

Commodity Strategist

What did we learn at our commodity conference?

Sticky inflation creates a complex commodity backdrop

At our Virtual Commodity Conference last week, we hosted over 30 senior executives, policy makers, and investors from Hess Corp, BP, EQT, Cheniere, Enel, Iberdrola, OCI NV, Fertigllobe, Rio Tinto, Anglo American, Hecla, Sibanye, PIMCO, WisdomTree, Invesco, APG, Legal and General, Andurand Capital, the European Commission, the US Department of Defense, etc. as well as some of our own BofA analysts and traders. Over 1000 people registered to attend. What did we learn? At a macro level, our speakers expressed the view that inflation would remain sticky as fiscal policy has yet to be leveraged to constrain demand. A complex geopolitical backdrop, the energy transition, and shifting supply chains could make it more difficult to normalize prices. Our speakers also discussed numerous solutions to decarbonize physically, such as increasing output of green hydrogen, ammonia, or methanol, and financially, such as incorporating new and non-benchmark commodities in portfolios, such as cobalt, lithium, iron ore, and ethanol.

A negative macro outlook pushed commodities lower...

Participants believed macro has dominated fundamentals for commodities, creating a bearish backdrop for prices. Thus, most attendees and speakers believed oil was more likely to touch \$60/bbl than \$90/bbl over the next few months. In contrast, attendees and speakers were much more constructive on copper and gold. Crucially, a large majority of attendees and speakers thought commodities, the big laggard across all major asset classes in 2023 compared the equities and bonds, could become once again the top performing asset class in 2024. Many blamed the rapid interest rate hiking cycle for the downward pressure on commodity prices, but also expressed confidence that very low levels of inventories and an eventual change in monetary policy direction next year could reignite the commodity complex.

...but low stocks, underinvestment may resurface in 2024

For oil and gas, short term fundamentals mask long term capex needs. In most energy scenarios, oil and gas will be needed for decades to come. Still, participants showed a bearish tilt on refining margins and refined product cracks and argued that global gas is still vulnerable to both the upside and the downside, especially as weather becomes more extreme. Plus, insufficient storage around the world should fuel gas price volatility as the LNG market grows and energy transition progresses. In Europe, natural gas demand could partially recover, but dependence on LNG will remain high and act as a constraint. In our metals segments, speakers noted that raw material shortages are a result of underinvestment and highlighted that the cost of capital for miners needs to decline. Even then, miners remain optimistic and keep transforming their portfolio due to the tremendous opportunities ahead in the green economy.

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Refer to important disclosures on page 43 to 44.

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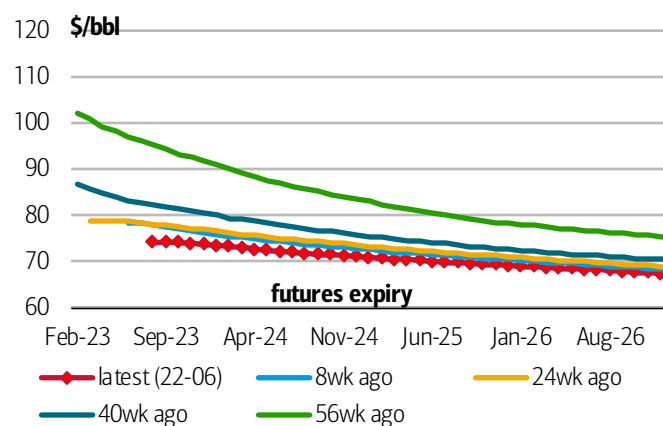
Keynote presentation: Energy markets in the midst of a transition

Short term fundamentals mask long term need for oil and gas supply

The oil market is driven by short term dynamics that reflect recent weak fundamentals, including a sluggish Chinese demand recovery and Russian exports running at much higher levels than anticipated just a few quarters ago. Yet, OPEC+ has done an excellent job of keeping the market in balance since 2020 and the market remains in backwardation as a result (Exhibit 1). Unfortunately, soft fundamentals have dragged the entire curve lower, making upstream investment less attractive. One speaker noted that upstream oil and gas capex during 2020-22 had ranged from \$300-400bn (Exhibit 2), but he believed investment closer to \$500bn per year is likely needed for supply to keep up with demand over the medium term.

Exhibit 1: Brent crude oil forward curve

OPEC+ has done an excellent job keeping the market balanced and the curve remains backwardated, which may discourage future investment

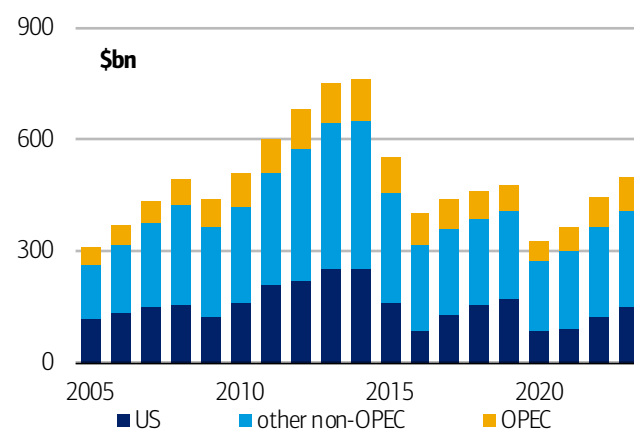


Source: Bloomberg

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Exhibit 2: Global oil and gas capex

Upstream oil and gas capex in 2020-22 ranged from \$300-400bn, but investment closer to \$500bn per year is likely needed to meet demand



Source: Woodmac

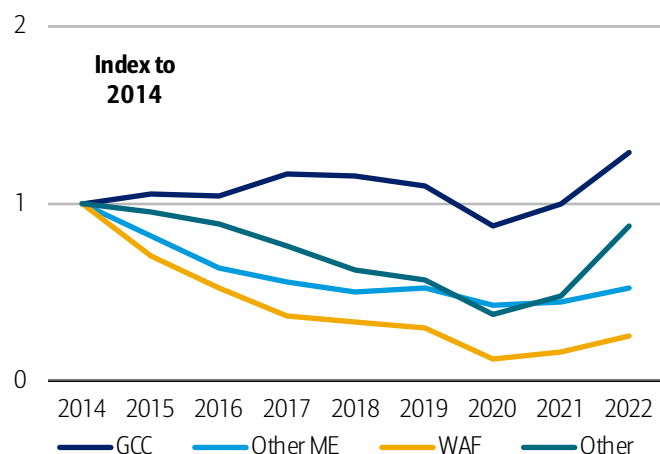
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Within OPEC, GCC countries are the only ones adding capacity...

Even though OPEC+ has done well managing the global oil market, most OPEC countries have been significantly underinvesting versus levels required to keep production flat (Exhibit 3). As a result, OPEC countries outside the Middle East have seen their production decline, a trend epitomized by West African countries, where production is trending near 2.9mn b/d or roughly 900k b/d below target levels. Across OPEC, only a handful of countries still hold spare capacity today, primarily in the Middle East (Exhibit 4). Even there, only Saudi Arabia, the UAE, and Kuwait have been deploying upstream capital in a way that will boost capacity over the medium term. By 2027, GCC OPEC countries are expected to add nearly 3mn b/d of oil production capacity, which will give those countries much more leverage of the oil market.

Exhibit 3: OPEC upstream capex

OPEC countries have been significantly underinvesting versus levels required to keep production flat

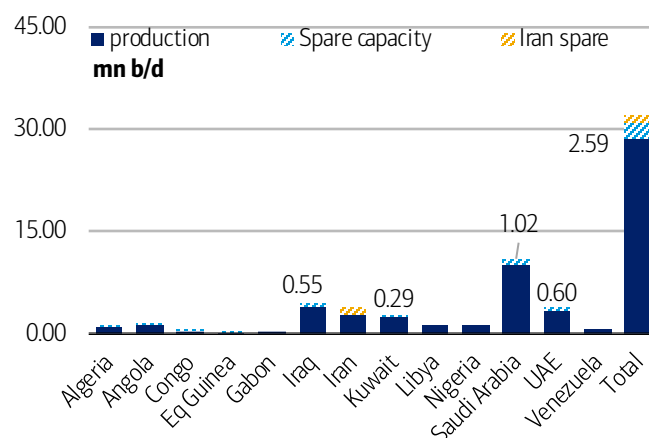


Source: Woodmac

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Exhibit 4: OPEC spare capacity

Across OPEC, only a handful of countries still hold spare capacity today, primarily in the Middle East



Source: IEA, BofA Global Research estimates

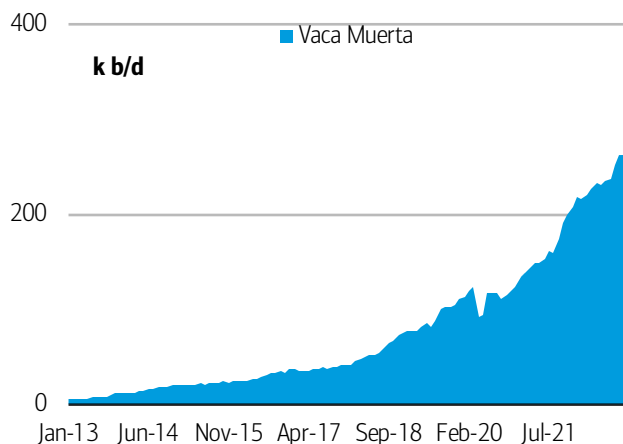
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...and with US shale likely to peak in 2-3 years, other supply needed

After upending how the world looks at global oil supply over the past decade, the US shale patch has tossed out its aggressive approach to growth and now favors more disciplined spending with a focus on returning cash to shareholders. This new dynamic is likely to cause US production to plateau at around 13-13.5mn b/d in the next 12-18 months. In the absence of US shale supply growth, Argentina's Vaca Muerta (Exhibit 6) is expected to add 60-100k b/d annually over the medium term, but it is unlikely that there will be another Permian Basin sized deposit that will help fill in the void of US shale growth. Also in South America, Guyana, Brazil, and even Suriname should experience meaningful growth over the next decade. Further afield, E&Ps are discovering massive deposits in offshore Namibia (Exhibit 7) and in the Mediterranean that should play a crucial role in the global supply stack later this decade.

Exhibit 5: Vaca Muerta crude oil production

The Vaca Muerta should help drive Argentina's liquids production up towards 1mn b/d by 2028

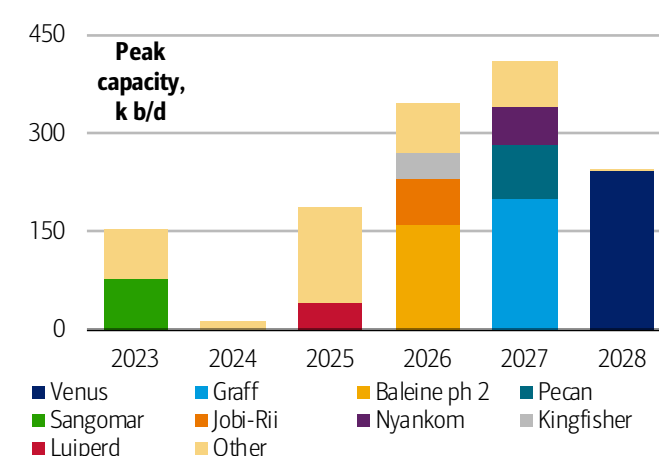


Source: Rystad Energy

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Exhibit 6: Potential non-OPEC Africa project starts

In the absence of US supply growth over the next decade, oil producers are looking further afield to South America and Africa for more output



Source: Woodmac

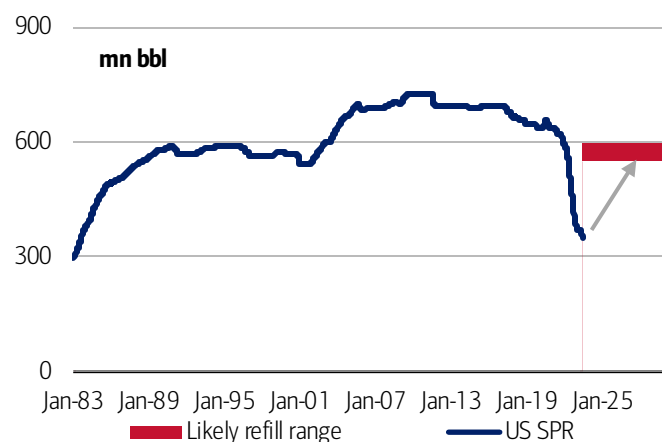
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In most energy scenarios, oil and gas needed for decades to come

Since the start of war in the Ukraine, focus has shifted away from complete decarbonization toward a more achievable goal that incorporates oil and gas in energy stack over a longer time horizon. Even the Biden Administration has recognized the importance of oil and gas and the benefit of shale gas on US electricity costs, which are 50-66% lower than Europe. Our speaker also voiced approval for the US strategic petroleum release in 2022 and expects the DOE to repurchase barrels to refill the reserve to 550-600mn bbl over the coming years (Exhibit 7). This effort was viewed as critically important to US energy security but also global economic security. After all, the energy transition is still only in its infancy, which decarbonization spend estimated at \$1.2tn in 2022, well below the \$4tn+ needed annually through 2050 to achieve environmental goals. Importantly, even in a net-zero scenario, oil and gas are expected to comprise roughly 20% of energy demand by 2050 (Exhibit 8).

Exhibit 7: US Strategic Petroleum Reserve inventories

The US SPR is likely to be refilled to 550-600mn bb over the coming years, according to one panelist

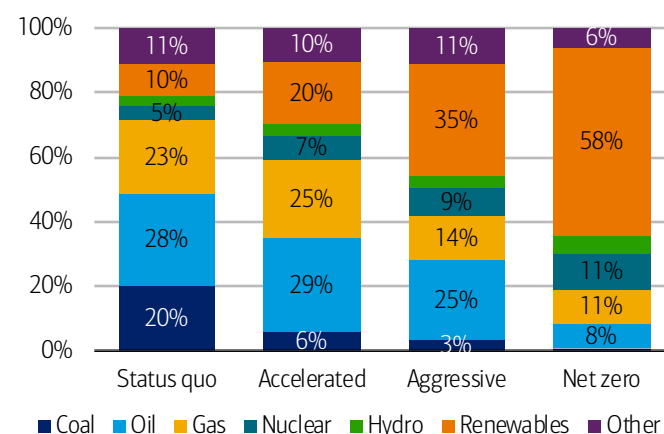


Source: Bloomberg, BofA Global Research

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Exhibit 8: Energy demand by source in 2050 under different transition scenarios

Even in a net-zero scenario, oil and gas are expected to comprise roughly 20% of energy demand by 2050



Source: BofA Global Research

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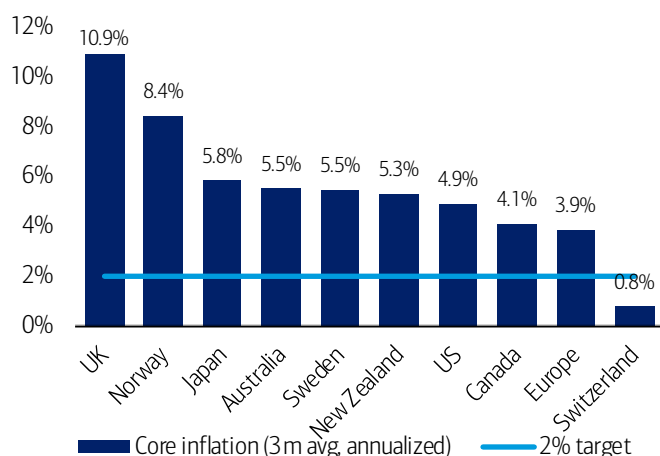
Keynote presentation: Macro Economic Landscape

Policy makers are facing an unfamiliar new regime that is prolonging inflation...

Global inflation was highlighted as a byproduct of excess monetary and fiscal stimulus, above and beyond what was initially necessary to combat the pandemic that served as a health, financial, and economic shock. The world has entered a new regime that has shifted preferences towards higher propensity to consume and lower labor supply, making it harder for monetary policy to reduce inflation and creating more complex trade-offs. Inflation was viewed as sticky, and higher for longer may be necessary due to shifts in preferences that have muted the monetary policy transmission mechanism. Central bankers need to preserve both mandates and optionality, while clearly communicating their priorities and trade-offs. One suggestion was for a shift towards inflation forecast targeting, which would allow markets to better understand the central bank reaction function and reduce uncertainty.

Exhibit 9: Developed markets core inflation (3-month average of annualized monthly changes)

Inflation remains elevated and appears sticky across most developed economies...

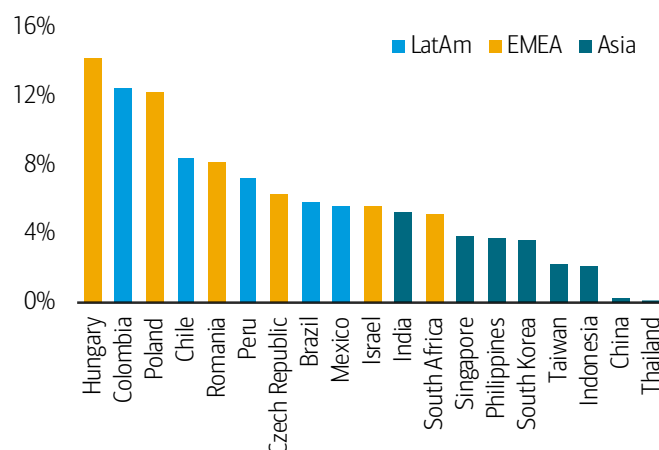


Source: Haver

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Exhibit 10: Emerging markets core inflation (3-month average of annualized monthly changes)

... and emerging economies as well, but emerging market central bankers are closer to cutting rates



Source: Haver

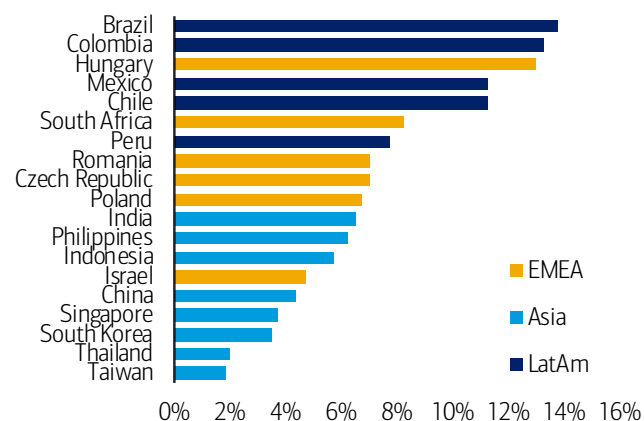
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... and will need to maintain high rates for longer as uncertainty remains

Rates were viewed as the most effective monetary policy instrument, but the effectiveness is not constant and varies across business cycles and shocks. Fiscal policy could help with constraining aggregate demand but is surprisingly not in the discussion or even on the table due to political dynamics. China's re-opening remains a key question as the size and efficacy of any stimulus remains uncertain as while a sizeable stimulus could put pressure on commodity prices and inflation, Chinese consumers have not yet exhibited massive revenge spending like the west. Emerging market economies (EME) are closer to cutting rates but must pay close attention to advanced economies due to pass-through of global financial conditions that are viewed as exogenous and must be maneuvered around.

Exhibit 11: Emerging market central bank policy rates

Emerging market policy rates have been at peak for some time as policy makers wait for the effects of rates on the real economy and inflation

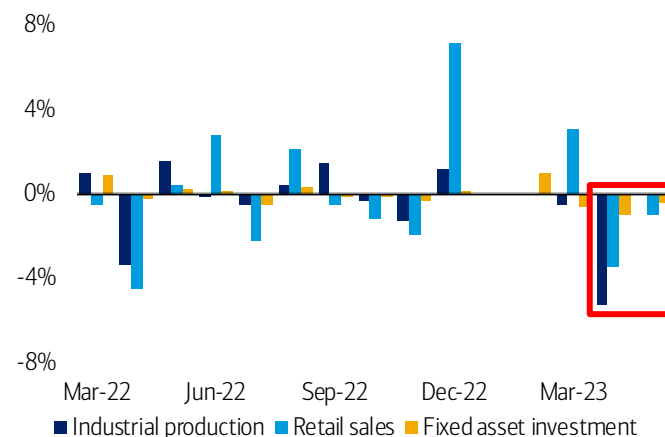


Source: Haver

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Exhibit 12: China industrial production, retail sales, and fixed asset investment relative to Bloomberg survey median

China's re-opening has undershot expectations, which could be a result of a shift in preferences that diverges from the experience in the west



Source: Bloomberg

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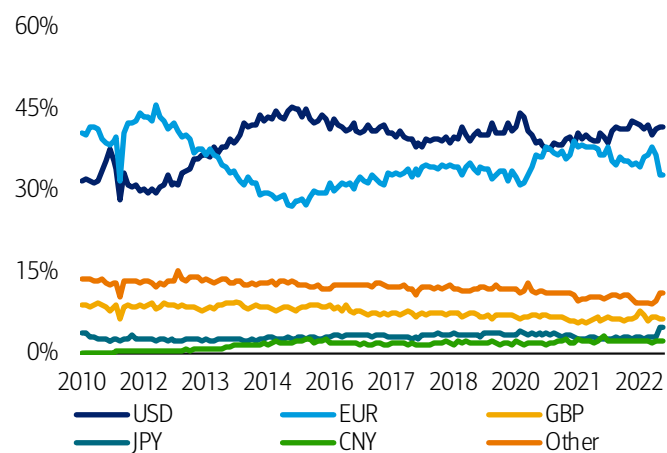
Debt constrains fiscal policy and de-dollarization is distant, but gold diversifies

The panel also addressed the topics of debt sustainability and de-dollarization. The importance of avoiding fiscal dominance and maintaining central bank credibility was viewed as paramount to avoid the pitfalls of some Latin American economies, but by the same vein, tighter monetary policy was expected to put pressure on public sector expenditures. Indeed, with high debt, rising expenditures, and higher rates, fiscal policy will have less degrees of freedom and have the difficult task of implementing proper policy that is painful in the short run and likely to spur social tensions and political polarization.

Shifting to de-dollarization, sovereigns have shown increased demand for gold reserves in order to diversify from traditional fiat currency and hedge against the risk of geopolitics and sanctions. While the dollar has fallen as a percentage of reserves, it still holds a commanding lead and is still central to financial flows, which likely will not go away or be replaced in the near term (Exhibit 13 and Exhibit 14). More interestingly, the world would benefit from global digital payment solutions and central banks especially the US should seek to advance these alternatives as the best digital money solutions will likely stem from central banks.

Exhibit 13: FX share of SWIFT payments

Dollar and euro still dominate cross-border payments as RMB remains around 2%

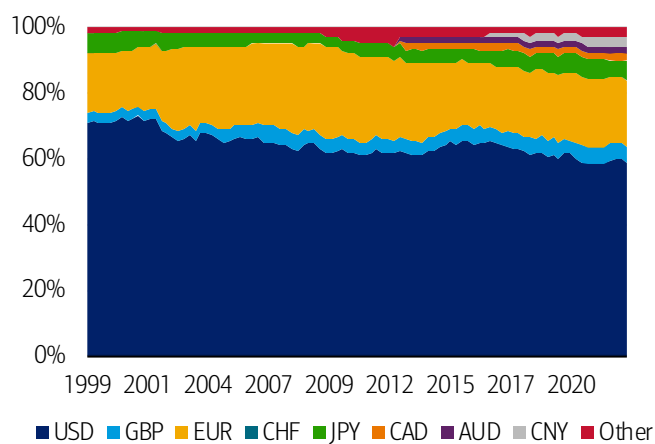


Source: Bloomberg

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Exhibit 14: IMF foreign exchange reserves by currency

US share of FX reserves has been steadily falling, and while CNY has been rising, but it remains small at around 2%



Source: IMF

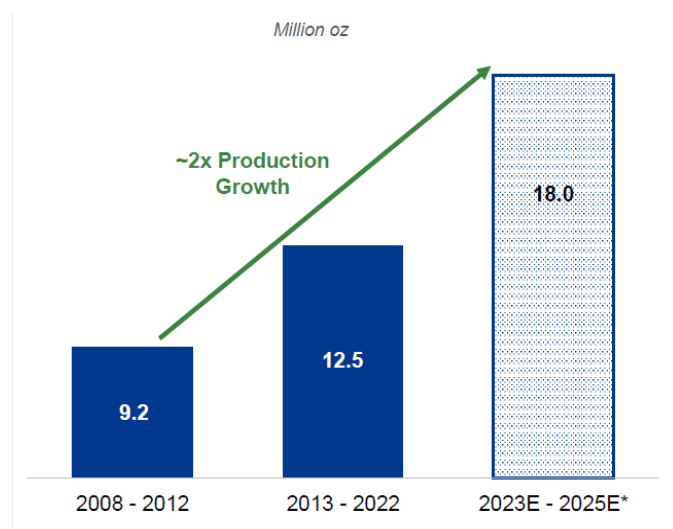
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Silver, the forgotten energy transition metal

We hosted Phil Baker, CEO of Hecla Mining to talk the evolution of HL and the silver market. Touching on the company, the manager highlighted that silver production has doubled over the past decade (Exhibit 15). Notwithstanding the production increases, Hecla has also managed to boost its silver reserves.

Exhibit 15: Average Silver Production: 2008 - 2025E

Hecla's has doubled its silver production over the past decade...

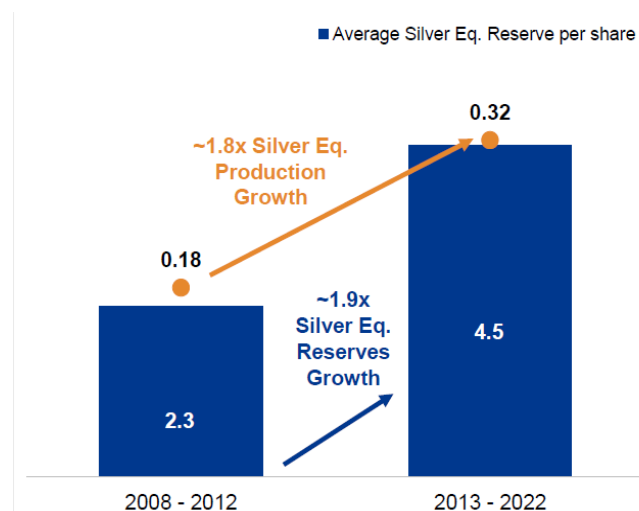


Source: Heda Mining

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Exhibit 16: Silver Eq. Production and Reserves per Share: 2008 2022

... also managed to boost its silver reserves



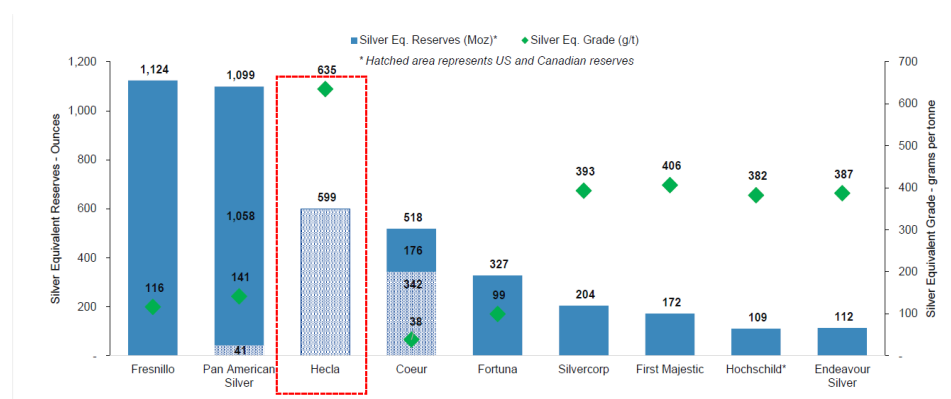
Source: Heda Mining

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Remarkably, the reserve base has among the highest ore grades among primary silver producers (Exhibit 17).

Exhibit 17: Silver Equivalent Reserves and Reserve Grade**

Hecla's reserve base has among the highest ore grades among primary silver producers



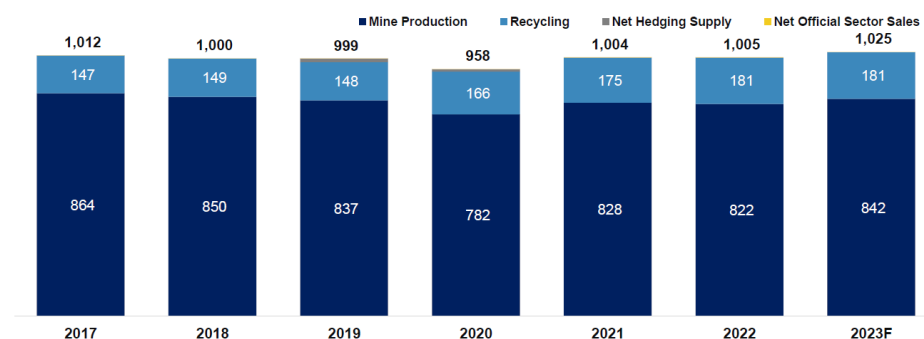
Source: Heda Mining

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This growth stands in stark contrast to dynamics on the wider silver market, with Exhibit 18 showing that global mine supply has flat lined for the best part of the past decade. In our view, this was heavily influenced by capex cuts, as many miners had been under pressure during the prolonged bear market in the wake of the Great Financial Crisis. Of course, the production discipline is one reason, silver is trading +20/oz at present.

Exhibit 18: Silver supply comes from mine production & recycling

Mine production has flat lined

Silver Supply
(Millions oz)

Source: Heda Mining

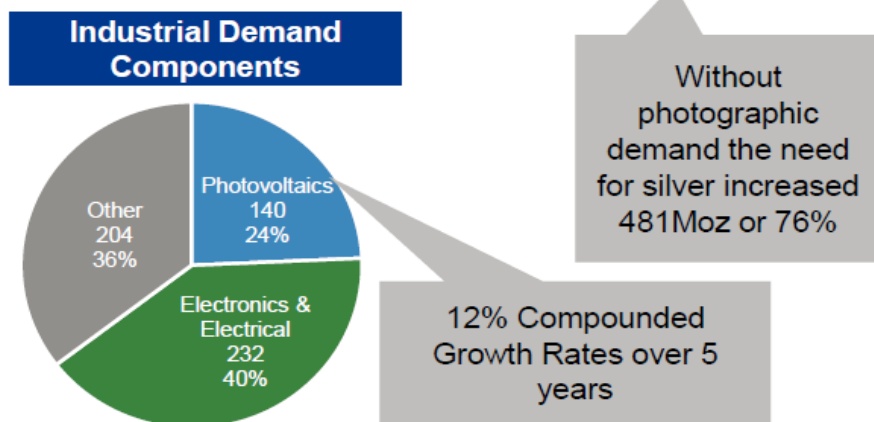
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Shifting towards demand, Hecla noted that photography demand has fallen sharply as the industry has digitalized (Exhibit 19), but this has been offset by higher consumption from industrial applications; investment demand has also helped

Exhibit 19: Change in silver demand over the past 23 years

The decline in demand from the photography industry has run its course

	1999	2022	% Increase
Industrial	343	576	68%
Photography	246	28	-89%
Jewelery/Silverware	260	255	-2%
Investment	26	279	1,073%
Total	875	1,138	30%

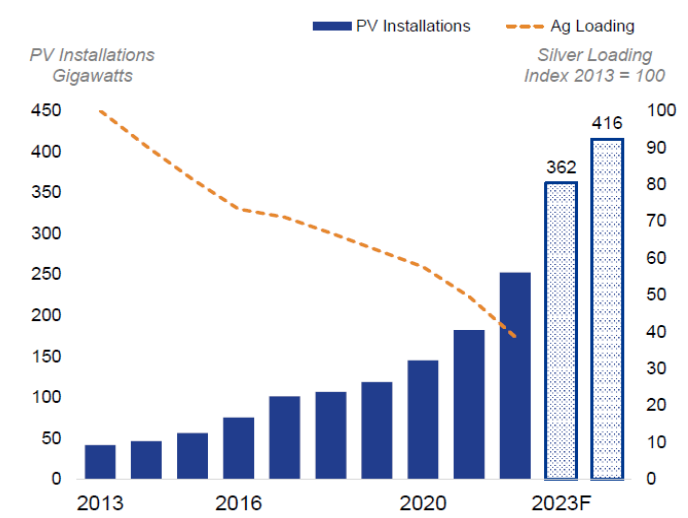


Source: Heda Mining

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Digging a bit deeper, silver usage from solar photovoltaic has also growing rapidly, and now accounts for 24% of industrial demand. Indeed, rising photovoltaic (PV) installations have offset a drive by panel manufacturers to reduce silver loadings per cell, although the latter has by now run its course. As such, total offtake should increase further, as Exhibit 21 highlights.

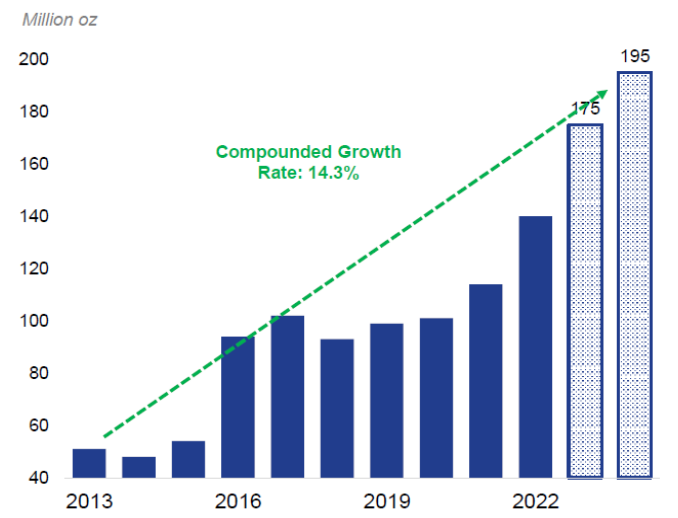
Exhibit 20: PV Installations (Gigawatts) and Silver Loadings
The impact of higher PV installations on silver demand has been muted by falling silver loadings per solar panel



Source: Heda Mining

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Exhibit 21: Silver used in PVs, 2013 2024F
The focus on the energy transition has given renewed impetus to demand increases



Source: Heda Mining

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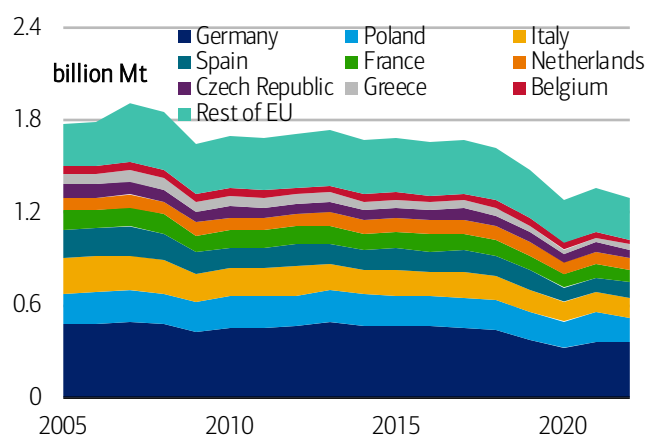
Role of Carbon Markets – how they are evolving to meet the Net Zero needs

Carbon markets have proven successful thus far...

The overwhelming sentiment of the panel was that carbon markets work, especially in Europe where discussion focused on the EU's emission trading system. The EU ETS system is the world's largest carbon market at 450 times larger than the voluntary market according to one panelist, which operates in all EU countries plus Iceland, Liechtenstein, and Norway. It currently covers 40% of the EU's greenhouse gases, primarily from the power and manufacturing industries. The carbon market has helped drop EU emissions from just under 1.8 billion Mt in 2005 to roughly 1.3 billion Mt in 2022 (Exhibit 22) excluding the UK. While prices have fluctuated over history, the bid-ask spread remains tight at usually under € 0.1/mt or less than 1% of the price further suggesting a relatively efficient carbon market.

Exhibit 22: EU emissions

EU emissions have declined roughly 500 million Mt since 2005

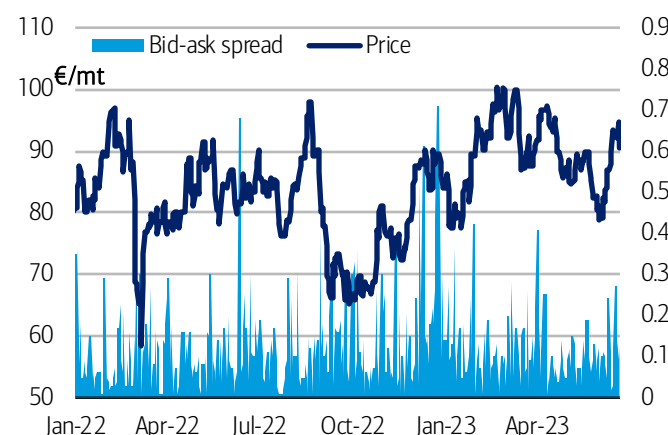


Source: BNEF
Note: excludes UK

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Exhibit 23: EU ETS prices

Despite fluctuating prices, the bid-ask spread remains tight



Source: Bloomberg, EU-ETS

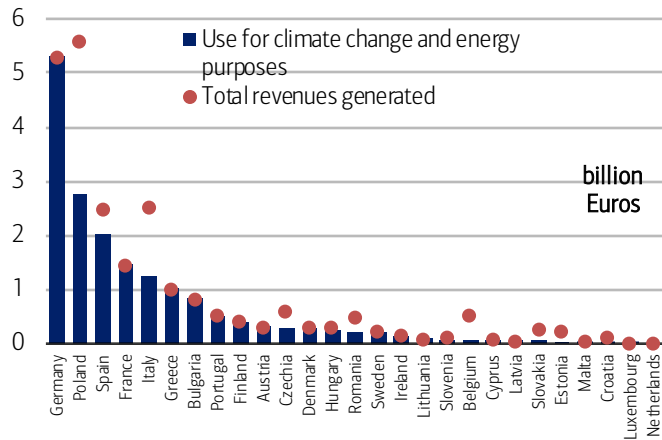
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...but evolution has been necessary for decarbonization...

That said the panelists noted carbon markets have learned and subsequently evolved for the better. The most substantive evolution to the EU ETS system may well be the higher targets going forward. New legislation several times have increased the overall reduction targets and, for some countries, more than doubled their previous targets. The EU ETS system has also expanded its coverage, with expansions into new industries in 2012 and now the maritime transport inclusion starting in 2024. Panelists reiterated throughout the discussion that this longer term known demand (thanks to the compliance regulation and targets) and transparency (including transparency on revenue expenditure) was important for incentivizing participation and development of new technologies, even more so than day to day prices.

Exhibit 24: 2021 auction revenue and reported usage

Transparency of auction revenue use should help investors

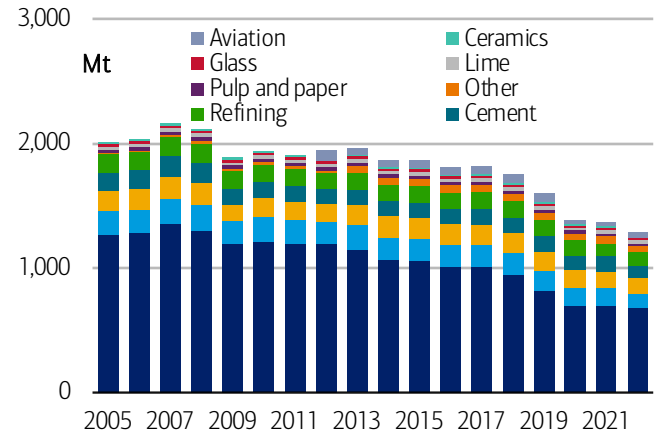


Source: European Environmental Agency

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Exhibit 25: EU emissions by sector

EU ETS continues to expand covered sectors



Source: BNEF

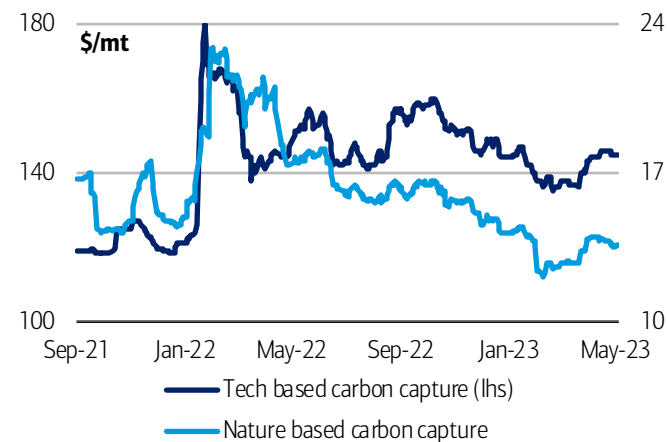
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...but likely need more.

Initial ghg reductions focused on less carbon intensive industries to decarbonize, while more carbon intensive industries will need further investment and innovation. Each additional Mt of ghg emissions is expected to cost more, as more CAPEX intensive technologies will be needed. Existing carbon markets and prices are therefore just “one policy in a much wider toolbox needed” to quote one panelist with multiple panelists mentioning more “carrots” needed in addition to the “stick”. To this end the additional tools could be new requirements, such as expanding targets economy wide instead of individual sectors, or outside of the markets through, for example, the Innovation Fund in the EU, the Inflation Reduction Act in the US, or completely new yet to be developed programs. Panelists stressed full decarbonization will require more than the current markets and that some are attempting to mitigate expected higher carbon prices in the future through long-term contracts such as power purchasing agreements (PPAs).

Exhibit 26: Carbon prices

Current carbon prices are not enough to incentivize full transition

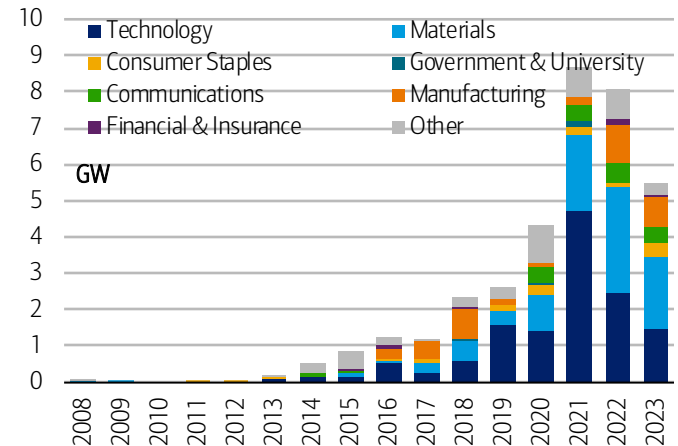


Source: S&P Global Commodity Insights

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Exhibit 27: EMEA PPAs by offtaker

PPAs and other long term deals will help balance fluctuating prices



Source: BNEF

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Commodity investing in a decarbonizing world

The theme of transition is the key to understanding the commodity markets

As the world moves towards the net-zero goal, the supply and demand are going to change as the energy infrastructure evolves. This change is important for corporates as well as investors who have historically used commodities for portfolio diversification as well as to hedge inflation. As fundamentals shift, commodity investing needs to adapt as well.

Energy transition involves different issues in equity and commodity investing

Commodity markets are different than investing in securities like Equities or Bonds when it comes to the energy transition and decarbonization. When one invests in equities and bonds, one takes part in the capital structure of the company. While investing in commodities, investors take the price exposure to that index, but do not take physical delivery and have no stake in the production process. Nevertheless, transition considerations are important for designing commodities indices that perform better in terms of their traditional goals, as well as for enabling exposure to emerging transition theme. As investors divest their portfolios from energy producers, commodity indices become even more important for diversification.

Transition considerations enhance the traditional role of commodity indices...

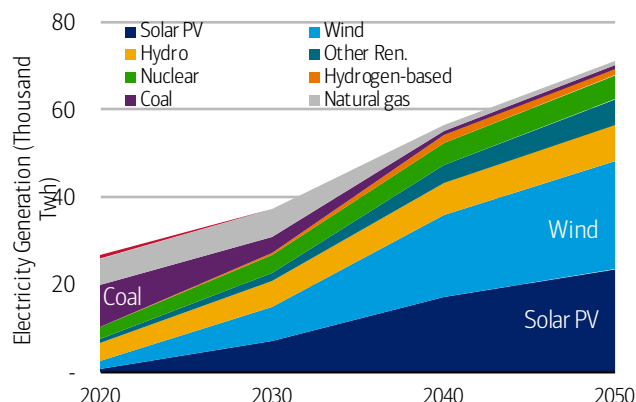
Investors utilize commodities because they are looking for a broad diversified exposure, low correlation with equities and fixed income, and inflation hedge. The role of commodity indices as tools for diversification can be enhanced if transition considerations are incorporating in constructing indices. Currently commodity indices are backwards-looking. The index weights are currently informed by how much commodities were produced over the last 10 years. This approach could be turned the other way by asking instead how much of different commodities are going to be used to reach different carbon goals.

...and can improve the commodity investment's inflation beta

If the commodity index targets the consumption basket of the future, it will have a stronger link to inflation. For instance, It is projected that the share of renewables in electricity generation would reach 88% in 2050 (Exhibit 28). Renewables are metal-intensive, and this will increase demand by up to 4 times over this period (Exhibit 29). Incorporating this transition consideration into commodity investing will improve its role as an inflation hedge, as the consumption and production basket in the economy evolves.

Exhibit 28: IEA Electricity generation projection for Net-Zero Emissions by 2050 scenario

Under IEA 2050 Net-Zero scenario, share of renewables in electricity generation is projected to reach 88% by 2050...



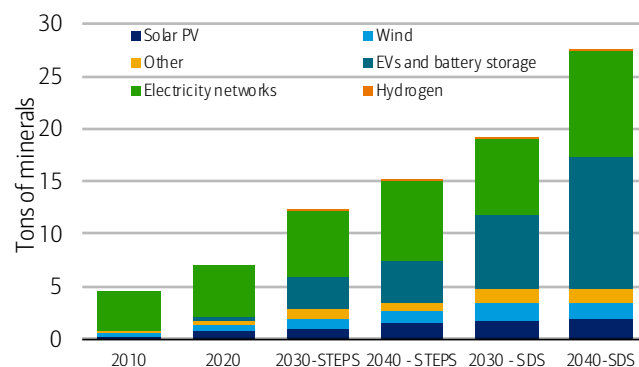
Notes: The chart includes IEA Electricity projections for Net-Zero Emissions by 2050 scenario

Source: IEA, BofA Global Research

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Exhibit 29: Total mineral demand for clean energy technologies, 2010-2040

...increasing estimated demand for minerals by up to 4 times by 2040



Notes: The chart presents total mineral demand estimates (tons) except for steel and aluminum. STEPS refers to the IEA Slated Policies Scenario, or scenario that assumes that governments will not reach all announced emissions reduction goals. SDS refers to IEA Sustainable Development Scenario, or a gateway to the outcomes targeted by the Paris Agreement

Source: IEA, BofA Global Research

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Transition considerations bring interest in nontraditional commodities

In equities, the investors are exposed to business risk of individual companies and need to consider how the companies perform relative to each other in the changing world. Equity investors also need to consider how do the companies contribute to enabling the transition through active research. There is also a real demand and interest from the commodity investors to play a role in the energy transition. The commodity investors are interested in gaining exposure to new and evolving commodities. Currently a typical commodity index does not capture some new materials that are important for transition and there is where the focus needs to be. It is important to identify the unique commodities that are enabling the transition and include them in a portfolio that gives exposure to those enabling commodities. Some examples of these new commodities are ethanol, iron ore, cobalt, and lithium.

Creating forward-looking commodity indices involves tradeoffs...

Conceptually there are two ways you could approach integrating climate concerns in the portfolio. One approach is purely forward looking: it would assume a certain path towards net zero, identify milestones along that path, as well as technologies and commodities necessary to achieve those milestones and reweigh commodities in the index using weights informed by these assumptions and calculations. The other approach would just take business as is and stick to current production numbers.

...and it is important to consider liquidity but avoid being behind the curve

The existing Commodity benchmarks are backward-looking since they incorporate historical production and/or liquidity. The backwards-looking aspect can be effective for a standard benchmark but by nature this approach will fall short when the intention is to play a part in a transition. It is important to find the balance to ensuring there is sufficient liquidity and capacity for new and evolving Commodities without being behind the curve.

Forward-looking portfolio needs to consider positive externalities of metals...

In our research, we have developed a framework that tries to strike the balance between being grounded in actual production and incorporating transition considerations. We estimated carbon footprint of commodities and used current production weights and current emissions estimates. At the same time, we also acknowledge that certain technologies are key for transition, and these technologies happen to be metal-intensive. Therefore we give credit to metals for the positive externalities that they provide through enabling technologies that are low carbon in the

long run. More specifically, we deal with the three key technologies that according to the international energy agency are expected to do the heavy weightlifting in terms of emissions reduction: electric vehicles, wind and solar energy. We estimate how much emissions-reduction will stem from these technologies and give credit to metals for enabling the transition.

...and needs to be dynamic and adapt as new technologies come aboard

The BofA research framework considers carbon intensity of the current production processes. As the efficiency of these processes improves, the carbon footprint per commodity may be lower in the future. In addition, if more technologies start to play an important role, such as carbon capture and storage, the framework can incorporate these new technologies as well. Finally, as more renewables and Battery electric vehicles (BEVs) are deployed, the share of metals going towards green energy will also increase and metals' contribution to emissions reductions could be higher in coming years. This will be reflected in the updated weights. In particular, BEV component of contribution of metals towards net zero will increase both because a higher production share of metals may go towards BEVs and also because the grid will include more renewables thus savings per BEV and per ton of metal will be higher.

Geopolitics – Returning the Commodity risk premium

Geopolitics will complicate both inflation fight and energy transition

Geopolitics show an intensifying level of great power competition

Geopolitical tensions have increased in the past 18 months with one of the largest ground wars in Europe since WWII and most-strained US-China relations in decades. While we are living in turbulent times, geopolitics are also quickly shifting away from non-state actors that dominated after 9/11 and now today we are seeing an intensifying level of great power competition. To deal with this changing world, there has been an US effort to develop a national security strategy to deal with the challenges ahead. In our view, there are three key pillars to America's strategy: (1) to invest in the sources of American power and influence; (2) to build the strongest possible coalition of nations to enhance collective security and to shape the global strategic environment; and (3) to modernize and strengthen the US military for the era of strategic competition. One key concept is "integrated deterrence", which seeks to deter conflict by combining strengths to maximum effect, by working seamlessly across war fighting domains and by assuring that US have an ability to work closely with allies and partners and are backed by credible forces.

Ukraine has come on top of multiple macro shocks...

The impact of the Russia invasion of Ukraine has tested many of the US national defense assumptions, including how strong is NATO when confronted with this type of challenge. And of course, NATO has remained unified, and it is working collectively to try to sustain Ukraine, and to make sure that this conflict does not result in unmatched Russian aggression. The issue is that Russia has violated the core principles that uphold peace and security by seeking to change the borders of another sovereign country by force. But once this aggression occurs, the US and NATO were able to assist Ukraine. It is hard to argue that Russia has had any perceivable gains geopolitically, economically, or diplomatically from this invasion, but the war has affected many countries in the Global South. The invasion happened very early after the Covid pandemic and has exacerbated problems of fiscal sustainability, inflation, trade, health, and forced many countries to change their supply chains. Still, many countries have preferred to remain on the side-line and not taken a strong voice in favor of Ukraine, although they've hedged their positions with other actions.

...and its impact across the commodity supply chain remains vast

While there is no immediate resolution in sight to this conflict, the political impact of Ukraine across the world has been far reaching. For starters, there is still short-term impacts ahead of the war on Russian commodity supplies. Renewing the grain deal at the end of July is important, but it is second order relative to the weather developments in the Northern Hemisphere, which are exacerbating supply problems given the low inventories we already have. Exports of natural gas to Europe from Russia have already been slashed too, but Russia remains still a major producer for oil. Continuing Russian exports as sanctions are upheld or expanded might be a challenge and thus impact prices. Russia has also cut supplies by 500 to 700 thousand b/d under the OPEC+ framework and could cut more production, applying further pressure on the global oil market. On the other hand, sanctions and tensions are going to really impact longer term investment in Russia too. For starters, international funding will be curtailed by sanctions, a higher tax rate on commodities by the Russian government will also hurt domestic investment and a labour drain will also hurt Russian commodity sector investment in the medium term. Thus, the longer-term impact of this war on commodities has yet to play out in a significant way.

The dollar will reign supreme in payments, but gold helps diversify

Of course, danger creates both change and opportunity. In that regard, central banks have moved to buy gold aggressively in the past year after Russian central bank assets were frozen, World Gold Council data shows. Our panellists argued that the centrality of the USD to global trade has been on a modest decline for years. Adversaries of the US and even some allies have moved on to diversify. Yet centrality of the USD remains incredibly important because uses for non-convertible currencies such as the CNY are limited, capital markets in emerging markets are not as developed, and many of the economies looking to challenge USD supremacy are not as open. Having said that, recent trends have favoured gold, as there has been a very strong desire to diversify away from dollar. As a result, central bank buying is impacting the fair value of gold. But shift in reserve management this will not likely have an impact on the rest of the commodities, as these are denominated in dollars, not in gold.

Geopolitical polarization could exacerbate the sticky inflation backdrop

Even then, geopolitical risks are nothing new, so this is a continuation rather than a new environment. And it can be both bullish and bearish for prices. But we start from a position where commodity markets are underinvestment and prices have been strong in the past year even if demand growth has been relatively weak to pre covid levels. Having too conservative vol assumptions ahead of time are likely to create potential challenges in investment. When you think about sovereign credit, the potential for shocks, the resiliency of individual countries is key. In particular, the political, institutional, or economic resiliency of these countries is key. The polarization of politics could also end up exacerbating by the likely sticky inflation environment ahead.

China is slowing down, but other countries like India could speed up

On China, the race to invest in critical minerals at a meaningfully lower rate than the market is inherently beneficial to supplies. Yet the risk is that some of the minerals have a huge concentration of supplies in different parts of the world. General vulnerabilities are going up, not going down. So as China invests in these regions, America has emphasized to these countries that they need to differentiate between aspects of their critical infrastructure where they may have greater risks to have China involved, and what is just investing in commodities to sell to the broader world. Yet China also faces a slower economic growth rate ahead as strategic competition mounts with America. The US has an explicit position here to create a China plus strategy that creates diversification of supply (friend shoring, near shoring). This means that demand growth rates in India and other parts of Asia is accelerating. So many of these countries stand to benefit from a reshuffling of global supply chains. Coupled with other offsets such as energy transition demand, the current geopolitical backdrop could lend strong support to commodity markets for years to come.

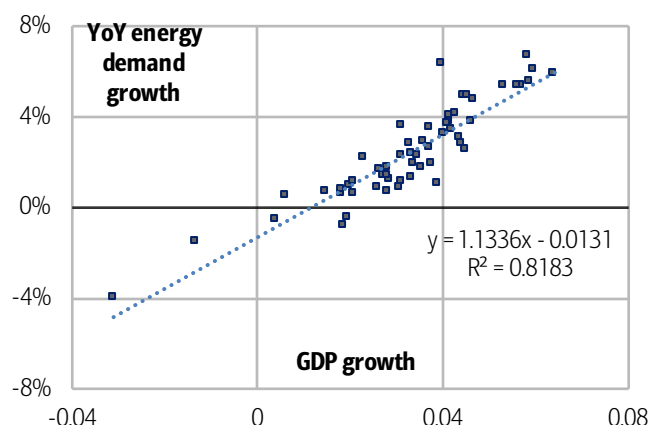
Bank of America Commodity Outlook

The world is adjusting after experiencing a major energy shortfall in 2022

While last year we witnessed an unprecedented energy crisis, we still managed to avoid a recession. After all, energy demand and GDP go hand in hand (Exhibit 30). From this standpoint, the exceptional ramp up in domestic coal production in China allowed more natural gas to come into Europe, helping to alleviate the loss in Russian energy supplies. Since then., the world has rapidly adjusted (Exhibit 31) and the broad commodity complex has been underperforming, from oil, gas, coal, to base metals. We are experiencing a major cyclical deceleration, triggered by various factors, including the spike in energy prices and the sharp increase in interest rates.

Exhibit 30: World GDP and energy demand growth (1966-2021)

Every percentage point growth in GDP tends to translate on average to a percentage increase in energy demand

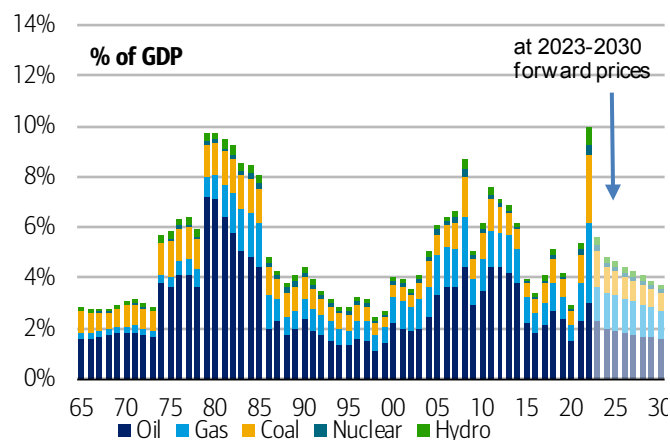


Source: BP, Bloomberg

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Exhibit 31: Primary energy to nominal GDP ratio – World

When looking at the ratio of primary energy to GDP for the world, we note that energy prices have fallen below the 2010-14 range



Source: BP, Bloomberg, BofA Global Research estimates

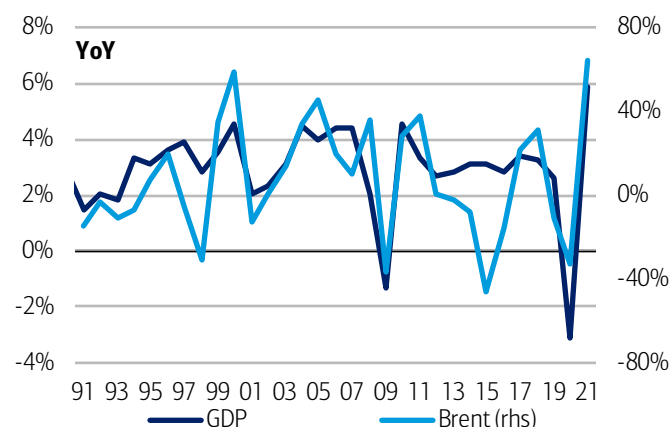
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Investors are still bearish but rate cuts could be the turning point

To worsen such dynamics, asset allocators have increasingly turned bearish, remaining underweight or going outright short commodities. Indeed, the Fed will keep hiking rates until either inflation comes down or the economy falls into a recession, with both events bearish commodities (Exhibit 32). Yet, politicians and regulators are having a hard time in slowing economies down. They do not want to do it too fast. The banking distress this year could have accelerated that, but given the situation with some of the regional financial institutions the regulators were focused on addressing the same. Now, why is this worth following from a commodities perspective? In our view, the end of the tightening cycle could be a turning point (Exhibit 33).

Exhibit 32: World gdp and Brent price growth

Oil prices tend to move in tandem with economic activity, and GDP growth forecasts could take a hit on the back of the banking crisis

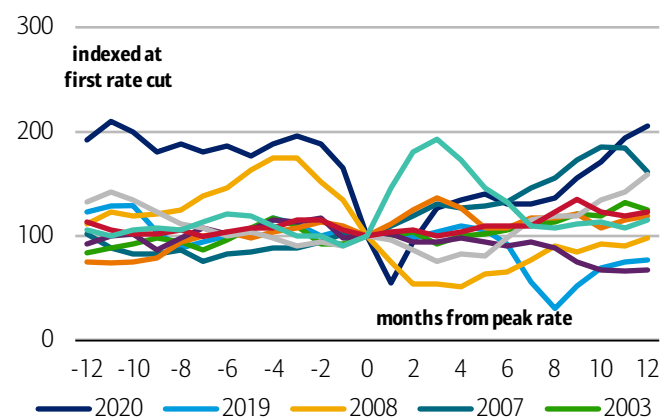


Source: Bloomberg

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Exhibit 33: WTI prices before and after US rate cuts

US interest rate cuts have tended to be more supportive of oil prices, but only 6-12 months out



Source: Bloomberg

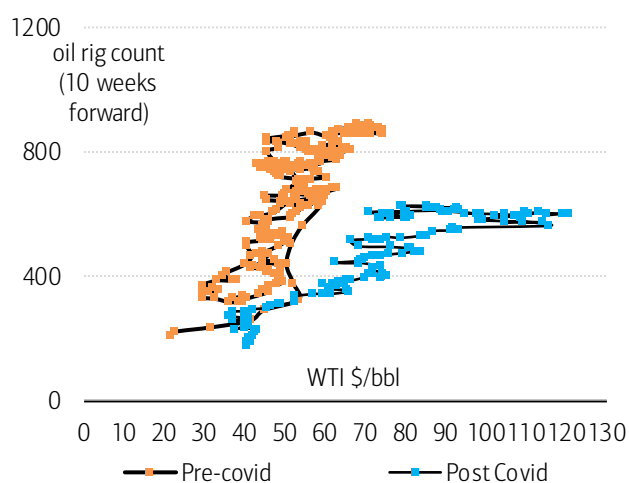
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Oil demand and supply are going against each other

As for oil supply, the price elasticity has declined, suggesting that larger price movements are needed for supply to respond. And this is what is happening to US shale, which we do not expect to change in trajectory, particularly in the current price environment (Exhibit 34). This paved the way for OPEC+ to become more proactive in managing prices, keeping markets tight by cutting output at \$95, \$85, \$75/bbl Brent crude prices. Lastly, oil prices have remained range bound also because of watered-down Russian sanctions. The price cap mechanism was successful in that it managed to achieve the dual goal of hurting Russian finances and at the same time keeping supply flowing into the market. Clearly, oil is at a crucial junction, whereby inventories should start to draw in 2H23, yet increased spare capacity across OPEC and more rate hikes should prevent a rally in prices. For now, we expect the battle between oil and money, and allocators and speculators, to continue playing out.

Exhibit 34: US oil rigs and front month WTI prices

Don't expect a significant change in trajectory of US shale supply in the current price environment

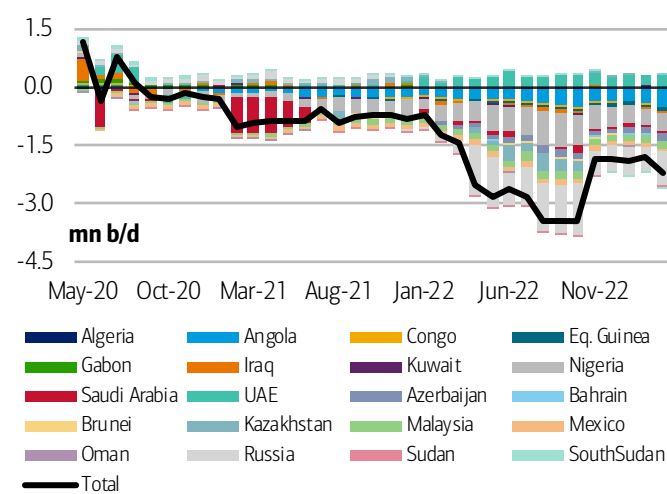


Source: Bloomberg, BofA Global Research

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Exhibit 35: OPEC+ production versus quotas

As of March, OPEC+ crude oil production had fallen about 2mn b/d behind its quotas



Source: OPEC, IEA

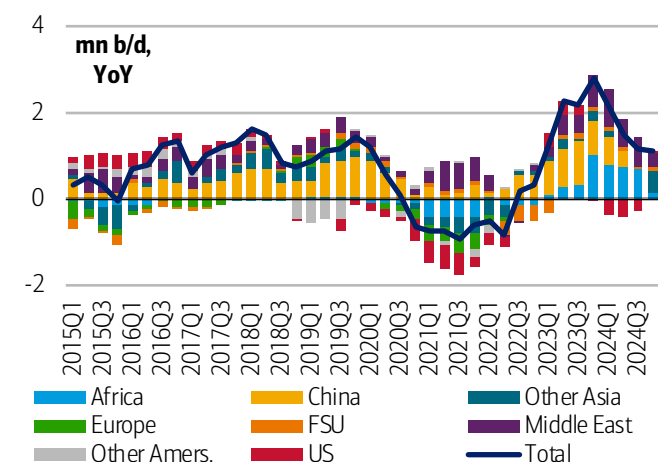
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We are bearish margins and refined product cracks

On the refining front, global capacity declined by 750k b/d YoY on average in 2021 and 200k b/d in 2022, which helped push margins to record levels. Demand growth in 2023 is a bit shakier and the fuel supply disruptions expected from Russia never materialized, while capacity is set to rise 2mn b/d YoY (Exhibit 36). These dynamics have eased fuel balances and the market is likely to get longer fuel as the year progresses thanks to the ramp up of capacity at several Middle East, Asian, and African refineries. China's decision on whether to keep releasing higher export quotas for the remainder of the year will play a key role in dictating the direction of margins (Exhibit 37). We have been bullish on gasoline cracks ahead of peak summer driving season, but headwinds are mounting, and we see downside to cracks into year-end and in 2024 on the back of a seasonal softening of demand, rising supply, higher rates, and EV penetration.

Exhibit 36: Global refining capacity

In contrast to the US, global refining capacity is expanding at a rapid clip compared to prior years

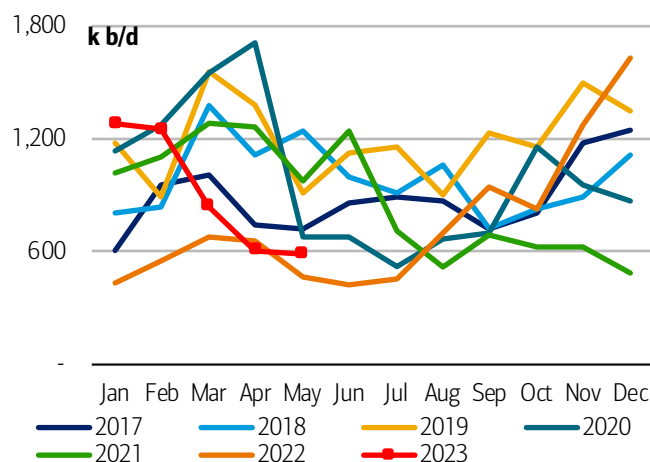


Source: Platts

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Exhibit 37: China exports of gasoline, jet fuel, and diesel

China has allowed for large volumes of petroleum product exports to the Pacific Basin at times this year



Source: Bloomberg

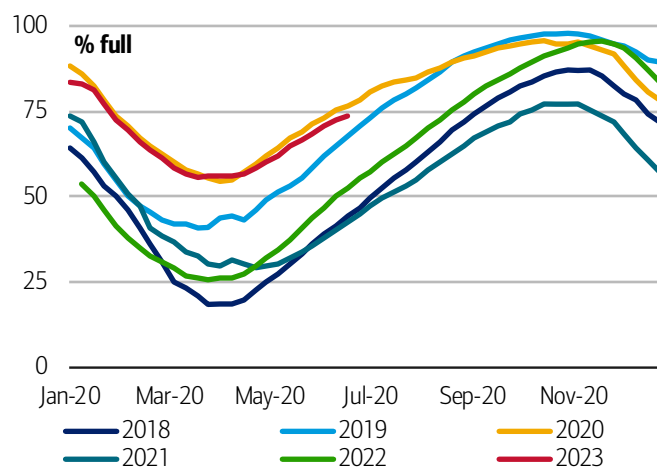
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Global gas still vulnerable, especially as weather shifts

In Europe, the surge in natural gas prices in 2022 led to a step change lower in weather adjusted demand from industry and residential and commercial sectors, and data for May still suggests demand is running at or below the new trendline levels starting from 2H22, despite the collapse in gas and power prices. Unsurprisingly, the drop in demand from warm weather and price elasticity, along with elevated LNG imports and high regional production, have kept Europe's inventories well stocked (Exhibit 38). This has helped drive TTF prices from a high of €340/MWh to a low of just €23/MWh in early June (Exhibit 39). More recently, pipeline and LNG supply outages in Norway, heavy maintenance at US LNG facilities, the reiteration of Groningen's shutdown date, and signs of life on the demand side have caused the market to spike higher. Alas, European and global gas markets are not out of the woods yet and are still susceptible to volatility. With limited supply growth into year-end, a normal or colder than normal winter could expose the fragility of the global gas market.

Exhibit 38: Europe gas storage

The drop in gas demand, along with elevated LNG imports, and high regional production, have kept Europe's inventories well stocked...

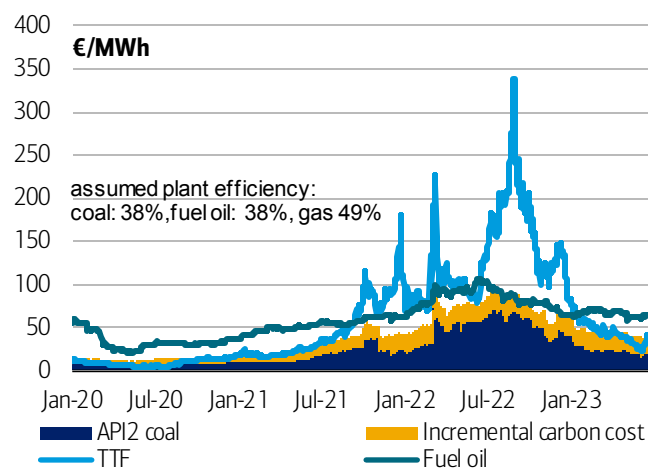


Source: Bloomberg

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Exhibit 39: Gas and gas equivalent prices for other fuels

...and helped drive TTF prices from a high of €340/MWh to a low of just €23/MWh in early June, but the market is still vulnerable to volatility



Source: Bloomberg, BofA Global Research estimates

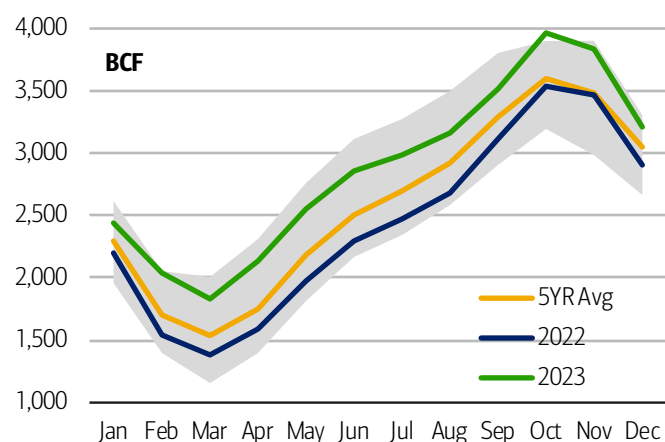
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A lot must go right for US nat gas near term, 2024 more constructive

US natural gas inventories were projected to reach unseasonably high end of season levels earlier this year, but a lot of things have gone right since then, and Henry Hub prices have livened up as a result. Over the past two months, natural gas balances received support from very strong power burns, low imports from Canada, and rising exports to Mexico, which helped counteract soft demand elsewhere. We still think inventories could still end up around 3.9 Tcf by year end (Exhibit 40) and see prices averaging \$2.75/mmbtu in 3Q and \$3.25/mmbtu in 4Q, but recession risks and a shrinking risk premium (Exhibit 41) present downside to these forecasts. In 2024 things could get more exciting, especially if winter weather is normal or colder than normal winter, production is on a flat or downward trajectory, and Plaquemines and Golden Pass LNG export facilities come online earlier than some in the market expect.

Exhibit 40: US natural gas inventories

We see US natural gas inventories peaking above 3.9Tcf at the end of October...

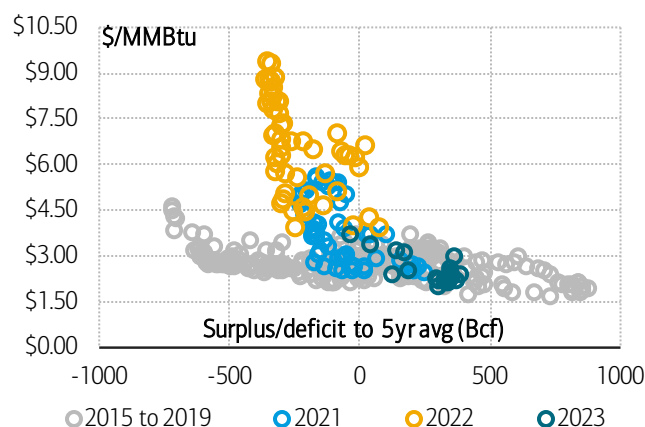


Source: EIA, BofA Global Research estimates

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Exhibit 41: Henry Hub prices and storage surplus/deficit to 5yr avg

...and see downside risk to our 2H23 price forecasts on recession risk and as Henry Hub's LNG shut-in risk premium fades to zero



Source: Bloomberg, BofA Global Research

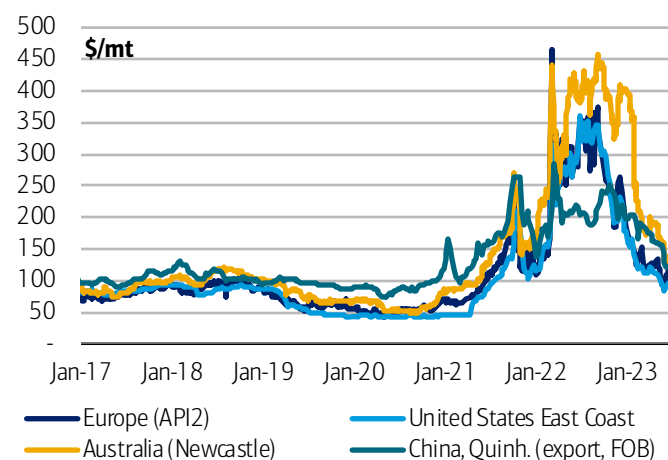
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The steep rally in thermal coal prices has quickly reversed

Echoing the dynamics in global gas markets, thermal coal prices have fallen dramatically from the 2022 highs (Exhibit 42). In September 2022, benchmark Newcastle prices climbed above \$450/t, sending coal above oil parity levels for the first time ever. From there, prices remained supported going into 2023 on gas-to-coal switching dynamics, supply disruptions from Australia due to la Niña, as well as the EU ban on Russian coal imports starting from August 2022. The latter kept the high CV thermal coal market extremely tight, with Newcastle 6,000 kcal/kg-Australian 5,500. kcal/kg differential widening to nearly \$290/t, against an historical average of \$20/t. The market was dislocated also in terms of trade flows. Post-EU ban, Russian coal producers managed to reroute their units towards Eastern markets, including China, South Korea, India, as well as Türkiye (Exhibit 43).

Exhibit 42: Global thermal coal prices

As global coal supplies increased and demand pulled back, seaborne thermal coal prices retraced from 2022 highs...

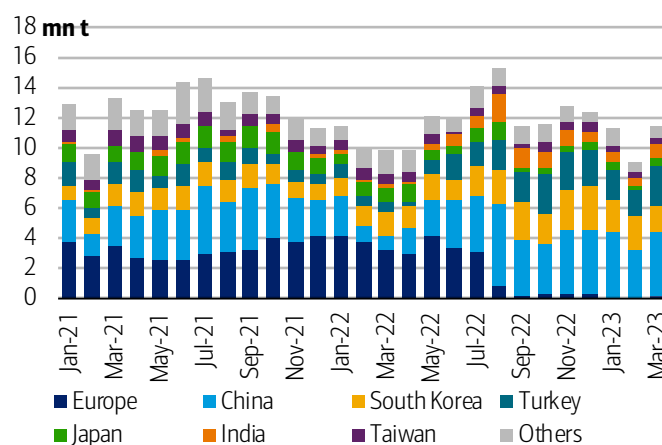


Source: Bloomberg, McCloskey

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Exhibit 43: Russia thermal coal exports by destination

...when sanctions forced a collapse in high calorific Russian coal exports into Europe



Source: McCloskey

Notes: Europe = EU27 + UK

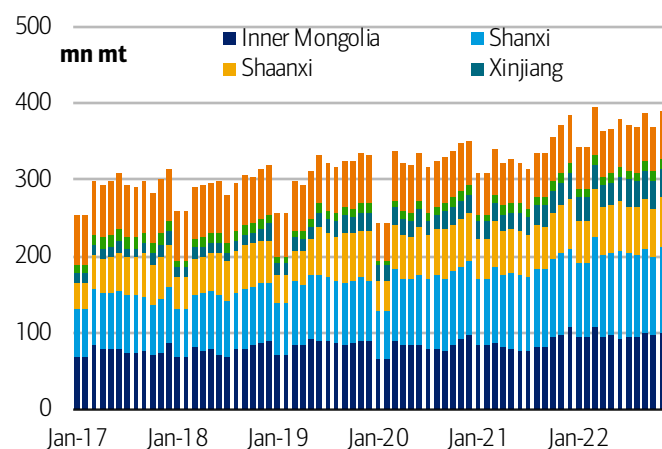
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China is ramping up both domestic coal production and seaborne imports

As for Asian markets, one of the key dynamics that has been playing out since last year is the exceptional ramp up in Chinese domestic coal production (Exhibit 44). Concerns around energy security pushed China to rely more heavily on the dirty fuel, with domestic output rising by about 10% YoY last year, a huge increase for a country that churns out about 3.6bn t of thermal coal annually. Nonetheless, given the slower than expected rebound in industrial activity, coal stocks have been hovering around record highs for most of this year, with major ports running almost at full capacity (Exhibit 45). That said, we expect Chinese coal demand to remain supported throughout the year and seaborne imports to see a double-digit increase compared to last year.

Exhibit 44: China coal production

China's major domestic coal production increase in 2022 was a key factor alleviating the global energy crisis



Source: McCloskey

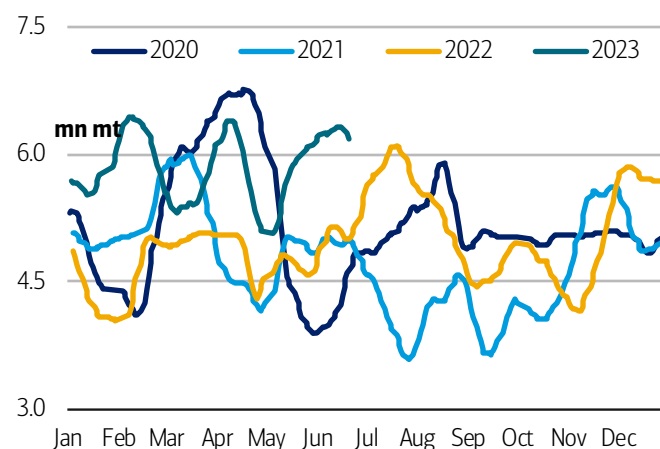
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Energy transition remains a focus

The planet is warming and efforts to tackle climate change are ongoing. Meanwhile, the war in Ukraine has ratcheted up the sense of urgency, adding energy security and independence as another dimension to green technology investment. This has led to a raft of ambitious energy targets, but will it be plain sailing to achieve them? It looks unlikely and we explore the main obstacles that need to be overcome – albeit none is insurmountable (Exhibit 46).

Exhibit 45: Coal inventory at Qinhuangdao port, 7-day MA

China has ramped up coal imports this year as energy security becomes a priority











Source: CEIC

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Exhibit 46: Evolution of sector constraints

By 2050, every sector will have been a constraint to the energy transition

Categories	Now	2030	2050	Commodities	Equities
 Permitting	●	●	●		
 Raw Materials	●	●	●		Diversified miners: Freeport, Glencore, Anglo American, Teck, Zijin; smaller diversified miners: Boliden, IGO, Eramet, Sandfire. Lithium pure plays: Ganfeng, Tianqi, Albemarle, Livent, Sigma, SQM. Copper pure plays: Southern Copper, First Quantum, Antofagasta, Lundin, Hudbay, Atalaya, KGHM, Jiangxi. Rare earths: MP Materials; Infrastructure: Caterpillar
 Solar	●	●	●	Copper, aluminium, silver, steel, silicon	AES, Array Technologies, SunRun, LONGi Green Energy Technology
 Wind	●	●	●	Copper, aluminium, steel, zinc, rare earths,	Vestas, Siemens Energy, AES, TPI Composites, General Electric
 Transmission and Distribution	●	●	●	Copper, aluminium, steel	Siemens Energy, General Electric, Eaton
 Energy Storage	●	●	●	Copper, aluminium, nickel, cobalt, platinum, lithium, manganese, silicon, graphite	Siemens Energy, Honeywell,
 System Integration	●	●	●	Copper, aluminium, steel	General Electric, AES, Eaton, Siemens, Schneider
 Electric Vehicles	●	●	●	Copper, aluminium, nickel, cobalt, lithium, manganese, silicon, graphite, rare earths	LG Energy Solutions, Aptiv
 Labour	●	●	●		

Source: BofA Global Research

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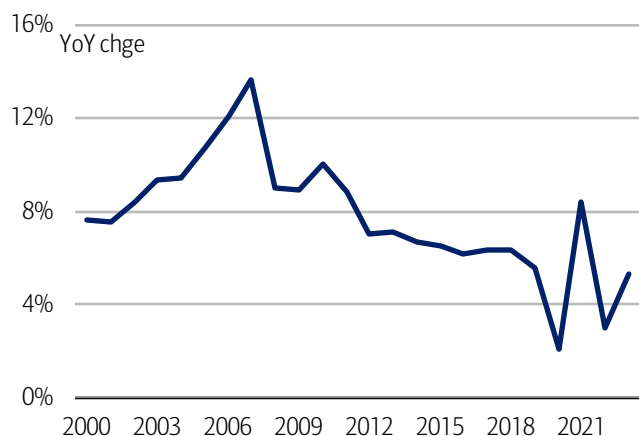
To start with, permitting needs to accelerate. We also believe that supply chains of raw materials and green technologies for electricity generation, storage and transmission have not received the attention they deserve, one reason we are bullish many mined commodities. In particular, China dominates many aspects of green technologies, including MIFTs (metals important for future technologies) or polysilicon. This is a concern in many countries that are looking to make their supply chains more autonomous. Furthermore, there is an impending shortage of skilled linemen and trades. This, along with rapid increases in capital spending and supply chain bottlenecks in materials/components, adds to cost inflation, which ultimately impacts returns. System integration is also critical, a topic we discuss in the section entitled, 'Importance of electricity transmission/distribution and energy storage'.

Near-term, focus is on China

Changing tack, the 'middle income trap' (rising wages leading to loss of competitiveness) is often seen as a likely constraint on China's growth, after 20+ years of rapid GDP per capita expansion amid industrialisation.

Exhibit 47: China, GDP per capita

The growth in GDP per capita has slowed gradually



Source: IMF, BofA Global Research

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A productivity gap is at the core of this, so to narrow it the Chinese government is investing heavily in its industrial base, with metal-intensive sectors among the key beneficiaries. The ambitions are reflected in industrial policies like Made in China 2025, which ultimately targets making China the leading manufacturing power by 2049. Whether this is achievable is a different question, but the path relies on the mined commodities.

Exhibit 49: China's 10 core industries

The government focuses on 10 core industries, many of which are metals-intensive



Source: BofA Global Research

Exhibit 48: Key milestones in China

China aims to be the leading manufacturing power by 2049

Main Steps	Milestones
2025	Major manufacturing power
2035	Global manufacturing power
2049	Leading manufacturing power

Source: BofA Global Research

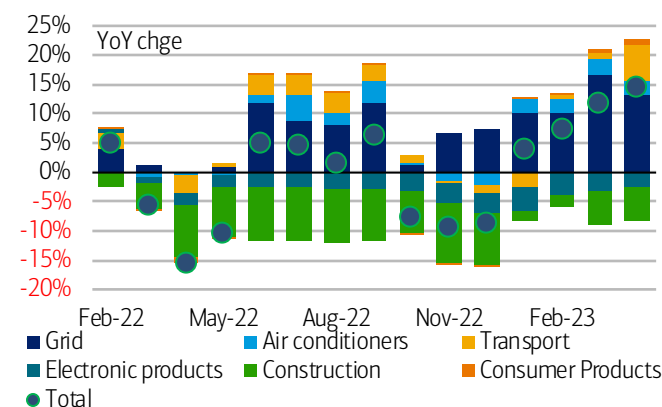
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Indeed, with youth unemployment rates of 20%-plus, maintaining elevated growth is a focus of China's government. Testament to the vigour with which China's government has pursued the strategy in sectors like new materials, but also energy savings & new energy vehicles, countries around the world have taken notice and are increasingly concerned.

China accounts for 50% of metals demand, but the influence of different economic sectors on consumption has changed rapidly. Through 2022 and into 2023, copper demand has held up, partially due to transportation and power. Essentially, EVs and renewables have offset the weakness in housing.

Exhibit 50: China, breakdown of copper demand

The grid (renewables) and transportation (EVs) have carried metals demand

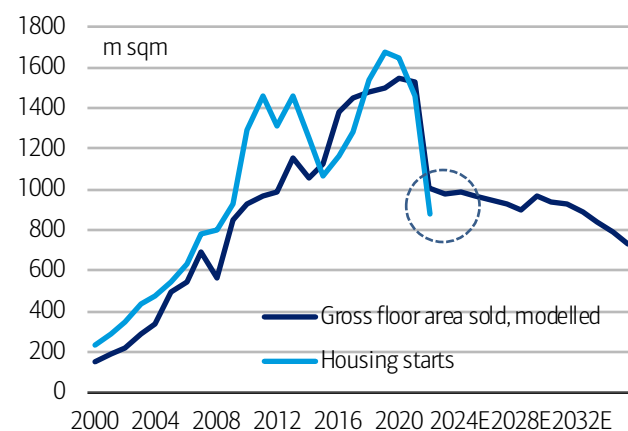


Source: Bloomberg, BofA Global Research

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Exhibit 51: China, housing starts and modelled gross floor area sold

With speculation gone, the housing market has reset lower, but there is scope for a rebound from current levels



Source: Bloomberg, BofA Global Research

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This also matters for the current discussion about stimulus: we see little likelihood the government will implement a broad-based economic package. In fact, as EVs and grid spending will remain supportive, the key is whether the government will reduce the drag from traditional sectors sufficiently to keep the metals market tight. The long-term housing demand model of our China property team implies that the housing market has reset lower, but there is scope for a stabilisation from current levels.

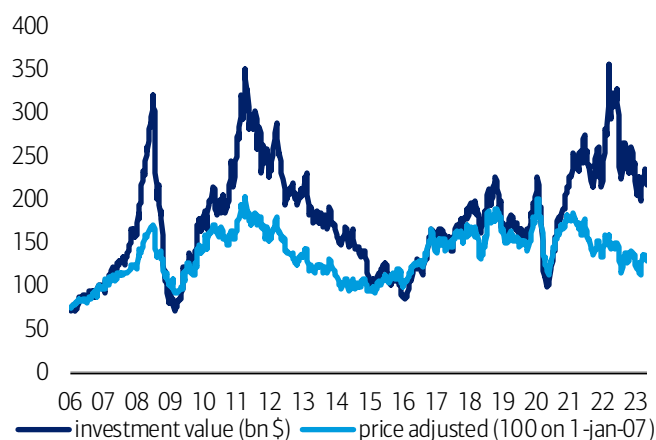
Boosting public sector leverage and expanding infrastructure investment as soon as possible is one of the best options for policymakers. Indeed, even by international standards, the central government still has more room to grow its balance sheet: a 1ppt increase in rates costs the US and Chinese central government's 1.2% of GDP and 0.7% of GDP, respectively. A more proactive fiscal policy would likely also boost sentiment, which has been an issue for metals demand as market participants have been running down inventories through the supply chain. In short, we remain constructive base metals into year-end.

Commodity beta allocations muted as inflation hedge turns into disinflation play

Commodity prices have been soft year-to-date after peaking last summer on a seemingly sustained grind lower. The fall has been on the back of an easing in supply, improving balances, and continual reassessment of future macro weakness, stemming from the US down the line and China's underwhelming re-opening as of late. Nominal commodity index AUMs have fallen since peaking in 2022, while price adjusted allocations did not surge and have too been falling, reflecting underinvestment (Exhibit 52). This suggests that the surge in prices and demand were largely on the back of inflation hedging more concentrated in a few commodity sectors temporarily, rather than the entire complex on a more permanent basis. So as the world has shifted past peak inflation and into the disinflation campaign, investors have dialed back their exposure and are using the asset class to express disinflationary and slower growth views. Futures and CTA positioning reflect similar sentiments as net positioning has meaningfully compressed and has turned short for copper (Exhibit 53).

Exhibit 52: Commodity index tracking assets under management

Passive allocations to commodity beta have fallen and remain underinvested, suggesting that inflows to the asset class were concentrated and transitory

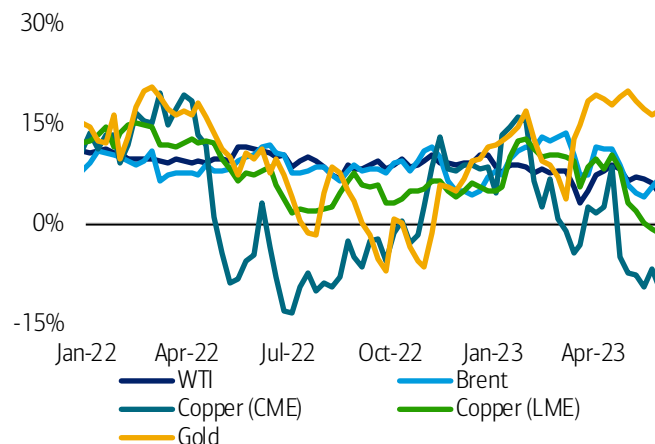


Source: Bloomberg, BofA Global Research

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Exhibit 53: Commitments of Traders (CoT) commodity futures non-commercial net positioning as % of open interest

Positioning across commodity futures by speculators reflects broad bearishness outside of gold



Source: Bloomberg

BofA GLOBAL RESEARCH

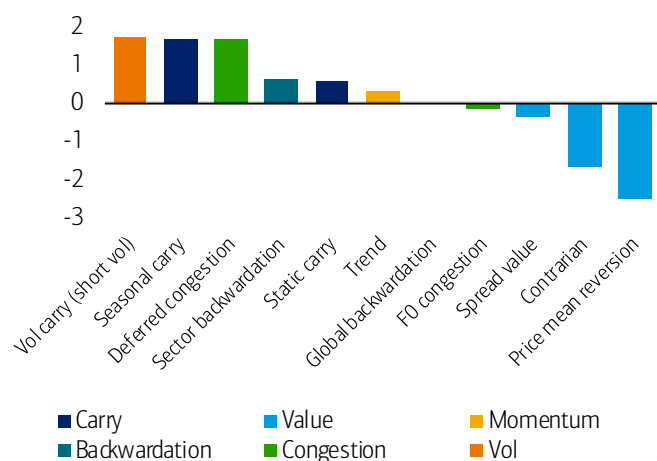
Carry to continue to lead commodity alpha with potential for defensive trend

Performance across commodity risk premia strategies has been mixed as carry strategies have thrived while value has underperformed (Exhibit 54). We continue to like commodity carry as while the strategy has done well year-to-date, this has been largely due to natural gas contango rather than a shifting of curves due to broad macro and risk asset weakness (see Quantamental Insights: Disinflation at a trickle keeps markets fickle). Moving forward, with slower growth on the horizon, commodity curves at an aggregate remain at historically average levels, suggesting room for further moves out of backwardation and into contango that would benefit carry strategies, even if prices remain range bound and do not deteriorate markedly after (Exhibit 55).

On the other hand, value strategies have been less than stellar. Commodity prices have grinded lower, but spreads have not compressed meaningfully on the back of more resilient than expected demand, but also the slow recovery of refining capacity. Mean reversion type strategies may continue to struggle until demand compression and capacity arrive more meaningfully as otherwise spreads can remain elevated. Finally, while trend strategies struggled to start the year on the back of choppy price action, the bias lower in commodity prices has generated short positioning that can now position for upside during risk-off and downside moves.

Exhibit 54: Year-to-date commodity alpha information ratios

Carry strategies have led commodity alpha year-to-date, while trend has lagged

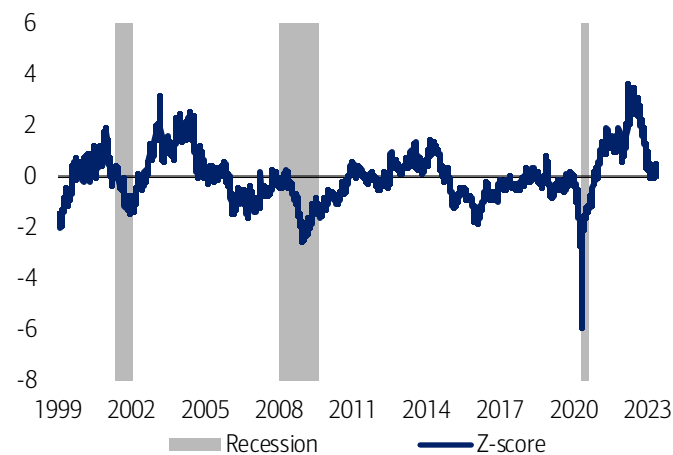


Source: BofA Global Research

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Exhibit 55: Z-score of backwardation across commodities aggregated by BCOM weights

Aggregate backwardation in commodities is at average levels relative to history, suggesting significant room for further movement into contango



Source: BofA Global Research

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How to invest in Commodities for this cycle

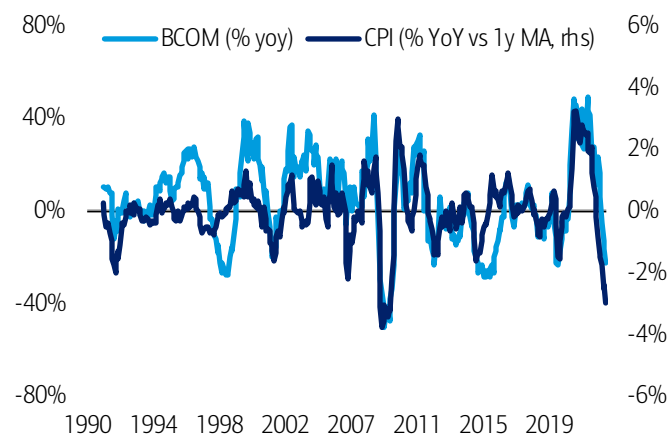
Commodity fundamentals are strong, but macro and disinflation have dominated

Our panelists highlighted that commodities have been trading weaker than expected on the back of macro developments and a more sluggish China re-opening. While fundamentals remain strong for commodities as physical markets are still tight, macro has dominated trading, leading prices to fall in lockstep with inflation as tactical positions are removed (Exhibit 56 and Exhibit 57). While China's economic data has disappointed, physical demand remains resilient which further points towards the softness in prices being wholly macro and sentiment driven, rather than fundamental. An interesting point was that China could be using the softness in commodity prices to build up inventories in preparation for energy transition and that it may not change course aggressively with regards to growth targets. The bearishness of investors and macro drivers was further exemplified in speculative positioning, which is at some of its lowest levels relative to history when prices were even lower. That said, our panelists agreed that commodity prices were more likely to recover into 2024 from low base levels in 2023 rather than decline further.

On investor interest in commodities, our panelists mentioned that in contrast to last year when inflation hedging was the dominant concern, focus has shifted towards recessionary risk and more defensive commodities like gold. Nonetheless, diversification remains a key factor maintaining interest in the asset class. Furthermore, there has been interest from longer term thematic builds in preparation for the energy transition. And while higher rates may crimp on economic growth and disincentivize allocation into risk assets like commodities that would otherwise aid in price discovery, they also can be bullish for commodities as underinvestment can lead to undersupply in already tight physical markets down the road.

Exhibit 56: Year-on-year BCOM total returns and US CPI relative to 1-year moving average

Commodity returns have moved in lockstep with deviations from trend inflation, which has dragged commodity prices lower...

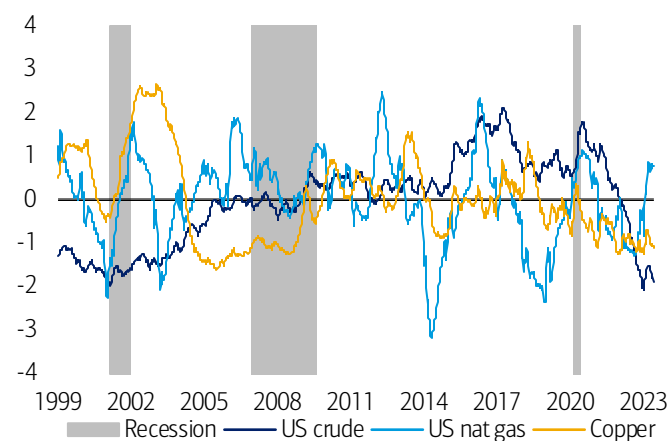


Source: BofA Global Research, Bloomberg

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Exhibit 57: Z-score of commodity inventories

... even though inventories remain below historical averages for many commodities



Source: BofA Global Research, Bloomberg

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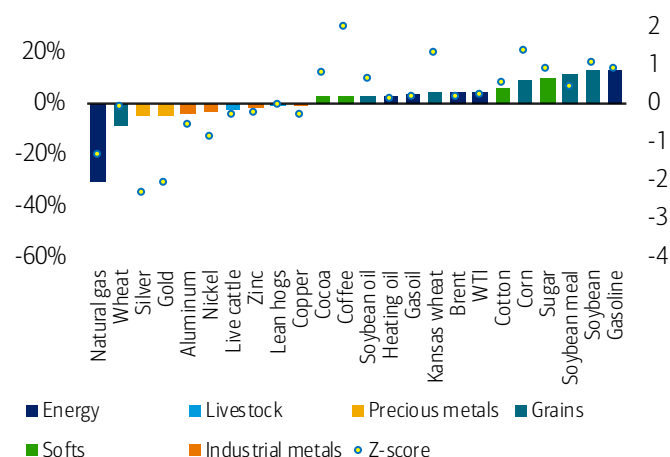
Commodity curves highlight tightness and remain a key signal and input

The value and signal from commodity curves were discussed as the theory of storage helps motivate why fundamentally we should expect bullish price action from backwarddated commodities. Panelists agreed that commodity curve shapes help with choosing where and how to position on both a discretionary and systematic basis, while simultaneously providing a parsimonious metric indicative of underlying inventory conditions and balances without having to normalize across commodities. When curves are in contango, investors could position farther out to minimize negative carry, while when curves are in backwardation, front end positioning maximizes roll returns and beta which can help improve and manage risk-return profiles.

Commodity curves are considered fairly valued now, as the backwardation in crude is expected given balances, while the metals are exhibiting relative flat curves as usual (Exhibit 58). That said, risks can arise as curves can still shift as oversupply in oil could lead to contango, while El Nino and drought could lead grain curves into backwardation (Exhibit 59). Furthermore, if macro fears dissipate, curves can shift into backwardation swiftly given the tight fundamental backdrop if bolstered by a revision upward in growth and demand.

Exhibit 58: Commodity futures backwardation (1st – 12th month as % of 1st month) and z-score relative to history

Commodity backwardation too has mean reverted over the past few months, but we have yet to see an overwhelming amount of contango...

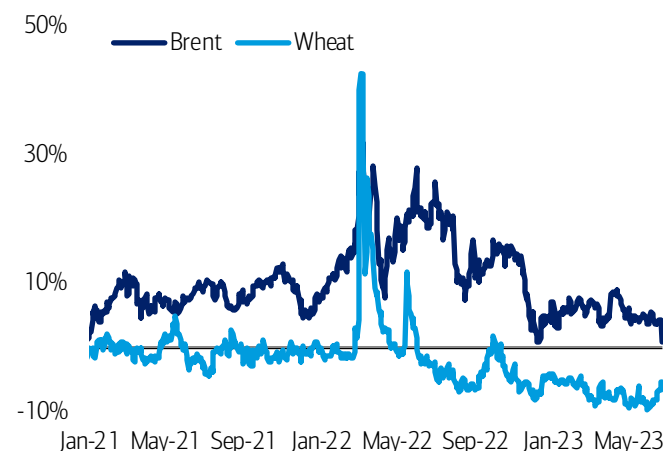


Source: BofA Global Research

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Exhibit 59: Brent crude and wheat backwardation (1st – 12th month as % of 1st month)

Brent crude and wheat could rapidly shift into contango and backwardation respectively



Source: BofA Global Research

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Energy transition provides opportunities, but liquidity remains a constraint

The final portion of the session covered the energy transition and the opportunities that will arise. The panelists agreed that exposure to metals such as copper and aluminum is the lowest hanging fruit for buy-and-hold positions, but also stressed the importance of battery metals such as cobalt and lithium. Cobalt and lithium however have nascent, thinly traded markets and liquidity is not yet readily available, which limits the possible exposure at the moment regardless of desired allocations. Liquidity was a key factor in assessing whether to allocate yet to these non-benchmark metals, so given the illiquidity, additional ways of gaining exposure have been through equities via ETFs or mining companies.

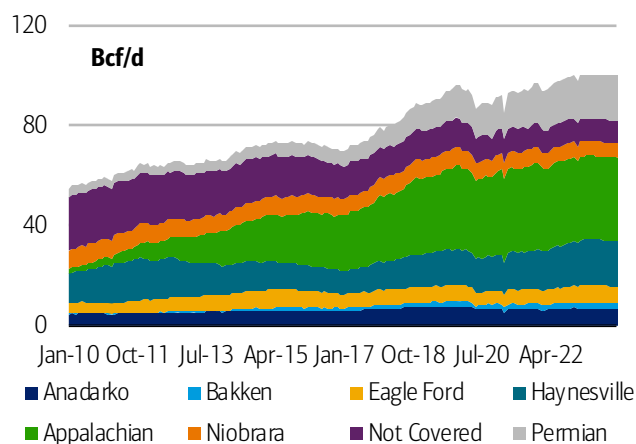
How did 2022 change the Global Gas Market

Production growth needed from all shale basins to meet US LNG ambitions

US gas production growth is a key source of uncertainty for the market, and one panelist expects it will likely average around 100Bcf/d in 2023, with output below 100Bcf/d at year-end. This forecast was viewed as a best-case scenario, with current fundamentals suggesting gas producers could drop another 15 rigs in the coming quarters. In 2024, current Henry Hub strip pricing around \$3.50/mmbtu could bring 500mmcf/d to 1 bcf/d of growth exit-to-exit. Concerns around drilling inventory are real, as low-cost acreage is getting drilled up and some inventory is not as economic as previously thought, which is exemplified by one Appalachian producer writing down 30% of its reserves. Elsewhere, Haynesville has just 10 years of core inventory, while the Permian has 5-10 years of core drilling locations left. As USGC LNG capacity ramps up, producers will likely have to tap more tier 2+ inventory to meet demand, which will cost more. The US is likely to face challenges ramping production to meet demand and pipeline infrastructure could also be a bottleneck, despite most LNG capacity growth occurring in oil and gas friendly states like Texas and Louisiana. One panelist believed that meeting future LNG demand will require more pipelines out of the Northeast, a region that faced significant challenges building pipelines in recent years.

Exhibit 60: US L-48 natural gas production

Expectations for US gas supply growth were muted, with one panelist expecting output below 100Bcf/d by year-end

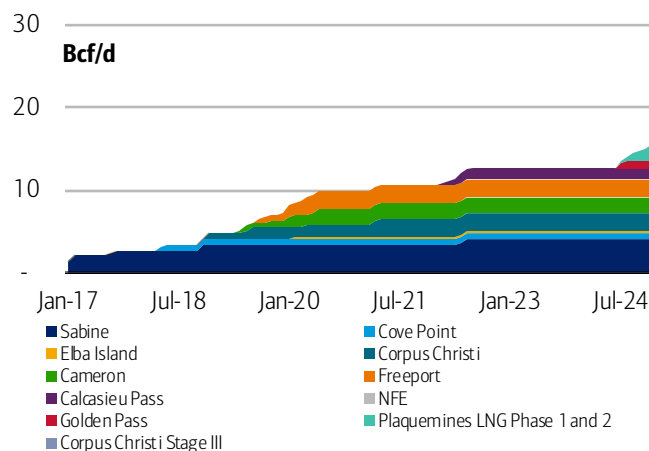


Source: Genscape, EIA, BofA Global Research estimates

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Exhibit 61: US LNG capacity

US LNG exports have recovered to new highs since the restart of the Freeport LNG terminal, but no new capacity is set to come online until 2024



Source: Company reports, EIA, Genscape, BofA Global Research estimates

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Insufficient storage to fuel gas price vol as LNG, energy transition progress

There was consensus among panelists that global gas storage is insufficient to handle the ramp up in LNG and future demand swings that will arise from the renewables buildout and shifting weather patterns. The recent collapse in US wind generation is a prime example of the magnitude of possible renewable power generation swings (Exhibit 62). As the energy transition progresses, thermal generation will need to become even more flexible, and more gas storage will be needed to absorb volatility in gas demand. Not only is total global gas storage capacity insufficient, but some existing storage is located where it is not needed (i.e. Spain).

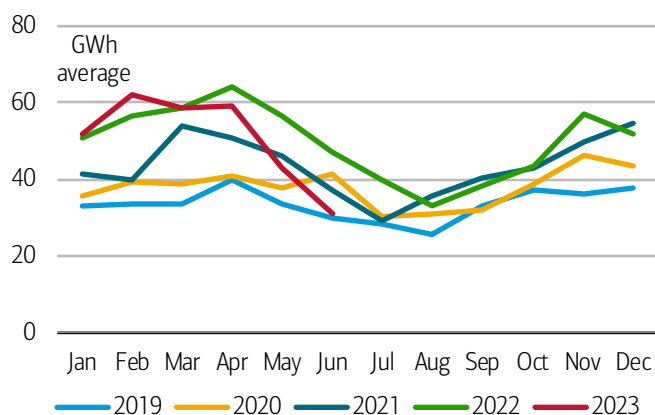
Steeper summer-winter spreads needed to drive more storage build-out

To encourage more US storage build-out, investors require bigger summer/winter spreads than are currently priced into the forward curve (Exhibit 63). A price signal like the one that emerged in 2005 might be required to shift attitudes on storage investment. One panelist said that there is a 7-10 year payback period for investment in US storage capacity. Thus, companies are willing to ride out seasonal volatility instead

of investing in more storage. Interestingly, while consensus is that 4Tcf end of October US gas storage level is very high, one panelist said storage likely needs to be even higher and closer to 4.2-4.4Tcf to be sufficient. While the US is much better placed to add capacity than places like Europe due to geology, destination markets also require more storage. China is another example of a market that lacks sufficient storage, despite an ongoing buildout of downstream gas infrastructure. China's lack of storage and increased demand for gas should drive huge swings in LNG demand (and prices), especially as weather shifts toward extreme conditions.

Exhibit 62: L-48 wind generation

Thermal gen will need to become more flexible to accommodate renewable power swings and more storage is needed to absorb gas demand volatility

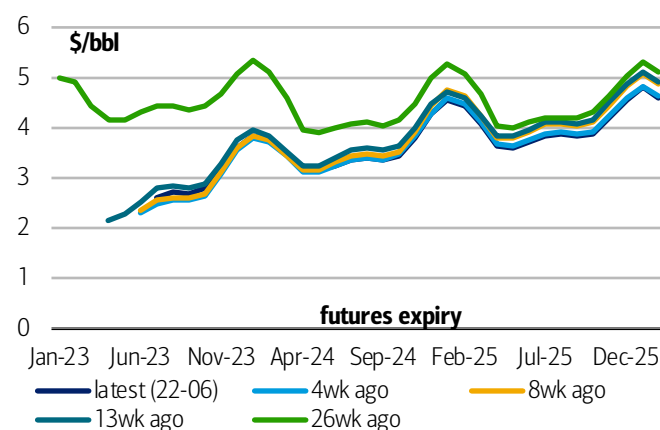


Source: Bloomberg

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Exhibit 63: US natural gas forward curve

To encourage more gas storage build-out, investors require bigger summer/winter spreads than are currently priced into the forward curve



Source: Bloomberg

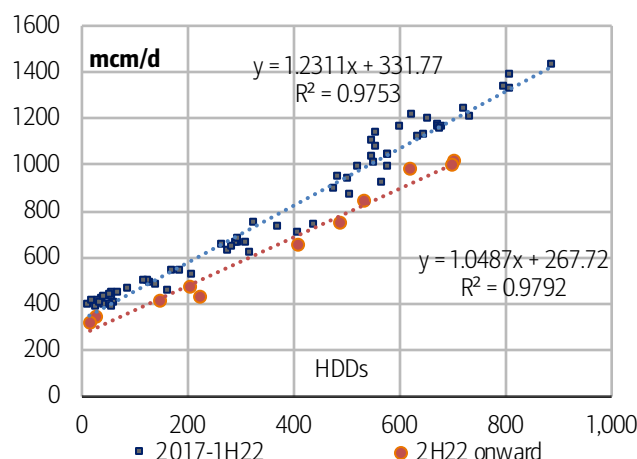
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EU gas demand to partially recover, dependence on LNG to remain high

The energy crisis in 2022 led to a rapid rewiring of Europe's gas market. In addition to boosting LNG dependence, Russian pipeline gas disruptions and the price spikes that followed led to an unprecedented 12-15% weather adjusted demand loss from the residential and commercial sector starting in the 2H 2022 (Exhibit 64). As gas and power prices decline, consumers are now starting to experience significant relief on their energy bills. The big question in the market is whether consumers will revert to their old patterns ahead of winter, when restraint is likely still needed. Panelists expected residential and commercial weather adjusted demand to increase due to lower prices, less peer pressure, and lighter political messaging around energy conservation, but they did not expect demand to return to 2015-19 levels. Industrial demand took a big hit too (Exhibit 65), but there are some early signs of a demand recover from the chemical and fertilizer sectors thanks to low prices. That said, an unfavorable macro backdrop and wider timespreads present a challenge for industrial planners. As a result, industrial demand is likely to see a modest uptick from seasonal lows but is also unlikely to see a return to 2015-19 levels. Over the medium to long term, European LNG demand is expected to stay strong, helping offset declining regional production as total gas consumption falls.

Exhibit 64: NWE LDZ and industrial demand versus HDDs

The biggest question in the market is whether European consumers will revert to their old patterns ahead of winter, when restraint is likely needed

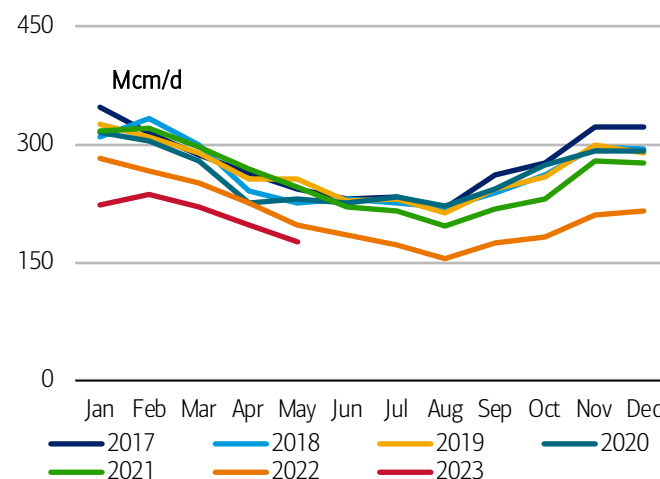


Source: Bloomberg, BofA Global Research estimates

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Exhibit 65: NWE industrial gas demand

Industrial demand is likely to see a modest uptick from seasonal lows, but it is unlikely return to 2015-19 levels



Source: Bloomberg

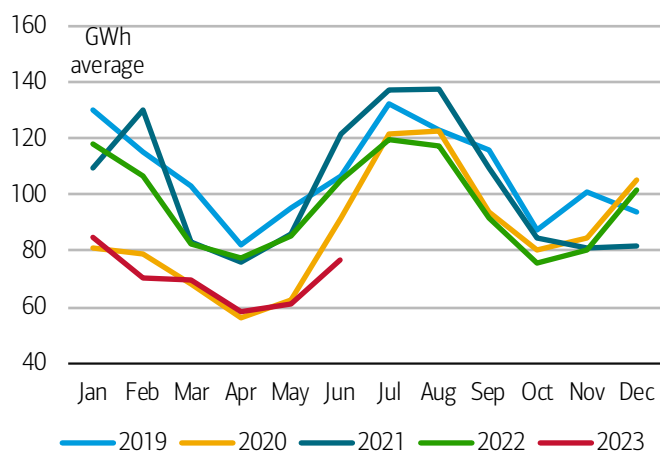
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Maximum global coal-to-gas switching opportunity is around 180-200Bcf/d

Coal-to-gas switching was discussed in detail, especially as it relates to potential future LNG demand growth. Panelists agreed that there is still a lot of potential gas demand globally (via new LNG contracts), but that demand likely requires prices below \$12/mmbtu. Significant US coal-to-gas switching occurred last year and was driven in part by coal deliverability issues (Exhibit 66). A lot of US coal went unused this winter due to mild weather and inventories have grown as a result. Market participants expecting more gas-to-coal switching this year due to high coal inventories have overlooked the fact a lot of the coal was contracted around \$5.50/mmbtu, up from \$3.50/mmbtu last year. Meanwhile, US gas is trading much lower at \$2.60/mmbtu today, leaving little incentive to switch. As much as 4Bcf/d of coal-to-gas switching has occurred at times in the US recently, supporting gas demand as balances remained loose. In Europe, coal-to-gas switching was helped by a major reduction in coal capacity. In fact, many of the major coal consumers of the past two decades barely have any coal capacity left. Much of this shift toward gas occurred at a time when carbon prices were much lower. With higher carbon prices, fuel switching occurs at much higher price levels (Exhibit 67), highlighting the value of the carbon mechanism in driving curbing power sector emissions. Without carbon markets, switching becomes harder at price set by TTF. China is a classic example of low coal-to-gas switching price levels. Indeed, gas demand there picks up around the \$7-8/mmbtu as this is the breakeven price for domestic coal.

Exhibit 66: US L-48 coal power generation

Gas-to-coal switching has not occurred this year due to high contracted coal prices of roughly \$5.50/mmbtu, while gas is trading closer to \$2.60/mmbtu

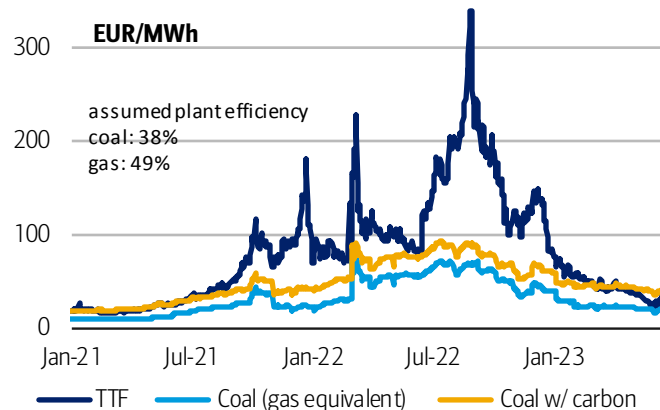


Source: Bloomberg

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Exhibit 67: NWE gas and gas equivalent coal prices

High carbon prices push up the fuel switching price range for European utilities



Source: Bloomberg, BofA Global Research estimates

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Is the Metals Industry ready for Net Zero

During the second metals panel, Neal Froneman, CEO Sibanye Stillwater delivered a keynote speech, followed by Iberdrola's Head of Procurement Cesar Marzabal Astigarraga to talk headwinds on the renewables side, while Anglo American's Chief Economist Paul Gait touched on global macro trends.

Mr Froneman confirmed that Sibanye Stillwater has been managing its portfolio with agility, noting that the company produces around 1Moz gold, over 2Moz of platinum-group metals and some refined nickel. By revenues, the split is still over 90% geared towards the PGMs. With Sibanye actively diversifying, the company is aiming to earn 1/3rd from gold, PGMs, and battery metals respectively. Indeed, the CEO sees growth opportunities in green or future facing metals, adding however that growth, is not "growth for the sake of growth", i.e. it has to be value accretive. The push into new assets will revolve around high quality resources with high ESG credentials in specific ecosystems. On the latter, Sibanye noted early on that that world is going to de-globalise/regionalise so positioned itself in European and North American markets.

Indeed, the Keliber lithium project in Finland is set to be one of the greenest lithium sites in the world. Linked to that, Mr Froneman thought that the product supplied will ultimately get a premium.

Mr Froneman added the operation fits within its strategy of decarbonisation, European battery materials and electrification technologies. The site will commence with production of 15kt, but there is scope to expand in at least 2-3 stages.

Finally, commenting on South Africa, Sibanye confirms that the operating environment will remain difficult this year, with up to 20% of total South African PGM production potentially lost. That said, the manager is optimistic that the power situation will gradually improve into 2024, also because coal fired power plant will come back online. Going forward, renewable power will be critical to manage.

Meanwhile Iberdrola's Cesar Marzabal noted three key issues with the renewables supply chain: 1) permits, 2) grid and 3) supply chain. Going through each of those issues Mr. Marzabal is optimistic on permitting, with the EU going in the right direction of shortening lead times, but he also notes that in the end it will depend on how pragmatic the final proposals are. He reinforces though that ambitious energy transition targets will not be reached under current guidelines. Speaking towards the supply chain and raw materials, the manager noted that volatility is what kept him awake during 2021 and 2022. As to Iberdrola's plans, Mr. Marzabal outlines that projects are 100% secured with solar panels, structures, and other components.

Changing tack and looking into macro, Paul Gait confirmed that China accounts for 50% copper or steel demand, although this is still smaller than the US' at the height of its hegemonic dominance of the global economy, and again, smaller than the UK was when it was the leading industrial power. As such, he notes that we have seen that level of industrial concentration before, implying that the status quo is not unusual.

That said, touching on the changing structure of demand, Mr. Gait outlines that as an economy develops, the growth rate declines and installed capital stock grows which is playing out in China. However, at a global level, there still is significant underinvestment. As such, and reflecting concerns over weak Chinese demand, the economist suggested that cycle have always been there, but outside China, the demand for a higher standard of living is going to be a perennial feature for raw materials demand. And of course, the metal intensity of economic activity is increasing on decarbonizing. Linked to that, the real concern is whether the mining industry can supply at the rate that will be required to deliver on these aspirations.

Touching on raw material shortages, Mr. Gait said this is a constraint of our own making, so if the broader society wished to see the transition take place at a faster rate, the levers by which it could do so are clear: cost of capital to the mining sector needs to fall; it needs to be easier to source capital, and that capital inflow has as a whole set of externalities, including increasing exploration rates and reinvestment rates; it would also enable the industry to attract the talent that it needs to build the next wave of supply.

Linked to that, an industry will have a cycle length that is proportional to the lead time for reinvestment. Given the lead time is increasing, cycles are going to become more pronounced. As such, volatility, which has been a feature over the last few years, is set to remain elevated on supply/demand imbalances.

Driving the Transition

Fertilizer companies have been exploring alternatives to natural gas

Natural gas is a key input cost for fertilizer companies, accounting for 60-80% of the cash costs. In the case of Europe, gas is well over 90% of the cash price of the products. That said, other alternatives to natural gas have been explored or are under development. These include carbon sequestration, blue hydrogen, renewable natural gas or biogas, electrolysis for green hydrogen production. These alternative solutions not only provide a buffer to volatile natural gas prices, but also allow to achieve a lower carbon footprint in hard to decarbonize industries, such as agriculture.

Margins in Europe are still challenged, despite the sharp fall in nat gas prices

Europe is still a challenging place to operate. While the price of natural gas has dropped from \$50-\$60/MMBtu in Q4 last year, to a little over \$10/MMBtu today, that did not happen in isolation. The price of the products produced from natural gas is also coming down (e.g. methanol and ammonia). That is why Europe is still sitting on the right side of the marginal cost curve. On the ammonia side, 90 mn t of European gross ammonia capacity is sitting on this marginal cash cost curve, as the price of ammonia, which was \$1,400/t in 4Q22, has now settled in the three hundreds. Smaller plants in Europe are old and inefficient and are fighting to get to contribution margin positive.




OCI's three "F"s: food, feedstock, and fuel

OCI operates in three end markets, the so-called "three Fs":

1. **Food**, the agricultural side for OCI's ammonia derivative products. This is the market with the strongest demand outlook, given the need to restore ags supply (more on this below)
2. **Feedstock** or chemical feedstocks (GDP-linked). In this segment, affordability has become the key focus for producers. While products have indeed become more affordable, this happened at a time of slowing global GDP. The rebound in Chinese demand did not materialize as expected, particularly on the construction side
3. **Fuel**, consisting in selling into the fuel space indirectly, producing diesel exhaust fluid (US) and blending low carbon methanol with gasoline (UK). In this end-market, driving demand has slowed down, affecting diesel demand in the US and EU

Exhibit 68: Ammonia and methanol decarbonization opportunities

Low carbon ammonia and methanol could help decarbonize hard-to-abate industries, such as agriculture

		Global GHG emissions	A Low carbon and renewable ammonia	B Low carbon and renewable methanol
	Agriculture	20%	<ul style="list-style-type: none"> • Enabler for low carbon agricultural value chain 	
	Fuel	10%	<ul style="list-style-type: none"> • No CO₂, SO_x, or particulate emissions upon combustion • Needs less refrigeration (-33°C NH₃ vs -253°C H₂) 	<ul style="list-style-type: none"> • Effective and easier to handle than H₂ • Cleaner burning low carbon fuel in marine transport • Widely used in road transport • Versatile base chemicals with established routes to gasoline and aviation fuels
	Feedstock or Energy carrier	30%	<ul style="list-style-type: none"> • Green feedstock for chemicals and low-cost solution to transport H₂ • 70% higher energy density than H₂ • Direct use in power generation, e.g., co-firing in coal or gas turbines 	<ul style="list-style-type: none"> • Efficient and promising green feedstock for chemicals in many end-markets • 84% higher energy density than H₂ • Ideal fuel for power generation such as use in fuel cells or turbines for off-the-grid or emergency power generation

Source: OCI

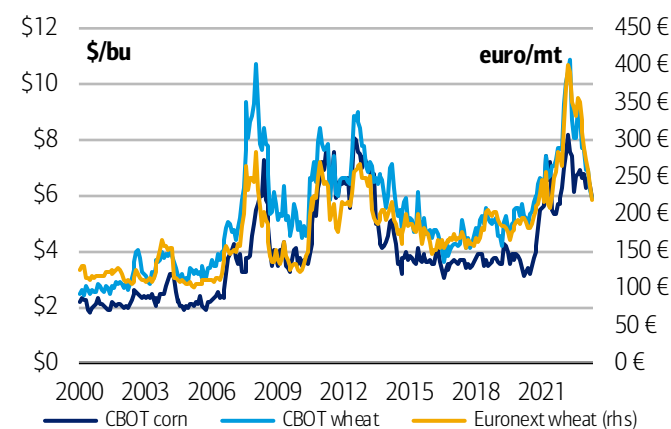
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The outlook for the agricultural sector is the most bullish

In the agricultural space, while the recent rally in grain prices was mostly weather-related, it was also a reflection of the market asking for increased output. It is going to take a few more seasons at least until we can get back to average production levels. Why is this important for a nitrogen fertilizer producer? Nitrogen plays a critical role in plant growth. Hence, from a demand perspective, there is a lot of demand for nitrogen, from corn to grains. Increased demand is also driven by high levels of affordability at the farmer level, given lower fertilizer prices. Farmers are going to want to plant more over the next few seasons because they're incentivized to do so.

Exhibit 69: Global grain prices

Corn and wheat prices rallied sharply on supply disruptions

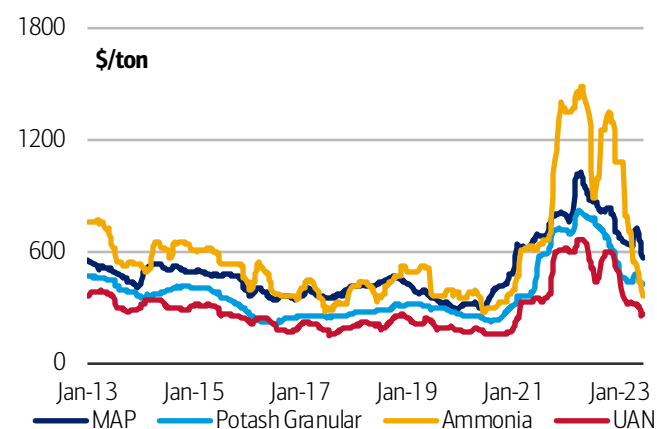


Source: Bloomberg

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Exhibit 70: USGC fertilizer prices

The drop in fertilizer prices should incentivize farmers to increase production



Source: Bloomberg

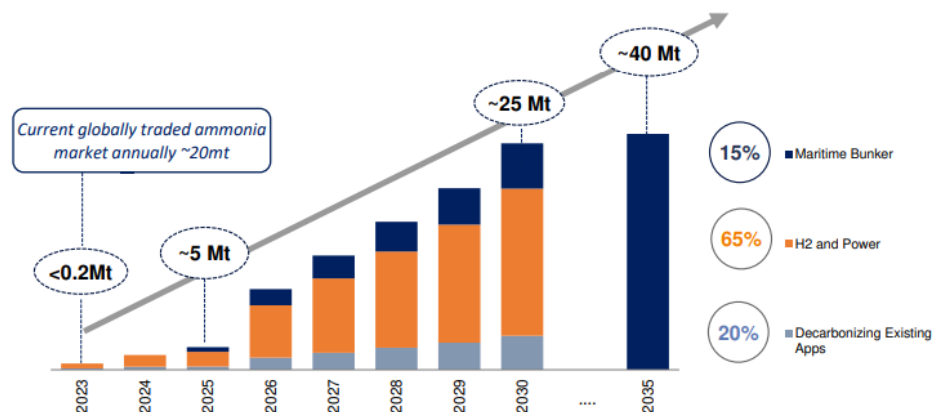
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Ammonia can help decarbonize the power sector by substituting coal

As for future technologies, another interesting space is the power sector. Indeed, there are positive prospects for increased **methanol** usage in diesel generators, particularly in the case of off-the-grid power plants. Methanol can be moved very easily, it is low carbon and low toxicity, and can be stored easily. That said, the most promising developments are coming from **ammonia** in large scale power generation (on-grid), a technology pioneered by Japan and Korea, where renewable electricity is not as abundant as in other regions. Both countries are looking at incentives to pay for the higher costs of this technology, including pricing CO2 properly. They are planning to incentivize coal substitution with ammonia up to 20% (50% in the future). 1 GW with a rate of substitution of 20% could consume up to 800,000 t of ammonia. That is a sizable number, given the size of the entire merchant ammonia market, today at 20 mn t (Exhibit 71).

Exhibit 71: Outlook for incremental low-carbon ammonia demand by end-use to 2035

New clean energy applications should boost demand for low-carbon ammonia



Source: OCI Global

BofA GLOBAL RESEARCH

Methanol demand from the shipping industry could grow over 12x

Finally, shipping is another promising area. It accounts for 3% of global GHG emissions, hence the increasing efforts in finding ways to lower the carbon footprint. Companies are now ordering dual-fuel ships to keep the optionality to switch to low-carbon fuels, such as methanol and ammonia. Today, the demand is already very significant. About 300,000 t of methanol go into shipping fuel, potentially reaching 4 mn t by 2026. That is equivalent to over a 12x rise in demand in the span of just three or four years.

BofA Cross Commodity Trader Panel

We brought together traders...

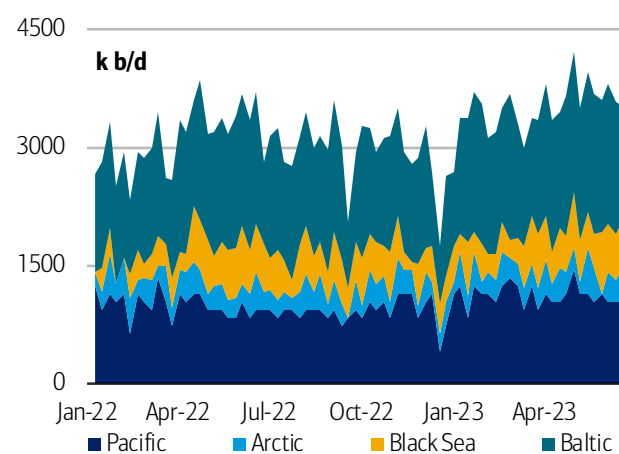
The final session of the conference brought together several Bank of America traders covering oil, natural gas, power, and metals for a panel on their respective areas of focus. The discussion largely focused on the overarching themes popping up in commodities in recent months and years including Russia, the weather, and energy transition.

...to discuss the immediate and lingering impacts from Russia

Russia's invasion of Ukraine sent shockwaves, including through commodities. Traders discussed the expected and not as expected impacts on the commodities markets. Sanctions, price caps, etc. were all implemented to limit Europe's dependence on Russia's fuel supply and limit profits going towards the war. Instead, Russia's crude exports have held strong as the country diverts to other regions. One panelist noted the current price environment has meant the price cap has not been fully tested. On the natural gas side, instead of simply limiting natural gas from Russia, Europe has lowered their overall natural gas consumption and sped up their energy transition, something the panelists discussed could be a permanent shift rather than a temporary one first expected.

Exhibit 72: Russia seaborne crude oil exports, average weekly

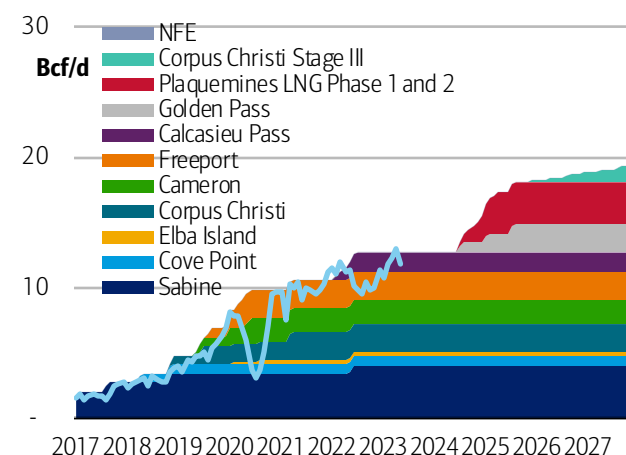
Russian exports are still strong



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Exhibit 73: US LNG exports

Europe has helped boost demand for US LNG



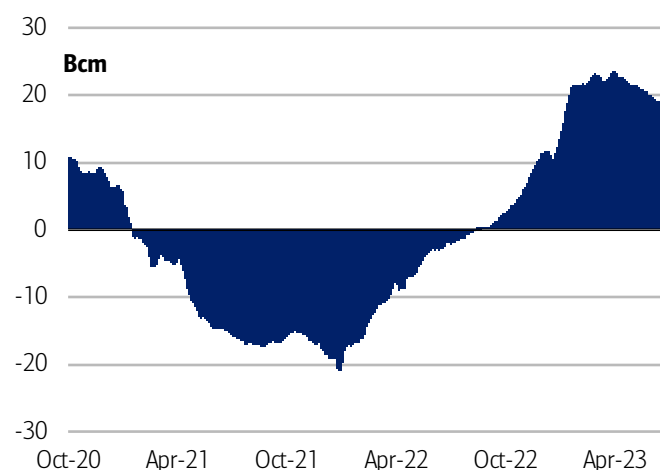
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Unexpected weather changes can both help and hinder fundamentals

Another overarching theme among the panel was the growing near term and longer-term weather impacts on all commodities. Europe's warmer than expected winter largely prevented a much tighter natural gas market and set the region up for strong inventories going into next winter. All eyes will be on coming seasonal weather forecasts, however, as a colder than normal or even normal winter could erase these strong inventories. The move away from Russian supply, as one panelist highlighted, also makes Europe much more susceptible to international fundamentals and prices during these times. On the other side of the Atlantic, panelists also discussed the interplay of doing enough for the energy transition versus doing things too fast, as might be seen from the drop in renewable generation in recent months. This in turn boosted natural gas generation. Temperatures, winter storms, wind speeds, etc have "reminded us what a seasonal commodity natural gas is".

Exhibit 74: European storage surplus to the 5 yr average

A warmer winter weakened withdrawals and lead to strong inventories going into this summer.

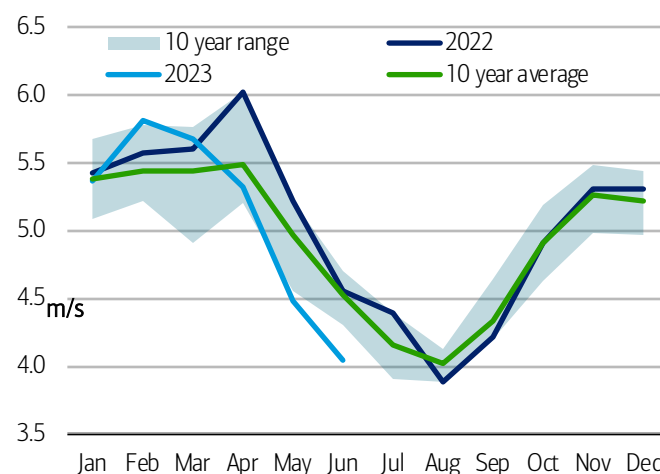


Source: Bloomberg

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Exhibit 75: Lower 48 monthly wind speed

Wind speeds have plummeted recently, weakening generation despite year-on-year capacity gains.



Source: CWG and BofA Global Research

Note: Data through June 15

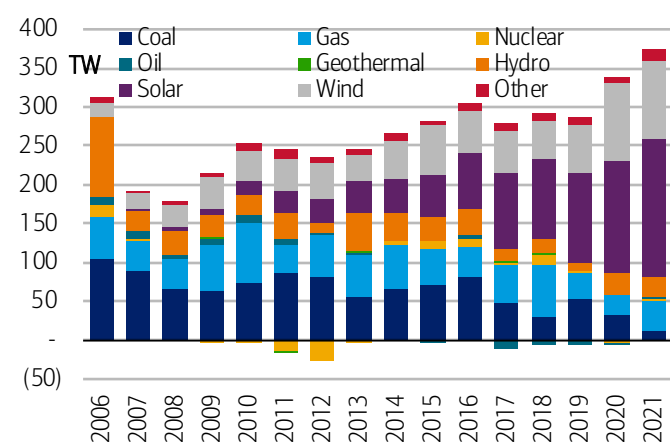
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And the energy transition is bearish energy but bullish metals

The last major topic of discussion was the energy transition. Panelists discussed the impact on every commodity here, much more so than the previous topics. Renewables share of global power capacity has been growing and will need to grow faster to meet net zero goals. On the metals side, our panelist noted supply side constraints are not new, but this strong demand due to the energy transition will be and likely disrupt the current equilibrium. The coming strong demand does not appear to be fully accounted for in day-to-day trading yet. Battery production, for EVs and grid storage, will further boost demand of critical metals and minerals. On the energy side, the energy transition should eventually weaken demand for all fossil fuels, but panelists noted the timing uncertainty and trading opportunities in that uncertainty.

Exhibit 76: Year on year global capacity change

Growing renewables should boost demand for metals but weaken nat gas and coal

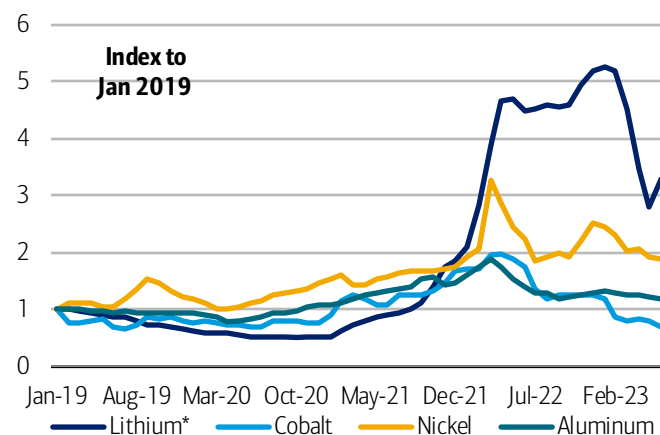


Source: BNEF

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Exhibit 77: EV battery metal prices

ET is expected to boost metal demand and prices over time



Note: BMI Lithium index price Source: Bloomberg

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