DOE Office of Electricity Peer Review
Oct 26, 2023

REVIEW OF RECENT ENERGY STORAGE ANALYTICS RESEARCH

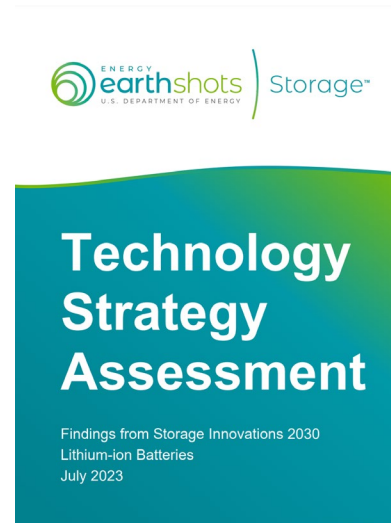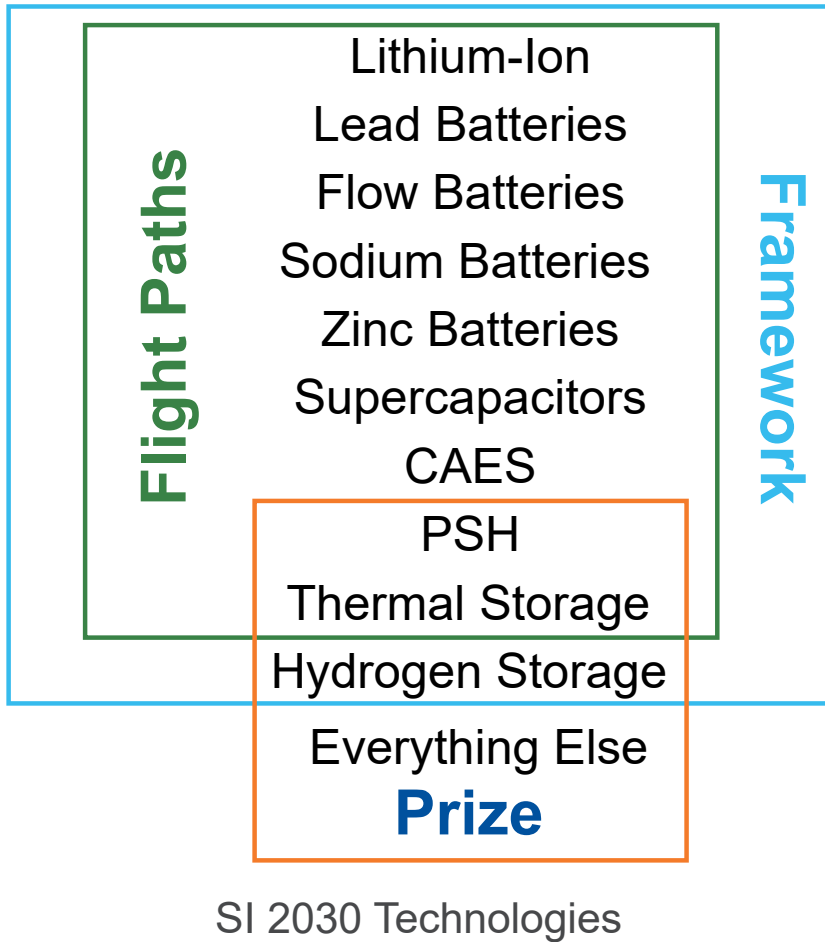**PATRICK BALDUCCI**

Argonne National Laboratory

Presentation ID # 900

ANALYTICS TOPICS AND TOOLS

Analytics and tools developed for DOE Office of Electricity (OE) or used to support the program are improving our understanding of how to site, size, operate, value, and integrate storage systems into distribution networks!

Topic	Tool or Modeling Approach (Lab)		
Investment Planning	Sandia Capacity Expansion Model (SNL)	QuESt Planning Tool (SNL)	Argonne Low-carbon Electricity Analysis Framework (Argonne)
Valuation	Energy Storage Evaluation Tool (PNNL)	Quest (SNL)	CHEERS and ESMO (Argonne)
Performance Characterization and Control Systems	Physics-based modeling (PNNL)	ES-Control (PNNL)	
Distribution System Integration	GridLAB-D (PNNL)		
Siting-Sizing	HELICS-based co-simulation (Sandia)		
End of Life Considerations	EverBESS (Argonne)		

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RESEARCH OVERVIEW: STORAGE INNOVATIONS (SI) 2030 FRAMEWORK STUDY

Flight Paths

Framework

Lithium-Ion
Lead Batteries
Flow Batteries
Sodium Batteries
Zinc Batteries
Supercapacitors
CAES
PSH
Thermal Storage
Hydrogen Storage
Everything Else
Prize

SI 2030 Technologies

ENERGY earthshots | Storage™
U.S. DEPARTMENT OF ENERGY

Technology Strategy Assessment

Findings from Storage Innovations 2030
Lithium-ion Batteries
July 2023

Identify individual innovation opportunities
Step 1: Assess R&D trajectory status quo
Step 2: Assess gaps with respect to improving technology cost/performance
Step 3: Define interventions that could be relevant to energy storage gaps
Step 4: Assess potential impacts of investment

Assess portfolios of interventions
Step 5: Implement Monte Carlo model
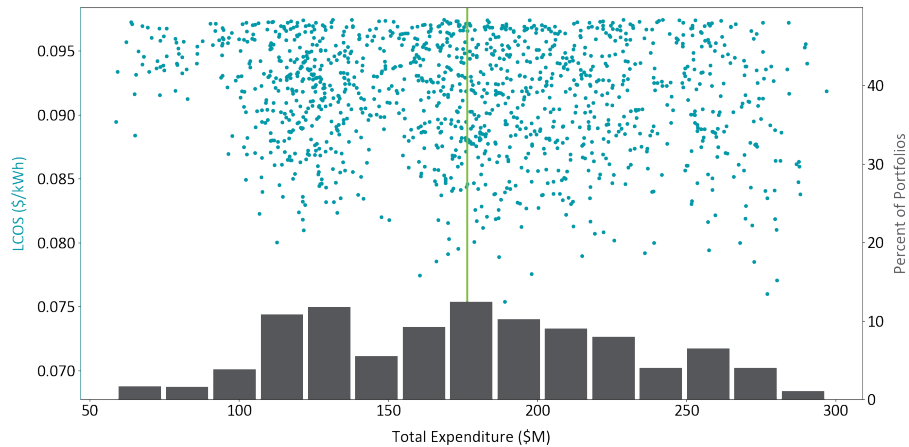Step 6: Evaluate portfolios of interventions

Analyze modeled outcomes
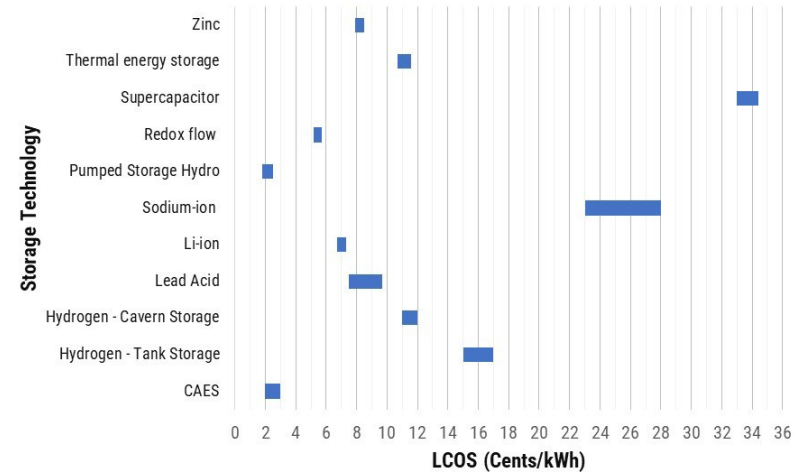Step 7: Conduct suitability evaluations
Step 8: Report on metrics

SI 2030 Study Framework

Find the results of SI 2030 and technology reports at https://www.energy.gov/oe/storage-innovations-2030.
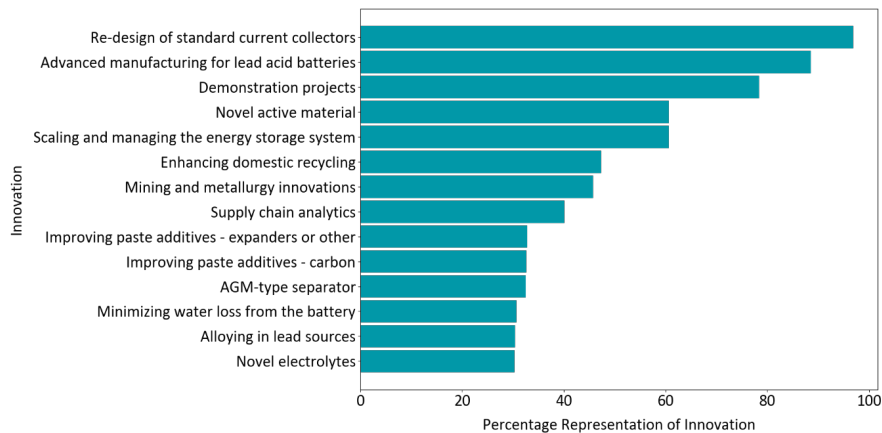
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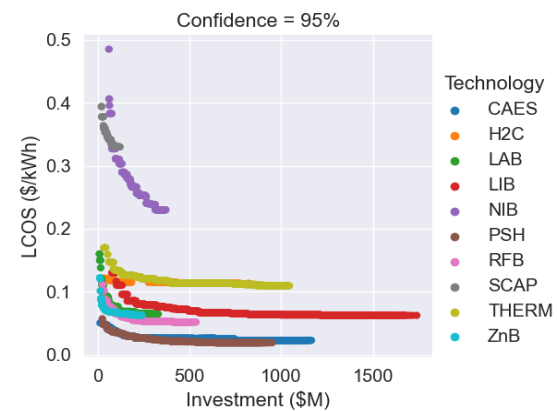
SI 2030 FRAMEWORK STUDY RESULTS

Top 10% of Portfolios for Lead-Acid Batteries

Top 10% Portfolios Levelized Cost of Storage (LCOS) Values

Top Performing Innovations for Lead-Acid Batteries

Cross Technology Results

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SESSION 9: ANALYTICS AND TOOLS

Presenter	Presentation Title	Lab
Patrick Balducci	Review of Recent Energy Storage Analytics Research	Argonne National Laboratory
Qiang Dai	Ensuring Knowledgeable End-of-Life Considerations in Stationary Storage Applications	Argonne National Laboratory
Cody Newlun	Power System Planning for Decarbonization and Energy Storage	Sandia National Laboratory
Tu Nguyen	QuESt 2.0 – Open-source Python Platform for Energy Storage Analytics: Major Update	Sandia National Laboratory
Di Wu	Evaluating Grid Deployments of Storage with Advanced Analytics and Tools	Pacific Northwest National Laboratory
Konstantinos Oikonomou	Long-Term Storage Planning Models and System Analysis	Pacific Northwest National Laboratory
Patrick Balducci	Evaluating Grid Deployments of Storage with Advanced Analytics and Tools	Argonne National Laboratory

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