Hydrogen Education in Texas

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April 9, 2010

Project ED009

Overview

Timeline

- Start: August 1, 2008
- End: August 31, 2010
- 85% complete

Budget

- Total Project Funding: $177,847
  - DOE share: 100%
  - Contractor share: 0%
- Funding FY08: $102,156
- Funding FY09: $75,691
- Funding FY10: $0

Barriers

- Hydrogen Education Barriers Addressed
  - Lack of readily available, objective, and technically accurate information
  - Disconnect between hydrogen information and dissemination networks
  - Regional differences
- Partners
  - Project Lead - Houston Advanced Research Center (HARC)
  - Collaboration/coordination
    - Texas H2 Coalition (information gathering and networking)
    - State Energy Conservation Office
    - Clean Cities Programs in major Texas urban areas (networking/advertising)
    - University of Texas (Fuel Cell Bus rides, tour hydrogen fueling station, technical expertise, speakers)
    - Gas Technology Institute (Technical expertise, speakers)
    - NREL (Technical Expertise, speakers)

Relevance

- Goal – To support the DOE goal of reduce petroleum use, greenhouse gas emissions, and air pollution and to contribute to a more diverse and efficient energy infrastructure by enabling the widespread commercialization of hydrogen and fuel cell technologies by increasing basic knowledge and awareness of hydrogen and fuel cell technologies among Texas state and local leaders

Project Objective	Barrier Addressed
To establish communications that reach target audiences	Disconnect between hydrogen information and dissemination networks
To assemble accurate and consistent educational materials and presentations for web, workshops/webinars, and meetings	Lack of readily available, objective, and technically accurate information
To conduct workshops/webinars for five major metro areas to reach different regional audiences	Regional differences
To assess knowledge improvements from project activities	

Approach

- **Overall approach** - This is the first state-wide hydrogen education effort in a state with major hydrogen producers and related energy interests. Large urban areas in Texas contain most of the state's leaders and are the focus of this project.

Objectives	Milestones	Progress
Communications and Outreach	• Create mailing lists for target audience • Create website for follow-up information • Identify related events and schedules • Contact with target cities/clean cities coordinators	• Completed • Completed • One remaining major event • Key contacts ID'd, Clean City coordinators involved in enlisting participation and communication.
Content Development	• Develop basic topics • Compile content from existing sources for accurate and consistent educational materials • Adapt content for communication and events (workshops, conferences, website) • Supplement with Texas focused content, including Texas recent hydrogen and fuel cell deployments	• Completed • Completed • Completed • Completed
Workshops /Webinars	• Contact target organizations for coordination • Determine timing of event in concert with other events and meetings • Hold workshops and participate in briefings and related events	• Completed • One remaining event • Completed four workshops and eight outreach events; one remaining
Assess change	• Determine method • Apply method • Go/no-go decision for inclusion in workshop • Base data collected	• Completed – H2 quiz materials in presentations, • Pop quizzes at workshops, on-line quiz follow-up • Completed • In progress

Technical Accomplishments and Progress

Performance Measure	Progress – FY08	Progress – FY09
Number of people reached (face to face – workshops and events)	75	498
Number of workshops and events presented	0	4 Workshops 8 Events
Number of workshop participants	0	98
Number of webinars provided	0	0
Number and kind of collaborators		Twelve: Clean Cities, COGs, utility, industry, non-profits, and universities
Type of Audience Reached	Primarily State Government	Diverse; primarily local/regional government and industry
Number of Fuel Cell Projects Implemented during project period in Texas	0	Three sites with over 130 pieces of material handling equipment being deployed and fueling.
Number of Attendees actively looking for fuel cell opportunities	0	Three who identified funding as being a primary hurdle
Response of project partners /collaborators	limited	Very positive, two cities have asked for additional workshops.
Preparation of a project summary/lessons learned that can be used by people interested in replication the program –	0	0
Places the program has been replicated	0	0

Technical Accomplishments and Progress

- Accomplishments
  - Project initiated with revisions to workshop strategies
  - Participated in eight related events using education materials
  - Worked with Clean Cities coordinators who supported efforts in four target cities: Austin, San Antonio, Houston and the Dallas-Ft. Worth areas
  - Website designed and deployed
  - Captured value from Texas Hydrogen Roadmap process, state energy studies, and emerging energy policies
  - Co-sponsored hydrogen fuel cell university project

"… very impressed with the turnout and quality of the information…The data presented on the well to pump and pump to vehicle was extremely valuable. We encounter questions like that a lot when dealing with different types of alternative fuel vehicles. We also like the information regarding the change in infrastructure over the past century. And of course, having Texas-specific examples is something our fleets up here really like and related to... The other thing that really struck us was the safety video. That's something else we get a lot of questions about so we're glad that it was addressed – and in such a good manner."

-NCTCOG

Technical Accomplishments and Progress

Barriers	Accomplishments
Disconnect between hydrogen information and dissemination networks	• Created http://h2101.harc.edu/ • Hosted 4 Workshops • Hosted a booth at six coordinating events to disseminate information and conduct outreach • Speaker at three coordinating events to discuss hydrogen issues
Lack of readily available, objective, and technically accurate information	• Compiled existing DOE information • Created educational posters • Expanded collaborators to include UT and GTI for local technical expertise
Regional Differences	• Hosted 4 workshops in Texas – San Antonio, Houston, Dallas/Fort Worth, and Austin.

The representative from the City's fleet department asked if he could order hydrogen powered cars today and have the infrastructure to fuel them. I suppose that, technically, one could do this but the expense and difficulty make it impractical today, except as a subsidized demonstration project.

While it makes sense for the federal government and industry to continue to develop a hydrogen transportation option, it seems too early for a City to be considering it."

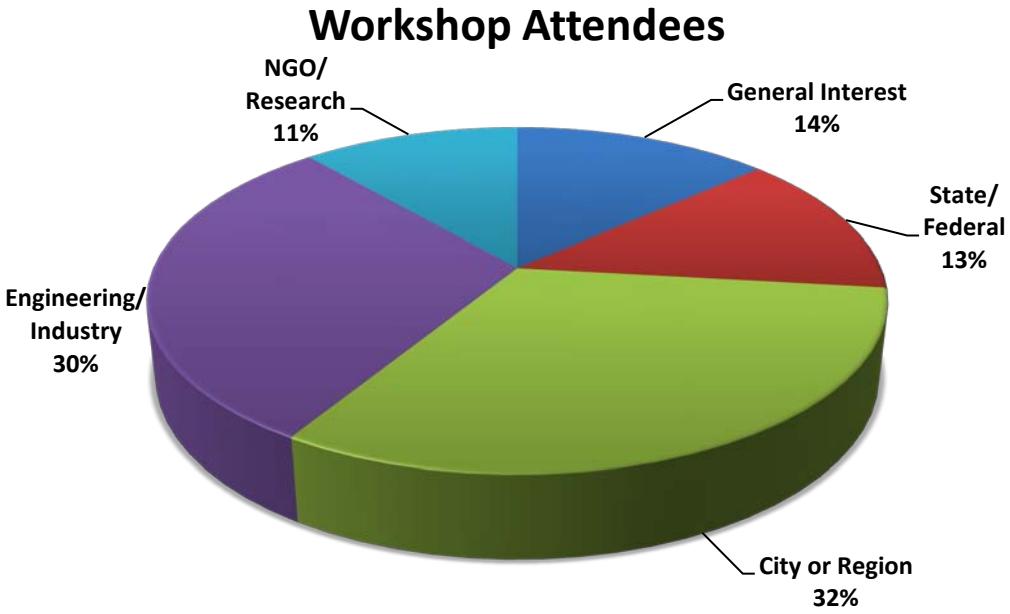
-San Antonio

Technical Accomplishments and Progress

- Project initiation and revisions
  - Project start was linked to DOE workshop with other DOE education projects (October '08)
- Project approach revised based on DOE workshop input and workshop experience
  - Shorter regional workshops to improve success and participation
  - Scheduling of parallel events with regional meetings
  - Opted to conduct all face-to-face workshops rather than webinars
  - Linkage and coordination with Clean Cities programs
  - Addition of briefings at related events in target cities
    - Education booths at Texas clean air conference (2008 and 2009)
    - Briefing of Houston Clean Cities stakeholders and Austin legislative staff
    - Displays at four related conferences and workshops in target cities (Houston, Austin, Dallas)
- Diversity of Participation
- Quiz Results

Technical Accomplishments and Progress

- Diversity of Participation



- Knowledge base of participants
  - H2 workshop quiz: 79% correct

Texas Events

Filling fuel cell bus at Austin workshop

We thought having the bus there, and someone to actually show it off and explain it as well, was very beneficial.
- DFW Clean Cities staff

Shell Eco-Marathon in downtown Houston

Fuel cell pallet trucks at Sysco Food warehouse in Houston

Fuel Cell Bus Heads for DFW Workshop

"the tour was very helpful; it demonstrated to me that fuel cell technology is a reality and that's its safe. It was very encouraging. From the tour, it was clear that for the technology price points to be competitive, there needs to be increased demand. The port is interested in participating in a demonstration project using a hydrogen fuel cell application on a yard tractor or on another viable piece of equipment here at the port."
- Port of Houston staff

Technical Accomplishments and Progress

Educational Events & Activities

- Booths and Presentations
  - Clean Air Through Energy Efficiency Conference: Plano, TX, December 14-17, 2008
  - Clean Air Through Energy Efficiency Conference: Houston, TX, October 14-16, 2009
  - Houston Clean Cities Event: Amp Up Your Fleet: June 24, 2009
  - Dallas/Ft. Worth Clean Cities Workshop: Fueling Your Alternative Fuel Vehicle Fleet: August 18, 2009
  - Texas Renewables 2009: Texas Renewable Energy Industries Association; Austin, TX, November 18-19, 2009
  - Austin Climate Expo and Alt Car Expo; Austin, TX, January 15-16, 2010
  - Houston Auto Show: January 29-30; handed out information at University of Houston Technology display
  - AICE-South Texas Chapter Meeting: Infrastructure Basics for an Emerging Hydrogen Fuel Alternative, March 4, 2010.
- Shell Eco-Marathon team sponsor for University of Houston Team Element1 with students building a prototype fuel cell vehicle
- Involvement of DOE funded hydrogen fuel cell materials handling projects (Sysco Foods in Houston)

Technical Accomplishments and Progress

Regional Coordination

- Contact with Clean Cities coordinators on project purposes and approach
- Commitments for joint meetings and communication coordination for informing stakeholder in the region
- Use of regional calendars, events, and newsletters for announcements and outreach

Collaboration

- Texas H2 Coalition
  - Subcontractor: 501(c)(6) business league/trade association
  - Workshop participation as speakers
  - Provides on-going outreach to enlist and inform target audience
- University of Texas/Center for Electromechanics
  - Fuel cell bus/fueling station and technical assistance
  - Delivered and demonstrated fuel cell bus in Dallas-Ft. Worth workshop
  - Hosted Austin workshop featuring fuel cell bus and fueling station demonstration
- Gas Technology Institute
  - Hydrogen infrastructure presentations and technical assistance
- Texas State Energy Conservation Office
  - Key state agency on energy alternatives
- NREL
  - Code workshop coordination
  - Code presentation in San Antonio workshop
- Clean Cities Programs
  - Regional contacts
  - Austin, Houston, Dallas/Ft. Worth, and San Antonio.
  - Cooperation in advertising, conducting, and attending area workshops
  - Workshops held in familiar local meeting places
- Sysco Foods
  - Food Service Industry recipient of DOE funding for hydrogen forklifts
  - Presentation for the Houston Workshop
  - Hosted a tour of their warehouse, including hydrogen fueling and forklifts
- Port of Houston staff
  - Workshop participation and follow-up discussions
- Austin Energy staff
  - Event coordination and participation
- University of Houston School of Technology
  - Eco-Marathon sponsor

Proposed Future Work

- Austin workshop, goal to “train the trainer”. Will be conducted as a webinar, with particular attention to outreach to El Paso partners
- Conduct follow up on hydrogen knowledge by participants
- Tour of materials handling warehouse
  - Tours in other Texas regions (DFW or San Antonio)
  - Materials handling workshop in collaboration with others?
- Update website for continuing use as education and outreach site
  - Add participation highlights
  - Add quiz results – how Texas participants scored
- Electronic follow-up with workshop participants to identify any regional discussions and projects
- Evaluate experience for successes and failures, and prepare a summary report to share lessons learned to increase replicability
- Completion by August 31, 2010

“We’d really like to participate in something like this again, especially if there are any follow-ups or next steps kind of assistance that can be provided”

-NCTCOG Clean Cities

Summary

- Framework in Texas
  - The state is important as one of the largest hydrogen producers and the state's role in the U.S. energy economy. The five program target areas comprise 70% of the population, and are home to most state and local leaders.
- Project Framework
  - Project activities have been in the largest metro areas.
  - Regional organizations (Clean Cities) and a hydrogen stakeholder group (Texas H2 Coalition) were essential in engaging participants.
  - Changes in the economy since developing the project strategy have affected outcomes.
    - Less involvement due to the business climate
    - Greater interest due to stimulus funds and environmental challenges in the state, but no pursuit of hydrogen projects
  - Fuel cell bus and fueling station provided real world exposure for participants – more discussion and response.
  - Materials handling and back-up power provide larger application experience