

USEA

United States Energy Association

CONSENSUS Program Webinar



**Update on DOE Office of Fossil Energy's
New Advanced Energy Storage Program**



CONSENSUS PROGRAM

IN COOPERATION WITH



U.S. DEPARTMENT OF
ENERGY

Fossil
Energy

The CONSENSUS Program, founded in 2008, seeks to educate the public, policy makers, industry, and other stakeholders and build a consensus on the wide array of benefits of Carbon Capture Utilization & Sequestration and Clean Coal technologies.

- Briefings
- Workshops
- Reports
- Monthly News Clips

To subscribe to our mailing list, please email Michelle Littlefield at mlittlefield@usea.org



U.S. DEPARTMENT OF
ENERGY



NATIONAL
ENERGY
TECHNOLOGY
LABORATORY



Energy Storage Overview

USEA Webinar | April 22, 2020



Image source: Adobe Stock

Webinar Presenters



Bhima Sastri

Director, Crosscutting R&D
and Systems Integration

U.S. Department of Energy



Briggs White

Technology Manager,
Crosscutting Program

National Energy
Technology Laboratory

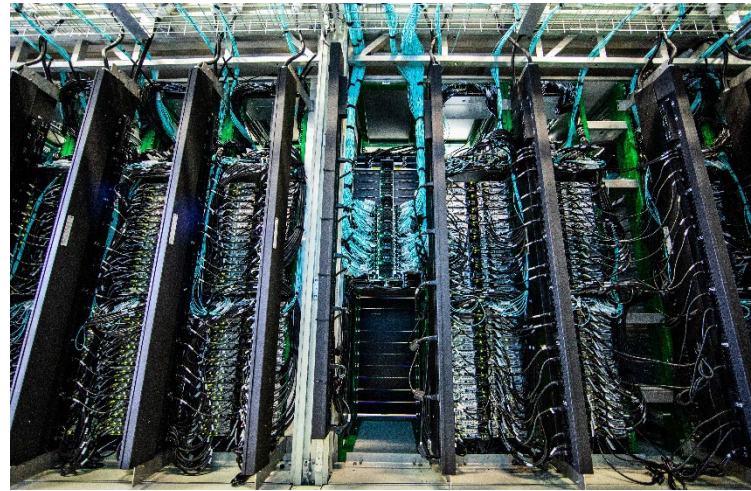
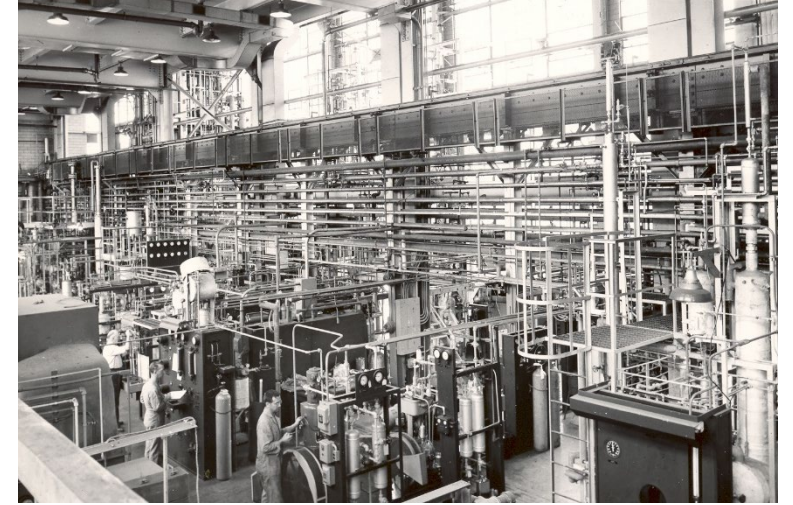


Jeff Hoffmann

Engineer and
Project Manager

National Energy
Technology Laboratory

Energy Storage: A History of Innovation



U.S. DOE Energy Storage Grand Challenge (ESGC)

Technology Development

Establish ambitious, achievable performance goals, and a comprehensive R&D portfolio to achieve them

Technology Transition

Accelerate the technology pipeline from research to system design to private sector adoption through rigorous system evaluation, performance validation, siting tools, and targeted collaborations

Policy and Valuation

Develop best-in-class models, data, and analysis to inform the most effective value proposition and use cases for storage technologies

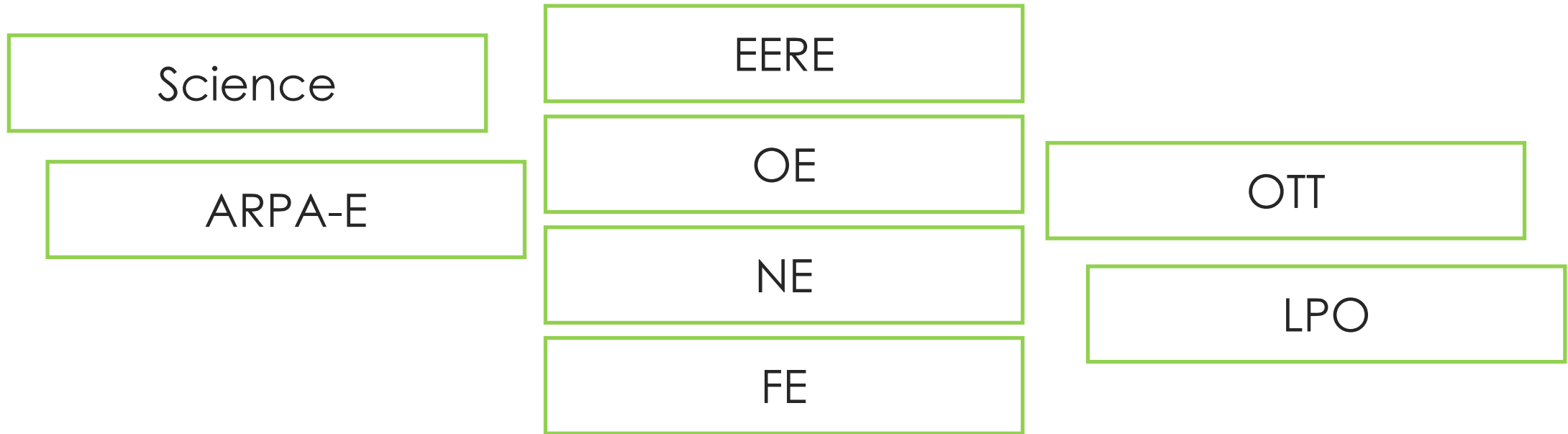
Domestic Manufacturing and Supply Chain

Design new technologies to strengthen U.S. manufacturing, recyclability, and reduce dependence on foreign sources of critical materials

Workforce and Technical Assistance

Train the next generation of American workers to meet the needs of the 21st century grid and energy storage value chain

DOE ESGC Key Collaborators



Premium on Reliability, Flexibility



Built for steady
predictable demand



Reliable, secure power
flexibly dispatched



Energy Storage Overview

Briggs White, NETL



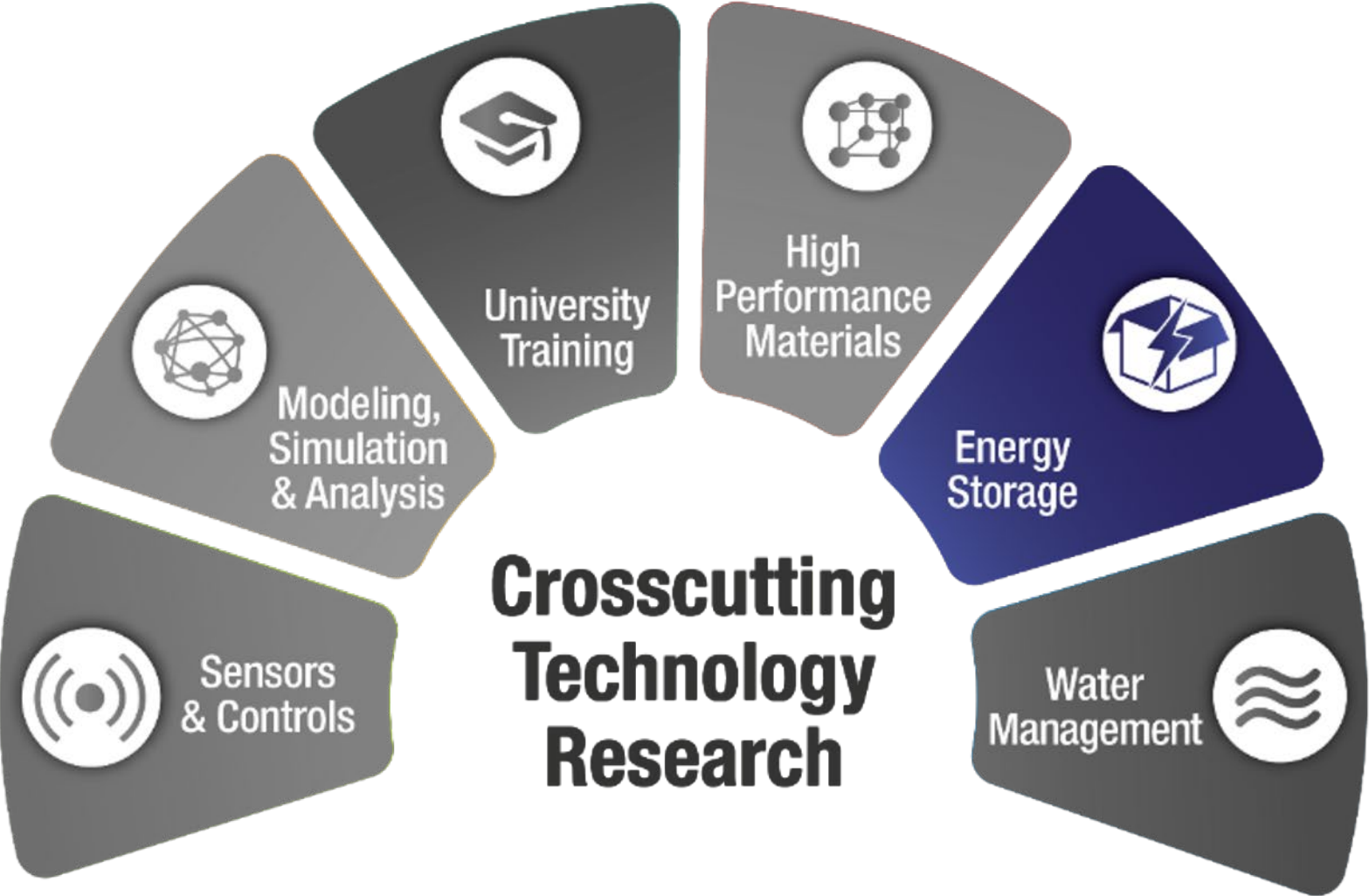
Image source: Adobe Stock

Today's Objectives

1. **Introduce** you to NETL's new Energy Storage program
2. **Share** useful information
3. **Highlight** current DOE Energy Storage Notice of Intent (NOI) and potential Funding Opportunity Announcement (FOA)
4. **Hear** and **learn** from you



Diverse Portfolio of Programs



Program Mission

Asset Flexibility | Grid Reliability | Environmental Performance



Thermal



Mechanical



Chemical



Hybrid

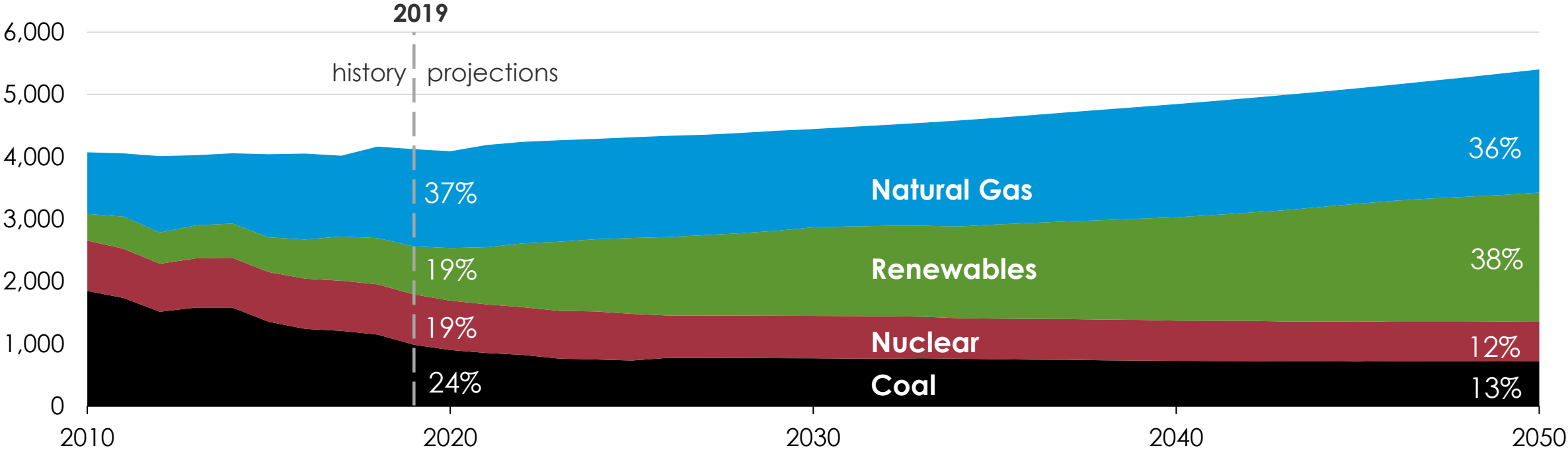
Electricity Generating Units (EGUs)
Fossil-fueled Smaller-Scale Assets
Fossil-fueled Industrial Facilities



Fossil Fuel Use as Renewables Double



Electricity generation | billion kilowatt-hours



Beyond Batteries

Batteries have a time and place, but...



Lithium-Ion
Battery



Power-to-Gas
(P2G)



Hydrogen
Storage



Biofuel



Thermal Energy
Storage (TES)



Flywheel Energy
Storage (FES)



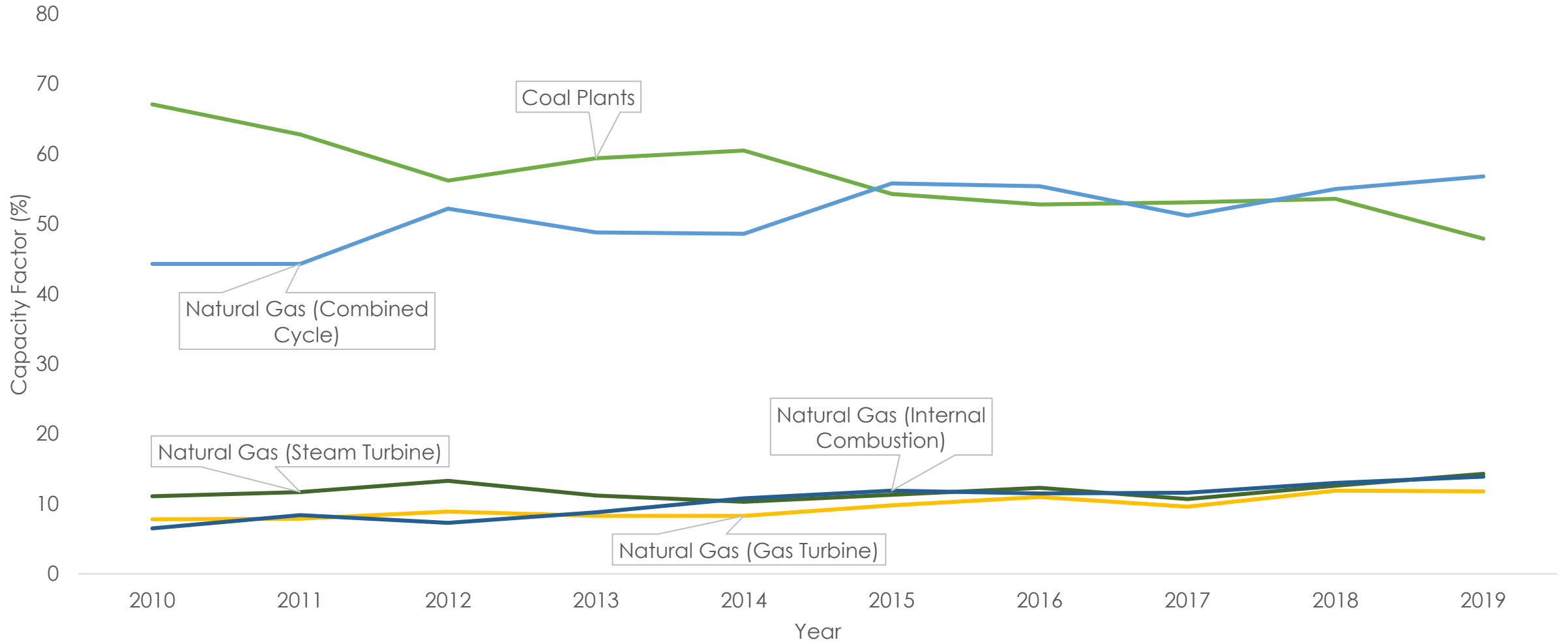
Hydraulic
Accumulator



Compressed
Air Energy
Storage (CAES)

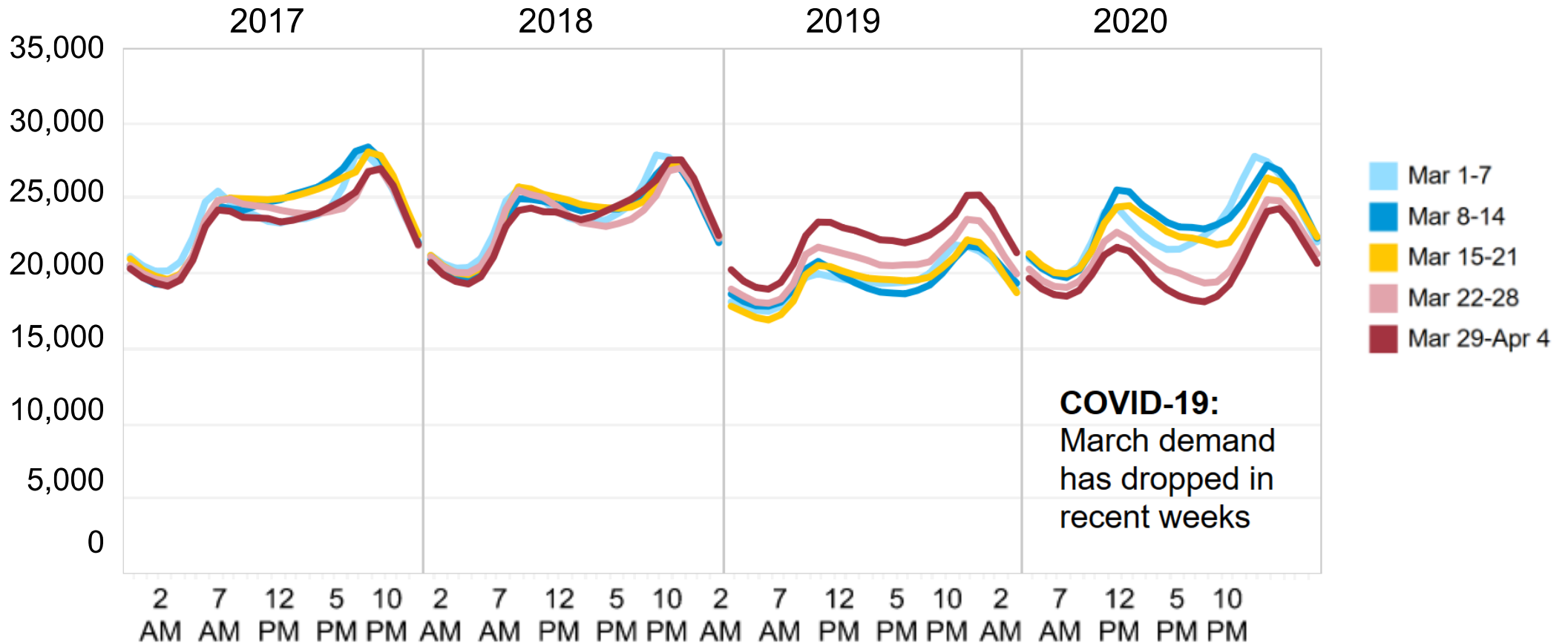
Energy storage technologies expand far
beyond batteries alone.

Capacity Factors



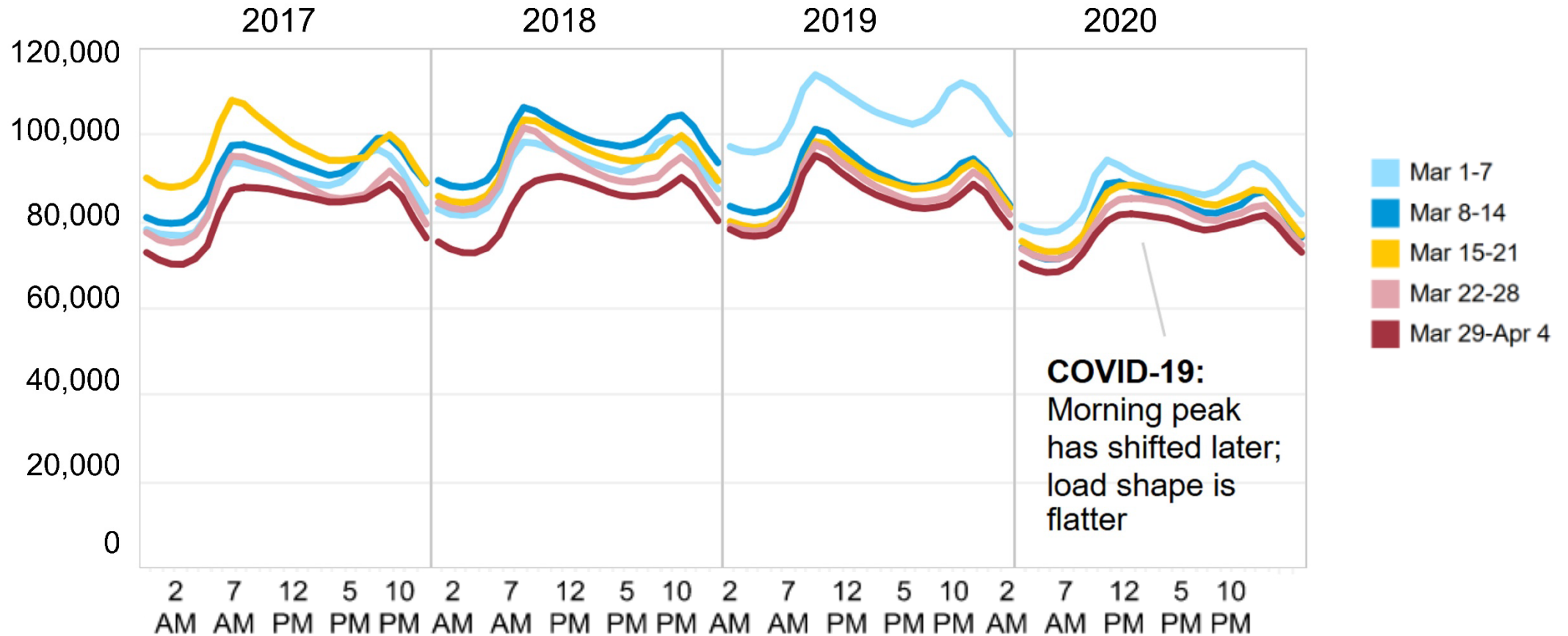
The Curves: CAISO

California ISO (CAISO) average weekday load shapes, 2017-2020
megawatthours (MWh)



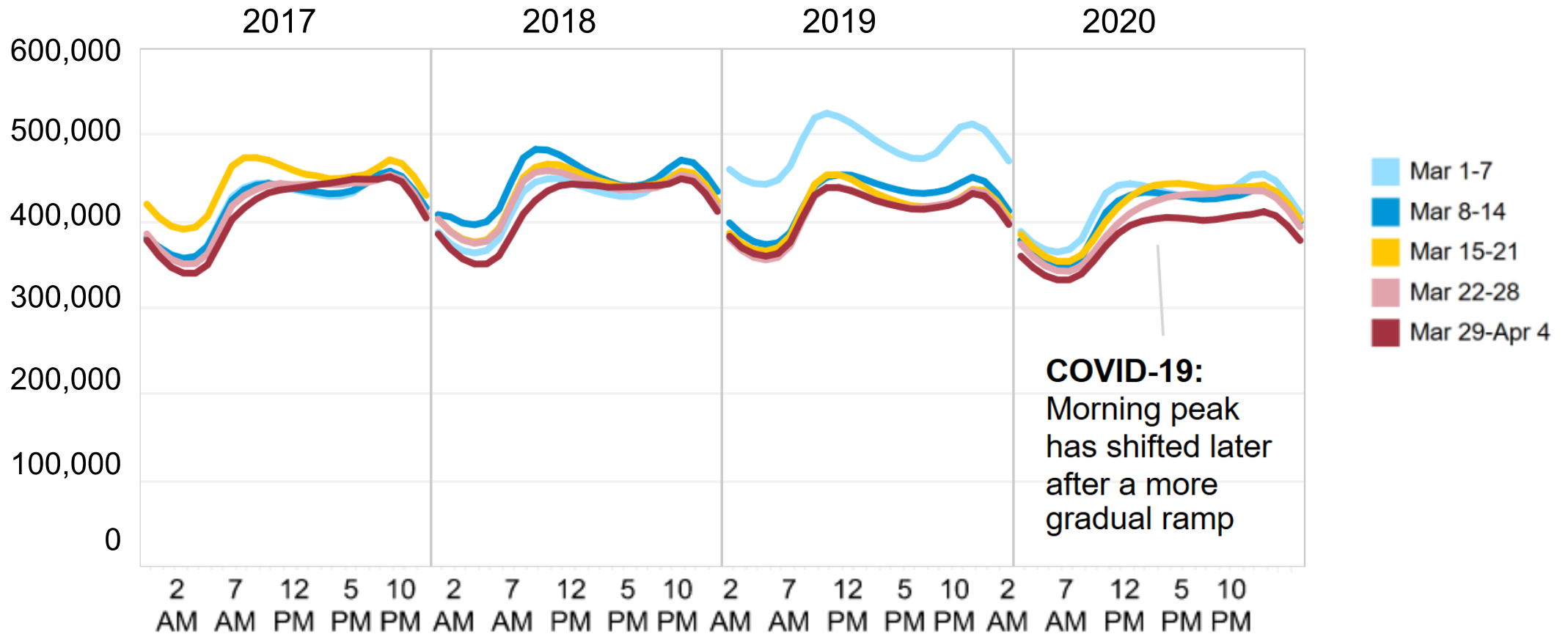
The Curves: PJM

PJM average weekday load shapes, 2017-2020
megawatthours (MWh)

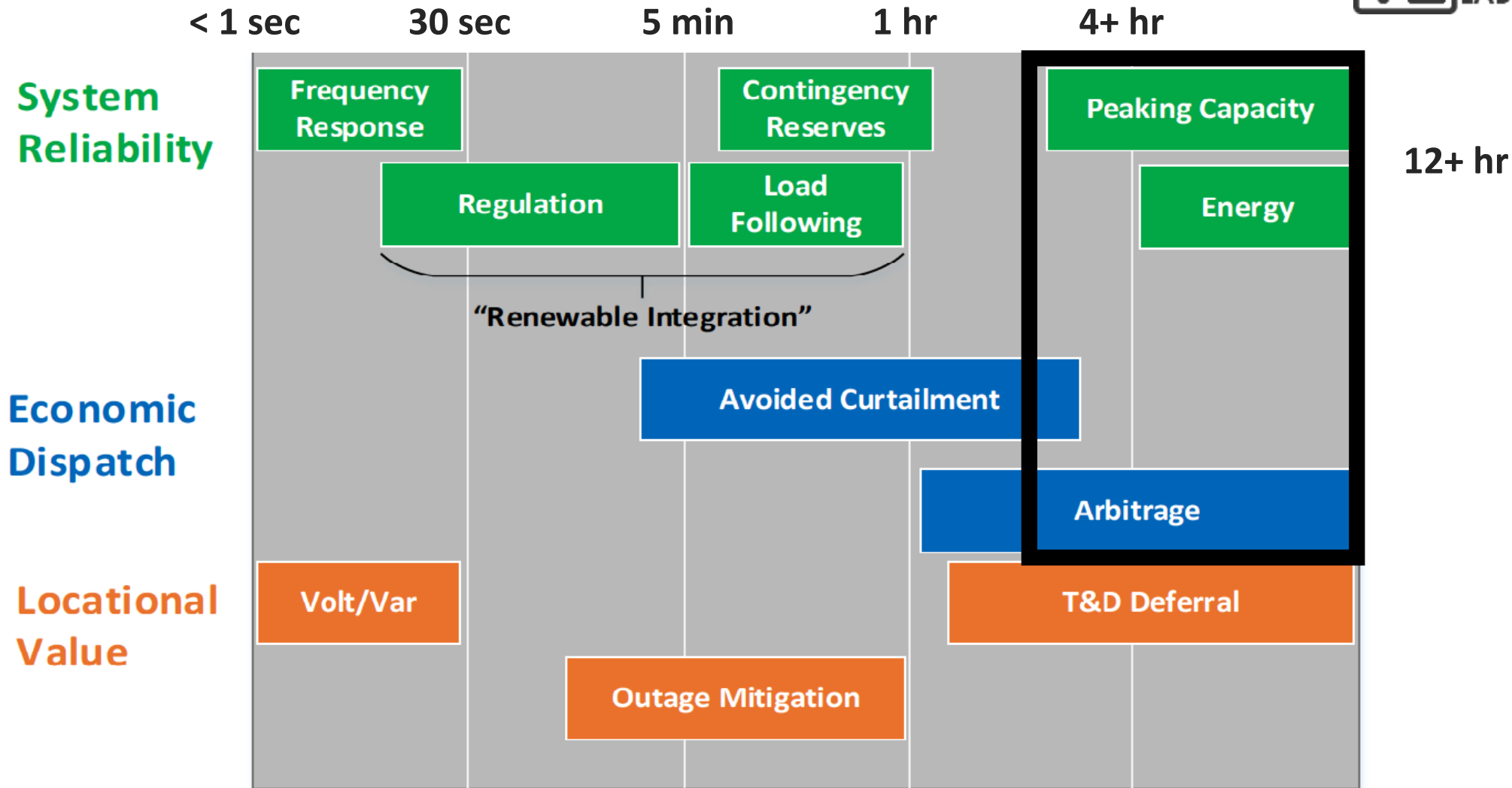


The Curves: Overall

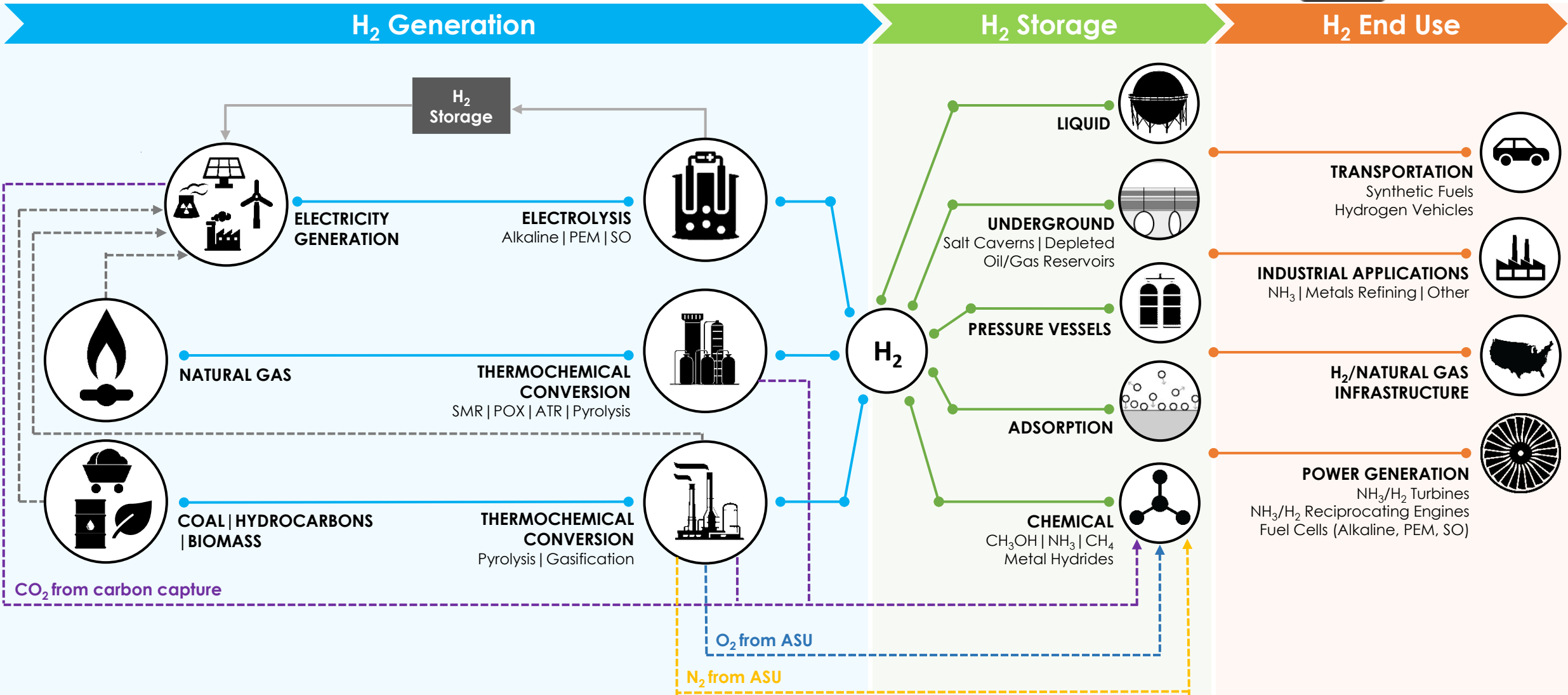
U.S. average weekday load shapes, 2017-2020
megawatthours (MWh)



Applications: Use Cases for Energy Storage



The Hydrogen Economy



Benefits: Reliable & Affordable

- ✓ **Reliability** in a changing grid
- ✓ **Resiliency** in unplanned events
- ✓ **Secure** energy supply
- ✓ **Reduced** customer cost



Benefits: Cleaner Environment

- ✓ **Cleaner** electricity
- ✓ **Smaller** real-world footprint
- ✓ **Reduction** in idling



Energy Storage: There is More to Do

- ❑ **Monetize** technical benefits
- ❑ **Increase** capital
- ❑ **Identify** adequate land
- ❑ **Scale up** pilot projects
- ❑ **Demonstrate** social benefits



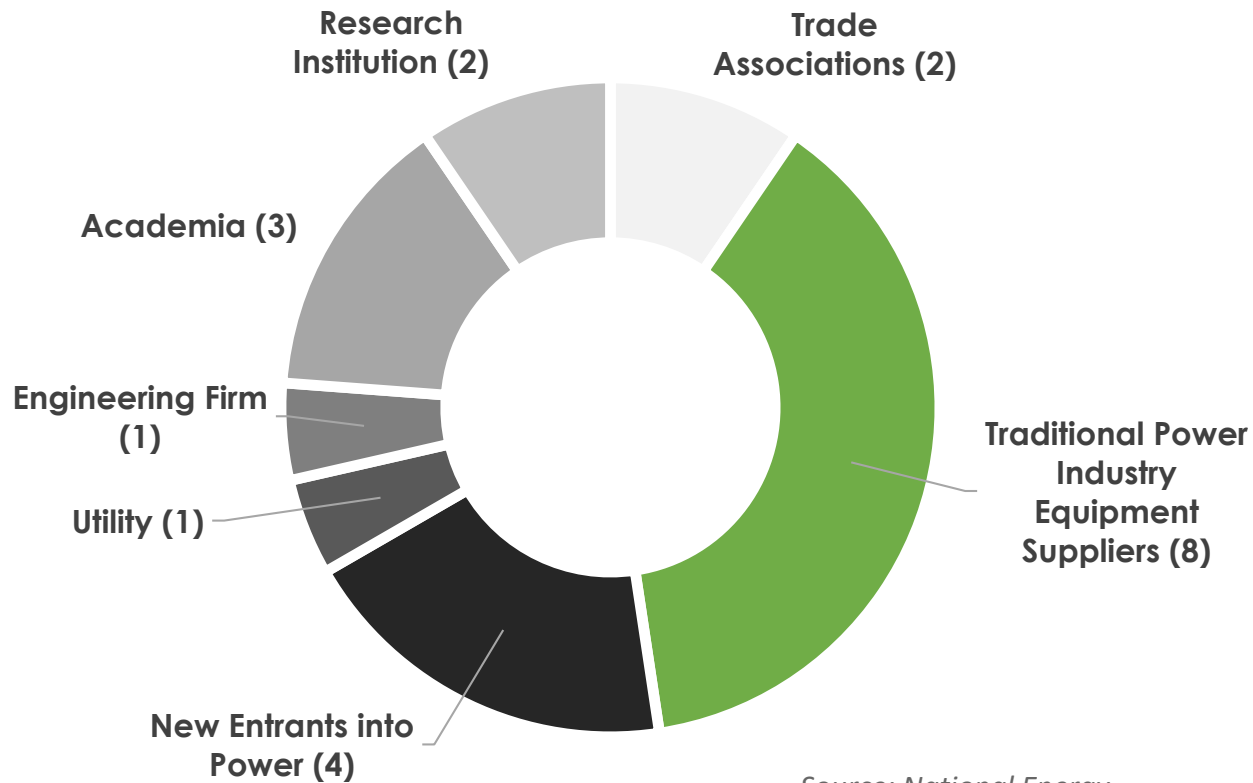
Support the Energy Storage Grand Challenge

Understand Market Needs

Identify Pathways For Storage Maturation

Pursue Technology Development & Deployment

December 2019 RFI 20+ Stakeholders Response



Source: National Energy Technology Laboratory (NETL)

Energy Storage Workshops

Thermal-Mechanical-Chemical Energy Storage Workshop

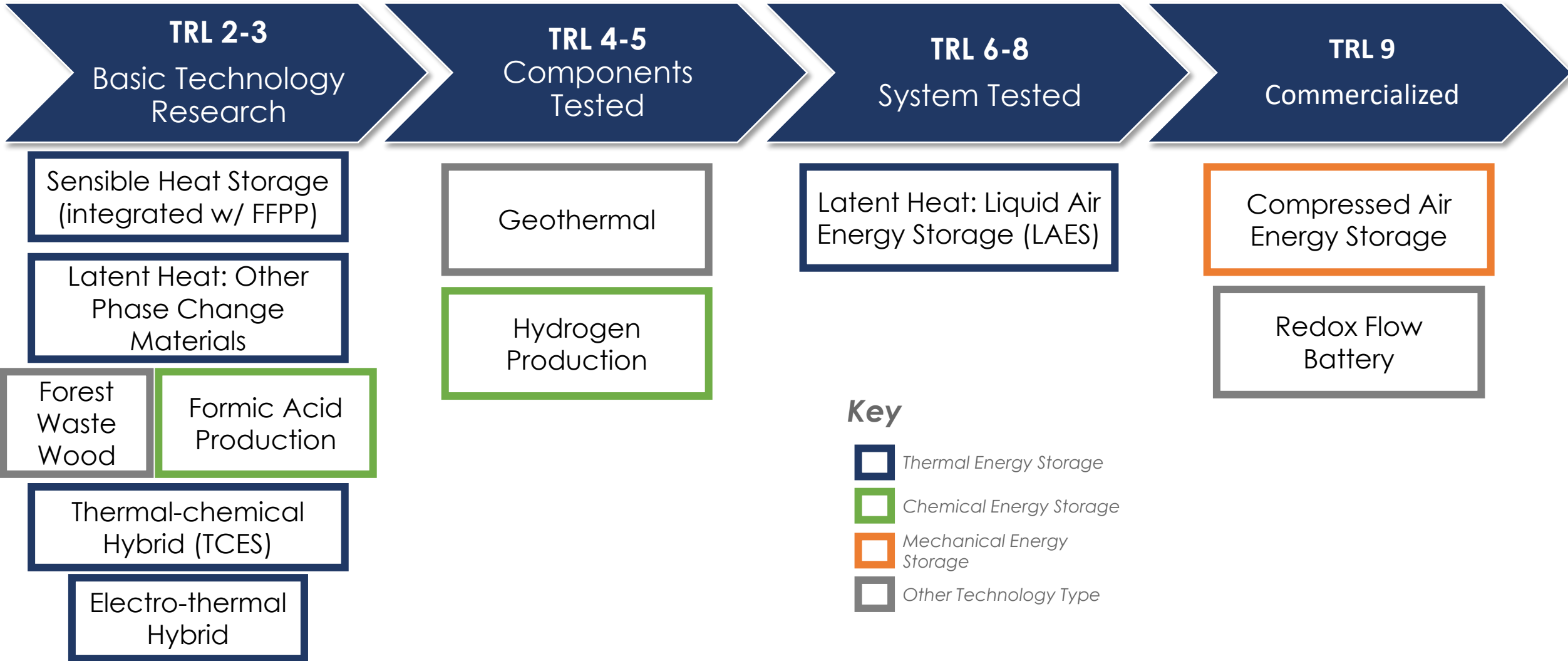
OMNI Willian Penn Hotel | Pittsburgh, Pennsylvania
February 4, 2020

30 presentations at: NETL.doe.gov/node/8217

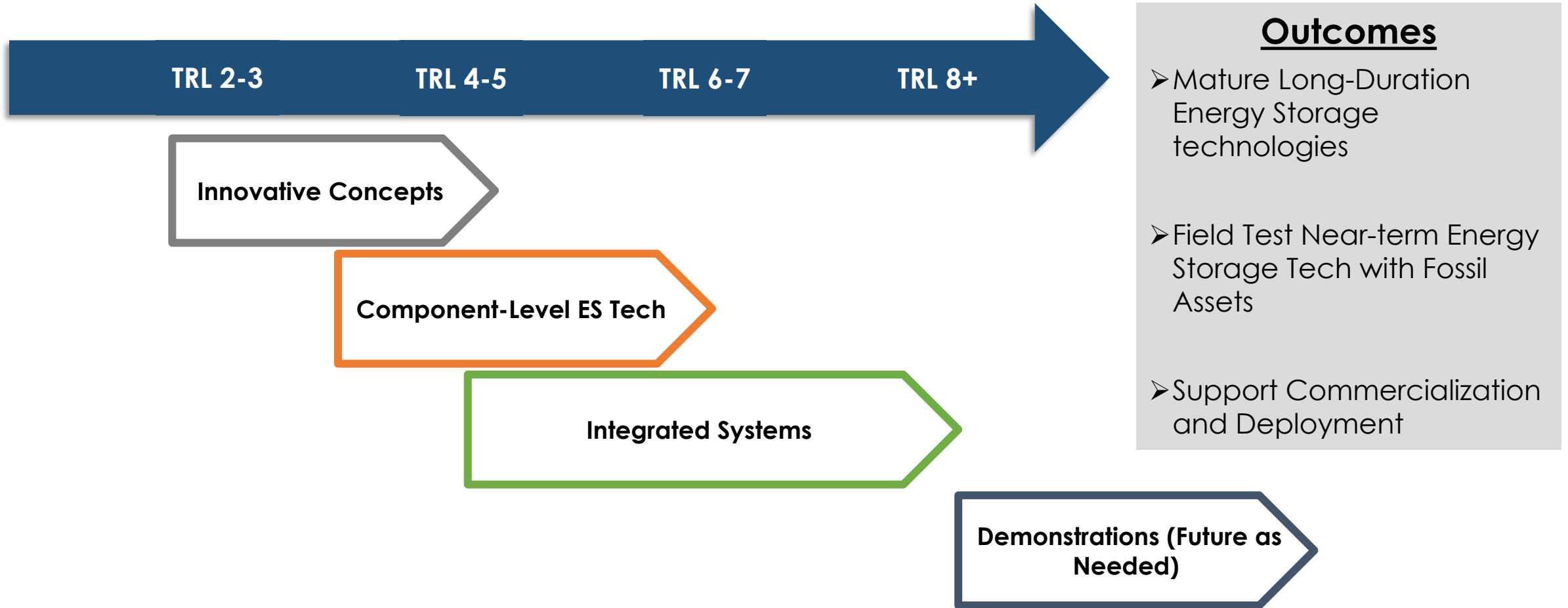
Energy Storage Grand Challenge Announces Initial Series of Public Workshops

U.S. DOE Office of Energy Efficiency & Renewable Energy
February 21, 2020

Technology Landscape: RFI Responses



Technology Development Vision

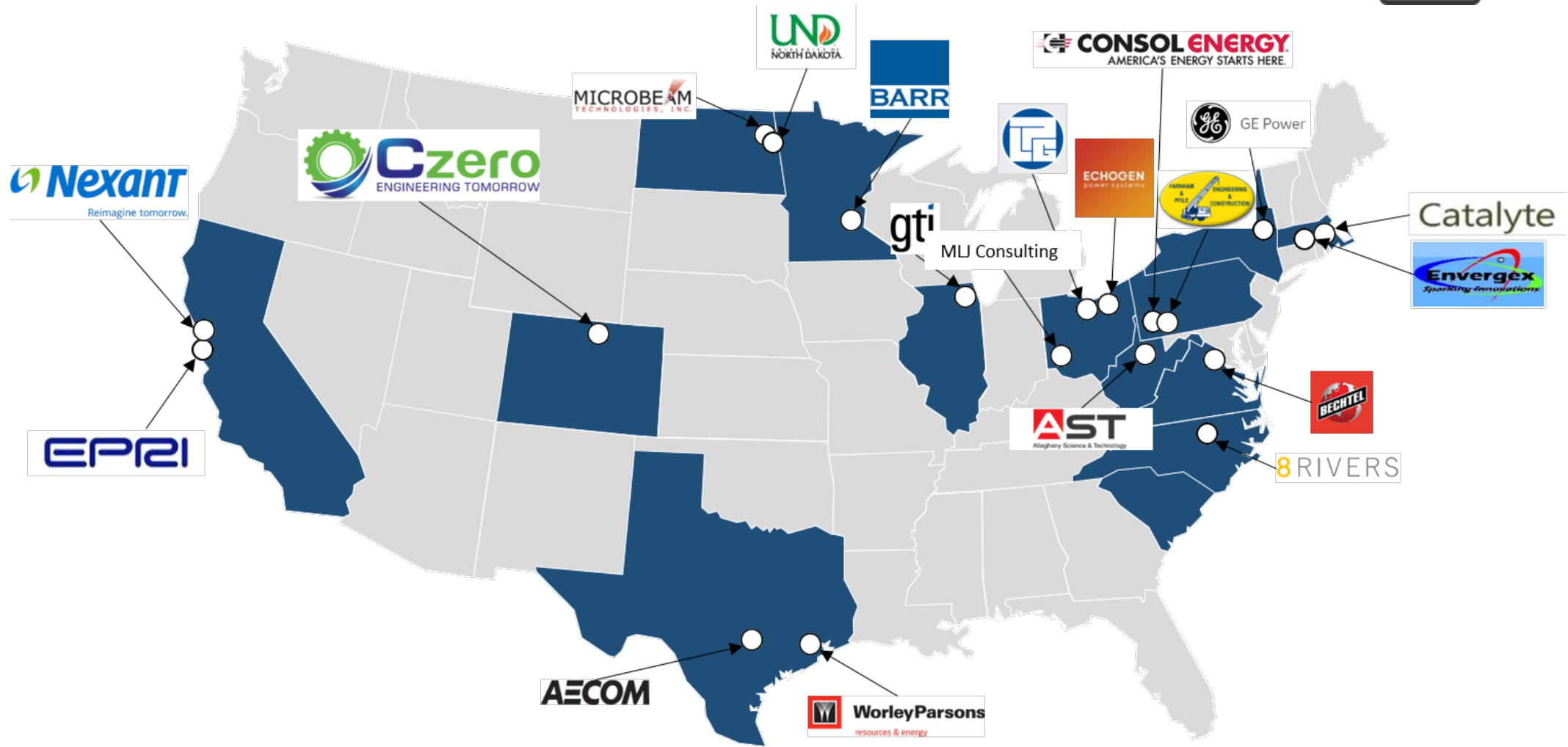


Share Knowledge | Develop Technology for Fossil Integration |
Promote Cleaner, Reliable Infrastructure

Active Projects:



Collaboration: Coal-First Projects



Potential Funding Opportunity Announcement

Objectives

- **Near-term, system-integrated**, energy storage solutions toward **commercial deployment** at fossil assets
- **Promising mid-TRL, component-level**, energy storage solutions toward **eventual system integration** with fossil assets
- **Innovative, low-TRL concepts** and technologies that offer **game-changing benefits** for fossil assets

Potential Funding Opportunity Announcement

Important Considerations

- Teaming partner list
- Include multidisciplinary partners and industry
- Look for the FOA:
 - NETL.doe.gov/business/solicitations
 - FedConnect
 - Grants.gov
- Informational webinar after FOA released

Planned Engagement

Spring 2020

Energy Storage Grand Challenge
workshops rescheduled as webinars

Energy Storage Grand Challenge draft
Roadmap developed for release and
feedback

More at:

<https://www.energy.gov/energy-storage-grand-challenge/energy-storage-grand-challenge>



Moving Forward Together

Identify technologies with significant benefits

Refine techno-economics of integration

Enhance technologies by working with project partners

Iterate to meet new challenges



Questions & Answers

VISIT US AT: www.NETL.DOE.gov



@NETL_DOE



@NETL_DOE



@NationalEnergyTechnologyLaboratory

Learn more:

netl.doe.gov/coal/crosscutting/energy-storage

netl.doe.gov/business/solicitations

energy.gov/energy-storage-grand-challenge/energy-storage-grand-challenge



Bhima Sastri

Director, Crosscutting R&D
and Systems Integration, DOE

bhima.sastri@hq.doe.gov



Briggs White

Technology Manager,
Crosscutting Program, NETL

briggs.white@netl.doe.gov



Jeff Hoffmann

Engineer and Project
Manager, NETL

jeffrey.hoffmann@netl.doe.gov