

X.15 Hydrogen Education State Partnership Project

Charles Kubert (Primary Contact),
Jessica Morey
Clean Energy States Alliance (CESA)
50 State St., Suite 1
Montpelier, VT 05602
Phone: (802) 223-2554
E-mail: ckubert@cleanegroup.org;
Jessica@cleanegroup.org

DOE Technology Development Manager:
Christy Cooper
Phone: (202) 586-1885; Fax: (202) 586-9811
E-mail: Christy.Cooper@ee.doe.gov

DOE Project Officer: Gregory Kleen
Phone: (303) 275-4875; Fax: (303) 275-4788
E-mail: Greg.Kleen@go.doe.gov

Contract Number: DE-FG36-08GO18111

Subcontractor:
Dr. Timothy Lipman, University of California, Berkeley,
Berkeley, CA

Project Start Date: October 1, 2008
Project End Date: September 30, 2011

- (D) Lack of Educated Trainers and Training Opportunities
- (E) Regional Differences
- (F) Difficulty of Measuring Success

Contribution to Achievement of DOE Education Milestones

This project will contribute to achievement of the following DOE milestones from the Education section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- **Milestone 16:** Develop database of state activities. (2Q, 2007). This project will be documenting state policies, programs and other state activities which are supporting hydrogen and fuel cell investments, industries and applications.

Accomplishments

- Developed network and listserve of state legislators and clean energy officials interested in hydrogen and fuel cell policies.
- Completed drafts of papers on hydrogen technology basics and state policy best practices.

Objectives

- Provide information and technical assistance to state policy leaders and state renewable energy programs in the development of effective hydrogen fuel cell programs.
- Identify and foster hydrogen program best practices.
- Identify and promote strategic opportunities for states and the Department of Energy (DOE) to advance hydrogen technology deployment through partnerships, collaboration, and targeted activities.

Technical Barriers

This project addresses the following technical barriers from the Education section of the Hydrogen, Fuel Cells and Infrastructure 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



Introduction

State policies can represent both significant barriers and a supportive framework to encouraging the development of hydrogen infrastructure and the adoption of hydrogen and fuel cell technologies for stationary and other non-transportation applications. Some of these policies are analogous to those for other distributed energy technologies (e.g., utility regulations governing interconnection); others are unique to hydrogen (e.g., policies governing hydrogen transportation and dispensing). In addition, the support of state clean energy funds for hydrogen and fuel cell demonstration projects can play an important role in raising the visibility and market interest in these technologies. Finally, coordinated state efforts, as evidenced by several of the state hydrogen collaboratives, can drive the development of hydrogen industry clusters.

In this project, CESA will track, identify, evaluate, communicate, and facilitate state adoption of effective financial, policy, and technology activities and best

practices that accelerate fuel cell and hydrogen technologies. CESA will use its membership network to effectively educate state clean energy policy makers, program managers, and decision makers about fuel cell and hydrogen technologies and the efforts by states to advance these technologies. With the assistance of the National Council of State Legislators (NCSL), CESA will have access to an effective forum for outreach and communication with state legislators from all 50 states on hydrogen issues and policies.

Approach

There are several major steps in the project.

- **Identification and Promotion of Best Practices:** CESA and its sub-contractor are assessing existing state hydrogen and fuel cell programs to identify and promote best practices and to develop case studies of exemplary programs.
- **Targeted Outreach:** Utilizing this initial work, CESA will provide state clean energy fund managers and state legislatures (through the NCSL) information and targeted outreach materials to educate them on the merits, opportunities, policies and programs proven effective for advancing fuel cell and hydrogen deployment. This information will also include a primer on fuel cell technologies including applications for back-up power in critical facilities.
- **Communications:** CESA is using its existing clean energy fund network as well as a listserve and bi-monthly conference calls to provide current information on hydrogen and fuel cell activities, trends, program elements and policies in different states.
- **Coordination:** CESA is coordinating communication among other DOE hydrogen education grantees to ensure that projects are coordinated and resources, programs and lessons learned from grantees and their states can be shared among the network of other education and outreach grantees.

Results

State Fuel Cell and Hydrogen Programs Survey and Recommendations Report

CESA completed a survey of its members on their hydrogen and fuel cell support and policies in their states. CESA also surveyed a wider listserve made up of members of the bi-monthly DOE/National Hydrogen Association (NHA)/CESA state hydrogen calls. This group includes non-profits, policy makers and advocacy groups in most of the 50 states.

Based on these surveys and further research, CESA's subcontractor, Dr. Timothy Lipman, has

completed an initial draft of a paper surveying and providing recommendations for best state policies to support hydrogen infrastructure and stationary fuel cell applications. This report will cover the benefits and incentives to states of supporting hydrogen and fuel cell technologies through public policies and financial incentives. The report will review in depth the leading state policies with an analysis of impacts. Given these results, as well as lessons learned from other clean energy technology policy support, the report provides recommendations to states on how to best promote hydrogen in their state and how to best direct limited public finance to advance the industry in their state. The report will be completed August 2009.

The report focuses on noteworthy hydrogen and fuel cell state/regional efforts in the following states with an emphasis on stationary programs and will include efforts both for commercialization as well as research, development and manufacturing:

- California - self-generation incentive program and CASFCC
- Connecticut - Connecticut Hydrogen-Fuel Cell Coalition
- Michigan - NextEnergy
- Texas - Fuel Cells Texas
- South Carolina Hydrogen and Fuel Cell Alliance
- Florida Hydrogen Initiative
- Ohio Fuel Cell Corridor
- Hawaii
- Illinois

Case Studies

Based on this research, CESA will identify two to three case studies to be completed by early 2010, with an additional two to three case studies to be completed in the following year. We have identified an initial state, Hawaii, to build a case study around. Hawaii has a well-coordinated, well-funded hydrogen energy development program with a number of high-visibility fuel cell applications as well as innovative policies including a \$10 million public venture capital and cost-sharing fund. In July CESA did a site visit to Hawaii's fuel cell test facility and to meet with University of Hawaii researchers and staff from Hawaii's state energy office to learn more about the history, impacts and future plans of the project.

Technology Assessment

CESA's sub-contractor, Dr. Timothy Lipman, has written a draft of his Fuel Cell Technologies Technical Overview paper. This paper covers the advantages of different fuel cell technologies, current economics, and best applications for stationary fuel cells in distributed

generation, back-up and critical power applications. The goal of this report is to help policy makers understand that hydrogen and fuel cells are technologies of today and to direct policies and incentives towards the most promising technologies and applications as well as significant barriers. The report will be completed in August 2009. Topics covered include: commercialization status.

- Performance and economic issues.
- Technology and system industry trends.
- Remaining hurdles and obstacles (cost issues, varying DG policies, etc.).
- Assessment of potential greenhouse gas savings from stationary fuel cells.
- Attractive niche fuel cell markets, e.g. premium power, emergency backup, etc.
- How fuel cells/hydrogen fit into an overall state energy portfolio.
- How fuel cell and hydrogen markets are likely to evolve over the short/medium/long term.
- Interplay between stationary and transportation hydrogen markets.

Bi-Monthly Conference Calls with DOE and NHA on Fuels Cells and Hydrogen Education

CESA, through Clean Energy Group, works with DOE and NHA to co-host bi-monthly conference calls on state and regional hydrogen fuel cell initiatives. These informational calls cover various topics to assist state and regional hydrogen initiative leaders to share lessons learned, and discuss useful information about fuel cell and hydrogen projects and reports. CESA is working with DOE and NHA to expand call audiences.

Calls during this year included:

- September 10, 2008 – The California Fuel Cell Partnership’s recently released “Vision for Transition to Fuel Cell Vehicle Commercialization” – highlights and key messages.
- December 17, 2008 – Hydrogen and fuel cell tax incentives – available and pending.
- February 4, 2009 – Fuel cell policy plan – the U.S. Fuel Cell Council has prepared a six-point plan to advance fuel cell research and commercialization over the next five years.
- March 30, 2009 – During the NHA annual conference in March, CESA was a co-sponsor of the State/Regional Hydrogen and Fuel Cells Initiative workshop along with NHA and the Department of Energy. This session, attended by 60 people, was an opportunity to learn about a variety of fuel cell applications and policies. Topics and speakers included the following:

- Hydrogen and Fuel Cell Tax Credits: An Overview. Ethan Brown, Director, Business Development, Ballard Power Systems.
 - Telecom Backup Power: The business and regulatory case. Kevin Harris, Business Development & Sales Director, Hydrogenics Corporation.
 - H2 Vehicles: Fuel Cell Vehicles vs. Battery Electric Vehicles. Sandy Thomas, President, H2Gen Innovations, Inc.
 - Forklifts/Materials Handling: The business case. Warren Brower, Product Marketing Manager, GenDrive, Plug Power Inc.
 - Infrastructure for Emerging Markets. Mike Ciotti, Project Manager – Hydrogen Solutions, The Linde Group and Tom Joseph, Business Development Manager, Air Products and Chemicals, Inc.
 - Job Creation/Analysis in the Hydrogen/Fuel Cell Industry. Paul Aresta, Energy Information Manager, Connecticut Center for Advanced Technology.
 - Combined Heat, Hydrogen and Power. Darlene Steward, National Renewable Energy Laboratory.
- June 11, 2009 – The call featured a review of the Department of Energy’s current hydrogen and fuel cell program and funding priorities. The call also covered a summary of the NHA’s 2009 “Hydrogen Road Show.”

CESA is planning a joint hydrogen states call with CESA’s regular monthly calls in order to engage more CESA fund managers. The call topic is planned to cover Hawaii’s “Renewables to Hydrogen” fund.

Steering Committee

CESA has begun to host bi-monthly calls with other DOE Hydrogen Education Topic 1 award recipients to share program successes and state policies in advancing hydrogen and fuel cells. Relevant information and policy developments are also being posted on the hydrogen collaborative listserv that CESA has initiated.

Outreach and Communications

To help with the communication, education, and network development components of this project, CESA is maintaining a fuel cell and hydrogen Web page and listserv for CESA members and other state leaders identified during this project. The Web page (<http://www.cleanenergystates.org/JointProjects/hydrogen.html>) provides current information on state hydrogen and fuel cell activities, trends, program elements, etc. The listserv will help CESA effectively communicate

state progress on hydrogen issues, identify high-priority opportunities for action, and share this information with its network of CESA members, NCSL members, and other interested parties.

Conclusions and Future Directions

Conclusions

- **State Policies and Incentives Matter:** Our survey and research have shown that states which have adopted proactive policy and financial incentives to support hydrogen and fuel cells in their states have seen significant industry growth and increased number of stationary installations.
- **Niche Markets will Advance the Industry:** Currently, the most promising areas for fuel cell growth appear to be in niche markets, particularly materials handling and critical/backup power. Applications in these areas are growing and are commercially competitive. As these applications grow, states can expect that other stationary and niche markets will also benefit. Given these developments, we will recommend that states focus in the near term on facilitating and promoting these applications while also looking to regulations, codes and standards that can promote other stationary applications in the midterm.

Future Directions

- **State Policy Recommendations:** Research will be completed on state policies and recommendations. This research will be updated next year as more states adopt supportive policies.
- **Communications and Outreach:**
 - **NCSL:** During the coming year, CESA will be working with NCSL. We will present the results of our research and recommendations during two conference meetings of NCSL. We will also communicate the results in a magazine article and a short briefing paper which NCSL sends to its members monthly.
 - **Other Forums:** We will be looking for opportunities to present in other forums, including NHA's annual conference in May 2010 and CESA bi-annual meetings.
 - **Bi-monthly Calls and Electronic Communications:** We will continue to work with DOE and NHA to lead the bi-monthly state hydrogen calls and continue to manage and grow our Web page and listserv. We will use the listserv to disseminate report results as well as to request feedback and updates on the results of our research and policy recommendations.