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Quintessentially Nickel

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KEY TAKEAWAYS

In 2024, the global nickel market recorded the third consecutive year of oversupply. The quality of this surplus, however, has changed from low-grade to high-grade nickel, with the nickel exchange inventories rising more than twofold by over 100 kt Ni in 2024 YTD, predominantly due to the inflow of the Chinese material from the newly opened cathode capacities. Considering other off-warrant inventories and underreported stocks, the actual stockpiling of Class 1 nickel in 2024 could be as high as 150 kt Ni, with some similar volumes likely to be stockpiled in 2025, resulting in yet another year of oversupplied market.

Along with other battery materials, including cobalt and lithium, nickel is shifting into structural oversupply for years to come as raw material availability concerns evaporate amid large-scale supply chain investments by the Chinese. As discussed in our latest issues, this leads us to implement a cost-based market approach in order to analyse the likely price floor for the industry. Since Indonesia has developed the entire value chain to produce all types of nickel, from NPI and FeNi to Class 1 and nickel sulphate, the fundamental nickel price becomes essentially linked to Indonesian nickel production costs.

Although we observed some progress in production costs' reduction in the last few years, such as large-scale rampups of HPAL projects that have lower costs compared to conventional NPI operations as well as the OESBF technology development, which enables direct conversion of low-grade laterites into matte, there has been a dramatic increase of domestic nickel ore prices caused by delays to RKAB mining quotas' approvals. Our understanding is that the latter might have been intentional as the Indonesian government tries to consolidate the domestic nickel industry in order to preserve domestic nickel resources and force a sustainable approach to nickel production by rationing nickel ore sales and production licences. Indonesian officials have also stated their expectations for the nickel price to remain stable around \$15,000-16,000/t, so this could be the floor for the prices in the future.

However, notwithstanding the abundant reserves and surging market share, some significant limitations to the Indonesian nickel supply remain in place, such as the depletion of high-grade resources, continuous decline in the NPI grades, worsening chemical composition of nickel ores due to rising impurities such as silicon and magnesium, worsening climatic conditions and everincreasing extreme rainfalls, as well as unresolved and deepening ESG challenges. We believe that Indonesian supply risks remain underappreciated, so unexpected upside price volatility may potentially occur in the short- to mid-term.

Overall, around 40% of all nickel producers are loss-making at the current price, as growing Indonesian supply is weighing on other high-cost operations all over the globe, predominantly in Australia and New Caledonia, so that could be a potential upside for the nickel price. Considering the scale of the potential supply curtailments in Indonesia and elsewhere, as well as the robustness of the nickel use in the stainless steel sector and other melting applications, including nickel-containing alloys and special steel, the market could be intrinsically more balanced than we initially anticipated.

If we look at macro factors, the future of the nickel market will be driven by a set of factors, including the development of downstream processing in Indonesia, the effectiveness of the government stimulus programme in China and whether it translates into real demand, the scale of the EV subsidies reduction in the US under the new Trump administration, and how successful the EU protectionist duties on stainless steel and EVs are in propping up the flagging EU domestic supply chain.

Since our May issue, we have raised the 2024 market surplus forecast from the initial ~100 kt Ni to ~150 kt Ni, which will be mainly concentrated in the high-grade nickel sector for the first time ever.

<u>Nickel</u>	2023	2024E	2025E
llco	3.25 Mt	3.39 Mt	3.56 Mt
036	+6%	+4%	+5%
Supply	3.43 Mt	3.54 Mt	3.71 Mt
Sobbia	+10%	+3%	+5%
Market Balance	183 kt	~150 kt	~150 kt
Low-grade Ni	140 kt	20+ kt	20+ kt
High-grade Ni	43 kt	130+ kt	130+ kt

MARKET BALANCE

On the one hand, we have downgraded the primary nickel use from 3.48 Mt (+7% YoY) to 3.39 Mt Ni (+4% YoY) primarily due to lower than expected Chinese stainless steel production (1.51 Mt, flat YoY), as melt output in 2H 2024 stagnated on a yearly basis amid sluggish domestic end-use demand, and batteries (486 kt Ni, +4% YoY) fell short of expectations caused by weak non-Chinese NEV sales and higher LFP share. Other melting sectors are expected to maintain a solid growth rate, including +8% for standard nickel-containing alloys, +8% for special steel and +8% for superalloys.

On the other hand, we have slightly adjusted our supply estimates from 3.59 Mt (+5% YoY) to 3.54 Mt (+3% YoY).



We have reduced our projections for the Indonesian NPI production (from 1.56 Mt to 1.51 Mt Ni, +9% YoY) due to delays in issuing new mining quotas and sluggish nickel chemicals output (from 531 kt to 453 kt Ni, +1% YoY) amid increasingly subdued demand from the NEV sector. At the same time, Class 1 nickel supply grew (from 1.01 Mt to 1.03 Mt Ni, +15% YoY) because of the continuous commissioning of new capacities in China and Indonesia, while production in other regions is forecast to decline. Production of other forms of low-grade nickel, including FeNi, nickel oxide and utility nickel, has been downgraded even further (from 253 kt Ni to 244 kt Ni, -22% YoY) as massive cuts across high-cost operations continue.

In 2025, we expect the nickel market to sustain a similar degree of surplus of around 150 kt Ni. The commissioning

of new capacity in Indonesia for the whole gamut of nickel products, including NPI, NPI-made matte, MHP from HPAL processing, nickel sulphate and Class 1, coupled with new Class 1 capacity additions in China, will be accompanied by a moderate increase in nickel use in stainless (+4% YoY), alloys (+7% YoY) and special steel (+8% YoY) as well as a mature growth in the EV batteries (+9% YoY). We have also factored in a higher disruption allowance of around 150 kt Ni taking into account an elevated supply risk both in Indonesia given the uncertainty with RKAB approvals, declining NPI grades and rapidly depleting high-grade ore reserves, as well as a potential moratorium to build new RKEFs, and at more aged and financially struggling assets in other regions, including Chinese NPI, some FeNi operations, and several high-grade nickel producers ex. China.



MARKET SENTIMENT

Sources: LME, NN Analysis

The nickel rally that started in late March was driven by the LME's ban on Russian nickel produced on or after 13 April 2024, the social unrest in New Caledonia, and a broad-based price rally across the LME metals, particularly in copper. However, the price lost all the gains and declined to \$17,000/t as early as June amid the announcements by the Indonesian government that the production quotas for 85-90% of annual nickel ore demand have been issued, which triggered the liquidation of speculative long positions. Despite subsequent closures of production assets, including BHP's Nickel West



in Australia and IGO's Forrestania, the bearish sentiment continued to dominate the LME trading, so the price plunged to \$15,500/t by the end of July as the fundamentals came back into focus.

In September, the LME nickel price rebounded to \$17,000/t as the US Federal Reserve lowered interest rates by 50 basis points, exceeding market expectations, and the Russian authorities commented on the potential restrictions on the exports of nickel in retaliation to Western sanctions. Later on, China's Central Bank unveiled the most aggressive financial stimulus since the pandemic to achieve the government's growth target. As a result, the price reached a three-month high of \$18,000/t at the beginning of October as these measures significantly boosted investors' confidence. Still, the price fell sharply after the Golden Week holiday as, after a more detailed look at the proposed stimulus package, the market had found it insufficient.

By mid-November, the prices slumped to \$15,300/t, the lowest level since 2020, regardless of news of Ambatovy's technical issues, Eramet's production cuts in Indonesia and reports of curtailments by one of the largest Indonesian NPI producers due to tight nickel ore supplies. At the time of writing, the LME price has stabilized at the lower end of the \$15,500-16,000 /t range.



Sources: LME, SHFE

In 2024, there has been a substantial increase in the exchanges' nickel stocks, with inventories rising more than twofold from less than 80 kt Ni at the beginning of the year to 190 kt Ni at the end of November. Considering the growth of other off-warrant inventories, although this was primarily caused by the change in the LME reporting methodology, the total inflow appears to be even higher. The rise of nickel stocks is mostly prompted by the inflow of Chinese material to the LME warehouses in Asia; so the share of China-origin material surged to over 40% in October, while the share of other brands, mainly from Russia and Australia, has been declining to 21% and 19%, respectively. We expect the volume of Chinese metal being stored at the LME to increase even more and that will be the key contributor to the emerging market surplus in 2025, as the delivery of newly produced material to the LME warehouses is the easiest approach to monetise the nickel production in the Indonesia-to-China supply chain.

The LME's COTR (Commitments of Traders Report) data have been extremely volatile in the second half of the year, with the positioning of investment funds constantly changing from net-short to net-long back and forth. This clearly illustrates how ambiguous current investor sentiments towards nickel are. Given the uncertainties with the supply, if the demand fundamentals remain unchanged in the medium term, we expect the price volatility to continue.



LME Positioning of Investment Funds







STAINLESS STEEL

China

China's stainless steel (STS) sector is the single largest industry in the world in terms of nickel demand, with total use projected to exceed 1.9 Mt Ni in 2024. This year, Chinese production of 300 series stainless steel continued its growth. Over the first 10 months, the melt output increased by 3%. However, the production growth did not lead to a material increase in stainless steel inventories, indicating that domestic demand in China remains robust.



Source: Zljsteel



China Stainless Steel Stocks

Source: Zljsteel

DEMAND

This growth is mainly attributed to the active expansion of the Chinese industrial base with an 11% YTD increase in investments in the chemical and petrochemical sectors, accounting for 14% of nickel end-use in STS (see Supplementary Materials, Table 1). Investments in other stainless steel-intensive end-use sectors are also rising with catering (12% nickel end-use in STS) growing by 34% YTD, and food processing (10% nickel end-use in STS) increasing by 24% YTD. Apart from the ever-rising domestic use, growing consumer and industrial goods export (+5% YoY in 10M 2024) also supports Chinese nickel demand in general and stainless steel use in particular.

Chinese stainless steel trade. In 9M 2024, stainless steel exports from China reached 3.8 Mt, increasing by +0.7 Mt (+24% YoY), with exports to Vietnam rising by 114 kt (+54% YoY), to Taiwan by 86 kt (+63%) and to Turkey by 67 kt (+28% YoY). Importantly, not only stainless steel exports have shown growth this year but exports of stainless products have also increased. According to Zljsteel, shipments of stainless steel products rose by 18% in 8M 2024.

At the same time, stainless steel imports into China were at 1.4 Mt, rising by 0.1 Mt (+4%) amid growing imports from Indonesia.



China Stainless Steel Exports

Source: Trade Data

One of the most prominent events in the Chinese stainless steel industry this year was the announcement of Delong's bankruptcy. In our view, this is one of the examples of the "too big to fail" principle: the local government had to step in to support the company in order to avoid layoffs, social unrest and failure to meet the GDP growth targets. As far as we know from the local sources, the company has been operating normally under the insolvency administration ever since.

Notably, in 2024, the share of scrap in the Chinese STS production increased from 20% to 22%, driven by the lower-than-expected NPI output, the reasons for which will be discussed later. This shift has also reduced the demand for primary nickel.



Looking ahead to 2025, China is expected to see continued growth in stainless steel production capacities. Tsingshan plans to add 2 Mt at its Fuan facility, of which around 0.8 Mt will be allocated to 300 series production.

However, the next year may present significant challenges for the Chinese economy. The re-election of President Trump has raised serious concerns about a likely renewal of the trade war between China and the United States. This development adds considerable uncertainty to the outlook for the Chinese export-orientated sectors, which remains a critical driver of their economic activity. A slowdown in exports could, in turn, impact stainless steel demand in China. In this context, economic support measures are becoming increasingly important. Critically, the recently implemented measures primarily address some structural issues related to public sector debt rather than lay the groundwork for sustainable long-term growth.

Additional stimuli are anticipated during the March 2025 Two Sessions (the National People's Congress and the Chinese People's Political Consultative Conference). The scope and nature of these measures are likely to reflect the policy stance of the new US administration. Experts broadly agree that the Chinese are holding back more robust policy tools for potential future challenges. With inflation at historically low levels, the Chinese government enjoys significant room for manoeuvre and can provide fiscal stimulus with minimal inflationary risk, securing a buffer against potential headwinds.

Overall, we expect the full-year Chinese 300 series and 200 series production to amount to 21 Mt and 11.7 Mt, respectively, translating into 1,507 kt of primary nickel use (flat YOY). In 2025, we expect primary nickel demand to rise by 4% to 1,563 kt Ni.

Indonesia



In 10M 2024, Indonesia's 300 series stainless steel production increased by 18% YoY.

Source: Zljsteel

Tsingshan is on track to set a new record for stainless steel output in the country, with its 300 series production rising by 14% during this period. Delong, while posting a significant 62% growth in its output over 10 months, is still recovering from a particularly weak 2023, when operations were fully halted for several months. The full recovery of production may take considerable time, as the company is facing challenges in selling its products. This is because Delong's production in Indonesia focuses on long products with China as the primary market where demand for such products remains weak.

One of the key developments of the second half of 2024 in the Indonesian stainless steel industry was the commencement of construction of a new stainless steel plant in Morowali with a capacity of 1.2 Mtpa. This facility is a JV between Tsingshan and Jindal, and production is expected to start in late 2025-early 2026.

In 9M 2024, stainless steel exports from Indonesia amounted to 3.6 Mt, increasing by 0.6 Mt (+19% YoY).

Indonesia Stainless Steel Exports



Source: Trade Data

We expect the Indonesian production to reach 5 Mt in 2024 (+16% YoY), which translates into 396 kt of primary nickel demand. In 2025, we forecast the melt output to amount to 5.3 Mt, with the nickel use rising to 416 kt Ni.

Europe

The European stainless-steel industry has endured a disappointing year so far, marked by significant economic and operational challenges. Despite that, several European countries have experienced some output recovery. However, the apparent demand in Europe remains rather lacklustre.

While there are some signs of recovery, caution still dominates the market. Strikes and economic instability have dealt additional blows to European producers, demanding careful manoeuvring by the manufacturers to navigate these obstacles.

Although major industrial actions, which affected Acerinox and Outokumpu earlier in the year, are now over, the operational environment remains rather gloomy. For example, in October, it was announced that Acerinox would run the Los Barrios plant in phases, suspending production at the hot-rolling mill due to the deteriorating market environment and potentially affecting the cold-



rolling mill as well. At the same time, Acerinox has recently reported that they still expect the demand in the fourth quarter to remain weak.

Additionally, the latest data from the October 2024 edition of the HCOB Eurozone PMI Index, compiled by S&P Global, points to economic stagnation with the Composite PMI showing a slight contraction. Manufacturing output shrank for the 19th consecutive month, while services showed only minimal growth. Employment dropped at the fastest pace since 2020, and business confidence weakened further. These trends suggest a highly likely economic contraction in Q4 2024.

Talking about European stainless steel production, in January-July 2024 Europe's output increased by 5% YoY, which looks like positive news; however, this growth is coming from a very low base year, so the current recovery is not as great as it sounds. Looking at specific country data, Belgian and Italian production recovered by 28% and 15%, respectively, during that period. In contrast, Spain experienced a major decline of around 40%, which could be attributed to the strikes earlier this year.

One of the most significant developments this year was the introduction of NPI to Europe, seen primarily as a stopgap measure for survival during challenging times in the industry. The influx of NPI has alleviated the pressure on scrap prices, but many producers expect it to remain a staple until Europe sees some meaningful improvement in its domestic environment.

Meanwhile, the Carbon Border Adjustment Mechanism (CBAM) looms on the horizon, with its full implementation scheduled in 2026. Although its additional environmental requirements may eventually curtail the use of cheaper NPI, many EU producers view this policy simply as another burden. They argue that CBAM risks becoming yet another blow to the European stainless manufacturing sector as it introduces burdensome bureaucracy without delivering the much-needed financial support to weather these difficult times; and they would prefer some more import duties instead.



European Stainless Steel Production

Low order books remain a significant issue for European manufacturers, as consumers refrain from placing advance orders. Consequently, lead times are becoming increasingly short, and some manufacturers have to deliver orders with just a month's notice now.

The European Central Bank has implemented three interest rate cuts this year, with the most recent reduction bringing the interest rate to 3.4%. This series of rate cuts aims to stimulate economic activity in the Eurozone. The ECB is expected to continue this accommodative monetary policy, potentially providing relief to struggling end-use sectors and stimulating additional demand for stainless steel.

Despite the halted operations at Acerinox's Los Barrios, Outokumpu's Tornio being on a ten-day maintenance break and the planned extended shutdown during the Christmas period at Acciai Special Terni, stainless steel cold coil spot prices continued to fall in November, driven by the weakening demand. The prices are still significantly lower than the peak price of $\sim \varepsilon_{5,150}$ /t in April 2022. As of November 2024, the prices have reached $\sim \varepsilon_{2,425}$, further declining from the August annual peak of $\sim \varepsilon_{2,725}$.



Source: Kallanish

While the struggle to navigate through geopolitical and economic uncertainties has been a common theme for the past two and a half years, we believe that 2025 will be marked by a minor recovery in the European stainless and end-use sectors. In our baseline scenario, we expect European production to experience a slight year-on-year growth, although rising energy prices, as well as further geopolitical tensions, can negatively affect the upcoming year.

According to our proprietary end-use model, based on the latest data from Deutsche Bundesbank (see Supplementary Materials, Table 2), Europe has so far been unable to turn the tide and reverse the negative trends in its manufacturing sector. The demand for nickel by the downstream sectors in Germany, which is the locomotive of the European economy and accounts for approximately 25% of the total EU nickel use, has



continued its downward trend. According to the latest available data, in 2024, nickel end-use continued to fall significantly and is now down by 8% YoY. Construction, the second biggest end-use sector in Germany, is the only sector that has remained flat. At the same time, the figures for the machinery sector, which is the largest end-use sector for nickel by a mile and accounts for roughly 70% of total demand, have dropped by 9% YoY in 2024.

In 2024, the stainless steel output in Europe is expected to increase by about 1% YoY, putting the total melt production at about 5.8 Mt and the nickel demand at 124 kt Ni.

Considering current macroeconomic data and the existing geopolitical climate, it is hard to envision a strong recovery just yet. However, favourable cuts in the interest rates may give an additional boost to the end-use sectors. European businesses are likely to stay cautious, so only a minor recovery is expected.

For 2025, we forecast that European markets will experience a growth of around +5%, which will put its total output at 6.1 Mt with the nickel demand growing to 131 kt Ni in 2024.

USA

Unlike Europe, the US stainless steel industry enjoyed a strong start to 2024, with 19% YoY growth recorded in May – the highest year-over-year increase since July 2021. Positive trends have persisted throughout the year and the growth in 7M 2024 stands currently at 8% YoY. While strikes in Europe disrupted the global market, the US continued to leverage this gap, allocating some of the shipments to Europe.

However, domestic mill bookings remained sluggish, exacerbated by the pre-election uncertainty. Similarly to Europe, customers in the US also remained cautious and avoided buying extra inventory due to significant uncertainty, maintaining a "wait and see" approach.

In terms of the end-use sectors, according to our proprietary model, based on the latest data from the US Census Bureau (see Supplementary Materials, Table 3), the US maintained a positive trend in 2024. In 2024, nickel demand by the end-use sectors grew by 5%, although there was a visible slowdown in 2H 2024. For example, automotive, power generation and appliances all declined in Q4 2024. This was likely fuelled by the political uncertainty within the US. On the other hand, the oil and gas sector kept momentum throughout the year and grew by 32% YoY while power generation and construction sectors grew by 3% and 4%, respectively.

For 2024, we expect the USA stainless steel nickel use to reach 30 kt, with the total melt output amounting to 2.0 Mt.

We believe that the US melt output will grow further in 2025. However, it is still too early to say whether the new Trump administration will provide any significant boost to the stainless sector. Importantly, if the US continue to implement interest rate cuts at the current pace it may improve customers' appetite for stainless but there is no certainty that the current interest rate policy could be sustained under Trump. *Thus, we expect that the US total melt output in 2025 will grow by* +5%, *which amounts to 2.1 Mt, with the nickel use increasing to 32 kt Ni.*

ALLOYS & SUPERALLOYS

Throughout 2024, the demand for nickel alloys exceeded all expectations. We forecast a similarly positive trend to continue in 2025, with aviation and oil and gas being the main drivers.

Ever since 2023, leading stainless steel producers have started refocusing on alloy production due to sluggish demand for stainless steel in the US and Europe. On average, during 9M 2024, major stainless mills increased their alloy output by approximately 5%, reflecting a strategic shift in response to market dynamics.

The liquified natural gas (LNG) sector, for which nickel alloys are essential, has also been a particularly strong performer. According to the recent BloombergNEF report, global LNG demand is forecasted to grow by 36% from 2023 to 2030, fuelled by Asia's decarbonisation efforts and expanding gas infrastructure. This growth is underpinned by new liquefaction projects in Qatar, the US, and Mexico, as well as floating LNG projects. However, potential delays in project completions could tighten supply in the mid-2020s. By the end of the decade, the timely fulfilment of these projects is expected to result in a significant oversupply in the global LNG market.

Despite the recent debates around the potential end of *the* oil and gas industry due to the global green agenda, it has been performing exceptionally well. However, active drilling rigs have been declining throughout 2024. In 9M 2024, the number of active rigs declined by 5% YoY. On the contrary, the demand for nickel alloys by this sector is booming as offshore production is still rising. The declining trend of active drilling rigs reflects a strategic shift rather than a broad slowdown. For instance, more nickel-intensive offshore rigs, especially in Brazil, Guyana and West Africa, have seen growing utilisation rates. Moreover, the new Trump presidency may further boost domestic drilling activity. President Trump's rhetoric, including the revival of slogans like "drill, baby, drill" emphasises expanding domestic oil production and rolling back regulations that could constrain the industry. However, for now, it remains to be seen whether it will have a major impact, as the head of Exxon Mobil's upstream division recently indicated that the producers are



prioritising economic sustainability over aggressive expansion.



Source: Baker Hughes

The five largest international oil companies planned to increase their 2024 CAPEX (by +4% YoY vs 2023), which was lower than the year before (+14% YoY in 2023 vs 2022). In 2025, the planned investment growth is expected to continue at a similar pace of +4% YoY. Considering the ever-growing number of project bids won by the European and US mills and the solid financial performance of the oil & gas industry, we expect the use of nickel, especially in Inconel 625, to remain robust in 2025.

The aerospace sector, however, had a few setbacks this year. While the demand is going through a strong phase, the industry faces a few supply-related issues. First of all, Boeing is facing continuous constraints on the number of planes it can produce as its factory workers are going on strike for the first time since 2008. Although, as of November 2024, the industrial action was suspended, restarting production to meet the demand will take time and coordination across their vast supplier network. As it stands, Boeing currently anticipates resolving the ongoing issues by late 2024 or early 2025. Similarly, in December 2024, Airbus announced plans to cut over 2,000 jobs in its Defence and Space division, citing significant financial challenges driven by cost overruns, delays, and heightened competition in the space sector. However, the company is simultaneously ramping up production of its A320 family aircraft to meet increasing market demand, highlighting its efforts to balance restructuring with growth in more robust areas of its business. As a result, in 9M 2024, new orders for jet engines declined for both commercial (-2% YoY) and military engines (-27% YoY). Additionally, deliveries of new aeroplanes made by Boeing and Airbus have declined by 8% YoY in 2024.

When it comes to the Chinese aviation industry, COMAC continues to expand its presence in the global market

focusing on both narrow-body and wide-body aircraft. Air China recently signed a framework agreement with COMAC to become the first user of their C929, a wide-body aircraft with a seating capacity of 280 and a range of 12,000 km.

C919, COMAC's flagship narrow-body aircraft, has seen significant progress since entering domestic service in May 2022. By October 2023, 12 C919s had been delivered, while China's three largest state-owned airlines ordered 100 C919 jets each, and the model secured over 1,000 orders overall.

COMAC is also increasing its production capacity and aims to manufacture 100 C919 jets annually by 2030. The total production is expected to exceed 1,000 by 2035. While the company plans to reach a competitive 25% market share for its C919 by 2042, it faces challenges in securing certifications from the US and European regulators, which are essential for global success. In addition, the jet engines currently used in the COMAC planes are produced in the West, which translates into additional metal demand outside China. However, from 2025 onwards, China will have domestically produced jet engines, further boosting the domestic production of superalloys.

Moreover, the industry continues to benefit from the ongoing global geopolitical tensions significantly. Heightened instability in the Middle East, Europe and South East Asia has increased the demand for advanced materials used in defence sectors. The US, Europe, and China are among the top producers and consumers of jet engines, turbines, and other high-performance military equipment. At the same time, trade restrictions and political divisions are driving the re-evaluation of material sourcing, resulting in higher demand for locally sourced alloys and superalloys.

Overall, we expect the standard alloys sector demand to increase to 189 kt (+8% YoY) in 2024, while that of the superalloys sector to grow to 75 kt (+8% YoY). In 2025, nickel use in both sectors is expected to sustain its robust growth, rising to 202 kt for standard alloys and 82 kt for superalloys.

BATTERIES

In 2024, nickel use in the battery sector is forecast to grow by 4% YoY only to 486 kt Ni on the back of the slowdown in NEV sales and rising LFP share. In 2025, we expect it to grow moderately by 9% YoY to 528 kt Ni, driven by the likely recovery of BEV sales with nickel-based chemistries, especially in Europe and the US.

In 10M 2024, global BEV-equivalent sales¹ increased by 17% YoY. Sales in China grew by 25% YoY, primarily driven

¹ Under this methodology, HEV and PHEV are re-calculated in BEV equivalents according to their relative battery capacity ratio: HEV 2 KWh vs PHEV 20 KWh vs BEV 60 KWh



by rising PHEV sales, which surged by 79% YoY, while the growth rate of BEV sales was materially smaller (+13% YoY only). In October 2024, NEV sales in China reached a record penetration rate of 47%, being almost on par with ICE cars, prompted by the intensive rollout of new models by domestic car producers as well as state support. For example, the Chinese government has continued to promote vehicle trade-in subsidies this year by doubling the cash handout for consumers who replace their ICE cars or old EVs with a new NEV.



Source: SNE Research

However, as some metrics suggest, the domestic market might have reached a state of saturation given the intensifying competition, so China turned its attention to foreign markets by raising its vehicle exports from 500,000 in the 2010s to 5 million in 2023, over 20% of which were NEVs, up by 78% YoY. We expect this trend to continue in the medium term as Chinese OEMs are likely to boost low-cost EV exports to developing economies, including Southeast Asia, the Middle East and Latin America.

In April 2024, LFP batteries gained a share of over 70% in China due to their low cost and technological advancements, leading to improved performance. For example, SAIC-GM and CATL have recently launched a potentially ground-breaking LFP battery with a 6C multiplier, enabling recharges of up to 200 km in just five minutes. This battery, set for use in GM's Ultium platform-based electric cars from next year onwards, is the fastest-charging battery in China. With a charging rate of 480 kW, the 6C battery uses advanced fast-charging technologies and a new electrolyte formulation to enhance efficiency and stability. Only a month later, Chery introduced a similar ultra-fast charging LFP battery under the Kunpeng brand, which will be capable of more than 3,000 charging cycles. However, it is yet to be revealed which particular models will use these batteries, and commercial production is expected to commence in 2027 only.

In Europe, 2024 recorded a remarkable deceleration in electric vehicle adoption efforts: In 10M 2024, European BEV-equivalent sales declined by 0.3% YoY due to a withdrawal of policy support in some countries (notably in Germany and France) and lower affordability of EVs for consumers as the ICE counterparts remain more price competitive. While several major announcements were made earlier in the year, such as Stellantis's and Mercedes-Benz's plans to launch multiple factories across Europe, that inspired optimism, many of these projects are now on hold. Moreover, companies like Northvolt, which have long been considered flagships of the European EV sector, are now struggling to compete with Asian producers and are also grappling with an unexpected drop in demand for electric vehicles, which points to an uncertain and challenging future.

In the meanwhile, France's draft 2025 budget has revealed plans to reduce support for electric vehicle purchases by a third, cutting the spending allocation on "*bonus écologique*" from EUR 1.5 billion to EUR 1 billion. So far, this subsidy has been a key factor in driving EV adoption by providing up to EUR 7,000 for eligible vehicles, but the reduction reflects the government's efforts to manage fiscal pressure. Additionally, a scheme that allowed lowincome households to lease EVs at reduced rates was discontinued due to overwhelming demand. It signals that while the demand for EV incentives may remain high, severe budget constraints are forcing a re-evaluation of support measures.

Currently, our forecast for the 63 announced factories is a 1.7 TWh capacity in Europe by 2030, with over 45% of this total capacity being owned by companies based in Asia.

At the same time, the announced PCAM capacities in Europe make up 35% of the theoretical demand by the gigafactories, and CAM takes up about 50% of the demand.

Overall, the European PCAM sector is a mixed picture of progress and challenges. While production capacity is growing, there are still significant hurdles related to potential future demand for non-Asian producers that may affect the trajectory of the domestic industry.

In other recent developments, the European Union imposed tariffs on Chinese-made EVs as the concerns about unfair trade practices and the impact of Chinese subsidies on the EU market grew. These tariffs, which could range from 17% to 35% depending on the manufacturer, were implemented on 31st October 2024. The European Commission claimed that Chinese EV manufacturers had gained a significant market share – rising from 3.9% in 2020 to 25% by 2023 – by unfairly benefiting from state subsidies, including tax breaks and cheap resources like lithium. However, this tariff proposal faced opposition from some key EU member states, Germany in particular, as the German automotive industry is heavily invested



in global cooperation. Some fear this could escalate into a trade war between the EU and China, further harming the European economy. China strongly opposed these tariffs, calling them protectionist and unfair. Ongoing negotiations aim to find a solution that complies with World Trade Organization rules while addressing the concerns over subsidisation. Overall, we expect this decision to constrain European EV sales even more, which will hinder the EU electrification plans in the medium term.

The US EV market has been sending similarly mixed signals throughout the year, with growth continuing but slower than previously anticipated (+6% YoY in 10M 2024). Citing lower-than-expected EV demand, companies like General Motors have scaled back their EV production plans. GM had initially aimed to build 400,000 EVs by mid-2024 but then extended some of these targets.

After Trump's re-election, there have been some developments regarding the future of the Inflation Reduction Act (IRA) and the US electric vehicle (EV) sector. Trump has declared his intention to roll back significant portions of the IRA, particularly focusing on unspent funds. He has vowed to terminate any remaining funds allocated for climate-related initiatives, calling the IRA a waste of money. While Trump has not detailed which specific IRA programs he intends to target, his administration could reduce and divert some of the funding planned for clean energy projects and EV adoption. However, certain aspects of the IRA, especially those supporting US-based manufacturing of EVs, could be preserved, as some Republicans recognise the value of fostering local production.

However, as Detroit automakers, including GM, Ford, and Stellantis, have already signalled, if the Trump administration were to cut tax credits from the IRA, the potential negative impact on the US automotive industry could be deadly. Ford is particularly struggling and expecting a \$5 billion loss in its EV operations. Reports indicate that demand for key EV models, such as the F-150 Lightning, is flagging despite the tax credits. These automakers rely heavily on government incentives to make electric vehicles more affordable and competitive.

At the same time, Trump has pledged to significantly increase tariffs on foreign goods, particularly Chinesemade EVs, with potential rates ranging from 60% to 100%. This move aims to shield American manufacturers from what is perceived as unfair competition due to Chinese government subsidies. However, this tariff strategy remains undecided due to concerns about its negative impact on the broader EV market and the US economy. Both the US and Europe are facing challenges with the adoption and affordability of EVs, and such protectionist policies could undermine environmental goals and escalate trade tensions with China, a leader in EV production, which possesses abundant domestic resources and leads in technological know-how.

As to the battery chemistry, LFP batteries are strengthening their market positions, especially in China. However, with the expected rise of solid-state batteries in the late 2020s, this can change. Solid-state technology is projected to boost the energy density of high-nickel batteries significantly, reaching up to 500 Wh/kg, compared to LFP's 170 Wh/kg. This improvement will reduce battery's size and weight, making BEVs more efficient and competitive, potentially diminishing the longterm dominance of LFP batteries.

In summary, recent analyses of the EV battery market underscore a dynamic yet challenging future, heavily influenced by technological innovation, global demand growth, and China's dominant role. Advances in Li-ion battery technologies and policy support are the main drivers of the growth while recent breakthroughs in efficiency and cost reductions further reinforce the dominant role of LFPs. When it comes to NCM batteries, we still believe they have a significant role to play, although at a lower scale than previously anticipated.





Annual change in nickel supply, kt Ni

Note: Including supply disruptions

Source: NN Analysis

The nickel market surplus that emerged in 2022 on the back of rapid Indonesian supply growth has been maintained ever since.

This year's growth was mostly fuelled bv the ongoing expansion of Indonesian NPI and HPAL intermediates projects and the inflow of Chinese and Indonesian materials from the newly commissioned cathode capacities. This was partly offset by the decrease in Chinese NPI, global FeNi and non-Chinese Class 1 production cutbacks as well as depressed Chinese and global nickel compounds output. We believe that the existing oversupply could persist in 2025, with the nickel exchange inventories growing as a result of the inflow of the recently registered Chinese cathodes.

Additionally, some potential supply curtailments resulting from a quite unstable price environment and operational challenges the global producers face could be a balancing factor on the oversupplied market.

We have revised our earlier forecast for refined nickel production in 2024 and 2025 slightly downwards. According to our latest estimates, it will grow by 3% YoY in 2024, reaching 3.54 Mt Ni.

We maintain the view that the ramp-up of the new Indonesian nickel projects will continue. Coupled with the commissioning of new Class 1 operations in China and Indonesia, this will make primary nickel production grow further. We expect primary nickel production to rise to 3.71 Mt Ni (+5% YoY) in 2025.

LOW-GRADE NICKEL

NPI

NPI is currently the predominant nickel product, and its share is expected to reach over 50% of the total primary nickel supply in 2024.

Since 2015, Indonesia's NPI production has been steadily growing at double-digit rates annually. However,

SUPPLY

2024 marked a significant shift in this trend as growth slowed to 7% YoY over 10M 2024.

In the second half of 2023, delays in issuing new mining quotas began to emerge, making ore availability a major bottleneck for the output expansion. As a result, nickel ore has been traded with a double-digit premium over the official HPM price.

In addition to restricted ore availability, producers are facing declining nickel grades as high-quality ore reserves are being rapidly depleted. This trend is evident in the decreasing nickel content of Indonesia's exported NPI.

Average Nickel Grade in Indonesian NPI



Sources: Trade Data, NN Analysis

As a result, consumers are also forced to rely on ores with high Mg and Si content, which presents additional metallurgical complexities. To mitigate these issues, nickel ore imports from the Philippines have been significantly increased in order to use those for blending purposes. In 9M 2024, Indonesia imported approximately 7 Mt of Philippine ore. These challenges for Indonesian NPI producers are unfolding against the backdrop of the continuing growth in Chinese stainless steel production, which is driving higher demand for raw materials.

Below is the overview of the recent developments at some key **Indonesian** industrial sites.

In 2024, no new NPI capacities were commissioned at the Indonesia **Morowali Industrial Park** (IMIP). However, its output is expected to reach 413 kt Ni (+10% YoY) due to the ramp-up of the previously launched capacities. We expect this production level to remain stable in 2025.

At the Indonesia **Weda Bay Industrial Park** (IWIP), the output declined this year. According to our estimates, the 2024 NPI production will amount to 383 kt Ni (-9% YoY). This contraction is partially attributed to an increase in the conversion of NPI into matte by several projects, as well as a decrease in ore availability. In 2025, we expect the trend of rising NPI-to-matte conversion to



continue, leading to a further decline in NPI production to 352 kt Ni.

One of the largest NPI producers in Indonesia is **Delong**, which holds stakes in Virtue Dragon, Obsidian, and Gunbuster projects. In 2024, the company increased total production across these projects to 406 kt Ni (+3% YoY), supported by the capacities commissioned in 2023. However, this growth was constrained by limited ore availability. We anticipate their production to rise further to 426 kt Ni in 2025. Additionally, in 2024, Delong launched a new project, Nica Nickel Indonesia, which produces both NPI and LG matte. By the end of the year, NPI output is expected to reach 15 kt Ni and increase to 30 kt Ni in 2025.

In 2024, **Lygend** successfully ramped up 8 production lines, which it commissioned on Obi Island in 2023, to full capacity. This year also marked the start of the second phase of the project, which involves the launch of 12 more lines. The new capacities are expected to be fully operational in 2025, driving nickel production from 103 kt Ni this year to 169 kt Ni next year.

In 2024, NPI production was launched at a new **Huabao Industrial Park**, where 12 production lines were brought online. Their output is projected to reach 60 kt Ni in 2024 and is expected to double to 120 kt Ni in 2025 after ramping up to full capacity.

Overall, we expect the Indonesian NPI production to reach 1.51 Mt Ni (+9% YoY) in 2024 and 1.67 Mt Ni in 2025.

In China, NPI production continues to decline as most producers are operating with negative margins. *We expect the Chinese NPI production to fall to 330 kt Ni (-15% YoY) in 2024 and to 280 kt Ni in 2025.*

NPI-to-matte

In 2024, the conversion of NPI to matte kept growing, although more slowly than anticipated in our earlier reports. It was driven by the deceleration of the NPI production growth and weak demand by the battery sector. We estimate the NPI-to-matte conversion to reach 257 kt Ni (+12% YoY) in 2024 and 378 kt Ni (+47% YoY) in 2025.

Importantly, with the increasing production of MHP, which will be discussed later, the need to convert NPI into matte for the battery sector will continue to ease, with matte mostly purposed for nickel metal production. However, if the ore shortage persists in 2025 along with the rising demand from China's stainless steel sector, it is highly likely that the conversion of NPI into matte will be the first to face reductions.

Ferronickel

Based on our latest estimates, the 2024 FeNi production is likely to contract more than earlier expected and can reach 214 kt Ni (-24% YoY), suffering from the low-price environment and high production costs.

Global FeNi Production, kt Ni



Source: NN Analysis

In the Americas, Solway announced that its **Guatemalan** subsidiaries CGN and Pronico had successfully secured the essential export license for ferronickel, authorised by the Ministry of Energy and Mines (MEM) in August. The company is now focused on initiating maintenance of the processing plant and undertaking necessary works at the mine, with plans to restart Fenix plant production in Q₂ or Q_{3 2025}.

Another South American producer Falcondo from **the Dominican Republic** has remained halted for more than a year since November 2023. Considering the unfavourable market conditions, we presume that these operations will remain halted in 2025.

Brazilian ferronickel majors Barro Alto & Codemin, owned by Anglo American, reported a 2% higher YoY output at 29 kt Ni in 9M 2024 due to operational improvements and higher stability at the Barro Alto plant as well as longer planned maintenance in 2023. This performance was partially offset by lower production from Codemin, which was impacted by an unplanned stoppage at the refinery during Q3. Their 2024 production guidance has been revised up from 36-38 to 38-39 kt Ni reflecting strong operational performance. However, the 2025-2026 production forecast shows a downward trend of 35-37 kt Ni due to the declining grades. Moreover, Anglo reconfirms that under its "portfolio transformation process", it is considering divestment of its nickel business.

Another Brazilian producer, Onca Puma owned by Vale, showed a 44% decrease in its YoY output in 9M 2024 at 9 kt Ni, which is expected to translate into lower YoY production in 2024 at around 16 kt Ni due to the lengthy furnace rebuild, which began in Q4 2023 and finished only in Q2 2024.

In Asia, following its volume-control policy to improve profitability in the unfavourable market conditions, the largest **Japanese** FeNi producer, PAMCO, maintained a subdued output level at around 3 kt Ni (-40% YoY) in 9M 2024 and is now expected to reach the lowest in a decade output this year at around 4.5 kt Ni only, which could further decrease to approximately 4 kt Ni in 2025.



The second largest Japanese facility – Hyuga plant, owned by Sumitomo Metal Mining, also drastically reduced its FeNi production by 55% YoY to 2.3 kt Ni in 9M 2024 and is expected to show the lowest output ever of around 3 kt Ni only in 2024. At this point, we do not anticipate their FeNi production to grow in 2025 and expect it to remain flat YoY.

The only **Burmese** nickel producer – Tagaung Taung's plant, which is facing operational challenges because of the ongoing Burmese civil war and low FeNi prices, is expected to end the year with flat or even reduced YoY production results at around 10 kt Ni, and no significant changes are expected in 2025. According to some news reports, China is currently in talks with both the National Unity Government and the Military Council to ensure the security of the Chinese-owned operations and personnel.

Since our latest report, we have revised our vision for **South Korean** POSCO's nickel plans. Based on the official POSCO news releases, the original POSCO's plans to switch to nickel sulphate production seem to be abandoned now or at least postponed. In South Korean Pohang, POSCO and Chinese CNGR have recently started the construction of a JV refining facility for the production of high purity 99.9% nickel at 50 ktpa Ni designed capacity, which will then be used for POSCO's PCAM production. The refinery will import nickel matte from CNGR's nickel smelter, and commercial production is scheduled to start by 2026. We expect POSCO's Gwangyang FeNi output to remain flat YoY in 2024 at around 38 kt Ni and to be around 35-40 kt Ni in 2025, depending on the Korean market situation and the price environment next year.

In Europe, Serbia's NewCo Ferronikeli plant, which changed its owner to the Turkish Yildirim Group in 2022 and relaunched operations in June 2023, seems to have remained mothballed throughout 2024. According to local news agencies, Yildirim is building a 109 MW solar farm to power up its ferronickel plant and reduce its electricity costs. The photovoltaic plant is due to come online early next year.

Another European producer from **Northern Macedonia** – Euronickel Industries Kavadarci plant, which reportedly was in a state of bankruptcy and was acquired by the very same Turkish company Yildirim, is currently halted. Local union leaders claimed that the new management was planning to restart operations in the second half of 2024, which, in our view, seems now very unlikely.

Solway's Pobuzhsky plant in **Ukraine** has remained halted for the last 2 years after production was discontinued in November 2022 due to the military conflict in Ukraine.

New Caledonian ferronickel giants – Eramet's SLN (Doniambo) and Glencore's Koniambo are going through particularly hard times. Regardless of all the efforts by the French government, Glencore still ceased operations at its loss-making asset in March and put its 49% stake

in the company on sale. At the same time, despite reaching an agreement with the French government to preserve the Group's balance sheet, the situation around Eramet's New Caledonian business remains very tense. SLN's Doniambo continues to face major structural challenges, operating at a minimal level under extremely difficult conditions, further exacerbated by the ongoing brutal civil unrest in New Caledonia, which started in the middle of May.

Overall, the nickel industry in New Caledonia has been severely impacted by the continuous social unrest, lowprice environment and underinvestment as a result of Glencore's and Eramet's decisions to withdraw their funding in 2024. As a result, the New Caledonian output forecast seems to be quite gloomy. In 9M 2024, their ferronickel production decreased by 43% YoY to 30 kt Ni, while their MHP production also decreased by the same 43% YoY to 15 kt Ni. At the same time, Ni ore mined fell by around 63% YoY to 65 kt Ni. We estimate that by the end of 2024, Doniambo is likely to produce around 33 kt Ni (-27% YoY) with a flat YoY output of about 30-35 kt Ni in 2025. Koniambo is likely to end this year with only 5 kt Ni produced (-82% YoY), and no output is expected in 2025.

New Caledonia Nickel Production, kt Ni





We maintain our earlier estimate that, depending on the market situation, the 2025 FeNi production could stay relatively flat or even increase slightly YoY in a range between 220-230 kt Ni on the back of Brazilian Onça Puma's ramp-up after the start-up of the second furnace, Antam possibly launching its facility in Halmahera while Solway's Fenix plant in Guatemala might also restart operations after having obtained the export licence. Two Balkan-based facilities – Ferronikeli and Euronickel Industries – might restart operations too under their new Turkish management.

Considering the high costs of production as well as the continuing price pressure on the back of persisting oversupply, the return of the exuberant output rates is not expected anytime soon.



Nickel Oxide & Utility Nickel

We expect the nickel oxide and utility nickel production to increase slightly to 30 kt Ni (+4% YoY) in 2024.

The only supplier of intermediates to the Japanese Matsusaka refinery, Indonesian nickel matte producer PTVI, is demonstrating steady production rates. Their 2024 production is expected to stay almost flat YoY at around 71 kt Ni. Despite the reported Vale Canada's PTVI deconsolidation, following the partial divestment completed in June 2024, we understand that the 80% offtake of PTVI's annual production of nickel matte is safequarded and will continuously flow to Vale facilities for further processing. On the back of the secure feed flow from PTVI, Vale reported a 33% higher Tonimet's (Utility Nickel) output YoY in 9M 2024 at 15 kt Ni. We have revised our earlier estimates and now expect Matsusaka to grow its Tonimet production by 30% YoY to around 20 kt Ni in 2024 keeping it relatively flat in 2025, depending on the situation in the Japanese stainless market.

Cuban Punta Gorda's crude nickel oxide output is expected to decrease by more than 20% YoY to around 10 kt Ni in 2024 suffering from the Cuban economic crisis, the US embargo, inflationary pressure and the National Electric Power System (SEN) collapse due to the lack of stable fuel supply.

We expect the 2025 nickel oxide and utility nickel production to stay relatively flat or even increase slightly to 30-35 kt Ni.

There is a high level of uncertainty around the possible output of Cuban Punta Gorda in 2025.

The Cuban mining industry remains hungry for investment, largely driven by its under-explored and mineral-rich resources as well as low operating costs and royalties. Cuba also has some geographical advantages with direct shipping routes to significant markets around the world both by air and sea.

Judging by his first presidential term, Trump's re-election could bring turbulent times for the whole of Latin America, which adds to the uncertainty of future Cuban developments.

HIGH-GRADE NICKEL

Class 1 Nickel

Our latest Class 1 production estimate for 2024 is at 1.03 Mt Ni (+15% YoY). Nickel metal and powder production is expected to grow steadily in 2024 due to the launch of new Class 1 nickel capacities in China and Indonesia.

Global Class 1 Nickel Production, kt Ni



Source: NN Analysis

In Canada, Vale's Copper Cliff pellets and powder production is expected to decrease slightly YoY as the finished nickel production from the Sudbury-sourced ore will grow modestly in 2024 due to a series of the finally completed prolonged maintenance works in the mining operations, smelter and refinery in Q2 and Q3, offset by the lower 3rd party feed use. Long Harbour's output of rounds has been growing in 2024 as it benefits from the continuing ramp-up of the higher-grade underground nickel mines and because Thompson's material is processed now entirely at Long Harbour while last year, this material was processed both at Long Harbour and Sudbury. Overall, we expect Vale's Canadian-based operations to produce around 80-85 kt of Class 1 Ni in 2024 (-3% YoY) with a further increase to around 85-88 kt Ni in 2025.

Another Canadian producer - Sherritt - grew its powder and briquettes output by 7% YoY in 9M 2024 to 23 kt Ni. It benefited from higher MSP availability, which increased due to lower maintenance and improved feed to the processing plant following the completion of the new Slurry Preparation Plant in 1H 2024. Their 2024 nickel production guidance is at 30-32 kt Ni, which translates into a YoY growth of about 5-12% depending on the actual results. Sherritt is gradually implementing its expansion programme, upon the completion of which, their MSP production will increase by ~20% of contained Ni & Co and is expected to fill the refinery to the nameplate capacity to maximise profitability from own mine feed, displacing lower margin 3rd-party feeds and increasing overall finished Ni & Co production. We estimate Sherritt's Class 1 nickel production to be at around 32 kt Ni in 2025.



The **UK**-based Clydach refinery is growing its carbonyl nickel output in 2024 after the maintenance works conducted at the PTVI and Matsusaka facilities in 1H of 2024 resulted in a more robust performance of the PTVI-Matsusaka-Clydach flowsheet. We forecast Clydach's pellets and powder production to grow by 2% YoY and reach 32 kt in 2024, increasing further to 34 kt in 2025.

The major **Chinese** metal nickel producer Jinchuan is gradually increasing its Class 1 output and is expected to reach a production level of 180-185 kt Ni in 2024 (+12% YoY). The company officially launched a new 25 ktpa Ni workshop in 1H 2024, which is expected to contribute to the growth in 2024 and beyond. We expect Jinchuan's metal nickel production to grow further to 185-190 kt Ni in 2025. Jinchuan increased its nickel metal output, leveraging feedstock from its Xiarihamu deposit, which, as we understand, was initially planned for battery-sector use.

Amid a weak demand from the battery sector, major nickel producers Huayou, CNGR and GEM continued to scale up their production of nickel metal in 2024. This allowed them to use their capacities to process Indonesian raw materials originally intended for the battery industry.

Taking into account several smaller producers that have already launched nickel metal production, we expect the total Chinese Class 1 output to reach 364 kt Ni (+41% YoY) in 2024 and rise further to 447 kt Ni in 2025.

In Q₃ 2024, test production of nickel metal commenced at PT Yongheng, the second Indonesian project jointly owned by Huayou and Tsingshan, with a designed capacity of 50 ktpa. There are some indications that Tsingshan plans to launch a third nickel metal project in Indonesia in 2025.

Indonesian Class 1 production is expected to reach 43 kt Ni in 2024 and grow further to 101 kt Ni in 2025.

Japanese Sumitomo Metal Mining was steadily increasing its 2024 Class 1 nickel output by 9% YoY to 48 kt in 9M 2024 supported by a stable inflow of Indonesian nickel matte from PTVI. We expect SMM's metal nickel output to grow by 7% YoY reaching 62 kt in 2024 and ramp-up further to 64 kt Ni in 2025 subject to smooth supplies of MSP from the Philippine HPAL facilities Taganito & Coral Bay JV.

Glencore's Nikkelverk refinery in **Norway** is showing a positive dynamic consistently increasing its cathodes and rounds output by 3% YoY to 73 kt in 9M 2024 and is expected to reach 97 kt (+2% YoY) in 2024 despite the maintenance outages that impacted the Sudbury smelter in Q3. There are indications that Glencore is using some copper processing lines for its nickel output, which makes it possible to produce above the 92 kt nickel per annum designed capacity. Depending on market conditions, we believe that Nikkelverk can grow its nickel output further and reach around 100 kt Ni in 2025.

In **Australia**, Glencore demonstrated strong production rates in 9M 2024 at its Murrin Murrin refinery with a 9% YoY

growth to 29 kt. It is expected to increase further by 10% YoY to around 40 kt in 2024. The seemingly high relative growth figure is due to longer-than-planned maintenance in the base period though. We believe their production can rise again to 42 kt in 2025.

It has to be said that this year proved to be difficult for the Australian nickel industry. BHP's Nickel West produced 36 kt Ni in 9M 2024 (-11% YOY) and its output is expected to fall by 32% YOY in 2024 as the company decided to suspend Nickel West's operations. In July, it was announced that Nickel West operations would stop in October 2024 and all handover activities should be completed by December 2024.

Throughout 2024, **Malagasy** nickel producer Ambatovy has been facing multiple operational challenges. Issues with the utility plant at the end of December 2023 were followed by a production halt at the end of September 2024 due to some damage to the slurry pipeline. As a result, their 9M 2024 output decreased by 26% YoY to 21 kt Ni. At the end of October 2024, their production resumed under close monitoring, so we expect their 2024 output to be around 29 kt Ni (-21% YoY). It might be possible that in 2025, Ambatovy can ramp up to somewhere around 30-35 kt subject to a successful resolution of their chronic operational issues.

On 31 October 2024, Reuters quoted Sumitomo Corp.'s CEO Shingo Ueno: "Our priority for Ambatovy is to normalise production by addressing operational issues (...) After that, we'll consider all options to determine the best course, as we've stated before". He added that options include retaining the project as well as selling its stake to others and making them a new operator.

Anglo American's **South African** Rustenburg plant's production of nickel cathodes is showing steady growth: it ramped up by 31% YoY to 19 kt in 9M 2024. The seemingly high relative growth is mostly due to the low base because of unplanned municipal water stoppages at the processing operations in the base period, as well as the benefits of no Eskom load-curtailment this year and high operational efficiency, which has enabled a release of built-up work-in-progress inventory. We expect the 2024 production to grow by 17% YoY to 25 kt while the 2025 output to remain flat YoY.

The second biggest South African nickel producer – Implats – demonstrated stable nickel briquette output at 12 kt in 9M 2024 (+4% YoY) due to higher operational flexibility, better grades from the improved ore mix and enhanced mining discipline. To some extent, this was offset by a lengthy safety stoppage following the fatal fallof-ground accident as well as by decreased tonnes milled and water outages at the refining complex.

We expect their nickel briquette output to reach around 16 kt in 2024 (+4% YoY) and remain flat YoY in 2025, provided there are no major operational disruptions.



Sibanye-Stillwater's Sandouville refinery in **France** demonstrated a steady 19% YoY increase in its cathodes production reaching 5.5 kt in 9M 2024. It benefited from improved operating performance and production stability following repairs and upgrades completed in 2023. Their 2024 production is expected to grow by 23% YoY to around 7 kt Ni.

However, on 21 August 2024, Sibanye announced that Sandouville would cease the production of nickel metal and salts in 1H 2025. They are now considering repurposing the facility to produce PCAMs for the French battery industry.

Russia

Nornickel has successfully adapted to the challenges associated with the cessation of equipment supplies from the West. The Company implemented an ambitious and unique project to repair its smelting furnace #2 at Nadezhda. Essentially, as far as the scale and costs are concerned, it is comparable to the construction of a brandnew furnace. The project is unique both in terms of the speed of its execution and the novel technologies employed, which were developed and completed in-house by Russian specialists. Previously, such vital repairs were carried out under the supervision of foreign contractors. Nowadays, the Company carries out this work internally, relying on its own expertise. As a result, Nornickel has significantly raised its production efficiency: the furnace's capacity for concentrate processing has increased by 25%.

The furnace was launched in record time beating the planned schedule: construction took only 60 days instead of the intended 90. As the furnace was launched well ahead of schedule, the Company was able to fulfil the production programme of its Norilsk division comfortably.

In 9M 2024, total nickel output remained largely unchanged YoY at 146 kt. The production of key metals has been demonstrating positive dynamics because of improvements in operational efficiency and an increase in mined ore volumes.

Nornickel has continued to raise the output of premium nickel brands, such as *Nornickel Plating Grade* for electroplating and *Nornickel High Purity* for superalloys to increase penetration into new markets. In addition, the carbonyl nickel department in the nickel electrolysis shop at Kola Division was successfully relaunched after scheduled annual major maintenance, where we began to develop special nickel powders.

In the second half of 2024, Nornickel inaugurated its Battery Technology Centre in St. Petersburg, marking a new phase in the company's efforts to advance technological capabilities in the promising field of nickelcontaining cathode active materials (CAM), which are a key component in modern batteries. The Centre will focus on battery materials R&D using unique Russian-made stateof-the-art equipment that enables the full cycle of synthesis and testing under specialised conditions. Nornickel's R&D centre has already produced the first samples of NCM 811+ specification cathode materials and has further plans to develop new products. The work of the research facility is expected to lay the groundwork for future projects aimed at creating new production facilities in the battery materials sector.

Taking into account all these initiatives, which have been successfully rolled out, Nornickel has raised the earlier announced 2024 production guidance (own Russian feed) from 184-194 kt to 196-204 kt.

The large-scale maintenance works completed at Nadezhda have increased production efficiency, so we expect strong output growth in 2025. As usual, the 2025 production guidance will be published at the beginning of the year.

Overall, we expect the 2025 global nickel metal production to grow to over 1.15 Mt Ni (+12% YoY) on the back of the ramp-up of the new Class 1 nickel capacities in China and Indonesia.

Nickel Compounds

The EV battery sector, a major user of nickel sulphate, continues to expand while demand seems to be lower than expected both in terms of penetration and battery chemistry choice as LFP / LMFP batteries are likely to play a greater role in the future.

Nickel sulphate production is largely determined by the availability of feed sources. Nickel sulphate can be produced from various feed sources using different production routes either directly from such intermediates as MHP, MSP, nickel matte and crude nickel sulphate or by Class 1 nickel dissolution as well as by processing recycled materials (e.g. battery scrap).

Global Nickel Chemicals Production, kt Ni



Source: NN Analysis

We have revised downwards our earlier estimates of the 2024 nickel compounds production from primary sources, excluding Class 1 nickel dissolution, to 453 kt Ni (+1% YoY) due to a shift from sulphate to cathodes



production in China, cutbacks at some Western producers and weaker demand from the battery industry.

Major **Chinese** NiSO4 producers, including Huayou and GEM, decreased their 9M 2024 output YoY by 21% to 34 kt Ni and by 12% to 33 kt Ni respectively. Zoomwe, in turn, increased its production by 15% to 87 kt Ni. In total, these three giants decreased their combined 9M 2024 nickel sulphate output by around 1% YoY to 154 kt Ni.

Chinese state-owned nickel giant Jinchuan raised its nickel salts output slightly by approximately 6% YoY to over 30 kt Ni in 9M 2024. Their production is expected to grow in 2025 and beyond on the back of the earlier announced JV with Halu Heavy Industry to build a two-staged 280 ktpa NiSO4 project. Its 1^{st} stage (140 ktpa NiSO4 designed capacity) is expected to be commissioned by the end of 2024 while the 2^{nd} stage is currently scheduled for completion in 2026.

Other Chinese sulphate producers decreased their combined output by 26% YoY in 9M 2024.

Overall, we expect Chinese nickel salts production to decrease by 5% YoY to 355 kt Ni in 2024. Nickel sulphate producers outside China and Indonesia show diverse output directions but as a total, they are expected to remain flat YoY in 2024.

Despite the expected decrease in nickel sulphate output in China as well as other Asia and the West, Indonesian output is expected to grow. Indonesian NiSO4 growth is supported by the ramp-up of HPAL capacities and NPI-tomatte conversion capacities that continue to grow but at a slower than earlier expected pace. As a result of increasing MHP production, the need to convert NPI into matte for the battery sector will continue to ease with the bulk of NPI going into nickel metal production.

The only operational **Indonesian** nickel sulphate producer Lygend Harita grew its NiSO4 output by 217% YoY to 29 kt Ni in 9M 2024. We expect its nickel sulphate output to reach around 40 kt Ni in 2024 (+156% YoY growth).

Having suffered from severe financial challenges and the worst civil unrest in decades, **New Caledonian** Prony's Goro plant is reportedly preparing to restart intermediates' production after the suspension triggered by brutal riots. In 9M 2024, their MHP output reduced by 43% YoY to 15 kt Ni. We expect its MHP output to fall by approximately 30-50% YoY to around 16-20 kt Ni in 2024.

Papua New Guinean Ramu plant, which had been producing at a rate above 100% of its nameplate capacity for several years in a row, decreased its 9M output by 10% YoY to 23 kt due to major maintenance completed in 2H 2024. Ramu's 2024 production guidance is at 30 ktpa Ni (-11% YoY). We expect Ramu's 2025 output to revert to its average annual levels at around 32-34 kt Ni.

As discussed earlier, **South Korean** POSCO seems to have abandoned its plans to switch to nickel sulphate

production. Instead, it is focusing now on launching a highpurity nickel JV with CNGR and presumably won't be starting commercial production of nickel salts anytime soon.

Australian major – BHP – produced 2.9 kt Ni in 9M 2024 (+16% YoY) before Nickel West operations were suspended in October 2024. As a result, nickel sulphate output is expected to decrease by 9% YoY in 2024. It has never reached its designed production capacity in the three years of its operations.

Finland-based Terrafame's Talvivaara battery chemicals plant reported a decline in the output of its battery chemicals plant in 9M 2024. They were affected by the strikes in Finland in Q1 2024 and a two-month shutdown due to a slump in the Chinese market, which had a negative impact on their Q2 and Q3 output. The company claimed that the shutdown of the battery chemicals plant should not affect Terrafame's intermediates' (MSP) production. Terrafame benefits from the flexible production process, which enables selling nickel product as an intermediate when the battery chemicals market does not meet the expectations.

However, on 29 October 2024, Terrafame issued a new statement. Due to the challenging market situation and its impact on Terrafame's business, the company decided to initiate negotiations with the unions regarding the future of its personnel citing production-related and financial reasons. The company estimated that it needed to reduce its staff by 75 FTPs but was considering a broad range of options including layoffs, changes to job descriptions and shifting to part-time work. At the end of September 2024, Terrafame employed 826 people. Taking all that into account, we estimate that Terrafame's 2024 nickel sulphate production could be at around 5-8 kt Ni with a flat 2025 output to follow, depending on the state of the market.

Despite unfavourable market conditions, we expect the 2025 nickel compounds' production to be around 0.5 Mt Ni. The major contributors to the 2025 growth are the expected launches and ramp-ups of the new & existing HPAL capacities and NPI-to-matte conversion lines in Indonesia as well as major Chinese producers who enjoy a unique competitive advantage and flexibility to switch between different nickel forms depending on the market conditions.

Indonesian HPAL

The HPAL projects launched in Indonesia by Lygend (HPL, ONC) and Huayou (Huayue, Huafei) have not only reached their design capacities but even exceeded them. Meanwhile, according to publicly available information, GEM plans to increase the combined capacity of its HPAL projects to 100 ktpa Ni by the end of this year.



In 2025, two new projects are expected to come online: Excelior, a joint venture between Tsingshan and Nickel Industries with the design capacity of 72 ktpa Ni, and Blue Flame, a Tsingshan project at Weda Bay with the capacity of 120 ktpa Ni.

However, a countertrend is also emerging, with several companies cancelling their HPAL project plans. The BASF and Eramet project, initially designed for 42 ktpa Ni, will not proceed; Hanrui Cobalt has abandoned its 62 ktpa Ni HPAL project, and Huayou's PT Huashan project, with the planned capacity of 120 ktpa Ni, has been postponed indefinitely.

Amid weak demand from the battery sector, companies are adopting a more cautious approach to investing in MHP production.

We see the nickel production by the Indonesian HPAL projects increasing to 329 kt Ni (+84% YoY) and 425 kt Ni in 2024 and 2025, respectively.

PRODUCTION COSTS



Sources: Company reports, SMM, LME, NN Analysis

2024 has proved to be another tough year for the global nickel industry. Almost all producers, ranging from those who produce intermediates to the Class 1 producers, were impacted by weak nickel prices at least to some degree. Many producers were facing lower profitability or even losses, which induced them to decrease output and undertake prolonged care & maintenance. The pressure of high operating costs caused by lower by-product credits, growing mining inflation rates, rising labour and contractor services costs, as well as electricity & fuel costs, wasn't helping either.

Judging by the producers' public reports, many **Class 1** nickel producers experienced elevated cash costs in 1H 2024. For example, Vale's Sudbury division costs increased to 15,219/t in Q2 2024 (+30% YoY) because of higher maintenance costs and lower fixed cost dilution due to the biennial maintenance, while in Q3 the figure stands flat QoQ at 15,175/t or -19% YoY.

Vale's VB & LH operations reported very high costs at \$31,114/t in Q2 2024 although it still was a 10% YoY decrease due to lower 3rd party feed volumes and prices. They plunged further to \$21,953/t in Q3 2024 (-29% YoY) because of the continued ramp-up of Voisey's Bay. Vale's average realised nickel price was \$18,638/t in Q2 2024 (-19% YoY), but it decreased even further to \$17,012/t in Q3 2024, down by 20% YoY, mainly due to the 20% YoY



fall in LME nickel average price in Q3 (from \$20,344/t to \$16,259/t).

Another Class 1 Ni producer, Sherritt, reported a slight decrease in its unit operating cost for nickel: it went down by 6% YoY to \$14,330/t in 1H 2024 as a result of lower mining, processing and refining costs as well as third-party feed costs. It was partially offset by lower fertiliser and cobalt by-product credits. In Q3 2024, Sherritt costs improved significantly (by 29% YoY to \$11,376/t) primarily due to lower consumables' prices (sulphur, natural gas, diesel), lower maintenance costs and operational improvements, as well as the impact of higher nickel sales.

Sherritt's net direct cash cost is expected to decrease YoY from \$15,917/t in 2023 to a range of \$12,125-13,228/t in 2024 due to cost optimisation and the expectation of higher output and sales.

European high-grade nickel producer Sandouville, which belongs to Sibanye-Stillwater, reported nickel-equivalent sustaining costs, which decreased significantly (by 37% YoY to \$23,684/t in 1H 2024) primarily due to reduced feedstock purchase costs (lower nickel price), lower reagent and overhead costs as well as increased output. Their Q3 2024 nickel-equivalent sustaining cost improved further to \$22,451/t, which was a 29% YoY reduction. There were the same main reasons behind it as well as some savings on fixed costs, which were partially offset by lower by-product credits. Sibanye maintains its original 2024 cost guidance for the Sandouville refinery at about €21,000-23,000/t.

Ferronickel producers are traditionally the most sensitive to the price environment.

As we have discussed above, Glencore's New Caledonian plant Koniambo was placed on C&M in March while a search for a potential buyer for its stake was initiated.

Eramet reported a 5% growth in the cash cost of its FeNi production (to \$20,062/t Ni) in 1H 2024. This increase was due to the lower ferronickel output and nickel ore exports in addition to an unfavourable price. It was largely offset by better cost management as well as declining energy prices. Eramet also reported a rising cash cost of its ferronickel production (by 6% YoY to \$19,180/t Ni) in Q3 2024, but at the same time, it is a 4% decrease QoQ reflecting a lower energy price and better cost control. Following the April agreement between Eramet and the French authorities, the French Government is expected to continue financing Eramet's New Caledonian entities in the form of undated fixed-rate subordinated bonds to meet their financial needs at least until the end of 2024.

South₃₂ reduced its operating unit costs at Cerro Matoso by 8% YoY to \$10,428/t Ni in 1H 2024 due to higher ferronickel output as well as lower price-linked royalties and a weaker Colombian peso. South32's cash cost is expected to increase YoY in FY 2025 to approximately \$12,456/t, reflecting the volume impact of planned lower nickel grades leading to a lower planned ferronickel output.

South₃₂ continues to progress its strategic review of Cerro Matoso and is expected to provide an update by Q₂ CY 2025.

Anglo American's facilities in Brazil (Barro Alto & Codemin) reported a decreased 1H 2024 C1 cost by 8% YoY at \$11,133/t Ni, which is lower than guidance, reflecting slightly higher output volumes in H1 and lower input costs, primarily from energy cost efficiencies. Anglo American is forecasting some cost increase for 2024 (to \$11,684/t Ni), as they are continuously impacted by declining grades partly offset by their strong operational performance.

The major global low-grade nickel product – NPI – demonstrated a year-on-year decrease in costs in 1H 2024. Based on the publicly available data, the weighted average cost of the **Chinese NPI producers** decreased by 22% YoY in 1H 2024 to around \$11,630/t Ni, presumably due to lower YoY ore prices. The weighted average Chinese NPI producers' cost slightly increased to around \$12,100/t Ni in Q3 2024 as a result of growing prices for the Philippines ore from August.

Along with that, **Indonesian NPI producers** also experience an essential decrease of 20% YoY in their weighted average cost in 1H 2024, amounting to around \$9,300/t, as nickel ore prices in Indonesia are directly pegged to the LME price through the state price formula. In 1H 2024, the LME price average stood at around \$17,500/t, down sharply by 28% YoY. The Indonesian weighted average NPI producers' costs slightly rebounded to around \$10,100/t Ni in Q3 2024 as a result of delays in mining permits issuing, as well as unfavourable weather conditions over the period.

The only Indonesian Ni sulphate producer PT HPL owned by Harita, which launched its NiSO4 production in April 2023, reported that its 1H 2024 cash cost fell by 19% YoY to \$8,499/t Ni with a slight further decrease in cash cost to \$8,309/t Ni in 9M 2024.

Some **intermediate nickel producers** reported rising production costs. FQM reported an increase in costs in its Australian-based Ravensthorpe facility by 27% YoY to \$26,389/t Ni in 1H 2024, reflecting lower nickel output, lower payabilities and high operating costs because of care and maintenance that started in May 2024 and completed in Q3 2024. In addition, the Company continues to support its personnel and local regional communities after operations at Ravensthorpe were halted. C&M costs for Ravensthorpe were reported at \$4 million per month in Q3 and are expected to reduce to approximately \$2 million per month from Q4 onwards.



Nickel 28, traditionally considered among the low-cost producers, reported a decrease of 9% YoY in the actual cash cost in 1H 2024 (to \$6,989/t Ni) at its Ramu plant in Papua New Guinea. Given their favourable cost profile, they remain a generator of substantial free cash, even at current commodity prices.

Ramu increased its actual cash costs in Q_3 2024 by 7% YoY to \$6,526/t Ni as the output was affected by the planned September shutdown to undertake some capital improvement projects, which are expected to increase Ramu's production capacity.

Indonesian MHP producer PT HPL owned by Harita reported a decrease in YoY cash cost in 1H 2024 by 16% to \$6,116/t Ni with a further reduction in cash cost to \$5,897/t Ni in 9M 2024.

Another Indonesian MHP producer PT QMB owned by GEM reported its 1H 2024 MHP production costs at approximately \$8,000/t Ni achieved through process optimization, efficient overhaul and other means of maximum cost reduction. The sulphuric acid plant constructed by the Company's partner, MDK, has been completed and put into operation, supplying sulphuric acid at preferential prices. The cost of sulphuric acid has slumped, thus PT QMB's MHP production costs are expected to drop further to \$7,500/t Ni by the end of 2024.

Indonesian nickel matte producer PTVI reported a decrease in its cash costs in Q2 2024 by 7% YoY to \$9,590/t Ni mainly due to lower fuel costs. Following the completion of divestment in June, the Company is currently carrying out the carve-out process from Vale Base Metal, which involves some associated modest one-off costs. PTVI reported unit cash cost of revenue at \$9,536/t Ni as of 9M 2024.

On the cash cost curve graph, we have shown our estimates of the LME-adjusted costs of some nickel producers in 1H 2024 based on the publicly available data, their own reports and our in-house calculations. LME-adjusted costs refer to the production cost adjusted to the LME deliverable Class 1 by adding the assessed product's premium or discount for each form of nickel for the corresponding period.

With the average nickel price in 1H 2024 being \$17,495/t, around 20% of global nickel producers were making losses. Since the beginning of 2024, the LME nickel price has fallen from \$16,600/t to the current level of \$15,745/t (as of 29 November 2024). Consequently, the number of loss-making producers increased and they now account for up to 40% of the global nickel supply.

According to our estimations, around 420 kt Ni of global capacities are either halted, on C&M, in a state of bankruptcy or experiencing external pressure affecting their operational stability and production rates. All that makes the current supply risk essential, which could provide a further impetus to the nickel price.

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GLOSSARY OF TERMS

Abbreviation	Term
BEV	Battery electric vehicle
CAGR	Compound annual growth rate
САМ	Cathode active material
СВАМ	Carbon Border Adjustment Mechanism
Co	Cobalt
COTR	Commitments of traders report
CRC	Cold rolled coil
CY	Calendar year
C&M	Care and maintenance
ESG	Environmental social governance
EV	Electric vehicle
FeNi	Ferronickel
FTP	Funds transfer pricing
EV	Financial year
GWb	Gigawatt bours
	Hamburg Commercial Bank
	Hybrid electric vehicle
	High prossure acid leaching
	Internal composition engine
	Initiation Reduction Act
	Joint venture
kt	Thousand tonnes
	Kiloustu koust
	Lithium Iron phosphate battery
	London Metal Exchange
	Liqueneo natural gas
	Mixed nydroxide precipitate
	Mixed sulphide precipitate
мтра	Million tonnes per annum
MW	Megawatt
	NICKEI CODAIT MANGANESE DATTERY
NEV	New energy vehicle (battery electric and plug-in)
	Nickel
NISO4	Nickel sulphate
	Nickel pig iron
OEM	Original equipment manufacturer
OESBF	Oxygen enriched side blown furnace
PCAM	Precursor cathode active material
PHEV	Plug-in hybrid
PMI	Purchasing managers index
QoQ	Quarter-on-quarter
RKEF	Rotary kiln-electric furnace
R&D	Research and development
SHFE	Shanghai Futures Exchange
TWh	Terawatt-hours
YoY	Year-on-year
YTD	Year-to-date



SUPPLEMENTARY MATERIALS

Table 1. Nickel End Use in China (YoY % Change)

Industry	Ni End Use	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24
Chemical, Petrochemical	152 kt	17%	17%	21%	9%	17%	9%	13%	10%	15%	13%	13%	14%	14%	14%	10%	18%	1%	4%	17%	11%	11%	19%
Building & Construction	117 kt	-9%	-9%	-29%	-28%	-28%	-31%	-26%	-23%	-15%	-21%	5%	-12%	-31%	-31%	-26%	-12%	-23%	-22%	-19%	-17%	-20%	-27%
NCM Batteries Installed in NEVs	80 kt	-26%	15%	6%	83%	9%	-13%	7%	3%	9%	14%	42%	46%	132%	3%	30%	24%	15%	10%	8%	12%	7%	-1%
Industrial boilers	63 kt	23%	23%	-3%	-11%	4%	-1%	-16%	-3%	-7%	-6%	-31%	-19%	-30%	-30%	10%	11%	-22%	-21%	-6%	-12%	-3%	-7%
Food Processing	55 kt	5%	5%	6%	-10%	2%	3%	5%	8%	36%	18%	19%	35%	23%	23%	17%	46%	34%	21%	26%	22%	12%	23%
Automotive	47 kt	-14%	-14%	11%	60%	17%	1%	-4%	5%	3%	9%	24%	25%	5%	5%	7%	15%	1%	2%	-2%	-2%	-1%	5%
Wire	44 kt	3%	3%	10%	0%	-13%	-1%	11%	-3%	-3%	-5%	3%	0%	-3%	-3%	-12%	-11%	8%	2%	-3%	-10%	-3%	10%
Air Conditioning	42 kt	14%	14%	13%	12%	18%	25%	29%	6%	-10%	-1%	13%	27%	13%	13%	13%	20%	13%	6%	-13%	-9%	11%	14%
Integrated circuit	38 kt	-23%	-23%	-3%	4%	7%	6%	4%	21%	14%	35%	28%	34%	59%	59%	28%	32%	17%	13%	27%	18%	18%	12%
Pulp & Paper	37 kt	23%	23%	-3%	-1%	-1%	6%	8%	13%	33%	15%	27%	-5%	23%	23%	12%	34%	23%	20%	20%	10%	17%	31%
Catering	31 kt	7%	7%	-2%	-2%	-6%	5%	7%	14%	19%	11%	23%	11%	19%	19%	31%	37%	31%	51%	28%	32%	42%	19%
Washing Machines	16 kt	2%	2%	19%	42%	29%	26%	16%	41%	24%	15%	13%	12%	15%	15%	6%	2%	4%	-4%	14%	7%	3%	6%
Textile	14 kt	-11%	-11%	2%	-14%	6%	3%	-4%	3%	-7%	7%	1%	5%	15%	15%	10%	24%	7%	17%	8%	16%	22%	20%
Shipbuilding	8 kt	-24%	-24%	14%	19%	-4%	7%	-10%	20%	14%	22%	4%	-3%	74%	74%	1%	-1%	-5%	2%	23%	-4%	6%	23%
Lifts	7 kt	12%	12%	10%	70%	10%	-9%	-14%	-7%	-4%	-3%	-3%	9%	3%	3%	-12%	-9%	-11%	-9%	-13%	-15%	-6%	-7%
Container	3 kt	-64%	-64%	-58%	-44%	-50%	-51%	-48%	-41%	-30%	11%	33%	46%	171%	171%	107%	139%	217%	203%	245%	224%	205%	255%
Total	753 kt	-7%	4%	5%	16%	7%	1%	6%	6%	11%	10%	18%	16%	31%	3%	13%	20%	9%	9%	11%	9%	10%	10%

Ni End Use in China	1327 kt
Indicator Coverage in China	57%

Table 2. Nickel End Use in Germany (YoY % Change)

Industry	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Estimated Yearly Ni Consumption 2023	YoY Change	Jan 24	Feb 24	Mar 24	Apr 24	May 24	Jun 24	Jul 24	Aug 24	Sep 24	Oct 24	Nov 24	Dec 24	Estimated Yearly Ni Consumption 2024	YTD Change
Automotive	2%	0%	-5%	-12%	-4%	-6%	3%	0%	-7%	-7%	-10%	-8%	5 kt	- 5%	-13%	-7%	-9%	-5%	-14%	-2%	2%	-10%	5%	4%	3%	10%	5 kt	-5%
Machinery	-9%	-14%	-12%	-15%	-9%	-10%	-18%	-13%	-9%	-13%	-16%	-7%	40 kt	- 12%	-16%	-9%	-15%	-14%	-5%	-8%	-6%	-12%	-9%	-7%	1%	-9%	37 kt	-9%
Electronics	-1%	-8%	-1%	-3%	5%	-22%	-15%	2%	16%	-13%	12%	-7%	1 kt	▼ -3%	-4%	0%	-9%	-5%	-12%	-3%	-7%	-1%	-21%	1%	-27%	-2%	1 kt	-9%
Appliances	6%	0%	24%	-1%	-3%	-8%	2%	-14%	-5%	-33%	-16%	-10%	4 kt	- 5%	-15%	-16%	-7%	-22%	-20%	-12%	-23%	-9%	-17%	18%	4%	-4%	3 kt	-11%
Construction	-12%	-11%	-23%	-20%	-15%	-20%	-10%	-6%	-2%	1%	18%	12%	6 kt	- 8%	1%	-3%	3%	2%	1%	1%	3%	1%	5%	-9%	-6%	-11%	6 kt	0%
Total	-8%	-12%	-10%	-14%	-8%	-11%	-15%	-11%	-7%	-13%	-12%	-5%	56 kt	-10%	-13%	-8%	-12%	-12%	-6%	-6%	-6%	-10%	-7%	-4%	-1%	-7%	52 kt	-8%

Ni End Use in 2020	
Ni End Use in EU27	315 kt
Ni End Use in Germany	75 kt
Germany Coverage in EU27	24%
Ni End Use in Germany	
for Selected Indicators	58 kt
Indicator Coverage in Germany	78%

Table 3. Nickel End Use in USA (YoY % Change)

Industry	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Estimated Yearly Ni Consumption 2023	YoY Change	Jan 24	Feb 24	Mar 24	Apr 24	May 24	Jun 24	Jul 24	Aug 24	Sep 24	Oct 24	Nov 24	Dec 24	Estimated Yearly Ni Consumption 2024	YTD Change
Automotive	1%	3%	2%	4%	6%	3%	1%	2%	4%	2%	3%	5%	28 kt	🔺 3%	1%	0%	1%	0%	-2%	0%	0%	0%	0%	-1%	-2%	-2%	28 kt	- 0%
Shipbuilding	-19%	-30%	21%	115%	111%	-4%	-18%	17%	61%	-14%	-32%	-36%	1 kt	🔺 3%	67%	33%	-20%	-13%	-27%	-4%	41%	3%	-28%	74%	47%	23%	1 kt	🔺 9%
Oil & Gas	7%	6%	6%	0%	18%	17%	23%	48%	8%	19%	12%	-1%	10 kt	🔺 12%	17%	65%	82%	9%	62%	1%	41%	19%	16%	45%	39%	5%	13 kt	🔺 32%
Power Generation	-8%	-4%	1%	-1%	-4%	5%	-3%	5%	-3%	10%	19%	17%	10 kt	۵% 🛦	19%	13%	10%	5%	10%	0%	11%	2%	-2%	-5%	-6%	-10%	10 kt	🔺 3%
Machinery	1%	1%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	15 kt	— 0%	-1%	-1%	0%	-1%	1%	1%	1%	-1%	1%	0%	0%	-1%	15 kt	— 0%
Electronics	4%	0%	1%	0%	1%	3%	0%	2%	2%	1%	2%	3%	5 kt	<u> </u>	4%	4%	4%	5%	2%	2%	5%	1%	2%	4%	1%	1%	5 kt	🔺 3%
Appliances	11%	8%	5%	12%	2%	1%	-1%	9%	-2%	12%	8%	-1%	7 kt	۵% 🛦	-3%	-3%	-4%	2%	-2%	-6%	14%	5%	-7%	-1%	-7%	-9%	6 kt	-2%
Construction	18%	23%	15%	16%	2%	16%	14%	12%	7%	6%	8%	37%	8 kt	🔺 14%	6%	8%	10%	8%	19%	5%	-4%	-2%	8%	-8%	-2%	5%	9 kt	▲ 4%
Total	3%	3%	3%	4%	5%	8%	3%	6%	6%	4%	5%	6%	83 kt	🔺 5%	5%	10%	11%	2%	9%	0%	8%	3%	1%	4%	3%	-1%	87 kt	🔺 5%

Ni End Use in 2020

Ni End Use in Americas	174 kt
Ni End Use in USA	122 kt
USA Coverage in Americas	70%
Ni End Use in USA	
for Selected Indicators	78 kt
Indicator Coverage in USA	64%