

Energy and Engineering Sciences



The Energy and Engineering Sciences Directorate at Oak Ridge National Laboratory conducts applied research and development programs that directly contribute to national goals of increasing energy production, improving energy transmission, and reducing energy consumption. These three goals form the foundation of a secure energy and environmental future.

Researchers in the Directorate are solving big and difficult problems. What are the consequences of climate change? How can we stabilize carbon dioxide? How will we power U.S. and world economies in a carbon-constrained world? What sort of energy distribution will we need? Scientists and engineers work together to address these and other concerns relating to a most fundamental need of modern societies and economies—energy.

The EES Directorate is organized into several *divisions* and *programs*. *Divisions* are discipline-focused organizations that provide the resources – staff, facilities, and supporting management – needed to accomplish research and development. *Programs* are customer-focused organizations that coordinate multidisciplinary projects, drawing resources from divisions across the Laboratory.

The *Engineering Science and Technology Division* performs research in a broad range of engineering fields, comprising industrial energy efficiency; building envelopes and equipment; combined cooling, heating, and power; solar energy applications; sensors, electronics, and signal analysis; robotics and energetic systems; power electronics; fuels, engines, and emissions; and transportation systems.

The *Fusion Energy Division* conducts research in nearly all areas of magnetic fusion energy development: plasma production and heating technologies, plasma fueling, magnetics, and plasma theory. Division staff are developing the understanding required for an attractive fusion energy source, and pursuing near-term applications of plasma science and technology, for example, high-temperature superconductivity.

The ***Nuclear Science and Technology Division*** addresses critical issues in the national and global nuclear community through application of computational and experimental modeling and experience with operating nuclear systems. The Division performs basic and applied research in nuclear systems analysis, design, and safety; medical, industrial, and research isotopes; nuclear fuels and materials; and nuclear security technologies.

The ***Energy Efficiency and Renewable Energy Program*** develops sustainable energy technologies to expand energy resource options and improve efficiency in energy production and use. Research focus areas include distributed energy, industrial energy efficiency, buildings and building equipment, and renewable energy resources including hydrogen, solar energy, biomass, and hydropower.

The ***Fossil Energy Program*** develops innovative solutions in coal, oil, and gas technologies. Research focuses on exploration and production issues, development of materials and processes for gas separation systems, carbon sequestration technologies, and materials for advanced fossil-fuel power plants.

The ***Nuclear Non-Proliferation Program*** develops technologies supporting the development and implementation of domestic and international policy aimed at reducing threats to the United States from weapons of mass destruction. The primary focus is reducing the proliferation of nuclear materials and weapons.

The ***Nuclear Technology Program*** coordinates research and development projects in advanced reactor and fuel cycle technologies, space power systems, heavy element and isotope production and distribution, enrichment technology, and the transport and storage of radioactive waste and spent nuclear fuel.

The ***Transportation Program*** develops technologies to address environmental concerns and reduce transportation petroleum use, while enabling the kinds of vehicles that Americans need and want. Research focus areas include combustion, propulsion systems, fuels, materials, power electronics and electric machines, and modeling that provides science-based input to informed policy decision-makers.

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