Global Metals Weekly

Tin: the forgotten metal

Why did tin outperform most metals last year?

Tin is an industrial metal that tends to fly under the radar, mostly because the market is small at around 300kt (the copper market is about 25Mt). With prices trending higher in the past two decades, the "forgotten commodity" fared better than most other industrial metals in 2023, too, rallying by up to 30% intra-year to $32,262/t. Support has been influenced by supply, with mine production barely moving above 300kt over the past 20 years. At the same time, tin is a MIFT (metal important for future technologies), so should benefit from the energy transition. This ultimately suggests that, while some supply issues may ease this year, prices will remain supported.

Tin has experienced multiple squeezes in recent years

Tin prices have been on an upward trend for a while now, since the early 2000s, when the metal was trading just around $4,000/t. Given the persistent tightness in the tin market, a new floor seems to have been set around $25,000/t. Low inventories in LME warehouses also made the metal prone to violent squeezes, with cash-to-3M spreads rising above $1,000/t multiple times in the past three years. Given the small size of the tin market, investors, which account for only about 5% of trading volumes, can have an outsized impact on prices and spreads. With forward curves increasingly sensitive to inventory levels, market participants should get used to violent price swings/volatility.

Deficits have eased despite challenged supply

Digging a bit deeper into fundamentals, the tin market has normalised in the past two years, after constant deficits. Softer balances were mostly driven by slowing demand, particularly from the semiconductor industry during Covid. This more than offset supply disruptions from key tin producers, including Myanmar. Shipments from this Asian country, China's top supplier, were disrupted last year (-3.6% YoY), as the government in Wa State, a key mining region, imposed a mining ban in August 2023. Tin mining in the region remains suspended for now, although it could resume after the Spring Festival in February. We expect the market to remain in a surplus, with prices averaging $25,300/t, albeit there is risk of prices rallying to $28,000/t should supply additions fail to normalize. Against near-term headwinds, fundamentals look robust longer-term on solar and electric vehicles. Indeed, tin demand from the green sector could more than double by 2030, potentially topping 70ktpa, equivalent to a fifth of current consumption.

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Commodities
Global

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EV – Electric vehicle

LME – London Metal Exchange

Refer to important disclosures on page 13 to 14.
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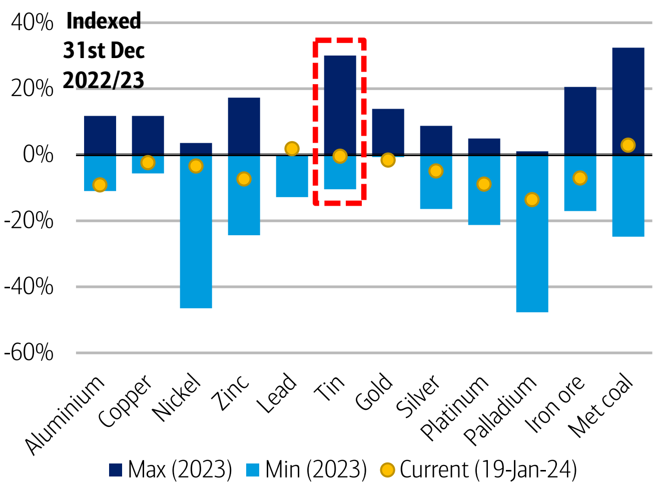
Tin: the forgotten metal

Why has tin been performing well?

Tin outperformed most metals and mined commodities last year

Tin is an industrial metal that tends to fly under the radar, mostly because the market is small with supply and demand at around 300kt or US$11BN (the copper market is around 25Mt or US$230BN). Yet, in 2023, the "forgotten commodity" fared well relative to the broader metals complex, rallying by up to 30% to $32,262/t, better than most other base metals (Exhibit 1). Indeed, tin prices had been on an upward trend since the early 2000s, when it was trading at just around $4,000/t (Exhibit 2). The uptrend has been accompanied by a decline in LME inventories in the past decade, which has reset the floor for LME prices at around $25,000/t. We acknowledge that stocks in LME warehouses rebounded to above 8kt in late 2023, but they are still significantly below historical peaks. Why have tin prices and fundamentals strengthened this much? There are a couple of reasons in our view: 1) tin is a MIFT (metal important for future technologies) so demand has been solid and 2) supply is not very consolidated, with no "blue chip" miner taking a strategic interest.

Exhibit 1: Metals and mined commodities performance
Tin fared better than other metals last year



Source: Bloomberg

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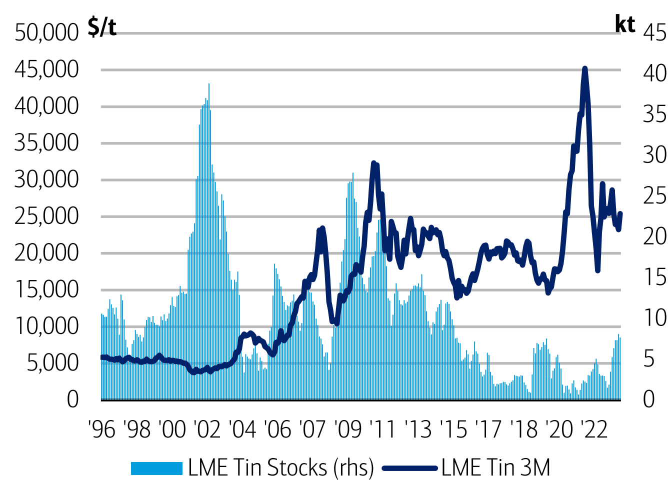
Exhibit 2: LME tin price and inventories
Tin prices have been on an upward trend since the early 2000s



Source: Bloomberg, BofA Global Research

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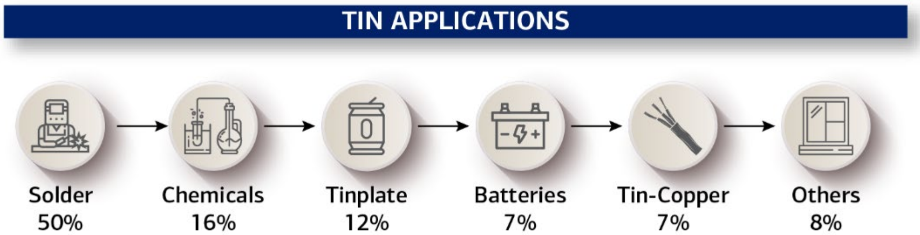
Tin is everywhere, from electronic devices to food containers

In contrast to other metals, which have more exposure to traditional sectors such as property, tin demand is heavily geared towards the electronic sector (Exhibit 3). Around half of global production is used to make **solder**, a metal alloy that electronics assemblers use to make circuit boards. These are then utilised to manufacture every day products, e.g. mobile phones and vehicles (including EVs). Beyond electronic devices, tin is used:

1. in the **chemical sector**, where it has over 100 applications, including pipes, windows and doors;
2. to make **tinplate packaging** for storing food products;
3. in lead-acid **batteries** in automobiles;
4. in **tin-copper** products that make up all electrical systems (e.g. wires, solar panels);
5. in other applications, such as **glass manufacturing**, where molten tin is used to make the glass flat.

Exhibit 3: Tin demand, by sector/application
There is a small amount of tin everywhere, from electronic devices to food packaging



Source: BofA Global Research

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Deficits have started to ease

Strong demand and limited supply growth have kept the tin market undersupplied in recent years. Supply-chain bottlenecks due to Covid-19 and regional unrest have been an issue. Indeed, supply disruptions, especially in Myanmar, took the market by surprise in 2023, giving some support to prices, even as the market was in surplus. With demand to remain stable this year (+0.3% YoY), but scope for supply issues to normalise, the tin market should remain in a surplus. As such, we see prices averaging $25,300/t, although there is risk of prices rallying to $28,000/t should supply additions fail to normalize.

Exhibit 4: Refined tin supply and demand
Deficits have started to ease

	2017	2018	2019	2020	2021	2022	2023
Production	381.5	386.5	367.8	339.6	380.2	380.3	366.2
YoY chge	8.2%	1.3%	-4.8%	-7.7%	11.9%	0.0%	-3.7%
Consumption	386.2	395.5	368.5	364.2	390.8	376.9	360.4
YoY chge	3.3%	2.4%	-6.8%	-1.2%	7.3%	-3.6%	-4.4%
Balance	-4.8	-9.0	-0.7	-24.6	-10.7	3.4	5.8
LME 3M ($/t)	19,984	20,068	18,585	17,110	31,172	30,959	25,912
LME 3M (c/lb)	906	910	843	776	1,414	1,404	1,175

Source: CRU

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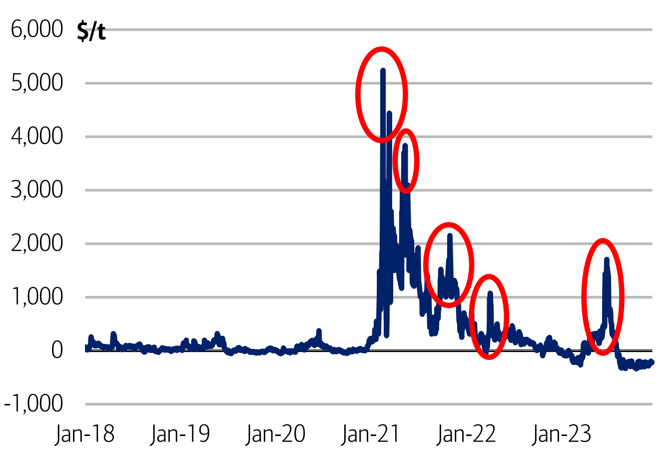
Violent moves in prices and time spreads

Tight markets have increased the likelihood of violent squeezes

The tight fundamental backdrop has a confluence of implications. Low tin inventories have raised the risk of sharp price squeezes: cash-to-3M time spreads have rallied above $1,000/t several times in the past three years (Exhibit 5).

Exhibit 5: Tin cash-to-3M time spreads
Tight supply has increased the likelihood of sharp squeezes



Source: Bloomberg, BofA Global Research

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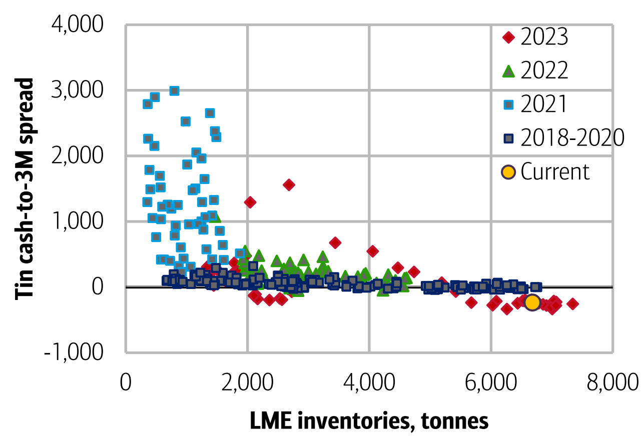
Exhibit 6: Tin cash-to-3M time spreads and inventories
Inventory levels in LME warehouses are key to time spreads



Source: Bloomberg, BofA Global Research

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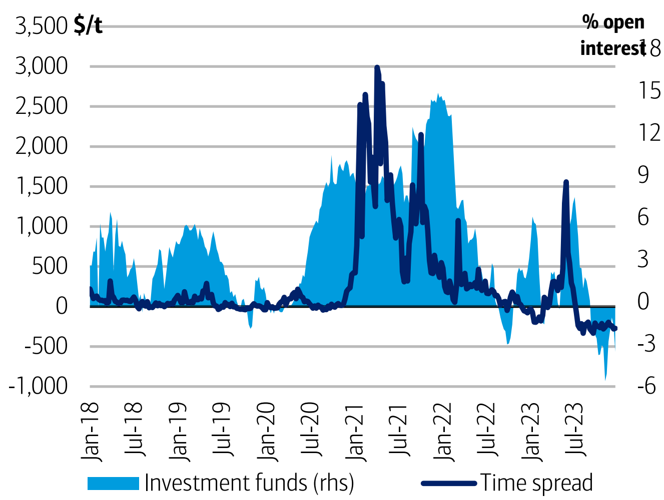
To that point, Exhibit 6 highlights the close relationship between time spreads and LME stocks. Of course, inventories matter because the London Metals Exchange runs contracts that are physically settled. As such, a lack of tonnes available in warehouses is a critical issue. And the current set-up in the tin market suggests that market participants might have to get used to increased price swings/volatility.

Speculative activity has also contributed to wide price swings

Beyond inventories, non-commercial positions in the paper market also have an impact on time spreads[1]. Exhibit 7 highlights how the largest moves in time spreads coincided with increased speculative activity on the exchange. The outsized importance of non-commercial market participants is remarkable when keeping in mind that investment funds account for only 5% of the total trading volume on the LME (Exhibit 8) against investment firms/credit institutions and commercial entities, which account for the bulk of activity (50% and 38%, respectively).

Exhibit 7: Tin non-commercial positioning and time spreads

Non-commercial positionings also influence the shape of the curve



Source: Bloomberg, BofA Global Research

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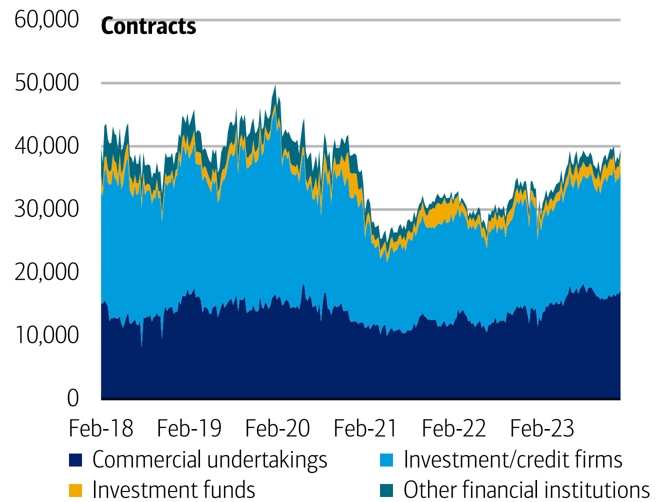
Exhibit 8: LME trading volume

Investment firms/credit institutions and commercial entities account for the bulk of trading activity



Source: Bloomberg, BofA Global Research

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With the view that the immediate tightness in the tin market may subside on supply additions, contangos have been influenced by rising short positioning from speculators, which hit record highs late last year. Exacerbated by an increase in LME stocks, the contango has risen to the widest in history, with cash-to-3M spreads dropping to -$399/t in October 2023.

Supply has been challenged

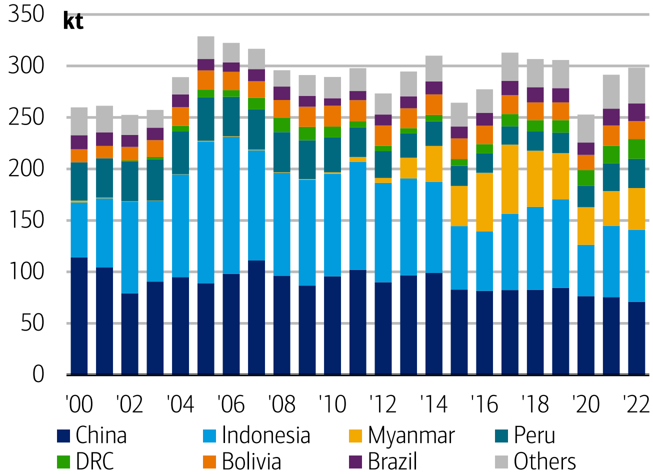
Operations in Myanmar have been suspended

Digging deeper into fundamentals, lack of supply growth was a key reason tin prices continued to rise in recent years. Indeed, tin-in-concentrate mine production has been flat-ish around 300kt for the past 20 years. China, today's largest producer and consumer, has struggled to significantly ramp up supplies from its own mines, despite growing domestic needs. To make up for the shortfall, Myanmar was able to increase its market share, currently churning out about 40ktpa of tin concentrates, making it China's top supplier. Yet, shipments from Myanmar were disrupted last year (-3.6% YoY), as the

[1] Forward prices can be calculated through a cost-of-carry model, i.e. the cash price is the starting point, and holding costs (such as expenses for storage in warehouses or interest) are added. Holding benefits (e.g. from lending a metal) are deducted. Forward curves are normally in contango, i.e. future prices are higher than the cash price. However, future prices can fall below cash prices when markets are extremely tight. In such a situation, metal consumers are prepared to pay a convenience yield, i.e. spend more to have metal available immediately

government in Wa State, a key mining region in the country, imposed a mining ban in August 2023. This led to a significant drop in exports to China in September, although they have since recovered thanks to stockpiled ores in Wa (Exhibit 10). With those inventories falling of late and Myanmar's mine production dropping by more than 5kt in 4Q23 or 47% YoY, Chinese smelters will have to seek supplies from alternative sources.

Exhibit 9: Tin-in-concentrate mine production, by country
Mine production has seen little growth over the past two decades



Source: CRU

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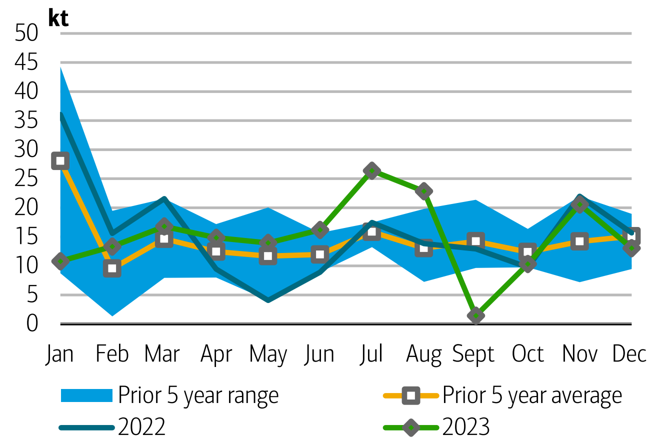
Exhibit 10: China tin ore imports from Myanmar
Tin exports from Myanmar, China's top supplier, have recovered late last year, thanks to stockpiled ores



Source: Bloomberg, BofA Global Research

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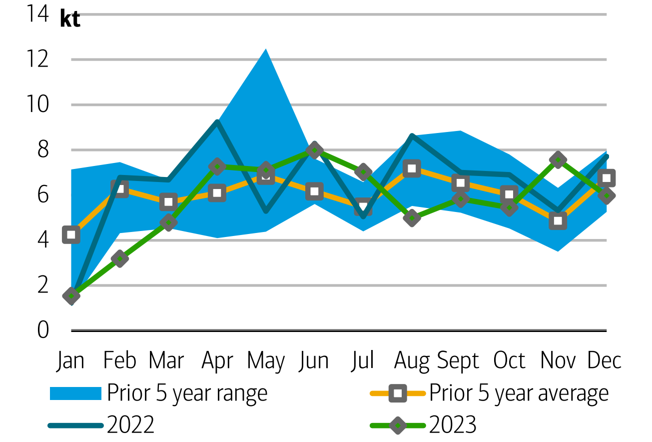
Indeed, according to the International Tin Association "Leaders of Wa State have authorised a partial resumption of mining in the area from 3rd January 2024, although most tin mines will remain closed for now [...]. Processing of surface ore stockpiles has been allowed since September 2023, subject to a 30% tax-in-kind to the EPC (Wa Central Economic Planning Committee), although these are now reported to be mostly exhausted. [...] Optimistic forecasts estimate that tin mining in Man Maw may eventually resume after the Spring Festival in February. However, whilst progress on lifting the suspension is promising, significant obstacles remain. There are intensifying civil conflicts in neighbouring Shan State, ongoing crackdowns on telecommunications scams, and the time required to remobilise mining workforces and restart mining operations."

Indonesian output has been underperforming, Peru affected by political unrest

Meanwhile, output in Indonesia, the world's largest tin producer in the early 2000s, has contracted materially over the years, and the country is now supplying half of what it did in the past (currently ~70ktpa of tin concentrates). Reflecting this trend, exports underperformed last year, dropping by 12%YoY (Exhibit 11). About two-thirds of the country's shipments went to China, Singapore and India.

In contrast, mine production in Peru, home of the world's second-largest tin company, Minsur, which mostly sells into the US and Europe, has been rising consistently since 2018 (currently 28ktpa of tin concentrates). Yet, mining operations in the country were severely affected in 1Q23 due to political unrest (Exhibit 12). Tin output has been rebounding since then but should remain below or close to 2022 levels.

Exhibit 11: Indonesia tin exports
Shipments from Indonesia, the world's second-largest tin producer, have underperformed



Source: Bloomberg, BofA Global Research

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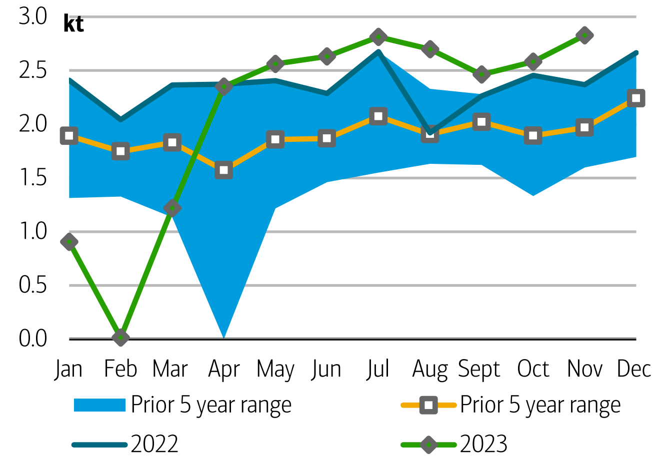
Exhibit 12: Peru tin production
Output in Peru has rebounded after disruptions in1Q23



Source: Bloomberg, BofA Global Research

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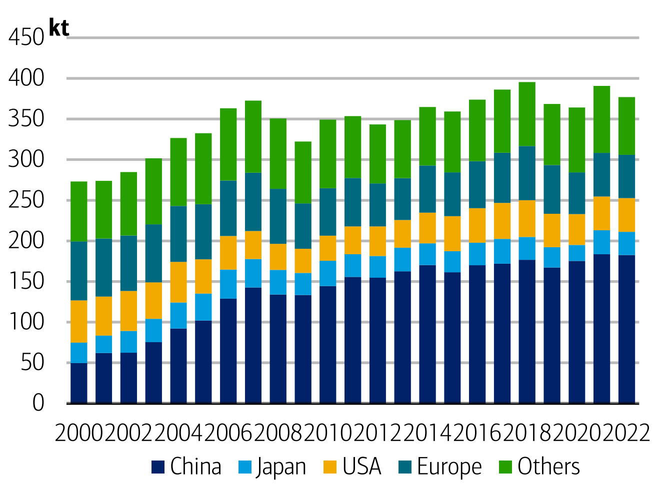
Tin has become more critical

Demand troughed last year and is starting to recover

While supply growth has been limited over the years, rising demand from electronics has forged ahead, particularly in China, where the tin market has tripled in the past 20 years. As a result, the Asian country is now the dominant consumer, accounting for 50% global demand. While tin demand growth has stabilised in the past five years it should remain supported as countries look to electrify their economies. After a challenged 2022, global semiconductor sales, a proxy for tin usage in soldering, troughed in 1Q23 and have started to recover in all major regions (Exhibit 14).

Exhibit 13: Refined tin consumption by country/region
The Chinese tin market has tripled in size in the past two decades



Source: CRU

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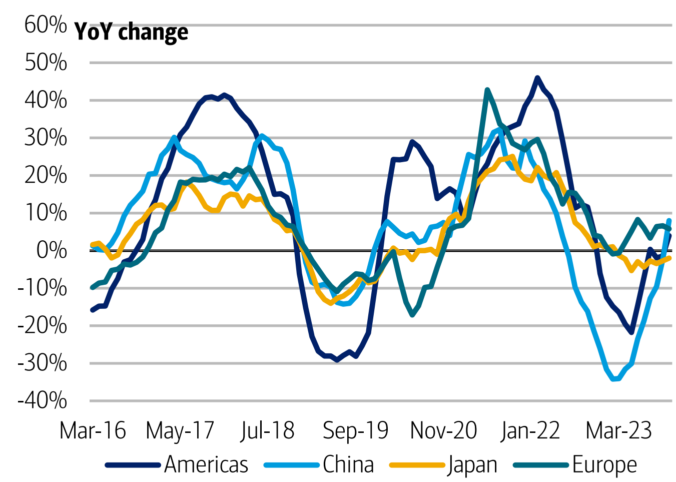
Exhibit 14: Semiconductor sales, by region
Semiconductor sales troughed in 1Q23 and have been recovering



Source: Bloomberg, BofA Global Research

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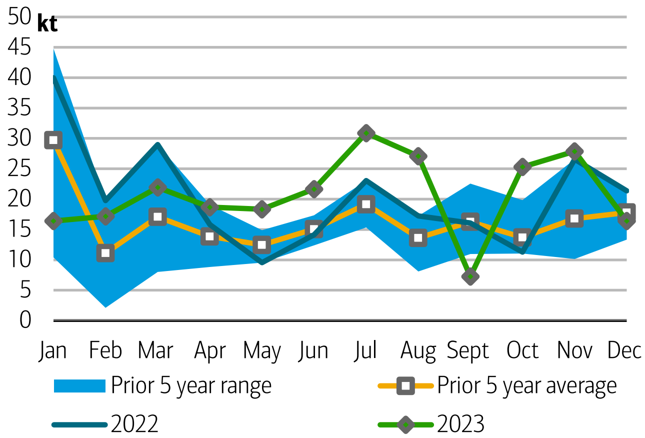
Chinese ore imports continue to rise despite macro headwinds

Focusing on the biggest market, China, demand has remained strong, with ore imports up by 2.1% YoY (Exhibit 15). It is worth noting that imports into the Asian nation have been rising consistently year on year since 2019, overcoming major macroeconomic shocks, testament to tin being a MIFT. While Chinese buyers have been trying to diversify their sources, opening up more to the DRC, Australia and South America (Exhibit 16), Myanmar remains the dominant supplier (~70% of total imports), a concern given the ongoing uncertainty there. Hence, developments in the Wa State remain key for the Chinese tin market, which could remain tight in 1Q24, particularly as stockpiles in Myanmar start to deplete.

Exhibit 15: China tin ore imports
Tin imports keep rising in China and were up by 2.1% YoY in 2023



Source: Bloomberg, BofA Global Research

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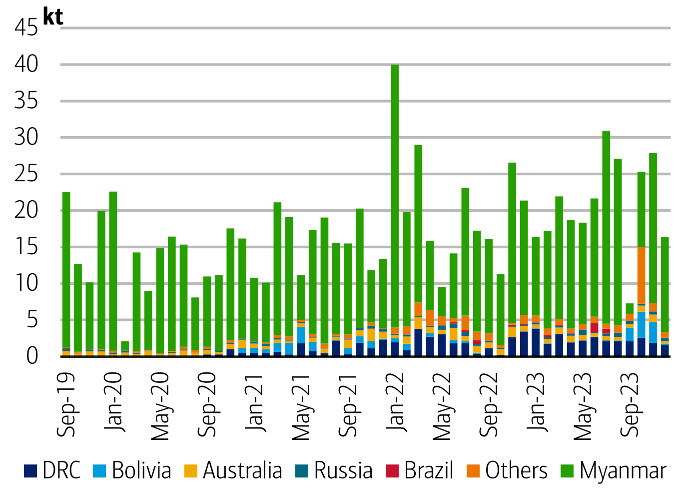
Exhibit 16: China tin ore imports, by origin
China has been trying to diversify its tin sources, although Myanmar remains the dominant supplier



Source: Bloomberg, BofA Global Research

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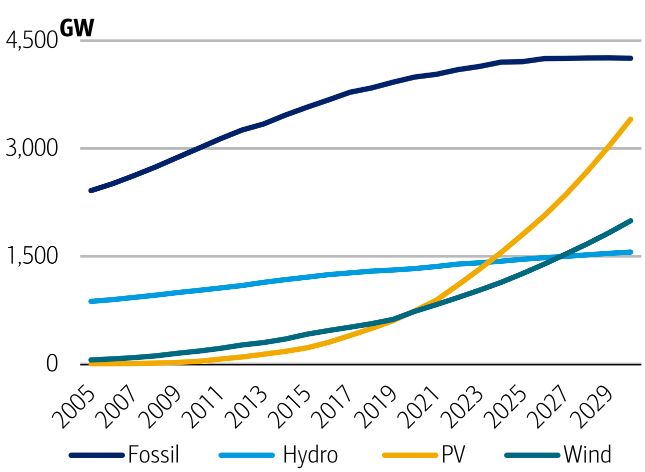
Demand should remain strong long-term on rising renewable power and EVs

Tin demand should also benefit from continued investment in renewable power (Exhibit 17) and rising EV penetration rates. Indeed, Minsur estimates that about 74 tonnes of tin is used per GW of installed solar capacity and about 1kg per EV (vs 500g in vehicles with a combustion engine). Exhibit 18 highlights that tin demand from the green sector could more than double by 2030, potentially topping 70ktpa, equivalent to a fifth of current consumption. Ultimately, this suggests that fundamentals are set to remain strong and the focus will be on the supply side and the extent to which producers will be able to meet this additional demand.

Exhibit 17: World, installed power capacity by source
Solar capacity is set to grow exponentially in the next years



Source: IEA, BNEF, BofA Global research

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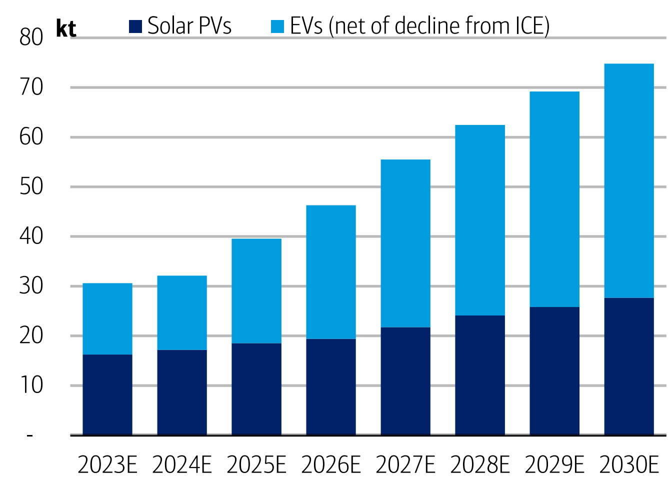
Exhibit 18: Tin demand from the energy transition
Demand from solar PVs and electric vehicles should continue to rise



Source: BofA Global research estimates

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Appendix

Table 1: Commodity prices, exchange rates, equity indices, yields and inventories
Metal prices have stabilized

Base metals	Cash, $/t	3-month, $/t	Cash, WoW change	3-month, WoW change
Aluminium	2,123	2,166	-2.2%	-2.4%
Copper	8,272	8,351	0.4%	0.1%
Lead	2,092	2,106	1.3%	0.7%
Nickel	15,799	16,036	-1.8%	-1.9%
Tin	25,109	25,298	3.1%	2.7%
Zinc	2,450	2,462	-1.7%	-2.1%
LMEX	3,616		-0.5%	
	Cash, c/lb	**3-month, c/lb**		
Aluminium	96	98		
Copper	375	379		
Lead	95	96		
Nickel	717	727		
Tin	1,139	1,148		
Zinc	111	112		
Other commodities, freight, exchange rates, equities and yields	**Spot**	**WoW change**		
Gold, $/oz	2,029	-1.0%		
Silver, $/oz	23	-2.5%		
Platinum, $/oz	903	-0.9%		
Palladium, $/oz	951	-2.8%		
Iron ore, China fines cfr $/dmt	134	-0.2%		
Brent, $/bbl	79	0.3%		
Baltic Dry Index	1,503	2.9%		
EUR/USD	1.090	-0.5%		
Dow Jones Industrial Average	37,864	0.7%		
10-year US Treasury yield	4.124	4.6%		
ICE BofA Commodity index, ER	407	-0.1%		
ICE BofA Commodity index Industrial Metals, ER	171	-1.1%		
ICE BofA Commodity index Precious Metals, ER	218	-1.2%		
ICE BofA Commodity index Energy, ER	482	0.0%		
Exchange stocks and cancelled warrants	**Stocks, tonnes**	**WoW change**	**Canc. warrants, tonnes**	**Canc. warr., of stocks**
Aluminium				
LME	443,000	0.0%	244,975	55.3%
Shanghai	121,886	0.0%		
Total aluminium	564,886	0.0%		
Copper				
LME	182,075	0.0%	34,775	19.1%
Comex	15,394	0.0%		
Shanghai	26,149	0.0%		
Total copper	223,618	0.0%		
Lead				
LME	136,100	0.0%	39,375	28.9%
Shanghai	67,456	0.0%		
Total lead	203,556	0.0%		
Nickel				
LME	46,368	0.0%	3,114	6.7%
Shanghai	11,821	0.0%		
Total nickel	58,189	0.0%		
Tin	7,970	0.0%	755	9.5%
Zinc				
LME	218,650	0.0%	57,175	26.1%
Shanghai	34,541	0.0%		
Total zinc	253,191	0.0%		

Source: BofA Global Research

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Exhibit 18: Price forecasts, fundamental drivers and risks

We are bullish a range of cyclical commodities

Metal	2024E	2025E	Fundamental drivers	Risks (D = downside; U = upside)
Aluminium	$2,563/t 116c/lb	$3,000/t 136c/lb	• China is almost operating at its 45mt capacity cap and smelters ex-China have closed capacity • China's smelters remain under pressure on hydro power shortages. At the same time, demand has been strong, so exports will likely remain capped • We expect rising deficits going forward	• D: No production discipline in China/World ex-China • D: China exports more • U: Smelter restraint and/or production disruptions reduce output • U: Stronger-than-anticipated demand growth
Copper	$8,625/t 391c/lb	$10,500/t 476c/lb	• Demand in China has been patchy, but grid spending has completely offset weakness in housing. Demand may be more balanced in 2024, and should hold up. Copper to rally, if the government pushes leads to broader recovery • Inventories are low, which is supportive, but could also increase volatility • We expect a small surplus for 2024	• D: China re-exports metal • D: Global demand slows sharply into next year • U: Strong restocking through the supply chain on improved confidence • U: Continued production disruptions in coming quarters
Lead	$2,000/t 91c/lb	$1,750/t 79c/lb	• There are no immediate scrap or concentrates shortages, suggesting the market could flip back into surplus • China's demand has slowed structurally, as the ebike market has matured	• D: Destocking in China or higher lead exports from the country. • U: Strong seasonal demand for replacement batteries after cold/hot winter/summer months
Nickel	$18,750/t 851c/lb	$20,000/t 907c/lb	• Nickel demand from electric vehicle producers should rise in the coming years, yet more NPI is being converted to nickel sulphate • China has built conversion capacity, which should take about 100Kt of Indonesian units into the refined market • Indonesian supply may prevent shortages near-term, but further out, more material is required • We expect a surplus for 2024, with prices increasingly supported by costs	• D: NPI producers don't close shop; ore inventories last for longer and more ores are imported form the Philippines. • D: Faster ramp-up of Indonesian NPI production • D: Stainless steel demand remains subdued
Zinc	$2,375/t 108c/lb	$2,250/t 102c/lb	• The zinc market has been better supplied, as demand from galvanisers has subsided • Zinc may remain an underperformer, but immediate downside more limited, also because costs have shifted higher on inflation • The surpluses could disappear, if more mine close	• D: Unreported inventories exist on the zinc market. More metal could become available • D: The zinc market is fragmented. There is evidence that miners, especially in China, could consider further output increases
Gold	$1,975/oz	$2,150/oz	• Gold has been a trade on US rates. The rally past $2,000/oz subsided as the Fed signalled a resumption of rate hikes. Until the end of the hiking cycle is reached, gold prices will remain capped. • If rate cuts come before 2Q24, gold could end next year at $2,400/oz • Central bank buying has been strong, but not sufficient; a Fed pivot may bring more investors into the market • Gold to rally in 2H24	• D: Deterioration of investor sentiment • D: Real rates become more positive; sustained USD rally • D: High gold prices deter buyers of physical gold; increased scrap supply
Silver	$23.26/oz	$24.75/oz	• The silver market has rebalanced on production discipline and demand from new applications including solar panels • As more spending on solar panels come through, silver should rally • Bottoming out of the global economy in 2024 should also help industrial demand	• U: Investors returning to the market • U: China's imports to rise • D: ETF liquidation • D: More supply
Platinum Palladium	$1,050/oz $750/oz	$1,250/oz $500/oz	• Palladium is slowly moving into surplus, keeping pressure on prices. • More production discipline is necessary. • Any supply cuts may reduce the palladium surpluses, but will likely push platinum into a deficit, so prices might diverge. • PGMs are in a difficult spot.	• D: Jewellery demand suffers due to rising prices • D: In palladium, the risk of deliveries from Russian stockpiles has not gone away • D: Demand from key buyers like Europe not increasing • U: Production disruptions reduce availability of PT and PD
Iron Ore	$125/t CIF	$90/t CIF	• Iron ore inventories at China's mills are extremely low. • Production cuts at mills, along with higher steel demand should support steel prices, likely pulling iron ore higher as well near-term	• D: China's steel production slowing sharply • U: Mine closures/slowdown in production increases
HCC Thermal coal	$270/t $150t	$215/t $125/t	• Thermal coal prices to come under pressure as supply is increasing and the energy emergency normalises • Normalisation of supply should also contribute to lower met coal prices	• D: Lack of supply discipline • U: Chinese steel production stronger (HCC) U: mine closures

Colours indicate our stance on each commodity: Green = bullish, Yellow = neutral, Red = cautious. **Source:** BofA Global Research estimates

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Table2: Commodity price forecasts

Copper should outperform

		Current	1Q24E	2Q24E	3Q24E	4Q24E	1Q25E	2Q25E	2023E	2024E	2025E	2026E	2027E	2028E	LT price
Base metals															
Aluminium	US$/t	2,123	2,250	2,500	2,750	2,750	3,000	3,000	2,268	2,563	3,000	3,250	3,015	2,781	2,546
	USc/lb	96	102	113	125	125	136	136	103	116	136	147	137	126	115
Copper	US$/t	8,272	8,000	8,500	8,750	9,250	10,000	10,000	8,442	8,625	10,500	9,500	9,539	9,578	9,617
	USc/lb	375	363	386	397	420	454	454	383	391	476	431	433	434	436
Lead	US$/t	2,092	2,000	2,000	2,000	2,000	1,750	1,750	2,156	2,000	1,750	2,024	2,217	2,409	2,602
	USc/lb	95	91	91	91	91	79	79	98	91	79	92	101	109	118
Nickel	US$/t	15,799	18,500	18,500	19,000	19,000	20,000	20,000	21,786	18,750	20,000	20,000	19,141	18,283	17,424
	USc/lb	717	839	839	862	862	907	907	988	851	907	907	868	829	790
NPI, 8-12%	CNY/t		1,032	1,032	1,032	1,032	1,062	1,062	1,129	1,032	1,062	1,102	1,138	1,174	1,210
Zinc	US$/t	2,450	2,500	2,500	2,250	2,250	2,250	2,250	2,648	2,375	2,250	2,424	2,596	2,769	2,942
	USc/lb	111	113	113	102	102	102	102	120	108	102	110	118	126	133
Precious metals															
Gold, nominal	US$/oz	2,024	1,950	1,950	2,000	2,000	2,100	2,100	1,924	1,975	2,150	2,096	2,095	2,094	2,093
Gold, real	US$/oz		1,950	1,950	2,000	2,000	2,049	2,049	1,924	1,975	2,098	1,995	1,946	1,898	1,850
Silver, nominal	US$/oz	22.15	22.50	23.00	23.53	24.00	24.50	24.50	23.20	23.26	24.75	26.07	27.18	28.30	29.42
Silver, real	US$/oz		22.50	23.00	23.53	24.00	23.90	23.90	23.20	23.26	24.15	24.81	25.21	25.60	26.00
Platinum	US$/oz	898	1,000	1,000	1,100	1,100	1,250	1,250	976	1,050	1,250	1,322	1,372	1,421	1,471
Palladium	US$/oz	920	900	800	700	600	500	500	1,379	750	500	500	824	1,147	1,471
		Current	**1Q24E**	**2Q24E**	**3Q24E**	**4Q24E**	**1Q25E**	**2Q25E**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**	**2028E**	**LT price**
Bulk Commodities															
Hard coking coal	US$/t fob	333	360	280	210	230	240	190	290	270	215	205	212	219	226
Semi-soft	US$/t fob	155	238	185	139	152	158	125	220	178	142	135	134	133	132
Thermal Coal	US$/t fob	128	148	148	151	153	125	125	176	150	125	112	112	113	113
Iron ore fines	US$/t CIF	131	150	130	120	100	90	90	115	125	90	90	94	98	102
		Current	**1Q24E**	**2Q24E**	**3Q24E**	**4Q24E**	**1Q25E**	**2Q25E**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**	**2028E**	**LT price**
Other materials															
Lithium spodumene	US$/t	955	1,950	1,850	1,750	1,500	1,500	2,000	3,802	1,763	2,188	1,858	1,722	1,586	
Lithium carbonate	US$/t	13,450	18,000	17,000	16,000	15,000	15,000	20,000	37,386	16,500	21,875	21,250	20,833	20,417	
Lithium hydroxide	US$/t	11,825	19,500	18,500	17,500	16,500	16,500	21,500	39,184	18,000	23,375	22,750	22,333	21,917	
Alumina	$/t	371	340	340	340	340	348	348	343	340	348	357	375	394	412
Uranium	$/lb		75.00	77.50	80.00	80.00	75.00	75.00	58.91	78.13	75.00	70.00	65.00	60.00	55.00
Molybdenum	$/lb	19.5	18.10	18.10	18.10	18.10	18.10	18.10	23.99	18.10	18.10	18.10	16.32	14.54	12.76
Cobalt	$/lb	15.8	18.00	18.00	18.00	18.00	18.00	18.00	17.57	18.00	18.00	18.44	19.84	21.23	22.63
Manganese ore	$/dmtu	4.15	4.35	4.35	4.35	4.35	4.35	4.35	4.79	4.35	4.35	4.93	5.52	6.11	6.70
Steel, HRC															
HRC, Europe	US$/t	718	719	701	639	674	721	702	767	683	714				
HRC, US	US$/t	1,202	1,130	1,020	882	805	799	799	975	959	799				
HRC, China	US$/t	556	568	585	602	623	592	597	565	595	602				
		Current	**1Q24E**	**2Q24E**	**3Q24E**	**4Q24E**	**1Q25E**	**2Q25E**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**	**2028E**	**LT price**
WTI	US$/bbl	73	73	75	77	75	57	57	79	75	57	57	57	57	57
Brent	US$/bbl	79	78	80	82	80	60	60	83	80	60	60	60	60	60
Henry Hub	US$/MMBtu	2.4	2.9	2.5	3.0	3.6	2.6	2.6	2.7	3.0	2.6	2.6	2.6	2.6	2.6

Note: quarterly energy forecasts are period-end, rest are period averages; **Source:** BofA Global Research

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Supply and demand balances

Table 3: Aluminium supply and demand balance
Deficits set to increase

'000 tonnes	2022	2023	2024	2025	2026
Global production	68,412	70,338	73,363	73,793	74,333
YoY change	1.3%	2.8%	4.3%	0.6%	0.7%
Global consumption	69,106	71,074	74,842	77,836	80,949
YoY change	0.7%	2.8%	5.3%	4.0%	4.0%
Balance	**-694**	**-736**	**-1,479**	**-4,043**	**-6,617**
Market inventories	8,448	7,711	6,232	2,189	
Weeks of world demand	6.4	5.6	4.3	1.5	
LME Cash ($/t)	**2,706**	**2,268**	**2,563**	**3,000**	**3,250**
LME Cash (c/lb)	**123**	**103**	**116**	**136**	**147**

Source: SNL, Woodmac, CRU, Bloomberg, company reports, IAI, BofA Global Research

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Table 4: Copper supply and demand balance
Balanced market in 2023E

'000 tonnes	2022	2023	2024	2025	2026
Global production	24,646	25,930	26,407	27,613	28,249
YoY change	2.2%	5.2%	1.8%	4.6%	2.3%
Global consumption	25,152	25,694	26,833	27,906	29,023
YoY change	0.9%	2.2%	4.4%	4.0%	4.0%
Balance	**-506**	**236**	**-426**	**-293**	**-773**
Market inventories	840	1,076	650	357	
Weeks of world demand	1.7	2.2	1.3	0.7	
LME Cash ($/t)	**8,822**	**8,442**	**8,625**	**10,500**	**9,500**
LME Cash (c/lb)	**400**	**383**	**391**	**476**	**431**

Source: SNL, Woodmac, CRU, Bloomberg, company reports, ICSG, BofA Global Research

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Table 5: Nickel supply and demand balance
Nickel to be well supplied

'000 tonnes	2022	2023	2024	2025	2026
Global production	3,170	3,423	3,959	4,284	4,569
YoY change	16.2%	8.0%	15.8%	10.4%	10.9%
Global consumption	3,105	3,334	3,549	3,943	4,227
YoY change	0.4%	7.4%	6.4%	9.4%	6.5%
Balance, incl. NPI oversupply	**64**	**89**	**409**	**342**	**342**
Market inventories	456	545	963	1,309	1,651
Weeks of world demand	7.6	8.5	14.1	17.3	0.0
LME price ($/t)	**25,707**	**21,786**	**18,750**	**20,000**	**20,000**
LME price (c/lb)	**1,166**	**988**	**851**	**907**	**907**

Source: SNL, Woodmac, CRU, Bloomberg, company reports, INSG, BofA Global Research

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Table 6: Zinc supply and demand balance
Project pipeline not a significant risk

	2022	2023	2024	2025	2026
Global production	13,919	14,000	15,150	15,900	16,150
YoY change	-2.8%	0.6%	8.2%	5.0%	1.6%
Global consumption	13,607	13,513	14,104	14,400	14,703
YoY change	-3.2%	-0.7%	4.4%	2.1%	2.1%
Balance	**312**	**487**	**1,046**	**1,500**	**1,447**
Market inventories	3,482	2,648	2,375	2,250	2,424
Weeks of world demand	13.3	10.2	8.8	8.1	8.6
LME Cash ($/t)	**3,482**	**2,648**	**2,375**	**2,250**	**2,424**
LME Cash (c/lb)	**158**	**120**	**108**	**102**	**110**

Source: SNL, Woodmac, CRU, Bloomberg, company reports, ILZSG, BofA Global Research

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Exhibit 19: Iron ore supply and demand balance
Flipping back into surplus

Wet Mt	2022	2023E	2024E	2025E	2026E
Global production	2,363	2,361	2,432	2,506	2,540
YoY change	2.2%	-0.1%	3.0%	3.1%	1.4%
Global consumption	2,301	2,348	2,372	2,374	2,386
YoY change	-5.0%	2.0%	1.0%	0.1%	0.5%
Balance	**63**	**14**	**60**	**132**	**154**
Iron ore price (US$/t)	**120**	**115**	**125**	**90**	**90**

Source: Woodmac, CRU, Bloomberg, company reports, BofA Global Research estimates

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Exhibit 20: Metallurgical coal supply and demand balance
Deficit to persist

Mt	2022	2023E	2024E	2025E	2025E
Global production	904	950	981	1,003	1,012
YoY change	-0.6%	5.1%	3.3%	2.3%	0.8%
Global consumption	925	971	993	991	1,003
YoY change	-1.4%	4.9%	2.3%	-0.2%	1.2%
Balance	**-21**	**-20**	**-12**	**12**	**8**
Met coal price (US$/t)	365	290	270	215	205

Source: Woodmac, McCloskey, company reports, BofA Global Research estimates

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Exhibit 14: Platinum supply and demand balance
Flipping into a small surplus

'000 ounces	2022	2023	2024	2025	2026
Global production	6,636	6,525	7,338	7,536	7,634
YoY change	-13.9%	-0.1%	12.5%	2.7%	1.3%
Global consumption	6,057	7,231	7,327	7,364	7,465
YoY change	-22.8%	19.4%	1.3%	0.5%	1.4%
Balance	**579**	**-706**	**10**	**172**	**169**
Spot ($/oz)	964	976	1,050	1,250	1,322

Source: Matthey, company reports, BofA Global Research estimates

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Exhibit 15: Palladium supply and demand balance
Rising surpluses ahead

'000 ounces	2022	2023	2024	2025	2026
Global production	9,505	9,313	10,097	10,405	10,649
YoY change	-4.5%	-2.1%	10.0%	3.0%	2.3%
Global consumption	9,829	9,710	8,804	8,442	8,091
YoY change	-3.2%	-1.2%	-9.3%	-4.1%	-4.2%
Balance	**-324**	**-397**	**1,293**	**1,962**	**2,558**
Spot ($/oz)	2,110	1,379	750	500	500

Source: Matthey, company reports, BofA Global Research estimates

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Table 7: Lithium supply and demand balance

The lithium market is increasingly oversupplied

tonnes	2022	2023	2024	2025	2026
Global production	669,470	910,102	1,239,024	1,688,160	2,027,990
YoY change	1.7%	35.9%	36.1%	36.2%	20.1%
Global consumption	704,218	923,882	1,214,630	1,534,918	1,890,413
YoY change	51.6%	31.2%	31.5%	26.4%	23.2%
Balance	**-34,748**	**-13,780**	**24,394**	**153,242**	**137,578**
Spot ($/t)	71,531	45,980	16,500	21,875	21,250

Source: Company reports, Woodmac, Bloomberg, BofA Global Research estimates

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Table 8: Cobalt supply and demand balance

The cobalt market needs some supply cuts

tonnes	2022	2023	2024	2025	2026
Global production	198,235	231,241	274,225	301,692	309,256
YoY change	25.4%	16.6%	18.6%	10.0%	2.5%
Global consumption	190,766	221,379	267,117	313,163	355,209
YoY change	18.1%	16.0%	20.7%	17.2%	13.4%
Balance	**7,469**	**9,862**	**7,109**	**-11,471**	**-45,953**
Spot ($/t)	68,428	38,733	39,681	39,681	40,652

Source: Company reports, CRU, Bloomberg, BofA Global Research estimates

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