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*Welcome to the*

# SEIA Finance, Tax and Buyers Seminar

Day 2 | Ballroom AB

# The Business Case for Storage

8:30 AM - 9:30 AM



**Mark Riedy**

Partner  
Kilpatrick Townsend  
& Stockton LLP



**Rob Ritchie**

Director of Storage  
Nexamp



**Michael Kleinberg**

Vice President - Energy  
Storage Advisory  
DNV



**Sarah Bresolin**

Director, Government  
and Regulatory Affairs  
ENGIE North America



**Aram Zamgochian**

Senior Director of  
Strategic Partnerships  
ESS Tech, Inc.

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# Quick Talk: Intro to Energy Storage Market Trends

9:30 AM - 10:00 AM



**Jeremiah  
Miller**

Director of Storage  
Markets and Policy  
Solar Energy  
Industries Association



**Vanessa  
Witte**

Senior Analyst  
Wood Mackenzie



## Energy storage trends in the U.S. market

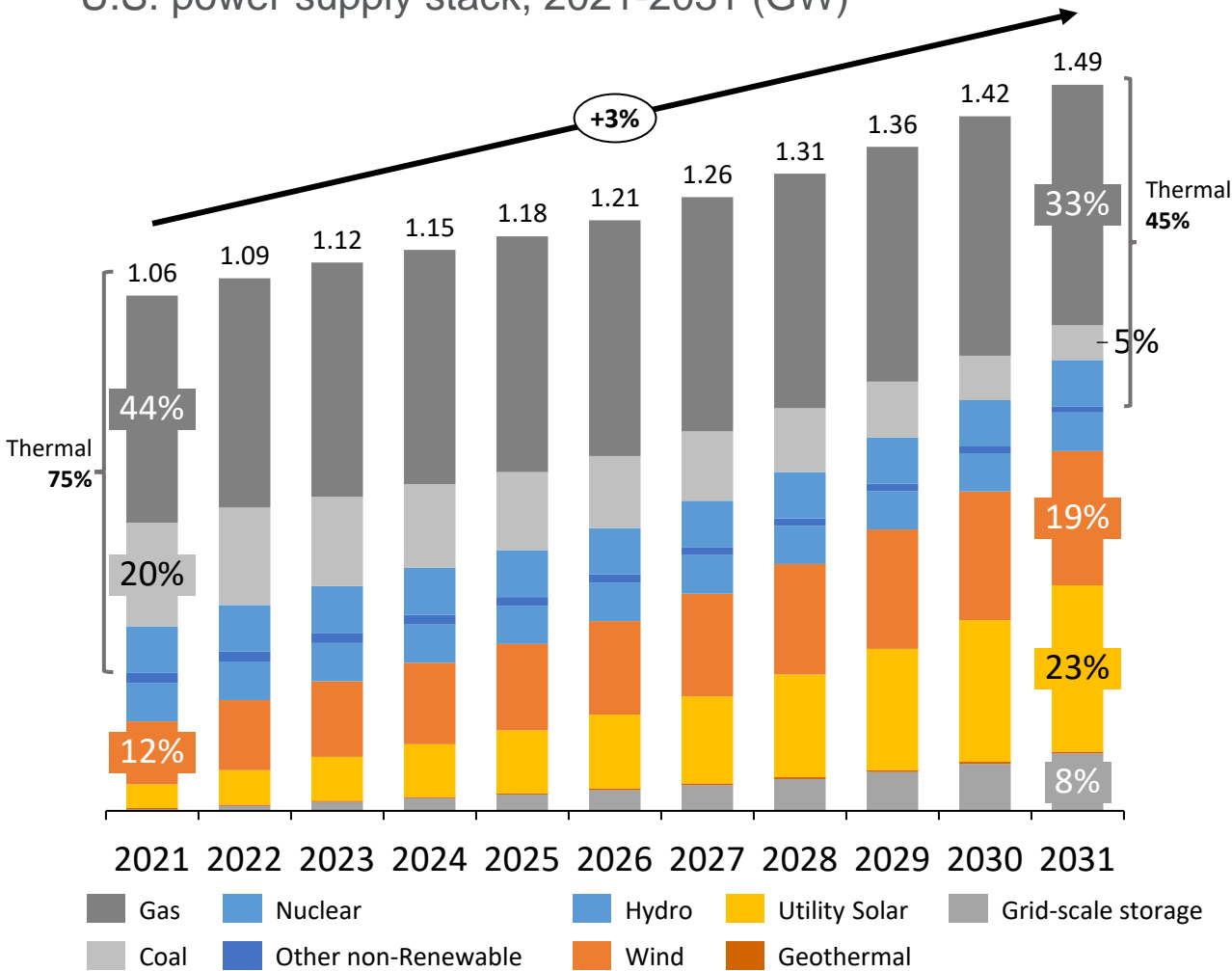
- SEIA Finance and Tax Seminar
- Vanessa Witte | March 2022



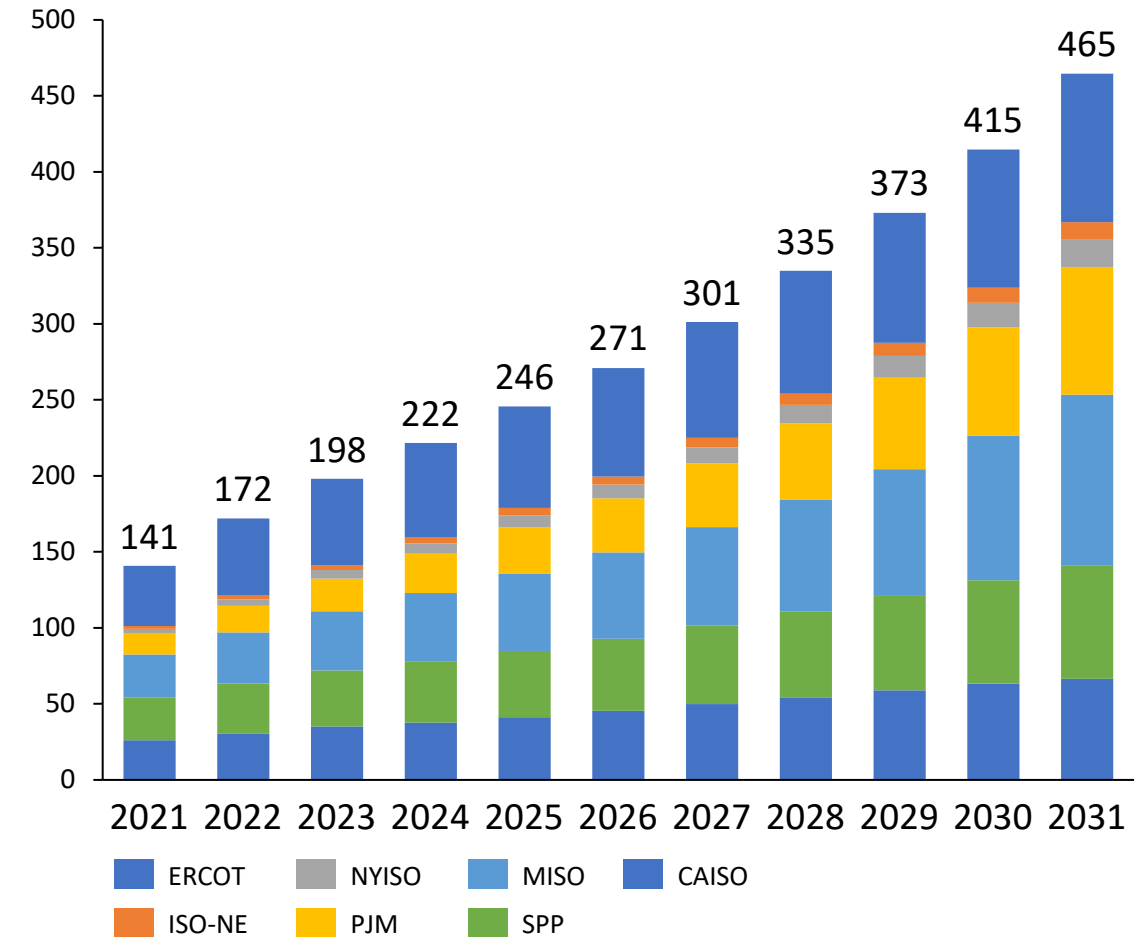
# Renewable generation will make up over 50% of the supply stack by end of decade

- Thermals decrease by 30% over the same period

U.S. power supply stack, 2021-2031 (GW)



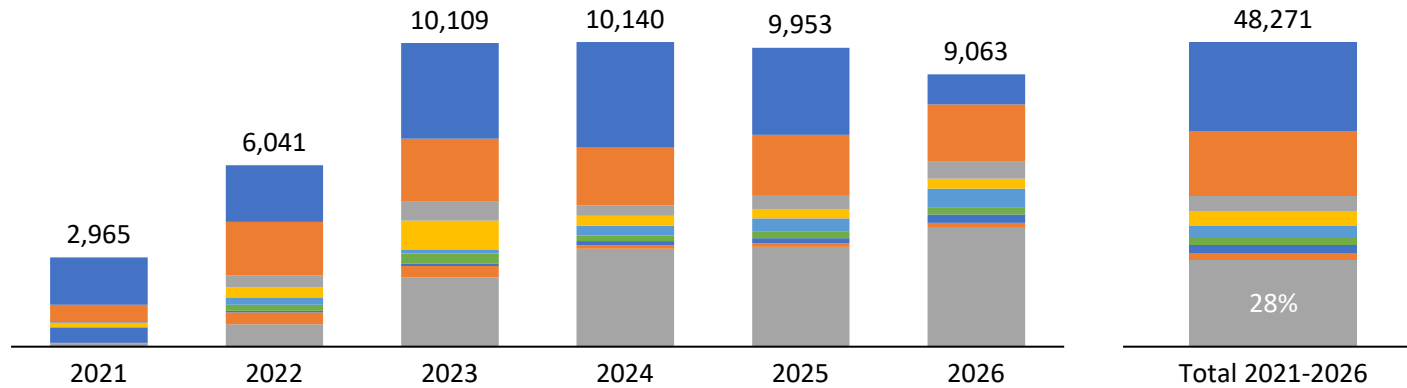
Cumulative solar, wind, and storage capacity (GW) by ISO 2021-2031



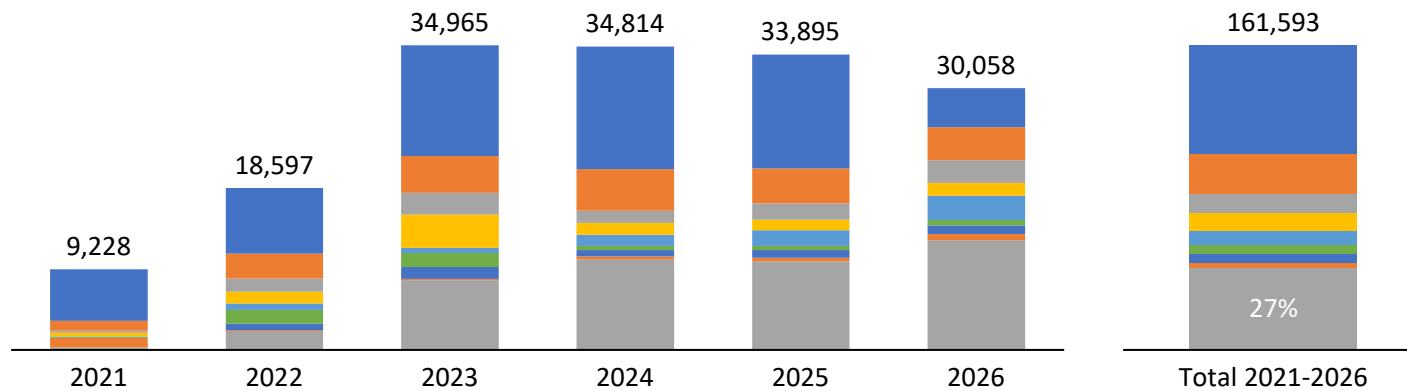
• Source: Wood Mackenzie

# US grid-scale energy storage five-year market outlook

- States with significant renewable build outs continue to lead as the top storage states
- US grid-scale annual and cumulative market outlook (MW)



- US grid-scale annual and cumulative market outlook (MWh)



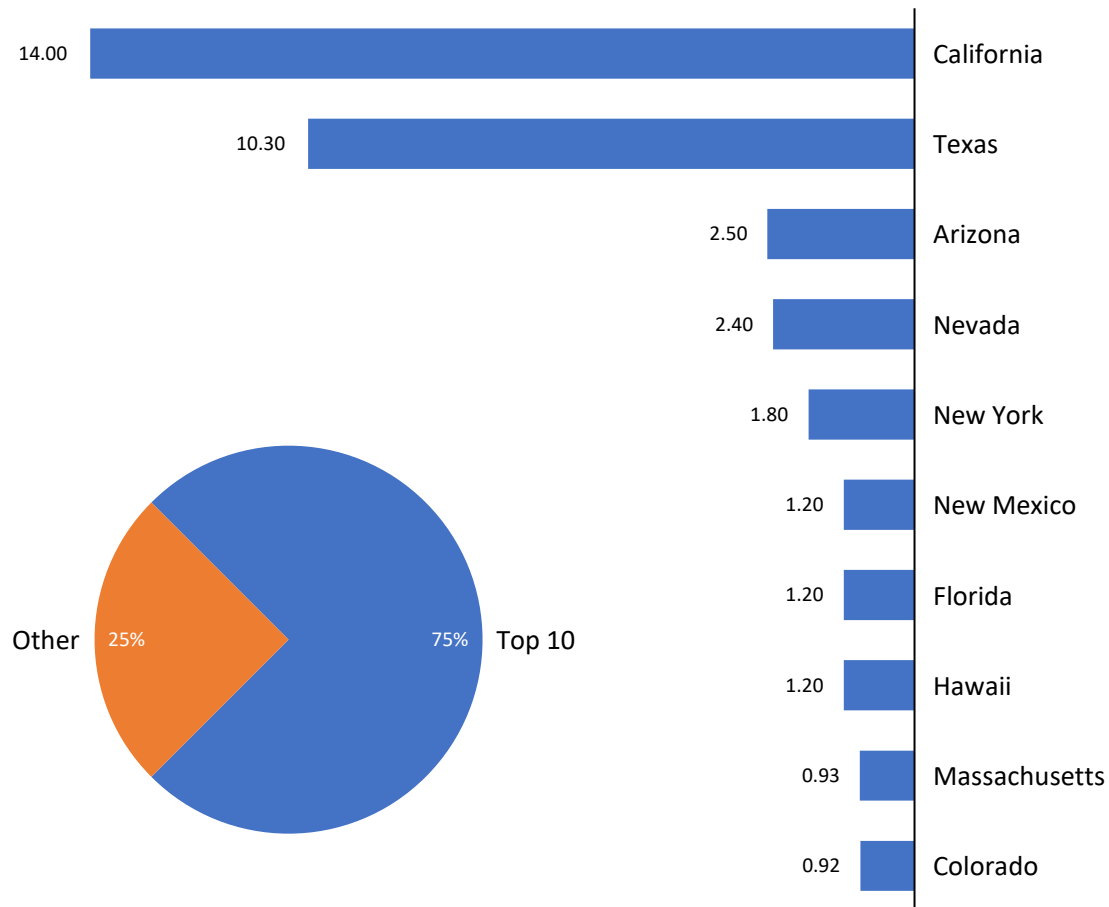
■ CA 
 ■ TX 
 ■ AZ 
 ■ NV 
 ■ NY 
 ■ NM 
 ■ FL 
 ■ HI 
 ■ All Others

- By the end of 2021, California retained a 47% share of cumulative grid-scale capacity, decreasing to 29% by 2026.
- The decrease is made up with small percentage increases as other states gain market share: NY, NV, NM, and AZ due to state incentives or solar penetration.
- Other states within PJM and MISO increase their share in the latter part of the forecast as developers look for market incentives and reform
- Texas solidly holds the #2 spot in 2021, though moves to #1 by 2026 due to a massive amount of solar build expected to create more congestion on an already volatile system, combined with attractive merchant revenue opportunities.
- **Average duration to increase**
- The nationwide average in 2021 was 3 hours; forecasted to increase to 4 hours by 2026.
- Outside of CA, duration at or over 4 hours will be largely due to solar+storage installations, as well as key markets starting with 4-hour installs

## Top markets in the U.S by pipeline

- California and Texas are consistent leaders through the forecast term

- Top ten grid-scale markets; 2021-2026 (GW)



Source: Wood Mackenzie

- US major market drivers and barriers

Drivers/barriers	Short-term (2022-2024)	Mid-term (2025-2028)	Long-term (2028-2031)
Federal clean energy legislation	● ○ ○	● ● ●	● ● ●
Battery/system cost declines	● ● ○	● ● ○	● ● ○
State goals and/or utility IRPs	● ● ●	● ● ●	● ● ○
Capacity market mechanisms	● ● ○	● ● ○	● ● ○
Wholesale market volatility	● ● ○	● ● ○	● ○ ○
Ancillary market prices	● ● ●	● ○ ○	● ○ ○
Grid congestion	● ● ○	● ● ○	● ○ ○
Project finance	● ● ○	● ● ○	● ● ○
Interconnection queue	● ● ●	● ● ●	● ● ○
Supply chain	● ● ○	● ○ ○	● ● ○

Major impact ●●● Some impact ●●○ Less impact ●○○  
 Driver ● Barrier ●

## US grid-scale energy storage pipeline snapshot

- Total queue requests from 2022-2028 top 300GW; IQ volumes not yet reflected in announced project totals
- US grid-scale energy storage deployments and pipeline as of February 2022 (MW)

California	3,061	5,237	8823	<b>114,285</b>
Texas	850	1,812	4266	<b>45,468</b>
Virginia	22	70	590	<b>24,151</b>
Illinois	192	--	--	<b>14,112</b>
Indiana	59	60	551	<b>13,716</b>
New York	109	166	2001	<b>13,599</b>
Ohio	79	20	110	<b>13,121</b>
Arizona	112	455	2015	<b>11,580</b>
Pennsylvania	56	--	--	<b>8,483</b>
All Others	1,514	4,306	14,177	<b>56,991</b>
<b>Total</b>	<b>6,054</b>	<b>12,126</b>	<b>32,533</b>	<b>315,507</b>

- Five of the top nine states based on interconnection queue cumulative volumes are not yet represented as top states according to announced short-term capacity installations, showing the expected growth of emerging markets in the mid and long-term.
- Operational projects increased 136% QoQ, under construction by 152%, announced by 181%, and active queue requests by 122%.

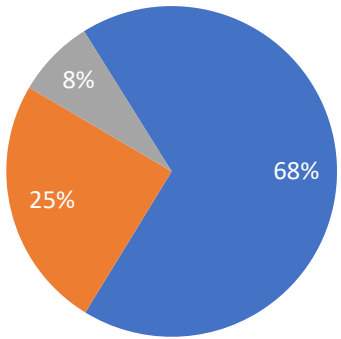
# Market outlook bolstered by expansion of energy storage into new markets

- State clean energy goals and utility IRPs have been instrumental to growth, ITC marks next phase

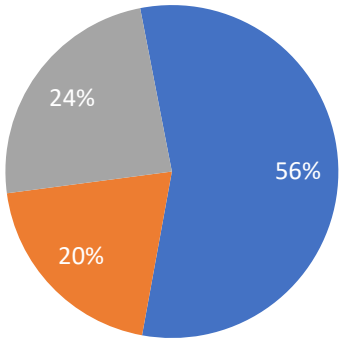
- US energy storage state segmentation (MW)

- Incremental grid scale energy storage volume by state through 2026 (MW)

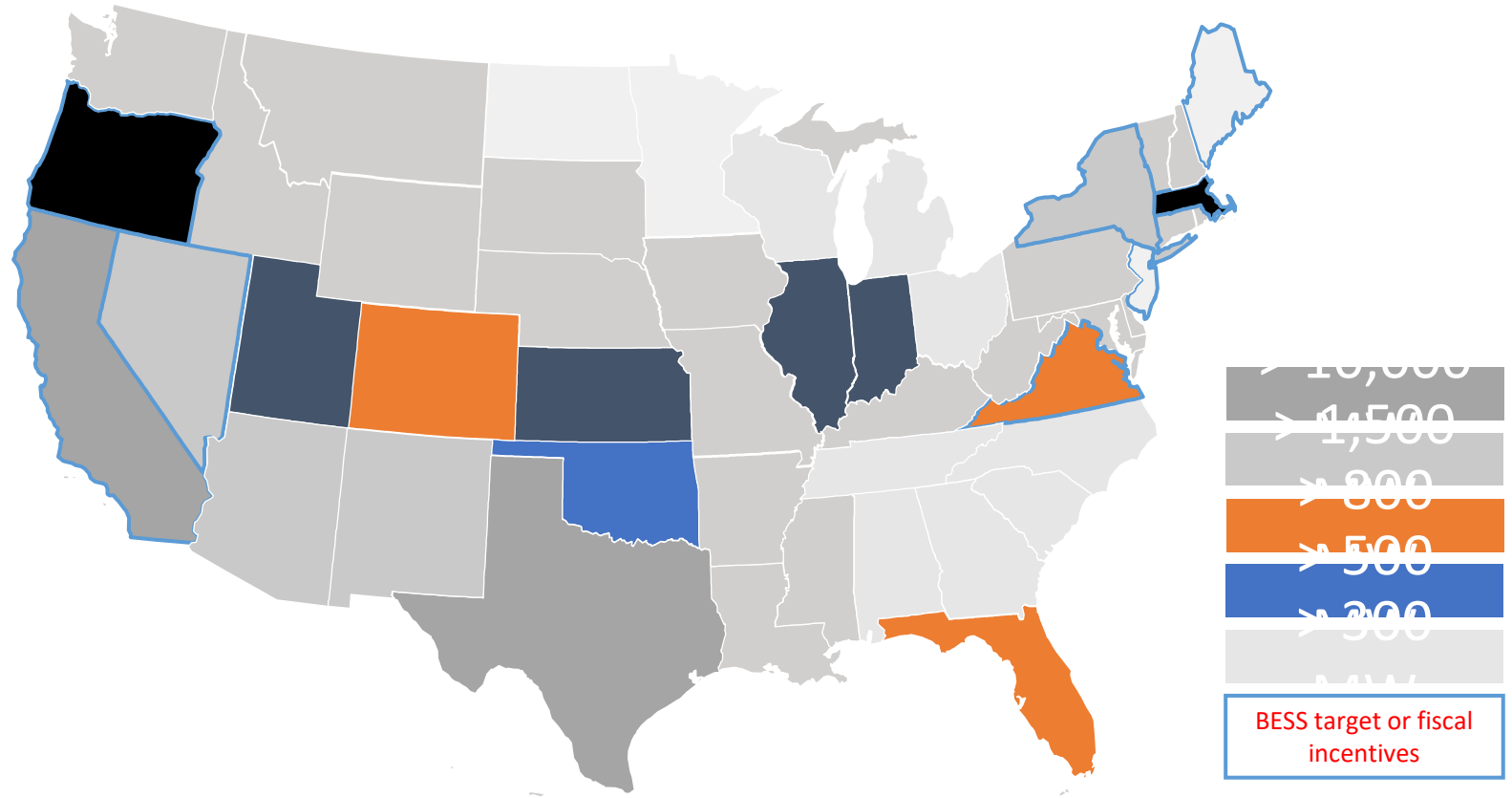
EOY 2022



EOY 2026



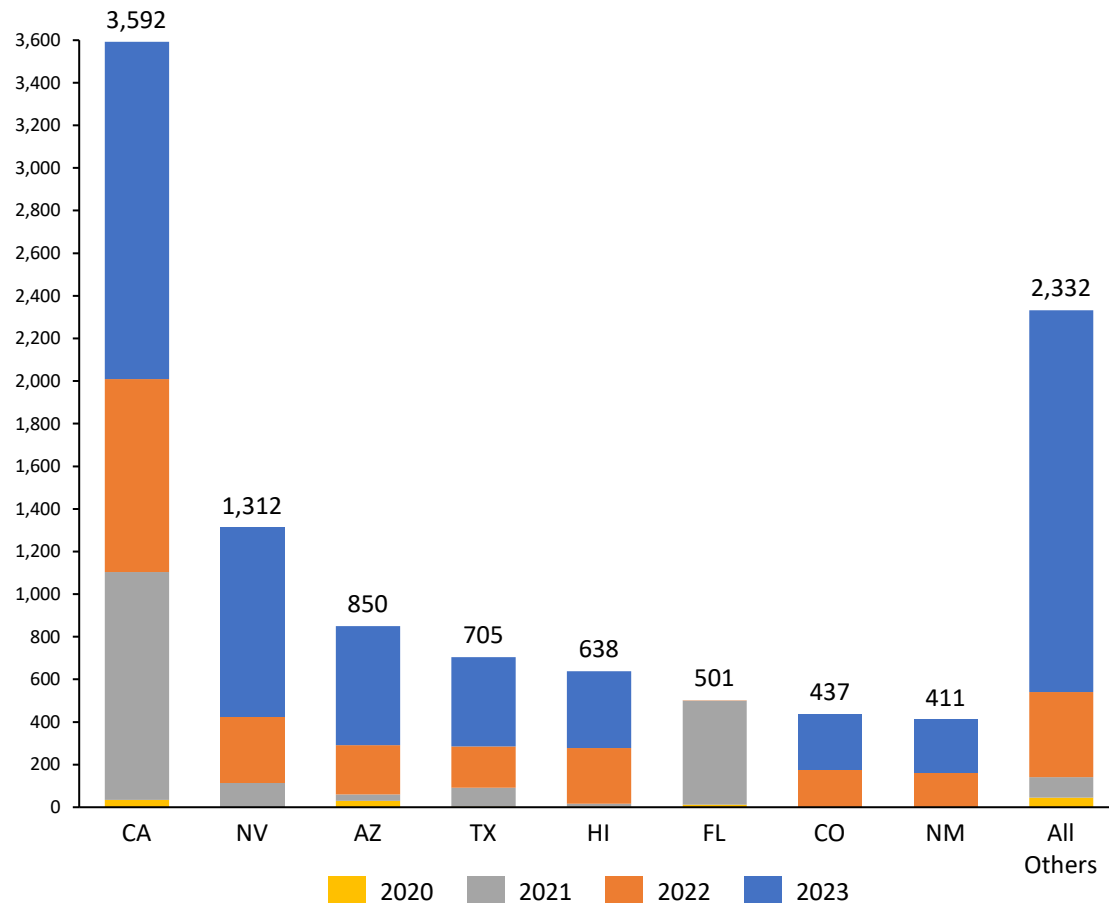
■ Top 3 ■ Top 10 ■ Other



# Solar-plus-storage in U.S. is set to explode with exponential growth

- 52% of all energy storage capacity deployments are paired with utility PV between 2020 and 2023

Solar-paired energy storage by announced projects by state 2020-2023 (MW)



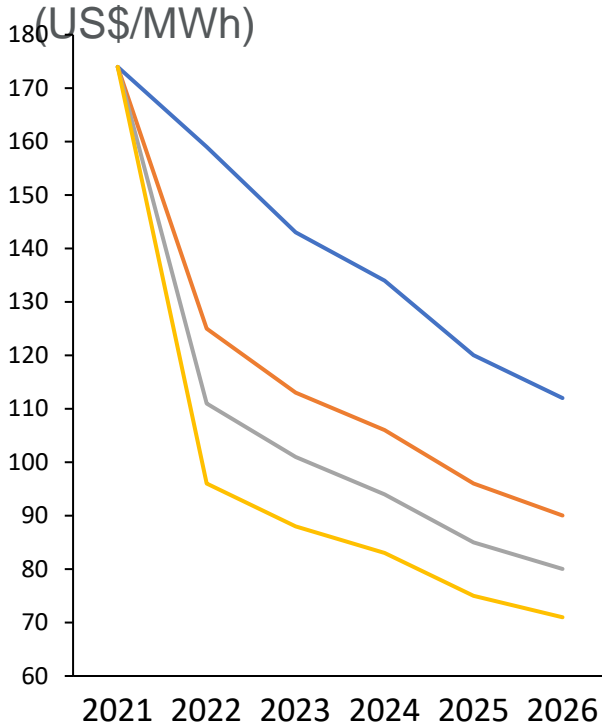
• Source: Wood Mackenzie

- **52% of all energy storage capacity deployments are paired systems with utility PV between 2020 and 2023.** There is a push to attach energy storage to utility PV before the Investment Tax Credit (ITC) steps down after 2023, allowing the energy storage system to receive the higher ITC.
- Some developers are still working on nuances of the paired system, such as procurement of the additional components and ensuring ITC has been achieved. Typically, this leads developers and IPPs with solar build experience to install larger volumes of hybrid systems.
- Developers are largely going with AC-coupled systems, due to the streamlined system set-up and ease of obtaining hardware, though DC has gained popularity depending on project needs.
- Woodmac forecasts hybrid systems will continue to be prominent system types, though heavily dependent on solar saturation and other market incentives in the short/mid-term through 2026.
- California's share of hybrids in the market falls from the majority in 2021, 56%, to 26% in 2023, as other states emerge.

# US energy storage market set for explosive growth in near-term

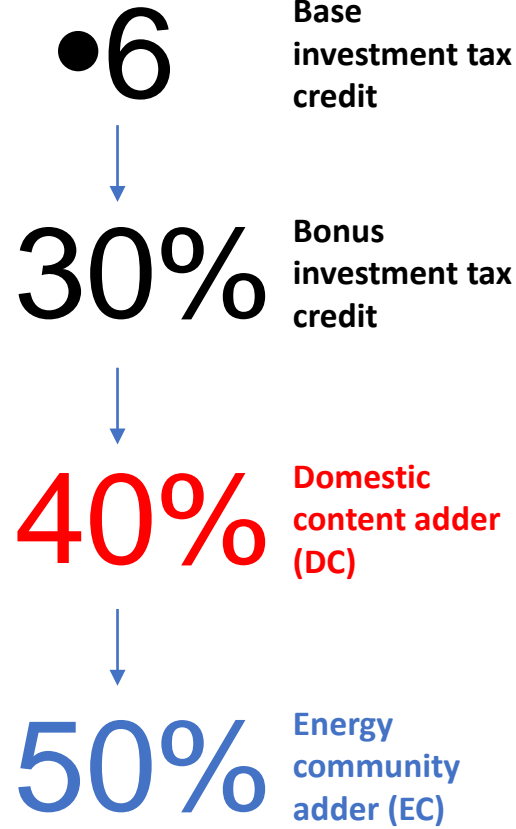
- State clean energy goals and utility IRPs have been instrumental in current growth, ITC marks next phase

- BESS LCOE scenarios



- Base credit
- Bonus credit
- Bonus + DCR
- Bonus + DCR + EC

- Key elements of the Building Back Better (BBB) draft legislation



Base investment tax credit

Bonus investment tax credit

Domestic content adder (DC)

Energy community adder (EC)

*Standalone energy storage is granted same treatment as wind and solar generation at the federal policy level and thus allowing prevailing wage and apprenticeship requirements allow access to 5X multiplier to base level credit, a short-putt for the technically complex EPC evolutions. Obtaining the 10 percentage point adder required for energy storage deployment for projects meeting domestic content requirements that move from 40% in 2022 to 55% by 2026 will be challenging given Energy community adder provides bonus current state of US supply chain for projects aiding coal communities most impacted by the energy transition and likely focus on repurposing retired coal*

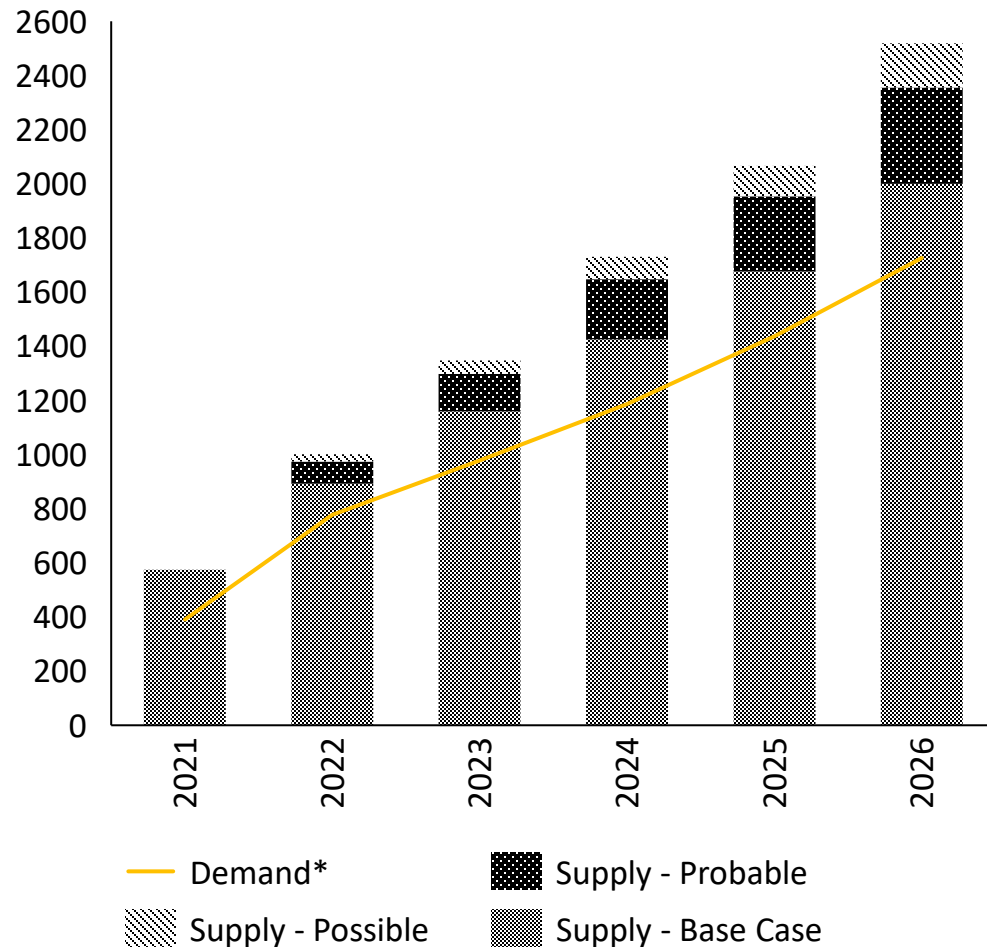
Source: Wood Mackenzie, reference plant is a standalone 4hr lithium ion battery located in TX charging from the grid



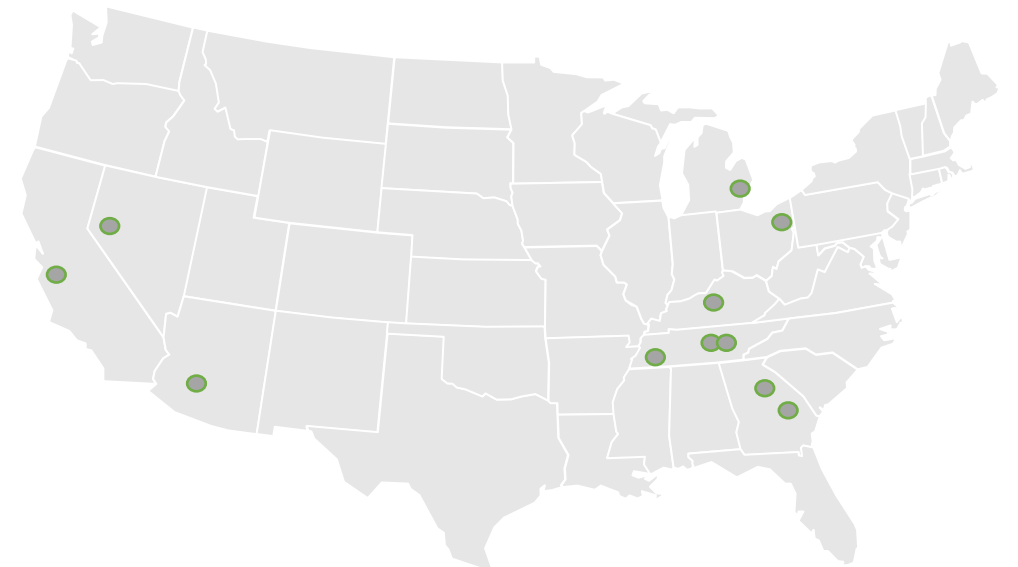
# Global battery manufacturing is able to meet demand, but delays expected

- China holds majority share of capacity, at over 75% over the forecast

## Global battery supply and demand (GWh)



- Global manufacturing supply was able to meet demand in 2021, though raw material supply was still extremely tight – a contributing factor to the increase in battery prices
- The APAC region currently holds the vast majority of capacity at 87% - even with new plant announcements in the EU and US, this only decreases to 83% by 2026
- Europe will become the second-largest battery supplier after China by 2031, Germany being the leading country in Europe.
- The U.S is playing catch up – Tesla announced 40GWh for megapack production, and KORE and Freyr are expecting 2 and 5 GWh by 2023



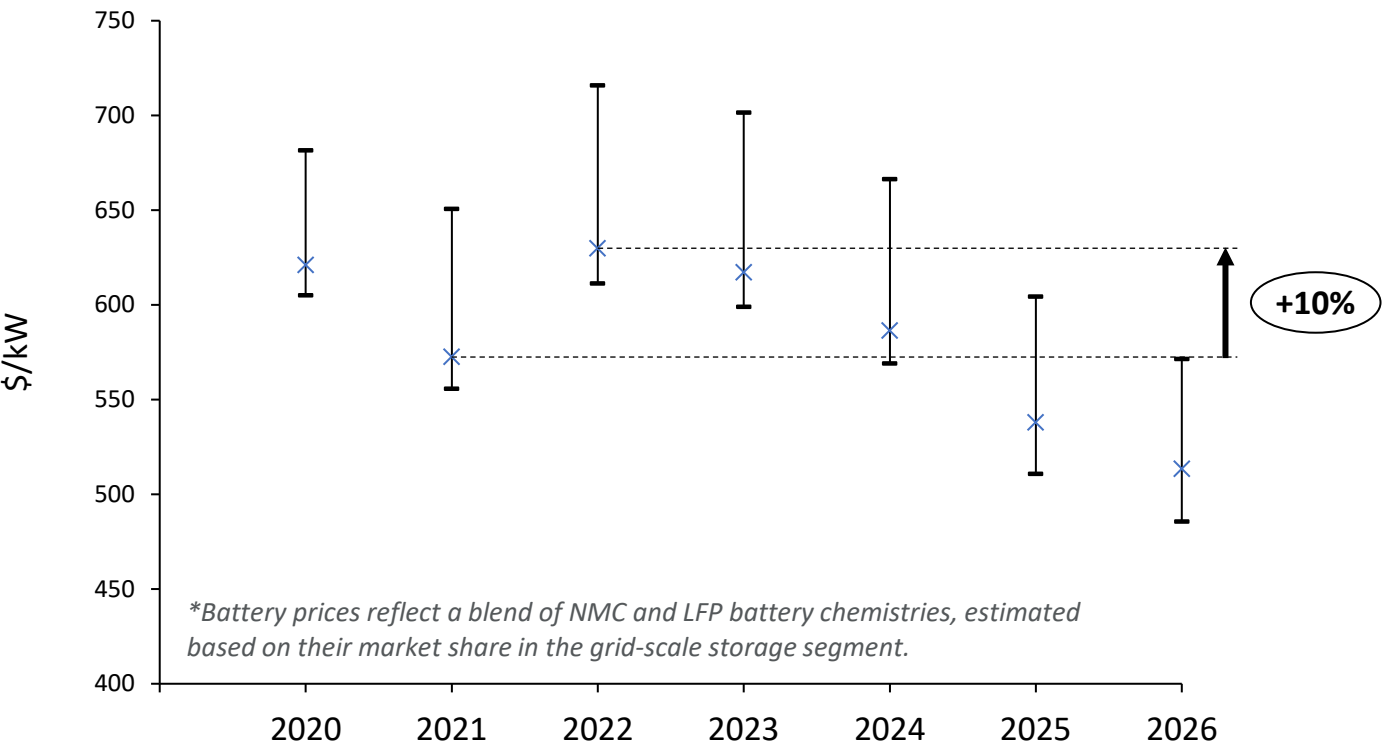
• Source: Wood Mackenzie, \*Demand includes energy storage systems, electric vehicles and electronics.



# Raw material supply limitations in 2021 ended the trend of continuously declining energy storage system prices

- With new supply coming online in the next two years, prices should abate by 2024

Grid-scale all-in energy storage system costs – 10MW/10MWh system (2020-2026)



### Pricing trends

- Battery module pricing is experiencing the largest increase of all system components, primarily due to the increased cost of raw materials from lithium and nickel.
- These materials remain in deficit through 2022 and 2023
- LFP module prices are now on par with NMC, though as demand continues to increase for LFP battery type, this edge could diminish

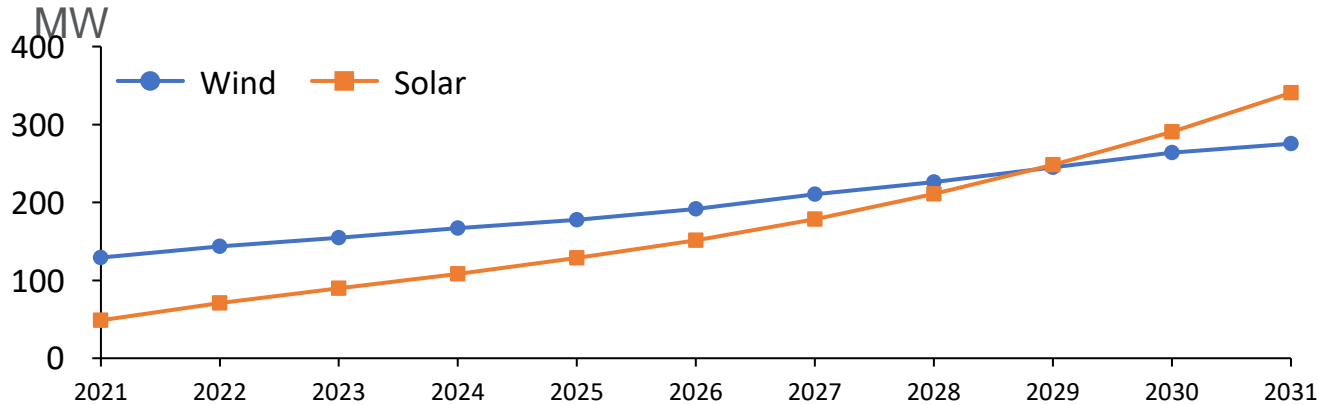
### Supply chain trends

- Tier II reliance will increase drastically to mitigate supply risk as raw material and module supply continues to tighten
- Raw material contract indexing has become the norm
- Shipping constraints and increased pricing have barely alleviated, and are likely to continue through 2022

• Source: Wood Mackenzie, Battery Raw Material Services – Demand H2 2021

## Resource adequacy and grid resiliency in play as renewable penetration increases

- Question remains as to what the “right” duration is and when will longer duration applications be required
- US wind and solar market outlooks, cumulative installed

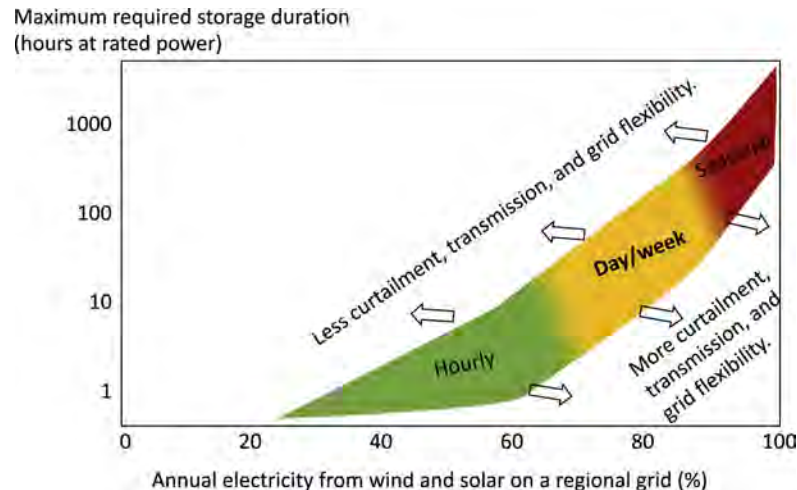


**41%**

**Total market penetration (capacity)**

- Issues with increased renewables penetration

*Between 30% and 40% (penetration), the system experiences a fundamental shift. Region-wide renewable generation availability surpasses 100% of load for a few hours of the year. Large amounts of energy are curtailed during periods of low load and high renewable generation in order to keep long-lead time conventional units online for when renewable generation decreases again – MISO RIIA*



- Expectations are for wind and solar to have access to long lasting tax credits (PTC/ITC) via a clean energy bill by H1 2022
- Market outlooks for both technologies are robust with over 600 GW of total installed capacity expected by EOY 2030
- Regions with high variable renewable energy penetration, especially wind heavy zones, will experience higher price volatility
- In absence of transmission expansion, higher levels of storage are required to absorb excess wind and solar generation



# Q&A

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# Navigating the Storage Financing Landscape

10:00 AM - 10:30 AM



**Mark Barnett**

Partner

Foley Hoag LLP



**Mihir Mehta**

SVP Finance

Soltage



**John Hopkins**

Director, Infrastructure

Harrison Street



**Ying Lucy Fan**

Vice President

North Sky Capital



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# Addressing Barriers to Access Through Community Solar & LMI Financing

10:45 AM - 11:45 AM



**Joe Fiori**  
Director,  
Energy Sales  
Nexamp



**Laura Stern**  
Co-CEO  
Nautilus Solar  
Energy, LLC



**Thomas  
Neyhart**  
Co-Founder and CEO  
PosiGen



**Steph Speirs**  
Chief Executive Officer  
and Co-Founder  
Solstice



**Guillermo  
Coustasse**  
General Counsel  
PearlX Infrastructure

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# Tax Potpourri: Getting into the Mix of all Things Tax

11:45 AM - 12:45 PM



**Lee Peterson**

Senior Manager  
CohnReznick, LLP



**Judy Kwok**

Partner  
Troutman Pepper



**John Marciano**

Senior Partner  
Allen & Overy LLP



**Elias Hinckley**

Partner  
K&L Gates

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# The Auxin Tariff Petition & Implications for Solar Businesses

12:45 PM - 1:15 PM



**Abigail  
Ross Hopper**

President and CEO  
Solar Energy  
Industries  
Association



**George  
Hershman**

CEO  
SOLV Energy

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# Achieving Impact through Solar Infrastructure

2:00 PM - 3:00 PM



**Susanne  
Fratzscher**

Associate Vice President,  
Strategic Solutions  
Sol Systems



**Dawn  
James**

Director, Global  
IoT Industry Strategy -  
Energy & Sustainability  
Microsoft



**Dana Clare  
Redden**

CEO  
Solar Stewards



**Van  
Vincent**

President and CEO,  
VLV Development and Partner  
VGI Energy Solutions



**Cheryl  
Comer**

Senior Strategic  
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# Beyond Solar: Financing Integrated C&I Energy Solutions

3:00 PM - 3:45 PM



**Andrew Blevin**

CFO  
Safari Energy LLC



**Alexandra Cooley**

Chief Investment Officer,  
Nuveen Green Capital  
Nuveen



**Doug Beebe**

Vice President Clean Energy  
Key Equipment Finance



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Vice President, Federal Policy  
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# Protect Your Profits: Leveraging AI for Efficient Contract Compliance

3:45 PM - 4:15 PM



**John  
Gottshall**

Subject Matter  
Expert

ThoughtTrace, Inc.



**Ashley  
Van Scyoc**

Product Marketing  
Manager

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# Paying it Forward: Solar Moves Toward Equity Through Financing Structures

4:30 PM - 5:30 PM



**Nicole Steele**

Management and  
Program Analyst

U.S. Department of Energy



**Omar Blayton**

CFO

Sunwealth  
Power, Inc.



**Denise  
Abdul-Rahman**

GLOV Special  
Projects Manager

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