

U.S. Energy Storage Monitor: Q3 2016 Executive Summary



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About This Report

U.S. Energy Storage Monitor is a quarterly publication of GTM Research and the Energy Storage Association (ESA). Each quarter, we gather data on U.S. energy storage deployments, prices, policies, regulations and business models. We compile this information into this report, which is intended to provide the most comprehensive, timely analysis of energy storage in the U.S.

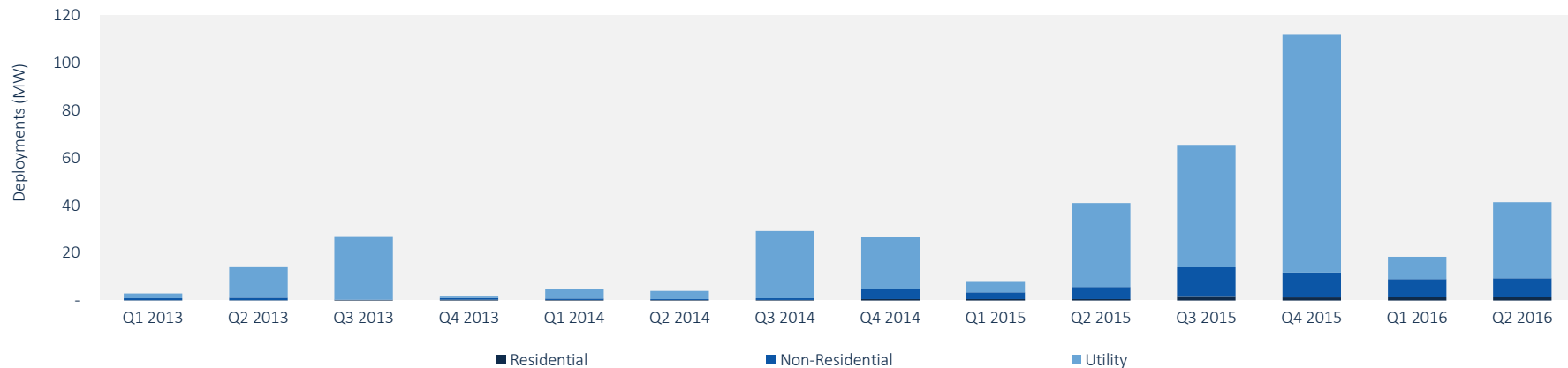
Notes:

- All forecasts are from GTM Research; ESA does not predict future pricing, costs or deployments
- References, data, charts and analysis from this report should be attributed to “GTM Research/ESA U.S. Energy Storage Monitor”
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For more information or to purchase the full report, visit www.energystoragemonitor.com.

Q2 2016 Deployments Grew 126 Percent Quarter-Over-Quarter to 41.2 MW

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



- The U.S. deployed 41.2 MW of energy storage in Q2 2016, increasing from 18.3 MW in Q1 2016 (up 126%) and increasing from 41.0 MW in Q2 2015 (up 1%).
- Behind-the-meter deployments increased slightly from Q1 2016, rising 3% quarter-over-quarter. Both the residential and non-residential segment saw quarter-over-quarter growth, albeit with only a modest increase from Q1 2016. Year-over-year, behind-the-meter deployments increased 66%, growth which is attributable to improved economics for storage and growth in new markets in 2016.
- Front-of-the-meter deployments declined slightly from Q2 2015 versus Q2 2016 (down 10%) but were up over threefold quarter-over-quarter (Q1 vs. Q2 2016).

California and PJM (Excl. NJ) Account for 82 Percent of Deployments Since Q1 2013

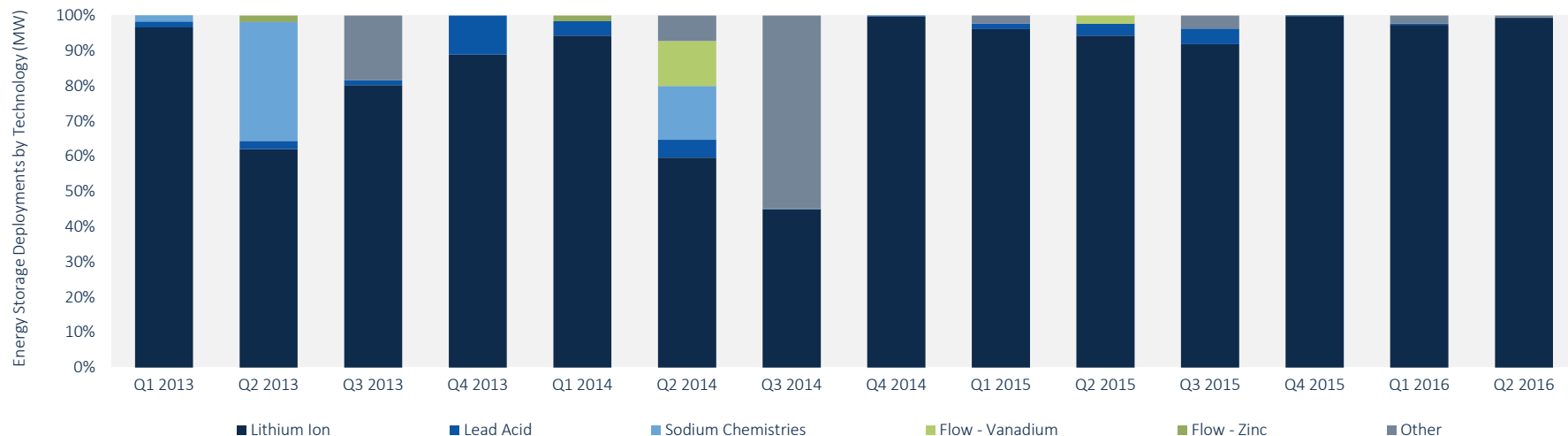
Rank	Residential	Non-Residential	Utility
1	All Others*	California	PJM (excl. NJ)
2	California	All Others*	All Others*
3	Hawaii	PJM (excl. NJ)	California

- PJM (excl. NJ) and California collectively account for the majority of U.S. energy storage deployments in megawatt terms (82% combined market share, down from 92% at the end of Q2 2016)
- For the first time, the category “All Others” surpassed California as the largest cumulative residential market. This transition speaks to the fact that developers and storage system vendors are exploring a number of newer markets across the U.S., though individually these state markets are still quite small. “All Others” markets account for 34% of total residential MW deployed since Q1 2013.
- California remains the largest non-residential energy storage market, with 83% of the total megawatts deployed in this segment.
- Utility-scale deployments are just as concentrated in PJM and California. PJM has historically seen significant deployments for frequency regulation in its RegD market. “All Others” markets account for 44 MW of the total utility-scale segment since 2013.

*GTM Research is currently monitoring seven individual markets. Complete coverage of all markets is available in the full report.

Lithium-Ion Chemistries Dominated Grid-Tied Storage Deployments at 99% in Q2 2016

Quarterly Energy Storage Deployment Share by Technology (MW %)

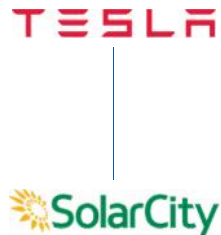


- Following the trend of the last seven quarters, Q2 2016 deployments were dominated by lithium-ion batteries, which held 99% market share with 40.9 MW deployed.
- The category “Other Technologies” came in second, with 0.3 MW of aqueous batteries deployed in Q2 2016.

**“Other” includes flywheel and unidentified energy storage technologies

Tesla Announced Plans to Acquire SolarCity at \$2.6 Billion

Proposed \$2.6 Billion Deal Will Create One of the Largest Vertically Integrated Clean Energy Companies

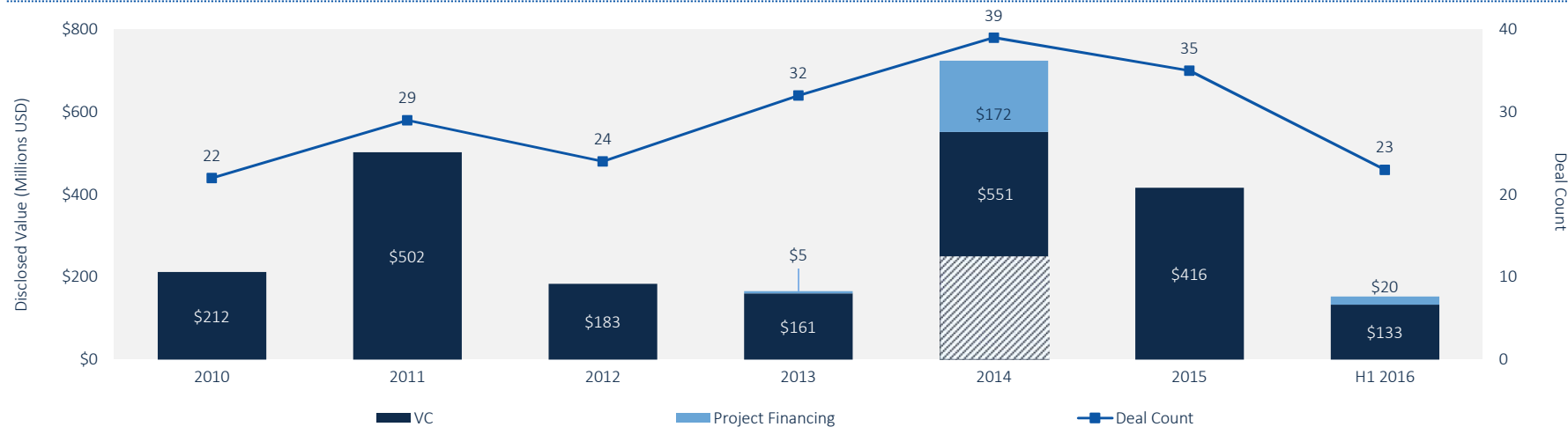


Offer Details

- In June 2016, Tesla announced plans to acquire SolarCity
- Initial proposal represented value of \$26.50 to \$28.50 per share, a 21% to 30% premium over the closing price of SolarCity's shares (based on data from June 20, 2016)
- In late July 2016, Tesla and SolarCity filed Form 8-K with the U.S. Securities and Exchange Commission, announcing their merger agreement
- The merger agreement consisted of an all-stock transaction with an equity value of \$2.6 billion based on the 5-day volume weighted average price of Tesla shares as of July 29, 2016; SolarCity common stock was valued at \$25.37 per share based on the 5-day volume weighted average price of Tesla shares as of July 29, 2016. The filing estimated \$150 million in cost synergies in the first full year following closing.
- If approved by shareholders, the transaction is expected to close in Q4 2016
- Tesla's goal is to create a vertically integrated clean energy company that can offer solutions across the value chain, including energy storage, solar PV and electric vehicles

Corporate Investments in Energy Storage at \$74 Million in Q2 2016

Disclosed Corporate Investments in Energy Storage, 2010-Q2 2016 (Million \$, Number of Deals)

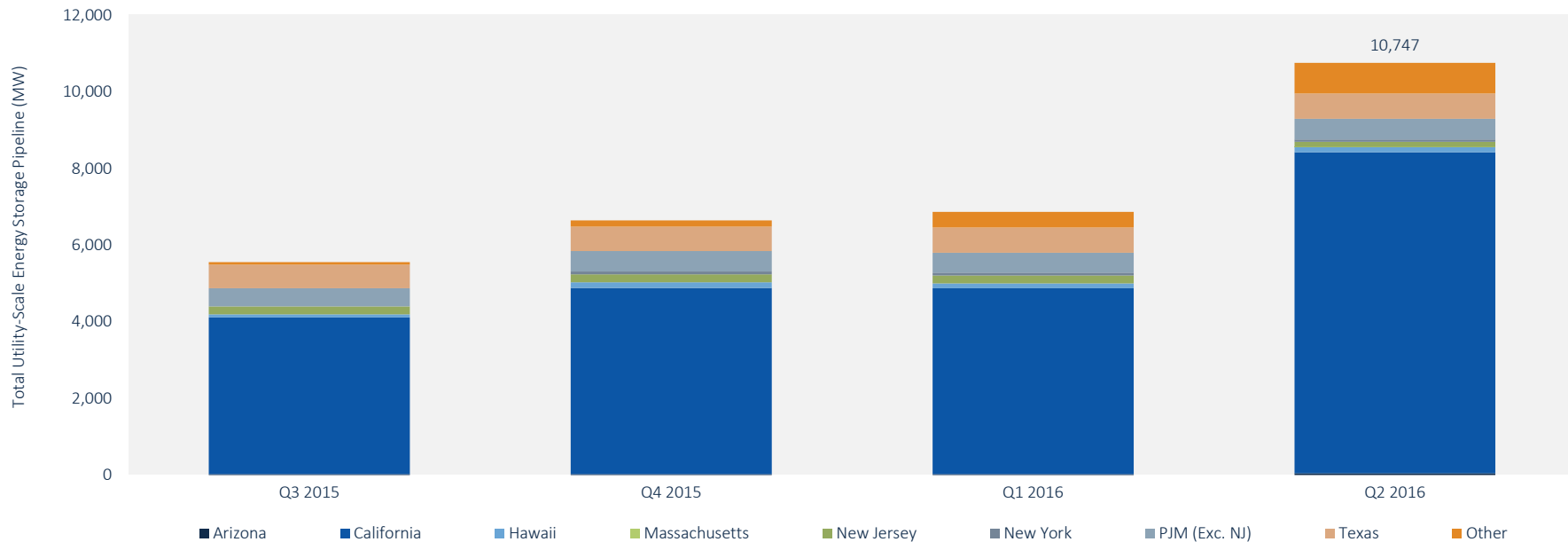


- The largest announced deal in Q2 2016 was from Aquion, which raised \$33 million in a funding round including both “existing and new investors,” according to the company.
- M&A activity included Doosan’s acquisition of 1Energy Systems, Tesla’s announced merger with SolarCity, Engie’s acquisition of an 80% stake in Green Charge Networks, and Exergonix’s acquisition of the assets of Coda Energy. Total’s acquisition of Saft closed in July 2016.

Note: The total disclosed investment in 2014 was boosted by a rumored \$250 million investment in Boston-Power (shaded in the figure above); 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.

U.S. Utility Energy Storage Pipeline Grew 57 Percent to 10.7 GW in Q2 2016

U.S. Utility-Scale Energy Storage Pipeline by Market Over Time (MW)



Source: GTM Research

Front-of-the-Meter Policy and Market Developments, Q2 2016

Oregon

PGE issued an RFI to solicit information on players across the energy storage value chain. **Oregon PUC** held a workshop to discuss utility plans for compliance with HB 2193. **BPA** issued an RFO for non-wires alternatives for congestion relief. **FERC** opened comments for proposed Owyhee Pumped Hydro project.

California

CPUC directed **SCE** and advised **SDG&E** to procure energy storage in response to the Aliso Canyon Gas Leak; **SCE** issued RA Only RFO (recently requesting 27 MW procurement through this RFO) and DBT RFP to meet this objective, while **SDG&E** made accommodations in LCR procurement to propose 37.5 MW procurement. **PG&E**, **SCE** and **SDG&E** filed briefs relating to their 2016 energy storage procurement plans. **FERC** approved **CAISO** DER aggregation. **CAISO** continued work on ESDER Track II.

Vermont

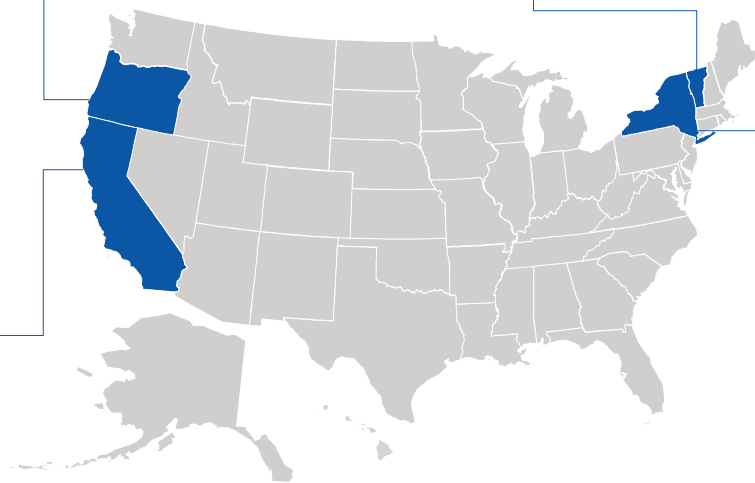
Green Mountain Power announced comprehensive energy transformation project for Panton, Vermont.

New York

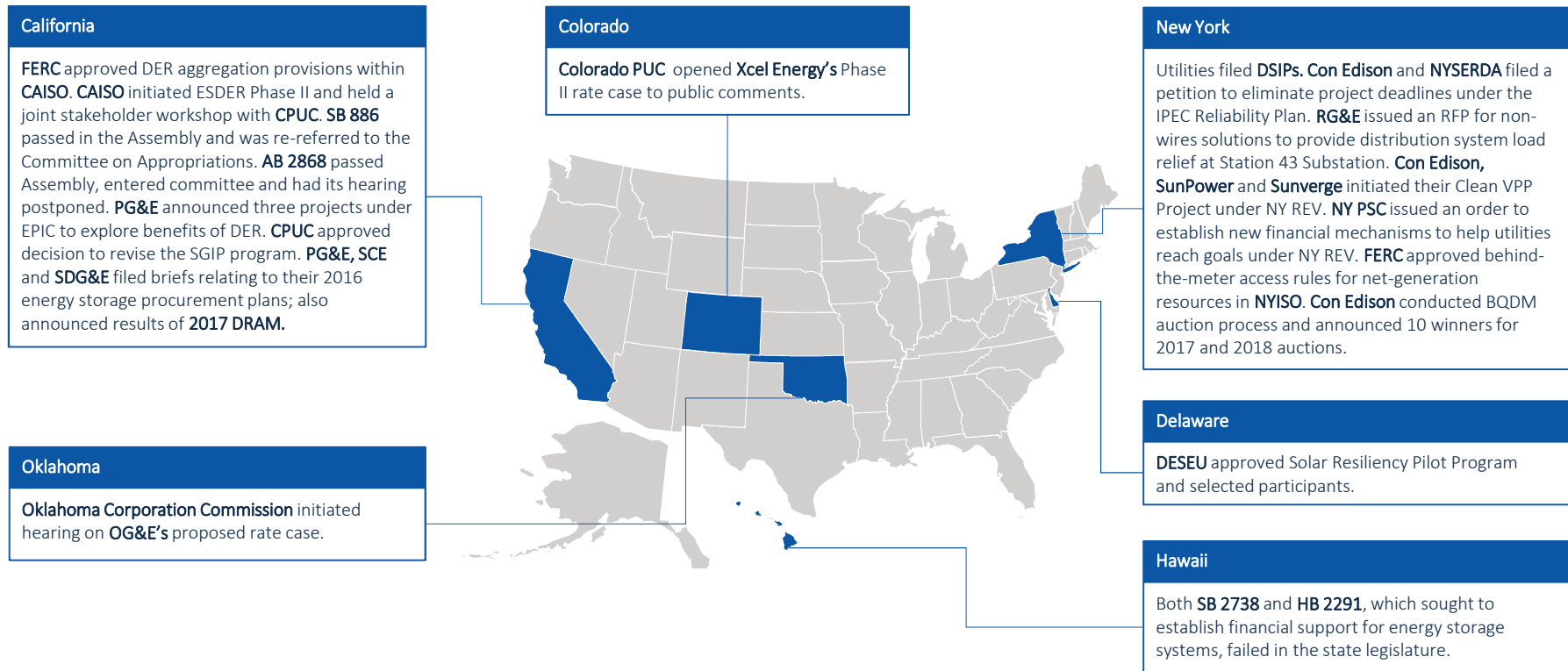
NY PSC held a technical conference to discuss the role of energy storage in achieving the state's clean energy goals; also issued an order to establish new financial mechanisms to help utilities reach goals under NY REV. **The state senate** introduced S. 7533, which may lead to the establishment of energy storage procurement targets for utilities. Utilities filed **DSIPs**. **RG&E** issued an RFP for non-wires solutions to provide distribution system load relief at Station 43 Substation.

Federal

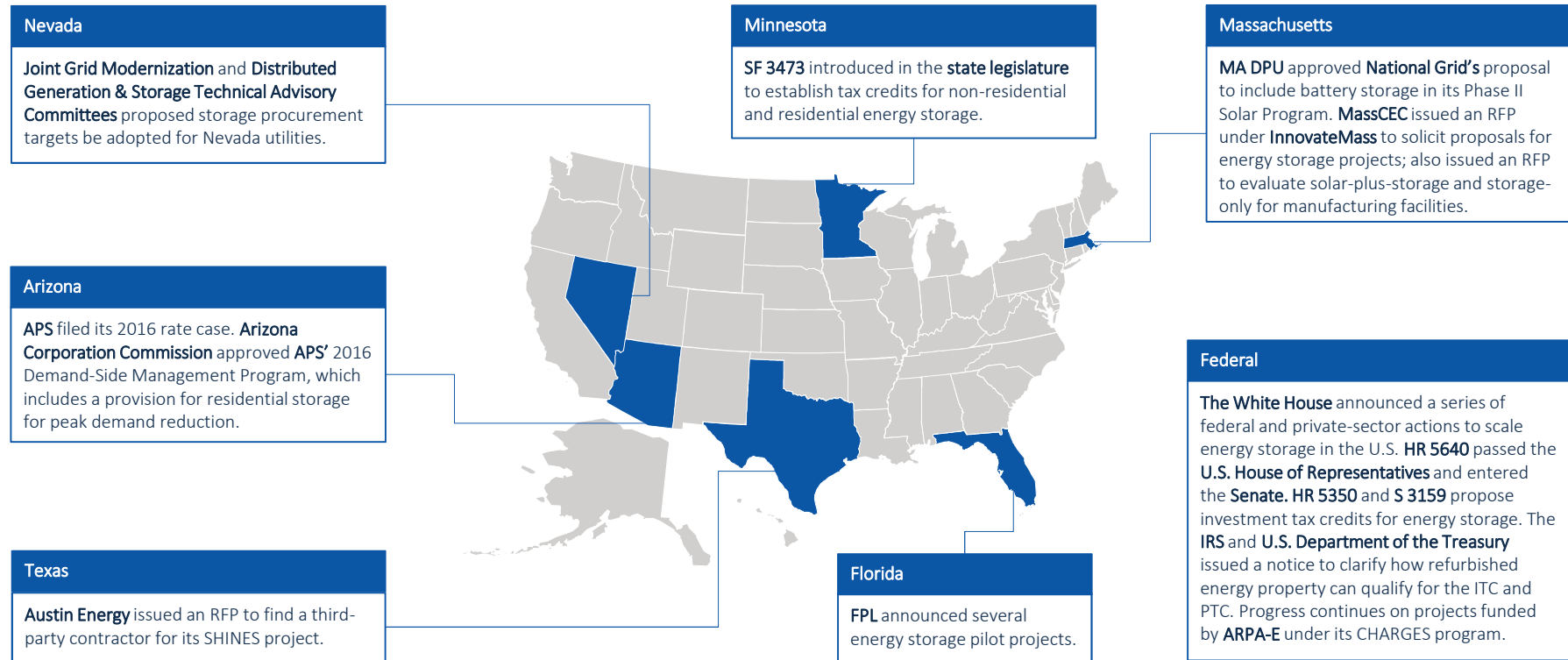
The White House announced a series of federal and private-sector actions to scale energy storage in the U.S. **HR 5640** passed the **U.S. House of Representatives** and entered the **Senate**. **HR 5350** and **S 3159** propose investment tax credits for energy storage. The **IRS** and **U.S. Department of the Treasury** issued a notice to clarify how refurbished energy property can qualify for the ITC and PTC. **PNNL** and **SNL** updated the Protocol for Uniformly Measuring and Expressing the Performance of Energy Storage Systems. Six ISOs and 43 stakeholders submitted comments on **FERC AD16-20** inquiry.



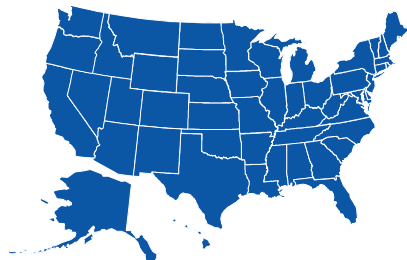
Behind-the-Meter Policy and Market Developments, Q2 2016



Behind-the-Meter Policy and Market Developments, Q2 2016 (Cont.)



White House: Summit on Scaling Renewable Energy and Storage With Smart Markets



- In June 2016, the White House announced a series of federal and private-sector actions to scale energy storage in the U.S. at the Summit on Scaling Renewable Energy and Storage With Smart Markets.
- The salient commitments to action in this announcement are:
 - A new report by the White House Council of Economic Advisers on the technical and economic considerations and opportunities relating to the grid integration of renewable energy resources.
 - The federal government committing to increasing its storage and microgrid capacity through programs that will make federal and military bases more resilient and provide funding for microgrids in rural communities.
 - The U.S. Department of Energy promoting access to and standardization of energy data.
 - Sixteen developers and power companies in at least eight states announcing new storage procurement and deployment targets for the next five years.
 - Investors announcing \$130 million in new funding commitments for energy storage.
 - Power companies and developers committing to deploy smart water heaters, smart meters, and demand response programs.

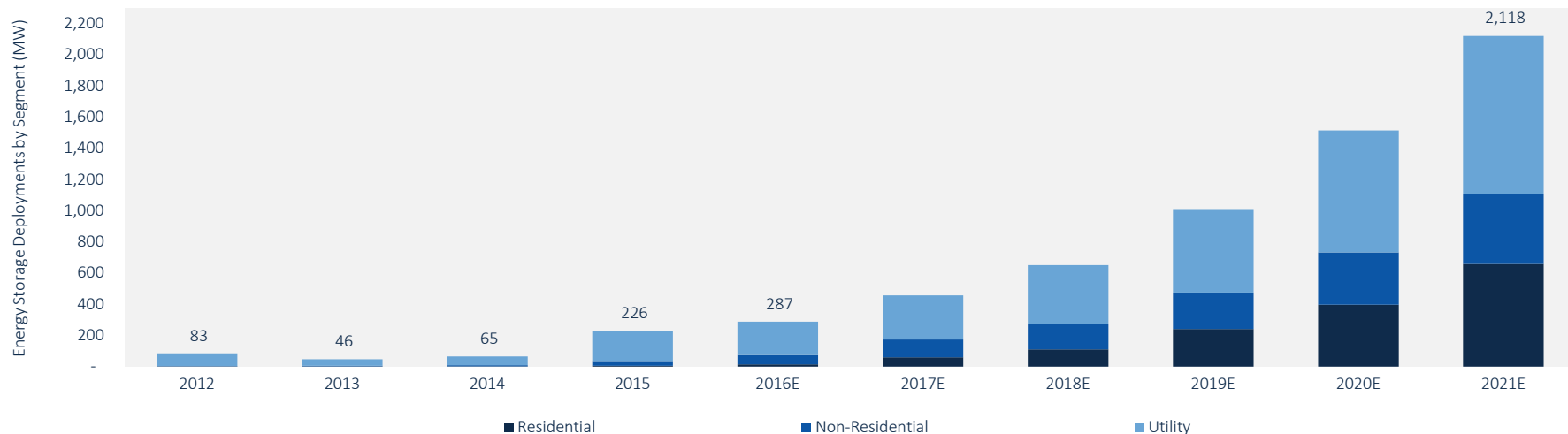
In aggregate, these new procurement, deployment and investment commitments could lead to approximately \$1 billion in investments in energy storage.

White House: Summit on Scaling Renewable Energy and Storage With Smart Markets (Cont.)

- Broadly speaking, the potential impacts for energy storage can be broken down into three categories:
 - **Storage for Making Military Facilities More Resilient:** The U.S. Navy has committed to three energy storage projects, including a 50 MW to 100 MW grid-scale storage project at Naval Weapons Station Seal Beach in California, a 6 MW solar plus 6 MW/18 MWh storage project at Naval Base Ventura County in California, and a second-use pilot project in Indiana. Of all the 33 commitments, those made by the U.S. Navy truly stand out and have a potential to move the market beyond the current business-as-usual environment.
 - **Grid Operators, Power Companies, State Agencies and Nonprofit Organizations Strengthen Existing and Announce New Storage Commitments:** While announcements from California PUC, ISO and IOUs are nothing new, the most recent details more clearly articulate their ongoing efforts. The same can be said about Massachusetts' energy storage initiative. Announcements from Duke Energy and NextEra Energy signal an active interest on the part of utilities in regulated markets to explore energy storage for providing reliability benefits and renewable integration.
 - **Private-Sector Commitments Don't Translate Into Significant Extension of Business-as-Usual:** Though many of these commitments appear lofty, it's difficult, if not impossible, to parse out which ones are truly incremental versus expected business-as-usual progression. Beyond the semantics, however, these commitments will put these companies in the public (and investment community's) eye, making it imperative that they follow through on these targets.
- Adding a nationwide public-private storage push into the equation will provide a much-needed boost to the market, as well as a likely upward bump in the storage outlook. The market will receive a direct lift from the program investments and surge due to positive network effects from a well-funded and expanding industry ecosystem.

U.S. Energy Storage Market Will Grow Ninefold From 226 MW in 2015 to 2.1 GW by 2021

U.S. Annual Energy Storage Deployment Forecast, 2012-2021E (MW)

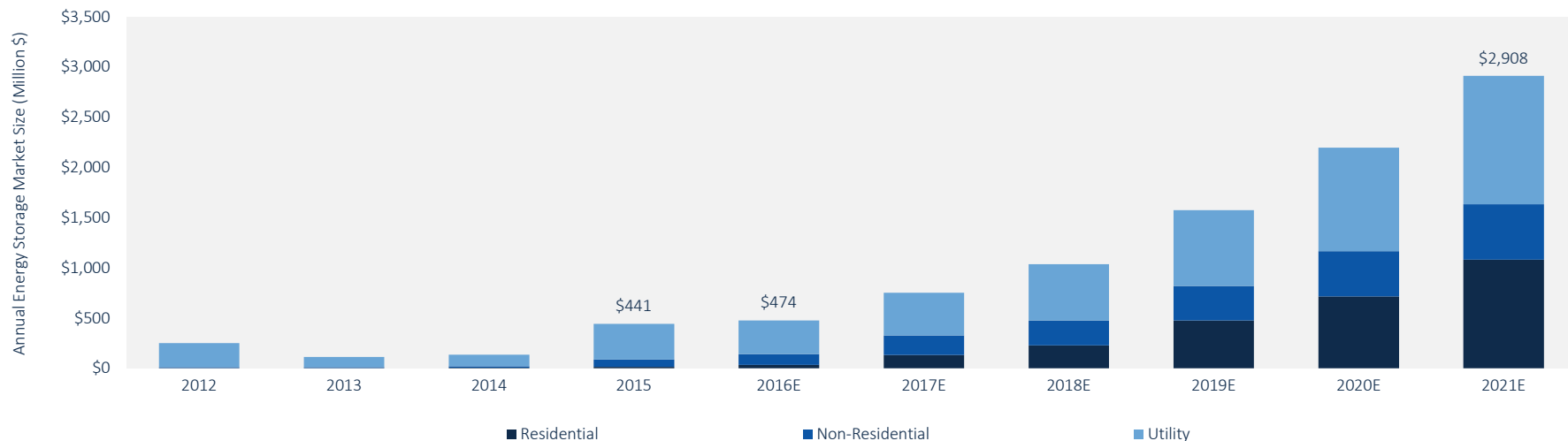


Source: GTM Research

- We expect the U.S. energy storage market to grow from 226 MW in 2015 to almost 300 MW in 2016 and over 2.1 GW by 2021, nine times the size of 2015 market.
- The behind-the-meter sectors will grow from 15% share in 2015 to account for a quarter of the deployments this year, and will become a much larger share of the market by 2021 at 52%.

U.S. Energy Storage Market Will Be Worth \$2.9 Billion by 2021

U.S. Annual Energy Storage Market Size, 2012-2021E (Million \$)



Source: GTM Research

- By 2021, the U.S. energy storage market is expected to be worth \$2.9 billion, a sixfold increase from 2015.
- The utility-scale segment will continue to be the largest segment through 2021, growing from \$356 million in 2015 to \$1.3 billion in 2021. The combined behind-the-meter segment's annual market will be worth about \$1.6 billion in 2021.

U.S. Energy Storage Monitor

Produced in a collaboration between GTM Research and the Energy Storage Association (ESA), the U.S. Energy Storage Monitor is the industry's only comprehensive quarterly research report on energy storage markets, deployments, policies, financing and regulations in the U.S. The report is available for purchase quarterly or as an annual subscription.

Executive Summary vs. Full Report Content

Content	Executive Summary	Full Report
Energy Storage Deployments	National Aggregate	By State and Market Segment
Technology Coverage	Deployments by Technology	Status by Technology
Market Trends	National Highlights	Detailed Analysis
Pricing Data	Not Available	Quarterly Index
Deployment Forecast	National Aggregate	By State and Segment

Report Pricing

Member Status	Executive Summary	Full Report (PDF Enterprise License)	
		Individual Quarterly Report	Annual Subscription-4 reports
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