Education and Outreach
- Session Introduction -

Gregory Kleen

2012 Annual Merit Review and Peer Evaluation Meeting
May 17, 2012
Goals and Objectives

• Goals - Educate key audiences about hydrogen and fuel cell technologies to facilitate near-term deployment, early adoption, broad commercialization, and long-term market acceptance

• Objectives
  • Increase the acceptance as a part of a clean energy portfolio
  • Increase general knowledge of the benefits in multiple applications among the key target audiences
  • Increase awareness of the potential full range of applications (e.g., not just light-duty vehicles and buses)
Objectives

• Increase the acceptance of the use of hydrogen and fuel cell technologies as a part of a clean energy portfolio of energy efficiency and renewable energy technologies in federal, state, and local government investments, and private sector investments

• Increase general knowledge and awareness of the benefits of the use of hydrogen and fuel cell technologies in multiple applications among the key target audiences

• Increase awareness of the potential full range of fuel cell and hydrogen applications (e.g., not just light-duty vehicles and buses)
## Audiences

Educate key audiences about hydrogen and fuel cell technologies to facilitate near-term demonstration, commercialization, and long-term market acceptance

<table>
<thead>
<tr>
<th>Audience</th>
<th>Rationale</th>
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<tbody>
<tr>
<td>Potential End Users</td>
<td>Potential early adopters need information about commercially available hydrogen and fuel cell products and the opportunities for incorporating them into their current and future operations</td>
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<td>State and Local Government Representatives</td>
<td>A broad understanding of hydrogen supports decision-making on current opportunities and lays the foundation for long-term change</td>
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<tr>
<td>University Faculty and Students</td>
<td>Interest is high; graduates needed for research in government, industry, academia, and related green jobs; workforce development needed for next generation</td>
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<td>Other Teachers and Students</td>
<td>Interest is high; teachers looking for technically accurate information and usable classroom activities; students being exposed to career possibilities</td>
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<td>Local Communities/General Public</td>
<td>Will be more likely to welcome local demonstration projects when they are familiar with hydrogen</td>
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<tr>
<td>First Responders</td>
<td>Must know how to handle potential incidents; their understanding can also facilitate local project approval</td>
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<td>Code Officials</td>
<td>Must be familiar with hydrogen to facilitate permit process and local project approval</td>
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Challenges

- Resistance to change
  - Low awareness
  - Few examples of real-world use
  - “What’s in it for me?” factor
- Lack of readily-available, objective, technically-accurate and “easily digestible” information
- Mixed messages
- Disconnect between hydrogen/ fuel cell information and traditional dissemination networks
- Lack of educated trainers and training opportunities
- Regional differences
- Difficulty measuring success
- High soft costs for deployments (insurance, permitting, uniform codes and standards)
Five University Projects: Curricula and workforce development

- Graduate Certificate in Hybrid and Electric Vehicles from Michigan Tech
- Hydrogen and Fuel Cell Technology concentration at University of North Carolina at Charlotte
- 2 intern positions at Protonex
- Summer interns at NREL, ORNL, and the National Center for Hydrogen Technology

Two Secondary-Education Projects: Curriculum development & Teacher training

- “H2 Educate!”:
  - Over 9,100 middle school teachers in 35 states
  - 90% felt that resources increased effectiveness of lesson plans
  - Disseminated via 13 presentations to secondary science educators and hydrogen and fuel cell professionals
  - Two-week curriculum
  - Reached over 500 teachers
Hydrogen Student Design Contest

• 2011 contest
  • included 54 teams from 19 countries, including 7 top engineering schools
  • Topic was Residential Fueling with Hydrogen
  • Grand Prize Winner - University of Waterloo

• 2012 contest
  • includes 33 teams are competing
  • Topic is Combined Heat and Power System for a University Campus Using Local Resources
  • Winners will be announced at 2012 WHEC June 3-7 in Toronto, Canada

The Grand Prize winning team from the University of Waterloo at the 2011 Fuel Cell and Hydrogen Energy Conference in Washington, D.C.
Seven State and Local Government Projects: Developed case studies, best practices, & technical assistance resources

- Conducted workshops
- Launched webinar series directed at State/Local officials
  - More than 1500 attendees for the 10 webinars
- Created a segment focusing on fuel cells that was aired on PBS's *Motorweek* series
- Created fuel cell roadmaps for 7 states in the Northeast region
- Conducted "matchmaking" events that link government agencies, fuel cell companies, and supply chain for further development
Progress: Early Adopters

• Early Market Outreach
  – Hands-on education sessions at material handling equipment dealerships, community colleges, & green business expos

• Expanding library for stakeholder use
  – Fact Sheets
    • Fuel Cells for Material Handling (hydrogenandfuelcells/education/pdfs/early_markets_forklifts.pdf)
    • Fuel Cells for Emergency Backup Power
  – Commissioned reports by Fuel Cells 2000:
    • Business Case for Fuel Cells Report
    • Fuel Cells Market Report
    • State-of-the States Report (http://www1.eere.energy.gov/hydrogenandfuelcells/technical_info.html)

• Expanding customer success stories
  • FuelCell Energy (http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/sbir_fuelcell_energy.pdf)
  • Proton Energy Systems (http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/sbir_proton.pdf)
  • CERL backup power
Progress: State Project Example, CCAT

Connecticut Center for Advanced Technology

- Developed Web-based virtual resource center to assist key stakeholders in Northeast states
  - Provides online tools to quantify costs and benefits at potential sites.
  - Models address environmental value, energy management, renewable hydrogen generation, distributed technology comparisons, and cost/economics of stationary fuel cells.
- Organized a “matchmaking” event that brought together suppliers and original equipment manufacturers (OEMs) from the Northeast region. Set up 12 meetings with each OEM.
- Initiated Northeast Cluster group for state leaders to collaborate

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<th>CT</th>
<th>NY</th>
<th>MA</th>
<th>ME</th>
<th>NH</th>
<th>RI</th>
<th>VT</th>
<th>NJ</th>
<th>Regional</th>
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<tr>
<td>Total Employment</td>
<td>2,529</td>
<td>1,728</td>
<td>964</td>
<td>18</td>
<td>45</td>
<td>32</td>
<td>16</td>
<td>111</td>
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<tr>
<td>Total Revenue / Investment ($ million)</td>
<td>$496</td>
<td>$292</td>
<td>$171</td>
<td>$2.9</td>
<td>$8.7</td>
<td>$6.9</td>
<td>$3.3</td>
<td>$26.5</td>
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<tr>
<td>Total Supply Chain Companies</td>
<td>599</td>
<td>183</td>
<td>322</td>
<td>28</td>
<td>25</td>
<td>19</td>
<td>5</td>
<td>8</td>
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Virginia Clean Cities Produced and Aired a series of three videos for the *Motorweek* series on PBS

- Vehicles and Infrastructure Update: included footage showing fuel cell electric cars and buses, hydrogen fueling stations, and the production of hydrogen from biogas
  - Began airing 10/22/2011
  - [http://video.pbs.org/video/2165096277](http://video.pbs.org/video/2165096277)
Monthly Webinar Series

Target State & Local Government Officials and Stakeholders
to Facilitate Market Acceptance

- Planned for 1st Tuesday of every month
- Audiences include state energy fund managers, state & local officials, project developers, and technology providers
- More than 300 attendees for the last three webinars:
  - America’s Next Top Energy Innovator Runner Up (April 2012)
  - National Hydrogen Learning Demonstration Status (Feb 2012)
- Upcoming Webinars:
  - June 2012: Recent fuel cell licenses
  - July 2012: Portable power
  - August 2012: Mobile lighting

We are requesting topics for future webinars and value your input!

(http://www1.eere.energy.gov/hydrogenandfuelcells/webinars.html)
Monthly newsletter includes recap of previous month’s news and events and a preview of upcoming activities.

Visit the web site to register or to see archives ([http://www1.eere.energy.gov/hydrogenandfuelcells/newsletter.html](http://www1.eere.energy.gov/hydrogenandfuelcells/newsletter.html))
Published more than 70 news articles in FY 2011
(including blogs, progress alerts, and DOE news alerts)

Communication and Outreach Activities include:

• **News Items:**
  - “Energy Department Awards More than $5 Million to Reduce Cost of Advanced Fuel Cells”
  - “Energy Department Announces up to $10 Million to Promote Zero Emission Cargo Transport Vehicles”
  - “SBIR/STTR Phase I Release 3 Technical Topics Announced, Fuel Cells and Hydrogen Storage Included”
  - “DOE Announces up to $2 Million to Collect Data from Hydrogen Fueling Stations and Demonstrate Innovations in Hydrogen Infrastructure Technologies”

• **Monthly Newsletter**

• **Blogs Published to Energy.gov website include:**
  - “Leaders of the Fuel Cell Pack”
  - “Fuel Cell Lift Trucks: A Grocer’s Best Friend”

"These technologies are part of a broad portfolio that will create new American jobs, reduce carbon pollution, and increase our competitiveness in today's global clean energy economy."
Participating Organizations

• **State & Local Government Projects**
  – Virginia Clean Cities
  – Technology Transition Corporation
  – Houston Advanced Research Center
  – South Carolina Hydrogen and Fuel Cell Alliance
  – Clean Energy States Alliance
  – Connecticut Center for Advanced Technology, Inc.
  – Ohio Fuel Cell Coalition

• **Early Adopters**
  – Carolina Tractor

• **Middle & High Schools**
  – National Energy Education Development Project
  – UC-Berkeley Lawrence Hall of Science

• **University Projects**
  – Humboldt State Univ.
  – University of Central Florida/UNC-Charlotte
  – Cal State-LA
  – Michigan Tech (MTU)
  – Univ. of North Dakota
  – Hydrogen Education Foundation

Note: all projects were competitively selected and were fully funded through FY10 appropriations
Reviewer Reminders

• Deadline to submit your reviews is **May 25th at 5:00 pm EDT.**

• ORISE personnel are available on-site for assistance.
  - **Reviewer Lab Hours:** Tuesday – Thursday, 7:30 am – 8:30 pm; Friday 7:30 am – 1:00 pm.
  - **Reviewer Lab Locations:**
    - Crystal Gateway Hotel—Rosslyn Room (downstairs, on Lobby level)
    - Crystal City Hotel—the Roosevelt Boardroom (next to Salon A)

• Reviewers are invited to a brief feedback session – at 11:30 am today, in this room.
Session Instructions

- This is a review, not a conference.
- Presentations will begin precisely at scheduled times.
- Talks will be 20 minutes and Q&A 10 minutes.
- Reviewers have priority for questions over the general audience.
- Reviewers should be seated in front of the room for convenient access by the microphone attendants during the Q&A.
- Please mute all cell phones and other portable devices.
- Photography and audio and video recording are not permitted.
Education Sub-program

DOE

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