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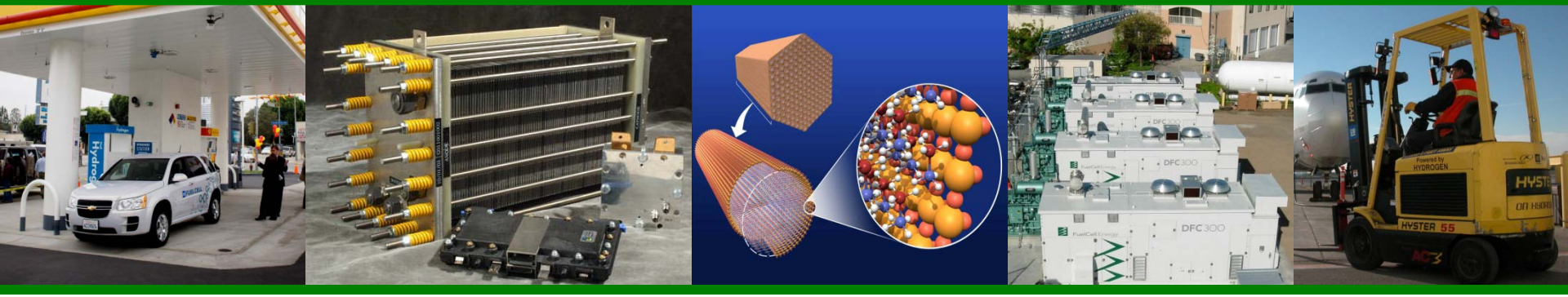

Education Sub-program
- Session Introduction -

Carole J. Read

2011 Annual Merit Review and Peer Evaluation Meeting
May 10, 2011

Goals & Objectives

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

Audience	Rationale
First Responders	Must know how to handle potential incidents; their understanding can also facilitate local project approval
Code Officials	Must be familiar with hydrogen to facilitate permit process and local project approval
Potential End Users	Potential early adopters need information about near-term opportunities
State and Local Government Representatives	A broad understanding of hydrogen supports decision-making on current opportunities and lays the foundation for long-term change
Local Communities/ General Public	Will be more likely to welcome local demonstration projects when they are familiar with hydrogen
University Faculty and Students	Interest is high; graduates needed for research in government, industry, academia, and related green jobs
Other Teachers and Students	Interest is high; teachers looking for technically accurate information and usable classroom activities

Goals & Objectives

- By 2011, expand availability of university curricula developed under FY 2008 solicitation and expand availability of case studies for near-term market applications.
- By 2012, complete analysis tool to estimate economic and job impacts of early market fuel cells on regional, state and national levels.

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

Progress: University/Pre-college

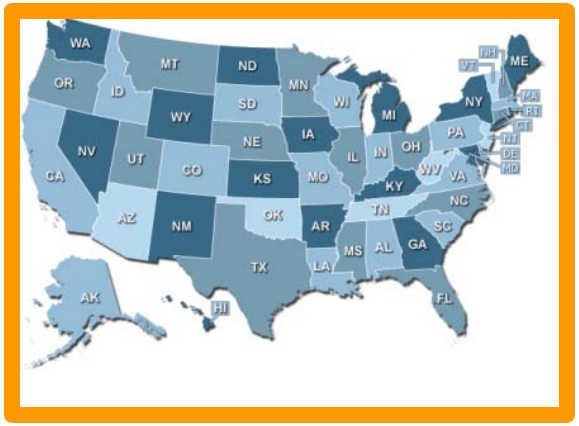
5 University Projects: Curricula include general education, specialized science & engineering courses, minor & concentration programs, modules, & internships

- Finalized development and are concentrating on teaching, reviewing, & refining
- Taught over 25 courses
- Created a Certification in Hybrid Electric Drive Vehicle Engineering for graduate students
- Leveraged undergraduates with student-taught middle school & high school workshops

Pre-college: Curriculum development &Teacher training

- "H2 Educate!": Reached over 8,000 middle school teachers through workshops & conference sessions in 35 states
- "HyTEC": Introduced additional 240 teachers to course materials at science teacher conferences across the country

Progress: Local/State Gov't



7 State and Local Government Projects: Developed case studies, best practices, & technical assistance resources

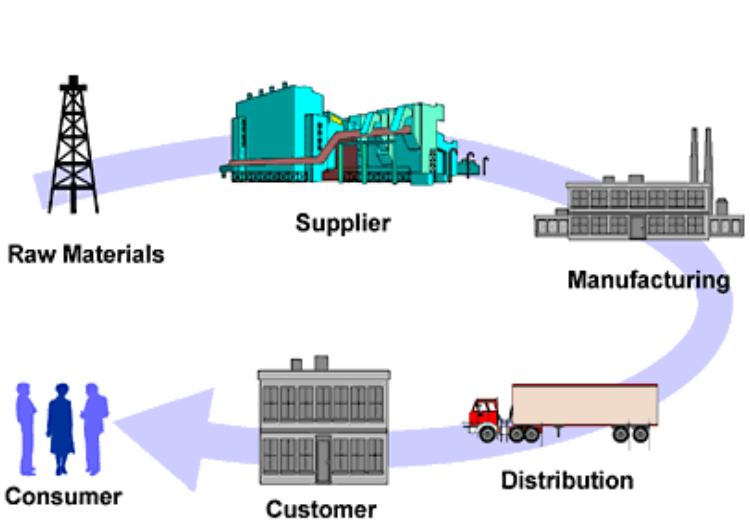
- Conducted over 80 workshops
- Launched webinar series directed at State/Local officials
- Developed a excel tool to assess the job and economic impact of fuel cell deployment in early markets
- Created 2 segments focusing on fuel cells to be aired on PBS's Motorweek series
- Created a database of stakeholders for the Northeast
- Conducts "matchmaking" process that links government agencies, fuel cell companies, and end users for further development

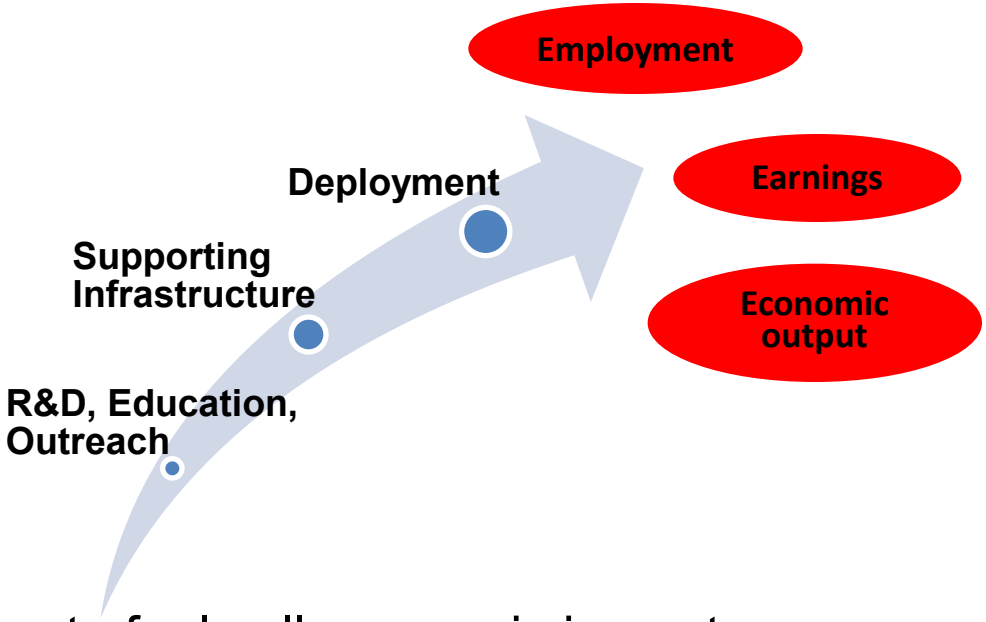
Progress: Early Adopters

SUCCESS: one site is acquiring 100 fuel cell forklifts as a result

- Early Market Outreach
  - Hands-on education sessions at material handling equipment (MHE) dealerships, community colleges, & green business expos
  - SUCCESS: one site is acquiring 100 fuel cell forklifts as a result
- Expanding library of fact sheets for stakeholder use:
  - Fuel Cells for Material Handling
    - hydrogenandfuelcells/education/pdfs/early_markets_forklifts.pdf
  - Case study Verizon Fuel Cell CHP experience
    - http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/fccs_verizon10.pdf
  - Case study Fuels Cells at Omaha Bank Data Center
    - http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/fccs_omaha10.pdf
  - Commissioned reports by Fuel Cells 2000: http://www.fuelcells.org/
    - Business Case for Fuel Cells Report
    - Fuel Cells Market Report
    - State-of-the States Report

Progress: Early Market Job Estimator





- ANL-RCF developed tool to estimate fuel cell economic impacts:
  - Production (PEMFC, PAFC and MCFC) in target applications
  - Installation of FCs and required infrastructure
  - O&M including fuel
  - Construction/expansion of manufacturing capacity
- State, regional and national level analyses
- Supply chain impacts using 440 sector input-output multipliers
- Applications in forklifts, back-up power & specialty vehicles

Progress: State Project Example, CCAT

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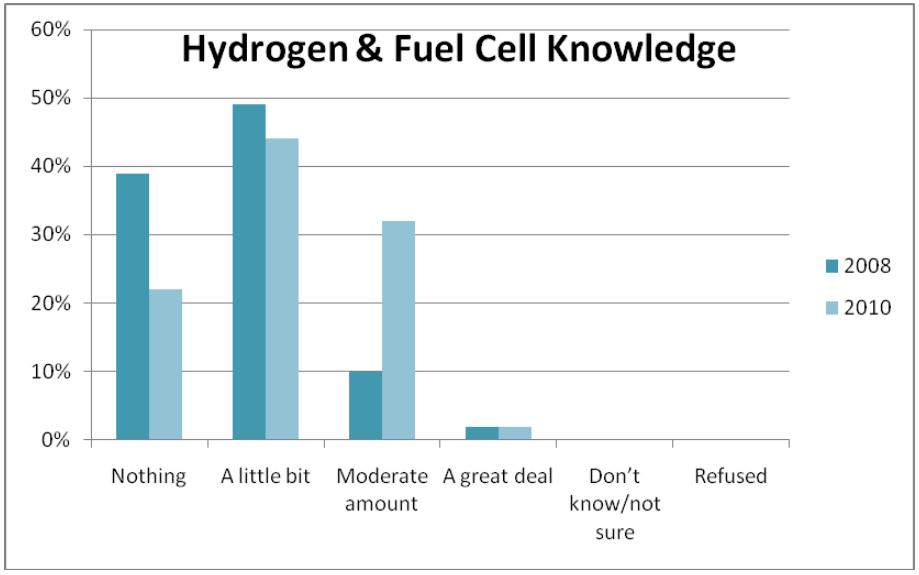
Connecticut Center for Advanced Technology

- Developed database of key stakeholders in Northeast states
- Assessed the economic impact of the hydrogen and fuel cell industry (H_2/FC) in an 8-state region (NE, NY, NJ)
- Surveyed the Level of Knowledge of State and Local Decision Makers and Key Stakeholders

Progress in outreach to targeted audiences:

Up to 200% increase in knowledge level



Fuel Cell Videos

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Virginia Clean Cities Produced and Aired on PBS Motorweek Series

- Early Markets: included footage and interviews at Sierra Nevada, Gills Onions, and NREL's National Wind Technology Center
  - Began airing on Feb. 19
  - http://video.pbs.org/video/1828815418
- Future Vehicles: Will include footage and interviews with fuel cell vehicle manufacturers, hydrogen fueling station operators, and electric, plug-in, and battery powered vehicle manufacturers
  - Slated to begin airing in June 2011

Webinar Series

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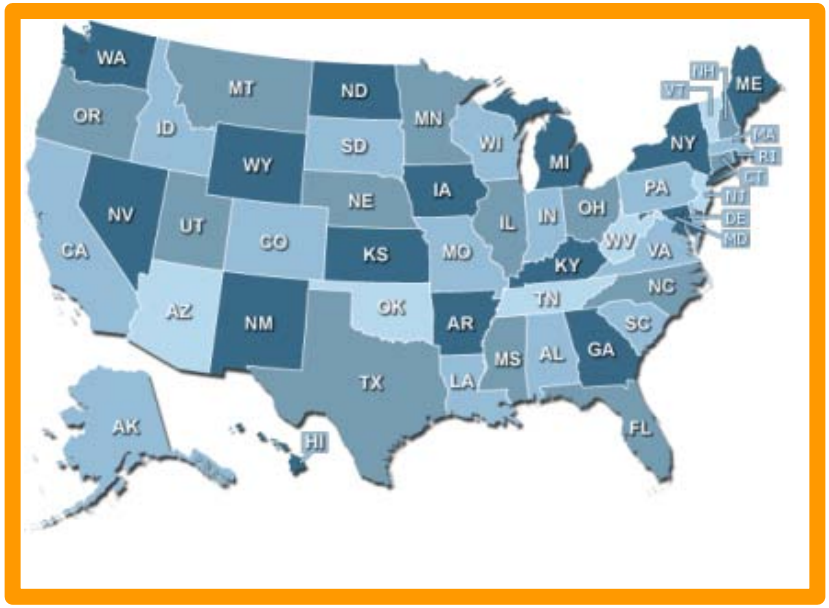
Target State & Local Government Officials and Stakeholders to Facilitate Market Acceptance

- Co-hosted by the Clean States Energy Alliance and the Technology Transition Corporation
- Audiences include state energy fund managers, state & local officials, project developers, and technology providers
- Past topics have included:
  - Fuel Cells for Supermarkets (April 2011)
  - H_2 Production and Storage for Fuel Cells (Feb 2011)
  - DOE Fuel Cell Technologies Program Budget Overview (Dec 2010)



hydrogenandfuelcells/education/state_local_calls.html

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

Upcoming Webinars

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- May 17, 2011: Local Leaders Create Fuel Cell Success Stories: Spotlight on Leading Local Companies, noon - 1 ET
- June 9, 2011: Fuel Cells and Renewable Portfolio Standards
- June 21, 2011: The Top 5 Fuel Cell States: Why Local Policies Mean Green Growth, noon - 1 ET
- July 19, 2011: Where the Jobs Are: Hydrogen Fuel Cells in Your Area, noon - 1 ET
- August 16, 2011: Go Local: Maximizing Your Local Renewable Resources With Fuel Cells, noon - 1 ET

Leveraging ARRA Investments

U.S. DEPARTMENT OF ENERGY

ARRA Investments Offer Opportunities for Fuel Cell Projects to Increase Energy Efficiency

Overview

- DOE State Energy Program: $3.1B in grants distributed to States by formula

States Examined To Date

- CA, NY, TX, CT, SC, OH, VA, HI, FL, WA, IL, MI, NC, LA, OR, and PA.

Summary spreadsheet to be posted on DOE Education webpage

Potential Opportunities for Deployment

- State/local government facilities & commercial building retrofits
- RE market development
- Industrial process efficiency
- Fleet programs

Example Opportunities

- CT- Fuel Cell Program: FC installation in commercial buildings
- PA- PEDA (Pennsylvania Energy Development Authority) Sustainable Business Recovery

EERE Fellowship Program

U.S. DEPARTMENT OF ENERGY

- Fuel Cell Technologies Program Opportunities Available
  - Conduct applied research at universities, national laboratories, and other research facilities
  - Up to five positions are available in the areas of hydrogen production, hydrogen delivery, hydrogen storage, and fuel cells

❑Applications are due June 30, 2011
❑Winners will be announced mid-August
❑Fellows will begin in mid-November 2011

eere.energy.gov/education/postdoctoral_fellowships/

Participating Organizations

U.S. DEPARTMENT OF ENERGY

- **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
- **Analysis**
  - Argonne National Lab
  - RCF Consulting
- **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

For More Information

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Education Subprogram

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Reviewer Reminders

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- Deadline for final review form submittal is May 20th at 5:00 PM EDT.
- ORISE personnel are available on-site for assistance. A reviewer ready room is set-up in room *The Boardroom* (next to Salon A) and will be open Tuesday –Thursday from 7:30 AM to 6:00 PM and Friday 7:30 Am to 2:00 PM.
- Reviewers are invited to a brief feedback session – at 5:45 PM today, in this room.

Session Instructions

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- This is a review, not a conference.
- Presentations will begin precisely at the 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, BlackBerries, etc.
- Photography and audio and video recording are not permitted.