

Public Abstract
Northern Great Plains Regional Hydrogen Technology Learning Center

The energy offices of Montana, Wyoming, North Dakota, and the University of Montana College of Technology (UMCT) submit this proposal to the National Association of State Energy Offices in response to Solicitation (#03-STAC-1) Area of Interest E, Regional Hydrogen Technology Learning Center. This project will initiate a Northern Great Plains Regional Hydrogen Technology Learning Center (H2 Center) to be located at the University of Montana College of Technology (UMCT). UMCT had developed some secondary school hydrogen-technology curricula, and has been given Montana legislative approval to advance hydrogen technology learning to assist the coming hydrogen economy. The concept of a hydrogen-based economy is very foreign to the vast majority of people. The greatest need for the general public and others is the education about and in support of the coming hydrogen technology economy.

Using these initial steps by UMTC, the proposed H2 Center would coordinate information and educational resources, services, and opportunities for public and private sectors and make them available throughout the region. The H2 Center will provide these groups with technical expertise and support, virtual materials, additional developed curricula, distance and hands-on learning sites and demonstrations for Montana, Wyoming, North Dakota, South Dakota and Idaho. As of the submittal date, Wyoming and North Dakota are signed onto the project. South Dakota and Idaho have expressed possible interest as a result of initial discussions.

The H2 Center will cover renewable hydrogen generation technologies including wind, biomass gasification, solar photovoltaics, geothermal, and micro-hydro turbines in cooperation with the UMTC Renewable Energy Center. Reformer technologies for fossil resources will cover coal, petroleum and natural gas. Energy conversion technologies will cover combined heat and power for buildings and stationary uses, distributed generation, battery and storage applications, and vehicle applications including direct combustion and fuel cells.

This H2 Center will provide this region with the information, infrastructure, and educational resources needed to transition to, build, maintain and service a hydrogen-based economy from present energy sources with which this region possesses (wind, coal, oil, gas). Potential benefits include a small number of direct jobs within the region, with the capability of 7,500 people trained for hydrogen-related technologies by 2025. The Montana Department of Environmental Quality Air and Energy Bureau (DEQ) and UMCT are coordinating this three-year project in cooperation with Wyoming and North Dakota. DEQ will manage the grant and sub-agreements between the participating states and UMCT. State participants will have the opportunity to participate in Center development, planning and coordination meetings, review and help distribute curricula, provide contacts for their state's institutes of higher education for seminars, in-state hands-on learning and satellite opportunities, and provide contacts and information on their in-state projects. We are requesting \$600,000 from NASEO STAC, and providing an additional 210,000 in matching funds. The North Dakota energy office has proposed an in-kind match of \$11,600, for a total project cost of \$812,065 (26 percent match).

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Public Abstract

Establishing a Hydrogen Technology Learning Center at Alcorn State University

Alcorn State University is a Land-grant Historically Black College and University institution Located at the southwestern part of the state of Mississippi. Alcorn owns and operate a 200KW Phosphoric Acid Fuel Cell power plant that went on-line on September 2000, and when it operate on grid-connected mode, it provides about 6% of the power used on campus. It is therefor natural for Alcorn to build upon that infrastructure by responding to the request for proposal by DOE about establishing the Hydrogen Technology Learning Center on its campus. It is proposed that the physical part of the center be composed of two rooms. Room one, with over fifteen workstations, equipped with multi-media upper end personal computers, to be used for in-class training and exchange of information and as virtual laboratory; and the other room as a laboratory. The laboratory will be equipped with the state-of-the-art instruments and it will be used for hands-on experiments related to the hydrogen technology education. The project is with the cooperation of the Mississippi Alternative Energy Enterprise, a state enterprise with activities in energy area. The center will be used to provide education and training in hydrogen technology for students, potential end-users, local officials and the public in general using all the resources available at Alcorn State University including the intranet, Internet and the FM radio station. To accomplish this important task a three to five year program is proposed with under \$200,000 per year budget including personnel, laboratory instruments and facility maintenance. It is an academically efficient program that will benefit the citizens of the state of Mississippi and Louisiana, the broader region, the nation and the world. It will make the transition from fossil-based fuel to hydrogen-based industry and economy smooth with minimum interruption and confusion, while preparing trained workforce, knowledgeable about hydrogen technology, from an under represented segment of the society at an under developed part of the nation.

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Public Abstract

Hydrogen Technology Learning Centers in the states of Arizona, Nevada, and Utah

This three-year program deals with Hydrogen Technology Learning Centers in the states of Arizona, Nevada and Utah. Upper level classes teaching the elements of a hydrogen and fuel cells are in the process of being developed at Arizona State University (ASU), University of Nevada, Reno, and Utah State University at undergraduate and graduate levels. Public demonstrations of the technology, and that aimed at state, county, municipal and school officials will be undertaken by the American Hydrogen Association (AHA). Practical seminars on the uses of hydrogen will be scheduled for the avid searcher of practical hydrogen related hardware, ranging from generation of hydrogen using electrolysis of water using photovoltaic and wind energies, use of the fuel within fuel cells and internal combustion engines, while pointing out the problems that need to be overcome—such as storage means of the on-board fuel, hydrogen distribution infrastructure and the like. On-the-road educational trip using the tools from the American Hydrogen Association are also anticipated, with members from various chapters from that organization used as instructor for making presentations in remote areas of the three states. Levels of presentations will be tailored to audiences, ranging from general public, elementary school students, high school students as well as technical and non-technical college and university students. Technical presentations will be offered in conjunction with existing *Alternative Energy Technology* program of ASU, and this program includes a variety of hands-on activities related to fuel cells. The hydrogen economy presentations will be a hybrid of hands-on demonstrable hydrogen powered units that will lead into visions of the hydrogen economy.

Arizona State University is the lead organization with close ties to the subcontracted University of Nevada, Reno and Utah State University. Another major subcontractor is the American Hydrogen Association that has instructional courses in-being with the necessary demonstration units that are capable of showing the student many applications of hardware powered by hydrogen, to the generation of hydrogen through the use of alternate energies power means such as photovoltaics, wind, landfill gases and the like. In addition, State Energy Offices of these three states will counsel and provide assistance in identifying, through their outreach data bases, names of individuals, companies, state, county and municipal offices and individuals, educational institutions and others who may have an interest in learning about the up and coming hydrogen economy.

Cost sharing, the required minimum 25%, from each participant is committed.

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Public Abstract
Energy Education Centers Collaborative

A multi-state collaboration between Massachusetts and Connecticut to develop and operate two Hydrogen Learning Centers on the campus of Cape Cod Community College located in southeastern Massachusetts and at the Mohegan Energy, Environment, Economics, Education Center in Connecticut seek to jump-start an energy education program through a grant from State Technologies Advancement Collaborative (STAC). These Centers will provide education for students, policy makers, fleet managers, building developers and the general public about the vision of a hydrogen economy, hydrogen technologies and applications and the safe use of hydrogen as an energy carrier.

The Energy Education Centers Collaborative team includes Cape Cod Community College of Massachusetts, the State of Connecticut Office of Policy and Management, the Mohegan Sun, and Proton Energy Systems Inc. Each of these organizations is dedicated to the development and use of environmentally friendly technologies, renewable resources, energy conservation, pollution reduction, and the realization of the future benefits to come as part of the hydrogen economy. Team members are experienced in education, protection of the environment, management of collaborative projects and the development of new innovative technologies. Collectively, they will provide a cost share that amounts to \$506,100. The Energy Centers Collaborative, through Cape Cod Community College seeks \$492,800 in STAC funding for a total project value of \$998, 900.

The one year project plan capitalizes on the synergies of current energy education activities ongoing at Cape Cod Community College and the Mohegan Energy, Environment, Economics, Education Center linking them through cooperation in the refinement of themes for interactive displays, educational curriculum and literature for distribution. Thus enabling coverage of a broad demographic region of Massachusetts and Connecticut. Kiosks at each site will house real world demonstrations of cutting-edge hydrogen technologies. This multi-dimensional hands-on interaction with new technologies performing useful work in real world applications is one of the fundamental principles of the team approach to energy education and its lasting impact on those who experience it.

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Public Abstract
The Southeast Hydrogen Technology Learning Center

A collaboration of major university, state government, national laboratory and private institutions throughout the Southeast has been forged to create the Southeast Hydrogen Technology Learning Center (“the Center”). The purpose of the Center is to educate public and professional audiences concerning the long-term benefits and the near-term realities of hydrogen, fuel cell systems, and related infrastructure. The Center collaboration is being led by the University of Tennessee and North Carolina State University, and includes team members Florida State University, Virginia Polytechnic Institute and State University, Oak Ridge National Laboratory, the Power Electronics Applications Center of the Electric Power Research Institute, and the North Carolina Sustainable Energy Association (NCSEA). State energy offices of North Carolina, Tennessee and Virginia will collaboratively support the Center. Other regional partners will be invited to join as the Center grows. The National Association of State Energy Officials (NASEO), the Association of State Energy Research and Technology Transfer Institutions (ASERTTI) and the US Department of Energy (DOE) are being asked to establish the Center through a two-year grant of \$425,818 to be combined with matching funds of \$216,845.

The Center’s team recognizes the enormous potential of hydrogen as a source of commercial energy and is seeking to invest substantial resources into its development. Large-scale use of hydrogen in the future could significantly reduce our imported oil dependency and simultaneously provide a clean source of energy. A critical component toward making this a reality is public and professional education. An energy system based on hydrogen would be transformative, and it is essential that the American public clearly understand the challenges and opportunities inherent in such a transformation.

The Center plans to locate initial demonstration sites at the National Transportation Research Center and the Power Electronics Application Center (both in Knoxville, TN), and the NC Solar Center (Raleigh, NC). Training will also take place in Blacksburg, VA and Tallahassee, FL, and a mobile demonstration trailer will be a key Center resource, enabling hands-on education and outreach to take place throughout the region. The Center’s reach will be augmented further through distance learning modules for professional audiences, curriculum development for K-12 education, a web site, and an annual Southeast regional hydrogen conference, targeting highlevel decision makers. Through the strength of its partners and breadth of approach, the Center will prove an important voice for all of DOE’s hydrogen programs.

The intent is to create a learning center in the broadest sense of the word. Numerous audiences will be targeted including school children and university students, local standard-setting and enforcing officials, public and private fleet managers, building developers, and policy makers. Topics will include hydrogen production, delivery, and storage technologies; fuel cell operations and applications; the economics and safety of hydrogen utilization; and, the overall vision of a hydrogen economy and the challenges to achieving the vision. A hands-on, interactive learning environment will be created that fosters active rather than passive learning. The Center aims to be technology neutral through the demonstration of hydrogen production through renewables and fossil fuels and education on both distributed and centralized production strategies.

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Public Abstract
Hydrogen Energy Education Network (HEEN)

Rutgers, The State University of New Jersey, The Pennsylvania State University and The University of Hawaii have proposed to initiate the Hydrogen Energy Education Network (HEEN), a collaboration among state universities to address the challenge of educating the nation on the promise and prospects for hydrogen energy. The mission of HEEN is to be recognized as a respected source of much-needed independent and unbiased information about hydrogen serving key audiences and stakeholders around the country.

Initially, each University will focus on a specific activity area including Public Policy (Rutgers University), Technical Training (Pennsylvania State University), and Sustainable Hydrogen Energy Undergraduate Education (University of Hawaii).

The Hydrogen Energy Education Network represents a unique approach to education, outreach and stakeholder involvement. The vision of the Network implements the innovative strategy of integrating each active element as part of a holistic approach to education and outreach. The Network is more than a group of Universities that will share common experiences and practices. Rather, the Network represents an innovative collaborative structure, where each participating University both deploys its demonstrated expertise by leading an activity area while also having the opportunity to contribute to and benefit from participation in any other Network activity.

It is the proposers' intent that the Hydrogen Energy Education Network will become the preeminent reference for the greater body of state and federal legislators, decision makers, state workers and all others involved in bringing hydrogen energy research, development, demonstration, and deployment to the forefront. This will be served in part by the development of the *Hydrogen Energy Learning Portal* (HELP) Web site that will serve as the central focus for sharing hydrogen information and resources among Network participants and the public at large. It will serve to expand hydrogen communications and networks across the country and will become a key hydrogen education resource with information developed for a range of audiences. The collective work of the Hydrogen Energy Education Network is a distributed hydrogen learning center, maximizing access and contributions to the field. The founding partners in this Network will pave the way to foster further collaboration in future years to "grow" the Network to include Universities and energy officials in other states. This requested project funding of \$306,188, which will be leveraged with \$82,904 of in-kind cost-share from the partners, will assist the Network in launching the Hydrogen Energy Education Network throughout the first year. Moreover, the work will be coordinated with ongoing activities by each of the partners thereby providing further leverage of the STAC resources. The members of the Network are confident that funding this proposal will quickly provide a resource that will be utilized by students, policymakers, planners, engineers, scientists, community leaders, and other stakeholders in helping them to make informed decisions concerning the role of hydrogen energy in the future of their communities.

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Public Abstract
Latex-Hytecen

This proposal is for the establishment of a Hydrogen Technology Learning Center through the University of Louisiana at Lafayette, the University of Texas, and Texas A&M University. These three Universities in Louisiana and Texas will hold workshops annually for industry representatives, college students and high school students. The subject of these workshops will be the safe and effective use of Hydrogen as an energy carrier and its ability to meet the energy demands of the future.

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Public Abstract
Colorado-Wyoming Mobile Hydrogen Education Center (MHEC)

Objective – To construct a mobile hydrogen technology learning center using a semi-trailer van as the platform. Topics of hydrogen properties, production, storage, utilization, and safety will be communicated as well as big-picture views of a hydrogen economy. A working electrolyzer and fuel cell will power some of the equipment in the trailer.

Budget – \$449,513 total project cost

Benefits – The MHEC will provide a very effective method of educating a large variety of audiences addressing the benefits of specific technologies and of an hydrogen economy. Exhibits will contain elements addressing audiences from upper elementary school through college students and faculty, safety officials such as fire marshals and transportation officials, fleet operators, facilities operators and developers, and the public in general.

Timeframe

- January 2004 - May 2004: Design Phase - setup activities for the construction phase such as acquiring equipment and materials for the exhibits and assembling the construction team, including contractors. Curriculum development for various audiences will begin in this phase and will continue throughout the construction phase.
- June 2004 – December 31, 2004: Construction Phase – build the trailer, install utilities, construct exhibits, install graphics on the trailer exterior, safety testing, and commissioning (testing and debugging the system). Training of the education crew will also begin during this phase and will carry into the implementation phase.
- January 2005 – December 31, 2005: Education/Implementation Phase - the trailer and education team will take an educational tour around Colorado and Wyoming with appearances at public schools, colleges and universities, gatherings of safety officials, public forums such as fairs, Earth Day, environmental presentations, etc. The education tour will continue beyond this time period if funds still exist or if additional funding is available.

Methodology – The proposed collaboration (see below) has a wide range of expertise with capabilities of producing a high quality project. A design team consisting of members from sponsoring organizations will construct a series of design charettes to organize the presentation of the materials for optimum content and communication including detailed drawings. The construction team will include CSU engineering and construction management students, contractors and members of the sponsoring organizations if needed. Toward the end of the construction phase an education crew will be identified and trained.

Sponsoring Organizations – Colorado State University, The Colorado Governor’s Office of Energy Management and Conservation (OEMC), Wyoming Business Council – Office of Minerals, Energy & Transportation, Fort Collins Utilities, Avalence LLC, Delta-Montrose Electric Association (DMEA), Avista Labs, and Poudre School District.

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