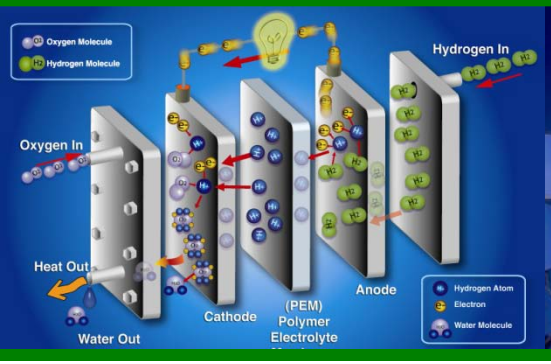
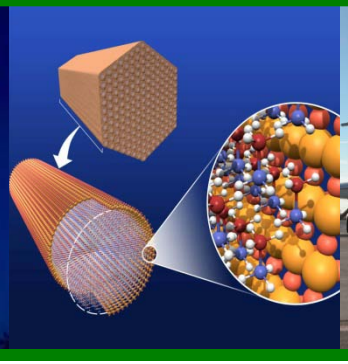
U.S. DEPARTMENT OF ENERGY





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)

U.S. DEPARTMENT OF ENERGY

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**

U.S. DEPARTMENT OF ENERGY

Fuel Cell ARRA Project

Goal:

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

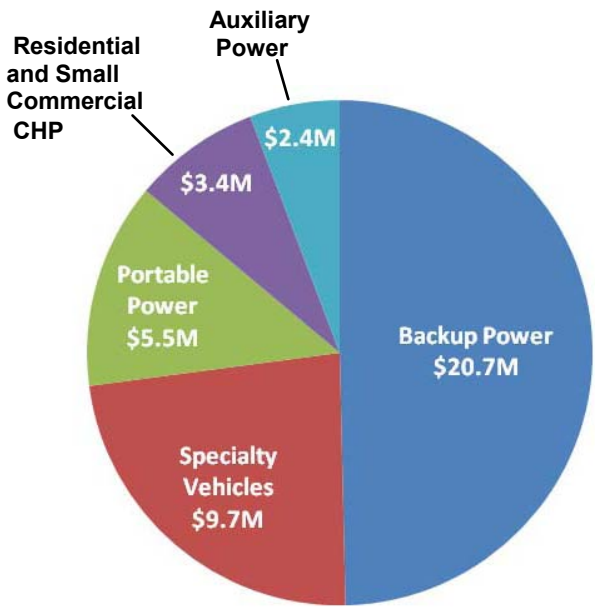
Recovery Act Funding for Fuel Cells

U.S. DEPARTMENT OF ENERGY

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.

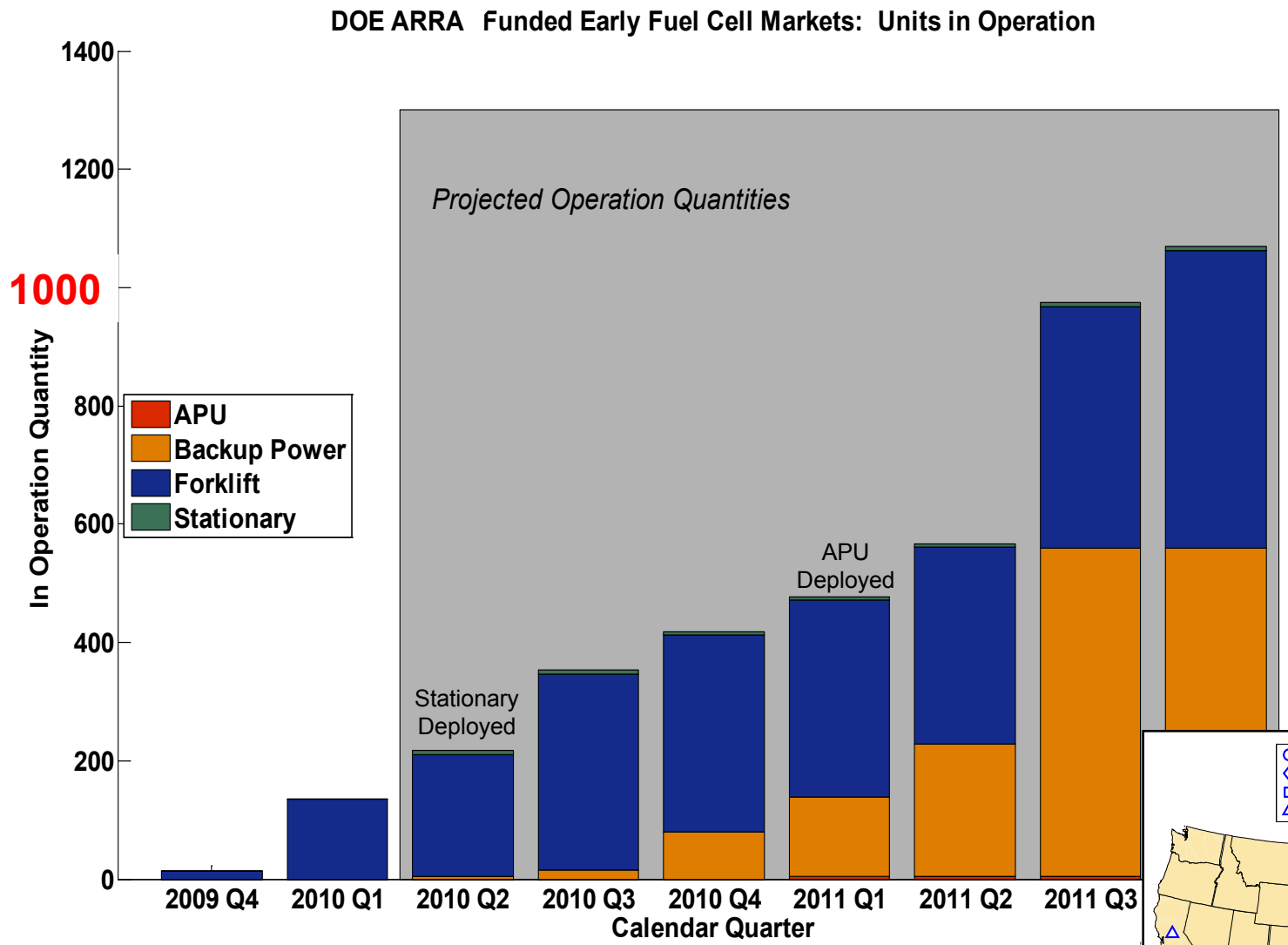


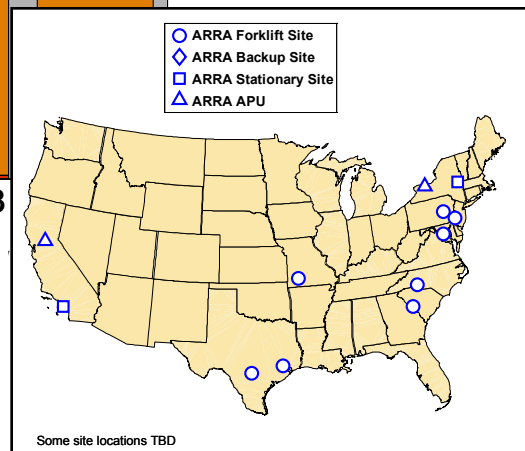
COMPANY	AWARD	APPLICATION
Delphi Automotive	$2.4 M	Auxiliary Power
FedEx Freight East	$1.3 M	Specialty Vehicle
GENCO	$6.1 M	Specialty Vehicle
Jadoo Power	$2.2 M	Backup Power
MTI MicroFuel Cells	$3.0 M	Portable
Nuvera Fuel Cells	$1.1 M	Specialty Vehicle
Plug Power, Inc. (1)	$3.4 M	CHP
Plug Power, Inc. (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

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

ARRA Fuel Cell Units in Operation

U.S. DEPARTMENT OF ENERGY





From National Renewable Energy Laboratory

U.S. DEPARTMENT OF ENERGY

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)

2010 Progress & Accomplishments

U.S. DEPARTMENT OF ENERGY

Fuel Cell Powered Lift Trucks Deployed First

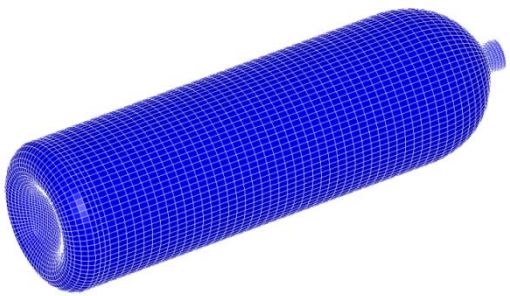
- All 12 project grants in place
- Over 145 fuel cell powered lift trucks deployed*
- 36 jobs created or retained*
- Over 31% of funds costed*

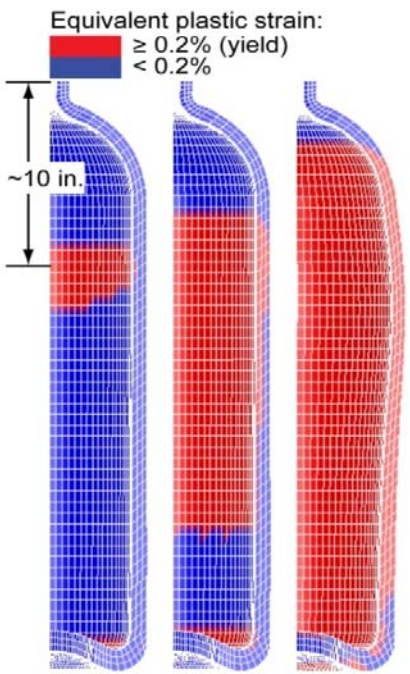
- Siting and permitting activities initiated
- Safety Plans developed for all projects
- Review of Safety Plans and Site Visits by Hydrogen Safety Panel planned for 2010

* As of March 31, 2010

U.S. DEPARTMENT OF ENERGY

Lifecycle Analysis of Tanks at SNL





(a) (b) (c)

Addressing cyclic fatigue of steel tanks to provide technical basis for code language for H_2 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

More information in AMR progress report: "SCS005, Dedrick, SNL: Materials and Components Compatibility"

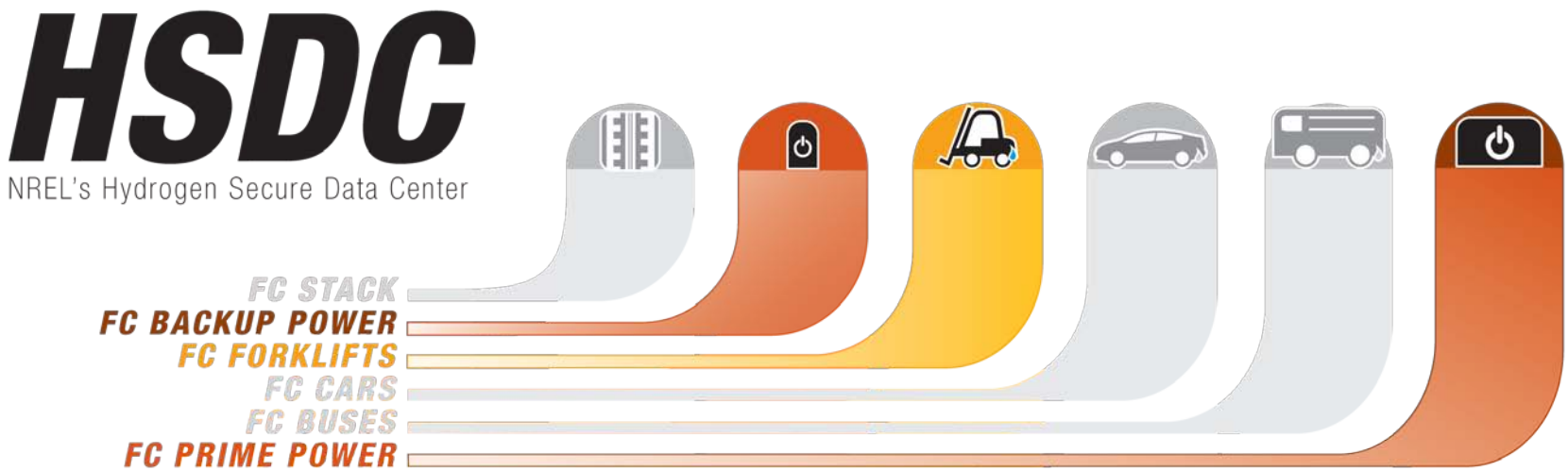
ARRA Hydrogen Fuel Cell Data

U.S. DEPARTMENT OF ENERGY

NREL Data Collection

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

Data includes operation, maintenance, safety, and hydrogen production



National Renewable Energy Laboratory: http://www.nrel.gov/hydrogen/news/2010/807.html

NREL Data Analysis - ARRA Deployments

U.S. DEPARTMENT OF ENERGY

- 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 partne 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

National Renewable Energy Laboratory: http://www.nrel.gov/hydrogen/news/2010/807.html

U.S. DEPARTMENT OF ENERGY

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.

Session Instructions

U.S. DEPARTMENT OF ENERGY

- 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.

Reviewer Reminders

U.S. DEPARTMENT OF ENERGY

- 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.**

For More Information

U.S. DEPARTMENT OF ENERGY

ARRA Recovery Project Contacts

DOE – HQ Technology Managers

Sara Dillich
(202) 586-7925
sara.dillich@ee.doe.gov

Donna Ho

Monterey Gardiner

Jason Marcinkoski

Dimitrios Papageorgopoulos

Ned Stetson

Support:

Matthew Simon (Energetics, Inc.)

GO Field Office Project Officers

James Alkire

Gregory Kleen

David Peterson

Reg Tyler

Lea Yancey

Support:

Shaun Onorato (Navarro Research & Engineering, Inc.)

NREL Data Collection and Analysis:

Jennifer Kurtz