



DISTRIBUTED STORAGE MARKET

MADRI: PHILADELPHIA, PA

MARCH 3, 2015

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MARKET INTELLIGENCE • ANALYSIS • BENCHMARKING

Table of Contents

- Section 1 » Definitions
- Section 2 » Business Cases
- Section 3 » Market Forecast
- Section 4 » Cost Curves
- Section 5 » Final Lessons

Definitions

- » Community Storage: storage at the distribution transformer
 - › Customer: utility
 - › Purpose: load-shifting, FR, voltage support
 - › Fleets: possible, but rare
 - › Ownership: utility
- » Commercial Storage: storage for non-domestic end users
 - › Customer: commercial or industrial user
 - › Purpose: energy cost management, energy cost management, managing ratcheting
 - › Fleets: unlikely under current market conditions, but could move in this direction
 - › Ownership: customer, leasing, and third party

Definitions

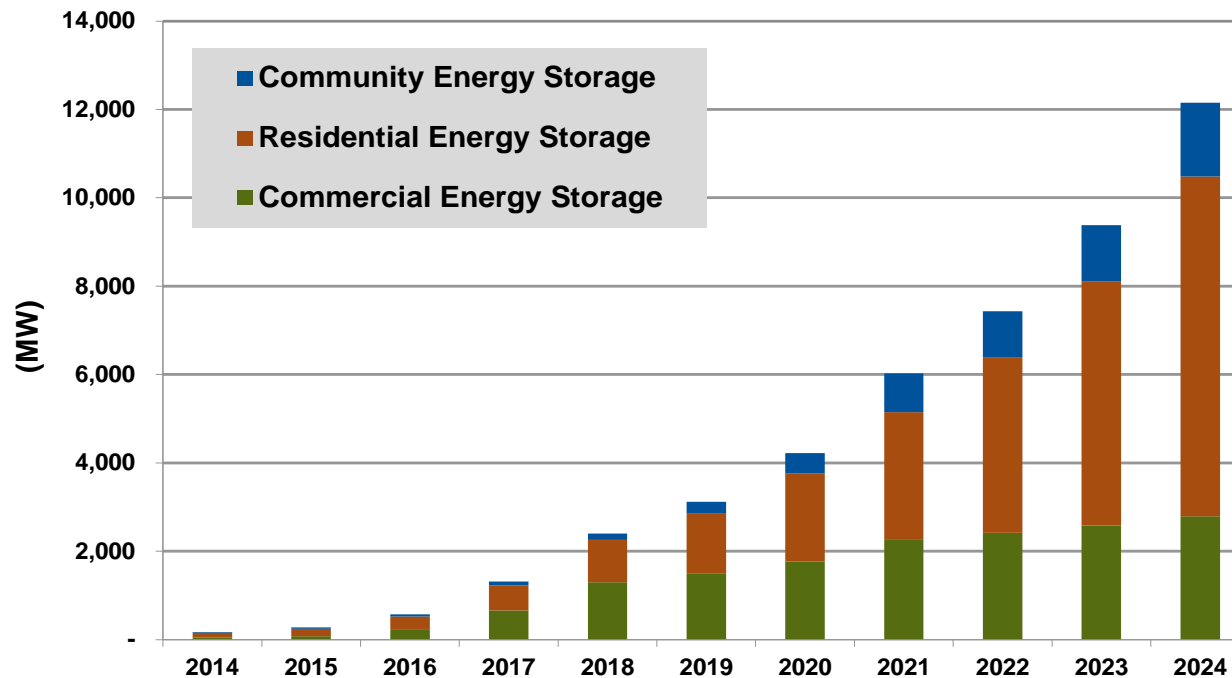
- » Residential Storage: storage for domestic end user
 - › Customer: homeowner
 - › Purpose: energy cost management, maximizing solar PV
 - › Fleets: yes, but emerging
 - › Ownership: customer and third party

- » **Community** : challenging because storage must be rate-based, high transaction cost, early commercialization failed, some utilities found it was not “cost effective”
- » **Commercial**: requires peaky and somewhat predictable loads to allow for correct sizing of battery system, hardware and software are sometimes packaged as separate offers with separate business cases, requires demand charges
- » **Residential**: driven largely by subsidies, requires low interconnection fees, typically paired with solar PV (everywhere except Japan), and used to maximize “self consumption”

Distributed Storage Global Forecast

- » Commercial storage is the fastest growing market for distributed storage, primarily in the U.S.
- » Residential storage is the second fastest growing market, but mainly outside the U.S.
- » Community storage is seeing a renaissance mainly in Europe

Installed DESS Power Capacity by Application, World Markets: 2014-2024

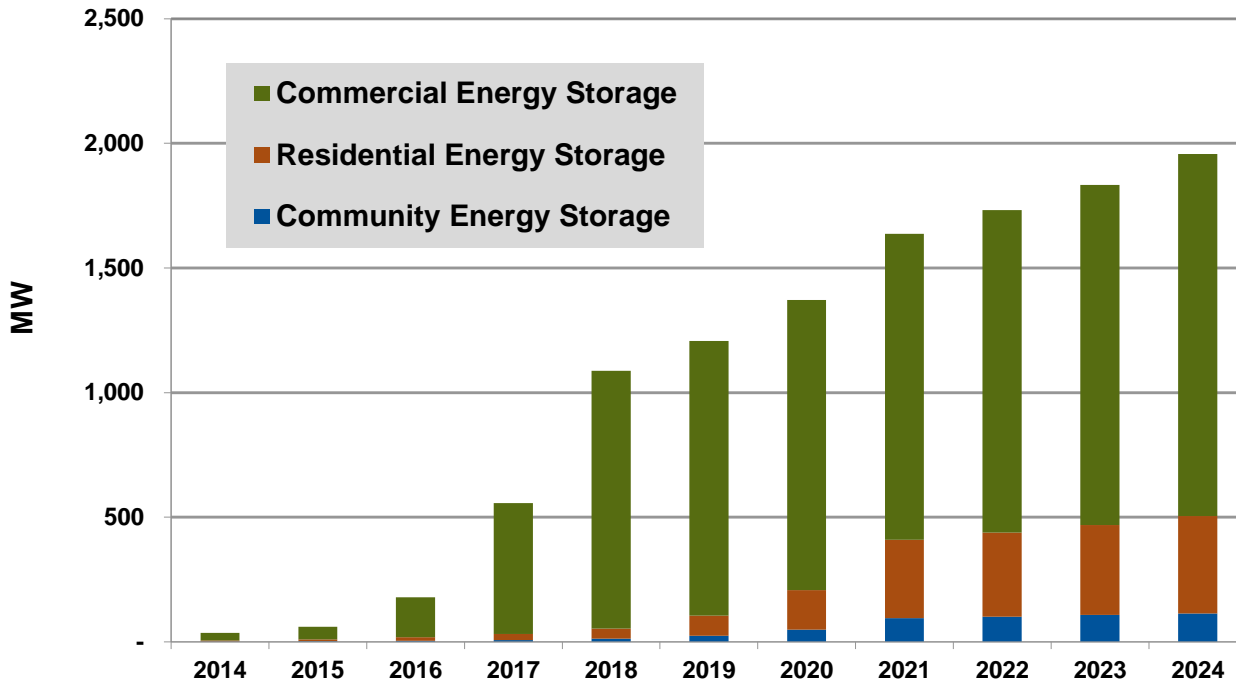


(Source: Navigant Research)

Distributed Storage North American Forecast

- » Nearly all Residential ESS will be paired with PV
- » Commercial ESS + PV is less developed, but could easily emerge as another application as PV is coincident with afternoon load

Installed DESS Power Capacity by Application, North America: 2014-2024

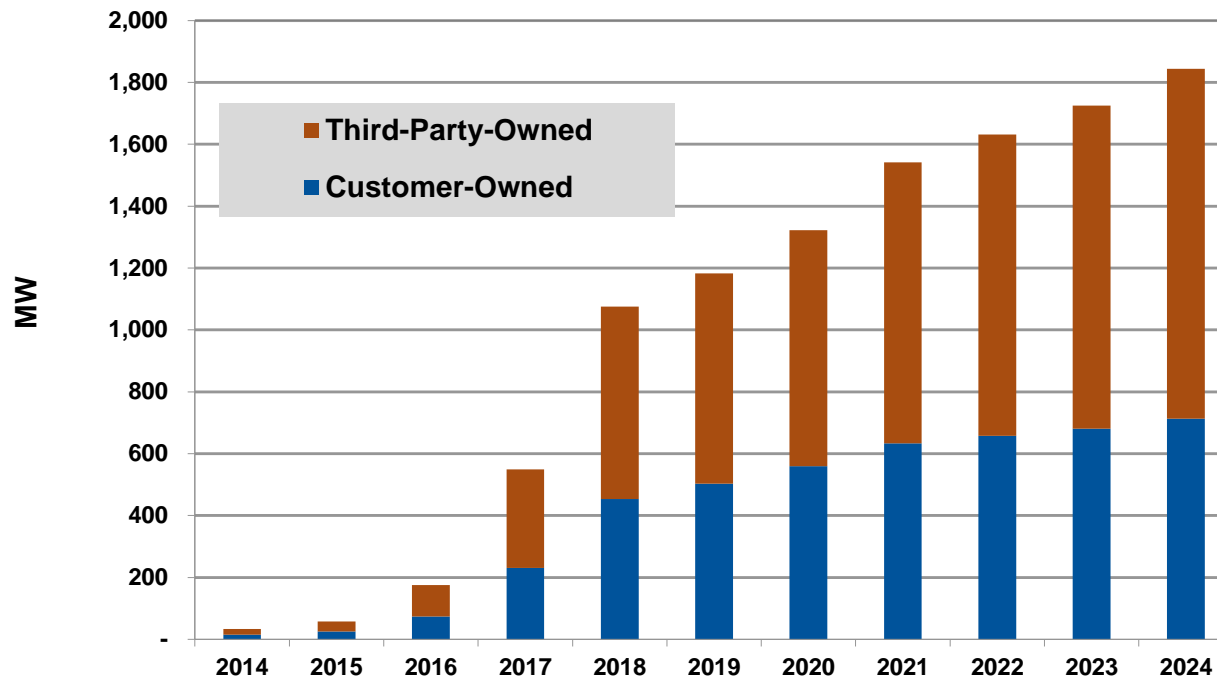


(Source: Navigant Research)

Distributed Storage North American Forecast by Ownership Structure

- » TPO (third party ownership) revolutionized customer-sited solar, the same is projected to happen with energy storage

New Installed DESS Power Capacity by Ownership Model, North America: 2014-2024

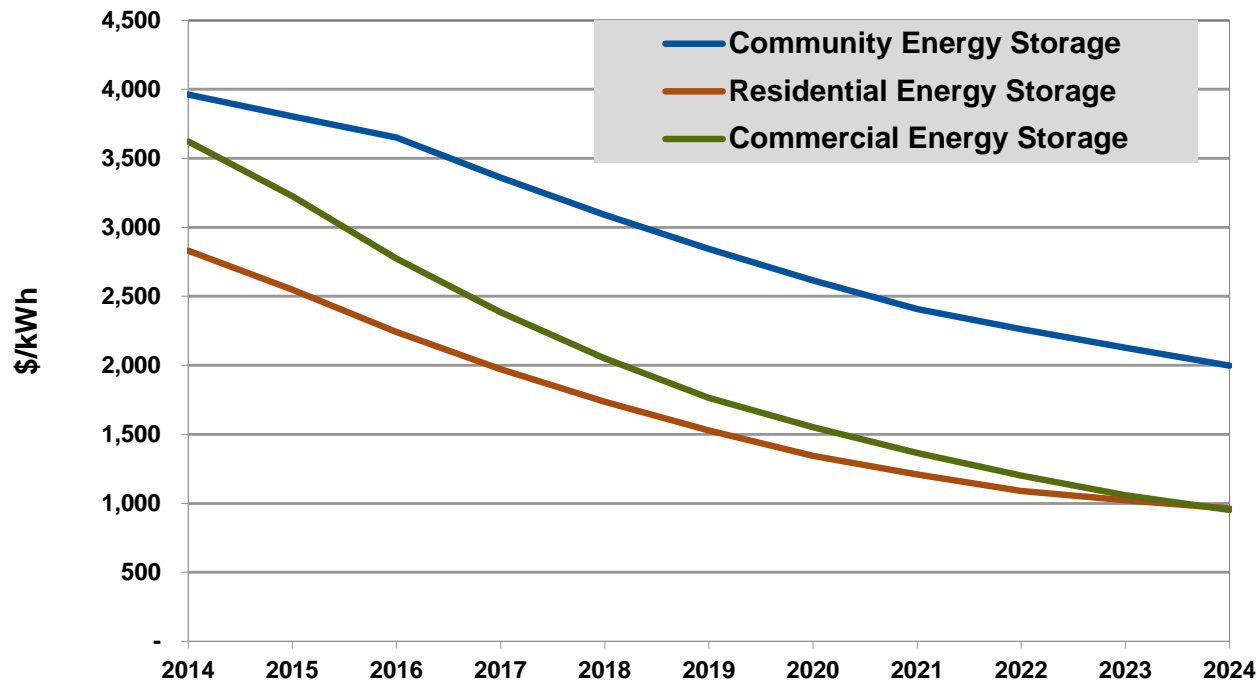


(Source: Navigant Research)

Cost Curves for Lithium Ion Systems, Before Subsidies

- » Storage is still relatively expensive, although TPO changes the customer motivation for adopting storage; residential and commercial integrators can take advantage of large pipelines to secure better terms from hardware suppliers

Lithium Ion Installed Cost, by Application, World Markets: 2014-2024



(Source: Navigant Research)

Final Lessons

- » For behind the meter storage, rate structures and interconnection fees are critical to the business case
- » The best customers for commercial storage have volatile energy costs, and consistent peakiness
 - › One failure to cut a peak can ruin the business case for an entire month
 - › Value add is in the software and controls
 - › The next frontier will be data and data services around commercial storage
- » Community storage hinges on PUC acceptance, very few standard offers in the market keep costs high

