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Extractive Industries and Mineral Resources: Turbulence All Around
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Introduction

Few global sectors embody the intersections of contemporary, turbulent environmental, geopolitical and economic politics as well as the extractive industries and mineral extraction. As highly contentious decarbonisation efforts proceed and intensify, the economic and strategic value of minerals critical to low-carbon transition has significantly increased for most countries, especially powerful ones. Attempts to secure these natural resources across the globe have led to increasingly intense competition among major powers, which produce various types of turbulence (ecological, normative, and political) at different levels (Sovacool et al., 2020; Kalantzakos, 2020; Kramarz et al., 2021). More than ever, the governance of extractive industries and mineral resources are urgently needed for a world experiencing a set of energy, sustainability and political transitions (Ali, et.al. 2017; Andrews-Speed, et.al 2015; Bleischwitz et.al. 2018)

Recent years have seen enormous growth in scholarly and popular attention to the need for much more significant and impactful climate mitigation policies – what some call the “decarbonization imperative” – and also to “rapid transitions.” just and transformational adaptation, or and “green new deal” demands and debates in various national and international forums. However, a just and ecologically and socially sustainable minerals sector too often remains an afterthought in climate and energy transition debates and scholarship. In short, the complex and challenging governance links between governance of extractive industries and decarbonization action have yet to get sufficient traction in most policy discussions.

While the work of the UNEP Resources Panel has improved the informational basis around which to debate the governance needs and challenges of the minerals sector, the absence of more authoritative intergovernmental/multilateral governance efforts means that the global extractives sector is largely governed through transnational initiatives, such as Responsible Minerals Initiative, the International Council on Mining and Metals and the Extractive Industries Transparency Initiative. Auld et al. (2018) identified a number of governance gaps along the mineral life cycle, including comparative little attention to a host of well-known environmental/ecological issues associated with the minerals sector, a relative neglect of end-of-cycle issues such as reuse, recycling, recapture, waste disposal and mine closure (see also Compaore and Andrews *forthcoming*; Mulvaney *forthcoming*; Le Billon & Shykora, 2020).

In this chapter we discuss different areas of turbulence surrounding the global decarbonization imperative and its significance for the extractives sector. Throughout the chapter, we consider whether and how existing forms of governance are dealing with identified challenges and turbulence dynamics. Some governments recently began to strengthen governance of critical minerals by promoting circular economy models (e.g., the EU Battery Regulation currently being developed), but these initiatives remain at a very early stage. Hence the existing governance system is highly fragmented with little connections across scales.

After a discussion of the relationship between the massive necessity of global decarbonization and its relationship to expected enormous growth in global demand for mineral resources, the chapter organizes its discussion of challenges to global extractives and minerals governance and the turbulence surrounding such governance into four types of turbulence: ecological, normative, geopolitical and multi-scalar.

Extractives and the Global Decarbonization Imperative

Mitigating climate change demands rapid transformations of global and national energy systems. According to the most recent IPCC Working Group III report, reaching the Paris Agreement's 1.5 degree target will require that nearly all electricity be supplied from zero- or low-carbon sources by 2050 (IPCC 2022). Hardly a week goes by without the issuance of yet another report demonstrating that every aspect of the global economy must be rapidly decarbonized. This critical necessity to rapidly decarbonize from global to local scale, in order to avoid the most catastrophic impacts of climate change, is sometimes called the decarbonization imperative (Lenox & Duff 2021).

The extractive industries and mineral resources are key components in the quest for a decarbonized future and demand for ever more minerals is expected to grow (Ali, et.al. 2017). For example, global demand of aluminum and copper can increase up to 350 percent by 2050 to limit the rise of global temperature well below 2°C above preindustrial levels by 2100 (Hund et al., 2020, p. 40). Two minerals are also crucial to producing wind turbines with a large volume of iron to make steel that composes the mainframe of wind turbine. Besides, graphite, nickel, cobalt, and lithium, so-called “high-impact minerals,” are significant for energy storage technologies, and the worldwide demand for extracting the minerals is expected to increase almost 500 percent by 2050 compared to the production level in 2018 (Hund et al., 2020, p. 93).

The EU (2020) estimates that, for electric vehicle batteries and energy storage, the EU would need up to 18 times more lithium and 5 times more cobalt in 2030, and almost 60 times more lithium and 15 times more cobalt in 2050 (compared to the current supply). Demand for rare earths used in permanent magnets 15 , e.g. for electric vehicles, digital technologies or wind generators, could increase tenfold by 2050. Meanwhile, IEA (2021) estimates that, in climate-driven scenarios, mineral demand for use in EVs and battery storage would grow at least thirty times to 2040. Lithium sees the fastest growth, with demand growing by over 42 times in the Sustainable Development Scenario by 2040, followed by graphite (25 times), cobalt (21 times) and nickel (19 times). The expansion of electricity networks also means that copper demand for grid lines more than doubles over the same period.

If the decarbonization transition is to succeed and accelerate, enormously valuable fossil fuel sectors must be rapidly scaled back by at least 80 percent, including oil, natural gas and coal even as renewable energy production grows exponentially. Those who seek stable, incremental policy development are likely to be pitted in contentious conflict with those seeking substantially more aggressive and stringent decarbonization policies likely to be perceived (or explicitly framed) as highly politicized because they take-on entrenched, powerful and well-funded interests (Tobin, Paterson and VanDeveer 2022). Various types of political – or highly politicized – turbulence seem a likely result. For example, coal is currently the largest source of revenue for many mining companies by a wide margin. Today's revenues from coal production are ten times larger than those from energy transition minerals (IEA 2021). While clean energy transitions can change this picture, existing investment plans fall short of what is needed to transform the energy sector. Furthermore, corporate leadership, shareholders and/or governments who run state-owned companies seem unlikely to give up these massive fossil fuel revenues without a fight.

Ecological Turbulence: Biodiversity and Nature versus the Energy Transition?

There is growing awareness amongst scientists and decision-makers that climate change and biodiversity are inextricably linked and must be addressed together (Bulkeley, et.al. 2022). This was highlighted in the first every joint report issued by the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (Pörtner et al. 2021) and reinforced in IPCC's Sixth Assessment Report by both Working Groups II (vulnerability and impacts) and III (solutions) (Pörtner et al. 2022; Pathak et al. 2022). However, addressing these issues simultaneously poses significant political challenges. To date, climate change and biodiversity loss have largely been governed separately at the intergovernmental level through two distinct treaty regimes organized around the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention on Biodiversity (CBD). While both regimes have set ambitious decarbonization targets and support biodiversity conservation and sustainable use, a growing body of research suggests that initiatives often require trade-offs between climate and biodiversity goals. For example, afforestation and reforestation efforts aimed at increasing carbon storage or providing flood risk mitigation may negatively impact species and habitat diversity that is considered essential for biodiversity conservation (Seddon, et.al. 2019). Moreover, the effectiveness of governance efforts in terms of achieving climate and biodiversity goals may also involve trade-offs in terms of advancing justice and livelihoods for local communities (Corbera, et.al. 2007; Burney, et.al.2021). At the very least, it is essential to ensure that actions to address one problem do not exacerbate the other (Cashore & Bernstein 2022).

Simultaneously pursuing climate and biodiversity goals may be particularly challenging in the energy sector, where significant mineral resources are needed to support the global shift to renewable energy sources. History has repeatedly shown that mineral extraction has negative impacts on biodiversity. For example, Bebbington et al. (2018) demonstrated that mining and mining-related infrastructure development contributes directly and indirectly to deforestation and forest degradation as well as the rights of forest-dependent communities. They document a vicious circle where mining-related infrastructure facilitates population movements and agricultural expansion further into the forest. Mining for critical minerals such as lithium and cobalt takes place in biodiversity hotspots and may generate conflict around alternative land-uses (e.g. forests and agriculture) and community livelihoods (Lèbre et al. 2020; Agusdinata et al., 2018). There is increasing commercial interest in mining the critical minerals contained in the cobalt-rich ferromanganese crusts of the seabed, even though the International Seabed Authority has been drafting regulations prohibiting such activity based on the precautionary principle (Smith et al. 2020). With ambitious decarbonization and climate goals driving increased mineral extraction, most mining operations seem likely to be framed around mitigating adverse climate and biodiversity impacts, rather than advancing broader global goals.

A growing number of transnational governance initiatives (TGI) seek to address climate change and biodiversity goals simultaneously, but these largely do not directly focus on extractive industry and mineral resources. Rather, they appear to be organizing around “nature-based solutions” as a way to simultaneously produce climate and biodiversity benefits (Bulkeley et al. 2022). At the same time, TGI targeting the extractives industry have paid insufficient attention to environmental and climate impacts of mining activities (Auld et al., 2018). In sum, the existing governance gaps implies huge risks for the extractives industry to undermine the goals of nature and biodiversity conservation in the name of supporting clean energy transitions.

Normative Turbulence: Political Contestation and Constructing Rights and Wrongs

The normative political environment is now highly contested, dynamic, and uncertain – with implications for national and global politics, firm strategies and investments and many activist campaigns. Here we highlight two areas of norm contestation related to extractive industry where urgent calls to address the climate crisis confronts the imperative to ensure justice and equity. The first area of contestation revolves around moving away from fossil fuels. Bridge and Le Billon (2013) note that various ideas and actors are challenging the acceptability of oil, often related to its enormous contributions to climate change and the substantial amounts of violence associated with oil over a century. Such normative challenges are also seen for coal – or fossil fuels, generally – which are increasingly framed as “bads.” A growing number of cities, states/provinces and national governments have set coal phase-out dates, for example, while many private financial institutions and multilateral development banks have enacted policies to prohibit financing for coal power plants, mines, and ports facilities (VanDeveer and Boersma 2022). In addition to opposition from powerful mining interests, these developments are also challenged by those whose livelihoods are depending on fossil fuels. Scholars and activists calling for a “just transition” highlight the need to acknowledge the rights of workers in the fossil fuel sector and to ensure that low-income workers affected by green economy policies are not left behind leading to increased levels of income inequality (Stevis and Felli 2020, 2015). The Yellow Vest movement in France is but one example of this contestation.

A second area of norm contestation revolves around the need to increase critical mineral extraction to support renewable energy production and advance net-zero goals. In this instance, increased extraction is seen as a global “good” that requires increased finance, investment and infrastructure to rapidly scale up “clean” technologies such as EV cars in order to meet global decarbonization goals. More public and private investors, including multilateral development banks, attempt to divest fossil fuel sectors and switch their money flow into green energy projects as a global trend (e.g., Energy Policy Tracker 2022).

But the imperative to address climate change is challenged by normative concerns related to equity and justice. For example, across Latin America and Australia, existing mining operations and new mining investments often include highly contentious and polarized politics related to Indigenous rights and exploitation and the perceived lack of local benefits for communities in and around mining areas. Across the Amazon basin, rivers are dammed to provide cheap electricity for mining operations while roads and other infrastructures must be cut into the Amazon interior to connect the mines to the global economy. Across sub-Saharan Africa illicit minerals trading and, in some areas militarized control of mine and minerals trade fuel debates over “conflict minerals” and how to govern such challenges. The huge growth in ethically framed certification schemes in the mining and mineral sector – and the growth of firm-based CSR – are a further indication of the growing complexity and contention related to the extractive industries (Auld, et.al. 2018). Whether talking about the need to reduce fossil fuels or increase critical mineral extraction, there is a need to confront these important questions about who benefits. How can we make sure that equity is not used by powerful actors to advance their own agenda? It is highly challenging to develop an inclusive system to support vulnerable actors who are affected by clean energy transitions.

Table 1: Extractive Industries & Normative Turbulence

	The reduction of fossil fuel extraction (Curbing fossil fuel energy)	The increase of critical mineral extraction (Increasing renewable energy)
The imperative to address the climate crisis	<ul style="list-style-type: none"> •Sustainable Development towards Net-Zero (curbing the use of “dirty” fossil fuels) e.g., cutting fossil fuel subsidies, imposing carbon tax 	<ul style="list-style-type: none"> •Sustainable Development towards Net-Zero (boosting the renewable/ “clean” energy production) e.g., climate finance for the renewable energy sector
The imperative to ensure justice and fairness	<ul style="list-style-type: none"> •Workers’ rights in the fossil fuel sector •Job security and livelihood of low-income workers affected by green economy policies •Income inequality e.g., the Yellow Vest movement in France 	<ul style="list-style-type: none"> •Environmental protection and biodiversity regarding land-use intensity of mineral extraction •Indigenous rights e.g., Free, Prior and Informed Consent (FPIC) -Illicit trade and connections of mineral extraction and markets to militarized violence

Geopolitical Turbulence: Great Powers & Supply Chain Challenges

While a more significant number of states regard a carbon-neutral future as a shared global goal, the current green transition policies provoke some new geopolitical tensions between great powers. UNFCCC COPs like Glasgow (2021) seem to illustrate that while Russia, India, China, the US and the EU appear to accept the decarbonization necessity rhetorically, they find agreement on the needed pace and means of decarbonization and the energy transition away from fossil fuels quite elusive. China and Russia, in particular, often loom large in both global energy and minerals markets and supply chain discussions, but progress toward material usage reductions or material transformations clearly remains slow in the US, the EU and elsewhere, as well. Moreover, Russia’s 2022 invasion of Ukraine seems to have triggered more uncertain, complex and contentious geopolitical dynamics surrounding the energy trade and supply – disrupting markets for extractives and renewables, alike. As Falkner and Buzan (2022) suggests, great power responsibility-taking generally remains elusive around environmental and climate risks, costs and contributions to the the problems. Also importantly, given the growing dominance of emerging economies in global supply chains, actors in these countries should take more responsibility in leading rapid and also just sustainability transition (Sun 2022).

New geopolitical tensions became more explicit around issue associated with stable access to critical mineral resources, such as cobalt and lithium, being crucial to produce renewable energy infrastructure and batteries of electric vehicles (EVs). More specifically, the US and the EU have become increasingly concerned about the dominance of Chinese companies and capital in the global supply chains of many critical raw materials and have framed such dominance as a threat to their economy and national security (e.g., Blair & Diamond 2021; Horizon Advisory 2021). Such framing is likely to lead a new type of ‘battery arms race’ among major powers in securing mineral resources, which would reinforce geopolitical tensions between China and Western

countries in the post-COVID world (Pattison & Firdaus 2021). Such a race would create new global governance gaps, with a host of potentially negative impacts.

First, great power competition is likely to reinforce poor socio-economic conditions in resource-rich developing countries. Although attempts to secure and govern critical minerals by major powers began to give attention to sustainability challenges associated with extraction, relevant policies and practices have been far from effective in supporting local economies, improving livelihoods of local communities, and protecting local environment in mining countries. Instead, interventions by powerful countries in the downstream part of the global supply chains often overlook the interest of vulnerable groups affected, and therefore fail to address the root causes of relevant sustainability issues (van der Ven et al., 2021).

Second, growing great power competition over the control of the global mineral supply chains often leads to state-driven securitization of clean energy transitions and risks to prevent necessary international cooperation to accelerate climate action. Some policymakers are concerned that more foreign states can weaponize critical minerals for security reasons based on some historical events. A representative case is that China restricted its export of rare earth minerals to Japan in 2010 due to the Japanese coast guard's investigation attempt in the disputed area near Senkaku/Diaoyu islands (Kalantzakos 2019; Wilson 2018). This incident led to the WTO lawsuits against China initiated by Japan, the US, and the EU (Mancheri et al. 2019).

For years, the US government has released official statements warning about a global race to control global mineral supply chains, particularly regarding China's dominant influence in critical mineral resource sectors (Kalantzakos 2018; Klinger 2019). The former and the current US administrations commonly declared that the US' heavy reliance on importing critical minerals from China is a national security threat, and the US will build resilient critical mineral supply chains with its allies (The White House 2020 & 2021). Meanwhile, Biden emphasized more explicitly the significance of diversifying supply chains to meet the increasing resource demand for clean energy technology *to achieve national and global climate goals* (The White House 2021, emphasis added).

The securitization of global mineral supply chains strengthened diplomatic ties between the US and its allies to reduce the risk of disruption of global mineral resource supply chains. In November 2021, The US and Australia released the US-Australia Critical Minerals Plan of Action "for electric vehicles and the broader transition to a green economy" (US Department of Commerce 2021). Similarly, the US and Canada prioritized the agenda of critical mineral supply chains through the US-Canada Joint Action Plan for Critical Minerals (US Department of State, 2021). For the same purpose, the EU states initiated the European Raw Material Alliance (ERMA) in 2020, and the EU and Canada created a strategic partnership on raw materials in 2021.

The US and its allies increasingly attempt to expand their influence in more mineral resource-rich countries and contain China's dominant power over global mineral supply chains. For instance, Five Eyes, an intelligence alliance (among the UK, the US, Canada, Australia and New Zealand) and the EU built a strategic partnership with Greenland, an Arctic region with abundant rare-earth minerals (Menezes 2021). On the other hand, there has been a lack of multilateral dialogue between China and these Western allies to cope with transnational governance challenges of the global

mineral extractions together, such as negative socio-environmental impacts on the most affected communities and nature in local mining sites. Therefore, the current geopolitical turbulence triggered by the state-centric securitization of mineral resources would obstruct international cooperation in building global norms and regulations for the sustainability of demanding resource extractions and pursuing rapid energy transitions towards global net-zero.

Multi-Scalar Turbulence

Decades of turbulent oil politics, rooted in interdependence, often tight oil markets and the persistent securitization and increasing financialization of oil (see Bridge and le Billon, 2013) offer many cautionary tales for minerals and extractives as a whole. For a start, because oil and gas extraction and transport are often locally, nationally, regionally and globally turbulent – including violence, displacement, rent-seeking, protest movements, and foreign investment and profiteering controversies, turbulence at any single or small number of cases or levels begets turbulence across scales and sometimes across issue areas. Few things illustrated the complex interconnections of the resource nexus better than oil and minerals (Andews-Speed 2015; Bleischwitz, et.al. 2018). This type of multi-scalar (or cross-scale) turbulence looks increasingly likely for minerals markets and governance (Balag’kutu, et.al. 2018).

Many crucial minerals are geographically concentrated in some resource-rich countries. For instance, Chile takes more than 20 percent of the global copper and lithium production while the DRC accounts for nearly two thirds of the global cobalt supply (IEA 2021). A growing concern is that, in many cases, those countries’ revenue heavily relies on mineral extraction, and it often worsens pre-existing corruption, civil conflicts, and other social and environmental issues. A widely cited example is the extraction of cobalt - an essential element in the lithium-ion batteries - in the Democratic Republic of the Congo (DRC), a country that has been suffering over decades from civil wars and conflicts. The cobalt mining in the DRC have been known for issues of child labor, horrific working conditions, and environmental damage, especially in artisanal and small-scale mining (Amnesty International, 2016; Banza Lubaba Nkulu et al. 2018; Sovacool, 2021). However, transnational governance imposed by downstream actors in the supply chain have so far made little contribution to addressing these issues. More often, governance tools used by downstream buyers and importing countries, such as due diligence measures, tend to become a tick box exercise for companies to make sustainability claims of their cobalt, instead of benefiting the local population by improving incomes and labor conditions for miners and communities (Sovacool et al. 2020; Umpula et al. 2021). Meanwhile, simply excluding illegal mines or mines associated with child labour and conflicts from the supply chain can lead large mining companies to dispossess informal miners from resources to which they believe they are entitled, and ultimately exacerbate living conditions of poor people relying on artisanal mining (Musiyarira et al. 2021; Prause 2020).

More fundamentally, social and environmental impacts of cobalt mining in the DRC have been shaped by the uneven distribution of wealth and power in the supply chain as economic gains are controlled by multinational corporations and local elites, without being trickle down to the people and communities affected by mining (Katz-Lavigne, 2020). Redistribution of wealth is especially challenging in states like the DRC, which suffer from weak and fragmented institutions. Such domestic contexts are not only conducive to corruption, but also generate conflicts within countries due to distributional effects of mineral extraction. For instance, artisanal miners and local

communities have organised several protests - even violent ones - against local authorities and foreign companies (Prause 2020). Such conflicts could bring further turbulence at the local and nation levels, which would prevent the country's development. As a result, without engaging with local stakeholders and supporting vulnerable people, transnational governance in global supply chains led by downstream actors in powerful countries may only bring more harm than benefits to resource-rich developing countries.

More critically, recent escalating geopolitical tensions between major powers discussed in the previous section are likely to overlook long-standing political turbulence at the local and national level in developing countries with abundant mineral resources. The dominant state-based securitization frame of energy transition and the global mineral resource supply chain emphasizes primarily the need for national protectionism (Bordoff and O'Sullivan 2022), and therefore, miss other significant dimensions of security, including both human and environmental security. As negative social and environmental impacts of mineral extraction are often caused by political dynamics embedded in unequal power relationships between transnational and national elites on one hand and local communities and workers on the other, the rise of the securitization frame in the Global North risks reinforcing existing inequality in producing countries. For that reason, there is an increasing need for inclusive, multi-stakeholder governance mechanisms to cope with those issues by directly addressing turbulence from the below.

Extractives and Governance: Turbulence Ahead

The extractives and minerals sector is home to multiple types/forms of turbulence, relating to both statist and human security concerns, driven by the decarbonization imperative and what we are calling normative turbulence, ecological turbulence, geopolitical turbulence and multi-scalar turbulence. Meanwhile, firms and states seek secure access to supply to mineral resources while environmental and human rights activists and local communities articulate and act on other values and policy priorities. What does this mean for governance?

More cooperation among great powers to build governance initiatives that are inclusive, effective attentive to multiple global goals including climate change and the SDGs. Doing so requires avoiding a new cold-war-like mindset that prioritizes inter-state competition and securitization of critical raw materials above other goals and more cooperative approaches. At least in the short-term, the Russian war in Ukraine seems to have made this more challenging. Recent proposals and initiatives include better global data gathering and information, more authoritative transnational standards for mining, processing and mineral recapture and use—and a host of other multilateral initiatives. But all such initiatives are contentious, in part because they require actors unaccustomed or opposed to such cooperation to change their preferences and behaviors.

But of course there are many governance gaps related to climate and environmental issues in the minerals sector. Even though consumers' and investors' call for mitigating negative environmental consequences of mineral extraction has grown, effective governance institution that can to enforce powerful industry or government actors are completing lacking. Besides, increasing climate risks such as water shortage in mining sites can hinder sustainable production of copper and lithium concentrated in areas exposed to a high-risk level of water stress (IEA 2021). Climate and other environmental issues remain mostly marginalized in extractives governance. The forecast remains turbulent for minerals markets, politics and governance at local, national, regional and global scales.

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