



Task Force 02

SUSTAINABLE CLIMATE ACTION AND INCLUSIVE JUST ENERGY TRANSITIONS

The Role of Critical Minerals in the Energy Transition: Policy Implications at The Local, National, Regional and Global Level

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Abstract

2023 was the hottest year: 1.45 °C above pre-industrial values. The trend points to an increase of 3° C. Consequently, climate events are becoming more extreme, frequent and long-lasting, affecting particularly vulnerable populations in the Global South. These countries not only lack financing to face losses and damages, and to propose mitigation and adaptation measures, but also bear the brunt of increased extraction of minerals needed for the energy transition in the Global North.

The G20 countries, responsible for 76% of GHG emissions, should lead ambitious climate action, particularly in the energy sector, which accounts for 86% of global CO2 emissions (UNEP, 2023).

In the outline of plans and policies for the energy transition, the demand for minerals considered critical, such as lithium, is increasing rapidly, exacerbating the global climate and ecological crisis by threatening Andean wetlands' contribution to climate adaptation and mitigation. Also, this pressure to extract is affecting the rights of the indigenous communities who inhabit the salt flats in Argentina, Chile and Bolivia, which together concentrate over 50% of the world's reserves. Additionally, geopolitical competition for technological control of the energy transition hinders countries in the region from advancing in the battery production value chain. Tensions emerge between technical-economic positions that prioritize the security of supply and friend-shoring and those that integrate the relationship between energy, ecological and socio-economic systems and challenge power asymmetries.

This policy brief discusses lithium's challenges for energy transition debates and calls the G-20 to ensure commitment to improved global cooperation that involves material reduction targets in the Global North, benefits for producer countries and a strong respect for planetary boundaries and human rights.

Keywords: critical minerals - lithium - climate change - environmental impacts - human rights

Diagnosis of the Issue

Energy transition is proposed as a solution to combat the frequency and intensity of climate events that impact economies, ecosystems, species and people, as fossil emissions account for approximately two-thirds of 2022 greenhouse gas (GHG) emissions (UNEP, 2023). However, energy transition definitions and scope vary from actor to actor, leading to multiple implications at the global, regional, national and local levels. Mainstream approaches prioritize replacing fossil fuels mainly with renewable sources to reduce GHG through technological change, without addressing broader issues such as power dynamics, distribution, consumption patterns and environmental and human rights effects. Alternative views bring new dimensions into the debate and focus on workers' rights (i.e. just energy transition), concentration and decentralization of energy production, democratization of energy access, and environmental and human rights impacts (i.e. corporate vs popular energy transition debates Svampa and Bertinat, 2022; FARN, 2024).

Within this debate, attention has been directed to transition minerals, also called critical minerals. Portrayed as “green” or environmentally “friendly”, using new terms as “sustainable” mining (Voskoboynik y Andreucci, 2022), governments and industries in the Global North are shaping policies to control the technology needed for energy transition and achieving net zero targets by 2050 (Climate Transparency, 2023). However, controlling these minerals is central to a new chapter in the global dispute for hegemony: reshaping strategic areas that involve energy transition and security. Security concepts are evolving to encompass natural assets and sustainability, as discussed by Riofrancos (2022), yet the complexities and costs of these paths receive little attention.

In 2023, the first Global Stocktake (GST) decision urged to triple global renewable energy capacity by 2030 and to hasten emissions reduction from road transport to zero and low-emissions vehicles¹. This increase demands scaling up the mineral supply, but projections on how much will be needed vary from source to source, levels of climate ambition, assumptions governing those projections, including changes in technology and ion-battery composition (many of which are under industrial secrecy) and vested interests. Also, the Declaration of Leaders emphasized expediting just energy transitions and outlined the Voluntary High-Level Principles for Collaboration on Critical Minerals for Energy Transitions (G20, 2023). While these principles mention the need to secure responsible value chains, cooperation, local value and increasing circularity, they overlook reduction targets and environmental management tools.

Countries such as Argentina, Chile, and Bolivia, whose high-Andean wetlands hold around 53% of the world's lithium reserves, are particularly bearing the costs of the energy transition of the Global North. These wetlands are very fragile ecosystems, subject to water scarcity throughout the year, and are home to several indigenous communities. While Argentina (4th producer) allows lithium access through concessions, Chile (2nd producer) and Bolivia (not yet producing) have restrictive regulations for company entry. However, operations proceed with inadequate analysis resulting in breaches of regulations.

Authorities neglect to allocate adequate time and resources to environmental planning, including complex but necessary hydrological studies. Such analyses, serving as a baseline before initiating mining projects, encompass understanding water dynamics, and integrating cumulative impacts of concurrent mining projects and existing community

¹ https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf

water use. Despite being a fundamental right for indigenous peoples, the right to free prior and informed consent is not consistently upheld according to international standards. Moreover, political authorities lack knowledge of the role of high-Andean wetlands in climate adaptation and mitigation, including carbon sequestration potential.

Last but not least, economies in South America are not necessarily moving towards a decarbonization path according to their climate commitments (particularly, Argentina is more than 80% dependent on fossil fuel and expanding its frontier to offshore deposits (2022); Chile, more than 60% (2022) and Bolivia, more than 90% (2021)), but are rather focusing on export-oriented strategies to foster growth and deal with persistent debt, poverty and inequality. The need to foster industrialization and added-value to the supply chain is not prioritized in the high-prices context. Additionally, transformation requires improving capacity, access to patents and resources, which underlines the need for renewed cooperation.

Recommendations

1. Projected demand should include planetary boundaries

According to the World Bank Group’s report, under a two-degree scenario, the production of minerals, such as graphite, lithium and cobalt, will need to be significantly ramped up by more than 450% by 2050, from 2018 levels (Table 1), to meet demand from energy storage technologies (Hund et al., 2023). Similarly, an Inter-American Development Bank (IDB) study projects lithium demand to be 1036% higher than 2020 levels (2022).

TABLE 1. 2050 projected annual mineral demand from energy technologies

Mineral	2018 annual production (Tons, thousands) ^a	2050 projected annual demand from energy technologies (Tons, thousands)	2050 projected annual demand from energy technologies as percent of 2018 annual production
Aluminum	60,000	5,583	9%
Chromium	36,000	366	1%
Cobalt	140	644	460%
Copper	21,000	1,378	7%
Graphite	930	4,590	494%
Indium	0.75	1.73	231%
Iron	1,200,000	7,584	1%
Lead	4,400	781	18%
Lithium	85	415	488%
Manganese	18,000	694	4%
Molybdenum	300	33	11%
Neodymium	23 ^b	8.4	37%
Nickel	2,300	2,268	99%
Silver	27	15	56%
Titanium	6,100	3.44	0%
Vanadium	73	138	189%

a. Data for 2018 annual production sourced from the U.S. Geological Survey.

b. Data sourced from Deetman et al. (2018).

Source: Hund et al., 2023.

However, the assumptions for estimates on projected demand of lithium are not clear; also, they are not necessarily part of a broader vision of moving to a post-fossil fuel society.

Such studies focus solely on individual mobility, overlooking public transit. They also fail to address supply, environmental and social risks such as mineral scarcity, ecosystem damage, and conflicts in extraction sites. Also, they exclude recycling, which today faces challenges such as lack of existing materials, costs, design, and technological barriers; but require strong policy commitments to revert overconsumption patterns. Today, high-income countries have an average material energy and mineral consumption of around 27,2 tons per capita, doubling the 12,3 world average (UNEP et al., 2019).

Thus, concrete incentives are needed to ensure a transition to low-carbon societies that respect both human rights and ecosystem boundaries.

Recommendation:

a) Develop a task-force with experts from different disciplines, perspectives and geographical representations to create a joint analysis of existing data projecting global mineral demand, integrating a push for significant material reduction targets for the Global North and increased circular economy strategies (recycling, re-use) that can ensure climate goals while reducing irreversible damage on communities and ecosystems.

2. Enhance multilateral cooperation to ensure that Southern countries' views are reflected.

In the current global scenario, disruptions caused by the pandemic and armed conflicts have led to a heightened focus on securing supply chains. Terms such as “on-shoring”, “reshoring”, and " friend-shoring" are used to describe the relocation of mining operations to Western countries, reducing reliance on minerals imported from the Global South. Policies such as the new US Inflation Reduction Act (2022), the EU Critical Raw Materials Act (2023), or the collaboration through the Minerals Security Partnership,

show the emphasis on the “security” element. Thus, stockpiling, especially by Global North countries, can exacerbate supply chain limitations, raise prices and lead to an unequal and unjust energy transition that excludes Global South countries and delays climate action (IRENA, 2023).

Despite that, less attention has been given to sustainability issues (detailed in points 1 and 3) and to the needs of producer countries, which also seek to add value to the supply chain. Even if regulations such as the EU’s Critical Raw Materials Act propose “strategic partnerships and alliances” and employ diplomacy to foster cooperation with third countries for mutual benefit, it is unclear how these aims are going to be accomplished.

Additionally, there are inconsistencies between the stated intentions and unfair trade and investment regulations imposed on developing countries by powerful nations that also pursue protectionist policies. Specifically, rules concerning technology transfer, local content, and regulations that impact investors' profit expectations were prohibited to safeguard investors' rights. These rules are subject to ad hoc supranational tribunals and the International Centre for Settlement of Investment Disputes (Ahumada, 2024). These ways of exercising power can be seen in the recent EU vs Indonesia dispute in the WTO regarding a ban on nickel exports.

Discrepancies between rules and decisions across regulatory mechanisms, agreements, and forums are the rule rather than the exception. Furthermore, countries in the Global South, which have contributed the least to GHG, are now tasked with resolving the climate crisis and should make their critical minerals available with doubtful benefit. Meanwhile, these countries grapple with climate change effects like floods, storms, droughts, and heat waves, and receive little response to their quest for more financing.

The G20 has a unique opportunity to guide and improve cooperation between producer and consumer countries. With the key players sitting at its table, practical approaches can

be implemented to ensure more favorable conditions for mineral-rich countries. This can lead to greater coherence and more responsible and transparent supply chains. However, adjusting these supply chains requires careful balancing of economic factors, environmental impacts, and the well-being of local communities.

Recommendations:

a) Entrust a legal and institutional review of existing contradictions between trade and investment agreements and climate commitments, to particularly: 1) identify obstacles to improving producer countries' added value expectations and 2) recommend paths towards contributing to their own energy transitions.

b) Provide principles to champion best cooperation practices among Global North countries.

3. Minimize adverse impacts on the Global South and ensure a just and equitable energy transition

The race to control critical minerals is increasing the pressure on producer countries. 74 new lithium mines must start operation by 2035 to satisfy the projected 3,3 million metric tons².

Mining operations pose ecological and safety risks, including water contamination, extensive physical waste, and threats to biodiversity, cultural landscapes, and local livelihoods (Riofrancos et al., 2023). Over half of the minerals crucial for the energy transition are found on or near indigenous lands (Owen et al., 2023; IRENA, 2023).

² For example, see: <https://www.autoevolution.com/news/benchmark-mineral-intelligence-calculated-how-many-more-mines-we-ll-need-for-evs-359-198133.html#>

However, these operations lack accountability without adequate enforcement of environmental and human rights laws, especially the right to prior informed consent. Although many resource-rich nations have laws safeguarding human rights and the environment, implementation gaps lead to conflicts and legal intervention, with permits being revoked due to a lack of cumulative analyses.

Moreover, countries in the Global South tend to prioritize the need to attract investment to solve their macroeconomic and social challenges (debt, inequality, poverty), before applying robust environmental planning tools that can minimize environmental and social impacts. Also, they need resources to implement more ambitious climate policies according to their NDCs, Long-Term Strategies and National Adaptation and Mitigation Plans. However, achieving this requires finance, capacity building and technology transfer, which could lead to their own energy transitions and technology access and improvement.

Even if studies have shown the importance of governance, regulation and civil liberties (Owen et al., 2023), solutions from the supply chain regulation tend to emphasize the role of industry with certifications and industry schemes to the detriment of the state.

Recommendations:

- a) Organize high-level dialogues among human rights and environmental experts, civil society, communities, industries and governments to reinforce commitment to human rights through socio-environmental management tools such as strategic environmental and cumulative impacts assessment, while respecting FPIC rights and the Right to Say No, moving beyond voluntary standards or mining certifications. Instead, ensure states and independent local civil society organisations are central to decision-making and process monitoring.

Scenario of Outcomes

The climate crisis needs urgent and coordinated action to secure life on Earth. If a broad consensus within the G20 regarding the type of technological improvements and societal change that the global society needs is undertaken in a way that the planetary boundaries and cultural diversity are respected and integrated into decision-making, energy transition paths can be fairer. Thus, geopolitical tensions can be reduced and multilateralism enhanced.

A task-force with broad participation of experts, policymakers and civil society that can give an outline and provide analysis of existing data and projections regarding critical mineral demand is a necessary step towards change. This should be complemented with other variables as material reduction targets to tackle overconsumption, circular economy, environmental damage, communities' rights, and increased industrialization in the Global South. In this scenario, more control over excessive extraction, stockpiling and price distortion can ensure a better understanding of the materials needed for an energy transition that will be rapid, fairer and avoid new challenges like human and environmental damages.

Also, a review of existing tensions and contradictions between agreements, spaces and fora is needed to ensure a fairer distribution of benefits and costs of the technological needs around energy transition. Otherwise, countries in the Global South will bear the costs of the new economic relationships arising from climate crisis solutions despite their minor contribution. These groups of countries require financing for their adaptation and mitigation strategies and technology transfer to drive their own energy transitions. In this scenario clear roadmaps for producer countries' needs, identifying technology transfer obstacles and more commitment from the Global North countries can drive change in cooperation patterns.

Last but not least, the ecosystem approach and the respect for Indigenous and local communities rights, including the right to say no, should be at the center of decision-making and strategic planning. Otherwise, the world will fail to provide a solution that puts life at the center.

As evidence has shown (Riofrancos et al., 2023) there are ways to ensure a future with less emissions, better mobility and less mining. Post-fossil fuel societies will need cultural change, including urban planning strategies and reducing overconsumption. The challenge is not minor and might be resisted. But, States in the G-20 should drive this change, and invite all stakeholders to secure global public goods and enhance multilateral collaboration. The countries in the G-20 have a unique position not only due to their contribution to GHG emissions but also because they control the most critical part of the technology of the end-products and can make a difference toward many mineral producer countries by fostering better cooperation with the Global South.

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