

EXECUTIVE SUMMARY

35x25

A Vision for Energy Storage



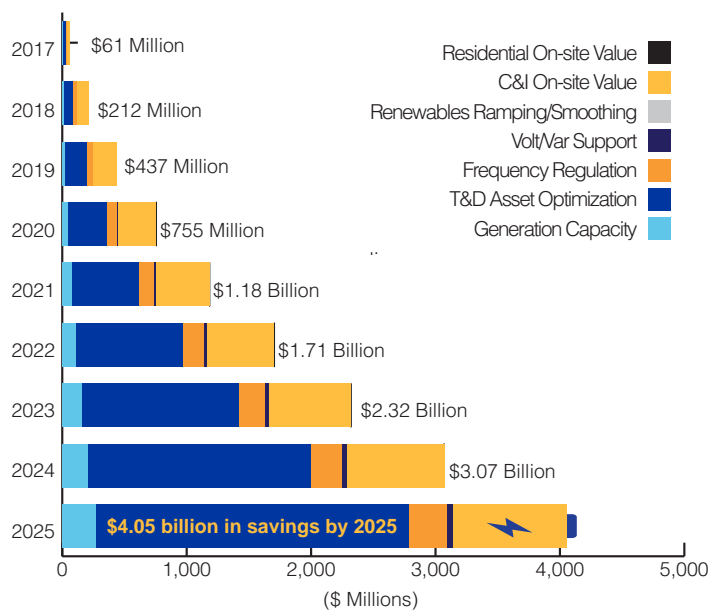
November 2017

A VISION FOR 2025

The United States power sector is in the midst of profound transformation. Energy demands and the role of the consumer are shifting, bringing new stresses and strains to an aging grid. Energy sources are also in transition, as the economics of natural gas and electricity continue to disfavor coal, and renewables increasingly prove to be a least-cost option in more and more markets. Recently, advancements in energy storage technologies are improving the economics of accommodating these changes, while improving reliability and resilience, and enhancing electric system performance.

These trends necessitate an electricity network that is flexible and adaptable to the rapidly changing needs of the grid and consumers. Dramatic and recent decreases in pricing, advances in technology, and attention to improving resilience are all factors contributing to an exponential growth in energy storage markets over the next several years. This confluence of forces will create an opportunity to innovate and drive the deployment of more than 35 gigawatts (GW) of new energy storage systems in the U.S. by 2025.

Estimated Cumulative Grid Operational Cost Savings from U.S. Energy Storage Deployment by Application, Vision Scenario (2017-2025)



MARKET DRIVERS FOR GROWTH

Although planning and investment in the electric power sector have evolved over the last century, the U.S. continues to rely almost entirely on large, centralized power plants and a one-way power flow. Until recently, decision-making could be entirely based on least-cost planning, as every choice had essentially the same value, and only limited sectors of the economy were vulnerable to electricity outages. Today, our economy is increasingly electrified and digitized. The electrification of transportation, data centers, HVAC, communications, industry and manufacturing means each of these interconnected networks are more reliant on the electricity grid to function properly. This significant expansion of demand will underpin the role of the centralized grid, but will also expose each of these segments of our economy to increasingly expensive disruptions.

Peaks, variations in demand, under- or over-supply of generation, and the inflexibility to respond to changing demands at any moment are all disruptive forces – even during normal operations. Every disruption increases the cost of delivering power for consumers, and the value of every kilowatt-hour delivered is steadily rising. As the electric grid increasingly plays a critical role at the center of multiple electrified networks, the cost, impact, and frequency of power disruptions will weigh on the entire U.S. economy. Energy storage addresses these vulnerabilities, and is the building block of a disruption-proof grid.

The key to integrating these networks lies in system flexibility and efficiency - building more buffer into the system in the form of on-demand capacity and responsive balancing capability. Fast responding energy storage addresses second-to-second fluctuations to match supply and demand without the need for inefficient fossil fuel power plants to wait on standby. Transmission- and distribution-scale energy storage systems improve market efficiency and operations, can provide backup power for entire communities, and enable further integration of dynamic demands and intermittent resources. Distributed energy storage systems improve system resiliency, prevent blackouts and surges, and increase overall reliability for the end user, while also saving them money.



Photo credit: RES

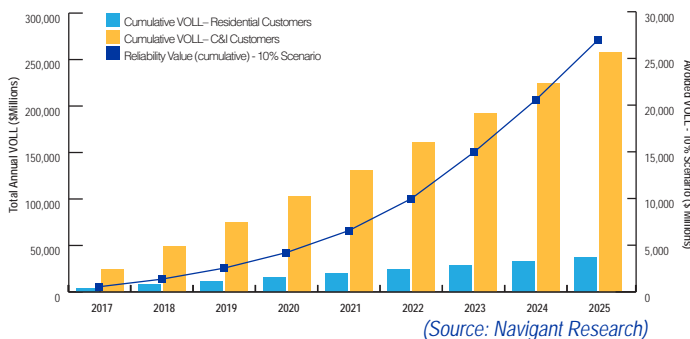
VALUING A DISRUPTION-PROOF GRID

It is important that stakeholders understand all the benefits that increased storage deployments will provide to the U.S. market, and simultaneously consider what opportunities will be lost if the U.S. does not adequately support the growth of energy storage deployments. To quantify these storage values, Navigant Research developed an evaluation framework based on the various services and applications storage systems provide.

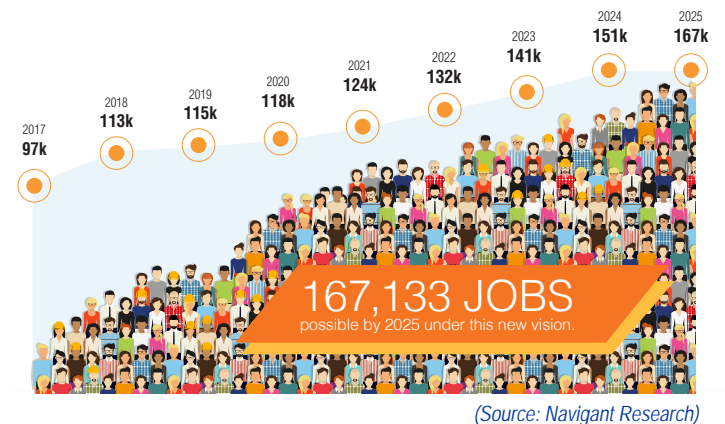
The full report explores the values that storage brings to a disruption-proof grid, including

- faster, more accurate response within seconds for operational cost savings;
- enhanced reliability and resilience to reduce disruptions to the grid;
- cleaner air; and
- the creation of more than 167,000 jobs in manufacturing and R&D, project development, operations and maintenance, construction, sales, marketing, management, administrative and other positions.

Cumulative VOLL for Residential and C&I Customers and the Value of U.S. Energy Storage to Improve Reliability (2017-2025)



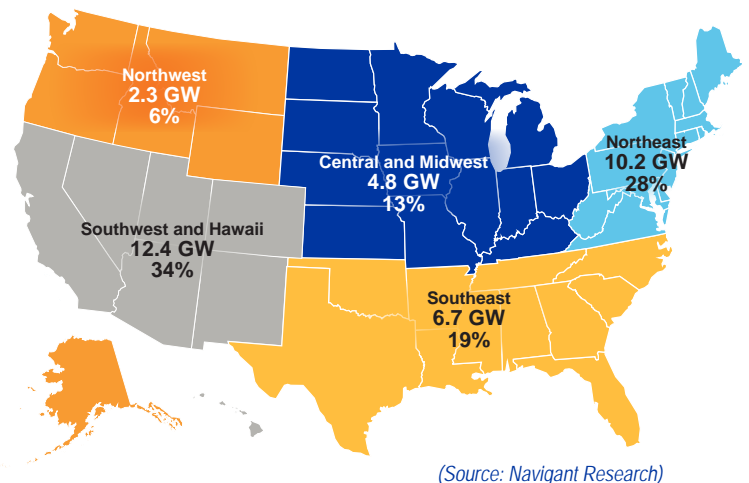
Cumulative U.S. Energy Storage Industry Jobs, Vision Scenario (2017-2025)



MAPPING 35 GW

Energy storage deployments will accelerate around the country with different factors influencing the overall size and dynamics of the market. A combination of aggressive renewable energy goals and development, high and volatile retail electricity prices, utility support, and regulatory mandates will drive a little over one-third of the total U.S. growth in the Southwest and Hawaii. The Northeast will account for slightly over one-quarter of capacity installed, due in part to the aggressive GHG reduction policies and state renewable generation targets. The remaining new capacity in the Central-Midwest region, the Southeast and the Northwest, will be driven by a combination of solar and wind integration, state policies for GHG reduction and mandates.

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



A CALL TO ACTION

The creation of a disruption-proof grid will require continued evolution of the way policymakers, operators and other stakeholders think about the grid. This will take the efforts of a diverse group of stakeholders to adapt and prepare for electrification and digitization of the power, transportation, data centers, HVAC, communications, manufacturing, and building sectors. The full report details ESA recommendations for stakeholders to enable a disruption-proof grid.

For Legislators:

- Conduct energy storage impact studies
- Enact procurement targets or mandates
- Establish incentive programs
- Set clean energy standards

For Regulators:

- Establish clear rules for storage
- Use updated modeling in proceedings
- Streamline interconnection standards
- Consider the effects of rate design

For Utilities:

- Update the approach to asset classification
- Expand integrated resource planning to include storage
- Explore new ownership and business models



CONCLUSION

Change itself is disruptive. To withstand, and indeed thrive from, the fundamental shifts taking place in the physical structure and business models of our electricity system will take flexible, dynamic solutions, as well as an openness of stakeholders to understand and correct the constraints of our current system. Energy storage can accelerate us toward that disruption-proof grid, and the deployment of 35 GW by 2025 will enable a more efficient, resilient, sustainable and affordable grid.

The Energy Storage Association

The Energy Storage Association (ESA) is the national trade association and the leading voice for the energy storage industry. ESA represents electric utilities, independent power producers, project developers, manufacturers, integrators, component, suppliers, and system support service companies, to accelerate the widespread use of competitive and reliable energy storage systems. For more information, visit www.energystorage.org.