



Lab Support for Liftoff Long Duration Energy Storage (LDES)



U.S. DEPARTMENT OF
ENERGY

The U.S. Department of Energy’s (DOE) 17 National Labs are well-positioned to support technologists, entrepreneurs, startups, and established firms in launching the LDES sector. Two areas where the labs’ capabilities are particularly relevant are highlighted in this addendum.

LDES Capabilities

Technology Performance and Cost

DOE labs possess numerous capabilities to support technology performance improvements (e.g., Round-trip Efficiency (RTE)) and cost reductions (e.g., \$/kW, Levelized Cost of Storage (LCOS)). This category includes technology testing and design, system-level integration capabilities, and manufacturing testing capabilities to reduce LDES cost and improve performance beyond what is currently commercially available.

Mecahnical Storage	Bidirectional Electrical Storage	Chemical & Thermal Storage
Uses mechanical force to convert and store electrical energy (e.g., pumped water, compressed air, spinning flywheels, emerginig gravity storage systems).	Absorbs electirc energy, stores it, and dispatches it as electricity (e.g., electrochemical storage systems).	Harnesses chemical or thermal energy for conversion to or from electricity (e.g., sensible and latent heat technologies, hydrogen).

Supply Chain Planning and Development

Additionally, DOE labs offer capabilities related to the supply chain formation of LDES to support the expansion of LDES manufacturing and deployment capacity, and workforce development.

Resource Flexibility	Power Electronics
Technologies and systems that enhance the flexibility of production or consumption of resources (e.g., thermostatically controlled loads, ice and chilled water, building mass, and other thermal storage).	The broad set of technologies (e.g., materials, components, subsystems, and systems) necessary for the control and conversion of electricity.

Lab Resources

National Lab expertise, facilities, licensable technologies, and software span a wide range of LDES categories. These include experts who can answer technical questions, facilities that can assist in testing and de-risking technology, and licensable technologies developed with DOE funding that can address a firm’s technology challenges. Additionally, open-source and proprietary software options are available to enhance an organization’s technology offerings.

	Technology Performance & Cost			Supply Chain Planning & Development	
	Mechanical Storage	Bidrec. Elec.	Chemical & Thermal	Flexible Generation	Power Electronics
Experts		✓	✓	✓	✓
Facilities	9	77	44	32	39
Licensible Technologies	✓	✓	✓	✓	✓
Software	✓	✓	✓	✓	✓

Visit [Lab Partnering Service \(labpartnering.org\)](https://labpartnering.org) to access these resources and more!

APPENDIX: FACILITIES

Argonne National Laboratory

Advanced Photon Source
 Argonne Leadership Computing Facility
 Advanced Mobility Technology Laboratory
 Laboratory Computing Resource Center
 Battery Post-Test Facility
 Cell Analysis Modeling & Prototyping Facility
 Center for Energy & Economic Systems Analysis (CEEESA)
 Center for Nanoscale Materials

Electrochemical Analysis & Diagnostics Laboratory
 Electrochemical Discovery Lab (EDL)
 Heat Transfer Laboratory
 Laboratory Computing Resource Center
 Materials Engineering Research Facility
 ReCell Center
 Smart Energy Plaza (SEP)

Brookhaven National Laboratory

Center for Functional Nanomaterials
 Center for Mesoscale Transport Properties
 Laboratory for Biomolecular Structure

National Synchrotron Light Source II
 Northeast Solar Energy Research Center

Idaho National Laboratory

Battery Test Center
 Dynamic Energy Transport & Integration Laboratory (DETAIL)
 Electric Vehicle Infrastructure Laboratory

Microgrid Test Bed
 Microreactor Applications Research Validation & Evaluation (MARVEL)

Lawrence Berkeley National Laboratory

A-Lab
 Energy Conversion Group (ECG)
 Energy Storage Assembly Facility
 Energy Storage Testing Facility

Facility for Low-Energy Experiment in Buildings (FLEXLAB)
 National Energy Research Scientific Computing Center (NERSC)
 The Materials Project
 Thermal Energy Labs

Lawrence Livermore National Laboratory

Advanced Manufacturing Laboratory
 Center for National Security Applications of Magnetic Resonance
 Cryo-compressed Hydrogen Facility (CCHF)
 Design Optimization Laboratory
 Dynamic Transmission Electron Microscope (DTEM) Lab

GEOSX
 Laboratory for Energy Applications for the Future (LEAF)
 Non-Destructive Characterization Laboratory
 Skyfall Test Bed

National Energy Technology Laboratory

Advanced Alloy Signature Center (AASC)
 Carbon Materials Manufacturing Facility (CaMMF)
 Hybrid Performance Lab

Magnetohydrodynamic Lab
 Reaction Analysis & Chemical Transformation (ReACT) Facility
 Solid Oxide Fuel Cell Experimental Laboratory

National Renewable Energy Laboratory

Battery Thermal Characterization Laboratory
 Behind the Meter Storage Lab
 Cell Fabrication & Breakdown Laboratory

Energy Systems Integration Facility
 Nanogrid Laboratory
 Thermal Energy Storage Materials & Processes Lab

Oak Ridge National Laboratory

Battery Manufacturing Facility (BMF)
 Building Technologies Research & Integration Center
 Carbon Fiber Technology Facility
 Center for Nanophase Materials Sciences (CNMS)
 Grid Research Integration & Deployment Center
 High Flux Isotope Reactor
 High Temperature Materials Laboratory (HTML)

Manufacturing Demonstration Facility
 Nanofabrication Research Laboratory
 Nation Transportation Research Center (NTRC)
 Building Technologies Research & Integration Center
 Oak Ridge Leadership Computing Facility
 Powerline Conductor Accelerated Test Facility
 Spallation Neutron Source (SNS)

Pacific Northwest National Laboratory

Advanced Battery Facility (ABF)
 Advanced Building Controls Laboratory
 Bioproducts & Engineering Laboratory (BSEL)
 Building Operations Control Center
 Center for Hydrogen Safety
 Clean Energy & Transactive Campus
 Electricity Infrastructure Operations Center EIOC

Environmental Molecular Sciences Laboratory (EMSL)
 GridLAB-D
 Grid Storage Launchpad
 Lab Homes
 Redox Flow Prototyping Laboratory
 Reliability Test Laboratory
 VOLTRON

Sandia National Laboratories

Advanced Dielectric Laboratories (ADL)
 Advanced Materials Laboratory
 Advanced Power Electronic Conversion Systems Laboratory
 Advanced Power Sources Laboratory
 Battery Abuse Testing Laboratory
 Battery Energy Storage Test Laboratory
 Battery Test Facility
 Center for Integrated Nanotechnologies
 Combustion Research Facility
 Control & Optimization of Networked Energy Technologies Lab
 Distributed Energy Technologies Laboratory
 Energy Storage Controls & Analytics Laboratory (ESCAL)

Energy Storage Test Pad & Energy Storage Analysis Lab
 Geomechanics Laboratory
 Grid Storage Management & Security (GSMS) Laboratory
 Hydrogen Effects on Materials Laboratory
 Hydrogen Transport & Trapping Laboratory
 Integrated Materials Research Laboratory (IMRL)
 MESAFab Complex
 Micro & Nano Technology Laboratory (MaNTL)
 Microsystems & Engineering Science Applications
 National Solar Thermal Test Facility
 Secure Scalable Microgrid Testbed
 Thermal Test Complex

Stanford Linear Accelerator Center

Cryo-EM (Cryogenic Electron Microscopy)
 Grid Integration Systems & Mobility (GISMo)
 Linac Coherent Light Source (LCLS)
 Stanford Synchrotron Radiation Light Source SSRL
 SUNCAT Center for Interface Science & Catalysis



The Grid Storage Launchpad (GSL) is a \$75 million national grid energy storage research and development (R&D) facility on the Pacific Northwest National Laboratory (PNNL)-Richland campus (located in Richland, Washington). The GSL will accelerate development of next-generation grid energy storage technologies that are safer, more cost effective, and more durable. This will be achieved through standardized

testing and validation of technologies from basic materials to 100 kW-scale battery systems for grid and transportation applications. In addition to grid-scale energy storage, researchers at GSL can also develop, test, and scale smaller prototype batteries, such as coin cells, pouch batteries, and prism batteries to improve understanding of battery performance and provide commercial-scale insights.

Visit pnnl.gov/grid-storage-launchpad-pnnl to learn more.



LDES NATIONAL CONSORTIUM

The LDES National Consortium is a lab-led forum that brings together stakeholders from National Laboratories, industry, and community groups to develop and implement strategies and activities to accelerate the commercialization and scale-up of LDES technologies.

Visit Idesconsortium.sandia.gov to learn more.

