







GREEN ENERGY MINERAL: KEY FACTS

Cobalt

US CRITICAL MINERAL? YES	
MAIN USES IN GREEN ENERGY TECHNOLOGY	KEY DEVELOPMENT ISSUES IN MINING
 Energy storage	 Environment  Governance  Labor and working conditions  Conflict  Land tenure

DEMAND PROJECTIONS

Cobalt is an important component of lithium-ion batteries used in electric cars, as well as energy storage batteries important for intermittent renewable technologies like wind and solar. Cobalt forms part of the battery’s cathode and helps stabilize the chemistry. If cobalt-containing lithium-ion batteries continue to dominate in the coming decades, demand for the metal is projected to be 644,000 tons per year by 2050 under a two-degree scenario (Hund et al., 2020). This would represent a 460% increase over 2018 production levels. However, the evolution of battery technologies is uncertain, and cobalt may therefore play a less important role in the types of batteries used by 2050. Cobalt’s relative scarcity and controversies around its production in the DRC is already motivating research to find cobalt-free alternatives (Oberhaus, 2020).

PRODUCTION/RESERVES



Source: OECD

The **DRC** provided nearly 70% of mined cobalt in 2020, making it by far the most important cobalt producer. Most is a by-product of copper mining, but the DRC also has rich primary cobalt deposits. Besides the DRC, only **Morocco** has a primary cobalt deposit that is being mined. Other cobalt producers extract the metal as a by-product of nickel mining, but at lower concentrations compared to the DRC deposits. More than 120 million tons of cobalt resources have been identified in manganese deposits on the floor of the Atlantic, Indian, and Pacific Oceans, making cobalt a possible candidate for deep sea mining.

China is the biggest producer of refined cobalt and is also cobalt’s biggest consumer (80% of annual production worldwide) used mainly in the production of batteries. Around 68% of products with cobalt are recycled and 32% of cobalt in new products is recycled (Hund et al., 2020). However, cobalt used in lithium-

ion batteries needs to be extremely pure, which limits the amount of recycled cobalt that can be utilized. Cobalt prices have fluctuated wildly in the last five years due to speculation linked to the green energy transition. Price have gone from a low of \$23,500 per ton in 2016 to a high of \$94,250 in 2018 to \$45,000 at the time of writing (LME, n.d.b).

MINING IN USAID-PRESENCE COUNTRIES

The **DRC** is the most critical cobalt-producing country, with 8 of the 14 largest cobalt mining companies being Chinese-owned (OECD, 2019). Smaller USAID-presence producing countries in descending order of importance are the **Philippines, Cuba, Morocco, South Africa, Madagascar,** and **Papua New Guinea** (limited presence country). With the exception of Morocco's industrial primary cobalt mine, other producers mined cobalt as a by-product of industrial nickel mining. Foreign companies involved in cobalt mining outside of the DRC include Japanese and Koreans (Madagascar), joint Canadian/Filipino (Philippines), Canadian (Cuba), Chinese/Canadian (Papua New Guinea), and Moroccan (Morocco) (NS Energy, n.d.b).

MAJOR INDUSTRIAL COMPANIES

Glencore, the world's largest minerals and metals companies, owns the first and third largest mines in the DRC. **China Molybdenum** owns the second largest and **Zhejiang Huayou Cobalt** owns the fourth largest (called Congo Dongfang International Mining, or CDM). An Indian healthcare entrepreneur owns the fifth largest (**Shalina Resources**, Chemaf mine).

ARTISANAL AND SMALL-SCALE MINING (ASM)

Between 15 and 30% of the **DRC's** cobalt production comes from ASM (World Economic Forum, 2019). This translates to around 60-80,000 miners of DRC's 2 million artisanal miners in total (Pact UK, 2020). This number fluctuates; the 2017/2018 season had between 150-200,000 miners (BR, 2019). ASM functions as a swing producer in the DRC responding to international price movements (OECD, 2019). ASM and LSM supply chains are not fully segregated; LSM operators often buy from ASM or intermediaries for integration into their refining capacity.

ISSUES IN USAID-PRESENCE COUNTRIES

Cobalt mining in the DRC has attracted heavy media attention in the last few years. Numerous news reports have documented concerns around child labor, fatal workplace accidents, poor working conditions including exposure to toxins causing birth defects, human rights abuses, forced displacement, forced evictions, modern slavery, and environmental devastation. Most of the concerns focus on the ASM sector, but some have also highlighted ways in which the LSM sector directly or indirectly create the conditions for poor practices. News outlets and institutions that have reported on cobalt in the DRC in the last two years include the World Economic Forum, The New Yorker, Foreign Policy, Council on Foreign Relations, the BBC, CBS News and Amnesty International. In 2019, a lawsuit was filed against companies including Apple and Google over the deaths of children in Congolese cobalt mining (Kelly, 2019).

The DRC also has numerous governance issues in its mining sector including corruption and transnational organized crime. This is a concern now that the government has created a state-owned enterprise monopoly over ASM cobalt trade. DRC armed groups also gain funding from the minerals trade, though there is no evidence that cobalt is a "conflict mineral" like tin, tungsten, tantalum, and gold (3TG) in the east. (Cobalt is mined in the copper belt in the south of the country, around 1,000 miles from Eastern DRC) (Ndagano, 2020)

MINE DEVELOPMENT AND SUPPLY CHAIN DYNAMICS

China is the dominant supply-chain figure given its role as the main refiner and consumer of cobalt used in lithium-ion battery manufacturing. Some Chinese companies like Zhejiang Huayou Cobalt, owner of the

The Congo Dongfang International Mining company, a subsidiary of Zhejiang Huayou Cobalt, has come under scrutiny for their role in spurring unsafe ASM production and have since announced that they no longer buy from ASM (Sanderson, 2020). Besides upstream miners, downstream consumers of cobalt have also sought to disassociate themselves from DRC cobalt. For example, Tesla announced that it would purchase cobalt from LSM producer Glencore and ensure there was no ASM contamination in its supply chain (Shead, 2020). Carmaker BMW also announced a deal with Moroccan miner Managem for cobalt produced in its mine (Berdikeeva, 2021).

Such decisions to step away from ASM cobalt in the DRC have been criticized as they do not help improve conditions for the thousands of people who depend on it for a livelihood and could arguably lead to more impoverishment. In response, some like Glencore have reversed course and are committing to buy from ASM with responsible sourcing standards (Biesheuvel, 2020). Glencore, Tesla and Zhejiang Huayou Cobalt have also joined the Fair Cobalt Alliance created in 2020 (The Impact Facility, n.d.).

In another initiative, commodities company Trafigura collaborated with NGO Pact and DRC company Chemaf to create a formal ASM cooperative on part of its concession. This has led to an offtake agreement announced this year between Trafigura and a new state-owned-enterprise called the Entreprise Générale du Cobalt (EGC) that officially has a monopoly on ASM cobalt (Jamasmie, 2021). This year, Trafigura released the EGC Responsible Sourcing Standards which Pact and Kumi Consulting will help implement (PACT, 2021)

ORGANIZATIONS AND INDUSTRY GROUPS

The **Cobalt Institute** is the main industry group founded in 1982 producing research and advocating on behalf of its members including both upstream and downstream supply chain actors (Cobalt Institute, n.d.). The Institute has developed the Cobalt Industry Responsible Assessment Framework (CIRAF). The **Fair Cobalt Alliance** launched this year is hosted by The Impact Facility, a business supply chain initiative founded by TDI Sustainability and the Fairtrade Foundation. The **Chinese Chamber of Commerce for Metals, Minerals & Chemicals (CCCMC)** collaborated with the OECD to launch the Responsible Cobalt Initiative in 2016 (Respect International, n.d.).
