
Pennsylvania Energy Storage Consortium

MEETING #5

NOVEMBER 2, 2022

Welcome & Overview

Mission Statement: To engage stakeholders on policy and market topics that identify the opportunities to deploy energy storage for a modern, resilient, cleaner, low-carbon grid for all Pennsylvanians.

Technical Notes:

- Please mute your mic/video unless indicated otherwise during Q&A.
- You may enlarge the presentation screen by going to the ellipses icon and clicking “focus on content” and/or “full screen.”

Forum Overview:

- Access the PA DEP Energy Storage [website](#)
 - Sign up for the Consortium mailing list
 - Download the “Pennsylvania Energy Storage Assessment: Status, Barriers & Opportunities”
- The Steering Committee serves as content advisors
- Past meetings have discussed the energy storage value proposition, opportunities for energy storage deployment in Pennsylvania, and associated equity considerations

Meeting Agenda

- I. Welcome & Overview**
- II. Leveraging Federal Funding Opportunities**
 - I. Infrastructure Investment and Jobs Act – Katrina Pielli, US DOE**
 - II. Inflation Reduction Act – Jason Burwen, American Clean Power Association**
- III. PA DEP Perspective on Federal Funding Opportunities – David Althoff, Pennsylvania DEP**
- IV. Breakout Room Discussions**
- V. Consortium Participant Updates**
- VI. Wrap-Up & Next Steps**

The breakout rooms will provide time for stakeholder discussion and Q&A.

Leveraging DOE OCED Funding Opportunities from the IJA

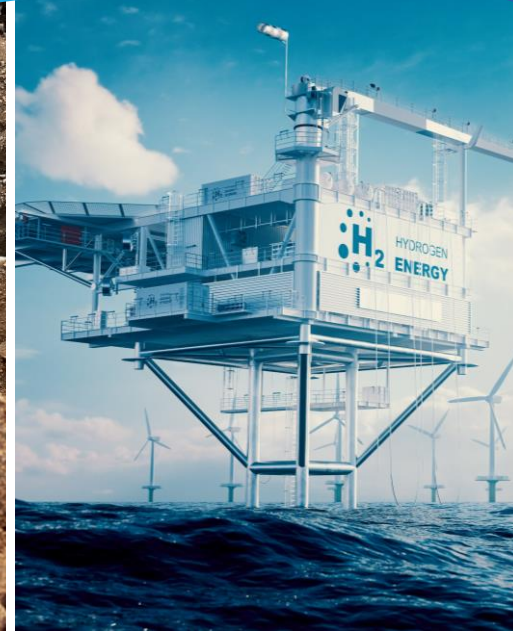
Katrina Pielli, Engagement Office Director, US DOE
Office of Clean Energy Demonstrations





OCED

Office of Clean Energy Demonstrations



Leveraging DOE OCED Funding Opportunities from IIJA

Katrina Pielli
Engagement Office Director
Office of Clean Energy Demonstrations
U.S. Department of Energy

November 2, 2022

Background

- The International Energy Agency says we need global public investments of at least \$90 billion this decade for large-scale clean energy demonstration projects to achieve net zero emissions by 2050
- Two recent historical climate laws enacted—the Bipartisan Infrastructure Law and Inflation Reduction Act—appropriated \$25+ billion to the Office of Clean Energy Demonstrations (OCED) to deliver large-scale clean energy demonstration projects
- OCED will accelerate clean energy technologies from the lab to market and fill a critical innovation gap on the path to achieving our nation's climate goals while mitigating risks that allow private sector investors and developers to act



OCED Mission

“Deliver clean energy technology **demonstration projects at scale** in partnership with the **private sector** to **accelerate deployment, market adoption,** and the **equitable transition** to a decarbonized energy system.”



OCED Mandate



CENTER OF EXCELLENCE

Serve as primary DOE office to deliver full scale clean energy demonstration projects and project management oversight excellence



CLEAN ENERGY + EQUITABLE

Help enable 100% clean electricity by 2035 and net zero emissions by 2050 through an equitable energy transition



FOLLOW ON INVESTMENT

Unlock and scale trillion-dollar clean energy follow on investment from the private sector and other sources of capital



DE-RISK TECHNOLOGY

Maintain risk-based, balanced, and defensible portfolio of investments

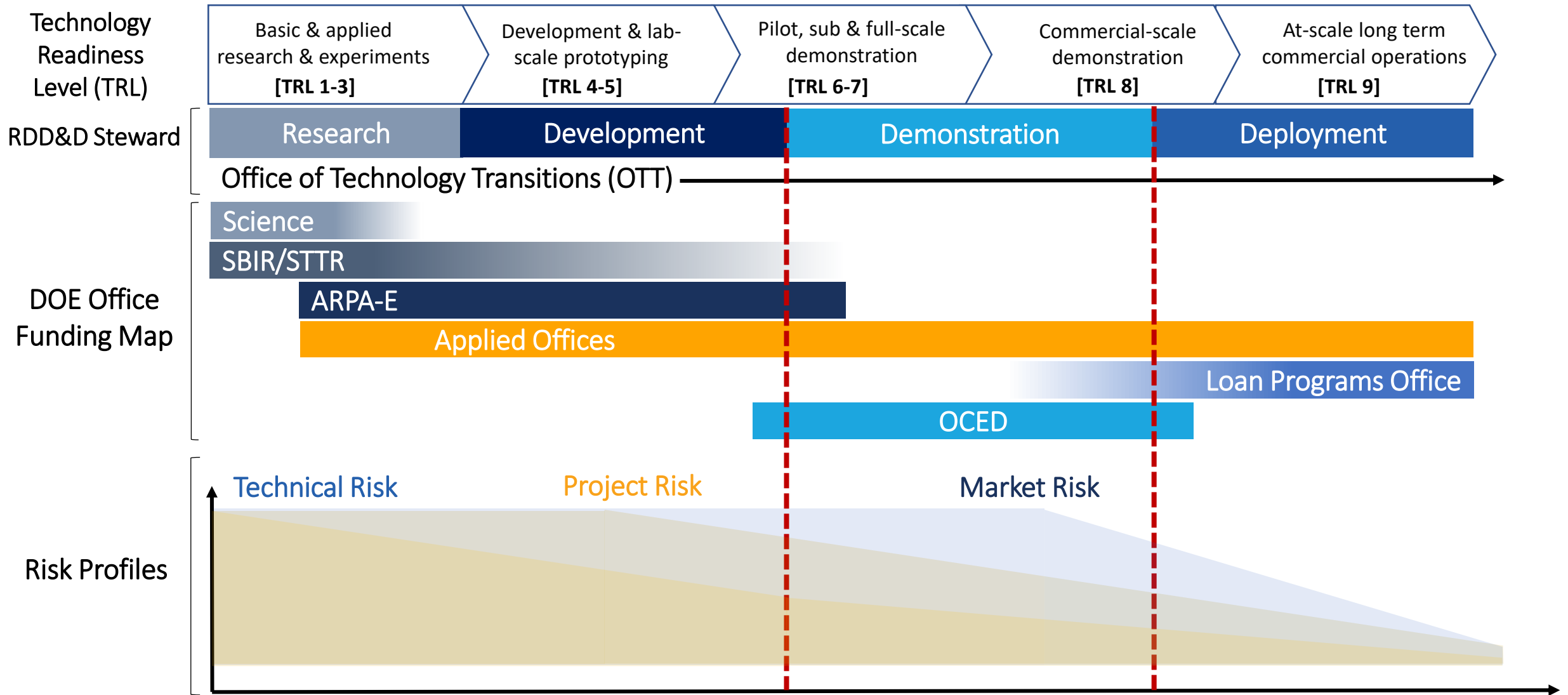


ENGAGEMENT + OUTREACH

Leverage private sector and broader energy ecosystem to inform OCED and DOE technology commercialization efforts



Role Across Research, Development, Demonstration & Deployment (RDD&D) Continuum



Energy and Environmental Justice in OCED


OCED seeks to become a center of excellence in advancing energy and environmental justice in large-scale demonstration projects within the federal government to support an equitable energy transition.

- All OCED-funded projects incorporate requirements from Energy and Environmental Justice and Justice40 Initiative; Diversity, Equity, Inclusion, and Accessibility; Community, Labor, and Tribal engagement; and Quality Jobs
- OCED collaborates with offices across DOE to support and implement Justice40 Initiative
- All OCED programs are covered under Justice40 Initiative
- OCED is conducting ongoing community engagement efforts



OCED Scope

- Regional Clean Hydrogen Hubs (\$7 billion)
- Advanced Reactor Demonstrations (\$2.5 billion)
- Carbon Management (\$3.5 billion)
- Industrial Emissions Demonstrations (\$500 million)
- Long Duration Energy Storage Initiative (\$505 million)
- Energy Improvement in Rural or Remote Areas (\$1 billion)
- Clean Energy Demonstrations on Mine Land (\$500 million)



Focuses
for today



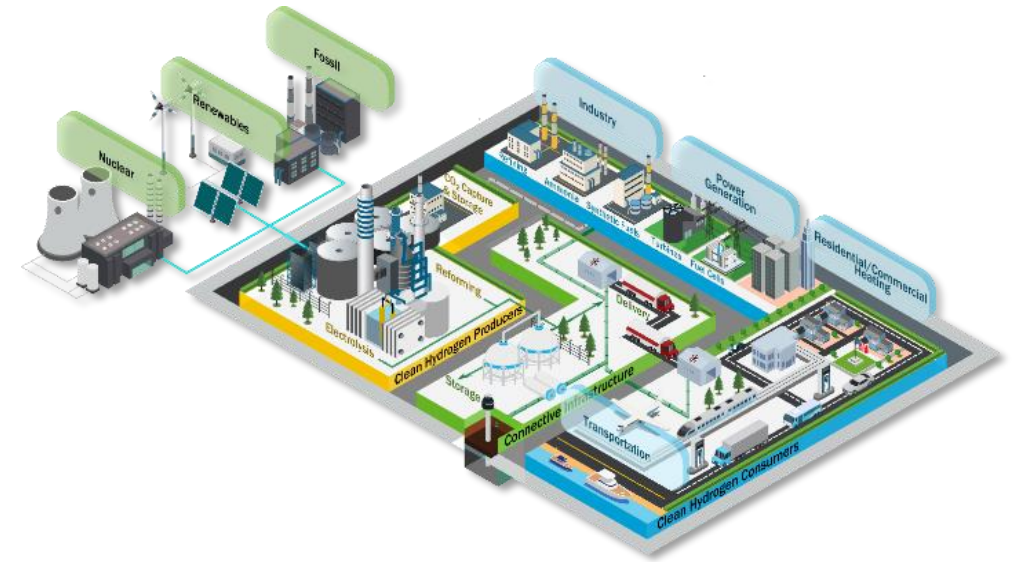
Regional Clean Hydrogen Hubs

Build 6-10 regional clean H2Hubs across the country to create networks of hydrogen producers, consumers, and local connective infrastructure to accelerate use of hydrogen

- Feedstock diversity
- End use diversity
- Geographic diversity
- Employment and training

Current Status

- Issued funding announcement in September 2022
- Concept papers were due by November 7, 2022
- Full applications are due by April 7, 2023



Advanced Reactor Demonstrations

Support domestic nuclear industry in design, licensing, construction, and operation of two advanced nuclear reactors to assure next generation American nuclear reactor designs can transition from concept to demonstration: TerraPower Sodium Reactor and X-Energy Xe-100 (pictured below)

Current Status

- Awarded \$2.5 billion in funding through the BIL
- TerraPower selected Kemmerer, WY as preferred site for Sodium reactor demonstration project



Carbon Management

Two programs:

- 1) Carbon Capture Demonstration Projects to develop six carbon capture facilities to improve costs, emissions reductions, and environmental effects from coal and natural gas***
- 2) 2) Carbon Capture Large-Scale Pilot Projects to establish and test innovative carbon capture pilot projects large enough to support new processes and technology improvements at scale***

Current Status

- Issued funding announcement in September 2022 for the \$2.5B Carbon Capture Demonstration Projects Program
 - Letters of Intent were due by October 21, 2022
 - Full applications are due by December 5, 2022
- Conducted stakeholder engagement and held four workshops in April 2022



Industrial Emissions Demonstrations

Establish demonstration projects that test and support technologies to reduce industrial emissions

- Reduce emissions in industrial and chemical production processes and heat generation
- Leverage smart, digital, sustainable manufacturing to develop new technologies and practices
- Increase energy efficiency of industrial processes

Current Status

- Conducting stakeholder engagement and outreach



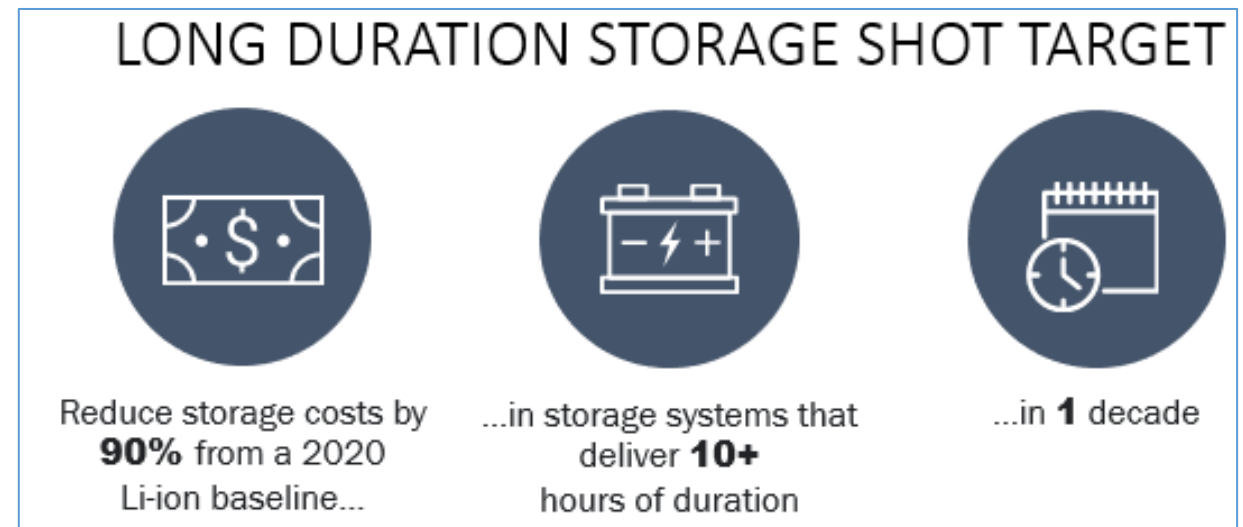
Long Duration Energy Storage Demonstrations - Overview

The Bipartisan Infrastructure Law appropriates \$505 million to carry out activities under Sections 3201(c) and 3201(d) of the Energy Act of 2020.

These provisions focus on the development of long-duration energy storage (LDES) demonstrations to:

- ***Validate first-of-a-kind LDES technologies, and***
 - ***Enhance the capabilities of customers and communities to integrate storage more effectively.***
- Supply energy at peak periods of demand on electric grid and improve energy efficiency
 - Reduce peak loads of homes and businesses
 - Provide ancillary services for grid stability
 - Increase the feasibility of microgrids

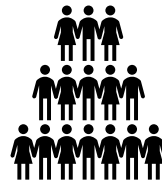
OCED focus is on delivery of 10+ hours



Long Duration Energy Storage Resilience at DOE and DOD Facilities

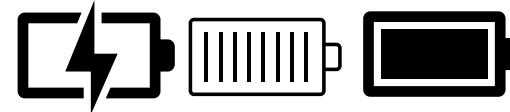
Who we're funding:

- DOE National Labs
- DoD Sites/Military Installations
- Other subrecipient partners needed to effectively implement and demonstrate LDES



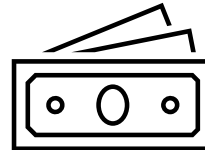
What we're funding:

- Demonstrations of innovative LDES that support resilience at DOE and DoD facilities
- Testing and validation that will accelerate commercialization of new technologies
- 100-500 kW+ systems that are capable of 10-24+ hours of storage leveraging National Lab/DoD infrastructure



How we're funding:

- Lab Call for DOE National Labs
- Mechanism TBD for DoD/Military sites

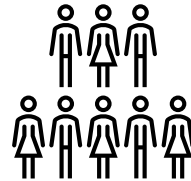


End Goal: Support DoD and DOE energy resiliency goals using LDES and effectively disseminate information from these projects to encourage industry adoption.

Long Duration Energy Storage Demonstrations

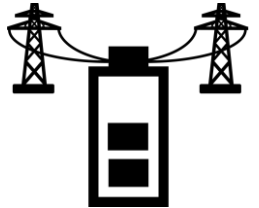
Who we're funding:

- Companies innovating energy storage
- Behind-the-meter storage customers (campuses, facilities)
- Vendors of innovative energy storage
- Engineering, Procurement, Construction (EPC)
- Offtakers



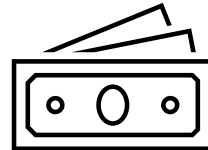
What we're funding:

- Demonstration projects that:
 - Ensure a range of technology types
 - Ensure regional diversity among projects
 - Have the capacity to discharge energy for 10 to 100 hours



How we're funding:

- Grants or Cooperative agreements
- Mechanisms informed by RFI

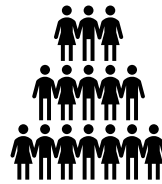


End Goal: Deploy innovative first-of-a-kind technologies at utility scale which might not otherwise proceed given potential technology risk.

Long Duration Energy Storage Pilot Grant Program

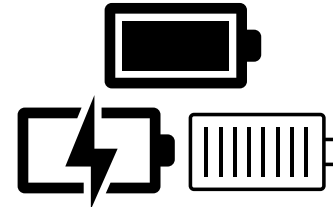
Who we're funding:

- Private Energy Storage Company
- Electric Utility
- State Energy Office
- Indian Tribe
- Tribal Organization
- Institution of Higher Education
- Electric Cooperative
- Political Subdivision of a State



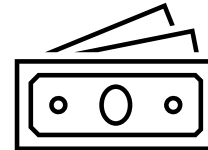
What we're funding:

- Opportunities for communities to deploy storage for the first time
 - Emphasis on overcoming regulatory and institutional barriers of deployment.



How we're funding:

Creative mechanisms informed by RFI:



- “Competitive grant program”
- TIA/ PIA
- Credit Enhancements
- Institutional Support
- Energy Storage Subscription
- Warranty Backstop
- And more!

End Goal: Build enduring capabilities (institutional, analytical, financial) for targeted communities to invest in storage resources that provide local benefits (including resilience, decarbonization, and financial).

Long Duration Energy Storage Initiative – Current Status

- Issued DOE National Lab Call October 2022
 - Letters of intent due November 2
- Listening sessions in July/August 2022
- Webinar in June 2022
- Issued RFI that closed in June 2022



Energy Improvement in Rural or Remote Areas (ERA) - Overview

Improve resilience, safety, reliability, and availability of energy in rural or remote areas and increase environmental protection from adverse impacts of energy use, in coordination with Department of Interior

- Rural or remote areas are defined as cities, towns, or unincorporated areas with fewer than 10,000 inhabitants



ERA - Snapshot

Demonstration Characteristics

- Technology risk mitigation
- Business model risk mitigation
- Workforce risk mitigation
- Community impact risk mitigation



Benefit communities
and their economies



Create good-paying
jobs



Reduce carbon
pollution

Authorized purposes:

- Overall cost-effectiveness of energy generation, transmission, or distribution systems;
- Siting or upgrading transmission and distribution lines;
- Reducing greenhouse gas emissions from energy generation by rural or remote areas;
- Providing or modernizing electric generation facilities;
- Developing microgrids; and
- Increasing energy efficiency



ERA – Current Status

- Estimated application opening date: 2023
- Conducting stakeholder outreach; three workshops in Oct/Nov
- Issued RFI in Oct – closes Nov 28, 2023
- Announced Environmental Justice Thriving Communities Technical Assistance Centers (EJ TCTACs) with EPA



Clean Energy Demonstrations on Mine Land - Overview

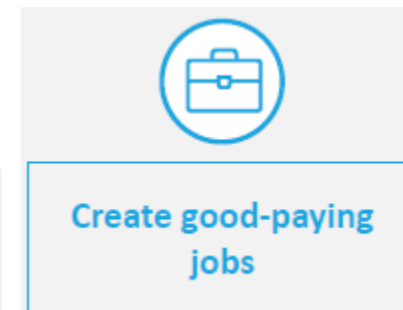
Carry out up to 5 clean energy projects on current and former mine land to show technical and economic feasibility

- Eligible technologies:
 - Solar (at least two projects)
 - **Micro-grids**
 - Geothermal
 - Direct air capture
 - Fossil generation with CCUS
 - **Energy storage**
 - Advanced nuclear
- Emphasis on economic development and environmental justice, lasting beyond selected projects



Clean Energy Demonstrations on Mine Land - Snapshot

- Program Vision: Demonstrate innovative mine land conversion to replicable clean energy projects
- Mine Land is defined in legislation (BIL) as:
 - Land subject to SMCRA and Mining Law of 1872
- Includes:
 - Active, inactive, and abandoned
 - Public and private land
 - Coal and hard rock
- 84 RFI responses received
 - Challenges
 - Opportunities
 - Demonstration Excellence



Clean Energy Demonstrations on Mine Land – Current Status

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- Announced Environmental Justice Thriving Communities Technical Assistance Centers (EJ TCTACs) with EPA



Thank You!

For more information, please visit:

www.energy.gov/OCED

Email:

Katrina.Pielli@hq.doe.gov or my team at:

DL-OCED-Engagement@hq.doe.gov



OCED

Office of Clean Energy Demonstrations



Leveraging Federal Funding Opportunities: Energy Storage and the Inflation Reduction Act (IRA)

Jason Burwen, Vice President of Energy Storage,
American Clean Power Association



The Highly Charged U.S. Outlook

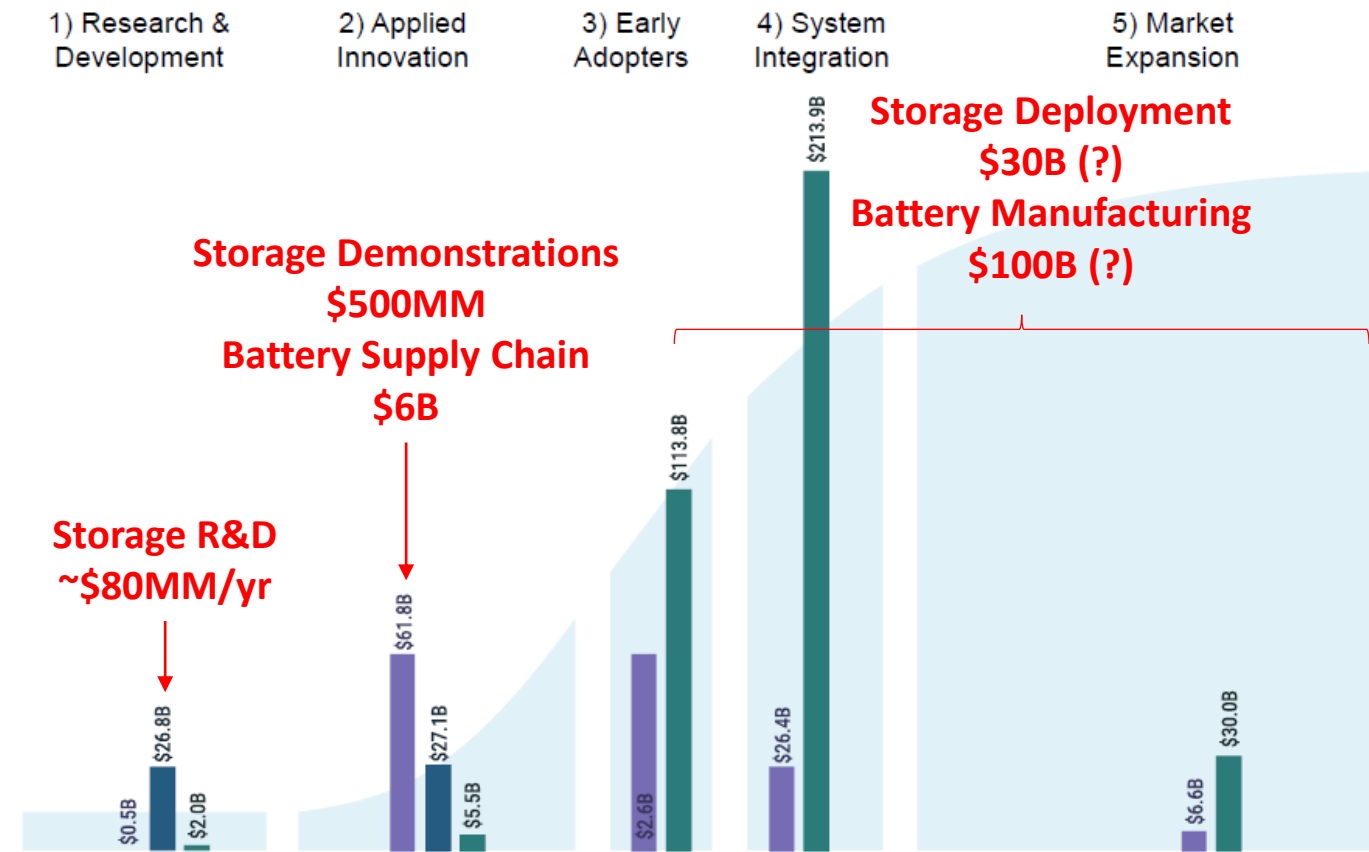
Pennsylvania Energy Storage Consortium // 2 Nov 2022

U.S. clean energy industrial policy is here

Three new bills that invest throughout the technology adoption S-curve, encourage innovation, back multiple technological solutions, and embrace risk:

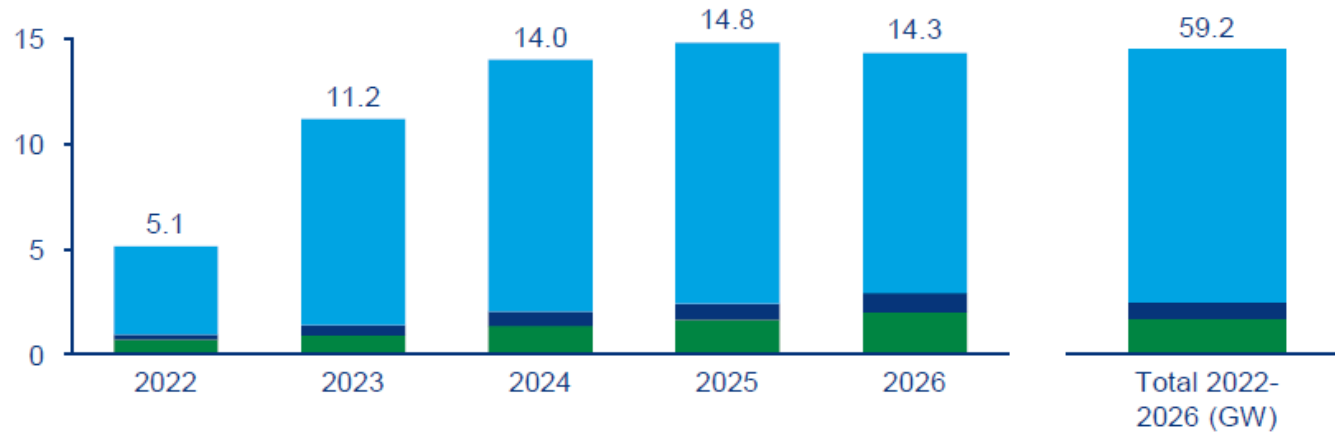
- **The CHIPS and Science Act (2022)** focuses investment on the first two phases of the S-curve, supporting early/lab-stage innovations and demonstrating commercialization.
- **The Infrastructure Investment and Jobs Act (2021)** focuses mainly on the commercialization of innovations, the second phase of the S-curve.
- **The Inflation Reduction Act (2022)** invests heavily in the third and fourth phases, when innovations are taken to market, accelerating uptake of deployed technologies.

Breakdown of US climate spending (>\$500B) across S-curve phases

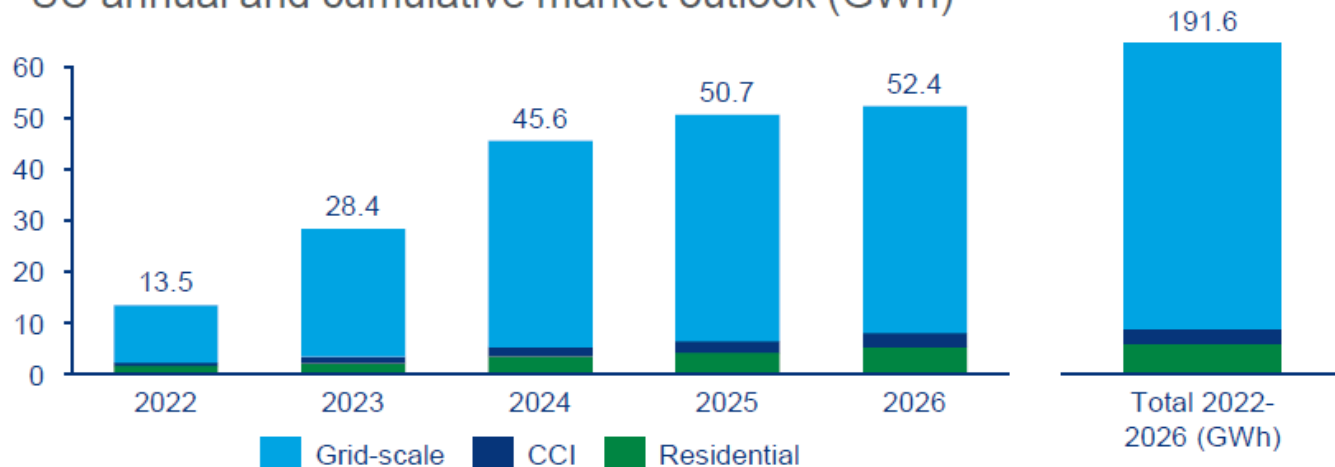


U.S. Outlook for Battery Energy Storage

US annual and cumulative market outlook (GW)



US annual and cumulative market outlook (GWh)



Grid-scale CCI Residential

Source: Wood Mackenzie

Main constraints on pace of deployment

1. Supply chain & trade
2. Transmission interconnection
3. Local permitting

Inflation Reduction Act: Charging up U.S. energy storage deployment

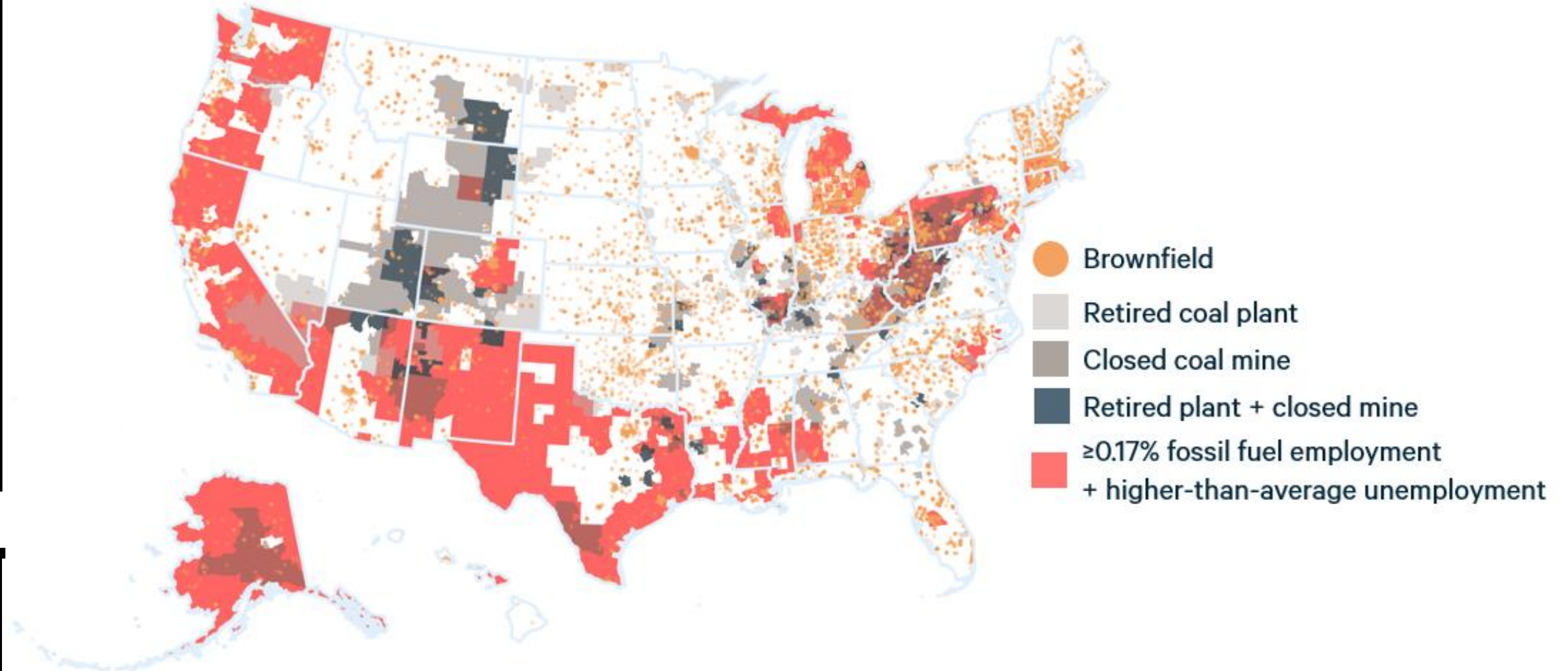


- 30% investment tax credit for energy storage 2023-2032
 - Multiple additional credit bonuses possible, up to 60% total
 - Transferability of credits → lower cost of capital, expanding investment base
- \$35/kWh battery cell + \$10/kWh battery module *directly payable* manufacturing incentives
 - Inverter manufacturing incentives
 - 10% production tax credit for electrode materials, refined critical minerals
- \$250B in federal loan guarantee authority for clean energy asset transition

Key topics for IRA incentives

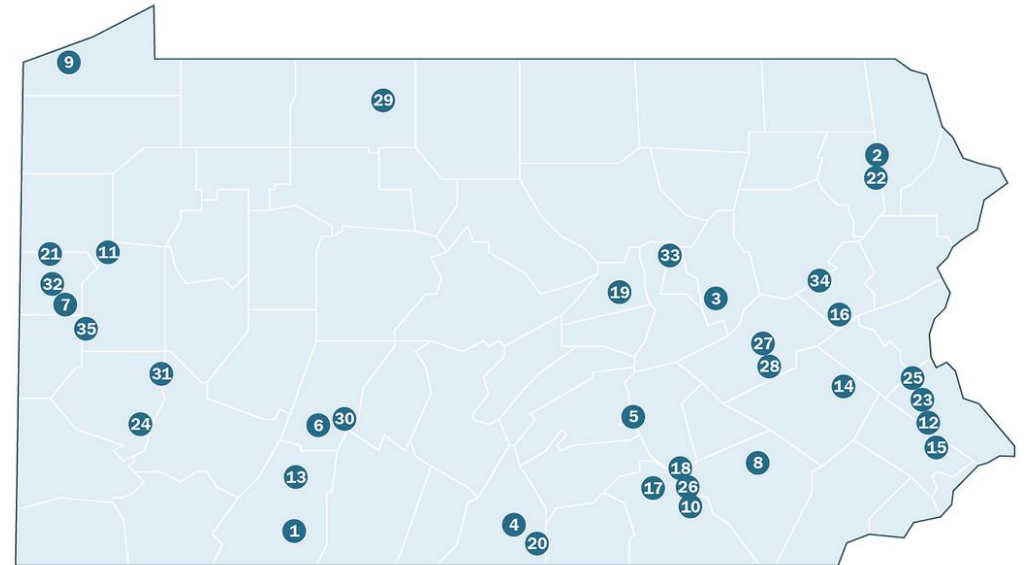
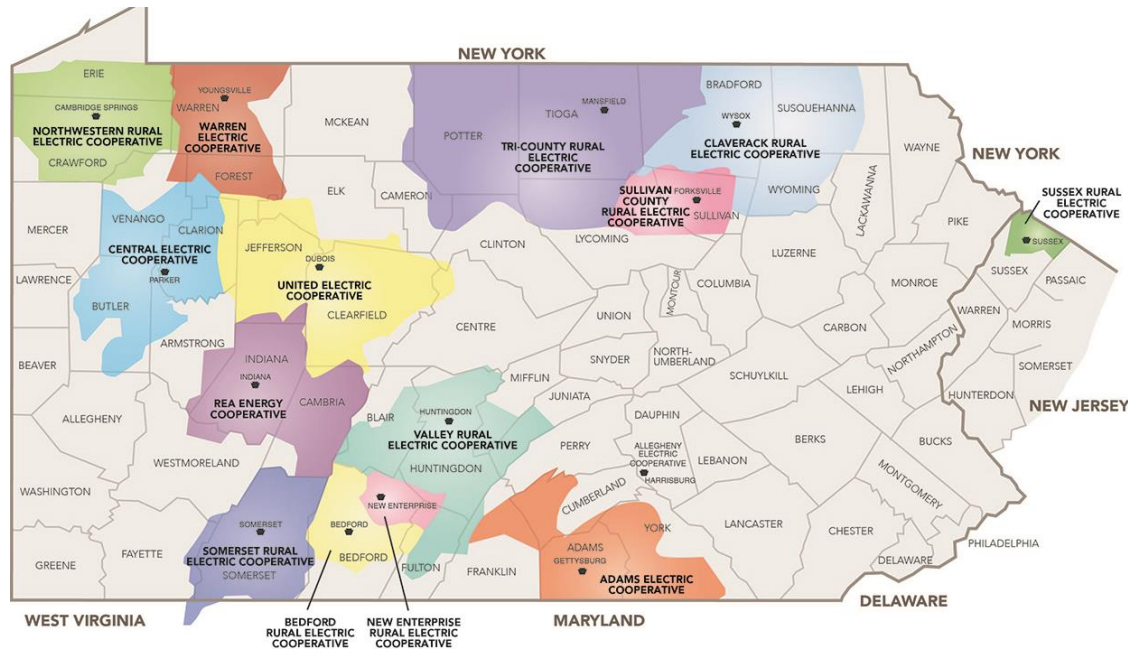
- Labor standards required for full 30% storage ITC – otherwise just 6% base ITC
 - Prevailing wage for construction + 5 years of alteration/repair
 - Apprentices as 1/5 employees and 10-15% of construction work hours
- Domestic content both a +10pp bonus for storage ITC and a requirement
 - 100% steel & iron, 40-55% U.S. manufactured content required for bonus and for ITC direct payment for munis and co-ops
 - Note also that EV tax credits require battery materials from U.S. or FTA countries, battery manufacturing from U.S. or North American countries
- Siting with <5 MW solar in low & moderate income communities provides +10-20pp bonus for storage ITC
- Energy communities siting a +10pp bonus for storage ITC that covers most of Pennsylvania territory

Energy communities in the IRA



SOURCE: RFF

Pennsylvania Munis & Co-ops



1. Berlin	7. Ellwood City	13. Hoopersville	19. Mifflinburg	25. Quakertown	31. Tarentum
2. Blakely	8. Ephrata	14. Kutztown	20. Mont Alto	26. Royalton	32. Wampum
3. Catawissa	9. Girard	15. Lansdale	21. New Wilmington	27. St. Clair	33. Watontown
4. Chambersburg	10. Goldsboro	16. Lehighton	22. Olyphant	28. Schuylkill Haven	34. Weatherly
5. Duncannon	11. Grove City	17. Lewisberry	23. Perkasie	29. Smethport	35. Zelenople
6. East Conemaugh	12. Hatfield	18. Middletown	24. Pitsaun	30. Summerhill	

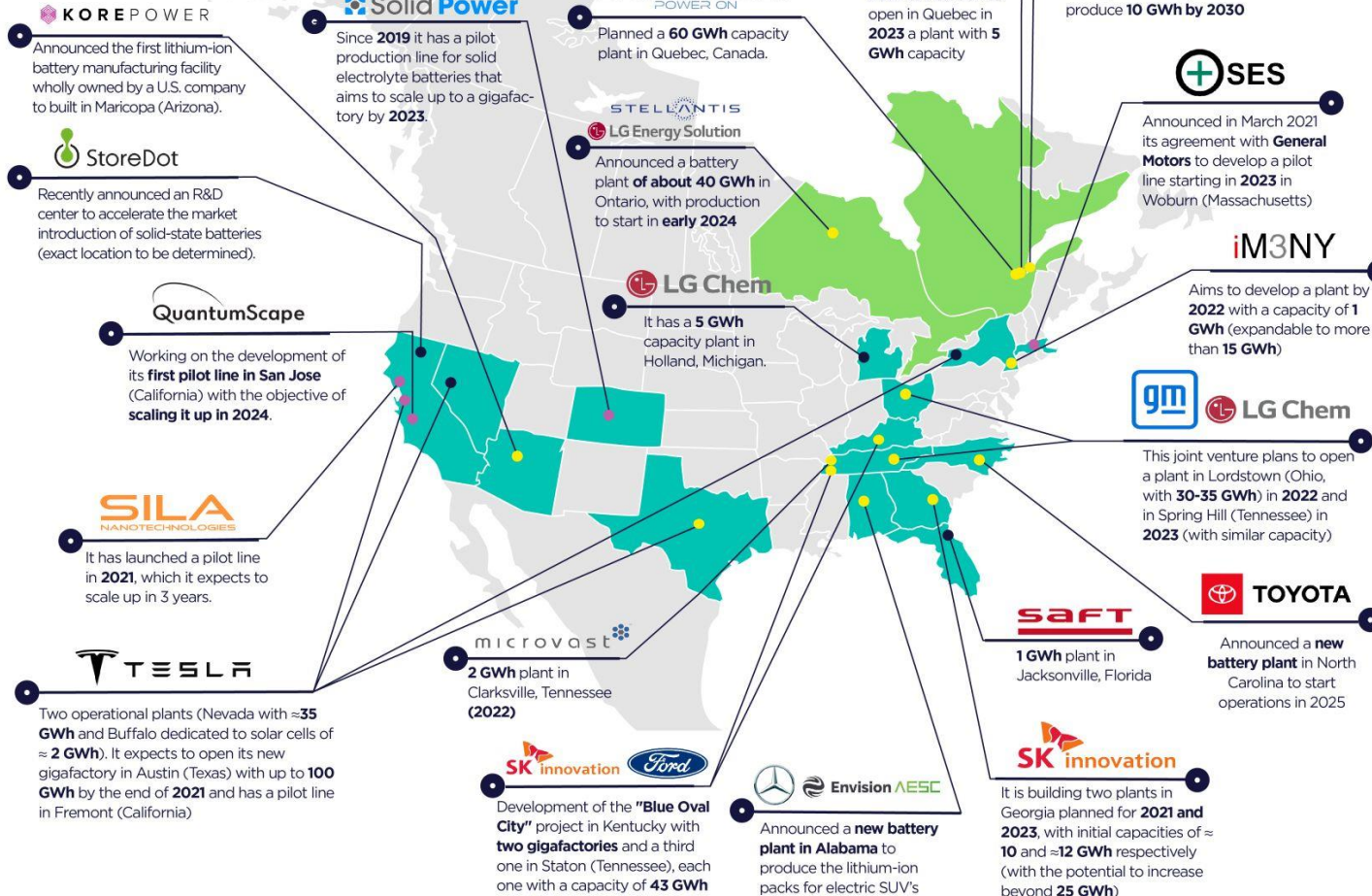
Battery Supply Chain Grants in IIJA

- IIJA appropriated >\$6 billion for U.S. Department of Energy grants for battery supply chain
 - 50% for minerals processing, 50% for battery manufacturing & recycling
 - DOE made \$2.8 billion in awards in Oct 2022; subsequent solicitation to come

NORTH AMERICAN BATTERY INITIATIVES

Analysis by CIC **energiGUNE**

Version 4. Last update: 22/03/2022



North American LIB supply capacity is expanding...

- 407 GWh in 2025
- 750 GWh in 2030

(SOURCE: S&P)

...~97% for EVs

STELLANTIS
SAMSUNG

Announced that they will form a **Joint Venture** to operate, starting in 2025, a **gigafactory** of about 40 GWh.

FREYR
KOCH

They have announced a **joint venture (50% each)** to start building a **gigafactory in the USA** (the final location has not yet been determined)

New opportunity for non-lithium technologies for grid applications

Pennsylvania Battery Supply Chain





Thank you.

Jason Burwen // VP Energy Storage // jburwen@cleanpower.org

Other U.S. policies accelerating energy storage

WHOLESALE MARKETS

- Interconnection reforms
 - Study storage under proposed use
- Capacity accreditation reforms
- Flexibility reserve products / market design reforms
- Enabling storage-as-transmission

U.S. STATES

- Storage deployment targets
 - 9 states have adopted
- Resource planning reforms
 - 32 states require utility plans
- Clean capacity programs / incentives
 - CA, NY, MA, NJ leading
- Direct procurement authority for state governments

PA DEP Perspective on IIJA and IRA Opportunities

David Althoff, Director of the Energy Programs
Office, Pennsylvania DEP



Breakout Room Stakeholder Discussion

Attendees are invited to join breakout rooms with our presenters to ask questions.

- **Breakout 1 – Clean Energy Demonstrations Discussion**
 - [Click here to join the meeting](#)
- **Breakout 2 – Additional Federal Funding Opportunities Discussion**
 - [Click here to join the meeting](#)

Please use the hand raise function to ask a question.

Stakeholder Discussion

- **Wrapping up Meeting #5, do any stakeholders want to share key learnings for Pennsylvania related to federal funding opportunities?**
- **Is there any additional work that needs to be done between this meeting and future meetings in terms of additional analysis on different state energy storage policy mechanisms and program options?**

Wrap-Up & Next Steps

Upcoming Energy Storage Consortium meetings:

- **Wednesday, January 25, from 1-3 ET**
- **Wednesday, March 22, from 1-3 ET**
- **Wednesday, May 24, from 1-3 ET**

Provide Feedback: PA_energystorage@strategen.com