

# Transforming **ENERGY**



# At the National Renewable Energy Laboratory (NREL), we are transforming the way America thinks about energy.

Energy innovations have created jobs, boosted economic growth, and strengthened energy security.

**Energy.** It is the very fabric of our lives. Flip a switch and our home illuminates. At the touch of a button, we can travel to our next destination. We sometimes take for granted that our goods, products, and services are all enabled by energy. Our nation's energy supply is in the midst of a remarkable transformation that includes more diverse energy options than ever before, improved efficiencies, and a more advanced energy grid to meet changing consumer demands. The impact? Consumers are enjoying lower energy bills by spending less than 4% of household income on energy, the lowest percentage on record. Every single state in America has benefited from this transformation.



NREL was established to advance renewable energy technologies as a commercially viable option.



# We are advanced energy **leaders.**

From the start, NREL's leadership in 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 our 40-plus years, NREL scientists have been awarded more than 60 R&D 100 Awards, known as the "Oscars of Innovation." Our groundbreaking advanced 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  
Wind  
Water



### Sustainable Transportation

Bioenergy  
Hydrogen and Fuel Cells  
Vehicles and Transportation Systems



### Energy Efficiency

Advanced Manufacturing  
Buildings



### Energy Systems Integration

Multi-Pathway Systems Integration  
Grid Modernization





NREL's knowledge and innovations provide the foundational scientific advancements that shape our energy future and lead to commercial solutions that allow consumers to efficiently and affordably tap a broad range of reliable, secure, and sustainable energy resources.

# Transforming energy through **analysis** and **integration**.

We don't stop at energy R&D. For our scientific and technological advances to have market impact, we are continually looking ahead to understand how advanced energy options can fit into a much larger picture. Transformation occurs by anticipating and responding to energy megatrends. Our thought leaders focus on trends in these areas and more:

## Insightful Analysis

Understanding the opportunity of integrated energy systems requires thoughtful consideration. Determining the potential cost to manufacture new types of solar cells, batteries, or biofuels is something industry needs to know before embracing these devices and bringing them to market. Our techno-economic analysis team provides this information and more.

## Systems-Driven Science and Engineering

A systems perspective focuses our research on delivering knowledge and innovations that are relevant to suppliers as well as users of energy technologies and services.



## We are transforming energy through **partnerships.**

Creating sustainable, transformational change is not an easy job—and we know we can't do it alone. That's why NREL partners with a diverse range of businesses and organizations. 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.



**817** active partnerships with industry, universities, foundations, and governments



**550** patents for NREL technologies to date



**R&D 100 Awards**  
**63**



**Research Investment** exceeded **\$410** million in business volume in Fiscal Year 2018

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.

During the past four decades, we've 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 your job done.

**“In partnership with NREL, we have sown the first seed for the series of technological innovations that is going to change how we manage electrical power.”**

Ram Ramakrishnan,  
executive vice president and chief  
technology officer for Eaton





**2,400**  
full- and part-time  
employees



**25%** of staff are early-  
career researchers and  
visiting scientists

## We are transforming energy through our **people.**

Our passionate people are 100% committed to changing the world every single day. NREL is a rich, cultural melting pot that enables many voices and levels of experience to collaboratively solve problems that come our way. And while passion is one thing, credentials are another. Our academic degrees outnumber our staff, and our researchers typically publish more than 1,000 publications a year. Our scientific innovation and excellence has resulted in more than 550 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 campus. Many of the high-performance buildings on NREL's main campus in Golden, Colorado, have achieved Leadership in Energy and Environmental Design (LEED) and/or net-zero energy status. NREL's Science and Technology Facility was the first federal laboratory building in the nation to achieve LEED Platinum certification.

Additionally, our Research Support Facility is one of the world's largest energy-efficient office buildings; and what we've learned here has been applied to more than 50 new buildings across the United States. Incorporating cost-effective design approaches that maximize the use of energy efficiency and renewable energy technologies has positioned these buildings as models for energy use and sustainability.



## Campus Size

Two campuses totaling **632** acres in Golden and Boulder, Colorado



## World-class facilities

open to entrepreneurs, engineers, scientists, and universities



## Publications

More than 1,000 scientific and technical materials published annually



Nationwide economic impact exceeded **\$1 billion** in 2017

# 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) 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 technology to market, innovation for positive societal impact is at the core of our work. With programs to advance research and technologies in geothermal, water, wind, solar, bioenergy, hydrogen and fuel cells, transportation, advanced manufacturing, buildings, computational science, energy systems integration, grid modernization, government energy programs, and energy analysis, we stop at nothing to push the boundaries of what's possible.





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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

NREL/BR-6A42-72156 • May 2019

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