

# FUEL CELLS 2000'S

## FUEL CELL Q U A R T E R L Y

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### Last Issue of Fuel Cell Quarterly

Fuel Cells 2000 is sorry to inform all Fuel Cell Quarterly subscribers that this will be the last issue of this newsletter. Thank you for your many years of support!

Fuel Cells 2000 has several other great resources that if you aren't already subscribed and familiar with, you should check out.

**[The Fuel Cell Technology Update](#)** – This monthly email newsletter goes out to more than 11,000 subscribers and covers the latest fuel cell news, advancements and announcements., and is divided into sections including: Transportation, Stationary, Portable Power, Micro Fuel Cells, Military Applications, Fuels/Reformers/Storage, Materials/Components/Testing, Requests for Proposals, Market Studies/Reports, Miscellaneous and Conferences. If your company has news to report, send it to [jennifer@fuelcells.org](mailto:jennifer@fuelcells.org).

**[Fuel Cell Insider Blog](#)** – Fuel Cells 2000's Fuel Cell Insider blog is a great place for the inside scoop on meetings and briefings here in Washington, DC, analysis of reports, policy updates and interesting fuel cell news.

We also have the Fuel Cell Insider [Facebook](#) page and [Twitter](#) feed so become a fan and follow us! Spread the word to friends and coworkers, too.

**[State Fuel Cell and Hydrogen Database](#)** – This searchable and comprehensive database contains a ton of information about state activity. We include all policy, legislation, incentives, roadmaps and initiatives as well as all stationary installations, vehicle demonstrations including cars, buses and forklifts, and hydrogen fueling stations. You can search by state or states or the entire U.S. at a time. Next year we will be improving the database's features and functions so it will only get better! We also have a Worldwide Stationary Fuel Cell Installation database that tracks installations in other countries.

**[Fuel Cell Match Maker Message Board](#)** – Fuel Cells 2000 has a free online networking and collaboration tool, the Fuel Cell Match Maker. It's a great way to reach out to the fuel cell community, be it to find a partner, promote your company's products or post resumes or job openings.

**Lots More!** [www.fuelcells.org](http://www.fuelcells.org) has many other resources and next year we will be reorganizing the site to make it easier to find what you are looking for. Articles, conference presentations, comprehensive charts, images, a Fuel Cell Library, the Fuel Cell Career and Education Center and much more.

So again, thank you for your support for Fuel Cells 2000 and fuel cells in general!

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## Connecticut: The New California?

Connecticut has recently been a hotbed of fuel cell and hydrogen activity, with all kinds of new deployments. In October, four next-generation fuel cell hybrid transit buses were introduced in the Hartford area, the nation's first privately-funded, publicly-accessible hydrogen station opened in Wallingford, and ten Toyota fuel cell vehicles were delivered to Connecticut.

### CTTransit Fuel Cell Hybrid Buses



One of CTTransit's fuel cell buses

The Hartford region's four new fuel cell hybrid buses were debuted by CTTransit, joining an earlier generation fuel cell hybrid bus that has operated in regular transit service in the greater Hartford area since 2007. All of the buses are equipped with UTC Power fuel cell systems. The newer generation fuel cell buses are lighter than the earlier generation vehicle and feature advanced lithium-ion battery systems and a more durable fuel cell power plant. The new buses are also capable of delivering real-time information that will be used in developing the next generation fuel cell hybrid system.

Steve Warren, CTTransit's Assistant General Manager-Maintenance Services, reports that the fuel efficiency of the agency's first fuel cell bus is about two times greater than a standard diesel bus, and anticipates that the new, lighter fuel cell buses will attain an even greater fuel economy.

Warren also reports that both bus drivers and riders both love the quiet, smooth ride and the environmental benefits provided by a fuel cell hybrid bus.

The four new fuel cell buses are part of the Federal Transit Administration's national Fuel Cell Bus Program, while the older fuel cell bus is part of DOE's Technology Validation Program. You can learn more about CTTransit's fuel cell buses, as well as other fuel cell buses operating in US transit systems (and plans for future deployments) at the National Renewable Energy Laboratory's Fuel Cell Bus Evaluation webpage ([http://www.nrel.gov/hydrogen/proj\\_fc\\_bus\\_eval.html](http://www.nrel.gov/hydrogen/proj_fc_bus_eval.html)).

### SunHydro Station and Toyota FCHV's

A new hydrogen fueling station debuted in Wallingford, Connecticut, developed by sister companies SunHydro and Proton Energy Systems. The Wallingford hydro-

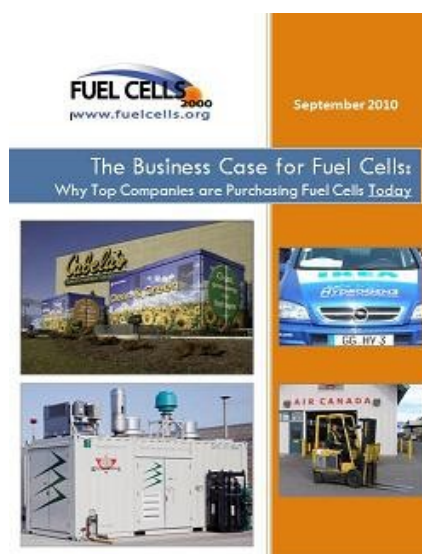
gen station is the first of nine SunHydro stations that will form an East Coast hydrogen highway running from Maine to Florida. When all of the stations are opened, fuel cell vehicles will be able to travel the East Coast emissions-free, using hydrogen fuel generated onsite via solar energy and a Proton Energy Systems electrolyzer. The new Connecticut station will offer limited public access at first, but full public access is planned.

In addition, SunHydro and Proton Energy systems received ten Toyota FCHV-adv vehicles, part of a nationwide Toyota demonstration of 100 FCHV-adv vehicles over the next three years. The fuel cell cars will be driven by the staff of SunHydro and Proton Energy Systems and other community members, and will fuel at the new hydrogen station.



Ten Toyota FCHV-adv vehicles

SunHydro's planned East Coast Hydrogen Highway will be available to support planned roll out of fuel cell vehicles by major auto manufacturers in 2015 (<http://www.hondanews.eu/en/news/index.pmode/modul,detail,0,1241-DEFAULT,21,text,1/index.pmode/>). Phase 2 of SunHydro's plan calls for a second hydrogen highway running from New York to California, followed by more widespread deployment of SunHydro stations. (SC)



If you haven't seen or heard about it already, Fuel Cells 2000 released

[The Business Case for Fuel Cells: Why Top Companies are Purchasing Fuel Cells Today](#). This report profiles 38 companies using fuel cells, including big names such as Whole Foods, Staples, Sprint, Hilton Hotels and many more!

Read about the different applications, energy challenges and benefits fuel cells provide. The report also contains lots of great resources and charts to help show the business case that fuel cells can provide today!

## Recent Reports Support Fuel Cells

This quarter a number of reports were released that supported fuel cells specifically, or supported a policy environment that would aid the deployment of fuel cell systems.

A new study, "[A portfolio of power-trains for Europe: a fact based analysis](#)", was released in early November

by McKinsey and Company. The report took real world data from leading vehicle manufacturers, hydrogen producers, and other industry groups, and compared battery electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV), and fuel cell electric vehicles (FCEV). The study found FCEVs to be "technologically ready" and an effective solution of a large portion of drivers. McKinsey found that "BEVs, PHEVs, and FCEVs have significant potential to reduce CO<sub>2</sub> and local emissions, assuming CO<sub>2</sub> reduction is performed at the production site. They play a complementary role, with BEVs ideally suited to smaller cars and shorter trips and FCEVs to medium/larger cars and longer trips." While the McKinsey report focused on the European vehicle fleet, it has strong implications for the US, where cars tend to be much larger, and our trips much longer.

Additionally, the US Department of Energy (DOE) released its updated "[well-to-wheels](#)" analysis, a sub-set of life cycle assessments which attempt to look at a product, system, or technology in its totality to determine the full cost and benefit to society, from the raw materials to the end of life disposal. A "well-to-wheels" analysis looks at the overall efficiency of transportation fuels from well-head to operations in a vehicle.

One of the major differences in this year's analysis was the splitting of plug-in hybrid electric vehicles into two distinct categories; those that are power-split, 10-mile electric range, and those that are series, 40-mile electric range. These categories seem to take into account the differences between the Nissan Leaf (power-split) and the Chevy Volt (series), both of which are being offered for commercial sale in limited locations in late December 2010, early January 2011.

Fuel cell electric vehicles continue to perform well in these types of analysis. Even when using the least "green" form of hydrogen, distributed from natural gas, fuel cell electric vehicles (FCEV) reduce greenhouse

gas emissions by 250 g CO<sub>2</sub>-eqv/mile over today's conventional ICE mid-sized cars. Emissions from coal gasification with sequestration have been revised downward, as has biomass gasification, both by nearly 15 g CO<sub>2</sub>-eqv/mile over last years numbers.

This analysis repeatedly shows that fuel cell electric vehicles should be included in our future vehicle fleet mix if we want to get serious about reducing emissions from the transportation sector.

In early December, the President's Council of Advisors released the, "[Report to the President on Accelerating the Pace of Change in Energy Technology Through an Integrated Federal Energy Policy](#)." The report outlines a course of action to face one of our greatest challenges, "how to transform the energy system within one to two decades, through leadership in energy technology innovation, for the reasons of economic competitiveness, environment, and security."

This report is refreshing in its honesty for why engaging in energy technology research, development, and deployment should be a top priority for our government, regardless of partisan politics. First the report tackles the economic advantage improved energy systems will give us. This section of the report reiterates remarks made by Secretary Chu that increased funding could help us leap-frog other countries that are investing heavily in alternative energy and the sciences. Second, the report addresses the environmental benefits we could see in terms of acid rain, smog, and global climate change if energy systems were improved. And lastly, the report acknowledges that our current energy infrastructure relies heavily on fossil fuels that undermine our safety and security.

The report takes great care to not endorse any specific technology, and instead looks to set up a broad-based framework to ensure that as a nation we achieve the best improvements in energy technology possible. The report also makes a very strong case for a large increase in energy funding, including 16 billion dollars a year in funding for DOE as well as 10 billion dollars a year from new revenue streams. The report also stresses that government support should not pick "winners" or go to specific deployment of systems, but instead should give us options. This is encouraging news for fuel cell supporters. Additionally, government should work to remove barriers to market entry, not impede change. This will require working to smooth out codes and standards, give incentives to those businesses that use alternative energy technologies, and streamlining permitting requirements, all of which would make it easier to install, and use fuel cell products. (ED)

A portfolio of power-trains for Europe:  
a fact-based analysis



The role of Battery Electric Vehicles, Plug-in Hybrids and Fuel Cell Electric Vehicles

## Biogas Fuel Cells All the Rage in California

In recent weeks, there have been several large-scale sales of FuelCell Energy fuel cell systems to wastewater treatment plants, municipal facilities, and even an egg ranch in California. These units are going to run off of biogas, making them eligible for California's generous Self Generation Incentive Program (SGIP). SGIP provides \$4,500 per kW for fuel cell systems running off of renewable fuel, which includes biogas or anaerobic digester gas (ADG).

The SGIP program has helped propel California to one of the world's leaders in stationary fuel cell installations and is leading to some big installations in the wastewater treatment and food and beverage processing field. When installed as combined heat and power (CHP) systems, fuel cells utilizing ADG are achieving around 85% efficiency while reducing emissions tremendously.

The recent sales total more than 10 mega-watts (MW) of power.

Three fuel cell power plants, ranging from 2.8 MW, to 1.4 MW and a 300 kW unit, will be installed around San Diego, California. The 4.5 MW purchase from BioFuels Fuel Cells, LLC, a California renewable energy company owned by New Energy Capital and BioFuels Energy, LLC, will be installed at three different locations and will utilize purified biogas from the Point Loma Wastewater Treatment Plant in San Diego. This project incorporates a unique solution that purifies the biogas on site, and then injects the biogas into an existing gas pipeline to supply fuel cells at two different locations in the San Diego area. This project will represent the first time that a FuelCell Energy fuel cell will be fueled by renewable biogas generated at a distant location.

The three fuel cell systems will utilize the waste head, bringing the efficiency to 90%, the projects are:

**University of California, San Diego** - 2.8 MW DFC3000 to supply power to the campus electrical grid. The University will utilize the byproduct heat from the fuel cell energy generation process as a continuous power source for 320 tons of chilling capacity to cool campus buildings, increasing the overall efficiency of the

power plant and generating cost savings for the University. When completed in late 2011, the 2.8 MW fuel cell will be the largest on any college campus, providing about 8 percent of UC San Diego's total energy needs. The \$19 million project requires no university funding: the project is eligible for \$7.65 million in State of California Self Generation Program incentives, and BioFuels Energy will provide the remaining \$11.35 million in private investment, loans, and investment tax credits.

**South Bay Water Reclamation Plant** - This municipal facility is a pump station that does not generate biogas on site. The 1.4 MW DFC1500 fuel cell power plant will provide reliable base-load power around-the-clock, replacing power purchased from the electric grid. Byproduct heat will be used for heating needs at the pump station, increasing the overall efficiency of the power plant.



FuelCell Energy units at Tulare Waste Water Treatment Plant in California, recent sales are to other facilities in the state

**Point Loma Wastewater Treatment Plant** - 300 kW DFC300 fuel cell will

generate the power required for the biogas purification process. Biogas generated from the wastewater treatment process will fuel the DFC300 power plant and provide directed biogas to the existing gas pipeline.

The City of San Diego estimates the project will generate \$2.6 million of revenue over ten years from payments made by BioFuels Energy for the biogas. In addition, the City expects to save \$780,000 in electricity costs to power the South Bay Water Reclamation Plant under a ten year power purchase agreement with BioFuels Energy.

For its Ontario, California, water recycling plant, Inland Empire Utilities Agency (IEUA) signed a landmark 20-year power purchase agreement (PPA) with UTS Bioenergy to install, operate and maintain a 2.8 MW fuel cell system, fueled primarily with renewable biogas. The fuel cell system will provide power and thermal energy to the water recycling plant and is expected to be operational by late 2012.

# Coke and Fuel Cells – It's the Real Thing!

A Coca-Cola Refreshments (CCR) production plant in Elmsford, New York is now using two UTC Power fuel cells to generate 35 percent of the facility's required electricity and heat.

The two PureCell® Model 400 phosphoric acid fuel cell (PAFC) systems are helping Coca-Cola achieve its sustainability goals by reducing the amount of electricity drawn from the grid, lowering energy costs, and conserving water. The fuel cells also reduce emissions – CCR anticipates that using fuel cells instead of non-base load utility power plants will prevent the release of more than 2,635 metric tons of carbon dioxide and more than 4 metric tons of nitrogen oxide emissions. The fuel cells have the added benefit of being able to generate power in the event of a power outage, allowing select operations to continue functioning until power is restored to the facility.

The New York State Energy Research and Development Authority (NYSERDA) provided funding to support the Elmsford fuel cell project.

CCR is planning to deploy additional fuel cells, recently completing an agreement to install two more UTC Power fuel cells at its bottling plant in East Hartford, Connecticut. Coca-Cola already has a strong commitment to fuel cells, having deployed the technology throughout the company, including 40 fuel cell-powered forklifts at a North Carolina Coca-Cola production center, fuel cells to provide power at an Odwalla juice packaging plant in California, a Nissan fuel cell vehicle operated by a Sacramento Coca-Cola bottling facility to promote its Coke Zero, and a GM/Opel fuel cell vehicle operated by Coca-Cola Germany. (SC)



Nissan X-TRAIL FCV promoting Coke Zero

Cont'd from page 4

UTS Bioenergy also purchased a 1.4 MW DFC1500 for the San Jose/Santa Clara Water Pollution Control Plant in San Jose, California. As with the Ontario plant, UTS entered into a 20-year power purchase agreement for the unit which is expected to be operational in early 2012.

FuelCell Energy also sold another 1.4 MW DFC1500 fuel cell power plant to the Rancho California Water District to power a pumping station located in Temecula, California. The fuel cell is expected to be operational by late 2011.

On the small side, the company sold two 300 kW DFC300 fuel cell power plants to the Eastern Municipal Water District (EMWD) in southern California to be fueled by renewable biogas. The fuel cells will be located at the Perris Valley Regional Water Reclamation Facility in Riverside County, California and are expected to be operational by mid 2011.

Finally, FuelCell Energy, Inc. also sold a 1.4 MW DFC1500 fuel cell power plant to G3 Power Systems, Inc. to be installed at the Olivera Egg Ranch, LLC, a poultry ranch located in French Camp, California that produces approximately 14 million cartons of eggs per year for stores and restaurants in the San Francisco Bay Area. An anaerobic digester will be installed that will process more than 1 million pounds of poultry waste per week, helping to reduce the ranch's waste it dumps into a waste lagoon, and the ADG generated will power the fuel cell to provide electricity for the ranch.



These installations help propel not only FuelCell Energy's image and financial stability, but also California's standing as a fuel cell leader in not only the United States, but the world.

The [California Stationary Fuel Cell Collaborative](#) has a great website with lots of information and resources, including an interactive map of all of California's [fuel cell installations](#).

## Conferences Abound

There are always a plethora of conferences occurring all over the world at any given time, and a surprising number of those are fuel cell and/or hydrogen focused.

Fuel Cells 2000 is a media sponsor to several of the conferences coming down the pike.



[Fuel Cell & Hydrogen Energy 2011](#) – The U.S. Fuel Cell Council and the National Hydrogen Association (NHA) have merged to form the new Fuel Cell and Hydrogen Energy Association (FCHEA) so the NHA's annual conference has been renamed. This event will be held February 13-16, 2011, just outside of Washington, DC, at the National Harbor.

**7th Int'l Hydrogen & Fuel Cell Expo** World's Largest Hydrogen & Fuel Cell Event  
**FC EXPO 2011** Mar. 2 - 4, 2011, TOKYO, JAPAN

[7th International Hydrogen & Fuel Cell Expo 2011](#) – This gigantic exposition, held in Tokyo, Japan, takes place on March 3-6, 2011. This year, there are four other concurrent events that attendees can visit – the PV Expo, Battery Expo, Smart Grid and Eco-House/Eco-Building – in addition to the hundreds of fuel cell and hydrogen exhibitors at the show. If you represent a U.S. company and are interested in exhibiting at the show as part of the U.S. Pavilion, contact Jennifer Gangi to find out about a great opportunity for a greatly discounted rate.

**HANNOVER MESSE 2011**

April 4 – 8

**H2FC-FAIR**

Tobias Renz FAIR

**GROUPEXHIBIT**

**HYDROGEN**

**FUEL CELLS**

[17th Group Exhibit Hydrogen + Fuel Cells at HANNOVER MESSE 2011](#) – This fuel cell exhibition is part of a much, much larger trade fair and showcases the latest fuel cell products. More than 150 companies from 25 countries will participate at the show, which will take place April 4-8, 2011, in Hannover, Germany.

There are lots of other conferences on the horizon, so be sure to check out <http://www.fuelcells.org/news/conf.html> for a complete listing.

Thanks again for your continued support for  
**Fuel Cells 2000 and fuel cells!**



Happy Holidays from **Fuel Cells**  
**2000!**