

IX.5 VA-MD-DC Hydrogen Education for Decision Makers

Chelsea Jenkins

Virginia Clean Cities (VCC)
860 Greenbrier Circle, Ste 404
Chesapeake, VA 23320
Phone: (757) 256-8528
E-mail: cjenkins@hrccc.org

DOE Manager

GO: Greg Kleen
Phone: (720) 356-1672
E-mail: Greg.Kleen@go.doe.gov

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Subcontractors:

- Catherine E. Grégoire Padró, Los Alamos National Laboratory, Los Alamos, NM
- Greg Jackson and Peter B. Sunderland, University of Maryland (UM), College Park, MD
- Christopher Bachmann, James Madison University (JMU), Harrisonburg, VA

Project Start Date: September 1, 2008

Project End Date: September 30, 2011

Fiscal Year (FY) 2011 Objectives

The goal of this three-year project is to increase the targeted audience's understanding of hydrogen and fuel cells, including early market applications, and to provide specific examples of actions that state and local government leaders can take to support the development and use of hydrogen and fuel cell technology leading to better understanding of community benefits. The main objectives of the two-year project are to:

- Conduct a dozen workshops by technical experts and professional educators.
- Produce video resources for public television, seminar use, DOE, and the general public.
- Use hardware demonstrations when possible and provide real-world examples of technology.
- Produce electronic "magazine" articles on hydrogen and fuel cell technology demonstrations and other instructional project deliverables.

Technical Barriers

This project addresses the following technical barriers from the Education section (3.9) of the 2009 Fuel Cell Technologies Program Multi-Year Research, Development and Demonstration Plan:

- (A) Lack of Readily Available, Objective, and Technically Accurate Information
- (B) Mixed Messages
- (C) Disconnect between Hydrogen Information and Dissemination Networks
- (D) Lack of Educated Trainers and Training Opportunities
- (F) Difficulty in Measuring Success

Contribution to Achievement of DOE Education Milestones

This project will contribute to achievement of the following DOE milestones from the Education Technical Plan (3.9) section of the 2009 Fuel Cell Technologies Program Multi-Year Research, Development and Demonstration Plan:

- **Milestone 17:** Hold "Hydrogen 101" seminars. (4Q 2008 through 4Q, 2011)

FY 2011 Accomplishments

The following has been accomplished during FY 2011:

- Maintained key partnerships with over 30 different public and private organizations in Virginia, Washington, D.C., and Maryland to promote program and message.
- Conducted four "Hydrogen 101" seminars in Virginia, Washington D.C., and Maryland.
- Aired Motorweek "Hydrogen and Fuel Cells Emerging Markets" video and developed Y3 "Vehicles and Infrastructure Update" video.
- Developed and updated website and social media tools (Facebook, YouTube, Twitter).
- Held ride-n-drives of Equinox Fuel Cell Electric at three events.
- Published quarterly newsletters.
- Developed first responders webinar workshop.
- Implemented surveys at two workshops.
- Completed fuel cell scooter demo with James Madison University Alternative Fuel Vehicle Lab and showcased at two events.



Introduction

In order to change the way we use energy and to increase the deployment of hydrogen and fuel cell technologies, decision makers will need to make informed

public policy decisions and continue to support research and development as well as deployment activities. This project aims to raise awareness of hydrogen and fuel cell technologies, provide examples of what state and local government can do, and show how decision makers can support the development and use of hydrogen and fuel cell technologies.

The objectives of this project are to provide hydrogen and fuel cell technology learning opportunities through seminars, multi-media, and video resources, and to provide technical support and demonstrations to local and state government and decision makers. These activities will help leaders become familiar with hydrogen and how it fits into the portfolio of near-term and long-term energy choices, develop an accurate understanding of hydrogen safety, recognize opportunities, and understand their part in facilitating use of hydrogen and fuel cell technologies.

Approach

Our primary approach is to host in-person and webcast seminars for our target market. Messaging ties to the hydrogen knowledge survey, on which the subprogram objectives and targets are based. Under DOE guidance, existing Education sub-program resources and new contributions by team members are considered. Educational content focuses primarily on a basic understanding of hydrogen properties and the energy security and environmental benefits of hydrogen and fuel cell technologies, but also focuses on more technical subjects related to fuel cells and other modes of hydrogen energy conversion. Special consideration has been given to “following the technology” and resources also concentrate on areas where hydrogen and fuel cells are publicly visible through demonstration projects or early niche market commercialization efforts, such as hydrogen fuel cell forklift program at the Defense Distribution Depot Susquehanna, Pennsylvania, and fuel cell installations at Gills Onions and Sierra Nevada Brewery in California.

The key to state and local government representative education is a broad understanding of how hydrogen supports decision-making on current opportunities and how to lay the foundation for long-term change. Additionally, providing real-world examples and demonstrations has been a key component of each seminar.

Results

The major achievements over the last year include hosting four successful, and highly received events completing a shooting schedule and beginning production of a third seven-minute video for seminar use and broadcasting on PBS and Discovery HD Theatre developing webinar curriculum and developing, completing, and showcasing a university student senior thesis deployment project.

Seminar Results

The curriculum prepared and presented by Dr’s Chris Bachmann, Dr. Peter Sunderland, and Dr. Greg Jackson at workshops in Harrisonburg, Virginia, and College Park, Maryland included:

- Overview of the current energy system
- What is hydrogen and what is a fuel cell?
- Hydrogen production, storage, distribution, and use
- Environmental, energy and economic implications of fuel cells and hydrogen
- Safety, codes and standards
- The future of hydrogen and fuel cells

Ride and drive events were held along with a screening of the “Emerging Markets” MotorWeek video. The JMU event also featured presentations by Hampton Roads Hydrogen, Marz Industries, and the JMU AFV demo team. Also, at both of these seminars, a post-workshop survey was distributed to assess the usefulness of each workshop component. The results of these surveys are provided in Table 1. Two additional events were held in conjunction with the presentation of senior thesis projects at James Madison University and as part of a general Fleet Innovation Seminar held at the Fairfax County government center in Fairfax, Virginia. The JMU event featured a “Hydrogen 101” presentation and a presentation highlighting the development and features of the Alternative Fuel Vehicle Lab scooter. Dr. Greg Jackson contributed a “Hydrogen 101” presentation at VCC’s Fleet Innovation Seminar in addition to a Fuel Cell Equinox Ride and Drive.

TABLE 1. Survey Results for Participants at 2/25 JMU and 3/11 UM Workshops (58 Total Attendees)

i. Overview and Introduction to Hydrogen & Fuel Cells		
Very Useful	Useful	Not Useful
58%	42%	0%
ii. Our Current Energy System and the Potential of Hydrogen		
Very Useful	Useful	Not Useful
67%	29%	4%
iii. Hydrogen Production, Storage, Distribution, and Use		
Very Useful	Useful	Not Useful
54%	46%	0%
iv. Environmental, Energy, and Economic Implication of Hydrogen		
Very Useful	Useful	Not Useful
67%	33%	0%
v. MotorWeek Video		
Very Useful	Useful	Not Useful
33%	63%	4%
vi. Ride-N-Drive		

TABLE 1. Survey Results for Participants at 2/25 JMU and 3/11 UM Workshops (58 Total Attendees) (Continued)

Very Useful	Useful	Not Useful
42%	54%	4%
vii. Overall Event		
Very Useful	Useful	Not Useful
67%	33%	0%
Why did you attend today's seminar?		
<ul style="list-style-type: none"> To contribute and learn. To learn more about the state of the science of creating environmentally friendly hydrogen. To see what the current status of hydrogen power is. Get more information about hydrogen, it's use, and applications. Interested in hydrogen production technologies. To become informed. To see student presentations. Learn more about advancements in development of hydrogen as an energy source. Learn about fuel cells and stations in VA. Knowledge of alternative energy source. Interest in and concern about our energy policy as it affects our economy and investments. General interest in renewable energy options. Learn about hazards and safety involving fuel cells. We are considering alternate fuel vehicles. Improve knowledge of hydrogen characteristics, use, and safety issues. Support Clean Cities mission and interested in fuel cells. Learn more about current state of fuel cell technology, especially as it relates to transportation, including current Administration support and potential involvement of state agencies. 		
What was the most interesting part of today's seminar?		
<ul style="list-style-type: none"> Multiple sources of info. Discussion of stationary applications. Vehicles running on hydrogen using combustion engines. Discussion of variety of applications. Emerging applications. Who is using fuel cells. How long fuel cells have been in use as fuel/energy provider. Production and storage info. Stationary applications. Characteristics of hydrogen and impact on fire safety. General operation and components of fuel cell systems. 		
What did we NOT cover today that you desired? How can we improve?		
<ul style="list-style-type: none"> Small hydrogen generator systems using solar power. Have flyer with local, regional, and national avenues with grant funding/assistance with trying to implement hydrogen facilities within government. More on economics, where are we going and how fast? More technical information regarding cutting edge research. 		
Other comments?		
<ul style="list-style-type: none"> Dr. Bachmann did a great job. Excellence coverage and balance of topics. Schedule event for fire fighters and fire safety personnel. 		

MotorWeek "Emerging Markets" Video

Virginia Clean Cities and the DOE worked with MotorWeek to produce and air a video entitled "Emerging Markets." In addition to footage of many fuel cell electric vehicles and early market applications at the 2010 National Hydrogen Association conference, footage also included interviews with leaders of hydrogen and fuel cell focused organizations and industry leaders who have implemented fuel cells. The video is approximately seven minutes and includes an overview of hydrogen and fuel cell applications that are in use presently.

MotorWeek "Vehicles and Infrastructure Update" Video

This video will highlight progress made in fuel cell electric vehicle design and use, as well as advances in infrastructure towards the planned release. Footage will include video of several vehicles and General Motor's newest fuel cell engine, along with video of various fueling installations.

Conclusions and Future Directions

The seminars that have been held to date have been very well received and the participants' knowledge of hydrogen and fuel cell technology has increased as indicated by the surveys. At least two more events/outreach projects targeted at decision makers will be carried out in the remainder of the project period. This project will end in September 2011.

Future Project Outputs

- Complete outreach efforts including First Responders Webinar.
- Complete production and airing of third MotorWeek video focusing on vehicles.

Planning and Improvements

After surveying several targeted individuals, it was confirmed that travel restrictions and time constraints have affected our ability to attract participants at in-person workshops. It is our hope that events such as the upcoming first responders webinar and other targeted outreach activities will address this issue.

Key Issues

The project's main issue is that current participants and the target audience in general are being assigned extra demands and do not have time to take part in the seminars and webinars.

FY 2011 Publications/Presentations

- Greg Jackson PowerPoint for 3/11 and 3/23 seminars.

2. Peter Sunderland PowerPoint for 3/11 seminar.
3. Chris Bachmann PowerPoint for 2/25 seminar.
4. PowerPoint for 6/11 Annual Merit Review oral presentation.
5. Student presentations of hydrogen demo thesis project.
6. MotorWeek “Emerging Markets” video.

All presentations available at <http://www.hrccc.org/cleaner-transportation-options/hydrogen/hydrogen-seminars/>