



Office of
ELECTRICITY

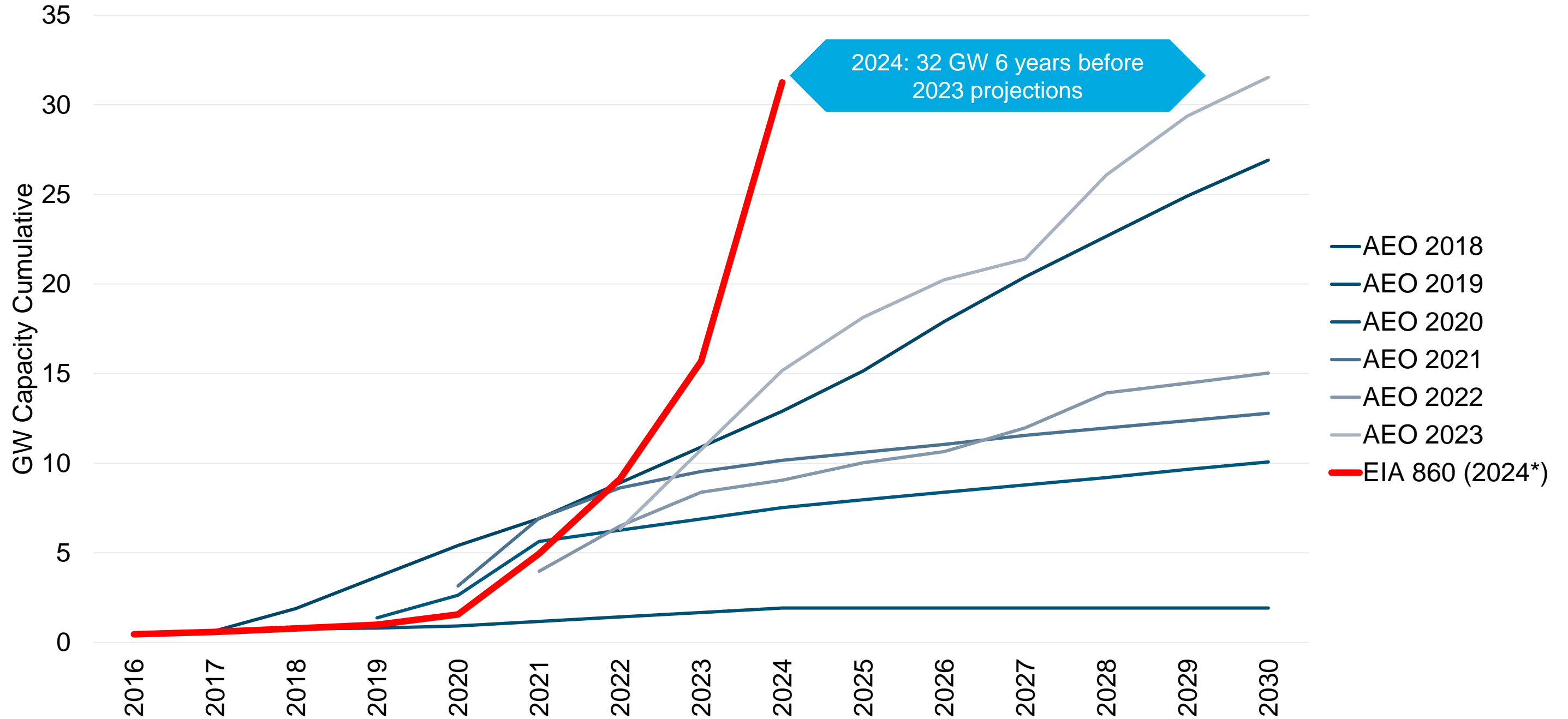
Where's Your Million-Dollar* Nugget?

October 9, 2024

Eric Hsieh

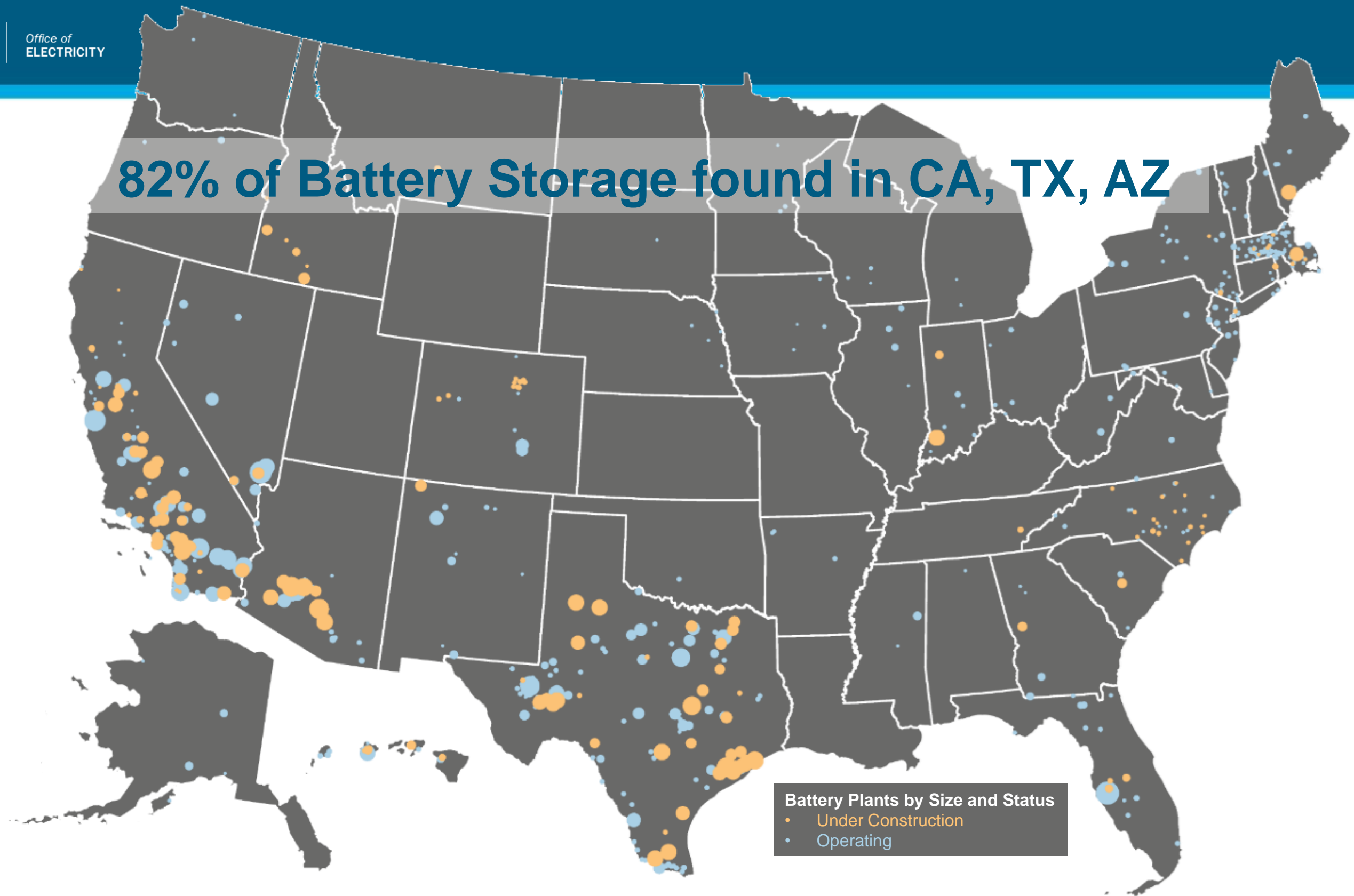
Deputy Assistant Secretary for Energy Storage

EIA AEO Storage Capacity: Projected vs Actual



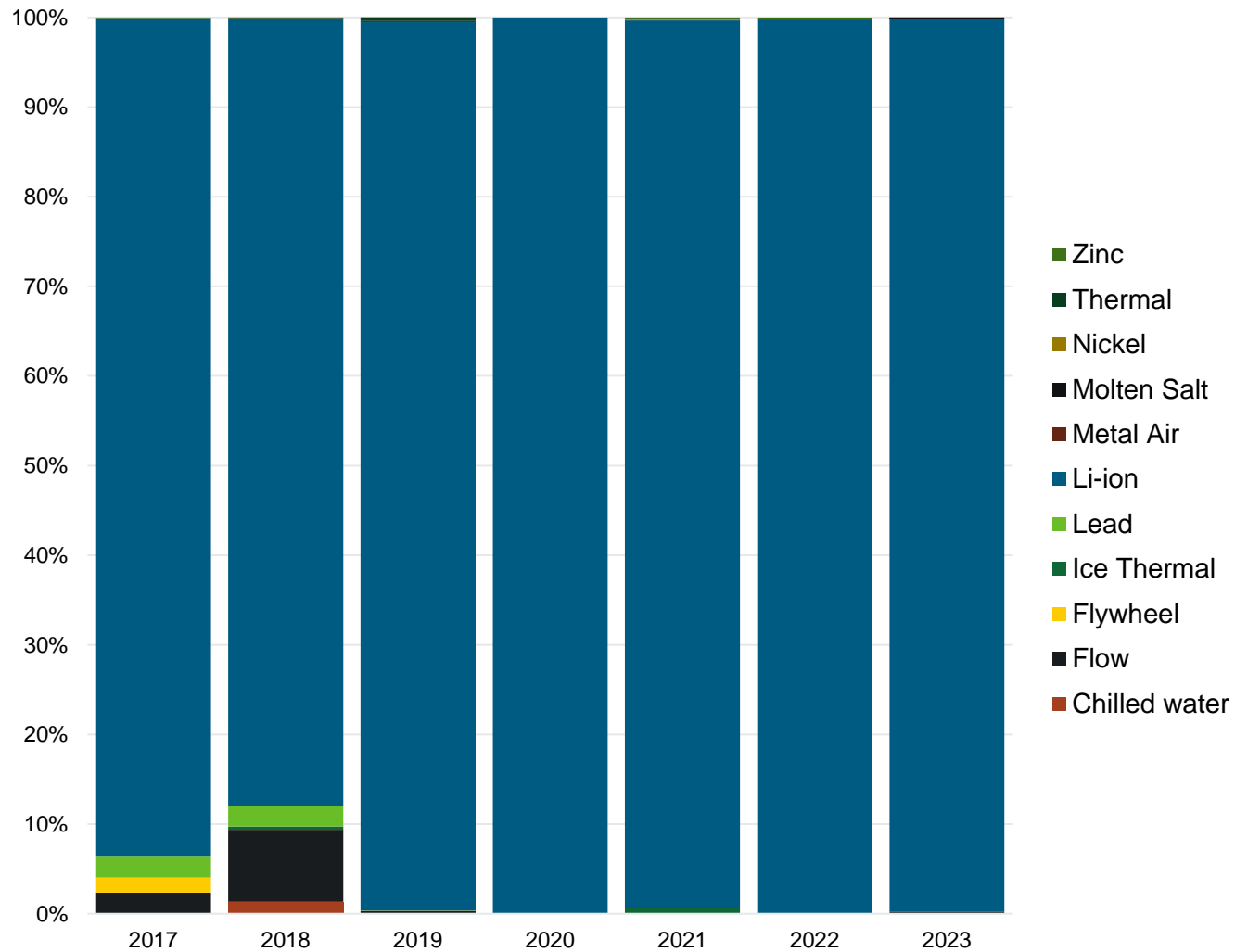
EIA Annual Energy Outlook and Form 860 Data, as noted. *2024 data includes projects under construction

82% of Battery Storage found in CA, TX, AZ

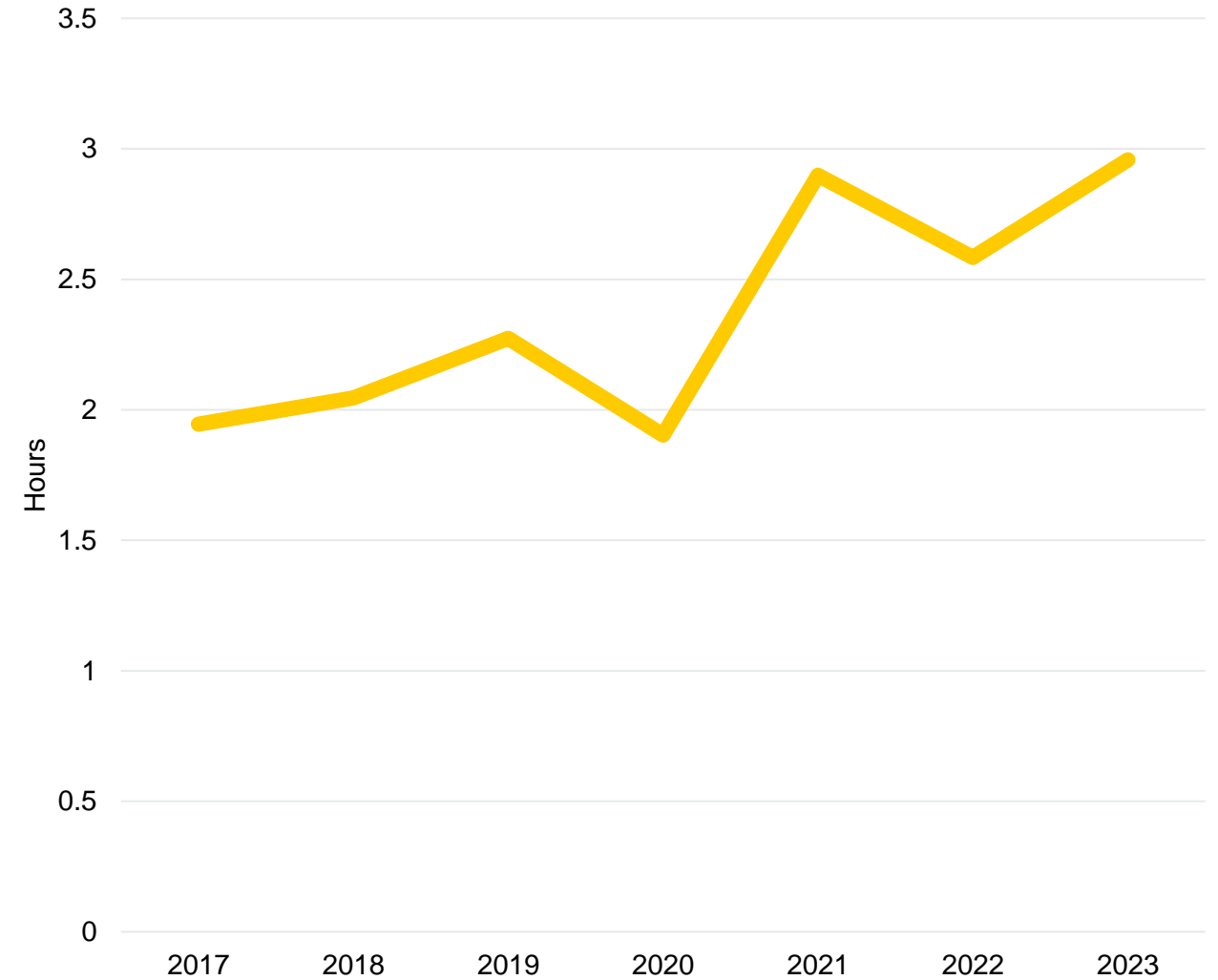


Most Commercial ESS: Lithium; Under 4 hours

Storage Deployments Technology Share



Average Duration of Deployed Storage Systems



The Expanding Storage Community

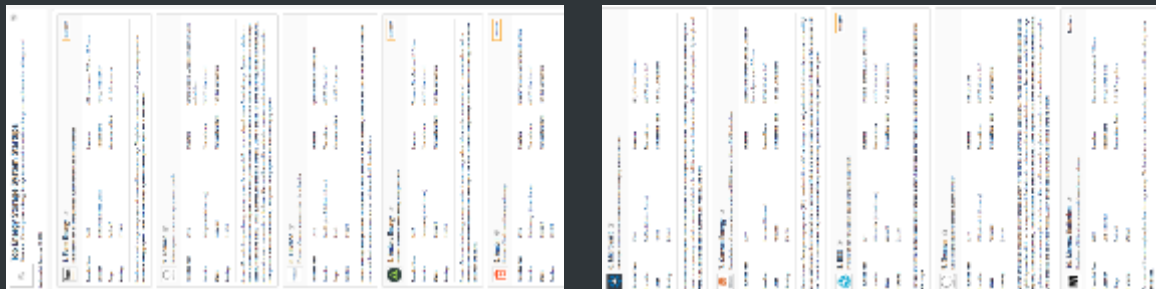
>75 LDES Companies
(Westly/Pitchbook)



>100 Storage Vendors
(EPRI)



>1200 Storage Startups (Tracxn)



3000 Utilities

6100 Hospitals

19,500 Incorporated Places

130,000 Primary and Secondary Schools

350,000 Places of Worship

OE Opportunities: Go Beyond Business-As-Usual

ESS Deployment Trends

Geographically concentrated

Almost exclusively lithium









Mostly under 4 hours duration

Office of Electricity "Focus Areas"

Increase storage accessibility to more users 

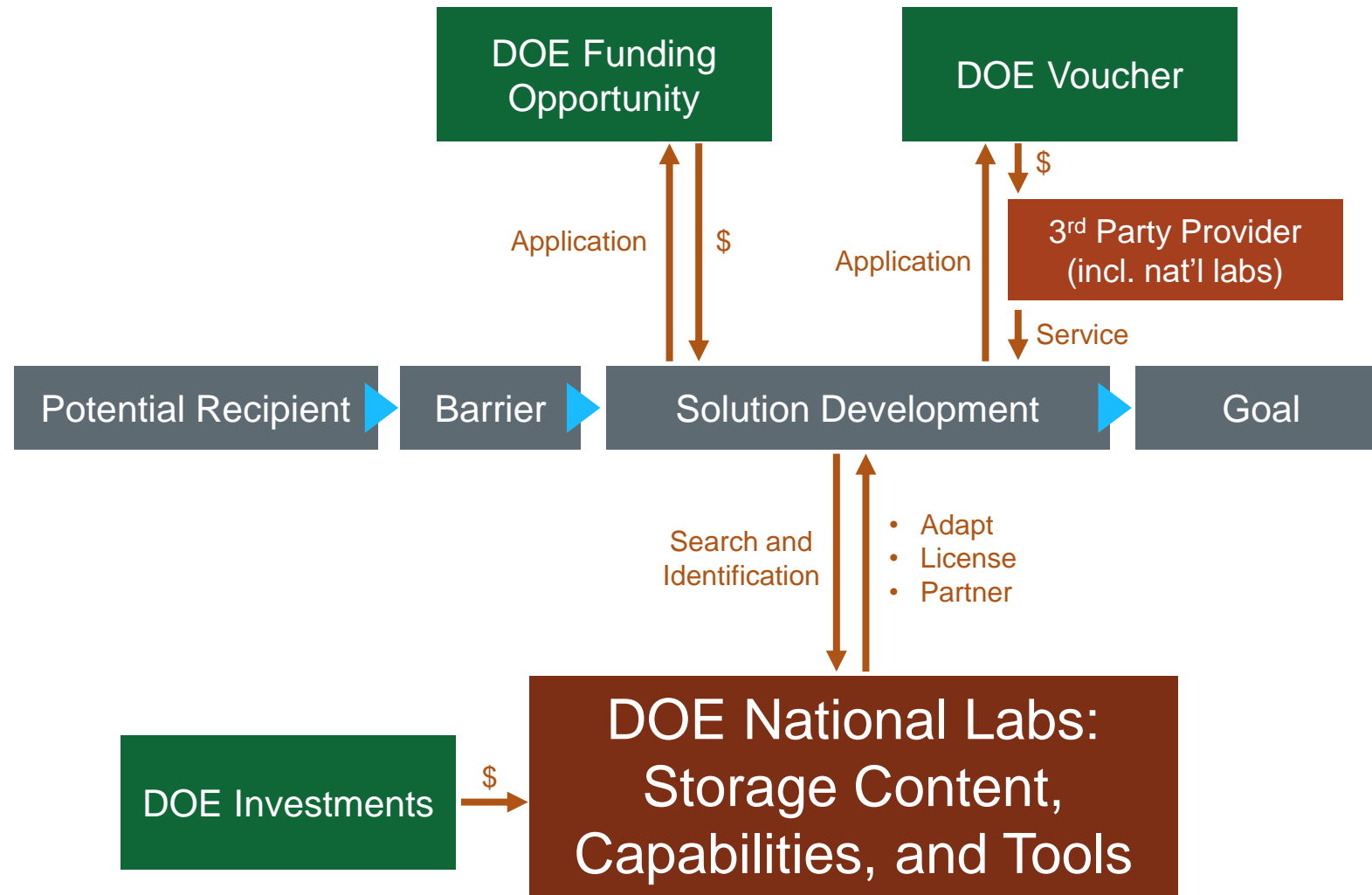
Diversify away from lithium 

Leapfrog to 10-24+ durations 

\$15M	Technology Liftoff 	3 Consortia
\$15M	Demo and Validation 	3 Teams
\$15M	Critical Facilities Energy Resilience 	3 Teams
\$9M	Energy Storage for Social Equity 	14 Communities
\$1M	Innovator and Community Vouchers 	Up to 14 Recipients
\$8M	Aligning Manufacturability & Preproduction Design^ 	4 Teams
\$200k	Beyond the Meter Energy Storage Integration Prize* 	2 Teams
\$300k	Energy Storage Innovations Prize Round 2^ 	10 Awardees

*Currently Open Opportunities ^Pre-Announcement or Notice of Intent Issued

Solution Pathways: Familiar to Novel

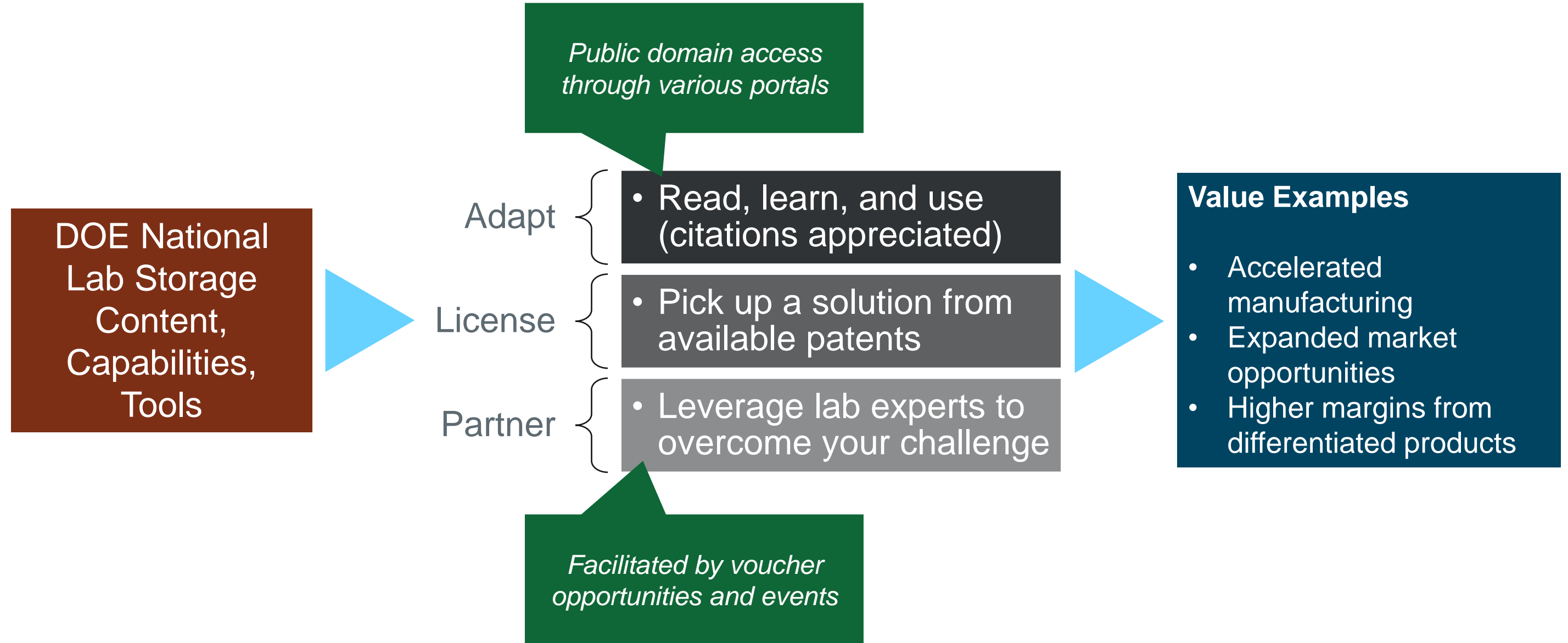


	Funding Opportunity	Voucher	Lab Content, Capabilities, and Tools
Potential # of Recipients, Per Opportunity	1s-10s	10s-100s	1000s+
Timing	At DOE Schedule	At DOE Schedule	Recipient-Driven
Application Complexity	High	Low-Medium	Zero-Medium
Scope	DOE Defined	Mutually Defined	Self- or Mutually-Defined
Financial Support	Direct to Recipient	In-Kind	In-Kind, Variable
FY2020-FY2024 OE Investment	~\$100M	~\$1M	~\$330M

Energy Storage Content Creators: OE's \$330M Investment



Pathways that Transform Content into Value

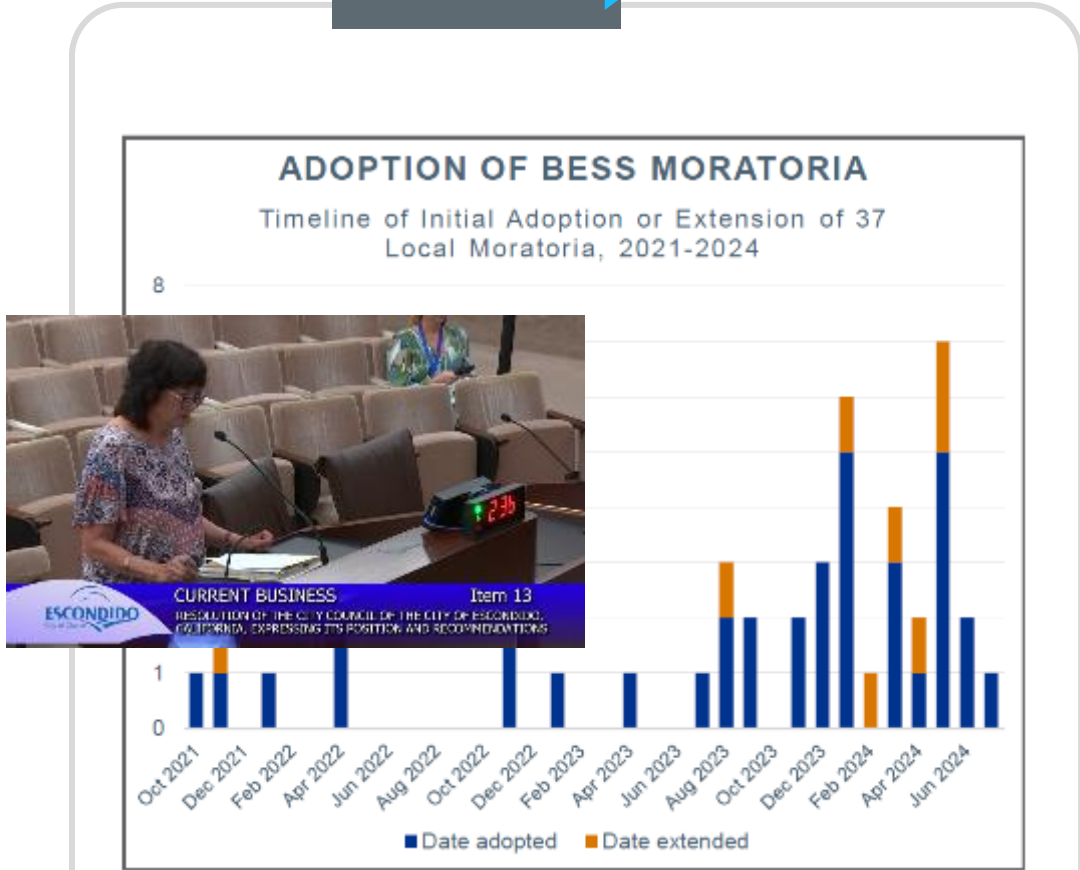


Adapt: Moratoria vs. Inspiration



Project Developer

More Developable Sites

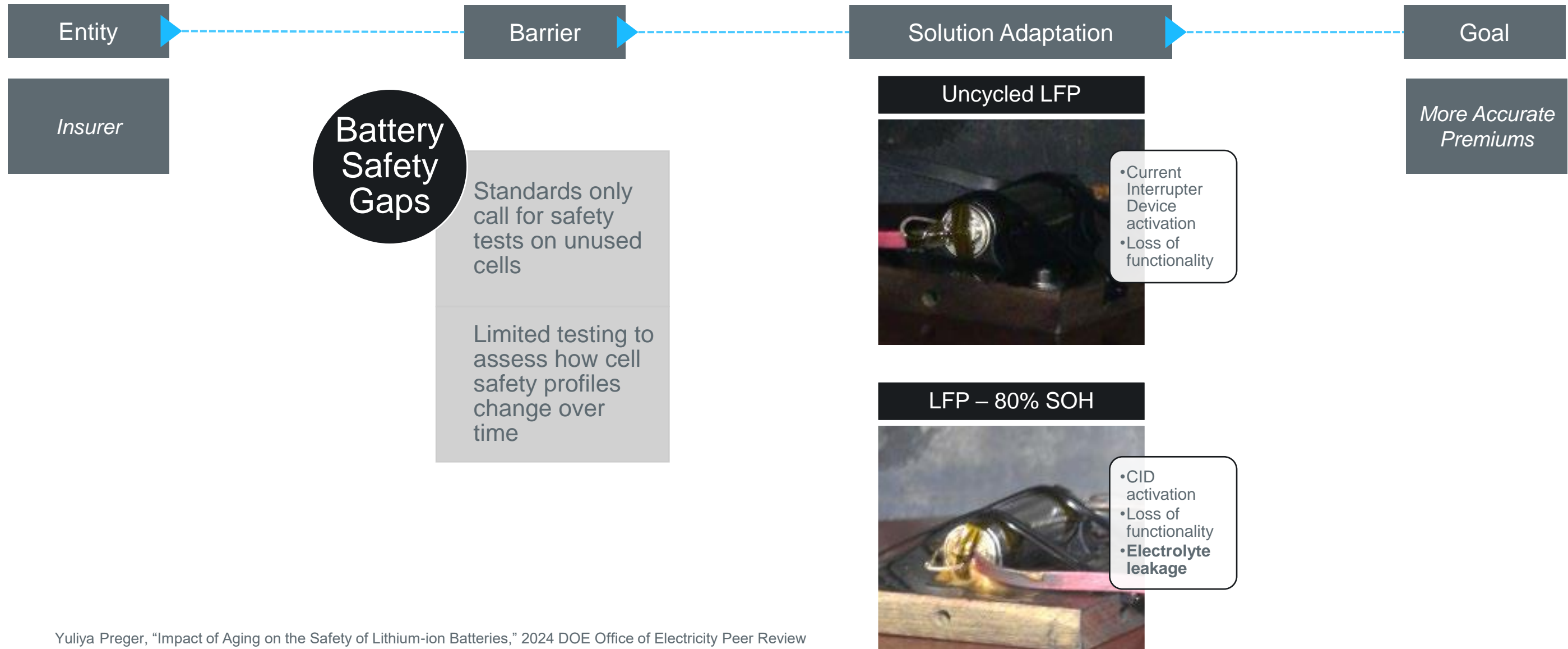


Devyn W. Powell, Jeremy B. Twitchell, Prathit B. Dave, "Tracking Local Moratoria and Other Key Considerations for Battery Energy Storage Siting" 2024 DOE Office of Electricity Peer Review

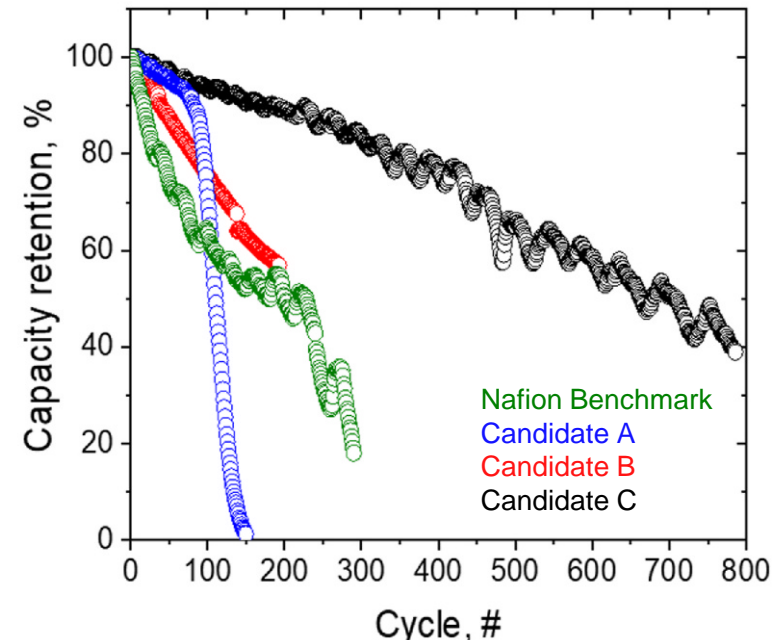
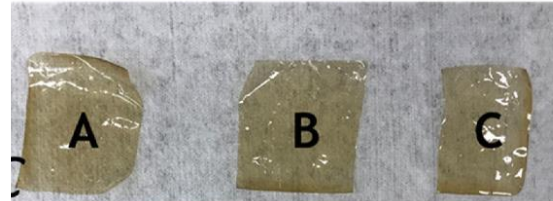
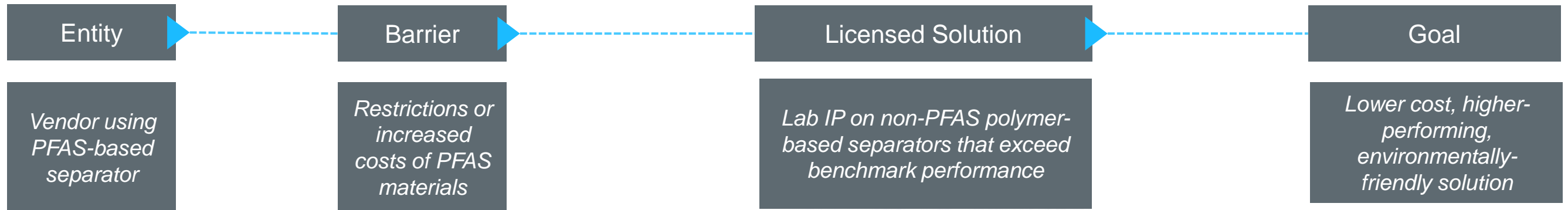


ES4SE program described in Jennifer Yoshimura, Adrienne Rackley, Henry Guan, "Energy Storage For Social Equity (ES4SE) Initiative," 2023 DOE Office of Electricity Peer Review

Adapt: Battery Wear – Unused vs. Aged Cells



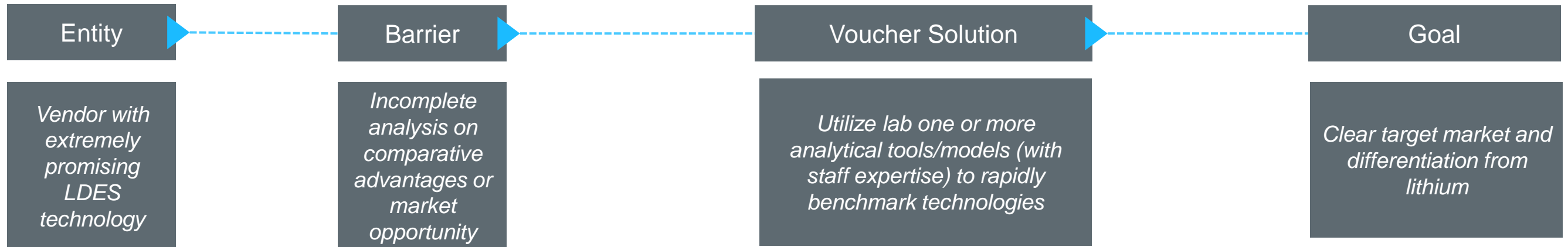
License: Environmental Sustainability and Performance



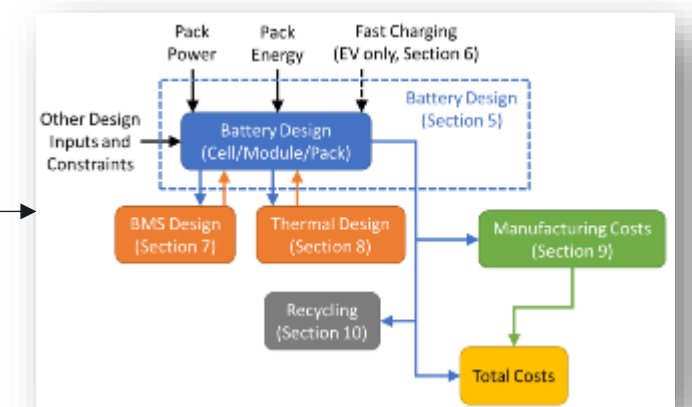
Information on specific licensing mechanisms available at <https://www.energy.gov/gc/laboratory-partnering>

Cy Fujimoto, "The Evolution of Membrane Development at Sandia National Labs," SAND2024-083530, 2024 DOE Office of Electricity Peer Review

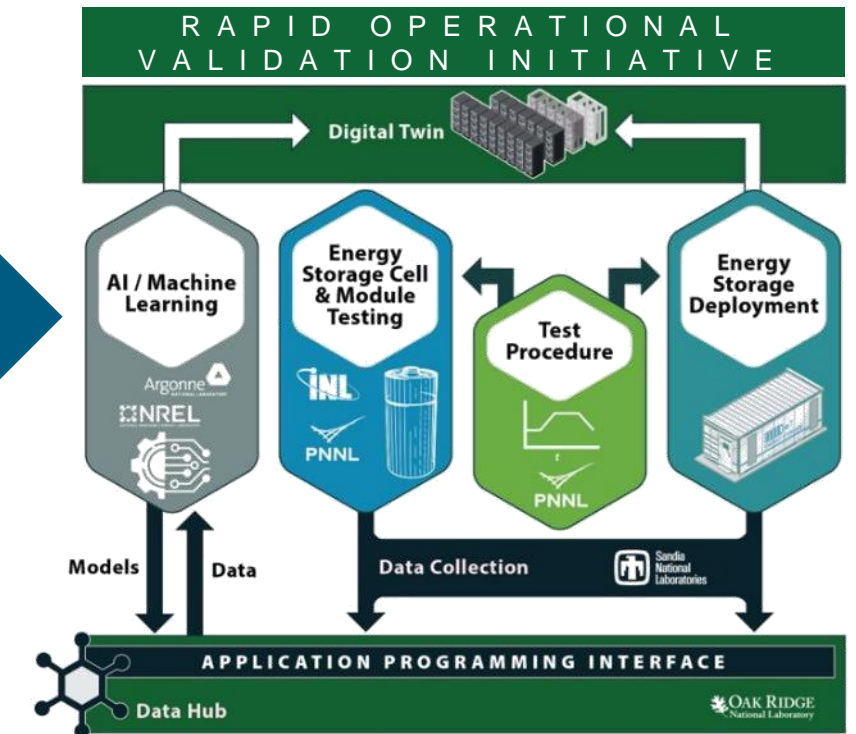
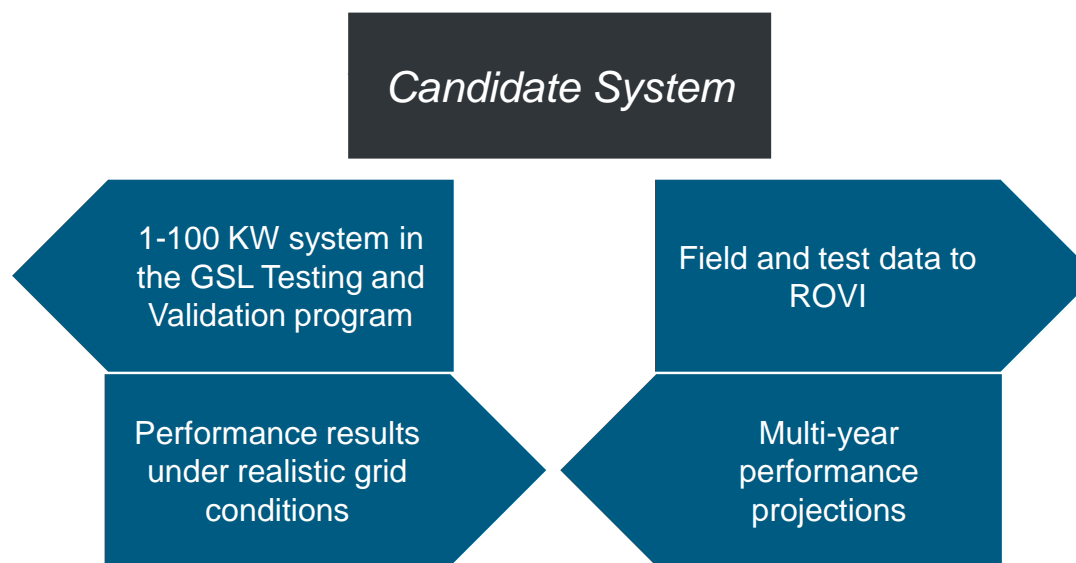
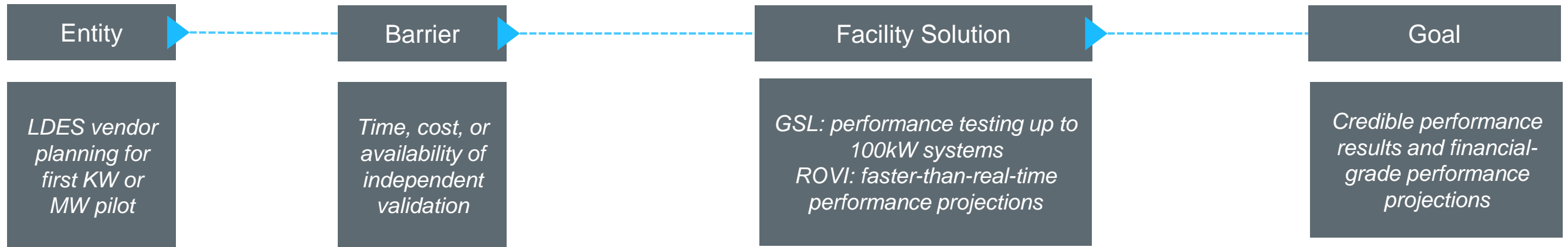
Partner: Competitive Analysis of Lithium vs. New Technology



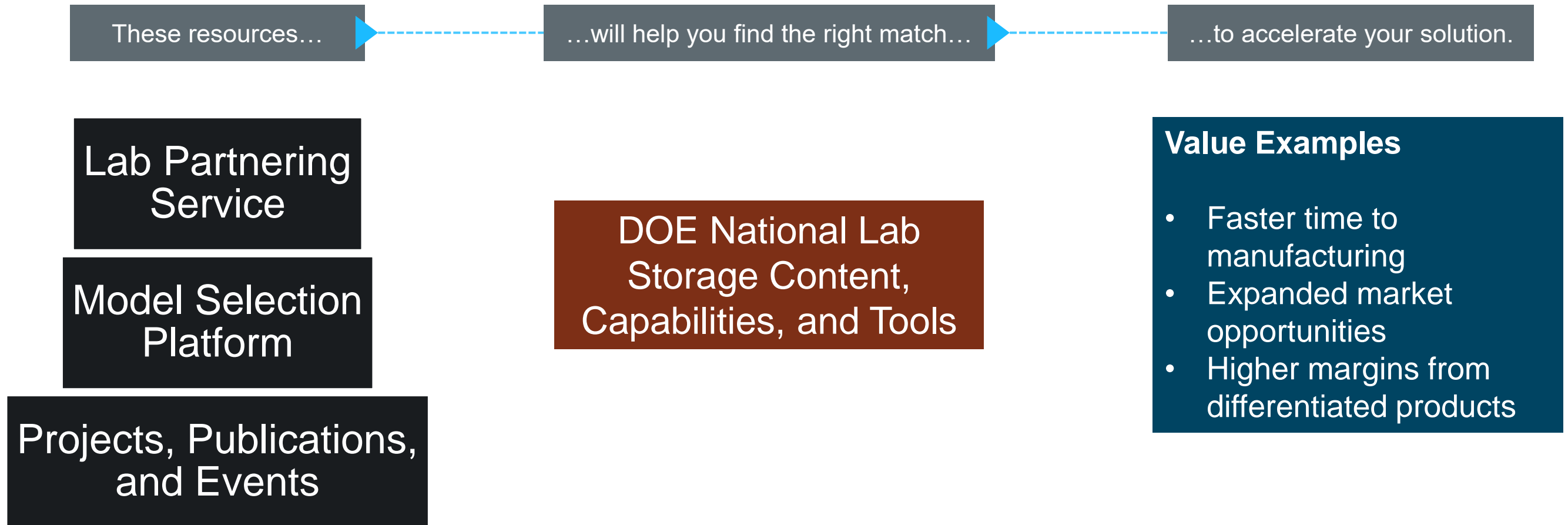
ESGC Summit Voucher Recipients



Partner: Testing, Validation, Projection via GSL and ROVI



How to find your million-dollar* nugget



**payback value not guaranteed*

Lab Partnering Service: Capabilities, Facilities, and Experts

The screenshot displays the Lab Partnering Service website. At the top, the navigation bar includes 'LAB PARTNERING SERVICE', 'Labs', 'Explore', 'Patents', 'Funding', and 'How to Partner'. Below the navigation is a banner for the 'Energy Storage Grand Challenge' with the text: 'The Department of Energy's (DOE) Energy Storage Grand Challenge (ESGC) is a comprehensive program to accelerate the development, commercialization, and utilization of next-generation energy storage technologies and sustain American global leadership in energy storage. This comprehensive set of solutions requires concerted action, guided by an aggressive goal: to develop and domestically manufacture energy storage technologies that can meet all U.S. market demands by 2030.'

On the right side of the page, there is a profile for Stanley Atcity, a Distinguished Member of Technical Staff at Sandia National Laboratories. His profile includes a photo, name, and a list of expertise areas: Energy Storage, Renewable Energy, Bidirectional Electrical Storage, Grid Integration, Flexible Generation and Controllable Loads, and Power Electronics. An 'About' section describes his background in electrical engineering and his current role at Sandia National Laboratories.

The main content area shows a list of technology summaries. The first entry is 'Fabrication of Uniform and Spatially Controlled Nanostructures on Substrates' from Lawrence Berkeley National Laboratory, categorized under Chemical and Thermal Storage, Intervention, Semiconductors, and Sensors & Detectors. The second entry is 'Fractionation and Removal of Solutes from Ionic Liquids' from Lawrence Berkeley National Laboratory, categorized under Biomass & Biofuels, Chemical and Thermal Storage, and Hydrogen Applications. The third entry is 'Low Temperature Lignin Dissolution, Depolymerization' from Lawrence Berkeley National Laboratory, categorized under Biomass & Biofuels, Chemical and Biotechnology, and Chemical and Thermal Storage.

At the bottom right, there is a 'Questions?' section with an 'ASK ME' button. The footer of the page features the U.S. Department of Energy logo and the text 'Office of TECHNOLOGY TRANSITIONS'.

<https://esgc.labpartnering.org>

Model Selection Platform

A few screening questions to find the best model (out of >60 choices) for your scenario

<https://msp.pnnl.gov/>

The screenshot shows the MSP website interface. At the top, it says "MSP Model Selection Platform For Energy Storage". Below this, there are two buttons: "FIND BEST MATCH" and "VIEW MODEL COMPARISON TABLE". A search bar is followed by filters for "Category", "Institution", "Energy Sector", and "Availability", each with a dropdown menu. A "RESET" button is also present. The main content area displays a grid of model cards. Each card includes an icon, a title, a subtitle, the institution name, and a brief description of the model's function.

Model Name	Institution	Description
AHA	Idaho National Laboratory	All Hazards Analysis. Assess multi-sectoral relationships between infrastructure elements to support diverse risk ...
ATB	National Renewable Energy Laboratory	Annual Technology Baseline. Provides a consistent set of technology cost and performance data for energy analysis.
ADOPT	National Renewable Energy Laboratory	Automotive Deployment Options Projection Tool. Estimates the impact of vehicle technology improvements on future U.S. vehicle sales, ...
GREET	Argonne National Laboratory	Life-cycle MODEL. Battery life cycle analysis of energy and environmental attributes in GREET®. Life cycle analysis simulations of alternative transportation fuels and vehicle technologies.
BLAST	National Renewable Energy Laboratory	Battery Lifetime Analysis and Simulation Tools. Assess battery lifespan for behind-the-meter, vehicle, and stationary applications.
BatPaC	Argonne National Laboratory	Battery Performance and Cost. Design and cost estimation of lithium-ion cells and packs.
EverBatt	Argonne National Laboratory	Battery recycling analysis of energy, environmental, and economic attributes. Evaluates cost and environmental impacts for the various lifecycle stages of a lithium ion ...
B2U Calculator	National Renewable Energy Laboratory	Battery Second-Use Repurposing Cost Calculator. Explore the effects of different repurposing strategies and assumptions on economics for ...

Access to Additional DOE Resources



Grid Energy Storage
Supply Chain Deep Dive Assessment

U.S. Department of Energy Response to Executive Order 14017, "America's Supply Chains"

February 24, 2022

[Grid Energy Storage Supply Chain Deep Dive Assessment](#)
February 2022

2022 Grid Energy Storage Technology Cost and Performance Assessment

Wilayanur Viswanathan, Kendall Mongird, Ryan Franks, Xiaolin Li, Vincent Sprengle*, Pacific Northwest National Laboratory.
Richard Baxter, Mustang Prairie Energy

* vince.sprengle@pnl.gov

Technical Report
Publication No. PNNL-33253
August 2022

ENERGY STORAGE GRAND CHALLENGE | U.S. DEPARTMENT OF ENERGY

[2022 Grid Energy Storage Technology Cost and Performance Assessment](#)
August 2022

U.S. DEPARTMENT OF ENERGY

Pathways to Commercial Liftoff: Long Duration Energy Storage

[Pathways to Commercial Liftoff: Long Duration Energy Storage](#)
March 2023

ENERGY earthshots | Storage

U.S. DEPARTMENT OF ENERGY

Achieving the Promise of Low-Cost Long Duration Energy Storage

An Overview of 10 R&D Pathways from the Long Duration Storage Shot Technology Strategy Assessments

August 2024

[Achieving the Promise of Low-Cost Long Duration Energy Storage](#)
August 2024

- [Battery Safety and Reliability Methods, Codes, Standards](#)
- [Community Capacity Building and Deployment Assistance](#)
- [Capacity-Building for Regulators](#) (including MI, LA, VT, GU)
- DOE Office of [Electricity Storage Peer Review Archive](#) (2010-2024)

Engage and Connect with DOE

- Outreach takes many forms
 - Informal input at DOE events (e.g., ESGC Summit, OE Peer Review)
 - Feedback for ESGC Roadmap
 - EAC Public Hearing (November, 2024)
 - Targeted listening sessions
 - **Formal Requests for Information (RFIs)**
 - Mini-solicitations (e.g. prizes)
 - [LDES Consortium](#)
- <https://www.energy.gov/oe/office-electricity>
 - News and blogs
 - OE Activities
 - Sign up for OE Updates
 - Sign up for Funding Updates



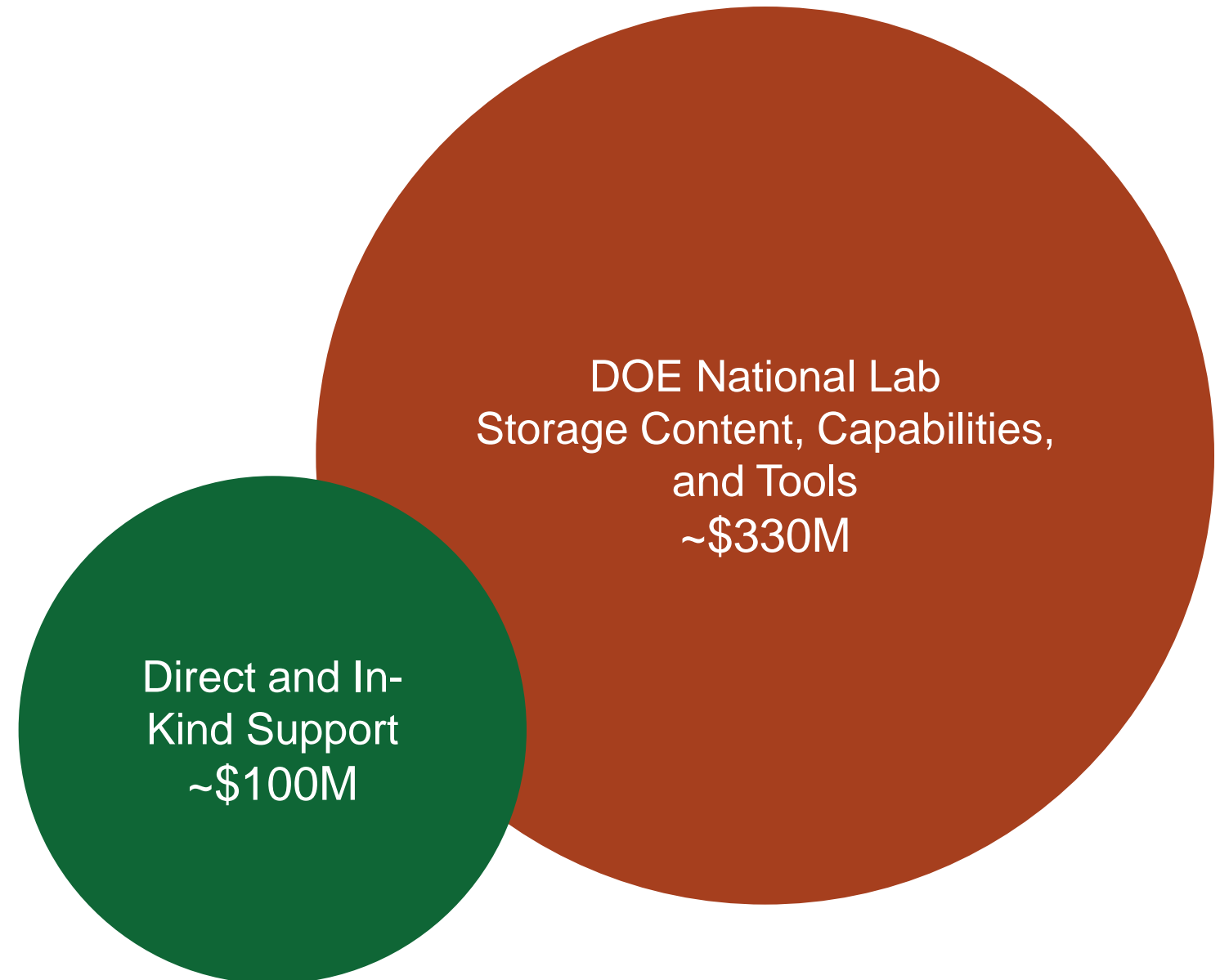
**THE NATIONAL CONSORTIUM FOR THE
ADVANCEMENT OF LONG DURATION
ENERGY STORAGE TECHNOLOGIES**



[LinkedIn](#) [X](#) [Web](#)

OE Storage Investments: FY2020-FY2024

- DOE support is much more than direct financial assistance
- Examining OE's public storage content and expertise can increase your odds of finding your million-dollar* nugget



**payback value not guaranteed*

Thank you

The background of the slide features a stylized representation of the Earth. The planet is shown from a perspective that highlights its curvature. Overlaid on the Earth is a complex network of glowing blue lines and nodes, resembling a global grid or a data network. The nodes are small, bright blue dots, and the lines are thin, connecting these dots across the globe. The overall color scheme is dominated by various shades of blue, from deep navy to bright, glowing cyan. The text 'Thank you' is centered in the upper half of the image in a large, white, sans-serif font.

Icons for Use



BATTERY STORAGE CHARGE



BATTERY STORAGE FULL



BATTERY



BATTERY RENEWABLE



ADVANCED ANALYTICS



COMPONENT



COMMUNICATION



COMMUNICATION



CONTAINER COAL



BATTERY



COMPONENT 2



COMPUTER RESEARCH DATA



ENERGY STORAGE



EXPAND



ENERGY ALERT



ELECTRIC



CONTINUOUS



LASER



GRID MANAGE



LONG DURATION STORAGE



PEOPLE



PLANT RENEWABLE



POWER GRID



POWER PLANT



PAPER



RISKS



RENEWABLE



RENEWABLE ENERGY



SECURITY



SECURITY



SOLAR



SECURE COMMS



WIND ENERGY



SUPPORT



TECH



TECH DEVELOPMENT



TECH GENERAL