

Working Paper

Political Risk and Resource Nationalism in Latin American Mining and Minerals

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Introduction: One Region, Many Views

Latin America, which we define overall to include Mexico and the Caribbean, is a vast, geographically diverse, resource-rich, multi-cultural, heterogeneous domain. As in other world regions, the long history of human occupation and the evolution from ancient settlements and cultures to modern-day nation-states has been marked by efforts to capture, utilize, and monetize natural resource wealth. The use of minerals and metals across the region was linked to early human detection of occurrences and the discovery of methods to extract and fabricate with them. European contact shifted the paradigm to exploitation for emerging global trade and economic power. Prized minerals and metals have long been part of the fabric of myth and mythology that permeated cultures in the Americas, how these territories were perceived by explorers, and how the pursuit of wealth unleashed by exploitation of natural resources drove behaviors and, ultimately, politics and policy.

Over the past century and more, Latin America's minerals and mining businesses have contributed to economic development and industrialization but with persistent boom-and-bust cycles. These often-sharp cycles exacerbate inherent governance complexities given the fabric of the countries and cultures in the region. The result has been outcomes that are less robust than many feel warranted given natural resource endowments, affecting opinions and views and spurring various incursions over time in resource politics and less accommodating policies for investment.

Latin America, particularly the South American economies, now figure prominently in yet a new round of natural resource pursuits. This time, attention is on minerals to support technologies bundled into the "energy transition" notion, a shift from fossil fuels with broad decarbonization and "net zero" imperatives. A question is whether a better job can be done to realize and distribute economic benefits from businesses that will continue to be characterized by sharp commodity cycles and robust international competition.

The energy transition paradigm differs from past cycles in that governments and industry are under extreme pressure to demonstrate that mining and processing also can be decarbonized. They also must show operational and commercial success under heightened scrutiny of "responsible sourcing" and emerging requirements to certify that materials are sustainably "green". Taken all together, the energy transition minerals "rush" appears to be creating expectations that could increase political and country risk factors across the region, invoking "resource nationalism" tendencies. How resource nationalism risks are defined, how these risk factors materialize, and how they might manifest across countries distinctive in traditions and languages will drive future results. These questions are the main focus of our paper.

Background

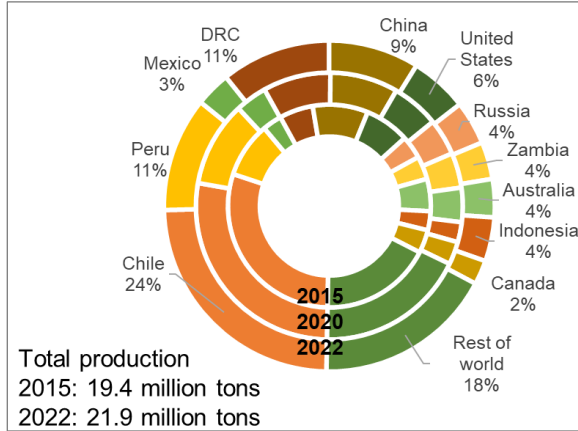
Minerals production tends to be geographically concentrated. Mineral occurrences are widespread on Earth, but “mineralization” – sufficient concentrations to define ore bodies – is rare and defined through exploration. Commercialization is contingent upon satisfactory solutions to a host of conditions ranging from access for exploitation to logistics to favorable commodity markets.

The range of uncertainties around minerals supply and demand balances is larger than commonly perceived, and several caveats could widen the cones of uncertainty. These include: (i) declining ore grades and maturity of the global mining asset base for minerals and metals; (ii) myriad challenges associated with mining operations including lengthening already long cycle times to realize new projects and production (an artifact of many of the issues underlying resource politics); and, (iii) on the demand side, challenges in implementing ambitious policies such as complex international supply chains to take minerals and metals into final products, and slower adoption of electric transport by consumers, among many others. Inevitable conflicts can arise when policy is the driver while technology and/or commercial focus is primarily on one part of a supply chain and industries struggle to “catch up,” and many geopolitical risks are inherent in pursuing “go fast” policy stances.¹

By all accounts, aspirations for reducing carbon-based fuels and replacing legacy fuels and systems with wind, solar, electrified transportation, and battery energy storage for both mobility and electric power grids will require very large commitments of raw materials inputs.² By some estimates, the demand for elements such as copper, nickel, cobalt, lithium, and those in the rare earths group for energy transition technologies will at least double by 2030.³ Already, the global supply of minerals has been responding to increased demand for assorted end uses, including alternative energy technologies: copper production has increased by 13.2% between 2015 and 2022, while lithium has increased by 342% in the same period.⁴ Given uncertainties in minerals supply and demand balances, the ability to sustain production growth and supply chains at costs and prices favorable to customers, while also providing sufficient margins to mining and processing companies, are major concerns ahead.

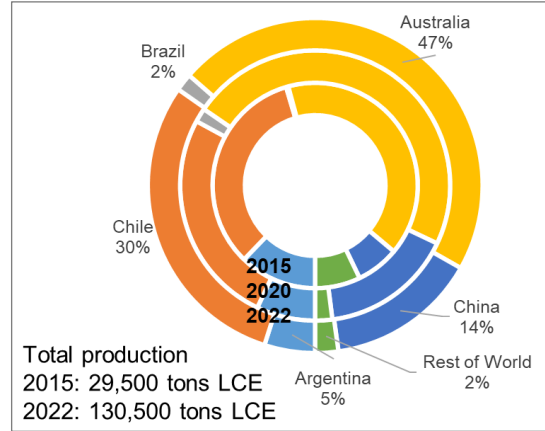
In 2022, Chile and Peru produced around 35% of global mined copper (see Figure 1) and held around 31% of global copper reserves, an estimated 0.9 billion tonnes at year end. Copper production in Peru and Chile could grow by 30% and 15% between 2022 and 2030, respectively (Jones, Acuña, & Rodriguez, 2021).⁵ Chile, Argentina, and Brazil produced 37% of global lithium supply in 2022 (see Figure 2) with 53.2% of global reserves, or an estimated 23 million tonnes, at year end. Bolivia’s lithium resource base is estimated to be 23 million tonnes⁶.

Figure 1 – Global Shares of Copper Mine Production



Source: T. Oré based on World Population Review, U.S. Geological Survey, Mineral Commodity Summaries.

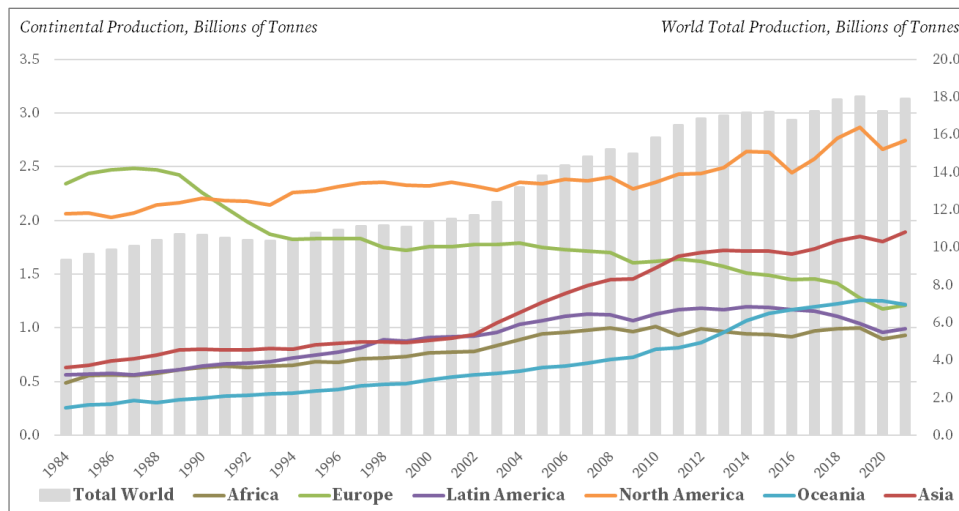
Figure 2 – Global Shares of Lithium Mine Production



Source: T. Oré based on Energy Institute Statistical Review of World Energy (2023).

Yet, overall, Latin America has declined in minerals tonnage output, even though countries such as Chile, Argentina, Peru, Bolivia, and Brazil are of great relevance due to their resources and production from heritage mines (Figure 3).⁷ The booming Asian economies underlie increased supply mainly from China but with Indonesia and Australia (Oceania) in tandem as vital exporters to Chinese customers.

Figure 3 – Continental and Global Minerals Production

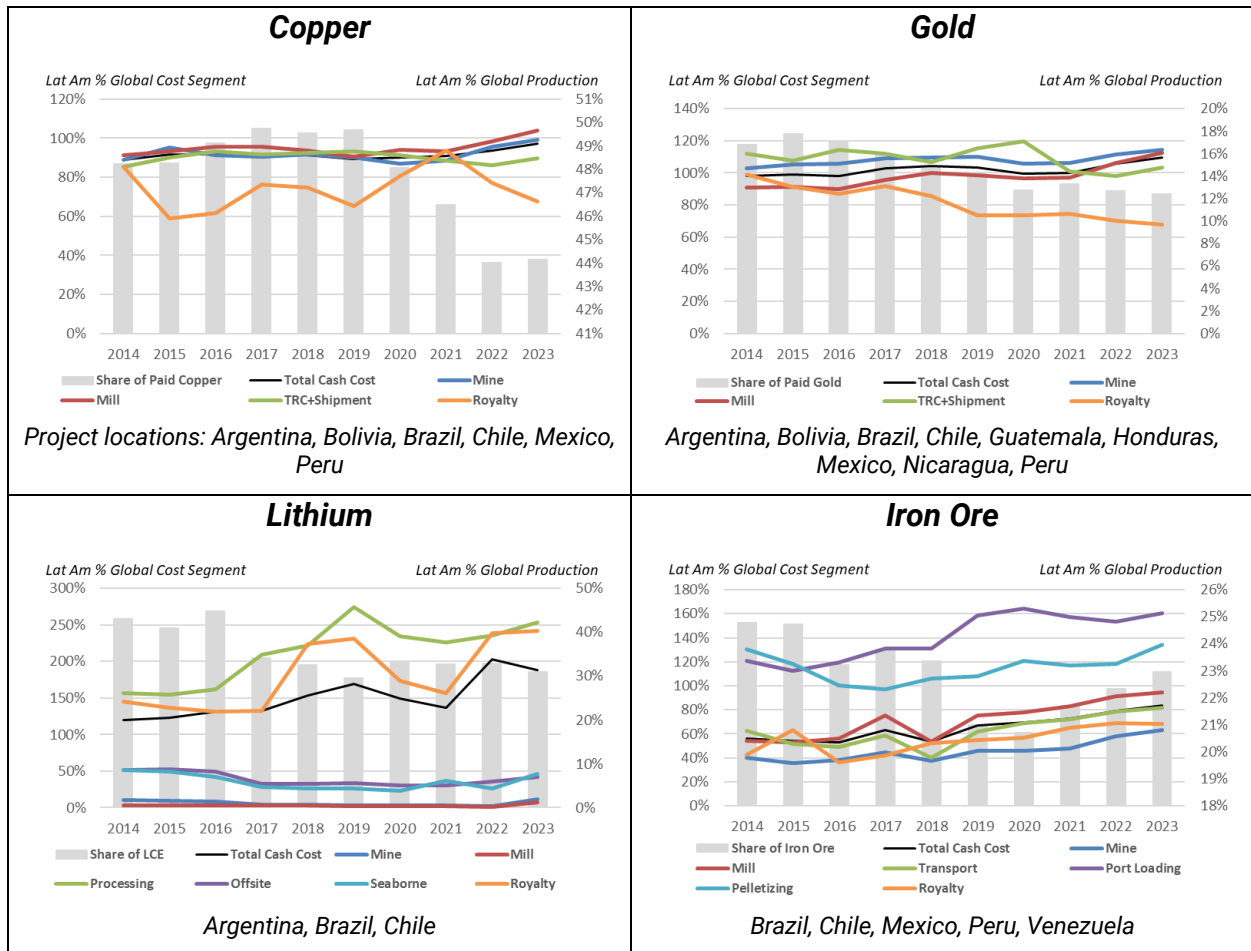


Source: Based on World Mining Data.⁸

Clues to performance within the Latin American mining industries lie in their respective cost structures. Costs for copper and gold, two mainstays of the region, are high relative

to worldwide averages, and rising while the regional share of production has fallen. Processing and royalty costs for lithium are well above global norms, dampening growth prospects. Chile’s restructuring of its lithium industry and related fiscal regime changes, as noted later, are the main drivers for increased royalty burdens. Of the four commodities, only iron ore production has increased even though operating costs have risen, especially for converting ore into pellets and loading for shipment.

Figure 4 – Latin American Shares of Global Average Value Chain Segment Costs and Production for Selected Commodities



Source: M. Michot Foss based on SPG, accessed via license.

Apart from the competitiveness of individual countries and businesses, an important consideration is how well-positioned Latin America is as an economic bloc for mining. The mining industry has long sought out locations for prospective investment that enable access to global markets as well as domestic customers. This means infrastructure to support trade routes across regional geographies. Economic blocs also can serve to support labor mobility, provide favorable tax regimes, bolster country and regional economic growth and opportunity, and boost investment. As such, they can

play an important role in both supporting mining, manufacturing, and other basic industries as well as spurring overall economic development.

Key Risk Factors Underlying Resource Nationalism

Resource nationalism can manifest in different forms. Host government actions can constitute full or partial nationalization, increased state-control, or “creeping expropriation” with changes in fiscal, legal, and regulatory frameworks.

But what are the factors that increase the risks of these actions?

A current research question is whether resource nationalism risks, as well as new ways in which resource nationalism is expressed, could emerge as competition heightens to source minerals and metals in response to energy transition policies and mandates around the world. For instance, many resource-owning governments have ambitions for value-added investment downstream of mining. Responses may include altered terms and conditions for projects and/or actions such as export controls to force investment in their domestic industries and markets. Indonesia presents such a case for nickel.⁹ Or, resource-owning governments may use environmental and/or socioeconomic levers to exert influence. Resource nationalism responses could include policies related to sustainability, ESG (environment, social, governance) requirements, “green” material certification (an emerging arena), local content, and treatment of local/indigenous communities. Again, Indonesia offers a case in point with the Grasberg nationalization.¹⁰ The potential for governments to use environmental permits and/or other aspects of the SLO as instruments for contract renegotiation purposes is well-documented.¹¹ The historical evidence suggests that environmental policy and claims can be a powerful negotiating tool for resource nationalist agendas.

Resource Nationalism Risks and Past Experience in Latin America

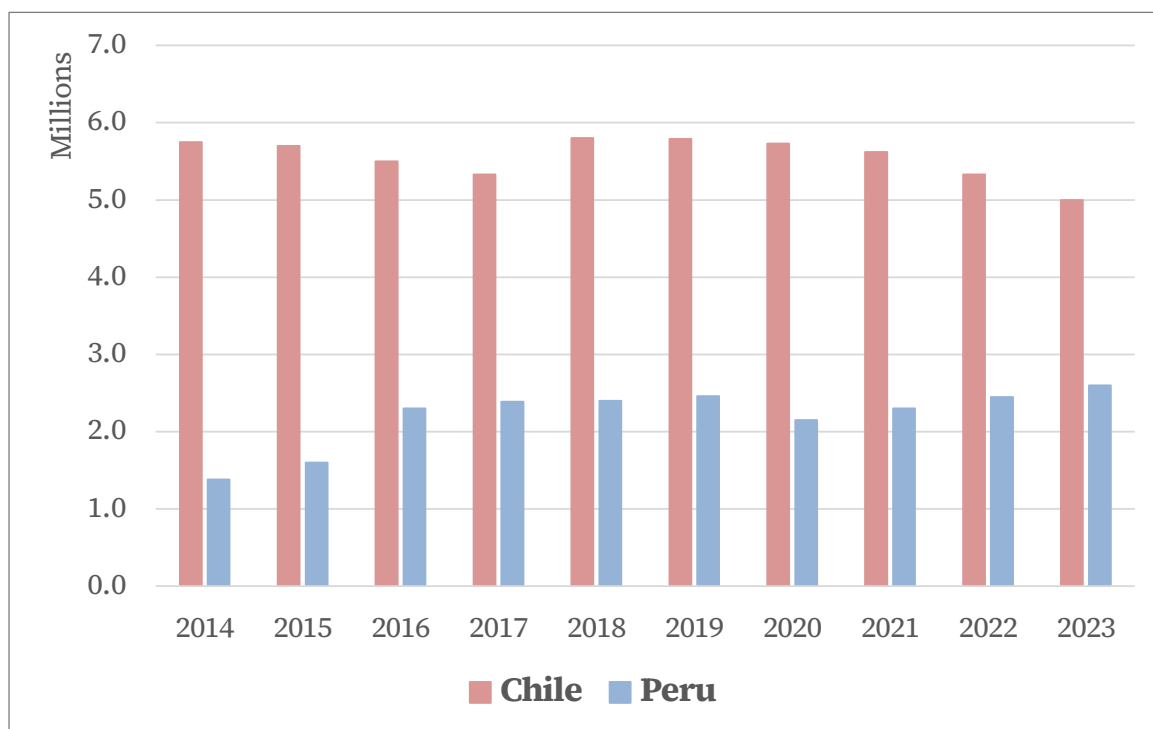
Resource nationalism risks in the Latin American region are not new and may surge back. The Latin American oil and gas industry has experienced multiple expropriation cycles. Governments open their sectors to private investment, followed by increased state control, forced contract renegotiations, and tax hikes, leading to a decline in investments, which eventually forced governments to open up their sectors again. Expropriations intensified during oil price booms when governments were eager to capture the windfall rents.¹²

Rents in mining typically have been lower than in oil, but as the globe ratchets up its mineral needs in response to energy transition policies and mandates and mineral rents increase, it would not be surprising to see cycles akin to those experienced in oil and gas. The nature of large-scale mining, characterized by high-sunk-cost investments with decades-long maturities and volatile rents, enhances expropriation and/or other risks such as forced contract renegotiations and changed fiscal-terms.

After a history of mining nationalizations in Latin America during the 1960s and 1970s, private investment returned and has been the driving force in countries such as Chile

and Peru. Following consolidation of all its copper mines into state-owned CODELCO (*Corporación Nacional del Cobre*), Chile partially reversed course in the 1980s. The state-owned mining company has remained the largest single producer, but private investment was able to flourish. Private investment allowed copper production to increase from more than one million tons per year in the early 1980s to more than five million per year by the 2010s, including the push to incorporate solvent extraction electrowinning (SX-EW) technology. To a lesser extent, a similar pattern has been observed in Peru.

Figure 5 – Trends in Copper Production, Chile and Peru



Source: M. Michot Foss based on CES minerals production database, based on U.S. Geological Survey.

Given the experience in these countries, perceptions of possible new resource nationalism risks can present disruptive scenarios. Recent developments in Chile (partial nationalization of lithium extraction with imposition of a new, sliding scale royalty scheme)¹³, Mexico (nationalization of lithium mines), and Panama (the forced closure of one of the largest copper mines in the world), as well as the earlier nationalization of lithium in Bolivia (2008-2009), and the recurrent prevalence of capital controls in Argentina constitute warnings that resource nationalism risks could become obstacles to the expansion of mining potential in the region.

Socio-environmental Tensions

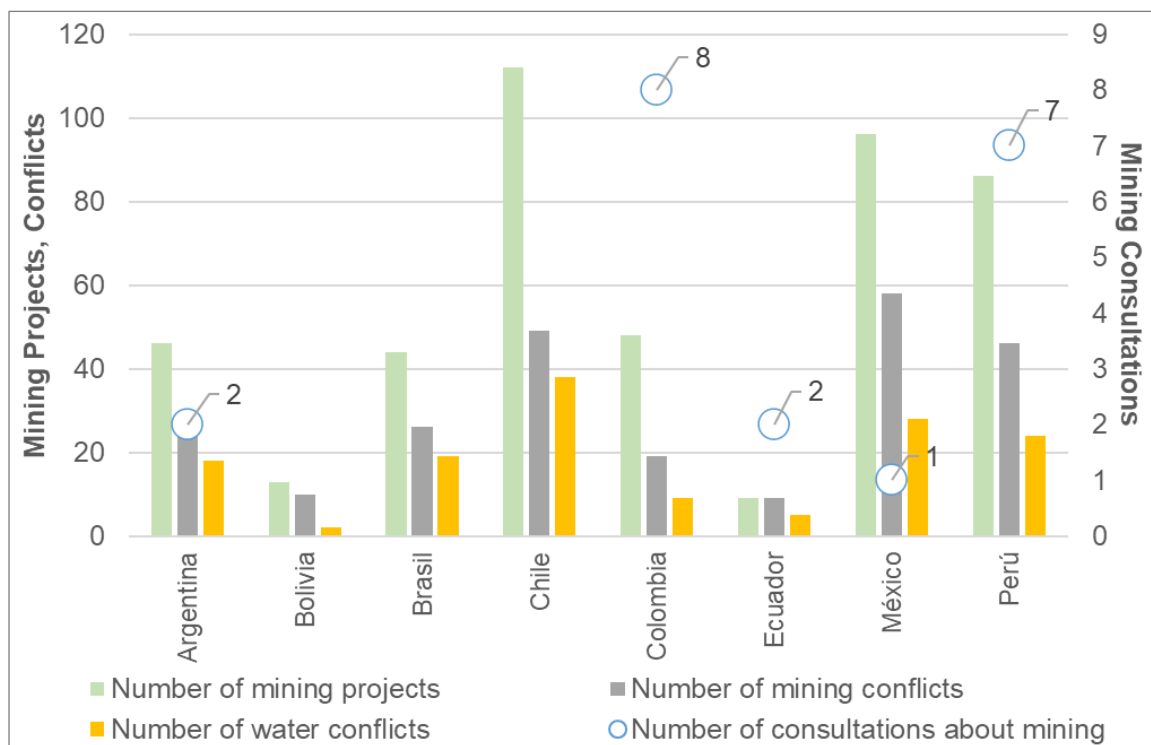
A crucial factor for mining and minerals production worldwide is socio-environmental conflicts and opposition from local and indigenous communities. These stakeholders

may have diverse and sometimes conflicting interests, complicating negotiations. In many countries, pervasive social inequities intensify this opposition, as well as the absence of effective public services, weak environmental protection, and a failing rent distribution system.

Extractive activities in the Latin American region have been associated with socio-environmental conflicts and, usually, local and indigenous communities opposed to them. This opposition may be influenced by Latin America's colonial past and evidence of abusive mining practices against indigenous communities. More recently, it may be explained by pervasive social inequities, the absence of effective public services, weak environmental protection, and failing sovereign rent distribution systems, especially for distributing economic rents back to local communities and jurisdictions. Even decentralized models of rent distribution – implemented in countries such as Peru and Bolivia – appear inadequate for improving the wellbeing of local communities. Indicators of poor-quality governance at subnational levels, rent-seeking behavior, and corruption may be some of the causes of the inefficient distribution of benefits. Lack of local ownership and participation in decision-making are also relevant factors for whether and how communities participate and engage in extractive resource industries. Thus, despite approved fiscal and other contract terms and development schedules by the sovereign governments, local and Indigenous communities and interests can roadblock development, leading to additional and lengthy negotiations.

Between 2000 and 2020, mining-associated conflicts in Chile and Peru almost quadrupled (Poveda, 2021).¹⁴ In part, this may be explained by the proximity of mining projects to Indigenous communities' lands, especially when those communities have been traditionally underrepresented and neglected. According to the Observatory of Latin American Mining Conflicts (OCMAL), out of a total of 284 mining conflicts up to 2020, 68% happened in South America. Water stress and water pollution concerns that lead to water conflicts are highly associated with mining conflicts and, of course, mining conflicts increase with the number of mining projects. Public prior consultations with local communities seem to have been a minor practice across countries (see Figure 6).¹⁵

Figure 6 – Mining Conflicts in Selected Latin American Countries



Source: T. Oré, based on Observatory of Mining Conflicts in LAC – OCMAL.¹⁶ Mining conflicts 1900-2021. Water conflicts 1979-2019. Mining consultations 2003-2019.

Evidence of the convergence between indigenous issues, socioenvironmental tensions, and resource nationalism responses comes from Chile’s Atacama Desert (Salar de Atacama). Concerns about lithium extraction from brines centered around indigenous communities most immediately affected, with consequences for the lithium mining industry, including government actions to assert state control.¹⁷ Lithium operators note, however, that less than 1% of fresh water in the Salar is used in the extraction process. Because the current process entails the natural evaporation of brines, which can take 18 months or more, consideration is being given to direct lithium extraction (DLE) methods, which will entail both energy and water inputs. Numerous ideas are under consideration to address sensitivities around water, including the provision of fresh water to local communities from desalinated water that lithium producers will require. Similar concepts are under development with respect to energy supplies and infrastructure to support DLE. Both are consistent with mining industry experience

Strategies also are emerging for direct transmission of economic benefits to Indigenous and other local communities affected by extractive industry operations, but time will tell how effective they are. For example, in Chile’s Salar, in 2016, a lithium operator directly negotiated with the local communities to share 3.5% of their yearly revenues.¹⁸

Canada, a member of the Americas, affords an interesting comparison. After a series of Supreme Court decisions, the obligation to consult and incorporate Indigenous

communities' concerns in resource development has been clearly established. Canadian First Nations groups have moved beyond “social license to operate” and seek meaningful participation beyond employment. While the focus of corporations is on environmental and social aspects of ESG, increasingly, First Nations seek equity (partnerships) and associated involvement in decision-making for projects. Several government initiatives now exist to help finance aboriginal investment in developments.

Indeed, a distinct trend towards equity participation by Indigenous groups in energy and mining projects can be discerned worldwide, which opens questions ranging from financing equity to the skills and expertise required for operatorship. Clearly, it is important to comprehensively assess current risks in the region that may affect mining operations of key minerals needed for energy transition policies while also acknowledging their impact on local and indigenous communities.

Identifying barriers to sustainable mining operations, as well as barriers to effective and more equitable policies (such as rent distribution) aligned to the needs of communities, can result in improved policy design and implementation. These actions, paired with higher quality governance (more transparency and accountability), can allow for more robust private investment and social welfare. Discussions on all dimensions of extractive industry activities are imperative to redefine policies and devise better mechanisms for enhancing environmental and safety protection, maximizing social wellbeing, and optimizing sustainable mining operations.

In sum, the “social license to operate” is essential to the current and future expansion of mining operations, including respect for local and indigenous communities. Defining SLO, its stakeholders, its process, what it entails, and lines of authority and accountability are, however, among the more difficult hurdles to achieving successful engagement.

Economic Rent Collection and Distribution as a Governance Problem

An implicit social license for mining operations exists in Andean region. On average, people from mining and extractive-dependent countries agree that extractive industries are positive for economic development. Where impact is perceived to be “fewer” positive sentiments are driven mainly by governance issues. Citizens in rural mining areas are more supportive of mining operations than those in urban areas.¹⁹

The effective distribution of extractive rents and the social license to operate are crucial for the successful development of mining projects in the region and the public perception of benefits. Therefore, conversations that lead to a greater understanding of the needs and perspectives of key stakeholders – local, indigenous communities, and subnational governments – are needed to reduce risks in both the short- and long-term time horizons.

Generalizing is difficult as Latin American countries are a heterogeneous group, not only in the way they govern their resources but also in the way they implement their policies. “Left” and “right” ideologies can have different meanings across countries. However,

two trends can be discerned across the spectrum. One – national governments want to increase the national value added to minerals. Two – as noted above, local and indigenous communities want to obtain more benefits and participation in mineral extraction. Depending on how these objectives are implemented into policy, they could be either an opportunity for economic development or a hindrance for mining investments.

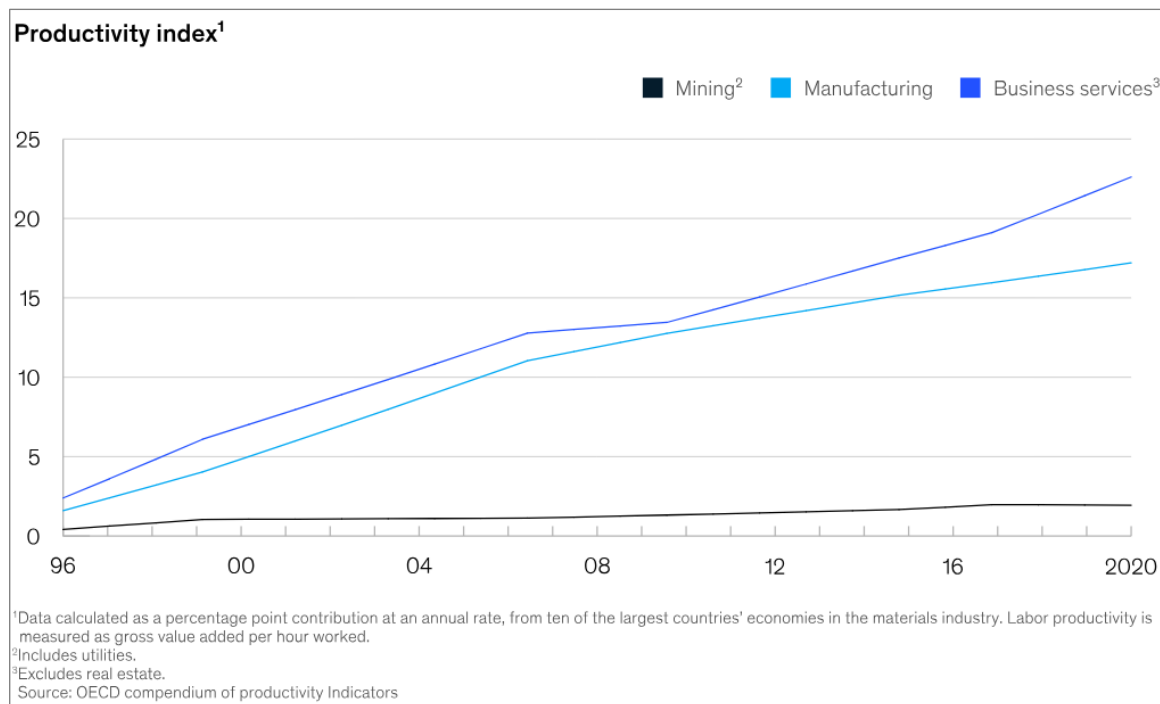
Rent distribution mechanisms, mostly in the form of royalties, are in place in Andean countries but have not been successful due to the inefficiency and corruption at subnational levels. The state captures extractive rents in Andean countries directly through the partial or total state ownership of mining companies and indirectly through royalties, general taxation, and specific taxes. Of these, royalties are typically the payments received by subnational governments, particularly in producing territories. Recipient municipalities tend to be inefficient in providing services (Peru and Colombia), which also relates to their limited capacity for public spending, corruption, lack of coordination between jurisdictions, and other institutional weaknesses.

Private Sector Challenges

As noted, the private sector has led growth in the development of the mining industry in countries such as Chile and Peru. Yet, clear economic policies are needed to enable the private sector as a means for market allocation and open trade policies to promote foreign investment and strengthen institutions to foster long term stability.

Current private sector challenges include long permitting times for operations, stagnant productivity levels, and lack of skilled labor against a historical backdrop of political and country risks. A longstanding barrier to mining expansion is found in the permitting processes, which can take years. In Chile, it can take between 8 to 11 years (the global average is about 16, depending upon commodity and location, but 20 years is more realistic for major projects). Worldwide, productivity gains for mining have hovered at around 1% per year during the last 25 years, limited by labor, aging mining sites, and decreasing mineral ore quality (Figure 7).

Figure 7 – Mining Productivity as Compared to Manufacturing and Business Services



Source: Costantini, et.al, 2022.²⁰

Some private actors are finding value in embracing ESG approaches and community engagement. Foreign private companies in Chile have shown that ESG strategies can be effective in obtaining Indigenous community support for project execution, including the direct transfer of economic benefits, as in the Salar negotiated share arrangement, but increasing total costs of mining for the company. However, ESG policies imposed by governments also can reinforce resource nationalism if they restrict investment and/or output in ways that lead to limited competition and market power. And royalty and share arrangements are material when it comes to cost structure for mining value chains (Figure 4).

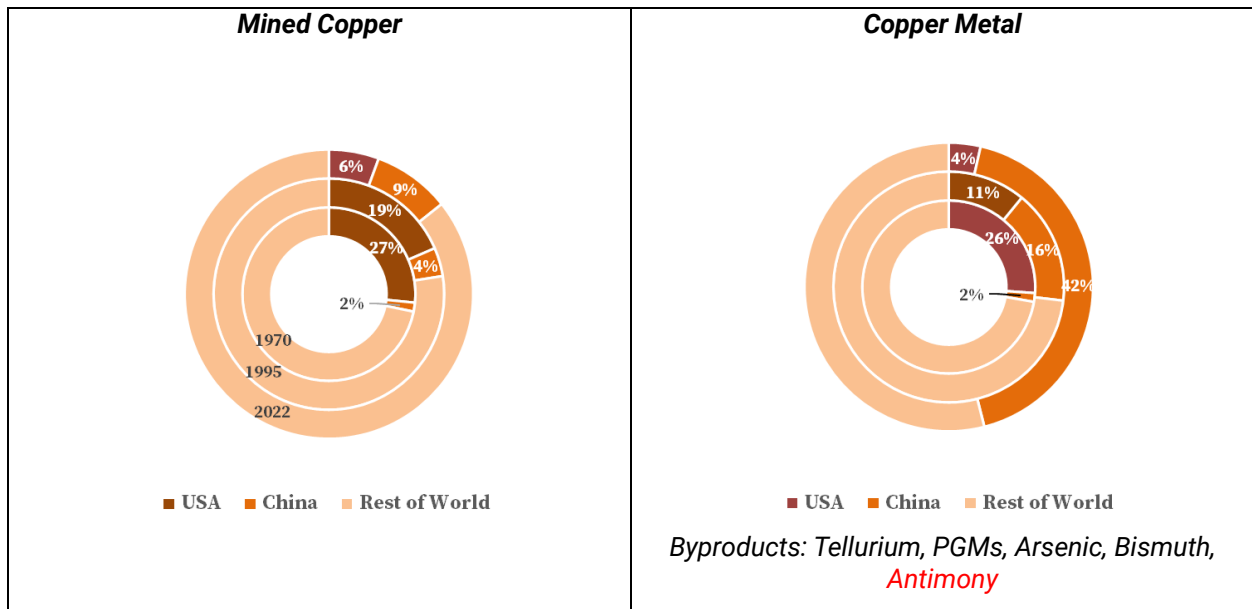
China's Influence in Latin America

China tends to play by its own set of rules.

Since early 2000, China has increased its control over processing of many critical minerals of strategic interest.²¹ Currently, China has all or near global monopoly control of: natural graphite (processed graphite from China's own resources constitutes 72% of global supply; altogether, China processes more than 90% of global supply), rare earth elements (70% of global REEs is derived from Chinese resources; China holds 85% of global REE processing and 87% of neodymium-iron-boron (NdFeB) magnet manufacturing), manganese (90% of processing; China accounts for 5% of mined output), cobalt (68% of processing; China contributes 1% of global mined cobalt), lithium (China controls 60% of world processing capacity, and supplies 14% of global

LCE from its own resource base), copper (China controls 50% of copper processing capacity, expected to increase another 45% in years ahead, and supplies 42% of copper metal). As well, the Chinese presence in many large minerals supplying countries cuts across supply chains. Indonesian nickel serves as a prime example, with Chinese interests dominating production and nickel pig iron trade, with moves to control processing and ultimately battery material and battery production within Indonesia (a potential result of Indonesian export controls aimed at forcing domestic value-added investment)²². Figure 8 provides a snapshot of the evolution of Chinese dominance for four metals groups that yield byproducts important for key technologies.²³ Some of these byproducts have been specific targets of Chinese actions to control exports.

Figure 8 – Shares of Mined and Processed Metal for Selected Commodities

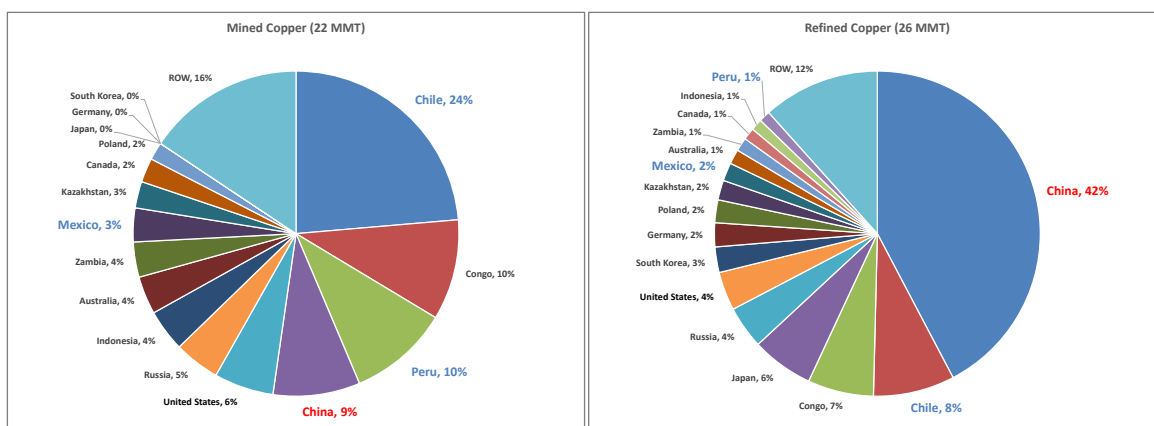




Source: Michot Foss, 2024.²⁴ Byproducts subject to Chinese export control actions show in red.

The implications for Latin American producers are shown in Figure 9. Chile controls 24% of global mined copper but only 8% of refined output. The difference for Peru is 10% mined to 1% refined, and for Mexico 3% mined to 2% refined. As indicated in Figure 8 above, China provides only 9% of global mined copper but 42% of copper metal.

Figure 9 – Influence of China, Mined and Refined Copper, 2022 Market Shares



Source: From Michot Foss, 2024 based on US Geological Survey.²⁵

While given credit for its large manufacturing base and domestic installed capacity for wind, solar, battery energy storage, and supporting supply chains, much of China’s positioning is opportunistic. The imperative has been to decouple from U.S. naval protection of sea lanes for oil transit. An artifact of that imperative is China’s position as “clean” energy swing producer for the world.²⁶ Evidence from Latin America indicates that Chinese investment is not necessarily targeted to lower emissions, climate action, or environmental advancement but toward a vertical strategy to link financing and securing raw materials and oil with participation in infrastructure and electric power generation, including imports from China’s alternative energy technology manufacturing base.²⁷

Chinese companies have invested in infrastructure, energy, and minerals projects in many Latin American countries, in some instances with the Chinese government providing unconditional loans (soft loans or loans with conditions that are not exercised).²⁸ China’s “go out” outbound investment trends reflect its political mandates that, in turn, mirror domestic political imperatives and complex calculations. A line of inquiry exists around the willingness by China’s central government to continue to fund aggressive, debt-financed outbound investment and whether and how it will discipline Chinese companies and provincial and municipal interests that have been in the forefront of foreign ventures, many of which have been unprofitable. China also is progressing along a learning curve on FDI.

Along with Indonesia, the Chinese experience in Sudan’s oil industry²⁹ offers a case study in the up-and-down trajectory of learning and adapting as the politics of its “go out” stance has shifted. Excess capacity in China’s oil industry that had been financed at the provincial level, a common occurrence, was deployed to Sudan at a time when

neither China's national government nor its major national oil company was interested. Indeed, the Belt & Road Initiative, BRI, widely viewed to be a mechanism for Chinese investment abroad actually was an effort to claw back commitments made by local governments and central enterprises acting outside of strategic direction from Beijing. The result is a reduced presence by Chinese investors with more control and oversight from Beijing. How Chinese investment and influence evolves in Latin America going forward will hinge on both Chinese government strategic intent and political reactions and responses within Latin American host countries.

Influence of Capital Markets

Financial instruments exist and are being used to fund mining operations, but constraints to capital flows are affecting mining industries worldwide.

The mining industry itself is focused on capital discipline, investing in incremental brownfield projects. Larger companies have been returning cash to investors in dividends and stock buybacks. Smaller companies, "juniors", face a capital drought.

Despite broad attention being directed to strategic minerals for energy transition policies, tapping into capital markets remains a distinct challenge for the mining and metals industries. Hurdles encompass the broad range of risks and uncertainties related to social license and permitting, with specific concerns stemming from social conflicts and how they play into project cycle times. Governments can move to embrace policies and regulations that enhance attractiveness to capital markets.³⁰ Workforce improvements would help build confidence. Multilateral institutions can help to de-risk, and governments outside of the region can tap risk-mitigating instruments, including trade partnerships, to back investment in the region by their home companies.

A common problem in the region and among countries is limited sources of capital. Recognizing the value that mining can create for economic development, a starting point is for sovereign governments to help create new and multiple funding sources. These can range from sovereign wealth funds seeking diversification to large buyers of raw materials such as auto manufacturers. For that to succeed, governments must implement favorable, stable policy and regulatory regimes that enhance certainty. Clarity around government support for joint ventures between international investors and home companies that might be targets for partnerships also is key. For countries striving toward downstream processing and manufacturing value-added, they must avoid the tendencies toward nationalism associated with Indonesia's nickel industry. Finally, embedding the value of indigenous peoples is seen to be essential for capital attraction.

Conclusions, Recommendations and Research Path

Several observations can be drawn from our paper.

- Resources are where they are. Concessions are important, rules and the stability of rules are critical.

- Resource nationalism, expressed in government actions to alter contractual and fiscal terms or affect the commercial context in other ways, remains a very real risk. An open question is how socio-environmental factors inherent in the social license to operate, SLO, concept might be used as a basis for claims.
- The role of social license and integrity of economic rent distribution are linked. These both play out in public perceptions and support for the mining industries.
- Project development cycles already are lengthy. Expectations that upfront negotiations with local communities will involve more complicated pathways for achieving SLO are likely to stretch timelines for new projects.
- All countries are different. Regulatory approaches and institutional capacity vary considerably.
- Indigenous communities, as with all communities, should be accorded essential human rights. A need exists for consensus around Indigenous territorial rights but these entail issues particular to countries and situations.
- Increasingly, Indigenous and local communities are signaling desire to participate in projects in meaningful ways, including as equity partners.
- The presence of Chinese investment throughout the Latin American region adds complexity to the resource politics calculus. China's dominance in strategic minerals and metals value and supply chains, influence on trade patterns, and style of engagement with host countries are altering the rules of the game.
- Examples of success cases where capital diversification has worked exist and offer lessons in navigating myriad risk factors that can undermine capital flows.

Going forward, research agendas have much to incorporate. What exactly are the arrangements for mining development? That question must be framed in light of the intricate and shifting interactions among stakeholders and a rapidly evolving “energy transition” paradigm that places new emphasis on responsible development and sourcing. Common definitions and understandings for what these imply are only in the early stages of formation. How they affect commerciality of both heritage and new mining and metals projects remains to be seen. Will the “minerals rush” undermine or boost “commercial frameworks”? What seems to work best, with what policy and regulatory frameworks? Can more robust frameworks with more focus on SLO concepts stave off resource nationalist tendencies while also helping with capital diversification?

Acknowledgements

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and academia. We thank all of those who participated and who provided feedback on the main observations and conclusions drawn from that event. We also thank the Baker Institute and CES for supporting the workshop and this research paper.

Notes

¹ See Michelle Michot Foss, 2024, Minerals and Materials Challenges for Our Energy Future(s): Dateline 2024, Center for Energy Studies, Energy, Minerals, and Materials Report, Baker Institute for Public Policy, <https://www.bakerinstitute.org/research/minerals-and-materials-challenges-our-energy-futures-dateline-2024>.

² For instance, see IRENA, Geopolitics of the Energy Transition: Critical Materials, July 2023, <https://www.irena.org/Publications/2023/Jul/Geopolitics-of-the-Energy-Transition-Critical-Materials>; IEA, The Role of Critical Minerals in Clean Energy Transitions, May 2021, <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>; and Kirsten Hund, Daniele La Porta, Thao P. Fabregas, Tim Laing, and John Drexhage, Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition, 2020, https://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf?_gl=1*2kj3co*_gcl_au*NTQ40DA0NDYxLjE3MjM1OTExNTQ.

³ IEA. (2023). Critical Minerals Market Review 2023. International Energy Agency -IEA.

⁴ Global mineral processing market concentration is documented in IRENA, 2023. Also see Michot Foss, 2024.

⁵ Benjamin Jones, Francisco Acuña, and Víctor Rodríguez, Cambios en la demanda de minerales Análisis de los mercados del cobre y el litio, y sus implicaciones para los países de la región andina, The United Nations Economic Commission for Latin America and the Caribbean – ECLAC, 2021, <https://repositorio.cepal.org/server/api/core/bitstreams/adbb16fd-48d0-4ba6-aab4-59561bfa0578/content>.

⁶ According to the Bolivian president, the estimated lithium reserves are 23 million metric tons. See Reuters, “Bolivia hikes lithium resources estimate to 23 million tons,” July 20, 2023. Available at: <https://www.reuters.com/markets/commodities/bolivia-hikes-lithium-resources-estimate-23-mln-tons-2023-07-20/>.

⁷ See <https://www.bakerinstitute.org/research/copper-and-lithium-how-chile-contributing-energy-transition>.

⁸ See https://www.world-mining-data.info/?World_Mining_Data.

⁹ Michelle Michot Foss and Jacob Koelsch, Need Nickel? How Electrifying Transport and Chinese Investment Are Playing Out in the Indonesian Archipelago, Center for Energy Studies, Energy, Minerals, and Materials Research Paper, Baker Institute for Public Policy, April 11, 2022, <https://www.bakerinstitute.org/research/need-nickel-how-electrifying-transport-and-chinese-investment-are-playing-out-indonesian-archipelago>.

¹⁰ The Indonesian government’s prominent nationalization of the Grasberg copper mine in 2018 is an example. Claims of violating environmental rules and human rights as they pertained to local and Indigenous communities were used in justifying the action. See Michot Foss and Koelsch, 2022 and Michot Foss, 2024.

¹¹ Based on case studies from Russia, Kazakhstan, and Ecuador prepared by Francisco J. Monald. Also see: Miriam Grunstein and Michelle Michot Foss; “The Law of the Land. Practices, Policies and Regulations Regarding Access to Lands for Energy Projects in Mexico”, OGEL 1 (2020), www.ogel.org. Subscription required for access. Michelle Michot Foss, Miranda Ferrell Wainberg, and Dmitry Volkov, Hydrocarbon Sector Organization and Regulation, Chapter 16 in Energy Cooperation in the Western Hemisphere, Benefits and Impediments (eds. Sidney Weintraub, Annette Hester, Veronica R. Prado),

Center for Strategic and International Studies, 2007, <https://www.csis.org/analysis/energy-cooperation-western-hemisphere>.

¹² Francisco J. Monaldi, "The Cyclical Phenomenon of Resource Nationalism in Latin America", *Oxford Research Encyclopedia of Politics*, Oxford University Press, 2020, <https://doi.org/10.1093/acrefore/9780190228637.013.1523>.

¹³ See Michot Foss, 2024.

¹⁴ Rafael Poveda, Estudio comparativo de la gobernanza de los conflictos asociados a la minería del cobre en Chile, el Ecuador y el Perú. Santiago: The United Nations Economic Commission for Latin America and the Caribbean – ECLAC, 2021, <https://www.cepal.org/es/publicaciones/47569-estudio-comparativo-la-gobernanza-conflictos-asociados-la-mineria-cobre-chile>.

¹⁵ The data suggest a gap between experience in the region and the UN's Free, Prior and Informed Consent, FPIC tradition, <https://www.ohchr.org/en/indigenous-peoples/consultation-and-free-prior-and-informed-consent-fpic>. For a case study of FPIC, see Grunstein and Michot Foss, 2020.

¹⁶ See https://mapa.conflictosmineros.net/ocmal_db-v2/.

¹⁷ See: <https://www.nrdc.org/stories/lithium-mining-leaving-chiles-indigenous-communities-high-and-dry-literally> and <https://indianexpress.com/article/explained/explained-global/chiles-atacama-lithium-mining-9531288/>; <https://www.euractiv.com/section/energy-environment/news/facing-water-stress-chiles-lithium-industry-under-scrutiny-in-atacama-desert/>; <https://www.reuters.com/markets/commodities/chiles-boric-announces-plan-nationalize-lithium-industry-2023-04-21/>; and <https://www.wilsoncenter.org/blog-post/chiles-national-lithium-strategy-new-beginning>.

¹⁸ See <https://www.albemarlelitio.cl/Sostenibilidad/social/comunidades>.

¹⁹ See Lenin H. Balza, Lina Diaz, Nicolas Gomez-Parra, and Osmel Manzano, The Unwritten License: The Social License to Operate in Latin America's Extractive Sector (December 15, 2021). Available at SSRN <http://dx.doi.org/10.2139/ssrn.4188882>.

²⁰ Xavier Costantini, William Fookes, Patrick Neise, Ferran Pujol, Bernardo Rubinstein, and Guillem Sivecas, How mining companies reach the operational excellence gold standard, McKinsey & Company, August 15, 2022, https://www.mckinsey.com/capabilities/operations/our-insights/how-mining-companies-reach-the-operational-excellence-gold-standard#.

²¹ See Michot Foss, 2024.

²² See Michot Foss and Koelsch, Need Nickel? How Electrifying Transport and Chinese Investment Are Playing Out in the Indonesian Archipelago, Center for Energy Studies, Energy, Minerals, and Materials, Research Paper, Baker Institute for Public Policy, April 11, 2022, <https://www.bakerinstitute.org/research/need-nickel-how-electrifying-transport-and-chinese-investment-are-playing-out-indonesian-archipelago>.

²³ See IRENA, 2023 and Michot Foss, 2024 for discussions on byproducts and related technologies. See <https://www.bakerinstitute.org/global-minerals-production-dashboard> to explore minerals production worldwide and for a table of key minerals by energy transition technology.

²⁴ See Michot Foss, 2024.

²⁵ See Michot Foss, 2024.

²⁶ Frank Fannon, How to break China's stranglehold over the energy transition, The Hill, July 13, 2023, <https://thehill.com/opinion/energy-environment/4093070-how-to-break-chinas-stranglehold-over-the-energy-transition/>.

²⁷ Institute of the Americas, China Stakes Its Claim in Latin American Energy: What It Means for the Region, the U.S. and Beijing, February 11, 2023, <https://iamericas.org/institute-study-highlights-chinas-expanding-presence-in-latin-americas-energy-sector-2/>.

²⁸ See Institute of the Americas, 2023.

²⁹ Steven W. Lewis, China's Oil Diplomacy and Relations with the Middle East, Post September 11 Update Report, Rice University's Baker Institute for Public Policy, 2002, <https://www.bakerinstitute.org/research/chinas-oil-diplomacy-and-relations-with-the-middle-east>. Amy

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³⁰ Wiles Kase, Sustainable mining finance must go beyond carbon, *Mining Magazine*, December 7, 2023, <https://www.miningmagazine.com/environment/news/1462960/op-ed-miners-sustainable-financing-focus-carbon>.