

Energy Storage Enables Grid Modernization Goals

Energy Storage Grand Challenge Summit
Storage as Enabler for Critical Infrastructure and Resilience Panel Session
August 8, 2024

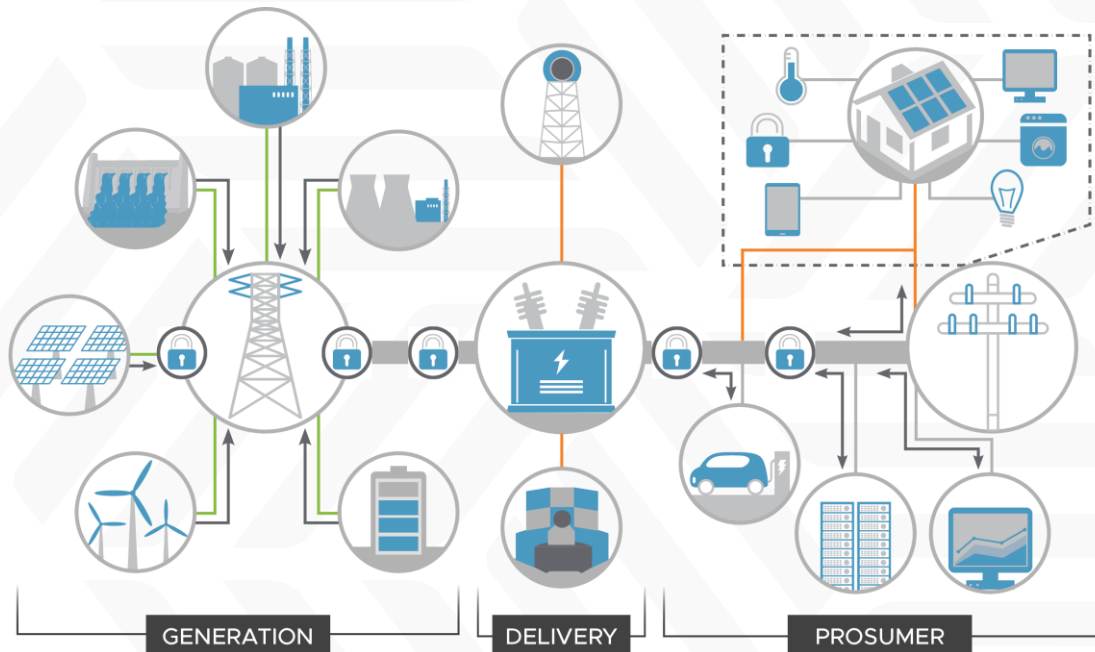
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Office of the Under Secretary for Science and Innovation (S4) for the
U.S. Department of Energy's Grid Modernization Initiative

DOE Grid Modernization Initiative

History: Beginning in 2015, GMI has leveraged the expertise of multiple DOE Offices, National Labs, and other partners to collaborate on cutting-edge research and development and technical assistance on grid modernization topics.

Vision: The GMI will coordinate activities across DOE to enable a just transition to a carbon and pollution-free power sector by 2035 and a net-zero emission economy by 2050 while maintaining the reliability, affordability, security, and resilience of the energy system.



Since 2016, over \$300M has been invested in over 120 projects across the National Laboratories, industry, and academia.

Many of these advancements (e.g. transmission modeling; resilience framework; state-based technical assistance) support advanced energy infrastructure implementation.

Integration required across a complex electricity delivery system to support changing energy demands

GMI/GMLC Structure



U.S. DEPARTMENT OF
ENERGY

Office of Energy Efficiency
& Renewable Energy

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Office of
Electricity

U.S. DEPARTMENT OF
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Grid Deployment
Office

U.S. DEPARTMENT OF
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Office of Fossil Energy
and Carbon Management

U.S. DEPARTMENT OF
ENERGY

Office of Energy Justice
and Equality

U.S. DEPARTMENT OF
ENERGY

Office of Science

U.S. DEPARTMENT OF
ENERGY

Office of Cybersecurity, Energy Security,
and Emergency Response

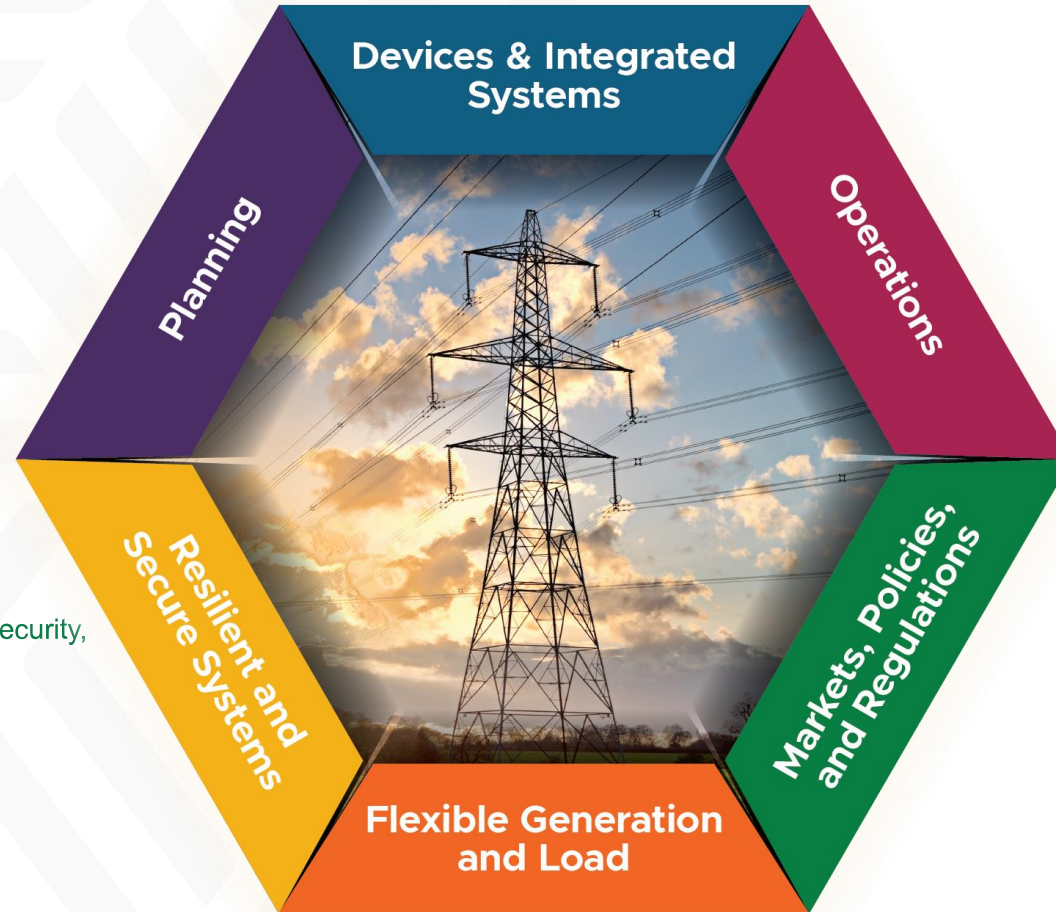
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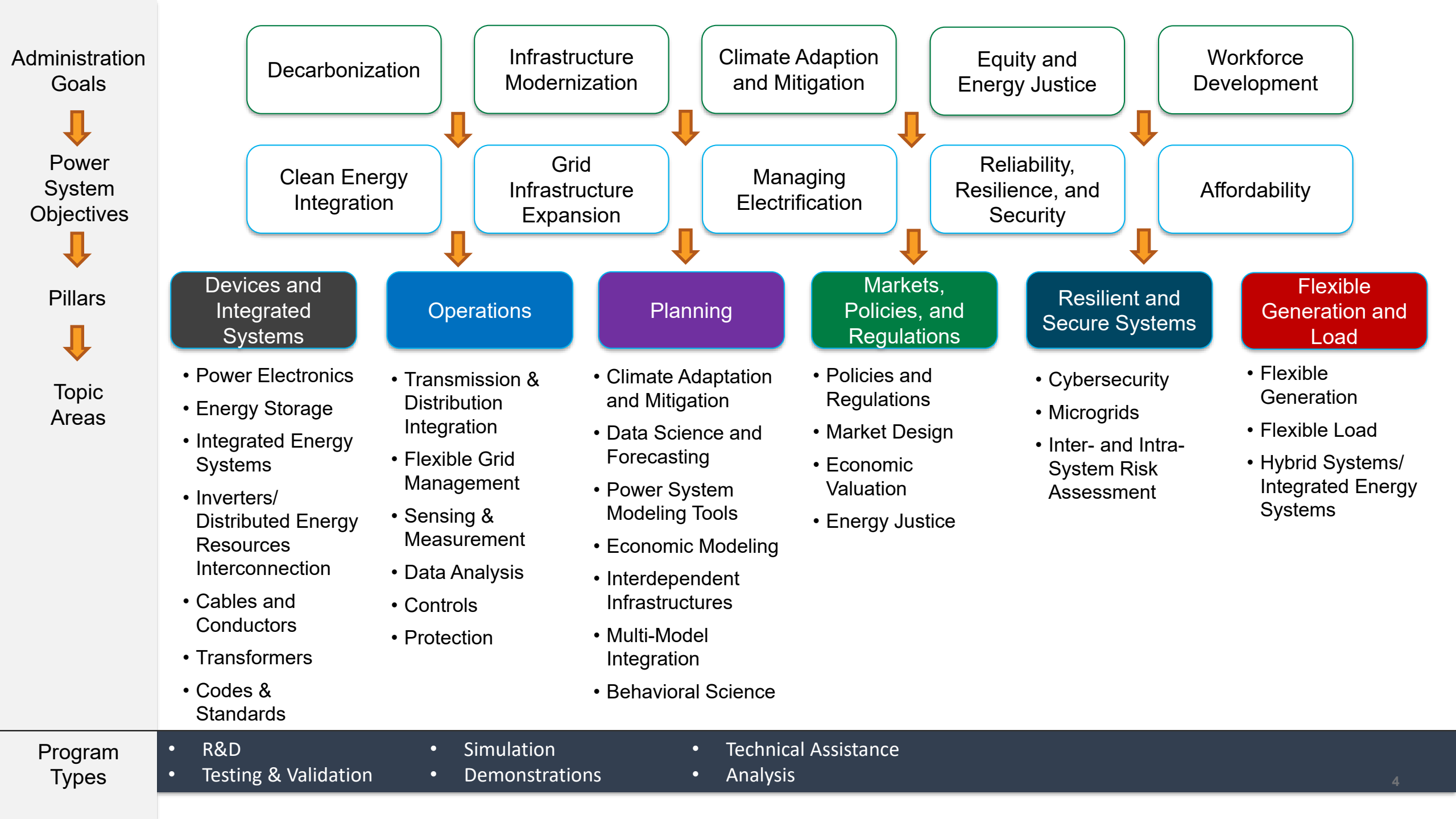
Office of
Nuclear Energy

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Office of Technology
Transitions

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R&D to address technology gaps

- ▶ Coordinated visibility & controls across all levels of (T, D, BTM) - Sensing, control, protection of IBRs at-scale
- ▶ Enhanced modeling tools – device-level to integrated system scale
- ▶ Harnessing flexibility of generation and end-use
- ▶ Scalability and integrated system testing – Device-level scaling & Devices-to-Systems
- ▶ Tools for managing risk and uncertainty
- ▶ Scenario-based decarbonization tradeoffs
- ▶ Evaluate impact of emerging technologies on grid modernization



GMI Execution Plan



- ▶ R&D for the basic and applied science necessary for the innovation and invention of new tools, technologies, and systems that will enable the grid of the future
- ▶ Testing and technology validation to confirm that component technologies can be incorporated into a complete system solution
- ▶ Simulation tools needed for power system planning that will model merging needs driven by changing technologies and operational challenges
- ▶ Demonstration projects to prove the effectiveness of innovative technologies in real-world conditions at scale
- ▶ Technical assistance projects to support stakeholders such as state regulatory agencies and regional planning organizations
- ▶ Technology transfer
- ▶ Stakeholder engagement and partnership
- ▶ Coordinate grid modernization activities across the participating Program Offices