



## **Community Briefing Presentation**

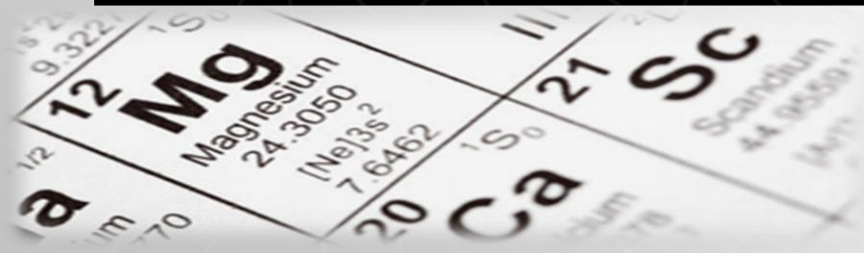
**8 December 2015**

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CEO

**ASX:**  
LMG

# Presentation contents

1. Project summary
2. Magnesium – its market & developments
3. LMG process
4. LMG site
5. Community impacts
6. Timelines and milestones
7. Corporate overview



# 1. Project summary

- Magnesium is a growth metal, with aluminium & magnesium sheet in cars lowering CO<sub>2</sub> emissions
- March 2016 complete feasibility study, financing arrangements & begin ordering the plant
- Third quarter 2017 – become Australia's only magnesium producer – “the green metal”
- Recycles 90% of fly ash into useable materials
- Low CO<sub>2</sub> emitter – 11tptMg versus 32tptMg



## 2. Magnesium production

### Primary magnesium metal production

- 2000 210,300 tonnes
- 2013 770,000 tonnes
- 2014 869,000 tonnes
- 2024 projected production 1,700,000 tonnes

Annual growth 6-7%

Above estimates assumes average Mg in cars grow from 3.1kg to 6.0kg. If Mg grows to 20kg then demand is 3 million tonnes compared to 600,000 as in above

China – 84% of world production



## 2. Magnesium uses

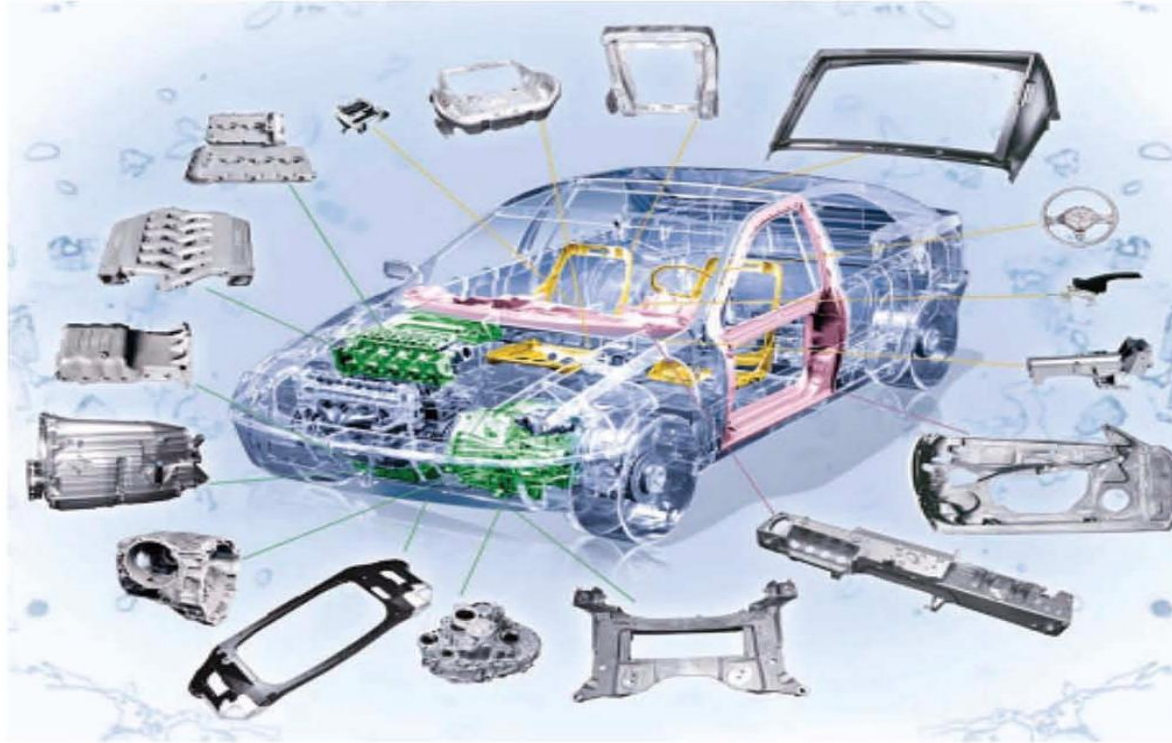
	%
• Aluminium alloy	34
• Die casting for automobiles	26
• Steel desulphurization	18
• Titanium sponge	17
• Other die casting	5
	-----
	100
	===

New uses – planes (FAA approved 3/2015), trains, magnesium sheet & consumer products (laptops, mobile phones etc)



## 2. Magnesium & cars

**Magnesium alloy applications replacing aluminium and steel is a focus for all automotive manufacturers**



**Industry drivers**

12	<b>Mg</b>	21	<b>Sc</b>
	Magnesium		Scandium
	24.3050		44.9559
	[Ne]3s <sup>2</sup>		[Ar]
	7.6462		
20	<b>Ca</b>		
	Calcium		
	40.078		
	[Ar]4s <sup>2</sup>		



## 2. Magnesium & emissions

USA EPA Targets	2012 mpg	2015 mpg	2025 mpg	2012 to 2025 Increase %
Compact car (Honda Fit)	30	35	46	53
Midsize car (Ford Fusion)	25	25	42	68
Full Size car (Chrysler 300)	21	23	35	66
Pick up truck (Ford F150)	17	21	25	47

Penalty currently only US\$55 per vehicle for every 1mpg short.

CAFE standard for 2016 – 35.5 mpg, 2025 – 54.5 mpg. EPA some 25% less than CAFE

EU Emissions Targets	2007	2014	2021	Reduction
Average Fleet Emissions (in g CO <sub>2</sub> per km)	159	123	95	28 or 23%

Penalty after 2020 at €95 per g CO<sub>2</sub> per km exceeding 2020 target  
100kg weight generates ~10g CO<sub>2</sub> per km



## 2. Magnesium developments



**2015 FORD F150**  
**All Aluminium Body (1-6% Mg)**





## 2. Magnesium developments

### 1. New Aluminium Sheet application

#### Ford F150

- 750,000 sales - Mg usage increase to 15kg - weight reduction 320kg (17%) with 13% emission saving

#### Ford Fusion

- 250,000 sales – Mg usage increase to 16 kg from 2.3kg – weight reduction 353kg (32%) emissions down 17%

### 2. New Alloys – GM

New alloy AX53 (Mg-Al-Ca) replaces AE44 used in the Corvette  
Mg intensive front end design for a car saves 45% mass & reduced number of parts by 56% – 100 to 44



## 2. Magnesium developments

### 3. New Processes – Germany

- TeMaKplus project – developed processing technologies for industrial scale production of magnesium sheet & strip materials to produce parts at competitive cost to aluminium & steel
- 11 major industrial companies (Thyssen Krupp), two research institutes & German Government – looking to commercialise the processes

### 4. Magnesium Sheet – Korea

- First to install in back seat panel for the Hyundai Sonata & now developing uses for outside panels



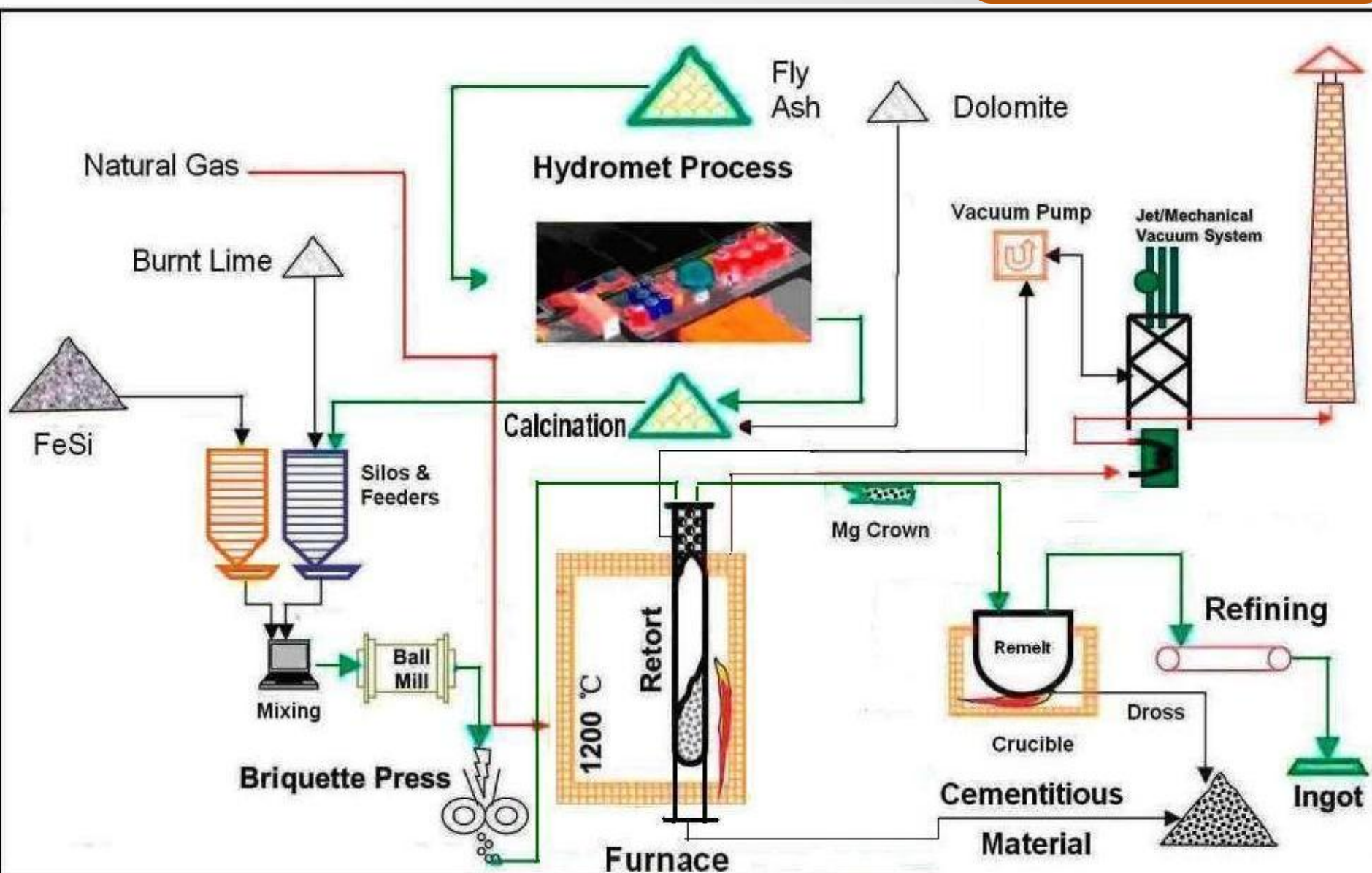
### 3. LMG process

#### Unique & proprietary process

- Combination of its unique patented hydromet process with the proven thermal reduction process in operation since 1941
- Hydromet process uses standard industrial reagents & equipment to remove impurities from the brown coal fly ash – sulfur, iron, silicon. Patent granted in Australia USA and China
- Beneficiated material used as feedstock to the established thermal reduction process to produce magnesium
- Owing to high Mg recoveries & the fly ash elements, the resultant cementitious product resembles a portland cement



### 3. LMG process





### 3. LMG Process: China Sample



Supplementary  
cementitious material



Magnesium crown



## 4. LMG Site



Swop Line  
from  
Yallourn

Swop Line  
from  
Hazelwood

Natural  
Gas  
Pipeline

Proposed  
Slurry  
Pipeline

320  
Tramway  
Site



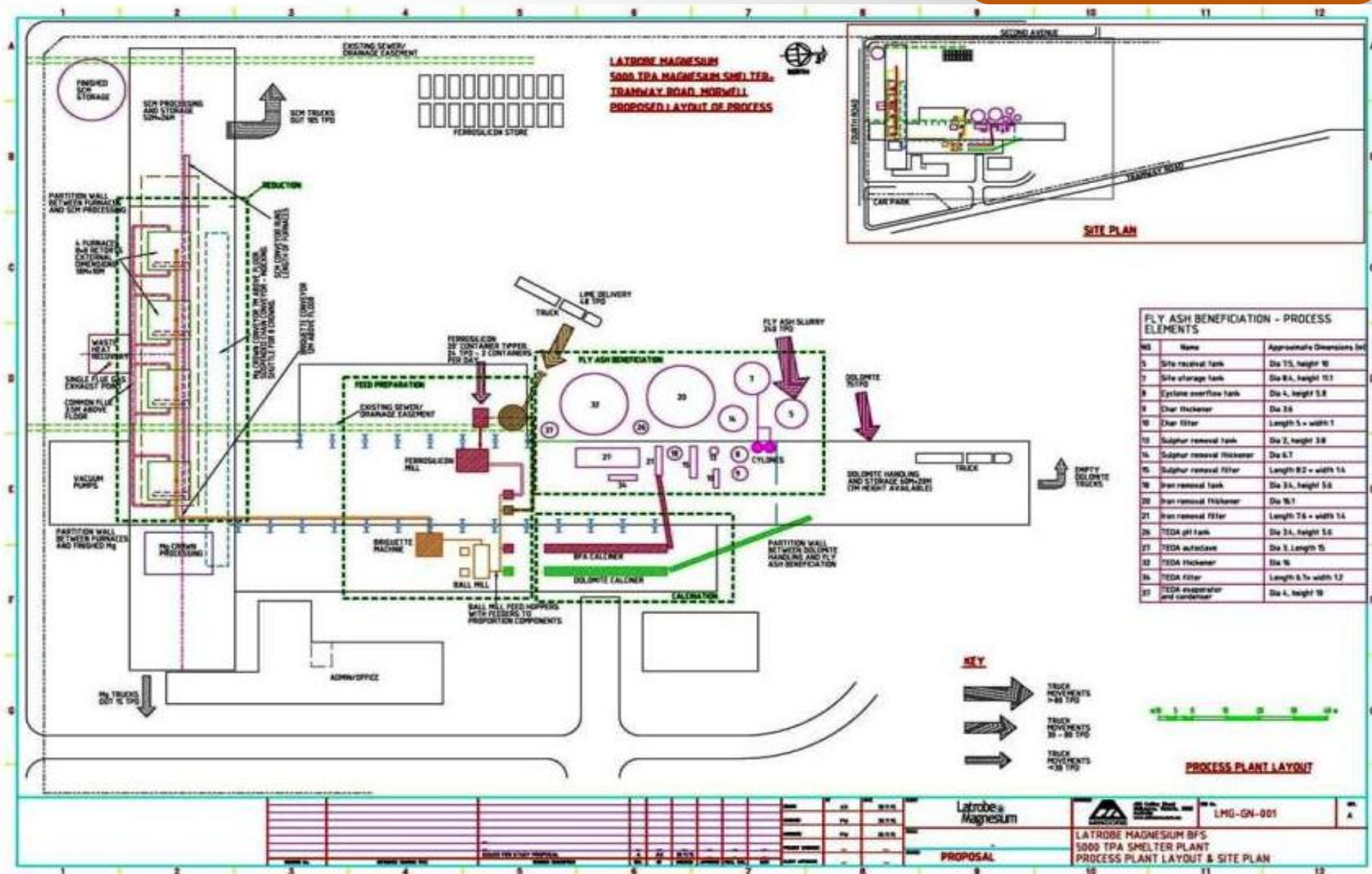
## 4. LMG Site



320 Tramway Site Building



# 4. LMG Plant Layout



# 5. Community Impacts

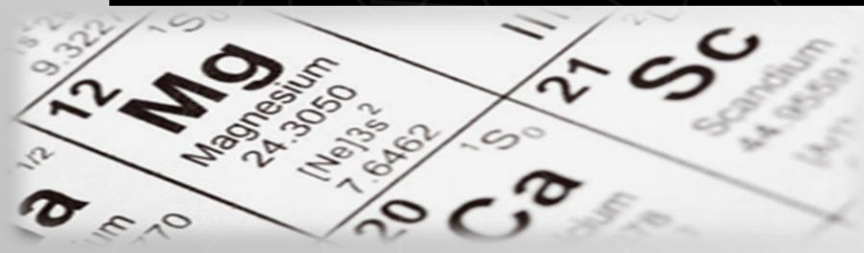
- Jobs
  - Initial employment 5kt plant 57 direct jobs
  - 40kt plant – 800 jobs (direct/indirect)
- Support of local supply chain
  - approx \$90m spent annually
  - some \$135m capital invested
- Support development of local infrastructure and promote new industry
- Efficient & environment friendly operation converting waste to valuable raw materials



## 6. Timelines/Milestones

### Key Dates

- Feb 2016 complete vertical retort test work
- Mar 2016 conclude MOU with major customers & suppliers
- Mar 2016 complete feasibility study, financing arrangements & start ordering equipment
- Jul 2016 commence installing equipment
- Jul 2017 start production of 5,000 tonnes pa plant
- Dec 2018 expand the plant to 40,000 tonnes pa





# 7. Corporate Overview

## Directors and Staff

- Jock Murray Non exec chairman
- David Paterson Director & CEO
- Kevin Torpey Director & mining consultant
- John Lee Non exec director
- Philip Bruce Non exec director
- Jim Siemon Project director
- David Wandmaker Plant operations manager

## Consultants

- CSIRO – Melbourne – Magnesium and smelter processors
- Clark & Marron – Magnesium industry experts
- GHD – Engineers for PFS
- Beijing Tieforce Engineering – Magnesium smelter construction company
- Curtin & Monash Universities – Mineralogy analyses
- Ecoengineers & Bureau Veritas Perth Laboratories – Hydromet advisor & laboratory
- BG&E Material Technologies – Cement advisor



# Disclaimer

- This presentation may contain forward looking statements that are subject to risk factors associated with the magnesium business.
- It is believed that the expectations reflected in these statements are reasonable but they may be affected by a variety of variables and changes in underlying assumptions which could cause actual results or trends to differ materially including but not limited to: price fluctuations, actual demand, currency fluctuations, production results, reserve estimates, loss of market, industry competition, environmental risks, physical risks, legislative, fiscal and regulatory developments, economic and financial market conditions in various countries and regions, political risks, project delay or advancement, approvals and cost estimates.
- Investors should undertake their own analysis and obtain independent advice before investing in LMG shares.
- All reference to dollars, cents or \$ in this presentation are to Australian currency, unless otherwise stated.

