



Transforming **ENERGY**



At the National Renewable Energy Laboratory, we are transforming today's energy challenges into tomorrow's solutions.

For more than 47 years, NREL's world-class research staff have devised solutions to transform the way we generate, consume, store, and distribute energy. Now, and in the years ahead, our work is more important than ever.

As the population grows, particularly in urban centers, and amid the threat of climate change, we need more sustainable, efficient, and equitable ways of meeting the world's energy needs.

Integrating new technologies and ever more devices into the grid requires us to examine their effects and enhance resilience and security within our most critical systems.

NREL continues to anticipate these challenges, offering solutions through research, innovation, deployment, analysis, partners, and people. We are building the foundation of tomorrow's energy landscape and inspiring the economic growth of the future.



NREL's vision is a clean energy future for the world in which solutions are inclusively designed and benefits are equitably distributed.

We are advanced energy leaders.

From the start, NREL's leadership in energy efficiency and renewable energy science and technology has set us apart. We are focused on creating the technical foundation that will support the continued evolution of an advanced energy ecosystem. Researching energy systems and technologies—and the science behind them—for a future powered by advanced integrated systems is what we are known for and what we do best.

Our scientific excellence shines bright. We are proud that, during more than 47 years, NREL scientists have been awarded 74 R&D 100 Awards, known as the "Oscars of Innovation." Our groundbreaking energy research has contributed to transformational scientific advancements, exponential decreases in costs, and more renewable installed capacity than ever before.



Our R&D Programs

Foundational Science

Biological Systems Science
Materials Science
Computational Science and Visualization



Renewable Power

Geothermal
Solar
Water
Wind



Sustainable Transportation

Bioenergy
Hydrogen and Fuel Cells
Transportation and Mobility



Energy Efficiency

Advanced Manufacturing
Buildings
State, Local, and Tribal Governments



Energy Systems Integration

Energy Security and Resilience
Grid Modernization
Integrated Energy Solutions





Research conducted at NREL will provide both the power and raw materials needed to support a continually expanding global population while stewarding essential planetary resources for future generations.

We are transforming energy through science.

We are focusing our expertise and resources on research to accelerate the transformation of traditionally fossil-based products, practices, and industries. With an eye toward emerging megatrends and evolving fields, our thought leaders have identified three distinct research areas to help guide our discoveries:

Integrated energy pathways

As the future grid changes and evolves, it will incorporate more renewables, varied types of loads and energy storage, and many more devices and assets that need to be controlled. NREL is focused on modernizing our grid to support a high level of renewable energy integration, incorporating storage and advanced controls, and expanding transportation electrification while maintaining grid reliability and security.

Electrons to molecules

NREL, along with energy industry partners, is exploring the use of affordable, renewable electricity to convert low-energy molecules—such as water and carbon dioxide—to generate cleaner, higher-value, and higher-energy chemicals, fuels, and materials.

Circular economy for energy materials

NREL research in this area reduces waste and preserves resources by designing materials and products with reuse, recycling, and upcycling in mind from the start.



We are transforming energy through partnerships.

Creating sustainable, transformational change is not an easy job—and we know we cannot do it alone. That is why NREL partners with a diverse range of organizations: businesses large and small, all levels of government, and academia and other nonprofits. Together, we accelerate the transition of renewable energy and energy efficiency solutions into practical applications. These collaborations are critical to creating a clean-energy ecosystem that transforms science into impact.

Our researchers, facilities, tools, and analyses catalyze cutting-edge innovations that create affordable and abundant energy and new business opportunities and greatly reduce risk for new technology investment. By bridging the gap from concept to market, we link R&D with real-world applications.



More than 1,100 active partnerships with industry, universities, foundations, and governments



772 patents for NREL technologies to date



74 R&D 100 Awards



\$783.5 million in business volume in Fiscal Year 2023

Our campuses boast world-class facilities and other unique laboratory environments that provide our partners with valuable research space and solutions to help speed new approaches to market.

In more than four decades, we have learned a lot about how to get the most out of every research dollar. To ensure our partners get what they need in the most efficient way possible, we have transformed the way we do business. We offer several types of partner agreements and mechanisms that enable us to provide flexible and efficient ways to get the job done.

“Our partnership with NREL drives forward a vision to advance the energy systems of the future by focusing on innovation and resiliency. New investment and innovative partnerships are critical to developing solutions that will manifest a global energy transition while promoting economic growth and prosperity.”

– Lisa Alexander
Senior VP of Corporate Affairs and Chief Sustainability Officer, Sempra Energy



3,675
employees, postdocs,
interns, visiting
professionals, and
subcontractors

We are transforming energy through our people.

Our passionate people are 100% committed to changing the world every single day. We recognize that to achieve our vision we need contributions from everyone, so we've made diversity, equity, and inclusion priorities for NREL. Our scientists come from a variety of backgrounds and range from seasoned clean-energy leaders with decades of expertise to graduate interns and postdoctoral researchers just beginning their careers.

And while passion is one thing, credentials are another. Our academic degrees outnumber our staff, and our researchers published 2,726 publications last year. Our scientific innovation and excellence has resulted in 772 patents and counting.



We are transforming energy at home.

NREL is a living laboratory. We showcase the benefits of energy efficiency and renewable energy technologies by investing in site design and building development across our campuses. Our Net Zero NREL initiative, launched in 2021, aims to achieve 100% carbon-free energy by 2030.

Many of the high-performance buildings on our 327-acre main campus in Golden, Colorado, have achieved Leadership in Energy and Environmental Design (LEED) certification, net-zero energy status, or both. Our Science and Technology Facility was the first federal laboratory building in the nation to achieve LEED Platinum certification, while our Research Support Facility is one of the world's largest energy-efficient office buildings; what we have learned here has been applied to more than 50 new buildings across the United States.

Our Flatirons Campus in Arvada, Colorado, is already a net-zero operation, exporting solar- and wind-generated power to the grid when there is a surplus. NREL's 22,000-square-foot research facility at the Alaska Campus in Fairbanks, is the farthest-north LEED Platinum building on Earth. Incorporating cutting-edge technologies, such as an adjustable foundation, a ground source heat pump, a solar thermal storage system, and hundreds of sensors, the building is approaching net-zero heating in a subarctic climate.

Cost-effective design approaches that maximize the use of energy efficiency and renewable energy technologies have positioned these buildings as models for energy use and sustainability.



Room To Innovate

More than **630** acres in Golden and Arvada, Colorado; Fairbanks, Alaska; and Washington, D.C.



World-Class Facilities

Open to entrepreneurs, engineers, scientists, and universities



Publications

2,726 scientific and technical materials were published last year



National Economic Impact

More than **\$1.9 billion**

At NREL, we are transforming energy to create a better today ... and tomorrow.

NREL is home to the most powerful high-performance computing system exclusively dedicated to advancing renewable energy and energy efficiency technologies. NREL also offers state-of-the-art immersive, high-resolution visualization capabilities at the Energy Systems Integration Facility's (ESIF's) Insight Center.

The high-performance computing data center at NREL is highly energy efficient, thanks to a warm-water liquid cooling system. The system captures and reuses waste heat as the primary heating source throughout ESIF offices and laboratory space.

Whether it is growing the scientific body of knowledge, developing analyses to help inform policymakers, engineering integrated energy infrastructure, or establishing valuable partnerships to bring the next generation of technologies to market, innovation for positive societal impact is at the core of our work. With programs to advance research and technologies in advanced manufacturing, bioenergy, buildings, computational science, energy analysis, energy security and resilience, energy storage, geothermal, grid modernization, government energy programs, hydrogen and fuel cells, solar, transportation, water, and wind, we stop at nothing to push the boundaries of what is possible.





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