

National Center for Hydrogen Technology

FOCUSED ON THE WORLD'S ENERGY NEEDS

EERC . . . The International Center for Applied Energy Technology®



A Unique Challenge...

Integrating Hydrogen into Our Everyday Lives

Hydrogen is envisioned to be the primary fuel of the future, strengthening the energy security of the United States. Hydrogen as fuel in a fuel cell, turbine, or combustion engine produces no harmful emissions, only water. Given the increase of instability caused by the world's insecure energy situation, the United States could have significant numbers of hydrogen cars on the road within 5 years. However, the reality is that, with the exception of only a few prototypes, much of the infrastructure for hydrogen does not exist and has not been demonstrated.

Significant advances have been made at the Energy & Environmental Research Center (EERC) to develop technologies dealing with the various aspects of hydrogen production, including generation, separation, purification, transportation, dispensing, and utilization. The challenge is to develop individual components, test various technologies, and put them to work from production through commercial deployment.

Meeting the Challenge

The EERC's National Center for Hydrogen Technology (NCHT) in Grand Forks, North Dakota, combines 60 years of expertise in hydrogen systems and is taking a lead role in developing, in concert with its industry and government partners, all aspects of the hydrogen economy. The EERC has a long history of developing, testing, and integrating technologies for production and utilization of hydrogen as a practical fuel. The EERC has built a world-class program using federal seed funding as a cornerstone for leveraging significant nonfederal cash cofunding. Currently, the NCHT program has over \$60 million in funded projects with more than 85 partners.



Hydrogen from Fossil Fuels

The EERC is conducting a suite of projects to overcome the technical issues associated with producing, cleaning, and utilizing hydrogen from natural gas, lignite coal, and other fossil resources (shown is the Great Plains Synfuels Plant – a model opportunity).



Hydrogen-Powered Fuel Cell Vehicles

The EERC teamed with ePower Synergies and Kraus Global to demonstrate a first-of-a-kind fuel cell ice refinisher, a Hyster fuel cell forklift, and a small-scale refueling system.



Battlefield Hydrogen (JP-8)

The EERC is developing an innovative hydrogen production and dispensing technology for the U.S. Department of Defense, which will be demonstrated at Grand Forks Air Force Base.



Hydrogen from Biomass

The EERC's biomass gasifier produces hydrogen-rich gas for use in a solid oxide fuel cell system.

Providing Real World Solutions Today...

The EERC operates comprehensive, world-class technology demonstration facilities and laboratories within its new \$3.5 million NCHT facility. The NCHT is leading the way to produce hydrogen from a variety of fossil and renewable fuels with a variety of technologies; test fuel cells in conjunction with a hydrogen production systems; develop a revolutionary, on-demand hydrogen-dispensing system; utilize hydrogen in combustion engines and turbines; and demonstrate fuel cell vehicles and other end uses for hydrogen.

Current NCHT Activities

- Development of fuel conversion technologies to produce hydrogen
- Research and development into technologies for converting intermediate fuels such as synthetic natural gas, methanol, and Fischer-Tropsch (FT) fuels into hydrogen
- Testing of advanced technologies for distributed production of hydrogen to minimize storage and transportation needs
- Testing of hydrogen compression and purification technologies for both stationary and mobile systems
- Testing of advanced materials and fuel cell systems for use with coal-derived hydrogen-rich fuels
- Development of education and outreach materials to bring hydrogen information to the workforce and future hydrogen users



Integrated Ethanol and Hydrogen Production

A new technology being developed at the EERC could expand the use of ethanol with a process that produces pure, clean hydrogen from ethanol plants.



Wind to Hydrogen

The EERC, the U.S. Department of Energy (DOE), and Basin Electric Power Cooperative are demonstrating hydrogen production from wind power for use in vehicles and farm equipment.



Hydrogen on Demand

The EERC is advancing a proprietary hydrogen production and dispensing system (patent granted) in partnership with Kraus Global, Inc. This system will overcome the cost, logistics, and safety issues of existing refueling systems which significantly limit their commercial potential.

About the EERC

The EERC is a research, development, demonstration, and commercialization facility 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 is a high-tech, nonprofit branch of UND which operates like a business. The EERC employs over 330 people with 123 areas of expertise, including numerous specialized fields, and is aggressively expanding its staff. The EERC currently houses 245,000 square feet of offices, technology demonstration facilities, laboratories, and some of the world's most advanced equipment and instrumentation.

The Center was founded in 1951 as the Robertson Lignite Research Laboratory, a federal facility under the U.S. Bureau of Mines. It became a Federal Energy Technology Center under DOE in 1977 and was defederalized in 1983. At that point, it became a part of UND, with the stipulation that it would not receive state-appropriated dollars. Today, the EERC leverages and enhances government research dollars by developing partnerships with industry, government, and the research community. Since 1987, the EERC has had nearly 1100 clients in all 50 states and 51 countries.

The EERC's eleven Centers of Excellence include the Coal Utilization Technologies Center; the Emission Control Technologies Center; the National Center for Hydrogen Technology; the Center for Climate Change, Carbon Capture, and Storage; the Center for Air Toxic Metals® (CATM®); the Centers for Renewable Energy and Biomass Utilization; the Water Management Center; the National Alternative Fuels Center; the Center for Oil and Gas; the Great Plains Applied Energy Technology CenterSM; and the Center for Environmental Chemistry and Cleanup.



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