

Re: Congresswoman Wilson: Hydrogen Holds Great Promise for Energy Independence

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- *From:* "lkgeo1" <lkgeo1@xxxxxxx>
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FuelCell Energy Helps Sierra Nevada Harness 'Beer Power' to Reduce its Energy Costs by 25 to 40 Percent

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Fuel Flexibility Enables Internationally Renowned Craft Brewer to Advance Its Sustainable Conservation Goals by Running on Renewable Gas Generated from the Brewing Process Waste DANBURY, Conn. FuelCell Energy, Inc. (Nasdaq:FCEL), a leading manufacturer of ultra-clean electric power plants for commercial, industrial and government customers, today announced the upgrade of its 1 megawatt (MW) Direct Fuel Cell® (DFC®) power plant at Sierra Nevada Brewing Co. to use fuel created from a waste by-product of the brewing process. With this enhancement, Sierra Nevada furthers its sustainability and energy efficiency goals, while realizing substantial cost savings by offsetting its purchase of natural gas.

The brewery's fuel cell power plant, which began running last summer and was dedicated by California Gov. Arnold Schwarzenegger, initially ran on natural gas. To boost the brewery's energy efficiency and ecologically friendly profile, Sierra Nevada founder Ken Grossman sought to convert the ultra-clean fuel cells from operating solely on natural gas to a gas mixture that the brewery produced as a by-product, methane.

Sierra Nevada installed a compressor and filtration system to purify methane gas that is generated during the brewery's water treatment process, and then feed it to the power plant for fuel. As a result, two of the plant's four fuel cell stacks can now operate in dual fuel mode — using any combination of natural gas and anaerobic digester gas (ADG). As Sierra Nevada increases its production and the amount of methane it generates, it also can operate the other two fuel cells on ADG. Gas produced in the digester reduces the amount of fuel used in the power plant. The system is now capable of producing 250 to 400 kilowatts (kW) of electricity from biogas, reducing the company's fuel costs by 25 to 40 percent. Regardless of the fuel blend used, the high efficiency of DFC power plants require less fuel than conventional

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power plants, resulting in lower operating costs and an overall reduction in the amount of carbon dioxide emitted into the atmosphere per unit of power output.

The 1 MW power plant, one of three FuelCell Energy megawatt-class sites now running in the state, is classified as an ultra-clean technology under California law and provides virtually 100 percent of Sierra Nevada's base load power requirements. The fuel cells operate in co-generation mode, so their 650 degree thermal output is utilized to create steam that further offsets the natural gas needs of their existing boilers providing an additional reduction in operating costs and increase in system efficiency. The facility was named one of 12 "Top Plants" worldwide by Power Magazine in 2006.

"By converting the DFC plants to operate on ADG, we have further advanced our company's sustainability goals and reduced our energy and waste disposal costs," said Sierra Nevada's Ken Grossman. "The fuel cell power plant provides us with reliable, 24-7 electricity and helps make our energy self-sufficiency a reality."

Sierra Nevada's installation of ultra-clean onsite power generation has also enhanced the company's reputation of being a good neighbor by helping to reduce demand on the local power grid for the production of its award-winning craft beer. The company benefits by ensuring that its critical business operations have access to reliable power and neighbors have access to more power that would otherwise be consumed by the brewery.

"The installation at Sierra Nevada is a great example of the fuel flexibility of our DFC power plants," said Bruce Ludemann, Senior Vice President of Sales and Marketing, FuelCell Energy. "Because fuel cells generate energy by chemical conversion rather than combustion, they can convert virtually any biomass- or hydrocarbon-power source into ultra-clean electricity. Sierra Nevada is reducing its energy costs and eliminating a manufacturing by-product that would otherwise add to its disposal and waste water expenditures."

When the fuel cells generate more power than the brewery requires, Sierra Nevada can send excess electricity back to the grid system and receive credit for a portion of its generation costs. A number of other FuelCell Energy power plant sites use waste-related processes to create renewable fuel for generating their electricity. Kirin Brewery in Japan operates a DFC power plant fueled on digester gas. In August, Gills Onions purchased two DFC units to be fueled with ADG resulting from waste onion peels. The power plant will create ultra-clean energy while lowering disposal costs of this by-product. Approximately half the project cost was offset by federal investment tax credits and accelerated depreciation (both created by the US Energy Act of 2005), as well as funds from the California Self Generation Incentive Program (SGIP).

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About FuelCell Energy, Inc.

FuelCell Energy develops and markets ultra-clean power plants that generate electricity with higher efficiency than distributed generation plants of similar size and with virtually no air pollution. Fuel cells produce base load electricity giving commercial and industrial customers greater control over their power generation economics, reliability and emissions. Emerging state, federal and international regulations to reduce harmful greenhouse gas emissions consider fuel cell power plants in the same environmentally friendly category as wind and solar energy sources — with the added advantages of running 24 hours a day and the capacity to be installed where wind turbines or solar panels often cannot. Headquartered in Danbury, Conn., FuelCell Energy services over 50 power plant sites around the globe that have generated more than 124 million kilowatt hours, and conducts R&D on next-generation fuel cell technologies to meet the world's ever-increasing demand for ultra-clean distributed energy. For more information on the company, its products and its worldwide commercial distribution alliances, please see <http://www.fuelcellenergy.com>.

Jim Michael wrote:

"lkgeo1" <lkgeo1@xxxxxxx> wrote in message
news:1160420629.939106.60080@xx

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[press release stuff deleted]

Where does the hydrogen come from? Yes, hydrogen is the most abundant element in the universe, but, here on earth, it is almost entirely combined with other elements in things like water and hydrocarbons. It takes energy to break those chemical bonds, so where does that energy come from?

Currently, the cheapest source of hydrogen comes from methane which reacts with steam to provide hydrogen and carbon dioxide. In this case, we take a clean burning fuel (natural gas is mostly methane) and ineffeciently produce hydrogen. That doesn't make sense. Hydrogen can be produced by the electrolysis of distilled water using electricity. Some fuel needs to be burned to make the electricity and the process is again ineffecient. Photovoltaic cells can make electricity from sun light, but the electricity produced is more valuable than the resulting hydrogen, so that doesn't make sense, either.

Jim Michael
jmichael@xxxxxxxxxxxx