



Ministry of Foreign Affairs

Market Study

Opportunities in the mining sector in Argentina

Dutch solutions for a more sustainable mining industry

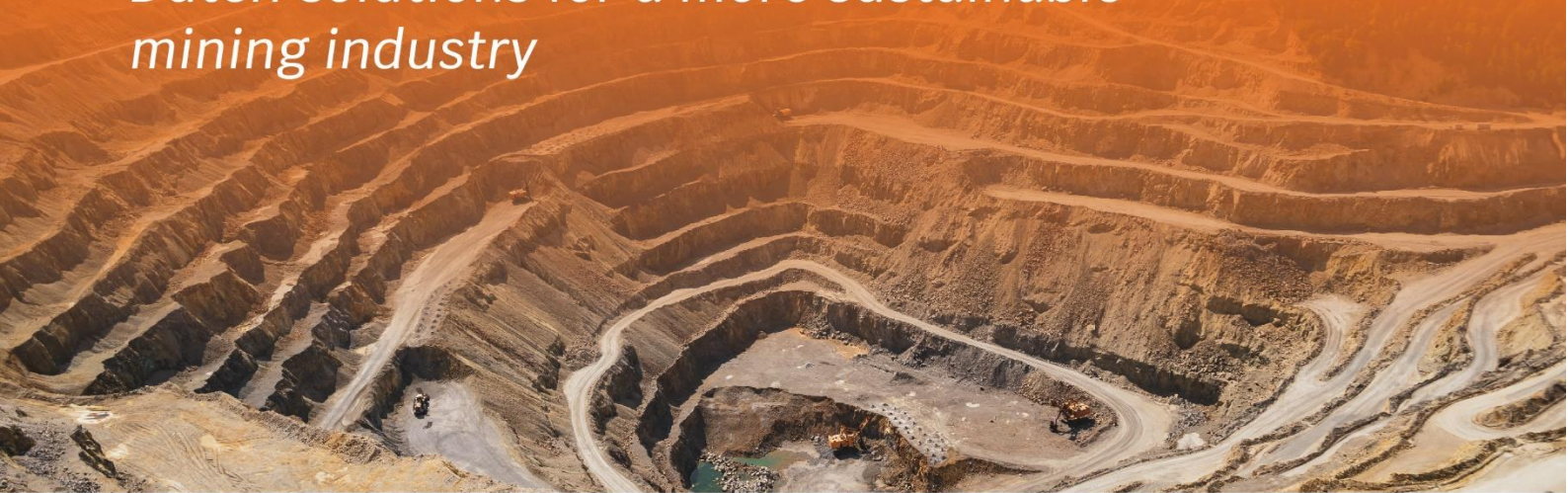
Commissioned by the Netherlands Enterprise Agency

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Opportunities in the mining sector in Argentina

Dutch solutions for a more sustainable mining industry



Author:

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Commissioned by:

NBSO Córdoba | Dutch Embassy in Buenos Aires | RVO / Dutch Enterprise Agency

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Executive Summary

The mining sector in Argentina is booming, with many investments announced and projects executed in mainly lithium and copper. Although Argentina has great mineral resources, the mining industry (dedicated to mainly gold and silver production), has been less developed in the last decades compared to sectors such as agri-food, services, and construction. With the rising prices and a foreseeable increase in demand for materials that are required to power the world's energy transition the mining industry is evolving rapidly. With the forecasted investments, the export of mining products is expected to rise from USD \$3 billion in 2022 to almost USD \$ 10 billion in 2030.

At provincial, national, and international level there is growing focus on the need for safer, more efficient, and sustainable mining practices. There is an opportunity for Dutch knowledge and technology that can help the Argentinian industry to meet these challenges. For this reason, the NBSO Córdoba and the Embassy in Buenos Aires have commissioned this study to learn the current situation and outlook of the mining sector and to highlight needs and challenges that could be met by Dutch companies. The study has been conducted by Mr. Gabriel Paganini, a mining consultant with a long and broad experience in the Argentinian and international mining industry.

Since Argentina has a very advantageous position in the world's **copper** and **lithium** mining sector, a thorough investigation was carried out in the northern provinces of Argentina, which are Jujuy, Salta, Catamarca, and San Juan. The first three provinces mentioned above stand out for their potential lithium production, the latter in copper, gold, and silver.

Jujuy province is part of the so-called "Lithium Triangle", which is located between Chile, Bolivia and Argentina and concentrates about 50% of the world's lithium reserves in the brines of the salt lakes. In Jujuy, the deposits are located in the basins and salt flats in the west of the province and in the Puna region of the Andes, on altitudes exceeding 3.500 meters. In the region. Lithium is a relatively new mineral in terms of exploration and mining, with the Salar de Olaroz being the only lithium project currently producing in the province. Other production sites will follow.

The province of **Salta** is developing the lithium mining industry very well; there are several salt flats with different companies and many of them are in the pre-production pilot plant stage. Salta is fortunate to be the province with the most mineral export destinations, with markets open in 50 countries on all five continents.

In **Catamarca** the multinational company Livent has been producing lithium in the Salar del Hombre Muerto - Antofagasta de la Sierra - Catamarca, since 1997 through its subsidiary Minera del Altiplano S.A. It is the oldest company that produces lithium in Argentina. Mining is done by pumping; it does not require traditional mining.

Finally, **San Juan**, the province with the greatest potential for the development of mining activity is leading the country's exploration activity. San Juan currently leads the national ranking of investments in mining exploration, with 42% of the resource that moved the activity in 2021. The province's territory concentrates 50% of Argentina's mining potential. Today, San Juan follows a model where it seeks to create a sustainable mining, a mining with society, a mining where mineral resources are granted to mining them.

The above-mentioned provinces are also highly positioned on the Investment Attractiveness Index, published by the Fraser Institute (Annual Survey of Mining Companies, 2021- Published on April 12, 2022). With San Juan leading, all four provinces rank higher than the neighboring mining countries Bolivia, Brazil, and Chile.

Based on the analysis carried out in the different mining provinces and the fact that in 2020 the Mining Secretariat proposed the need to develop a strategic planning for mining development based on sustainability. With focus on sustainable mining through the responsible, rational, and ethical use of natural resources and the environment. Also inclusive, through the economic growth of the local economies, integrated to the mining value chain. Moreover, competitive by obtaining productive efficiency of the projects in all its stages. This study has been conducted regarding the institutional framework, understood as the set of rules that structure the interaction between the industry and the community actors.

An analysis was made about the different production processes of lithium and copper to detect in which stage of the lithium and copper productive processes the Dutch companies can intervene and apply their knowledge, technologies, and services, to improve and make mining in Argentina more sustainable and maintain Argentina's current production levels and remain at the forefront of the global mining industry. This report concludes that mining in Argentina must improve very important aspects: Reduce the consumption of water, improve energy use, and provision in remote locations and improve sustainability and care of the environment, but for these challenges, it is important to have better engineering on the mining projects.

Several interviews were conducted with different Dutch companies that are experts in water, energy, engineering, and environmental management, to match the needs of Argentina with the right company in the Netherlands.

Finally, the report and assessment highlight the complexity of the mining sector of Argentina and water, energy, and environment management in general. The use of these resources competes with many other industries and cannot be separated by focusing exclusively on mining, as it requires attention to the interconnection with other sectors and users. This study shows that the Dutch companies can complement Argentina's vast knowledge of mining in creating a prospering, inclusive and sustainable mining industry that powers the world's energy transition.

Below we highlight some of the demanded solutions where Dutch companies can add value:

- **Water technology and knowhow:** solutions to increase the recycling rate and reduce the water footprint treatment, separation, membrane filtration, smart suction, etc.).
- **Energy transition:** solutions for reducing the current energy use, include renewable energy solutions and help design a future energy transition (such as hydrogen once technology is accessible and able to be implemented in the harsh mining conditions).
- **Developing mining and environmental and water management solutions:** assisting with the development of a long term and sustainable mining strategy, improving mining processes, assisting with safe and efficient tailing management, managing supply and treatment of water for production.
- **Engineering solutions:** creative and effective engineering solutions that provide business solutions, reduce environmental impact, and aim on positive social impact. From planning the mine, logistics, production, to the mine closure at the end of the life cycle.



Introduction to the mining industry of Argentina

General Introduction

The Argentinean mining industry stands out as an activity of great economic importance for the regions where the projects are located, as another link in the productive framework, in the value chain and in the national export chain. Mining provides strategic materials for renewable energies (inputs for the manufacture of solar panels, wind turbines and batteries), contributing to the decarbonization of the economy and long-term carbon neutrality strategies.

In 2020, the Mining Secretariat proposed the need to develop strategic planning for mining development based on sustainability, with a focus on sustainable exploitation through responsible, rational and ethical use of natural resources and the environment; inclusive, through the economic growth of the territories; integrated into the value chain; and competitive as a factor of productive efficiency of the project in all its stages. All of this within an institutional framework, understood as the set of rules that structure the interaction between industry and community actors.

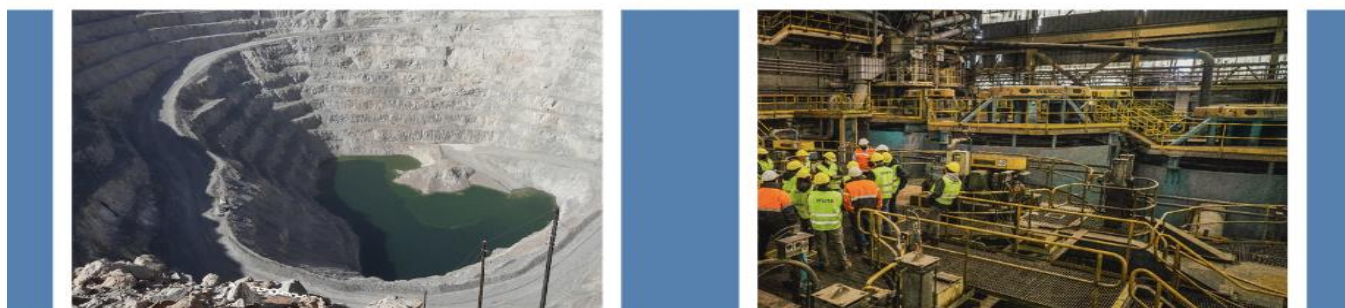
This strategic planning was approved in 2020 by Resolution 47/20 of the Mining Secretariat, based on two aspects. The first is long-term oriented and based on the formulation of a "Strategic Plan for Argentine Mining Development" (PEDMA) as an initiative aimed at developing a general strategy for the future of national mining development over the next 30 years. The second contemplates the strategic articulation with short- and medium-term actions through a public management plan structured with 7 strategic objectives and 18 management programs for 2020/2023.

Accompanying the need to work on these processes, the Dutch private sector can play an important role in making the mining value chains in Argentina more sustainable, addressing the challenges of environmental and social sustainability, as Dutch companies are active in engineering solutions, consultancy, dredging, water technology, measurement, and control processes, etc.

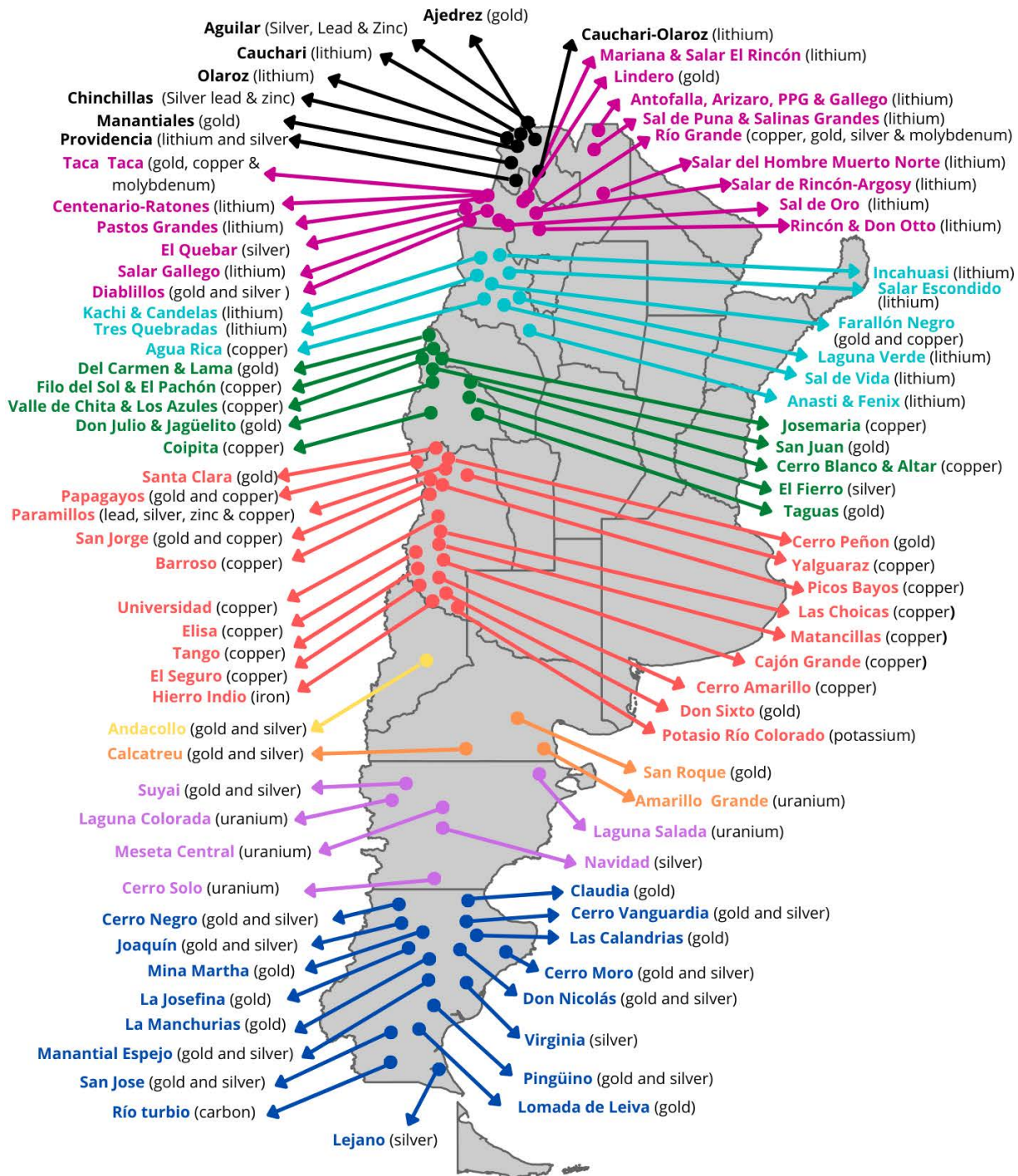
Future Outlook

Argentina is positioned among the world's main mineral reserves, which makes it an attractive investment destination in the short term. In particular, the northwest of our country, together with Chile and Bolivia, forms the so-called "Lithium Triangle" and is currently the fourth largest global producer and the third largest reserve of this mineral in the world; however, it must be understood that mineral reserves are a dynamic concept, dependent on the explorations carried out and the economic conditions that make their economic exploitation possible. In this sense, Argentina represents a relatively unexplored territory, so it is to be expected that the country's position in the world rankings of mineral reserves will rise as exploration work progresses and activity develops in the near future.

According to S&P's Exploration Budget Database, Argentina has climbed the ranks in recent years as a destination for global exploration budgets and in 2019 broke into the top 10 globally. However, it should be mentioned that part of the potential for mining activity in our country is already in the process of being realized. The country currently has a portfolio of more than 40 advanced projects, in stages ranging from advanced exploration to construction, which could come into production over the next few years. Of these, between January 2020 and December 2021, investments of USD 9,314 million have been announced, of which 94.5% will be for construction and expansion. Estimates by the Ministry of Mining indicate that the completion of the most advanced projects alone would quadruple exports of the 2021 mining basket over the next ten years, to more than USD 13.2 billion.



Geographic Overview of Mining Activities



- Province of Jujuy
- Province of San Juan
- Province of Río Negro
- Province of Salta
- Province of Mendoza
- Province of Chubut
- Province of Catamarca
- Province of Neuquen
- Province of Santa Cruz

Overview of Different Mining Sectors

The Argentine mining industry produces 3 minerals:

- **Metalliferous:** The current metalliferous mining in Argentina is characterized by operations and projects where the main products are gold, silver, copper, lead and zinc. There are 13 operations in operation where the main metal is gold, accompanied by silver; 4 where the majority product is silver, the co-product being gold in 3 of them and lead and zinc in the other; and 1 deposit with combined production of lead, silver, and zinc, 12 gold mines of varying scale are under production. There are no copper operations at present, however, there are more than 20 advanced stage projects, several of which can be considered world class for their size and metal content. Argentina has the potential to grow its productive capacity, with a total of more than 30 projects with identified resources of this type, and more than 250 prospects or mineral occurrences in areas with high geological potential.
- **Lithium and potassium:** In the case of lithium, Argentina is part of the so-called "lithium triangle", which covers part of the provinces of Jujuy, Salta and Catamarca. There are 2 operations at present and a third one under construction and due to start production next year. In addition, there are 17 other projects between Feasibility and Advanced Exploration, some of which already have pilot plants where they are evaluating and perfecting production processes. Between all these projects, by May 2022 they had a total of 98 million tonnes of lithium equivalent, placing Argentina in first place in terms of lithium resources worldwide. There are also more than 20 early-stage deposits in both salt flats and pegmatites (or hard rock). The potassic deposits of the Huitrinian Basin (Mendoza and Neuquén) make up the most important potassic basin in Latin America and one of the largest in the world. Argentina also has potassium in the salt flats of the Northwest, where it is associated with lithium in the brines, and which could be a by-product of this, if market conditions are right.
- **Industrial Rocks and Minerals:** The production of industrial rocks and minerals takes place in the 23 provinces of the country, with the provinces of Buenos Aires (28.3%) and Córdoba (17.3%) accounting for nearly 50% of the production value (CeNam 2017 Indec).



Overview of Mines Producing, Under Construction and Mining Projects

Table 1: Mining operations in Argentina per category and province:

Mining Operations	Main Product	Province
Aguilar (closed with possible opening)	Lead, Silver & Zinc	Jujuy
Chinchillas	Lead, Silver & Zinc	Jujuy
Ajedrez	Gold	Jujuy
Lindero	Gold	Salta
Farallon Negro	Gold	Catamarca
Gualcamayo	Gold	San Juan
Cap Oeste	Gold	Santa Cruz
Cerro Moro	Gold	Santa Cruz
Cerro Negro	Gold	Santa Cruz
Cerro Vanguardia	Gold	Santa Cruz
Don Nicolas	Gold	Santa Cruz
Lomada de Leiva	Gold	Santa Cruz
Las Calandrias	Gold	Santa Cruz
Veladero	Gold	Santa Cruz
Mina Martha	Silver	Santa Cruz
Olaroz	Lithium	Jujuy
Fenix	Lithium	Catamarca
San José	Silver	Santa Cruz
Manatial Espejo	Silver	Santa Cruz
Rio Turbio	Carbon	Santa Cruz

Table 2: Mines in construction and under development in Argentina, per category and province:

Project	Main Product	Province	Current Status
Andacollo	Gold	Neuquen	Construction
Centenario Ratones	Lithium	Salta	Construction
Mariana	Lithium	Salta	Construction
Sal de Oro	Lithium	Salta	Construction
Tres Quebradas	Lithium	Catamarca	Construction
Sal de Vida	Lithium	Catamarca	Construction
Josemaria	Copper	San Juan	Construction
Providencia	Silver	Jujuy	Construction
Lama	Gold	San Juan	Feasibility
Suyai	Gold	Chubut	Feasibility
Pastos Grandes	Lithium	Salta	Feasibility
Salar de Rincón	Lithium	Salta	Feasibility
El Pachón	Copper	San Juan	Feasibility
Rio Colorado	Potassium	Mendoza	Feasibility
Cauchari	Lithium	Jujuy	Pre-feasibility
Kachi	Lithium	Catamarca	Pre-feasibility
Mara	Copper	Catamarca	Pre-feasibility
Filo del Sol	Copper	San Juan	Pre-feasibility
San Jorge	Copper	Mendoza	Pre-feasibility
Taguas	Gold	San Juan	PEA
PPG	Lithium	Salta	PEA
Salar del Hombre Muerto	Lithium	Salta	PEA
Candelas	Lithium	Catamarca	PEA
Taca Taca	Copper	Salta	PEA
Los Azules	Copper	San Juan	PEA
El Quevar	Silver	Salta	PEA
Navidad	Silver	Chubut	PEA
Laguna Salada	Uranium	Chubut	PEA
Amarillo Grande	Uranium	Rio Negro	PEA

Table 2 (cont.): Mines in construction and under development in Argentina, per category and province:

Project	Main Product	Province	Current Status
Pingüino	Gold And Silver	Santa cruz	Advanced exploration
Manantiales	Gold	Jujuy	Advanced exploration
Don Julio	Gold	San Juan	Advanced exploration
Conserrat del carmen	Gold	San Juan	Advanced exploration
Jagüelito	Gold	San Juan	Advanced exploration
Cerro Peñon	Gold	Mendoza	Advanced exploration
Calcatreau	Gold	Rio Negro	Advanced exploration
San Roque	Gold	Rio Negro	Advanced exploration
La Josefina	Gold	Santa Cruz	Advanced exploration
La manchuria	Gold	Santa Cruz	Advanced exploration
Claudia	Gold	Santa Cruz	Advanced exploration
Las Calandrias	Gold	Santa Cruz	Advanced exploration
Antofalla	Lithium	Salta	Advanced exploration
Arizaro	Lithium	Salta	Advanced exploration
Gallego	Lithium	Salta	Advanced exploration
Pular	Lithium	Salta	Advanced exploration
Rio Grande	Lithium	Salta	Advanced exploration
Sal de Puna	Lithium	Salta	Advanced exploration
Sal de los Angeles	Lithium	Salta	Advanced exploration
Salinas Grandes	Lithium	Salta	Advanced exploration
Incahuasi	Lithium	Catamarca	Advanced exploration
Salar Escondido	Lithium	Catamarca	Advanced exploration
Laguna Verde	Lithium	Catamarca	Advanced exploration
Anasti	Lithium	Catamarca	Advanced exploration
Los Sapitos	Lithium	San Juan	Advanced exploration
Rio Grande	Copper	Salta	Advanced exploration
Altar	Copper	San Juan	Advanced exploration
Cerro Blanco	Copper	San Juan	Advanced exploration
La Ortiga	Copper	San Juan	Advanced exploration
Las flechas	Copper	San Juan	Advanced exploration
Rio Salinas	Copper	San Juan	Advanced exploration
Rincones de Araya	Copper	San Juan	Advanced exploration
San Francisco	Copper	San Juan	Advanced exploration
Valle de Chita	Copper	San Juan	Advanced exploration
Piuquenes	Copper	San Juan	Advanced exploration
El Fierro	Silver	San Juan	Advanced exploration
Lejano	Silver	Santa Cruz	Advanced exploration
Virginia	Silver	Santa Cruz	Advanced exploration



Description of the Most Important Mining Provinces

Argentina ranks sixth among the countries with the greatest mineral resources, with a potential surface area of 750,000 km² of which 75% remains to be explored. With regard to the geological potential of minerals such as copper, silver, gold and lithium, which place the country at the forefront of the world in terms of identified resources and geological potential, all products of high demand in the world, in terms of economic development and transformation of current energy matrices, It has more than 80 projects at different stages with some in production of international magnitude.

The construction of these projects at regional level would have an impact on the socio-economic development of provinces such as Jujuy, Salta, Catamarca, San Juan, Mendoza, Neuquén, Rio Negro, Chubut, and Santa Cruz.

Please read more at: <https://www.fraserinstitute.org/categories/mining>

The province of **Jujuy**, through the efforts of its governor and in line with the interest of the National Government and the Federal Mining Council in developing the mining industry, continues to be the destination of important investments for the expansion, construction, and exploration of new mining ventures. Jujuy is a province rich in mineral resources, which is due to its location in the vicinity of the Andes Mountains and a favourable tectonic framework. This has allowed the occurrence of different geological processes in its territory. In fact, different geological events took place in the province, which are reflected today in important silver, lead and zinc deposits in the northeast, belonging to the Bolivian Stanniferous Belt; the concentration of boron, lithium, and sodium, where two metallogenic belts converge, favourable for the location of different types of minerals. In turn, in the Puna, the presence of endorheic basins at an average altitude of 3,700 metres and its arid climate, favours the concentration of minerals such as Boron, Lithium and Sodium.

To the east and southeast of the province are the Cordillera Oriental, Sierras Subandinas and the Santa Bárbara System, with the presence of application rocks and industrial minerals. Jujuy is part of the so-called "Lithium Triangle", which is located between Chile, Bolivia and Argentina and concentrates about 50% of the world's lithium reserves. In the province, the deposits are located in the basins and salt flats in the west of the province and in the Puna region. In the region, lithium is a relatively new mineral in terms of exploration and exploitation, with the Salar de Olaroz being the only lithium project currently producing in the province. Borates, on the other hand, have a longer tradition, with exploitation



dating back to the end of the 19th century, although in recent years, due to a combination of factors, their importance has declined. These factors include: price volatility, lower demand from Brazil and the emergence of a new supplier such as Bolivia, which not only has a higher grade but also lower transport costs, have discouraged provincial production. The potential for the discovery and development of new deposits of lithium, silver, zinc, lead, iron, copper, gold, etc. is very high and the province of Jujuy continues to move forward to achieve adequate maintenance for those companies interested in prospecting, exploring and putting into production new deposits in a serious and socially and environmentally responsible manner, being able to generate genuine investments that promote local and regional development.

Mining in **Salta** is a state policy. Mining is contemplated in the provincial constitution of Salta in Art. 82, which generates and provides legal certainty, which added to the geological potential is an attraction for investors. Currently, Salta preserves a traditional mining industry, which refers to the exploitation, processing and commercialisation of borates, where two companies stand out: Borax Argentina (exploiting the Tincalayu and Sijes deposits) and Minera Santa Rita (exploiting different salt flats in the Puna). The rest of the traditional non-metalliferous mining activity is related to the exploitation of volcanic glass, onyx, common salt and other leading salts. ‘



Metalliferous mining activity in Salta had its great achievement with the founding of the first precious metal ingots from the Lindero mine, and from this point on, the exploitation and processing of metals that had been paralysed since 1980 when the Concordia mine and the La Poma mine were closed, has resumed. On the other hand, exploration work continues at the most important mine in Salta, Taca Taca, Quevar and Diablillos. The other activity that is developing very well is related to lithium; there are several salt flats with different companies and many of them are in the pre-production pilot plant stage. Finally, Salta is fortunate to be the province with the most mineral export destinations, with markets open in 50 countries on all five continents, but as these are low-priced minerals, foreign exchange earnings are not so important. However, these figures will change when gold from the Lindro mine starts to be exported on a regular basis, or when the various lithium projects get underway. So far, the first export of lithium condensate to China has been achieved, preceded by the export of brine from the Salar de Diablillos.



In **Catamarca**, a modern state is being developed and built to adapt to the current circumstances that the country, the region, and the world are requiring. The development of mining in the province has constitutional hierarchy and is considered a strategic activity for the economic growth of the province. For this reason, it has been constantly emphasized that mining is a state policy in the province, and this allows for the development of projects in which the administration accompanies all the processes.



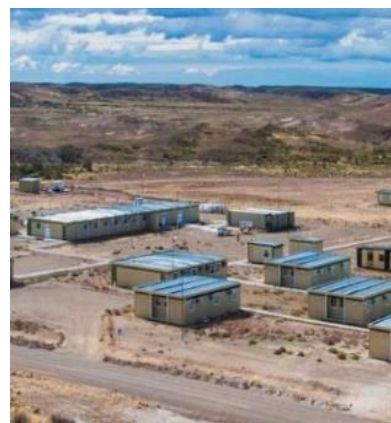
A clear example is the integration of the Agua Rica project with Minera Alumbrera's plant and infrastructure. The multinational company Livent has been producing lithium in the Salar del Hombre Muerto - Antofagasta de la Sierra - Catamarca, since 1997 through its subsidiary Minera del Altiplano S.A. It is the oldest company that produces lithium in Argentina. Mining is done by pumping; it does not require traditional mining. The brine is treated in a fully automated selective absorption plant that extracts the lithium, returning the rest of the solution to the salt flat. Subsequently, it is concentrated in evaporation pools to be treated in two plants, one located in the salt flat and the other in Güemes, near the city of Salta.

In this context, **San Juan** is the province with the greatest potential for the development of mining activity, leading the country's exploration activity. San Juan currently leads the national ranking of investments in mining exploration, with 42% of the resource that moved the activity in 2021, according to a report prepared by the Grupo de Empresas Mineras Exploradoras de la República Argentina (GEMERA). The figures show that the work carried out has made it possible to demonstrate that the model implemented in San Juan is viable, even in times of health crisis, but that it is necessary to continue working so that investment in exploration is transformed into real investment in production.



Within this framework, San Juan has turned mining into a state policy with fiscal stability, legal security and a license to operate based on sharing values with society as a whole. The province's territory concentrates 50% of Argentina's mining potential. Today, San Juan follows a model where it seeks to create a sustainable mining, a mining with society, a mining where mineral resources are granted to mining them.

The province of **Santa Cruz** has a great geological mining potential and a favourable geology for gold and silver prospecting and exploration. The Deseado Massif is a world-class deposit characterised by a large hydrothermal volcanic event of Middle to Upper Jurassic age, being the province with the largest number of epithermal deposits in Argentina. Santa Cruz is a mining friendly territory with continuous gold and silver production for more than 20 years. The province has the main mines and exploration areas available and is a region of special interest for the mining sector in relation to the development of investments given the geographical and climatic conditions, favourable for exploration. In addition, Santa Cruz has the largest hydroelectric development project in Argentina, on the Santa Cruz River. During the pandemic, the Santa Cruz government declared mining activity to be essential.



Since then, seven projects have produced 600,000 ounces of gold and 16 Moz of silver, making Santa Cruz the main gold and silver exporting province, generating more than 50% of Argentina's metalliferous production.

The province of **Río Negro** has been characterised by its traditional production of industrial and construction minerals (bentonite, diatomite, limestone, gypsum, etc.) in areas such as the Southern Region and Alto Valle. The involvement of this type of minerals is deepening with the suspension of iron ore production from the Sierra Grande complex.

The province is back on investors' radar after more than 10 years of inactivity. The wide mining offer includes metalliferous deposits, as well as energy mineral deposits (coal, uranium, vanadium, etc.). Calcatreu, the most advanced metalliferous project in Río Negro, is entering its feasibility stage. The operating company - Patagonia Gold - is in the process of planning, organising and initiating the technical, environmental and social studies necessary to design and size the project, as well as obtaining the necessary permits for its authorisation and start-up. In the field of energy minerals, Amarillo Grande is undoubtedly the main reference in the province of Río Negro.



Amarillo Grande is a major uranium and vanadium project, with estimated resources of large volume with only a portion explored and sized, such that the results of the PEA (Preliminary Economic Study) carried out are already attractive. In addition, the province has INVAP, a state-owned company, pioneer and leader in nuclear technology, as well as in communications technology -satellites and radars- and other industrial technologies. But Bariloche is also home to the Balseiro Institute, the CNEA, the CONICET, etc., with a Technological & Industrial Pole under construction and development. And in Pilcaniyeu there is the Uranium Enrichment Laboratory. All this suggests that we are on the verge of a mining project that could change the Argentine history of nuclear technology and its applications (energy, medicine, food, etc.), as well as the development of alternative energies.

With almost two decades of prohibition of open-pit and cyanide mining, the province of **Chubut** has a very high geological potential: only a few deposits show that a successful model can be replicated, as in Santa Cruz, but with other minerals and associated metals. Chubut is a province that, for several government administrations, has had a common denominator: chronic and sustained economic deficits, which translate into social problems. Mining is a transforming factor of economic impact that allows for growth and improvement of the communities in the areas of influence of the projects, always within the framework of environmental care and preservation. The province in question still has the opportunity to recover some of the lost ground thanks to the wide geological offer with epithermals associated to the permo-Triassic magmatism in the Somun Cura Massif (Suyai, Navidad), as well as uranium in sediments (Cerro Solo and Laguna Salada). These projects, if put to good use, could be the answer to the needs of Chubut's society, which could increase if the mining industry is not enabled.



Neuquén can be considered a territory with very little exploration for metalliferous minerals. From this point of view, Neuquén is an attractive place for exploration as there are several prospects located in its geography. The importance of the industrial minerals segment is growing, mainly because hydrocarbon production activity is driving these minerals and is currently in a stage of growth. The Andacollo district has hosted historical gold production; and in the north of the province there is a wide presence of potassium along the Neuquén basin, which assures presence and quality.



For the past 12 years, the mining industry in **Mendoza** has been paralysed and completely removed from the province's productive focus. As a result of a political decision following the passing of Law 7722, the development of mining projects that require the use of chemical substances has been stopped in Mendoza. Undoubtedly, this was a regulatory framework based on arbitrary questions related to the environment which, nevertheless, remain unclarified to this day. This has resulted, amidst political interests and various kinds of struggles, in the mere prohibition and the consequent disregard of empirical information regarding the possibility of developing some projects in social and environmental harmony.

Forecast of Industry Development in following 10 Years

Mining has been one of Argentina's fastest growing industries in recent years. Mining output is expected to have increased by 53% between 2005 and 2015. Mining still accounts for about 4% of Argentina's GDP. However, mining's contribution to foreign trade is more significant: total mineral exports reached USD 3.4 billion in 2019, accounting for about 5% of total foreign sales. This places the mining sector ahead of traditional activities as the country's fourth largest exporter (such as the livestock industry). Argentina's authorities estimate that its mining exports will triple by 2030. Argentina's mining exports will rise from USD 3.4 billion in 2019 to more than USD 10 billion, according to their projections (2030). The Argentine government anticipates that private investments in copper, lithium, gold, silver, potassium, and uranium projects will total approximately USD 27 billion in the coming years.

In terms of mining, the federal government has policies in place to: (a) Regulate mining and promote the development of the sector. (b) Promote stability and legal security in the treatment of mining concessions. (c) Boost national and foreign private investment in the sector. (d) Promote equal treatment to national and foreign investors. (e) Ensure that assets are freely transferable. (f) Ensure free competition in the sector.

In February 2016, the federal government abolished mining export taxes (Presidential Decree No. 349/2016). Considering the significant changes in the international financial environment, Presidential Decree 793/2018 established an extraordinary and temporary decision (until December 31, 2020) imposing a 12% export duty on all merchandise included in MERCOSUR's Common Nomenclature tariff positions. This export duty cannot be more than ARS4 per US dollar of taxable value or official "free on board" (FOB) price (as applicable). That limit is ARS3 for each US dollar of taxable value or official FOB price for merchandise included in the MERCOSUR Common Nomenclature tariff positions detailed in Annex I to this decree. The National Congress passed Law No. 27,541 (Economic Emergency Law) in 2019, allowing the federal government to impose export duties on mining activities until December 31, 2021. These can't be more than 8% of the dutiable value or the official FOB price. However, in March 2020, the current Secretary of Mining admitted to some Prospectors and Developers Association of Canada mining investors that the Argentine authorities have been working to reduce export taxes based on the valuation of each individual mining project.

Regulatory and Legal Frameworks

Mining regulations in Argentina are primarily established by the Mining Code, though additional rules may emerge from local procedural laws and certain special federal laws. The Mining Code establishes regulations that govern the general scope of permits, technical requirements, permit-holder obligations, and permit limitations. Mining natural resources are the provinces' property. Each province has its own set of mining regulations. Even though provincial laws and regulations cannot alter the rights and obligations established by the Mining Code, the process for obtaining and maintaining exploration permits varies slightly from province to province. The provinces are entitled to the following payments as owners of mining property: An **annual canon** determined by the substance's category and the extent of the area. The concessionaire is not subject to any other tax on the mining property, or the assets used to exploit it during the first five years of the concession term (counted as from the date of registration). If the annual canon is not paid, the mining authorities may terminate the mining concession. This is not automatic, and the concessionaire must be notified in advance. And **royalties** determined by the laws of the jurisdiction in which the mine is located.

In addition to the Mining Code and provincial regulations, Law No. 24,196, as amended (the "Mining Investment Regime") establishes a promotional regime for mineral ores prospecting, exploration, development, extraction, and refining. Since its inception, Argentina's Mining Investment Regime has favoured significant mining prospecting and exploration activities by providing special benefits that reduce the economic burden and risks associated with those activities.

Investment Conditions for the Mining Industry

The benefits of the Mining Investment Regime relevant to a project's prospecting and exploration stage are the following:

- Income tax advantages include: (a) The double deductibility of prospecting and exploration expenses on the income tax assessment. (b) The option of using an accelerated depreciation system for fixed assets, real estate, and equipment. (c) Exemption from mine profits and mining rights contributed in exchange for an equity stake in the relevant company.
- Option to capitalize 50% of proven mining reserves.
- 3 percent royalty cap on mine-mouth value of extracted minerals.
- Reimbursement of the Value Added Tax ("VAT").
- Exemption from payment of customs duties and customs fees for capital assets used in mining activities; fiscal, foreign exchange, and customs stability ("Fiscal Stability").¹

The Argentine Supreme Court of Justice (the "SCJ") has ruled that Fiscal Stability requires the national, provincial, and municipal governments to commit to limiting the total tax burden of a mining project. It does not, however, preclude the introduction of new taxes if the total tax burden does not exceed the tax burden established at the time the feasibility study was filed.

To determine whether the Fiscal Stability Act has been violated, compensations granted by the Argentine State through the suspension or reduction of other taxes must be considered in order to calculate the overall increase in the total tax burden. The Tax Reform Act (the "Reform"), which was published in the Official Gazette on December 29, 2017, may have an impact on the overall tax burden of ongoing projects:

¹ *Fiscal Stability means that the overall tax burden of the companies comprised within these regulations will not be increased. Instead, the tax burden is capped at the national, provincial or municipal level (provided that the province has adhered to this regime).*

The corporate income tax rate is reduced from 35% to 30% in fiscal years 2018 and 2019, and to 25% beginning in fiscal year 2020. Since 2018, the "Equalization Tax" has been repealed. This tax is levied on dividends distributed in excess of the previous fiscal year's accumulated earnings (35 percent applicable to profits not previously taxed). As a result of this tax cut, the Argentine government can levy a new tax or raise the rate of an existing tax without affecting the total tax burden of the mining project and, thus, fiscal stability.

The Mining Investment Regime sets forth the following obligations and formalities to be complied with by its beneficiaries:

- Filing of corporate, tax and mining information and documents with the application to become beneficiary and filing of annual updates thereafter.
- Filing of annual affidavits on forecasted investments; investments made in the expired term; use of double deduction of expenses and accelerated depreciation for the assessment of the income tax.
- Creation of a special accounting provision for the prevention and mitigation of environmental damages and the filing of an annual affidavit reporting this provision.
- Use of equipment subject to any of the above benefits only for mining purposes (i.e.: goods exempted from custom duties when imported, assets over which income-tax double deduction or accelerated depreciation was applied, etc.). However, with the authorization of the National Mining Office, such goods can be transferred to other individuals and legal entities registered in the promotional regime.

Risk Analysis

The most important risk of investing in Argentina are:

Legal certainty: Argentina and its high mining potential can play a transcendental role in the international mining industry since mining as a large-scale industry is still a virgin industrial sector in our country. For Argentina's mining potential to come to light and become an industry that symbolizes a factor of development, it is necessary to have a regulatory body that provides legal certainty and guarantees for investors. At the same time, it is necessary that the political sector accompanies with something much more than decisive, such as state policies, a set of tools aimed at transcending provincial mandates, outlining long-term strategic objectives. Very few industries have as much inherent risk as mining. It involves investments that can reach billions of dollars. However, there is no guarantee that an identified and feasible body will reach the construction and production stage. Exogenous and endogenous factors are decisive in defining an investment: the former are out of reach, but the latter can be enhanced so that a board meeting can make a decision that can transform the lives of thousands of people, as well as future generations. Currently, out of the 8 provinces where mining activity takes place, only 2 (Salta and San Juan) have legal certainty, and there we can clearly see the progress of the industry.

Remittance of profits abroad:

Its update based on S/P publications for exploratory budgets in 2021.

- Between 2015/2021 an annual average of US\$ 190MM invested (2.8% of foreign direct investment).
- The activity is critical for increasing a country's wealth by increasing resources and reserves.
- The exploration circuit does not yield tangible results, although it is equivalent in terms of investment and time to that of development and research in other industries.
- Investments continue to grow exponentially, 2021 received 46.6% more than 2020.
- Generates 2.566 direct jobs and 3.874 indirect jobs per year.
- It distributes U\$S 32 billion in salaries. U\$S 90 billion in provincial consumption, U\$S 3 billion in provincial taxes and U\$S 32.6 billion in national taxes.
- Exploratory Budgets - National Mining Secretariat - S&P SNL - In USD 2015 (see graph below).

Table 3: Exploratory budget from 2015 – 2021 in USD. Source National Mining Secretariat

Exploratory budgets - National Mining Secretariat - S&P SNL

	2015	2016	2017	2018	2019	2020	2021
Early Stage	28.000.000	45.000.000	47.000.000	61.000.000	67.000.000	31.800.000	41.500.000
Exploration stage	20.500.000	28.000.000	45.000.000	56.000.000	56.500.000	33.700.000	58.000.000
Advanced stage	20.500.000	28.000.000	45.000.000	56.000.000	56.500.000	33.700.000	58.000.000
Operation stage	55.000.000	50.000.000	72.000.000	68.000.000	60.000.000	55.500.000	69.300.000
Total	124.000.000	151.000.000	209.000.000	241.000.000	240.000.000	154.700.000	226.800.000

In addition, in recent years, the **Buy Argentine** and **Supplier Development Act** was passed, which is an industrial policy tool that allows the state's purchasing power to be channelled to improve national productive capacity and promote the development of local suppliers.

The exploratory budgets allocated to the different provinces are headed by San Juan, which takes 40% of the total, dethroning the historic leader, Santa Cruz.

Table 4 & 5: Exploratory budget from 2017 – 2021 per province. Table 4 in USD and Table 5 % relative share. Source National Mining Secretariat

Exploratory Budgets - Provincial Allocation - In million USD

	Salta	Catamarca	San Juan	Chubut	Rio Negro	Santa Cruz	Jujuy	La Rioja	Mendoza	Sin clasificar
2017	11,6	5,1	34,9	5,7	1,1	74,4				26,9
2018	33,4	21,0	44,3	4,4	1,9	71,2	7,8		2,0	54,7
2019	42,7	19,5	62,1	4,6	3,5	40,5	15,4			52,4
2020	13,8	10,2	65,7	3,0	0,9	30,2	6,5			24,4
2021	28,0	19,6	92,8	2,6	4,0	43,4	23,9	0,2	0,0	12,3

Exploratory budgets - Provincial allocation - % share

	Salta	Catamarca	San Juan	Chubut	Rio Negro	Santa Cruz	Jujuy	Mendoza	Sin clasificar
2017	7%	3%	22%	4%	1%	47%	0%	0%	17%
2018	14%	9%	18%	2%	1%	30%	3%	1%	23%
2019	18%	8%	26%	2%	1%	17%	6%	0%	22%
2020	9%	7%	42%	2%	1%	20%	4%	0%	16%
2021	12%	9%	41%	1%	2%	19%	11%	0%	5%

Notes on the exploratory budgets:

- Exploration is equivalent to mining research and development, so it should be considered as a business with particular characteristics, as it can expand and generate scientific knowledge with the discovery of new ore bodies either from the base or in the vicinity of existing mines.
- In the short term, the results are not so visible, as the operations are small and irregular, the results are not tangible.
- In construction and operation, it is sustained over time, creates stable employment, and requires goods and services. Production and export results are observed. There are royalty payments in the provinces. This not only creates the basis for future economic development through the valorisation of the country's wealth.

Work scheme to make the effects of investment in exploration tangible: (1) Socio-economic analysis of the baseline information on the positioning of exploration. (2) Pay attention to the publications of the national mining secretariat, that classifies the stages as:

- Early: protection and initial exploration.
- Advanced: advanced exploration, PEA, pre-feasibility, and feasibility.
- Mining operations: expansion and operation.

Assumptions:

- Analysis according to the national mining secretariat between advanced projects and operations 50%.
- Labour cost of U\$S 15200 per month.
- Indirect employment is evaluated according to the information provided by drilling companies.
- Provincial labour was used at 70%.
- Domestic costs are 40%, while imported costs amount to 60%.

The Free Exchange Market is established by article 1 of Decree No. 260/02 according to the text modified by article 132 of Law 27,444. According to article 2 of the Decree, foreign exchange operations will be carried out at the freely agreed exchange rate and must be subject to the requirements and regulations established by this Central Bank.

Additionally, article 29 of Law 24,144, Organic Charter of the BCRA, provides that it is empowered to issue rules on exchange matters in accordance with current legislation and to exercise the control that compliance requires. For its part, the Necessity and Urgency Decree 609/19 (B.O. 09.1.19) -and its amending Necessity and Urgency Decree 91/19 (B.O. 12.28.19)- established that the equivalent value of the export of goods and services must entered the country in foreign currency and/or negotiated in the foreign exchange market under the conditions and terms established by this BCRA.

This legislation reduces the possibilities of remitting profits abroad

General Economic, Social and Environmental Challenges in Argentina

The mining industry propels Argentina's long-term development; it serves as a catalyst for community development, national industry expansion, and export growth. It is an activity that puts people and their families first, contributing to the satisfaction of current needs without jeopardizing future generations' ability to satisfy their own, ensuring a balance between economic development, environmental care, rational use of natural resources, and social welfare.

Argentine mining adopts and promotes responsible resource use, based on key factors for sustainable development such as good practices related to innovation, transparency, citizen participation, social inclusion, local development, environmental care and preservation, and human training.



As a result, the central goal of mining activity in Argentina is sustainable development, which includes economic, social, and environmental aspects as part of a harmonious, balanced, equitable, and responsible development that contributes to people's quality of life. Mining must therefore prioritize social inclusion and place people and communities at the centre of its operations. As a result, mining activity includes among its goals the socioeconomic development of the areas where its operations are located and citizens live, thereby creating shared value. It also adds value by ensuring the participation and safety of its employees and communities. In this sense, mining must be developed by ensuring the responsible, rational, and ethical use of natural resources, and economic perspectives must be supplemented in order for sustainable development to be possible. In this regard, incentives must be created so that national and global capital chooses it as a mining investment destination, with equal or lower costs and equal or higher productivity than other mining centers around the world.



Identification of Relevant Mining Processes and Activities in Copper and Lithium Production

This section explains in detail the production processes of lithium and copper and highlight the need for solutions Dutch companies might provide to preserve water and energy consumption.

Mining and Water Use

As a one-of-a-kind and limited natural resource, efficient water consumption has emerged as a critical issue in mining development. It is a strategic and high-cost resource for the industry, which is why work is being done to ensure efficiency and sustainability in the extraction and water use processes. Water is used in mining for mineral separation during extraction, as well as for lubrication, cooling, and cleaning during drilling. Liquid solutions are essential in the separation and recovery of metals in the hydrometallurgical process, whether by leaching, flotation, or gravity separation. Mining consumes less than 1% of total consumption in Argentina. And the water used in mining is mostly recycled but not consumed on a continuous basis.

Water use is distributed as follows in San Juan, one of the provinces with the highest mining activity in the country: 91.92 percent in agricultural activities; 4.28 percent in hydropower; 2.8 percent in supplying the population; 0.96 percent in mining; 0.03 percent in recreational use; and 0.01 percent in other industries. In other words, the volume is small in comparison to the sector's importance. Mining accounts for 45 percent of global economic activity in the province; therefore, it is critical to pursue continuous improvement and ensure the mining sector's increasingly sustainable development. In addition to optimizing exploration, extraction, concentration, and waste disposal (tailings) activities, one of the main challenges to promoting mining sustainability is reducing the use of new water. In this regard, chemistry becomes a valuable ally, with new polymer technologies allowing for more efficient recovery of the water used in the process.

The mining sector activities to be addressed in the study are two: lithium and copper.

Lithium

As a lightweight mineral with high energy storage capacity, lithium has become important for battery development. Given that its use includes mobile phones, notebooks, electric cars and renewable energy storage systems, among others, global market demand has grown at a rate of 5% in recent years. This has put the so-called lithium triangle, a region whose salt flats contain more than 80% of the world's lithium brine reserves, centre stage. The triangle is delimited by the Uyuni salt flat (Bolivia) to the north, the Atacama salt flat (Chile) to the west, and the Argentine Puna to the south (where different salt flats are located, such as the Hombre Muerto salt flat, Salinas Grandes, Olaroz-Cauchari basin, Rincon salt flat and Laguna de Tres Quebradas, among others). There are more than 20 lithium mining projects in the country, mainly concentrated in the provinces of Salta, Jujuy and Catamarca. The Argentine lithium mining model is based on the extraction of the mineral and its export as lithium carbonate. The country is the world's second largest exporter and expects to increase its production and exports in the coming years. National and provincial governments of different political persuasions have promoted the activity with the aim of attracting capital, but without taking into account the potential negative social and environmental impacts of lithium exploitation.



There are two types of deposits that are the source of current lithium exploitation. These are pegmatites (ore) and salt flats.

Production process from salt flats

This process consists of subjecting the extracted brine to different evaporation stages, which take place in pools where lime is added to precipitate sodium, potassium, magnesium, and other salts until the lithium content is reached. The processing of lithium compounds (carbonate, chloride, hydroxide) continues in an industrial plant, with a chemical process using reagents to extract new residues and reach the desired purity.

Initially, part of the brine is extracted by means of a pumping system, and then subjected to an evaporation process in pools dug in the salt pans themselves and waterproofed, thus recovering the salts contained in the solution. The lithium content depends on the composition of the brines and is generally accompanied by other elements such as boron, bromine, calcium, carbonates, chlorides, nitrates, magnesium, potassium, and sodium.

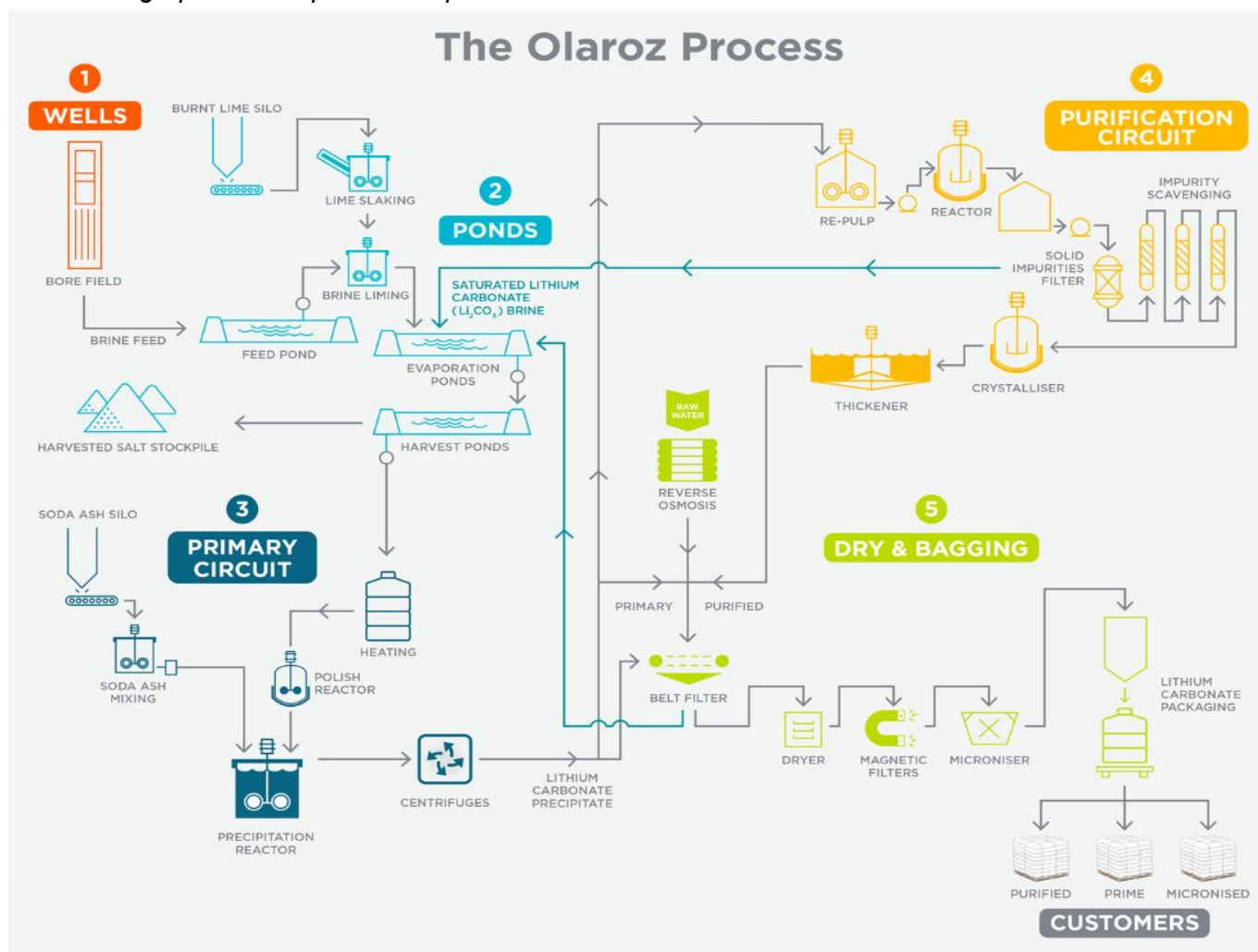


This means that as the composition of the salt flats varies, the treatment of each one of them is specific and, therefore, the production process will be adjusted to that particularity. The separation of lithium will be carried out in a process plant in which the following will be obtained: industrial grade lithium carbonate or battery, lithium hydroxide, lithium chloride, or lithium fluoride. The brine extracted from the salar has an

approximate lithium content of 0.22% which, after treatment in the evaporation pools, can reach up to 6%, depending on the boron and magnesium impurities present. The conventional process consists of the removal of boron by extraction with a solvent (resin) followed by the removal of magnesium and calcium by combining lime with carbon dioxide. As a next step, the lithium carbonate is precipitated with sodium carbonate (soda ash) at a high temperature, and finally the solution obtained is washed. This last step is due to the low solubility of the lithium carbonate, which allows it to be separated from the rest of the compounds. However, the residual brine contains recoverable parts of lithium, which is generally recycled in the evaporation basins.

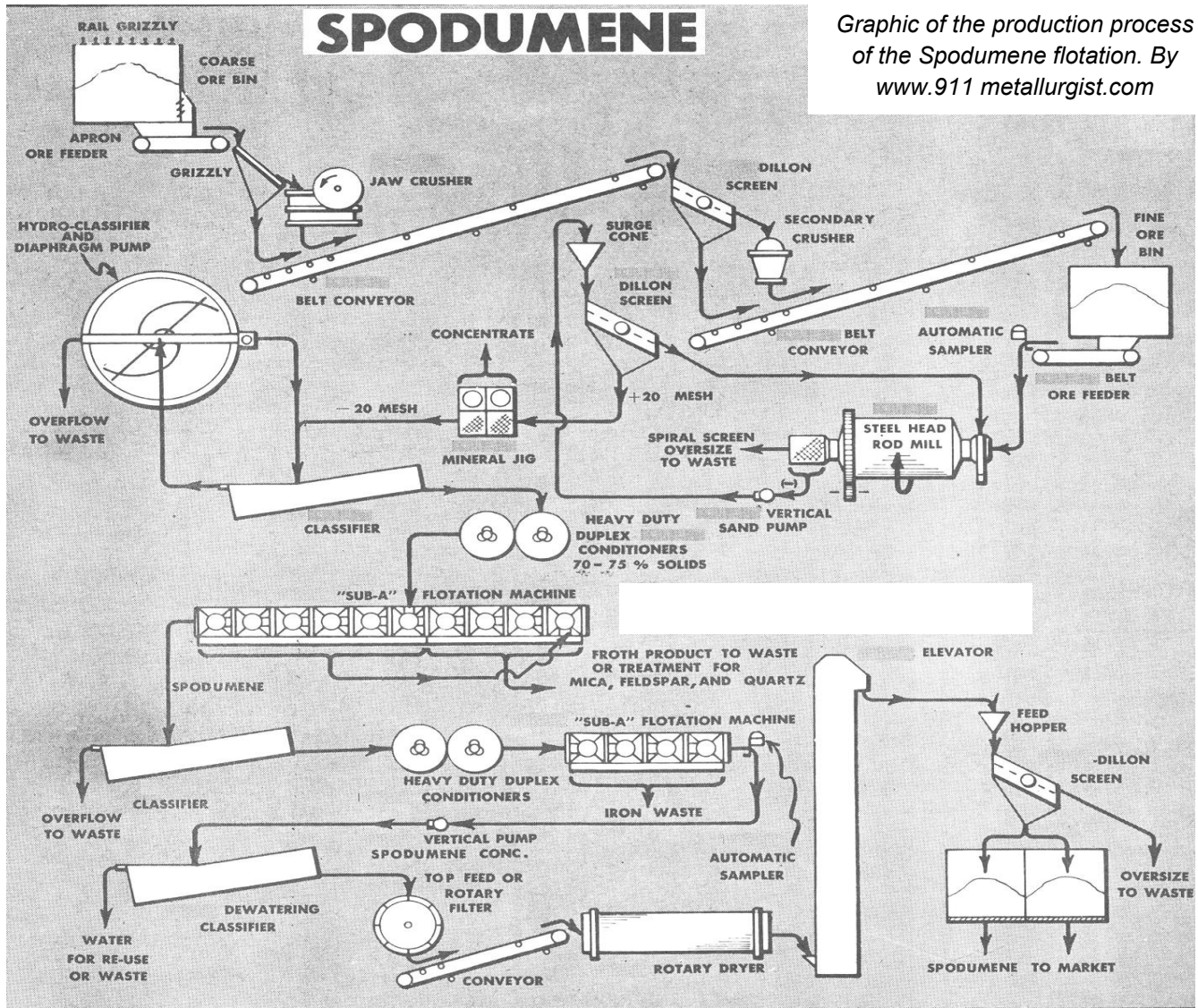
However, if lithium carbonate is subjected to hydrochloric acid, with subsequent concentration by crystallization in vacuum evaporators, lithium chloride is obtained. This compound can then be subjected to an electrolysis process to obtain lithium metal as the final product. In the differential precipitation process used to obtain the final product (lithium carbonate, hydroxide or fluoride), different chemical reagents are used. In the case of high sodium content, appropriate reagents could be benzoyl-1,1,1-trifluoroacetone or trioctylphosphine oxide dissolved in paraffin. However, if the brine has a high magnesium content, tributylphosphine and ferric chloride could be used as reagents, or tributyl phosphine could be used with sodium perchlorate and an ionic liquid or 1-butyl-3-methyl-imidazolium hexafluorophosphate. Figure 1 shows the production process at Olaroz, an Argentinean mining project whose controlling companies are Orocobre (Australian, 66.5%), Toyota Tsusho (Japanese, 25%) and Jujuy Energía y Minería Sociedad del Estado (Argentinean JEMSE, 8.5%).

Below is a graphic of the production process of the Salar Olaroz.



Production process from pegmatite (ore)

This process, unlike the previous one, has a familiarity with traditional mining of other types of metals, which is why lithium ores are extracted by open pit mining. The average lithium oxide (Li₂O) content is 1.5%. The ores extracted from the project under exploitation are subjected to a concentration process, which includes crushing, grinding and flotation, resulting in a lithium concentrate with a grade of 6.0 to 6.5% Li₂O. If lithium hydroxide (LiOH) is to be produced, the mixture resulting from the above process is ground and then leached to recover the lithium in aqueous solution as lithium hydroxide. The leached pulp is sedimented and filtered.



Graphic of the production process of the Spodumene flotation. By www.911metallurgist.com

FLWSHEET FOR SPODUMENE FLOTATION

The filtrate obtained, containing about 10% lithium hydroxide in solution, is evaporated and crystallized as lithium hydroxide monohydrate, then centrifuged and dried at 80-120°C with indirect steam to give dry crystals of the monohydrate. The solution obtained in the centrifuge is returned to the crystallizer and a small part is discarded to avoid accumulation of impurities such as aluminum (Al), magnesium (Mg), calcium (Ca), potassium (K) and chlorine (Cl). Crystallizers quickly become encrusted with lithium hydroxide and require weekly washing with hydrochloric acid (HCl) to descale them by the formation of lithium chloride. This product must be treated separately. If anhydrous lithium hydroxide is required, the monohydrate is calcined at low temperature in vacuum at 100-120°C, and the product, which is

hygroscopic, is then packaged. If lithium carbonate is to be produced from the calcined spodumene, it is ground and then treated with concentrated sulphuric acid (96-98%) at 250°C in a stirred reactor to form lithium sulphate (soluble), which is then extracted by leaching the calcine with water at 50-60°C. The slurry is decanted and decanted into a slurry of lithium sulphate. The pulp is decanted and filtered. The solution obtained is treated with calcium hydroxide to precipitate the sulphates present, as calcium sulphate and alumina, leaving the lithium in solution as hydroxide. The reaction of the spodumene with concentrated sulphuric acid at 250°C occurs in the form of a semi-plastic paste with the appearance of pasty cement and the generation of gases containing sulphur dioxide (SO₂), sulphur oxide (SO₃) and gaseous sulphuric acid, which requires stirred reactors such as mixers or deck ovens, with control and neutralization of the exhaust gases. The carbonate is washed with hot water at 90-95°C and the washing solutions are recirculated to the process so as not to lose dissolved lithium. The product obtained is 98.5 - 99% lithium carbonate.

Copper

Argentina has the potential to grow exponentially in terms of copper, as it not only has the necessary geological potential, but also has projects in the pipeline that are well advanced in terms of technical and economic evaluation. Furthermore, in terms of demand, it is a metal whose applications have increased as technology advances, so it is imperative that Argentina is part of this growing market, since in terms of current exchange, it is an industry that moves approximately US\$ 150 billion a year, that is, a third of Argentina's GDP.



Argentina, within numerous copper locations (San Juan and Catamarca), has eight mega-projects identified and in various stages of advanced development. Refined copper consumption has increased over the last 20 years at an average annual rate of 2.6% and is expected to continue to grow in the future, as this mineral is a fundamental input for industrial production and a key element in the long-term sustainable development of the world economy.



There are different production processes, depending on whether the copper was found in nature with oxygen (oxidized) or sulphur (sulphide).

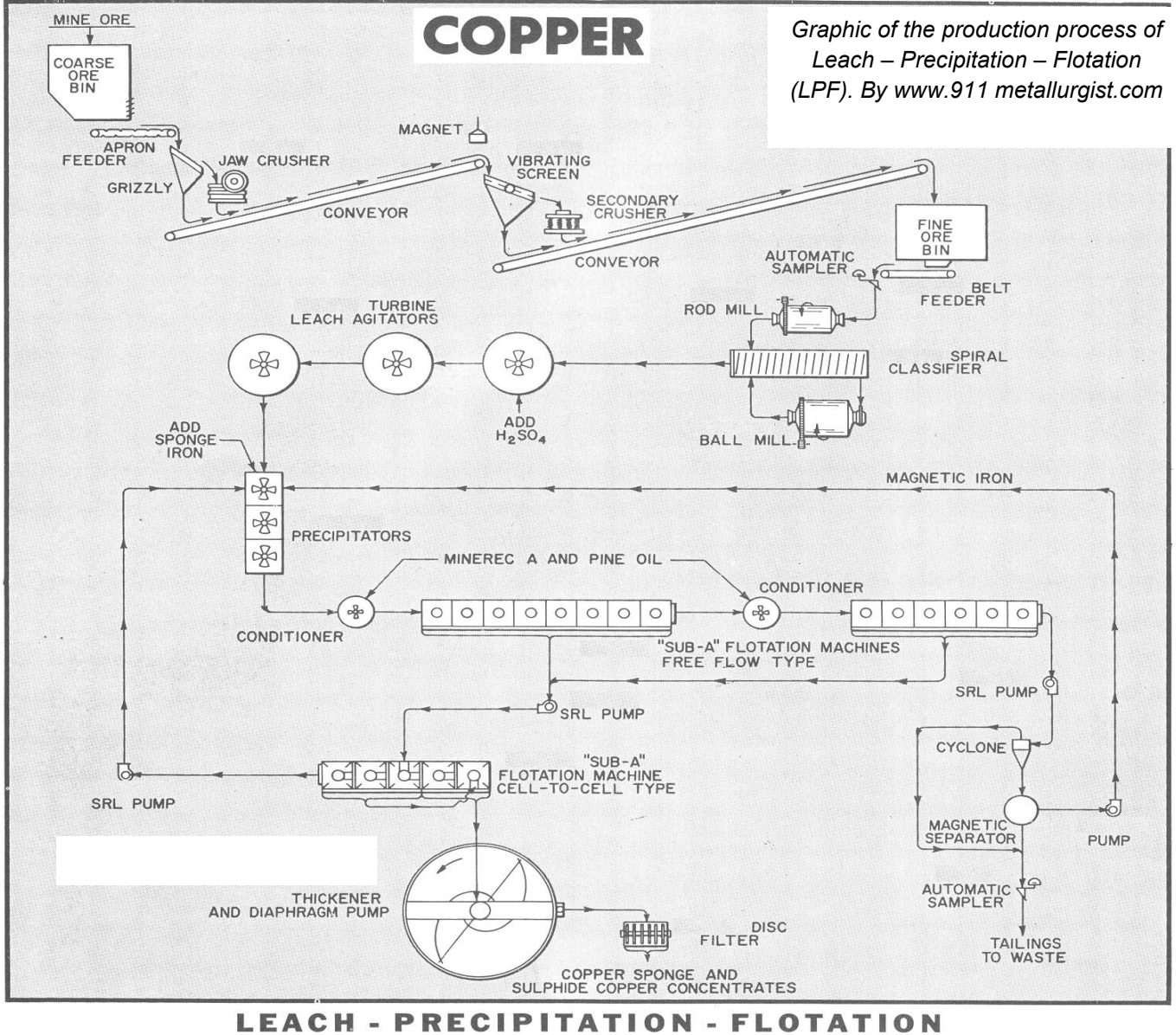
Production process of sulphide copper:

- **Grinding:** Using mills, the ore particles are further reduced to a maximum size of 180 microns (0.18mm). This forms a pulp with water and reagents that is taken to flotation.
- **Flotation:** In this stage, the pulp from grinding is fed into pools called flotation cells. Air is bubbled in and the mixture is kept in constant agitation to form abundant froth. The copper reacts hydrophobically (it runs away from the water) and adheres to the froth, which must then be dried to obtain the copper concentrate, which has a purity of 30% and is taken to the smelting process.
- **Smelting:** To separate the copper from other minerals and impurities, the dried copper concentrate is treated at high temperatures in special furnaces. After several processes, RAF (fire refined) copper is obtained which is cast into plates weighing approximately 225kg called anodes.



- Electrorefining:** The anodes are taken to pools containing a solution of water and sulphuric acid. There they are immersed, and a very thin copper foil (cathode) is placed in front of each anode. Low-intensity direct current is applied and the high-purity copper that is installed on the anode begins to be attracted to the cathode and is deposited on it. After a few weeks, a copper cathode with a purity of 99.9% is obtained.

Below is a graphic of the production process:

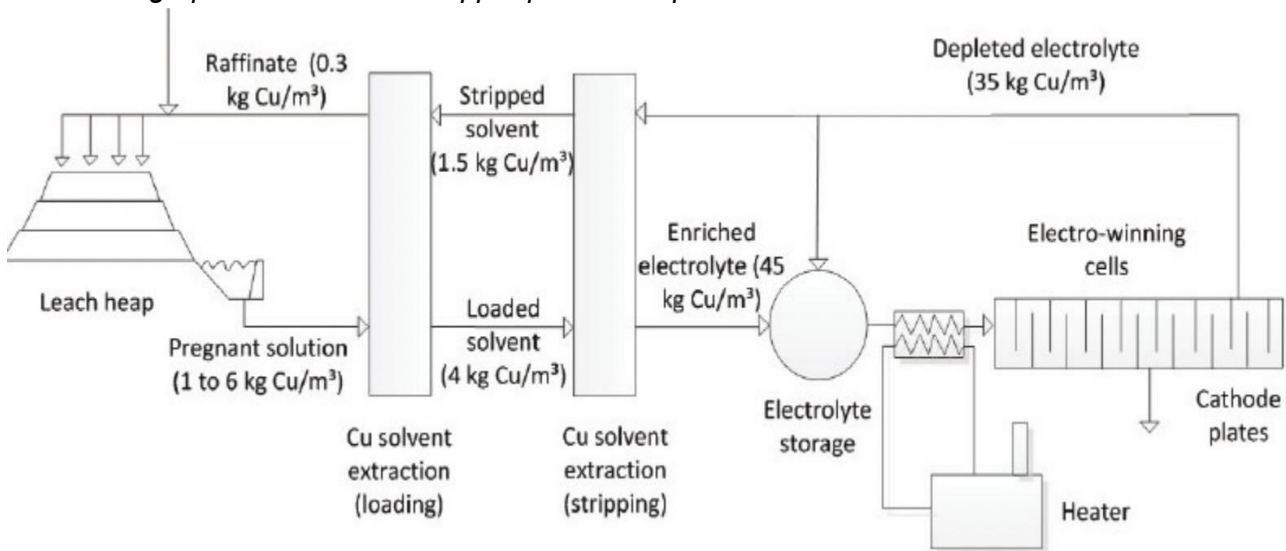


Oxidized copper production process:

- **Leaching:** Heaps of mineralized material are sprinkled with a sulphuric acid water solution that dissolves the copper contained in the oxidized minerals, forming a copper sulphate solution. This solution drains through the heap, is collected, then purified and concentrated before being taken to electrowinning.
- **Electrowinning:** A process by which one compound, in this case copper, is separated from another using electricity. Thus, copper is recovered from the solution developed in the leaching process, obtaining cathodes of high purity (99.9%).
- **Cathodes:** The cathodes obtained are carefully examined. Those selected are stacked, weighed and packed for shipment, which is done by trains and trucks to the shipping ports.



Below is a graph of the oxidised copper production process.



Conclusion

Through various projects around the world, Dutch water engineers and companies have demonstrated for decades an enormous capacity and experience in the management of water in its most diverse forms. Therefore, we believe that Dutch companies can intervene in the various stages of the lithium and copper production process, thus protecting and maintaining not only water, but also the environment and the surrounding communities.

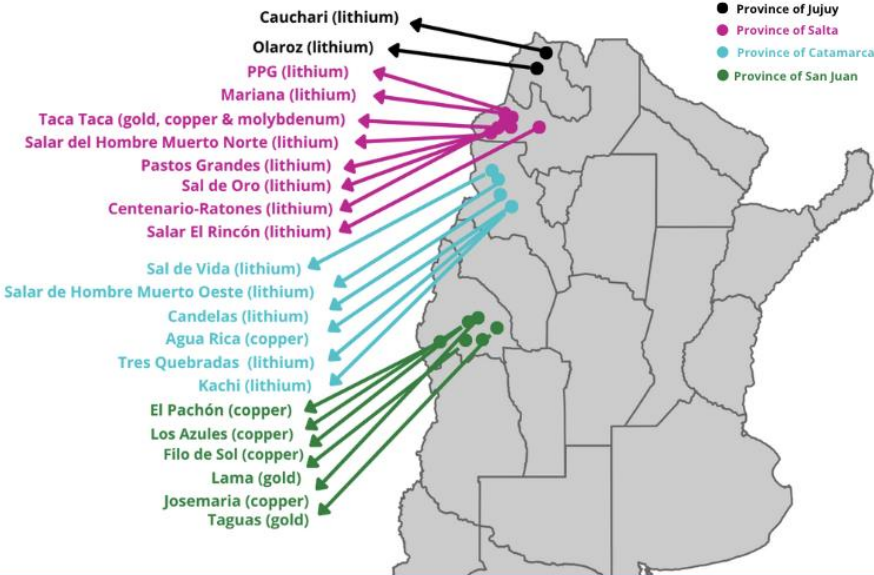


Overview Specific of Mining Investments and Concrete Business Opportunities

Argentina has a very advantageous position in the global copper and lithium mining industry.




GEOGRAPHIC OVERVIEW OF THE LITHIUM AND COPPER PROJECTS IN ARGENTINA



Jujuy

Cauchari Olaroz (Lithium)

Location		23° 41' 62" Lat. S; 66° 71' 31" Long. W Cauchari-Olaroz is located in Jujuy Province in north-west Argentina. The Project is situated in the Salar de Olaroz and Salar de Cauchari, adjacent to Olaroz facility, which has been in production since 2015. It is located at a distance of 1,600 km from Buenos Aires and 200 km from Jujuy Capital.
Area	83,104 ha	
Mineralization type	Brine	
Project status	CONSTRUCTION	
Estimated average annual production	40,000 t/yr. LCE	
Product to obtain	Lithium Carbonate (Li ₂ CO ₃)	
CAPEX	741 M USD	
Estimated annual employment in operation	2,100 jobs	
Estimated LOM:	40 years	
Mining Method	Pumping - Evaporation	
Property data owner/controller	Ganfeng Lithium & Lithium Americas Corp, JEMSE	
Operator	Minera Exar S.A.	

Project geology:

- **Regional geology:** The salt flats are the result of a long paleoenvironmental evolution that began with the formation of freshwater lakes during the Pleistocene, which became saline early until they dried up during the Holocene. Inherent volcanism leads to the transfer of a large number of ions into the basin, resulting in the formation of a wide variety of salts dominated by sodium chloride. The volume fraction of salt in the total filling determines two main types of salt surfaces: 1) Crystal and 2) Impurity. Crystalline salt marshes are impregnated with interstitial brines of varying ion content. Almost all brines are carriers of economically important chemical elements, especially boron and lithium.
- **Deposit geology:** Salar de Cauchari is a mixed-style salt marsh with a rock salt core in the centre of the marsh covered by fine-grained (clay) sediments up to 50 m. Rock salt cores contain clay to silty and sandy layers. The salar is surrounded by relatively coarse-grained alluvial and fluvial sediments. These sectors mark the perimeter of the actual Salar as seen in satellite images and extend down to the centre of the Salar, where they form the distal facies that develop as sand and silt accumulate. A deep sand unit was intercepted at depth (between 300 m and 500 m) in several core holes in the SE. Project area department. The Salar de Olaroz Basin is one of many inland salt lakes (salt lakes) located high up in the Pune region of Argentina. Due to the collision of the

Pacific plate with the South American plate, the basin is bounded by a number of north-south reverse faults that moved the Paleozoic sediments of the Andes from west to east. Thus, the western side of the basin is continuously pushed up. This adds sediment to the pool.

Resources and Reserves

RESERVES	Avg. Li Grade (mg/l)	Brine (m ³)	Lithium Metal (t)	LCE (t)
Proven	616	1.6 x 10 ⁷	96,650	514,450
Probable	606	9.6 x 10 ⁸	586,270	3,120,590
Total	607	1.1 x 10 ⁹	682,920	3,635,040

Infrastructure

The Salar de Cauchari has all the necessary infrastructure, 100 % paved land connectivity with the ports of Chile, access to water sources and electricity line crossing the properties, railway line crossing the properties to the south, two gas pipelines cross the project, one to the north 10 km away and the other to the south over the properties of South American Salar SA.

a) Wells

Well production equipment selection: The largest lithium brine aquifers are targeted by screened wells. For brine pumping, submersible electric pumps were proposed. Through a network of pipelines and mixing pools, these pumps transport brine to evaporation ponds.

Evaporation ponds: The ponds' design includes provisions for continuous production during salt harvesting and maintenance. Using self-priming pumps, brine will be transferred between the successive evaporation ponds.

Natural Gas Pipeline: Natural gas is obtained from the Rosario gas compression station, which is located 52 kilometres north of the project site on the Gas Atacama pipeline. The pipeline's capital costs are currently estimated to be US\$10.9 million, including a contractor bid of US\$10.6 million. This pipeline has the capacity to supply natural gas to a 40,000 tpa LCE facility.

Power Supply: A 33 kV transmission line connects to a 345 kV transmission line located approximately 60 kilometres south of the Project to provide electricity. A substation with a voltage transformer (345/33 kV) and associated switchgear makes up the interconnection. A voltage transformer (33/13.2 kV) and electrical room with associated switchgear and auxiliary equipment for a 13.2 kV local distribution system are also located on the Project site. The plant, camp, intermediate brine accumulation and homogenizing pools/lime pumps, wells, and evaporation ponds are all powered by the 13.2 kV local electrical distribution system. Unless there are significant constraints, all distribution is aerial, unless underground distribution is used. The estimated load for the Project is approximately 123,461 MWh/y or 16.4 MW/h, which includes a design safety factor of 1.2. A stand-by dual diesel/gas generating station, located close to the main substation, will power selected equipment during grid outages

Camp: The construction and permanent camps are about 8,000 meters south of National Highway 52. With a capacity of 360 people, the permanent camp is a full habitational and administrative complex to support all workforce activities.

- b) Other Buildings: Other buildings include a) A warehouse for spare parts and consumables; b) A steel building for the storage of soda ash; c) A steel building for the storage of solvent extraction plant chemicals designed with appropriate ventilation, safety, and security features; d) Operating facilities for sheltering operators, electrical equipment, and central control rooms; and, e) Product storage facility designed for protecting the product against contamination and staging it for shipment.

- c) **Access and Site Roads:** Access to the plant site is via paved National Highways 9 and 52, which connect the site to San Salvador de Jujuy and Salta in Argentina. In addition, National Highway 52 connects to Paso Jama to the west, a national border crossing between Chile and Argentina, and provides connection to Chilean Route 27 and convenient access to Antofagasta, the likely embarkation port for the product. Access within the site is possible through a gravel road, Route 70, which skirts the west side of the salars. This road is approximately 1 km from the plant site. Site roads to ponds, wells, and other infrastructure will be part of the overall construction.
- d) **Fuel Storage:** The estimated average consumption of brackish water for mining/industrial use is 105 (+/- 20%) liters per second ("L/s"). Water demands for industrial use is supplied by groundwater wells adjacent to the salar and a water pipeline from the north.
- e) **Pond Solid Wastes:** The evaporation process in the ponds leaves considerable amounts of salts on the bottom of the ponds. These salt piles may reach 15 m in height. 740 ha of salt piles were built over a 40-year period and these piles were built near the pond areas. These discarded salts are classified as inert waste. The salts are generated from brines already present in the salar and do not introduce foreign compounds. It is estimated that sodium chloride and sulphate make up over 87% of this waste.
- f) **Tailings Liquid Disposal:** Several possible sites for the evaporation ponds for the plant's industrial liquid wastes were analysed. Pond construction is similar to the evaporation ponds, complete with liner. A 50 ha parcel located close to the plant has been selected for the industrial waste evaporation ponds and presents no risks to distant populated areas.

Transparency

The Sustainability Report and the Socioeconomic Impact Report of Minera Exar were presented with the aim of making visible the activities that are being developed in economic, environmental and social terms. In this sense, the company's president, Franco Mignacco, ratified the importance of these communication tools whose objective is to promote the transparency and relevance of the project.

Stakeholder expectations

Minera Exar believes that stakeholder engagement is an important aspect of corporate governance. They are committed to building meaningful relationships with stakeholders and recognize that approaches to engagement must vary by stakeholder group to meet their needs and expectations. They have gone through a process to analyze the influence and impact of stakeholders and based on the analysis they have created their approach to engagement.

Sustainability and Environmental compliance

Minera Exar adheres to the Equatorial Principles ("EP")² even before exploration activities begin. These principles are a voluntary commitment stemming from an initiative by the International Finance Corporation (IFC), a member of the World Bank Group, to stimulate sustainable private sector investment in developing countries. Financial institutions applying these principles are obliged to assess and consider the environmental and social risks of their projects financed in developing countries, and therefore only provide for projects with proven social and environmental impacts (such as the protection of human health and population mobility). In this context Minera Exar has determined from the outset that equatorial principles will be the minimum standard for development projects and is taking the steps described in the relevant sections of the report. Furthermore, Environmental and social impacts of the project, both positive and negative, were assessed for each of the various stages of the lithium brine exploitation project, including construction, operations, and closure.

² EP: Credit risk management framework for determining, assessing and managing environmental and social risk in Project Finance transactions.

Social, cultural, and political implications in Argentina


Minera Exar has developed a plan to promote social and economic development within a sustainable framework. Minera Exar began working with the Susques chapter on community relations programs in 2009. The aim of the program is to involve local communities in projects, implementing programs designed to positively impact these communities. Minera Exar has signed formal agreements with neighboring communities that have surface rights to develop the project. Under these agreements, the community agreed to grant Minera Exar transportation and other rights in exchange for cash payments to be used based on decisions made at community meetings.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

Minera Exar recognizes that access to water is not only pivotal to their operations, but a key concern for local communities. For the Caucharí-Olaroz Project, the arid location increases the importance of this issue. The company is committed to responsible water management and abiding by applicable regulations with regard to water use. While process water requirements for the Caucharí-Olaroz Project are relatively low in comparison to other lithium carbonate production processes, they recognize water availability as a concern to our stakeholders. To meet the demands of the expanding operation, we have applied to the relevant authorities to increase the Project's water use to 150 L/s.

It is an opportunity for the Dutch companies because Minera Exar is urgently looking to solve the problem of water care, so that it can continue to produce lithium and at the same time continue to have good relations with the local community.

Salar de Olaroz (lithium)

Location		23° 28' 32". S; 66° 39' 57" O The Salar de Olaroz is located in the Department of Susques, in the southwest of the Province of Jujuy, about 270 km from the city of San Salvador de Jujuy, in the Republic of Argentina. The region is an extensive high plateau -about 3900 m above sea level- with annual rainfall of less than 100 mm, low cloud cover, average wind speed of 25 km/h and average temperature of 8°C.
Area	28,000 ha	
Mineralization type	Brine	
Project status	Feasibility	
Estimated average annual production	17,500 t/yr. LCE	
Product to obtain	Lithium Carbonate (Li ₂ CO ₃) Potassium	
CAPEX	97,6 M USD	
Estimated annual employment in operation	2,100 jobs	
Estimated LOM:	40 years	
Mining Method	Pumping - Evaporation	

Property data owner/controller	Orocobre
Operator	Orocobre

Resources and Reserves

Resource Category	Area	Thickness	Mean specific yield	Brine volume	Concentration			Tonnes of Contained Metal		
					Lithium	Potassium	Boron	Lithium	Potassium	Boron
					mg/L	mg/L	mg/L	Million Tonnes	Million Tonnes	Million Tonnes
Measured Resource	93	54	8.4%	0.42	632	4930	927	0.27	2.08	0.39
Indicated Resource	93	143	10.0%	1.33	708	6030	1100	0.94	8.02	1.46
Measured and Indicated Resource	93	197	9.6%	1.75	690	5730	1050	1.21	10.10	1.85

Infrastructure:

The project site is adjacent to the paved highway Route 52 which passes south of the salar through the international border with Chile, 45 km to the northwest (Jama Pass), continuing on to the major mining centre of Calama and the port of Mejillones, near Antofagasta in northern Chile. Approximately 70kms to the south of the project site a railway crosses from northern Argentina to Chile, providing potential access to a number of ports in northern Chile. Access to good road systems and potentially rail are important for project development.

Approximately 15 kms to the north of the salar, there is a gas pipeline running from northern Argentina to Chile. There is a dehumidifying and compression station where the pipeline crosses the N-S road along the west side of Salar de Olaroz. This has the potential to provide a gas supply for onsite electricity generation.

There is a local village close to the project site (Olaroz Chico, population ~150), and the regional administrative centre of Susques (population 2000) is within half an hour's drive and offers basic services. There are a number of other local villages within 50 kilometres radius of the salar. The company employees many people for these local communities.

Access to the area from the City of San Salvador de Jujuy, where the Company has an office, is via Route 9, which heads north-northwest for approximately 60 km, meeting the international highway Route 52 near the town of Purmamarca. Following Route 52 leads to the town of Susques. Access to the project area is from Route 52, which heads south along the eastern side of the Olaroz Salar. Route 70, leading north from Route 52, provides access to the western side of the salar. The total drive distance between the City of San Salvador de Jujuy and the Olaroz project is approximately 220 km, and takes approximately 3 hours. A potential project development could draw on local labor from Olaroz Chico, other villages and Susques and more skilled and other contract services from San Salvador de Jujuy.

Local accommodation is provided by a basic hotel - Hostal de Pastos Chicos – located approximately 5 km west of Susques and half an hour's drive east of the project, on Route 52 leading to the Jama Pass and Chile. The hotel provides services to travelers crossing the international border. A company camp has also been established on the east side of the salar on one of the company's properties.

Transparency

The Board of Orocobre ensures that behaviours, values, and decisions are aligned with the suite of corporate policies that define appropriate standards of conduct and behaviour. This includes but is not limited to the Code of Conduct, the Anti-Bribery and Corruption Policy, and the Board Disclosure/Conflict of Interest Policy. Corporate culture develops within this framework through management processes and management interaction with the board and its members.

Stakeholder expectations

Orocobre maintains formal and informal engagement channels with stakeholders and works in cooperation with them to address matters as they arise.

Sustainability and Environmental compliance

Orocobre is committed to ensuring the ongoing vitality of the local environment and the integrity of the ecosystems in the regions where they operate. Monitoring and reporting environmental impact is a regulatory requirement for their operations. Each project requires the approval of an Environmental Impact Report which must be updated every two years.

Social, cultural, and political implications in Argentina


The aim of Orocobre is to measure the longer-term outcomes of our community activities, rather than only the short-term investment that they make or the activities that they undertake each year. This requires developing social baseline data so that they can measure the change that occurs. During FY21 they started implementing the methodology proposed by the Business for Societal Impact (B4SI) Framework for our community investment initiatives.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

This year, due to increased production, Salar Olaroz increased water use in its operations. It went from 21% to 48%. This is why the Dutch companies must intervene in the project in order to reduce water consumption in the salar's operations, so that the company can continue to produce in quantity, without harming the sustainable objectives and the localities that are nearby.

Salta

Taca Taca (gold, copper & molybdenum)

Location		24° 41' 60" Lat. S; 68° 00' 00" Long. W It is located in the Puna de Salta, at the central-western end of the Salar de Arizaro, department of Los Andes, 240 km west of the city of Salta and 55 km east of the border with Chile, at 3,600 m.a.s.l. The nearest town is Tolar Grande, 34 km away. The access to the project is by the RN 51 to Cauchari and from there by the RN 27.
Area	2,546 ha	
Mineralization type	Copper porphyry	
Project status	PRELIMINARY ECONOMIC ASSESSMENT (PEA) 2012	

Estimated average annual production	Copper: 244 kt Gold: 110 kOz Molybdenum: 4 kt
Product to obtain	Copper - Gold concentrate
CAPEX	3,583 M USD
Estimated annual employment in operation	1630 jobs
Estimated employment in construction stage	3500 jobs
Estimated LOM:	28 years
Mining Method	Open pit
Property data owner/controller	First Quantum Minerals LTD
Operator	Corriente Argentina S.A.

Project geology:

- **Regional geology:** It is located in a copper-porphyry Paleozoic (Tertiary) mineralized zone of recognized economic importance in Chile. This mineralization is related to the advance of the Paleogene magmatic arc above Pune, Argentina. Oligocene rhyodacite intrusion of the Santa Inés Formation is responsible for mineralization and alteration of the Taca Taca copper porphyry.
- **Deposit geology:** Porphyry-type copper-molybdenum mineralization (Taca-Taca alto and Taca Taca bajo) and subsulfur epithermal (Taca Taca sur) have been found in the project area. These changes are characterized by an early potassic type, with bluestone emplacement in certain areas of the deposit, followed by heterotypic changes in intensity. A locally progressive area of pelican alteration has been determined, where hydrothermal processes will reach their maximum. There are three main types of mineralization associated with the Taca Taca copper-gold-molybdenum porphyry: one is super/secondary porphyry copper mineralization, another is characterized by residual copper-gold oxides in the leach cap, and the third is copper-gold mineralization. and hematite in quartz veins. Taca Taca is defined as an "Andean copper-gold-molybdenum porphyry system".

Resources and Reserves:

RESOURCES	Tonnage (Mt)	Grade			Metal Content		
		Cu (%)	Au (g/t)	Mo (%)	Cu (t)	Au (kOz)	Mo (kt)
Measured & Indicated	2,203	0.43	0,08	0,012	9,458	6,052	264,5
Proven & Probable	1,789	0.44	0,09	0,012	7,735	5,086	2013,5

Infrastructure

- Power supply:** The nearest transmission line to the project site is located near Lapuna in the north. This is a 345 kV line from the Guemes power station in Salta province that extends to the Losand Mountains in Chile. The line is privately owned and operated by Termoandes SA (Termoandes). Among several power generation alternatives, including on-site diesel-fired power generation, wind turbine power generation, natural gas-fired power generation, and solar power, a direct connection to the existing 345 kV transmission line was chosen as the preferred alternative.
- Maximum installed power requirements:** The estimated total demand for the mine, processing facilities and infrastructure is in the range of 180 MW to 240 MW at a processing rate of 60 Mtpa. To

- meet the requirement of supply authorities, the site power factor is corrected to 0.95 lagging or better, resulting in a site peak demand of 260 MVA.
- c) **Supply requirements and substations:** Power distribution for the project site are primarily for the following areas, with 9 kV, 4.16 kV and 33 kV supply: a) the process plant b) the mine c) the MSA d) ancillary facilities, administration, workshops, warehouse, etc. e) camps f) remote areas, e.g. TSF, water tank, water return pumping system (if feasible), drinking water pumping system, etc. New 66 kV transmission lines radiating from a 345/66/33kV central substation to each of the freshwater drilling fields in the Burras Valley, Arizaro Valley, Chaschas Valley and Socompa were also constructed.
 - d) **Renewable energy:** The company has realized the possibilities of providing 100% of the necessary electricity from renewable sources, especially wind and solar generators.
 - e) **Water supply:** Develop the regional drilling field to provide the project with a combination of high and low salinity water. Brine from the proposed drilling site adjacent to Salar de Arizaro is intended for grinding and coarse flotation. The rest of the treatment water is fresh water or brackish water obtained from wells in the regional catchment. Research by Ausenco (May 2016), SRK (May 2015) and later by FQM showed that there are several desirable areas for priority freshwater research and the necessary development of a sustainable freshwater supply. Tie Atrodas Valle de Arizaro, Valle de las Burras, Valle de Chaschas a Socompa.
 - f) **Desalination assessment:** Schlumberger (2013) completed a scoping study level assessment and design of a desalination process to provide fresh water make-up for the Project. The PEA report (Ausenco, 2013) stated that fresh water of not greater than 1,500 mg/L TDS (total dissolved solids) is preferred for cleaner flotation, cooling, reagent mixing and concentrate washing. On the other hand, brine water at up to 300,000 mg/L TDS may be used for grinding and rougher flotation. Information in the PEA report indicates that a desalination plant would require a brine TDS of not greater than 50,000 mg/L. For reference, water samples taken from the Salar de Arizaro (Ausenco, 2012) had a TDS of 255,500 mg/L. Bolstering the fresh water volume by means of a desalination plant and treatment of water pumped from the salar may be neither possible nor required. In acknowledging this, Schlumberger devised a “recipe” for blending and mixing of brine waters to service the water demand as then envisaged. However, the plant water demand and possible borefield locations have since been revised and, subject to further analysis of water quality and sustainability from these locations, fresh and brine water abstraction quantities at suitable TDS levels may be possible.
 - g) **Road access:** Existing public roads provide access to the Project site from Salta, Argentina. To the north east of the Project site, a bypass of the existing road is envisaged to avoid a section with narrow switchbacks and another section which is subject to seasonal weather disruptions. Existing public roads may also be used to access the site from Chile through border crossings at either Paso de Sico or Paso Socompa.
 - h) **Plant site and administration facilities:** The preferred siting for the processing plant is to the north east and adjacent to the open pit. The location with respect to the terrain is shielded from prevailing winds emanating from the north west at speeds up to 23.2 m/s (83.5 km/h). On approach from the east, the plant site would also be partially shielded from view by the topography and by the waste dump on the Salar de Arizaro. The administration offices and related infrastructure are proposed to be sited to the northwest (i.e. upwind) of the pit and the plant area.
 - i) **Administration buildings:** An operations administration building is located near to the entry to the Project site. This building would provide private offices and common office areas for personnel, in addition to common areas for meetings, filing rooms and kitchens.
 - j) **Metallurgical laboratory:** A metallurgical laboratory is located within the plant area, adjacent to the process plant building. The laboratory building is of steel construction with roof and wall cladding, and it is fully equipped with all analytical and sample preparation equipment including dust and fume hoods and associated air handling treatment systems. Waste streams from the laboratory is pumped to the process plant where they would join the main process streams and be neutralised.

- k) **Process water storage:** A process water storage pond is located in a small valley immediately to the southeast of the processing plant.

Transparency

First Quantum strongly supports all forms of transparency and provides all stakeholders with clear information about the company's contribution to the host government. Contributions are reported annually in tax transparency and public reports. This report highlights First Quantum's contributions to host governments and helps illustrate the positive impact of the strive to make wherever they operate.

Stakeholder expectations

The board is accountable to shareholders for the performance of First Quantum oversight of management and the affairs and business of the company. The Board recognizes its wider responsibility to employees, communities and other stakeholders, and it considers the impacts of the operations on communities and the environment.

Sustainability and Environmental compliance

First Quantum recognizes that people and communities are affected by their business activities, so they have the responsibility to ensure that those people and communities benefit through opportunities such as employment, business development, education, training or community investment over the long term. They also recognize that the activities consume resources and have impacts on the broader global environment, and that they have a responsibility to minimize and redress harmful impacts and to optimize positive benefits. Due to that, they build sound safety, environmental, and social management practices into all aspects of the business. They strive for continuous improvement in their environmental, safety and social management performance. Their sustainable development strategy is built around four key pillars: a) Economically viable investments; b) Technically appropriate operations; c) Environmentally sound practices; d) Socially responsible actions.

And they aim to deliver this strategy by:

- Implementing sound corporate governance practices
- Implementing environmental management systems in line with an equivalent to ISO 14001:2015 Standard
- Improving community relations through better communications, supporting sustainable community development programs and establishing formal grievance procedures
- Respecting the human rights of our employees and communities
- Implementing health and safety management systems based on an equivalent to the OHSAS/BSI 18001:2015 Standard
- Transparent reporting on operations and activities

Within their social responsibility strategy they have a strong focus on Corporate Social Responsibility projects that are specifically developed to assist the communities which host our operations.


Social, cultural, and political implications in Argentina

Each of their operations has a community social and economic development plan which is aligned with the United Nations Sustainable Development Goals. By aligning the community initiatives with every one of the United Nations Sustainable Development Goals, they put the CRS strategy at the forefront of best practice in private sector social investment locally and globally. First Quantum seeks to ensure that their employees, their families and their immediate communities realize the positive economic impacts of mining and to assist in improving the quality of life for those people and communities impacted by their activities. Plans are developed according to a combination of location, legal requirements, community needs and business risk. First Quantum continually refine their social investment strategies and through partnerships with government and civil society, to ensure that benefits of mining extend beyond the life of the mine.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

Fundamental to First Quantum’s philosophy is the ongoing commitment to innovation in mining, working in collaboration with equipment manufacturers to deliver benefits in productivity and profitability as well as incremental GHG emissions reductions and health, crushing, processing, water management and concentrate grade improvements across our operations & safety improvements. For the last ten years, it has been a priority for First Quantum to obtain reliable, efficient and robust technologies that maximise the use of electrical power within the mining and haulage of waste and ore. First Quantum leads the industry in the implementation of several mining technologies which improve energy efficiency and reduction of emissions, including trolley assist and electric shovels and drills combined with in-pit crushing and conveying. They will continue to prioritise the use of renewable energy where possible as well as work with their partners to develop technology essential for decarbonisation.

Mariana (lithium)

Location		24° 48’ 36’’ Lat. S; 68° 18’ 00’ Long. W The Mariana I, II and III project is located in the west of the Province of Salta in the Salar de Llullaillaco. In a straight line it is located 280 km west of the capital city of Salta.
Area	16,000 ha	
Mineralization type	Brine	
Project status	CONSTRUCTION	
Estimated average annual production	10,000 t/year LCE	
Product to obtain	Lithium Carbonate (Li ₂ CO ₃)	
CAPEX	243 M USD	
Estimated LOM:	25 years	
Mining Method	Pumping - Evaporation	
Property data owner/controller	Ganfeng Lithium Co., Ltd.	
Operator	Litio Minera Argentina	

Project geology:

Deposit geology: Drilling and hydrogeological data indicate that the Mariana project, Salar de Llullaillaco, is a sedimentary recharge complex in a basin supported by unconfined and interconnected aquifers. They are saltwater carriers and are found at depths of 328 meters or more. From the initial geological observations of the borehole, we identified 8 lithological types in the borehole cores in the western, eastern and southern regions of the basin. As only two wells intercepted the volcanic lithology attributed to the Mesozoic basement, the aquifer volume remained open at depth.

Resources and Reserves

Resources	Average Lithium Grade (mg/l)	Brine (Mm ³)	Lithium Metal (t)	LCE (t)
Measured	314	1,6831	528,000	2,810,000
Indicated	316	960	303,000	1,600,000
Inferred	328	470	154,000	786,000

IT:

The company has developed an industry-leading chemical lithium and lithium battery research platform with tens of thousands of square meters of laboratories. The premises of the company include: a laboratory for the research of inorganic lithium compounds; organolithium synthesis research laboratory; lithium battery materials research laboratory; metal smelting research laboratory; lithium alloy research laboratory; power and energy storage battery research laboratory; lithium battery The recycling research laboratory is equipped with more than 1,600 R&D and analysis equipment, such as a glove box, scanning electron microscope (SEM), X-ray diffractometer (XRD), and gas mass spectrometer (GC-MS), to provide solid support for technological innovation.

Transparency

Ganfeng Lithium adopted a "zerotolerance" approach to corruption by introducing the Management Regulations for Anti-bribery, Anti-Corruption, Anti-fraud and Reporting, the Administrative Measures for Bidding, Negotiated Tendering and Contract Review, the Management Regulations for Anti-Money Laundering and Anti-Terrorist Financing, and the Management Regulations for Employee Integrity and Self-discipline.

Stakeholder expectations

Ganfeng Lithium attaches great importance to protecting the rights and interests of shareholders, and actively maintains close communication with shareholders. They hold a general meeting of shareholders every year in accordance with the rules, treat all shareholders equally, accept online voting and separately count the votes of small and medium shareholders to maximize their participation in corporate decision-making and protect the interests of investors. Considering the interests of shareholders, they provided timely explanations, carefully listened to their opinions and suggestions, and protected the rights of small and medium shareholders to know and speak.

Sustainability and Environmental compliance

Ganfeng Lithium's mission is to use lithium resources to create a green, clean and healthy life for human development and progress, accelerate vehicle electrification and renewable energy to reduce carbon footprint and make the world more sustainable. It focused on building an eco-friendly project, an off-grid solar farm with 120MW of solar panels and 288MWp of battery storage, with plans to expand to 150MW of solar panels and 360MWp of battery storage exclusively designed by Ganfeng. In this sense, Mariana will be the first lithium project in the world to use 100% renewable energy and the largest off-grid solar farm in the region. The system has been designed to meet and comply with international standards of quality, energy efficiency and environmental protection, and is capable of providing various operational spaces and camps with a capacity of approximately 500 people. The project is characterized by the decision to preserve the salt marsh as a complex environmental system. Therefore, the planning of activities and facilities is based on a stable and researched environment, taking into account vegetation, flora, fauna, limnology, water, soil, air and archeology to protect the most important biological sites.


Social, cultural, and political implications in Argentina

Relations with communities are key for the company, highlighting cooperation with municipal and provincial authorities and private institutions, and fundamentally, dialogue. Promoting local culture and moving towards a sustainable future by fostering employability, the development of local suppliers, the continuity of cultural practices, and the care of physical and mental health. The company practices corporate social responsibility with a focus on education, health, culture and economic development. During this time, the company collaborated to improve community and health infrastructure, and supported recreational, sporting and educational activities, creating a positive impact on the communities of Tolar Grande and General Güemes as direct areas of influence, and the department of Los Andes as an indirect influence.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

In order to enhance its water management capabilities, the company has formulated a water footprint plan to increase recycling through such measures as steam condensate reuse. In addition, the Basic Lithium Plant plans to launch the construction of an ecological lake to pool the purified industrial wastewater, which will then be reused for cleaning highways, watering trees and cleaning roads in factories, thereby promoting efficient use of water resources. In the Mariana project, there is a sewage treatment plant on the project site to treat waste liquids and make them comply with the local waste dumping regulations, thereby preventing the pollution of groundwater in the project area. Ganfeng Lithium organolithium plant built a new wastewater collection tank with an effective volume of 208 m³. It has effectively prevented the polluted rainwater and sewage from washing the ground from flowing into the rainwater ditch and polluting groundwater. It is an opportunity to invest in this project, because Dutch companies can help the company to meet its goal of Zero discharge of wastewater.

Centenario Ratones (lithium)

Location		24° 52' 58" Lat. S; 66° 43' 58" Long. W) The Centenario Ratones salt flat area is located 300 km west of the city of Salta, at 3,900 m.a.s.l. The project is accessed from San Antonio de Los Cobres along provincial route 129. Pastos Grandes, is located 60 km from the project, with a population of 100 inhabitants.
Area	50,000 ha	
Mineralization type	Brine	
Project status	CONSTRUCTION	
Estimated average annual production	24,000 Tn LCE	
Product to obtain	Lithium Carbonate (Li ₂ CO ₃)	
CAPEX	595 M USD	
Estimated annual employment in operation	284 jobs	
Estimated employment in construction stage	800 jobs	

Estimated LOM:	50 years
Mining Method	Pumping - Chemical adsorption
Property data owner/controller	Eramet (50,9%) Tsingshan (49,9%)
Operator	Eramine Sudamericanas S.A.

Project geology:

Deposit geology: The project area is a hydrological basin containing two salt flats, Centenario and Ratonés. The Ratonés Salar is located to the N of C° Ratonés. A mountainous island of metamorphic rocks emerges in the central eastern part of the salt flats, where it forms a wide bay in its southern sector. Within and around the bay is the borate concentration. The Salar de Centenario is the continuation of the previous one, from which it is separated by the confluence of two important alluvial cones that expand into the depression. Genetically, it is related to the development of an important alignment of extinct hot springs, whose travertine remains can be seen on the eastern edge of the salar, coinciding with the regional fracture that limits the depression.

Resources and Reserves

RESOURCES	Brine (Mm ³)	Grade	Metal Content
		Li (mg/l)	LCE (t)
Measured	916	408	1,991,000
Indicated	1,442	379	2,912,000
Inferred	3,010	311	4,987,000

Transparency

To promote transparency and the introduction of international standards in its sector, the Group joined the Extractive Industries Transparency Initiative (EITI). Eramet is also a partner member of the Responsible Minerals Initiative (RMI) with the aim of helping to improve best practices in the sector.

Stakeholder expectations

Both stakeholders internally and externally, stakeholders are all of the parties directly or indirectly affected by Eramet's activity. At every stage of the process, setting up an extensive collaboration with all of these participants is a key factor in the success of projects.

Sustainability and Environmental compliance

As part of its decarbonization efforts, Eramet has developed a strategy based on reducing its scope 1 and 2 CO₂ emissions (i.e., in terms of direct on-site emissions and indirect emissions linked to electricity and heat purchases), as well as by supporting the circular economy. A Group decarbonization road map sets out the measures that need to be implemented in the field, such as: The use of bio-reducers in ore reduction; The development of CO₂ capture and storage (CCS) systems in partnership with other stakeholders; The use and production of electricity from renewable sources along with the electrification of mines; The use of natural gas instead of heavy fuel oil for electricity production in order to reduce the carbon content of the electricity consumed by SLN's Doniambo plant and GCO and The development of hydrogen ore reduction in conjunction with bio-reducers.

On the other hand, the goal for SLN is to limit the risks of polluting the rivers or lagoon downstream of the mines with suspended matter, the solid particles present in natural and polluted water. This know-how has resulted in various solutions being implemented, including the building of structures nearby mines to

slow down then settle the rainwater. As such, SLN has fitted its sites with sedimentation tanks that can trap the suspended matter to prevent it re-entering the natural environment. A total of nearly 2,500 sedimentation tanks have been installed, all of which are now monitored by drones.

Social, cultural, and political implications in Argentina


In our increasingly fragile world, major industrial groups have a huge responsibility, particularly those in the mining and metallurgy sectors. This is why Eramet has decided to ensure its efforts are aligned with and promote international and sectoral commitments, as well as to formalize these efforts in several policies and charters.

As a mining and metallurgy player, Eramet has a singular responsibility: its business has an impact in the areas where the Group operates and must conduct itself completely transparently in sectors that are sometimes under stress.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

Eramet is fully aware of the ecological emergency, they are committed to meeting 3 objectives: Reduce our emissions to the atmosphere; Protect water resources and accelerate the restoration of mining sites by promoting biodiversity; and reduce the energy and climate footprint. Dutch companies can help the organization meet its targets as soon as possible.

Pastos Grandes (lithium)

<p>Location</p> 	<p>24° 34' 48" Lat. S; 66° 40' 48" Long. W</p> <p>The property is located in the Los Andes Department, in the central portion of the Puna block of the Province of Salta, in the extreme northwest of Argentina. It extends over the basin called Salar de Pastos Grandes, 13 km southeast of the town of Santa Rosa de Pastos Grandes, 56 km southwest of the town of San Antonio de los Cobres and 154 km west-northwest of the city of Salta , capital of the province. The altitude is 3785 meters above sea level.</p>
<p>Area</p>	<p>12,619 ha</p>
<p>Mineralization type</p>	<p>Brine</p>
<p>Project status</p>	<p>FEASIBILITY</p>
<p>Estimated average annual production</p>	<p>24,000 LCE/year</p>
<p>Product to obtain</p>	<p>Lithium Carbonate (Li₂CO₃)</p>
<p>CAPEX</p>	<p>448 M USD</p>
<p>Estimated LOM:</p>	<p>40 years</p>
<p>Mining Method</p>	<p>Pumping - Evaporation</p>
<p>Property data owner/controller</p>	<p>Lithium Americas</p>
<p>Operator</p>	<p>Proyecto Pastos Grandes S.A.</p>

Project geology:

Deposit geology: The salar is the current expression of a larger sedimentary basin, known as Sijes developed since the Miocene. The Sijes Formation is composed of sandstones, clays, tuffs and evaporites (Halite and Gypsum) and travertine. This unit is a potential aquifer and can store brines rich in Lithium. The Salar Pastos Grandes is filled with seamless clastics (clay and silt), organic material and fine-grained sediments. The evaporites are represented by Halite, gypsum and ulexite. The age of these sediments is late Quaternary to recent and 30 m thick. The stratification is horizontal and covers the pre-existing formations and the geological characteristics indicate erosion and dissolution of older rocks and subsidence in the central part of the salt flat. The sediments harbor brines rich in Lithium which has been demonstrated by exploration work.

Resources and Reserves

RESOURCES	Average Lithium grade (mg/l)	Lithium Metal (t)	LCE (t)
Measured	446	425,000	2,262,000
Indicated	406	349,000	1,858,000
M+I	427	774,000	4,120,000
Inferred	428	150,000	798,000

Infrastructure

While basic first aid, accommodation and food can be found in the village of Santa Rosa de los Pastos Grandes, there are not many resources available on the property itself. The village of Santarosa de Los Pastos Grandes, population 120, is located 12 kilometres north of the property and provides basic infrastructure including a domestic water system and 220 volt diesel power generation, a first aid station with an ambulance service and limited, basic accommodation and restaurant services. The city of San Antonio de los Cobres, located 65 kilometres from Santa Rosa, an hour's drive, is the centre of the province of Los Andes, home to about 6,000 people. It is a lively commercial and tourist centre with several hotels and several restaurants that provide good support for explorers of the area. 36 kilometres northwest of the property is the village of Salar de Pocitos, with a population of about 100; the village is the international train station of Antofagasta-Salta. The terminology of the Puna gas pipeline includes the expansion of the Mina Fenix (lithium) operation at Salar del Hombre Muerto and the possible future expansion of the Tincalayu borate operation. The main infrastructure is connected to San Antonio de los Cobres and Salta, as well as to other communities in Chile and the Pune region.

- a) **Road Connections:** National Route RN-51, passing through San Antonio de los Cobres connects Salta city in Argentina with Antofagasta city in Chile on the Pacific coast. RN-51 in the Salta – San Antonio de los Cobres segment (170 km) is more than 70% paved. From San Antonio de los Cobres, Route RN-51 leads to the international border at the Sico Pass along 140 km of well-maintained gravel road. From the Sico Pass, Chilean routes 23, 367 and 365 connect the 300 km to Antofagasta, the most populated city in northern Chile and the largest sea harbour in the region. PR-129, a well-maintained dirt road, connects the Salar de Pastos Grandes with San Antonio de los Cobres and the Salar de Pocitos village.
- b) **Electrical Power Connection:** The 600-megawatt (MW), 375 kilovolt (KV) power line between Salta and Mejillones in Chile passes 53 km to the north of the Property. The line was built with the aim to transport energy from Argentina to Chile but had been out of service since 2009. In February 2016 the line resumed operation and transported 110 MW from Mejillones (Chile) to the Argentinean Interconnected System. In the event that a power supply to Pastos Grandes is required, a transformer station and a power line of 60 km could be installed off the main line.

- c) **Natural Gas:** A natural gas line (Gas de la Puna) passes through San Antonio de los Cobres to Estacion Salar de Pocitos, 26 km northwest of the Property. At Estacion Salar de Pocitos there is an industrial park where a gas distribution pipeline feeds the Mina Fenix (at Salar del Hombre Muerto) and other operations in the Puna under development. This is also another alternative power supply for a potential lithium operation at Salar de Pastos Grandes.
- d) **Railway Antofagasta-Salta:** An existing railroad between Salta and Antofagasta is administered by two different companies: The Chilean Ferrocarril Antofagasta – Bolivia (Luksic Group) and the Argentinean state owned Ferrocarril Belgrano. It consists of a narrow gauge railway connecting Antofagasta (Chile) in the Pacific coast to the northern part of Argentina with connections to Buenos Aires on the Atlantic coast. It is presently out of service, although temporarily maintained in both country segments. The reactivation of this connection is being promoted between the regional governments. The Chilean portion has worked hauling copper cathodes and providing general supply for the Escondida and Zaldivar mines (in Chile). More recently, it has worked intermittently transporting borates, fruit, cattle and grains between Salta and Antofagasta. Transportation costs to the Pacific coast and the port of Antofagasta using this link would benefit a lithium operation at Pastos Grandes and elsewhere in the Puna.

Transparency

The objective of this corporate disclosure policy is to ensure that communications to the investing public about Lithium Americas Corp. (the “Company”) are: Timely, factual and accurate; and Broadly disseminated in accordance with all applicable legal and regulatory requirements. This policy confirms in writing the Company's existing disclosure policies and practices.

Its goal is to raise awareness of the Company's approach

Stakeholder expectations

Lithium Americas seeks to actively engage with external and internal stakeholders as set out in 102-40. We seek to adhere to our Code of Business Conduct and Ethics in all stakeholder relations, including relations with external stakeholders such as governments, regulatory authorities, suppliers and prospective customers. We engage with our employees through informal channels to gauge levels of employee satisfaction and give consideration to levels of employee retention. Lithium Americas maintains a strong focus on community engagement and has developed a community engagement plan for Thacker Pass, recognizing that the well-being of all stakeholders is essential to the Project's success. The Project was designed to reflect information collected during numerous stakeholder consultations. This approach is expected to mitigate potential concerns at the design level, and ensures the local community is included early in the development process. Looking forward to 2020, we plan to participate in a number of public meetings in Humboldt County to allow stakeholders to speak directly with the Lithium Americas team, learn more about the Project, ask questions and provide comments. The Company seeks to maintain positive relationships with local Indigenous groups and the local, state or provincial and national governments and regulators in the jurisdictions where we conduct business. We engage with governments and regulators to answer their questions, engage on permitting matters and other regulatory applications, foster general goodwill for our Projects, and address concerns as they arise.

Sustainability and Environmental compliance

Climate change: Energy and GHG emissions: Our goal to achieve low carbon emissions and combat climate change is to use energy efficiently and opt for renewable energy sources wherever possible. Its strategy to control and limit GHG emissions includes a special focus on accounting for energy generation and consumption in our operations.

Biodiversity: Lithium Americas is committed to protecting biodiversity and integrating conservation actions into the design and life cycle of projects and operational activities. We will actively participate in the management, protection and mitigation of habitats and ecosystems in project areas.

Water management: Water is a precious and sometimes scarce natural resource. The organisation's priority is to sustainably manage water resources by limiting its use and safeguarding its quality. They engage with neighbouring communities to collaboratively manage shared water resources throughout the life cycle of the project. From the outset, water management considerations have been incorporated into project decisions and design, reflecting a focus on using water efficiently and limiting its impact on quality.


Social, cultural, and political implications in Argentina

Lithium Americas is committed to building collaborative and trusted relationships with local and Indigenous communities and recognize that the well-being of stakeholders and communities is essential for their success.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

It is an opportunity to invest in the Pastos Grandes project, as lithium america's priority is to sustainably manage water resources by limiting their use and safeguarding their quality. They engage with neighbouring communities to collaboratively manage shared water resources throughout the life cycle of the project. Commit to measure, manage and mitigate impacts on water resources throughout the life cycle of our operations.

PPG (lithium)

<p>Location</p> 	<p>24° 34' 48" Lat. S; 66° 42' 36" Long. W The PPG Project is constituted by the union of the Pastos Grandes and Pozuelos projects. They are located in the Department of Los Andes, in the central portion of the Puna block of the Province of Salta. They extend over the Salar de Pastos Grandes and Salar de Pozuelos basins, 13 km to the south and southwest of the town of Santa Rosa de Pastos Grandes, 56 km southwest of the town of San Antonio de los Cobres and 154 km west-northwest of the city of Salta, capital of the province. The altitude is 3785 m.a.s.l.</p>
<p>Area</p>	<p>21,324 ha</p>
<p>Mineralization type</p>	<p>Brine</p>
<p>Project status</p>	<p>PRELIMINARY ECON. ASSESSMENT (PEA)</p>
<p>Estimated average annual production</p>	<p>25,000 t/yr. LCE</p>
<p>Product to obtain</p>	<p>Lithium Carbonate (Li₂CO₃)</p>
<p>CAPEX</p>	<p>338 M USD</p>
<p>Estimated LOM:</p>	<p>20 years</p>
<p>Mining Method</p>	<p>Pumping -Evaporation</p>
<p>Property data owner/controller</p>	<p>Lítica Resources (PLUSPETROL S.A.)</p>

Project geology:

Deposit geology: The Pozuelos and Pastos Grandes salt flats share the same local formations. The Pozuelos and Geste formations separate the basin northeast of Pozuelos. Quaternary rocks have been observed to accumulate in the form of evaporites such as halite and borates, carbonates and sulfates occupying depressions between mountains. The Pastos Grande salt flats are the current expression of a larger sedimentary basin known as the Sijes, which has formed since the Miocene. The beam formation consists of sandstone, clay, tuff and evaporite (rock salt and gypsum) and travertine. This facility is a potential aquifer that can store lithium-rich brine. The purple-white formation is an ancient salt flat larger than today, and is a potential aquifer that could store lithium-rich brine. Salar de Pastos Grandes is filled with loose clasts (clay and silt), organic materials and fine-grained sediments. The sediments are late to the latest Quaternary in age and 30 m thick. According to research work, the sediments contain lithium-rich brines.

Resources and Reserves

RESOURCES	Tonnage (Mm ³)	Grade		Metal Content	
		Li (mg/l)	K (mg/l)	LCE (t)	KCl (t)
Measured	751	468	4,445	1,852,860	6,368,159
Indicated	266	538	2,876	763,760	1,462,020
Inferred	350	500	3,116	938,500	2,079,613

Infrastructure:

- Project Access: Salar Pozuelos (Pozuelos), the main project site, is reachable by traveling along the gravel road (Ruta del Borax) from Santa Rosa de los Pastos Grandes heading east and then south, circumventing Salar de Pastos Grandes, for another 32 [km] before reaching Pozuelos. Total driving distance from the City of Salta to Salar Pozuelos is 250 [km], using this route, with a driving time of around four (4) hours.
- Electrical Power: Six natural gas generation sets will be used as a Combined Heat and Power (CHP) system to supply energy and heat to the plant, one of which is considered as a stand-by set. Heat from the CHP will be used to produce process steam. It is expected that 65 % of the steam production will be obtained from cogeneration. The remaining steam production shall be handled by using a conventional steam boiler set.
- Natural Gas: Natural gas will be supplied via a new 25 [km] 4" gas pipeline coming from the existing Puna/Fenix gas pipeline.

Transparency

The whistle-blowing hotline "Ethics Line" is a tool designed to facilitate the reporting of behaviours that do not comply with the Company's Code of Conduct handbook and the Anti-bribery and Anti-corruption Policy. Ethics Line is open 24 hours a day, 7 days a week. It is run by the company KPMG so as to ensure confidentiality and transparency throughout the process.

Stakeholder expectations

The management of the relationship with their stakeholders is an aspect of their responsible behaviour that they seek to manage transversality in all of their activities and in all the geographies where they have presence.

Sustainability and Environmental compliance

Pluspetrol is committed to conducting its activities while constantly improving its good practices, pursuing excellence in all of its processes in order to achieve its long-term growth and sustainability objectives. The company states: “We ethically manage our business, which comprises the economic, social, and environmental aspects of our operations for decision-making, balancing short and long-term interests to create shared value for the Company and its stakeholders. Our commitment is supported by the following principles, which are developed in different management systems for both the corporation and the different business units. “

Social, cultural, and political implications in Argentina


The pillars of Pluspetrol’s social investment are:

- Education: Educational programs, improving basic infrastructure, teacher training and supporting students through scholarships.
- Health: Initiatives to improve the welfare of communities through prevention and care programs and health services.
- Institutional Strengthening: Activities that enhance the self-management of social organizations.
- Community Development: Sustainable initiatives, vocational training and the improvement of infrastructure to encourage productive independence.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

It is an opportunity to invest in the project as optimizing freshwater consumption in its operations is a central commitment in terms of its environmental management, both in terms of the use of the resource itself and the discharges associated with it.

Salar del Hombre Muerto Norte (lithium)

Location		25° 13' 12" Lat. S; 67° 04' 12" Long. W The project is located in the northern part of the Hombre Muerto Salar, in the border area of the provinces of Catamarca and Salta, 170 km southeast of the city of Salta. The HMN Project is strategically located in the Hombre Muerto Salar, an active lithium production area of Livent Corp. (former FMC) in the Fenix lithium mine, about 12 miles south of the project area).
Area	3,237 ha	
Mineralization type	Brine	
Project status	PRELIMINARY ECON. ASSESSMENT (PEA)	
Estimated average annual production	5,000 t/yr. LCE	
Product to obtain	Lithium Carbonate (Li ₂ CO ₃)	
CAPEX	93 M USD (norte)	
Estimated annual employment in operation	2,100 jobs	
Estimated LOM:	30 years	

Mining method	Pumping-Evaporation
Property data owner/controller	NRG Metals Inc.
Operator	Lithium South Development Corporation

Project Geology:

Deposit geology: The local geology of the Hombre Muerto Salar includes a basement of intrusive, sedimentary and metamorphic rocks from the Precambrian and early Paleozoic, thick sequences of Ordovician marine sedimentary rocks with a roof of continental Mesozoic sedimentary units. These are superimposed by the Miocene to Pliocene volcanic deposits, which are common characteristics of the salt flats in the sedimentary basins of the region.

Resources and Reserves:

RESOURCES	Brine (Mm ³)	Grade		Metal Content	
		Li (mg/l)	K (mg/l)	LCE (t)	KCl (t)
Indicated	119	797	7,039	509,000	1,609,000
Inferred	21,9	534	5,517	62,000	231,000

Infrastructure

Electrical Power: The 600-megawatt (MW), 375 kilovolt (Kv) power line between Salta and Mejillones in Chile passes about 160 km north of the Property. The line was built in the 1990s with the aim of transporting energy from Argentina to Chile, but it was out of service by 2009 due to difficulties with the energy policy of previous local governments. In February 2016, the line resumed operation and reportedly transmits 110 MW from Mejillones to the Argentinean Interconnected System. In the event that a power supply for mining operations is required, a special line must be constructed for service (Rojas, 2017). Currently, Salta province and private companies, such as Total Eren, are considering a new gas pipeline and power distribution project that would use 32% renewable energy. The project could be completed in 18 to 24 months. NRG is being considered as a potential future off-taker.

Natural Gas Pipeline: A natural gas line (Gasoducto de la Puna) passes through San Antonio de los Cobres and Estación Salar de Pocitos, and it is connected to Orocobre's Tincalayu borate mine via a 5-inch diameter pipeline.

General Services: Fresh water in the area near the Project is scarce. Water for human consumption is brought from Salta; water for general use and camp needs can be provided by a spring managed by Orocobre's Tincalayu operations, some 5 km north of the Project property areas. Fresh water for the process plant will be provided by a new well located approximately 3 km away. There are no camp facilities on site at this time. As the Project evolves, a camp will be required to support basic needs for exploration activities. Communications by satellite phone are available in the area; communication and internet systems have been used by nearby camps.

Transparency

NRG is committed to leading its sector in sustainability transparency and disclosure. They follow the leading globally accepted frameworks and standards in order to provide key information to all of their stakeholders.

Stakeholder expectations

They regularly engage with stockholders concerning their Board, governance, and executive compensation practices with the specific goal of seeking stockholder feedback. They engage stockholders and use their feedback to drive changes in their governance and compensation practices.

Sustainability and Environmental compliance

They are committed to operating in an environmentally responsible manner and in compliance with all applicable environmental requirements. Their Environment-Over-Production policy sets a clear directive that environmental compliance takes precedence over production at NRG. Every employee is empowered to take necessary steps to always maintain environmental compliance.


Social, cultural, and political implications in Argentina

PositiveNRG is their company's philanthropic giving program. It helps to build the culture by creating a workplace that empowers employees to support communities, causes, and organizations that they elect to champion through donations of their time and/or money. The platform offers multiple touch points, which allow for engagement with non-profit organizations and internal employee team building.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

The operation of some of its power generation facilities depends on the availability of sufficient quantities of fresh water, as well as recycled, brackish and ocean water. The main direct use of this water is for cooling the condensers during power generation. Therefore, the company requires the help of Dutch companies, as they are experts in water care.

Sal de Oro (lithium)

Location		24° 48' 36" Lat. S; 68° 18' 00' Long. W The Mariana I, II and III project is located in the west of the Province of Salta in the Salar de Llullaillaco. In a straight line it is located 280 km west of the capital city of Salta.
Mineralization type		Brine
Project status		CONSTRUCTION
Estimated average annual production		25,000 t/year LCE
Product to obtain		Lithium Hydroxide (LiOH), (Li ₂ CO ₃)
CAPEX		830 M USD
Estimated LOM:		30 years
Mining Method		Pumping - Evaporation
Property data owner/controller		POSCO
Operator		POSCO ARGENTINA S.A.

Project geology:

Deposit geology: The local geology of the Hombre Muerto Salar includes a basement of intrusive, sedimentary and metamorphic rocks from the Precambrian and early Paleozoic, thick sequences of Ordovician marine sedimentary rocks with a roof of continental Mesozoic sedimentary units. These are superimposed by the Miocene to Pliocene volcanic deposits, which are common characteristics of the salt flats in the sedimentary basins of the region.

Resources and Reserves

RESOURCES	Metal Content	
	LCE (t)	KCl (t)
Indicated	1,580,000	6,239,034
Inferred	495,000	1,875,878

Transparency

Posco Argentina understands that working together with local authorities is fundamental, always prioritising transparency in all its operations with the aim of contributing to the common good.

Sustainability and Environmental compliance

Posco Argentina SAU, working under strict environmental control standards, in pursuit of compliance with current legislation. The Environmental Management Plan includes Hazardous and Non-Hazardous waste management programmes, continuous environmental training programmes, a vegetation and fauna monitoring programme, a monthly surface water monitoring programme linked to the project, and cooperation work with our CSR area.

Social, cultural, and political implications in Argentina


Each CSR action of POSCO Argentina is designed and applied within the framework of corporate citizenship, aiming to achieve beneficial results for the communities and for the company, in order to build a "better tomorrow" for everyone. At the same time, the positive effects are intended to last over time and generate general impacts in each community, aspiring to improve the quality of life of the population. The contributions to the communities are based on six core areas of promotion and benefit, which arise from the needs of each community and POSCO Argentina's interest in developing long-term sustainable mining, committed to transparency and ethical and responsible planning and execution.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

Recognising that water resource management is an important issue for sustainable management and its communities, POSCO strives to minimize the risk of water shortages by optimizing water management and expanding recycling.

Catamarca

Agua Rica (copper)

Location		27° 22' 41'' Lat. S; 66° 16' 13'' Long. It is located in the province of Catamarca, department of Andalgalá, 35 km east of the Bajo de la Alumbrera deposit. It is an area of difficult access, with heights of up to 3,300 m.a.s.l. The closest city of influence is Andalgalá. It is accessed from Andalgalá, passing through the city of Piscoyuyo, along a dirt road suitable for double-traction vehicles.
Area	15,485 ha	
Mineralization type	Copper-Gold-Silver-Molybdenum porphyry system	
Project status	PREFEASIBILITY	
Estimated average annual production	Copper: 155 kt Gold: 102 koz Silver: 1,400 koz Molybdenum: 5,2 kt	
Product to obtain	Copper cathode + Doré	
CAPEX	3,019 M USD	
Estimated annual employment in operation	1,500 jobs	
Estimated employment in construction stage	3,500 jobs	
Estimated LOM:	28 years	
Mining Method	Open pit	
Property data owner/controller	Yamana Gold Inc. 56,3% Glencore Plc. 25% Newmont Goldcorp 18,8%	

Project geology:

- **Regional geology:** Corresponds to the post-accretionary metallogenic belt associated with the Neogene magmatic arc (Tertiary) and related to the NE-SW trending perforation belt. This zone of the transition zone (26°-30°) is characterized by a small evolutionary volcanism in the mid-Miocene, which extends eastward and is associated with special tectonic conditions. It includes the Northwest Corridor, which controls magmatic and hydrothermal activity, including Agua Rica and Bajo la Alumbrera. These corridors host polymetallic mineralizations (Farallon Negro Catamarca) and porphyries in the north, whose subtypes are related to magmatism and associated structural mechanisms.
- **Deposit geology:** The mining area contains both high-quality gold-copper-silver veins and a large tonnage of copper-gold porphyry mineralization. Cerro Atajo is an intrusive complex in the same rock as the nearby Alumbrera mine. (Yamana MD&A June 30, 2016) The Agua Rica deposit is a Cu-Mo-Au porphyry deposit with polymetallic epithermal overprints. Three main stages of alteration/mineralization are clearly recognized: early porphyry Cu-Mo-Au, late epithermal Cu-Au-Ag-

As-Pb-Zn, and epigenetic Cu enrichment. Epigenetic leach enrichment has replaced pyrite, chalcopyrite, and bornite with near-surface high-grade chalcopyrite, cobaltite, chalcopyrite, and its gradient descend to bands of chalcopyrite and chalcopyrite that do not contain chalcopyrite, then open into the primary chalcopyrite mineral. a pit. Almost all copper ore is cobalt or chalcocite.

Resources and Reserves

RESOURCES	Tonnage (Mt)	Grade				Metal Content			
		Cu (%)	Au (g/t)	Ag (g/t)	Mo (%)	Cu (t)	Au (Oz)	Ag (Oz)	Mo (t)
Measured	53,6	0,22	0,13	1,55	0,02	117.920	224.000	2.671.000	10.720
Indicated	206,3	0,30	0,11	1,8	0,03	618.900	730.000	12.337.000	61.890
Inferred	742,9	0,23	0,09	1,62	0,03	1.708.670	2.150.000	38.693.000	222.870

RESERVES	Tonnage (Mt)	Grade				Metal Content			
		Cu (%)	Au (g/t)	Ag (g/t)	Mo (%)	Cu (t)	Au (Oz)	Ag (Oz)	Mo (t)
Probable	517,6	0,43	0,16	2,63	0,03	2.225.680	2.663.000	43.766.000	155.280
Proven	587,2	0,57	0,25	3,02	0,03	3.347.040	4.720.000	57.014.000	176.160

Infrastructure:

Power: Power for the project comes from the national grid. The main supply substation is at El Bracho, near Tucumán, where a 220 kV switching system is located, connected to a 50 km 220 kV line to the Villa Quinteros switching station.

Water: The water supply for the project comes from an underground water resource in the Campo El Arenal, the same area that Minera Alumbraera draws its water from. Modelling based on a drilling program done for this study shows that the Campo El Arenal basin is able to supply the water requirements for a 90,000 tpd mill, even with Alumbraera continuing to operate but that the project may need to supply some makeup wells for local agriculture to mitigate minor seasonal reductions in the flow of the Rio Santa Maria.

Transparency

Yamana's approach to significant issues of corporate governance is designed with a view to ensuring that the business and affairs of the Company are effectively managed to enhance shareholder value. Yamana is committed to, and supports, on-going reviews of its processes, policies, and practices in order to ensure it is maintaining good stewardship of investor interests.

Stakeholder expectations

Although stakeholder engagement activities continued to be affected in 2021 due to the ongoing effects of COVID-19, they were able to adjust activities to continue engaging with host communities. To keep community engagement teams and host communities safe from the spread of the virus, operations used various digital platforms instead of face-to-face events. Where Yamana organised face-to-face meetings or visits, local, regional and national health precautions were closely followed.

Sustainability and Environmental compliance

As stated in the Environmental Protection SoC, Yamana acknowledges its responsibility to manage and reduce, to the degree possible, its impact on the natural environment, and is committed to advancing environmental protection at its operations. This is done through proactive and operationally focused management. Responsible environmental management is core to the sustainability of Yamana's business.

Social, cultural, and political implications in Argentina


To Yamana, social performance is defined by the strength of their relationships and extent of their impacts on host and surrounding communities, both positive and negative. It is underpinned by their engagement and management of relationships and focuses on delivering measurable short and long-term benefits to communities.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

The primary social and environmental issues for the Agua Rica Project are anticipated to be as a result of alterations to water quality and quantity at the minesite and process plant. The high sulphide content of the ore, waste rock and dry tailings is expected to cause generation of acid rock drainage (ARD) and metal leaching (ML). Water, which will be obtained by a combination of pit dewatering and groundwater abstraction from the Campo El Arenal, will be required for the process plant. Since water is an essential resource to residents of communities surrounding the project, it will be vital to avoid any change in availability or quality of water from traditional sources. Mitigation and management measures have been developed to address potential effects on water quality and quantity at the minesite and process plant.

Salar de Hombre Muerto Oeste and Candelas are operated by the same company

Salar del Hombre Muerto Oeste (lithium)

Location		<p>(25° 13' Lat. S; 67° 04' Long. W</p> <p>The project is in the geological province of Puna, 90 km north of the town of Antofagasta de la Sierra, province of Catamarca. The HMW Project is located to the West and South of the Salar del Hombre Muerto. The HMW Project is in close proximity to other world class lithium projects owned by Galaxy Resources, Posco and Livent. It is around 1,400 km northwest of the capital of Buenos Aires and 170 km west-southwest of the city of Salta (in a straight line).</p>
Area	9,493 ha	
Mineralization type	Brine	
Project status	PRELIMINARY ECON. ASSESSMENT (PEA)	
Estimated average annual production	20,000 t/yr. LCE	
Product to obtain	Lithium Carbonate (Li ₂ CO ₃)	
CAPEX	439 M USD (norte)	
Estimated LOM:	40 years	
Mining method	Pumping-Evaporation	
Property data owner/controller	Galan Lithium Limited	


Project Geology:

Deposit geology: The local geology of the Hombre Muerto Salar includes a basement of intrusive, sedimentary and metamorphic rocks from the Precambrian and early Paleozoic, thick sequences of Ordovician marine sedimentary rocks with a roof of continental Mesozoic sedimentary units. These are superimposed by the Miocene to Pliocene volcanic deposits, which are common characteristics of the salt flats in the sedimentary basins of the region.

Resources and Reserves:

RESOURCES	Brine Vol (Mm ³)	Grade		Metal Content	
		Avg Li (mg/l)	Avg K (mg/l)	LCE (t)	KCl (t)
Indicated	450	946	9,725	2,267,000	7,496,000

Candelas (lithium)

Location		25° 47' 59" Lat. S; 67° 14' 36" Long. W The Project is located to the East and South of the Salar del Hombre Muerto. Candelas lies approximately 40km ESE of the Hombre Muerto West project. It is around 1,400 km northwest of the capital of Buenos Aires and 170 km west-southwest of the city of Salta (in a straight line).
Area	24,072 ha	
Mineralization type	Brine	
Project status	PRELIM. ECON. ASSESSMENT (PEA 2021)	
Estimated average annual production	14,000 t/yr.	
Product to obtain	Lithium Carbonate (Li ₂ CO ₃)	
CAPEX	408 M USD	
Estimated LOM:	25 years	
Mining Method	Pumping -Evaporation	
Property data owner/controller	Galan Lithium Limited	

Project geology:

Deposit geology: The local geology of the Hombre Muerto Salar includes a basement of Precambrian and early Paleozoic intrusive sedimentary and metamorphic rocks, a thick sequence of Ordovician marine sedimentary rocks, and a continental Mesozoic sedimentary unit above. They are overlain by Miocene to Pliocene volcanoclastic sediments, a common feature of salt flats in sedimentary basins in the region.

Resources and Reserves

RESOURCES CATEGORY	In situ Li (kt)	Avg Li (mg/l)	LCE (kt)	Avg K (mg/l)	In situ K (kt)	KCl Equiv. (kt)
Indicated*	167	672	685	5,193	1,734	3,307

Transparency

Galan Lithium Limited and its subsidiaries (together Galan or the Galan Group) take a zero-tolerance approach to bribery and corruption and is committed to conducting all its business activities in compliance with the laws and with honesty, fairness and integrity at all times. The Galan Group is subject to the laws and regulations of the countries in which it operates and is dedicated to upholding the laws and regulations, including those that relate to bribery and corruption.

Stakeholder expectations

The Board of Directors of Galan Lithium Limited (the Company or Galan) aims to ensure that Shareholders and other investors are provided with timely, accurate and transparent information about itself, its projects and its governance. Information is regularly communicated to Shareholders and Shareholders have the option to communicate with the Company and its share registry by electronic means.


Sustainability and Environmental compliance

Galan Lithium Limited (ASX:GLN) has signed a collaborative partnership with Circular Ltd to establish full lithium traceability and dynamic CO2 and environmental, social and governance (ESG) tracking for its lithium brine assets, in Argentina's Lithium triangle. Galan will be implementing Circular's solution to help its future market products meet sustainability objectives for ethical sourcing, CO2 transparency and other ESG performance metrics (e.g. water consumption).

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

It is an opportunity to invest in both projects because Managing water is important in order to minimise the amount of water that is taken from the salar. Usually, the mined water is not freshwater. The water quality is very saline because it contains different kinds of dissolved ions. Nevertheless, even if the water is only pumped from high-lithium concentration areas, there is a potential of this affecting water levels in nearby locations.

Kachi (lithium)

Location		26° 31' 12" Lat. S; 67° 25' 48" Long. W The Kachi Project is located in the province of Catamarca, approximately 100 km south of the Livent's Hombre Muerto Salar Operation (former FMC).
Area		74,000 ha
Mineralization type		Brine
Project status		PREFEASIBILITY
Estimated average annual production		50,000 t/yr. LCE
Product to obtain		Lithium Carbonate (Li ₂ CO ₃)

CAPEX	544 M USD
Estimated LOM:	25 years
Mining Method	Pumping -Evaporation
Property data owner/controller	Lake Resources NL
Operator	Morena del Valle Minerals S.A.


Project geology:

Deposit geology: Boreholes indicate that the fill of the Kachi Basin is predominantly sand dominated by silt and clay. The surface of rock salt varies. As a result, Kutch is classified as an immature salt marsh system. Igneous rocks are present in the sediments of the basin, but their distribution and thickness are limited. The conglomerate will form the base of the sedimentary sequence of the brine-bearing basin. Several sedimentary geomorphic units can be identified, including: Sala Carachi Pampa; Laguna Carachi Pampa, a brackish body of water supplied by volcanic springs on the northeastern edge of the salt flats; Vega Carachi Pampa, a transient wetland north of the lagoon; and the Barreal Carachi Pampa, a clay depression on the western and northern edges of the salt marshes. These units are partially overlain by recent alluvial and alluvial deposits and wind dunes.

Resources and Reserves

RESOURCES	Grade		Metal Content	
	Li (mg/l)	K (mg/l)	LCE (t)	KCl (t)
Indicated	289	5,880	1,005,000	6,705,000
Inferred	209	4,180	3,394,000	24,000,000

Tres Quebradas (lithium)

Location		27° 27' 00" Lat. S; 68° 39' 36" Long. W It is located in the Municipality of Fiambalá, 30 km from the border with Chile, 200 km from the Caldera port (Chile). 90 km north of the place Cortaderas, about 4,100 m.a.s.l.
Area	16,000 ha	
Mineralization type	Brine	
Project status	CONSTRUCTION	
Estimated average annual production	20,000 LCE/year	
Product to obtain	Lithium Carbonate (Li ₂ CO ₃)	
CAPEX	380 M USD	
Estimated LOM:	35 years	
Mining Method	Pumping - Evaporation	

Property data owner/controller	Zijin Mining Company
Operator	Liex S.A.

Project geology

Deposit geology: The project includes the "Tres Quebradas" lagoon, which is not fresh water, but a reservoir of supersaturated sodium, calcium and chlorine brine. The density of salt water is 1.22 (25% heavier than fresh water). It is black because it contains manganese and other metals. There are two large salt meadows in this area, which form very rough surfaces, suggesting that it is a mature salt formed mainly from sodium chloride nuclei. The freshwater contribution to salinity is limited to the southern point where the Valle Ancho and Piscis rivers enter. All the rivers at the northern end of the complex provide warm water rich in metals. On the one hand, the water that enters the salt flats is alkaline and carbonated, on the other hand, it is acidic, with a high metal content. There are more than a dozen thermal investments, in some cases lithium levels reach as high as 1000 mg/l, a world record. This sediment goes directly to the salt flats and the "Tres Quebradas" lagoons, where they are concentrated by evaporation.

Resources and Reserves

RESOURCES	Brine (m ³)	Grade	Metal Content
		Li (mg/l)	LCE (t)
Measured & Indicated	1.39E+8	1,007	4,000,000
Inferred	2.83E+7	1,239	3,000,000

Infrastructure:

Minimal infrastructure currently exists in the vicinity of the Project. The national highway RN60 comes to within 50 km of the property. Dirt roads can be used to access the eastern and western sides of the property. A lone hotel is located on RN60, approximately 50 km north of the point where the site dirt road connects to RN60. With regard to other infrastructure considerations (availability of power, water, and mining personnel; potential tailings and waste disposal areas, and processing plants) it is noted that infrastructure studies have not yet been conducted for this early-stage project. However, some initial possibilities have been identified. Electrical power for the site camp and operational equipment is provided by a combination of solar, wind and diesel generation. Exploration for potential freshwater sources is conducted on one or more of the large alluvial fans that are adjacent to the salar Complex. The town of Fiambalá represents a potential source for mining personnel. Such personnel would need to reside at a camp constructed at the site. The storage requirement for tailings and waste materials is expected to be minimal. Processing details would be further evaluated in the follow-up stage of exploration.

Transparency

The company requires all directors, supervisors, employees, suppliers and contractors to abide by the policies and standards. To ensure that the relevant policies and standards are implemented, they conduct a variety of activities such as integrity pledge signatures, surveys, warning films, and integrity talks to strengthen anti-corruption education and promote the development of the Company's integrity system. They are committed to creating a healthy and transparent supply chain. There are integrity clauses in all contracts entered into between their subsidiaries and suppliers or contractors, thus achieving a 100% acknowledgement rate for our anti-corruption policies and procedures. At the same time, they organise collaborative "Anti-bribery" talks for suppliers and contractors to learn about anti-corruption policies and regulatory documents such as the Policy Statement on Whistleblowing Management and the Policy Statement on Business Ethics Management. By assessing corruption risks of various positions, they

provide anti-corruption training to personnel in high-risk positions, such as Directors, supervisors, senior management, new employees, newly promoted employees, employees in sensitive key positions, etc.; 100% of these personnel have received such training.

Stakeholder expectations

The company adheres to the principles of integrity, interaction, equality, and transparency, and respects the needs of stakeholders; they have established and improved the communication and participation mechanism of stakeholders and adopted multiple measures strengthened periodic /aperiodic communication with stakeholders; they invite stakeholders to participate in decision-makings and activities related to corporate sustainability in order to understand the needs of stakeholders and the strengths and weakness of the Company's ESG work. They regularly record, measure, and review the communication with stakeholders, and improve the communication mechanism in a timely manner based on the feedback from stakeholders, so as to continuously improve the effectiveness and timeliness of communication with various stakeholders.

Sustainability and Environmental compliance

As a global company, they have established an Environmental Management System (EMS) according to international practice and the environmental regulatory requirements of the host countries. They are working on getting ISO 14001 environmental management system certification for their mines and smelters. Their goal is to ensure all of their mines and smelters in operation will be ISO 14001 certified by 2023. As at the end of the reporting period, 35 subsidiaries had been ISO 14001 certified, an increase of 16 subsidiaries from the previous year, with the certification coverage reaching 87.5%.


Social, cultural, and political implications in Argentina

The company respects the culture, traditions, and religious beliefs of the communities, does not operate in protected areas of Indigenous peoples, attach importance to their concerns and strives to respond to their legitimate claims. They interact with the communities in a culturally appropriate manner. Any commercial activity that may result in disrespect for or even damage of Indigenous people's culture and heritage is strictly prohibited.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

It is an opportunity to invest in this project because they are continuously innovating on their equipment and processes to improve the water reuse rate, maximize the utilization and recycle of water resources, reduce the discharge of contact water into the external environment, and utilize multiple storage facilities to collect rainwater and runoff, etc., to minimize the use of external sources of water for their operations. Externally, they strengthen water resources management by striking the balance between their operational needs and the needs of the local communities and ecosystems and taking into account the impact of climate change in the places where our projects are located.

Sal de Vida (lithium)

Location 	25° 19' 48" Lat. S; 66° 52' 48" Long. W The project is located in the northern part of the Hombre Muerto salt lake, in the border area of the provinces of Catamarca and Salta, 170 km southeast of the city of Salta. The project is strategically located in the Hombre Muerto Salar, an active lithium production area of Livent Corp. (former FMC) in the Fenix lithium mine, about 12 miles south of the project area.
Area	4,391 ha
Mineralization type	Brine
Project status	CONSTRUCTION
Estimated average annual production	10,700 LCE (Stage 1) expandable to 32,000 LCE in subsequent stage(s).
Product to obtain	Lithium Carbonate (Li ₂ CO ₃), Potassium chloride (KCl)
CAPEX	271 M USD (stage 1) + 524 M USD (Extension)
Estimated annual employment in operation	170 (stage 1)
Estimated employment in construction stage	430
Estimated LOM:	+ 44 years
Mining Method	Pumping - Evaporation
Property data owner/controller	Allkem Limited
Operator	Galaxy Lithium

Project geology:

Deposit geology: The local geology of the Hombre Muerto Salar includes a basement of intrusive, sedimentary and metamorphic rocks from the Precambrian and early Paleozoic, thick sequences of Ordovician marine sedimentary rocks with a roof of continental Mesozoic sedimentary units. These are superimposed by the Miocene to Pliocene volcanic deposits, which are common characteristics of the salt flats in the sedimentary basins of the region.

Resources and Reserves

RESOURCES	Metal Content		Brine (Mm ³)	Grade	
	LCE (t)	KCl (t)		Li (mg/l)	K (mg/l)
Measured	2,198,000	8,484,000	540	770	8,307
Indicated	2,583,000	10,385,000	680	717	8,051
Inferred	376,000	1,289,000	100	706	6,747

Transparency

Galaxy Resources Limited conducts its business with total integrity and honesty. They greatly value their reputation for honesty and integrity, and it is essential that employees and all those who represent or are associated with Galaxy (Galaxy Representatives) conduct Galaxy's business in a manner that complies with the laws and standards of behaviour prescribed by the jurisdictions in which we operate. This Anti-Bribery and Corruption Policy (Policy) sets out the anti-bribery and corruption commitments of Galaxy and its subsidiaries. It also sets out in practical terms how you should behave if you are confronted with bribery or corruption, as well as the requirements for maintaining accurate books, records and internal controls. All Galaxy Representatives must comply with this Policy at all times in all aspects of their work. Failure to comply with this Policy and applicable laws may result in disciplinary action, including dismissal.

Stakeholder expectations

Galaxy interacts with a wide range of stakeholders in relation to our business through a variety of communication channels.

Sustainability and Environmental compliance

Galaxy is committed to conducting its activities in an environmentally responsible manner by understanding and minimising the potential impacts of its operations on the environment. Galaxy aims to continually improve its environmental management system and performance while taking into account technical developments, scientific understanding, consumer needs and community expectations. Galaxy reports on environmental management activities, including impact assessment, climate change, pollution, water stewardship and biodiversity in its annual Sustainability Report.

Social, cultural, and political implications in Argentina

Galaxy aims to be an active member of the communities in which it operates and strives to improve the wellbeing of such regions. The Company recognises the importance of building and maintaining positive relationships with its stakeholders across the globe. Galaxy believes in regular, transparent engagement aimed at ensuring local stakeholders have a clear and current awareness of Galaxy's activities and any impacts those activities may have. Galaxy works closely with local communities to minimise any adverse impacts arising from its operations.


As part of making a valuable contribution as community partners, Galaxy seeks meaningful long-term relationships that respect local cultures and create lasting benefits. The aim is to support the development of diversified and resilient local economies that contribute to quality-of-life improvements that continue beyond the life of operations.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

As the world's population increases, the demand for clean and safe drinking water continues to grow. This, in turn, increases society's interest and concern for water security. Water security is a key risk to Galaxy's business operations, a fundamental concern for our communities and an important issue that we will continue to address as our projects develop. Galaxy strives to recycle and reuse water (where safe and possible) within the mining process to minimise water abstraction and any release of mine-affected water to the environment.

San Juan

Lama (gold)

Location		29° 19' 45" Lat. S; 69° 59' 33" Long. W Located at more than 4,000 meters above sea level on the border between Chile and Argentina. The property is accessed through a 360-kilometer gravel road from the City of San Juan, capital of the homonymous province, using the same route that provides access to the Veladero mine.
Area	6,747 ha	
Mineralization type	High Sulphidation epithermal style (Au-Ag)	
Project status	FEASIBILITY - RE - ENGINEERING.	
Estimated average annual production	Gold: 330,000 Oz Au/year Silver: 14 M Oz Ag/year	
Product to obtain	Doré (Au-Ag)	
CAPEX	1,200 million USD	
Estimated annual employment in operation	2,462 (e)	
Estimated LOM:	23 years	
Mining Method	Open pit	
Property data owner/controller	Barrick Gold Corp.	
Operator	Barrick Exploraciones Argentina S.A.	

Project Geology:

Regional geology: The geology of this area is dominated by extrusive volcanic rocks, partially intruded by underground strata of diverse sizes and numerous dikes and rock beds, while the El Indio gold deposits and prospects, as well as the structure of the surrounding area, are located mainly to the north. Wide-angle reverse faults, normal faults and fold bands parallel to the main structural grains. Lama is located near the centre of a north-striking graben that hosts almost the entire Tertiary volcanic sequence along the Chilean and Argentine ridges.

Deposit geology: The Lama region has been a centre of repeated intrusions and volcanism, beginning with a series of dacite and rhyolite magmatic ash flows deposited in the Early Permian. Subsequently, during the Late Permian/Triassic, the flow was intruded by granitic bedrock that included the PascuaLama granite intrusive complex, which occupied the central and eastern part of the area and was the main host lithology of the deposit. After a long hiatus extending into the Oligocene, large reserves of small diorite and dykes were intruded into granite complexes and volcanic rocks. Dam emplacement continued into the Miocene, followed by the deposition of the Middle and Upper Miocene dacitic limestone flows. This Miocene intrusive activity preceded the magmatic and associated hydrothermal activity around 8.78–8.79 My that produced the sediments.

Resources and Reserves:

RESERVES	Tonnage (Mt)	Grade			Metal Content*	
		Au (g/t)	Ag (g/t)	Cu (%)	Au (oz)	Ag (oz)
Measured	42,81	1,86	57,21	0,10	461,520	27,561,450
Indicated	391,73	1,49	52,22	0,08	3,380,90	230,201,300
Inferred	15,4	1,74	17,83	0,05	155,340	3,090,500

Infrastructure:

Access Road: The principal access into the Project site from the Argentinean side is via a 363km combination of paved, gravel and dirt roads from the city of San Juan, the capital of San Juan province in Argentina. A portion of these roads (176km, two-lane, gravel road) is shared access from Tudcúm to the Veladero plant site. This road was constructed in 2003/2004 and is planned to be extended from the Protocol Area in the northeast quadrant of the Veladero mine site to connect with the in-plant south access road to the Pascua-Lama process plant.

Power Supply: It provide permanent power to the site by means of a 220kV aerial transmission line, approximately 170km long, connecting to the Chilean grid at Punta Colorada, approximately 90km north of La Serena. Detailed engineering for the 220kV transmission line and substations is complete. Prior to connection to the grid, the Project will use diesel generators.

Transparency

Their core values, responsibilities and the principles and behaviours that guide how they do business are codified in their Anti-Bribery and Anti-Corruption Policy and Anti-Fraud Policy, as well as the Code of Business Conduct and Ethics. Protecting themselves from and taking a stance against corruption, bribery and fraud is one of their sustainability principles and a foundational value. The company aim for 100% adherence to the Code of Business Conduct and Ethics and our related policies.

Stakeholder expectations

The bedrock of their approach to sustainability governance is a commitment to listen to their stakeholders and incorporate their input into our decision-making. Their aim is to build strong and lasting relationships grounded in trust and transparency. This is only possible through regular, open and honest communication.

Sustainability and Environmental compliance

The company recognises that the environment in which it operates and the communities in which it operates are inextricably linked and applies a holistic and integrated approach to sustainability management: Regard access to clean water as a fundamental human right; Build community resilience into our climate change work and Understand that global prosperity and life is underpinned by healthy and functioning ecosystem services


Social, cultural, and political implications in Argentina

Barrick strives to be a good corporate citizen and a genuine partner for our host communities in locally led development, and to build resilience to global challenges. They are guests in the local communities and the host countries in which they operate. They believe they have the right to and must share in the benefit from the development and mining of their assets. They do this in three key ways: paying their fair share of tax; delivering jobs and economic opportunities to local communities through local hiring and buying policies; and investing in community-led development initiatives for socio-economic upliftment.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

Water is a vital and increasingly scarce resource. Steady, reliable access to water is critical to the effective operation of their mines. Access to water is also a fundamental human right. Managing and using water responsibly is a critical part of their sustainability strategy. Reducing the volume of freshwater consumed and protecting water quality decreases their environmental footprint and helps them maintain community and stakeholder support.

Taguas (gold and silver)

Location		29° 11' 27.79" Lat. S; 69° 52' 35.98" Long. W Access to the site is from the town of Tudcum, located 200 km from the city of San Juan. To reach Taguas, the 148 km mining road that links Tudcum to the Veladero gold mine is used. From Veladero one must travel 25 km further north along the Las Taguas River to reach the Project camp.
Area	3,274 ha	
Mineralization type	High Sulphidation epithermal style (Au-Ag)	
Project status	PRELIMINARY ECONOMIC ASSESSMENT	
Estimated average annual production	Gold: 47,000 Oz Silver: 825,000 Oz	
Product to obtain	Gold-silver doré bars	
CAPEX	141,1 million USD	
Estimated annual employment in operation	350 (e)	
Estimated employment in construction	700 (e)	
Estimated LOM:	10 years	
Mining Method	Open pit	
Property data owner/controller	Orvana Minerals Corp.	
Operator	Compañía Minera Piuquenes S.A.	

Project Geology:

Regional geology: Taguas is located at the northern end of the Cura Valley volcanic belt, of tertiary age, and on the eastern flank of the El Indio metallogenic belt (Siddeley and Araneda, 1990). The physical continuity of the volcanism and stratigraphy of the thin Chilean Cura Valley volcanic belt has been confirmed by several regional studies (Ramos 1995, 1998 and Godeas et al., 1993). The Cura Valley belt has similarities with the Chilean flank in both age and type of basement and alterations (Davidson and Mpodozis, 1991) and is an extension of the El Indio belt in Argentina.

Deposit geology: The Tagua field is home to a high-sulfide gold-silver epithermal system in altered Tertiary volcanic rhyolite. Epigenetic gold-silver oxide mineralization occurs on the south side of Taguas, Cerro Taguas Norte, Cerro Taguas Sur, Cerro III and Cerro IV. The mineralization consists of a subvertical mineralized structure that also affects the low-grade mineralized zone to the northeast. The width of a high-quality field is from 1.5 m to 8 m, and the length is from 40 m to more than 500 m. The high-grade zone consists of relatively continuous mineralization with gold grades ranging from 0.2 to greater than 4.0 g/t Au and 10 to greater than 50 g/t Au. Oxidation extends from the surface to about 200 m below the surface. In the north-central part of the mine, Cerro Campamento and Cerro Silla Sur, gold-silver sulphides (pyrite-manganite) have been found. In addition, individual mineralized vein structures ranging from 1.5m to 5m intersect over 50 g/t Au and 100 g/t Ag. Evidence of porphyry copper-gold mineralization has also been found in the Taguas deposit.

Resources and Reserves

	Tonnage (Tonnes)	Gold		Silver	
		Grade (Gr/Tonnes)	Gold Contained (Oz)	Grade (Gr/Tonnes)	Silver Contained (Oz)
TOTAL INFERED	133,626,330	-	1,496,943	-	40,488,585
Cerro Campamento	1521330	4.1	196311	41.4	2024422
Cerro Silla Sur	750000	3.14	75632	57.9	1396163
Cerro Taguas	131355000	0.29	1225000	8.8	37068000

Transparency

The Board of Directors of Orvana Minerals Corp. has determined that Orvana Minerals Corp. and all of its subsidiaries (collectively, “Orvana” and each an “Orvana Entity”) should formalize its policy relating to the Extractive Sector Transparency Measures Act (this “Policy”). This Policy supplements Orvana’s existing policies, including the Code of Business Conduct and Ethics, as well as the Anti-Corruption Policy. It is important that Orvana and its subsidiaries respect all international and local transparency measures, anti-bribery and anti-corruption laws. The measures included in the Extractive Sector Transparency Measures Act (the “Act”) will enhance transparency and reporting obligations of payments to governments by Orvana, thereby assisting to deter and detect corruption.

Stakeholder expectations

They strive to ensure that they have sound corporate governance practices to maintain investor confidence in the way in which they do business.

Sustainability and Environmental compliance

Orvana’s priority is to operate in full compliance with all local regulatory requirements and permits, and supports the goal of environmentally sustainable economic development. The Company is committed to developing and operating its projects in full compliance with recognized international and local standards. In furtherance of this commitment, the Company regularly implements programs to protect and enhance natural habitats and sensitive species including reclamation efforts, reforestation efforts and the establishment of water sources for wildlife.


Social, cultural, and political implications in Argentina

The Company is actively involved in the areas of education, sanitation, purchasing of local goods and services and generally working with communities to contribute to and to improve their standard of living. It is committed to developing programs that are sustainable and will outlive life at any mine operation.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

It is an opportunity to invest at Tagua Project because the company is committed to developing and operating its projects in full compliance with recognized international and local standards. In furtherance of this commitment, the Company regularly implements programs to protect and enhance natural habitats and sensitive species including reclamation efforts, reforestation efforts and the establishment of water sources for wildlife.

Filo del Sol (copper)

<p>Location</p> 	<p>28° 29' 30" Lat. S; 69° 39' 46" Long. W</p> <p>The Filo del Sol Project is located in the Atacama Region, in northern Chile and in the adjacent province of San Juan, Argentina, 140 kilometres southeast of the city of Copiapó, Chile, and extends to both sides of the border between Argentina and Chile. The centre of the main deposit area is 28.49 ° S latitude and 69.66 ° W longitude. The average altitudes are from 4,000 to 4,900 m.a.s.l.</p>
<p>Area</p>	<p>14,014 ha</p>
<p>Mineralization type</p>	<p>High Sulphidation Epithermal</p>
<p>Project status</p>	<p>PREFEASIBILITY</p>
<p>Estimated average annual production</p>	<p>Copper: 67 kt Gold: 159 koz Silver: 8,65 koz</p>
<p>Product to obtain</p>	<p>Copper cathode + Doré</p>
<p>CAPEX</p>	<p>1,266 M USD</p>
<p>Estimated annual employment in operation</p>	<p>800 jobs</p>
<p>Estimated employment in construction stage</p>	<p>1,800 jobs</p>
<p>Estimated LOM:</p>	<p>14 years</p>
<p>Mining Method</p>	<p>Open pit</p>
<p>Property data owner/controller</p>	<p>Filo Mining Corp.</p>
<p>Operator</p>	<p>Filo del Sol Exploración S.A.</p>

Project geology:

Regional geology: It is found in the post-accretionary metallogenic belt of the magmatic arc during the neogene (Tertiary). Between 30° and 34° Lat. S, during the middle Miocene (18-15 Ma) a horizontalization of the Nazca plate begins with the consequent cortical thickening. The magmatic activity reaches a great development in the provinces of San Juan and the centre of Mendoza. With the progressive horizontalization of the plate, the arch migrates eastward. These particular conditions generated a magmatism that culminated in episodes of hydrothermal alteration, high sulphidation gold mineralization, porphyry copper and molybdenum, and locally associated vetiform polymetallic deposits.

Deposit geology: The Filo del Sol Project shows a complete transition between a high sulphidation epithermal environment and a porphyry system, and both types of deposits are represented. Weathering and supergenic processes have created high-grade copper and silver oxide zones. Mineralization, of potential economic interest, within the Filo del Sol deposit includes high grade leached oxide / mixed copper mineralization, structurally controlled gold and silver mineralization, sub-horizontal “mantle type” high grade silver mineralization and mineralization of scattered sulfides of copper, gold, silver and molybdenum.

Resources and Reserves

RESERVES	Tonnage (Mt)	Grade			Metal Content		
		Cu (%)	Au (g/t)	Ag (g/t)	Cu (t)	Au (Oz)	Ag (Oz)
Proven and probable	259,1	0,39	0,33	15,1	1.009.697	2.764.000	126.028.000

Infrastructure:

Water Supply: Water is supplied from aquifers in Argentina, located near the proposed plant site. The industrial water make-up requirement is 75 L/s and is fully supported by the aquifers.

Power Supply: The site is supplied with electricity through a 127 km long, 110 kV, single circuit power transmission line connected to the Los Loros substation in Chile. Average electrical demand is 52 MW.

Product Transport: Copper cathode is transported by truck to Puerto Caldera, a port near the city of Caldera which is located 77 km by road northwest of Copiapó. The approximate trucking distance from the plant site is 245 km, of which roughly 60 km of existing road will require upgrade to accommodate the truck traffic. Doré is transported approximately 175 km to Airport Desierto de Atacama for ongoing airfreight.

Waste dump: During mining operations, waste rock generated during the extraction of ore from open pit operations are permanently stored immediately east of the Filo del Sol pit. Due to the presence of near-surface permafrost throughout the facility's upper end of its footprint, 'bottom up' construction and the excavation of keyway in the toe area are required to provide good contact and stability of the ultimate facility.

Heap Leach Facilities: The heap leach facilities include two leach pads: an on/off copper pad and a permanent gold pad. The on/off heap leach facility is located approximately 1 km northeast of the open pit and consists of 580,000 m² dynamic leach pad, operation ponds and process plant. The permanent gold heap leach facility is located immediately east of the on/off pad and consists of 1.6 Mm² permanent gold heap leach pad, operation ponds. The process plant is located next to the on/off pad process plant.

Transparency

Their commitment to responsible exploration involves engaging in environmental and climate stewardship, operating a safe and diverse workplace, demonstrating accountability, integrity, and transparency, and building community trust.

Sustainability and Environmental compliance

The Corporation apply precautionary principle by using suitable planning, impact assessment, and monitoring tools; design projects to avoid, minimize, mitigate and, if necessary, offset adverse environmental impacts; incorporate water and energy efficiency in project design, implementation, and continuous improvement; and conserve biodiversity and ecosystem services in the regions hosting its projects.


Social, cultural, and political implications in Argentina

The Corporation prioritises the health and safety of employees, contractors and local communities; respect the human rights of employees, contractors, local communities and indigenous people; engage and consult with its key stakeholders as it designs and develops its projects; and pursue collaboration and shared value generation opportunities.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

It is an opportunity to invest in the Filo de Sol project because the company is very engaged in climate and environmental stewardship that avoids, minimizes or offsets impacts.

El Pachón (copper)

Location		31° 45' 39" Lat. S; 70° 43' 50" Long. W It is located in the province of San Juan, in the department of Calingasta; approximately 300 km west of the city of San Juan, Argentina, and 5 km from the border with Chile. At an altitude of 3,600 m.a.s.l. The community closest to the project area on the Argentine side is Barreal, which is approximately 150 km away
Area	1,004 ha	
Mineralization type	Cu Porphyry	
Project status	FEASIBILITY	
Estimated average annual production	Copper: 280 kt Silver: 3 Moz	
Product to obtain	Copper concentrate	
CAPEX	4,500 M USD	
Estimated annual employment in operation	1,100 jobs	
Estimated employment in construction stage	3,000 jobs	
Estimated LOM:	30 years	
Mining Method	Open pit	

Property data owner/controller	Glencore Plc.
Operator	El Pachón S.A.

Project Geology:

Regional geology: It is found in the post-accretionary metallogenic belt of the magmatic arc during the neogene (Tertiary). Between 30° and 34° Lat. S, during the middle Miocene (18–15 Ma) a horizontalization of the Nazca plate began and its consequent cortical thickening. Magmatic activity reaches a great development in the provinces of San Juan and the centre of Mendoza. With the progressive horizontalization of the plate produces a migration of the arch towards the east. These particular conditions give rise to a magmatism that culminates with episodes of hydrothermal alteration and high sulfurization gold mineralization. Another important type of mineralization is the Copper-Molybdenum porphyry such as Pachón, Mercedario in San Juan; Paramillos, San Jorge and San Benicio in Mendoza; with locally associated veiniform polymetallic deposits.

Deposit geology: The deposit is located in the Cordillera Principal, formed by a basement of granitoids and vulcanites (Gr. Choiyoi), above in discordance there are jurassic sedimentary units, on them - also in discordance - lie stratified and andesitic vulcanites and to a lesser extent rhyolitic and riodacitics (Fm. Pachón). The latter is locally intruded by mesosilicic bodies, granular to porphyric, with which mineralization is linked. The sequence of deposit formation was synthesized by Lencinas and Tonel (1994): 1-Intrusion of the Diorita Pachón stock. 2-Formation of the porphyric copper system. 3-Posthumous intrusion of dioritic porphyry in whose intrusive dome there is magmatic breccia with accumulation of hydrothermal fluids. 4-Hydrothermal brecciation, alteration and mineralization of the breccia. 5-Intrusion of the dacitic porphyry at the northern limit of the hydrothermal breccia. 6-Formation of poorly mineralized tourmaline breccias. 7-Leaching and supergenic enrichment. The formation stage of the hydrothermal breccia is accompanied by a sinking of 50 to 70 m from the breccia body relative to the surrounding volcanoes.

Resources and Reserves:

RESOURCES	Tonnage (Mt)	Grade				Metal Content			
		Cu (%)	Au (g/t)	Ag (g/t)	Mo (%)	Cu (Mt)	Au (Oz)	Ag (MOz)	Mo (Kt)
Measured	537	0.67	-	2.4	0,013	15.11	-	198	324
Indicated	1,055	0,49	-	2.0	0,011	8.7	-	109	185
Inferred	1,536	0,41	-	2.2	0,009	6.3	-	89	138

Transparency

Glencore is honest and straightforward when they communicate. They push themselves to improve by sharing information and encouraging dialogue and feedback.

Sustainability and Environmental compliance

Glencore is committed to managing the land in a productive and sustainable manner ensuring proactive stewardship of our landholdings, including those that have not undergone industrial activity. In the spirit of the precautionary principle, they strive to understand and address environmental challenges at the operations, and to encourage resource efficiency and continuous improvement in our environmental performance, including prevention of incidents.

Social, cultural, and political implications in Argentina


Glencore is committed to respecting human rights in line with the United Nations (UN) Guiding Principles on Business and Human Rights. They uphold the dignity, fundamental freedoms and human rights of our people, communities and others potentially affected by our activities.

Glencore's ambition is to uphold and promote respect for human rights within the Group and throughout their value chain to enable people's basic rights and freedoms. They aim to: avoid causing, or contributing to adverse human rights impacts; prevent or mitigate adverse human rights impacts linked to our operations, products or services through our business relationships; and make a positive contribution to the advancement of human rights of all people, including vulnerable groups. In the event that we cause or contribute to an adverse impact on human rights, we provide for, or cooperate in, processes to enable appropriate remedy.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

It is an opportunity to invest in the El Pachon project because the aim of Glencore is to be a leader in environmental performance, and to minimise harm to the environment, through environmental stewardship and responsible resource management across our global operations.

Los Azules (copper)

Location		31° 13' 30'' Lat. S; 70° 13' Long. W Los Azules Project is located in the Central West of the Province of San Juan, Calingasta Department, 129 km from the homonymous town. The area is located in the Cordillera de Los Azules and at the northern end of the Cordillera de La Totora. Approximately 250 km west of the city of San Juan and 3 km from the border with Chile.
Area	18,000 ha	
Mineralization type	Copper porphyry	
Project status	PRELIMINARY ECON.ASSESSMENT (PEA) 2017	
Estimated average annual production	Copper: 153 kt, Gold: 35 koz, Silver: 1,2 koz	
Product to obtain	Copper, gold and silver concentrates	
CAPEX	2,363 M USD	
Estimated annual employment in operation	800 jobs	
Estimated employment in construction stage	1500 jobs	
Estimated LOM:	36 years	
Mining Method	Open pit	
Property data owner/controller	McEwen Mining	
Operator	Minera Andes Inc.	

Project geology:

Regional geology: The geological province in which it is located is the Cordillera Frontal, it comprises volcanic rocks of the Mesozoic with intrusion of Miocene diorite, intruded at the same time by a sub-parallel strip of diorite-dacite dikes along the main north fault northwest. The mineralization and hydrothermal alteration typical of porphyric copper is spatial, temporal and genetically related to the dikes. Copper mineralization (chalcocite + pyrite + chalcopyrite) is associated with intrusive bodies of dacitic composition to diorite of tertiary age.

Deposit geology: In the project area, the geology consists of volcanic rocks intruded by diorite plutons, which in turn are intruded by a sub-parallel dike system consisting of diorite to dacite, with the main components of these faults trending NE. Mineralization and alteration of porphyry-type systems are temporally, spatially, and genetically related to dykes. The system has zones: The leach zone is 60 to 180 meters deep and contains jarosite, goethite and hematite; Superficial enrichment zone from 60 to 300 m with calcite +/- cerulite; Primary sulphide zone containing chalcopyrite, bornite, pyrite +/- calcite and primary cerulite. The Los Azules hydrothermal alteration system has a minimum length of 5 km and a minimum width of 4 km and extends NW along an important tectonic corridor. The system disappeared into the northern volcanic cap, so its possible extension is unknown. The altered area around the Los Azules deposit is approximately 4 kilometres long and 2.5 kilometres wide. Drilling has not yet fully defined the mineralization boundaries.

Resources and Reserves

RESOURCES	Tonnage (Mt)	Grade				Metal Content			
		Cu (%)	Au (g/t)	Ag (g/t)	Mo (%)	Cu (t)	Au (Oz)	Ag (MOz)	Mo (t)
Measured	962	0,48	0,06	1,8	0,003	4,600,000	1,700,000	55,7	25,900
Inferred	2.666	0,33	0,04	1,6	0,003	8,750,000	3,800,000	135,4	88,000

Transparency

The policies of the company are the foundations for sustainability governance and always provide precise direction regarding the expected behaviour of each of our employees. These behaviours include ethical conduct, integrity and transparency, absolute respect for the human rights of all people, and compliance with all applicable laws and regulations.

Stakeholder expectations

Their corporate governance approach finds its origin in the commitment to comply with the highest standards of ethical business practices, care and preservation of society and the environment, seeking to ensure the sustainability of the company and generate shared value with all of their stakeholders.

Sustainability and Environmental compliance

The company comply with all environmental legislation, regulations and requirements in the region where they operate; They have current environmental authorizations and licenses, approved by SEMARNAT; Relevant industry standards guide them regarding and environmental risk management, including the International Code for Cyanide Management; they establish protocols that enable them to identify, supervise and control the environmental aspects of their activities and they embrace international sustainability initiatives, including the Global Compact and the United Nations Sustainable Development Goals; the GRI Sustainability Reporting Framework, and the Principles Towards Sustainable Mining, from the Mining Association of Canada.


Social, cultural, and political implications in Argentina

The company contributes to the development of communities surrounding its areas of operation, through the creation of employment; construction of roads or maintenance of the existing ones; provision of basic health and hygiene services; contributions to basic education, technical and professional training of the inhabitants, among others.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

Mining-related operations often have a high environmental and social cost. The environmental impacts most associated with the industry include water pollution, soil exploitation and erosion, loss of biodiversity, and adverse effects on climate change, resulting from greenhouse gas emissions. It is an opportunity to invest in this project because their business principles consider of utmost importance the reduction of potential environmental impacts through the adoption of best practices in the areas of biodiversity protection, responsible water use, energy efficiency and the responsible management of chemicals and waste required in the operation.

Josemaría (copper)

Location		28° 27' 13" Lat S; 69° 35' 39" Long W. It is located near the limit of the Iglesia Department in the north of the province of San Juan, approximately 10 km from the border with Chile, in the middle of the Andes mountain range. It covers elevations from 4,000 to 4,900 meters above sea level. The closest city is Guandacol, in the province of La Rioja, located 200 km SE on a gravel road.
Area	16,715 ha	
Mineralization type	Copper, Gold and Silver Porphyry	
Project status	CONSTRUCTION	
Estimated average annual production	Copper: 125 kt Gold: 230 kOz Silver: 790 kt	
Product to obtain	Copper - Gold concentrate	
CAPEX	4,061 M US	
Estimated annual employment in operation	1,650 jobs	
Estimated employment in construction	4,300 jobs	
Estimated LOM:	19 years	
Mining Method	Open pit	
Property data owner/controller	Lundin Mining Corp.	
Operator	DEPROMINSA S.A.	

Project Geology:

Regional geology: The mining property is located within the Frontal Cordillera on the eastern flank of the Andes and its host rock is the Permian-Triassic batholithic rocks of the Choiyoi Formation. There are also volcanic rocks from the Tertiary period assigned to the Doña Ana Group. The latter are intruded by quartz-dioritic porphyry of estimated Miocene age. It is a copper-gold porphyry type deposit. The geological characteristics, which include the tenor and the style of mineralization, the lithology of the host rock and the patterns of alteration and distribution of the mineralization, are similar to other Andean porphyry of the metallogenetic belt.

Deposit geology: Associated gold-copper mineralization at Shi Lihua occurs in an altered intrusive dacite and hydrothermal breccia with anhydrite, magnetite, pyrite, hematite, gypsum, quartz and sericite. Most of the copper and gold mineralization is in the Miocene porphyry system and forms elongated bodies with dimensions of at least 900 m NS and 600-700 m W and 600-700 m vertically. The deposit is open to the south and north. In fact, in 2012/13 In the season of 2018, the company started a diamond program of more than 7,000 meters to explore the aforementioned extension. Based on the published results, it is likely that the size of the deposit will increase significantly in the north-south direction.

Resources and Reserves:

Josemaria 2020 sulphide mineral resource @ 0.1% CuEq cut-off

RESOURCES	Tonnage (Mt)	Grade			Metal Content		
		Cu (%)	Au (g/t)	Ag (g/t)	Cu (t)	Au (MOz)	Ag (MOz)
Measured	197	0,43	0,34	1,3	861,825	2.2	8.5
Indicated	962	0,31	0,22	1,0	2,494,758	5.6	26.6
Inferred	704	0,24	0,15	0,8	1,315,417	2.3	18.6

Josemaria 2020 oxide mineral resource @ 0.2 g/t Au cut-off

RESOURCES	Tonnage (Mt)	Grade			Metal Content		
		Cu (%)	Au (g/t)	Ag (g/t)	Cu (t)	Au (Oz) thousands	Ag (Oz) thousands
Measured	26	-	0.33	1.2	-	280	940
Inferred	14	-	1.3	132	-	132	632

Transparency

They engage in ethical business practices founded on transparency and accountability to enhance trust with all our stakeholders throughout the mine life and beyond.

Stakeholder expectations

Ludín Mining's stakeholder engagement approach is based on clear communication, transparency and trust, helping the company understand and respond to the interests and concerns of their stakeholders and the emerging issues and risks to their operations.

Sustainability and Environmental compliance

Effective environmental management is integral to the success of all of Ludín Mining's operations, from day-to-day activities on-site, to corporate strategic planning. Ludín Mining's operations are committed to compliance with applicable laws and regulations, our Responsible Mining Policy and framework and our

Responsible Mining Management System (RMMS). This standard is an auditable specification outlining mandatory requirements for management systems to be implemented at all Lundin Mining Sites for the management of the HSEC aspects of our business.

Social, cultural, and political implications in Argentina

They collaborate to enhance the health and well-being of their communities by addressing impacts and developing initiatives that achieve positive social and economic benefits that last.

Explanation of the rationale for being considered a specific and concrete business opportunity for the Dutch mining services sector

Lundin Mining Corp.'s primary objective is to minimize potential environmental impacts through implementation of environmental management controls and procedures that are tailored to meet the individual needs of each of their operations in their unique environmental settings. They are looking to achieve this through effective use of environmental impact assessment to identify, quantify, and eliminate or mitigate impacts; integration of environmental controls within their operations, with monitoring to evaluate their reliability and effectiveness, and to identify potential opportunities for improvement; employment of risk assessment and management techniques to minimize the potential for unforeseen environmental impacts or incidents; and routine checking and continuous improvement through the annual environmental audit process.

Specific and Concrete Opportunities for Dutch Business

This section examines water, energy, engineering, and environmental issues in the Argentine mining sector and connects solutions provided from the Netherlands who can offer innovative concepts and technologies to improve the mining industry. A series of studies on the mining industry in Argentina identified the current challenges of the mining industry and assessed them as opportunities for solution providers from the Netherlands.



The Dutch water sector is renowned for its expertise in subjects ranging from technical solutions to water management and research. This knowledge enables the Netherlands to form partnerships on water-related topics and provide a platform for capacity building, learning and exchange. The Netherlands has the knowledge and skills to increase recycling rates and reduce the water footprint (treatment, separation, membrane filtration, smart suction, etc.) and environmental management and water management, laying a solid foundation for solutions. Argentina's mining industry can benefit from this experience by identifying strategic partnerships that reduce the water footprint of the mining sector. Below is an overview of the companies and organizations that were consulted, from technology providers to research and academic institutions.

Overview of Dutch companies & organizations that can add value to the mining sector in Argentina

→ **IHE Delft:** IHE Delft Institute for Water Education is a knowledge institute in the Netherlands. The institute focuses on three pillars: Education, Research & knowledge transfer. Since 1957 the Institute has provided water education and training to more than 23,000 professionals from over 190 countries, the vast majority from Africa, Asia and Latin America. Also, numerous research and institutional strengthening projects are conducted in partnership to strengthen capacity in the water sector worldwide. Through our overarching work on capacity development, IHE Delft aims to make a tangible contribution to achieving all Sustainable Development Goals in which water is key.

→ **Alia Instruments:** Alia Instruments provides a range of abrasive slurry density measurement equipment for mining applications, including the advanced Alia Density Meter. The device measures in-line slurry density in near real-time for any size of pipe, independent of external process conditions and slurry composition. This makes the Alia Density Meter ideal for use in challenging conditions such as dense slurries that contain sand, metal, rocks, and air bubbles that are present in various applications.

→ **Skygeo:** The company helps engineers working within organizations of all sizes, understand millimeter-scale deformation patterns to assess geotechnical risk earlier and more efficiently.

→ **Royal Haskoning DHV:** Innovation in engineering is their forte across food and beverage, oil and gas, petro-chemical, production, and assembly lines. Delivering all project phases from feasibility to full engineering, procurement, and construction management (EPCM) services, we have the skills required to bring projects to completion.

→ **Van Essen Instruments:** Van Essen Instruments offers monitoring technologies that provide real-time intelligence to support decision-making in mining projects. Their solutions can be used in different mining phases such as; exploration and feasibility, planning and construction, operations, and closure. Their suite of Diver products is suitable for monitoring of heap leach, tailings, slope stability, and dewatering processes. Our technology offers accurate site assessment and simplifies complex water management in mining projects.



→ **Witteveen en Bos:** As an engineering and consultancy firm, They advise and help clients all over the world in resolving today's complex challenges. They work on improving the human environment for everyone, today and for future generations. Together with their stakeholders, they contribute to social, ecological and economic progress, with the sustainable development goals of the United Nations serving as an inspirational guideline.

→ **MDT Pure Water:** They offer customized products that fit perfectly with these unique projects. MTD is a trusted water partner for multinational companies, the Ministry of Defence, contractors and installers worldwide. They can rapidly provide a temporary water infrastructure at all possible locations with the assurance of safe drinking water and reliable wastewater facilities which you can rely on. MTD thinks of solutions for installing water infrastructure in production plants, temporary housing or after disasters. No location is impossible. Safe drinking water is guaranteed. MTD is capable of self-producing drinking water. In addition, the wastewater can be treated so that it can flow back into the environment. This is how MTD manages and monitors the entire water project.

→ **Soulforce B.V:** SoluForce system transport ore, minerals, water, slurry, chemicals and other fluids in mining environments. With a strong focus on reliability and sustainability, all SoluForce pipeline components can resist extreme loads and adhere to rigid safety standards typically found in mining operations. The SoluForce system is designed for static and dynamic operations and does not suffer from corrosion, resulting in an extremely reliable and safe solution.

→ **Trisoplast:** Trisoplast is a robust, flexible and durable insulation solution consisting of a mixture of a special clay-polymer component with sand and water. Perfect as environmentally protective soil sealing at landfills, tank storage depots, industrial sites and infrastructure. Trisoplast is also the waterproof solution for underground construction and the construction of ponds and water basins, among other things. A patented Dutch top product that is used all over the world.

→ **Antea:** Antea Group is an international engineering and environmental consulting firm. We specialize in full-service solutions in the fields of environment, infrastructure, urban planning and water.



→ **ROHR - IDRECO:** The company has the ability to pump abrasive materials and reach up to 100 meters deep, making it specially equipped to serve coal, iron ore, gold, diamond, copper and oil sands mining companies.

→ **Arenal Dredging and Mining:** Arenal is world's first and only producer of innovative ceramic ultrasonic (non-nuclear) spectroscopy and thermal analysers for the determination of Slurry Density, Specific Gravity, Total Suspended Solids, flow, mass flow and temperature of abrasive and high concentration slurries. The ceramic sensor constructions not only provides the best acoustical and thermal physical properties but also it provides the highest degree of hardness ensuring optimal abrasive resistance for the high demanding applications in this industry.

→ **Netics B.V:** NETICS is a leading innovative research and consulting firm in civil engineering and is internationally recognized as the expert in the field of reuse and construction with dredged material. NETICS has the knowledge and expertise to stabilize this dredged material into building materials. This makes it possible to build innovative civil engineering structures such as: flood defenses, breakwaters, dams, banks, dikes and islands. There are now dozens of validated application possibilities for our products.

→ **Cohere Consultants V.O:** They give high level technical advice in the fields of dynamics and vibration, structural engineering, and geological engineering. To do this, they often use advanced data modeling and numerical modeling tools. Their work often comprises risk and impact assessments and advising our clients on policy and decision making.

→ **Crux Engineering B.V:** CRUX is an independent consulting firm in the fields of geotechnical engineering, geohydrology, and soil. By combining these consultancy services with their expertise in monitoring, soil investigation and soil improvement techniques, we are ideally placed to provide complete and, where necessary, innovative, (geo)technical design solutions. CRUX is also a leader in performing environmental impact analysis. For example, a quantitative risk analysis of expected displacements, vibrations and/or groundwater level changes at the site of adjacent structures can be made prior to the work. The causality of already occurred (construction) damage can also be investigated by them.



→ **Hiber:** Hiber Easypulse uses satellites to bring IoT for the mining industry everywhere, anytime. Track your assets around the world, even in the most remote locations, without any worries. Mining equipment monitoring never looked this good (or easy).

→ **Ginaf Trucks B.V:** By using GINAF equipment you're best positioned to reduce your transportation cost in a safe and productive manner. High payloads, combined with compact fuel saving drivelines, easy maintenance access and smart operator assistance all contribute to the best operational performance.

→ **Optecs B.V:** SMCS is an AI based decision making solution in the second level of measurement and control system. As an advanced control system, SMCS optimises the process using 3 main modules. Decision making module which is based on fuzzy logic. Optimization module which uses a combination of genetic algorithm, particle swarm and pattern search and optimises the framework of decision making module. And as the third module SMCS uses dynamic modelling as a sort of soft sensor to obtain certain information from the grinding process. Therefore, SMCS is able to reach the optimum process and maintain that level regardless of the nonlinear and time-dependent nature of the process.

→ **Wageningen University and Research:** Is a university and research institute focused on life sciences. WUR helps to map the relationships between different sectors (agriculture, mining, household, etc.). Wageningen University and research researchers aim to identify links that could help the mining sector face future climate challenges. Further research can be done on helophyte filters. It is currently being tested in domestic wastewater to assess its potential in mining. Another research topic could be the geotechnical evaporation of polluted/contaminated water. Blue energy can also be explored with a focus on energy requirements for desalination.

→ **Arcadis:** Is a Dutch global company delivering sustainable design, engineering, and consultancy solutions for natural and built assets. Their purpose is improving quality of life by creating liveable places where people and communities thrive. They enhance mobility, so that they can move sustainably in and between the cities. And they work to protect the environment and natural resources for future generations. They focus on finding innovative and lasting solutions to the world's biggest challenges, while making a difference to everyone's lives, now and in the future. Arcadis brings solutions such as mobility, climate adaptation, energy transition, resilience, etc.



→ **NX Filtration:** NX Filtration provides membrane technology solutions for the sectors that are confronted with water scarcity and water contamination challenges. Their membrane technology is capable of selectively removing organics from polluted water, including micropollutants, color, antibiotics, PFAS, bacteria and viruses. This has resulted in new and simple processes for the treatment of water, the reuse of wastewater and the production of potable water. They deliver robust products and innovative solutions enabling the partners to excel in sustainable membrane filtration applications.

→ **Deltares:** Is an applied research institute focused on water and the subsurface. They conduct research on innovation, solutions, and applied technologies.

→ **Fugro:** Is a company focused on geo-data collection and analyses in energy and infrastructure markets around the globe. Their services are focused on marine site characterization, land site characterization, marine asset integrity, and land asset integrity. Based on data acquisition and analysis. Fugro can provide their clients with thorough information and advice to make informed decisions. Their purpose is to create a safe and liveable world. Their ambition is to support their clients to achieve net zero carbon emissions, enable the development of sustainable infrastructure and strengthen climate resilience.

→ **Paques:** Paques is a technological company focused on anaerobic systems for wastewater treatment. Paques biotechnology helps companies reduce freshwater consumption, reduce their carbon footprint and recover valuable resources from waste. Major global changes make the integration of water purification, sustainable energy generation and resource reuse increasingly important.

→ **Royal IHC:** Is a consultancy company focused on dredging activities, on the nexus of sand and water in the mining industry, sand excavation, slurry transport, separation of valuables. They design and build a variety of standardized and custom-build vessels that suit the needs. They offer a complete in-house package, from concept design to the delivery of integrated vessels including life-cycle support, R&D and engineering.



→ **Allied Waters:** This company focuses on implementing innovations in the urban water cycle that are “driving the circular economy”. Innovative solutions to water scarcity, turning residuals into resources, new energy/water concepts based on green hydrogen and new bacterial proteins are some of the topics covered under the Allied Water umbrella.

→ **AquaBattery:** This is a start-up company that is the inventor and promoter of the only electrical storage system that is 100% sustainable. They have developed an innovative product that stores electricity solely using water and table salt. Their drive in this is to stop the use of toxic, environmentally, harmful materials, such as acids used to build conventional batteries, and provide a sustainable energy storage technology to the world.

→ **Klaren International:** Is a technology and engineering company based in the Netherlands that develops self-cleaning heat exchangers for operation up to zero-fouling.

→ **Nijhuis:** This company delivers solid and adaptive solutions for sustainable water use, energy, and resource recovery. They have multidisciplinary teams to develop, design, manufacture, and implement smart and game-changing solutions based on their expertise range of proprietary, innovative, and best available technologies.



Vision for transformation Water Management

Argentina has a very advantageous position in the global mining sector for copper and lithium. However, the large amount of water required for mining and Argentina's unique water stress situation creates a complex situation where water becomes a production bottleneck. This challenge will require significant adaptation and transformation, transforming mining and processing waters, to maintain Argentina's current production levels and remain at the forefront of the global mining industry.

All the research done on the project in Argentina concluded that the Argentine mining industry needs a restructuring that the Dutch companies can manage. The needs, challenges and issues identified in all projects in Argentina are grouped into five themes.

→ **Long-term strategy to remain a prominent copper and lithium producer globally:** Argentina needs to increase production if it is to remain a prominent miner. The transformation of this sector requires a long-term sustainable strategy to overcome the impact of climate change.

→ **Mining processes:** Various stages of mining operations have been identified as sensitive to water loss, such as large-scale settlement and beneficiation processes. There is an opportunity to reduce water consumption in the production process through specific measures at each stage, for example by reducing areas exposed to evaporation and increasing the efficiency of water reuse. Also, another interesting topic is the treatment of sulphides by leaching, which has a lower water resistance than the concentration process. Some remedial requirements related to this topic are: Reducing water consumption for beneficiation processes by increasing water recirculation, reducing waste in tailings, and reducing evaporation areas in wastewater, ponds, and tailings lagoons.

→ **Tailing management:** This is where the main moisture loss through impregnation and evaporation occurs. In addition to ensuring the physical and chemical stability of sediments, the industry is looking for technologies and innovations to reduce water loss and increase water reuse. Similarly, we are looking at alternatives to reduce the amount of water sent to the TSF and to manage the transport of these wastes that have been concentrated, bonded or filtered. The requirements of different transitions associated with this subject include: reducing residual waste water waste and recovering more water from plants; Restoring more water from waste stored in light, reducing water consumption due to retention, evaporation and stabilization. Residues when removing pasta, thick or filtered waste to increase or restore fixed concentration; Warehouse management (deposit plan), monitoring and chemical and physical stability to reduce water consumption and control film; The transition from existing innovative methods, including sludge management technology.

→ **Water treatment and supply:** We need ways to reduce water, but we also need alternatives to water. Alternative water sources can be desalinated seawater or treated wastewater. But both have problems. Here the most significant water losses due to impregnation and evaporation are identified. In addition to taking care of deposits' physical and chemical stability, the industry is looking for technologies and innovations that make it possible to reduce water losses and thus increase the reuse of water. Likewise, it looks for alternatives to reduce the water sent to the TSF and to be able to deal with the transport of these tailings, whether it is thickened, pasted, or filtered. It is necessary to reconstruct the various reconstructions of this subject: the treatment of wastewater containing sulfate concentration; To compete with the RO factory and to improve the process efficiency, you need a new technology. Reduce fresh water (surface water and underground waters) in the continental source. Controls of coastal influences (social and biodiversity) but eliminates the electricity consumption and the process of water resources; Identify solutions to corrosion problems using direct seawater and seawater processes (pumping systems, equipment, new materials) (pumping systems, equipment, new materials); Risk assessment and risk management and emergency weather conditions that cause the risk of collection. According to the rules

of stability and financing, the assessment of the climatic risk is mandatory as TCFD. Clean and reuse water close to objects (sewerage units, wet, wet in other industries).

→ **Mine closure:** Argentina's environmental authority requires the mining industry to submit a facility closure plan, including environmental liability measures and management. Various conversion requirements related to this topic: Use new technologies to operate, shut down and operate aircraft after shutdown and manage acidic drainage from landfills using wastewater treatment plants or passive methods.



A range of transformation needs have been identified for each of these themes. The identified transformation needs are further elaborated in a specific opportunity and connected to Dutch Solution Provider (companies and organizations), that by nature of their activities and services could contribute to the solution of the identified opportunity. The links between the Argentina mining sector's need, opportunity, and Dutch solution provider are based on insights gathered during the analysis.

Long- term strategy to remain a prominent copper and lithium producer globally.

Transformation Needs	Description of the specific opportunity	Matching Dutch Solution Provider
Master planning	A multi-year master plan linking different levels of government with the mining sector and other water users will help identify solutions and prevent water conflicts. The Netherlands has extensive knowledge of long-term masterplan development.	IHE Delft; Deltares; Arcadis; Furgo, Royal Haskoning DHV,
Business model definition	Current business models related to the provision and supply of water to various end users and the possibility of using treated wastewater from one sector to another should be reviewed.	IHE Delft; Deltares; Arcadis; Hiber
Governance	The Netherlands has a rich history in water governance having several water governance levels, ensuring long-term strategies	IHE Delft; Deltares; Arcadis; Cohere consultants V.O; Antea; rohr-idreco; Royal Haskoning DHV

Mining processes

Transformation Needs	Description of the specific opportunity	Matching Dutch Solution Provider
Sulfide leaching	An evaluation of alternatives to sulfide treatment is needed to reduce water intensity compared	Arcadis

	to the concentration process. Sulfide leaching is possible using the new technical conditions, but taking into account the right infrastructure to solve the corrosion problem.	
Evaporation losses	Tailing lagoons could be adjusted through dredging, whereby the overall evaporation area is reduced, leading to the decline in evaporation losses.	WUR, Deltares, IHC Mining, Aquabattery
Renewable energy	In the mining industry, ensuring a stable power supply is important because energy costs are the second largest cost after labor costs. Solar systems can provide additional energy for the desalination process. However, renewable resources can fluctuate throughout the day. Therefore, the energy storage system can ensure a stable power supply.	Aquabattery

Tailing management.

Transformation Needs	Description of the specific opportunity	Matching Dutch Solution Provider
Reducing water in tailings transport to TSF	Water saving equipment reduces water in landfills and increases water reuse. Also, waste movement issues can be addressed through proper operational monitoring and control.	Deltares, Fugro, IHC Mining, Aquabattery
Water recovery from tailing deposits	Minimizing water loss through evaporation and retention increases water recovery from the SDF. Techniques or optimization of sedimentation schemes designed to reduce evaporation areas can allow for better ETS management and greater water recovery. New technologies can reduce evaporation costs by using the area to generate electricity, for example, or increase water recovery from sedimented	Deltares, Fugro, IHC Mining, Aquabattery

	waste, including flotation devices/elements that create synergies in the lagoon.	
Tailings transport	The higher concentration of solids in tailings requires equipment capable of transporting them to the TSF, avoiding problems in the pumping system from the thickeners to the TSF.	IHC Mining
Management of deposit (monitoring, chemical & physical stability of TSF)	Waste management should be reflected in the life cycle from concept design to post-closure. Therefore, real-time data collection and regular evaluation can correct deviations from reliable operation and reduce risks associated with physical and chemical stability.	IHC Mining, Fugro, Arcadis
Transition from conventional to innovative tailings management	Waste disposal is clearly the most water-intensive process in mining. Given the innovative Dutch suspension technology used in other areas.	IHC Mining, Deltares, Arcadi

Water treatment and supply

Transformation Needs	Description of the specific opportunity	Matching Dutch Solution Provider
Treatment of high sulfate concentrations effluents	There are filter applications that could be used to remove sulfates in wastewater. However, some technologies are limited in their capacity depending on the overall salts concentration.	NX Filtration, Paques, CoolSeparations
High energy consumption	The filters produced by NX filtration have a lower energy consumption than other filters currently used. In addition, in collaboration with Dutch organizations and companies, the mining sector could pilot innovative methods of energy production to diversify energy sources for the mining industry, such as floating solar panels and energy storage systems.	NX Filtration

Alternative water source to continental sources	Due to declining continental water availability, alternative water sources need to be assessed. Opportunities lie in water reuse or recycling, e.g., cleaning domestic water to a quality applicable in the mining sector. In addition, research and knowledge institutes can contribute with innovative water treatment setups, such as helophyte filters.	WUR, Deltares, Allied Waters, NX Paques, Nijhuis Filtration,
Desalinization	There are pre-treatment stages and new desalination plants based on RO technology.	Nijhuis, IHE Delft, Allied technologies that could increase the performance of Water, Klaren International
Corrosion issues	Seawater and desalinated water pumping systems corrosion since more frequent maintenance is required. New materials would make it possible to prevent corrosion.	Dutch consultancies and Oil have increased operating costs associated with & gas consultants
Effluent water treatment	There is the possibility of using biological treatment technology for wastewater treatment.	Paques

Mine closure

Transformation Needs	Description of the specific opportunity	Matching Dutch Solution Provider
Environmental impact assessments	Closure of mines and mine tailings can have environmental impacts that need to be planned and monitored.	WUR, IHE Delft, Deltares, Fugro, Arcadis

Water is not the only possibility to invest in the Argentine mining industry, in the following items you will find other ways to intervene in energy, environment and engineering processes.

Energy transition

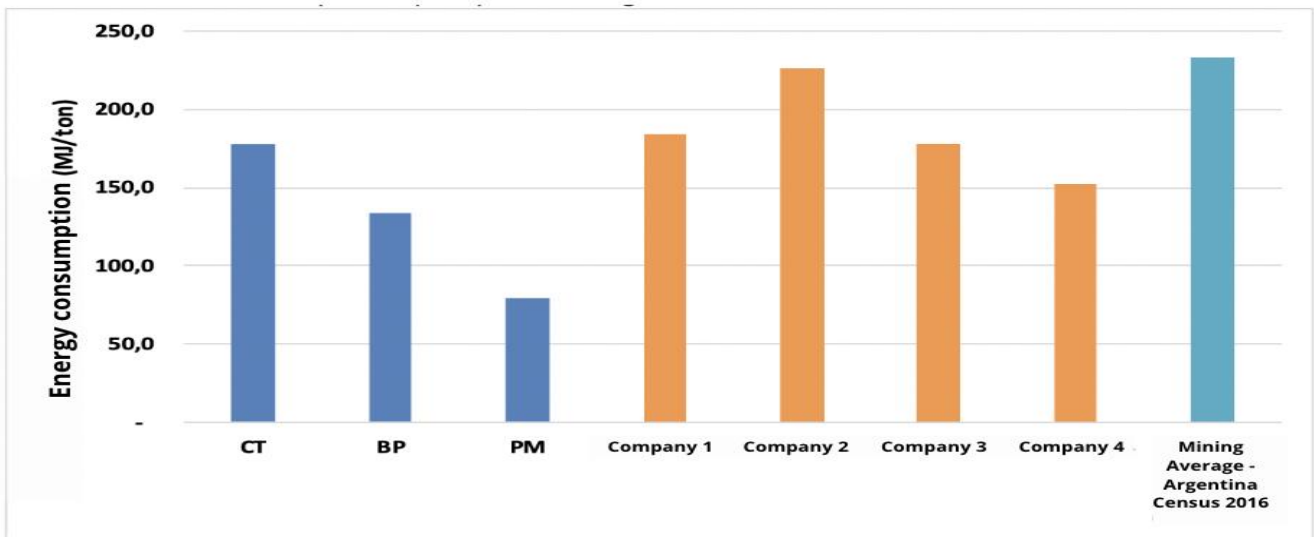


The Argentine mining industry aims to ensure responsible, transparent and reliable mining by reducing greenhouse gas emissions, through energy management systems and performance targets that help mining operations. But this is not reflected because in the 2016 energy consumption mining census the results were as follows:

Use	Energy consumption (%)			
	Derivates	Natural Gas	EE Network	Total
Vehicles	83%	1%		37%
Own generation	15%	96%		44%
Others	2%	3%	100%	19%
Total	44%	39%	17%	100%

Following this criterion, total energy consumption for the mining sector is estimated at 800 ktoe.

In order to estimate the specific consumptions in mining operations in Argentina and compare them with benchmark levels, it is necessary to distinguish between metalliferous and non-metalliferous mining, since they have very different specific consumptions. The following figure shows the comparison between benchmark levels published by the US DoE (Mining Industry Bandwith Energy Study, 2007) and some gold and silver mining companies in Argentina. It should be clarified that the own generation of electricity with fossil fuels is common in metalliferous mining operations and can increase the specific energy consumption with respect to the case where grid electricity is used, due to the efficiency of the conversion process in the plant. To take this effect into account, the benchmark levels used consider that the grid electricity consumed in the plant actually corresponds to an energy volume approximately 3 times higher, which includes the most relevant losses along the energy chain. In the case of companies operating in Argentina, about 50% of the electricity demanded would come from the grid, to which a factor should be applied to account for losses in the energy chain. This factor is probably much lower than that applied in the United States given the generation structure by source in Argentina.



Source: Prepared by the authors based on company sustainability reports and CENAM17.
 Note 1: Figures for companies 2 and 3 include operations in Argentina and other countries.
 Note 2: Figures for company 4 correspond to its environmental impact report.
 Note 3: Census figures include metalliferous, non-metalliferous and application rock mining.
 Note 4: for metalliferous mining, intensities are estimated based on material processed
 Note 5: CT, current technology; BP, best practice; PM, practical minimum.

In the specific case of lithium mining, one of the two companies that extract this mineral in Argentina has a total specific energy consumption of close to 54,000 MJ/ton of lithium carbonate. About 50% corresponds to electricity and the remaining 50% to caloric uses. Ninety-one percent of the fuel used is natural gas and 9% is diesel. The contribution of solar energy in the pools used for concentration by evaporation is not included in the energy consumption. With respect to lime kilns, in the specific case of the Province of San Juan, the specific energy consumption is around 1,000 MJ/ton of lime, with an almost exclusive use of natural gas as an energy source.

In the case of metalliferous mining and given its high specific consumption of electricity in its processes, a first fuel saving measure is the substitution of fossil fuel sources for renewable energies for its own generation. According to the National Mining Census, in 2016, 350 ktoe of the 800 ktoe consumed by the mining sector in Argentina corresponded to own electricity generation with natural gas (85%) and oil derivatives (15%). The complete substitution of these fossil fuels with renewable energies would represent a maximum savings potential of 44% of total energy consumption. Given the variable characteristics of the renewable resources typically available in the mining areas (wind and solar), it is likely that only a fraction of the maximum potential could be technically feasible. Another 300 ktoe would be used in vehicles, mostly diesel. Therefore, any measures that impact vehicle efficiency and/or vehicle driving patterns have significant savings potential. Finally, electrical uses demand 135 ktoe of electricity from the grid plus about 100 ktoe produced locally. These uses correspond to a variety of equipment generally driven by electric motors (fans, pumps, conveyor belts, grinding and separation equipment, among others). Therefore, all measures concerning the rational and efficient use of this equipment, including frequency variators, are potentially applicable.

Dutch companies can intervene in mining projects to ensure responsible, transparent and reliable mining, reducing greenhouse gas emissions through energy management systems and performance targets that help mining operations achieve the targets set by the CAEM.

Environment



Large-scale mining exploitation in Argentina is still proving to have significant social and environmental impacts, with resulting emergences of confrontation and conflicts. Although Argentina has a legal and institutional system that recognises human rights, including environmental protection, access to information and public participation, there are still significant gaps regarding enforcement and compliance. This situation leads to conflicts with and within local communities, which hurts vulnerable populations and local economies, health, and the environment, thereby threatening sustainable development.

Dutch companies can intervene in the provinces where mega-mining is taking place in order to reduce the use of tons of polluting substances to extract the resource, the use of large amounts of electricity and fuel, and the use of huge volumes of water.

Engineering processes

Finally, several interviews have been held with different companies of Dutch origin to intervene in Argentina to offer their multidisciplinary engineering services in the energy, mining, manufacturing and water sectors. These are:

→ **Hiber Latam:** They support customers by providing innovative solutions and processes, advice at all stages of the project and technical service.

→ **Arcadis Chile:** Is the world's leading company delivering sustainable design, engineering, and consultancy solutions for natural and built assets. We are more than 33,000 people, in over 70 countries, dedicated to improving quality of life.

→ **Fugro Chile:** They contribute to the design, construction and maintenance of facilities across the country by delivering integrated onshore and offshore geotechnical, geophysical and testing facilities. Their expertise and consultancy support developments in the energy and infrastructure sectors.

→ **Witteveen+Bos:** This company applies its wide-ranging expertise on energy, water and environment in projects carried out in the Netherlands and abroad. They address complex issues based on a multidisciplinary approach. They continually work on knowledge development by looking beyond the borders of different disciplines and entering into collaborations with their partners.



Conclusion & Recommendations

This investigation and assessment highlighted the complexity of the mining sector of Argentina and water, energy, and environment management in general. These are resources used by many industries and cannot be separated by focusing exclusively on mining, as it requires attention to the interconnection with other sectors and users. Research shows that the Dutch Companies have the opportunity to complement Argentina's vast knowledge of mining.

In the current situation of the mining sector in Argentina it might be the perfect timing for introducing new knowledge and technologies. Most of the lithium and copper projects are in the preparation phase, defining the processes, technologies, and standards to be used in production. In contrast to Chile, where most mines are long in production, in Argentina many new investments have been announced and the projects are in the preparation phase, creating a window of opportunity to introduce innovative solutions.

As a first approach it is important to find the right local partner (importer & distributor, technical or engineering service companies, etc), serving the markets that you are looking for and serve the mining companies/projects of your interest. It helps to select companies that have a good reputation and have experience in trade and international transactions. Due to the import restrictions and ever changing regulations, it is important to work with a partner that has longer experience in e.g., importing. Working with a local partner allows you to learn more about the market, the culture, business practices. In a later stage, after successfully serving customers in the market, you can always decide to take further steps such as opening a branch. Another benefit is that provincial policies are focussed on developing the regional economy, so local companies get priority. Dutch companies can partner with local companies provide technology, knowhow and services for the mining industry and jointly offer solutions to the mining industry.

If your company is already active in the mining industry, it is worthwhile to check with your current partners or clients that you collaborate with in other countries to see if they also operate in Argentina. E.g., several service providers and mining companies active in Chile, also have a branch in Argentina. Getting direct introductions and work with trusted partners can help to generate new business faster.

Tips on Doing Business in Argentina

When planning to export your products to, or establishing a company in Argentina, it is important to be aware of the main laws (the ones regulating the mining sector were described in this report), regulations, procedures and taxes involved in all transactions to avoid any unforeseen drawbacks or complications.

In this regard, our NBSO together with the Embassy in Buenos Aires fulfil an important role in providing information and recommendations to Dutch companies for the promotion and facilitation of business and offering advice to achieve successful international business transactions.

Regulations in Argentina are very dynamic, and they get modified mainly by political situation, according to the economic and financial status of the country as well as the availability of dollars in the National reserves. The situation today (November 2022) is not at its best, and a new import system is being implemented (SIRA), which might make importing a little more complicated for some sectors.

To avoid unnecessary costs and (expensive) delays, it is important to carefully identify, together with your Argentinian customer, all necessary customs requirements before moving forward with an export transaction.

Main import procedures and considerations

Import License

Any Argentinian company or individual that wishes to import goods must be registered in the Importers and Exporters Registry (this does not include small purchases by courier service).

Import operations must also be previously registered in the online “SIMI – Sistema Integral de Monitoreo de Importaciones” (Import Monitoring System) and approved by the Secretariat of Commerce through an import license.

There are two types of import licenses:

1. **Automatic License:** Applies to almost all goods under the Mercosur Tariff Code (NMC; directly related to the internationally used HS Code). The import of these goods is automatically authorized within a few days.
2. **Non-Automatic License:** This concerns goods which are protected in the Argentinian market (protection of local industry) or sensitive goods. The list can be found [here](#). To import goods which require a Non-Automatic License, the importer must present additional information through the online SIMI-system before the import is authorized. Approval for these kinds of imports is usually given in about 30 to 60 days. This is now being changed to the SIRA System, which might delay (or even not allow) the access to the dollar currency to pay for imports. Some companies are already starting to pay for imports with their own dollar reserves in foreign accounts (the problem here is that the official foreign exchange rate is considerably lower than the real value of the US Dollar in Argentina).

Import Duties and taxes

Imports are affected by several taxes that impact the final local price of the goods:

1. **Import Duty:** Imports pay a certain percentage over the CIF (Cost, Insurance & Freight)-value of the imported goods, which varies from 0% to 35%. Some goods affected by anti-dumping measures may have higher import duties. Import duties are determined by their respective NCM (HS) codes.
2. **Statistics Fee:** This is an additional tax also based on the CIF value of the imported good. The current rate is 3%, with a maximum fee of between USD 180 and USD 150.000 depending on the value of the goods. Some goods are exempt from this tax, such as temporary imports, goods from Mercosur origin, among others.
3. **IVA (VAT-Value Added Tax):** The standard rate is 21%, although a reduced rate of 10.5% is applied for a number of goods. The amount is calculated over the CIF value + import duties + statistics fee.
4. **IVA Adicional (Additional VAT):** Rate of 10% or 20%, depending on the good. This tax does not apply when the importer is the final user.
5. **Income Tax (advance payment):** 6% if the goods will be commercialized or 11% if the importer is the final (physical) user. This tax does not apply when it is a capital good to be used by the importer.
6. **Gross Receipt Tax (advance payment):** Rate of 2.5%. This tax does not apply when it is a capital good to be used by the importer or if the good is imported by the National, Provincial or Municipal government.

Example:

Concept	Value*
Initial CIF Value	\$1000
Import Duty (for example 15%)	\$150
Statistics Fee	\$30
VAT	\$247,80
VAT (additional)	\$236
Income Tax (advance payment)	\$70,80
Gross Receipt Tax (advance payment)	\$29,50
Final warehouse value	\$1764,10

**Some taxes may be compensated by the importer against taxes arising from its commercial activities.*

Setting up a company or branch

The Argentinian law allows the establishment of different types of legal entities, with differing minimum financial and legal requirements. Foreign companies can operate in the country by registering an Argentinian branch in the Registro Público (Public Registry). To establish a branch, a foreign company must appoint a local attorney with full powers, who will be in charge of completing all the necessary administrative steps. The timeframe may vary depending on the type of legal entity to be established and availability of the required documentation.

The most common types of entities are:

- **Sociedad Anónima – S.A.** (equivalent to a N.V.) – Owned by at least two shareholders.
- **Sociedad de Responsabilidad Limitada – S.R.L.** (equivalent to B.V.) – Requires a minimum of two partners. Liability of the partners is limited to the amount of their capital stakes.
- **Sociedad por Acciones Simplificadas – S.A.S.** (Simplified Stock Companies). This type of legal entity was established with the objective of facilitating investments. It can be formed by one or more partners. Registration is done digitally and if the standard model is used, it can be approved within a few days. Currently there are some rumors concerning the disappearance of this type of society.

Company Taxes

Commercial operations are subjected to several national, provincial and municipal taxes, that may vary per governmental jurisdiction:

1. IVA (VAT-Value Added Tax): Ranging from 0% to 21%
2. Income Tax: Ranging from 0% to 35%
3. Minimum Presumed Income Tax: 1%, applied to assets located in Argentina
4. Credit-Debit Tax: 0.6%, applied to all credits and debits on bank accounts.
5. Stamp Tax: Usual rate is 1%, although it can vary between provinces. This tax is applied on all legal documents or exchange of legal documents related to the creation, amendment or termination of rights and obligations.
6. Gross Receipt Tax: This is a provincial tax; hence percentages vary per province.
7. Municipal Fees: Municipalities are entitled to levy specific fees, as long as they do not interfere with provincial or national taxes.

Do's and don'ts in Argentina

Argentinian entrepreneurs are generally competitive and very proud of their business. At the same time, they are also generally open to new ideas and technologies. Furthermore, great value is attached to personal attributes. Family and friends are given high priority; therefore the “work/life” balance is given much importance.

Business meetings: In Argentina, Spanish is the language of commerce. Especially when dealing with authorities or SMEs, the use of the English language is uncommon. Even though many Argentines speak English, a good command of the Spanish language or the hiring of an interpreter are recommended. During meetings, social matters are discussed first, before moving on to business matters. Thereafter, the communication with Argentinian business partners is very direct.

Business etiquette: Argentines value business relations, they invest time in and pay attention to it. Argentines like to discuss business matters in restaurants. Business dinners (which often start at 9 p.m.) are more popular than lunches. In addition, they value a well-groomed appearance, even if it is 30 degrees Celsius outside. Good relationships with secretaries determine whether you get access to high-ranking persons.

Communication: Formal contact suffices with handshaking and eye contact. Touching someone's shoulder is seen as a sign of friendship as well as greeting with one kiss on the cheek, regardless of gender. Argentines are very direct, do not take your interlocutor's points of criticism too literally.

Hierarchy: Argentinians are informal in their dealings. This is also the case between managers and subordinates. However, companies and the government are organized hierarchically. The boss is really the boss, and a subordinate often does what he or she is told.

Food & drinks: Argentina is known worldwide for Argentinian steak and wine (Malbec). Argentines are big meat eaters, mainly beef. Barbecue on charcoal is a very popular weekend pastime. Do not decline an invitation for such an 'asado', as this is where important business is often discussed. Fish is available, but most of the catch is exported. The Argentines are also proud of their 'empanadas' (stuffed rolls with a large diversity of filling).

Main Fairs and Exhibitions

The main events within this sector are as follow:

- **ArminerA**, which takes place from the 22nd to the 24th of May 2023 in Buenos Aires. It takes place every two years. <https://arminera.ar.messefrankfurt.com/buenosaires/es.html>
- **Seminario Internacional del Litio**. August 9th and 10th in Salta province. <https://litioensudamerica.com.ar/>
- **Expo San Juan**. Machinery exhibition, conferences about commercial promotion and different mining techniques, training, etc. It takes place every two years; this year was in October. <https://exposanjuan.com.ar/>
- **Argentina 2022 Gold, Silver and Copper**. In Buenos Aires province, December 15th and 16th. <https://argentinaoroyplata.com.ar/>

Follow-ups and support from NBSO Córdoba and the Embassy in Buenos Aires

Do you have any further questions after reading this report? Do you want to take further steps to explore opportunities for your company? Please contact the Dutch economic network in Argentina for further guidance and support:

- The team of the NBSO Córdoba and the Embassy can assist you with **providing tailor made information** about doing business in Argentina, provide information about setting up a business, import procedures and further market information related to your company.
- We also have a broad network of contacts in the mining industry and can help to find potential clients or business partners and can arrange a direct introduction and help with matchmaking.
- If you wish to **bring a visit to Argentina**, we can support you with planning your agenda and assist with organizing meetings and making relevant visits.
- You can also consider participating in one of the local or regional mining events, such as the biannual congress ArminerA, which takes place from the 22nd to the 24th of May 2023 in Buenos Aires. You can contact us for information about other mining events in Argentina, Chile and Brazil that might be relevant for your company.

Contact details: NBSO Córdoba, info@nbso-argentina.com, +54 9 358 4383175. Embassy in Buenos Aires, bue-ea@minbuza.nl. You can contact us for information or to schedule a video meeting for mutual introduction and to define if and how we could assist you further.



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