Li-BRIDGE

ACCESS
Energy Storage at Argonne

Argonne NATIONAL LABORATORY

Energy Storage at Argonne: Spanning fundamental science to deployment

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Vision: Discover sustainable, purpose-driven energy storage materials/chemistries and integrate them into scaled devices, ready for translation to industry, to enable deep decarbonization of transportation and grid.

HISTORY OF THE BATTERY PROGRAM AT ARGONNE NATIONAL LABORATORY

Seventy Years of Battery R&D

The Argonne battery program grew out of the laboratory's nuclear R&D program. Researchers were studying alternative methods for converting the heat generated in controlled nuclear reactions to electricity while searching for a better path than steam generation. One of the early approaches studied was "thermally regenerative galvanic cells."

1960s

Argonne's nuclear energy pyrochemical processing expertise with molten salts led to exploratory studies of Li/S and Li/P galvanic energy storage cells.

DOE and Argonne initiate a major R&D program focused on Li(Al)/FeS Li(Al)/FeS_2 couples; DOE establishes the National Battery Test Laboratory at Argonne.

1970s

1980s

Argonne provides technical management of industrial R&D projects on aqueous battery technology and initiates R&D on high-temperature sodium batteries.

Argonne executes two multi-year multi-million dollar CRADAs with industry on Li(Al)/FeS and Li-Polymer batteries.

1990s

DOE-EERE establishes their on-going Argonne-led $10-12 million/year applied battery R&D program on advanced Li-Ion batteries.

2000s

Argonne wins a 5-year, $19M Energy Frontier Research Center funded by DOE-BES; Argonne's patent portfolio grows and numerous patents are granted to companies.

Argonne wins a 10-year, $240M DOE-BES Energy Storage Hub and $8.8M in ARRA funding to build battery materials scale-up and post-test analyses facilities.

2010s

2020s

Argonne embarks on deep decarbonization of the economy with emphasis on next generation, sustainable storage

ARGONNE'S ENERGY STORAGE EFFORT SEAMLESSLY LINKS SCIENCE TO APPLICATION

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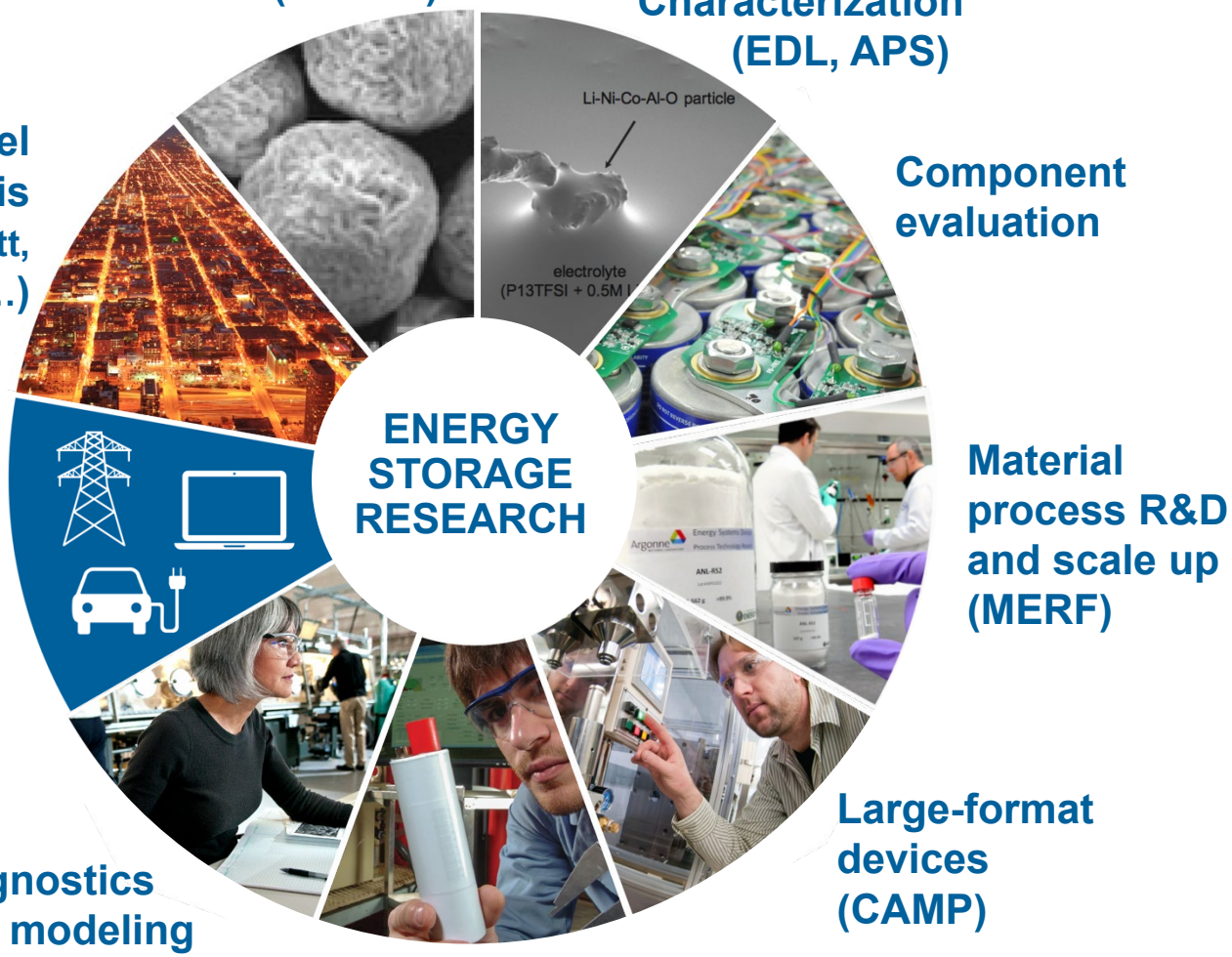
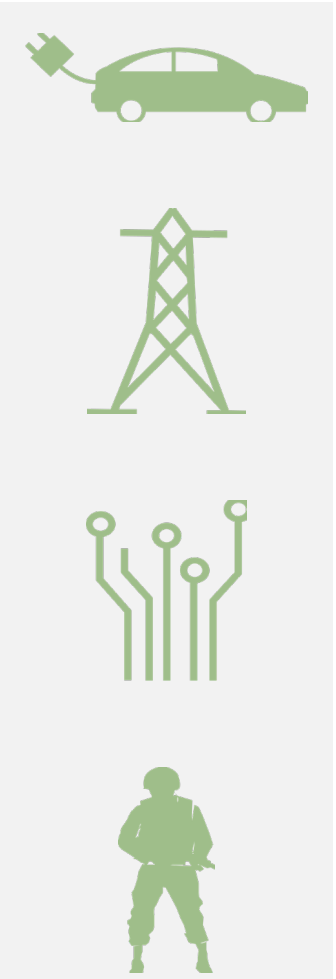
ADVANCED PHOTON SOURCE

CENTER FOR NANOSCALE MATERIALS

ARGONNE LEADERSHIP COMPUTING FACILITY



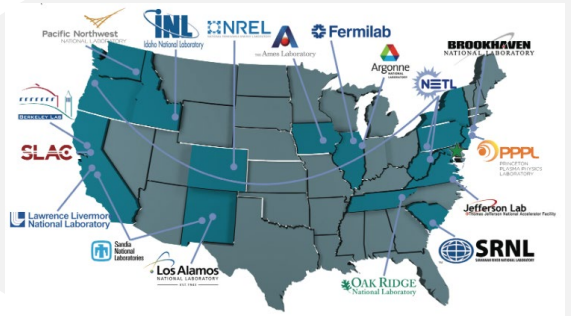


LI-BRIDGE PUBLIC-PRIVATE ALLIANCE

Goal: Create an innovation ecosystem in the US aimed at bridging the battery supply chain gap

- **Li-Bridge is a DOE sponsored program led by Argonne aimed at solving the looming battery supply chain gap.**
- **National Blueprint for Lithium Batteries, a document published in 2021 by the Federal Consortium for Advanced Batteries (FCAB) describes the challenge.**
- **Li-bridge brings together FCAB, DOE Labs, trade associations, and US industry.**
- *Li-Bridge will issue a report in February 15, 2023 on roadmaps, technology, policy, and financial gaps etc.*

Li-BRIDGE



NY BES+ NEW YORK BATTERY AND ENERGY STORAGE TECHNOLOGY CONSORTIUM

NEW ENERGY NEXUS

NAATBatt INTERNATIONAL

NATIONAL LABS ENGAGE PUBLIC SECTOR THROUGH THE FEDERAL CONSORTIUM FOR ADVANCED BATTERIES (FCAB)

FCAB FEDERAL CONSORTIUM FOR ADVANCED BATTERIES

> 14 Federal Agencies, including DOE

U.S. PRIVATE SECTOR ENGAGE THROUGH U.S.-BASED TRADE ASSOCIATIONS

> 300 Industrial partners

WEBINAR GUIDED TOURS OF ARGONNE TOOLS THAT CAN ENHANCE YOUR ANALYSIS

Argonne at Work Webinar Series showcases tools to help enable innovation through the Bipartisan Infrastructure Law

- October 27, 2022: Advanced Grid Modeling and Analysis
  - Techno-economic Assessments, Electricity Markets Complex Adaptive Systems, Energy Equity & Environmental Justice, Conventional Hydropower Energy and Environmental Resource Systems, Argonne Low-carbon Electricity Analysis Framework
- October 14, 2022: Tools and Capabilities for Energy Storage Deployment
  - BatPaC, GREET, Energy Equity & Environmental Justice, EverBatt
- May 24, 2022: Facilities to support U.S. Battery Manufacturing and Recycling
  - MERF, CAMP, EADL, Post-Test Facility
- May 10, 2022: Supporting the U.S. Battery Industry through the BIL
  - BatPaC model, GREET, EverBatt

The ReCell Center: Advanced Battery Recycling

Funded by DOE's Vehicle Technologies Office, ReCell works with industry, academia and national laboratories to develop the most successful advanced battery recycling infrastructure

New, expanded focus areas:

Direct Recycling:

Recycling materials back to their original purpose without destroying their chemical structure

Advanced Resource Recovery:

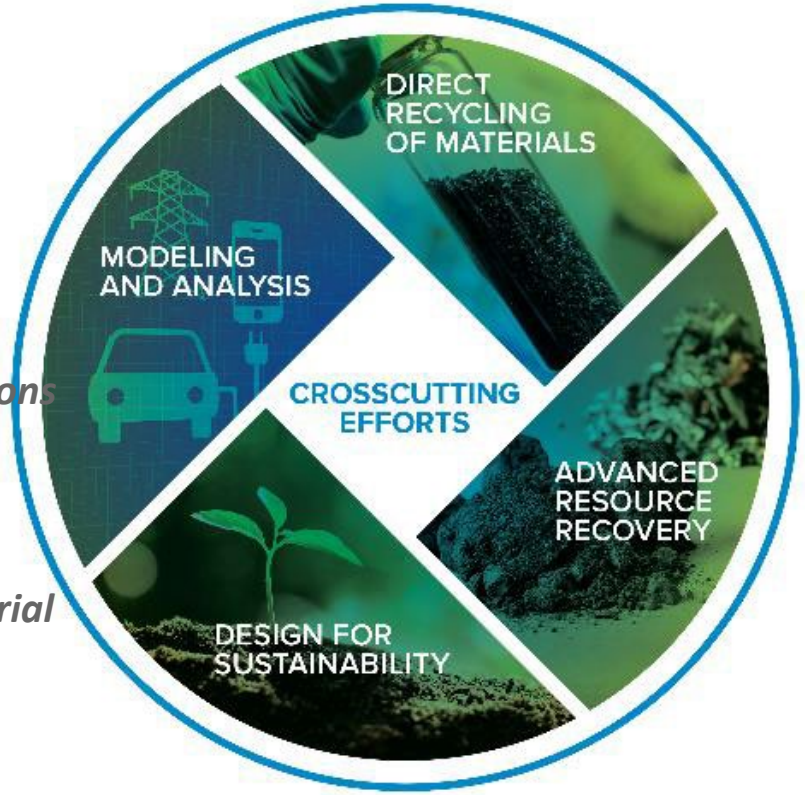
Recapturing materials for reuse in batteries or other applications through chemical conversion

Design for Sustainability

Working toward more sustainable batteries by improving material choice, battery design, and second life opportunities

Modeling and Analysis

Developing tools to provide a deep materials/process understanding, and evaluate economic and environmental impacts



Argonne NATIONAL LABORATORY

NREL NATIONAL RENEWABLE ENERGY LABORATORY

OAK RIDGE National Laboratory

Michigan Technological University

WPI

UC San Diego

www.ReCellCenter.org

Save the Date!!

The 2nd Industry Collaboration Meeting will take place April 26-28 at Argonne National Laboratory

For more information or questions about partnering with Argonne or Li-Bridge:

- www.anl.gov/access
- www.anl.gov/li-bridge
- Email: energystorage@anl.gov

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