

## X.12 State and Local Partnership Building

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### Objectives

- Foster strong relationships among federal, state, and local government officials, industry, and appropriate stakeholders.
- Serve as a conduit between the DOE and state and local government decision makers.
- Provide technically accurate and objective information to government decision-makers and identified stakeholders to improve/enhance decision making.
- Increase the knowledge base and improve awareness regarding the use of hydrogen and fuel cells.
- Provide support for hydrogen and fuel cells in early market applications, consistent with DOE's market transformation efforts.

### Technical Barriers

This project addresses the following technical barriers from the Education section of the 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 of Measuring Success

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

- Milestone 17: Hold "Hydrogen 101" seminars. (4Q, 2008 through 4Q, 2012)
- Milestone 30: Evaluate knowledge and opinion of hydrogen technology of key target audit audiences and progress toward meeting objectives. (4Q, 2012)

### Accomplishments

- Identified key stakeholders at the local and state level to expand and strengthen partnerships.
- Performed a preliminary survey of local stakeholders and decision makers.
- Developed resources to analyze potential sites for hydrogen and fuel cell development. Resources include a database of potential sites for technology deployment and a report to identify criteria for the deployment of technologies for transportation and stationary applications.
- Developed a Web-based virtual regional resource center that provides online information, models and other tools to assist local, state and regional planners quantify the costs and benefits of hydrogen and fuel cell technology at potential sites. Models address environmental value, energy management, renewable hydrogen generation, distributed technology comparisons, and cost/economics of stationary fuel cells.
- Presented at nine regional planning agencies/regional councils of government.
- Exhibited at the Connecticut Conference of Municipalities Conference.
- Presented on a Bi-Monthly State and Regional Initiatives Call.
- Developed and held a workshop for municipalities.
- Developed and held a legislative briefing/forum.
- Presented at Green Energy & Building Expo and Connecticut Power and Energy Society Meeting.
- Provided information to municipal decision makers including hydrogen and fuel cell benefits and project analysis.
- Monitored state energy studies/plans for accurate information regarding hydrogen and fuel cells.
- Developing a plan with the Connecticut Department of Transportation for hydrogen fueling infrastructure and vehicles.
- Identified financial and investment opportunities for local, state and federal stakeholders.

- Planned a regional briefing for outreach and establishment of dialogue between New England hydrogen and fuel cell stakeholders and decision makers.
- CCAT developed two hydrogen and fuel cell educational videos available online for dissemination.



## Introduction

This project assists with the building of partnerships between the DOE, states and municipalities. CCAT is implementing this process and structure that provides an opportunity for federal, regional, state, and local involvement to encourage and promote the use of hydrogen and fuel cell technology. The structure includes leadership by the DOE; the establishment of collaborative meetings, workshops, and briefings to provide information to municipal and state decision makers; the provision of assistance to municipalities for the development of local energy plans; support for state stakeholder groups to implement initiatives in support of state and federal policies; and implementation of strategies to facilitate the deployment of hydrogen and fuel cell systems in the state.

CCAT developed a virtual regional resource center (RRC) that provides online information, models, and other tools to assist decision makers and end users to quantify the costs and benefits of hydrogen and fuel cell technology at potential sites. The RRC will assist local and state planners and decision-makers in identifying potential opportunities. CCAT developed models that assess environmental value, energy management, renewable energy, cost and economics, and comparisons of competing technologies.

## Approach

CCAT's approach has been to develop resources for hydrogen and fuel cell deployment to aid in the education of state and local decision makers. These resources include online information, models, and tools for potential users to analyze the costs and benefits of hydrogen and fuel cell technology. Coordination and cooperation is sought by both local and state decision-makers in order to introduce hydrogen and fuel cell technology in early market applications. The project uses local "bottoms up" decisions guided by state/regional "tops down" assistance to help reduce conflict, improve state/regional and municipal relations, and provide better solutions to community-based energy problems. Because of the high risk and high capital cost of implementing new technologies, CCAT also coordinates with local, state, and regional decision makers to identify innovative funding and procurement

mechanisms, such as group purchases and corporate tax credits, to encourage market growth, reduce costs, and increase public acceptance.

## Results

CCAT has developed models that assess environmental value, energy management, renewable energy, cost and economics, and comparisons of competing technologies. These models make available information for non-technical and technical audiences, including state and local decision makers and potential end users and will be an integral component of education and outreach efforts. The models are described in the following.

### Environmental Model

The Environmental Model assesses the environmental benefits of hydrogen and fuel cell applications compared with other conventional technologies. The model can be used to assess potential emissions reductions, including greenhouse gases, using hydrogen and fuel cell technology.

### Economic/Cost Model

The Economic/Cost Model assesses potential yearly heating and electricity cost savings when using a commercially available fuel cell for baseload power. The model allows users to assess the economic viability of a fuel cell system.

### Energy Management Model

The Energy Management Model assesses the efficiency benefits of stationary fuel cell applications. The model can be used to assess the potential energy savings using a fuel cell to replace conventional electricity generating technologies.

### Distributed Technology Comparison

The Distributed Technology Comparison allows a user to compare fuel cells with other distributed energy technologies including microturbines, combustion turbines, reciprocating engines, photovoltaic systems, and wind turbines, based on certain criteria such as installation cost, efficiency, emissions, heat rate, etc.

### Hydrogen Generation from Renewable Technology Model

The Renewables to Hydrogen Model assesses wind, photovoltaic and hydroelectric power generation technologies to identify hydrogen production capacities and average cost per kilogram of generated hydrogen from these renewable technologies.

CCAT has also completed a preliminary assessment of the level of knowledge and opinions of hydrogen and fuel cell technologies of local and state stakeholders to determine the effectiveness of the project implementation. In addition, other resources have been developed including criteria for target locations (i.e. supermarkets, institutions, industrial facilities) for the deployment of hydrogen and fuel cell technologies and educational videos that serve to increase the awareness levels of local and state stakeholders.

Through the development of models and associated outreach activities, CCAT has provided analytical services and project development assistance. Table 1 below depicts notable results from outreach efforts. In addition, CCAT has provided assistance to over 24 additional end-users including municipalities, state government, and commercial and industrial facilities.

**TABLE 1.** Results of Notable Analysis/Modeling

Organization	Potential Fuel Cell	Notes
Town of Weston	UTC 400	Project Modeling and Interconnection Assistance
Town of Killingly	FCE 300	Project Modeling
University of Bridgeport	FCE 300 or UTC 400	Project Modeling and RFP Development Assistance
United States Postal Service	FCE 300 or UTC 401	Project Modeling and ESCO Assistance for Distribution Centers
Greater Hartford Transit District	FCE EHS 300	Tigger/Tiger Grant Application Assistance for Vehicles and Refueling
Department of Veteran Affairs	Fuel Cell of other CHP	Project Modeling and Verification

EHS - Electrochemical Hydrogen Separator, FCE - Fuel Cell Energy, UTC - UTC Power, CHP - combined heat and power, RFP - request for proposal, ESCO - Energy Service Company

## Conclusions and Future Directions

This partnership effort has successfully created criteria, models and tools that allow for effective deployment of hydrogen and fuel cell technologies in early market applications. Models and tools have been created to facilitate the education of decision makers and end users as well as the ability to analyze potential sites for hydrogen and fuel cell technology.

Next steps include the execution of a regional briefing to be held on July 22, 2010 which will discuss federal, regional and state efforts, partnership opportunities, planning efforts and tools to facilitate project identification and development. CCAT will also undertake a concluding project survey to assess the effectiveness of the current outreach program.

Finally, CCAT seeks to leverage additional DOE funding to continue education and outreach efforts on the regional scale to encourage and support the development of state roadmaps. Through past project success, CCAT can effectively encourage and support the successful development and deployment of hydrogen and fuel cell projects in the New England region.

## FY 2010 Publications/Presentations

1. Drejer, T., "Regional Resource Center", presentation at the Green Energy and Building Expo, Uncasville, CT, February 19, 2010.
2. Drejer, T., "Regional Resource Center", presentation at the Connecticut Power and Energy Society Meeting, Cromwell, CT, March 10, 2010.
3. Rinebold, J.M., "2010 DOE Hydrogen Program Review Presentation", presentation at the 2010 DOE Annual Merit Review and Peer Evaluation Meeting, Washington, D.C., June 11, 2010.