Annex to *'Green mining' is a myth: the case for cutting EU resource consumption*

Research relying on quantitative (numerical) data largely depends on incomplete data, employing various data 'assumptions', and reducing complex social issues into models. Official 'global data' sets used by international organisations express human-centric and economic growth-oriented framings, which primarily serve business and national security agendas. There are distinct ideological biases and objectives embedded and normalized into the research that is to guide public policy. For example, 'social risk' or 'good governance' scores,[1] do not reveal the socio-cultural impacts of mining and infrastructural development in local areas. Governance indicators—notably environmental, social, and corporate governance (ESG)—are rather concerned with mining project viability, and hence investment risks.

Economic calculations based on quantitative data, therefore, miss crucial on the ground realities such as the extent of social and ecological degradation and damage from extractive, mining, mineral processing, manufacturing and other developmental activities. Frequently, researchers and policymakers uncritically accept what constitutes data, how it is collected and later operationalised by plugging data points into different models. Furthermore, news articles, reports, other media outlets, and indeed civil society organisations ourselves, often portray these estimates based on numerical data as 'facts', meanwhile missing or unable to communicate the human and ecological aspects hidden behind those 'data signifiers' and numerical values.

Reporting accuracy is distorted further by excluding local knowledges, such as the different experiences of people and their localised understandings of the world (e.g. epistemologies and ontologies[2]) that are not represented by modeling studies.[3] Therefore, *'Green mining' is a myth: the case for cutting EU resource consumption* report includes case studies to gesture to these epistemological issues. This annex hopes to increase awareness of the socio-ecological shortcomings, underestimations and (the epistemological and practical) gaps within the official reports used and, consequently, the '*Green mining*' report itself, to understand and frame the 'green energy transition'.

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[1] Lèbre et al. (2020) The social and environmental complexities of extracting energy transition metals.

[2] Ontology: the study of being or what can be said to exist. Ontology designates how people make sense of existence, perceive and relate to their surroundings. A given ontology will naturally shape and underlines culture, language, epistemology and, consequently, the activity of people. The ontology of a people or a culture will dictate how people relate to human and nonhuman natures; Epistemology: Is the branch of philosophy that investigates the origin, nature, methods, and limits of human knowledge. Epistemology seeks to understand how knowledge is constituted, how different systems of knowledge production is formed, verified and justified.

[3] Silvast et al. (2020) What do energy modellers know? An ethnography of epistemic values and knowledge models.

Realities to Keep in Mind

The numerous, and cumulative,[4] impacts that mining has on people and ecosystems remain largely under acknowledged and accounted for. It is important to recognise how slow violence manifests itself in the bodies of people ingesting contaminated water, air, and food originating from mining processes, which spread heavy metals and toxic substances within ecosystems. Moreover, it is important to consider not only the ecological, but also the psychosocial challenges people confront and incur from landscape changes caused by extractive activities.

The neglected social features include how livelihoods and cultural practices change when mining investments, skilled and unskilled workers enter rural areas. The data referenced in the '*Green mining*' report does not express the psychosocial impact of how local economies drastically change or how police, military and extra-legal forces invade areas to beat, tear gas, and, potentially, kill inhabitants resisting mining.[5] Nor the societal split or divisions that are generated within communities over the known and unknown costs and uncertain benefits of mining operations, which mining companies exploit as divide and conquer tactics to gain social license to operate.[6] Acknowledging this reminds readers that behind every statistical number there are complicated social and ecological impacts, which blend with histories, cultures, local politics, and developmental desires (or non-desire). The case studies in this report have tried to offer a small contribution to acknowledge these complexities.

Missing Data Makes Conservative Estimates

The reductive nature of quantitative approaches reinforce the prevailing political and economic bias. Take, for example, the data comprising the predictions for the increase in use of critical raw materials for certain products is "based on key market research reports and publicly available information."[7] This represents a significant limitation, which relates to studies based somewhat on private databases.[8] In some studies using private databases (none which are used in the 'Green Mining' report), one modeling researcher told us, they can only "*characterize mining environments*." This characterization extracts from environments the main attributes and features necessary to establish governance, "resource" control and mapping of a given region. For example, S&P Market Intelligence databases (and others) --a central database for extractive research--do not provide coverage for rare earth elements (REE),[9] which presumably relates to China's dominance of the raw material sector in general.[10] The EU is dependent on 98% of its REE from China,[11] and the socio-ecological cost of REE mining and production is catastrophic, if not ecocidal,[12] which remains officially under acknowledged in reports.

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[4] Willow A. (2017) Cultural cumulative effects: Communicating energy extraction's true costs.

[5] Witness G. (2020) *Defending tomorrow: The climate crisis and threats against land and environmental defenders*; Dunlap A. (2020) Wind, coal, and copper: the politics of land grabbing, counterinsurgency, and the social engineering of extraction.

[6] Ibid.

[7] EC (2020). *Critical Raw Materials for Strategic Technologies and Sectors in the EU: A Foresight Study*.

[8] S&P Market Intelligence Database.

[9] Lèbre et al. (2020) The social and environmental complexities of extracting energy transition metals.

[10] EC (2020). *Critical Raw Materials for Strategic Technologies and Sectors in the EU: A Foresight Study*.

[11] EC (2020). Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability.

[12] Klinger JM. (2017) Rare earth frontiers: From terrestrial subsoils to lunar landscapes.

Incomplete data and damaging impacts collide with civilian and military technologies. Material requirements for lasers, semi-conductors, and satellites are unaccounted for due to "limited information."[13] On the domestic side, the European Commission (EC) *Foresight* report still does "not consider e-bikes" within the category of e-mobility.[14] This implicitly entails the recent spread of e-scooters and other digitalisation devices, which remain under accounted for yet require minerals from "[a]lmost the entire periodic system of elements."[15] The intensity and spread of e-bikes, scooters and other digitalisation technologies are unaccounted or retain significant knowledge gaps within EC studies, which, tragically, under the European Green Deal are positioned as technologies central to creating ecological sustainability.

This type of accounting continues across studies, which has particular relevance to the rolling out of wind energy, solar power and electrification infrastructures. World Bank[16] and EC[17] reporting, as briefly mentioned in Chapter 1, do not include secondary energy infrastructure: high-tension towers, transmission lines and transformer substations. Given the ambitious imperative for grid reinforcement and a "fully integrated, interconnected and digitalised" European energy market promoted under the European Green Deal,[18] which includes submarine cables between France and Ireland,[19] existing reports significantly underestimate the extractive cost for the "green transition". Secondary infrastructural development is a significant issue, encompassing serious socio-ecological impacts.[20]

This unaccounting in the referenced reports continues with declining ore grade fluctuations, relative prices of commodities, changing mining and production techniques and new technologies. Dominant accounting procedures and reporting promote "green growth" and the expansion of extractive industries. The technological optimism in EC reports, acknowledging "technological optimisation,"[21] yet still ignores the severity of materials needed. This includes the potential of various "rebound effects" and how technological shifts (and corresponding mineral substitution) will only create *different* mineral demands.[22] The extractive and ecological costs are increasing and underrepresented, meanwhile there is a continuous failure on part of policy makers to reconceptualise economic growth imperatives to establish ecologically sound futures for the EU while decreasing socio-ecological pressures in the Global South and in Europe.

Summary

[13] EC (2020). Critical Raw Materials for Strategic Technologies and Sectors in the EU: A Foresight Study.

[14] Ibid. p. 35.

[15] Ibid. p. 12.

[16] Hund et al. (2020) Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition.

[17] EC-JRC (2020). Raw materials demand for wind and solar PV technologies in the transition towards a decarbonised energy system.

[18] EC (2019). The European Green Deal.

[19] RTE (2021). Celtic Interconnector: interconnection project between France and Ireland.

[20] Dunlap A. (2020) Bureaucratic Land Grabbing for Infrastructural Colonization: Renewable Energy, L'Amassada and Resistance in Southern France.; Neukirch M. (2020) Grinding the grid: Contextualizing protest networks against energy transmission projects in Southern Germany.

[21] EC-JRC (2020). Raw materials demand for wind and solar PV technologies in the transition towards a decarbonised energy system.

[22] Hund et al. (2020) Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition.

There are significant methodological challenges and unknowns. This indicates that the extractive costs of metal and mineral use in wind energy, solar power, electrification infrastructures and electric vehicles are significant, and an underestimated concern. The abstraction of modeling, data and data collection or non-accounting of energy and material intensive factors are embedded features in need of redress and greater explanation. Moreover, this combines with the lack of visibility around mineral supply webs for infrastructure that prove to be a central challenge to understanding the social and ecological costs of the European "green transition".