LatAm Natural Resources

LatAm Natural Resources Year Ahead: Mostly a tale of two halves

Price Objective Change

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Equity
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Caio Ribeiro
Research Analyst
BofAS
+1 646 855 4051
caio.ribeiro@bofa.com

Leonardo Marcondes >>
Research Analyst
Merrill Lynch (Brazil)
+55 11 3140 4801
leonardo.marcondes@bofa.com

Leonardo Neratika >>
Research Analyst
Merrill Lynch (Brazil)
+55 11 2188 4200
leonardo.neratika@bofa.com

Guilherme Rosito >>
Research Analyst
Merrill Lynch (Brazil)
+55 11 2188 4363
guilherme.rosito@bofa.com

Iron ore for 1Q, oil for the full year and pulp in 2H

With a new year kicking off, we publish an in-depth year ahead report with our best ideas for 2024 in the LatAm metals & mining, oil & gas and pulp & paper space. Overall, we see a supportive environment for materials and oil in 2024 driven by peaking interest rates, tailwinds from "green-spending", a weaker USD and recovering economic growth in the US and Europe particularly in 2H24. We are constructive on iron ore names heading into 1Q on a restocking trade and see Vale as the best vehicle to position for this trade. We see oil markets looking balanced in 2024 ($80/bbl avg forecast). Finally, we would be buyers of pulp names, particularly as we approach 2H24 as we see a lack of meaningful supply additions post 2025 – Suzano preferred. We also tweaked our WACC assumptions (as detailed by Exhibit 2) to reflect updated country risk and risk-free rates, as well as cost of debt. Exhibit 1 summarizes our PO changes.

Idea #1: Buy Iron ore names as a 1Q tactical trade: Vale

The combination of low iron ore inventories, weaker supply seasonality and restocking before the Chinese New Year should push iron ore to $150/ton on average in 1Q24. We see Vale as the ideal vehicle to position for this with the stock trading at 4x EV/EBITDA 24, generating a 14% FCF yield and with a minimum dividend yield of 7%. Extraordinary dividends could also be an upside risk given leverage remains below the cap.

Idea #2: Buy Ternium on 1H US HRC price rebound

Ternium's earnings should improve ahead reflecting the recent US HRC price surge. Lead times almost doubled from recent troughs to above nine weeks before starting to normalize late-Dec. On top of that, a Q1 seasonal pickup in demand, and an anticipated increase in scrap costs could continue to support prices. Our $3.5bn 2024 EBITDA for TX is 20% above consensus, and valuation looks cheap at 2.5x 2024 EV/EBITDA, well below historical closer to 4x.

Idea #3: Buy oil in 2024

We see a balanced oil market in 2024 and forecast prices at $80/bbl on average. We are positive on Petrobras as we believethat minimum cash return (45% of FCF) is still entincing. Meanwhile, we remain cautious on YPF due country risk in Argentina.

Idea #4: Buy pulp names on signs of 1H price weakness

We believe any potential pricing downside for pulp looks limited and see an overall lack of new supply from 2025 onwards which could support a multi-year price rebound. Suzano remains our preferred stock in the pulp & paper space given volumes growth from Cerrado, lower costs and attractive valuation and yields from 25 onwards.

Exhibit 1: Summary of PO changes
We are updating our PO estimates across the board

	Rating	PO	Old PO
CSN ADR	BUY	$4.40	$4.10
Ecopetrol	NEUTRAL	COP 2765	COP 3200
Ecopetrol ADR	NEUTRAL	$14	$13
Gerdau	NEUTRAL	R$ 24	R$ 27
Gerdau (ADR)	NEUTRAL	$5.00	$5.10
Klabin	U/P	R$ 21	R$ 19
Klabin ADR	U/P	$8.60	$7.90
Petrobras	BUY	R$ 48	R$ 45
Petrobras ADR	BUY	$20.20	$18.00
Suzano	BUY	R$ 65	R$ 60
Suzano (ADR)	BUY	$14	$13
Ternium	BUY	$49	$47
Vale	BUY	R$ 95	R$ 102
Vale ADR	BUY	$20	$20
YPF	U/P	ARS 7920	ARS 6650
YPF ADR	U/P	$11.30	$9.50

Source: BofA Global Research estimates
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Refer to important disclosures on page 72 to 75. Analyst Certification on page 71. Price Objective Basis/Risk on page 67.
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Overview: 2024 LatAm Natural Resources

Exhibit 2: Summary of PO and WACC changes
We are updating our price objectives and WACCs across the board ahead of 2024

	Rating	PO	Old PO	%	Price	Upside %	WACC	Old WACC	%
CSN	BUY	R$ 21	R$ 21	0.0%	19.25	9%	12.8%	12.6%	20bp
CSN (ADR)	BUY	$4.40	$4.10	7.3%	3.92	12%	12.8%	12.6%	20bp
Ecopetrol	NEUTRAL	COP 2765	COP 3200	-13.6%	2445.00	13%	12.8%	12.0%	80bp
Ecopetrol (ADR)	NEUTRAL	$14	$13	3.9%	12.25	14%	12.8%	12.0%	80bp
Gerdau	NEUTRAL	R$ 24	R$ 27	-11.1%	23.36	3%	10.8%	10.8%	-10bp
Gerdau (ADR)	NEUTRAL	$5.00	$5.10	-2.0%	4.82	4%	10.8%	10.8%	-10bp
Petrobras	BUY	R$ 48	R$ 45	6.7%	38.43	25%	14.7%	14.5%	20bp
Petrobras (ADR)	BUY	$20.20	$18.00	12.2%	16.28	24%	14.7%	14.5%	20bp
Southern Copper	U/P	$47.00	$47.00	0.0%	85.49	-45%	10.4%	10.7%	-30bp
Suzano	BUY	R$ 65	R$ 60	8.3%	54.75	19%	9.4%	9.9%	-50bp
Suzano (ADR)	BUY	$14	$13	7.7%	11.22	25%	9.4%	9.9%	-50bp
Ternium	BUY	$49	$47	4.3%	40.83	20%	15.0%	14.5%	50bp
Vale	BUY	R$ 90	R$ 102	-11.8%	74.27	28%	12.0%	12.3%	-20bp
Vale (ADR)	BUY	$19	$20	-5.0%	74.27	-73%	12.0%	12.3%	-20bp
YPF	U/P	ARS 7920	ARS 6650	19.1%	19955.75	-60%	16.2%	14.4%	180bp
YPF (ADR)	U/P	$11.30	$9.50	18.9%	16.71	-32%	16.2%	14.4%	180bp

Source: BofA Global Research estimates

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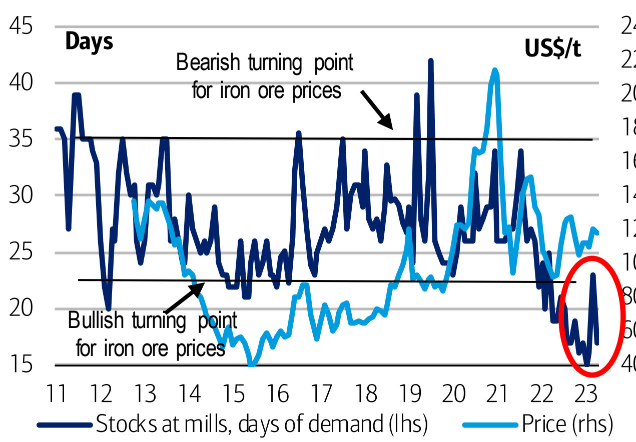
Metals & Mining

Iron ore the 1Q star, base metals outlook improves into 2H

Back in November, we upgraded Vale, Ternium and CSN to Buy alongside our global commodity team's more bullish stance for metals ahead of 2024, particularly on iron ore in the short term. We called for iron ore prices to extend its recent rally and touch $150/t into 1Q24 as mills may be forced into the market given persistent low inventories. In fact, prices continued to rise since then, up ~$13/t to the current ~$140/t. After that, we see prices gradually normalizing to $100/t by 4Q24, putting our 2024 iron ore average price at $125/t.

Exhibit 3: Iron ore prices and inventories at Chinese steel mills
Mills started restocking in September, driving iron ore prices to >$140/t from just above $100/t in August



Source: Bloomberg, Mysteel, BofA Global Research

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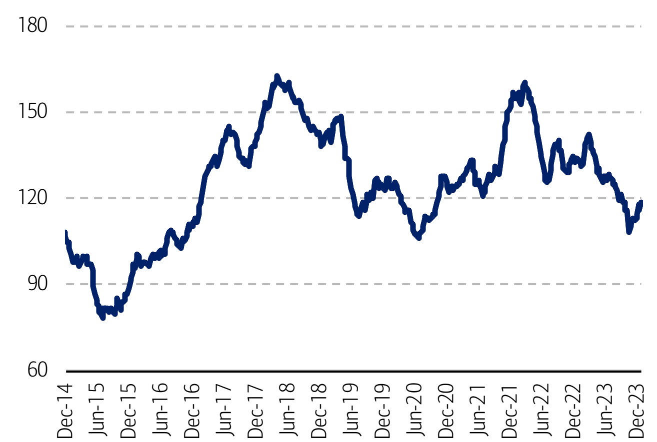
Exhibit 4: Iron ore inventories at Chinese ports (Mt)
Iron ore inventories at Chinese ports reached a multi-year low in December



Source: Mysteel, BofA Global Research

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As iron ore market gets looser through the year, our metals strategists call for gold as the summer trade, while copper and aluminum reach a sweet spot in 2H24 (see "2024 Metals and Mining Outlook"). Exhibit 5 summarizes our latest metal price forecasts.

Exhibit 5: BofA 2024 price forecasts

Iron ore is a 1Q trade, gold should rally in summer and aluminum/ copper in 2H24

		Current	1Q24E	2Q24E	3Q24E	4Q24E	2024E	2025E
Base metals								
Aluminium	$/t	2,199	2,250	2,500	2,750	2,750	2,563	3,000
	0 c/lb	100	102	113	125	125	116	136
Copper	$/t	8,172	8,000	8,500	8,750	9,250	8,625	10,500
	c/lb	371	363	386	397	420	391	476
Lead	$/t	2,250	2,000	2,000	2,000	2,000	2,000	1,750
	c/lb	102	91	91	91	91	91	79
Nickel	$/t	17,184	18,500	18,500	19,000	19,000	18,750	20,000
	c/lb	779	839	839	862	862	851	907
Zinc	$/t	2,648	2,500	2,500	2,250	2,250	2,375	2,250
	c/lb	120	113	113	102	102	108	102
Precious metals								
Gold	nominal, $/oz	1,970	1,950	1,950	2,000	2,000	1,975	2,150
	real, $/oz		1,950	1,950	2,000	2,000	1,975	2,098
Silver	nominal, $/oz	23.76	22.50	23.00	23.53	24.00	23.26	24.75
	real, $/oz		22.50	23.00	23.53	24.00	23.26	24.15
Platinum	$/oz	902	1,000	1,000	1,100	1,100	1,050	1,250
Palladium	$/oz	1,037	900	800	700	600	750	500
Bulk Commodities								
Iron ore fines	$/t cif	132	150	130	120	100	125	90
Hard coking coal	$/t fob	313	360	280	210	230	270	215
Semi-soft	$/t fob	184	238	185	139	152	178	142
Thermal Coal	$/t fob	123	148	148	151	153	150	125
MIFTs and other commodities								
Lithium spodumene	$/t	2,600	1,950	1,850	1,750	1,500	1,763	2,188
Lithium carbonate	$/t	20,425	18,000	17,000	16,000	15,000	16,500	21,875
Lithium hydroxide	$/t	21,225	19,500	18,500	17,500	16,500	18,000	23,375
Alumina	$/t	327	340	340	340	340	340	348
Uranium	$/lb		75.0	77.5	80.0	80.0	78.1	75.0
Molybdenum	$/lb	17.0	18.1	18.1	18.1	18.1	18.1	18.1
Steel								
Northern Europe	$/t	684	719	701	639	674	683	714
North America	$/t	1,047	1,130	1,020	882	805	959	799
China	$/t	543	568	585	602	623	595	602

Source: BofA Global Research estimates

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Vale, Ternium and CSN our Buy ratings in the space

We rate Ternium as Buy as earnings momentum should improve ahead reflecting the recent US hot rolled coil (HRC) rally extending above $1,000/short ton (st). Lead times almost doubled from recent troughs to over nine weeks (Exhibit 18), also evidencing a sharper supply-side response. Demand has been resilient particularly from the auto industry and should improve following the resolution of the United Auto Workers' (UAW) strike and some restocking at service centers. Our $3.5bn 2024 EBITDA for TX is 20% above consensus, and valuation looks cheap at 2.5x 2024 EV/EBITDA, well below historical closer to 4x. TX also benefits from our bullish short term iron ore view via the recently consolidated Usiminas.

Remain more cautious on Gerdau …

Our more conservative view on Gerdau, Neutral rated, reflects our short-term preference for iron ore over steel. GGB is the LatAm steelmaker least exposed to iron ore, it doesn't benefit from rising US HRC prices, and is facing some pressure in North America from lackluster construction demand and peaking metal spreads (**Exhibit 16**), and in Brazil from weaker demand and higher import penetration (**Exhibit 17**). Yet, valuation remains attractive at 4.6x 2024E EV/EBITDA (vs historical average closer to ~6x) and keeps us at Neutral.

... as well as Southern Copper

Despite our long-term bullish house view on copper, short-term headwinds for the commodity, political and project execution risks and valuation keeps us at U/P on Southern Copper.

Key changes to our models

Main changes to our models include: i) updating cost of capital components, including marking to market cost of equity component, as well as updating cost of debt; ii) updating macro estimates with BofA recent estimates (link to macro report); iii) marking to market 4Q23 commodities prices; iv) updating our Vale forecasts to reflect recent guidance at the 2023 Vale Day (link to Vale Day report); v) updating our CSN estimates to reflect the guidance at the CSN Day 2023 (link to CSN Day report)

Exhibit 6: Metals & Mining – summary of BofA (old and new) vs Bloomberg consensus estimates
We are mostly above consensus for 2024E EBITDA for metals & mining stocks

			2024E					2025E				
			New	Old	%	Cons.	%	New	Old	%	Cons.	%
	SCCO (US$mn)	Revenues	10,325	10,327	0.0%	10,653	-3.1%	12,207	12,205	0.0%	12,000	1.7%
		EBITDA	5,571	5,653	-1.4%	5,693	-2.1%	7,196	7,433	-3.2%	6,371	12.9%
		Net income	2,792	2,750	1.5%	2,829	-1.3%	3,749	3,837	-2.3%	3,443	8.9%
	Vale (US$mn)	Revenues	44,922	47,700	-5.8%	42,403	5.9%	39,934	40,768	-2.0%	42,293	-5.6%
		EBITDA	19,640	22,665	-13.3%	18,762	4.7%	15,032	16,438	-8.6%	18,337	-18.0%
		Net income	12,211	14,246	-14.3%	10,271	18.9%	8,192	9,544	-14.2%	9,301	-11.9%
Steel	CSN (R$mn)	Revenues	44,273	45,324	-2.3%	44,154	0.3%	38,341	43,157	-11.2%	44,030	-12.9%
		EBITDA	11,641	12,554	-7.3%	11,422	1.9%	8,855	10,323	-14.2%	11,086	-20.1%
		Net income	2,668	3,204	-16.7%	2,058	29.6%	443	1,740	-74.5%	2,103	-78.9%
	Gerdau (R$mn)	Revenues	63,387	70,204	-9.7%	69,127	-8.3%	66,403	75,210	-11.7%	69,351	-4.3%
		EBITDA	9,529	11,582	-17.7%	11,846	-19.6%	10,406	11,148	-6.7%	11,845	-12.2%
		Net income	4,673	6,156	-24.1%	5,727	-18.4%	4,986	5,649	-11.7%	5,591	-10.8%
	Ternium (US$mn)	Revenues	19,959	19,598	1.8%	19,123	4.4%	20,657	19,719	4.8%	20,663	0.0%
		EBITDA	3,531	3,508	0.6%	2,951	19.6%	3,725	3,658	1.8%	3,275	13.8%
		Net income	2,207	1,958	12.7%	1,495	47.6%	2,344	1,928	21.6%	1,667	40.6%

Source: BofA Global Research estimates, Bloomberg

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Oil & Gas

Brent to average $80/bbl in 2024

Having peaked at $95/bbl in September and rebounded again to almost $91/bbl in the second half of October, WTI crude oil prices have pulled back considerably since the Hamas-linked spike on a softening fundamental backdrop driven in part by rising US, Guyana, Brazil, and Canadian supplies and slower economic growth. However, even if prices are lower than what they were three months ago, the geopolitical backdrop has not improved and risks from (1) Russia to (2) the Middle East to (3) Venezuela and others could keep the oil market on edge over the course of 2024. Will OPEC+ cohesion increase in 2024 as other countries join Saudi to manage production? This is one of the vexing questions for oil. So far, internal disagreements and an abrupt Angolan exit have dominated the headlines, and the oil market is now waiting for actions, not words.

Should OPEC+ loadings start to decline on the back of commitments made in November, Brent will likely gain support and rally above $80/bbl, further boosted by geopolitics. But if loadings increase on a fracturing OPEC+, prices could be on a downward path below $70/bbl. With this backdrop, BofA's Global Oil team opted to lower our 2024 Brent crude oil price forecast from $90 to $80/bbl, and reset our WTI forecast to $75/bbl. Still, China's energy imports may increase sharply if Brent drops below $65/bbl, likely setting a range for the year. Geopolitics may also alter oil prices on three fronts: (1) over 60 countries representing half the world's population, from India to the US, will go to the polls this year and energy prices matter; (2) risks keep rising at key energy choke points from the Persian Gulf to the Red Sea to the Panama Canal; and (3) conflict deaths have spiked sharply in 2022 and 2023 due to Ukraine and Gaza, and more turmoil could be on the horizon.

Remain more cautious on Ecopetrol…

Although we expect dividends for 2024 to continue to be attractive (as there is still a COP25.7 trillion deficit in the Fuel Price Stabilization Fund), we see some downside risk arising from potential government interference at both the company and the oil and gas sector. Ultimately the government intends to halt new exploration activities while still respecting existing production and exploration contracts. This comes in a moment where Ecopetrol struggles to increase production. In December, the company released its capex budget for 2024 of COP23-27 trillion, above our previous forecast of COP22.7 trillion. In spite the higher-than-expected capex, production is expected to drop from current levels. According to Ecopetrol, oil and gas production for 2024 should be between 725 and 730kboepd, which is below 3Q23's figure of 741kboepd and also below BofA's previous estimated 755kboepd.

And keep an underperform on YPF...

Following the election of Javier Milei as president of Argentina, YPF stock soared approximately 70%. This can be largely explained by the libertarian agenda of the new president which contemplates: 1) a non-regulated energy market, which could result in higher local prices for hydrocarbons and oil-products; 2) faster removal of capital controls; as well as 3) privatization of YPF.

Although we welcome Milei's agenda for the oil and gas industry, we maintain our cautious investment thesis on YPF's shares. We highlight that the end of subsidies and currency devaluation will likely impact inflation in Argentina, which is already approaching 200% per year.

Key changes to our models

Exhibit 7: Oil & Gas – summary of BofA (old and new) vs Bloomberg consensus estimates

We are mostly below consensus for 2024E EBITDA estimates for Oil & Gas companies

			2024E					2025E				
			New	Old	%	Cons.	%	New	Old	%	Cons.	%
Oil & Gas	Ecopetrol (US$ million)	Revenues	32,931	34,561	-4.7%	35,991	-8.5%	31,280	30,757	1.7%	34,649	-9.7%
		EBITDA	15,590	15,911	-2.0%	14,708	6.0%	13,302	12,366	7.6%	14,387	-7.5%
		Net income	5,626	5,726	-1.7%	4,226	33.1%	4,855	5,081	-4.4%	4,231	14.8%
	Petrobras (US$ million)	Revenues	101,932	109,460	-6.9%	103,093	-1.1%	89,754	87,559	2.5%	94,834	-5.4%
		EBITDA	54,584	60,027	-9.1%	54,719	-0.2%	44,466	43,901	1.3%	51,360	-13.4%
		Net income	23,878	27,403	-12.9%	24,142	-1.1%	16,329	17,650	-7.5%	21,599	-24.4%
	YPF (US$mn)	Revenues	21,559	21,743	-0.8%	8,747	146.5%	24,551	23,872	2.8%	8,912	175.5%
		EBITDA	5,139	5,644	-8.9%	2,470	108.1%	5,462	4,816	13.4%	2,870	90.3%
		Net income	202	627	-67.7%	567	-64.3%	293	128	128.0%	731	-60.0%

Source: BofA Global Research estimates, Bloomberg

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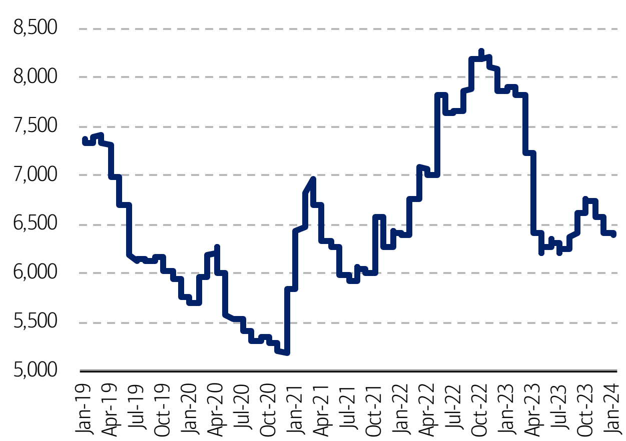
Pulp & Paper

As we approached the end of 2023, we started to see some signs that the pulp price rebound was losing steam, including: (i) the increase in domestic pulp production in China, (ii) a slowdown in downstream demand datapoints in China and recent drop in tissue prices and output (see our December China Paper Thermometer report; Exhibit 8 and Exhibit 9), (iii) and recent increase in producer inventories (please see our November PPPC review). In fact, although the December hike appears to have been passed through, buyers pushed back more relative to previous hikes after the drop in futures and resale prices.

Exhibit 8: Tissue – average prices in China (RMB/t)

Average tissue prices are currently at RMB 6,400/t as of early January



Source: BofA Global Research, SCI

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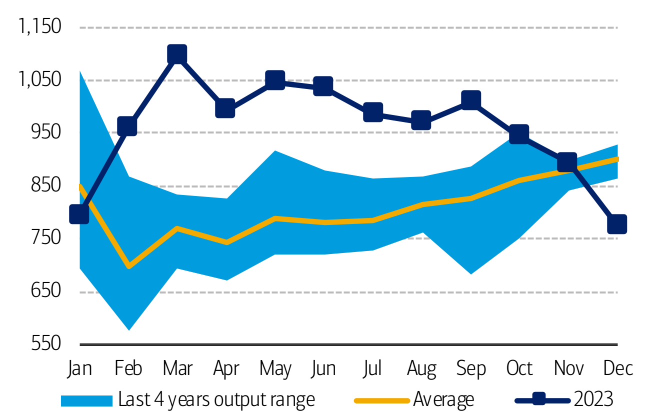
Exhibit 9: Tissue – production volume in China (Kt)

Chinese tissue production dropped in December below the past four years range for the first time this year



Source: BofA Global Research, SCI

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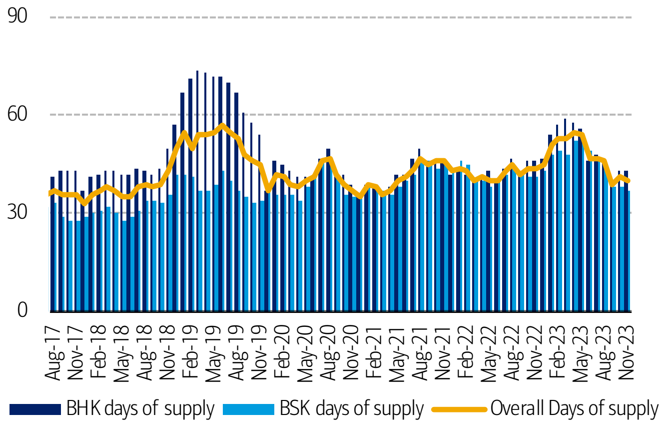
Exhibit 10: Pulp – producer inventory levels (standard days of supply)
Producer inventories dropped 1 day m/m in Nov to 40 days of supply



Source: BofA Global Research, PPPC (World-20 report)

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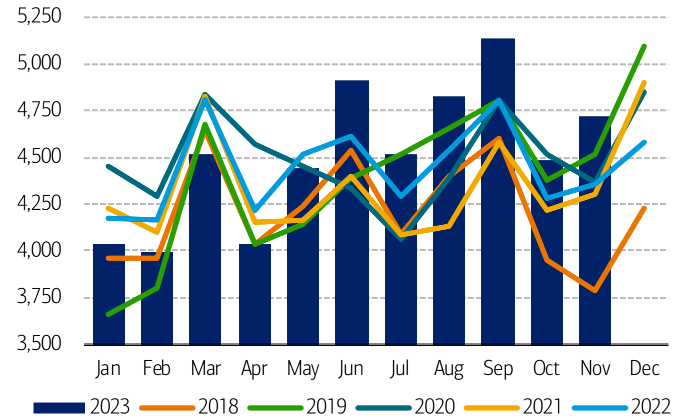
Exhibit 11: Total pulp shipments (Kt)
November shipments increased 8.3% y/y



Source: BofA Global Research, PPPC (World-20 report)

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Although demand seasonally slows in 1Q and there is new supply ahead (Cerrado), we believe that any price drop ahead should be shallow and short-lived given current prices remain close to cost support (~$550/ton). In fact, this year when prices dropped below this level we saw massive and swift supply adjustments which triggered the rebound since May. We also see a lack of major confirmed new supply additions post 2024 which could pave the way for a multi-year pulp price recovery in the years to come.

Short term pulp headwinds could be a buy opportunity; Suzano is our top pick

Despite some short-term headwinds for pulp, we believe any potential pricing downside looks limited and see an overall lack of new supply from 2025 onwards which could support a multi-year price rebound. Suzano remains our preferred stock in the LatAm Pulp & Paper coverage universe given significant growth coming in 2024 from its Cerrado project (2.55Mt/year) which should also accelerate the ongoing cash cost improvement (with costs peaking in 1Q23). We see Suzano delivering 12-16% FCF yields from 2025 on (assuming $600/t real hardwood [HW] price) once the capex disbursements related to Cerrado are completed and see the stock trading at 5.5x EV/EBITDA in 2025.

Key changes to our models

Main changes to our models include: i) updating cost of capital components, including marking to market cost of equity component, as well as updating cost of debt; ii) updating macro estimates with BofA recent estimates (link to macro report); iii) marking to market 4Q23 commodities prices; and iv) include the recent forestry assets acquisition in the Suzano model.

Exhibit 12: Pulp & Paper – summary of BofA (old and new) vs Bloomberg consensus estimates
In terms of 2024E EBITDA, we are below consensus for Suzano

			2024E					2025E				
			New	Old	%	Cons.	%	New	Old	%	Cons.	%
Pulp & Paper	Suzano (R$mn)	Revenues	39,487	39,566	-0.2%	41,462	-4.8%	45,883	45,356	1.2%	48,034	-4.5%
		EBITDA	18,186	18,245	-0.3%	19,604	-7.2%	22,877	22,485	1.7%	23,379	-2.1%
		Net income	8,173	9,116	-10.3%	5,186	57.6%	6,364	7,656	-16.9%	7,825	-18.7%

Source: BofA Global Research estimates, Bloomberg

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Summary of recommendations

Mining

Vale: Buy, PO down to $20/ADR (R$95/local share)

Property should be less of a drag for Chinese steel demand next year but still fall 9% y/y, yet some offset from infra (+4.6% y/y) and exports (up to 90Mt) led our team to anticipate crude steel production down a shy 0.6% y/y in 2024 to 1,011Mt. All in, we expect global crude steel production growth to accelerate from 0.2% y/y this year to 1.9% in 2024, with Europe's rebound on top of growth in India and the US more than offsetting weaker Chinese output. On the other hand, not all this increase should be based on blast furnaces, and we now see iron ore consumption up 1.1% y/y, behind an expected iron ore output growth of 3.5% and widening the market surplus.

That said, restocking coupled with seasonally weaker iron ore output from Brazil and Australia should support a tighter 1Q, then we see prices gradually falling to $100/t by 4Q24 as market flips to an unbalance. This short-term strength however is enough to boost our 2024 iron ore average price forecasts to $125/t and back our Vale's Buy rating. Vale shares currently price in iron ore around ~$116/t in 2024, below spot of ~$140/t and our 2024 forecasts. Our higher forecasts translate into stronger cash flow generation, which could also provide room for higher cash returns, an upside risk in our view.

Exhibit 13: Vale – implicit iron price waterfall (US$mn)
We estimate Vale is pricing in iron ore around $116/t

	3.5x	4.0x	4.5x	5.0x	5.5x
Enterprise Value	**81,351**	**81,351**	**81,351**	**81,351**	**81,351**
Assumed Multiple	**3.5x**	**4.0x**	**4.5x**	**5.0x**	**5.5x**
Implied EBITDA	**23,243**	**20,338**	**18,078**	**16,270**	**14,791**
Base Metals EBITDA	**225**	**225**	**225**	**225**	**225**
Others EBITDA	**(1,213)**	**(1,213)**	**(1,213)**	**(1,213)**	**(1,213)**
Ferrous (US$mn)					
Implied Ferrous EBITDA	**24,231**	**21,326**	**19,066**	**17,258**	**15,779**
Other Ferrous and ROM EBITDA	243	**243**	**243**	**243**	**243**
Implied EBITDA iron ore + pellets	**23,988**	**21,083**	**18,823**	**17,015**	**15,536**
Total cash expenses	**(16,547)**	**(16,547)**	**(16,547)**	**(16,547)**	**(16,547)**
Cash COGS	(14,228)	(14,228)	(14,228)	(14,228)	(14,228)
Royalties	(1,288)	(1,288)	(1,288)	(1,288)	(1,288)
SG&A & other	(1,031)	(1,031)	(1,031)	(1,031)	(1,031)
Implied Revenues - iron ore + pellets	**40,535**	**37,630**	**35,370**	**33,562**	**32,083**
Total iron ore + pellets sales (Mt)	**306.3**	**306.3**	**306.3**	**306.3**	**306.3**
Iron ore sales (Mt)	266.0	266.0	266.0	266.0	266.0
Pellets sales (Mt)	40.4	40.4	40.4	40.4	40.4
Implicit realized iron ore price (US$/MT)	**124.4**	**114.9**	**107.6**	**101.7**	**96.8**
Vale's realized price to benchmark reverse calculation:					
(-) Vale's premium vs calculated prices	0.8	0.8	0.8	0.8	0.8
(+) Freight discount (US$/t)	3.0	3.0	3.0	3.0	3.0
(+) Humidity discount	9.1	8.3	7.6	7.1	6.7
IMPLICIT AVG IRON ORE PRICE (Platts - 62% Fe content)	**134.8**	**124.5**	**116.5**	**110.1**	**104.8**

Source: BofA Global Research estimates, Platts, Bloomberg

BofA GLOBAL RESEARCH

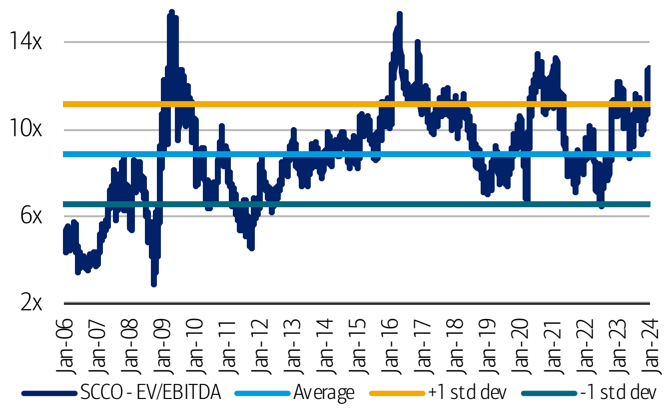
SCCO: Underperform, PO of US$47/share

As the global economy has slowed through 2023, copper has been supported by China's investment in the grid and rising car production, although mine supply disruptions have also contributed to the resilience in prices. While green spending in China may slow, the housing market should become less of a drag. This, along with a rebound of demand ex-China and a gradual emptying of the mine project pipeline, should gradually reduce the supply overhang, with copper likely posting the first full-year deficit in 2025.

That said, despite our long-term bullish house view on copper, short-term headwinds for the commodity, political and project execution risks and valuation keeps us at U/P on

Southern Copper (SCCO) We see SCCO trading at ~12.6x EV/EBITDA, well above its historical average close to 9x.

Exhibit 14: SCCO – Bloomberg consensus 1-yr forward EV/EBITDA (x)
SCCO has been trading above one standard deviation above its historical average



Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Steel

CSN: Buy, PO of R$21/share ($4.40/ADR)

We rate CSN as Buy as we see it as a better way to position for the iron ore bullish thesis given its attractive valuation. We see CSN trading at ~5.0x 2024E EV/EBITDA. On top of that, we see CSN pricing in iron ore around $120/t, below spot and our base case. Another positive trigger for CSN would be the deleveraging from the higher cash flow, as we now see leverage peaking in 1H24, which should boost returns given the debt-to-equity conversion.

Exhibit 15: CSN – implicit iron price waterfall (R$mn)
We estimate CSN is pricing in iron ore around $120/t for 2024

	4.5x	5.0x	5.5x	6.0x	6.5x
Enterprise Value	58,730	58,730	58,730	58,730	58,730
Assumed Multiple	4.5x	5.0x	5.5x	6.0x	6.5x
Implied CSN EBITDA	13,051	11,746	10,678	9,788	9,035
Steel EBITDA (R$mn)	1,958	1,958	1,958	1,958	1,958
Cement EBITDA (R$mn)	1,100	1,100	1,100	1,100	1,100
Logistics EBITDA (R$mn)	1,770	1,770	1,770	1,770	1,770
Energy EBITDA (R$mn)	103	103	103	103	103
Corporate/elimination (R$mn)	(2,688)	(2,688)	(2,688)	(2,688)	(2,688)
Proportional of controlled entities (R$mn)	1,434	1,434	1,434	1,434	1,434
Implied mining EBITDA	9,374	8,069	7,001	6,111	5,358
Total cash expenses	(11,558)	(11,558)	(11,558)	(11,558)	(11,558)
Cash COGS	(9,195)	(9,195)	(9,195)	(9,195)	(9,195)
Expenses	(2,363)	(2,363)	(2,363)	(2,363)	(2,363)
Implied Revenues	20,931	19,626	18,558	17,669	16,916
Total iron ore sales (Mt)	42.1	42.1	42.1	42.1	42.1
Implicit realized iron ore price (US$/t)	102.0	95.6	90.4	86.1	82.4
CMIN realized price to benchmark reverse calculation:					
(-) CMIN premium (discount) vs calculated prices	(7.0)	(7.0)	(7.0)	(7.0)	(7.0)
(+) Freight discount (US$/t)	13.4	13.4	13.4	13.4	13.4
(+) Humidity discount	10.6	10.1	9.6	9.3	8.9
IMPLICIT AVG IRON ORE PRICE (Platts - 62% Fe content)	133.1	126.2	120.6	115.8	111.8

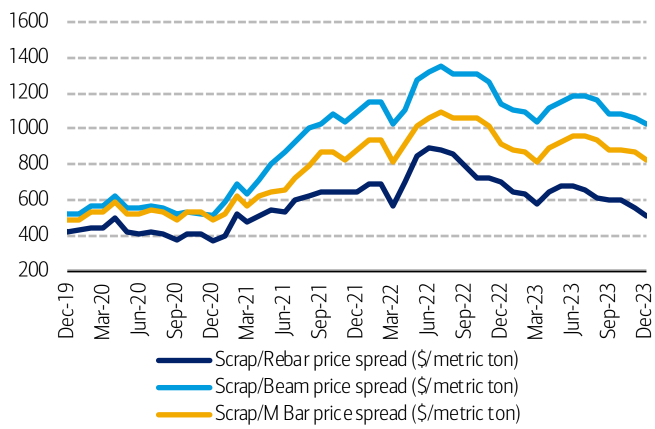
Source: BofA Global Research estimates, Platts, Bloomberg

BofA GLOBAL RESEARCH

Gerdau Neutral, PO of R$24 ($5.00/ADR)

We recently took a more conservative relative view on Gerdau and downgraded it to Neutral. Gerdau is the LatAm steelmaker least exposed to iron ore, it doesn't benefit from rising US HRC prices, and is facing some pressure in North America from lackluster construction demand and peaking metal spreads (Exhibit 16), and in Brazil from weaker demand and higher import penetration (Exhibit 17).

Exhibit 16: US long steel metal spreads (US$/t)
Metal spreads for US long steel prices started to show some weakness recently



Source: BofA Global Research, CRU

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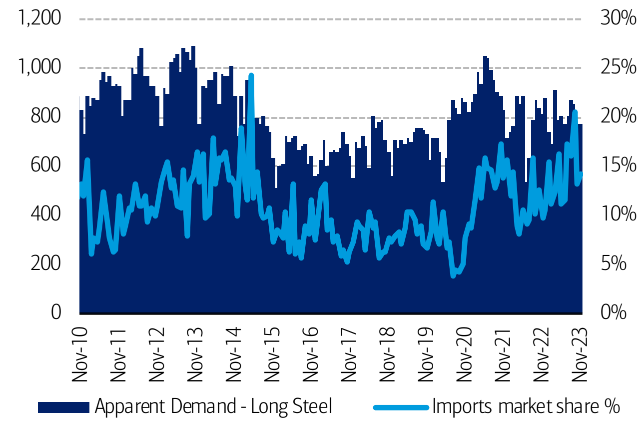
Exhibit 17: Long steel apparent demand vs import penetration
Imports market share was 14% according to IABR in November



Source: BofA Global Research, IABR

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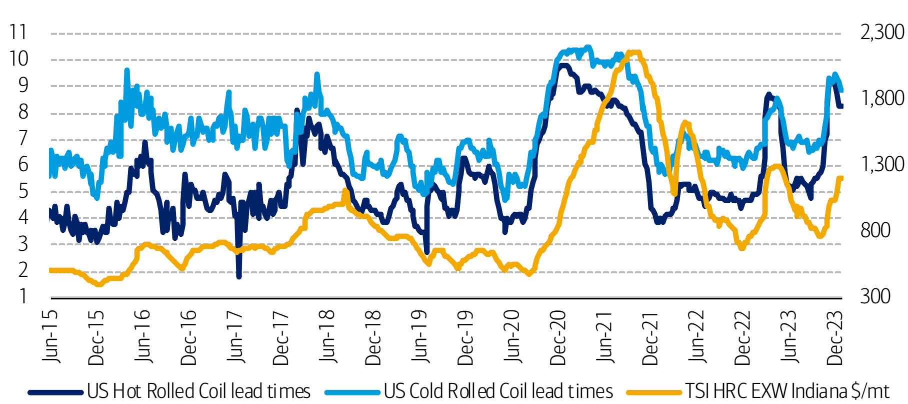
Ternium: Buy, PO of $49/share

We rate Ternium as Buy and believe earning momentum should improve ahead reflecting the recent US HRC price surge. Lead times almost doubled from recent troughs to above nine weeks before starting to normalize late-December (Exhibit 18), also evidencing a sharper supply-side response. Demand has been resilient particularly from the automotive industry and should improve following the resolution of the UAW's strike and some restocking at service centers.

On top of that, limited import arrivals (given reduced arbitrage in 4Q23), a Q1 seasonal pickup in demand, and an anticipated increase in scrap costs could continue to support prices. Our $3.5bn 2024 EBITDA for TX is 20% above consensus, and valuation looks cheap at 2.5x 2024 EV/EBITDA, well below historical closer to 4x. TX also benefits from our more constructive short term iron ore view via the recently consolidated USIM.

Exhibit 18: US flat steel lead times (weeks) and US HRC prices (RHS)
US flat steel lead times are moving up as prices begin to rebound



Source: BofA Global Research, Platts

BofA GLOBAL RESEARCH

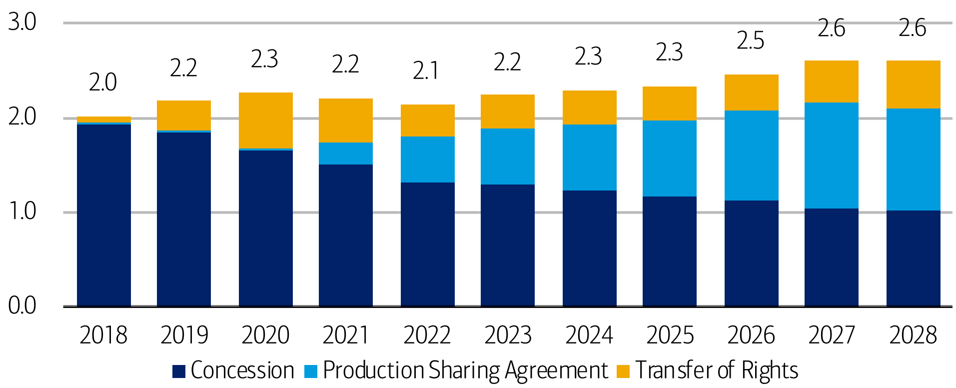
Oil & Gas

Petrobras: Buy, PO up to R$48.0/share (US$20.2/ADR)

As we have been flagging, we expect PBR's valuation to be driven by the market's expectations over total cash return. We believe that minimum total cash return (45% FCF) is still enticing supported by: 1) substantial growth in upstream production ahead; and 2) pricing policy more aligned with international prices. In this regard, we maintain our Buy rating for Petrobras while we update our model and PO to R$48.0/share ($20.2/ADR) from R$45.0/share ($18.0/ADR).

Substantial growth in upstream production ahead. Even though Petrobras's guidance for production in 2024 fell short market's expectations, we continue to believe that the company is somewhat conservative in its assumptions. We assume that oil production in 2024 will be 2.3mbpd, which is 0.1mbpd above the Petrobras's estimates. Overall, we are 0.1mbpd above Petrobras's Strategic Plan for each of the years to come. Our assumptions assume an oil production growth of 16.3% in 2028 vs 2023.

Exhibit 19: BofA estimate for Petrobras oil production (Mbpd)
We are 0.1Mbpd above PBR's estimates for all the years

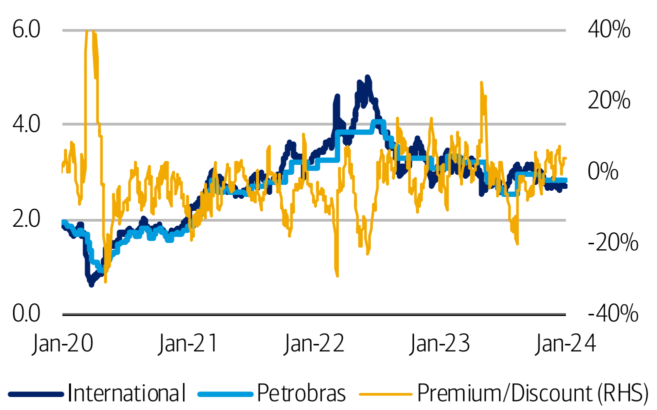


Source: BofA Global Research and Petrobras

BofA GLOBAL RESEARCH

Pricing policy more aligned with international prices. Even though price adjustments have become less frequent – avoiding passing on to the consumer the high volatility of oil prices – Petrobras has succeeded in keeping prices aligned with the international benchmarks. Although Petrobras's upstream operations are the main driver in terms of cash generation, refining margins are also important for Petrobras.

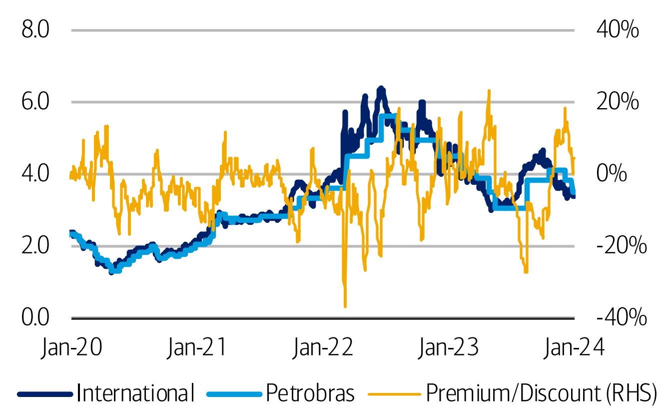
Exhibit 20: Gasoline import parity (R$/liter)
Petrobras prices are in line with international reference



Source: BofA Global Research, Platts

BofA GLOBAL RESEARCH

Exhibit 21: Diesel import parity (R$/liter)
Petrobras prices are in line with international reference



Source: BofA Global Research, Platts

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Total cash return is still enticing. Despite the recent increase in capex announced at the Strategic Plan, execution should be back-end loaded and not meaningfully inflate 2024 capex. Assuming that Petrobras will strictly follow the 45% FCF formula, oil prices of US$80/bbl and the capex of US$17.8 billion (vs Strategic Plan's of US$18.0 billion) for 2024, we see total cash return (dividends + buybacks) at ~11%, which, in our view, is still enticing.

We note that Petrobras' capex has consistently been reported at lower levels vs its strategic plans over the past several years. This could support higher yields vs our expectations.

In addition to that, despite the creation of the remuneration capital reserve announced in late October (click here for more details), we do believe that Petrobras could likely pay extraordinary dividends as we expect that the government will be supportive of dividends, especially given the current scenario in which the government has been revising up its expectations of fiscal deficit for 2024. Lastly, the company also disclosed potential extraordinary dividends between US$5 and 10 billion for the five-year horizon in its Strategic Plan.

Changing estimates. We introduce our new PO of R$48.0/share (US$20.2/ADR) as we: 1) rollout our PO to YE24; 2) update our FX assumptions (FX 2024 EoP to R$ 4.75/US$ from R$ 5.10/US$); 3) lower our Brent assumption in 2024 to US$80/bbl from US$90/bbl; 4) update our WACC to 14.7% from 14.5% as we update our assumptions for the risk free rate to 3.99% (from 3.3%) and for the country risk for Brazil to 2.45% (from 3.7%); 5) incorporate the 3Q23 result into our model; and 6) incorporate Petrobras's Strategic Plan 2024-28 into our estimates. Please see our report on the plan for more details on the plan (Petrobras: Mixed reviews on new plan: expectedly higher capex; production a letdown). Our estimates are being revised down for 2024 and 2025 due to the lower Brent and the more appreciated FX.

Exhibit 22: New vs Old (R$ millions)

Our new target for Petrobras is R$48.0/share (US$20.2/ADR)

	2023E			2024E			2025E		
	Old	New	Ch.	Old	New	Ch.	Old	New	Ch.
Net Revenue	505,421	514,484	2%	553,045	500,742	-9%	448,941	434,746	-3%
EBITDA	267,736	276,694	3%	303,531	266,700	-12%	225,394	215,477	-4%
Net Income	118,677	128,026	8%	138,456	117,303	-15%	90,497	79,093	-13%
EPS	9.10	9.81	8%	10.61	8.99	-15%	6.94	6.06	-13%

Source: BofA Global Research

BofA GLOBAL RESEARCH

Ecopetrol: Neutral, PO up to US$14.0/ADR (COP$2,765/share)

We believe that the dividends in 2024 will continue to be attractive – as there is still COP25.7 trillion deficit in the Fuel Price Stabilization Fund (FEPC) – and that the government is committed to closing the gap between oil-products prices and international references in this year. However, we see some risks arising from the government's ownership of ~88% of Ecopetrol and resulting influence on investment decisions.

In addition, the government is positioning Colombia not only as a key advocate for the global energy transition but also as a test case of how a fossil-fuel-producing country can decarbonize. Ultimately the government intends to halt new exploration activities while still respecting existing production and exploration contracts.

This comes in a moment where Ecopetrol struggles to increase production. In December, the company released its capex budget for 2024 of COP23-27 trillion, above our previous forecast of COP22.7 trillion. In spite the higher-than-expected capex, production is expected to drop from current levels. According to Ecopetrol, oil and gas production for 2024 should be between 725 and 730kboepd, which is below 3Q23's figure of 741kboepd and also below BofA's previous estimate 755kboepd.

Changing estimates. We introduce our new PO of US$14.0/ADR (COP 2,765/share) as we: 1) rollout our PO to YE24; 2) update our FX assumptions (FX 2024 EoP to COP 4,750/US$ from COP 3,950/US$); 3) lower our Brent assumption in 2024 to US$80/bbl from US$90/bbl; 4) update our WACC to 12.8% from 12.0% as we update our assumptions for the risk free rate to 3.99% (from 3.3%) and for the country risk for Colombia to 2.86% (from 2.5%); and 5) incorporate Ecopetrol 2024 capex plan into our estimates. Please see our report on the plan for more details on the plan (Ecopetrol S.A.: 2024 capex plan figure above BofAe; upstream prod. estimate seems shy). Our estimates are being revised down for 2024 and 2025 due to the lower Brent and the more appreciated FX.

Exhibit 23: New vs Old (COP billions)
Our new target for Ecopetrol is US$14.0/ADR

	2023E			2024E			2025E		
	Old	New	Ch.	Old	New	Ch.	Old	New	Ch.
Net Revenue	140,980	142,259	1%	160,495	134,440	-16%	148,404	125,317	-16%
Reported EBITDA	62,204	65,305	5%	73,888	63,647	-14%	59,665	53,293	-11%
Net income	16,987	19,330	14%	21,360	19,089	-11%	20,448	16,056	-21%
EPS	8.3	9.4	14%	10.4	9.3	-11%	9.9	7.8	-21%

Source: BofA Global Research

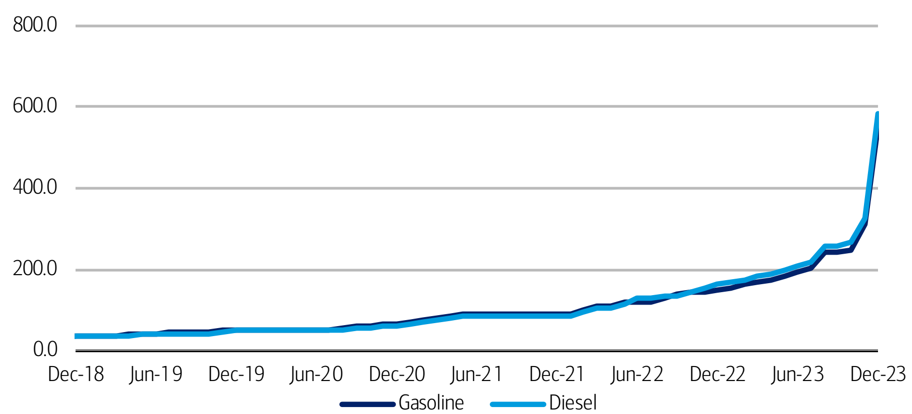
BofA GLOBAL RESEARCH

YPF: Underperform, PO up to US$11.3/ADR (ARS 7,920/share)

Following the election of Javier Milei for president of Argentina, YPF stock soared approximately 70%. This can be largely explained by the libertarian agenda of the new president which contemplates: 1) a non-regulated energy market, which could result in higher local prices for hydrocarbons and oil-products; 2) faster removal of capital controls; as well as 3) privatization of YPF.

So far, two important points have already improved since the election: 1) the substantial devaluation of the local currency, and 2) YPF (and the other refiners) have been able to increase fuel prices at pump in a faster-than-expected way. According to CECHA (Confederación de Entidades del Comercio de Hidrocarburos y Afines de la República Argentina), diesel and gasoline prices in December were approximately 120% higher compared to October.

Exhibit 24: Fuel prices at the pump in Buenos Aires (ARS/liter)
Prices have soared since the election in November



Source: BofA Global Research, CECHA

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Although we welcome the Milei's agenda for the oil and gas industry, we maintain our cautious investment thesis on YPF's. We highlight that the end of subsidies and currency devaluation will likely impact inflation in Argentina, which is already approaching 200%.

In this regard, we believe that it will be important to continue monitoring Milei's governability (given that La Libertad Avanza - Milei's political party - will have only a few seats in both upper and lower houses) and popularity (as we expect the economic adjustments at the beginning to be followed by a recession and higher inflation before the economy starts to improve).

Before becoming more optimistic on YPF, we would like to have clearer visibility on the conditions in which these and other measures will be implemented given their likely unpopular consequence (inflation). At least in the short term, we think that the development of Vaca Muerta, and therefore YPF, could continue to face: 1) challenging economics (high inflation, financing difficulties, FX devaluation); 2) capital controls; 3) government involvement in oil/gas/oil product pricing; and 4) restricted access to oil services/ equipment. For more detail, please see our recent resumption of coverage report on YPF entitled: Above-ground concerns could keep Vaca Muerta's vast potential buried.

Changing estimates. We introduce our new PO of US$11.3/ADR (ARS 7,920/share) from US$9.5/ADR (ARS 6,650/share) as we: 1) rollout our PO to YE24; 2) update our FX assumptions (FX 2024 EoP to ARS 2,400/US$ from ARS 1,629/US$); 3) lower our Brent assumption in 2024 to US$80/bbl from US$90/bbl; 4) change our WACC to 16.2% from 14.4% as we updated with the most recent country risk of Argentina of 18.2% (from 15.0%) and the most recent risk free rate of 3.99% (from 3.3%); 4) incorporate the 3Q23 result into our model; and 5) incorporate the increase in fuel prices by YPF into our estimates. Our estimates are being revised down for 2024 due to the Brent price and up in 2025 due to the more depreciated FX.

Exhibit 25: New vs Old (US$ millions)
Our new target for YPF is US$11.3/ADR

	2023E			2024E			2025E		
	Old	New	Ch.	Old	New	Ch.	Old	New	Ch.
Net Revenue	15,908	18,036	13%	21,743	21,559	-1%	23,872	24,551	3%
EBITDA	4,221	4,975	18%	5,895	5,438	-8%	5,168	5,786	12%
Net income	995	1,441	45%	627	202	-68%	128	293	128%
EPS	2.5	3.7	45%	1.6	0.5	-68%	0.3	0.7	127%

Source: BofA Global Research Estimates

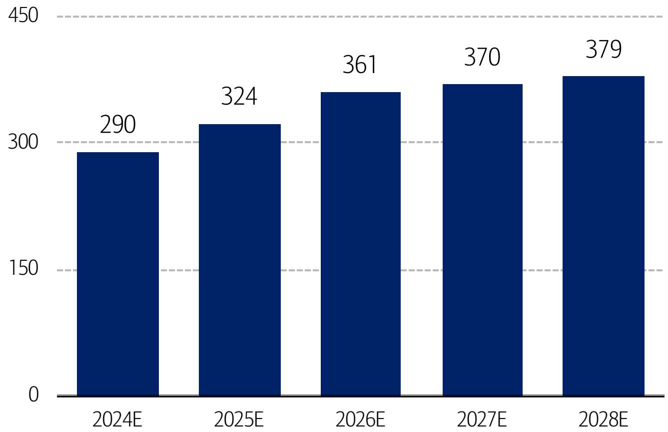
BofA GLOBAL RESEARCH

Pulp & Paper

Suzano: Buy, PO of R$65 (US$14/ADR)

We have a Buy rating on Suzano as we continue to see an interesting asymmetry in the investment case. Pulp began 2024 at $653/t and our channel checks have been mentioning that prices could be fairly stable in 1Q24. This could lead to pulp prices in 2024 above our estimate of $580/t and consensus close to this level. This could trigger upwards earnings revisions and higher cash generation in 2024. Meanwhile, when we look at 2025, with Cerrado fully ramped up, we see Suzano trading at 5.5x 2025E EV/EBITDA and generating an 11% free cash flow yield which should then improve to 15-16% by 2026-28. Therefore, in our view, Suzano offers an interesting entry point at the end of the capacity addition cycle as we should see at least two full years with no material capacity additions going forward (other than the Oki 1.5Mtpa market pulp expansion in 2025). Results should be boosted further by the startup of the lower cost Cerrado mill, driving profitability and cash generation up in the coming years.

Exhibit 26: Suzano's pulp EBITDA/t (US$/t)
Cerrado's startup should drive Suzano's profitability up...



Source: BofA Global Research estimates

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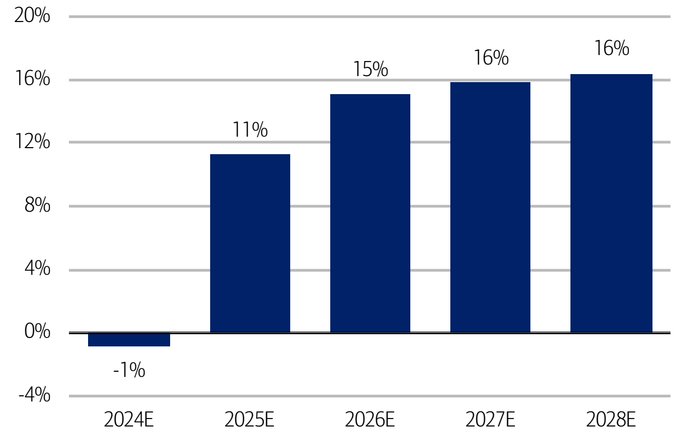
Exhibit 27: Suzano's FCF yield (%)
.. which in turn should leads to double digits free cash flow yields



Source: BofA Global Research estimates, Bloomberg

BofA GLOBAL RESEARCH

2024 Metals, mining & steel outlook

Below is an excerpt from our global commodity strategists' year ahead report (see "2024 Metals and Mining Outlook").

Long-term prices: inflation = structurally higher

Jason Fairclough >>
Research Analyst
MLI (UK)
+44 20 7995 0225
jason.fairclough@bofa.com

Raising long-term prices for most key mined commodities

We raise long-term prices (these reference 2029) for most commodities. In part, this is our usual end-of-year process whereby we keep prices flat in real terms but effectively "roll forward" the long-term price to reflect some level of incurred inflation. Our long-term price is expressed in money of the current year (real $) and, in this year-ahead note, we move our reference year from 2023$ to 2024$. For reference in the table below we also give the actual nominal long term price in our model which goes into FY2029 (in 2029$).

Beyond this mechanical "roll forward" we go back to basics to reset some key long-term prices including iron ore, copper, coking coal and thermal coal where we feel like the economics of supply and/or demand dynamics may have changed. Our new LT prices are shown in the table below.

Inflation was much higher than 2.5% last year

Historically, our assumed inflation "roll" (nominal vs real) is 2.5%, i.e. in the long term we inflate both prices and costs by a terminal 2.5% inflation rate. Post-Covid, we acknowledge the step-up in costs, which appears to be quite structural. As such, our 2024 "roll forward" is assumed at +10% rather than +2.5%, just for this year.

Deriving LT prices: some classic approaches

A "long-term" or "equilibrium" price is perhaps more used by equity investors and corporates than by commodity investors. A long-term price may be used for capital allocation decisions, for M&A and as an input to a discounted cash flow analysis (DCF) for investment purposes. A long-term price could also be used to estimate the mid-cycle earnings of an asset.

We think there are a few approaches to thinking about long-term prices.

- **Marginal cost.** Probably most conservative. 75th to 90th percentile.
- **Incentive price.** What price incentivizes a mining company to build a new mine?
- **"Supply discipline" led pricing:** i.e. quasi oligopolistic pricing. Think: iron ore, oil, diamonds.

We also like to cross-reference these figures against historical price levels. We think that the 5-year and 10-year average price levels are informative inasmuch as they are the "ex-post" prices that would have been realized and would have ultimately driven the cash flow for productive assets and for the companies that owned them.

Exhibit 28: Changes to long-term prices

We raise most long-term commodity prices, particularly for bulk commodities – iron ore & coals

Commodity	Unit	Spot	New LT Price (2024$)	Previous LT price (2023$)	% Chg	New LT Price (2029$)	5 Yr Avg	10 Yr Avg	New LT vs 5 yr	New LT vs 10 Yr	75th	90th	Incentive Price?
Bulks													
Iron ore	US$/t	132	90	79	14%	102	114	93	-21%	-3%	49	77	120
Coking Coal	US$/t	324	200	140	**43%**	226	230	190	-13%	5%	150	170	240
Thermal Coal	US$/t	130	100	75	33%	113	160	119	-38%	-16%	85	100	
Base													
Copper	US$/t	8122	8500	7168	19%	9617	7688	6860	11%	24%	4344	5755	8500
Aluminium	US$/t	2177	2250	2042	**10%**	2546	2196	2024	2%	11%	1999	2120	2200
Nickel	US$/t	16787	15400	14024	10%	17424	18591	15569	-17%	-1%	17772	22182	10000
Zinc	US$/t	2571	2600	2449	**6%**	2942	2779	2578	-6%	1%	1861	2161	
Lead	US$/t	2285	2300	2274	1%	2602	2056	2066	12%	11%			
Cobalt	US$/lb	15	20	17.08	**17%**	23	20	19	1%	3%			
Precious													
Gold	US$/oz	1982	1850	1800	3%	2093	1715	1479	8%	25%			
Silver	US$/oz	24	26	26	**0%**	29	21	19	23%	36%			
Platinum	US$/oz	932	1300	1295	0%	1471	953	1014	36%	28%			
Palladium	US$/oz	1136	1300	1295	**0%**	1471	1928	1360	-33%	-4%			
Rhodium	US$/oz	4250	3250	3238	0%	3677	11378	6294	-71%	-48%			
Precious													
Uranium	US$/lb	74	48.61	45.3	7%	55	39		26%				

Source: Bloomberg, WoodMackenzie, BofA Global Research estimates

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Balancing "commercial" vs intellectual arguments

Again, inasmuch as these long-term prices are used for capital planning or investment purposes, we think it is important to be "commercial" in obtaining a realistic estimate rather than being a slave to any dogma on the "right" way to derive a long-term price. As an example, using a long-term iron ore price based on the 90th percentile on the cost curve has been objectively (very) wrong for iron ore for the past 5 years.

Commodity-specific discussions

Iron ore: nearly always surprises UP!

For most of the last 8 years, since the China hard landing scare in 2015 when iron ore traded below US$40/t, the market has stayed bearish iron ore. Why? Because Chinese steel production was going to imminently collapse. Even as the market has been bearish, the street has spent the last 8 years continuously marketing iron ore UP as supply has disappointed down and demand held up.

Interestingly, even with the (slow-motion) collapse of the Chinese property market, Chinese steel production has stayed robust and iron ore has kept a bid. Our new long-term price of US$90/t (2024$) is above the cost curve (90th percentile about US$80/t) but still well below the average price for the last 5 years of US$113/t. The average price for the last 10 years including the China hard landing scare in 2015 is $92.

Copper: the world needs new mines. What price makes the miners build?

We raise our long-term copper price to US$8500/t (2024$) from $7200 (2023$) based on an updated incentive pricing analysis. Capex for mines seems to be structurally higher. Grades are moving structurally lower. Strip ratios are structurally higher. ESG/community relation issues mean that projects take much longer to plan and build. All of these factors point to increased capital intensity. This means a higher long-term copper price is required to incentivize new supply. Interestingly, and quite different to the bulk commodities, the average copper price for the last 5 years is $7700/t, and for the last 10 years $6900/t, i.e. both well below our new assumed LT price. This is an interest contrast with iron ore.

Coking coal: India demand is about to shock us

We raise our long-term coking coal price to US$200/t (2024$) from a previous level of US$140/t (2023$). What is the thinking? We think that coking coal is becoming an incentive-priced commodity rather than a marginal cost-priced commodity. India steel production looks likely to double on an 8-10 year view. This means c.90 Mtpa of incremental seaborne coking coal supply. At the moment it isn't clear who will supply it. BHP has the best undeveloped coking coal resources but has made it clear that with the change to coking coal royalties in Queensland it will NOT be building a new mine for the foreseeable future. In our view, this leaves the US (or Russia!) as the marginal supplier, which we think will require quite high incentive prices to bring on marginal supply. The average price for the last 5 years was $230/t, and for the last 10 years $190/t.

Thermal coal: nobody (in the West) is building new mines

The FOB Newcastle price is our reference product. We raise our long-term thermal coal price to US$100/t (2024$) from $75/t (2023$). This reflects the c.90th percentile of the cost curve. Our new LT price could still be conservative inasmuch as NO Western companies appear to be planning to build new thermal coal mines. Of course, new mines are being built in Asia – China, Indonesia and India. The average price for the last 5 years is $160/t and the last 10 years $120/t albeit with these averages very much skewed by the 2022 war induced spike.

Others: aluminium, zinc – less resource-constrained, China marginal producer

For some commodities, China is not only a key consumer but also a key producer. These tend to be industries that have more "capital" rather than "resource" characteristics. As such, China can and has overinvested in these industries, driving down returns and leading the commodity to (often) trade on marginal cost. For these commodities, we pay closer attention to current cost curve levels but accept that, even here, high inflation means that the cost curves may have permanently shifted up/steepened.

- **Aluminium:** Marginal cost (90th percentile) is c. $2100-2150/t. With upward pressure on energy prices, we think this could settle at around US$2250/t.

- **Zinc:** Marginal cost $2200; we acknowledge inflationary pressures and increased supply side consolidation and raise the assumed LT price to US$2600/t.

Green spending saves the day

Michael Widmer
MLI (UK)
+44 20 7996 0694
michael.widmer@bofa.com

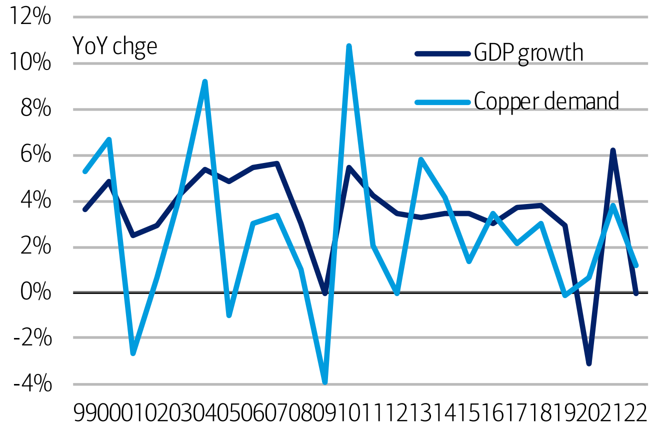
Danica Averion
MLI (UK)
+44 20 7996 2325
danica_ana.averion@bofa.com

> While the energy transition has not pushed the mined commodities significantly higher in 2023 given the weak global macro backdrop, spending on green technologies has offset some of the cyclical headwinds. This should remain the case in 2024.

Base metals' beta to GDP growth has declined

Base metal prices have been remarkably resilient in recent months, notwithstanding the global economic headwinds. Granted, a lack of supply growth, for instance in copper, exacerbated by a series of disruptions earlier this year, meant subdued surpluses. Beyond that, as a cyclical asset, metal demand tends to be closely correlated with global GDP growth (Exhibit 29), but that sensitivity has been declining. This is reflected in Exhibit 30, which highlights that the beta of demand over GDP growth has fallen for all base metals in the past decade.

Exhibit 29: GDP growth and copper demand
Copper demand has become less volatile since the Global Financial Crisis (GFC)



Source: Woodmac, CRU, ICSG, Bloomberg, BofA Global Research

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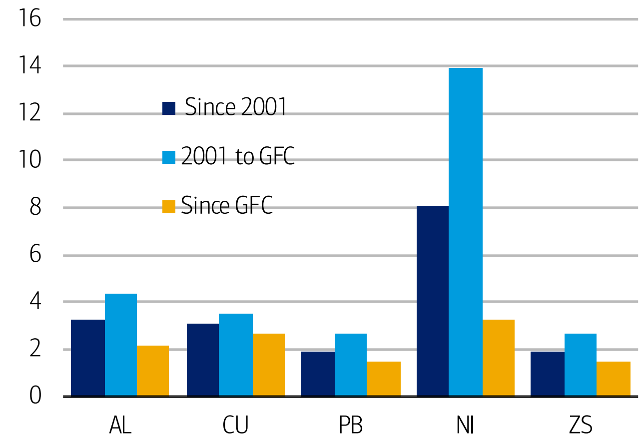
Exhibit 30: Beta of copper demand over GDP growth
Copper's beta has been declining since the GFC



Source: Woodmac, CRU, ICSG, Bloomberg, BofA Global Research

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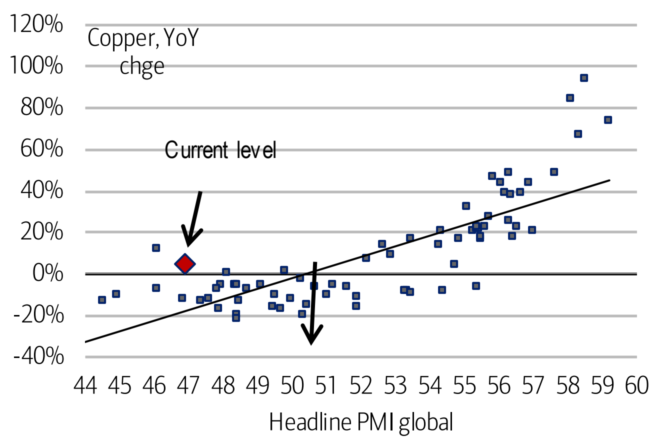
The decline in beta is multi-faceted. To start with, global economic growth has been weaker in the past decade compared to the run-up to the Great Financial Crisis, which also had an impact on stocking cycles, usually an amplifier of underlying demand. This has perhaps been most visible in China, where the government has refocused from purely quantitative growth targets, which were often accompanied by a misallocation of capital and overcapacities, towards higher-quality, healthier expansion.

Exhibit 31: Global average (US, Europe, China) PMIs and copper prices
PMIs would justify copper prices trading 20% lower



Source: Bloomberg, BofA Global Research

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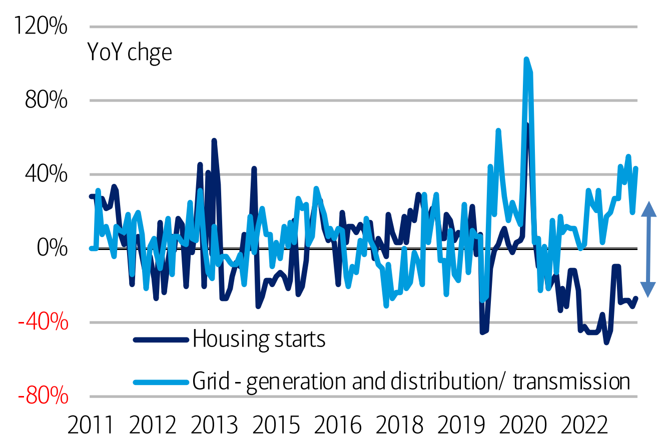
Exhibit 32: China, housing starts and grid investment
A gap has opened up between housing starts and grid investment



Source: Bloomberg, BofA Global Research

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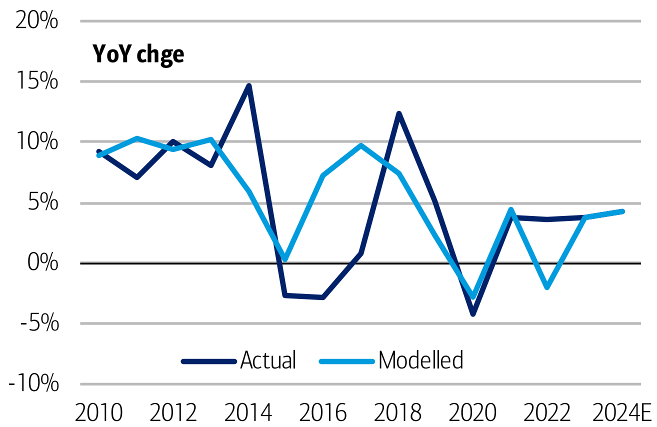
Green spending to support metals demand in 2024

Exhibit 31 also confirms that traditional relationships have weakened, showing that global average (China, US, Europe) Purchasing Manager Indices are very subdued and would justify copper prices trading around 20% below current levels. Taking China specifically, Exhibit 32 highlights that a gap has opened up between housing, a traditional growth driver, and spending by the grid, especially on renewables. In essence, while the energy transition has not pushed the mined commodities significantly higher given the weak global macro backdrop, spending on green technologies has still offset some of the cyclical headwinds.

Factoring this in, we have adjusted our demand growth models, breaking them down into green and traditional sectors; in China, we also split out housing. The results are mirrored by Exhibit 33 and Exhibit 34, which show that one of our analyses forecasts a slight expansion of demand next year, even though copper usage from housing is set to decline further (**this estimates may deviate from some of our other models, but they illustrate underlying dynamic well**).

Exhibit 33: China, copper demand ex-housing, renewables and autos

Copper demand growth has been slowing



Source: Bloomberg, BofA Global Research

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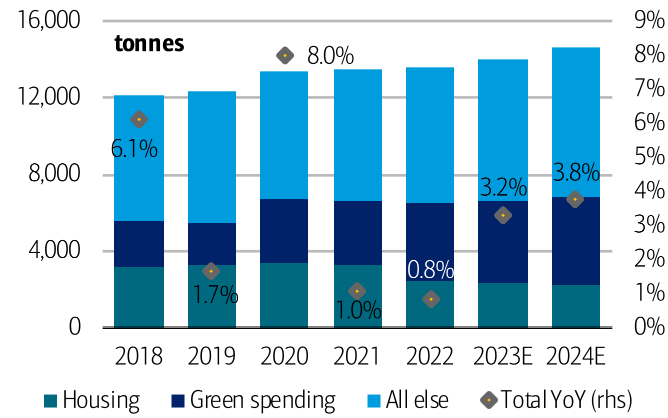
Exhibit 34: China, copper demand

One of our demand models projects an acceleration of demand growth



Source: Bloomberg, IEA, BofA Global Research

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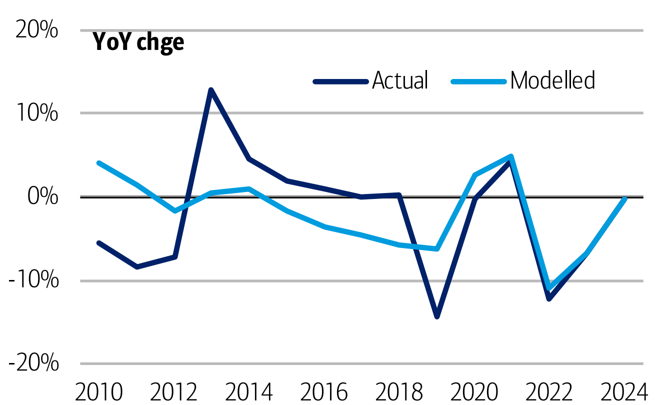
Using the IEA's renewable installation and BofA's electric vehicle production forecasts, the picture is similar in Europe. Indeed, with the EU looking to accelerate the roll-out of green energies, demand growth for many metals should accelerate next year.

Exhibit 35: Europe, non-green copper demand

Traditional sectors have been a drag on copper demand



Source: Bloomberg, BofA Global Research

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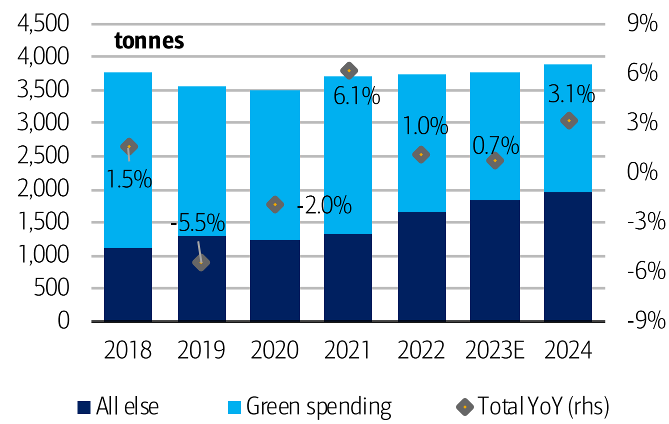
Exhibit 36: Europe, copper demand

Copper demand is set to expand on the rising popularity of EVs and the grid



Source: Bloomberg, IEA, BofA Global Research

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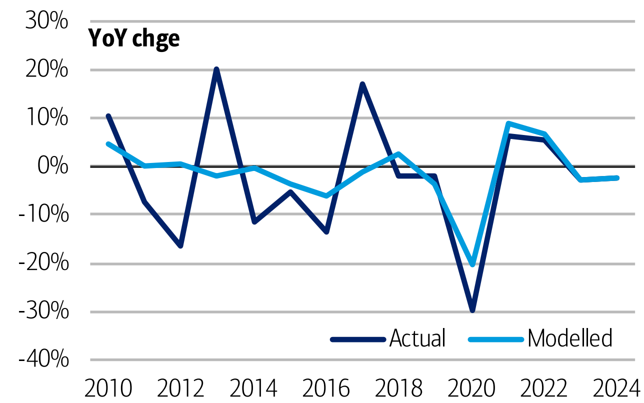
This dynamic is also visible in the US, where increased spending to greenify the economy should completely offset the drag on demand from the "traditional" sectors.

Exhibit 37: US, non-green copper demand
Outsourcing and offshoring have long been a drag on copper demand



Source: Bloomberg, BofA Global Research

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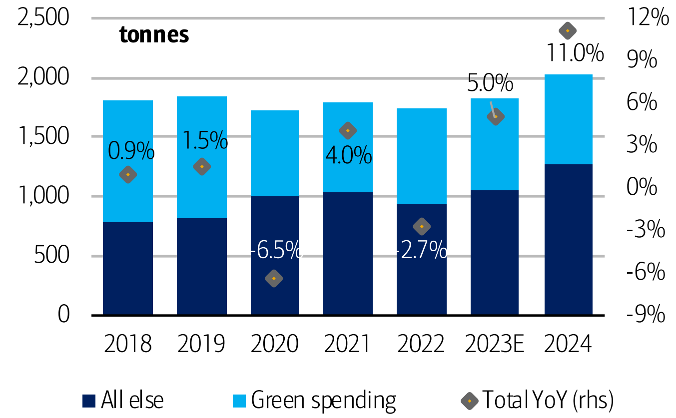
Exhibit 38: US, copper demand
Investment in the grid and rising EV production to support copper demand in 2024



Source: Bloomberg, IEA, BofA Global Research

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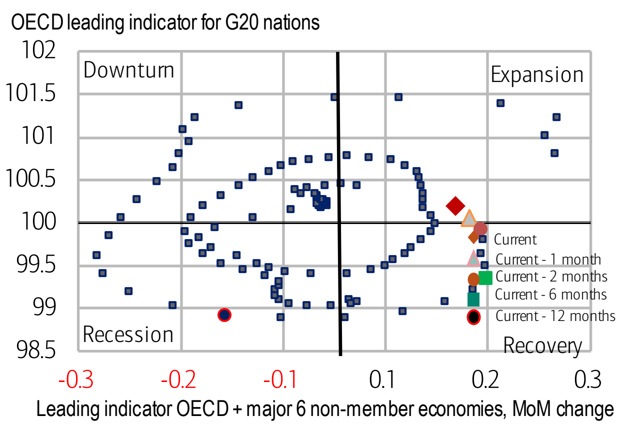
Traditional economy should also become more supportive

As green spending becomes more of a growth driver, we are also cautiously optimistic that the global economy, and hence traditional demand, will become less of a drag. This is picked up by Exhibit 39, which shows one of our business cycle analyses. This tool is 8 months forward-looking and has flipped into the "Expansion" stage, usually the most bullish period for the cyclical commodities.

Exhibit 39: Metals business cycle
The 8-month forward-looking business cycle has flipped into "Expansion"



Source: Bloomberg, BofA Global Research

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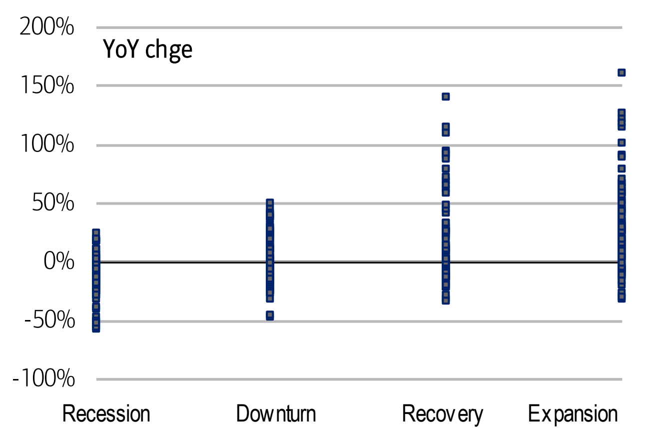
Exhibit 40: Copper prices and business cycle stages
Copper tends to perform best during the "Recovery" and "Expansion" phases



Source: Bloomberg, BofA Global Research

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Exhibit 41 shows that the improvement in our business cycle model has been driven by China, although the US backdrop has also become less bearish.

Exhibit 41: OECD leading indicators by country and region
China has led the improvement in leading indicators. The US is getting better too, while Europe is flat

Region/ country	Sep-23	Aug-23	Jul-23	Jun-23	May-23	Apr-23	Mar-23	Feb-23	Jan-23	Dec-22	Nov-22	Oct-22	Sep-22
G20	100.17	100.05	99.92	99.78	99.63	99.49	99.34	99.19	99.05	98.95	98.88	98.87	98.92
US	99.43	99.33	99.22	99.10	98.99	98.90	98.85	98.84	98.85	98.87	98.93	99.03	99.16
Europe	99.22	99.20	99.20	99.20	99.19	99.15	99.04	98.87	98.66	98.45	98.26	98.16	98.19
China	101.96	101.62	101.26	100.88	100.50	100.11	99.72	99.30	98.88	98.52	98.22	98.00	97.88

Source: Bloomberg, BofA Global Research

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China's government is stimulating traditional sectors

Where could support from the wider economy come from? Taking a closer look at China, the government has increasingly focused on the "traditional" sectors. Property, part of construction, has become a particular focal point, as our China economists outline, with the government announcing a flurry of policies in recent weeks, including:

- Tier-1 cities could **relax their home purchasing restrictions** (HPR) in non-core areas while more Tier-2-and-lower cities may ease their HPR in all areas.

- Meanwhile, the cities subject to HPR could **reduce downpayment ratios** to, or near, the PBoC floor, further unleashing housing demand. Some cities could go further, offering subsidies to cover part of deed taxes or parking spaces, as cities such as Nanning recently announced. More cities could relax controls on home pricing to boost transactions.

- **Urban village refurbishment** in big cities could also help boost housing demand and property investment, if the project is large, well-funded and combined with monetary compensation. Policy makers have reportedly decided to issue special-purpose bonds to finance such programs next year, potentially creating new home demand equalling 4% of national home sales volume or 18% of the home sales volume in the 21 largest cities involved, according to our property analysts. Guangzhou city plans to roll out a guideline for refurbishment by end-2023, indicating a similar timeline to other cities.

Exhibit 42 summarises the timeline of some policy announcements.

Exhibit 42: Policy-easing measures since mid-August

The government has started to deliver policy easing from property, monetary and capital market perspectives

Type	Date	Detail
Property	25-Aug	MOHURD, PBoC and NFRA issued new mortgage guidance - borrowers with no local housing are considered as first-time homebuyers v This guidance has been confirmed by all Tier 1 cities: Shenzhen and Guangzhou on Aug 30; Shanghai and Beijing on Sep 1. More than 70 Tier-2 and Tier-3 cities include Xiamen, Wuhan, Zhongshan, Xi'an, etc. followed the guidance.
	31-Aug	(1) The PBoC cut the nationwide minimum down payment requirement to 20% (from 30%) for first-time home buyers and 30% (from 40%) for second-time buyers; (2) The mortgage interest floor for second-time homebuyer was cut to LPR plus 20bp (from LPR plus 60bp previously); (3) Homeowners with outstanding mortgage loans can apply for refinancing, negotiating with the bank to determine the new loan's interest rate. (effective from Sep 25)
	7-Sep	Following PBoC guidance, six big state banks announced details of mortgage back-booking repricing, which apply to first home residential mortgages issued before Aug 31, 2023. The definition of first home will use the newly loosened standard. Rate of LPR-based mortgage loans will be the higher of a) the national floor and b) the local floors announced by PBoC local branches for first-home mortgages during the respective period.
	11-Sep	Tier-1 city Guangzhou reduced first/second-home mortgage rate and second home down-payment ratio. Guangzhou also reportedly abandoned its strict developer pricing control.
	Early Sep	Tier 2 cities such as Qingdao, Nanjing, Dalian and Shenyang removed their HPRs.
Monetary	15-Aug	The PBoC cut the 1-year MLF rate by **15bp** to 2.50% and the 7-day reverse repo rate by **10bp** to 1.80%.
	21-Aug	The benchmark 1-year LPR declined by **10bp** to 3.45%.
	1-Sep	Major banks started another round of deposit pricing cuts with 1-5 year time deposit pricing lowered by 10-25bp.

Source: BofA Global Research, government statements

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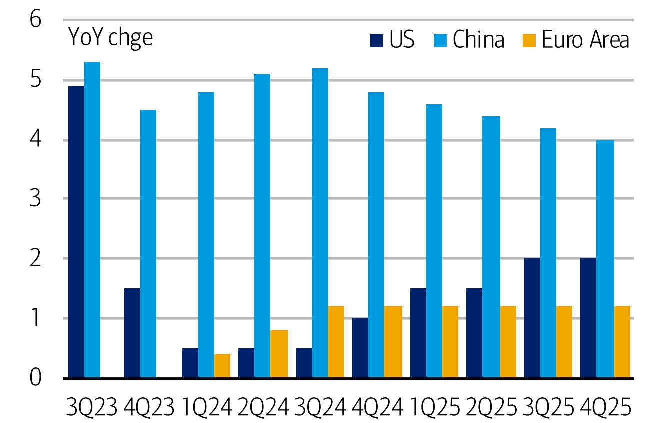
3Q24 may be the sweet spot from a growth perspective

Incidentally, Exhibit 43 shows the GDP growth estimates from our colleagues in the economics team, outlining that 3Q24 could be a sweet spot: Europe and the US are then accelerating, while China's growth rate has not yet peaked.

Exhibit 43: Global GDP growth estimates
3Q24 looks to be the sweet spot next year



Source: BofA Global Research

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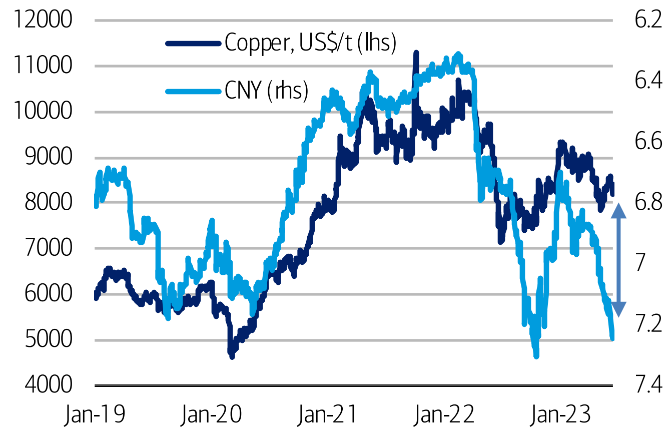
Exhibit 44: Copper and CNY
A weaker CNY has been a headwind for copper



Source: Bloomberg, BofA Global Research

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Rates and USD also becoming less of a headwind

USD and rates have also been headwinds to the mined commodities this year. Exhibit 44 shows how pronounced the CNY weakness has been. At the same time though, and mirroring correlations with other macro data, copper has been remarkably resilient. With the rates cycle turning (Exhibit 45), sustained USD strength would be unusual next year.

Exhibit 45: Policy rates
The rates cycle is set to turn in 2024

	2023	2024	2025
US	5.5-5.75	4.75-5	3.75-4
China	3.5	3.5	3.4
EA	4.0	3.3	2.0

Source: BofA Global Research

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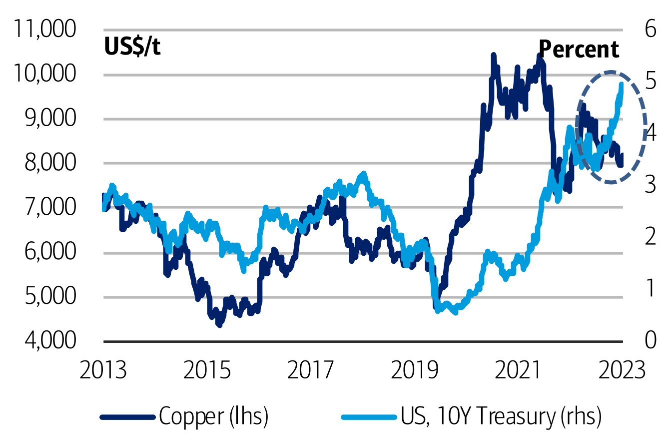
Exhibit 46: Copper and US 10Y Treasuries
Recent rate increases have pushed copper prices lower



Source: Bloomberg, BofA Global Research

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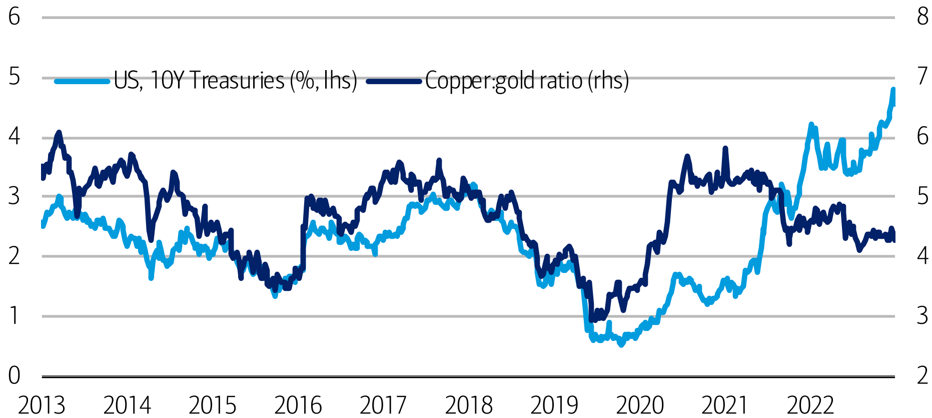
Sticking with rates, the recent sharp drop in US Treasuries has compounded headwinds to the metals (Exhibit 46). Linked to that, possible causes of rising US rates have been much discussed. High/rising US fiscal deficits, apprehension that inflation may remain elevated, along with the decoupling of bonds/equities have all been seen as potential candidates.

The following chart shows the correlation between Treasuries and the copper:gold ratio. Somewhat simplified, taking gold's current spot price of $1,950/oz as a starting point, the implication is that copper should be trading at $14,400/oz ($6.53/lb). Yet we would caution that much lower spot prices are an indicator that the bond vigilantes have come out in force. In fact, we believe both copper and gold are fairly priced at present, while rates had pushed higher after the market had been re-pricing the Fed rate paths. As such, we follow dynamics in the rates market closely and acknowledge the risk that any volatility may spill over into the mined commodities. Yet we don't think that US fiscal dynamics are an immediate risk (more on this in the gold section).

Exhibit 47: US Treasuries and copper:gold ratio
Treasures have risen faster than the copper:gold ratio



Source: Bloomberg, BofA Global Research

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Steel and bulk commodities

Overview: steel prices have stabilized at the lows

Danica Averion
Commodity Strategist
MLI (UK)
+44 20 7996 2325
danica_ana.averion@bofa.com

Michael Widmer
Commodity Strategist
MLI (UK)
+44 20 7996 0694
michael.widmer@bofa.com

We expect global steel production to accelerate next year

Looking into 2024, steel headwinds may subside as the global economy accelerates. As such, we expect global crude steel production growth to accelerate from 0.2% YoY this year to 1.9% in 2024 and 1.1% in 2025. Some of the underlying dynamics show however, that the global steel market is changing: Chinese steel output may well continue to soften in the next two years (more on this below), although growth in India will more than offset that.

Exhibit 48: Global crude steel production
We expect global crude steel production to grow by 1.9% next year, with India's output more than offsetting the decline in China

Summary table

Crude steel production, Mt	2022	2023E	2024E	2025E
China	1,013	1,018	1,011	1,005
Europe	181	163	186	195
US	81	81	84	88
Other NAFTA	30	31	31	32
South America	43	40	41	41
Russia	72	75	75	75
CIS ex. Russia	14	15	15	17
Middle East	45	47	48	49
India	125	136	149	159
Japan	89	86	82	79
South Korea	66	66	67	68
Rest of the world	127	131	134	139
World ex. China	873	871	913	940
World	1,886	1,889	1,924	1,945
YoY change	-3.9%	0.2%	1.9%	1.1%

Source: worldsteel, CRU, company reports, BofA Global Research estimates

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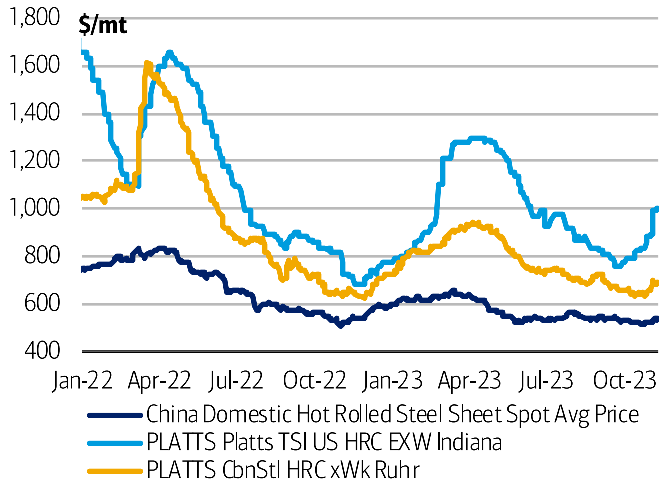
US HRC prices have outperformed, EU and China still challenged

Global steel prices have come down sharply since 2Q23, particularly in Europe and the US, on the back of the energy crisis and tighter monetary policy hitting sectors sensitive to rates (Exhibit 49). Meanwhile hot-rolled coil (HRC) quotations in the **US** started rallying again from late September, thanks to supply discipline from the mills and resilient demand from the automotive industry, despite recent strikes and ultimately higher lead times. In contrast, **EU** HRC prices are still trading at a discount to the US, as European demand remains weak on a challenging macroeconomic backdrop. Steel prices in **China** also trade at a discount to Western markets: while China's steel production has been rising by +1.8% YoY YTD, exports have continued to hover at record highs, indicating weak domestic demand.

Exhibit 49: Global steel prices

Steel prices have declined since 2Q23, yet US HRC prices have been rallying on supply discipline and demand holding up



Source: Bloomberg, BofA Global Research

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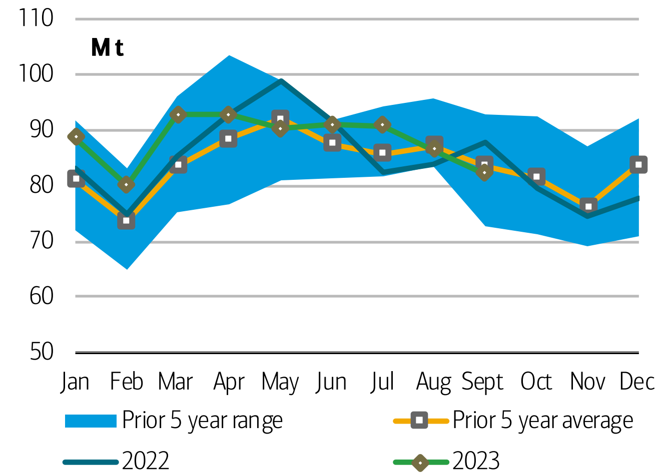
Exhibit 50: China crude steel production

Chinese crude steel production is up YTD, yet domestic demand has remained weak, pushing exports up



Source: Bloomberg, BofA Global Research

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China: steel production to decline

Matty Zhao >>
Research Analyst
Merrill Lynch (Hong Kong)
+852 3508 4001
matty.zhao@bofa.com

Edward Leung, CFA >>
Research Analyst
Merrill Lynch (Hong Kong)
+852 3508 3282
edward.leung@bofa.com

Miriam Chan, CFA >>
Research Analyst
Merrill Lynch (Hong Kong)
+852 3508 7478
miriam.chan@bofa.com

We expect Chinese crude steel production to drop by 0.6% YoY in 2024

9M23 Chinese steel production was up by +2% yoy (+14mnt), with net exports +44% (+19mnt), while domestic consumption was down -1% (-5mnt) and inventories flattish. Property, which accounts for around 30% of steel demand, has been the biggest concern in FY23 – although property new starts dropped over 20% YTD, we believe steel demand probably declined by slightly less, as other construction activity has been an offset. Consequently, we forecast a -10% decline in property-related steel demand in FY23. Meanwhile, we see most other areas of demand holding up in FY23, offsetting the property-induced drop, including infrastructure +4% yoy, auto +4% yoy, and shipbuilding +6% yoy.

In FY23, we forecast China crude steel production +0.5% yoy to 1,018mnt, net exports +44% yoy at 82mnt and domestic demand -2% yoy at 885mnt. This implies a -4% yoy decline in production for the remainder of FY23. Looking ahead, we forecast FY24 production to drop -0.6% yoy to 1,011mnt, net exports to keep rising to 90mnt and domestic demand to fall -1.6% yoy to 871mnt. We see property demand remaining weak, dropping by -9% yoy, and machinery declining by -2% yoy. Meanwhile, infrastructure should continue to be the backbone of China's economy, +5% yoy, along with shipbuilding +3% and auto +1%.

With no policy-driven production cut implemented for 4Q23, the current margin has continued to trend down QoQ. Steel mills have been adjusting their mix to more profitable products so they can keep producing. We raise FY24 steel prices, along with raw material prices, forecasting China steel prices +8-10% yoy to RMB4300-4400/t, the iron ore price at US125/t and coking coal price at Rmb2000/t. We forecast a thin margin of RMB100-200/t in FY24 vs the loss-making situation in FY23.

Exhibit 51: China steel supply and demand

We forecast FY24 production to drop by 0.6% yoy and property demand to fall by another 9% yoy

	2020	2021	2022	2023E	2024E	2025E
China crude steel production - NBS reported	1065	1035	1013	1018	1011	1005
% YoY growth	*7.0%*	*-2.8%*	*-2.1%*	*0.5%*	*-0.6%*	*-0.7%*
Per capita output of steel kg/capita	755	734	718	722	717	712
China finished steel production	1001	983	962	967	961	954
Imports	20	14	11	8	8	8
Exports	-54	-67	-68	-90	-98	-85
Net exports	-33	-53	-57	-82	-90	-77
% YoY growth	*-35.7%*	*57.3%*	*8.2%*	*44.1%*	*9.8%*	*-14.4%*
China net finished steel production	967	931	905	885	871	877
Inventory change	1	-1	0	0	0	0
China demand for finished steel from crude	966	932	905	885	871	877
% YoY growth	*10.7%*	*-3.6%*	*-2.8%*	*-2.2%*	*-1.6%*	*0.7%*
Per capita consumption of finished steel	685	661	642	628	618	622
Demand by segment	2020	2021	2022	2023E	2024E	2025E
Property	357	330	282	253	231	235
% YoY	4.8%	-7.4%	-14.6%	-10.1%	-8.7%	1.6%
Infrastructure	194	201	209	218	228	233
% YoY	10.6%	3.3%	4.2%	4.1%	4.6%	2.1%
Machinery	185	189	181	170	167	163
% YoY	7.9%	1.9%	-4.2%	-6.1%	-2.0%	-2.0%
Auto	39	39	38	40	41	41
% YoY	4.1%	2.2%	-2.6%	4.2%	1.2%	1.7%
Appliance	11	11	11	11	11	11
% YoY	2.4%	3.6%	-2.6%	-1.0%	1.0%	0.9%
Shipbuilding	19	18	21	22	23	24
% YoY	-3.2%	-0.9%	13.2%	6.3%	3.2%	2.4%
Other (incl energy, pipes)	161	142	162	170	170	170
% YoY	37.6%	-11.9%	14.3%	5.0%	0.0%	0.0%
Total demand	966	932	905	885	871	877
Total demand % YoY	10.7%	-3.6%	-2.8%	-2.2%	-1.6%	0.7%

Source: Mysteel, NBS, BofA Global Research estimates

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US: rally, despite recession concerns

Lawson Winder, CFA >>
Research Analyst
Merrill Lynch (Canada)
+1 416 369 7592
lawson.winder@bofa.com

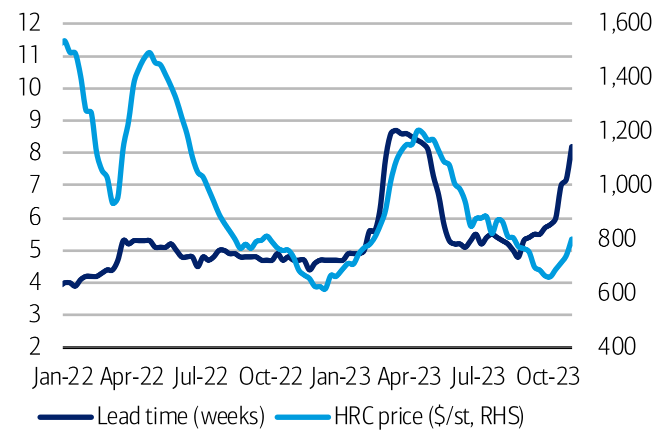
Sathish Kasinathan
Research Analyst
BofAS
+1 646 855 2769
sathish.kasinathan@bofa.com

US HRC: stronger near-term rebound

The US hot-rolled coil (HRC) price has rebounded from a low of $650/short ton (st) in late-September/early-October, with some mills now targeting a minimum base price of $1,000/st. We see potential for the HRC price to continue trending higher and to move above $1,000/st in Q1'24. This is due to 1) a sharper supply-side response (Granite City Blast Furnace B idling + maintenance outages) as evident from the strong rebound in lead times (see Exhibit 52), 2) improved automotive demand (following the resolution of the United Auto Workers' strike), 3) some restocking given low inventory levels at Service Centers, 4) limited import arrivals (given reduced arbitrage in recent months), 5) a Q1 seasonal pickup in demand, and 6) an anticipated increase in scrap costs.

Exhibit 52: US HRC lead times vs price

HRC lead times declined from ~9 weeks in March 2023 to below 5 weeks by late-August, though lead times have since rebounded to >8 weeks



Source: Platts, CRU, BofA Global Research

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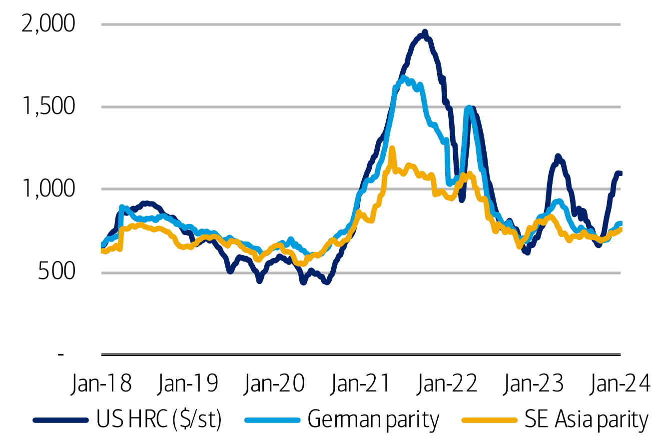
Exhibit 53: U.S. HRC vs regional import parity price

Import arbitrage was negative in Sept-Oct 2023, but has since turned positive



Source: Platts, CRU, BofA Global Research

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Having said that, we expect the price rally to eventually lose steam as supply tightness eases. Higher prices should incentivize domestic mills to ramp up production. At the same time, import arrivals could see some uptick given widening arbitrage (see Exhibit 53). Lastly, the 3 million (m) ton per year Big River Steel 2 project is expected to come online in H2'24, with the company (US Steel) guiding for 0.75-0.9m st in incremental production, equivalent to about 3% of US flat-rolled sheet production. We therefore expect HRC pricing to correct after peaking in late Q1'24, and to average $870/st (up 11% from prior forecast) for the full year.

Upside risks include supply discipline (from further industry consolidation), production disruptions/a slower ramp-up post outages, a continued delay in the restart of the AHMSA mill in Mexico, stronger-than-expected underlying demand/restocking and improvement in foreign steel pricing. Downside risks include weaker-than-expected demand (especially continued delays in funding for infrastructure projects) and a surge in imports.

Exhibit 54: Updated US hot-rolled coil (HRC) price forecasts

Lifting near-term price forecasts; on average 2023/24/25 forecasts up 2%/11%/4%

Product	Unit	2020	2021	2022	Q1'23A	Q2'23A	Q3'23A	Q4'23E	2023E	Q1'24E	Q2'24E	Q3'24E	Q4'24E	2024E	2025E
US Hot Rolled Coil	USD/Short Ton	577	1,580	1,018	859	1,063	790	826	885	1,025	925	800	730	870	725
Change vs prior	%				0%	0%	0%	12%	2%	22%	13%	5%	1%	11%	4%

Source: BofA Global Research estimates, CRU

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US supply and demand forecasts

We forecast US apparent steel demand to decrease 4.8% YoY in 2023E (following a -7% YoY decline in year-to-date through October). Higher construction demand (underpinned by demand from spending related to the Infrastructure Investment and Jobs Act (IIJA), Inflation Reduction Act (IRA) and reshoring) and a continued recovery in automotive production should drive higher steel consumption in 2024E and 2025E.

Exhibit 55: US steel supply and demand model

US apparent steel demand is forecast to decrease 4.8% YoY in 2023E; higher construction and auto demand should drive a consumption rebound in '24E

(in m short tons)	2016	2017	2018	2019	2020	2021	2022	2023E	2024E	2025E
Crude steel production	87	90	95	97	80	95	89	89	92	97
% change	-0.5%	4.0%	6.1%	1.3%	-17.1%	18.0%	-6.1%	0.6%	3.5%	5.0%
Capacity	123	122	122	121	118	116	115	117	122	130
% change	-1.0%	-0.9%	0.4%	-0.7%	-2.9%	-1.1%	-1.6%	2.5%	3.9%	6.1%
Capacity utilization (AISI/BofAe) (%)	*70.5%*	*74.0%*	*78.2%*	*79.8%*	*68.1%*	*81.2%*	*77.5%*	*76.0%*	*75.7%*	*74.9%*
Imports (finished steel)	26	30	26	21	16	23	25	22	22	21
% change	-16.4%	12.2%	-13.1%	-18.1%	-23.3%	41.1%	11.0%	-14.8%	0.0%	-3.0%
Exports	9	10	9	7	7	8	8	9	10	10
% change	-6.4%	12.8%	-16.2%	-15.9%	-9.9%	23.5%	1.0%	11.3%	5.0%	5.0%
Net imports	17	19	17	14	10	15	17	12	12	11
% change	-20.9%	11.9%	-11.4%	-19.2%	-30.5%	53.2%	16.5%	-27.3%	-3.7%	-9.4%
Apparent steel use	104	109	112	110	91	108	106	101	104	107
% change	-4.4%	4.4%	2.5%	-1.0%	-17.4%	18.0%	-1.5%	-4.8%	2.8%	3.4%
Import market share (%)	*25%*	*27%*	*23%*	*19%*	*18%*	*21%*	*24%*	*21%*	*21%*	*19%*
BofA US HRC ($/short ton)	521	616	830	601	577	1,580	1,018	885	850	725

Source: BofA Global Research estimates, AISI, US Census Bureau, CRU

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EU: demand remains weak, rebound in 2024

Patrick Mann, CFA >>
Research Analyst
MLI (UK)
+44 20 7995 8960
patrick.mann@bofa.com

The industry struggled to recover this year, but outlook should improve in 2024

European steel spreads (prices less raw materials) have come under significant pressure, recently falling to its lowest point since the third quarter of 2020 (when demand was heavily impacted by Covid-related stoppages and economic uncertainty). While steel prices have declined to EUR 605/t, this is well above the c. EUR 435/t in 3Q20. The increase in the price of raw materials - specifically coking coal – has been pressuring spreads. The inability of the steel producers to pass on higher raw material costs in steel prices is indicative of a weak market and weak demand, in our view. Hence, EU steel production continued to decline and is on track to end the year at 129Mt, a record low.

Exhibit 56: Europe steel supply and demand

We expect steel production and demand to rebound in 2024

	2016A	2017A	2018A	2019A	2020A	2021A	2022A	2023E	2024E	2025E
Crude steel making capacity	287	284	285	285	285	282	285	286	287	289
EU - 28	230	227	228	228	228	225	225	225	225	225
Other Europe	57	57	57	57	57	57	60	61	62	64
Crude steel production	198	204	199	186	178	205	181	163	186	195
% YoY	*-1.0%*	*2.8%*	*-2.0%*	*-6.8%*	*-4.2%*	*15.1%*	*-11.5%*	*-10.0%*	*13.9%*	*4.6%*
EU - 28	162	163	159	149	139	160	143	129	148	154
% YoY	*-2.3%*	*0.5%*	*-2.6%*	*-6.3%*	*-6.3%*	*14.9%*	*-10.7%*	*-10.0%*	*15.0%*	*4.5%*
Other Europe	36	41	41	37	39	45	39	35	38	40
	5.7%	13.1%	0.5%	-8.5%	4.0%	16.0%	0.0%	-10.0%	10.0%	5.0%
Crude steel utilisation rate	69%	72%	70%	65%	62%	73%	64%	57%	65%	67%
EU	70%	72%	70%	65%	61%	71%	63%	57%	66%	69%
Net imports (EU 27)	4	3	9	5	3	11	15	15	15	15
Plus: imports	26	26	29	25	22	29	31	31	31	31
Less: exports	22	23	21	20	19	18	16	16	16	16
Apparent consumption	202	207	208	191	181	216	197	179	202	210
% YoY	*0.9%*	*2.5%*	*0.7%*	*-8.3%*	*-5.3%*	*19.3%*	*-8.7%*	*-9.2%*	*12.7%*	*4.2%*

Source: Eurofer, CRU, BofA Global Research estimates

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Nonetheless, we expect a strong rebound in the next two years and see output in the region recovering by 15% to 148Mt in 2024 and 4.5% to 154Mt in 2025. Demand should also pick up, as most of this year's headwinds ease, especially high inflation and tight economic conditions.

Iron ore: Inventories at record lows

Danica Averion
Commodity Strategist
MLI (UK)
+44 20 7996 2325
danica_ana.averion@bofa.com

Michael Widmer
Commodity Strategist
MLI (UK)
+44 20 7996 0694
michael.widmer@bofa.com

Overview

Against perennial expectations of persistent iron ore surpluses, fundamentals have again supported prices well above the cost curve. With iron ore inventories at China's mills low and the economy stabilising, steel producers may ultimately come back to the market. If that is accompanied by the usual seasonal disruptions on the seaborne iron ore market, there is scope for prices to rally in 1Q24. Yet, we are concerned that rising supply will push iron ore back below $90/t by 2025.

Exhibit 57: Iron ore supply and demand balance
We expect rising surpluses in 2025

Wet Mt	2022	2023E	2024E	2025E	2026E
Global production	2,363	2,361	2,443	2,548	2,581
YoY change	2.2%	-0.1%	3.5%	4.3%	1.3%
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	15	72	174	195
Iron ore price (US$/t)	120	115	125	90	90

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

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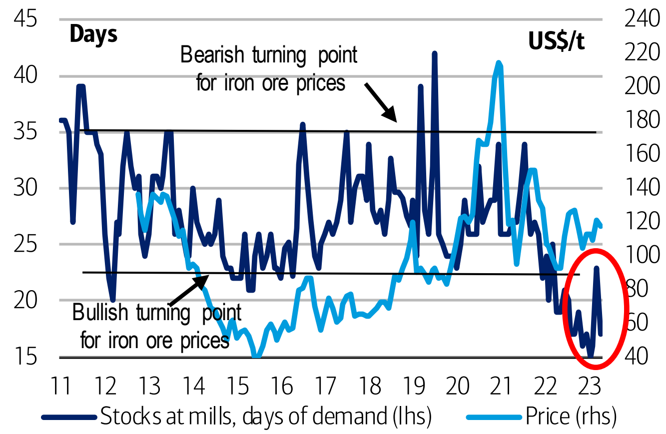
Brief restocking pushed iron ore prices above $120/t, yet stocks are still low

Iron ore rallied over the summer of 2023, hitting $126/t in September. This rebound was driven by restocking at China's steel mills, after inventories had fallen to record lows in August, to just below 9Mt or 15 days of demand (as we argued in Global Metals Weekly: Steel bends iron ore fortunes at will). The increase in inventories, alongside very high capacity utilisation rates at iron ore-consuming blast furnaces versus scrap-using electric furnaces, also fed through to rising iron ore imports. That said, iron ore stocks at mills have dropped again of late. With port inventories also low (Exhibit 59), this implies a relatively tight iron ore market.

Exhibit 58: Iron ore prices and inventories at Chinese steel mills
Mills started restocking in September, driving iron ore prices to $126/t from just above $100/t in August



Source: Bloomberg, Mysteel, BofA Global Research

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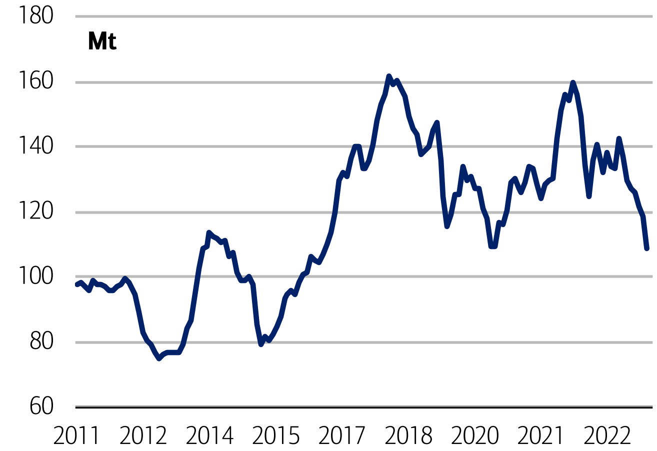
Exhibit 59: Iron ore inventories at Chinese ports
Iron ore stocks at ports have fallen close to 2020 levels



Source: Bloomberg, BofA Global Research

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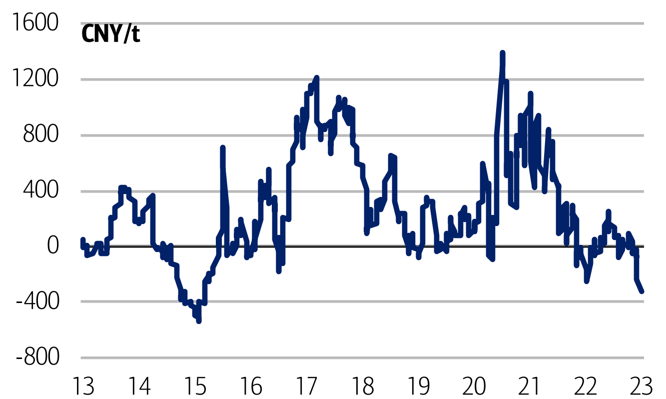
Steel mills are slowing production as margins remain negative

Why are China's steel mills running on empty? Profitability is an issue (Exhibit 60) as domestic steel prices have struggled to increase in 2023. Encouragingly, operators started to cut production in September, with total crude steel output falling by 6.3% YoY, a visible deviation from the 1.8% YoY YTD increase.

Exhibit 60: China, margins at steel mills (BOF)
Margins at steel mills have turned negative on subdued domestic steel prices



Source: Bloomberg, BofA Global Research

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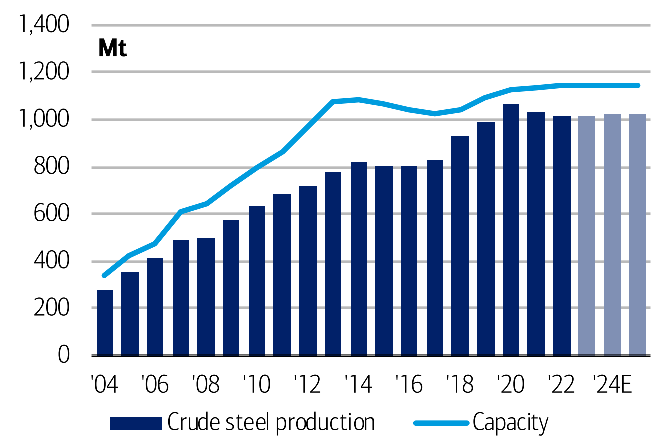
Exhibit 61: China crude steel production
Chinese steel output growth is set to slow in the coming years



Source: Mysteel, NBS, BofA Global Research estimates

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Production cuts and a potential stabilisation of housing starts, which have been slow to come through, should ultimately help support margins at mills. In turn, this should raise iron ore purchases and keep prices supported.

Can the green transition counteract the property slowdown in China?

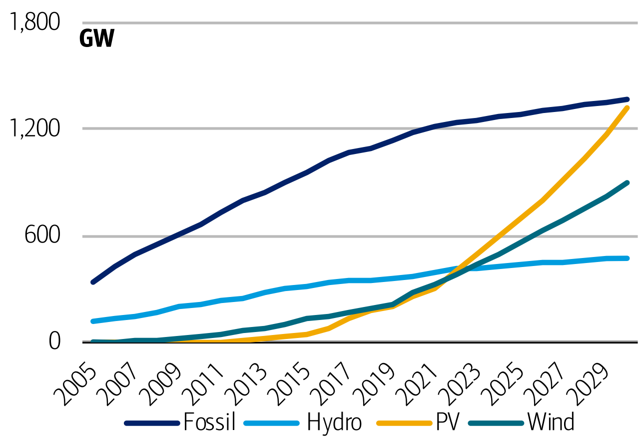
China is the world's largest steel producer, churning out around 1Bt of steel per year (Exhibit 61) of the 1.9Bt produced globally, and its property sector has historically been a key demand driver. Rising urbanisation rates have contributed to rapid growth of the steel industry, with steel intensities reaching 705kg/capita in 2020, the highest globally, although this fell slightly to 651kg/capita in 2022. Yet with the property sector set to contract structurally, there are concerns over whether China can maintain steel production at +1BNt. In turn, these concerns are feeding through to iron ore demand.

Slowing urban population growth in China helps explain the slowing momentum in China's steel industry. Our China Property team expects housing demand to continue falling out to 2030 at a 3% CAGR, and more rapidly thereafter, at a 5.4% CAGR out to 2035. Will China's steel industry contract at the same pace? Not necessarily, in our view. Again, this has implications for iron ore market balances.

Steel production in China has risen by 1.8% YTD, despite property new starts declining for 30 consecutive months and falling by 23% YoY YTD. Granted, some of those excess steel units were shipped abroad, with exports hitting multi-year highs. While the Chinese government is looking to stabilise the real estate market, if not necessarily turn it around outright, grid spending has also become a focus. In the past two years in particular, investment by the grid in generation and transmission infrastructure has continued to gather pace, decoupling from traditional sectors like real estate. We expect this trend to continue.

While the world's second-largest economy is still heavily reliant on coal, its energy mix is changing. Solar PV capacity in China is on track to reach 1,300GW by the end of the decade. This, coupled with 900 GW for wind, would imply that renewables will have a bigger market share than fossil fuels. When it comes to steel, the green energy built out could add 15Mt on average annually to domestic steel demand. Adding the extra demand from the EV industry, this estimate would rise to 28Mt. While accounting for just 3% of total steel consumption at the moment, the incremental demand could help offset the drag from property going forward.

Exhibit 62: China, installed power capacity by source)
Solar and wind will have a bigger market share than fossil fuels in 2030



Source: IEA, BNEF, BofA Global Research estimates

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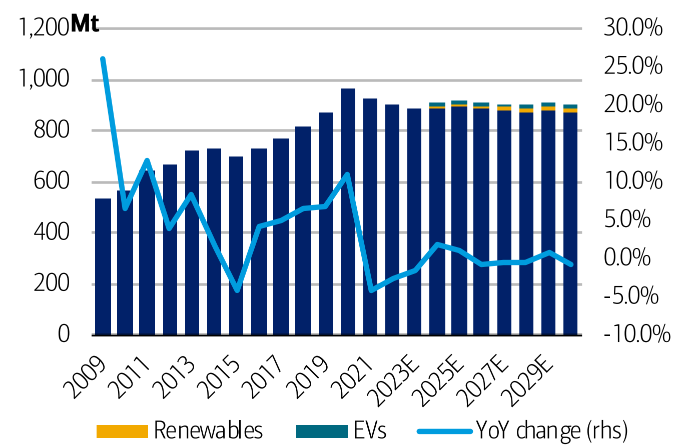
Exhibit 63: China steel demand
China's steel demand should stabilise



Source: BofA Global Research estimates

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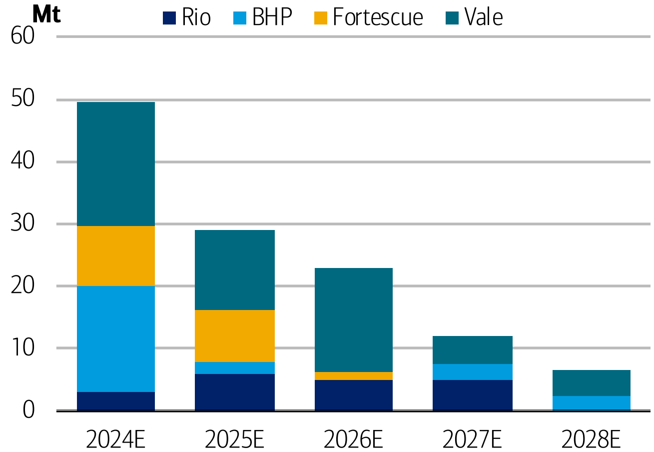
The market is well supplied out to 2030E

With demand likely holding up, we believe iron ore supply should keep growing, putting the iron ore market in a somewhat difficult position. Volumes from Australia and Brazil are set to increase steadily, with the four majors (Rio Tinto, Vale, BHP, FMG) on track to add about 120Mt of iron ore supply to the market in the next five years (Exhibit 64). Remarkably, production costs at the majors will remain low, implying a steep cost curve. All in, we see increasing surpluses ahead, averaging ~130Mt out to 2030. This means that iron ore will likely revert to being priced at marginal costs. To eliminate the surplus, we estimate that the floor for iron ore prices is around US$87/t. (Exhibit 65).

Exhibit 64: Changes in iron ore supply from majors, 100% basis (YoY)
We expect 120Mt of supply increases from the majors in the next five years



Source: company reports, BofA Global research estimates

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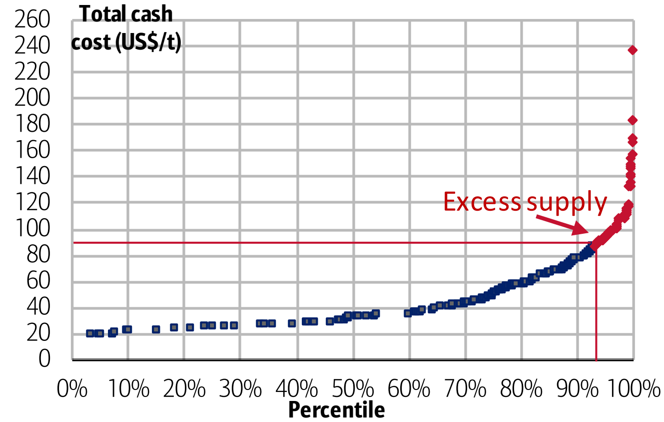
Exhibit 65: Iron ore cost curve
We estimate the floor for iron ore prices at around US$87/t



Source: Woodmac, BofA Global Research
Notes: Figures are FOB, i.e. exclude freight costs

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Base metals

Michael Widmer
MLI (UK)
+44 20 7996 0694
michael.widmer@bofa.com

Danica Averion
MLI (UK)
+44 20 7996 2325
danica_ana.averion@bofa.com

Aluminium: prices rise on weak supply growth

Overview

While aluminium has fallen as China's re-opening trade has faded, prices have been supported at around $2,200/t ($1/lb), partially on costs. China's smelters briefly operated at full capacity this year, but the domestic market has been able to absorb all those units (partially on green spending), on top of 1Mt of Russian aluminium imports. While demand will likely remain soft ex-China near-term, lack of supply growth should keep the aluminium market tight. Meanwhile, an acceleration of global growth into 2H24 is set to push prices higher again.

Exhibit 66: Aluminium supply and demand balance
The aluminum market should remain tight

'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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Restrained global aluminium production growth

The latest run of global aluminium production shows that smelters ex-China have had little appetite for boosting production, with supply increasing by just 0.5% YoY YTD (January to September). Meanwhile, operators in China raised output by 4.1% YoY in September, partially because 2.3Mt of capacity was restarted at smelters in Yunnan province. Yet, continued issues around hydro power supplies have prompted operators in the region to again shutter around 1.2Mt of capacity since and those potlines are unlikely to restart until mid-2024.

Exhibit 67: Global aluminium production
Aluminium production is up 1.8% YoY YTD; China is now operating close to its capacity cap of 45Mt

	YTD 2023	YTD 2022	YoY change	Annualised Sep-23	Annualised Sep-22	YoY change	Annualised Aug-23	MoM change	YTD 2023 Annualised	2023 S/D model	Model v YTD Delta
Africa	1,192	1,215	-1.9%	1,618	1,643	-1.5%	1,590	1.8%	1,589	1,646	56
North America	2,892	2,801	3.2%	3,918	3,662	7.0%	3,909	0.2%	3,856	4,058	202
Latin America	1,090	928	17.5%	1,509	1,399	7.8%	1,472	2.5%	1,453	1,689	236
Asia	3,493	3,426	2.0%	4,696	4,623	1.6%	4,686	0.2%	4,657	5,930	1,273
West Europe	2,028	2,221	-8.7%	2,713	2,884	-5.9%	2,708	0.2%	2,704	3,130	426
E.Europe	2,995	3,061	-2.2%	3,979	4,039	-1.5%	3,980	-0.0%	3,993	4,049	56
Oceania	1,403	1,368	2.6%	1,886	1,837	2.6%	1,884	0.1%	1,871	1,958	87
Middle East	4,573	4,542	0.7%	6,083	6,096	-0.2%	6,087	-0.1%	6,097	6,710	613
Other non-IAI nations	1,836	1,836	0.0%	2,446	2,446	0.0%	2,461	-0.6%	2,448	0	-2,448
IAI ex-China	21,502	21,398	0.5%	28,847	28,628	0.8%	28,776	0.2%	28,669	29,170	500
China	30,924	30,098	2.7%	42,583	40,917	4.1%	42,470	0.3%	41,232	40,601	-631
IAI Total	**52,426**	**51,496**	**1.8%**	**71,431**	**69,545**	**2.7%**	**71,246**	**0.3%**	**69,901**	**69,770**	**-131**

Source: IAI, BofA Global Research

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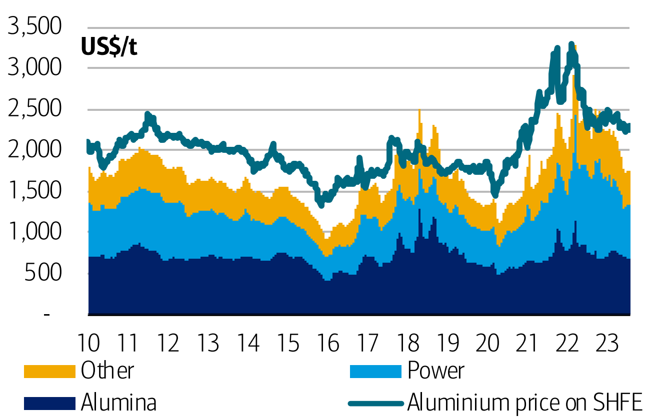
China's smelters don't take advantage of margins

The lack of production increases YTD is worth noting when we keep in mind that profit margins at an "average" Chinese smelter purchasing spot coal and alumina are positive, as our real-time cost estimator highlights (Exhibit 3). This is somewhat unusual because operators would not have left money on the table in the past; i.e. profits usually lead to output increases. In our view, this shows that China's 45Mt capacity cap still holds.

Exhibit 68: China, cash cost estimator on spot coal and alumina
Profit margins of an "average" smelter in China are positive



Source: Bloomberg, BofA Global Research

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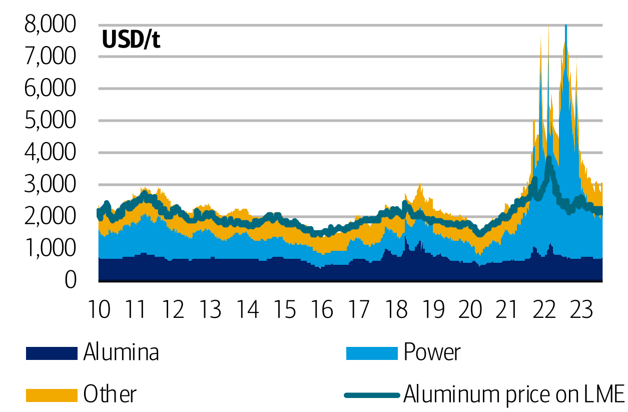
Exhibit 69: Europe, cash cost estimator on spot electricity and alumina
Headwinds for European smelters have subsided somewhat



Source: Bloomberg, BofA Global Research

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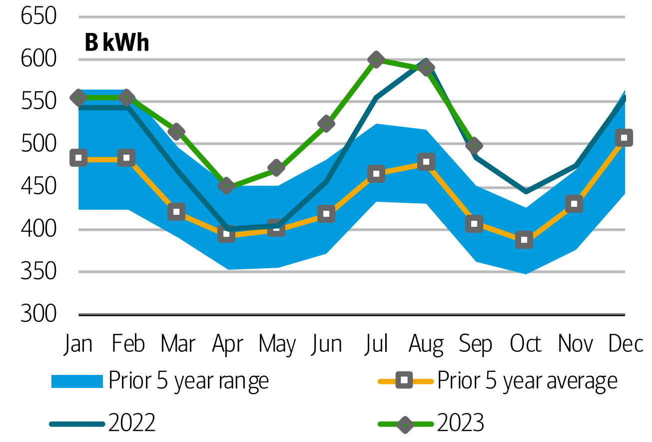
Meanwhile, if production costs at smelters in Europe are valued at spot power prices, operators in the region are still hurting. While the immediacy of the energy crisis has subsided, it has not been resolved. Hence, the incentive to restart production is very low. In fact, we see a risk that more smelters will be closed in the region. Similarly, there is continued discussion as to whether capacity will be shut at US smelters.

China's hydro power backdrop remains challenging

Operators in Yunnan province had idled around 2Mt of capacity over electricity shortages, as hydro power generation ran at multi-year lows earlier this year. Smelters in the region reactivated facilities over the summer, but those tonnages did not lead to weaker fundamentals on the physical market. Since then, and highlighting continued issues with power supplies, operators have announced that around 1.2Mt of capacity will be closed again, units that the domestic market will likely miss.

Exhibit 70: China, thermal power generation
Thermal power generation has been elevated



Source: Bloomberg, BofA Global Research

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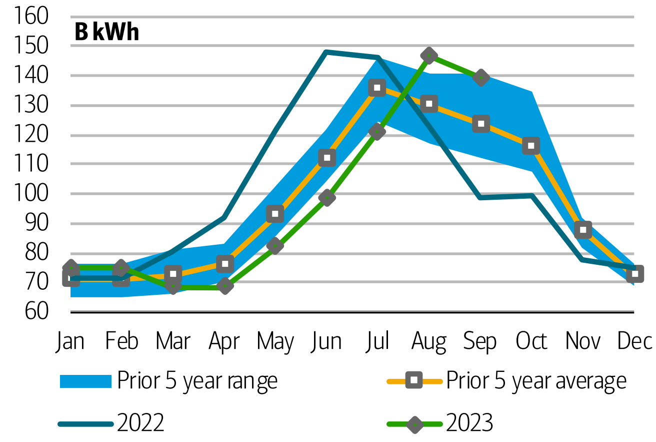
Exhibit 71: China, hydro power generation
Hydro power generation has been running at multi-year lows



Source: Bloomberg, BofA Global Research

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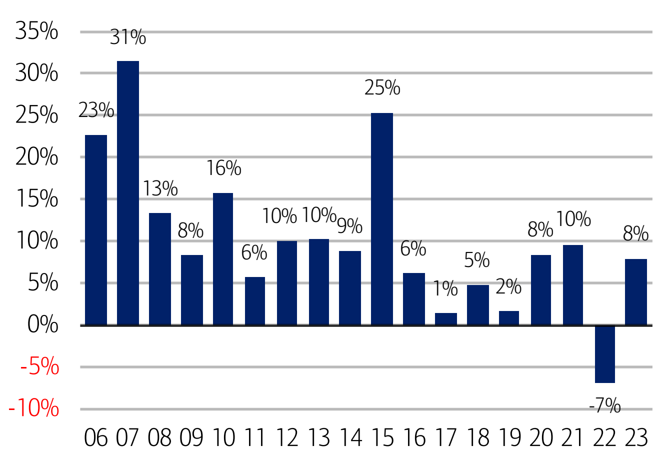
China's demand holds up, exports contained

Indeed, switching to demand, Exhibit 72 shows that China's apparent consumption of aluminium has been holding up, expanding by 8% YoY YTD, with purchased tonnages consistently above last year's levels, except in April, when concerns over the health of China's economy escalated. The dynamic behind that has also been reflected in comments from Chalco management, which outlined that despite the shrinking property market, a lifting of housing restrictions, along with rising investment in other sectors like solar/new energy vehicles/infrastructure projects, should be supportive to aluminium consumption.

Exhibit 72: China, apparent aluminium demand
Aluminium consumption has risen by 8% YoY



Source: Bloomberg, CRU, BofA Global Research

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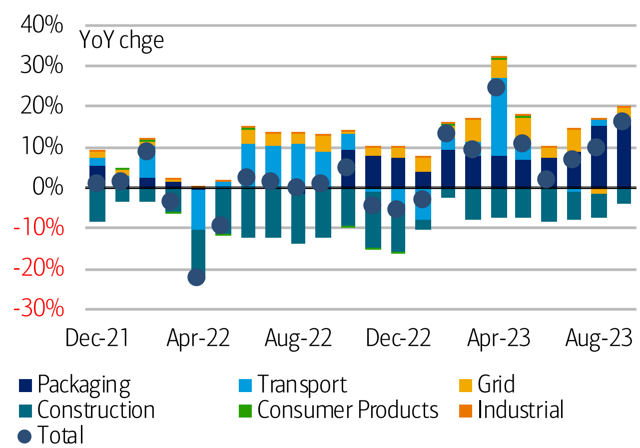
Exhibit 73: China, breakdown of aluminium demand growth
Demand growth has been patchy



Source: Bloomberg, BofA Global Research

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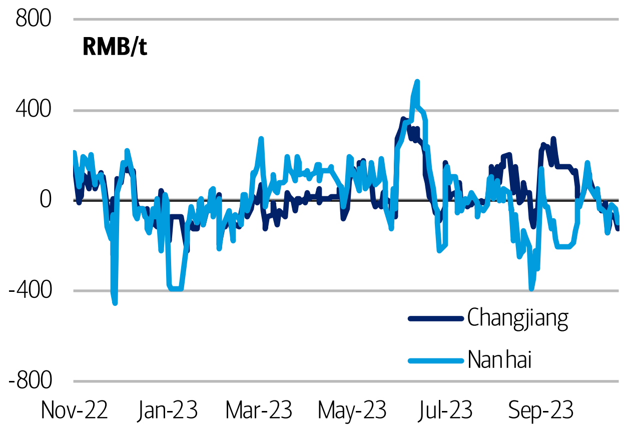
Exhibit 74 shows the implications: steady demand growth, alongside production discipline, has contributed to keeping physical premia supported. Meanwhile, Exhibit 75 outlines that SHFE aluminium prices have been trading above those on the London Metals Exchange in recent months. The implications? If China's government manages to reboot the economy in 2024, the domestic market may be able to absorb some of the additional aluminium units once smelters in Yunnan re-start again, and potentially also the Rusal tonnages.

Exhibit 74: China, physical premia
The physical market has been well supported



Source: Bloomberg, BofA Global Research

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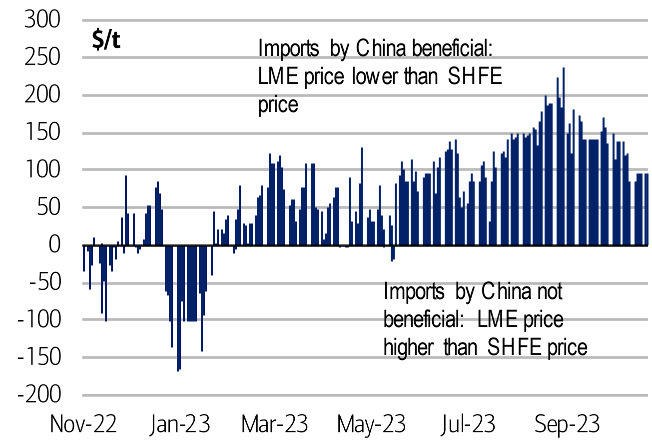
Exhibit 75: Price differentials, Shanghai Futures Exchange and London Metal Exchange
Aluminium has been trading at a premium in Shanghai for most of 2023



Source: Bloomberg, BofA Global Research

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Copper: diminishing supply overhang

Overview

As the global economy has slowed through 2023, copper has been supported by China's investment in the grid and rising car production, although mine supply disruptions have also contributed to the resilience in prices. While green spending in China may slow, the housing market should become less of a drag. This, along with a rebound of demand ex-China and a gradual emptying of the mine project pipeline, should reduce the supply overhang, with copper likely posting the first full-year deficit in 2025.

Exhibit 76: Copper supply and demand balance
Copper moving back into small, temporary surplus

'000 tonnes	2022	2023	2024	2025	2026
Global production	24,646	25,983	27,195	27,659	28,374
YoY change	2.2%	5.4%	4.7%	1.7%	2.6%
Global consumption	25,152	25,694	27,052	28,134	29,260
YoY change	0.9%	2.2%	5.3%	4.0%	4.0%
Balance	**-506**	**289**	**143**	**-476**	**-886**
Market inventories	658	947	1,090	614	
Weeks of world demand	1.4	1.9	2.1	1.1	
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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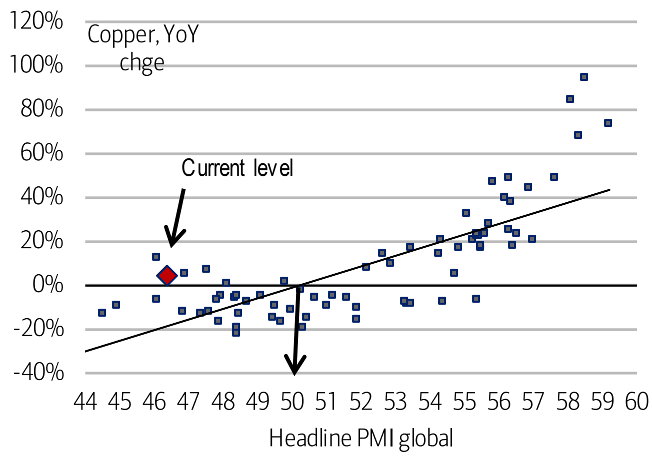
China's green spending generates around 5% of global demand growth

Copper prices have been resilient notwithstanding the global slowdown (Exhibit 77). This has been heavily influenced by investment in the grid and continued strong car production in China (Exhibit 78; see our Global Metals Weekly: Copper's beta to GDP growth is declining 08 August 2023).

Exhibit 77: Global (US, Europe, China) average PMIs and copper prices
Copper prices have been resilient



Source: Bloomberg, BofA Global Research

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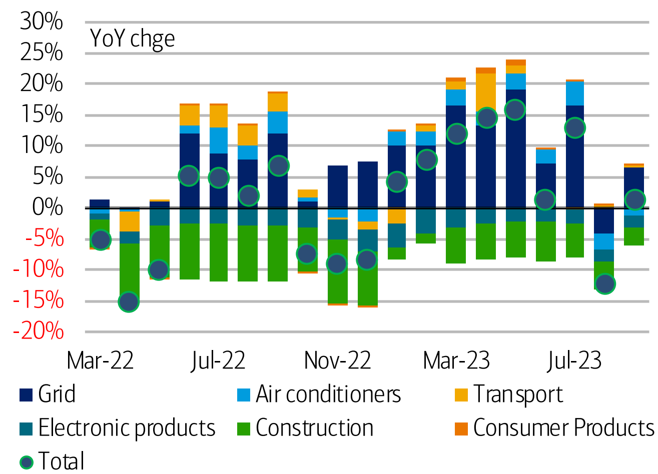
Exhibit 78: China, breakdown of copper demand

Green technologies have supported copper demand



Source: Bloomberg, BofA Global Research

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Supply issues persist

Most miners have reduced production guidance

At the same time, supply remains an issue, with Exhibit 79 and Exhibit 80 highlighting that only 1 of the 10 largest copper producers (this excludes Zijin) raised 2023 production guidance.

Exhibit 79: 2023 production guidance from the 10 largest miners
8 of the 10 largest miners have reduced 2023 production guidance

	4Q22	3Q23	Change
Codelco	1,385	1,320	-65
Freeport	1,951	1,814	-136
BHP	1,730	1,717	-13
Glencore	1,060	1,040	-20
Southern Copper	926	932	6
Anglo American	885	885	0
First Quantum	805	805	0
KGHM	607	607	0
Antofagasta	690	655	-35
Rio Tinto	680	615	-65
Teck	418	353	-65
Total	**11,136**	**10,743**	**-393**

Note: Freeport is sales guidance, BHP figures consolidate Escondida and is per fiscal year
Source: company reports, BofA Global Research

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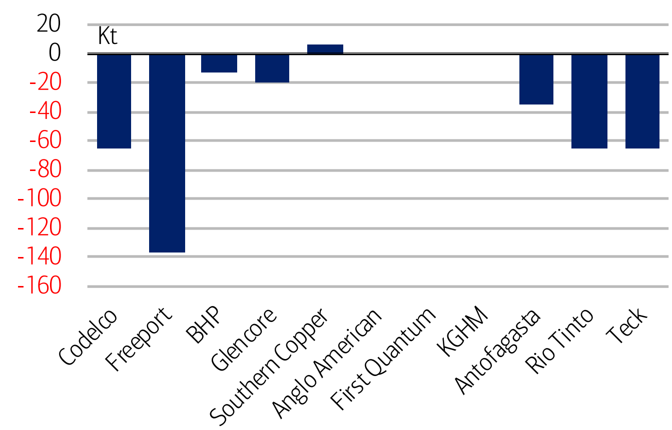
Exhibit 80: Change in 2023 production guidance
Zijin is the only miner to have visibly overdelivered relative to original guidance



Note: Freeport is sales guidance, BHP figures consolidate Escondida and is per fiscal year
Source: company reports, BofA Global Research

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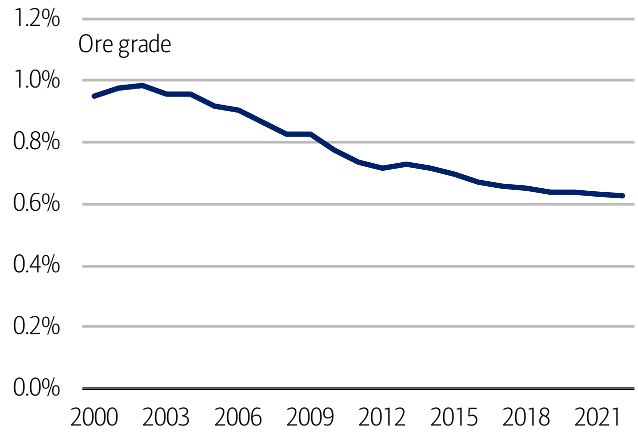
Operational challenges reflected in production costs

While many of the challenges at the miners relate to operational issues, these headwinds are nothing new. Indeed, the issues have been reflected in virtually every market metric.

Exhibit 81 highlights that ore grades have fallen steadily. Exhibit 82 takes the decline in ore grades a step further, showing that this has been an important factor behind rising production costs: in essence, lower ore grades means that more material needs to be moved to produce one tonne of copper and this is expensive.

Exhibit 81: Evolution of ore grades
Ore grades have declined over the past two decades



Source: Woodmac, BofA Global Research

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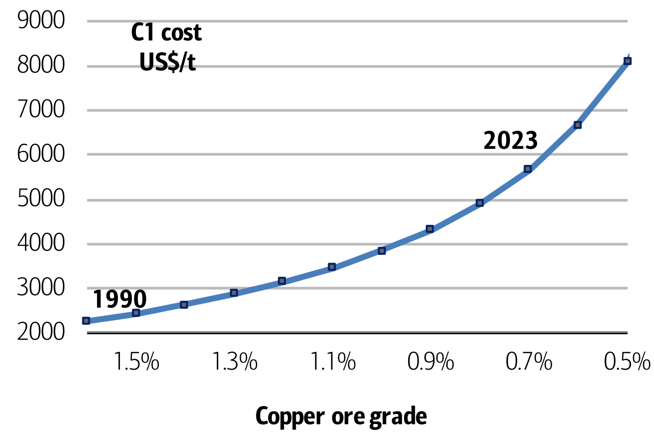
Exhibit 82: Ore grades and production costs
The reduction in ore grades has pushed up operating costs



Source: Woodmac, BofA Global Research

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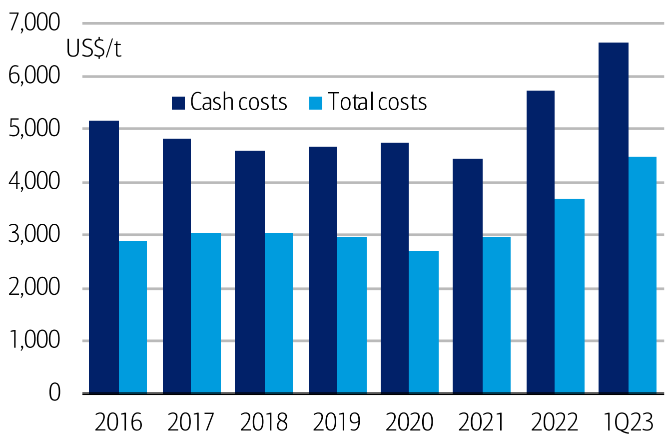
The cost inflation is also reflected in Exhibit 83, which highlights that copper production expenses have hit record highs. There is a silver lining: higher costs means that the floor under copper prices has shifted up. Taking the 75th-95th percentile of production costs as a reference, it would be hard for copper prices to fall below $5,500/t ($2.50/lb) at present. To put this into context, the lowest price during the Covid pandemic was $4,371/t ($1.98/lb).

Exhibit 83: Chile, copper production costs
Chile's total production costs now run at $6,600/t ($2.99/lb)



Source: Cochilco, BofA Global Research

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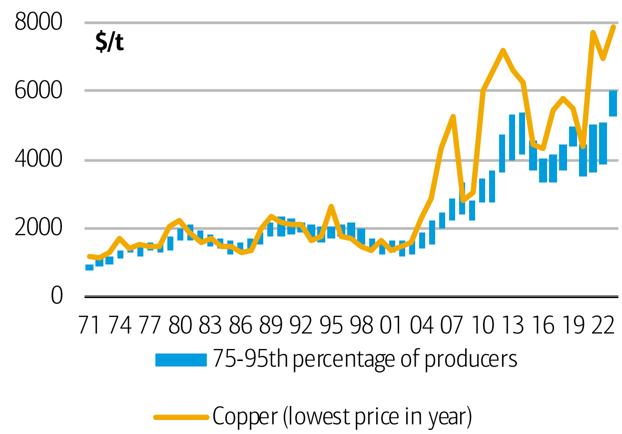
Exhibit 84: Production costs and copper prices
Production costs have supported copper prices



Source: Bloomberg, Woodmac, BofA Global Research

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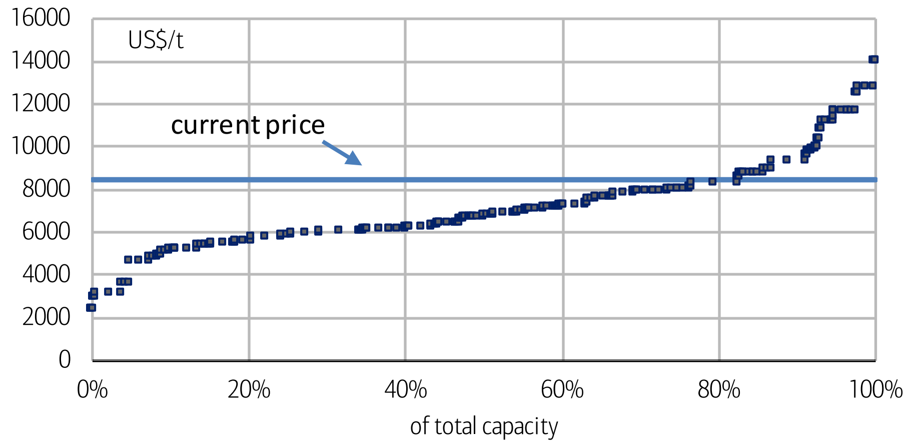
But cost inflation has not been an issue just for current operations. The following chart outlines that around 20% of all the projects currently in the pipeline would not break even.

Exhibit 85: Project incentive prices and copper prices
Current copper prices are too low for many projects, assuming 15% required return on capital



Source: Woodmac, BofA Global Research

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As for the lack of production growth, the reluctance to bring new mines to market has also been reflected in comments from Glencore, which recently fully acquired the 200Kt MARA copper project in Argentina. As the company outlines, MARA is a brownfield project, with very low capital intensity and a life of nearly 30 years. It will be a top 25 producer for the first 10 years of its life at production of at least 200,000 tonnes of copper. Looking into bringing the mine online, the company's CEO Gary Nagle outlined that the world is starting to recognize the impending shortage of copper over the next few years, and this will be one of the first projects that can feed into that demand. Yet he also noted that copper prices need to be higher before the project will be brought online. Keep in mind that operating costs during pre-feasibility studies were estimated at $3,000/t ($1.5/lb)!

Nickel: decent supply growth keeps prices capped

Overview

The nickel market is becoming increasingly complex. With different products catering for a variety of sectors, aggregate global balances lose relevance somewhat. That said, China's nickel market participants have boosted supply in Indonesia, also giving themselves the flexibility to switch between different products. This should keep the nickel market well supplied, likely capping prices for now.

Exhibit 86: Nickel supply and demand balance
More than enough nickel units are going around

'000 tonnes	2022	2023	2024	2025	2026
Global production	3,220	3,617	3,980	4,230	4,501
YoY change	16.2%	12.3%	10.0%	10.5%	10.2%
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	**114**	**283**	**431**	**288**	**274**
Market inventories	506	789	1,220	1,508	1,781
Weeks of world demand	8.5	12.3	17.9	19.9	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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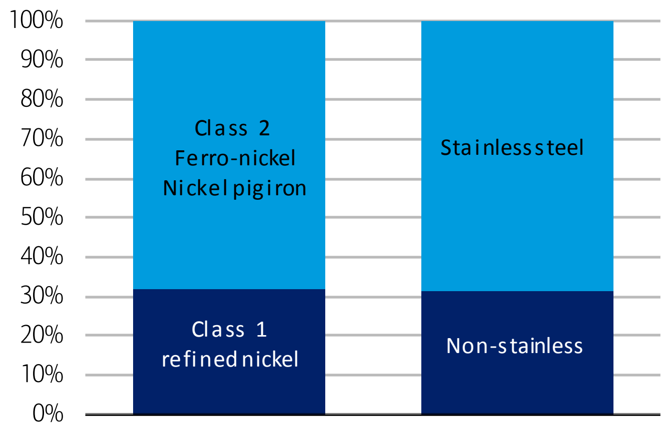
Nickel market is increasingly complex

Modelling the nickel market has always been a bit trickier than analysing the other base metals, largely because it's not just refined nickel that is traded, but also compounds and alloys. That said, there have historically been two key sectors for demand (stainless steel/non-stainless steel) and two key products (Class 2 non-refined ferronickel/nickel pig iron (NPI) and Class 1 LME-traded refined nickel). In the decade after 2001 when

China industrialised, many of the consuming sectors were relatively mature, i.e. they expanded at a steady and sometimes anaemic pace. That generally made it possible to take a view on nickel fundamentals with a market balance that aggregated all the different demand sources and production routes into a single line.

Exhibit 87: Traditional breakdown of nickel supply and demand
Stainless steel mills and non-stainless steel consumers split the market between themselves



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

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Exhibit 88: Nickel product breakdown and key consumers
Nickel sulphate is making an entry into the nickel market

Nickel supply	Nickel demand
Class 2 non refined nickel	
Ferronickel	Stainless steel mills, mostly ex-China
Nickel pig iron (NPI)	Stainless steel mills, China
Class 1 refined nickel	
Refined nickel	Stainless steel mills
	Non-stainless steel consumers, eg plating
Nickel sulphate	Battery industry

Source: BofA Global Research

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However, as batteries for electric vehicles and energy storage have become more popular, nickel demand has been super-charged and is now growing exponentially. Indeed, nickel sulphate, a chemical, is becoming increasingly important for the sector (Exhibit 88). This dynamic has had various side effects. Most notably, perhaps, the market has become increasingly disjointed, with market balances for nickel sulphate, refined nickel and ferronickel/NPI. These products have also been trading at varying discounts or premia (Exhibit 89 and Exhibit 90).

Exhibit 89: Physical market premium, Nangjiang Shanghai
Refined nickel premia have been elevated

Source Bloomberg, BofA Global Research

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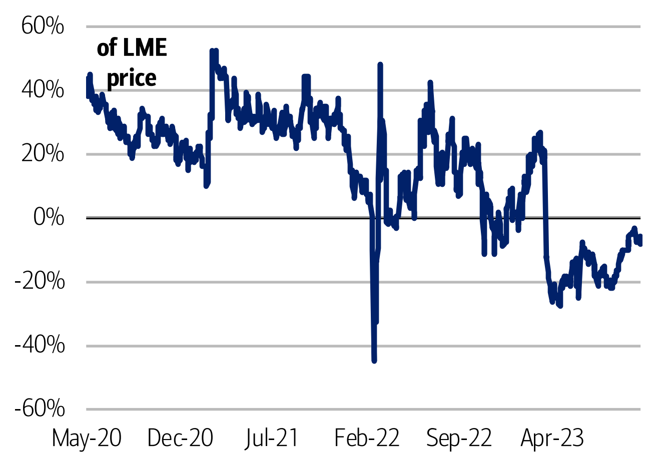
Exhibit 90: Nickel sulphate, of LME prices
Nickel sulphate has been trading at a discount to refined nickel



Source: Bloomberg, BofA Global Research

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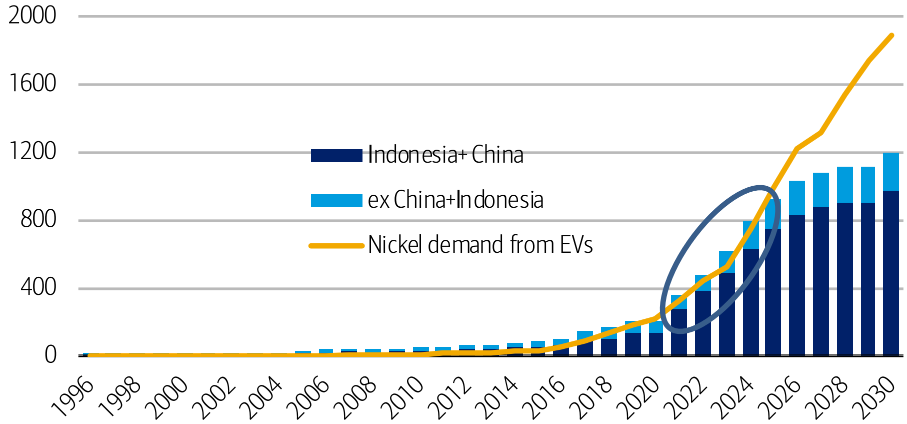
Production of nickel chemicals in China/Indonesia pushing higher

Matching supply with demand is no easy feat in a rapidly expanding market. Yet China's metals producers have been at the forefront of ensuring that nickel is not a constraint on EV manufacturing, predominantly by investing upstream in Indonesian mining and downstream into processing in China. The following chart picks up on this, showing that output increases in those two Asian countries alone would have been enough to feed global nickel demand from the auto industry (of course, nickel sulphate is also produced in other countries).

Exhibit 91: Supply of nickel chemicals versus nickel demand from EV batteries
Supply from China and Indonesia could cover total global nickel demand



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

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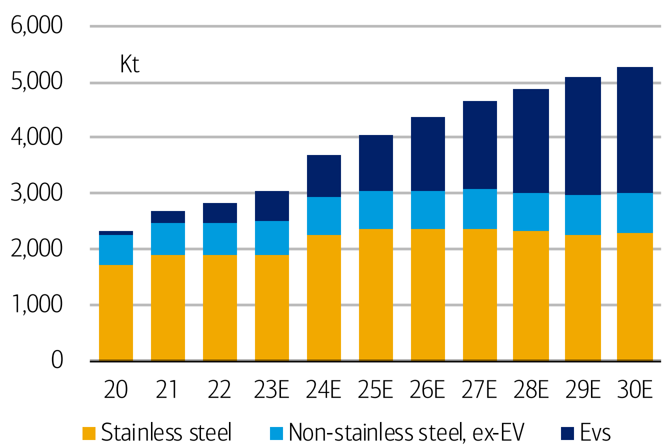
EVs to remain the marginal nickel demand drivers

Exhibit 92 takes this a step further, capturing the breakdown of nickel demand by sector, highlighting that offtake from traditional nickel users is set to remain relatively stable, while purchases from electric vehicle manufacturers are rising sharply. Meanwhile, Exhibit 93 looks at the supply side, outlining that chemicals output and recycled scrap from EVs are the marginal drivers, although nickel pig iron output is also increasing.

Exhibit 92: Nickel demand by major sector
Nickel demand growth is increasingly driven by EVs



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

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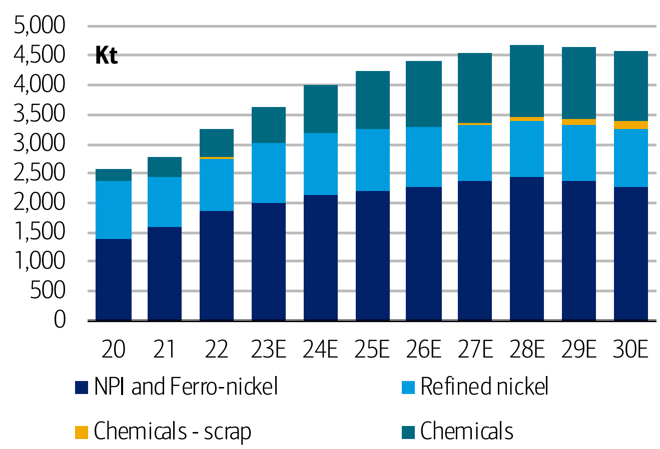
Exhibit 93: Nickel supply by product
Chemicals are making inroads into nickel supply



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

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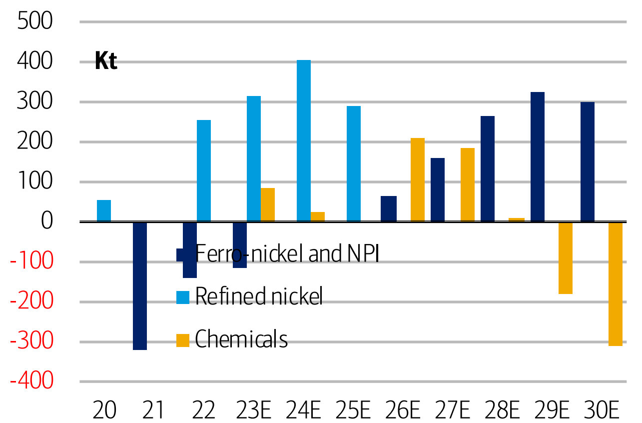
Chemicals balances deteriorate rapidly beyond 2026

Exhibit 94 squares off nickel demand with supply, confirming that the nickel market has been well supplied in recent years across all three products and we expect a market surplus also in 2024, likely keeping a lid on prices. Indeed, the projected surplus is so large that nickel should trade around marginal costs.

Further out, and acknowledging the exponential demand growth from chemicals, there is a risk that deficits will re-emerge, unless operators repeat what they have done in recent years, i.e. output needs to increase at breakneck speed. This analysis makes a range of assumptions, including:

- Nickel units are fungible, i.e tonnages can be converted between refined nickel, nickel sulphate and ferronickel/ NPI
- Any refined nickel surpluses are reallocated to chemicals first and then NPI/FeNi second, as long as those products are undersupplied

Exhibit 94: Nickel market balances by major product
Producers need to accelerate investment in chemicals



Source: This analysis makes a range of assumptions; for instance, we assume that any refined nickel surpluses are re-allocated to chemicals first and then NPI/ FeNi second, as long as those products are undersupplied.
Source: CRU, Woodmac, company reports, BofA Global Research

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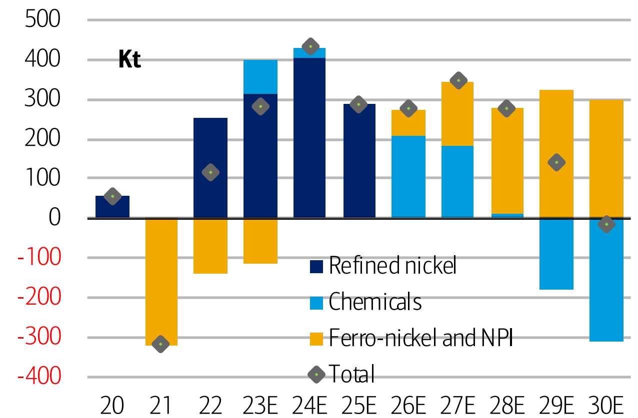
Exhibit 95: Aggregate nickel market balances
Unless more investment in chemicals comes through, the nickel market will switch into deficit



Source: This analysis makes a range of assumptions; for instance, we assume that any refined nickel surpluses are re-allocated to chemicals first and then NPI/ FeNi second, as long as those products are undersupplied.
Source: CRU, Woodmac, company reports, BofA Global Research

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2024 Oil & Gas outlook

Fundamentals are soft due to rising non-OPEC supply…

Having peaked at $95/bbl in September and rebounded again to almost $91/bbl in the second half of October, WTI crude oil prices have pulled back considerably since the Hamas-linked spike on a softening fundamental backdrop driven in part by rising US, Guyana, Brazil, and Canadian supplies and slower economic growth. However, even if prices are lower than what they were three months ago, the geopolitical backdrop has not improved and risks from (1) Russia to (2) the Middle East to (3) Venezuela and others could keep the oil market on edge over the course of 2024. Will OPEC+ cohesion increase in 2024 as other countries join Saudi to manage production? This is one of the vexing questions for oil. So far, internal disagreements and an abrupt Angolan exit have dominated the headlines, and the oil market is now waiting for actions, not words.

…but don't count OPEC+ production cuts out just yet

Should OPEC+ loadings start to decline on the back of commitments made in November, Brent will likely gain support and rally above $80/bbl, further boosted by geopolitics. But if loadings increase on a fracturing OPEC+, prices could be on a downward path below $70/bbl. With this backdrop, we opt to lower our 2024 Brent crude oil price forecast from $90 to $80/bbl, and reset our WTI forecast to $75/bbl. Still, China's energy imports may increase sharply if Brent drops below $65/bbl, likely setting a range for the year. Geopolitics may also alter oil prices on three fronts: (1) over 60 countries representing half the world's population, from India to the US, will go to the polls this year and energy prices matter; (2) risks keep rising at key energy choke points from the Persian Gulf to the Red Sea to the Panama Canal; and (3) conflict deaths have spiked sharply in 2022 and 2023 due to Ukraine and Gaza, and more turmoil could be on the horizon.

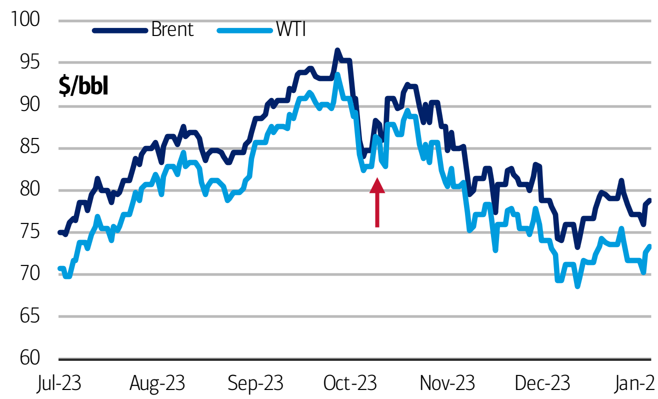
(Geo)political risks, low stocks are a dangerous cocktail

Even then, crude inventories are declining again and product stocks remain low, lending support to oil prices. Plus, speculative length in oil is light. OECD strategic stocks also have yet to rebuild, leaving oil vulnerable to upside price swings. Importantly, long dated Brent crude oil prices remain well anchored in the middle of our $60-80/bbl band, suggesting that for prices to drop below the $70/bbl mid-cycle point, inventories would have to build meaningfully throughout this year. This is unlikely given (1) OPEC's plans to reduce production, (2) the rising chance of an economic soft landing, and (3) the (geo)political risks involved. With OPEC+ managing the downside created by a soft fundamental backdrop and red hot (geo)politics in 2024, we view selling rich out-of-the money put spreads to buy out-of-the money calls as an attractive risk-reward proposition in what we see as a rangebound market loaded with unknown unknowns

WTI has pulled back from its October 7 levels…

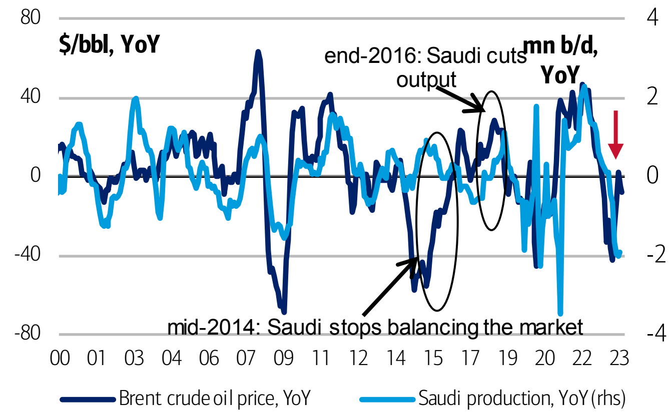
Having peaked at $95/bbl in September and rebounded again to almost $91/bbl in the second half of October, WTI crude oil prices have pulled back considerably since the Hamas-linked spike (Exhibit 96) on a weakening fundamental backdrop. Despite continued efforts by Saudi Arabia to keep removing crude volumes from an oversupplied market (Exhibit 97), growing US output and a slowing global demand picture in 2024 have nudged oil prices lower. Yet, after a brief drop below $70/bbl in early December and again in early January (see Energy held by a thread of diesel), crude oil prices have bounced from the lows on rising geopolitical fears.

Exhibit 96: Daily Brent and WTI prices
WTI crude oil prices have pulled back considerably since the October 7 Hamas-linked spike...



Source: Bloomberg
BofA GLOBAL RESEARCH

Exhibit 97: Brent crude oil price and Saudi production changes
...despite continued efforts by Saudi Arabia to keep curbing crude volumes

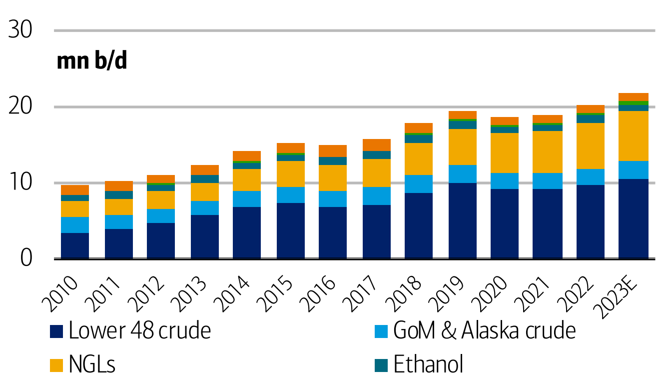


Source: Bloomberg
BofA GLOBAL RESEARCH

...due to expanding US shale oil supplies and...

While prices are lower than where they were three months ago, the geopolitical backdrop has not improved (see Geopolitics create oil asymmetries). It is precisely this volatile political and geopolitical backdrop that could keep the oil market on edge over the course of 2024, as fundamentals paint a softer picture. As we explained in our 2024 Year Ahead (see Year Ahead 2024: Energy outlook), the oil market needs firm OPEC+ cuts to support Brent prices above $80/bbl this year. In that regard, the fact that total US liquids production reached a record 21mn b/d at the end of last year (Exhibit 98) driven by a very large expansion in shale supply across various basins (Exhibit 99) is a huge headwind for the producer group.

Exhibit 98: Total US liquids production
Total US liquids production reached a record 21mn b/d at the end of last year...



Source: EIA
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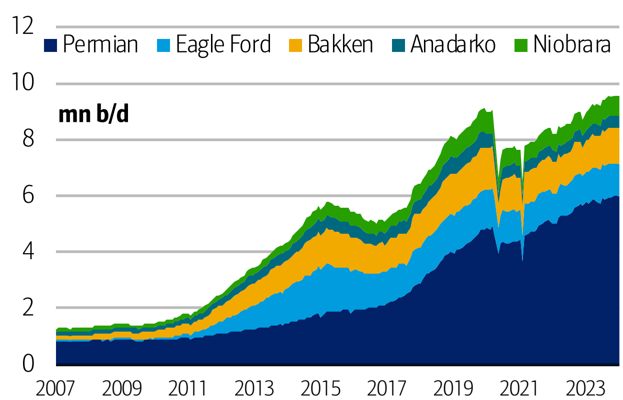
Exhibit 99: US oil production by major shale basins
...driven by a very large expansion in shale supply across various basins

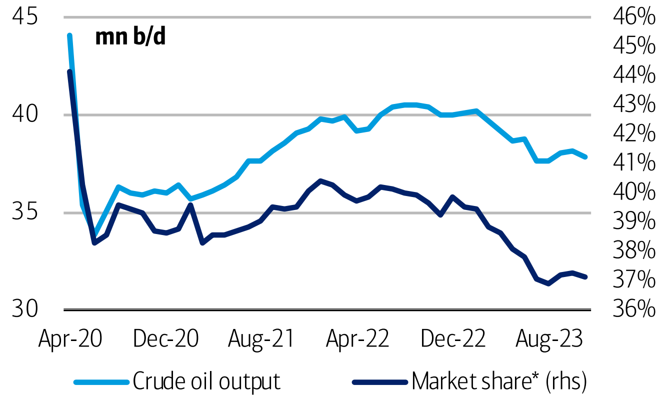


Source: Bloomberg
BofA GLOBAL RESEARCH

...a weak OPEC+ commitment to limit volumes

Precisely because of rapidly rising US shale supplies, as well as ongoing production growth in Guyana, Brazil, Canada, and other corners of the market, OPEC+ production and market share has come down significantly in the past year (Exhibit 100). Yet Saudi Arabia has carried most of the weight of the output cuts in the last 18 months with its voluntary production reductions. Although Saudi hoped to build goodwill to encourage others to join in the cuts, the unilateral action has led to a breakdown in OPEC cohesion and internal tensions (Exhibit 101). As the group gathered in their last meeting of 2023, some players like Angola refused to play by the new rules, ultimately leaving the organization and triggering a confidence crisis in the producer group.

Exhibit 100: OPEC+ crude oil production and market share (vs global liquids supply)
While OPEC+ production and market share has come down significantly in the past year...



Source: IEA, BofA Global Research

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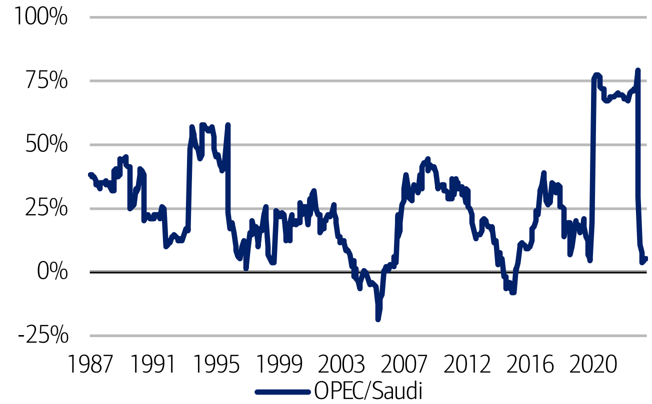
Exhibit 101: OPEC cohesion (correlation between Saudi supply changes and other OPEC supply changes)
...Saudi Arabia has carried most of the weight, leading to a breakdown in OPEC cohesion



Source: IEA, BofA Global Research estimates

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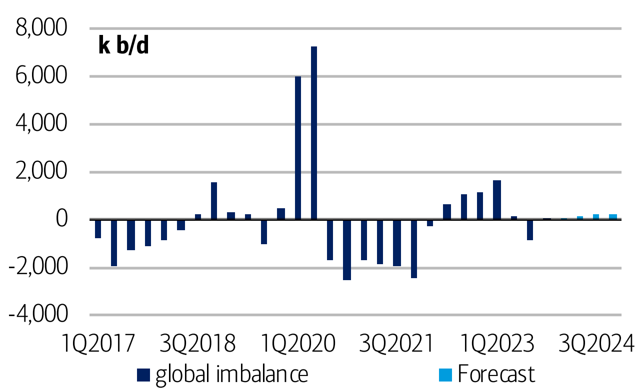
Balances look soft unless OPEC+ curbs output

Will OPEC+ cohesion increase in 2024 with others joining Saudi to manage production and ultimately market prices? This is one of the key questions for the oil market over the next few quarters. In our year ahead outlook in November, we projected a balanced oil market in 2024 and a $90/bbl Brent average for 2024, but fundamentals have softened since then (Exhibit 102). Now, Saudi oil production volumes likely must remain flat at 9mn b/d for the remainder of the year and (Exhibit 103) contributions from other members will be needed to prevent global oil balances from deteriorating further. While we assume additional cuts from other OPEC+ members, we think the group will fall short of its headline 2.2mn b/d 'cut'. Internal disagreements dominated the November meeting, so the group has spent much of the last four weeks trying to convince the market that the level of internal cohesion is still high despite the Angolan exit.

Exhibit 102: Global oil surplus (current)
In our year ahead outlook in November, we projected a balanced oil market in 2024, but balances have softened since then...



Source: IEA, BofA Global Research estimates

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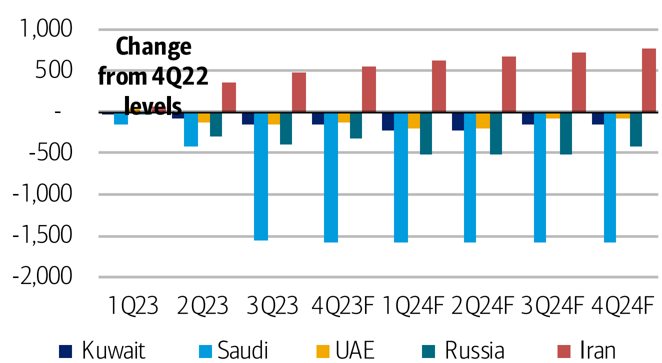
Exhibit 103: Change in supply from select countries
...and we assume Saudi oil production volumes of 9mn b/d during 2024 and cuts from other members to prevent balances from weakening further



Source: IEA, BofA Global Research estimates

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Still, growing spare capacity in Saudi and the UAE...

Moreover, while OPEC+ released a communique in their last meeting with large production cut commitments (Exhibit 104), there were a range of issues with it, starting with the lack of clarity with regard to exact quotas and production commitments levels. Further marring the view, the communique referred to both production and exports, making it difficult to gauge how balances will play out in the first half of this year. Meanwhile, spare crude oil production capacity has already increased to ~4mn b/d from a low of 1.8mn b/d in late 2022 and could continue to grow throughout 2024 (Exhibit 105) as OPEC+ continues to cut production volumes and the UAE maintains its energy investment programs.

Exhibit 104: Select press release text from recent OPEC meetings
While OPEC+ released a communique in their last meeting with production cut commitments...

Meeting	Action
10/5/2022	"Adjust downward the overall production by 2 mb/d from the August 2022 required production levels, starting November 2022 for OPEC and non-OPEC Participating Countries as per the attached table."
4/3/2023	"The Meeting noted the following voluntarily production adjustment announced on 2 April 2023 by" Saudi Arabia (500kb/d); Iraq (211kb/d); UAE (144 kb/d); Kuwait (128kb/d); Kazakhstan (78kb/d); Algeria (48kb/d); Oman (40kb/d); and Gabon (8kb/d) "starting May until the end of 2023"
6/4/2023	"Adjust the level of overall crude oil production for OPEC and non-OPEC Participating Countries in the DoC to 40.46 mb/d, starting 1 January 2024 until 31 December 2024, which is to be distributed as per the attached table."
11/30/2023	"The OPEC Secretariat noted the announcement of several OPEC+ countries of additional voluntary cuts to the total of 2.2 million barrels per day, aimed at supporting the stability and balance of oil markets. These voluntary cuts are calculated from the 2024 required production level as per the 35th OPEC Ministerial Meeting held on June 4 2023, and are in addition to the voluntary cuts previously announced in April 2023 and later extended until the end of 2024."

Source: OPEC, BofA Global Research

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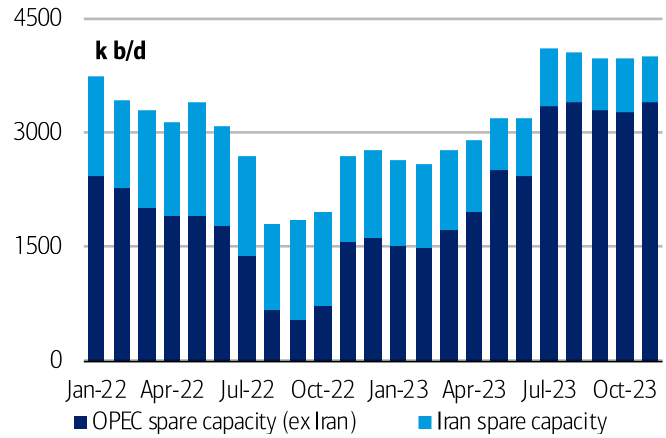
Exhibit 105: OPEC spare capacity
...spare capacity has already increased and could continue to grow throughout 2024



Source: IEA, BofA Global Research estimates

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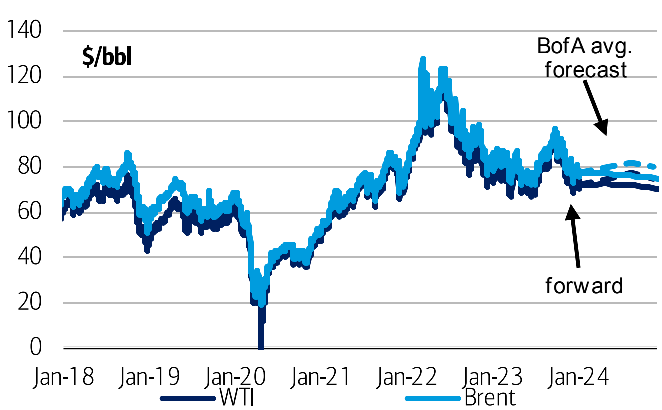
...and softer balances contribute to lower the prices in 2024

With spare capacity on the rise, OPEC+ credibility under the spotlight, and a weakening global supply/balance, oil prices have been on a downward slide for three months, even if the last month has provided some relief. From our perspective, however, we maintained our $86 and $90/bbl WTI and Brent crude oil forecasts for 2024 (Exhibit 107) despite these headwinds, but we acknowledge that fundamentals have softened and the economy continues to slow down (Exhibit 107). In the light of this, we are now resetting our projected annual averages for Brent and WTI crude oil prices in 2024 to $80 and $75, down from $90 and $86 prior.

Exhibit 106: Brent & WTI crude price history, forecast, forward curve
We now project average prices of $75 and $80/bbl for WTI and Brent crude oil in 2024...



Source: Bloomberg, BofA Global Research estimates

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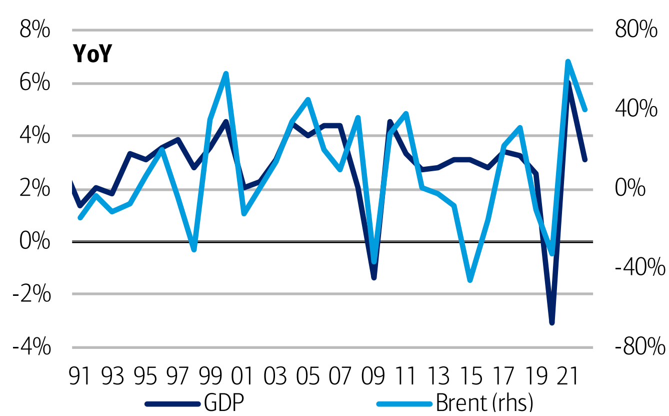
Exhibit 107: World GDP and Brent price growth
...and we acknowledge that fundamentals have softened and the economy continues to slow down



Source: IMF, Bloomberg

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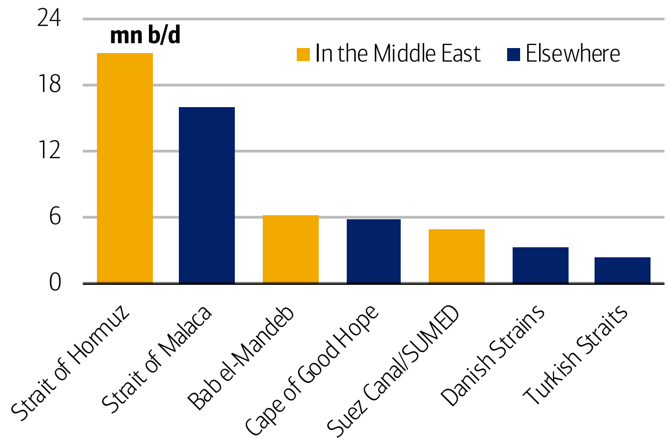
Yet geopolitical tensions in the Gulf keep rising...

Even then, we remain very worried about (geo)politics. Not only are military tensions high across the world, but we are also facing a historical election year where over 60 countries representing about half of the world's population, from India to the US to the European Parliament, will go to the polls. Energy prices matter to voters the world over and the Biden Administration has been dealing with foes for much of the past 18 months to ensure ample supplies, allowing Russia, Iran, or Venezuela to increase their export volumes relative to market expectations. Against a slowing demand and growing supply backdrop, we note growing risks at key energy trading choke points (Exhibit 108) from the Persian Gulf to the Red Sea to the Panama Canal, as well as the sharp increase in conflict deaths witnessed in 2022 and 2023 due to both the Ukraine and Gaza wars (Exhibit 109). NATO can hardly afford to stretch itself thinner into more global conflicts ahead of major elections, and autocrats are taking notice.

Exhibit 108: EIA chokepoints

Against this slowing demand and growing supply backdrop, we note growing risks at choke points...



Source: EIA (estimates as of 2019), BofA Global Research

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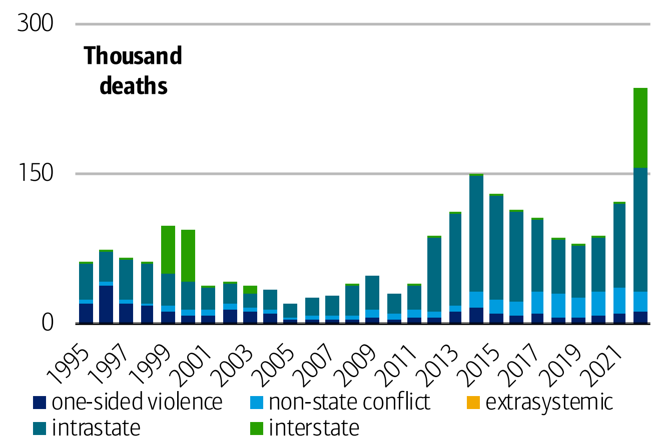
Exhibit 109: Deaths in armed conflicts

...and the sharp increase in conflict deaths witnessed in 2022 and 2023 due to both the Ukraine and Gaza wars



Source: United Nations Office for the Coordination

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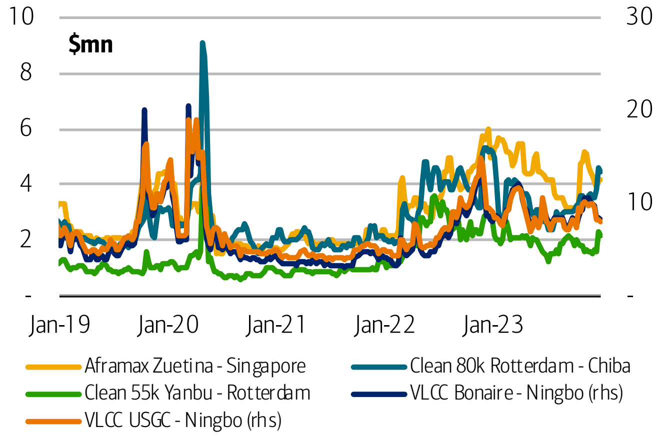
...and crude inventories are declining again...

For the time being, ample shipping capacity has kept freight rates in check despite geopolitics and weather disruptions (Exhibit 110), a factor that has surely alleviated some of the pressures on global energy markets. Yet (geo)politics remain front and center of an energy market looking for a clear direction. Importantly, the ability to manage unexpected events over the coming quarters is much thinner than in previous periods due to the lower government strategic energy stocks available at present. Saving the fact that Saudi Arabia has ample spare production capacity, there are limited tools across OECD economies to cap an unexpected surge in oil prices. Even if onshore, aboveground crude oil inventories increased in recent months from post covid lows of ~2.9bn barrels to ~3.1bn during 2023, they have started declining once again (Exhibit 111) and are now at ~3bn barrels.

Exhibit 110: Tanker spot rates
Ample shipping capacity has kept freight rates in check despite geopolitics and weather disruptions



Source: Clarksons

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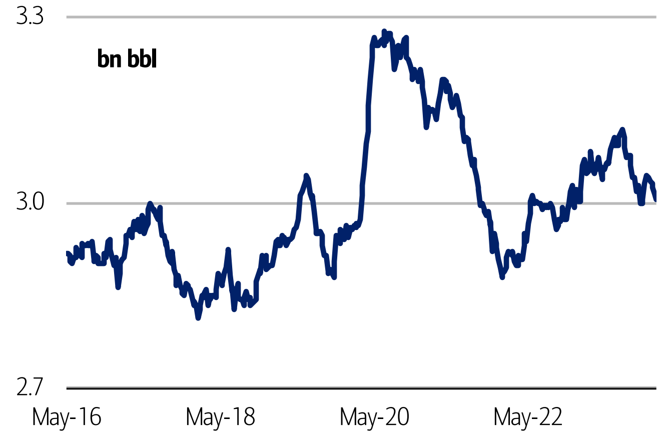
Exhibit 111: Kayrros global onshore aboveground crude oil inventories
While onshore crude oil inventories increased in recent months, they have started declining once again



Source: Kayrros

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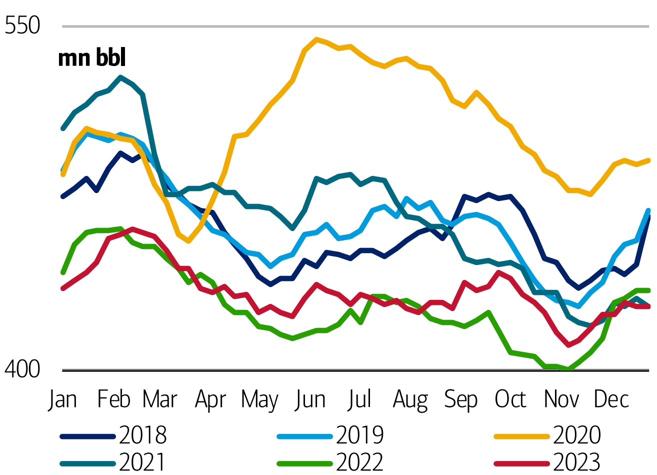
...while product stocks remain remarkably low...

While commercial crude stocks are low-ish, a much starker picture emerges for fuels like diesel, jet or even gasoline. Looking at aggregate petroleum product inventories across the main hubs, we note that stocks of transportation fuels are at very low levels and nearly 30mn barrels below five-year averages (Exhibit 112). As a result of the relatively tight petroleum product market situation, refining margins have yet to normalize after the big disruptions caused by the Ukraine war (Exhibit 113) and the banning of Russian petroleum product imports in Europe and the US. We believe new refineries will eventually expand capacity to bring crack spreads lower, but it may take some time (see Waiting for Dangot(e)).

Exhibit 112: Gasoline, diesel, and jet fuel inventories in the US, ARA, and Singapore
Aggregate petroleum product inventories across the main hubs are at very low levels...



Source: Bloomberg

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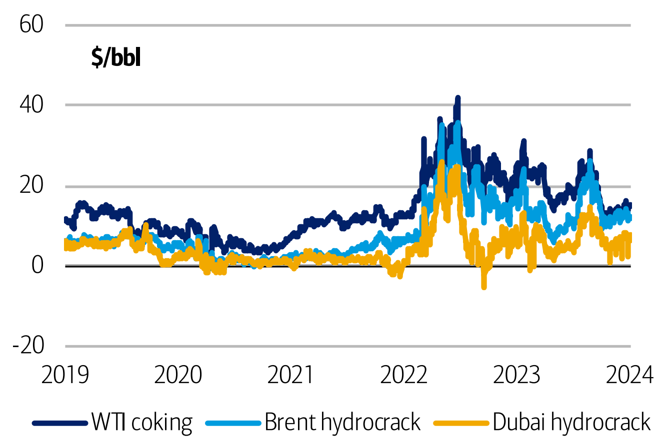
Exhibit 113: Regional refining margins
...and refining margins have yet to normalize after the big disruptions caused by the Ukraine war



Source: Bloomberg

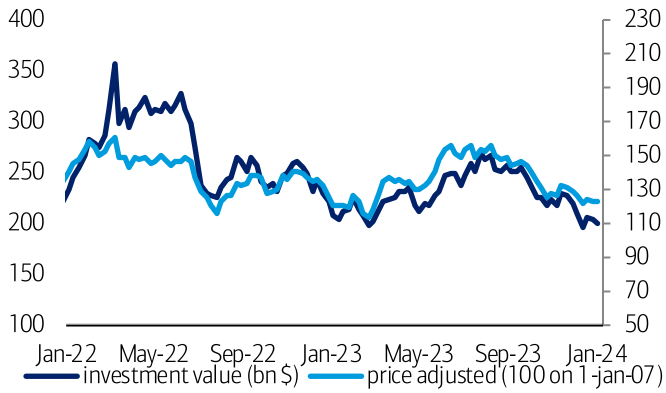
BofA GLOBAL RESEARCH

...just as speculative positioning has turned short

When it comes to investor positioning in commodity markets, we note that long exposure is down considerably in commodity indices (Exhibit 114) from a high point of ~$350bn in March 2022 to today's levels of ~$200bn. If we adjust this figure for price effects, we note that the value (indexed to Jan 1, 2007) of 122 is closer to 2020's low of

112 and even 2009 low of 91. Put differently, investor portfolios do not have much exposure to the asset class. Similarly, speculative positions across both Brent and WTI crude oil futures and options markets are down significantly (Exhibit 115) from a high last year of 545k contracts in September to 307k contracts recently after falling as low as 135k in December. So, sentiment and positioning can change on a dime, leading to large price swings, as we saw on January 3 on the back of the attack in Iran.

Exhibit 114: Index money invested in commodities (long) (nominal and price-adjusted)
Looking at investor positioning in commodity markets, we note that exposure is down considerably



Source: Bloomberg, BofA Global Research estimates

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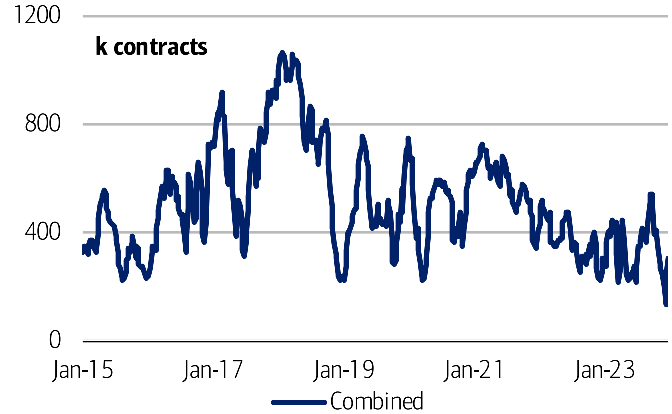
Exhibit 115: WTI and Brent managed money net length (futures only)
Similarly, speculative positions across both Brent and WTI crude oil markets are down significantly



Source: Bloomberg

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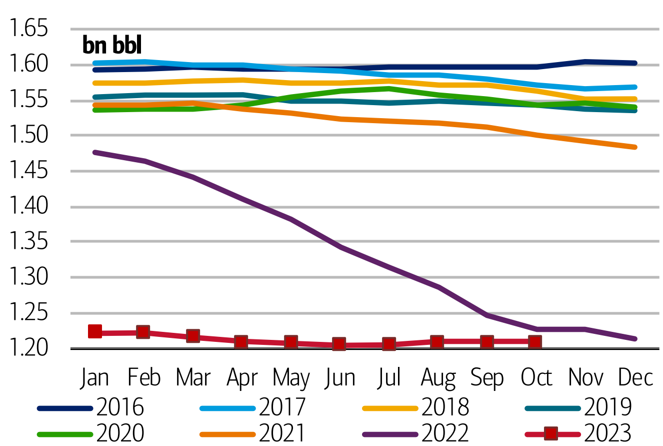
Also, OECD strategic stocks have yet to rebuild...

Beyond the fact that crude oil spec positioning length is light and commercial oil stocks are generally on the low side, strategic oil inventories across OECD economies are at the lowest point in decades (Exhibit 116). Although the US has started to push some barrels into strategic stockpiles in recent months (Exhibit 117), it is important to note that the ability of Western governments to limit an oil price rally, should there be one, has been reduced. Conversely, should oil WTI prices drop below $70/bbl for a sustained period of time, we would expect a pickup in the refill of government oil stocks globally, contributing to create a soft put for oil prices.

Exhibit 116: OECD government petroleum stocks
Strategic oil inventories across OECD economies are at the lowest point in decades...



Source: IEA

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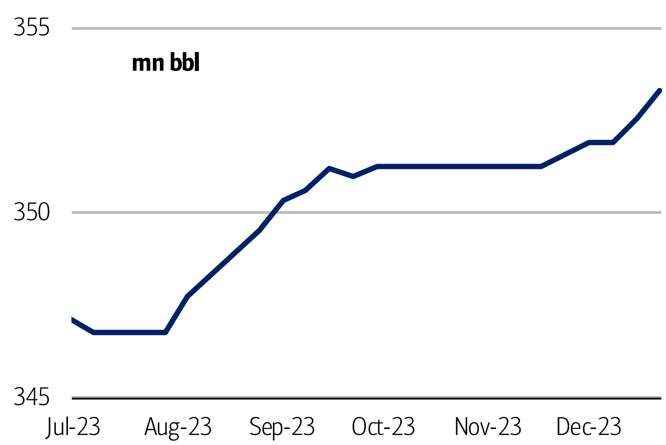
Exhibit 117: US Strategic Petroleum Reserve
...although the US has started to push some barrels into strategic stockpiles in recent months



Source: Bloomberg

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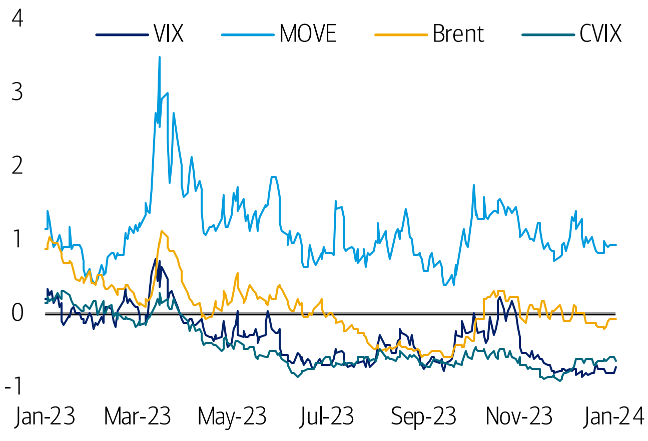
...leaving oil vulnerable to upside price swings...

With oil prices trapped in a $25/bbl range for most of last year compared to a $50/bbl range in 2022, volatility implied in crude oil options prices has been declining steadily but it has not collapsed. On a relative basis, volatility in the Brent crude oil market is not as high as it has been in the interest rates market (Exhibit 118) but has stayed persistently above the depressed vol levels witnessed in the equity and foreign exchange markets. Importantly, oil options continue to price a marked put skew due to continued dominance of producer hedging flows (Exhibit 119) and the relatively absence of consumer hedging activity, offering an attractive opportunity for investors worried about geopolitical risks.

Exhibit 118: Z-score of cross-asset implied volatility since 2006

On a relative basis, volatility in the Brent crude oil market is not as high as in the rates market



Source: BofA Global Research, Bloomberg

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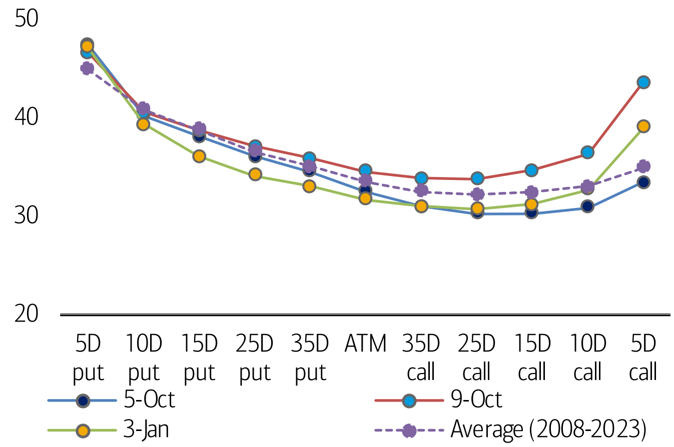
Exhibit 119: Brent crude 3-month option skew

Oil options continue to price a marked put skew due to continued dominance of producer hedging flows



Source: Bloomberg

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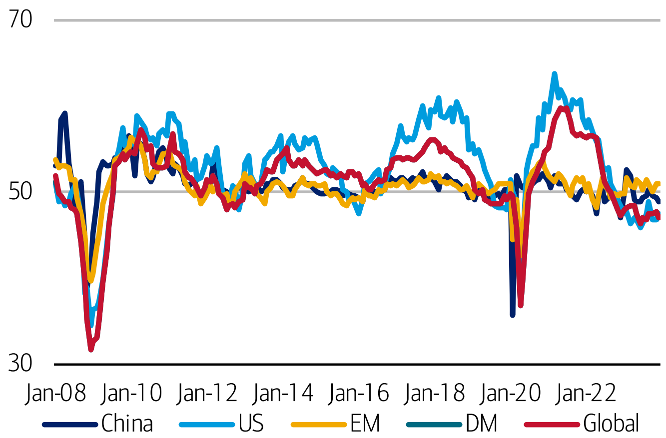
...especially if the economy improves on rate cuts

Another factor that has caused oil prices to drop is the worsening macro conditions across the global economy, particularly in the industrial and trade sectors. For starters, PMIs have been sinking for quite some time and are in contraction mode around the globe (Exhibit 120). However, industrial activity cannot contract forever if the economic outlook brightens. So, an eventual upturn in global manufacturing could quickly lead to rising metals prices and eventually energy prices too (Exhibit 121). Put differently, unless a recession unfolds over the coming months, industrials will have to restock on their finished and intermediate goods, as well as their raw materials this year, triggering a round of fresh commodity demand (see Rates, recession, and restocking are the keys to energy).

Exhibit 120: Global manufacturing purchasing manager indices
PMIs have been sinking for quite some time and are in contraction mode around the globe...



Source: Bloomberg

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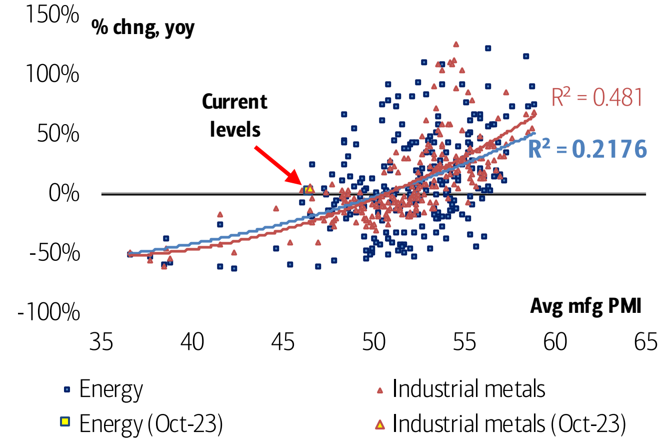
Exhibit 121: Average manufacturing vs (US, China, Eurozone) and annual commodity sector index returns
...but an eventual upturn in global industrial activity could quickly lead to rising metals and energy prices



Source: ISM, Markit, Bloomberg

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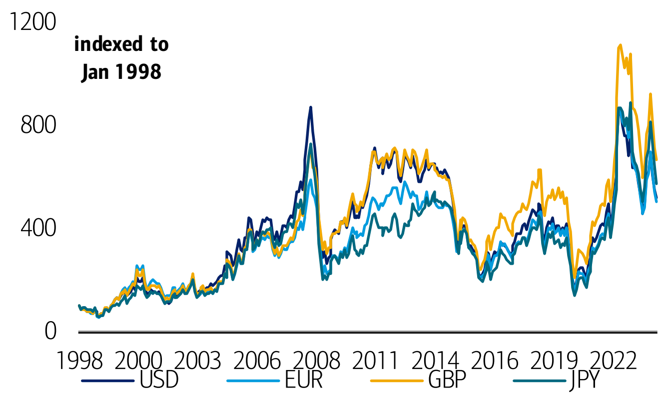
With fuel prices dropping relative to income...

Beyond the tailwinds that a cyclical inflection point could create for the energy sector over the course of the next few weeks, there are also important demand and price-level considerations related to the inflation-adjusted and relative prices of energy. While fuel prices measured in local currency have risen in absolute levels compared to history and fuels are somewhat expensive in a range of economies including the United Kingdom and Japan (Exhibit 122), fuel prices adjusted for income and inflation have come down considerably (Exhibit 123) in other places like the United States. After all, $1 in 2024 has the purchasing power of $0.84 in 2019 before the pandemic.

Exhibit 122: Front-month gasoil futures price in local currency indexed to January 1998
While fuel prices measured in local currency have risen in absolute levels compared to history...



Source: Bloomberg, BofA Global Research

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Exhibit 123: US gasoline price as a share of hourly wages
...fuel prices adjusted for income or inflation in the US have come down considerably

Source: Bloomberg, BofA Global Research

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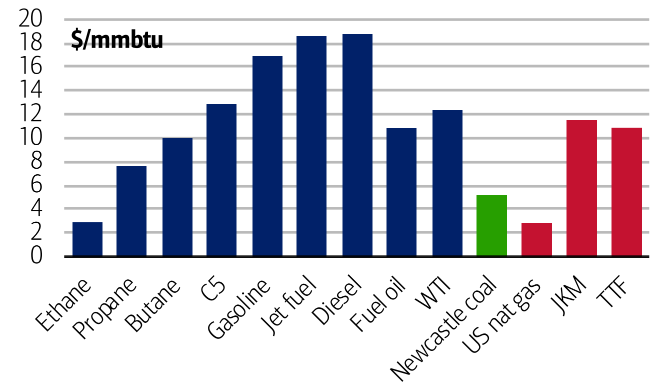
...and nat gas and thermal coal staying high...

Beyond the inflation considerations that define the real price of energy, it is also crucial to understand relative fuel prices to capture how high or how low Brent and WTI prices can trade over the course of this year. On this point, when looked at from a relative calorific value cross-fuel perspective, crude oil is not particularly expensive right now given its position as the king of thermal fuels (Exhibit 124) even after the slight drop in European TTF natural gas prices below EUR35/MWh in the first week of the year. In part, this is because Australian thermal coal and JKM liquid natural gas prices have held up (Exhibit 125) better than the European counterparts, although admittedly warm winter weather has been a headwind for prices.

Exhibit 124: Fuel prices in Mmbtu

When looked at from a relative calorific value cross-fuel perspective, oil is not particularly expensive right now



Source: Bloomberg, BofA Global Research

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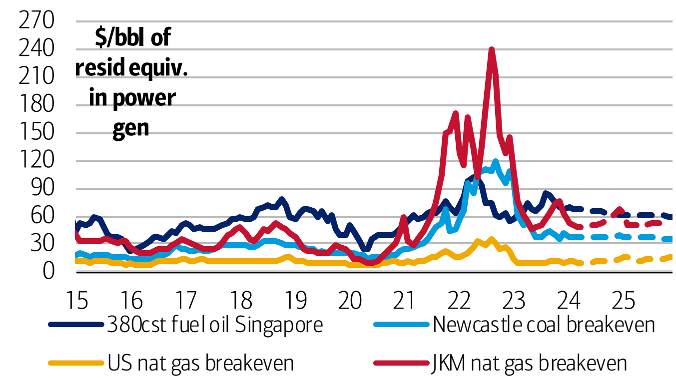
Exhibit 125: Asia resid fuel oil prices and breakevens with coal and gas in power generation

In part, this is because Australian thermal coal and JKM liquid natural gas prices have held up



Source: Bloomberg, BofA Global Research

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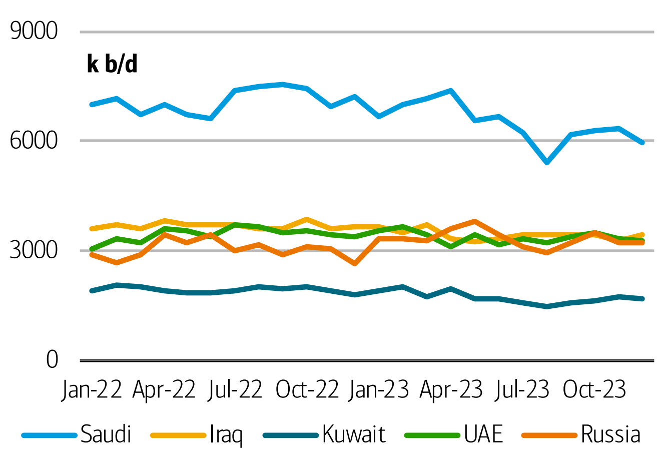
...prompt oil has limited downside near-term...

So, what happens next over the coming weeks? Given the geopolitical risks involved and the relatively low starting point for stocks, we see limited downside for Brent and WTI prices in the near-term. Even then, looking at loadings for Russian and Middle East oil across a range of shipping terminals, we note that exports have yet to start dropping (Exhibit 126) to reflect the agreement that OPEC+ came to last month. If these loadings start to decline in earnest as we expect, the Brent oil market will likely gain support and rally above $80/bbl, further boosted by geopolitics. But if loadings increase further and reflect a fractured OPEC+, crude prices could take again a downward path below $70/bbl. If it comes to that, we would emphasize that China's energy imports have tended to increase sharply when Brent prices drop below $65/bbl (Exhibit 127).

Exhibit 126: Monthly crude loadings by country

Looking at loadings for Russian and Middle East oil, we note that exports have yet to start dropping



Source: Bloomberg

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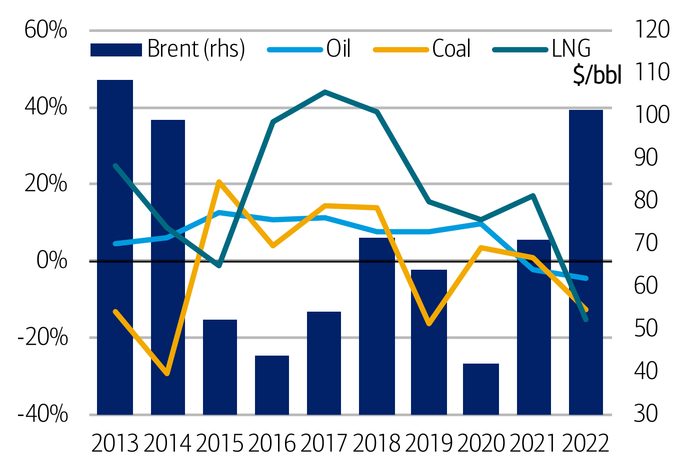
Exhibit 127: YoY change in imports to China by fuel versus Brent prices

China's energy imports have tended to increase sharply when Brent (oil or gas) prices dropped below $65



Source: Energy Institute

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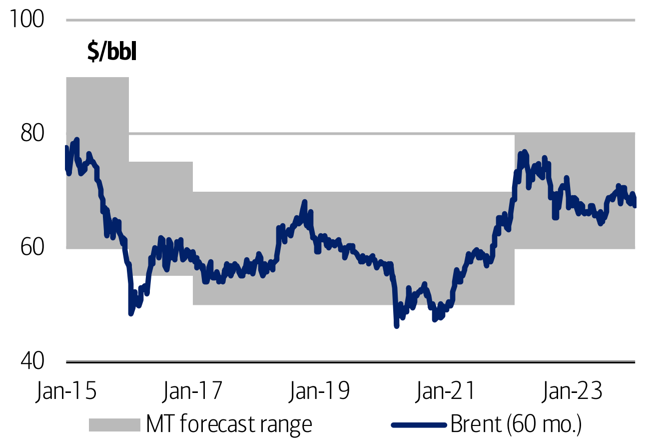
...as long-dated prices remain anchored at $70

Beyond OPEC+ actions and SPR refills, we still believe China energy import needs (see report: China coal floors global gas) will likely floor crude oil prices in 2024. More importantly, long dated Brent crude oil prices remain well anchored in the middle of our

$60-80/bbl band (Exhibit 128), suggesting that for prices to drop below the $70/bbl midpoint inventories would have to build steadily throughout this year, an unlikely event given (1) OPEC's plans to reduce production, (2) the high likelihood of an economic soft landing, and (3) the (geo)political risks involved. After all, the cost curve for global oil production has not changed materially in recent years and lower prices would likely trigger a reduction in US shale drilling and completion activity (Exhibit 129). With OPEC+ managing the downside created by a soft fundamental backdrop and red hot (geo)politics in 2024, we view selling rich out-of-the money put spreads to buy out-of-the money calls as an attractive risk-reward proposition in what we see as a rangebound market loaded with unknown unknowns.

Exhibit 128: Long dated Brent prices

Long dated Brent crude oil prices remain well anchored in the middle of our $60-80/bbl band



Source: Bloomberg, BofA Global Research estimates

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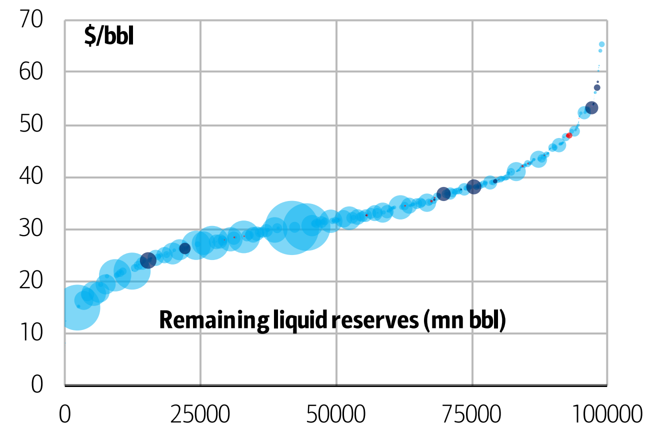
Exhibit 129: Global tight oil asset cost curve

The cost curve for tight oil production has not changed materially in recent years



Note: Assumes 15% cost of capital. **Source:** Woodmac

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Political pressures from governments in Argentina, Brazil and Colombia

Argentina – Milei's agenda is positive for YPF, but path is unlikely to be smooth

Javier Milei won the presidential election in Argentina in November after obtaining 55.7% of the votes in the run-off vs 44.3% for Sergio Massa, a much bigger difference than reflected in most polls.

With a libertarian agenda, Milei's proposals contemplate: (1) a non-regulated energy market, which could result in higher local prices for hydrocarbons and oil-products; (2) faster removal of capital controls; as well as (3) privatization of YPF. All these policies should have a positive effect on YPF's investment case and since the election the stock has skyrocketed (approx. 70% up).

We see the development of Vaca Muerta as one of Argentina's main avenues to improve its current situation. Despite evolution over the past several years, pipeline capacity constraints and transport bottlenecks (for both oil and gas) remain the main obstacles to unlocking Vaca Muerta's energy potential. Constructing new infrastructure, however, requires significant investment (and therefore financing) - which, in our view, will not be easy to attract.

Ultimately, the measures mentioned above could be considered unpopular given their potential short-term effect on Argentina's economic and social situation. As a consequence, we believe Argentina could continue to face political volatility, which could hinder YPF's ability to tap into attractive financing opportunities.

Although this agenda is expected to be positive for YPF's cash generation - the implementation of all of these measures is unlikely to be smooth, in our view. As we mentioned in our 10 October 2023 report (Above-ground concerns could keep Vaca Muerta's vast potential buried), the new president will inherit very challenging economic conditions amid negative net international reserves and further FX devaluation that could pressure inflation.

In addition, it will be important to monitor Milei's governability (given that La Libertad Avanza will have only a few seats in both upper and lower houses) and popularity (as we expect the economic adjustments at the beginning to be followed by a recession and higher inflation before the economy starts to improve).

Brazil – The big risk: company-government relationship

The Petrobras-government relationship has been the main point of concern among investors for a long time (not exclusively under PT governments). Although Petrobras improved its corporate governance materially with the SOE law and changes in its bylaws and policies, which led the company to become much more protected from potential government influence, politicians' speeches still affect the stock price.

Local newswires suggest that this administration is more sensitive with fuel and natural gas pricing and is also looking to foster economic growth through higher investment from SOEs. Despite that, we highlight that, during Jean Paul Prates' tenure, PBR has positively surprised the market with fuel pricing adjustments that have closed the gap with import parity, production has climbed ahead of expectations and the new dividend policy still provides higher dividend yield prospects vs peers.

Although the pressure to keep domestic fuel prices below import parity should persist, we believe implementing meaningful changes to PBR's fuel pricing policy will be a big challenge as it would require a change in bylaws. Additionally, we also believe that the company's improvements in terms of corporate governance over the past several years relatively mitigates the risks of approving low-return investments.

Colombia - Hurdles for oil & gas industry have increased

The new administration in Colombia has been quite vocal regarding its intention to reduce the dependency of the country's economy on the oil & gas industry. Ultimately the government intends to halt new exploration activities while still respecting existing production and exploration contracts. Regarding new concessions and awarding new acres for exploration campaigns, it's still unclear whether these will remain on the table. At the same time, we believe that licenses could become harder to obtain as the government adopts stricter environmental standards thus increasing the costs for oil and gas producers to operate in the country.

In addition, the new government led by Gustavo Petro passed a tax reform bill (Reforma Tributaria para la Igualdad y la Justicia Social) with the ultimate aim of making the tax system more egalitarian in the country. The tax reform was approved by the Congress on 3 November 2022 and sanctioned by the president in December. For the oil and gas industry two important changes were introduced: one is the end of the tax deductibility of royalties and the second is an additional taxation based on the yearly average crude oil price. If oil prices are above USD67/bbl an additional tax rate of 5% will apply, if above USD75/bbl the tax rate increases by 10% and finally, if above USD82/bbl an additional tax rate of 15% will apply.

The end of the deductibility of royalties sets Colombia apart from its regional peers Argentina, Brazil and Mexico which abate royalties from the base on which corporate income taxes apply. Ultimately, these changes should be detrimental not only for the profitability of existing assets but also for future projects under analysis. However, we would argue that by enhancing the tax burden on oil & gas companies, Colombia has increased its fiscal dependency on oil making it more challenging for the administration to adopt further measures that could destroy value for the industry.

FEPC has been a key point of Ecopetrol's investment thesis

Regarding fuel prices, gasoline and diesel prices remain below import parity pricing (IPP) leading to a ~COP26trn deficit in the fuel price stabilization fund (FEPC) at the close of 3Q23. Although changes in the regulatory and taxation framework and potential political influence in Ecopetrol carry negative implications for the company, we would argue this has already been digested by the market and is already priced in.

Ecopetrol expects to close the gap between domestic gasoline and diesel prices and international references next year (and even pursue a premium to IPP after that). If the company follows through on this plan, we expect the overhang generated by the government's influence on fuel pricing should diminish.

Competitive environment in the fuel distribution business

A tough 1H23…

The first half of 2023 was a tough period for the fuel distributors as they were negatively impacted by the high volume of Russian diesel imported to Brazil, which was significantly cheaper than Petrobras's prices. This led to an oversupply in the market that pressured margins downward amid high inventory levels. As a result, 1H23 fuel distributors' margins fell short of the market's original expectations.

And a brighter 3Q23

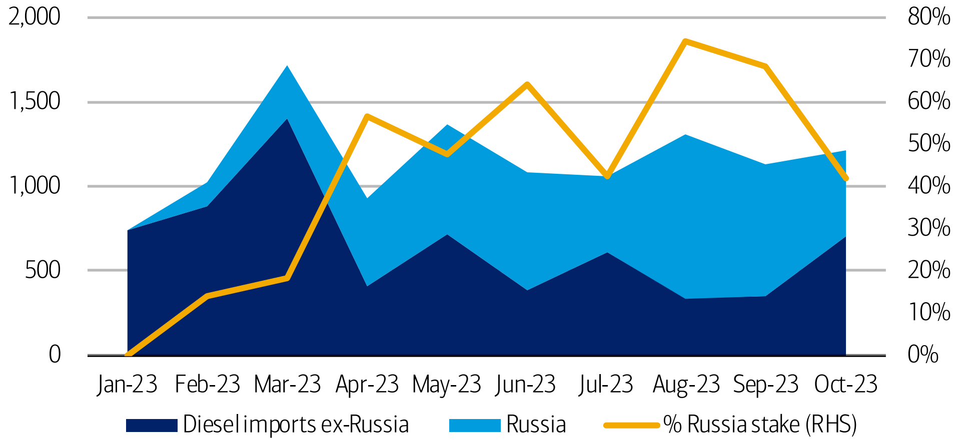
The market, however, changed after July. The higher seasonal demand of the 3Q23 absorbed normalized inventory levels while the gap between local and Russian diesel prices closed, leading to a healthier competitive landscape. In this context, fuel distributors' adjusted margins in the 3Q23 reached very strong levels even adjusting by the inventory gains.

What to expect from 4Q23

Looking ahead the 4Q23, margins are expected to be strong but not as strong as the 3Q23. October should continue to be a strong month for the fuel distribution companies

– as imports haven't picked up and Russian diesel's participation in total imports has dropped.

Exhibit 130: Brazil diesel imports (000' m3)
Russia has become the main source of diesel for Brazil in 2023



Source: BofA Global Research and MDIC

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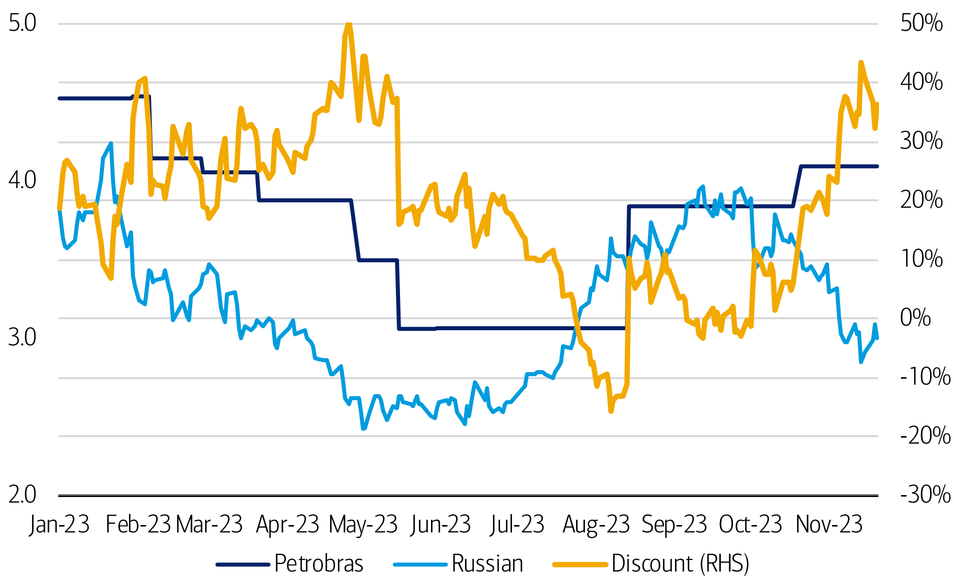
However, we have noted that the gap for the Russian diesel started to open again in October, which could potentially trigger to an increase of imports and, consequently, to an oversupply. In addition to that, we believe that the resumption of the PIS/Cofins for diesel (to R$0.35/liter) on January 1 could also trigger an increase in imports with the distributors seeking to have higher gains from potential inventory gains.

Exhibit 131: Petrobras prices vs Russian diesel (R$/liter)
We've seen the gap opening again in the end of the year



Source: BofA Global Research and Platts

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What to expect for 2024?

Throughout all the past years, the fuel distribution segment was marked by volatility. Structural changes have impacted the companies' margins impeding investors to have a clearer visibility of what should be recurring margins and sustainable returns of the business. Even though the companies have indicated sustainable margins at around R$130-140/m3, inventory gains/losses and different non-recurring effects have always been present.

In this context, we introduce key themes that, from our perspective, will be essential to understand the margins for the sector in 2024:

1) Improvement of the competitive landscape & tax evasion. Taxes constitute a significant portion of the cost of fuels sold in Brazil and; for this reason, tax evasion was prevalent among some fuel distributors, allowing them to charge lower fuel prices. These practices are more common on ethanol given that its production is pulverized and taxes are partially paid by the fuel distribution companies, which facilitates the practice of tax evasion. Taxes on gasoline and diesel, on the other hand, are fully paid at the refinery gate and, given the significant share of this market held by Petrobras, there is very little room for tax evasion.

Tax evasion have enabled certain distributors to supply large quantities of fuel products at prices below those offered by the major distributors (Vibra, Ipiranga and Raízen), thereby causing players that eschew such practices to lose margins, as they are forced to lower their prices and margins to remain competitive.

Within the context of a potential tax reform in Brazil, we believe that new ideas could be implemented to mitigate the tax evasion in the fuel distribution segment. Also, since the government has been seeking new alternatives to increase revenues, we believe that it could seek to eliminate this problem that has been affecting the major fuel distributors in Brazil.

2) Volumes could drop year over year due to a weaker grain crop as a result of worse weather conditions. The fuel distribution business is highly correlated with the broader economy's health: diesel sales are a reflection of economic activity (used in industry, agriculture and logistics), while Otto-cycle fuel sales reflect both household income and business activity. In this regard, BofA's macroeconomic team has a lower GDP growth for 2024 of 2.2%.

In addition to that, a weaker grain crop in Brazil this year should also affect the fuel demand in 2024. According to the IBGE (Brazilian Institute of Geography and Statistics), the harvest is expected to be 2.8% lower, or 8.8 million tons less, than this year's estimate of 317 million tons.

3) Shifting Supply Dynamics & margins. Competitive sourcing of fuel for the distribution players is the cornerstone of the business and, since 2015, the supply dynamics have significantly for the sector. Over the past years, margins have been positively or negatively affected by different factors: 1) The implementation of a fuel pricing policy; 2) the surge of diesel and gasoline imports by third-party players; 3) increase of ethanol consumption vs gasoline, 4) truckers strike; 5) privatization of some refineries; 6) the relevance of Russian diesel in the Brazilian matrix; 7) among others.

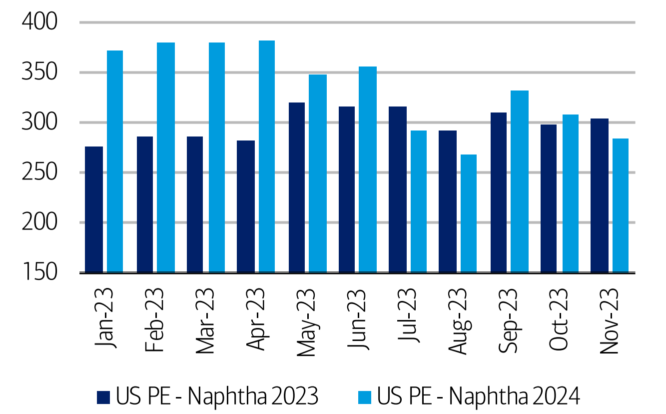
As we discussed above, we could enter 2024 with an oversupplied market that could likely impact margins throughout the first half of the year. The main question in our view will be whether there will be more rationality among the importers given that an oversupply situation affects the profitability of the sector as a whole.

Despite the improvement, petrochemicals should face another challenging year

Although we were still expecting a weaker 2023 for the petrochemical companies, actual spreads fell short of our estimates. Month after month, we published in our Monthly Petrochemical Monitor reports (see the last update) that demand for petrochemicals was still weak and margins below historical averages amid cost inflation pressure. All these factors contributed to a weaker 2023 leading petrochemical companies to revise down their guidance.

With this tougher-than-expected 2023, our expectations for 2024 were also revised downward. As demand still hasn't absorbed all the capacity addition seen over 2022-23, operating rates are still expected to be below the mid-80s level which implies that spreads will continue below the historical average for 2024.

Exhibit 132: Est. for US PE – Naphtha annual spread change (US$/ton)
Although 2023 spreads were revised up, 2024 spreads were revised down



Source: BofA Global Research, CMA

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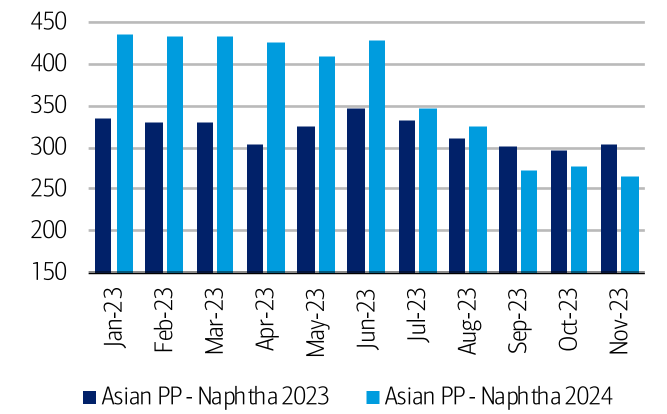
Exhibit 133: Est. Asian PP – Naphtha annual spread change (US$/ton)
Avg. 2023-24 have been revised down since the beginning of the year



Source: BofA Global Research, CMA

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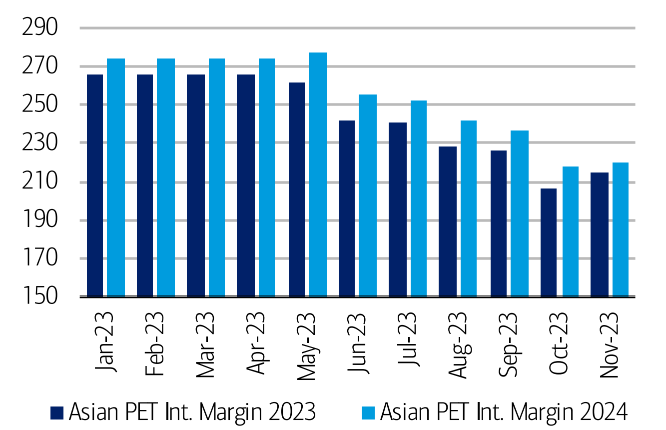
Exhibit 134: Est. Asian PET Int. mg. annual spread chg. (US$/ton)
Avg. 2023-24 have been revised down since the beginning of the year



Source: BofA Global Research, CMA

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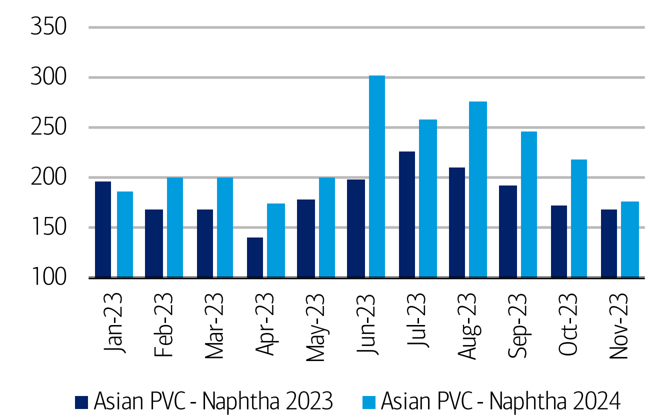
Exhibit 135: Est. Asian PVC – Naphtha annual spread change (US$/ton)
Estimates for 2024 spreads significantly changed throughout the year



Source: BofA Global Research, CMA

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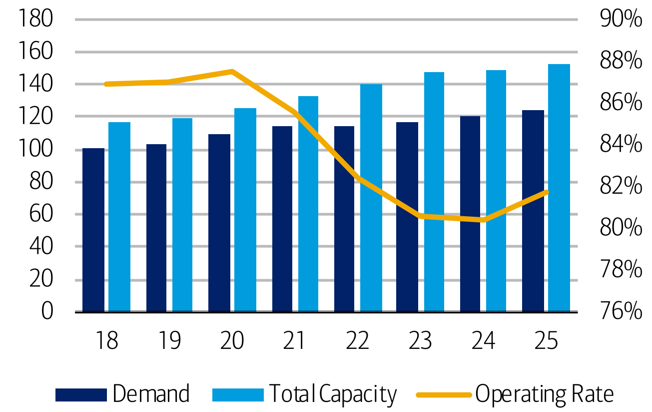
Polyethylene (PE): recovery in 2025 and a challenging 2027

The outlook for polyethylene spreads is still challenging as the product will likely continue facing sluggish demand as the market is oversupplied. The relief, in our view, could come from lower feedstock prices (naphtha and ethane) but we do not expect an improvement in PE prices. Operating rates are a major concern, as they are in the lowest range in 30 years, hoovering in the low 80%. The scenario for US polyethylene is expected to recover around 2025, when spreads are estimated to normalize by reaching margins near the historical average as stronger demand is expected to push operating rates up.

Exhibit 136: Global Polyethylene Supply & Demand (million metric tons)
Operating rates should increase in 2025 to 82% (vs 80% in 2024, and 81% in 2023)



Source: BofA Global Research, CMA

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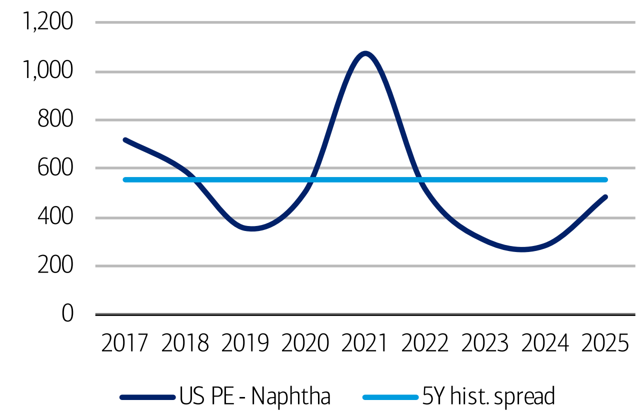
Exhibit 137: US PE – Naphtha (US$/ton)
Spreads should reach the bottom in 2024 at US$284/ton



Source: BofA Global Research, CMA

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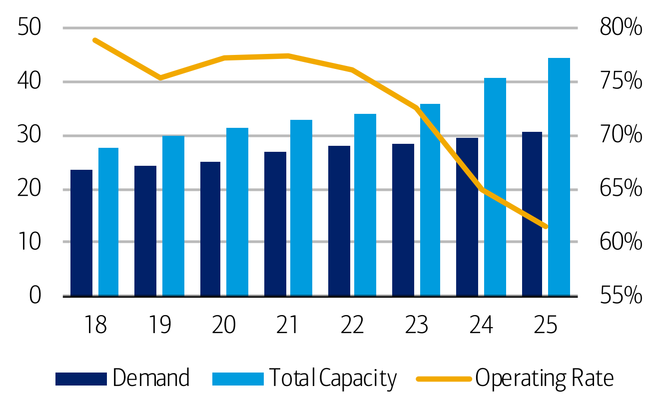
PET: High capacity addition has affected spreads

PET was able to keep up a relatively strong margin during the 1H23. However, it started suffering in the second half of the year with: 1) lower-than-expected demand; 2) higher raw materials costs; and 3) new capacity additions, especially in China. All these led spreads to reach US$145/ton in September, the lowest level over the pasts five years.

We expect PET integrated margins to return to normal levels around 2025 to 2026, when spreads should reach the historical 5 years average, in reason of higher demand and higher operating rates in PET plants.

Exhibit 138: Global PET Supply & Demand (million metric tons)
Worldwide operating rates will normalize in 2025 at 62%.



Source: BofA Global Research, CMA

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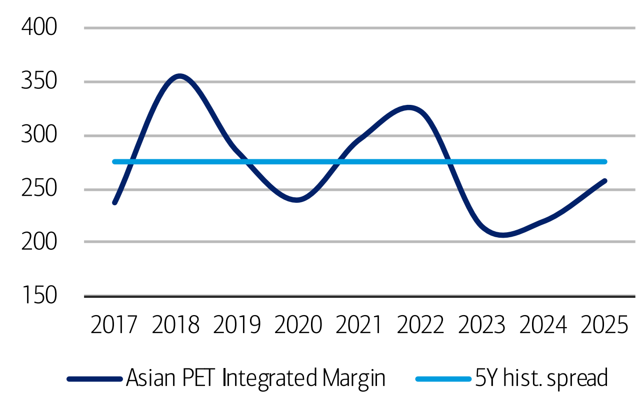
Exhibit 139: Asian PET Integrated Margin (US$/ton)
In 2025 Asian PET margin should reach US$258/ton.



Source: BofA Global Research, CMA

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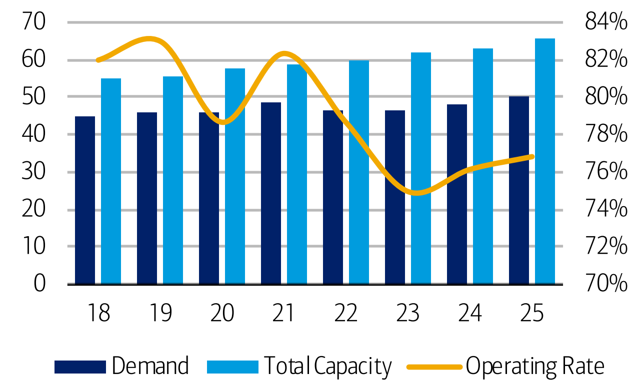
PVC: China playing a key role on demand

The scenario for PVC is also expected to continue tight, as it continues to be affected by a still weak demand and low operating rates (around 75% for 2023). China's slowing property market and excessive debts of the country's property developers have been the main contributors to this tougher environment, as PVC demand in mainland China accounts for approximately 44% of global demand. This challenging market is expected to persist in 2024, followed by a gradual recovery in 2025 boosted by an improvement in demand.

We highlight, however, that PVC continues to be our favorite petrochemical as demand is expected to benefit over the next decade from government-led infrastructure spending projects and building activities in emerging and developed markets. Announced projects include: 1) China's Belt and Road initiative that should see projects from East Asia to Europe was launched in 2013 (US$1.2-1.3 trillion of total estimated investment expected by 2027); and 2) infrastructure spending in the U.S. supported by 2021 legislation (US$1.2 trillion).

Exhibit 140: Global PVC Supply & Demand (million metric tons)
For 2025 we expect operating rates to reach 77% (from 75% in 2023)



Source: BofA Global Research, CMA

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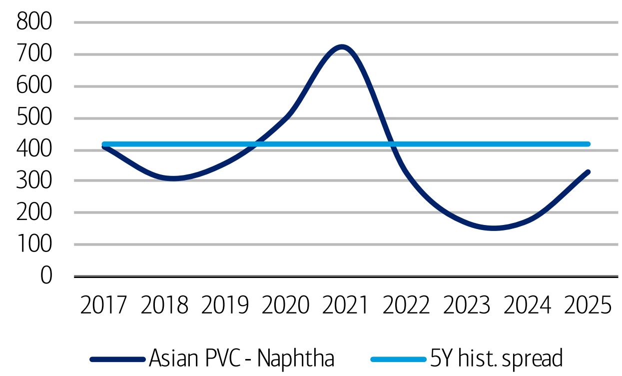
Exhibit 141: Asian PVC – Naphtha (US$/ton)
We expect US$329/ton spread for 2025, well above the US$175/ton in 2024



Source: BofA Global Research, CMA

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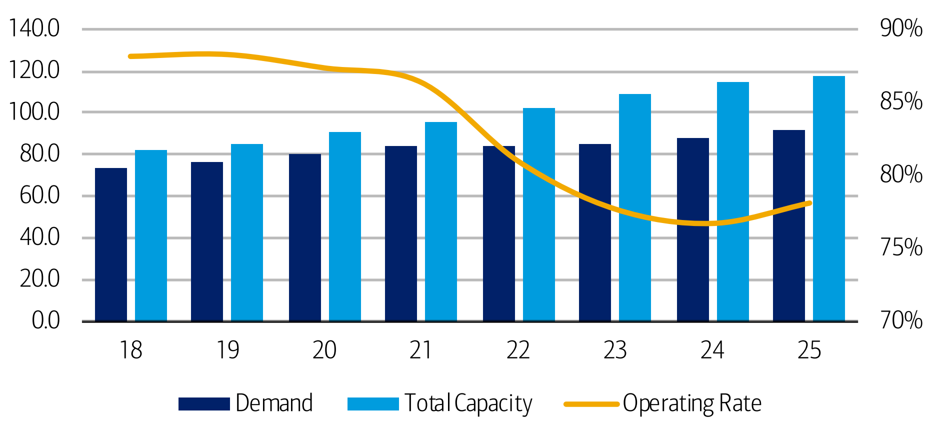
PP: capacity additions and higher costs pressure spreads

Asian PP spreads suffered during 2023, with prices affected by weak demand and high feedstock prices. In the US, spreads remained flat throughout the year at very low levels as PP producers were able to pass through only propylene prices variations.

Regarding Asian and European margins, we expect both to continue pressured and only recover in 2025 with a stronger demand pushing operating rates to mid-80s%. In the US, we expect spreads to continue tight as there are no signs of demand recovery in the short term – in this regard, we expect operating rates to remain at low levels.

Exhibit 142: Global Polypropylene Supply & Demand (million metric tons)
In 2025 we should see an improvement in operating rates after 4 sequential years of decline.



Source: BofA Global Research, CMA

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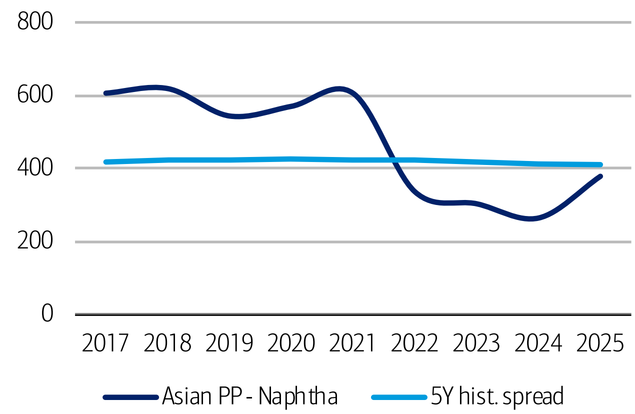
Exhibit 143: Asian PP – Naphtha (US$/ton)
Spreads should normalize in 2025 at U$410/ton



Source: BofA Global Research, CMA

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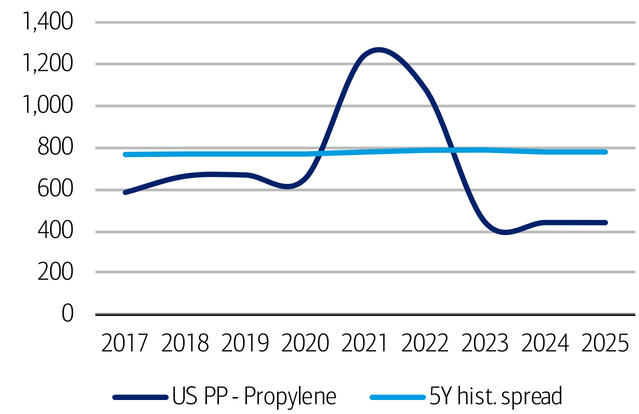
Exhibit 144: US PP – Propylene (US$/ton)
Spreads are expected to remain at current levels



Source: BofA Global Research, CMA

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2024 Pulp & Paper outlook

Main views/key themes: Demand to grow 1.4% in 24E

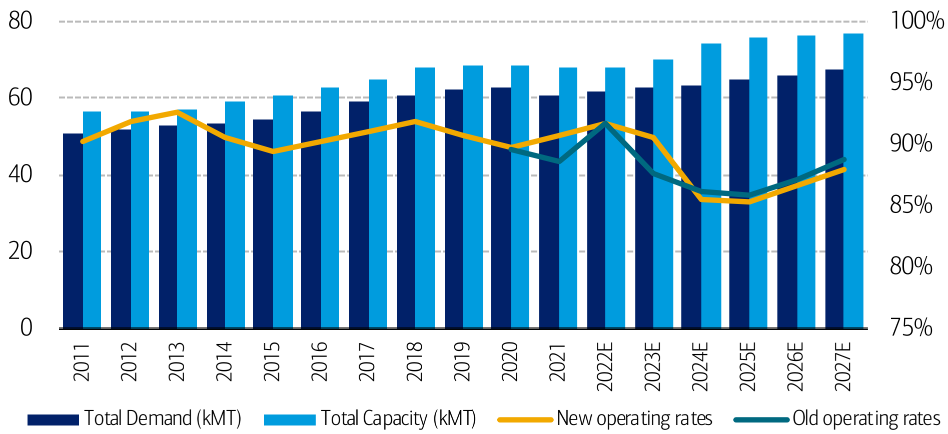
China saves the day in 2023; Demand to grow 1.4% in 24E

We expect pulp shipments growth to decelerate into 2023E and close the year expanding by ~1.4% y/y, or 880Kt, as China growing at double digits this year should more than offset steep declines for all other regions except LatAm and other Asia/Africa. For 2024, we expect a 1% y/y drop in China as woodchip imports normalize and domestic integrated pulp production rebounds, yet other key regions such as Europe and North America should post a 3-3.5% recovery after a sharp drop this year.

Exhibit 146 shows our global supply/demand (SD) model for pulp following our latest ***Pulp Project-er***, project-by-project analysis of supply. Overall, operating rates look to be 90.6% this year, dropping to 85% in 2024 as supply comes online, primarily from Suzano's 2.550Mt/yr Cerrado project starting up in June 2024, coupled with the ramp-up of Arauco's 1.560Mt/yr MAPA and UPM's 2.1Mt/yr Paso de los Toros which started up this year, and supply disruptions normalizing from a very elevated level this year above 2Mt.

Exhibit 145: BofA – Global market pulp supply/demand (Mt) and operating rates (%; LHS) summary

Operating rates look to be 90.6% this year, dropping to 85% in 2024 as supply comes online...



Source: BofA Global Research estimates, Fastmarkets RISI, Hawkins Wright, PPPC, Brian McClay & Associates

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Exhibit 146: BofA – Global market pulp supply/demand model (Kt)

… primarily from Suzano's 2.550Mt/yr Cerrado project starting up in June 2024, coupled with the ramp-up of Arauco's MAPA and UPM's Paso de los Toros

BofA Market Pulp Supply Demand Model	2017	2018	2019	2020	2021	2022E	2023E	2024E	2025E	2026E
Total Demand (kMT)	**59,212**	**60,801**	**62,206**	**62,604**	**60,947**	**61,838**	**62,717**	**63,608**	**64,861**	**66,162**
% change y/y	**4.3%**	**2.7%**	**2.3%**	**0.6%**	**-2.6%**	**1.5%**	**1.4%**	**1.4%**	**2.0%**	**2.0%**
USA	6,832	6,818	6,964	7,222	6,768	6,903	6,282	6,471	6,438	6,406
Canada	600	636	727	915	1,048	1,069	973	1,002	997	992
West Europe	12,921	13,106	12,634	11,378	11,868	12,105	10,290	10,650	10,596	10,543
East Europe and CIS	3,564	3,744	3,801	3,678	3,942	3,883	3,417	3,519	3,555	3,590
Latin America	3,701	3,631	3,324	3,547	3,553	3,695	3,769	3,882	4,037	4,199
China	20,568	21,414	22,959	24,850	23,232	23,000	27,255	26,982	27,926	28,904
Japan	1,901	1,930	2,002	1,834	1,772	1,949	1,715	1,801	1,783	1,765
Asia/Africa	6,814	7,061	7,580	7,243	6,754	7,125	7,268	7,486	7,711	7,942
Nordic Countries	1,925	2,070	1,856	1,558	1,652	1,685	1,432	1,482	1,475	1,468
Oceania	386	391	359	379	358	422	317	333	343	353
Total Capacity (kMT)	**65,035**	**68,070**	**68,404**	**68,554**	**68,069**	**67,878**	**70,014**	**74,618**	**76,520**	**76,815**
Net Additional Capacity	**2,140**	**3,035**	**334**	**150**	**(485)**	**998**	**2,298**	**3,037**	**1,903**	**295**
Net Hardwood additional capacity						1,150	2,327	2,338	1,903	295
Net Softwood additional capacity						(153)	(30)	699	0	0
Delta of unplanned downtime			**(564)**	**582**	**716**	**(1,189)**	**(162)**	**1,567**	**0**	**0**
Unplanned Closures/downtime		**(1,450)**	**(2,014)**	**(1,432)**	**(716)**	**(1,905)**	**(2,067)**	**(500)**	**(500)**	**(500)**
Producer Inventories (kMT)	**4,751**	**6,484**	**6,362**	**5,244**	**6,060**	**6,485**	**7,186**	**6,986**	**6,986**	**6,986**
Producer Inventories (days of supply)	29	39	37	31	36	38	42	40	39	39
Inventory consumption		**1,733**	**(122)**	**(1,118)**	**816**	**425**	**701**	**(200)**	**0**	**0**
Operating rates (%)	**91.0%**	**91.9%**	**90.8%**	**89.7%**	**90.7%**	**91.7%**	**90.6%**	**85.0%**	**84.8%**	**86.1%**

Source: BofA Global Research estimates, Fastmarkets RISI, Hawkins Wright, PPPC, Brian McClay & Associates

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Compared to our prior model, our total capacity forecasts decline by ~3.5Mt in 2023 and by ~1.4Mt in 2024 – primarily driven by a ~2,067Kt hit from unplanned downtime this year vs our previous forecast of 500Kt, coupled with some indefinite capacity closures and project delays.

Exhibit 147: BofA – Old vs New supply/demand model (kMT)

We are updating our capacity forecasts following the project delays and unplanned closures

		2021A	2022E	2023E	2024E	2025E	2026E
Total Demand	**New**	**60,947**	**61,838**	**62,717**	**63,608**	**64,861**	**66,162**
	Old	60,468	63,162	64,342	65,495	66,693	67,936
	Change	0.8%	-2.1%	-2.5%	-2.9%	-2.7%	-2.6%
Total Capacity (after unplanned downtime)	**New**	**68,069**	**67,878**	**70,014**	**74,618**	**76,520**	**76,815**
	Old	69,199	69,082	73,459	76,057	77,669	77,924
	Change	-1.6%	-1.7%	-4.7%	-1.9%	-1.5%	-1.4%
Net additional capacity	**New**	**(485)**	**998**	**2,298**	**3,037**	**1,903**	**295**
	Old	(51)	998	3,047	2,598	1,613	255
	Change	851.0%	0.0%	-24.6%	16.9%	18.0%	15.7%
Capacity utilization (%)	**New**	90.7%	91.7%	90.6%	85.0%	84.8%	86.1%
	Old	88.6%	91.7%	87.6%	86.1%	85.9%	87.2%
	Change	220 bps	0 bps	300 bps	-110 bps	-110 bps	-110 bps

Source: BofA Global Research estimates, PPPC, Fastmarkets RISI, Hawkins Wright, Brian McClay & Associates

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A December hike … before a cold winter

As we approached the end of 2023, we started to see some signs that the pulp price rebound was losing steam, including: (i) the increase in domestic pulp production in China, (ii) a slowdown in downstream demand datapoints in China and recent drop in tissue prices and output (see our December China Paper Thermometer report; Exhibit 8 and Exhibit 9), (iii) and recent increase in producer inventories (please see our November PPPC review). In fact, although the December hike appears to have been passed through, buyers pushed back more relative to previous hikes after the drop in futures and resale prices.

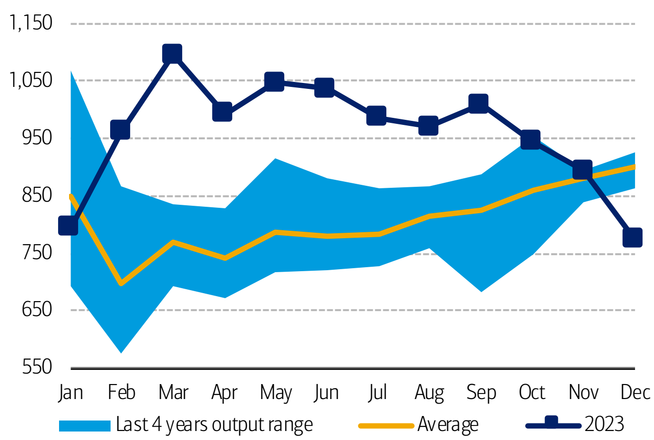
Short term pulp headwinds could be a buy opportunity

Although demand seasonally slows down in 1Q and there is new supply ahead (Cerrado), we believe that any price drop ahead should be shallow and short-lived given current prices remain close to cost support (~$550/ton). In fact, this year when prices dropped below this level we saw massive and swift supply adjustments which triggered the rebound since May. We also see a lack of major confirmed new supply additions post 2024 (other than Oki's 1.5Mtpa market pulp expansion in 2025) which could pave the way for a multi-year pulp price recovery in the years to come. Despite some short-term headwinds for pulp, we believe any potential pricing downside looks limited and see an overall lack of new supply from 2025 onwards which could support a multi-year price rebound.

Strong Chinese P&B demand, pulp imports fuel price hikes

Despite the slowdown by 4Q23, we saw strong paper & paperboard demand in China throughout 2023. On a consolidated basis, output rose 8.5% y/y, up 18% y/y for tissue, 16.5% for uncoated woodfree paper (UWF), 6.5% for coated paper and 2.5% for ivory board, with duplex being the only grade down y/y at -4.2%. Meantime, aggregated inventories dropped 19% or ~600Kt to 2.5Mt (see our October China Paper Industry Thermometer update). The combination of production increases and inventory consumption indicates improved paper and board demand, which is also shown on coated paper prices, up 6.1% y/y, while tissue prices dropped 18% throughout 2023 from a strong 2022, but remained above 2021 levels.

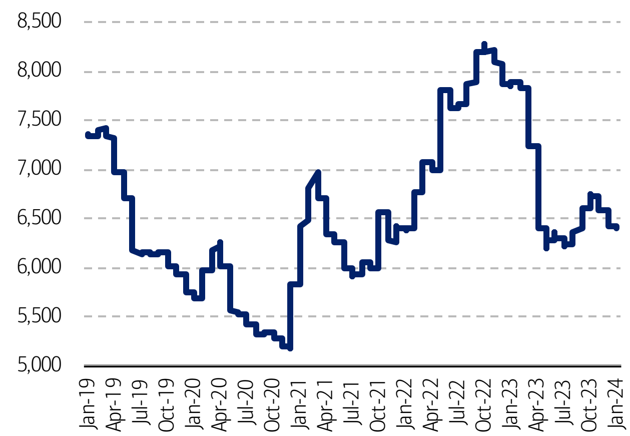
Exhibit 148: Tissue – production volume in China (Kt)
Chinese tissue output has been running well above its average



Source: BofA Global Research, SCI

BofA GLOBAL RESEARCH

Exhibit 149: Tissue – average prices in China (RMB/MT)
Average tissue prices rose 1.8% m/m to RMB 6,733/t



Source: BofA Global Research, SCI

BofA GLOBAL RESEARCH

Meantime, shipments to China were boosted by improved buying activity after prices bottomed out earlier this year and stimulated restocking. This move could also be fueled by lower output from integrated producers in China (~10Mt of capacity, with ~2Mt operating at $530-550/MT cash cost), which is also reinforced by wood chip imports to China down 21% YTD as of November – implying a reduction of 1.55Mt of pulp production from integrated players (Exhibit 154) or 1.7Mt on an annualized basis. All in, pulp imports in China skyrocketed 25.3% YTD as of November, while global pulp shipments rose 3.5% YTD as per PPPC (Pulp and Paper Products Council) GL100 data (see Nov PPPC review).

Exhibit 150: Summary table for World Pulp Statistics – Shipments (Kt)
PPPC reported global pulp shipments up 8.3% y/y to 4,722Kt in November

	Nov-23	m/m %	y/y %	2023 ytd	ytd (%)
Total shipments	**4,722**	**5.4%**	**8.3%**	**49,632**	**1.7%**
Softwood pulp	1,984	4.6%	4.6%	20,656	0.2%
Hardwood pulp	2,583	6.7%	11.7%	27,231	4.5%
Others	155	-4.9%	1.3%	1,745	-18.6%
By region					
North America	604	-4.1%	-8.4%	6,715	-7.2%
Europe - Total	1,035	2.0%	-8.2%	11,477	-15.3%
LatAm	326	1.0%	2.7%	3,723	3.0%
China	1,944	12.7%	35.5%	18,718	25.3%
Japan	148	-1.3%	-23.2%	1,742	-15.7%
Other Asia & Africa	637	4.4%	8.3%	6,954	-0.3%
Oceania	28	-5.9%	-31.2%	304	-24.3%

Source: BofA Global Research, PPPC

BofA GLOBAL RESEARCH

Exhibit 151: Summary table for World Pulp Statistics – Inventories
Producer inventories down one day m/m in Nov to 40 days of supply

	Nov-23	m/m	y/y
Days of supply	**40**	**-1**	**-4**
Softwood pulp	37	-1	-4
Hardwood pulp	43	0	-3
Shipment-to-capacity (operating rates %)	**92%**	**+700bp**	**+400bp**

Source: BofA Global Research, PPPC

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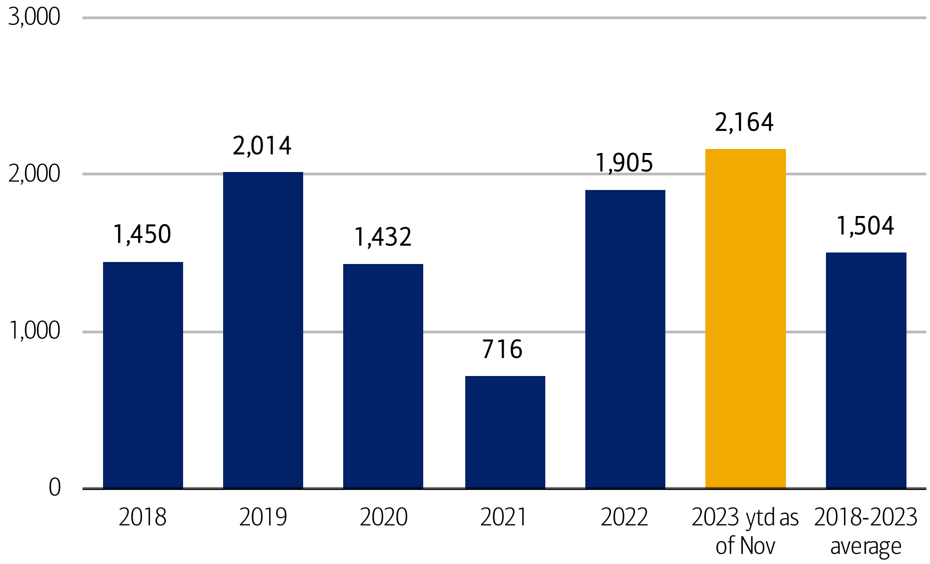
Disruptions have been significant in 2023

RISI estimates close to ~2.2Mt of supply disruptions YTD up until November (Exhibit 152) and additional shutdowns continue to take place, e.g. Arauco recently announced it is indefinitely suspending its 160Kt/yr USK (Unbleached Softwood Kraft) Licancel mill. Furthermore, wood chip imports into China are down 26% YTD as of Aug implying a reduction of 1.4Mt of pulp production from integrated players or 1.7Mt on an annualized basis (Exhibit 154). Imported wood chip prices in Asia are currently trading at ~$188/t (Exhibit 155) which implies that wood costs alone for pulp producers in Asia amount to close to ~$420/t.

Assuming wood costs account for around 74% of Asian pulp producer costs, total pulp cash costs on a per ton basis should be close to ~$565/t. RISI currently estimates the production cost of higher cost integrated pulp capacity in China ranges between $530-550/t. As China has picked up its woodchip imports, we could expect woodchip prices to move up over the near term. While current prices above $600/t incentivize integrated producers to restart, we see prices rangebound as there is not much upside from the $600-650/t range, but also prices much below such levels could trigger the integrated producers to return to market pulp.

Exhibit 152: Market pulp unplanned downtime (kMT)

RISI estimates close to 2.2Mt of supply disruptions YTD up until November 2023, already the second highest level since 2018

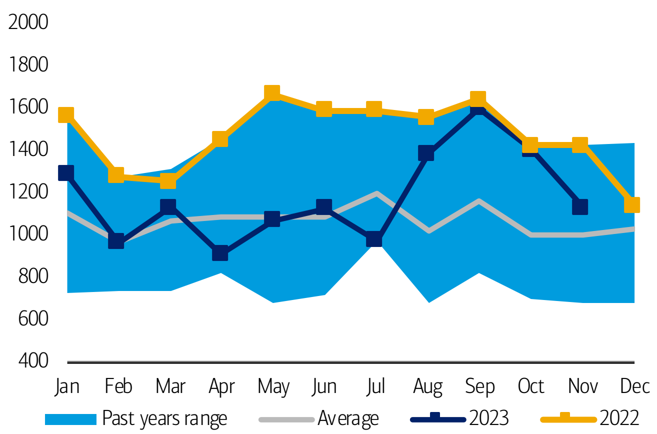


Source: BofA Global Research, Fastmarkets RISI

BofA GLOBAL RESEARCH

Exhibit 153: Chinese hardwood chip imports (Kt)

Wood chip imports into China are down 21% YTD as of November ...



Source: BofA Global Research, China NBS

BofA GLOBAL RESEARCH

Exhibit 154: Estimated Chinese hardwood chip imports effect on its domestic integrated pulp production (kMT)

... implying a reduction of 1.4Mt of pulp production from integrated players or 1.7Mt on an annualized basis

Integrated pulp production delta y/y (Kt)	
2022 YTD woodchip imports (Kt)	16,435
2023 YTD woodchip imports (Kt)	12,985
Woodchip imports delta (Kt)	3,450
Pulp yield	*45%*
Delta integrated pulp produced (Kt)	1,552
Annualized woodchip imports delta (Kt)	3,763
Pulp yield	*45%*
Annualized delta integrated pulp produced (Kt)	1,693

Source: BofA Global Research estimates, China NBS

BofA GLOBAL RESEARCH

Exhibit 155: Average imported hardwood chip prices in China (US$/MT)
Imported wood chip prices in Asia are currently trading at ~$188/t which implies that wood costs alone for pulp producers in Asia amount close to ~$420/MT

Source: BofA Global Research, China NBS

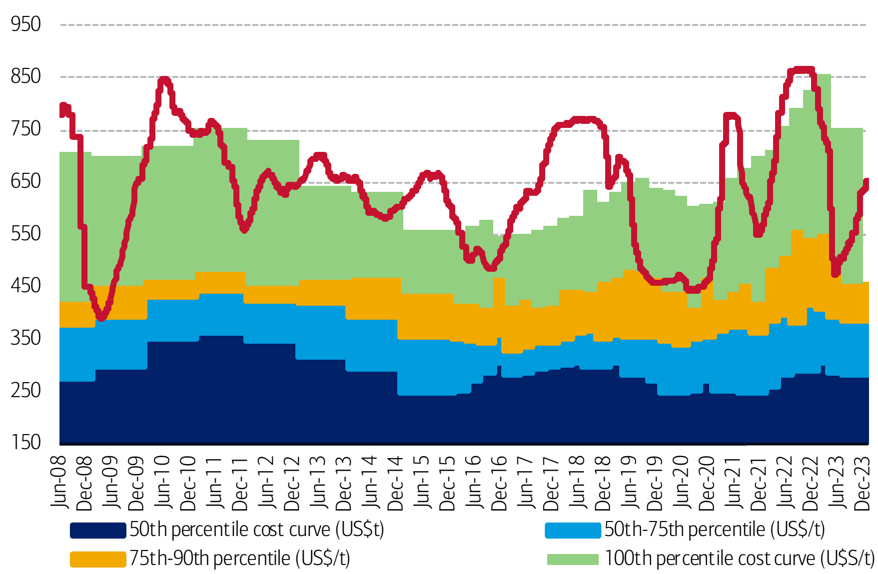
BofA GLOBAL RESEARCH

Pulp prices tested cost support

As seen on Exhibit 156 pulp prices were below the 90th percentile of the cost curve when they bottomed. That was only seen in 2008 and 2019 before, historical pulp price bottoms. After that, prices quickly rebounded, but remain relatively close to cost curve support at current levels. After that, prices quickly rebounded, but remain relatively close to cost curve support at current levels. In our view, this could suggest that pulp price downside for now is limited, which helps support our fairly stable pulp price estimate for 2024.

We forecast an average HW pulp price for 2024 of $580/t and expect to see prices peaking in 1Q24 then gradually coming down in 2Q-3Q24 given seasonally weaker demand and new supply starting-up (Suzano's Cerrado project in June). We then see prices rebounding again in 4Q24 given stronger demand seasonality.

Exhibit 156: China hardwood prices vs cost curve support (US$/t)
At the bottom prices were below the 90th percentile and quickly rebounded



Source: BofA Global Research, Fastmarkets FOEX, Fastmarkets RISI

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Risks and other factors to watch

Chinese demand has carried the slowdown in other regions and, coupled with disruptions, was enough to support a tighter-than-expected pulp market in 2023. However, looking to 2024, we expect Chinese demand to decelerate, particularly as the restocking movement seems to be in its last legs and integrated producer are returning, as evidenced by higher woodchip imports. Therefore, a key risk is if the rebound in North America and European demand is not enough to sustain the weaker demand on a y/y basis from China.

Chinese paper exports have also been running high in 2023 and how sustainable these exports are is also key for pulp prices to be sustained in 2024. Supply additions are not a particular point of attention in 2024 as CMPC has said that their net volume addition will be close to zero and Suzano has said they will ensure they will add Cerrado volumes the least disruptive way possible. However, if prices are sustainably higher we could see a normalization of disruptions in 2024, which could make the market more loose and drive prices down.

Exhibit 157: Stocks mentioned
Prices and ratings for stocks mentioned in this report

BofA Ticker	Bloomberg ticker	Company name	Price	Rating
SID	SID US	Cia Siderurgica SA	US$ 3.92	C-1-8
SIDHF	CSNA3 BZ	Cia Siderurgica SA	BRL 19.25	C-1-8
EC	EC US	Ecopetrol S.A.	US$ 12.25	C-2-8
XESSF	ECOPETL CB	Ecopetrol S.A.	COP 2445	B-2-8
GGBUF	GGBR4 BZ	Gerdau S. A.	BRL 23.36	C-2-8
GGB	GGB US	Gerdau S.A.	US$ 4.82	C-2-8
PBR	PBR US	Petrobras ON	US$ 16.28	C-1-8
PBRQF	PETR3 BZ	Petrobras ON	BRL 39.64	C-1-8
PBRA	PBR/A US	Petrobras PN	US$ 15.74	C-1-8
PTRBF	PETR4 BZ	Petrobras PN	BRL 38.43	C-1-8
SCCO	SCCO US	Southern Copper	US$ 85.49	B-3-8
SUZ	SUZ US	Suzano	US$ 11.22	B-1-7
XXRTF	SUZB3 BZ	Suzano	BRL 54.75	B-1-7
TX	TX US	Ternium	US$ 40.83	C-1-7
VALEF	VALE3 BZ	Vale	BRL 74.27	B-1-8
VALE	VALE US	Vale SA	US$ 15.27	B-1-8
YPF	YPF US	YPF SA	US$ 16.71	C-3-9
YPFSF	YPFD AR	YPF SA	ArP 19955.75	C-3-9

Source: BofA Global Research

BofA GLOBAL RESEARCH

Price objective basis & risk

CSN (SIDHF / SID)

Our price objective of R$21/share (US$4.4/ADR) blends a DCF and 4.5x 2024E EV/EBITDA multiple, below peers given the higher iron ore prices. The multiple uses a discount to its historical average closer to 6x given elevated prices. For the DCF assume a 2.6% perpetuity growth and a 12.8% WACC based on a 15.7% cost of equity and a 5.0% cost of debt (with a 34% tax rate).

Upside risks to our PO are 1) stronger-than-expected pricing power in the domestic market, 2) stronger-than-expected volume recovery/growth for steel and iron ore, 3) higher-than-expected iron ore sales and prices, 4) further growth from its strong FCF, whether downstream or via M&A, and 5) further progress on deleveraging and/or a higher-than-expected dividend payment announcements.

Downside risks to our PO are: 1) weaker-than-expected Chinese steel and global iron ore prices, 2) an appreciating BRL, 3) lower-than-expected iron ore/steel demand or higher costs, 4) any execution issues with its assets, particularly its planned iron ore expansion, and 5) any political Brazil risk.

Ecopetrol S.A. (XESSF / EC)
Our price objective of COP2,765 (US$14/ADR) is based on a DCF-based valuation using the BofA base case oil price scenario, which sees a rise in the price of Brent to US$80/bbl in 2023, US$90/bbl for 2024, and US$70/bbl for 2025 and beyond. We use a 12.8% WACC and a LT growth rate of 2%. Ecopetrol trades at a discount to international peers, warranted in our view by the company's current challenges.

Upside risks to our price objective are oil price movements and faster-than-expected implementation in the company's production and development projects. Downside risks to our PO are negative oil price trends, slower-than-expected oil and gas production growth, possible changes to energy policy in Colombia, which could affect risk perceptions as well as the company's assets.

Gerdau S. A. (GGBUF / GGB)
Our BRL24/share (US$5/ADR) price objective reflects a 50/50 blend of DCF and EV/EBITDA analysis. Our DCF factors in a 10.8% WACC. Our EV/EBITDA analysis uses a 5.5x 2024E multiple, below its historical average and global peers given peak earnings.

Upside risks to our price objective are: 1) stronger-than-expected demand in N. America and Brazil, 2) stronger-than-expected improvement in global macro outlook, and 3) higher-than-expected steel prices in the Brazilian market.

Downside risks to our price objective are: 1) higher costs, leading to weaker margins, 2) weaker-than-expected demand in the US long steel market, 3) weaker-than-expected demand environment in Brazil, and 4) lower-than-expected Chinese steel prices.

Petrobras (PBRQF / PBR)
Our price objective of US$20.20/ADR (R$48.00/share) is based on a discounted cash flow (DCF)-based valuation using the BofA base case oil price scenario, which assumes a Brent price of US$80/bbl for 2023, US$90/bbl for 2024, and US$70/bbl for 2025 and beyond. We use a 14.70% weighted-average cost of capital (WACC) and an long-term growth rate of 2.0%.

Upside and downside risks to achieving our price objective are more favorable or less favorable results from the following factors: (1) oil price trends, (2) political/economic developments in Brazil, (3) possible increase in global risk aversion/higher interest rate environment, and (4) operational delays in production/development projects.

Petrobras PN (PTRBF / PBRA)
Our price objective of US$20.20/ADR (R$48.00/share) is based on a discounted cash flow (DCF)-based valuation using the BofA base case oil price scenario, which assumes a Brent price of US$80/bbl for 2023, US$90/bbl for 2024, and US$70/bbl for 2025 and beyond. We use a 14.70% weighted-average cost of capital (WACC) and an long-term growth rate of 2.0%.

Upside and downside risks to achieving our price objective are more favorable or less favorable results from the following factors: (1) oil price trends, (2) political/economic developments in Brazil, (3) possible increase in global risk aversion/higher interest rate environment, and (4) operational delays in production/development projects.

Southern Copper (SCCO)
Our price objective of US$47/share blends our DCF model and a multiple valuation approach. Our DCF uses a 10.4% WACC and 2.5% terminal growth. For our multiple valuation, we use a 8x 2024E EV/EBITDA, below its 10-year average of c. 9x, which we view as appropriate given higher prices and peak earnings forecasts.

Upside risks to our price objective are: 1) Better macro outlook, 2) higher-than-expected copper prices, 3) faster-than-expected development of projects, particularly Tia Maria, 4) better global copper demand sentiment, and 5) less political risk in Mexico/Peru.

Downside risks to our price objective are: 1) metal price risk as 80% of SCCO revenues come from copper, 2) operational risks including from strikes and other labor disputes, 3) higher costs, 4) any project delays/cost inflation, 5) political risk, and 6) weaker-than-expected copper pricing and demand.

Suzano (XXRTF / SUZ)

Our R$65 ($14/ADR) PO is based on an average of (a) a discounted cash flow (DCF) model, which uses a 9.4% WACC, 2.5% growth rate in perpetuity, and our forecasts through 2028E, and (b) an EV/EBITDA multiple of 7.0x 2024E, fairly in line with its average multiple over the past couple years.

Risks: (1) Global cycle trends, particularly in N America, Europe, and Asia, (2) global cycle trends in key products' pricing, particularly (though not limited to) hardwood pulp pricing to China, (3) potential volatility in the Brazilian economy and the Brazilian Real [BRL], (4) various operational risks associated with Suzano's large fleet of pulp and paper mills, (5) various merger-related integration and other risks associated with the Fibria combination, (6) capital-allocation, cycle, balance sheet/leverage and operating risks associated with large investment projects, such as (but not limited to) new pulp mills, (7) paper/board and pulp sector volatility & demand/pricing trends, (8) demand, supply-chain and other risks created by the COVID-19 pandemic.

As with all our paper/forest/packaging companies, fundamental trends (volumes, pricing, inflation, macro trends) may wind up better or worse than expected.

Ternium (TX)

Our price objective for Ternium of $49/share is based on a 50/50 blend of DCF analysis (with a WACC of 15%) and a 4.0x 2024E EV/EBITDA multiple valuation approach, in-line with its historical average.

Upside risks to our price objective are: 1) a benign outcome from the USMCA agreement, 2) a smooth Argentine economic recovery, 3) multiple re-rating, 4) better steel prices than our forecast, 5) better demand conditions than we forecast, and 6) removal of Section 232 tariffs/quotas against LatAm.

Downside risks to our price objective are: 1) worsening economic conditions in Argentina, 2) a negative outcome from the USMCA agreement for Mexican exports, 3) sustained or heightened tariffs on steel, 4) any operational disruptions, and 5) worse prices than we forecast.

Vale (VALE / VALEF)

Our US$20 (R$95/local share) PO is based on a 50/50 blended valuation approach. On multiples, we use a 4.0x 2024E EV/EBITDA (slightly below its normalized 4.5-5x given elevated prices), and our DCF using a WACC of 12% and terminal growth rate of 2.5%. We use a below normalized 4.0x EV/EBITDA 2024E, below its 5x historical average given our above-normal iron ore forecasts.

Downside risks to our price objective: 1) weaker than expected iron ore prices, 2) a global economic slowdown, negatively impacting metals prices, 3) appreciation of the Brazilian Real and the Canadian Dollar (80% of Vale's costs are denominated in those currencies), without an offsetting increase in metal prices, 4) slowdown in infrastructure spending or global steel production, mainly in China, 5) higher freight rates, reducing Vale's competitiveness in China, 6) higher government intervention, and 7) more fallout from its Brumadinho tailings dam tragedy.

Upside risks: 1) Stronger than expected iron ore prices, 2) stronger than expected global economic growth, 3) acceleration of infrastructure spending or global steel production, mainly in China, and 4) change in China's policy on steel production cuts.

YPF SA (YPF)

Our PO of US$11.30/ADR (ARS 7,920/share) is based on a DCF methodology, using the BofA base case oil price scenario, which assumes Brent prices of US$85/bbl in 2023, US$90/bbl for 2024, and US$70/bbl for 2025 and beyond. We use a 16.2% WACC and terminal growth rate of 3%.

Upside risks to our PO are: (1) new growth projects that are implemented in a way that allows for higher returns, (2) prices for refined products in Argentina, (3) energy policy in Argentina that could become more favorable for oil companies, (4) global energy price movements, (5) improvement in risk perceptions of Argentina.

Downside risks to achieving our price objective are: (1) worsening of Argentina's macroeconomic scenario and maintenance of capital controls, (2) increased government involvement in energy policy in Argentina, (3) execution risk in improving recovery factor in YPF's oil fields, (4) more restricted access to oil services and equipment.

YPF SA (YPFSF)

Our PO of US$11.30/ADR (ARS 7,920/share) is based on a DCF methodology, using the BofA base case oil price scenario, which assumes Brent prices of US$85/bbl in 2023, US$90/bbl for 2024, and US$70/bbl for 2025 and beyond. We use a 16.2% WACC and terminal growth rate of 3%.

Upside risks to our PO are: (1) new growth projects that are implemented in a way that allows for higher returns, (2) prices for refined products in Argentina, (3) energy policy in Argentina that could become more favorable for oil companies, (4) global energy price movements, (5) improvement in risk perceptions of Argentina.

Downside risks to achieving our price objective are: (1) worsening of Argentina's macroeconomic scenario and maintenance of capital controls, (2) increased government involvement in energy policy in Argentina, (3) execution risk in improving recovery factor in YPF's oil fields, (4) more restricted access to oil services and equipment.

Analyst Certification

We, Caio Ribeiro, Guilherme Rosito, Leonardo Marcondes and Leonardo Neratika, hereby certify that the views each of us has expressed in this research report accurately reflect each of our respective personal views about the subject securities and issuers. We also certify that no part of our respective compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

Special Disclosures

BofA Securities is currently acting as exclusive Financial Advisor to Manara Minerals Investment Company LLC in connection with its proposed strategic partnership with Vale S.A. on Vale Base Metals Limited, which was announced on 27 Jul 2023.

Latin America - Natural Resources Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
BUY				
	3R Petroleum	XPXXF	RRRP3 BZ	Leonardo Marcondes
	Alpek SAB de CV	ALPKF	ALPEKA MM	Leonardo Marcondes
	CSN	SIDHF	CSNA3 BZ	Caio Ribeiro
	CSN	SID	SID US	Caio Ribeiro
	Dexco SA	DURXF	DXCO3 BZ	Leonardo Neratika
	Empresas CMPC SA	XEMCF	CMPC CI	Leonardo Neratika
	Enauta Participacoes S.A.	QGEPF	ENAT3 BZ	Leonardo Marcondes
	Orbia	MXCHF	ORBIA* MM	Leonardo Marcondes
	Petro Rio	HRTPF	PRIO3 BZ	Caio Ribeiro
	Petrobras	PBRQF	PETR3 BZ	Caio Ribeiro
	Petrobras	PBR	PBR US	Caio Ribeiro
	Petrobras PN	PBRA	PBR/A US	Caio Ribeiro
	Petrobras PN	PTRBF	PETR4 BZ	Caio Ribeiro
	PetroReconcavo	XPXYF	RECV3 BZ	Leonardo Marcondes
	Suzano	XXRTF	SUZB3 BZ	Caio Ribeiro
	Suzano S.A.	SUZ	SUZ US	Caio Ribeiro
	Ternium	TX	TX US	Caio Ribeiro
	Usiminas SA	USNZY	USNZY US	Caio Ribeiro
	Usiminas SA	USSPF	USIM5 BZ	Caio Ribeiro
	Vale	VALE	VALE US	Caio Ribeiro
	Vale	VALEF	VALE3 BZ	Caio Ribeiro
	Vibra Energia SA	XUBRF	VBBR3 BZ	Leonardo Marcondes
NEUTRAL				
	Bradespar	BRDQF	BRAP4 BZ	Caio Ribeiro
	Companhia Brasileira de Alumínio	XZUDF	CBAV3 BZ	Leonardo Neratika
	CSN Mineracao	XZRAF	CMIN3 BZ	Caio Ribeiro
	Ecopetrol S.A.	XESSF	ECOPETL CB	Caio Ribeiro
	Ecopetrol S.A.	EC	EC US	Caio Ribeiro
	Gerdau S. A.	GGBUF	GGBR4 BZ	Caio Ribeiro
	Gerdau S.A.	GGB	GGB US	Caio Ribeiro
	Metalurgica Gerdau	MZGPF	GOAU4 BZ	Caio Ribeiro
	Ultrapar	XLRUF	UGPA3 BZ	Leonardo Marcondes
	Ultrapar Pa-ADR	UGP	UGP US	Leonardo Marcondes
UNDERPERFORM				
	Empresas Copec SA	PZDCF	COPEC CI	Leonardo Neratika
	Grupo Mexico	GMBXF	GMEXICOB MM	Caio Ribeiro
	Klabin S.A	XLWDF	KLBN11 BZ	Caio Ribeiro
	Klabin S.A	KLBAY	KLBAY US	Caio Ribeiro
	Southern Copper	SCCO	SCCO US	Caio Ribeiro
	YPF SA	YPF	YPF US	Leonardo Marcondes
	YPF SA	YPFSF	YPFD AR	Leonardo Marcondes
RSTR				
	Braskem SA-A	BAKAF	BRKM5 BZ	Leonardo Marcondes
	Braskem SA-ADR	BAK	BAK US	Leonardo Marcondes

Disclosures

Important Disclosures

Equity Investment Rating Distribution: Energy Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships [R1]	Count	Percent
Buy	83	61.48%	Buy	64	77.11%
Hold	28	20.74%	Hold	21	75.00%
Sell	24	17.78%	Sell	18	75.00%

Equity Investment Rating Distribution: Non-Ferrous Metals/Mining & Minerals Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships [R1]	Count	Percent
Buy	58	53.70%	Buy	26	44.83%
Hold	24	22.22%	Hold	10	41.67%
Sell	26	24.07%	Sell	13	50.00%

Equity Investment Rating Distribution: Paper/Forest Products Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships [R1]	Count	Percent
Buy	9	45.00%	Buy	8	88.89%
Hold	2	10.00%	Hold	1	50.00%
Sell	9	45.00%	Sell	5	55.56%

Equity Investment Rating Distribution: Steel Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships [R1]	Count	Percent
Buy	14	43.75%	Buy	9	64.29%
Hold	12	37.50%	Hold	7	58.33%
Sell	6	18.75%	Sell	3	50.00%

Equity Investment Rating Distribution: Global Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships [R1]	Count	Percent
Buy	1895	53.62%	Buy	1083	57.15%
Hold	832	23.54%	Hold	454	54.57%
Sell	807	22.84%	Sell	383	47.46%

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster[R2]
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Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

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