

2026 DOE Office of Electricity Energy Storage Annual Meeting & Peer Review

Session 6: Stakeholder Developments & Industry Trends

Presentation 605:
Reducing Investment Risk for Energy Storage Financing

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Reducing Investment Risk for Energy Storage Financing

Bankability Concerns

Corporate



Technology

Chemical	Cell	Li, Pb, Ni, Na, Metal-Air	
	Flow	V, ZnBr, ZnCl, FeCr, ZnCr	
Thermal	Cold	Chilled Water, Ice	
	Hot	Molten Salt, Brick	
Mechanical	Rotation	Flywheel	
	Gravity	Pumped Hydro, Elevation	
	Pressure	CAES, LAES, Hydraulic	
Electrical	Electrostatic	SuperCap, Pseude-Cap	
	EM Field	SMES	

Project



Markets



Energy Storage Technologies

- Commercial: Highlight Best Practices to Lower Cost and Transaction Risk
- Emerging: Support Investment to Achieve Faster Commercialization

Reduce Investment Risk

- Reduce Project Development Risk
- Promote Project Risk Transparency
- Promote Wider Access to Low-Cost Capital
- Reduce Project & Transaction Costs

Goal

- Support Grid Reliability & Resiliency
- Clarify Performance Impacts on Financial Returns
- Reduce Friction for Financial Industry Participation and Investment

Energy Storage
Pricing Survey

Energy Storage
Financing Study

RIR Webinars

RIR Surveys

RIR Resources

Energy Storage Pricing Survey

Energy Storage Pricing Survey (ESPS)

- Sandia National Laboratories
- 2018 – 2026 [2026 ongoing]
- 2024 ESPS: SAND2024-12994

Range of System Costs

- 10kW, 100kW, 1MW, 10MW, 100MW
- 2 Hour to 10 Hour

Provides

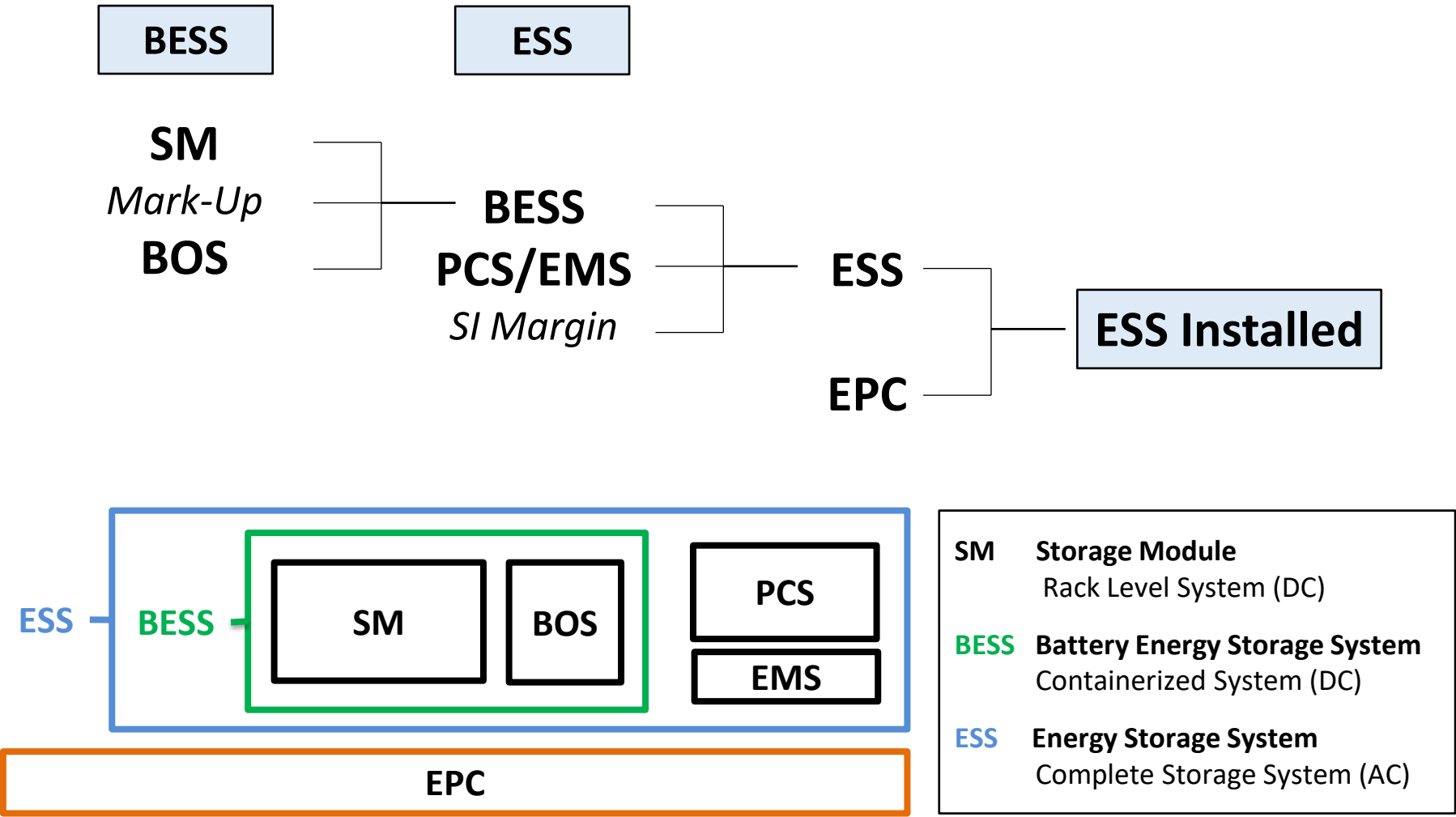
- Realistic Expectation for System Price
- Standardized Reference Benchmark Price

Covered Technology Sections

- | | |
|---------------|----------------|
| • Description | • Applications |
| • History | • Equip. Cost |
| • Providers | • Op. Cost |
| • Design | • Proj. Cost |
| • Deployment | • TCO |

2026	Covered Technologies	Emerging Technologies
1	Compressed Air Energy Storage: Adiabatic	Flow Battery: Cerium Zinc
2	Compressed Air Energy Storage: CO2	Flow Battery: Iron Chrome
3	Compressed Air Energy Storage: Diabatic	Flow Battery: Organic
4	Flow Battery: Vanadium	Flow Battery: Polysulfide Bromine
5	Flow Battery: Zinc Bromine	Flow Battery: Zinc Iron
6	Flow Battery: Iron	Iron Air
7	Flywheel: Long Duration	Iron Sodium
8	Flywheel: Short Duration	Liquid Metal Battery
9	Gravity Energy Storage	Lithium Sulfur
10	Lead	Nickel Cadmium
11	Liquid Air Energy Storage	Nickel Metal Hydride
12	Lithium Ion	Nickel Hydrogen
13	Non-Flow Battery: Zinc Bromine	Nickel Zinc
14	Pumped Hydro Storage	Sodium Nickel Chloride
15	Sodium Ion	Supercapacitor
16		Superconducting Magnetic Energy Storage
17		Thermal Energy Storage
18		Zinc Air

Energy Storage Pricing Survey: Component Waterfall



	Description
SM	Storage Module
BOS	Balance of System
BESS	Battery Energy Storage System
PCS	Power Conversion System
EMS	Energy Management System
ESS	Energy Storage System
EPC	Engineering Procurement & Construction
ESSI	Installed Complete System

Energy Storage Pricing Survey: 2025 Results



2025 Energy Storage Pricing Survey					
	Size (MW)				
	100	10	1	0.1	0.01
\$/kW					
PHS	3006.6				
CAESD	1722.2				
CAESA	2640.0				
LAES	4246.7				
FWSD		1350.3	1467.8	1690.2	
\$/kWh (4 Hr)					
GES	851.6				
FWLD		771.5	890.0	1002.8	
Li	192.5	256.6	384.5	543.3	1010.6
FBZnBr			895.0	928.3	
NFBZnBr	429.7	472.4	499.4	537.1	
Pb			431.8	548.4	613.8
\$/kWh (6 Hr)					
NAS	354.6	368.8	386.0		
FBFe		610.6	629.4	669.4	
\$/kWh (8 Hr)					
FBV	554.7	674.9	792.8		
\$/kWh (10 Hr)					
CAESC	438.9	480.7			

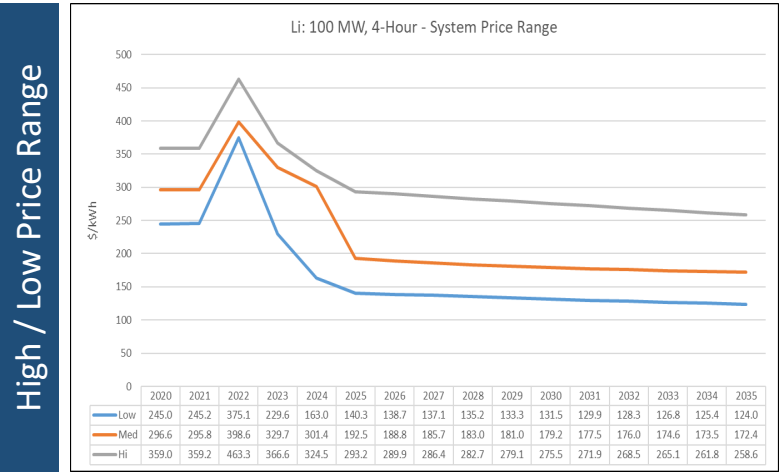
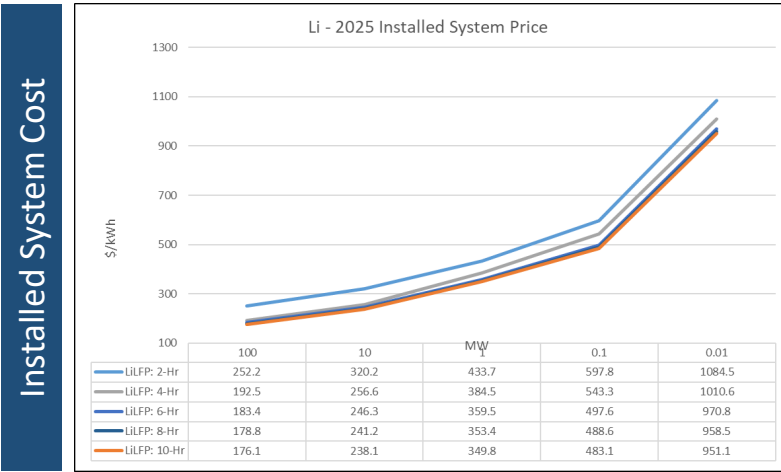
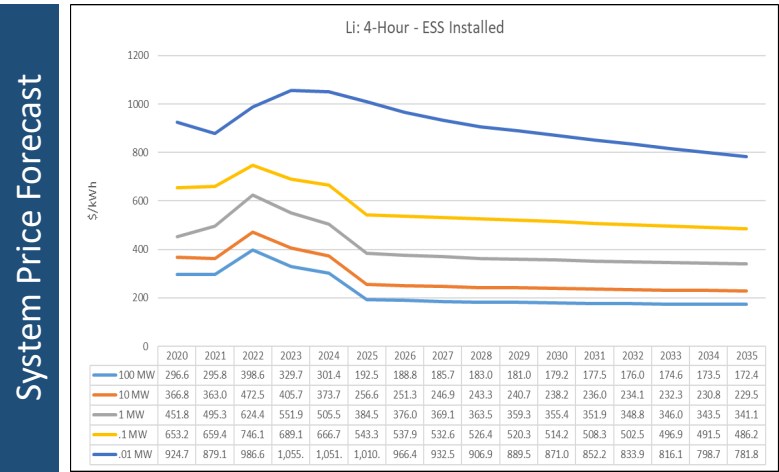
Project vs. Product Cost Structure

Lithium-ion Cost Trends

- Sustained Declines Post-Covid

Non-Lithium Cost Structure

- Dependent on Duration
- Dependent on Power



Energy Storage Financing Study

Outreach to Financial Industry

- Improve Project Development Risk Management
- Promote Technology and Project Risk Transparency
- Promote Wider Access to Low-Cost Capital
- Reduce Project & Transaction Costs

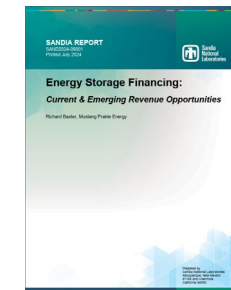
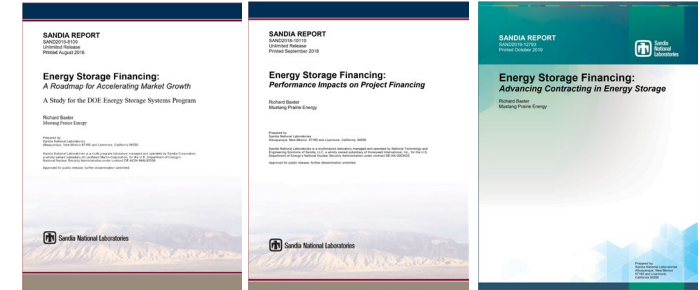
Study Components

- Summits: Current Market Assessment
- Reports: Document Lessons Learned

Energy Storage Financing Studies

- A Roadmap for Accelerating Market Growth
- Performance Impacts on Project Financing
- Advancing Contracting in Energy Storage
- Project & Portfolio Valuation
- Operations & Strategy
- Cost & Revenue Certainty
- Current & Future Revenue Opportunities
- Deployment: Challenges & Opportunities
- Operational Strategies & Impacts
- Reducing Investment Risk for Energy Storage Financing

SAND2016-8109
SAND2018-10110
SAND2019-14896
SAND2021-0830
SAND2022-0422
SAND2024-07453
SAND2024-09001
SAND2026-xxxx
SAND2026-xxxx
SAND2026-in Progress



Energy Storage Financing Study: Energy Storage Financing Summits

	Prior Events		
• Part of the Energy Storage Financing Study Series (SNL)	2026 – Jan 27 & 28	NY, NY	170 Attendees
• DOE Direct Engagement with Financing Community	2025 – Jan 28 & 29	NY, NY	170 Attendees
• Promote DOE Programs with Financial Community	2024 – Jan 23 & 24	NY, NY	170 Attendees
• Feedback to DOE / Laboratories on Existing & New Programs	2023 – Jan 26 th	NY, NY	150 Attendees
	2020 – Jan 14 th	NY, NY	170 Attendees
• Advisory Committee Meetings	2019 – Oct 22 nd	SF, CA	74 Attendees
• Free, Invitation Only, and Closed to Press	2019 – Jan 23 rd	NY, NY	146 Attendees
• Audience: Lenders, Private Equity, Investment Banks, Project Developers, Insurance, OEMs, System Integrators, Gov., etc.	2018 – Oct 6 th	SF, CA	104 Attendees
	2018 – Jan 18 th	NY, NY	124 Attendees
• Hosts: Kirkland & Ellis and Mustang Prairie Energy	2017 – June 7 th	D.C.	84 Attendees
• In Partnership with: Sandia National Laboratories and the U.S. Department of Energy	2017 – Jan 11 th	NY, NY	68 Attendees
	2014 – Dec 16 th	NY, NY	65 Attendees

Reducing Investment Risk: Webinars

Goal

- Educate widest possible audience on drivers of investment risk for energy storage companies and projects
- Platform for highlighting and engaging more industry participants
- Provide additional outreach avenues for Sandia National Laboratories energy storage efforts

Intended Audience

- Those concerned with investment in energy storage companies and projects
- Those looking for Insights across the energy storage market
- What are the direction and magnitude of investment risks

Event Description

Webinars

- 3 to 4 Speakers, 45 Min - 1 Hr
- Presentation, Discussion, Q&A

Keynotes

- Single Speaker, 30 Minutes
- Presentation, Discussion, Q&A

Location

- Sandia National Laboratory website

Engagement

- **Financial:** VC, PE, Debt. Inv. Bank, Financial Services, Insurance
- **Equipment:** OEM, Supply Chain, Engineering, EPC, System Integrator, Operations
- **Project:** Developer, Owner, Utility, Law, Accounting
- **Research / Gov:** Federal, State, NGO, Market Regulator, Research, Gov. Laboratory

Reducing Investment Risk: Surveys

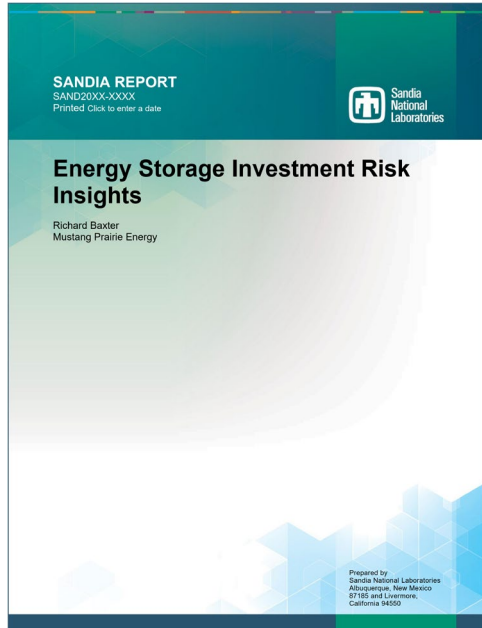
- **Industry Insights Into Key Drivers for Reducing Risk in Energy Storage Financing**
- **Respondents Cover 10 Organization Types**
 - **Highlights Different Drivers per Org. Type**
- **Highlight Linkage of Technology and Performance Risk to Financial Return**
- **2025 Survey: 139 Responses**
- **2026 Survey: Begin Late June 2026**



2025 Survey Questions

1. **What Group Best Describes Your Organization?**
2. **Which Lithium-Ion Technology Risk is Your Primary Concern?**
3. **Which Emerging Technology Risk Is Your Primary Concern?**
4. **Which Counter Party Risk Is Your Primary Concern?**
5. **What Data And Software Risk Is Your Primary Concern?**
6. **Which Construction and Development Risk Is Your Primary Concern?**
7. **Which Operational and Performance Risk Is Your Primary Concern?**
8. **What Insurance Risk Is Your Primary Concern?**
9. **What Market and Revenue Risk Is Your Primary Concern?**
10. **Which Regional Market Is the Most Appealing?**
11. **What Contract Provision Is Your Primary Concern?**
12. **What Off-Take Revenue Structure Risks are your Two Primary Concern?**
13. **What Revenue Driver Is Your Primary Concern?**
14. **What Other Question Should Be Added to the Survey?**

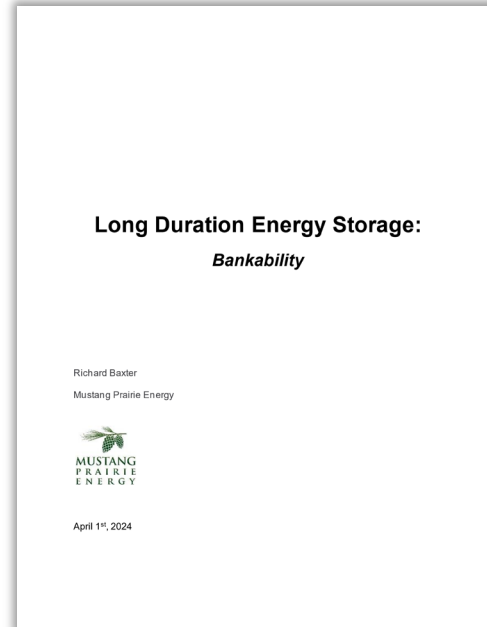
Reducing Investment Risk: Resources



SNL
January 8th, 2025

This Study is designed to provide insights from the financial investment and insurance industry concerning how performance metrics impact investment decisions for emerging energy storage technologies. This study was conceived by the U.S. Department of Energy for the Rapid Operational Validation Initiative (ROVI) in order to better target the effort of that program.

The goal of this portion of the ROVI program is to define the process and information needed for insurance and financial industry participants to make a transaction decision for emerging energy storage technologies. These insights are gathered through interviews, surveys, and key reports from leading firms in these industries already addressing these challenges.



PNNL
April 1st, 2024

This Study provides an overview of bankability concerns that affect Long Duration Energy Storage (LDES) systems at distinct levels of development and provides a framework to address these challenges. Ensuring bankability for LDES is critical to identify and quantify development risks in order to attract financing from banks and investors for corporate and project investment. This need for addressing bankability concerns is an ongoing issue for LDES systems as energy storage project financing remains plagued with a lack of clarity for investors, and LDES projects in particular can require extensive capital outlays due to their scale.

The most direct approach to address these overall bankability concerns causing hesitancy by capital providers is to address three key areas of development—corporate, technology, and project—through a standardized due diligence review process. Improving clarity through a structured due diligence efforts is imperative for the LDES community to help to reduce investment risk and attract sustainable financing from banks and investors for corporate and project investment.

Reducing Investment Risk: Resources from Other Organizations

U.S. Department of Energy

- Energy Information Agency
- ARPA-E
- U.S. Energy Dominance Financing
- Water Power Technologies Office
- FERC
- Office of Electricity (OE)
 - Energy Storage Grand Challenge
 - Long Duration Storage Shot
 - Grid Storage Launchpad
 - Energy Storage Database

National Laboratories

- Argonne National Laboratory
- National Energy Technology Laboratory
- National Laboratory of the Rockies
- Pacific Northwest National Laboratory
- Sandia National Laboratories

Other Government Organizations

- State Government
 - CEC
 - CPUC
 - NYSERDA
- International Non-Government Organizations
 - The World Bank
 - IFC
 - IEA
 - IRENA
 - ADB

Other Groups

- Trade Associations
 - LDES Council
 - BCI
 - SWRI
 - NAATBatt International
- Private Groups
 - Lazard
 - Volta Foundation

Acknowledgements

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Eric Hsieh, DOE – Office of Electricity

- Deputy Assistant Secretary, Office of Electricity Energy Storage Division



Dr. Ray Byrne – Sandia National Laboratories

- Manager, Electric Power System Research

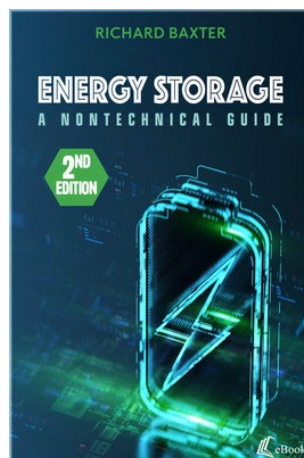


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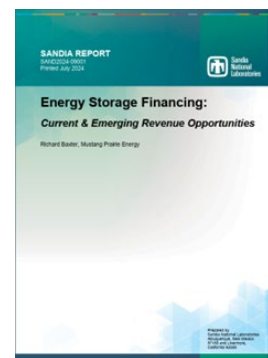
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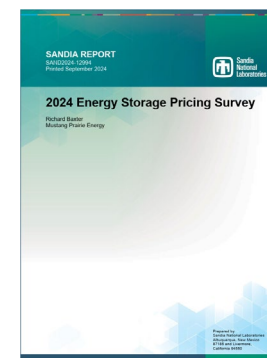
Richard Baxter is President of Mustang Prairie Energy where he bridges the financial and technical sides of the energy storage industry for capital providers, project developers, and manufacturers. Richard has been active in the energy storage industry for over 20 years, working across the industry, including at a storage OEM, investment bank, and as a strategy consultant.

Richard is the author of the U.S. DOE sponsored study series on Energy Storage Financing through Sandia National Laboratories. He is also the author of the Energy Storage Pricing Survey through (Sandia National Laboratories) series and supports the Technology Cost and Performance Assessment for the DOE's Grid Energy Storage Technology Cost and Performance Assessment. Previously, he supported the initial development and first three years of the Lazard Levelized Cost of Storage (LCOS) Survey.

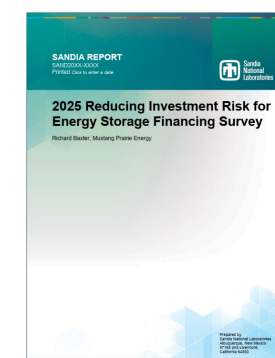
He has served on the Board of Directors for the Energy Storage Association, the Charitable Foundation of the Energy Bar Association, and NovoCarbon. He was also the founder and Executive Director of the Advancing Contracting in Energy Storage (ACES) Working Group where he led the development of the ACES Energy Storage Best Practice Guide.



Energy Storage
Financing



Energy Storage
Pricing Survey



Reducing Investment
Risk Survey