

## IX.2 State and Local Government Partnership

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### Fiscal Year (FY) 2011 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 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 2009 Fuel Cell Technologies Program Multi-Year Research, Development and Demonstration Plan:

- (A) Lack of Readily Available, Objective, and Technically Accurate Information
- (C) Disconnect Between Hydrogen Information and Dissemination Networks

### Contributed to Achievement of Education Milestones

This project will contribute to the achievement of the following DOE milestones from the Hydrogen Education 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, 2012).
- **Milestone 30:** Evaluate knowledge and opinion of hydrogen technology of key target audit audiences and progress toward meeting objectives. (4Q, 2012).

Related milestones in Task 3 (Educate State and Local Government Representatives) and Task 7 (Assess Knowledge and Opinions of Hydrogen Technologies) of the above reference have both been achieved with support from the State and Local Government Partnership.

### FY 2011 Accomplishments

- Identified key stakeholders in Connecticut such as legislators, state agencies (utility, environment, energy, transportation, etc.), mayors, first selectmen, public works officials, council of governments and completed a pre and post-project survey to assess knowledge.
- Expanded database to include key stakeholders in the "Northeast Region" while strengthening existing relationships with state stakeholders, and regional partners, including Northeast Energy & Commerce Association, Clean Energy States Alliance, Massachusetts Hydrogen Coalition, Hydrogen Energy Center, and New Energy New York.
- Undertook economic modeling through the use of an IMPLAN economic model to assess the economic impact of the hydrogen and fuel cell industry in terms of its direct, indirect, and induced economic effects, in all eight states.
- Identified target locations for fuel cell deployment in the service area based on deployment criteria including energy intensive commercial building types identified by Environmental Protection Agency's (EPA's) Commercial Building Energy Consumption Survey (CBECS) and mapped out locations using ArcGIS software.
- Developed a web-based virtual Regional Resource Center (RRC) 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.
- Developed a comprehensible plan with the Connecticut Department of Transportation for hydrogen fueling infrastructure and vehicles for Connecticut.
- Organized a regional briefing for Northeast stakeholders held on July 22, 2010 in Westborough, Massachusetts.
- Presented at regional planning agencies/regional councils of government; the Green Energy & Building Expo and Connecticut Power and Energy Society

Meeting; exhibited at the Connecticut Conference of Municipalities Conference; and participated on bi-monthly State and Regional Initiative calls.

- Presented at events such as the Fuel Cell and Hydrogen Energy Association Annual Conference, the Northeast Sustainable Energy Association Annual Conference “Building Energy 11”, and the 2010 Fuel Cell Seminar and Exposition.
- Developed and held the Fuel Cells for Municipalities Workshop on September 22, 2009 in Glastonbury, Connecticut and a legislative briefing/forum for state policy makers on January 22, 2010 in East Hartford, Connecticut.
- Provided technical and economic information to municipal decision makers including hydrogen and fuel cell benefits and project analysis.
- Participated on the NEPOOL ISO Planning Advisory Committee to identify regional energy issues, problems and solutions; and in a webinar organized by the Clean Energy States Alliance that addressed hydrogen and fuel cell technology and the development of guidance document “Roadmaps” to enhance support for the industry and facilitate deployment.
- Developed two hydrogen and fuel cell educational videos titled “Hydrogen and Fuel Cell Technology, Connecticut Hydrogen Fuel Cell Coalition” and “Hydrogen and Fuel Cell Technology, a World of Opportunity.”



## Introduction

This project assists with the building of partnerships between the DOE, states and municipalities. CCAT has developed a structure with an approach 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 resources for potential developers to assess opportunity for deployment; support for state stakeholder groups to implement initiatives in support of state and federal policies; identification and assessment of economic benefits of the hydrogen and fuel cell industry and implementation of strategies to facilitate the deployment of hydrogen and fuel cell systems in the state.

The structure also includes a virtual RRC developed by CCAT 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 provides tools for implementation to assist local and state planners and decision-makers in identifying potential opportunities for the deployment of hydrogen and fuel cell technologies. The models available

through the RRC are used to assess environmental value, energy management, renewable energy, cost and economics, and comparisons of competing technologies. CCAT is also developing guidance documents or Hydrogen/Fuel Cell “Roadmaps” for the New England States, New York, and New Jersey.

## 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 “bottom-up” decisions guided by state/regional “top-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 and refined resources to analyze potential sites for hydrogen and fuel cell deployment throughout the region. 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 RRC models are described in Table 1.

### Economic Impact

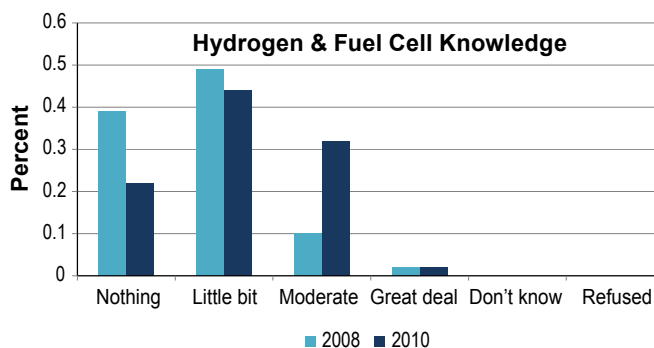
A study was conducted to examine the economic impact for each state of the Northeast Region. The economic impact was defined as the direct output, employment, and labor income associated with the 25 hydrogen and fuel cell original equipment manufacturers located in CT, MA, and NY, as well as the region-wide multiplier effects supported by the purchases of businesses and workers related to the industry (Figure 1).

### Awareness

CCAT has also completed an 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. As shown in Figure 2, the results of the awareness survey suggest that there

**TABLE 1. RRC Models and Descriptions**

Model Type	Description
Environmental	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	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	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	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	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.

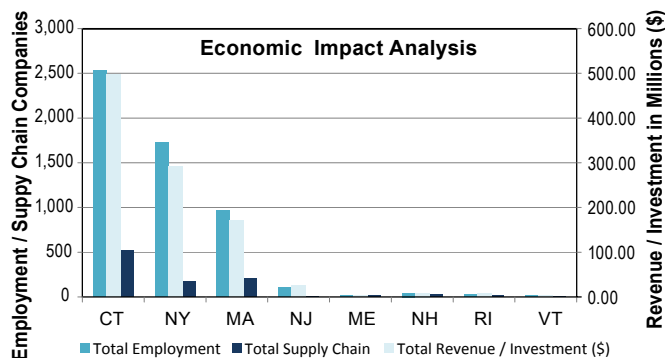


**FIGURE 2. Level of Awareness**

created to facilitate the education of decision makers and end users and to provide the ability to analyze potential sites for hydrogen and fuel cell technologies.

Next steps: CCAT will continue to build upon existing relationships and partnerships while creating new opportunities. Identified target locations for fuel cell deployment in the service areas based on energy intensive commercial building types identified by EPA’s CBECS will be mapped by locations using ArcGIS software and included within the individual state guidance documents. In addition, CCAT will facilitate the dissemination of information to municipal decision makers and stakeholders, and keep state officials abreast of activities to deploy hydrogen and fuel cell technologies through the use of collaborative meetings and briefings to achieve state goals including energy reliability, security, efficiency, emissions and economic development. CCAT will also provide the information on financial and investment opportunities to encourage market growth, reduce costs, and increase public acceptance.

CCAT will continue its education and outreach efforts on the regional scale and continue to support the development of state roadmaps. These roadmaps should serve to effectively encourage and support the successful development and deployment of hydrogen and fuel cell projects in the New England, New York, and New Jersey regions.



**FIGURE 1. Economic Analysis Results**

was an increase in level of knowledge regarding hydrogen and fuel cell technology, its application, costs, and benefits.

### Conclusions and Future Directions

This partnership effort has successfully identified a process with stakeholder participants, created models and tools that will allow potential adapters to assess opportunities for deployment of hydrogen and fuel cell technologies in early market applications, and has been expanded to replicate the stakeholder process and tools to develop guideline “Roadmap” documents in each of the New England States, New York, and New Jersey. The process models and tools and guideline documents have been

### Special Recognitions

#### 2011 Annual Merit Review Awards

On May 11, 2011, DOE recognized CCAT for work on the advancement of fuel cell and hydrogen technologies for Connecticut and the Northeast. The award highlighted CCAT’s collaborative educational outreach efforts that span the Northeast with groups such as the Northeast Energy Commerce Association and the Northeast Sustainable Energy Association, the analysis of job growth and economic development impacts attributable to the fuel cell industry and its supply chain, and the development of models to help potential fuel cell customers evaluate the life-cycle costs and benefits of deploying fuel cells.

**FY 2011 Publications/Presentations**

1. Rinebold, J.M., “State Hydrogen/Fuel Cell Roadmap Development”, presentation at 2010 Fuel Cell Seminar and Exposition, October 21, 2010.
2. Rinebold, J.M., “State Supply Chain and Cluster Development”, presentation at Clean Energy State Alliance, October 28, 2010.
3. Rinebold, J.M., “Connecticut Hydrogen Fuel Cell Industry Status and Direction 2010 and 2011”; December 2010.
4. Rinebold, J.M., “Economic Development through the Northeast Electrochemical Energy Storage Cluster”, presentation at the Fuel Cell and Hydrogen Energy Association Annual Expo, Washington, D.C., February 14, 2011.
5. Rinebold, J.M., “Fuel Cells and Storage: The Path Forward”, presentation at the 2011 Northeast Sustainable Energy Association Annual Conference “Building Energy 11”, Boston, MA, March 10, 2011.
6. Gabe, Todd, Ph.D., “Economic Impact of the Northeastern Hydrogen and Fuel Cell Industry (DOE State and Local Government Partnership Project)”, Version 1.0; April 2011.
7. Rinebold, J.M., “State and Local Government Partnership”, presentation at the 2011 DOE Annual Merit Review and Peer Evaluation Meeting, Washington, D.C., May 10, 2011.