portable fuel cell systems

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Voller Energy is a manufacturer of portable fuel cell systems

> “According to DGI the market for portable fuel cells will be over 500 million units and worth almost $6b by 2008*.”

Voller Energy Limited is a private UK company founded in 2002 – its mission to bring fuel cell technology "To Market" by developing a range of portable power packs, battery chargers and mobile generators (Gen-Sets). The company plans to use the technology it has developed to introduce integrated fuel cells that will replace the rechargeable batteries used in portable electronic equipment such as laptop computers, power tools, cameras and mobile phones.

Voller Energy products currently use Proton Exchange Membrane (PEM) technology and clean reliable environmentally friendly hydrogen as the fuel.

Voller Energy's key strengths lie in marketing and manufacturing, but more importantly in the design of sophisticated control and monitoring systems which are essential to obtain reliable performance from this emerging technology. Voller Energy has filed a number of important patents relating to this balance of plant and is well positioned to develop fuel cell technology and maintain its lead in the rapidly growing portable fuel cell market.

October 2003 saw the launch of our first portable power pack, the Portapack VE100, a 100 watt combined gen-set and battery charger. This will be shortly followed by the higher powered VE1000 gen-set. Voller Energy is also developing the VE10 a new integrated fuel cell system.

Voller Energy mobile generator products are supplied to both military and commercial customers under the Portapack™ brand name. The clear advantage of these products is their ability to produce clean safe electricity in the remotest of locations with minimal heat and no exhaust gasses. In fact the only thing a Portapack produces is electricity, some heat and *pure water*!

* Darnell Group Inc (DGI) 'Fuel Cells for Portable Power : Markets, Manufacture and Cost' revised final report (4) for Breakthrough Technologies and US Fuel Cell Council submitted January 13, 2003

Market

If you have ever had your battery go flat on your mobile phone, laptop, camcorder or power tool you will appreciate Voller Energy fuel cell technology. Fuel cells can provide instant recharging, using small canisters of fuel your device can be immediately up to full power. Given these advantages, it's no surprise that the portable fuel cell sector is expected to show rapid growth in the next few years. Existing battery technology will not provide sufficient power for the next generation of mobile phones, notebooks computers, PDA's and cordless power tools.

Mobile Phones

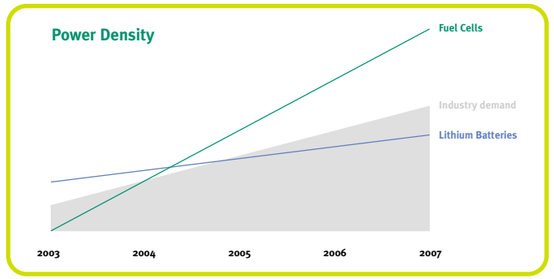
Users of the new 3G mobile phones want an equivalent 'talk time' to 2G phones when using 3G's advanced features such as high quality video, gaming and commerce.

Notebook Computers

Notebook Computer users want 'wireless connectivity'. The idea is to sit on a park bench or the beach while connected to a high speed internet link using wireless technology. This idea only works if you don't need a power lead as well.

PDA's and Convergent Devices

So called 'Convergent Devices' combine the functions of a Personal Digital Assistant (PDA) with a digital camera, camcorder, personal audio player, mobile phone or notebook computer. They are many devices in one and, as a result, need more power. Portable fuel cells will enable this technology.



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Portapack VE100

Welcome to the exciting new world of proton exchange membrane (PEM) fuel cell technology. The Voller Energy Portapack VE100 is a hand portable 100 watt battery recharger and mobile generator.

The unit has both AC and DC outputs. Voller Energy chargers can remotely and automatically top up conventional lead acid batteries on demand, provide AC mains electricity compatible with most of the world's domestic supplies and provide car cigar lighter DC power.

This means that whatever electrical product you are operating, a Voller Energy portable fuel cell system can probably power it, whether situated in a jungle or on top of a mountain.

To achieve this the company has developed a low cost microprocessor controlled management system to optimise the use of the PEM cell stack with some unique user features built in. The company was one of the first to file a patent on the process for controlling a PEM fuel cell system.

IT IS ESSENTIAL TO READ THE SAFETY MANUAL BEFORE OPERATING THE VE100

VE100

The VE100 generates electricity by converting the chemical energy stored in hydrogen to electrical energy in a proton exchange membrane fuel cell stack.

The AC supply is selectable to either 50 Hz 230 Volts or 60 Hz 110 Volts AC. The AC output is a square simulated sine wave and suitable for equipment that is dependent on the alternating voltage. The IEC socket supplies 230 Volts AC and the US style socket supplies 110 Volts AC. Either socket can be used simultaneously with the 13.8 Volts DC output.

VE100 can be used with internal canisters of hydrogen, or with an external hydrogen supply.

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Portapack VE1000

For more powerful applications Voller Energy provides the Portapack VE1000 mobile gen-set. The VE1000 is a 1,000 watt (1Kw) ambient power mobile generator and battery charger.

The VE1000 provides robust portable power whenever and wherever you need it. Simply plug in like the mains.

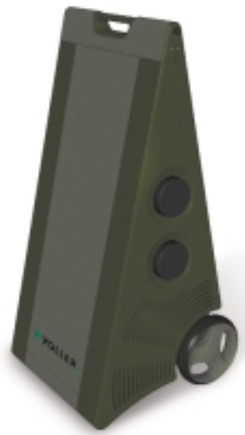
Portapack VE1000 will provide up to 1KW of power for about ten hours from a large size (L) hydrogen bottle. Internal hydrogen canisters are available for short term use.

Ideal for recharging batteries or standby power in remote areas or critical systems support.

The VE1000 is a transportable unit for remote portable power where noise, heat or exhaust fumes of a portable gasoline generator are inappropriate.

Suitable for industrial, business and military applications.

VE1000



Military and custom designed versions of the VE1000 are also available

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Portapack VE10

Voller Energy VE10 is an integrated fuel cell designed for portable electronic equipment such as mobile phones, laptop computers, camcorders and power tools. No longer will batteries need recharging, just plug in a new cartridge of fuel and your device is immediately at full power.

The Portapack VE10 provides 2 to 20 watts of ambient power.

Initially Voller Energy is developing a wearable battery recharger for military and commercial use.

VE10

Typical Power Requirements for Portable Electronic Equipment

APPLICATION:	Runtime (hours)	Watt hours (Wh) Requirements (Batteries)	Fuel Cell Wattage Requirement
Mobile phones	4	5.5Wh	2W
PDAs/handhelds	3	7.5Wh	3W
Notebook Computers	3	38.0Wh	16W
Digital Cameras	2	9.0Wh	6W
Camcorders	2	15.0Wh	9W
Two-way Radios & Portable Audio Devices	4	9.0Wh	3W

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Registered in England number 4392993
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Voller Energy Limited operate a policy of continuous improvement to their products and services. Also, new approvals, standards and safety requirements are emerging in the fuel cell industry. Therefore information in this document is subject to change without notice.

Please refer to the Voller Energy web site for the latest information www.voller-energy.com
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