

Development of Hydrogen Education Programs for Government Officials

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Project Overview

- **Timeline**
 - August 1, 2008 thru July 31, 2011 (75% complete)
- **Budget**
 - DOE Share: \$841,611 (Education \$241,611)
 - Recipient Share: \$607,000 (Education \$12,000)
 - Funding received in FY 10: \$650,000
 - Funding for FY 11: \$0
- **Barriers**
 - Mixed Messages can create potential for conflicting public messages
 - Disconnects between hydrogen information and dissemination networks
 - Difficulties of measuring success
- **Partners**
 - Municipal Association of South Carolina (MASC)
 - South Carolina Energy Office (SCEO)
 - South Carolina Fire Marshal's Office (SFMO)
 - SC American Planners Association (SCAPA)
 - Greenway Energy LLC

Relevance

Hydrogen 101: State and Local Government Education

- To accelerate the on-going construction of the hydrogen economy in South Carolina and the Southeast by providing accurate and reliable information to state and local decision-makers.
- Challenges to overcome:
 - Lack of adequate educational materials
 - Mixed messages about hydrogen and alternative energy technologies
 - Inefficient dissemination of hydrogen educational materials
 - Lack of educated trainers

Relevance

Hydrogen 101: State and Local Government Education

2008 – 2011

- Goals
 - Identify key messages for decision makers
 - Develop varying presentation formats
 - Available time
 - Audience interest & technical level
 - Develop webinars for state and local government officials
 - Give H₂ 101 presentations to a variety of stakeholders
 - Give monthly webinars for interested stakeholders
 - Collect feedback and improve presentations

Approach

- Assess the needs of the program and the team
- Design the decision-maker targeted program
- Develop the training materials
- Deploy materials to the audience to be educated
- Evaluate the educational program

Approach

Hydrogen 101: State and Local Government Education

April 2010 – March 2011

- Specific Metrics
 - In person presentations & meetings
 - 4 originally scheduled
 - Over 30 completed
 - Webinars
 - 3 originally scheduled
 - 3 completed
 - Stakeholders reached
 - 1744

Approach

Hydrogen 101: State and Local Government Education

Task Schedule:

Milestone Number	Project Milestones	Task Completion Date			Percent Complete	Progress Notes
		Original Planned	Revised Planned	Actual		
1	Strategy & Curriculum	3/2/2009	5/31/2009	5/31/2009	100%	Completed
2	NHA Presentation	4/1/2009	4/1/2009	4/1/2009	100%	Completed
3	Y1 Annual Report	9/30/2009	9/30/2009	9/30/2009	100%	Completed
4	Y2 Annual Report	9/30/2010	9/30/2010	9/30/2010	100%	Completed
5	Y3 Annual Report	9/30/2011	9/30/2011		25%	Started
6	Project Management	12/31/2010			75%	Ongoing

Technical Accomplishments Activities

April 2010 – March 2011

- Activities
 - 3 - H₂ 101 Webinars.
 - Slideshare site (www.slideshare.net/greenwayenergy)
 - Youtube channel (www.youtube.com/greenwayenergy)
- 26 SC State legislators (SC Hydrogen Permitting Act)
- SC Department of Health and Environmental Control
- Southern Legislative Council Annual Meeting
- Leadership Aiken Conference
- SC Commission on Minority Affairs
- Urban Land Institute
- USC Energy Leadership Seminar with Jeffery Immelt
- Green is Good for Business Conference
- SC Secretary of Commerce, Bobby Hitt

Technical Accomplishments Activities (continued)

- Individual Meetings with National, State and local candidates from SC
 - Gubernatorial Candidates:
 - Staff of Nikki Haley (Elected)
 - Vincent Sheheen
 - Jim Rex
 - US Congressional Candidates
 - Tim Scott, 1st Dist (Elected)
 - Mac McCullough, 1st Dist
 - Joe Wilson, 2nd Dist (Elected)
 - Eddie McCain, 2nd Dist
 - Jeff Duncan, 3rd Dist (Elected)
 - Jane Dyer, 3rd Dist
 - Trey Gowdy, 4th Dist (Elected)
 - Paul Corden, 4th Dist
 - Mick Mulvaney, 5th Dist (Elected)
 - Ashley Cooper, Lt. Governor candidate
 - City of Columbia Mayoral candidates
 - Steve Morrison
 - Steve Benjamin, (Elected)
 - Lori Lambert, Charleston County

Complementary Activities

- Activities that enhance the Hydrogen 101 program but were not conducted directly for it.
 - SCHFCA Twitter feeds: frequent tweets highlighting hydrogen and fuel cell facts and news.
 - SCHFCA newsletters: Quarterly communications sharing recent news and upcoming events.
 - Interviews:
 - Palmetto People
 - Greater Columbia Business Monthly
 - Website
 - Fact sheets

Technical Accomplishments Feedback

March 2010 – April 2011

- Feedback
 - H₂ technologies sound good, but it would be good to better understand applications where they financially make sense
 - What is the status of the technology? When will we see everyday applications of fuel cells?
 - Where does the hydrogen come from?
 - How can we improve market adoption?
 - How can I help?
 - Financial support is tough in this economy but what other things can we do to promote the technology in the marketplace?

Technical Accomplishments Activities

April 2010 – March 2011

- H₂ 501 – Early Markets for Hydrogen Technologies
 - H₂ Technology Case Studies
 - H₂ Lift Truck Case Study
 - Telecom Backup Case Study
 - (Under review with Economic Dev. Focus Group)
 - Combined, Heat, and Power (CHP) Study
 - (Under review with Economic Dev. Focus Group)
 - Novel consensus economic models used to help decision makers understand opportunities
 - Working with 3rd parties – economic developers and technology consultants to improve model output utility
 - Developing case study parameters to best illustrate ideal and borderline cases
 - NEW Hydrogen 101 Webpage
 - Case Studies and Company (Trulite and Proterra) “Value Proposition” models to be posted on a new webpage, Summer 2011

Technical Accomplishments

Early Market Case Studies

- Finishing case study development and testing message with an Economic Developer Focus Group
- Going live with new Hydrogen 101 webpage at the South Carolina Economic Developers Association meeting, Aug 2011
- Developing summaries of studies to be published online and in journals
- Running model scenarios that are of most interest to government officials, industry, and business
- Scheduling presentations with business leaders, decision makers and government officials

Technical Accomplishments

Lift Truck Analysis Conclusions

- In a 24/7 heavy use operation, as few as 35 trucks can make a positive case
- In lighter usage, about 40-50 trucks are a good starting point to consider switch
- Economics are most sensitive to high labor costs—HFC forklifts improve productivity
- Higher hydrogen throughput improves the market value proposition
- Payback can be less than 5 years in current market
- Cost of capital will add expenses if financed

Technical Accomplishments

Telecom Backup Conclusions

- Two cases present a market value proposition:
 1. Fuel cells that replace both batteries and a diesel genset have the shortest payback period
 2. Sites with existing hydrogen fuel supply
- Delivered hydrogen cost is the dominant factor when competing against diesel gensets alone
- Need high tax burden to take full advantage of federal tax rebates after 2010
- Cost of capital will add expenses if financed

Technical Accomplishments

CHP Conclusions

- Systems analyzed are 300kW or larger
- Relative price of natural gas and electricity or “spark spread” is key for CHP systems
- Payback for Fuel Cell CHP can approach 6-8 years with current market prices
- Payback can be less than 5 years with state level incentives
- For SC electricity prices (\$0.075/kWh), state tax incentives are needed for fuel cells to compete with turbines for CHP
- Hot water demand significantly helps economics
- Cost of capital will add expenses if financed

Technical Accomplishments

Southeastern States Education and Outreach

- Goal:
 - Work with stakeholders in neighboring southeastern states to identify tapped and untapped resources that can cooperatively become an economic engine for the state
 - Encourage the formation of Hydrogen and Fuel Cell Clusters by teaching stakeholders about the “Best Practices” used in South Carolina
 - Promote cooperative efforts among multiple states
- States to Collaborate with:
 - Florida
 - Tennessee
 - North Carolina

Technical Accomplishments

Southeastern States Education and Outreach

- Document the “best practices” that have benefited the South Carolina Hydrogen and Fuel Cell Economic Cluster
- Identify stakeholders with knowledge about the industry, research facilities and projects in neighboring southeastern states
- Work with stakeholders to identify resources in SE states that may be the start of state’s Hydrogen and Fuel Cell Economic Cluster
- Survey economic developers in SE states about opportunities to use Market Value Proposition case studies to promote fuel cells for forklifts, CHP and telecom back up power
- Document and report the state’s resources that make a case for a Hydrogen and Fuel Cell Economic Cluster
- Travel to meet with thought leaders, potential champions and regional economic developers to present “Best Practices” and highlight existing resources that could make up an Economic Cluster

The South Carolina Hydrogen and Fuel Cell Alliance

- A non-profit Public/Private Partnership of academic, government and business coordinating resources in South Carolina to advance commercialization of hydrogen and fuel cells.
- Areas of focus:
 - Education and Outreach
 - Infrastructure Development
 - Policy Development and Implementation
 - Research and Technology Transfer
- Project Team:
 - Municipal Association of South Carolina (MASC)
 - State Energy Office
 - Office of the State Fire Marshal
 - Greenway Energy



Summary

- Completed 2010 targets for presentations and reached a target group of stakeholders with emphasis on new elected officials
- Audiences are engaged in presentations and want to learn more about hydrogen and fuel cells
- Presentations have focused mostly on showcasing industries with a market value proposition for hydrogen fuel cells
- Updates to material continue to focus on case studies and interviews of fuel cell users
- Continuing to update presentation and web materials
- Expanded project includes work with other Southeastern States