

IX.4 State and Local Government Partnership

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Project 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 addressed 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
- (C) Disconnect Between Hydrogen Information and Dissemination Networks
- (D) Lack of Educated Trainers and Training Opportunities

Contribution to Achievement of DOE Hydrogen Education Milestones

This project contributed to the achievement of the following DOE milestones from the Hydrogen 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 audience 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.

Project Accomplishments

- *Identify Key Stakeholders* - Developed a database of local and state decision-makers and key stakeholders.
- *Develop Resources for Hydrogen and Fuel Cell Deployment* – Developed modeling, "Roadmap" documents and a database detailing criteria for the deployment of hydrogen and fuel cell technologies for transportation, stationary and portable power applications, as well as, potential sites for the deployment of hydrogen and fuel cell technology including: commercial and public buildings and transit, public and private fleet vehicle locations.
- *Develop Online Information, Models and Tools for User Analysis* - Developed an inventory of appropriate models and tools to assess environmental value, energy management, renewable energy, cost and economics, and a comparison of competing technologies. Developed a website and Regional Resource Center with appropriate information, models and tools.
- *Educate State and Local Decision Makers* – Organized and held over 120 project partner meetings, and approximately 20 regional and/or Connecticut state collaborative meetings/workshops, including assistance provided to municipalities regarding the development of fuel cell projects, grant applications, and transportation initiatives.
- *Integrate Local Energy Plans with State Plans* – Developed a "Connecticut Hydrogen and Fuel Cell Deployment Transportation Strategy" plan for the Connecticut Department of Transportation to develop

hydrogen fueling and vehicle deployment strategies and local municipalities to integrate energy plans with state plans and energy goals.

- *Identify Financial and Investment Opportunities* - Developed “Roadmap” documents incorporating incentives, funding, and investment opportunities for hydrogen and fuel cell technologies.
- *Organize and Hold Regional Briefing* - Developed a database of DOE contacts and key stakeholders in northeast states for regional briefing.
- *Pre- and Post-Program Survey* - Developed surveys to assess level of knowledge of local and state decision makers and key stakeholders for the beginning of the project.
- *Developed Market Assessment* - Undertook economic modeling and use of an IMPLAN economic model to assess the economic impact of the hydrogen and fuel cell industry (H₂/FC) in an 8-state region consisting of NJ, NY, CT, MA, RI, NH, VT, and ME in terms of its direct, indirect, and induced economic effects. Identified and Mapped target locations for fuel cell deployment in the Northeast region.
- *Develop a Toolbox for Roadmap Construction* - Developed an inventory of models and tools to assess environmental value, energy management, renewable energy, cost and economics, and a comparison of competing technologies.
- *Train Individuals on Models* – Held at least nine regional briefings and workshops including webinars.
- *Educate and Assist State and Local Officials and State Organizations* – Held roughly ten state and local briefings to build upon existing partnerships while creating new opportunities.
- *Develop a Basic “Roadmap” to provide Guidance for Technology Deployment* - A “Roadmap” has been developed for each state making up the 8-state region. These development plans include information on the economic value of the region’s hydrogen and fuel cell industry identified through a multi-state economic impact model, deployment opportunities including mapping of potential end users, and a summary of supporting policies/incentives.
- *Outreach and Reporting* - Provided “Roadmaps”, white papers, and supporting educational materials to strengthen the level of knowledge of local and state decision makers and key stakeholders.



Introduction

This project assisted with the building of partnerships between the DOE, states and municipalities. CCAT

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 technologies. The structure included 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 development of “Roadmap” documents with implementation of strategies to facilitate the deployment of hydrogen and fuel cell systems in each Northeast regional state.

The structure also included a virtual Regional Resource Center 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 Regional Resource Center 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 Regional Resource Center are used to assess environmental value, energy management, renewable energy, cost and economics, and comparisons of competing technologies.

CCAT published the Hydrogen and Fuel Cell Development Plans (“Roadmaps”) for New York, New Jersey and each of the states in New England. These development plans provide links to relevant information to help assess, plan, and initiate hydrogen or fuel cell projects to help meet the energy, economic, and environmental goals in the region. The plans identify policies and incentives that support hydrogen and fuel cell technology to increase deployment at sites that would benefit from on-site generation. The “Roadmaps” show the relationship between increased demand for hydrogen and fuel cell technologies, increased production, and job creation throughout the supply chain. The development plans show how policies and incentives can be coordinated regionally to maintain the regional economic cluster as a global exporter for long-term growth and economic development.

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

Informational Tools

CCAT has developed and refined resources to analyze development of hydrogen and fuel cell facilities throughout the region. These models make available information for non-technical and technical audiences, including state and local decision makers and potential end users. The Regional Resource Center models are described in Table 1.

TABLE 1. Regional Resource Center 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.

Economic Impact

A regional economic impact was conducted for each state of the Northeast Region to examine the overall economic values of the industry in state and the collective region. The economic impact was defined as the direct output, employment, and labor income associated with the

25 hydrogen and fuel cell 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. A summary for each state as well as the region as a whole is illustrated in Table 2.

TABLE 2. Economic Impact Summary

	CT	NY	MA	VT	NH	RI	VT	NJ	Regional
Total Employment	2,529	1,728	964	18	45	32	16	111	5,443
Total Revenue/ Investment (\$ million)	\$496	\$292	\$171	\$2.9	\$8.7	\$6.9	\$3.3	\$26.5	\$1,009
Manufacturer Revenue/ Investment (\$ million)	\$254	\$119	\$59.6	0	0	0	0	0	\$433
Total Supply Chain Companies	599	183	322	28	25	19	5	8	1189
Total Manufacturers	8	9	8	0	0	0	0	0	25

Currently, approximately 1,180 companies make up the growing hydrogen and fuel cell industry supply chain in the Northeast region. These companies making up the region are estimated to have realized over \$1 billion in revenue and investment, contributed more than \$51 million in state and local tax revenue, and approximately \$650 million in gross state product from their participation in this regional energy cluster. The manufacturers consist of 25 companies responsible for supplying 2,228 direct jobs and \$433.15 million in direct revenue and investment.

Collaborations

CCAT continues to build upon existing relationships while creating new opportunities. Table 3 lists significant businesses and organizations of which CCAT was successful in growing relationships and/or developing new bonds with through interactions, as a result of the project.

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, NY and NJ. The process models and tools and guideline documents have been created to facilitate the education of decision makers/end users and to analyze potential sites for hydrogen and fuel cell technologies. Final copies of these documents are currently available through the CCAT,

TABLE 3. Collaborations

Type	Organization		
Hydrogen and Fuel Cell Industry	- FuelCell Energy - UTC Power - Proton Onsite - Nuvera Fuel Cells - Plug Power	- Avalence - General Motors - Infinity Fuel Cell - Ballard - Acumentrics	- Electrochem - Nanoptek - Watt Fuel Cell - Protonex - SiEnergy Systems
Federal Partners	- Department of Energy - Small Business Administration	- Department of Defense - Department of Commerce	
State Partners	- CT Department of Public Utility Control - CT Department of Economic and Community Development - Department of Transportation - CT Siting Council	- CT Clean Energy Finance and Investment Authority - New York State Energy Research and Development Authority - Massachusetts Clean Energy Center	
Regional Organizational Partners	- CT Power and Energy Society - Northeast Energy and Commerce Association - Clean Energy States Alliance	- New Energy New York - Massachusetts Hydrogen Coalition	- Hydrogen Energy Center - Northeast Electrochemical Energy Storage Cluster
Local Partners	- Mayors - First Selectmen	- Public Works Officials - Council of Governments	
Utilities	- Northeast Utilities	- United Illuminating	

Northeast Electrochemical Energy Storage Cluster, and Connecticut Hydrogen Fuel Cell Coalition websites.

Next steps: On behalf of CCAT, the Connecticut Innovations/Connecticut Small Business Innovation Research Office and the Department of Commerce will bring two workshops specifically focused on the clean energy/hydrogen and fuel cell sector to the Small Business Innovation Research and Global Trade Summit, taking place on July 24-26 at Mohegan Sun in Connecticut. Topics of these two workshops include 1) Opportunities for the Clean Energy Sector: Hydrogen and Fuel Cells and 2) Clean Energy Opportunities in Canada. In addition, the Fuel Cell Seminar & Exposition, a premier meeting for the fuel cell industry, taking place at Mohegan Sun on November 5-8, is plotted to host the 2012 Regional Supply Chain Exchange for the hydrogen and fuel cell industry.

CCAT will continue to educate and train state and local official, organizations, and decision makers on a limited basis by leveraging resources from other projects. CCAT will continue to disseminate “roadmap” documents amongst state and regional agencies and coordinate the development of supportive state policies.

CCAT has recently proposed a project that incorporates replication of the “Roadmap” process with the focus of promoting the coordinated development of hydrogen refueling infrastructure and deployment of fuel cell electric vehicles in the Northeast region. The Northeast Corridor Hydrogen Infrastructure Development Initiative would address the four critical areas that provide significant obstacles to alternative fuel and vehicle use: 1) Policies, 2) Barrier Reduction, 3) Safety and Training, and 4) Market Development Outreach.

Special Recognition & Awards/Patents Issued

2011 Annual Merit Review Awards. On May 11, 2011, the 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 2012 Publications/Presentations

1. Rinebold, J.M., “Hydrogen and Fuel Cell Development “Roadmap” Plans (CT, MA, NY, VT, NH, ME, NJ, RI)”, U.S. DOE, and SBA, Final Reports, April 10, 2012.
2. Rinebold, J.M., “Connecticut Hydrogen Fuel Cell Industry Status and Direction: 2012”, CHFCC, April 2012.
3. Rinebold, J.M., “Northeast Hydrogen Fuel Cell Industry Status and Direction: 2012”, NEESC, April 2012.
4. Rinebold, J.M., “State and Local Government Partnership”, presentation at the 2012 DOE Annual Merit Review and Peer Evaluation Meeting, Washington, D.C., May 17, 2012
5. Rinebold, J.M., “Fuel Cell CHP, Jobs, Economic Development, Clean Energy”, presentation at NECHPI 2012, January 31, 2012.
6. Rinebold, J.M., “Assessing the Economic Impact of the Northeast Electrochemical Energy Storage Industry”, presentation at 2011 Fuel Cell Seminar and Exposition, November 3, 2011.