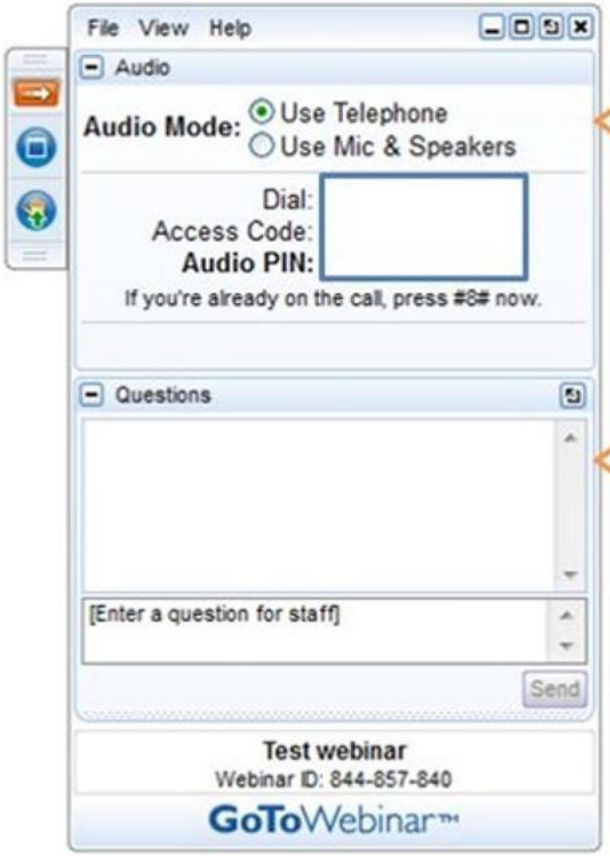
Energy Storage Technology Advancement Partnership (ESTAP) Webinar:

# 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**

# Housekeeping




All participants are in "Listen-Only" mode. Select "Use Mic & Speakers" to avoid toll charges and use your computer's VOIP capabilities. Or select "Use Telephone" and enter your PIN onto your phone key pad.

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

**This webinar is being recorded.**

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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

CleanEnergy States Alliance

Sandia National Laboratories

U.S. DEPARTMENT OF ENERGY

# 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:

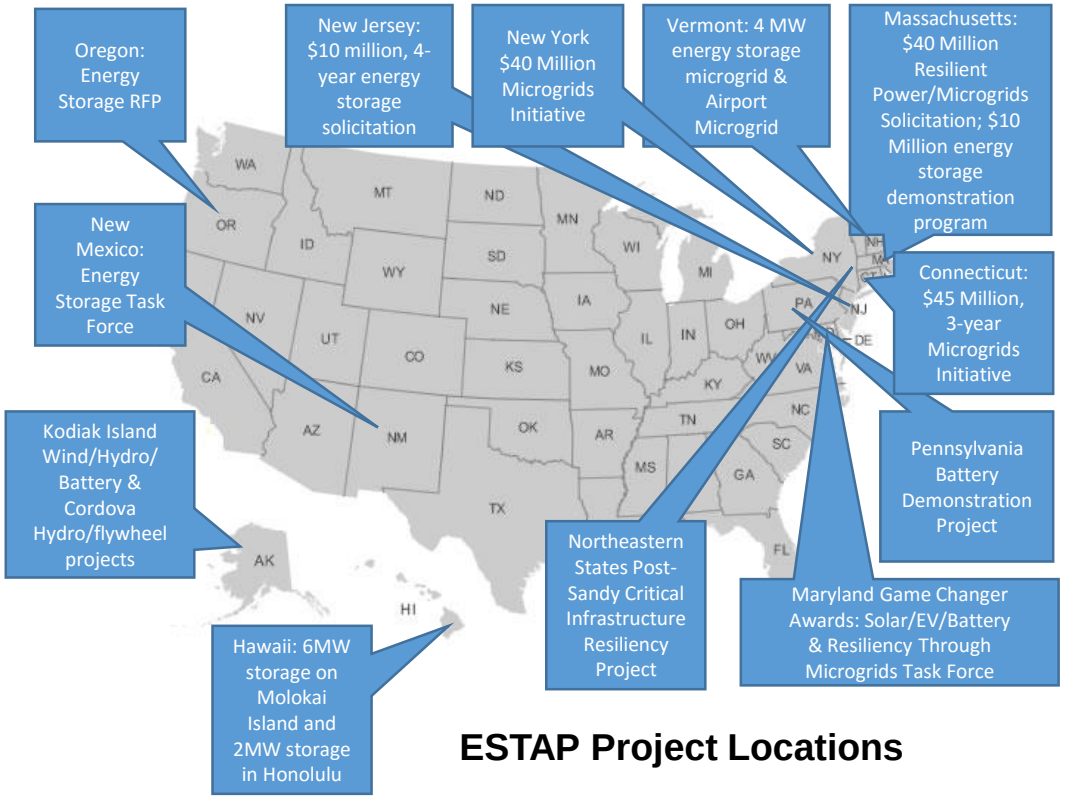
**State & Federal Energy Storage Technology Advancement Partnership (ESTAP)** is conducted under contract with Sandia National Laboratories, with funding from US DOE.

**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**

CleanEnergy States Alliance

Sandia National Laboratories

U.S. DEPARTMENT OF ENERGY

# Energy Storage Technology Advancement Partnership

More CESA Projects

Overview

ESTAP Resource Library

ESTAP Webinars

ESTAP News

ESTAP Listserv Signup

## ESTAP

**Project Director:** Todd Olinsky-Paul

**Contact:** Todd Olinsky-Paul, Todd@cleanegroup.org

SIGN UP FOR THIS e-MAILING LIST

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

gtmresearch

# 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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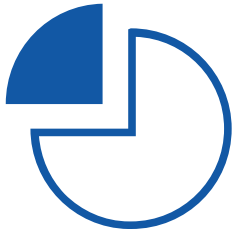
# About Greentech Media

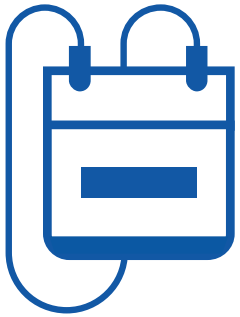
## News/Online

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

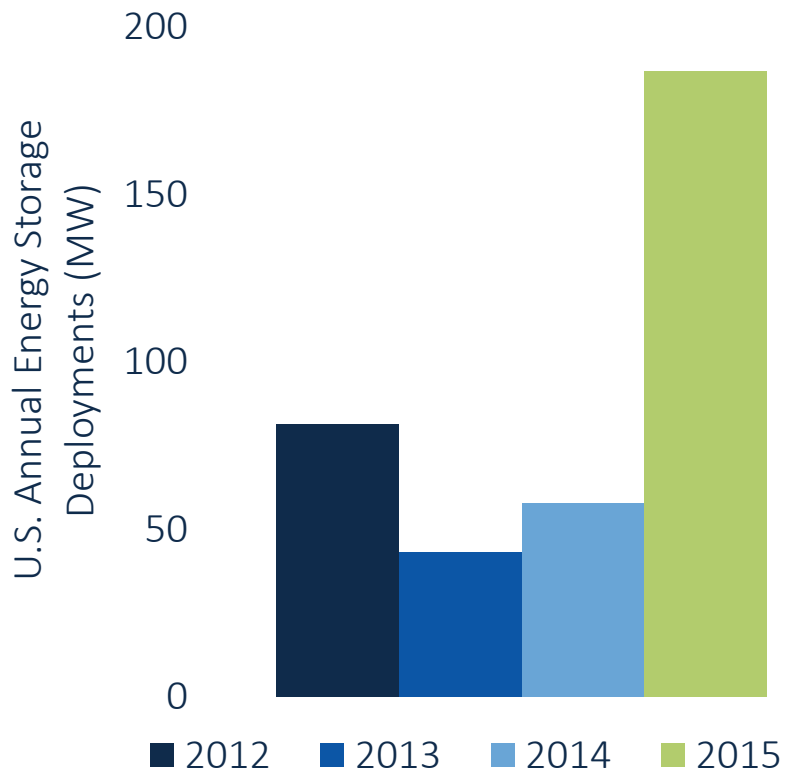
Greentech Media and GTM Research experts come together to produce all of Greentech Media's industry conferences throughout the year. These summits provide a platform for our latest market intelligence and draw together the industry influencers from organizations across the value chain.

# Contents

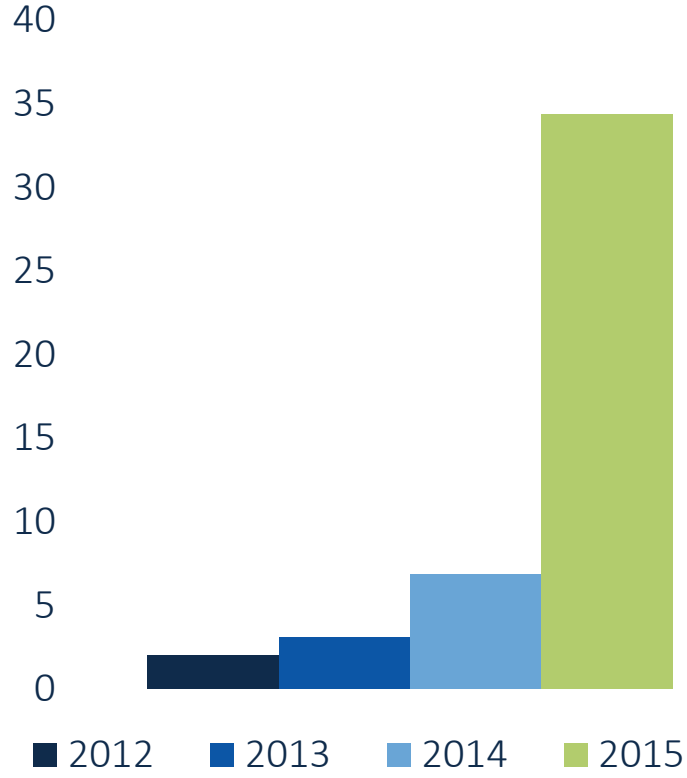
# 1. Deployment Trends

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

## Front of the Meter




## Behind the Meter

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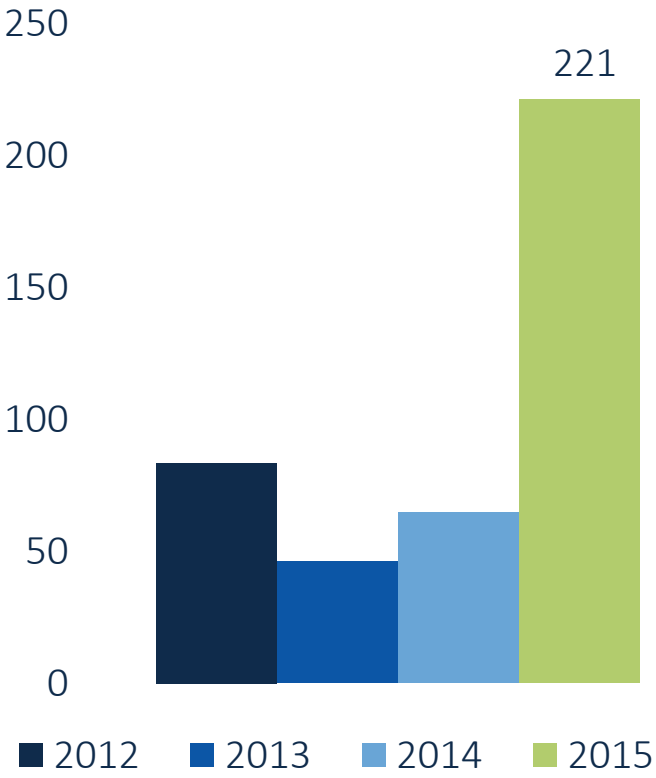
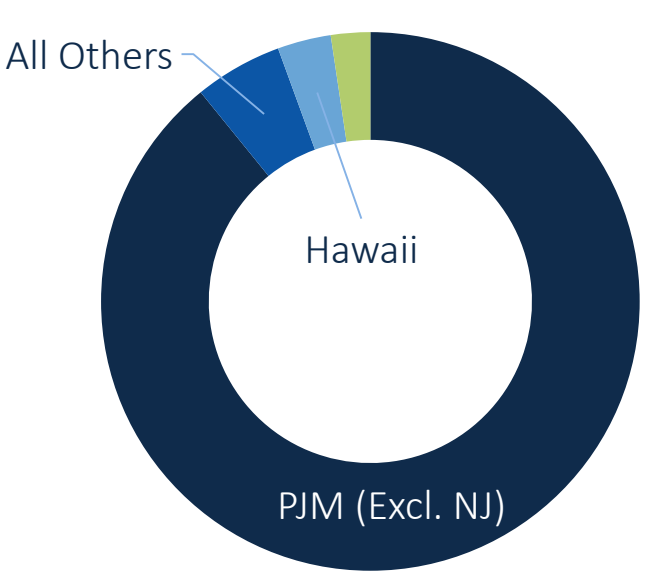
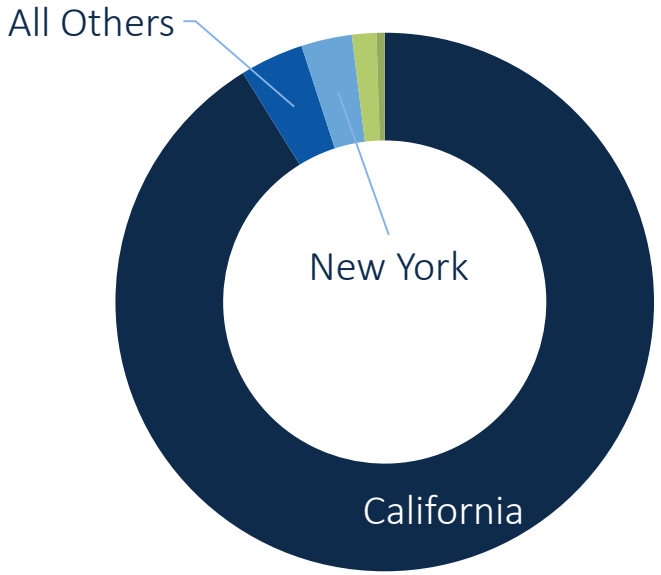


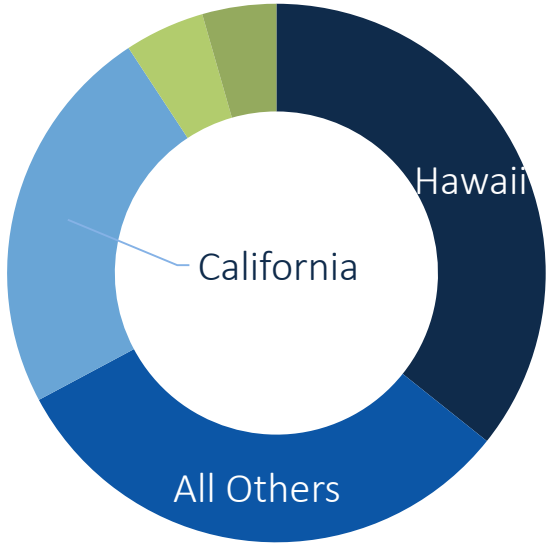

Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review

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

| Utility | Non-Residential | Residential |
|---|---|---|

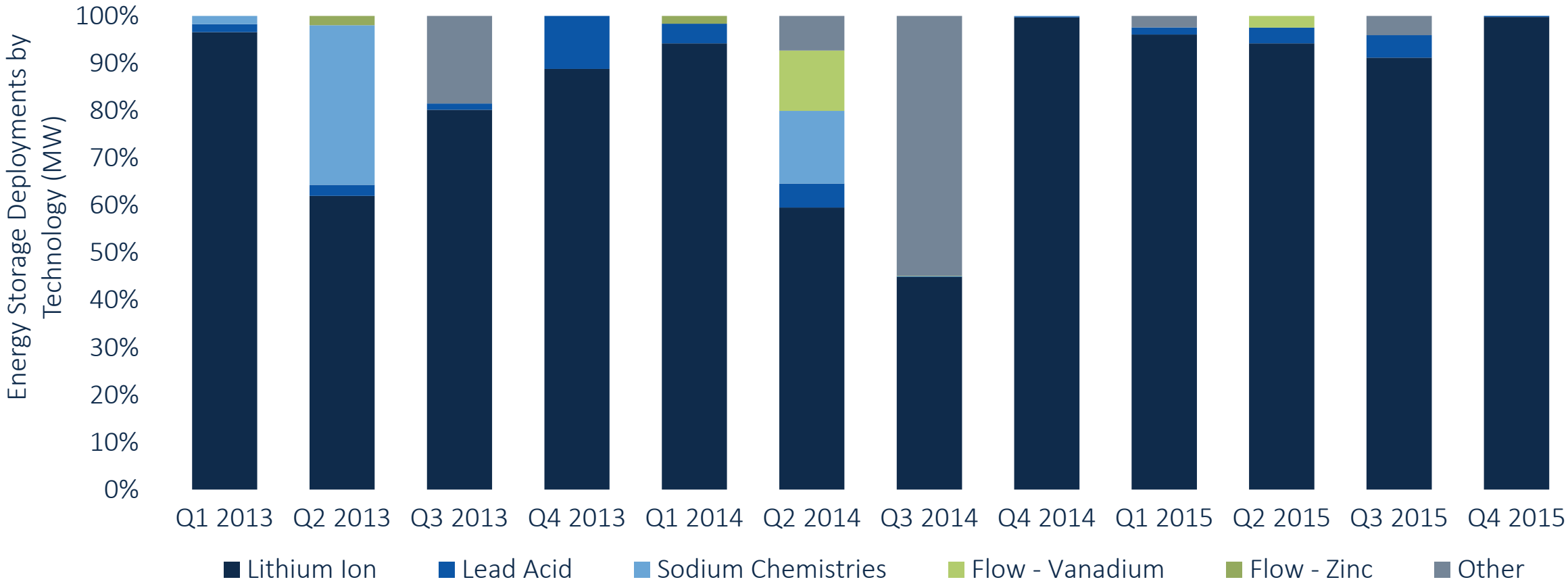



Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review. *GTM Research is currently monitoring seven individual markets. Complete coverage of all markets is available in the full report.

# 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

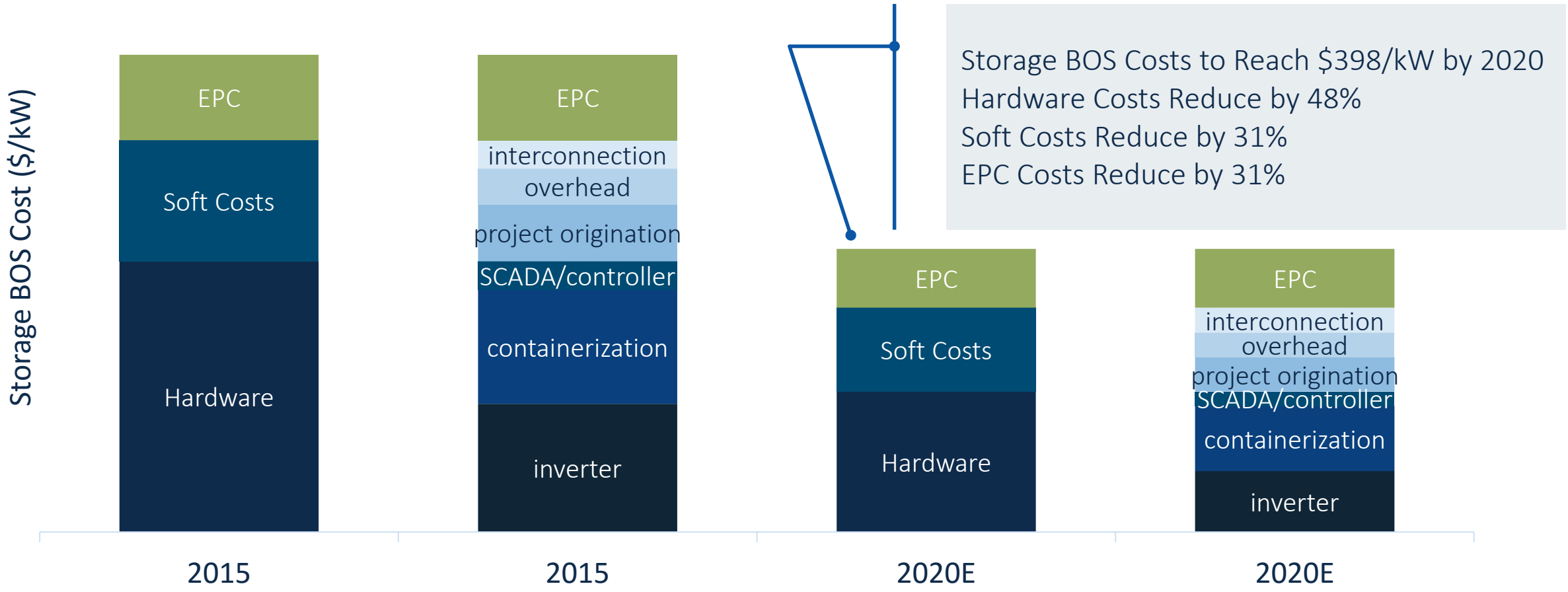
# 2. Market Drivers and Business Models

## 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 |

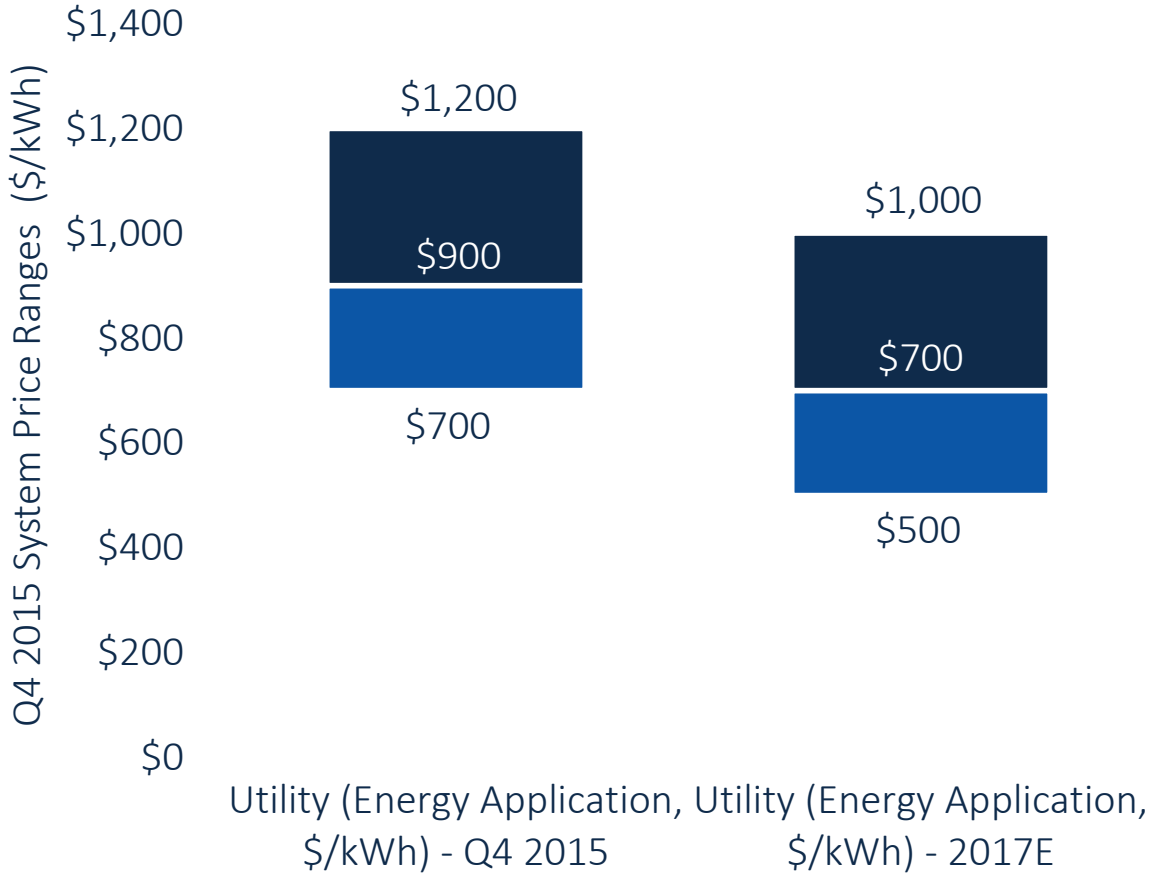
# 1) 41% Storage BOS Costs Reduction by 2020; Reach Below $400/kW



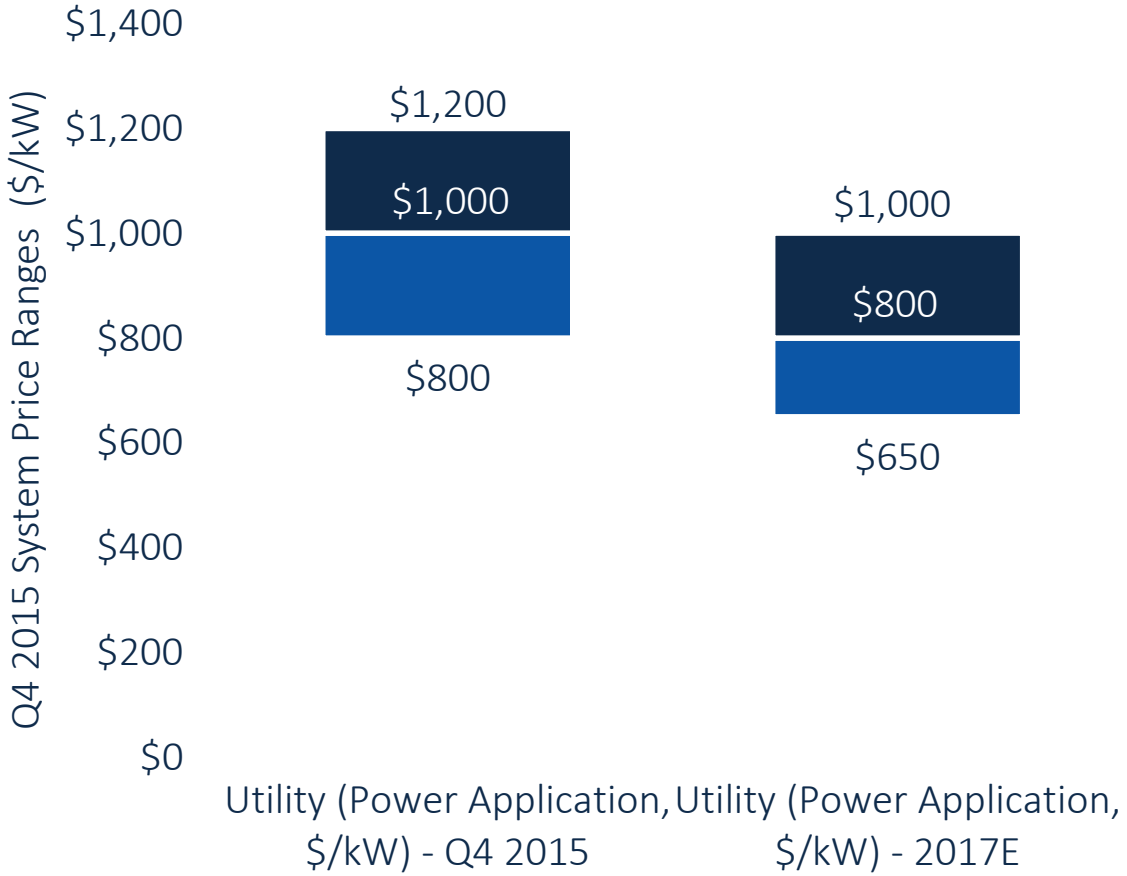

Source: GTM *'Grid-Scale Energy Storage Balance of Systems 2015-2020: Architectures, Costs and Players'*

# 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)

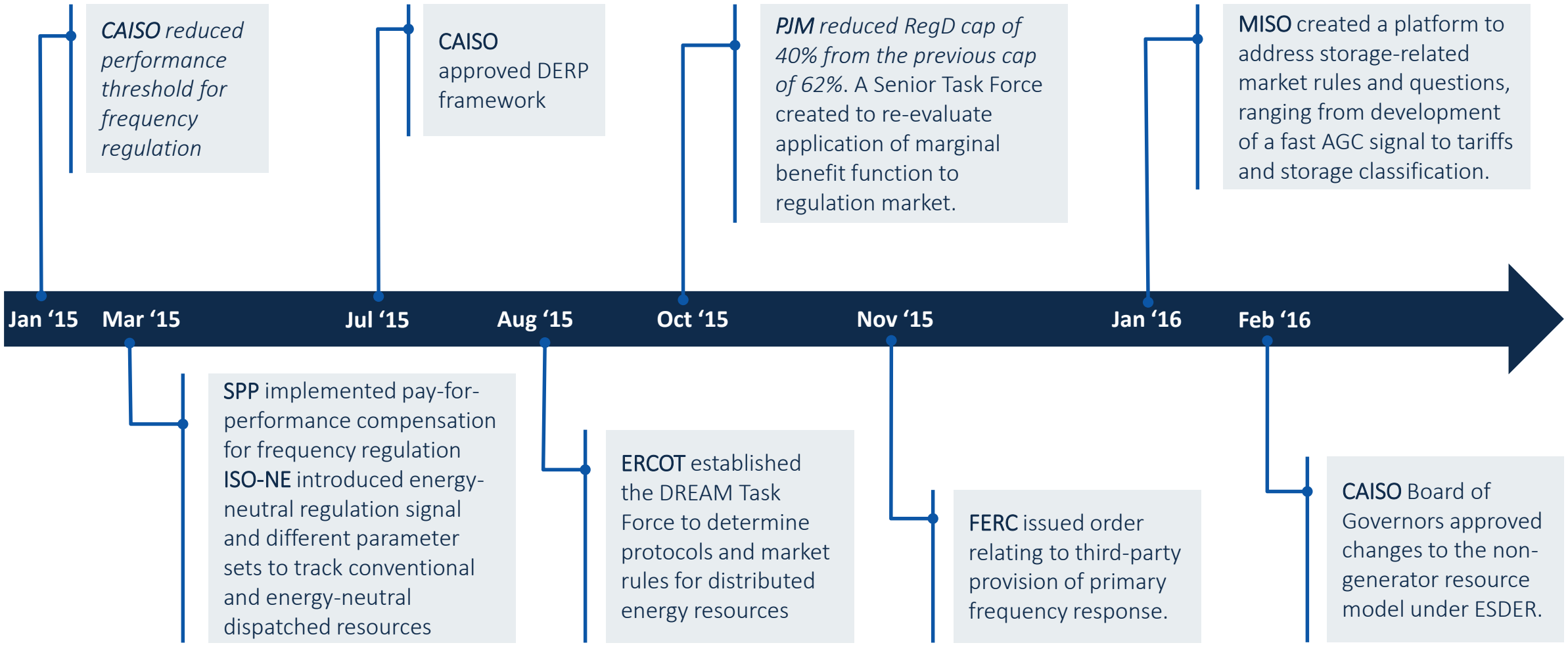



Utility-Scale Price Trends Q4 2015, Power Applications ($/kW)



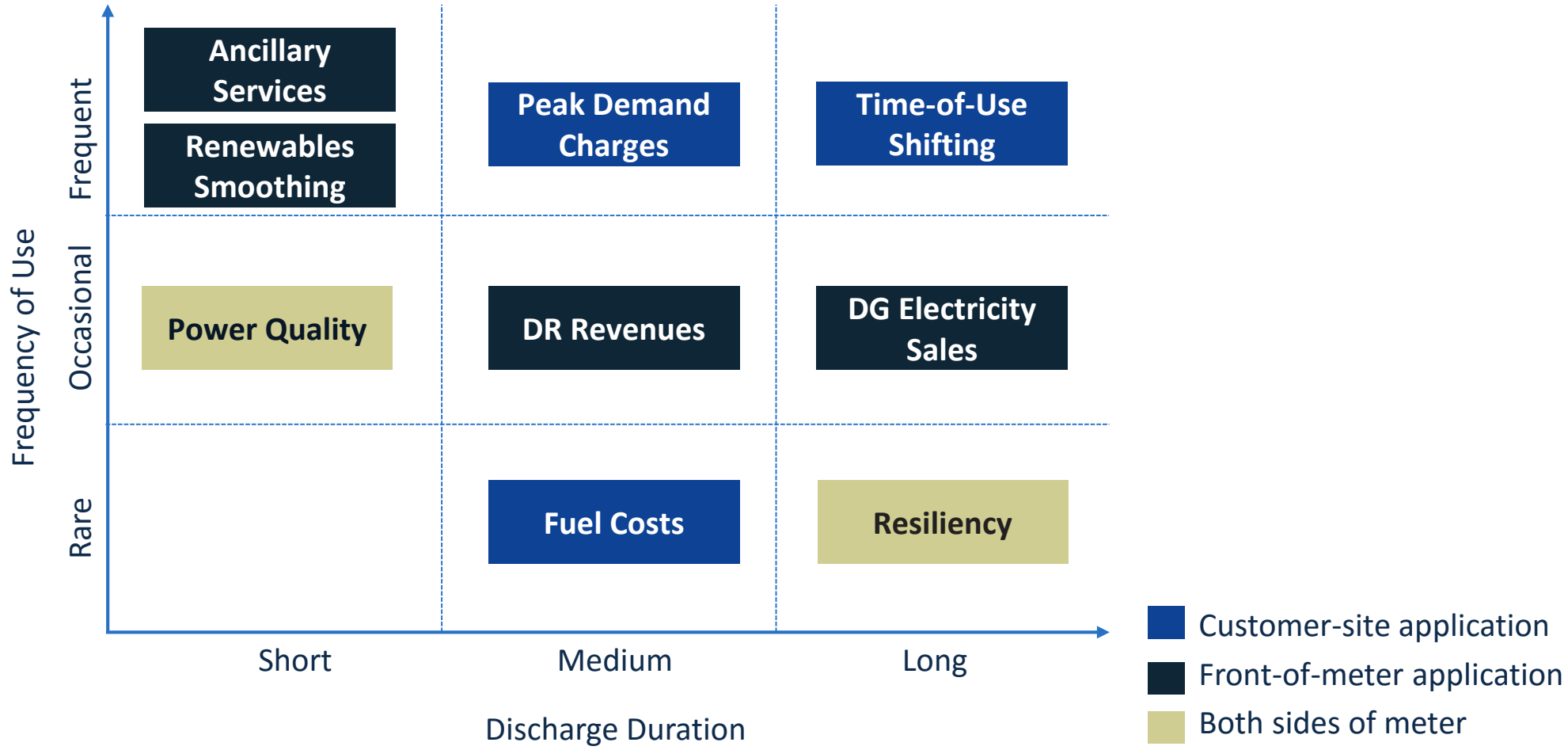

Source: GTM Research/ESA U.S. Energy Storage Monitor 2015 Year in Review

# 2) Wholesale Markets' Structures Evolving to Include Storage




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

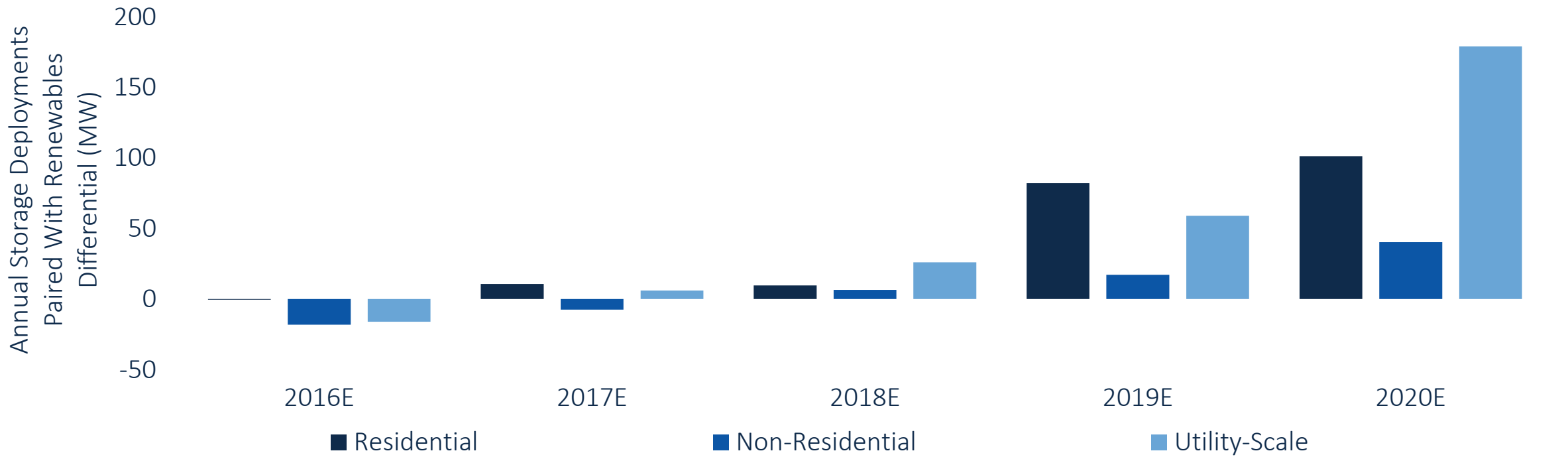
# 3) Solar-Plus-Storage Benefits Vary in Duration and Frequency




Source: GTM Research

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

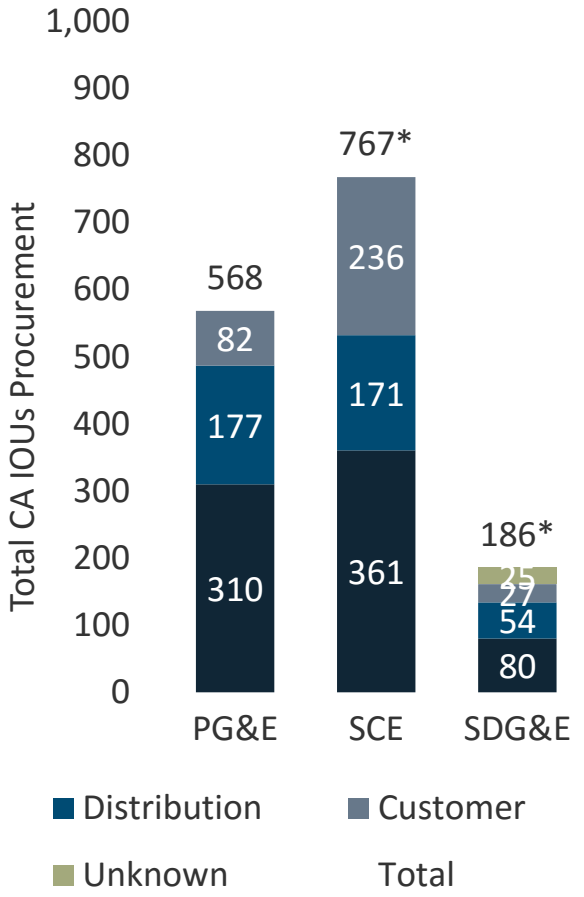
U.S. Storage Deployment Paired With Renewables Differential Vs. No Extension




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 |
|---|---|---|---|
| PG&E | 50 MW transmission<br>24 MW distribution | 7 projects totaling 75 MW selected in December 2015 | First projects expected to be on-line by May 2017 |
| Southern California Edison, An Edison International Company | 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 |
| SDGE, A Sempra Energy utility | 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**

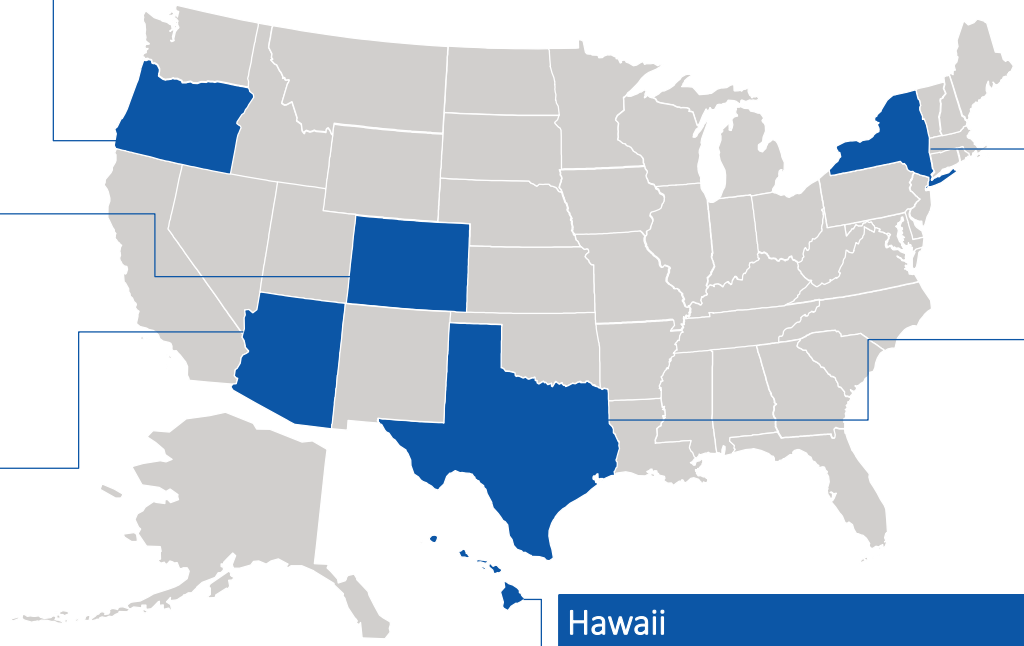
**PSC Colorado/Xcel Energy** submitted two storage project proposals under the Innovative Clean Technologies program.

**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.

**Hawaii**

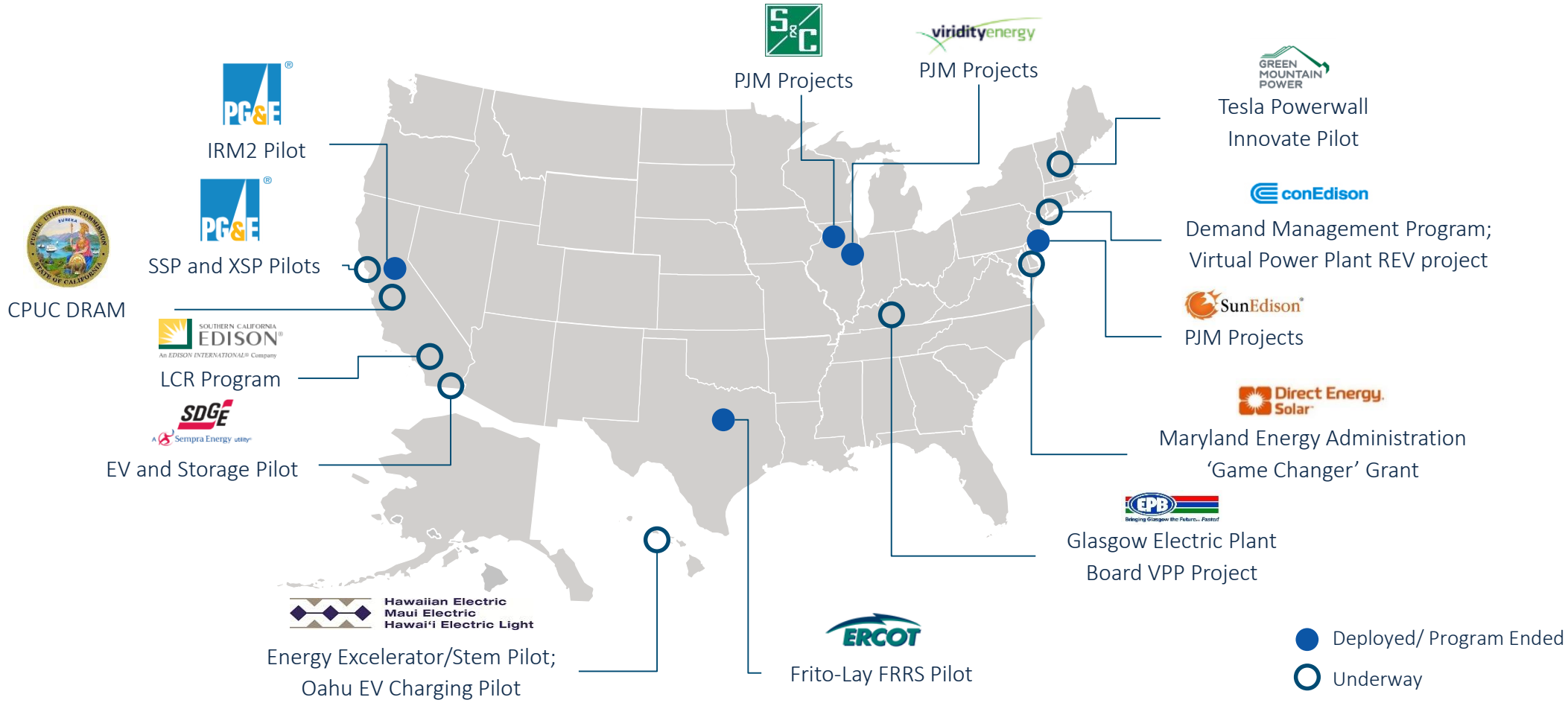
**KIUC** entered in a 20-year PPA with **SolarCity** for power from a 13 MW/52 MWh lithium-ion storage system

**Federal**

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

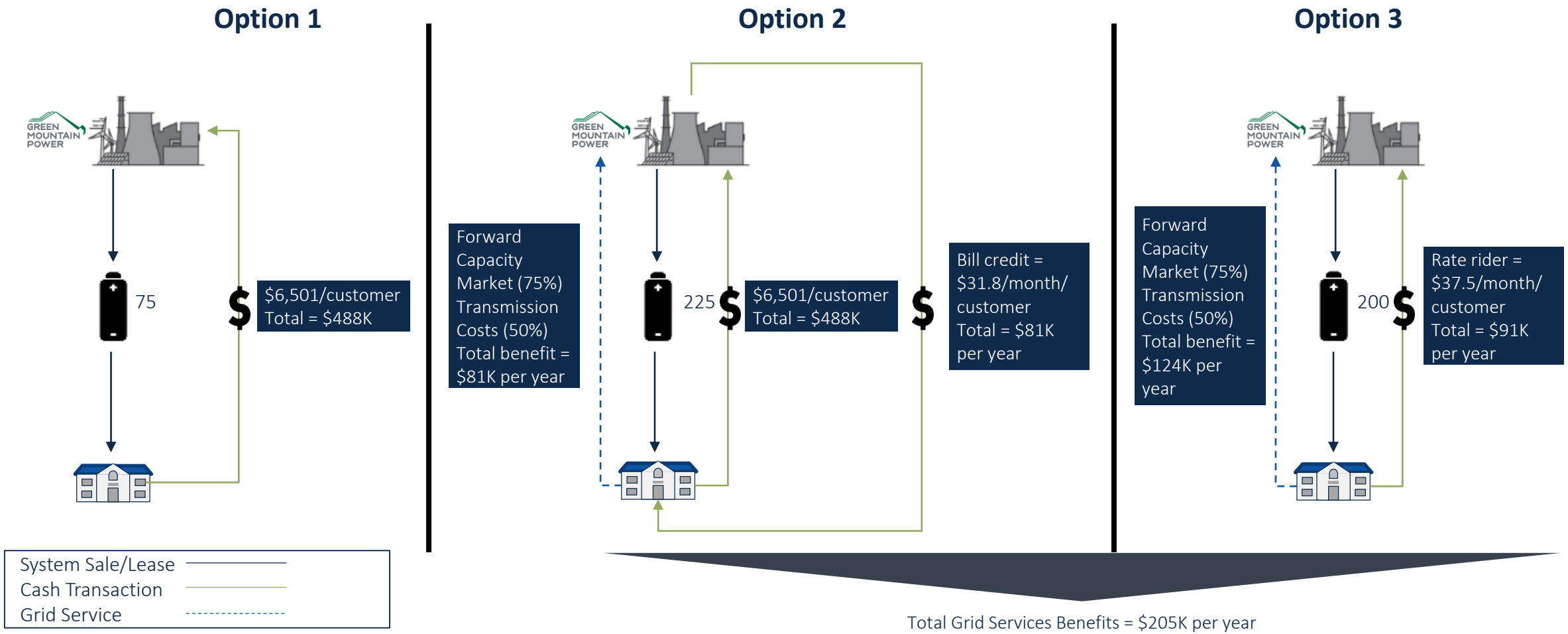
Source: GTM Research/ESA U.S. Energy Storage Monitor

# 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

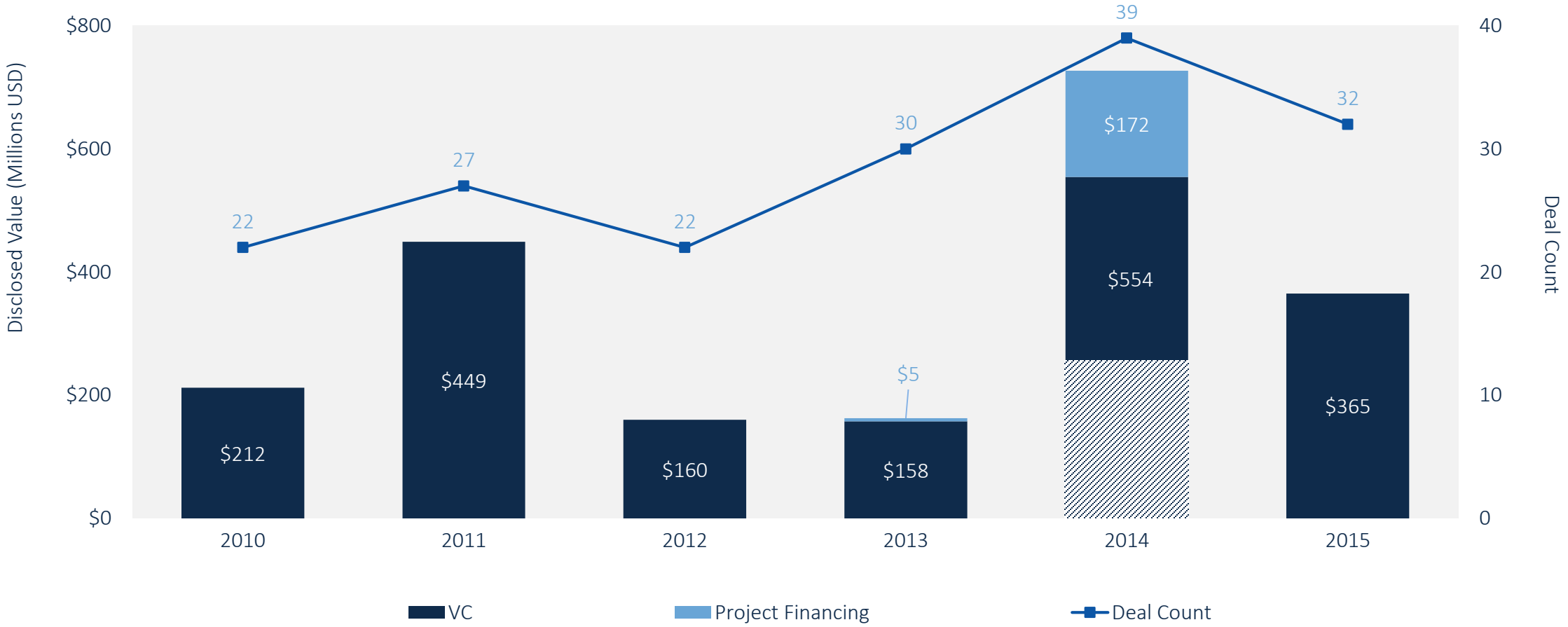



Source: Green Mountain Power, GTM Research

# 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.)



















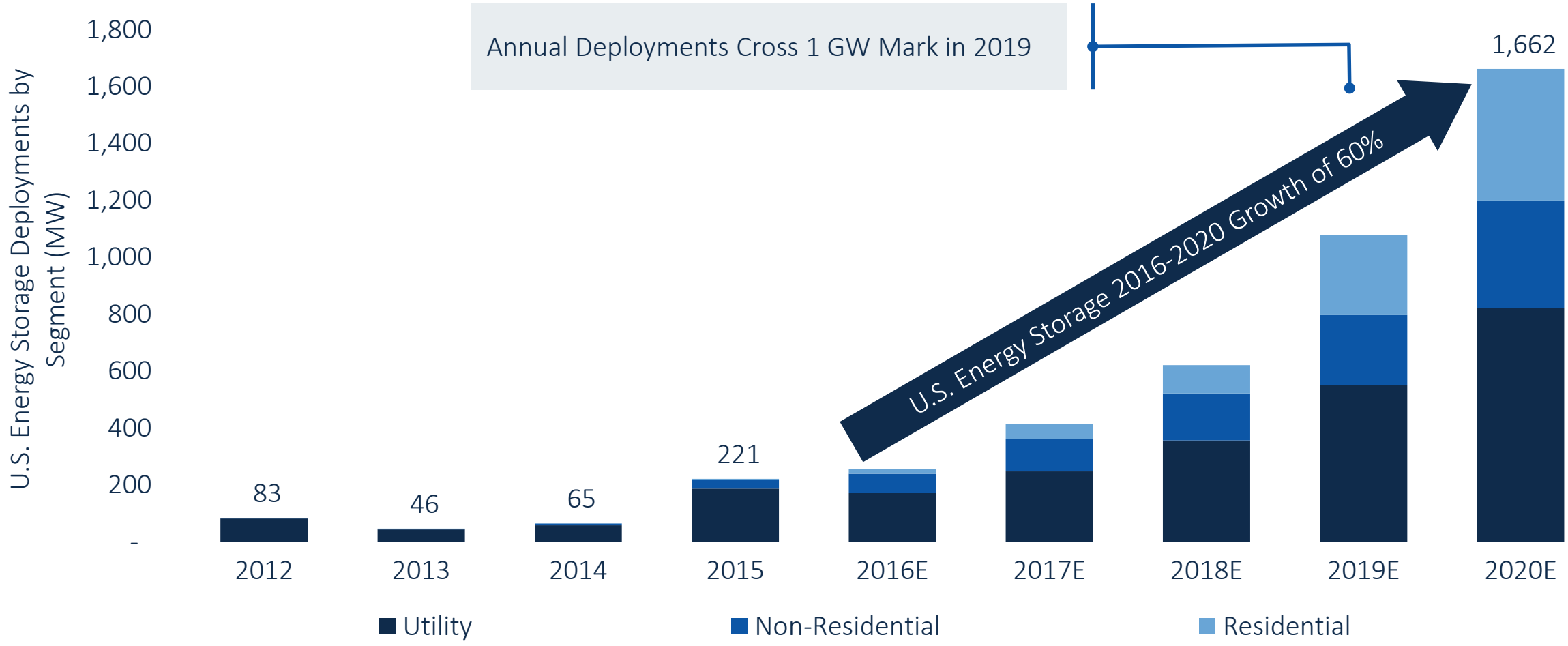




Source: GTM Research/ESA U.S. Energy Storage Monitor

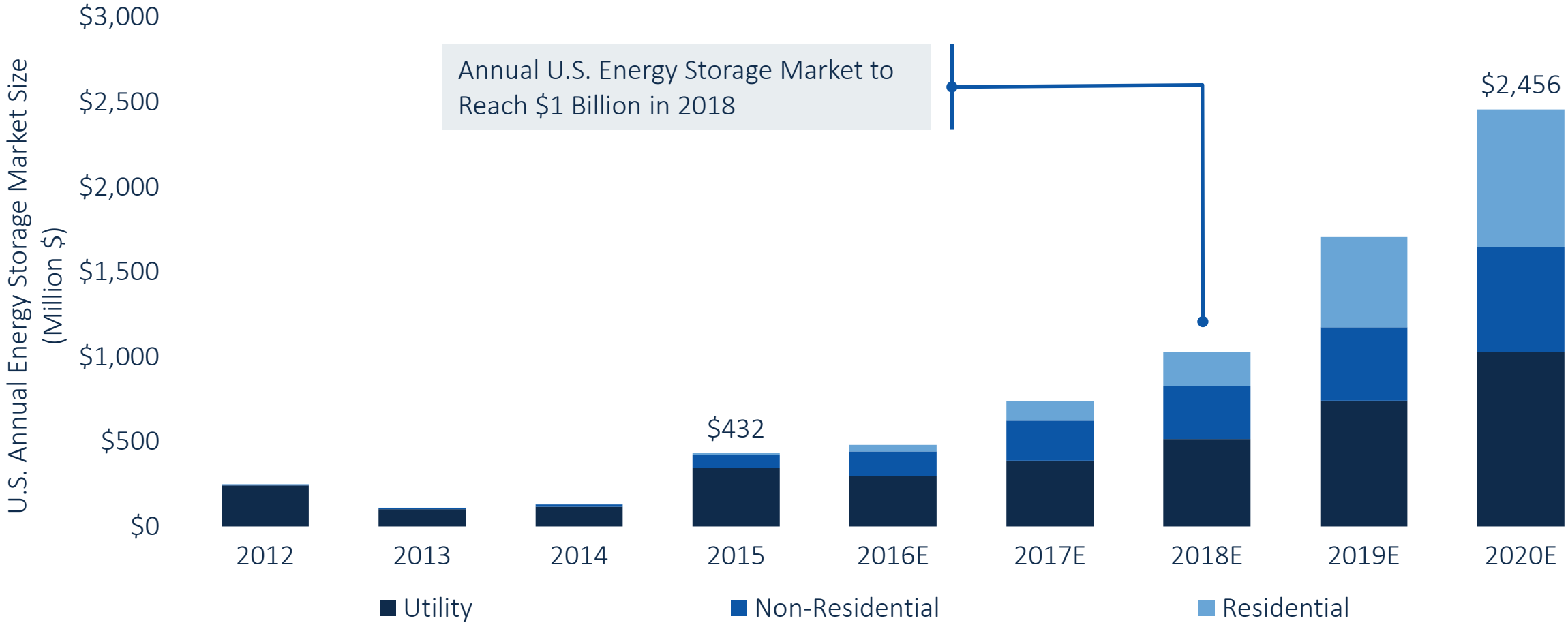
# 4. Outlook

# 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](www.cesa.org/webinars)

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