

PROGRAM facts

Power Systems
Advanced Research

05/2007

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY



HISTORICALLY BLACK COLLEGES AND UNIVERSITIES AND OTHER MINORITY INSTITUTIONS (HBCU/OMI) PROGRAM GRANTS

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Description

In 1984–1985, the U.S. Department of Energy (DOE) established a program of research grants to Historically Black Colleges and Universities and Other Minority Institutions (HBCU/OMI). Carried out by the National Energy Technology Laboratory (NETL) under the Office of Fossil Energy (FE) of DOE, the HBCU/OMI program provides a mechanism for fostering cooperative research into fundamental and advanced concepts related to the science of fossil energy resources among participating academic institutions, industry participants, and Federal agencies. The program gives students and faculty hands-on experience in developing technologies to promote the efficient and environmentally safe use of coal, oil, and natural gas. Minority participation helps produce the next generation of scientists and engineers with diverse backgrounds, helping ensure a future supply of technically competent U.S. managers, scientists, engineers, and technicians from previously under-utilized resources.

By increasing collaborative opportunities to perform fundamental and applied scientific research, the HBCU/OMI program also supports DOE's Strategic Plan: promote America's energy security through reliable, clean, and affordable energy; strengthen U.S. scientific discovery and economic competitiveness; and improve the quality of life through innovations in science and technology.

Advanced Research — To support coal and power systems development, NETL's Advanced Research Program conducts a range of pre-competitive research focused on breakthroughs in materials and processes, coal utilization science, sensors and controls, computational energy science, and bioprocessing — opening new avenues to gains in power plant efficiency, reliability, and environmental quality. NETL also sponsors cooperative educational initiatives in University Coal Research, Historically Black Colleges and Universities, and Other Minority Institutions.



RECENT GRANT RECIPIENTS

2006 Grants

University of Puerto Rico

at Mayaguez, Mayaguez, PR — Design and fabrication of wireless, battery-free sensors for high-temperature environments to measure temperature, pressure, and carbon dioxide concentration.

Florida International

University, Miami, FL — Development of an experimental technique for measurement of the gas-solids flow, especially cluster formation, in gasifiers or combustors.

Grambling State University,

Lincoln, LA — Production of a prototype membrane reactor for hydrogen production and separation at extreme conditions, and integration of a carbon dioxide separation unit.

University of Texas at

San Antonio, San Antonio, TX — Fabrication of low-temperature solid oxide fuel cells out of novel electrode and electrolyte materials, and determination of the structure-performance relationship of these materials.

2005 Grants

Florida International University,

Miami, FL — Recovery of high-viscosity crude oil from oil sands and tar sands by developing computer-based models that can predict the effects of solvent injection.

Program Areas

The HBCU/OMI program is organized into two elements:

Core Program — The HBCU/OMI program encourages grant applicants to focus on innovative research and development involving advanced concepts that are pertinent to fossil fuel conversion and utilization in areas that support NETL's technology lines. The core program stimulates collaborative efforts for improving prospective U.S. commercial capabilities, and enhances the scientific and technical understanding of chemical and physical processes involved in conversion and utilization of fossil fuels. These efforts will broaden potential utilization of fossil energy resources and provide technological benefits for the U.S. commercial sector and the American consumer.

Symposium — Held jointly with the University Coal Research (UCR) program as part of an annual program review, the symposium promotes the exchange of scientific and engineering information to enhance the educational training and research capabilities of participants, as well as stimulate interest in these programs by others in the fields of science, engineering, and technical management.



“Tapping the creativity and talents of America’s young scientists to investigate long-term solutions for clean and efficient use of our Nation’s abundant coal resources reiterates the Department’s commitment to overall basic science.”

- Jeffrey D. Jarrett,
Assistant Secretary for Fossil Energy

Core Research Areas

Program core research is organized under three technical areas:

Sensors and Controls — Control system development is viewed as an important enabling technology for the commercial deployment of advanced power generation systems. Topics of current interest include:

- Robust Sensor Networks for Intelligent Control of Advanced Coal Combustion/Gasification Processes
- Novel Sensor Systems for Meeting the Objectives of DOE's Deep Trek Program for Well Penetration Below 15,000 Feet
- Air Emission Sensors, Controls, and Modeling for Oil and Gas Resources

Computational Energy Sciences — Work may be proposed in areas such as the development of theory and advanced computational models, gathering of experimental data from physical systems or molecular dynamics simulations, and the validation of the models. Topics of current interest include:

- Multiphase Flow Simulation of Gas-Solids Flows
- Advanced Diagnostics for Gas-Solids Flow Systems
- Dynamic Simulation and Advanced Process Control of Integrated Gasification Combined Cycle (IGCC) Plants

Advanced Materials — New materials are required to significantly improve performance and reduce costs of existing and/or advanced coal-based power systems. Topics of current interest include:

- Experimental Studies for Development of High-Temperature Structural Materials
- Experimental Studies for Development of Functional Materials
- Advanced Materials for Gas Turbine Coatings for Use in High-Hydrogen Fuel Applications

RECENT GRANT RECIPIENTS

2005 Grants (cont.)

Hampton University, Hampton, VA — Development of an economically viable, iron-based catalyst to promote the conversion of carbon monoxide and hydrogen derived from fossil fuels into a wide variety of products for industrial use.

Morgan State University, Baltimore, MD — Development of laser instrumentation for monitoring and controlling the flow of solids in coal-fired boilers.

North Carolina A&T State University, Greensboro, NC — Use of recent nanotechnology advances to further develop oxygen-selective membrane materials for the production of high-grade, oxygen-rich gas streams suitable for use in coal combustion and gasification.

Prairie View A&M University, Prairie View, TX — Review of methane hydrate research programs worldwide to determine their goals, achievements, funding, and future direction; and to help identify opportunities to increase international collaboration.

University of Texas, El Paso, TX — Exploratory research to investigate flame synthesis techniques to produce cost-effective carbon nanotubes from low-heating-value gases that could be used as sensors, gas storage media, or high-temperature materials.

Recent Awards

The 10 grant projects listed to the left are those most recently awarded under the HBCU/OMI program. Project durations vary from 12 months to 36 months. The projects shown represent a total of \$1,715,020 in NETL awards, in addition to matching funds from a number of the participating institutions (typically, less than one-fourth of the total grant).



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Additional details on each of the projects included in the program can be found on the Department of Energy's Fossil Energy website at:

<http://www.fe.doe.gov/techline/techlines/index.html>