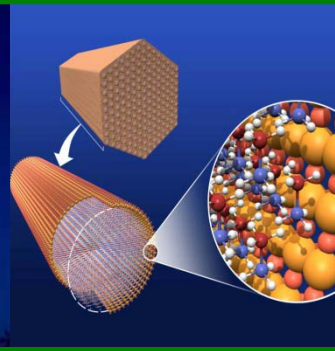
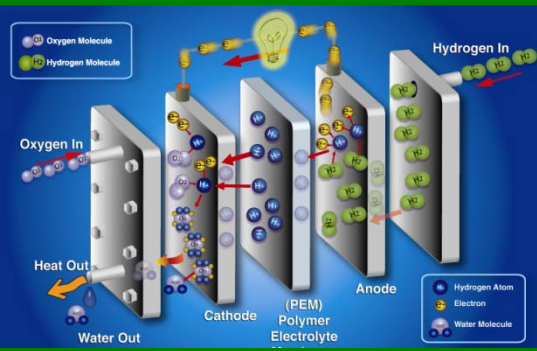




U.S. DEPARTMENT OF  
**ENERGY**



# Fuel Cell Technologies ARRA Project: *Hydrogen Fuel Cells: Enabling Market Transformation and Manufacturing*

*Sara Dillich*

*2010 Annual Merit Review and Peer Evaluation Meeting  
(8 June 2010)*

## *American Recovery and Reinvestment Act (ARRA) of 2009*

### **Goals:**

- **Create new jobs as well as save existing ones**
- **Spur economic activity**
- **Invest in long-term economic growth**

## *Fuel Cell ARRA Project*

### **Goal:**

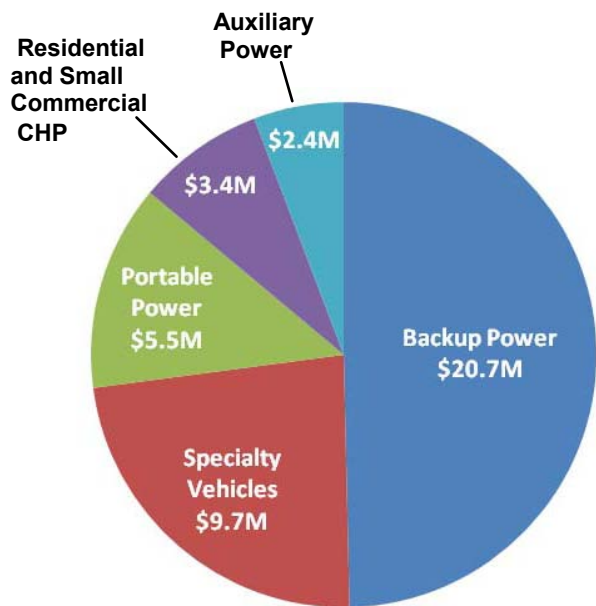
**Accelerate the commercialization and deployment of fuel cells and fuel cell manufacturing, installation, maintenance, and support services**

# Recovery Act Funding for Fuel Cells

*More than \$40 million from the 2009 American Recovery and Reinvestment Act to fund 12 projects to deploy up to 1,000 fuel cells*

**FROM the LABORATORY to DEPLOYMENT:**

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

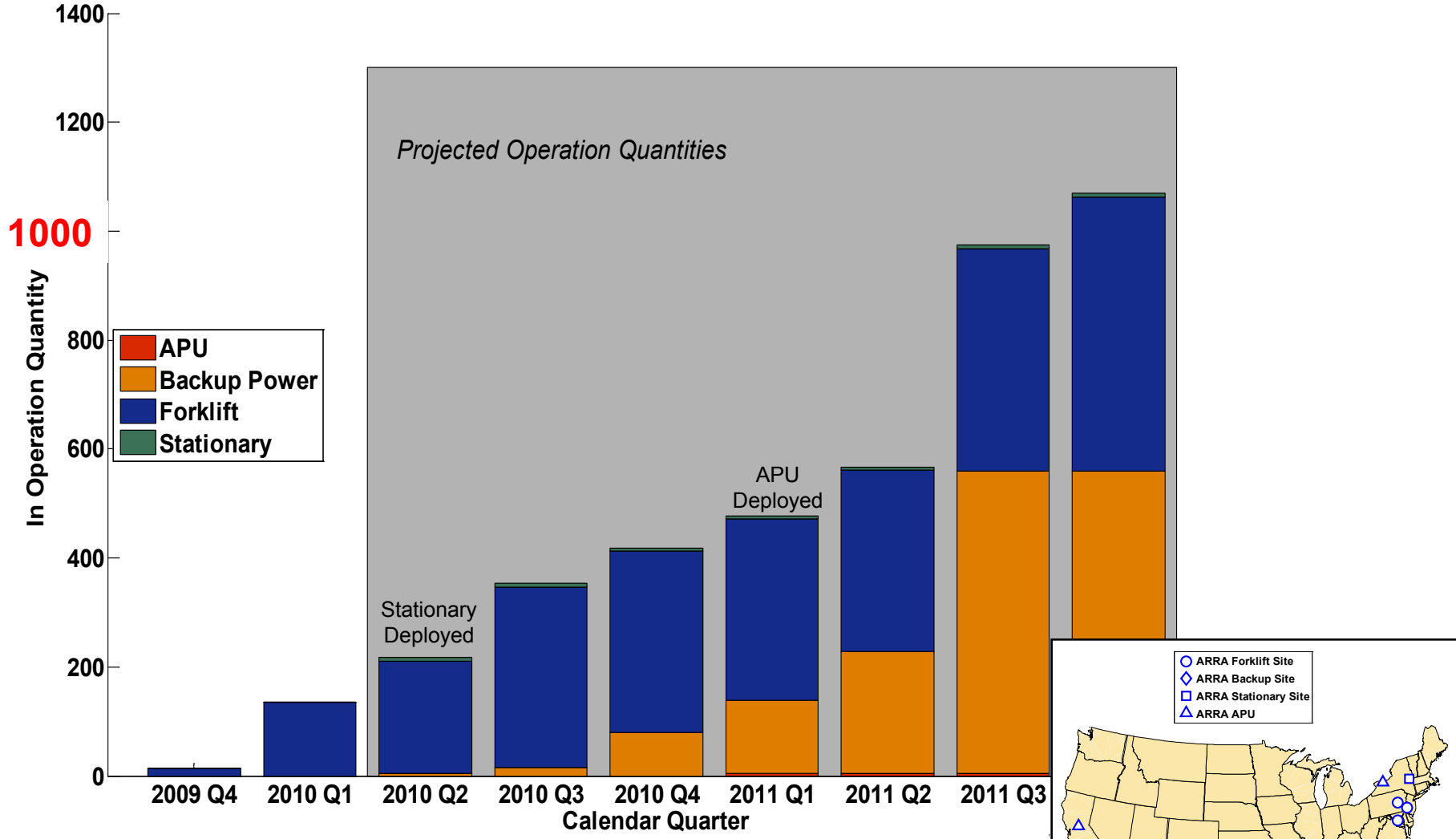


Approximately \$51 million in cost-share funding from industry participants—for a total of about \$93 million.

COMPANY	AWARD	APPLICATION
Delphi Automotive	\$2.4 M	Auxiliary Power
FedEx Freight East	\$1.3 M	Specialty Vehicle
GENCO	\$6.1 M	Specialty Vehicle
Jadoo Power	\$2.2 M	Backup Power
MTI MicroFuel Cells	\$3.0 M	Portable
Nuvera Fuel Cells	\$1.1 M	Specialty Vehicle
Plug Power, Inc. (1)	\$3.4 M	CHP
Plug Power, Inc. (2)	\$2.7 M	Backup Power
Univ. of N. Florida	\$2.5 M	Portable
ReliOn Inc.	\$8.5 M	Backup Power
Sprint Comm.	\$7.3 M	Backup Power
Sysco of Houston	\$1.2 M	Specialty Vehicle

# ARRA Fuel Cell Units in Operation

DOE ARRA Funded Early Fuel Cell Markets: Units in Operation



From National Renewable Energy Laboratory

Some site locations TBD

## *Managing Risk*

### **Risk Mitigation Strategies**

- **Completed initial NEPA review for all projects; site-specific NEPA reviews in progress for several projects.**
- **Developed and executed contingency plans for unexpected project terminations.**
- **Identified and are addressing safety concerns which may impact commercial acceptance of fuel cell systems.**
- **Identified and are tracking metrics needed to evaluate the performance of projects.**



Fuel Cell Powered Lift Trucks (Sysco)

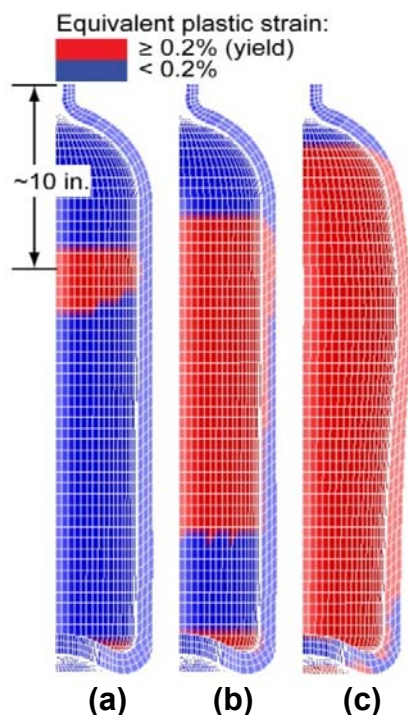
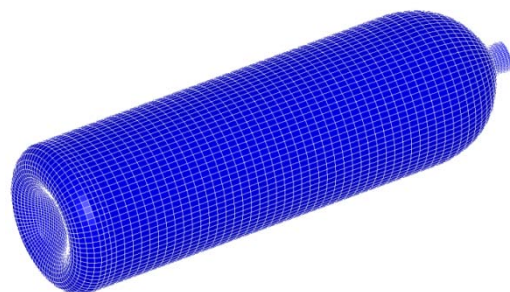
## *Fuel Cell Powered Lift Trucks Deployed First*

- **All 12 project grants in place**
- **Over 145 fuel cell powered lift trucks deployed\***
- **36 jobs created or retained\***
- **Over 31% of funds costed\***

- **Siting and permitting activities initiated**
- **Safety Plans developed for all projects**
- **Review of Safety Plans and Site Visits by Hydrogen Safety Panel planned for 2010**

\* As of March 31, 2010

## *Lifecycle Analysis of Tanks at SNL*



**Addressing cyclic fatigue of steel tanks to provide technical basis for code language for H<sub>2</sub> powered industrial trucks (CSA HPIT1)**

- **Quantifiable data being collected for crack initiation, crack growth, leak before-burst, etc.**
- **Developing unified design methodologies for high cycle-life tanks**

**Next Steps: Risk analysis of indoor refueling and operation in support of NFPA-2 requirements development**

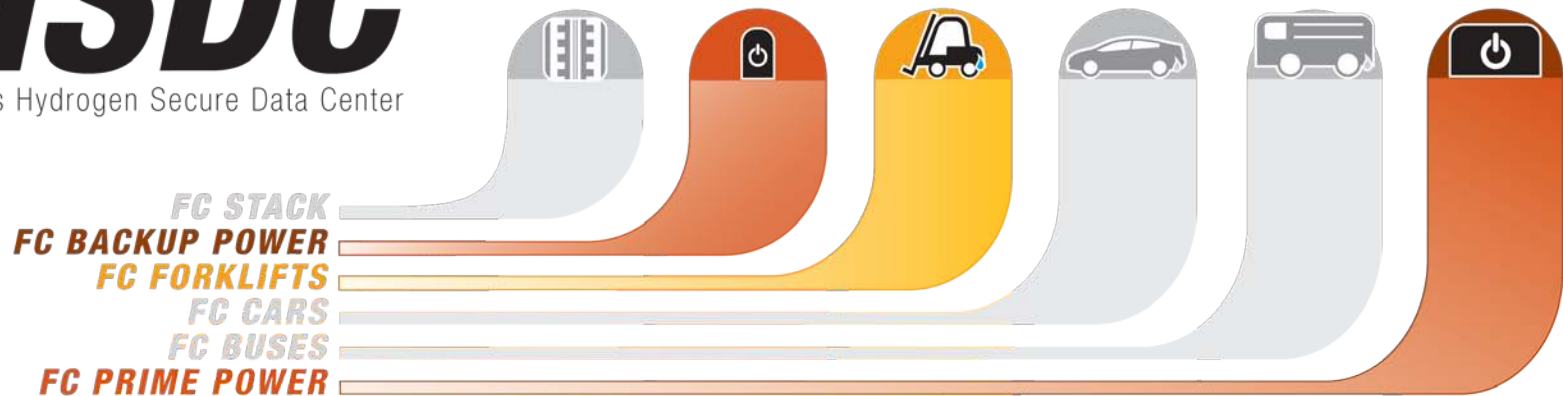


## NREL Data Collection

Fuel Cell & Infrastructure Data to NREL's Hydrogen Secure Data Center

Data includes operation, maintenance, safety, and hydrogen production

***HSDC***  
NREL's Hydrogen Secure Data Center



- Independent technology **assessment**; focused on fuel cell system and hydrogen infrastructure: performance, operation, and safety
- **Leverage** data processing and analysis capabilities developed from the fuel cell vehicle Learning Demonstration project and DoD Forklift Demo
- Establish a **baseline** of real-world fuel cell operation and maintenance data and identify technical/market barriers
- **Support market growth** through analyses relevant to the **value proposition** and reporting on **technology status** to fuel cell and hydrogen communities and **stakeholders**

• **Individual data analyses** for each FC system and site

- **Identify individual contribution to CDPs**
- **Only shared with partners who supplied data**

**Detailed Data Products (DDPs)**

**Composite Data Products (CDPs)**

- **Aggregated data across multiple systems, sites, and teams**
- **Publish analysis results without revealing proprietary data**

## *Off to a Good Start*

- **Preliminary feedback suggests deployed fuel cell powered lift trucks already showing increases in productivity over batteries**
- **Over 500 fuel cells for backup power in communication towers planned**
- **Portable fuel cells for recharging consumer electronics have been redesigned for low-cost manufacturing and robust operations. Real-life field testing of units by end-users has been initiated**
- **Potentially more than 1,000 fuel cells deployed in the market by 2012**



Left: MTI's portable fuel cell for recharging electronics such as a BlackBerry or iPod.

Bottom: Communication tower with backup fuel cell power nearby.



- 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.

- Deadline for final review form submittal is **June 18th**.
- ORISE personnel are available on-site for assistance. A reviewer lab is set-up in room 8216 and will be open Tuesday –Thursday from 7:30 AM to 6:00 PM and Friday 7:30 AM to 3:00 PM.
- Reviewer feedback session – **Thursday, at 5:45pm (after last ARRA Project), in this room.**

## ***ARRA Recovery Project Contacts***

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