



# Leverage to Battery Metals

Australian Nickel Conference

Peter Harold, Managing Director

17 October 2017

[www.panoramicresources.com](http://www.panoramicresources.com)

ASX: PAN

# Disclaimer

## No New Information or Data

This presentation contains references to exploration results and Resource estimates, all of which have been cross referenced to previous market announcements made by the Company. The Company confirms that it is not aware of any new information or data that materially affects the information included in the relevant market announcements and, in the case of estimates of Mineral Resources, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed.

## Forward Looking Statements

This presentation may contain certain “forward-looking statements” which may not have been based solely on historical facts, but rather may be based on the Company’s current expectations about future events and results. Where the Company expresses or implies an expectation or belief as to future events or results, such expectation or belief is expressed in good faith and believed to have a reasonable basis. However, forward looking statements are subject to risks, uncertainties, assumptions and other factors, which could cause actual results to differ materially from future results expressed, projected or implied by such forward-looking statements. Such risks include, but are not limited to metals price volatility, currency fluctuations, increased production costs and variances in ore grade or recovery rates from those assumed in mining plans, as well as political and operational risks in the Countries and States in which we operate or sell product to, and governmental regulation and judicial outcomes. For a more detailed discussion of such risks and other factors, see the Company’s Annual Reports, as well as the Company’s other filings. The Company does not undertake any obligation to release publicly any revisions to any “forward-looking statement” to reflect events or circumstances after the date of this announcement, or to reflect the occurrence of unanticipated events, except as may be required under applicable securities laws.



Battery Revolution

Metal Price Outlook

Savannah Ni, Cu, Co

Savannah comparisons

Corporate

Summary



# Battery Revolution

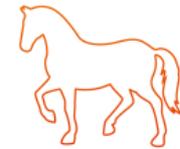
**PANORAMIC**  
RESOURCES LTD



# What is a Disruption?

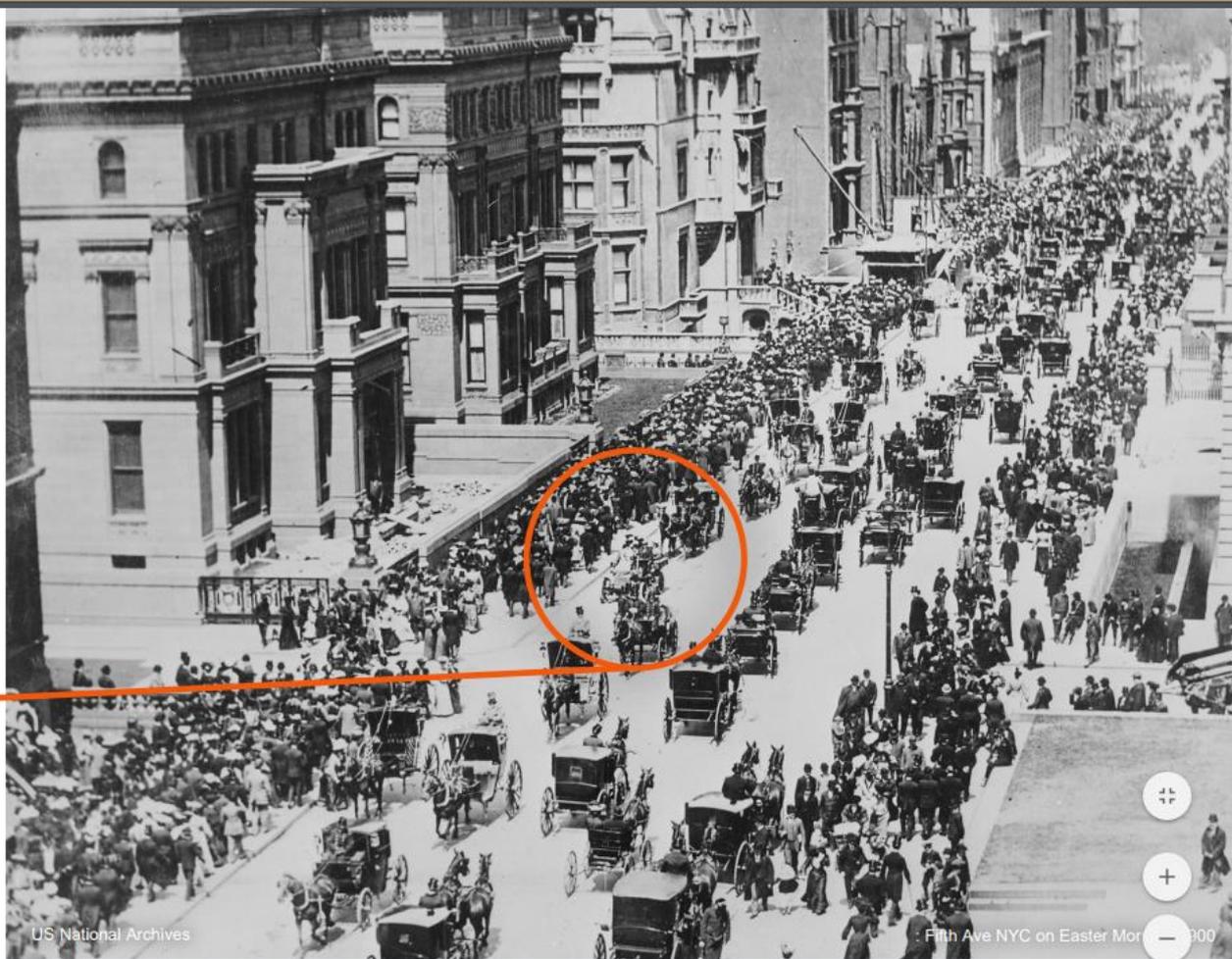
WHEN A NEW PRODUCT OR SERVICE HELPS  
**create a new market**

AND  
**significantly weaken,  
transform, or  
destroy an existing product,  
market category / industry**



5<sup>th</sup> AVE NYC  
1900

Where is  
the  
car?



5<sup>th</sup> AVE NYC  
1913

Where is  
the  
horse?



# 1. Electric Motor - 5X more Energy Efficient

## Energy Efficiency



Internal  
Combustion  
Engine



Electric  
Motor

## 2. EVs are 10X cheaper to charge/fuel

- ▶ It costs **\$15,000** to fill up a (gas) Jeep Liberty over **five years** (Consumer Reports)
- ▶ An **Electric** Jeep Liberty would cost **\$1,565** in electricity
- ▶ Improvements in power electronics will **increase 10X**

### Assumptions:

12,000 miles/year

Tesla Roadster: 4.6 miles per kWh.

Ave retail electricity in the U.S.: 12 ¢/kWh

5 year-cost =  $(60,000 \text{ miles} * 0.12 \text{ \$/kWh}) / 4.6 \text{ miles/kWh} = \$1,565.$



### 3. EVs: 100X fewer Moving Parts

ICE (Gas) Vehicle

**2,000+** moving parts (1)

Transmission,  
driveshaft, clutch,  
valves, differentials,  
pistons, gears,  
carburetors,  
crankshafts...



Electric Vehicle (EV)

**18** moving parts (1)



- ▶ EVs **10X-100X** cheaper to maintain!
- ▶ Tesla: **Infinite Mile Warranty!** (2)

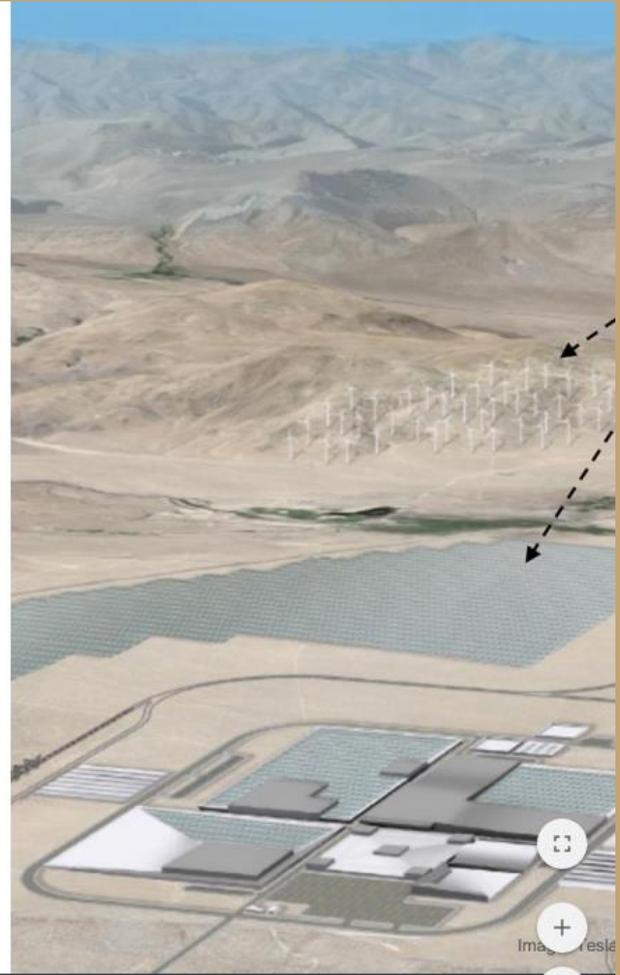
# Tesla's Battery GigaFactory

- ▶ **\$5 Billion investment** (6,500 jobs)
- ▶ Battery pack output: 50 GWh year  
→ **500,000 cars/year**
- ▶ **Double world battery production**

**Reduce battery  
pack costs by**

**30-50+  
%**

Tech improvement. "Tesla expects to increase pack capacity by roughly 5% per year." (1)



# Battery Megafactories are coming!

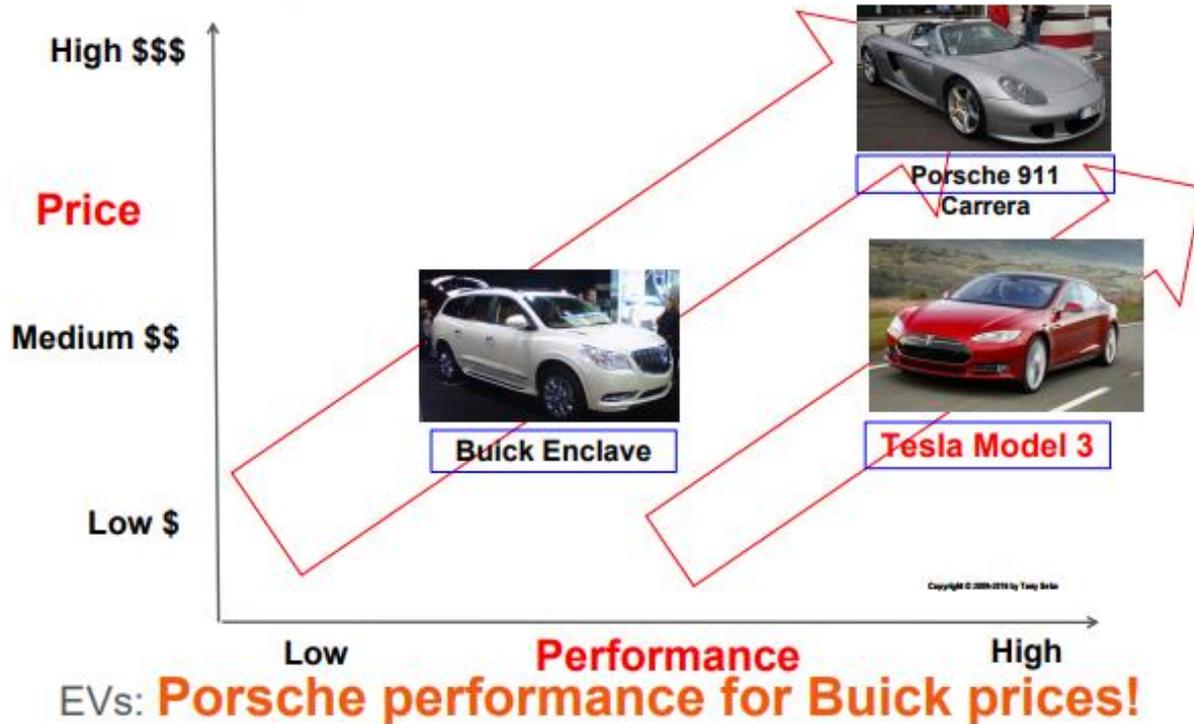
- ▶ **BYD** plans to add **6 GWh** every year.
  - ▶ Could ramp up to **34 GWh** by 2020 - matching Tesla's **35 GWh** (1)
- ▶ **Foxconn** and **LG Chem** could add combined **22 GWh** (2)
- ▶ Nissan: 4.5 GWh
- ▶ **Samsung SDI**, TDK, Apple, Bosch, VW, etc.

**Tech Cost Curve could accelerate!**



Image Source: Samsung SDI

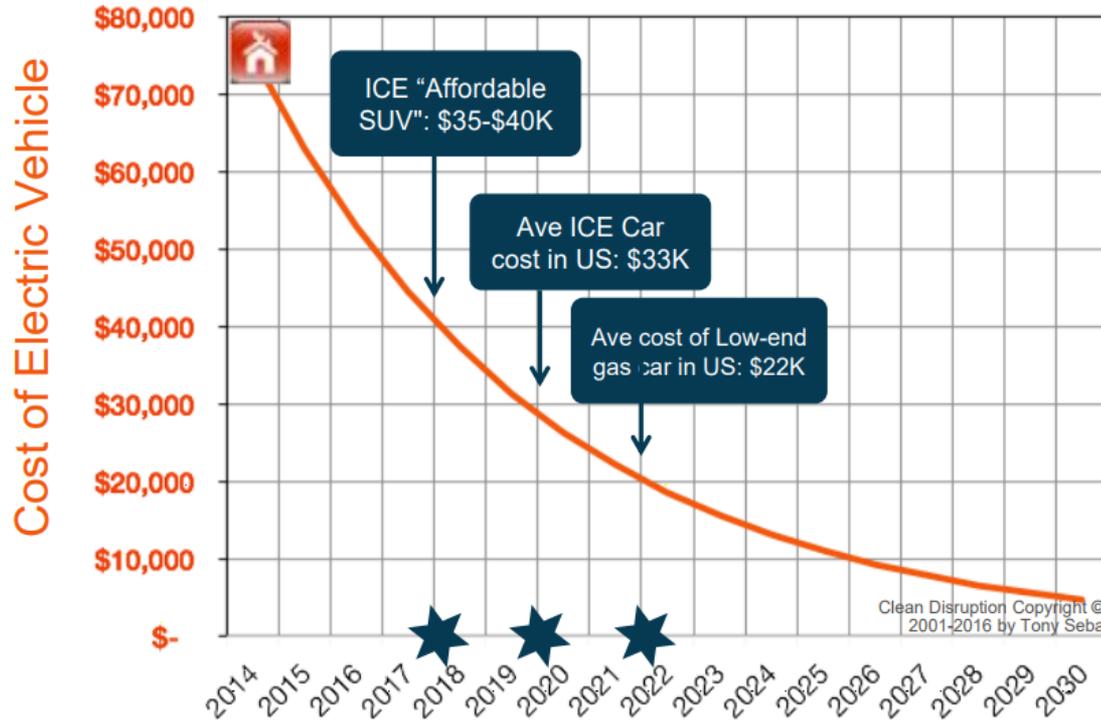
# EVs Shift the Price/Performance equation: Disrupt the BASIS of COMPETITION



OK, SO THE EV IS DISRUPTIVE  
How long will the transition  
take?

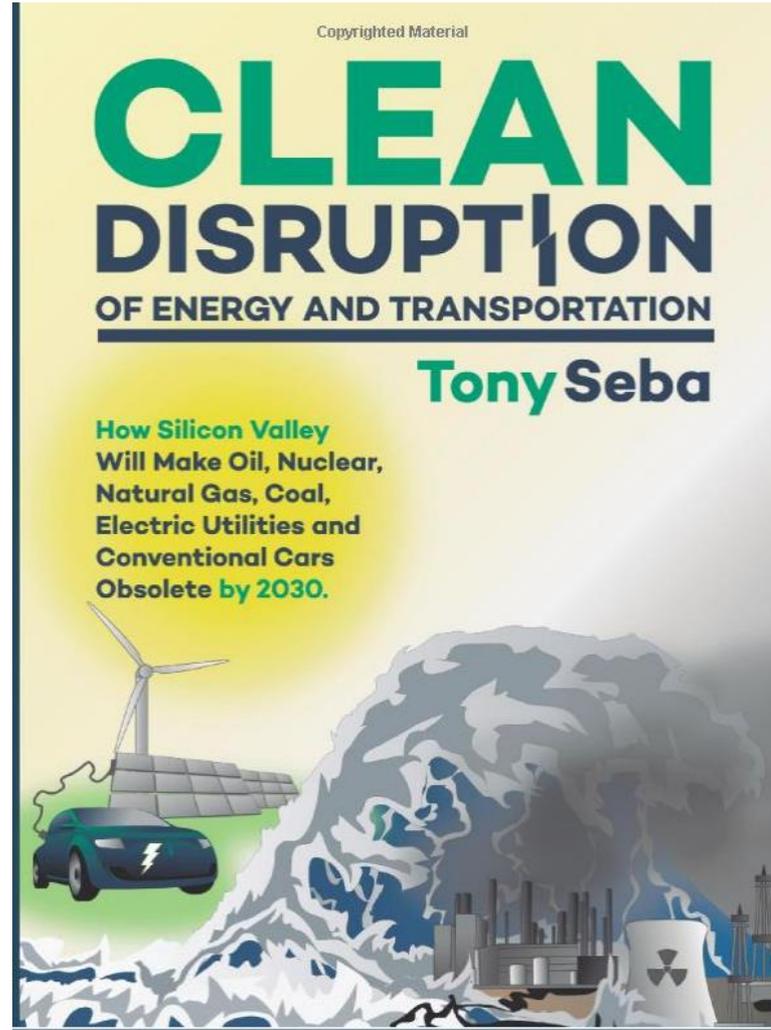


# Disruption from Above: Cost of EV with 200-mile (320 Km) range



**Assumptions:**  
4 miles/kWh,  
50kWh batteries,  
16% yearly improvement in  
battery costs,  
EV Costs = 3X cost of battery

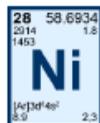
# “Conventional cars obsolete by 2030”



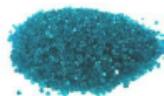
# Battery metals

Nickel and cobalt are key ingredients for the manufacture of lithium-ion batteries

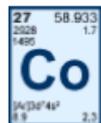
An example of a Nickel-Cobalt-Aluminum (NCA) battery



↓ 8 parts



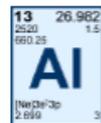
Nickel Sulphate



↓ 1 part



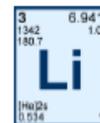
Cobalt Sulphate



↓ 1 part



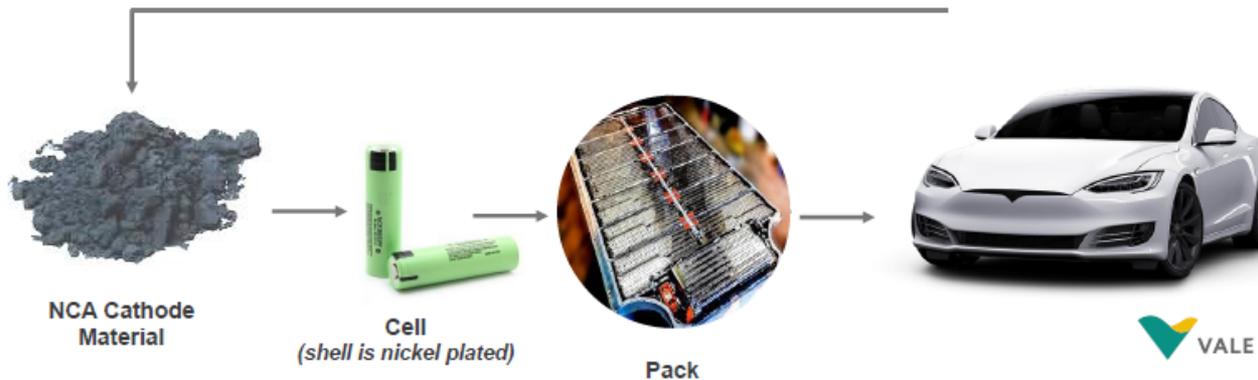
Aluminum Sulphate



↓ 1 part



Lithium Carbonate

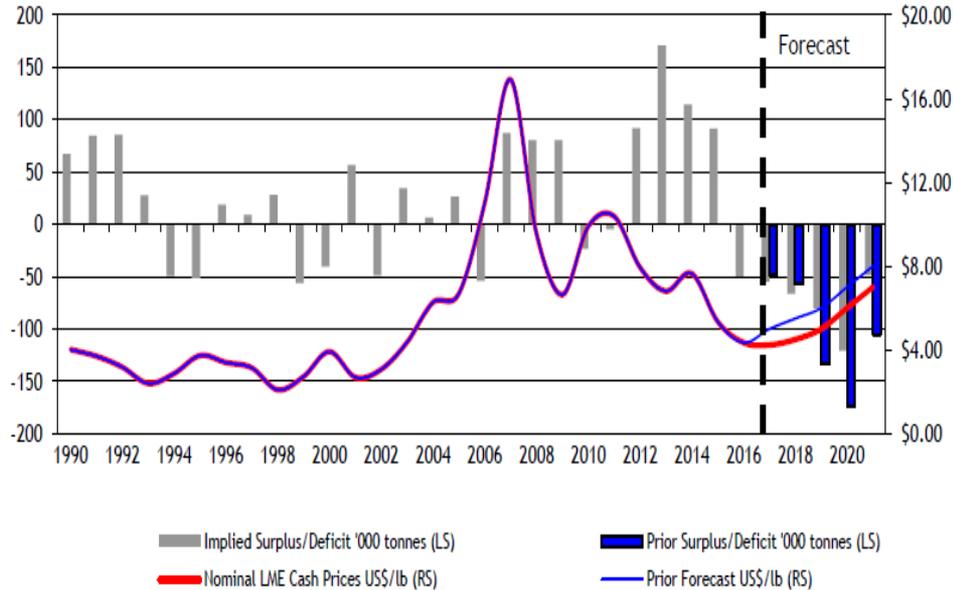


Source: Vale Analysis

# METAL PRICE OUTLOOK



# Nickel price



Source: Wood Mackenzie, RBC Capital Markets estimates

- Ni Price as at 16 October 2017
  - US\$5.32/lb LME cash

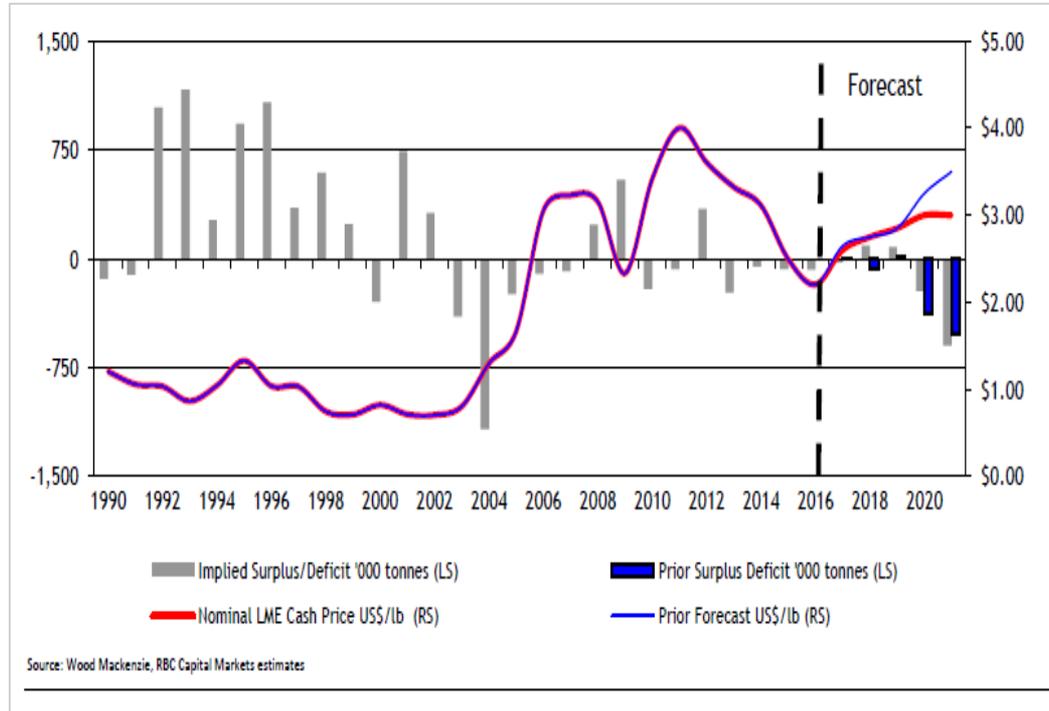
- RBC Price Forecasts (US\$/lb)\*

2018	\$4.50
2019	\$5.00
2020	\$6.00
2021	\$7.00

**Long Term (Real 2017 \$) \$8.00  
2022 and beyond**

\*Source document: RBC Capital Markets Global Metals & Mining Q3/2017 Outlook – 28 June 2017

# Copper price



■ **Cu Price as at 16 October 2017**  
 ■ **US\$3.18/lb LME cash**

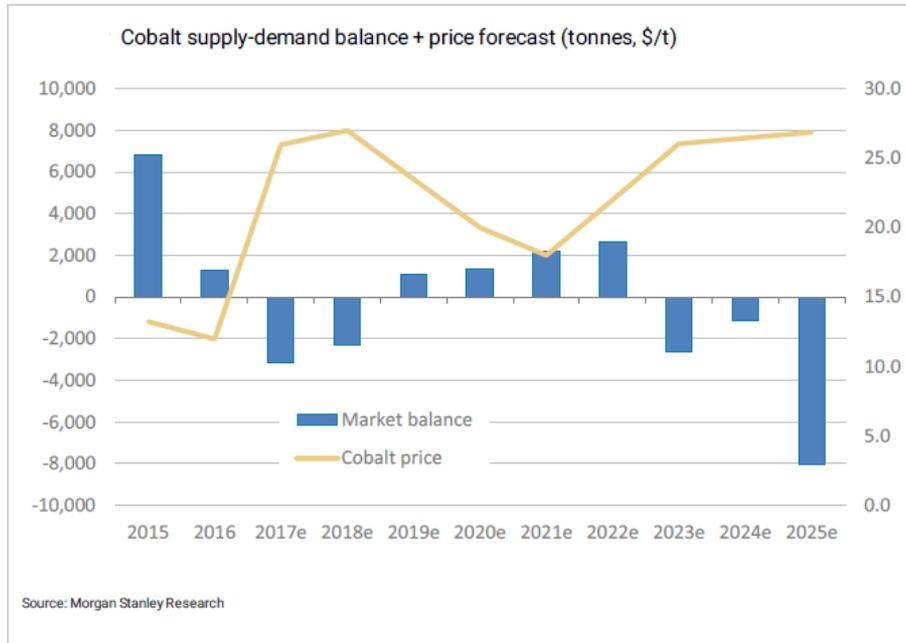
■ **RBC Price Forecasts (US\$/lb)\***

2018	\$2.75
2019	\$2.85
2020	\$3.00
2021	\$3.00

**Long Term (Real 2017 \$) \$2.85**  
**2022 and beyond**

\*Source: RBC Capital Markets Global Metals & Mining Q3/17 Outlook – 28 June 2017

# Cobalt price



- **Co Price as at 16 October 2017**
  - **US\$29.30/lb (99.3% Co low)**

## Morgan Stanley\*

- Since 2000, Co price has averaged US\$20/lb (real 2017\$).
- Demand growth from EV's positive price pressure
- **Long term forecast US\$23/lb (real 2017\$)**

\*Source: Morgan Stanley Research "Commodity Matters, Cobalt, Measured" – 28 June 2017

# SAVANNAH - the journey continues

Large Resource, Long Life, Low Cost

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# Savannah - summary

## Combined Resources at Savannah\*

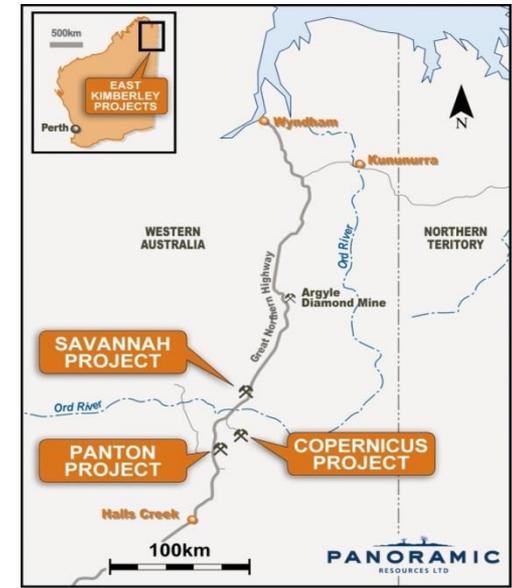
- 226,400t Ni
- 104,700t Cu
- 15,300t Co

## Assets

- Underground mine, 1Mtpa processing plant, mobile mining fleet & associated infrastructure

## History

- Operated continuously for 12 years
- 8.5Mt ore milled
- 95kt Ni, 53kt Cu, 5kt Co of metal
- Care and maintenance from May 2016



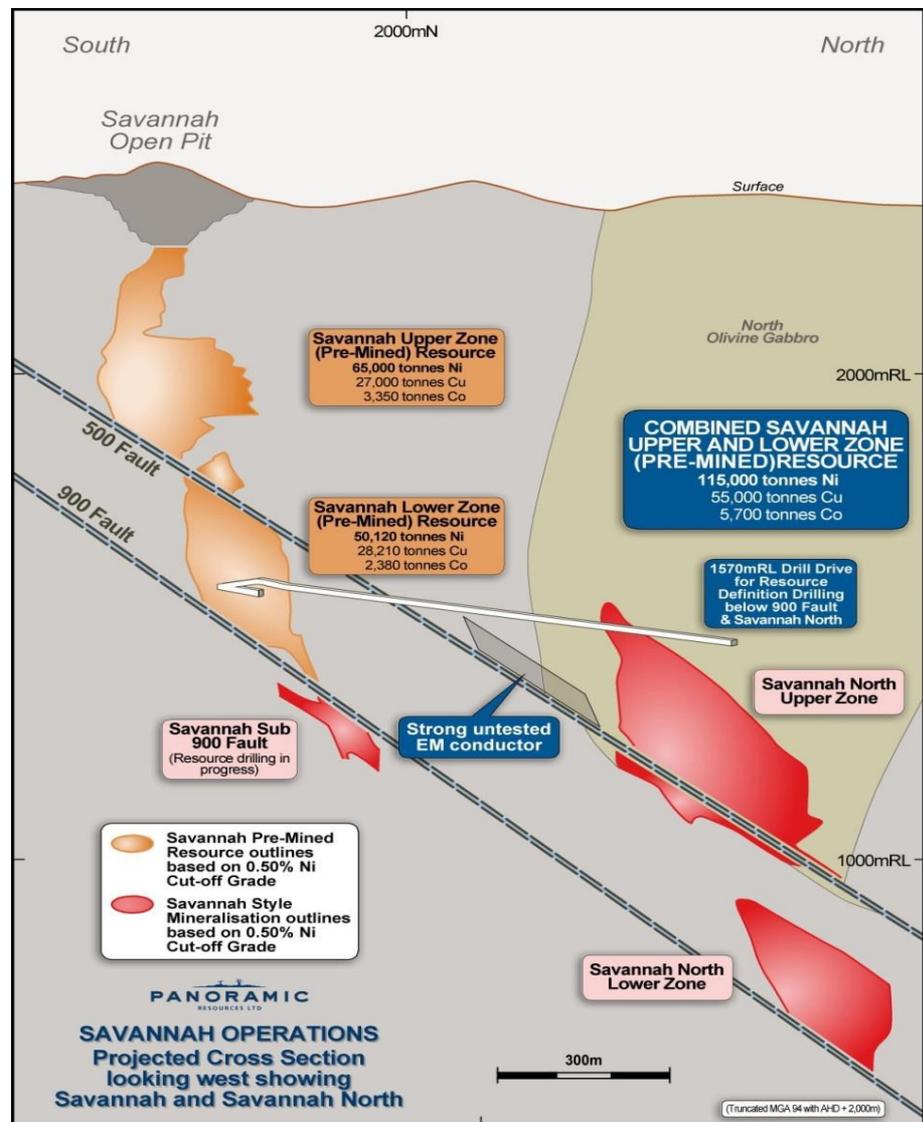
# Savannah North

## Upgraded Resource\*

- 175,100t Ni
- 74,400t Cu
- 12,700t Co

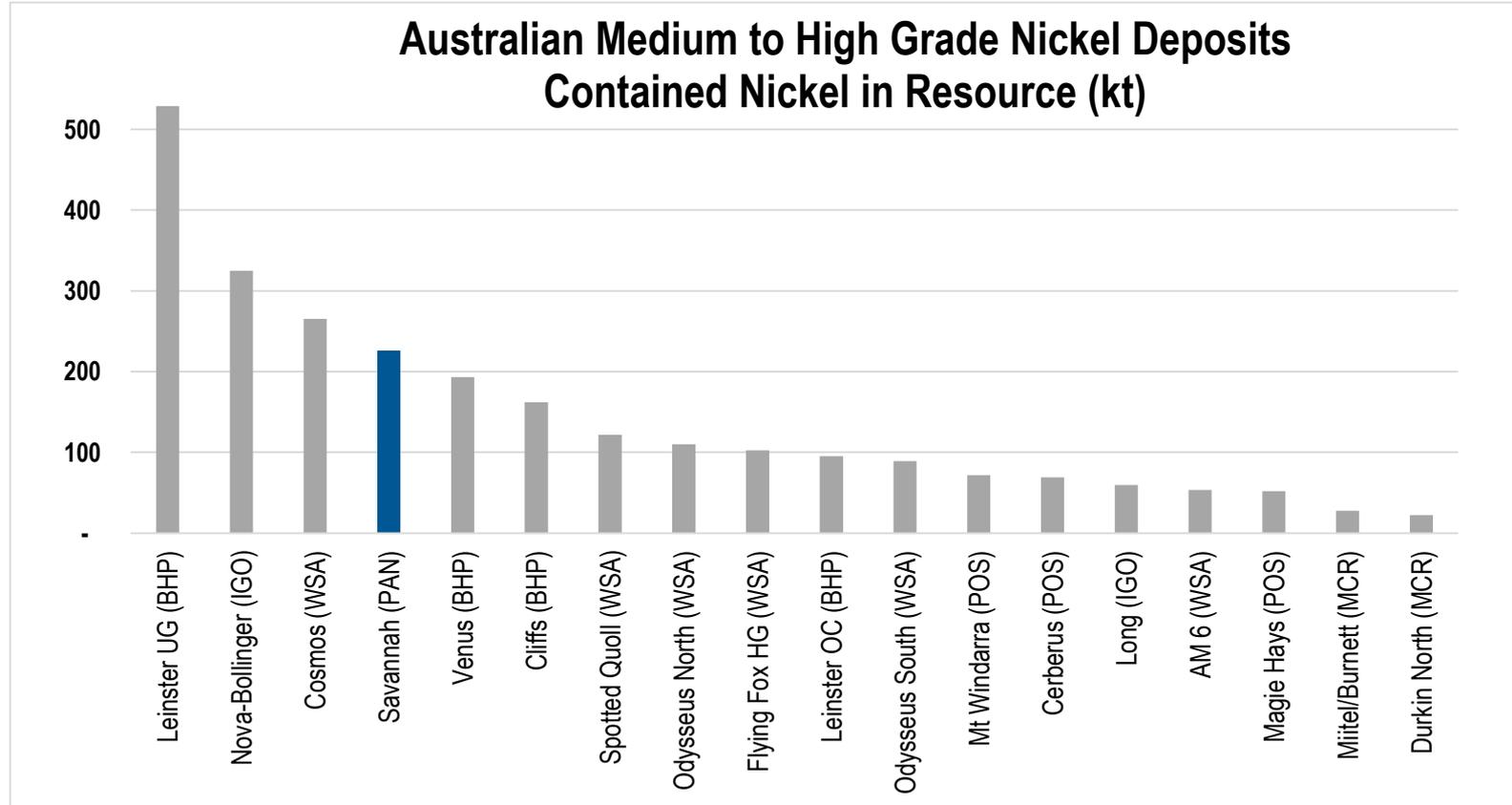
## Key Points

- ~500 metres from existing decline
- July 2017 Feasibility Study Optimisation:
  - ~8.5 year mine life
  - ~11,000t Ni, ~5,800t Cu, ~760t Co pa
  - Short development timeframe
  - Relatively low re-start CAPEX
  - Competitive OPEX
- Exploration upside



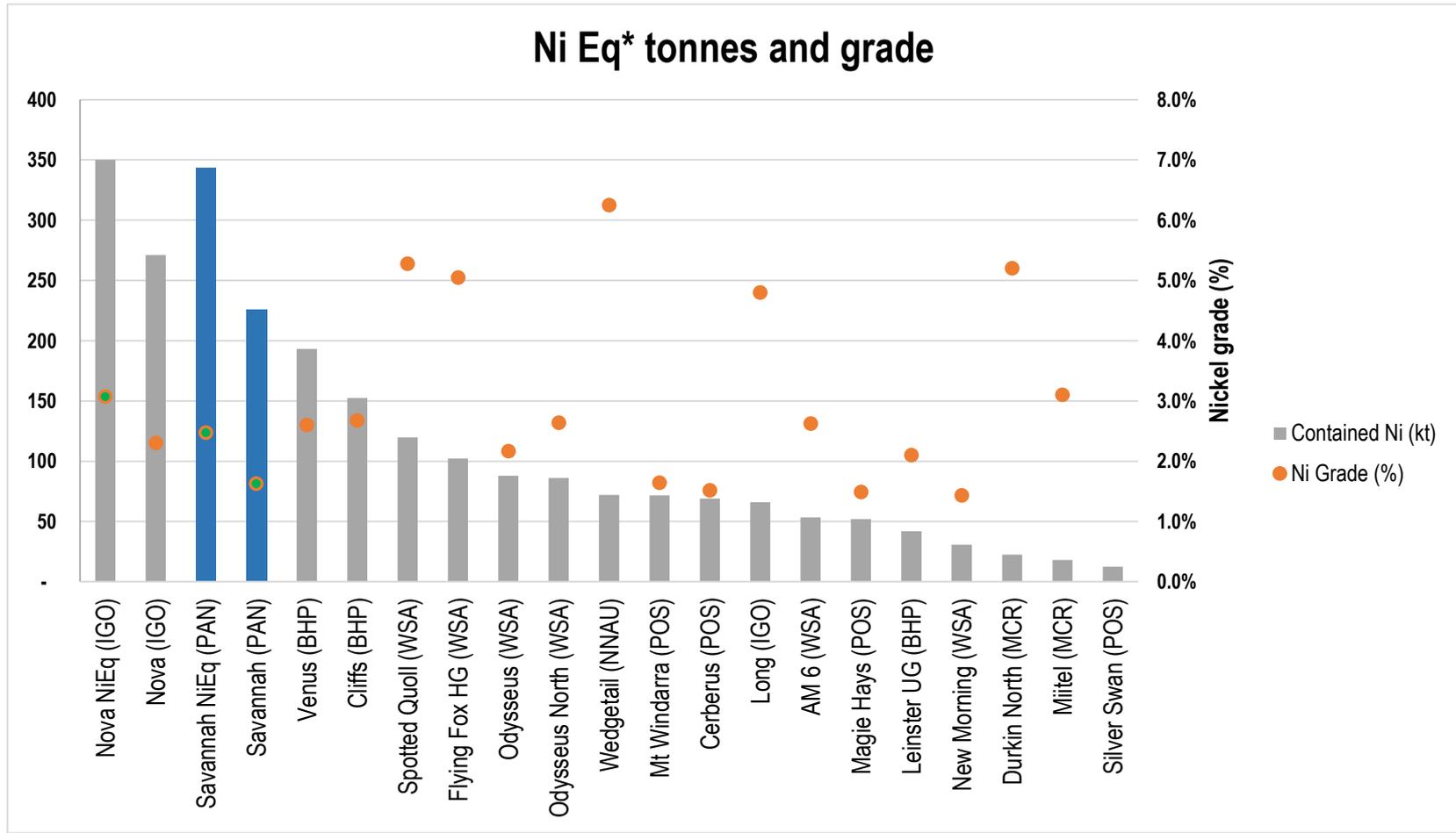
# Savannah against its peers

- Savannah is the fourth largest contained sulphide nickel in Western Australia
- Savannah has the size and scale



Source: Various ASX Company Announcements

# Savannah grade and metal contained comparison



\*Panoramic internal calculations using Ni US\$5.00/lb, Cu US\$2.95/lb, Co US\$18.00/lb

CORPORATE

  
**PANORAMIC**  
RESOURCES LTD



# Corporate directory

## Capital Structure and Enterprise Value

ASX Ticker	ASX: PAN
Shares on issue	428.6M
Share Price	\$0.41 (16 October 2017)
Market Cap	~\$176M
Cash	~\$10.7M (30 June 2017)
Bank debt	Nil
Enterprise Value	~\$165M

## Significant Shareholder (at 30 September 2017)

Zeta Resources Limited	27.5%
Commonwealth Bank of Australia	5.43%

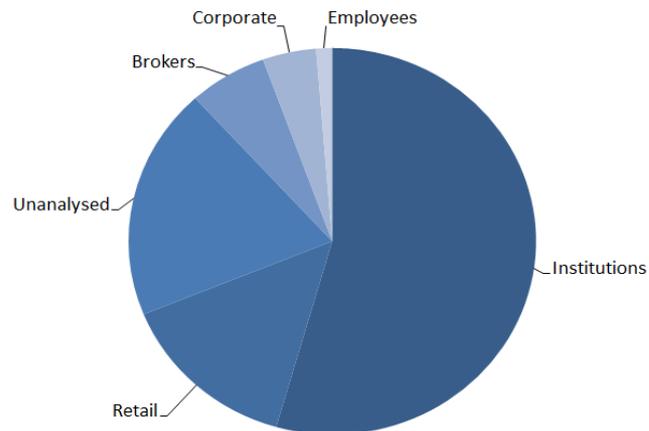
## Volume

30-day average daily volume	405,000
90-day average daily volume	550,000

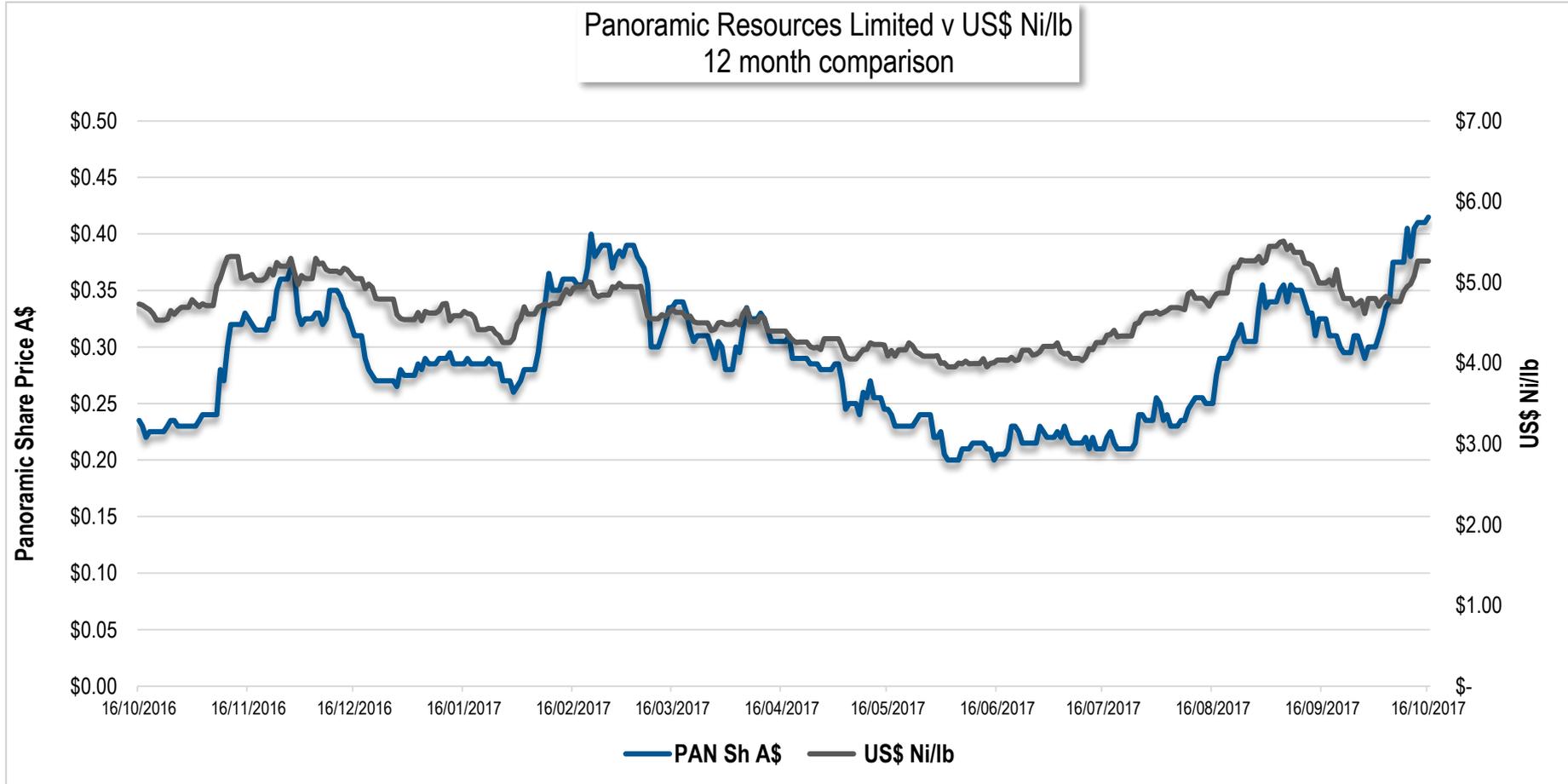
## Board

Brian Phillips	Non Executive Chairman
Peter Harold	Managing Director
John Rowe	Non Executive Director
Peter Sullivan	Non-Executive Director
Trevor Eton	CFO/Company Secretary

## Shareholder spread +50% institutional



# Highly leveraged to nickel price

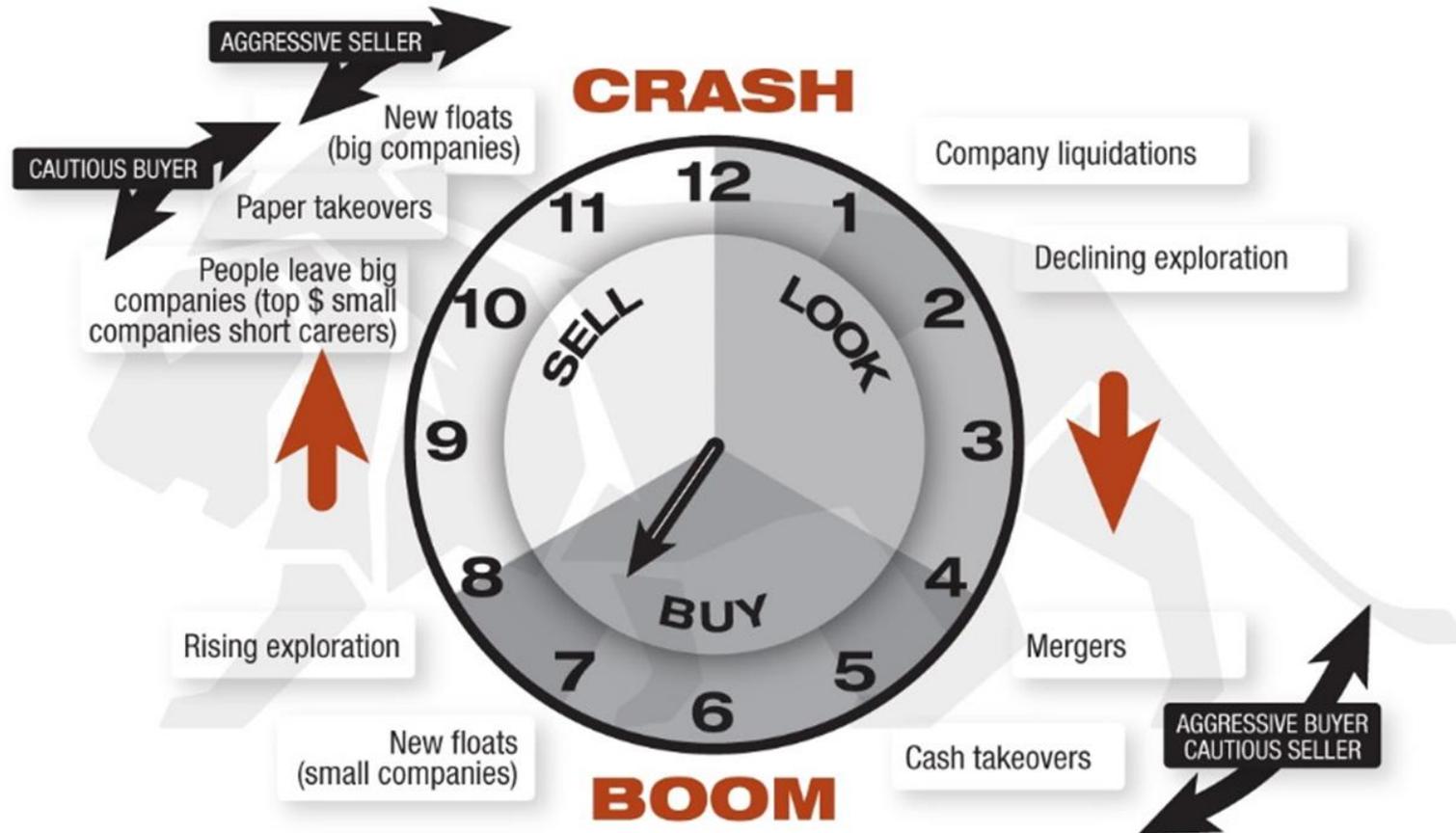


# Panoramic – A full house

- ✓ Savannah is a significant Australian base metal project
  - 226,000t nickel
  - 105,000t copper
  - 15,300t cobalt
  - financially robust, +8 year mine life
  - Low re-start capex
  - Short timeframe to production
- ✓ Panoramic has a house full of commodities leverage to Ni, Cu, Co, Au and PGMs
- ✓ Excellent potential for further exploration success and mine life extension
- ✓ Proven management team that will drive value



# Investment in Resources – Timing is right



Source: Lion Selection Group ASX:LSX, October 2017.

## **Mission Statement**

We strive to achieve excellence in all aspects of our business to provide long term capital growth and dividend return to our shareholders, a safe and rewarding work environment for our employees, and opportunities and benefits to the people in the communities we operate in.



# Appendices



*Note: further 2012 Edition JORC compliance tables are referenced in the PAN ASX announcement dated 30 September 2017*



# Resources and Reserves

## NICKEL – MINERAL RESOURCES AS AT 30 JUNE 2017

Resource	Equity	Metal	JORC Compliance	Measured		Indicated		Inferred		Total	
				Tonnes	(%)	Tonnes	(%)	Tonnes	(%)	Tonnes	(%)
<b>Savannah Project</b>											
Savannah (above 900)	100%	Nickel	2012	1,275,000	1.51	759,000	1.20	-	-	2,034,000	1.39
		Copper			0.87		0.90		-		0.88
		Cobalt			0.07		0.07		-		0.07
Savannah (below 900)	100%	Nickel	2012	780,000	1.64	125,000	1.72	-	-	905,000	1.65
		Copper			0.76		0.75		-		0.76
		Cobalt			0.10		0.09		-		0.10
Savannah North (Upper)	100%	Nickel	2012	-	-	4,229,000	1.64	1,759,000	1.25	5,987,000	1.53
		Copper			-		0.65		0.49		0.60
		Cobalt			-		0.12		0.10		0.11
Savannah North (Lower)	100%	Nickel	2012	-	-	2,697,000	1.96	853,000	2.02	3,549,000	1.97
		Copper			-		0.98		0.93		0.97
		Cobalt			-		0.14		0.13		0.14
Savannah North (Other)	100%	Nickel	2012	-	-	242,000	2.22	493,000	1.67	735,000	1.85
		Copper			-		0.50		0.53		0.52
		Cobalt			-		0.14		0.11		0.12
<b>Lanfranchi Project</b>											
Cruikshank	100%	Nickel	2004	-	-	2,018,000	1.42	611,000	0.79	2,629,000	1.28
Deacon	100%	Nickel	2012	89,000	2.99	-	-	134,000	1.70	224,000	2.22
Gigantus	100%	Nickel	2004	-	-	-	-	652,000	1.63	652,000	1.63
Helmut South Ext	100%	Nickel	2012	21,000	4.54	29,000	2.87	-	-	50,000	3.59
John	100%	Nickel	2004	-	-	-	-	291,000	1.42	291,000	1.42
Lanfranchi	100%	Nickel	2012	40,000	4.12	55,000	4.40	63,000	3.49	158,000	3.97
Martin	100%	Nickel	2012	-	-	47,000	3.58	7,000	4.16	54,000	3.66
McComish	100%	Nickel	2004	-	-	-	-	992,000	1.49	992,000	1.49
Metcalfe	100%	Nickel	2012	-	-	280,000	1.99	111,000	1.35	391,000	1.81
Schmitz	100%	Nickel	2012	30,000	4.92	23,000	3.93	16,000	2.95	69,000	4.14
Lower Schmitz	100%	Nickel	2012	-	-	51,000	5.60	79,000	4.80	131,000	5.11
Winner	100%	Nickel	2004	-	-	14,000	4.40	-	-	14,000	4.40
Total (Equity)		Nickel									
		Copper									
		Cobalt									

# Resources and Reserves

## NICKEL – MINERAL RESOURCES AS AT 30 JUNE 2017

### Notes:

- *Figures have been rounded and therefore may not add up exactly to the reported totals*
- *All resources are inclusive of reserves*
- *Savannah Project Resource cutoff grade is 0.50% Ni*
- *Lanfranchi Project Resource cutoff grade is 1.00% Ni*

### Cross references to previous market announcements:

- *Savannah (above 900) - refer ASX announcement dated 30 September 2016 titled "Mineral Resources and Ore Reserves at 30 June 2016"*
- *Savannah (below 900) - refer ASX announcement dated 30 September 2015 titled "Mineral Resources and Ore Reserves at 30 June 2015"*
- *Savannah North – refer ASX announcement dated 24 August 2016 titled "Major Resource Upgrade for Savannah North"*
- *Cruickshank - refer ASX announcement dated 28 April 2011 titled "Cruickshank Resource Upgraded 26% to 33,560t Ni"*
- *Deacon, Helmut South Ext, Lanfranchi, Metcalfe - refer ASX announcement dated 30 September 2016 titled "Mineral Resources and Ore Reserves at 30 June 2016"*
- *Gigantus, John, McComish, Winner - refer ASX announcement dated 12 October 2011 titled "Business Review 2011"*
- *Martin - refer ASX announcement dated 13 September 2013 titled "Resources and Reserves at 30 June 2013 and Exploration Update"*
- *Schmitz - refer ASX announcement dated 30 September 2015 titled "Mineral Resources and Ore Reserves at 30 June 2015"*
- *Lower Schmitz - refer ASX announcement dated 28 April 2016 titled "Quarterly Report for the period ending 31 March 2016"*

### No New Information or Data

*The Mineral Resource estimates tabled above have been previously reported, and the relevant market announcements cross referenced.*

*The Company confirms that it is not aware of any new information or data that materially affects the information included in the relevant market*

*announcements and, in the case of estimates of Mineral Resources, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed.*

# Resources and Reserves

## NICKEL – MINERAL RESOURCES AS AT 30 JUNE 2017

Reserve	Equity	Metal	JORC Compliance	Proven		Probable		Total		Metal Tonnes
				Tonnes	(%)	Tonnes	(%)	Tonnes	(%)	
<b>Savannah Project</b>										
Above 900 Fault	100%	Nickel	2012	1,365,000	1.15	194,000	1.24	1,558,000	1.16	18,100
		Copper			0.66		1.28		0.74	11,500
		Cobalt			0.06		0.07		0.06	900
Savannah North	100%	Nickel	2012	-	-	6,650,000	1.24	6,650,000	1.42	94,500
		Copper			-		1.28		0.61	40,900
		Cobalt			-		0.10		0.10	6,700
<b>Lanfranchi Project</b>										
Deacon	100%	Nickel	2012			42,000	2.67	42,000	2.67	1,100
Metcalfe	100%	Nickel	2012			113,000	1.57	113,000	1.57	1,800
Lanfranchi	100%	Nickel	2012			11,000	2.56	11,000	2.56	300
Schmitz	100%	Nickel	2012			15,000	2.96	15,000	2.96	500
Helmut Sth Ext	100%	Nickel	2012			27,000	2.19	27,000	2.19	600
<b>Total (Equity)</b>		<b>Nickel</b>								<b>116,800</b>
		<b>Copper</b>								<b>52,400</b>
		<b>Cobalt</b>								<b>7,600</b>

### Notes:

- Figures have been rounded and therefore may not add up exactly to the reported totals
- Savannah Project Reserve cutoff grade is 0.80% Ni
- Lanfranchi Project Reserve cutoff grade is 1.00% Ni except for airleg mining which is 2.00% Ni

### Cross references to previous market announcements:

- refer to ASX announcement dated 30 September 2016 titled "Mineral Resources and Ore Reserves at 30 June 2016"
- refer to ASX announcement dated 2 February 2017 titled "Savannah Feasibility Study. Ten-year life with minimal restart capital requirements"

### No New Information or Data

The Nickel Ore Reserve estimates tabled above have been previously reported, and the relevant market announcements cross referenced. The Company confirms that it is not aware of any new information or data that materially affects the information included in the relevant market announcements and, in the case of the estimates of Ore Reserves, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcements continue to apply and have not materially changed

# Resources and Reserves

## PLATINUM GROUP METALS – MINERAL RESOURCES AS AT 30 JUNE 2017

Resource	Equity	JORC Compliance	Tonnage	Grade									Contained Metal	
				Pt (g/t)	Pd (g/t)	Rh (g/t)	Au (g/t)	Ag (g/t)	Cu (%)	Ni (%)	Co %	Pt-Eq (g/t)	Pt (oz ,000)	Pd (oz ,000)
<b>Thunder Bay North</b>														
Open Pit	100%	2004												
Indicated			8,460,000	1.04	0.98	0.04	0.07	1.50	0.25	0.18	0.014	2.13	283	267
Inferred			53,000	0.96	0.89	0.04	0.07	1.60	0.22	0.18	0.014	2.00	2	2
Underground	100%	2004												
Indicated			1,369,000	1.65	1.54	0.08	0.11	2.60	0.43	0.24	0.016	3.67	73	68
Inferred			472,000	1.32	1.25	0.06	0.09	2.10	0.36	0.19	0.011	2.97	20	19
<b>Sub-total – Thunder Bay North (Equity)</b>			<b>10,354,000</b>	<b>1.13</b>	<b>1.07</b>								<b>377</b>	<b>355</b>
<b>Panton</b>														
Top Reef	100%	2012												
Measured			4,400,000	2.46	2.83	-	0.42	-	0.08	0.28	-	-	348	400
Indicated			4,130,000	2.73	3.21	-	0.38	-	0.09	0.31	-	-	363	426
Inferred			1,560,000	2.10	2.35	-	0.38	-	0.13	0.36	-	-	105	118
Middle Reef	100%	2012												
Measured			2,130,000	1.36	1.09	-	0.10	-	0.03	0.18	-	-	93	75
Indicated			1,500,000	1.56	1.28	-	0.10	-	0.04	0.19	-	-	75	62
Inferred			600,000	1.22	1.07	-	0.10	-	0.05	0.19	-	-	24	21
<b>Sub-total – Panton (Equity)</b>			<b>14,320,000</b>	<b>2.19</b>	<b>2.39</b>								<b>1,008</b>	<b>1,102</b>
<b>Total - PGM (Equity)</b>													<b>1,385</b>	<b>1,456</b>

# Resources and Reserves

## PLATINUM GROUP METALS – MINERAL RESOURCES AS AT 30 JUNE 2017

### Notes

*Thunder Bay North Open Pit Resource: The open pit Mineral Resource is reported at a cut-off grade of 0.59 g/t Pt-Eq within a Lerchs-Grossman resource pit shell optimized on Pt-Eq. The strip ratio (waste:ore) of this pit is 9.5:1. The platinum-equivalency formula is based on assumed metal prices and overall recoveries. The Pt-Eq formula is:  $Pt-Eq\ g/t = Pt\ g/t + Pd\ g/t \times 0.3204 + Au\ g/t \times 0.6379 + Ag\ g/t \times 0.0062 + Cu\ g/t \times 0.00011 + Total\ Ni\ g/t \times 0.000195 + Total\ Co\ g/t \times 0.000124 + Rh\ g/t \times 2.1816$ . The conversion factor shown in the formula for each metal represents the conversion from each metal to platinum on a recovered value basis. The assumed metal prices used in the Pt-Eq formula are: Pt US\$1,595/oz, Pd US\$512/oz, Au US\$1,015/oz, Ag US\$15.74/oz, Cu US\$2.20/lb, Ni US\$7.71/lb, Co US\$7.71/lb and Rh US\$3,479/oz. The assumed combined flotation and PlatsolTM process recoveries used in the Pt-Eq formula are: Pt 76%, Pd 75%, Au 76%, Ag 55%, Cu 86%, Ni 44%, Co 28% and Rh 76%. The assumed refinery payables are: Pt 98%, Pd 98%, Au 97%, Ag 85%, Cu 100%, Ni 100%, Co 100% and Rh 98%.*

*Thunder Bay North Underground Resource: The underground mineral resource is reported at a cut-off grade of 1.94g/t Pt-Eq. The Pt-Eq formula is:  $Pt-Eq\ g/t = Pt\ g/t + Pd\ g/t \times 0.2721 + Au\ g/t \times 0.3968 + Ag\ g/t \times 0.0084 + Cu\ g/t \times 0.000118 + Sulphide\ Ni\ g/t \times 0.000433 + Sulphide\ Co\ g/t \times 0.000428 + Rh\ g/t \times 2.7211$ . The assumed metal prices used in the Pt-Eq formula are: Pt US\$1,470/oz, Pd US\$400/oz, Rh US\$4,000/oz, Au US\$875/oz, Ag US\$14.30/oz, Cu US\$2.10/lb, Ni US\$7.30/lb and Co US\$13.00/lb. The assumed process recoveries used in the Pt-Eq formula are: Pt 75%, Pd 75%, Rh 75%, Au 50%, Ag 50%, Cu 90%, and Ni and Co in sulphide 90%. The assumed smelter recoveries used in the Pt-Eq formula are Pt 85%, Pd 85%, Rh 85%, Au 85%, Ag 85%, Cu 85%, Ni 90% and Co 50%. Ni and Co in sulphide were estimated by linear regression of MgO to total Ni and total Co respectively. The regression formula for Ni in sulphide (NiSx) is:  $NiSx = Ni - (MgO\% \times 60.35 - 551.43)$ . The regression formula for Co in sulphide (CoSx) is:  $CoSx = Co - (MgO\% \times 4.45 - 9.25)$ .*

### Cross references to previous market announcements:

- *Thunder Bay North Open Pit Resources – refer Magma Metals Limited (ASX:MMW) announcement dated 7 February 2011 titled “Positive Scoping Study for Thunder Bay North Project”*
- *Thunder Bay North Underground Resources – refer Magma Metals Limited (ASX:MMW) announcement dated 23 February 2012 titled “Magma Metals Increases Mineral Resources at TBN to 790,000 Platinum-Equivalent Ounces”*
- *Panton - refer ASX announcement dated 30 September 2015 titled “Mineral Resources and Ore Reserves at 30 June 2015”*

### No New Information or Data

*The Mineral Resource estimates tabled above have been previously reported, and the relevant market announcements cross referenced. The Company confirms that it is not aware of any new information or data that materially affects the information included in the relevant market announcements and, in the case of estimates of Mineral Resources, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed.*