Brazil's green transition beyond COP30

Rare earth extraction and green hydrogen production in Brazil: who and what for?

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Introduction

Brazil is a strategic player in the global green transition. It currently produces 92% of the world's niobium, a mineral classified as critical by the European Union (EU), and is estimated to hold around 23% of global rare earth reserves. With substantial renewable energy output, primarily from hydroelectric power plants, the country is also well positioned to become a major producer and exporter of green hydrogen, drawing interest from EU institutions. Furthermore, the Brazilian government has expressed support for carbon markets as an opportunity to secure funding, despite their questionable effectiveness in actually reducing emissions.

The 1992 Rio Convention saw the adoption of the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC secretariat is responsible for convening the annual United Nations Climate Change Conference, also known as the Conference of the Parties (COP). Brazil holds the presidency of COP30 this year and has chosen Belém do Pará as the host city. Belém is located in the heart of the Amazon rainforest, one of the most biodiverse regions on the planet, though scarred by centuries of extractivism and deforestation. Under the leadership of President Lula da Silva, Brazil is seeking to set itself apart from previous COP presidencies and showcase its climate ambitions, even as it continues to back new oil extraction projects within its borders. For example, the government has recently applied for the country to join the Organization of the Petroleum Exporting Countries (OPEC+). After three consecutive years of COPs hosted by authoritarian, oil-producing nations with significant restrictions on civil society, this year's summit is expected to take place in a very different context, characterised by widespread social mobilisation.

This article examines two core aspects of Brazil's green transition policy in terms of foreign interests in the country: rare earth mining and green hydrogen production.

Rare earths are rapidly becoming a focal point of global geopolitical competition, due to their vital role in manufacturing numerous technologies linked to the green transition, digitalisation and the defence industry. The term refers to 17 elements in the periodic table that are grouped together because they share similar magnetic and conductive properties. Contrary to what their name might suggest, they are actually quite abundant. The adjective "rare" instead reflects the difficulty of obtaining them in a pure state, since complex chemical processes are required to separate them from the gangue. Originally used on a large scale for industrial lighting, rare earths now have a vast range of applications and are found in most of the technologies we rely on every day. When added in small quantities to other materials, they can produce unique effects and even substitute critical minerals in the production of specific technologies. Digital devices such as mobile phones, hard drives and fibre-optic cables depend on rare earths to function. They are also essential components in certain "green" technologies, including wind turbines, electric vehicles and some solar panels. At the same time, rare earths remain crucial to the fossil fuel industry. They are used in the manufacture of combustion vehicles and in oil refining, as well as in military technologies such as drones, missiles and "smart" bombs. In light of the above, demand for these elements is expected to rise exponentially in the coming years, and control over their supply will bring both political and economic power.

For its part, **hydrogen** is an energy carrier[1] used in a range of industrial processes, particularly in oil refining and the production of chemical fertilisers. Decarbonising these sectors involves replacing grey hydrogen, produced from fossil gas, with green hydrogen obtained by splitting water molecules into hydrogen and oxygen using renewably sourced electricity. The fossil fuel industry is among the main stakeholders supporting the development of the global green hydrogen market, as it helps to sustain a centralised energy model built around large-scale, corporate-led projects. Agribusinesses, similarly, could use this transition to maintain their own large-scale industrial food production model. Other industrial sectors, such as steelmaking and metallurgy, also use hydrogen in their production processes. Their importance is expected to grow as renewable technologies become the driving force behind the energy transition.

Rare earth extraction and green hydrogen production in Brazil

Although Brazil is a mining country, the industry is not part of its national identity. This distinguishes it from other Latin American countries, such as Bolivia and Chile, and reduces public awareness of the impacts of mining, while also creating a greater openness to discussions about the future. However, some states do have a long mining tradition. This is the case in Minas Gerais, where two major disasters – Mariana (2015) and Brumadinho (2019) – thrust mining into the national debate. In both cases, the collapse of tailings dams containing toxic iron ore waste caused devastating mudflows. Responsibility for the two incidents lies with Vale, a Brazilian company that was privatised in the 1990s.

Brazil holds the world's second-largest rare earth reserves (23%), surpassed only by China (50%). Other countries with notable reserves include India (7%), Australia (6%), Russia, Vietnam, the United States and Greenland. However, Brazil's deposits have so far remained unexploited.

According to the most recent data, the areas with the largest ion-adsorption clay reserves[2] are Bahia, Minas Gerais and Goiás. Furthermore, one of the most important deposits, owing to its high concentration, is found in the Amazon rainforest at Morro dos Seis Lagos. Discovered in 1975 by the state-owned mining company, it has yet to be exploited. During the first half of the 20th century, Brazil exported monazite, a mineral rich in rare earth elements. However, extraction ceased following a ban by the International Atomic Energy Agency (IAEA) due to the mineral's radioactivity. Decades later, in 2010, the government renewed its interest in "re-globalising" the country's rare earth industry and invested substantial public funds in identifying deposits. That same year, the National Mining Plan 2030, prepared by Brazil's Ministry of Mines and Energy, classified rare earths as strategic minerals for the country's technological and energy development.

1 An energy carrier is a substance that stores energy, much like a battery, and is produced using a primary energy source.
2 There are several types of deposit containing rare earths. Ion-adsorption clay deposits are of particular interest because they are cheaper to mine than hard-rock deposits. However, they also tend to have lower rare earth concentrations. These clay deposits yield heavy rare earth elements and are typically found in subtropical regions with warm, humid climates. The main extraction methods are in-situ leaching, heap leaching and pond leaching.

The Brazilian government has similar plans for green hydrogen. With its abundance of solar radiation and wind resources, coupled with vast stretches of land suitable for large-scale photovoltaic and wind infrastructure, Brazil is well positioned to become one of the world's leading exporters of green hydrogen. This would enable it to meet the energy needs of other countries and regions with high energy consumption and heavy dependence on fossil fuels and energy-related geopolitical ties, such as Europe. Furthermore, the fact that hydroelectric power accounts for 60% of Brazil's electricity mix gives the country an advantage over its competitors in the race to become the premier green hydrogen exporter. Although hydropower is considered renewable because it generates electricity without direct emissions, the construction of hydroelectric dams has severe impacts on society, the environment and land use. These facilities are built along river courses and require extensive areas for reservoirs to store water. This often results in the displacement of local communities and peoples, as well as the disruption of river ecosystems and the flooding of surrounding soils.

Geopolitical interests: the United States and Europe in the race for resources

The energy transition proposed by institutions in the Global North requires vast quantities of minerals and resources found across the planet. This has triggered a global scramble to secure access to these resources, intensifying geopolitical tensions and perpetuating neo-colonial and extractivist dynamics.

China currently dominates the production of rare earths, controlling much of the world's reserves and possessing the necessary refining and processing capabilities. However, countries in the Global North, particularly the United States and the European Union, are seeking to challenge this dominance. Both have entered into competition to obtain rare earths from other parts of the world. Against this backdrop, Brazil's substantial reserves have attracted the attention of countries aiming to reduce their reliance on Chinese rare earths.

The United States government has shown a particular interest in Brazil's rare earth deposits. The Joe Biden administration initiated discussions to secure technical assistance and US investment in Brazil's rare earth sector. Following the shift to a Republican government, the new Brazilian ambassador met with officials to discuss potential extraction projects. However, the deterioration of relations between Brazil and the Donald Trump administration ultimately put an end to any prospects for collaboration.

More recently, the Lula da Silva government opted to study rare earth deposits and processing possibilities independently of the United States. This work is being carried out through a public-private partnership involving several companies and research groups from around the world, including the Brazilian mining company Vale and the Dutch automotive giant Stellantis. The stated aim is to establish a fully Brazilian supply chain for permanent magnets, which are made from rare earth elements.

In July 2021, the Brazilian government published its National Hydrogen Programme,

setting out guidelines to achieve this goal. This initiative coincided with the hydrogen and biofuel agreements that had been reached the previous month as part of the United Nations (UN) energy dialogues.

Hydrogen is also a key element in the energy transition strategies of the world's main emerging economies: Brazil, Russia, India, China and South Africa, collectively referred to as the BRICS. In May 2025, the group created the Energy Research Cooperation Platform to encourage member countries to collaborate and share experiences, knowledge, databases and training in strategic areas such as hydrogen.

Brazil's diverse conditions and the government's interest in producing and exporting green hydrogen have attracted attention from various regions and countries in the Global North. Unlike the case of rare earths, Brazil and the United States have reached an agreement on green hydrogen through the Energy Transition Partnership, which focuses on training and developing clean energy technologies, including hydrogen.

The EU has also expressed interest in importing green hydrogen produced in Brazil as part of its Hydrogen Roadmap Europe. One of the EU's objectives is to import half of the hydrogen it will require by 2030, thereby ensuring what it terms "energy security". Its main contribution will be public financing through the Global Gateway programme, combined with diplomatic efforts to encourage European multinational companies to undertake projects and benefit from these public funds.

However, some EU countries have gone further. For example, in July 2019, Germany and Brazil partnered to strengthen ties between the two countries and develop renewable energy in the Latin American nation (German-Brazilian Energy Partnership). Meanwhile, German institutions have played an active role in shaping processes and strategies within Brazil's hydrogen market, guiding it towards the large-scale production of this energy carrier and its by-products, such as fertilisers and e-methanol. Brazil's green hydrogen policies ultimately reflect the interests of

What is the Global Gateway?

Global Gateway is the new cooperation strategy adopted by the European Commission in 2021. It aims to mobilise €300 billion for infrastructure development in the digital, energy, climate, transport, health, education and research sectors, pulling from European financial and development institutions such as the European Investment Bank (EIB). These projects are carried out in Global South countries and are presented as being based on principles and values such as democracy, transparency and equality. In practice, however, the underlying priorities are security and stimulating Europe's private sector. Developing these infrastructures benefits European institutions and large corporations, not the societies and communities in the Global South where they are to be implemented. In the case of energy and climate projects, for example, they facilitate the export of resources such as hydrogen and rare earths, ultimately serving the EU's economic interests.

these institutions, as demonstrated by the H2Brasil project[3].

A key player in this process has been the German federal government's agency for international cooperation and development (Deutsche Gesellschaft für Internationale Zusammenarbeit, GIZ). The GIZ has also played a major role in developing Chile's hydrogen strategy, operating within the Energy Department as an advisor on energy strategy and legislative development.

Finally, it is important to highlight the role of lobbying in promoting this energy carrier. In 2019, the Green Hydrogen Organisation (GH2) was established as a lobbying platform for companies, government institutions and organisations representing the interests of a wide range of stakeholders in the green hydrogen sector. GH2 engages in advocacy with governments and within multilateral forums. Its influence was evident at COP27, held in Egypt in 2022, where it succeeded in launching the African Green Hydrogen Alliance. This initiative, involving ten African countries, seeks to make green hydrogen production and export a driver of national economic growth, despite the risks associated with the immaturity of the technology. GH2 has also identified Brazil as a model country in the development of policies and financing mechanisms related to green hydrogen, emphasising its strengths and enhancing its international standing.

Corporate power carves up the nation

Pursuing energy strategies at different scales involves both geopolitical and corporate interests. While national governments reach agreements from a diplomatic standpoint, setting up mechanisms to facilitate investment, it is companies that give these agreements concrete form through real projects.

Investment in Brazil's rare earth sector has increased considerably in recent years. According to the National Mining Agency, as of 2025, there are 2,216 ongoing procedures for the exploration and extraction of these elements across the country[4]. The companies involved in rare earth exploration in Brazil are primarily based in the United States, Australia, Canada, China and Brazil itself.

Bahia has 886 rare earth exploration projects under way, the highest number of any state in Brazil (see map). The official narrative portrays mining as a driver of economic growth and development, while downplaying the social and environmental impacts that extractivism has already had on the region. The US-based company Energy Fuels is developing a rare earth extraction project between the municipalities of Caravelas and Prado, with plans to extract ilmenite, rutile, zircon and monazite, the latter of which may contain rare earth elements. The project remains relatively unknown among local communities and has not yet faced any opposition. However, the 17 concessions acquired by the company affect territories inhabited by the Pataxó Indigenous people, as well as several settlements and lands associated with the Landless Workers' Movement

3 This project comprises a series of initiatives designed to foster a conducive environment for major corporations to develop the green hydrogen market in Brazil. One area of focus has been the academic sector, where green hydrogen has been incorporated into university curricula and laboratories specialising in green hydrogen by-products, such as sustainable aviation fuels (SAFs), have been established.

4 Of these, 97% are exploration permits, 1.4% are extraction applications, 0.6% are rights to apply for extraction and 1% are extraction concessions.

(Movimento dos Trabalhadores Rurais Sem Terra). Notably, Energy Fuels is the same company seeking to mine rare earths in Toliara, Madagascar. Its activities there have raised serious concerns due to the damaging effects of mining and strong local backlash, which has been met with a heavy-handed response.

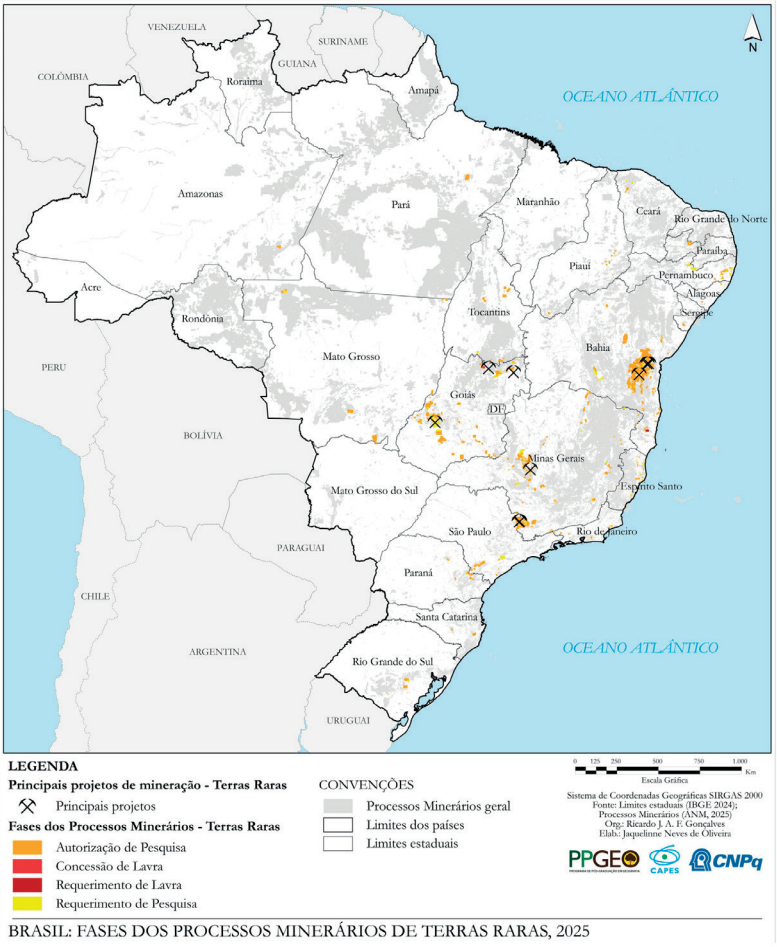

Figure 1: Ongoing procedures for the exploration and extraction of rare earths in Brazil.
Source: Integration of Goiás (Brazil) into the Global Rare Earth Extraction Networks

The state of Goiás has a total of 458 ongoing procedures for rare earth mining. Most of these are prospecting permits, with a few mining concessions in Minaçu and Catalão. The latter has long endured the consequences of niobium extraction and processing. Niobium is also classified as a critical mineral, owing in particular to its military applications, and Brazil is the world's leading producer, accounting for 90% of global output. At present, Minaçu is home to the country's only operational rare earth extraction project.

With regard to hydrogen, Brazil's National Hydrogen Programme involves the realisation of projects with a combined capacity of almost 8.5 million tonnes of green hydrogen per year. This is nearly equivalent to the amount that the EU intends to import from other regions by 2030. More than half of these projects aim to produce green hydrogen itself, while the remainder plan to use it as a raw material to manufacture green ammonia (essential for fertiliser production) or e-methanol (used in synthetic fuels).

Currently, only five projects are operational, accounting for just 0.01% of the total projected capacity. The rest are under development, with nearly half expected to begin operations within the next three years. Some have already completed environmental impact assessments, signed memoranda of understanding or announced associated renewable energy projects.

As expected, they are not distributed evenly across the country. The majority are concentrated in the northeastern region, particularly in the states of Piauí and Ceará. Eight of the ten projects with the highest green hydrogen production capacity are located in these two states, accounting for almost 88% of the total. With its two major

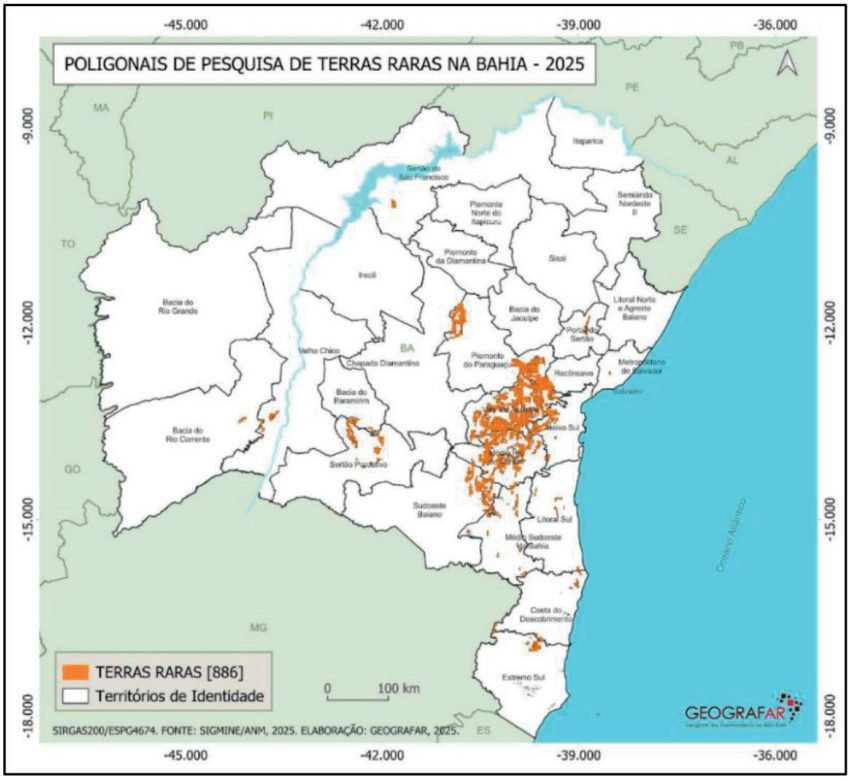

Figure 2: Ongoing procedures for the exploration and extraction of rare earths in the state of Bahia.
Source: A quem serve a transição energética? Minerais estratégicos, terras raras e conflitos na

The first rare earth mine in Brazil

Rare earth mining in Minaçu is operated by Serra Verde, a Brazilian company with significant US investment. During its first operating period between 2024 and July 2025, the mine exported 479.5 tonnes of raw material, all of which was shipped to China (a 45-day maritime journey), as Brazil lacks the industrial capacity to refine it. The company also aims to produce 5,000 tonnes of rare earth oxides per year.

Minaçu has historically depended on mining. Before rare earth extraction began, the municipality was home to an asbestos mine that operated for 50 years, resulting in severe social and environmental impacts.

The project was selected for the Mineral Security Partnership, a US-led initiative bringing together 14 countries and the EU to counter China's dominance in the critical minerals sector. Under this partnership, the project received a $150 million investment from US and UK investors in 2024.

initiatives, Piauí accounts for almost half of the country's projected production, and the Green Energy Park Piauí project alone represents 28%.

This project could be considered one of the most illustrative, as it has been selected to receive funding from the EU's Global Gateway, which has allocated €2 billion to fund projects in Brazil. It is being spearheaded by the Belgian company Green Energy Park Global, which has already reached agreements with Vale.

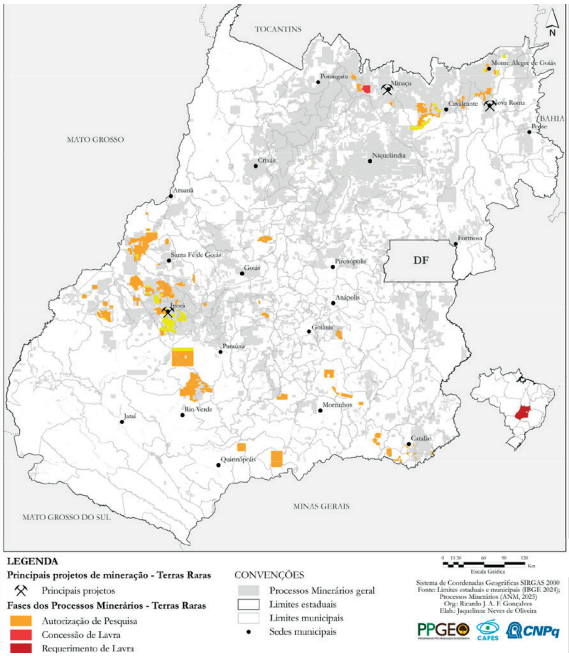

Figure 3: Ongoing procedures for the exploration and extraction of rare earths in the state of Minas Gerais

Source: Integration of Goiás (Brazil) into the Global Rare Earth Extraction Networks

Meanwhile, the owners of the second- and third-largest green hydrogen production projects are backed by Spanish capital. The Solatio project, led by the Solatio Global investment fund in the state of Piauí, accounts for almost a fifth of the total projected production. The Jepri-CIPP project, owned by the Jepri Group and located in Ceará, represents 14%. Interestingly, neither of these companies has historically been involved in advancing energy projects. They have both gained prominence in recent years amidst the energy transition[5].

A transition that reproduces colonial dynamics —

The Brazilian government's focus on rare earth mining and green hydrogen production must be viewed through the lens of global competition for access to critical minerals and resources required for a capitalist green transition. Led by countries in the Global North and emerging powers such as China, this transition presents decarbonisation as a business opportunity and a race between nations, while reproducing and potentially deepening the North's neocolonial dynamics towards the Global South. Brazil is seeking to position itself within these dynamics, as evidenced by its bid to host COP30 and government proposals to commodify forests and emissions. The country's significant rare earth reserves and its potential for hydrogen production, thanks to its abundant solar, wind and hydroelectric resources, bolster this strategy. However, the growing presence of large corporations and transnational capital in these territories undermines popular sovereignty and poses a threat to the environment and local populations.

Figure 4: Geographical distribution of the projects with the highest green hydrogen production
Source: Geovisualiser of "green" hydrogen projects

5 Very little information is available on their websites, or access is restricted to registered users. This limits people's right to information and undermines transparency. Similar situations have occurred with green hydrogen projects driven by companies and investment funds that view the energy transition as a business opportunity. This is particularly the case given their access to public guarantees and financing.

As with most mining activities, rare earth extraction has severe impacts on territories, ecosystems and human lives. Since rare earths are often found mixed with radioactive elements, extracting and processing them is particularly hazardous. Green hydrogen production also has negative consequences, owing to the extensive land use required for large-scale renewable energy projects, the low efficiency of the production process and the high levels of water consumption it demands.

Several rare earth extraction projects in Brazil have already raised alarm and prompted opposition from local communities. In Pitinga, deep in the heart of the Amazon, a Chinese company has recently acquired a tin mine with the intention of shifting operations towards producing niobium and rare earths. This has caused concern among local residents who have long suffered the adverse effects of tin mining, as these consequences would only worsen with the switch to these other minerals. Large-scale extraction of rare earths would endanger water quality, ecosystems, human health and the livelihoods of Indigenous peoples in the area.

CBMM[6], a Brazilian company that operates a niobium mine in Araxá, Minas Gerais, has announced plans to start extracting rare earths, as the deposits contain monazite. However, recovering these elements from monazite poses serious health risks due to its radioactive content, causing alarm among local populations. In Catalão, in the state of Goiás, the niobium mine operated by Mina Boa Vista and China Molybdenum (processing) has displaced rural and indigenous communities, harmed people's health and caused environmental destruction. The mine was cited in a 2022 ruling by the Permanent Peoples' Tribunal, which condemned ecocide in the Cerrado region. Rare earth extraction would further intensify these existing impacts and create new ones in the territory and among local communities.

A recurring issue in both green hydrogen and rare earth projects is the lack of transparency and public access to information. While hydrogen projects are still in the development phase and rely on emerging technologies, it is essential that those affected or interested are able to find out more about them. In practice, however, information is often only made available during legally defined public participation processes, which are not publicised by the responsible authorities. The time frames are also very short and there are few mechanisms to facilitate the participation of affected communities. Consequently, these processes become little more than a formality for the companies involved.

The three largest green hydrogen projects planned in Brazil are being developed by European multinational companies and investment funds. This increases the risk of perpetuating the extractivist dynamics that have characterised relations between countries in the Global North and Global South for centuries. With an export-oriented focus, these projects could exacerbate social, environmental and land-related issues for local communities in order to meet the demands of populations in the North.

Whereas these extraction practices for export were previously associated with fossil fuel production, they are now being reproduced through critical mineral extractivism and green hydrogen production. These two examples illustrate how the institutional approach to the green transition prioritises economic profit over local impacts and

6 Companhia Brasileira de Metalurgia e Mineração (CBMM) is the world's leading producer of niobium and is largely controlled by Chinese capital.

historical dynamics. As a result, it risks aggravating territorial inequalities and perpetuating neocolonial practices.

In Brazil, the People's Mining Sovereignty Movement (Movimento pela Soberania Popular na Mineração, MAM) is calling for an end to the profit-driven management of natural resources through mining, as this has historically enriched local elites and transnational corporations. The movement instead advocates placing the subsoil under the control of the population, meaning the Brazilian people would decide what, where and why to extract. In other words, it supports the creation of mining-free zones and the democratic distribution of wealth generated in areas where extraction occurs, with affected communities actively involved in decision-making.

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