

Greater than the Sum of its Parts

The National Renewable Energy Laboratory (NREL) is the lead laboratory in the United States responsible for transforming our nation's electricity and building infrastructure for the rapid deployment of renewable energy technologies. NREL's Electricity, Resources, and Building Systems Integration Center (ERBSIC) brings together a diverse group of experts performing grid integration and optimization R&D activities associated with large-scale deployment of renewable energy, energy efficiency, and demand control technologies.



Marjorie Schott, NREL

Integration is Key

The ERBSIC is a group of dedicated scientists, engineers, physicists and computer science and applied math professionals, that pool their resources and capabilities together to create an enhanced combined effect on renewable technology integration. Projects can be as varied as:

- Designing net-zero energy buildings
- Improving solar field performance
- Characterizing the performance and reliability of distributed power systems
- Assessing renewable energy generation plant site performances
- Expanding the power grid to deliver energy from wind farms
- Optimizing residential energy systems.

A System of Systems Approach

Today's electric power grid is limited in its ability to receive, transmit, and distribute electricity generated from renewable resources such as wind, solar, biomass, and geothermal and is a significant roadblock to achieving our nation's clean energy goals. From generation to transmission to distribution and end use delivery, the ERBSIC's work spans across the entire electricity system that includes many applications across many technologies.

As a modernized electric grid is implemented with integrated communications and controls, the flexibility of this "smarter grid" will enable large-scale integration and interoperability of a greater diversity of technologies, connected at all parts of the grid. Examining how these individual systems can be integrated and harmonized into a more intelligent, secure, and sustainable electricity system provides an exciting new area for R&D at NREL that includes many applications across many disciplines. The ERBSIC's cross-disciplinary approach to addressing inter-related grid connectivity and performance issues provides a fresh perspective on the impact renewable energy technologies can have on the electric power system.





NREL is a national laboratory of the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Operated by the Alliance for Sustainable Energy, LLC

Working Toward Common Goals

The ERBSIC is comprised of six technology-focused groups with more than 100 employees that share a common enthusiasm to support the U.S. Department of Energy's advanced energy goals. Efforts towards these goals include: For more information on collaborative opportunities with NREL's Electricity, Resources, and Building Systems Integration Center, visit our Web site at www.nrel.gov/eis/erbsi_center.html or contact Dave Mooney, David.Mooney @nrel.gov.

- Finding new renewable ways to power our homes, businesses, and vehicles
- Working with industry partners to accelerate research from scientific innovations to market-viable alternative energy solutions
- Building infrastructure so that the deployment of renewable and efficiency technologies proceeds at speed and scale.



Distributed Energy Systems Integration Group - Conducts collaborative research and provides technical support in a range of distributed generation areas. These areas include interconnection engineering and standards, system integration engineering and testing, interconnection interface applications, and policy and regulatory analysis.



Resource Information and Forecasting Group - Provides high-quality renewable resource data for U.S. and international locations. Provides tools to accurately assess renewable energy density (watts per square meter) as it varies with time and location and information on how to design efficient integrated renewable energy systems.



Advanced Commercial Buildings Group - Focuses on the development of integrated design strategies to enable commercial buildings to be designed, constructed, and operated using much less energy and seeks to see net zero-energy buildings become the standard in the commercial building industry.



Transmission and Grid Integration Group - Collaborates with utility and industry partners and provides data, analysis, and techniques to increase utility understanding of integration issues and confidence in the reliability of emerging renewable energy applications.



Advanced Residential Buildings Group - Accelerates the introduction of energy-efficient building technologies through technology/financial whole building optimization. Develops strategies for zero-energy new and existing homes. Research objectives include developing integrated energy-efficiency and onsite renewable energy power solutions that can be successfully used on a large production scale to develop homes that produce as much energy as they use on an annual basis.



Thermal Systems Group - Investigates improving thermal systems (systems that use heat) for power production. Many of these technologies—including parabolic trough mirrors that focus the sun's heat onto mirrors to produce power and geothermal power plants that use hot water from underground to produce electricity—are for utility-scale power production.

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National Renewable Energy Laboratory

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