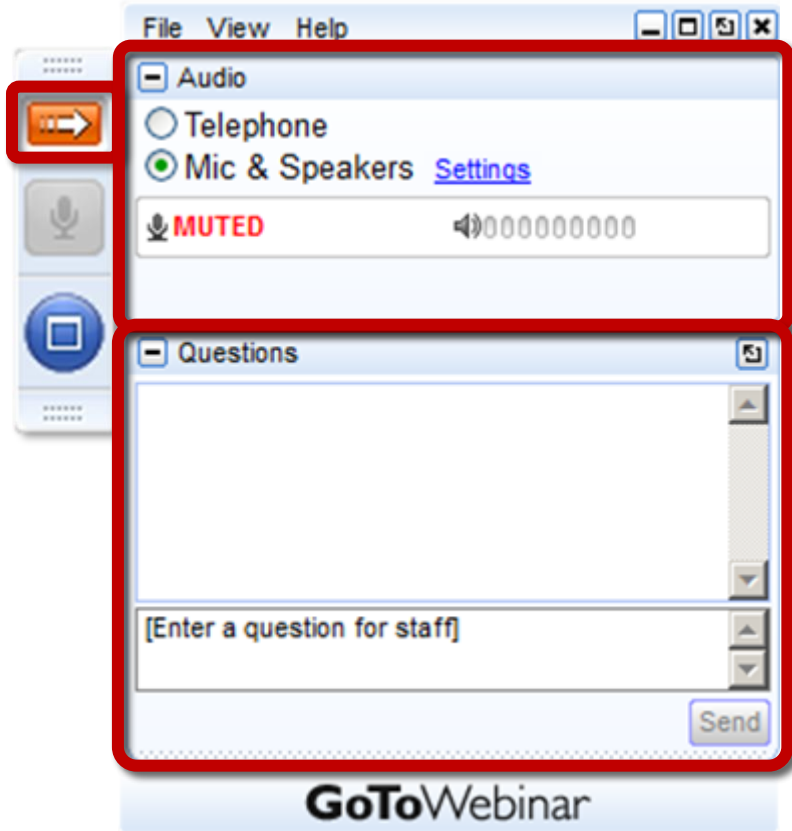


CESA Webinar

# Storage as Wires

May 28, 2021

# Webinar Logistics



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# CleanEnergy States Alliance



GOVERNOR'S  
Energy Office



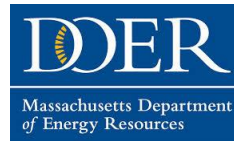
Maryland  
Energy  
Administration



NYSERDA



Department of Commerce  
Innovation is in our nature.



# Storage as Wires

## *Webinar Speakers*

### **John Fernandes**

Senior Consultant – Emerging Technologies  
Customized Energy Solutions



### **Ariel Horowitz**

Senior Program Director  
Massachusetts Clean Energy Center



### **Val Stori**

Project Director  
Clean Energy States Alliance (moderator)





# Customized Energy Solutions


Analyze · Simplify · Implement



## Storage-as-Wires

May 28, 2021


Clean Energy Group / Clean Energy States Alliance

 **The Company**

Established in 1998, **Customized Energy Solutions (CES)** is a consulting and services company that assists clients in managing and staying ahead of the changes in the wholesale and retail electricity and natural gas markets. Serving hundreds of clients, Customized Energy Solutions offers best-in-class hosted energy market operations platforms and a wide spectrum of consulting services. CES is committed to promoting economic development through the advancement of transparent, efficient, and non-discriminatory wholesale and retail electricity and natural gas markets.

**Presence**

**Headquartered Philadelphia, PA**



**Over 200 Associates across 9 Regional offices in United States, Canada, India, Japan & Mexico. We support clients in all 7 US ISOs and RTOs**

**Resources**

**>11000 MW assets under Active Management**

**>300 MW Energy Storage assets under Management**

**Awards and Recognitions**







CES is proud to have won this award 10 times: 2001, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012


**Inc. 5000 – Eleven Time Honoree, Philadelphia 100 - 2001, 2004 – 2012, 2019**

**Best Places to work: 2014, 2016**

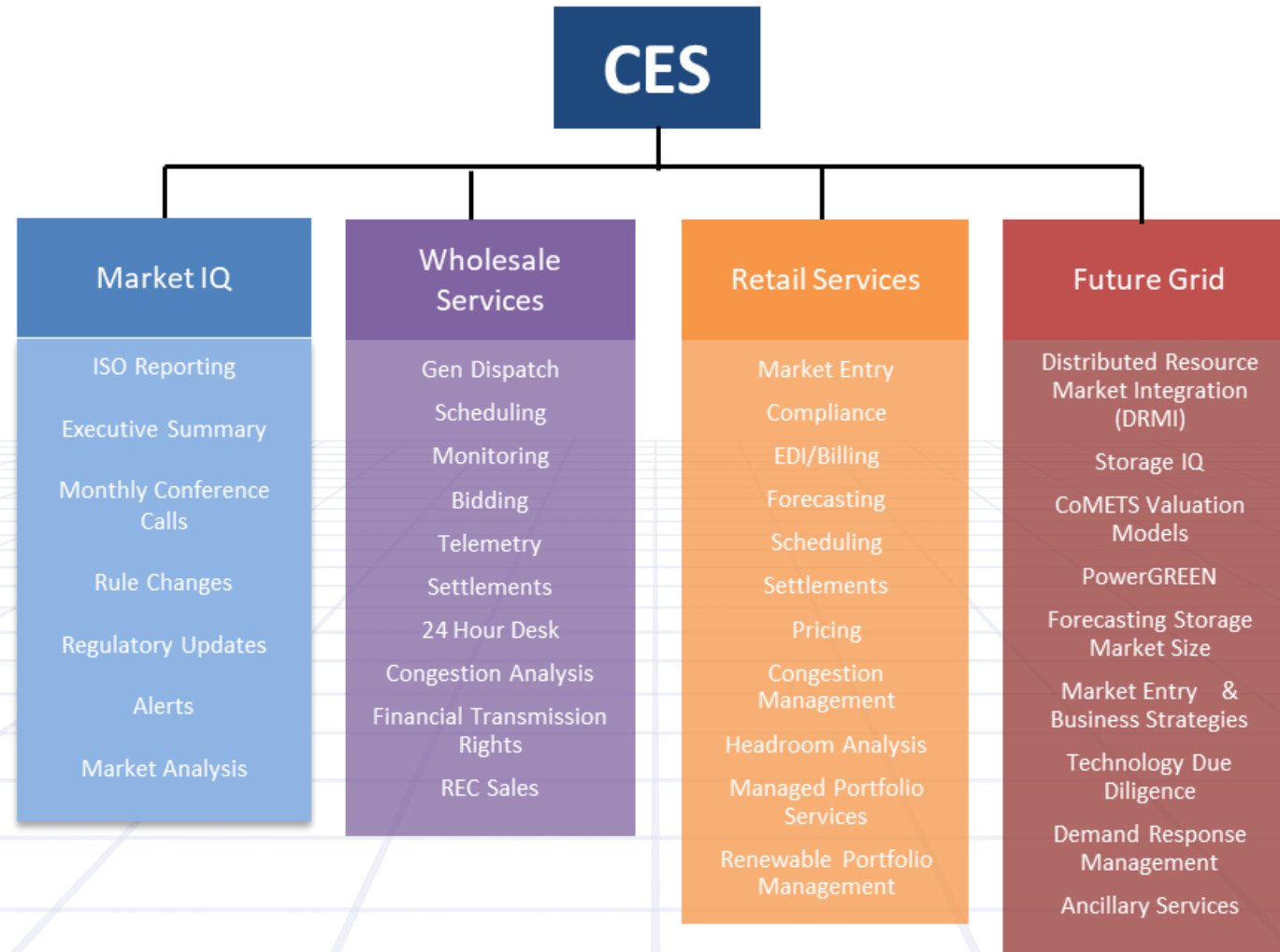
**2016 Energy Storage Association Brad Roberts Award Winner**

**Clients**

**500+ Clients Worldwide**



**Our consulting services enables competitive suppliers, technology providers, marketers, utilities and customers to prosper through change, by turning knowledge into value**





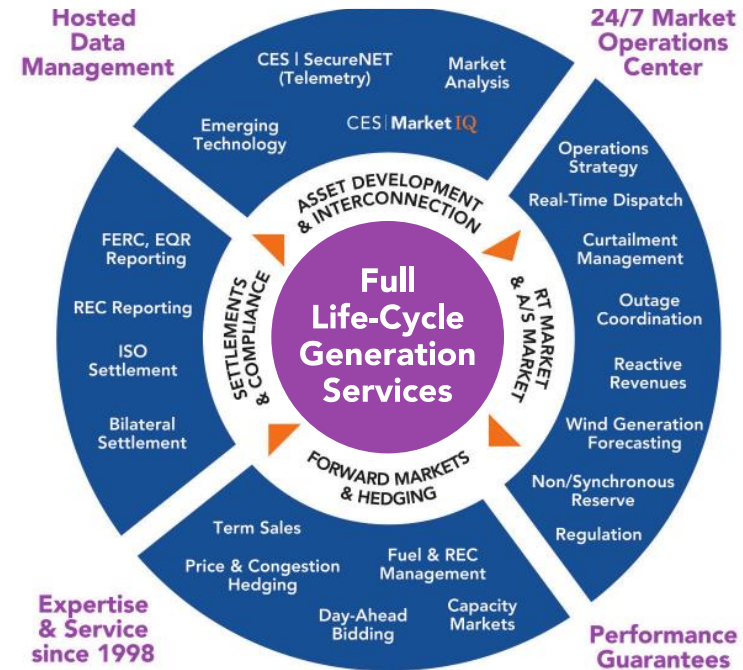
## RETAIL SERVICES

Enabling power and gas retailers' growth and profitability with end-to-end solutions through our state-of-the-art hosted software and service platform, **CES | BLUE**.



## GENERATION SERVICES

Supporting the market entry and optimal operations of power generation with comprehensive hosted software and service solutions through **CES | GOLD**.







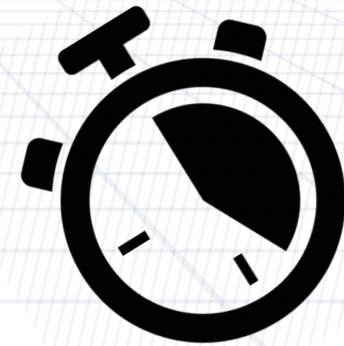
CES Emerging Technologies practice offers a range of consulting, software and services around Energy Storage Systems (ESS), their technology and market applications, to help project developers, investors, technology companies and other clients understand the evolving market rules and the value proposition of new technologies

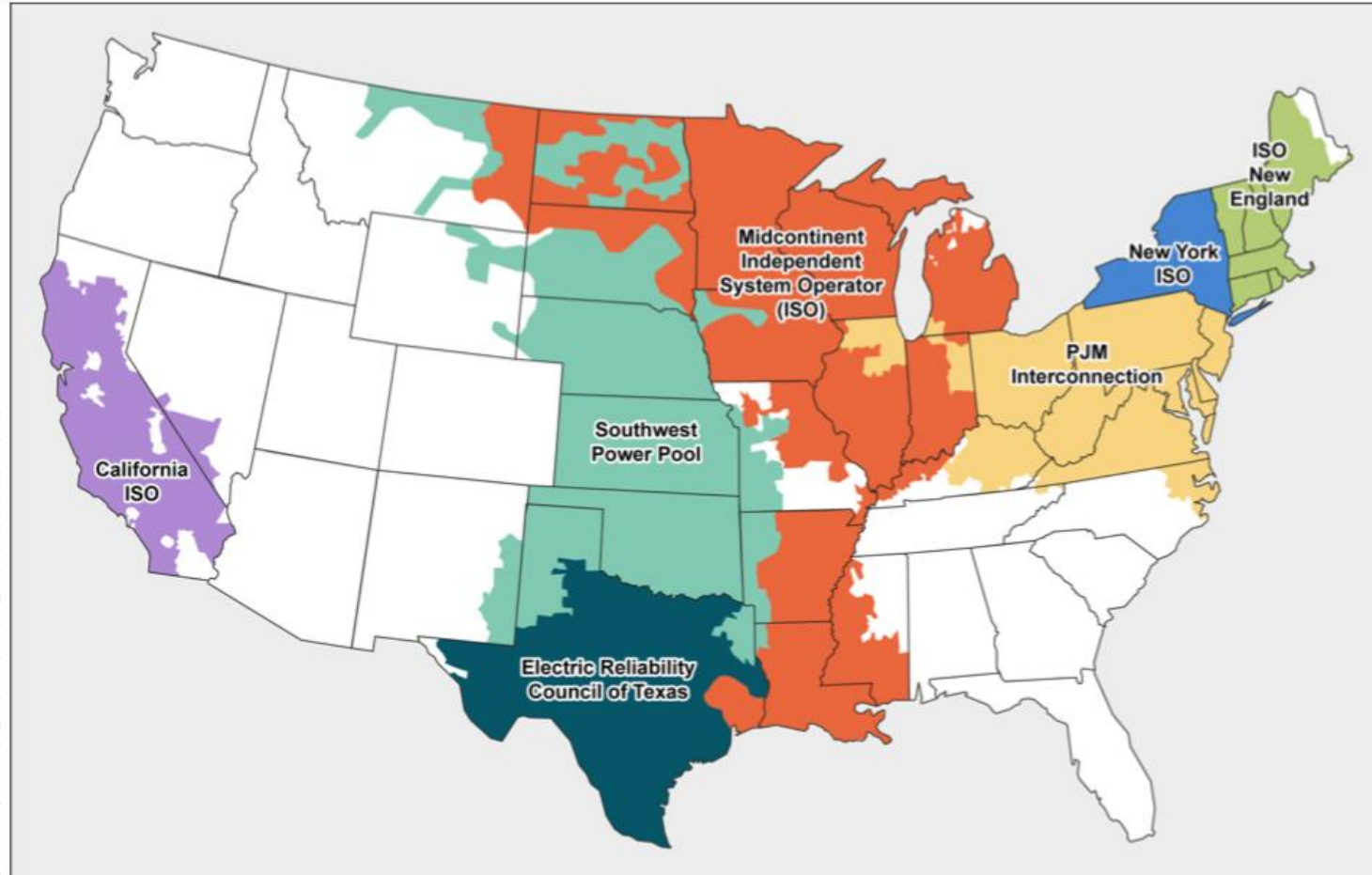
Market Advisory Services	<i>Our market advisory services help clients understand energy market opportunities, developments and policies</i>	Market Overview	Bid Advisory	Policy Support
		Market Forecast	StorageIQ	Trainings
Financial Services	<i>Our financial services help clients understand Business trends, estimate revenues and cash Flows, optimize investments and abate risks</i>	Financial Modeling	Risk Analysis	
		Due Diligence	Investment Advisory	
Software Services	<i>Our software services and analytical tools help clients simulate dispatch of energy storage projects and make critical investment decisions</i>	CoMETS	Behind-the-Meter	Microgrid
		In-Front of the Meter	RE Integrated Layouts	Bespoke Solutions
Strategy Consulting	<i>Our strategy consulting services help clients successfully enter and navigate the energy storage market to achieve key objectives</i>	Market Potential	Market Entry	
		Investor Search	Business Accelerators	

Backed by our practical experience of running day-to-day operations of over 300 MW of energy storage facilities in competitive markets, our team brings unparalleled value to customers via our consulting services



# Quick Background



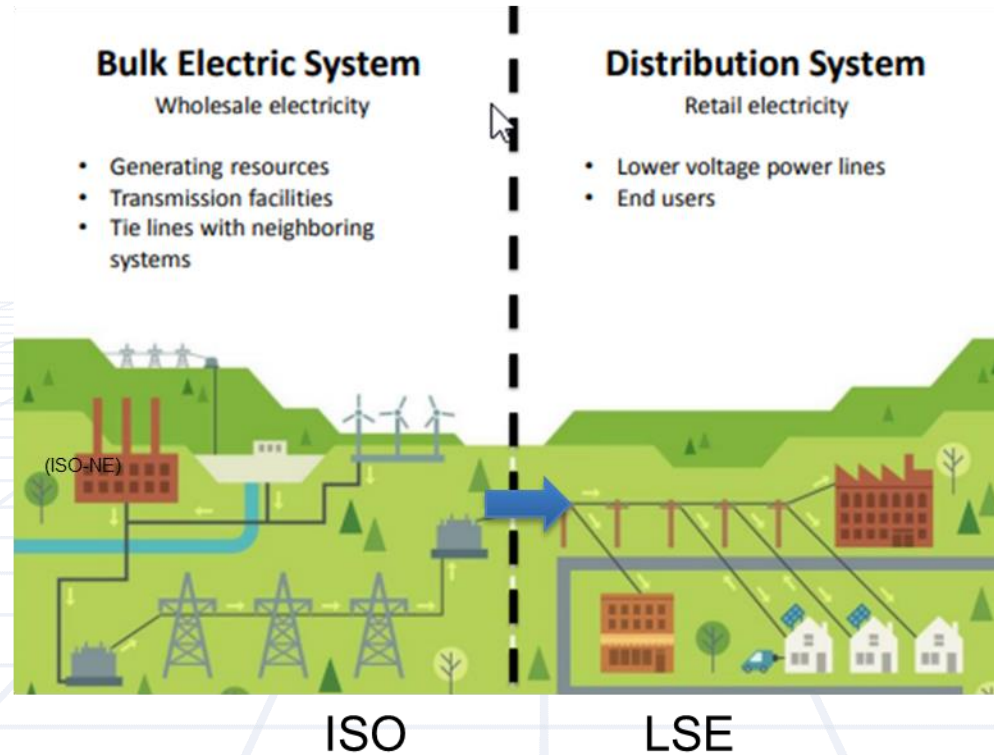




## NWA T&D; Asset deferral, storage as Tx

### WS Energy Storage opportunities

- ✓ Energy
- ✓ Capacity
- ✓ Ancillary Services



### Retail Energy Storage Opportunities

- ✓ Peak shaving (Demand Charges)
- ✓ TOU energy arbitrage
- ✓ Power quality/resiliency
- ✓ Back up power



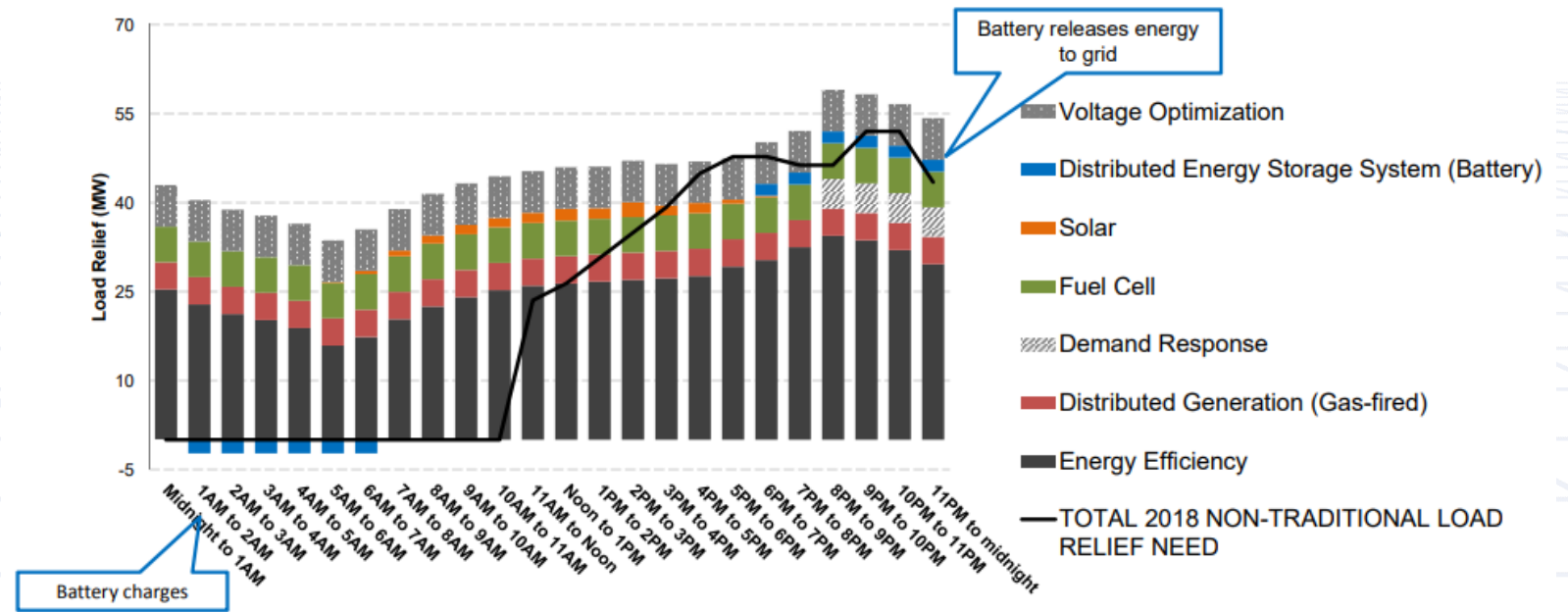
# Policy Milestones for Storage-as-Wires

- Western Grid's Projects will be used to provide voltage support and to address thermal overload situations at the CAISO's instruction
  - *Submitted as economic projects*
- According to Western Grid, the NaS batteries are similar to substation equipment, such as large electricity capacitors, used in many wholesale transmission system facilities
  - *The Commission previously concluded that capacitors are transmission facilities*
- CAISO Says...
  - Allowing Western Grid to recover costs and a ROE through rolled-in transmission rates will distort the CAISO's markets and give Western Grid an economic advantage insofar as the energy from the Projects would be the lowest-price energy available and therefore always selected when offered
  - Energy produced by the Project would either be bid into the market at zero dollars as a price-taker or would be injected into the CAISO grid like must-take energy

- To the extent that an electric storage resource seeks cost-based rates for a particular service, that resource may need to compete at least in part on cost against other alternatives that could provide the service.
  - In some cases, an electric storage resource may only be cost competitive for the cost-based service if expected market revenues are considered in the evaluation of the electric storage resources
- Allowing electric storage resources to recover costs through both cost-based and market-based rates concurrently has raised issues that must be addressed:
  - Double recovery of costs to the detriment of cost-based ratepayers
    - Double recovery can be addressed by appropriate market revenue crediting
  - Potential for adverse competitive impacts in wholesale electric markets to the detriment of other competitors
    - Many assets that participate in RTO/ISO markets receive some form of cost-based rate recovery
  - The need for independence of regional grid operators from market participants
    - Transmission operation vs. market participation
- Reduce, up-front recovery vs. full recovery + crediting



- Puget Sound Energy – Glacier
  - Outage Mitigation / Resiliency, Capacity Flexibility, Ancillary Services
- ConEd – BQDMP
  - Program-Level Storage; system upgrade deferral with straightforward arbitrage
- Presidio
  - ...ok, not Presidio





- MTEP planning models will test and ensure the ability of the system to absorb the corresponding charge (and discharge) at other non-critical system condition periods
- MISO will evaluate the appropriateness of SATOA or SATA such devices as solutions to transmission issues comparably to any other transmission (wires) solution. Considerations may / will include
  - Ability of the facility to address the transmission issue (e.g. loading, voltage, stability) in all hours that the reliability issue is identified to exist.
  - The minimum and maximum capacity required to address the Transmission Issue to ensure that excess storage capacity is not treated as a transmission asset.
  - Assurance of sufficient energy and/or reactive capability (Mwh/MVar) to maintain injection capacity for the period identified as necessary in the reliability study
  - Comparable expected availability (forced outage rates as available) compared to alternatives or other facilities.
  - Life-cycle based cost comparisons including consideration of period that is required to address the Transmission Issue identified which may be less than the comparable life cycle of alternatives
  - Other considerations that may support comparative evaluation among various solution alternatives, such as lead-time to develop, right of way or substation impacts, expandability, operational flexibility, system capacity, or others

- Attachment O of the MISO Tariff sets forth the formula rate templates and protocols under which [TO] and other MISO transmission owners recover their respective annual transmission revenue requirements (ATRR), and through which they establish charges for transmission service for facilities they own that are under MISO's functional control.
- There are plenty of participants in this sector that face high hurdles or are completely precluded from becoming a Transmission Owner
  - A number of protests to FERC asserted that MISO's Tariff changes were discriminatory or were unduly favorable towards MISO's incumbent TOs

- A single storage facility providing a reliability service (acting as “wire”) while also offering product into an organized market
  - Impacts of Western Grid and the FERC Policy Statement
- Some loss of clarity from wires-only
  - Must now be subject to the GIQ
  - Must now be settled in the market
  - ISO/RTO cannot operate the asset in the market
- Key Dilemma
  - Storage-as-wires-only is not to be settled in the market; all charging and discharging happens regardless of economic signals
  - Storage charging and discharging when participating in the market is fully dependent on market signals
  - Is it even possible to make these activities mutually exclusive on a single asset?

**John Fernandes**  
**Senior Consultant – Emerging Technologies**  
**Customized Energy Solutions**  
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MASSACHUSETTS  
CLEAN ENERGY  
CENTER®

# ENERGY STORAGE UPDATE

Presented By

Ariel Horowitz, PhD

Senior Program Director

## OUR MISSION

Grow the economy and help meet the state's clean energy and climate goals.



# AGENDA

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About MassCEC

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Defining “Wires-Type” Value Streams

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ACES Program

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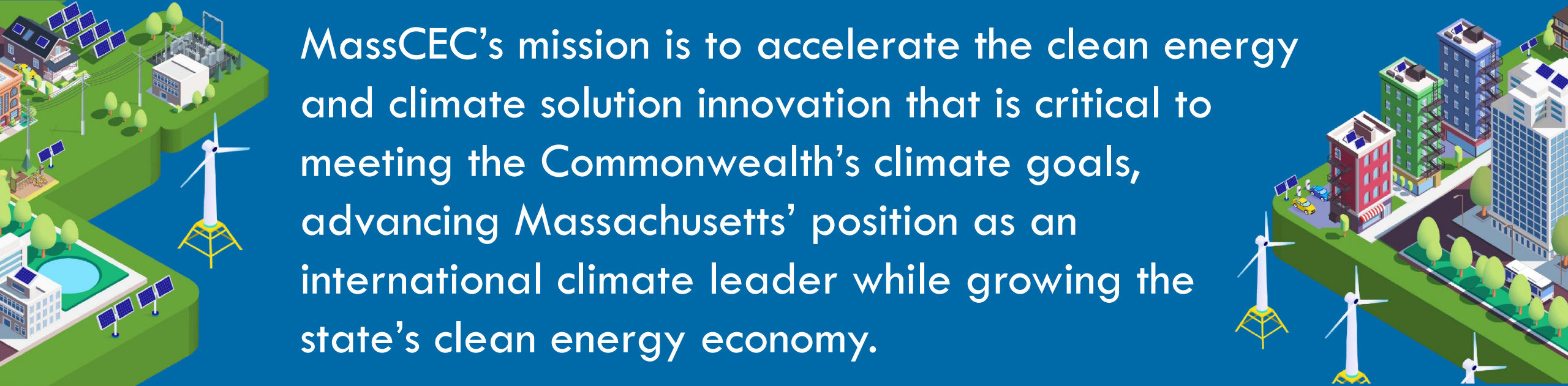
ACES Case Studies

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IOU Case Studies

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Takeaways and Themes



MassCEC's mission is to accelerate the clean energy and climate solution innovation that is critical to meeting the Commonwealth's climate goals, advancing Massachusetts' position as an international climate leader while growing the state's clean energy economy.

## Focus Areas:




**High-Performance Buildings** - Accelerate impactful, resilient, and cost-effective electrification technologies and approaches to decarbonizing the building sector.



**Net-Zero Grid** - Support technologies for a modernized and smarter grid and demonstrate innovative business models and market development policies for delivering resiliency, risk management, and clean energy.



**Clean Transportation** - Foster development of clean technologies, enable new models for electric vehicle deployment, and accelerate growth of clean transportation companies in Massachusetts.

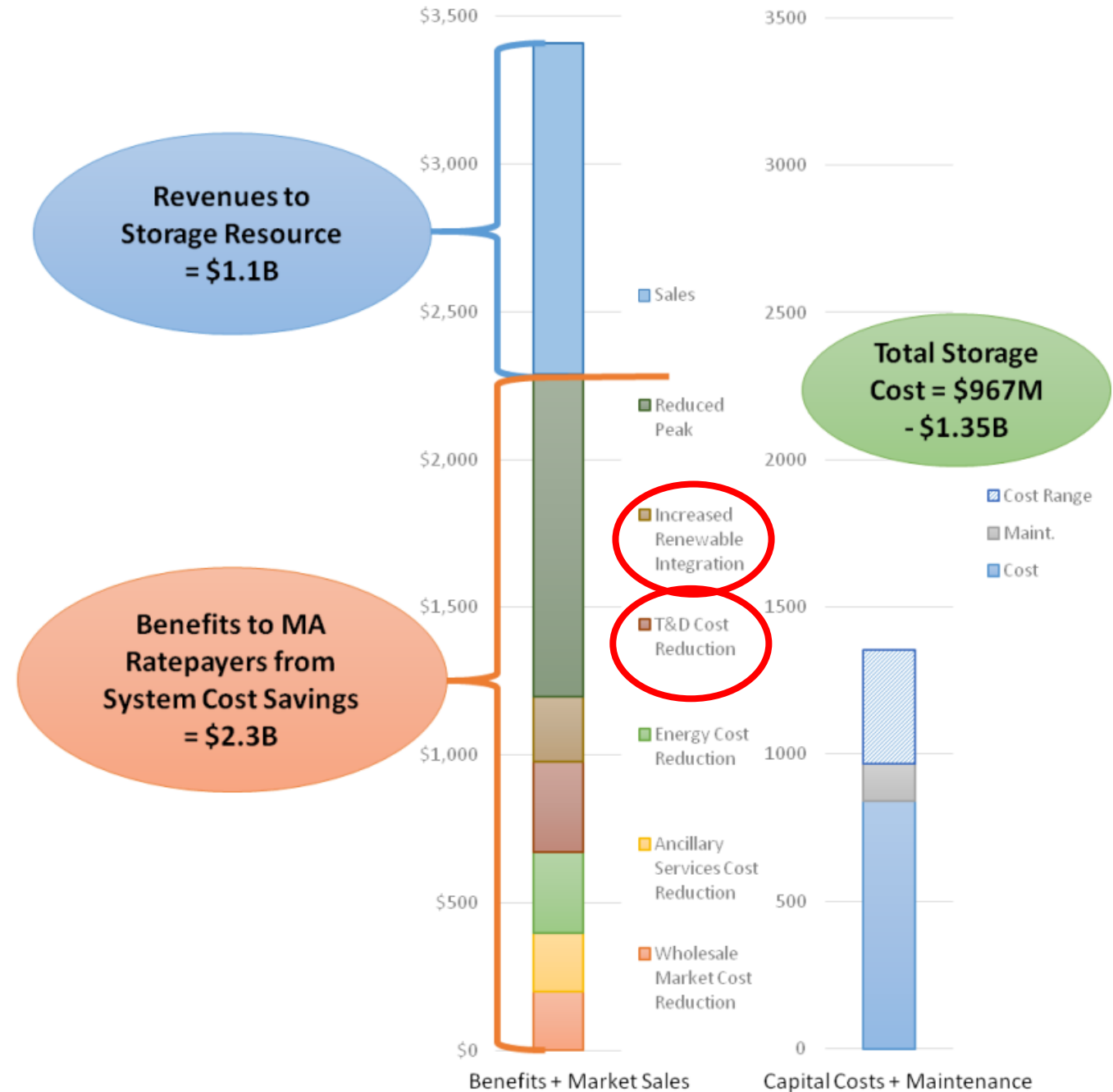


**Offshore Wind** - Reduce risk, maximize economic development opportunities, train a workforce to meet the industry's specialized needs, and ensure supply chain opportunities for Massachusetts' businesses.

# STATE OF CHARGE REPORT: ANTICIPATED BENEFITS FROM ENERGY STORAGE

Which of these value streams are “wires-type”?

- Function could not be performed solely with traditional generation
- Function serves to avoid *incurring* capital rather than avoid *allocation* of undepreciated capital





# Advancing Commonwealth Energy Storage (ACES)



26

Proposals selected  
for award



9

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



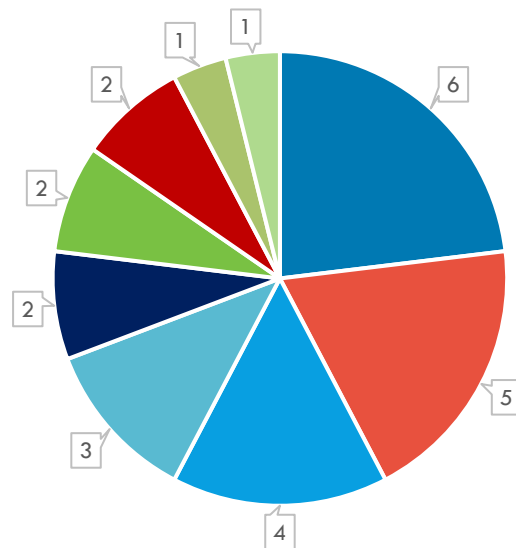
32 MW/85 MWh

Energy storage  
proposed



\$20 MM/\$32 MM

Grant funding  
request / Cost share  
leveraged

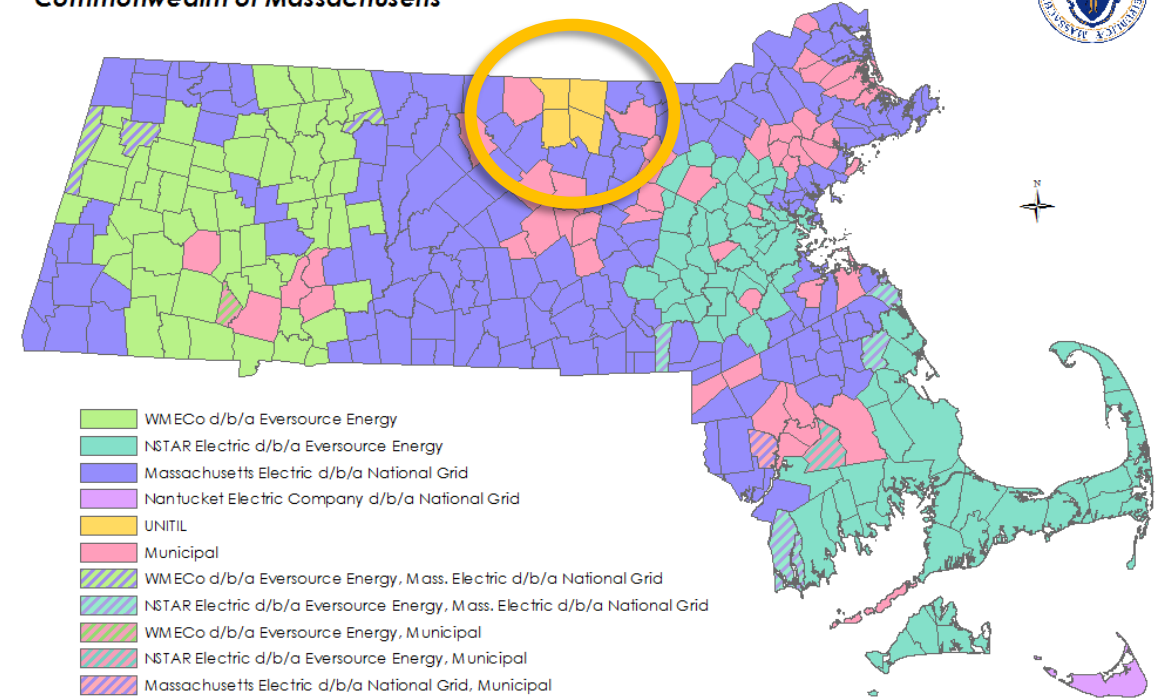


- Behind the Meter - C&I Solar Plus Storage
- Municipal Light Plant (MLP) Asset
- Merchant - Solar Plus Storage
- Resiliency/Microgrid
- NEW USE CASE - Transit
- Behind the Meter - Residential Storage Dispatched by Utility
- Merchant - Co-Located with Traditional Generation Plant
- Investor Owned Utility (IOU) Grid Mod Asset
- Load Serving Entity (LSE)/Competitive Electricity Supplier Portfolio Optimization

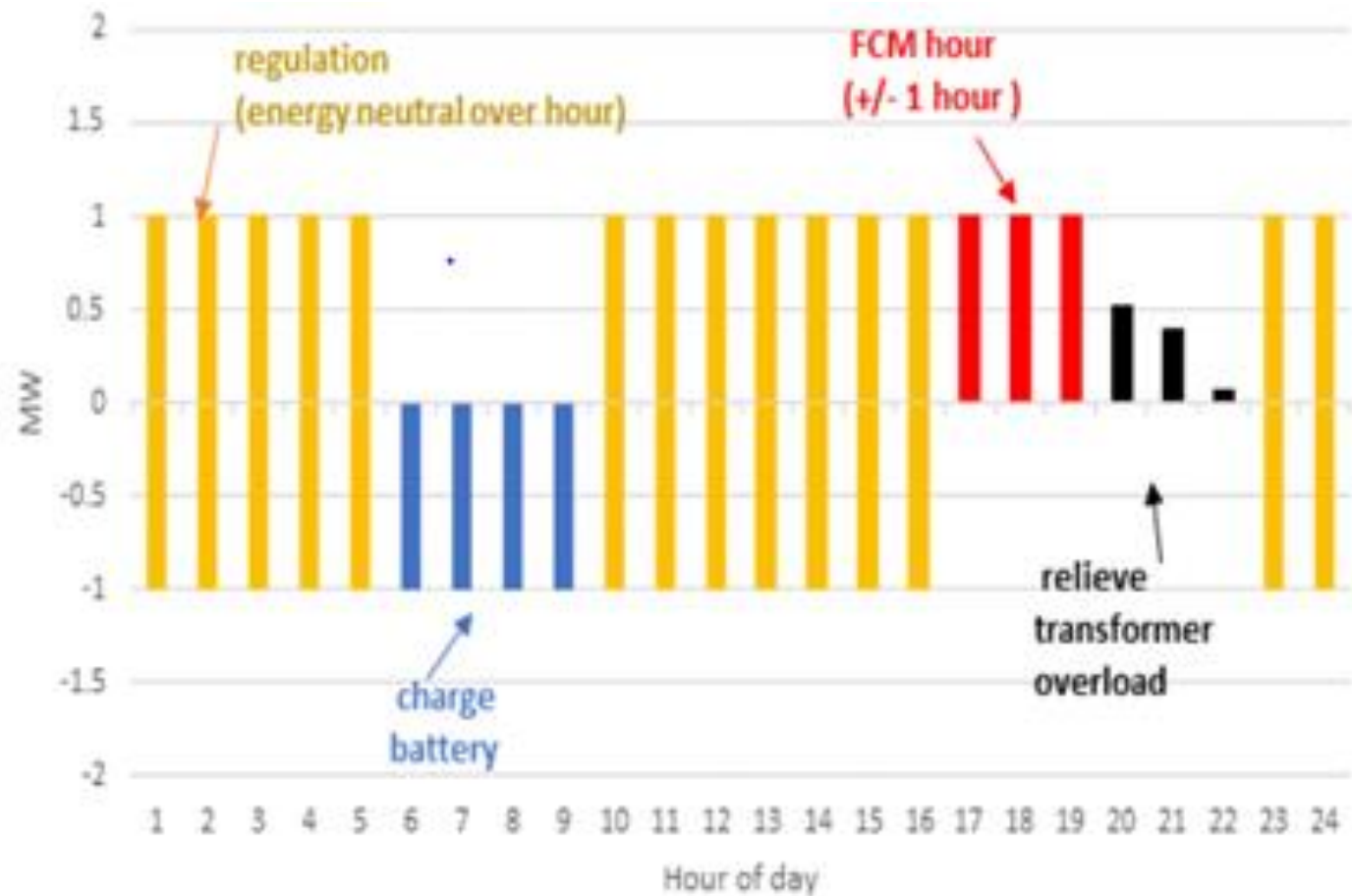
# CASE STUDY 1: UNITIL

- 2 MW/4 MWh BESS
- Installed at utility-owned substation
- ACES grant: \$1.225M
- Total project cost: \$4.16M

**Electricity Providers by Municipality**  
*Commonwealth of Massachusetts*



Source: Massachusetts Department of Public Utilities, September 2015



Transformer deferral:  
 \$1.7M savings over 10 years  
*(wires-type value stream)*

ISO-NE ICAP savings:  
 \$2.1M savings over 10 years  
*(non-wires-type value stream)*

# CASE STUDY 1: UNITIL

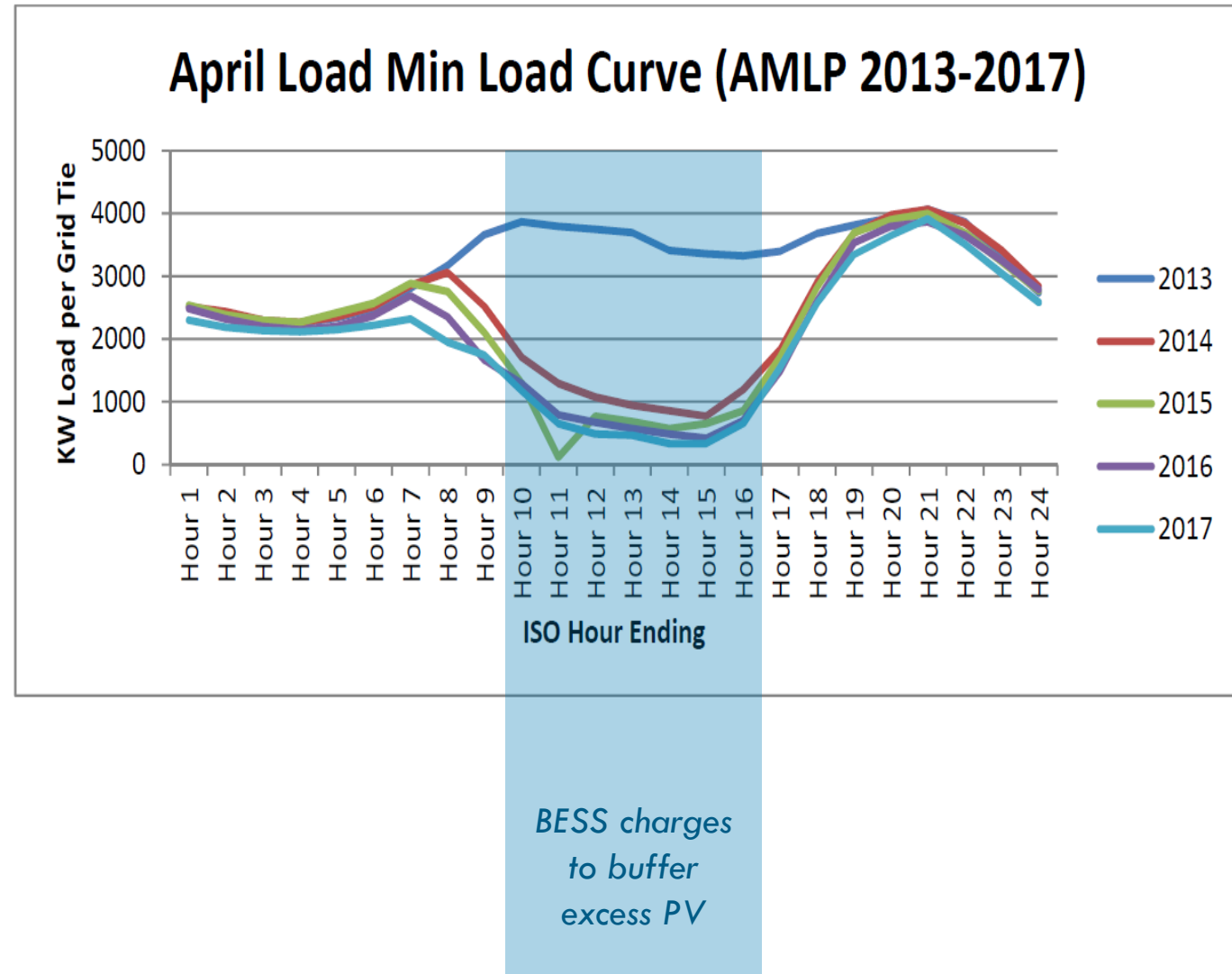
## CASE STUDY 2: ASHBURNHAM

- Ashburnham Municipal Light Plant (one of 51 MLPs in Massachusetts)
- ~2800 residential customers
- ACES grant: \$600,000
- Total project budget: \$2.7million
- 3 MW/5 MWh BESS at MLP-owned substation



# CASE STUDY 2: ASHBURNHAM

- Ashburnham MLP was saturated on solar hosting capacity prior to BESS installation
- Major risk of backflow onto transmission network during low load conditions
- Addition of BESS enables ~1 MW additional solar in MLP territory
- Use case during April/May only – does not conflict w/summer peak-focused dispatch



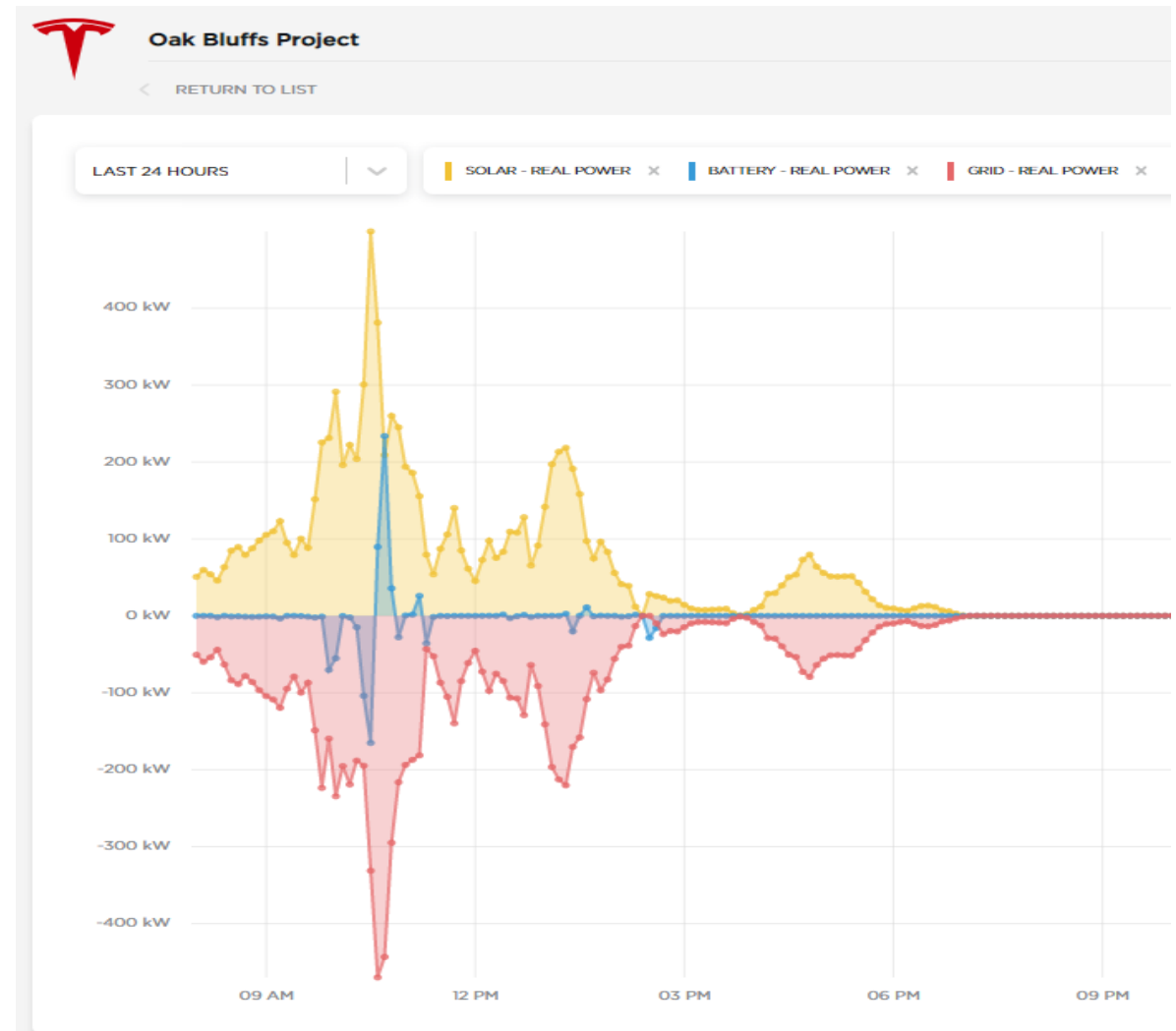


## CASE STUDY 3: WH BENNETT

- Customer-owned BESS
  - 500 kW/ 1140 kWh
- Adjacent to PV, same owner
  - 650 kW
- ACES grant: \$382k
- Total project budget: \$764k

# CASE STUDY 3: WH BENNETT

- Use case is focused on power quality
  - “We are running into significant technical constraints with DG interconnections on the Vineyard. It may be possible that there are no possible conventional system upgrades that Eversource could offer, and you may have to investigate a battery storage solution as part of their interconnection”
- Only requires ~10% swing in BESS SOC on a daily basis
- System is front-of-the-meter and cannot defray customer load or participate in peak-focused DR
- No value stacking!



# OUTSIDE OF ACES: UTILITY-OWNED STORAGE-AS-WIRES

- Avoiding peak-focused upgrades:
  - National Grid – Nantucket project
  - Eversource – Martha’s Vineyard project
  - Unclear deferral timeline given Massachusetts policies encouraging electrification of load
- Avoiding reliability-focused upgrades:
  - Eversource – Outer Cape project
  - 25 MW/ 13 MWh BESS in Provincetown, MA
  - Poor performing circuit (>25,000 customer-hours per year of outage)
  - 1.5 – 10 hour duration depending on load conditions





# COMMON THEMES AND TAKEAWAYS

## Storage can serve wires-type purposes, but with limits

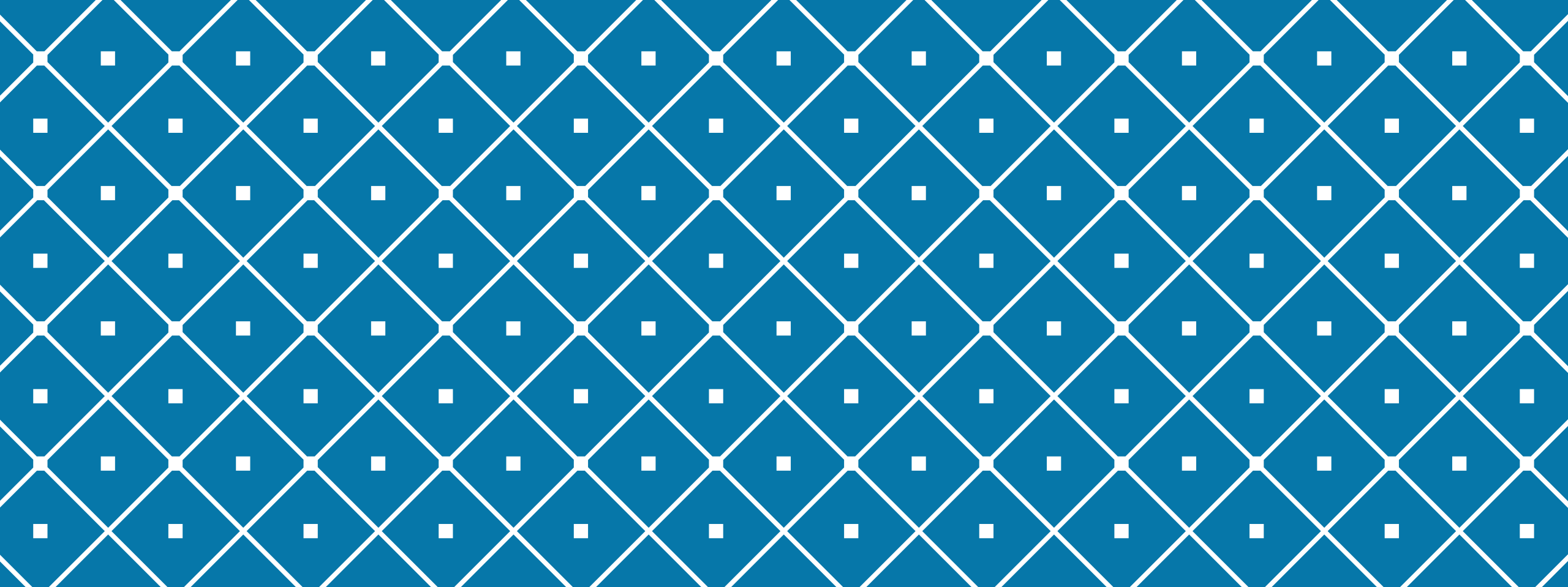
- Deferral is not the same as elimination of need
- Ownership and regulation remain complex
- Limited duration = limited used

## Economic model: teamwork can make the dream work

- Combining wires and non-wires value streams may lead to strong ROI
- Strategy depends on temporal separation of value streams – time of day or seasonal

## Cost is important – but reliability is king

- Wires-type use for service quality may eliminate opportunity to pursue additional value streams
- But, reliability is worth paying for



**THANK YOU!**

[ahorowitz@masscec.com](mailto:ahorowitz@masscec.com)

# Thank you for attending our webinar

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Project Director, CESA  
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Learn more about the Clean Energy States Alliance at [www.cesa.org](http://www.cesa.org)

Connect with us on Facebook:  
<https://www.facebook.com/cleanenergystates/>

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# Upcoming Webinar

## **An Introduction to Community Resilience Hubs**

*Wednesday, June 16, 1-2pm ET*

This webinar will introduce the Resilience Hub concept, explain how the development of Hubs can strengthen local resilience in the face of climate impacts, and discuss the process of conceptualizing and implementing a community Resilience Hub, with a focus on energy resilience measures.

*Read more and register at: [www.cesa.org/webinars](http://www.cesa.org/webinars)*

