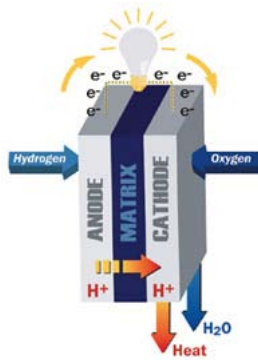




Fujitsu Hydrogen Fuel Cell Q&A

Q. What is a hydrogen fuel cell?

A. A hydrogen fuel cell is an electrochemical device that combines hydrogen fuel and oxygen from the air to produce electricity, heat and water. Fuel cells operate without combustion, so they are virtually pollution free. Since the fuel is converted directly to electricity, a fuel cell can operate at much higher efficiencies than internal combustion engines, extracting more electricity from the same amount of fuel. The fuel cell itself has no moving parts—making it a quiet and reliable source of power.



Q. What hydrogen fuel cell product did Fujitsu install?

A. The PureCell™ Model 200 system from UTC Power

Q. What are the advantages of the PureCell™ 200?



A. Fuel cells offer a clean, quiet, scalable power solution. Fuel cells are virtually pollution-free. Some specific advantages of the UTC PureCell™ 200 are:

- Ultra-low emissions (meets the most stringent air emissions standards as set by the California Air Resources Board ~ CARB 07)
- Low sound profile (60dBA @ 30 ft)
- By using both the heat and power the fuel cell generates, carbon footprints can be significantly reduced
- No ozone-depleting fluorocarbons
- Low maintenance resulting from innovative design and few moving parts

Q. What are some of the specific environmental benefits Fujitsu will obtain from the fuel cell technology?

A. Fujitsu would need to plant 110 acres of forest to match the lifetime CO₂ benefits of the fuel cell system. The fuel cell will also help preserve water resources. It produces hot water while generating energy, and the hot water can be used to generate more power. When compared to conventional power plants, the fuel cell will save at least 800,000 gallons of water per year (based on the 500 gal/MWh average water usage of power generation plants in the U.S.). Over the 15-year life of the fuel cell, Fujitsu will leave 12 million gallons of water untouched. The reduction of NO_x emissions is equivalent to removing 100 cars from the roadways per year, taking a total of 1,500 cars off the road over the 15-year life of the fuel cell.



Q. What powers the hydrogen fuel cell?

A. Natural gas. While natural gas is a fossil fuel, the highly efficient hydrogen fuel cell produces 35 percent less CO₂ per megawatt-hour than the average fossil fuel-based power plant.

Q. What is the reliability of a fuel cell?

A. When connected in parallel with the electric grid, the PureCell™ 200 provides power in excess of 99.99 percent of the time. Since 1991 UTC Power's 200kW power module has generated more than one billion kilowatt-hours of energy.

Q. How does hydrogen compare with gasoline, diesel and other fuels?

A. Hydrogen can be totally nonpolluting (water and heat), and can be produced in any country or locale from a variety of energy sources. It can be economically competitive with gasoline or diesel and can help reduce dependence on imported fuels.

Hydrogen has several properties that differ strongly from natural gas or methane. Unlike other fuels which can cause harmful emissions, hydrogen oxidizes to harmless water. Hydrogen also has a higher energy density per unit of weight than CNG or methane, making it a more efficient source of energy by volume. One of the other positive characteristics of hydrogen is that it dissolves to incombustible levels very quickly. Hydrogen also rises quickly and therefore is less of a threat outdoors.

Q. Why did Fujitsu opt for a hydrogen fuel cell over solar energy?

A. Fujitsu began exploring ways to deliver power to the Sunnyvale campus that would be both green and cost-effective. Fujitsu carefully assessed a number of alternatives, including solar energy, and opted for hydrogen power based on a number of limitations of solar power systems.

- Solar requires a large surface area be available. While Fujitsu's Sunnyvale campus has sufficient surface area, this area is spread over the roofs of eight buildings making for a complex power grid.
- Solar power requires batteries for energy storage, and housing the batteries requires additional space.
- Batteries have a three to five year life, requiring an expensive replacement. They are also considered a hazardous material increasing the expense of disposal.
- Solar produces its highest output with full sun. Power output fluctuates with weather changes, and no power is produced at night.
- The hydrogen fuel cell would cost less and last longer than a solar solution.

Q. How is hydrogen produced?

A. Hydrogen can be produced using diverse, domestic resources including fossil fuels, such as natural gas and coal (with carbon sequestration); nuclear; and biomass and other renewable energy technologies, such as wind, solar, geothermal, and hydro-electric power. Given hydrogen's greater energy mass, that is, its ability to deliver more energy per unit of volume, hydrogen is widely believed to be more efficient than other fuels,

even though its production may be fossil-fuel based. Extensive public and private research is currently being done into improved methods of producing hydrogen in a sustainable and increasingly more environmentally, and economically attractive way.

Q. Is hydrogen production currently economically attractive?

A. The overall challenge to hydrogen production is cost reduction. Hydrogen must be cost-competitive with conventional fuels and technologies on a per-unit of energy basis in order to succeed in the commercial marketplace.



The administration in Washington has pledged billions of dollars for hydrogen production. With the government committed to the effort, both through policy and funding, we are confident that innovators in the U.S. and around the globe will continue to improve the efficiency and practicality of hydrogen production.

Q. How will Fujitsu use the energy generated by the hydrogen fuel cell?

A. Our intent is to use it to power the chiller plant for our HVAC system on campus. That's important because that is what chills the water to blow cool air through the facilities to keep the data center and labs as well as the offices in working order. Approximately 34 percent of the company's power currently goes into cooling the facility so this will make a substantial impact in our energy use. In total, the hydrogen fuel cell will provide 50 percent of the power needed to cool the data center and labs.

Q. How will Fujitsu use the hot water generated by the operation of the hydrogen fuel cell?

A. It will be piped through a heat exchanger and used for campus heating, ventilation and air conditioning systems.

Q. Does Fujitsu plan on installing additional hydrogen fuel cells for the campus?

A. Fujitsu has no immediate plans for future installations. However, based on the performance, payback and practicality of the current installation, we would certainly not rule out future expansion.

Q. Does Fujitsu measure its emissions annually?

A. Yes, Fujitsu Group discloses its CO2 emission every year on its website and in its sustainability report. The current scope of these documents is all subsidiaries in Japan and manufacturing sites outside of Japan.

Q. How many tons of carbon emissions does Fujitsu currently put into the atmosphere every year?

A. In 2006, the global emission of CO2 was 1.15 million tons, a 29 percent reduction from the 2000 level. Fujitsu is targeting to reach the 1990 level by 2010.

Q. When will Fujitsu be carbon neutral?

A. Fujitsu is still trying to formulate a suitable definition of "carbon neutrality" for an IT company that produces IT products with a carbon footprint, and how to include the steady reduction in that footprint.





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1.888. FUJITSU

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