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Aluminium's place in a changing world

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CRU Aluminium: Expertise across three continents

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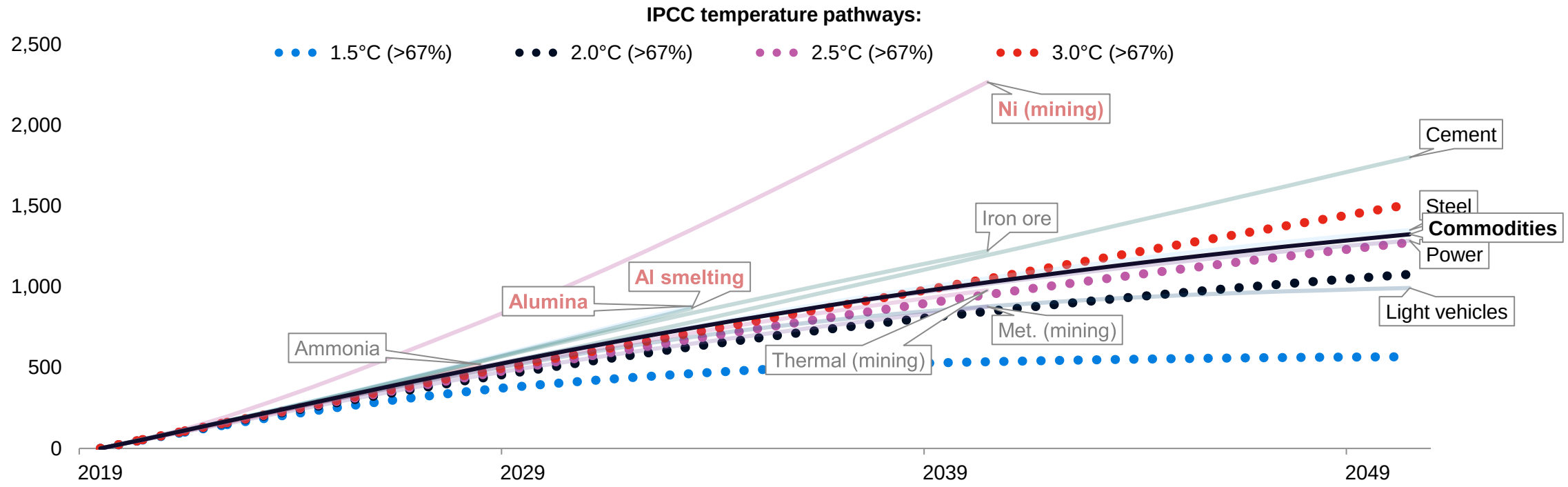
Meeting *Agenda*

1. Challenges and opportunities
2. Aluminium demand and supply
3. Aluminium balance and price

Global emissions are on a 2.5–3.0°C pathway by 2050

Aluminium and nickel sector emissions are on a ‘well-above a 3.0°C’ temperature pathway

GHG emissions by sector by scenario, normalised to 2019 global GHG emissions, cumulative, bn tCO_2e/y



DATA: *CRU Sustainability and Emissions Service*

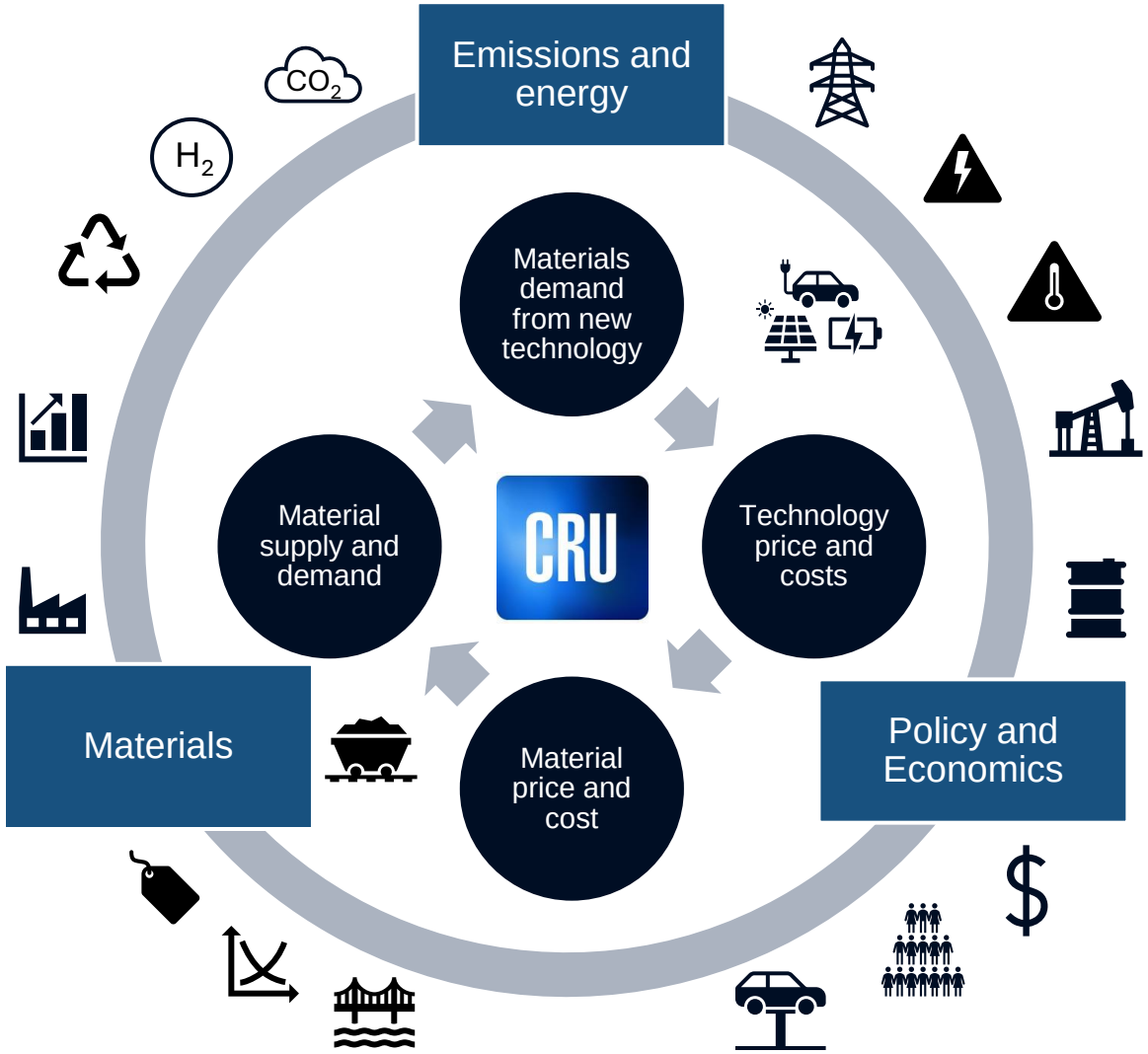
Forces defining the metals' landscape

Climate change

- Decarbonisation
- Energy transition
- Sustainability
- Biodiversity

Supply chain risks

- Global trade and supply chains
- S/D imbalances
- High debt



Geopolitics & Economics

- Changing role of governments
- Securing green resources
- Power shifts

Technology change

- Clean technologies
- Technology costs
- Value of Innovation

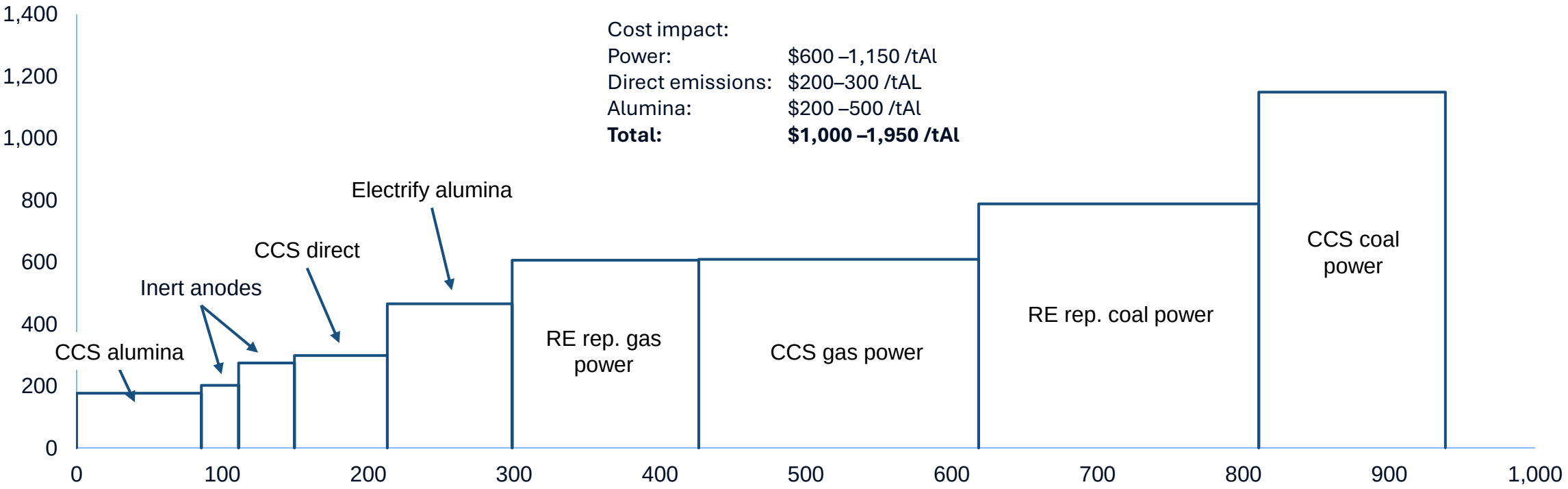
What metals will we need most?

	Renewable electricity generation	Energy storage	Power conversion and transmission	Electrification of systems and materials
Conductors	**Cu** **Al** **Ag**	**Cu** **Al** **C**	**Cu** **Al**	**Cu** **Al**
Structural materials	**Fe** **Al**	**Fe**	**Fe**	**Fe** **Al**
Semi-conductors / Storage Materials	**Si**	**Li** **Na** **Ni** **Co** **Mn**		
Others	**Glass** Semiconductors (CdTe, perovskites)	**Iron phosphate**, lead, vanadium, sulphur Energy carriers (**hydrogen**, **ammonia**, **methanol**)	Magnetic materials inc **GOES**, **NdFeB**, SmCo Semiconductors (Si, SiC, GaN) PGMs for fuel cells Graphene conductors High-temperature superconductors	Reductants (**hydrogen**, biocarbon, electrolysis)

The decarb. challenge is mainly about cost; but also technology

Aluminium requires a ~$1,500 /t price premium to incentivise full decarbonisation

Impact of technology change on aluminium cost, 2030, real 2023, $/t aluminium



DATA: *CRU Sustainability and Emissions Service*

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Demand & Supply Outlook

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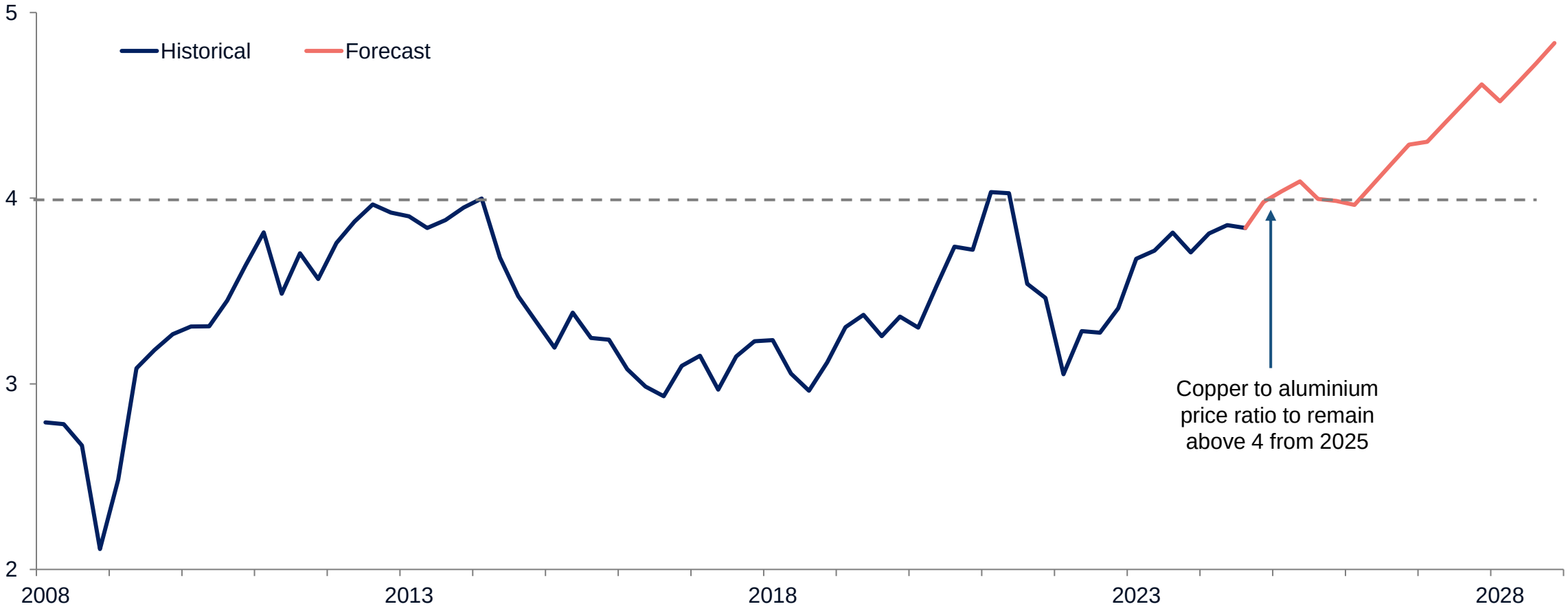
LME 3M ebbs and flows on pre/post pandemic trends

Copper price is increasingly x4 that of aluminium, instigating substitution discussions

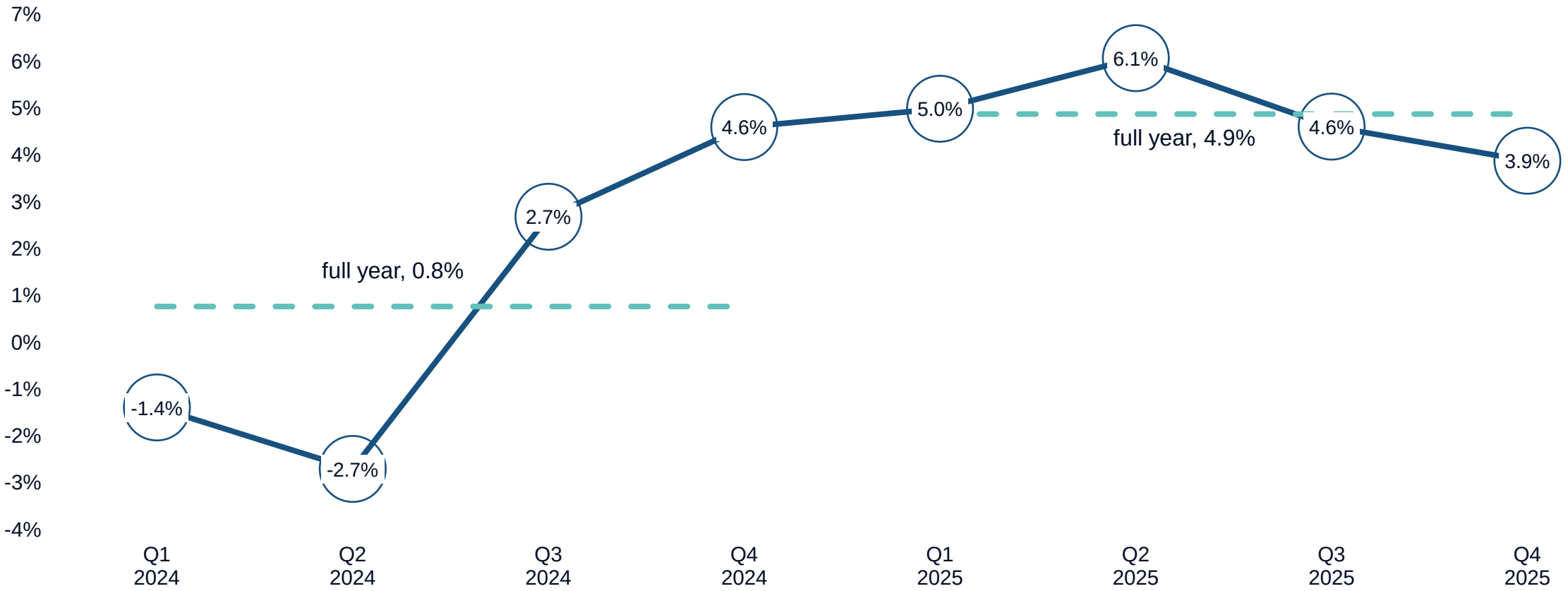
Copper to aluminium price ratio



DATA: LME, CRU Copper Market Outlook

World ex. China: Demand to remain sluggish this year but will rebound in 2025

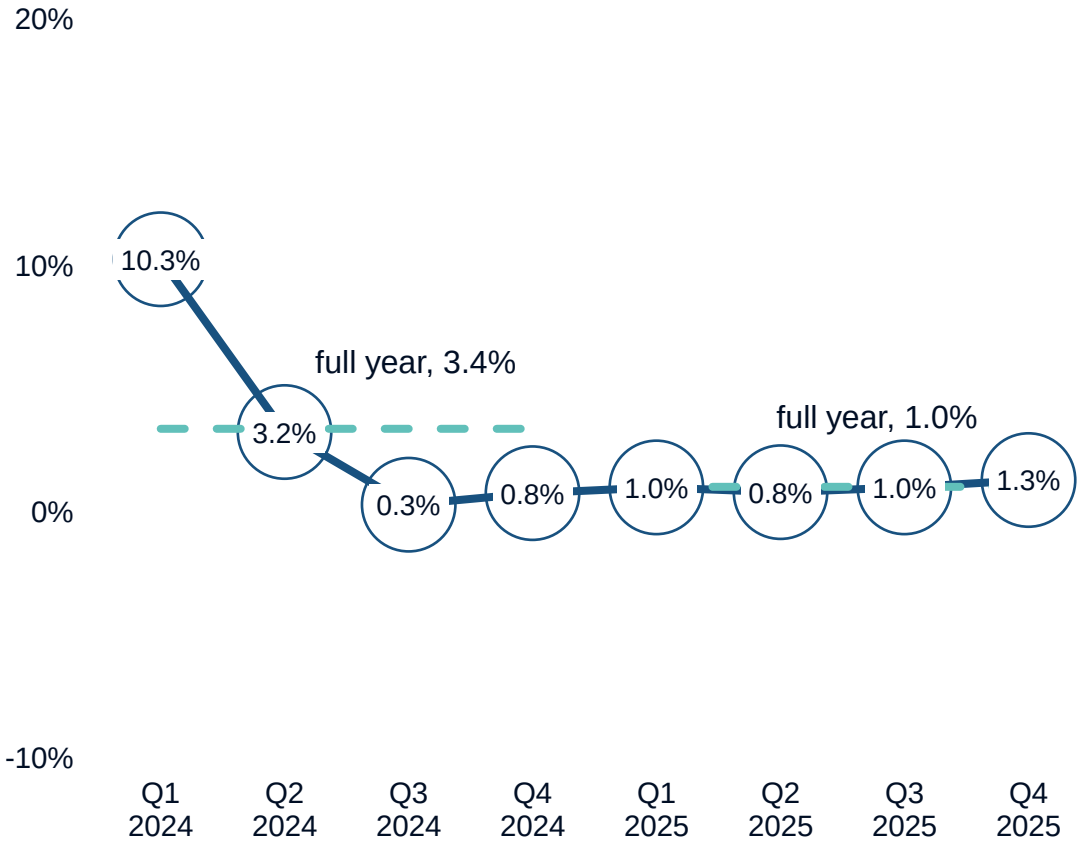
World ex. China aluminium consumption, y/y % change



DATA: CRU, Associations

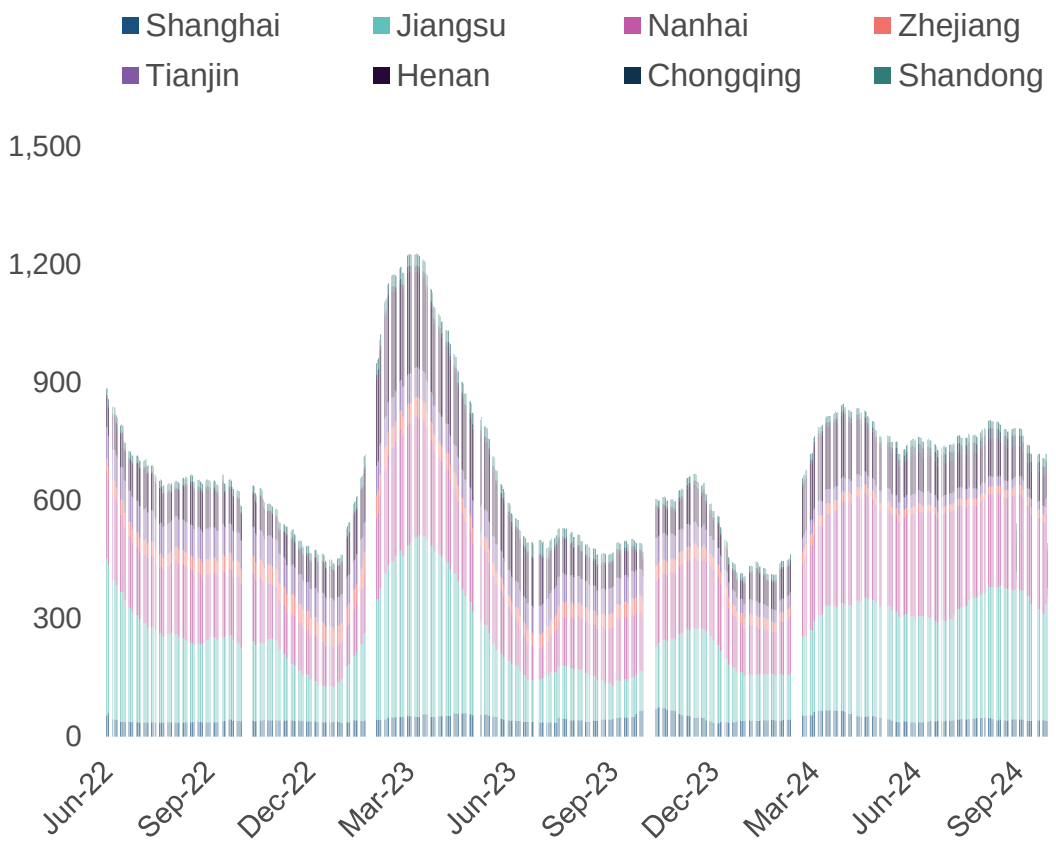
China: Growth slows but stimulus limits downside

China aluminium consumption, y/y % change



DATA: Nanchu warehouse, SHFE, CRU

Reported ingot stock, '000t



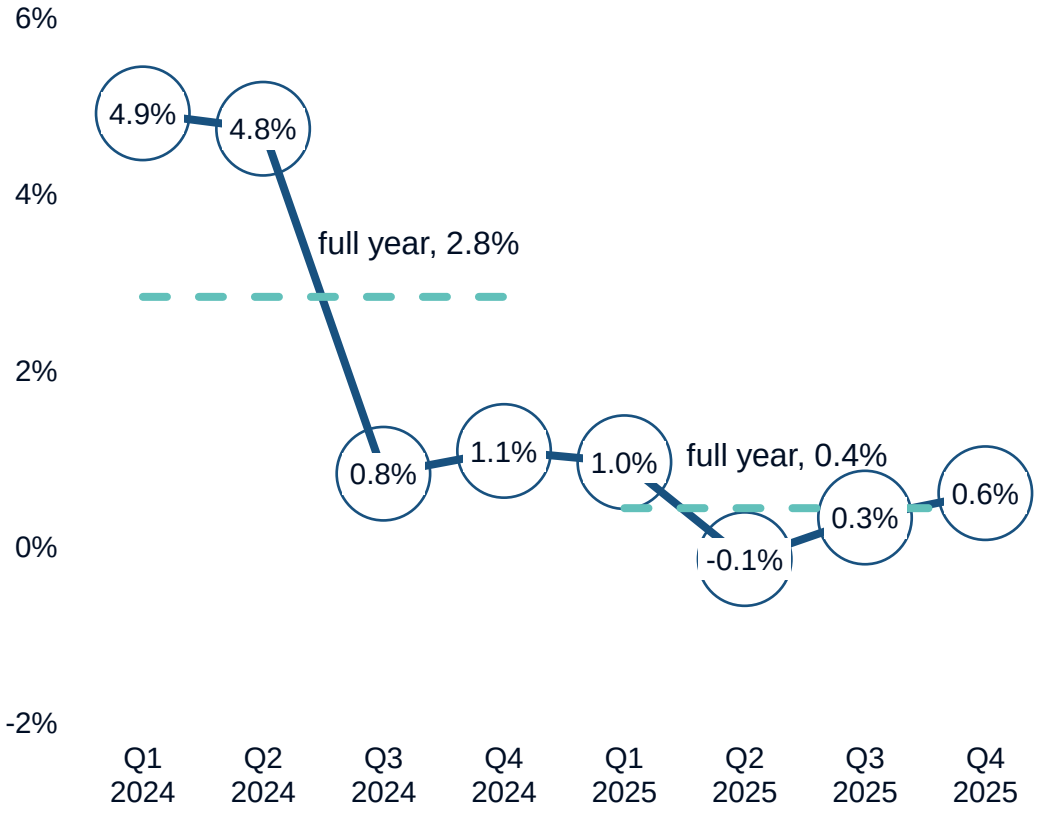
World ex. China: Further restarts not expected until 2025 in Europe and the US

World ex. China aluminium production, y/y % change

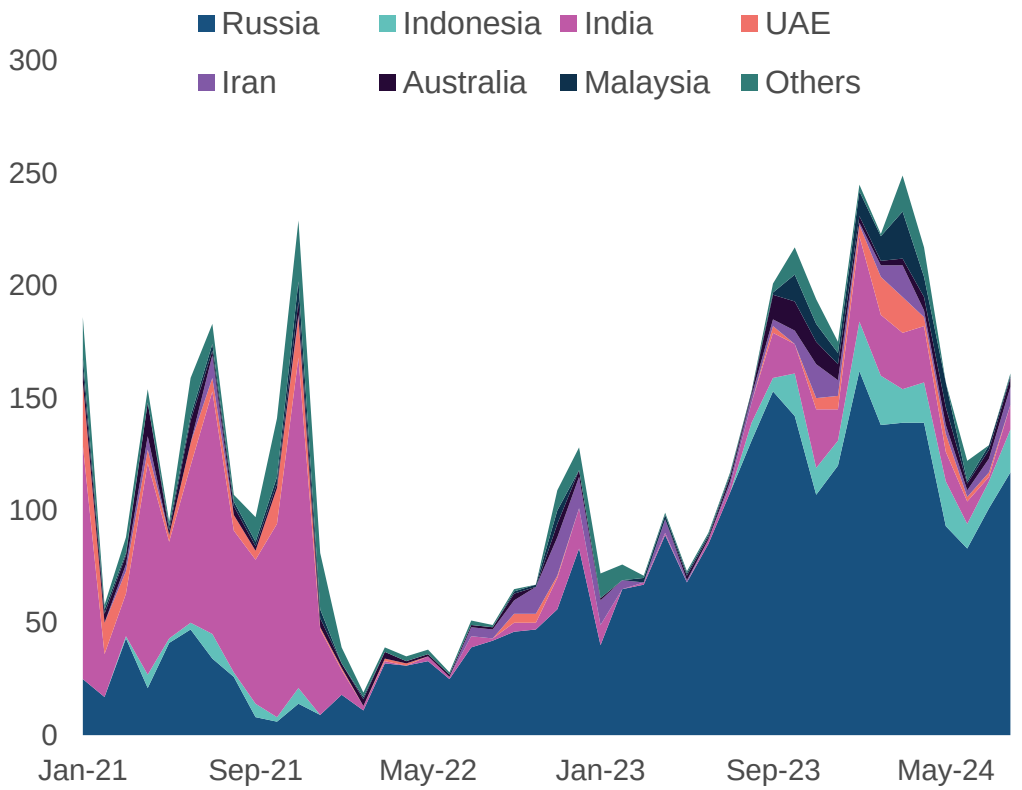
DATA: CRU

China: Production growth limited in 2025

China aluminium production, y/y % change



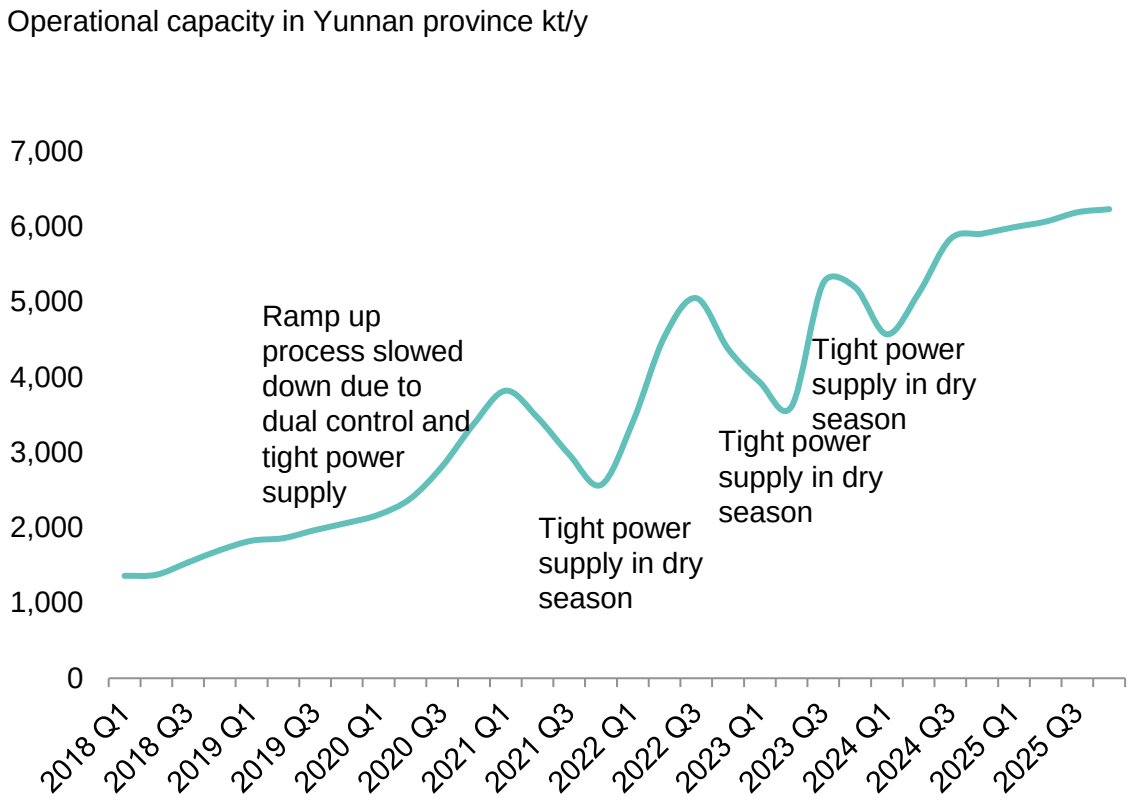
China primary aluminium imports (HS code 760110), '000t



DATA: CRU, China Customs

Yunnan production is highly contingent on hydropower

Smelters in Yunnan unlikely to cut production in 2024

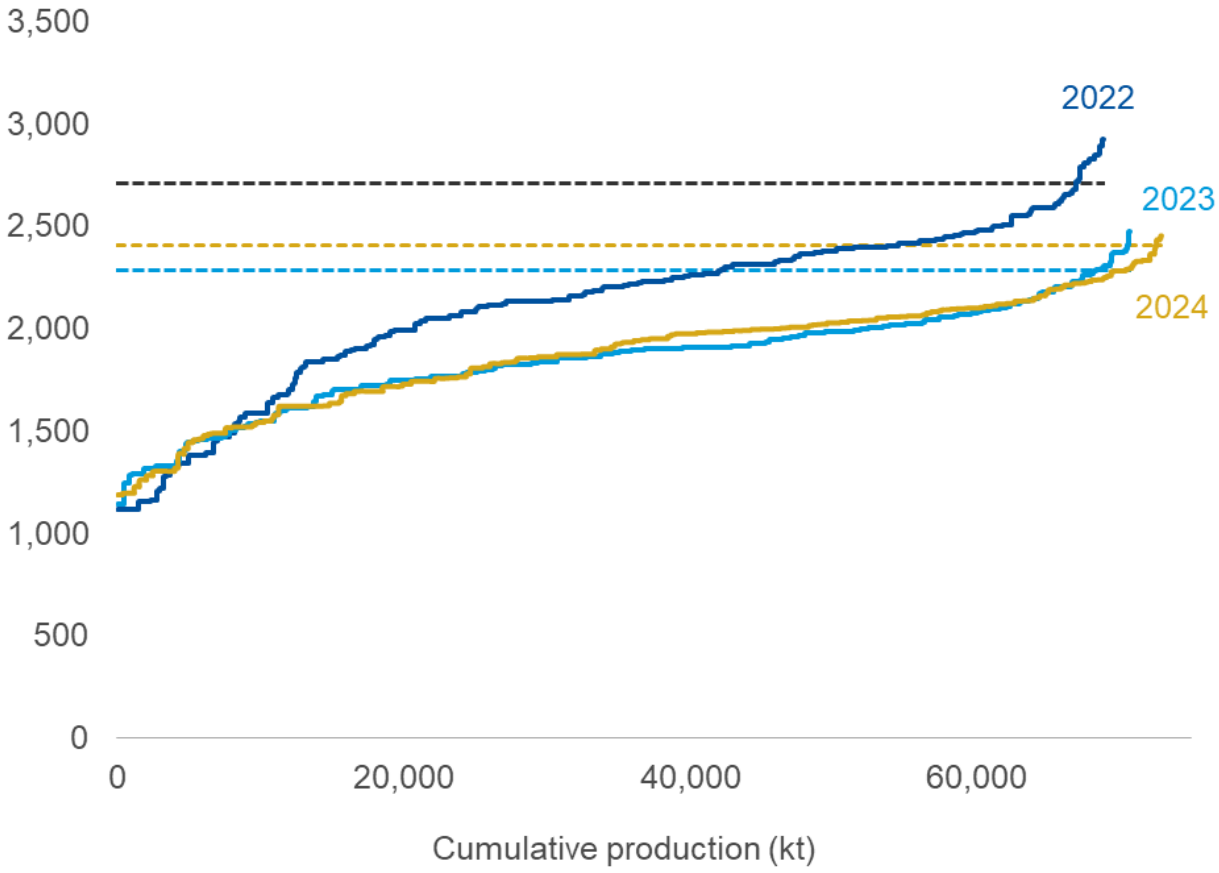


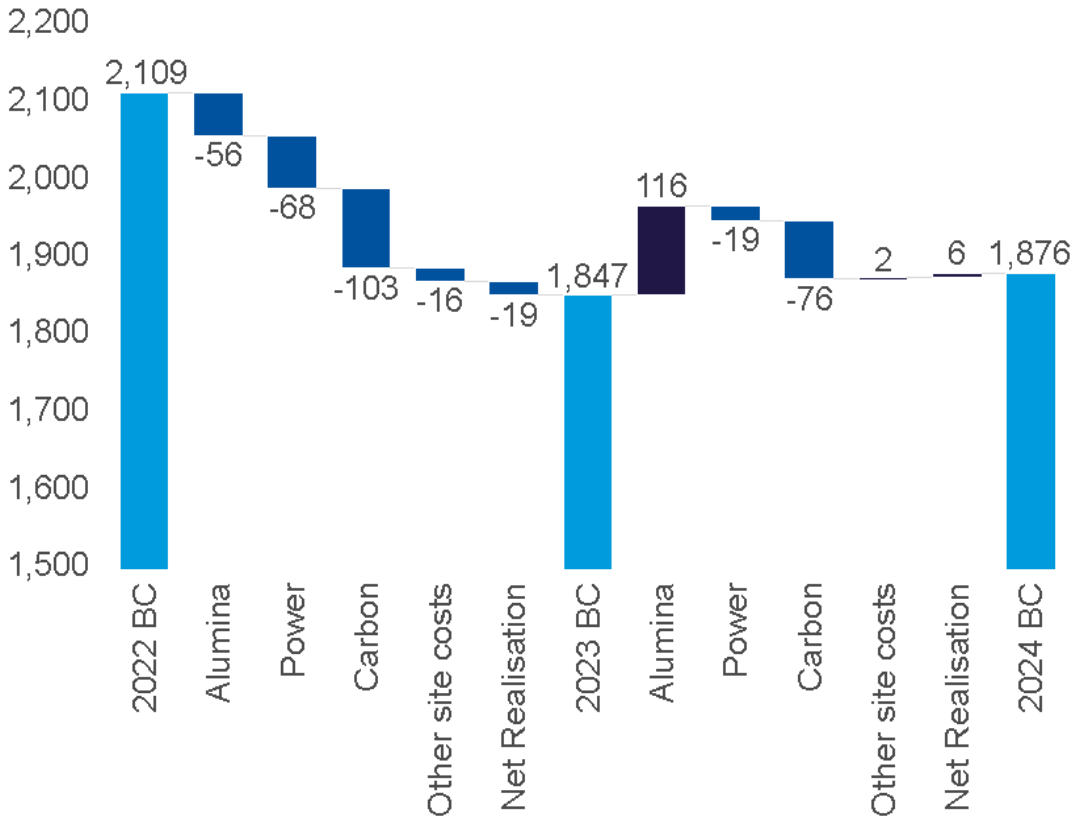
Data: CRU

- Smelters in Yunnan province cut production in dry season for consecutive four years from late 2019 to late 2023, due to the tight hydro power supply in dry season in Yunnan province
- Yunnan smelters are unlikely to cut production in 2024 since the hydro power supply is better than normal years, and the renewable power supply has increased significantly in the province in addition to the less demand for electricity from non-aluminium industry
- Possibility of curtailments for Yunnan smelters in dry season should not be ruled out in 2025 and beyond

Smelting cost stable after 2022 highs

Aluminium Smelting Business costs curves, and LME 3M price, $/t





DATA: CRU Aluminium Cost Model

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Aluminium Balance & Price Outlook

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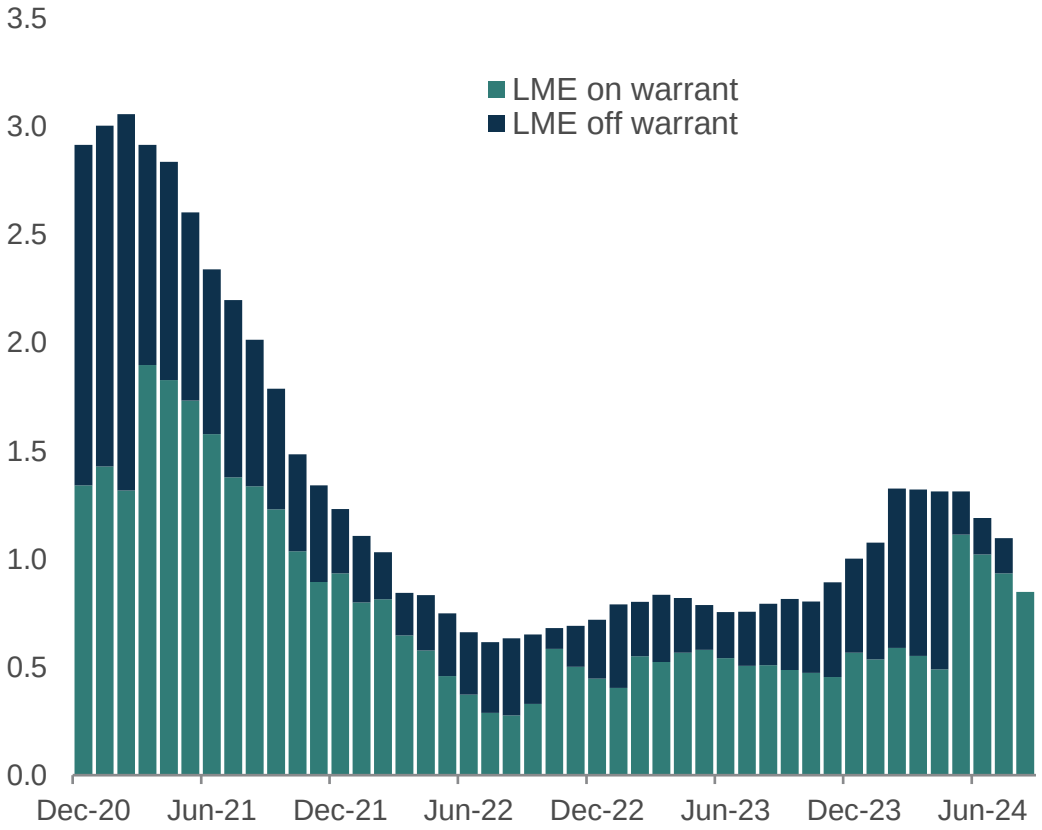
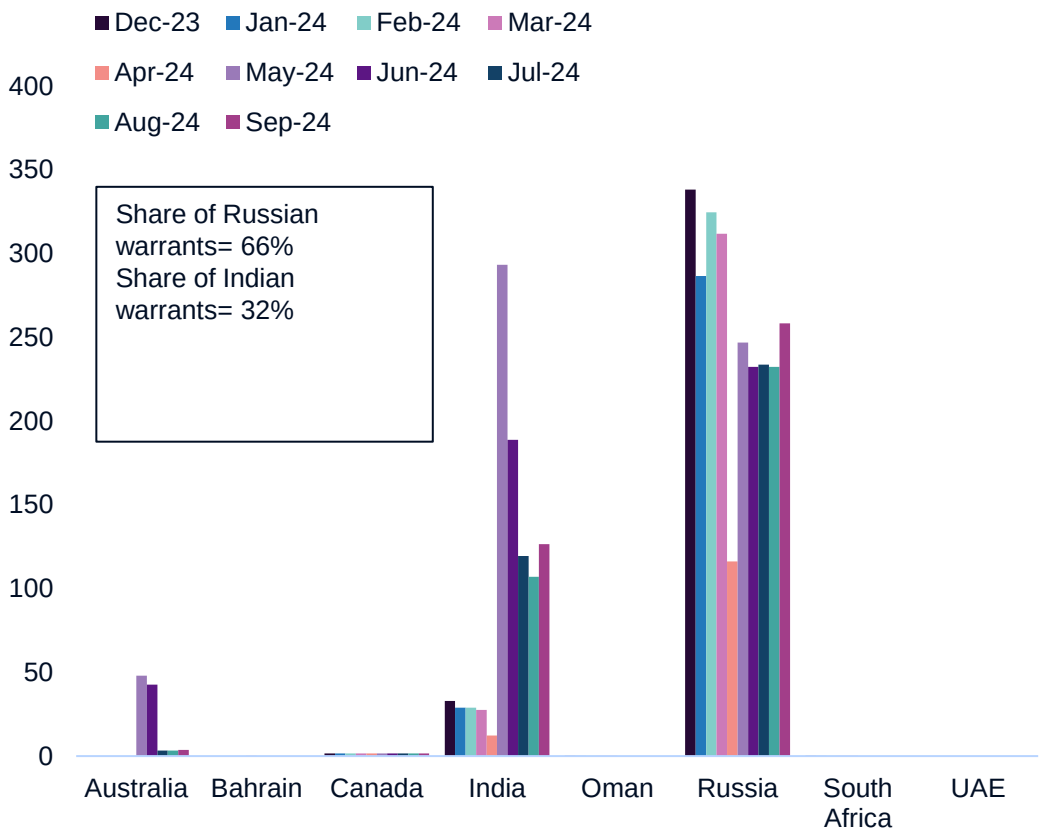
LME stocks are falling and metal is mainly Russian or Indian

LME aluminium inventories, million tonnes



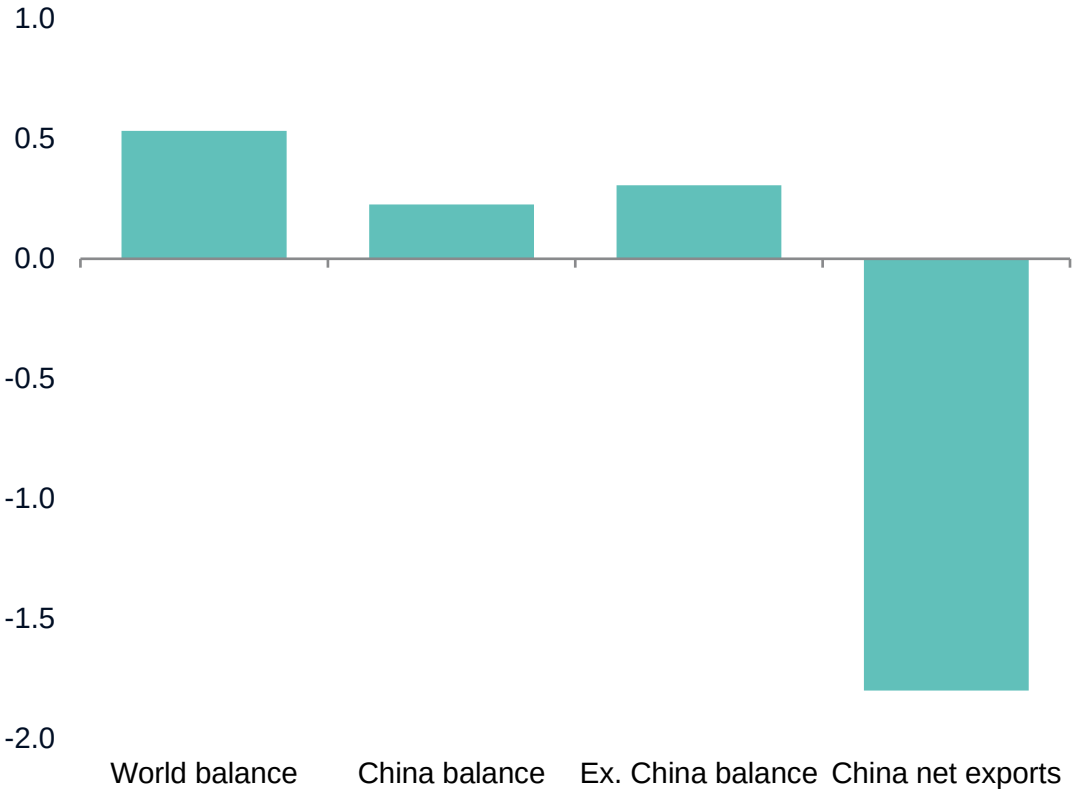
DATA: CRU, LME

Country of origin of warranted aluminium held in LME warehouses, '000 t

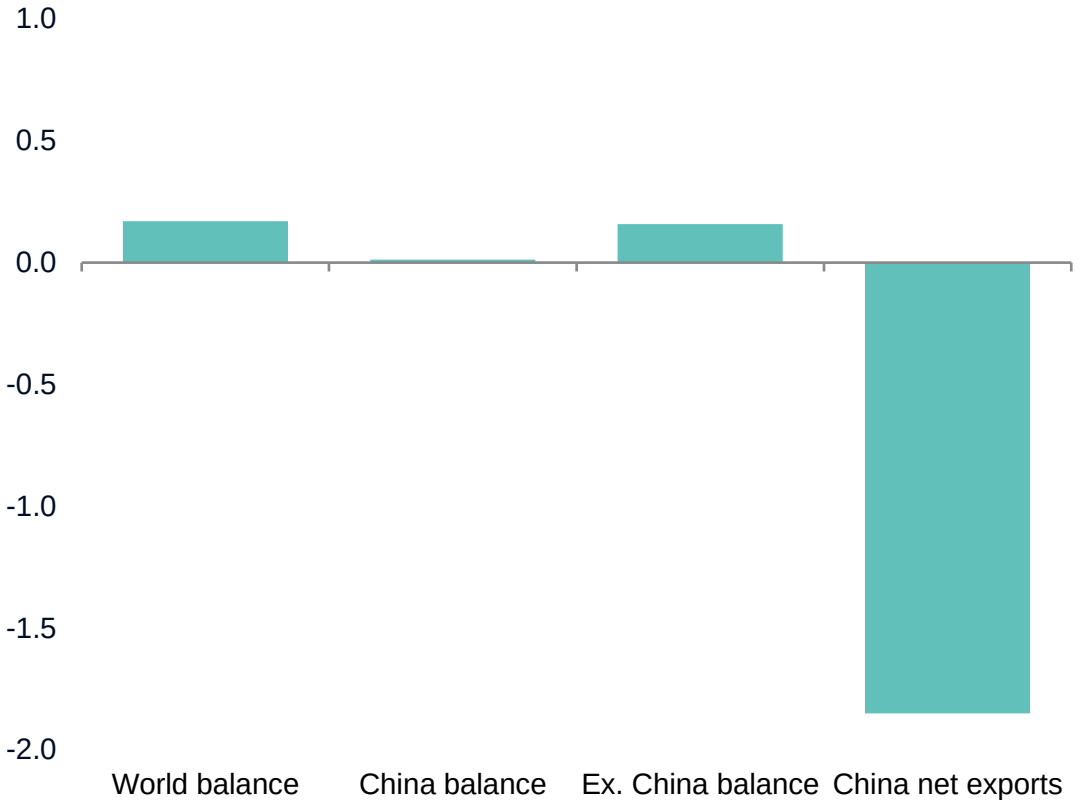


Balance: Substantial surplus for 2024 but set to shrink in 2025

2024 aluminium market balance, million tonnes



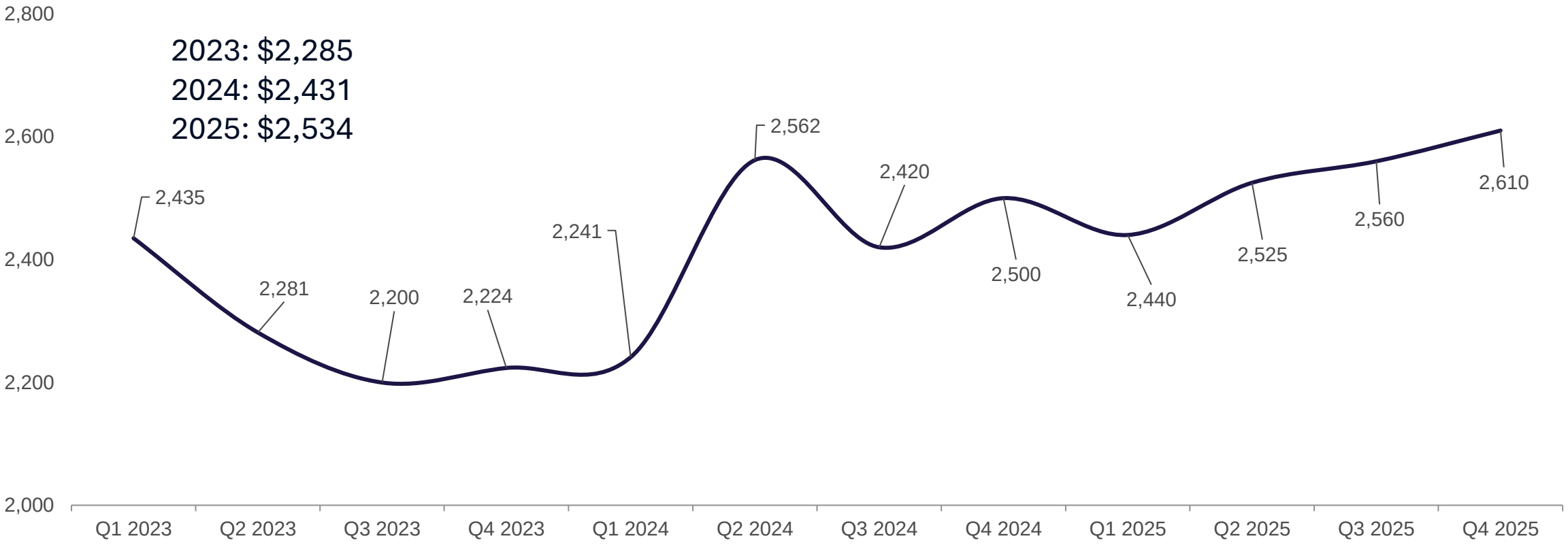
2025 aluminium market balance, million tonnes



DATA: CRU

Price forecast: Price to hit a ceiling soon as demand continues to disappoint

LME aluminium 3-month price forecast, $/t



DATA: CRU

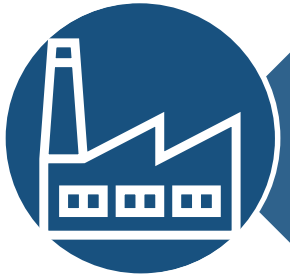
The key risks to our price forecasts

CRU's Price Risks (forecast)	Bull/Bear/Neutral	2025-2028
Investment in project pipeline: With carbon free technology not ready at industrial scale many producers are hesitant to invest in traditional technology	Bullish	
Resource Nationalism/protectionism: This could fragment the global economy and raise prices. However, if it tips over into lower global growth this would then be bearish	Neutral	
Increased Substitution/Thrifting: Copper price rises could spark even great shift from copper to aluminium in electrical applications	Bullish	
Chinese domestic demand: Property investment and residential property sales remained in contraction and the drop in house prices accelerated. However, stimulus plans show central government is keen to act	Neutral	
Slower adoption of Emerging Technology: A slower takeup of new energy vehicles, solar and wind would be bearish for aluminium demand	Bearish	
Yunnan smelter production: Yunnan smelter production is contingent on hydropower and this has been insufficient in prior years and if repeated the China primary capacity cap will constrain potential alternatives	Bullish	

DATA: CRU

Takeaways

Demand has disappointed, particularly in Europe, and hopes of recovery slip to 2025



Restarts in Europe will be vital to meet the demand recovery but may be delayed with demand

Prices have risen too far too soon on Chinese stimulus but will rise again in 2025 with demand

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Thank you.

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