

# Report on Global and China's Cobalt Industry, 2018-2022

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## Abstracts

### Description

Cobalt is an important raw material for superalloy, cemented carbide, diamond tool, batteries, anticorrosive and magnetic materials. It is widely applied in fields including aerospace, electronic appliances, machinery manufacturing, automobiles, chemical industry, agriculture, ceramics, etc.

Global cobalt reserves reached 7.2 million tons by the end of 2016, among which Kinshasa of Congo DRC owned 3.4 million tons, accounting for 47% - the largest proportion in the world. The rest was shared by countries as Australia and Cuba, with proportions of 14% and 7%. China owned only 1.1% of the global reserve. However, Canada ranked the first in production volume, taking up 7% of the global figure, followed by China and Russia both with a share of 6%.

CRI analysis reveals that the difference is caused mainly due to backward infrastructure in Congo and a lack of smelting and deep-processing enterprises in Australia. Major cobalt ore producers mentioned above commonly export the materials to China, Finland and other countries for further smelting and deep-processing. Therefore, global production of refined cobalt is inconsistent with the distribution of cobalt reserves. The production volume of cobalt in China was approximately 650 tons in 2016, most of which was extracted from imported ore.

Cobalt mines and reclaimed refined cobalt are major sources of cobalt metal in the world. Cobalt ore mostly comes from copper-nickel associated ores. The two sources take up approximately 85% of the total production with reclaimed refined cobalt accounting for 10% of it. Production volume of cobalt in Glencore, Freeport-McMoran,

Eurasian Natural Resources and Vale amounts to approximately 50% among major global manufacturers.

The production volume of refined cobalt exhibits a stable growth in general. The global production volume reached 93,900 tons despite a slight drop in 2016. The trend of refined cobalt in China grows in consistency with that of the world. The production volume in China reached 45,000 tons in 2016, accounting for 47.92% of the global volume. With its market status continuously rising, China's cobalt industry will exert an increasing influence on the global market. Driven by the fast-growing demand in lithium batteries in China in the early 21st century, demand for cobalt has been released in a short time. As a result, cobalt was in short supply in successive years from 2006 to 2008. However, cobalt prices were slashed by the financial crisis in 2008. Focused efforts were made to improve cobalt production capacity in 2009, resulting in a serious surplus in cobalt supply across the globe. In recent years, a balance has been struck again in global supply and demand of cobalt and the demand is exceeding the supply.

The global consumption volume of cobalt approached 103,000 tons in 2016, with a year-on-year increase of 4.3%. The downstream demand of global cobalt industry was occupied by battery demand and industrial demand of 54% and 46% respectively. Demand for batteries was mainly derived from that for 3C batteries, power batteries and energy storage batteries, among which 3C batteries accounted for 87% of the total, power batteries accounted for 12% and energy storage batteries represented a small portion. Industrial demand is mainly derived from that for superalloy, cemented carbide and ceramics.

Lithium-ion batteries for electric vehicles is estimated to experience the largest increase in consumption of battery-used cobalt. Global production volume of electric vehicles grows exponentially in recent years, with a growth rate far higher than that of traditional automobiles. The production volume in China reached 710,000 units in 2017, up by 30% over the previous year. As major raw material for electric vehicles, cobalt is expected to boast a rapid growth. Moreover, power batteries account for the largest proportion in the downstream application of cobalt. In the application of lithium batteries, cobalt is mainly applied in LCO, NCA and NCM, among which LCO is primarily used in consumer electronics and NCM is primarily used in consumer electronics and power batteries. Presently, the application of cobalt in battery is still dominated by LCO. NCM materials are expected to become a bursting point of demand for cobalt along with the development and prevalence of new energy vehicles.

According to CRI analysis, China is a major cobalt smelting country and has strong

demand for cobalt. However, its cobalt reserve accounts for a mere 1.1% (80,000 tons) of the world's reserve. Kinshasa of Congo DRC has the largest reserve of cobalt and is China's major cobalt ore supplier. Cobalt ore can be classified as four major types, namely copper-cobalt ore, nickel-cobalt ore, sillicon-cobalt ore and cobalt-bearing pyrite, with cobalt usually mixed in the ore. With the decline in prices of copper, nickel and other metal, reduction of production or halt of production in mines are on the increase. As a result, the growth rate in production volume experienced a notable decline. In addition, political instability has been bothering Congo DRC since 2017, which is likely to result in a lowered production volume or even a shrinking supply of cobalt ore.

With rapid development in new energy vehicle industry, the global market will demand more for cobalt. It is estimated that the CAGR of production volume of new energy vehicles will exceed 30% and the CAGR of demand for cobalt for NCM-use will reach 50% from 2018 to 2022. The CAGR of demand for lithium batteries in terms of energy storage will reach 50% from 2018 to 2022. NCM is also predicted to have a higher penetration in the market from 2018 to 2022, with an CAGR in demand for cobalt of 100%. The demand for cobalt of lithium batteries in 3C and industrial application will maintain a CAGR of 2% to 3% from 2018 to 2022. It is estimated that the global demand for cobalt will stay at 10% from 2018 to 2022.

Readers can Obtain the Following Information Through this Report:

Development Environment of Cobalt Industry

Supply and Demand of Cobalt in China and the World

Analysis on Major Downstream Demand

Price Trend of Cobalt

Major Cobalt Smelting Enterprises in China and the World

Driving Forces and Market Opportunities of Cobalt Industry in China and the World, 2018-2022

Threats and Challenges in Cobalt Industry in China and the World, 2018-2022

Prospect of Cobalt Industry in China and the World, 2018-2022

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## About

Congo-Kinshasa has the world's largest reserves of cobalt ores, representing 50%. The country also ranked first in terms of production volume of cobalt ores. Its annual production volume of cobalt maintained between 70,000 tons and 90,000 tons for the previous three years, accounting for over 70% of the global volume. The ore grade of cobalt in Congo-Kinshasa is mainly evaluated between 0.3% and 0.5%, much better than that in other places of origin. Generally, 8%-10% of local ores are for open-pit mining.

It is estimated that the added global production capacity of refined cobalt will be 12,000 tons and 11,000 tons in 2018 and 2019 respectively at corresponding growth rates of 11.89% and 8.99%.

According to industries, global downstream consumption of cobalt can be classified into lithium battery, high-temperature alloy, cemented carbide, magnetic material and other industrial demand. Demand of lithium batteries mainly includes that of 3C electronic consumer goods and new energy vehicles. High-temperature alloy usually functions as irreplaceable materials of high-temperature heated end components such as aviation engines, rocket engines and combustion turbines. Thus, cobalt based high-temperature alloy plays a significant role. Other industrial demand includes traditional demand of hard surfacing materials, pigments, catalysts and organic materials, exhibiting comparatively stable growth rates.

With emergence of consumption of new energy vehicles, the global consumption structure of cobalt has changed significantly. The proportion of new energy vehicles ascended from 4.0% in 2014 to 13.4% in 2016 and is expected to reach 22.7% in 2018. Change of this industrial structure suggests that the accelerating demand for new energy vehicles will greatly facilitate demand for cobalt and exert certain impacts on the cobalt price.

In 2016, 104,500 tons of cobalt were in demand globally, up by 9.90% YOY. Specifically, demand of new energy vehicles was 13,900 tons, that of 3C electronic consumer goods was 37,700 tons, that of high-temperature alloy was 16,100 tons, that of cemented carbide was 8,600 tons and industrial demand was 20,600 tons. Global demand for cobalt is expected to be 114,900 tons and 127,800 tons in 2017 and 2018 respectively, at corresponding growth rates of 9.99% and 11.26%.



Driven by new energy vehicles, global demand for cobalt grew at a rate of 9.90% in 2016. The global demand volume of cobalt was 104,500 tons in 2016, among which demand volume of power battery materials was 13,900 tons at a growth rate of 74.81%. Supply shock along with fast growing demand reversed the supply-demand relationship of cobalt in 2016, leading to shortage of cobalt. The era of scarce cobalt has approached. Increasing demand and supply shock resulted in supply shortage of cobalt of 3,300 tons and continuously rising price of cobalt in 2016.

The added global supply of refined cobalt is projected to be limited during 2017-2019. In the following three years, there will be a limited number of new cobalt ores and refined cobalt projects but demand for cobalt will keep growing fast. Considering limited recovery of output volume of hand-grabbing ores, it still takes time to improve the pattern of shortage. We predict that the growth rate of the global supply of refined cobalt will be 8.11%, 11.89% and 8.99% respectively from 2017 to 2019, with corresponding demand volume of refined cobalt being 109,300 tons, 122,230 tons and 133,300 tons.

Global demand for cobalt will continue to rapidly expand in the next two years owing to strong demand for new energy vehicles. The growth rate of global demand for cobalt is expected to reach 9.99%, 11.26% and 15.02% respectively from 2017 to 2019, with corresponding demand volume of refined cobalt being 114,900 tons, 127,800 tons and 147,000 tons.

Cobalt is likely to be in short supply in the global market during 2017-2019, with price constantly rising. We project that the shortage volume of cobalt metal will be 5,600 tons, 5,500 tons and 13,700 tons in 2017, 2018 and 2019 respectively and that the cobalt price will remain strong.

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