GRID
MODERNIZATION LABORATORY CONSORTIUM
U.S. Department of Energy

U.S. DEPARTMENT OF ENERGY

14 National Laboratories Partnering With Industry To Build A Cleaner, More Resilient Power Grid For The Nation

Modernizing the nation's power grid so that it can accommodate more clean energy resources while being resilient, reliable, and secure in the face of increasing natural and man-made threats is critical to our national security and economic prosperity.

The Grid Modernization Lab Consortium (GMLC) brings together 14 national laboratories to coordinate and execute cross-cutting research in support of the Department of Energy's Grid Modernization Initiative (GMI). The GMI focuses on developing new tools and technologies to measure, analyze, predict, protect, and control the grid of the future.

Public-Private Collaboration on Grid Modernization

Through the GMI and GMLC, DOE leadership catalyzes private-sector innovation, working in collaborative partnerships to ensure a regional breadth of issues and activities while bringing together multiple industry stakeholders to find common, adoptable approaches that benefit all parties.

Started in 2014, the GMLC has collaborated with more than 200 industry partners to solve key, cross-cutting grid modernization challenges. These partners include large and small utilities from all regions of the country; grid technology companies and equipment manufacturers; R&D organizations representing both industry and academia; and institutional stakeholders, including federal, state and local agencies, regulators, as well as industry associations.

Research Pillars

The GMI's research and development portfolio supports a just and equitable transition to a resilient, reliable, flexible, secure, sustainable grid that can deliver affordable electricity to all. This transition requires a substantial amount of change to existing systems, such as updating support tools, increasing capacity, meeting new regulatory requirements, and improving communication between systems. To meet these challenges, GMLC's research and development portfolio is operating under the following GMI pillars.

Market, Policies, and Regulations

The GMI experts provides unbiased, third-party technical assistance and analysis to regulators, policymakers, public utilities, and regional planning and reliability organizations to help them make informed decisions on key grid modernization issues, such as how to value, regulate, and support the deployment of emerging grid technologies.

Planning

GMI actively develops grid planning tools that use cutting-edge high-performance computational tools, allowing for greater performance, fidelity, and accuracy. The tools can also better handle the uncertainty and volatility introduced by renewable energy and extreme weather events.

Operations

GMI is providing grid operators greater ability to predict and respond to abnormal conditions in real-time using advanced communications tools and approaches. GMI's experts are delivering the hardware and software architecture, algorithms, and control frameworks for a more resilient and secure grid.

Flexible Generation and Load

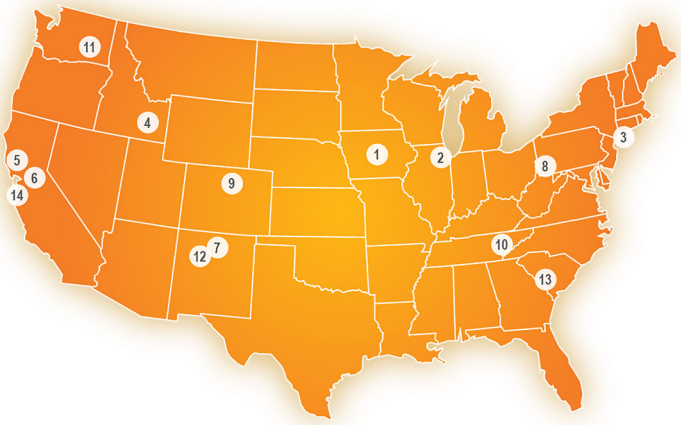
Distributed and intermittent energy sources—wind, solar, energy storage—are changing the way electricity is generated. Despite its many benefits, renewable energy also introduces load volatility to a power sys–tem attuned to steady, predictable generation. The recent emergence of dedicated off-grid or smaller scale generation assets in remote areas add another layer of complexity. GMI's researchers are developing tools and technologies that address these impediments to the widespread deployment of flexible generation.

Devices and Integrated Systems

The power grid of the future will likely be a smart grid that uses digital devices on both ends of the electric meter with the ability to monitor energy usage in real-time, detect outages and disruptions quickly, and even provide customers with personalized energy consumption feedback. GMI researchers are creating and testing viable pathways for these devices to connect, communicate, and coordinate delivery of energy services.

Resilient and Secure Systems

The complexity of the electric grid and its interconnection with other critical systems can accentuate the risk of cascading failures. As a result, it is paramount that the grid be reliable and resilient against all malicious threats, natural disasters, and other systemic risks such as human error. The GMI develops tools and technologies needed to identify, analyze, predict, and protect the grid from emerging threats and reduce the risk of outages and blackouts. and financial metrics that reflect emerging grid attributes, architectures and outcomes. This resource enables users to conduct baseline grid modernization assessments and ROI calculations, while also providing a dashboard for policy makers, regulators, and industry stakeholders.



GMLC Laboratories

1. Ames Laboratory (Iowa)
2. Argonne National Laboratory (ANL)
3. Brookhaven National Laboratory (BNL)
4. Idaho National Laboratory (INL)
5. Lawrence Berkeley National Laboratory (LBNL)
6. Lawrence Livermore National Laboratory (LLNL)
7. Los Alamos National Laboratory (LANL)
8. National Energy Technology Laboratory (NETL)
9. National Renewable Energy Laboratory (NREL)
10. Oak Ridge National Laboratory (ORNL)
11. Pacific Northwest National Laboratory (PNNL)
12. Sandia National Laboratories (SNL)
13. Savannah River National Laboratory (SRNL)
14. SLAC National Accelerator Laboratory (SLAC)

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