U.S. DEPARTMENT OF ENERGY

Achieving American Leadership in the Grid Storage Supply Chain

Summary

To meet growing demand for long duration energy storage, domestic manufacturing will have to increase significantly. The use of renewables is rapidly increasing, and the adaption of electric vehicles is on the rise, which will require the national grid to not only produce and deliver electricity, but also store it reliably and cost-effectively. The International Energy Agency (IEA) recently released a report showing that to reach a goal of net-zero emissions by 2050, grid storage will need to grow to almost 2,500 gigawatt-hours (GWh) in less than a decade. Currently, across the globe, battery technologies provide over 30 GWh of grid storage(BloombergNEF, 2020) while pumped storage hydropower (PSH)provides 160 gigawatts (GW) of long-duration energy storage (LDES) (PSH) (U.S. Department of Energy, 2020)..

This fact sheet summarizes strategies to address key vulnerabilities in the grid storage supply chain, the United States. These strategies include:

- Developing domestic, sustainable manufacturing and recycling capabilities along the energy storage supply chain.
- Maximizing the use of domestic resources by focusing on second-life and recycling technologies.
- Enabling the diversification and deployment of grid storage technologies through targeted research activities.

Addressing these opportunities will have significant impacts with respect to increasing well-paying skilled domestic jobs, improving the gross domestic product (GDP), and ensuring minimal environmental and climate impacts.

Key Findings and Opportunities

This report identifies four key challenges that contribute vulnerabilities to the supply chain:

- **Reliance on other countries** for components and products for lithium-ion batteries makes the U.S. supply chain vulnerable. More than 50% of the mine production of the ores necessary for the production of lithium-ion batteries is controlled by three or fewer countries.
- **Environmental and climate impacts** of material refining, battery manufacturing, and

recycling industries. Raw material extraction, refining, and recycling are energy- and resource-intensive processes with significant potential environmental, environmental justice, and climate impacts.

- **Increasing transportation electrification** needs will decrease an already limited market. The storage needs of the transportation sector is estimated to be almost 10-times greater than that of grid storage by 2030.
- **Limited adoption** of alternative inexpensive and abundant materials haven't supported the establishment of a robust supply chain.

Policy Next Steps

The United States is currently at a significant disadvantage with respect to the supply chain for lithium-ion batteries. It lags China in capacity for all segments of the supply chain, and behind the rest of Asia and Europe in some. China has policies to encourage the development of this supply chain for internal resilience, and Europe is quickly developing policies and a domestic industrial manufacturing base. New investment in energy storage through the Bipartisan Infrastructure Law has expanded the Department's focus on advanced storage technologies, but to become globally competitive in manufacturing and secure acquisition of grid energy storage technologies, the United States could increase focused efforts in the following areas: .

- Development of sustainable upstream, midstream, and recycling facilities and industries to support grid storage.
- Development of a second-use industry that repurposes end-of-life batteries for grid storage.
- Development and deployment of diverse cost-effective, and long duration (10-plus hours) technologies for grid storage. ■

Download the full document and the corresponding other documents that are part of the DOE response to the supply chain executive order at: www.energy.gov/policy/supplychains