

2023 U.S. Department of Energy
Energy Storage Financing Summit: NYC
January 26th, 2023

Current Study - Energy Storage Financing: *Current & Future Revenue Opportunities*

In Partnership With



Hosts

KIRKLAND & ELLIS



Welcoming Remarks

Robert Fleishman – Partner, Energy Regulatory Kirkland & Ellis

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Robert Fleishman is a corporate partner in the Washington, D.C., office of Kirkland & Ellis LLP. Robert has a leading reputation advising companies on the energy regulatory and compliance aspects of transactions and other energy market activities and defending energy and financial industry participants and individuals in energy markets against charges of market manipulation, particularly before the Federal Energy Regulatory Commission (FERC), the Commodity Futures Trading Commission (CFTC), and other regulatory bodies.

His deep knowledge of the electric and gas regulatory and enforcement landscape informs his representation of clients on energy regulatory, enforcement, compliance, transactional, commercial, legislative, and public policy matters and activities. He has been recognized in energy regulatory law by Chambers Global (2022), Chambers USA (2010–2022), Best Lawyers in America, Energy (2007–2022), and The Legal 500 US (2008–2010; 2012–2013; 2015–2022). Robert was named by The National Law Journal to its list of 2017 Energy & Environmental Trailblazers, was honored by the Energy Bar Association (EBA) with the EBA President’s Award (2019) and the Paul E. Nordstrom Service Award (2016), and also received the Center for the Advancement of Energy Markets Service Award (2005). Robert served as Editor-In-Chief of the Energy Law Journal from 2005- 2019 and is a past President of the Energy Bar Association.

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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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2023 U.S. DOE Energy Storage Financing Summit: Jan 26th: Morning



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Welcome

Robert Fleishman, Kirkland & Ellis LLP

Chairman

Richard Baxter, Mustang Prairie Energy

Keynote

Imre Gyuk, U.S. Department of Energy, Office of Electricity

Keynote

Doreen Harris, New York Energy Research and Development Agency (NYSERDA)

**Valuation
Workshop**

Moderator

Tu Nguyen
Sandia National
Laboratories

- Patrick Balducci, Argonne National Laboratory
- Eva Gardow, Electric Power Research Institute
- Walker Olis, Sandia National Laboratories
- Dexin Wang, Pacific Northwest National Laboratory

Lunch

2023 U.S. DOE Energy Storage Financing Summit: Jan 26th: Afternoon



Chairman	Richard Baxter, Mustang Prairie Energy	
Keynote	Eric Hsieh, U.S. Department of Energy, Office of Electricity	
Keynote	Chris Young, Federal Energy Regulatory Commission (FERC)	
Panel 1: Markets Overview	<p>Moderator</p> <p>Robert Fleishman, Kirkland & Ellis</p>	<ul style="list-style-type: none"> • Anna Astretsova, GridStor • Will McNamara, Sandia National Laboratories • John O'Brien, Quinbrook • Carl Williams, Equinor • Chris Young, Federal Energy Regulatory Commission
Panel 2: Capital Providers	<p>Moderator</p> <p>Tatiana Monastyrskaya, Kirkland & Ellis</p>	<ul style="list-style-type: none"> • Dan Cary, Macquarie Asset Management • Alfred Griffin, Generate • Kevin Johnson, US DOE LPO • Alex Lopez-Jensen, Nord/LB • Allison Saegh-Fleming, JP Morgan
Panel 3: Current & Future Revenue	<p>Moderator</p> <p>Robert Eberhardt, Kirkland & Ellis</p>	<ul style="list-style-type: none"> • Ali Amirali, Lotus Infrastructure Partners • Jeff Bishop, Key Capture Energy • Scott Daniels, CSA Group • Davion Hill, Momentum Energy Storage Partners • Ines Serrao, Silicon Valley Bank

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Energy Storage Financing Study Series

Outreach to Financial Industry

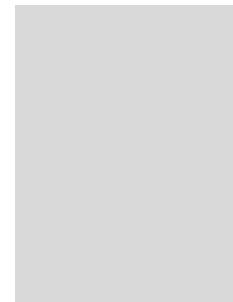
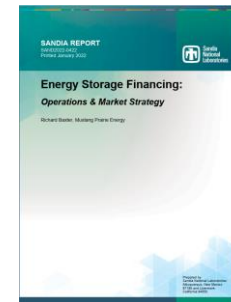
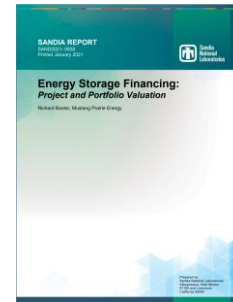
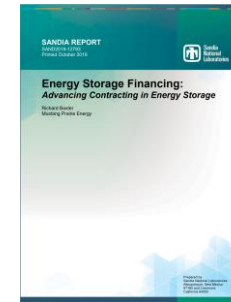
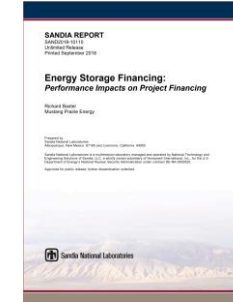
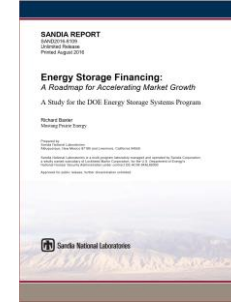
- Improve Project Development Risk Management
- Promote Technology and Project Risk Transparency
- Promote Wider Access to Low-Cost Capital
- Reduce Project & Transaction Costs

Study Components

- Workshops: Valuation Modeling Advancements
- 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 SAND2023-xxxx
- Current & Future Revenue Opportunities SAND2023-xxxx



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Energy Storage Financing Study Series: Summits & Workshops

Financing Summits

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

Event Dates

2023 – Jan 26 th	NY, NY	216 Attendees
2022 – Oct 19 & 20	Virtual	250 Attendees
2022 – April 13	Virtual	340 Attendees
2022 – Jan 19 & 20	Virtual	400 Attendees
2021 – Sept 28 & 29	Virtual	240 Attendees
2021 – Jan 26 & 27	Virtual	300 Attendees
2020 – Sept 22 & 23	Virtual	150 Attendees
2020 – Jan 14 th	NY, NY	170 Attendees
2019 – Oct 22 nd	SF, CA	74 Attendees
2019 – Jan 23 rd	NY, NY	146 Attendees
2018 – Oct 6 th	SF, CA	104 Attendees
2018 – Jan 18 th	NY, NY	124 Attendees
2017 – June 7 th	D.C.	84 Attendees
2017 – Jan 11 th	NY, NY	68 Attendees
2014 – Dec 16 th	NY, NY	65 Attendees

Valuation Workshops

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

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Energy Storage Financing: Current & Future Revenue Opportunities

Current Revenue

Behind the Meter

- Consumer Savings
- FERC 2222 (Wholesale)

Front of the Meter

- Ancillary Services
- Energy
- ISO / RTOs

Bilateral

- Utility
- Large Consumer

Market Drivers

Application Definition

- Nat. Lab Working Group
- NAESB

State PUC

- IRP – Structural
- Grid Reliability
- Consumer Benefits

ISO / RTO

- Wholesale

Environmental

- CO₂ Price
- Local Emissions

Revenue Opportunities

Products & Service

- Enter Existing Markets
- Evolve Existing Service
- Create New Services

Risk Management

- Insurance
- Market Instruments

Approach

- Needs (Pull vs. Push String)
- Leverage Market Drivers
- Location Specific

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US DOE: Office Of Electricity Energy Storage Programs

OE Leads Grid Storage Efforts Across DOE

- Determine Capabilities & Value
- Reduce Investment Risk
- Educate Market Participants

Cost Competitiveness

Technology Development

- Materials & Components
- Technology Maturity
- Increased Energy Density / Performance
- LDES Development

Grid & Field Validation

Demonstration Projects

- System Design
- System Integration
- Deployment: Proof of Concept
- New Demo Systems in IA, AL, NM, WA

Reliability & Safety

New Standard Development

- IEEE 1547.9 ES Interconnection
- IEEE P2686 BMS
- IEEE P2688 EMS

Safety

- ESS Fire Codes & Standards (NFPA, IFC, UL)
- Emergency Response Training (Utility, etc.)

Storage Analytics

Economic Analysis

- Valuation Modeling
- Project Finance
- Cost & Performance
- Applications / Market Rules
- PUC Education
 - IL, PA, MI, UT, IN

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US DOE: Office Of Electricity Energy Storage Programs & Resources



Events

Annual Peer Review 2022

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

Safety & Reliability Forum (2022)

<https://www.pnnl.gov/events/energy-storage-systems-safety-reliability-forum-0>

Programs

Energy Storage for Social Equity

PNNL & SNL

<https://www.pnnl.gov/projects/energy-storage-social-equity-initiative>

Resources

U.S. DOE Energy Storage Handbook

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

ES Pricing Survey / ES Financing Study

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

Valuation Tools

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

PNNL: <https://eset.pnnl.gov/>

EPRI: <https://www.der-vet.com/>

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US DOE: Office Of Electricity: Grid Storage Launchpad (GSL) Facility



- Expected Completion: Early 2024
- 90,000 sq. ft facility
- Provide systematic and independent validation of new grid storage technologies from basic materials and components, through prototyping under grid operating conditions (<100kW)

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\$75M
TOTAL
ESTIMATED
FACILITY COST

100 WORKSTATIONS
30+ LAB MODULES



US DOE: OE - Recent and Ongoing Storage (or Related) Opportunities

Name and Link	Offices	Closing	Amount	Storage
Grid Resilience Utility and Industry Grants	GDO	12/16/2022	\$2.5B	Eligible
Storage Innovations 2030 Prize	OE	12/16/2022	\$300K	Targeted
Long-Duration Energy Storage Demonstrations	OCED, OE	12/22/2022	\$349.0M	Targeted
Innovations to Accelerate Energy Storage Deployment	SC, OE	1/3/2023	\$500K	Targeted
Grid Innovation Program	GDO	1/13/2023	\$5.0B	Eligible
AMMTO-BTO and OE FY22 Multi-Topic FOA	EERE	2/3/2023	\$17.5M	Eligible
Distributed BESS Integration and Coordination	EERE	2/7/2023	\$6.0M	Targeted
Innovative Pumped Storage Hydropower Technologies	EERE	3/6/2023	\$6.0M	Targeted
Energy Earthshot Research Centers	SC	3/7/2023	\$200M	Targeted
Clean Energy Demos on Current and Former Mine Land	OCED	TBD	\$500.0M	Eligible
Underserved and Indigenous Community Microgrids	OE	TBD	\$9.1M	Eligible

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2023 U.S. DOE Energy Storage Financing Summit: Jan 26th: Morning



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Welcome

Robert Fleishman, Kirkland & Ellis LLP

Chairman

Richard Baxter, Mustang Prairie Energy

Keynote

Imre Gyuk, U.S. Department of Energy, Office of Electricity

Keynote

Doreen Harris, New York Energy Research and Development Agency (NYSERDA)

**Valuation
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Moderator

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Lunch

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2023 DOE Energy Storage Financing Summit: Virtual – DOE Keynote

Imre Gyuk – Director of Energy Storage Research, Office of Electricity U.S. Department of Energy



After taking a B.S. from Fordham University, Dr. Gyuk did graduate work at Brown University on Superconductivity. Having received a Ph.D. in Theoretical Particle Physics from Purdue University he became a Research Associate at Syracuse. As an Assistant Professor he taught Physics, Civil Engineering, and Environmental Architecture at the University of Wisconsin. Dr. Gyuk became an Associate Professor in the Department of Physics at Kuwait University where he became interested in issues of sustainability.

Dr. Gyuk joined the Department of Energy to manage the Thermal and Physical Storage program. For the past 12 years he has directed the Electrical Energy Storage research program in the Office of Electricity developing a wide portfolio of storage technologies for a broad spectrum of applications. He supervised the \$185M ARRA stimulus funding for Grid Scale Energy Storage Demonstrations and is now partnering with the States on storage projects for grid resilience.

His work has led to 9 R&D 100 awards and a Lifetime Achievement Award. He is internationally recognized as a leader in the energy storage field.

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Keynote 1 Slide Deck

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2023 DOE Energy Storage Financing Summit: Virtual – DOE Keynote

Doreen Harris – President & CEO of New York State Energy Research & Development Agency U.S. Department of Energy



Doreen M. Harris was appointed president and CEO of the New York State Energy Research and Development Authority (NYSERDA) on April 7, 2021. Prior to becoming president, Ms. Harris served as acting president and CEO since June 2020.

Ms. Harris has held public and private sector leadership roles advancing clean energy projects and engineering companies for more than 20 years. During her tenure at NYSERDA, she has held executive, technical, and policy positions, including Vice President of Large-Scale Renewables. Ms. Harris has overseen the State’s nation-leading advancement of renewable resources under the Climate Leadership and Community Protection Act and Clean Energy Standard. Ms. Harris has also spearheaded the strategic development of New York’s offshore wind resource, including the execution of the State’s offshore wind master plan. She was instrumental in advancing and implementing the Accelerated Renewable Energy Growth and Community Benefit Act, which is modernizing the siting of large-scale renewable energy projects across New York. Ms. Harris serves as the co-chair of the New York State Climate Action Council, a 22-member committee that is preparing a Scoping Plan to achieve the State’s bold clean energy and climate agenda.

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Keynote 2 Slide Deck

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Energy Storage Valuation Workshop

Moderator: **Tu Nguyen** – Sr. Member of the Technical Staff
Sandia National Laboratories

- **Patrick Balducci**, – Manager of the Power Systems Group
Argonne National Laboratory
- **Eva Gardow** – Technical Executive
Electric Power Research Institute
- **Walker Olis** – R&D Electrical Engineer
Sandia National Laboratories
- **Dexin Wang** – Technical Lead in Energy Storage Optimization
Pacific Northwest National Laboratory



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Energy Storage Valuation Workshop



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Workshop Slide Deck 1

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Workshop Slide Deck 2

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Energy Storage Valuation Workshop

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Workshop Slide Deck 3

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Energy Storage Valuation Workshop

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Workshop Slide Deck 4

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Lunch

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2023 U.S. DOE Energy Storage Financing Summit: Jan 26th: Afternoon



Chairman	Richard Baxter, Mustang Prairie Energy	
Keynote	Eric Hsieh, U.S. Department of Energy, Office of Electricity	
Keynote	Chris Young, Federal Energy Regulatory Commission (FERC)	
Panel 1: Markets Overview	<p>Moderator</p> <p>Robert Fleishman, Kirkland & Ellis</p>	<ul style="list-style-type: none"> • Anna Astretsova, GridStor • Will McNamara, Sandia National Laboratories • John O'Brien, Quinbrook • Carl Williams, Equinor • Chris Young, Federal Energy Regulatory Commission
Panel 2: Capital Providers	<p>Moderator</p> <p>Tatiana Monastyrskaya, Kirkland & Ellis</p>	<ul style="list-style-type: none"> • Dan Cary, Macquarie Asset Management • Alfred Griffin, Generate • Kevin Johnson, US DOE LPO • Alex Lopez-Jensen, Nord/LB • Allison Saegh-Fleming, JP Morgan
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**Eric Hsieh, Office of Electricity, Acting Deputy Assistant Secretary for Energy Storage
U.S. Department of Energy**



Eric Hsieh is the Acting Deputy Assistant Secretary for Energy Storage at the U.S. Department of Energy. His group develops strategies to accelerate storage technology adoption, from early-stage materials to commercial markets.

Eric also co-leads the crosscutting Energy Storage Grand Challenge and Long Duration Storage Energy Earthshot.

He previously held positions at Nexans, A123 Systems, and the Federal Energy Regulatory Commission (FERC). Eric received degrees in Public Policy from UC Berkeley and Computer Science from MIT.

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Keynote 3 Slide Deck

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2023 DOE Energy Storage Financing Summit: NYC – Jan 26th

**Chris Young, Director of FERC's Division of Policy Development
Office of Energy Policy Innovation (OEPI), Federal Energy Regulatory Commission**



Mr. Young has served on the professional staff of the Federal Energy Regulatory Commission for over a decade, both in the Office of Electric Reliability and the Office of Energy Policy and Innovation (OEPI). As Director of the Division of Policy Development in OEPI, he manages a diverse team of policy experts who advise the Commission on an array of topics including capacity markets, demand response, transmission and interconnection reforms, and the integration of new technologies into the electric power system. Recently, he has focused on rulemakings and compliance proposals involving the integration of electric storage resources and distributed energy resources into wholesale electricity markets.

Before joining FERC, Mr. Young was Director of Research at the Pace Energy and Climate Center and worked in private sector consulting. He earned degrees from Vassar College in Science Technology and Society, and from the Fletcher School of Law and Diplomacy in development economics and resource policy.

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Keynote 4 Slide Deck

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Break

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2023 U.S. DOE Energy Storage Financing Summit: NYC

Panel 1 – Markets

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

- **Anna Astretsova**, GridStor
- **Will McNamara**, Sandia National Laboratories
- **John O'Brien**, Quinbrook
- **Carl Williams**, Equinor
- **Chris Young**, FERC

- **Market Structure: Compensation**
- **IRA: ITC vs. PTC**
- **State / Regional Opportunities**
- **Supporting Profitability**

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Break

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Panel 2 – Capital Providers

Moderator: **Tatiana Monastyrskaya**, Kirkland & Ellis

- **Dan Cary**, Macquarie Asset Management
- **Alfred Griffin**, Generate
- **Kevin Johnson**, US DOE LPO
- **Alex Lopez-Jensen**, Nord/LB
- **Allison Saegh-Fleming**, JP Morgan

- **Leveraging the IRA Funding**
- **Supply Chain Impacts**
- **Tax Equity Investors**
- **Opportunities: Contracted vs. Merchant**

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Break

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Panel 3 – Current & Future Revenue

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

- **Ali Amirali**, Lotus Infrastructure Partners
- **Jeff Bishop**, Key Capture Energy
- **Scott Daniels**, CSA Group
- **Davion Hill**, Momentum Energy Storage Partners
- **Ines Serrao**, Silicon Valley Bank

- **Revenue & Profitability: Not the Same**
- **Risk Appetites: Real Value of Opportunity**
- **EV Charging: New Services?**
- **Hybrid Storage & Repowering**

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Thank you

**The reception will immediately follow
down the hall in the designated reception area**

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Acknowledgements

The author would like to acknowledge the support and guidance of Dr. Imre Gyuk, Director of the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability's Energy Storage Program, and Dr. Babu Chalamala and Dr. Ray Byrne of the Energy Storage Systems Program of Sandia National Laboratories.

Dr. Imre Gyuk, DOE – Office of Electricity

- Program Manager for the OE's Energy Storage Program



Dr. Babu Chalamala – Sandia National Laboratories

- Manager, Grid Energy Storage

Dr. Ray Byrne – Sandia National Laboratories

- Manager, Advanced Grid Modeling



Author Contact Information

- Richard Baxter
- Mustang Prairie Energy
- rbaxter@mustangprairie.com
- M: 617-320-0598