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Hawaii Clean Energy Study Tour

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.
Laboratory Snapshot

Only National Laboratory Dedicated Solely to Energy Efficiency and Renewable Energy

- Leading clean-energy innovation
- 37 years
- 1,763 employees with world-class facilities
- Campus is a living model of sustainable energy
- Owned by the Department of Energy
- Operated by the Alliance for Sustainable Energy
NREL’s Energy Vision

A clean, resilient and reliable energy system that contributes to economic prosperity, national security, and environmental quality.
Scope of Mission

Sustainable Transportation
- Vehicle Technologies
- Hydrogen
- Biofuels

Energy Productivity
- Residential Buildings
- Commercial Buildings

Renewable Electricity
- Solar
- Wind
- Water: Marine Hydrokinetics
- Geothermal

Systems Integration
- Grid Integration of Clean Energy
- Distributed Energy Systems
- Batteries and Thermal Storage
- Energy Analysis

Partners
- Private Industry
- Federal Agencies
- State/Local Government
- International
Challenges to Success

Energy Market Barriers

• Inconsistent public policy
• Outdated infrastructure
• Lack of knowledge
• Limited private investment
• Global renewable industry investment increased from 2013 to 2014
NREL’s Solutions Role

Reducing Investment Risk

• Integrating technology at scale

• Enabling basic and applied clean energy technology innovation

• Accelerating technology market introduction and adoption

• Encouraging collaboration in unique research and testing partnering facilities

• Providing analysis and expertise to inform decisions and catalyze market adoption
Energy Systems Integration Facility

- NREL's Energy Systems Integration Facility (ESIF) integrates electric, thermal, and fuel systems with high-performance modeling and simulation capabilities.

- The ESIF’s world-class laboratories offer megawatt-scale hardware-in-the-loop testing with actual or simulated electrical devices, a supervisory control and data acquisition system, and unique analysis and visualization tools.

- Energy systems integration brings together the wide range of energy carriers—electricity, thermal sources, and fuels—with other infrastructures, such as water and transportation, to work together optimally.
Analyses, Models, and Tools

• NREL analyzed high penetrations of renewable energy in the eastern and western U.S. power grids for benefits, impacts, and mitigation strategies.

• For solar photovoltaic manufacturing, NREL modeling tools identify cost improvements and assess competitive advantages.

• The OpenEI website links and shares energy data worldwide.

• NREL’s System Advisor Model determines the economic value of proposed solar, wind, and geothermal projects.
Innovation for the Future

Integrating/Upgrading Energy Systems

• Grid modernization through integration of energy systems at all scales
• Innovation today for the smart homes of tomorrow

Advancing DOE’s SunShot Solar Initiative

• Reduce the cost of solar energy systems to 6 cents per kWh by 2020
• Cost competitive without subsidies to enable large-scale adoption across the US

Achieving Scientific Breakthroughs

• Improving Efficiency in Bio-based Hydrocarbon Fuels – NREL scientists discover effect of catalyst structure for producing significant amounts of hydrocarbon fuels
• Water Power Software Makes a Splash – Open-source software provides essential modeling and simulation for water power research and development
• Semiautomated Truck Platooning – NREL study finds platooning of long-haul trucks reduces fuel consumption at all tested highway speeds
For more than 37 years, NREL has delivered innovation impact enabling the emergence of the U.S. clean energy industry.

For more information please visit our website at www.nrel.gov.