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

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Contract Number: DE-EE0000483

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.
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

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

Table 2. Site Breakdown – Fueling Station and Power Unit Operations

<table>
<thead>
<tr>
<th></th>
<th>Wegmans</th>
<th>Whole Foods</th>
<th>Coca-Cola</th>
<th>Sysco Phil.</th>
<th>Kimberly-Clark</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GenDrive Power Units Delivered</strong></td>
<td>59 of 136</td>
<td>61 of 61</td>
<td>11/15/2010</td>
<td>10/31/2011</td>
<td>9 of 25</td>
</tr>
<tr>
<td><strong>Go/No-Go</strong></td>
<td>59 of 136</td>
<td>61 of 61</td>
<td>10/31/2010</td>
<td>9/30/2011</td>
<td>9 of 25</td>
</tr>
<tr>
<td><strong>Project Complete</strong></td>
<td>9/30/2013</td>
<td>9/30/2013</td>
<td>9/30/2013</td>
<td>9/30/2013</td>
<td>9/30/2013</td>
</tr>
</tbody>
</table>

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