



Energy Storage Technology Advancement Partnership
(ESTAP) Webinar:

State of the U.S. Energy Storage Industry: 2015 Year in Review

April 19, 2016

Hosted by Todd Olinsky-Paul
ESTAP Project Director
Clean Energy States Alliance

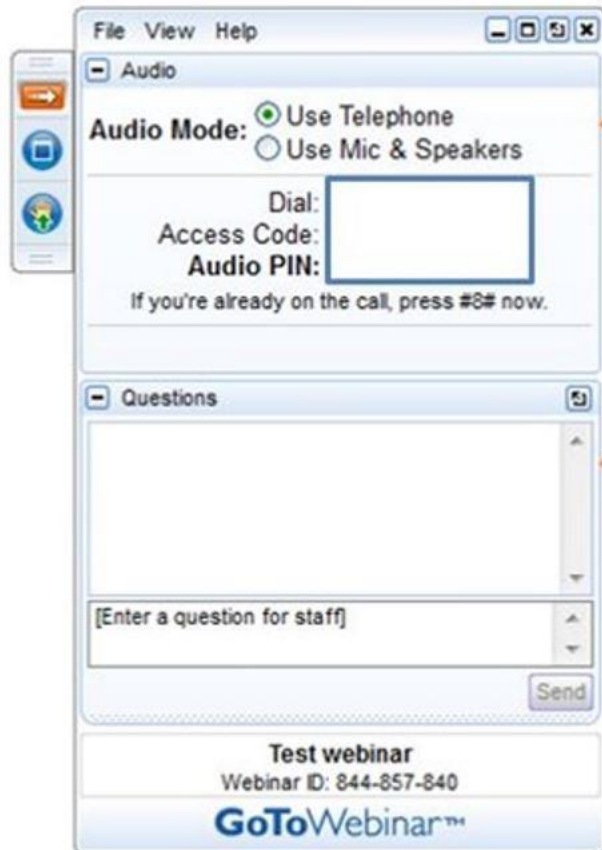


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The screenshot shows the GoToWebinar interface. At the top is a menu bar with 'File', 'View', and 'Help'. Below it is a sidebar with icons for chat, a presentation, and a help icon. The main area has two sections: 'Audio' and 'Questions'. The 'Audio' section has 'Audio Mode' with two radio buttons: 'Use Telephone' (selected) and 'Use Mic & Speakers'. Below this are fields for 'Dial:', 'Access Code:', and 'Audio PIN:', followed by the instruction 'If you're already on the call, press #8# now.' The 'Questions' section has a large text box for questions, a smaller input field with the placeholder '[Enter a question for staff]', and a 'Send' button. At the bottom, it says 'Test webinar', 'Webinar ID: 844-857-840', and the 'GoToWebinar' logo.

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← Submit your questions at any time by typing in the Question Box and hitting Send.

This webinar is being recorded.

You will find a recording of this webinar, as well as all previous CESA webcasts, archived on the CESA website at

www.cesa.org/webinars

State & Federal Energy Storage Technology Advancement Partnership (ESTAP)

Todd Olinsky-Paul

Project Director

Clean Energy States Alliance (CESA)



Thank You:

Dr. Imre Gyuk

U.S. Department of Energy,
Office of Electricity Delivery and
Energy Reliability

Dan Borneo

Sandia National Laboratories



ESTAP is a project of CESA

Clean Energy States Alliance (CESA) is a non-profit organization providing a forum for states to work together to implement effective clean energy policies & programs:

State & Federal Energy Storage Technology Advancement Partnership (ESTAP) is conducted under contract with Sandia National Laboratories, with funding from US DOE.

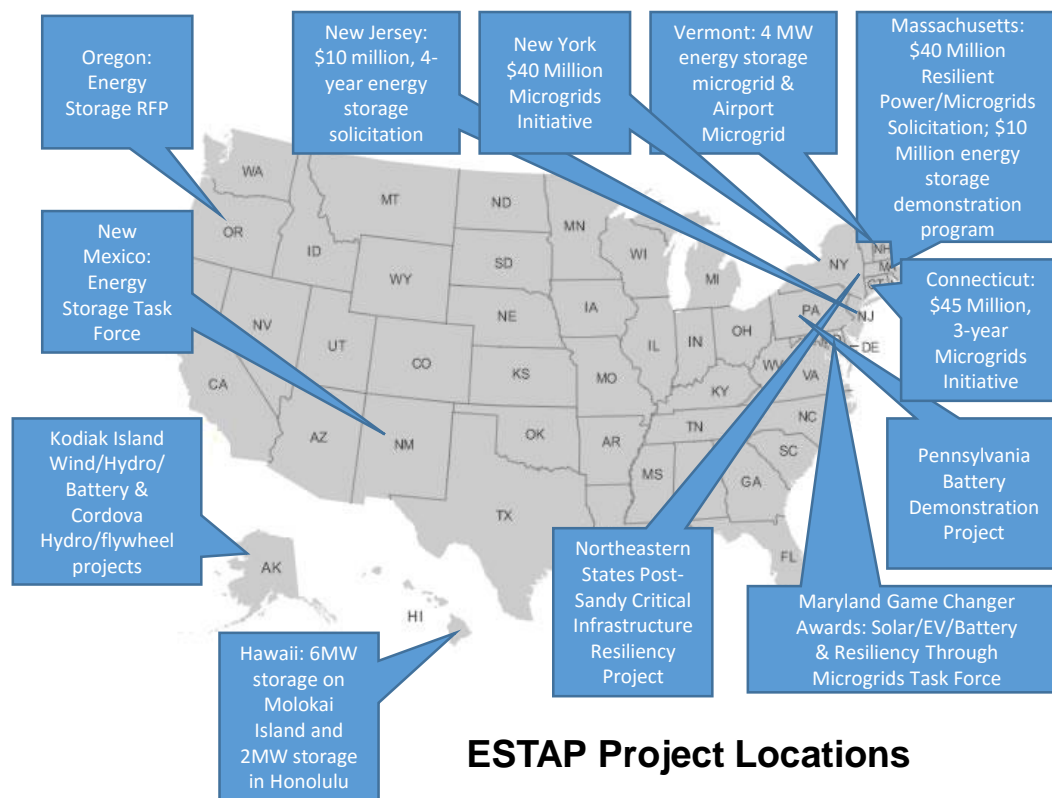
ESTAP Key Activities:

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



Energy Storage Technology Advancement Partnership

[More CESA Projects](#)

Overview

[ESTAP Resource Library](#)[ESTAP Webinars](#)[ESTAP News](#)[ESTAP Listserv Signup](#)

ESTAP

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The Energy Storage Technology Advancement Partnership (ESTAP) is a federal-state funding and information sharing project, managed by CESA, that aims to accelerate the deployment of electrical energy storage technologies in the U.S.

The project's objective is to accelerate the pace of deployment of energy storage technologies in the United States through the creation of technical assistance and co-funding partnerships between states and the U.S. Department of Energy.

ESTAP conducts two key activities:

1) Disseminate information to stakeholders through:

- The ESTAP listserv (>2,000 members)
- Webinars, conferences, information updates



NEW RESOURCES

October 14, 2015
Resilience for Free: How Solar+Storage Could Protect Multifamily Affordable Housing from Power Outages at Little or No Net Cost
By Clean Energy Group

September 30, 2015
Webinar Slides: Energy Storage Market Updates, 9.30.15

UPCOMING EVENTS

December 16, 2015
ESTAP Webinar: State of the U.S. Energy Storage Industry,

[More Events](#)

LATEST NEWS

November 30, 2015
Massachusetts Takes the Lead on Resilient

Today's Guest Speakers

- **Ravi Manghani**, Senior Analyst, Energy Storage, GTM Research
- **Brett Simon**, Analyst, Energy Storage, GTM Research

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State of the U.S. Energy Storage Industry: 2015 Year in Review



Ravi Manghani and Brett Simon

Senior Energy Storage Analyst and Energy Storage Analyst

manghani@gtmresearch.com and simon@gtmresearch.com

April 19, 2016

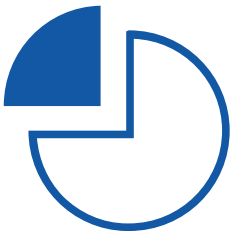
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About Greentech Media



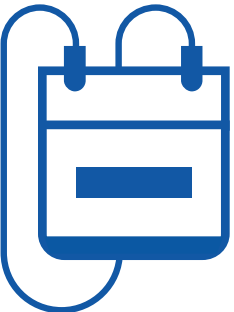
News/Online

Greentech Media delivers business-to-business news, analysis and events at the forefront of the global energy transformation. Our coverage area extends across the clean energy industry with a focus on solar power and the electric utility market's evolution. Greentech Media's industry-leading coverage is provided by a team of analysts from our market intelligence arm, GTM Research, as well as our world-class journalists and global network of expert contributors.



Research

GTM Research is the market analysis and consulting arm of Greentech Media. GTM Research is comprised of analysts covering solar, grid edge, and energy storage markets. Our analysts combine diverse backgrounds in energy, environmental, emerging technology, information technology and strategic consulting sectors. This diverse team provides critical and timely market analysis in the form of research reports, consulting, and data subscription services.



Event

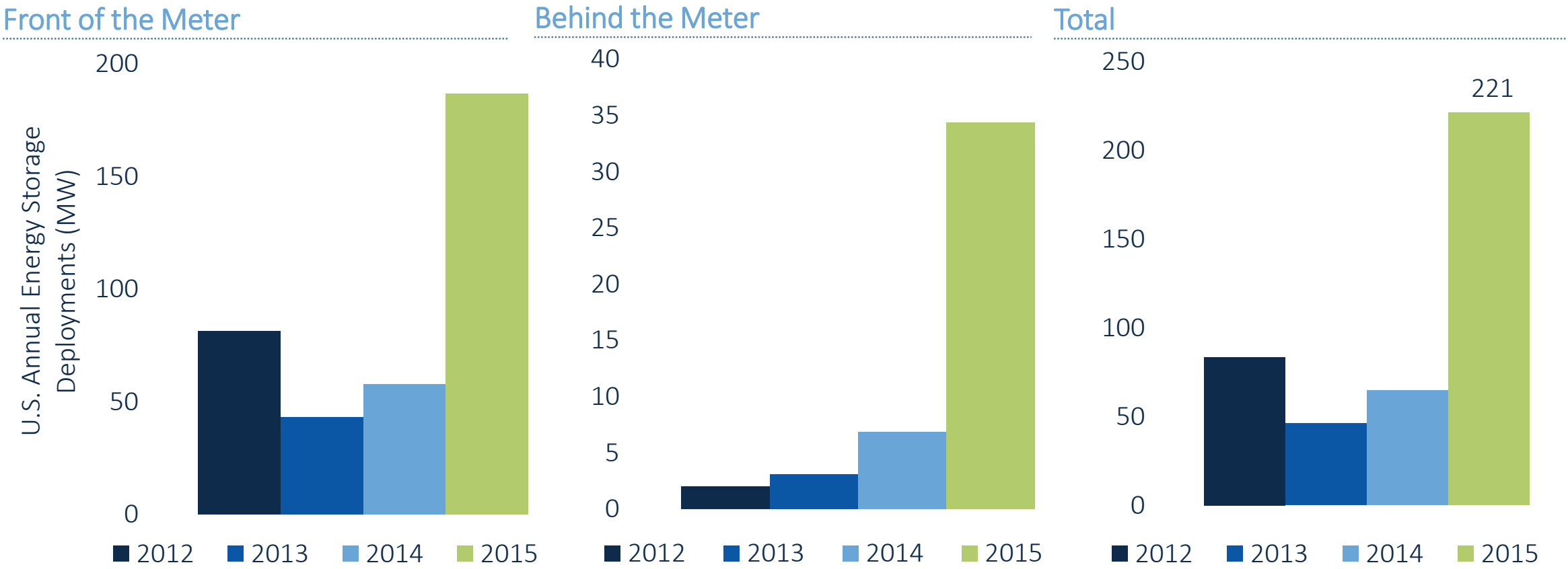
Greentech Media and GTM Research experts come together to produce all of Greentech Media's industry conferences throughout the year. These summits provide a platform for our latest market intelligence and draw together the industry influencers from organizations across the value chain.

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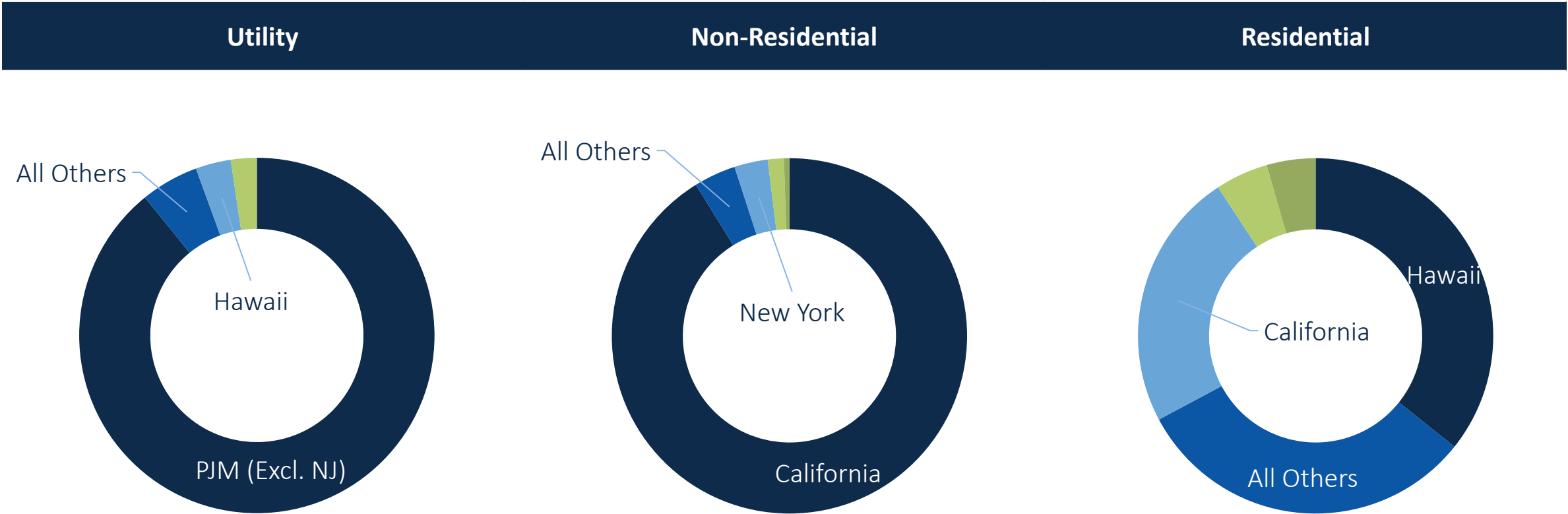
1. Deployment Trends

A Record Year for U.S. Energy Storage Market With 221 MW of Deployments



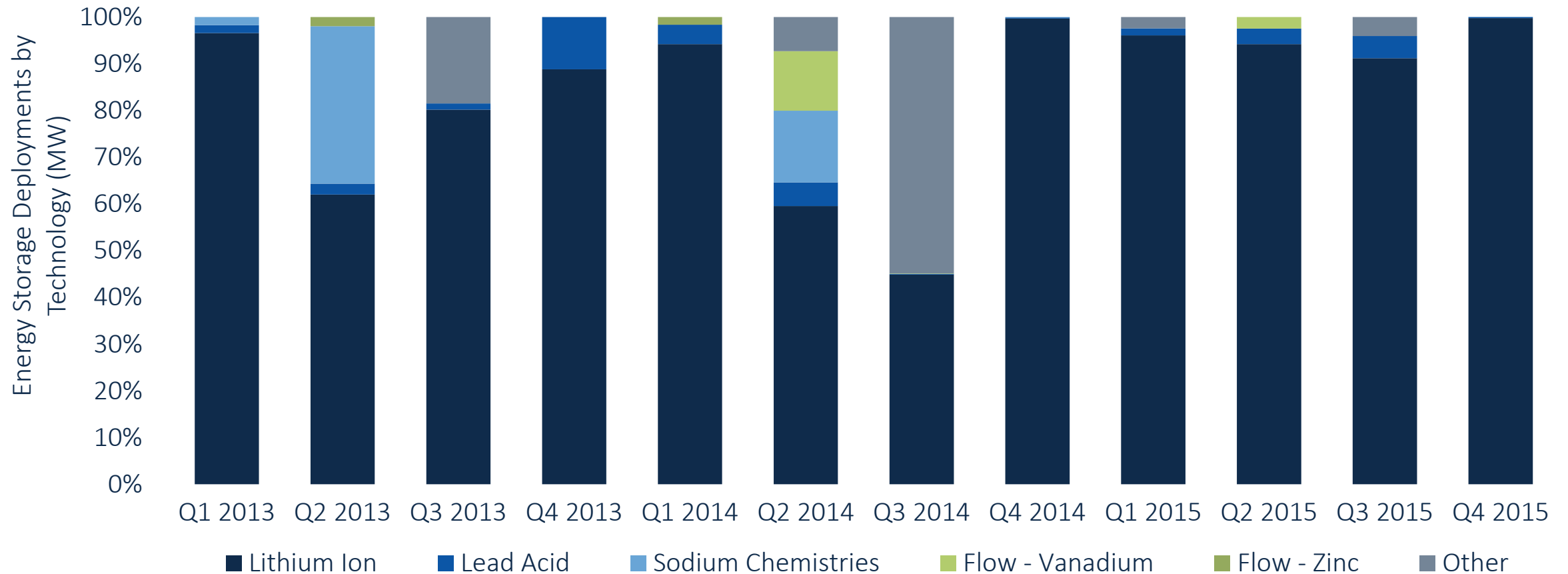
Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review

PJM (Excl. NJ), California and Hawaii Led Utility, Non-Residential, and Residential Segments in 2015



Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review. *GTM Research is currently monitoring seven individual markets. Complete coverage of all markets is available in the full report.

Lithium-Ion Technologies Made Up 96% of 2015 Deployments (MW)



Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review. Other includes flywheel and unreported energy storage technologies

2. Market Drivers and Business Models

Five Biggest Themes of 2015 and Beyond

Five Key Storage Market Drivers in 2015

#1

System Cost Reductions Continue at Rapid Pace

#2

Wholesale Markets' Structures Develop to Include Storage

#3

Strong Renewables Growth Bolsters Storage Growth

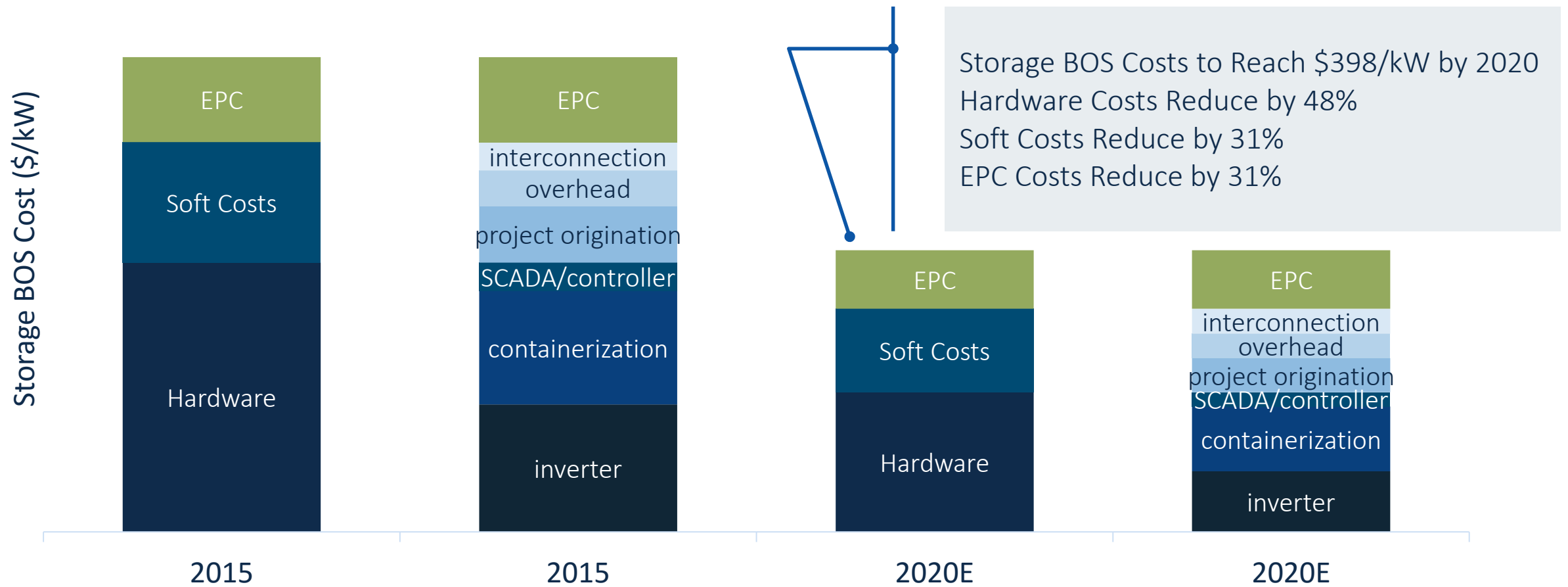
#4

Storage Mandates and All-Source RFOs Become a Commonplace

#5

Storage Emerges As a Viable Technology for Grid Services

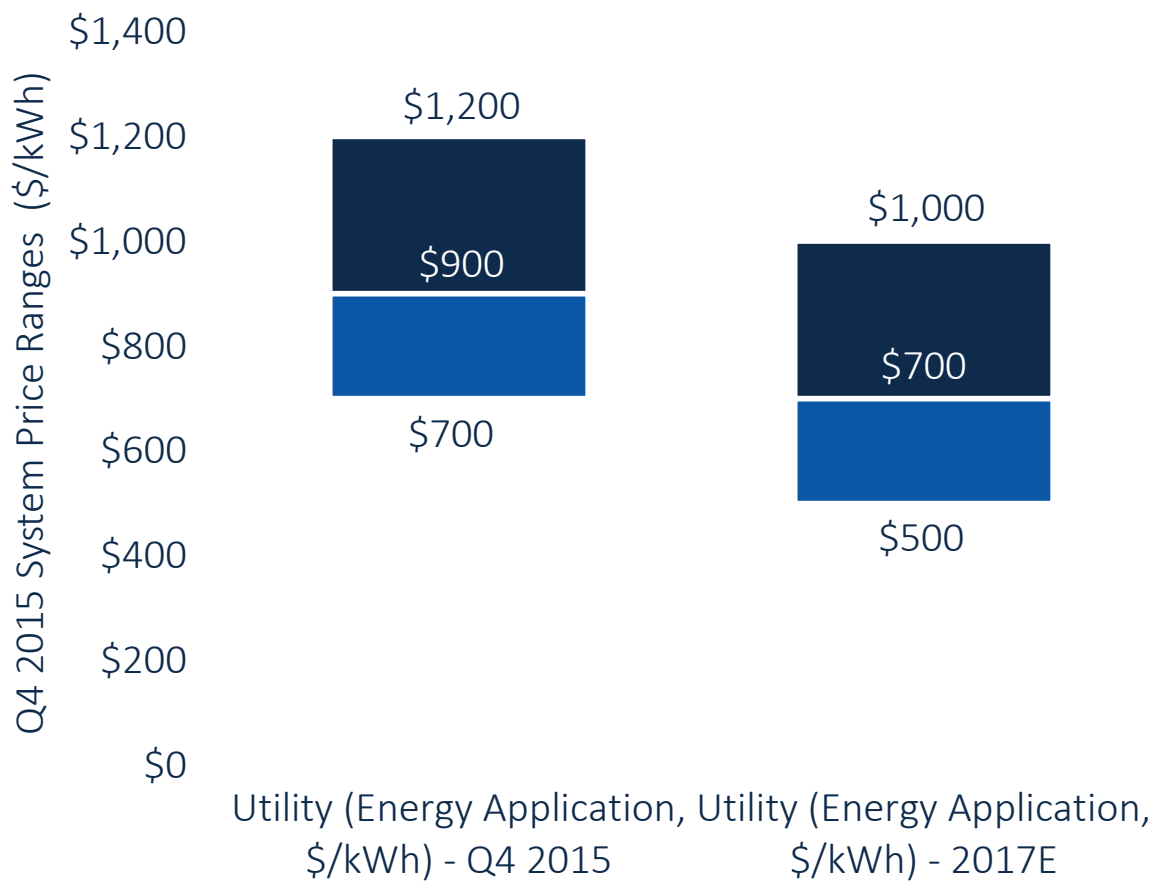
1) 41% Storage BOS Costs Reduction by 2020; Reach Below \$400/kW



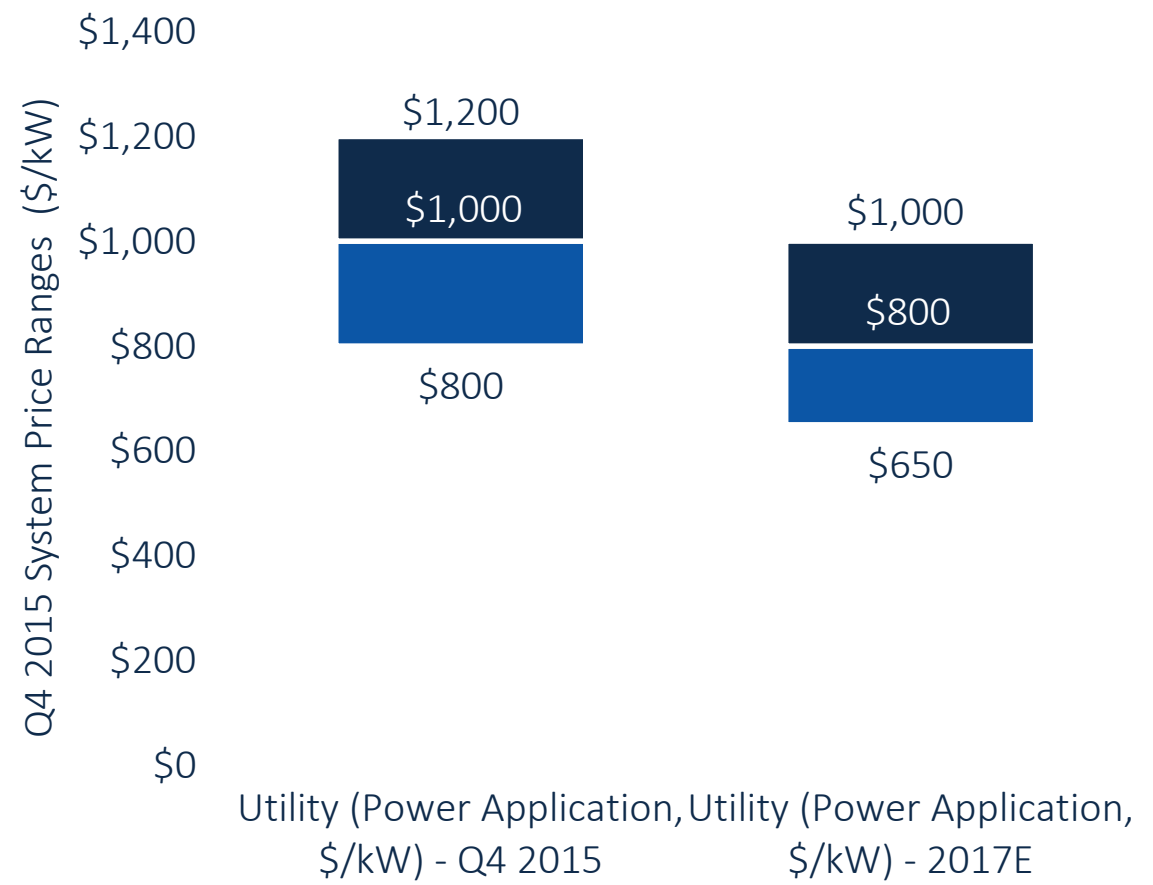
Source: GTM 'Grid-Scale Energy Storage Balance of Systems 2015-2020: Architectures, Costs and Players'

1) Front-of-Meter System Prices Expected to Drop 20% over Next Two Years

Utility-Scale Price Trends Q4 2015, Energy Applications – 2 Hours (\$/kWh)

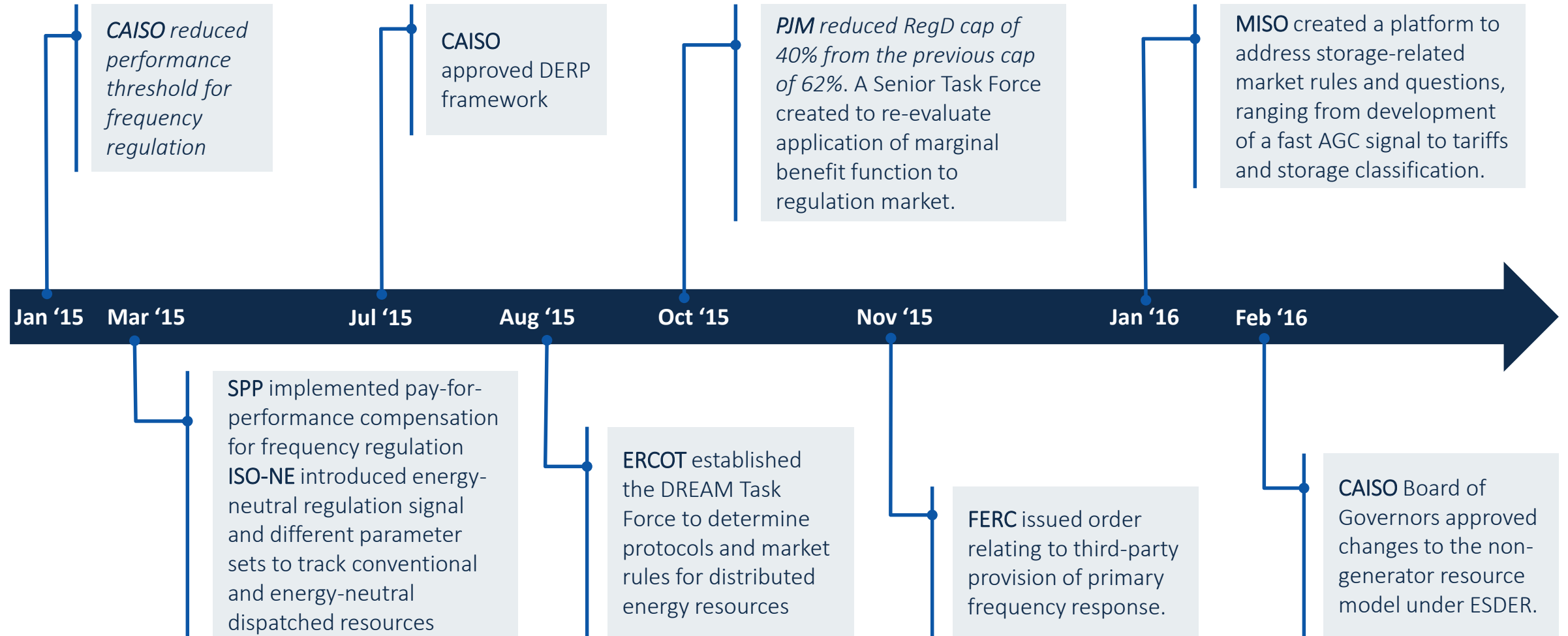


Utility-Scale Price Trends Q4 2015, Power Applications (\$/kW)



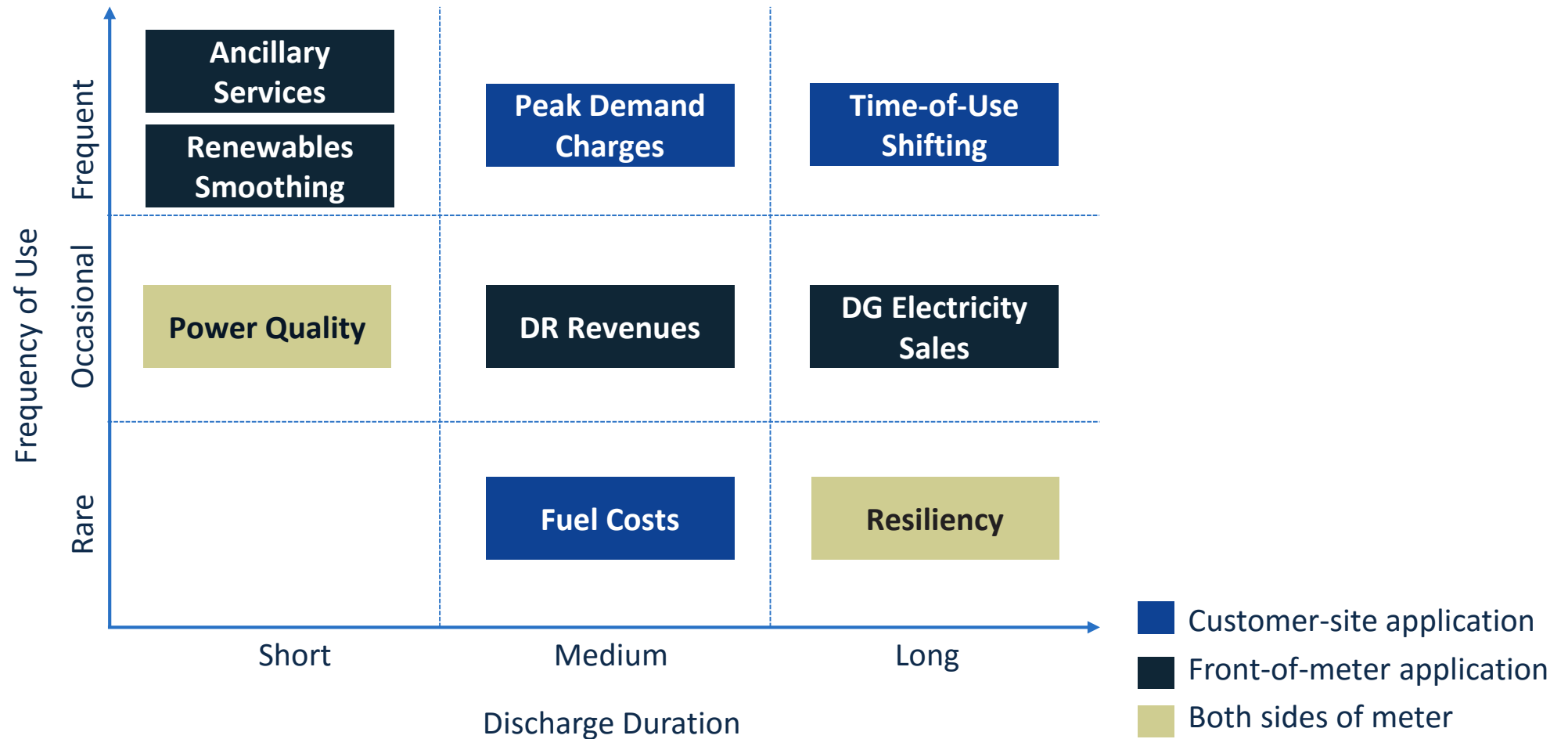
Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review

2) Wholesale Markets' Structures Evolving to Include Storage



Source: GTM Research/ESA U.S. Energy Storage Monitor

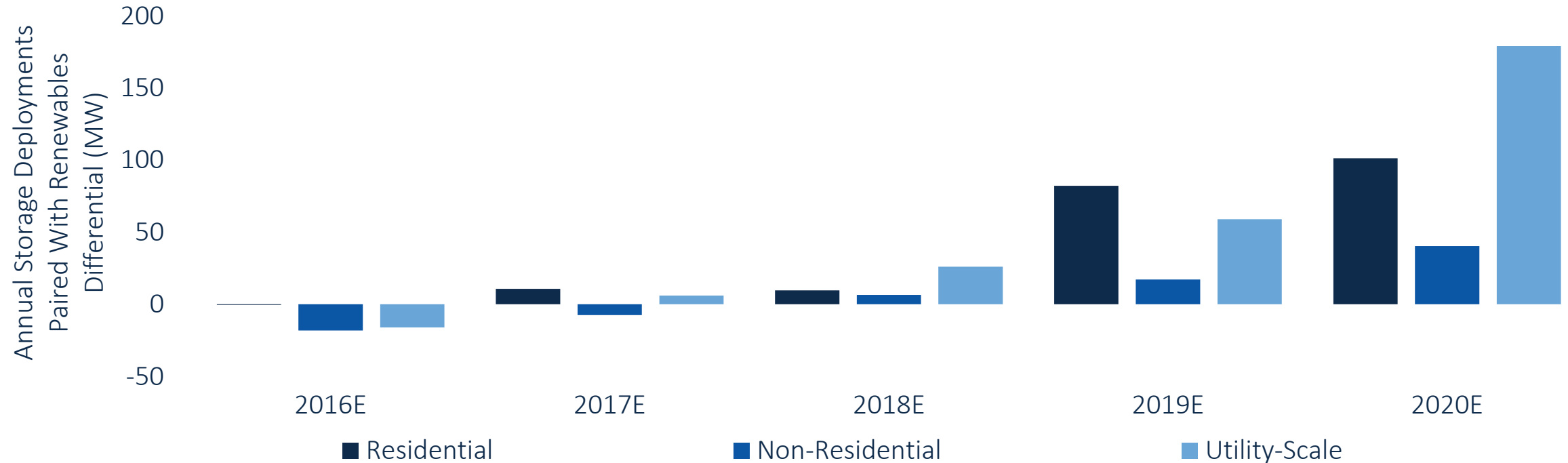
3) Solar-Plus-Storage Benefits Vary in Duration and Frequency



Source: GTM Research

3) Tax Credit Extension to Spur Further Growth in Storage Paired With Renewables

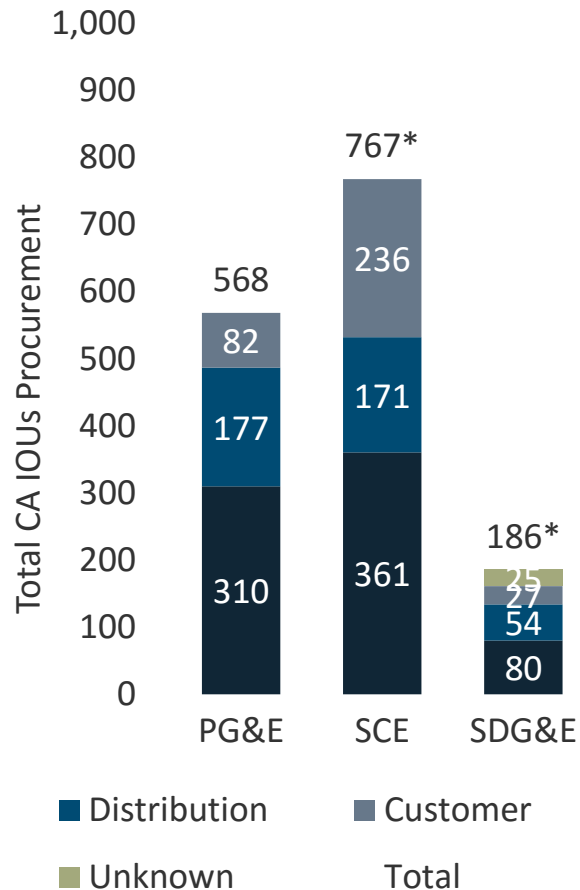
U.S. Storage Deployment Paired With Renewables Differential Vs. No Extension






Compared to the non-ITC scenario, GTM Research expects an additional 0.5 GW of storage paired with renewables from 2016-2020, a 33% increase compared to a scenario with no tax credit extension.

Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review

4) Progress by California IOUs for 2014 Energy Storage Procurements Under AB 2514



Utility	2014 Proposed Target	Actual Procurements	Timeline
	50 MW transmission 24 MW distribution	7 projects totaling 75 MW selected in December 2015	First projects expected to be on-line by May 2017
	16.3 MW distribution (Plus Local Capacity Requirement procurement)	2 projects totaling 16.3 MW selected in September 2015	Projects can start as early as January 1, 2017; must be interconnected by December 1, 2024
	10 MW transmission, 6 MW distribution (Plus Local Capacity Requirement procurement)	12 MW solicited through LCR RFO. 4 MW sought through distribution deferral RFP, but elected not to procure any storage through the RFP.	Project can be on-line as early as 2017, interconnection required by January 1, 2022

Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review

4) Other Notable Utility Procurements from New York to Guam!

Oregon

Oregon DOE and **U.S. DOE** awarded \$295,000 under **Electrical Energy Storage Demonstration Project RFP**.

Colorado

PSC Colorado/Xcel Energy submitted two storage project proposals under the **Innovative Clean Technologies** program.

Arizona

APS issued an all-source RFP to procure between 400 MW and 600 MW of capacity resources by 2020. **TEP** selected two 10 MW storage projects under **REST**

Guam

Guam Power Authority is soliciting bids for up to 40 MW of energy storage.

New York

PSEG Long Island amended its **South Fork Resources RFP** and issued a **New Renewable Capacity and Energy RFP**. **Con Edison** and **Orange and Rockland** issued a **Grid-Scale Energy Storage RFI**.

Texas

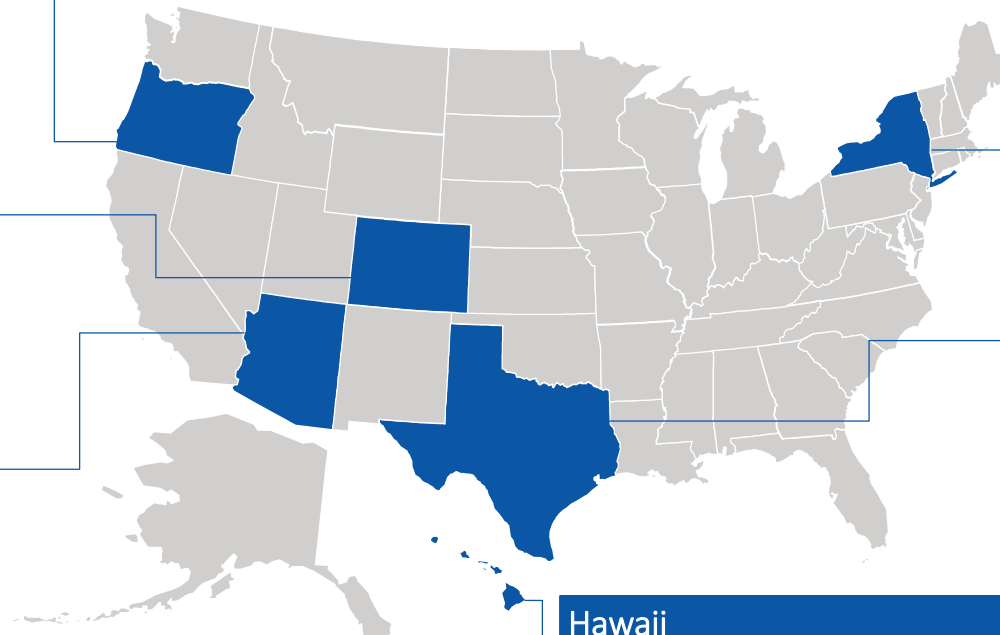
Austin Energy issued an RFI to solicit information on energy storage technology.

Federal

U.S. DOE announced funding under **Grid Modernization Initiative**, including \$18 million for six **SHINES** projects.

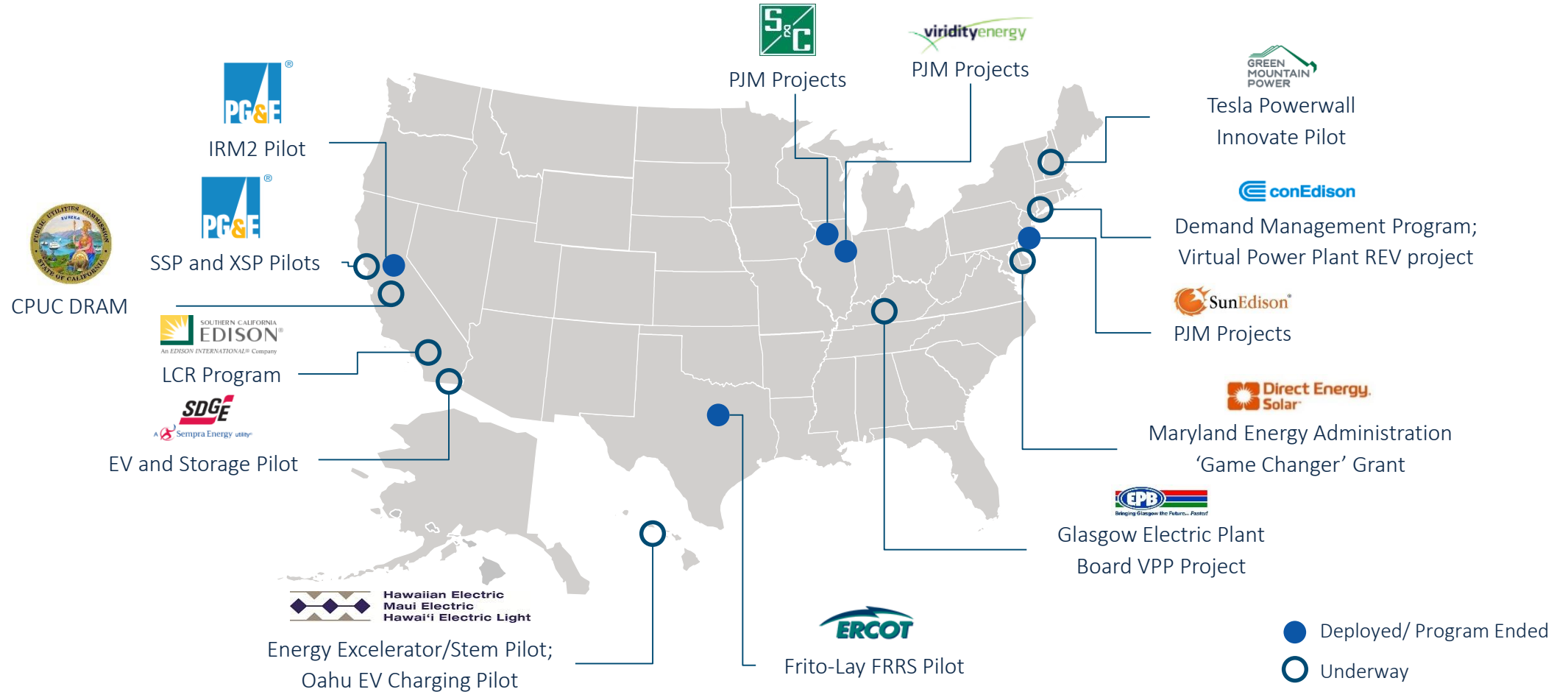
Hawaii

KIUC entered in a 20-year PPA with **SolarCity** for power from a 13 MW/52 MWh lithium-ion storage system



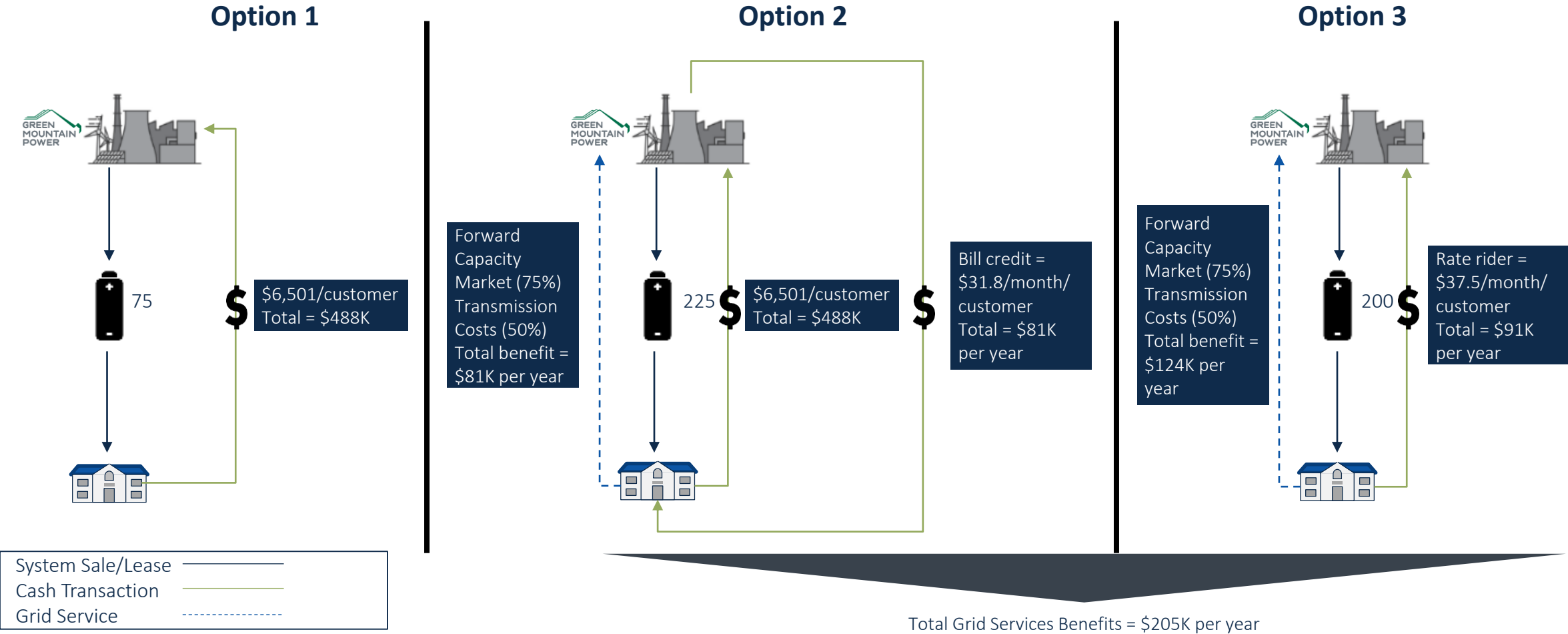
Source: GTM Research/ESA U.S. Energy Storage Monitor

5) Significant Early Activity in Behind-The-Meter Storage for Grid Services



Source: GTM Research/ESA U.S. Energy Storage Monitor

5) Green Mountain Power to Use Behind-the-Meter Storage to Reduce Peak Capacity and Transmission Costs

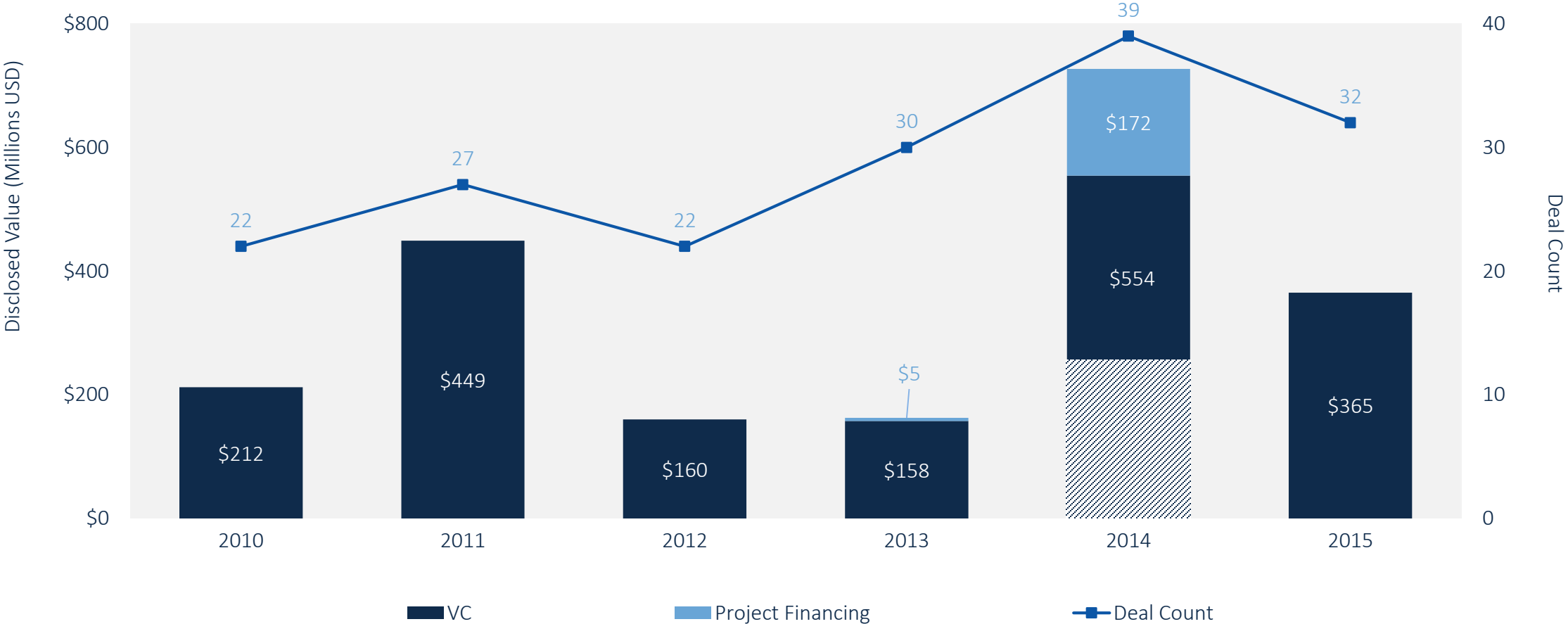


Source: Green Mountain Power, GTM Research

3. Vendor Activities

Corporate Financing, Products, and Partnerships

Corporate Investments in Energy Storage Totaled \$365 Million in 2015



Source: GTM Research

Note: Data excludes battery materials and upstream companies. 2014 data differs from *U.S. Energy Storage Monitor 2014 Year in Review* due to exclusion of EV startup Atieva and inclusion of stealth startup Fluidic Energy.

Significant Amount of New Partnership, Product and Business Model Announcements



Source: GTM Research/ESA U.S. Energy Storage Monitor

Significant Amount of New Partnership, Product and Business Model Announcements (cont.)



Source: GTM Research/ESA U.S. Energy Storage Monitor

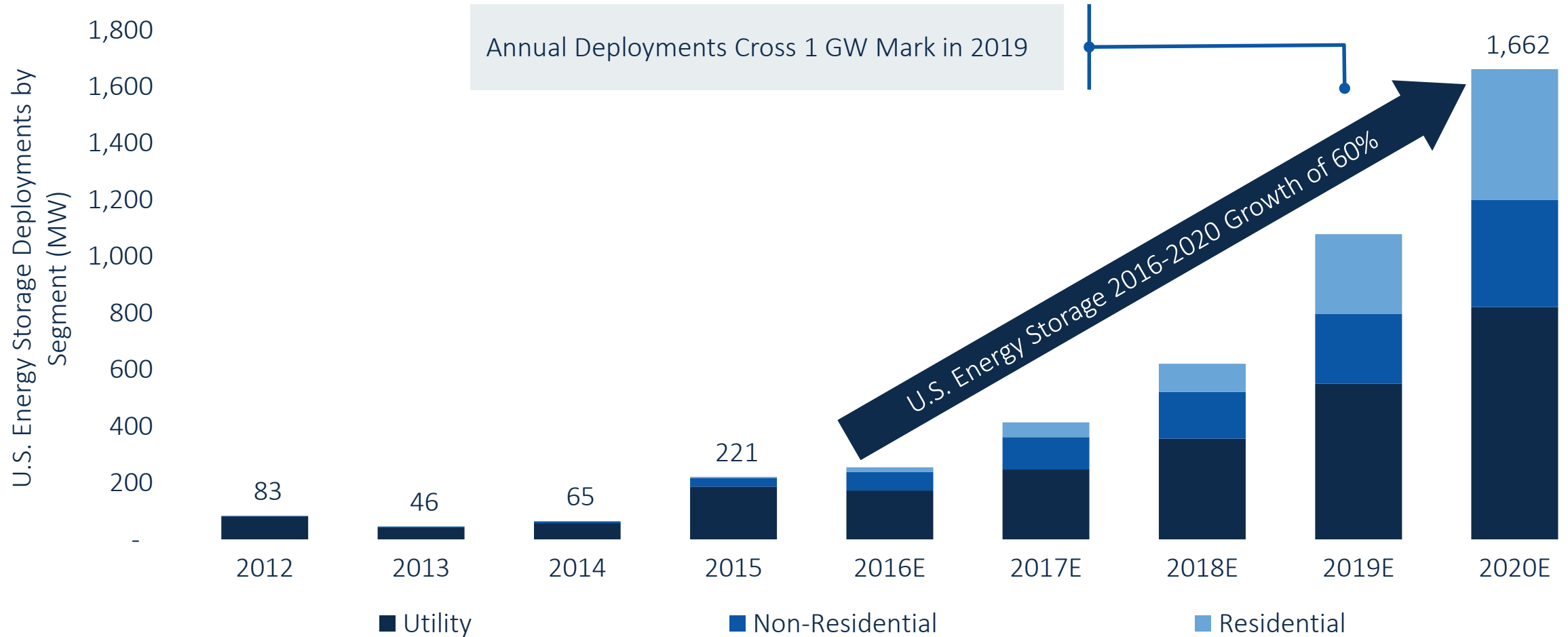
Significant Amount of New Partnership, Product and Business Model Announcements (cont.)

The logo for e-on, featuring the text "e-on" in a stylized red font.The logo for Eaton, featuring the word "EATON" in blue capital letters with a dot between the "A" and "T".The logo for Rhombus, featuring a stylized blue and yellow diamond shape above the word "Rhombus" in blue.The logo for Peteresen Dean, featuring a small square icon followed by the text "PETERSEN DEAN" in orange and "Roofing & Solar Energy" in smaller black text below.The logo for Bestronics, featuring a stylized blue "B" icon followed by the text "BESTRONICS" in bold black and "Electronic Manufacturing Services" in smaller black text below.The logo for Spider 9, featuring the word "SPIDER" in bold black, a red spider icon, and the number "9" in red, with "Dynamic Energy Systems" in smaller black text below.The logo for AES Energy Storage, featuring a stylized green and blue circular icon followed by the text "AES" in bold black and "Energy Storage" in smaller black text below.The logo for Arise Solar, featuring a stylized blue and yellow sun icon above the text "ARISE" in bold black and "SOLAR" in smaller black text below.The logo for Sprint, featuring the word "Sprint" in bold black and a stylized yellow and orange fan-like icon to the right.The logo for WESCO, featuring the word "WESCO" in bold blue capital letters with a registered trademark symbol.The logo for Solax Power, featuring a stylized orange and yellow "X" icon followed by the text "SOLAX" in bold black and "POWER" in smaller black text below.The logo for Itochu, featuring the word "ITOCHU" in bold blue capital letters with a stylized blue and white graphic above.The logo for Johnson Controls, featuring the text "Johnson Controls" in bold black and a stylized blue and green circular icon to the right.The logo for American Vanadium, featuring a stylized green and purple mountain-like icon above the text "AMERICAN VANADIUM" in black.The logo for Duke Energy, featuring a stylized blue and green circular icon followed by the text "DUKE ENERGY" in bold black.The logo for Spruce, featuring a stylized blue and white circular icon followed by the word "spruce" in lowercase black.The logo for Tyco, featuring the word "tyco" in bold blue lowercase letters.The logo for Gildemeister, featuring the text "GILDEMEISTER" in bold green and "energy solutions" in smaller black text below.The logo for REC Solar, featuring the text "REC" in bold blue and "SOLAR" in bold black, with a stylized yellow and orange sun icon to the right.The logo for JuceBox, featuring the text "JuceBox" in bold black and a stylized blue and white wind turbine icon to the right.The logo for SolarWorld, featuring a stylized yellow and orange sun icon above the text "SOLARWORLD" in bold black.The logo for DMG Mori Seiki, featuring the text "DMG" in white on a green background and "MORI SEIKI" in white on a red background.

Source: GTM Research/ESA U.S. Energy Storage Monitor

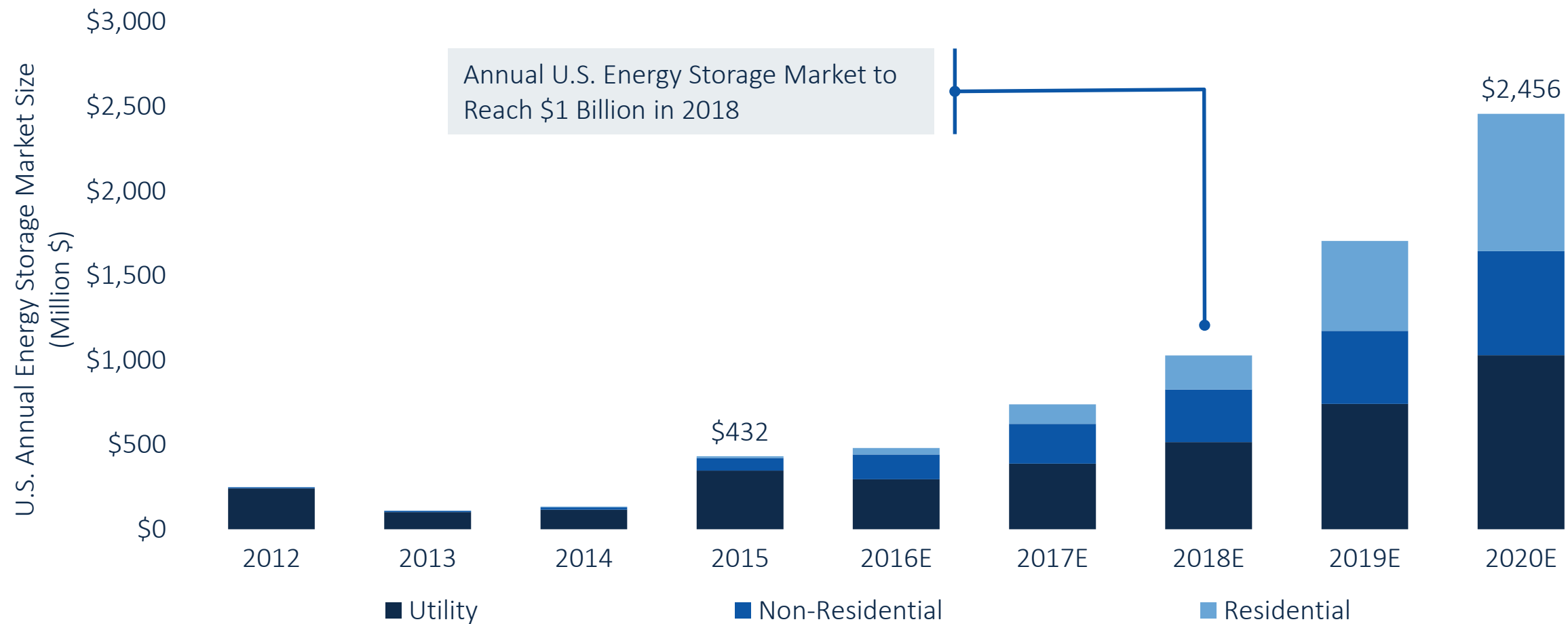
4. Outlook

U.S. Annual Energy Storage Deployments Will Cross 1 GW in 2019, Reach 1.7 GW by 2020



Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review

U.S. Energy Storage Market to Reach \$2.5 Billion by 2020, Sixfold Growth From 2015



Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review

Thank you!

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April 19, 2016

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Upcoming ESTAP Webinars

- **Procurement Guidance for Energy Storage Projects: Help with RFIs, RFQs and RFPs**, April 20, 2-3:30pm ET
- **Energy Storage Market Updates and Focus on Modeling for System Design**, April 21, 12-1pm ET

More information at www.cesa.org/webinars



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