Apple patent looks at fuel cell system for portable device

4 September 2015, by Nancy Owano

A fuel cell battery to last weeks, not days, is the subject of a patent filed by Apple. According to news reports, the patent is about an energy cell powering a portable electronic device. *The Telegraph* said this was likely a MacBook.

James Titcomb, Telegraph technology news editor, said the patent application suggests a number of different energy sources.

He said that "the energy could come from 'a fuel cartridge which is detachably affixed to the fuel cell system', meaning rather than recharging, one would simply replace the device's cartridge when it had run out."

Ben Lovejoy in *9to5Mac* also talked about the replacing aspect. "There is, of course, no such thing as a free lunch, and fuel cell systems require the fuel to be replenished once it is exhausted, which the patent addresses by referencing removable cartridges."

The patent said that "Exemplary fuels that can be used with a hydrolysis reaction can include: Sodium Borohydride, Sodium Silicate, Lithium Hydride, Magnesium Hydride, Lithium Borohydride and Lithium Aluminum Hydride."

The fuel, said the inventors, may also take the form of pure hydrogen (e.g., compressed hydrogen gas or liquid hydrogen). In that case, "the fuel cartridge may contain components such as a metering device (e.g., a valve) and a pressure gauge. Ideally, the fuel has a relatively low life cycle carbon footprint, is not toxic, and generates a waste product that is amenable to being repeatedly re-charged with hydrogen and is not toxic."

The title of the patent is "Fuel Cell System to Power a Portable Computing Device" and it was filed in March this year by Apple. The application lists six California-based inventors.

As part of the patent application, Apple put forward its case in the context of renewable energy:

"Our country's continuing reliance on fossil fuels has forced our government to maintain complicated political and military relationships with unstable governments in the Middle East, and has also exposed our coastlines and our citizens to the associated hazards of offshore drilling. These problems have led to an increasing awareness and desire on the part of consumers to promote and use renewable energy sources."

The awareness has not been lost on electronics manufacturers, who have become "very interested in developing renewable energy sources for their products, and they have been exploring a number of promising renewable energy sources such as hydrogen fuel cells."

Discussing advantages, the patent said that "Such fuel cells and associated fuels can potentially achieve high volumetric and gravimetric energy densities, which can potentially enable continued operation of portable electronic devices for days or

even weeks without refueling."

The difficulty, said the patent application, is designing hydrogen fuel cell systems "sufficiently portable and cost-effective to be used with portable electronic devices."

Why did *The Telegraph* suggest the portable electronic device was likely a MacBook? Titcomb said the patent seemed to relate to MacBooks because it "repeatedly mentions the MagSafe connector used on the laptop computers, and does not namecheck the 'Lightning' connectors used on the iPhone and iPad."

9to5Mac Ben Lovejoy commented: "The most likely implementation would be a mix of conventional batteries and fuel cells, allowing the MacBook to be recharged in the usual way, switching to fuel cell power only when extended wireless use is required."

More information: Fuel Cell System to Power a Portable Computing Device, www.freepatentsonline.com/y2015/0249280.html

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