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DEVELOPING WORKING PARTNERSHIPS

LEVERAGES AND ENHANCES  
GOVERNMENT RESEARCH DOLLARS

EFFICIENT ENERGY TECHNOLOGIES

RESEARCH AND DEVELOPMENT  
PROGRAMS, OPPORTUNITIES FOR  
TECHNOLOGY COMMERCIALIZATION

11 CENTERS OF EXCELLENCE  
WORLD-CLASS

ENVIRONMENTAL TECHNOLOGIES  
TO PROTECT AND CLEAN OUR  
AIR, WATER, AND SOIL

INDUSTRY, GOVERNMENT, AND THE  
RESEARCH COMMUNITY

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***Energy & Environmental Research Center (EERC)...***

The International Center for Applied Energy Technology<sup>SM</sup>



# WORLD - CLASS

The Energy & Environmental Research Center (EERC) is an applied research, development, demonstration, and commercialization facility located in Grand Forks, North Dakota, recognized as one of the world's leading developers of cleaner, more efficient energy technologies as well as environmental technologies to protect and clean our air, water, and soil.

The EERC, a high-tech, nonprofit division of the University of North Dakota (UND), operates like a business and pursues an entrepreneurial, market-driven approach to research and development in order to successfully demonstrate and commercialize innovative technologies.

## EERC Philosophy

*Today, the EERC leverages and enhances government research dollars by developing working partnerships with industry, government, and the research community. By fostering private sector partnerships at the start of research and development programs, opportunities for technology commercialization are dramatically enhanced.*



## Keys to Success

- A unique culture
- A practical problem-solving approach that consistently meets client needs
- A willingness to assume risk
- A commitment to commercializing innovative technologies
- A working environment that provides the freedom to pursue promising opportunities
- A dedication to building partnerships with the private sector, government, and the research community
- A commitment to excellence

## EERC Professionals

The EERC employs an exceptionally talented and diverse group of people whose work attracts business from around the world. Currently, the EERC has total employment of over 330 in-house scientists, engineers, and support personnel, including 20 full-time-equivalent employees supported elsewhere on the UND campus.

Altogether, our employees have 123 different areas of expertise.



“The EERC is a first-class organization, with highly motivated and experienced professionals and technicians.... One of the best—or the best—R&D facilities in the United States and World...”

—U.S. Department of Energy evaluation report

## DEVELOPING WORKING PARTNERSHIPS



### EERC Quick Facts: FY09

- Total research portfolio: **\$236.9** million
- Funded dollars: **\$43.9** million
- EERC research represents about **55%** of the total externally funded research at UND based on dollar value.
- Total active contracts: **341**
- **94%** of contracts were with nonfederal entities
- **88%** of contracts were with private industry
- Total employees over **330**
- Total clients: **1074**
- Total Web site hits in FY09: **16.9** million
- Average visitors a year: **2000**



## Global Partnerships

The EERC is international in scope. It has established working relationships with organizations from all corners of the globe and attracted them to the Grand Forks area. Since 1987, the EERC has had nearly 1100 clients in 51 countries and 50 states, involving individual contracts and multiclient consortia with private industry, federal and state agencies, and academic institutions. Several companies have corporate offices at the EERC.



## EERC Program Areas

The EERC's primary areas of focus are highly interrelated, giving the EERC the ability to approach a problem in a multidisciplinary manner, employing multiple focus areas and quickly crafting teams to solve the problems.

### **Advanced Power and Energy Systems**

Improving the efficiency and environmental performance of electrical power systems, creating advanced materials for the energy sector, developing technologies for remote power generation, and developing and demonstrating zero emission and water use minimization technologies.

### **Energy Conversion System Optimization**

More than 50 years' experience researching and developing innovative energy technologies, leading the world in research and development of coal (special emphasis on low-rank coal), and improving the performance of coal-fired power plants.

### **Environmental Chemistry**

Decontaminating and disposing of contaminated equipment; removing toxic contaminants from soil and water; creating flavor, fragrance, and pharmaceutical compounds; and destroying explosives.

### **Environmental Control Technologies**

Leading the world in clean air technologies, including the reduction of emissions from stationary and mobile sources worldwide ( $\text{SO}_x$ ,  $\text{NO}_x$ , particulates,  $\text{CO}_2$ , and toxic metal control) and the measurement and control of mercury in air, soil, and water.

### **Fossil Energy Resources (oil, gas, and coal)**

Over five decades of practical field and laboratory experience in oil- and gas-related fields; understanding the physical, chemical, and mineralogical nature of coal; and developing specialized value-added products from coal, plastic wastes, and other lower-cost carbon sources.

ENVIRONMENTAL  
TECHNOLOGIES  
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“... the road to energy independence runs right through Grand Forks and up to the front doors of the EERC.”

—U.S. Senator Byron Dorgan

# LEVERAGES AND ENHANCES GOVERNMENT RESEARCH DOLLARS

## **Hydrogen Production and Distribution and Fuel Cell Technology**

Developing new technologies to produce high-quality hydrogen from coal, biomass, and wind for fuel cell use; patenting innovative technology for on-demand hydrogen and battlefield hydrogen (JP-8); and demonstrating hydrogen fuel cell-powered vehicles.

## **Renewable Energy**

Developing and demonstrating biomass utilization for power generation; demonstrating wind energy technologies; promoting the use of alternative transportation fuels such as reformulated gasoline, cellulosic ethanol, and biodiesel; and developing and testing advanced tactical fuels from renewable sources for the U.S. military.

## **Waste Utilization, Management, and Site Remediation**

Cleaning up contaminated groundwater plumes, mixed wastes, and landfills; developing environmentally friendly, commercially viable uses for coal ash from power plants; and providing innovative strategies for wastewater treatment from industrial processes.

## **Water Management (availability, contaminant remediation, and flood and drought protection)**

Providing solutions to water supply and water quality issues using a basinwide approach, demonstrating flood protection and mitigation solutions, conducting groundwater research, and working toward energy and water sustainability



## EERC History

- 1951** – Founded as the U.S. Bureau of Mines Robertson Lignite Research Laboratory.
- 1977** – Becomes a Federal Energy Technology Center under the U.S. Department of Energy.
- 1983** – Defederalized and becomes the University of North Dakota Energy Research Center.
- 1989** – Renamed the University of North Dakota Energy & Environmental Research Center.
- 1994** – Completes \$7.6 million expansion of labs and pilot plant facilities.
- 1997** – April flooding of the Red River forces the EERC to close for 20 days, EERC flood damages estimated at \$40 million to \$45 million in lost equipment and business.
- 1998** – EERC laboratories damaged in flood become fully operational.
- 1999** – Annual contract awards exceed \$11 million.
- 2000** – Annual contract awards exceed \$15 million.
- 2001** – Celebrates 50 years of innovative, applied energy and environmental research.
- 2002** – Breaks ground on \$8 million expansion and renovation.
- 2003** – Opens 47,000-square-foot expansion and renovation project.
- 2004** – Contract awards exceed \$26.5 million.
- 2005** – Contract awards total \$29 million.
- 2006** – Contract awards exceed \$45 million (fourth consecutive record-breaking year). Breaks ground for new 15,000-square-foot hydrogen facility.
- 2007** – Proposal number exceeds 300, valued at over \$138 million.
- 2008** – Contract awards exceed \$95 million. Dedicates hydrogen facility.
- 2009** – EERC achieves sixth consecutive record year. Contract portfolio exceeds \$236 million.



EFFICIENT  
ENERGY  
TECHNOLOGIES



## Centers of Excellence

Out of the EERC program areas, 11 Centers of Excellence have been established. The Centers of Excellence lead the world in developing advanced energy systems and the prevention and cleanup of air, water, and soil pollution. The Centers were initiated to provide solutions to strategic energy and environmental issues and have received national and/or international recognition as leaders in their respective topic areas:

1. Coal Utilization Technologies Center
2. Emission Control Technologies Center
3. National Center for Hydrogen Technology (NCHT)
4. Center for Climate Change and Carbon Capture and Storage
5. Center for Air Toxic Metals® (CATM®)
6. Centers for Renewable Energy and Biomass Utilization
7. Water Management Center
8. National Alternative Fuels Center
9. Center for Oil and Gas
10. Great Plains Applied Energy Technology Center<sup>SM</sup>
11. Center for Environmental Chemistry and Reclamation



# 11 CENTERS OF EXCELLENCE

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