

## Global Metals Weekly

## The tiger trails the dragon

**Metals demand growth in India has lagged China's**

India may be the most populous nation, but its metals demand growth has lagged. Indeed, the country's copper consumption per capita barely reaches 5% of China's. Comparing the two nations over time, India's copper demand has been much lower than when China was at similar development stages across 1) urban population, 2) car production and 3) installed power generation capacity. While India's metals consumption should expand from here, based on current demographic and government policies, we don't expect the exponential demand growth we saw in China in the wake of its WTO entry in 2001. What explains China's greater appetite for mined commodities relative to India? Essentially, their economies are set up in very different ways.

**India has a very different economic set-up to China**

To start with, China's savings rate has always been elevated, with saving at some stage almost twice as high as India's. The implications? China's investment has been structurally higher. Savings dynamics are also reflected in current account balances, with China's external trade accounts in permanent surplus and India's predominantly in deficit. Of course, China has always put greater emphasis on external trade, as evident in differentials of trade openness (i.e. (imports + exports) / GDP). Indeed, at peak industrialisation, trade accounted for almost 60% of its GDP, versus India's 49% today. This is also visible in the constitution of exports: China's are dominated by metals-intensive manufacturing products. By contrast, while high-tech and manufacturing also feature in India's exports, many shipments are more basic commodity-related products, which don't really add to metals demand.

**Housing, EVs, grid to push demand, but not exponentially**

Looking into some of the key sectors, China's urban population has exploded in recent years, while India's trajectory looks more stable. This matters because construction activity in urban centres can be a key copper demand driver. Meanwhile, as China and India have gotten wealthier, energy demand and power generation have increased, but India's investment in power generation capacity looks to remain more subdued in the coming years. The picture in automobiles is similar, with India set to be churning out more than 7M cars by 2030, similar to China's production in 2006/07 and well short of the +30M units China will be producing by 2030.

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**Refer to important disclosures on page 13 to 14.**

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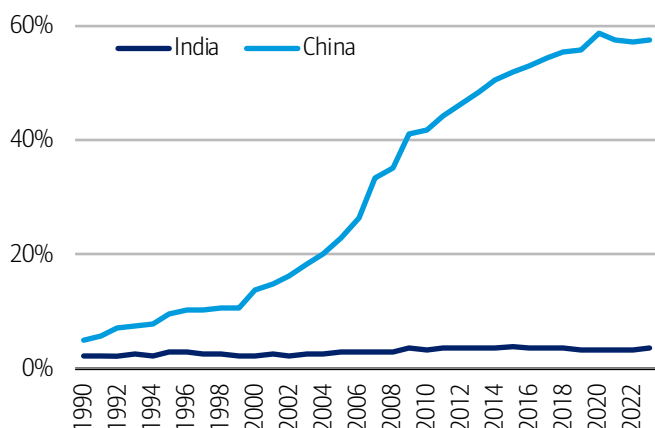
# The tiger trails the dragon

## India's metals demand has lagged China's

China has been the key driver of metals demand over the past two decades (Exhibit 1 and Exhibit 2) and now accounts for 50% of global consumption. This stands in contrast to dynamics in India, where metal usage was lower to start with and has remained subdued.

### Exhibit 1: Aluminium, share of total demand

China consumes more than half of global aluminium supply

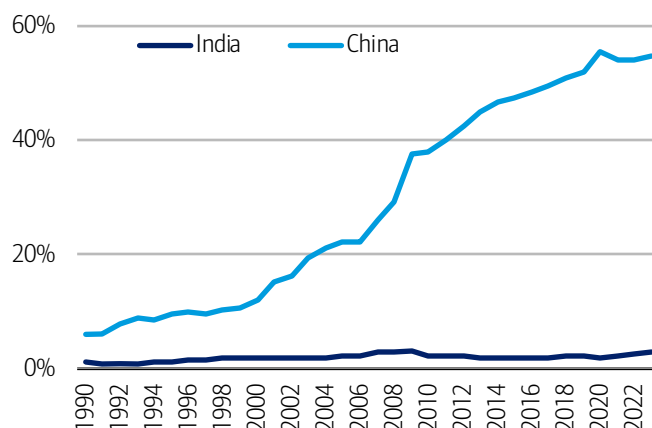


Source: CRU, Woodmac, BofA Global Research

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### Exhibit 2: Copper, share of total demand

China dominates global copper demand



Source: CRU, Woodmac, BofA Global Research

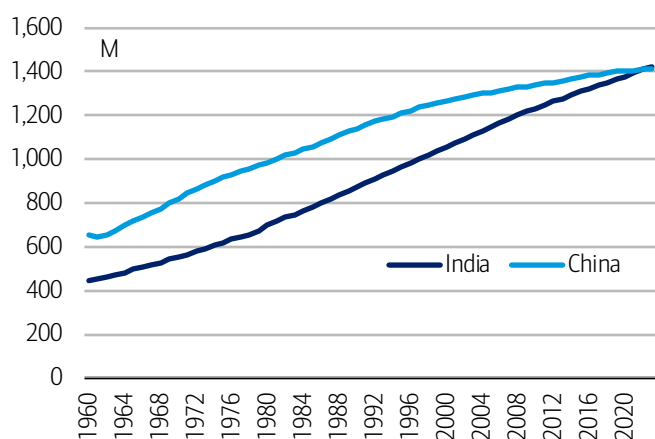
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## India lags even more on demand per capita

India has once again become a focal point of commodity markets because it is now the most populous nation. Exhibit 4 combines the demand and population figures, showing India's copper consumption per capita barely reaches 5% of China's, reinforcing the growth potential.

### Exhibit 3: China and India, population size

India is the most populous country

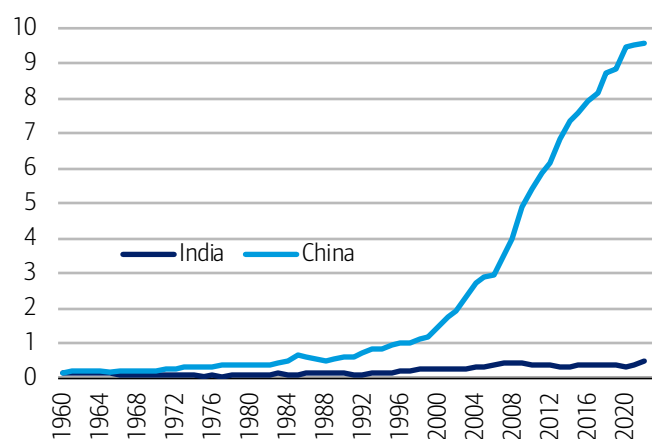


Source: World Bank, IMF, BofA Global Research

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### Exhibit 4: Copper demand per capita

China's copper consumption per capita is 20 times larger than that of India



Source: CRU, Woodmac World Bank, IMF, BofA Global Research

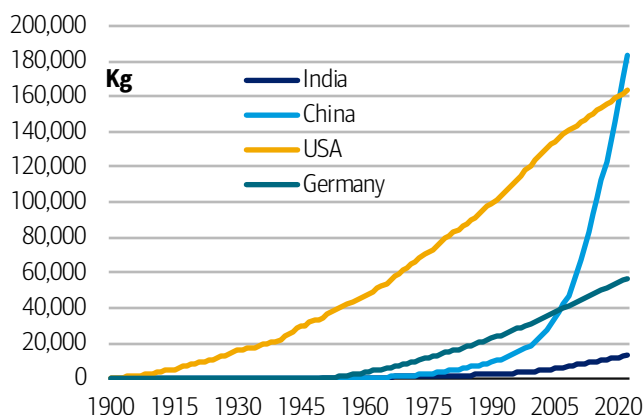
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## India's under-investment is also visible

Exhibit 5 looks at the demand differentials from a different angle, estimating the "installed" copper stock in different countries. "Installed metal" sums up annual demand over time, giving an idea of how much different countries have invested and how much metal is embedded in the capital stock. On that metric, India lags well behind other countries. Interestingly, China also has room to grow.

**Exhibit 5: Copper, installed metal**

As India and China build the capital stock, both have room to grow

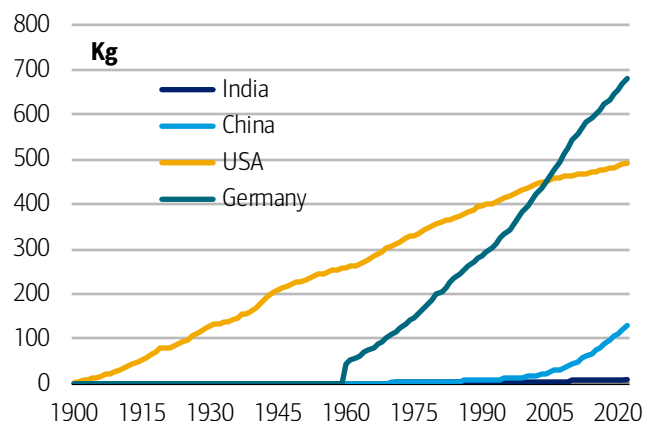


Source: World Bank, IMF, BofA Global Research

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**Exhibit 6: Copper, installed per capita**

India lags also on copper installed per capita



Source: World Bank, IMF, BofA Global Research

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Exhibit 7 and Exhibit 8 pick up on these differences, comparing India's and China's copper demand at similar development stages across 1) **urban population**, 2) **car production** and 3) **power generation capacity**, all of which have an influence on metals demand. The bottom line: China's copper demand is much higher than India's at present and we expect India to remain less of demand driver than China even by 2030.

**Exhibit 7: Copper demand India and China at comparable development stages**

India's copper demand is lower than China's at different development stages

| Sector                                       | Units     | Year | GDP    | GDP/ capita | Copper demand, Kt |
|--|-----------|------|--------|-------------|-------------------|
| <b>Housing Urban population, M people</b>    |           |      |        |             |                   |
| India  | 508.4     | 2022 | 11,855 | 7,528       | 683.6             |
| China  | 512.5     | 2003 | 5,036  | 3,898       | 2,992.0           |
| <b>Car production Car production, units</b>  |           |      |        |             |                   |
| India  | 5,113,173 | 2022 | 11,855 | 7,528       | 683.6             |
| China  | 5,198,000 | 2005 | 6,542  | 5,004       | 3,745.0           |
| <b>Grid installations Power capacity, MW</b> |           |      |        |             |                   |
| India  | 485,500   | 2022 | 11,855 | 7,528       | 683.6             |
| China  | 564,217   | 2006 | 7,601  | 5,781       | 3,854.0           |

Source: World Bank, IMF, CRU, Woodmac, BofA Global Research

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**Exhibit 8: Copper demand India and China at comparable development stages**

Even by 2030, India's copper demand will be smaller than China's at similar development stages

| Sector                                       | Units     | Year | GDP    | GDP/ capita | Copper demand, Kt |
|--|-----------|------|--------|-------------|-------------------|
| <b>Housing Urban population, M people</b>    |           |      |        |             |                   |
| India  | 609.5     | 2030 | 20,868 | 13,829      | 1,413.6           |
| China  | 616.5     | 2008 | 9,962  | 7,504       | 5,230.0           |
| <b>Car production Car production, units</b>  |           |      |        |             |                   |
| India  | 7,259,947 | 2030 | 20,868 | 13,829      | 1,413.6           |
| China  | 8,117,240 | 2008 | 9,962  | 7,504       | 5,230.0           |
| <b>Grid installations Power capacity, MW</b> |           |      |        |             |                   |
| India  | 633,900   | 2030 | 20,868 | 13,829      | 1,413.6           |
| China  | 663,033   | 2007 | 8,919  | 6,747       | 4,620.0           |

Source: World Bank, IMF, CRU, Woodmac, BofA Global Research

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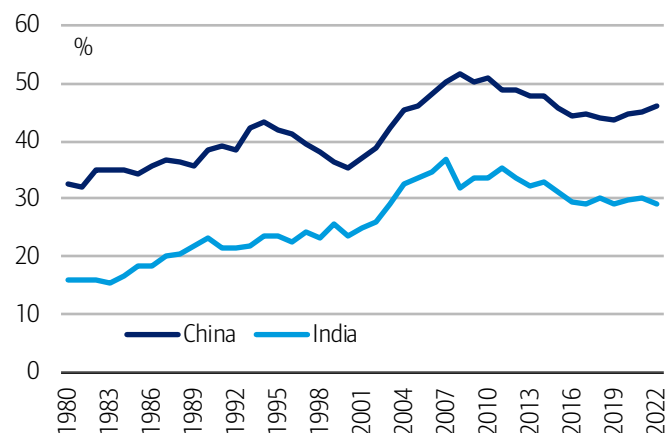
**Economies of China and India set up very differently**

What could explain China's greater appetite for the mined commodities relative to India? The two economies are set up very differently. Exhibit 9 picks up on this, highlighting that China's savings rate has been extremely high, with the country at one stage saving

almost twice as much as India. The implications? China's investment rate has been much higher structurally, as Exhibit 10 shows.

#### Exhibit 9: China and India, total savings as a share of GDP

At one stage, China's savings rate was twice as high as India's

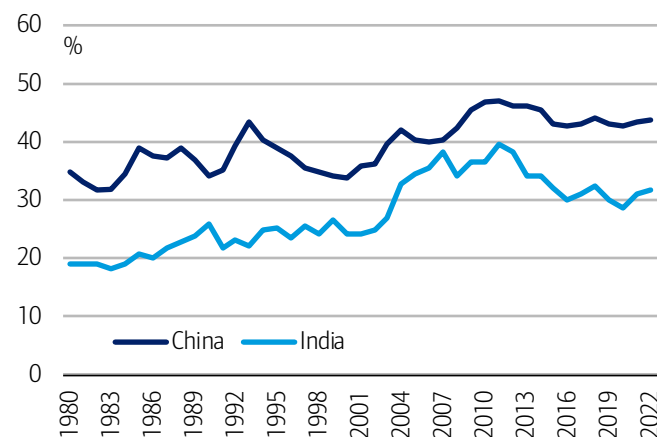


Source: IMF, BofA Global Research

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#### Exhibit 10: China and India, total investment as a share of GDP

Higher savings = higher investment



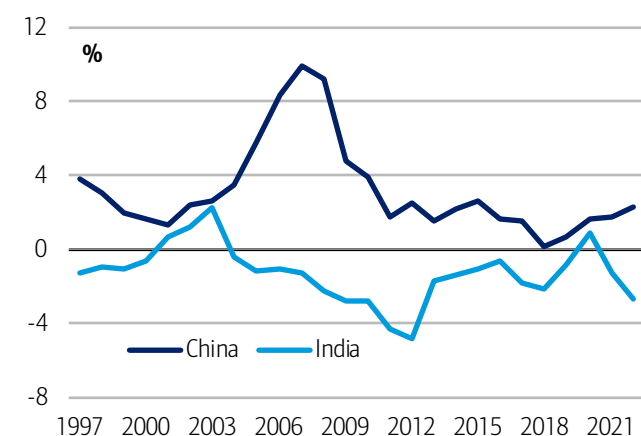
Source: IMF, BofA Global Research

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The savings overhang is also picked up on by Exhibit 11, which shows that China's current account has been in permanent surplus. This is unusual for an emerging market which normally imports capital. Meanwhile, India's external accounts show a more traditional picture, with the country usually in a current account deficit. From the outset, China has put much stronger emphasis on external trade. This is reflected in Exhibit 12, which shows a remarkable differential in the trade openness of the two Asian nations (trade openness = (imports + exports) / GDP). Indeed, the sum of imports and exports accounted for more than 60% of China's GDP during the period of rapid industrialisation, while India's is still hovering at around 49%, as Exhibit 12 shows. The current trend of deglobalisation does not necessarily help India either.

#### Exhibit 11: Current account, of GDP

China has run a current account surplus, while India is in deficit



Source: IMF, BofA Global Research

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#### Exhibit 12: China and India, trade openness

As China industrialised, combined imports and exports accounted for 60% of GDP



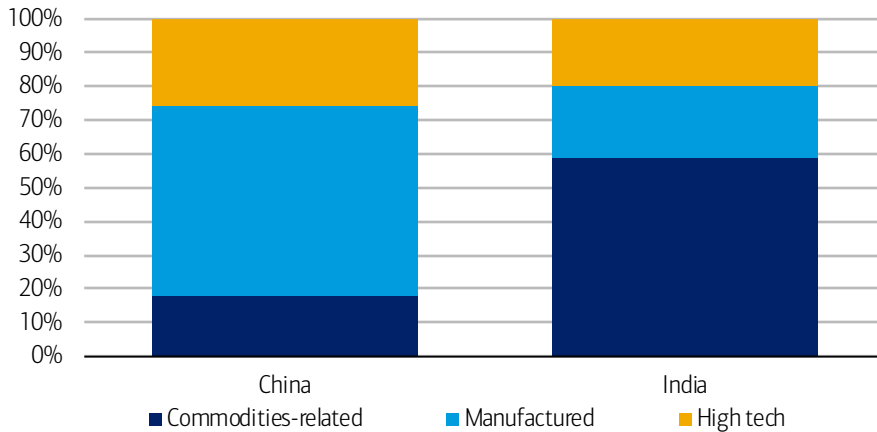
Source: World Bank, BofA Global Research

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Exhibit 13 digs a bit deeper, highlighting a remarkable difference in exports. Commodities have a relatively small share of China's sales abroad, which are dominated by metals-intensive manufacturing products. Meanwhile, high-tech and manufacturing also feature in India's exports, but shipments are primarily commodity-related products.

**Exhibit 13: Breakdown of top-20 exports by category**

China's trade is manufacturing-heavy, while India is focused on more basic commodities



Source: IMF, BofA Global Research

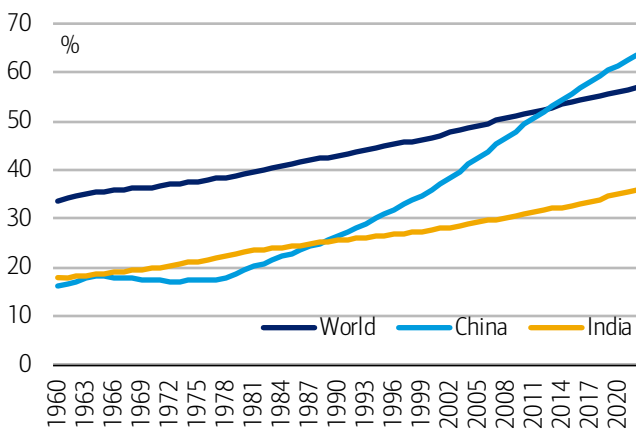
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**Urbanisation and population growth**

Urbanisation matters for metals-intensive housing construction. Exhibit 14 shows that China and India had more or less the same urbanisation rates until 1989, when China's accelerated. Exhibit 15 shows the implications for the urban population: India has around half the people living in cities that China does, even though it now has a bigger population.

**Exhibit 14: Urbanisation rates**

China's urbanisation rate has accelerated; India's has been stable

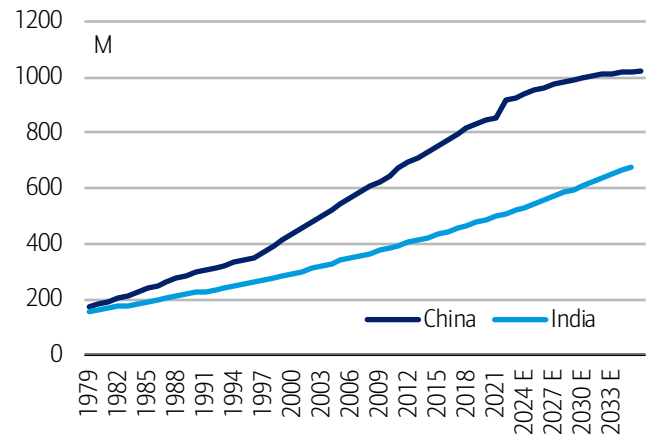


Source: World Bank, IMF, BofA Global Research

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**Exhibit 15: China and India, urban population**

India's urban population is set to remain below that of China



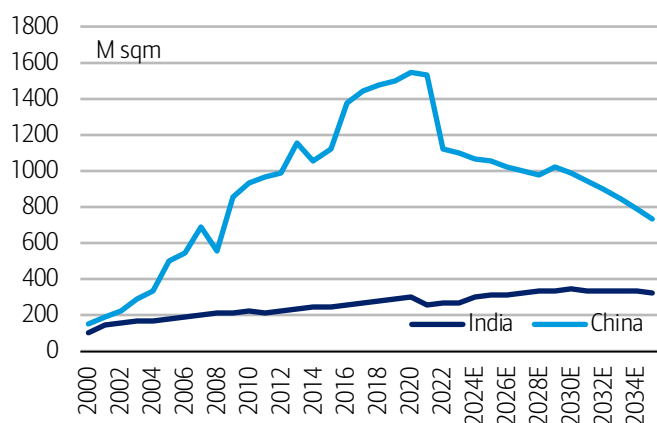
Source: World Bank, IMF, BofA Global Research

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Of course, this matters because construction in urban centres has been a key copper demand driver in China. India lags on this front. Referencing the long-term housing model from our China equities team, Exhibit 16 shows the implications for housing demand: while India's increases, under the current demographic trajectory, it will in all likelihood remain below China's (we also assume India's households require less sqm).

**Exhibit 16: China and India, housing demand**

Under the current urbanization trajectory, India housing demand is set to lag

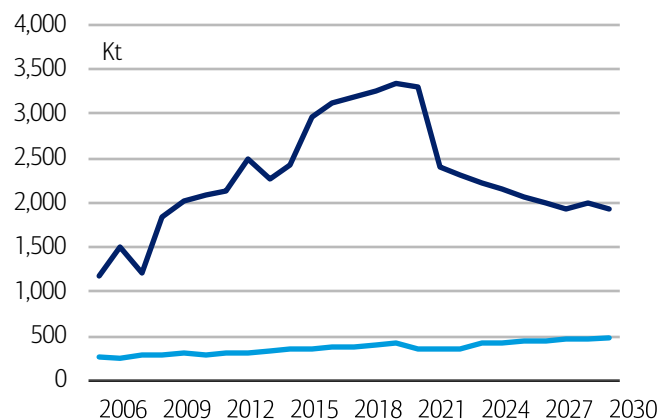


Source: BofA Global Research

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**Exhibit 17: China and India, copper demand from housing**

Even if China's housing sector slows, it should continue to use more copper than India's



Source: BofA Global Research

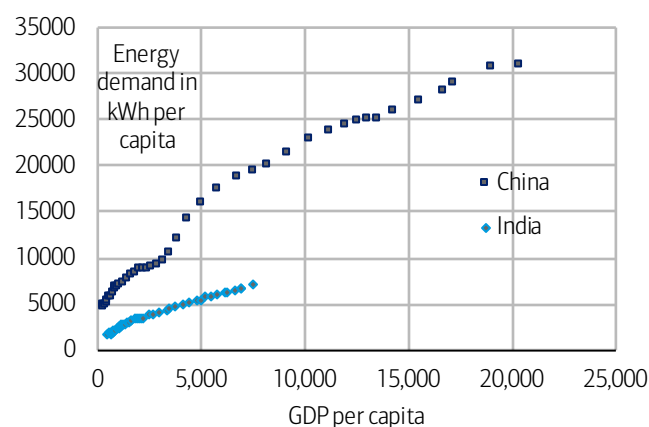
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**Electrification**

As China and India have become wealthier, energy demand has risen (Exhibit 18). Not surprisingly, electricity usage has increased (Exhibit 19).

**Exhibit 18: China and India, electricity usage per capita**

China uses more electricity than India

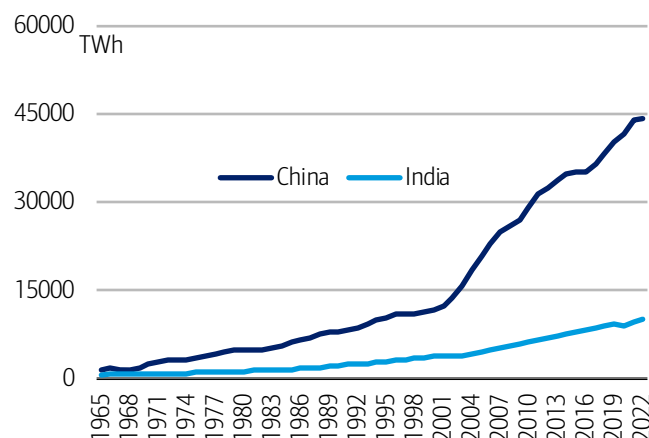


Source: IEA, BofA Global Research

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**Exhibit 19: China and India, electricity generation**

China is more electricity intensive than India



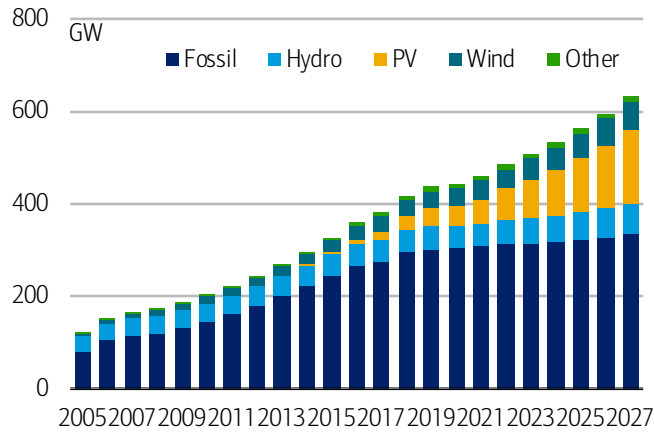
Source: IEA, BofA Global Research

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Exhibit 20 picks up on this, showing that India's power generation capacity should keep rising gradually over the coming years, with metals-intensive renewables like solar panels accounting for the majority of growth. Yet, Exhibit 21 puts those numbers into context: India is set to grow, but the expansion in power generation capacity still lags that of China, Europe and the US.

**Exhibit 20: India, power generation capacity**

India's power generation capacity is set to grow

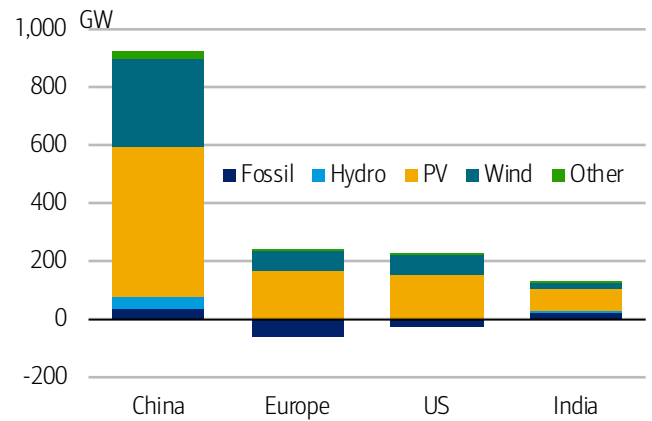


Source: IEA, BofA Global Research

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**Exhibit 21: Electricity generation capacity, growth 2022-2027**

Every country/ region is investing in generation capacity but India lags



Source: IEA, BofA Global Research

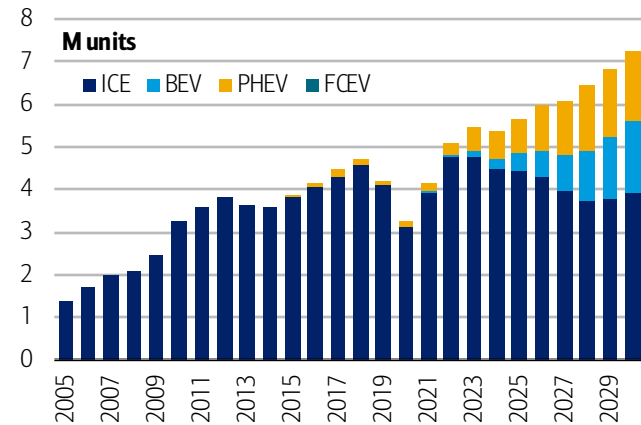
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**Industrialisation/EVs**

Finally, the picture in automotives is similar, with Exhibit 22 showing that India is set to churn out more than 7M units of cars, led by a rising market share of electric vehicles. Meanwhile, India's automotive industry will likely remain smaller than in China, Europe and the US, which should limit the pull on metals demand.

**Exhibit 22: India, car production**

India is set to produce more than 7M cars by 2030

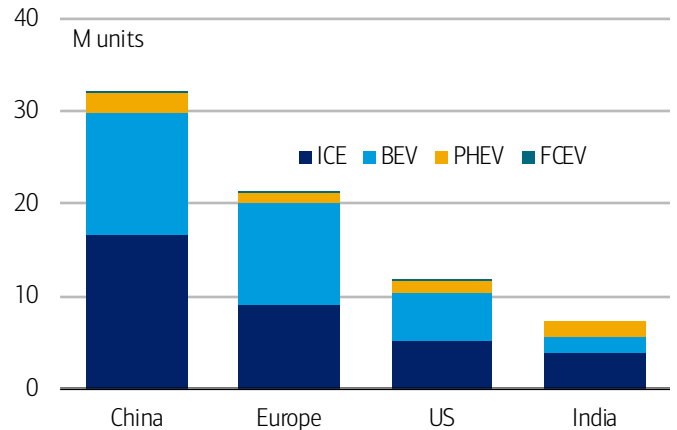


Source: HIS, BofA Global Research

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**Exhibit 23: Car production in different countries and regions**

China will likely lead global car production by 2030



Source: HIS, BofA Global Research

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# Appendix

## Exhibit 12: Commodity prices, exchange rates, equity indices, yields and inventories

Metal prices have stabilized

| Base metals   | Cash, \$/t     | 3-month, \$/t | Cash, WoW change       | 3-month, WoW change    |
|---|----------------|---------------|------------------------|------------------------|
| Aluminium   | 2,125          | 2,176         | -2.7%                  | -2.6%                  |
| Copper  | 8,256          | 8,295         | -3.1%                  | -3.2%                  |
| Lead  | 2,101          | 2,109         | -0.9%                  | -0.9%                  |
| Nickel  | 19,953         | 20,241        | -5.4%                  | -5.0%                  |
| Tin   | 26,221         | 26,457        | -5.1%                  | -4.5%                  |
| Zinc  | 2,409          | 2,398         | -3.9%                  | -4.3%                  |
| LMEX  | 3,675          |               | -3.2%                  |                        |
|   | Cash, c/lb     | 3-month, c/lb |                        |                        |
| Aluminium   | 96             | 99            |                        |                        |
| Copper  | 374            | 376           |                        |                        |
| Lead  | 95             | 96            |                        |                        |
| Nickel  | 905            | 918           |                        |                        |
| Tin   | 1,189          | 1,200         |                        |                        |
| Zinc  | 109            | 109           |                        |                        |
| Other commodities, freight, exchange rates, equities and yields | Spot           | WoW change    |                        |                        |
| Gold, \$/oz   | 1,914          | -1.5%         |                        |                        |
| Silver, \$/oz   | 23             | -4.0%         |                        |                        |
| Platinum, \$/oz   | 916            | -1.1%         |                        |                        |
| Palladium, \$/oz  | 1,299          | 3.1%          |                        |                        |
| Iron ore, China fines cfr \$/dmt                                | 105            | 0.6%          |                        |                        |
| Brent, \$/bbl   | 87             | 0.7%          |                        |                        |
| Baltic Dry Index  | 1,129          | -0.6%         |                        |                        |
| EUR/USD   | 1.095          | -0.5%         |                        |                        |
| Dow Jones Industrial Average                                    | 35,281         | 0.6%          |                        |                        |
| 10-year US Treasury yield                                       | 4.155          | 2.9%          |                        |                        |
| ICE BofA Commodity index, ER                                    | 443            | 0.7%          |                        |                        |
| ICE BofA Commodity index Industrial Metals, ER                  | 176            | -3.4%         |                        |                        |
| ICE BofA Commodity index Precious Metals, ER                    | 212            | -1.7%         |                        |                        |
| ICE BofA Commodity index Energy, ER                             | 533            | 2.1%          |                        |                        |
| Exchange stocks and cancelled warrants                          | Stocks, tonnes | WoW change    | Canc. warrants, tonnes | Canc. warr., of stocks |
| Aluminium   |                |               |                        |                        |
| LME   | 491,750        | -2.3%         | 211,075                | 42.9%                  |
| Shanghai  | 105,233        | -6.7%         |                        |                        |
| Total aluminium   | 596,983        | -3.1%         |                        |                        |
| Copper  |                |               |                        |                        |
| LME   | 85,375         | 7.6%          | 350                    | 0.4%                   |
| Comex   | 39,359         | -0.3%         |                        |                        |
| Shanghai  | 52,915         | 1.5%          |                        |                        |
| Total copper  | 177,649        | 3.9%          |                        |                        |
| Lead  |                |               |                        |                        |
| LME   | 56,125         | -1.8%         | 7,225                  | 12.9%                  |
| Shanghai  | 49,722         | -1.2%         |                        |                        |
| Total lead  | 105,847        | -1.5%         |                        |                        |
| Nickel  |                |               |                        |                        |
| LME   | 37,014         | -0.3%         | 1,050                  | 2.8%                   |
| Shanghai  | 3,593          | 15.4%         |                        |                        |
| Total nickel  | 40,607         | 1.0%          |                        |                        |
| Tin   | 5,900          | 7.7%          | 45                     | 0.8%                   |
| Zinc  |                |               |                        |                        |
| LME   | 92,175         | -2.9%         | 15,775                 | 17.1%                  |
| Shanghai  | 63,069         | 1.7%          |                        |                        |
| Total zinc  | 155,244        | -1.1%         |                        |                        |

Source: BofA Global Research

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**Exhibit 25: Price forecasts, fundamental drivers and risks**

We are bullish on a range of cyclical commodities

| Metal                   | 2023E                    | 2024E                    | Fundamental drivers  |   | Risks (D = downside; U = upside) |  |
|-------------------------|--------------------------|--------------------------|--|---|----------------------------------|--|
| Aluminium               | \$2,353/t<br>107c/lb     | \$2,875/t<br>130c/lb     | <ul style="list-style-type: none"><li>China is reaching for a 45mt capacity cap and smelters ex-China have closed capacity.</li><li>China's smelters remain under pressure on hydro power shortages, but are now restarting some capacity. At the same time, demand should pick up, so exports will likely remain capped.</li><li>We expect rising <b>deficits</b> going forward</li></ul>   | <ul style="list-style-type: none"><li>D: No production discipline in China/ World ex-China</li><li>D: China exports more</li><li>U: Smelter restraint and/or production disruptions reduce output</li><li>U: Stronger than anticipated demand growth</li></ul>  |                                  |  |
| Copper                  | \$8,788/t<br>399c/lb     | \$9,750/t<br>442c/lb     | <ul style="list-style-type: none"><li>Copper rallied as China re-opened, but has given back most of these gains</li><li>Demand in China has been patchy, but grid spending has completely offset weakness in housing. Demand may be more balanced in 2023, and should hold up. Copper to rally, if the government pushes through more stimulus</li><li>Inventories are low, which is supportive, but could also increase volatility</li><li>We expect a small <b>deficit</b> for 2023</li></ul>  | <ul style="list-style-type: none"><li>D: China re-exports metal</li><li>D: Global demand slows sharply into next year</li><li>U: Strong restocking through the supply chain on improved confidence</li><li>U: Continued production disruptions in coming quarters</li></ul>   |                                  |  |
| Lead                    | \$2,087t<br>95/lb        | \$2,000/t<br>91c/lb      | <ul style="list-style-type: none"><li>There are no immediate scrap and concentrates shortages, suggesting the market could flip back into surplus</li><li>China's demand has slowed structurally, as the ebike market has matured</li></ul>  | <ul style="list-style-type: none"><li>D: Destocking in China or higher lead exports from the country.</li><li>U: Strong seasonal demand for replacement batteries after cold/ hot winter/ summer months</li></ul>   |                                  |  |
| Nickel                  | \$22,063/t<br>1001c/lb   | \$21,250/t<br>964c/lb    | <ul style="list-style-type: none"><li>Nickel demand from electric vehicle producers should rise in the coming years, yet more NPI is being converted to nickel sulphate</li><li>China has built conversion capacity, which should take about 100Kt of Indonesian units into the refined market</li><li>Indonesian supply may prevent shortages near-term, but further out, more material is required</li><li>We expect a <b>surplus</b> for 2023, but <b>deficits</b> beyond</li></ul>   | <ul style="list-style-type: none"><li>D: NPI producers don't close shop; ore inventories last for longer and more ores are imported from the Philippines.</li><li>D: Faster ramp-up of Indonesian NPI production</li><li>D: Stainless steel demand remains subdued</li></ul>  |                                  |  |
| Zinc                    | \$2,603/t<br>118c/lb     | \$2,375/t<br>108c/lb     | <ul style="list-style-type: none"><li>The project pipeline is not well filled with high quality operations</li><li>Zinc may remain an underperformer, but immediate downside more limited, also because smelter closures in Europe have not been offset by supply additions elsewhere</li><li>Cost support is starting to kick in, as recent mine closures highlight</li></ul>   | <ul style="list-style-type: none"><li>D: Unreported inventories exist on the zinc market. More metal could become available</li><li>D: The zinc market is fragmented. There is evidence that miners, especially in China, could consider further output increases</li></ul>   |                                  |  |
| Gold                    | \$1,923/oz               | \$1,963/oz               | <ul style="list-style-type: none"><li>Gold has been a trade on US rates. The rally past \$2,000/oz subsided as the Fed signalled a resumption of rate hikes. Until the end of the hiking cycle is reached, gold prices will remain capped</li><li>Central bank buying has been strong, but not sufficient; a Fed pivot may bring more investors into the market.</li><li>Gold to rally into year-end 2023.</li></ul>   | <ul style="list-style-type: none"><li>D: Deterioration of investor sentiment</li><li>D: Real rates become more positive; sustained USD rally</li><li>D: High gold prices deter buyers of physical gold; increased scrap supply</li></ul>  |                                  |  |
| Silver                  | \$22.98/oz               | \$23.26/oz               | <ul style="list-style-type: none"><li>The silver market has rebalanced on production discipline and demand from new applications including solar panels</li><li>As more spending on solar panels come through, silver should rally</li><li>Bottoming out of the global economy in 2024 should also help industrial demand</li></ul>  | <ul style="list-style-type: none"><li>U: Investors returning to the market</li><li>U: China's imports to rise</li><li>D: ETF liquidation</li><li>D: More supply</li></ul>   |                                  |  |
| Platinum<br>Palladium   | \$1,068/oz<br>\$1,391/oz | \$1,465/oz<br>\$1,100/oz | <ul style="list-style-type: none"><li>Palladium is slowly moving into surplus, likely keeping prices capped.</li><li>Supply problems in South Africa have reduced platinum supply. The hydrogen economy and substitution should push the metal up</li></ul>  | <ul style="list-style-type: none"><li>D: Jewellery demand suffers due to rising prices.</li><li>D: In palladium, the risk of deliveries from Russian stockpiles has not gone away</li><li>D: Demand from key buyers like Europe not increasing</li><li>U: Production disruptions reduce availability of PT and PD</li></ul> |                                  |  |
| Iron Ore                | \$114/t CIF              | \$98/t CIF               | <ul style="list-style-type: none"><li>Iron ore inventories at China's mills are extremely low.</li><li>Production cuts at mills, along higher steel demand should support steel prices, likely pulling iron ore higher as well near-term</li></ul>   | <ul style="list-style-type: none"><li>D: China's steel production slowing sharply</li><li>U: Mine closures/slowdown in production increases</li></ul>   |                                  |  |
| HCC<br>Thermal coal     | \$278/t<br>\$184/t       | \$249/t<br>\$160/t       | <ul style="list-style-type: none"><li>Thermal coal prices to come under pressure as supply is increasing and the energy emergency normalises</li><li>A normalisation of supply should also contribute to lower met coal prices</li></ul>   | <ul style="list-style-type: none"><li>D: Lack of supply discipline</li><li>U: Chinese steel production stronger (HCC)</li><li>U: mine closures</li></ul>  |                                  |  |
| Brent and WTI crude oil | \$80/bbl<br>\$75/bbl     | \$90/bbl<br>\$85/bbl     | <ul style="list-style-type: none"><li>We project Brent and WTI to average \$80/bbl and \$75/bbl, respectively, in 2023.</li><li>The global oil balance should stay tight in 2023, supported by additional OPEC+ cuts starting in May, slower non-OPEC growth, and rebounding Asia demand,</li><li>We forecast global demand growth to slow to 1.2mn b/d YoY in 2023 and 1mn b/d in 2024.</li><li>Non-OPEC supply should grow roughly 1.8mn b/d YoY in 2023 and 720k b/d in 2024.</li><li>We project total US crude and NGL supply to rise 1.1mn b/d in 2023 and 600k b/d in 2024.</li><li>OPEC crude oil supplies are set to fall 650k b/d in 2023 and 230k b/d in 2024 as OPEC+ actively manages balances..</li></ul> |   |                                  |  |

Colours indicate our stance on each commodity: Green = bullish, Yellow = neutral, Red = cautious. 2020E/2024E = period averages. bbl = barrel. b/d = barrels/day. c/lb = cents/pound. oz = ounce.

Source: BofA Global Research estimates

**Exhibit 14: Commodity price forecasts**

Copper should outperform

|                         |            | Current | 2Q23E  | 3Q23E  | 4Q23E  | 1Q24E  | 2Q24E  | 3Q24E  | 2022E  | 2023E  | 2024E  | 2025E  | 2026E  | 2027E  | LT price |
|-------------------------|------------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| <b>Base metals</b>      |            |         |        |        |        |        |        |        |        |        |        |        |        |        |          |
| Aluminium               | US\$/t     | 2,091   | 2,260  | 2,250  | 2,500  | 2,750  | 2,750  | 3,000  | 2,706  | 2,353  | 2,875  | 3,500  | 3,103  | 2,707  | 2,310    |
|                         | US\$/lb    | 95      | 103    | 102    | 113    | 125    | 125    | 136    | 123    | 107    | 130    | 159    | 141    | 123    | 105      |
| Copper                  | US\$/t     | 8,243   | 8,461  | 8,250  | 9,500  | 10,000 | 10,000 | 9,500  | 8,822  | 8,788  | 9,750  | 10,500 | 9,703  | 8,907  | 8,110    |
|                         | US\$/lb    | 374     | 384    | 374    | 431    | 454    | 454    | 431    | 400    | 399    | 442    | 476    | 440    | 404    | 368      |
| Lead                    | US\$/t     | 2,087   | 2,118  | 2,050  | 2,050  | 2,000  | 2,000  | 2,000  | 2,149  | 2,087  | 2,000  | 1,750  | 2,024  | 2,298  | 2,572    |
|                         | US\$/lb    | 95      | 96     | 93     | 93     | 91     | 91     | 91     | 97     | 95     | 91     | 79     | 92     | 104    | 117      |
| Nickel                  | US\$/t     | 19,789  | 22,277 | 20,000 | 20,000 | 22,500 | 22,500 | 20,000 | 25,707 | 22,063 | 21,250 | 22,500 | 20,289 | 18,077 | 15,866   |
|                         | US\$/lb    | 898     | 1,011  | 907    | 907    | 1,021  | 1,021  | 907    | 1,166  | 1,001  | 964    | 1,021  | 920    | 820    | 720      |
| NPI, 8-12%              | CNY/t      |         | 1,000  | 1,000  | 1,000  | 1,032  | 1,032  | 1,032  | 1,424  | 1,000  | 1,032  | 1,062  | 1,102  | 1,141  | 1,180    |
| Zinc                    | US\$/t     | 2,356   | 2,539  | 2,250  | 2,500  | 2,500  | 2,500  | 2,250  | 3,482  | 2,603  | 2,375  | 2,250  | 2,424  | 2,597  | 2,771    |
|                         | US\$/lb    | 107     | 115    | 102    | 113    | 113    | 113    | 102    | 158    | 118    | 108    | 102    | 110    | 118    | 126      |
| <b>Precious metals</b>  |            |         |        |        |        |        |        |        |        |        |        |        |        |        |          |
| Gold, nominal           | US\$/oz    | 1,912   | 1,977  | 1,925  | 1,900  | 1,900  | 1,950  | 2,000  | 1,803  | 1,923  | 1,963  | 2,150  | 2,112  | 2,074  | 2,037    |
| Gold, real              | US\$/oz    |         | 1,977  | 1,925  | 1,900  | 1,854  | 1,902  | 1,951  | 1,803  | 1,923  | 1,915  | 2,046  | 1,961  | 1,879  | 1,800    |
| Silver, nominal         | US\$/oz    | 22.66   | 24.20  | 22.65  | 22.50  | 22.50  | 23.00  | 23.53  | 21.80  | 22.98  | 23.26  | 24.75  | 26.31  | 27.86  | 29.42    |
| Silver, real            | US\$/oz    |         | 24.20  | 22.65  | 22.50  | 21.95  | 22.44  | 22.96  | 21.80  | 22.98  | 22.69  | 23.56  | 24.43  | 25.24  | 26.00    |
| Platinum                | US\$/oz    | 906     | 1,027  | 1,000  | 1,250  | 1,465  | 1,465  | 1,465  | 964    | 1,068  | 1,465  | 1,453  | 1,457  | 1,462  | 1,466    |
| Palladium               | US\$/oz    | 1,268   | 1,445  | 1,300  | 1,250  | 1,200  | 1,200  | 1,000  | 2,110  | 1,391  | 1,100  | 1,000  | 1,155  | 1,310  | 1,466    |
|                         |            | Current | 2Q23E  | 3Q23E  | 4Q23E  | 1Q24E  | 2Q24E  | 3Q24E  | 2022E  | 2023E  | 2024E  | 2025E  | 2026E  | 2027E  | LT price |
| <b>Bulk Commodities</b> |            |         |        |        |        |        |        |        |        |        |        |        |        |        |          |
| Hard coking coal        | US\$/t fob | 256     | 243    | 250    | 275    | 249    | 249    | 249    | 370    | 278    | 249    | 218    | 198    | 178    | 158      |
| Semi-soft               | US\$/t fob | 161     | 202    | 168    | 168    | 168    | 168    | 168    | 277    | 185    | 168    | 147    | 133    | 120    | 107      |
| Thermal Coal            | US\$/t fob | 144     | 160    | 159    | 164    | 181    | 166    | 153    | 357    | 184    | 160    | 125    | 112    | 99     | 85       |
| Iron ore fines          | US\$/t CIF | 103     | 111    | 120    | 100    | 110    | 100    | 90     | 120    | 114    | 98     | 90     | 90     | 89     | 89       |
| <b>Other materials</b>  |            |         |        |        |        |        |        |        |        |        |        |        |        |        |          |
| Lithium spodumene       | US\$/t     | 3,250   | 4,178  | 3,500  | 3,250  | 3,500  | 3,000  | 3,000  | 4,498  | 4,132  | 3,125  | 3,250  | 2,567  | 1,883  |          |
| Lithium carbonate       | US\$/t     | 36,975  | 36,189 | 45,000 | 43,762 | 35,000 | 35,000 | 30,000 | 71,531 | 45,980 | 32,500 | 32,500 | 28,333 | 24,167 |          |
| Lithium hydroxide       | US\$/t     | 35,800  | 39,889 | 43,500 | 45,262 | 36,500 | 36,500 | 31,500 | 70,142 | 48,363 | 34,000 | 34,000 | 29,833 | 25,667 |          |
| Alumina                 | \$/t       | 345     | 344    | 331    | 331    | 340    | 340    | 340    | 362    | 342    | 340    | 348    | 357    | 366    | 375      |
| Uranium                 | \$/lb      |         | 53.80  | 60.00  | 59.00  | 66.30  | 66.30  | 66.30  | 50.17  | 55.77  | 66.30  | 75.00  | 67.08  | 59.17  | 51.25    |
| Molybdenum              | \$/lb      | 26.0    | 21.30  | 21.80  | 21.80  | 21.80  | 21.80  | 21.80  | 18.74  | 24.42  | 21.80  | 21.80  | 18.40  | 15.00  | 11.60    |
| Cobalt                  | \$/lb      | 19.3    | 16.05  | 15.60  | 15.60  | 15.60  | 15.60  | 15.60  | 31.04  | 16.37  | 15.60  | 15.60  | 16.84  | 18.08  | 19.32    |
| Manganese ore           | \$/dmu     | 4.35    | 4.80   | 4.60   | 4.60   | 4.60   | 4.60   | 4.60   | 6.06   | 4.92   | 4.60   | 4.60   | 5.10   | 5.59   | 6.09     |
| <b>Steel, HRC</b>       |            |         |        |        |        |        |        |        |        |        |        |        |        |        |          |
| HRC, Europe             | US\$/t     | 668     | 845    | 711    | 703    | 771    | 751    | 741    | 950    | 773    | 749    |        |        |        |          |
| HRC, US                 | US\$/t     | 871     | 1,171  | 965    | 799    | 854    | 909    | 843    | 1,122  | 971    | 849    |        |        |        |          |
| HRC, China              | US\$/t     | 556     | 556    | 575    | 571    | 568    | 585    | 602    | 663    | 565    | 595    |        |        |        |          |
| Energy                  |            | Current | 2Q23E  | 3Q23E  | 4Q23E  | 1Q24E  | 2Q24E  | 3Q24E  | 2022E  | 2023E  | 2024E  | 2025E  | 2026E  | 2027E  | LT price |
| Brent                   | US\$/bbl   | 86.1    | 77.7   | 80.0   | 82.0   | 90.0   | 90.0   | 90.0   | 100.2  | 80.5   | 90.0   | 60.0   | 60.0   | 60.0   | 60.0     |
| WTI                     | US\$/bbl   | 82.4    | 73.7   | 75.0   | 77.0   | 84.0   | 84.0   | 84.0   | 95.3   | 75.4   | 84.0   | 57.0   | 57.0   | 57.0   | 57.0     |
| Henry Hub               | US\$/MMBtu | 2.8     | 2.3    | 2.8    | 3.3    | 4.0    | 4.0    | 4.0    | 6.7    | 2.8    | 4.0    | 2.6    | 2.6    | 2.6    | 2.6      |

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

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## Supply and demand balances

## Exhibit 15: Aluminium supply and demand balance

Deficits set to increase

| '000 tonnes           | 2021  | 2022  | 2023E | 2024E | 2025E |
|-----------------------|-------|-------|-------|-------|-------|
| Global production     | 67563 | 68550 | 69770 | 73505 | 74274 |
| YoY change            | 3.2%  | 1.5%  | 1.8%  | 5.4%  | 1.0%  |
| Global consumption    | 68618 | 69228 | 70631 | 74162 | 77870 |
| YoY change            | 7.5%  | 0.9%  | 2.0%  | 5.0%  | 5.0%  |
| Balance               | -1054 | -677  | -860  | -658  | -3597 |
| Market inventories    | 9142  | 8464  | 7604  | 6947  | 3350  |
| Weeks of world demand | 6.9   | 6.4   | 5.6   | 4.9   | 2.2   |
| LME Cash (\$/t)       | 2474  | 2706  | 2353  | 2875  | 3500  |
| LME Cash (c/lb)       | 112   | 123   | 107   | 130   | 159   |

Source: SNL, Woodmac, CRU, Bloomberg, company reports, IAI, BofA Global Research  
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## Exhibit 17: Lead supply and demand balance

Lead should not be in short supply

| '000 tonnes           | 2021  | 2022  | 2023E | 2024E | 2025E |
|-----------------------|-------|-------|-------|-------|-------|
| Global production     | 13183 | 13472 | 13712 | 13837 | 13908 |
| YoY change            | 4.5%  | 2.2%  | 1.8%  | 0.9%  | 0.5%  |
| Global consumption    | 13127 | 13343 | 13809 | 13938 | 14070 |
| YoY change            | 4.5%  | 1.6%  | 3.5%  | 0.9%  | 0.9%  |
| Balance               | 56    | 129   | -96   | -102  | -162  |
| Market inventories    | 706   | 834   | 738   | 637   | 475   |
| Weeks of world demand | 2.8   | 3.3   | 2.8   | 2.4   | 1.8   |
| LME Cash (\$/t)       | 2200  | 2149  | 2087  | 2000  | 1750  |
| LME Cash (c/lb)       | 100   | 97    | 95    | 91    | 79    |

Source: SNL, Woodmac, CRU, Bloomberg, company reports, ILZSG, BofA Global Research  
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## Exhibit 19: Zinc supply and demand balance

Project pipeline not a significant risk

| '000 tonnes           | 2021  | 2022  | 2023E | 2024E | 2025E |
|-----------------------|-------|-------|-------|-------|-------|
| Global production     | 13883 | 13494 | 14100 | 14600 | 15150 |
| YoY change            | 1.6%  | -2.8% | 4.5%  | 3.5%  | 3.8%  |
| Global consumption    | 14016 | 13553 | 13896 | 14242 | 14596 |
| YoY change            | 6.3%  | -3.3% | 2.5%  | 2.5%  | 2.5%  |
| Balance               | -133  | -59   | 204   | 358   | 554   |
| Market inventories    | 736   | 580   | 784   | 1142  |       |
| Weeks of world demand | 2.7   | 2.2   | 2.9   | 4.2   |       |
| LME Cash (\$/t)       | 3003  | 3482  | 2603  | 2375  |       |
| LME Cash (c/lb)       | 136   | 158   | 118   | 108   |       |

Source: SNL, Woodmac, CRU, Bloomberg, company reports, ILZSG, BofA Global Research  
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## Exhibit 21: Platinum supply and demand balance

Substitution, a rebound of auto and hydrogen are all bullish

| '000 ounces        | 2021  | 2022   | 2023E | 2024E | 2025E |
|--------------------|-------|--------|-------|-------|-------|
| Global production  | 7768  | 6942   | 6618  | 7976  | 8260  |
| YoY change         | 20.0% | -10.6% | -4.7% | 20.5% | 3.6%  |
| Global consumption | 8282  | 6138   | 7489  | 7573  | 7960  |
| YoY change         | 17.0% | -25.9% | 22.0% | 1.1%  | 5.1%  |
| Balance            | -514  | 804    | -870  | 403   | 300   |
| Spot (\$/oz)       | 1092  | 964    | 1068  | 1465  | 1453  |

Source: Matthey, company reports, BofA Global Research estimates  
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## Exhibit 16: Copper supply and demand balance

Balanced market in 2023E

| '000 tonnes           | 2021  | 2022  | 2023E | 2024E | 2025E |
|-----------------------|-------|-------|-------|-------|-------|
| Global production     | 24127 | 24613 | 25860 | 26959 | 27461 |
| YoY change            | 3.8%  | 2.0%  | 5.1%  | 4.3%  | 1.9%  |
| Global consumption    | 24863 | 25166 | 25607 | 26631 | 27697 |
| YoY change            | 3.8%  | 1.2%  | 1.8%  | 4.0%  | 4.0%  |
| Balance               | -736  | -553  | 253   | 328   | -236  |
| Market inventories    | 1164  | 611   | 864   | 1191  | 955   |
| Weeks of world demand | 2.4   | 1.3   | 1.8   | 2.3   | 1.8   |
| LME Cash (\$/t)       | 9321  | 8822  | 8788  | 9750  | 10500 |
| LME Cash (c/lb)       | 423   | 400   | 399   | 442   | 476   |

Source: SNL, Woodmac, CRU, Bloomberg, company reports, ICSG, BofA Global Research  
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## Exhibit 18: Nickel supply and demand balance

Nickel to be well supplied

| '000 tonnes                   | 2021  | 2022  | 2023E | 2024E | 2025E |
|-------------------------------|-------|-------|-------|-------|-------|
| Global production             | 2772  | 3220  | 3617  | 3980  | 4230  |
| YoY change                    | 7.9%  | 16.2% | 12.3% | 10.0% | 10.5% |
| Global consumption            | 2798  | 2931  | 3217  | 3693  | 4049  |
| YoY change                    | 14.5% | 4.8%  | 9.8%  | 14.8% | 10.6% |
| Balance, incl. NPI oversupply | -26   | 288   | 400   | 287   | 181   |
| Market inventories            | 392   | 680   | 1080  | 1367  | 1548  |
| Weeks of world demand         | 7.3   | 12.1  | 17.5  | 19.3  | 19.9  |
| LME price (\$/t)              | 18455 | 25707 | 22063 | 21250 | 22500 |
| LME price (c/lb)              | 837   | 1166  | 1001  | 964   | 1021  |

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

## Exhibit 20: Iron ore supply and demand balance

Flipping back into surplus

| Wet Mt                  | 2021  | 2022  | 2023E | 2024E | 2025E |
|-------------------------|-------|-------|-------|-------|-------|
| Global production       | 2,274 | 2,301 | 2,334 | 2,435 | 2,541 |
| YoY change              | 0.7%  | 1.2%  | 1.4%  | 4.3%  | 4.3%  |
| Global consumption      | 2,305 | 2,216 | 2,269 | 2,304 | 2,314 |
| YoY change              | -0.4% | -3.9% | 2.4%  | 1.5%  | 0.4%  |
| Balance                 | -31   | 84    | 65    | 131   | 227   |
| Iron ore price (US\$/t) | 160   | 120   | 114   | 98    | 90    |

Source: Company reports, CRU, Bloomberg, BofA Global Research estimates  
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## Exhibit 22: Palladium supply and demand balance

Palladium will likely be oversupplied in the medium term

| '000 ounces        | 2021   | 2022  | 2023E | 2024E  | 2025E  |
|--------------------|--------|-------|-------|--------|--------|
| Global production  | 10,013 | 9,626 | 9,608 | 10,427 | 10,869 |
| YoY change         | 9.2%   | -3.9% | -0.2% | 8.5%   | 4.2%   |
| Global consumption | 10,149 | 9,829 | 9,107 | 9,004  | 8,741  |
| YoY change         | 2.3%   | -3.2% | -7.3% | -1.1%  | -2.9%  |
| Balance            | -136   | -203  | 501   | 1,423  | 2,129  |
| Spot (\$/oz)       | 2,399  | 2,110 | 1,391 | 1,100  | 1,000  |

Source: Matthey, company reports, BofA Global Research estimates  
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