


<b>DOE Hydrogen and Fuel Cells Program Record</b>		
<b>Record #:</b> 17004	<b>Date:</b> 4/25/2017	
<b>Title:</b> Industry Deployed Fuel Cell Backup Power (BuP)		
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**Item:**

**Table 1:** Number of fuel cells deployments (current and planned) for applications in backup power (BuP).

	<b>DOE Funded<sup>1</sup> (ARRA) as of Record Date</b>	<b>DOE Funded (Appropriations)<sup>2,3</sup> as of Record Date</b>	<b>DOE Total</b>	<b>Industry-Funded Fuel Cell Shipments and Units On Order (Globally)<sup>4-9, 13-18</sup> from 2009 – Record Date</b>	<b>DOE and Industry Total from 2009 – Record Date</b>
<b>Number of Backup Power Deployments (current and planned)</b>	824	83	907	7,660	8,567

The successful deployment of more than 900 BuP fuel cell systems with U.S. Department of Energy (DOE) funds has led to more than 7,600 BuP fuel cell shipments and units on order with no DOE funding. The 8,567 BuP fuel cell shipments and units on order equate to almost 43,000 kW of fuel cell systems.<sup>i</sup>

**Data/Assumptions/Calculations:**

The manufacturers providing the fuel cells for the deployments (current and planned) mentioned in Table 1 above are:

Alteryg	Ballard	GenCell
Hydrogenics	Plug Power	

<sup>i</sup> Estimated total kW of fuel cell systems deployed assumes each BuP system has a 5 kW capacity. This is the average BuP system size based on the NREL report *Backup Power Cost of Ownership Analysis and Incumbent Technology Comparison*: <http://www.nrel.gov/docs/fy14osti/60732.pdf>

Total DOE American Recovery and Reinvestment Act (ARRA) investment for these fuel cell projects was \$18.5M, with an industry cost share of \$30.8M.<sup>ii</sup> While publicly available sales information for BuP fuel cell sales is difficult to obtain, industry reports of sales activity in recent years show signs of substantial growth.

In August 2011, Ballard Power Systems purchased IdaTech Power Systems and in April 2013 they announced the shipment of their 500th methanol-fueled telecom BuP system.<sup>10</sup> Also in 2011, ReliOn announced that it has deployed more than 3.9 MW of its fuel cell systems at approximately 1,350 customer sites globally and Alteryx Systems' Freedom Product achieved 5 million operational hours in telecommunications and other applications worldwide.<sup>11</sup>

In early April of 2014, Plug Power Inc. announced the acquisition of ReliOn Inc., a developer of hydrogen fuel cell stack technology and fuel cells systems based in Spokane, Washington. The acquisition brings fuel cell stack technology and products in-house which Plug Power plans to integrate into several models of its GenDrive fuel cell systems with first deployments in 2014. Under the "GenSure" brand, Plug Power's ReliOn business unit develops modular, scalable proton exchange membrane (PEM) hydrogen fuel cell systems featuring innovative air-cooled stack designs with low-cost snap-and-build stack assembly technology. The company has deployed over 5,000 fuel cell stacks at customer sites.<sup>12</sup>

In May 2016, Ballard announced the sale of its methanol backup power business assets to Chung-Hsin Electric & Machinery Manufacturing Corporation, a Taiwan-based power equipment company.<sup>17</sup>

Based on fuel cell manufacturers' feedback, it was determined that their purchase orders for deployments were considered either directly or indirectly due to results of the DOE Fuel Cell Technologies Office (FCTO). This includes fuel cell R&D, Market Transformation, and American Recovery and Reinvestment Act deployment funding. In some instances, companies increased the number of purchases beyond those with DOE funds assistance. In other instances, the fuel cell manufacturers were able to show the business case using data collected from DOE projects and obtained purchase orders with no DOE funding.

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<sup>ii</sup> ARRA funding supported deployments in BuP power for: ReliOn with deployments at AT&T and PG&E sites, Sprint Nextel with deployments at Sprint sites, and Plug Power with deployments at Warner Robins Air Force Base and Fort Irwin. Funds included units as well as other aspects of the project such as installation, pre-testing, data collection, analysis, maintenance, and reporting.

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