ALKANE RESOURCES LTD
AUSTRALIAN ZIRCONIA LIMITED

# Dubbo Zirconia Project

## NSW Australia

***An alternate and strategic long term supply of critical rare earths, zirconium and niobium***

ALKANE RESOURCES LTD

MULTI-COMMODITY MINER EXPLORER

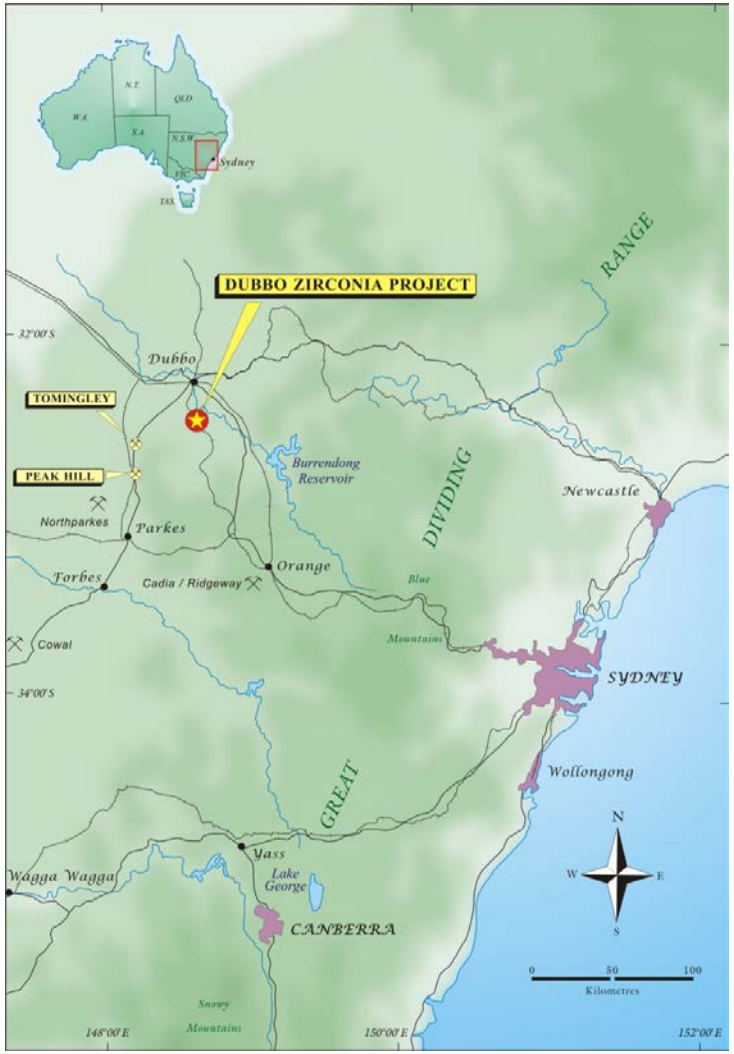
www.alkane.com.au

Metal Events Ltd's:
9th International
Rare Earths
Conference

Kowloon
Shangri-La Hotel
Hong Kong
November 12-14 2013

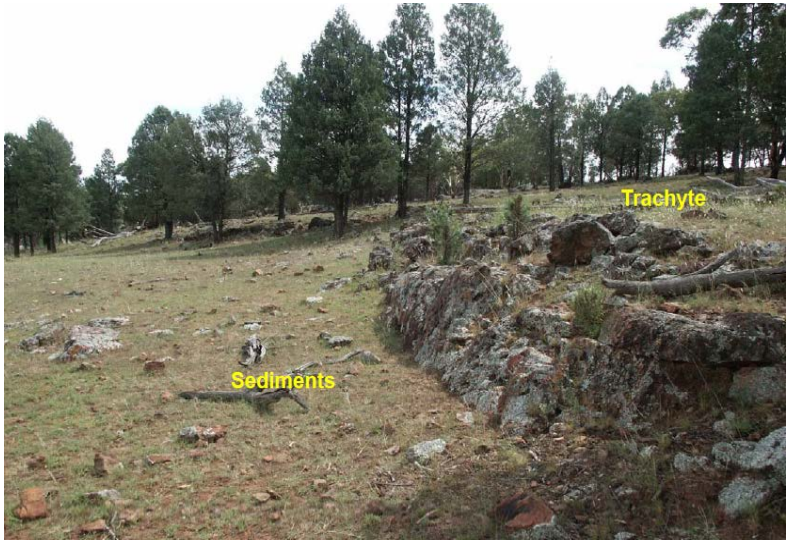
# Corporate Snapshot

- Listed on ASX since 1969, also listed on OTCQX (US)
- Market cap $150M
- 6,100 shareholders (85% Australian)
- Multi commodity explorer, miner and developer focused on Central West of NSW
- Active in region for more than 20 years
- Developed Peak Hill Gold Mine in 1996, operated to 2005 being the end of mine life
- Tomingley Gold Project (TGP) construction nearing completion, first gold production early 2014
- World-class Dubbo Zirconia Project (DZP) feasibility completed; environmental assessment and financing in progress
- Successful ongoing exploration



# Dubbo Zirconia Project

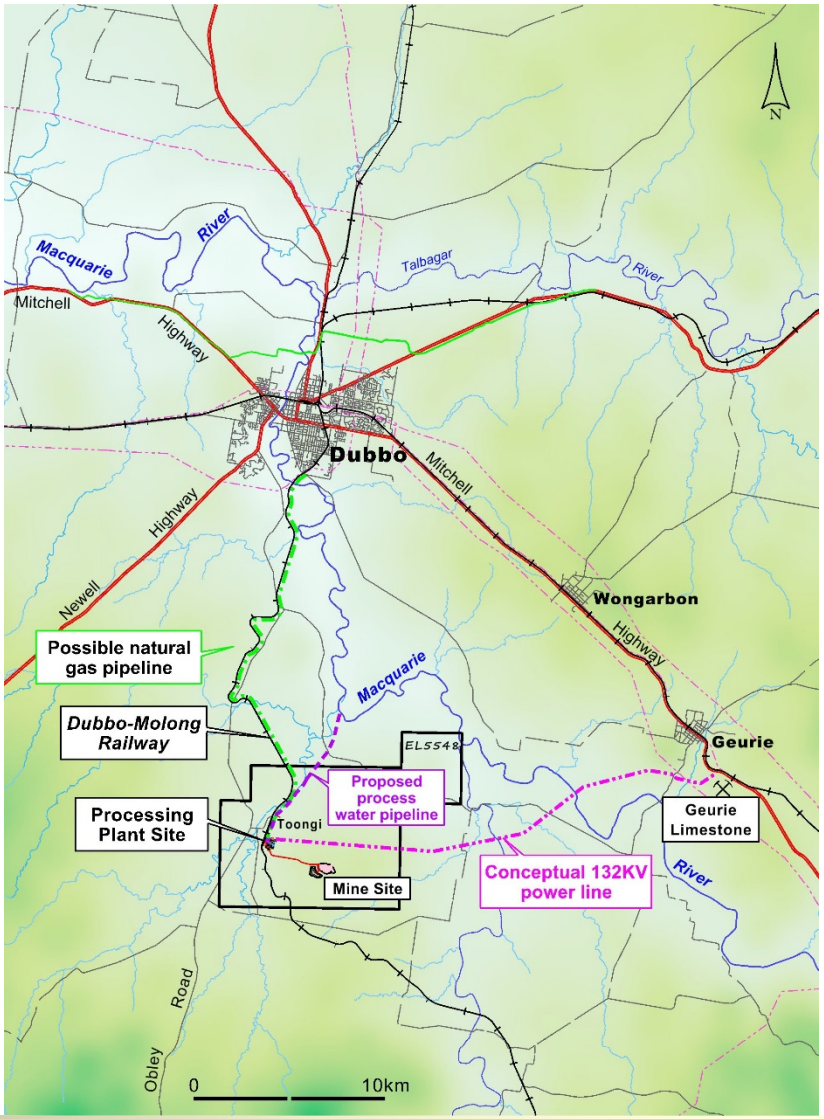
- A very large polymetallic resource of the metals zirconium (hafnium), niobium (tantalum), yttrium and rare earths
- Important and strategic metal mix, including 25% heavy rare earths
- Open pit life of at least 70 years at 1 million tonne ore production per annum
- $1 billion project cost – 95% in processing plant and infrastructure
- Demonstrated flow sheet with pilot plant and products for market evaluation
- Robust technical and financial feasibility completed
- Environmental Impact Statement compiled and on public exhibition from 18 Sept to 18 Nov
- Strong market interest in products
- Growing and diverse markets



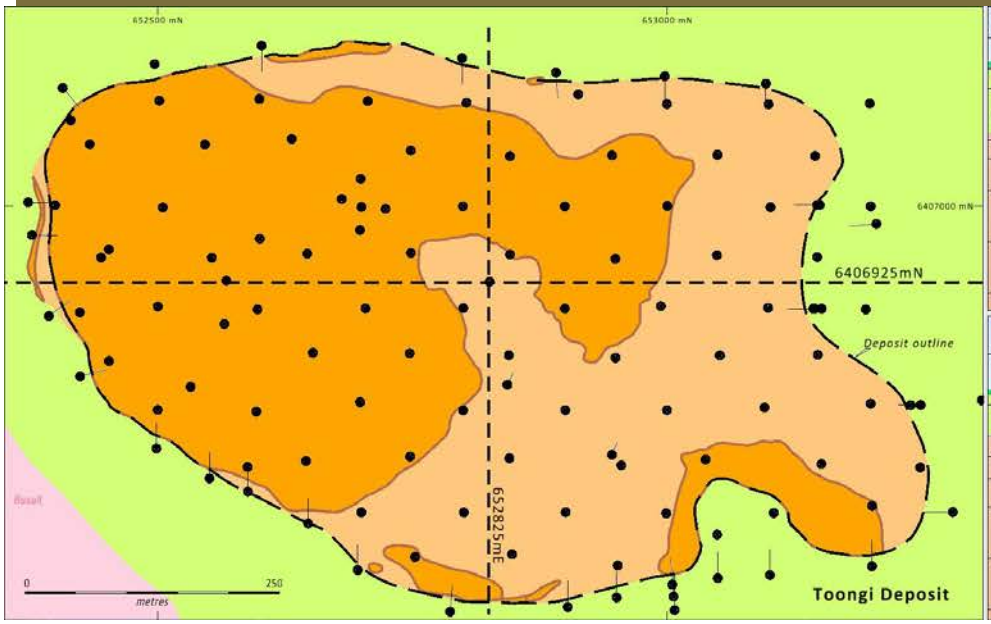
# Location

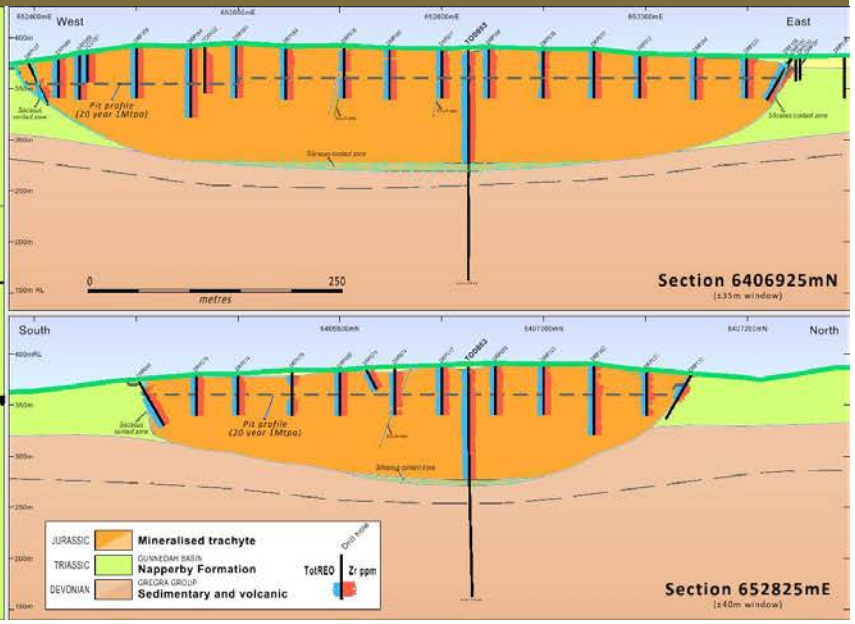
## ➢ Project close to existing infrastructure

- Proposed project infrastructure
  - upgrade of 27km Obley Road to semi articulated truck & trailer standard
  - refurbishment/upgrade of Dubbo-Toongi section of railway
  - 30km gas pipeline in rail corridor
  - 132kV power line Geurie to Toongi
  - 8km Water Supply Pipeline from Macquarie River to Toongi
  - Limestone at Geurie for waste neutralisation
- Major population base
  - Dubbo 42,000
  - Region >80,000
- Major agricultural region with associated light industry
- Major gold and base metal mining region



# Geology, Resources & Reserves



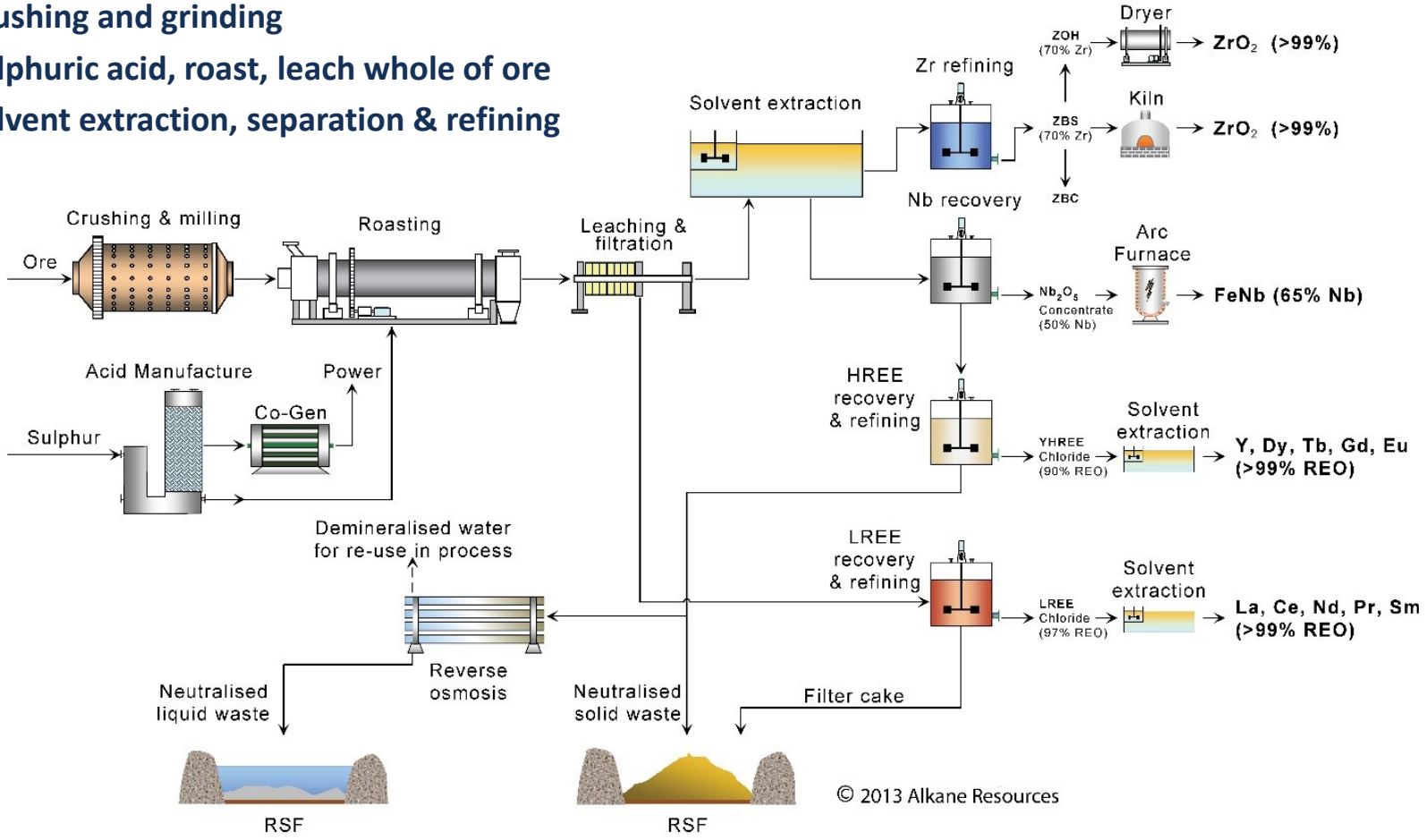

| Resources | Depth (m) | Tonnes (Mt) | Grade |
|---|---|---|---|
| **Measured** | **0-55** | **35.7** | 1.94% $Zr0_2$, 0.04%$HfO_2$, 0.46% $Nb_2O_5$ , 0.03% $Ta_2O_5$ , 0.14% $Y_2O_3$, 0.74% REO (0.9% TREO) |
| **Inferred** | **55-100** | **37.5** | As above |
| **Total** | **0-100** | **73.2** | **As above** |
| **Reserves** | | | |
| **Proven** | **0-26** | **8.1** | 1.93% $Zr0_2$, 0.04%$HfO_2$, 0.46% $Nb_2O_5$ , 0.03% $Ta_2O_5$ , 0.14% $Y_2O_3$, 0.75% REO (0.9% TREO) |
| **Probable** | **26-45** | **27.9** | As above |
| **Total** | **0-45** | **35.9** | **As above** |



**Trachyte lava or sub-volcanic intrusive** **Largely homogenous ore body**

# Process Flow Sheet

- Simple open cut mining operation
- Crushing and grinding
- Sulphuric acid, roast, leach whole of ore
- Solvent extraction, separation & refining



# Demonstration Pilot Plant

DPP Filtration, PLS, SX, Zr and Nb recovery

Y and HREE refining and recovery

Zirconium refining and precipitation

Reverse osmosis and water recycle

# Process and Product Development

## Continuous process optimisation and product development through operation of the demonstration pilot plant

- *Development of high purity, variable grain size zirconia for multiple end use applications*
- *Operation of ceramics colours laboratory to provide test samples for ceramic companies*

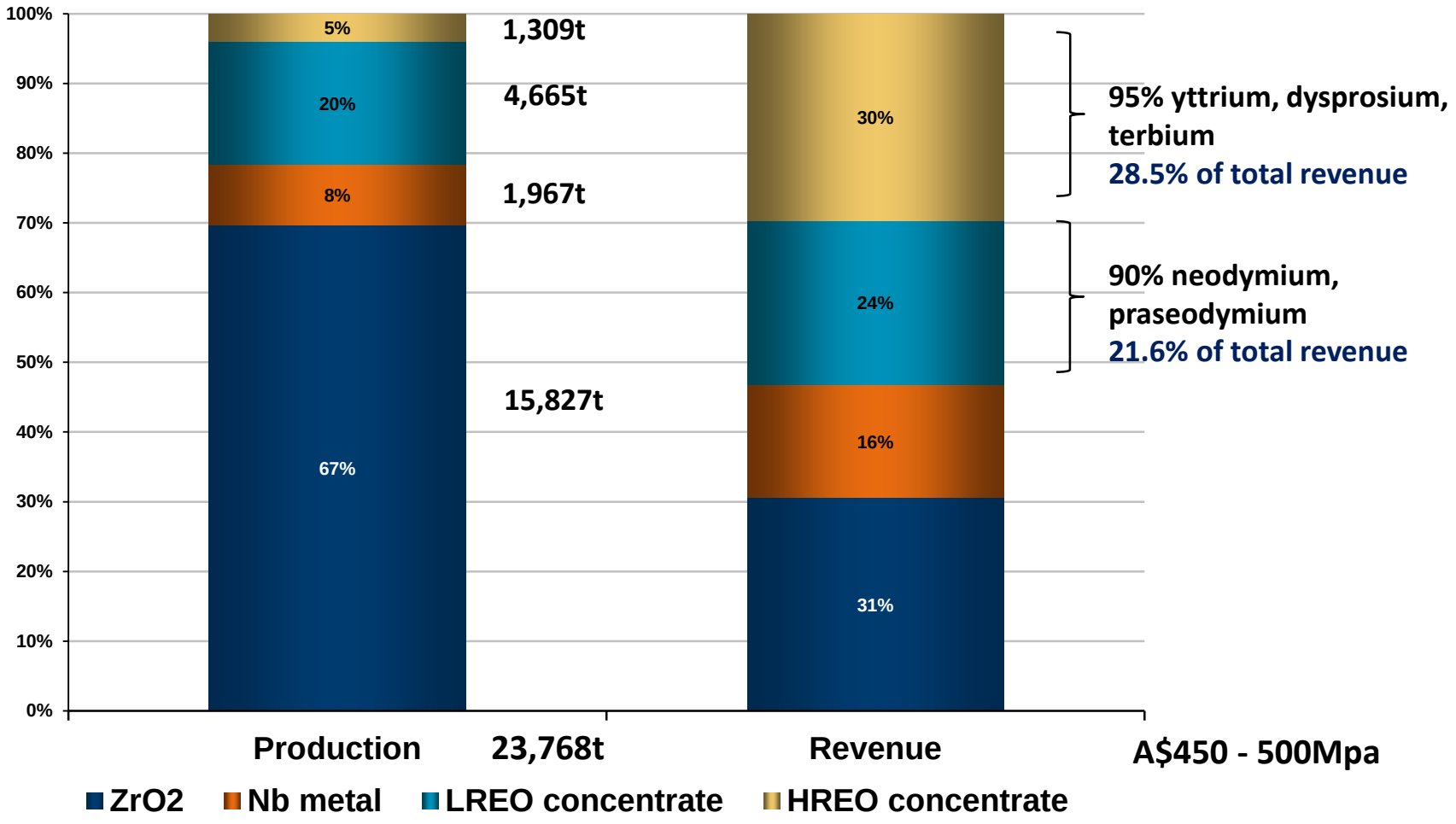
- *Significant improvement of rare earth recoveries:*

| | | |
|---|---|---|
| *LREEs* | *45-61% → 67-74%* | *3,997tpa → 4,665tpa* |
| *HREEs* | *32-54% → 52-66%* | *911tpa → 1,300tpa* |

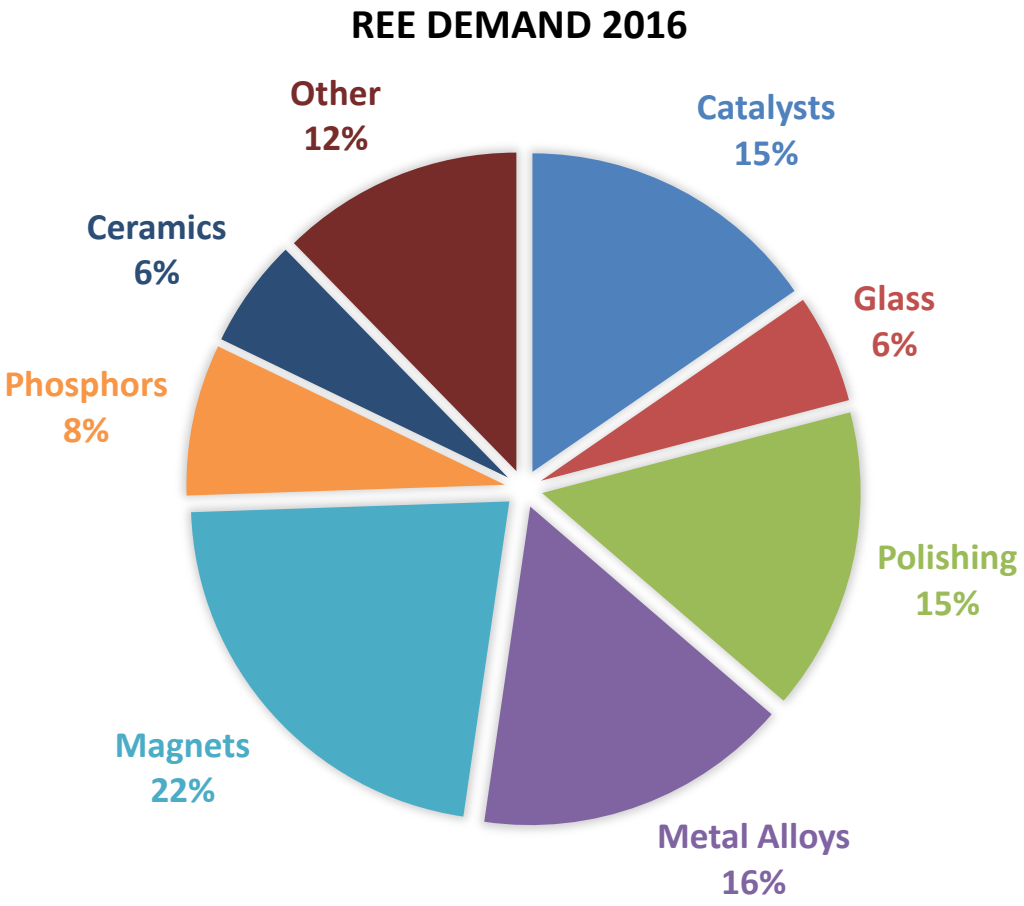
- *Major increase in revenue stream from improved rare earth recovery without increased operating costs*

- *Significant water recycling*
- *Experimental work for tantalum recovery*
- *Experimental work for waste salt recovery and re-use*

# Product Output @ 1Mtpa



# REE Industry

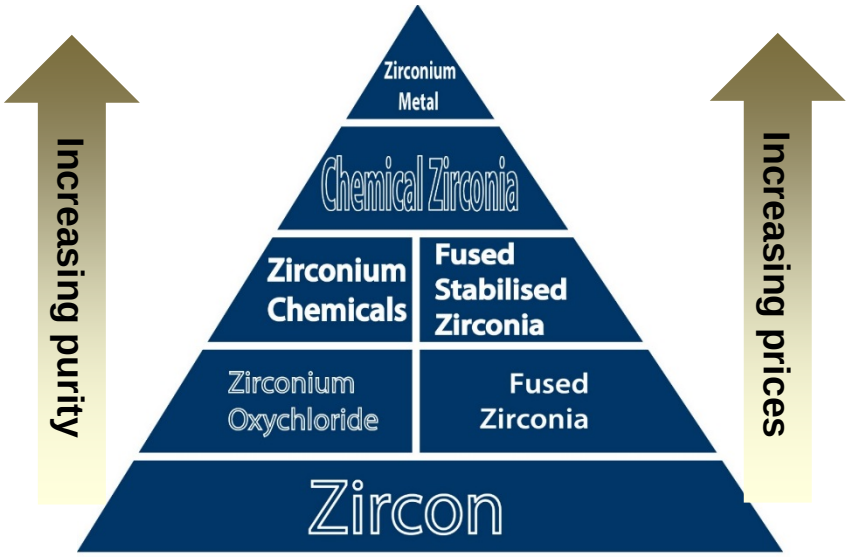



- Total REE consumption 2012 115,000t with annual growth estimated at 5-10% to be 162,000t in 2016
- China produces about 90% of world supply and consumed about 65%, with Japan 15% and the US 14%
- The REE industry is "imbalanced" with potential oversupply of light rare earths (Ce & La) and undersupply of heavy rare earths and neodymium
- Nd, Eu, Tb, Dy and Y are considered to be in critical supply through to at least 2020

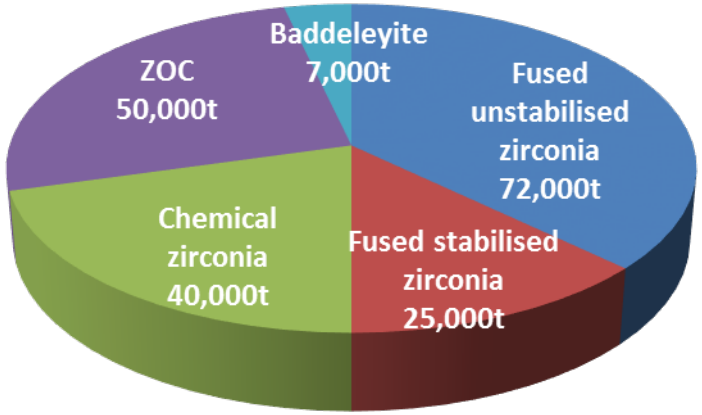
**Market imbalanced but overall CAGR 6% - 12% seems likely by 2016**


Source: IMCOA

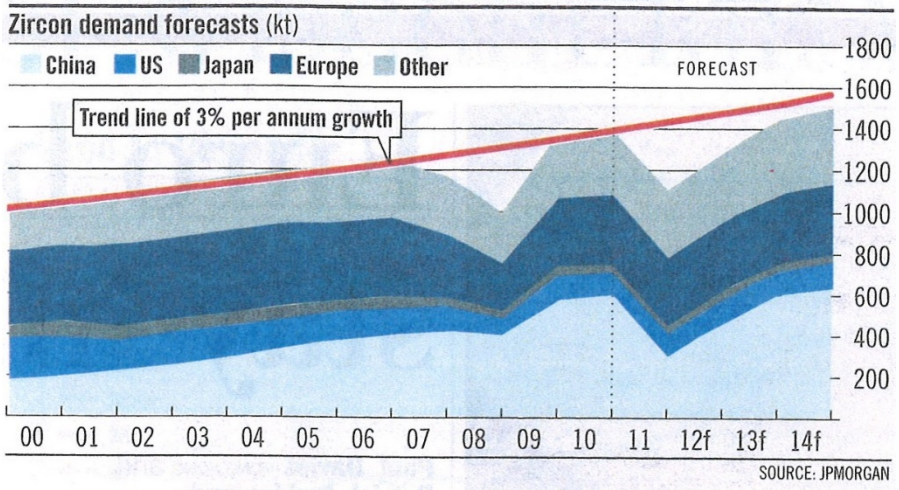
# Zirconium Industry




**Zirconium Chemicals Output**
**(2011 – 194,000t $ZrO_2$ basis CAGR 5-10% )**




- Global market US$3-4B
- Mid 2013 consumer zircon inventories running down
- Market expected to move back into under supply 2015 - 2016
- Prices starting to recover
- 18% - 20% zircon used in zirconium chemicals
- CAGR anticipated at 5% - 8% pa

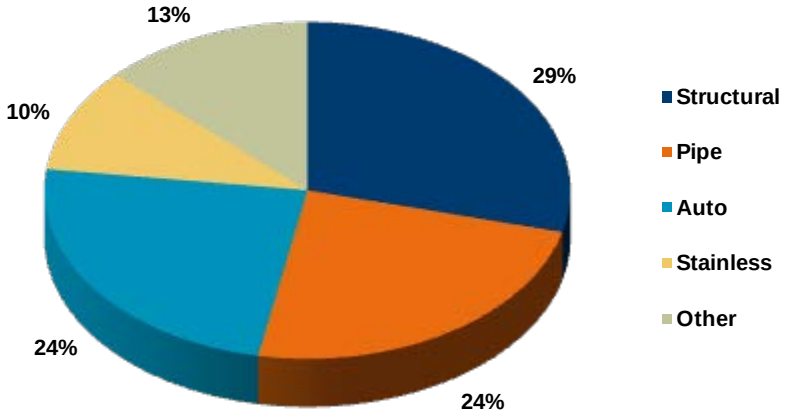


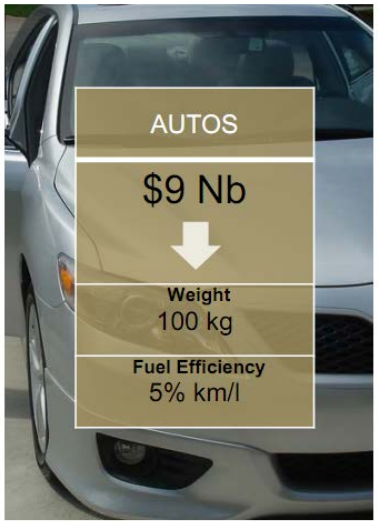



*Source: Iluka, TCMS, JP Morgan*

# Niobium Industry

## Current use of ferro-niobium





- 90% of Nb used in standard grade ferro-niobium for the production of high strength low alloy (HSLA) steels
- Nb HSLA steels are primarily consumed in structural and pipe, but the auto industry is becoming an increasing consumer
- World production 80,000t Nb in 2012. CBMM in Brazil accounts for 85%

**CAGR 10% Demand driven by greater usage in steels of BRIC producers**

# Pathway to Market

## AZL MoU's and Agreements to secure 100% of output

| | |
|---|---|
| Zirconium (Zr) | • Leading chemical company to develop applications and markets in Asia for zirconia produced by DZP<br>• European manufacturer/trading company to market DZP products in Europe and North America<br>• Ceramic colours laboratory developed in Perth to produce test products for ceramic tile industry |
| Niobium (Nb) | • JV with European Treibacher Industrie AG to produce and market ferro-niobium<br>• Test work for tantalum recovery |
| Light rare earths<br>Heavy rare earths | • Japan's Shin-Etsu Chemical toll treatment JV for separation and sale |

## Alkane has a 25 year history of sustainable mine management

EIS lodged 28 June and addresses all environmental aspects

**Water**

- 70% recycle of process water currently achievable
- Limited groundwater aquifers – minimal impact
- Water secured from existing water licenses

**Transport**

- Mixture of rail and road preferred, but rail still has some limitations

**Power**

- State grid. The sulphuric acid plant will generate (cogen) about 70% of power onsite

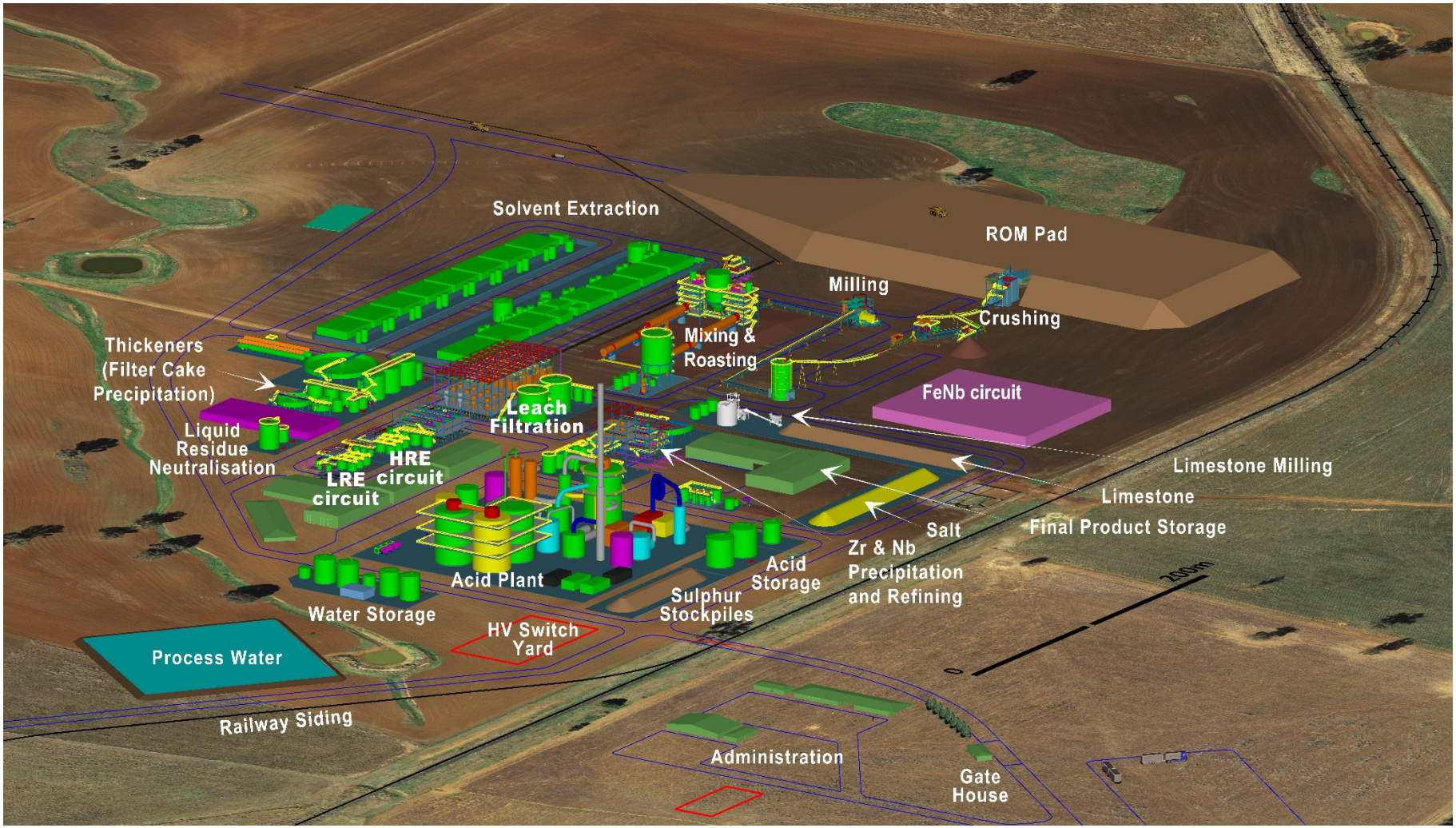
**Fauna**

- Farming/industry co-habitation: Sheep/cattle farming across available farming land
- Endangered species identified and potential impacts mitigated

**Naturally occurring radioactive material (NORM)**

- Waste salts remain onsite and contains less radioactivity than ore.

# Commercial Plant 3D Model



# Financing Program

## Advisors assisting with $1bn DZP financing package

- Sumitomo Mitsui Banking Corp
- Credit Suisse (Australia)
- Petra Capital

| Funding Sources | | Funding Uses | |
|---|---|---|---|
| **Debt Funding** | | **Construction** | |
| - Government Assistance/ECA Funding | | Capital Expenditure - Plant | $396.8 M |
| - Commercial Banks | | Sulphuric Acid Plant | $116.6 M |
| | | Infrastructure & Owners Costs | $253.4 M |
| **Equity Funding** | | Project Management | $63.5 M |
| - Equity Raising | | **Sub-total** | **$830.3 M** |
| - Project Level Minority Interest Sale | | Contingency/Working Capital | $166.1 M |
| **Total Funding Required** | **$996.4 M** | **Total** | **$996.4 M** |

# Major Milestones

| Major Milestones | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|
| Environmental Impact Statement | | | | |
| Project Approval Process | | | | |
| Project Financing Program | | | | |
| EPC / EPCM tender → award | | | | |
| Detailed design / Long lead orders | | | | |
| CONSTRUCTION | | | | |
| PRODUCTION | | | | |

# Disclaimer

**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 of 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**

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) 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 2004 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.

# DZP Resource & Reserves

## Dubbo Zirconia Project – Mineral Resources

| Toongi Deposit | Tonnage (Mt) | $ZrO_2$ (%) | $HfO_2$ (%) | $Nb_2O_5$ (%) | $Ta_2O_5$ (%) | $Y_2O_3$ (%) | 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 |
| Total | 73.20 | 1.96 | 0.04 | 0.46 | 0.03 | 0.14 | 0.75 |

*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 2004 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 Zirconia Project – Ore Reserves

| Toongi Deposit | Tonnage (Mt) | $ZrO_2$ (%) | $HfO_2$ (%) | $Nb_2O_5$ (%) | $Ta_2O_5$ (%) | $Y_2O_3$ (%) | 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 |
| Total | 35.93 | 1.93 | 0.04 | 0.46 | 0.03 | 0.14 | 0.74 |

*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 2004 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. The reserves were calculated at a1.5% combined $ZrO_2$+$Nb_2O_5$+$Y_2O_3$+REO cut off using costs and revenues defined in the notes in ASX Announcement of16 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.*