

## XI.11 Fuel Cell-Powered Lift Truck GENCO Fleet Deployment

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### Subcontractors:

- Plug Power Inc., Latham, NY
- Air Products and Chemicals, Inc., Allentown, PA
- Linde North America, Murray Hill, NJ

Project Start Date: October 1, 2009  
Project End Date: September 30, 2013

### Objectives

- Convert electric-drive fork lift truck fleets to fuel cell use in a variety of large distribution centers and manufacturing facilities.
- Demonstrate the economic benefits of large fleet conversions of lift trucks from batteries to fuel cell power units by measuring, analyzing and reporting on the performance, operability and safety of the systems.
- Provide affordable and reliable hydrogen.
- Spur further fuel cell lift truck fleet conversions.
- Establish a proving ground for hydrogen fueling technology that will promote the future adoption of fuel cells in other applications, such as cars, and help drive the use of fuel cell technology in the United States.

### Accomplishments

#### General

- Nine jobs were maintained through the third quarter of 2010 in New York.

#### Wegmans

- National Environmental Policy Act (NEPA) environmental forms have been approved and the fueling station is operational, logging almost 2,000 hydrogen fills during first quarter 2010.
- Fifty-nine GenDrive power units are running and have logged 24,375 operating hours during the first quarter of 2010.
- Nine of the GenDrive power units were delivered two months ahead of schedule.
- Wegmans has achieved all project milestones and is pleased with performance of GenDrive power units.

#### Sysco Philadelphia

- Sysco contractors have completed concrete pad for the hydrogen fueling station.
- The remainder of the fueling station will be completed concurrent with building construction.
- NEPA environmental forms are nearing completion.

#### Coca-Cola

- NEPA environmental forms have been approved.
- Linde fueling station contracts are under final negotiation.

#### Kimberly-Clark

- Lease arrangement has been completed.
- Air Products fueling station contracts are under final negotiation.
- Nine GenDrive power units have been delivered to date.
- NEPA environmental forms have been approved.
- Permits have been secured.
- Site contractor has poured pad.
- Air Products to set equipment for the fuel station the week of October 19.

#### Whole Foods

- Linde fueling station contracts are under final negotiation.
- Permit application is ready for submission.
- All sixty-one GenDrive power units have been delivered.
- NEPA environmental forms have been approved..



## Introduction

This project addresses the DOE's priorities related to acquiring data from real-world fuel cell operation, eliminating non-technical barriers, and increasing opportunities for market expansion of hydrogen fuel cell technologies.

## Approach

The project involves replacing the batteries in 357 electric lift trucks with 110 class-1, 61 class-2, 14 stock picker (modified class-2) and 172 class-3 Plug Power GenDrive fuel cell power units at five distribution centers. These distribution centers handle goods for Wegmans (Pottsville, PA), Coca-Cola (Charlotte, NC), Sysco Foods (Philadelphia, PA), Whole Foods (Landover, MD) and Kimberly-Clark (Graniteville, SC). Fuel for the power units involves on-site hydrogen handling and dispensing equipment and liquid hydrogen delivery by Air Products or Linde, depending on location.

The project builds on GENCO's previous field trial experience with a handful of Plug Power's GenDrive power units. Those trials demonstrated productivity gains and improved performance compared to battery-powered lift trucks. Full lift truck conversion at the five distribution center locations allows improved competitiveness of operations and helps the environment by reducing greenhouse gas emissions and toxic battery material use. Success at these distribution centers may lead to further fleet conversions at some or all of GENCO's 110 distribution centers.

## Results

**TABLE 1.** Site Breakdown – Power Unit and Hydrogen Supplier

	Wegmans	Whole Foods	Coca-Cola	Sysco Phil.	Kimberly-Clark	TOTAL
Class 1 GenDrive	0	45	40	0	25	110
Class 2 GenDrive	36	14	0	25	0	75
Class 3 GenDrive	100	2	0	70	0	172
<b>TOTAL</b>	<b>136</b>	<b>61</b>	<b>40</b>	<b>95</b>	<b>25</b>	<b>357</b>
<b>Hydrogen Supplier</b>	Air Products	Linde	Linde	Linde	Air Products	

**TABLE 2.** Site Breakdown – Fueling Station and Power Unit Operations

	Wegmans	Whole Foods	Coca-Cola	Sysco Phil.	Kimberly-Clark
<b>Fueling Station Operational</b>	Phase 1 Complete	9/15/2010	11/15/2010	3/31/2011	8/31/2010
► <b>Go/No-Go</b>	GO	9/15/2010	11/15/2010	3/31/2011	8/31/2010
<b>GenDrive Power Units Delivered</b>	59 of 136	61 of 61	11/15/2010	10/31/2011	9 of 25
► <b>Go/No-Go</b>	59 of 136	61 of 61	10/31/2010	9/30/2011	9 of 25
<b>Project Complete</b>	9/30/2013	9/30/2013	9/30/2013	9/30/2013	9/30/2013

## Conclusions and Future Directions

GENCO has made great strides facilitating hydrogen fuel cell usage at the Wegmans site and progress is being made to bring the four remaining sites online. Successful integration of Plug Power's GenDrive power units into each facilities material handling operations will continue. Working with hydrogen providers Air Products and Linde, each of the five sites will incorporate hydrogen fueling into their daily activities. Table 2 provides detailed information on when the remaining sites will be fully operational.

## FY 2010 Publications/Presentations

1. 2010 DOE Hydrogen Program Annual Merit Review, (presentation ARRAH2011), Washington, D.C., June 2010.