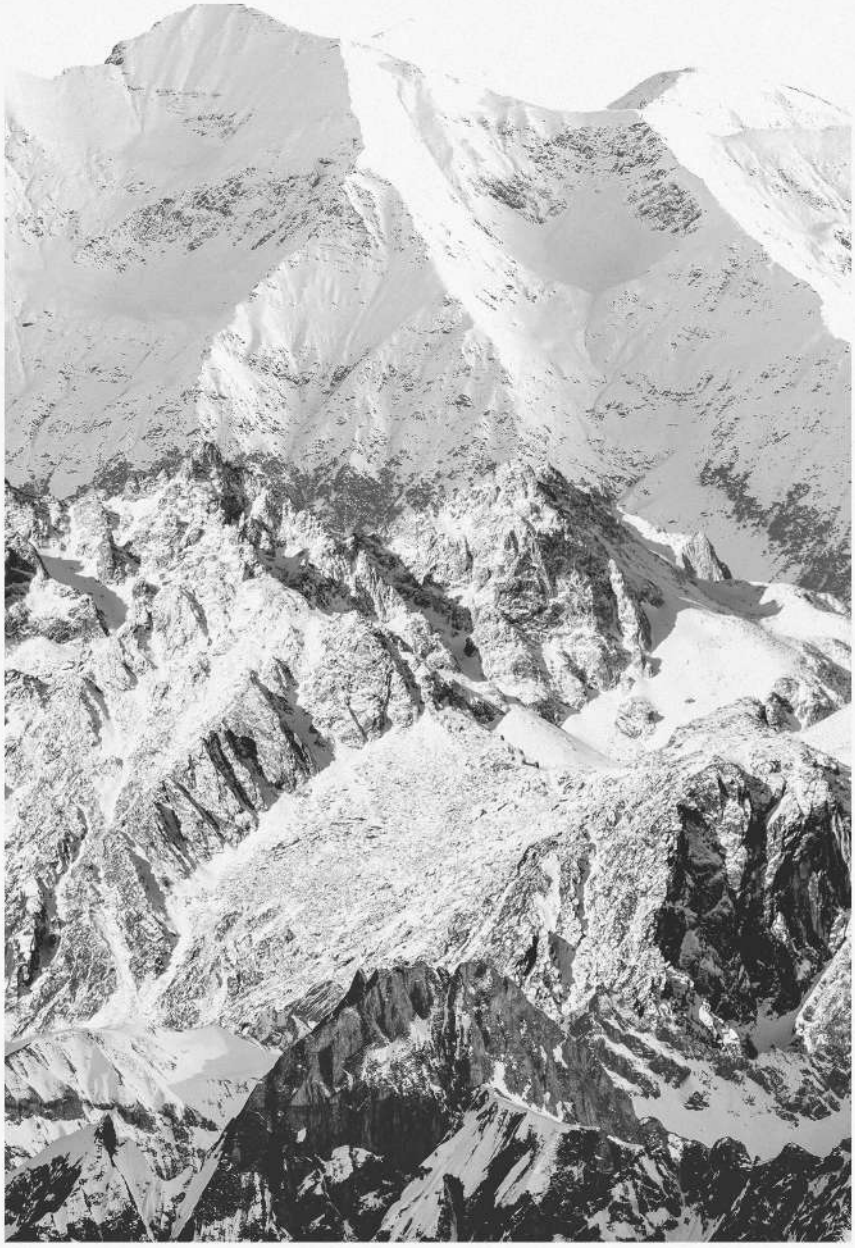
# STATE OF THE COBALT AND RARE EARTHS

## OPPORTUNITIES IN CHILE 2025



AHK Deutsch-Chilenische Industrie- und Handelskammer
Cámara Chileno-Alemana de Comercio e Industria

PartnerForMining

Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag

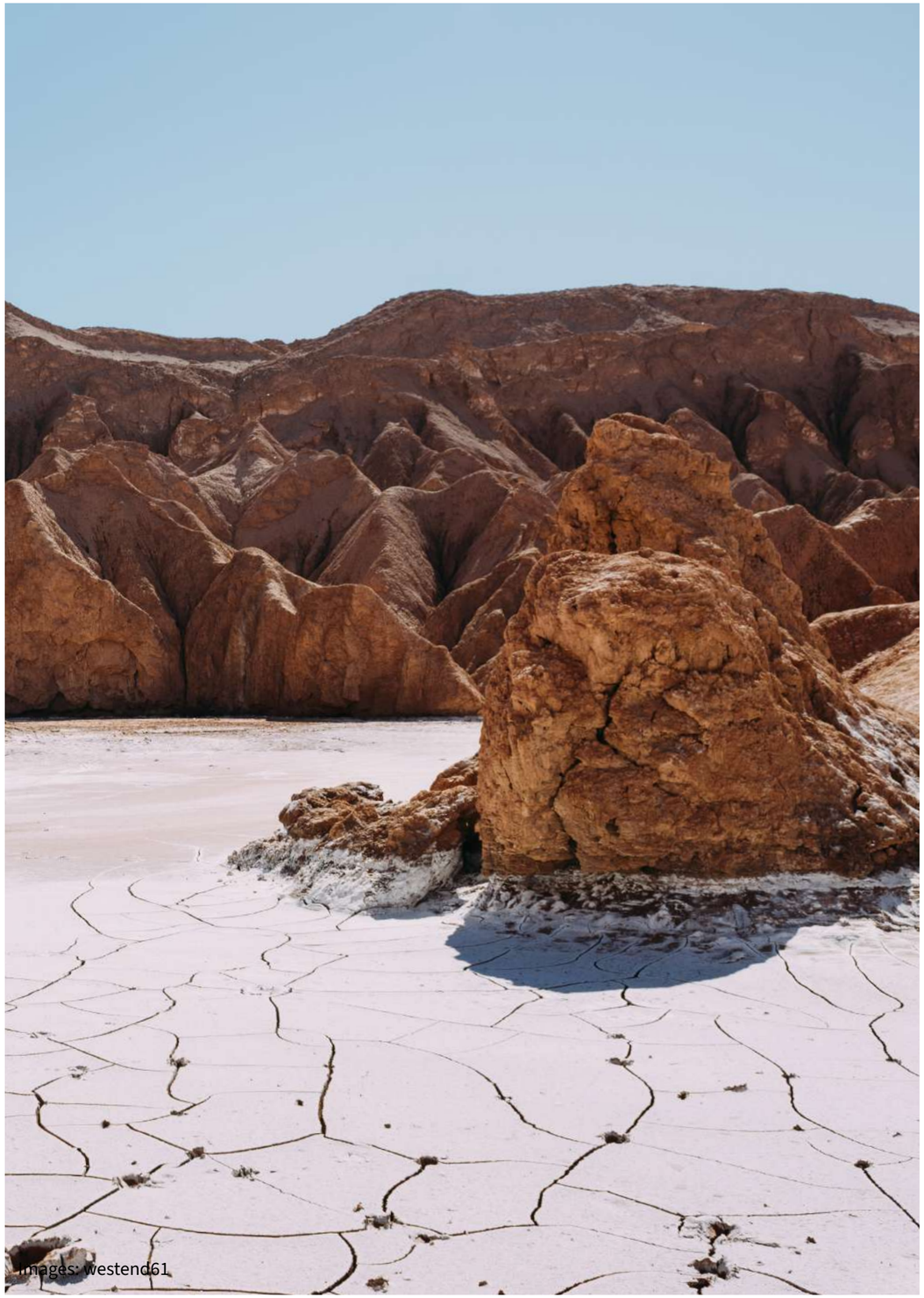
## DISCLAIMER

*This report is provided for informational and educational purposes only. The information contained herein has been gathered from various sources deemed reliable and is presented in good faith. However, no guarantees are made regarding the accuracy, completeness, or timeliness of the information. AHK Chile assumes no liability for errors or omissions in the content, nor for any actions taken based on this document.*

*Readers are advised to conduct their own research and consult relevant professionals before making decisions based on the information in this report.*

**Content: AHK Chile**
**Iris Wunderlich**
**(iwunderlich@ahkchile.cl)**

**Version 1.0,**
**Status quo June, 2025**



Images: westend61

# A

# PURPOSE OF THE REPORT AND INTRODUCTION TO THE SUBJECT

Images: Rabih Shasha (@rabihshasha)

The following report was developed as part of the "Responsible Mining for Future Technologies" project, which is being implemented by the Chilean-German Chamber of Commerce and Industry (AHK Chile) and financed by the German Federal Ministry for Economic Affairs and Energy. This document aims to compile and organize public information regarding the potential of emerging cobalt and rare earth mining in Chile for dissemination among stakeholders in both countries.

Chile's economy largely depends on exploiting natural resources, such as mining, forestry, and agriculture. In particular, the mining sector has been the main driver of the country's economic development over the past 30 years. Chile has a rich mining heritage and stands out for its copper reserves, which total 190 million tons and represent 19% of the world's known reserves. Chile also has the largest reserves of iodine, nitrates, and lithium carbonate, as well as deposits of molybdenum, rhenium, iron, gold, and silver.

In view of the links that Chile and Germany have historically maintained in terms of cooperation in the mining and mineral resources field, AHK Chile notes that, within the framework of the energy transition and electromobility, the development of the Chilean mining industry can provide a range of opportunities with respect to critical inputs, innovation, automation and human capital formation, among other alternatives. With respect to market diversification in response to new mineral resources demanded by new technologies, the use of by-products associated with the extraction and production of copper and other metals should be considered, as well as the exploration of other minerals with potential in the context of the energy transition, such as cobalt and rare earths.

Germany is Chile's main trading partner among the European Union member states. In 2023, it registered an investment stock of USD 1,192 million in Chile, participating in sectors such as medicines and pharmaceuticals, mining, global services, construction, trade, and industry. In terms of mining exports, Chile sent $700 million in 2024, representing an average annual growth of 12.8% over five years (source: Subrei, 2025).

Not only have German companies found a favorable and stable environment for investment in Chile, they have also diversified into a significant number of sectors, promoting progress and sophistication beyond commercial matters to include research and development.

Due to the strong commercial ties, cooperation, and friendship between Chile and Germany, the Chilean government has had an investment attaché in Berlin since the end of 2022. This attaché's mission is to build bridges and provide German companies with in-depth information about investment opportunities in Chile, accelerating their decision to invest.
In order to take advantage of Chile's competitive advantages as a supplier of critical minerals, Chile's relationship with Germany could be deepened by generating joint projects. The idea would be to propose initiatives aimed at incorporating technological innovation, sustainability and transparent supply chains into mining and its downstream industries, with special emphasis on the possibilities offered by renewable energies and global climate protection.

In January 2023, the governments of Germany and Chile signed a "Cooperation Agreement" (particularly between the Chilean Ministry of Mining and the Ministry of Economics and Climate Protection of the Federal Republic of Germany) to strengthen bilateral ties and develop a work and collaboration agenda on mining and environmental issues in the context of the climate crisis.

The agreement establishes thematic areas of interest that address aspects ranging from prospecting, exploration, extraction, treatment and processing of raw materials to mineral processing through efficient and sustainable technologies. This could open up interesting possibilities for collaboration given the attention that Chilean mining would be paying to other alternatives for the provision of resources in the context of decarbonization and the climate crisis.

Images: Cristobal Olivares

B

# GLOBAL COBALT OVERVIEW

Cobalt in Chile

Images: whitenoisecomms.com

Named cobalt in allusion to certain magical references made by German miners in the Middle Ages who blamed evil spirits of the earth for their bad luck whenever they found traces of the mineral instead of silver or copper, today cobalt is highly valued for the indispensable triad it forms together with copper and lithium for the development of electromobility.

Cobalt is a ferromagnetic metal similar to iron and nickel in its hardness, tensile strength, machine usability, thermal properties and electrochemical behavior. It is a transition element in the periodic table (atomic number 27) that is particularly notable for its resistance to high temperatures, which makes it a highly sought-after resource for use in the manufacture of more durable, stable and safer lithium-ion batteries.

As an important input for the production of aircraft engines, good quality steel and grinding balls, in recent years it has become an essential element for the advancement of renewable energies, becoming a true “blue gold”.

Similarly, the battery of a smartphone contains between five and 10 grams of cobalt, while that of an electric car can reach up to 15 kilograms. Half of the cobalt extracted is now destined for these uses.

Batteries containing this metal account for almost 55% of the global electric vehicle battery market, a figure that is estimated to account for 68% of cobalt demand by 2030 (source: Cobalt Institute, 2025).

The recycling of electric vehicle batteries is expected to grow by 30% annually until 2035. This growth will significantly increase the supply of recycled cobalt. Cobalt is one of the main incentives for recycling lithium-ion batteries because it is feasible to recover cobalt from scrap.

## 1 WORLD COBALT PRODUCTION

World cobalt production corresponds to a by-product of the extraction of other metals such as copper, zinc or nickel and is mostly present in mineral deposits in Central Africa and Indonesia, which account for more than 80% of production in 2023 according to USGS data (2024).

Images: SteveAllenPhoto999

The types of deposits of greatest interest from which cobalt is obtained are concentrated in stratabound deposits of copper sulfides and oxides, located in the Democratic Republic of Congo (DRC) and Zambia; nickel-rich deposits in tropical regions such as Indonesia, the Philippines, Cuba, Guatemala and the Dominican Republic; and in magmatic deposits of nickel sulfides and copper concentrated in Canada, Russia and Australia.

Currently, the DRC dominates the global cobalt market, producing over 73% of the world's cobalt in 2023, equivalent to more than 170,000 tons. However, social conflicts and political instability motivate consumer countries to seek more reliable alternatives. Indonesia is another major producer, having displaced Russia to third place in 2023. Although Indonesia's production costs are low due to its leaching techniques, cobalt is a by-product of nickel mining. Therefore, its production can be affected by fluctuations in the metal's price.

China is the main consumer of cobalt and also the main refiner. The Asian giant's production comes from copper, nickel and iron ore mining, from which cobalt is obtained as a by-product. However, because the recovery rate of this element is low, the process for obtaining it is complex and the cost of production is high. Few mines are economically profitable. This means that China is highly dependent on imports (source: Sernageomin, 2024).
According to the United States Geological Survey (USGS), Australia led world lithium production in 2023, with an estimated volume of 86,000 metric tons (LME) in early 2024. Chile and China were second and third with 44,000 and 33,000 metric tons, respectively.

It is worth noting that between 2010 and 2023, global production increased tenfold, and the countries that increased their production the most in absolute terms are Australia, Chile and China (source: ECLAC). Global production is concentrated in a handful of companies, with the two largest lithium producers (Albemarle and SQM) accounting for 53% of global production in 2022. Just six operating companies control nearly 80% of the world's lithium production, and it is expected that the reserves of these large producers will begin to decline, requiring them to replenish their reserves to maintain the same level of production.

### WORLD COBALT PRODUCTION YEARS 2022 AND 2023

| | 2022 | | 2023 | |
|---|---|---|---|---|
| **COUNTRY** | **PRODUCTION (T)** | **PARTICIPATION (%)** | **PRODUCTION (T)** | **PARTICIPATION (%)** |
| RDC | 144.000 | 73,1 | 170.000 | 73,91 |
| Indonesia | 9.600 | 4,87 | 17.000 | 7,39 |
| Rusia | 9.200 | 4,67 | 8.800 | 3,83 |
| Australia | 5.790 | 2,94 | 4.600 | 2 |
| Philippines | 3.900 | 1,98 | 4.000 | 1,74 |
| Others | 24.510 | 12,44 | 25.600 | 11,13 |
| **TOTAL WORLD** | **197.000** | **99.97** | **230.000** | **100** |

**Source:** USGS (2024) from the study
"Geological Potential of Critical and/or Strategic Minerals in Chile" by Sernageomin (2024).

## 2 WORLD COBALT RESERVES

In 2023, cobalt reserves reached 11,000 kt (USGS, 2024), especially in the DRC, where 6,000 kt are concentrated, with grades between 0.3 and 0.5%, representing almost 55% of world reserves. The largest deposits are concentrated in Katanga province, where some of the largest cobalt mines are located, such as Mutanda, Kamoto, Etoile and Ruashi, where the cobalt obtained is a by-product of copper mining.
The DRC's reserves are followed by Australia with 1,700 kt of cobalt ore and China's Gansu province with the largest domestic reserves.

# COBALT IN CHILE

Images: Vinicius Henrique Photography (@x_vinicius)

Chile is emerging as a major player in the global cobalt market. With an estimated production of between 10,000 and 15,000 metric tons of cobalt per year, Chile has the potential to reach leading positions worldwide.

The country's geological richness, particularly its iron oxide-copper-gold (IOCG) deposits and cobalt-bearing mine tailings in the Atacama and Coquimbo regions, represents a significant competitive advantage. This advantage can be exploited through innovative technologies that minimize environmental impact and optimize metal recovery.

From a scientific point of view, bioleaching is one of the most promising techniques for cobalt recovery in Chile. The process, based on the use of microorganisms to solubilize the metal present in sulfide ores and tailings, offers a more efficient and sustainable alternative. In addition, it helps mitigate environmental risks associated with pyrite oxidation, reducing the possibility of acid drainage and groundwater contamination (source: UST, 2025).

Along these lines, the Cobalto Verde project awarded by the National Agency for Research and Development (ANID) in 2023 to CSB UNAB, as the lead institution, and AMTC of the University of Chile, as a secondary institution, seeks to advance in the reprocessing of tailings and recover cobalt from biotechnology.

Cobalto Verde projects that at an average price of USD 44,700 per ton, the production that could be achieved in the future in Chile, adding the production from tailings and mines, would bring an annual income to the country of around USD 1,118 million. This confirms that the development of a national cobalt industry could diversify Chile's productive matrix, reducing its dependence on copper and lithium.

# 1 COBALT RESOURCES IN CHILE

In Chile, there are no reports on the resources or reserves of cobalt in deposits where this element is considered part of the main ore. Only some resource reports include cobalt in different prospects where it could be considered a by-product. One example is the project that is part of Capstone Copper's Mantoverde-Santo Domingo District Integration Plan, which has the potential to become one of the world's largest and lowest-cost producers of battery-grade cobalt (source: Capstone, 2022).

The latest report from the Canadian company (2025) indicates significant potential for exploiting this mineral in its future copper operations. They are currently conducting a preliminary economic evaluation to confirm the extraction, which should be completed by 2025.

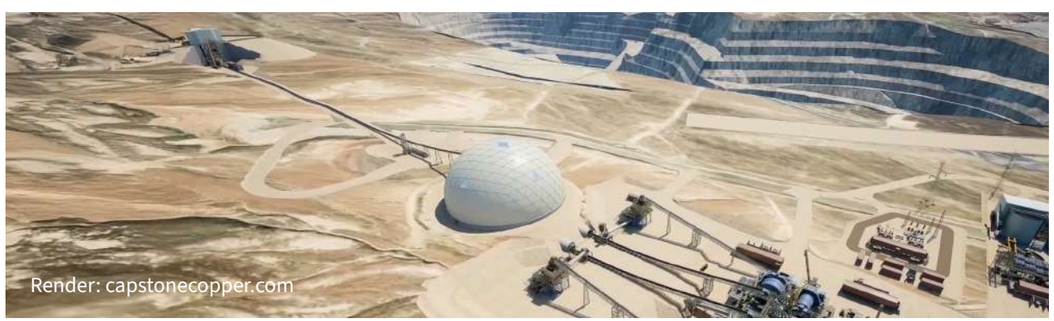
According to statements by its president and CEO, Darren Pylot, if Santo Domingo were in operation today, refined production of 4,700 tons of cobalt per year would make Capstone the fourth largest battery grade cobalt producer outside of China and the largest in the Americas.

In general, considering the affinity of cobalt with copper, arsenic and iron, all copper and iron deposits in Chile have great potential for cobalt sulfides or arsenides, especially those deposits rich in arsenic.

Similarly, cobalt deposits with the potential to be mined as a by-product correspond to IOCG oxide deposits and IOA oxide-type deposits. These deposits are associated with the Faja Ferrífera and the Atacama Fault System. Manto Verde, Los Colorados, El Algarrobo, and El Romeral are favorable deposits for exploration in this region (source: Brian Townley study, 2017).

Due to cobalt's affinity with arsenic, recent studies do not rule out the presence of cobalt ore in porphyry copper deposits. As in the case of gold, recovering it in the same metallurgical process used for concentrates would be an interesting objective to consider.

It is also possible to consider the environmental liabilities generated by mining, whose recovery processes do not take cobalt into account and, therefore, this mineral becomes directly part of the tailings. Since the tailings contain elements of economic interest linked to the deposits from which they were generated, it is confirmed that the cobalt contents derived from IOCG/IOA (iron-copper-gold and iron-apatite), Cu-Co-Au vetiforms and Miocene Cu-Mo porphyry deposits are related to the existence of pyrite. However, there is no public information reporting an estimate of resources or reserves of this mineral in these types of deposits (source: Sernageomin).



Render: capstonecopper.com

According to an investigation commissioned by Corfo, the Non-Metallic Mining Committee and Sernageomin in 2017, the districts of La Cobaltera, Carrizal Alto and Tambillos-Minillas - located between Atacama and Coquimbo, have potential to extract the mineral. Although, according to experts, there is still a lack of information to dimension its productive possibilities.

A recent study by the Geophysics Department at the University of Chile, published in the journal Earth-Science Reviews, examined the energy and mineral resources of the Chilean continental shelf, which extends up to 200 nautical miles offshore. The study determined the presence of 100 seamounts, suggesting the existence of cobalt-rich crusts along the Chilean coast.

Render: capstonecopper.com

# 2 CHILEAN COBALT PRODUCTION

Historically, the deposits that were exploited only for cobalt as the main resource in Chile are generally linked to copper, in very limited mining districts, distributed between the regions of Atacama and Coquimbo. There are records of cobalt production from the first half of the 19th century until the mid-1940s, which was entirely sent abroad.

Especially between 1906 and 1944, this production had important variations due to price decreases due to the opening of mines in Canada and increases due to the demand generated during the Second World War.

Spatially and temporally, these deposits are part of the Chilean Ferriferous Belt. The mining districts of San Juan, Carrizal Alto located in the Atacama region and Tambillos-Minillas, in the Coquimbo region, stand out, which had a relevant cobalt exploitation. Cobalt grades varied between 2 and 8%, and their production amounted to between 250-300 tons per year. Because this production was mainly used for steel alloys used in World War II, the historical record indicates that maximum production was reached in the 1940s.

The mines with the highest grades were Rosa Amelia and Blanca, located in the San Juan district in the present-day commune of Freirina, Atacama region, which contributed 80% of the national production in those years. The rest of the production was concentrated in mines in Copiapó, Coquimbo and Petorca, as well as in deposits in the sectors of El Volcán and Alto Maipo, today's Metropolitan Region of Santiago, where cobalt was exploited as the main ore.

Today, these districts may have remaining exploration potential for cobalt as a primary ore, because they were mined only to 100 meters depth, so deeper exploration could yield positive results (source: Brian Townley Study, 2017).

# 3 COBALT PROJECT PORTFOLIO IN CHILE

The interest in diversifying the Chilean mining activity as an allied industry of energy transition, cobalt exploration has intensified in recent years, mainly in the Atacama districts with historical production of the resource.

One source of information that has stimulated exploration corresponds to the chemical characterization of ores from metallic deposits in the Coastal Range provided by Sernageomin (2017) and available between the Atacama and Valparaíso regions. The most advanced exploration was led by Chilean Cobalt Corporation/Baltum with the La Cobaltera project, in the San Juan district (Atacama) with the execution of around 20,000 meters of diamond drilling until 2019, which has identified cobalt mineralization, copper and indications of gold. Currently, there are no public resource estimate reports available, resulting from the studies carried out to generate a NI43-101 report, about 14,000 m of drilling (source: SRK Consulting, 2019).

Another project under development by the same company is Carrizal Alto, in Atacama, with no defined exploration information. Additionally, the Farellón and Perth projects, of Red Metal Resources Ltda., in this district, show the results of analysis of surface samples and about 700 meters of reverse air drilling, with intercepts of copper, gold and indications of cobalt, which also do not have public resource reports (source: Sernageomin, 2024).

Render: capstonecopper.com

Images: SteveAllenPhoto999

D

# GLOBAL OVERVIEW OF RARE EARTHS

Images: Nikita_Karchevskyi

In the global transition to cleaner energy and advanced technologies, rare earth elements are essential mineral resources. This group of 17 chemical elements, including scandium, yttrium, and the 15 transition series elements known as lanthanides, is essential for manufacturing electric vehicles, wind turbines, and electronic and cellular devices, many of which contain more than a dozen of these elements. Rare earth elements also play a crucial role in sectors such as defense, medicine, and aerospace.

Rare earth elements are subdivided into two groups: light (atomic numbers 57 to 64: La, Ce, Pr, Nd, Pm, Sm, Eu, and Gd) and heavy (atomic numbers 65 to 71: Tb, Y, Ho, Er, Tm, Yb, and Lu). Yttrium (atomic number 39) and scandium (atomic number 21) are also considered part of this group because they have similar properties and are often found mixed with lanthanides in the same deposits.
In the world, rare earth deposits are widely distributed in the five continents, however, they are usually found in low concentrations, which makes their extraction difficult and expensive. The most important sources of rare earths are distributed in deposits in carbonatites and related rocks mostly concentrated in southern Africa; in addition to deposits in other types of geological contexts such as rock formations and clays in

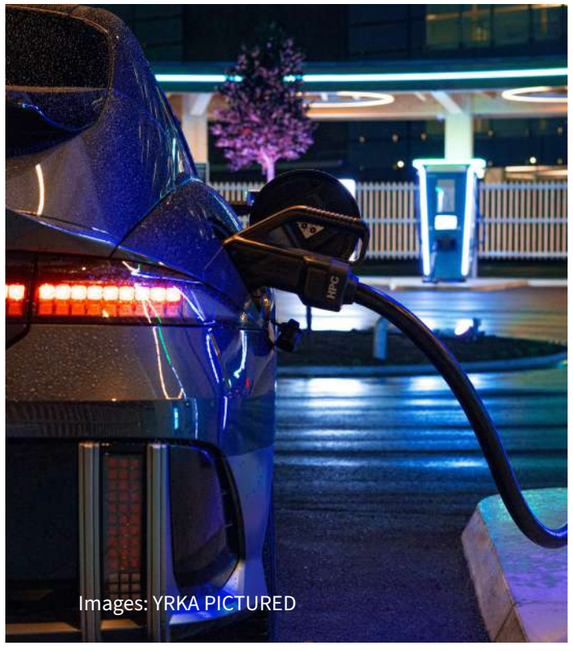

Images: YRKA PICTURED

Australia, China, North America and South America, especially in Brazil.

Some known areas where carbonatite deposits have been discovered include the Mountain Pass mine in California (USA), the Bayan Obo deposit in Inner Mongolia (China) and the Songwe Hill deposit in Malawi. Each of these deposits contains abundant rare earths, making them essential sources to meet global demand.

Chile is beginning to explore its potential as a key player in rare earths production from clay deposits discovered in the south of the country.

As the world moves towards electrification and digitalization, the demand for rare earths is increasing. In particular, because of its strategic importance in the manufacture of electric vehicles and economic forecasts that the adoption rate of electric cars will increase to 50% by 2030, rising - in just a decade - from three million in 2020 to 46 million electric vehicles in 2030.



Images: YRKA PICTURED

To increase their range, the average size and power of electric car batteries are expected to grow from 47 kWh to 94 kWh by 2030. These batteries require rare earth elements, especially neodymium (Nd) and praseodymium (Pr), as well as new, lighter materials such as graphene and other rare earth components such as neodymium-praseodymium (NdPr). These materials are expected to increase in price.

## 1 GLOBAL RARE EARTHS PRODUCTION

For decades, China led without counterweight the world's production of rare earths, capturing up to 90% of the production and supply of these elements. Starting in the 2010s, China imposed a series of restrictions on the supply of these materials through quotas, licenses and taxes, which triggered the development of the current knowledge of the characteristics and geological context of rare earth element deposits, as well as exploration programs.

This measure motivated the start of rare earth production in Australia in 2011 and in the USA in 2012; and the beginning of exploration and development projects and the establishment of new mining sites in other countries around the world (source: Sernageomin).

In 2023, global rare earth production increased from 300,000 to 350,000 tons REO eq. (rare earth oxides equivalent) over 2022. In the same year, China continued to lead world production with a total of 240,000 REO eq. tons, accounting for about 70% of annual production (USGS, 2024).

In addition to the geographic concentration of deposits, exploration and exploitation, it is important to consider the processing capacity, particularly refining, which must be considered in the market configuration and the level of criticality of this group of elements, and for which China controls about 90%.

## WORLD RARE EARTH PRODUCTION YEAR 2022 AND 2023

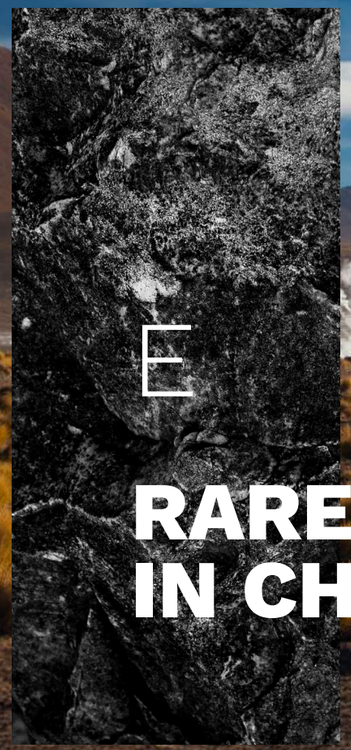
| | 2022 | | 2023 | |
|---|---|---|---|---|
| **COUNTRY** | **PRODUCTION (T)** | **PARTICIPATION (%)** | **PRODUCTION (T)** | **PARTICIPATION (%)** |
| China | 210.000 | 70,00 | 240.000 | 68,57 |
| USA | 43.000 | 14,33 | 43.000 | 12,29 |
| Australia | 18.000 | 6,00 | 18.000 | 5,14 |
| Myanmar | 12.000 | 4,00 | 38.000 | 10,86 |
| Thailand | 7.100 | 2,37 | 7.100 | 2,03 |
| Others | 7.820 | 2,61 | 7.220 | 2,06 |
| **TOTAL WORLD** | **300.000** | **100** | **350.000** | **100** |

**Source:** USGS (2024) from the study
"Geological Potential of Critical and/or Strategic Minerals in Chile" by Sernageomin (2024).

## 2 WORLD RARE EARTH ELEMENT RESERVES

As of 2023, world reserves of rare earth elements are approximately 104 Mt. China leads with approximately 33.85% of these reserves. However, countries with significant rare earth element reserves, such as Brazil, Russia, and India, have much lower production rates than the top five global producers.The DRC's reserves are followed by Australia with 1,700 kt of cobalt ore and China's Gansu province with the largest domestic reserves.

Images: Chalabala



E

# RARE EARTHS IN CHILE

Images: Kurt Cotoaga (@kydroon)

Chile, with its vast natural resources and an environment conducive to responsible mining, is well positioned to capitalize on the growing demand for rare earths. With a focus on sustainability and technological innovation, the country has the potential to become a major global supplier if progress can be made in extracting these elements from clays in the Biobío region or from ripios and disused mine tailings dams in the Coquimbo and Atacama regions.

Given the exploration and drilling conditions, there is no current or historical production of rare earth elements in Chile. Its occurrence has been the subject of research for about 40 years with very discreet results until the development of the Biolantanides Project that the Canadian capital company, Aclara Resources, intends to exploit clay horizons in the meteorized upper part of intrusive rocks in the commune of Penco, Biobío region.

Images: somosaclara.cl

## 1 CHILE'S RARE EARTH RESOURCES

No reserves of rare earth elements have been quantified in Chile. Of the types of deposits identified where rare earths are distributed worldwide, in Chile to date, the known resources are concentrated in clay-type deposits with ionic adsorption capacity, located in the Biobío region, which is home to the only primary mining project with current knowledge of its geological, mineralogical, environmental and technological characteristics.

Being, for now, the only prospect that justifies and supports the installation of a project for the exploitation of rare earth elements in the country, the Aclara company's facilities have resource estimates. To this initiative called Módulo Penco is added the previous information available in areas located in Cerro Carmen, Atacama region, north of the country.

The highest degree of certainty in resource determination has been achieved at Módulo Penco, where measured and indicated resources have been defined based on a drilling program (source: Ausenco Engineering Chile Ltda., 2021).

## 2 CHILEAN RARE EARTHS PRODUCTION

In Chile there is still no known production of rare earths. As reported, the only exploration project that could potentially produce rare earths in the country is the one led by Aclara Resources and Grupo CAP (which holds a 28.1% interest).

Since 2017, this project has advanced as a pioneering initiative in the country, focusing on the production of rare earth concentrate from ionic clays to exploit heavy rare earths. The project is estimated to require an investment of USD 130 million and will generate approximately 2,200 jobs, both directly and indirectly. In 2024, the project submitted its environmental impact assessment (EIA) to the Servicio de Evaluación de Impacto Ambiental (SEIA).

The company is working with an innovative extraction system that obtains minerals through a sustainable process using 100% recycled water. At the end of operations, the company will restore the productive areas with native species. This method is applied in a shallow clay deposit and considers the following: the non-use of explosives; the non-generation of tailings, radioactivity, and industrial waste.

In forest areas, excavations of no more than 20-30 meters are carried out to extract clay, which is treated to remove impurities and obtain a precipitate of rare earth carbonates, producing a weekly truckload; subsequently, the treated and washed clays are returned to the territory as fertilizer and allow the generation of native forest in the area.

This project has the potential to position Chile as a key player in the rare earths industry. As a result of this work, in November 2024 Aclara obtained a Research, Development and Innovation grant from Corfo to implement and develop a technological project for the exploration of rare earths through artificial intelligence.

Images: Daniel Arroyo (@danielh989)

F

# RARE EARTH PROJECT PORTFOLIO

Images: Danil_Rudenko

## 1 MODULO PENCO - ACLARA

It is located in the Coastal Mountain Range, near the city of Penco, Biobío region, and geologically it is located in the intrusive contact zone between the Southern Coastal Batholith and the Eastern Series of the Paleozoic Metamorphic Basement (Aclara, 2024).

Four main lithological units are recognized in the project area. In one of them, the mineralogy of interest corresponds to yttrium and heavy rare earth elements, hosted in xenotime and garnet; yttrium and dysprosium, in monazite and allanite.

For Aclara, the project is extremely attractive due to its high concentrations of heavy rare earths, which are concentrated and exploited worldwide in China.

Images: somosaclara.cl


Images: somosaclara.cl


Images: somosaclara.cl

The Modulo Penco project currently involves the construction and operation of a mine site with a processing plant for clays rich in rare earth elements (REE). The plant will have the capacity to process up to 320 t/h of wet clays and produce approximately 3,100 wet tons per year (1,700 dry tons) of REE concentrate. The project involves an investment of US$130 million, and is estimated to have a useful life of 9 years under current conditions (source: Aclara, 2024).
As part of the project's progress, Aclara must submit a new report to the Environmental Assessment Service (SEA) which, in general terms, is a technical redesign of the project that addresses the observations made by public services and the local community regarding environmental and social requirements.

In 2024, Grupo CAP bought 20 % of its subsidiary in Chile from the Canadian company Aclara Resources, which is focused on the ETR exploitation project in the country. This partnership would eventually expand the business value chain, as it would incorporate the possibility of manufacturing alloys, which is the stage prior to the manufacture of permanent magnets, used in electric vehicle motors or wind turbines (source: Aclara, 2024).


Images: vacuumschmelze.de

In 2024, the German company VAC (Vacuumschmelze) and Aclara Resources signed a Memorandum of Understanding (MoU) to collaborate on developing a resilient, ESG-compliant supply chain for permanent magnets. The partnership aims to leverage Aclara's rare earth projects in Chile and Brazil and VAC's magnet manufacturing expertise to meet the growing demand for sustainable and strategic rare earth materials.



## 2 CARMEN

This prospect is located on the eastern flank of Cerro Carmen in Diego de Almagro, in the Atacama Region. Geologically, it has been defined as a skarn-type deposit. It is in an area known as El Salado, which includes two other similar prospects, Sierra Áspera and Veracruz, located a couple kilometers north. These prospects have received less study (Source: Sernageomin).

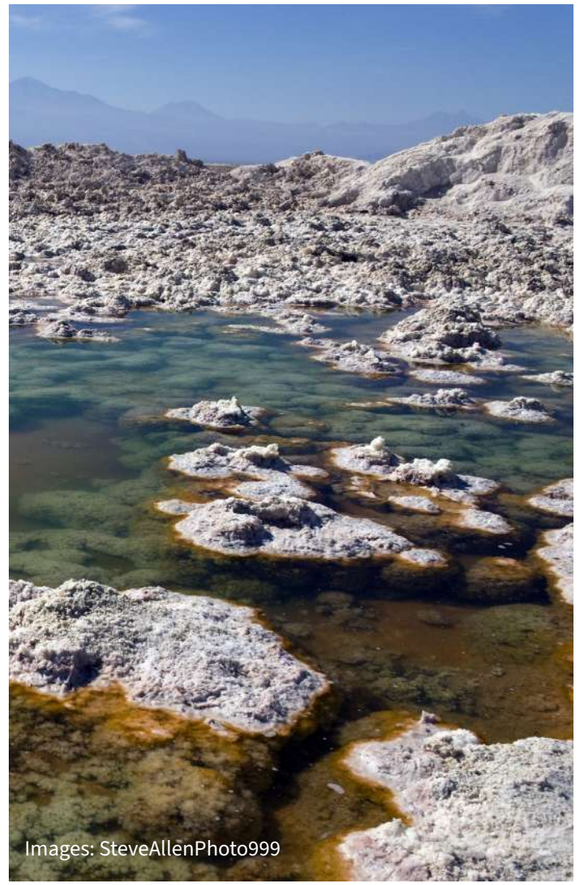
The existing minerals are iron, titanium, uranium, and REE in a quartz and feldspar matrix with hematite alteration.

The exploration program consisted of surface mapping to define mineralized bodies, gamma radiometry, excavating 35 trenches totaling 1,450 meters, and collecting 129 channel samples (450 meters long with a total weight of 800 kilograms) that were analyzed for 45 elements, including REE, uranium, and titanium, by ICP-MS.
Four main lithological units are recognized in the project area. In one of them, the mineralogy of interest corresponds to yttrium and heavy rare earth elements, hosted in xenotime and garnet; yttrium and dysprosium, in monazite and allanite.

## 3 TAILINGS

Due to the growing interest in exploring new sources of REE, attention has focused on processing mining waste, especially tailings deposits, to recover elements of non-traditional value (EVNT), including RREE.

Along these lines, JRI Ingeniería S.A.-Eco-Metales Limited (2020) compiled a list of 31 tailings deposits with copper (Cu) values exceeding 1,000 parts per million (ppm), iron (Fe) values surpassing 7%, and a total REE value surpassing 200 ppm. These deposits are mainly located in the Antofagasta, Atacama, and Coquimbo regions.


Images: SteveAllenPhoto999

G

# OPPORTUNITIES FOR CHILE-GERMANY COOPERATION

Images: SteveAllenPhoto999

Regarding potential opportunities between Chile and Germany in resources such as cobalt and rare earths, the High-Level Consultative Committee's definitions and recommendations are of particular interest. The committee is currently meeting with 16 experts as part of the process of developing a national strategy for essential minerals. This document is one of the Chilean government's key initiatives to establish the country as a leader in the global energy transition.

The Consultative Committee, of an intersectoral nature, has been one of the central spaces of the process, together with the Technical Committee - which in its first session brought together more than 120 experts from more than 80 institutions from the public, private, academic and civil society sectors - and the future territorial roundtables, which will begin to be deployed over the coming months.

In addition to taking advantage of the growing demand for mining products for energy transition, food security and global carbon neutrality, this initiative is considered key to diversifying the Chilean economy and attracting new investments. Simultaneously, international treaties and the status of suppliers are being reviewed to ensure sustainable sourcing.

In line with Chilean mining's efforts to diversify beyond copper production, circular economy and secondary mining strategies are feasible alternatives for cobalt extraction as a by-product of mining activity.


Images: Lemonakis Antonis

Recognizing the potential of its mining liabilities, the Chilean government has prioritized the valorization of tailings and the creation of added value in secondary mining. Thus, the government has opened itself to the possibility of creating a new line of business in mining that would generate significant economic returns for the country.

At the local level, at the end of last year, Corfo opened the first tenders to support alliances with local value chains between universities and research and technological development entities that have permanent technical capabilities and infrastructure to carry out R&D activities through the development of clean processes for the separation of cobalt from mining waste and pilots for the sustainable recovery of rare earth elements from secondary sources.

Because both Germany and Chile are committed to economic transformation and climate goals, they can develop a strategic partnership that enables them to source and process raw materials sustainably through environmentally friendly practices, resilient supply chains, and adherence to high ESG standards.

Aclara's circular mineral harvesting process favors the extraction of rare earths in ionic clays using 100% recycled water and without using natural sources. The technology, already patented and internationally recognized, would be opening up possibilities for the manufacture of rare earth alloys, an initiative that will be developed in collaboration and under a strategic agreement with VAC (Vacuumschmelze), a German company that engineers and manufactures permanent magnets based on rare earths.

Finally, before considering the possibility of collaborating or investing in Chilean territory, it is important to bear in mind that, although Chile does not usually offer subsidies or financial incentives, there are some advantages that investors in the mining sector can take advantage of. Among them are the following:

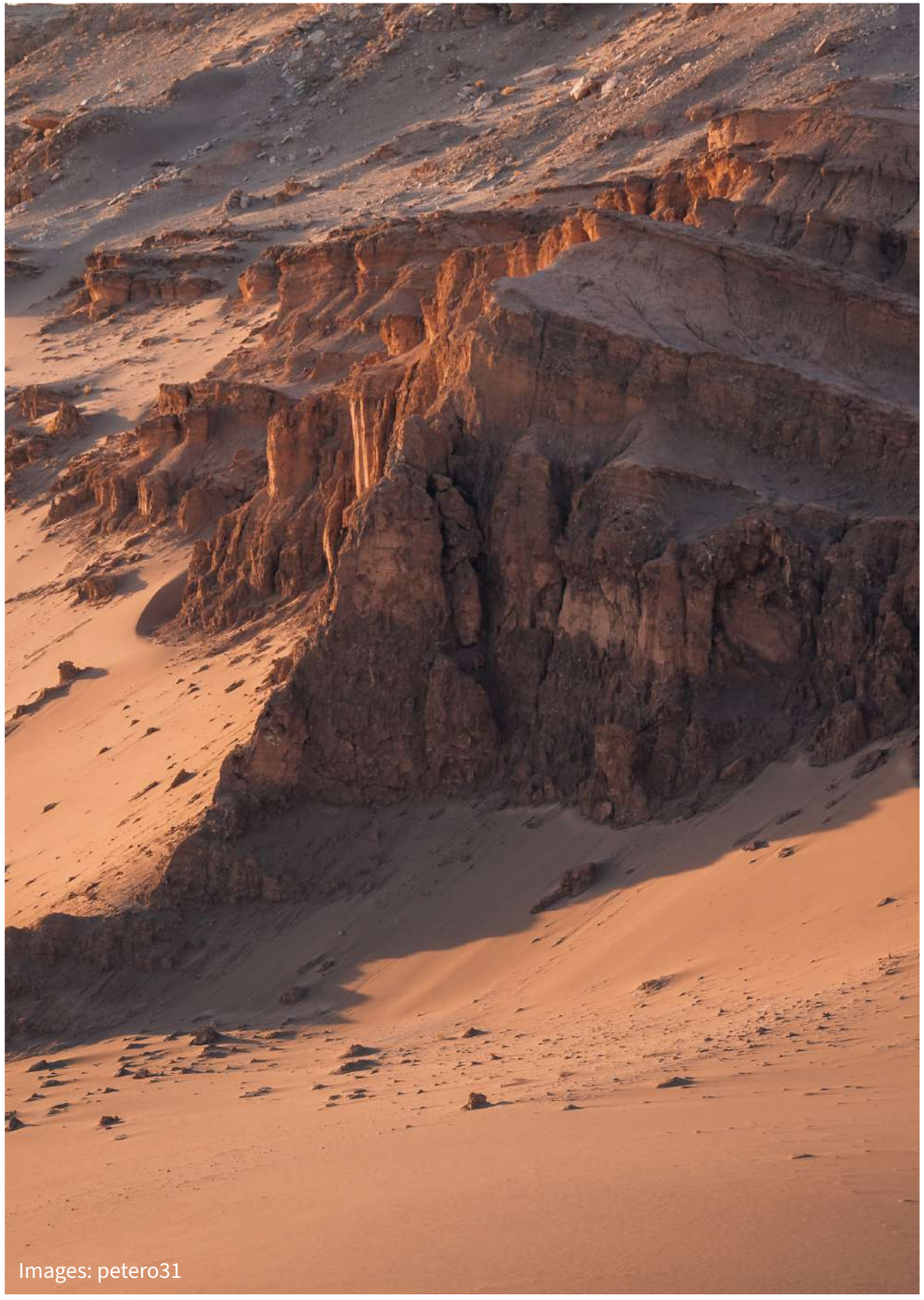
**- VAT (IVA) Exemption on Import of Capital Goods** The importation of capital goods for investment projects in excess of USD 5 million is exempt from customs duties and 19% value added tax (VAT). These benefits, which must be processed by the Ministry of Finance, apply to goods, spare parts, accessories, parts and other components. The goods must have a useful life of at least three years.

**- Research and development law:** This legal tool aims to encourage investment in R&D through tax benefits. In 2012 a series of amendments were introduced to the law, which will be in force until December 31, 2025 for any sector, including mining. The regulation establishes a tax credit of 35 % against the First Category tax (corporate income) on the amount invested in R&D (with a cap of 15,000 UTM per taxpayer, equivalent to approximately USD 1 million), while the remaining 65 % may be considered as an expense to generate income. The law includes both internal R&D expenses and those incurred in outsourcing. It covers both capital and ongoing expenses and includes intellectual property expenses. Projects must be certified by Corfo. The incentive is complementary to other public financing.

**- Free trade zones:** Chile has three free trade zones, two of which are important for the mining sector: the Iquique Free Trade Zone (Zofri), located in the capital of the Tarapacá region, and the Tocopilla Free Trade Zone (Zofrat), with a special focus on mining.

Zofri, in addition to its original facilities dedicated mainly to commercial logistics, includes the Alto Hospicio business park. Alto Hospicio, located on the outskirts of the city of Iquique, is conveniently located as it connects the routes to the region's main mining operations with Chacalluta, in the Arica and Parinacota region, a few kilometers from the Peruvian border. Corfo, its main shareholder, has identified opportunities in the free trade zone for the manufacture and maintenance of mining machinery and spare parts, as well as for other mining services. Zofrat is an export processing zone located in the port of Tocopilla, in northern Antofagasta. It was created for the production of mining inputs, parts and pieces. Zofrat's tax benefits were recently extended until 2035.


Images: SteveAllenPhoto999



Images: petero31

## TERMINOLOGY

| | |
|---|---|
| **BEV** | Battery Electric Vehicle |
| **Cochilco** | Chilean Copper Commission |
| **Corfo** | Chilean Economic Development Agency |
| **EIA** | Environmental Impact Assessment |
| **EIS** | Environmental Impact Statement |
| **ESG** | Environmental, social and governance |
| **REE** | Rare Earth Elements |
| **EU** | European Union |
| **IOCG** | Iron-copper-gold oxides |
| **IVA (VAT)** | Consumer Price Index |
| **PHEV** | Plug-in hybrid electric vehicle |
| **MoU** | Memorandum of Understanding |
| **RCA** | Environmental Qualification Resolution |
| **RDC** | Democratic Republic of the Congo |
| **REO eq.** | Equivalent rare earth oxides |
| **SEIA** | Environmental Impact Assessment System |
| **Sernageomin** | National Geology and Mining Service |
| **Subrei** | Undersecretariat for International Economic Relations |
| **USD** | US Dollar |
| **USGS** | United States Geological Survey |
| **UST** | Santo Tomás University |
| **UTM** | Monthly Tax Unit |

# STATE OF THE COBALT AND RARE EARTHS

## OPPORTUNITIES IN CHILE

AHK Deutsch-Chilenische Industrie- und Handelskammer
Cámara Chileno-Alemana de Comercio e Industria

PartnerForMining

Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag