

The Business Case for Fuel Cells 2011: Energizing America's Top Companies



Authors and Acknowledgements

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About This Report

This report profiles a select group of nationally recognizable companies and corporations that are deploying or demonstrating fuel cells. These businesses are taking advantage of a fuel cell's unique benefits, especially for powering forklifts and providing combined heat and power to their stores and headquarters.

This list is by no means exhaustive – tens of thousands of fuel cells have been installed around the world, for primary or backup power, for decades now. There are many other companies in the United States and worldwide using fuel cells that we didn't profile. Outside of the business world, fuel cells are being used at wastewater treatment plants, government buildings, universities, military bases, homes and hospitals, to name just a few. There are many other applications for fuel cells, including portable power, vehicles, buses and consumer electronics, which are also being researched, demonstrated and deployed by numerous organizations around the world.

The information contained in this report has been obtained from public sources and via contact with fuel cell manufacturers and the companies profiled. Please contact Fuel Cells 2000 at info@fuelcells.org or 202-785-4222, ext. 17 with any corrections, updates or questions.

About Fuel Cells 2000

Fuel Cells 2000's mission is to promote the commercialization of fuel cells and hydrogen by supplying accurate, unbiased industry information and developing and disseminating summary materials accessible to a general audience. Fuel Cells 2000 helps researchers to assess technical and commercial capabilities, suppliers to identify sales prospects, teachers to develop experiments and lesson plans, students to find college and university offerings, graduates to find jobs, investors to identify opportunities, and purchasers to find suppliers. Our materials and information are available free of charge, with minor exceptions. Fuel Cells 2000 is independent and non-aligned, and supports fuel cells of all types for all applications.

Fuel Cells 2000 is an activity of the Breakthrough Technologies Institute (BTI), a non-profit [501(c)(3)] independent, educational organization that identifies and promotes environmental and energy technologies that can improve the human condition. BTI was established in 1993 to ensure that emerging technologies have a voice in environmental and energy policy debates. Our current focus is on air quality, climate change, energy efficiency, and energy independence. Our programs have won international recognition and numerous awards.

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Acronyms Used In This Report

ARRA	American Recovery and Reinvestment Act
CCEF	Connecticut Clean Energy Fund
CEFIA	Clean Energy Finance and Investment Authority
CHP	Combined heat and power
CO ₂	Carbon dioxide
DOE	U.S. Department of Energy
GHG	Greenhouse gas emissions
ITC	Investment Tax Credit (federal)
kW	Kilowatt
kWh	Kilowatt hour
LEED	Leadership in Energy and Environmental Design
MW	Megawatt
NYSERDA	New York State Energy Research and Development Authority
PDC	Perishable distribution center
PEM	Proton exchange membrane
PPA	Power Purchase Agreement
SGIP	Self-Generation Incentive Program (California)
sq. ft.	Square foot
TR	Tons of refrigeration

Front cover photo credits

Top left: Fuel cell forklifts at BMW Manufacturing Co. plant in South Carolina

Bottom left: UTC Power fuel cell at Coca-Cola's East Hartford, Connecticut bottling facility

Top right: UTC Power fuel cell at Cox Communications' data center in California

Middle right: ClearEdge Power fuel cells at Universal Studios Hollywood in California

Bottom right: Bloom Energy Servers at the Fireman's Fund Novato, California campus

Fuel Cells Mean Business

Fuel cells are boosting American business two-fold – by helping customers save money and emissions, as well as reviving U.S. manufacturing and ingenuity.

Last year, Fuel Cells 2000's The Business Case for Fuel Cells: Why Top Companies are Purchasing Fuel Cells Today, compiled an impressive list of 38 companies using fuel cells to help save money, fuel and time, increase reliability and efficiency, improve public image, and reduce their carbon footprint at North American facilities.

Our 2011 report highlights **34** companies, including **24** new companies taking advantage of the cost and environmental benefits fuel cells offer, and **10** repeat purchases from customers profiled in our last report. Some are really taking the ball and running with it. Walmart – the number 1 company on the Fortune 500 list - uses fuel cells to generate power at **17** of its California retail sites, as well as operating fuel cell-powered forklifts at several of its warehouses.

The companies profiled are collectively saving millions of dollars in electricity costs while reducing carbon emissions by hundreds of thousands of metric tons per year. The profiled companies are using fuel cell lift trucks, or fuel cells for power generation or combined heat and power (CHP), and in many cases both. These are two of the hottest U.S. markets for fuel cells, although by no means the only markets.

In the last year, the **34** companies profiled in our new report have purchased or deployed, collectively:

- More than **250** fuel cells totaling **30+** Megawatts (MW) of stationary power, including more than **12.5 MW** from new customers
- More than **240** fuel cells at telecommunications sites
- More than **1,030** fuel cell-powered forklifts

Repeat customers include: AT&T, Coca-Cola, Cox Enterprises, Price Chopper, Sysco Corporation, Whole Foods Market, and Walmart. All have installed or ordered additional systems for several North American locations since our last report.

These purchases continue the trend we noted in 2010, in which we profiled 38 nationally recognizable companies that have deployed fuel cells in the United States and Canada. Fuel cells are steadily becoming a go-to technology for businesses interested in increasing both their economic and environmental bottom lines.

Industry Winners

The following companies are leading the field, cumulatively deploying many MWs of fuel cells and hundreds of fuel cell forklifts:

- Walmart – 6.8 MW (17 stores) and 70+ forklifts
- Coca-Cola – 2.1 MW (four locations) and 72 forklifts
- Sysco – 500+ forklifts at several locations, hundreds more on order
- Whole Foods – 1.2 MW (four stores), 60+ forklifts

Made in America

Forklift and combined heat and power markets are dominated by American companies, helping provide jobs and opportunities for export. All the companies profiled in this report are using fuel cells from companies with headquarters in the U.S.

- Altery Systems – California
- Bloom Energy – California
- ClearEdge Power – Oregon
- FuelCell Energy - Connecticut
- Hydra Fuel Cell – Oregon
- IdaTech – Oregon
- Oorja Protonics – California
- Plug Power – New York
- ReliOn - Washington
- UTC Power – Connecticut

A full list of fuel cell manufacturers can be found at www.fuelcells.org.

In addition to being a leader in the private sector use of fuel cells in the distributed power marketplace and the forklift market, the United States is also home to the world's leading fuel cell and component manufacturers. 45 Fortune 500 companies are involved in the fuel cell industry in some capacity, either through deployment, demonstration or development.

In addition, many fuel cell components, such as membrane electrode assemblies, are manufactured by large global companies such as DuPont, Gore and 3M in the U.S.

What Are Fuel Cells?

Fuel cells utilize the chemical energy of fuel to generate electricity without combustion. The process is inherently efficient and environmentally clean. The only emissions from the fuel cell itself are water and waste heat, which can be captured and put to use. A fuel cell can be seen as an electrochemical engine, and will produce both electricity and heat as long as fuel is supplied.

Why Fuel Cells?

Fuel cells are gaining traction and finding success helping customers save money while reducing their carbon footprint and increasing their "green" profile with consumers. Companies are installing fuel cells to generate onsite primary or back up power to buildings, data centers and cell towers, due to their high reliability and low emissions. Businesses are also choosing fuel cells to power their materials handling equipment, and in some cases, their entire forklift fleet in warehouses and distribution centers, because of the productivity and performance advantages of fuel cell lift trucks over battery-powered ones.

"Staples is a leader, a driving force, and an early adopter — others are just now getting on board." —

Bob Valair, Director of Energy and Environmental Management, Staples, Inc.

Stationary Power

In the stationary market, fuel cells are gaining traction in the retail and grocery markets, at corporate headquarters, office parks and mixed-used residential buildings. Fuel cells are delivering highly efficient power, or CHP to these sites and – importantly – they can continue to generate power during grid power failures and permit a company to continue its operations. Fuel cells are also helping companies achieve various levels of Leadership in Energy and Environmental Design (LEED) certification.

Fuel cells are inherently efficient, with electrical efficiencies between 40 and 60 percent, depending on the type.¹ When the waste heat is captured in a CHP configuration, overall energy efficiency can be 85 percent or higher. That waste

¹ <http://www.fuelcells.org/basics/types.html>

A fuel cell is a device that combines hydrogen and oxygen electrochemically, with no combustion, to produce electricity. The only byproducts are heat and water. A fuel cell has a structure similar to a battery, but a battery stores electricity, while a fuel cell generates electricity from fuel. The fuel cell does not run down or require recharging. It will produce energy in the form of electricity and heat as long as fuel is supplied.

Fuel cells are not a new technology – they were first invented in the early 1800s.

Fuel Cell Benefits

- Increased productivity
- Cost savings via high electrical and overall efficiency
- Fuel flexibility: operation on conventional or renewable fuel
- High quality, reliable power
- Exceptionally low/zero emissions
- Modularity/scalability/flexible installation
- Not dependent on the power grid
- Silent operation
- Lightweight
- Rugged
- Can be used with or instead of batteries and diesel generators
- Can partner with solar, wind, and other renewable technologies

heat can be used for space heating, hot water, or even cooling, air conditioning or refrigeration. Some fuel cells are designed to operate in water-balance, with no consumption or discharge of water in normal operations. One manufacturer's 400-kilowatt (kW) fuel cell system can save around 1.6 million gallons of water per year compared to the U.S. electric grid.

Most fuel cells in the field operate on natural gas or pure hydrogen, but some fuel cells also have the ability to run on propane or a renewable fuel source such as anaerobic digester gas or other biogas. This allows customers with organic remnants of daily processes, such as effluent from beer and winemaking, or animal waste from industrial farming, to eliminate the expense of removing the waste and instead use it to power their facilities. This not only reduces costs and emissions, but can also add to a company's public and "green" image.

Fuel cells generate low to zero emissions, depending on the fuel source, and are exempt from air quality permitting in numerous states. Fuel cells are also extremely quiet, so they can be installed indoors or outdoors without noise disruption.

"We just don't have space on our tower rooftops for large solar arrays." — Randall H. Knox, III, Adobe's senior director of Global Workplace Solutions

In many cities, solar and wind power may not be an option due to lack of space and inadequate access to the elements - such as crowded urban settings where there isn't enough square footage for a large-scale photovoltaic system. Fuel cells provide constant power and flexible siting, unlike other renewable options. Adobe (profiled on p. 8), for example, took advantage of fuel cells' smaller footprint and installed a 1.2-MW fuel cell system on the roof of the parking garage of their San Jose, California headquarters. Fuel cells also work in combination with other renewable technologies and can serve as an energy storage system to provide power for times when the sun isn't shining or wind isn't blowing.

Reliability is another big selling point for fuel cells. According to Lawrence Berkeley National Laboratory, the annual cost of power interruptions in the U.S. is estimated at \$80 billion or more.² Fuel cells - which can be grid connected or grid independent - can be configured so that they continue to provide power when the grid fails. During Hurricane Irene, which pummeled the East Coast in August 2011, the Whole Foods Market in Glastonbury, Connecticut, was able to keep its coolers running with its fuel cell. During a recent catastrophic power outage in Southern California, one of the only buildings in San Diego that retained power was the Albertsons grocery store, whose fuel cell is capable of operating independent of the grid and kept the lights on and food fresh. For everyone else, the blackout lasted for 12 hours.

"When you drive down the neighborhood and the only thing lit is Albertsons, it attracts people... We had a very busy day." — Rick Crandall, SUPERVALU's Southern California director of sustainability, speaking about the recent southwestern power outage.

Warehouse Operations

Fuel cell forklifts have moved well past the demonstration stage to commercial sales and are providing customers with benefits on multiple fronts - savings in emissions, labor costs, and most importantly, time. Fuel cell forklifts last two to three times as long between fueling than batteries, with much shorter refueling times - one or two minutes compared to a half hour or longer to change out a battery.

² <http://certs.lbl.gov/pdf/55718.pdf>

In 2009, the U.S. Department of Energy (DOE) awarded \$9.7 million of American Recovery and Reinvestment Act (ARRA) funds for fuel cell forklifts. Combined with industry's cost share of around \$11.8 million, the ARRA has helped deploy more than 465 fuel cell-powered forklifts, with more than a hundred more in the pipeline. **Since receiving that initial ARRA funding, several of the recipients, including large distributors like Sysco Corporation, have purchased additional units on their own.** DOE's analysis of the forklifts deployed via the ARRA concludes that fuel cells provide eight times lower refueling/recharging labor cost and two times lower net present value of total system cost compared to batteries.

Another significant benefit is elimination of storage space and battery changing rooms. Fuel cells have a significantly smaller footprint, which recovers valuable warehouse space to store more product. In Coca-Cola's San Leandro, California, bottling and distribution facility, the company was able to recover more than 2,000 square feet (sq. ft.) of facility space by removing the infrastructure associated with the lead-acid battery charging, changing and maintenance. Fuel cell forklifts are also well suited to operation in cold environments, with demonstrated reliability in warehouse freezers and refrigerators.

And of course, there are significant emissions reductions. The supply chain industry estimates that annual greenhouse gas emissions (GHG) created by an average 20-truck lead acid battery-powered forklift fleet can be reduced by hundreds of tons a year by converting to fuel cell-powered equipment. By using hydrogen fuel cells instead of lead-acid batteries, greenhouse gases can be reduced by over 90 percent, according to customer consumption estimates.³

These benefits have not gone unnoticed. There have been many purchases outside of the ARRA. Fuel Cells 2000 estimates that there are more than 2,000 fuel cell forklifts either deployed or on order, all in the U.S., making America far and away the world's leader in fuel cell forklifts. Since our last report, several big companies have made substantial fuel cell purchases, including BMW Manufacturing Co. (~100), Kroger Co. (161) and WinCo Foods (184).

The market is growing enough that forklift manufacturers and integrators, such as Crown Equipment Corporation, are offering fuel cells as part of their product catalog. Crown has even launched a Fuel Cell Qualification program, the first of its kind within the forklift industry, and has qualified 20 of its electric forklift models to operate with various fuel cells. The company now offers 29 qualified combinations of fuel cell packs and trucks and conducts its fuel cell testing at a 25,000-sq. ft. research facility near Dayton, Ohio, that is dedicated solely to this purpose. In addition to retrofitting its forklifts already in operation with fuel cells, Crown recently built its 500th new forklift to be operated with fuel cells.

"An increasing number of our customers are considering fuel cell-powered forklifts as a viable option. They are coming to us with questions and asking for help determining if and how this technology can be integrated into their fleets and facilities. Crown continues to work closely with fuel cell manufacturers to guide the evolution of the technology and increase levels of fuel cell integration with lift trucks." — Ernst Baumgartner, Crown Equipment Corporation's fuel cell project manager

³ http://www.kimberly-clark.com/newsroom/latest_news_events/feature_stories/Industrialpark.aspx

Backup Power

In the 2010 report, we also highlighted backup power as a growing market for fuel cells, profiling telecommunications companies such as Sprint, Motorola and Verizon that are installing fuel cells at cellular towers and switching centers. Fuel cells last longer than batteries, are extremely reliable, and can be sited in rugged terrain and extreme weather climates. One fuel cell manufacturer, IdaTech, reports that one of its customers in the Caribbean kept power on during the harsh winds of Hurricane Irene thanks to their fuel cell.⁴ T-Mobile recently installed one of IdaTech's units in California, the first fuel cell to run on Bio-HydroPlus, a renewable fuel mixture of bio-methanol and de-ionized water.

DOE, through the ARRA, has helped deploy more than 360 fuel cells around the country for backup power. AT&T (profiled on p. 10) has more than 260 ReliOn Inc. fuel cells installed at various sites across the U.S. and is installing at least 120 more. Branching out beyond the big telecom companies, Alteryg Systems, a fuel cell manufacturer, has installed a system at Union Pacific Railroad's Stockton, California, telecommunications facility to supply backup power for railway switching, communication, and various other crucial railway demands. Alteryg also has customers in Jamaica, where the fuel cells have supplied power during hundreds of power outages since being installed. Reliable power is a universal need and a tremendous market for fuel cells.

Fuel Cell Financing

Customers can take advantage of the Federal Investment Tax Credit (ITC) for fuel cells, and in 2011, can apply for a grant in lieu of the tax credit for companies with limited funds and/or tax liability. Customers in California are also able to apply for Self-Generation Incentive Program (SGIP) grant funding to help alleviate the cost of stationary fuel cells. Other state-level grant and credit programs can also help offset the initial cost of purchasing fuel cell systems. Some states have development agencies or other public benefit funds that finance fuel cell installations.⁵

Power Purchase Agreements are a significant part of the story.

A power purchase agreement (PPA) is an innovative arrangement that allows a company to gain the advantages of an on-site system without carrying all the risk. Customers do not purchase the fuel cell, but instead pay a fixed charge for the power used. Bloom Energy and UTC Power now offer customers clean electricity at favorable rates for terms of 10 and 20 years, while retaining ownership of the fuel cell system itself. FuelCell Energy has been working with third party companies to arrange PPAs.

Power delivered from the fuel cells in some cases is cheaper than the local utility, and the stability of pricing for the future is an additional incentive. This also reduces any fears about maintenance and upkeep, since the manufacturer or third-party assumes responsibility.

Federal Investment Tax Credit for fuel cells:

Business property owner: Credit of 30% of the cost up to \$3,000 per kW.

Non-business property owner: Credit of 30% of the cost up to \$1,000 per kW.

Minimum 0.5 kW capacity.

Electricity-only efficiency of more than 30%.

Eligibility extended to all utilities and telecommunications firms.

Allowance of credit is permissible against Alternative Minimum Tax. This allows persons subject to AMT to take the credit against that portion of their tax liability.

⁴ <http://gigaom.com/cleantech/kathy-fosberg-on-fuel-cells/>

⁵ See Fuel Cell 2000's free, searchable [State Fuel Cell and Hydrogen Database](#) for specific state policies.

An additional financial benefit can be derived from net metering, where customers can reduce electric bills by receiving credit for electricity that is generated at the consumer's site and exported to the grid. State net metering policies encourage consumers to deploy stationary fuel cells and other renewable technologies to reduce the burden of over-stressed power grids and to encourage clean power generation. Many states permit net metering of customer-sited fuel cells. Many states also impose a Renewable Energy Portfolio requirement, which places an obligation on power companies to include an increasing amount of renewable energy generation among its resources.

Value

With federal and state assistance, more and more companies are buying fuel cells. This helps to build economies of scale and bring down capital costs for manufacturers. In turn, this helps reduce the need for market incentives. While public support programs remain an important part of the fuel cell business equation, in some cases, fuel cells are today providing more than enough benefits to compete directly with conventional combustion technologies. Some customers who were initially enticed by ARRA or state support programs are finding enough added value with their fuel cell systems that they are returning to buy more.

Outside of the business world, state and municipalities are purchasing fuel cells to provide power for universities, hospitals, prisons and wastewater treatment plants. Fuel cells are being evaluated by the military to provide uninterrupted power to bases and remote sites, portable power for military personnel and extended power for unmanned aerial and ground vehicles. International interest is also high - demand for residential fuel cells is exceeding expectations in Japan; residential systems are of great interest in Germany and other countries as well; and Korea is focused on large-scale fuel cell systems and aims to be a major exporter of the technology.

Operational, environmental and economic savings are covered in detail in our profiles, using, where we can, the companies' own words. Their actions speak loudly, too. When companies like Walmart try fuel cells in a variety of applications and come back for more – after initially installing units in two stores, Walmart now powers **17** retail stores with fuel cells. This speaks volumes to the benefits of fuel cells to business applications. We hope our new report encourages other businesses to explore how fuel cells can generate value in their operations.

Companies Profiled in this Report

Company	Fuel Cell Stationary Power	Fuel Cell Forklifts	Total kW/MW or # of Forklifts*
Production Facilities			
BMW Manufacturing Co.		✓	~100 forklifts
Carla's Pasta	✓		300 kW
Coca-Cola	✓	✓	2.1 MW; 72 forklifts
Distribution Facilities			
Central Grocers		✓	231 forklifts
CVS Caremark		✓	unavailable
Kimberly-Clark		✓	25 forklifts
Kroger		✓	161 forklifts
Staples	✓		300 kW+
Sysco		✓	600+ forklifts
WinCo Foods		✓	184 forklifts
Grocery Stores/Retail			
Price Chopper	✓		1 MW
Stone Edge Farm	✓		5 kW
Stop & Shop	✓		400 kW
SUPERVALU	✓		800 kW
Walmart	✓	✓	6.8 MW; 71 forklifts
Whole Foods Market	✓	✓	1.2 MW; 61 forklifts
Hospitality			
Lafayette Hotel	✓		40 kW
Mixed Use			
Becker + Becker	✓		800 kW
The Ratkovich Co.	✓		500 kW
Sharks Ice	✓		500 kW
Corporate Headquarters/Data Centers			
Adobe	✓		1.2 MW
Bank of America	✓		500 kW
BD	✓		800 kW
Cox Enterprises	✓		2 MW
Diversey	✓		400 kW
Google	✓		400 kW
Fireman's Fund	✓		600 kW
Kaiser Permanente	✓		Up to 5 MW
NBCUniversal	✓		20 kW
Telecommunications			
AT&T	✓		~8 MW
Liberty Towers	✓		Unavailable
NTT America	✓		500 kW
Time Warner Cable	✓		30 kW
T-Mobile	✓		5 kW

*Cumulative total from 2010 and 2011 reports.

Adobe

Recent and Planned Fuel Cell Activities:	<p>In September 2010, Adobe installed 1.2 MW of Bloom Energy Servers at its San Jose, California headquarters campus.</p> <p>The twelve 100-kW fuel cells are located on the fifth floor of Adobe headquarters West Tower. The fuel cell system is designed to supply approximately one-third of the electricity required by the building. Adobe's headquarters spans three office towers with over one million sq. ft. of office space, making it the largest corporate presence in downtown San Jose.</p> <p>Adobe has signed a five-year contract to purchase methane captured at a Pennsylvania landfill.⁶ "In reality, the methane gas is probably not making it to San Jose. But we're actually paying for the gas in Pennsylvania and paying for the tariffs so it can be put in the pipeline and transported to California." – Randall H. Knox, III, senior director, Global Workplace Solutions⁷</p> <p>Adobe is considering adding Bloom Energy Servers at other company sites in California.⁸</p>
Benefits:	<p>The fuel cell power cost is approximately 8.5 cents/kilowatt-hour (kWh), which includes: maintenance, fuel, amortized cost over the 10-year fuel cell lifespan, 30 percent federal Investment Tax Credit, and California incentives.⁹</p> <p>According to Randall H. Knox, III, "That is down from the 13 cents we would ordinarily pay PG&E."</p>
What Adobe Is Saying About This Fuel Cell Installation:	<p>The following quotes are from Randall H. Knox, III:</p> <p>"While the wind is fairly constant, they're [wind turbines] not a large producer of energy at this point. Fuel cells look like they offered the best alternative.... At this point and based on everything I've seen, I would say fuel cells are by far the best solution in an urban environment."¹⁰</p> <p>"We just don't have space on our tower rooftops for large solar arrays."¹¹</p>
Earlier Fuel Cell Activities:	<p>This is Adobe's first fuel cell installation.</p>

⁶ <http://www.greentechmedia.com/articles/read/adobe-installs-1.2-mw-of-bloom-boxes-cheaper-than-grid-power/>

⁷ <http://green.blogs.nytimes.com/2010/09/28/short-on-roof-space-adobe-plants-fuel-cells/>

⁸ <http://www.greentechmedia.com/articles/read/adobe-installs-1.2-mw-of-bloom-boxes-cheaper-than-grid-power/>

⁹ <http://www.greentechmedia.com/articles/read/adobe-installs-1.2-mw-of-bloom-boxes-cheaper-than-grid-power/>

¹⁰ <http://venturebeat.com/2010/09/27/at-adobe-campus-bloom-energy-completes-largest-fuel-cell-installation-to-date/>

¹¹ <http://green.blogs.nytimes.com/2010/09/28/short-on-roof-space-adobe-plants-fuel-cells/>

Two views of the 1.2 MW of Bloom Energy Servers installed on the roof of Adobe's San Jose headquarters campus

Photo Credit: Edelman



AT&T

<p>Recent and Planned Fuel Cell Activities:</p>	<p>In July 2011, AT&T announced that it will install 7.5 MW of Bloom Energy Servers at 11 sites in California.</p> <p>These sites will include San Diego, San Jose, Redwood City, Corona, Fontana, Hayward, Pasadena, Rialto, San Bernardino, and San Ramon. The fuel cells will power administrative AT&T office buildings, data centers and facilities that house network equipment and will be fully operational by mid-2012. The Bloom Energy Servers are expected to produce over 62 million kWh of energy annually.</p>
<p>Benefits:</p>	<p>The Bloom Energy Servers are expected to cut carbon emissions by half, reducing total carbon emissions by 250 million pounds per year.</p>
<p>What AT&T Is Saying About This Fuel Cell Installation:</p>	<p>"Bloom Energy provided us with a solution that was not only cost comparable but also allows us to minimize environmental impact." - John Schinter, director of energy, AT&T¹²</p>
<p>Earlier Fuel Cell Activities:</p>	<p>AT&T has deployed 259 ReliOn fuel cells (out of planned 376), each with a new refillable 72-hour hydrogen fuel system, at 114 (out of 180) locations across the AT&T Mobility Network. Funding for the fuel cells was provided through the 2009 American Recovery and Reinvestment Act (ARRA). The deployments include AT&T sites in Arizona, California, Colorado, Florida, Illinois, Indiana, Kentucky (reserve site), Louisiana, Michigan, New Mexico, South Dakota, and Utah. The remaining fuel cells will be installed by the end of 2011.¹³</p>
<p>ReliOn fuel cells at AT&T sites in Arvada and Byers, CO</p>	

¹² <http://www.cellular-news.com/story/49974.php>

¹³ http://www.hydrogen.energy.gov/pdfs/review11/h2ra006_maxwell_2011_o.pdf

Bank of America

Recent and Planned Fuel Cell Activities:

Bank of America has installed 500 kW of Bloom Energy Servers at one of its largest 24/7 call centers in Southern California.

Bank of America has committed \$20 billion over 10 years to address climate change through lending, investing, products and services, and in its own operations. As part of this initiative, the company sought to cut electricity costs while increasing power reliability and enhancing energy security by reducing its dependence on the grid.

Benefits:

The five Bloom Energy Servers help to eliminate Bank of America's need for diesel generators while reducing the company's carbon footprint and providing energy cost stability.

What Bank of America Is Saying About This Fuel Cell Installation:

"Installing low-carbon technologies, like Bloom's Energy Servers, at our facilities is not only the right thing to do for our planet, but it's also a smart business decision." - **Mark Nicholls, Senior Vice President; Corporate Workplace executive, Bank of America**¹⁴

Earlier Fuel Cell Activities:

This is Bank of America's first fuel cell installation.

Five Bloom Energy Servers at Bank of America's call center



¹⁴ <http://www.bloomenergy.com/customers/customer-story-bank-of-america/>

BD (Becton, Dickinson and Company)

Recent and Planned Fuel Cell Activities:

BD has installed Bloom Energy Servers at their biosciences facility in San Jose, California. BD installed four 200-kW fuel cells for a combined 800-kW installation.

Benefits:

The fuel cells installation provides reliable energy costs, decreases dependency on the electricity grid, and reduces greenhouse gas emissions.

What BD Is Saying About This Fuel Cell Installation:

"As a global healthcare company, BD believes that a healthy environment is essential to human health and we must do our part to reduce our environmental footprint. Installing a fuel cell from Bloom Energy at our San Jose, CA site, and participating in their Bloom Electrons™ service is an important example of BD's commitment to use innovative energy solutions in our global operations." - **Glenn Barbi, Vice President, Office of Global Sustainability, BD**

Earlier Fuel Cell Activities:

This is BD's first fuel cell installation.

Bloom Energy Servers at BD's San Jose, CA facility



Becker + Becker

<p>Recent and Planned Fuel Cell Activities:</p>	<p>In 2010, Becker + Becker installed 400-kW UTC Power fuel cells at two mixed-use buildings, one located on Roosevelt Island, New York City, the other in New Haven, Connecticut.</p>
	<p>Becker + Becker is a mission-driven green architecture, planning, preservation and development firm that seeks projects with social and environmental value. Recently, fuel cells have played a role in helping Becker + Becker achieve these goals with the first two installations at multifamily buildings in the world.</p>
	<p>At 360 State Street in New Haven, Connecticut, 65 percent of the electricity generated by the fuel cell is used to provide power to common and commercial areas. The remainder of the power (excess generation) goes back to the grid with reimbursement. One hundred percent of the fuel cell’s waste heat is used for domestic hot water and space heating for 500 apartments, as well as pool heating. The payback period with state and federal incentives is six years, and would be 13 years without incentives. The total investment was four million dollars (fuel cell cost was \$1.875 million). Financial incentives included a Connecticut Clean Energy Fund (CCEF)¹⁵ grant of \$985,000, Federal Tax Credit of \$3,000/kW or 30 percent of install cost (\$1.2 million anticipated), Renewable Energy Credit sales of approximately \$50,000 per year depending on market pricing, and a distributed generation natural gas rate-discount that forgives distribution charges.</p>
	<p>At the Octagon, on Roosevelt Island, New York, 100 percent of electricity generated by the fuel cell powers 500 apartments and common areas. Seventy percent of the fuel cell’s waste heat is used for domestic hot water and space heating. The power is sub-metered to tenants, who are charged for their electricity use. Payback period for the installation, with state and federal incentives, is 4.5 years, and 14 years without incentives. Total installed cost was 4 million dollars, of which \$2.175 million was for the fuel cell unit, plus installation and existing system tie-in and upgrades. Becker + Becker received \$2.2 million in total incentives including a New York State Energy Research and Development Authority (NYSERDA) grant of \$1.2 million, and Federal Tax Credit of \$3,000/ kW or 30 percent of install cost (\$1.2 million anticipated).¹⁶</p>
<p>Benefits:</p>	<p>The fuel cell systems will reduce carbon emissions by 790 metric tons per year per site.</p> <p>Annual energy cost savings at each site are in the range of \$350,000.¹⁷</p>
<p>What Becker + Becker Is Saying</p>	<p>“On-site fuel cell technology represents the future of electricity generation in this country. Traditionally, large capacity fuel cells have been utilized at schools,</p>

¹⁵ Effective July 1, 2011, the Connecticut Clean Energy Fund became part of the newly created Clean Energy Finance and Investment Authority (CEFIA). In report, we will use CCEF where applicable.

¹⁶ http://www.hydrogen.energy.gov/pdfs/htac_june2011_becker.pdf

¹⁷ According to Becker + Becker

About This Fuel Cell Installation:

hospitals, and other energy-intensive facilities, but multifamily residential buildings present a perfect – heretofore uncultivated – opportunity for fuel cell technology because of their ability to continually utilize the fuel cell’s process heat in the form of hot water and space heating demand.” - **Bruce Becker, President of Becker + Becker**¹⁸

Earlier Fuel Cell Activities:

These two applications represent the company’s first fuel cell installations.

Top: The Octagon, Roosevelt Island, NY



Bottom: 360 State Street, New Haven, CT



¹⁸ <http://www.utcpower.com/pressroom/pressreleases/first-fuel-cell-to-power-residential-building-in-new-york>

BMW Manufacturing Co.

<p>Recent and Planned Fuel Cell Activities:</p>	<p>In October 2010, BMW Manufacturing Co. deployed a fleet of 86 Plug Power GenDrive® powered materials handling vehicles at its Spartanburg, South Carolina automotive manufacturing plant.</p> <p>That fleet has since grown to nearly 100. The fuel cell-powered forklifts, tuggers and stackers are used in the new assembly hall that produces the BMW X3 Sports Activity Vehicle®.</p> <p>Since 2003, BMW Manufacturing Co. has used methane gas to power part of the plant’s total energy requirements, earning the company the number four spot on EPA’s “Top 20 On-site Generation” list. The gas is collected from the local Palmetto landfill and is cleaned, compressed and delivered to the plant via a 9.5-mile pipeline. BMW Manufacturing Co., the South Carolina Research Authority, the Gas Technology Institute, Ameresco Inc., and the South Carolina Hydrogen and Fuel Cell Alliance are working together to develop a method to convert some of this methane gas onsite into hydrogen for the fuel cell forklifts. This effort is funded, in part, by a grant from DOE. In the meantime, hydrogen is delivered to the plant for use in the plant’s hydrogen storage and distribution center.</p>
<p>Benefits:</p>	<p>By using fuel cell-powered forklifts, BMW Manufacturing Co. will avoid consuming 1.8 million kWh of electricity annually, which will save 1,200 tons of CO₂ emissions.¹⁹</p> <p>The GenDrive® fuel cell forklifts can be fueled by the vehicle’s operator in just 60 to 180 seconds, compared to the 20 minutes it takes specialized maintenance personnel, on average, to change out a depleted lead-acid battery.²⁰</p>
<p>What BMW Manufacturing Co. Is Saying About This Fuel Cell Installation:</p>	<p>“BMW has taken another important step to affirm our global commitment to sustainability with a project such as this in Spartanburg. There’s a clear vision and determination to reach our goal of using renewable energy as much as possible throughout the plant site.” - Josef Kerscher, President of BMW Manufacturing²¹</p> <p>“The implementation of a hydrogen fuel cell based application for our materials handling equipment helps solidify BMW’s position as the leading sustainable automotive manufacturer.” - Max Metcalf, Communications Manager, BMW Manufacturing</p>
<p>Earlier Fuel Cell Activities:</p>	<p>BMW Manufacturing Co. initially purchased 86 fuel cell-powered forklifts.</p>

¹⁹ <http://www.ballard.com/fuel-cell-applications/material-handling.aspx>

²⁰ http://www.plugpower.com/news/pressreleases/10-10-12/BMW_DEPLOYS_86_GENDRIVE_FUEL_CELLS_FROM_PLUG_POWER.aspx

²¹ <http://www.bmwusa.com/standard/content/experience/newsfeed/post/2010/10/11/BMW-Manufacturing-Introduces-Hydrogen-Fuel-Cell-Material-Handling-Equipment.aspx>

Top left: BMW Manufacturing Co. Energy Center



Top right: Fuel cell forklift operating at the facility



Bottom: Hydrogen delivery to BMW facility



Carla's Pasta

Recent and Planned Fuel Cell Activities:	<p>In July 2010, Carla's Pasta announced that it would install a FuelCell Energy DFC300 fuel cell power plant to provide CHP to Carla's Pasta's 58,000 sq. ft. production facility in South Windsor, Connecticut. It will be operational by December 2011.</p> <p>LOGANEnergy, a fuel cell energy service company, will purchase and install the 300-kW fuel cell power system.</p>
Benefits:	<p>The fuel cell will provide 60 percent of the plant's electrical needs, and since waste heat and water will be captured and used, the system's combined electric and thermal efficiency will reach 80 percent. The fuel cell system will also provide back-up power for critical production loads. This configuration will increase energy security while reducing operating expenses.</p>
What Carla's Pasta Is Saying About This Fuel Cell Installation:	<p>"We operate our frozen pasta and pesto plant 24 hours per day and were attracted by the fuel cell power plant's reliability and energy security as it generates power right on our property. The high efficiency of the fuel cell power plant decreases our fuel and electrical costs, and lowers our carbon footprint." - Sergio Squatrito, Vice President of Operations²²</p> <p>"It made absolutely perfect sense for us....We've been debating it and debating it and debating it, and then finally the government incentives with a little bit of help finally pushed us over that edge of wanting to do it.... It's over \$2 million dollars. It's a large investment. But it's something that, if you use it and you have the energy needs, it'll help offset some of the swings in energy costs. It will help us offset some of the swings in fuel costs for our boilers." - Sergio Squatrito, Vice President of Operations²³</p> <p>"In business you have to do what makes sense and this does make sense." - Carla Squatrito, President</p>
Earlier Fuel Cell Activities:	<p>This is Carla's Pasta's first fuel cell installation.</p>

²² <http://www.reliableplant.com/Read/26028/pasta-pesto-fuel-cell-power>

²³ <http://www.courant.com/videobeta/8861541a-936a-4ee4-acdf-be3cfe0161cb/News/Carla-s-Pasta-Fuel-Cell-1-17News/Carla's-Pasta-Fuel-Cell-%7C-1/17News/Carla's-Pasta-Fuel-Cell-%7C-1/17News/Carla's-Pasta-Fuel-Cell-%7C-1/17News/Carla's-Pasta-Fuel-Cell-%7C-1/17>

Central Grocers

<p>Recent and Planned Fuel Cell Activities:</p>	<p>In February 2011, Central Grocers, a member-owned cooperative wholesale food distributor, placed a follow-on order for an additional 11 GenDrive® forklift units (eight Class 2 stand-up reach truck units and three Class 1 three-wheel sit-down counterbalanced truck units) for its Joliet, Illinois distribution center.</p> <p>Central Grocers has already deployed 220 fuel cell-powered pallet and lift trucks at this site.</p>
<p>Benefits:</p>	<p>Fuel cell-powered materials handling vehicles were selected for the Joliet site because they did not require battery swapping, can be refueled in minutes, and had fewer maintenance issues. Other benefits include:</p> <ul style="list-style-type: none"> • \$0 invested in a building battery charging and changing infrastructure in the new facility; • reduced operational costs; and • reduced carbon footprint. <p>After a year's operation, the fuel cell-powered forklifts showed an uptime rate of 98 percent.²⁴</p>
<p>What Central Grocers Is Saying About This Fuel Cell Installation:</p>	<p>The following quotes are from John Coari, Central Grocers' Vice President of Operations</p> <p>"The promise of the GenDrive® products has lived up to all of our expectations since the initial deployment. Purchasing additional GenDrive® units for our Joliet fleet was an easy decision because we knew it would drive productivity and keep our carbon footprint at a minimum."²⁵</p> <p>"Manually changing batteries was quite an ordeal and we were only getting about three to four years out of each battery."²⁶</p>
<p>Earlier Fuel Cell Activities:</p>	<p>In 2008, Central Grocers placed a large commercial order for Plug Power fuel cells for a new, 934,340 sq. ft. Joliet, Illinois Greenfield distribution center.</p> <p>The order included 140 Class 3 Plug Power GenDrive® power units (115 GD-3M24-390 and 25 GD-3M24-310F Freezer units) that were deployed in Yale lift trucks. An additional 80 Class 2 GenDrive® fuel cell power units were supplied in 2010. Central Grocers retired 170 battery-powered forklifts when the fuel cell forklifts were deployed. The project was supported by \$3.8 million in state corporate tax credits and \$87,500 under an employer training and investment program grant.²⁷</p>

²⁴ <http://www.mmh.com/article/lift-trucks-central-grocers-embraces-fuel-cells/>

²⁵ <http://fuelcellworks.com/news/2011/02/01/central-grocers-places-follow-on-order-for-plug-powers-gendrive-fuel-cells/>

²⁶ <http://www.mmh.com/article/lift-trucks-central-grocers-embraces-fuel-cells/>

²⁷ <http://www.forkliftaction.com/news/newsdisplay.aspx?nwid=6555>

Clockwise:
Central Grocers'
fuel cell forklifts,
hydrogen
storage, and
fueling station



Coca-Cola

Recent and Planned Fuel Cell Activities:

Coca-Cola has committed to holding its overall worldwide manufacturing emissions flat through 2015 at 2004 levels. **The company has deployed fuel cells at U.S. sites in a variety of applications.** The most recent installations include:

Materials Handling

- **In June 2011, Coca-Cola Bottling Co. Consolidated's (CCBCC) Charlotte, North Carolina production center began operating a fleet of 40 counterbalanced class one lift trucks powered by Plug Power fuel cells.**

The forklifts are refueled at three indoor fueling stations with hydrogen from Linde North America.

- **In January 2011, Coca-Cola Refreshments USA (CCR) announced that they will deploy a new fleet of Plug Power GenDrive®-powered lift trucks at Coca-Cola's 250,000 sq. ft. bottling and distribution center in San Leandro, California.**

The GenDrive® fleet at Coca-Cola's facility includes 37 Class-1 sit down counterbalanced trucks. The site previously used lead-acid batteries to power its fleet. Plug Power received a purchase order from Coca-Cola in November, 2010 and shipped all 37 units to the customer in December, 2010. Linde North America is supplying the hydrogen.

Combined Heat and Power

- **In June 2011, CCR unveiled two UTC Power 400-kW fuel cells that generate 100 percent of the power and 50 percent of the heat used at its East Hartford, Connecticut bottling facility.**

The project is a collaboration between Coca-Cola, UTC Power, East Hartford, and CCEF.

- **In October 2010, operations at CCR's Elmsford, New York production facility began operation of two UTC Power PureCell® Model 400 fuel cell systems.**

The fuel cell systems provide 35 percent of the electricity and heat required by the facility. NYSERDA provided funding to support the project.

Primary Power

- **In March 2011, Coca-Cola subsidiary, Odwalla, announced the installation of a 500-kW Bloom Energy fuel cell system at its juice packaging facility in Dinuba, California**

The fuel cell system generates 30 percent of the plant's power and operates using redirected biogas.

	<ul style="list-style-type: none"> • Coca-Cola has announced that it plans to expand the use of Bloom Energy Servers to additional manufacturing facilities.²⁸ <p>Coca-Cola will take advantage of the Bloom Electrons™ service, which allows customers to purchase the electricity provided by the Bloom Box without having to purchase the fuel cell.</p>
<p>Benefits:</p>	<p><i>Materials Handling</i></p> <p>The Plug Power fuel cell-powered forklifts require only a three-minute fuel time and operate for six to eight hours per fueling.</p> <p>Unlike the standard battery powered electric trucks, the fuel cell-powered forklifts operate at 100 percent power through the entire fill of hydrogen.</p> <p>San Leandro, California:</p> <ul style="list-style-type: none"> • By removing the infrastructure associated with the lead-acid battery charging, changing and maintenance, CCR will recover more than 2,000 sq. ft. of facility space to use for other business operations. • Electrical consumption will be reduced by an estimated 1.6 million kWh/year. • CCR anticipates these savings will yield a return on investment and a 15 percent carbon reduction across the business.²⁹ <p><i>Combined Heat and Power</i></p> <p>Elmsford, New York:</p> <ul style="list-style-type: none"> • The fuel cell power plants will help CCR lower its energy costs. • The UTC Power fuel cells on-site at CCR are capable of operating independent of the local utility power company. If there's a large-scale power outage in the Elmsford area, the fuel cells will allow select operations to continue at the facility while grid power is being restored. • The Model 400 is designed to operate in water-balance - no consumption or discharge of water in normal operations - saving millions of gallons of water when compared to central generation. • CCR will prevent the release of more than 2,635 metric tons of CO₂ and more than four metric tons of nitrogen oxide emissions by using the fuel cells instead of non-base load utility power plants.

²⁸ <http://c0688662.cdn.cloudfiles.rackspacecloud.com/downloads-pdf-release-bloom-electrons-customers-1-20-2011.pdf>

²⁹ <http://www.airliquide.com/en/air-liquide-in-the-us-to-power-coca-cola-hydrogen-forklift-fleet-at-california-facility.html>

	<p><i>Primary Power</i></p> <p>Dinuba, California:</p> <ul style="list-style-type: none"> The Bloom fuel cell system at Odwalla’s bottling facility will reduce the plant’s carbon footprint by 35 percent.
<p>What Coca-Cola Is Saying About These Fuel Cell Installations:</p>	<p>“Due to the high efficiency of the hydrogen fuel cells and the convenient location of the refueling stations in our plant, we expect to improve both our operating costs and our productivity.” - Bo Calloway, Director of Fleet Operations, CCBC³⁰</p> <p>“Sustainability is a core component of our business at Coca-Cola and we have a goal to be the beverage industry leader in energy conservation and climate protection. Converting to hydrogen fuel cell powered forklifts in our San Leandro facility represents one more step towards our commitment to reduce carbon emissions by 15 percent by 2020.” - Brian P. Kelly, Product Supply Leader, Coca-Cola Refreshments³¹</p> <p>“Coca-Cola is focusing on implementing green innovations and initiatives to reduce our Company’s overall environmental footprint at each step of our operations. Use of these fuel cell systems at our Elmsford facility is one way in which we are working to achieve our 2020 environmental goals.” - John Lacey, Sales Center Manager, Coca-Cola Refreshments</p>
<p>Earlier Fuel Cell Activities:</p>	<p><i>Fuel cell vehicles</i></p> <ul style="list-style-type: none"> In 2009, a Nissan X-Trail fuel cell vehicle was leased to Coca-Cola’s Sacramento bottling facility. This was Nissan’s first fuel cell vehicle lease in North America. Since 2008, Coca-Cola Germany has been participating in a project with Berlin’s Clean Energy Partnership to demonstrate a GM/Opel HydroGen4 fuel cell vehicle in everyday driving conditions.
<p>Top: UTC Power fuel cell at the East Hartford, CT Bottling Facility</p>	

³⁰ <http://www.vendingmarketwatch.com/news/10284606/coca-cola-consolidated-powers-charlotte-nc-plant-with-hydrogen-fuel-cell-technology>

³¹ <http://www.airliquide.com/en/air-liquide-in-the-us-to-power-coca-cola-hydrogen-forklift-fleet-at-california-facility.html>

**Middle: UTC
Power fuel cell at
the Elmsford, NY
Bottling Facility**



**Bottom: Bloom
Energy Servers at
the Odwalla
Bottling Facility
in Dinuba, CA**



Cox Enterprises

Recent and Planned Fuel Cell Activities:

Cox Enterprises is working to reduce its annual company-wide carbon footprint by 20 percent by 2017.

In February 2011, Cox installed 1.6 MW of fuel cell power at two of its California sites:

- **Two separate 400-kW UTC Power PureCell® fuel cell systems were installed at Cox's San Diego, California headquarters.**

One fuel cell provides 100 percent of the electrical load for one building, and the other provides nearly 60 percent of the electrical requirement for the main building.

- **Two 400-kW UTC Power PureCell® fuel cell systems were also installed at Cox's Rancho Santa Margarita facility in Orange County, California.**

These fuel cells provide nearly 60 percent of the 300,000 sq. ft. building's electricity requirement.

All four fuel cells are powered by a blend of biogas and natural gas. The installations qualified for incentives under California Public Utility Commission's SGIP.

Benefits:

By using biogas, the Rancho Santa Margarita site anticipates preventing about 3,000 tons of garbage from going into a landfill annually.³²

The UTC Power installations prevent the combined release of more than 5,387 metric tons of carbon annually.³³

Approximately two million gallons of water are saved each year.³⁴

What Cox Enterprises Is Saying About This Installation:

"At Cox Communications, we're deploying technology that benefits our customers and our communities. The fuel cell enables us to be good environmental stewards, as well as embrace a technology that positively impacts our operating costs." - **Jay Rolls, Senior Vice President for Technology**³⁵

"My energy bills are going down, and we're doing the right thing for the environment." - **Bill Geppert, oversees San Diego operations**³⁶

"At Cox Communications, we're always looking for innovative ways to do business more sustainably to reduce our carbon footprint. The fuel cell technology is one of the most cutting-edge environmental solutions on the

³² <http://ranchosantamargarita.patch.com/articles/cox-goes-high-tech-to-reduce-carbon-footprint>

³³ <http://www.utcpower.com/products/purecell400> (slideshow)

³⁴ <http://www.utcpower.com/products/purecell400> (slideshow)

³⁵ <http://green.tmcnet.com/channels/renewable-energy/articles/142291-renewable-energy-cox-communications-completes-oc-fuel-cell.htm>

³⁶ <http://www.signonsandiego.com/news/2011/jan/13/moldering-garbage-powers-communications>

market for renewable energy." - **Duffy Leone, vice president of operations for Cox Communications in California**³⁷

"The fuel cells at our Cox Communications facilities in California represent an important step in our overall Cox Conserves program. The three new alternative energy installations are making a substantial impact on helping us reach Cox Conserves' goal." - **Keith Mask, assistant vice president of energy management and engineering, Cox Enterprises**³⁸

Earlier Fuel Cell Activities:

In January 2010, Cox installed 400-kW of Bloom Energy Servers at the KTVU television station in Oakland, California.

UTC Power fuel Cell at a Cox Communications Data Center



³⁷ <http://www.ocmetro.com/t-cox-fuel-cell-technology-02042011.aspx>

³⁸ <http://coxenterprises.mediaroom.com/index.php?s=43&item=1093>

Diversey, Inc.

Recent and Planned Fuel Cell Activities:

In December 2010, Diversey, a global provider of cleaning and hygiene solutions, installed a 400-kW UTC Power fuel cell system at its headquarters in Sturtevant, Wisconsin.

The fuel cell is providing 40 percent of the electricity, and 80 percent of the heating, at the 278,000-sq. ft. global headquarters. The installation is helping Diversey meet its 2008 pledge to cut carbon emissions up to 25 percent of 2003 levels by 2013.

With a 30 percent federal grant and other expected grants or rebates, Diversey expects to recoup its \$2.5 million fuel cell investment in about five years.

Benefits:

The fuel cell will reduce Diversey's carbon emissions by more than 3,300 metric tons per year.

What Diversey is Saying About This Fuel Cell Installation:

"Reducing our waste and using cleaner energy sources are smart choices for the environment that generate substantial cost savings for our operations. This installation is another step in our ongoing efforts to continuously improve our operations." - **Ed Lonergan, Diversey President and CEO**³⁹

"We are at a threshold to make this economically viable and attractive." - **Mark Goldman, Diversey spokesperson**⁴⁰

Earlier Fuel Cell Activities:

This is Diversey's first fuel cell purchase.

Installation of Diversey's UTC Power fuel cell



³⁹ http://www.diversey.com/2010grr/content/operations1_fuel.html

⁴⁰ http://www.journaltimes.com/news/local/article_48050e18-0c53-11e0-90a7-001cc4c002e0.html

Fireman's Fund

<p>Recent and Planned Fuel Cell Activities:</p>	<p>In May 2011, Fireman's Fund installed 600-kW of Bloom Energy Servers at its two-building campus in Novato, California.</p> <p>The six fuel cells will supply 66 percent of the campus' energy needs - about 5.1 million kilowatt hours a year. The fuel cells are helping Fireman's Fund meet its pledge to reduce its overall carbon footprint by 25 percent by 2012. Two of the office buildings are LEED certified and have received an Energy Star certification with a score of 92.</p>
<p>Benefits:</p>	<p>The company's carbon footprint has been reduced by 15 percent.</p> <p>By using the fuel cells, Fireman's Fund is lowering its energy costs. Power delivered from the fuel cells will cost less than 10 cents/kWh (the cost of grid power is over 13 cents/kWh). With these savings, Fireman's Fund estimates that the investment in fuel cells will be paid back in three to five years.⁴¹</p>
<p>What Fireman's Fund Is Saying About This Fuel Cell Installation:</p>	<p>According to Lori Fouché, CEO:⁴²</p> <p>"We take sustainability seriously. This solution is not only good for the environment, but it makes economic sense."</p> <p>"Bloom Energy fuel cells allow Fireman's Fund to use a clean and reliable onsite energy source that reduces its energy costs and carbon footprint, is good for the environment and further demonstrates the company's commitment to sustainability."</p> <p>"The efficiency of the Bloom fuel cell gets us off the grid more effectively and with a much smaller footprint than solar. If we covered the entire parking lot with panels we'd still realize only 10 percent of the energy savings."</p>
<p>Earlier Fuel Cell Activities:</p>	<p>This is the insurance company's first fuel cell installation.</p>
<p>Six Bloom Energy fuel cells at Fireman's Fund</p>	

⁴¹ <http://novato.patch.com/articles/novatos-firemans-fund-takes-big-step-toward-reducing-carbon-footprint>

⁴² Personal communication with Fireman's Fund.

Google	
Recent and Planned Fuel Cell Activities:	<p>Google was one of Bloom Energy’s pilot customers, installing 400-kW of Bloom Energy Servers at Google’s main campus in Mountain View, California.</p> <p>Google has been carbon neutral since 2007.</p> <p>The fuel cell system powers a building on Google’s main campus, a facility that includes an R&D center. Over a period of 18 months the fuel cell generated 3.8 million kWh of electricity.</p>
Benefits:	Over the first 18 months the project has had 98 percent availability.
What Google Is Saying About This Fuel Cell Installation:	"As we strive to continually implement innovative and responsible practices across our company, we are proud to be one of the early customers of Bloom Energy." - Rick Needham, Manager Green Business Operations ⁴³
Earlier Fuel Cell Activities:	This is Google’s first fuel cell installation.
Bloom Energy Servers at Google’s Mountain View corporate campus	

⁴³ http://c0688662.cdn.cloudfiles.rackspacecloud.com/downloads-pdf-release-bloom-foundation-customer-2-24-10_1.pdf

Kaiser Permanente

<p>Recent and Planned Fuel Cell Activities:</p>	<p>Over the next decade, Kaiser Permanente is committed to reducing its emissions by 30 percent and increasing its supply of renewable and clean energy sources by 27 percent. Fuel cells will help Kaiser Permanente achieve these goals.</p> <p>In January 2011, Kaiser Permanente announced it will purchase up to 5 MW of Bloom Energy Servers for use at several Kaiser Permanente facilities across California.</p> <p>The fuel cells are expected to be deployed by the end of 2011. They will run on natural gas. However, to offset GHG emissions at the sites, Bloom Energy will supply the utility natural gas network with biogas, a non-fossil-methane derived from landfills or manure.</p> <p>The power purchase agreement between Bloom Energy and Kaiser Permanente requires Bloom Energy to install, own, operate, and maintain the fuel cells, while Kaiser Permanente purchases only the electricity generated by the fuel cells.</p>
<p>Benefits:</p>	<p>Each location’s fossil fuel use for electricity will be reduced by approximately 34 percent.</p>
<p>What Kaiser Permanente Is Saying About This Fuel Cell Installation:</p>	<p>“These fuel cell agreements are a major step toward our goal of including a wide array of sustainable sources in our energy portfolio.” - Don Orndoff, Senior Vice President of National Facilities Services⁴⁴</p> <p>"Kaiser Permanente recognizes the health of the environment directly affects individual and community health. By expanding the use of clean energy such as fuel cells, Kaiser Permanente is demonstrating its commitment to greening its energy portfolio and reducing its carbon footprint." - Kathy Gerwig, Vice President and Environmental Stewardship Officer⁴⁵</p>
<p>Earlier Fuel Cell Activities:</p>	<p>In the 1990s, Kaiser Permanente installed 200-kW International Fuel Cells (now UTC Power) CHP fuel cell systems at three of its California hospitals⁴⁶:</p> <ul style="list-style-type: none"> • Anaheim Medical Center (1993) – two 200-kW fuel cells. • Riverside Medical Center (1994) – two 200-kW fuel cells. • South Sacramento Medical Center (early 1990s) – one 200-kW fuel cell.

⁴⁴ <http://www.environmentalleader.com/2011/01/20/kaiser-permanente-to-install-4-mw-of-bloom-boxes/>

⁴⁵ <http://www.bloomenergy.com/customers/customer-story-kaiser/>

⁴⁶ http://www.hawkinsindustries.com/hawkins_51.html and <http://www.goldenstateenergy.com/keym1.html>

**Bloom Energy
Servers**



Kimberly-Clark

<p>Recent and Planned Fuel Cell Activities:</p>	<p>In February 2011, Kimberly-Clark Corporation, Plug Power Inc., Air Products, GENCO, and the Aiken-Edgefield Development Partnership opened the nation's first multi-use industrial park fueling station to supply hydrogen directly for industrial, commercial, and government use.</p> <p>The Air Products fueling station supplies hydrogen directly to Kimberly-Clark's 450,000-sq. ft. distribution facility managed by GENCO ATC to fuel the fuel cell-powered Toyota forklifts operating there. Both the fueling station and the Kimberly-Clark facility are located in Sage Mill Industrial Park, Graniteville, South Carolina.</p> <p>The fueling station and hydrogen-powered forklifts were made possible through the use of \$1.1 million of a \$6.1 million cost-share award made to GENCO ATC through the ARRA.</p>
<p>Benefits:</p>	<p>The central location of the hydrogen fueling station allows multiple vehicles to utilize the hydrogen from a single supply source. The Aiken County government will also use the fueling station to fuel two hydrogen-powered shuttle bus vehicles and a hydrogen-powered pick-up truck as part of its local transportation system.</p>
<p>What Kimberly-Clark and GENCO Are Saying About This Installation:</p>	<p>"Kimberly-Clark is constantly looking for innovative ways to minimize the impact of our operations on the environment. We are pleased to partner with GENCO ATC, Plug Power and Air Products to help expand hydrogen fuel cell technology to our entire forklift fleet. This energy technology can reduce our carbon emissions by hundreds of metric tons per year, lower costs and drive efficiencies to power our operations." - Rick Sather, Vice President of Customer Supply Chain at Kimberly-Clark⁴⁷</p> <p>"Hydrogen fuel cells represent the best in energy innovation as a sustainable, productive and clean alternative to lead-acid batteries." - Herb Shear, Chairman and CEO, GENCO ATC</p>
<p>Earlier Fuel Cell Activities:</p>	<p>In March 2010, third party logistics provider, GENCO Supply Chain Solutions, purchased 25 fuel cell forklifts from Plug Power for the distribution center in Graniteville, South Carolina that it operates for Kimberly-Clark Corporation.</p> <p>By replacing lead acid batteries with fuel cell-powered equipment, Kimberly-Clark is reducing carbon emissions by 90 percent, as well as lowering costs. The hydrogen-powered forklifts take approximately 75 percent less time to fuel and need to be refueled less frequently.⁴⁸</p>

⁴⁷ http://www.kimberly-clark.com/newsroom/latest_news_events/feature_stories/Industrialpark.aspx

⁴⁸ <http://www.sustainabilityreport2010.kimberly-clark.com/planet/announcing-our-new-climate-change-goal.asp>

**Top: Filling a
Kimberly-Clark
forklift with
hydrogen**



**Middle: Fuel cell
forklift at work in
Kimberly-Clark
warehouse**



**Bottom:
Hydrogen station
at Sage Mill
Industrial Park**



Lafayette Hotel

<p>Recent and Planned Fuel Cell Activities:</p>	<p>The Lafayette Hotel, a historic, 130-room building in San Diego, California, is in the process of installing eight ClearEdge5 Power units for a total system size of 40 kW.</p> <p>The fuel cells will generate power for the hotel, and waste heat from the units will be used to heat the pool, a central feature of the hotel. The installation should be completed by the end of 2011.</p> <p>The hotel, opened in 1946, was in need of an upgrade and modernization, but needed project costs kept under control. The combination of fuel cells and system-wide efficiency upgrades increased the hotel’s green footprint by reducing the use of electricity thus reducing monthly costs. The fuel cells helped the project qualify for more lucrative rebates and developers will save 42 percent off the system capital expenditures after rebates and incentives.⁴⁹</p> <p>The project took advantage of a number of financial incentives including the fuel cell rebate worth \$100,000, the fuel cell tax credit (\$108,745), SDG&E On Bill Financing Loan (\$55,225), and other energy efficiency rebates (\$95,670). In addition, the Lafayette project qualified for over \$1 million in Historic Tax Credit Equity. The total funding was \$27,432,257.⁵⁰</p> <p>When completed, the hotel will meet Energy Star certifications and the fuel cell system will qualify the hotel for green certifications, allowing it to promote eco-tourism.</p>
<p>Benefits:</p>	<p>The fuel cells are projected to save \$29,993 in the first year of operation - \$19,556 in net electric savings and \$10,377 in net avoided heating costs. The anticipated 10-year savings from the fuel cell is \$425,728, with more than \$1.2 million in savings on operating expenses expected over 20 years. The hotel will see a 26 percent energy cost savings.⁵¹</p> <p>These savings will allow the system to payback the initial investment, with incentives, in 5.8 years, with a projected 20-year internal rate of return of 11.8 percent.⁵²</p> <p>The fuel cells reduce GHG emissions 99.2 tons every year, or by 36 percent.⁵³</p>
<p>Earlier Fuel Cell Activities:</p>	<p>This is the Lafayette Hotel’s first fuel cell installation.</p>

⁴⁹ <http://clearedgepower.com/business/clean-energy-action-historic-lafayette-hotel>

⁵⁰ <http://www.green-technology.org/gcsummit/images/Energy-Upgrade-Case-Study.pdf>

⁵¹ <http://clearedgepower.com/business/clean-energy-action-historic-lafayette-hotel>

⁵² <http://www.green-technology.org/gcsummit/images/Energy-Upgrade-Case-Study.pdf>

⁵³ <http://www.green-technology.org/gcsummit/images/Energy-Upgrade-Case-Study.pdf>

Lafayette Hotel



NBCUniversal

Recent and Planned Fuel Cell Activities:

In April 2011, NBCUniversal installed four ClearEdge Power ClearEdge5 micro-CHP units totalling 20-kW of power at the production kitchen at Universal Studios Hollywood.

The natural gas-powered fuel cells supply both electricity and hot water to the food production kitchens.

The installation is part of NBC Universal's "Green is Universal" sustainability commitment to help reduce the company's CO₂ emissions.

Benefits:

The fuel cells will reduce CO₂ emissions from the park's food production operations by 40 percent.

What NBCUniversal Is Saying About This Fuel Cell Installation:

"The ClearEdge Power stationary fuel cell energy system is a great fit for our needs at Universal Studios Hollywood. The fuel cell system is an excellent example of the type of innovative solutions that we adopt to address our environmental challenges while helping to demonstrate that new energy solutions are now available to people who want to make a greener choice." - **Russ Randall, Senior Vice President, Technical Services, Universal Studios Hollywood**⁵⁴

Earlier Fuel Cell Activities:

This is NBCUniversal's first fuel cell installation.

NBCUniversal's ClearEdge5 Fuel Cell Systems



⁵⁴ http://s3.amazonaws.com/clearedgepower-production/uploads/04.18.11_ClearEdge_FINAL_from_Universal_RUSS_approved_FINAL.pdf

NTT America

Recent and Planned Fuel Cell Activities:

In July 2011, NTT America installed five 100-kW Bloom Energy Servers at its Lundy Data Center in San Jose, California.

The fuel cells support a portion of the data center's electric load. As part of several broad energy efficiency initiatives, NTT America continually monitors advancements in energy conservation technologies and chose Bloom Energy's fuel cell technology, running on directed biogas, as the best choice to minimize its carbon footprint and decrease the amount of electricity pulled from the public grid, while at the same time reducing operating costs. The Bloom Energy Servers are connected to a natural gas pipeline and NTT has contracted with a pair of landfills in Pennsylvania to supply the biogas.

NTT America's energy efficiency initiatives include hot aisle/cold aisle server rack design, aisle containment solutions, high efficiency computer room air conditioner (CRAC) cooling systems, distributed electricity generation and dynamic temperature sensor/control technology.

Benefits:

NTT America's initial deployment consists of five Bloom Energy Servers, with a total capacity of 500 kW, or approximately the baseline required to power 500 average homes or five 30,000 sq. ft. office buildings.

- NTT America will produce over 4.2 million kWh annually, while reducing CO₂ emissions by 1.6 million pounds, the equivalent to planting approximately 4,000 trees each year.
- As part of NTT America's energy efficiency initiatives, the fuel cell option reduces the dependency on the public electric grid, minimizing the company's carbon footprint by using renewable fuels.
- The fuel cells at the NTT America data center utilize renewable biogas, additionally reducing the carbon footprint through decreased dependency on fossil fuels.

Distributed generation means electricity is generated where it will be used, allowing NTT America to reduce the amount of energy loss due to transmission across power lines, increasing efficiency and trimming costs.

What NTT America Is Saying About This Fuel Cell Installation:

"As one of the major data center operators in the world, we recognize the importance of energy efficiency and the need for distributed generation and use of clean fuels. Equally important is our enterprise customers' interest in, and support of, energy efficiency both from the environmental and cost reduction avenues. As a key driver for the future of the data center, NTT America will continue to evaluate, support and deploy technologies that can be environmentally sound and cost effective for our customers." - **Kazuhiro Gomi, president and CEO of NTT America**⁵⁵

"The hope is, as the product and market evolve, it will make sense to deploy the

⁵⁵ <http://www.us.ntt.com/en/about-us/newsroom/press-releases/press-releases/article/ntt-america-deploys-bloom-energy-servers-running-on-renewable-biogas-at-san-jose-data-center.html>

	product elsewhere. If it makes sense economically, we will do so... NTT wanted to be an early adopter in a location where the economics makes sense.” - Tarif Abboushi, vice president, data center infrastructure NTT America ⁵⁶
Earlier Fuel Cell Activities:	This is NTT America’s first fuel cell installation.
Bloom Energy Servers at NTT America	

⁵⁶ <http://www.greendatacenternews.org/articles/293455/ntt-america-talks-about-bloom-energy-fuel-cell-dec/>

Price Chopper

<p>Recent and Planned Fuel Cell Activities:</p>	<p>In April 2011, Price Chopper powered up a 200-kW UTC Power Model 200 fuel cell at its existing Glenville, New York store and recently installed a 400 kW UTC Power’s PureCell® Model 400 fuel cell at its Middletown, Connecticut retail site.</p> <p>These are the second and third fuel cells installed at Price Chopper retail sites.</p> <p>The Glenville fuel cell supplies a portion of the store’s electricity requirement and can deliver partial standby power in the event of a power grid failure. The fuel cell has separate electrical feeds for parallel operation with the utility or to provide backup power when isolated from the grid. The plant recovers heat from the fuel cell for space and domestic hot water heating.⁵⁷</p>
<p>Benefits:</p>	<p>The Connecticut project, with support from CCEF allows Price Chopper to send excess power generated back to the grid which allows for reduced grid dependency, reduction in overall carbon footprint, increased efficiencies of systems and utility cost reductions.</p>
<p>What Price Chopper Is Saying About Their Fuel Cell Installations:</p>	<p>“Super markets are a great facility to apply fuel cell technology because we are operating 24/7 year-round. It’s not like an office building where you go home at 5 o’clock and the lights go off. I wish we had them in all our stores during the 2003 blackout.” - Benny Smith, Vice President of Facilities⁵⁸</p>
<p>Earlier Fuel Cell Activities:</p>	<p>In 2009, Price Chopper's debuted its first fuel cell, located at the company’s state-of-the-art, 69,000 sq. ft., Colonie, New York store. The retail site supplies its own power on-site with UTC Power’s PureCell® Model 400 system, which serves as both a primary and emergency power source. The fuel cell generates 60-70 percent of the store’s power in the summer, and up to 100 percent during the winter. Heat from the fuel cell is captured to supply hot water, refrigeration, air handling, snow melting and floor heating.⁵⁹</p> <p>Price Chopper received grants from NYSERDA to help finance both the Colonie and Glenville fuel cell projects. The estimated payback is five years or less.</p>

⁵⁷ <http://cdhrgy1.user.openhosting.com/Documentation/Monitoring%20Notes/Database%20Notes%20-%20Glenville%20-%20206-9-2011.pdf>

⁵⁸ http://supermarketnews.com/Sustainability_Green/price_chopper_installs/

⁵⁹ http://supermarketnews.com/Sustainability_Green/price_chopper_installs/

UTC Power fuel cell system at Price Chopper's Colonie, NY store



The Ratkovich Co.

<p>Recent and Planned Fuel Cell Activities:</p>	<p>Real estate enterprise, The Ratkovich Co., deployed a 500-kW Bloom Energy Server at the Alhambra Office Park in Alhambra, California, in December 2010 to help reduce electricity bills.</p> <p>The fuel cells power a quarter of the office complex.</p> <p>The company is considering another 500-kW fuel cell installation at the same office park. The Ratkovich Co. also plans to install fuel cells at other properties in its portfolio.</p> <p>Also in December 2010, The Ratkovich Company, in partnership with Penwood Real Estate Investment Management, announced the purchase of over 28 acres of land at Playa Vista, California that will use solar and fuel cell technology to take the development entirely off the grid.</p> <p>The site features 11 existing historic buildings, including the hangar where Howard Hughes' legendary Spruce Goose was built (currently used as a production soundstage, where films such as "The Aviator," "Titanic," "Avatar," "Eagle Eye" and "Transformers" were filmed). The property will undergo \$50 million worth of planned renovations that will tie the development together as a single, cohesive campus of creative office and production space for tenants in the entertainment, media and technology industries. The tentative project completion date is January 2012.⁶⁰</p>
<p>Benefits:</p>	<p>The Alhambra office park saves approximately \$500,000 per year on electricity bills. The Ratkovich Co. anticipates recouping its investment in less than a decade.</p>
<p>What The Ratkovich Co. Is Saying About This Fuel Cell Installation:</p>	<p>"We were convinced that this was a technology that was extraordinarily good. And we're not paying as high of an electric bill, so we'll save a lot of money." - Wayne Ratkovich, Chief Executive, The Ratkovich Co.⁶¹</p>
<p>Earlier Fuel Cell Activities:</p>	<p>This is The Ratkovich Co.'s first fuel cell purchase.</p>

⁶⁰ <http://www.prnewswire.com/news-releases/the-ratkovich-company-acquires-former-hughes-aviation-headquarters-at-playa-vista-105040164.html>

⁶¹ <http://articles.latimes.com/2010/dec/21/business/la-fi-bloom-box-20101221>

**Bloom Energy
fuel cells at The
Ratkovich Co.'s
Alhambra Office
Park**



Sharks Ice

<p>Recent and Planned Fuel Cell Activities:</p>	<p>The Sharks Ice complex will install 500-kW of Bloom Energy Servers by 2012.</p> <p>Sharks Ice, the practice arena for the National Hockey League’s San Jose Sharks, is helping the City of San Jose implement the Green Vision, Economic Development Strategy, and Climate Action Plan. San Jose will fund the purchase of the Bloom Energy system with \$2 million from the Ice Centre Revenue Fund.</p> <p>The fuel cell system will provide approximately 85 percent of the building’s electrical needs.</p>
<p>Benefits:</p>	<p>By installing Bloom Energy Servers, Sharks Ice at San Jose will be using a cheaper and cleaner electricity to power a facility which currently generates an electrical energy bill of more than \$65,000 per month largely due to the 24-hour a day, seven days per week refrigeration requirement.</p> <p>Sharks Ice anticipates that it will reduce its carbon footprint by 30 percent over the next 10 years.</p>
<p>What Shark Ice Is Saying About This Fuel Cell Installation:</p>	<p>“We are pleased to be working closely with the City of San Jose and an innovative company like Bloom Energy to install an environmentally-friendly resource that will provide electricity to our facility. Utilizing the Bloom Energy Servers will not only allow Sharks Ice to continue to provide a state-of-the-art public ice facility for our patrons but will allow for reducing its carbon footprint which will benefit the entire community.” - Jon Gustafson, General Manger of Sharks Ice at San Jose.⁶²</p>
<p>Earlier Fuel Cell Activities:</p>	<p>This is Sharks Ice’s first fuel cell purchase.</p>
<p>Sharks Ice facility</p>	

⁶² <http://c0688662.cdn.cloudfiles.rackspacecloud.com/downloads-pdf-release-bloom-Sharks-Ice-4-12-11.pdf>

Staples

Recent and Planned Fuel Cell Activities:

Bloom Energy Servers are planned at several Staples sites through the Bloom Electrons™ service.⁶³

Staples has pursued renewable energy strategies, including solar and wind, but continued to search for a consistently reliable solution that could operate 24/7 while significantly reducing carbon volumes. The company moved forward with a 300-kW Bloom fuel cell installation at one of its distribution centers in 2008, and due to its success, has enabled Staples to purchase additional systems for other locations.⁶⁴

Staples stated that it has accomplished a 30 percent improvement in fuel efficiency and, over the next five years, plans to accomplish an additional 10 percent improvement in its vehicle fleet. This will be accomplished through a combination of measures, including the use of all-electric trucks in high-density urban delivery areas, diesel/electric hybrids for urban delivery areas, lighter composite materials in body construction, dynamic routing software and fuel cell technology as it becomes available.⁶⁵

Benefits:

Staples' 2008 fuel cell installation (Ontario, California) resulted in a reduction of 2.5 million pounds of CO₂ during its first year of operation. The fuel cells have been more than 99 percent available and have generated most of the power for one of Staples' major facilities. Solar and fuel cells, along with energy efficiency and green procurement strategies, helped Staples exceed its carbon reduction goal of seven percent by the end of 2010, achieving 13 percent by mid-year 2011.⁶⁶

The solar/fuel cell combination allowed the Ontario warehouse to become almost completely "grid-neutral" for power purchases, actually exporting power back to the grid on Saturdays and Sundays. The fuel cell system has had no significant downtime, and it's monitored daily to ensure reliability. During the work week, Staples uses the system to generate base load to meet the building's electricity needs.

What Staples Is Saying About Their Fuel Cell Installation:

"Staples is a leader, a driving force, and an early adopter — others are just now getting on board." - **Bob Valair, Director of Energy and Environmental Management, Staples, Inc.**⁶⁷

⁶³ http://www.bd.com/press/pdfs/Bloom_Electrons_Customer_Press_Release.pdf

⁶⁴ <http://staplesenergyonline.com/news.html>

⁶⁵ http://investor.staples.com/phoenix.zhtml?c=96244&p=irol-newsArticle_print&ID=1485674&highlight=

⁶⁶ <http://staplesenergyonline.com/news.html>

⁶⁷ <http://asset.sce.com/Documents/Shared/SGIPCCaseStudyStaplesOntarioWarehouse.pdf>

Earlier Fuel Cell Activities:

Staples installed its first 300-kW Bloom Energy fuel cell at an Ontario, California distribution center in 2008.

The project generated over 2 million kWh of power during its first year of operation.

Bloom Energy Servers at Staples' Ontario, California warehouse



Stone Edge Farm

<p>Recent and Planned Fuel Cell Activities:</p>	<p>Stone Edge Farm, an organic and sustainably managed vineyard estate in Sonoma, California, installed a 5-kW ClearEdge Power fuel cell CHP unit in 2011 to further their sustainability efforts.</p> <p>Waste heat from the system is used to heat an 11,000 gallon lap pool on the vineyard's property.</p> <p>Stone Edge Farm is currently studying the fit for a 10-kW fuel cell from ClearEdge Power that will further reduce the carbon footprint and provide back-up power. The waste heat will be used to heat the main house radiant flooring and another pool.</p>
<p>Benefits:</p>	<p>The fuel cell is expected to reduce the vineyard's electricity bill by 49 percent. 24,000 pounds of CO₂ emissions will be avoided annually.</p> <p>The fuel cell will pay for itself in approximately eight years, much faster than an equivalently sized solar installation. Financial savings will reach \$250,000 over 20 years.</p>
<p>What Stone Edge Farm Is Saying About This Fuel Cell Installation:</p>	<p>"A key to minimizing our impact on the earth is determining energy efficiency best practices that help meet the operational needs of our growing agricultural operations." - Mac McQuown, Owner⁶⁸</p> <p>"The more we looked at it, the more sense it made. And it was a really good fit for the application here." - Michael Bartlett, Stone Edge Farm⁶⁹</p>
<p>Earlier Fuel Cell Activities:</p>	<p>This is the vineyard's first fuel cell installation.</p>
<p>Stone Edge Farm Photo Credit: Robert VonLiski</p>	

⁶⁸ <http://wine.drinks-business-review.com/news/california-winery-turns-green-with-new-energy-efficient-system-250711>

⁶⁹ <http://www.pressdemocrat.com/article/20110724/BUSINESS/110729780/1036?Title=Fuel-cells-become-new-option-in-Sonoma-County&tc=ar>

Stop & Shop

Recent and Planned Fuel Cell Activities:

In June 2010, a 400-kW UTC Power PureCell® Model 400 fuel cell was commissioned at the Stop & Shop supermarket in East Torrington, Connecticut.

The Torrington Stop & Shop is maximizing the utilization of energy from the fuel cell, using both the electricity and waste heat generated by the system. The fuel cell provides an estimated 94 percent of the facility's total annual electric energy requirements. Additionally, the fuel cell's waste heat satisfies 70 percent of the facility's space heating requirements as well as provides the thermal energy for a 30 tons of refrigeration (TR) absorption chiller that generates chilled water used to reduce the electric energy requirements of the supermarket's refrigeration system.⁷⁰

Thermal energy produced by the fuel cell is used year-round for space and water heating, dehumidification, and in the production of chilled water used for product refrigeration. This thermal energy reduces the electricity requirements for space cooling and medium-temperature refrigeration by 20 percent.⁷¹

During the first year of operation, the fuel cell generated more than 3 million kWh of electricity.⁷²

The fuel cell installation was supported with a grant of \$882,000 from the CCEF's On-Site Renewable Distributed Generation Program, which defrayed approximately 38 percent of the total project cost.

Benefits:

Stop & Shop anticipates that the system will prevent the release of approximately 523 metric tons of CO₂ per year. The fuel cell will also save the store 3.5 million gallons of water, compared to central utility generated electricity.⁷³

By using the fuel cell in CHP mode, the store has reduced its electric utility costs by 93 percent and its combined electric and gas utility cost by 56 percent.

Stop & Shop expects to recoup its investment in seven years.

What Stop & Shop Is Saying About This Fuel Cell Installation:

"In our commitment to be a sustainable company, we continually look for new innovations and technologies that help us build more efficient stores. The fuel cell technology is the latest step we've taken to ensure we're doing everything we can to lower our impact to the environment in each community we serve." - **Jihad Rizkallah, Vice President of Store Planning, Stop & Shop**⁷⁴

⁷⁰ <http://www.ahold.com/node/3690>

⁷¹ <http://crrreport2010.ahold.com/climate-action/case-studies/case-study-3.php>

⁷² Personal communication with Stop & Shop

⁷³ http://www.utcpower.com/files/pressreleases/PR_021011_SS_Torrington.pdf

⁷⁴ http://www.stopandshop.com/about_us/news_media/press_release.htm?p=613352d0-f091-4dc1-bf2f-a2c31ec54adb

	<p>"Fuel cell technology has great potential to reduce the environmental impacts associated with operating a supermarket, as well as to reduce demands on the local electric power infrastructure." - Kenneth Welter, manager of refrigeration engineering, Stop & Shop⁷⁵</p>
<p>Earlier Fuel Cell Activities:</p>	<p>This is Stop & Shop's first fuel cell installation.</p>
<p>UTC fuel cell system at the Stop & Shop Torrington, CT store</p>	

⁷⁵ http://www.ahold.com/files/StopandShop%20FC%20completion%20-%2010%2011-22_0.pdf

SUPERVALU (Albertsons, Star Market)

<p>Recent and Planned Fuel Cell Activities:</p>	<p>SUPERVALU has committed to cutting GHG emissions 10 percent by 2012 over 2007 levels.</p> <p>In August 2010, SUPERVALU opened a new 55,000 sq. ft. Albertsons store in Clairemont (San Diego), California that generates nearly 90 percent of its electricity using a 400-kilowatt UTC Power fuel cell system.</p> <p>Waste heat is captured and provides the store with space heat, hot water, and refrigeration using an absorption chiller.</p> <p>Albertsons' fuel cell allowed the store to continue operating during the September 2011 southern California blackout - one of the very few businesses able to do so. "When you drive down the neighborhood and the only thing lit is Albertson's, it attracts people. We had a very busy day." - Rick Crandall, Southern California director of sustainability, SUPERVALU⁷⁶</p>
<p>Benefits:</p>	<p>Albertsons' fuel cell system is estimated to reduce CO₂ emissions by 478 metric tons per year.⁷⁷</p> <p>The Clairemont store received the <i>2011 Sustainable Project of the Year</i> award by the Association for Retail Environments (A.R. E.).</p>
<p>What SUPERVALU Is Saying About This Fuel Cell Installation:</p>	<p>"When it comes to minimizing our environmental footprint, the Clairemont store is a tremendous achievement for us. With the assistance of UTC Power's fuel cell, it's our first store that significantly reduces its burden on the power grid." - Rick Crandall, Southern California director of sustainability, SUPERVALU⁷⁸</p>
<p>Earlier Fuel Cell Activities:</p>	<p>A remodeled Star Market store in Chestnut Hill, Massachusetts features a UTC Power 400-kW fuel cell that provides building's electricity, domestic hot water, heat and air conditioning. The fuel cell unit was placed in service in 2009.</p> <p>By using the fuel cell, Star Market is guaranteed power at all times for refrigeration, HVAC, elevators, cash registers and lighting. The harnessed heat energy will cool refrigeration cases (through absorption chiller technology) year round and heat the store in the winter. By providing virtually all the power for the store, the fuel cell does not tax the public power grid.⁷⁹</p>

⁷⁶ <http://www.sfgate.com/cgi-bin/article.cgi?f=/g/a/2011/09/09/bloomberg1376-LRA1WB6JTSE801-4DU72ENO1ALLJ1F9A44GVIN2TN.DTL>

⁷⁷ <http://www.prnewswire.com/news-releases/new-san-diego-albertsons-store-to-make-clean-power-on-site-with-ultra-clean-utc-power-fuel-cell-101797383.html>

⁷⁸ http://supermarketnews.com/news/fuel_cell_0831/

⁷⁹ <http://www.reuters.com/article/2008/09/10/idUS141119+10-Sep-2008+BW20080910>

**UTC Power
PureCell® fuel
cell at Albertsons
Clairemont store**



Sysco

<p>Recent and Planned Fuel Cell Activities:</p>	<p>In March 2011, Plug Power Inc. received its third order from Sysco Corporation for its GenDrive® fuel cell units.</p> <p>The order is for 100 hydrogen fuel cell units that will power the electric lift truck fleet at Sysco’s Front Royal Virginia Baugh Northeast Co-op, Inc. redistribution facility. The order includes five class-1 GenDrive® units to be used in sit down counterbalanced trucks, 76 class-2 GenDrive® units to be used in standup reach trucks, and 19 class-3 GenDrive® units to be used in pallet jacks.</p> <p>Also in March 2011, third party logistics provider GENCO deployed 34 class-3 power units operating at Sysco’s Philadelphia facility.</p> <p>The remaining 36 class-3 and 25 class-2 power units are scheduled for delivery to Sysco Philadelphia by April 2012. The facility uses a Air Products hydrogen dispenser. GENCO received a cost-share ARRA grant to deploy fuel cells at six warehouses that it operates, including the Sysco Philadelphia site.</p> <p>Sysco has also purchased additional GenDrive® fuel cells for fleets in San Antonio, TX (113), Boston, MA (160), Long Island, NY (42) and Riverside, CA (80).</p> <p>Sysco Houston also received a \$1.2 million cost-share ARRA grant for its first deployment of 90 fuel cell systems for a fleet of pallet trucks a new distribution center in Houston, Texas.</p> <p>Due to the success of the Houston installation, Sysco plans to replace approximately 1,000 lead-acid batteries with over 500 fuel cells at additional sites over the next two years. Sysco is also considering conversions at several other facilities.⁸⁰</p>
<p>Benefits:</p>	<p>Conversion to fuel cells will allow Sysco’s Front Royal Virginia facility to open up 5,000 sq. ft. of facility space for other operations. This space had previously been used for lead-acid battery charging, changing and maintenance.⁸¹</p>
<p>What Sysco Is Saying About Their Fuel Cell Installations:</p>	<p>“In our warehouses, we have found that hydrogen fuel cell-powered lifts and pallet jacks not only reduce our emissions, but reduce our maintenance costs as well because the constant power level is easier on the machines than traditional batteries. Doing what’s right pays off on multiple levels.” - Gary W. Cullen, Vice President, Distribution Services⁸²</p> <p>“Hydrogen fueling took it to the next level in terms of operator self-sufficiency. If you can fuel a car, you can use hydrogen. With hydrogen it is easier for the operator to take care of equipment on their own. You only need one person to refuel and the process is much simpler. At first, there were concerns about</p>

⁸⁰ http://www.hydrogen.energy.gov/pdfs/review11/h2ra010_kliever_2011_o.pdf

⁸¹ <http://fuelcellpower.org.uk/?p=179>

⁸² <http://www.sysco.com/investor/onlinesustainabilityreport/warehouseefficiencies.html>

	<p>learning the new technology, but now they have embraced it. In fact, most of our employees now prefer the hydrogen fuel cells over batteries.” - Chad Harrison, Plant Operations Manager⁸³</p> <p>“There is never going to be a time when there is not enough fuel to run a shift. With lead-acid batteries, you always have a concern. If the previous shift does not charge the batteries properly, the next shift suffers. With hydrogen, if an operator forgets, then the unit can be refueled within three minutes and be up and running.” - Chad Harrison, Plant Operations Manager⁸⁴</p>
<p>Earlier Fuel Cell Activities:</p>	<p>Sysco Houston distribution center:</p> <p>In 2010 Sysco Houston’s converted 98 forklifts to operate using Plug Power GenDrive® fuel cells (26 forklifts and 72 pallet jacks). The Houston facility needed only 100 GenDrive® units to replace more than 200 lead-acid batteries, helping to save on storage space.</p> <p>In a May 2011 presentation by Sysco Houston⁸⁵ about the fuel cell forklifts, the following was stated:</p> <ul style="list-style-type: none"> • The units had attained over 12 months and 300,000 hours of continuous fuel cell operation to February 2011. • Sysco Houston had successfully demonstrated the operation of 25 class-3 power units in sub-zero temperatures. • Sysco Houston is saving nearly \$100,000 per year in man-hours spent on refueling fuel cells versus swapping batteries. • The performance of fuel cells is much better than lead-acid batteries. • The current cost of hydrogen fuel is approximately the same as the cost of electricity to charge lead-acid batteries. • Sysco Houston has changed the way they maintain the pallet jack and forklift power source from reactive maintenance with lead-acid batteries to preventative maintenance with the hydrogen fuel cells. <p>For Sysco Houston, the fuel cells should eliminate about 4,800 hours per year in battery recharging time.⁸⁶</p> <p>Sysco contracted with Air Products to supply hydrogen and hydrogen fueling technology for the Sysco Houston site. Air Products' fueling infrastructure at Sysco includes an outdoor liquid hydrogen storage tank and a dual Series-150 compression system, along with multiple indoor fueling dispensers for operator refueling.</p> <p>“With the GenDrive® fuel cells, we are saving time and money. For the 98 units of equipment we estimate that about 1,200 hours or approximately \$24,000 is saved per fiscal quarter. Almost 1.5 fuel cells pay for themselves per quarter or about six per year. Over the life expectancy of the fuel cells, almost 60 of them</p>

⁸³ http://www.plugpower.com/Libraries/Documentation_and_Literature/Sysco_Houston_Case_Study.sflb.ashx

⁸⁴ http://www.plugpower.com/Libraries/Documentation_and_Literature/Sysco_Houston_Case_Study.sflb.ashx

⁸⁵ http://www.hydrogen.energy.gov/pdfs/review11/h2ra010_kliever_2011_o.pdf

⁸⁶ <http://www.sysco.com/investor/onlinesustainabilityreport/warehouseefficiencies.html>

will pay for themselves. In addition, there are energy cost savings we gain by using hydrogen to refuel the fuel cells in place of the electrical costs to recharge lead-acid batteries.” - **Scott Kliever, Vice President of Finance and Plant CFO**⁸⁷

Top: Sysco Houston forklift



Bottom: Forklift fueling at Sysco Houston



⁸⁷ http://www.plugpower.com/Libraries/Documentation_and_Literature/Sysco_Houston_Case_Study.sflb.ashx

Time Warner Cable

Recent and Planned Fuel Cell Activities:	<p>In November 2010, Time Warner Cable installed an Alteryg Freedom Power™ 30-kW backup fuel cell system at its distribution hub site facility in Palm Springs, California.</p> <p>Time Warner Cable also is using a fill-in-place system, which enables the replacement of hydrogen in the fuel cells without switching cylinders.</p>
Benefits:	<p>Television, high speed data and phone signals from the company’s primary distribution center in Palm Desert are transmitted over fiber to the hub site and then distributed to residential and business customers throughout Palm Springs. The fuel cell will provide power in the event of grid outage, ensuring customers continue to receive digital telephone, internet, and video services without disruption.</p> <p>The fuel cell system eliminates the need for a diesel generator and liquid fuel tank. Compared to the incumbent diesel generator, the fuel cell system reduces maintenance needs. The fuel cell also has a low noise signature.⁸⁸</p>
What Time Warner Cable Is Saying About This Fuel Cell Installation:	<p>“With the installation of this fuel cell system, Time Warner Cable’s superior service reliability will now be even better. In addition to providing our customers with the highest quality services, this reserve power system will help us reach the State of California’s goals for improving air quality, secure our energy future by reducing greenhouse gas emissions, and cut our petroleum dependency.” - Jon Tennies, Facility Supervisor⁸⁹</p>
Earlier Fuel Cell Activities:	<p>This is Time Warner Cable’s first fuel cell installation.</p>
Alteryg Systems installation at Time Warner	

⁸⁸ http://www.altergysystems.com/announcements/time_warner.asp

⁸⁹ <http://www.prnewswire.com/news-releases/time-warner-deploys-enersys-hydrogen-fuel-cell-reserve-power-system-in-southern-california-110225909.html>

Walmart

Recent and Planned Fuel Cell Activities:

In late 2009, Walmart installed Bloom Energy Servers at two California retail stores. **Based on the success of the 2009 installations, Walmart has subsequently installed 17 additional Bloom Energy Servers at locations across California.** This is part of Walmart's company-wide goal to be supplied by 100 percent renewable energy.

In November 2010, Walmart opened a Perishable Distribution Center (PDC) in Balzac, Alberta, Canada that uses 71 fuel cell-powered materials handling vehicles in both the refrigerated and freezer areas of the warehouse.

All material handling equipment at the PDC is powered by fuel cells. Hydrogen produced by hydroelectric power is shipped to Balzac for on-site refueling of the hydrogen cells.

Benefits:

Stationary Power

The 400-kW installation at Walmart's Calexico, California store is expected to generate approximately 3.4 million kWh annually with the potential to eliminate one million pounds of CO₂ annually when powered by biogas.⁹⁰ The fuel cell provides 60 percent of the store's power needs. Walmart currently has 17 stores in California using fuel cells.

Materials Handling

Walmart expects that the Balzac fuel cells will deliver two million dollars over seven years in operational cost savings.⁹¹

The PDC's fuel cell-powered materials handling fleet will reduce CO₂ emissions approximately 55 percent, or 530 metric tons per year.⁹²

What Walmart Is Saying About These Fuel Cell Installations:

From **Virginia Garbutt, logistics director for Walmart Canada:**

"In the construction phase, we were able to eliminate the costs associated with wiring and we didn't need a battery area. And there are ongoing operational savings as well, such as no time lost for battery changing."⁹³

"That technology has made the distribution center more cost-efficient than others. It was a risk going in, because it was a relatively new technology, but we have been absolutely pleased."⁹⁴

The Walmart Canada website states, "Not only is there a compelling environmental benefit for this technology, but it also eliminates the need for a large battery-charging area as well as providing improved performance. We are

⁹⁰ Personal communication with Walmart

⁹¹ <http://www.walmartcsr.ca/index.php/en/environment/building-greener-balzac-alberta>

⁹² <http://www.foodlogistics.com/article/10241156/green-giant?page=2>

⁹³ <http://www.foodlogistics.com/article/10241156/green-giant>

⁹⁴ <http://www.chron.com/business/article/More-than-hot-air-Hydrogen-is-clean-profitable-2219932.php>

also exploring the possibility of equipping on-site shunt trucks with hydrogen-powered fuel cells and expanding the use of fuel cells to other Walmart distribution centers in the area.”⁹⁵

Earlier Fuel Cell Activities:

Walmart participated in alpha and beta trials of fuel cell-powered pallet trucks between 2005-2007. These took place at Walmart warehouses in Ohio and Missouri.

In late 2009, Walmart deployed Bloom Energy Servers at its retail stores in Lancaster and Hemet, California.

Top: Hydrogen Fueling Station at Balzac, Alberta, Canada Distribution Center



Bottom: Bloom Energy Servers at a Walmart retail site



⁹⁵ <http://www.walmartcsr.ca/index.php/en/environment/building-greener-balzac-alberta>

Whole Foods Markets

Recent and Planned Fuel Cell Activities:

Whole Foods deployed the first grocery store fuel cell in 2008 (Glastonbury, Connecticut) and now powers four retail stores with fuel cells. Whole Foods also uses fuel cell-powered forklifts at one of the company's warehouses.

In June 2011, Whole Foods Market opened a new store in Fairfield, Connecticut that uses a UTC Power PureCell® Model 400 fuel cell to provide on-site power.

The 400-kW system generates 90 percent of the store's electricity needs and byproduct thermal energy is used for store heating, cooling and refrigeration. Linde is supplying the hydrogen. The installation was supported by a grant from the CCEF.

In October 2010, Whole Foods opened a new 50,000 sq. ft. market in San Jose, California featuring a UTC Power PureCell® Model 400 fuel cell to generate 90 percent of the store's electricity.

The store uses byproduct thermal energy for heating, cooling and refrigeration for an overall efficiency of approximately 60 percent, nearly twice the efficiency of the U.S. grid.

Whole Foods is also working with Bloom Energy to evaluate the feasibility of using Bloom Energy Servers for a couple of their Northeast region stores.

Benefits:

In late August 2011, the Whole Foods Market in Glastonbury, Connecticut was able to retain part of its power during Tropical Storm Irene because of the presence of a UTC Power PureCell® 200 fuel cell.

The Glastonbury store is home to Whole Food's first fuel cell, which and has been operational since 2008. The fuel cell meets half of the site's electric needs, helping to power the store's freezers and refrigerators. Since the fuel cell is configured for grid-independent operation and is capable of providing 200 kW of standby power during a grid failure, the store's refrigerated and frozen product loss was minimized. **According to Tom Neal, Whole Foods Glastonbury store team leader, "That put us in a good position when we did reopen."**⁹⁶

Total energy costs at the **Glastonbury, Connecticut** store are 30 percent lower than for the West Hartford store, which has the same utility provider, normalized for store size.⁹⁷

By generating most of its power on-site with a fuel cell, the Whole Foods Market **Fairfield, Connecticut** store will prevent the release of more than 847 metric tons of CO₂ annually and save nearly 3.5 million gallons of water.

By generating most of its power on-site with a fuel cell, the Whole Foods **San Jose, California** store will prevent the release of more than 370 metric tons of CO₂ annually.

⁹⁶ <http://www.hartfordbusiness.com/news20290.html>

⁹⁷ <http://www.cleanenergystates.org/assets/Uploads/Loftus-FuelCellsSupermarkets.pdf>

<p>What Whole Foods Is Saying About Their Fuel Cell Installations:</p>	<p>“We’re always looking for innovative ways to be more energy and resource efficient while reducing our environmental impact. We take the stakeholder approach and consider all aspects of our building impact when designing new and retrofit systems. To be able to have combined heating and cooling, while generating power on site using a cleaner process that also results in fewer emissions and lower water consumption (which would be used if we took grid power) is a huge value to us and our communities. We also have the benefit of additional back-up power in the event of grid failure.”- Kathy Loftus, Whole Foods Market global leader of sustainable engineering and energy management⁹⁸</p>
<p>Earlier Fuel Cell Activities:</p>	<p>In 2010, Whole Foods Market deployed 61 Plug Power GenDrive® fuel cell-powered forklifts in its Landover, Maryland distribution center. Whole Foods Market is partnering with Plug Power and GENCO to complete this installation. The funding for the fuel cells is part of a \$6.1 million award made to GENCO in April of 2009 by the U.S. DOE through the ARRA.</p> <p>Alliance Material Handling, a Maryland-based Crown lift truck supplier, supplied the forklifts for this site. The fleet consists of 45 class-3 pallet jack and 16 class-2 standup reach trucks, all powered by GenDrive® fuel cells. The decision to move from lead-acid batteries was facilitated by the opportunity to improve the Company’s productivity in their Maryland operations, while also achieving environmental and economic benefits.</p> <p>In 2009, a new 60,000-sq. ft. Whole Foods Market in Dedham, Massachusetts began generating approximately 90 percent of its electricity and nearly 100 percent of its hot water using fuel cell technology. UTC Power owns, operates and maintain the PureCell® Model 400 fuel cell system, which is also capable of providing standby power if there’s a grid failure to allow the store to operate without disruption and to avoid costly food spoilage. The fuel cell project was approved for a \$400,000 grant from the Massachusetts Renewable Energy Trust Large Onsite Renewables Initiative (LORI).</p> <p>In 2008, Whole Foods debuted its first fuel cell at its new 46,000 sq. ft. Glastonbury, Connecticut store. The fuel cell generates half of the electricity and heat and almost all of the hot water required to operate the store. Whole Foods received a \$940,000 grant from the CCEF for the installation. This was the first fuel cell installation at a grocery store in the country.</p>
<p>Top: UTC Power fuel cell at Fairfield, CT Whole Foods</p>	

⁹⁸ Personal communication with Whole Foods

**Middle: UTC
Power fuel cell at
San Jose, CA
store**



**Bottom: UTC
Power fuel cell at
Glastonbury, CT
store**



Other Recent Customers

These companies have made news with their recent fuel cell purchases. Look for more complete profiles in next year's report.

CVS Caremark	<p>In July 2011, CVS Caremark opened its new, LEED-certified Chemung, New York distribution center. The company is developing a program to use fuel cell powered forklifts at the facility.</p> <p>CVS is exploring is the use of alternative and renewable energy as a means to reduce the company's GHG emissions.</p> <p>In 2009, CVS Caremark successfully piloted the use of fuel cell technology in forklift machinery in the company's North Smithfield, Rhode Island distribution center.</p>
Kroger Co.	<p>In June 2011, Kroger purchased 161 Plug Power GenDrive® fuel cells to power its entire fleet of electric lift trucks at the company's food distribution center in Compton, California.</p> <p>The order includes four class-1 units for sit down counterbalanced trucks, 42 class-2 units for reach trucks and 115 class-3 units for pallet trucks.</p> <p>Plug Power and Kroger have developed a hydrogen fueling infrastructure, placing compact dispensers strategically throughout the facility. Lift truck operators can fuel the GenDrive® units themselves in as little as 60 seconds.</p> <p>Productivity improvements are expected as the electric lift trucks operate at full power as long as hydrogen fuel is supplied.</p>
Liberty Towers, LLC	<p>In October 2010, Liberty Towers, LLC received the first commercial delivery of a Hydra Fuel Cells HydraStax® fuel cell.</p> <p>Liberty Towers, LLC, a company that develops, acquires and manages wireless communications towers in the continental U.S., purchased the fuel cell systems to provide primary and backup power at cell tower sites across the country.</p> <p>"Liberty is excited to work with Hydra Fuel Cell Corporation and their PEM based fuel cell product, as part of our off-grid solutions program, to select back-up and primary power solutions to support tower operations during emergency conditions or as an overall grid replacement for remote tower sites that have no reasonable possibility of securing grid power. We believe Hydra's highly scalable fuel cell solutions can provide us the ability to cost effectively employ off-grid solutions, while controlling costs." - Michael Hofe, President & COO Liberty Towers⁹⁹</p>

⁹⁹ http://www.libertytowers.net/news/article.asp?ARTICLE_ID=3&

<p>T-Mobile</p>	<p>In November 2011, T-Mobile deployed IdaTech’s 5-kW ElectraGen™ fuel cell system to deliver back up power to one of the company’s California sites. This deployment is the first use to use Bio-HydroPlus renewable fuel, a liquid fuel mixture of bio-methanol (62 percent methanol by weight) and de-ionized water for powering IdaTech’s backup power fuel cell systems.</p>
<p>WinCo Foods</p>	<p>WinCo Foods will deploy 184 Plug Power GenDrive® units to power materials handling vehicles at the Modesto, California distribution center.</p> <p>WinCo entered into a five-year lease for the fuel cells through Somerset Capital Group.</p> <p>“WinCo Foods appreciates the opportunity to utilize the GenDrive® fuel cells which will reduce our labor costs while powering our equipment in a more environmentally conscious way. We very much appreciate the teamwork displayed by Plug Power and Somerset to meet our needs and to make this conversion as efficient as possible.” - Michael Read, WinCo Foods spokesman</p>

Additional Resources

Fuel Cells 2000

Fuel Cells 2000 is a non-profit education and outreach program of the Breakthrough Technologies Institute and offers numerous resources on its website, www.fuelcells.org, for any audience.

In addition to the basics such as how a fuel cell works, applications, benefits, image galleries, Fuel Cell Library, conference presentations and a free monthly Technology Update, the website includes:

- Reports, including [State of the States: Fuel Cells in America 2011](#) and the [2010 Fuel Cell Technologies Market Report](#)
- State Fuel Cell and Hydrogen Database, which includes all US fuel cell installations, vehicle demonstrations, hydrogen fueling stations and state legislation and policies, including tax credits and grants: www.fuelcells.org/info/statedatabase.html
- Worldwide Stationary Installation Database: www.fuelcells.org/info/databasefront.html
- Comprehensive charts, including Fuel Cell Vehicles, Specialty Vehicles, Fuel Cell Buses, Hydrogen Fueling Stations (U.S. and World) and Fuel Cell Equity and Investment: www.fuelcells.org/info/charts.html

Database of State Incentives for Renewables & Efficiency

DSIRE provides information on state, local, utility and federal incentives and policies that promote renewable energy and energy efficiency. Established in 1995, DSIRE is financed by the U.S. Department of Energy and managed by the N.C. Solar Center and the Interstate Renewable Energy Council. www.dsireusa.org

U.S. Department of Energy's Fuel Cell Technologies Program

The U.S. Department of Energy Fuel Cell Technologies Program within the Office of Energy Efficiency and Renewable Energy supports research addressing the technological, economic, and institutional obstacles to the widespread commercialization of fuel cells and related technologies.

The site has information on the program and industry in general, including technical and educational reports, presentations, fact sheets and links.

<http://www1.eere.energy.gov/hydrogenandfuelcells>

U.S. Department of Energy Fossil Energy Program

The U.S. Department of Energy's Office of Fossil Energy is partnering with several fuel cell developers to develop the technology for the stationary power generation sector through the Solid State Energy Conversion Alliance (SECA).

<http://fossil.energy.gov/programs/powersystems/fuelcells/index.html>

Fuel Cell and Hydrogen Energy Association

Trade association for hydrogen and fuel cell industry. Members include fuel cell manufacturers, component suppliers, fuel providers, universities and other companies involved in the industry.

www.fchea.org

Fuel Cell Manufacturers Listed In This Report

Altergy Systems	www.altergy.com
Bloom Energy	www.bloomenergy.com
ClearEdge Power	www.clearedgepower.com
FuelCell Energy	www.fuelcellenergy.com
Hydra Fuel Cell	www.hydrafuelcell.com
IdaTech	www.idatech.com
Oorja Protonics	www.oorjaprotonics.com
Plug Power	www.plugpower.com
ReliOn	www.relion-inc.com
UTC Power	www.utcpower.com

Many other fuel companies are offering products to early markets. For a complete list, visit www.fuelcells.org/info/fcdevel.html.

Hydrogen Infrastructure Companies Listed In This Report

Air Products and Chemicals, Inc.:	www.airproducts.com
Linde North America LLC:	www.linde.com

For more information about any of the information included in this report, please contact Fuel Cells 2000 at info@fuelcells.org.

Appendix 1. Fuel Cell-Powered Forklifts in North America

BLUE SHADED ENTRIES = ENTIRE MATERIALS HANDLING FLEET IS FUEL CELL-POWERED AT THIS LOCATION

Company	Location	Site	Year Deployed	Fuel cell manufacturer*	# of forklifts
Ace Hardware	N/a	N/a	N/a	Oorja Protonics	6
Baldor Specialty Foods	Bronx, NY	Facility	Planned in 2012	Oorja Protonics	50
BMW Manufacturing Co.	Spartanburg, SC	Manufacturing plant	2010	Plug Power	86
Bridgestone-Firestone	Aiken County, SC	Manufacturing plant	2008, more added in 2009	Plug Power	43
	Warren County, TN	Manufacturing plant	N/a	Plug Power	N/a
Central Grocers	Joliet, IL	New distribution center	2009, more added in 2011	Plug Power	231
Coca-Cola	San Leandro, CA	Bottling and distribution center	2011	Plug Power	37
	Charlotte, NC	Bottling facility	2011	Plug Power	40
CVS Caremark	Chemung, NY	Distribution facility	Planned (under construction)	N/a	N/a
	North Smithfield, RI	Distribution facility	N/a	N/a	N/a
Defense Logistics Agency, U.S. Department of Defense	San Joaquin, CA	Distribution depot	Planned in 2011	Plug Power	20
	Fort Lewis, WA	Distribution depot	Planned in 2011	Plug Power	19
	Warner Robins, GA	Distribution depot	2010	Hydrogenics	20
	Susquehanna, PA	Distribution depot	2009, additional units in 2010	Nuvera, Plug Power	40, 15 additional
EARP Distribution	Kansas City, KS	Distribution center	2011	Oorja Protonics	24
East Penn Manufacturing	Topton, PA	Manufacturing facility	N/a	Nuvera	10
FedEx	Springfield, MO	Service center	2010, ARRA funding awarded to FedEx Freight East	Plug Power	35
	Toronto, ON, Canada	Logistics hub	N/a	Hydrogenics	N/a
GM	Oshawa, ON, Canada	Car assembly plant	N/a	Hydrogenics	19
	Oshawa, ON, Canada	Car assembly plant	2005	Hydrogenics	2
Golden State Foods	Lemont, IL	Distribution facility	2011	Oorja Protonics	20
H-E-B	San Antonio, TX	Perishables distribution center	2009, ARRA funding awarded to Nuvera	Nuvera	14
ISOLA Laminates	Ridgeway, SC	Warehouse	2007, 2-week demonstration	Hydrogenics	2*
Kimberly-Clark/GENCO	Graniteville, SC	Distribution center	Planned, ARRA funding awarded to GENCO	Plug Power	25
	Graniteville, SC	Distribution center	GENCO operating a fuel cell forklift pilot program	N/a	2*
Kroger Co.	Compton, CA	Distribution Center	Purchased 2011	Plug Power	161
Leigh Fibers	Spartanburg, SC	Warehouse	2007, 2-week demonstration	Hydrogenics	2*
LPC	Lodi, CA	Warehouse	2009	Oorja Protonics	N/a ("entire fleet")
Martin-Brower	Stockton, CA	Food distribution Center	2010, 2011 add-on order converted entire Stockton pallet jack fleet	Oorja Protonics	15, 2 nd order -N/a
Michelin	Columbia, SC	Manufacturing plant	2007, 2-week demonstration	Hydrogenics	2*
Nestlé Waters	Dallas, TX	Bottling facility	2009	Plug Power	32
New United Motor Manufacturing, Inc. (NUMMI)	Fremont, CA	Manufacturing plant	2007	Oorja Protonics	N/a
Nissan North America	Smyrna, TN	Assembly plant	Purchase in 2009, 18-month field	Oorja Protonics	60

Company	Location	Site	Year Deployed	Fuel cell manufacturer*	# of forklifts
			trial beforehand		
	Smyrna, TN	Assembly plant	2007, 5-month demonstration	Plug Power	N/a
Ozburn-Hessey Logistics	Smyrna, TN	Warehouse	2004	Ballard Power Systems	4
PBR	West Columbia, SC	Warehouse	2007, 2-week demonstration	Hydrogenics	2*
The Raymond Corp.	Greene, NY	Manufacturing facility	2007	Plug Power	N/a
Super Store Industries	Lathrop, CA	Warehouse freezer	2009	Oorja Protonics	N/a
Sysco	Riverside, CA	Distribution Center	Purchased 2011	Plug Power	80
	Boston, MA	Distribution Center	Purchased 2011	Plug Power	160
	Long Island, NY	Distribution Center	Purchased 2011	Plug Power	42
	San Antonio, TX	Distribution Center	Purchased 2011	Plug Power	113
	Front Royal, VA	Redistribution facility	Planned in 2011	Plug Power	100
	Philadelphia, PA	Distribution center	2010, ARRA funding awarded to GENCO	Plug Power	95
	Houston, TX	Distribution center	2010, ARRA funding awarded to Sysco Houston	Plug Power	98
	Vancouver, BC, Canada	Distribution center	N/a	Plug Power	N/a
	Canton, MI	Distribution center	N/a, completed	Plug Power	30
	Grand Rapids, MI	Distribution center	N/a, completed	Plug Power	11
Testa Produce	Chicago, IL	Distribution Center	Order placed Nov. 2010	Oorja Protonics	20
Unified Grocers	N/a	N/a	N/a	Oorja Protonics	N/a
United Natural Foods, Inc. (UNFI)	Sarasota, FL	Distribution center	2010	Plug Power	65
U.S. Foodservice	Livermore, CA	Distribution facility	Planned	Oorja Protonics	40
Walmart	Balzac, AL, Canada	New refrigerated distribution center	2010	Plug Power	More than 80
	Washington Court House, OH	Food distribution center	2007	Plug Power	55
	OH	Two distribution centers	2006	Plug Power	12
	MO	Distribution center	2005	Plug Power	4
Wegmans	Pottsville, PA	Warehouse	2010, ARRA funding awarded to GENCO	Plug Power	136
Whole Foods Market	Landover, MD	Distribution center	2010, ARRA funding awarded to GENCO	Plug Power	61
WinCo Foods, LLC	Modesto, CA	Distribution center	Purchased	Plug Power	184

Fuel Cell Manufacturers – Materials Handling Market



Nuvera



Hydrogenics



Oorja Protonics



Plug Power

* 2 forklifts were deployed in 2-week trials at several companies in the Charlotte, SC area

In 2008, Plug Power entered into a 2-yr. agreement with Ballard Power Systems to purchase fuel cell stacks for its electric lift truck applications

ARRA = American Recovery and Reinvestment Act. N/a = information unavailable

Appendix 2. Stationary Fuel Cells at Retail and Grocery Sites

Customer	Type	Location	Status	Fuel Cell Manuf.	Fuel Cell	Configuration	Benefits	Image
United States								
Albertsons	Grocery store	San Diego, CA	2010-present	UTC Power	PureCell® Model 400 PAFC (400 kW)	CHP - generates nearly 90% of the store's power; byproduct heat used to warm water, heat the store when necessary and power a chiller to help cool the refrigerated food; overall energy efficiency of approximately 60%; configured for grid-independent operation if the power fails.	The project is estimated to cut carbon dioxide emissions by 478 metric tons each year compared to California non-baseload power plants.	
Cabela's	Sporting goods retailer	East Hartford, CT	2008-present	UTC Power	PureCell® PAFC (800 kW)	Power - delivers approximately 100% of the required building power, running continuously in conjunction with the utility supply, also capable of providing emergency power to keep the store operational if the power grid fails.	N/a	
McDonald's	Fast food	Deer Park, NY	2002-decommissioned	Plug Power	GenSys 5CS PEM (5 kW)	Power – delivered partial power to the restaurant.	N/a	
McDonald's	Fast food	Portland, OR	2009-present	ClearEdge Power	ClearEdge5 PEM (5 kW)	N/a	N/a	
Price Chopper	Grocery store	Colonie, NY	2010-present	UTC Power	PureCell® Model 400 PAFC (400 kW)	CHP - meets 60-70% of the store's energy needs in summer and 100% in winter, uses thermal energy for heating and cooling, configured for grid-independent operation if the power fails.	Reduces the building's carbon footprint by 71 tons, saves more than 4 million gallons of water/yr.	
Price Chopper	Grocery store	Glenville, NY	2011-present	UTC Power	PureCell® Model 400 PAFC (400 kW)	The fuel cell is configured to provide partial backup power in case of grid failure. Waste heat is captured in a CHP configuration and used for space heating and hot water.	NOx emissions are being reduced Chopper by almost 3 metric tons per year.	
Price Chopper	Grocery store	Eastern New York	Planned	UTC Power	PureCell® Model 400 PAFC (400 kW)	A fleet demonstration project will be performed consisting of 5 fuel cell installations at 5 different stores. The fuel cells will operate in combined heat and power mode and will provide backup power to provide chilling during grid outages.	N/a	
Price Chopper	Grocery store	Middletown, CT	Planned	UTC Power	PureCell® Model 400 PAFC (400 kW)	The fuel cell system is set up to send excess electricity production back to the grid.	N/a	

Customer	Type	Location	Status	Fuel Cell Manuf.	Fuel Cell	Configuration	Benefits	Image
Safeway	Grocery store	Santa Cruz, CA	2009-present	Bloom Energy	Bloom Energy Server SOFC (200 kW)	Power-- serves 20% of the building's energy load.	N/a	
Staples	Retail distribution center	Ontario, CA	2008-present	Bloom Energy	Bloom Energy Server SOFC (300 kW)	Power - delivers electricity to the store (no further details available).	In the first year, the fuel cell generated over 2 million kWh of power, which resulted in a reduction of 2.5 million pounds of CO ₂ . Fuel cell availability has been above 99%.	
Star Market	Grocery store	Chestnut Hill, MA	2009-present	UTC Power	PureCell® Model 400 PAFC (400 kW)	CHP - provides electricity and thermal energy in the form of chilled water and hot water. The chilled water supplies refrigeration system sub-coolers, predominately for space conditioning and cold storage areas. The hot water produced is used for space conditioning, desiccant regeneration, and for making domestic hot water.	N/a	
Stop & Shop	Grocery store	East Torrington, CT	2010-present	UTC Power	PureCell® Model 400 PAFC (400 kW)	CHP - generates 95% of the store's total electric energy requirement, uses thermal energy for heating and cooling.	From Jun 2010-Jan 2011 the fuel cell produced over 1.7 million kWh of electricity and reduced the total electric and natural gas utility bills by roughly 50%.	
Wal-Mart	Retail store	Lancaster, CA	2009-present	Bloom Energy	Bloom Energy Server SOFC (400 kW)	Power - delivers electricity to the store (no further details available).	N/a	
Wal-Mart	Retail store	Hemet, CA	2010-present	Bloom Energy	Bloom Energy Server SOFC (400 kW)	Power - delivers electricity to the store (no further details available).	N/a	
Wal-Mart	Retail stores	17 site in California		Bloom Energy		N/a	N/a	
Whole Foods Market	First grocery store to deploy a fuel cell	Glastonbury, CT	2008-present	UTC Power	PureCell® Model 200 PAFC (200 kW)	CHP - generates 50% of store's electricity and nearly 100% of store's hot water, configured for grid-independent operation if the power fails.	Total electrical and heat energy costs were 30% lower after the first year than a comparable, conventionally powered store in West Hartford, CT.	
Whole Foods Market	Grocery store	Dedham, MA	2009-present	UTC Power	PureCell® Model 400 PAFC (400 kW)	CHP - generates approximately 90% of electricity and nearly 100 percent of store's hot water.	N/a	

Customer	Type	Location	Status	Fuel Cell Manuf.	Fuel Cell	Configuration	Benefits	Image
Whole Foods Market	Grocery store	San Jose, CA	2010-present	UTC Power	PureCell® Model 400 PAFC (400 kW)	CHP - generates 90% of electricity, byproduct thermal energy is used for heating, cooling and refrigeration	By generating most of its power on-site with a fuel cell, the store will prevent the release of more than 370 metric tons of carbon dioxide annually.	
Whole Foods Market	Grocery store	Fairfield, CT	2011-present	UTC Power	PureCell® Model 400 PAFC (400 kW)	CHP - will generate 90% of the power and meet all of the store's hot water needs.	Provides 90% of the store's power, byproduct thermal energy used for store heating, cooling and refrigeration, will prevent the release of more than 847 metric tons of CO2 annually.	
International								
John Lewis	Department store	UK	Planned	AFC Energy	Alkaline fuel cell (AFC)	Note: Fuel cell forklifts may be added to additional John Lewis stores and to Waitrose super-markets.	N/a	
Many retail and grocery stores are also employing fuel cell-powered forklifts at their distribution centers. See Fuel Cell 2000's fuel cell forklift chart at http://www.fuelcells.org/info/charts/forklifts.pdf								

Appendix 3. Companies Profiled in 2010 Report

	Fuel Cell Stationary Power	Fuel Cell Forklifts	Fuel Cell Vehicles
Production Facilities			
Coca-Cola*	√	√	√
Gills Onions	√		
Nestlé Waters		√	
Pepperidge Farm	√		
Sierra Nevada Brewery	√		
Super Store Industries		√	
Bridgestone-Firestone		√	
Nissan North America		√	
Kimberly-Clark*		√	
Michelin	√		√
Distribution Facilities			
Martin-Brower		√	
Sysco*		√	
United Natural Foods Inc.		√	
U.S. Foodservice*		√	
FedEx	√	√	√
UPS	√		√
Retail & Grocery Stores			
Cabela's	√		
IKEA			√
Staples*	√		
Walmart*	√	√	
Central Grocers*		√	
H-E-B		√	
Price Chopper	√		
Star Market	√		
Wegmans		√	
Whole Foods Market*	√	√	
Telecom			
Sprint	√		
Verizon	√		
Motorola	√		
Hospitality			
Hilton Hotels	√		√
Starwood Hotels and Resorts	√		
Corporate Headquarters/Data Centers			
eBay	√		
First National Bank of Omaha	√		
Fujitsu	√		
Cox Enterprises	√		
Chevron	√		
Cypress Semiconductor	√		

*Repeat customer profiled in 2011 report