

DOE Energy Storage Overview

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Storage is needed for reliable Resource Adequacy





Storage of Various Durations will be Needed: Short, Medium, and Long

15 min – 4 hrs	4 – 12 hrs	12h – 3 days:
Use: smoothing	Use: day/night PV storage.	Use: bad weather backup.
renewables.	Example: Flow Batteries	Example: Thermal/Gravity
Example: <u>Li-ion</u>		

Long Duration Energy Storage is essential for the Development of a Decarbonized, Reliable Grid BUT it will require New Technology, New Business Cases and New Regulatory Frameworks!



Energy Storage at DOE

- U.S. has set a goal to reach 100% carbon pollution-free electricity by 2035
 - Could require 40x 110x more grid energy storage
- Storage includes a range of functions provided by many technologies
 DOE storage work is found across the spectrum of offices and labs
- Successful storage deployment requires:
 - Full range of R&D, deployment, manufacturing, and institutional support
- New targets and opportunities:
 - Long Duration Storage Shot: tech targets for cost-effective decarbonization
 - Bipartisan Infrastructure Law: opportunity to validate at scale
 - Inflation Reduction Act: incentives for storage







LONG DURATION STORAGE SHOT TARGET



Affordable grid storage for clean power – any time, anywhere



THE LONG DURATION STORAGE SHOT TARGET

With 5¢ / kwh storage, dependable clean energy is competitive with existing electricity sources



Cost Goal: Move energy from A to B for less than 5¢ / kwh

RD&D Required for Cost-Effective Decarbonization



- 5¢/kwh LCOS enables dispatchable clean energy while minimizing rate increases
- Business as Usual LCOS Expectations will not achieve this goal



Source:

DOE's Energy Storage Portfolio

DOE Storage Spending FY2020-FY2021



Many Technology Offices:

- Basic Energy Sciences
- ARPA-E
- Energy Efficiency and Renewable Energy (Water Power, Solar, Vehicles, Advanced Manufacturing)
- Office of Electricity
- Office of Technology Transitions
- Loan Programs Office
- Nuclear Energy
- Fossil Energy and Carbon Management
 - + Crosscutting Technical Assistance



Energy Storage Advancement Throughout DOE





Energy Storage Grand Challenge (ESGC) Use Case Framework



Facilitating Grid Decarbonization

• Ensure reliability, resilience, and security in a decarbonized grid



Serving Remote Communities

• Support communities not connected to the bulk power system

Electrified Mobility

• Support electrification of the transportation sector



Interdependent Network Infrastructure

• Services that use and serve the electric grid



Critical Services

• Maintain operations in facilities critical to public health/safety



Facility Flexibility, Efficiency, and Value Enhancement

• Optimize energy production/usage

Long Duration Energy Storage

- Bipartisan Infrastructure Law (BIL)-funded \$505 million program
- Key Initiative goals:
 - Demonstrate new, innovative storage technologies that may address future long duration needs.
 - Validate first-of-a-kind long duration systems at utility scale and validate pathways to Storage Shot 90% cost reduction targets.
 - Pilot storage to help new storage end users overcome institutional and informational barriers.
 - Increase **resilience** of critical government facilities.
- Future activities beyond:
 - Scaling up domestic manufacturing
 - Incentives to accelerate deployment



Four Long Duration Energy Storage Demonstration Programs

\$355 million –

- Validation: "Demo Projects" for first-of-a-kind LDES utility scale demonstrations.
- Piloting: "Pilot Grants" to lower the barriers to storage deployments.

\$150 million —

- Demonstration: "Demo Initiative" for innovative earlystage long duration technologies.
- Resilience: "Joint Program" for storage demonstrations on DOE/ DOD facilities.

