

## **Arafura Resources**

NdPr Magnets - Critical Materials for Clean Energy

**Future Energy and Finance Asia April 2017** 



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Mr Hussey is a full-time employee of Arafura Resources.



### **Company Snapshot**





- ASX listed company developing the **Nolans Rare Earths Project** in Australia
- ▲ Focus on **strong growth, high value** magnet-feed rare earths (REs)
- ▲ Currently finalising feasibility studies
- Afforded major project status by Northern Territory and Australian governments
- △ Nolans will be **one of the world's largest** suppliers into this market



### **Secure Supplier of Magnet-Feed Rare Earths**

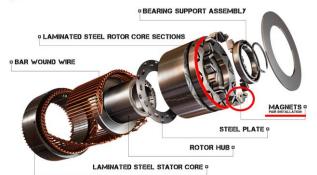




- One of the world's largest resources of Neodymium (Nd) and Praseodymium (Pr)
- △ Critical for production of RE Magnets. Critical elements to lower carbon emissions.
- ▲ Secure supply from long-life resource in low sovereign risk location
- △ Clear chain of custody of product from mine to market
- ▲ Well defined, existing regulatory process for rehabilitation and hazardous waste management



#### 1kg of NdPr





41 million by 2040 each containing 1.7kg of NdPr



# **Market Update**



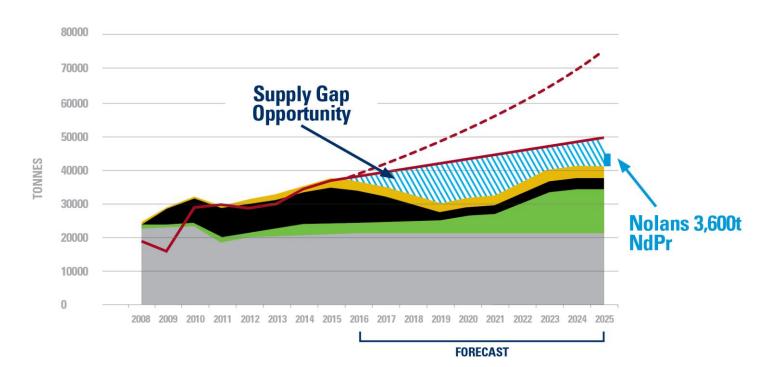


### The NdPr Opportunity



#### NdPr Oxide Supply & Demand



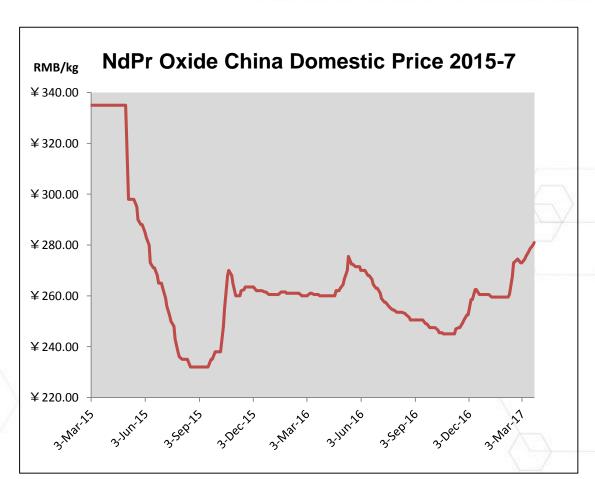




### **NdPr Supply Dynamics**



- △ China's consolidation to the "big 6" producers in 2015 is starting to positively impact price
- ▲ Enforcement of illegal and polluting mines and smelting
- ▲ Chinese rehabilitation costs yet to be realized
- ▲ Introduction of a raw material tracing system (chain of custody)





Source: MetalPages (An Argus Media company)

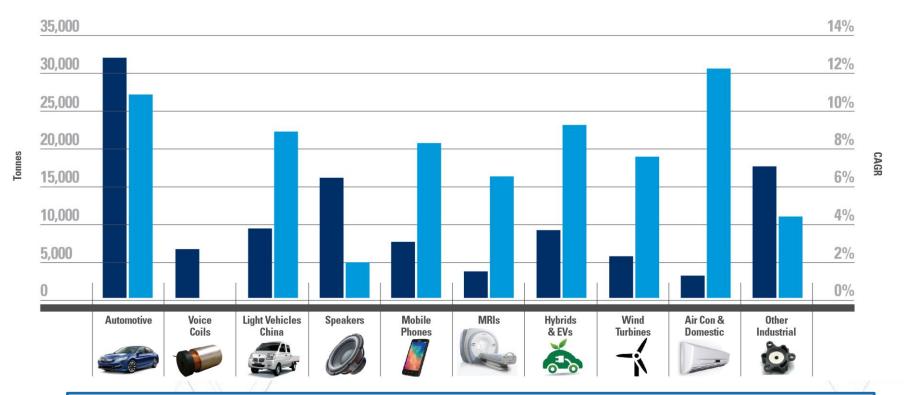
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### **Current and Forecast Magnet Growth**









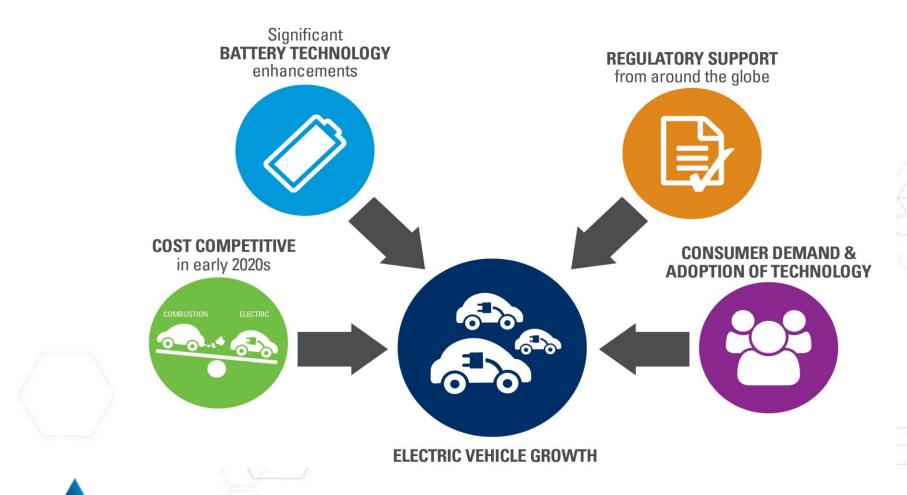


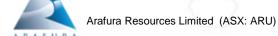
▲ Magnet growth being driven by clean technologies



### **EV Growth Enablers**







### **EV Automakers Focus PMSM = NdPr Magnets**



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MANUFACTURER	PMSM	AACIM	NOTES
AUDI	1		25% of US sales from EVs by 2025
BMW	1		EV range to extend to Series 3 and X4 for next generation of models
BYD	1		World's largest manufacturer of EVs
FORD	1		40% EVs by 2020
GENERAL MOTORS	1	1	Alliance with Lyft to create an integrated network of on-demand autonomous vehicles. China accounts for one-third of GM's total production
HONDA	1		Targeted two-thirds of sales by 2020. Honda Daido Steel heavy Dy free magnets
HYUNDAI	1		26 hybrid, plug-in, fuel cell and EV models by 2020
MITSUBISHI	1		Electric powered SUVs
NISSAN/RENAULT	1		10% EVs by 2020
TESLA		1	Independent manufacturer – disruptive technology?
TOYOTA	1		Gasoline to hydrogen fuel by 2050
VOLKSWAGON	1		25% EVs by 2025

PMSM = Permanent Magnet Synchronous Motor AACIM = Asynchronous AC Induction Motor





# Value Proposition





### **Nolans Value Proposition**



- △ One of the world's largest resources of NdPr in a low sovereign risk location
- ▲ Established and responsible regulatory environment
- ▲ Environmental approvals expected 2017
- ▲ 20+ year mine life can provide a stable, secure, clearly defined supply of critical raw materials for a low emissions economy





#### **Contact:**

**Level 3, 263 Adelaide Terrace** 

Perth WA 6000 Australia

T: +61 8 6210 7666

E: arafura@arultd.com



