

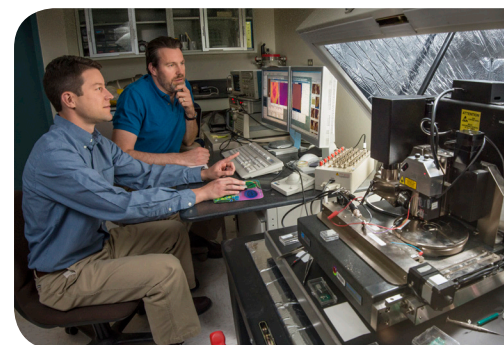
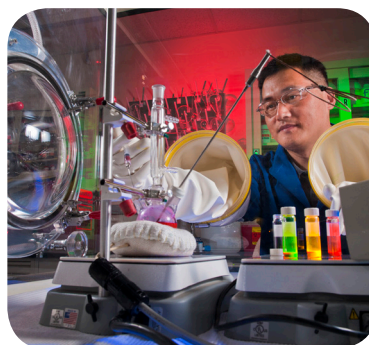
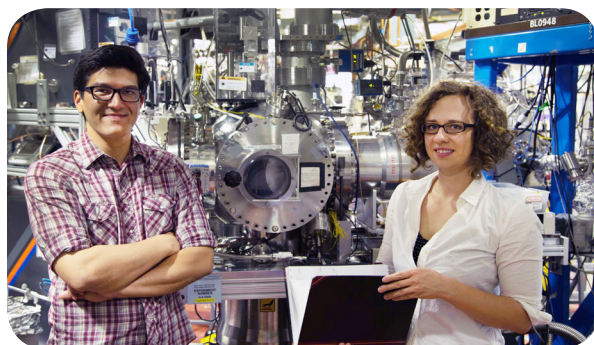
Exceptional service in the national interest



Secure and Sustainable Energy Future

Our nation's need for secure, economic, and reliable sources of energy has never been more acute, while our global future hinges on the ability to produce and use energy with minimal environmental impact. Meeting these goals will rely on sound technical advances—such as those provided by Sandia National Laboratories since the first Energy Crisis of the 1970s. Answering the current need, Sandia has channeled its immense expertise and resources into three focus areas to create the knowledge and innovations critical to a secure and sustainable energy future:

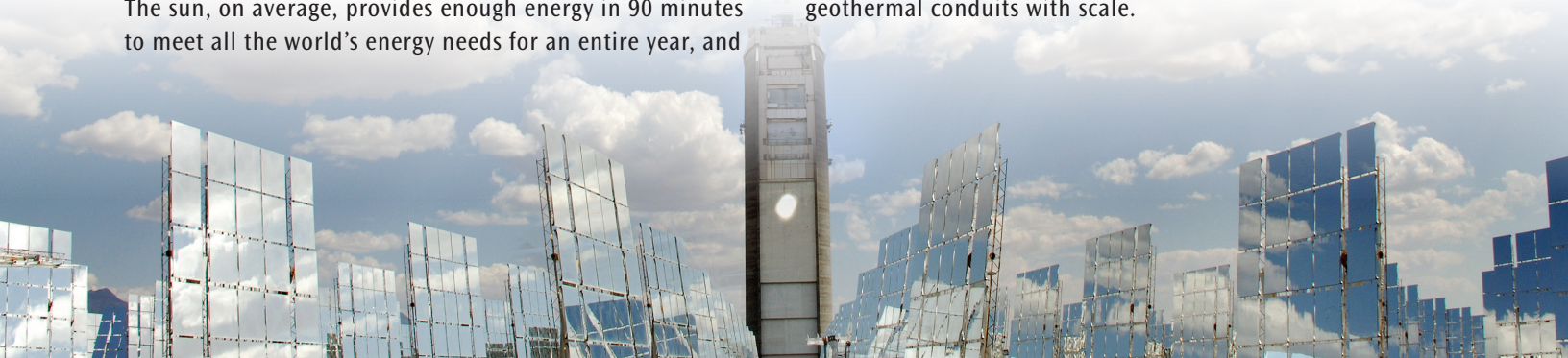
- **Stationary Power:** Contributing to the long-term process of modernizing the nation's stationary power infrastructure, Sandia is pursuing work in smart grid and microgrids, renewable energy, energy storage and other key areas needed to create the power grid of the future while protecting the current system against multiple vulnerabilities.
- **Climate and Earth Systems:** Intent on ensuring that the Earth can support stationary and transportation energy systems and mitigating the environmental effects of these systems, Sandia is advancing advance climate solutions and developing knowledge to inform US policy on climate change and its impacts.
- **Transportation Energy:** Sandia is leveraging its long-standing industry and academic partnerships and extensive R&D capabilities in such areas as gas-phase chemical physics, materials science, systems biology, and computational modeling and simulation to accelerate the transition to a sustainable transportation system, which requires shrinking the product-development cycle while developing alternative fuels and aggressively expanding the alternative fuel infrastructure.



Sandia's rich history in energy research started with the national push for energy independence in the 1970s. Since then, Sandia has led research and development at all levels of energy generation, distribution and storage. Today, Sandia houses innovative programs in geothermal, water, nuclear, biomass, fuel cells, hydrogen and energy storage resources, as well as solar and wind.

The sun, on average, provides enough energy in 90 minutes to meet all the world's energy needs for an entire year, and

Sandia is finding new ways to harness that energy, using both photovoltaic solar panels and concentrating solar power, in which mirrors focus the sun's rays onto a receiver. Sandia is conducting applied research to improve wind turbine performance and reliability, while lowering costs. Geothermal energy is a vast U.S. resource, largely untapped due to cost. Sandia is developing new drilling techniques to reach this energy source, and finding solutions to the clogging of geothermal conduits with scale.



Inconstant supply is another challenge Sandia is addressing. While a coal plant produces a steady source of heat at a nearly constant temperature, clouds interrupt solar power and the wind doesn't always blow. Incorporating fluctuating power into the grid without overloads or shortages is essential to increased use of renewable energy. Sandia scientists and engineers are capitalizing on the Labs leadership in systems engineering to incorporate variable energy sources into the grid. Looking ahead, Sandia researchers are enhancing technologies for energy storage and modernizing the grid. Sandia is also discovering ways to secure the nation's aging, vulnerable and fragile electric grid, while building in resilience in the event of natural or man-made power disruptions.

Sandia is working closely with industry to find new and imaginative energy solutions. Sandia's Solar Glare Hazard Analysis Tool (SGHAT), winner of the R&D 100 Award, is an innovative web-based tool that can quickly identify and calculate the hazards of solar glare. Another program seeks to harness the incredible power of ocean waves, tides and river currents. Sandia's world-renowned Battery Abuse Testing Laboratory rigorously evaluates the safety and reliability of batteries for the growing electric and plug-in hybrid electric vehicle market. And, the Small Modular Reactor program is developing small-scale nuclear reactors that can be shipped safely to military bases or developing countries to quickly provide electricity without building extensive power lines. These efforts, along with countless others, are paving the way to a cleaner and more affordable energy future.

Energy is critical to national security and economic health, but access to water is just as important. The two are inextricably linked: harvesting energy requires abundant water, while water needs readily available, low-cost energy for treatment and distribution. The nation's ability to provide both faces mounting challenges that Sandia seeks to solve.

Technologies developed at Sandia are helping the U.S. emerge as a global leader in the export and deployment of clean, affordable and secure energy solutions while improving the quality of life for people around the world.

Learn more by visiting energy.sandia.gov

