How We Drive Grid Resilience with Targeted R&D

Office of Electricity

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Advanced Grid R&D

U.S. DEPARTMENT OF ENERGY | OFFICE OF ELECTRICITY

Office of Electricity (OE)

A secure and resilient power grid is vital to national security, economic security, and the services Americans rely upon.

- Lead the Department's efforts to ensure the Nation's most critical energy infrastructure is secure and able to recover rapidly from disruptions.
- Lead the efforts to modernize the electricity delivery system to ensure that it supports the evolving grid and protects it from emerging threats.
- Lead the Department's research and development activities to provide long-term transformational strategies that will help ensure the Nation's most critical energy infrastructure is secure, reliable, and resilient.
- OE achieves this mission through a mix of technology and policy solutions in partnership with the private and public sectors.

OE Role in the Electric Grid

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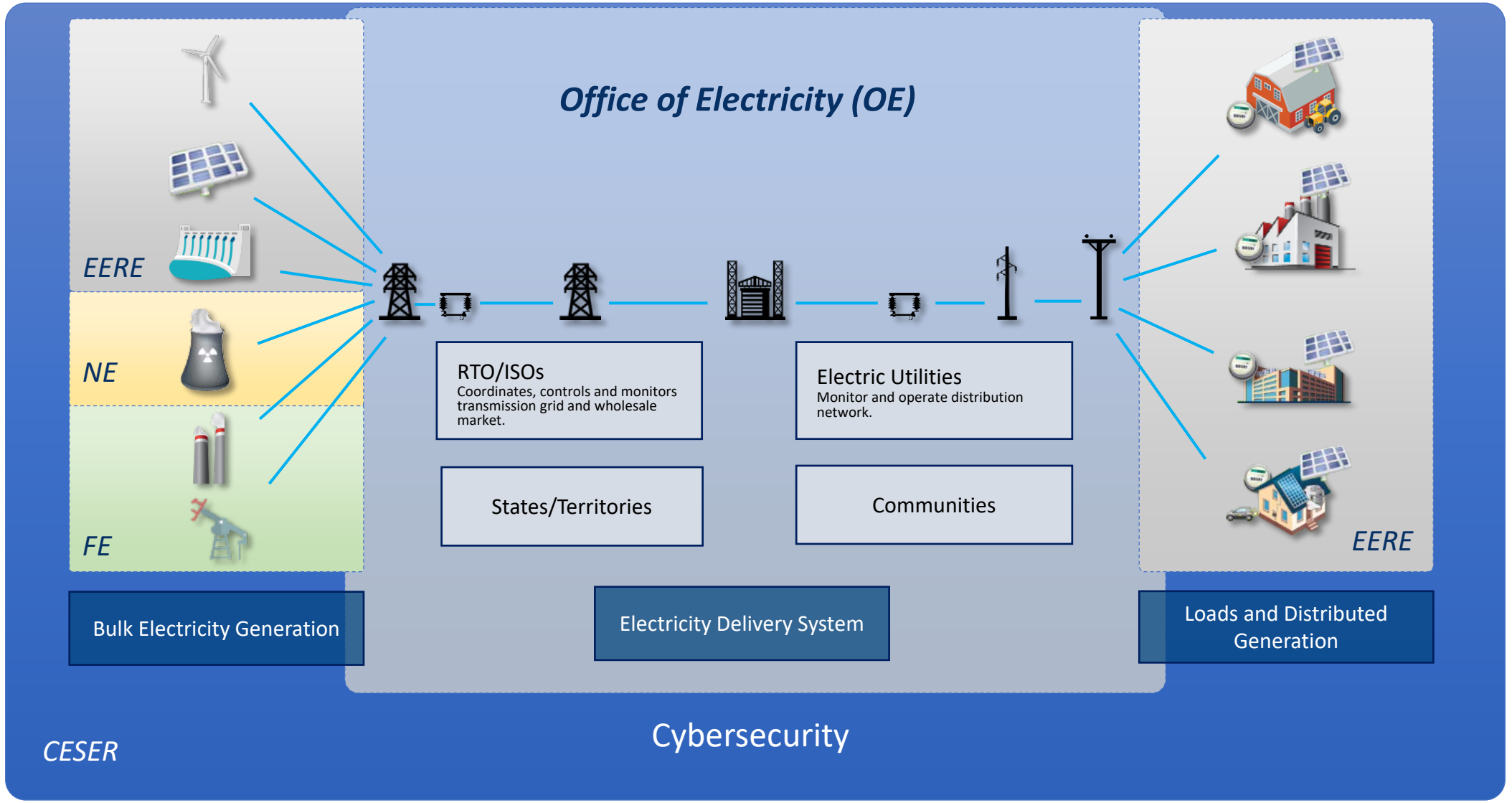

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Key Trends Driving Electric Grid Change

- Changing mix of types and characteristics of electricity generation
- Growing demands for a more resilient and reliable grid, especially due to weather impacts
- Growing threat of cyber and physical attacks
- Opportunities for customers to provide grid services and participate in electricity markets
- Increased use of digital and communication technology in the control of power systems

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Advanced Grid R&D (AGR&D) Portfolio

Advanced Grid Modeling →	NAERM	Energy Storage Systems	Advanced Power Grid Components
High-Fidelity and Low-Cost Sensors	Advanced Distribution Systems	Dynamic Controls and Communications	Advanced Microgrids

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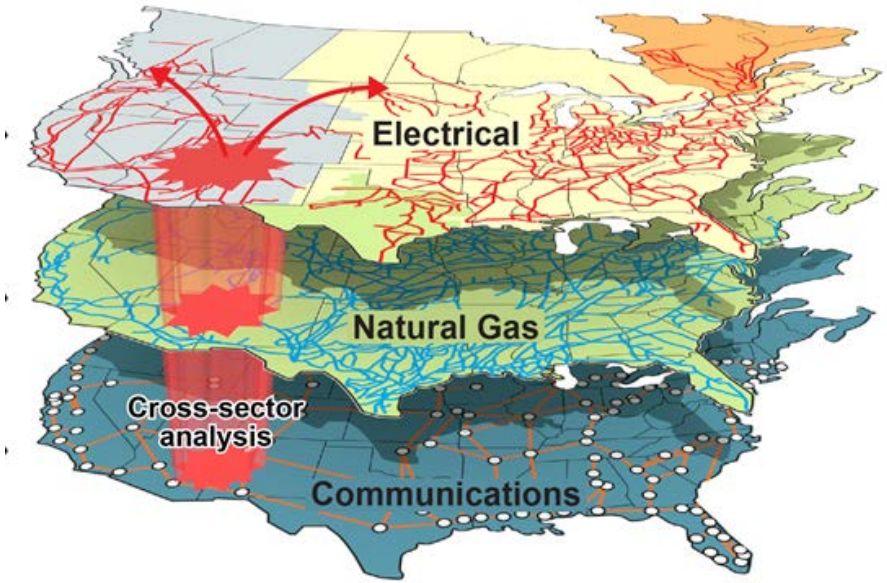
North American Energy Resiliency Model (NAERM)

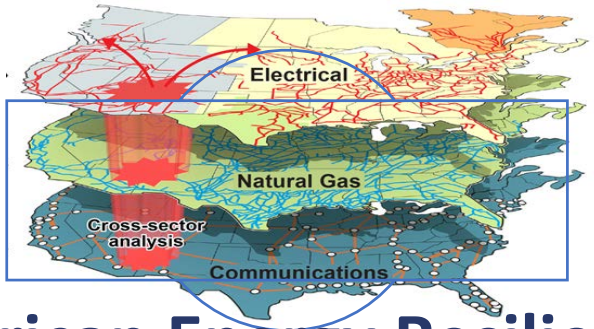
Vision - Rapidly predict energy system interdependencies, consequences and responses to extreme events at a national scale

Mission - Develop and deploy engineering-class modeling system for planning and real-time resilience analysis

Key Objective – Catalyze partnerships with industry, national labs, states/communities and other federal agencies to enhance coordination to support energy resilience



Sensors Development



North American Energy Resiliency Model

Low-Cost

Ubiquitous sensors with functionalities capable of providing visibility all the way to the edge of the network

Synchrophasors

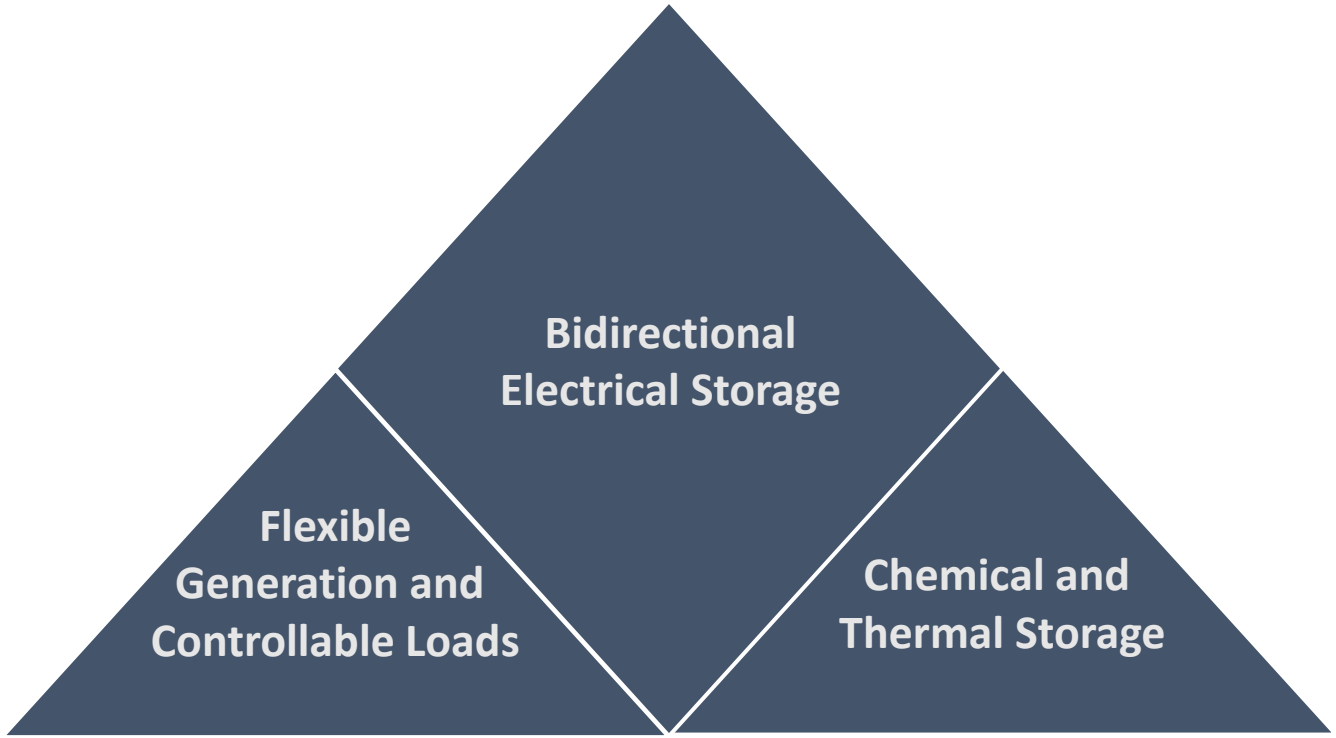
Provide detailed real-time status checks of specific locations on the electric grid

High-Fidelity

Diagnosis, prediction, and mitigation of system disruption during steady state and extreme-event conditions

The Energy Storage Grand Challenge

By 2030, the U.S. will be the world leader in energy storage utilization and exports, with a secure domestic manufacturing supply chain independent of foreign sources of critical materials



The Energy Storage Grand Challenge

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Science

ARPA-E

EERE

OE

NE

FE

OTT

LPO

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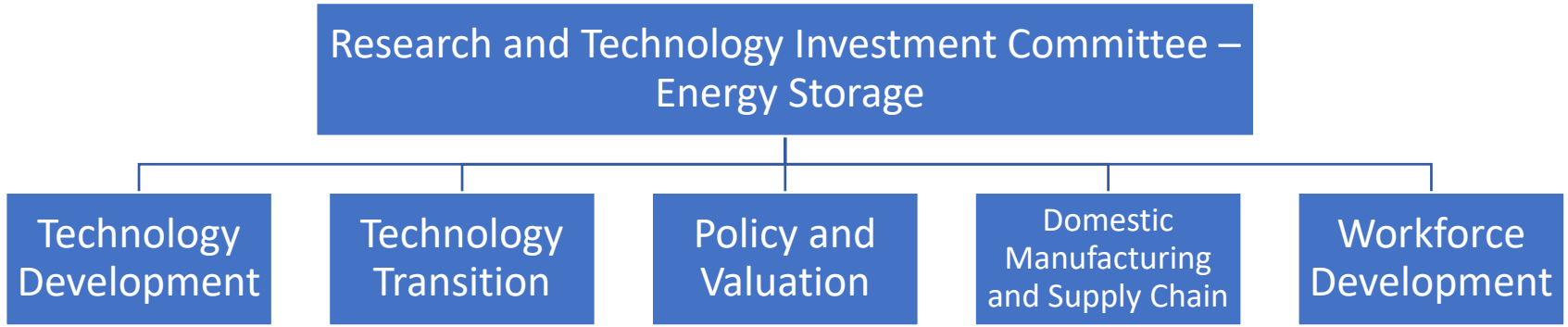
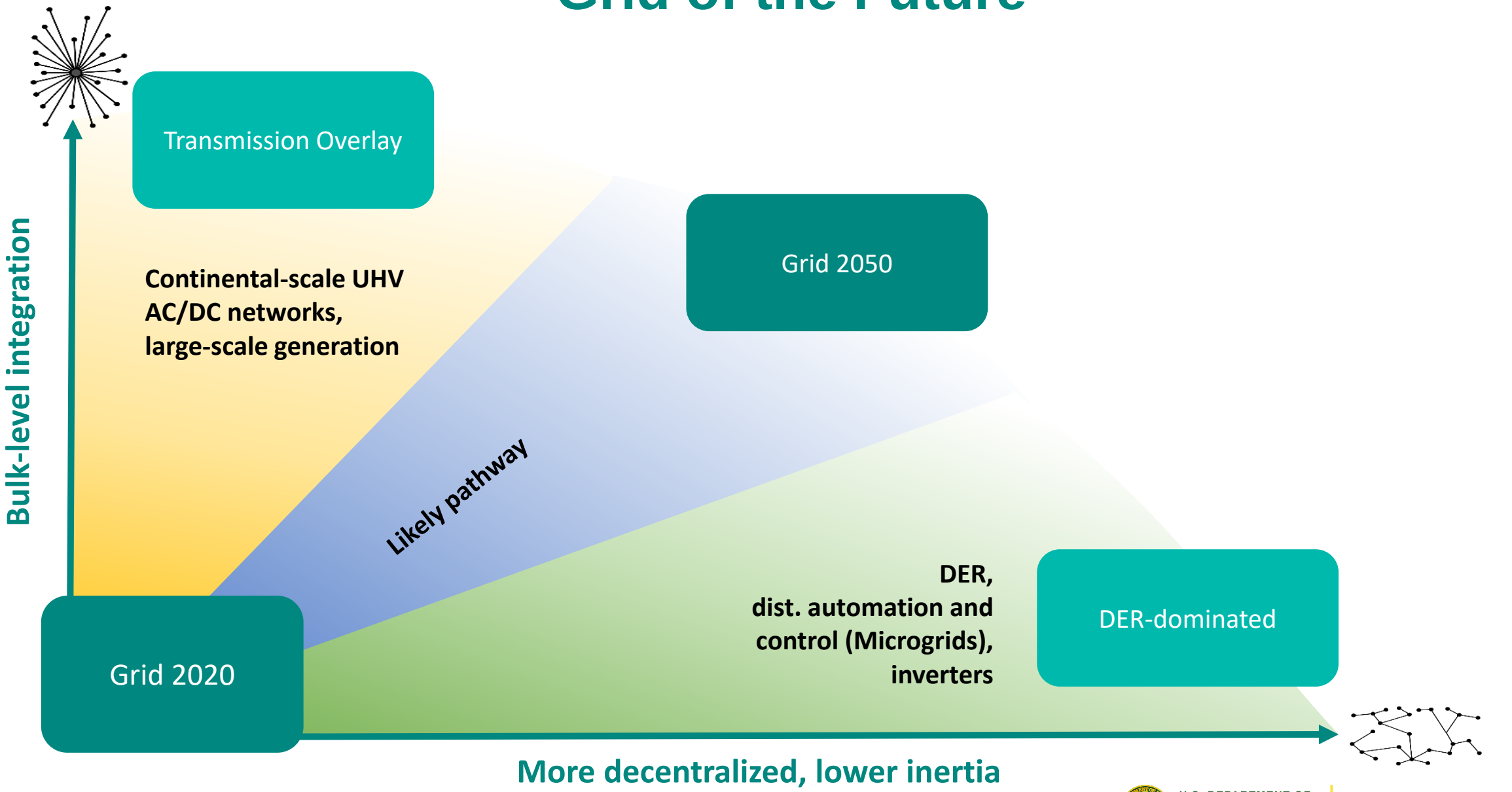
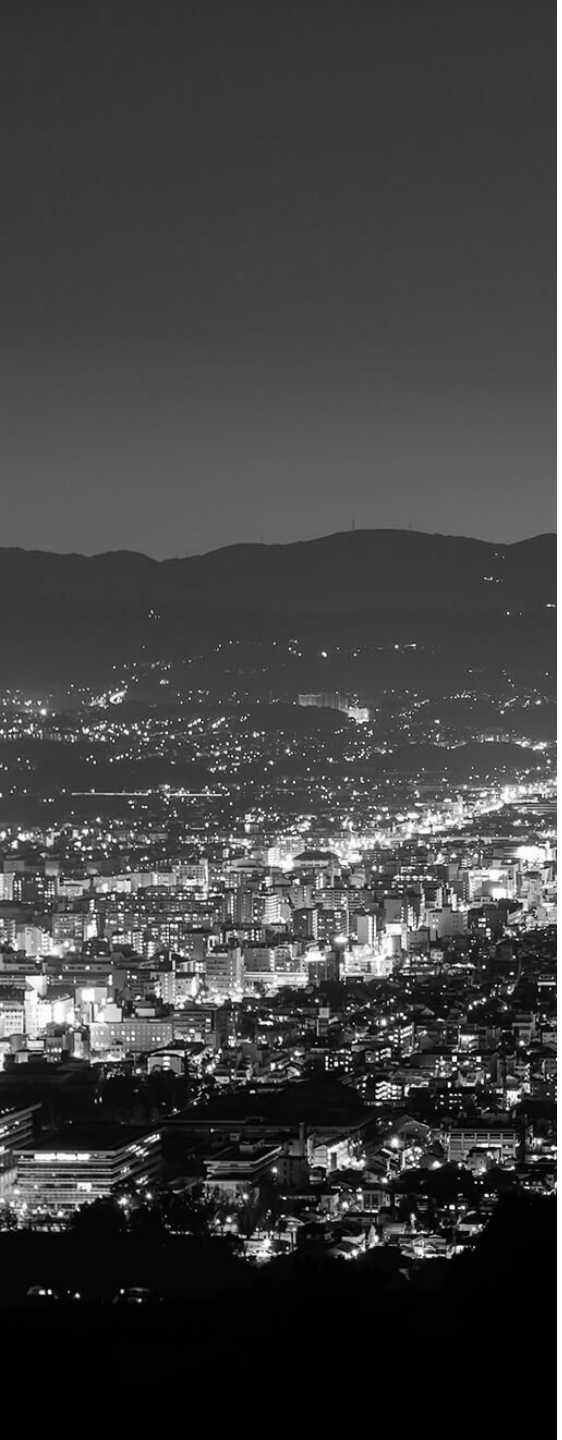
Energy Storage Grand Challenge Focus Areas



Technology Development	Technology Transition	Policy and Valuation	Domestic Manufacturing and Supply Chain	Workforce Development
• Establish ambitious, achievable performance goals, and a comprehensive R&D portfolio to achieve them.	• Accelerate the technology pipeline from research to system design to private sector adoption through rigorous system evaluation, performance validation, siting tools, and targeted collaborations	• Develop best-in-class models, data, and analysis to inform the most effective value proposition and use cases for storage technologies.	• Design new technologies to strengthen U.S. manufacturing, recyclability, and reduce dependence on foreign sources of critical minerals	• Train the next generation of American workers to meet the needs of the 21st century grid and energy storage value chain

Grid of the Future





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Questions?

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