Latrobe Magnesium

A GLOBALLY COMPETITIVE
LOW-COST, LARGE-SCALE, LONG-LIFE
MAGNESIUM PROJECT

OPERATIONAL UPDATE

LATROBE MAGNESIUM LIMITED

MAGNESIUM MARKET

The magnesium market continues to show very strong growth. The August 2004 report "Magnesium in China" produced by industry experts Clark and Marron shows an average growth rate of 15% per annum in China over the last 10 years, accelerating to 27% per annum over the last three years. Indeed, in 2002-2003 the growth rate in the key high quality die-casting market was 67% in China.

A June 2004 report commissioned by Latrobe Magnesium Limited (LMG) from Clark and Marron forecasts additional capacity requirements by 2012 of 369,000 to 447,000 tonnes per year of magnesium metal, of which required additions to capacity outside China amount to 160,000 to 237,000 tonnes per annum.

The key to success for an emerging producer is low operating costs. Clark and Marron produce league tables of operating costs for major producers and projects globally. Clark and Marron have been commissioned by LMG to validate the Company's cash operating costs. On the basis of their review and assumptions made regarding energy costs and the use of the latest Russian cell technology, the LMG project has the potential to be placed in the lowest quartile of producers and projects worldwide.

LEADING INTO THE FUTURE

Latrobe Magnesium Limited is leading the way in the Australian magnesium industry with a low-cost, large-scale facility projected to reach full production of high quality magnesium metal alloys and high value magnesium components by 2010.

The $1 billion LMG project in Victoria's energy-rich Latrobe Valley gains a competitive edge by turning decade-old waste fly ash produced by the region's power stations into a valuable and increasingly sought-after product.

By using fly ash – a by-product of brown coal combustion – LMG has access to an economical source of magnesium with no mining costs, minimal handling costs and benefits from the high magnesium content (up to 12%) of brown coal ash.

THE WAY FORWARD

LMG will commence the initial leaching and solution purification test work with the Russian Institute of Titanium and Magnesium (RITM). This work will determine whether the fly ash can produce a synthetic carnallite suitable to be processed by the Russian Technology. It is expected that this conservative approach will confirm earlier leach and purification test work performed by HRL Laboratories in Melbourne and Lakefield Research Inc in Ontario. The estimated total cost of this work is approximately $224,000. Of this, 50% is refundable to LMG under its funding contract with the Department of Transport and Regional Services (DOTARS).

Whilst performing this test work, a licensing agreement for the Russian Technology and the use of the Solikamsk pilot plant will be negotiated.

LMG will then undertake the remaining work in the evaluation stage to enable RITM to complete a study for the LMG plant based on Russian technology. Worley Engineers in Sydney will manage the feasibility study and will evaluate the Australian capital and operating costs for the plant. The estimated cost for this section of the evaluation stage is $603,000. Of this, 50% is refundable to LMG under its funding contract with DOTARS. This evaluation stage is expected to be completed by May 2005. A further capital raising will be made to fund this work.

Following the successful completion of the evaluation stage, the securing of the necessary funding and the BFS, the Project is expected to be in production within 4 to 5 years.

LMG'S COMPETITIVE ADVANTAGE

LMG's mission is to develop and operate a world best-practice, integrated magnesium metal production facility with sound economic and technology fundamentals.

The keys to success are in place and include:

- Federal, State and Local Government support
- No mining costs
- Minimal materials handling costs
- Resource security
- A large skilled workforce available in the region
- The support from existing infrastructure and power
- The conversion of waste power station ash into valuable products
- Production could start in 2010
- Minimum 20-year life at full production
- Positive cash flow within the first year of full production
- An environmentally friendly process, which reduces carbon dioxide.

Leading Western Magnesium Projects – Comparative Table

Company	Latrobe Magnesium	Mag Alloy Corp	Magnesium International	Leader Mining
Project Location	Australia	Congo	Possibly Egypt?	Canada
Sovereign Risk Eliminated	✓	✗	✗	✓
Technical Risk Eliminated	✓	✓	✓	✓
Identified Project & Resource	✓	✓	✗	✓
Feedstock Environmental [1] Advantage	✓	✓	✗ [2]	✗
Feedstock Cost [3] Advantage	✓	✗	✗	✗
Co-located with Power Station	✓	✗	✗	✗

1. Carbonate feed sources for magnesium production release CO_2 during the leaching process. This does not occur with fly ash or carnallite feed sources.
2. MIL proposes using Dow technology with consumable carbon anodes that generate uncontrolled CO_2 release.
3. Using fly ash as a feed source eliminates the costs of mining, truck or rail transportation of feed, and processing of feed.

THE OPPORTUNITY

LMG represents a unique opportunity for large-scale magnesium metal users to obtain an immediate and preferred position for magnesium metal production in the Australian market.

This opportunity has the additional potential to establish die-casting and other magnesium value-added production industries. The project offers a position alongside a clean technology magnesium supplier, one which will reduce power station CO_2 emissions and environmentally benefit the Latrobe Valley by ameliorating the problem of accumulated ash waste.

LMG offers the potential of a large scale electrolytic plant which could operate in the lowest quartile of magnesium plants world wide, proven commercially scaled magnesium technology, and prime development potential for value-added products.

THE DRIVERS OF GROWTH

In the competitive global economy, there are many factors driving an increased demand for flexible, light and strong magnesium metal.

Government environmental regulations, especially in Europe, and trends such as higher magnesium use in the automotive industry, will significantly increase global demand for magnesium metal and components within the next decade.

Magnesium is increasingly being used in the automotive industry to reduce vehicle weight, fuel consumption and greenhouse gas emissions. Magnesium is also more frequently required for high demand products such as laptop computers, mobile phones, digital camera cases and power tools.

Government Regulatory Environment (Europe)

CO2 Emissions from automobiles	**Current**	**160g/km**
	2008	**140g/km**
	Next step	**120g/km**
	Then	**100g/km**
Automotive Recycling Requirement	**2006**	**85%**
	2015	**95%**
Fuel Reduction	**By 2007**	**30%**
Fuel Efficiency Tax	**Car tax based on litres/100 km**	

ECONOMICS AND OPPORTUNITIES

The LMG project has economy of scale and low operating costs based on existing commercially proven technology.

The project will provide 100,000 tonnes per year of magnesium alloy at an operating cost per pound of production which is projected to be in the bottom quartile globally. This is more economically efficient than many Chinese suppliers who are producing the bulk of today's magnesium.

The magnesium-containing ash from brown coal power generation adjacent to LMG will ensure a unique opportunity to produce low cost magnesium and supply casting and fabrication plants in an area with excellent infrastructure and transport links.

The project will convert the power stations' ash disposal problem into a profitable, long-term enterprise for LMG.

LMG represents a significant opportunity for magnesium industry suppliers and users to contribute to a world-best practice, highly efficient, low-cost producer.

This objective will be achieved using leading edge technology from Russia, currently employed in four magnesium plants producing some 80,000 t/y of magnesium metal.

There are a number of large-scale magnesium prospects, both in Australia and globally, that have sought to cost, detail and develop magnesium metal production facilities. However, none have the unique competitive operating and capital cost advantages afforded by the LMG project due to the nature of its feed material and proximity to a power station.

World production of magnesium metal now totals around 415,000 tonnes per year, which is significantly less than the consumption of other structural metals. However, an increase in demand for magnesium is being driven by requirements for lower weight and the inherent strength and rigidity demonstrated by magnesium alloys.

This increased usage is evident in the automobile industry, which seeks to reduce weight, improve fuel efficiencies and reduce greenhouse gas emissions. This is demonstrated in the latest General Motors SUVs which consume more than 20 kg of magnesium alloy per vehicle.

KEY LMG ECONOMIC INDICATORS

- **Capital Costs** **A$ 865m**
- **Owner Costs** **A$ 143m**
- **Total Project Costs** **A$ 1,008m**
- **Annual Operating Costs** **A$ 197m**
- **Production Costs** **A$ 0.81/lb**
- **IRR un-escalated, 60:40 loan:equity** **21.3%**

A TECHNOLOGICAL EDGE

LMG will use proven, leading edge and clean technology to produce magnesium from the ash feedstock readily available in the Latrobe Valley.

The leaching, purification, electrolysis, alloying and casting processes to be used by LMG are all commercially proven and operating in a number of magnesium plants around the world.

It is planned to use Russian dehydration and electrolytic cell technology, as these technologies have proven operating costs in the magnesium industry.

Cost efficiencies associated with the plant feed characteristics, proximity to power supply, and efficient electrolysis will combine to result in a low operating cost production facility.

The electrolytic technology as developed in Russia is safe and has no challenging technical boundaries.

A small pilot plant will be established on site as part of a Bankable Feasibility Study (BFS) to provide magnesium chloride solution from the ash feed material for further optimisation test work. It is anticipated that this will result in increased efficiencies with the dehydration and cell technologies to further drive down production costs.

Leading research institutions, such as CSIRO and HRL Laboratories in Melbourne, will undertake this work.

TECHNOLOGICAL BENEFITS

LMG will benefit from the selected technologies due to:

- proven technology in major plant functions
- the value-add potential for the project
- low operating costs
- no carbon dioxide emissions
- no SF_6 cover gases will be used, benefiting Occupational Health and Safety
- a cleaner production operation.

A PERFECT LOCATION

LMG's secure supply of production resources assures the advantage of an uninterrupted 20-year production life.

The fly ash waste material used in the production process is a by-product of power generation at the three-major power stations in Victoria, Australia's second most populous state.

These operations are located at Hazelwood, Yallourn, and Loy Yang, and rely on burning vast natural reserves of brown coal from the Latrobe Valley to produce power for the Victorian and national power supply system.

LMG has signed both a Joint Venture Agreement with Hazelwood Power to use its fly ash for magnesium production, and a contract on ash supply from Yallourn Power. In addition, LMG has a letter of intent from Loy Yang Power to supply feedstock.

The ash from these operations is high in magnesium, as identified in the Power Station and State Electricity Commission Victoria (SECV) records.
The annual rate of brown coal consumption combined with currently stockpiled ash enables extraction of 100,000 tonnes of magnesium per year.

INTEGRATION WITHIN GIPPSLAND

The Latrobe Valley in Victoria's picturesque Gippsland region has a number of long standing major industrial sectors such as electricity, pulp and paper, engineering and tertiary education.

In more recent years, these groups have been complemented by new industries, such as information technology and scientific research, and development in emerging sectors.

The region is an internationally renowned, world-class centre of excellence in brown coal mining, and is undeniably Victoria's powerhouse, providing 85% of the state's electricity.

Outstanding opportunities exist for major businesses to operate beside power generators and to source plentiful electricity, steam, and solid fuels direct from the supplier. The region has already attracted investment by some of the world's largest utilities and manufacturing companies from China and other Asian countries.

LMG's integration with the local industries of Gippsland will create new career opportunities and wealth to the providers of goods and services to the region.

LATROBE VALLEY FEEDSTOCK ANALYSIS

A summary of the major deposits of the region with relevant properties:

Location	Yallourn	Loy Yang	Morwell	Gellion dale	Flynn	Gorman dale	Yallourn Nth Ext
% Volatile Matter db	50.3	49.8	48.3	49.4	50.6	51.5	47.4
% Moisture	60.5	62.8	61.3	64.5	64.1	55.1	52.3
%Ash db	2.1	1.0	2.4	5.8	1.3	1.5	4.9
% Mg db[1]	0.20	0.07	0.31	0.46	0.12	0.12	0.25
% Mg in Ash	9.52	7.00	12.92	7.93	9.23	8.00	5.10
Mg t/Mt dry coal	2,000	700	3,100	4,600	1,200	1,200	2,500
% Na db[1]	0.09	0.14	0.09	0.35	0.28	0.04	0.11
% Ca db[1]	0.12	0.04	0.54	1.44	0.02	0.09	0.97

db dry basis t/Mt tonnes per million tonnes
Data source: "Typical analyses of brown coals from the Gippsland Basin"
[1] Data source: "Typical mineral and non-mineral analyses of brown coal from the Gippsland Basin (% Dry Basis)

The region's power stations operate under the following performance parameters:

Location	Yallourn	Loy Yang / Edison	Hazelwood
Installed capacity – MW	1,450	3,000	1,600
Coal consumption – t/y (wet)	18,000,000	34,000,000	18,000,000
Coal consumption – t/y (dry)	6,300,000	12,969,640	7,020,000
% Volatile matter db	50.3	49.8	48.3
% Ash db	2.1	2.0	2.7
% Mg in Ash	9.52	6.01	11.48
Contained Mg t/y	12,029	14,711	20,247

MW megawatts t/y tonnes per year db dry basis

HAZELWOOD: TWO SOURCES OF FEEDSTOCK

Ash Waste Storage Ponds

Various methods used in a valuation report commissioned by LMG support an estimated range of about 5.3 to 6.9 million tonnes of ash produced and stored in the ponds.

All the sampling programs to date have indicated that over 90% of the magnesium is contained in the samples with <15% C. These averaged 15.3% MgO or 9.2% Mg. The data from the Company sampling programs averaged 15.8% MgO or 9.5% Mg.

Based on this analysis it is estimated about 95% of the ash has a magnesium content of between 9.2% and 9.5% Mg. The ash waste storage ponds at Hazelwood can therefore be estimated to contain between 480,000 and 540,000 tonnes of magnesium.

Precipitator Ash

An expert evaluation report estimated that annual ash waste production at Hazelwood Power alone could vary between 160,000 tonnes and 250,000 tonnes.

Based on numbers provided by Hazelwood for coal burnt through electricity production at Hazelwood and Energy Brix Australia Limited, it can be estimated that average annual waste ash production will be approximately 220,000 tonnes.

LMG's data evaluation shows an analysis of precipitator ash waste of 19.13% MgO or 11.5% Mg.

LMG's independent expert estimates recovery of 25,300 tonnes of magnesium per annum from fresh Hazelwood ash.

LMG envisages that an annual production rate of up to 100,000 tonnes of magnesium alloy could be maintained for a minimum of 20 years based on the data in the following table:

Feedstock Source Description	Unit	Stream 1 Hazelwood	Stream 2 Yallourn	Stream 3 Loy Yang
Wet Coal	t/y	18,000,000	18,000,000	34,000,000
Moisture	%	61.0	65.0	61.9
Dry Coal	t/y	7,020,000	6,300,000	12,969,640
Ash	%	2.77	2.10	1.99
	t/y	194,454	132,300	257,707
Ash Recovery	%	95.0	95.0	99.5
Precipitator Ash	t/y	184,731	125,685	256,418
Mg	%	11.5	9.5	6.0
	t/y	21,313	12,029	15,486
Mg Recovery	%	95.0	95.0	95.0
Mg Produced	t/y	20,247	11,428	14,711
Total	t/y		46,386	
Pond Ash	t/y	270,075	187,200	128,853
Mg	t/y	25,681	17,918	7,782
Unit Total	t/y	45,928	29,346	22,494
Total	t/y		97,768	

t/y tonnes per year % percent

HELPING THE ENVIRONMENT

There is a common misconception that minerals production is bad for the environment. In fact, this does not have to be the case.

The LMG project will be a "green project". Environmental advantages associated with the unique production process include the absence of carbon dioxide release and a positive contribution to regional efforts to reduce greenhouse gas emissions.

Key environmental factors associated with the LMG project are summarized below.

Feedstock

- ✓ This is a recycling process
- ✓ It reuses the dumped fly ash from power stations
- ✓ There is no mining pollution
- ✓ Energy saving in transport and processing

Leaching

- ✓ No CO_2 released
- ✓ Avoids 1.8 tonnes of CO_2 release for each tonne of Mg from magnesite
- ✓ Leach plant savings due to small particle size

Purification

- ✓ Purification precipitates such as iron oxide left as very minor tailings residue
- ✓ Calcium will be removed as a saleable precipitated calcium carbonate (PCC) product using recycled power station CO_2

Dehydration

- ✓ Simplified process using synthetic carnallite
- ✓ No glycol used
- ✓ Ammonia used
- ✓ Methanol used

Electrolysis

- ✓ Carbon electrodes are non-consumables
- ✓ Chlorine is recycled
- ✓ Spent electrolyte is recycled

Alloying

- ✓ No use of SF_6 gas
- ✓ This is a major greenhouse gas use reduction

Casting

- ✓ Because of on-site integrated Mg complex, there is significant reheat energy saving by use of hot metal direct from casting

ON TRACK FOR PRODUCTION

Having completed a small raising, and coupled with existing Federal Government funding, LMG will have secured the working capital required to begin a bankable feasibility study (BFS) into the development of the $983 million facility. This will initially entail test work to be carried out by the Russian Institute of Titanium and Magnesium to confirm the leaching characteristics of the ash already shown in test work in Australia and Canada.

The BFS, at a total cost of $15.5m, will allow LMG to prove operating and capital costs and ensure that key environmental issues, including greenhouse gas emissions, are appropriately factored into decision making.

Construction of the plant is scheduled for completion by September 2009, with full production underway in 2010.

The early studies conducted by LMG demonstrated a robust business case for the production of magnesium metal from the power station fly ash in the Gippsland region.

CONCLUSION

LMG is determined to optimise commercial returns to the project and best value to shareholders.

LMG's project is undeniably of significant benefit to the local, regional and national interests of Australia.

This exciting new industry is effectively enhanced and underpinned by existing infrastructure and a skilled labour force.

The LMG management approach and the key support from all tiers of Government will also ensure that this strategically important and technically sound magnesium project delivers a superior investment opportunity.

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