



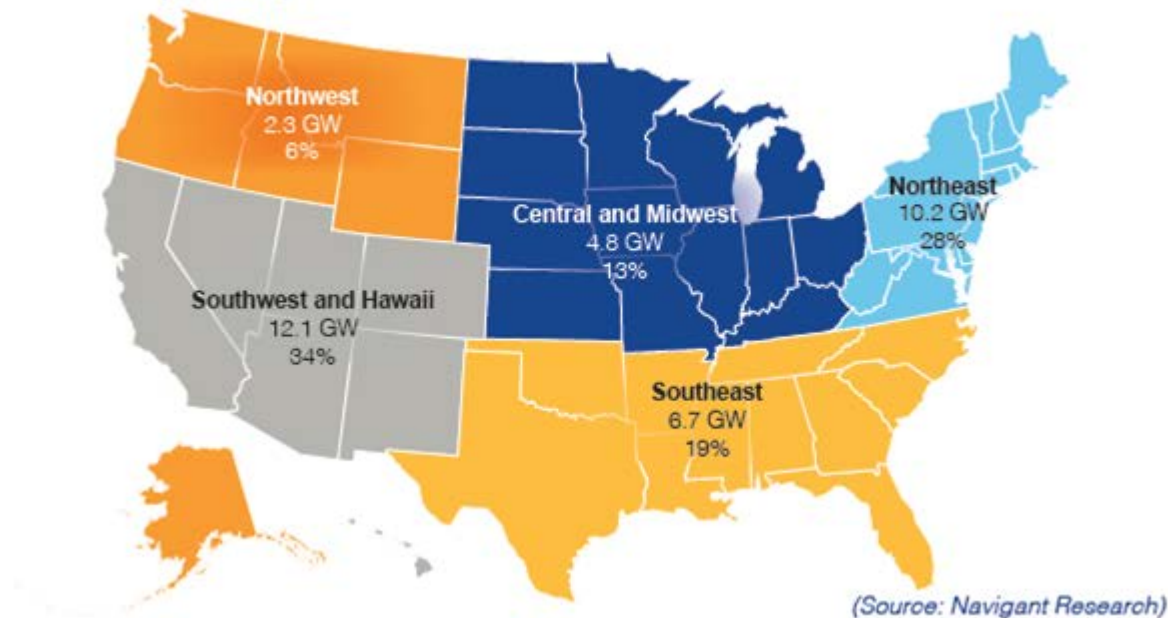
## Storage as the Next Breakthrough Technological Solution

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# ENERGY STORAGE IS EXPECTED TO GROW

- Energy Storage Association predicts 35 GW by 2025

Figure 4.1 Cumulative U.S. Energy Storage Energy Capacity Additions by Region, Vision Case, (2017-2025)



ESA 35X25 A Vision for Energy Storage

# ENERGY USE CASE COSTS

- Costs vary with use case and technology
- Primary technologies
  - Lithium Ion
  - Flow batteries
  - Pumped Storage Hydroelectric
- Other technologies
  - Lead acid
  - Flywheels

## ENERGY STORAGE COSTS DECLINING

- Lazard (2017) projects 36% decline in lithium ion costs from 2017 to 2021, and 19% decline in same period for flow batteries
- IRENA (October 2017): by 2030, installed costs of battery energy storage systems could fall by 50-60%
- ESA (35x25) Report: battery system costs (primarily lithium ion) declining 50% every 3-4 years

# ENERGY STORAGE USE CASES

- Front-of-Meter
  - Connected at Transmission or Distribution Levels
  - Merchant storage projects (e.g., MISO, PJM)
  - Transmission & distribution deferrals
  - Long-term contract structures
    - Energy Storage Tolling Agreements
    - Capacity Services Agreements
  - Co-Location with Solar, Wind
- Behind-the-Meter (BTM)

## POLICY DRIVERS

- FERC Order 841
- State Procurement Targets (e.g., California, New York, New Jersey, Massachusetts)
- Subsidies (e.g., California's SGIP)
- Tax Credits
  - Solar + Storage
  - Standalone Credit?

## RESOURCES

- Energy Storage Handbook:  
<http://www.klgates.com/epubs/Energy-Storage-Handbook-Vol2/>
- Energy Storage: 2017 Year in Review:  
<http://www.klgates.com/ePubs/Edge-February-2017/>
- KLG 2d Annual Energy Storage Conference—  
DC, November 29

**Questions?**



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