In 2010, a team of Pentagon officials and American geologists uncovered Afghanistan’s best kept secret: a plethora of mining resources such as lithium, copper, cobalt—including 1.4 million metric tons of rare-earth elements, estimated to be worth more than $1 trillion, all of them essential to modern industry. After this development, Afghanistan, according to The New York Times, rapidly became heralded as a country which could “be transformed into one of the most important mining centers in the world.” More than a decade later, however, US forces filing out of Afghanistan were leaving these resources untapped, attracting the interest of neighboring nations.

In July 2021, China and the Taliban agreed on a pact of non-aggression, ensuring that the former will not meddle in Afghan political affairs, and that the latter will not use its territory as a base for Uyghur separatists. The pact substantiates what The Global Times, a newspaper with close ties to the Chinese Communist Party, reported: “huge opportunities for mutually beneficial cooperation between the two countries, especially in sectors such as utilities and mining.” China expects to soon begin the extraction of copper—an essential resource for manufacturing electric cars—from the Mes Aynak mine in the Logar province, for which the Metallurgical Corporation of China (MCC), one of the

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This article has been corrected with minor changes. These changes do not impact the academic content of the article.
leading Chinese metallurgical companies, signed a 30-year lease in 2007.\(^4\) China is certainly not the only interested party; even Russian Ambassador to Kabul Dmitry Zhirkov has recently shown interest in Moscow’s participation in the Afghan economy, particularly in developing resource deposits.\(^5\)

This isn’t to say that states can merely stroll into Afghanistan and extract its resources. In addition to the shortage of a trained workforce, the country’s mining potential could be turned into yet another colossal disappointment by endemic corruption, political instability, and the lack of road and electric infrastructure. According to Chris Ecclestone, a principal and mining strategist at Hallgarten & Company in London, “the Chinese are going to meet big challenges when tapping into Afghan mining resources, as every country did before them over the last decades.”\(^6\) Even if “the Graveyard of Empire’s” minerals do not end up stimulating other nations’ appetites, Afghanistan’s mineral reserves and the questions around their appropriation shed light on the potential for metals to become the bedrock of great future geopolitical strife—especially against the backdrop of a global push for a carbon-free world.

**“On Your Mark”: the Quest for a Carbon-Free World**

In the past decade, announcements in favor of a carbonless world have proliferated: in the United States, the Green New Deal’s ambition to wean the country off fossil fuels has been reinforced by the US’s official return to the Paris Agreement in February 2021,\(^7\) as well as by President Biden’s December 2021 executive order announcing the federal government’s goal to be carbon neutral by 2050.\(^8\) Across the Atlantic, in 2019, the European Commission’s European Green Deal set out a policy package to achieve the same goal by 2050.\(^9\) This push to achieve zero-carbon has even reached specific industries, such as the automobile sector: Norway and the UK have both announced a ban on the sale of new petrol and diesel cars by 2025 and 2030, respectively.\(^10\)

Beyond the environmental impact of a zero-carbon world, the reputational and geopolitical implications of the green transition are palpable. If the United States succeeds in transitioning the quickest, it will be lauded for its environmental consciousness, all the while positioning itself as the leader of the “green world.” However, a crucial component of the diplomatic ambitions behind the green transition has seemingly been forgotten the world over: mineral resources—and more specifically “rare metals.” These resources are as indispensable to the green transition as they are to the United States wanting to lead it.

The 20th century was the era of black gold—the 21st will undoubtedly be the era of metals. We will need colossal amounts of abundant metals (iron, aluminum, copper, zinc), and metals that are much rarer—commonly called “rare
metals”—to develop green technology. Rare metals consist of a set of around thirty raw materials—including cobalt, tungsten, indium, gallium—and rare-earth metals, a subset of fifteen metals that includes samarium, europium, and neodymium. Such metals are not rare from a geological standpoint; deposits are plentiful around the globe and in the depths of oceans, as well as on asteroids. The so-called rarity of these metals is rather linked to their small concentration in the Earth’s crust. For example, there is 1,000 times less neodymium and 2,200 times less gallium than there is iron in the ground.11

The properties of these metals make them essential resources for the energy transition. For instance, the engines of most “zero-emission” cars and the rotors of offshore wind turbines are both made of neodymium, a rare metal particularly prized for its magnetic properties. Likewise, batteries of a large share of electric cars could not be manufactured without resources such as cobalt, graphite, or even lithium.

Clean energy technologies, however, generally require more minerals than their fossil fuel-based counterparts. By way of example, the International Energy Agency (IEA) reports that “a typical electric car requires six times the mineral inputs of a conventional car, and an onshore wind plant requires nine times more mineral resources than a gas-fired power plant.”12 Consequently, new concerns over the capability of the mining sector to supply sufficient volumes of metals for making the world green have appeared. As explained by the IEA in a 2021 report, reaching the goals of the Paris Agreement “would mean a quadrupling of mineral requirements for clean energy technologies by 2040. An even faster transition, to hit net-zero globally by 2050, would require six times more mineral inputs in 2040 than today.”13 These concerns do not only pertain to fears about geological and industrial processing capacity limits: geopolitics also play a role.

Indeed, the list of rare metals overlaps with another list of so-called “critical” resources, which the United States Geological Survey (USGS) and the European Commission last updated in 2018 and 2020, respectively.14 Their production is concentrated in a handful of countries, and the tensions between supply and demand are such that shortages could possibly arise and jeopardize the U.S. and European hopes of carbon neutrality. Indeed, Brazil supplies 92 percent of the world’s niobium, South Africa accounts for 84 percent of the world’s rhodium production, and the Democratic Republic of Congo (DRC) provides 60 percent of the world’s cobalt.15 However, it is China that truly has the lion’s share: it produces, among others, 80 percent of the world’s gallium, 74 percent of its antimony, 83 percent of its tungsten, and 69 percent of its...
natural graphite. Overall, Beijing is the world’s largest producer of eighteen of the thirty critical metals. By comparison, the thirteen member states of the Organization of Petroleum Exporting Countries (OPEC) “only” represent 28 percent of global oil production. As Dudley Kingsnorth, Professor at the Western Australian School of Mines, put it, “China is an OPEC on steroids.”

By seeking to break free from fossil fuels and create a new, greener world, we are setting ourselves up for a new and more potent reliance on China, which controls most of the production of rare and critical metals. As the International Renewable Energy Agency (IRENA) flagged in its 2019 report, “just as fossil fuels have shaped the geopolitical map over the last two centuries, the energy transformation will alter the global distribution of power, relations between states, the risk of conflict, and the social, economic and environmental drivers of geopolitical instability.” A geopolitics of energy transition is unfurling right before our eyes, even though no one seems to have grasped this reality. The 27 page COP21 agreement (2015) never mentions future needs for mining resources, nor does the final declaration of the Glasgow COP26 summit that was held in 2021. Why does considering such a central, crucial issue continue to elude the Western states? Where will we extract these metals from? How will their production impact mankind and the environment? Which nations will assert their leadership in the geopolitics of rare metals?

Why does considering such a central, crucial issue continue to elude Western states?

China’s Head Start

To date, Western states have almost completely abandoned the production of strategic mining resources to a handful of mining states. China is now the leading, sometimes quasi-monopolistic producer of a host of rare and critical metals essential to the energy transition. As previously mentioned, rare metals are not as rare as their name would indicate: deposits have been identified all over the world. The United States itself was once a leader of the production of rare-earth metals thanks to its Mountain Pass mine in the 1980s, until its environmental impacts led the Molycorp group, which owned the mine, to stop all activity in 2002. French production went much the same way. In the 1990s, the chemical company Rhône-Poulenc (now Solvay) transferred most of its radioactive rare-earth metal refinery activities to China. As a former Rhône-Poulenc employee later admitted, “there was shit we didn’t want, that’s what it comes down to.”
China’s leadership on the production of rare metals cannot be understood without looking at the environmental implications of their extraction. Before these metals can be incorporated into green technology, colossal amounts of rocks must be extracted and treated with significant volumes of acid. The material must then be purified with a dizzying amount of water: the purification of one ton of rare earth metals requires 200 square cubes of water which, laden with heavy metals, often ends up being dumped into rivers, soil, and groundwater without receiving any prior treatment.22

The most striking example of contamination can be witnessed in the region of the city of Baotou, known for its status as the largest rare-earth production site on the planet. A 2019 report on the Weikuang Dam, past the suburbs of Baotou, revealed an artificial lake into which metallic pipes regurgitate torrents of black water from nearby refineries. The ten-square-kilometer lake was brimming with toxic waste. Vivian Wu, a recognized Chinese expert in rare metals, assesses that “the Chinese people have sacrificed their environment to supply the entire planet with rare earths.”23 The knowledge of how polluting this industry is, is precisely why Western states decided to relocate it beyond their borders.

Western powers thus knowingly delocalized the pollution associated with the production of rare metals to countries that were all too happy to develop a sector on which Western states would now be dependent. As magnanimously put by the Canadian rare metals industrialist Gregory Bowes, “we can thank [the Chinese] for the environmental damage they have endured to produce these metals in our place.”24 Low-end refineries mushroomed in China in the 1990s, and the world thus became divided between those who sacrifice their health and their environment to provide the components of green tech and those who acquire them to better enjoy the technologies presented as “clean.” This division of roles between producer and consumer states is the first element of the geopolitics of rare metals.

From Production to Transformation

Merely producing most of the world’s rare metals wasn’t enough for China, however. Indeed, Beijing quickly became aware that its control of the production of rare metals gave it colossal economic leverage. China’s strategy thus expanded to the manufacture of the end-products—green tech—in order to conduct its own energy transition. As explained by Chen Zhanheng, an official from the China Rare Earth Industry Association, “China’s own industries could benefit from the added value of rare-earth minerals.”25

To achieve this objective, China’s strategy was ruthless. Not only have Chinese industrial operations benefited from government incentives, cheap labor costs, and a depreciated national currency, but starting in the 2000s
Beijing began restricting exports of various rare and critical resources. Take rare-earth metals, for example. While 65,000 tons were exported in 2005, only 35,500 tons were exported in 2020. This strategy reached its peak in a 2010 rare-earth metal embargo on Japan and the United States.

The pact that China imposes today borders on blackmail: foreign high-tech industrialists can benefit from unlimited access to a large array of rare and critical metals (including rare earths), on the sole condition that they relocate their production centers—and the associated technologies—to China. Whether they are seduced or coerced into doing so, many countries have turned exclusively to China, which has allowed it to dominate not only one, but the entire industrial value chain.

Despite its rank as one of the most polluting countries in the world, China has emerged as a giant of the green industry and intends to consolidate its status as the main producer of green tech, thereby partly absorbing Western aspirations toward the creation of “green jobs” in the process. China today manufactures 67 percent of photovoltaic equipment, enjoys 37 percent of the world’s wind-installed capacity, and is home to 73 percent of global lithium cell manufacturing capacity—a technology key to manufacturing electric cars.

Europe, Japan, and the United States have floundered in comparison. For Europe and the United States, promises of high-tech factories developing wind turbines, solar panels, or electric cars have been floated across the political forum, but they are often illusory. For instance, the EU provides less than 1 percent of EV batteries and a 2020 report by the Joint Research Centre of the European Commission found that its “contribution is marginal in each step of the [photovoltaic energy] supply chain.” As summed up by Mark Tory, CEO of Northern Minerals Limited, “China has done such a great job for the last decades of going down the value chain of these metals, whereas the West has done nothing.”

China’s Global Search for Rare Metals

China, however, still needs to import large volumes of minerals to fulfill its enormous needs. As put by Jack Lifton, an American consultant and lecturer on the market fundamentals of technology metals, “the Chinese consume 50 to 60 percent of the world’s metals. Therefore, they need to feed their market. They don’t want to export more, they want to import more critical raw materials.”

Take copper, for example. While China is the largest copper-refining country, accounting for 50 percent of global demand for refined copper, it is also the world’s largest copper importer, with 60 percent of its copper being imported.
Consequently, “China will go anywhere they can to get their hands on minerals,” Mark Tory says. Despite already owning around 60 percent of global production of rare-earth metals, China has sought to extend its grasp on these metals elsewhere. For example in 2016, Shenghe, one of the world’s largest rare-earth material producers, acquired a 12.5 percent stake in Greenland Minerals, an Australian company which aims to extract rare earth in the Kvanefjeld deposit, southwest of Greenland. The same company, Shenghe, has also acquired an 8 percent stake in MP Resources, the group that exploits the American Mountain Pass rare earth mine.

The most impressive of China’s feats lies in the DRC, which boasts more than half of the world’s cobalt reserves. For the past fifteen years or so, China has progressively entered the DRC’s cobalt mining market by buying out European and North American companies such that they now control a majority of the cobalt mines in the southern DRC. As of 2020, fifteen of the nineteen cobalt-producing mines in Congo were owned or financed by Chinese companies. Today, China has its hands on 70 percent of the DRC’s cobalt.

At the beginning of the Covid-19 pandemic, as countries hastened to obtain shipments of masks and medical equipment from China, Western powers quickly realized how dependent they had become on this nation. This episode of “mask diplomacy” should have served as a wake-up call for the West as regards rare metals: what can it do to get out of this dependency?

With the demand for a greener world has come a demand for more rare and critical metals, which will explode in the years to come. In May 2021, the IEA released its assessment of the multiplying need for resources in order to reach a low-carbon world by 2040. The results are jarring: in order to reach the goals of the Paris Agreement, the world will need to produce forty-two times more lithium, twenty-five times more graphite, twenty-one times more cobalt, and seven times more rare-earth metals in 2040 compared to 2020.

These findings led Fatih Birol, Executive Director of the IEA, to declare that “today, the data shows a looming mismatch between the world’s strengthened climate ambitions and the availability of critical minerals that are essential to realising those ambitions.” This is not only due to the fact that mining companies will not be able to sustain the growing demand for metals, but also because the Chinese policy of holding back mineral resources for its own green transition could make it more difficult for rival nations to achieve their own ecological goals. Since China’s monopoly cannot be ignored, Western powers can either be fatalistic and simply accept that China has the upper hand—or fight back.
Mining Nationalism and Mineral Sovereignty

This multiplication of mining fronts is being met with resistance all over the world, by governments and members of civil society alike. Mineral resources are not lacking, but their extraction is blocked by states fearing that the energy transition will be a mere repetition of the neo-colonialist modus operandi of past centuries. Metal extraction must now be more profitable and more respectful of human dignity (i.e., ensuring that children do not work in mines).

As a result, nations are increasingly refusing to give foreign industrial companies access to areas rich in minerals. In Greenland, a left-wing environmentalist party that opposed a controversial mining project recently won the most votes in the country’s 2021 parliamentary election. The project at hand would have consisted of mining rare earths and uranium from the Kuannersuit deposit, one of the world’s richest uranium and rare-earth mineral deposits. In Serbia, Rio Tinto’s July 2021 announcement that it would develop a lithium mine in Western Serbia spurred an onslaught of civilian protests in early December due to fears of environmental degradation at the mining site. By the end of the month, the company had decided to put the $2.4 billion project on hold indefinitely.

In other cases, countries grant foreign mining companies access to their resources, yet toughen the surrounding regulatory and fiscal framework in order to protect their own interests. The DRC, for instance, signed a new law in March 2018 which increased taxes on mining companies and doubled government royalties from the mining industry. In South America, the newly elected leftwing government of President Pedro Castillo has established a list of criteria that mining companies must respect in order to continue operations. These criteria—which encompass labor laws, environmental regulations and community relations—are indicative of President Castillo’s overarching desire to have the mining sector “contribute more to help pay for education and health spending.” In short, mining countries have come to realize that in a post-oil era, they must capitalize on their minerals’ potential added value, be it social or economic.

This mining nationalism, previously confined to China, has spread; as Jack Lifton puts it, “China galvanized the nationalism of resources, not only on its own territory, but all over the world.” A 2020 study by the OECD, analyzing global export restrictions on industrial raw materials from 2009 to 2019, reported that metals such as copper or cobalt have consistently been the object of export restrictions during this ten-year period in nations such as China, Indonesia, Argentina, the DRC, and even Zambia. Tensions are abounding between countries that are sites of production and countries wishing to access resources and clients. The balance of power is no longer systematically in favor of the latter, but increasingly in favor of the former.
“Get Set”: to Compete with China

The strategic and economic stakes of getting out of China’s grip cannot be understated: as early as the Obama administration, the American defense industry was reliant on China for the supply of rare metals essential to the design of the Lockheed Martin F-35 fighter jet and the Boeing JDAM smart bombs. In 2012, the U.S. administration was even forced to allow the import of rare earth magnets needed for the F-35’s radars, landing gear, and computer systems from China. This exception to a 1973 law, which in principle prohibits the purchase of certain metals from foreign suppliers for incorporation into national weapons technology, is still in effect today.54

It was especially during the Trump presidency that the US ramped up its pushback against China. After an initial impetus provided by former President Donald Trump, the US Department of Commerce published its “Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals” in June 2019. The report’s executive summary is clear: “the United States is import-reliant … for 31 of the 35 minerals designated as critical by the Department of the Interior.”55 The report contains six calls for action which incidentally mirror the IEA’s key recommendations to increase mineral security.56 While the IEA insists on increasing market transparency and scaling up recycling efforts, the United States goes a step further and notably evokes a better “understanding of domestic critical mineral resources” and the necessity to “improve access to domestic critical mineral resources on federal lands and reduce federal permitting timeframes.”57

This strategy is already underway. The Californian Mountain Pass Mine reopened in the United States in 2018,58 while France’s Minister of the Ecological Transition, Barbara Pompili, discussed the opening of lithium mines in France as recently as December 2021.59 All over Europe, dozens of lithium extraction projects have arisen.60 This trend is spearheaded by the assessment made by EU Commissioner for the Internal Market Thierry Breton who, as the EU was publishing its fourth list of critical raw materials in 2020, stated that “the era of a conciliatory or naive Europe that relies on others to look after its interests is over.”61

On the other hand, the French metallurgical and mining group Eramet also announced on November 8, 2021 that it will open a lithium processing plant, essential for manufacturing car batteries, in Argentina in 2024 in partnership with the Chinese company Tsingshan.62 Japan, through its governmental body JOGMEC (Japan Oil, Gas and Metals National Corporation), signed a ten-year loan extension with the Australian mining company Lynas in 2019. The latter will reimburse JOGMEC’s 147-million-dollar investment on easier terms, and in return, will prioritize supplies of rare earth extracted from its Mount Weld mine to Japanese industrial customers.63
As for Europe, it launched a bilateral cooperation on raw materials with Latin American countries called the “EU-Latin America Raw Material Dialogue” in 2011. Companies themselves are even concluding contracts with mines directly. Tesla, for example, secured rights to 10,000 acres of land in Nevada to produce lithium in 2020 and signed a multi-year nickel supply agreement with the New Caledonian miner Prony Resources in 2021. Despite the underlying motivation for the green transition, this metal frenzy is creating geopolitical upheaval that could go against the comradely ideals displayed at the conclusion of the Paris Accords.

The energy transition will thus take place under the banner of changing dependencies. Behind the energy transition that has been lauded by nations and environmentalists alike—one of environmental and ethical soundness—lays the rude reality that has yet to be understood: this energy transition will not necessarily be more respectful of people and their environments. The green world will be forged through new solidarities and new geopolitical tensions in addition to those already existing over our access to soil. The situation in Afghanistan is indicative of this new reality. During the 20th century, the West gave petrodollars to the Saudis, who proceeded to flood the world with a form of radical Islam—Wahabism—all so that the Western world could drive comfortable gasoline-powered cars. A century later, who is to say that we will not be giving lithium dollars or lithium yuan to the Taliban who, with this money, will spread another form of radical Islam in the world, just so that we are able to drive in comfortable electric cars? If our fate is so sealed, then we will have learned nothing from history—unless we rethink our production and consumption patterns.

**“Go”: Toward Ethical Sourcing and the Circular Economy**

First, we will need to ensure a more ethical sourcing of minerals. This is the objective of a European Union Conflict Minerals Regulation that came into force on January 1st, 2021, which requires that EU-based importers of tin, tungsten, tantalum, and gold ensure that these minerals have been ethically sourced and do not finance armed conflict. These types of regulations, when put in place in a confined geographic area such as the EU, could have severe geopolitical repercussions. While they could serve to incentivize other countries across the world to install similar measures, there is also a risk that companies may leave the EU and
relocate to places with less stringent policies. Such forecasts must be tempered, however: the Conflict Minerals Regulation is only aimed at four minerals—a number far from sufficient today.

Second, given economic growth’s interdependence with resource use, the circular economy, which pulls resources from within the economy itself, could answer the world’s growing mineral needs.\(^6^7\) However, in Europe for example, circularity has a low potential: not only is Europe’s 55 percent recycling rate too low, but a foreign nation has already grasped the opportunity to benefit from the recycling of metals within Europe.\(^6^8\) Japan, which boasts sixteen metal recycling centers belonging to Hitachi, Mitsubishi Electric, Sony, and Sharp, has pushed its industrialists to create European companies to import European electronic waste to Japan, where it is then processed in Japanese foundries. In 2017, 78 percent of the copper and 83 percent of the zinc recycled in Japan came from imports, especially from Europe.\(^6^9\) The situation has been flagged as a fundamental issue to which the European Commission and Member States should pay the utmost attention. For Europe to catch up to Japan, one could envision a Europe-wide collection and recycling of metals. The added value of these metals would thus be centralized at a local level. After the nationalism of raw minerals, perhaps we are moving toward the nationalism of recyclable metals.

Yet circularity cannot exist when our needs and methods of consumption constantly push us to use more metals and resources. As stated by the European Environment Agency, “the circular economy … may not deliver the transformation to sustainability if circularity measures fuel a growth strategy that leads to increased material consumption.”\(^7^0\) If the answer does not only reside in the circular economy, then perhaps the solution lays in reframing and rethinking societal notions of progress in broader terms than consumption.

**Breaking the Interdependence Trap**

If we want to avoid this constant back-and-forth between Western nations and China, perhaps it is our methods of consumption altogether that we should be reconsidering. The post-oil world may also be the opportunity to rethink our capitalism. A search for sobriety—which does not have to rhyme with degrowth—must accompany the green transition. Perhaps the solution lies in the existence—and coexistence—of alternative schools of thought about growth. Where post-growth focuses on the need to “decouple well-being from
economic growth,” doughnut economics “combine attention to the legitimate needs of the present human population with the need for a transformation to a sustainable future.”

These ideas are already a reality in some countries. This is best exemplified by the Wellbeing Economic Governments partnership, an international collaboration currently comprised of Scotland, New Zealand, Iceland, Wales and Finland dedicated to ensuring that development in the 21st century is conducive to human and ecological wellbeing. Yet, only a handful of observers appear to have grasped how such innovative approaches to development criteria will likely boost these states’ diplomatic momentum.

At a time when the political and industrial apparatuses of the West are entirely focused on reviving economies that have been violently hit by the health crisis, we can see how much more painful the energy transition is likely to be than we imagined, even more so if reliance on China’s rare metals is sought to be avoided. Yet breaking the interdependence trap is crucial, and not only for commercial reasons: China’s grasp on rare metals gives it an undeniable geopolitical weapon against the West. China’s consolidation of its position in metals could lead to repeats of its aforementioned 2010 rare-earth metal embargo against the United States and Japan, one that was in essence fueled by its dispute with Japan over possession of the Senkaku Islands. Though the embargo was short-lived, China could just as easily hamper the United States’ production of F-35 jets, for example.

Changing our methods of consumption may just be the first step in countering Beijing’s hold on the West’s energy transition. We still refuse to admit it, and yet in reality, this new technological leap needs to be accompanied by leaps of conscience.

Notes


9. At the 26th United Nations Climate Change Conference (COP26), India, the world’s third largest carbon emitter, announced that India is now targeting 2070 for net-zero emissions. China, who vowed to achieve the same objective but by 2060, did not make any new commitments during the COP26. Lucy Handley, “India targets 2070 for net-zero emissions; China makes no new commitments,” CNBC, November 1, 2021, https://www.cnbc.com/2021/11/01/india-targets-2070-for-net-zero-emissions-china-makes-no-new-commitments.html.


27. John Seaman, researcher at the French Institute of International Relations, interview with author, 2015.


61. Michael Peel and Henry Sanderson, “EU sounds alarm on critical raw materials shortages,” Financial Times, August 31, 2020, ft.com/content/8f153358-810e-42b3-a529-a5a6d0f2077f.


71. Ibid.

72. Wellbeing Economy Alliance,