

# PROGRAM facts

Power Systems  
Advanced Research

6/2007

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



## DOE-WRI JOINTLY SPONSORED RESEARCH PROGRAM ON ENERGY-RELATED TOPICS

### CONTACTS

#### **Kamalendu Das**

Project Manager  
Gasification and Combustion  
Projects Division  
National Energy Technology  
Laboratory  
3610 Collins Ferry Road  
P.O. Box 880  
Morgantown, WV 26507  
304-285-4065  
kamal.das@netl.doe.gov

#### **Robert R. Romanosky**

Technology Manager  
Advanced Research  
National Energy Technology  
Laboratory  
3610 Collins Ferry Road  
P.O. Box 880  
Morgantown, WV 26507  
304-285-4721  
robert.romanosky@netl.doe.gov

#### **Vijay K. Sethi**

Western Research Institute  
365 North 9th Street  
P.O. Box 3395  
Laramie, WY 82072-3380  
307-721-2376  
vsethi@uwyo.edu  
<http://wri.uwyo.edu/>

### Description

For over two decades, the University of Wyoming Research Corporation — doing business as the Western Research Institute (WRI) — has been supporting the U.S. Department of Energy (DOE) Office of Fossil Energy (FE) and its mission of developing fossil energy and related environmental technologies. The funding for these research efforts has generally been provided through congressionally mandated cooperative agreements, with the DOE's National Energy Technology Laboratory (NETL) overseeing program efforts. For this purpose, there are two current types of cooperative agreements: the Base Program, which is fully funded by federal money, and the Jointly Sponsored Research (JSR) Program, which requires at least 50 percent cost-sharing by non-federal sources.

Under the Base Program, WRI performs research on fossil energy-related topics to provide fundamental new insights for developing future technologies. Base Program projects develop ideas to a level promising enough to attract commercial co-sponsors for further development and commercialization under the JSR Program. In many instances, a potential JSR co-sponsor has been identified, but additional laboratory or bench-scale data are necessary to assess the utility of the technology prior to co-sponsor investment.

Under the JSR Program, WRI utilizes its expertise — in particular, that derived from the Base Program — to attract commercial co-sponsors and continue developing future technologies in the U.S. energy sector. Participants in each project are committed to develop, commercialize, and deploy technologies of value to the nation's energy industry. Involvement of an industrial partner in the program focuses on fostering commercialization, and defines the pertinent research to be undertaken to ensure relevancy of the research, and commitment to commercialize the technology in the most expeditious way.

**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.



## PROJECT DURATION

Start Date  
04/10/98  
End Date  
04/09/08

## COST

Total Project Value  
\$50,953,544  
DOE/Non-DOE Share  
\$23,202,579 / \$27,750,965

WRI is a not-for-profit research and technology development organization. WRI is developing the coal technologies of the future, including coal conversion; providing support to the coal and utility industries in Wyoming; and delivering research and technology services for the oil and gas industry, including coal bed methane. WRI is the University of Wyoming's School of Energy Resources public outreach partner. Among its many facilities, WRI's Combustion Test Facility (CTF) is a pilot-scale coal furnace that simulates a pulverized coal-fired utility boiler. The CTF is ideal for testing emissions, emission control equipment and strategies, and power plant configurations. The system affords great flexibility, and WRI personnel offer extensive power generation expertise and testing support.

## JSR Program Goals

JSR Program efforts are designed to support and further efforts under the Base Program in achieving the following goals:

- Increase production of U.S. energy resources
- Enhance competitiveness of U.S. technologies
- Reduce dependence on foreign energy supplies and strengthen national and regional economies and
- Minimize environmental impacts of energy production and utilization



WRI's 22-acre Advanced Technology Center provides offices, laboratories, shops, and large-scale pilot facilities just outside Laramie, Wyoming.

## Major Technology Areas

The goals of the JSR and Base programs are accomplished by focusing RD&D and commercialization in three major technology areas:

- *The Energy Program* emphasizes increased production and utilization of domestic energy resources, and includes improved oil and gas recovery, coal beneficiation and upgrading, coal bed methane recovery, and renewable energy resources.
- *The Environmental Program* attempts to minimize adverse effects of energy production and utilization activities by providing technologies to clean underground oily wastes, remediate and recover oil from tank bottom wastes, mitigate acid mine drainage, and demonstrate uses for solid wastes from clean coal technologies.

- *The Technology Enhancement Program* encompasses resource characterization, development or improvement of environmental monitors and sensors, and development of predictive techniques.

Interactions between the JSR and Base programs are dynamic and continuous, since commercialization of promising new technologies is the driving force for both. The Base Program explores innovative concepts that will attract industrial co-sponsors for continued development under the JSR Program. It is intended that Base projects move to the JSR stage, where the objective is to develop and demonstrate the technology sufficiently for sound and prudent commercialization decisions to be made.

Technology development is crucial to the preservation and growth of the American economy and standard of living. Much of this technology and growth will come from companies that were small or nonexistent just a decade ago. Unlike large multinational companies with internal R&D facilities, these companies must rely on creative and innovative contractors such as WRI to assist with their process and product development activities. Activities such as the WRI cooperative agreement programs meet this crucial national need.



*WRI's pilot-scale CTF is ideally suited for flexible testing of coals and combustion processes.*

Additional information about Advanced Research may be found on the Department of Energy's Office of Fossil Energy Web site at:

<http://www.fossil.energy.gov/programs/powersystems/advresearch/index.html>

## Current Active Projects

Over the life of the JSR program, WRI has initiated some 75 tasks requiring at least 50 percent matching funding. The DOE funding of \$22 million for these projects has been matched by another \$25 million in non-federal cost-share funding. The majority of the demonstrations take place at WRI, although some may take place at various sites around the United States and in some foreign countries. Current active JSR projects include:

- Validation of a New Soil Volatile Organic Compound (VOC) Sampler
- Ash-Based Building Panels Production

## ADDRESS

### National Energy Technology Laboratory

1450 Queen Avenue SW  
Albany, OR 97321-2198  
541-967-5892

2175 University Avenue South  
Suite 201  
Fairbanks, AK 99709  
907-452-2559

3610 Collins Ferry Road  
P.O. Box 880  
Morgantown, WV 26507-0880  
304-285-4764

626 Cochrans Mill Road  
P.O. Box 10940  
Pittsburgh, PA 15236-0940  
412-386-4687

One West Third Street,  
Suite 1400  
Tulsa, OK 74103-3519  
918-699-2000

## CUSTOMER SERVICE

1-800-553-7681

## WEBSITE

[www.netl.doe.gov](http://www.netl.doe.gov)

- Emissions Monitoring and Control of Mercury from Subbituminous Coal-Fired Power Plants
- Combination Reforming of Methane/CO<sub>2</sub> to Produce Syngas for Conversion to Liquid Fuels
- Thermal Precombustion Mercury Removal Process for Low-Rank Coal-Fired Power Plants
- Production of Substitute Natural Gas from Coal
- In-situ Treatment of Acid Mine Drainage Using a Bio-Organic Oxygen Elimination Treatment Technique
- Development of the WRITE Process for Pipeline Ready Heavy Oil
- Production of Ethanol-Based Fuels from Natural Gas
- Mercury Calibration System
- Advanced Oxidation Technologies in Treating Methyl Tertiary Butyl Ether and Gasoline Contaminants
- Mercury Continuous Emission Monitoring Calibration
- Novel Integrated Process to Produce Fuels from Coal and Other Carbonaceous Feedstocks
- Halogenated VOC Field Screening
- Assessments of Environmental Impacts and Beneficial Use of Coal Bed Methane Produced Water in the Powder River Basin
- Enhanced Oil Recovery Tracer Measurement
- Corrosion Effects of Calcium Chloride Injection for Mercury Control on the Pollution Control Equipment
- Novel Sorption/Desorption Process for CO<sub>2</sub> Capture (Feasibility Study)
- Evaluation of Oil Shale's Multipollutant Reduction Capability

## Accomplishments

The JSR Program at WRI continues to be highly successful and strongly supported by WRI's industrial clientele. All of the available DOE funding for each of the first nine years has been committed to projects, and the demand for funds continues to outstrip available monies.

WRI continues to solicit projects consistent with the program goals. In particular, these projects include energy programs that emphasize enhanced oil recovery, coal beneficiation and upgrading, coal bed methane recovery, and the utilization of renewable energy resources. Environmental activities emphasize cleaning underground oily wastes, mitigating acid mine drainage, and demonstrating uses for solid waste from clean coal technology, pressurized fluidized-bed combustion, and other similar advanced combustion systems. Technology enhancement activities include resource characterization studies, and improved environmental monitors and sensors. Favored projects are those that contribute to the enhanced competitiveness of U.S. technology, increased production of domestic resources, and reduced environmental impacts associated with energy production and utilization.