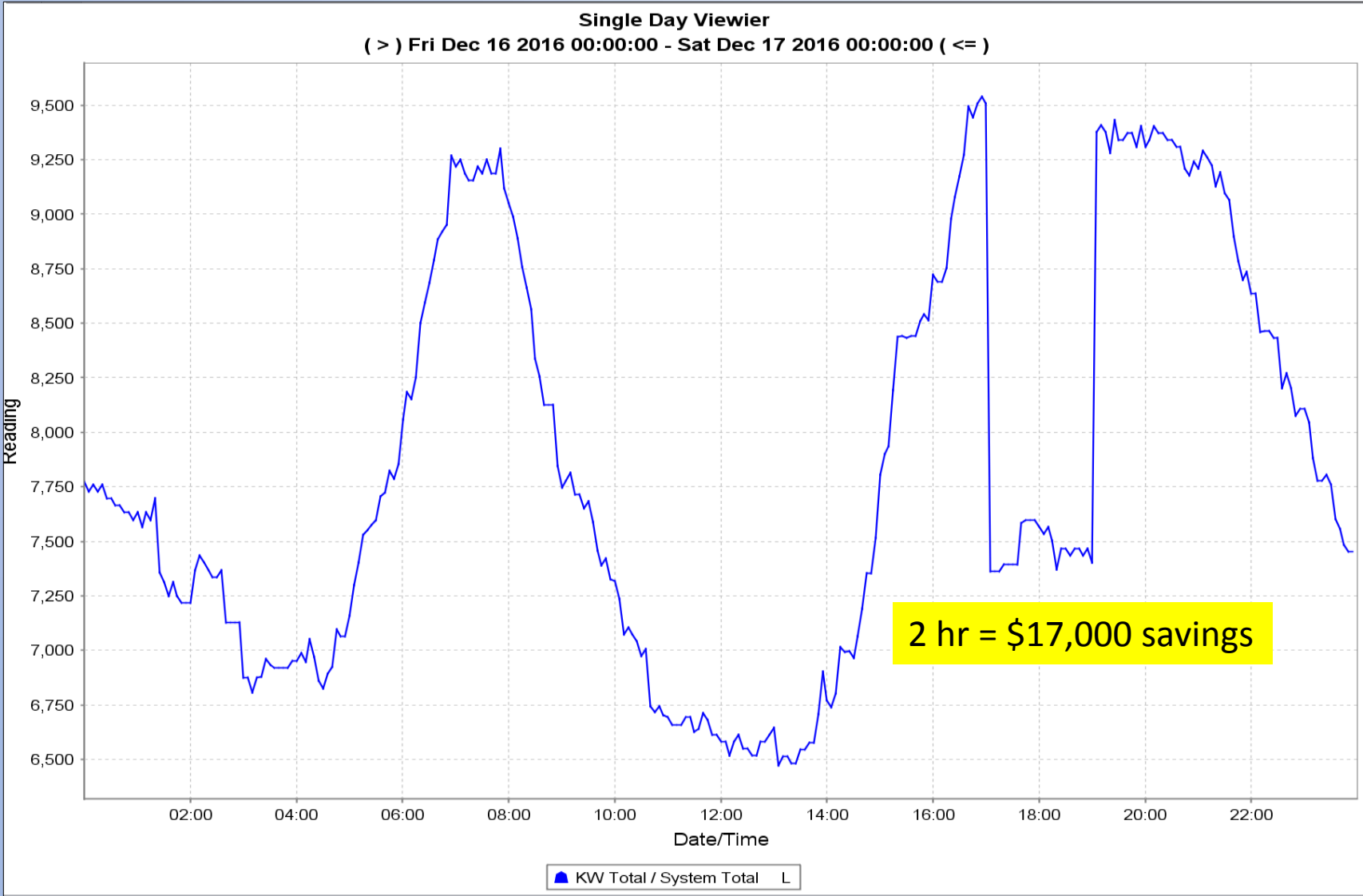
**Project Summary:** 2 MW / 3 mWh lithium ion battery project, connected with 3.4 MW solar PV at utility substation; islanding capability to support municipal emergency facility.

## **Project Benefits and Revenue Streams:**

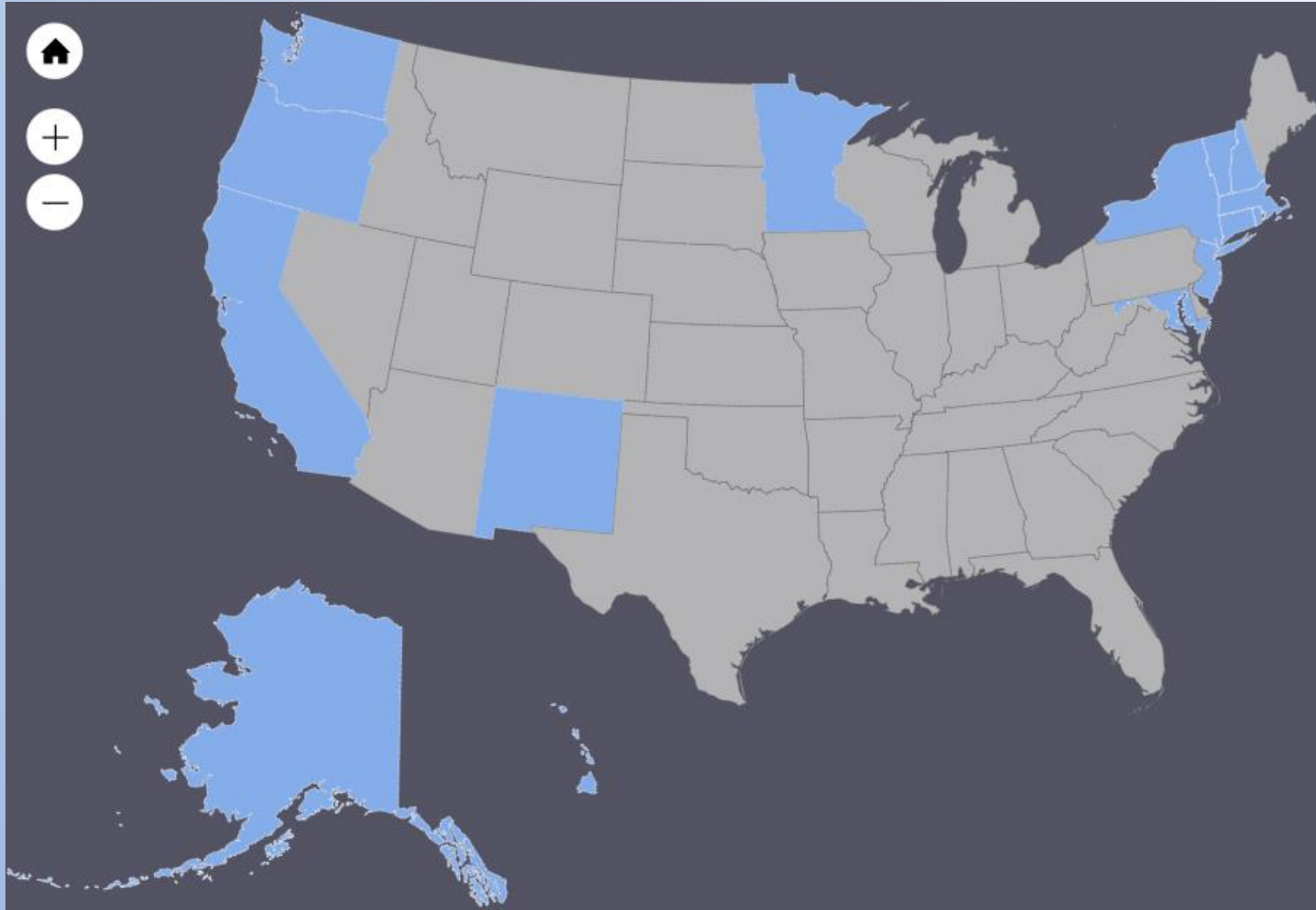
- Backup power to support town police station / dispatch center during grid outages;
- Cost savings through reduction of SMLD's capacity and transmission obligations to ISO-NE;
- Revenues from electricity arbitrage
- Integration of intermittent solar PV



# Sterling, MA Monthly Peak Reduction



# State Policy and Programs





# California Energy Storage Procurement Mandate and Incentives

## Energy Storage Procurement Mandate

- 1.325 GW by 2020
- Sub-targets for transmission, distribution and customer-sited storage
- IOUs have individual targets
- SCE procurement exceeded requirements

**TABLE 2: California Energy Storage Procurement Target (in MW)**

Storage Grid Domain (POINT OF INTERCONNECTION)	2014	2016	2018	2020	Total
<b>Southern California Edison</b>					
Transmission	50	65	85	110	310
Distribution	30	40	50	65	185
Customer	10	15	25	35	85
<b>Subtotal SCE</b>	<b>90</b>	<b>120</b>	<b>160</b>	<b>210</b>	<b>580</b>
<b>Pacific Gas &amp; Electric</b>					
Transmission	50	65	85	110	310
Distribution	30	40	50	65	185
Customer	10	15	25	35	85
<b>Subtotal PG&amp;E</b>	<b>90</b>	<b>120</b>	<b>160</b>	<b>210</b>	<b>580</b>
<b>San Diego Gas &amp; Electric</b>					
Transmission	10	15	22	33	80
Distribution	7	10	15	23	55
Customer	3	5	8	14	30
<b>Subtotal SDG&amp;E</b>	<b>29</b>	<b>30</b>	<b>45</b>	<b>70</b>	<b>165</b>
<b>Total (ALL THREE UTILITIES)</b>	<b>200 MW</b>	<b>270 MW</b>	<b>365 MW</b>	<b>590 MW</b>	<b>1,325 MW</b>

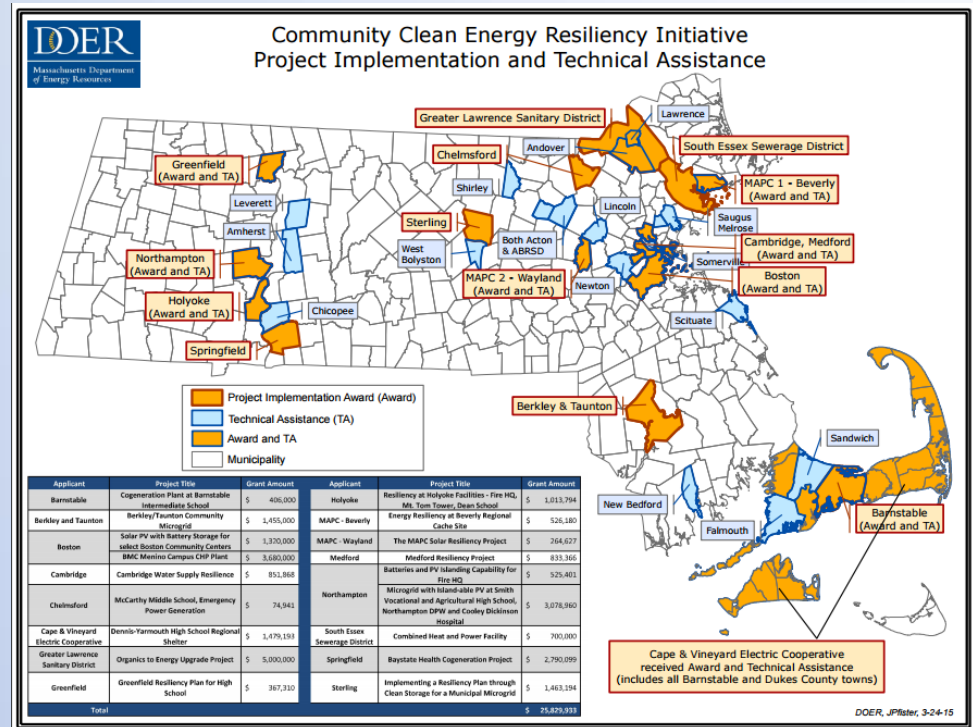
California's energy storage procurement mandate includes procurement targets for customer-sited systems.

## Self Generation Incentive Program (SGIP)

- \$83M/year
- Program reopens May 1, 2017
- 75% of incentives reserved for energy storage
  - 15% reserved for residential storage
- Storage incentives set at 36-50 cents/watt-hour (expected to decrease)

# Massachusetts Energy Storage Initiative

- \$40M CCERI grants (2014-2017)
- Energy Diversity Act (2016)
- *State of Charge* report (2016)
  - State energy storage roadmap and analysis; recommendations for energy storage policy and program development
- \$10M ACES Energy Storage Demonstration Grants (2017)
- Utility Procurement Targets (due July 2017)
- SMART Solar Incentives (due January 2018)
- Microgrids program
- Resilient fueling stations program
- Grid modernization
- Energy efficiency plans
- Alternative portfolio standard
- Rebates



With federal and foundation support, CEG/CESA is providing free technical assistance to DOER awardees for project implementation, as well as to DOER and MassCEC for policy and program development

# CEG proposal for Northeastern States Collaborative on Energy Storage Policy

- Northeastern states share similar markets (within ISO-NE)
- States can learn from the experience, lessons and analysis of Massachusetts
- States can share knowledge gained through their own experience
- States can collectively apply for DOE and foundation funding to support energy storage policy development
- States can collaborate on policies of regional importance
  - ISO regulatory reforms
  - Market development
  - Industry development
  - Utility interconnection issues

# Resources



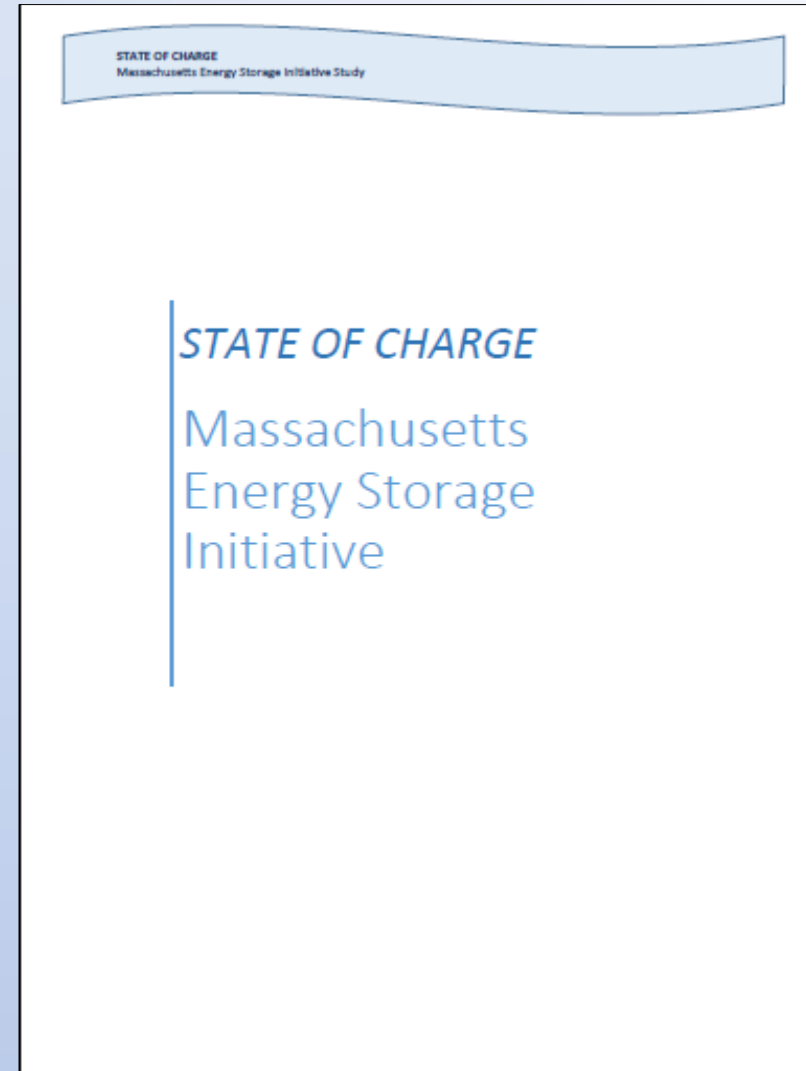
# Massachusetts Energy Storage Report and Legislation

## *State of Charge* report

- Optimization modeling results: 1,766 GW energy storage in MA by 2020
- Policy recommendations: 600 MW energy storage in MA by 2025

## Massachusetts Energy Diversity Act

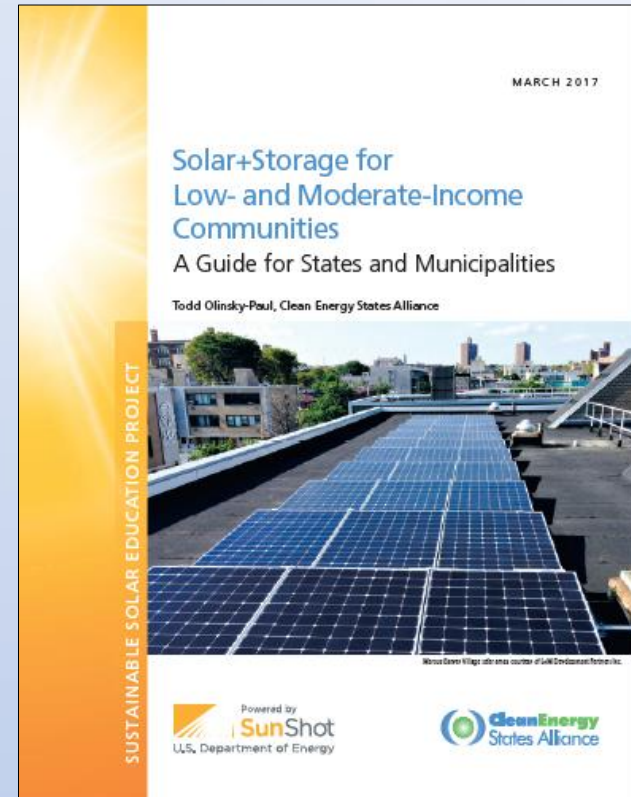
- Distribution utilities may now own energy storage in MA
- DOER directed to develop utility storage targets by June 2017; 3-year compliance and reevaluation schedule



# CESA Solar+Storage Guidebook

## *Solar+Storage for Low- and Moderate-Income Communities* *A Guide for States and Municipalities*

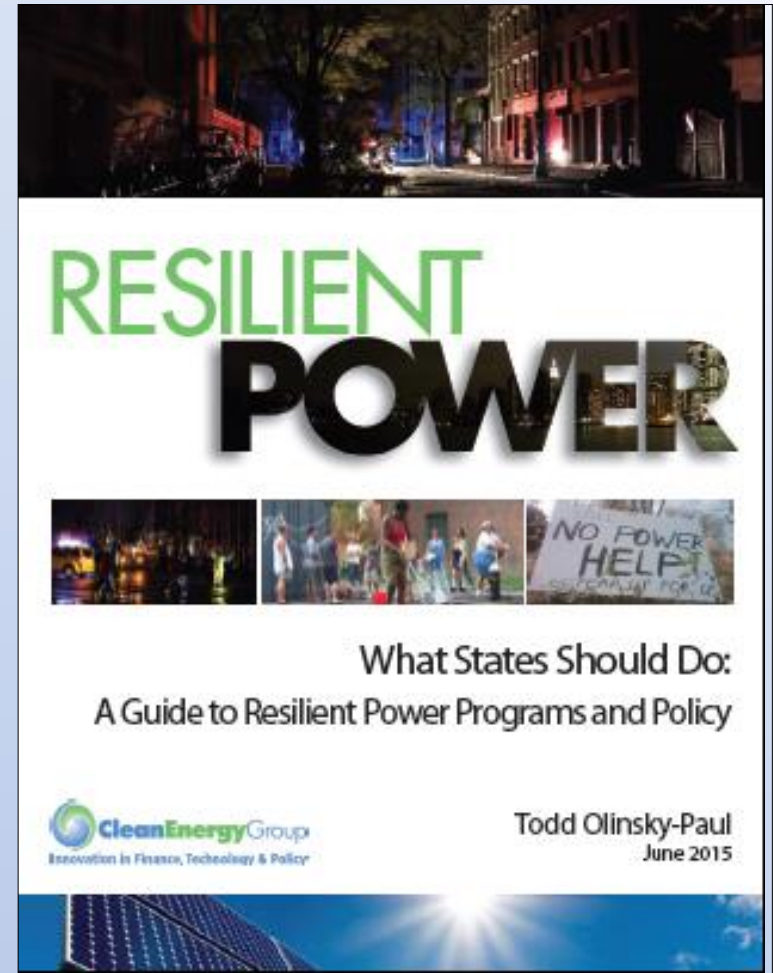
- **What Is Solar+Storage**
- **Why Solar+Storage for LMI Communities?**
  - Cost Savings
  - Resiliency
- **Policy Tools**
  - Grants and Rebates
  - Utility Mandates/Procurement Targets and Portfolio Standards
  - Incorporating Solar+Storage into Existing Programs
  - Tax Incentives and Alternative Ownership Structures
  - Financing and Clean Energy Financial Institutions
  - Market-Based Tools and Regulatory Reform
  - Technical Assistance, Tools, and Resources
- **Conclusions**



# CEG Resilient Power Handbook

## *What States Should Do: A Guide to Resilient Power Programs and Policy*

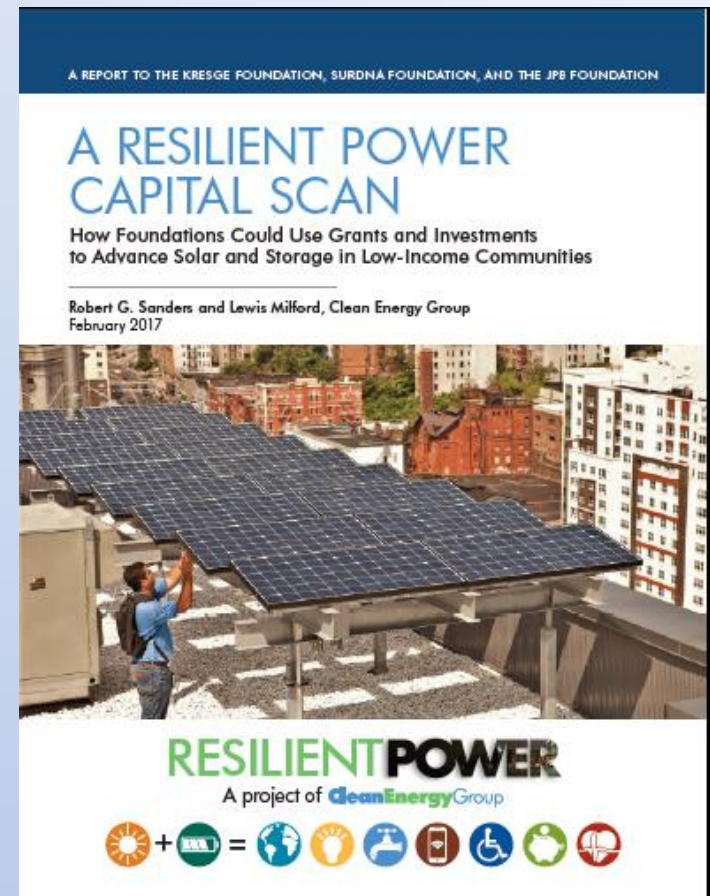
- Focus on solar+storage
- Information on state resilient power programs
- Lessons learned
- Best practices and policy recommendations



# CEG Foundations Report

## *A Resilient Power Capital Scan: How Foundations Could Use Grants and Investments to Advance Solar and Storage in Low-Income Communities*

- CEG report published 2017
- Intended to help foundations direct their philanthropic efforts
- Identifies **five market barriers** to the deployment of solar+storage technologies in low-income communities
- Proposes more than **50 investment interventions** that could address these five primary barriers
- Many of these interventions could be adopted by states and municipalities, and/or by NGO partners





# Other CESA/CEG Resources:

- Procurement guide for municipalities (SNL)
- Energy storage technical reports
- Energy storage economic analyses
- Demonstration project case studies
- Webinars and reports
- Online resources

[www.cesa.org/projects/energy-storage-technology-advancement-partnership/](http://www.cesa.org/projects/energy-storage-technology-advancement-partnership/)

[www.resilient-power.org](http://www.resilient-power.org)

# Thank You

Todd Olinsky-Paul

Project Director

CESA

[Todd@cleanegroup.org](mailto:Todd@cleanegroup.org)

