



Lithium Mining in the Salar de Atacama, Chile

Critical Factsheets on Mining Projects

This factsheet is part of a series of case studies on contested mining projects, to shed light on the reality of local populations and the environmental impacts by extractivism.

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1. BASIC INFORMATION

Municipality:	San Pedro de Atacama, Antofagasta Region, Chile
Companies:	Sociedad Química y Minera de Chile Salar (SQM Salar)
Minerals:	Lithium carbonate and hydroxide, potassium salts
Status:	Active
Total concession:	2,687,630 hectares



From the Salar de Atacama salt flat in the east to the Cordillera Domeyko mountains in the west. European Space Agency, 2017

SUMMARY

Sociedad Química y Minera de Chile (SQM) is an international mining company established in 1968. SQM, partly owned by Chilean and Chinese private investors, operates in the eastern part of the Salar de Atacama, the only salt flat worldwide currently being mined. SQM has a strategic role in Chile's lithium extraction industry, controlling extensive mining rights in the Salar de Atacama through a lease agreement with Corporation for the Promotion of Production (CORFO) valid until 2030. In 2022, the company managed 2,687,630 hectares of mining concessions, representing 16.2% of all mining concessions in Chile, making it the largest concession holder in the country. The company is active in 7 of the 12 salt flats in the San Pedro de Atacama commune, including the Salar de Atacama, Llano de la Paciencia, Loyoques, Aguas Calientes Centro, Capúr, El Laco, and Pulár. Indigenous communities live in all these areas. As the Atacama, the world's driest desert, is gradually losing its last water resources, indigenous communities have been sounding the alarm for several years - backed up by scientific research and environmental organisations.

[1] The government agency that owns the mineral rights in the Salar de Atacama.

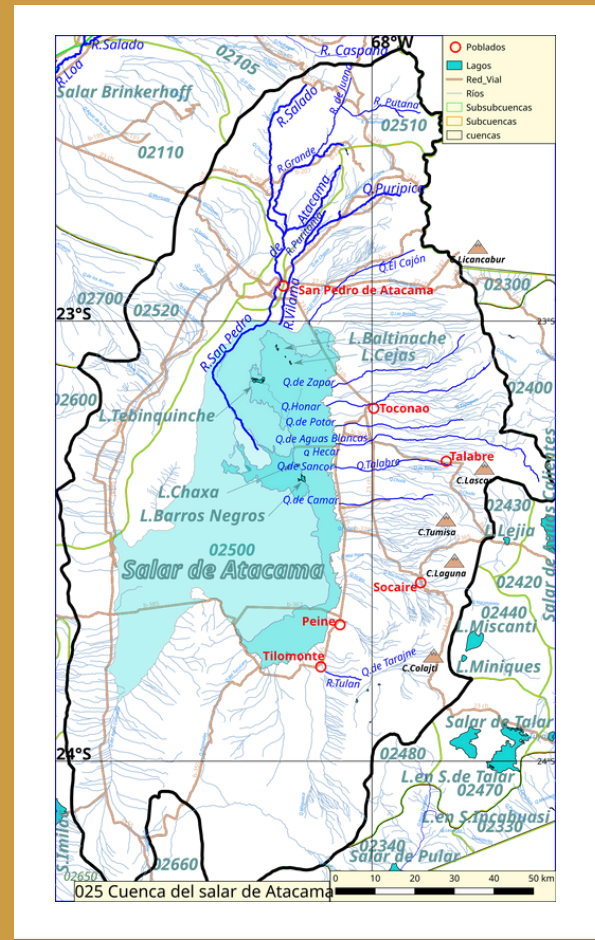
2. PERMITTING HISTORY & EIA STATUS

To understand SQM's permitting history, it is essential to grasp Chile's unique lithium regulations, particularly its designation as a "non-concessionable" resource, reserving its exploitation exclusively for the State, as stipulated by the Mining Code in 1983 (Articles 7, 8, and 9).² This regulatory framework creates a clear distinction between mining rights granted before and after 1979. Concessions established prior to 1979, such as the so-called "OMA" (Offices of Maricunga and Atacama), include over 30,000 rights requested by the CORFO in the Salar de Atacama. These concessions retain their exploitation rights and are currently leased to companies like SQM and Albemarle.

In contrast, concessions granted after 1979 cannot directly explore or exploit lithium. Non-state companies interested in lithium extraction must navigate a complex administrative and regulatory process to obtain operational permits. This process culminates in the signing of a Special Lithium Operations Contract (CEOL) with the Ministry of Mining, which authorises third parties to explore, exploit, and benefit from lithium deposits.

SQM's case is particularly notable because its concessions originate from the period before 1979, granting it a unique position under Chile's lithium regulatory framework. The company entered a lease agreement for mining rights with CORFO. This agreement however was nullified and replaced by a new lease agreement with CORFO in 1993. This contract granted SQM Salar exclusive rights to mineral resources in 140,000 hectares of the Salar de Atacama until December 31, 2030. In 2023, the company was promised again the rights to produce lithium until 2060 through a Memorandum of Understanding and in 2024, SQM was officially granted those rights by signing a public-private partnership agreement with the National Copper Corporation of Chile (Codelco).

Since 1996 when the mining project began, SQM Salar has received 20 permits from the environmental authority after submitting environmental impact statements and assessments. Thirteen of these authorised mining in Atacama. For example, SQM was issued the environmental permit for Environmental Resolution N° 226/2006 on October 19, 2006 which authorised the company to use pumping wells to extract brine in the authorized exploration area. The latest Environmental and Social Impact Assessment (ESIA) was approved by the Environmental Court in 2022.



Map of the Salar de Atacama. Juan Villalobos, 2019.

[2] During the Cold War and under the dictatorship of Augusto Pinochet, Decree Law 2886/1979 from the Ministry of Mining established lithium reserves as state property, categorising them as "non-concessionable."

3. PROJECT SUSTAINABILITY

3.1 ENVIRONMENTAL IMPACTS

In 2018, 60 representatives from various organisations all over Chile came together to discuss the threats of lithium mining projects by SQM Salar to the environment and the life of communities in San Pedro de Atacama. The environmental impacts highlighted in the meeting were severe pollution, water diversion of San Pedro River, drying up of brines, deterioration of watersheds and resources, and destruction of ecosystems.

SQM Salar extracts substantially more brine (1500-1700 L per second) compared to competitor Albemarle (442 L per second). In 2016, SQM was sued by the Environmental Superintendency due to a serious violation of over-extraction of brine. Research using satellite imagery and machine learning also found that there was a strong inverse relationship between the water reservoir levels of natural lagoons and SQM's ponds for lithium mining. Evidence from indigenous communities further confirmed SQM's water overconsumption.

Extraction of massive amounts of fresh water and brine (180 million liters/day aprox.) by SQM negatively affects the nearby protected wetland ecosystems, biodiversity and human settlements populated equally by Atacameño indigenous people and non-indigenous communities who depend on small-scale agriculture and tourism. A 2019 study found that lithium mining in the Atacama desert had been linked to environmental degradation because of its strong negative correlations with vegetation cover and soil moisture.

Another research supports this, finding that if SQM expands the area for brine extraction, it will cause environmental degradation in the surrounding areas. In addition to evidence that the mining depletes vital water supplies, research has found lithium mining in the Atacama to be directly linked to the 10-12% decrease of James' and Andean flamingo species likely due to increase of the mining pond area and disturbances.

Impacts of lithium carbonate and hydroxide in Salar del Carmen are often not taken into account. However, the SMA has ordered urgent measures due to direct damage on local wildlife. These impacts are the result of the company's decision not to comply with its own Environmental Qualification Resolution (Environmental Licence), showing a pattern of destructive behaviour that contradicts the label of "responsible mining" used in public, especially in Europe.

Finally, aside from water overconsumption and ecosystem degradation, lithium production generates greenhouse gas emissions. A life cycle assessment study based on SQM Salar data found that one tonne of lithium concentrate produced in Chile generates 0.08-0.18 g CO₂e, 1300-2800MJ of energy consumption, and 2.95-7.20m³ of freshwater consumption. SQM committed to achieve carbon neutrality by 2030, however it was found that GHG emissions increased from 2018 to 2019 and in absolute terms from 2019 to date.

3.2 SOCIOECONOMIC IMPACTS

The 2005 EIA of SQM Salar and research by consultancy IdeAmbiente indicated that there would be no significant social impacts of lithium mining due to the distance from communities and also claimed that transportation of chemical substances would not pass through community areas.

Recent evidence on the contrary links lithium mining to negative impacts on agricultural livelihood due to water shortages and depletion of soil moisture. For instance, a farmer from the town of San Pedro observed that historically, the town was an agricultural oasis, but mining has used up the available water leading to land degradation in the form of desertification. An interviewee of the Likan Antai people shared the same sentiment.

SQM Salar was obliged to provide USD 10-15 million annually to communities near the mining areas while CORFO was responsible for allocating these funds. As of recently however, a total of USD 29 million for 2021 and 2022 had yet to be distributed by CORFO because a formal consultation with indigenous communities had not been completed. Consequently, these communities are yet to see the economic benefits of lithium mining. Even if they receive it, these monetary compensations may not be fully beneficial for the community given they do not consider the negative impacts on the social fabric of the communities. According to one Atacameño leader, the monetary agreements with SQM cause deep division between the communities and undermine people's attachment to the land.

4. STAKEHOLDER ENGAGEMENT

Beyond its ecological significance, the Salar de Atacama is home to indigenous communities, including the Atacameño or Lickanantay Peoples, who have historically inhabited the region. The region is home to 18 Atacameño/Lickanantay Communities who are collectively represented by the Consejo de Pueblos Atacameños (CPA), as well as other indigenous communities and organisations that are not represented by the CPA.

In Chile, the process of “indigenous consultation” has been regulated since 2013 under Supreme Decree No. 66, which establishes guidelines for consultations as defined by Article 6 of the International Labor Organization’s (ILO) Convention 169. Despite this framework, the engagement of indigenous communities has been problematic.

Although SQM Salar, a subsidiary of SQM, was founded in the 1990s, meaningful stakeholder engagement with indigenous communities only began in 2017-2018. Before conducting an Environmental and Social Impact Assessment (ESIA) in 2007, there is no evidence that SQM Salar consulted the affected communities during the planning stages of the study. There seemed to be stakeholder involvement prior to the submission of the 2022 ESIA, as well as the finalisation of the company’s 2020 sustainability report, 2022 emergency response plan, and 2022 human rights impact assessment, but these do not show definitive proof of significant improvement in stakeholder engagement.

Photo: Ramón Balcázar



Indigenous representatives have consistently demanded data on water quality and environmental impacts, yet in 2023, they reported that this information had still not been provided. Furthermore, the monitoring data shared on SQM's website is designed for consultation only, offering no participatory mechanisms for community input. SQM's limited transparency and lack of meaningful engagement have fueled ongoing concerns and criticism from indigenous groups.

For instance, SQM entered into a settlement agreement with CORFO in 2018 by amending its 1993 lease agreement without prior stakeholder consultation. The Camar community appealed to the Supreme Court, arguing the deal was invalid because it did not follow ILO Convention No. 169 requiring indigenous consultation. The court upheld the appeal, ordering CORFO to conduct a consultation before moving forward with the agreement.

More recently in 2023, indigenous communities through the Council of Atacameño Peoples rejected the new Memorandum of Understanding regarding lease rights between SQM and Codelco, because they were not consulted beforehand. The company responded that due to sensitive market information, the communities were not consulted immediately, but to compensate for this, the two companies met with the council and the latter agreed to the terms before the agreement was finalised.

An NRDC and OPSAL report showed evidence of social opposition to the SQM operations as stemming from the fact that the communities have not been fully consulted under the principles of the International Labour Organization (ILO) Convention 169 or the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

5. SOCIETAL OPPOSITION AND LITIGATION

In 2016, the Superintendency of the Environment, the agency responsible for monitoring environmental compliance, started a sanction process against SQM Salar due to the latter's non-compliance to six environmental commitments with three of these characterised as "serious" infractions and one as "very serious". The company subsequently submitted a compliance plan to correct these noncompliances and in 2019, it was initially approved by the Environmental Court.

The approval was revoked later however in 2020 after the Atacama Indigenous Council filed a lawsuit to scrap the plan and the indigenous communities submitted a complaint about SQM's water use. In addition, communities in 2021 asked authorities to suspend the company's mining operations until a new compliance plan was submitted. In response to the revocation, SQM submitted in 2021 an environmental impact study on a modified version of the compliance plan and finally received an approval from the court in 2022 to implement the plan.

Societal opposition likewise formed against the signing of the new SQM-Codelco agreement. From December 2023 to January 2024, indigenous communities mobilised to protest against the signing of the new SQM-Codelco lease agreement because there was no prior stakeholder consultation. The Atacama community of Coyo filed an appeal for protection against the agreement, but it was later rejected by the Court of Appeals of Antofagasta because the court said that the two parties did not commit an illegal act when they entered into the agreement.

Likewise, in January 2024, 18 communities of the Consejo de Pueblos Atacamenos, led by the Comunidad Atacameña de Socaire (CAS), occupied the access to the SQM plant denouncing the lack of FPIC, as well as the accumulated environmental impacts of water extraction and air pollution on biodiversity and local food production. They oppose increasing mining concessions in the area due to detrimental environmental consequences that threaten their means of subsistence, such as the production of corn, potatoes and other traditional crops.

The Comunidad Atacameña de Socaire has repeatedly called on the Chilean government to implement safeguards against the expansion of mining in their territory. Sandra Cruz, President of the Atacameña Community of Socaire, has specifically requested that an Indigenous Consultation be conducted to define the scope and implications of leasing contracts with Corfo, the Partnership Agreement between SQM and Codelco, and the development of democratic, long-term governance structures.

Given that most lithium extraction activities, including SQM's Andean Camp, are situated within CAS territory, these operations pose significant threats to ancestral and economic activities such as agriculture, livestock herding, and water access for sustenance and biodiversity associated with wetlands. CAS has therefore demanded for these processes to explicitly ensure differentiated participation and minimum guarantees to enable proper dialogue and binding mechanisms of participation while safeguarding their autonomy.



6. TECHNICAL FEASIBILITY

The Chilean government regards SQM Salar as a company with technical expertise on lithium production because it has over 25 years of experience. Codelco entered a public-private partnership with SQM Salar with the aim to increase annual lithium production until 2060 without the need for new evaporation ponds. According to the latter, this is possible by exploring the adoption of better and more efficient technology.

While the company is preparing to increase lithium production, it is questionable if it will be able to ensure sustainable operations because firstly, this new technology might not be as effective as expected. Second, SQM Salar has a history of noncompliance with environmental regulations. It was mentioned above that the Superintendency started a sanction process against the company for violations. One very serious violation claimed to have been committed was the modification of the Environmental Monitoring Plan (EMP) without prior environmental authorization. There were also serious violation allegations such as over-extraction of brine, failure to take measures on Algarrobo trees, and problems with the EMP for the Peine system.

7. FINANCIAL FEASIBILITY

The financial feasibility of SQM's lithium extraction project may be overestimated due to transparency issues, unfulfilled obligations, and the potential underestimation of fiscal and community costs. These concerns are compounded by financial problems linked to the company itself, raising questions about the long-term sustainability of the project.

SQM has faced significant criticism for its lack of transparency regarding payments and taxes. Studies emphasise large fiscal transparency gaps as well as reporting gaps in Chile's lithium industry, where there is no publicly available data on the taxation of the sector. This lack of opacity undermines confidence in the accuracy of projected revenues from royalties, taxes, and community contributions. Furthermore, the progressive royalty structure introduced in the 2018 CORFO-SQM contract, which ranges from 6.8% to 40% depending on lithium prices, adds an element of unpredictability. While this model is designed to maximise returns during high market prices, global lithium demand and pricing fluctuations could lead to overestimated revenue projections, introducing significant financial uncertainty.

The project's financial viability is further challenged by the obligations to fund research and development (R&D) and community initiatives. SQM's contract specifies contributions of \$10 to \$18.9 billion USD for co-financing the "Clean Technologies Institute," yet CORFO's financial reports lack any mention of revenue or progress related to these R&D clauses. This lack of accountability raises concerns about whether these commitments will be fulfilled. Similarly, the company's obligations to local communities include annual contributions ranging from \$10 to \$15 billion USD, with a percentage of sales allocated to regional governments and municipalities.

However, only 19 of the 21 eligible indigenous communities have signed agreements to receive these funds and distribution has been postponed, hence creating disparities in resource distribution and delays in achieving development goals.

In addition to these challenges, SQM has a history of environmental and social accountability issues. The company delayed meaningful consultation with indigenous communities until 2017-2018, decades after its operations began, and it has yet to address concerns over water quality and environmental impacts fully. Such unresolved issues could lead to additional financial burdens from penalties, litigation, or reputational damage, further straining investor confidence. Compounding these risks is SQM's dependence on volatile global lithium prices. Projections based on favorable market conditions could prove overly optimistic, leaving the company vulnerable to financial shortfalls if prices decline.

In summary, transparency gaps, market volatility, and unfulfilled commitments jeopardise the financial feasibility of SQM's operations. While the 2018 CORFO-SQM contract includes mechanisms to ensure fiscal contributions and community development, their implementation and reporting lack clarity. These unresolved issues risk overstating the project's financial viability and could hinder both fiscal returns and community benefits.

8. COMPANY ESG PERFORMANCE

SQM, as well as Albemarle, joined in 2021 the Initiative for Responsible Mining Assurance (IRMA).³ SQM Salar received a score of 75 out of 100, higher than Albemarle who received a score of 50. SQM scored low on security and emergency preparedness, but high on biodiversity, fair labor, and noise reduction.

However, the IRMA mechanism has methodological limitations especially in the case of mining in water ecosystems, as it is the case of the Salares de Atacama. On the one hand, the audit process only included interviews with SQM workers while the local communities' views were not properly collected. In addition, despite the rating, evidence has been found regarding SQM's violations of the environmental regulation and the right to FPIC of local communities, as described in the previous sections.

[3] DIRMA is a global organisation managing both a standard for large-scale mining and a system for independent verification of a mine's performance against that standard. IRMA's Standard for Responsible Mining is the world's first shared definition of what it means to mine responsibly and includes several sections focused on high-bar standards for the labour sector.

Outside of the scope of voluntary standards,, in 2022, it significantly increased its spending on advertising and marketing, reaching \$5.7 million, more than double the \$2.4 million spent in 2021. Projections for 2023 indicate a record annual figure. The company has focused its strategy on associating with themes of sustainability, human development, and its fiscal contributions. However, it has used its influence to [limit the ambition of environmental and climate policies](#) in Chile. For example, it influenced the 2008-2010 reform of the Environmental Act by using its political connections to soften the provisions of the law.

Compounding on this behavior, SQM has been linked to [Pinochet's dictatorship since its privatisation](#) and in democracy has been involved in corruption, fraud and illegal funding of several political campaigns [including former President Sebastián Piñera](#), who [was denounced](#) in the International Criminal Court for crimes against humanity committed during the social outbreak that started in October 2019.





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