

## QUARTERLY ACTIVITIES REPORT

31 December 2017

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### LATROBE MAGNESIUM PROJECT

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#### **1. Fast Cycle Retorts**

LMG and its engineers have designed a new fast cycle vertical retort and furnace (FCR). During the last quarter the furnace has been built and installed at a CSIRO facility in Melbourne. The FCR is still not fully operational owing to a leak that was discovered in the retort in late December when initial testing was carried out. With the Christmas period and the closure of a number of manufacturing facilities, it has meant that the removal of the retort, fixing of the leak and reinstalling of the retort could not commence until the middle of January 2018. The work is expected to be completed in January so that the FCR can be commissioned in February

A large sample of dolomite and RWE Power's fly ash has been produced and will be processed through the FCR to produce magnesium and supplementary cementitious material. Initial results should be available by the end of February. It takes 2 days to process a sample and the time to complete the full testing will depend upon the performance of the FCR.

It is believed that this FCR will be superior to existing horizontal retorts in the following areas:

- The retort charge will be larger.
- The reduction time will be greatly reduced.
- The energy usage will be less due to more efficient heat transfer within the retort.
- The use of better quality material in the retort should greatly increase the retorts life.
- FCR offers a competitive advantage over other vertical retort designs.

These benefits should produce reduced capital and operating costs for the project

#### **2. Hambach Project**

On 18<sup>th</sup> December 2017, LMG announced that they had signed a term sheet with RWE Power AG that details how both parties will proceed with the development of a new Germany-based magnesium plant. The up to 30,000 tonnes per annum plant is unique as the magnesium will come from the brown coal fly ash from coal mined at RWE's Hambach mine and processed through their supercritical brown coal power station near Cologne, Germany.

Latrobe Magnesium's project is a world-first in developing a magnesium production plant from brown coal fly ash in Victoria's Latrobe Valley using its patented hydromet extraction process and its own newly developed fast cycle vertical retort furnace (FCR).

The project involves four stages of development:

- Conduct the vertical retort test work using the RWE fly ash
- Completion of a feasibility study
- Completion of engineering, procurement and permitting
- Construction and commissioning.

From June to October 2017, LMG conducted a number of successful small scale tests using its unique hydromet process on the RWE fly ash producing magnesium and supplementary cementitious material (SCM). From this work, LMG was able to ascertain that the RWE fly ash delivered the best economic outcome of any of the fly ashes tested by LMG to date. This result was achieved mainly due to:

- the treatment of dry precipitator ash versus ash dam material thereby requiring less energy;
- the elimination of dolomite as a consumable thereby reducing process costs; and
- the lower cost of energy and labour in Germany as compared to the Latrobe Valley.

LMG has recently produced a large scale beneficiated sample of RWE fly ash to process through its FCR, currently being commissioned at CSIRO in Melbourne. The furnaces are expected to complete the processing of this RWE fly ash by the end of February 2018.

From the FCR test work, LMG will produce a SCM sample to send to Germany for testing. It will then collect the necessary German site specific information so that it can complete a feasibility study on this project. This is expected to take up to 12 months.

Europe imports over 160,000 tonnes of magnesium per annum. There is currently no producer in the EU and magnesium metal has recently been listed among the most critical raw materials in the EU's list of 27 metals.

RWE Power AG and LMG have identified the brown coal fly ash from RWE's Hambach mine as being the most suitable to commercially extract magnesium. RWE Power mines produce about 100 million wet tonnes of brown coal per annum (from which approximately 35 to 40 million tonnes per annum are produced from its Hambach mine) compared to 45 million tonnes per annum in the two Latrobe Valley mines. It operates about 10,000 MW of lignite capacity in the Rhenish lignite area with about 10,000 employees. In addition, RWE Power belongs to the RWE Power Group which is focussed on electricity in Germany, the Netherlands and UK as well as energy trading in its subsidiary RWE Supply and Trading.

Since 2000 RWE Power has invested more than €4 billion into the only brown coal super critical power station in Neurath and Niederaubem, with highest efficiency for lignite power stations in the world (greater than 43%) to ensure stable and secure power supply for the German electricity grid.

### **3. Latrobe Valley Project**

The next stage of the Latrobe Valley Project is to complete the FCR test work discussed in point 1 and complete the test work on the Yallourn fly ash.

LMG has identified two suitable and available sources of fly ash in the Latrobe Valley, being:

#### **(a) Yallourn Ash Supply**

On 16 January 2018, LMG and EnergyAustralia Yallourn Pty Ltd signed a Memorandum of Understanding for Yallourn power station to supply its fly ash to LMG's proposed 3,000 tonnes per annum magnesium plant in the Latrobe Valley. The MoU allows for the expansion of the plant to 40,000 tonnes per annum.

The project involves four stages of development:

- Conduct testing of Yallourn fly ash using LMG hydromet process and Monash University's ash leaching and precipitation process
- Complete a feasibility study
- Construct a 3,000tpa magnesium plant
- Expand to a 40,000tpa magnesium plant.

From January to March 2018, LMG will conduct laboratory scale tests on Yallourn fly ash to determine whether its hydromet process or Monash University's process are best suited to produce magnesium, saleable iron product and supplementary cementitious material. LMG will own the developed IP on the Monash process.

Upon the successful completion of this work, LMG will produce a large scale beneficiated sample of Yallourn fly ash to process through its FCR, currently being commissioned at CSIRO in Melbourne.

From the FCR test work LMG will then be in a position to complete a feasibility study using Yallourn fly ash.

Each stage of this project is conditional on the successful completion of the previous stage and the signing of formal agreements between the parties.

#### **(b) Alternative Ash Supply**

LMG has held negotiations in relation to an alternative ash supply in the Valley. It is presently conducting some initial analyses to determine whether it is similar to previous ashes already tested by LMG.

Negotiations on an ash supply agreement have commenced and all the major points have been agreed. The agreement is presently in the final phase of documentation and should be finalised between the parties shortly.

#### **4. Feasibility Study**

With the successful completion of the FCR test work, ash test work and receipt of site specific information, LMG's engineers will be in the position to finalise LMG's bankable feasibility study on its two projects.

#### **5. Funding**

In October 2017, LMG executed a \$750,000 lending facility with RnD Funding Pty Ltd for a period of 12 months. The loan will be repaid from its Research and Development rebate expected to be received from the Commonwealth Government based upon LMG's research and development expenditure for the year ending 30 June 2018.

The Company drew down \$375,000, being the balance of this facility, in January 2018.



David Paterson  
Chief Executive Officer

18 January 2017

#### **About Latrobe Magnesium**

Latrobe Magnesium is developing a magnesium production plant in Victoria's Latrobe Valley and another plant near Cologne in Germany using its world-first patented extraction process. LMG intends to extract and sell magnesium metal and cementitious material from industrial fly ash, which is currently a waste stream from brown coal power generation.

LMG has completed a preliminary feasibility study validating its combined hydromet / thermal reduction process that extracts the metal. Construction is estimated to start on its initial 3,000 tonne per annum magnesium plant in the third quarter of 2018 year with production commencing 12 months later. The plant will then be expanded to 40,000 tonne per annum magnesium 18 months later. The plant will be in the heart of Victoria's coal power generation precinct, providing immediate access to feedstock, infrastructure and labour.

LMG plans to sell the refined magnesium under long-term contracts to Australian and overseas customers. Currently, Australia imports 100% of the 8,000 tonnes annually consumed.

Magnesium has the best strength-to-weight ratio of all common structural metals and is increasingly used in the manufacture of car parts, laptop computers, mobile phones and power tools.

The LMG project is at the forefront of environmental benefit – by recycling power plant waste, avoiding landfill and is a low CO<sub>2</sub> emitter. LMG adopts the principles of an industrial ecology system.