



Energy Storage Technology Advancement Partnership
(ESTAP) Webinar:

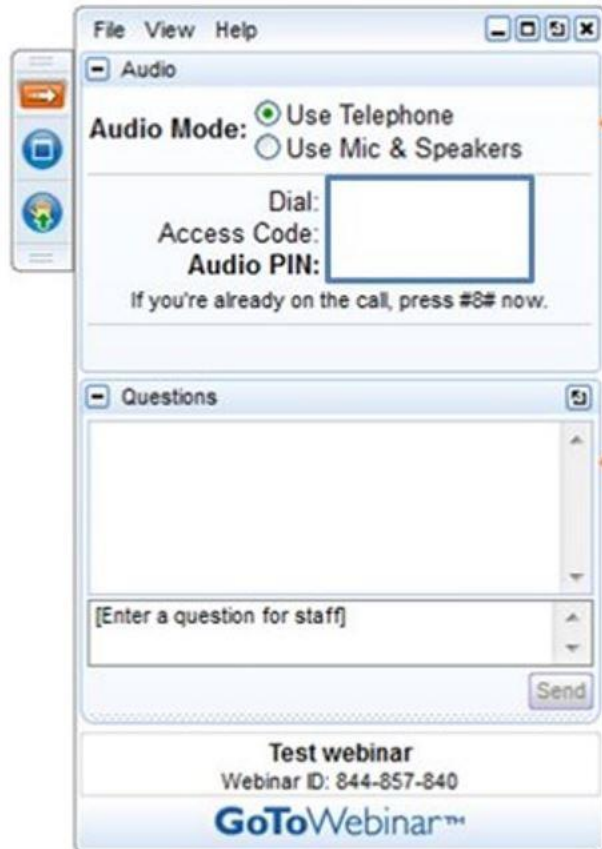
Energy Storage Industry Update

December 16, 2015

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



Housekeeping



The screenshot shows a web browser window with a menu bar (File, View, Help) and a sidebar with navigation icons. The main content area is divided into two sections: 'Audio' and 'Questions'. The 'Audio' section has two radio buttons: 'Use Telephone' (selected) and 'Use Mic & Speakers'. Below this are fields for 'Dial:', 'Access Code:', and 'Audio PIN:', with a note: 'If you're already on the call, press #8# now.' The 'Questions' section features a large text input area with a placeholder '[Enter a question for staff]' and a 'Send' button. At the bottom, it displays 'Test webinar', 'Webinar ID: 844-857-840', and the 'GoToWebinar' logo.

← 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.

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.

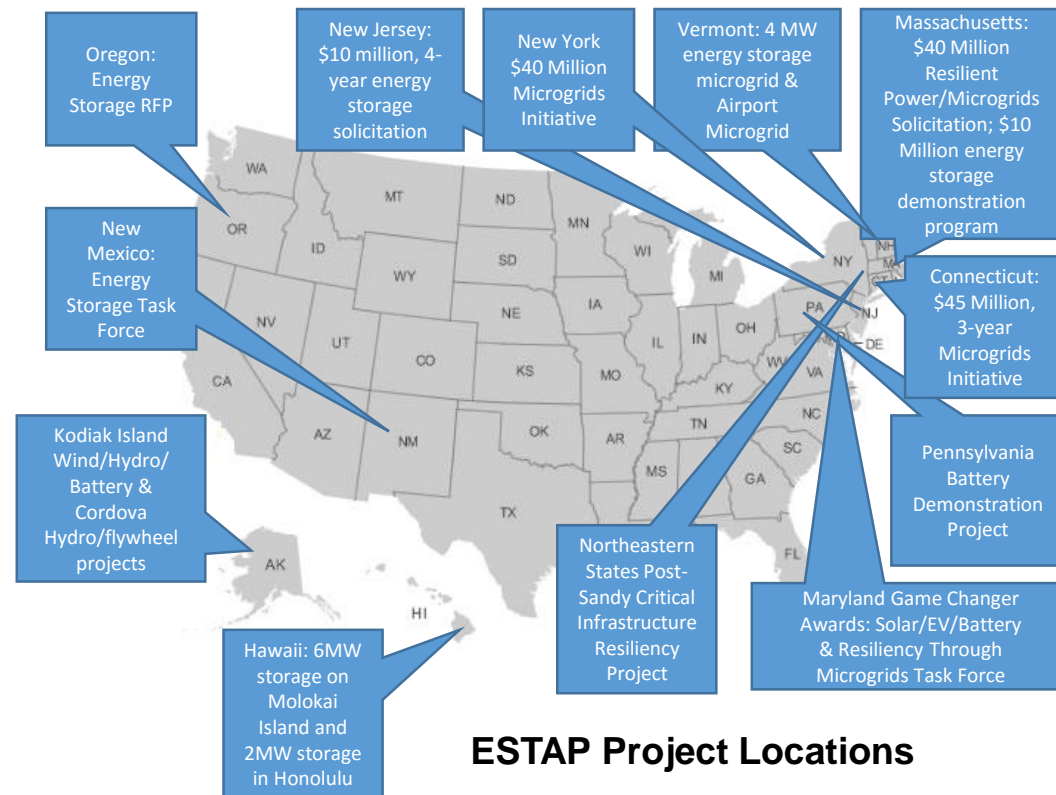
ESTAP Key Activities:

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

Project Director: Todd Olinsky-Paul

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

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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](#)

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Webinar Archive: www.cesa.org/webinars

ESTAP Website: <http://bit.ly/CESA-ESTAP>

ESTAP Listserv: <http://bit.ly/EnergyStorageList>



Today's Guest Speakers

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

gtmresearch

State of the U.S. Energy Storage Industry

Prepared For:



Ravi Manghani and Brett Simon

Senior Analyst, Energy Storage and Analyst, Energy Storage

manghani@gtmresearch.com and simon@gtmresearch.com

December 16, 2015

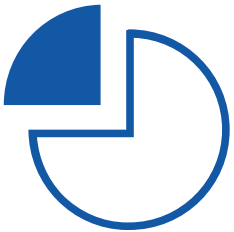
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About Greentech Media



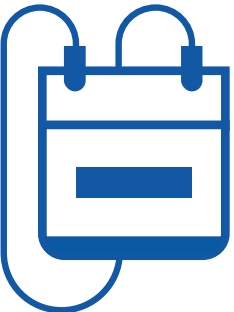
News/Online

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.

Agenda

-
- 1. U.S. Energy Storage Deployments**

 - 2. Storage Applications and Technology Landscape**

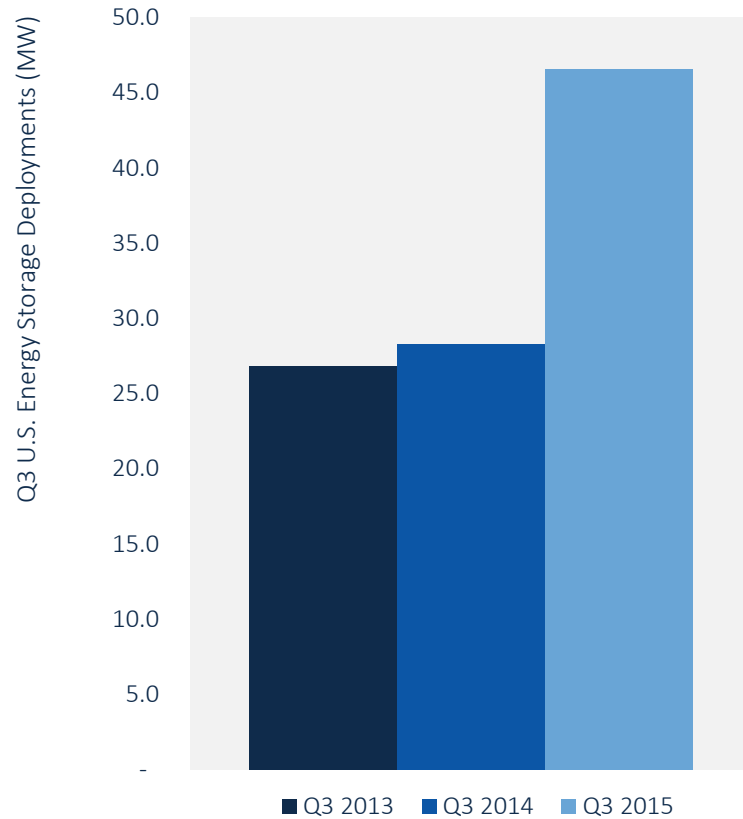
 - 3. Policy and Market Developments**

 - 4. Investment and Vendor Ecosystem**

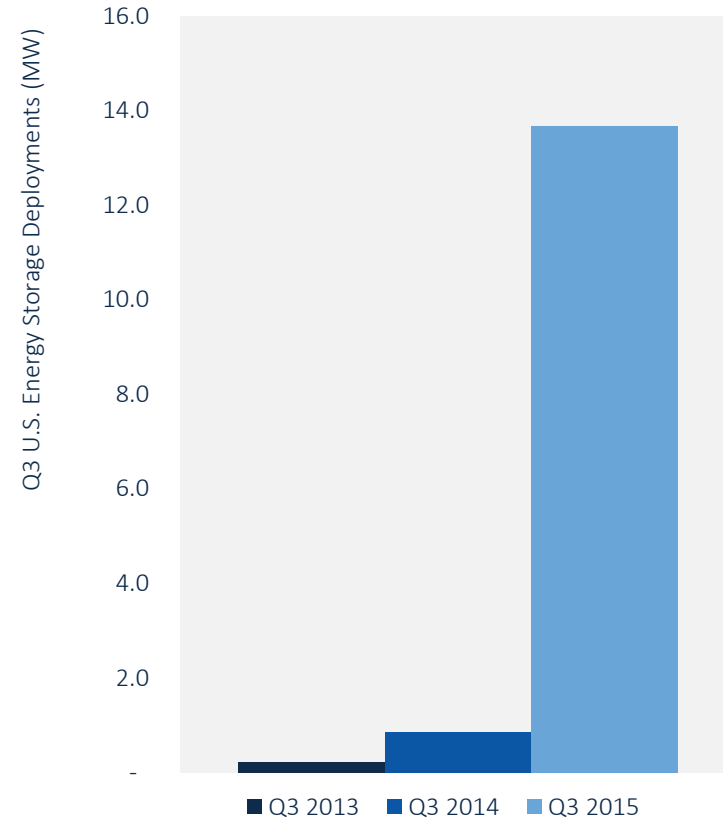
1 U.S. Energy Storage Deployments

Q3 U.S. Energy Storage Deployments, 2013-2015 (MW)

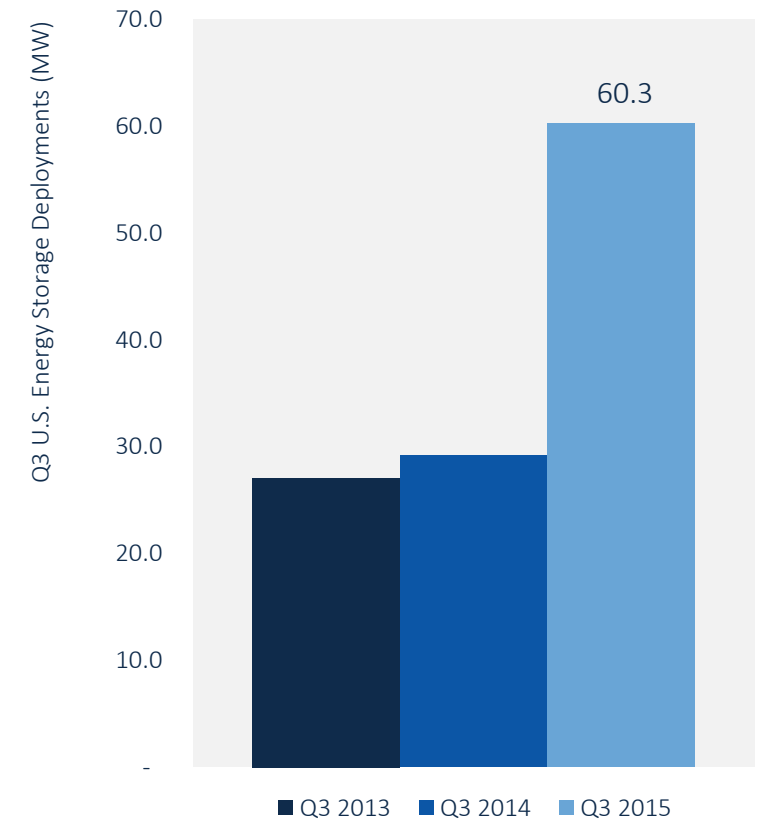
Front of the Meter



Behind the Meter



Total

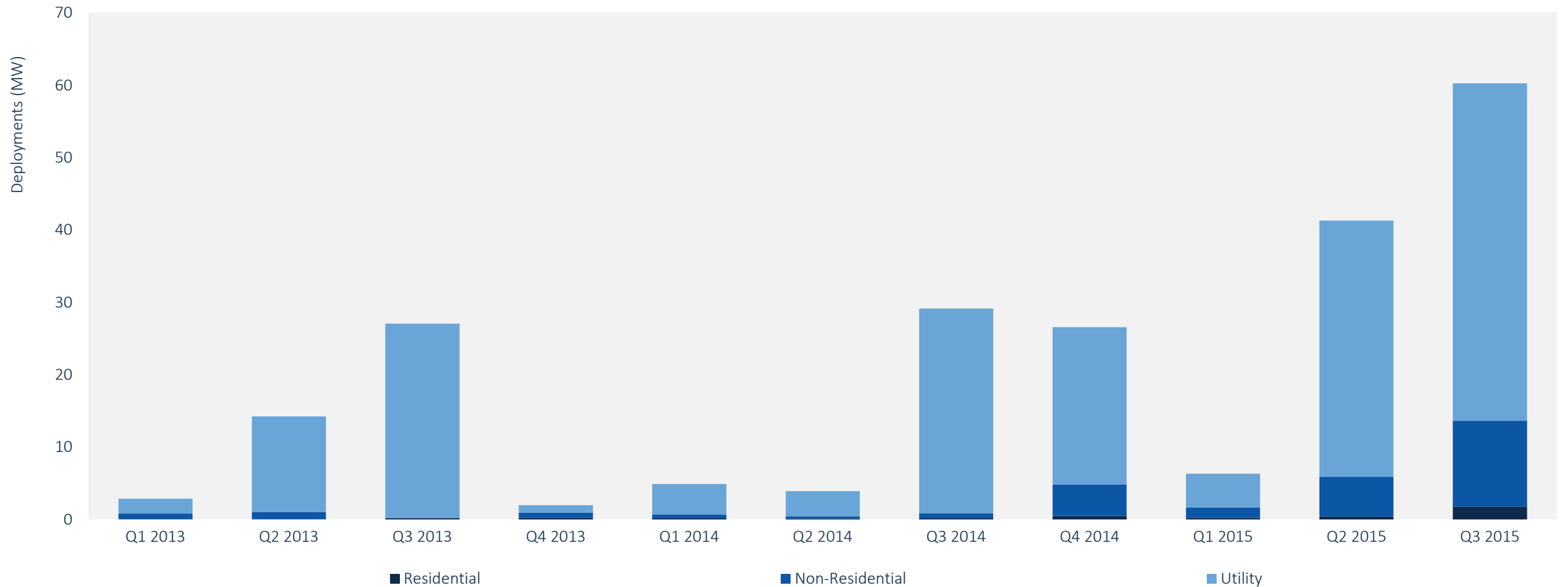


Source: GTM Research/ESA U.S. Energy Storage Monitor

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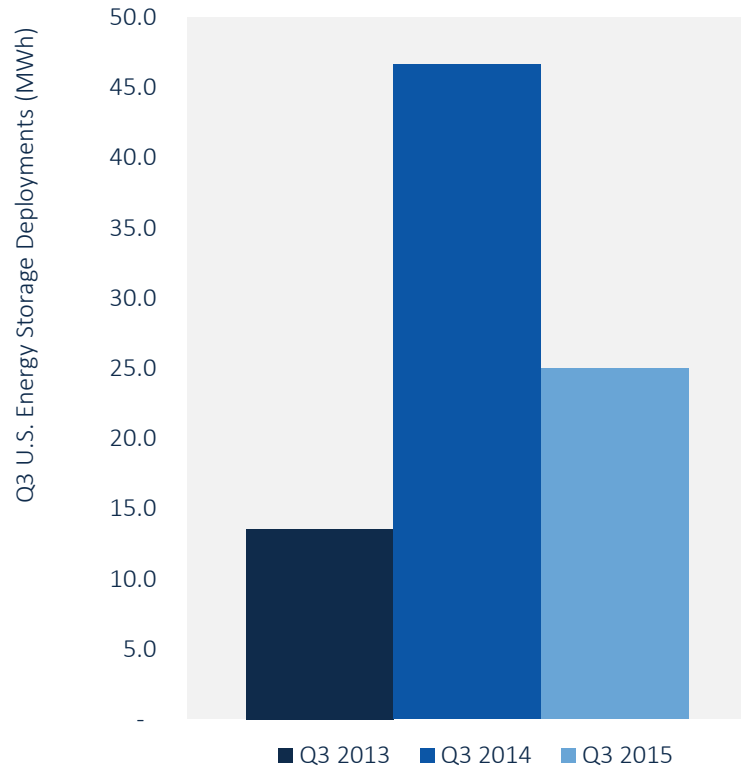
U.S. Energy Storage Deployments by Segment (MW)



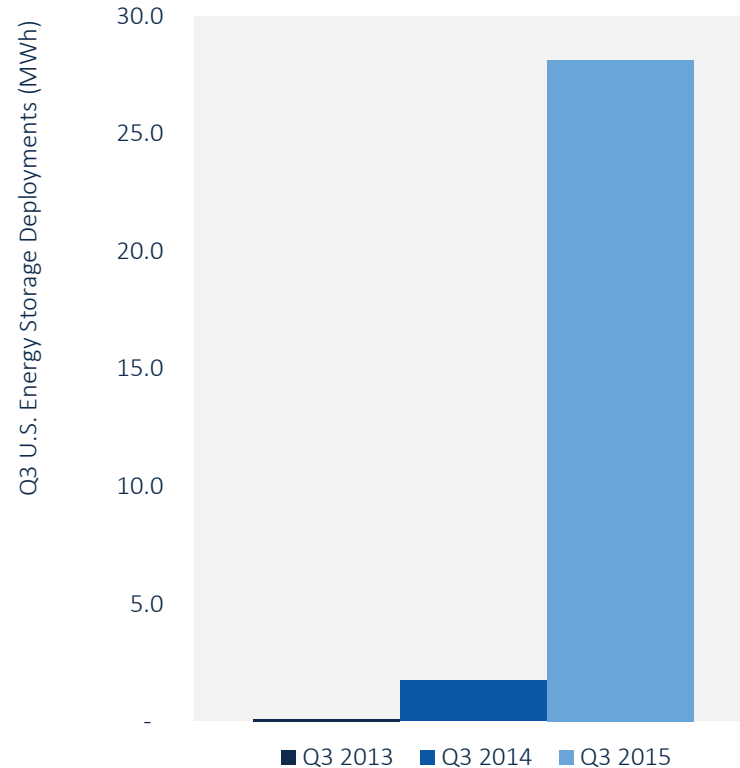
Source: GTM Research/ESA U.S. Energy Storage Monitor

Q3 U.S. Energy Storage Deployments, 2013-2015 (MWh)

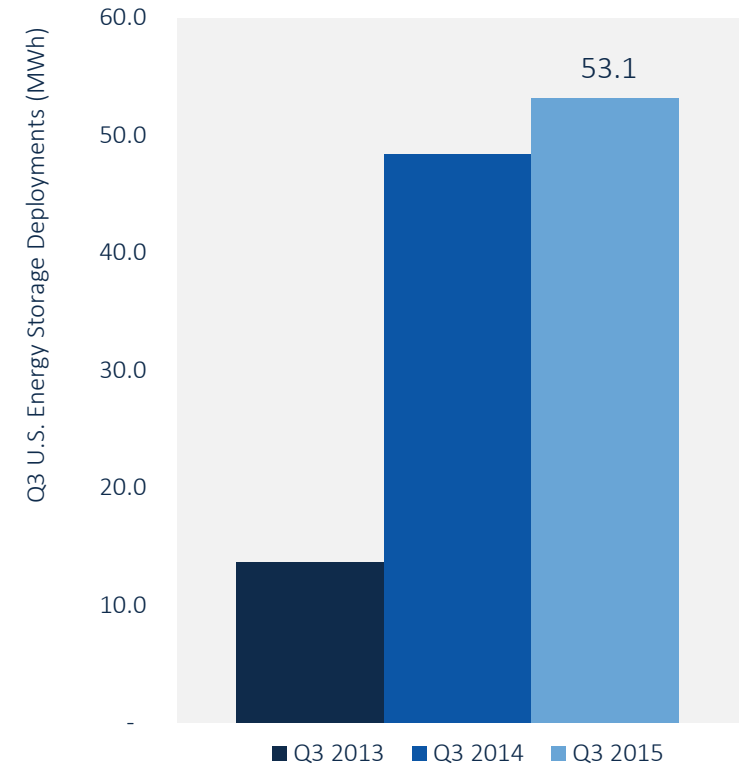
Front of the Meter



Behind the Meter



Total



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

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

Top Energy Storage Markets, Q3 2015

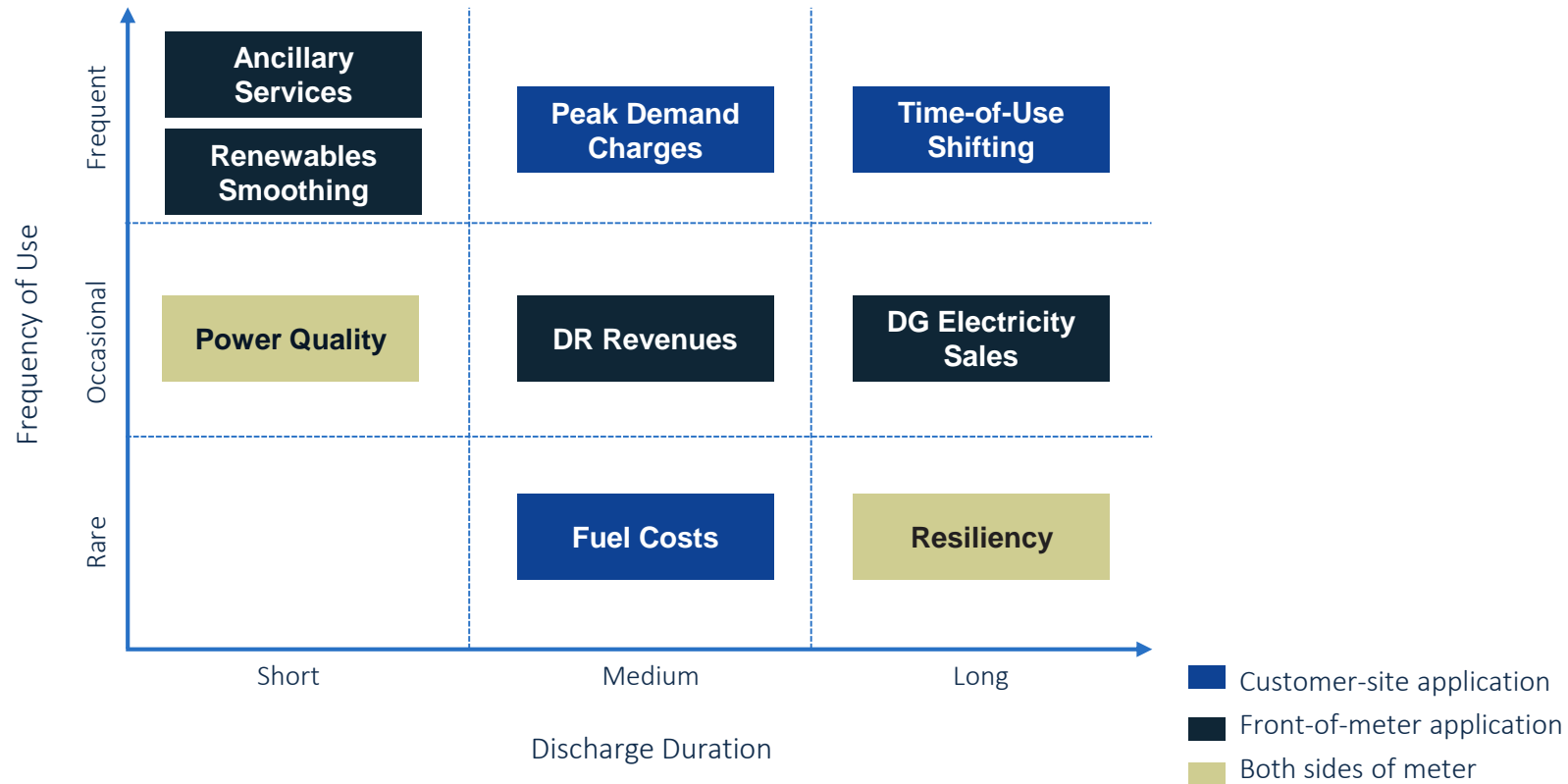
Rank	Residential	Non-Residential	Utility
1	Hawaii	California	PJM (excl. NJ)
2	All Others*	Hawaii	California
3	California	New York	All Others*

Source: GTM Research

* GTM Research is currently monitoring seven individual markets. Complete coverage of all markets is available in the U.S. Energy Storage Monitor Report.

2 Storage Applications and Technology Landscape

Energy Storage Applications Vary by Location and Segment



Vendors Pursue a Variety of Energy Storage Technologies

Li-Ion Battery Technology Vendors



Lead-Acid Battery Technology Vendors



Flow Battery Technology Vendors



Ultracapacitor Technology Vendors



Flywheel Technology Vendors



CAES Technology Vendors



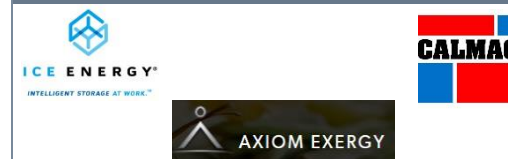
Sodium-Based Battery Technology Vendors



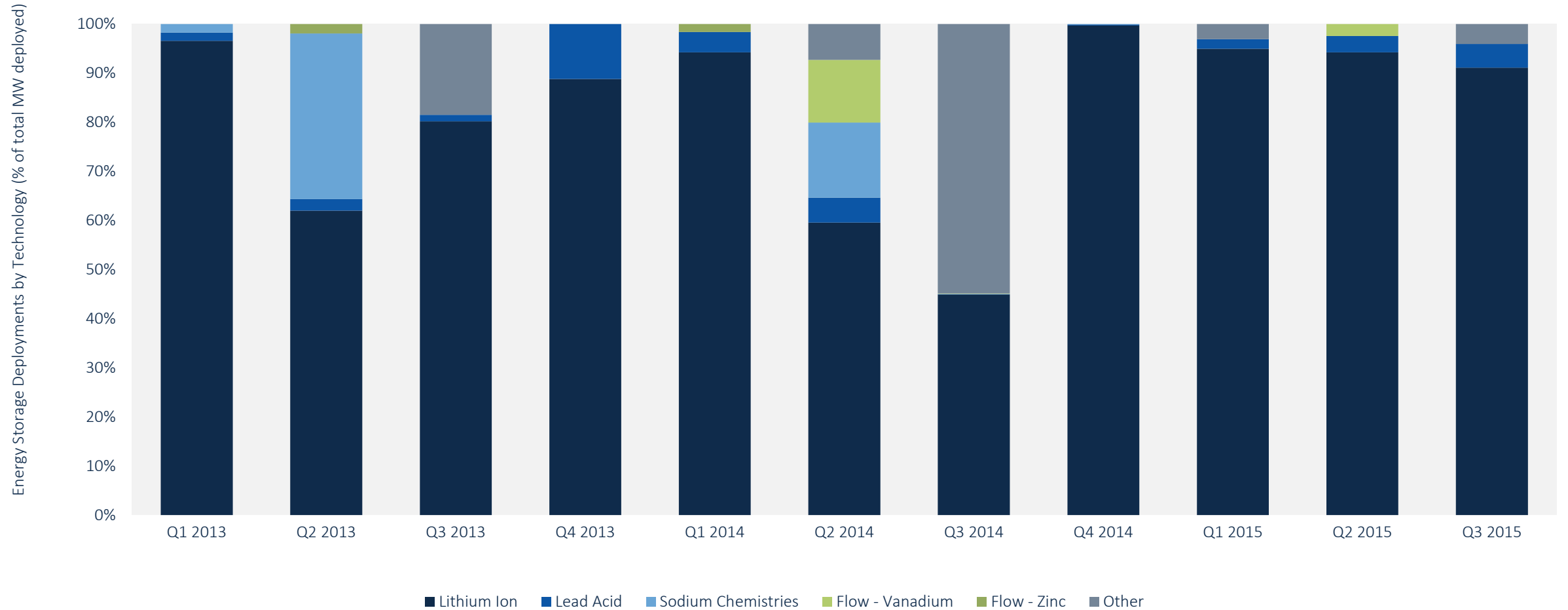
Emerging Technology Storage Vendors



Thermal Storage Vendors



Lithium Ion Batteries Dominate the U.S. Technology Landscape



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

* "Other" includes flywheel and unreported energy storage technologies

3 Policy and Market Developments

Front-of-the-Meter Policy and Market Developments, Q3 2015

California

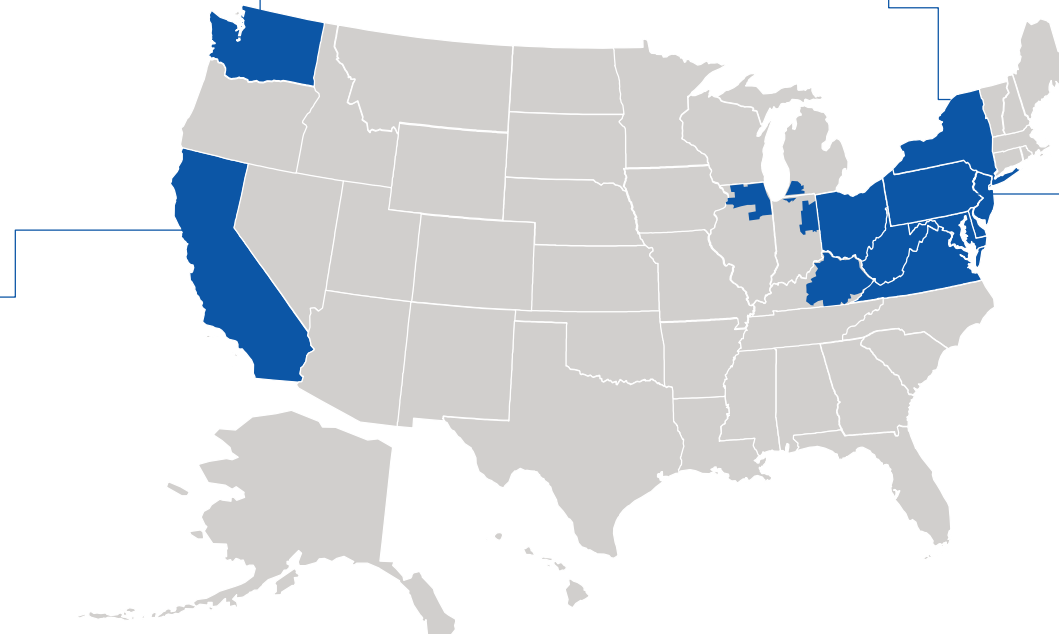
Legislature set a target of 50% renewable electricity by 2030. **CPUC** to provide decision on storage procurement framework by December 2015; also partially approved SCE's Local Capacity Requirements RFO. **SCE** chose 16.3 MW of resource adequacy storage projects under 2014's RFO; also issued an RFO to solicit up to 100 MW to support Preferred Resources Pilot. **PG&E** issued RFO to procure compressed-air energy storage system. **CAISO** approved DERP framework, currently conducting ESDER stakeholder initiative.

Washington

Washington Utilities and Transportation Commission white paper encouraged IOUs to model energy storage costs and benefits

New York

NYSERDA and **Consolidated Edison** jointly released a battery storage safety RFP; **Public Service Commission** ordered utilities to file Distribution System Implementation Plans



PJM

PJM Operating Committee proposed reduction of RegD cap and modified the ranking procedure for self-scheduled and \$0 cost resources. Senior Task Force created to re-evaluate application of marginal benefit function to regulation market.

Federal

Senate introduced American Energy Innovation Act. **Department of Treasury** and the **IRS** solicited public comments on ITC to determine if energy storage should qualify. **NASA** selected two energy storage technology proposals under its Game Changing Development Program.

Front-of-the-Meter Policy and Market Developments, Q3 2015 (Cont.)

Oregon

Oregon PUC opened a docket to comply with the state's procurement targets for IOUs; Oregon DOE issued an RFP for an energy storage demonstration project with up to \$300,000 available to the awardee

New Hampshire

PUC initiated an investigation into grid modernization

Massachusetts

IOUs filed grid modernization plans in August 2015 as directed by DPU; DOER selected a study partner for its energy storage initiative in September 2015

Arizona

TEP selected two 10 MW storage projects under REST

Connecticut

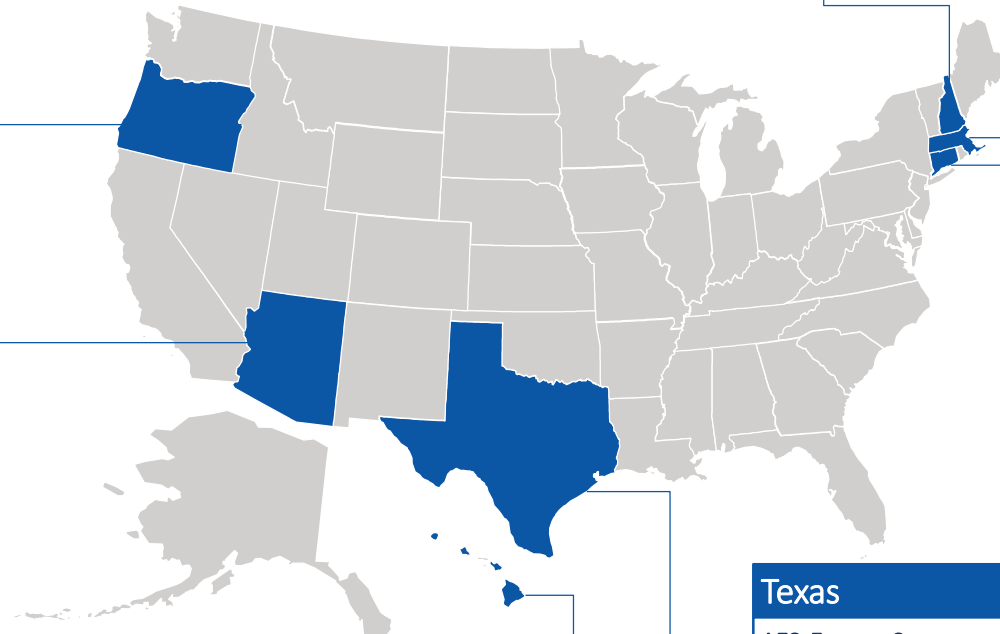
State legislature amended state budget provisions to require Conn. electric distribution companies to submit pilot proposals for grid-side system enhancements; also passed act to permit the creation of storage RFPs

Hawaii

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

Texas

AES Energy Storage announced a 20 MW storage project in Oncor territory which is expected to come on-line in late 2016; ERCOT established DREAM Task Force to determine protocols and market rules for distributed energy resources



Behind-the-Meter Policy and Market Developments, Q3 2015

California

PG&E and **Olivine** opened supply-side pilot for residential customers. **SCE** issued RFO to solicit up to 100 MW to support Preferred Resources Pilot. **SCE, SolarCity** and the **SunSpec Alliance** announced a partnership for the Smart Energy Homes demonstration project. **CAISO** approved DERP framework, and currently conducting ESDER stakeholder initiative. **CPUC** issued Demand Response Auction Mechanism; modifications to SGIP's GHG emission factor still under consideration.

New York

NY PSC announced first demonstration projects under NY REV

New Jersey

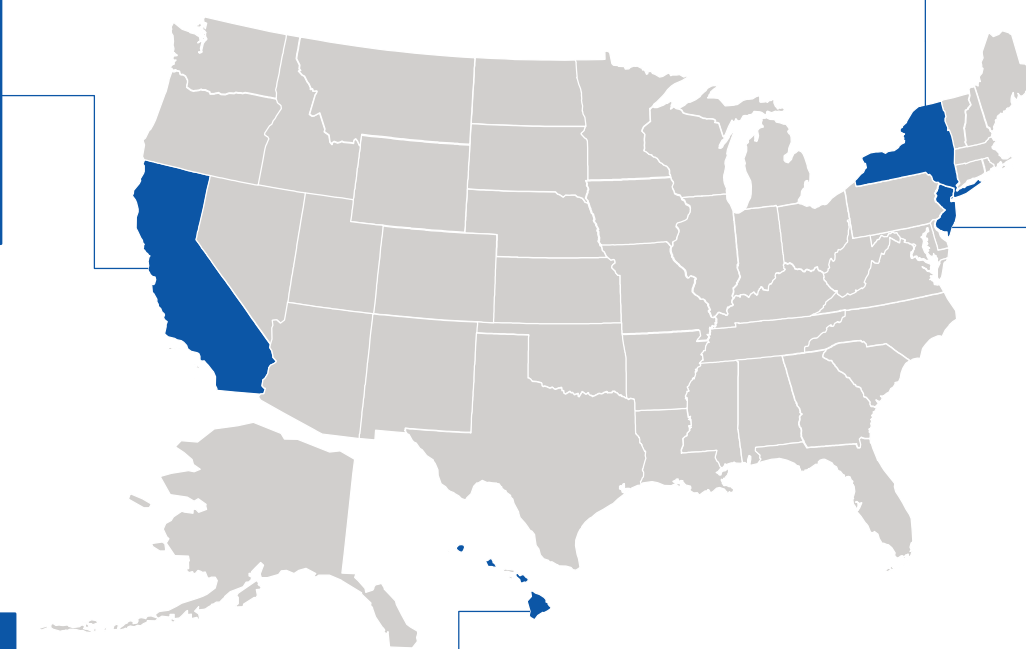
NJ BPU issued the Second Straw Proposal for the FY 2016 Renewable Electric Storage Incentive Program

Hawaii

Hawaii PUC ended traditional net metering for new solar customers and instead offered two new options: self-supply or grid-supply

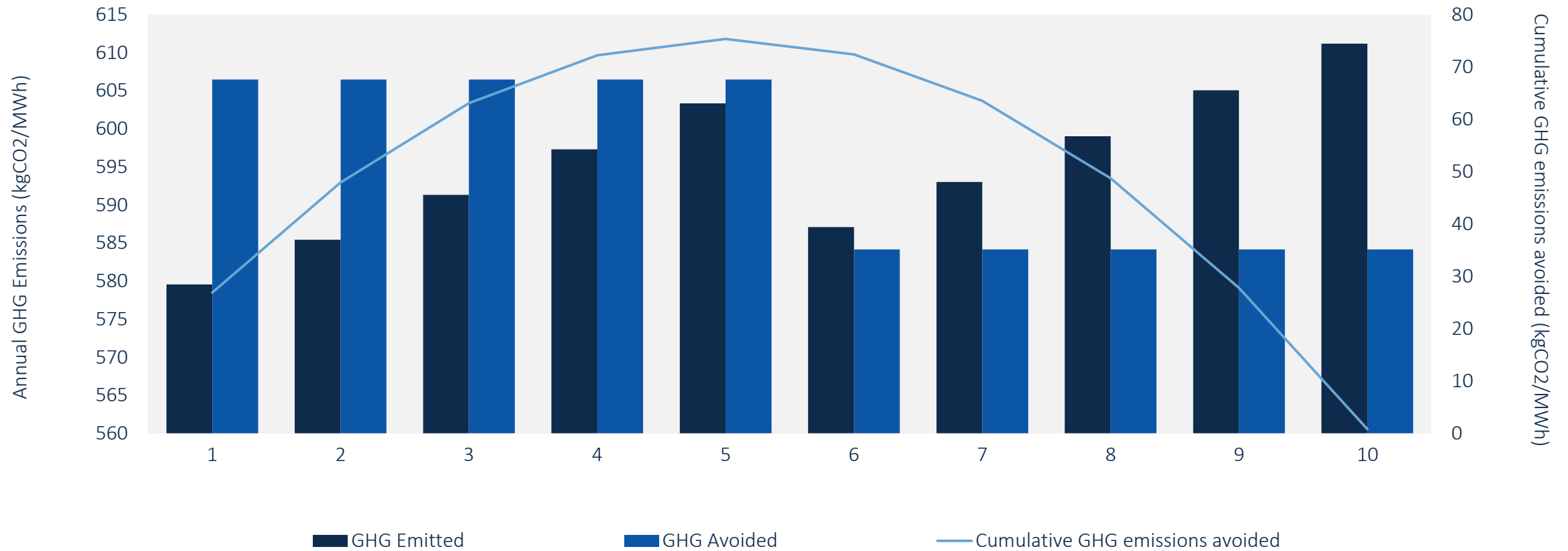
Federal

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Storage Can Help Meet Clean Power Plan Goals: SGIP Case Study

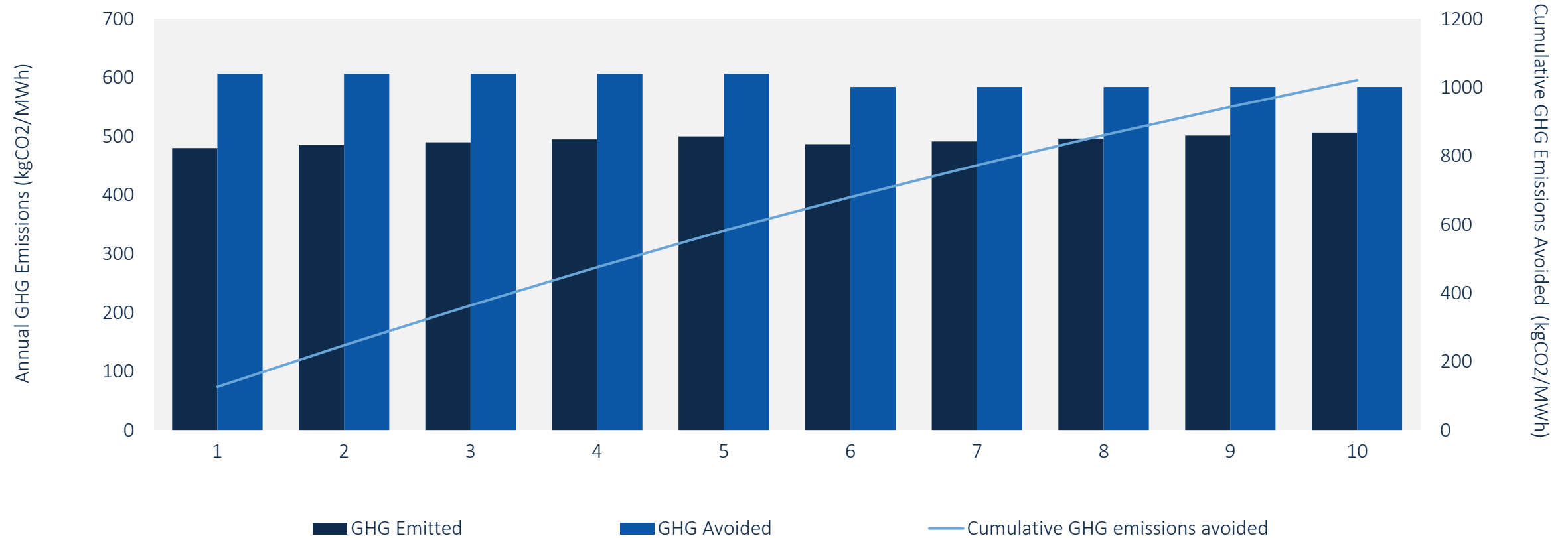
Energy Storage Round-Trip Efficiency: 69.6% Initial Roundtrip Efficiency Case



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

Storage Can Help Meet Clean Power Plan Goals: SGIP Case Study (cont.)

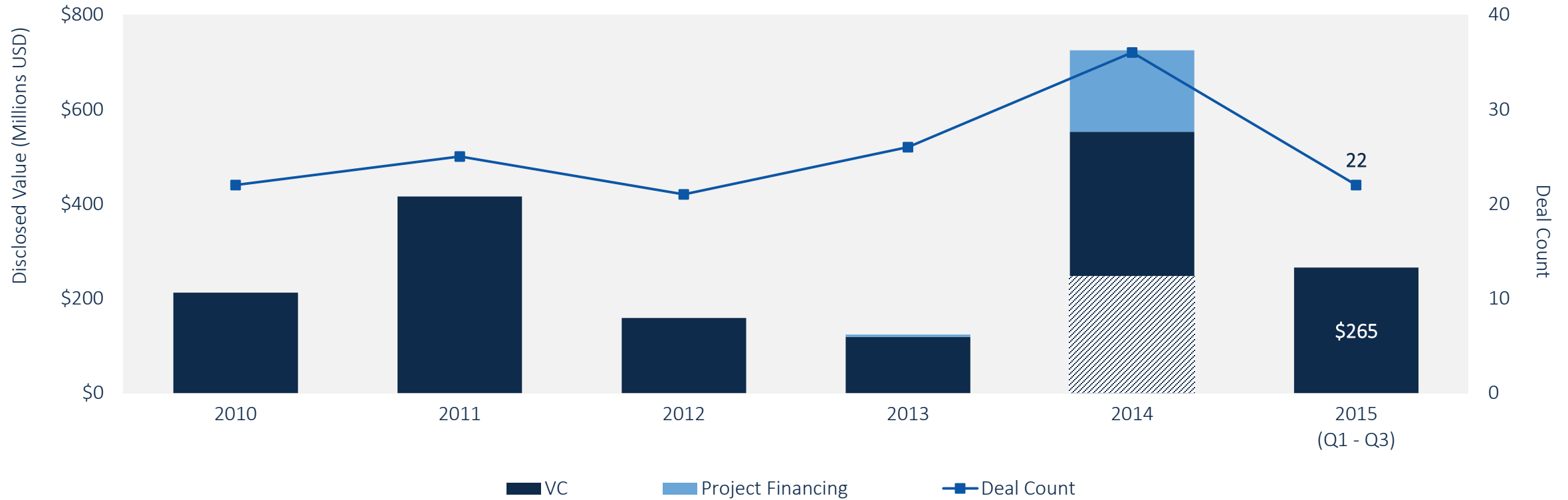
Energy Storage Round-Trip Efficiency: 84% Initial Roundtrip Efficiency Case



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

4 Investment and Vendor Ecosystem

Energy Storage Investments Total \$265 Million in 2015



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

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.

Vendor Ecosystem: Partnerships and M&A in Q3 2015



Vendor Ecosystem: Partnerships and M&A in Q3 2015 (Cont.)



Vendor Ecosystem: Many New Product/Service Announcements in 2015

Younicos



SAMSUNG SDI



TESLA



Thank You!

For further information, please visit www.greentechmedia.com or email sales@greentechmedia.com

December 16, 2015

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