



# **EXECUTIVE SUMMARY**

**MagPower Systems Inc.**

**October, 2008**

***PORTABLE  
MAGNESIUM-AIR FUEL CELL  
(e -MAG 250)***



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## 1.0 INTRODUCTION

MagPower's business interest is developing alternative energy sources to commercial production. Our long term objective is to develop an environmentally friendly non-toxic power source that generates electricity through a combination of magnesium, oxygen and a saltwater electrolyte using MagPower's patented (and patent pending) technologies. Various technological factors have historically been perceived as barriers to development. These include issues related to: hydrogen evolution, precipitate control, anode materials and air diffusion cathode. In addition, expensive manufacturing processes have inhibited product development. For these reasons, magnesium-air technology has not yet achieved commercial production.

MagPower has overcome the main technological barrier of hydrogen inhibition (HI) and is in the process of resolving the 'hydrogen problem' in commercial electrochemical applications. The company believes that the patents it has received for both processes have high potential for commercialization. Collaborative projects between MagPower Systems and various consultative and industrial groups have produced new (and improved) technologies which advanced the magnesium-air to commercialization with subsequent patents and spin offs. MagPower is developing several applications through world wide licensing agreements. MagPower is developing commercial products for the toy industry and for the emergency lighting and power industries.

## 2.0 THE TECHNOLOGY

MagPower has patented the technology to control the detrimental formation of hydrogen that occurs in electrochemical reactions in the identified, however not limited to, the following applications:

*Magnesium-Air Fuel Cell (MAFC) (Patented)*

*Electrowinning (zinc Patented), copper, nickel, manganese)*

Zinc Alkaline Batteries

Coolants

Electroplating and Anodizing

Waste Water Recycling

Hydrogen Embrittlement

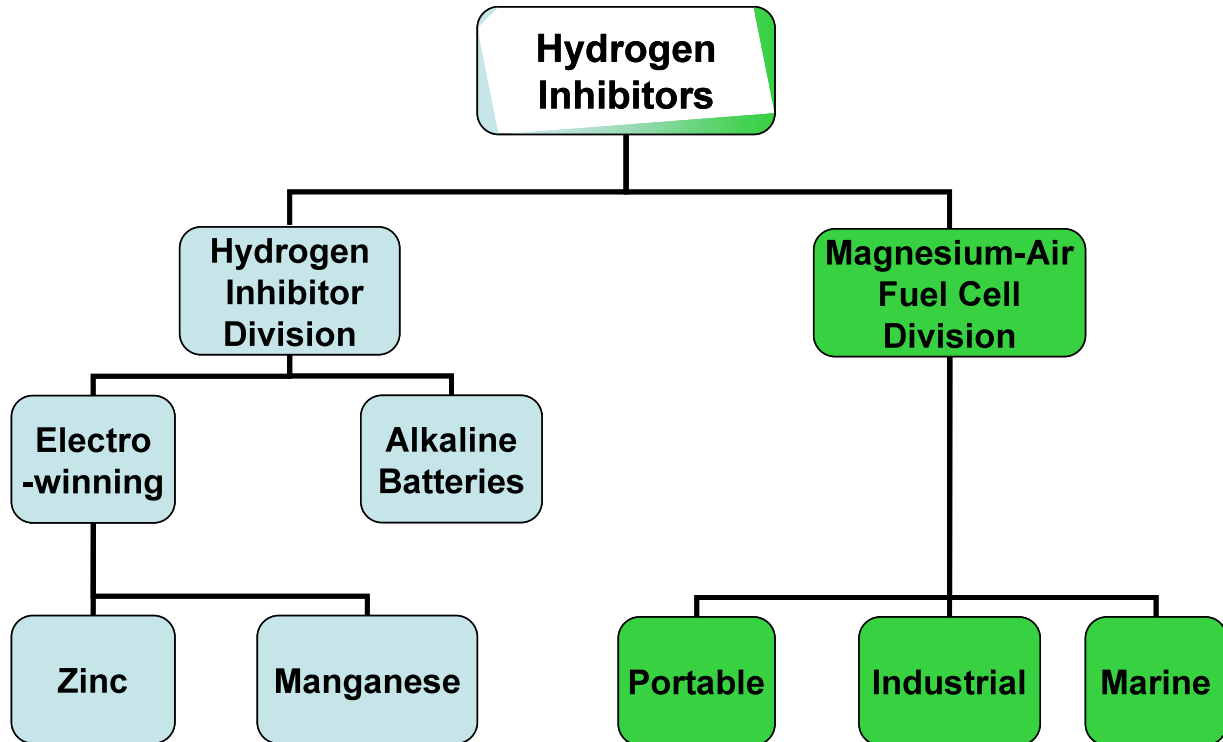
Heater Packs (US Military)

- Independent technological certification of the Hydrogen Inhibitors (HI) that MagPower has developed was completed at the laboratories of Vizon SciTec (formerly B.C. Research) and at the University of British Columbia, Vancouver B.C.

## 3.0 INTELLECTUAL PROPERTY

MagPower established two divisions in 2001 to effectively manage its new technology; the Hydrogen Inhibitor Division and the Magnesium-Air Fuel Cell Division. These were further divided into subdivisions for specific applications as noted in the following Intellectual Property Flow Chart.

Intellectual Property Divisions



MagPower owns the intellectual property rights to two issued patents, namely; 1) Methods and products for improving performance of batteries/fuel cells and 2) Hydrogen evolution inhibiting additives for zinc electrowinning. These patents have also been granted international patent status (PCT) for several applicable countries. The company also has three patents pending (zinc electrowinning, air cathode and MAFC lantern).

During the development of the MAFC, new and innovative "parts" have had to be designed. These may be included in future patents. Some of these 'parts' may have commercial applications other than in the MAFC.

**4.0 THE BUSINESS SEGMENTS**

MagPower Systems Inc. has developed two business segments in which to generate revenues; namely, the magnesium-air fuel cell and the hydrogen inhibitors. Each of these segments has their own distinct markets and business opportunities.

#### 4.1 MAGNESIUM-AIR FUEL CELL (MAFC)

##### The Technology

MagPower has developed a powerful, reliable and environmentally and user friendly non-toxic power source that generates electricity using magnesium, oxygen and a saltwater electrolyte in conjunction with MagPower's patented Hydrogen Inhibitors (HI). Magnesium (the fuel) is consumed in the reaction and must be replaced together with the saltwater (the electrolyte). In bringing the MAFC towards commercialization, MagPower has developed several other new and innovative technologies. The MAFC manufacturing process has also had to be developed. The MAFC has been developed as a standby, back-up or primary power source that is scalable from 10 watts to 5 kilowatts and could be reduced to the size of a hearing aid battery. In addition to the MAFC, MagPower has identified several other innovative consumer and commercial products using the magnesium-air technology. The company consistently reviews the development process, looking for ways to significantly reduce fuel cell manufacturing costs by assessing methods, and costs, in areas such as injection molding techniques, places of manufacturing, and its own research.

##### The Markets

The MAFC is a less expensive and a more reliable replacement to the lead acid and solar power sources. The MAFC will penetrate a multi-million dollar market that supplies a primary, standby or alternative source of power to the consumer. There is no other credible magnesium-air fuel cell competitor in the world and MagPower has the potential to penetrate 100% of the alternate portable power source market with its technology.

##### The Product

The first product that MagPower has developed – e-Mag

MagPower's entry system model, the consumer friendly MAFC 250 (Magnesium-Air Fuel Cell, 12-volt/250 watts) provides reliable and continual electricity and will retail for less than \$600.00 CAD. In comparison, the currently available DMFC in the United Kingdom provides only 50 watts at a cost of approximately \$4,500.00. A 100 watt PEMFC in the USA retails at \$7,300.



The MAFC 250 has been designed for the environment that includes the use of recycled plastic material and non toxic construction materials. This allows all the components of the MAFC to be recycled.

##### Business Model

MagPower is licensing its MAFC technology worldwide through Territorial and Specific Application licensing agreements. Revenues will flow back to MagPower in the form of licensing fees and royalties.

Territorial licenses are being sought which gives the licensee the exclusive right to manufacture and distribute the MAFC within their territory for a fixed time period.

Specific application licenses give the licensee the right to distribute the MAFC with an associated product that the Licensee manufactures. A USA Military license has been signed with InfraTech Corporation who is a supplier to the USA Military. MagPower is also working with other potential product licensees.

Revenues will also be generated through supply of the consumables, namely magnesium and salt.

## 4.2 HYDROGEN INHIBITORS (HI)

### The Technology

MagPower has patented powerful, reliable, and environmentally friendly non-toxic inhibitors that have been shown to control the formation of hydrogen in metal electrowinning processes. There are over 20 such inhibitors that the company has developed.

### The Markets

The commercial application for the HI significantly reduces power consumption and increases the current efficiency in the electrowinning production of metals such as zinc, manganese, copper and nickel. The hydrogen inhibitors have been shown to increase current efficiency in electrochemical processes such as plating out of zinc from electrolytic solution in electrowinning operations. This equates into a multi-million dollar energy and operating savings commodity for these industries and substantial licensing revenue. MagPower has signed Non-Disclosure Agreements with several international major mining companies. At present, the company is conducting ongoing work at the University of British Columbia for a major mining company, the results of which are very encouraging. There appears to be no other company involved in this type of research and development.

Using MagPower's hydrogen inhibitors to improve energy density in the zinc alkaline battery has shown that our HI can reduce hydrogen formation by up to 40%, resulting in a potential longer lasting battery.

Further Identified Applications for the Hydrogen Inhibitors include:

Hydrogen Embrittlement	Waste Water Recycling
Anodizing/Electroplating	Coolants
Heater Packs (USA Military)	

### Business Model

MagPower will license its HI technology worldwide through Territorial and Specific Application licensing agreements. Revenues will flow back to MagPower in the form of licensing fees and royalties, as well as supply of the inhibitor.

## **5.0 THE REVENUE STREAM**

MagPower's business model is to license its technologies for specific applications and exclusive territorial distribution by each licensee. This is suitable for the targeted markets as it generates revenue from agreements and royalties and consumables which potentially provide a staggered revenue. Revenues generated will further finance the development of other products that will result in similar licensing agreements.

## **6.0 THE COMPANY**

As a member of "Team Canada" in the fuel cell sector, MagPower is a private company incorporated in 1999 with its corporate offices in White Rock and laboratory facilities at the University of British Columbia.

The Company's first mandate is to continue its global licensing strategy for the MAFC. It will provide a solution to the energy needs that require a primary, alternative or emergency power source. Its second mandate is to license the use of its hydrogen inhibitors to the metal producing industries, and for use in the zinc alkaline battery industry.

## **7.0 MANAGEMENT**

Management draws on the talent of individuals such as Dr. David Dreisinger, an electrowinning expert at the University of British Columbia; Mr. Joey Jung, battery and fuel cell expert; Mr. Klaus Oehr, electrochemist; Mr. Noulan Bowker, a specialist in marketing of energy devices; Mr. Scott Wilson, Mr. Earl Whittemore and Mr. Erich Metten, industrial design consultants who specialize in research, design and manufacturing; Mr. Thierry Do, branding and design specialist, and other leading edge consultants. MagPower has established an advisory board consisting of financial and technical executives.

## **8.0 KEY INVESTMENT CONSIDERATIONS**

### Management

MagPower's management and technical team provides strengths in business, research and development. Its highly respected researchers and product developers bring together exceptional expertise in electrochemistry and electrowinning, design, branding and marketing.

### Proprietary Patented Technology — A Barrier to Entry

MagPower has been the first to overcome technological problems in 1) developing a commercial MAFC and 2) reducing hydrogen related problems in electrochemical reactions, thereby increasing the viability of commercial applications, due to its patented hydrogen inhibitors.

### Profitable Revenue Model

Executed licensing agreements for MagPower's technology will generate strong revenue for the company.

### Market Potential for Significant Growth

The world's insatiable demand for portable, environmentally friendly consumer focused power technology like the MAFC, and together with the hydrogen inhibitors technology, creates a unique opportunity for MagPower. The fact that these technologies can be applied to many different consumer and industrial processes greatly expands the potential for strong growth for a prolonged period for the company. MagPower will continue to be a leading edge research and development company in innovative power and consumer oriented products.