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## Firms falter in planning IT security

By Adam Bello

Many leaders in corporate Canada respond to potential data security threats like a coming rainstorm: They hear the thunder before the pouring rain, but buy an umbrella only after getting drenched.

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Rob Colraine, IDC Canada

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# On a mission for Canadian innovation

## Metal-air fuel cell starts to attract interest

By Rachana Raizada

The race is on to put a viable commercial fuel cell on the green energy market. While hydrogen fuel cells (poised to win) are basking in the limelight, it may be the metal-air fuel cell, which like the proverbial tortoise sneaks quietly ahead.

At a recent talk hosted by the Advanced Systems Institute in Vancouver, Shawn McGroarty, CEO of Delta, BC-based MagPower Systems Inc., demonstrated the company's Magnesium Air Power Cell (MAPC).

Pouring in a saltwater electrolyte, an electrochemical reaction begins in which atmospheric oxygen reacts with the magnesium fuel plate. A moment later the voltmeter shows an open circuit current of 1.7 volts.

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## Leonard Brody

Entrepreneur, venture capitalist, author  
Avoid the five "classic mistakes" that start-ups make.

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# Metal-air fuel cells offer choice

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The precipitate, magnesium hydroxide, is environmentally benign. "You can pour it on the garden when you're finished," says McGroarty.

Bruce Downing, president, MagPower, explains that though metal-air technology has been known since the 1960s, it wasn't a feasible commercial proposition. This was due to energy loss from the formation of hydrogen and the manufacturing challenges associated with injection moulding around the air cathode.

In 1999 a contract research team drawn from the University of British Columbia and BC Research was put together with a federal government grant. Within a year MagPower had developed a key to successful commercialization by developing hydrogen inhibitors (HIs) which control the formation of hydrogen, thereby increasing current efficiency and reducing power consumption.

Downing, who is a geologist, perceived applications for the HIs in metal electro-winning processes. MagPower now has patented HIs for its magnesium-air power cell, the zinc electro-winning process and for zinc alkaline batteries.

When Duracell provided MagPower with testing procedures and zinc powder, the company proved hydrogen formation could be reduced by 58 per cent in zinc alkaline batteries thereby extending battery life. MagPower has also successfully tested its HIs in Mitsui Corporation's zinc electro-winning process.

By developing a patent pending

water disinfection and filtration systems.

In February 2004, motivated by MagPower's desire to fast-track marketing of its MAPC, UltraGuard and MagPower amended the agreement to provide MagPower the rights to sell and sublicense UltraGuard's UltraFlo disinfection systems in Africa, and Asian countries including India, China, South Korea and Japan.

John Gaetz, CFO, UltraGuard, is very pleased with the MAPC because it is scalable, requires no special equipment and can be used for water purification in remote locations distant from the electrical grid.

Metal-air cells (the most commonly used metals are aluminum, zinc and magnesium) are likely to compete with hydrogen fuel cells and batteries in military, portable and micropower applications.

A December 2003 report called "Evolution Of Fuel Cells And Advanced Batteries For Military Applications: Trends And Markets" by Col. Dick Hooker (USA, Ret.) and Anna Welch Crull for the Business Communications Company, states that at the present time the value of hydrogen and metal-air fuel cells in the military is about \$22 million. This is projected to increase over the next five years at an average annual growth



Shawn McGroarty, CEO, MagPower Systems Inc.

Its business goals include manufacturing a portable power cell for consumer retail through chains such as Home Depot and Canadian Tire, a 1-2.5 kilowatt unit for larger applications, and designing customized cells for the US military.

Metal-air cells are an unheralded alternative to battery systems and better-known fuel cell technologies that require hydrogen fuel, such as the Proton Exchange Membrane cell developed by Ballard, or Siemens' Solid Oxide Fuel Cells which operate at high temperatures.

Both Downing and McGroarty confirm that at conferences, the majority of attendees—even those within the fuel cell business—have never heard of the technology. The Canadian Fuel Cell Commercialization Roadmap released by Industry Canada in March 2003 dismisses Alkali Fuel Cells (which includes metal-air technology) as "unlikely to be widely commercialized."

Metal-air cell companies such as MagPower are fighting a battle against the skepticism with hydrogen fuel cells,

which to date have promised more than they have delivered. Analysts such as John Clarke of Toronto-based Octagon Capital Corp. consider the sector to be still in "the pre-commercial stage."

Udo Michelfelder, a Germany-based reseller of fuel cell systems for portable applications, points out that metal-air cells using zinc, aluminum or magnesium offer higher energy densities than hydrogen.

"I personally see ZOXY Energy Systems AG and Electric Fuel (both zinc-air-cells) as the leaders in this market," says Michelfelder. He points to BASF Venture Capital's investment in ZOXY, which produces and markets electrically rechargeable zinc-air battery systems on an industrial scale for professional stationary applications.

"I did think that metal-air would go to market much faster. ZOXY could be a good proof that this technology makes inroads," he says. "MagPower is focusing on magnesium-air, which technically does have the highest energy density and therefore is very interesting. The magnesium-air cell is probably the most difficult to realize, and MagPower with its inhibitor technology might have the best solution to overcome these issues."

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Udo Michelfelder

Reseller of fuel cell systems for portable applications

method of injection moulding around the power cell's air diffusion cathode, MagPower has been able to successfully manufacture the MAPC and its components. It recently took over an injection moulding manufacturing facility to develop new products.

The company's business model relies on licensing revenues: MagPower recently signed territorial licences for Japan, Australia and Central and South America and application-specific licences with companies such as UltraGuard Water Systems Corp, Coquitlam, BC.

In 2003, UltraGuard's subsidiary Innovative Fuel Cell Technologies Inc. acquired the worldwide rights to manufacture and market the MAPC as an alternative power source for its ultraviolet

rate of around five per cent.

McGroarty confirms that Frederick, Md.-based Infratech (its licensee for the US military) is interested in specific applications as well as using the company's 12 volt MAPC in Iraq to recharge lead acid batteries. Downing, who recently attended a Tactical Power Sources Conference says that he was told by a US Marine, "Leave it with us. We will find uses you've probably never seen or heard of."

MagPower has tentative plans to go public in 2004, with a product in hand that is portable, uses no throwaway environmentally hazardous materials, has an indefinite dry storage life and easily replaceable anodes and reusable electrolyte.

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