



**EERC**

*Energy & Environmental Research Center*

*Putting Research into Practice*

**UND** University of  
North Dakota  
Grand Forks



**T**he Energy & Environmental Research Center (EERC) is a research, development, demonstration, and commercialization facility at the University of North Dakota (UND) recognized internationally for its expertise in:

- Cleaner, more efficient energy technologies.
- Air, water, and soil pollution prevention.
- Water management.
- Waste management/remediation.
- Advanced power and energy systems.
- Renewable energy.
- Advanced analytical methods.
- Education and outreach.

### **EERC Philosophy**

The EERC emphasizes true working partnerships between private industry, government agencies, academic institutions, and the research community. By fostering private sector partnerships from the initiation of a research and development program, the opportunities for technology commercialization are dramatically enhanced.

### **EERC Keys to Success**

- A practical problem-solving approach that consistently meets client needs
- A willingness to assume risk
- A commitment to commercialize 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 unique culture
- Nine Centers of Excellence

### **EERC Quick Facts**

- Since 1987, more than 750 clients in all 50 states and 47 countries
- In FY03, 88% of contracts with nonfederal clients
- Multidisciplinary team of more than 260 highly skilled scientists, engineers, and support personnel
- Approximately one funding proposal sent out a day
- 297 active contracts in FY03

### **Education, Training, and Outreach**

The EERC has sponsored, organized, and collaborated on more than 50 world-class energy and environmental conferences.

The EERC also specializes in designing tailor-made outreach programs, including the following:

- Short courses
- Workshops
- Field experiences

*"Not only is the EERC working to develop and commercialize a range of new, innovative energy and environmental technologies, it understands how to work with industry." —Robert A. Bell, Vice President of Research and Development, Consolidated Edison Company of New York, Inc.*

*"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 the world . . . ."*  
—U.S. Department of Energy  
evaluation report





# EERC Program Areas

The EERC has at its foundation nine primary areas of focus as listed below. These nine 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 problem.

## Energy & Environmental Topics

### Advanced Power and Energy Systems

- Improvement of the efficiency and environmental performance of electrical power generation
- Advanced materials science
- Remote power generation
- Zero-emission technologies
- Water use minimization

### Energy Conversion System Optimization

- More than 50 years' experience in the research and development of innovative energy technologies
- The world's leading research and development center for coal, with special emphasis on low-rank coal
- Improved performance of coal-fired power plants and other electricity generation systems

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

- Understanding of the physical, chemical, and mineralogical nature of coal
- Over three decades of practical field and laboratory experience in oil- and gas-related fields
- Development of specialized value-added products from coal, plastic wastes, and other low-cost carbon sources

### Environmental Control Technologies

- A world leader in clean air technologies
- Reduction of the environmental impact of air pollutants at power plants and other sources worldwide ( $\text{SO}_x$ ,  $\text{NO}_x$ , particulates,  $\text{CO}_2$ , and toxic metals)
- Measurement and control of mercury in air, soil, and water

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

- Development of new technologies that convert fossil fuels, biomass, and other feedstocks to high-quality hydrogen for fuel cell use
- Innovative technology for on-demand hydrogen
- Advanced fuel cell system studies

### Renewable Energy

- Development and demonstration of biomass utilization for power generation
- Development and demonstration of wind energy technologies
- Development, demonstration, and promotion of the use of alternative transportation fuels such as reformulated gasoline, ethanol-based aviation fuel, and biodiesel

### Environmental Chemistry

- Definition and cleanup of contaminated groundwater plumes, mixed wastes, and landfills
- Decontamination and disposal of contaminated equipment
- Groundbreaking work for more than 18 years to understand the chemistry of water and  $\text{CO}_2$  under pressurized and heated (super- and subcritical) conditions. This technology removes toxic contaminants from soil and water and is also applied to flavor and fragrance compounds, pharmaceutical compounds, and the destruction of explosives.

### Waste Management/Remediation

- Contaminant cleanup and site remediation
- Development of environmentally friendly, commercially viable uses for coal ash from power plants
- Innovative strategies for wastewater treatment from industrial processes

### Water

- Solutions to water supply and water quality issues using a basinwide approach
- Flood protection and mitigation
- More than three decades of experience in groundwater research
- Energy and water sustainability

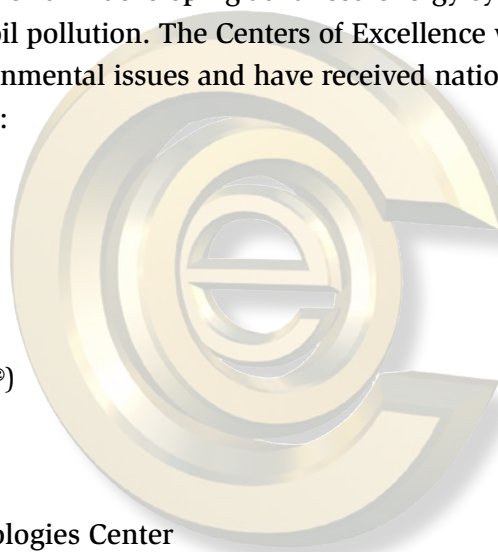


*The Advanced Hybrid™ filter, invented by EERC Senior Research Manager Stan Miller and licensed to W.L. Gore & Associates, Inc., is being demonstrated at Otter Tail Power Company's Big Stone Plant in South Dakota. The full-scale unit became operational October 25, 2002.*

# EERC Centers of Excellence

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

- Coal Utilization Technologies Center
- Center for Air Toxic Metals® (CATM®)
- Center for Biomass Utilization<sup>SM</sup> (CBU<sup>SM</sup>)
- Coal Ash Research Center
- National Alternative Fuels Laboratory® (NAFL®)
- Emission Control Technologies Center
- Water Management Center
- Supercritical and Subcritical Extraction Technologies Center
- Wind Energy Resources Center



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