Frequently Asked Questions About Mining

DIC 2022

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Introduction

Mining is all around our daily life and is a paramount activity for the development of the country. However, it is also a controversial activity. Currently, the citizens are demanding us to improve the standards, the transparency and the information about productive activities such as mining. The National State is the body in charge of providing the answers.

In this framework, two new instances have been created in Argentina. The first one is the Open Information System to the Community about Mining Activities (SIACAM), which is a unique data and information system about the different variables related to mining, that include economic, social, environmental and ongoing project indicators. The first SIACAM version has been deployed, and will be widened and updated during the next months.

On the other hand, the National Board on Mining Open to Community (MEMAC) was created. The MEMAC starts from the diagnosis that until now there has not been a sufficient constructive, scientific dialogue with robust information on mining, and its positive and negative impacts, its challenges and its potentialities.

MEMAC is formed by Representatives of the Ministry of Productive Development, Ministry of Environmental and Sustainable Development, Ministry of Science, Technology and Innovation, Ministry of Health, the Federal Mining Council (COFEMIN), the National Interuniversity Council; the National Council for Scientific and Technical Research (CONICET); the Governors of the different jurisdictions; trade associations and business chambers linked to the sector and its suppliers.

Attending to the need for information and recurring concerns about the status of the Mining in Argentina, its challenges and opportunities, we have developed this Frequently Asked Questions About Mining, that can also be useful for those who want to enter the activity. The topics are the following:

1) Basic data about mining
2) Social, labor and local development aspects
3) Economic aspects,
4) Environmental and Health aspects,
5) Regulatory aspects
6) Citizen and community participation

1. Basic data about mining

1.1 What is the purpose of mining? Which are the main uses?

Mining has surrounded our daily life from the very start of the human civilization. In our homes, everything is built from minerals: bricks, tiles, ceramics, floors, iron, plates, wires, bronzes, utensils, pipes, cables, fittings, paints, toilets, tools and crockery. They are made up of elements extracted from minerals.

Outdoors we use vehicles, built entirely or almost entirely with raw materials that are produced from mining. Also, the fuel, the roads and the traffic lights have mineral origin. Without mining, there would be no important civil works, railways, ships, machines or industrial facilities in the modern world. No energy could be produced or transported, neither tools or machines to sow, harvest, elaborate, process, preserve and transport food or manufacture any good in the economy.

The service sector is also very dependent on mining through technology, from hairdressers to information technology companies. The art production would be very difficult without mining, since, for instance, musical instruments require minerals. Without mining, the existence of the Internet, computers, and telecommunications would not be possible either, since electronics require a wide variety of minerals.

Likewise, renewable energies, essential to deal with climate change, require mining.

In short, both our current and past society have been built on the production and industrialization of minerals. As the saying goes: “If it is not farmed, let it be mined”.

1.2 What types of mining exist?

Although we usually talk about "mining" as a whole, there are different types of mining. For example, we can break down mining according to metals (such as copper, silver, gold, iron, etc.), lithium, fuels (such as coal) and non-metallic minerals (such as clay, salt, lime, etc.) sand, application rocks, etc.).


Non-metallic mining, Santa Rosa Quarry, La Pampa.


Cerro Negro project, Santa Cruz. Underground and open pit exploitation.

In general, the production processes are different for each case. Due to its own characteristics, currently metal mining usually takes place on a large scale and, depending on the case, it can be open pit or underground.

In non-metalliferous mining, the scales are, on average, lower than metalliferous. Meanwhile, in brine-based lithium, the production processes are different, since it is much more of a chemical process and, compared to metal and non-metal mining, blasting services are not required.


Cachauri-Olaroz project, lithium production. Jujuy.

1.3 What types of minerals exist?

Even though there are several classifications, the most common groups minerals in: *metallic minerals, non-metallic minerals, industrial minerals and application rocks, and fuel minerals.*

In the case of metallic (or metal) and non-metallic minerals, their differentiation lies in their physical properties: metallic ones such as gold, silver, nickel or copper, among others, have a shine, are moldable and are good

electricity conductors. Meanwhile, non-metallic minerals are those that do not have a metallic shine and are not conductors. Some examples of non-metallic minerals are sulfur, graphite and salts, among many others.

Non-metallic minerals include a very important group of minerals that are the industrial minerals and application rocks, which, as their name indicates, have a wide variety of uses in industry and in the construction field. In the first group we find quartz, feldspar, micas, clays, fluorite and talc. Among the latter, there is limestone, sand, granite, marble, among others, which can be used as raw materials or as ornamental rocks.

Finally, coal is considered a "fuel" mineral (along with oil and gas) for i ts primary use, electricity generation.

1.4 What are the current types of mining like? How does open pit mining work? How does underground mining work? And what about lithium?

There are different methods for mining exploitation. As far as traditional mining is concerned, there are two main ways of obtaining it: underground and surface. The latter encompasses various methodologies and includes the so-called Open Pit, widely used in large-scale mining.

A surface mine is an open pit excavation intended for the exploitation of minerals. This system can be used for the extraction of metallic or non-metallic minerals from any mineral deposit close to the ground surface. These operations tend to employ few staff per unit of product, since there is a high mechanization degree in the tasks.


Open pit, Gualcamayo Field, San Juan.

As we have mentioned before, open pit mining is a superficial extraction, and its purpose is to extract large volumes of rock that contain low mineralization percentages. The result is a large, high-precision opening in the ground, developed to extract the maximum content of mineralized rock with no danger of collapse. After the mineralized rock extraction, the material is transported to a processing plant to reduce its size (grinding) and continue to separate the mineral of interest from the rest of the rock obtained.

On the other hand, underground mining is the exploitation of the mineral resource that develops below the land's surface. For the selection of this method, not only the characteristics of the deposit must be considered, which is generally found in-depth, but also the cost of extraction, since it is a more expensive method than the superficial one. Due to this, underground mining is generally used for: deposits such as gold and / or silver veins, which are thin and deep, or also in deep horizontal deposits, such as large coal deposits that, in our country, are arranged in the form of horizontal mantles at depths averaging 300 meters. Underground mining is also used in large surface fields that no longer allow surface mining due to cost reasons.

There is a wide variety of engineering methods for underground mine exploitation. The methods come from the kind of mineral to extract.

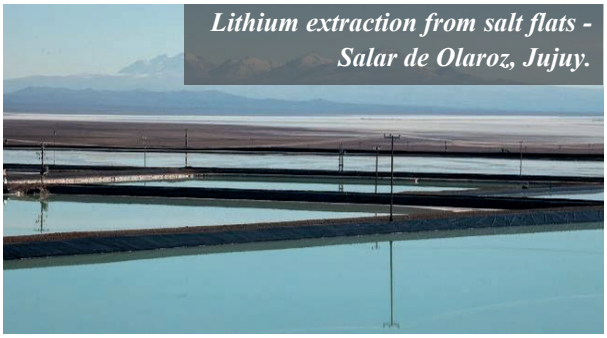

Underground - Cerro Negro Field, Santa Cruz

In more expensive than open pit or surface mining. Since the exploitation process is more complex, it usually uses more specialized labor, implying greater risks for the workers. Hence, the deployment and maintenance of ventilation, energy, transport, and safety systems are a huge challenge.

Lithium can be obtained from two sources: a special type of rock called "pegmatite" and salt flats. Lithium extraction from pegmatites is similar to the traditional exploitation of other metal types, so, under this modality, lithium minerals are extracted by open-pit mining. This method is used mainly in Australia, China, Zimbabwe, Portugal and Brazil.

Lithium extraction from salt flats entails a particular extraction process, typical for this mineral, which includes, in most cases, a pumping system followed by brine evaporation.

More precisely, brine (groundwater with high salt concentration) is pumped from the salt flat depths and transported to large evaporation ponds built in the waterproofed salt flats. In these pools, lithium is separated from other salts (sodium salts, for example) by evaporation and/or precipitation until a concentrated lithium brine is obtained.



Lithium extraction from salt flats - Salar de Olaroz, Jujuy.

The processing of lithium compounds (such as chlorides, carbonates or hydroxides) continues in an industrial plant, with a chemical process in which reagents are used to extract new residues and achieve the desired purity. Today, Argentina produces lithium carbonate with a purity greater than 99%, equivalent to lithium for battery manufacturing use.

1.5 Which are the stages of a mining project?

The stages of a mining project are described as follows, in increasing order of progress. Traditionally, they are:

a. Prospection

This stage is aimed at determining areas, that is, areas with a high concentration of interesting minerals presence, with the potential to be future exploration areas. This process is carried out through minimally invasive activities on the ground, generally with a detailed mapping of the area of interest made by specialized computer tools. A collection of rock samples is sent to be analyzed in the laboratory, and geophysical studies are also carried out to more accurately evaluate the subsoil characteristics.

b. Initial exploration

The objective is to determine the main geological characteristics of the deposit identified at the prospection stage. Meaning: the minerals contained at the deposit, the amount of interest mineral, and its distribution (both in

depth and extension). At this stage, the sampling data is not enough to estimate the economic importance of the resource.

c. Advanced Exploration

Once the areas with the highest mineral content have been defined, more detailed studies are performed to define the possible field's characteristics. In this stage, the number of drillings is notably intensified, mainly of the DDH (diamond) type, because this type of drilling allows more detailed data of the subsoil findings. The data collected at this stage is sufficient to have a first estimate of the resource.

d. Preliminary Economic Evaluation

It is a general evaluation that leads to a preliminary report, ("PEA") carried out at an early project stage, to initially establish the reserves (the part of the mineral resource that can be extracted with an economic benefit).

e. Prefeasibility

It is a deeper analysis, that aims to delve into the possibility of the project start-up. Cost analysis is included in this study, based upon estimated data from previous stages. The financial analysis of the project is based on mining, processing, metallurgical, economic, commercial, legal, environmental, social and governmental considerations.

f. Feasibility

In this stage, the following items are defined: the design of the mine, the exploitation method, how minerals will be processed, transportation, production costs, and the resources required for the mine development. The project's economic feasibility is also set according to the law (mineral concentration on rock) and the mineral quantity.

g. Building

It is the construction of the facilities necessary for the project start-up. All the infrastructure works for the project start-up are carried out at this stage (road preparation, plant construction, etc.) Generally, this stage lasts for several years for metal mines (e.g., copper, gold, silver) and requires a higher task force. Vendor development (construction, engineering services, transportation, logistics, catering, supply trade, etc.) in the regions where the project is located is also favored.

h. Operation

The project is fully in production. The extraction and commercialization of higher volumes of minerals begin at this stage. This is when the periodic flow of foreign currency income to the country starts, in the case of exported minerals.

i. Maintenance

It is a systematic revision program to the entire set of tools and machinery that make up the mine's productive system. It is carried out preventively and correctively during the production process, and prior to the closing process. It differs from the production stage because production is at full stop.

j. Closing process

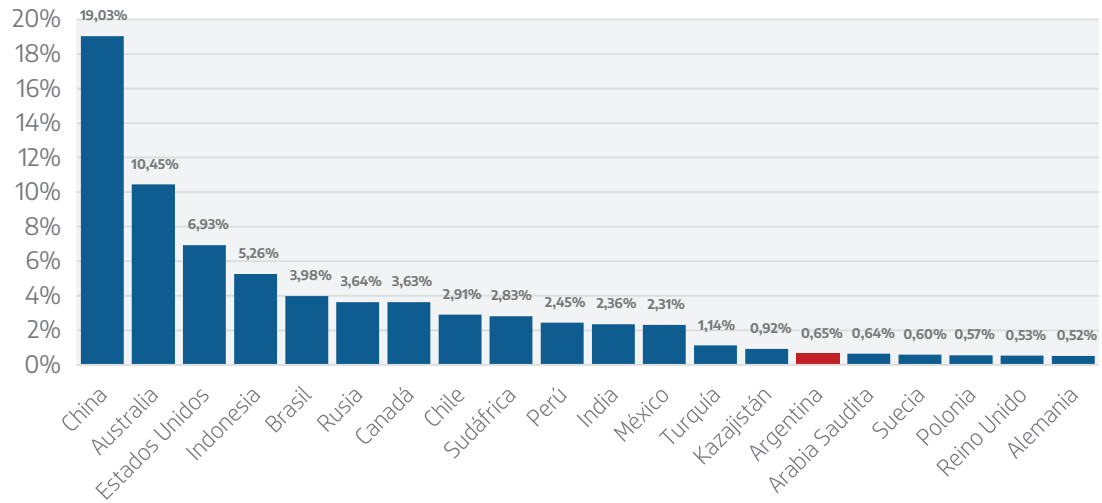
This process begins when the project reaches the end of its useful life, and on-site remediation tasks must be carried out according to what was planned at the beginning of the project and to the schemes authorized by the competent authorities.

1.6 Which countries have mining development?

Given the importance of mining in our daily lives and the wide territorial distribution of fields, there is large number of countries performing mining activities. According to OCDE database, which has disaggregated information for 66 countries, in 2018 the global mining GDP was equivalent to 0.65% of the global GDP (considering only the primary link).

China is, by far, the top contributor to global mining GDP, with 19%. Followed by Australia (10.5%) and United States (6.9% of total). Developed countries such as Canada, the United Kingdom, Germany and Sweden are among the 20 top miners in the world, as well as large emerging countries such as Indonesia, Brazil, Russia, India, Mexico or Turkey. Argentina is ranked 15th globally, with 0.65% of the total world mining GDP.

Chart N° 1 Share of the top 20 countries over global mining GDP



Source: Own elaboration based on TiVA-OECD. Data until 2018

1.7 What minerals does Argentina produce and in what quantities? What is the relative importance of each of the minerals in the Argentine economy?

Argentina produces more than 30 different types of minerals, including gold, silver, lithium, crushed stone, sand, lead, limestone, boulders, zinc, salt, borates, clays and coal, among others. It is worth mentioning that, until 2013, copper was the second most important mineral, but the country is not producing it since the closure of the

Bajo La Alumbrera mine in 2018. However, production may probably be reactivated according to the investment level in several fields. Argentina is ranked 4 in world lithium production.

In 2019, the three minerals making the most relevant contribution to the Argentine mining GDP were gold (57.4% of the total), silver (15.9%) and lithium (7.0% between carbonate and chloride). These three minerals accounted for around 80% of the total mining production.

Chart 1. Mineral Production in Argentina, 2019

Mineral	Share in Mining GDP
Gold	57.4%
Silver	15.9%
Lithium carbonate	6.3%

Continued on next page.

Chart 1. Mineral Production in Argentina, 2019 (cont.)	
Mineral	**Share in Mining GDP**
Stone crushed	4.4%
Sand for construction	3.6%
Lead	2.2%
Limestone	1.7%
Boulder	1.2%
Zinc	1.1%
Common Salt	1.0%
Siliceous sand	0.9%
Mineral coal	0.8%
Clay	0.7%
Lithium chloride	0.7%
Cast	0.3%
Borates	0.3%
Tuff stone	0.2%
Basalt	0.2%
Others	0.9%
Source: Mining Secretary Data are estimated in constant Argentine Pesos (ARS) 2016	

In terms of quantities, more than 74 million tons of minerals were produced in 2019, highlighting crushed stone (22.75 million), construction sand (21 million) and boulders (8.88 million).

The minerals with the highest monetary participation, such as gold, silver and lithium, had a low participation in terms of volume. Argentina produced 53.1 tons of gold, 1,071 tons of silver and 34,293 tons of lithium (between carbonate and chloride). This indicates a very high value per ton of these minerals vis-a-vis the rest.

1.8 What are the mining projects underway in Argentina?

According to the 2016 National Mining Census, in Argentina there are 1,144 productive establishments with production linked to mining. Some of them stand out for their larger scale and/or export potential.

Metalliferous projects tend to be larger in scale and have a greater export potential. Currently, Argentina has 17 metal projects in operation, whose main products are gold, silver, lithium, with lead and zinc production as by-products. In these projects:

- In 12 of them the main metal is gold.

In 3 of them, silver.

In 2, lithium is produced.

In addition to the projects in operation, Argentina has a portfolio of 95 projects in advanced stages, ranging from advanced exploration to construction, including gold, silver, copper, lithium, potassium and uranium.

Chart 2. Metalliferous projects in operation

Name	Main Product	Province	Controlling Agents
Ajedrez	Gold (alluvial)	Jujuy	Espíritu de Los Andes S.A
Cap-Oeste	Gold	Santa Cruz	Patagonia Gold / FOMICRUZ
Cerro Moro	Gold	Santa Cruz	Yamana Gold Inc.
Cerro Negro	Gold	Santa Cruz	Newmont Goldcorp
Cerro Vanguardia	Gold	Santa Cruz	AngloGold Ashanti Ltd / FOMICRUZ
Córdoba	Gold (alluvial)	Jujuy	Gasmarra Minería S.A
Don Nicolás	Gold	Santa Cruz	Cerrado Gold Inc.
Farallón Negro	Gold	Catamarca	YMAD
Fenix	Lithium	Catamarca	Livent Corporation
Gualcamayo	Gold	San juan	Mineros S.A.
Lindero	Gold	Salta	Fortuna Silver Mines
Lomada de Leiva	Gold	Santa Cruz	Patagonia Gold / FOMICRUZ
Manantial Espejo (Cose Joaquín)	Silver	Santa Cruz	Panamerican Silver Corp
Puna Operation (Chinchillas - Pirquitas)	Silver	Jujuy	SSR Mining Inc.
Salar de Olaroz	Lithium	Jujuy	Allkem Ltd. / Toyota Tsusho / JEMSE

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Chart 2. Metalliferous projects in operation (cont.)			
Name	**Main Product**	**Province**	**Controlling Agents**
San José	Silver	Santa Cruz	Hochschild Mining Plc / McEwen Mining Inc.
Veladero	Gold	San Juan	Barrick Gold Corporation / Shandong Gold Mining Co. Ltd.

The trajectory of two of the main mining operations in activity in the country are included as an example: Cerro Vanguardia (Santa Cruz) and Veladero (San Juan).

Cerro Vanguardia is the oldest of these two. It began its activity in 1998 through a US$ 270 million investment carried out by the South African company AngloGold Ashanti. It is a mining operation dedicated to the exploration, extraction and treatment of gold (Au) as the main product and silver (Ag) as a by-product, located on the Patagonian plateau, about 150 km northwest of the city of Puerto San Julián, in the Magallanes Department, Santa Cruz Province. From its inception to 2021, the project accumulated exports of US$6,592 million, reaching its maximum value in 2017, with foreign sales of US$508 million. Although it was estimated that the project would end in 2012, investments were made in 2010 for an additional US$ 50 million to extend the useful life, which added to the US$ 29 million investments made during the previous year. Later, these were added to the US$ 183 million invested between 2015 and 2017, linked to maintenance capital expenditure and investments in exploration, aiming to extend the useful life of the mine.

As for Veladero, it has been operational since 2005, having accumulated exports (in February 2022) equivalent to US$ 13,052 million since then. Like Cerro Vanguardia, it mines and treats gold as the main product and silver as a by-product. It is located in Iglesia, a department in San Juan, 350 kilometers from the province capital.

The initial capital cost was estimated at US$460 million, which was added to the US$83 million previously disbursed by Canada's Barrick Gold, who made the investments in the project's first stage. In addition, it was estimated that a total of US$ 65.5 million of sustainability capital would be required, destined for equipment maintenance and replacement, as well as other works necessary for the development of tasks during the 13 years of operational life originally planned by the project.

Between 2009 and 2010 the company made investments of US$23 million for the first expansion of the original project, and in 2017 Barrick Gold announced the sale of a 50% stake in the mine to the Chinese company Shandong Gold Mining Co. Ltd, U$S 960 million. The new company gave rise to the formation of a joint venture with equal shares, called Minera Andina del Sol.

This new stage of the project gave rise to an expansion scheme that was established in five additional phases, which will give continuity to operations until at least 2031. The original closure was scheduled for 2018.

1.9 What's the potential of mining in Argentina?

In 2021, mining accounted for over 4% of goods exports, with more than U$S 3.2 billion. This figure is similar to exports of bovine meat and wheat. Mining also employs more than 33,000 people directly, and this employment is located in regions far from the main cities in the country. Within mining, the metal segment (the most important) is, together with hydrocarbons, the sector with the highest remuneration and formality rates in

the country. Due to this it can be stated that mining contributes to the generation of federal productive poles, and collaborates with the decentralization outside the Central area.

To have an estimation about the still unexploited mining potential under the Argentine soil, it can be compared to the production levels reached by the neighboring countries of Chile and Peru, with which we share the Andes Mountains. Indeed, both countries lead the rankings of global mineral exports, occupying the first and second place as world producers of copper, respectively, while Peru also occupies the third place in silver production. (Statistical Yearbook of Copper and Other Minerals 2001-2020, Cochilco).

Argentina is ranked among the main mineral reserves worldwide. This feature will make our country a major player in mining investments in the short term. Together with Chile and Bolivia, the northwest of our country forms the so-called "Lithium Triangle", currently the fourth largest producer and the third largest world reserve of this mineral.

Mineral reserves are a dynamic concept, based on the exploration and the economic conditions that make economic exploitation feasible. Argentina is a relatively unexplored territory. We expect that, compared to the world rankings of mineral reserves, its position will rise as exploration tasks advance and activity develops shortly. According to the S&P exploratory budget base, Argentina has, in recent years, climbed positions as a destination for global exploratory budgets, and in 2019 it entered the world's top 10.

However, it should be mentioned that part of the potential of mining activity in our country is already in process. The country currently has a portfolio of 95 advanced projects, in stages ranging from advanced exploration to construction, which could run into production in the coming years. Among these, between January 2020 and December 2021, investments amounting to U$S 9.31 billion have been announced. 94.5% of them will be allocated to construction and expansion.

Estimates from the Mining Secretary indicate that only the completion of the most advanced projects would quadruple exports of the 2021 mining basket over the next ten years, to exceed US$13.2 billion.

1.10 Which are the differences and similarities between current mining and past mining?

Like many other productive activities, mining has undergone changes throughout history. The most important changes occurred during the 20th Century. Changes in the processes and the transformation of minerals took place and made two things possible: the increase in production scale and the conversion of rocks formerly considered sterile or with no economic value into ore (rock with economic value). Technological advances made it possible to reduce costs and to extract minerals more cheaply, reducing environmental impacts and the risks for workers.

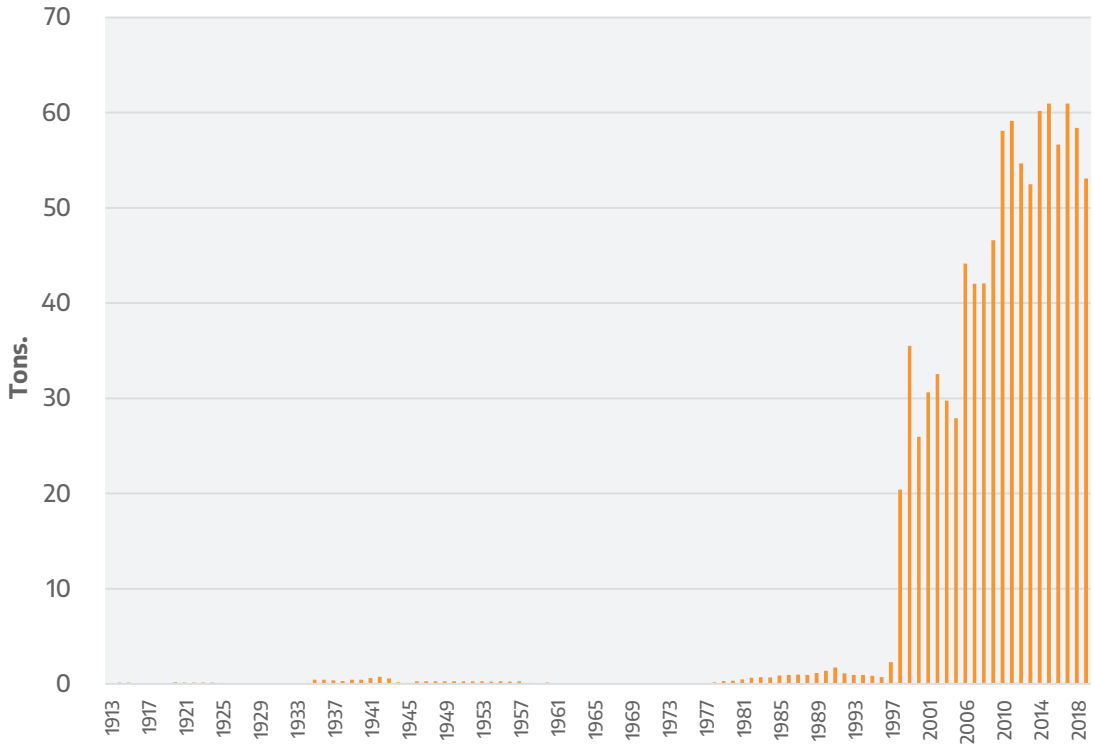
Worldwide, the greatest changes in industrial safety and the environment began to take place in the 1970s, largely as a result of new regulations that have forced companies to change their practices. Since then, mining – particularly metal mining– has become an industry with high levels of safety.

In all productive activities, including mining, the Environmental Impact Assessment was adopted as the main preventive procedure. Processes and infrastructure are based on this document, and were adapted to make them compatible with the objective of protecting the environment. Within the framework of these procedures, waste management programs, protocols for the safe handling of chemical inputs, noise and emission mitigation procedures, continuous water, air, and soil quality monitoring systems were implemented. If said preventive systems should fail, contingency plans were included to guarantee that the potential incident do not significantly impact the environment.

When these changes began to globally take shape, mining in Argentina was scarcely developed. Until the 1990s, the State was in charge of the top mining activities in the country, such as iron, coal, uranium, and copper. Private companies, mostly national capitals, were engaged in mining, supplying construction and industrial minerals.

Thanks to the regulatory framework given by the mining investment law of 1993, with the principal mining productive transformations already underway, metal mining became relevant in Argentina in the 1990s. There was no foreign direct investment (FDI) in the sector until then. Its arrival caused the appearance of more advanced technologies, new for Argentina, with greater safety and less environmental impact. For this reason, Argentina entered the global metals market when the new standards were already developed, which prevented the country from going through adverse experiences. The best example of this is the gold production in Argentina from 1913 up to the present.

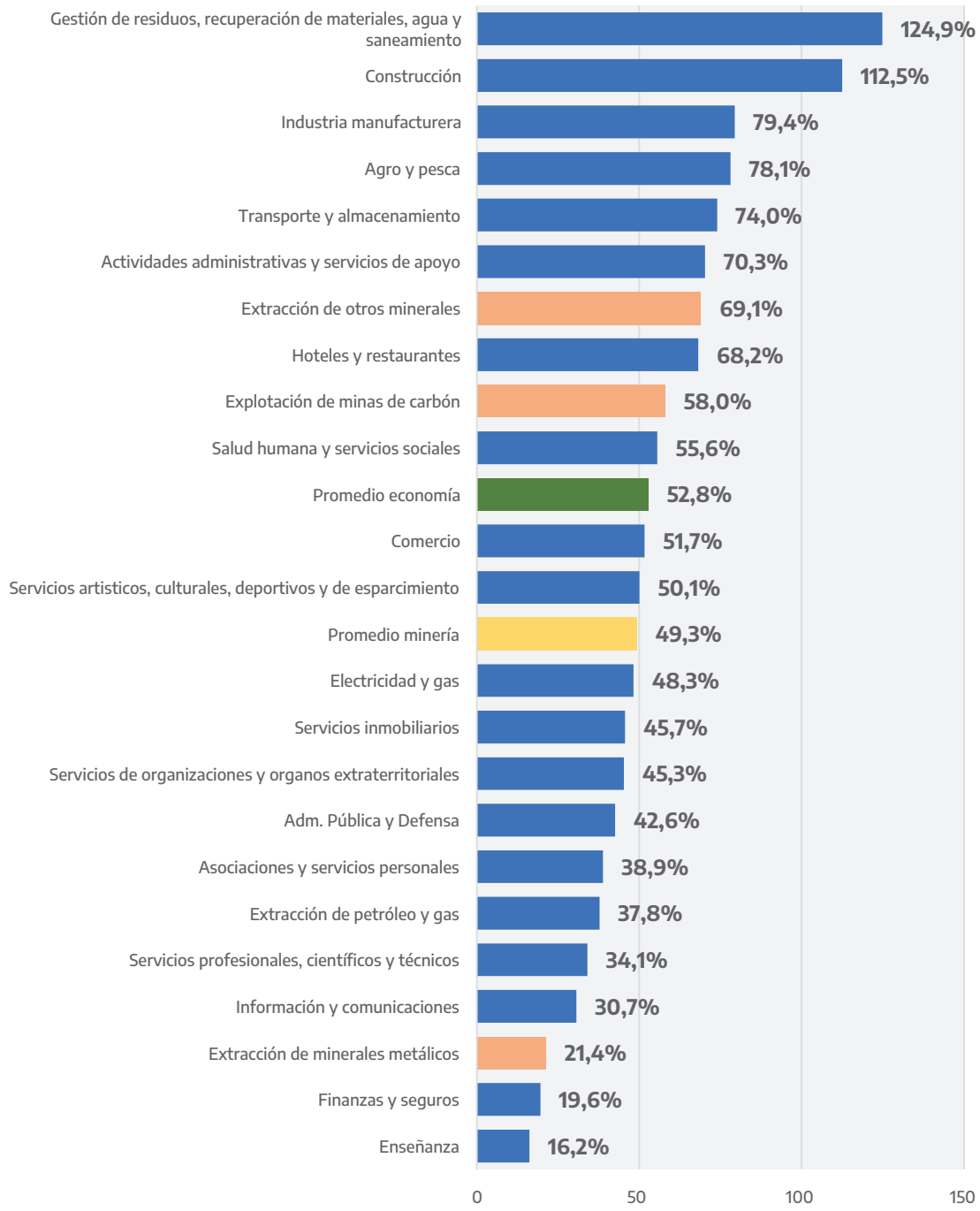
Chart N° 2 Gold production in Argentina



Source: Mining Secretary, based upon British Geological Survey and own estimations.

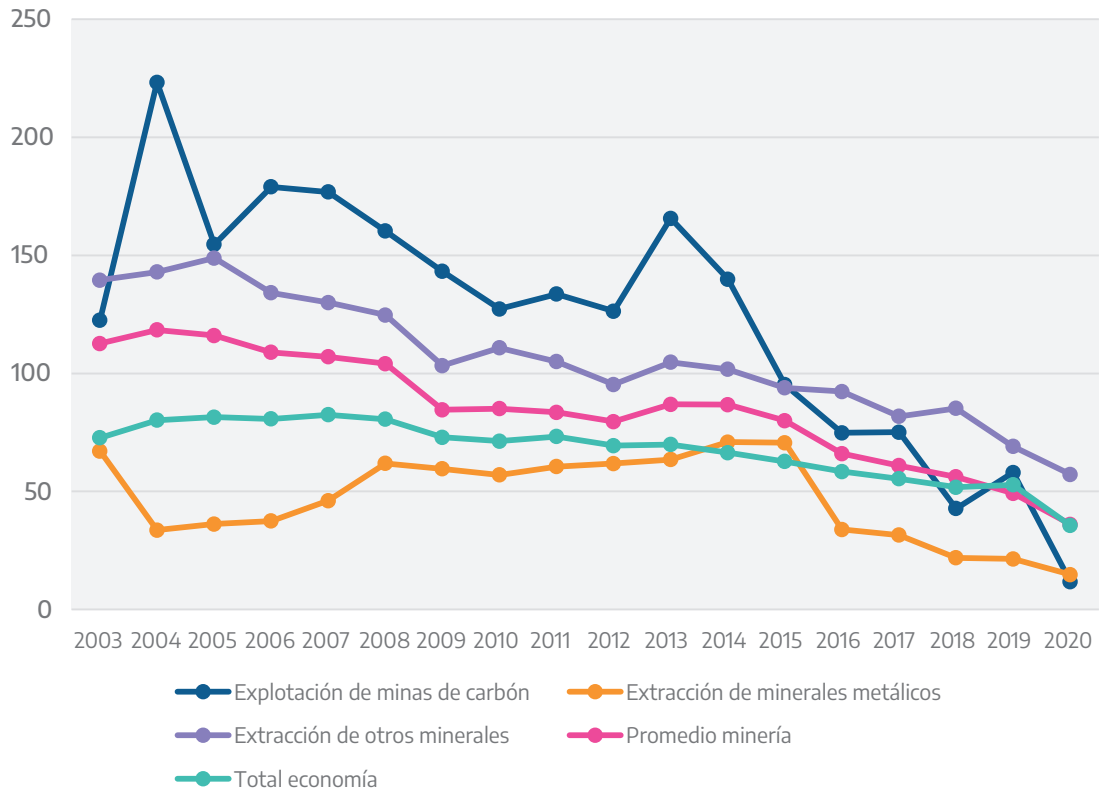
Metal mining is currently one of the safest activities in the economy. According to the Superintendency of Occupational Risks (SRT), in 2019 and 2020, metal mining registered the lowest occupational accident rates in the entire economy, only behind education and the financial sector, both branches with low-risk exposure. In contrast, non-metallic mining – where traditional and handcrafted practices are more frequent – still registers higher levels of occupational accidents than the average for the economy. However, according to SRT data, both metal and non-metal mining have experienced – similarly to what has happened in other productive activities – a sustained reduction in labor accidents rate so far.

Chart N° 3 Accident rate by sector (cases with days off and disability per 1,000 workers covered). Year 2019.



Source: CEP-XXI and National Directorate for Mining Promotion and Economy, with data from the Superintendence of Occupational Risks.

Chart N° 4 Accident rate by sector (cases with days off and disability per 1,000 workers covered), 2003-2020



Source: CEP-XXI and National Directorate for Mining Promotion and Economy, with data from the Superintendence of Occupational Risks.

2. Social, labor and local development aspects

2.1 How many jobs does mining generate?

There were 33,825 direct formal salaried jobs in mining by the end of 2021. Only the following aspects are considered here: formal and registered employment, metal mining, non-metal mining, coal mining, direct support services to mining, and mining employment in companies linked to mining production process (for example, cement and brick industries).

These figures only account for direct employment. According to the Center for Production Studies (CEP-XXI), mining generated 1.03 indirect formal jobs per direct job in 2019 (considering only the first-ring suppliers).[1] Extrapolating with the current data, this would offer approximately 34,830 additional indirect jobs only in the first-ring suppliers, which would amount to 68,655 formal jobs between direct and immediate providers. The Argentine Chamber of Mining Entrepreneurs (CAEM), based on information from the consulting firm Abeceb, estimates a total of 83,000 jobs throughout the chain in 2021. Figures are higher since not they do not only take immediate suppliers into account but vendors' suppliers and non-registered employment too (for example, independent employees that are also part of the supply chain).

[1] First-ring suppliers are those selling goods and services directly to mining companies. Suppliers have their own suppliers (second ring) and so on. The CEP-XXI estimation only considers the effect on immediate suppliers.

2.2 Which are the main provinces in terms of mining employment?

Although all 24 jurisdictions have formal mining employment, there are 7 provinces that account for 80% of direct mining jobs.

If we focus on the place where mining operations are carried out, we find that Santa Cruz is the main province, with 27.8% of total direct employment. It is followed by San Juan with 14%, the province of Buenos Aires with 11.9%, Salta with 7.7%, Jujuy with 7.4%, Córdoba with 6.2% and Catamarca with 5%.

Chart 3. Direct jobs in mining, per province, November 2021

Province	Jobs	% of total
Santa Cruz	9,414	27.8
San Juan	4,733	14.0
Buenos Aires	4,016	11.9
Salta	2,589	7.7
Jujuy	2,485	7.4
Córdoba	2,080	6.2
Catamarca	1,681	5.0
CABA (City of Buenos Aires)	1,286	3.8
Mendoza	897	2.7
Río Negro	655	1.9
Chubut	558	1.7
Neuquén	527	1.6
Santa Fe	496	1.5
Entre Ríos	473	1.4
La Pampa	446	1.3
San Luis	436	1.3
Santiago Del Estero	303	0.9
Tucumán	209	0.6
Misiones	189	0.6
Corrientes	162	0.5
La Rioja	75	0.2

Continued on next page.

Chart 3. Direct jobs in mining, per province, November 2021 (cont.)		
Province	**Jobs**	**% of total**
Chaco	48	0.1
Formosa	45	0.1
Tierra Del Fuego	22	0.1
TOTAL	**33,825**	**100.0**

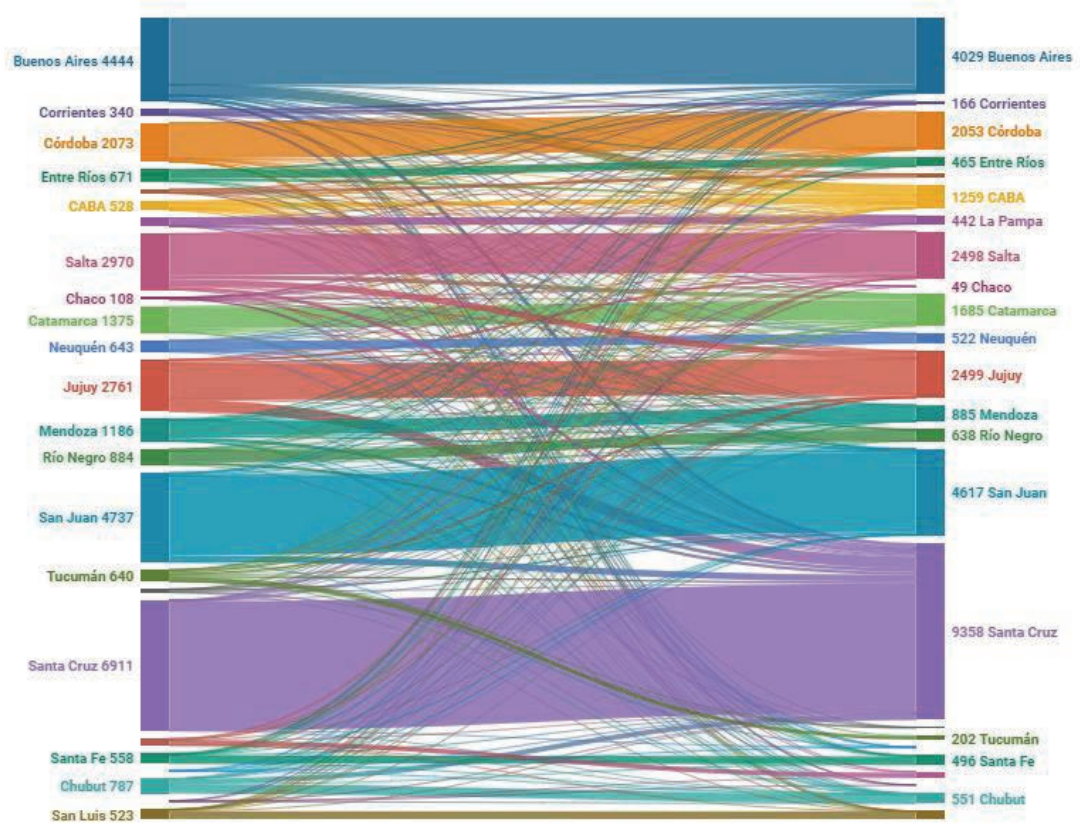
Source: CEP-XXI based on SIPA and the National Directorate of Mining Information and Transparency.

The types of mining are different in each case. Santa Cruz stands out in metal mining (gold and silver) and coal. San Juan excels in metal mining (particularly gold), Salta in metal mining (mainly gold) and lithium, Jujuy in metal mining (mainly silver) and lithium, Catamarca in metal mining and lithium, and the provinces of Buenos Aires and Córdoba mainly in non-metalliferous mining.

If instead of focusing on the place where the mining operations are carried out, we focus on the usual place of residence of the mining workers, figures are somewhat different. Although the seven provinces mentioned are also leaders according to this criterion, we may observe a higher geographical dispersion, which shows that there are workers from multiple provinces who work in the provinces with the highest mining development because job opportunities are higher.

For example, 80% live in the province where they work, and the remaining 20% work in a jurisdiction different from the one they live in. The flows of workers between provinces are shown below: where they live is shown on the left axis, and where they work on the right. Santa Cruz is an attraction pole for mining workers: in October 2021, there were 9,358 formal jobs in mining in that province, of which 6,911 are domiciled there, and the rest come from other jurisdictions. The remarkable cases are Jujuy (618 workers from Jujuy work in Santa Cruz), San Juan (349 workers from San Juan work in Santa Cruz), and Chubut (274 workers from Chubut work in Santa Cruz). Catamarca is another net attracting province of mining workers, mainly from Jujuy, Salta and Tucumán. In CABA (Buenos Aires City), where administrative tasks for various mining companies are carried out, many workers from the Buenos Aires suburbs commute – similarly to what happens in many branches of activity.

Chart N° 5 Flow of mining workers by province where they live (left axis) and province where they work (right axis), October 2021



Source: CEP-XXI based upon AFIP (IRS) The left axis shows the province of residence of the mining workers, while the right axis shows where they work.

2.3 What is the link between metal and lithium mining activity and local development?

There are many regions where the inhabitants feel forced to migrate to large urban centers with higher productive and commercial activities concentration.

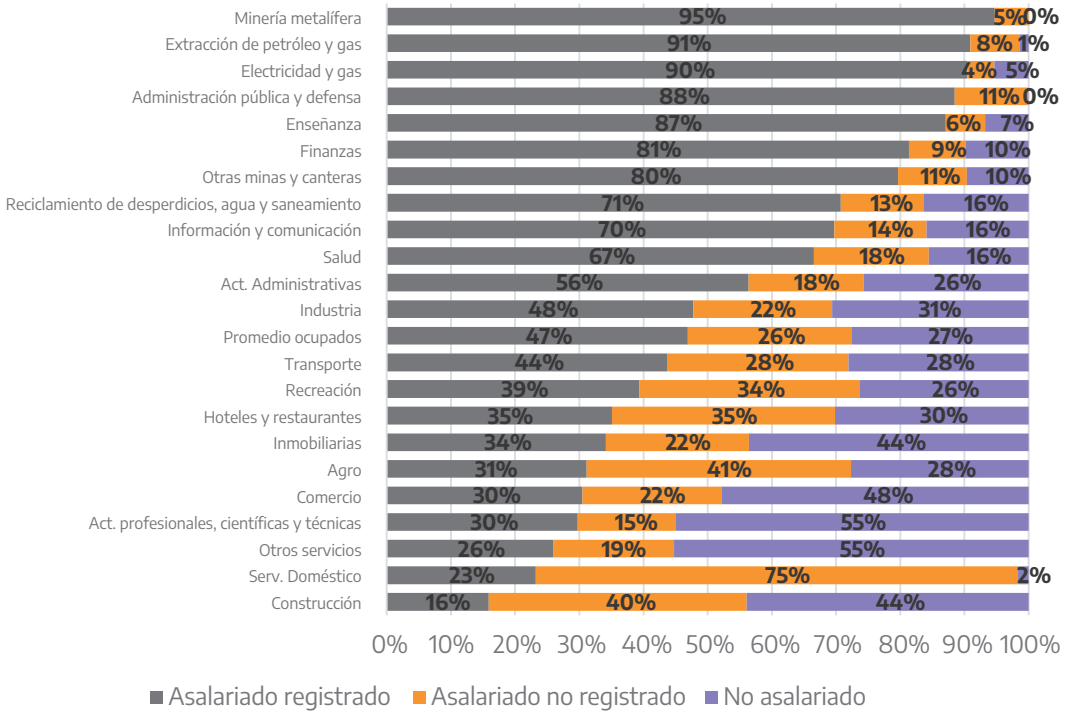
In mining provinces, such as Santa Cruz or San Juan, this activity stood for 11.8% and 5.4% of registered employment in companies, respectively, at the end of 2021. Now, observing where it takes place within each province, these numbers become much more relevant: in Catamarca, the activity takes place in the Puna and some departments in the western part of the province, while most of the activities in the province –among them the olive, farming and textile industries– are developed in the departments that make up the central or eastern zone. The same happens in Jujuy, where farming and tobacco activities take place in the Valleys and Yungas area, while mining takes place in the Puna and the Quebrada. In San Juan, most of the productive activities are located in the center/southeast of the province, while mining is in the northwest in the departments of Jáchal, Calingasta, and Iglesia.

In recent months, the country regions with greater dynamism in formal employment were the areas linked to mining. According to a report by the Center for Production Studies, 5 of the 10 departments with the highest relative growth in employment between 2019 and 2021 could achieve this performance thanks to mining. Andalgalá (Catamarca) was the department with the highest relative variation between November 2019 and November 2021, with a 27.6% increase in private jobs in the entire local economy. Santa María (Catamarca), Belén (Catamarca), Calingasta (San Juan), and Magallanes (Santa Cruz) were other departments with solid mining presence and suppliers that were also among the top 10 best performing departments in the country.

2.4 How are labor conditions currently in mining?

Labor conditions are highly dependent on the kind of mining. According to a recent report published by the Ministry of Mining and the Center for Production Studies, working conditions in large-scale metal mining are far better than the average. In terms of wages, metal mining offers the highest salaries in the economy, jointly with the hydrocarbon sector, tripling the average. In terms of labor formality, the rates in metal mining are around 95% according to INDEC Extended Household Survey and reach 100% for medium and large metal mining companies.

Chart N° 6 Employment composition by activity sector, in percentage; average 2016-2021

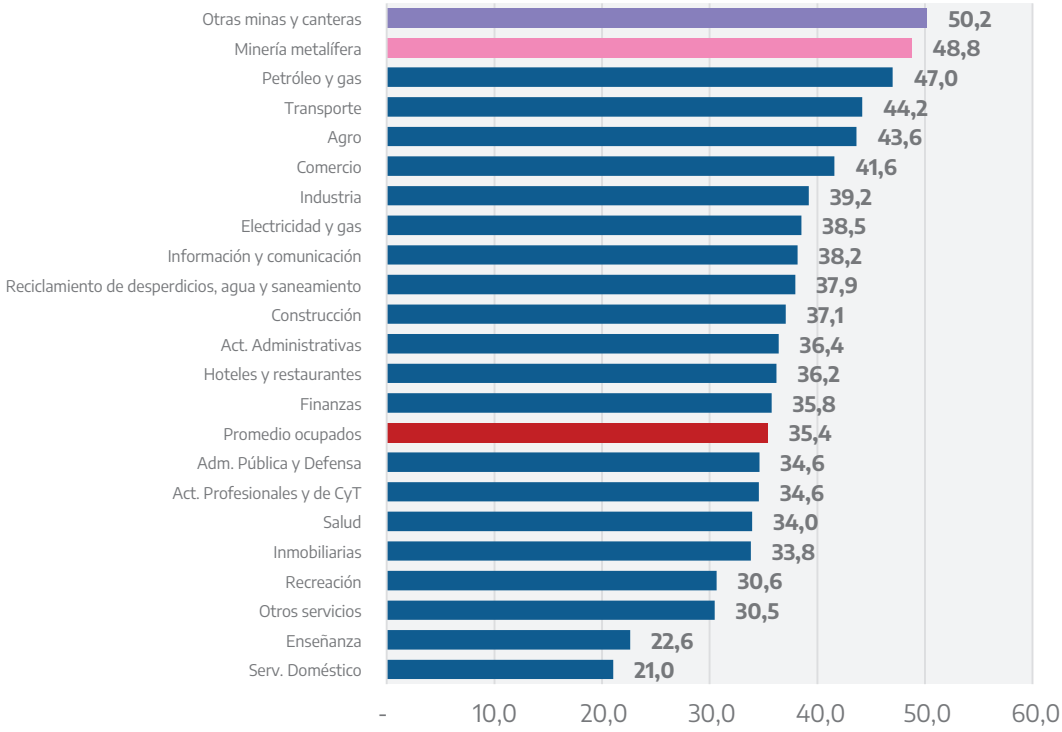


Source: CEP-XXI and National Directorate for Mining Promotion and Economy, with data from the INDEC Expanded Household Survey.

In large-scale metal mining, labor regimes are particular, given that the fields are usually far from the main towns. That is why employers are not only responsible for the worker's labor and personal safety for 8 or 12 hours, as is the case in other sectors. In metal mining regimes are: 7 days off for 14 days of work, or 7 for 7, or

21 working days for 10 days off, depending on the case. These peculiarities have, as a consequence, the employee's permanence for 14 continuous days in the project: he eats, sleeps, spends free time, and socializes there in addition to the respective working hours. These characteristics explain why mining is the activity with the highest rate of hours worked per week. In turn, labor relations are more stable in metal mining: according to data from INDEC Extended Household Survey, in 2016-2021, 90.9% of workers in metal mining had more than one year of seniority in the position they held, above the average for wage earners (82.8%). This figure was also higher than the average for the rest of the mining activities, although the difference was lower (85.6%). This relatively high job stability is typical of those working directly in mining firms, but not so much in some of their suppliers, mainly construction: due to its characteristics, (working subject to projects) is a highly intermittent branch. Indeed, in the whole country, the percentage of salaried employment in construction with more than one-year seniority is 59.1%, the lowest in the economy, together with farming and hotels and restaurants (both highly seasonal activities).

Chart N° 7 Hours worked per week in the main occupation, 2016-2021



Source: CEP-XXI and National Directorate for Mining Promotion and Economy, with data from the INDEC Expanded Household Survey.

There are strict work safety protocols in large-scale mining because of the type of work requirements. In 2019 and 2020, metal mining was, according to data from the Superintendency of Occupational Risks (SRT), among the activities with the lowest rates of occupational accidents, only behind education and finance, which are low accident risk activities.

Working conditions are somehow different in small-scale mining. Small-scale mining occurs more frequently in the non-metal segment. Usually, there is no formal employment contract, only self-employment, wages are

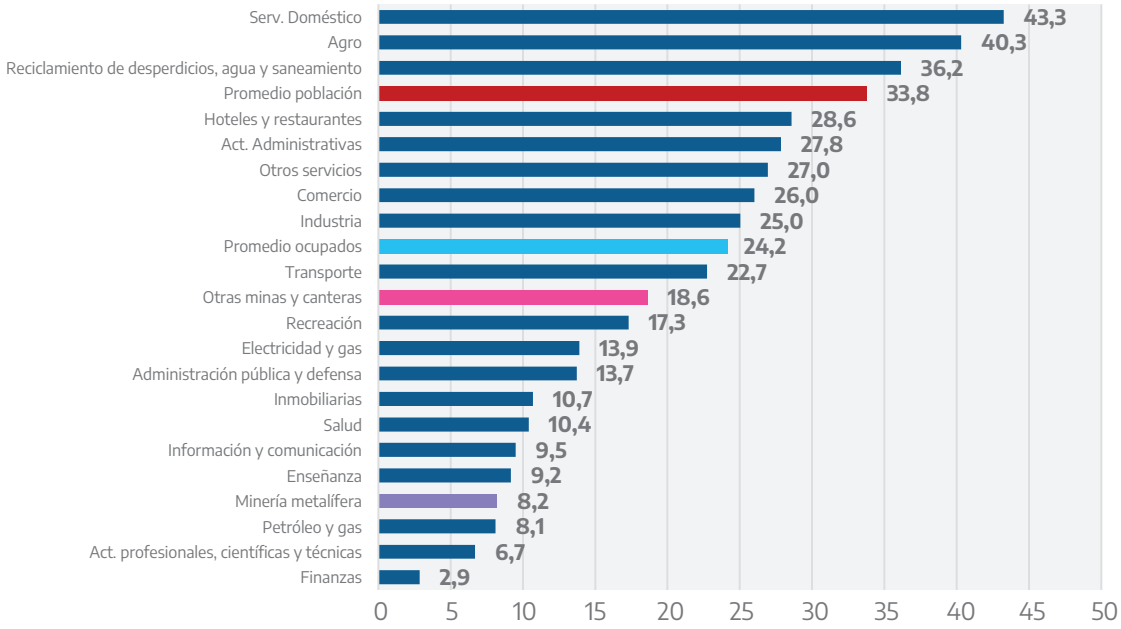
considerably lower than in metal mining, and job safety is very precarious. Indeed, according to the SRT, labor accident rates are higher than the economy average in non-metal mining.

2.5 Which is the link between mining and poverty?

There is a negative correlation between mining and poverty since salaries are way higher than the national average. According to data from the Extended Household Survey, from 2016 to 2021 the average poverty rate for the Argentine urban population was 33.8%, and for employed persons as a whole, 24.2% (the figure is lower given that poverty tends to be higher in unemployed people).

However, the poverty figures in mining are considerably lower than the average for the economy. They account for 8.2% in the metal industry (one of the lowest in the economy behind finance, professional, scientific, and technical activities and similar to oil and gas extraction) and 18.6% for the rest of mining activities.

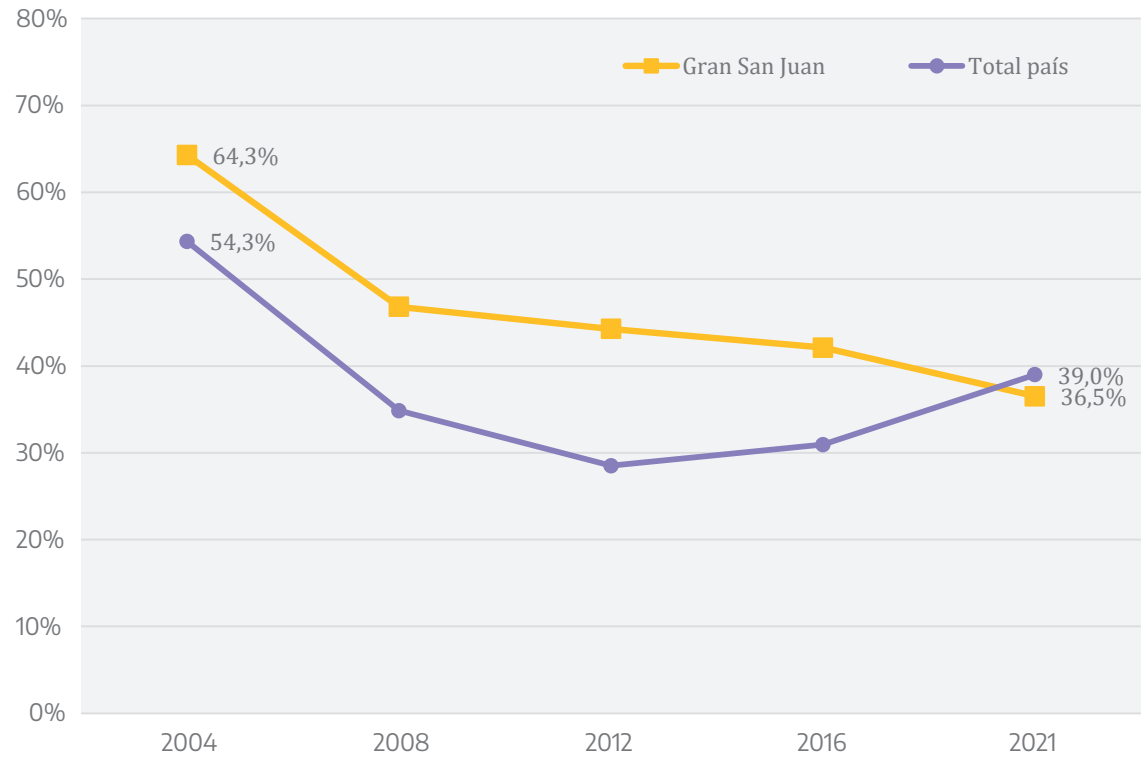
Chart N° 8 Poverty rates within the workers in this activity (in %) 2016-2021



Source: CEP-XXI and National Directorate for Mining Promotion and Economy, with data from the INDEC Expanded Household Survey.

If we consider this at the regional level, poverty rates in San Juan in 2004 –before the mining boom– were 10 points higher than the national average. This rate was 2.5 points lower in 2021. This data is consistent with the fact that, according to data from the Employment and Business Dynamics Observatory of the Ministry of Labor, San Juan created registered private employment at a higher rate than the national average since that date.

Chart N° 9 Poverty rate in Greater San Juan, compared to the national average, 2004-2021



Source: CEP-XXI based on EPH-INDEC, INDEC y BCRA.

2.6 Which professional and technical profiles does the mining activity demand?

Mining activity involves a wide professional range from the exploration to the closure stage. As it is a highly technical activity, particularly in large-scale metal mining, a significant proportion of workers have technical/university training. According to INDEC Extended Household Survey, in 2016-2021, 92.5% of mining workers have medium or high qualifications, [2] a much higher figure than the private sector average (74.6 %).

People trained in disciplines such as geology, geophysics, and hydrogeology, for example, are necessary for the exploration stage. People trained in civil engineering, industrial engineering, mechanical engineering, and mining engineering are necessary for the feasibility and construction stage. Anthropology, sociology, economics, hydraulic engineering, environmental engineering, chemical engineering, agronomic engineering, archeology, paleontology or biology graduates- among others- are required when establishing the socioeconomic and environmental baselines.

Mining techniques and technicians, machinery operators, professional drivers, mechanical technicians, electrical technicians, laboratory technicians, drillers, electronic technicians, electromechanical engineers and chemical engineers are required in extraction and processing operations.

[2]Jobs whose qualification - according to the National Occupations Classification (CNO) - is of the "professional" or "technical" type are considered "high", and those with "operational" tasks have a "medium" qualification. Meanwhile, those tasks considered "without qualification" by CNO are of "low" qualification.

Different professionals related to environmental sciences are hired throughout all the stages of the production process. They are in charge of the rollout and maintenance of the several environmental management systems contemplated in the Environmental Impact Studies evaluated by the competent authorities.

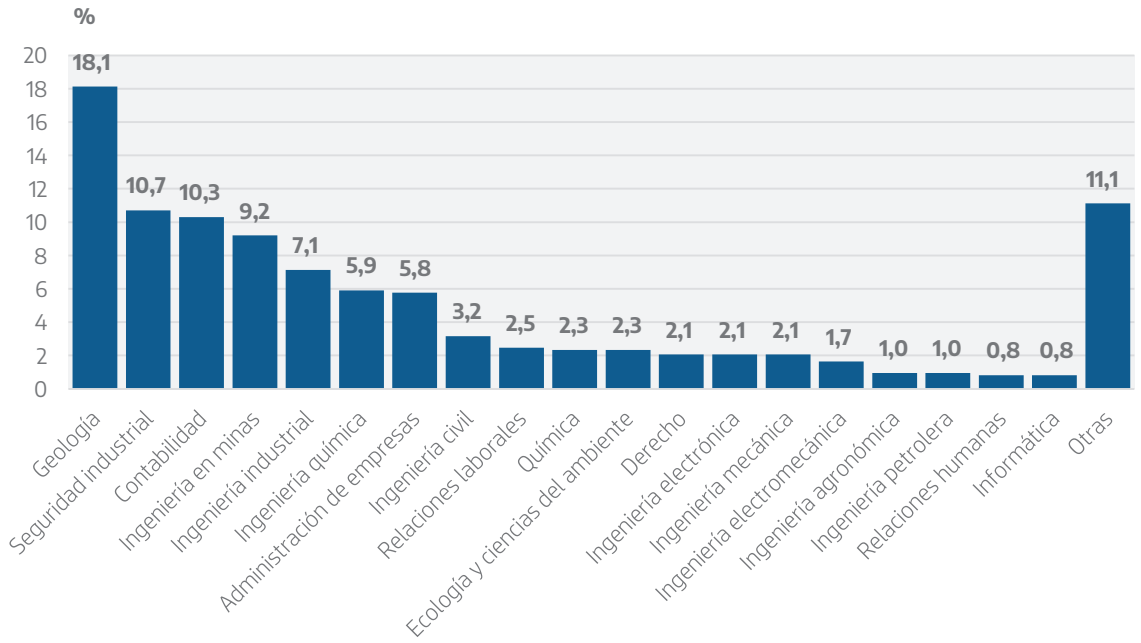
Providing health and safety services, we find doctors, brigade members, rescuers, professional nurses with an orientation in emergency medicine, safety and hygiene graduates, and safety technicians.

A wide range of workers deals with operational support: gastronomic, security, waste collection, monitoring, transportation, construction, energy supply, soil movement, maintenance, and mechanical support personnel, among others.

We find the support of professional and administrative services -such as legal services, accounting, economics and business administrators, communications, IT, robotics, satellite mapping, and finance, among others - throughout the life of a mining project.

According to information estimated by the Center for Production Studies, more than 65% of young mining professionals studied applied sciences: geology (18.1% of the total), industrial safety (10.7%), mining engineering (9.2%), industrial engineering (7.1%), chemical engineering (5.9%), civil engineering (3.2%), electronic engineering (2.1%), mechanical engineering (2.1%), electromechanical engineering (1.7%) and agronomic engineering (1.0%). Other than applied sciences, professional mining firms from accounting (10.3%), business administration (4.8%), labor relations (2.5%), ecology and environmental sciences (2.3%), chemistry (2.3%), and chemistry (1.1%) stand out.

Chart N° 10 University Degrees in Mining



Source: CEP-XXI based on University Policies Secretary The register of university graduates from 2016-2018 was taken and their employment status was compared in October 2021.

2.7 Where are mining workers from?

More than 96% of mining workers are born in Argentina, according to the CEP-XXI based on information from AFIP.

However, mining –particularly metal mining– is characterized by a relatively high percentage of workers born in a different city from the one where they work. According to INDEC Extended Household Survey, 55% of metal mining workers were born in the same city where they currently live. This figure is lower than the average for the economy (71.5%). Likewise, 10% were born in another city of the same province and 34% in another province of the country.

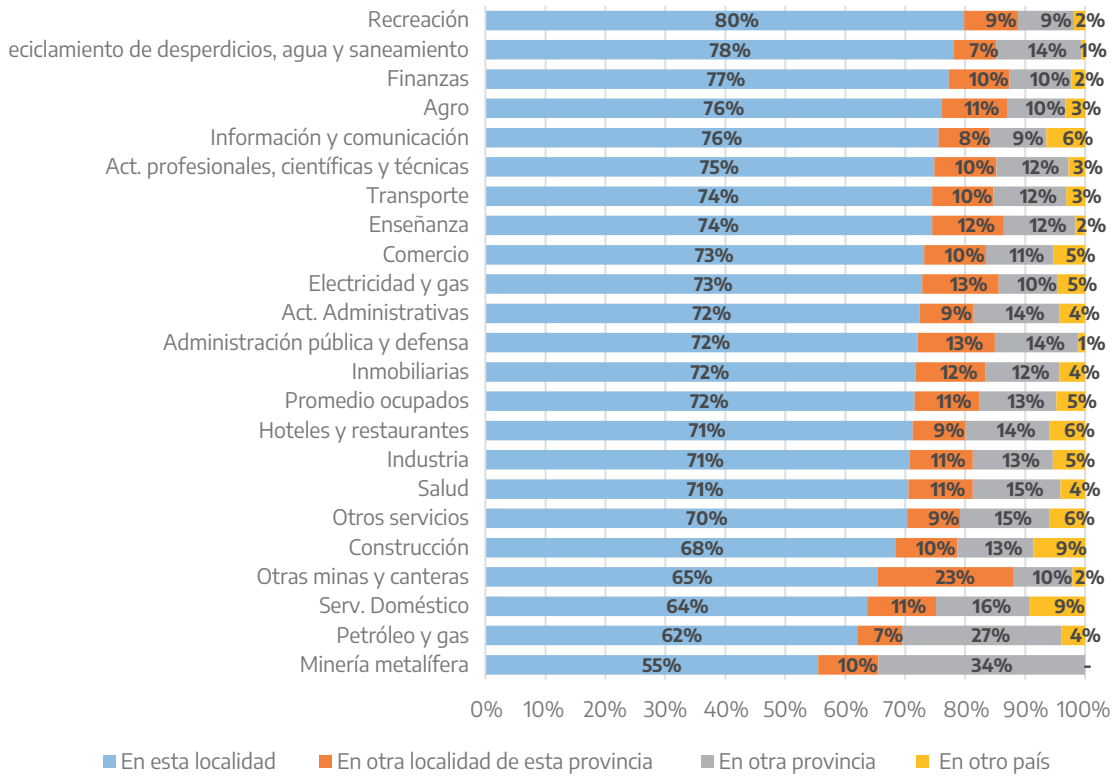
The reason, which is also recurrent in oil and gas extraction, is that metal mining is a formal employment and high wages source that provides opportunities for upward social mobility in families from different parts of the country. This fact fosters internal migration. Likewise, Santa Cruz – a sparsely populated province thirty years ago and currently among those with the highest demographic growth – weight in mining explains, in part, why the percentage of workers born in another province is higher than in other productive sectors.

Chart 4. Country of birth of mining workers, October 2021

Country of Birth	% of total
Argentina	96.57
Chile	0.95
Bolivia	0.84
Perú	0.47
Paraguay	0.39
Venezuela	0.27
Uruguay	0.09
Other countries	0.42
TOTAL	100

Source: CEP-XXI based upon AFIP (IRS)

Chart N° 11 Place of birth of the employed according to sector, average 2016-2021



Source: CEP-XXI based on EPH-Extended (INDEC).

2.8 Why are mining operations globally growing if minerals are a non-renewable resource? Can resources deplete?

Mining projects usually last much longer than what they are advertised with the initial investment. The reason is that, during the study, several estimates are made to determine the project's technical and economic feasibility. Most of them are conservative – based on the knowledge of what they find below the surface, assumptions about the economic conditions for the project and a given technology for a moment in time, among the main factors to consider. However, during the useful life of the projects, these three factors have variations that, combined, allow operations to extend many times.

It is worth mentioning that during the project, with the company operating on the site, important advances are usually made in resources knowledge. The decision to exploit a field occurs after extensive exploration work. First comes the drilling to discover the characteristics and concentration of the minerals. Then follows the modeling with specialized software to estimate the geological potential. These models may vary during resource extraction, and more knowledge of the land surrounding the exploitation also appears.

Since the highest costs are in the construction of mineral processing plants, the additional cost of expanding operations is a marginal fraction and an opportunity for companies.

According to data from world exploration budgets surveyed by S&P Global Market Intelligence and exposed in a recent study by the Ministry of Productive Development, around a third of world exploration is done close to other projects, especially when international prices rise. Since most of the national territory of Argentina is unexplored, this data is particularly relevant.

On the other hand, the estimation of feasible reserves to be exploited also depends on prevailing economic conditions. If these conditions improve, it will be possible to produce even when mineral concentrations decrease (cut-off grade).

Finally, technological advances made cost reduction, improved productivity, and lower cut-off grades exploitation possible. They function as an international price improvement. This is also a paradox: thanks to technological advances and applications, in many cases there is an increasing supply of natural resources despite their non-renewable nature. It has been happening for the past decades. Due to this, mining is more developed now than at the beginning of the century. With more mining production today than 20 years ago, the transition to more global warming-friendly energy sources (which require multiple minerals) may become a reality.

An example of this in Argentina is the Veladero mine in San Juan: it started operations in 2005, with closure expected in 2018. Despite this, the mine has currently planned investments of more than US$900 million to continue operating until at least 2031. In this way, Veladero intends to double its initial useful life.

Another similar case is Chinchillas in Jujuy, where the original project continuity was possible by taking advantage of the facilities and investments made in another deposit (Pirquitas). Exploration efforts on-site made it possible to identify exploitable reserves with similar mineralization at approximately 42 kilometers between the two deposits, making possible the operations extension through new investments.

In any case, mineral resources on the planet are limited. Hence, efficient use and recovery of materials are fundamental innovations to guarantee the medium and long-term resource supply.

2.9 But, resources are never effectively depleted? What if a field must cease operations?

Despite the answer to the previous question, yes, some projects do stop operations. In these cases, the mine closure starts. This is a law-complying project and consists of the site rehabilitation until reaching an environmentally healthy level.

However, since mining projects require a significant infrastructure deployment for their start-up –such as bridges, roads, power lines, and services– once a project ends, said infrastructure remains in place to be used by citizens.

There are many experiences in the world in which closed mines become serviceable as tourist attractions (such as Sierra Grande in San Antonio Oeste, Río Negro, and the mining tourism circuit in Córdoba), generation of renewable energy or real estate ventures, among others. On the other hand, the workforce employed in the finished production has valued

Pueblo Escondido, Córdoba. Source: Córdoba Tourism.

experience in the labor market, useful for other projects.

In summary, although mining projects tend to extend their useful life, they sometimes leave qualified labor, with proven experience, advances in infrastructure, and environmental readjustment. Due to this possibility, it is a priority that the different governments use the mining income to improve the productive capacities of the national territory, applying programs and policies aiming to improve the lives of all people. In this sense, the investments in education, scientific research, or knowledge production that the States make from the tax resources arising from the current mining activity can potentially generate significant and lasting benefits that favor future generations, contributing to the greater sustainability of this activity.

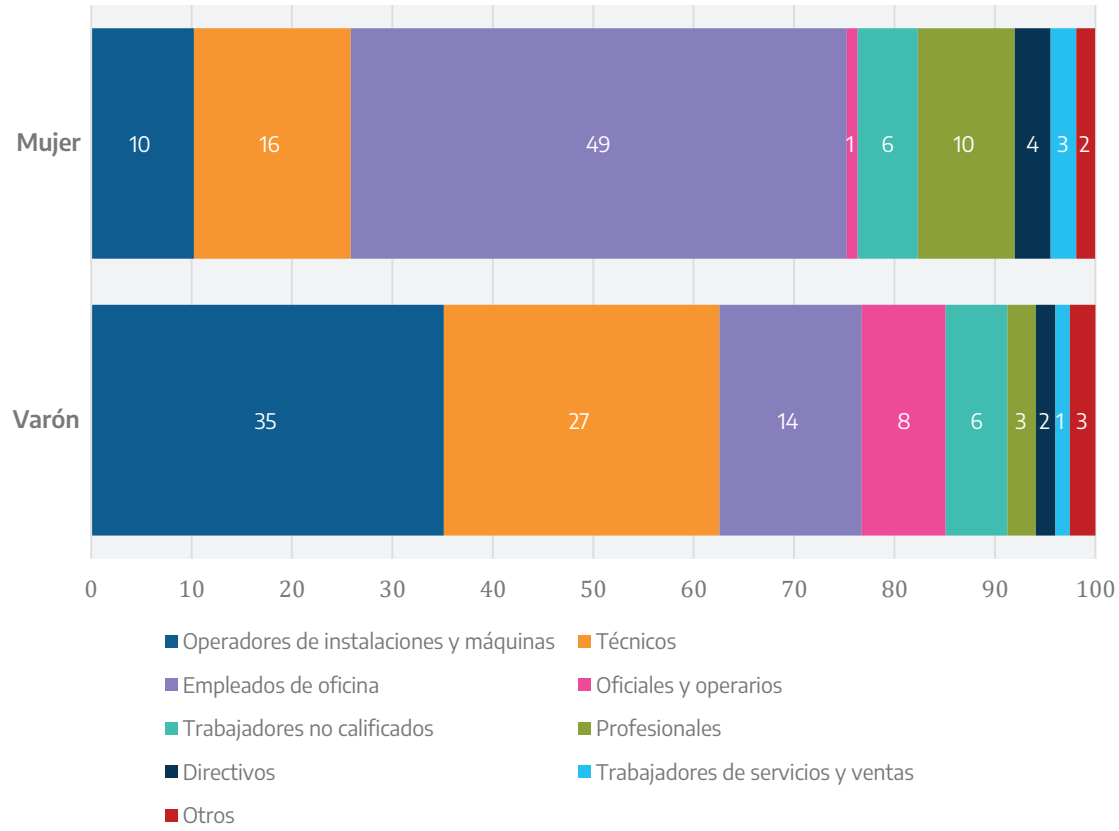
2.10 How is mining activity gender composition?

Mining has historically been a highly masculine activity. Currently more than 3,000 women and around 30,000 men work in mining. As a percentage, women account for around 9% of mining jobs.

Women's inclusion in mining jobs has been rising since 2017 (five years ago, it only accounted for 7% of the total) There are many reasons for this: a greater gender perspective awareness in productive activities, the rise of lithium mining (with similar characteristics to the chemical industry compared to the metalliferous one, which favors women's inclusion), and the advancement of new technologies (which make physical force less necessary).

Beyond a considerable trend towards feminization, mining continues to be one of the most masculine activities in the economy. There are also significant impediments to the inclusion of women in mining. One of them has to do with the particular labor regime (7 days of work for 7 days off, for example), which means more time away from home compared to other sectors. It is worth adding that a large part of the labor insertion of women occurs in professional and administrative tasks, and much less in operational tasks, where men have even more presence.

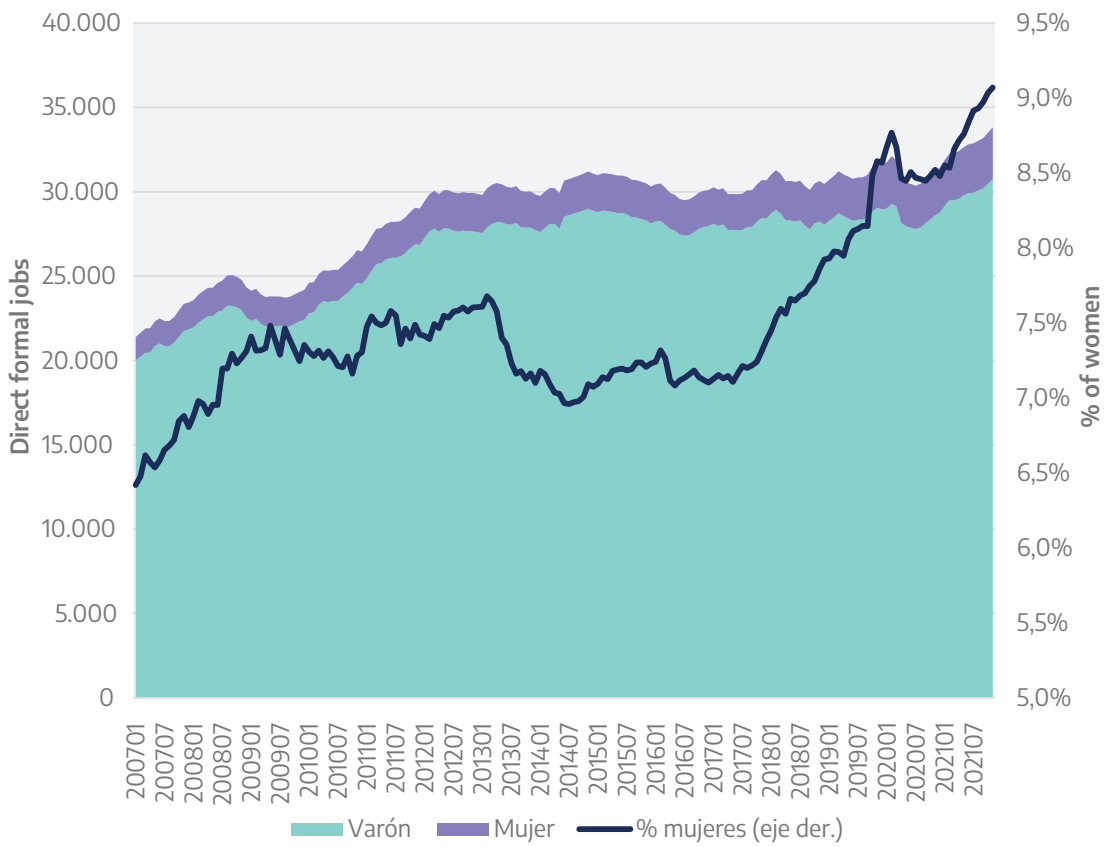
Chart N° 12 Place of birth of the employed according to sector, average 2016-2021



Source: CEP-XXI and National Directorate for Mining Promotion and Economy, with data from AFIP.

In November 2021, women's gross remuneration was $184,502 including all mining, much higher than the private sector average ($108,350). However, this remuneration was 10.9% lower than men's. Although this difference is less than the average for the economy (-27%), it is still notable.

Chart N° 13 Evolution of female participation in mining, in jobs and in percentage; 2007-2021



Source: CEP-XXI and National Directorate for Mining Promotion and Economy, with data from the Trasparency and Mining Information Directorate and SIPA

3. Economic aspects

3.1 What is the contribution of mining to the economy?

The contribution of mining to the economy can be split into several axes, such as its contribution to GDP, employment, foreign exchange, tax collection or the development of local suppliers, among other variables. Here we will focus on the contribution to GDP (there are other questions focusing on the other dimensions).

According to INDEC, in 2019 (the last year before the pandemic) mining, both metal and lithium and non-metal, accounted for 0.91% of Argentina's GDP. Metal and lithium mining accounts for 85% of the total turnover of mining companies, and non-metal mining for the remaining 15%.

It is worth noting that 0.91% is the direct contribution of mining to the national GDP. Since the activity concentrates in some provinces, the contribution to certain provincial economies is higher in some cases. For example in 2018 the direct contribution of mining to the gross geographic product (GDP) in San Juan was 10.4%.. These figures refer to the direct contribution of mining to the economy and do not consider the traction power the activity has on other sectors' production, such as industry, transport, construction, commerce, and different types of services.

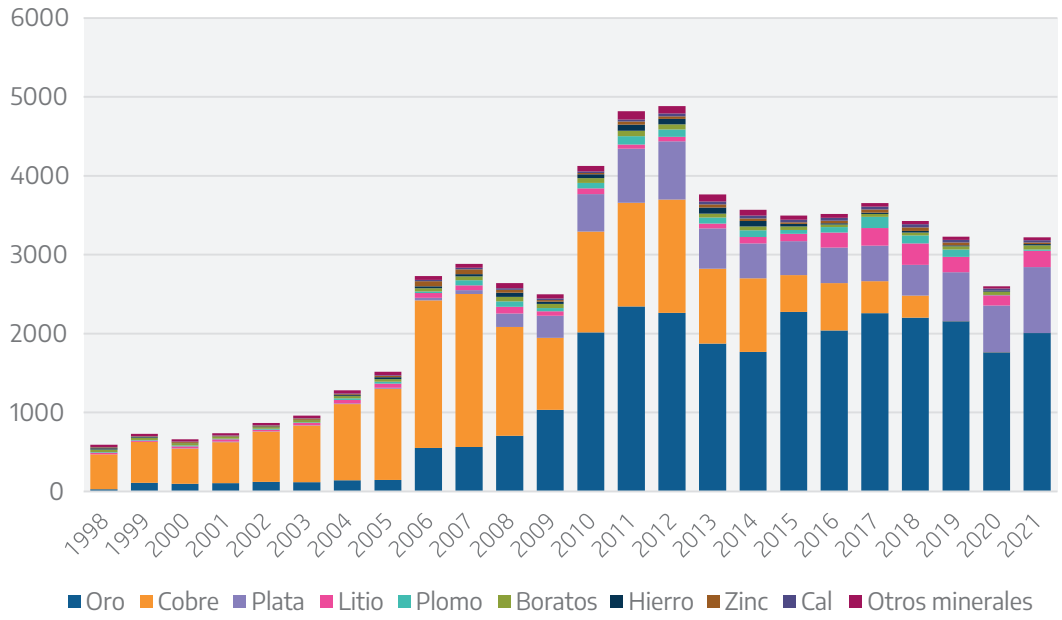
On the other hand, it is also necessary to emphasize that mining development is fundamental from a national sovereignty and security point of view since the production within the national territory is not subject to international logistics disruption. Think, for example, of the production of phosphate and potassium fertilizers that are essential for agricultural production. Russia and Belarus are among the principal suppliers of these goods worldwide. According to FAO data, in 2019, Argentina imported 77% from Russia, and the total of its needs came from Belarus. Their supply could be affected in the event of an armed conflict. It would cause a drop in agricultural productivity, affecting the well-being of a significant part of the population.

3.2 How much mineral do we export and import?

In 2021, Argentina exported minerals for US$ 3,221 million, accounting for 4% of our country's exports of goods. This means less than a twelfth of Peru's exports in the same period, equivalent to US$39,637 million, and 17 times less Chile did, which reached US$56,755 million in mining exports during that year.

If we consider this in a per-product basis, metal mining and lithium stand out. Gold was the most exported mineral in 2021, with US$2,006 million, followed by silver (US$835 million) and lithium (US$208 million). The rest of the minerals total US$172 million. Among them borates (US$52 million), lime (US$27 million), zinc (US$22 million) and lead (US$17 million) stand out.

Chart N° 14 Mineral exports from Argentina, in millions of dollars



Source: CEP-XXI based on Customs.

Copper was the main export mineral for several years, but the main active mine (Bajo La Alumbrera in Catamarca) ceased operations in 2018. However, ongoing investment projects allow us to forecast growing copper exports for the second half of the decade.

On the other hand, imports of mineral products were US$ 612 million in 2021, a figure five times lower than mineral exports. Among imports, iron (US$205 million), zinc (US$110 million), calcium phosphates (US$37 million), uranium (US$24 million) and potassium chloride (US$32 million) stand out. These minerals are imported mainly by industrial firms: iron ore and zinc are imported mainly by Argentine steel companies, calcium phosphates by agro-industrial companies, and potassium chloride by the chemical industry as a fertilizer-producing input.

Taking destinations into account, 6 countries are standing for more than 85% of our mining exports. In 2021 Switzerland accounted for 27% of our mining exports, the United States 24%, India 16%, Canada 11%, Belgium 5%, and South Korea another 5%. Regarding mining imports, Brazil stands out with 53, being the main iron ore supplier. Peru (8%), Chile (7%), Russia (4%), and Mexico (4%) complete the ranking of the top suppliers of the minerals imported by Argentina.

A large surplus can be observed in the mining companies' trade balance since they export much more than they import. During the year 2021, imports counted 336 million dollars, with machinery, spare parts for machinery, and some inputs such as plastic and chemical origin standing out in particular.

Chart 5. The 20 most essential international good suppliers to mining companies during 2019

Company	Company's country of origin	Main Countries where the goods come from	Products
Epiroc	Sweden	Sweden, EE. USA, Canada	Machinery
Komatsu	Japan	Germany, Japan	Machinery
Polytex	Chile	Chile	Plastics (geomembranes)
Finning	Canada	USA, Thailand, Australia	Machinery
Chemours	US A	US A	Chemicals (sodium cyanides)
American Soda Ash	US A	US A	Chemicals (Ash soda)
Vulco (Weir Group)	UK	Chile	Pumps, hoses, cyclones, valves, liners

Continued on next page.

Chart 5. The 20 most essential international good suppliers to mining companies during 2019 (cont)

Company	Company's country of origin	Main Countries where the goods come from	Products
Superior Industries	US A	US A	Idler rollers and conveyor pulleys
Posco	Korea	Korea	Machinery, prefabricated buildings
FMC	US A	China, Russia, US A	Chemicals
Cashman (Caterpillar Group)	US A	US A	Machinery
Millenium Machinery	US A	US A, Sweden	Machinery
Solmax	Canada	Canada, US A	Geomembranes
Transityre	Netherlands	US A, Spain	Kartotec
Pneumatics (CYSA Group)	Germany	Paraguay	Paper and plasterboard
Glencore	Switzerland	Brazil	Zinc
Orica	Australia	Australia	Flsmith
Explosives	Denmark	US A, China, Chile, Belgium	Esco
Equipments (Weir Group)	US A	US A	Wear pieces
Australian Gold Reagents	Australia	Australia	Chemicals (sodium cyanides)

Source: CEP-XXI based on Customs.

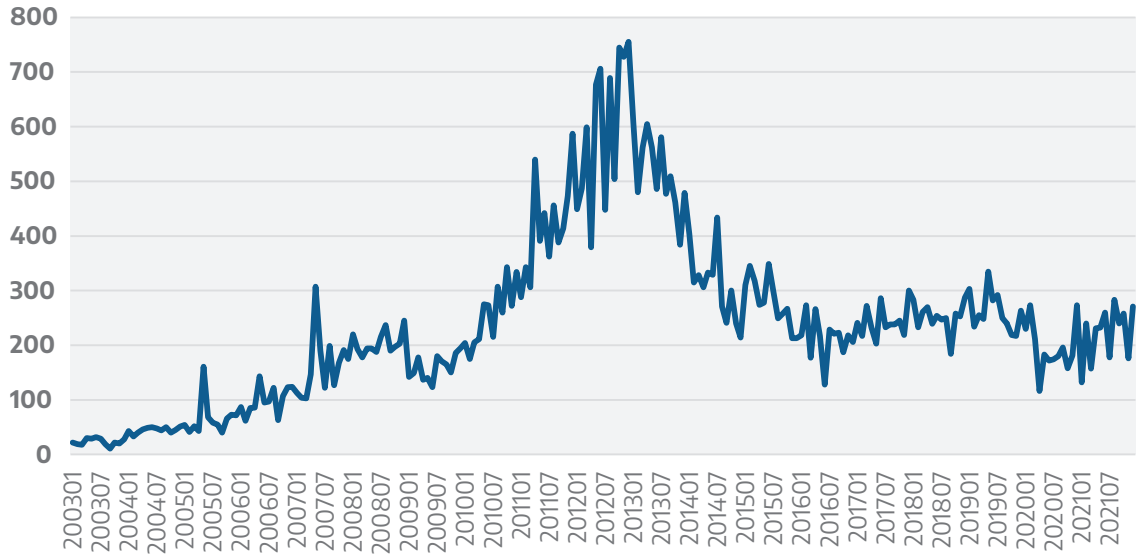
3.3 Does mining bring foreign currency to Argentina?

Mining contributes a significant foreign exchange amount to the Central Bank (BCRA) reserves, being one of the few sectors whose foreign exchange balance is structurally in surplus.

According to information from the Ministry of Mining based on the BCRA, in the case of mining, the balance between incoming and outgoing currencies has been persistently positive since the BCRA began measuring this indicator in early 2003. This result is due to two reasons: firstly, mining is a highly exporting branch. Thus, foreign exchange earnings from exports are much higher than foreign exchange disbursements resulting from imports or the remittance of profits to their parent companies abroad. Secondly, mining in Argentina requires a lot of foreign investment, which results in foreign exchange income when it enters the country.

The following graph shows the final result of the mining exchange balance (that is, the income of foreign currency minus the outflow of foreign currency from the sector) since 2003, together with the most relevant projects (among them, Veladero, today the most important in the country in operation) launched in that period.

Chart N° 15 Final result of the mining exchange balance, in millions of dollars



Source: Mining Secretary, based on Central Bank (BCRA)

Mining did not take away more dollars than those entering the country during this period. Or, to say the same, the sector contributed foreign currency every month for 18 years.

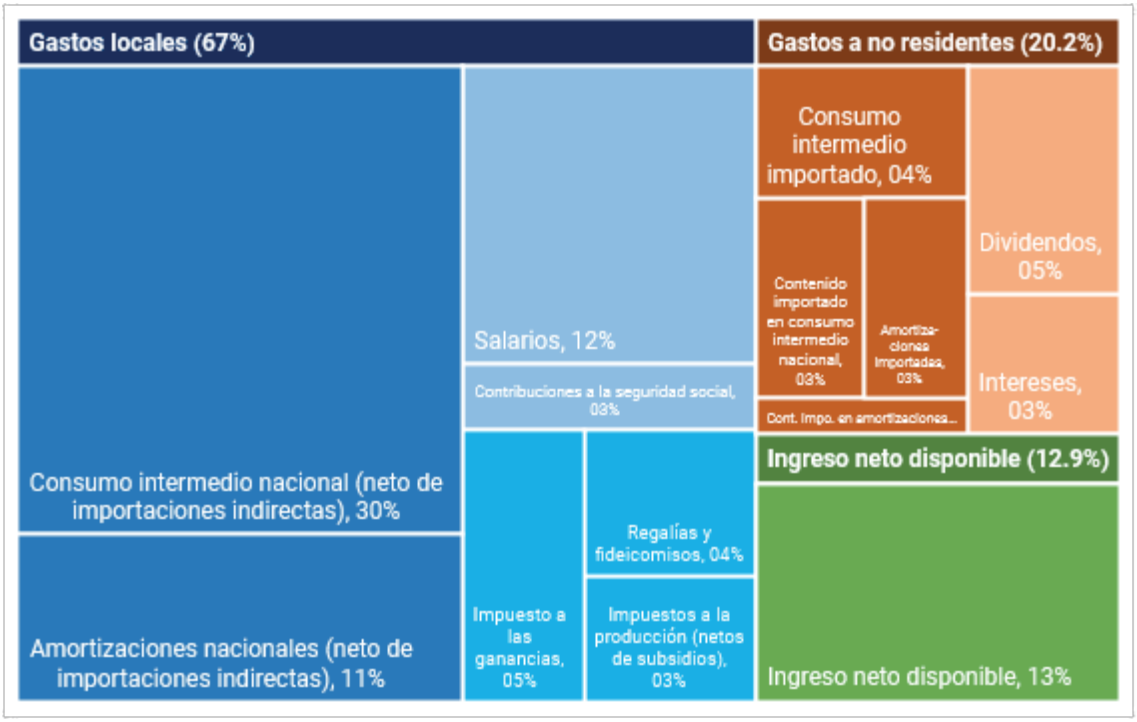
Please refer to "Foreign currency contribution from the mining sector"(special report of the Ministry of Mining), for further detail.

3.4 How is the income generated by mining distributed?

According to CEP-XXI estimates, around 80% of the sales of the large metal mining companies in operation remain in the country. For this calculation, the CEP-XXI obtained information from the National Survey of Large Companies, performed annually by INDEC to the 500 companies with the highest turnover in the country, excluding agricultural and financial sector companies.

According to the CEP-XXI study, 29.8% of the expenses of the large mining firms are to buy inputs from national suppliers (called "intermediate national consumption" in the jargon). Another 10.6% goes to national suppliers that replace machinery and buildings depreciated over time ("national amortizations"), 15.2% goes to salary costs (salaries and contributions) and 11.4% to both national and provincial taxes. Adding spending on national suppliers, wage bills and taxes, we reach 67% of turnover. About 20% of mining sales go to foreign actors, such as foreign suppliers (11.7%), lenders (3.2% in interest payments), and shareholders (5.2% in dividend payments). Lastly, almost 13% remains in the country and therefore contributes favorably to the foreign exchange balance of the activity, even though it is a net disposable income for firms. Hence, it reaches 80% if added to the 67% allocated to suppliers, employees, and taxes.

Chart N° 16 Breakdown of mining sales, 2017-2019



Source: CEP-XXI based upon ENGE-INDEC

These CEP-XXI estimates include nine large mining companies (accounting for around half of the national mining production). These companies are in the full production phase (this is why they are part of the large companies panel, since turnover the criterion for such consideration). This data is relevant since mining companies make many expenses –without invoicing previously– for building deposits in the first years of the mine's life cycle. By considering the life cycle instead of taking a snap while operations take place, the percentage of the billing that remains in the country may be even higher.

3.5 What are the benefits that the activity receives from the Mining Investment Law?

Mining has an investment regime that seeks to adapt the general tax regime to the activity's characteristics, such as: finite resources use, high exploration risk, long maturation periods, the need for large investments to start-up projects in regions with poor infrastructure, and high volatility in international mineral prices.

In this sense, the provisions of the General Tax Regime apply to the activity, with the modifications established by the Mining Investment Act (Act No. 24,196). This act sets a number of fiscal and tax benefits:

> Fiscal stability for a 30 year-term, from the moment of presentation of the technical-economic feasibility study to the enforcement authorities of the Mining Investment Act. During this period, the company will be able to maintain the tax conditions under which it determined that its project is economically viable, without the total tax burden being affected, as a result of changes in tax laws (Article 8).

Income tax deduction of 100% of the amounts invested in prospecting, exploration, special studies, mineral and metallurgical tests, pilot plant tests, applied research, and other works to determine their technical-economic feasibility (Article 12).

Capital investments accelerated amortization regime for the execution of new mining projects and for the expansion of the existing mining operations productive capacity, as well as those required during their operation (Article 13).

VAT refund for the purchase of goods or services under exploration (Article 14 bis).

Tariff payment exemption for the imports of capital goods and raw materials (Article 21).

Special provision for environmental care. This provision is income tax-deductible up to 5% of the extraction and benefit operating costs.

Chart 6. What does Fiscal Stability comprehend?

Yes	No
Direct taxes, rates and tax contributions. Exchange regime, rights, tariffs or other import or export charges. New ventures and expansion projects.	Indirect taxes and VAT. Royalties Social Security Contributions. Exchange rate variation. Reimbursements, refunds or taxes return.

Although the regime does not imply monetary expenditures for the mining activity (no subsidies of any kind granted) uncollected taxes due to the granted benefits and that deviate from the general tax treatment must be considered. This is known as tax expenditure. These values are estimated annually by the Undersecretary of Public Revenue in the Ministry of Economy. During the last three years, the tax expenditures of the Investment Regime for Mining Activity were equivalent to 0. 02% of Argentine GDP. For more information, please see report on the Mining Investment Law.

3.6 How many taxes do mining companies pay?

As mentioned in the previous question, the mining sector is subject to the same taxes and charges as the General Tax Regime, with the modifications established by the Mining Investment Act (No. 24,196).

In order of relevance, the main taxes paid by the activity at the national level are export duties, income tax, and bank debits and credits tax. In addition, social security contributions made by workers and employer charges are relevant. In terms of VAT, its incidence is lower in the activity due to two reasons: 1) metal mining has benefited from its export nature, so, like all foreign sales, these are not affected by this tax. 2) the Mining Investment Act grants VAT refund benefits for exploration services.

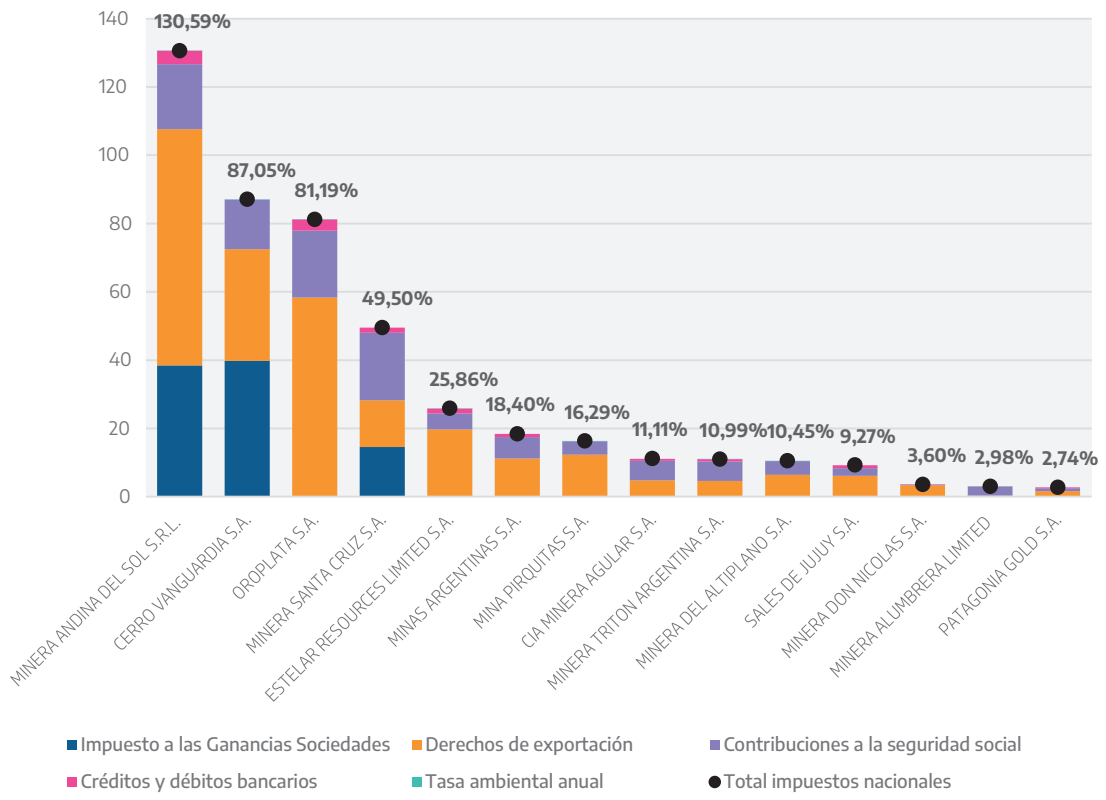
At the provincial and municipal levels, the main burden paid by mining are royalties, mining canon, gross income, and commercial and municipal fees for different concepts. Other contributions made by companies are fiduciary funds, which are usually established as a proportion of mining turnover or production and vary from province to province. Many companies owned by the provincial States take part in several projects, so they also

have a part of the profits. Among the main provincial companies with share in mining projects we may find JEMSE in Jujuy, REMSA in Salta, CAMYEN in Catamarca, and FOMICRUZ in Santa Cruz.

According to CEP-XXI estimates on large mining companies in operation, based on information from INDEC, tax payment in the sector in 2017-2019 was 11.4% of total billing, not counting security social contributions (including an additional 2.7%). The majority corresponds to national taxes (such as export duties or income taxes) and the rest to provincial taxes (such as royalties) and trusts.

Please refer to the exports submitted by companies for mining taxation examples. See Bajo la Alumbrera 2017 Sustaintability Report as an example. You may also check the Extractive Industry Transparency Initiative (EITI) latest report for details on the national taxes paid in 2019 by 14 large mining companies. In total, these 14 large companies paid national taxes of 460 million dollars during that year.

Chart N° 17 Payment of national taxes by large mining companies by type, 2019 (in millions of dollars)



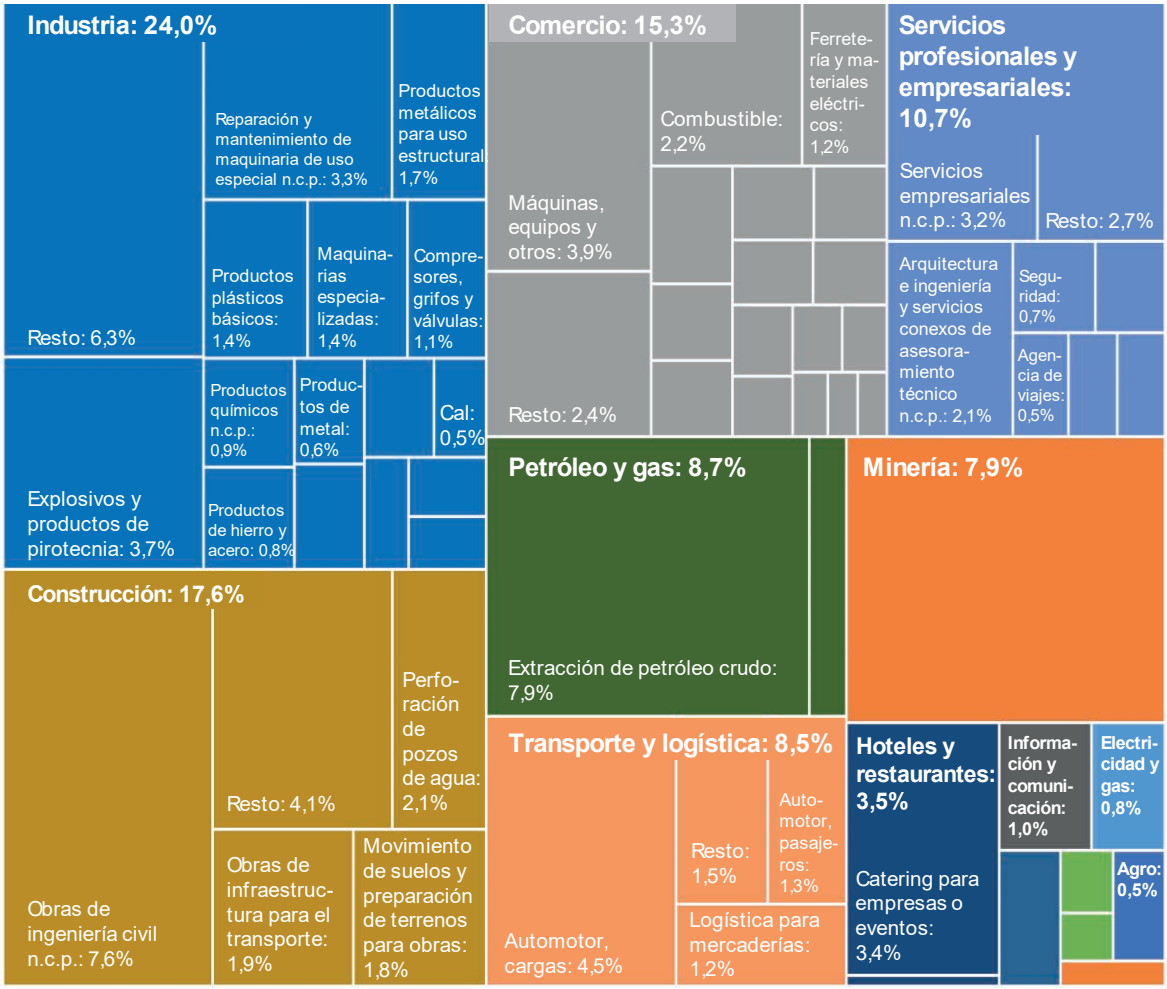
Source: EITI based on statements from companies, Ministry of Environment and Sustainable Development and AFIP.

3.7 What are the main mining supply sectors currently in Argentina?

According to a recent study by the Center for Production Studies based on AFIP and Customs, mining companies in 2019 made purchases from other national companies for 106,754 million pesos, which equals around 2,224 million dollars at the exchange rate of that year. This figure is equivalent to 51% of the total turnover of mining companies for that year. This value discounts the imports embedded in local suppliers.

The most relevant national suppliers of mining are the manufacturing industry (24%), construction (17.6%), commerce (15.3%), professional and business services (10.7%), oil and gas (8.7%), transport and logistics (8.5%), mining itself (7.9%), and hotels and restaurants (3.5%). These branches account for more than 95% of national suppliers.

Chart N° 18 Sectoral breakdown of suppliers of mining companies (according to purchase amount) - 2019



Source: CEP-XXI based on AFIP.

According to the same study, national suppliers account for more than 80% of the total purchases of goods and services made by mining firms. Machinery and some inputs from the chemical industry stand out among the imports carried out by mining companies.

In provinces with metal and lithium mining, we also find provincial regulations that encourage the hiring of suppliers and local labor, generally in the form of a minimum requirement on the total contract number. For

example, the province of Catamarca demands large mining projects hire 70% of suppliers and workers from that same province.

3.8 How developed is the mining value chain in Argentina? Has there been progress in recent years?

The mining value chain in Argentina has been growing since the 1990s, in step with the growth of the activity. For example, formal employment in companies classified as "Support services for mining activity" – which is only one of the supplier sectors – tripled in the last 15 years.[3]

According to estimates by the Center for Production Studies based on AFIP, INDEC, and Customs (CEP-XXI), more than 80% of purchases of goods and services by mining companies take place within the domestic market. This figure is remarkably high because a large part of the purchases made by mining firms are non-tradable services (such as construction, transportation, catering, professional services, etc.) acquired in the local market.

Mining suppliers are diverse and include civil works construction companies and their local subcontractors and exploration activities, usually carried out by specialized SMEs ("juniors") that sell the good projects to producing mining companies owing the capital needed for their development. Companies connect to a network of local contractors and suppliers of goods and services from the construction and the beginning of production.

Also, large companies are part of the group of companies that supply goods and services to the mining companies. This is the case of global firms such as Sandvik, Finning, or Caterpillar. These companies have a very different reality from that of small and medium-sized companies that venture into the field of the mining value chain.

Many mining vendors supply more than one activity since the mining industry in the country is not yet as developed as it could be, considering the existing geological resources. Supplier companies also have links with hydrocarbon activity –which often requires related goods and services– and other sectors.

3.9 How are the salaries in the mining supplier companies?

According to a report written by the Center for Production Studies (CEP-XXI) based on AFIP information, wages in mining supplier companies are slightly higher than the average for the formal private sector (+2.4%).

Two compensating forces explain this fact. On the one hand, mining partially drives the employment of relatively low-wage branches, such as construction and accommodation and gastronomy services. On the other hand, in activities where mining is a more relevant client, wages tend to be higher than in other activities in the same sector. For example, in construction activities related to mining, wages are almost 30% higher than in the sector. This difference rises to 41% in hotels and restaurants. All of this suggests the existence of a positive wage premium in mining supplier companies. One possible reason behind this phenomenon is that large mining companies demand highly qualified suppliers to comply with safety regulations and minimize risks. These

[3]Since it is important to estimate total indirect mining employment over time, the evolution of employment in one of the main supplying branches (CLAE 99000) was taken as a proxy, for which it is reasonable to measure formal employment. In 2007, the number of formal jobs in this CLAE was 1,032, while at the end of 2021 jobs were more than 3,000. This data can be checked here.

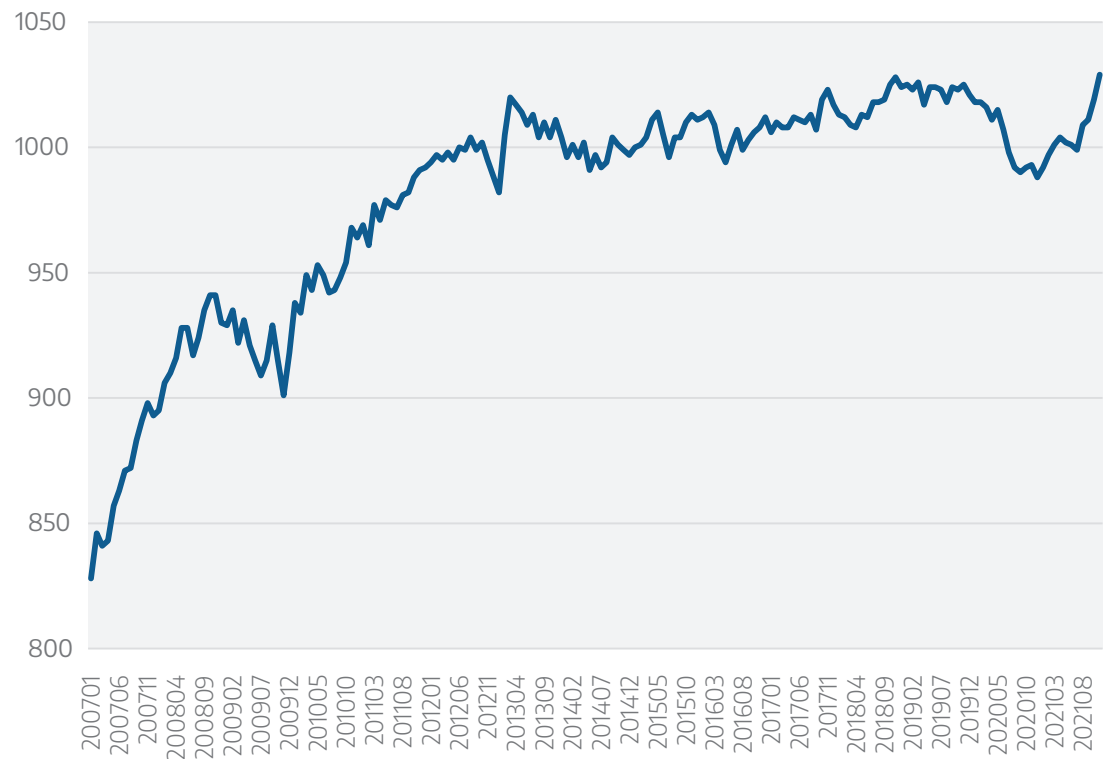
suppliers must train their personnel. This higher employment qualification in mining suppliers could be a reason for the wage premium.

3.10 How many mining companies are there nowadays?

There are currently 1,029 mining companies with registered employment. More than 97% of them are SMEs employing up to 200 workers. A trend toward the creation of companies appeared between 2007 and 2013. A stagnation process followed this trend until 2019. The pandemic brought an initial retraction in the number of companies. Despite this, a strong rebound in 2021 caused the historical peak in November that year.

Companies with mining as their declared main activity are listed here, as well as companies whose declared main activity is not mining but do have mining links.

Chart N° 19 Number of Mining Companies



Source: CEP-XXI based on AFIP (IRS) and the National Directorate of Mining Information and Transparency.

4. Environmental and Health aspects

4.1 What are the main environmental impacts of mining?

Mining activity, like all human activity, has an environmental impact. The main impacts are water usage, solid waste and dust generation.

The practices of the activity, as well as the state regulations, have evolved in the last 30 years. With few exceptions, all mining activity occurs in closed circuits, recirculating the water to avoid effluent generation. Solid waste is stored and managed according to its category. Dust generation[4] is strictly monitored and minimized through practices such as road spraying. Closure practices are carried out after the ore depletion to ensure that the remaining facilities do not generate negative environmental impacts. In this way, under normal operating conditions, there is no release of polluting substances into the environment caused by mining.

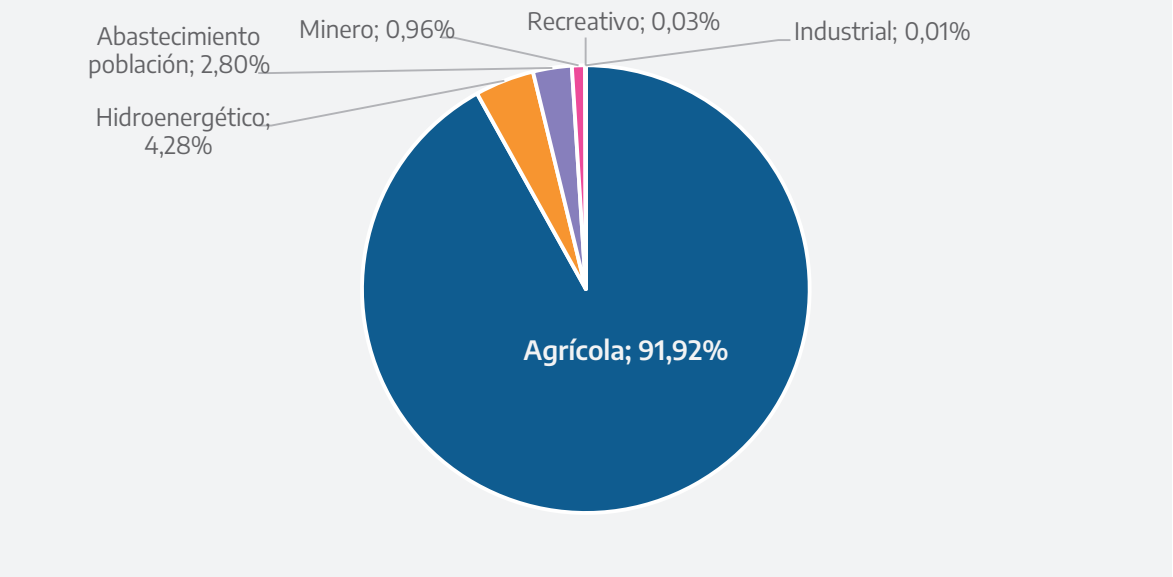
4.2 How much water does mining use?

It is important to mark the difference between water use and consumption. Mining uses significant amounts of water. Since it is recirculated in closed circuits -in which it is only necessary to replenish what evaporates- net consumption is low compared to other productive activities.

For example, in a mining province like San Juan, water consumption is less than 1%, while agriculture is the top consumer with more than 80% of the total demand. In Chile, a country with much greater mining development, consumption by this activity does not surpass 4% of the total society's demands.

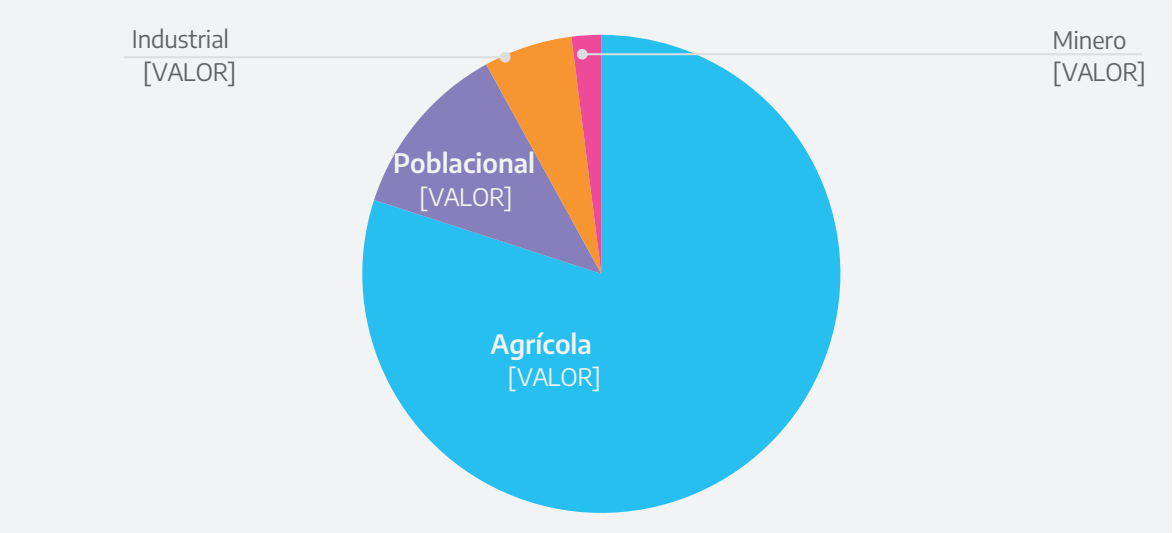
[4] Oscar Minolli. (2021, February 26th). *Particulate material dispersion in mining projects: How far does the dust from the mines go?*

Chart N° 20 Water Consumption in San Juan



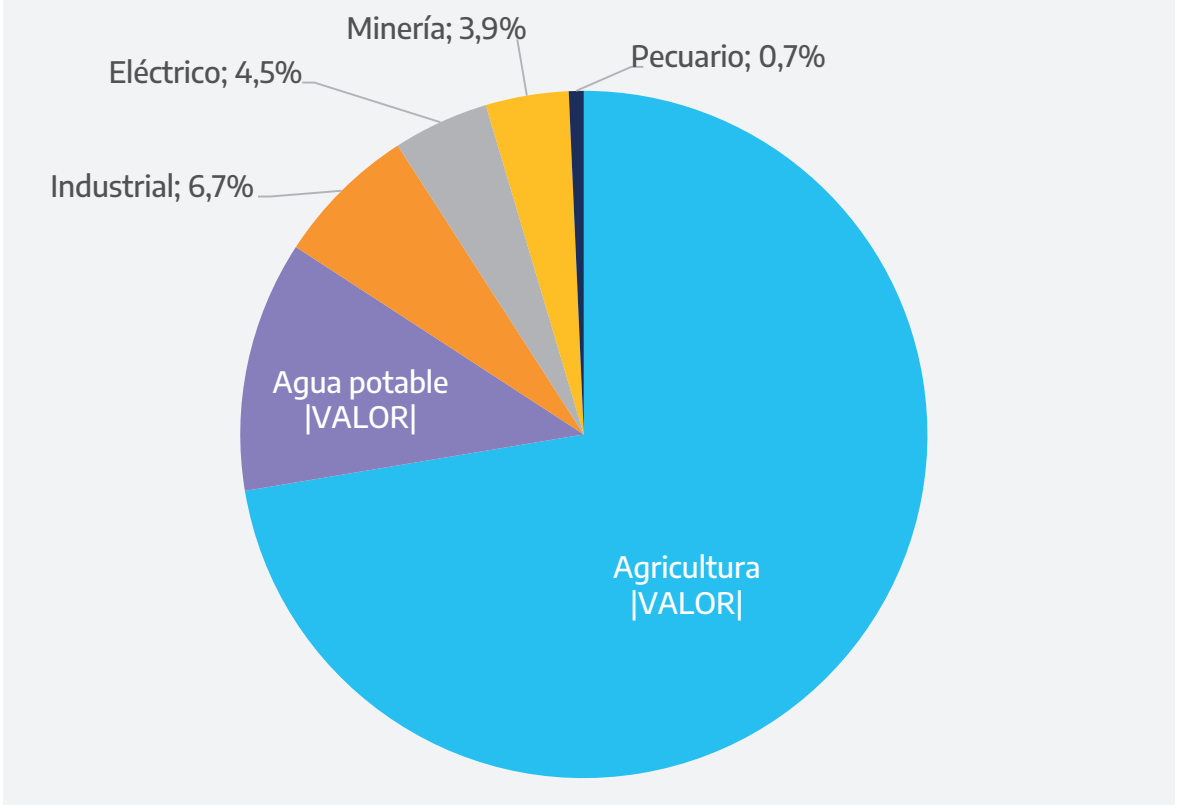
Source: Ministry of Mining, San Juan

Chart N° 21 Water Use in Peru



Source: National Authorities, Peru

Chart N° 22 Distribution of consumptive demand in Chile, by sector, year 2015



Source: Water General Directorate, Chile

As an example, the Argentine Circle of Engineers, in a recent report entitled "Mining in Argentina", mentions that: “To compare the amount of water used by mining to other uses, in 2011 the largest gold and silver mine in San Juan, Veladero, had a total average water consumption of 57 liters/sec. This stands for the same amount of water consumed by a 60-ha farm as an agricultural use permit in that province.

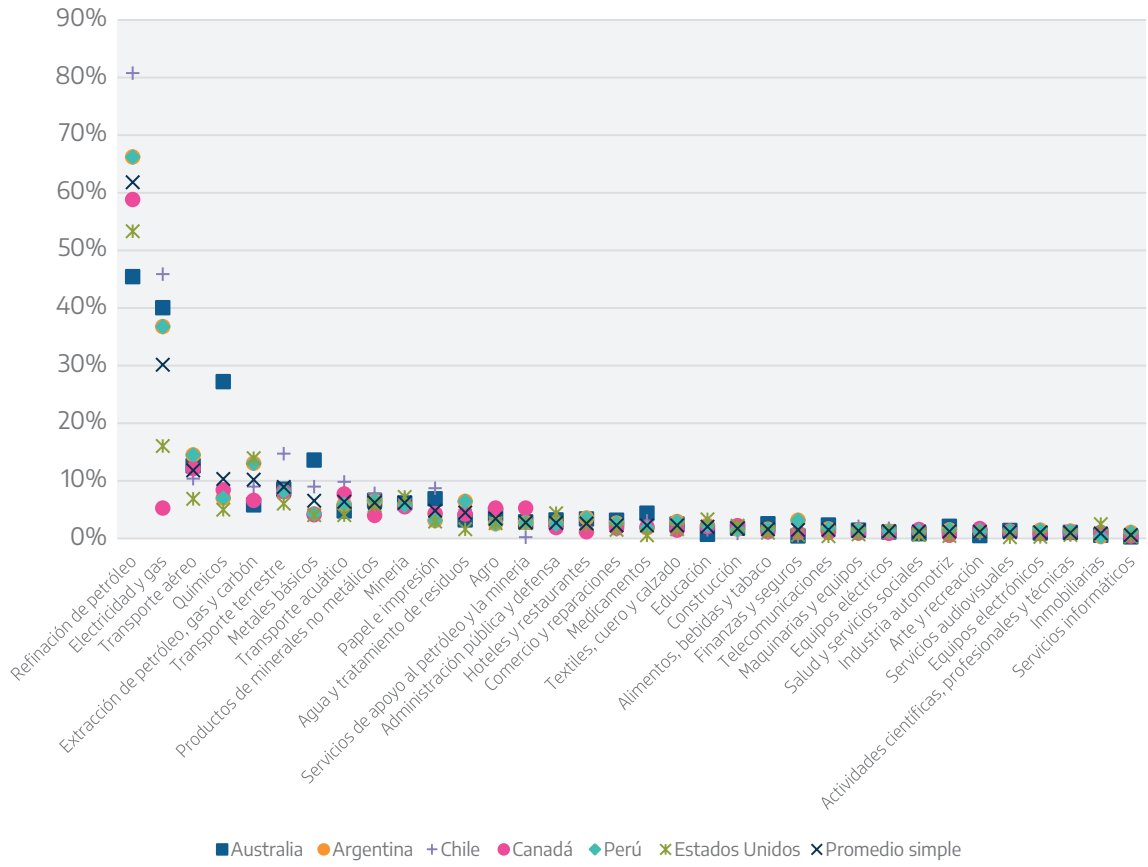
It is also important to highlight that mining works towards the development of efficient water use practices. At the same time, mining is implementing water compensation methods for companies to generate investments to save water in other productive activities, generating a surplus that compensates for the mine consumption, even reaching the possibility of achieving zero net consumption.

4.3 How much energy does mining consume? Is it possible to improve the energy efficiency of mining?

Like much of the manufacturing industry, mining is an energy-intensive sector (it consumes a relatively high amount of energy per unit of output). This happens for two reasons: on the one hand, the constant movement of transportation equipment requires fuel and, on the other, the mineral concentration and refining processes require plenty of electricity.

One way to view the energy consumption of mining is through the so-called input-output matrices, through which it is possible to see which sectors demand certain types of inputs from other sectors. The graph below shows, for the case of Argentina and other countries where mining is relevant (Australia, Chile, Canada, and the United States), the sectors ranked according to energy intensity. Energy costs were considered a sales percentage of a sector to create this indicator.

Chart N° 23 Energetic Costs as a Sales Percentage of a Sector, 2018.



Source: CEP-XXI based upon OECD We reached this calculation by the sum of the expenses a sector makes in oil, gas, coal extraction, oil refining, and electricity and gas supply as a percentage of production gross value.

Taking these countries' average, mining ranks 10th in energy intensity, below: fuel refineries, electricity and gas supply companies, air transport, chemical industry, oil companies, land and water transport companies, basic metals manufacture (such as steel, aluminum, and other metals refineries) and non-metallic mineral products manufacture (such as cement, a very energy-intensive activity). On the other end, activities such as computer services, creative industries, professional services, health or even the automotive industry, and consumer electronics are relatively low energy-intensive. In the average of the selected countries, 6.2% of mining revenues were allocated to energy in 2018. In Argentina, according to this source, that figure was 5.8% (similar to the average).

Regarding the energy expenditure of a mining project, it is essential to know that there is great heterogeneity. The mineral extracted, the stage of the project, the production process, and the amount produced are fundamental

variables that determine energy consumption. For example, in copper mining, the concentration process is the one that consumes the most energy. According to a report from COCHILCO,this process consumes 54% of the sector's energy in Chile.

During 2016, the National Mining Census (CENAM) was carried out in Argentina. Its results are published in INDEC and the total consumption of electrical energy in the sector is reported there. It is just a portion of mining's energy consumption (electricity) since the necessary energy is also relevant – in the form of fuel – to move the transport equipment.

Consumption of electrical energy (network and own generation) total for the country, 2016		
	MWh	Percentage
TOTAL	1,939,584	100%
Network	1,568,234	80.9%
Own Generation	371,350	19.1%
Source: INDEC.		

According to CENAM data, the electricity consumption of mining in 2016 was 1,939,584 MWh. Almost 81% of this was obtained from the network and 19% was from its own generation. This last figure is relatively high since many mining projects are located in remote areas, without access to the electricity network. According to CAMMESA, the local electricity demand in Argentina was 138,070,000 MWh in that year, so mining represented 1.4% of the total. The fact that mining accounted for 0.73% of GDP in that year (around half of its share of electricity demand) is in line with what we have already mentioned above: it is a relatively energy-intensive sector. In turn, the fact that its contribution to GDP is higher than its contribution to water use shows that this sector is relatively little water-intensive (see the previous question).

Several companies make different environmental sustainability indicators available in their sustainability reports or through the Global Reporting Initiative (GRI), including annual energy consumption. For example, in the sustainability reports of Alumbrera -a world-class copper project operating in Catamarca until 2018- you can see the total electrical energy consumption, which coincides almost 100% with the information provided by CAMMESA for the said firm. In 2014, when production was still high, consumption was 847,376 mWh, 58% coming from hydraulic sources (low carbon emissions) and 42% from thermoelectric. This figure was equivalent to 0.65% of the total Argentine electricity demand, and ranked fourth in the scale of electricity consumption at the main production plants in the country, below the Aluar plant in Puerto Madryn (aluminum), Acindar in Villa Constitución (steel industry) Tenaris in Campana (steel industry), and above several YPF refineries, the PBB Polisur petrochemical company (in Bahía Blanca) and the Ternium steel plant in San Nicolás, province of Buenos Aires .

The relatively high energy consumption of mining favors particularly the implementation of energy efficiency and decarbonization policies, based on both the gradual replacement of internal combustion vehicles with others powered by electricity and the gradual incorporation of renewable energies for different production facilities. For example, the Cerro Moro mine, in the Province of Santa Cruz, has a pilot wind energy project that generated approximately 1,000 KwH in 2019.

4.4 How many environmental incidents associated with open-pit mining have occurred since the activity began in the country? Why were they caused and what is currently being done to prevent further incidents?

Accidents are a characteristic of all human activity, and it is not possible to reduce risks to zero. From plane crashes to fire possibility, the risk is something we experience on a daily basis. This does not mean that we should fail to implement minimization measures. Environmental incidents in mining are a possibility as in any industrial activity. And, as in the rest of the activities, the vast majority of incidents are very small-scale, without generating major consequences on the environment.

In the past 30 years, there has been a significant environmental incident in the Veladero mine, in the province of San Juan, in 2015. It consisted of the spill of a cyanide solution (which is made up of 99.9% water) into a water body.

Although we could consider this incident as significant compared to others of a much smaller scale, expert reports were carried out by provincial organizations (Secretariat of Environment of San Juan), national (National Institute of Water, Ministry of Environment and Sustainable Development of the Nation) and international (United Nations Office for Project Services). They showed that this spill had no effect over two kilometers downstream from the mine, degrading naturally after a few weeks.

There was another study carried out by the National University of Cuyo. Its data reveal that all the substances found are of natural origin, as shown by the values corresponding to samples taken by said university at spots outside Veladero area of influence, where the same substances were found and in similar concentrations as in the points under Veladero influence.

Notwithstanding this, incidents of this type should be avoided. The provincial state of San Juan fined the company an amount of 145,696,000 pesos (which, at the exchange rate of the date, March 2016, was equivalent to 10.05 million dollars, one of the largest sanctions in the industrial history of Argentina) and the activities' suspension until the end of the works required to improve the mine's environmental safety.

In turn, every incident is an improvement opportunity. Measures such as real-time monitoring with circuit video cameras, or the installation of sensors and secondary containment systems are enforced to further reduce risks.

4.5 What chemicals are used in mining? What is the role of cyanide?

Some of the substances involved in the activity, such as metals, are a constitutive part of the geology of the production sites: they are part of the natural environment in which the activity is carried out. The presence of metals is frequent throughout the earth's crust. A well-known example of this is the high iron content that colors the soils of the province of Misiones. Some of the substances that may not be found naturally in the environment, such as detergents or emulsifiers, among others, are of very low toxicity, and not dangerous for the operation. But all the substances involved in the mining process are also part of the set of inputs used daily by hundreds of productive activities throughout the world, without restricting their development. Some are even used daily in homes, such as sodium hypochlorite (bleach) or lime.

Cyanide, in particular, is used exclusively in the leaching process[5] required to obtain gold and/or silver, this being the most widely used procedure for this purpose worldwide. This is done following international standards and protocols such as the International Cyanide Management Code and is always used diluted, with controlled concentrations ranging from 200 to 2,000 grams per cubic meter of solution, depending on the main mineral and the rest of the minerals. Because of this, the United States Environmental Protection Agency considers that cyanide, among the possible leachate options, is the best alternative in terms of safety and the environment.[6]

Finally, all the substances used are transported, stored, handled and disposed of in accordance with regulatory standards whose purpose is to minimize potential releases into the environment. These regulations are common to most productive activities, such as the National Law No. 24,051 on Hazardous Waste, through which the proper management of hazardous waste generated by many human activities is guaranteed.

4.6 How much waste does mining generate? How are they managed? Who is controlling?

Mining, like most productive activities, generates several types of residual materials. A kind of waste similar to household waste is generated, such as: containers of different materials (stored differently and sent for recycling), organic materials (such as food leftovers from the staff canteens), or sludge from the treatment of sewage effluents from staff, which they are usually composted and stored for later use in the revegetation of areas destined for closure.

Hazardous waste is generated, such as lights, vehicle batteries, and oils, and disposed of through specialized operators, authorized and controlled by the provincial environmental authority as stipulated in National Law 24,051 on Hazardous Waste.

And finally, waste from the mining activity is generated, such as sterile rocks with no commercial value or tailings deposited in facilities specifically designed to provide long-term stability. Although most mining residues are practically inert, with no potential to generate environmental damage, some contain sulfates and other natural substances. These substances are confined or inerted through different engineering measures designed to guarantee physical and chemical stability for centuries. These stabilization processes are part of the closure plans that the companies prepare in the framework of participation processes, evaluated by the provincial authorities.

4.7 What is the difference between “social mining”, “responsible mining” and “sustainable mining”?

Social mining is developed on a small scale, generally through artisanal practices, in production schemes at the family level, or in cooperatives.

Responsible mining complies with all environmental, fiscal, etc. regulations, even exceeding regulatory standards through good voluntary practices, such as the ISO 14000 Environmental Management Systems certification.

[5]Leaching refers to a chemical extraction process of the mineral of interest, transforming it into a soluble salt while the impurities are not modified.

[6] Fraser Institute (2012). What is the role of cyanide in mining? (MiningFacts.org); y Lucinda Wood. (2016). *Cianuro en la minería, su utilización, disposición y toxicidad* (Espacio de Diálogo Minería para un Desarrollo Sustentable). Ministerio de Economía y Energía.

Sustainable mining is one that, in addition to being responsible, entails strategic state planning that guarantees that the positive economic and social impact produced by the activity translates both into a benefit for present generations, and a legacy that benefits future generations.

4.8 What are environmental liabilities? What role does the Ministry of Mining have in this regard?

In general, mining environmental liabilities refer to the impacts generated by abandoned mining operations, with no identifiable or solvent responsible party, and where a regulated and certified mine closure has not been carried out by the corresponding authority.

As it does not have direct jurisdiction over the land of the environmental liabilities, the Ministry of Mining works with the provincial authorities to apply the best management methodologies. Some of the initiatives carried out by the Ministry of Mining consist of diagnosing and studying the issue to assist provincial authorities while developing guidelines and good practices for the diagnosis, survey, and management of environmental liabilities. Mine closure plans are developed to prevent the generation of liabilities. These plans aim to guarantee physical and chemical stability conditions, thus avoiding the adverse effects on the environment and fostering the health of the communities.

An example: the "Guide to good practices for the closure of mines" was carried out in 2019, which was reflected recently in Resolution 161/21. This guide has inspired the mine closure law enacted as a provincial law in Santa Cruz.

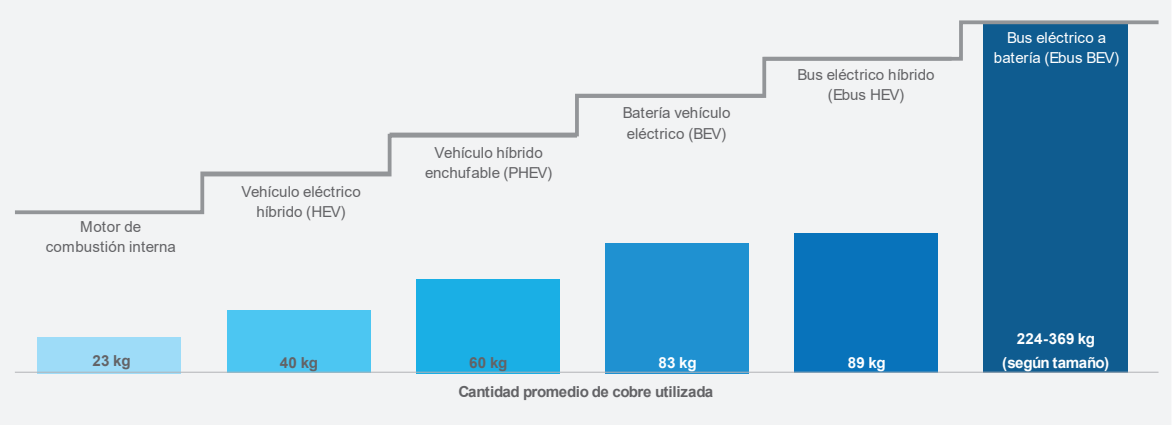
4.9 What is the role of mining in the energy transition essential to mitigate global warming?

Minerals are a necessary condition for the world to comply with the transition process towards low-carbon energies and, therefore, to fight global warming. According to projections made by the International Energy Agency (IEA) for 2040, the global demand for minerals and metals for clean energy technologies would double in the "Declared Policies Scenario" based on policies in the energy sector, and would quadruple in the "Sustainable Development Scenario". This scenario considers that the countries fully comply with the global objectives agreed in the Paris Agreement. The Paris agreement commits adhering nations to reduce greenhouse gas emissions to stabilize global temperature rise at around 1.5 degrees above the pre-Industrial Revolution levels, within the framework of the United Nations.

These estimates show that, for example, solar photovoltaic power will require nearly tripling the copper demand. Wind power will require significant amounts of rare earth – such as neodymium and praseodymium – and copper (600 kt per year), driven by the offshore wind, and demand more wiring. The electricity expansion will also require a large metal quantity, mainly copper (around 150 mt per year) and aluminum (around 210 mt per year).

On the other hand, the adoption of electric vehicles, new generation batteries, and storage systems, among others, will cause global lithium requirements to multiply fivefold (Cochilco, 2020). In turn, increasing electrification will boost copper and other minerals demand, with electric vehicle motors requiring five times more wires and silver-based joints than traditional cars.

Figure 1 Average copper demand by vehicle type



Source: CEP-XXI based upon ICA (2007)

All of the above shows that minerals in general –and metals in particular– are essential to generate and provide inputs for renewable energies, as well as low-carbon production technology. Mining will not only have an irreplaceable role concerning green energy but also continue to provide material for the production of information and communication technologies, computers, cell phones, consumption of electronic products, infrastructure, or food. As an illustration, a computer or a cell phone use more than 40 elements of mineral origin in their manufacture (Arvanitidis et al., 2017)[7].

This potential was recognized by the United Nations Environment Assembly on the approval of Resolution UNEA/EA.4/Res.19 on the governance of mineral resources at the fourth session. This resolution acknowledges the paramount contribution of mining to the achievement of the Sustainable Development Goals and the dependence that clean technologies with low carbon emissions have on the extraction of metals and minerals.

4.10 Are there effects of mining on health? Which are them?

There is some record of health effects resulting from smelters linked to mining activities carried out more than 30 years ago, such as the case of Abra Pampa, in the Province of Jujuy. But this is not something particularly characteristic of the mining activity, but because the environmental regulations at that time were much laxer than today. For this reason, there are many environmental liabilities today in Argentina and the world, caused by different productive activities carried out without environmental or sanitary requirements of any kind. Burying waste anywhere was legal 40 years ago for any activity, but regulations and corporate policies have changed since then. Today, in an ordinary operation, mining is subject to compliance with national and international requirements looking to avoid damaging health and the environment.

Regarding modern mining, and given the concerns some sectors of civil society have about the relationship between metal mining and the health of the people who live close to production sites, the Ministry of Health of the Province of Catamarca, within the framework of a cooperation agreement with the Center for Infectious Studies Foundation (FUNCEI), has encouraged the performance of a study to assess the health impact of this

[7] Arvanitidis, Boon, Nurmi, DiCapua (2017). White Paper in Responsible Mining. Technical Report. December 2017. IAPG Task Group on Responsible Mining

activity on the workers of Bajo de la Alumbrera and the inhabitants of surrounding areas. Bajo de la Alumbrera was the most important copper mine in Argentina and was in operation from 1997 to 2018 in the Agua de Dionisio plateau region.

The study ended in September 2010. It is published as "Health Status Assessment Program in Mining Activity Influence Zones in the Province of Catamarca", and includes, in addition to epidemiological and environmental studies, both qualitative and quantitative data on the populations of the area near Bajo de la Alumbrera. For example, opinions of both residents of nearby departments and mine operators are surveyed there.

For the specific case of the analysis of cancer incidence in Catamarca, the study states: "Mortality from cancer in adults in Catamarca does not show differences with other regions of the country." For the area surrounding Bajo de la Alumbrera, the same study states: “Through the testimony and opinion of the medical directors of the Andalgalá, Belén, Hualfín, and Santa María hospitals, there were no changes detected in the epidemiological profile of the populations and their areas of influence, controlled by Health Posts with the presence of doctors and nurses”.

It is worth adding that, within the framework of the National Board on Mining Open to Community (MEMAC), the Ministry of Productive Development entrusted the Ministry of Health with the preparation of a new report to better understand and update the existing link between the development of mining and the health of the Argentine population.

5. Regulatory aspects

5.1 What is the regulatory framework of the mining activity?

Argentina is a federal republican system, distributing regulatory powers between the National State and the provinces.

The National Constitution establishes in Article 41 that the Nation is in charge of norms that include the minimum budgets for the protection of the natural resources, and, to the provinces, those necessary to complement them, without altering the local jurisdictions.

Likewise, Article 75 of the CN, paragraph 12, mandates that the National Congress is in charge of writing the Civil, Commercial, Criminal, Mining, and Labor and Social Security Codes, in unified or separate bodies, that such codes must not alter the local jurisdictions, and that its application corresponds to the federal or provincial courts, depending on their respective jurisdictions.

According to Article 124 of the Constitution, the provinces have the original domain of the natural resources in their territory and write their local regulations for the administration and protection of their resources.

Thus, at the national level, the Mining Code regulates the activity establishing the rights, obligations, and procedures related to the acquisition, exploitation, and use of mineral substances.

Specifically, the mines are private assets of the Nation or the Provinces, depending on the territory. The Mining Cadastral Registry will depend on the mining authority of each jurisdiction with the main purpose of reflecting the physical, legal and other background information leading to the preparation of the cadastral registration corresponding to each mining right acknowledged by the Code. Each jurisdiction is responsible for granting permits and verifying compliance with current regulations.

The Mining Code also includes a Chapter called "Environmental Protection for Mining Activity" which establishes environment protection and natural and cultural heritage protection regulations, since they may be affected by the activity.

According to Article 282 of the Mining Code, “miners can freely exploit their belongings, without being subject to other rules than those of their safety, police and environmental conservation. The protection of the environment and the conservation of the natural and cultural heritage in the field of mining activity will be subject to the provisions of the complementary title and those established in due course under article 41 of the National Constitution.”

On the other hand, the mining activity is not exempt from compliance with the general environmental regulations. These regulations include all national laws on minimum budgets for environmental protection, such as Law 25,675 of "National Environmental Policy" which establishes the minimum budgets for the achievement of sustainable and adequate management of the environment, the preservation and protection of biological diversity and the implementation of sustainable development. Although this law applies to the entire national territory, it establishes the minimum budgets to be regulated by each province as the owner. In turn, it is also subject to compliance with the different environmental regulations enacted by the respective provinces.

5.2 Who controls the mining companies? What role does the Ministry of Mining have while controlling?

The provinces are in charge of the control function, since, according to the National Constitution (Art. 124), they are the owners of the mining resources. Therefore, the rules and control to comply with the provisions regarding mining concessions, production, transit guides, municipal regulations, approval of environmental impact studies and mining police are under the provincial and sometimes municipal sphere.

The National Mining Secretariat assists in such control, either by the institutional strengthening of the provincial authorities' capacities or by supporting them in specific control actions on which they need assistance.

Concerning all control tasks, the National Mining Secretariat is in charge of the administration of Law 24,196 on Mining Investments, which is national in scope and to which all the provinces adhered on time.

Another of the functions that it can perform is to enable access and quality of information to the general public. The Open Information System for the Community on Mining Activity (SIACAM) has been developed with this objective. In turn, given that mining has become a topic of debate for civil society, the Secretariat is carrying out, as of this year, the National Board on Mining Open to Community (MEMAC) with the aim of opening channels for dialogue and seeking consensus on the citizen questions regarding the activity.

This national body also administers the Mining Integration and Complementation Treaty with the Republic of Chile, signed in 2000.

5.3 How is the approval process of a mining project like? What about the case of environmental impact studies?

Initially, the country-located company must request the concession of the lands to the mining court of the province where it wants to operate and pay for the corresponding mining canon. From this moment on, an Environmental Impact Study must be performed for every activity the company wishes to carry out. They also must have the corresponding approval by the provincial government, which includes the instances of social participation, and the communities make observations that are taken into account by the company to improve its environmental performance. This includes every project from its initial exploration stage to the moment of the

approval for production start request. The reason is that each activity has a determined environmental impact and therefore the province must analyze the effects to require companies the measures to prevent or mitigate them.

5.4 How is the export process of a mining project like? Are mining exports made by affidavit and without effective State controls?

Although mining companies indeed file affidavits about the content of the exported metal, it is also true that this modality is the same for the rest of the exportable goods and services. It was never a particular criterion for mining. On the other hand, the State carries out independent controls on the mineral. Before the export, the seller and the buyer sign a sales contract that establishes the mineral conditions, the penalties for impurities (marginal amounts of lead, iron, silica, etc.), and an impartial arbitrator mediates between the parties in case of differences between the analyses of the mineral carried out by each party. This contract is presented to AFIP before the export operation.

AFIP General Resolution No. 2108/2006 establishes that the declaration at FOB prices (free on board, that is, at the port of departure) is made provisionally and can be modified considering the refining of metals and according to price differences that may arise later. The customs declaration is implemented through two designations:

1. "Export destination of mineral concentrates with provisional FOB value" (ES03) at the time of shipment, where provisional content appears. This means that the declared FOB values will be modified later.

2. “Export destination to mineral concentrates consumption” (EC09), filed within 180 days [8], where the destination, FOB value, and quantity of mineral are definitively established.

The inspection body only taxes economically recoverable minerals. This means that, for example, a concentrate sample[9] may contain some iron percentage that will not be taxed. This occurs because that mineral is penalized by the buyer as an impurity in commercial contracts[10]. Refining it from the mineral of interest raises production costs and there is no way to recover it. This is valid for other elements with no commercial value (such as silica) that could be found in a concentrate.

For export cargo at the plant, whether in the mine or in the deposit of the flow transporter, AFIP General Resolution No. 2977/2010 must be complied with. Among the requirements, authorized scales are required under the terms of General Instruction No. 4/2006, and a specific space for merchandise load must be stowed and made available to the customs service at the time of filing. In turn, the merchandise to be exported must be individualized to enable its identification in the support documentation (invoice, delivery note, or equivalent document) and its differentiation from that destined for the domestic market. When loading Doré bars[11], Customs carries out online monitoring through a circuit of cameras installed in areas with panoramic vision,

[8] This time period emanates from the fact that the contracts are set in terms of "Mother of Adaptive Moving Averages" (MAMA) based on the average prices of minerals up to 3 months after export, added to logistics and analysis.

[9] A concentrate is obtained from the grinding process: a fine and dusty intermediate product formed by the metal separation from the waste. It is the raw material for the refining process.

[10] For more details on contractual, logistical, customs and commercial aspects: Mining Law Argentine Institute (2020). Webinar - Marketing of minerals.

[11] Doré bars are ingots of a semi-pure alloy of gold and silver and may include other minerals such as molybdenum, platinum, etc. They can weigh between 20kg and 25kg.

without blind spots, to record the entire operation from the entry of the merchandise to the dispatch. Weighing and sealing controls are carried out once more at the exit customs office, before export.

Samples from each export are taken, usually in the customs registration office's place of jurisdiction, keeping the registration in a Sample Traceability System[12]. The procedure consists of taking three samples[13] of 2 to 5 grams following statistical methods to preserve their representativeness. The analyses are carried out under IRAM-ISO 9001:2008[14] standards by laboratories contracted for this purpose or by the Institute of Mining Technology (INTEMIN), which depends on the Argentine Mining Geological Service (SEGEMAR). The samples are taken as close as possible to the export, and there are up to 5 years to carry out laboratory analyses of the exported mineral. According to SEGEMAR's report for the year 2020, INTEMIN carried out the analysis of 211 samples of the so-called "golden alloys" or "bullion" of export ingots.

The mineral content concentration changes according to the deposit and the production stage of the mine, since the mineral concentration decreases as the exploitation matures. For example, doré bars concentration ranges from 2% to 70% (below 2% is considered pure silver). The export duties calculation is done by multiplying the mineral content by the FOB prices established at the contract (which may be the day when the laboratory analyzes, shipment, etc.), minus refining costs, penalties, international freight, and insurance (that is, the components of the CIF value are subtracted until the FOB value in Argentina is reached).

The buyer pays an advance based on the agreement but, as mentioned above, he performs his laboratory analysis at the destination and, if any differences appear, he will resort to the arbitrator established in the sales contract. On the other hand, the Customs at the destination country perform the corresponding weighing and sampling, and compares them to the certificates issued by the national Customs.

The General Directorate of Customs not only takes into account the commercial conditions established in the contracts but also all the results of the laboratory analyses carried out by all parties, including those from abroad[15]. In cases where the affidavits are inaccurate or contain unjustified differences, the sanctions established in title II, chapter seven of the customs code will be applied (usually, between one and five times the value of the difference found).

Figure 2 Export Process in Mining

[12]For more details on the Sample Traceability System (STM), enter here.

[13]One sample is sent for analysis, another is reserved by the local Customs and the third remains in the possession of the interested party.

[14]IRAM 16014 standards for mineral concentrates sampling and IRAM 16015 standard for gold and silver in bullion determination, both developed to obtain samples fully representative of the export lot for subsequent analysis in terms of quality characteristics.

[15] RG AFIP Nº 2108/2006, section. 8: "The certificate issued abroad must be endorsed with the signature of the foreign importer or his representative with sufficient power. The Customs Service may require that the exporter of the country demonstrate the legal relationship of said signatory with the importer."

Source: IADEM.

Large mining companies are controlled not only by local governments but also by foreign governments. For example, Canada —through the Extractive Sector Transparency Measures Act, ESTMA for its acronym in English— obliges companies of that origin to make annual declarations of operations abroad, which are accessible by any person.[16]

5.5 What is the role of the Mining Secretary on the sustainable development of the national mining activity?

The Mining Secretary is in charge of the global background of the national mining sector. It promotes an accountable mining activity that sets sustainable development in compliance with current national regulations and international protocols. Likewise, it materializes public policies at the national level that are accepted and applied by the provincial states, the owners of natural resources. These needs are based upon the achievement of coherence and uniformity in the mining policy, within the federal framework that fosters the investment attraction for the development of the industry. It has a territorial presence through the Federal Mining Council (COFEMIN).

The Mining Secretary has a National Directorate of Sustainable Mining Production. Several socio-environmental initiatives are promoted here to encourage a gradual increase in the area sustainability, in collaboration with the provinces, companies, academia, and civil society in general. These initiatives include climate change mitigation and adaptation measures, strengthening of provincial capacities in environmental control and monitoring, development of a national regulatory framework on mine closure, promotion of associations among small artisanal mining producers, and development of training programs in trades to improve the employability of communities in the mining sector, initiatives to increase gender parity both in companies and in government authorities, promotion of practices for the efficient use of water and energy, etc.

5.6 In which provinces is mining banned?

There are currently seven provinces that ban metal mining activity for different reasons (Chubut, La Pampa, Mendoza, Córdoba, Tierra del Fuego, Antarctica and the South Atlantic Islands, San Luis and Tucumán). Their

[16] Reports can be read here.

legislation prohibits different forms of production processes linked and/or included within metal mining, particularly to open-pit production and the use of cyanide, mercury, and sulfuric acid. For a short period of time, La Rioja was among the provinces that vetoed the activity, but, having passed legislation to that effect in 2007, it repealed it the following year. The same happened in Río Negro, which after enacting a prohibition law in 2005, finally repealed it in 2012.

6. Citizen and community participation

6.1 What is social license?

The "social license to operate" is a concept born within the framework of a new paradigm of the industry-society relationship. It was created in 2004 by the United Nations Organization so that companies that carry out activities in a given territory have the consent of local communities.

Some approaches understand the social license to operate as the consent that communities give to a project throughout its life, apart from the legal license. This theoretical approach is focused on “permission”. However, new scenarios and actors such as international organizations, financing agencies, National and Provincial States, NGOs, local communities, and society demand bidirectional, participatory and dialogical relations between a company and the society.

When a company arrives in a territory, it finds values, traditions, symbols, beliefs, modes of behavior, and representations that make up a feeling of belonging of the local population towards the place. The social license is then built as a dynamic, relational and dialogical process, with horizontal relationships of mutual learning that lead to participatory constructions.

In the current process of building a social license, there is much work in progress on participatory projects born from a mutual effort between the company and the community. The tangible and intangible capitals of both parties are articulated through synergies to create long-term actions in the region.

It is not only about creating transparent information but about moving towards bidirectional spaces where the community can raise their voice in the project through participatory processes.

Based on the principles of equality, non-discrimination, participation, transparency, and accountability, companies are comprised as a complement to the non-delegable role of the State to contribute to the better sustainable development of the territory.

6.2 What are the instances of citizen participation?

At the national level, citizen participation is guaranteed in the General Law of the Environment No. 26,675, in force since 2002, which establishes that the authorities must institutionalize consultation procedures or public hearings as mandatory instances for the authorization of those activities that may generate significant negative effects on the environment. Likewise, the law specifies that citizen participation must be ensured, mainly, in the procedures for assessing the environmental impact and in the plans and programs for the environmental regulation of the territory, in particular, in the stages of planning and results evaluation.

Added to this requirement is the ability of any citizen to access information on any mining project held by governments or companies, under the protection of National Law 25,831, in force since 2004, which establishes the free access regime. to environmental public information.

Subsequently, Argentina's accession to the Escazú Agreement through Law No. 27566 of the year 2020, establishes Access to Information, Public Participation, and Access to Justice in Environmental Matters in Latin America and the Caribbean.

These instances are completed at the provincial level through diverse statutes that regulate the Environmental Impact Assessment procedures in detail. These procedures consider publicity practices and early participation of all interested social actors.

Finally, mining companies tend to enforce community participation programs that go beyond the law requirements and the initial stages of a project, for example: participatory environmental monitoring processes through which members of the community are invited to take part of the monitoring processes for water and air quality, among other environmental control activities. Participatory instances are also generated in the development of mine closure plans, in which the community is involved in the design of closure measures and the forecasts associated with the future of the community after the end of activity.

However, these instances of participation have not been enough to avoid conflict around mining so far. Based on this observation, to deepen and strengthen the instances of participation and responding to an increasingly nationalized discussion, the MEMAC was launched as a plural, federal and transdisciplinary arena to discuss the different aspects of the activity. In addition, SIACAM intends to continue delving into the different dimensions in this document to comply with the state's duty to build and deliver the most significant information and transparency to citizens.

Ministerio de Economía
Argentina

Secretaría de Minería