

2024 U.S. Department of Energy  
Energy Storage Financing Summit: Virtual  
October 9<sup>th</sup> & 10<sup>th</sup>, 2024 – Day 2

Current Study - Energy Storage Financing: *Operational Strategies & Impacts*

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U.S. DEPARTMENT OF  
**ENERGY**



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# Welcoming Remarks



## Sam Kamyans – Partner, Tax Practice Group Kirkland & Ellis

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Sam Kamyans is a partner in the Tax Practice Group in the Washington, D.C., office of Kirkland & Ellis LLP. He is known as a “very talented” advisor in partnership taxation, uniquely in structuring tax-driven transactions to invest in, finance, or acquire carbon capture, hydrogen, clean fuels, solar, storage, and other energy transition projects. Sam has developed tax structures to implement market leading transactions relying upon section 45Q, 45Z, 45V, and 45/48 credits. He advises energy clients, including domestic and international private equity funds, and major sponsors to structure creative transactions to optimize each clients’ commercial and tax goals.

In addition, Sam brings a solutions-oriented approach to structure and implement mergers and acquisitions, divestitures, equity extractions, distressed asset restructurings, and public and private offerings.

In addition, Sam frequently publishes articles that clients rely upon to structure their deals, including a carbon capture financing guide, a guide to evaluating how to optimize credits for multi-credit projects, and practical publications on implementing IRS guidance.

Prior to joining Kirkland, Sam served at the Internal Revenue Service, where he assisted in issuing guidance on partnership taxation and energy-related matters. He has also served as tax counsel to Sempra Energy, a Fortune 500 energy company, and as a partner at a prominent U.S. energy-focused firm.

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# Chairman's Remarks and Summit Overview

## Richard Baxter - President Mustang Prairie Energy



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 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.

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# Day 1: 2024 U.S. DOE Energy Storage Financing Summit: Virtual



<b>Welcome</b>	Sam Kamyans, Kirkland & Ellis	
<b>Chairman</b>	Richard Baxter, Mustang Prairie Energy	
<b>Keynote</b>	Imre Gyuk, U.S. Department of Energy, Office of Electricity	
<b>Keynote</b>	Xiaoping Wang, The World Bank Group	
<b>Panel 1: LDES Market</b>	<p>Moderator</p> <p>Sam Saunders, Kirkland &amp; Ellis</p>	<ul style="list-style-type: none"> <li>• Alex Campbell – LDES Council</li> <li>• Valerio DeAngelis – Sandia National Laboratories (ROVI)</li> <li>• Mike Firenze – MFI Energy</li> <li>• Will McNamara – Sandia National Laboratories (LDES Consortium)</li> <li>• Russ Weed – Flow Battery Industry Group</li> </ul>
<b>Keynote</b>	Eric Hsieh, U.S. Department of Energy, Office of Electricity	
<b>Panel 2: Modeling &amp; Valuation</b>	<p>Moderator</p> <p>Ray Byrne, Sandia National Laboratories</p>	<ul style="list-style-type: none"> <li>• Patrick Balducci – Argonne National Laboratory</li> <li>• Miles Evans – Electric Power Research Institute</li> <li>• Tu Nguyen – Sandia National Laboratories</li> <li>• Dexin Wang – Pacific Northwest National Laboratory</li> </ul>

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# Day 1: 2024 U.S. DOE Energy Storage Financing Summit: Virtual

## Recap of Highlighted DOE Programs Mentioned



THE NATIONAL CONSORTIUM FOR THE  
ADVANCEMENT OF LONG DURATION  
ENERGY STORAGE TECHNOLOGIES

<https://lidesconsortium.sandia.gov/>



[https://www.energy.gov/oe/  
storage-innovations-2030](https://www.energy.gov/oe/storage-innovations-2030)

Summary Report: [Achieving the Promise of Low-Cost LDES  
Methodology Report](#)

[Lithium-ion Batteries Technology Strategy Assessment](#)

[Lead-acid Batteries Technology Strategy Assessment](#)

[Flow Batteries Technology Strategy Assessment](#)

[Zinc Batteries Technology Strategy Assessment](#)

[Sodium Batteries Technology Strategy Assessment](#)

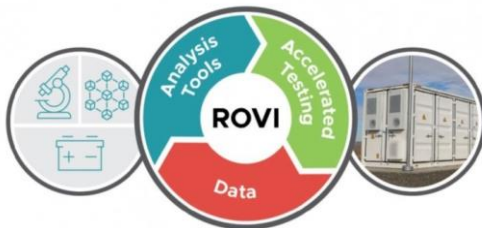
[Pumped Storage Hydropower Technology Strategy Assessment](#)

[Compressed-Air Energy Storage Technology Strategy Assessment](#)

[Thermal Energy Storage Technology Strategy Assessment](#)

[Supercapacitors Technology Strategy Assessment](#)

[Hydrogen Storage Technology Strategy Assessment](#)



[https://www.energy.gov/oe/rapid-  
operational-validation-initiative-rovi](https://www.energy.gov/oe/rapid-operational-validation-initiative-rovi)

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# Day 2: 2024 U.S. DOE Energy Storage Financing Summit: Virtual



<b>Welcome</b>	Sam Kamyans, Kirkland & Ellis	
<b>Chairman</b>	Richard Baxter, Mustang Prairie Energy	
<b>Keynote</b>	Mike Gravely, California Energy Commission	
<b>Keynote</b>	Tom Ferguson, Massachusetts DOER	
<b>Panel 3: Markets &amp; Policy</b>	<p>Moderator</p> <p>Paul Wight, Kirkland &amp; Ellis</p>	<ul style="list-style-type: none"> <li>• Jan Ahlen, NRUCFC</li> <li>• Todd Olinsky-Paul, Clean Energy States Alliance</li> <li>• Justin Rangooni, Energy Storage Canada</li> <li>• Allison Weis, Wood Makenzie</li> <li>• Paul Zumma, American Public Power Association</li> </ul>
<b>Keynote</b>	Kaitlin Johnson, Federal Energy Regulatory Commission (FERC)	
<b>Panel 4: Capital Providers</b>	<p>Moderator</p> <p>Rob Eberhardt, Kirkland &amp; Ellis</p>	<ul style="list-style-type: none"> <li>• Craig Irwin, Roth Capital</li> <li>• Kate Howling, DOE Loan Programs Office</li> <li>• John O'Brien, Independent</li> <li>• Richard Riley, New Energy Risk</li> <li>• Patricia Vorhees, The Alta Group</li> </ul>
<b>Panel 5: Operational Strategies &amp; Impacts</b>	<p>Moderator</p> <p>Sharaf Islam, Kirkland &amp; Ellis</p>	<ul style="list-style-type: none"> <li>• Jason Abiecunas, FlexGen</li> <li>• Ryan Franks, Twaice</li> <li>• Robert Harris, BreitGRID</li> <li>• Mohammed Muthalib, DNV</li> <li>• Shawn Shaw, Camelot Energy</li> </ul>

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# U.S. DOE – Office of Electricity’s Energy Storage Division



## Energy Storage Division Goals

- DOE Clearinghouse for Grid Energy Storage Development & Commercialization
- Drive Long Duration Energy Storage (LDES) Efforts
- Improve Reliability, Modeling & Analytics, and Validating Performance for Commercialization

## Key Programs

Energy Storage Technology RD&D

Rapid Operational Validation Initiative (ROVI)

## Strategic Efforts

Storage Innovations (SI) 2030

Long Duration Storage Shot Tech Assessments

Storage Innovations (SI) Liftoff

Energy Storage Safety Strategic Plan

## OE Energy Storage Facilities

Grid Storage Launchpad

## Cross Cutting DOE Collaborations

Energy Storage Grand Challenge

Long Duration Storage Shot

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<https://www.energy.gov/oe/energy-storage>

# Sandia National Laboratories: Energy Storage

## Programs

### DOE Energy Storage Systems Annual Peer Review

- Aug 5-7, 2024
- <https://doepeerreview.sandia.gov/>

### Electrical Energy Storage Applications and Technologies (EESAT)

- January 20<sup>th</sup>-21<sup>st</sup>, 2025
- <https://cmte.ieee.org/pes-eesat/call-for-papers/>

### Energy Storage Systems Safety & Reliability Forum

- May 14-16, 2024
- <https://pnnl.cventevents.com/event/18b24511-29ad-4de6-b63a-31dc926d2e69/summary>

### Power Electronics & Energy Conversion Workshop

- July 30 -31<sup>st</sup>, 2024
- <https://energy.sandia.gov/programs/electric-grid/power-electronics-and-controls/2024-power-electronics-energy-conversion-workshop/>

### Energy Storage Webinars for Regulators

- <https://www.sandia.gov/ess/conference-archive>

## Resources

### DOE Global Energy Storage Database

- <https://gesdb.sandia.gov/>

### U.S. DOE Energy Storage Handbook

- <https://www.sandia.gov/ess/publications/doe-oe-resources/eshb>

### Energy Storage Pricing Survey

- <https://energy.sandia.gov/programs/energy-storage/publications/laboratory-publications/>

### Energy Storage Financing Studies

- <https://energy.sandia.gov/programs/energy-storage/publications/laboratory-publications/>

### Energy Storage Safety Collaborative

- <https://www.sandia.gov/energystoragesafety/>

### Quest

- <https://www.sandia.gov/ess/tools-resources/quest>

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# Energy Storage Pricing Survey Series

## Energy Storage Pricing Survey Overview

### Provides

- Realistic Expectation for System Price
- Standardized Reference Benchmark Price
- Range of System Costs Based on Range of Power / Energy Ratings

### Technologies Covered

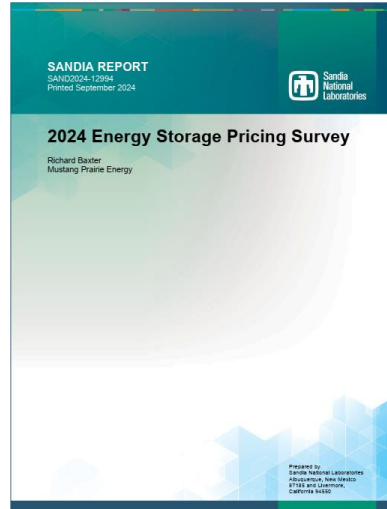
- 16 Technology Families Currently Covered
- 14 Emerging Technology Families Introduced
- Grid Applications of 2 Hours to 10 Hours
- UPS Technologies Not Covered

### Data Acquisition

- Primary – OEM & Customers
- Secondary – Market Reports
- Weighting of Data Allows to Promote Market Accuracy
- Survey Options
- U.S. Based Deployment

### Anonymity

- Component and System Price Quotes
- Specific OEM Price Quote Remains Confidential



## Key Takeaways

### Lithium

- Slowing Average Cost Decline in Near Term (Lithium)
- Greatest Decline in Larger Systems
- Supply chain Issues Remain

### Non-Lithium

- Project Development / EPC Costs Lacking Experience
- Exposure to Commodity Prices

## Energy Storage Pricing Survey (ESPS)

Available at <https://www.sandia.gov/ess-ssl/>

- |             |                |
|-------------|----------------|
| • 2018 ESPS | SAND2019-14896 |
| • 2019 ESPS | SAND2021-0831  |
| • 2020 ESPS | SAND2021-14700 |
| • 2021 ESPS | SAND2024-08994 |
| • 2022 ESPS | SAND2024-08996 |
| • 2024 ESPS | SAND2024-12994 |

# Energy Storage Financing Study Series

## Outreach to Financial Industry

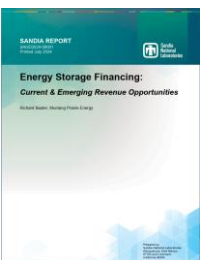
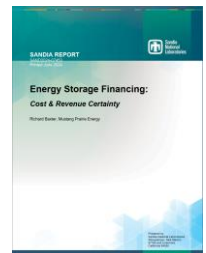
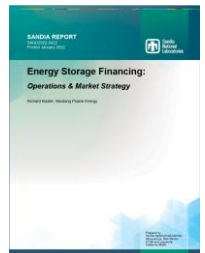
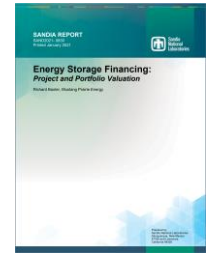
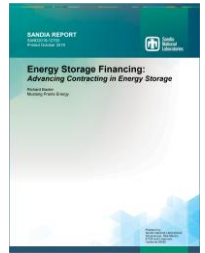
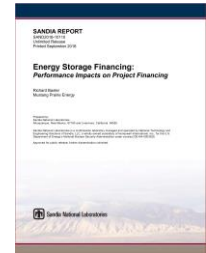
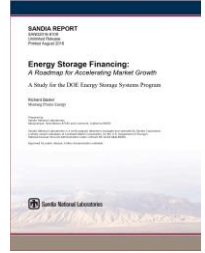
- Improve Project Development Risk Management Education
- Promote Technology and Project Risk Transparency
- Promote Wider Access to Low-Cost Capital
- Reduce Project & Transaction Costs

## Study Components

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

## Energy Storage Financing:

- A Roadmap for Accelerating Market Growth SAND2016-8109
- Performance Impacts on Project Financing SAND2018-10110
- Advancing Contracting in Energy Storage SAND2019-14896
- Project & Portfolio Valuation SAND2021-0830
- Operations & Strategy SAND2022-0422
- Cost & Revenue Certainty SAND2024-07453
- Current & Future Revenue Opportunities SAND2024-09001
- Deployment: Challenges & Opportunities SAND2024-xxxx
- Operational Strategies & Impacts SAND2024-xxxx



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# U.S. DOE Energy Storage Financing Summits – Virtual

## Virtual Financing Summits

### Virtual 2023 U.S. DOE Energy Storage Financing Summit

250 Attendees, October 19-20<sup>th</sup>, 2023

<https://www.kirkland.com/events/kirkland-seminar/2023/01/2023-doe-energy-storage-financing-summit>

### Virtual 2022 U.S. DOE Energy Storage Financing Summit

250 Attendees, October 19-20<sup>th</sup>, 2022

<https://www.kirkland.com/events/kirkland-seminar/2022/10/2022-us-doe-energy-storage-financing-summit>

### U.S. DOE Energy Storage Financing For Social Equity Summit

340 Attendees, April 13<sup>th</sup>, 2022

<https://www.kirkland.com/events/kirkland-seminar/2022/04/us-doe-energy-storage-social-equity-summit>

### Virtual 2022 U.S. DOE Energy Storage Financing Summit

400 Attendees, January 19 & 20<sup>th</sup>, 2022

<https://www.kirkland.com/events/kirkland-seminar/2022/01/2022-us-doe-energy-storage-financing-summit>

### Virtual 2021 U.S. DOE Energy Storage Financing Summit

240 Attendees, September 28 & 29<sup>th</sup>, 2021

<https://www.kirkland.com/events/kirkland-seminar/2021/09/2021-us-doe-energy-storage-financing-summit>

### Virtual 2021 U.S. DOE Energy Storage Financing Summit

300 Attendees, January 26 & 27<sup>th</sup>, 2021

<https://www.kirkland.com/events/kirkland-seminar/2021/01/2021-us-doe-energy-storage-financing-summit>

### Virtual 2020 U.S. DOE Energy Storage Financing Summit

150 Attendees, September 22 & 23, 2020

<https://www.kirkland.com/events/kirkland-seminar/2020/09/2020-kirkland-doe-energy-storage-financing-summit>

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# U.S. DOE Energy Storage Financing Summits – In Person

## Financing Summits

- Outreach to the Financial Industry
- Allows DOE to engage directly with financial leaders in the storage industry
- Promotes financial industry networking with storage industry leaders
- Platform to promote DOE programs and resources

## Valuation Workshops

- Valuation Modeling Advancements
- Compare Modeling Approaches
- Revenue Recognition / Value Stacking
- Results from Project Analysis

## In-Person Event Dates

2024 – Jan 23 & 24	NY, NY	175 Attendees
2023 – Jan 26 <sup>th</sup>	NY, NY	150 Attendees
2020 – Jan 14 <sup>th</sup>	NY, NY	170 Attendees
2019 – Oct 22 <sup>nd</sup>	SF, CA	74 Attendees
2019 – Jan 23 <sup>rd</sup>	NY, NY	146 Attendees
2018 – Oct 6 <sup>th</sup>	SF, CA	104 Attendees
2018 – Jan 18 <sup>th</sup>	NY, NY	124 Attendees
2017 – June 7 <sup>th</sup>	D.C.	84 Attendees
2017 – Jan 11 <sup>th</sup>	NY, NY	68 Attendees
2014 – Dec 16 <sup>th</sup>	NY, NY	65 Attendees

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# Energy Storage Financing: *Operational Strategies & Impacts*

## Strategy Components

### Regional Market

- System Scale
- Revenue/Value Creation

### Operations

- O&M
- Charging Losses
- Replenishment
- Warranty
- Insurance

### Battery Intelligence

### Energy Management Software

### Dispatch & Optimization

## Impacts

### Supported Project Lifetime

### Capabilities (Throughput, C-Rate, etc.)

### Applications Supported

### Off-Take Contracts

### Merchant Tail Operating Position

## Market Segments

### Wholesale

### Utility

### Behind the Meter

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# 2024 U.S. DOE Energy Storage Financing Summit: Virtual – Keynote

## Mike Gravely, Research Program Manager, Energy Storage California Energy Commission



Mike Gravely is the Team Lead and Senior Electrical Engineer for the Energy Systems Research Office at the California Energy Commission. His team is managing over \$300 million in microgrid, energy storage and related energy research and demonstration projects. In this role, he oversees the full spectrum of research activities to improve the California Electric Grid including assessing future energy storage needs for California and addressing the grid related issues associated with integrating higher concentrations of renewables. In 2020, the Energy Commission awarded over \$100 million in state funds and vendor cost-share investments to over 25 new grants to complete research and demonstration projects with new and emerging energy storage technologies. One key area of this research is focused on understanding the capability and value of long duration energy storage solutions (from 10 hours to 100+ hours) to assist California in transitioning to the goal of 100 percent zero-carbon resources by December 31, 2045.

Mike Gravely has a BSEE from the Virginia Military Institute and an MSEE from California State University at Sacramento. Prior to the Energy Commission, Mike served in executive positions in the Federal Government and private industry including addressing the business challenges of a startup energy storage company. Mike also serves as the Military Advisor to the Chair of the California Energy Commission. As Military Advisor he leverages his over 22 years of military service to coordinate Energy Commission activities with the Department of Defense bases in California.

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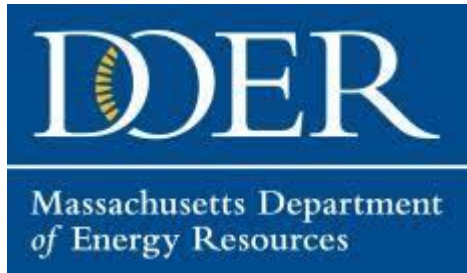
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# 2024 U.S. DOE Energy Storage Financing Summit: Virtual – Keynote

## Tom Ferguson, Energy Storage Programs Manager Massachusetts Department of Energy Resources



Ferguson is Energy Storage Programs Manager at DOER. In this role, Tom manages the Clean Peak Energy Standard, which incentivizes demand reduction or clean energy dispatch during peak demand periods. Tom is also responsible for developing and implementing new policies and programs to spur the deployment of energy storage throughout the Commonwealth.

Prior to DOER, Tom advanced the development of innovative technologies as a business development and licensing manager for The Research Foundation for SUNY and UMass Amherst, and as CTO of energy storage startup Third Power.

Tom has a Ph.D. from Columbia University's Earth & Environmental Engineering Department, where he pioneered a novel biomass-to-hydrogen process with integrated carbon capture, and a B.A. from Vassar College in Physics and Astronomy.

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# 2024 U.S. DOE Energy Storage Financing Summit: Virtual

## Panel 3 – Markets & Policy

Moderator: **Robert Fleishman**, Kirkland & Ellis

- **Jan Ahlen**, NRUCFC
- **Todd Olinsky-Paul**, Clean Energy States Alliance
- **Justin Rangooni**, Energy Storage Canada
- **Allison Weis**, Wood Mackenzie
- **Paul Zumma**, American Public Power Association

- **State Programs: Lessons Learned**
- **FERC 2023 / National Policy Drivers**
- **Market Growth / Impacts**
- **State Incentives: Best Practices**

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# 2024 U.S. Department of Energy Energy Storage Financing Summit: Virtual

---- Break ----

## October 9<sup>th</sup> & 10<sup>th</sup>, 2024 – Day 2

Current Study - Energy Storage Financing: *Operational Strategies & Impacts*

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# 2024 U.S. DOE Energy Storage Financing Summit: Virtual – DOE Keynote

## Kaitlin Johnson, Attorney-Advisor in the Office of Energy Policy and Innovation Federal Energy Regulatory Commission



**FERC**



Kaitlin Johnson is an attorney-advisor in the Division of Policy Development in the Office of Energy Policy and Innovation at FERC. In her current role, she focuses on policy analysis, rulemaking and compliance issues related to energy storage, hybrid resources, distributed energy resource participation in wholesale markets, and interconnection.

Previously, Ms. Johnson was a manager of regulatory affairs at the energy efficiency company Opower, and an associate attorney at the law firm Van Ness Feldman. She was also a clerk for Federal District Judge William K. Sessions III.

She holds a J.D from Yale Law School, a M.E.M degree from Yale School of the Environment, and a B.A. from Middlebury College.

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# 2024 U.S. DOE Energy Storage Financing Summit: Virtual

## Panel 4 – Capital Providers

Moderator: **Robert Eberhardt**, Kirkland & Ellis

- **Craig Irwin**, Roth Capital Partners
- **Kate Howling**, DOE Loan Programs Office
- **John O'Brien**, Independent
- **Richard Riley**, New Energy Risk
- **Patricia Vorhees**, The Alta Group

- **Manufacturing / OEM Financing**
- **Risk Mitigation**
- **Market Strategies / Opportunities**
- **Leasing Opportunities**

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# 2024 U.S. DOE Energy Storage Financing Summit: Virtual

## Panel 5 – Operational Strategies & Impacts

Moderator: **Sam Kamyans**, Kirkland & Ellis

- **Jason Abiecunas**, FlexGen
- **Ryan Franks**, Twaice
- **Robert Harris**, breitGRID
- **Mohammed Muthalib**, DNV
- **Shawn Shaw**, Camelot Energy

- **Operation Services**
- **Battery Intelligence**
- **Energy Management Software**
- **Dispatch & Optimization**

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# Acknowledgements

The author would like to acknowledge the support and guidance of Eric Hsieh, Deputy Assistant Secretary, Office of Electricity Energy Storage Division, Dr. Imre Gyuk, Chief Scientist, Energy Storage, Department of Energy's Office of Electricity, and Dr. Ray Byrne, Manager, Electric Power System Research Program of Sandia National Laboratories.

## Eric Hsieh, DOE – Office of Electricity

- Deputy Assistant Secretary, Office of Electricity Energy Storage Division



## Dr. Imre Gyuk, DOE – Office of Electricity

- Chief Scientist, Energy Storage, Office of Electricity



## Dr. Ray Byrne – Sandia National Laboratories

- Manager, Electric Power System Research



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# Thank you

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