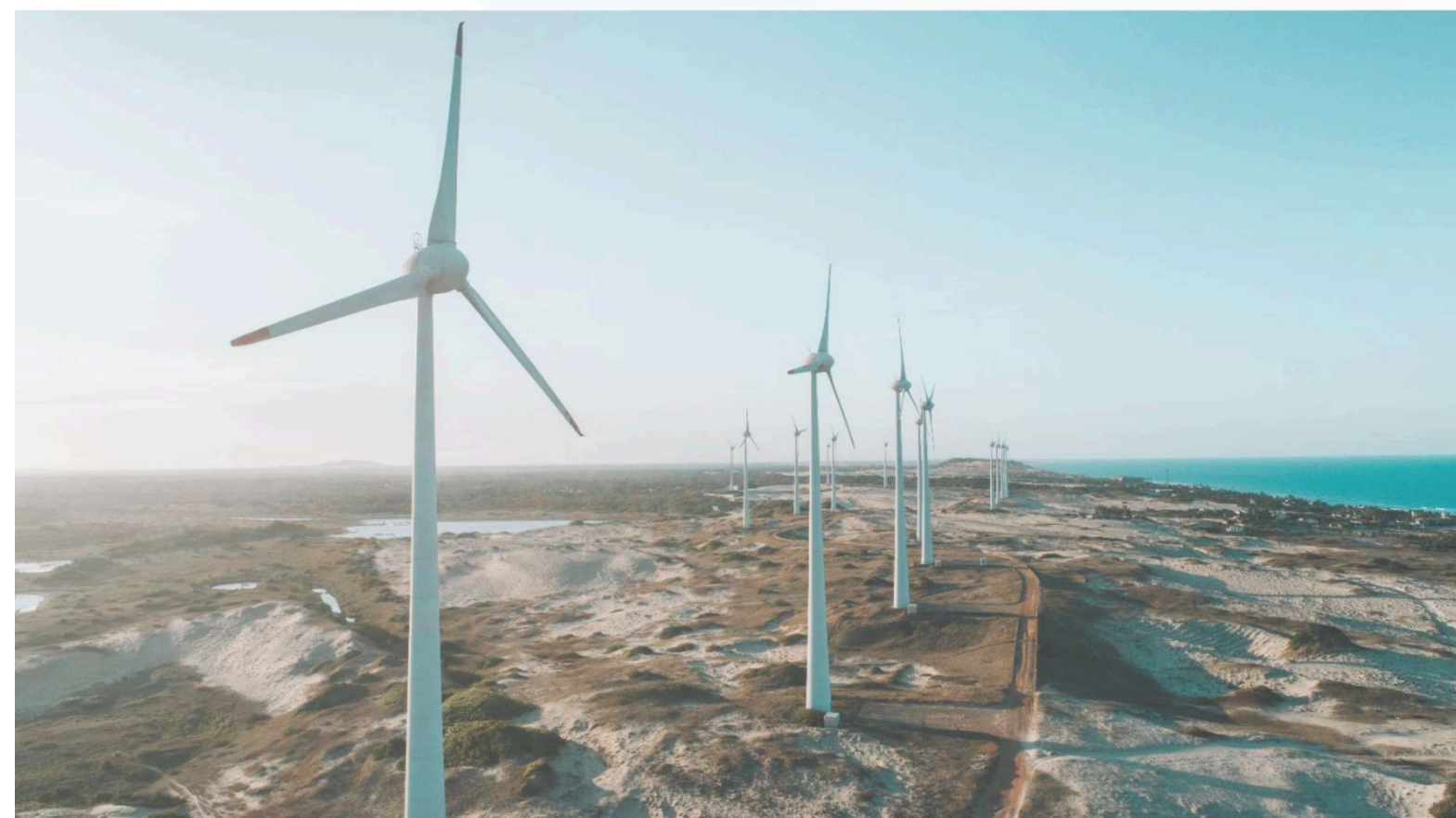


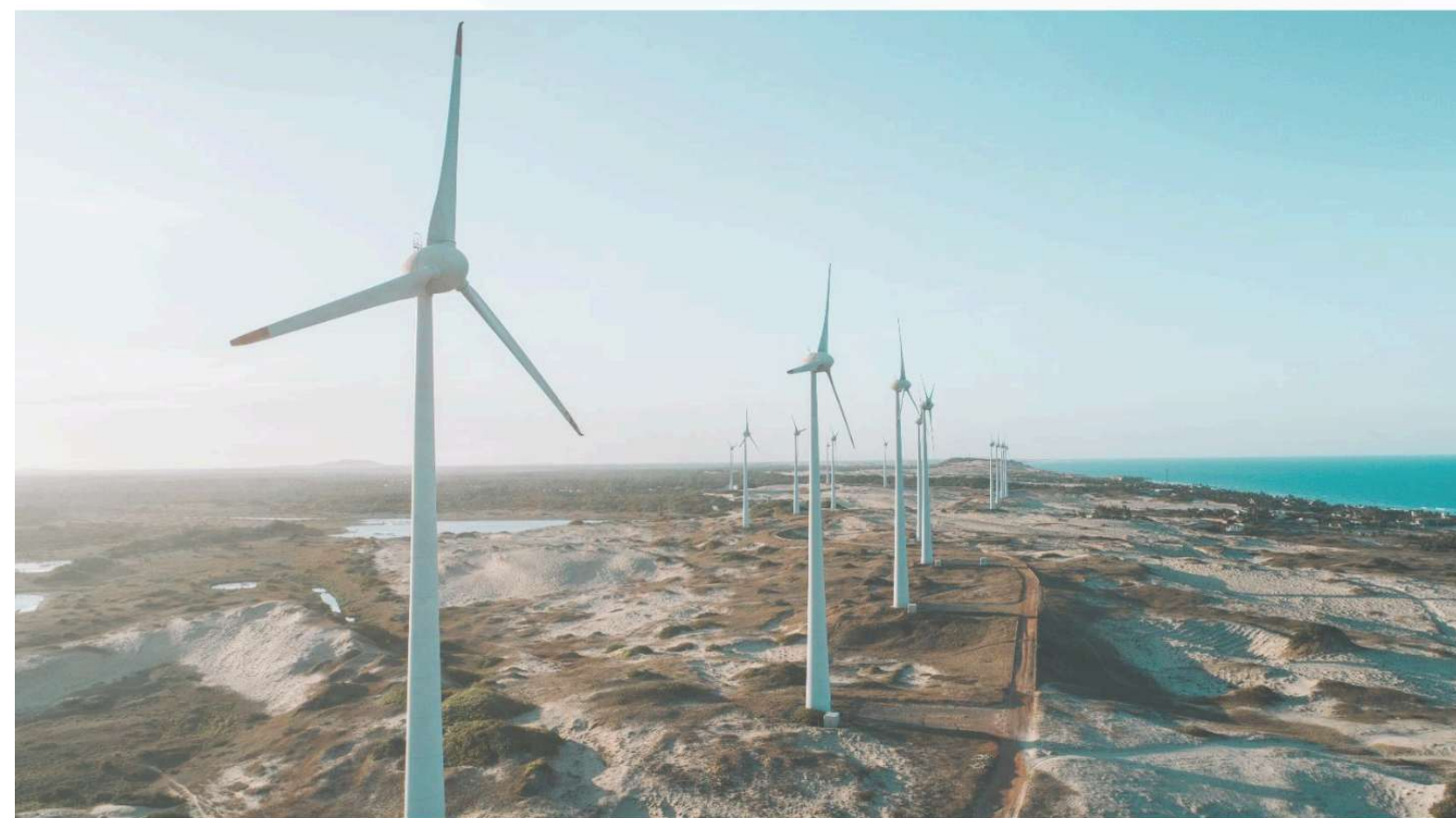
China Cobalt Market Report 2024



中国钴

市场报告

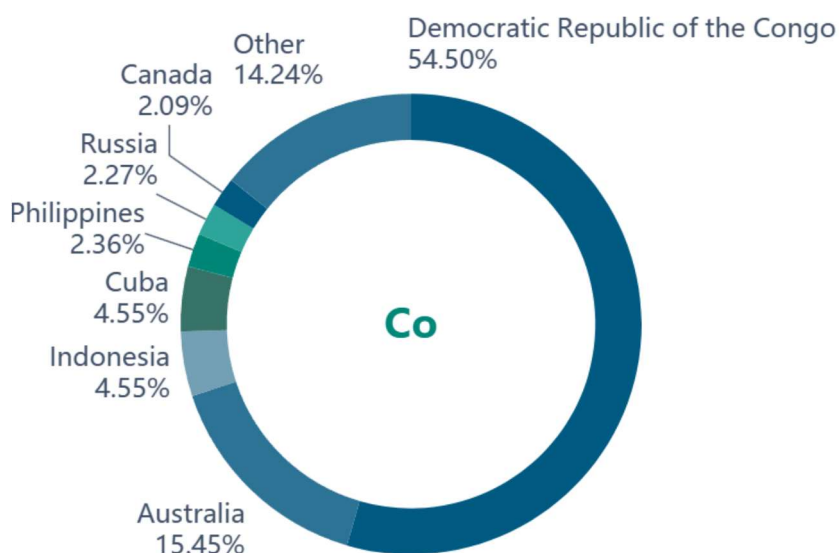
2024



1 Global Cobalt Raw Material Analysis

1.1 Global Cobalt Reserves Types and Distribution Characteristics (2023)

Figure: Global Cobalt Reserves Distribution in 2023



Source: SMM

Table: Global Cobalt Reserves Distribution in 2023

Country	Total Reserves (10,000 mt)
Democratic Republic of the Congo	600
Australia	170
Indonesia	50
Cuba	50
Philippines	26
Russia	25
Canada	23
Others	108.9
Total	1100

The global distribution of cobalt reserves is highly concentrated. According to statistics from the United States Geological Survey (USGS), the global proven cobalt reserves amount to 11 million mt. The distribution of cobalt reserves is extremely uneven, with countries such as the Democratic Republic of Congo (DRC) and Australia being the most enriched. The DRC's share of cobalt reserves is 54.5%, followed by Australia with 15.45% and Indonesia with 4.55%. The reserves are distributed in small amounts in other countries.

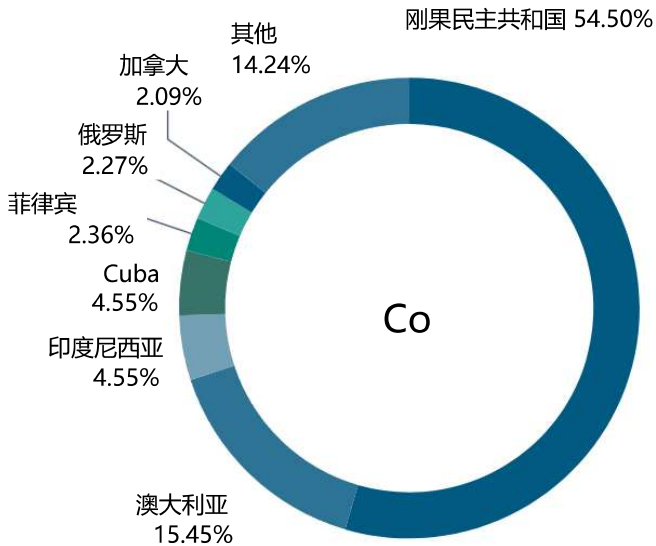
- **Congo (DRC):** In 2023, the DRC has about 6 million tonnes of existing cobalt reserves, accounting for the largest share globally and making it the largest cobalt-producing country, accounting for over 75% of global cobalt production. The grade is mostly between 0.3%-0.5%, and the quality is comprehensively superior to other sources.
- **Australia:** In 2023, Australia has 1.7 million mt of existing cobalt resource reserves, ranking second in the world, accounting for 15.45% of the global total. However, it falls far behind the DRC in terms of cobalt development and supply. Australia is stepping up the development of cobalt mineral resources. Broken Hill, one of the oldest mining towns in the western part of New South Wales, is about to become one of the important cobalt production areas.
- **China:** The vast majority of China's cobalt reserves come from associated ores, which are importantly coexistent in copper, nickel, and iron ores. There are now 150 known cobalt reserve sites, distributed across 24 provinces (regions), with Gansu Province having the most reserves, accounting for approximately 30% of the national total. However, the quality of China's cobalt ore is relatively low, and cobalt is primarily recovered as a by-product. The recovery rate is low, the process is complex, the production cost is high. There are very few mines that can be mined economically, so China deeply relies on the imports.

1) Resource distribution is based on the statistics of globally identified reserves in 2023.

1 全球钴原材料分析

1.1 全球钴储量类型和分布特征 (2023 年) 国家

图表：2023 年全球钴储量分布



来源：SMM

表格：2023 年全球钴储量分布

国家	总储备 (10,000 公吨)
民主共和国	600
澳大利亚	170
印度尼西亚	50
Cuba	50
菲律宾	26
俄罗斯	25
加拿大	23
其他	108.9
总共	1100

全球钴储量分布高度集中。根据美国地质调查局 (USGS) 的统计数据，全球已探明的钴储量达到 1100 万吨。钴储量分布极不均匀，刚果（金）和澳大利亚等国家最为富集。刚果（金）的钴储量占比为 54.5%，其次是澳大利亚的 15.45% 和印度尼西亚的 4.55%。其他国家的储量分布较少。

刚果（金）：2023 年，刚果（金）拥有约 600 万吨现有钴储量，占全球最大份额，使其成为最大的钴生产国，占全球钴产量的 75% 以上。品位主要在 0.3%-0.5% 之间，质量全面优于其他来源。

> 澳大利亚：2023 年，澳大利亚拥有 170 万吨的现有钴资源储量，位居世界第二，占全球总量的 15.45%。然而，在钴的开发和供应方面，它远远落后于刚果（金）。澳大利亚正在加快开发钴矿资源。新南威尔士州西部最古老的矿业城市 Broken Hill 即将成为重要的钴生产区之一。

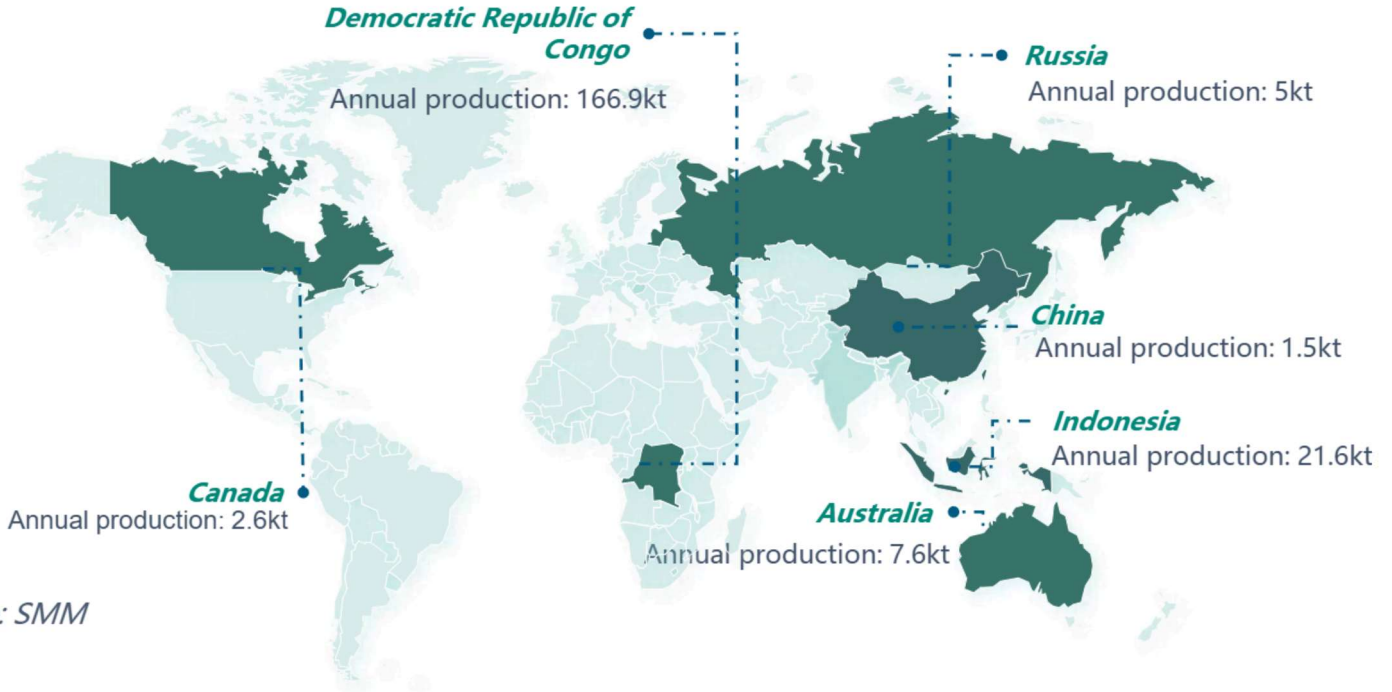
> 中国：中国绝大部分钴储量来自伴生矿石，这些矿石与铜、镍和铁矿石重要地共存。目前已知有 150 个钴储量点，分布在 24 个省（区），其中甘肃省拥有最多储量，约占全国总量的 30%。然而，中国的钴矿石质量相对较低，钴主要作为副产品回收。回收率低，工艺复杂，生产成本低。经济上可开采的矿山非常少，因此中国在很大程度上依赖进口。

资源分配基于 2023 年全球已确认储量的统计数据。

1 Global Cobalt Raw Material Analysis

1.2 Global Cobalt Raw Material Supply Analysis (2018-2024F)

Figure: Global Cobalt Raw Material Supply by country in 2023

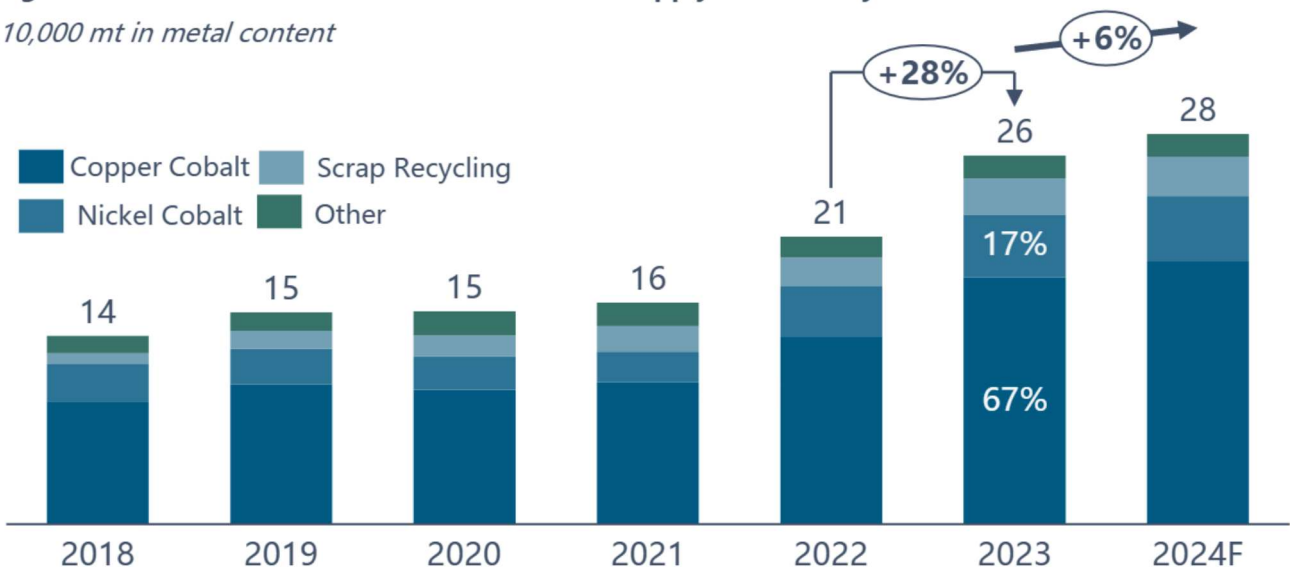


Source: SMM

➤ The production of operating mines: According to SMM statistics, the total global supply of cobalt raw materials in 2023 is 264,000 mt in metal content, of which the total supply of primary materials is 238,300 mt in metal content, mainly concentrated in the Democratic Republic of Congo (DRC), Australia, Indonesia, Canada, and other regions. SMM predicts that the cobalt supply will remain relatively stable in the next five years. The DRC's copper-cobalt mine projects will gradually expand their production capacities in the coming years. The volume of cobalt raw material suppliers from foreign and Chinese capitals will continuously increase, leading to supply growth. China maintains a relatively stable import volume of cobalt resources. The domestic supply remains very small volume due to the shortage of cobalt resource in China. China will continue relying on the imported cobalt raw materials, especially from the DRC to meet the domestic demand. Additionally, the supply of cobalt from nickel-cobalt mines in Indonesia and other places, as well as from lithium battery recycling, will gradually increase over the next few years. Therefore, this also provides a part of the increment for the domestic supply of cobalt resources.

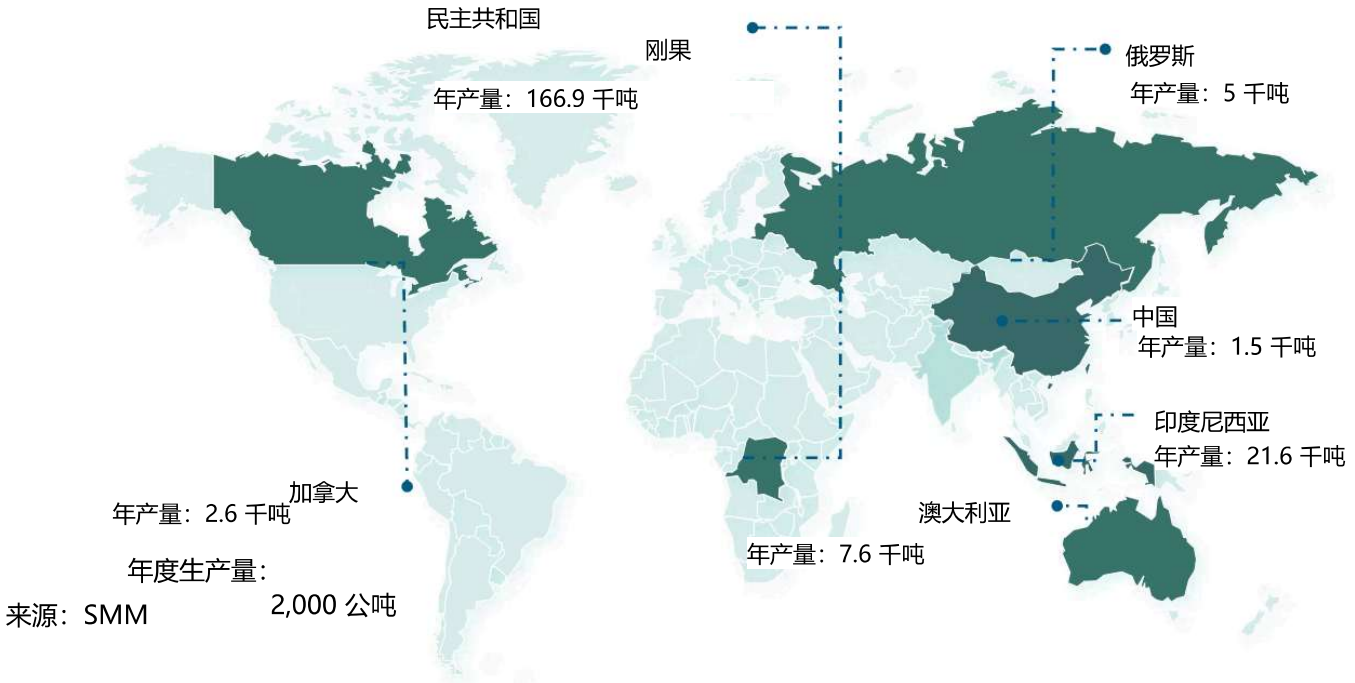
Figure: 2018-2024F Global Cobalt Raw Material Supply Volume - By Source of Material

10,000 mt in metal content



1 全球钴原材料分析

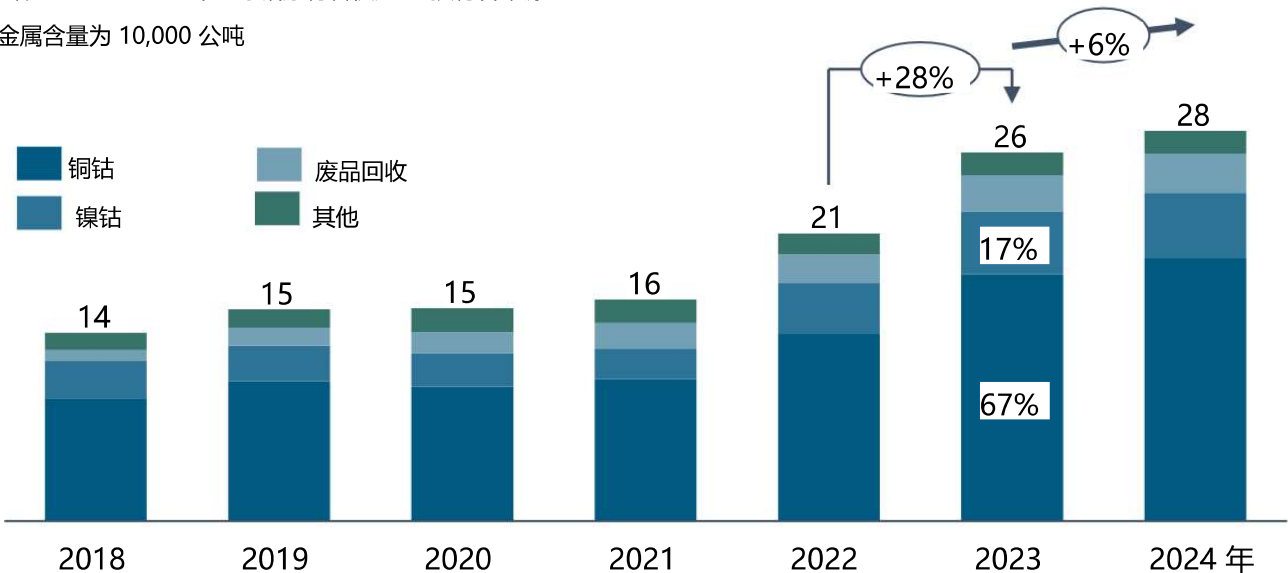
1.2 全球钴原材料供应分析 (2018-2024F) 图表：2023 年各国的全球钴原材料供应



> 运营矿山的生产：根据 SMM 统计数据，2023 年全球钴原材料的总供应量为 264,000 吨金属含量，其中初级材料的总供应量为 238,300 吨金属含量，主要集中在刚果（金）、澳大利亚、印度尼西亚、加拿大等地区。SMM 预测未来五年内钴供应将保持相对稳定。刚果（金）的铜钴矿项目将逐渐扩大产能。来自外资和中国资本的钴原材料供应商数量将不断增加，导致供应增长。中国保持相对稳定的钴资源进口量。由于中国钴资源短缺，国内供应量非常有限。中国将继续依赖进口的钴原材料，特别是来自刚果（金）以满足国内需求。此外，印度尼西亚等地的镍钴矿以及锂电池回收的钴供应将在未来几年逐渐增加。因此，这也为国内钴资源供应提供了一部分增量。

图表：2018-2024 年全球钴原材料供应量-按材料来源

金属含量为 10,000 公吨



1 Global Cobalt Raw Material Analysis

1.3 Analysis of Future New Projects (2023-2024F)

Table: 2023-2024F Overview and Analysis of Newly Commissioned Projects

10,000 mt in metal content

Resource Type	Region	Mine/Project Name	Expected Production Year Output	Notes
Copper-Cobalt	Democratic Republic of the Congo (DRC)	Kisanfu	3	Maintaining Growth in 2024
Copper-Cobalt	Democratic Republic of the Congo (DRC)	Kinsevere	0.5	First Cobalt Production in 2023
Copper-Cobalt	Democratic Republic of the Congo (DRC)	Musonoi	0.78	Infrastructure Construction Completed in 2024
Copper-Cobalt	Democratic Republic of the Congo (DRC)	Mutoshi Mine	1.6	Originally scheduled for Q4 2023, but delayed due to financial issues
Nickel-Cobalt	Indonesia	Huayue Phase I and II	0.6	Commenced Production in H2 2023
Nickel-Cobalt	Indonesia	Tsingshan-GEM-Brunp	0.75	Gradual increase in production in 2024
Nickel-Cobalt	Indonesia	PT Huayu Nickel Cobalt	1.2	Projected Full Production Capacity by 2024
Pyrite	Australia	Broken Hill	0.4	Site Construction Completed in 2022

Source: SMM

Analysis of Factors Affecting Resource Extraction Volume:

➤ Factors affecting copper-cobalt mine projects

Copper-cobalt mines are primarily located in the Democratic Republic of the Congo, and the main content is copper. Due to the considerable profit from copper in 2023 and Q1 2024, it is encouraging the ramping-ups of the greenfield and brownfield projects. High copper prices and low cobalt prices could further drive producers to adjust their product mix to achieve better profit margins. However, the logistical issues and stability in the DRC always affect the existing mines and projects, which are worthy being considered.

➤ Factors affecting nickel-cobalt mine projects

Primarily in Indonesia, due to the successful construction and expansion of the MHP projects, Indonesian capacity has rapidly risen. Indonesian low-grade laterite nickel ore can be processed using high-pressure leaching technology to recover cobalt elements, which also has a cost advantage. However, cobalt is also a by-product, so it is easily affected by the fluctuations in the price of nickel, which affects the progress of the MHP project, and in turn affects the output of cobalt. And also the other factor that could have a great impact on these HPAL projects is the attitude from the new Indonesian government.

1 全球钴原材料分析

1.3 未来新项目分析 (2023-2024F)

表格: 2023-2024 年新委托项目概况和分析

金属含量为 10,000 公吨

资源 Type	地区	我的/项目 Name	预期产量 年产量	笔记
铜-钴	民主 共和国 刚果 (民主共和国)	Kisanfu	3	在 2024 年保持增长
铜-钴	民主 共和国 刚果 (民主共和国)	金塞韦雷	0.5	2023 年首次钴生产
铜-钴	民主 共和国 刚果 (民主共和国)	穆索诺伊	0.78	2024 年基础设施建设完成
铜-钴	民主 共和国 刚果 (民主共和国)	穆托什矿山	1.6	原定于 2023 年第四季度, 但由于财务问题而推迟
镍-钴	印度尼西亚	华悦一期和 II	0.6	2023 年下半年开始生产
镍-钴	印度尼西亚	青山-GEM-布伦普	0.75	生产逐渐增加 2024
镍-钴	印度尼西亚	PT Huayu Nickel 钴	1.2	预计的全面生产能力 到 2024 年
黄铁矿	澳大利亚	布罗肯希尔	0.4	2022 年工地建设完成

来源: SMM

影响资源提取量的因素分析:

> 影响铜钴矿项目的因素

铜钴矿主要位于刚果民主共和国, 主要含铜。由于 2023 年和 2014 年第一季度铜的可观利润, 鼓励加快绿地和棕地项目的推进。高铜价和低钴价可能进一步推动生产商调整产品组合以实现更好的利润率。然而, 刚果民主共和国的物流问题和稳定性总是影响现有矿山和项目, 值得考虑。

> 影响镍钴矿项目的因素

主要在印度尼西亚, 由于 MHP 项目的成功建设和扩展, 印尼的产能迅速提高。印尼低品位的后期镍矿可以利用高压浸出技术进行处理, 以回收钴元素, 这也具有成本优势。然而, 钴也是一种副产品, 因此容易受到镍价格波动的影响, 这影响了 MHP 项目的进展, 进而影响了钴的产出。另一个可能对这些 HPAL 项目产生重大影响的因素是新印尼政府的态度。

2 Global Cobalt Demand Analysis

Analysis and Forecast of Downstream Demand for Cobalt Products

➤ Global demand for cobalt mainly comes from digital products, EVs, and energy storage applications in the lithium battery field, and traditional industries such as high-temperature alloys, hard alloys, catalysts, ceramic pigments, magnetic materials, organic materials, and other industries. With the popularization of smartphones, the demand for cobalt in batteries of digital products and magnetic materials is accelerating. The proportion of cobalt demand in traditional industries is also synchronously declining. The recent implementation of subsidies from many countries/regions for new energy vehicles has markedly enhanced their development prospects. Consequently, cobalt demand, essential for electric vehicle batteries, has experienced a surge.

2.1 Analysis of the Electric Vehicle Market Trends

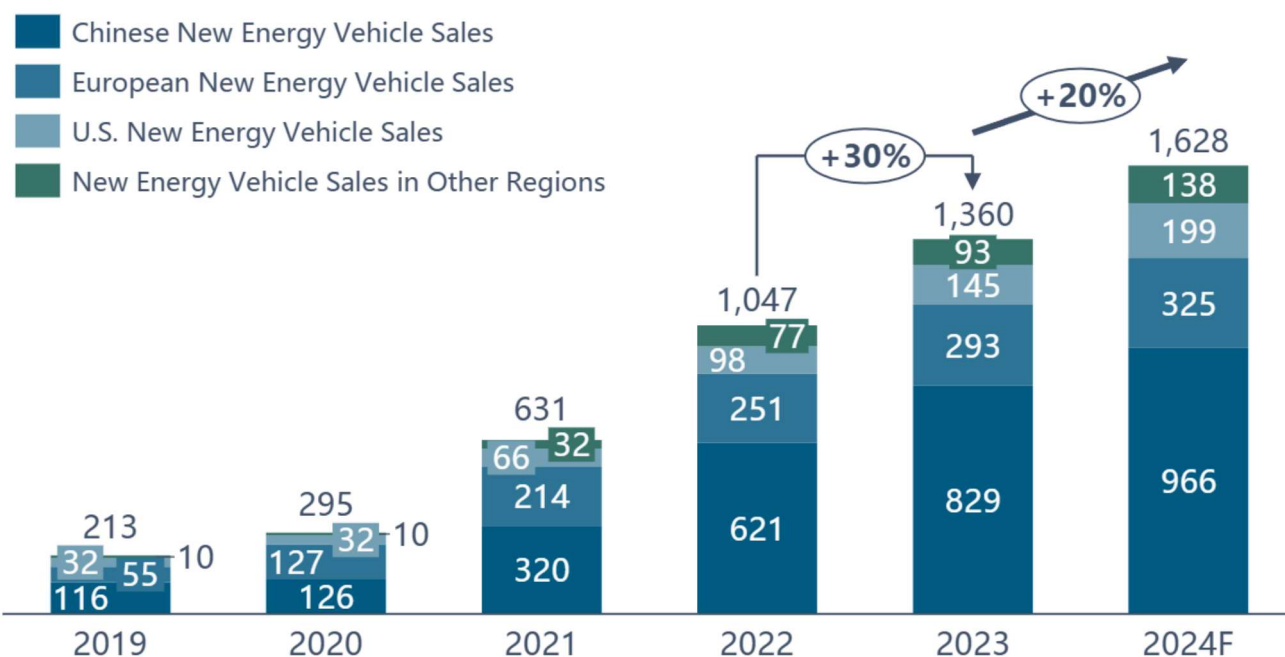
➤ Between 2019 and 2022, global sales of electric vehicles soared, achieving a compound annual growth rate (CAGR) of 69% and exceeding 11 million units by 2022. Despite the economic downturn and the elimination of subsidies in China in 2023, sales still grew by 31% YoY, reaching more than 13 million units. Looking forward, while the market growth rate for EVs is expected to decelerate from its initial surge, it is still projected to expand at a strong rate of 10-20%.

➤ In 2023, China dominated the electric vehicle market with 61% of global sales and a penetration rate of 32%. In non-Chinese regions, the penetration rate was considerably lower at 9%. Europe saw new energy vehicles make up 21% of its total vehicle sales, achieving a penetration rate of about 17%. In the United States, these vehicles represented 11% of total sales with a penetration rate just under 10%. Overall, adoption in other global regions has been relatively slower. This suggests significant potential for future demand growth in overseas markets.

➤ SMM expects Chinese EVs market will remain strong growth in 2024. However, in the rest world, the electric vehicle sector is facing headwinds now. SMM still believes the EVs will gain more market shares from the ICE vehicle.

Figure: 2019-2024F Global new energy vehicle sales

10,000 units



Source: SMM

2 全球钴需求分析

钴产品下游需求分析与预测

> 钴的全球需求主要来自数字产品、电动汽车和锂电池领域的能源存储应用，以及高温合金、硬质合金、催化剂、陶瓷颜料、磁性材料、有机材料等传统行业。随着智能手机的普及，数字产品和磁性材料中钴的需求正在加速增长。传统行业对钴的需求比例也在同步下降。许多国家/地区最近对新能源汽车实施的补贴政策显著增强了其发展前景。因此，对电动汽车电池至关重要的钴需求出现了激增。

2.1 电动汽车市场趋势分析

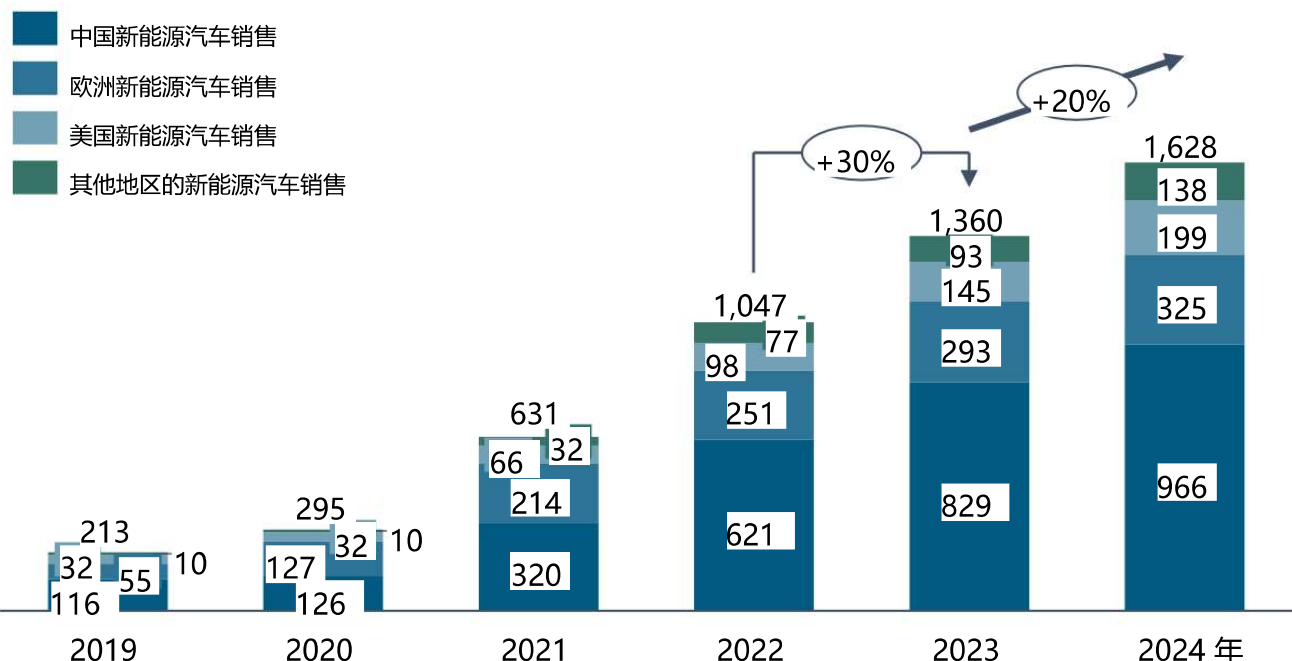
在 2019 年至 2022 年间，全球电动汽车销量飙升，实现了 69% 的复合年增长率 (CAGR)，到 2022 年超过 1100 万辆。尽管经济衰退和 2023 年中国取消补贴，销量仍同比增长 31%，达到 1300 万辆以上。展望未来，虽然电动汽车市场增长率预计会从最初的激增中放缓，但仍有望以 10-20% 的强劲速度扩张。

> 2023 年，中国在全球销量中占据了 61% 的电动汽车市场份额，渗透率达到 32%。在非中国地区，渗透率明显较低，仅为 9%。欧洲新能源汽车占其总销量的 21%，渗透率约为 17%。在美国，这些车辆占总销量的 11%，渗透率略低于 10%。总体而言，其他全球地区的采用速度相对较慢。这表明海外市场未来需求增长潜力巨大。

SMM 预计 2024 年中国电动汽车市场将继续保持强劲增长。然而，在世界其他地区，电动汽车行业目前面临困难。SMM 仍然相信电动汽车将从传统内燃机车辆中获得更多市场份额。

图表：2019-2024 年全球新能源汽车销量

10,000 个单位



来源：SMM

China Cobalt Market Report | SMM New Energy

➤ In Chinese EVs market, cobalt demand has been affected by the increasing market shares of LFP battery and high-nickel content ternary lithium battery. In 2023, due to the collapse of lithium prices, battery producers preferred reducing their stock of raw materials. Those factors resulted in 17% decrease in domestic cobalt demand from the EVs battery sector in 2023. SMM expects the domestic market share of ternary lithium battery will drop to 24% in 2024 from 27% in 2023. However, the cobalt consumption from EVs battery sector is expected to rise by 8.3% in 2024, thanks to new models with NCM batteries and low inventories of battery raw materials.

Figure: 2018-2024F EVs lithium battery demand in China by type

unit: GWH (left) ; % (right)

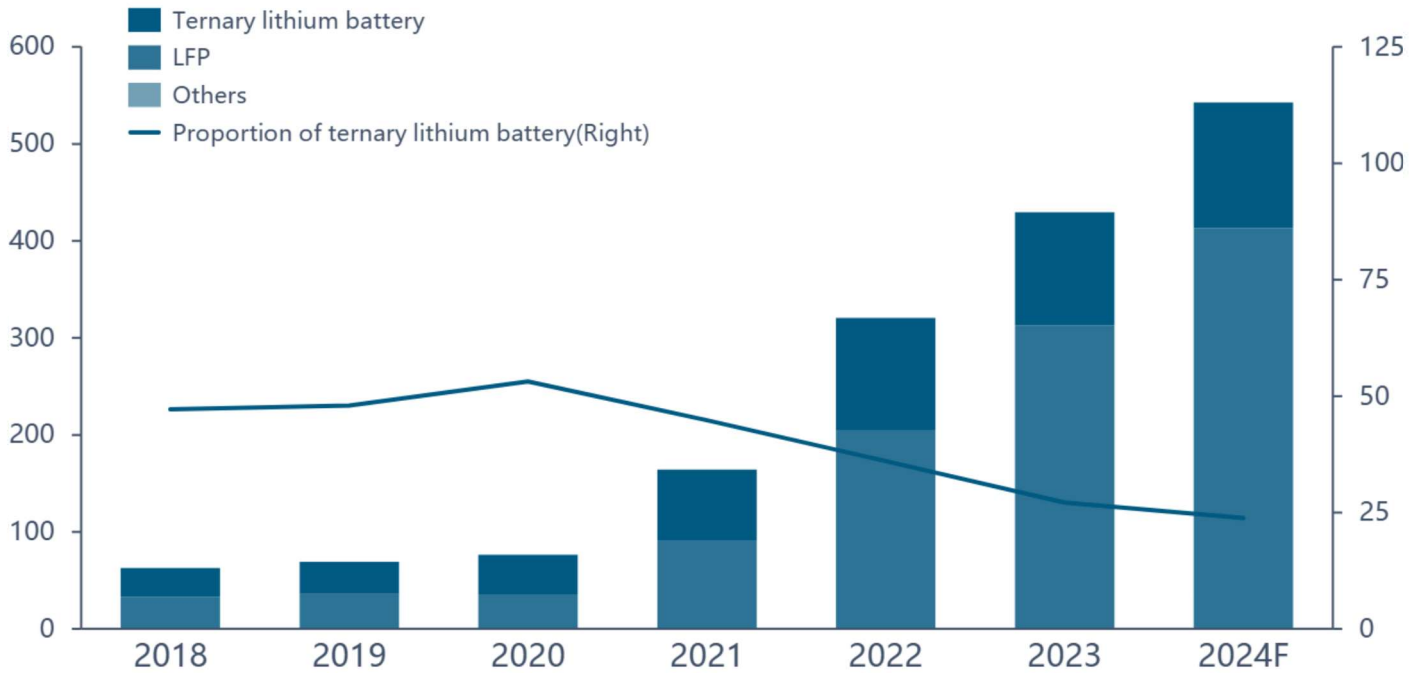
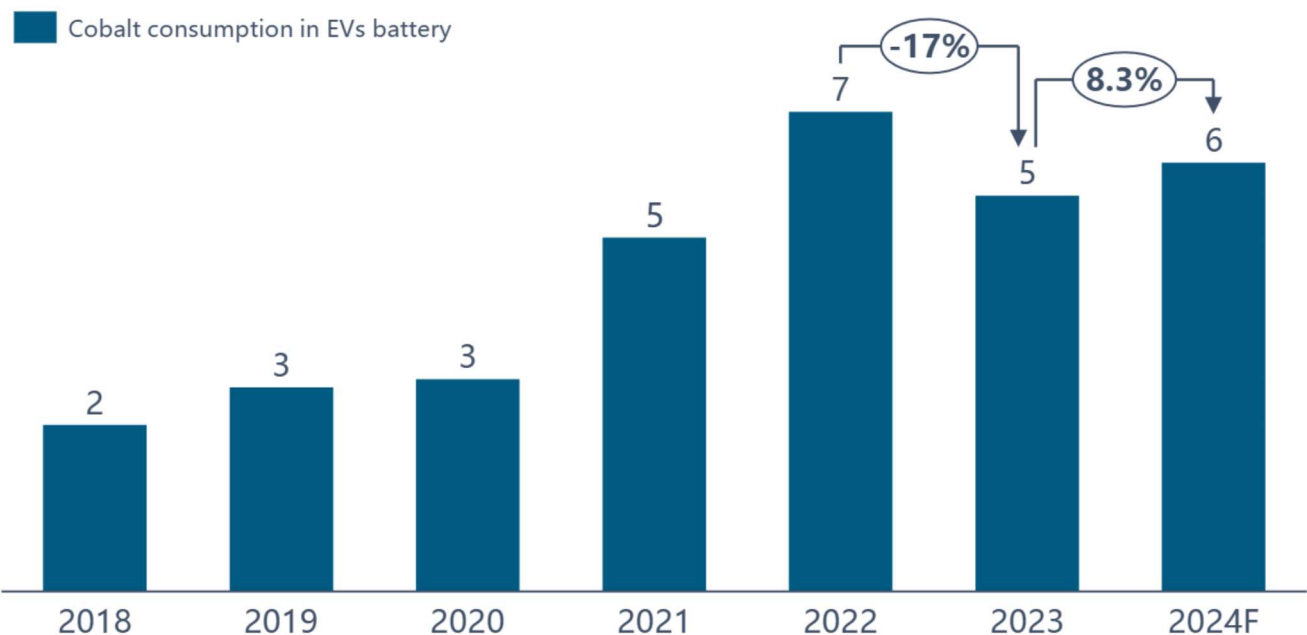


Figure: 2018-2024F Cobalt consumption from EVs battery sector in China

unit: 10,000 tons metal content



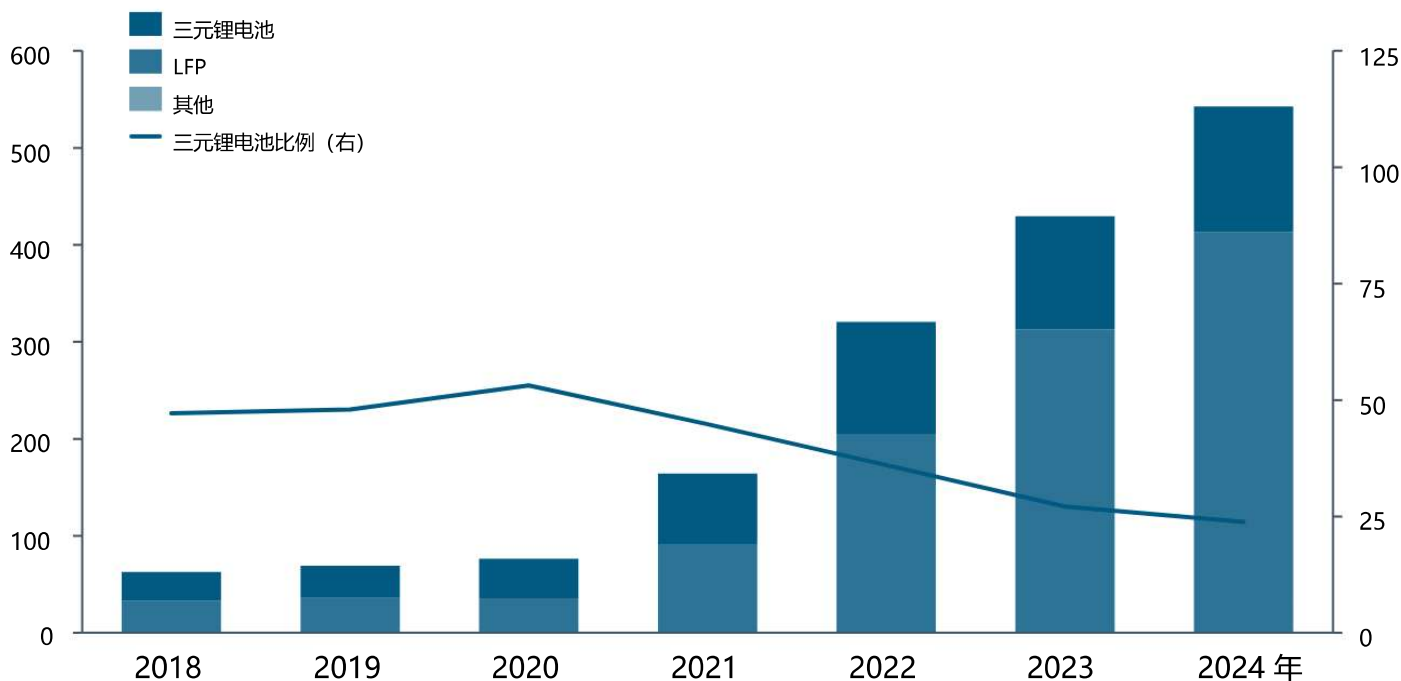
Source: SMM

中国钴市场报告 | SMM 新能源

> 在中国电动汽车市场，钴需求受到 LFP 电池和高镍含量三元锂电池市场份额增加的影响。由于 2023 年锂价格崩溃，电池生产商更倾向于减少原材料库存。这些因素导致 2023 年电动汽车电池行业国内钴需求下降了 17%。SMM 预计，2024 年三元锂电池在国内市场份额将从 2023 年的 27% 下降到 24%。然而，由于新型号采用 NCM 电池和电池原材料库存低，预计 2024 年电动汽车电池行业的钴消耗量将增长 8.3%。

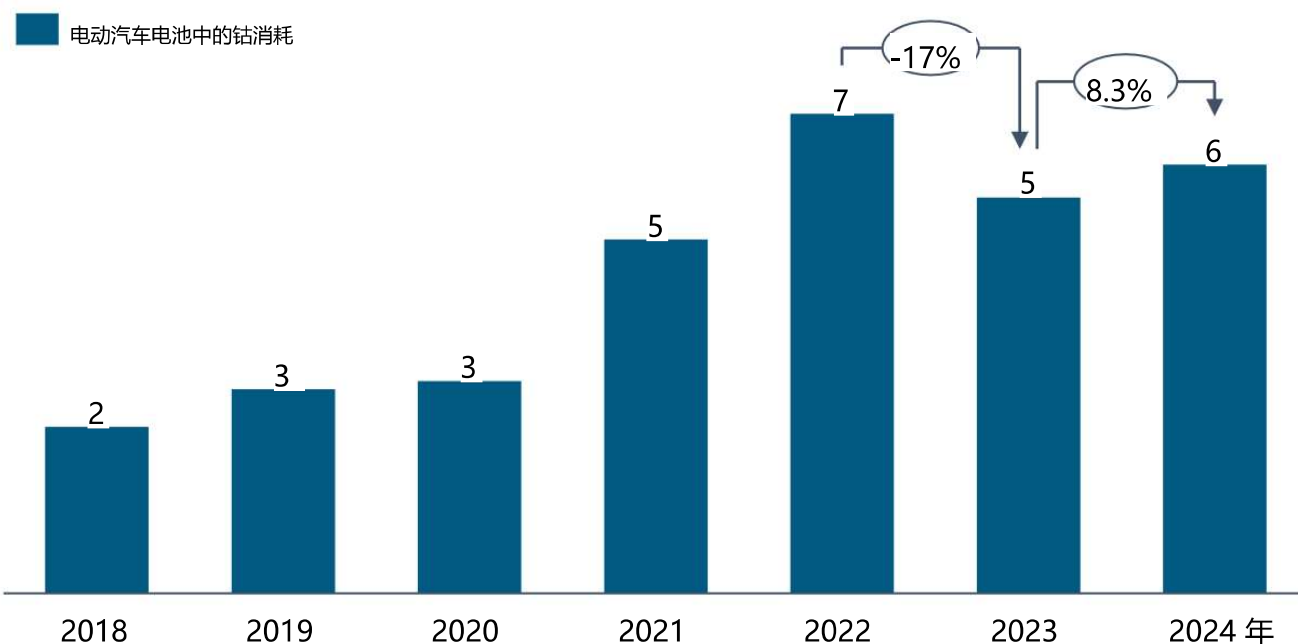
数字：2018-2024 年中国各类型电动汽车锂电池需求

unit: GWH (left) ; % (正确)



数字：2018-2024 年中国电动汽车电池行业钴消耗

单位：万吨金属含量



来源：SMM

2. Global Cobalt Demand Analysis

2.1 Analysis of the Electric Vehicle Market Trends

➤ In the electric vehicle market, battery electric vehicles (BEVs) constitute roughly 70% of sales, with plug-in hybrid electric vehicles (PHEVs) making up about 30%. In 2023, the growth rates for battery electric vehicles in China experienced an initial rise, followed by a decline, and then stabilized. Plug-in hybrids showed a similar pattern, with their growth rates picking up towards the end of the year. The increase in sales of plug-in hybrid models in 2023 can be attributed to the significant rise in lithium-ion battery materials costs over previous year, which pushed up battery prices. Chinese OEMs made efforts to release more plug-in hybrid models to meet demand. Plug-in hybrid models, which feature dual power systems and smaller batteries, are less affected by price fluctuations of key materials. They also offer advantages such as reduced dependence on charging infrastructure and fewer range limitations in various scenarios. As a result, many automakers have ramped up their investment in the development of hybrid platforms. This year, the launch of numerous high-quality plug-in hybrid models has enriched market segmentation and boosted their sales volumes. As automakers continue to expand their range of plug-in hybrid offerings, the market share of these vehicles is expected to steadily rise.

Figure: Sales volume and market share of BEVs and PHEVs from 2020 to 2023 in China

10,000 units

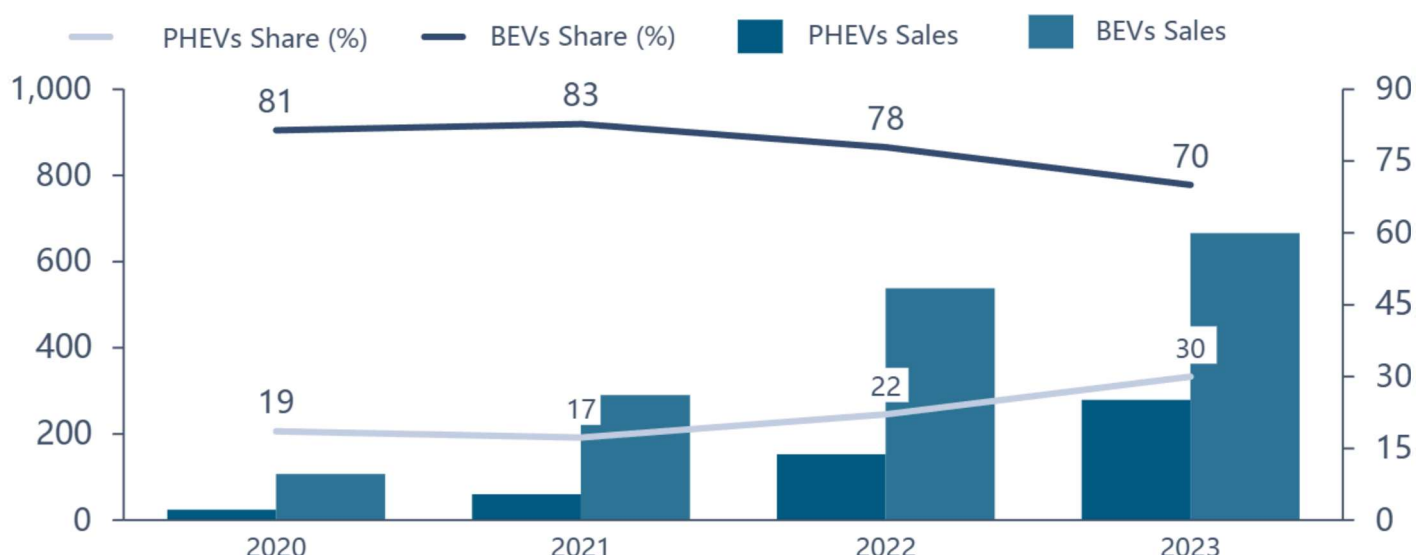
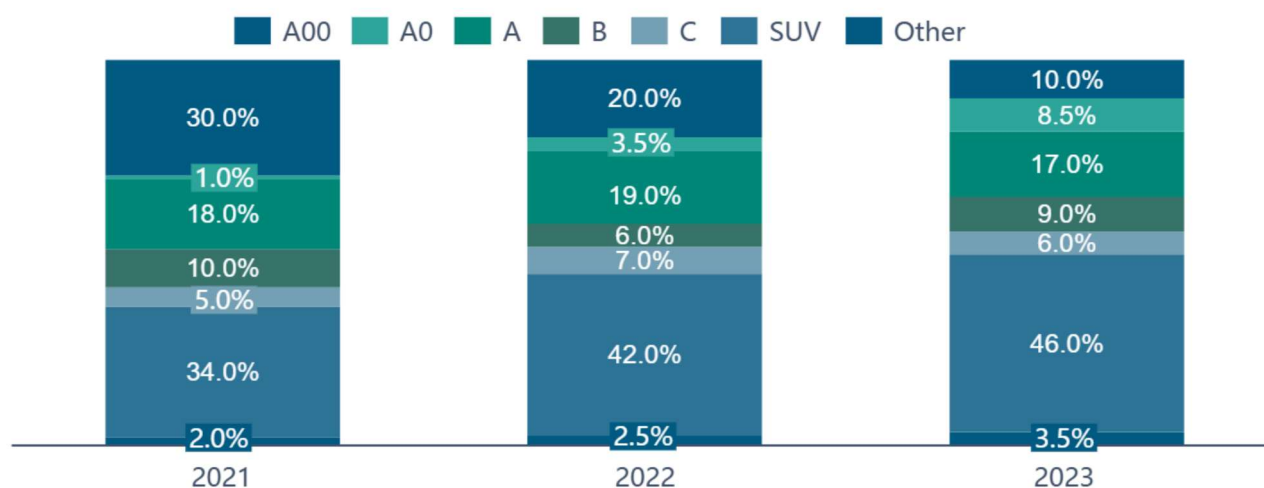


Figure: Market share of electric vehicle sales by class in China

Unit %



Source: SMM

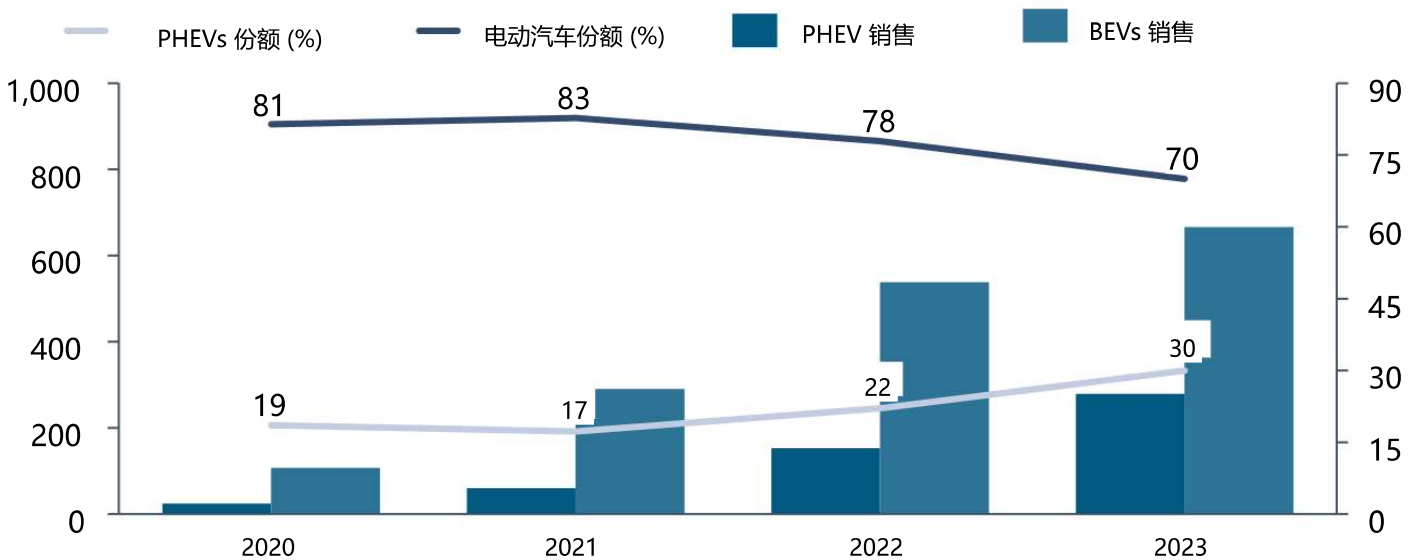
2. 全球钴需求分析

2.1 电动汽车市场趋势分析

在电动汽车市场中，纯电动汽车（BEVs）约占销售量的 70%，插电混合动力汽车（PHEVs）约占 30%。2023 年，中国的纯电动汽车增长率经历了初期上升，随后下降，然后稳定。插电混合动力汽车显示出类似的模式，其增长率朝年底有所提升。2023 年插电混合动力车型销量的增加可以归因于锂离子电池材料成本较上一年显著上升，推高了电池价格。中国的汽车制造商努力发布更多插电混合动力车型以满足需求。插电混合动力车型具有双动力系统和较小电池的特点，不太受关键材料价格波动的影响。它们还提供了诸如减少对充电基础设施的依赖和在各种情况下减少续航限制等优势。因此，许多汽车制造商加大了对混合动力平台开发的投资。今年，大量高质量的插电混合动力车型的推出丰富了市场细分并提升了销量。随着汽车制造商不断扩大插电混合动力车型的范围，预计这些车辆的市场份额将稳步增长。

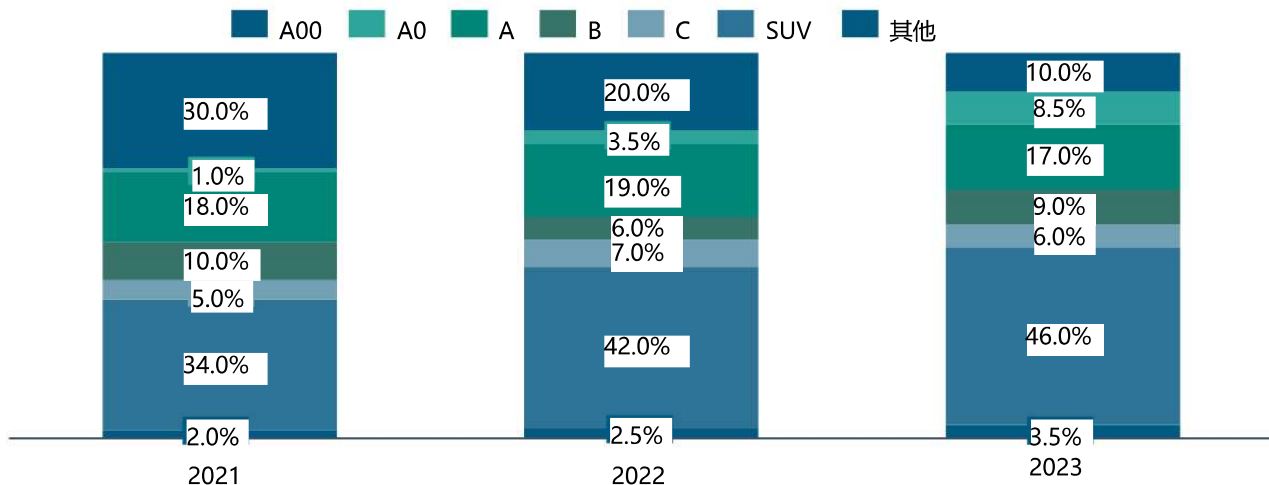
图表：2020 年至 2023 年中国纯电动汽车和插电式混合动力汽车的销售量和市场份额

10,000 个单位



图表：中国各类电动汽车销售市场份额

单位 %



来源：SMM

2. Global Cobalt Demand Analysis

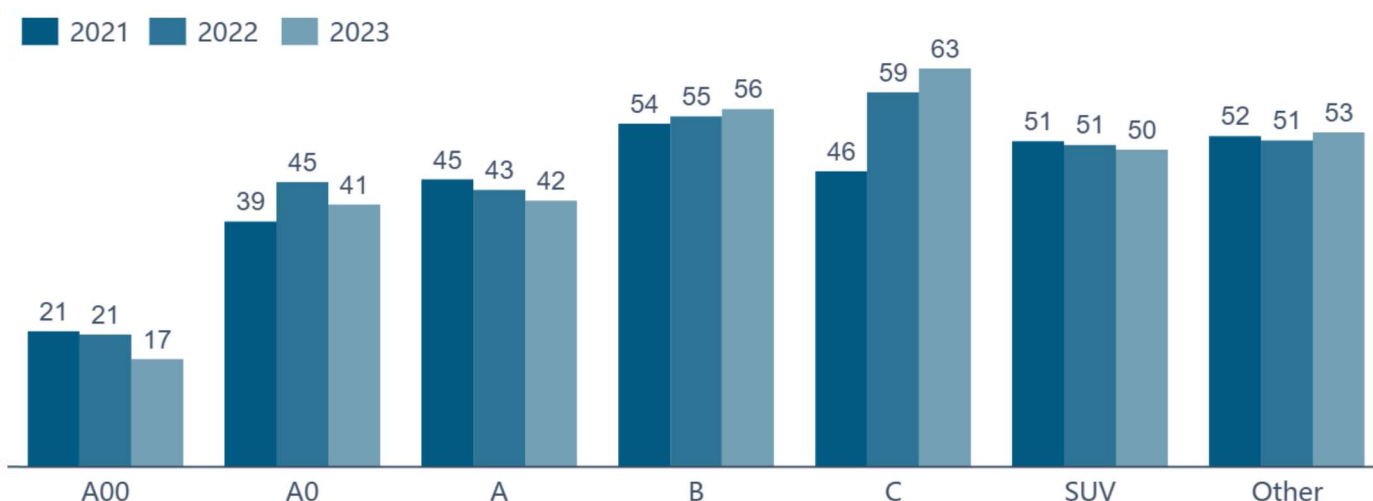
2.1 Analysis of the Electric Vehicle Market Trends

➤ Chinese domestic self-owned brand automakers have shown strong performance in 2023, with BYD leading with over 3.0m units sales, achieving YoY growth of 62%. BYD's success can be attributed to its diverse portfolio of five major brands, which cater to different market segments and price ranges, contributing to its ongoing market share expansion. Additionally, GAC Aion has exhibited impressive performance, with a growth rate exceeding 77%, compared to 2022. The brand continues to hold a strong position in the online ride-hailing market. Among newer brands, Tesla remains the sales leader, although its growth has slowed due to less frequent product updates. Li Auto, a prominent domestic brand, has successfully targeted specific customer demographics by offering exceptional value within its price segment, resulting in significant sales growth. The launch of the AITO by Huawei's automotive sector in the fourth quarter of 2023 has sparked significant enthusiasm in the Chinese market, leading to continued sales growth. This momentum is expected to carry into 2024. After a strong performance in 2023, Li Auto plans to launch new models in 2024, potentially sustaining its robust growth trajectory.

➤ The average battery capacity for BEVs has consistently increased, with a yearly rise of 3.8 kWh in both 2022 and 2023. For PHEVs, the average battery capacity per vehicle also grew yearly, with increases of approximately 3.1 kWh in 2022 and 3.2 kWh in 2023. There is a clear differentiation in battery capacity trends across various vehicle model levels. Notably, smaller micro models, particularly in the A00 category and Class A, have seen a decline in average battery capacity. This trend reflects a slowdown in sales growth for small micro vehicles, with demand concentrating on top models like the Wuling Hongguang Mini, which has decreased the market's battery capacity. Conversely, Class B and Class C vehicles have experienced increases in individual vehicle battery capacity. Despite a decrease in the market share of pure electric models in 2023, there was notable structural improvement and increased demand for intelligent features in plug-in hybrid models within these classes. This, coupled with the launch of several mid-to-high-end new energy models, has driven an upward trend in battery capacity per vehicle. Looking into 2024, the average battery capacity per vehicle in the new energy sector is expected to continue rising, driven by two main factors. First, the ongoing advancement in vehicle intelligence, which increases battery consumption. Second, changes to national policies that exempt electric vehicles from acquisition tax only if they have a range below 200 kilometers, likely promoting structural optimization and boosting average battery capacity per vehicle.

Figure: Average battery capacity by category for electric passenger vehicles in China

Unit: kWh



Source: SMM

2. 全球钴需求分析

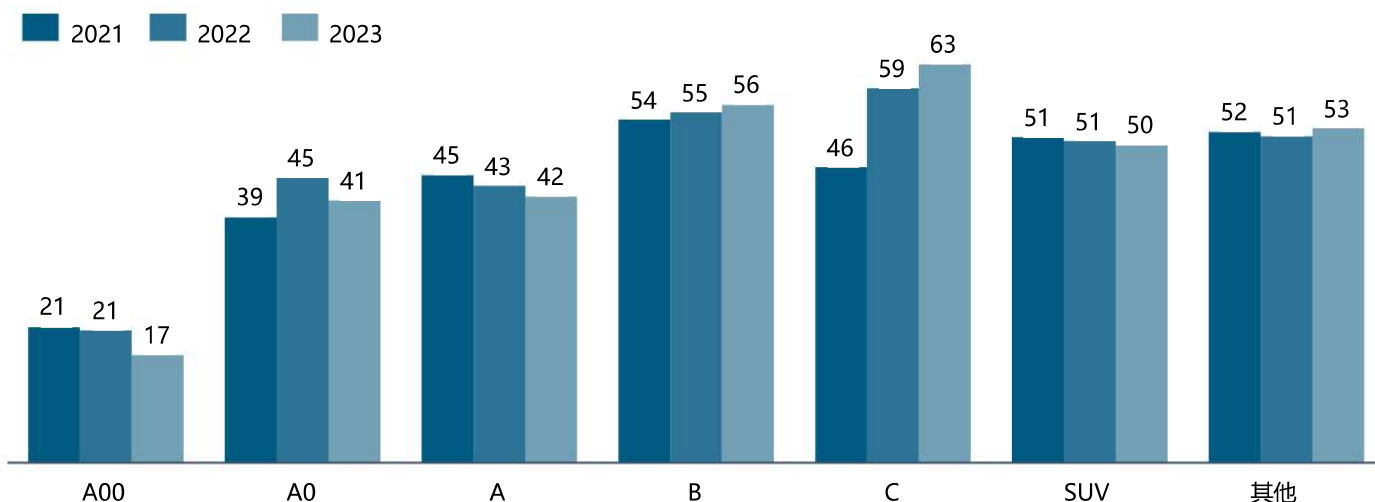
2.1 电动汽车市场趋势分析

> 2023 年，中国国内自主品牌汽车制造商表现强劲，比亚迪以超过 300 万辆的销量领先，同比增长 62%。比亚迪的成功归功于其五大主要品牌的多样化组合，迎合不同的市场细分和价格范围，有助于其持续扩大市场份额。此外，广汽蔚来表现出色，增长率超过 77%，相比 2022 年有所增长。该品牌在在线打车市场上仍保持强劲地位。在较新的品牌中，特斯拉仍然是销售领导者，尽管由于产品更新频率较低，其增长有所放缓。李宇汽车作为一家知名国内品牌，通过在其价格段内提供卓越价值成功地针对特定客户群体，实现了显著的销售增长。2023 年第四季度华为汽车部门推出 AITO 引发了中国市场的极大热情，导致持续的销售增长。这种势头预计将持续到 2024 年。2023 年表现强劲后，理想汽车计划在 2024 年推出新车型，可能会维持其强劲增长轨迹。

> BEV 的平均电池容量持续增加，2022 年和 2023 年均年增长 3.8 千瓦时。对于 PHEV，每辆车的平均电池容量也在逐年增长，2022 年约增加 3.1 千瓦时，2023 年增加 3.2 千瓦时。不同车型级别的电池容量趋势存在明显差异。值得注意的是，尤其是 A00 类别和 A 级别的较小微型车型的平均电池容量出现下降。这一趋势反映了小微型车辆销售增长放缓，需求集中在五菱宏光 Mini 等顶级车型上，这降低了市场的电池容量。相反，B 级别和 C 级别的车辆的个体车辆电池容量有所增加。尽管 2023 年纯电动车型的市场份额有所下降，但插电混合动力车型在这些级别内的智能功能需求明显增加，市场结构有显著改善。这与几款中高端新能源车型的推出相结合，推动了每辆车的电池容量呈上升趋势。展望 2024 年，新能源汽车领域每辆车的平均电池容量预计将继续上升，主要受两个因素推动。首先，车辆智能化的持续进步，增加了电池消耗。其次，国家政策的变化，只有电动汽车的续航里程低于 200 公里才能免征购置税，可能促进结构优化，提升每辆车的平均电池容量。

图表：中国电动乘用车各类别平均电池容量

单位：千瓦时



来源：SMM

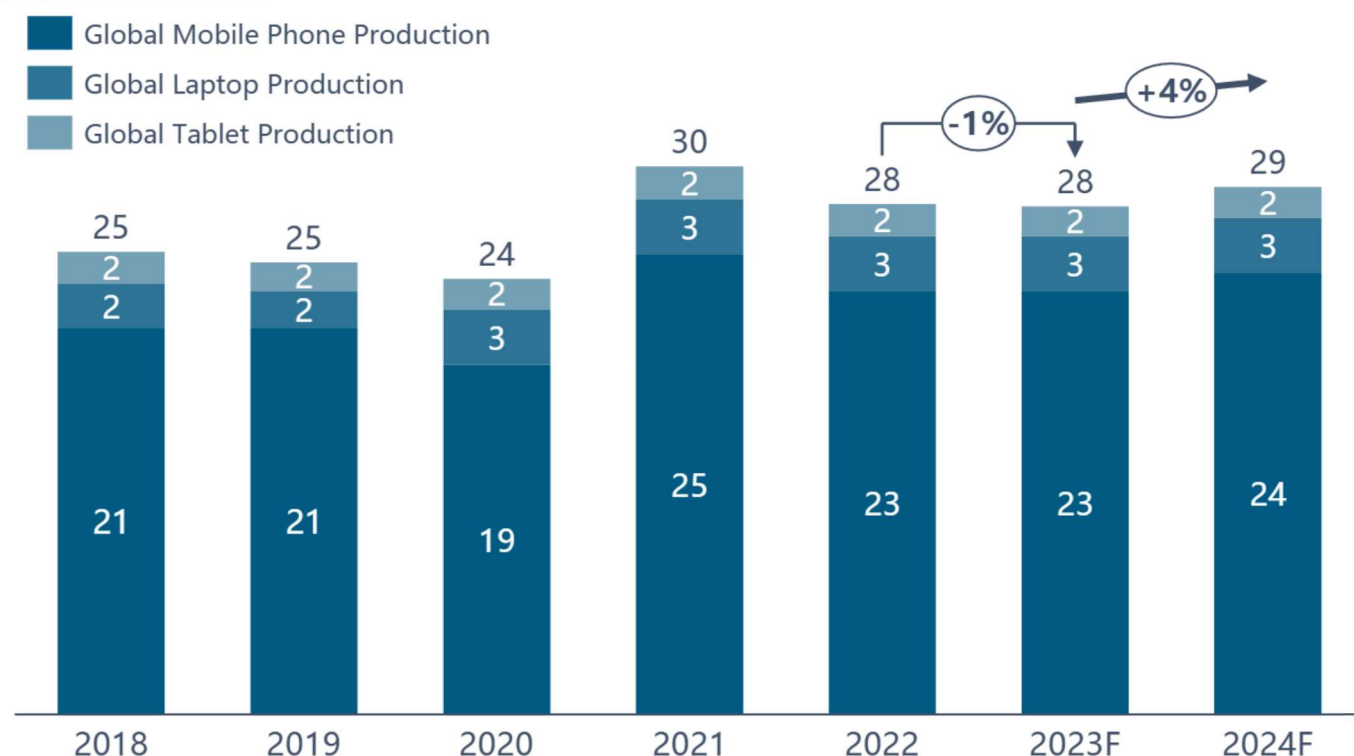
2. Global Cobalt Demand Analysis

2.2 Consumer electronics market

- The traditional digital market mainly covers consumer goods such as laptops, tablets, and smartphones. The demand has passed the explosive growth phase, and the future will primarily involve replacement of existing stocks and increased battery demand brought about by high-end intelligence. Due to the implementation of new national standards and the prominent economic performance of declining lithium prices, demand for electric bicycles is steadily increasing. Furthermore, with the advancement of technology and the increase in people's consumption levels and changes in lifestyle, emerging electronic products such as wearable devices, electronic cigarettes, drones, and bluetooth speakers continue to emerge. With the diversification of application scenarios, it is expected that the consumer lithium battery market will maintain a steady growth trend.
- In the first half of 2023, the demand in the traditional digital consumption field was weak, and the industry chain continued to reduce inventory, leading to lower demand for consumer lithium batteries. However, in the second half of the year, the demand for mobile phones rebounded due to regional recovery and new products upgrades. The decrease in laptop shipments narrowed in the context of channel inventory digestion, which also led to a recovery in lithium battery demand.
- In the two-wheel vehicle market, the trend of lithium batteries further replacing lead-acid batteries continues. The main reason is the significant decrease in the cost of lithium carbonate, the core metal material of lithium batteries, in 2023, which highlighted the cost-effectiveness of lithium batteries and increased the penetration rate of lithium-powered two-wheelers.
- Furthermore, although the e-cigarette market has been temporarily disrupted due to stricter overseas policies, China, as the main producer of e-cigarettes globally, has seen a significant year-on-year increase in exports since 2023. In the long term, as the global e-cigarette policy outlook gradually becomes clear, it will be beneficial to further promote the compliant expansion and development of the global e-cigarette market and achieve the substitution of traditional tobacco.
- Overall, the global consumer electronics market has undergone three major cycles to date, driven respectively by PCs, mobile phones and tablets, and emerging consumer devices such as wearable devices and drones.

Figure: 2018-2024F Global production of traditional consumer electronics market

Unit: 100 Million Units



Source: SMM

2. 全球钴需求分析

2.2 消费电子市场

传统数字市场主要涵盖笔记本电脑、平板电脑和智能手机等消费品。需求已经经历了爆炸性增长阶段，未来主要将涉及现有库存的更换以及高端智能带来的增加电池需求。由于新国家标准的实施和锂价格下降的显著经济表现，对电动自行车的需求稳步增长。此外，随着技术的进步、人们消费水平的提高以及生活方式的变化，新兴电子产品如可穿戴设备、电子烟、无人机和蓝牙音箱不断涌现。随着应用场景的多样化，预计消费者锂电池市场将保持稳定增长趋势。

> 2023 年上半年，传统数字消费领域需求疲弱，产业链持续减少库存，导致消费型锂电池需求降低。然而，下半年由于地区复苏和新产品升级，手机需求出现反弹。在渠道库存消化的背景下，笔记本出货量下降幅度收窄，也带来了锂电池需求的复苏。

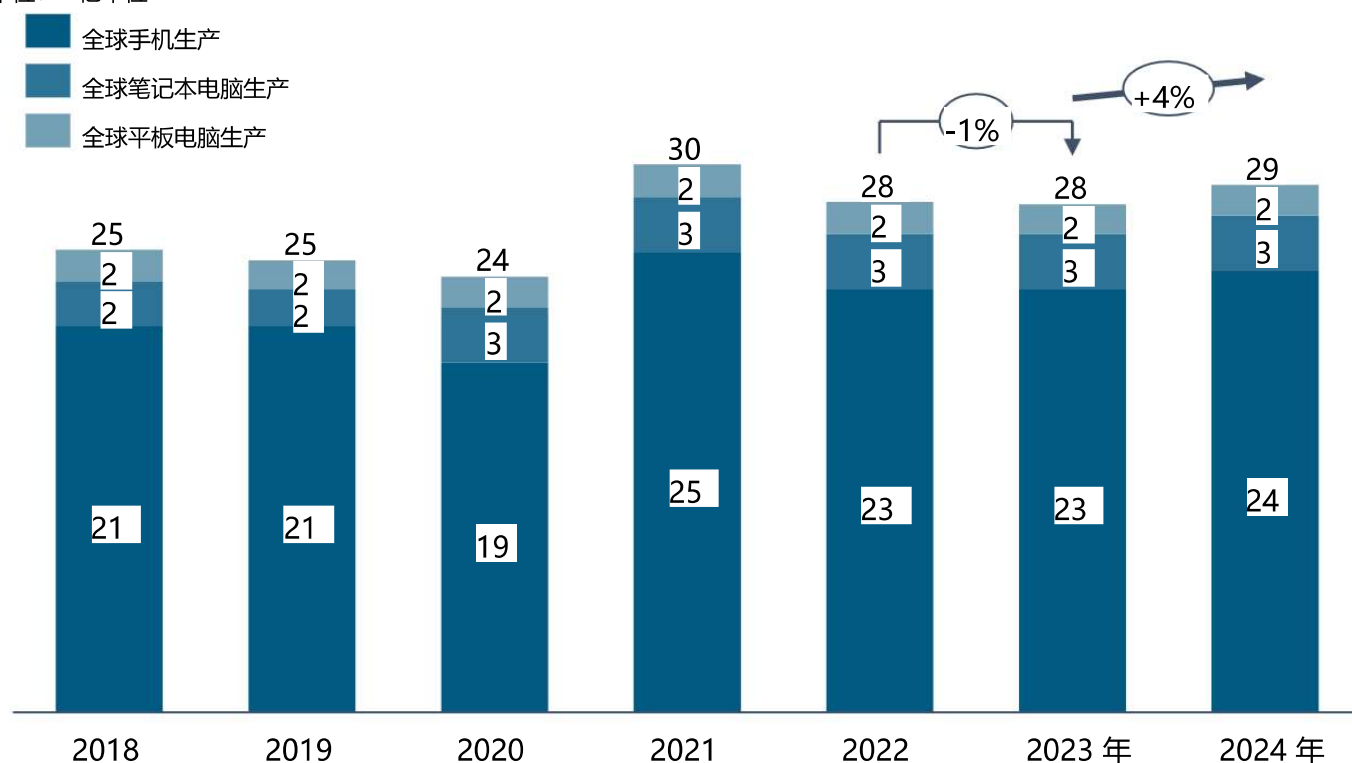
在两轮车市场上，锂电池进一步取代铅酸电池的趋势持续。主要原因是 2023 年锂电池的核心金属材料——碳酸锂的成本显著降低，突显了锂电池的性价比，并提高了锂动力两轮车的渗透率。

此外，尽管由于海外政策更加严格，电子烟市场暂时受到了干扰，但作为全球主要电子烟生产国，中国自 2023 年以来出口量显著同比增长。从长远来看，随着全球电子烟政策前景逐渐明朗化，进一步推动全球电子烟市场的合规扩张和发展，实现传统烟草的替代将是有益的。

> 总体而言，全球消费电子市场迄今已经经历了三个主要周期，分别由个人电脑、手机和平板电脑，以及新兴消费设备如可穿戴设备和无人机驱动。

图表：2018 年至 2024 年全球传统消费电子市场生产量

单位：1 亿单位



来源：SMM

2. Global Cobalt Demand Analysis

2.2 Consumer electronics market

➤ From the perspective of traditional consumption: In 2024, the smartphone and laptop sectors are expected to continue their strong recovery. The emergence of new technologies such as 5G and foldable screens will accelerate the upgrade of smartphone products. The application of new technologies, such as AI, will further increase the power consumption of smartphones over time, demanding higher battery capacities. There is still room for further growth in the global smartphone output and its demand for lithium batteries. In 2024, Chinese smartphone brands like Huawei and Xiaomi are expected to introduce significant new features to the market, demonstrating their substantial market influence. In the laptop segment, two key developments are anticipated for 2024. First, following inventory reductions, a resurgence in demand for laptop upgrades is expected. Second, the emergence of generative AI at the PC interface is set to introduce new applications, attract more chip suppliers, potentially shorten the replacement cycle, and enhance the gross margins of end products.

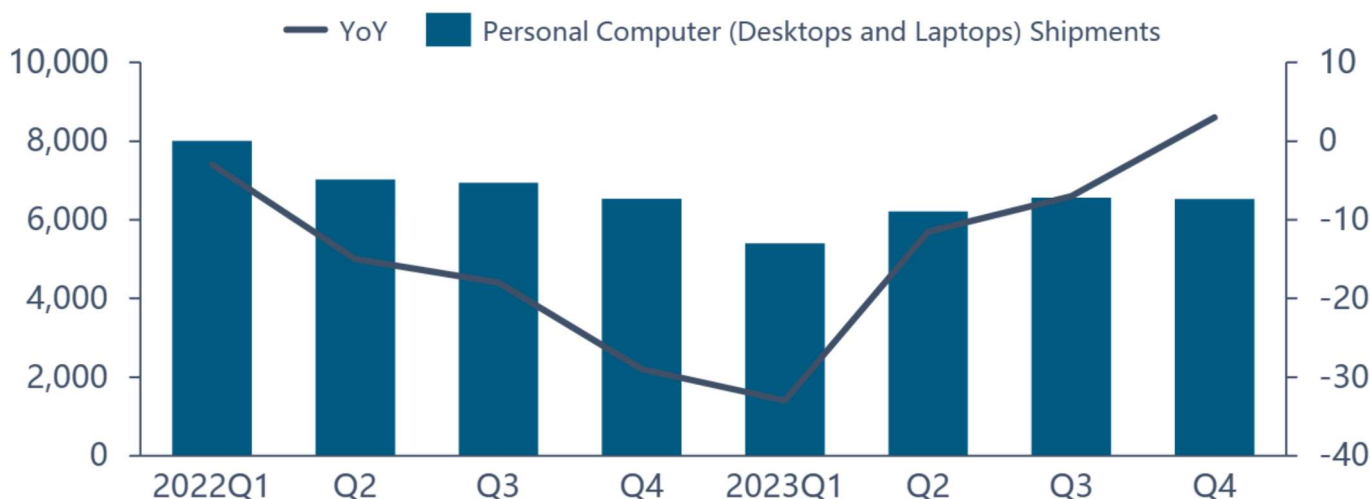
Figure: Global smartphone shipments

Unit: 100 million Units



Figure: Global personal computer (desktops and laptops) shipments

Unit: 10,000 Units



Source: SMM

2. 全球钴需求分析

2.2 消费电子市场

> 从传统消费的角度来看：预计到 2024 年，智能手机和笔记本电脑领域将继续强劲复苏。5G 和可折叠屏等新技术的出现将加速智能手机产品的升级。AI 等新技术的应用将进一步增加智能手机的功耗，要求更高的电池容量。

全球智能手机产量和对锂电池的需求仍有进一步增长空间。预计到 2024 年，华为和小米等中国智能手机品牌将在市场上推出重要的新功能，展示其巨大的市场影响力。在笔记本电脑领域，2024 年预计将出现两个关键发展。首先，在库存减少后，预计将出现笔记本电脑升级需求的复苏。其次，生成式人工智能在 PC 界面的出现将引入新的应用程序，吸引更多芯片供应商，潜在地缩短更换周期，并提高最终产品的毛利率。

图表：全球智能手机出货量

单位：1 亿单位



图表：全球个人电脑（台式机和笔记本电脑）出货量

单位：10,000 单位



来源：SMM

2. Global Cobalt Demand Analysis

2.2 Consumer electronics market

➤ Looking at the emerging consumption fields, the global market is currently in a phase where emerging consumption is driving the growth of consumer electronics. Emerging consumption includes wearable devices, wireless headphones, electronic cigarettes, drones, etc. In the wearable device sector, with market competition and technological advancement, manufacturers constantly enrich product features to satisfy consumers. In 2023, the growth rate has slowed down due to economic conditions but it still has long-term development potential. It is expected to maintain moderate growth in the medium and long term. In the drone sector, drones are categorized into two major markets: military and civilian. Civilian uses can be further divided into industrial and consumer levels, with broad terminal application scenarios. In the past, consumer-grade drones were the main growth drivers in the civilian sector. In recent years, with the application of 5G technology, drone application scenarios in the industrial sector have expanded, and the market share of industrial drones has gradually surpassed half of the total civilian drone market, becoming the main growth engine for the future. In light of the development of information warfare, security issues related to territorial disputes have become increasingly frequent in recent years, expanding the demand for consumer batteries in the military drone sector.

Figure: Global shipments of wearable wristband devices

Unit: 10,000 Units

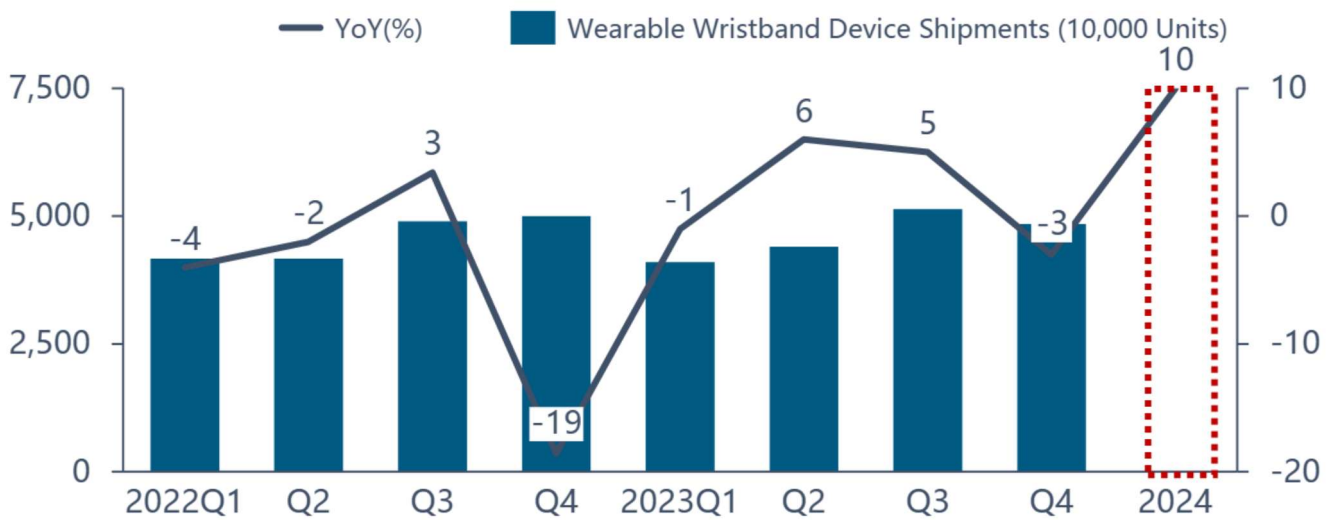
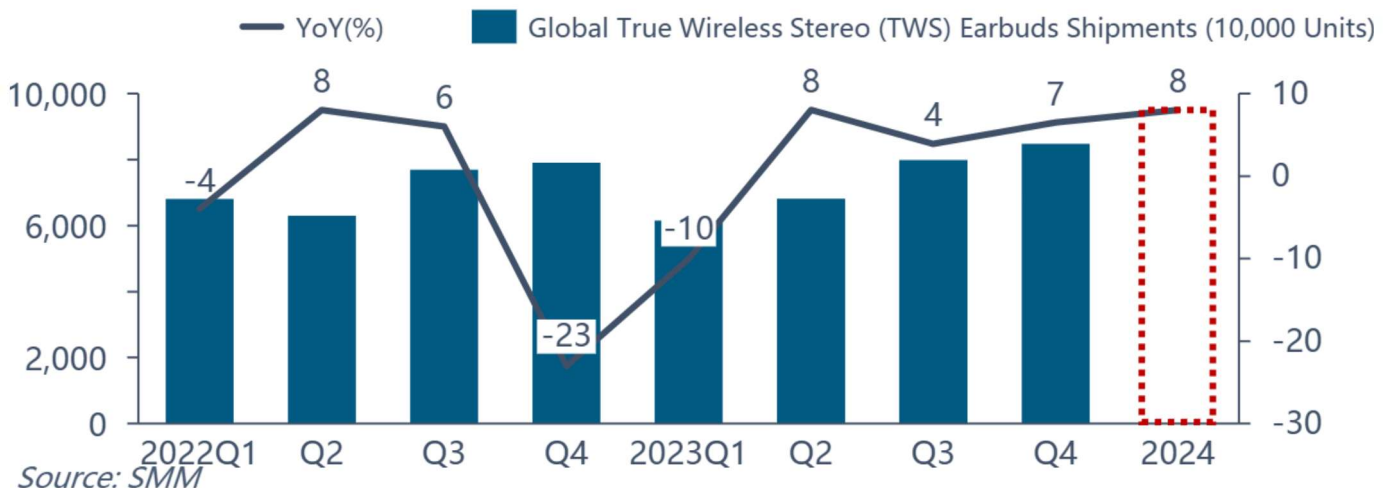


Figure: Global shipments of true wireless stereo (tws) earbuds

Unit: 10,000 Units



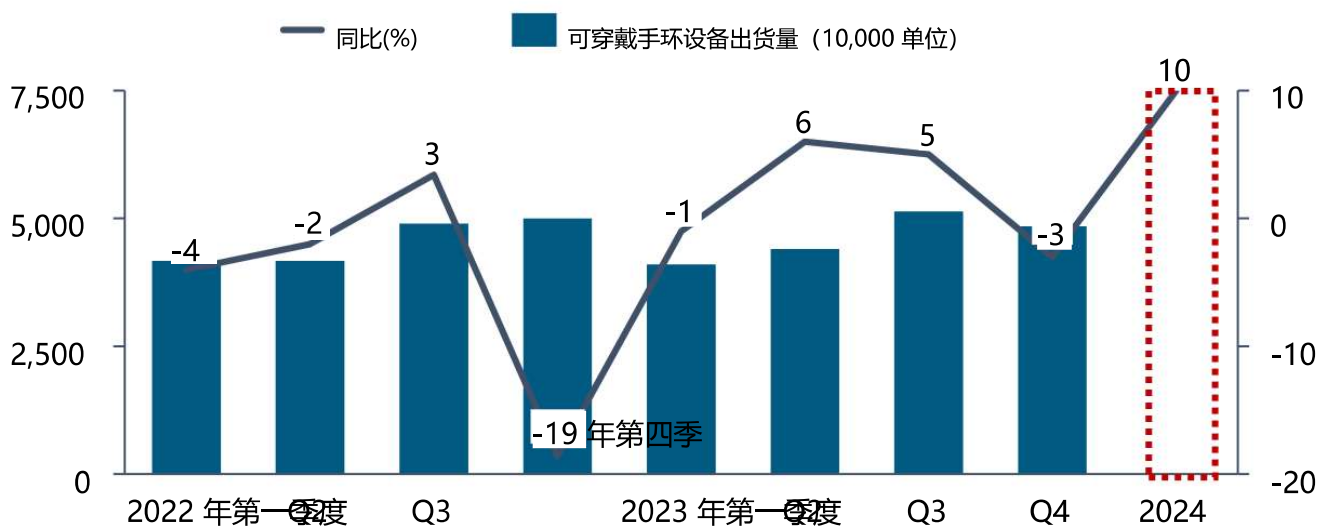
2. 全球钴需求分析

2.2 消费电子市场

➢ 着眼新兴消费领域，全球市场目前正处于新兴消费推动消费电子增长的阶段。新兴消费包括可穿戴设备、无线耳机、电子烟、无人机等。在可穿戴设备领域，随着市场竞争和技术进步，制造商不断丰富产品功能以满足消费者需求。2023 年，由于经济条件，增长速度有所放缓，但仍具有长期发展潜力。预计在中长期内将保持适度增长。在无人机领域，无人机分为两个主要市场：军事和民用。民用用途可以进一步分为工业和消费者级别，具有广泛的终端应用场景。过去，消费级别的无人机是民用部门的主要增长驱动力。近年来，随着 5G 技术的应用，工业部门的无人机应用场景已经扩大，工业无人机市场份额逐渐超过总民用无人机市场的一半，成为未来的主要增长引擎。鉴于信息战发展，近年来与领土争端相关的安全问题日益频繁，扩大了军用无人机领域对消费者电池的需求。

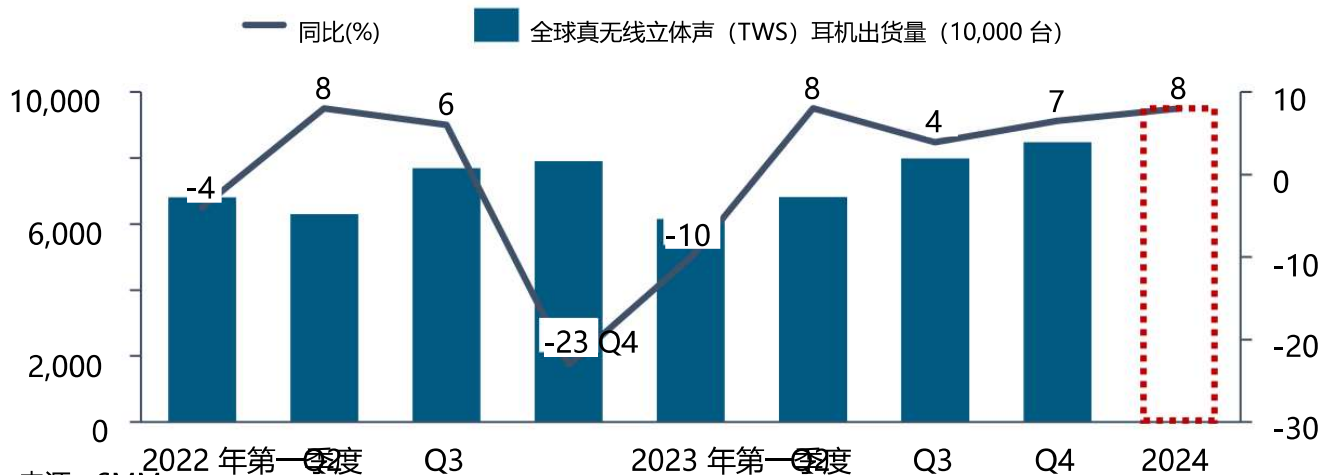
图表：可穿戴手环设备的全球出货量

单位：10,000 单位



图表：真无线立体声 (TWS) 耳机的全球出货量

单位：10,000 单位



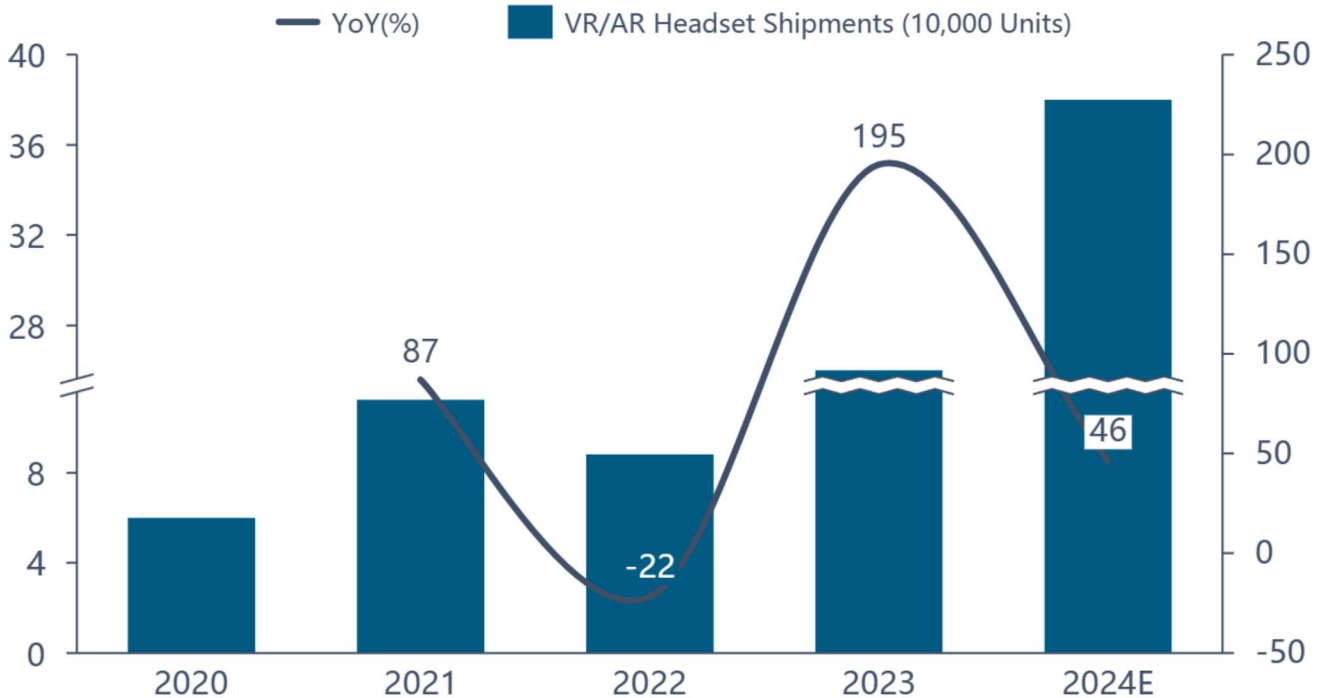
来源：SMM

2. Global Cobalt Demand Analysis

2.2 Consumer electronics market

Figure: Global shipments of VR/AR headsets

Unit: 10,000 Units



2.3 Traditional market

➤ In traditional markets, cobalt demand is relatively modest, primarily catering to sectors like high-temperature alloys, hard metals, catalysts, ceramic pigments, magnetic materials, and organic materials. High-temperature alloys are crucial in aerospace and energy for their superior strength at high temperatures, oxidation resistance, and thermal corrosion resistance. Hard metals are preferred in tool materials for their high hardness, wear resistance, strength, toughness, heat resistance, and corrosion resistance. The production of high-temperature alloys has increased notably, driven by advancements in the military and aerospace sectors, thereby securing cobalt demand. Additionally, as a key magnetic material, cobalt is used in manufacturing various magnetic components like magnets and cores and is utilized in communications and electronics through its inclusion in steel-vanadium alloys. Cobalt alloys, valued for their excellent biocompatibility and corrosion resistance, are extensively used in manufacturing medical devices like artificial joints and dental implants. With ongoing advancements in science and technology, the future applications of cobalt look promising.

➤ In 2023, the alloy segment, crucial in traditional industries, saw growth driven by military and aerospace needs. Future demand for alloys is expected to remain stable. Meanwhile, demand for magnetic materials is largely focused on samarium-cobalt permanent magnets, used extensively in microwave devices, high-speed motors, sensors, and magnetic components. Supported by Chinese government policies, market demand growth, and technological innovation, this sector is expected to continue its growth trend. However, since samarium-cobalt permanent magnets require relatively less cobalt, the incremental demand for cobalt may be limited.

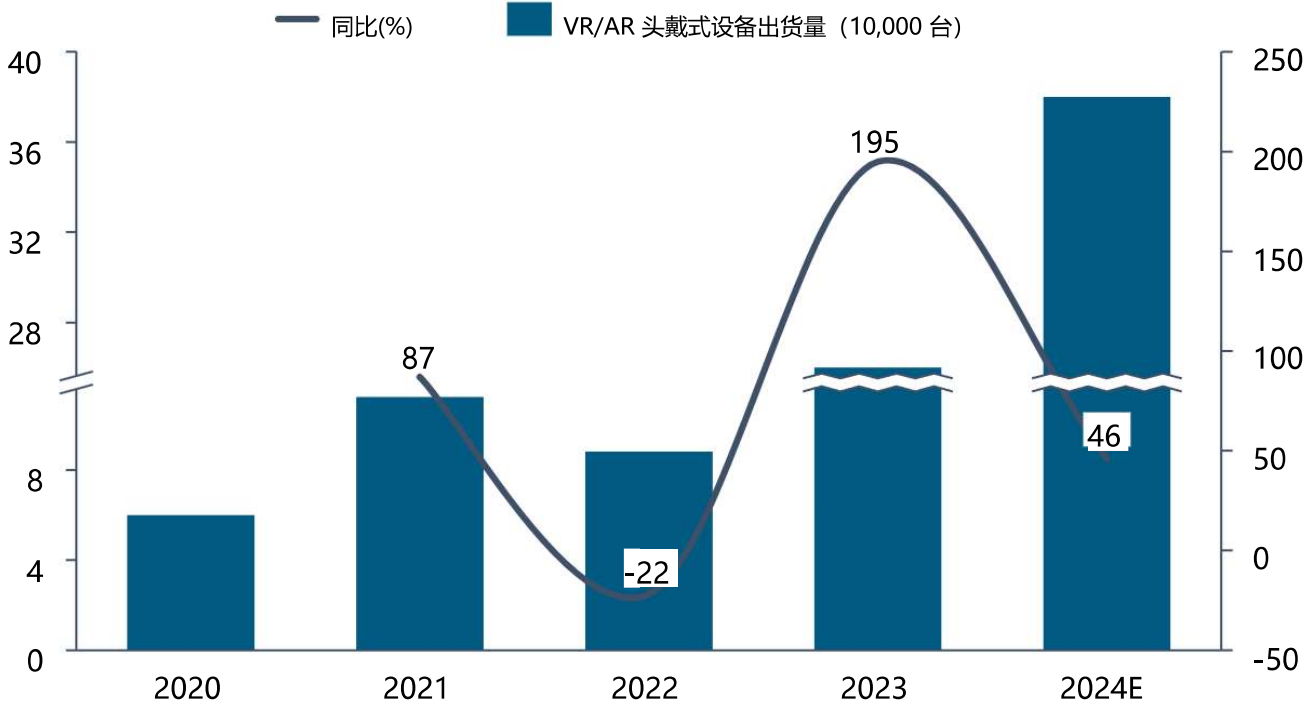
Source: SMM

2. 全球钴需求分析

2.2 消费电子市场

图表：全球 VR/AR 头戴式设备出货量

单位：10,000 单位



2.3 传统市场

> 在传统市场中，钴的需求相对较小，主要用于高温合金、硬质金属、催化剂、陶瓷颜料、磁性材料和有机材料等领域。高温合金在航空航天和能源领域至关重要，因为它们在高温下具有优越的强度、抗氧化性和热腐蚀性。硬质金属在工具材料中备受青睐，因为它们具有高硬度、耐磨性、强度、韧性、耐热性和耐腐蚀性。高温合金的生产显著增加，得益于军事和航空航天领域的进步，从而确保了钴的需求。此外，作为关键的磁性材料，钴用于制造各种磁性元件，如磁铁和磁心，并通过其在钢-钕合金中的含量在通信和电子产品中得到应用。钴合金因其优异的生物相容性和耐腐蚀性而备受重视，在制造人工关节和牙科植入物等医疗器械中得到广泛应用。随着科学技术的不断进步，钴的未来应用前景看好。

> 2023 年，传统行业中至关重要的合金领域受到军事和航空航天需求的推动而增长。预计未来对合金的需求将保持稳定。与此同时，对磁性材料的需求主要集中在钕钴永磁体上，广泛应用于微波设备、高速电机、传感器和磁性元件。在中国政府政策、市场需求增长和技术创新的支持下，预计该行业将继续保持增长趋势。然而，由于钕钴永磁体对钴的需求相对较少，对钴的增量需求可能受到限制。

2. Global Cobalt Demand Analysis

2.3 Traditional market

Figure: Global production of high-temperature alloys

Unit: 10,000 mt

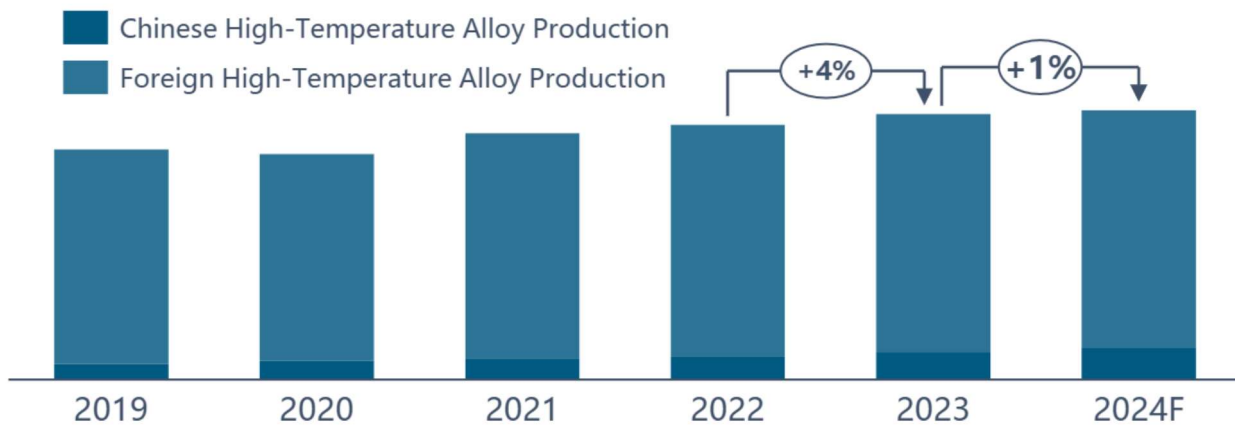


Figure: Global production of hard metals

Unit: 10,000 mt

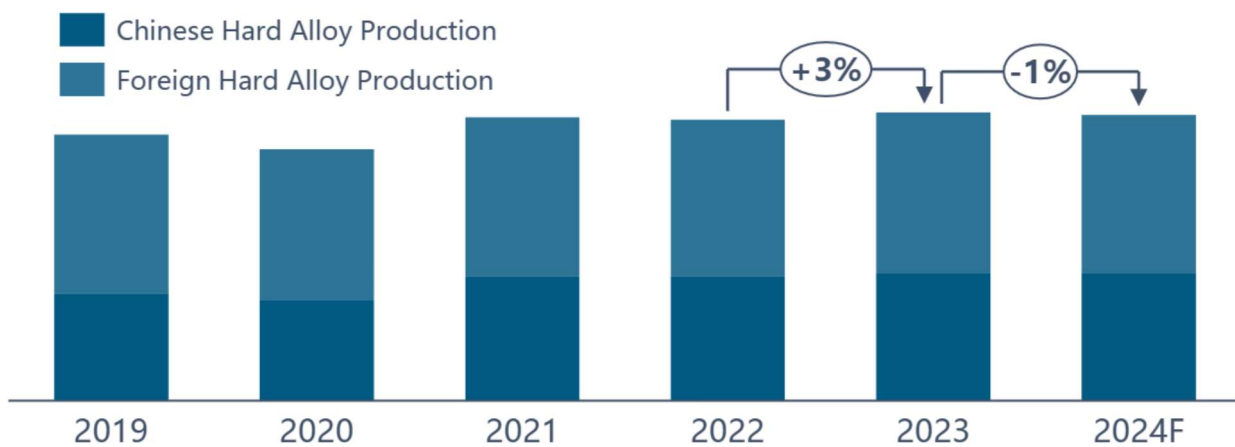
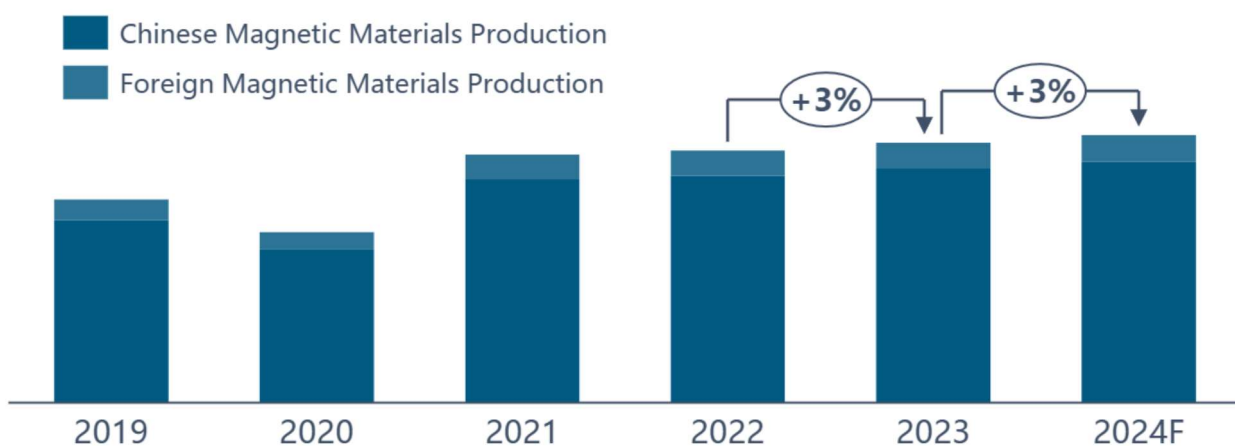


Figure: Global production of magnetic materials

Unit: 10,000 mt



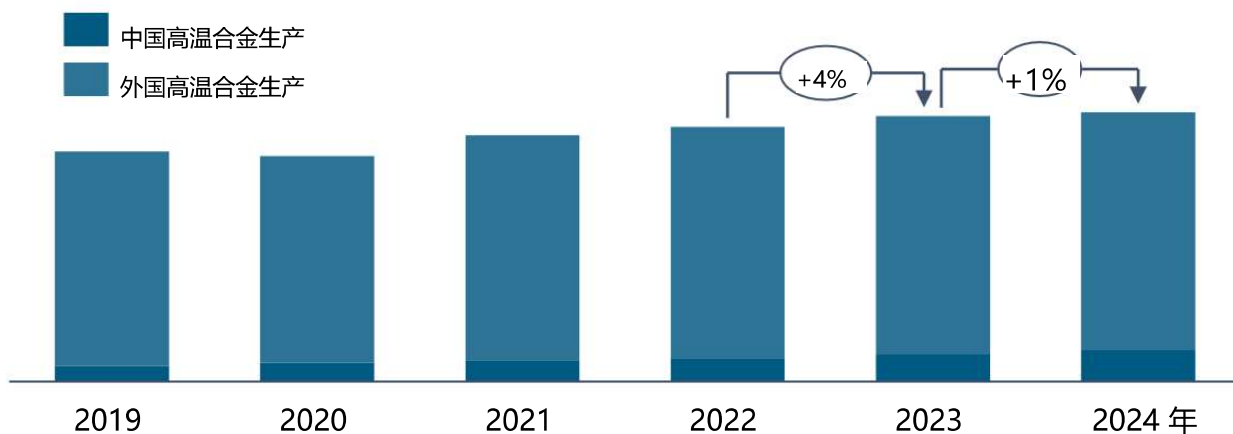
Source: SMM

2. 全球钴需求分析

2.3 传统市场

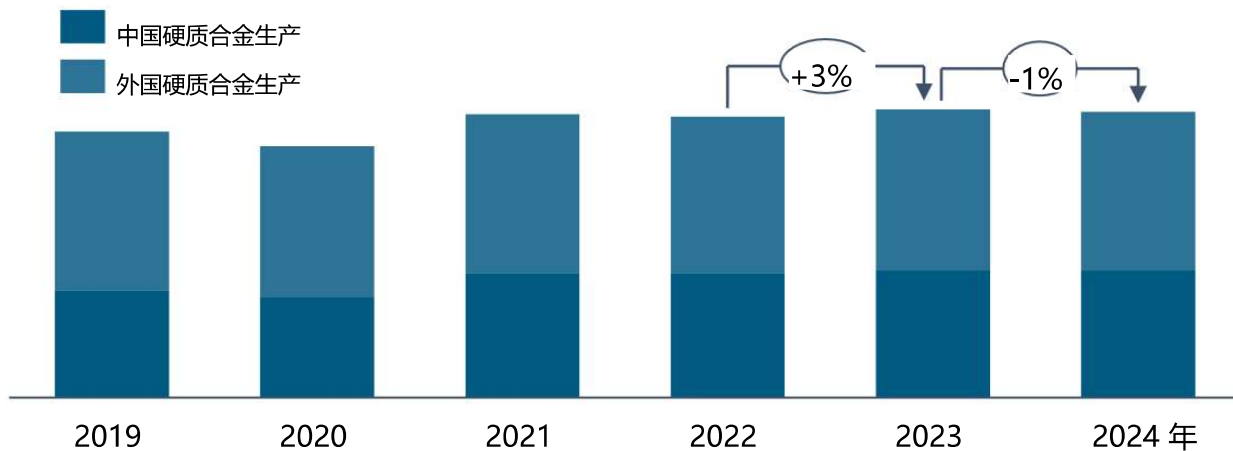
图表：高温合金的全球生产

单位：10,000 公吨



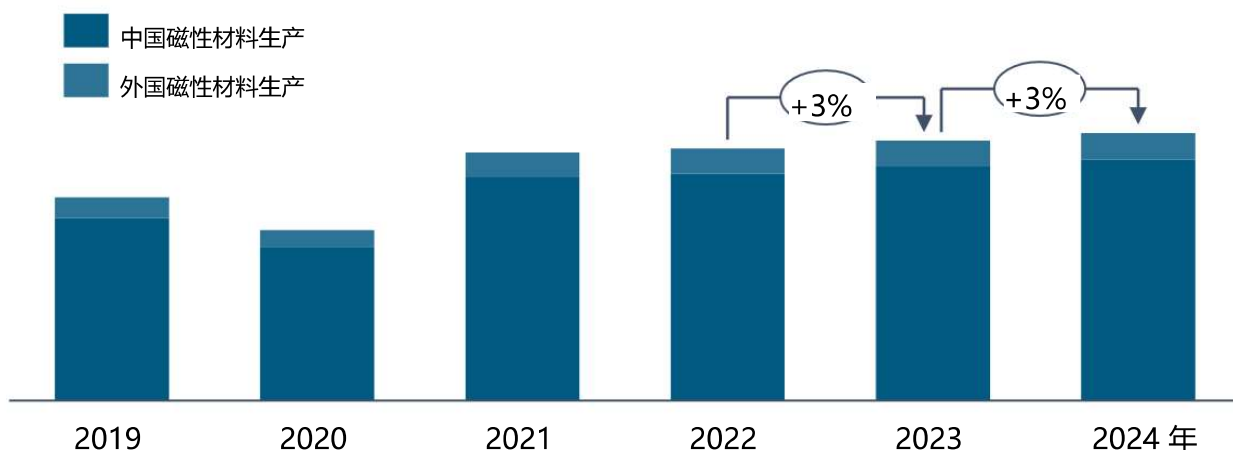
图表：硬质合金的全球生产

单位：10,000 公吨



图表：磁性材料的全球生产

单位：10,000 公吨



来源：SMM

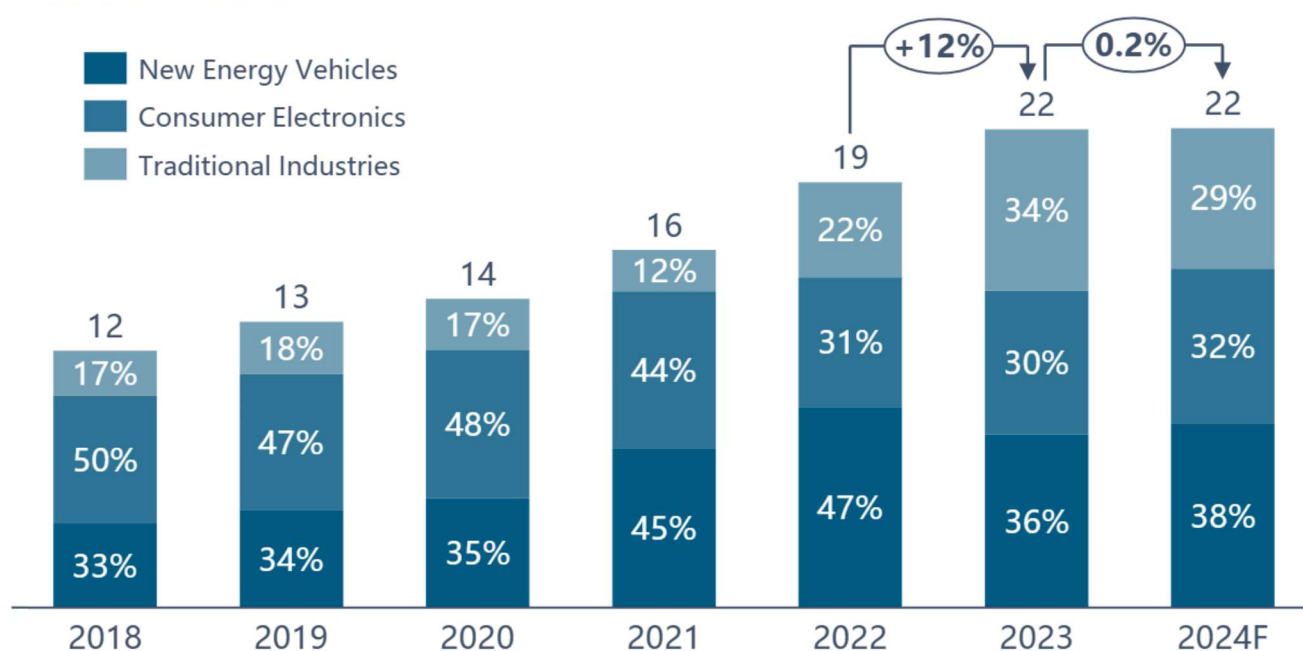
2. Global Cobalt Demand Analysis

2.4 Overall Assessment of Cobalt Demand:

- Global demand for cobalt mainly comes from digital, EVs, and energy storage applications in the lithium battery field, and traditional industries such as high-temperature alloys, hard alloys, catalysts, ceramic pigments, magnetic materials, organic materials, and other industries. With the popularization of smartphones, the demand for cobalt in digital batteries and magnetic materials was accelerating. The proportion of cobalt demand in traditional industries was also synchronously declining. The recent implementation of subsidies for new energy vehicles has markedly enhanced their development prospects. Consequently, cobalt demand, essential for electric vehicle batteries, has experienced a surge.
- In 2023, the total global demand for cobalt raw materials was 216,200 mt in metal content. Looking at the specific downstream application proportions, the global lithium battery industry accounted for 66% of the cobalt demand. Looking downstream, the EV battery industry accounted for 36% of the demand for cobalt. In China, mainly affected by the decline in subsidies for new energy vehicles, EV battery demand was digested ahead of schedule at the end of 2022, causing the demand for NEV sectors to recover less than expected in 2023, and the proportion has declined YoY. Digital batteries, driven by Q3 releases from Huawei and Apple, made up 30% of cobalt demand. Q3 saw an optimistic recovery in the digital market and a notable H2 rise in consumer electronics demand. In addition to this, the global traditional industry accounted for 34% of the cobalt demand. Stimulated by military and aerospace demand, the demand in traditional industries has significantly increased YoY.
- In 2024, global demand for cobalt raw materials is expected to modestly increase to about 216,700 mt, driven by rising consumer and EV demands. The lithium battery industry's share of this demand is projected to rise to 70%. Looking downstream, due to the drive of new energy vehicles, the EV battery still has a certain increase in the demand for cobalt.
- Aside from other traditional industries, the demand in 2023 was ahead of schedule, so it is projected that operations will return to normalcy in 2024 and then continue to run steadily.

Figure: 2018-2024F Global Cobalt Demand by Downstream

10,000 mt in metal content



Source: SMM

2. 全球钴需求分析

2.4 钴需求的总体评估：

> 全球对钴的需求主要来自数字、电动汽车和能源存储应用在锂电池领域，以及高温合金、硬质合金、催化剂、陶瓷颜料、磁性材料、有机材料等传统行业。随着智能手机的普及，数字电池和磁性材料对钴的需求正在加速增长。传统行业对钴的需求比例也在同步下降。最近对新能源汽车实施的补贴明显增强了它们的发展前景。

因此，对于电动汽车电池至关重要的钴需求出现了激增。

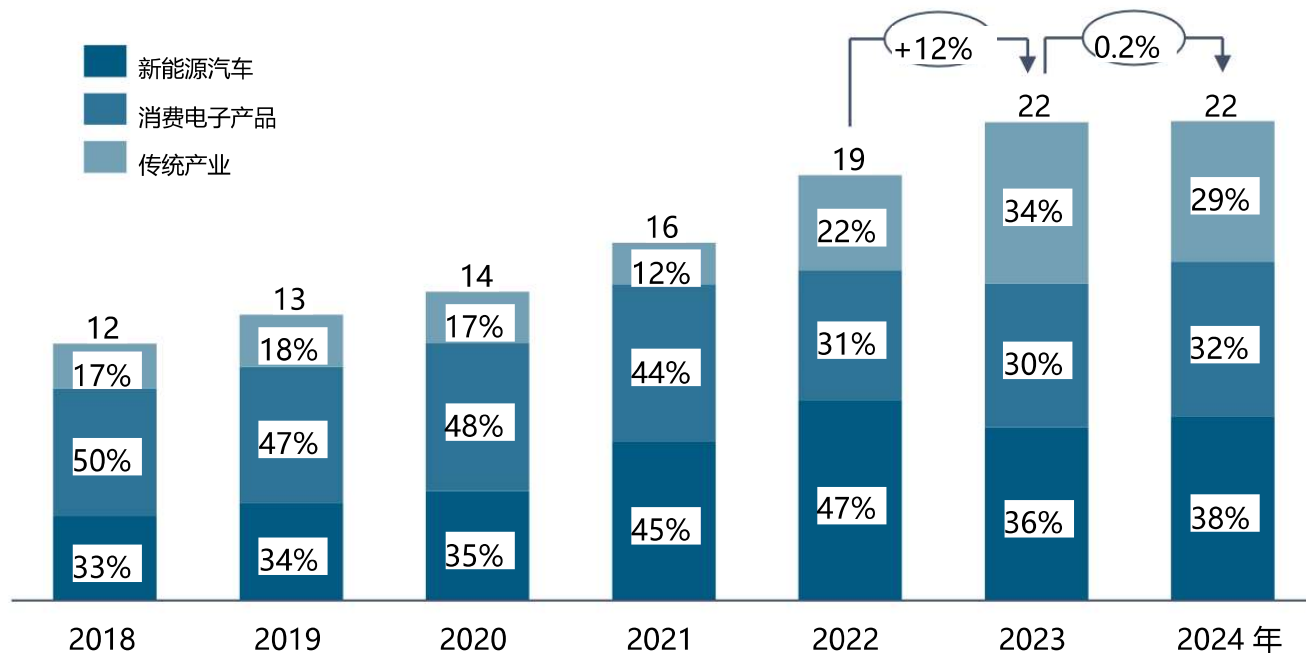
> 2023 年，全球对钴原材料的总需求量为 216,200 吨金属含量。从具体的下游应用比例来看，全球锂电池行业占钴需求的 66%。在下游方面，电动汽车电池行业占钴需求的 36%。在中国，主要受新能源汽车补贴下降的影响，2022 年底提前消化了电动汽车电池需求，导致 2023 年新能源汽车行业的需求恢复不及预期，比例同比下降。数字电池，受华为和苹果 Q3 发布的推动，占钴需求的 30%。Q3 看到数字市场乐观复苏，消费电子需求在下半年显著增长。除此之外，全球传统行业占钴需求的 34%。受军事和航空航天需求的刺激，传统行业的需求同比显著增加。

> 到 2024 年，全球对钴原材料的需求预计将适度增加至约 216,700 公吨，受消费者和电动汽车需求的推动。预计锂电池行业对这一需求的占比将提高至 70%。展望未来，由于新能源汽车的推动，电动汽车电池对钴的需求仍将有一定增长。在数字市场上，计算机和平板电脑的升级。

除了其他传统行业外，2023 年的需求超前于计划，因此预计 2024 年业务将恢复正常，然后继续稳步运行。

图表：2018-2024 年全球钴需求按下游行业

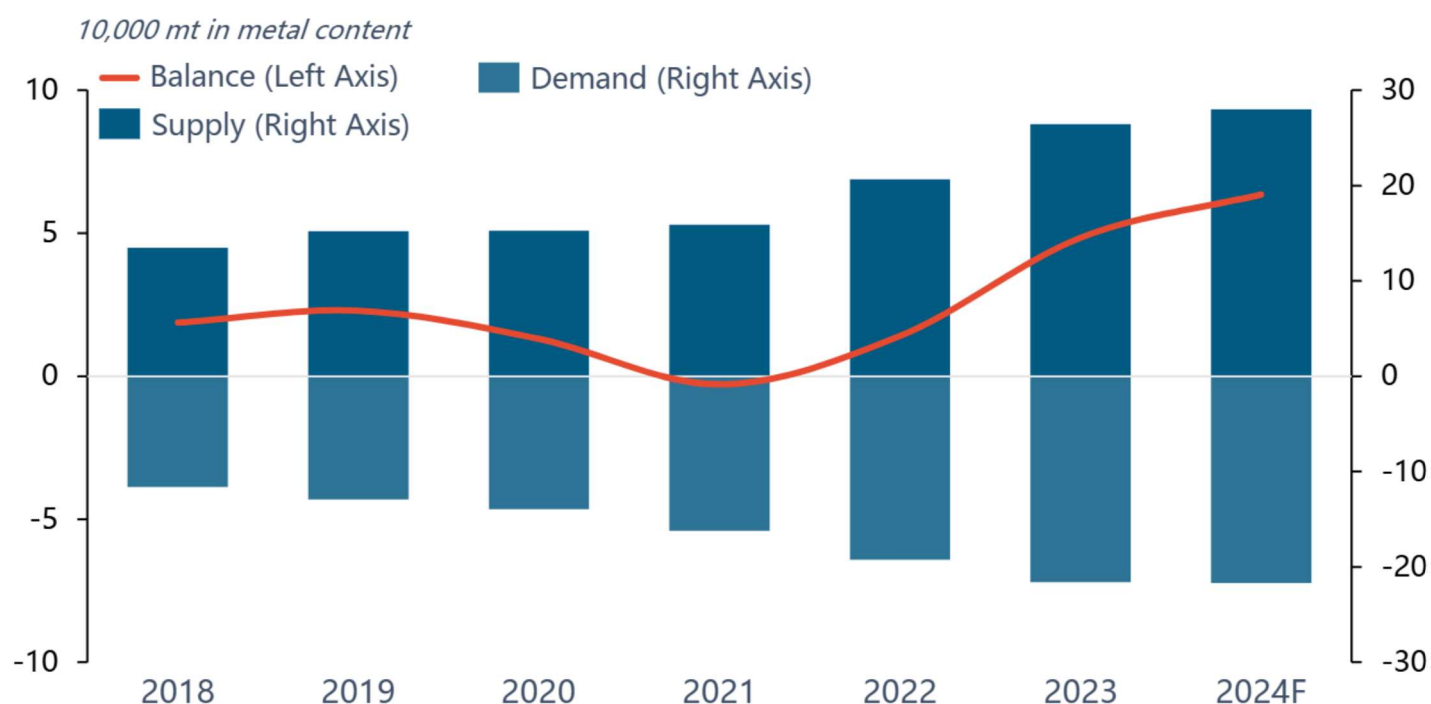
金属含量为 10,000 公吨



来源：SMM

3. Global cobalt supply and demand analysis (2018-2024F)

Figure: Global cobalt raw material supply and demand balance (2018-2024F)



Source: SMM

➤ From 2018 to H1 2020, the supply side continued to grow while the demand side was rapidly weakened due to a significant decline in China's new energy subsidies and the sudden outbreak of the COVID-19 pandemic, resulting in an oversupply in the market balance. From H2 2020 to Q1 2022, with countries, especially those in Europe, increasing subsidies for new energy vehicles, the global production and sales volume of new energy vehicles in 2021 is to reach 6.31 million vehicles, up 114% YoY. However, the supply side was hindered by geographical differences in Africa and the impact of shipping logistics in South Africa and other places, leading to a shortage of global cobalt resources and becoming the main bottleneck in cobalt supply. From Q2 2022 to the end of 2022, due to the ongoing impacts of the COVID-19 pandemic and sluggish economic growth, consumer demand in the digital segment decreased. Ternary power gradually shifted towards high-nickel, high-energy density, and the growth rate of cobalt demand in traditional industries slowed.

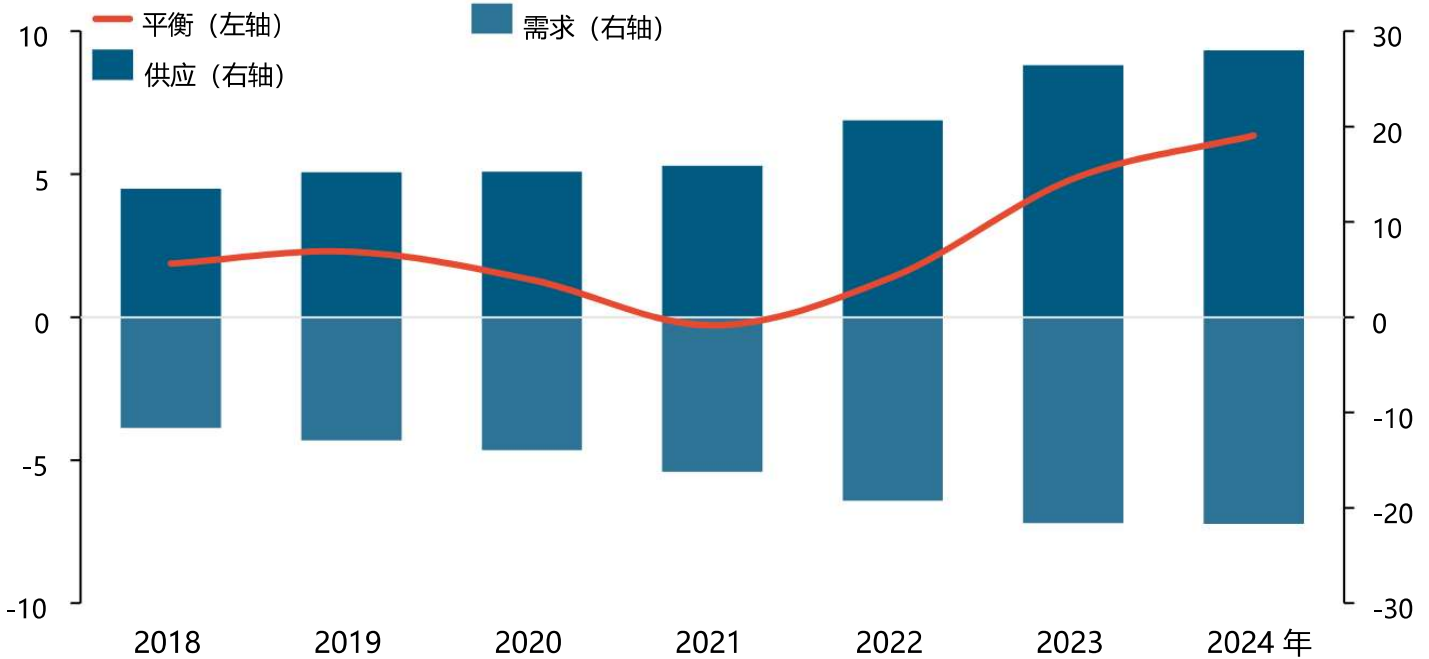
➤ In 2023, the global cobalt market trended towards accumulation, with supply growth outpacing demand growth. On the supply side, new production capacities such as Glencore, CMOC Group Limited, and the Indonesian nickel-cobalt project were launched in 2023, increasing supply. The global cobalt supply is expected to be 264,000 mt in metal content, with a growth rate of 28%. On the demand side, the early demand in the digital consumer market weakened, but there was a certain recovery towards the end of the year driven by new Huawei devices. However, the EV market was hit by LFP products, the economy of ternary materials declined, the production of ternary products fell, and the corresponding cobalt demand growth slowed. The total global cobalt demand in 2023 is estimated to be 216,000 mt in metal content.

➤ In 2024, the growth rates of global cobalt supply and demand were relatively stable, but the supply growth rate was higher than the demand growth rate, thus maintaining an overall surplus in the supply-demand relationship. On the supply side, the expansion of raw ore capacity continues, notably with a significant increase in MHP production in Indonesia. Additionally, the recycling market is maintaining its growth momentum, contributing to an overall rise in supply. The global cobalt supply is estimated to reach approximately 280,200 mt in metal content. On the demand side, the demand growth rate in the EV market slightly increased, the consumer market steadily grew, and the growth rate in traditional industries remained stable. In 2024, the total global demand for cobalt is anticipated to be approximately 216,700 mt in metal content.

3. 全球钴供应和需求分析 (2018-2024F)

图表：全球钴原材料供需平衡 (2018-2024F)

金属含量为 10,000 公吨



来源：SMM

> 从 2018 年到 2020 年上半年，供应端持续增长，而需求端由于中国新能源补贴大幅下降和新冠疫情突然爆发而迅速削弱，导致市场供需失衡。从 2020 年下半年到 2022 年第一季度，各国，尤其是欧洲国家，增加对新能源汽车的补贴，预计 2021 年全球新能源汽车的生产和销售将达到 631 万辆，同比增长 114%。然而，由于非洲地区地理差异和南非等地的航运物流影响，供应端受阻，导致全球钴资源短缺，成为钴供应的主要瓶颈。从 2022 年第二季度到 2022 年底，由于新冠疫情持续影响和经济增长疲软，数字领域消费者需求下降。三元动力逐渐转向高镍、高能量密度，传统行业对钴需求增长速度放缓。

> 2023 年，全球钴市场趋向积累，供应增长超过需求增长。在供应方面，2023 年推出了新的生产能力，如嘉能可、中色集团有限公司和印尼镍钴项目，增加了供应。全球钴供应预计为金属含量 264,000 吨，增长率为 28%。在需求方面，数字消费市场早期需求减弱，但受华为设备推动，年底出现一定程度的复苏。然而，电动汽车市场受到 LFP 产品的打击，三元材料经济下降，三元产品生产减少，相应的钴需求增长放缓。预计 2023 年全球钴总需求金属含量为 216,000 吨。

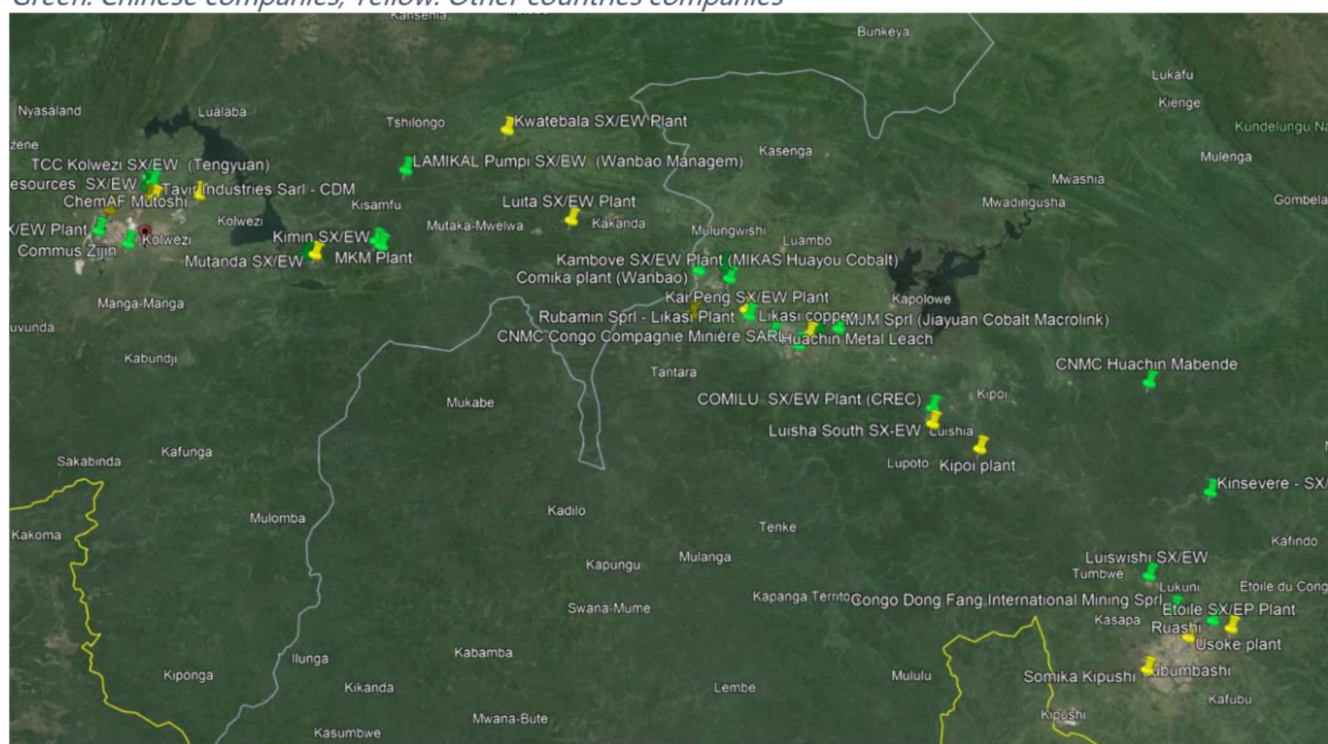
> 2024 年，全球钴供需增长率相对稳定，但供应增长率高于需求增长率，因此维持了供需关系的总体过剩。在供应方面，原矿产能继续扩张，尤其是印度尼西亚的 MHP 产量大幅增加。此外，回收市场保持增长势头，有助于供应总体上升。全球钴供应量预计将达到约 280,200 吨金属含量。在需求方面，电动汽车市场的需求增长率略有增加，消费市场稳步增长，传统行业的增长率保持稳定。预计 2024 年，全球钴的总需求量将达到约 216,700 吨金属含量。

4. Appendix: Main drivers for Chinese companies to invest in the global cobalt industry

- As shown in this report, China does not have enough cobalt reserve to meet the demand, which is one of main drivers for Chinese cobalt producers to find investment opportunities in the other countries. At the same time, strong copper demand and less copper reserve in China make these projects more valuable for investment.
- In 1999, the Chinese government initiated the Going Out Strategy, which encouraged Chinese companies to expand overseas foreign direct investments. As strong domestic demand growth in many different minerals and less reserve in China, many Chinese companies would like to directly invest in overseas mining assets under the Going Out Strategy in order to secure their supply chain.
- Supported by a new mining code in 2022 which was issued under pressure from the World Bank, the liberalization of mining sector in DRC resulted in an influx of foreign companies, including Chinese investors. From 2003, Chinese companies started to invest in some small-scale pyrometallurgical smelting projects, which includes Wanbao, Huayou and others. During the copper bull market of 2004-2007, companies at that time made huge profits. However, the global financial crisis eliminated many small and medium-sized companies. After the global financial crisis, the hydrometallurgical process has become more popular in DRC as high-grade copper/cobalt ore was depleting. DRC need more investment to further develop the mining and refining industry. At the same time, EVs industry started booming in China. Chinese companies realised cobalt is the critical mineral for the lithium-ion battery industry and started to invest in cobalt mines rather than only refining facility in DRC.
- Since the European debt crisis, Chinese companies accelerated the M&A of mining assets in DRC from many western mining companies. For example, MMG purchased Anvil Mining Limited in 2012. Jinchuan Group fully incorporated Metorex as a subsidiary with a \$1.28 billion buyout in 2012. In 2014, Zijin Mining merged COMMUS at 112 million USD from Huayou Cobalt. In 2016, CMOC acquired 56% shares of TFM with 2.65 billion USD from Freeport-McMoRan. The commodity super-cycle in China and the financial situation of some western mining companies gave more opportunities to Chinese mining companies to access some minerals resources that they always desire to obtain before. In order to access more copper/cobalt reserves in DRC, Chinese companies adopted more flexible investment strategies, for example Sicomines project and Deziwa project, which supplied more options for DRC authorities.
- Similar as DRC, the strong demand in battery metals, the Indonesian nickel export ban policy, and HPAL technology development encouraged more Chinese investment in the nickel/cobalt industry in Indonesia, which secures nickel supply for China and further enhance China's position in the global cobalt industry.

Figure: Copper/cobalt processing plants in DRC

Green: Chinese companies, Yellow: Other countries companies



Source: SMM, Google maps

4. 附录：中国公司投资全球钴产业的主要驱动因素

如本报告所示，中国没有足够的钴储备来满足需求，这是中国钴生产商在其他国家寻找投资机会的主要驱动因素之一。同时，中国对铜的强劲需求和较少的铜储备使这些项目更具投资价值。

1999年，中国政府启动了“走出去”战略，鼓励中国企业扩大海外外国直接投资。由于中国许多不同矿产的国内需求增长强劲，中国许多企业希望在“走出去”战略下直接投资海外矿业资产，以确保其供应链。

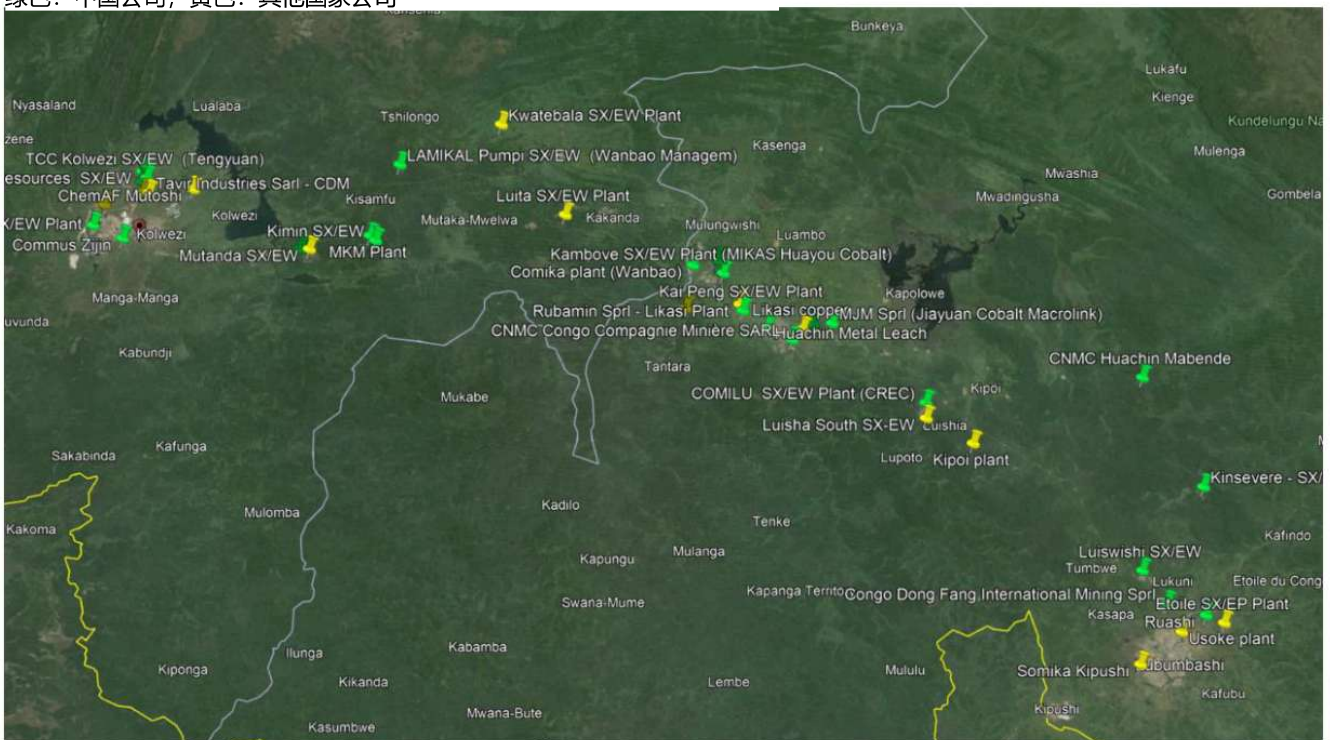
> 在2022年，受世界银行的压力下颁布了一部新的矿业法规，刚果（金）的矿业部门自由化导致了外国公司的涌入，包括中国投资者。从2003年开始，中国公司开始投资一些小型冶金冶炼项目，包括万宝、华友等公司。在2004年至2007年的铜牛市期间，当时的公司获得了巨额利润。然而，全球金融危机淘汰了许多中小型公司。全球金融危机过后，刚果（金）的高品位铜/钴矿正在枯竭，使得水冶冶炼工艺在该地区变得更加流行。刚果（金）需要更多投资来进一步发展矿业和精炼行业。与此同时，中国的电动汽车产业开始蓬勃发展。中国公司意识到钴是锂离子电池行业的关键矿物，开始在刚果（金）投资钴矿，而不仅仅是精炼设施。

> 自欧洲债务危机以来，中国企业加快了对刚果（金）的矿业资产进行并购，从许多西方矿业公司手中收购。例如，2012年MMG收购了Anvil Mining Limited。金川集团在2012年以12.8亿美元的价格全资收购了Metorex作为子公司。2014年，紫金矿业以1.12亿美元从华友钴公司收购了COMMUS。2016年，中色公司以26.5亿美元从自由港-麦克莫兰公司收购了TFM 56%的股份。中国的大宗商品超级周期和一些西方矿业公司的财务状况为中国矿业公司提供了更多机会，以获取他们一直渴望获得的一些矿产资源。为了获取更多刚果（金）的铜/钴储量，中国企业采取了更灵活的投资策略，例如四川矿业项目和德吉瓦项目，为刚果（金）当局提供了更多选择。

与刚果民主共和国类似，电池金属需求旺盛、印尼镍出口禁令政策以及HPAL技术的发展促使更多中国投资进入印尼的镍/钴行业，确保了中国的镍供应，并进一步提升了中国在全球钴行业中的地位。

图：刚果（金）铜/钴加工厂

绿色：中国公司，黄色：其他国家公司



来源：SMM，谷歌地图



**Shanghai metals
market (SMM)
New Energy Team**

上海金属

市场 (SMM)

新能源团队