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# A Just energy Transition: Between Global Demands and local challenges. A look at lithium extraction policies in Latin America

*Una transición energética justa: entre las demandas globales y los retos locales. Una mirada a las políticas de extracción de litio en América Latina*

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## Abstract

The transition to sustainable energy is crucial for addressing the global climate crisis and reducing reliance on fossil fuels. This study critically examines lithium extraction policies in Latin America, a region vital for this strategic mineral. It contextualizes the issue within global capitalist consumption patterns that have depleted natural resources in the Global South. Despite technological progress, the shift to renewable energy remains tied to structural inequalities and geopolitical power dynamics. Through ethnographic fieldwork in Argentina, Bolivia, and Chile in 2024, the research highlights the environmental, social, and sustainability challenges of lithium extraction. Findings show severe environmental impacts, such as water depletion and biodiversity loss, and social conflicts exacerbated by mining. The study contrasts the approaches of Argentina, Bolivia and Chile in managing lithium resources, underscoring the geopolitical tensions between national control and foreign investment. While Chile advances with foreign partnerships, Bolivia stresses state control, and Argentina faces fragmented provincial regulations. The article concludes that a just energy transition requires addressing global inequalities and ensuring equitable distribution of benefits and costs. It advocates for structural transformations towards sustainable and inclusive development models that respect ecological limits and social justice.

Keywords: Energy Transition; Lithium; Latin America; Extractivism; Renewable Energy.

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## Resumen

La transición a la energía sostenible es crucial para hacer frente a la crisis climática mundial y reducir la dependencia de los combustibles fósiles. Este estudio examina críticamente las políticas de extracción de litio en América Latina, una región vital para este mineral estratégico. Contextualiza la cuestión dentro de los patrones de consumo capitalistas globales que han agotado los recursos naturales en el Sur Global. A pesar de los avances tecnológicos, el cambio hacia las energías renovables sigue ligado a las desigualdades estructurales y a las dinámicas de poder geopolítico. A través de un trabajo de campo etnográfico en Argentina, Bolivia y Chile en 2024, la investigación pone de relieve los desafíos ambientales, sociales y de sostenibilidad de la extracción de litio. Los hallazgos muestran graves impactos ambientales, como el agotamiento del agua y la pérdida de biodiversidad, y conflictos sociales exacerbados por la minería. El estudio contrasta los enfoques de Argentina, Bolivia y Chile en la gestión de los recursos de litio, subrayando las tensiones geopolíticas entre el control nacional y la inversión extranjera. Mientras Chile avanza con asociaciones extranjeras, Bolivia hace hincapié en el control estatal y Argentina se enfrenta a una fragmentación de las normativas provinciales. El artículo concluye que una transición energética justa requiere abordar las desigualdades globales y garantizar una distribución equitativa de beneficios y costes. Aboga por transformaciones estructurales hacia modelos de desarrollo sostenibles e inclusivos que respeten los límites ecológicos y la justicia social.

Palabras clave: Transición energética; Litio; América Latina; Extractivismo; Energías renovables.

## Introduction

The energy transition is a global imperative in response to the climate crisis and the unsustainability of the current energy model, predominantly based on fossil fuels. However, this process does not develop in a vacuum; it is deeply influenced by the dynamics of power, inequality, and exploitation that characterize the global capitalist system. This article examines the energy transition from a critical perspective, focusing on lithium extraction policies in Latin America, a key region in the geopolitics of this strategic mineral.

Since the Industrial Revolution, intensive use of fossil fuels has driven economic growth at the expense of the environment. The increase in greenhouse gas emissions has triggered global warming, precipitating an ecological crisis of unprecedented proportions. In this context, the transition to renewable energy is presented as a necessary solution, albeit one not without challenges and contradictions. Replacing fossil fuels with clean energy sources requires significant technological advances and a radical transformation in global energy infrastructure and consumption and production patterns.

Latin America is at the epicenter of this transition, with its vast lithium reserves concentrated in the so-called Lithium Triangle (Argentina, Bolivia, and Chile). This mineral, essential for manufacturing lithium-ion batteries used in electric vehicles and energy storage systems, has been dubbed the "white gold" of the 21st century. However, lithium extraction poses serious environmental, social, and economic challenges that must be addressed to ensure a just and sustainable energy transition.

This article analyzes lithium extraction policies in Latin America, exploring how they interact with global and local power dynamics. It examines the strategies and challenges faced by Chile, Bolivia, and Argentina in managing lithium and the environmental and social impacts arising

from its exploitation. Through an ethnographic approach and a critical review of the literature, it seeks to understand the implications of the energy transition in terms of social and environmental justice.

The central hypothesis of this work is that without a structural transformation of the global economic and political system, the energy transition risks perpetuating existing inequalities and generating new forms of dependence and exploitation. For the transition to be truly just, it is necessary to address not only the decarbonization of the energy matrix but also the equitable redistribution of associated benefits and costs, the active participation of local communities, and respect for the planet's ecological limits.

This article is structured into several sections. The first part contextualizes the energy transition within the framework of global policies and historical dynamics of resource exploitation. The second section focuses on global inequality and the concept of energy imperialism, mainly focusing on lithium extraction in Latin America. Subsequent subsections explore the specific roles of Chile, Bolivia, and Argentina in the geopolitics of lithium, followed by a discussion of the environmental and social challenges identified from an ethnographic perspective. Finally, the need for structural transformation for a just energy transition is addressed, concluding with a look to the future.

This analysis aims to contribute to the debate on energy justice, highlighting the importance of integrating equity and sustainability considerations into transition policies and offering a critical perspective on the power dynamics shaping the current global energy scenario.

## Energy Transition and Global Policies

### *Historical and Current Context*

The global capitalist way of life, linked to increasingly high consumption patterns, has generated an accelerated process of natural resource use and extraction, primarily from the Global South (Brand & Wissen, 2017). Since the Industrial Revolution, the consumption of fossil fuels has increased exponentially due to the rise in industrial production and consumption. This has elevated the concentration of carbon dioxide and other greenhouse gases in the atmosphere, driving global warming.

In general terms, capitalism has intensified an unsustainable metabolic profile by accelerating social metabolism, using less labor-intensive and more energy-intensive employment. The new global commercial architecture, globalization, has consolidated an unsustainable consumption model that, to be maintained in the richest countries, requires more raw materials and energy from the Global South. This results in more significant pressure on natural resources and territories, amplifying processes of dispossession and criminalization of local populations.

In this constant predation scenario, a growing process of natural resource scarcity has emerged, producing a system collapse. The expansion of capitalism and the consumption of fossil fuels are two inseparable and entirely dependent axioms, leading to the current energy crisis. Many non-renewable energy sources, such as oil, are disappearing, reducing the global energy balance. In 2022, 82% of the primary energy consumed worldwide came from burning fossil fuels (BP, 2022), specifically oil, coal, and gas, increasing CO2 production by 5.7% and aggravating the climate crisis.

The search for new energy sources has become a central theme in global geopolitics, focusing on the Energy Transition (ET) process. This process is understood as the transformation of the energy matrix towards independence from fossil fuels. Kazimierski (2019), points out that this transition is driven not only by technological advances but also by the physical and ecological limits of our resources and the planet. Furthermore, this transition does not imply a change in the global productive system or consumption patterns, perpetuating the current system.

The Great Energy Transformation (García-Bilbao, 2013), requires a radical and unprecedented transformation of the global energy infrastructure, replacing fossil fuels with clean, renewable, and sustainable energies such as wind, solar, tidal, and geothermal. However, achieving this change necessitates developing an efficient and profitable energy storage system and modifying energy infrastructure and transportation (Kazimierski, 2019). In this sense, constructing innovative batteries is crucial for accumulating this energy.

It is not just about decarbonizing the energy model but also transforming the productive model and, more generally, the system of social relations and the relationship with nature (Svampa, 2023). An energy transition that does not address the inequality in the distribution of energy resources, energy poverty, and does not promote the decommodification and resilience of civil society, will lead to a partial reform, without modifying the structural causes of socio-ecological collapse or resolving geopolitical disparities.

## Energy Transition and Global Inequality

It is difficult to find features of a systemic energy transition in the current global context. The current experiences are mainly associated with decarbonization, the gradual abandonment of the fossil fuel-based matrix, and the shift to renewable energies (Svampa, 2023). In Latin America, we are witnessing a corporate energy transition, driven from the North to the Global South, perpetuating an energy model with the same logic of concentration and business typical of the fossil regime and predatory extractivism. The corporate energy transition is supported by various entities, including multinational companies, states, institutions, and organizations, which see the transition as a business and wealth accumulation opportunity and geopolitical hegemonic positioning. Seeking to ensure control of ownership and access to energy sources, materials, and technologies necessary for the transition.

This situation reflects the final crisis of a civilization centered on the human being, founded on the domination and commercialization of nature, patriarchy, racism, and colonialism. These structures have not only shaped humanity's historical and economic development but also perpetuated systems of oppression and exclusion that directly affect the possibility of a just energy transition (Lander, 2023).

The commodification of nature has led to the excessive exploitation of natural resources, ignoring ecological limits and causing significant environmental imbalances. This approach has contributed to ecosystem deterioration, biodiversity loss, and climate change. In the context of the energy transition, this translates into continued extraction of resources such as lithium, which is vital for renewable energy technologies but is carried out in a way that does not consider the environmental and social impacts on the exploited regions. On the other hand, colonialism has imposed economic and cultural models that dispossess indigenous peoples of their lands, resources, and autonomy, destroying their ways of life and traditional knowledge. In the current context, extractive policies for resources such as lithium perpetuate a neocolonial relationship, where the wealth extracted from the Global South feeds the sustainable development of the Global North, leaving behind a trail of environmental degradation and social disintegration.

Moreover, it is crucial to recognize that Latin America remains the region with the most significant inequalities in income and wealth distribution globally (Svampa, 2023). Additionally, this region faces a significant land concentration and grabbing process, exacerbating socio-economic disparities. An extreme case of these dynamics is Chile, where water resources have been privatized, limiting equitable access to water and exacerbating the vulnerability of local communities. This privatization intensifies inequality and endangers environmental sustainability and water security, which are critical factors in the energy transition.

The current ecological, social, and cultural crisis highlights the urgent need for an integral transformation that recognizes and values the plurality of experiences and knowledge. A just energy transition must address these structural inequalities, promoting the equitable redistribution of the benefits and costs of the new energy economy, ensuring inclusive participation of all affected communities, and respecting the planet's ecological limits. This change implies questioning and dismantling the bases of domination and exploitation that have sustained anthropocentric civilization and building a future based on social justice, gender equity, environmental sustainability, and respect for cultural diversity.

In this sense, the energy transition cannot be detached from the power dynamics and structural inequality between the Global North and the Global South. Energy imperialism refers to how Global North countries, through their policies and transnational companies, exercise control over the energy resources of the Global South, perpetuating relationships of dependence and exploitation.

Lithium extraction in Latin America is a clear example of these dynamics. Bolivia, Argentina, and Chile, which hold the largest lithium reserves, face pressures from multinationals and

Northern governments to extract and export this strategic resource. However, the wealth generated by lithium extraction rarely benefits local communities equitably. Instead, inequalities are exacerbated, imperial lifestyles are perpetuated, and the North maintains its development at the environmental and social sacrifice of the South (Gudynas, 2013; Lander, 2023).

Addressing the structural causes of inequality and exploitation that characterize the global capitalist system is necessary for the energy transition to be genuinely just. This implies not only decarbonizing the economy but also transforming the power relations between the North and the South, promoting equitable redistribution of the benefits and costs of the transition, ensuring active participation of local communities in decision-making, and respecting the planet's ecological limits.

## Lithium Extraction

Lithium, often called the "white gold" of the 21st century, has become one of the most critical resources at the forefront of the global transition to sustainable energy. This mineral is essential for creating lithium-ion batteries, fundamental to many clean technologies, from electric vehicles to energy storage systems for electrical grids and portable devices. As countries intensify their efforts to move away from fossil fuels in response to climate change, the demand for lithium has grown unprecedentedly.

The transition to renewable energy sources involves adopting greener technologies and increasingly depends on essential minerals that enable this transition. In this context, the demand for lithium has catalyzed a new dynamic in resource geopolitics, placing this mineral at the heart of national and international strategies. The International Energy Agency (IEA) projects that lithium demand will increase tenfold by 2040, creating a complex landscape where the economy, environment, and politics are intricately linked.

This surge in demand has led to a significant expansion of mining activities, mainly concentrated in the so-called Lithium Triangle in South America, encompassing regions of Argentina, Bolivia, and Chile. These countries are uniquely positioned to influence the global lithium market, holding nearly three-quarters of the world's reserves of this valuable mineral. However, lithium extraction is not without its challenges. It involves considerable environmental, economic, and social challenges that require careful and strategic management.

The environmental challenges are particularly notable. Lithium extraction, especially from brine, is a water-intensive process that can devastate local ecosystems. It affects biodiversity, alters hydrological cycles, and can contaminate water bodies, posing severe risks to sustainability in regions already vulnerable to climate change. Additionally, the social impact of lithium mining on local communities can be significant, including displacements and changes to traditional ways of life.

As we move towards a greener future, it is crucial to recognize and address these challenges with effective policies and responsible mining practices that ensure the energy transition is sustainable in terms of carbon reduction and fair and equitable for communities affected by the extraction of essential resources like lithium. This chapter will examine the lithium extraction methods, the associated impacts, and the strategies that countries and corporations can adopt to mitigate environmental and social problems while maximizing the economic benefits of this critical resource.

## Chile's Role in Global Lithium Geopolitics and Advances in International Policy

Chile, a key player in lithium extraction and production, plays a crucial role in the global geopolitics of this essential mineral for the energy transition. The country, which possesses some of the largest lithium reserves in the world, has been a pivotal supplier for the global battery industry, especially for those used in electric vehicles and electronic devices. As the demand for lithium continues to rise, Chile's role on the international stage will become increasingly significant.

The Salar de Atacama in Chile is one of the world's primary sources of lithium due to its high brine concentration and optimal extraction conditions. This salar has enabled Chile to position itself as one of the global leaders in lithium production, competing mainly with Australia (Flexer et al., 2018; SGS, 2023).

In the geopolitics of lithium, Chile has adopted a strategy that combines exploiting its natural resources with attracting foreign investment. Mining companies such as SQM (Sociedad Química y Minera de Chile) and Albemarle Corporation are the main actors in lithium extraction in the country. These companies have established significant operations in the Salar de Atacama (Svampa, 2023).

In this context, in recent years, Chile has advanced in consolidating an international lithium policy that aims not only to maintain its position as a production leader but also to add value and promote sustainable development. First, Chile has strengthened its regulatory framework for lithium mining, seeking to balance resource exploitation with environmental protection. The country has implemented policies to sustainably manage water resources and minimize the environmental impact of mining operations. President Gabriel Boric announced the recent creation of a national lithium company, which is a significant step towards greater state involvement in the industry and better sector regulation (Ministry of Energy of Chile, 2024).

Moreover, one of the biggest challenges for Chile has been moving its lithium production beyond raw material exports to higher value-added products. In this regard, the Chilean government has promoted investment in technology and advanced processing capabilities. Partnering with foreign companies to produce more complex materials, such as battery cathodes, is one of the strategies to boost local industrialization and increase the economic benefits derived from lithium (Ministry of Energy of Chile, 2024).

International cooperation is also a fundamental aspect of Chile's lithium policy. In this sense, Chile has actively worked to establish strategic relationships with other countries and international organizations in the lithium sector. Cooperation with European and Asian countries has been crucial for technology development and knowledge transfer in lithium processing and battery manufacturing. Additionally, Chile has participated in international forums and bilateral agreements to regulate and optimize lithium trade, ensuring a stable and sustainable supply. The country has also increased its R&D efforts to improve extraction efficiency and develop new technologies that reduce environmental impact. Academic institutions and research centers in Chile are collaborating with mining companies to innovate in extraction and processing methods and battery recycling.

Despite the advances, Chile faces several challenges to sustainable leadership in lithium geopolitics. Global competition is intense, with countries like Australia and China increasing their production and technological capabilities (USGS, 2023). Moreover, international pressure for more sustainable and responsible mining practices necessitates continually improving environmental and social standards.

Nevertheless, Chile's opportunities are enormous. The growing global demand for lithium, driven by the transition to renewable energy and electric vehicles, ensures a robust market for the future. If Chile can continue innovating in technology, improving its regulatory framework, and strengthening its international relations, it can maintain and enhance its leadership in lithium production.

### Bolivia's Role in Global Lithium Geopolitics

Bolivia has adopted a distinctive approach to the exploitation and management of its lithium resources, reflecting its aspirations to control the production process and maximize economic and social benefits for its population. The Salar de Uyuni contains approximately 7% of the world's lithium reserves, positioning Bolivia as a crucial player in lithium geopolitics (Gruber et al., 2011).

Since Evo Morales's government began in 2006, Bolivia has pursued a policy of state control over its natural resources, including lithium. The state-owned company Yacimientos de Litio Bolivianos (YLB) has been the main vehicle for this strategy, aiming not only to extract lithium but also to advance along the value chain towards battery production and other derivative products (Perotti & Coviello, 2015).

Similarly, Bolivia has signed agreements with foreign companies to acquire the necessary technology and technical knowledge for lithium processing while maintaining a majority state share in these projects. This approach aims to ensure that the economic benefits of lithium exploitation stay within the country and are reinvested in national development.

Despite its great potential, Bolivia has faced several challenges on its path to lithium industrialization. Technically, lithium extraction in the Salar de Uyuni is more complicated than in

other salars due to the high magnesium concentration, which complicates the lithium separation process (Wagner, 2011). Additionally, the necessary infrastructure for large-scale production and lithium transport is still under development (Svampa 2023).

Politically, the country has experienced tensions and conflicts related to lithium resource management. Evo Morales's resignation in 2019, followed by a change in government, caused uncertainties about the continuity of lithium policies. However, the current government under President Luis Arce has reaffirmed its commitment to lithium industrialization and continues to seek international partnerships to advance this goal.

Bolivia's approach to state control of lithium has significant implications for global geopolitics. Unlike its neighbors Chile and Argentina, which have adopted models more open to foreign investment, Bolivia seeks to maintain tighter control over its resources. This strategy could position Bolivia as an alternative model for other developing countries looking to maximize the benefits of their natural resources. Additionally, Bolivia's ability to develop a complete value chain around lithium could alter global market dynamics, offering a more diversified source of lithium batteries and other derivative products. However, Bolivia needs to overcome technical challenges and attract sufficient investments to develop the necessary infrastructure to reach this potential.

### Argentina's Role in Global Lithium Geopolitics

Argentina has vast lithium reserves, mainly in Salta, Jujuy, and Catamarca. These areas are rich in brines with high lithium concentrations, making them highly attractive for lithium mining investment. According to the United States Geological Survey, Argentina holds approximately 9% of the world's lithium reserves, positioning it as a significant player in the global market (USGS, 2021).

Unlike Chile and Bolivia, Argentina has not developed a coherent strategic policy for lithium exploitation. Lithium is treated under the same neoliberal regulatory framework as general large-scale mining, which has not been significantly modified by governments of different political orientations. The provincialization of natural resources has fragmented lithium management, hindering the implementation of a national productive policy (Svampa, 2023). This decentralization has led to a lack of coordination in lithium exploitation, with each province implementing its regulations and agreements with mining companies. This has created a complex regulatory mosaic and limited the country's ability to negotiate and manage its resources strategically and unifiedly.

Moreover, the rapid expansion of the lithium frontier in Argentina has progressed without adequate consultation with local communities, leading to various social conflicts. Indigenous and rural communities have expressed concerns about the environmental and social impacts of lithium mining, including competition for water resources and disruption of local ecosystems (Slipak and Argento 2022; Svampa, 2023).

During Alberto Fernández's government, Argentina began working on an Electromobility Bill to advance the lithium battery value chain. This initiative seeks to exploit lithium as a raw material and develop the capacity to produce lithium batteries and other high-value-added products within the country (Ministry of Productive Development, 2021).

Lithium mining in Argentina, like elsewhere, faces significant sustainability challenges. Intensive water use in mining operations is a primary concern, especially in arid and semi-arid regions with limited water availability. Additionally, mining policies must include active consultation and participation of local communities to avoid conflicts and ensure that the economic benefits of mining are distributed equitably. Implementing corporate social responsibility practices and adhering to international sustainability standards can help mitigate negative impacts and promote more inclusive and sustainable development.

To consolidate its position in the global lithium market, Argentina must address sustainability and social responsibility challenges, ensuring that lithium exploitation is environmentally sustainable and socially equitable. Furthermore, regional cooperation among the Lithium Triangle countries could strengthen their collective position and promote more cohesive and strategic development of this vital resource.

Despite individual initiatives to develop the lithium industry, Argentina, Bolivia, and Chile, the three countries that form the Lithium Triangle, have not established a common strategy for lithium. This lack of strategic coordination perpetuates a competitive dynamic among them, each acting as a supplier of raw materials without added value. Such competition reinforces their subordinate insertion into the international economic scheme, where countries continue exporting raw natural resources instead of higher-value-manufactured products (Svampa, 2023). This lack of cooperation prevents large-scale collaboration that could strengthen their global position. A common strategy would allow these countries to negotiate better market conditions, set more favorable prices, and coordinate sustainability and social responsibility policies. However, differences in national policies, resource management structures, and economic priorities have hindered the formation of a cohesive alliance.

If achieved, regional collaboration could significantly transform the lithium industry in Latin America, benefiting not only the Lithium Triangle countries but also the regional economy. Coordination could facilitate technology and knowledge transfer, promoting the development of local high-value-added industries and improving living conditions for local communities.

## Environmental, Social, and Sustainability Challenges in Lithium Extraction: Results from an Ethnographic Stay

The following data results from an ethnographic study conducted over three months in 2024. The study focused on crucial lithium extraction regions in Latin America, specifically within the Lithium Triangle, which includes areas in Argentina, Bolivia, and Chile. This study aims to delve

deeper into lithium extraction's environmental, social, and sustainability challenges, providing a comprehensive view based on direct observation and testimony from local communities.

The ethnographic work was carried out using a combination of qualitative methods, including participant observation and in-depth interviews with local community members, community leaders, mining workers, and representatives from non-governmental organizations. Additionally, visits were made to lithium extraction and processing sites to understand the conditions and challenges on the ground.

The method of extracting lithium from brines is based on solar evaporation. The brine, rich in lithium and other minerals, is extracted through pumping wells and transferred to evaporation ponds, where it evaporates under the sun. This process can extend from 12 to 18 months, during which the water evaporates, increasing the concentration of lithium that can then be extracted and processed (Gamba, 2019). The magnitude of water consumption in this process is significant. For every ton of lithium produced, it is estimated that around 500,000 liters of water are evaporated. In extremely arid regions like the Salar de Atacama, this massive groundwater extraction severely impacts local aquifers (Flexer et al., 2018). The overexploitation of these water resources can decrease groundwater levels, affecting water availability for other uses.

In this context, the intensive use of water by the lithium mining industry has generated significant conflicts with other local economic activities, particularly agriculture and livestock, which also depend on the same water resources. These activities are essential for the subsistence of many rural and indigenous communities in the affected regions.

In the Salar de Atacama, for example, farmers have reported a decrease in water availability for irrigation, affecting crop production (Ladera Sur, 2018) (El Desconcierto, 2024). The reduction in water resources has led, for instance, to lower agricultural productivity, putting local communities' food security at risk (Liu and Agustinata, 2020). Farmers have pointed out that competition for water with mining operations affects not only the quantity of available water but also the quality of the water, as the salinization of soil and groundwater has become an increasing problem due to the evaporation of brines.

Livestock, another crucial economic activity in these regions, is also affected since, in such fragile ecosystems, water availability is vital for maintaining animals and cultivating forages. The competition for water with lithium mining has decreased available pastures and the communities' ability to maintain their herds. This not only affects the livelihoods of ranchers but also has cultural and social implications, as livestock is an integral part of the identity of many indigenous and rural communities.

The reduction in groundwater levels has contributed to desertification, altering local ecosystems and affecting biodiversity. The salt flats, unique habitats, host endemic species that depend on these specific environments. The alteration of water levels and the chemical composition of the salt flats have thus generated concerning effects on species such as flamingos (CONAF, 2023).

Moreover, conflicts over water between mining companies and local communities have led to social and political tensions. Indigenous communities have protested against mining operations, demanding their right to fair and equitable access to water resources. These protests have led to clashes between authorities and companies, highlighting the need for more equitable and sustainable water resource management (Svampa, 2023; Dorn, 2024).

In this sense, lithium extraction has generated multiple conflicts with local communities, particularly with indigenous communities living in salt-flat regions. In many cases, mining companies and governments have been accused of not respecting the right to prior, free, and informed consent, an internationally recognized right for indigenous peoples. In Chile and Argentina, for example, indigenous communities have filed legal actions to defend their rights, arguing that mining projects affect their territories and water resources without proper consultation.

Lithium extraction raises essential questions of environmental and social justice. Local communities, often located in the Global South, bear the brunt of the environmental and social costs of lithium mining. At the same time, the economic and technological benefits are distributed unevenly, favoring industrialized nations of the Global North. This dynamic perpetuates existing inequalities and raises questions about the equity and sustainability of the global energy transition.

On the other hand, another major social issue related to lithium mining is the unequal distribution of economic benefits. Although lithium exploitation generates significant revenue, these benefits often do not reach local communities, exacerbating existing inequalities. To address these challenges, it is essential to strengthen the governance of natural resources. Regulatory frameworks must ensure that lithium extraction is conducted sustainably and equitably, including implementing responsible mining practices (Svampa, 2023).

## From Global to Local: The Energy Transition as an Imperial Way of Life

The energy transition, a response to the urgent need to transform capitalist society towards more sustainable models, is inherently linked to an imperial way of life. This global transformation is marked by a massive expansion of renewable energies and a commitment by numerous countries to decarbonize their economies and achieve climate neutrality. However, this process is filled with contradictions and challenges, reflecting the complexities of a capitalist restructuring that, while welcomed by many, remains deeply problematic due to its continued reliance on fossil fuels and its impact on the Global South.

Globally, infrastructure installation for renewable energy production has grown significantly, especially in the electricity sector. Countries worldwide have set ambitious goals to reduce carbon emissions and transition to more sustainable economies. This dynamic is part of a restructuring of capitalism that is being positively received by broad sectors of the global population (Brand and Wissen, 2017; Brand and Wissen, 2024). However, despite advances in adopting renewable energies, the consumption of fossil fuels continues to increase globally. This is partly due to the

growing energy demand driven by the global economy, which includes digitalization and other forms of economic development. In 2022, about 80% of the world's energy was still generated from fossil fuels despite investments in renewable energies (Brand and Wissen, 2024).

The energy transition is not a linear process free from crises but a phase of uncertain transition. Brief stabilizations that adopt authoritarian or ecological modernization forms may emerge, reflecting the inherent tensions and conflicts in this process (Liu & Agusdinata, 2020). The uncertainty of the future is due to the complexity of current challenges, which include the ecological crisis, geopolitical competition, and social tensions. The transition to more sustainable and democratic forms of capitalism is not guaranteed but is a process of struggles, conflicts, and contradictions over the direction society should take in economic, political, and environmental terms. A clear example of how the energy transition is inscribed in the imperial way of life is the exploitation of lithium in the Lithium Triangle. This extraction process reflects the Global North's dependency on the natural resources of the Global South, perpetuating a relationship of dependency and exploitation. Local communities often do not equitably benefit from the revenues generated by lithium extraction, while the environmental and social costs are externalized to these regions (Lessenich, 2015).

The analysis by Kohei Saito (2022), is crucial to understand why a transition to renewable energies alone is insufficient. Although changing the energy source can reduce carbon emissions, it does not address the underlying structural causes that lead to resource overexploitation and social injustice. The solution requires a structural transformation of the global economic and political system, rethinking the foundations of capitalism to focus on sustainable development models that integrate social equity and respect for the planet's ecological limits. To achieve true sustainability, it is necessary to go beyond technological adjustments and seek profound changes in how we organize the economy, distribute resources, and measure progress. This radical change involves challenging and redesigning unsustainable consumption practices, production policies, and international regulations that currently facilitate excessive environmental exploitation and the perpetuation of inequality.

In this sense, the energy transition, as part of capitalist restructuring, is intrinsically linked to an imperial way of life that depends on exploiting the Global South. Although crucial, the shift toward renewable energies is not enough to resolve the ecological and social crises without a deep structural transformation of the global economic and political system. This process requires reconfiguring the foundations of capitalism toward more sustainable and equitable models that respect ecological limits and promote social justice.

## Conclusions

This analysis has highlighted the intricate relationship between the energy transition and the inherent dynamics of global capitalism. The energy transition, envisioned as a response to the climate crisis and the urgent need for sustainability, is deeply rooted in historical patterns of ex-

ploitation and dependency that have characterized capitalism's evolution. This situation presents serious challenges and contradictions that must be rigorously addressed with a holistic vision.

Since the Industrial Revolution, the capitalist way of life has been inextricably linked to the exponential increase in fossil fuel consumption, with devastating consequences for the environment. The concentration of carbon dioxide and other greenhouse gases has reached critical levels, driving global warming and precipitating the current energy crisis. In 2022, despite international efforts and commitments to promote renewable energies, 82% of the primary energy consumed globally still came from fossil fuels (BP, 2022).

The quest for energy independence from fossil fuels has become a geopolitical imperative. However, as Kazimierski (2019) and García-Bilbao (2013), note, this transition is not only limited by technological advances but also by the physical and ecological limits of the planet. The Energy Transformation requires a radical restructuring of the global energy infrastructure, involving the adoption of clean technologies such as wind, solar, and geothermal and the development of efficient energy storage and transportation systems.

Moreover, the global energy transition continues reproducing structural inequalities between the Global North and the Global South. Current energy policies perpetuate an extractivist model that relies on the systematic plundering of natural resources from the Global South to sustain the consumption patterns of the Global North (Brand & Wissen, 2017). Specifically, lithium extraction in the Lithium Triangle—encompassing Argentina, Bolivia, and Chile—is a clear example of how the energy transition can perpetuate imperial lifestyles based on exploitation and the transfer of negative costs.

The pursuit of new energy sources, such as lithium, has triggered a new wave of extractivism, particularly in the Lithium Triangle in South America. This extraction process poses significant environmental challenges, such as the overexploitation of water resources and ecosystem degradation, and perpetuates social and economic inequalities. Local communities, predominantly indigenous and rural, bear the brunt of the environmental and social costs of lithium mining. At the same time, the economic and technological benefits are concentrated in the industrialized nations of the Global North (Svampa, 2023).

In this context, moving beyond a mere technological transition to renewable energies is necessary. The current environmental crisis cannot be resolved without addressing the underlying structural causes of capitalism, which foster resource overexploitation and social injustice. Achieving true sustainability requires a structural transformation of the global economic and political system, rethinking the foundations of capitalism towards development models that integrate social equity and respect for the planet's ecological limits.

To ensure that the energy transition is not only ecologically sustainable but also socially fair, several key strategies must be implemented: 1) Equitable Redistribution of Benefits: Ensure that local communities equitably benefit from resource extraction through fair agreements and ade-

quate compensations; 2)Strict Environmental Regulation: Implement and enforce stringent environmental regulations to minimize the negative impacts of lithium extraction on the environment and human health; 3) Development of Alternative Technologies: Promote research and development of technologies that reduce dependence on lithium and other critical resources, diversifying material sources and reducing pressure on producing regions; 4) Community Participation: Engage local communities in the decision-making process, ensuring that their voices and concerns are heard and respected in developing extraction projects; 5) International Cooperation: Encourage the formation of partnerships among lithium-producing countries to develop joint strategies that address environmental and social challenges comprehensively.

Finally, although the current energy transition is essential to address the climate crisis, it will not be sufficient without a profound structural transformation of the global economic and political system. This transformation must go beyond technological adjustments to address the underlying causes of inequality and exploitation. Only through a holistic and inclusive approach can the energy transition contribute to a sustainable and equitable future for all regions and communities.

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