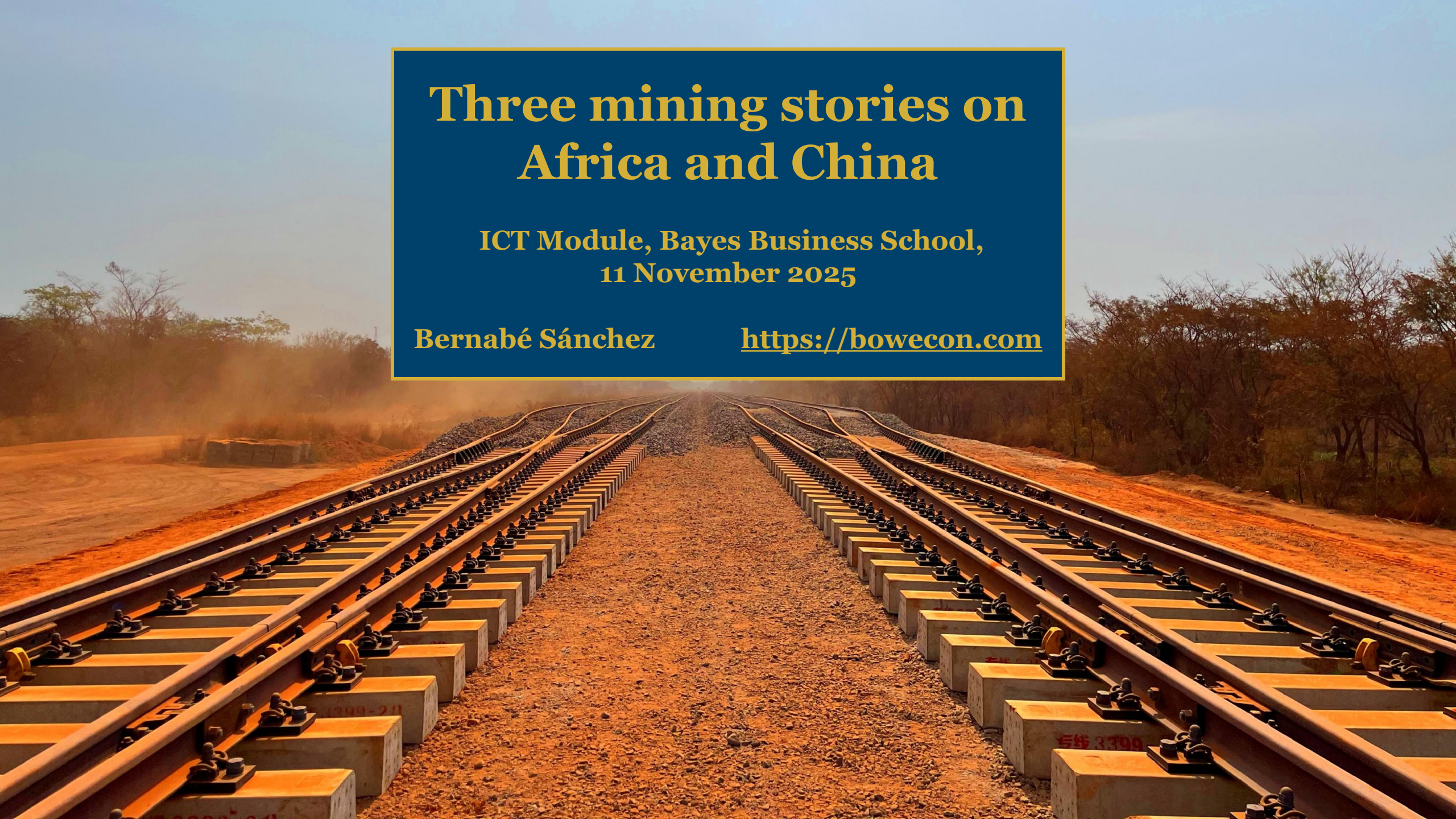


Three mining stories on Africa and China

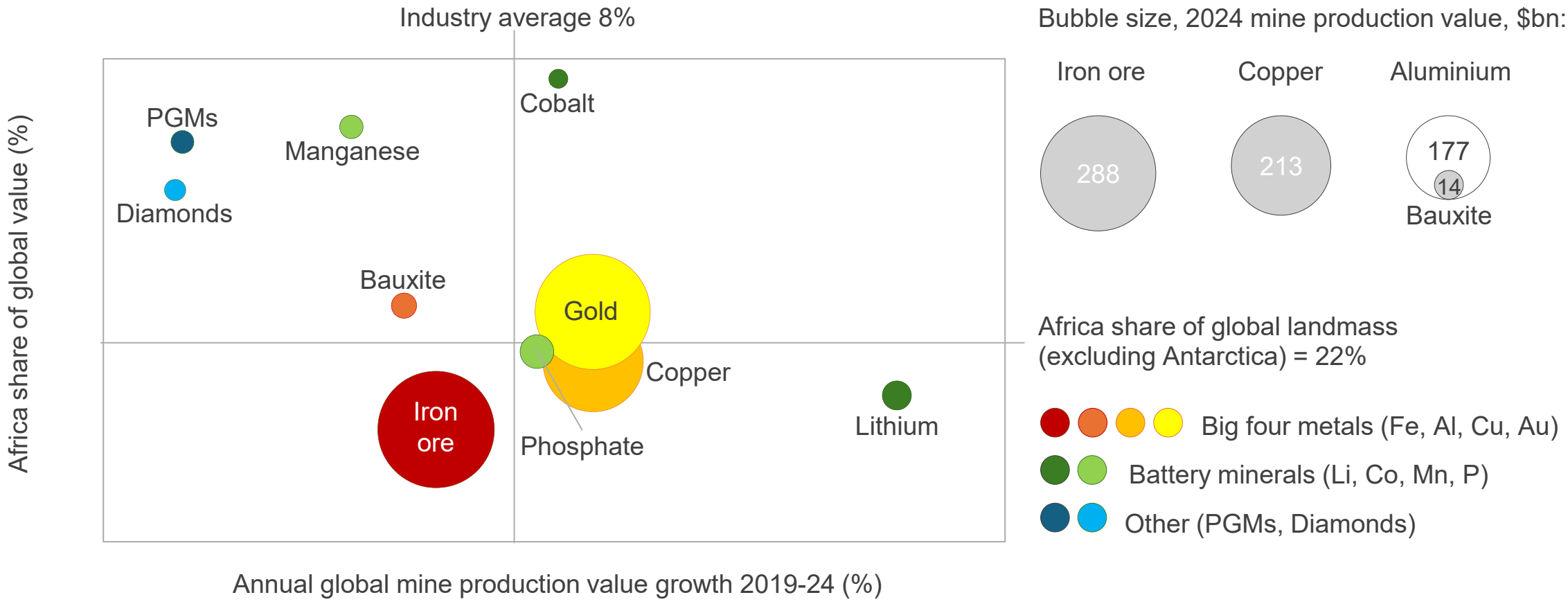
ICT Module, Bayes Business School,
11 November 2025

Bernabé Sánchez https://bowecon.com

Three mining stories on Africa and China
Bayes Business School, 11 November 2025

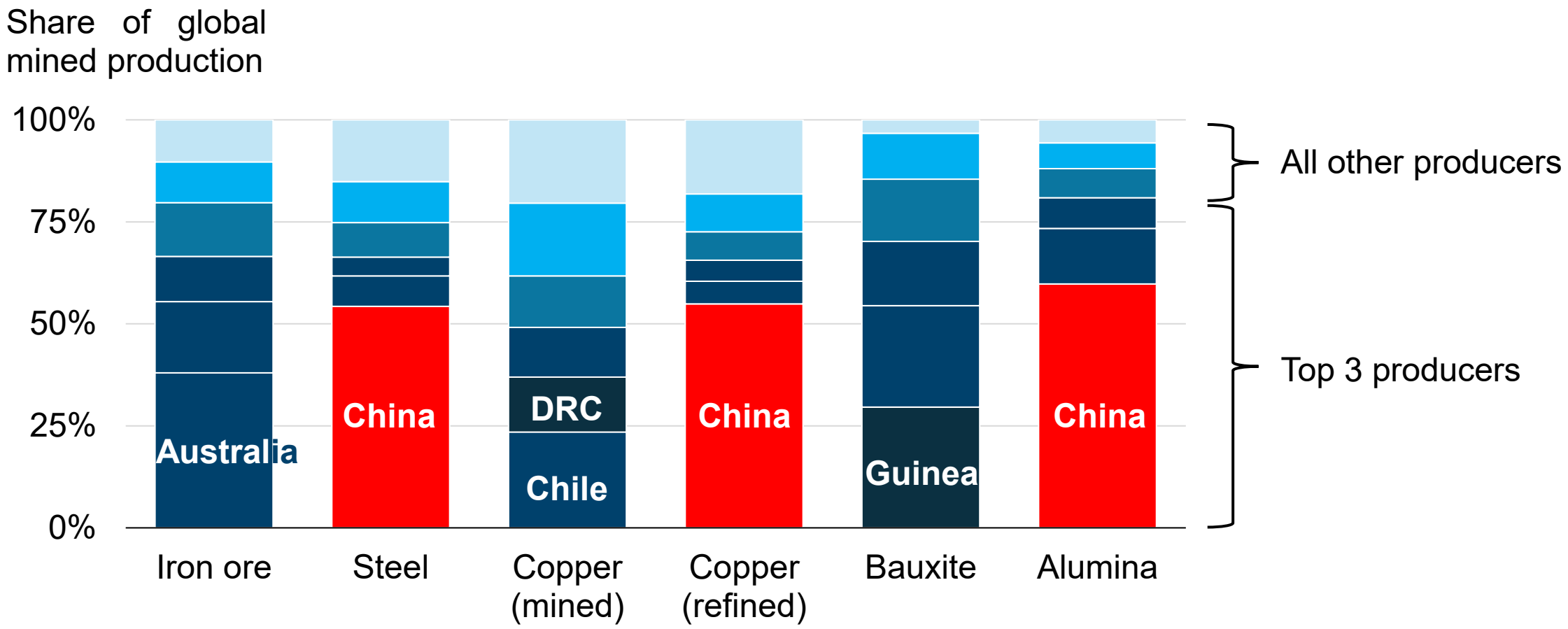
Table of contents

Mining industry value has been shifted over the past 5 years from iron ore towards gold and copper



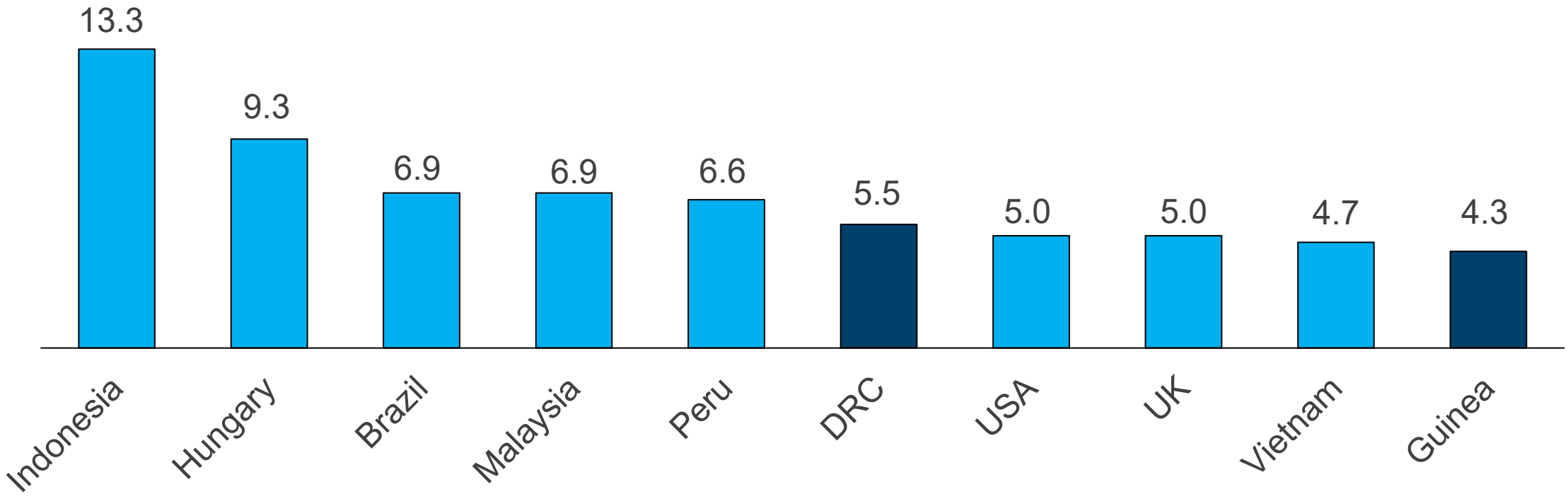
Sources: *USGS Mineral Commodity Summaries, World Gold Council, Kimberley Process Statistics, World Nuclear Association*

Processing is now dominated by China across most important metal value chains



Source: British Geological Survey (2025), World Mineral Production 2019-23

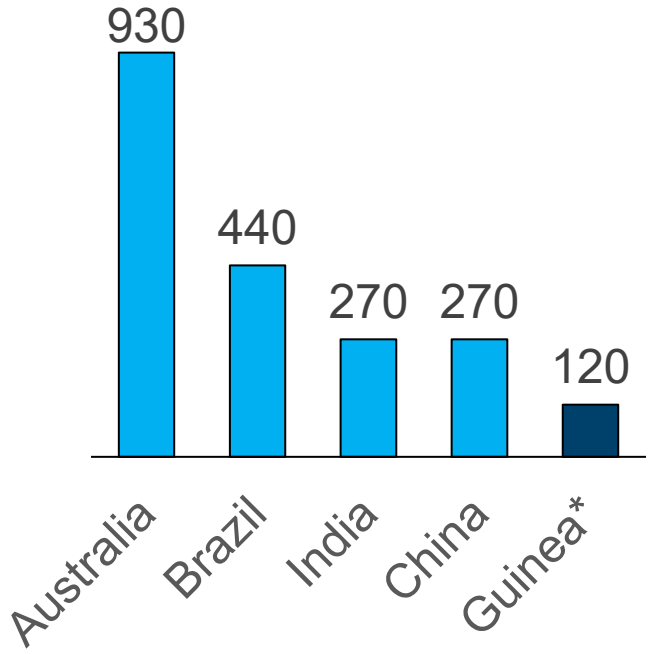
Chinese investment overseas has also been focused on mineral and metal supply chains



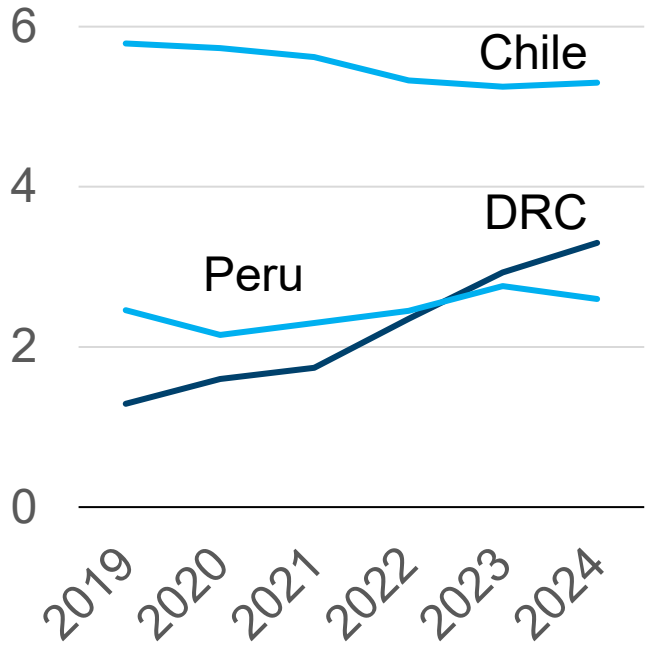
Source: CRU LME Week Breakfast, October 2025

The DRC and Guinea are responsible for the largest mine production increases for main industrial metals

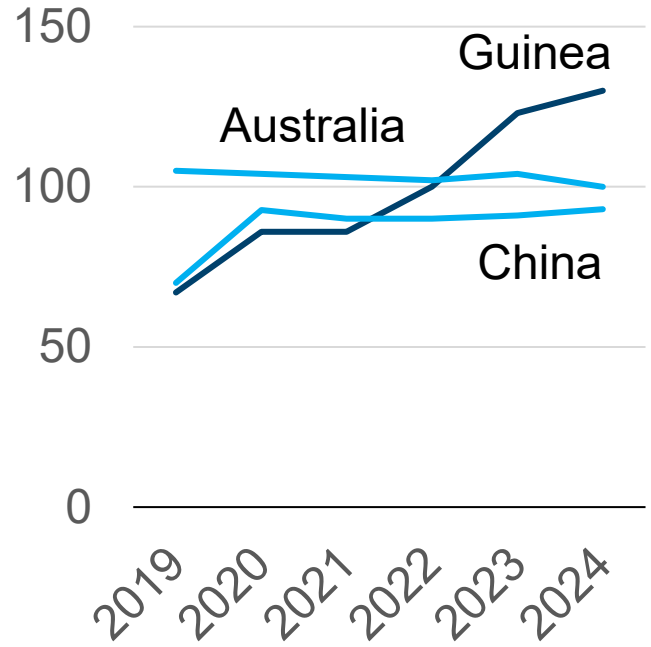
Iron ore 2024
Million tonnes



Copper
Million tonnes



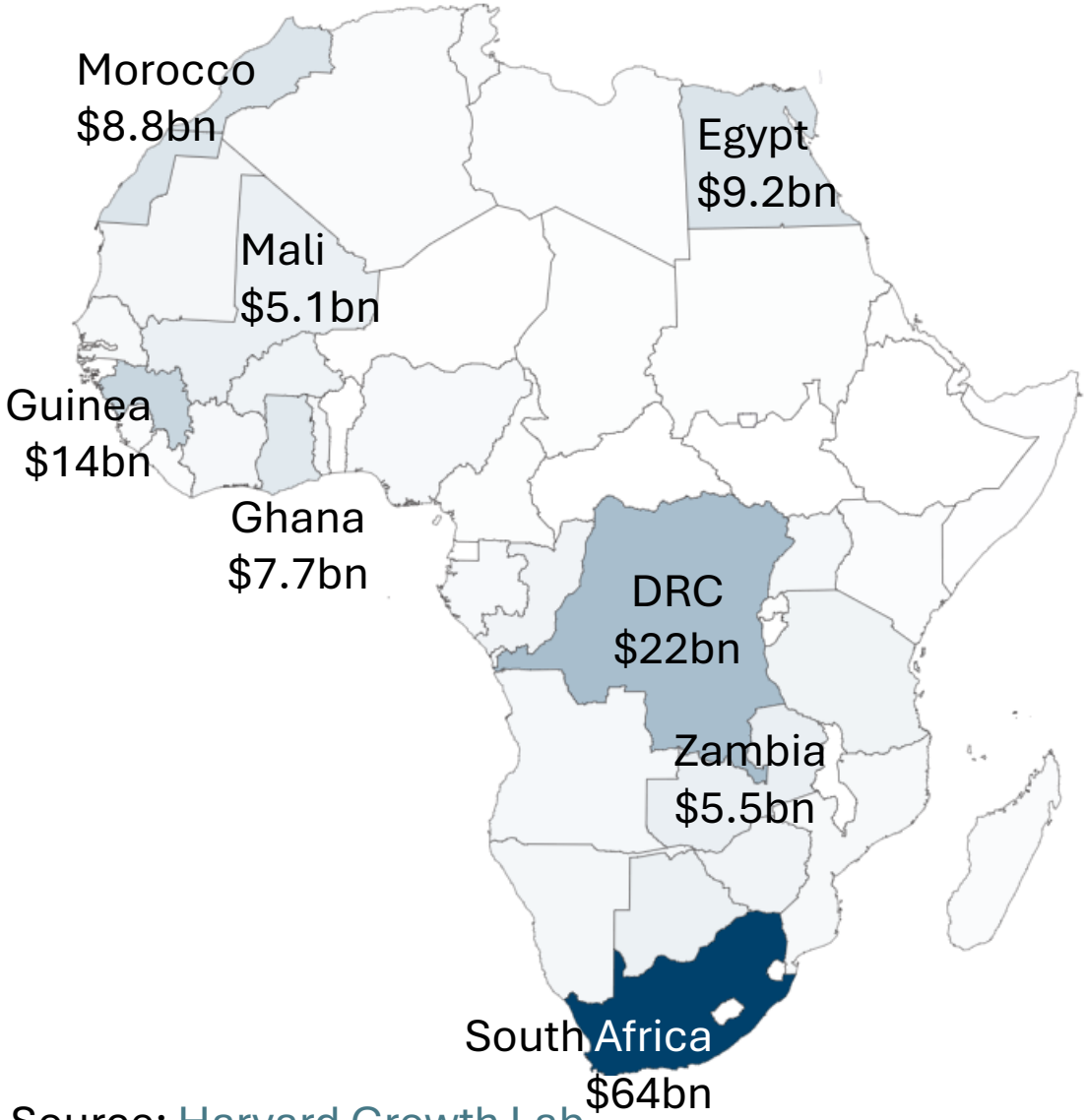
Bauxite
Million tonnes



** Guinea iron ore shown as expected 2029 production for illustrative purposes*
Source: USGS Mineral Commodity Summaries

Top African mineral and metal exporters in 2023

South Africa	Gold, platinum, diamonds >50% total
DRC	Copper and cobalt >95% of total
Guinea	Gold and bauxite >99% of total
Egypt	Semi-fabricated metal and cement ~55% of total
Morocco	Phosphates and derived fertilizers ~80% of total
Ghana	Gold almost 90% of total
Zambia	Copper ~80% of total
Mali	Gold 99% of total



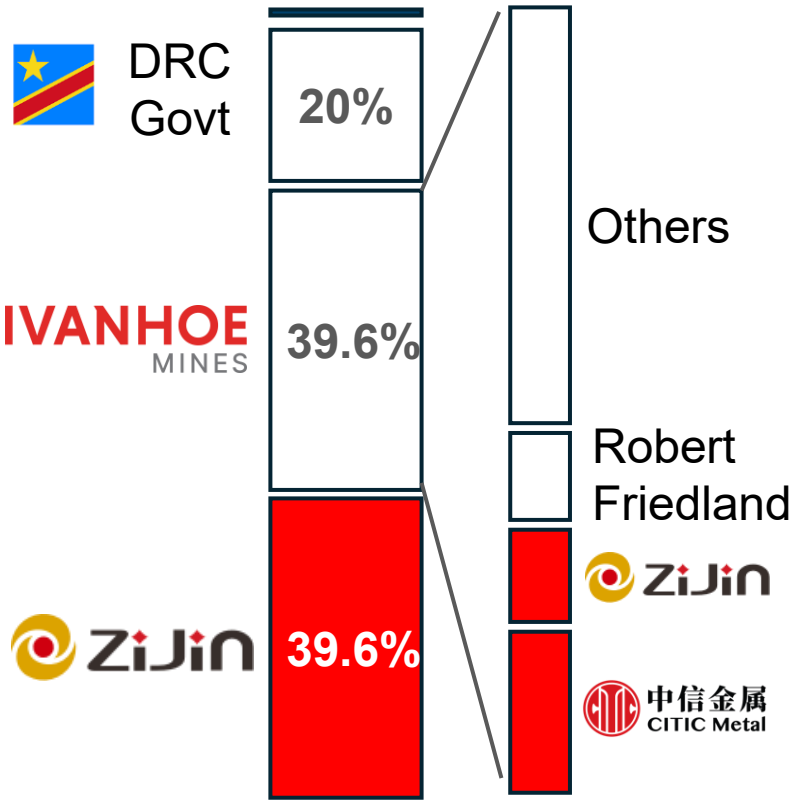
Source: Harvard Growth Lab
Notes: Metals, Minerals, Stone and Mineral Chemicals, excluding Fossil Fuels

KAMOA-KAKULA

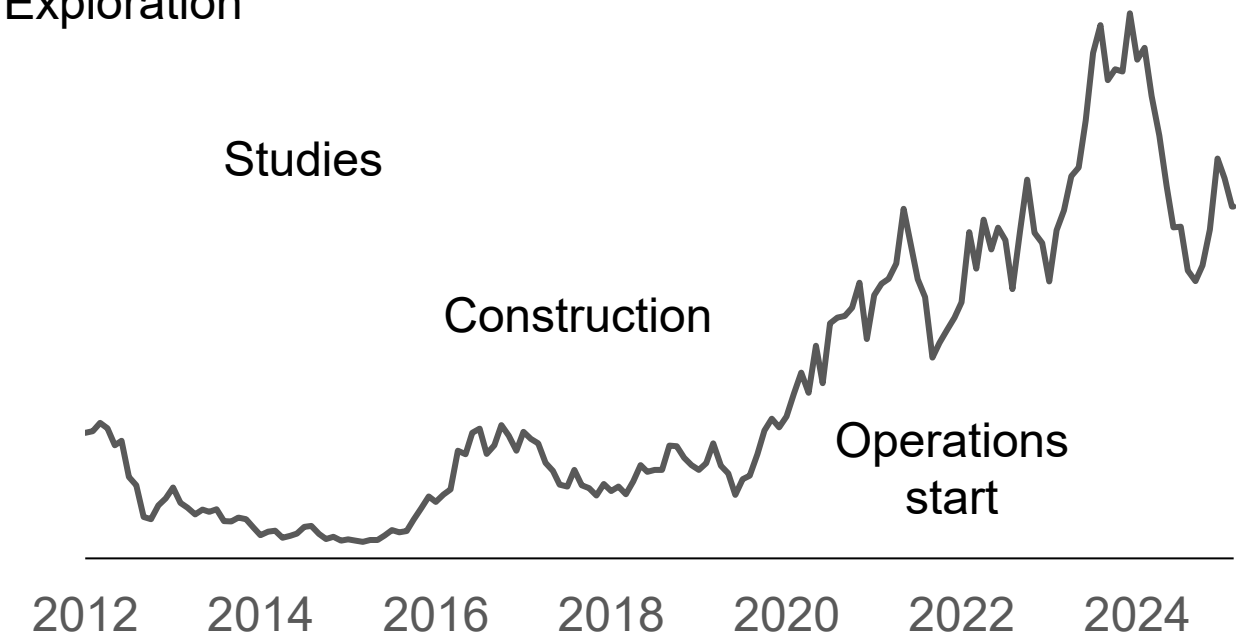
The World's fastest-growing, highest-grade, lowest-carbon major copper mine

Kamoa-Kakula accounts for most of Ivanhoe Mines $13bn market cap and is targeting 550kt copper

Ownership:



Ivanhoe Mines share price and Kamoa Kakula project timeline:



Sources: Ivanhoe Mines 2025 Investor Presentation, Yahoo Finance

Mining projects start with exploration

Source: Ivanhoe Mines 2018 Investor Presentation

Geologists discover and delineate the orebody, providing estimates of reserves and resources

Figure 1.4 Kamoa-Kakula Exploitation Licence, Showing the Kamoa, Kakula, Kakula West, Kamoa North Bonanza Zone and Kamoa Far North Mineral Resource Areas.

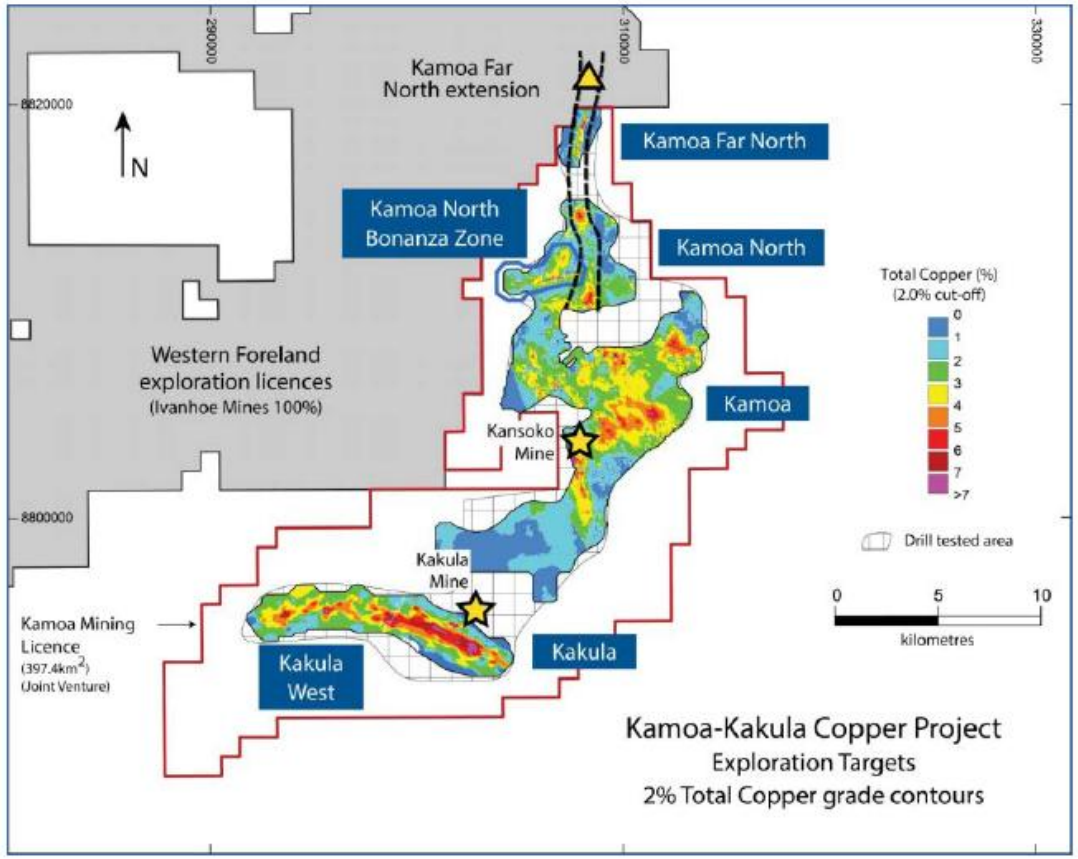


Table 1.2 Kamoa and Combined Kakula Indicated and Inferred Mineral Resources

Deposit	Category	Tonnes (millions)	Area (km²)	Copper (%)	Vertical Thickness (m)	Contained Copper (kt)	Contained Copper (billion lbs)
Kamoa	Indicated	760	55.2	2.73	5.0	20,800	45.8
	Inferred	235	21.8	1.70	4.0	4,010	8.8
Kakula	Indicated	627	21.7	2.74	10.3	17,200	37.9
	Inferred	104	5.6	1.61	6.7	1,680	3.7
Total Kamoa-Kakula Project	Indicated	1,387	77.0	2.74	6.5	38,000	83.7
	Inferred	339	27.4	1.68	4.5	5,690	12.5

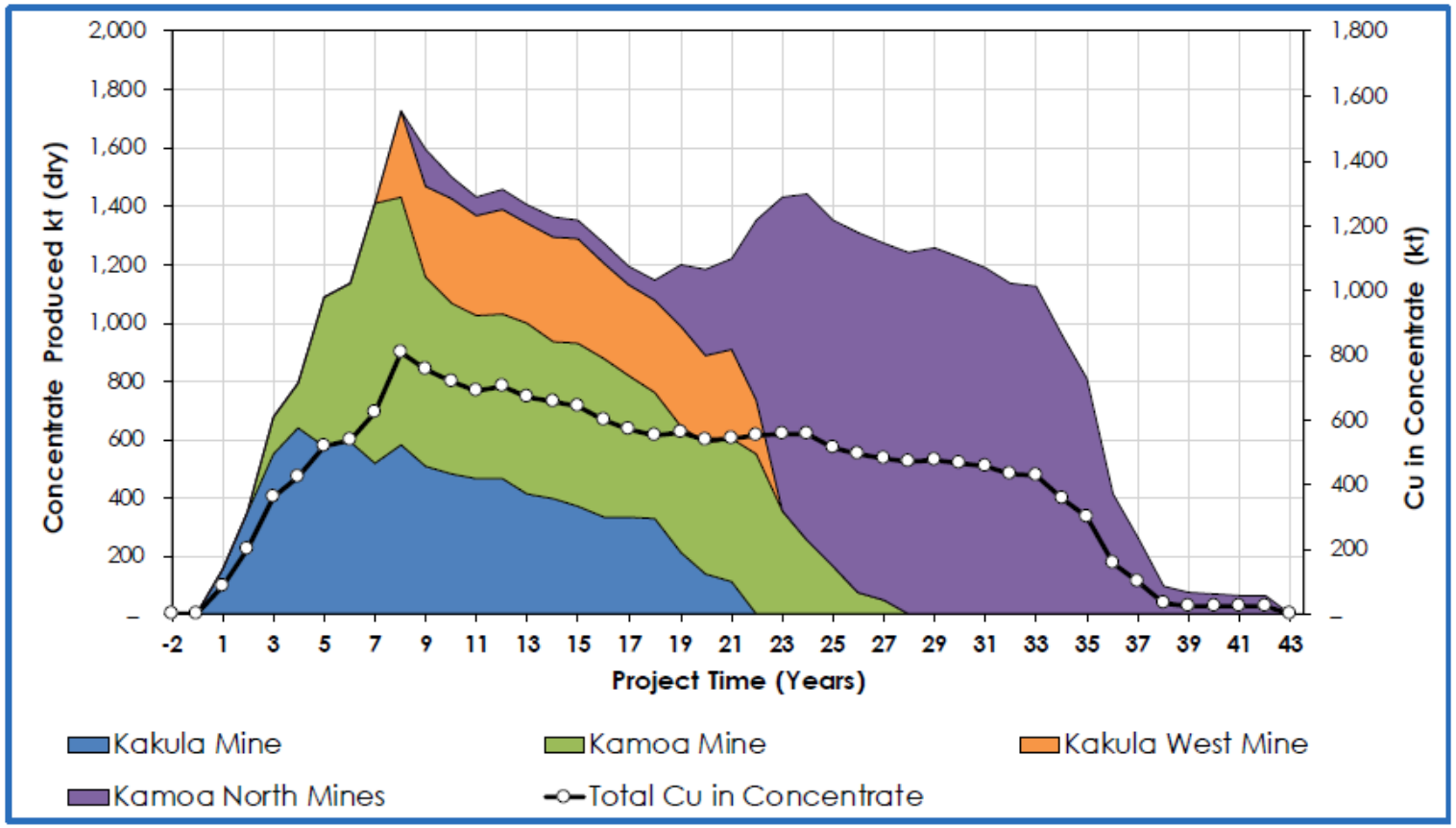
Table 1.5 Kamoa-Kakula Project Mineral Reserve

Classification	Ore (Mt)	Copper (%)	Contained Copper (Mlb)	Contained Copper (kt)
Proven Kakula Mineral Reserve	–	–	–	–
Probable Kakula Mineral Reserve	110	5.22	12,665	5,745
Proven Kansoko Mineral Reserve	–	–	–	–
Probable Kansoko Mineral Reserve	125	3.81	10,525	4,774
Total Proven Mineral Reserve	–	–	–	–
Total Probable Mineral Reserve	235	4.47	23,190	10,519

Source: Ivanhoe Mines 2020 Kamoa-Kakula Integrated Development Plan

Mining engineers and metallurgists develop a mine and metal processing plan…

Figure 1.22 Kamoa-Kakula 2020 PEA Concentrate and Metal Production



Project studies from lower to higher levels of confidence:

- Preliminary economic assessment (PEA)
- Pre-feasibility study (PFS)
- Feasibility study (FS)

Source: Ivanhoe Mines 2020 Kamoa-Kakula Integrated Development Plan

… and provide estimates for capital expenditure and operating costs

Table 1.14 Kakula 2020 FS Capital Costs

Capital Costs (US$M)	Initial Capital (US$M)	Expansion Capital (US$M)	Sustaining Capital (US$M)	Total (US$M)
Underground Mining				
Underground Mining	131	202	538	871
Mining Infrastructure and Mobile Equipment	38	16	362	416
Capitalised Pre-Production	76	–	–	76
Subtotal	246	218	899	1,363
Off-site Power				
Power Supply Off Site	36	–	–	36
Subtotal	36	–	–	36
Concentrator and Tailings				
Plant	123	128	70	320
Tailings	13	26	88	127
Subtotal	136	154	157	448
Infrastructure				
Surface Infrastructure	69	101	14	184
Other Infrastructure	–	–	–	–
Subtotal	69	101	14	184
Indirects				
EPCM	35	17	0	53
Owners Cost	66	47	–	114
Customs Duties	8	18	40	66
Closure	–	–	82	82
Subtotal	110	83	122	315
Capital Expenditure Before Contingency	596	556	1,193	2,346
Contingency	50	38	72	159
Capital Expenditure After Contingency	646	594	1,265	2,505

Totals have been rounded.

Table 1.12 Kakula 2020 FS Unit Operating Costs

	Payable Cu (US$/lb)		
	Years 1–5	Years 1–10	LOM Average
Mine Site	0.48	0.52	0.62
Transport	0.32	0.32	0.32
Treatment and Refining Charges	0.11	0.11	0.11
Royalties and Export Tax	0.20	0.20	0.20
Total Cash Costs	1.12	1.16	1.26

Source: Ivanhoe Mines 2020 Kamoa-Kakula Integrated Development Plan

Analysts estimate the NPV and IRR of the project under different price scenarios

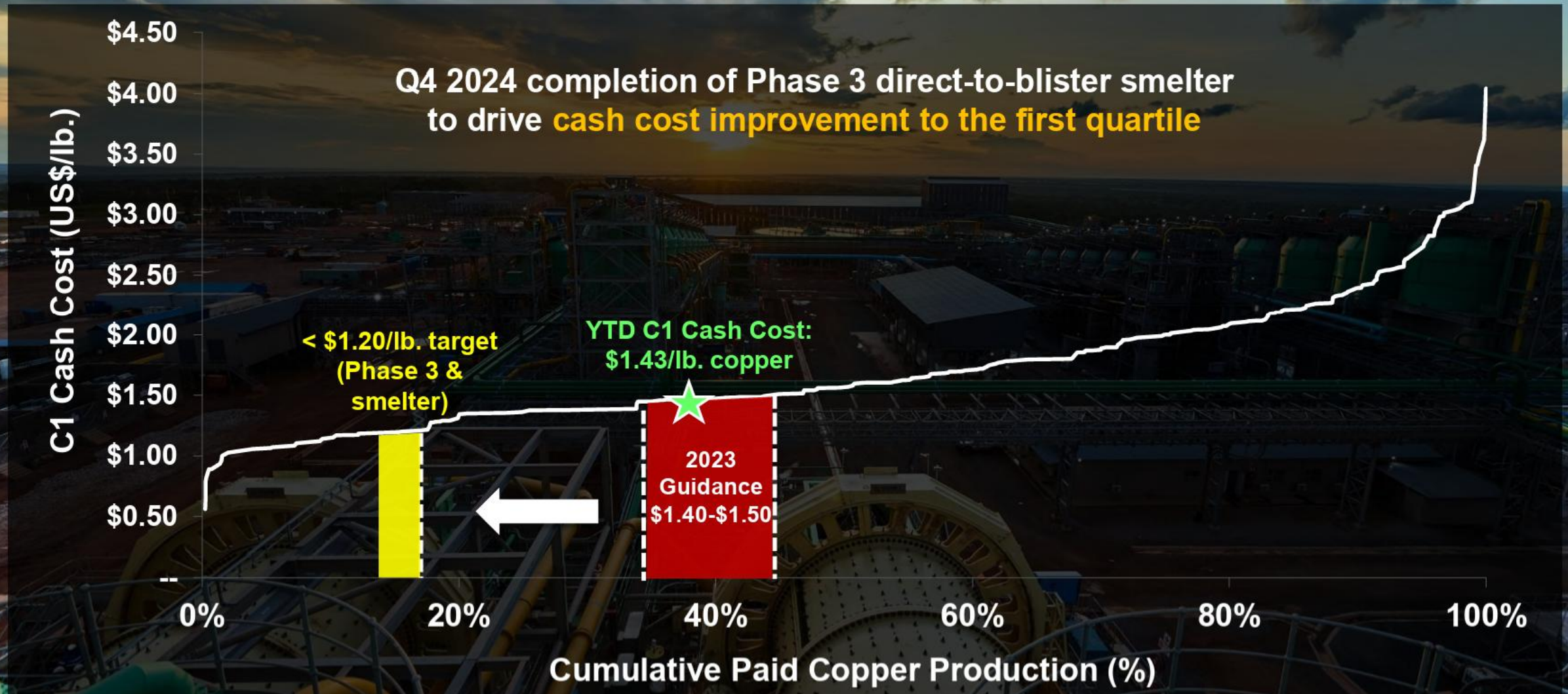
Table 1.15 Kakula 2020 FS Copper Price Sensitivity

After Tax NPV (US$M)	Copper Price (US$/lb)						
Discount Rate	**2.00**	**2.50**	**3.00**	**3.10**	**3.50**	**4.00**	**4.50**
Undiscounted	4,225	7,519	10,911	11,595	14,353	17,532	19,928
4.0%	2,828	5,072	7,370	7,832	9,704	11,852	13,457
6.0%	2,334	4,227	6,156	6,544	8,117	9,918	11,256
8.0%	1,935	3,551	5,190	5,520	6,857	8,384	9,513
10.0%	1,609	3,005	4,413	4,696	5,845	7,153	8,116
12.0%	1,340	2,558	3,779	4,024	5,022	6,154	6,982
15.0%	1,018	2,028	3,031	3,232	4,052	4,977	5,649
IRR (%)	38.5	57.9	74.0	77.0	88.9	100.4	106.9

Source: Ivanhoe Mines 2020 Kamoa-Kakula Integrated Development Plan

KAMOA-KAKULA YTD C1 CASH COSTS WITHIN GUIDANCE

(Figures shown on 100% basis for Kamoa-Kakula)



Note: Represents 2025 C1 pro-rata cash costs that reflect the direct cash costs of producing paid copper incorporating mining, processing, mine-site G&A and offsite realization costs, having made appropriate allowance for the costs associated with the co-product revenue streams.
Source: Wood Mackenzie, 2023 (based on public disclosure, the Kamoa-Kakula 2023 PFS has not been reviewed by Wood Mackenzie).


IVANHOE
MINES
INVESTOR PRESENTATION
January 2024
TSX: IVN | OTCQX: IVPAF

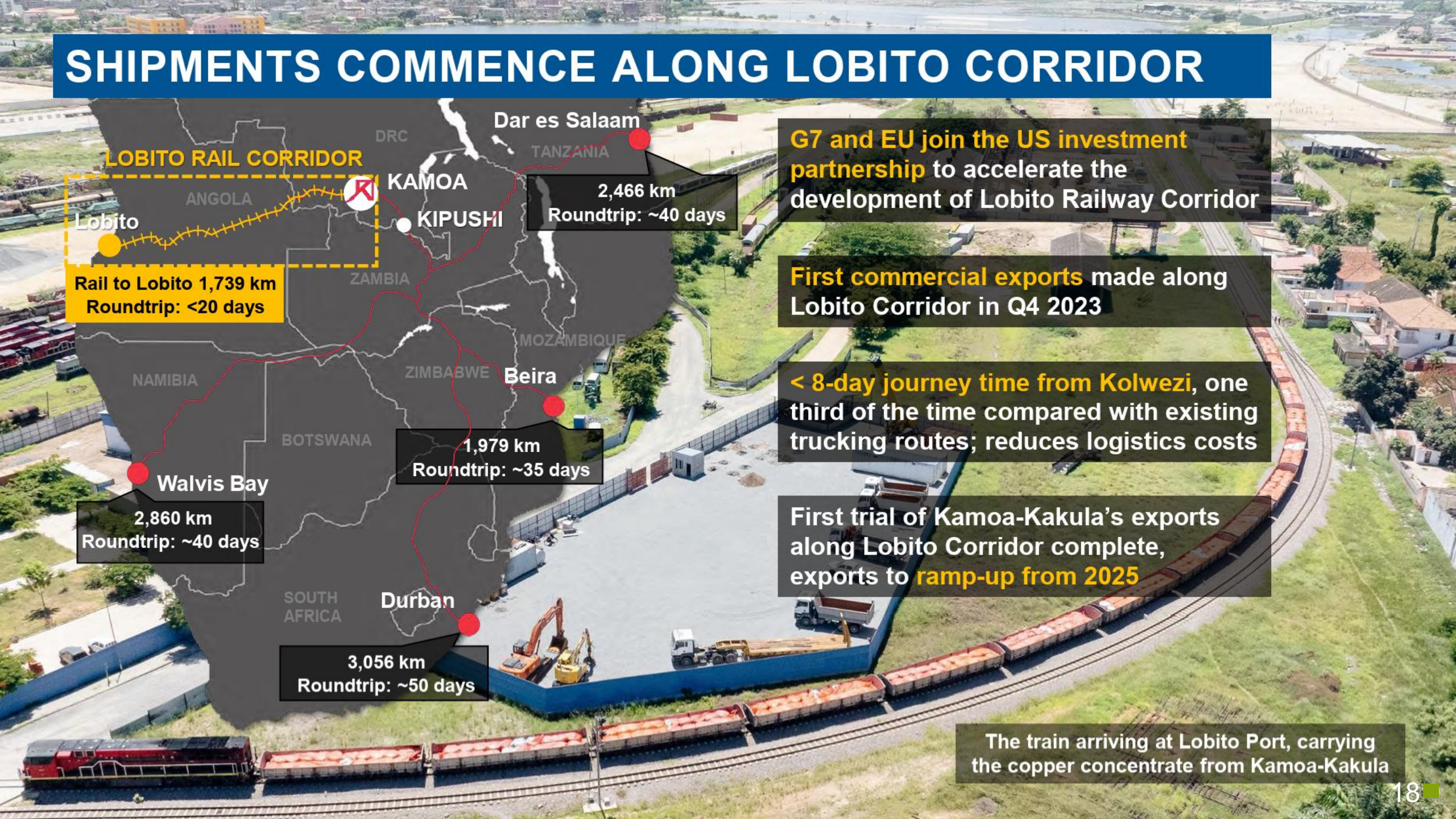
Kamoa-Kakula's Phase 1 & 2 4.6-Mtpa-concentrators, with the Phase 3 5.0-Mtpa-concentrator in the distant background

IVANHOE MINES

KAMOA-KAKULA

The world's fastest growing, highest grade and greenest major copper mine

SHIPMENTS COMMENCE ALONG LOBITO CORRIDOR



G7 and EU join the US investment partnership to accelerate the development of Lobito Railway Corridor

First commercial exports made along Lobito Corridor in Q4 2023

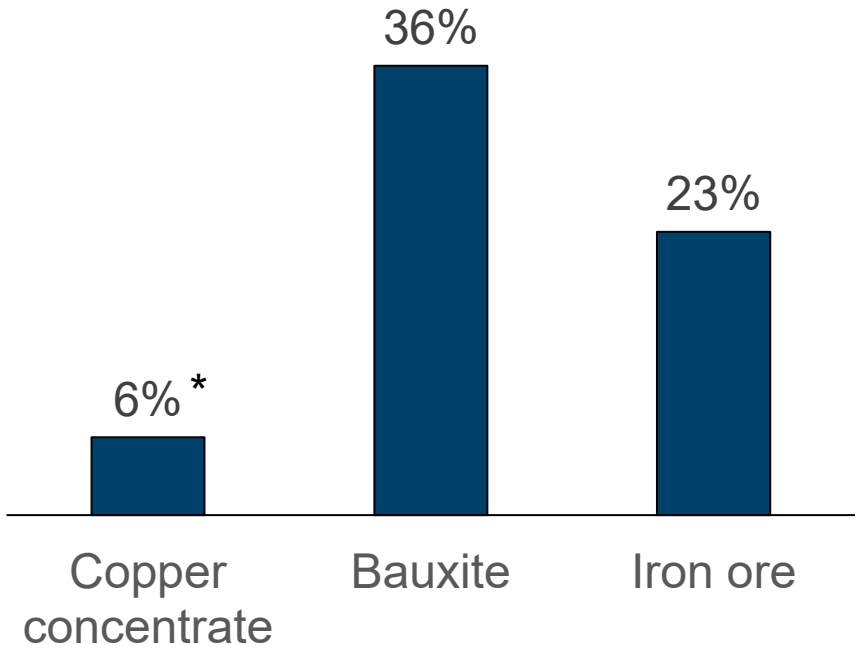
< 8-day journey time from Kolwezi, one third of the time compared with existing trucking routes; reduces logistics costs

First trial of Kamoa-Kakula's exports along Lobito Corridor complete, exports to **ramp-up from 2025**

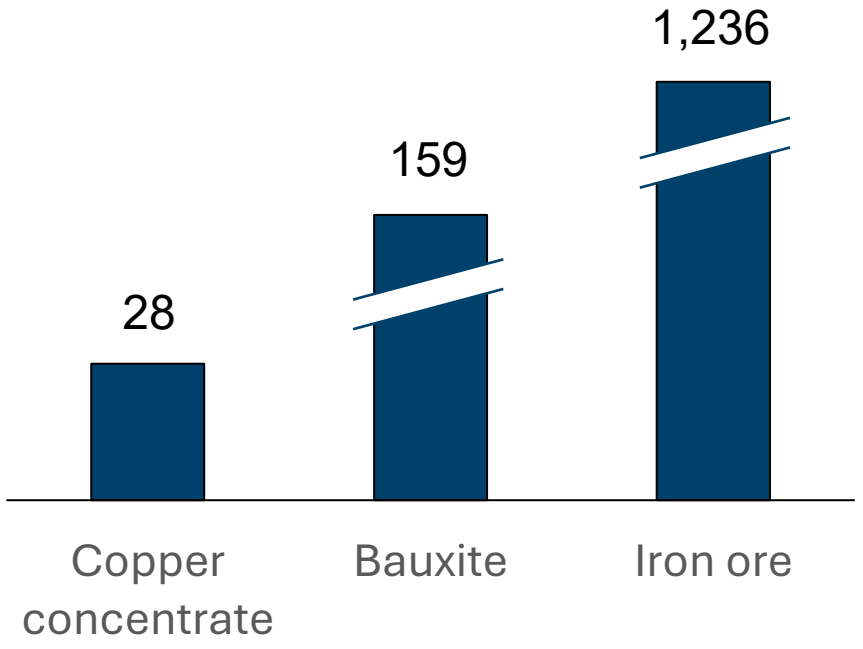
The train arriving at Lobito Port, carrying the copper concentrate from Kamoa-Kakula

Shipping and logistics costs have a small impact on copper, but are crucial for bauxite and iron ore

Shipping costs for African producers, % of 2024 price



China import volumes, Million tonnes

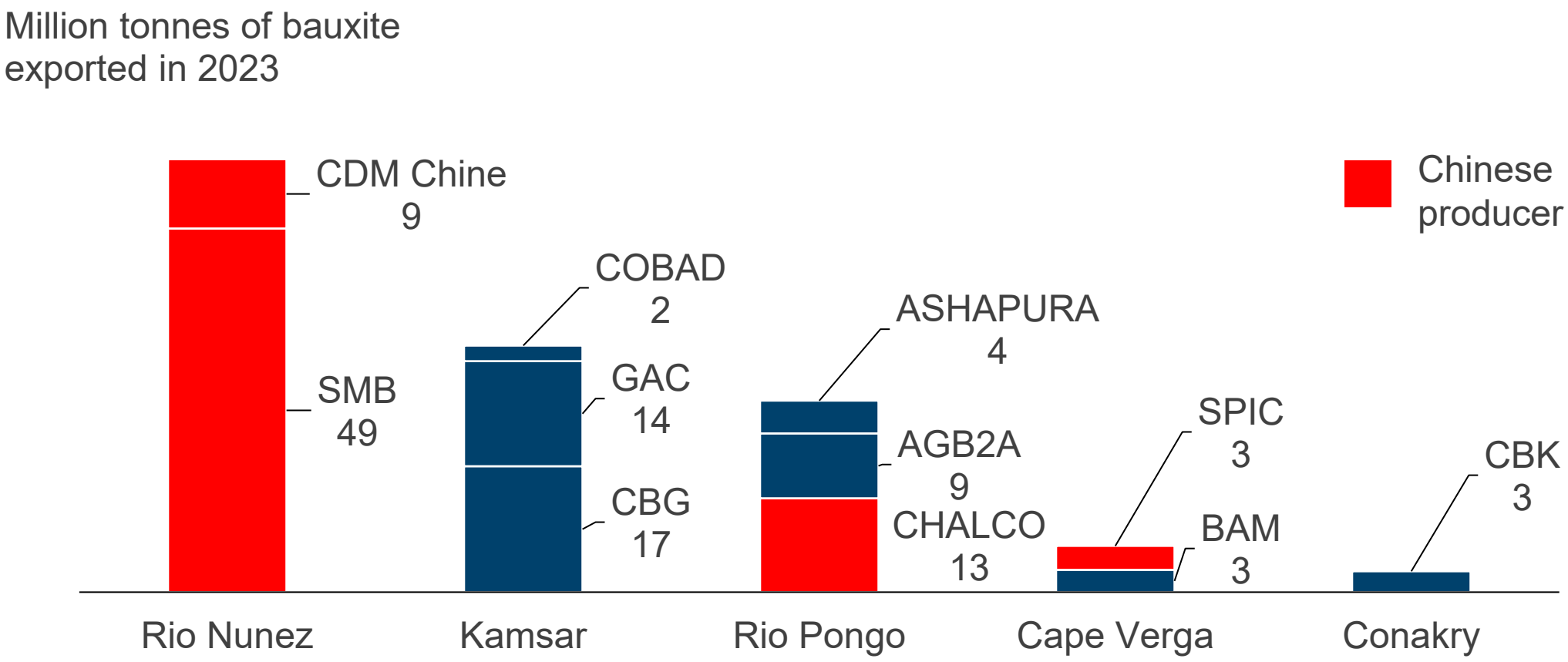


** Total logistics cost for copper concentrate based on Kamoa-Kakula 2023 Integrated Development Plan*
Source: China customs, C3 capesize rate, Ivanhoe Mines

Despite the distance and need to tranship, Guinea has emerged as China's largest bauxite supplier

Source: https://www.winninggroup.com.sg/en/service/logistics

Bauxite mining in Guinea is a very competitive landscape, shipping out of five main port areas



Source: Bulletin de Statistiques Minières et Carrières No 22, Ministère des Mines et de la Géologie

There has been significant infrastructure investment to improve in-land logistics

First new railroad in Guinea since 1970, 135km Santou-Dapilon line constructed by China Railway 18 for SMB-Winning

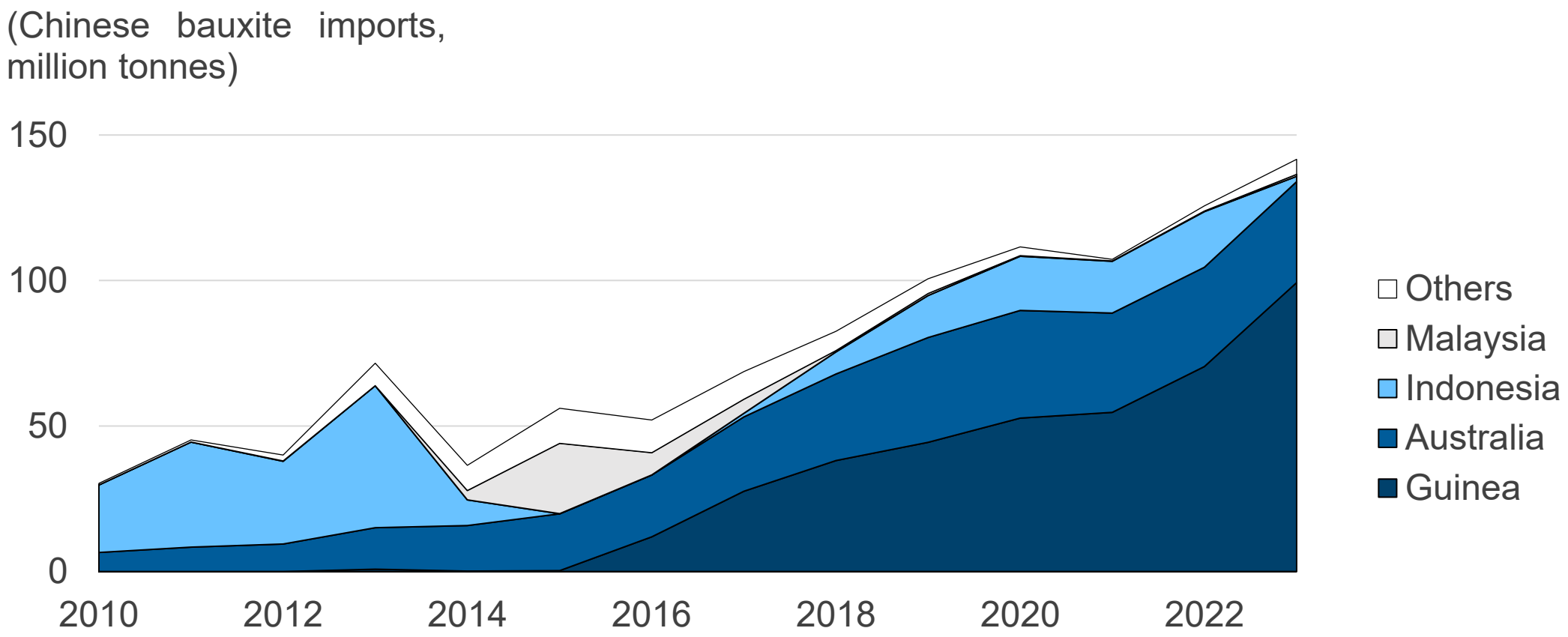
Despite the limitations of barge transhipments, these river ports have also become much more efficient

River port in Guinea with barge loading (AGB2A-GIC in Boffa, July 2025)

China’s alumina refineries have increasingly relied on imported bauxite

Alumina refinery, 3-million tonne capacity, Shanxi province in China, March 2018

About 75% of China's bauxite imports have come from Guinea over the past two years

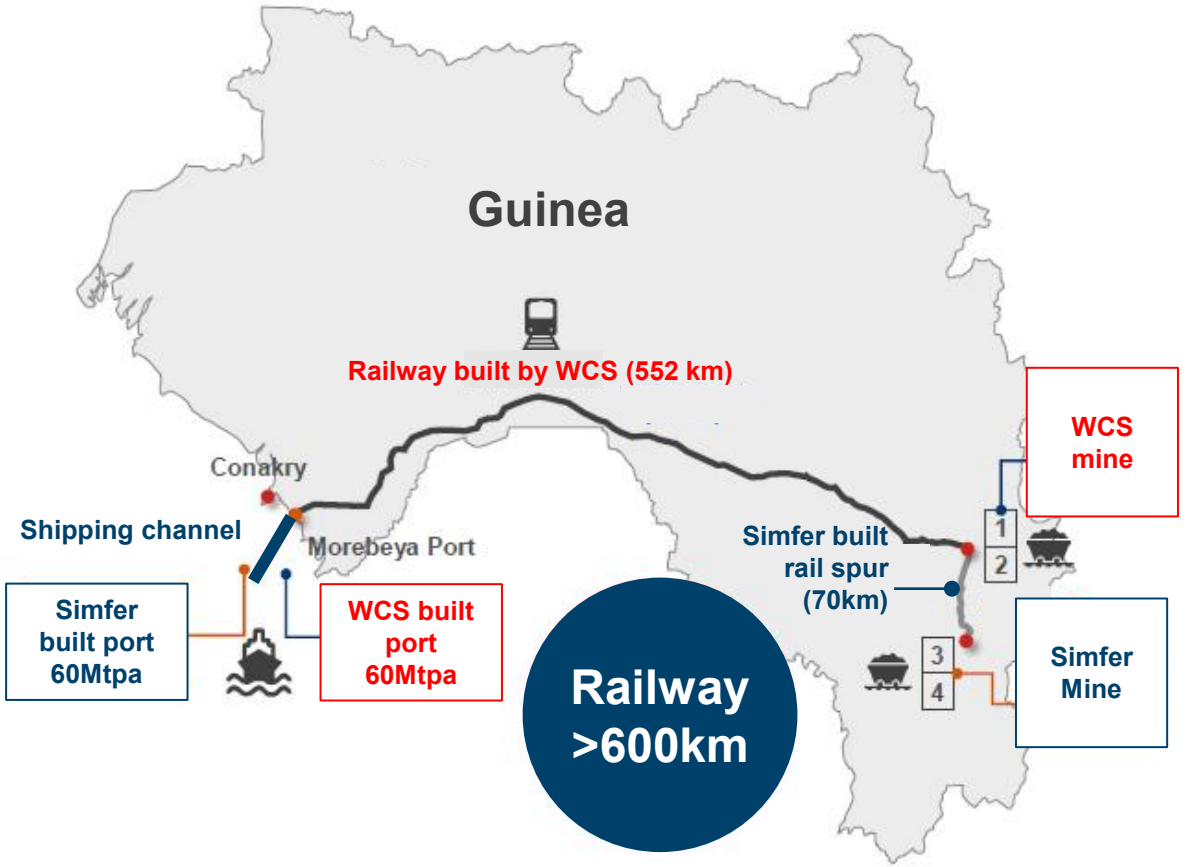


Source: S&P Global Trade Atlas

The bauxite experience is now being applied to the 120 million tonne Simandou iron ore project

Source: https://www.seetaoe.com/details/236089.html

Simandou is a $20 billion iron ore mining and infrastructure project in Guinea



Simplified ownership:

15%	Guinea Govt
21%	BAOWU
21%	WINNING CONSORTIUM SIMANDOU: Winning International (50%), Weiqiao Aluminium (50%), UMS (nominal)
20%	CIOH: Chinalco (75%), Baowu (20%), China Railway Construction (2.5%), China Harbour Engineering (2.5%)
23%	RioTinto

Source: Rio Tinto Investor Seminar, December 2023

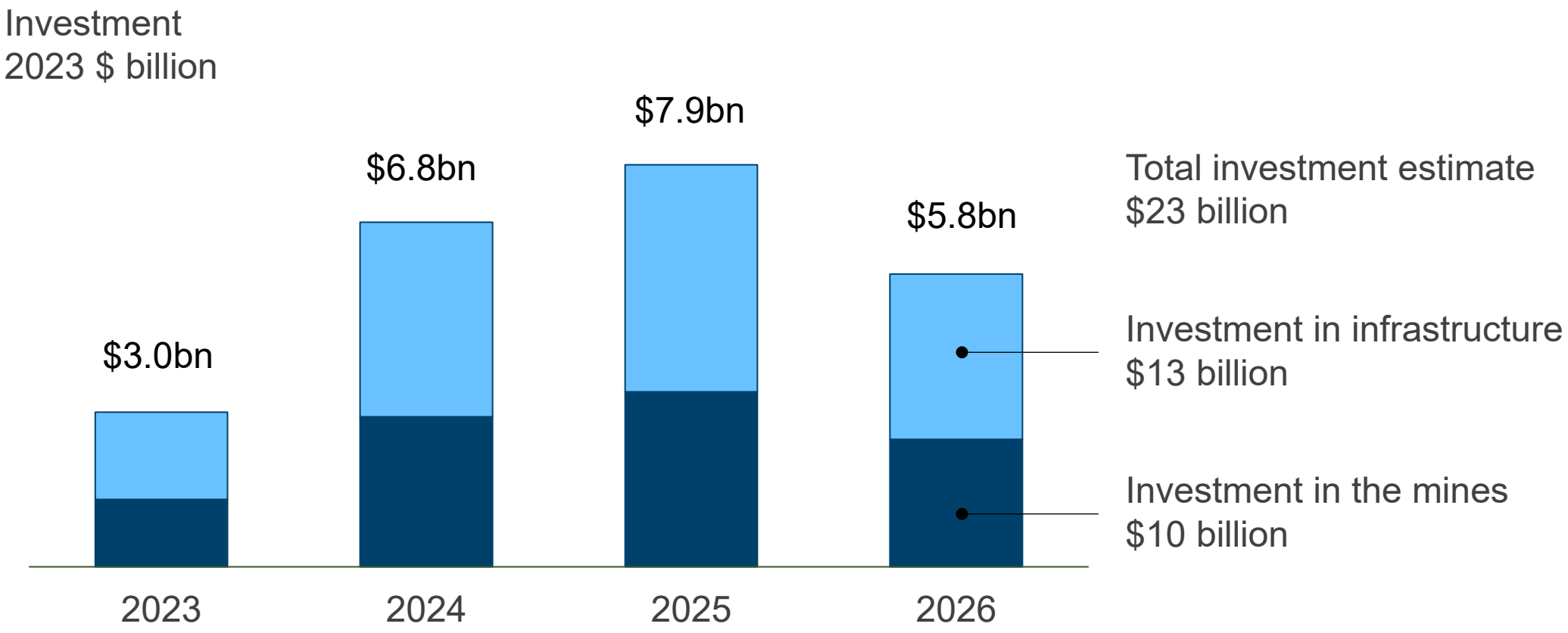
The new infrastructure requirements were huge, with over 200 bridges and 30 km of tunnels required

Simandou capital and operating cost estimates and tax settings available publicly

	Compagnie du Transguinéen infrastructure	Simfer Rio Tinto mine	Winning Consortium Simandou mine
Royalties (rate over total revenues)	$0.50/t	3.5%	5%
Local development fund (rate over total revenues)	N/A	0.25%	0.5%
Corporate income tax	15% years 1-17 25% years 18+	15% years 1-8 30% years 9+	0% years 1-10 30% years 11+
Guinea Government equity	15%	15%	15%
Capex	$13 billion	$5.1 billion	?
Opex and sustaining capex	$17/wmt	$11/wmt	?

Source: Rio Tinto Investor Seminar December 2023, Convention de Base de WCS June 2020

Financial reporting obligations mean that it is easier to track project progress



Source: Rio Tinto 2024 full year financial results; author's calculations

Higher transparency with publicly available Environmental and Social Impact Assessments

Selected Chapters of the Rio Tinto Simfer Mine and Rail Spur ESIA 2024	
1. Geology and mineral waste	10. Landscape and living environment
2. Water environment	11. Socio-economic considerations
3. Noise, vibration and explosives	12. Land use and ownership
4. Air quality	13. Labour force and employment conditions
5. Local climate	14. Project induced migration
6. Greenhouse gas emissions	15. Health and safety of affected communities
7. Use of non-mineral resources and waste	16. Ecosystem services
8. Biodiversity	17. Human rights
9. Cultural heritage	18. Mine closure

Source: Rio Tinto ESIAs available via https://bowecon.com/Simandou-impact

Conclusions

Key trends in the mining sector:

- Value moving from iron ore towards copper
- China now dominates mineral processing and plays a lead role in upstream financing
- Africa supplying a disproportionate amount of additional volume

The top three African mineral growth stories:

- Kamoa-Kakula in the DRC: “The World’s best copper mine”
- The remarkable ascent of Guinea to become the World’s top bauxite producer
- Simandou iron ore in Guinea: the largest greenfield mining project globally

Questions?