

Global Metals Weekly

The spark has been missing for silver

Investor demand appears to be lacking

Silver has stabilised above \$20/oz, as the market has posted steady deficits. These have been mirrored by falling inventories, with stocks in CME warehouses and in LBMA vaults declining. While prices have been maintained, we acknowledge that silver has not made a decisive push higher of late. Why not? Lacklustre investor demand is one reason. Indeed, we see a lack of interest among assets under management at physically backed ETFs, CME net non-commercial positions, trading volumes on Shanghai Gold Exchange/Shanghai Futures Exchange and US coin purchases. Yet, we also note encouraging signs in commercial demand, which ultimately may also attract investors, reinforcing our constructive view on the metal for 2024.

China's silver market has been tightening

Why has investor interest been weak? Silver is much more of an industrial metal, so the weakness in industrial demand has been an issue – one reason the gold-silver ratio has risen lately. A bottoming out of the global economy in the coming months would support the silver market. Already now, we note that silver imports from Japan and the US are off the lows and could trend higher from here. Similarly, China was a net exporter of silver early last year, but those shipments had subsided by end-2023. Accompanying this, silver on China's domestic market is no longer trading at a discount.

Solar PV remains a bullish driver

Demand for silver from green technologies is also strong. On the PV side, this is driven by: 1) solar installations and 2) changes in technology. Global annual renewable capacity additions increased by almost 50% to nearly 510 gigawatts (GW) in 2023, of which 373GW were solar. This was the fastest growth rate over the past two decades, according to the IEA. For 2024, solar installations are set to increase by 399GW. We also assume that TopCon solar PV, which is more silver-intensive than PERC (Passivated Emitter and Rear Contact), is gaining market share. Finally, EVs, which use silver in electronics, are becoming more popular too. This should also boost silver demand.

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EV: electric vehicles

PV: photovoltaic

GW: gigawatt

LBMA: London Bullion Market Association

CME: Chicago Mercantile Exchange

IEA: International Energy Agency

MIFT: Metals important for future technologies

The spark is missing for silver

Markets tight, inventories are falling

Silver prices have stabilised above \$20/oz, supported by fundamentals, with the market posting steady deficits, as Exhibit 1 shows.

Exhibit 1: Silver supply and demand balance

The silver market has been tight

tonnes	2022	2023	2024E	2025E	2026E
Global production	31,250	31,878	31,465	31,278	28,895
YoY change	0.0%	2.0%	-1.3%	-0.6%	-7.6%
Global consumption	35,427	34,259	35,514	36,735	36,999
YoY change	0	-3.3%	3.7%	3.4%	0.7%
Balance	-4,177	-2,381	-4,049	-5,457	-8,104
Spot (\$/oz)	21.8	23.2	0.0	0.0	0.0

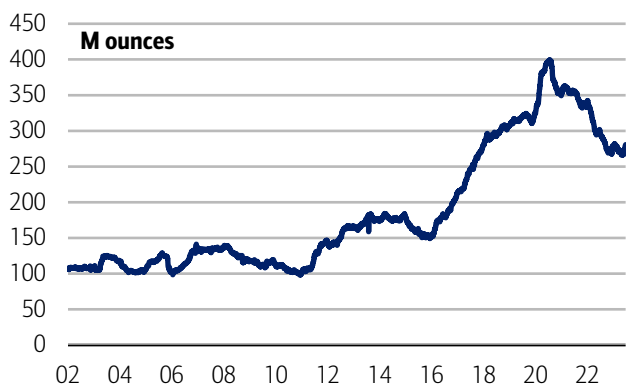
Source: Silver Institute, company reports, BofA Global Research

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Those deficits have also been mirrored by falling inventories, with stocks on CME and in LBMA vaults declining (Exhibit 2 and Exhibit 3).

Exhibit 2: Silver, inventories in CME warehouses

Inventories have fallen

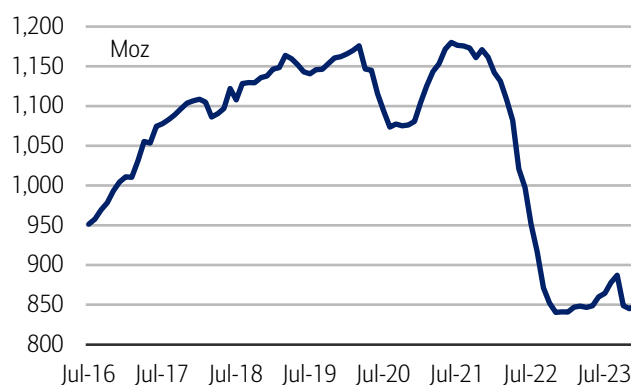


Source: Bloomberg, BofA Global Research

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Exhibit 3: Silver, inventories in LBMA vaults

Silver has left LBMA warehouses



Source: Bloomberg, BofA Global Research

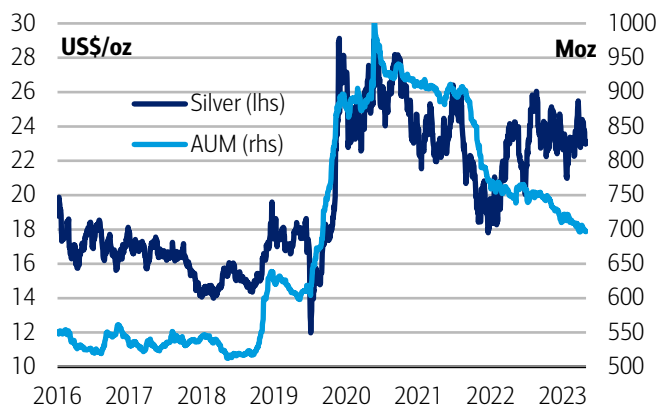
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Investor interest is subdued

While prices have been supported, we acknowledge that silver has not made a decisive push higher of late. Why not? Lacklustre investor demand is one reason.

Exhibit 4: Prices and assets under management

Investors kept liquidating ETF positions

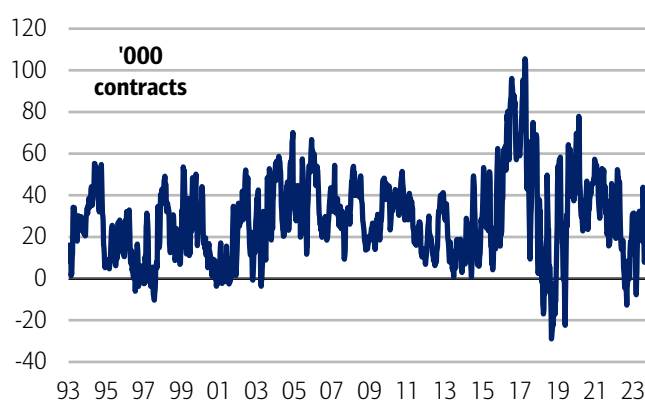


Source: Bloomberg, BofA Global Research

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Exhibit 5: CME, net non-commercial positions

Net long, but positions have been within longer-term ranges



Source: Bloomberg, BofA Global Research

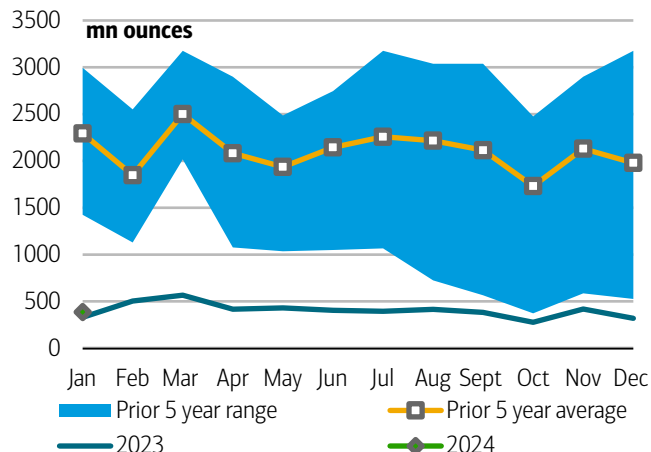
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This is mirrored in Exhibit 4, which shows that assets under management at physically backed ETFs have fallen. Similarly, CME net non-commercial positions have remained within longer-term ranges.

The picture has been similar in Asia. Indeed, trading volumes on the Shanghai Futures Exchange (SHFE), the largest venue trading in silver futures, fell again last year. Of course, with the exchange dominated by retail investors, the lack of interest from these market participants has been heavily influenced by a perceived lack of price upside, also because industrial demand is weak. Similarly, silver trading volumes on the Shanghai Gold Exchange (SGE) dropped sharply.

Exhibit 6: Silver volumes traded on Shanghai Gold Exchange

Trading volumes have been low

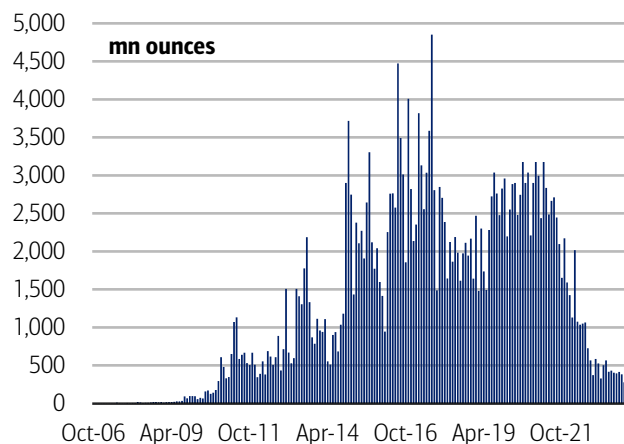


Source: Bloomberg, BofA Global Research

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Exhibit 7: Silver volumes traded on Shanghai Gold Exchange

Trading volumes are well below longer-term ranges



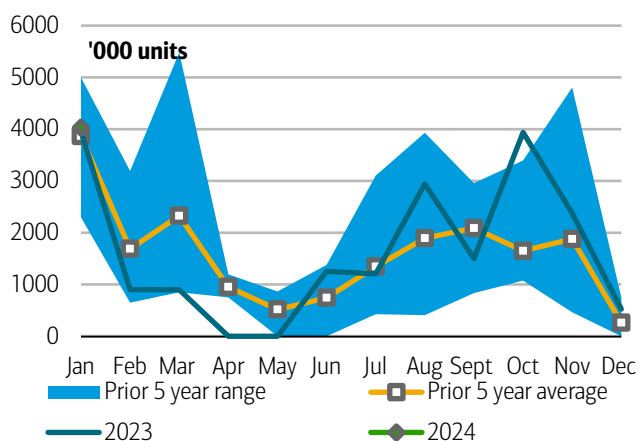
Source: Bloomberg, BofA Global Research

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Lack of interest from retail investors has also been mirrored in silver products: coin purchases in the US have been low, as Exhibit 8 highlights.

Exhibit 8: Silver coin purchases in the US

Coin purchases have been within the ranges seen in recent years

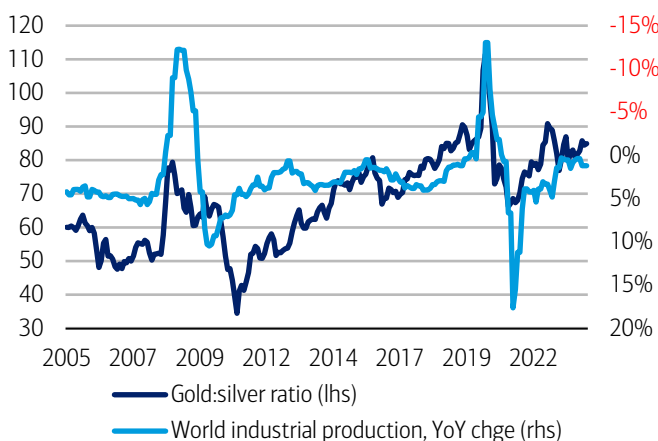


Source: Bloomberg, BofA Global Research

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Exhibit 9: Gold-silver ratio and global industrial production

Weak industrial production has pushed up the gold-silver ratio



Source: Bloomberg, BofA Global Research

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Commercial demand is picking up

Trade data getting stronger

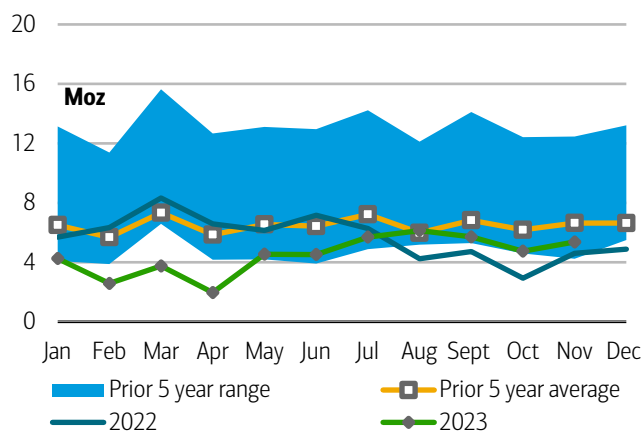
US is no longer a net exporter

Industrial usage also matters for silver demand. Indeed, Exhibit 9 highlights that the gold silver ratio has moved higher, as industrial production has slowed. Linked to that, Exhibit 10 and Exhibit 11 show that silver imports from the US and Japan have been hovering

around multi-year lows, especially in 1H23. At the same time, there are encouraging signs of a rebound, with purchases from abroad picking up towards the end of last year.

Exhibit 10: Japan silver imports

Imports have recovered

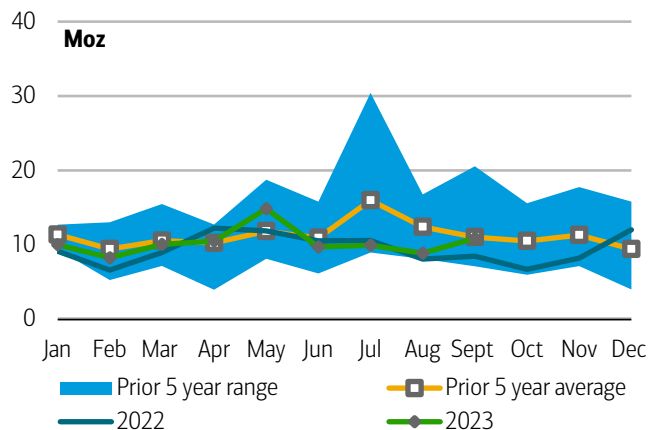


Source: Bloomberg, BofA Global Research

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Exhibit 11: US silver imports

Imports are trending higher



Source: Bloomberg, BofA Global Research

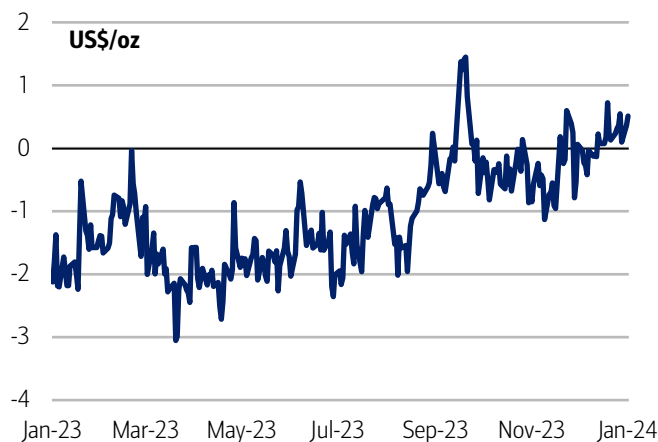
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China net exports subsiding

The picture has been similar in China, whose domestic silver market was subdued at the outset of 2023. That said, fundamentals have been stabilising, with silver trading at a premium domestically towards the end of the year. This has also been mirrored in shipments, with China no longer a significant net exporter in 4Q24.

Exhibit 12: China, silver premium

Silver is trading at a premium in China

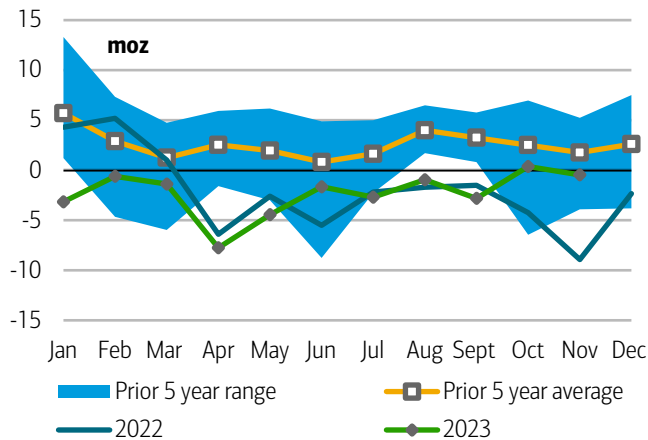


Source: Bloomberg, BofA Global Research

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Exhibit 13: China, silver imports

Silver purchases from China abroad



Source: Bloomberg, BofA Global Research

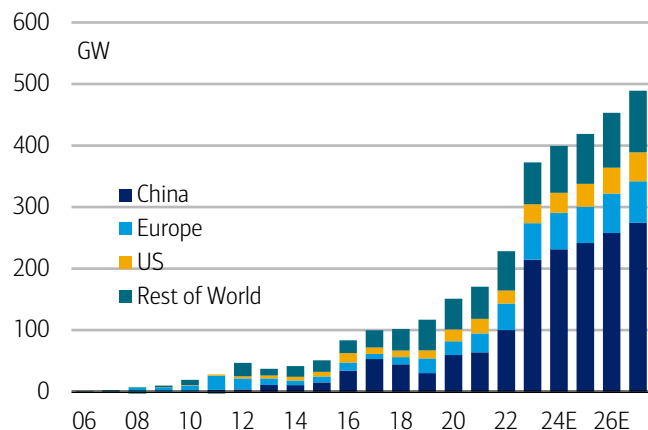
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PV demand should increase further

Silver is a MIFT, so it is essential for the energy transition, especially for solar photovoltaics and EVs. Indeed, Exhibit 14 and Exhibit 15 show our expectations of new solar installations and the resulting silver demand. The data shows that China remains a key driver, but World ex-China is following closely.

Exhibit 14: New installations solar PV

Installations jumped on China



Source: Bloomberg, BofA Global Research

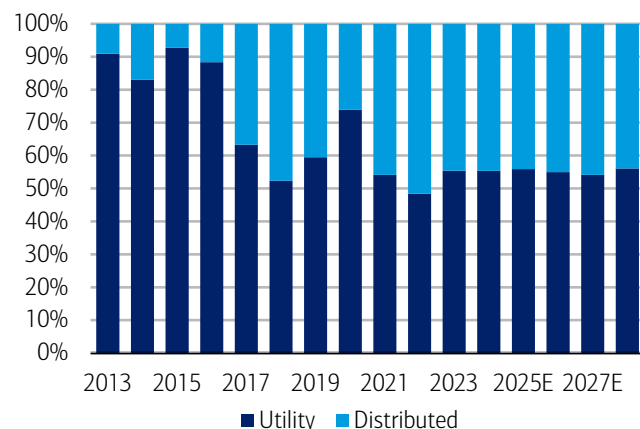
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In its recently published "Renewables 2023" report, the IEA confirmed that "Global annual renewable capacity additions increased by almost 50% to nearly 510 gigawatts (GW) in 2023, the fastest growth rate in the past two decades. [...] While the increases in renewable capacity in Europe, the US and Brazil hit all-time highs, China's acceleration was extraordinary. In 2023, China commissioned as much solar PV as the entire world did in 2022, while its wind additions also grew by 66% year-on-year. Globally, solar PV alone accounted for three-quarters of renewable capacity additions worldwide.

That said, China's investment in solar PV comes with various caveats. Beyond overcapacities in PV production, Exhibit 16 shows that distributed solar has steadily gained market share. At the same time, investment in the grid has been increasingly de-emphasised (Exhibit 17). Hence, there is some concern as to whether the grid is fit for purpose. This may well slow installation of rooftop solar PV. For silver demand to keep increasing, utility-scale facilities would need to pick up some of the slack.

Exhibit 16: China, solar PV installations utility-scale and rooftop/distributed

Distributed solar PV has gained market share



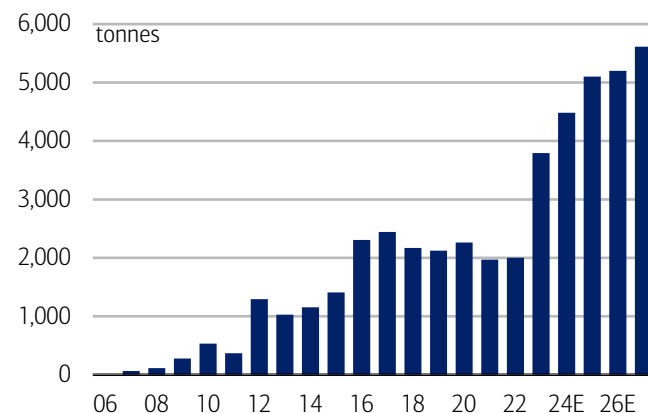
Source: IEA, BofA Global Research

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The IEA also noted that "Under existing policies and market conditions, global renewable capacity is forecast to reach 7,300 GW by 2028 (from 4.1GW at present). This growth trajectory would see global capacity increase to 2.5 times its current level by 2030, falling short of the tripling goal. Governments can close the gap to reach over 11,000GW

Exhibit 15: Silver demand from PV

Silver demand is trending higher

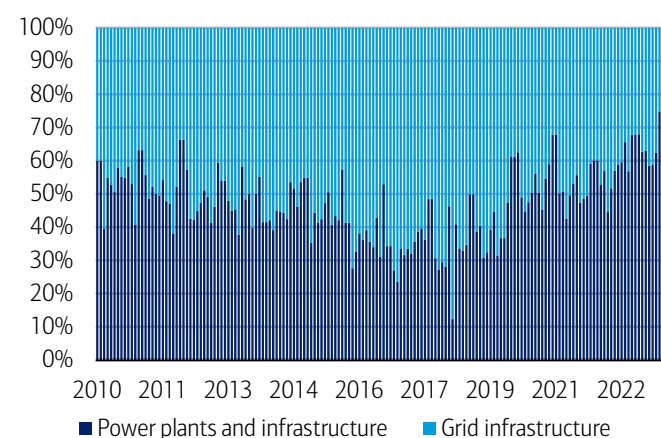


Source: Bloomberg, BofA Global Research

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Exhibit 17: China, grid spending

Spending has de-emphasized grid infrastructure, i.e. power transmission and distribution



Source: Bloomberg, BofA Global Research

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by 2030, by overcoming current challenges and implementing existing policies more quickly. These challenges fall into four main categories and differ by country: 1) policy uncertainties and delayed policy responses to the new macroeconomic environment; 2) insufficient investment in grid infrastructure preventing faster expansion of renewables; 3) cumbersome administrative barriers and permitting procedures and social acceptance issues; 4) insufficient financing in emerging and developing economies. For headwinds, see: [Metals Politics](#), [Tech goes Metals](#), Bottlenecks and constraints for the energy transition.

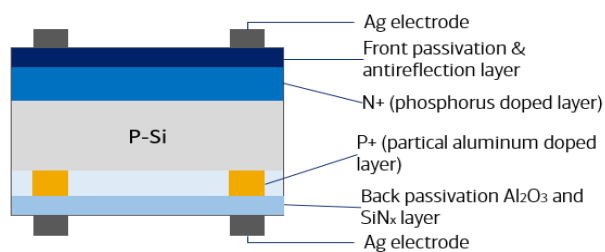
Silver is a key metal for c-Si panels and contents vary

Beyond just solar PV installations, changes in technologies matter (see [Metals Strategist: Tech goes metals 06 October 2023](#)), as market-dominating crystalline silicon cells coming in different versions. All silicon crystalline solar cells are made using a very thin wafer of base silicon. The silicon is then 'doped' with to create a positive (p-type) or negative (n-type) charge. The chemical elements used for doping are either phosphorous, which creates a positive charge and boron, which results in a negative charge. Depending on the type of cell architecture, either N-type or P-type doped silicon is then used as the base or 'substrate' of the cell. (see Solar - China: Solar Glow #4: Cell technology driving more efficient solar power, [28 September 2023](#)).

- **P-type Passivated Emitter and Rear Contact (PERC)** is currently the most mature technology, with a market share of 91% in 2021, although this dropped to 88% in 2022. With PERC being close to its conversion efficiency ceiling of 24.5%, all of the cell capacity additions in 2023 used N type technology.
- **N-type TOPCon** already has a conversion ratio of 24.5%, i.e., it is even higher at this junction than the maximum that PERC panels achieve. TOPCon should gain market share as cell producers tend to choose the technology given the similarity between the production process of PERC and TOPCon cells.
- **Heterojunction (HJT)** solar cells use a base of common crystalline silicon with additional ultra-thin film layers of amorphous silicon on either side, forming what is known as a heterojunction. This technology is chosen mostly by new entrants.

Exhibit 18: Basic construction diagram of a common P-type silicon cell

PERC solar panels use a p-type base

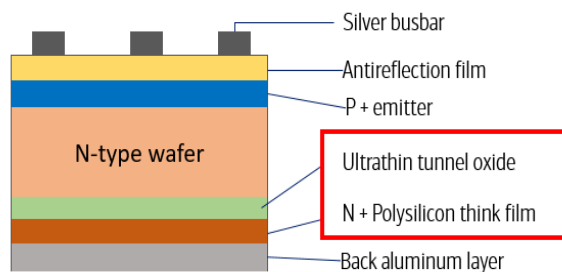


Source: BofA Global Research

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Exhibit 19: Basic construction diagram of an N-type TOPCon silicon solar cell

TOPCon solar panels use an n-type base



Source: BofA Global Research

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Metals content varies in c-Si crystalline solar panels; silver intensity to fall

Why does differentiation between solar panels matter? Exhibit 18 shows that the silver content varies materially between the technologies.

Exhibit 20: Silver content in different c-Si panels

PERC cells have the lowest silver content per W

	PERC	TOPCon	Heterojunction (HJT)
Silver, mg/w	10	13	22
Market share	2022: 91%	2022: 8%	2022: 0.6%
	2023: 65%	2023: 26%	2023: 5%

Source: Standard Solar Cells Are Now Using Almost 50% Less Silver (bnef.com)

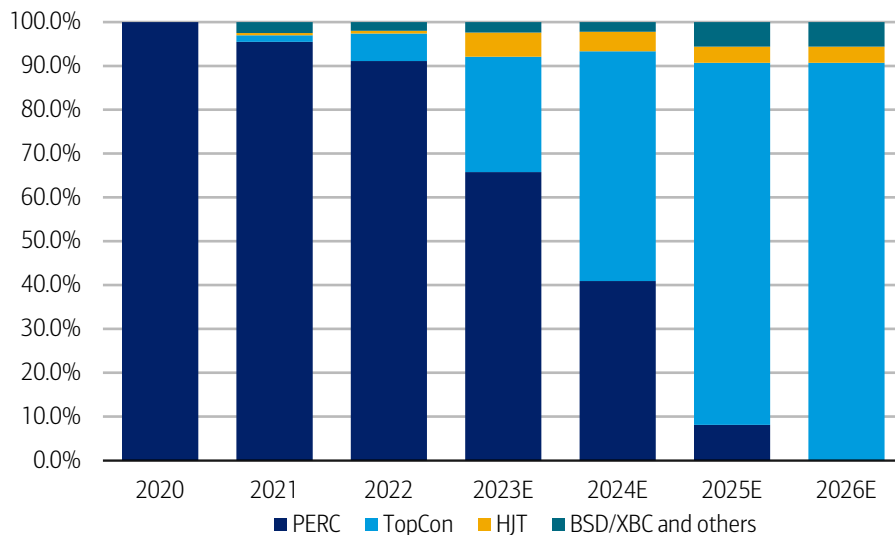
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Indeed, our colleagues in equity research have picked up on recent declines in silver content, anticipating that PV manufacturers will reduce intensities further:

- **4BB → MBB → SMBB → NBB:** Silver-paste consumption has dropped in the past few years mainly through MBBs (Multi busbar; busbars are used for power distribution). The technology narrows the bar width and thus reduces silver consumption. The number of BB on the cell increased from 4BB in 2013-15 to SMBB (16 bars) in 2022.
- **Silver-covered copper:** Another way to reduce silver is to use silver-covered copper paste instead of pure silver paste. Current widely used, paste has 50% silver content, which can reduce to c30%. If combining NBB with 30% silver-content paste, the silver consumption can drop further to 4mg/W.
- **HJT cell developers** are now promoting NBB (None busbar) tech, to remove BB on the cell. Indeed, most new HJT cell capacity in 2H23 will apply NBB tech.

Exhibit 21: Market share of silver PV technologies

PERC will become less relevant



Source: Silver Institute, BNEF, BofA Global Research

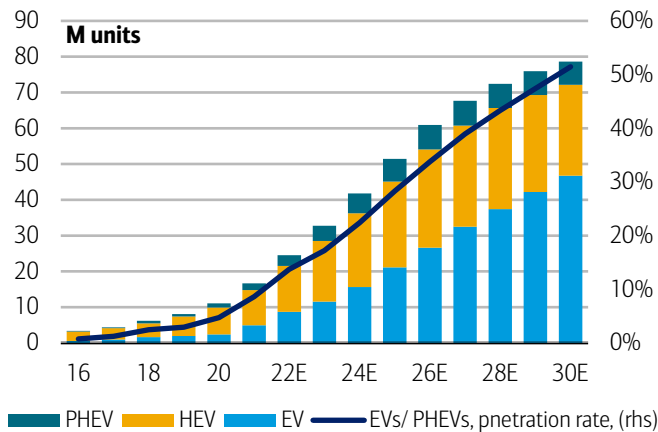
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EV should add to demand

While solar PV will be a key demand driver, electric vehicles also matter, with Exhibit 22 and Exhibit 23 showing our expectations or rising EV units. As a reminder, silver is mostly used in high-end electronics given its conductivity.

Exhibit 22: Global xEV production

EV penetration rates keep trending higher



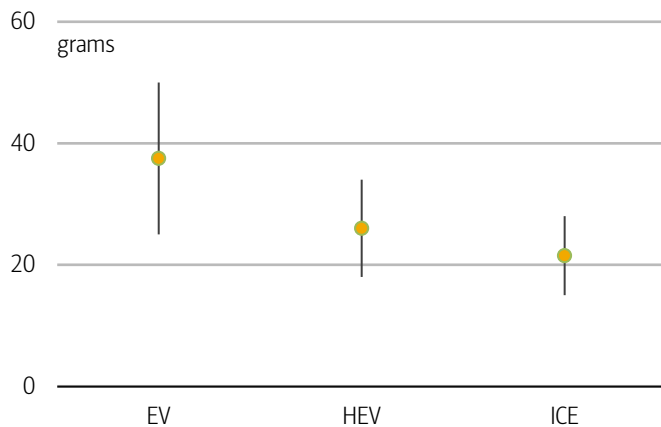
Source: Bloomberg, BofA Global Research

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Exhibit 24 shows silver loadings per vehicle, with Exhibit 25 outlining the likely trajectory of silver demand in the coming years.

Exhibit 24: Silver usage per vehicle

EVs are more silver intensive than cars with a combustion engine

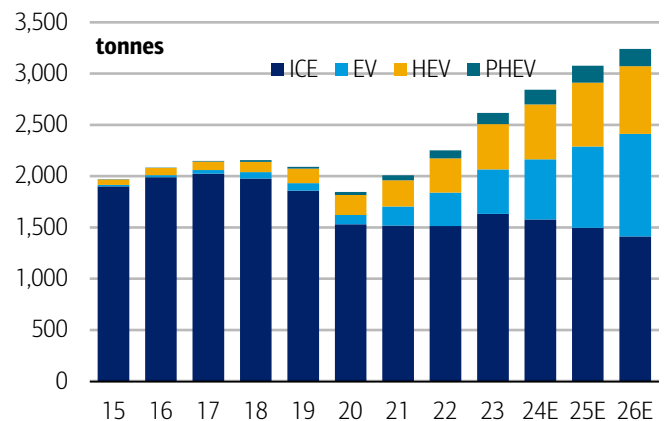


Source: Silver Institute, BofA Global Research

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Exhibit 23: Silver demand from car manufacturers

Silver demand is trending higher on rising usages in xEVs

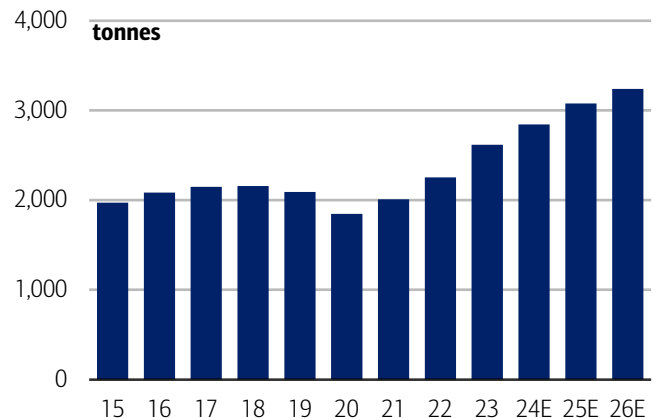


Source: Bloomberg, BofA Global Research

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Exhibit 25: Silver demand from car manufacturers

Silver demand is set to trend higher in the coming years



Source: Bloomberg, BofA Global Research

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Appendix

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

Metal prices have fallen into 2024

Base metals	Cash, \$/t	3-month, \$/t	Cash, WoW change	3-month, WoW change
Aluminium	2,235	2,281	-4.1%	-4.1%
Copper	8,368	8,467	-1.9%	-1.8%
Lead	2,007	2,042	-2.2%	-2.2%
Nickel	15,835	16,064	-4.0%	-4.0%
Tin	24,540	24,834	-3.6%	-3.3%
Zinc	2,516	2,538	-4.2%	-3.9%
LMEX	3,670		-2.9%	
	Cash, c/lb	3-month, c/lb		
Aluminium	101	103		
Copper	380	384		
Lead	91	93		
Nickel	718	729		
Tin	1,113	1,127		
Zinc	114	115		
Other commodities, freight, exchange rates, equities and yields	Spot	WoW change		
Gold, \$/oz	2,044	-1.1%		
Silver, \$/oz	23	-4.0%		
Platinum, \$/oz	959	-4.8%		
Palladium, \$/oz	1,040	-8.4%		
Iron ore, China fines cfr \$/dmt	142	4.4%		
Brent, \$/bbl	78	0.6%		
Baltic Dry Index	2,086	-0.4%		
EUR/USD	1.095	-1.0%		
Dow Jones Industrial Average	37,440	-0.7%		
10-year US Treasury yield	4.001	4.1%		
ICE BofA Commodity index, ER	406	-0.7%		
ICE BofA Commodity index Industrial Metals, ER	176	-3.1%		
ICE BofA Commodity index Precious Metals, ER	220	-1.9%		
ICE BofA Commodity index Energy, ER	475	0.4%		
Exchange stocks and cancelled warrants	Stocks, tonnes	WoW change	Canc. warrants, tonnes	Canc. warr., of stocks
Aluminium				
LME	558,175	1.3%	183,900	32.9%
Shanghai	96,637	-5.4%		
Total aluminium	654,812	0.3%		
Copper				
LME	163,175	-2.2%	22,950	14.1%
Comex	17,538	6.1%		
Shanghai	33,130	15.4%		
Total copper	213,843	0.9%		
Lead				
LME	127,725	2.5%	42,800	33.5%
Shanghai	52,449	-7.4%		
Total lead	180,174	-0.6%		
Nickel				
LME	64,536	4.1%	6,354	9.8%
Shanghai	13,464	1.2%		
Total nickel	78,000	3.6%		
Tin	7,450	-3.3%	705	9.5%
Zinc				
LME	220,050	-0.9%	53,500	24.3%
Shanghai	21,814	-14.3%		
Total zinc	241,864	-2.3%		

Source: BofA Global Research

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Exhibit 26: 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	<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> D: NPI producers don't close shop; ore inventories last for longer and more ores are imported from 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	<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Gold has been a trade on US rates. The rally past \$2,000/ounce (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 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> U: Investors returning to the market U: China's imports to rise D: ETF liquidation D: More supply 	
Platinum	\$1,050/oz	\$1,250/oz	<ul style="list-style-type: none"> Palladium is slowly moving into surplus, keeping pressure on prices. 		<ul style="list-style-type: none"> D: Jewellery demand suffers due to rising prices 	
Palladium	\$750/oz	\$500/oz	<ul style="list-style-type: none"> 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. 		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> D: China's steel production slowing sharply U: Mine closures/slowdown in production increases 	
HCC Thermal coal	\$270/t \$150t	\$215/t \$125/t	<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> 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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Exhibit 27: Commodity price forecasts

We are constructive aluminium, copper, gold, and iron ore

		Current	1Q24E	2Q24E	3Q24E	4Q24E	1Q25E	2Q25E	2023E	2024E	2025E	2026E	2027E	2028E	LT price	
Base metals																
Aluminium	US\$/t	2,235	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	
	US\$/lb	101	102	113	125	125	136	136	103	116	136	147	137	126	115	
Copper	US\$/t	8,368	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	
	US\$/lb	380	363	386	397	420	454	454	383	391	476	431	433	434	436	
Lead	US\$/t	2,007	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	
	US\$/lb	91	91	91	91	91	79	79	98	91	79	92	101	109	118	
Nickel	US\$/t	15,835	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	
	US\$/lb	718	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	2,516	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	
	US\$/lb	114	113	113	102	102	102	102	120	108	102	110	118	126	133	
Precious metals																
Gold, nominal	US\$/oz	2,040	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	23.03	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	951	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	1,028	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	131	148	148	151	153	125	125	176	150	125	112	112	113	113	
Iron ore fines	US\$/t CIF	140	150	130	120	100	90	90	115	125	90	90	94	98	102	
OE		OE	Current	1Q24E	2Q24E	3Q24E	4Q24E	1Q25E	2Q25E	2023E	2024E	2025E	2026E	2027E	2028E	LT price
Other materials																
Lithium spodumene	US\$/t	1,300	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	13,575	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	12,400	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	360	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	20.1	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	712	719	701	639	674	721	702	767	683	714					
HRC, US	US\$/t	1,213	1,130	1,020	882	805	799	799	975	959	799					
HRC, China	US\$/t	566	568	585	602	623	592	597	565	595	602					
Energy		Current	1Q24E	2Q24E	3Q24E	4Q24E	1Q25E	2Q25E	2023E	2024E	2025E	2026E	2027E	2028E	LT price	
Brent	US\$/bbl	78	94	92	88	86	60	60	86	90	60	60	60	60	60	
WTI	US\$/bbl	73	90	88	84	82	57	57	81	86	57	57	57	57	57	
Henry Hub	US\$/MMBtu	2.7	3.8	3.5	4.3	4.5	2.6	2.6	2.7	4.0	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 2: 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: Nickel supply and demand balance

Nickel to be well supplied

'000 tonnes	2022	2023	2024	2025	2026
Global production	3,170	3,424	3,966	4,289	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	90	417	346	342
Market inventories	456	546	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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Exhibit 28: Iron ore supply and demand balance

Flipping back into surplus

Wet Mt	2022	2023E	2024E	2025E	2026E
Global production	2,363	2,346	2,436	2,506	2,540
YoY change	2.2%	-0.7%	3.8%	2.9%	1.4%
Global consumption	2,301	2,346	2,372	2,374	2,386
YoY change	-5.0%	2.0%	1.1%	0.1%	0.5%
Balance	63	-1	64	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 30: 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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Table 3: Copper supply and demand balance

Balanced market in 2023E

'000 tonnes	2022	2023	2024	2025	2026
Global production	24,646	25,733	26,407	27,613	28,249
YoY change	2.2%	4.4%	2.6%	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	39	-426	-293	-773
Market inventories	840	879	453	160	
Weeks of world demand	1.7	1.8	0.9	0.3	
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: 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 29: Metallurgical coal supply and demand balance

Deficit to persist

Mt	2022	2023E	2024E	2025E	2025E
Global production	904	951	987	1,007	1,015
YoY change	-0.6%	5.2%	3.8%	2.0%	0.7%
Global consumption	925	971	993	991	1,003
YoY change	-1.4%	4.9%	2.3%	-0.2%	1.2%
Balance	-21	-19	-6	16	11
Met coal price (US\$/t)	365	290	270	215	205

Source: Woodmac, McCloskey, company reports, BofA Global Research estimates
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Exhibit 31: 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 6: 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 7: 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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