

# Exploration : Australia vs The World

Richard Schodde  
Managing Director, MinEx Consulting  
Adjunct Professor, Centre for Exploration Targeting, UWA

International Mining and Resource Conference (IMARC)  
31<sup>st</sup> October 2023, Sydney

# Overview

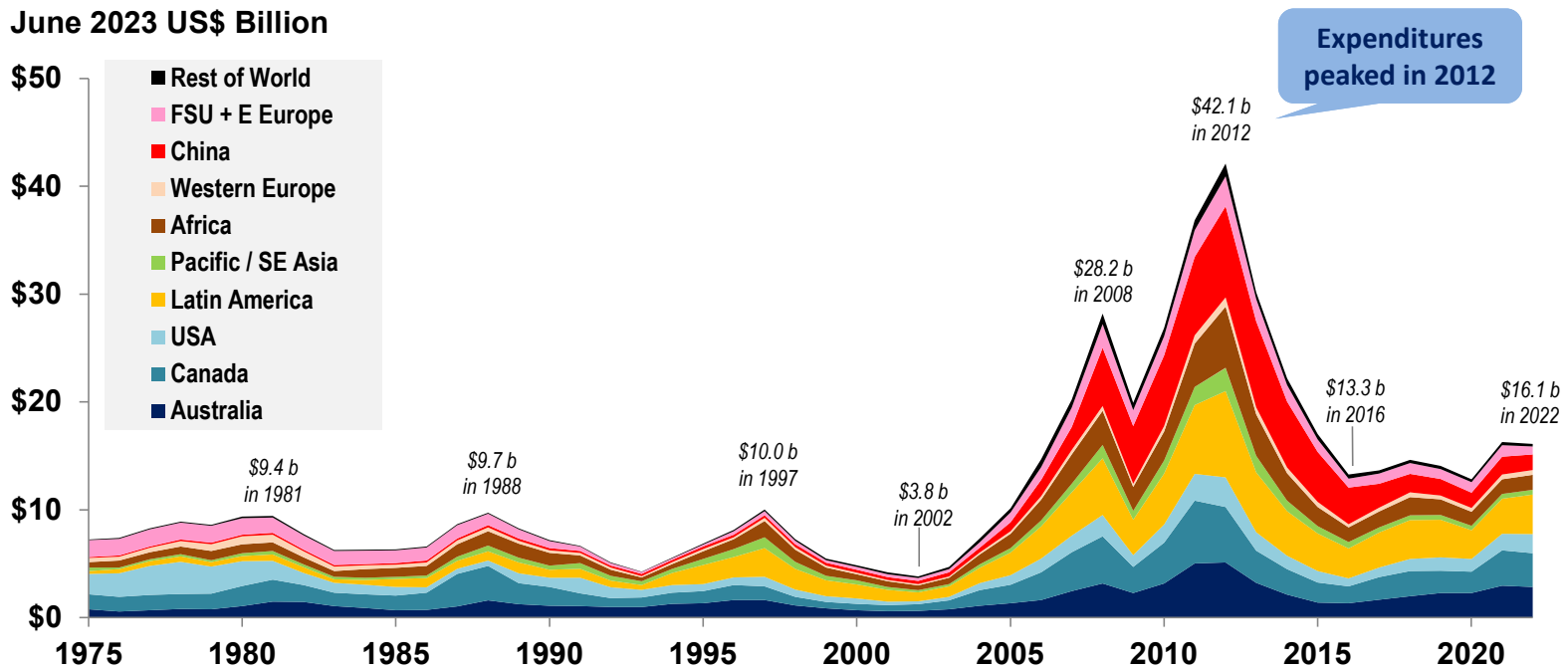
1. Long term trend in exploration expenditures
2. Number of discoveries made
3. Trend in discovery performance
4. Location of recent discoveries
5. Value proposition for exploration
6. Case Study : The value proposition for different players
7. Summary / Conclusions

In 2022 exploration expenditures are less than half that achieved in the boom of 2010-12

## **1. TRENDS IN EXPLORATION SPEND**

# Exploration expenditures by Region

## All Metals : 1975-2022



Note: Includes Bulk Minerals as well as Base & Precious Metals

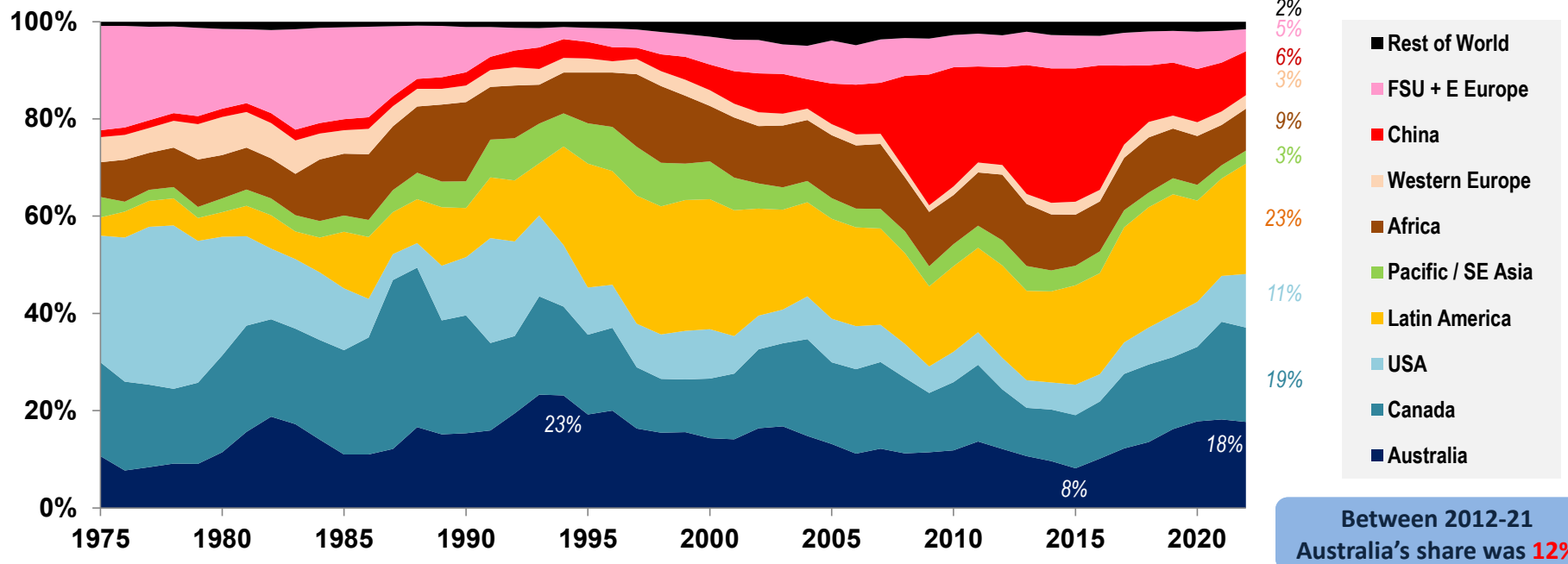
Sources: MinEx Consulting estimates October 2023, based on data from ABS, NRCAN, MNR (China), IAEA and S&P

# Exploration expenditures by Region: 1975-2022

In recent years there has been a major shift back to Canada and Australia

Market share in 2022

Percentage of total spend



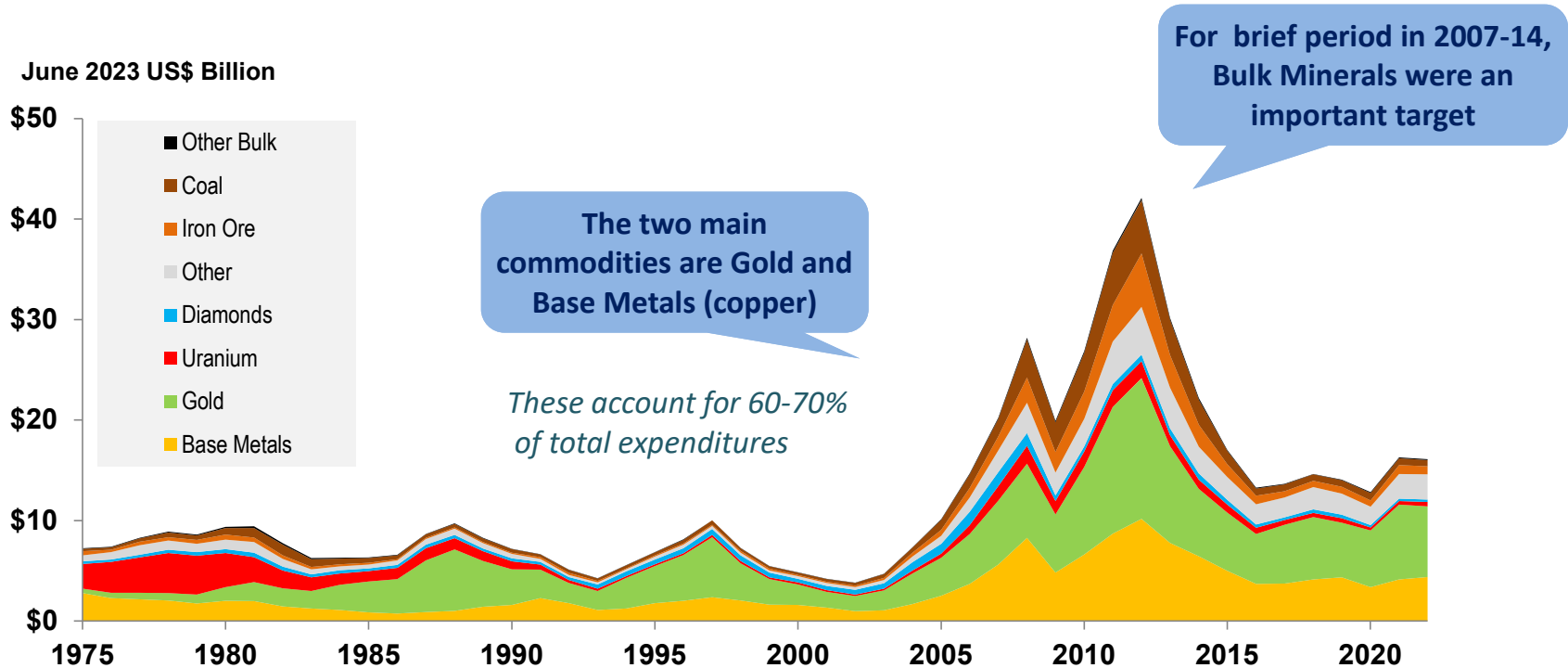
Between 2012-21 Australia's share was 12%

Note: Includes Bulk Minerals as well as Base & Precious Metals.  
 "Rest of World" refers to, Mongolia, Middle East and South West Asia (including India and Pakistan)

Sources: MinEx Consulting estimates October 2023, based on data from ABS, NRCAN, MNR (China), IAEA and S&P

# Exploration expenditures by Commodity

## All Regions : 1975-2022

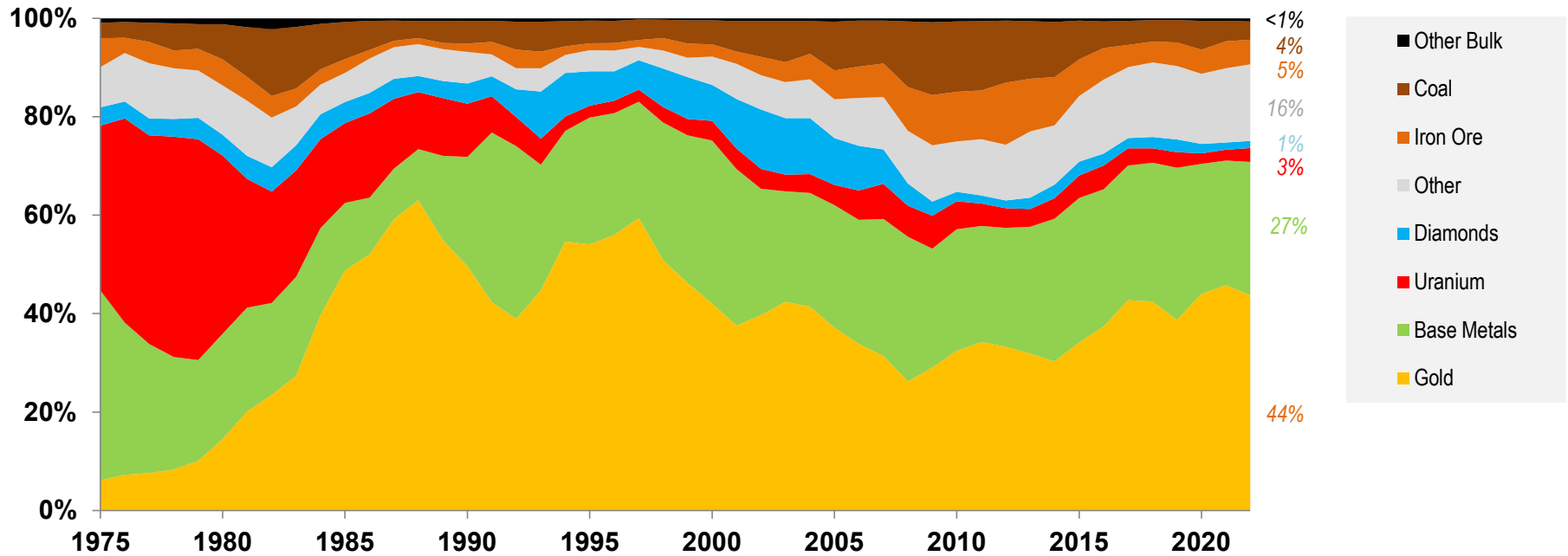


Sources: MinEx Consulting estimates October 2023, based on data from ABS, NRCAN, MNR (China), IAEA and S&P

# Exploration expenditures by Commodity: 1975-2022

Gold and Base Metals (Copper) remain the main targets

Percentage of total spend



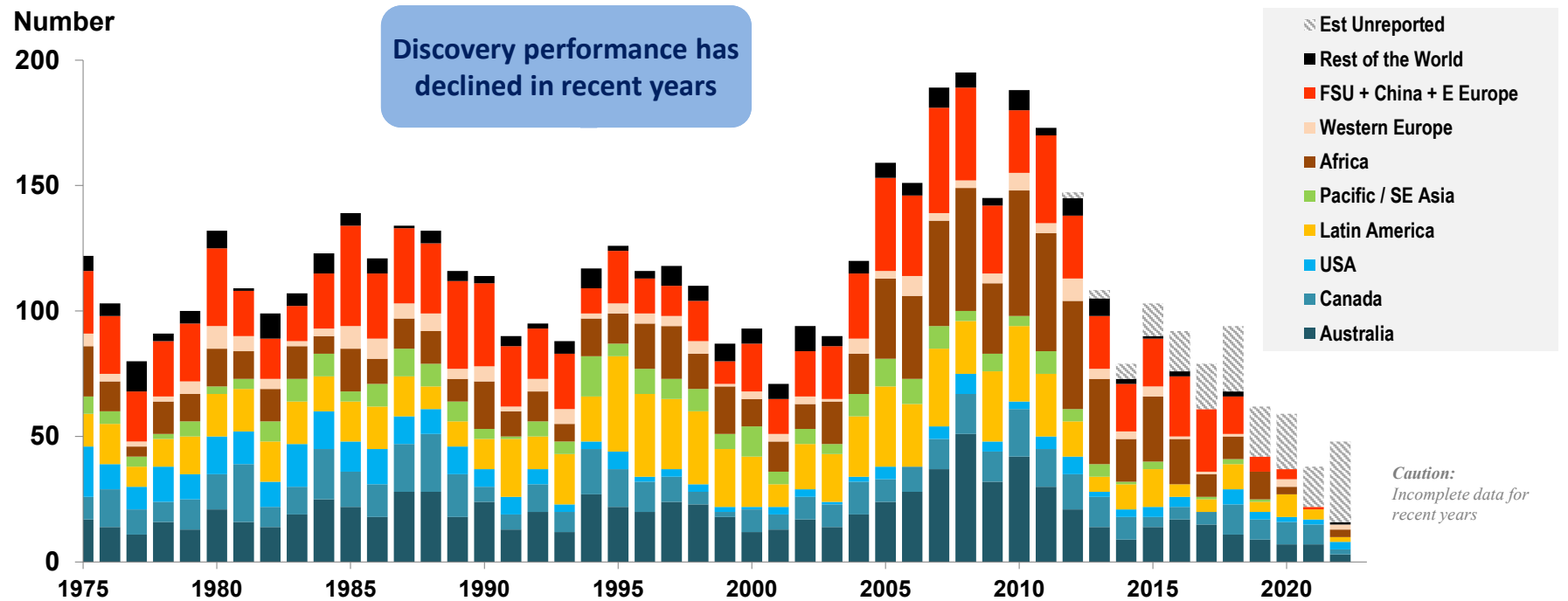
Sources: MinEx Consulting estimates October 2023, based on data from ABS, NRCAN, MNR (China), IAEA and S&P

Over the last decade the rate of discovery has slowed down

## **2. TRENDS IN NUMBER OF DISCOVERIES MADE**



# Number of Discoveries by Region : 1975-2022

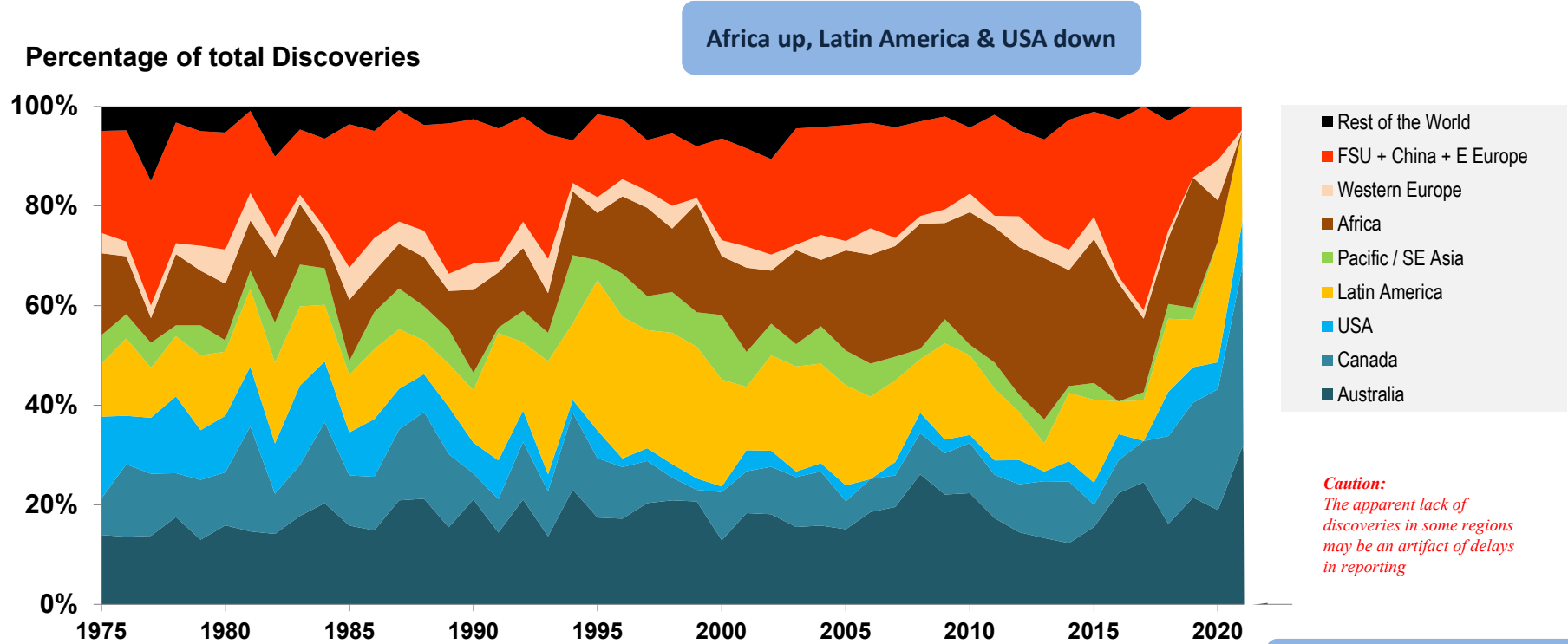


Note: Based on deposits >="Moderate" in-size. i.e. >100koz Au, >10kt Ni, >100Kt Cu, 250kt Zn+Pb, >5kt U<sub>3</sub>O<sub>8</sub>, >5 Mt Heavy Minerals, >20 Mt Fe, >20 Mt Thermal Coal >10 Mt Met Coal, >3 Mt P<sub>2</sub>O<sub>5</sub> and >3 Mt K<sub>2</sub>O  
Includes an adjustment for unreported discoveries in recent years

Between 2012-21  
Australia's share was **18%**

Source: MinEx Consulting © October 2023

# Discoveries by Region : 1975-2021



**Caution:**  
The apparent lack of discoveries in some regions may be an artifact of delays in reporting

Between 2012-21  
Australia's share was **18%**

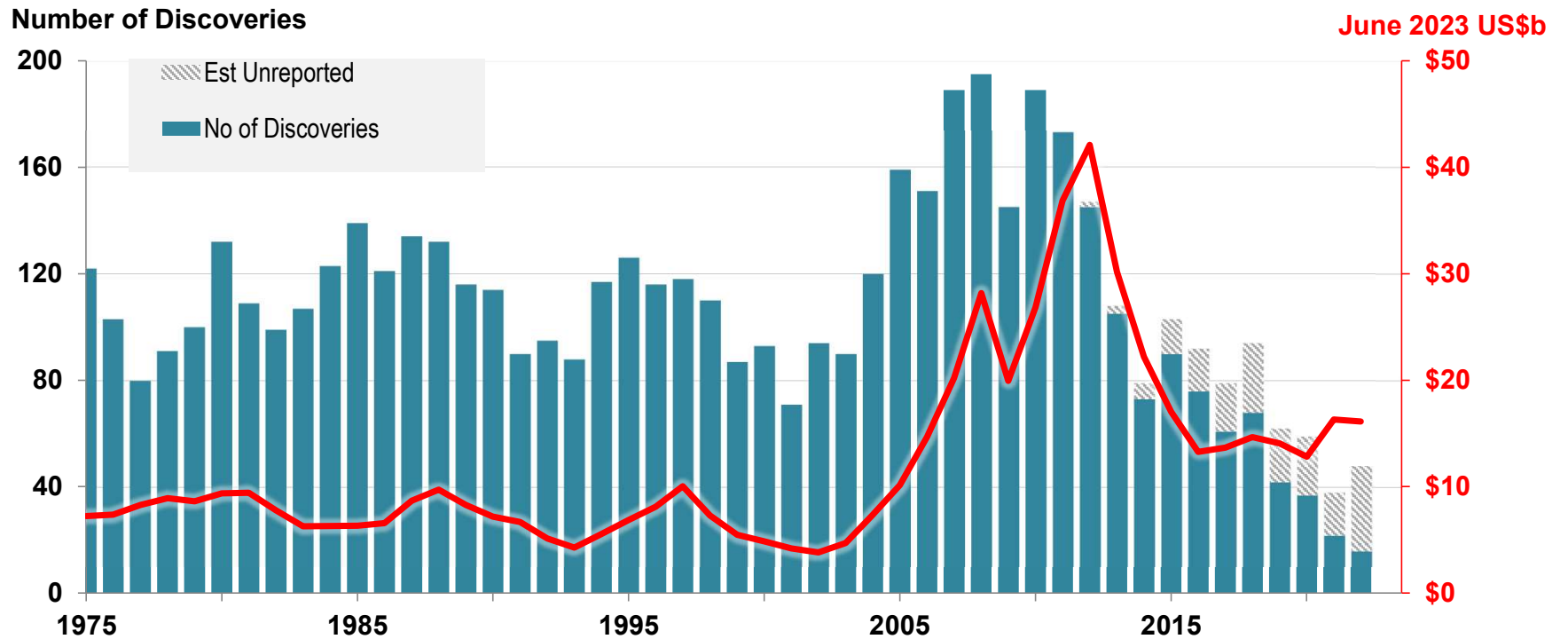
Note: Based on deposits >="Moderate" in-size

Source: MinEx Consulting © October 2023

Over the last decade the cost per discovery has tripled

## **3. TRENDS IN DISCOVERY PERFORMANCE**

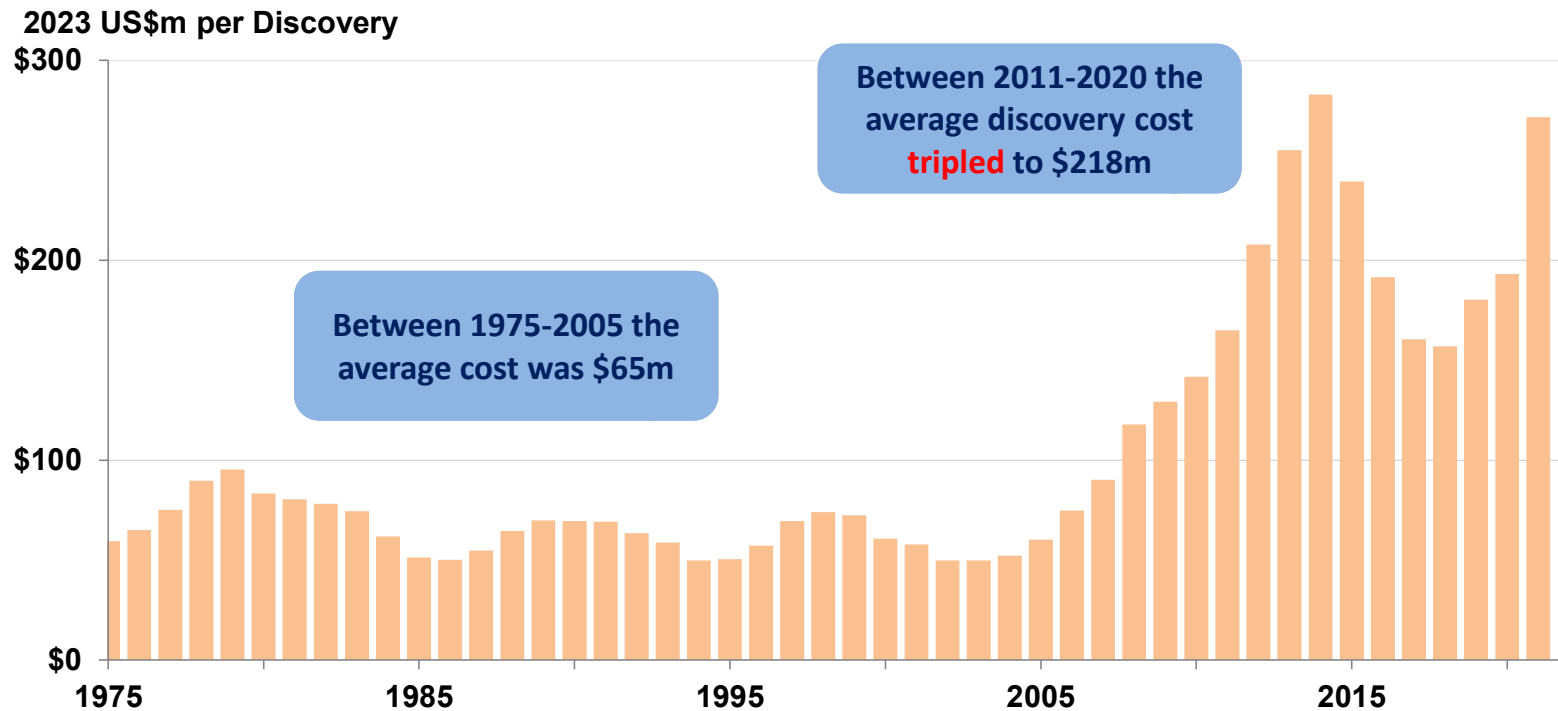
## Exploration Expenditures and Number of Discoveries World: 1975-2022



Note: Data from 2012 onwards includes an adjustment for unreported discoveries

Source: MinEx Consulting © October 2023

## Average Discovery Cost : World: 1975-2021



Note: Analysis is based on finding a deposit >= 'Moderate' in-size  
Data from 2012 onwards includes an adjustment for unreported discoveries

Source: MinEx Consulting © October 2023

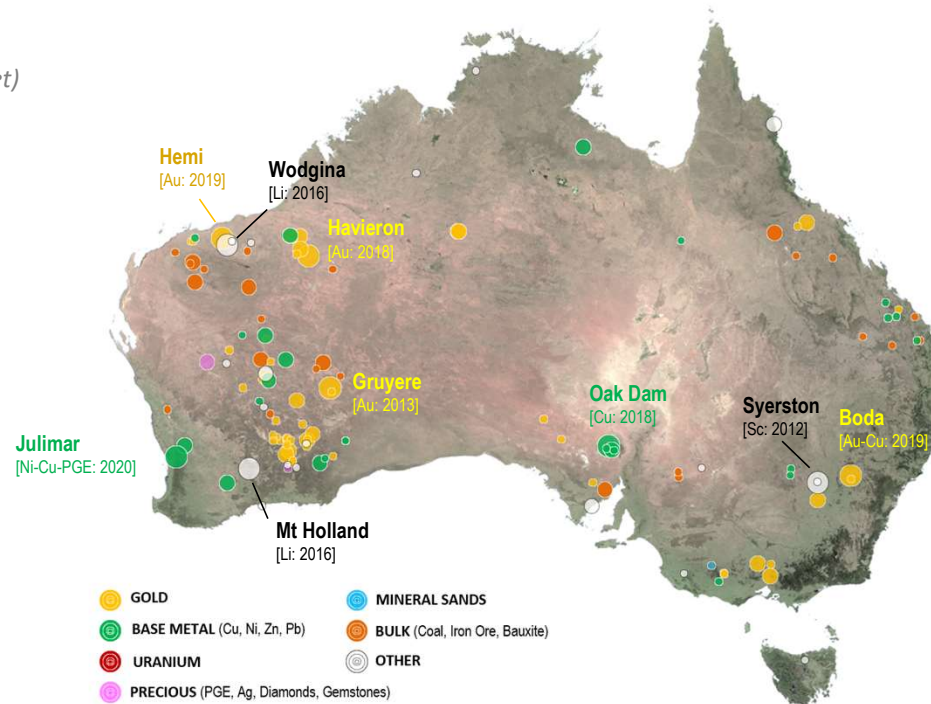
Over the last decade 737 new deposits were found in the World (including 126 in Australia)

## **4. LOCATION OF RECENT DISCOVERIES**

# Recent Discoveries in Australia over last decade since 2012

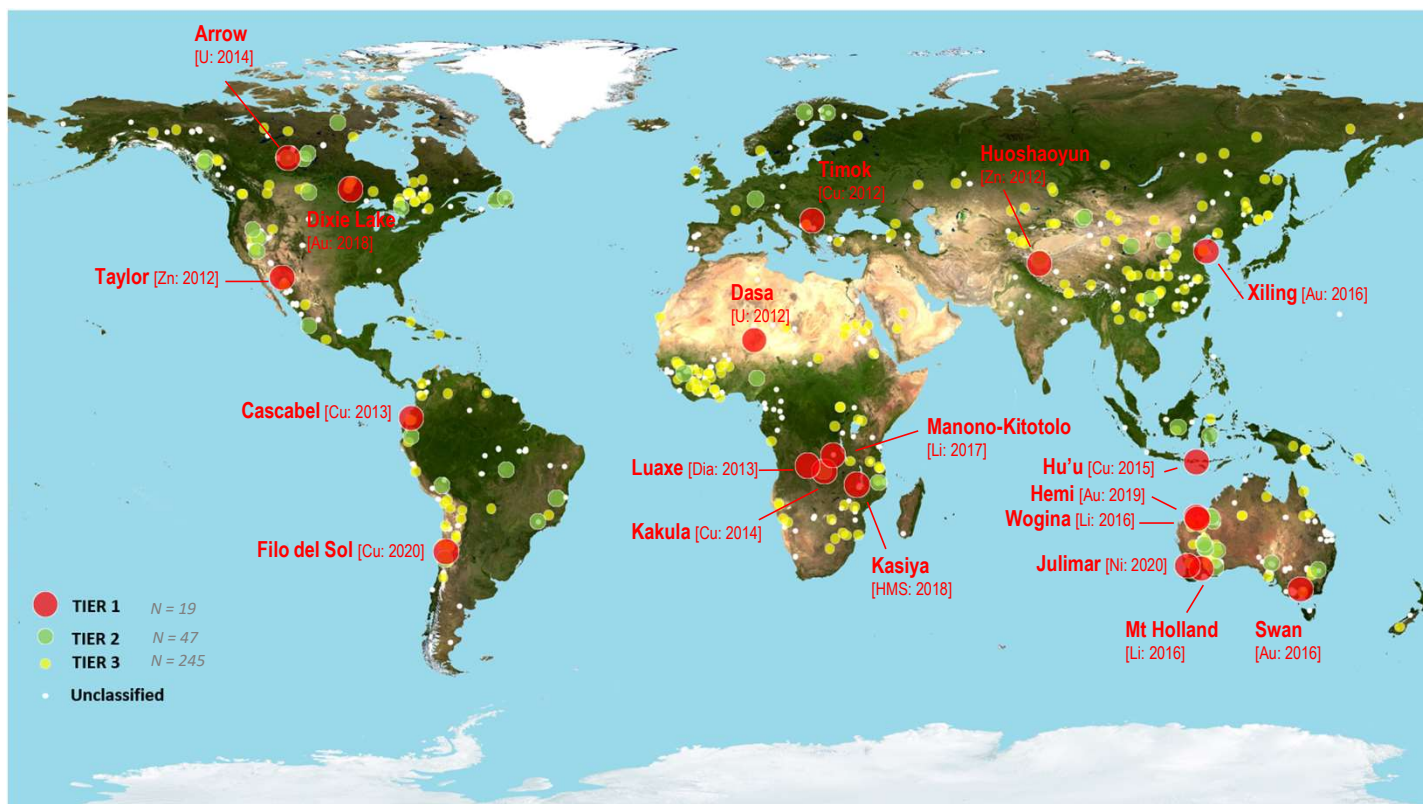
*N = 126*

*(excluding an estimated 27 (as yet) unreported discoveries)*



Source: MinEx Consulting © October 2023

## Tier 1, 2 & 3 Deposits : World : 2012 - Present



**N = 737**  
 (excluding an estimated  
 103 (as yet) unreported  
 discoveries)

Note: **Tier 1 deposits** are "Company making" mines. They are large, long life and low cost. ... ie >20 Years, >200 ktpa Cu or >250koz pa Au, and Bottom Quartile costs. Have an NPV of >\$1000m, and Expected Value of ~\$2000m in 2013 \$

**Tier 2 deposits** are "Significant" deposits - but are not quite as large or long life or as profitable as Tier 1 deposits. They have an NPV of \$200-1000m and EV of ~\$500m in 2013 \$

**Tier 3 deposits** are small / marginal deposits While they can be profitable they often only get developed at the top of the business cycle. At best they don't meet more than one of the Tier 1 or 2 criteria. NPV of \$0 to \$200m, EV of ~\$80m in 2013 \$

**Unclassified deposits** are small deposits that are less than "Major" in size and/or of minimal value. EV of (say) ~\$10m in 2013\$

Source: MinEx Consulting © October 2023

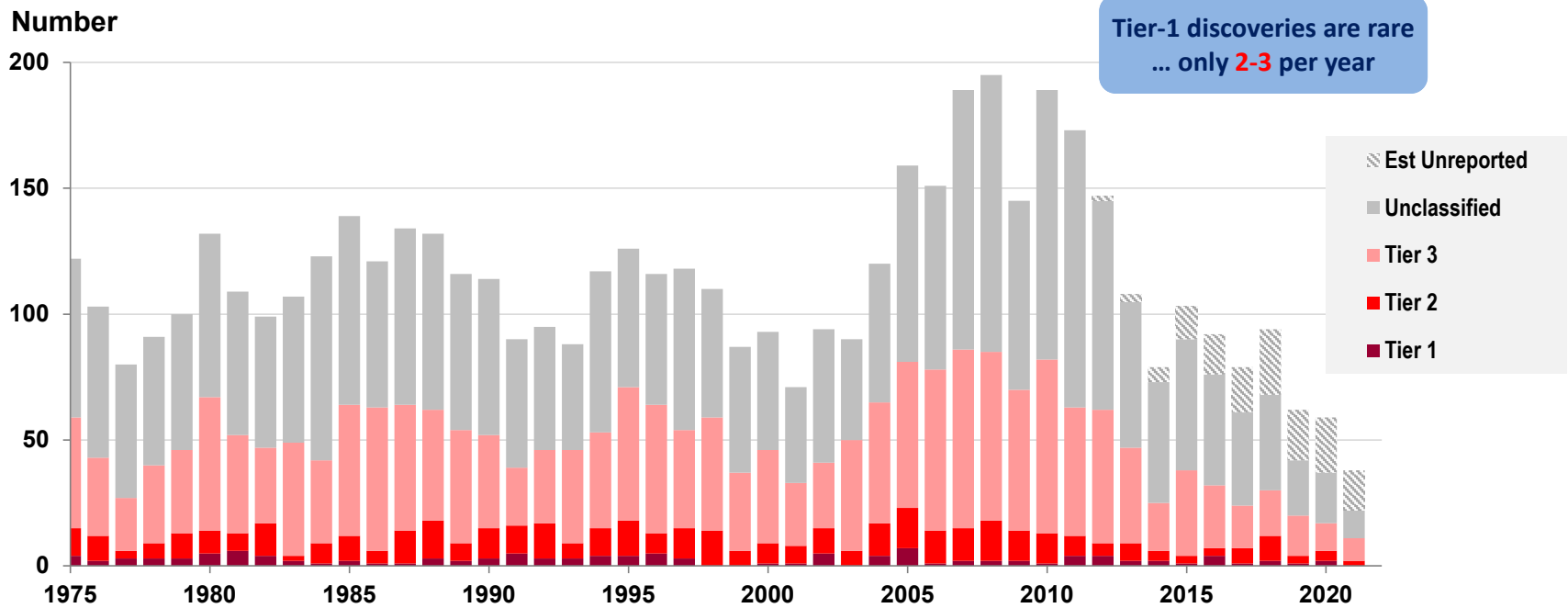


At present, at the global level, exploration is (at best) a break-even proposition

## **5. VALUE PROPOSITION FOR EXPLORATION**

# Number of Significant Discoveries by Tier

## World : 1975-2021



Note: **Tier 1 deposits** are "Company making" mines. They are large, long life and low cost. ... ie >20 Years ,>200 ktpa Cu or >250koz pa Au, and Bottom Quartile costs. Have an NPV of >\$1000m, and Expected Value of ~\$2000m in 2013 \$

**Tier 2 deposits** are "Significant" deposits - but are not quite as large or long life or as profitable as Tier 1 deposits. They have an NPV of \$200-1000m and EV of ~\$500m in 2013 \$

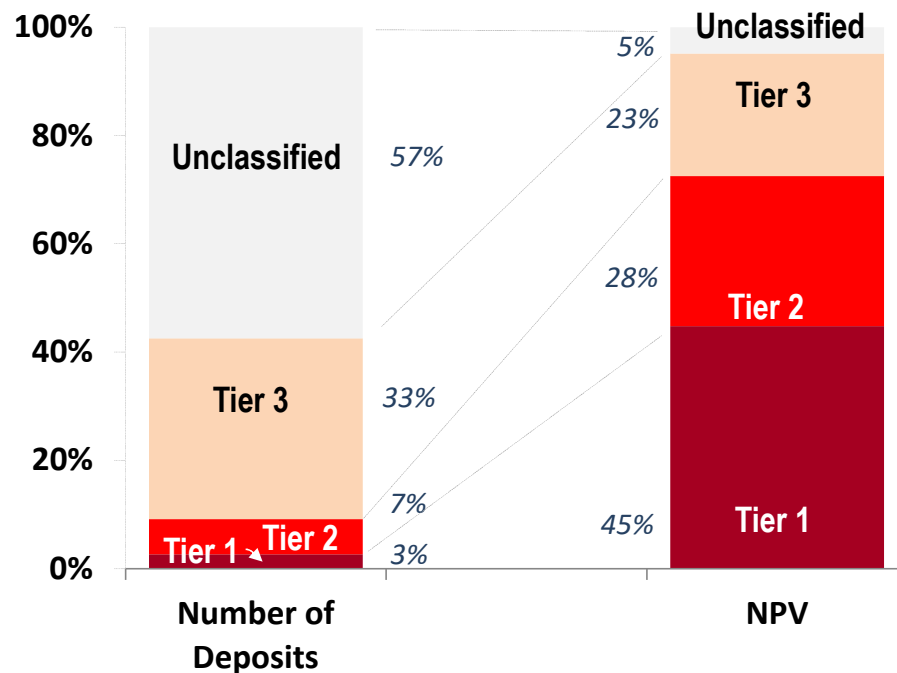
**Tier 3 deposits** are small / marginal deposits While they can be profitable they often only get developed at the top of the business cycle. At best they don't meet more than one of the Tier 1 or 2 criteria. NPV of \$0 to \$200m, EV of ~\$80m in 2013 \$

**Unclassified deposits** are small deposits that are less than "Major" in size and/or of minimal value. EV of (say) ~\$10m in 2013\$

Source: MinEx Consulting © October 2023

# Most of the wealth created are in Tier 1 and 2 discoveries

Estimated value of 700 known discoveries found in World between 2012-2021



Note: NPV values refer to the Net Present Value at the Decision-to-Build stage  
 EV = Expected Value, which is the weighted average value of the NPV range  
 Values are based on long run commodity prices as prevailing at Jan 2013

**Caution: Values are indicative / approximate-only**

### Definitions

**'Unclassified deposits'** are small deposits that are less than "Major" in size and/or of minimal value. EV of (say) ~\$10m in 2013\$

*Example: Kizilkaya [Copper-Zinc]*

**'Tier 3 deposits'** are small / marginal deposits. While they can be profitable they often only get developed at the top of the business cycle. They don't meet more than one of the Tier 1 or 2 criteria. NPV of \$0 to \$200m, EV of ~\$100m in 2013\$

*Example: Berenguela [Silver]*

**'Tier 2 deposits'** are "Significant" deposits - but are not quite as large or long life or as profitable as Tier 1 deposits. They have an NPV of \$200-1000m and EV of ~\$500m in 2013\$

*Example: Copler [Gold], Marigold [Gold]*

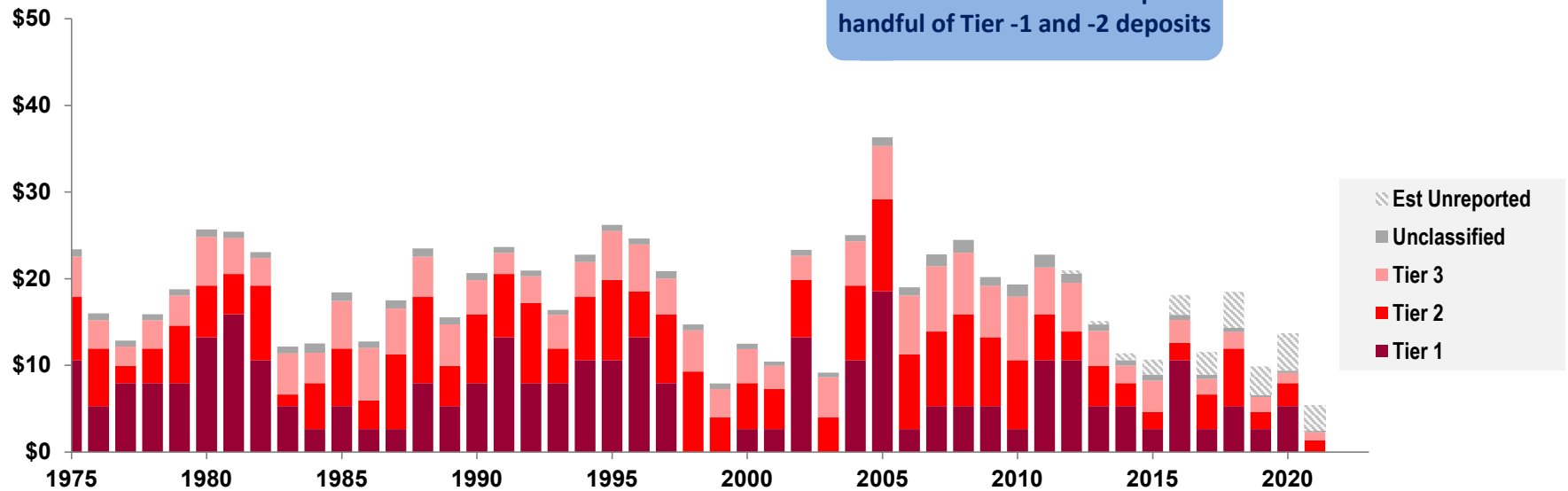
**'Tier 1 deposits'** are "Company making" mines. They are large, long life and low cost. ... ie >20 Years, >200 ktpa Cu or >250koz pa Au, and Bottom Quartile costs. Have an NPV of >\$1000m, and EV of ~\$2000m in 2013\$

*Example: Julimar [Ni-PGE-Cu]*

Source: MinEx Consulting © October 2023

# Estimated Value of Discoveries : World : 1975-2021

June 2023 US\$ Million

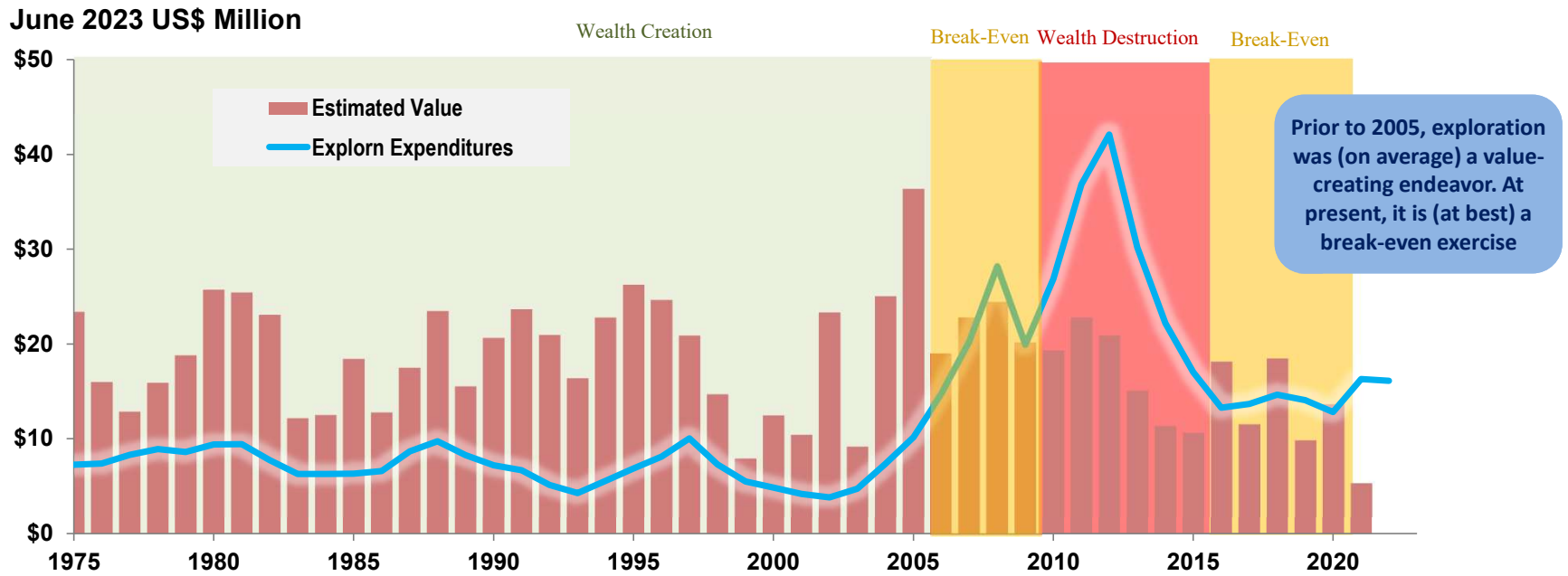


Note: The analysis is based on a notional valuation (in constant 2013 US\$) of \$2000m, \$500m, \$80m and \$10m for Tier 1, 2, 3 and Unclassified deposits respectively.  
The value of the "Est Unreported" is based on the 5 year rolling average value for reported discoveries

Caution: Values are indicative / approximate-only

Source: MinEx Consulting © October 2023

# Exploration Spend and Estimated Value of Discoveries : World : 1975-2021



Note: The analysis is based on a notional valuation (in constant 2013 US\$) of \$2000m, \$500m, \$80m and \$10m for Tier 1, 2, 3 and Unclassified deposits respectively.  
The value of the "Est Unreported" is based on the 5 year rolling average value for reported discoveries

Caution: Values are indicative / approximate-only

Source: MinEx Consulting © October 2023

## Discovery performance by Region: Spend & performance by Region

### ALL COMMODITIES 2002-2021

ROW & Latin America were **below average**. Australia & Africa performed best

i.e. “Bang-per-Buck”

	Explorn Expenditure (June 2023 US\$b)		No of Discoveries #		No of Tier 1&2 Discoveries		Est Value # (June 2023 US\$b)		Est Value/Cost	
	2002-11	2012-21	2002-11	2012-21	2002-11	2012-21	2002-11	2012-21	2002-11	2012-21
<b>Australia</b>	<b>\$21.6</b>	<b>\$24.4</b>	<b>294</b>	<b>153</b>	<b>29</b>	<b>16</b>	<b>\$42.2</b>	<b>\$29.1</b>	<b>1.96</b>	<b>1.19</b>
Canada	\$27.1	\$25.7	124	110	15	12	\$24.4	\$20.1	0.90	0.78
United States	\$12.2	\$13.4	36	41	7	4	\$12.6	\$7.3	1.03	0.54
Latin America	\$32.0	\$40.2	253	102	27	9	\$38.1	\$16.7	1.19	0.42
Africa	\$20.0	\$22.5	324	194	31	9	\$46.6	\$26.7	2.33	1.19
Pacific / SE Asia	\$7.5	\$8.2	73	20	6	3	\$9.6	\$5.2	1.28	0.63
Western Europe	\$3.4	\$4.8	42	30	1	3	\$2.6	\$3.4	0.77	0.70
E astern Europe	\$2.4	\$2.2	23	8	1	1	\$4.1	\$3.2	1.70	1.46
FSU	\$10.5	\$11.0	73	38	6	0	\$7.8	\$3.1	0.75	0.28
China	\$30.2	\$39.1	204	120	16	9	\$24.3	\$19.2	0.81	0.49
Rest of World	\$5.9	\$4.8	58	24	8	0	\$10.0	\$1.3	1.69	0.27
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Western World	\$129.6	\$143.9	1204	674	124	56	\$186.2	\$109.7	1.44	0.76
<b>World</b>	<b>\$172.7</b>	<b>\$196.2</b>	<b>1504</b>	<b>840</b>	<b>147</b>	<b>66</b>	<b>\$222.4</b>	<b>\$135.2</b>	<b>1.29</b>	<b>0.69</b>

# Note: Data for 2012-21 includes an adjustment for estimated unreported discoveries

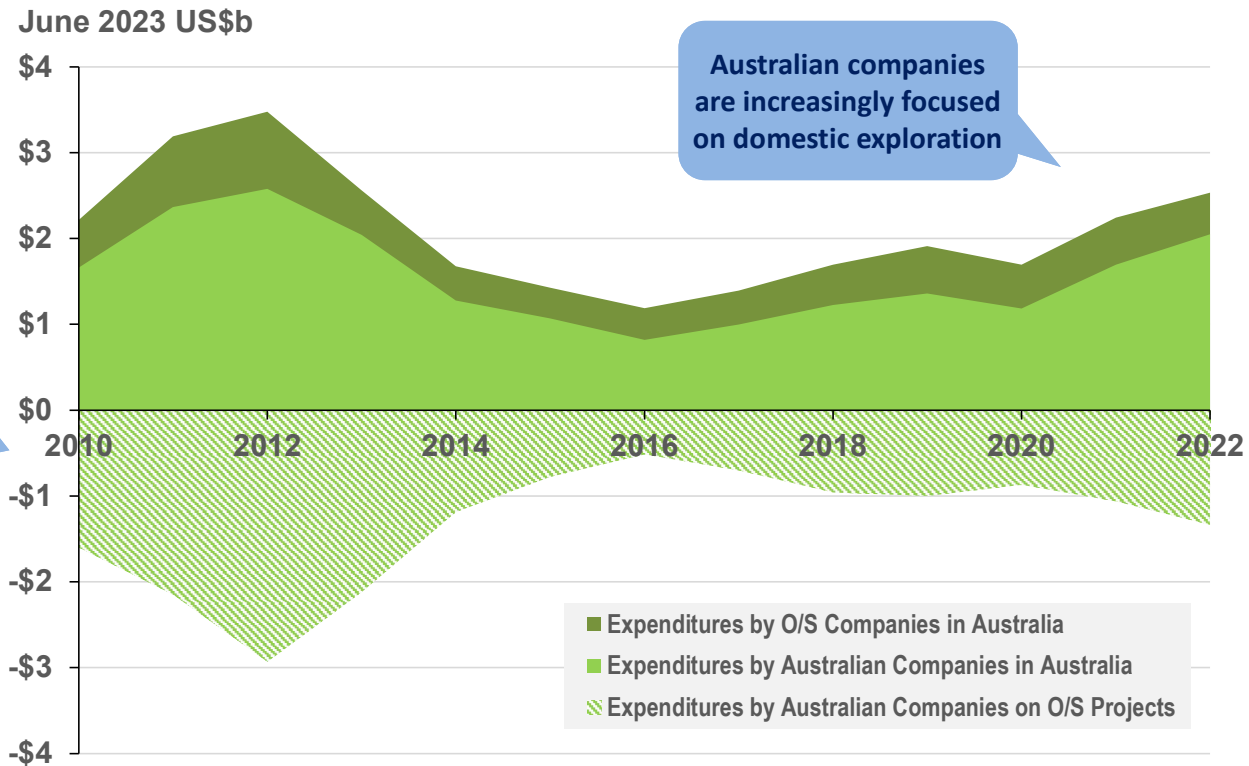
Source: MinEx Consulting © October 2023

Over the last decade, Australia accounted for **12%** of the World’s exploration spend, found **18%** of all deposits (including 24% of the Tier 1&2’s) and generated **22%** of total value for the industry

Local exploration companies have better success than foreign companies

## **6. CASE STUDY : THE VALUE PROPOSITION FOR DIFFERENT PLAYERS**

# Flow of Exploration Funds : Australia



In 2012 Australian Companies spent more on exploration outside the country than inside!

Australian companies are increasingly focused on domestic exploration

Between 2012-2021 US\$19.3b was spent on exploration in Australia - \$14.3b from local companies and \$5.0b from foreign companies.

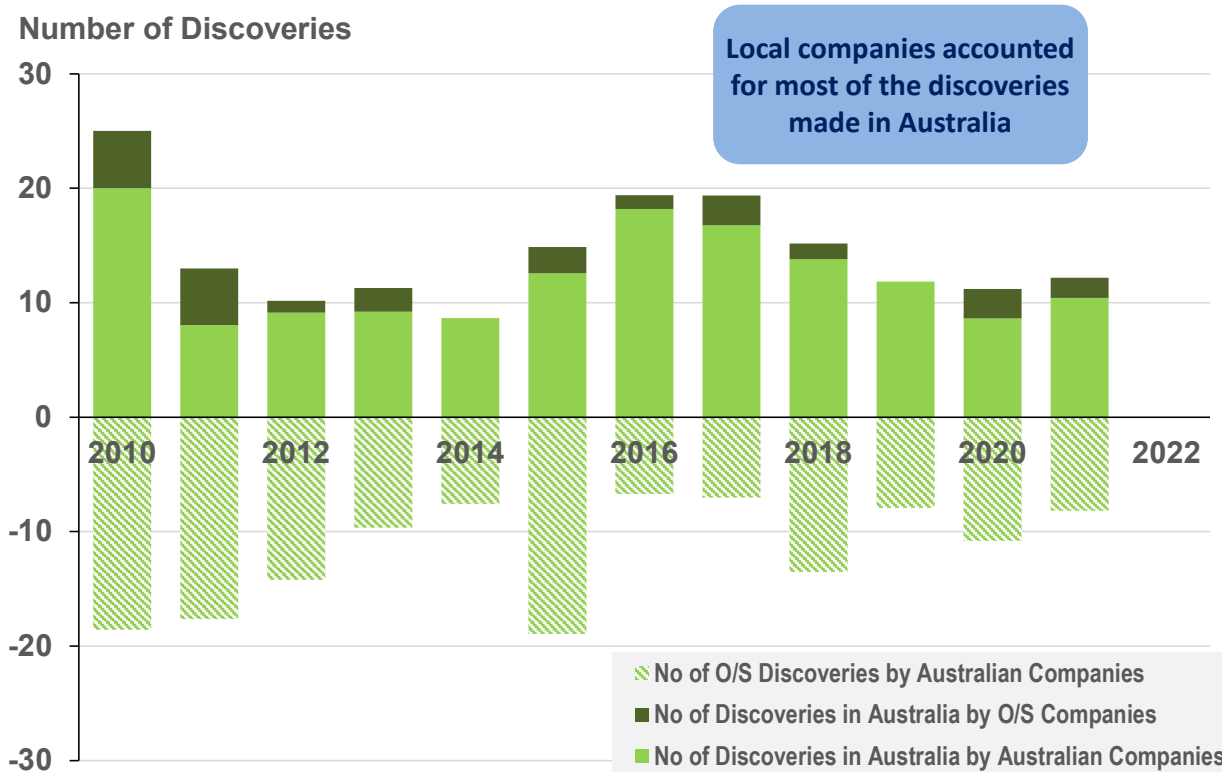
Australian explorers also spent \$12.1b on projects overseas

Note: Excludes expenditures on Iron Ore, Coal and Bauxite.  
Also excludes O/S expenditures on exploration in China and FSU

Source: Analysis of S&P data by MinEx Consulting © October 2023



# Discoveries : Australia (and elsewhere)



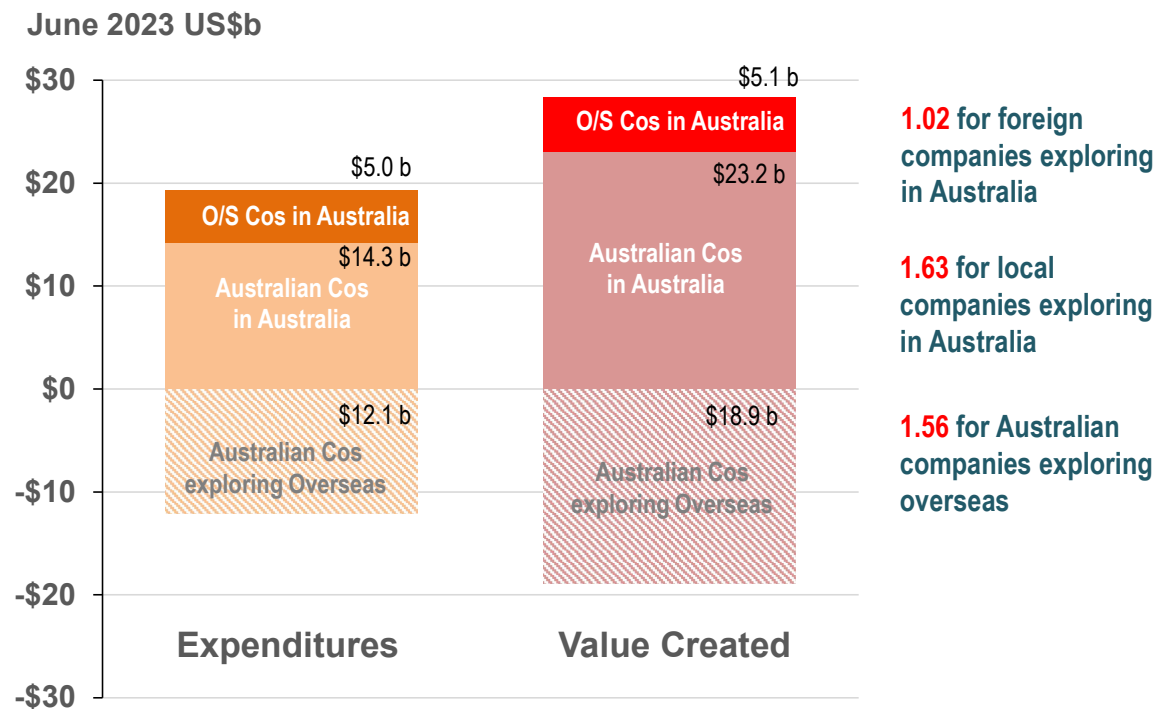
**Between 2012-2021 a total of 134 new deposits were found in Australia - 119 by local companies and 15 by foreign companies.**

**Australian explorers also made 105 discoveries overseas**

Note: Excludes Iron Ore, Coal and Bauxite discoveries, or any discoveries in China or FSU  
 The analysis includes an adjustment for (as yet) unreported discoveries

Source: MinEx Consulting © October 2023

# Value Proposition for Australian Explorers : 2012-2021



**Estimated “Bang-per-Buck”**

**1.02** for foreign companies exploring in Australia

**1.63** for local companies exploring in Australia

**1.56** for Australian companies exploring overseas

**1.47** weighted average for exploration (local and foreign cos) in Australia

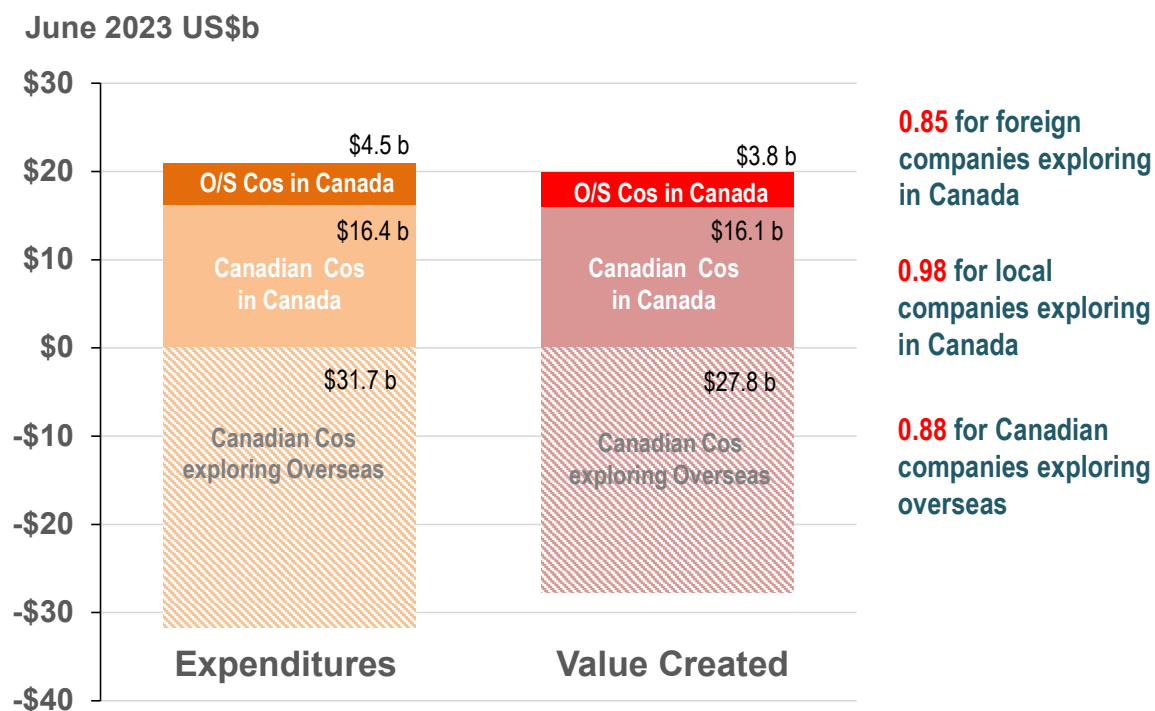
*Note: This value differs from that reported on Slide 22, due to exclusion of Bulk Mineral exploration.*

**Caution: Values are indicative / approximate-only**

Note: Excludes Iron Ore, Coal and Bauxite exploration spend and discoveries.  
 Also excludes expenditures and discoveries by Australian Companies in China or the FSU  
 The analysis includes an adjustment for (as yet) unreported discoveries

Source: Analysis of S&P data by MinEx Consulting © October 2023

# Value Proposition for Canadian Explorers : 2012-2021



Estimated “Bang-per-Buck”

0.85 for foreign companies exploring in Canada

0.98 for local companies exploring in Canada

0.88 for Canadian companies exploring overseas

0.95 weighted average for exploration (local and foreign cos) in Canada

Note: This value differs from that reported on Slide 22, due to exclusion of Bulk Mineral exploration

Caution: Values are indicative / approximate-only

Note: Excludes Iron Ore, Coal and Bauxite exploration spend and discoveries.  
 Also excludes expenditures and discoveries by Canadian Companies in China or the FSU  
 The analysis includes an adjustment for (as yet) unreported discoveries

Source: Analysis of S&P data by MinEx Consulting © October 2023

## 8. SUMMARY / CONCLUSIONS

## Summary / Conclusions [1/2]

- In 2022 exploration expenditures are only half what they were in 2012
- Over the period 2012-21 Australia accounted for **12%** of global spend
- The rate of discovery has halved in the last decade. Currently running at ~50 deposits pa for the World.
- Over the period 2012-21 Australia accounted for **18%** of all discoveries by number
- Now costs ~US\$200m to make a discovery

## Summary/ Conclusions [2/2]

- Most of the wealth created by exploration is associated with Tier1 & 2 discoveries
- Over the last decade the World spent \$196b on exploration and generated \$135b of value ... giving a “bang-per-buck” of 0.69. Australia and Africa were much better at 1.19.
- Australia captured **22%** of the value created by the global exploration industry
- In the Case of Australia, local companies performed better than foreign companies. Surprisingly, Australian explorers also did well overseas !

Contact details

Richard Schodde  
Managing Director  
MinEx Consulting  
Melbourne, Australia

Email: [Richard@MinExConsulting.com](mailto:Richard@MinExConsulting.com)

Website: [MinExConsulting.com](http://MinExConsulting.com)

Copies of this and other similar  
presentations can be downloaded  
from my website