



# AMEC Convention 2017

*Driving the next cycle*

7 - 8 June, Crown Perth WA

[www.amecconvention.com.au](http://www.amecconvention.com.au)

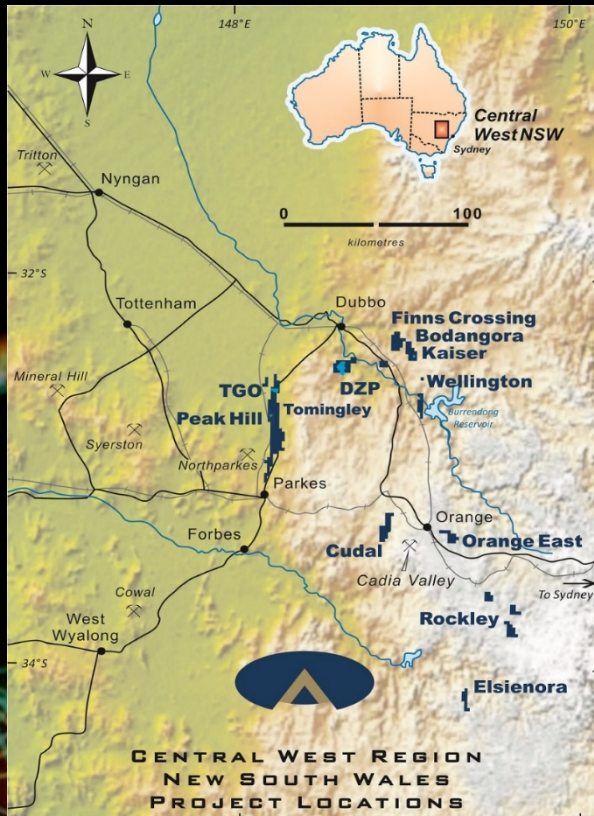


**ALKANE**  
RESOURCES LTD

[www.alkane.com.au](http://www.alkane.com.au)

# Alkane Resources Ltd

Multi Commodity Developer  
Focused in the Central West NSW



Two major projects through subsidiaries

**Australian Strategic Materials Ltd (ASM)**

- Dubbo Project
- Technology metals

**Tomingley Gold Operations Pty Ltd (TGO)**

- Tomingley gold production
- Cash flow generation

Active exploration programs

Significant discoveries

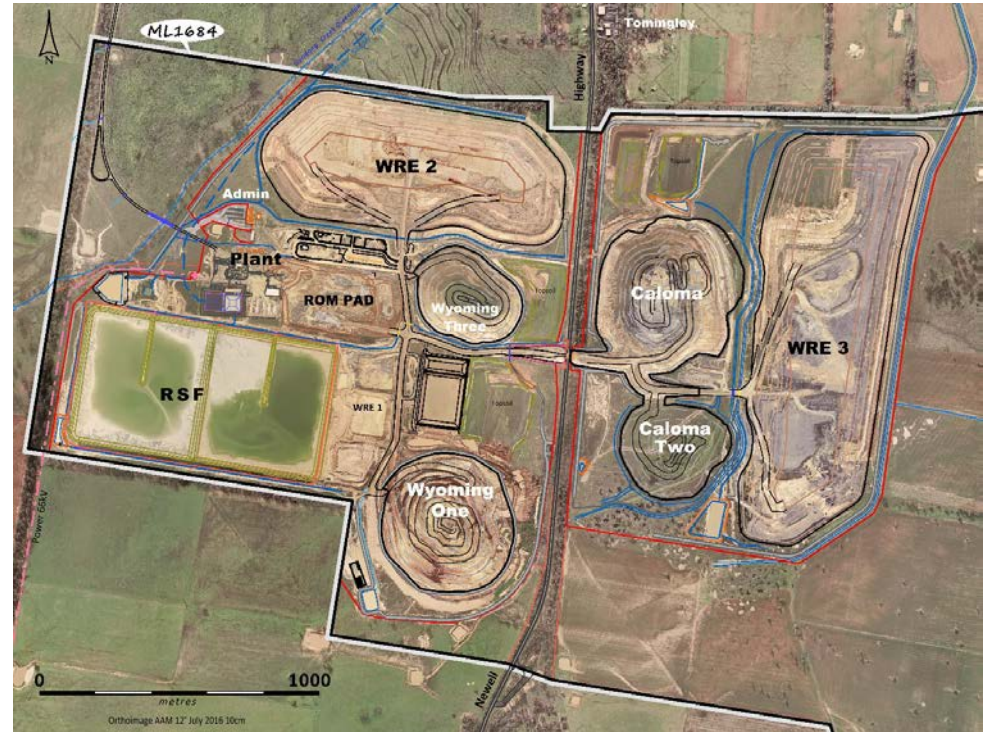
- Bodangora porphyry Au-Cu system
- McPhillamys 2.5Moz Gold
- JV sold to Regis Resources Ltd 2012

Market capitalisation  
Current cash + bullion

A\$130M  
A\$33M

# Tomingley Gold Operations

- Resource – 579,000oz of gold (22 Sept 2016)
- Reserve – 253,000oz (22 Sept 2016)
- Mine method – open cut W1, W3, C1 & C2
- Underground feasibility in progress
- Mine Life – 4.5 years inclusive of underground
- Processing plant standard CIL 1.0Mtpa throughput
- 208,000oz produced to end May 2017
- FY16 – Revenue A\$109.6M, TGO EBITDA A\$24.6M Profit A\$6.7M
- Forward gold contracts at 31 Mar 2017 31,000oz @ A\$1,704/oz



## Resource Expansion and Exploration

- Regional aircore drilling to test multiple targets, generated intercepts to be followed up
- Re-evaluation of large gold-copper system at Peak Hill mine site
- Major subpit RC and core drilling programs in progress to expand resource/reserve base in mine environs

Note: ASX announcement 22 September 2016 - the Company confirms that all material assumptions and technical parameters underpinning the estimated Mineral Resources and Ore Reserves, and production targets and the forecast financial information as disclosed continue to apply and have not materially changed.

# Megatrends – Driving the next cycle

Clean  
Energy

Transportation

Internet of  
Things

Sustainability

Ageing  
Population

Urbanisation

## Technology drivers

- Faster
- Stronger
- Cleaner
- Smaller
- Lighter
- Safer

# Collection of Big Data by Sensors & Actuators

## “Australian Strategic Materials & Alkane can supply up to 19 critical elements”

*Connecting people and processes ubiquitously for Smart Systems and IoT*



Machine Vision /  
Optical Ambient Light



Acoustic / Sound /  
Vibration



Flow



Position /  
Presence / Proximity



Force / Load / Strain /  
Torque / Pressure



Leaks /  
Levels



Motion / Velocity /  
Displacement



Electric / Magnetic



Chemical /  
Gas



Temperature



Acceleration / Tilt



Humidity / Moisture

Lanthanum

Cerium

Praseodymium

Neodymium

Samarium

Europium

Gadolinium

Terbium

Dysprosium

Erbium

Ytterbium

Lutetium

Gold

Silver

Tantalum

Hafnium

Yttrium

Zirconium

Niobium

*Resourcing tomorrow's technology*



ALKANE  
RESOURCES LTD

# Emissions minimisation

Clean  
Energy

Neodymium

Praseodymium

Zirconium

Hafnium

Niobium

## Zero or Low CO<sub>2</sub> Emissions

### Power

- Wind
- Solar
- Nuclear
- Wave
- Thermoelectric

### Storage

- Large capacity batteries
- Ferroelectric
- Solid oxide fuel cells
- Portable batteries
- Piezoelectrics

# Rare earth permanent magnets

## Global wind capacity to nearly double in next five years (2015-2020)

In 2015 – 433GW (84,868t REE)

In 2020 – 792GW (155,232t REE)

## Dubbo Project can support 1.4GW output

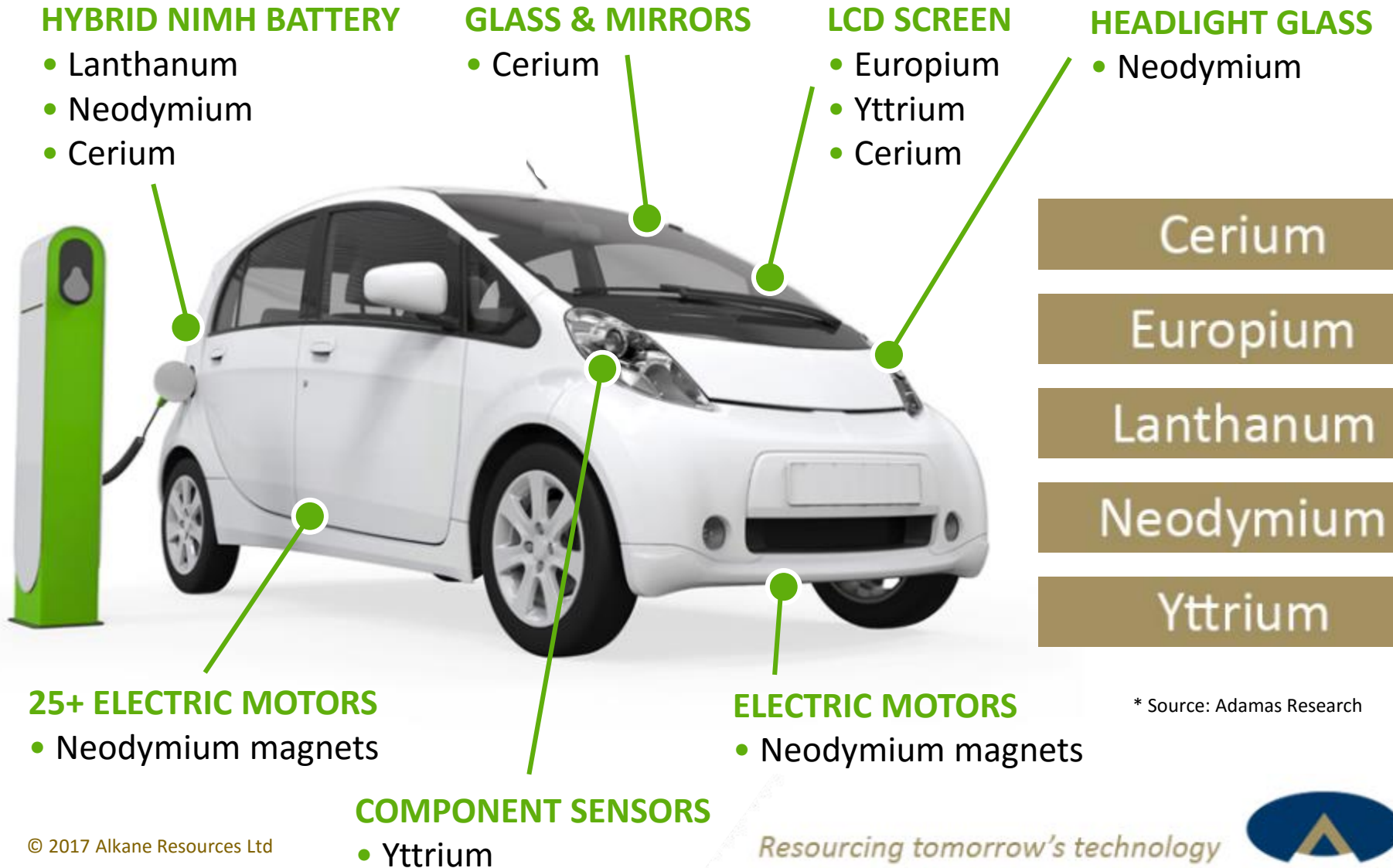
- 196kg REE used per MW power in wind turbine NdFeB permanent magnets
- Niobium is used to strengthen and reduce the amount of steel in stand

Neodymium

Praseodymium

Niobium

# Rare earths in auto transport





# Nuclear power demand still growing

**449 Operating nuclear plants**  
**60 Undergoing construction**  
**170 Planned in China by 2050**

Zirconium clads nuclear fuel rods  
Hafnium is used in nuclear control rods  
Zirconium niobium alloys

Zirconium

Hafnium

Niobium

# Next gen transport applications

- Zirconium & hafnium in jet engines – super alloys
- Niobium & hafnium in rocket nozzles – super alloys
- Hafnium for thermoelectric applications – electricity generation
- Hafnium in special space batteries
- Heat shields



Transportation



Zirconium



Hafnium



Niobium

# Hafnium – next gen memory

## Permanent Memory

Ferroelectric micro-processing using  $\text{HfO}_2$

- Ultra-fast, low-power, non-volatile successor to flash memory (atomic layer deposition)
- $\text{HfO}_2$  already used in electronics and compatible with silicon fabrication techniques
- k-gate chips, films, ferroelectric tunnel junctions, optoelectronic modulators, RAM (embedded memory) and piezoelectric transducers

# Dubbo Project

- 400km northwest of Sydney
- 25km from Dubbo city (pop~45,000)
- Dubbo infrastructure – roads, rail, power, gas, light engineering, people
- Large polymetallic resource - zirconium, hafnium, niobium (tantalum), yttrium and rare earths
- Defined resource supports 80+ year open pit operation

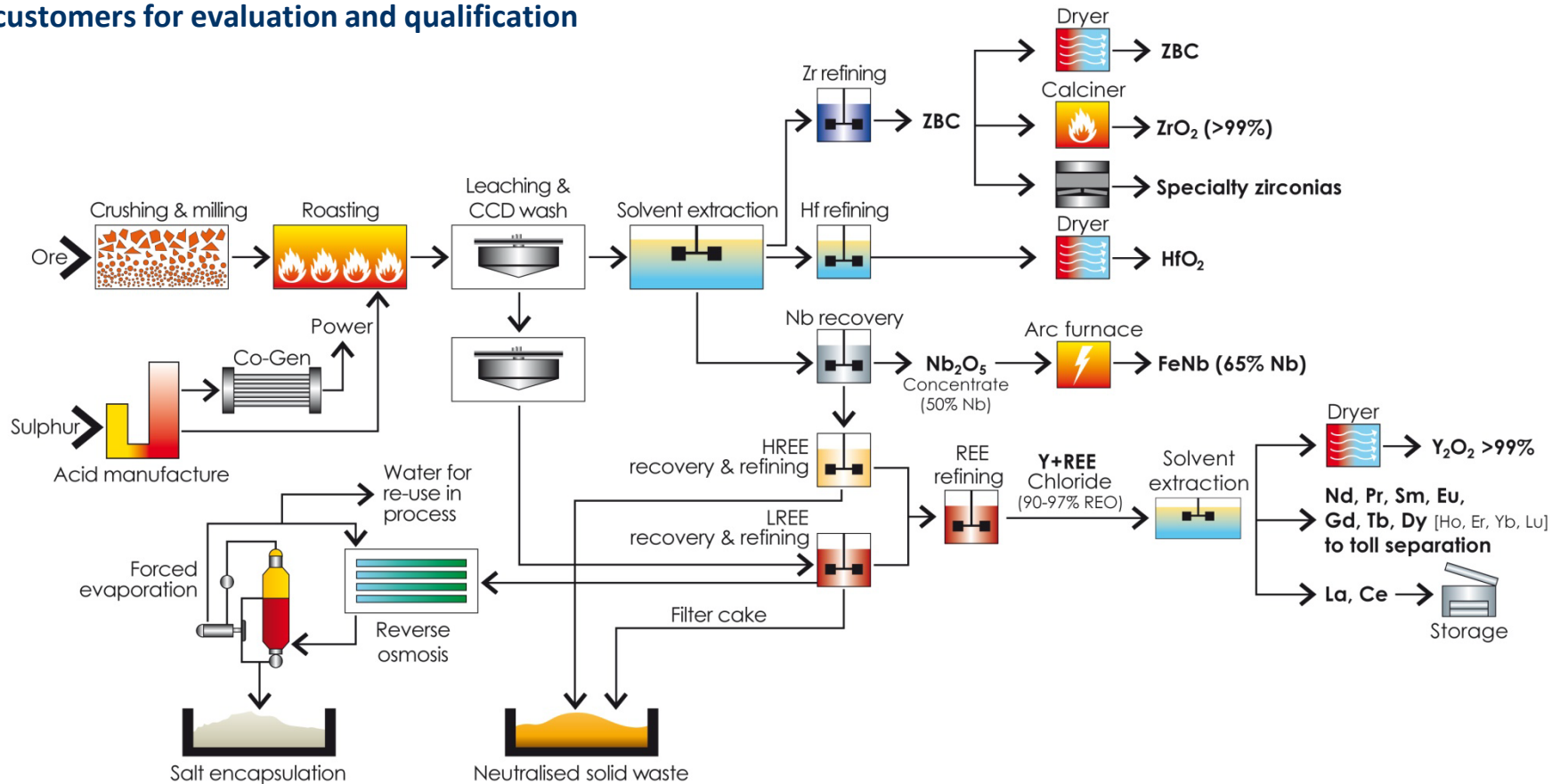
## CURRENT STATUS

- Pilot plant at ANSTO has demonstrated the flow sheet with products for market evaluation over 8 years
- All State & Federal environment approvals
- Front End Engineering Design (FEED) +/-15% study confirmed robust technical & financial DFS – 30% detailed design
- Outotec Finnish technology & engineering solutions company to present a fixed price EPC
- Sumitomo Mitsui Banking Corporation financial advisors – funding options being developed
- Staged modular design option reduces CAPEX costs, same rate of output for lower risk – Outotec program underway

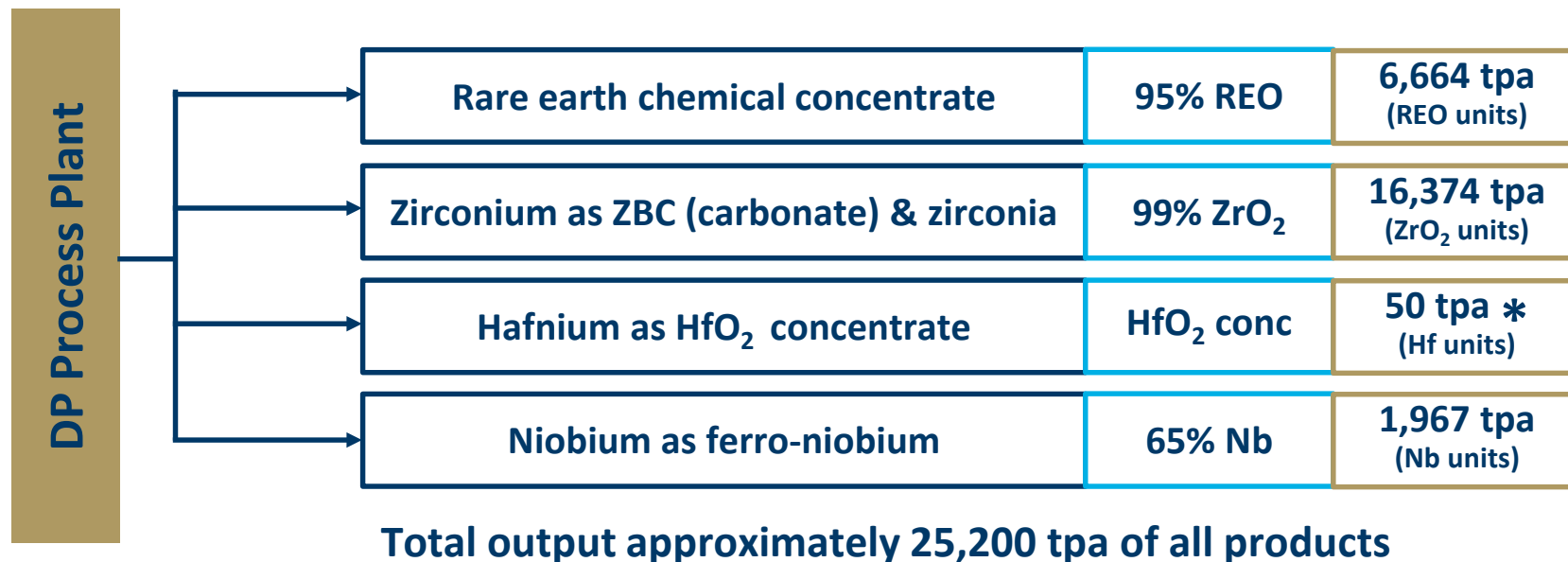


# Separation Process

Process of sulphuric acid leach and solvent extraction separation and chemical refining proved and products distributed to customers for evaluation and qualification



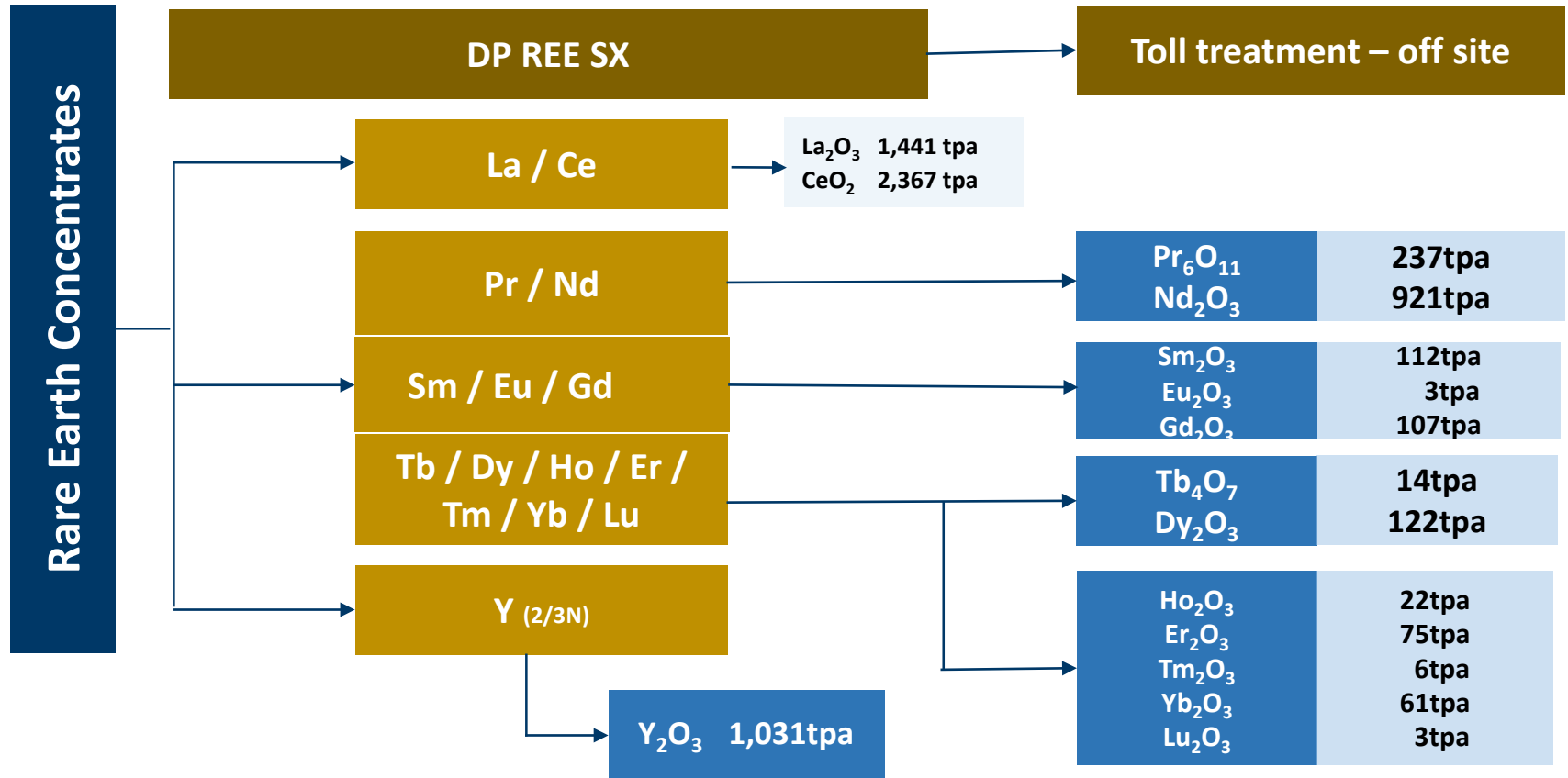
# Product Output



Tonnage based upon recoveries developed from mass balances of the demonstration pilot plant.

\* Start up output. 200tpa potential depending upon market demand

# Rare Earth Output

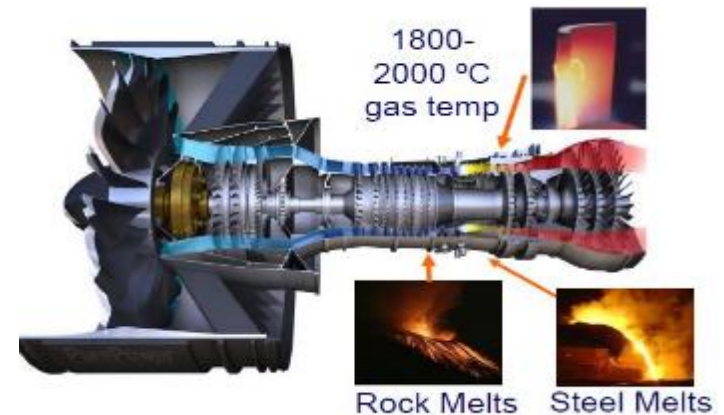


Tonnage based upon recoveries developed from mass balances of the demonstration pilot plant & preliminary solvent extraction stages on site at the DP.

Total saleable RE products from site ~1,030 tpa and off site ~ 1,675 tpa.

# Marketing and Off-take

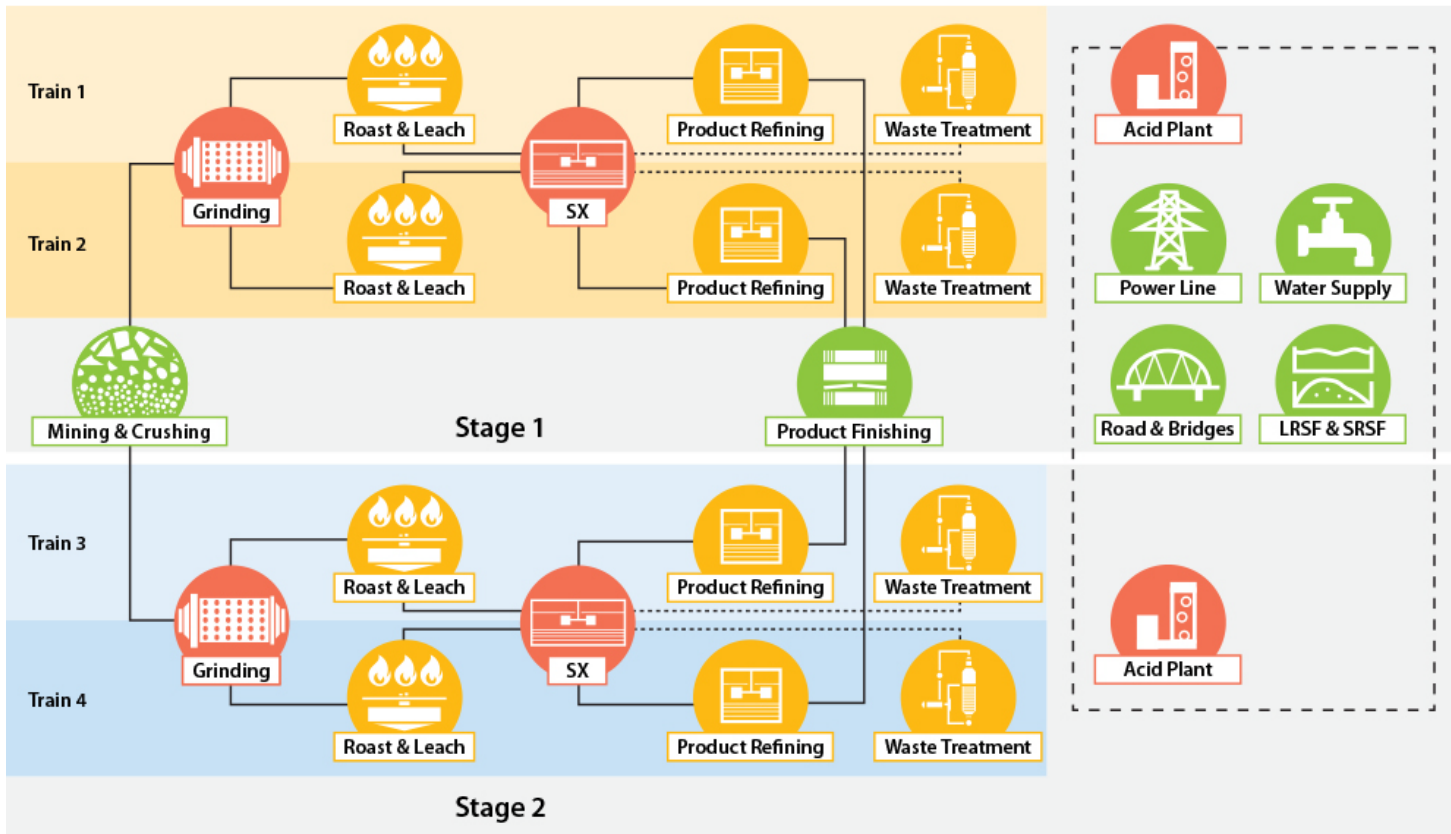
- **Minchem** – World wide zirconium product & marketing/sales agreement.
- **Treibacher Industrie AG** - JV to produce & market ferro-niobium
- **Vietnam Rare Earth (VRE)** – LOI for the production and marketing of separated rare earth products, and down stream value added metal alloy production
- **Siemens** – MOU signed for supply of rare earths and rare metals by DZP and supply of equipment and services by Siemens
- **Aerospace and permanent magnet companies** – Ongoing interest and discussions with multiple end users for separated rare earth products
- **Supply and JV discussions ongoing with organisations** - High purity zirconium feed for reactor grade metal and hafnium for metal production. Recent interest in  $\text{HfO}_2$  for ferroelectric applications – next generation microprocessors and data storage



**Powering the world**



# Modular Design – lowers risks



Construction  
2017 - 2019

Estimated cost  
US\$480M

Construction  
2022 - 2023

Estimated cost  
US\$360M

Estimated total  
Cost US\$840M

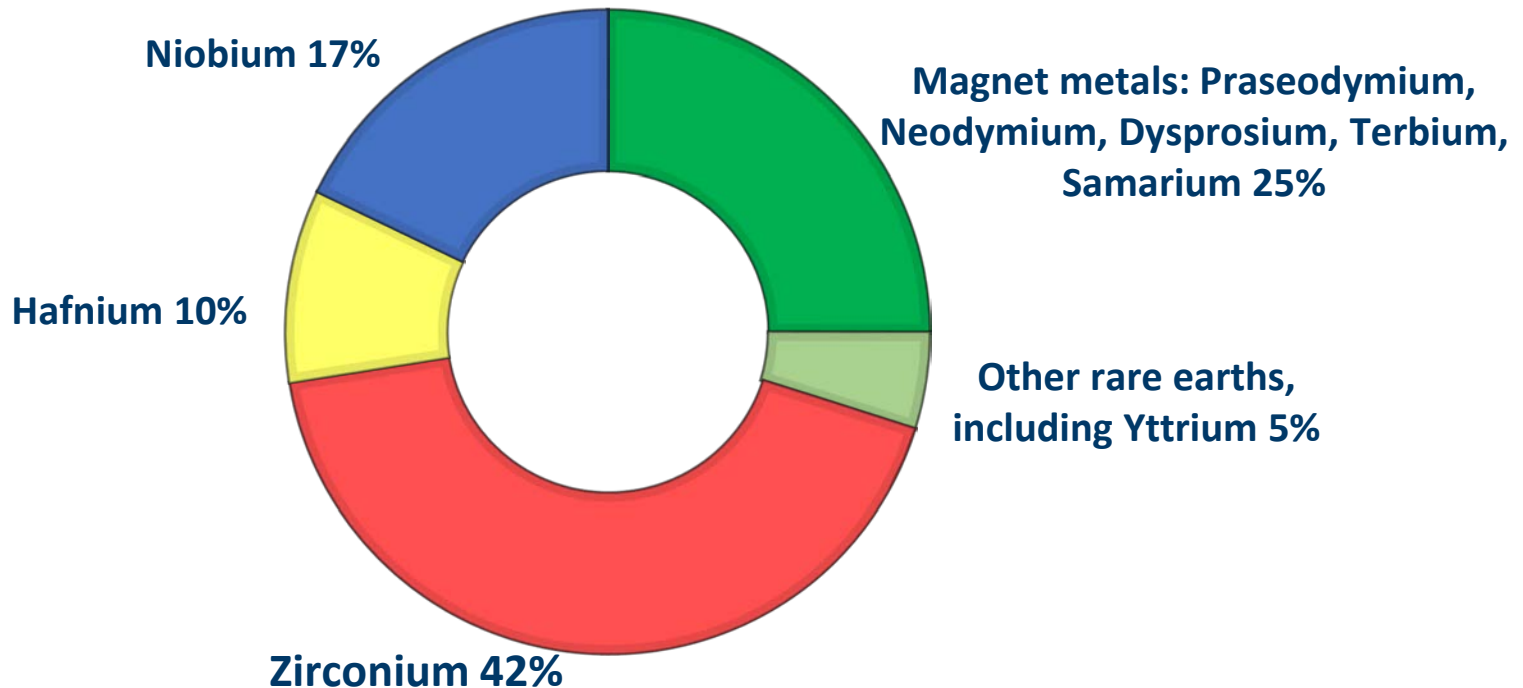
Legend - Built to a production capacity of:



Detail in ASX release 28 October 2016

# Diversified products – lowers risks

## Dubbo Project - product revenue split



\*Stage 1 revenue US\$200 - 220M

Opex US\$120 – 130M

\*Stage 1 + 2 revenue US\$400 - 440M

Opex US\$220 – 230M

\* estimates subject to completion of Modular Construction study

Note: ASX announcements 16 November 2011, 11 April 2013, 30 October 2013, 27 August 2015, 7 April 2016 and 28 October 2017 - the Company confirms that all material assumptions and technical parameters underpinning the estimated Mineral Resources and Ore Reserves, and production targets and the forecast financial information as disclosed continue to apply and have not materially changed.

# Dubbo – leading the next cycle

**TGO** continues to generate positive cash flow – strong recovery in production and reduction in costs following rain impacted first half (FY17)

## **DUBBO PROJECT IS CONSTRUCTION READY**

- Water and power supply arrangements well advanced
- Progressing customer certification of products and off-take agreements - multiple products with variable customer standards
- Targeting a minimum of 60% output committed through off-take
- Outotec engineering study on modular development, including 30% detailed design for BFS in progress and scheduled Q3 2017
- Advancing financing strategy through direct investment into ASM and ECA style debt facilities
- Subject to financing, final detailed design and site infrastructure scheduled to commence in Q4 2017

**EXPLORATION** continues to generate new discoveries, to facilitate a strong pipeline of developments

# Disclaimer

This presentation contains certain forward looking statements and forecasts, including possible or assumed reserves and resources, production levels and rates, costs, prices, future performance or potential growth of Alkane Resources Ltd, industry growth or other trend projections. Such statements are not a guarantee of future performance and involve unknown risks and uncertainties, as well as other factors which are beyond the control of Alkane Resources Ltd. Actual results and developments may differ materially from those expressed or implied by these forward looking statements depending on a variety of factors. Nothing in this **presentation should be construed as either an offer to sell or a solicitation of an offer to buy or sell securities.**

This document has been prepared in accordance with the requirements of Australian securities laws, which may differ from the requirements of United States and other country securities laws. Unless otherwise indicated, all ore reserve and mineral resource estimates included or incorporated by reference in this document have been, and will be, prepared in accordance with the JORC classification system of the Australasian Institute of Mining, and Metallurgy and Australian Institute of Geosciences.

## Competent Person

Unless otherwise stated, the information in this presentation that relates to mineral exploration, mineral resources and ore reserves is based on information compiled by Mr D I Chalmers, FAusIMM, FAIG, (director of the Company) who has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Ian Chalmers consents to the inclusion in the presentation of the matters based on his information in the form and context in which it appears.

# DP Resources and Reserves

## Dubbo Project – Mineral Resources

| Toongi Deposit | Tonnage (Mt) | ZrO <sub>2</sub> (%) | HfO <sub>2</sub> (%) | Nb <sub>2</sub> O <sub>5</sub> (%) | Ta <sub>2</sub> O <sub>5</sub> (%) | Y <sub>2</sub> O <sub>3</sub> (%) | REO (%)     |
|----------------|--------------|----------------------|----------------------|------------------------------------|------------------------------------|-----------------------------------|-------------|
| Measured       | 35.70        | 1.96                 | 0.04                 | 0.46                               | 0.03                               | 0.14                              | 0.75        |
| Inferred       | 37.50        | 1.96                 | 0.04                 | 0.46                               | 0.03                               | 0.14                              | 0.75        |
| <b>Total</b>   | <b>73.20</b> | <b>1.96</b>          | <b>0.04</b>          | <b>0.46</b>                        | <b>0.03</b>                        | <b>0.14</b>                       | <b>0.75</b> |

*These Mineral Resources are based upon information compiled by Mr Terry Ransted MAusIMM (Alkane Chief Geologist) who is a competent person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Terry Ransted consents to the inclusion in the report of the matters based on his information in the form and context in which it appears. The full details of methodology were given in the 2004 Annual Report.*

## Dubbo Project – Ore Reserves

| Toongi Deposit | Tonnage (Mt) | ZrO <sub>2</sub> (%) | HfO <sub>2</sub> (%) | Nb <sub>2</sub> O <sub>5</sub> (%) | Ta <sub>2</sub> O <sub>5</sub> (%) | Y <sub>2</sub> O <sub>3</sub> (%) | REO (%)     |
|----------------|--------------|----------------------|----------------------|------------------------------------|------------------------------------|-----------------------------------|-------------|
| Proved         | 8.07         | 1.91                 | 0.04                 | 0.46                               | 0.03                               | 0.14                              | 0.75        |
| Probable       | 27.86        | 1.93                 | 0.04                 | 0.46                               | 0.03                               | 0.14                              | 0.74        |
| <b>Total</b>   | <b>35.93</b> | <b>1.93</b>          | <b>0.04</b>          | <b>0.46</b>                        | <b>0.03</b>                        | <b>0.14</b>                       | <b>0.74</b> |

*These Ore Reserves are based upon information compiled by Mr Terry Ransted MAusIMM (Alkane Chief Geologist) who is a competent person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. The reserves were calculated at a 1.5% combined ZrO<sub>2</sub>+Nb<sub>2</sub>O<sub>5</sub>+Y<sub>2</sub>O<sub>3</sub>+REO cut off using costs and revenues defined in the notes in ASX Announcement of 16 November 2011. Terry Ransted consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.*

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# TGO Resources and Reserves

| TOMINGLEY GOLD PROJECT MINERAL RESOURCES (as at 30 June 2016) |                 |                   |                 |                   |                 |                   |                 |                   |                     |
|---|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|---------------------|
| DEPOSIT   | MEASURED        |                   | INDICATED       |                   | INFERRED        |                   | TOTAL           |                   | Total Gold<br>(Koz) |
|   | Tonnage<br>(Kt) | Grade<br>(g/t Au) | Tonnage<br>(Kt) | Grade<br>(g/t Au) | Tonnage<br>(Kt) | Grade<br>(g/t Au) | Tonnage<br>(Kt) | Grade<br>(g/t Au) |                     |
| Open Pittable Resources (cut off 0.50g/t Au)                  |                 |                   |                 |                   |                 |                   |                 |                   |                     |
| Wyoming One   | 1,980           | 1.7               | 416             | 1.6               | 671             | 1.1               | 3,067           | 1.6               | 153                 |
| Wyoming Three   | 86              | 2.0               | 16              | 1.3               | 33              | 1.4               | 135             | 1.7               | 8                   |
| Caloma  | 604             | 1.3               | 1,892           | 1.4               | 1,204           | 1.4               | 3,700           | 1.4               | 163                 |
| Caloma Two  |                 |                   | 1,085           | 2.4               | 704             | 1.3               | 1,789           | 2.0               | 112                 |
| Stockpiles  |                 |                   |                 |                   |                 |                   | 701             | 0.8               | 18                  |
| <b>Sub Total</b>  | <b>2,670</b>    | <b>1.6</b>        | <b>3,409</b>    | <b>1.7</b>        | <b>2,612</b>    | <b>1.3</b>        | <b>9,392</b>    | <b>1.5</b>        | <b>454</b>          |
| Underground Resources (cut off 2.50g/t Au)                    |                 |                   |                 |                   |                 |                   |                 |                   |                     |
| Wyoming One   | 169             | 4.8               | 206             | 4.4               | 363             | 4.2               | 738             | 4.4               | 104                 |
| Wyoming Three   | 10              | 3.6               | 6               | 3.1               | 4               | 3.1               | 20              | 3.4               | 2                   |
| Caloma  |                 |                   | 1               | 2.9               | 18              | 2.9               | 19              | 2.9               | 2                   |
| Caloma Two  |                 |                   | 92              | 3.5               | 63              | 3.2               | 155             | 3.3               | 17                  |
| <b>Sub Total</b>  | <b>179</b>      | <b>4.7</b>        | <b>305</b>      | <b>4.1</b>        | <b>448</b>      | <b>4.0</b>        | <b>932</b>      | <b>4.2</b>        | <b>125</b>          |
| <b>TOTAL</b>  | <b>2,849</b>    | <b>1.8</b>        | <b>3,714</b>    | <b>1.9</b>        | <b>3,060</b>    | <b>1.7</b>        | <b>10,324</b>   | <b>1.8</b>        | <b>579</b>          |

| TOMINGLEY GOLD PROJECT ORE RESERVES(as at 30 June 2016) |                 |                   |                 |                   |                 |                   |                     |
|---|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|---------------------|
| DEPOSIT   | PROVED          |                   | PROBABLE        |                   | TOTAL           |                   | Total Gold<br>(Koz) |
|   | Tonnage<br>(Kt) | Grade<br>(g/t Au) | Tonnage<br>(Kt) | Grade<br>(g/t Au) | Tonnage<br>(Kt) | Grade<br>(g/t Au) |                     |
| Open Pittable Reserves (cut off 0.50g/t Au)             |                 |                   |                 |                   |                 |                   |                     |
| Wyoming One   | 1,297           | 1.6               | 150             | 1.3               | 1,447           | 1.7               | 78                  |
| Wyoming Three   | 0               | 0                 | 0               | 0                 | 0               | 0                 | 0                   |
| Caloma  | 116             | 1.7               | 722             | 1.6               | 838             | 1.6               | 43                  |
| Caloma Cut Back   | 233             | 1.4               | 251             | 1.1               | 484             | 1.2               | 19                  |
| Caloma Two  | -               | -                 | 318             | 3.2               | 318             | 3.2               | 33                  |
| Stockpiles  | 700             | 0.8               | -               | -                 | 700             | 0.8               | 18                  |
| <b>Sub Total</b>  | <b>2,347</b>    | <b>1.4</b>        | <b>1,441</b>    | <b>1.9</b>        | <b>3,788</b>    | <b>1.5</b>        | <b>191</b>          |
| Underground Reserves (cut off 2.50g/t Au)               |                 |                   |                 |                   |                 |                   |                     |
| Wyoming One*  | 224             | 4.0               | 300.5           | 3.4               | 524.4           | 3.7               | 62                  |
| <b>Sub Total</b>  | <b>224</b>      | <b>4.0</b>        | <b>300.5</b>    | <b>3.4</b>        | <b>524.4</b>    | <b>3.7</b>        | <b>62</b>           |
| <b>TOTAL</b>  | <b>2,571</b>    | <b>1.6</b>        | <b>1,742</b>    | <b>2.2</b>        | <b>4,312</b>    | <b>1.8</b>        | <b>253</b>          |

Note: ASX announcements 21 September 2015, 10 December 2015 and 22 September 2016 - the Company confirms that all material assumptions and technical parameters underpinning the estimated Mineral Resources and Ore Reserves, and production targets and the forecast financial information as disclosed continue to apply and have not materially changed