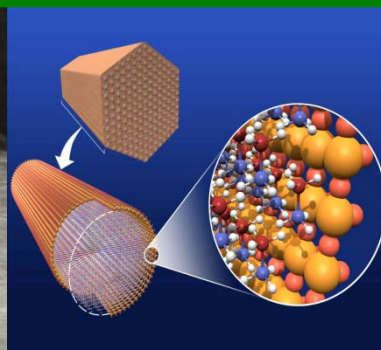




U.S. DEPARTMENT OF  
**ENERGY**



# Market Transformation Sub-program - Session Introduction -

*Pete Devlin*

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

## **GOALS**

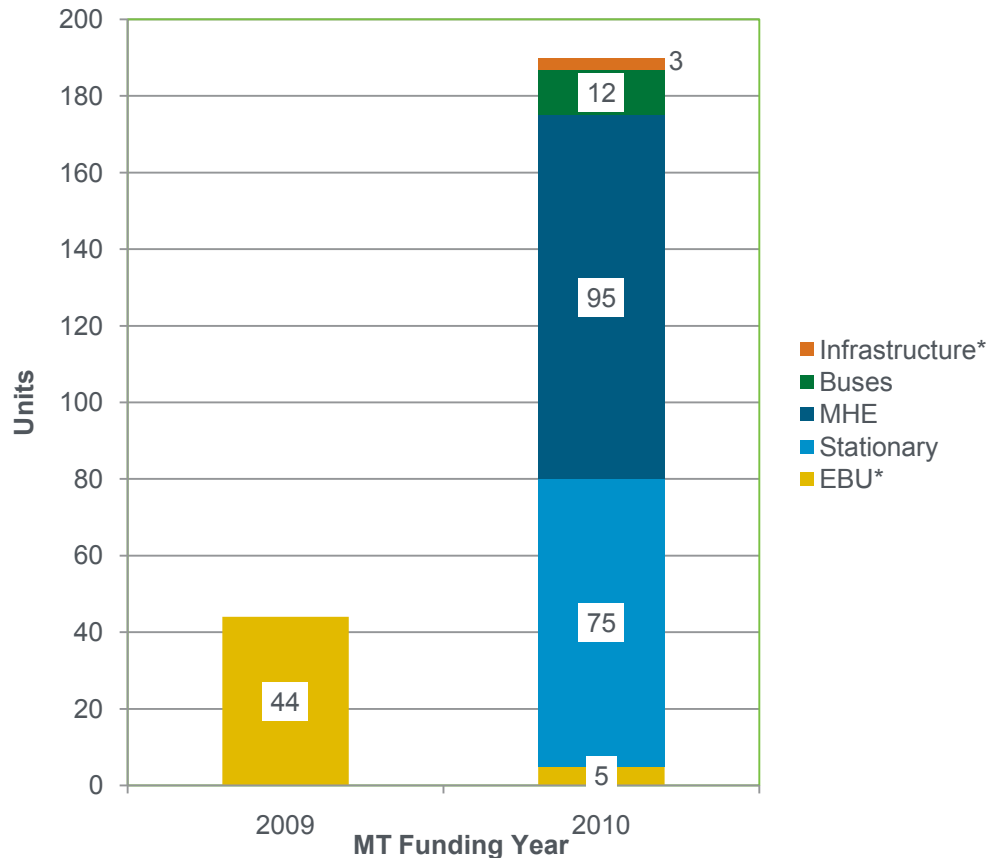
- Ensure continued technology utilization growth for domestically produced hydrogen and fuel cell systems
- Lower life cycle costs of fuel cell power by identifying and reducing non-technical barriers

## **OBJECTIVES**

- Catalyze key implementation projects and partnerships with state and local governments and other stakeholders
- Increase domestic market penetration by standardizing institutional and financial market practices
- Increase data analysis associated with siting and deployment (i.e. insurance, permitting, and installation)
- Develop and launch a transparent energy efficiency and reliability certification program

- To test emerging applications at the Technology Readiness Level (TRLs) 7-9 level to expand user and servicing expertise
- To test new technology applications in user operating conditions to establish baseline energy efficiency and reliability performance and determine commercial viability
- To develop strategies to mitigate commercial risks and develop new approaches to ensure high hydrogen and system utilization and reliability under mass market penetration scenarios
- To develop comprehensive standards for measuring energy efficiency to catalyze private sector financing for fuel cell systems
- To obtain data from operating experience
- To facilitate affordable insurance premiums for hydrogen and fuel cell technologies

## Fuel Cell Installations (ARRA Projects Not Included)



## Total Installations by Type\*

### 2009 Deployments (\$5 M)

- 44 EBU Units

### 2010 Deployment (\$15 M)

- 5 Mobile Light Stands
- 75 Micro CHP Units
- 95 MHE Units
- 12 HICE Buses
- 1 Electrolyzer
- 1 Mobile Refueler
- 1 Hydrogen Reformer (Landfill Gas)

\*Figures include Market Transformation funding only, ARRA and Other are excluded

- Developed a new mobile lighting technology and tested it in real operations (Sandia National Lab)
- Started a first-of-its-kind application to generate hydrogen from renewable energy for transportations fuel and grid management (NRL and HNEI)
- Completed the multi-site award of back up power for DOD, NASA and NPS
- Continuously operated 90 fuel cell powered lift trucks at DOD sites
- Installed and operated H2 buses at 9 DOD and DOE sites
- Started a MicroCHP deployment for light commercial facilities (PNNL)
- Catalyzed an industry fuel cell lift truck project using LFG feedstock (SCRA/ BMW)
- Launched DMFC powered lift truck operations in 4 locations
- Worked with DOD to investigate 3 new uses of fuel cells (aircraft and shipboard APUs and WTE FCs)

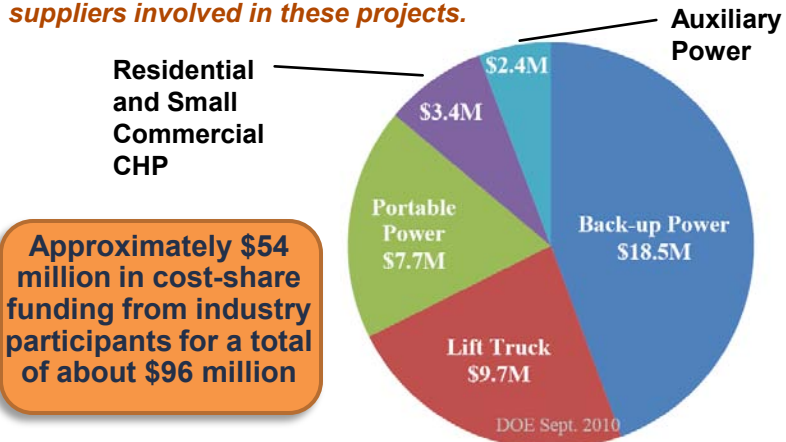
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# ARRA Fuel Cell Funding & Budget

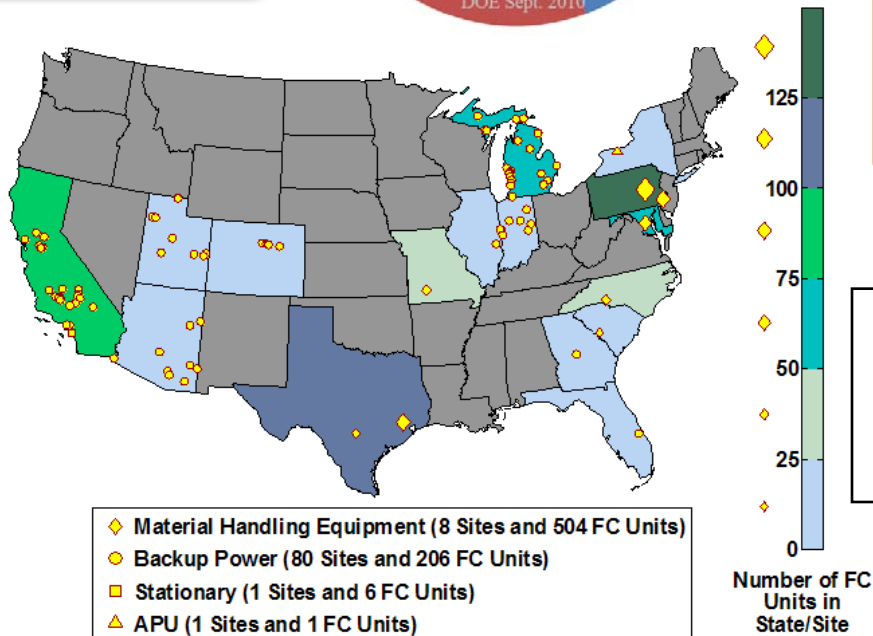
DOE announced more than \$41 million from the 2009 American Recovery and Reinvestment Act to fund 12 projects, which will deploy up to 1,000 fuel cells – to help achieve near term impact and create jobs in fuel cell manufacturing, installation, maintenance & support services sectors

## FROM the LABORATORY to DEPLOYMENT:

DOE funding has supported R&D by all of the fuel cell suppliers involved in these projects.



Approximately \$54 million in cost-share funding from industry participants for a total of about \$96 million



COMPANY	AWARD	COST SHARE	APPLICATION
Delphi Automotive	\$2.4 M	\$2.4 M	Auxiliary Power
FedEx Freight East	\$1.3 M	\$1.5 M	Lift Truck
GENCO	\$6.1 M	\$6.1 M	Lift Truck
Jadoo Power	\$2.2 M	\$2.6 M	Portable
MTI MicroFuel Cells	\$3.0 M	\$3.6 M	Portable
Nuvera Fuel Cells	\$1.1 M	\$2.2 M	Lift Truck
Plug Power, Inc.	\$3.4 M	\$3.4 M	CHP
Plug Power, Inc.	\$2.7 M	\$2.7 M	Back-up Power
Univ of N Florida	\$2.5 M	\$0.6 M	Portable
ReliOn, Inc.	\$8.5 M	\$9.6 M	Back-up Power
Sprint - Nextel	\$7.3 M	\$17.2 M	Back-up Power
Sysco Houston	\$1.2 M	\$2.0 M	Lift Truck

**JOBS STATUS**  
(April 2011)  
48.7 jobs reported on Recovery.gov

## Deployment Status – April 2011

Fuel Cell Application	Operational Fuel Cells	Total Fuel Cells Planned
APU	0	3
Backup Power	267	539
Material Handling	369	504
Stationary	0	6
<b>Total</b>	<b>636</b>	<b>&gt; 1,000</b>

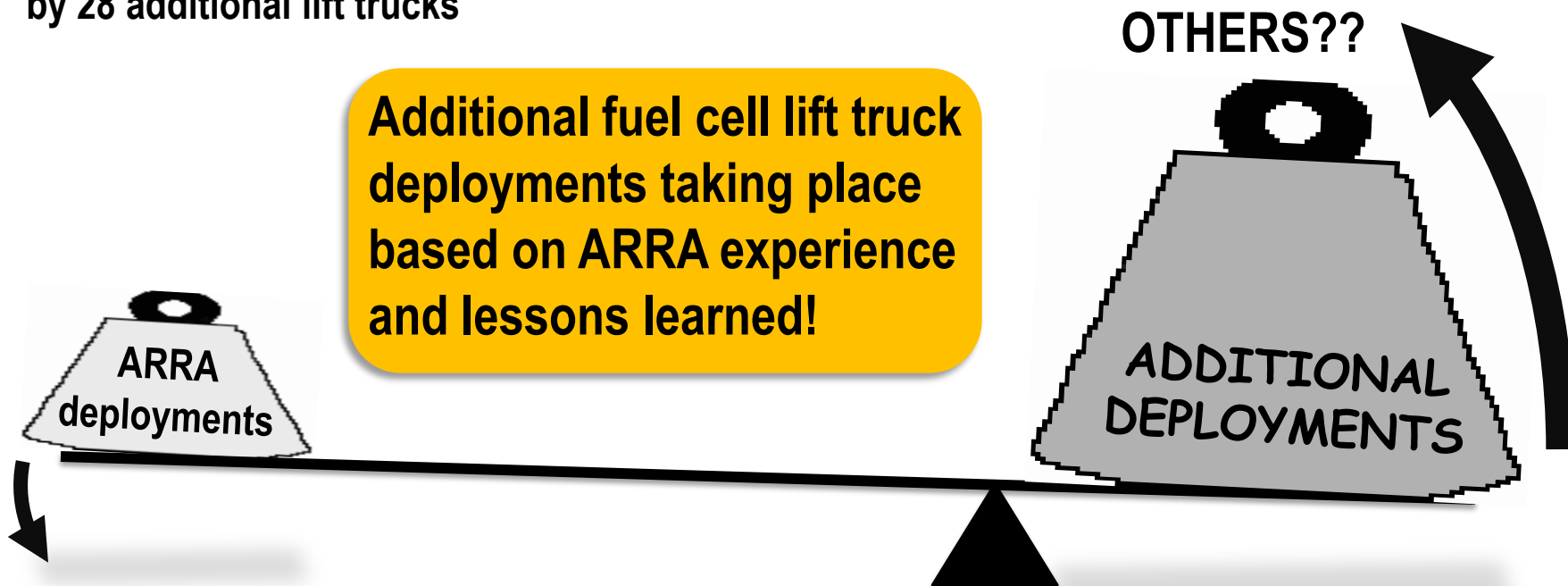
## LEVERAGING ADDITIONAL FUEL CELLS DEPLOYMENTS

- Sysco (Corporation) plans to convert an additional 500+ battery powered lift trucks to fuel cell power
- H-E-B Grocery, with Nuvera Fuel Cells, plans to expand their current fleet of fuel cell powered lift trucks by 28 additional lift trucks

### NREL ARRA Data Collection Snapshot

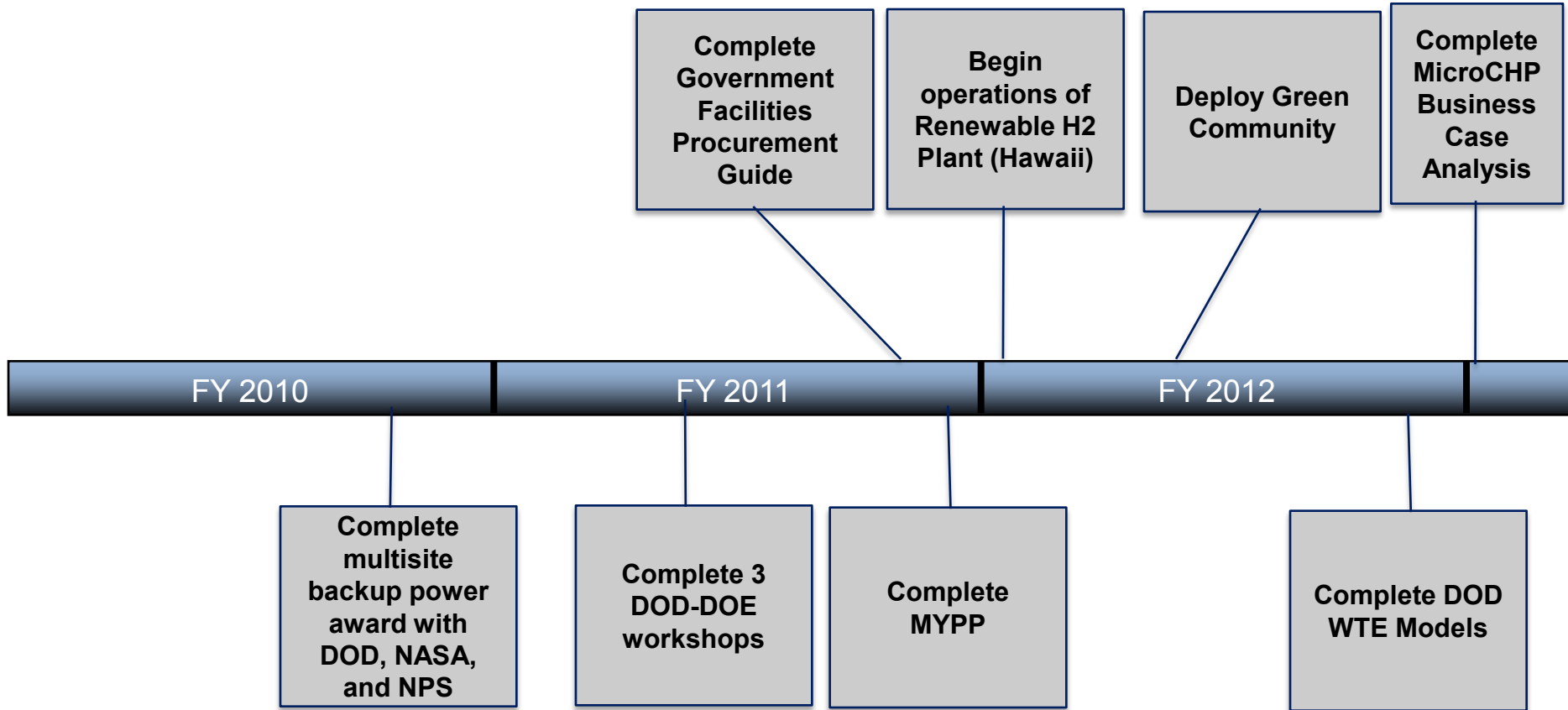
ARRA Material Handling Equipment Data	As of 12/31/2010
Hydrogen Dispensed	> 18,500 kg
Hydrogen Fills	> 38,800
Hours Accumulated	> 307,400 hrs

**Additional fuel cell lift truck deployments taking place based on ARRA experience and lessons learned!**





## Key milestones & future plans



## Market Transformation

### DOE Headquarters

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**Market Transformation presentations in salon E – Crystal City Marriott Hotel  
Tuesday, May 10<sup>th</sup> at 2:30 PM – 5:45 PM**

- 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.

- Deadline for final review form submittal is **May 20<sup>th</sup> at 5:00 pm EDT.**
- ORISE personnel are available on-site for assistance. A reviewer-ready room is set up in *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 6:15 PM today, in this room.

- 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
- Fellowships will begin in mid-November 2011



[www.eere.energy.gov/education/postdoctoral\\_fellowships/](http://www.eere.energy.gov/education/postdoctoral_fellowships/)

Postdoctoral fellowships in  
hydrogen and fuel cell research ▶

## Market Transformation

### Industry

Boeing  
BMW  
Excel Energy  
First Energy  
Ford Motor  
GM  
HELCO  
Price Choppers  
Walmart

### Other Federal Agencies

Army - CERL  
Environmental Protection Agency  
Federal Aviation Administration  
Federal Transit Administration Navy - ONR  
Defense Logistics Agency - TARDEC  
NASA  
U.S. Department of Transportation  
U.S. Department of Defense  
U.S. Department of Interior - National Park Service  
U.S. Department of Commerce

### Federal Labs

ANL  
LANL  
LLNL  
NREL  
ORNL  
SNL

### State Governments

California  
Connecticut  
Hawaii  
New York  
South Carolina

### NGOs

American Gas Association  
Electric Power Research Institute  
Fuel Cell and Hydrogen Energy Association  
Green Communities  
US Clean Heat and Power Association