



Sandia National Laboratories

# 2024 Peer Review

## Bridging the Gap: From Research to Impact

### Recent Advances and Partnerships in Energy Storage and Safety



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Sandia National Laboratories

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Partnerships are the cornerstone of transforming groundbreaking research into tangible, real-world solutions, driving innovation and societal progress.



**EPR**I

ELECTRIC POWER  
RESEARCH INSTITUTE



**CALIFORNIA**  
ENERGY COMMISSION



U.S. DEPARTMENT OF  
**ENERGY** | OFFICE OF  
**ELECTRICITY**



**한국전기안전공사**  
Korea Electrical Safety Corporation



**NYSERDA**



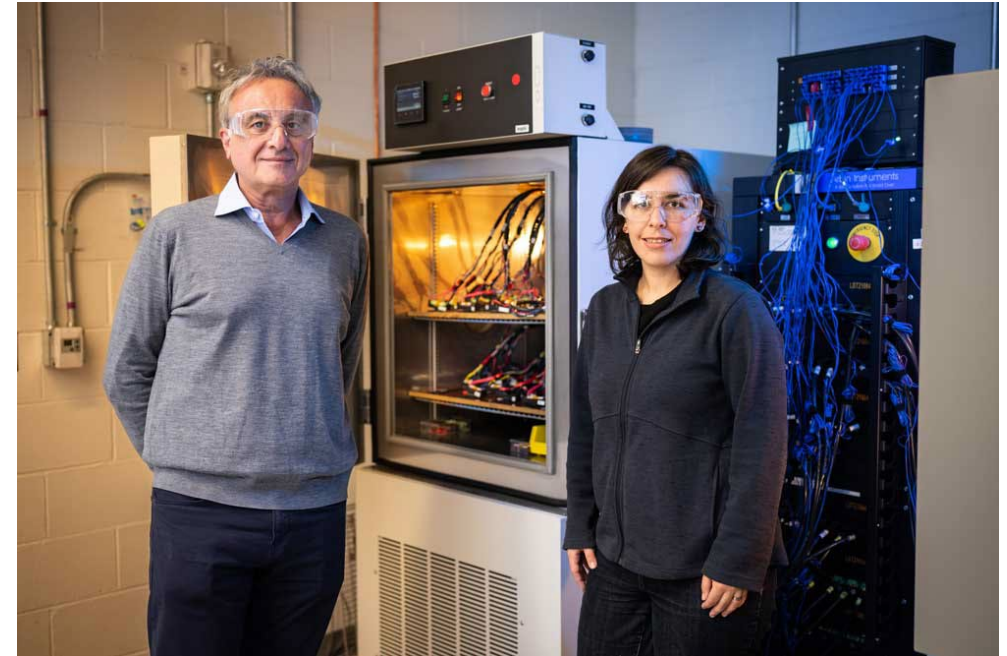
**CleanEnergy**  
States Alliance

# ROVI Rapid Operational Validation Initiative Revolutionizing Energy Storage



Accelerate market readiness of emerging energy storage technologies by developing tools that speed up testing and validation.

Use AI models to analyze battery data to optimize charging cycles, extending battery life and enhancing performance.

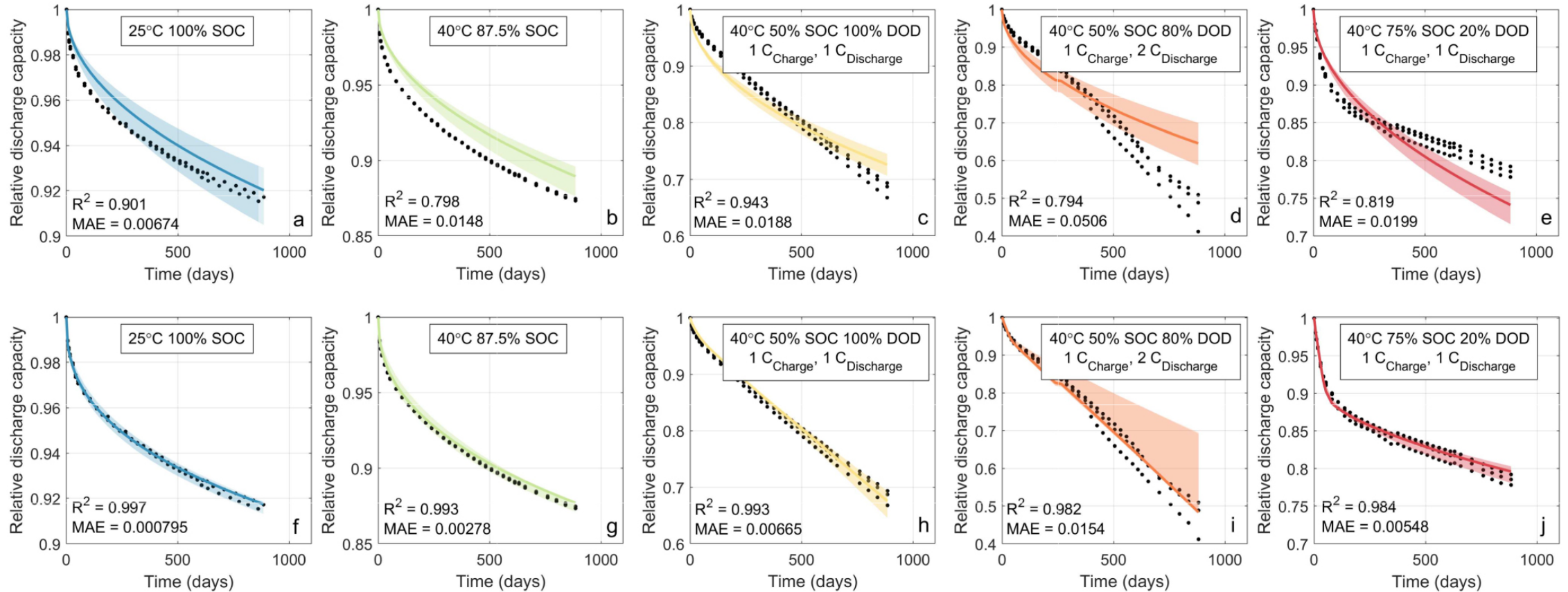


By accelerating the development and deployment of U.S.-based battery technologies, ROVI helps reduce dependency on foreign supply chains, enhancing national energy security and resilience.

# Using AI to Bridge Research to Impact



ML-assisted battery modeling: symbolic regression and optimization predicts calendar/cycle aging with quantified uncertainty for LFP/Gr dataset



# Power Electronics & Energy Conversion Workshop

July 30<sup>th</sup> & 31<sup>st</sup>

8:00AM MT - 4:00PM MT

Location: Albuquerque, New Mexico

Venue: State Bar of New Mexico

Hosted By: Sandia National Laboratories



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To identify research directions and priorities for the next generation of power electronics and energy conversion systems for the electric grid, transportation, and national security

## Recent Advances:

Wide Bandgap  
Semiconductors  
(WBG)

Advanced Power  
Conversion  
Architectures

Integration and  
Packaging  
Technologies



## How Advancements Enhance ESS

Cell-Level battery  
interfaces to  
cascaded &  
modular  
multilevel  
conversion  
systems



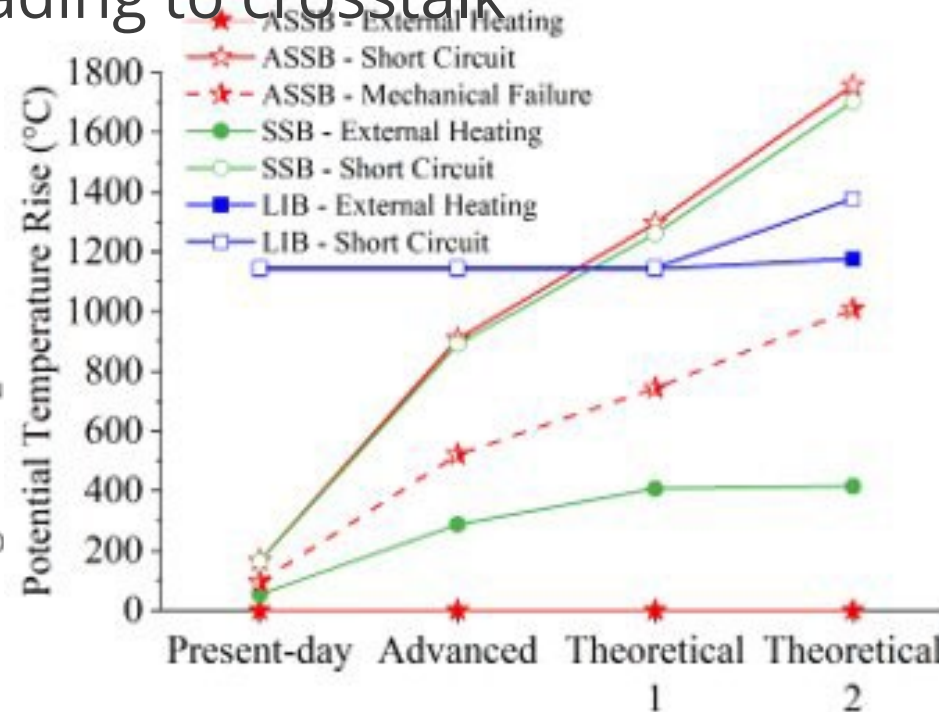
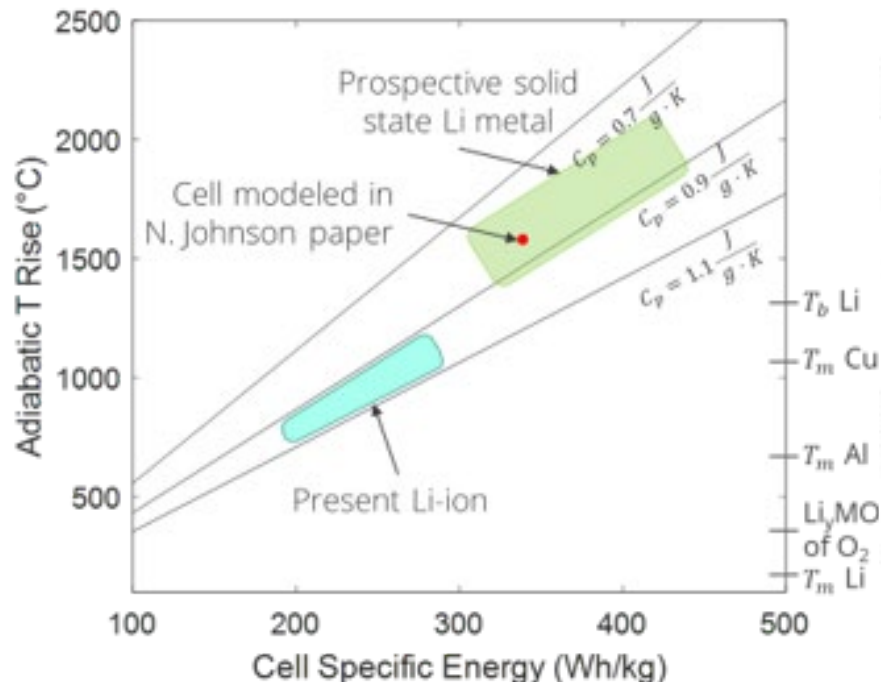
## Future Directions & Potential Applications

SAGE  
Integration of AI  
in power  
electronics



## Potential Safety Risks to SSB

- Highly reactive metal anode
- High energy density (high temperature failure)
- Unwanted side reactions based on separator choice
- Poor stress tolerance leading to crosstalk

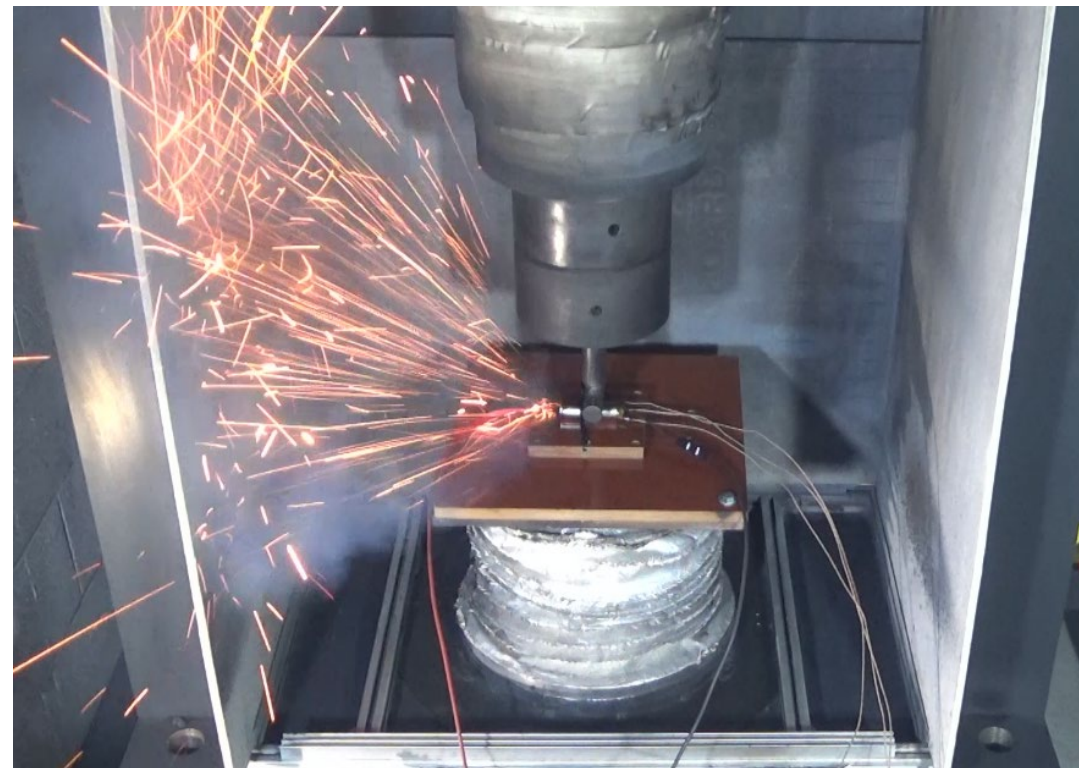




Na-ion batteries are now available commercially, offering similar performance to Li-ion batteries but at a lower cost.

Recent results from Sandia's Battery Abuse Testing Laboratory will be presented in the Sodium Batteries Session on Tuesday

Are sodium ion Batteries safe?  
Are they as safe as Li-ion batteries?  
We will find out!



Na-ion crush test performed at SNL.



WHAT'S NEXT FOR  
**LDES?**



# LDES NATIONAL CONSORTIUM ANNUAL WORKSHOP

September 10-11, 2024

Commerce, CA



Sandia  
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Argonne  
NATIONAL



Idaho National Laboratory



NATIONAL RENEWABLE ENERGY LABORATORY



OAK  
RIDGE  
National Laboratory



Pacific Northwest  
NATIONAL LABORATORY



# 9th IEEE Workshop on the Electronic Grid

Santa Fe, New Mexico



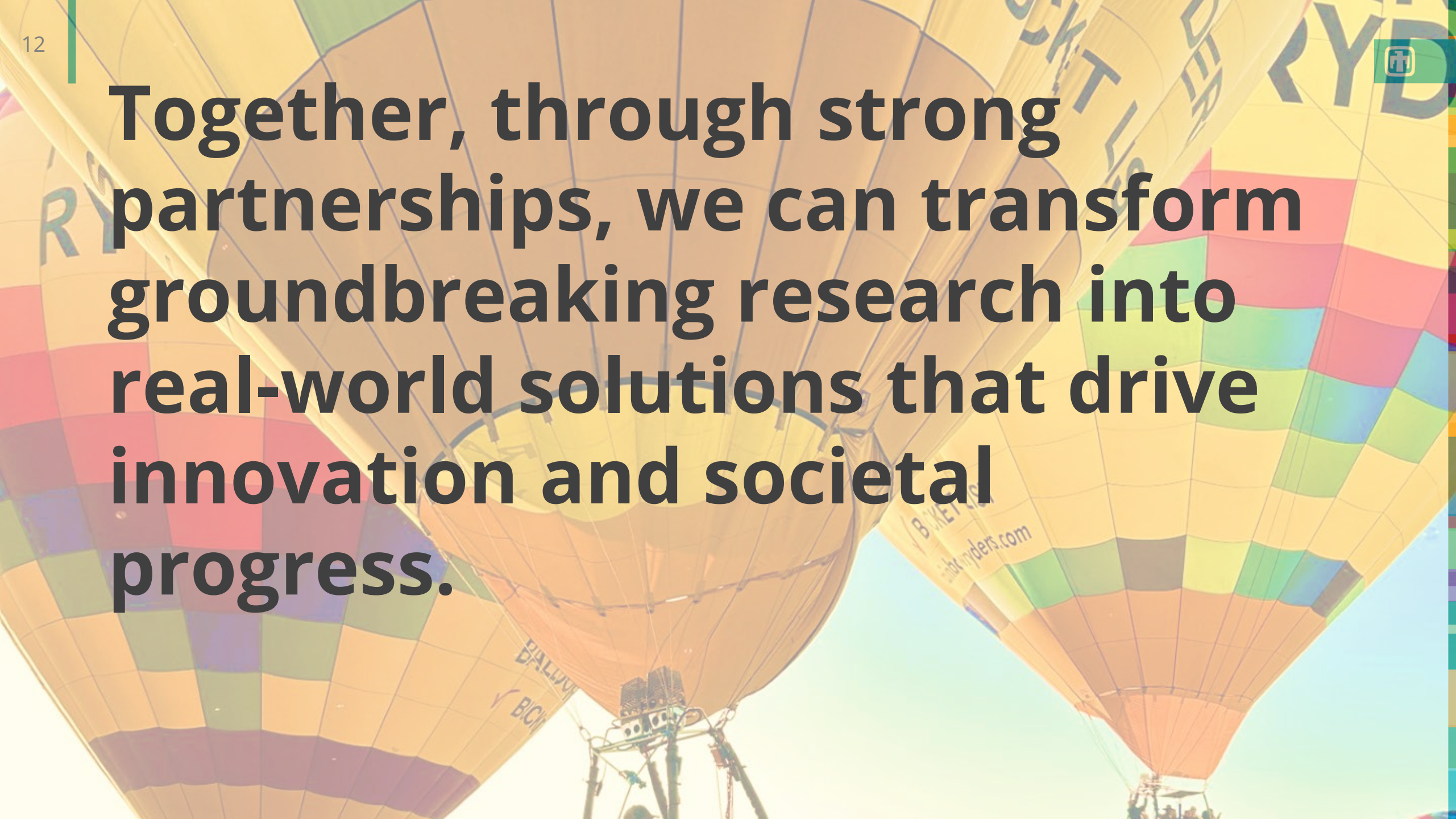
November 19-21, 2024

# 9<sup>th</sup> Annual Energy Storage Safety & Reliability Forum



Sandia  
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Puerto Rico  
Spring 2025



**Together, through strong partnerships, we can transform groundbreaking research into real-world solutions that drive innovation and societal progress.**