



AN END USER'S VIEW ON BATTERY STORAGE

Maine Energy Storage Commission



NOVEMBER 2019

CES WHO WE ARE

- Full Service Energy Consulting Firm
- Based in Portland, ME
- Over 800 clients from California to Canadian Maritimes with \$2 billion in annual energy spend
- 100% supplier neutral/product neutral
 - Over 50 suppliers throughout North America
- Battery storage services focus on supporting end users behind the meter
 - Market valuation, solicitation, contracting support, ongoing performance review



4.5 MW Behind-the-Meter Lithium Ion Storage

UMass Amherst – 1.32 MW/4 MWh storage plus solar & CHP

UMass Boston – 0.50 MW/2 MWh solar plus storage

UMass Dartmouth – 0.52 MW/1 MWh storage plus wind

Brandeis University – 0.78 MW/1.5 MWh storage

Acushnet Company – 1.5 MW/3 MWh storage plus CHP

UMASS
AMHERST



ACUSHNET
COMPANY

Titleist

FootJoy

Sally Cameron
FINE TILLED PUTTERS



PINNACLE



CASE STUDY | UMass Amherst ACES Demonstration

- 1.32 MW/4 MWh lithium ion battery installed by Borrego and operated by UMass Amherst
- Battery charging and discharging targeted to optimize 5 MW+ of onsite solar, to reduce campus demand during peak hours when local utility grid is stressed, and to improve resiliency on the campus' microgrid
- Energy storage research initiative and educational contribution for UMass Amherst students

PROJECT TEAM

University of Massachusetts Amherst, University of Massachusetts Clean Energy Extension, Borrego Solar Systems, Competitive Energy Services

STATE GRANT AWARD

ACES grant covers nearly 50% of \$2.4 million upfront system cost

STORAGE CARBON IMPACT

Charging and discharging strategy review with marginal grid emissions



CASE STUDY | Behind-the-Meter Value Streams

Capacity Avoidance → High Value

- Generation: ICAP
- Transmission: Utility Rate Design
- Distribution: Utility Rate Design

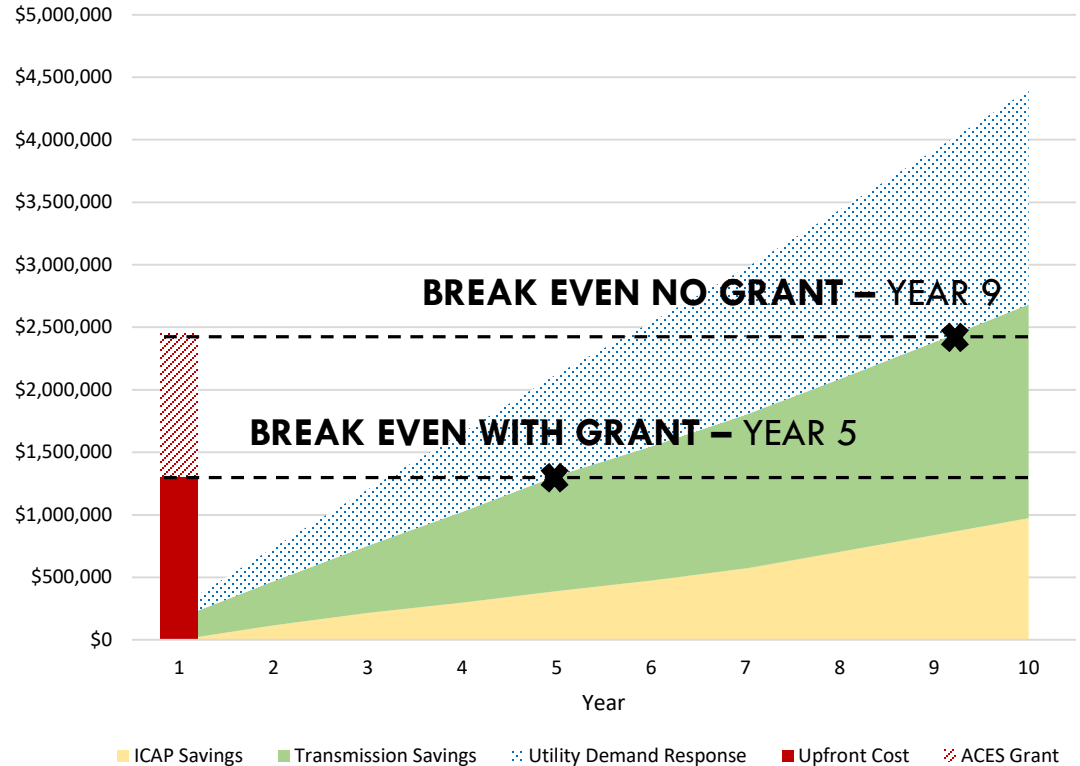
Energy Arbitrage → Low Value

- Peak Shifting: Energy Market

Grid Stability → Low Value

- Frequency: Ancillary Market
- Reserves: Ancillary Market

UMass Amherst Energy Storage Pro Forma: 2020 - 2029





KEY DEMONSTRATION TAKEAWAYS

1. Current storage market conditions require better utility rate design and programs supporting ongoing operations to be viable in Maine
2. A robust storage marketplace can exist in Maine under the right conditions



THANK YOU



RATE DESIGN | Maximizing Transmission Value

CMP's and Emera's transmission rate design needs to be modified for end users to be able to maximize the value of battery storage technology/cost improvements and to minimize external funding needs for storage

