Raising H2 and Fuel Cell Awareness in Ohio

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May 17, 2012
ED013

This presentation does not contain any proprietary, confidential, or otherwise restricted information.

Overview

Timeline

- Start-October 31, 2008
- Finish-6/30/2012
- 90% Complete

Budget

- Total project funding
  - DOE-$199,500
  - Contractor share - $27,300
  - Funding in FY11
    $0
  - Funding in FY12 - $0

Barriers

- Lack of educated trainers and training opportunities
- Mixed messages
- Lack of Readily Available, Objective, and Technically Accurate Information

- **Partners**
  - Funding Partners
    - The Ohio Department of Development (ODOD)
    - Edison Materials Technology Center (EMTEC)

Overview

- Partners (cont'd)

Interactions/Collaborations

Ohio Board of Regents
Ohio Department of Education
Great Lakes Science Center
Rolls Royce
Stark State College
City of Dublin
Kent State University
The Ohio State University
Youngstown State University
AEP
Hocking College Advanced
Energy Institute
Ohio Society of Professional Engineers
Ohio Senate
Akron Sierra Club
STEM Educators
Ohio House of Representatives
Battelle
GrafTech
City of Mansfield
Green Pathways
NASA Glen
Air Force Research Lab
Ohio Fuel Cell Coalition Members
Lorain County Community College

Relevance

Objectives: The overall objective of proposed program is to increase the awareness and understanding of state and local government officials in Ohio concerning hydrogen and fuel cell technology; thereby, accelerating the deployment of clean energy solutions, which will improve our environment, decrease our dependence on foreign energy, and bolster the manufacturing sector.

This increase in the awareness and understanding will directly contribute to the following Hydrogen Education Subprogram objectives:

- By 2012, increase understanding of hydrogen and fuel cell technologies among state and local governments by 10 percent compared to 2004 baseline
- By 2012, increase knowledge of hydrogen and fuel cell technologies among key target populations (state and local governments) by 20 percent compared to 2004 baseline

Relevance

The specific objectives of the proposed program are to:

Objectives (cont'd)

- Compile a succinct set of educational materials that will educate the target audience, state and local government officials, about the benefits and economic development opportunities associated with hydrogen and fuel cell technologies.
- Prepare an informative and engaging agenda for the forums and market the forum appropriately.
- Conduct approximately nine forums around the state that will raise the awareness of government stakeholders as to the environmental, economic and other benefits of hydrogen and fuel cells.

Relevance

Objectives (cont'd)

- Include in the nine regional forums, statewide and region specific information about fuel cell companies, research entities and community colleges concerning fuel cell activities and give examples of early market deployment and manufacturing operations.

- Publish a bi-annual newsletter that will keep the target audience informed about technical, legislative and business developments related to hydrogen and fuel cell technologies.

- Measure the increased awareness of state and local government officials using the metrics from the DOE Hydrogen Education Subprogram 2004 Baseline Study and additional instruments to determine knowledge of financial incentives, university and college workforce development programs, and awareness of specific local company activities.

Impact on Addressing Barriers

Knowledge of Fuel Cells has increased significantly during the May 2011 to May 2012 timeframe. The Ohio Fuel Cell Coalition has presented 32 Forums in various locations around the State of Ohio to an audience of 745 people. We surveyed each targeted audience on their knowledge of fuel cells and its importance in revitalizing the manufacturing sector and in creating jobs. The results have been very favorable.

Other milestones achieved:

- Developed set of introductory materials suitable for a non technical audience (3Q, 2011)
- Developed material for community seminars (3Q, 2011)
- Developed database of state activities (3Q, 2011)
- Hold “Hydrogen 101” seminars (3Q, 2011 through 3Q, 2012)

Approach

Ohio Fuel Cell Coalition approach to educating the targeted audience on fuel cells was to hold regional forums throughout the State of Ohio with Partners that we mentioned earlier. This approach allows the Region to see the progress that has been made in the fuel cell arena not only across the State but also specifically in the Region.

Technical Approach

- Regional Forums which includes “Fuel Cells 101”, a statewide overview with a regional emphasis. Stressing how the Ohio Fuel Cell Initiative is helping retain and create jobs.
- Regional Forums include information on early fuel cell successes in Ohio - i.e. forklifts, stationary, military applications, and supply chains strengths.
- We have also included in our forums how fuel cells act as an enabler with other alternative energy areas.

Target Audience and Approach

The target audience for the proposed program are state, federal and local government officials that will be affected by the manufacturing and deployment of fuel cell technologies in their regions. Also, included in this group will be economic development, transit, and public utilities individuals. These represent the key decision makers framing the future of Ohio's fuel cell industry and early deployment of fuel cell applications for stationary power generation, niche transport, and public transit.

Target Audience and Approach

Target Audience Segments (in order of importance)

Elected Officials ~550	• Retaining or increasing employment • Need for less expensive, clean alternative energy sources • Need for accurate, current information • Demonstration opportunities
Economic Development ~100	• Retaining or increasing employment • Business matchmaking opportunities • Demonstration opportunities • Need for accurate, current information
Transit ~50	• Efficient fleet vehicles • Demonstration opportunities • Need for less expensive, clean alternative energy sources • Need for accurate, current information
Utilities & Public Safety ~500	• Need for accurate, current information; • Need for less expensive, clean alternative energy sources • Demonstration opportunities

Total 1,200

Approach

Milestones

Task 1: Review Educational Materials

Subtask 1.1 – Define Needs
A program steering committee of ODOD and EMTEC determined the criteria for the forum. This included the following: nontechnical and concise; application focus; consistent with the DOE Hydrogen Education subprogram. **(Complete)**

Subtask 1.2 – Review and Compile Materials
Materials were reviewed and compiled and we determined to have general fuel cell information materials with an emphasis on regional activities. **(Complete)**

Subtask 1.3 – Material Approval
The steering committee commented and approved all materials. **(Complete)**

Task 2-Forum Preparation

Subtask 2.1 – Target Audience Database
OFCC sought out the most cost effective marketing and communication channels to reach the audience taking advantage of emailing when available and appropriate. ODOD helped significantly in this endeavor. **(Complete)**

Subtask 2.2 – Preparation of Forum Materials
Prepared all the forum materials for all events from May, 2011 to May, 2012. These materials consisted of: Regional presentations, packages of information which included all educational materials previously prepared. The local events will be served coffee ,water and sometimes brunch. **(Ongoing)**

Subtask 2.3 – Market Forums
We secured various databases from our Regional Partners along with using the OFCC database to market the forums. We also issued press releases in the various areas. **(Ongoing)**

Subtask 2.4 – Venue and Logistics
All venues and logistics were researched and secured. **(Complete)**

Approach

Milestones

Task 3 – Educational Forums

Subtask 3.1 – Conduct Forums

The following Forums were held in the past year: April 18-19, 2011 – Ohio Fuel Cell Symposium, North Canton, OH (200 people); May 21, 2011 – Ohio Society of Professional Engineers, Warrensville, OH (40 people); May 31, 2011 – Muirfield Dublin Reception, Dublin, OH (25 people); June 7, 2011 – Community Leaders Forum, Lima, OH (25 people); Community Leaders Forum, Perrysburg, OH (20 people); August 12, 2011 – Lorain County Community College, Elyria, OH (20 people); NorTech B2B Conference, Cleveland, OH (70 people); Global Business Forward, Gahanna, OH (30 people); Community Leaders Forum, Dayton, OH (60 people); Manufacturing Educational Council, Akron, OH (25 people); Ohio Reception at Fuel Cell Seminar, Orlando, FL (100 people); November 15, 2011 - Community Leaders Forum, Athens, OH (40 people); May 1, 2012 - Supply Chain Exchange at Ohio Fuel Cell Coalition Symposium, Elyria, OH (100 people); May 1-2, 2012 – Ohio Fuel Cell Coalition Symposium, Elyria, OH (200 – 230 people, estimated). **(Ongoing)**

Subtask 3.2 – Conduct Internet Web Seminars

Webinars were determined not to be an appropriate way to reach our target audience. **(Complete)**

Task 4 – Follow up Activities

Subtask 4.1 – Draw Audience

The task of drawing an audience to the 2012 Symposium started during this time frame. The venue for this years symposium will be in Elyria at the Lorain County Community College. **(Ongoing)**

Subtask 4.2 – Newsletter

Follow up the forums by disseminating a newsletter— the bi-annual newsletter has been changed to a bi-monthly newsletter and/or fact sheet that is published specifically to provide timely, accurate, hydrogen and fuel cell information to government stakeholders, community leaders, industry and university professionals. **RESULTS – The OFCC has distributed 10 bi-monthly newsletters instead of bi-annual to a 5000 member data base which includes government stakeholders.** **(Ongoing)**

Approach

Milestones (continued)

Subtask 4.3 – Matchmaking and Other Services
Follow up the forums with matchmaking services – Linking of government agencies, fuel cell companies and end users to facilitate demonstrations and early market adoption.
RESULTS – The OFCC has various meetings linking fuel cell companies, suppliers and end users to early market adopters to facilitate access to capital, the supply chain and other economic development incentive programs. (Ongoing)

Task 5 – Program Management

Subtask 5.1 – Program Management
The OFFC partnered with EMTEC to insure oversight and to coordinate efforts including invoices and other administrative duties. **(Ongoing)**

Subtask 5.2 – Define Metrics
The OFCC surveyed all audiences in the forum on their knowledge of Fuel Cells, Ohio's fuel cell initiative and other Ohio based programs such as: College Workforce development programs, financial incentives and most important awareness of specific regional activities. **(Ongoing)**

Subtask 5.3 – Reporting
The OFFC got off to a slow start and was late with its quarterly reports but is now caught up. **(Ongoing)**

Technical Accomplishments and Progress

Knowledge of Fuel Cells has increased significantly during the May, 2011 to March, 2012 timeframe. The Ohio Fuel Cell Coalition has presented 32 Forums in various locations around the State of Ohio to an audience of 745 people. We surveyed each targeted audience on their knowledge of fuel cells and its importance in revitalizing the manufacturing sector and in creating jobs in Ohio. The results have been very favorable.

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Technical Accomplishments and Progress

- Number of Forums
  - The original plan was to do 9 forums in the State and last year we held 15 forums and this year we held 32 for a total of 47 forums.
- Increased Number of Attendees
  - Our original goal was to have 1,200 attendees and last year we attracted 745 and the two reporting years before we had 1,735 attendees for a total of 2,480 attendees.

Results of Survey Questions

- Benchmark Knowledge of Fuel Cells
  - The original benchmark of knowledge of Fuel Cells ranged from no knowledge to very knowledgeable with the vast number in the range of no knowledge to some knowledge. After the forums the range of knowledge has shifted from some knowledge to good knowledge.
- Did we have the appropriate information distributed at the forums?
  - The overwhelming response to this survey question was “Yes” that the information provided helped increase individuals knowledge of fuel cells.

Technical Accomplishments and Progress

Results of Survey Questions (cont'd)

- Awareness of the Fuel Cell Industry in Ohio
  - The overwhelming response to this questions was yes compared to their original knowledge of the Fuel Cell Industry in Ohio.

- Economic Impacts of the Fuel Cell Industry in Ohio
  - The forums certainly helped increased the knowledge of the economic impact of Fuel Cells in the State of Ohio. After the forums the surveys shifted the knowledge from little or no knowledge to overwhelmingly knowledgeable

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- **Creation of Fuel Cell Coalition Portal/Database**
  - The OFCC will be formally launching a portal that will contain information on fuel cells and equipment available to companies for Fuel Cell R&D, deployment and assistance. The portal was discussed during each forum. The OFCC has also built a substantial database during this time frame which included the targeted audience.

Collaborations

PRIME – (Helped in preparing, reviewing and assisting with forums.)

- EMTEC
- Ohio Department of Development

UNIVERSITIES - (Helped in hosting or presenting forums.)

- Ohio Board of Regents
- Hocking College Advanced Energy Institute
- Stark State College
- Youngstown State University
- The Ohio State University
- Kent State University
- University of Toledo
- Ohio Northern University
- Ohio University

INDUSTRY - (Helped in hosting or presenting forums.)

- Rolls Royce
- Battelle
- GrafTech
- Crown Equipment
- Gorman-Rupp
- American Trim
- Catacel
- Technology Management Inc.
- Lockheed Martin
- Honda
- Plug Power

FEDERAL LABS - (Helped in hosting or presenting forums.)

- NASA
- ARFL

Proposed Future Work

- Draw audience to 2012 OFCC Symposium
  - One of the most effective and cost effective means of following up with government stakeholders is drawing them to the annual Ohio Fuel Cell Symposium This meeting will detail the matchmaking and other follow-up services OFCC provides as part of this program and on its own this year's symposium will emphasize a supply chain exchange forum.
- After the 2012 Symposium we will hold additional forums in Cleveland, Akron, and Columbus.
- We will compile all survey results and compare to original milestones.
- After the final forum, we will compile a newsletter summarizing all forums in the last 12 months.

Supply Chain Exchange

OFCC Symposium – May 1 - 2, 2012

- Every fuel cell manufactured in the USA has an Ohio Component
- Because of the automotive and aerospace industries, Ohio is rich with supply chain companies that will complement the fuel cell industry
- Ohio supply chain companies have excellent quality and reasonable costs.
- Ohio has strong fuel cell supply chain companies including balance of plant, component and materials suppliers and service providers.
- Ohio has reasonable wages
- Ohio will ask fuel cell companies what their needs are and help fulfill those needs.
- LCCC has a Fabrication Laboratory (Fab Lab) and SMART center for inexpensive rapid prototyping

Project Summary

- **Relevance:**
  - The proposed program demonstrates a strong fit with the objectives of the Hydrogen Education subprogram by targeting state and local government decision makers; thereby, acting as a conduit for the DOE and raising the awareness of this important stakeholder group.
- **Approach:**
  - Ohio Fuel Cell Coalition approach is to educate the targeted audience on fuel cells by holding regional forums throughout the State of Ohio with various partners and collaborators. This approach allows the regions to see the progress that has been made in the fuel cell arena not only across the State but also specifically in the Regions.
- **Technical Support and Accomplishments:**
  - Knowledge of Fuel Cells has increased significantly during March 2011 to March, 2012 timeframe. The Ohio Fuel Cell Coalition has presented 32 forums in various locations around the State of Ohio to an audience of 745 people. We surveyed each targeted audience on their knowledge of fuel cells and its importance in revitalizing the manufacturing sector and in creating jobs in Ohio. The results have been favorable.

Project Summary

- **Collaborations:**
  - **As noted earlier our collaborations have increased significantly in the past year. Our collaborators included prime contractors and a host of 24 collaborators including universities, industry, and federal labs.**

- **Future Work:**
  - **Draw audience to annual 2012 Ohio Fuel Cell Symposium. Which also included matchmaking services and collaborations. We will also be holding an additional 3 - 4 forums throughout the State.**
  - **We will then compile total results and summarize the findings.**

Supplemental Slides

Why Fuel Cells in Ohio

Ohio is competitively advantaged to participate in the fuel cell/hydrogen economy growth, and developing this industry is critical to Ohio interests:

- Builds on Ohio's manufacturing infrastructure and can help reverse the decline in manufacturing jobs
- Returns Ohio as the driver in a critical segment of industry, and acts as economic lever for additional technology development
- Creates high skill/high income jobs

Ohio Competitive Advantages -
- support for industry growth

- **Technical support**
  - University R&D/collaboration
    - Research entities – Case, Akron University, Youngstown State University, OSU, Battelle, Ohio University
    - Federal labs– NASA GRC, Air Force Research Lab
  - Community and Technical Colleges - Stark State College, Lorain County Community College, Hocking College Advanced Energy Institute
  - Industrial manufacturing and advanced materials expertise – Wirenet, Magnet, EWI

- **Business support**
  - Team NEO, ODOD, Stark Development Board, EWI, Akron Regional Development Board, TechColumbus, Columbus2020
  - Ohio Fuel Cell Coalition

- **Supply chain**
  - American Trim, NexTech Materials, GrafTech, Catacel, Die-Matic, Gorman Rupp, RSI, Ashlawn Energy, Innoventures, item North America, Faraday Technologies, Azbil Yamatake, AMREL, Mound Technical Solutions.

"There is not a fuel cell manufactured in the U.S. that does not have Ohio components"

Ohio Competitive Advantages

- **Integrators**
  - Rolls-Royce Fuel Cell Systems Inc, TMI, Lockheed Martin, Honda, Energy Technologies Inc., NexTech Materials, Battelle, Crown Equipment Corp.
- **Financial support**
  - Third Frontier Fuel Cell initiative, Team NEO, ODOD, Columbus2020, CincyTech
- **Central logistics and manufacturing location**
  - Within 500 miles of 60% of US markets
  - Proximity to auto manufacturers; access to entire state manufacturing sector

Ohio Competitive Advantage

Fuel Cell Patents

- 1995 - 97: **12** fuel cell patents granted in Ohio.
- 2005 - 07: **144** fuel cell patents granted in Ohio.

1200% change in a 10-yr period! (*SRI report 2009*)

Fuel Cell Workforce

- In 2010, Ohio employed 9.8% of all U.S. residents who work in the fuel cell/hydrogen industry. Ohio represents 3.7% of the U.S. population, according to 2010 figures from the U.S. Census Bureau.

Ohio: Growing Activity and Visibility in Fuel Cell Industry

Company investments or projects

- Rolls-Royce Worldwide HQ located in Canton
- NexTech Materials (Columbus)
- Crown Equipment (New Breman)
- Catacel-Fuel Cell Processing
- Battelle-GPU/APU
- ETI (Mansfield)
- Lockheed Martin/TMI (Akron)

OHIO'S ACCOMPLISHMENTS

- $300 Million in leverage
- National and Global recognition
- One of top 5 fuel cell states in US
- Research
- Supply chain leadership
- Educational initiatives

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