

## Energy Sciences at Brookhaven

### *Fueling the Future*

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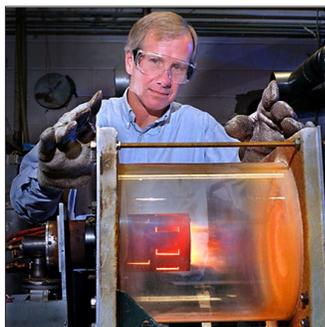
Research in energy sciences and technology at the U.S. Department of Energy's Brookhaven National Laboratory supports DOE's theme of "Reliable, Affordable, and Environmentally Sound Energy for America's Future."

In applying biochemical processes to energy production, Brookhaven is addressing the nation's need to reduce environmental contaminants associated with energy production. Technologies are being developed to recover valuable minerals from brines from geothermal power production. Researchers have also applied biochemical processes to upgrade heavy crude oils.

Geoscience activities include geochemical studies of organic sulfur in marine sediments and three-dimensional imaging of core samples from oil drilling, leading to an improved understanding of the origins and properties of oil reservoirs. Others involve identifying impurities in combustion products and developing advanced materials coatings.

Related to transportation, Brookhaven is developing a wide range of technologies for natural-gas and hydrogen vehicle storage systems. Researchers are also designing an efficient catalyst for converting remote natural gas to methanol, a non-petroleum feedstock.

In the area of heating equipment, Brookhaven is developing an advanced oil burner system that offers increased efficiency and reduced air pollution emissions relative to conventional burners. This concept will be used in



Brookhaven's Tom Butcher with an advanced oil burner system.

residential appliances, and is also the centerpiece of a novel thermophotovoltaic system for electric power generation.

Brookhaven scientists are also researching advanced, clean liquid fuels, such as heating oil, with ultra-low sulfur and nitrogen contents, as well as liquid biofuels. Work

focused on energy conservation includes the development of advanced heating equipment and improved heating distribution systems in buildings.

Research into advanced battery systems includes exploratory work on low-cost lithium-ion battery materials. Basic research is also under way on electrochemical reactions with application to batteries, fuel cells, and electrochemical sensors.

Cogeneration of heat and electric power is currently seen as an important option for achieving large gains in energy efficiency, and is being considered even for the individual home. In this area, Brookhaven is now serving as a host site for the demonstration of integrated thermal technologies such as microturbines, absorption chillers, and fuel cells.

New programs in environmental technologies address the physical and chemical sciences associated with waste management and contaminated sediments.

For more information on Brookhaven's cutting-edge energy programs, go to <http://www.bnl.gov/est/> on the World Wide Web.

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Brookhaven scientists have devised advanced grouting that may ease geothermal energy production.