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| DOE Hydrogen and Fuel Cells Program Record | |  |
| Record #: 13008 | Date: 10/04/2013 | |
| Title: Industry Deployed Fuel Cell Powered Lift Trucks | | |
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Item:

Table 1: Number of fuel cell deployments (installed and on-order) for applications in material handling equipment (MHE).

| | DOE Funded¹ (ARRA) as of 9/30/2013 | DOE Funded²⁻⁴ (Appropriations) as of 9/30/2013 | DOE Total | Industry Funded or on Order (U.S.)²⁻⁹ From 2009 – Record Date | DOE and Industry Total From 2009 – Record Date |
|--|--|--|------------------|---|---|
| Number of MHE Deployments (current & planned) | 504 | 189 | 693 | 5,394 | 6,087 |

The successful deployment of nearly 700 U.S. Department of Energy (DOE) fuel cell material handling units has led to almost 5,400 industry installation and on order units with no DOE funding.

Data/Assumptions/Calculations:

Total DOE American Recovery and Reinvestment Act (ARRA) investment for these fuel cell powered lift trucks is about \$9.7M, with an industry cost share of \$11.8M.¹ The DOE Fuel Cell Technologies (FCT) Office has estimated that the nearly 700 fuel cell powered lift trucks deployed with DOE cost share led to almost 5,400 orders/deployments with no DOE funding. As industry continues to place orders and deploy units, DOE will revise its records and determine actual orders filled/units commissioned as a result of initial DOE funding (Market Transformation and ARRA projects).

The manufacturers providing the fuel cells for the deployments (installed and on-order) mentioned in Table 1 are:

¹ ARRA funding supported deployments in MHE for: FedEx Freight East; GENCO with deployments at Coca Cola, Kimberly Clark, Sysco Philadelphia, Wegmans, and Whole Foods Market; Nuvera Fuel Cells with deployments at H-E-B Grocery. Funds included units as well as other aspects of the projects such as infrastructure, training, installation, data collection, analysis, and reporting.

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|-------------------|------------------|
| Hydrogenics | Oorja Protonics |
| Nuvera Fuel Cells | Plug Power, Inc. |

In 2011, Plug Power announced the next generation of its GenDrive® fuel cell products for electric lift trucks and committed to purchase a minimum of 3,250 fuel cell stacks by the end of 2011 from Ballard Power Systems.¹⁰ Plug Power also announced its intent to partner with Axane, an Air Liquide subsidiary, to better penetrate the European forklift market, which the company estimates to include an installed base of 2,000,000 forklifts and 325,000 annual unit sales.¹¹

As of October 2013, examples of companies that have purchased or ordered fuel cell powered lift trucks are as follows:

| | | |
|-------------------------|----------------------|-----------------------------------|
| Ace Hardware | FedEx Freight | Proctor and Gamble |
| Baldor Specialty Foods | Golden State Foods | Stihl |
| BMW Manufacturing Co. | Kimberly-Clark/GENCO | Sysco Foods |
| Bridgestone-Firestone | Kroger Co. | Testa Produce |
| Central Grocers | Lowes | United Natural Foods, Inc. (UNFI) |
| Coca-Cola | Martin-Brower | U.S. Foodservice |
| CVS | Mercedes | Walmart |
| EARP Distribution | Nestle Waters | Wegmans |
| East Penn Manufacturing | Nissan North America | WinCo Foods, LLC |

Based on OEM feedback, it was determined that their purchase orders for deployments were considered either directly or indirectly due to results of the DOE FCT Office. This includes both Market Transformation and ARRA deployment funding. In some instances, companies increased the number of purchases beyond those with DOE funds assistance. In other instances, the OEMs were able to show the business case using data collected from DOE projects and obtained purchase orders with no DOE funding. The list only includes deployments that can be traced to DOE FCT Office involvement.

Referencesⁱⁱ:

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10. “Ballard Announces Commitment From Plug Power to Purchase 3,250 Fuel Cell Stacks Through 2012,” July 19, 2011:
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http://plugpower.com/news/pressreleases/11-11-09/PLUG_POWER_ANNOUNCES_JOINT_VENTURE_WITH_AIR_LIQUIDE_TO_MEET_GROWING_EUROPEAN_FUEL_CELL_DEMAND.aspx

ⁱⁱ Units not accounted for in the publically available literature were obtained through personal communications with industry. This Record and supporting information were peer-reviewed by NREL’s National Fuel Cell Technology Evaluation Center in October 2013