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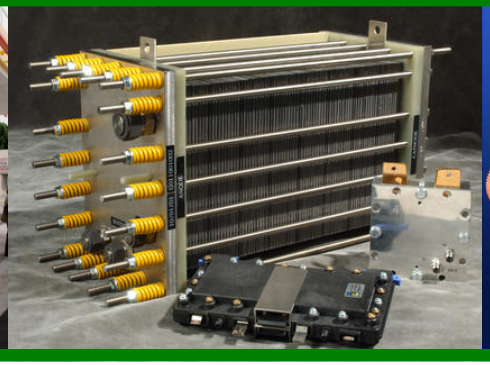
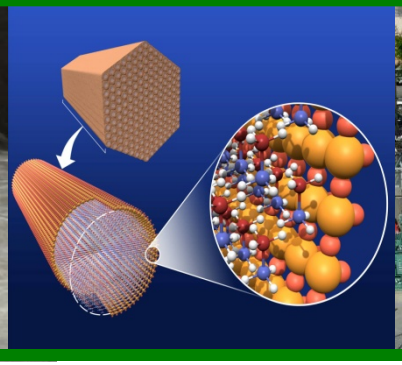

Education and Outreach
- Session Introduction -

Gregory Kleen

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

Goals and Objectives

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- 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

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- 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

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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
Potential End Users	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
State and Local Government Representatives	A broad understanding of hydrogen supports decision-making on current opportunities and lays the foundation for long-term change
University Faculty and Students	Interest is high; graduates needed for research in government, industry, academia, and related green jobs; workforce development needed for next generation
Other Teachers and Students	Interest is high; teachers looking for technically accurate information and usable classroom activities; students being exposed to career possibilities
Local Communities/ General Public	Will be more likely to welcome local demonstration projects when they are familiar with hydrogen
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

Challenges

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- 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)

Progress: University/Pre-college

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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
- "Investigating Alternative Energy: Hydrogen & Fuel Cells"
  - 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

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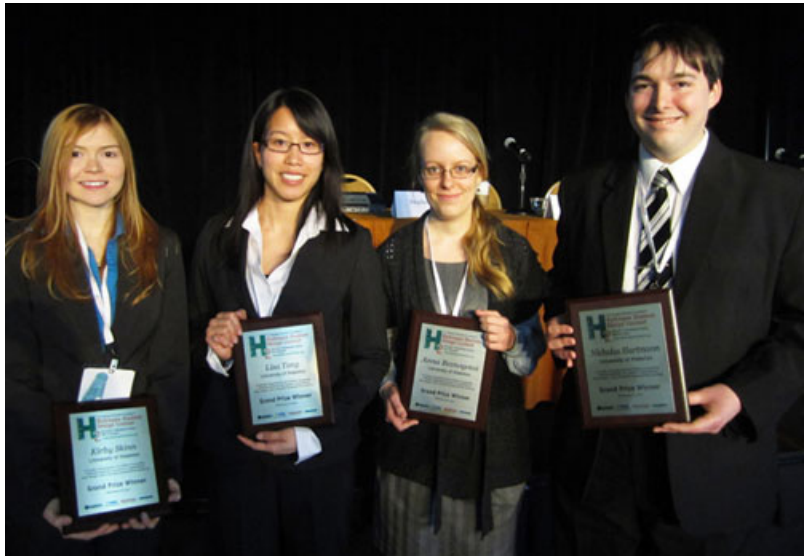
- 2011 contest
  - included 54 teams from 19 countries, including 7 top engineering schools
  - Topic was Residential Fueling with Hydrogen
  - Grand Prize Winner - University of Waterloo
- 2012 contest
  - includes 33 teams are competing
  - Topic is Combined Heat and Power System for a University Campus 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.

The Hydrogen Education Foundation's Hydrogen Student Design Contest
www.HydrogenContest.org
Supported by the U.S. Department of Energy

2012 Partners and Supporters

WHEC 2012

CHP EPA COMBINED HEAT AND POWER PARTNERSHIP

NREL NATIONAL RENEWABLE ENERGY LABORATORY

Progress: Local/State Government

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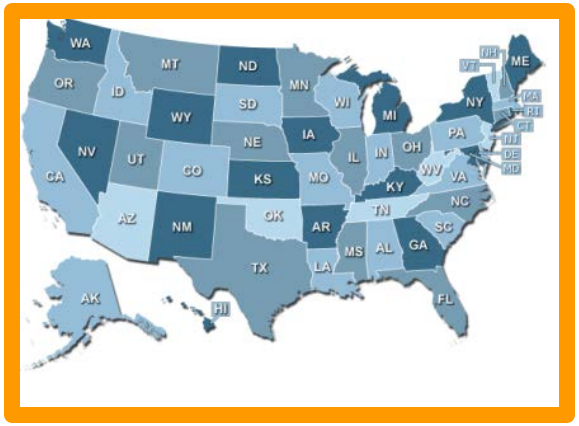
Local/State Government Projects organized 10 webinars that attracted more than 1,500 attendees.



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

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- **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

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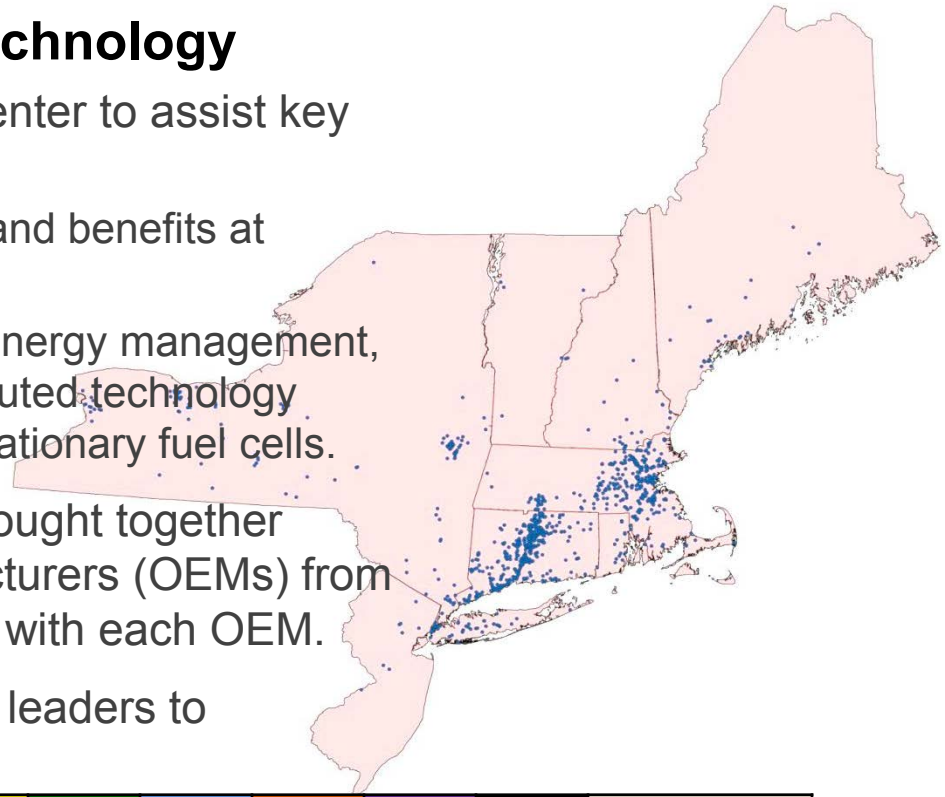
Connecticut Center for Advanced Technology

- 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



	CT	NY	MA	ME	NH	RI	VT	NJ	Regional
Total Employment	2,529	1,728	964	18	45	32	16	111	**5,443**
Total Revenue / Investment ($ million)	$496	$292	$171	$2.9	$8.7	$6.9	$3.3	$26.5	**$1,009**
Total Supply Chain Companies	599	183	322	28	25	19	5	8	**1189**

Fuel Cell Video

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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**

Monthly Webinar Series

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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:
  - Federal Facilities Guide to Fuel Cells (May 2012)
  - 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

  (http://www1.eere.energy.gov/hydrogenandfuelcells/webinars.html)

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

Program Newsletter

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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)

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Fuel Cell Technologies Program

January 2012 Newsletter

Welcome to the inaugural issue of the Fuel Cell Technologies Program newsletter. This newsletter will be issued monthly to our Fuel Cell News subscribers and will include a recap of the previous month's news and events as well as a preview of upcoming activities.

In this issue:

- In the News
- Funding Opportunities
- Recent Blogs
- Webinars and Workshops
- Events Calendar
- Studies, Reports, and Publications

In the News

Communication & Outreach

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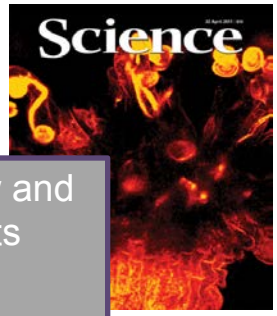
Published more than 70 news articles in FY 2011

(including blogs, progress alerts, and DOE news alerts)

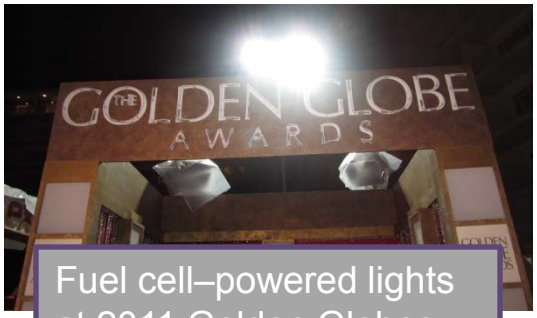
"These technologies are part of a broad portfolio that will create new American jobs, reduce carbon pollution, and increase our competitiveness in today's global clean energy economy."

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"



Progress in low and zero Pt catalysts highlighted in *Science*



Fuel cell–powered lights at 2011 Golden Globes

Fuel cells providing critical backup power

Participating Organizations

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- **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

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- 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

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- 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.

For More Information

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Education Sub-program

DOE

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