Homes in Puerto Rico. *Photo by Robin Burton, NREL*

Transforming Buildings Around the World

NREL research is enabling comfortable, resilient, energy-efficient, clean energy-ready buildings

Buildings are where we live, work, go to school, gather as a community, and so much more. Globally, buildings are responsible for 30% of energy consumption and 26% of energy-related emissions. The National Renewable Energy Laboratory (NREL) is committed to adapting tools and capabilities to support emerging economies and improve the energy efficiency and flexibility of their buildings.

Building Expertise at NREL

NREL is transforming energy through integrated building science to improve resilience, energy efficiency, occupant comfort, indoor air quality, and lower utility costs for people around the world. This level of advanced, integrated building research is made possible by NREL's industry-leading experts and world-class facilities, available to its partners.

Technology Innovation and Integration

Leveraging NREL's facilities, researchers are innovating across building components, technologies, and smart systems.

Efficiently Controlling Humidity

NREL and industry partner Mojave co-developed a liquid desiccant HVAC system with efficient humidity control to lower the greenhouse gas emissions associated with controlling indoor air moisture in commercial buildings in humid climates.

Validation, Verification, and De-Risking

NREL's unparalleled testing and validation capabilities can determine performance under real-world conditions to understand grid impacts and technology feasibly in a wide variety of climates and conditions, which can help de-risk emerging technologies for investors.

Building Technology for Extreme Climates

At NREL's Alaska Campus, researchers are working with Arctic communities to design building envelopes for comfortable

and healthy buildings in extreme conditions. While the team in Alaska evaluates air-source heat pumps that operate down to -30°F (-35°C), NREL is also working on projects to develop and validate heat pump technologies that support residential and small commercial buildings in extreme heat and humidity.

Community Engagement and Technical Assistance

Through multiple programs, NREL leverages technical expertise and experience partnering with both communities and cleantech innovators as we plan for, transition to, and maintain resilient, equitable, and clean energy systems.

Uniquely Local Clean Energy Plans

In 2017, back-to-back hurricanes destroyed around 80% of Puerto Rico's electric grid. This was the longest blackout in U.S. history, taking 328 days to get power fully restored. In the face of extreme challenges, the people of Puerto Rico want to rebuild differently. NREL led the Puerto Rico Grid Resilience and Transitions to 100% Renewable Energy Study (PR100). The findings are the culmination of two years of stakeholder engagement, scenario modeling, and impact analysis.

Workforce Development

As new technologies emerge in the built environment, workforces must be able to understand, adapt, and advocate. NREL is engaging with communities and educational institutions to educate and empower multidisciplinary stakeholders in the adoption of grid-interactive efficient buildings and advanced construction technologies. Additionally, NREL works in rural communities in Alaska and around the world to train local workforces in energy-efficient building and clean energy installation.

Delivering Guidance For Practitioners by Practitioners

Facilitating collaboration and engagement across stakeholders is vital to accurate and relevant information. Through Better Buildings Design and Construction Allies, NREL has grown a cohort of design and construction professionals to help overcome barriers and scale best practices in high-performance building design. As a result, digestible and actionable design guidance have been created by practitioners for practitioners to overcome barriers to achieve carbon reduction goals.

Energy Modeling and Analysis

NREL enables communities, cities, tribal governments, utilities, state energy offices, and other stakeholders to identify opportunities for energy efficiency and building resilience.

Using Data to Achieve Net Zero

Net Zero World is supporting energy-efficient buildings in Argentina at regulatory, technical, economic, social, and strategy/roadmap levels. Using open-source tools developed by NREL (e.g., OpenStudio®, ComStock™, ResStock™), energy efficiency savings and associated economic benefits are calculated for whole-building, city, regional, and national analysis. Net Zero World is also supporting institutional capacity building, development of regulatory changes, and finance mechanisms that support and accelerate energy efficiency implementation.

NREL's Energy Systems Integration Facility is designed to support public and private sector research in advancing and de-risking promising clean energy technologies.
Photo by Dennis Schroeder, NREL 51460

Work with us
www.nrel.gov/buildings/work-with-us.html

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NREL Transforming ENERGY

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