



Cogeneration At Home: Ceramic Fuel Cells And Bloom Energy

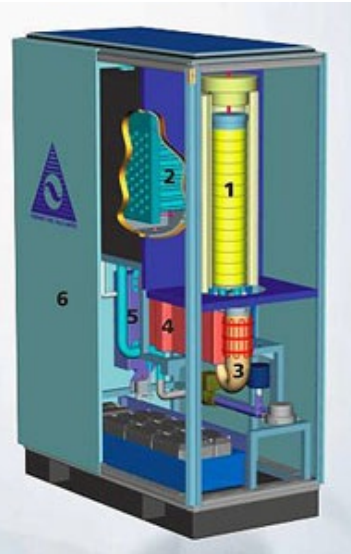
Posted by [Big Gav](#) on March 30, 2008 - 10:55am in [The Oil Drum: Australia/New Zealand](#)

Topic: [Alternative energy](#)

Tags: [bloom energy](#), [ceramic fuel cells](#), [cogeneration](#), [fuel cell](#), [natural gas](#) [[list all tags](#)]

[Comments fixed.]

The Engineer-Poet recently had a post on [The Cogeneration Stopgap](#) at the Oil Drum, which looked at how the combination of cogeneration (generating combined heat and power - CHP - using natural gas) and heat pumps could be used to heat North American homes much more efficiently and extend the life of North America's dwindling natural gas reserves for a period of time while houses are retrofitted to make them more energy efficient and natural gas use is replaced with electricity. The only example of cogeneration technology touched on in the article was from [Climate Energy](#), whose CHP unit is made by Honda.



An Australian company working in this area called [Ceramic Fuel Cells](#) was in the news recently after landing a \$240 million deal with Dutch energy company Nuon to [supply 50,000 CHP units](#) by 2014. The company still needs to meet a number of commercial requirements set by Nuon - in particular improving the durability of the cells from two years to four.

The company is hoping that production will begin by June 2009 in a new €12.4 million factory in Heinsberg, Germany, which aims to produce 10,000 2 kW units per year. The cells are expected to emit 60% less carbon dioxide than traditional combustion generators. The company is also partnering with Britain's Powergen, Germany's EWE and Gaz de France.

Ceramic Fuel Cells

Ceramic's fuel cells have been under development for [several years](#), listing on the ASX in 2004 and the AIM shortly after. The company specialises in solid oxide [fuel cells](#), which convert natural gas (and presumably biogas) into power and heat without burning the fuel. The cells convert about 50 per cent of the energy in the fuel to electricity - traditional gas-fired power stations manage around 30 per cent - with another 35 per cent of the potential energy captured as heat from the catalytic process.

The company doesn't have any plans to market units in Australia in the foreseeable future, preferring to concentrate on the [European market](#) due to higher energy prices, specific CHP rebates in Germany, feed-in tariffs and possible carbon credits for trading on the EU emissions trading scheme (set up under the Kyoto protocol).



CHP in Britain

[Reuters](#) reported that boilers containing Ceramic's units could be sold in Britain in 2010 if utility company Powergen orders units this year. The article estimates that fuel cell units for home units will be priced between 1,500 and 2,000 pounds and that larger units priced at over 3,000 pounds will be operated by utility companies. The same report goes on to speculate that because utilities will save so much money by producing electricity using CHP (which they believe is twice as efficient as centralised generation and sending power through the grid), that they expect utilities will eventually start giving next-generation boilers to customers for free, with the units having a 4-5 year payback period.

Powergen has also previously looked at a different micro-CHP approach using [Stirling Engines](#) attached to water boilers. I can't tell what happened to this plan, though the company is assume was the prospective supplier - [Disenco](#) - is still marketing a CHP product (although [full production](#) isn't due to begin until this year, which may explain the absence of progress).

Another British CHP company called [Ceres Power](#) received an order for 37,500 units from British Gas owner Centrica in [January](#), for delivery from 2011. These units are smaller but cheaper than Ceramic's units. [Carbon Commentary](#) have looked at this unit and claimed the main challenge facing CHP vendors in the UK is a the lack of feed-in tariffs - which would presumably affect Ceramic as much as Ceres.

Bloom Energy

Another company that has received a lot of [attention](#) in the fuel cell market is US company Bloom Energy, who are also developing solid oxide fuel cells (though there is some [legal argument](#) underway about who actually developed the technology in this case). Bloom Energy

The company is investigating using natural gas and ethanol as fuel for the cells, and [most reports](#) speculate the cells will be able to generate 100 kw of power (the company's [web site](#) says absolutely nothing). [One report](#) from Business 2.0 claims the company is aiming to sell units for around US\$10,000.

Bloom is backed by a number of high profile investors, including the omnipresent Kleiner Perkins Caulfield Byers, and has raised US\$100 million in funding. According to [Vinod Khosla](#), the company is currently building a "massive" facility in Mumbai, India.



One possible application for Bloom's fuel cells is in [data centres](#), with the cells used to eliminate the need for uninterruptible power supplies (UPS's) and thus (in some cases) the need for additional disaster recovery (DR) facilities.

Japan

Japan has also seen trials of hydrogen fuel cells for CHP, with the hydrogen coming from reformed natural gas. The cells are [leased for 1 million yen](#) (US\$9,500) for a 10-year period from Matsushita Electric Industrial Co. Toyota, Honda and Toshiba are all also working on fuel cells, usually as part of efforts to develop fuel cell vehicles.

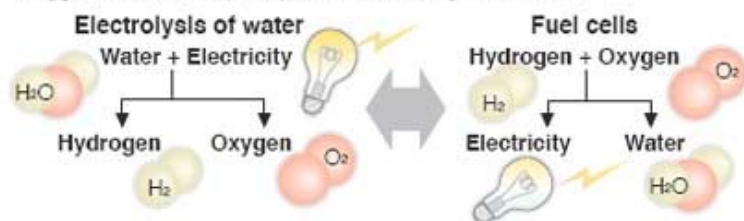
The Japanese Government is spending 2.4 billion yen (US\$310 million) per year on fuel cell development and plans for 10 million homes (25% of Japanese households) to be [powered by fuel cells by 2020](#).

An alternative use for fuel cells

In Japan, more than 2,000 homes are using the fuel cell as a new ecological power-generating technology.

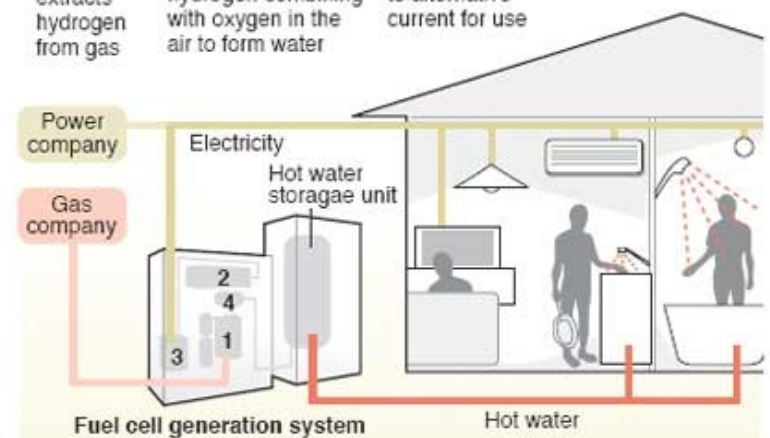
Chemical reaction

A fuel cell generates power from the chemical reaction of hydrogen and oxygen, the reverse principle of the electrolysis of water.



How fuel cell-powered home works

- ① Fuel performing unit extracts hydrogen from gas
- ② Fuel cell unit creates power from chemical reaction of hydrogen combining with oxygen in the air to form water
- ③ Inverter converts power from direct current to alternative current for use
- ④ Cold water is heated and stored in a tank



The Air Car

One last note - a commenter on the "Air Car" articles noted that MDI's main business seems to be a [variable-fuel stationary power supply](#), so presumably they could be a vendor in this market at some point as well.

Crossposted from [Peak Energy](#)



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