



# Arafura Resources Ltd

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Hong Kong Minor Metals Conference

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**Arafura**

Resources for the future



# Business summary

## **Exploration**

Focused on the Northern Territory in Australia

## **Development**

Long life resources capturing significant market position

## **Rare Earth Market**

Developing technical & market knowledge

## **Relationships**

Developing strong relationships in Asia & Europe



# Arafura's projects

Arafura Resources

100% Arafura

10% NuPower Uranium

Nolans

Exploration

Resource will sustain a  
Operating life of +20yrs

Multiple revenue streams  
REO, Phosphate, Uranium

Target production 2010

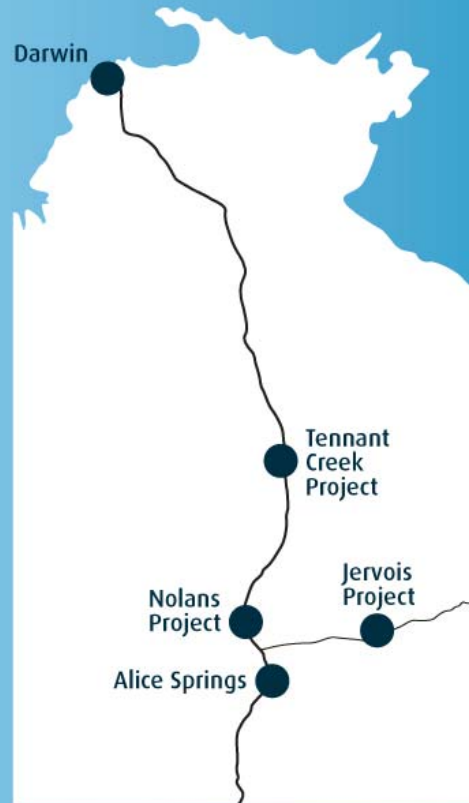
Vanadium

Gold

Nickel  
farm-in by Mithril Resources



# Nolans - location



## Nolans

5km to gas line

10km to Stuart Highway

60 km to rail line

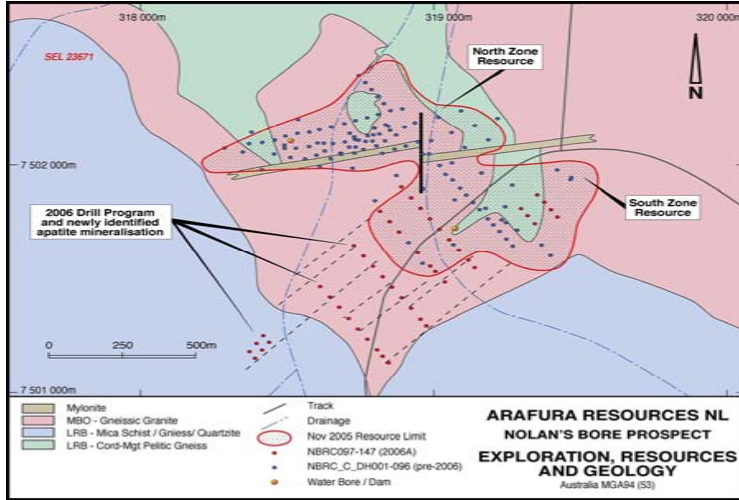
135 km north of Alice Springs

1200 km to Darwin



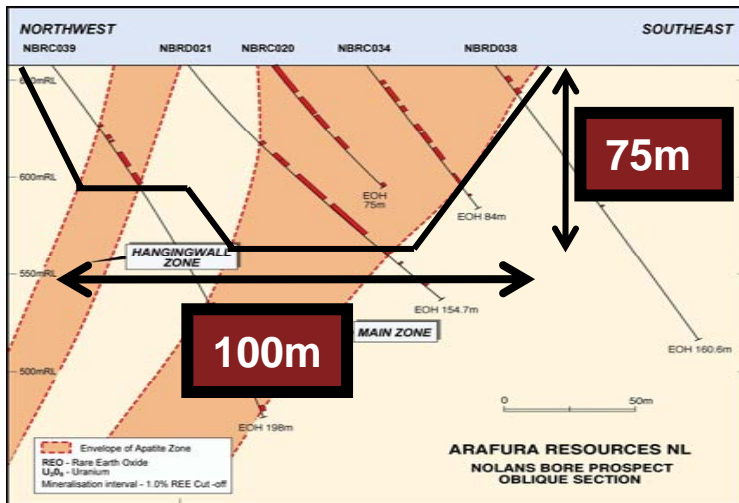


# Nolans project geology



**18.6 million tonnes (JORC) resource**

3.1% REO	577,000 t
14% P <sub>2</sub> O <sub>5</sub>	2.6mt P <sub>2</sub> O <sub>5</sub>
0.47 lb/t U <sub>3</sub> O <sub>8</sub>	8.7m lbs

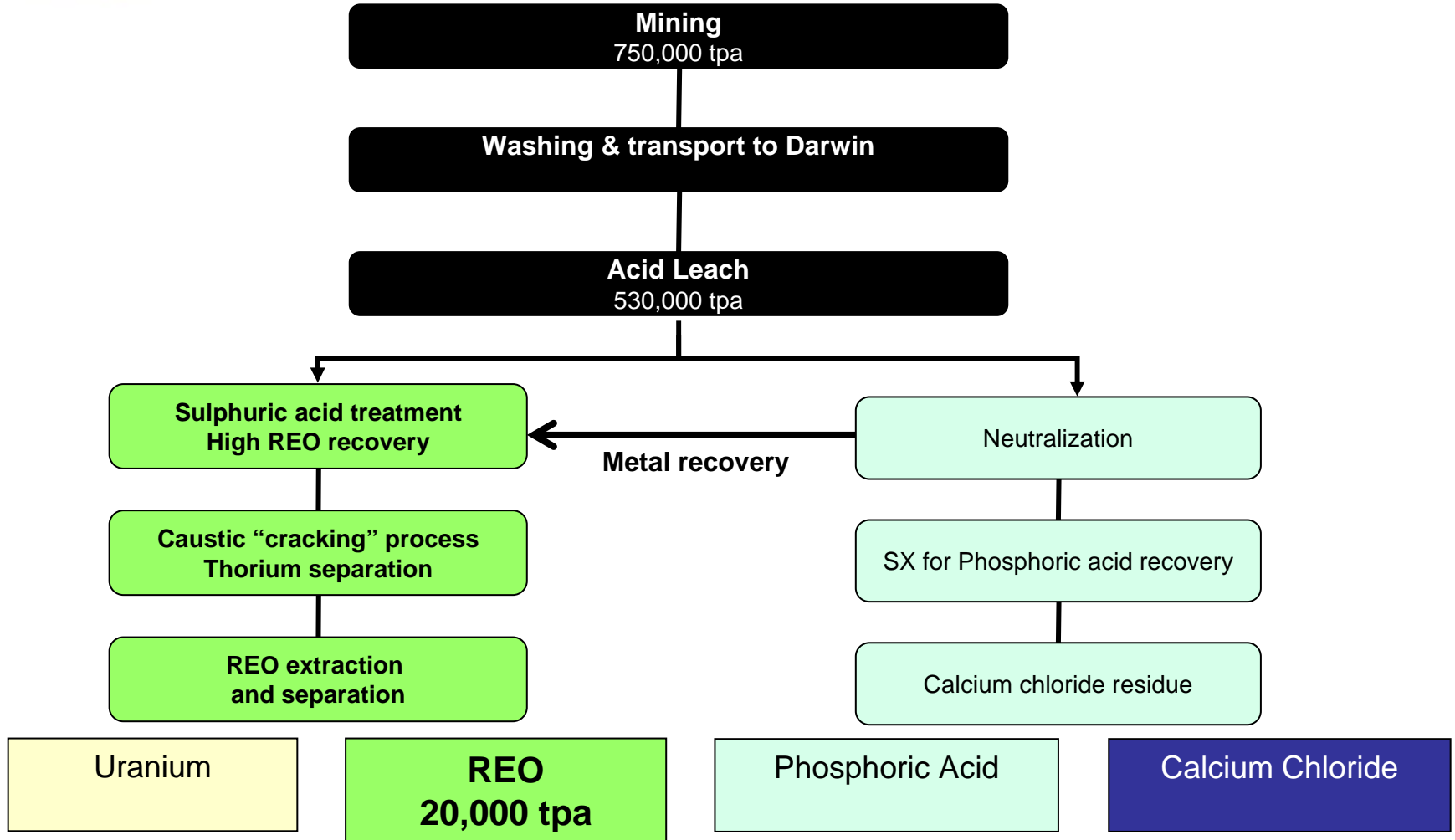


**Mining rate @ 750ktpa**

- Low strip ratio
- No overburden
- No waste in first 3 yrs
- Low cost mining - SAFE

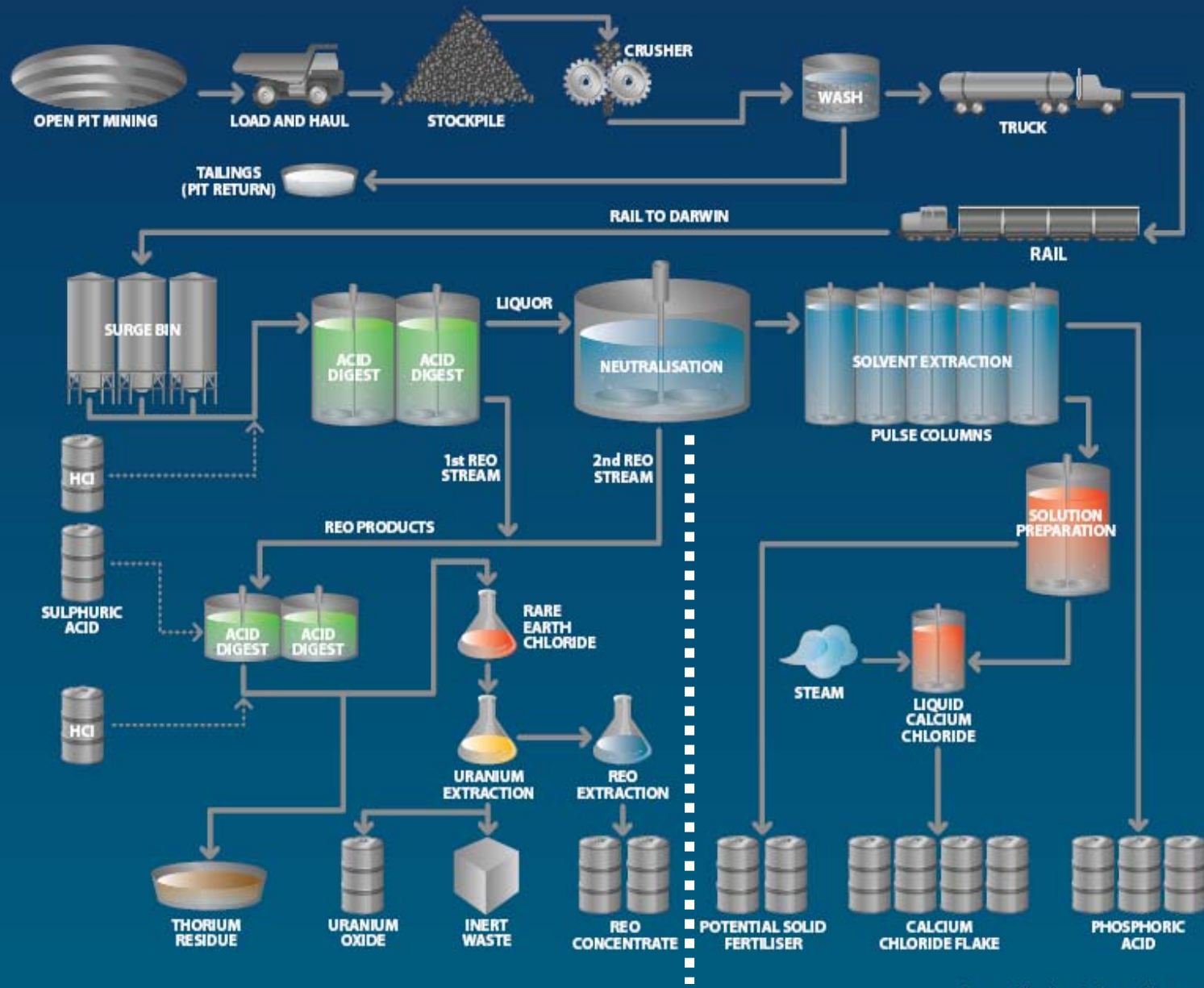


# Nolans process





# Nolans Project Flowsheet



Conceptual Flowsheet design as at July 2007



# Nolans recoveries

## Important recoveries

Beneficiation (REO) 95%

30% mass rejection

Rare Earths 90%

sulphuric acid process

**Total RE Recovery 83%**

**highest in the industry**

Phosphoric acid 80%

low contaminants, high quality

## Indicative recoveries yet to be finalized in test work

Uranium Recovery 80%





# Development Plan

## Development Plans – Nolans

2007	Pre-feasibility study (Q4 - 2008) and pilot plant (Jan 2008)
2008	Pilot plant and detailed engineering design
2009	Construction
2010	Commissioning and production
2011	Full production

## Parallel Issues

2007	Lodge Notice of Intent, Mining lease applications, & Regulator approvals – an 18 month process
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# History of RE market

	<u>Market driver</u>	<u>Industry Structure</u>
1900's	Emerging market in flint	} Emerging market
1950's	Polishing & glass	
1960's	Oil Industry Catalyst	} Strong growth
1970's	CRT TV era	
1980's	Battery era	} Industry reforms
1990's	Magnet era	
2000	Electronics & HEV era	} China's dominance
	So what does the future hold?	

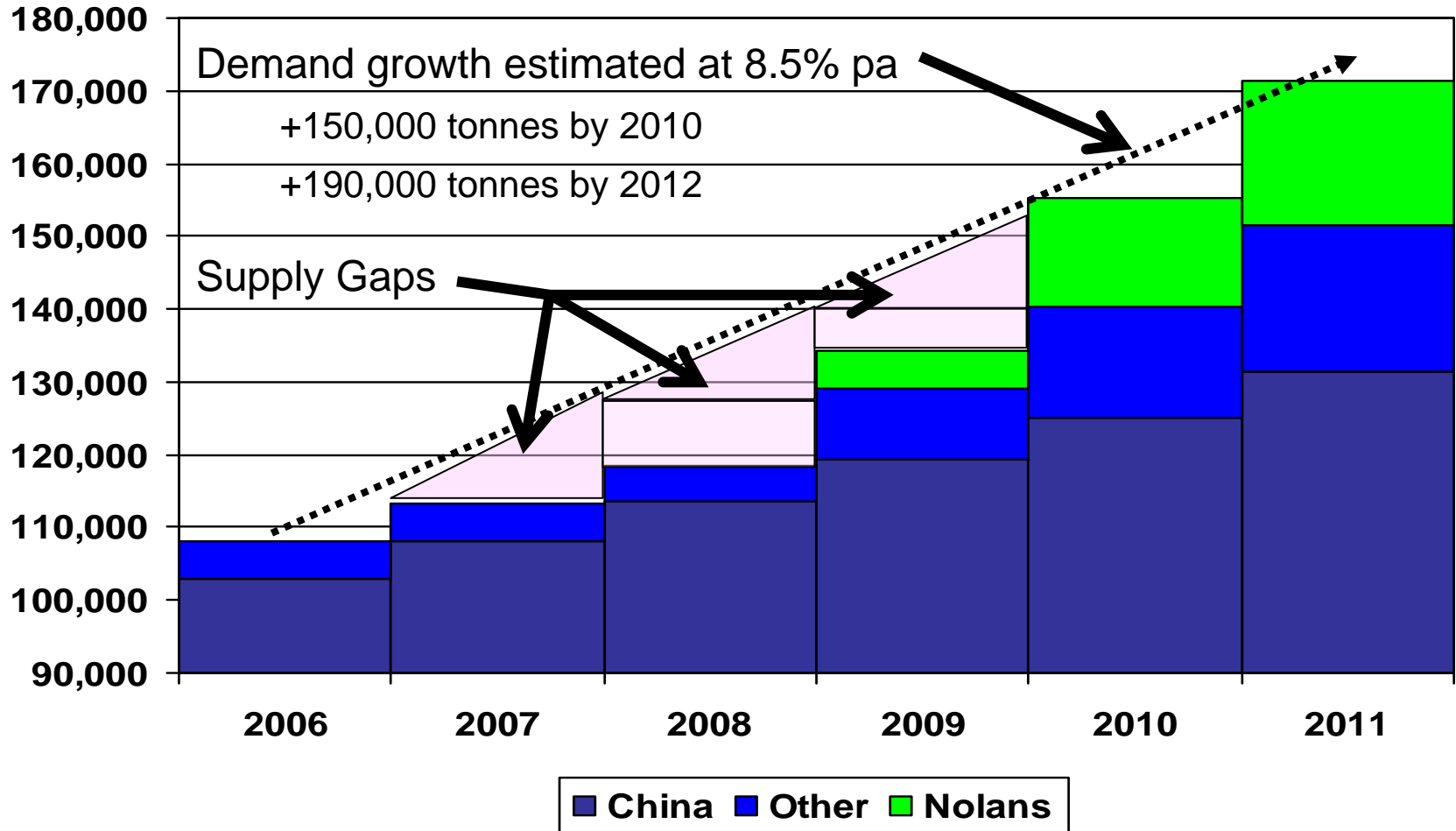


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2000	Electronics & HEV era	China's dominance
2010's	Energy, lifestyle, communications New entrants - Mt Weld, Nolans, Hoidas and others will come	Rapid Growth Economies of scale Industry consolidation



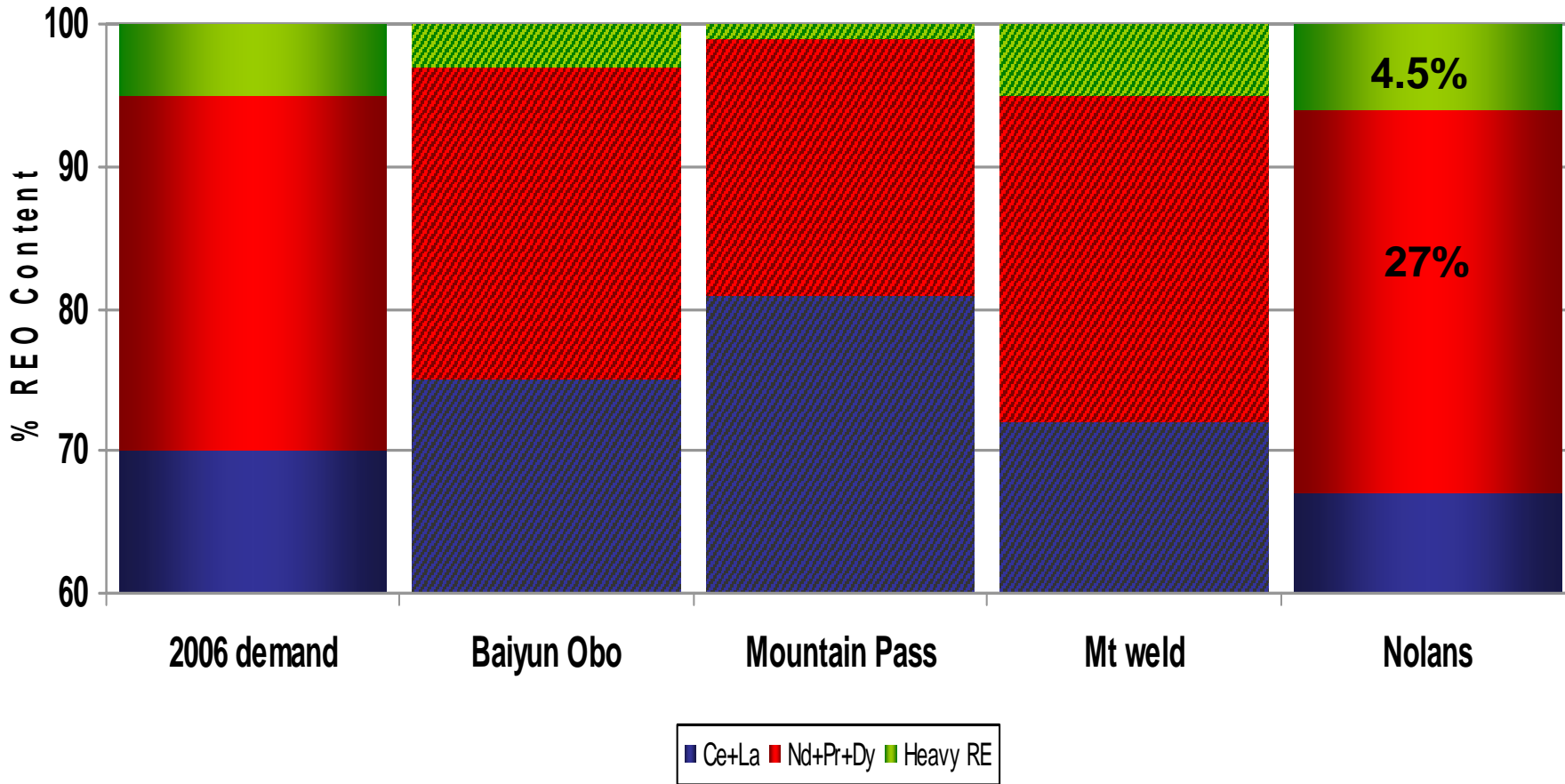
# Rare Earths Demand and Supply





# Nolans product mix

The Nolans project is rich in high value rare earths.





# REO HEV Magnet Market

An example of fragmentation in the magnet market market

Current HEV NdFeB Permanent Magnet Supply Chain

Rare Earth Mines	RE Carbonate <sup>1</sup>	NdOxide <sup>2</sup>	Magnetic Powder <sup>2</sup>	Permanent Magnets	Hybrid Transmissions	HEV Manufacturers
Bayun Obo (Bastnasite/Monazite)	Baotou Iron & Steel and Rare Earth Co.	Baotou RE Hi-Tech Co.	Shin-Etsu (Japan)	Shin-Etsu Chemical Co. (JP)	Aisin Seiki (JP)	Ford Motor Co. (US)
		Baotou Iron & Steel and RE Co.	Showa Denko (Japan)	Other Asian Magnet Manufacturers		
			Santoku and JV Partners (Japan and China)	European Magnet Manufacturers		
			Less Common Metals (UK)	USA Magnet Manufacturers		
		Gansu RE Co.		Ningbo Heli Magnetic Technology Co. (CH)		
DaMao RE Co.						
Jiangxi/Guangdong (Ionic Clays)	Baotou Rare Earth Hi-Technology Co.	ZAMR	Treibacher (Europe)	Yungshe Strong Magnet Material (CH)	Toyota Motor Co. (JP)	Toyota Motor Co. (JP)
		JAMR		Beijing Zhongke Sanhuan Hi-Technology (China)		
		Liyang Rhodia Founder RE Co.	Tianjin Magnaquench (China)	TDK Hitachi-Metal JV (JP)		
		Baotou Rare Earths Co.		Beijing Zongke Sanhuan Hi-Tech (CH)		
	DaMao Rare Earth Co.	Treibacher				
		Baotou Hefa RE Co.				
		Mianning Founder RE Co.				
Sichuan (Bastnasite)	Gansu RE Co.	China RE Holdings	Ningbo Yunsheng Strong Magnet Co.	Neomax (JP)	Honda Engineering Co. (JP)	Honda Motor Co. (JP)
	Mianning Founder RE Co.	Indian Rare Earths	Shanghai Epsom Magnet Co.	Next 10 largest suppliers in China with capacity > 300T/yr		
	Baotou Hefa RE Co.	AS Silmet				
	Ganzhou RE Co.					
Guangdong (Monazite)	Liyang Rhodia Founder RE Co.	Many small Chinese companies (>80)	Ganzhou Qiangdong Co.			
	Baotou Jinmeng					
India (Monazite)	Indian Rare Earths		10-20 smaller specialist companies			
Russia (Apatite)	AS Silmet					

Source: Roskill Report, Company Websites, Annual Reports & Press Clippings

Notes: 1 Based on share of total RE concentrate industry

2 Not to Scale

3 Includes prod'n of concn from Rhodia's Chinese JVs (Baotou Rhodia & Liyang Founder), La Rochelle and Japanese JV with Santoku

4 AMR Technologies Inc is a Canadian corporation. It's Chinese JV (ZAMR) produces Nd oxide

5 JV between Baotou Rare Earth Hi-Technology Co. and Showa Denko of Japan





# REO Battery Market Structure

Another example of market fragmentation

Current HEV NiMH Battery Supply Chain

Rare Earth Mines	RE Carbonate <sup>1</sup>	Mischmetal <sup>2</sup>	NiMH Alloy <sup>2</sup>	NiMH Batteries	HEV Manufacturers
Bayun Obo (Bastnasite/Monazite)	Baotou Iron & Steel and Rare Earth Co.	Baotou Iron & Steel and RE Co.	Santoku and JV Partners (Japan and China)	Sanyo Electric (JP)	Ford Motor Co. (US)
		Baotou RE Hi-Tech Co.			
		Baotou Rhodia/Santoku JV	Showa Denko (Japan)	Panasonic EV Energy Co. (JP)	Toyota Motor Co. (JP)
Jiangxi/Guangdong (Ionic Clays)	Baotou Rare Earth Hi-Technology Co.	Ganzhou Quiandong RE Co.			
		Baotou Xijun RE Co.			
	Baotou Rewin RE Co.	Japan Metals and Chemicals (Japan)			
DaMao Rare Earth Co.	Jiangxi South RE Co.		Great Western Technologies (USA)		
Sichuan (Bastnasite)		Xian Xijin		Treibacher Industrie (Europe)	
		Gansu RE Co.			
		Mianning Founder RE Co.			
		Baotou Hefa RE Co.			
Guangdong (Monazite)		Many small Chinese companies (>30)	Other Companies		
				Ganzhou RE Co.	
India (Monazite)				Honda Motor Co. (JP)	
Russia (Apatite)					

Source: Roskill Report, Company Websites, Annual Reports & Press Clippings

- Notes:
- 1 Based on share of total RE concentrate industry
  - 2 Not to scale for Mischmetal or NiMH Alloy as market shares are not known
  - 3 Includes prod'nof confrom Rhodia's Chinese JVS (Baotou Rhodia & Liyang Founder), La Rochelle and Japanese JV with Santoku
  - 4 JV owned 30% by Baotou Rhodia and 70% by Santoku. Baotou Rhodia is a JV owned 55% by Rhodia Electronics & Catalysis
  - 5 JV between Sumitomo Metal Industries Ltd (JP) and Molycorp (US)



# Threats & opportunities

## THREATS

### Lack of production restraint

- Oversupply, imbalanced supply
- Current fragmentation

### Substitution

- Li-ion batteries
- PGM catalysts
- New era electronic

### Recycling

- Yet to have an impact

### “New Era” mining opportunities

- New styles of supply are coming

Caused by in-efficiency

## OPPORTUNITIES

### Increased heavy crude oil production

- FCC demand

### Automotive exhaust catalysts

- Cerium

### Strong growth in HEV market

- Magnet, battery

### Strong growth in PDP market

- Phosphors

### Nuclear Applications?

- Eg: Gadolinium in neutron absorption

### Research & development

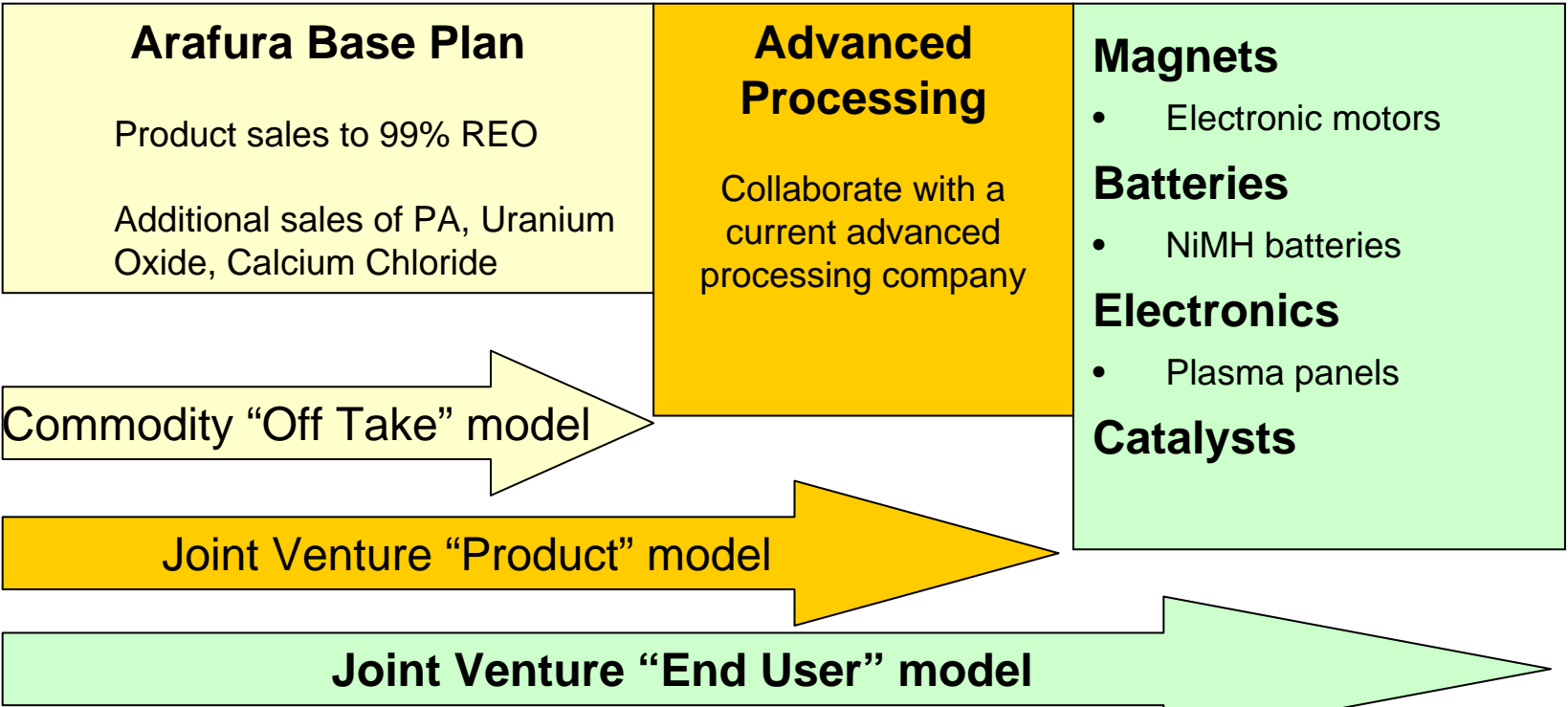
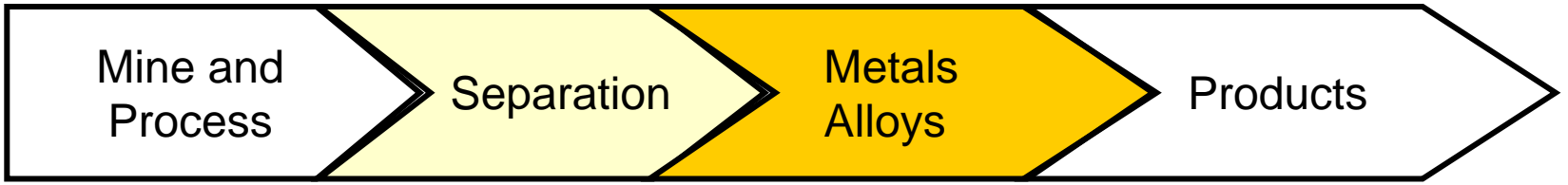
- Imperative for RE to remake its market

Driven by energy efficiency, lifestyle & environmental abatement strategies



# Arafura - Joint Venture Structures

Arafura Strategy



# Arafura

Resources for the future



# Partnership issues

## Commodity off-take

Simple production concept : complex in marketing

Accentuates the current market complexity & fragmentation

Does have production scale efficiency

## Product Model

Requires a partner with downstream technology & production capability

The capability to market 20,000 tonnes of all products

It is more flexible in production and simpler in marketing

Has economies of scale efficiency and less commercial risk

## End User Model

Minimises commercial risk for all parties

Establishes security of supply in the vale chain

Enables strategic growth



# Summary

## **Development of Nolans**

Focused on developing the Nolans multi-commodity deposit

## **Relationships in Partnership**

Looking to develop an exclusive value chain relationship

## **Rare Earths Market**

Rapid growth in demand will drive prices up & substitution/recycle

New entrants will easy supply beyond 2010 – but not price

Balance between production & demand is critical

Market consolidation will happen

R&D for new applications is vital

END